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

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT:

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CALIFORNIA DEPARTMENT OF PUBLIC HEALTH:

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

Nerissa Wu, PhD, MPH, Chief, Exposure Assessment Section, Environmental Health Investigations Branch

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June-Soo Park, PhD, Chief, Environmental Chemistry and Biomonitoring Branch, Environmental Chemistry Laboratory

INDEX

PROCEEDINGS

DR. EDWARDS: So welcome, everyone. This is great to see all of you in person -- just about all of you in person. I think this is the first time that I've been presiding over this meeting since I started here two years ago. So, yeah, I'm the Chief Deputy Director. I think Vince has been doing this, but Vince did retire two weeks ago. So I just wanted to let everyone know that. And so I guess till we have a new person for Vince, we'll be -- I'll be presiding over these meetings as well.

So with that, I guess I'll get into introductions and I'll start with Carl who is remotely attending.

PANEL MEMBER CRANOR: I'm Carl Cranor, distinguished professor of philosophy and a member of the Environmental Toxicology Program. Very sorry to miss this meeting. It sounded like a lot of fun. I'll observe as best I can. I was diagnosed with COVID yesterday.

DR. EDWARDS: Oh. Laura.

PANEL MEMBER CUSHING: Hi. I'm Laura Cushing, assistant professor in the Department of Environmental Health Sciences at UCLA.

DR. EDWARDS: Tom.

PANEL MEMBER McKONE: I'm Tom McKone, professor emeritus at the School of Public Health, University of California, Berkeley, and also a retired affiliate at

Lawrence Berkeley National Laboratory.

DR. EDWARDS: Ulrike.

PANEL MEMBER LUDERER: Hello. My name is Ulrike Luderer. I'm a professor in the Department of Environmental and Occupational Health at UC Irvine.

DR. EDWARDS: Jenny.

PANEL MEMBER QUINTANA: Hi. My name is Penelope, nicknamed Jenny, Quintana, and I'm a professor of environmental health in the School of Public Health at San Diego State University.

CHAIRPERSON SCHWARZMAN: I'm Meg Schwarzman and I'm a researcher and lecturer in the Environmental Health Sciences Division at the School of Public Health, UC Berkeley.

DR. EDWARDS: Oliver.

PANEL MEMBER FIEHN: Oliver Fiehn -- is that on? Now, it's on.

Oliver Fiehn, professor of molecular and cellular biology and Genome Center of University of California, at Davis.

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

DR. EDWARDS: All right. Great. It looks like we have a quorum. So with that, I will turn it over to

Meg to run the meeting.

CHAIRPERSON SCHWARZMAN: I'm going to pass back to Dave for just a minute.

DR. EDWARDS: All right. Great. So the Panel last met on March 7th, 2023. The meeting did include updates on the Biomonitoring California Program activities, including the community biomonitoring studies. We also heard from a guest speaker Matt MacLeod, a professor of environmental chemistry at Stockholm University. And he presented on the application of a population based pharmacokinetic model for interpretation of PFAS data from the California Regional Exposure Study. The Panel, staff presenters, and audience members delved into planning for future program activities. The Panel also provided feedback on current activities.

Key discussion topics included:

The challenges and opportunities of assessing exposures to PFASs, including highly exposed subpopulations and the use of California Water Board data to identify potential hot spots of exposure in California; the use of expanded PFAS methods to analyze samples from the California Regional Exposure (CARE) Study, and the Studying Trends in Exposures in Prenatal (STEPS) Study; and then complexities in messaging potential arsenic exposures due to rice consumption; and interpretation and

future analysis of the data for urinary naphthalene in the Stockton Air Pollution Exposure Project, or SAPEP.

A summary of the March meeting and transcript are posted on the March 23 SGP meeting page on the Program's website at biomonitoring.ca.gov.

All right. And then one other item the -- also that Eunha Hoh resigned in July from -- as being a Panel member to give more attention to her other commitments. She was appointed by the Speaker of the Assembly in 2018, and has been an outstanding member of the Panel for the past five years. We want to thank her for her service to the people of California and wish her the very best in her future endeavors.

All right, I think back to Meg. Sorry about that.

CHAIRPERSON SCHWARZMAN: Thank you, Dave and good morning. Since I have a bit to say, I'm just -- is that good for closeness of the microphone?

Okay. For -- to just begin for transparency sake, I wanted to share that in September, I was contacted by Veena Singla of the Natural Resources Defense Council and we discussed PFAS definition in general, but not the work of this committee, and I suggested that they contact Biomonitoring California staff for more information.

So as a reminder for Panel members, please comply

as usual 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 morning's meeting, we will start with an update from the Program on recent activities, including the Program's extended method for detecting perfluoroalkyl and perfluoroalkyl substances, in serum and plasma.

The remainder of the meeting will focus on the SGP's consideration of the expansion of the PFAS designated chemical group and that will include an overview of the potential expansion of the designated chemical group document by OEHHA. It will include a public comment period and discussion by Panel members. There will be time for questions from the Panel and the audience after each presentation.

So instructions for how we'll do this remote -- I mean, split hybrid meeting. If SGP members wish to speak or ask a question, just raise your hand and I will call on you. If online webinar attendees have questions or comments during the presentation -- sorry, the question periods after each talk, then you can submit them via the Q&A feature of the Zoom webinar or by email to

biomonitoring@oehha.ca.gov. We won't be using the Zoom chat function during the meeting. Please keep your comments brief and focused on the items under discussion. This is for the webinar attendees. And relevant comments will be read aloud and paraphrased when necessary.

If online attendees wish to speak during the public comment periods and discussion sessions as opposed to submitting written comment, please use the raise hand feature in Zoom and Stephanie Jarmul will call on you at the appropriate time.

If you're attending in person and you wish to comment during the public comment periods and the discussion sessions, please come to the front here. We'll return a microphone to this stand or raise your hand and I'll call on you at the appropriate moment.

And for the benefit of the transcriber, a reminder to please clearly identify yourself if you're commenting from the public or the audience before providing a comment and also write your name and affiliation on the sign-in sheet that's in the room at the back of the room, I think.

Okay. So we will start by hearing from two speakers from the program. I will hold off on asking for clarifying questions from the Panel and audience until we've heard both presentations. So our first presenter is

Nerissa Wu, Chief of the Exposure Assessment Section in the Environmental Health Investigations Branch (EHIB) of the California Department of Public Health and the overall lead for Biomonitoring California. She'll provide an update on current program activities

(Thereupon a slide presentation).

DR. WU: Good morning, everybody. Is there a way to -- it's good to see everyone in person.

Welcome to those of you who are joining us online. Today's update was actually initially designed for our August meeting, which then had to be delayed because of the hurricane, but we've edited it to incorporate some of the more recent activities.

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DR. WU: So there is a lot to go over, so I'll spend a little bit of time on some administrative updates before covering project updates and laboratory and communications activities.

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DR. WU: We've had a lot of staff change. We've had a few people leave the program: Cheryl Holzmeyer, who used to run this meeting; Sabrina Smith, who's been such an instrumental part of the Environmental Chemistry Lab; and Andrew Tan, who helped manage samples over at the Environmental Health Laboratory. They have all left the

program, so we just wanted to wish them well and thank you for all their work. We also have a number of new staff that are indicated in blue here. We have McKenna Thompson -- Thomas -- sorry, Thompson. Sorry. We have Rebecca Belloso, who's helping run the meetings now and Meltem Musa, who you'll hear from later today. And we have one new staff person at DTSC, Ruihong Xiao. And three interns who have joined us Emily Beglarian, Emily Gokun, and Sarah Snyder all who have joined the Program in the last few months. So welcome to all of you and I'm looking forward to working with you.

And we also have two new staff who have taken on new roles. We have Susan Hurley, who you're very familiar with, formerly with OEHHA. She's now with CDPH. Thankfully still with Biomonitoring. And Stephanie Jarmul who you have just heard from, who is now the Chief of the Safer Alternatives Assessment and Biomonitoring Section. So congratulations, Stephanie. We're very, very fortunate to have her in that role.

We do still have open positions at Biomonitoring, so anyone interested in joining the team, please get in touch with us.

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DR. WU: The other programmatic update I have is that the 7th Legislative Report, which covers July 2019 to

June 2021 is now available. This is posted on our website. This is a bi-annual report that we're required to put together that reports out on activities and data that's been generated during that two-year reporting window. And we're at work on the 8th legislative report.

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DR. WU: So let me turn to some project updates. And as I go through this, you'll note that we have a lot of external collaborations in the works now. And I'm pointing this out, because I think it was a year ago talking about how to make the Program as impactful as possible. One of the recommendations was for us to reach out and form more partnerships. And I think we've done a lot of that this last year. And it's been a very effective approach.

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DR. WU: So I'm starting off with the California Regional Exposure, or CARE, Study. This is our surveillance work that was conducted in Southern and Southeastern California with samples collected from 2018 to 2020. And we're currently using that data to better understand sources of PFAS exposure. So Toki Fillman from our staff has been focused on this association between drinking water levels and the serum levels in those CARE participants working to identify a single drinking water

source for each of those participants, which is complicated, because there's a lot of mixing. There's a lot of switching off of wells. And that might vary by time or by season. So Toki has been working with the Water Board to validate water boundaries. And initially we had 42 percent of participants who were assigned to multiple sources, but with her effort, we've gotten all but four percent assigned to a single jurisdiction now.

The second part is to assign a PFAS level for each of those water systems. So Toki has been looking at data that has been submitted in response to Water Board orders in 2019 and 2022. And the team has been collecting data from consumer confidence reports.

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DR. WU: So at this point, we have 75 water systems that have both a CARE participant living in it and PFAS testing data from the Water Board's investigative orders and 62 percent of those water systems have at least one PFAS detection. So the next step will be to look at the associations between drinking water data and the CARE serum results.

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DR. WU: While this has all been going on, Toki has also been working with the Water Board to think about how the new Water Board order is coming up and the

upcoming EPA maximum contaminant levels will impact water quality as well as availability of data. She's also met with the CalEnviroScreen staff to talk about how we'd like to incorporate the PFAS data into their mapping tool. And Toki and Kathleen have been working with Boston University School of Public Health, Emily Pennoyer, Tom Webster, and Wendy Heiger-Bernays, to look at the relationship between dietary factors, drinking water, and the PFAS levels in our participants.

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DR. WU: Moving on to ACE. This is the Asian Pacific/Islander Community Exposures Project. This is the study that focused on Chinese and Vietnamese communities in San Francisco and San Jose. Samples were collected in 2016 and 2017. And we biomonitored folks for metals and PFASs. We've returned those results. We've reported on summaries of those results in this forum. We're now getting back to some of the exposure work.

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DR. WU: We have also compared the ACE findings to the risk-based categories that were proposed by the National Academies of Sciences, Engineering, and Medicine in the 2022 guidance on PFAS exposure testing and clinical follow up. And as shown, we have a disproportionate proportion of percentage of ACE participants that fall

into this category of increased risk of adverse health effects. That's compared with a more general population of the CARE study. You can see that many more of the ACE participants are falling into that higher risk category. So clearly a concern and a priority for us to identify exposure sources for PFAS in this population.

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DR. WU: So Kelly Chen, also from our staff, is currently working with our exposure data to better understand the dietary sources of PFAS exposure. She's been focused on fish consumption habits. We do have very detailed dietary information, which we collected in our exposure questionnaire. The questionnaire was not solely PFAS. There were also questions related to metals, but there were a number of questions related to fish consumption that Kelly is delving into.

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DR. WU: So ACE participants reported eating much more fish more frequently than NHANES participants. They reported a total of 47 different fish species that they purchased, 14 species that they might be catching themselves or their friends and family catching, as well as 10 shell fish species that were consumed. We did incorporate a question about what part of the fish you eat for the ACE 2, the second part of this study. And 84

percent of the participants reported eating non-fillet parts of the fish.

We don't have a lot of data on PFAS levels in non-fillet parts of fish, but estimates in the literature suggest that the non-fillet parts may be two to ten times higher in PFAS than fillet. So these variation in how much fish you're eating and what parts of the fish you're eating are really important, because the advisories are often based on and provide guidance in terms of fillet.

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DR. WU: So the next steps that Kelly is working on are to identify potential associations with the PFAS serum levels, based on how participants answered questions about fish consumption. So, for example, are there differences in PFAS levels between the participants who ate self-caught fish versus purchased fish? Are there differences in PFAS levels based on what part of the fish you're eating, whether it's the fillet or the non-fillet parts like the head, eyes, and skin? And are there differences based on the habitat of the fish. Fish are -- okay. Fish levels are related to where they spend their time. And so categorizing fish by fresh water, marine, or migratory environments is a reasonable approach.

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DR. WU: Kelly has also been looking at the fish

consumption advisories. Sixteen states already have a PFAS related advisory, generally focused on PFOS. And there are many states, including California, that are monitoring PFASs and considering guidance. So Kelly has been connected with -- connecting with many different groups, OEHHA's Fish, Ecotoxicology, and Water Section, the Water Board's Surface Water Ambient Monitoring Program, U.S. EPA, San Francisco Estuary Institute, and other researchers who are concerned with this question of safer fish consumption. We're sharing the data that we've collected in ACE and hope that the data collected will result in better understanding of how fish is playing a role in PFAS exposure. We're also hoping that we can feed information back to the communities not just the ACE population, but all communities that rely heavily on fish for nutrition and eat different parts of the fish. So really good work from Toki and Kelly on these projects. They are both getting presented at the National Biomonitoring Conference in January.

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DR. WU: For our most recent surveillance effort, we're working on the Studying Trends in Exposures in Prenatal Samples, that's STEPS. And we've been working on this to estimate population estimates of PFAS exposure and also time trends among pregnant Californians. So in

designing the study we've put a lot of effort into thinking what are the time points we want to capture and what counties. And since our last update, we have selected Orange County and Fresno County as the two places of focus.

Orange County, we've had evidence of elevated PFAS levels in drinking water from sampling that was collected in 2013 to 2015. Since that time, there have been wells taken offline, there have been some filtration put into place. So it's an opportunity for us to measure the impact that interventions in water quality will have on serum levels.

In Fresno, we have relatively little information, both biological and in drinking water, so this data will be a contribution to understanding the PFAS levels in Fresno. The eligibility criteria are nulliparous individuals and healthy singleton pregnancies. So among the available samples we have, we're conducting some random sampling.

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DR. WU: We actually have -- we had a goal of obtaining 500 samples per county evenly spread across those time points 2015, 2018, and 2021. We oversampled, because you never know that's going to happen with your sampling and we have a little bit over 500 samples per

county. The samples are in our freezers. We were able to obtain those in June and DTSC is going to start conducting the PFAS analysis using the expanded panel that you'll hear about in just a few minutes.

We're still working to establish a prospective sampling from a non-biobank county, if that's still a possibility. And we're working on evaluating some collaborations to really magnify and maximize the impact, what we can learn from STEPS. So we're looking at some additional chemicals and biomarkers that we might be able to measure. We're thinking about potential PFAS exposure sources that we could identify, like drinking water, and also how can we evaluate associations with health outcomes.

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DR. WU: On the lab side of the Program, Environmental Health Lab has been adding to our available methods. We now have a urinary nickel method, VOC metabolites and an updated PAH method. We're going through some final steps of validation. And all three of those new methods will be available to our studies in the coming year.

We currently do run VOC metabolites through a private lab, but we're really hoping to bring this work in line shortly, and work is also continuing on the mercury

speciation method. So the lab is currently receiving and aliquoting samples from BiomSPHERE and FRESSCA Mujeres. And work has also started on the CARE-LA samples. If you remember, we did a subset of those participants. We biomonitored them for phenols and speciated arsenic. But we'd really like to be able to generate population estimates for both of those panels. So EHL is completing analyses on all CARE-LA participants at this point.

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DR. WU: In the Environmental Chemistry Lab, they have completed the Intra-Program Pilot study, analysis of PFAS in serum and plasma, which Songmei is going to talk about shortly. They do have the thousand plus samples for the STEPS study they're about to embark on and they are continuing to work to extend the panels that our Program can measure. So they're working on a PAH method in serum as well as siloxanes in serum. And there's some initial stage of development for a total fluorine method first for use in products and environmental media, but eventually we hope to have this available for biomonitoring.

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DR. WU: And getting the word out on all of our projects is the outreach and communications group and they've been focused on producing fact sheets and other material for different audiences. The two fact sheets

shown here are nearing completion. One is focused on arsenic in rice, which I think we talked a little bit about last time. It's currently in a testing phase working with key informant interviews and focus groups to ensure that the language is accessible and understandable. And the other is focused on our study of how flame retardant levels change with foam replacement in your home. And that's also in development. It will be a companion piece for a scientific publication on the FREES Study.

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DR. WU: The CARE Study report, which has detailed -- details study methods as well as our results has just been approved for distribution. This is the first time our program has put together such a comprehensive report like this on a study, it will undergo remediation and some translation. And then we'll be releasing the report and also holding a public meeting to present the results in early 2024. We do already have a two-page graphic summary of findings both in English and Spanish, and that's already posted on our website.

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DR. WU: The outreach group also tracks legislation that might impact or be impacted by our work. AB 496 Cosmetic Safety legislation has just been signed

into law. And it's going to prohibit the distribution of personal care products that contain certain ingredients. There are 12 ingredients that are on the list for 2025 and an additional 26 ingredients that will be banned starting in 2027. So some of the ingredients mercury, parabens, phthalates and some PFASs, which are on the list, are things that we have historically measured. We don't currently have surveillance projects that measure any of these chemicals with the exception of PFASs, but we're always looking for opportunities to monitor changes in exposure in the population as legislation is enacted.

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DR. WU: And finally, the outreach group has been completing a series of interviews, soliciting feedback on the impact of our program. How's their data being used? Are the fact sheets, or questionnaires, or other materials we put together, are they being accessed and used? And are there things that the Program should be taking a look at?

We've just completed 15 years as a program, Biomonitoring California. So in part of observing this mark in time, we did want to get feedback from collaborators, advocates, and other partners on their thoughts about the Program. So some of the findings from these interviews will be included in the 8th Legislative

Report, which is what we're working on now. Results may be presented in this forum or as part of a 15-year celebration for the Program.

But ultimately, I think the results will also trigger discussion, both within the program and with our partners, about how we move forward for the next 15 years.

And with that, I will turn it back to McKenna.

The microphone is -- Songmei just pay attention, the microphone is kind of sliding around. Make sure you can speak into it.

(Thereupon a slide presentation).

CHAIRPERSON SCHWARZMAN: I want to take a moment to introduce our next speaker. I think we have questions after these two presentations. We're going to hold them for just a minute.

Okay. Songmei Gao is a Research Scientist III at the Environmental Chemistry Laboratory at the Department of Toxic Substances Control focusing on PFAS analysis in biomatrices. She will give an update on the methods for analyzing an extended number of PFAS in human serum and plasma.

DR. GAO: Okay. Good morning, everyone. I am Songmei from ECL Lab of DTSC. I'm so glad to have the opportunity to introduce our work about the extended list of PFAS analysis.

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DR. GAO: So here is the outline of my presentation. So after I introduce the background of method development and how we developed the method, I will discuss its application to IPP7 study. So it's kind of the last step of method validation. So we also have a recommendation for a future study based on the IPP7 data.

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DR. GAO: So PFAS are a large group of chemicals. I list some PFAS on the right side. We can see, although all they have at least one carbon-fluorine bond, their structure can be very different. So there are thousands of PFAS in the world. Previous biomonitoring methods are available only for a few of them, typically, just the most persistent legacy compounds, such as PFOA, PFOS. So driven by the regulation, longer chain PFAS were phased out, so more emerging compounds are used such as the short chain PFAS, and the -- some telomers and ether acids, et cetera. So Gen-X, ADONA and F53B are the key emerging replacements, but -- because of the analytical method

So there's not enough knowledge about those human exposure to this replacement. So beside that, our previous method applied only to serum sample analysis. So right now, there are more demands for plasma sample analysis, because the clients only have the plasma sample

in their biobank. So therefore, the objective of our study is to establish a sensitivity method. We can include more replacements of PFASs and can be used for human serum and plasma sample analysis.

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DR. GAO: Here's the history of the method of development for PFAS in ECL Lab. So in 2009 ECL Lab established the first method to detect 12 legacy compounds. At that time, we called perfluorinated compound, PFC method. So later on our lab developed another method in 2016. So this method was expanded to 32 compounds, including some telomer assays. Last year, we developed the current method using the new generation instruments, 6500 system. So beyond the 5500 method, we add another 19 more emerging PFAS to investigate, so they included the short chain PFAS and the Gen-X, ADONA, F53B. The total we investigate 51 compounds.

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DR. GAO: Here's the challenge in the method of development. As we introduced it before, PFAS have diversified structure, so their physical and chemical properties are very different. So it's very difficult to analyze all the compounds in one condition. Even in -- for the PFAS with same functional group, short chain and longer chain show different retention in the SPE cartridge

and the analytical column. So we screened three different SPE extraction sorbents, DVB, C8, and the phenyl cartridge. So C8 works best.

In regarding to the PFAS with different functional groups, the difference among them more obvious. So they have the different optimize the mass spectrometry conditions and source temperatures. So for each sample, we included a quantitation signal, qualification signal, and internal standard channels. So we total need to monitored 126 detection channels for each sample. So we have to compromise the experiment conditions to make all these channels work together.

So beside that for the mass spectrometry detection, the more signal into the method, the less sensitivity of it, so it's more challenge.

So second challenge is the matrix effect. A significant matrix effect was observed for some compounds. So that signal can be 10 times lower because of the matrix effect labeled internal standard can be helpful while compromise this matrix effect. We have only labeled internal standard 29. Sometimes, the labeled internal standard cannot work all the time. So we can do further cleaning by using the SPE extraction and the LC separation.

So another headache for method is the background

issue. So PFAS are "everywhere compounds". So we can generally detect the background peaks or some interferences peak. And we have to wash the system periodically and thoroughly. And also we need to screen the high quality solvents. We have to use the LCMS grade solvent.

So last the limitation is limited time and the resources including staff. So we have sample for -- timeline for sample analysis. So even we want to improve the method more, but we don't have time. So the method is not perfect, yet it is the best for us.

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DR. GAO: So here's the method. So the sample preparation is very simple. Just mix 100 microliter sample with the internal standard and the formic acid and then put them into the system for analysis. We use the C8 cartridge for extraction and for UHPLC separation. The analytical method drop the time from 30 to 12 minutes per sample comparing to previous method. So less solution used make this method more greener. So the calibration curve is prepared from 0.01 microgram per ml to 10 microgram per ml in bovine serum.

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DR. GAO: So the method was validated. We have in-house QC in bovine at three levels. And also, we have

in-house QC in human plasma at two levels. We also have NIST SRM 1958 as a QC. So generally the accuracy and the precision criteria were set as 30 percent. All compounds are -- generally can be within 20 percent. And the linearity R squared, so we set up like a larger than 0.95. Most of our compounds can be larger than 0.99. And also, we tested the stability of this compound. So after the sample stored in freezer at minus 20, most of the compounds are stable more than one year, but these two PAPs have trouble. So we need to do further investigation.

So in addition to the -- this QC evaluation, they also attended the international performance test. So they include nine PFAS compounds. So we attended last year and this year, our score were within one. So we specify our results.

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DR. GAO: So here is the IPP7 data. So IPP7 we collect the 36 paired human serum and plasma samples. The purpose of this study is to get information on human exposure to the replacement to PFAS. And also we want to get some information about the relationship of PFAS concentration in plasma and serum. So at this time, we still monitor 51 compounds, but we successfully report 42 compounds. So among these 42 compounds, 20 compounds were

detected and 13 compounds detection frequency are more than 30 percent.

So overall, the serum sample and plasma sample have similar detection frequency. So in the figure, I list the legacy compounds on the left side. We'll see. They still have high detection frequency. For the Gen-X and ADONA, we didn't detect any signal. F53B we detected around 40 percent detection frequency.

We also see the little box, the four new PFAS is PFPeS, PFHpS, and PFECHS, F53B major were detected for the first time by Biomonitoring California with a detection frequency of 39 percent to 100 percent. Here, these three compounds, PFHpA, 5:3 FTCA, 8:2 FtS they have lower MDL than previous study. Right now the MDL is 0.01 microgram per ml. And before -- they just lowered the MDL five times than before. So the detection frequency for these three compounds are also higher than previous ACE study.

So here's the compound. This is PFBS, a carbon 4 PFAS. They keep the same MDL. It is increasing in detection frequency. So this showing industry moving to the short chain PFAS.

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DR. GAO: Here the plot. We compared the median and the range of PFAS concentration in serum and plasma. So only the PFAS with detection frequency are larger than

30 percent are plotted. We can see legacy compound PFOA, PFHxS, and PFOS still have the highest concentration among those compounds. Although the four new reported PFAS have the high detection frequency, but their concentration are still pretty low. And also the plasma concentration range we can say is similar to the serum concentration range.

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DR. GAO: Here's the plot to show the example. There are serum and the plasma concentration relationship for these compounds. So the red line is a one to one line. PFAS -- PFOA and PFAS sample distribute just along the line, so their serum and plasma concentration matched pretty well. For the F53B sample, so a little bit away from the one line. So F53B plasma matrix a little bit higher than the serum. So generally, the plasma concentration matched with the serum concentration very well, but for some compound that we still observe some significant matrix effect.

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DR. GAO: Well, in this slide, we want to get a discussion, so released our recommendation for future study. Due to the limited resource, we must work efficient. So the IPP7 study provides some information to answer the tradeoff questions, yes; do we want to know information from more samples, or we want to monitor more

compounds? So although there are maybe no signal with observed right now. So now the recommended list based on the QC criteria, detection frequency, and the sensitivity of the signal and also the matrix effect. Although, some key replacement such as the Gen-X, ADONA, and some short chain PFAS, they are not detected now, but we still keep monitoring them. So this we recommended 32 compounds.

And also, we noticed that in 2016, the ACE Project have 32 compounds. This different. The blue hat PFAS in ACE we dropped, because they are -- we didn't detect any signal for them. By the way, add this red underline PFAS for future studies.

--o0o--

DR. GAO: Here is the bring home message: So our new method can be expanded to monitoring list from 12 legacy compounds to 42 PFAS include some important replacement PFAS. The method can be used with serum and plasma analysis. So this method also less solvent consuming, faster, and more sensitive for some compounds. So in the paired study, these 20 compounds were detected, among them 13 compounds with detection frequency more than 30 percent. So we also recommend 32 compounds for monitoring later and we promise we will keep optimize or improve this method.

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DR. GAO: So here's -- I want to show my thanks to the fine support from the Biomonitoring California and UCSF EaRTH Program. And also appreciate all the IPP7 participants and all the people help me and discuss with me and help me to present here.

Thank you.

(Applause).

CHAIRPERSON SCHWARZMAN: We have, excuse me, 10 minutes for clarifying questions from both the Panel and the audience. And then we have a discussion -- 30-minutes discussion section. So this is just for clarifying questions.

Tom.

PANEL MEMBER McKONE: So this really goes to the first presentation, Nerissa. And it's just a clarification. So in the CARE program, which is very water focused, and in the ACE program, which is again on a specific population, you were talking about the efforts in the ACE program to do questionnaires to really try to pull out a lot of information about the different exposure pathways or sources.

And I was just wondering in the CARE program, is there a questionnaire or some way to, you know, figure out do people use dental floss with PFAS? Are they -- are they sports players on synthetic turf? And, I mean, is

there some way -- so, I mean, I would give you a little more ability to see confounding kinds of exposures that wouldn't be linked to drinking water. I was just curious if there's some effort.

DR. WU: There is. So for the Regional Exposure Study, there was a questionnaire, but it was not as in-depth or as extensive as the ACE questionnaire. So it did touch on diet. And the Boston University collaborators, led by Emily Pennoyer, are looking at dietary factors in conjunction with drinking water and the PFAS levels. And we are looking at other exposure factors for some of the other things we measured in the CARE study. But we don't have the ability to do the same kind of in-depth analysis of fish consumption. There's only so many questions you can ask on a questionnaire and CARE wasn't -- you know, we went into ACE knowing that there's certain dietary factors that we were particularly interested in. And so that questionnaire was particularly focused on it.

So there are different questions we can interrogate from those different data sets, but CARE will be -- we will be using the exposure information for CARE.

PANEL MEMBER LUDERER: Thank you for all of presentations. So I think my -- let's see, I have a couple of questions. And I think this is for -- regarding

the measurement of PAHs that you mentioned in serum. And I was wondering whether you would be able to measure some of the PAHs that can't be biomonitored in urine, because they are excreted into the feces via the bile.

DR. WU: I think that's really a question for June-Soo. June-Soo, there's a question about PAHs in serum and the different PAHs that you might be able to pick up in that method.

DR. PARK: Yes. The -- so we don't want to overlay with the urinary PAH analysis, but we had expert joined our group from UCLA. So she measured air samples, 137 PAHs, most of the -- she was interested in the non-targeted PAHs in the blood. So basically, what we trying to do is to what else -- what else PAHs the people got exposed in the California population. So that's what our aim is, yep.

PANEL MEMBER LUDERER: Yeah. I was particularly curious about of some of the high molecular weight PAHs that you don't --

DR. PARK: Exactly. Exactly.

PANEL MEMBER LUDERER: Yes. Right. Okay.

DR. PARK: Exactly.

PANEL MEMBER LUDERER: Okay. Thank you.

And then there was another question related to the PFAS in fish and whether you have any information

about like the fat content of the fish and whether that affects the PFAS levels in the fish and the biomonitoring results?

DR. WU: Well, that's an interesting question. I don't know if Kelly Chen is probably online if she wants to raise her hand and say something about this. At this point, I don't think we have looked at fat content of the fish. Kelly, do you have something to add?

MS. CHEN: Hi there. This is Kelly. We haven't looked into that, but that's a great question. I know that PFAS doesn't bioaccumulate in fat tissue similar to other chemicals, but I can look more into that.

DR. ATTFIELD: But part of that questionnaire does ask about the frequency of different types of fish that they consume, so we are able to maybe segment out the different types of fish by different protein to fat ratios, so it's an interesting point.

Thank you.

CHAIRPERSON SCHWARZMAN: Other clarifying questions from the Panel.

Yes, Jenny.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana.

I had a couple clarifying questions I guess for Nerissa at first. One was that you talk about looking at eating non-fillet fish parts for the PFAS, but can you

just remind if you did that for mercury as well. Previously looked at mercury levels in blood related to the non-fillet fish parts, because I know there's some literature about that and I was curious. And I'm sorry if already reported that. I don't recall.

DR. WU: No. Actually, we have looked at -- I believe we have looked at fish consumption -- just frequency of fish consumption and mercury, and then just the comparison of people who had met a level of concern in the ACE population compared to the general population. But one of the things that our new staff is enabling us to do is to go back and look in more detail at some of these exposure issues. So that's a good point to get back to the mercury issue with fish parts.

PANEL MEMBER QUINTANA: Great. And then you mentioned the STEPS Study. And again, I apologize. I think you've probably presented this before, but can you just explain the selection criteria and rationale again?

DR. WU: The selection of the counties or --

PANEL MEMBER QUINTANA: Of the subjects. I think it was nulliparous and the healthy singleton.

DR. WU: Yes. So nulliparous in part because previous child birth or breast feeding will have a lot of -- will impact your PFAS levels. And so we stuck with nulliparous, so that -- there had been no other live birth

or breast feeding in the past, just to sort of make our population a little bit more uniform.

Singleton pregnancies, there's some concern that like blood volume might also impact your PFAS levels, so if you have multiple pregnancies -- a multiple pregnancy that might be another impact, and healthy pregnancies just again to try to make our population as uniform as possible, so we don't have other confounding -- other impacts on PFAS levels that we can't take into account.

PANEL MEMBER QUINTANA: So the instruction criteria is either nulliparous, or singleton, or are you trying to balance the two or --

DR. WU: So it has to be all three of those things, nulliparous --

PANEL MEMBER QUINTANA: I see.

DR. WU: -- and singleton pregnancy.

PANEL MEMBER QUINTANA: I see. So the first pregnancy. So all these people are --

DR. WU: Yes. Yes.

PANEL MEMBER QUINTANA: Okay. So you -- I mean you take them at a certain point in the pregnancies. Is it 14 weeks or 16 weeks, I forget?

DR. WU: It's anytime during the second trimester. So this is using the biobank samples that are collected by the Genetic Disease Screening Program.

PANEL MEMBER QUINTANA: Okay.

DR. WU: So their second trimester is between 14 weeks zero days and 20 weeks zero days I believe.

PANEL MEMBER QUINTAN: Okay.

DR. WU: So any time during that point a woman will come in for her second trimester screening and those are the -- those are the samples that are -- that are available to us to be biobanked.

PANEL MEMBER QUINTANA: And can you remind me, it's serum, correct, not plasma?

DR. WU: It's serum, that's right.

PANEL MEMBER QUINTANA: Okay. I thought about that for the last presentation.

I have more questions, but I'll wait for others first.

CHAIRPERSON SCHWARZMAN: I just want to check about online questions

MS. JARMUL: We have a question from Jianwen.

Jianwen, do you want to unmute yourself.

DR. SHE: Yes. Good morning, everyone. And I like to -- I have a comment with the Songmei's presentation. And congratulations ECL Laboratory, increase the capability and recover almost more than 40 analytes of PFAS in last few years.

My comment is I see that you mentioned your

method suffers matrix effect, which is a good finding. To improve it, we need to verify it's really from matrix effect or from the spike standard be lost. So I think your discovery is through the comparison of the response of the standard spike into solvent, and then how much standard recovery in your samples. And with this comparison alone, we cannot verify the matrix effect. So my question is did you do a post-sample preparation standard addition to verify this loss of the response is from either your C8 column lost the analytes or is it matrix effect?

DR. GAO: Thank you. So the question is is this online extraction method. So it's not offline SPE method.

DR. SHE: Yes.

DR. GAO: So it's not --

DR. SHE: You cannot do a -- you cannot do a post-sample preparation addition to verify, is that what you say?

DR. GAO: Yeah, it's different from normal SPE.

DR. SHE: I under -- sorry, I understand that part. I think the after online preparation if you move that Y out to do a post-sample preparation addition, you may -- can distinguish, which is your CHE lost or the matrix effect, because regardless the online or offline, the test procedure is the same.

We might talk after that unless someone like June-Soo wanted to add something --

DR. GAO: So see I think I have some data. I didn't calculate that. So the reagent still passed the online SPE procedure. So this -- I think this is the matrix effect.

DR. SHE: Okay. Thank you very much. Thank you.

Other questions?

Yeah, Oliver and then I'll come back to Jenny.

PANEL MEMBER FIEHN: Yes. I wanted to stay with the second presentation on the analytics. I've seen that you use 100 microliters plasma or serum and you inject 50 microliters later on of the re-suspended solvent, I guess, or your overall injection was 50 microliters after. I had wondered what happens to the plasma lipids. So when you use solid-phase extraction, you extract very lipophilic compounds. That includes PFAS, but it also includes triglycerides and all sorts of lipids that are very abundant in plasma. So I'm a little worried that you do not appear or -- I understand that you inject them together, the lipids and the PFAS together, instead of using a cartridge that are available on the market that specifically removes lipids. Such cartridges have been published in a EHSB. And I wonder if you have tried them or thought about these fatty acyl removal kits.

DR. GAO: No. So this method is still the online extraction. So we do the online SPE extraction. So it's cleaning a little bit. And also we can try to separate them from the LC separation. So I know sometimes they still have trouble, so that's why I reported some, you know, matrix effect, but we still can improve. Yeah. This one we use the online extraction, because there are less manual involved, probably less contamination, yeah.

CHAIRPERSON SCHWARZMAN: Jenny.

PANEL MEMBER QUINTANA: This question is for Nerissa again. I remembered the second half of my question about the STEPS Study.

DR. WU: Great. If I could just correct my prior answer. It's 15 weeks zero days to 20 weeks zero days is the second trimester for GDSP sampling.

PANEL MEMBER QUINTAN: Thank you.

DR. WU: Sorry. I misspoke earlier.

PANEL MEMBER QUINTANA: I guess my question was excluding subjects without -- with a -- your criteria is a healthy preg -- a healthy pregnancy and then the healthy baby, so you're determining that, is that right, or just the healthy pregnancy?

DR. WU: It -- well, healthy pregnancy as defined in the GDSP world, so it's a pregnancy without a screen positive for one of the --

PANEL MEMBER QUINTANA: I see.

DR. WU: -- one of the things they're screening for.

PANEL MEMBER QUINTANA: I see. Okay. I wasn't sure exactly what that meant. I want to make sure you weren't excluding certain populations.

And then just curious about age. It seems like this kind of -- these chemicals are going to be more and more age dependent as they enter the food change and bioaccumulate and stuff. And I'm just curious if you have a -- also an age range criteria, because if you don't, you might be biasing towards certain populations or what have you, so I was just curious about that.

DR. WU: Sure. Well, they're pregnant individuals, so there is some age bracketing --

PANEL MEMBER QUINTANA: Okay.

DR. WU: -- by that. And I think we did apply age bracketing. Dina, do you want to answer this question? But there were certain other criteria just for kind of bracketing our population a little bit and --

MS. DOBRACA: Dina Dobraca, California Department of Public Health employee and Biomonitoring California staff. So for STEPS just to explain healthy pregnancies, we do not have access to they're called registry cases. When they screen positive, those are staged for

individuals who are asking specific research questions to understand the etiology of a disease. So that's -- that's why that criteria is there.

And then the -- we use the California birth record for the year as our sampling frame for this study. And within the counties that we selected, we excluded pregnant individuals under the age of 15 and pregnant individuals over the age of 45. And in those counties, those are very few exclusions, but we did band the age range to that age range. We also exclude people who are missing age just to sort of get around data entry issues or missing data. So there's a little bit more eligibility criteria than was listed in the slide just to make sure we had complete data on the individuals who were selected.

CHAIRPERSON SCHWARZMAN: If we're done with clarifying questions, including from online, Stephanie -- yeah. Okay. Then we get to move into our discussion section. And this can be input from the Panel and also from audience or online attendees about the program updates that were just presented.

You want to start us off? Tom, go ahead.

PANEL MEMBER McKONE: Just this -- I thought it would be useful to start addressing the question about, you know, does -- the question with PFAS compounds with the ability to sample so many. The question came up about

so do we do more samples of more compounds? I mean, do all the compounds on fewer samples because you can't really do both. And I thought it's interesting to consider if it's possible to sort of -- and I think it's already happening, this sort of staging through the first set of samples, which is not a lot, but for every compound and then screen out the ones that really aren't showing up. And then when that set is developed, then do more people, right, and fewer PFAS compounds.

If you could exclude the ones that -- like are below 10 percent detection, it's probably not worth it to go out and do a large number of people for every compound and exclude those.

Again, I think this came up, but I actually think it's a good idea to try and do that staging. And it might be a useful cost-effective way to get a lot of information.

CHAIRPERSON SCHWARZMAN: I had a similar kind of thought and maybe we could turn it to Program staff actually as a question of like is that a reasonable response to the question? Like does that get at the resource constraint that you're talking about or do we really have to make a choice between number of samples and number of analytes? Like, I would choose range of analytes, but this hybrid approach sounds really useful to

me if it still accomplishes that streamlining function that you're asking about.

DR. WU: Well, I'll have Songmei and June-Soo get into the details of this, but that is essentially what we're doing with the STEPS. We're -- as Songmei described, there are many more compounds that they could identify, but the time to verify all the peaks of ones that are very, very low detection frequency, is very laborious. And so we're going with a list of 42. We are going to keep an eye on the ones that we are not reporting out for those to see if things are coming up. I mean, we do want to make sure that we're both tracking the time trends of the existing ones, but also looking forward to new things that might be coming up. So it is that balancing act, but that's been our -- that is our strategy going forward for STEPS. Songmei or June-Soo, do you want to --

DR. GAO: I say something. Because I think this -- just we have to monitor 126 channel or signal for sample, so if they look at the data based on lack of the study. So we take a long time for the data review. So sample analysis acquisitions very quick. Probably one thing we can finish that would take probably several weeks to look at the data and summarize that, yeah.

DR. PARK: This is June-Soo. I primarily also

add to what Songmei just explained. It's kind of picking the very -- the compound -- the PFAS compound very low level. It's not the EPA -- the 10 more of compound, it's not like you times two or something like that. It takes a three times, four times more, because you have to differentiate from your noise levels. So that's why the -- we have to come up with the first phase this much and second phase more. Yeah, that's why the Jianwen -- Dr. She ask the very valid also same as Dr. Fiehn, because we using the -- you know, pretty much neutral SPE cartridges. So that's not enough to get rid of all the -- polar compound like fatty acid, so they do come together, but that's what we got.

So Songmei already developed the method using the three more analytical columns. She used the two separate injection, one just -- she just presented it, but the other one is also called phenyl column. She can add six more, right? So but we have to come up with a -- you know, a practical way to, you know, work within resource and kind of outcomes. So that's what I'd like to stress out what Songmei said.

Also, the one more thing to add. I forgot important thing. Dr. Amber Kramer, our new biomonitoring scholar, she -- yes, she interested in particularly the more carcinogenic PAH high molecular one, also the

metabolites. Also, she's very interested in the markers of wildfire, which California has huge issue, yes.

Thank you.

CHAIRPERSON SCHWARZMAN: Just to wrap that point up, I guess I would just register that I fully support and I think it's what Tom is saying too that that emphasis on casting a wide net, because it's one of the great services sort of that biomonitoring serves is detecting compounds that we may not know are increasing in prevalence and use.

Oliver and then José.

PANEL MEMBER FIEHN: Yes. Sorry. Starting with that --

CHAIRPERSON SCHWARZMAN: José and then we'll come back.

PANEL MEMBER SUÁREZ: José Suárez. I have a question with regards to -- I have a question with regards to some of the newer PFASs that you can measure now that are in -- detectible in a good amount of participants, but at very low concentrations, which was a good amount of them, I think. So my question is how much do we know about some of these that you're measuring now, the prevalence of these in vacutainer tubes in cryovials as potential sources, which are not real sources of exposures?

DR. PARK: Yeah, sure. That's why we always try

to stick to the cryovial we tested in the past. Sometimes it's not always like that, you know, the -- without our involvement in the samples collected from, you know, the Biobank. That's why the -- in that case we try to also test cryovials they used. They should -- their low background levels coming out leaching out from the containers, yeah. That's what -- we do our best to minimize all the background interference. Yeah, thank you.

PANEL MEMBER FIEHN: So I have two related question. One is about the internal standards. If I understood correctly, you only have one internal standard. And that is, of course, not much to, you know, have analysis of very polar and very non-polar PFAS and PFOS. So the question is are there additional initiatives to -- you know, maybe with industry -- with chemical industry to look at more surrogate standards established.

Second, I would very much advocate that any analyses that are done would contain community standards like NIST SRM 1950 as another control to make sure that in the future we can rely -- relay back sort of we are missing standards now or we want to advant -- advance our methods, we would know what we have missed in the past. So that's on the analytical side.

On the data analysis side, I had wondered a

little bit, similar to the questions before, can we use the classic high abundant PFAS as a canary in coal mine to get the idea of total PFAS in a specific subject or is it so that the new PFAS you mentioned those that are coming from industry are unrelated, so you did not correlate it to the classic ones. So that's why we would need to really have as many as possible to detect those, because maybe sources might be different. So these are two different but related questions, I guess.

CHAIRPERSON SCHWARZMAN: Other --

DR. PARK: Yeah. Dr. Fiehn, thank you again.

There is, I think, some misunderstanding. To my understanding, we have many internal standards that possible. So this is -- Songmei's method, the new method we use that almost the equivalent to the isotope solution method, which is still golden standard in the analytical chemistry. So that's the first question.

The second question is kind of a lump sum all together. That's kind of very controversial all the time. That's why I think Nerissa -- Dr. Wu did you keep some, you know, verbiage in your slide -- yeah, yeah. So basically that -- the way we like to screen first -- you know, right now, we are -- we have combustion ion chromatography instrument can measure total fluorine. So what also we -- we both purchased that instrument to

support our Safer Consumer Products team, so carpeted work the initiatives, you know, for PFAS. And right now we are very close to the -- screening all the treatment spray from the Scotchgard whatever, you know, the commercially available treatment spray for, you know, your textile, carpet, and rugs. That's where we are right now.

Next method we want to develop is the food packaging. So it's -- we're getting data to measure -- to get some idea what kind of total fluorine level we expect. And also we got that -- we have a significant enough levels. We try to move to the comprehensive analysis and looking at the individuals. We're not going to stop there. We also screened by the non-target analysis, because we do have some important PFAS database that right now Dr. Miaomiao has about 600 PFAS. If it's not enough, we're going to screen by the U.S. EPA chem dashboard that they have. To my recollection, they have 12,000 PFAS, based on their data. So that's where we are right now. Yep.

DR. ATTFIELD: Hello. Kathleen Attfield, Biomonitoring California, CDPH. In answer to your question about PFAS profiles, we're very interested in looking at profiles and for populations over time, but I don't think we can use the legacy compounds as sort of canaries in the coal mine, though that would be great,

because of the shift in PFAS manufacturing, both in the United States and abroad, that there's just different -- yeah, different profiles of PFAS used in products, but -- and especially with the long half-life of the earlier PFAS, we see those declining in our population -- in our populations here in the United States and in California, but we are concerned about the other ones beginning to accumulate more being -- showing up in different ways.

CHAIRPERSON SCHWARZMAN: I have a question for Nerissa about the response to the cosmetics safety legislation AB 496. And I'm just thrilled to hear -- I know this is something that we've talked about a lot as a Panel and the Program is very interested in trying to track impact of new policy. And I was hoping you could expand on that just a little bit to tell us what you're considering and where you have baseline data. As someone who has tried to use biomonitoring data to look at the impact of policy, there's that real bind of comparing two points in time when the data were gathered for different purposes and in different ways. And I'm just curious what the prospects are for looking at that?

DR. WU: Well, I did hesitate about putting that slide up there, because I knew it would spark an optimism, which I mean I -- we don't have a plan right now. We only have serum for our surveillance currently. We are

considering other potential sources of surveillance samples, but this is far down the road. But yeah, a lot of the things we're interested in tracking are urinary metabolites, and we can't -- we can't do that through our current STEPS Project.

So it's all -- you know, we're always looking for opportunities if there's something we can -- another study that we can join into, so that we can get access to those samples. We have the lab methods and the will to do it. We just don't have the projects set up right now. So totally open to hearing some possible collaborations we might be able to form.

CHAIRPERSON SCHWARZMAN: And the pro -- what you're talking about is needing baseline levels for the equivalent chemicals that you want to monitor in the future post-legislative implementation.

DR. WU: Right. I mean, in surveillance, we really want to think about what population we're gathering samples from and in what way, because it's -- you know, convenient samples are useful for some things, but if you're really looking for time trends, we would want to have a pretty broad general population sampling, so that's harder to come by. But yeah, for phthalates, parabens, and it would be urinary mercury that we'd be interested in, we'd really need to have urine.

CHAIRPERSON SCHWARZMAN: And CARE doesn't give you what you --

DR. WU: Well, we do have urine from -- we do -- we have the samples from CARE from 2018 and 2020, and we will -- we're hoping to have this population basis for phenols levels for CARE-LA. So that could be used as a baseline. It's not a true population survey, but it's pretty close. And so we could use that as a comparison, but there -- there are lots of other things changing over time. And so if we were really going to do temporal trends with those, we would have -- want to have a robust surveillance methodology looking year after year as these legislations go into effect.

CHAIRPERSON SCHWARZMAN: Is there any possibility of returning to those CARE participants?

DR. WU: We did not write that into our IRB. I think we do have the potential to talk about study information in general. So if we wanted to talk about other work Biomonitoring is doing, we could broadcast that out to all participants. But no, we don't have permission given our current consent to go back for additional study work.

CHAIRPERSON SCHWARZMAN: Or to go back and request new samples? That would have to be a new --

DR. WU: Right.

CHAIRPERSON SCHWARZMAN: Thank you. That's really helpful. It's an exciting opportunity.

Jenny.

PANEL MEMBER QUINTANA: Hi. Jenny Quintana. I want to echo how important it is to document the positive effect of policies. It's such a powerful tool and support for passing these kind of policies. Like you said, it's -- it would be a very helpful and useful outcome of California Biomonitoring. I mean, everyone has seen that wrap of children's blood lead dropping after they banned leaded gasoline and unleaded fee. You know, it's a very powerful graphic. It just -- you know, get the lead out of gas and, shoom, you know, it goes down in the kids blood.

And so I think I talked about it before trying to do that for diesel. You know, markers of carcinogens in diesel will be very powerful as we went to clean diesel to get that kind of documentation. Again that's urine, like you said.

But it also made me think it's also very important to look at disparities. So when the flame retardants were -- certain ones were banned. You know, I think it was Ami Zota that had the paper showing that it was lower income participants that remained exposed to these more legacy compounds in older furniture and homes

and stuff like that. And people did not have the advantage of the new compounds as quickly as person's that were nor disadvantaged. And so I think it's also useful. I don't know if -- what data you have on any indicators of being disadvantaged. But I think it's important to continue to document disparities as well, if you can.

CHAIRPERSON SCHWARZMAN: One other thought that I have, and I'm sure you all have thought through this also, so forgive me if I'm just mentioning things that you've already talked about internally, but is -- you know, I know that when you do a study in any particular population in California, you often also compare it to NHANES biomonitoring levels. And I am just wondering if there's the potential to use that comparison to be able to use NHANES biomonitoring data in the past as baseline and make some extrapolations based on the relationships you've seen between California levels and NHANES levels for particular substances in isolated studies. It would -- it would require a lot of caveats for samples taken under different circumstances and things like that, but I'm wondering about being able to draw on biomonitoring data.

It's certainly something that we looked at, you know, in looking at the impact of Prop 65 is trying to dig out California data, which you can do going to great lengths working with the RDC. But, in fact, because of

the influence of California's economy, you know, we weren't sure that we were actually seeing big differences between California and the rest of the country, because they change product lines for the whole country. They don't make separate product lines for California.

So in that sense, you know, we sometimes can see things at the national level that we would expect, you know -- that reflect California laws. Whereas, looking at biomonitoring data on carcinogens associated with diesel, we do see the regional differences. Because the -- you know, either -- not because of the clean diesel necessarily, but because of emissions controls, those really do only happen in California or in other states that have copied California's requirements.

And so there, you can actually see regional differences. But where it's product marketing, you know, like changing a product line or eliminating a toxic from a product, it's so much harder to -- you know, you're not necessarily going to pull out the regional differences, because of how the products are changed, yeah.

Anyway, just a thought.

We -- we're at time. It's -- I didn't make an explicit call for public comment during this time. Has there -- anything come in, Stephanie?

MS. JARMUL: Yes. Jianwen, still has his hand

up. Jianwen, did you want to quickly ask a question.

DR. SHE: Yeah. This is clearly the same comment. I follow Dr. Oliver Fiehn's concern about method, but June-Soo and Songmei, they're the expert. The questions ask how many standards, how many quality -- how many NIST PT program or quality assessment program, which is really how many analyte included in that analysis we evaluated.

I kind of express my concern in the strategy, because program try to depend on which action to move. It's very important. That's maybe -- also Songmei and June-Soo mentioned that only 10 percent of recovery into the standard, which is the golden standard method. But when you have absolute recovery is so low, that golden standard method compensate the loss of matrix effect down to facts. And so with that one, I am -- reason my concern and then maybe just for Program to consider, which analyte we really for sure we know at least, which analyte we have only 10 percent of absolute recovery, regardless the matrix effect we lost.

I think document this one is very important step to move on, because I made a lot scientific mistakes in my life. I find PBDF. I think PBDF -- I think I count verified as PBDE. So I don't -- possibly a lot of popular site, but I -- my better experience when think I find some

new compound and teach me the lesson to be conservative.

Thank you.

DR. GAO: Hi, Jianwen. This is Songmei. So I understand your concern. So I may not introduce the whole procedure clearly, so I talking about the challenges meet all the 51 compounds. It's not the other reported compounds. There are two longer chain perfluorocarboxylic acids that there has not matrix effect. Very bad at the beginning. So we start the extraction cartridge from the DVB. So that's why we change the C8. So C8 the matrix effect, our data improved. So it's better than 10 times drop. There's still half -- probably recovery only have 50 percent. So they can pass the validation. So the validation we use the serum -- serum -- bovine serum, so they can pass the validation. But eventually we drop these two compounds in real sample analysis, because they couldn't pass the human serum criteria.

CHAIRPERSON SCHWARZMAN: Great. Thank you for that. We're going to break for 10 minutes.

DR. SHE: Thank you.

CHAIRPERSON SCHWARZMAN: And let's return promptly at 10:38. So we have a 10-minute break now. We'll start right again.

(Off record: 10:29 a.m.)

(Thereupon a recess was taken.)

(On record: 10:39 a.m.)

CHAIRPERSON SCHWARZMAN: Okay. We will restart the meeting. I want to introduce Martha Sandy and Meltem Musa. Martha Sandy is the Chief of the Reproductive and Cancer Hazard Assessment Branch in the Office of Environmental Health Hazard Assessment. And Meltem Musa is a staff toxicologist in the Safer Alternatives and Biomonitoring Section within that Branch at OEHHA. Martha and Meltem will be presenting a recommendation to the Panel on the potential expansion of the PFAS designated chemical group.

(Thereupon a slide presentation).

DR. SANDY: Good morning and thank you. It's great to be here in person with everyone. So I'm Martha Sandy and I'll be starting off this presentation, then handing it over to my co-presenter Meltem Musa. And I want to welcome her to Biomonitoring California, her first meeting with us. So we will be discussing the potential expansion of the existing designated chemical group perfluoroalkyl and polyfluoroalkyl substances or PFASs -- to PFASs and other substances with carbon-fluorine bonds.

We prepared a document on the potential expansion of this chemical group. And that document is available in the Biomonitoring California website as part of this morning's meeting materials. This document was originally

provided to the Scientific Guidance Panel and posted on the Biomonitoring California website in August. This talk will highlight some of the content that is covered in more detail in that document.

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DR. SANDY: So now for some background on the existing designated chemical group. In March of 2015, the SGP recommended that PFASs be added to the designated chemicals list. And later that year, in November, 2015, the SGP recommended that PFASs be added to the priority chemicals list. These listings include chemicals covered in the 2011 publication by Buck et al.

For members of the audience, let me explain what designated and priority chemicals are. Designated chemicals are the entire pool of chemicals that can be considered for biomonitoring by the Program. They are designated based on inclusion in CDC's National Report on Human Exposure to Environmental Chemicals Program and on recommendations by this Scientific Guidance Panel for Biomonitoring California. Priority chemicals are those recommended by the SGP as priorities for biomonitoring in California.

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DR. SANDY: Since the addition of PFASs to the designated and priority chemicals list in 2015, there have

been a number of presentations and discussions on PFASs at SGP meetings covering a variety of topics. On this slide, I have indicated meetings where PFASs were discussed. Several of these meetings, identified here in the red boxes, have featured invited presentations from researchers on various aspects of biomonitoring and environmental monitoring of PFASs and other organofluorine chemicals or total fluorine in these media. We've also heard presentations on identification of exposure sources and exposure pathways and on pharmacokinetic modeling and more.

At the November 2021 meeting, after presentations from Program staff on a analyses of PFAS data from a number of Biomonitoring California studies and presentations from invited speakers on targeted and non-targeted methods, and findings on PFASs, and other organofluorines in biological and environmental samples, and discussions with the Panel, the Panel requested that the Program report back on the PFASs chemical group.

At the next SGP meeting in March of 2022, a number of options were discussed, including expanding the PFASs chemical group. The Panel expressed interest in broadening this PFASs chemical group on the designated and priority lists as did other meeting attendees.

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DR. SANDY: This slide was presented in March 2022 during our report back on this PFASs chemical group. As you can see, the figure presents various groups of PFASs, different groups of fluoropolymers and non-polymers. And all, I want to make the point, are aliphatic substances. This limitation, the exclusion of aromatic compounds, was pointed out during a report back in 2022.

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DR. SANDY: Well, since 2011, there has been a dramatic increase in scientific research on fluorinated chemicals. And this slide shows this with a number of articles published on PFASs and other fluorinated chemicals plotted year by year from 2011, where approximately 500 articles were published in that single year to 2023, where approximately 2,000 articles were published in that year alone.

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DR. SANDY: As a result of the increased amount of scientific research that has been conducted on PFASs and other fluorinated chemicals since 2011, we now know a lot more about the uses and the sheer numbers of these chemicals in products, the environment, and biota than ever before. This is the result of increased development and application of expanded analyses using both targeted

and non-targeted approaches to measure perfluorinated and polyfluorinated chemicals and application of methods to measure total organofluorines.

In years since 2011, we also have an increased amount of information on the toxicity of PFASs and other fluorinated chemicals as a result of published epidemiology and animal toxicology studies, as well as findings from mechanistic studies and other NAMs.

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DR. SANDY: So today, the Program recommends that the PFASs designated chemical group be replaced with an expanded chemical group, specifically perfluoroalkyl and polyfluoroalkyl substances and other substances with carbon fluorine bonds.

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DR. SANDY: This slide shows some examples of chemicals containing carbon-fluorine bonds that would be included in the proposed expansion of the designated chemical group. You can see here para-Chlorobenzotrifluoride or PCBTF. It's a solvent. It is used for metal cleaning and in products such as paints and inks.

Perfluorotoluene is a solvent. Benzotrifluoride is a solvent. It is also a chemical intermediate used in the production of other chemicals. And the last chemical

on this slide (Perfluoropropyl)benzene is available for purchase from multiple chemical suppliers.

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DR. SANDY: Here are additional examples of chemicals that would be included in the proposed expansion of the designated chemical group. 1,1-Difluoroethane is use as a refrigerant, a propellant, and a foam expansion agent. It is also a chemical intermediate in the production of pesticides and consumer products, such as cleaning products and air fresheners.

(Difluoromethyl)benzene is a chemical intermediate used in the production of other chemicals.

1-Fluoro-4-nitrobenzene is a component in hair dyes. It is also a chemical intermediate used in the production of other chemicals.

Fluorobenzene is a solvent and is used in industrial processes such as steel production. It is also a chemical intermediate.

And now, I'll turn the presentation over to Meltem.

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DR. MUSA: Thank you, Martha.

As a reminder, here are the criteria for the Scientific Guidance Panel uses for recommending designated chemicals. The criteria are: Exposure or potential

exposure; known or suspected health effects; the need to assess the efficacy of public health actions; availability of a biomonitoring analytical method; availability of adequate biospecimen samples; and, incremental analytical cost. It is important to note that these criteria are not joined by the term "and".

In the next couple of slides, I will be going over some examples of chemicals that would be included in the expanded chemical group and discussing relevant information on exposure and health effects. The document we prepared on the potential expansion of this chemical group provides additional information relevant to the criteria.

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DR. MUSA: This slide lists example chemicals with carbon fluorine bonds that would be included in the proposed expansion of the designated chemical group for which there is information on exposure or the potential for exposure. Examples of chemicals that are found in groundwater include PCBTF and benzotrifluoride. Examples of chemicals that can be present in the diet and for which this U.S. EPA has established tolerances on several types of fruit and vegetables include bifenthrin, which is an insecticide used on numerous crops in greenhouses and building to control insects such as ants and termites.

And cyhalothrin, which is another insecticide, used in agriculture. Bifenthrin has also been detected in past samples in urban settings, such as homes in Oakland, here, and homes of farmworkers in Salinas.

Examples of chemicals that have been detected in air include PCBTF, which has been detected in workplace air in vehicle and paint manufacturing plants. Difluoromethane. Atmospheric concentrations of this chemical has been -- have been increasing since 2009.

An example of chemical detected in wildlife is bromethalin, a rodenticide, which has been detected in birds in San Francisco in California. And an example of chemical detected in human biospecimens is fipronil, as pesticide used to control insects such as ticks and termites. Its metabolite fipronil sulfone has been detected in the serum of North Carolina residents with no known exposure to fipronil or other pesticides. It has also been detected in human cord blood samples in a study conducted in China.

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DR. MUSA: This slide lists example chemicals with carbon-fluorine bonds that would be included in the proposed expansion of the designated chemical group for which there is information on health effects or the potential of health effects. Examples of chemicals that

have been identified as carcinogens and are on the Proposition 65 list as causing cancer include PCBTF, and tetrafluoroethylene. Tetrafluoroethylene is used as a chemical intermediate and to make polymers such as PTFE. Other chemicals that U.S. EPA has identified as Group C, possible human carcinogens, include bifenthrin, fipronil, and ethalfluralin.

An example of chemical with endocrine disruption activity is bifenthrin, which has been reported to lower serum testosterone levels in mice. Examples of chemicals that have been reported to cause neurotoxicity include benzotrifluoride, bifenthrin, and fipronil.

An example of chemical reported to be immunotoxic is trifloxystrobin, a fungicide. Examples of chemicals toxic to the liver and kidney include benzotrifluoride and fipronil.

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DR. MUSA: The current PFASs designated group dates back to publications such as Buck et al. from 2011. As you know since then, with the proliferation of research published on fluorinated chemicals, we have a greater appreciation of the broader scope of organofluorine chemicals present in the environment and in biota, including humans.

At the March 2022 SGP meeting, the Panel

expressed interest in broadening the PFASs chemical group on the designated and priority lists, as did other meeting attendees. The current designated chemical group, PFASs, does not cover some important chemicals of concerns.

First, we recommend replacing the current designated chemical group with the expanded chemical group, PFASs and other substances with carbon-fluorine bonds. Justification to expand the chemical group include the observation that the carbon-fluorine bond is extremely strong. As such, substances with carbon fluorine bonds are persistent, and once released into the environment, it is an ongoing long-term potential for exposure.

As briefly presented here and discussed in more detail in the document prepared for the potential expansion of the chemical group, several chemicals in the expanded group have been tested for toxicity and caused adverse health effects such as cancer, liver and kidney effects, and neurotoxicity. Expanding the chemical group is a resource-efficient approach. It will facilitate use of non-targeted laboratory screening methods for chemicals with carbon-fluorine bonds and identification of emerging chemicals of concern.

Expanding this group will give the Program the flexibility to choose to biomonitor for additional substances with carbon-fluorine bonds of potential health

concern and be responsive to market shifts in use. Importantly, just because we can measure any chemical in designated chemical group does not mean we must or we will monitor for it. For example, as discussed in several previous SGP meetings, we can purposely decide not to monitor for pharmaceuticals.

This slide concludes our presentation. Thank you for your attention.

CHAIRPERSON SCHWARZMAN: Thank you very much. We have 10 minutes -- so just to say how this next chunk of time is going to go before the end of the meeting, we have a moment here for clarifying questions from the Panel. And then we have time both for public comment and then Panel deliberation and recommendations to the Program.

So let's start with clarifying questions about this presentation.

Yes, Tom.

MS. JARMUL: One moment, we may have just gotten disconnected.

(Technical difficulties.)

MS. JARMUL: Well, it seems like everyone online can see and hear us, so I think it might just be a problem with this screen.

(Laughter).

MS. JARMUL: I think we can continue while we try

to work that out.

CHAIRPERSON SCHWARZMAN: Okay. Thank you

So clarifying questions. Yes, Tom.

PANEL MEMBER McKONE: So that was a very useful and informative presentation. Thank you. And the question I have just goes to -- and again, we agreed many, many years ago, right, that exposure potential is a very important factor. And given that the fluorine bond -- the carbon-fluorine bond is very strong, these are probably almost all likely to be very persistent chemicals, right? They don't degrade well in the environment. So persistence is actually the best indicator of the potential for human exposure. They're one chemical property you could pick. I actually wrote a paper about this. But it is -- it is a -- but it demonstrated it.

So the only other factor would be quantity. And I would think that probably we'd just -- knowing these are persistent, the next criteria would -- well toxicity, but in terms of exposure, the level of production. And that may be changing and going up or down, but that would probably be -- because it's almost certain that they -- if they are produced, they will be in the environment and they will be in the environment for quite a while, the question is at what level.

Anyway, just a -- kind of a thought or maybe you

wanted to comment on whether that's -- that approach.

DR. SANDY: Thank you for your comments and yes. It's hard to find production level information for all the -- you know, these chemicals. It's also hard to find use information for all these chemicals, but that's something we can continue to look for, but I think being able to biomonitor for them will also be important.

CHAIRPERSON SCHWARZMAN: Any other clarifying questions for the presenters?

MS. JARMUL: Carl has his hand up.

CHAIRPERSON SCHWARZMAN: Carl.

PANEL MEMBER CRANOR: Pardon?

CHAIRPERSON SCHWARZMAN: Now, we can hear you.

Oh, Carl, we were -- sorry. Your hand was up for a clarify questioning, is that right?

PANEL MEMBER CRANOR: I do. I agree with what Tom said. And I wonder if there's any indication that these myriad substances have undergone any kind of testing or careful screening before entering commerce? Like my guess is that they probably haven't because of the structure of their law. So we're playing catch-up. And this provision of -- under the Biomonitoring Program, provides a slight way to do something about that, not a lot, but something. Any ideas about careful screening or legal testing?

CHAIRPERSON SCHWARZMAN: Tom has a response.

(Laughter).

PANEL MEMBER McKONE: Well, no. Carl, that's a really good point is the U.S. Doesn't have a requirement, but the Europeans do. And one place to probably look for -- probably not production information, but more details about toxicity, because in Europe you can't -- you know, you have to have -- you have to go through the screen through REACH. And if you don't, you can't produce or use the chemical.

PANEL MEMBER CRANOR: Right. But how much of that influences what's around us? I don't know.

CHAIRPERSON SCHWARZMAN: And just to modify that a moment, the data requirements are all tiered by tonnage band. So if you're not producing a lot of it in Europe, you don't have to provide health effects data, right? Like the health effects data doesn't come in until the higher tonnage bands. So that may not actually help us for the emerging chemistries as much as we wish it did.

PANEL MEMBER CRANOR: Right.

CHAIRPERSON SCHWARZMAN: Oliver.

PANEL MEMBER FIEHN: Yeah. Thank you. It was good, but I -- you know, we have discussed these expansions of the Program many times in the past. And often, there was a very -- a lot of literature that

supported this. So here, although there are apparently 2,000 publications a year, or something, on PFAS in general, I found the information on production current exposures, current knowledge of toxicity a little lacking. I do understand what Tom said in terms of, in principle, if something is persistent in principle, it can be found, and in principle we can be exposed.

But I thought that the evidence provided is not very strong, compared to other chemicals we have seen in the past. So the other thing is, you know, we mentioned earlier this morning that there are already in the ChemTox dashboard off the U.S. EPA, 12,000 compounds listed with fluoroalkane bonds. I wonder at which point it becomes too difficult in terms of, you know -- or too expansive in terms of really deciding which compounds to analyze?

So for fipronil, I would say, yeah definitely. There are 51 literature reports on fipronil in plasma -- in human plasma. There's no question about it, but it's a pesticide. So, you know, we don't want pesticides in blood. Understood, right? But, you know, just because something has a carbon-fluorine bond and there -- you know, the chemical properties were so different, you know, from something that is an industrial intermediate where it's unclear if people might get exposed, and at which level and at when, to something that are pesticides or

closer to consumer products.

You know, I wish we would have more information on, you know, circling it better and also giving better advice what to look for in terms of properties of these chemicals, and which kinds of chemical groups we need to look for and include.

CHAIRPERSON SCHWARZMAN: I feel like we're veering into discussion territory.

Does anyone else have clarifying questions?

In that case, I want to -- we're meant to -- sorry, Martha, did you have a --

DR. SANDY: Could I --

CHAIRPERSON SCHWARZMAN: Oh, please, of course, yes.

DR. SANDY: Just to give some perspective, we realize that the group we have right now doesn't cover all the chemicals we know we have concerns about. It doesn't cover the aromatics. And we want a group that addresses Program leads and priorities and those won't change, as we learn more about -- and as different chemicals are used in different ways, our approach has been to be inclusive to allow the broadest flexibility in what we measure, because we are an exposure based program, and this list of designated chemicals is really a laboratory list of chemicals that can be measured. It allows us to use

non-targeted analyses to get a sense of the presence and levels of these fluorinated chemicals, and to identify chemicals within the group to focus on.

I can also comment that we, you know, also tried to come up with some functional or use-based definitions, but we don't really know all the possible uses that are happening right now or what might happen in the future of these fluorinated compounds. So it -- that's a challenge for us, so...

CHAIRPERSON SCHWARZMAN: Thank you.

I meant to poll the room and attendees about how much public comment we anticipate, just in thinking about how to divide up the time. Stephanie, do you have a read on that?

MS. JARMUL: We've only received one public comment so far. But if others want to comment online, can you raise your hand virtually.

CHAIRPERSON SCHWARZMAN: Folks who want to comment online should raised hand virtually because I think the next section is public comment period, and we can then tell how much time to allocate to each comment.

We'll give a moment for that.

MS. JARMUL: I think we only have one comment that I can read.

CHAIRPERSON SCHWARZMAN: Okay. Then we'll move

into the public comment period. We'll do this and we'll do our Panel discussion. And if more public comments come in, it sounds like we'll have time for that.

MS. JARMUL: Definitely. And there's actually two from Anna Reade from the NRDC. She mentions that the EU's universal PFAS restriction proposal does have a lot of use information, more than we can collect here in the U.S.

And then she submitted a longer comment that I'm going to read aloud.

"Good morning. My name is Anna Reade and I'm a Senior Scientist with the Natural Resources Defense Council. On behalf of the NRDC and its members, I am pleased to support the California Biomonitoring Program's recommendation to expand the PFAS chemical group on the designated chemicals list to perfluoroalkyl and polyfluoroalkyl substances, and other substances with carbon-fluorine bonds.

"The Program's justification for expansion is scientifically supported, resource efficient, and will further California's ability to protect public health. The proposed expansion meets several of the criteria for designated chemicals under SB 1379, including chemicals with the potential for exposure and known or suspected health effects.

"Importantly, the concern over chemicals with carbon-fluorine bonds and the persistence that results is supported by other experts in the field. We thank California Biomonitoring and the Scientific Guidance Panel for their important work to protect the health of Californians."

And that's it.

CHAIRPERSON SCHWARZMAN: Okay. If that's it -- and there's no public comment in the room, right?

MS. JARMUL: Correct.

CHAIRPERSON SCHWARZMAN: Okay. So if that's it for public comment, I think, because we have more time allotted for it than that, I'll kind of return and check back and make sure that we don't have more public comment later, but we can move on to Panel discussion. We're meant to end this period with a recommendation for the Program in response to this proposal. So just so you know, have in mind, where we're headed with this.

Comments, discussion points?

Lara.

PANEL MEMBER CUSHING: This is more of a clarifying question. It's Lara Cushing. I was wondering if you could say more about how this expanded definition would enable non-targeted analysis and maybe how a different definition would not, and -- because that's

seems like a real benefit to me too in order -- like looking forward, being able to embrace new methods for non-targeted screening that are resource efficient and enable us to identify new emerging compounds. And as it -- like, could we not do that with a definition that was more restrictive or like has that been a barrier with some of the other chemical classes as they're currently defined.

DR. SANDY: Thank you. So I was looking to see if June-Soo wants to chime in, but, you know, they can -- you've heard from ECL talk about their non-targeted analyses of other types of -- not our Biomonitoring California samples. And we've heard from other guest speakers over the years where they're picking up total fluorine in serum and then trying to see how much they can account for with what we know -- what we're targeting for biomonitoring. There's a lot of unknowns. And some of that may not be captured by the individual chemicals that are currently on our designated chemicals list. So we would not be allowed to monitor for them in Biomonitoring California samples. So it allows us to look for more, once we find chemicals that we want to go after that we're measuring in people.

CHAIRPERSON SCHWARZMAN: Thank you.

Ulrike.

PANEL MEMBER LUDERER: Yeah. Kind of following up on that. I mean, I think that is really one of the benefits of having this designated chemicals list is it provides flexibility to be able to respond. You know, as things change and we know that things are constantly changing in terms of what's getting put into the marketplace and, you know, things that -- chemicals that are discovered to have toxicities, they get rid of them, and then other chemicals that we don't know the toxicity of as well, or hasn't been as well defined, gets added. And so I think having that ability to both use non-targeted approaches and also maybe to develop targeted methods for chemicals that are within this broad group, that as the presentation noted, there's evidence for human exposure for some of these, but they currently are not included under the definition of PFAS that's currently being used.

So, I mean, I think from my perspective, it makes sense to have this broad designated category, realizing that, you know, it's probably never going to happen that we're going to measure every chemical that's -- you know, that could fall under that umbrella, but it does provide the flexibility to be able to -- to, you know, as things come up, as they be -- you know, maybe there's more evidence about exposure, and, you know, we want to try and

understand exposure better for a particular chemical. They can just -- you know, the method can be developed without having to come back, and, you know, add it chemical by chemical to that designated list.

CHAIRPERSON SCHWARZMAN: Yeah. Tom.

PANEL MEMBER McKONE: Just a follow-up. And I'm going back several years when we took these cyclic siloxanes as a class for the same reason. And again, we were talking about a very large number of chemicals, but it was the problem is we were just seeing them emerge in the market and there's different variations.

And our fear was that if we had specified a couple, it would -- we would limit the opportunity to then measure one that was emerging. So I really -- I don't know how to put the language. I favor the idea of giving some flexibility, but then, you know, to avoid opening the door to like 10,000 every, you know, fluorine-bond chemical, say it's open, but there needs to be some demonstration.

I mean, it's -- the State has latitude or the Program -- the Biomonitoring Program, you know, I would say maybe recommend giving broad latitude to go into this class, but to also have some justification for which compounds and why and again along the lines of what they're doing, which is use, toxicity, and again

suggesting they look at whatever we can get from Europe about the types of uses, and toxicity, and exposure. So not limit, but also encourage them to be a little bit selective and careful, so if we open the class up and don't open it up to 10,000, so that everyone is overwhelmed trying to find the right chemical.

CHAIRPERSON SCHWARZMAN: I wonder if part of what you're getting at there, Tom, is that -- is in a sense the difference between designated and priority chemicals. So right, if we're expanding -- the Program is proposing expanding a list of designated chemicals in this way, and that's not the same as our instructing the program to prioritize that big a chemical list, or a group. And anyway, I wondered if that helps partly get at that difference?

I have Jenny, and then I have Oliver, and then José.

PANEL MEMBER QUINTANA: I agree we don't want to overwhelm anybody, but I think this problem is so perfectly suited to biomonitoring, because, as you said earlier, look at total fluorine, what the heck is it? You know, so you have almost a top-down way of looking at it as well as the bottom-up, which is use, and production, and that kind of stuff. So I do think that the approach of finding the most abundant is, in a way, already weeding

out problems using non-targeted -- you know, applying non-targeted to see what's there or guess what's there and then investigate.

So I think it is important, especially when you have this rapidly changing situation, the regrettable -- potentially regrettable substitutions going on, you know, that it's -- it's really interesting to see the power of biomonitoring. And I think part of the problem is the source problem that we really don't know what the sources are. And without that, it's hard to get at what Oliver said about finding the canary in the coal mine. So if we looked at all these different chemicals and see which ones correlate with each other, these two tend to track together. And these eight track together, you know, then you might be able to whittle down the list, the ones that are indicative.

But without knowing the sources and how they change, it's also concerning that you're data from 2016 or something had things correlated, but now they wouldn't, because they'd be changing. So I think it's a complicated problem and I think it really does really lend itself to biomonitoring as helping solve this problem.

PANEL MEMBER FIEHN: Okay. Thank you. This is all good comments. I understand the difference. We all understand the difference between designated and priority,

but the point really is that eventually we're going to do biomonitoring. And I would say 80 percent, maybe 90 percent of all the reports we have received for targeted reports on different studies on different chemical classes and different compounds. So the non-targeted approach, although it's favorite, and, you know, always a hope, you know, like a carrot in front of you that you can't reach, hasn't been really shown to pay off or at least not to the extent that we are all happy with it, let's put it this way maybe.

So then you could say, well, you know, obviously, targeted approaches can do quantification. You would have internal standards. You would have isotope dilution mass spectrometry for quantification, that then you can monitor across populations and, you know, so on, and different biofluids in water, and fish, and you name it.

From non-targeted all you can really say is presence or absence, which is something. So I think it would be time for the Program to not only expand designated chemical lists, but also try to see can we say something about presence and absence, and if so, how.

Now, we did discuss it before for halogenated compounds, in general, it's easier than for others. Brominated and chlorinated have really nice isotope patterns, poly or perfluorinated also have nice patterns

by being less than nominal mass. So if you have something like 20 fluorines, you can easily detect it in a non-targeted approach. And there are people who have published such things.

Now, that is fine, but, of course, in a program, if you now want to look at exposure roots, or different foods, and different sources, and soil, and what not, that is overwhelming Biomonitoring California in terms of expense and, you know, informatics and so on. There is a resource called MASST in San Diego who collect public available MS/MS non-targeted data for many years. They have one billion spectra so far. They have published many studies on different types of associations. You know, they focus, of course, on microbiomes, but they also look at bile acids and novel bile acids, but this resource can also be exploited for understanding non-targeted analysis.

So if we expand our designated list of chemicals ever more, which likely we will do just to give -- you know, nobody wants to restrain the Program, you know, but the Program also has to show how it can be used. And instead of saying, well, we know go for 300 people and do it -- we can also do that, 300 people, and some CARE, or whatever ACE, or whatever other program, and then we want to relook at non-targeted, we could do that. But also, we could say why don't we ask the Program to see can you find

these perfluorinated and other types of halogenated compounds in MASST and some of the databases that are publicly available and that have source information.

So not to the level that you can use it in, you know, body mass index, and age groups, and, you know, so on and so forth, not like in a real biomonitoring study, but at least the presence, and absence, and associations with sources. So that would be a comment and a pledge that I would like to do today.

PANEL MEMBER SUÁREZ: I think that's very interesting. And in following up on that, kind of side tracking about my question in that sense and kind of bringing it back at the same time, is, well firstly, it is very -- it's great that you've been giving some additional thought about expanding to different compounds that seem to have very strong fluoride -- carbon-fluoride bonds there and looking at dietary sources of exposure, in this case looking from that agricultural side, including pesticides. I see some pyrethroids in there, in fact, that no one has talked about.

The same questions kind of come back when we're thinking about there are thousands of different chemicals. And coming from a list of thousands to 10 different chemicals from -- selecting from that, I am sure that we could make the rationale that we could include maybe a

dozen more that might fit the same criteria that are mentioned here.

So my comment here would be it would be very interest to start incorporating different criteria and actually having a strong list of criteria now specifically to be able to score somehow which chemicals should be then included in the designated list such as this one, given that there are a lot of different resources, some of which Oliver was talking about, different -- thinking of different ways in which some sort of a score could be created, such that we can start prioritizing or including specific lists of chemicals, given that, you know, as I was mentioning 10,000, 15,000 chemicals worth considering. Probably a good amount of those would be -- would qualify here in the exposure potential list and probably on the health effects list, right?

So maybe you have -- you've done this. I didn't fully see if there was some sort of a scoring criteria for that to be able to include these in there, but it would be nice to give some thought of what you've been -- how you've been selecting these in that sense.

DR. SANDY: This is Martha Sandy. So it's been awhile since we've brought chemicals to our Panel to put on the designated list or the priority list. And again, just to remind you, the criteria for the designated

chemicals to use, that's in the enabling legislation. And you as a Panel -- as the Panel will use those criteria. And the criteria are not joined by the word "and". So a chemical or a group to put on the designated list just needs to meet at least one, but it's the recommendation of the Panel as to what should be on that designated list.

And again, it's a list that allows us to biomonitor if we find information. And as you hear, we can't -- we aren't monitoring all of the chemicals on the designated list right now, but it gives us the flexibility if we understand more about a particular chemical within one of the designated chemical groups that we really want to look at.

PANEL MEMBER McKONE: We're moving toward a recommendation. So what we're asked to do is the current designated group is perfluoroalkyl and perfluoroalkyl substance -- perfluoroalkyl or --

(Laughter).

PANEL MEMBER McKONE: It says both, right?

Okay. Polyfluoro, there we are. So it's very restrictive. It's perfluoro and polyfluoro. And then it's expanded to other substances with a carbon-fluorine bond, which is like going from this to, you know, the whole room.

But maybe -- I mean, if we just put a little bit

of a restriction on the addition, other substances with carbon-fluorine bonds that meet the criteria of the enabling legislation, which is -- you know, we're expanding the group to something new, but we're also saying it's not a free ticket to look for every -- but that's already there. As Martha pointed out, there's already a restriction because you can't -- you can't go outside of the criteria in the enabling legislations, so I mean we might want to emphasize that, so that we don't feel like we've opened the door to, you know, 10,000 new chemicals.

CHAIRPERSON SCHWARZMAN: I feel like the most important thing that I could come back to in this is sort of language from the presenters about being allowed to look. And I feel like our -- we have many different roles on the Panel, and sometimes we make recommendations to the Program about what we think they should focus on and how studies should be conducted, and priorities for, yeah, the -- expending the limited resources on doing studies. And, for me, when the question comes to what should we permit the Program to do, what should they be allowed to do, that gets a lot less -- I want to be a lot less prescriptive in that. You know, that's a place where I don't want to limit the Program especially because we've all, I think, acknowledged how dynamic the marketplace is

around PFAS, I mean, around many chemicals, but particularly around PFAS with increasing categories coming under scrutiny, gaining attention, and then how that shifts.

And my impulse here is to allow a very broad definition, even acknowledging that there's -- there are many things that the program would never consider monitoring that qualify as a single carbon-fluorine bond, but sort of acknowledging what a long deliberative process this has been, and should a chemical emerge that they -- that there's rationale for studying, not wanting to have to limit them to like redesign the group just in order to be able to include that.

Like, I feel like the deliberative process in selecting chemicals to study, and in designing studies is already very robust, and we get to have input on that. And so the idea of limiting the Program through the -- through the designated group doesn't feel necessary to me. That's kind of how I'm seeing it.

I don't know if others have comments on that.

Jenny.

PANEL MEMBER QUINTANA: I just want to say that I agree with you on that point. And are we moving to making a motion at some point or how does -- what is the next process?

CHAIRPERSON SCHWARZMAN: We should have a motion before this time is up, because we need to make a recommendation, but we can fully let the discussion run its course before doing that. We don't have any time pressure and it looks like Stephanie has a comment or a -- yeah, public comment. Okay.

MS. JARMUL: This is again from Anna Reade from the NRDC. She states that, "The California Water Board is planning to perform non-targeted testing on drinking water in collaboration with EPA. This expansion would allow California Biomonitoring to follow up with interesting and important findings from this work."

CHAIRPERSON SCHWARZMAN: Other comments from the Panel or discussion points?

Tom.

PANEL MEMBER McKONE: Less an interesting example of what we want to give the Program an opportunity to do, which is to respond to new information that comes up. I mean that's the example from NRDC is like, oh, look, there's this whole new data set. And then if we restrict it some way, the class of compounds -- fluorinated compounds, then they'd have to say, well, we have to get permission to do that. So I favor your comment as a recommendation, which is that we do allow the broad expansion with our understanding that that's not a

requirement or even a suggestion that they just do non-targeted screens for every fluorine-carbon bond, but that it gives some openings to go -- and again, I think we have to assume the Program criteria, the enabling legislation is sufficiently protective; that it doesn't mean this is giving free rein to just go out and look for every compound in this class.

CHAIRPERSON SCHWARZMAN: I would say the enabling legislation and the budget.

(Laughter).

CHAIRPERSON SCHWARZMAN: If anyone has concerns about overreach, you can put those aside.

(Laughter).

CHAIRPERSON SCHWARZMAN: Other points in the discussion. Other thoughts about this designated chemical group.

Is there -- would anyone like to make a motion to start a decision, if folks feel like they've deliberated all they need?

PANEL MEMBER McKONE: No. I make a motion that we allow this class to be expanded as the proposed definition. And I don't if -- I mean, I wouldn't put a qualifier on it, but I think we understand there are budget constraints, and, you know, requirements that contain the set of compounds still. It's not -- you know,

we're not opening it up to an entire universe, but I don't think we have to put that qualifier in our recommendation. I think the recommendation would be to allow the language to be revised as proposed in the title presentation.

CHAIRPERSON SCHWARZMAN: So maybe just to restate that for the record. I would say that Tom McKone motions that the chemical group PFAS and other substances with carbon-fluorine bonds be included as designated chemicals for the California Environmental Contaminant Biomonitoring Program. Do we have a second?

PANEL MEMBER QUINTANA: Second.

PANEL MEMBER CRANOR: I second.

PANEL MEMBER LUDERER: (Hand raised).

CHAIRPERSON SCHWARZMAN: Okay. We have a second. So then I will -- I'll just go around and record votes of every Panel member.

Lara?

PANEL MEMBER CUSHING: Yes.

CHAIRPERSON SCHWARZMAN: Lara agrees.

Tom --

PANEL MEMBER McKONE: Yes.

PANEL MEMBER LUDERER: Aye.

PANEL MEMBER QUINTANA: Aye.

PANEL MEMBER FIEHN: Aye.

PANEL MEMBER SUÁREZ: Aye.

CHAIRPERSON SCHWARZMAN: And Carl?

Oh, we can count that as an agree. Okay. And I also support the motion.

PANEL MEMBER CRANOR: Aye. I was muted. Aye.

(Laughter).

CHAIRPERSON SCHWARZMAN: There we go. Okay. So with that, the motion passes unanimously.

Great. Okay. So we're a little ahead of schedule, which is wonderful. People will get a little bit more time for lunch. We had a pretty tight lunch turnaround before.

So I want to just open up the public comment period now. And this is not specific to items on the agenda for today. There's 10 minutes allotted for the open public comment and commenters can provide any -- comments on any topic. 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'll read them out loud. If you wish to speak rather than submit a written comment, please alert us using the raise hand feature in Zoom webinar and we'll call on you. And if you're attending in person and wish to comment, please come to the front of the room or raise your hand. And reminders to public commenters that for the benefit of the transcriber, please clearly identify yourself before

providing comment and write your name and affiliation on the sign-in sheet.

So with that as having provided a little time for those comments to come in.

Stephanie, do -- is there any to report?

MS. JARMUL: No public comments have come in, no.

CHAIRPERSON SCHWARZMAN: Okay.

In that case -- oh, sorry go ahead.

PANEL MEMBER McKONE: So there was a comment that we were given in advance. Does that -- do we have to -- I mean, should we acknowledge that or do we have --

CHAIRPERSON SCHWARZMAN: Program staff --

MS. JARMUL: That wasn't specific for this meeting.

CHAIRPERSON SCHWARZMAN: So that concludes the substantive portion of this meeting rescheduled from August. The transcript of the meeting will be posted on the Biomonitoring California website when it's available. The next SGP meeting will be this afternoon from 1 to 4 p.m. And information regarding options for attending the meeting are available on the meeting webpage for this afternoon's meeting. And I want to note specifically that there's a separate Zoom link for this afternoon's meeting. It's a different meeting for those joining online, and that's available on the webpage.

So with that, I want to thank Program staff, today's presenters, the Panel, and the audience. And I'll adjourn the meeting.

Thank you.

(Thereupon the California Environmental Contaminant Biomonitoring Program, Scientific Guidance Panel meeting adjourned at 11:34 a.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 19th day of November, 2023.

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