MEETING

STATE OF CALIFORNIA

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

ENVIRONMENTAL CONTAMINANT BIOMONITORING PROGRAM

SCIENTIFIC GUIDANCE PANEL

ELIHU HARRIS BUILDING

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THURSDAY, JULY 26, 2012

10:03 A.M.

JAMES F. PETERS, CSR, RPR
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APPEARANCES

PANEL MEMBERS

Ulrike Luderer, Chairperson, M.D., Ph.D.

Asa Bradman, M.S., Ph.D.

Carl F. Cranor, Ph.D., M.S.L.

Marion Kavanaugh-Lynch, M.D., M.P.H.

Thomas McKone, Ph.D.

Julia Quint, Ph.D.

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

Dr. George Alexeeff, Director

Ms. Carol Monahan-Cummings, Chief Counsel

Ms. Amy Dunn, Safer Alternative Assessment and Biomonitoring Section

Ms. Sara Hoover, Chief, Safer Alternatives Assessment and Biomonitoring Section

Dr. Gail Krowech, Staff Toxicologist, Safer Alternatives Assessment and Biomonitoring Section

Dr. Laurel Plummer, Associate Toxicologist, Safer Alternatives Assessment and Biomonitoring Section

Dr. Lauren Zeise, Chief, Reproductive and Cancer Hazard Assessment Branch

DEPARTMENT OF PUBLIC HEALTH

Dr. Michael Lipsett, Chief, Environmental Health Investigations Branch

Dr. Laura Fenster, Environmental Health Investigations Branch

Dr. Ryszard Gajek, Environmental Health Laboratory Branch

APPEARANCES CONTINUED

DEPARTMENT OF PUBLIC HEALTH

Ms. Amiko Mayeno, Environmental Health Investigations Branch

Dr. Sandra McNeel, Environmental Health Investigations Branch

Dr. Jianwen She, Chief, Biochemistry Section

Dr. Wei Zou, Environmental Health Laboratory Branch

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Dr. Myrto Petreas, Chief, Environmental Chemistry Branch

ALSO PRESENT

Mr. Davis Baltz, Commonweal

Ms. LeVonne Stone, Fort Ord Environmental Justice Network

Ms. Rachel Washburn, Loyola Marymount University

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PROCEEDINGS

OEHHA DIRECTOR ALEXEEFF: Good morning, everyone. We're going to bring this meeting to order. Please take your seats. Okay. I want to welcome everyone here. I am George Alexeeff, and I'm Director of the Office of Environmental Health Hazard Assessment. And I want to welcome you to our July 26th, 2012 Biomonitoring California Scientific Guidance Panel meeting.

And what I'd like to do is, first of all, just mention a little bit of the logistics. And that is that the restrooms are out the door to the back, and then if you go to the left and then take the first right. And then to find an emergency exit, you go out the door and you'll see an exit directly across the hall.

Now, the meeting is being transcribed. You can thank our transcriber. And we regret that it cannot be webcast, but there will be a transcript of the meeting posted on the website in about a month after this meeting. And since it is being transcribed, I would still encourage everyone to speak very clearly into microphones, either when asking questions or in comments.

Before we start, first, I do want to thank -- we're still waiting for one Panel member to come here. But while we're waiting, I did want to introduce our latest member Dr. Carl Cranor. And Dr. Carl Cranor is a

distinguished professor of philosophy and member of the faculty of Environmental Toxicology Graduate Program at the University of California at Riverside. And for 25 years his research has focused on philosophic issues concerning risks, science and law. He's an author of *Regulating Toxic Substances: A Philosophy of Science and the Law*; *Toxic Torts: Science, Law and the Possibility of Justice*; and *Legally Poisoned: How the Law Puts us at Risk from Toxicants*, as well as a coauthor of Identifying and Regulating Carcinogens.

His research has been supported in about a million dollars in grants from the National Science Foundation, the University of California Toxic Substances Research and Teaching Program and other agencies. He's served on the California -- a number of California advisory panels. He was on the Proposition 65 Scientific Advisory Panel, Electric and Magnetic Fields Panel, Nanotechnology Panel, as well as the Institute of Medicine and National Academy of Science committees. He's an elected Fellow of American Association for the Advancement of Science and the Collegium Ramazzini.

So what I'd like to do first is swear Dr. Cranor in. This is going to be my first oath of office that I'm swearing someone in, so hopefully all will go smoothly.

PANEL MEMBER CRANOR: Do we share the mic?

OEHHA DIRECTOR ALEXEEFF: Yeah. He's going to come over here.

Okay. So Dr. Cranor will repeat after me.

"I, Carl Cranor..."

PANEL MEMBER CRANOR: "I, Carl Cranor..."

OEHHA DIRECTOR ALEXEEFF: "...do solemnly swear or affirm..."

PANEL MEMBER CRANOR: "...do solemnly swear or affirm..."

OEHHA DIRECTOR ALEXEEFF: "...that I will support and defend the Constitution of the United States..."

PANEL MEMBER CRANOR: "...that I will support and defend the Constitution of the United States..."

OEHHA DIRECTOR ALEXEEFF: "...and the Constitution of the State of California..."

PANEL MEMBER CRANOR: "...and the Constitution of the State of California..."

OEHHA DIRECTOR ALEXEEFF: "...against all enemies, foreign and domestic...;"

PANEL MEMBER CRANOR: "...against all enemies foreign and domestic...;"

OEHHA DIRECTOR ALEXEEFF: "...that I will bear true faith and allegiance to the Constitution of the United States..."

PANEL MEMBER CRANOR: "...that I will bear true

faith and allegiance to the Constitution of the United States..."

OEHHA DIRECTOR ALEXEEFF: "...and the Constitution of the State of California...;"

PANEL MEMBER CRANOR: "...and the Constitution of the State of California...;"

OEHHA DIRECTOR ALEXEEFF: "...that I take this obligation freely..."

PANEL MEMBER CRANOR: "...that I take this obligation freely..."

OEHHA DIRECTOR ALEXEEFF: "...without any mental reservation..."

PANEL MEMBER CRANOR: "...without any mental reservation..."

OEHHA DIRECTOR ALEXEEFF: "...or purpose of evasion...;"

PANEL MEMBER CRANOR: "...or purpose of evasion...;"

OEHHA DIRECTOR ALEXEEFF: "...and that I will well and faithfully discharge..."

PANEL MEMBER CRANOR: "...and that I will well and faithfully discharge..."

OEHHA DIRECTOR ALEXEEFF: "...the duties upon which I am about to enter."

PANEL MEMBER CRANOR: "...the duties upon which I

am about to enter."

OEHHA DIRECTOR ALEXEEFF: Okay. Thank you very much.

(Applause.)

OEHHA DIRECTOR ALEXEEFF: Okay. So now I would like to just briefly give an overview of our last Scientific Guidance Panel. The last Scientific Guidance Panel meeting was held in Oakland on March 16th of this year. And at that meeting, the Panel provided input on the program and also laboratory updates. They discussed the Program's initial results from its numerous collaborations. The Panel responded to discussion questions to help guide development of the Program's upcoming data summary report. And the Panel unanimously recommended that non-halogenated aromatic phosphates, as a group, be added to the list of designated chemicals.

The Panel advised that the Program do additional screening of bisphenol A substitutes and structurally related compounds, including working toward a pilot laboratory screening and conducting additional research on structure activity relationships.

The outcome of this additional screening will help the Program identify a subset of chemicals for which a potential designated chemicals' document could be developed in the future. And the summary of the

highlights of the Panel meeting are on the Biomonitoring website.

So now, first, I would like to thank the Panel members for taking time out of their day and coming here to provide advice to the Biomonitoring California Program. And we really appreciate your time and the efforts that you do spend on this activity.

And I will now turn it over to Dr. Luderer.

CHAIRPERSON LUDERER: Thank you. I, too, would like to welcome everyone, members of the public, the Guidance Panel members and the Program staff to the meeting. I'd like to briefly summarize what our goals for the meeting today will be.

So, as usual, we will receive Program and laboratory updates, and the Panel will provide input on those. We'll also hear an update on chemical selection activities and provide input. We will discuss and provide feedback on issues in interpreting and communicating biomonitoring results for chemicals of short half-lives in humans. And each of these presentations will be followed by an opportunity for Panel questions, a public comment period, and then time for further Panel discussion and recommendations.

So I wanted to just review again how we will handle the public comment today. So if a member of the

public would like to make a comment, he or she should please fill out a comment card, which is being held up there by Amy Dunn. You can also obtain them in the table outside the room. And you can turn those cards into Amy.

To ensure that the meeting proceeds on schedule and that everyone who wants to comment has the opportunity to speak, we'll time the public comments. And the time allotted for public comments will just be divided equally among all the individuals who wish to speak.

So please keep your comments focused on the agenda topics that are being presented. And there will also be an open public comment period at the end of the day for general comments that anyone would like to make.

I also want to remind everyone to remember to speak directly into the microphone and please introduce him or herself before speaking, and this is for the benefit of our transcriber.

The materials for this meeting have been provided to the Scientific Guidance Panel members and are available on the website to the public. There are also a few handouts and a sample of the Panel's folder at the staff table, which is located at the back of the room.

And just also remember that there will be updated presentations posted on the website a few days after the meeting. And so you can visit the website and obtain

those there. We're going to take one break today at around noon for lunch.

And with those announcements out of the way, I just want to then go ahead and introduce the first item on the agenda today, which is an update on the Biomonitoring California Program activities. And this will be given by Dr. Michael Lipsett, who is Chief of the Environmental Health Investigations Branch, California Department of Public Health, and the lead of Biomonitoring California.

Dr. Lipsett

(Thereupon an overhead presentation was Presented as follows.)

DR. LIPSETT: Thank you, Dr. Luderer. And it's a pleasure to be speaking before you and the Panel again. I'm sorry that this setup is a little bit awkward. Don't feel you need to look at me, look at my slides instead, or you can sort of look back and forth.

(Laughter.)

DR. LIPSETT: So next slide, please.

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DR. LIPSETT: I'm going to be talking in this update about staffing and funding, brief updates about the specific projects that we have, the results of our selection for the Request for Information for our collaborations with other researchers and some additional

program activities.

So next slide, please.

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DR. LIPSETT: I wanted to start by saying thank you and farewell to Dr. Das, who was the lead of this Program for the past 3 years. She did a great job. She's taken a new job, as all of the Panel members know, except perhaps Dr. Cranor, as the Executive Medical Director for the Division of Workers' Comp in the Department of Industrial Relations. So, Rupa, thank you very much.

(Applause.)

DR. LIPSETT: So we are in the process of looking for a candidate to replace Dr. Das. But in the meantime, I will be the interim lead, as I was at the beginning of the program in 2008.

For additional staff changes, we have a new Programmer Analyst in the Environmental Health Lab. Dr. She will talk about John Chen when it's his turn to give the lab update. And in my Branch, we have a new epidemiologist, a Research Scientist, Lauren Joe. It says in-kind there, because she's not funded specifically to do biomonitoring work, but the bulk of her time will be devoted to this. She's been an applied epidemiology fellow with our Branch the past 2 years under the sponsorship of the Council of State and Territorial

Epidemiologists. She's great. We're really happy to have her assistance. And I don't think she's here today.

No, she's not, but -- okay. Next slide, please.

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DR. LIPSETT: Funding for the program. We have a budget for California as you all know. And we have been fortunate in being flat funded for this year with no cuts in the budget. And with the CDC cooperative agreement, we are going to be entering year 4 of 5 this fall in September. And we are awaiting our official notification of this continuation -- of the continuation, and hopefully we will be receiving that within the next month, or at least before year 4 is officially supposed to begin.

Next slide, please.

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DR. LIPSETT: Okay. So on our Maternal and Infant Environmental Exposure Project.

Next slide.

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DR. LIPSETT: And all of the Panel members, I guess except Dr. Cranor, are familiar with this project. So I'm providing a little bit of background on each of these for Dr. Cranor's benefit. This is a collaboration that we have with UCSF and UC Berkeley. At UCSF the PI is Dr. Tracey Woodruff, who's head of the Program on

Reproductive Health and the Environment, and with Dr. Rachel Morello-Frosch at UC Berkeley.

It's a convenience sample of 92 mother-infant pairs. However, we have only 65 paired cord bloods and maternal sera, because a number of the mothers did not deliver at SFGH or they delivered in the middle of the night when, surprisingly, the protocol for collecting cord blood was not followed. So we have a smaller number of paired bloods.

Current status. We're going to be releasing the first set of chemical results hopefully by the middle of this month, but certainly between mid-August and mid-September. We have additional sample analyses ongoing. The first set of results will include lead, mercury and cadmium in blood, 12 perfluorinated chemicals as well and then BPA and triclosan in urine.

Next slide, please.

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DR. LIPSETT: Okay. So of these analyses, this is the status of the various chemical analyses. And the ones that are bolded are those that have been done since the last SGP meeting. The hydroxy-PAHs and DAPs are still under review for QA/QC. And then the metals in urine analyses, the method is still being validated and Dr. She will be talking about that.

Next slide, please.

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DR. LIPSETT: So overall, this is the current status of the project with the squares in green representing steps that are still being -- that are in progress, the ones that are checked. You know, a typical convention, those are the ones that are completed.

And could we go to the next slide, please.

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DR. LIPSETT: Okay. Our next project, the Firefighter Occupational Exposure Study.

Next slide, please.

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DR. LIPSETT: This was a collaboration with UC Irvine and the Orange County Fire Authority, their wellness and fitness committee, which is composed of representatives from labor and management at UC Irvine. The PI -- or the co-PI is Dr. Leslie Israel.

This was, like MIEEP, a convenience sample. The first set of chemical results were returned to the firefighters in January. That these were blood metals and 12 perfluorinated chemicals. I'll be talking a little bit about these results with you in a minute.

And ongoing data analysis is happening with the fire station dust samples. This is the Environmental

Chemistry Lab is looking at the composition of the samples that were obtained in a number of these stations, and looking at the station house characteristics as well. And then continuing biomonitoring data analysis and analysis of questionnaire data.

Next slide.

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DR. LIPSETT: So as with the MIEEP table, the chemicals that are bolded are ones that have been done since the last SGP meeting. There's an asterisk there, because 2 samples are going to need to be reanalyzed. But it's my understanding that the machine is down, and has been down for an extended time, and that's why they haven't been completed at this time.

And in our lab, the phthalates, hydroxy-PAHs, phenols, pyrethroid and OP pesticide metabolites have been analyzed, but they're -- the analysis has been completed and they're currently under QA/QC review.

Okay. Next slide.

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DR. LIPSETT: So this is basically unchanged since the last SGP meeting, in terms of what's in progress and the things that have been completed.

Next slide, please.

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DR. LIPSETT: So preliminary results that were returned to the firefighters. Well -- okay. Well, this is a description of the population. Mainly male, middle aged -- our mean, middle aged. They worked from 1.5 to 40 years in the profession, and they're mainly white non-Hispanic. About half are actual firefighters and the others are engineers, captains, or chiefs.

Next slide, please.

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DR. LIPSETT: So looking at the blood metals, the columns you have there are the minimum detection limits and the laboratory detection frequency, the range, and then, at the suggestion of the Panel last time, you know, because we do have some issues related to presenting detailed results on a public forum and when they're going to be posted on the web, and if we want to get these data published in a peer-reviewed journal, we don't want to compromise that. And this was the suggestion of the Panel was to present, say, the percent of the results that were greater than the NHANES 95th percentile.

And so you see those numbers there for the firefighters. There were 6 firefighters who had mercury levels that were above the adult male level of concern, which is 10 micrograms per liter. They were notified of their test results prior to receiving any other results,

that is of their mercury results, early on. And we're told that these were higher than expected, and that these were likely due to recent -- to fish consumption. They were provided contact information for Dr. Israel and Dr. Das if they had any questions. And also a fact sheet about selection of lower mercury fish, so they chose -- should they want to choose to try to lower their mercury levels.

No one contacted either Dr. Das or Dr. Israel about this. And I guess they felt comfortable with that.

Okay. Next slide, please.

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DR. LIPSETT: So with -- these are the 2 of the perfluorinated -- of the dozen perfluorinated compounds that were examined, these are the most common ones that are found in the general population. They were detected, not surprisingly, in all the participants. And PFOS is in the -- within the general population is a PFC usually found in the highest concentration, which was true here as well of all the perfluorinated compounds.

And you can see only 1 percent of the firefighters had levels that were greater than the 95th percentile of the general population. And the PFOA values in FOX were very similar overall to those in the general population.

Next slide.

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DR. LIPSETT: Okay. We have the Biomonitoring Exposures Study or BEST.

Next slide, please.

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DR. LIPSETT: So we started with a pilot study in -- well, it's intended to be in 7 Central California studies. We collaborated -- or are collaborating with Kaiser Permanente, their Division of Research. This is a stratified random sample of adult Kaiser members from the Central Valley. The stratification factors were age, sex, race, ethnicity, and sort of urban versus rural. This is based on the characteristics of their zip codes.

And we ended up not recruiting anyone from Yolo County. The counties that were recruited from were Fresno, Madera, Merced, Sacramento, San Joaquin, and Stanislaus.

The current status is we have recruited these 112 participants.

Next slide, please.

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DR. LIPSETT: And this is the current status. The squares in blue are ones that were completed since the last SGP meeting. And the ones in green, as with the

other status tables, indicate tasks that are still in progress.

Next slide, please.

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DR. LIPSETT: At the last Panel meeting, the Panel wanted to know about the response rates in the different counties. So I wanted to give a little bit of background about the recruitment process and the response rates. So recruitment was done county by county. And because of logistical considerations, we would start with one county and reach the quota there, then go to the next county.

And this is the process in the recruitment sequence going from Sacramento, San Joaquin, Fresno, Madera, and then Merced and Stanislaus. However, because of the low response rate in Merced -- or, excuse me, Madera, San Joaquin and Fresno were opened up again for recruitment. So basically individuals receive these letters with self-addressed stamped returned post cards. Then follow-up phone calls were made to people who indicated that they wanted to participate or that who -- people who didn't respond at all or people who wanted more information.

So I wanted -- I neglected to do this earlier. I want to do this now just to thank our collaborators at

Kaiser, Dr. Steven Van Den Eeden, who's the co-PI, Amethyst Leimpeter, who's the project manager, Gary Nabhan who's the phlebotomist and interviewer, and Denise Hodges who scheduled the appointments with the participants in the different counties. This is logistically a pretty complicated process, because the phlebotomists -- we have phlebotomists go to the individual's homes to collect the samples.

Okay. Next slide, please.

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DR. LIPSETT: Okay. So these are the numbers that were recruited in the different counties. And overall, there were 577 recruitment letters mailed out. A hundred and sixty-two people were not reachable. Either they didn't respond to the postcards or -- or, excuse me, to the letters or they were not -- their phone had been disconnected or they didn't respond to phone calls. And 35 of these 577 were not followed up, because we reached our goal in those counties.

So there were 380 individuals who were actively recruited. So the overall participation rate then was 29 percent, which is 112 over 380. If you want to have a crude response rate, it would have been 19 percent or the 112 over 577.

But if you look at the 29 percent, that's

comparable to the response rates that, you know, there are other statewide survey like the California Health Interview Survey. That's not bad. I mean, by county, the rates range from 12 percent in Madera to 45 percent in Merced.

Okay. I guess I should stop for a second while the computer reboots.

You should have copies.

PANEL MEMBER McKONE: No, but we have the paper version and I have my computer as well.

DR. LIPSETT: Okay. You've got it on your computer. Should I just continue then?

MS. HOOVER: Yeah.

DR. LIPSETT: Okay. So then on the next slide, it's one -- for those of you who can't see the other screen, it's, "Reasons Given for not Participating in BEST".

So for people who were reached by phone who decided -- who indicated that they would not participate, the reasons they gave were: They were too busy, they didn't have time. This is commonest reason. There are some people who said that they were -- okay. It's up again -- so that they were either too old or too sick and it didn't really matter if they had chemicals in their body. There was another -- some other people who had

mistrust of the process, of having problems with needles, or with having an unknown person, phlebotomist, the lab tech come to their house or they had some issues just related to having their blood stored or used and analyzed.

And finally, there was an issue about scheduling conflicts, because the phlebotomist was only going to come to their home during working hours. And so those people could not -- I mean people who couldn't manage that cited that as a reason for not participating.

Okay. Next slide, please.

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DR. LIPSETT: So we have also done some usability testing of the results return materials for the pilot BEST. The idea behind this is to test the individual participants understanding of materials, where they're given their mock results in several rounds, initially among English speakers and then among Spanish speakers.

And this is to just see how well they understand the way the results are being presented and what the reaction to these is. And this is a broader audience. As I said before, these are adults in Kaiser Permanente. And different from the MIEEP study who were pregnant moms or the firefighters study. So this is to test it in a broader audience.

Next slide, please.

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DR. LIPSETT: So a few of the findings among -- and this is among relatively few people though too. I don't want to sort of generalize the entire population based on this, but there was a misunderstanding that some people felt that if they had chemicals in their body that they would never leave their bodies, that they were there permanently.

And people also had difficulty interpreting graphs, and even with the concept of a median. So this term "median" is going to be replaced I guess in the next set of materials by the word "middle" instead.

And then so the next steps we're going to address these and some other issues in the results return materials, and then translate them and conduct testing with Spanish speakers.

Next slide, please.

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DR. LIPSETT: Okay. So that was all from the pilot BEST. And then we're going to have an expanded version of this with an additional 200 participants in the same counties. Basically, it's going to be the same overall design with stratified random sample among Kaiser participants in the 7 counties, same stratification factors. The recruitment is supposed to begin in

September and sample collection in October.

A few minor design changes that is going to be for both English and Spanish speakers, with materials in both languages. In terms of responding to the questionnaires, they will have a choice of doing them on-line or in hard copy.

And the biggest difference, or one of the biggest differences, is that we're not going to have phlebotomists going there now. The people are going to be going to the regional lab at their convenience to have -- you know, to give urine and blood samples.

Next slide.

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DR. LIPSETT: Oh, there we go. It's expanding.

Okay. Next slide.

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DR. LIPSETT: All right. So I want to talk about the -- next slide, please -- the results of our last Request for Information. It was issued to collaborators via the biomonitoring listserv in December 2011. We were looking for archived blood or urine samples from an ongoing study or a study that -- from a study conducted in California, with specimens collected after 2005 in a sensitive population, like children, women.

Well, that's what we ended up with, as well. And

then with adequate sample volumes that were -- where the samples were collected and stored in a way such that we felt that the samples had not been contaminated. So we received 8 applications.

And then the winners were -- next slide, please.

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DR. LIPSETT: OEHHA.

(Laughter.)

DR. LIPSETT: Congratulations, OEHHA. Actually, maybe we should collect samples from the entire Department.

(Laughter.)

DR. LIPSETT: Increase the numbers of samples for the labs.

Allan, what do you think about that?

CHIEF DEPUTY DIRECTOR HIRSCH: We can make that happen.

DR. LIPSETT: All right. Well, I'm going to continue on with this.

So the first is from the UC Berkeley study of environmental pollutants in childhood leukemia. The study population are mothers of children with or without leukemia. We're going to be looking at PBDEs, PCBs, and organochlorine pesticides. The research questions that we hope to help answer for this project are whether the

levels of these chemicals in mothers' sera correlate with their children's serum chemical levels or levels in the dust collected -- dust samples collected at home; and whether there are differences in the levels of these chemicals between moms of children with leukemia versus those without. And the PI on this is Dr. Catherine Metayer, as I said, in UC Berkeley.

Next slide.

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DR. LIPSETT: Second is CHAMACOS. The study population is children in Salinas -- Latino children in Salinas Valley. The chemical -- or chemicals will be analyzed are bisphenol A and related phenols, possibly including benzophenone or 4-t-octylphenol.

And the principal research question is to really examine the variability in BPA and these other phenols over time, but within and between 3 to 6 year old children. And the PI is Dr. Bradman.

The third -- next slide, please.

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DR. LIPSETT: -- is look at urinary PAH variability in relation to ovarian function in women in Orange County. We're looking -- our lab will be looking at 8 PAH metabolites to help address research questions about the variability of urinary PAH metabolites over

several menstrual cycles.

And secondly, whether the changes in these PAH biomarkers are associated with changes in markers of ovarian function. And Dr. Luderer is the PI for this project.

So finally -- next slide.

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DR. LIPSETT: -- or almost finally. Additional program activities. We have conducted a survey of environmental health priorities among California local health officers and directors of environmental health. Received responses from 41 individuals representing 38 counties and 2 cities. And 85 percent of California's population resides within these areas, but that doesn't necessarily mean that these responses represent how 85 percent of the population would respond, but nonetheless this is a good response overall.

The data summary report, which we presented to you in draft form at the last meeting has gone -- was finalized incorporating responses to your comments and suggestions. And it was sent up our Departmental and Agency chain for review. It is still under review. I don't know when it will -- the review will be completed, just to forestall any questions on that. If there is, I don't know.

And then finally, OEHHA is developing a video for the program. It's to increase our presence on-line. And so we have our own YouTube channel. The first video is going to posted in the next week or so, and you can look for a notice in the Biomonitoring listserv. This is going to be a brief overview of the program. And subsequent videos will highlight specific program activities, such as the Panel's deliberations, say for example, relating -- adding additional chemicals to the designated or priority chemical list.

So next slide.

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DR. LIPSETT: I just want to thank everybody in the Program for their contributions to this, and be happy to answer or actually to redirect any questions that I get from you --

(Laughter.)

DR. LIPSETT: -- because I'm not -- you know, as interim lead, I'm not as familiar with all the details of the Program as Rupa. So I don't want to create too high a bar of expectations for my responses at this point.

(Laughter.)

CHAIRPERSON LUDERER: Thank you very much, Dr. Lipsett. It's always exciting to hear about all the progress the Program has make since our last meeting.

So we have some time for some Panel clarifying questions, and then we were going to take public comments and then have more Panel discussion afterwards.

Dr. McKone.

PANEL MEMBER McKONE: Thank you. It's a very interesting update. Is that on? Is it working?

MS. HOOVER: Yeah.

PANEL MEMBER McKONE: I guess, are you going to get a TED talk? We should really try and get somebody who's really good to do a TED talk on biomonitoring and its role, right? That would really put it on the map.

But it's just a thought.

DR. LIPSETT: Well, this is -- you know, OEHHA is developing the video content, and, you know, we can have --

PANEL MEMBER McKONE: Yeah, but we have to get somebody at that organization to sort of be aware of this and then find like a really dynamic --

DR. LIPSETT: Okay.

PANEL MEMBER McKONE: I mean, you probably --

DR. LIPSETT: How about Dr. Luderer?

PANEL MEMBER McKONE: Yeah.

(Laughter.)

PANEL MEMBER McKONE: I don't know how you get into that, but those really draw tremendous attention

there. But that's -- I was just, in a way, joking on that.

I had a little more serious question about -- or just a clarification. So it looks like, among these, the FOX study is really ready for publication, right? You have enough results.

And is that -- you know --

DR. LIPSETT: A publication is --

PANEL MEMBER McKONE: -- maybe we went through this, but is it already in the circulation to a journal or --

DR. LIPSETT: No, it's -- the article is in preparation now by our staff, and then -- you know, I'm not a co-author on it, so I don't know the exact status of it, but I know it's being -- the initial draft is being prepared, and it will have to get cleared -- at least in our organization, it has to get cleared for submission to a journal. That's usually a couple months process at least, depending on how controversial it seemed to be.

But it will -- there will be an article that will be submitted hopefully some time this fall.

PANEL MEMBER McKONE: And part of the reason I ask is I really want to see the detail. I know we said not to --

(Laughter.)

PANEL MEMBER McKONE: -- with that, but personally, you know, I think it would be great to see how they really compare. I mean, you know, I looked at just the -- you can't do much with those high numbers, but, you know, it doesn't look that different from NHANES at the high end, but, you know, you don't -- I'd like to see what it looks like at all the percentiles.

I think that could be a really interesting topic. I hope it will go in like EHP or something. That's just my suggestion is put it in a really good journal with high impact.

DR. LIPSETT: Well, Dr. Das is one of the -- she's one of the co-PIs, and she's heard your suggestion. And, yeah, we'll -- I'm sure that she and Dr. Israel will select an appropriate journal for it, if it -- you know, it could be EHP. It could be, you know, one of the occupational medicine journals too.

PANEL MEMBER McKONE: And I guess -- so the other ones, the maternal-infant study is still not to a point of publication, right? That's still -- there's a lot of analysis still going on. And then similarly, the BEST study is really --

DR. LIPSETT: No where near --

PANEL MEMBER KcKONE: -- in the early phases, not even analyzed yet, but getting blood.

DR. LIPSETT: Right.

PANEL MEMBER McKONE: So we're not going to see a lot of it.

So I guess -- what I raise is this issue of how we communicate early results. I guess we just stick with this formula we had of compare some percentiles, so we don't reveal enough to forego publication by making it public.

DR. LIPSETT: Yeah. Well, let me just share with you some of my thoughts about it, because I haven't really been heavily involved with this program the past few years. But I think that we are going -- we're going to have to be getting samples piggybacking on routinely collected samples. And I've been talking with our genetic disease people about getting maternal prenatal specimens that are like a stratified random sample from throughout the -- several hundred thousand of these are collected every year.

This would mean that we would not be administering questionnaires to these -- you know, to people who are -- who are don't -- you know, who are coming in for routine medical tests. But we could be analyzing these and providing, you know, results in a much earlier time frame both to the Panel and to -- well, basically these are things that would not necessarily end

up in a peer-reviewed publication, so we would have results that we could present to you on an ongoing basis for like looking at trends in different chemicals.

That's the direction that I would like to see us move, over the course of the next couple of years. But in using these models of doing these community studies, where we get participants where we are committed both ethically and by the law to return results to them and then to develop these publications, it's a protracted process.

And I found -- I've only found out recently -- I wasn't really aware of this in detail about how many times the staff have to go back to the IRBs during the course of these. It's like -- it's unbelievable, you know, 10, 12 times over the course of one of these studies. So that adds a whole other component of delay to the process too.

CHAIRPERSON LUDERER: Dr. Quint.

PANEL MEMBER QUINT: Yeah, I just had a question about the high values, the ones that were, I think, for PFOS in the FOX study. I know there's no -- you know, there isn't a health impact that we know about from having a high PFOS level. But is there any attempt or any possibility of trying to find out or talk about what exposures those firefighters may have had compared to their other members of the cohort that cause their values to be higher, even though we don't have a -- you know,

like mercury and lead, we don't have a sort of danger level too that would be warning -- you know, that we'd want to communicate that there's a health concern, as you did with mercury.

DR. LIPSETT: I can't -- I know PFOS was used in Scotchgard. And I don't know what other kinds of products these firefighters might be exposed to, but maybe Dr. McNeel can answer this question.

This is Dr. Sandra McNeel from the Environmental Health Investigations Branch.

DR. McNEEL: Thank you. Yes, as part of the data analysis, we are looking at factors that we identified either from our exposure questionnaire to the firefighters or some of the different types of materials that are present in the fire stations.

And, you know, that unfortunately is part of the material that we're putting in this article. So I didn't feel, you know, we could discuss it now. But as soon as, you know, we get the -- you know, get the article accepted and in press, we'll be a little bit more able to discuss that.

PANEL MEMBER QUINT: Yeah, I just -- because we want to keep our eye on the fact that the exposures are what we are sort of aiming to reduce here.

So the other question I had had to do --

PANEL MEMBER McKONE: Can I get a clarification on this. I'm concerned about -- so why were they high? What's the basis for saying they're high?

I mean, 6 percent were above NHANES, 95.

PANEL MEMBER QUINT: Right, but they were higher than other people in the cohorts, so I'm just wondering if -- there is no high-low, because we don't know what high and low means here. But I'm just saying for -- if people -- in an occupational study, you're looking at people who have similar sort of experiences in terms of being firefighters.

So I'm just wondering if there are differences in jobs or whatever that would cause some values to be higher than others, because that gets us closer to exposure and the biomonitoring results. That's all. It's not that it's necessarily of concern, but it just tells us more about where these chemicals are coming from, which is what I'm interested in.

The other question I had was about, you know, the publication of journal articles. For people who are not in the Department, I mean I know there is protracted sort of process. But for collaborators who are university or Kaiser, is there a control over when those publications go out or is that part of the agreement when the collaboration is -- when you have a collaboration?

DR. McNEEL: Yes, a certain amount of that as far as, you know, who is going to be the first author and responsible for, you know, shepherding the article through publication, are some of the negotiations that go into the collaborations. So, for instance --

PANEL MEMBER QUINT: So timing?

DR. McNEEL: Yes. And also, for instance, some of the MIEEP articles will be coming out through UCSF rather than through -- you know, through our administrative review.

DR. LIPSETT: Thanks.

CHAIRPERSON LUDERER: Okay. So I think what we'll do now is we do have one comment from a member of the public, and then we'll go back to the Panel for further discussion. We haven't received any additional comments, I assume, Amy?

MS. DUNN: Right, no other comments.

CHAIRPERSON LUDERER: All right. So we have one commenter. And this is Davis Baltz from Commonweal.

MR. BALTZ: Well, good morning, everyone. Nice to see you again. I missed the last meeting. I'd also like to welcome Dr. Cranor to the Panel. And I know you've been interested in biomonitoring for a long time, and I'm sure that you'll make some wonderful contributions.

His book, *Legally Poisoned*, is well worth reading, if you haven't. And I don't know how you get on Stephen Colbert's guest list, but I think that would be a great topic, if you can figure out how to get there.

(Laughter.)

MR. BALTZ: Also, I'd like to extend my thanks to Dr. Das for her service for the last 3 years, and welcome Dr. Lipsett back into the role. I'm sure he has some mixed feelings about that, but it's certainly in capable hands.

(Laughter.)

MR. BALTZ: And then finally, I think Dr. Alexeeff has been named Director since our last meeting or at least since the last one I've attended. So congratulations on that.

Well deserved, and --

(Applause.)

MR. BALTZ: You did a fine job with that swearing in. I don't remember that being quite so involved.

(Laughter.)

MR. BALTZ: And you didn't bungle it like John Roberts.

(Laughter.)

DR. LIPSETT: That's because there wasn't a Bible.

MR. BALTZ: So as all of you know from past comments I've made, we're, you know, looking forward very much to the actual release of results from the MIEEP and FOX studies, as soon as they're available. And, you know, in particular, I think the FOX study is going to be able to attract some media.

As most of us know, the Governor has taken a pretty bold step on flame retardants just in the last couple of weeks. And I think there's going to be a lot of interest in the Biomonitoring Program's results when these are reported. And NGOs, of course, are going to be interested in that data as well. And we'll be happy to, you know, do what we can to make sure it gets out into the public realm.

And, you know, last meeting, the Panel recommended that the non-halogenated aromatic phosphates be designated. And that, I think, to me shows how you've been looking forward. And as the Department of Consumer Affairs develops their new standard for flammability in upholstered furniture, it's going to be important to look at what alternatives may be proposed to meet the flammability standards. It maybe is going to be a smolder standard.

But just the point being that flame retardants are going to be on the radar for a while now. And so,

let's continue to keep that in mind. And to the degree that more data can be provided and studies undertaken, I think that will benefit all of California, and, in fact, of course the country, because of California's role in spreading these chemicals around the world.

And then I think just the last thing to say at this time is Dr. Lipsett mentioned in the little budget slide that he feels fortunate to be flat funded. And, you know, that kind of speaks volumes, but it is true that the Program has not taken cuts, which looked like might be possible for a while.

And as we go forward with limited resources, we'll do all we can all of us to figure out how more resources are come into the program, but to continue to focus on strategic forward-looking initiatives that can have some impact without, you know, having to draw in resources that aren't there I think will be important, at least in the near term.

So looking forward to the meeting today.

Thanks.

CHAIRPERSON LUDERER: Thank you very much.

Now, we have time for additional Panel discussions, comments on the presentation.

Do any Panel members have any questions or comments?

Dr. Bradman.

PANEL MEMBER BRADMAN: I just have a quick question. Maybe this is for Dr. Lipsett. Is there any information on the survey of Environmental Health Priorities? And is there any tidbits you can provide us or plans for summarizing that? That was an intriguing survey and I think could be very important.

DR. LIPSETT: Yeah. I think we can provide that at the next meeting. The result -- these results just really came in over the course of the last couple months and staff are just beginning to analyze them at this point, okay?

PANEL MEMBER BRADMAN: Okay.

CHAIRPERSON LUDERER: Actually, Dr. Lipsett, I have a question as well. I was very interested in your comment about using some of the more population based or medical samples that are routinely done to do some biomonitoring where the results can be published more quickly. And I was wondering whether included in that group might be some of the blood spots, because I know that the Environmental Health Lab had done some very exciting work being able to measure -- biomonitor some of these chemicals in blood spots and whether that might be a possibility to include those?

DR. LIPSETT: Yeah. Our lab did do some initial

testing of the blood spots, in particular looking at flame retardants. And Dr. She could address, you know, some of those initial findings now. But one of the things that we found was that for flame retardants in particular the contamination is so ubiquitous that the paper on which the blood spots were collected were contaminated with a variety of these flame retardants.

So at least looking at those kinds of POPs, these blood spots would not work. And also, as you know, the volume is really minimal. They can be used to look at metals. And I think New York has done this, has looked at PFCs.

But, Dr. She, would you like to try to respond to Dr. Luderer's question.

DR. SHE: Just like Mike mentioned, we do need to work more on this project. We currently have a APHA fellow, Dr. Simon Ip. And then he will reapply the APHA fellowship based on this project. And gladly APHA just extended his fellowship for another year, so we will work more, and then we will get more definite answer back to the Panel.

Thank you.

CHAIRPERSON LUDERER: Thank you. And I think it's a very -- it would be a very exciting opportunity, obviously because it's a sensitive subpopulation, and

there are so many samples, albeit very small samples with the infant blood spots.

Yes, Dr. Cranor.

PANEL MEMBER CRANOR: Just a quick question about the firefighter's study. One of the things, just looking over the list that's not here, and I'm kind of curious about it, the byproducts of combustion, furans and dioxins, that you would expect some of these substances to be transformed, some reason they were all left off the list?

DR. McNEEL: Sandy McNeel.

Yes, we were actually very interested in trying to include those particular chemicals, especially for this population. But as we looked into the logistics of being able to -- our labs cannot analyze for those chemicals, so we would have to send them out to a commercial lab, which is quite expensive.

And it also involved -- to get a reasonable panel of the dioxins and the furans required about 50 cc of blood. And it -- over and above the 40 cc that we were already collecting for the panel for the rest of our chemicals.

And so from the standpoint of, you know, collecting blood from active firefighters who might have to go out immediately after that to a call, our

collaborator PI, Dr. Israel, is not really very happy with taking large volumes of blood from the firefighters. So it was a combination of blood volume required for the analyses and the cost of getting those done.

PANEL MEMBER CRANOR: Thank you.

DR. McNEEL: But, yes, we're hoping that laboratory techniques will improve to the point that they require a smaller amount of blood and hopefully the price gets cheaper.

Thank you.

CHAIRPERSON LUDERER: Any additional questions or comments from Panel members regarding any of the other studies, the BEST studies or the RFI projects?

Okay. I think we can move on then to our next topic, which is the laboratory update. And I'd like to introduce Dr. Jianwen She, Chief of the Biochemistry Section of the Environmental Health Laboratory Branch at CDPH. And Dr. Myrto Petreas who will be speaking after Dr. She who is Chief of the Environmental Chemistry Branch and the Environmental Chemistry Laboratory at the California Department of Toxic Substances Control.

Dr. She.

(Thereupon an overhead presentation was presented as follows.)

DR. SHE: Thanks, Dr. Luderer. And good morning

to the members of the Panel and the audience. I'm Jianwen She, Biochemistry Section Chief in the Environmental Health Laboratory. This morning I would like to update you on what the lab has been working on since our last meeting in March 2012.

Next.

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DR. SHE: First, we are pleased to welcome a new member of our team, Mr. John Chen. Mr. Chen is the new Laboratory Information Management System Specialist. He was hired from within CDPH and comes to us with lots of valuable experience.

Formally, Mr. Chen was the Assistant Database Applications Manager for another lab in CDPH. He has a Bachelor's degree in engineering and a Master's degree in Computer Science. And I think he's not here today.

We currently have 2 Environmental Laboratory Scientist positions open. One of the scientists, Dr. Rana Zahedi, has been transferred to State funding and still remains in our group. The other Laboratory Scientist, Dr. Dongli Wang, has left our group, and I would like to say thank you and farewell to him for his contribution to the program. We are actively recruiting for both these openings.

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DR. SHE: This morning, I will be presenting updates on methods in production, under validation and under development.

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DR. SHE: Currently, we have 7 methods in production. Today I would like to highlight the analyte additions to the OP specific metabolite.

Would you click that.

Thank you.

Yes, we add 6 new chemicals in this groups, and -- thank you.

Next slide, please.

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DR. SHE: The 6 additions to the OP specific metabolites, pyrethroids, and herbicides methods are listed in blue. EHLB method captured all of the listed analytes, but I would like to point out that the 6 asterisked chemicals are a Biomonitoring California priority.

Next slide, please.

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DR. SHE: Our arsenic speciation method is currently under validation. Analysts noticed separation issues between arsenobetaine and arsenic-III as peak number 2 and number 3, and the complication with the

stability of arsenic-III, since our last update.

The chromatogram here shows the improved baseline separation of arsenobetaine and arsenic-III by LC-ICP-MS. Arsenobetaine is labeled at peak number 2. Arsenic-III is peak number 3. Arsenobetaine is a common form of arsenic found in many different types of fish. And arsenic-III is a highly toxic chemical; achieving baseline separation is essential in determining the level of either chemical in urine.

To accomplish the separation between peaks analysts have adjusted the mobile phase pH and they have changed the diluent as well. This also has stabilized arsenic-III. Both the diluent and the mobile are degassed by argon and the mobile phase is kept under nitrogen to minimize oxygen exposure and the oxidation of arsenic-III.

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DR. SHE: We have made a significant progress in our metals panel for urine. Shown here are results from NIST standard referencing materials, New York State PT program and INSPQ PT for arsenic, cadmium, mercury and the lead in urine. The table shows the target value for each of the standard reference materials and our PT samples.

Highlighted in green are our reported results. I hope you can see the green ones. As you can see, we are very close to all of the targeted values and have passed

all 3 programs.

Please click one more.

So we passed all through PT program.

Next slide, please.

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DR. SHE: Currently, under development is our perchlorate method. And also to improve our overall level capacity, we also developed automatic data review procedure. We call it ADR. And also tried automation the sample preparation, because we cover the -- so far, we covered the most analyte method development already. So we have time to work on to improve the throughput.

Thank you. Next slide.

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DR. SHE: Shown here is our initial demonstration of capability for the perchlorate method. The table shows, second column, expected values, and the third column our average measured values. And also the precision on the number 4 column for each QC samples and the 2 NIST standard reference materials. You can see we are very close to all of the target values. Our precision is excellent. We aim to validate this method very soon.

Next slide, please.

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DR. SHE: As I mentioned, we tried to automate

our data review process. From this slide, I will not go over the detail. You can see detailed review process is time consuming and very complicated. For example, our data review process consists of peer review, quality assurance review, supervisor review, and completing the data package.

You can see the complexity of this process. Our goal is to automate some of the items on the track list. This will help us efficiently speed up the data review process.

Next slide, please.

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DR. SHE: The next 2 slides display our lab sample analysis data. You see a completed status reflects the labs result or it is submitted to EHIB for further evaluation and data return.

For the MIEEP project, column number 2, sample analysis is completed for all organic analytes in urine, but some of them are still under review. For example, DAPs and the hydroxy-PAH is currently under QA review.

For the FOX project, column number 3, DAP analysis is completed for about 80 percent of the samples. Other analysis is complete. And some of them is still under peer review.

For the pilot BEST Study, you can see we have

received 110 blood samples and 109 urine samples. Blood sample analysis for metals is complete, and the results have been submitted to EHIB for all of the 110 samples.

Next slide, please.

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DR. SHE: This is continuation of the last slide.

And next one, please.

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DR. SHE: Our laboratory is enrolled in several proficiency testing programs. And most recently, we submitted the results for round 49 of the German External Quality Assessment Scheme, or called G-EQUAS. We measured the different kind of chemicals, but the list is a lot bigger. This program only have a very few chemicals for each kind of analysis.

For example, they have 3-PBA, bisphenol A, mono-benzyl phthalate, mono-n-butyl phthalate, 1-naphthalene and 2-naphthalene.

Please click one more.

And we are very happy that we received notice all our measured value for within G-EQUAS tolerance range and we passed this PT program.

One more click.

Thank you.

We have submitted data and we are waiting results

for the following CDC PT programs. And the reason is the CDC PT covered much more chemicals. So, for example, we have the arsenic speciation, OP specific metabolites, phthalate metabolites, hydroxy-PAH, and the environmental phenols result submitted to CDC.

Next slide.

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DR. SHE: For the future, we are focused on the complete MIEEP data review, and we continue to analyze FOX samples, data review, and also for pilot BEST Studies. And as Dr. McNeel mentioned, we also have the RFI samples coming. We will work on the RFI samples.

Analysts are working to complete the method validation for arsenic speciation and perchlorate. We aim to automate sample preparation and data review procedures. And finally, we also try cross-training employees to improve the levels of throughput.

Next slide.

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DR. SHE: I want to thank all of my team members for their excellent work and thank you. And I'm ready to take some questions.

CHAIRPERSON LUDERER: We have time for some clarifying questions from Panel members?

And we'll have more time for more discussion

after Dr. Petreas presentation as well.

Dr. Cranor.

PANEL MEMBER CRANOR: Yes. I think I would like some clarification of the acronyms on the last chart and maybe the earlier one. I just don't recognize Q-EQUAS and QAs and OCs and things like that.

DR. SHE: Okay. I should spell out, for example, G-EQUAS stand for German External Quality Assessment Scheme. Very few outside quality assessment program exist for nonpersistent chemicals. This is one of them. And both the CDC and the other Biomonitoring Program use them to judge and us to judge how we perform it to provide a standard with. And QA stand for Quality Assurance. QC is Quality Control program.

And, for example, we also have our internal quality control samples to make sure we have good precision from batch-to-batch run. And then we also use our external quality control or quality assessment program to guarantee that our accuracy matched the other labs. We do not have a system error in our measurement.

PANEL MEMBER CRANOR: Okay. Maybe one follow-up question on the earlier slide. Must be about Slide 7 or something like that.

Now, I need my glasses.

You have target values. Those were stable values

that somebody else had identified and then you were comparing your results to those, is that correct?

DR. SHE: Yes. The target value established by the external institution for their standard reference materials and then they have tolerance range. And so we try to compare our lab merit value to assess the similarity or closeness of our merit value to the target value.

PANEL MEMBER CRANOR: Thank you.

CHAIRPERSON LUDERER: Okay. Thank you. Yes. It's actually very great to always see how well your QC and quality control is working, that, you know, the precisions are really excellent that you presented. So thank you.

Dr. Petreas.

Oh, you have a question.

OEHHA DIRECTOR ALEXEEFF: Yeah. George Alexeeff. Maybe just a follow-up to what Dr. Cranor was saying. So maybe on that slide 7, just for the record, if you could indicate, you know, the standard organizations what NIST stands for and what MIST stands for.

DR. SHE: So NIST standard for National Institute of Standards and Testing. Actually, NIST to have a different level of the quality control program, for example, that have certified value, reference value.

That's one of the very strict programs. And they have tended to have very little tolerance range. If your program can pass this, then it's very good.

And then, for the other programs, like PT programs for New York State, the third one you ask I would ask Dr. Ryszard the INSPQ what's that program by the way?

Ryszard, do you have --

DR. SHE: The last one is INSPQ.

DR. GAJEK: My name is Ryszard Gajek. Richard is my name I use here in the United States.

Well, we participate in few so-called performance testing schemes. And these are usually conducted by some laboratories, pretty famous known standard reference laboratories. And New York State Department of Health, this is the second mark, which is universally recognized as a reference lab, and we participate in this program.

The last one Quebec, how we call it. It is Canadian based program. It is also a known reference now.

DR. SHE: Thank you.

CHAIRPERSON LUDERER: It's the Institut National de Santé Publique.

(Laughter.)

DR. SHE: Thank you very much.

CHAIRPERSON LUDERER: Which is The Public Health Institute.

DR. SHE: I guess the next best -- next time is the best we should spell it out.

CHAIRPERSON LUDERER: Dr. Petreas.

(Thereupon an overhead presentation was Presented as follows.)

CHAIRPERSON LUDERER: Thank you very much, Dr. She.

DR. PETREAS: Good morning, everyone. So I will start my update for our Department's participation to the program. If we can go to the next slide, please.

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DR. PETREAS: And wait for both screens. So I'll follow the usual sequence talking about staff and resources, training. Where do we stand on our capabilities for analyzing chemicals on the priority list, and where do we stand with our progress with the field studies, and then refer to other relevant activities.

Next slide, please.

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DR. PETREAS: So I'll start by reminding you who's doing what in our lab. And I'll start with our 2 initially funded by the initial bill, the California Environmental Contaminant Biomonitoring Program, we have Dr. Miaomiao Wang who has spear-headed the PFC analysis, the perfluorinated chemicals, and Judy Wang, who has done

all the work so far on PBDEs, PCBs, and organochlorine pesticides, the so-called POPs, persistent organic pollutants.

Then with the CDC cooperative agreement, we had -- we added staff. And we have Dr. Tan Guo who also works on POPs, Dr. Harwani who's working on PFCs, and Dr. Sabrina Crispo-Smith, also working on POPs, but also spending time in streamlining methods and trying to increase throughput and productivity. POPs are very elaborate and sophisticated and time-consuming. So the more time we can save the better for everyone.

So we do have depth, because one person cannot run one method, so we have at least 2 people doing the same work, so they can help each other and be more productive.

We have a 4th opening, a 4th position on the cooperative agreement, and we're actively recruiting to fill that position.

Now, these people will not be able to carry the work without the in-kind support from our State staff. And this is several in-kind support, including supervision, because none of the funded people are supervisors. And starting from sample management and aliquoting and instrumentation work, and also actual analysis on POPs and PFCs. But then all the new methods

on BFRs, new brominated flame retardants, the metabolite work, bromophenols and BPA. And, of course, QA/QC is part of the infrastructure where there are State staff that provide to the program.

Next, please.

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DR. PETREAS: So we believe in training. And with every opportunity we bring vendors or send people for training. The most recent was with the acquisition of our Agilent GC-MS. We had the in-house training for the staff. And then 2 of our staff were sent to Atlanta in May to participate in a 4-day hands-on training at Agilent. And try to piggy-back on that trip and save on travel expenses, we coordinated to have a visit to the New York Department of Public Health, and then onto CDC for training, where our staff met and were trained by both colleagues in both institutions.

Then one of our staff went to Washington. She was invited to a conference, but then spent a day at the Washington Department of Public Health. And we're expecting one person from them to come to us in August.

And from staff, that was the most effective and they really like talking to each other and being at the lab and talking jargon and touching the instruments and solving problems. So we tried to, whenever possible, to

help that.

And, of course, our Department has the ECL seminars. And we participate in the APHL webinars in every opportunity we have for free training.

Next, please.

Next slide, please.

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DR. PETREAS: So these are 2 of our staff, Dr. Darcy Tarrant and Dr. Sabrina Crispo-Smith next to the Agilent instrument that they got training on.

Next, please.

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DR. PETREAS: Quality Control. Dr. She went into detail. You know, how important quality control is. We passed the CDC proficiency test for perfluorinated chemicals. This is the only test that we were given from CDC so far. And we look forward for more of those.

We participated in an unofficial exchange with UCSF on BPA in serum, and that went pretty well. And we have plans to participate in all international proficiency testing programs that are available. As Dr. She referred, not all the analytes have reference values, and it's very hard to find programs that cover the things we do, but we are ready to participate in the German EQUAS. I didn't notice the spelling of that. Anyway, that international

program the deadline is in April so -- in September, so we plan to participate, and anything else available. But again, the problem is there aren't too many available programs.

So what we do is we use in-house QC, and the NIST, the National Institute for Standards and Testing, has some certified material. We're talking about serum here. And in every batch, we use these for internal controls to see how well we're doing for the chemicals that are available with certified values.

However, because this is real blood. And even though they may not be certified values, if chemicals are present, we continue monitoring them. So we don't have something to contrast against, but we can trace our own internal ability. If we find the congener that has no certified value, or pesticide with no certified value, we still track it and see how well we're doing over time.

And we have an elaborate internal quality management program which makes us test everything pretty well.

Next.

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DR. PETREAS: So in terms of capabilities, if you remember from my last presentation in March, this slide hasn't changed. So we have no major break-throughs or

additional chemical classes that we have developed methods on. We are mostly in production mode in every -- in all of these classes to generate data from the samples we have. We have made a lot of progress in switching our hydroxy metabolite technique from the GC to the LC. And I hope to present things to you next meeting. But mostly we're in production.

So if we can go to the next slide.

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DR. PETREAS: So this is where we stand on the various studies we have. So it's yellow. My screen was green. So green was done and red was not done, and yellow was in between.

So with the MIEEP study, everything is done. With the FOX study, again everything is done with the exception of 2 samples that have to be repeated for the PCBs and PBDEs. And we're waiting for our instrument to come back again, so we can run them, and then we can release the data.

Our California Teachers study. This is our biggest study. It's over 2,500 samples to be expected. This is an ongoing study. We have received 900 samples so far, and we have processed and aliquoted 637, which means lipids have been measured, thyroid hormones have been reported. PFCs have been reported to our colleagues just

this week on 320. Our collaborators, our principal investigator, just received those samples and we're ready to send also to our Biomonitoring Program. We have made progress with the PCBs and PBD analysis on 100 of those, but we have not released them yet.

The pilot BEST, we you received 110 samples. All of them have been aliquoted and sent for lipids, and we started working on the PFCs. So we have not started on PCBs, pesticides, or PBDEs on the pilot yet.

The last column is the study that Dr. Lipsett referred to it. This is in collaboration with Dr. Metayer. It's the UCB childhood leukemia study. And we'll be looking at 50 maternal serum samples. And we spent some time yesterday with the principal investigator trying to select whom to measure, so we can get more out of this pilot study.

The aim is to generate interesting data that will allow for more funding, so both the principal investigator can explore more issues, but also the problem will be more sustainable in the future.

Next slide, please.

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DR. PETREAS: So I'm going to refer to some other activities not directly funded by -- or related to the Biomonitoring Program, but can be of benefit to the

Program.

Next, please.

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DR. PETREAS: So the Teachers Study. Just to remind you, this is in collaboration with the Cancer Prevention Institute of California, UC Irvine, University of Southern California and City of Hope. It has been funded by the California Best Cancer Research Program.

And it involves -- I mean, this substudy involves 1,300 cases and 300 controls from the -- throughout California. We started getting blood samples. The collection would go on for another couple of years. We have approximately 900 samples, and we, as I indicated before, are in the process of analyzing for PCBs, PBDEs, brominated flame retardants, perfluorinated chemicals, and we're sending to a clinical lab aliquots for thyroid hormones and lipids.

Again, the hypothesis is the presence of any of these chemicals and outcome of breast cancer.

Next slide, please.

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DR. PETREAS: Okay. Changing gears here. I want to go and tell you about our progress with the dust. So we have validated protocols to measure PAHs, PCBs, PBDEs, BFRs in dust from vacuum cleaner bags.

And we applied this technique primarily to our childhood leukemia study where we measured over 200 homes twice, and we applied the same technique to the firehouse dust from the FOX study.

Next.

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DR. PETREAS: So this work has been presented already. We have 2 times measured. So we have vacuum cleaner bags from 200 houses sampled twice. Once in the early stages from 2001 to 2007, and then the second time, that's when we got involved, in 2010. We visited again the homes and retrieved the bags.

So now that all the data are in, we see no statistically significant decrease in penta, octa, or deca-BDEs from the 2 samplings. Originally, there was some indication that maybe the octas were dropping, but that's not so. Now, that we have all the data in, we see -- and the conclusion is that even though chemicals were banned or restricted, these persist in residential dust for many years after any production or any other intervention.

So even though we're very happy with the -- probably, the flammability standard will change and no more chemicals will be introduced, we have to deal with all the legacy, and the tons and tons and thousands and

millions of devices and products that are in our houses and have to be wasted eventually. So waste management is a big issue here.

So in addition from this study, we found evidence of deca-BDE debromination. That's something that the industry refuted, but now we have good evidence that it breaks down to the nonas and the octas and so forth.

Now, this is work from Todd Whitehead, who did his dissertation with us. And looking at the data, in addition to differences by income, which has been already shown by Ami Zota and others, he sees race and also geographic region, which is very intriguing, because homes from certain -- we think has to do with the climate. So it's Sacramento County area or Sierra. So those houses, the dust is much higher than the Bay Area or other places.

So given what we have on the questionnaires, which aren't too much, tried to ask the question could it be with air-conditioner use or hotter environment or something with the micro-climate of indoor air quality.

Next slide, please.

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DR. PETREAS: We were even more excited, because now we measured the new BFRs in dust. And what I'm showing here is the most prevalent that we found are 2 components of Firemaster 550, which is a replacement of

PBDEs, and some other chemicals. I'm not going to spell out their names. But it is the most prevalent, but also we have trace levels of others. All of them are brominated, and all of them are known to be used as flame retardants.

Interestingly, we have measured these both in the firehouses and in the second round, the most recent visit to the houses. And we don't see much difference, so similar levels and patterns in homes and firehouses.

Next slide, please.

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DR. PETREAS: So this is a slide, Reber Brown of our staff presented recently. These are BFRs in house dust in California in gray, as compared to published data from Heather Stapleton for Boston-based homes collected in 2006. So just be aware that the timing may have a difference here. So California data were collected in 2010, Boston in 2006 were much higher, but it may have to do with timing.

But nevertheless, the important thing is we are in the same ballpark. We can measure them and they are there and we have more work to do with these.

Next.

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DR. PETREAS: Our Department is putting big

emphasis on safer consumer products. So our lab has been dealing with these issues for years. So in terms of phthalates in children's items, we have developed a method -- a screening method to measure phthalates in plastics, and this is already published.

And now we're in the process of developing an LC-MS method for screening BPA and BPS in receipts and canned food liners. So we tried to be ready whenever and if we were asked to do anything more with the consumer products that are within our area of expertise.

Next.

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DR. PETREAS: And if you have any questions?

CHAIRPERSON LUDERER: Thank you very much, Dr. Petreas.

Dr. Cranor, do you have a question?

PANEL MEMBER CRANOR: Several different unrelated questions. So I'm the new kid on the block, so I don't know a lot. Perhaps you can help me.

When you have your -- for your validated methods, I know that the Centers for Disease Control has a count of -- you know, I don't know. I haven't looked at their website recently, but last time I looked it was like they counted 219 substances that they had pretty reliable -- they reliable methods for. On your slide, again it's

probably slide 7, how do you count those substances? How many do how -- how many can you reliably detect?

DR. PETREAS: What I'm listing there are the chemical classes. If we take the example, the first line, PCBs. It's 1 class. And in those, we can measure 15. I'm showing 15 congeners of PCBs. In addition, we measured 10 metabolites of PCBs with 2 different techniques.

PANEL MEMBER CRANOR: So does that count as 15 or 25?

DR. PETREAS: It counts as 15 PCBs and 10 metabolites of PCBs. They are 2 separate methods.

PANEL MEMBER CRANOR: Okay. Just how does that compare with CDC? I don't know. I'm just curious. How do they count things? I'm just interested in numbers at the moment?

DR. PETREAS: They probably have more PCB congeners validated. We measure the major ones, the ones we can -- there are others, smaller prevalence -- lesser prevalent.

The 10 metabolites that we measure are not yet on the CDC list, so there's some -- not entirely overlap with what we do and what they do.

PANEL MEMBER CRANOR: Does your -- to what extent does your list overlap CDC, and to what extent does it

supplement CDC?

DR. PETREAS: Okay. CDC is big.

PANEL MEMBER CRANOR: Yes, of course.

DR. PETREAS: So we try to do as many as they can, and that's why these are the classes we selected. Organochlorine pesticides, PCBs, PBDEs we overlap. They may do a few more within each class, but that's what we focused here and we can report.

The metabolites, in particular, in this case and the other brominated and chlorinated flame retardants, even though they're doing some work, they haven't been on the list. So if you refer on the list and the report, they're not reported yet. So we may be reporting for our program before they do.

DR. LIPSETT: I can supplement.

PANEL MEMBER CRANOR: I have another question.

DR. LIPSETT: I can supplement her response a little bit.

PANEL MEMBER CRANOR: Oh, sure.

DR. LIPSETT: So Dr. Cranor, the way that this Program is set up with the legislation initially, we were starting with the universe of chemicals as a designated list, so we can biomonitor any of these so-called "designated chemicals". And the initial list was the CDC list, and it continues to be that. As CDC expands its

list, those are all kind of automatically designated chemicals. And the Panel is given the authority to add to the designated list and also to help us with what are called "priority chemicals".

So we have a number on our list, like some of these alternative flame retardants, the newer ones, that CDC does not do, but they're -- in principle, we could, you know, analyze anything that's on their list, but that would be kind of an inefficient use of our resources.

PANEL MEMBER CRANOR: Sure.

DR. LIPSETT: We're a much tinier program than CDC's.

PANEL MEMBER CRANOR: Of course. Do you have any opinion about the value of analyzing the same substances in California that CDC evaluates versus supplementing what they did, sort of extending -- helping the total universe of exposure to be extended?

DR. PETREAS: I mean, this Program started with the low-hanging fruit. This is what we could measure, so we started measuring that.

PANEL MEMBER CRANOR: Yeah, sure.

DR. PETREAS: Now, we expanded, because we stumbled upon some things when we found very high levels of PBDEs in California. That was very important, so we want to explore more of that in the flame retardant issue

in general.

I suppose after years and years, if we find that our levels are not so different than NHANES, maybe we can drop some classes and put more emphasis on other classes, but not yet. This is still -- we still need to know what's out there before we can make these decisions.

PANEL MEMBER CRANOR: Right.

DR. LIPSETT: And one other hope for this Program, with some of the funding that we will be receiving from CDC in 2014, is that Myrto's lab will be getting a time-of-flight spectrometer that will allow for non-targeted screening of -- and so we'll be able to -- I guess -- I know it's not this simple. It's not this simple, but to look and see what's actually there. And rather than deciding ahead of time what we're going to be looking for, so we can see if there are new chemicals that are showing up that we weren't aware were an issue with respect to exposures. And this is another difference from CDC's program.

PANEL MEMBER CRANOR: One more unrelated question. On slide 12, you said that -- wait. Is that the place?

I think you did say that the -- somewhere -- deca-PBDEs were losing bromines. What do they particularly go to or is there any typical degradation

product?

DR. PETREAS: By losing bromine, so the deca, which means 10 bromines, they go to the nona, octa, which are not in the manufacturing process. They're not part of the commercial product. So by -- if we see those congeners, the nonas and the octas, they can only come from deca losing bromines.

PANEL MEMBER CRANOR: Okay.

DR. PETREAS: And eventually they go all the way down to hexas, which are the more persistent ones.

PANEL MEMBER CRANOR: To which?

DR. PETREAS: Hexa, the 6.

PANEL MEMBER CRANOR: Okay. They don't go to the penta likely, or do they?

DR. PETREAS: When we say penta, you may refer to the commercial product of penta. There are many. Penta means 5, so having 5 bromines. There are many of them having 5 bromines. The penta, which is used in foam, which is the most notorious, has some penta, some tetra, and some hexa congeners in the mixture. The longest lived are the -- it's PBDE 153, which is a hexa.

So eventually, if I can make the analogy, with PCBs, the most persistent is PCB 153. And PBDEs are very similar structurally, so the belief is eventually, once things get to steady state, if we go through the diet and

not so much with hot-spot exposure, we all will have more PBDE 153 than what we see now, because that's the most long lived.

CHAIRPERSON LUDERER: Dr. McKone.

PANEL MEMBER McKONE: Can I, yeah, follow up on the same topic. So if everything above 6 is going down to 6, but 6 is banned because it's persistent, aren't the non-persistents just cascading back down to a persistent?

DR. PETREAS: Yes, exactly. So that's the fear that --

PANEL MEMBER McKONE: Did that logic ever come up in the regulation --

(Laughter.)

PANEL MEMBER McKONE: -- of saying we're going to go to a non-persistent one, but it just turns into a persistent one?

DR. PETREAS: The argument all along had been that deca is like a stone. It doesn't get absorbed. It doesn't get broken down. It just gets excreted very quickly.

PANEL MEMBER McKONE: Okay. Deca. And it doesn't break down to the lower --

DR. PETREAS: Well, we see that it does.

PANEL MEMBER McKONE: It does. So it is --

DR. PETREAS: And not only us. I mean many

people have reported that.

PANEL MEMBER McKONE: I actually had another question on Slide 12, since it's up. So you had brought up this issue, and I don't know how much of the details you have on all this. I might have to ask Todd, but I thought I'd bring it up, is that the Bay Area was different from Sacramento, right? You said there was a significant difference from the inland versus the coastal?

DR. PETREAS: It was Sacramento and Sierra counties, which he lumped together some foothill counties. So it's warm weather. I mean, that's what the, at least, initial thoughts are. I mean, we're still in brainstorming, so he may want to talk with you if you have any suggestions.

PANEL MEMBER McKONE: Right. Well, the reason that's interesting is that they're persistent. You know, it seems like the slide would indicate that they're persistence is not related to -- you know, the chemical persistence probably is not that different by climate, right, because they're persistent chemicals. I mean changing the temperature a few degrees -- remember, temperature -- in environmental chemistry, the reaction is proportional to the absolute temperature, right?

So going from the average in the Bay Area is only a few degrees absolute. It's a very small change. So has

anyone looked at other factors, you know, the level of which the houses are sealed?

DR. PETREAS: He looked at the age of the house and there was no association. He's looking into use of air conditioning. So it's maybe air exchange rates or how much new fresh air versus -- there was also a question about, but I guess a very self-subjective -- it's a self-administered questionnaire about having torn furniture. I don't know how many people would say they have torn furniture, exposed foam or -- but it did not associate -- it did not explain this difference.

PANEL MEMBER McKONE: So they haven't yet really found out a systematic factor that would explain the difference?

DR. PETREAS: No. And that's only for PBDEs, mind you, because PCBs were measured in the homes, PAHs, and those differences did not exist between those two counties -- these geographic regions.

PANEL MEMBER McKONE: It was only the difference only in the PBDE class.

DR. PETREAS: Yes.

PANEL MEMBER McKONE: They're not very volatile. I mean suppose you -- houses in the Bay Area are better ventilated, right, because they don't use as much air conditioning, but there's such a small fraction of those

in the area, that the amount you would remove by having added -- again, I should talk to him, I guess.

DR. PETREAS: Yes, he needs ideas.

PANEL MEMBER McKONE: It's a real technical detail, but it's not really all that plausible, unless there's some -- unless they're attaching to particles.

DR. PETREAS: Yeah, that's the idea, more particles.

PANEL MEMBER McKONE: Okay. It's actually a really challenging question.

CHAIRPERSON LUDERER: Dr. Quint.

PANEL MEMBER QUINT: Yeah. I just wanted to ask about -- this is Julia Quint. You mentioned that the industry for a long time, as I know, said that deca didn't break down. And you and others have found that that is not true. So what are the -- has anything happened with this new information, this science that's refuting, you know, this longstanding issue that deca doesn't break down? Has anything happened? I mean, what are the sort of policy fallout from that, if any?

DR. PETREAS: This information circulates in scientific circles. In terms of policy, not much.

(Laughter.)

PANEL MEMBER QUINT: I guess I was asking about something other than scientific circles.

DR. LIPSETT: Well, deca is being phased out. And after 2013 I guess it's not going to be produced here. But as you saw from Myrto's other slide, one of the slides showed some of these newer flame retardants in dust. Look at the 4th one down, the most prevalent, it's not deca-diphenyl ether now, it's deca-diphenyl ethane, which has replaced it. So that's the policy fallout.

(Laughter.)

PANEL MEMBER McKONE: And does that break down?

PANEL MEMBER QUINT: I know it's a revolving door.

DR. PETREAS: That would be additional scientific circles discussion.

(Laughter.)

CHAIRPERSON LUDERER: Let me just take a break from Panel questions here to find out whether we have any public comments.

All right. We have one public comment and the commenter is LeVonne Stone from the Fort Ord Environmental Justice Network. I'm sorry, is that right?

MS. STONE: Hi. I'm the Executive Director of the Fort Ord Environmental Justice Network. And the reason I'm interested in this subject of biomonitoring, I knew nothing about it. I was with the Community Tribal Subcommittee with the Agency of Toxic Substances Disease

Control, Board of Scientific Councilors in CDC. And I didn't know we had a biomonitoring group or whatever in California. And this is my first knowledge of it about a week ago.

And so I'm here because we're at a Superfund site. I'm from Monterey County, and we have all kinds of exposures. They're tearing down rotten old buildings from the base. Children and adults are right in the path of these buildings that are being torn down. And my concern is that there's all this disconnect with the State of California. The southern part is treated differently from the northern part.

And then when you get down toward Monterey, it's just like we don't exist. We're completely cutoff, because we're such a nice pretty little community and for tourists and nothing ever happens there. That it's a big fact, not true.

And I was looking at the example for the biomonitoring groups for the firemen. And I said, you know what, that's exactly what we're exposed to, and we don't even have masks. They're doing prescribed burning. And people are getting sick and there is nobody to say this stuff is bad for you. And they are doing their own assessment and saying, "Oh, it's okay. We're going to make sure the smoke goes up into outer space".

You can't tell smoke which way to go like you can't tell air which way to go. You can't stay in your home for 2 or 3 days and expect the air not to bring in the smoke that you have to breathe.

So I'm just really concerned, and especially when we're talking about flame retardants. It says here, "Exposure occurs principally by inhalation of low levels of air or ingestion of very low levels in water. These levels may be higher for people living near hazardous waste sites". That's where we are. Not even near, we're on the base.

There's a university on the base. There's schools on the base. There's a lot of low-income people on the base. And I have been working with the State, with the federal, and everybody else trying to get some kind of attention to what's happening where we are.

I don't know anybody who had any biomonitoring done in our communities or near our communities, and have results from what is in their bodies, the chemicals. I heard people talking about it. One lady said, "I've got 143 chemicals in my body". Well, we're so scared by now we might have 543, because we've never had any of it done. And if it's been done, it's been without our knowledge, and we have no knowledge of it.

The Cancer Registry in California is almost like

where is it? Where is it by location?

So I'm just really concerned that this information is not getting out to the public, to the community organizations no matter how small they are or how big. We serve a vast area, and we're not very popular, because we're bringing these things up, our health departments are not dealing with them, so who do we go to?

And then we talk about Environmental Justice. And Lisa Jackson says, the Environmental Protection Agency defines environmental justice as, "The fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income with respect development, implementation, and enforcement of environmental laws, regulations and policies.

"Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, or commercial operations or the execution of federal, State, local, tribal programs and policies.

"Meaningful involvement means that potentially affected community residents have an appropriate opportunity to participate in the

decision making about a proposed activity that will affect their environment or health."

So if that's what it means, we have a whole lot of work still to be done, because every time there's a change in administrative or staff, somebody you've been in contact with, then the ball is dropped and you have to start all over again. And you have to do the explaining and the talking, and the convincing. And so I'm here today, because I want to know where we can pick up the pieces and where we can tie the knots together, and how we can really get this information out to where it would really help the people who needs it.

Thank you.

CHAIRPERSON LUDERER: Thank you very much, Ms. Stone, for those comments. I know that the Panel, as well as the Program, have -- one of the things that we have had several discussions about at other meetings is the potential for involvement of community groups potentially having collaboration with community groups in the Biomonitoring Program. So we very much appreciate your comments.

Would any of the Program staff like to respond to that question or comment?

DR. LIPSETT: Yeah. And I will -- I actually have other staff who are not biomonitoring staff who work

in my branch and I'd like to put you in touch with them. They do work on hazardous waste sites. And so I'll talk with you after this -- on a break or during the lunch time and just make sure that you have the contacts and they may be able to help with some of the issues that you raise.

MS. STONE: Thank you.

CHAIRPERSON LUDERER: Thank you.

Do we have any additional comments or questions from Panel members at this time?

Dr. Bradman.

PANEL MEMBER BRADMAN: I just want to respond to that. At some level, I think Dr. Luderer mentioned, you know, our previous discussions on this, but this Panel, and in general, the Biomonitoring Program, I think is very committed to making sure that the Biomonitoring Program as best it can with the current funding level respond to the goals of the legislation to biomonitor in California, to hopefully get representative samples in California, make sure that there's real information about exposures that can be addressed.

I think it's really important. Your contributions here are extremely important to kind of keep this program on the right track. And just say personally, and I think also among other Panel members, there's a real strong commitment to making sure that information about

exposures is developed. And so any, you know, related and consequent policy implications can be addressed.

So again, I thank you for coming here. And again this is a really important issue.

CHAIRPERSON LUDERER: Thank you again. Actually, one of the questions that I had was answered, but I wanted to say that I was -- and I think other Panel members have also had a great interest in this ongoing, that you are obtaining a time-of-flight spectrometer and will be looking at the -- looking for unknown non-target compounds. So that's very exciting.

DR. PETREAS: High expectations.

(Laughter.)

CHAIRPERSON LUDERER: Okay. So we're a little bit early here, 10 minutes to 12:00, but I think we can break for lunch now. And shall we return then -- there's an hour for lunch allotted, so should we -- do we return at 1:00 or 10 minutes early?

MS. HOOVER: 1:00.

CHAIRPERSON LUDERER: 1:00. Okay. We'll return at 1:00, so we have extra time for lunch.

(Off record: 11:52 AM)

(Thereupon a lunch break was taken.)

AFTERNOON SESSION

(On record: 1:14 PM)

CHAIRPERSON LUDERER: Please sit down. I'd like to welcome everyone back. Everyone, please find your seats. I hope you all had a good lunch.

We have a little extra item here added to the agenda. I'd like to reintroduce Dr. Michael Lipsett, the Chief of the Environmental Health Investigations Branch and the Biomonitoring California lead.

DR. LIPSETT: Okay. Thank you, Dr. Luderer. I meant this morning to just acknowledge that our project officer from the CDC on our cooperative agreement is here in the audience today Lovisa Romanoff. Lovisa, raise your hand there.

(Applause.)

DR. LIPSETT: We really appreciate that she takes such an active interest in the Program and comes to the Scientific Guidance Panel meetings when possible.

So thanks Lovisa. And, Sara, you can take over.

(Thereupon an overhead presentation was Presented as follows.)

CHAIRPERSON LUDERER: Well, I guess I've already called the meeting back to order, but I'd welcome you all back from lunch and introduce Sara Hoover, who is the Chief of the Safer Alternatives Assessment and

Biomonitoring Section at OEHHA. And she's going to provide us with an update on chemical selection.

MS. HOOVER: Thank you, Dr. Luderer. So today I'm going to be talking about some work that I did with Dr. Laurel Plummer who's an Associate Toxicologist in my section.

Next slide.

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MS. HOOVER: The purpose of this agenda item is to give the Panel and the audience an interim update on some additional screening of BPA substitutes and structurally related compounds. You may remember that this relates to the item at the March meeting, where we presented a preliminary screen of these chemicals looking at toxicological data and occurrence in the environment and in biomonitoring studies.

I'll also be just providing a very brief update on upcoming chemical selection activities.

Next slide.

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MS. HOOVER: So at the March meeting, we presented this preliminary screen. We had a really valuable discussion with the Panel, and we went back and looked at all those suggestions and pulled the major suggestions related to this screen.

So the first major suggestion was to prioritize the chemicals that we looked at for further consideration as potential designated chemicals in the future using various approaches. And the first suggestion was to actually look more deeply at the information we had collected in the preliminary screening document and see if we could get some information on prioritization from what we already had done.

We also talked quite a bit about evaluating the feasibility of a pilot laboratory screening. The idea of actually rather than doing more literature research, to actually take our wonderful resource of the laboratory and look at bulk urine or urine from volunteers and see if we can detect some of the compounds we might be interested in to see if it's worth pursuing. And the third major suggestion was to look more deeply at structure activity information.

Another suggestion was to contact the FDA and see if we could get more information on potential substitutes for BPA in food contact applications. So my talk today is going to be giving you an update on where we are with these suggestions

Next slide.

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MS. HOOVER: So this is just to remind you what

we're talking about. This is bisphenol A, and these are some of the related compounds.

Now, I want to emphasize again, as we did before, that we're -- in some cases, we're talking about chemicals that are known or being considered for use as substitutes. And in some cases, we're talking about chemicals already in use alongside BPA, but they're structurally related and therefore of potential concern.

Next slide.

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MS. HOOVER: So we did, as I said, we went back and followed the suggestions of the Panel. And here, we're just showing an excerpt from the March initial screening document. And here we've pulled -- sorry. Here we've pulled the chemicals that have production volume information from the 2006 information from U.S. EPA. This is the TSCA Inventory Update Reporting.

So needless to say, a very important note that this is outdated. Six years is quite a long time, given all that's happened with BPA, but that's what we had to work with. So we pulled these to start with.

So now I'm going to page through what we showed you before, just as a reminder. So next click.

So these were the couple that we had found that were detected in biomonitoring studies.

Next.

These detected in consumer products.

Next.

We also looked at some in vivo assays, like the uterotrophic assay.

Next.

And in vitro assays that were indicative of potential endocrine activity.

Next.

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MS. HOOVER: Actually, sorry go back to the previous slide.

So you can see -- so just in looking at that, you can -- the Panel could choose to look at the intersection of this information, which is a little bit hard to tell in this version, and decide if there's particular ones that look of interest. Like high volume, 1 to 10 million, indications of endocrine activity. That would be a way to start to prioritize these chemicals.

Next slide.

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MS. HOOVER: But we also really want to emphasize that, as we did before, the literature review was not necessarily comprehensive, number 1, but number 2, just because there's a study in the literature or not a study

in the literature doesn't necessarily mean that the absence of data doesn't give you any indication about whether you should be concerned or not.

So we're looking at these chemicals too. These had no production import volume based on 2006 data. But again, that doesn't necessarily mean anything, so we're pulling out these.

Next click.

A couple that were detected in biomonitoring studies.

Next.

Detected in consumer products.

Next.

Some in vivo evidence of estrogenicity.

Next.

In vitro indications of endocrine activity.

So you can see that, you know, some of the same chemicals are appearing in those boxes. So this is one approach that the SGP could use in order to pull out chemicals they might be interested in us taking further and looking at for potential designation.

Now, since we did the initial screen, Dr. Plummer also became aware of some new literature. And I'm just going to share that with you now.

Next slide.

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MS. HOOVER: Oh, sorry. One last click, which was a predicted high BCF. Continue.

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MS. HOOVER: So there's a really interesting series of 3 papers. The authors -- it's a big collaborative effort that involved the New York Biomonitoring Program and many other programs across the world. This -- and here I'm just going to excerpt just some of the information. So I want to emphasize again that today is just an interim update to show you where we are.

So looking at this, bisphenol S was measured in urine from 315 samples in the U.S., which actually was all taken in New York and Asia, and they already found that BPS could be detected in 81 percent of these samples. One hundred percent in the samples from Japan and Vietnam and 97 percent from New York.

As a comparison, we pulled out the geometric means for BPS in New York of 0.3 microgram per gram creatinine; Japan 0.933. And then comparing that to BPA in NHANES from 03-04, which was 2.58.

So the figure is just showing you the red bars are the BPS in urine. They also attempted to do an estimated daily intake, a predicted intake for BPS. So

this just gives you an idea of what's going on in the world.

Next slide.

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MS. HOOVER: They also did a companion paper, where they looked at paper products, which is really interesting. They looked at paper products and currency. And they looked at quite a lot of paper products, such as thermal receipts, currency, as I mentioned, food cartons, fliers. They looked at tickets. They looked at all kinds of different papers that they gathered from the U.S., Japan, Korea, and Vietnam.

And they found that BPS was detected in 100 percent of the thermal receipt paper samples they tested, about 90 percent of currency samples. And this is just pulling a couple pieces of data from the paper in fliers, 80 percent, in food cartons, 57 percent.

They also found that there was significant negative correlation between BPS and BPA. Makes sense. BPS is thought to be a substitute for BPA -- or known to be a substitute for BPA in thermal receipts.

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MS. HOOVER: And then the third paper looked at dust, in indoor dust. And this shows you -- this is a

pretty busy slide, so I'll try to walk you through it a bit. So on the -- this is again drawn from their paper this figure. So this figure shows composition. And you can see the red bar is BPA, the, what now appears to be, purple is BPS, and the turquoise bar is BPF. And so BPA, BPS, and BPF dominated the composition of the indoor dust for bisphenols across the world.

BPA was found in 99 percent of the samples, BPS was found in 100 percent of the samples, and BPF was found in 74 percent of the samples. They also noted that the highest concentrations in dust for BPS were found in Japan, and the next highest was the U.S.

And then just a little small point of interest, because I looked at other bisphenols, just to note, that in other parts of the world, like Korea, they were able to detect BPAF, in China they detected BPB and BPP. So there's, you know, definite clear evidence of use of these chemicals in the world.

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MS. HOOVER: Okay. So now I'm going to change gears a little bit. So that was just -- actually back up to the previous slide, and I'll do the -- can you back up to the previous slide.

Okay. So just to sum up, this is again the

interim update, but even at the last meeting, Dr. Solomon, for example, was saying well maybe we should move forward with some of these chemicals. We now have really good evidence for BPS, for example. It's real clear from multiple angles that this looks to be like an important emerging chemical related to BPA.

So now what I'm going to do is just give you a very brief update on the pilot study, the pilot laboratory study that we talked about at the March meeting.

Okay. Now, next slide.

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MS. HOOVER: Okay. So this is just a brief status update. So the concept again, as I mentioned, is to try to focus on a subset of compounds that are structurally related to BPA. So you may remember in the original screening document, we covered beyond structurally related to BPA. We covered things that were known to be substitutes but were not structurally related.

So this lab screening pilot would focus just on a subset structurally related to BPA. OEHHA would assist the lab in choosing the most relevant compounds, in terms of both potential for health concern and potential for exposure.

EHL is exploring the predictive multiple reaction monitoring as a possible analytical approach. And this is

just to give you a heads up. If you want more information on this, I would defer that to Dr. She and his colleagues.

And just a note, that we did confirm -- this was a question that came up last time. There is a -- what we're calling the ECL Pilot Study, which is -- it's been an ongoing study that we've been able to use to pilot procedures. And you can test volunteers under the rubric of this study.

And so we checked, and there is room -- potential room to test some volunteers under this. So this type of a laboratory screening could be done on bulk urine, which wouldn't involve the pilot study or it could actually recruit some volunteers and do it that way.

So that's just where we are. We've just been looking at feasibility and planning it out.

Okay. Next slide.

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MS. HOOVER: So Dr. McKone, in particular, had raised questions about well what about more looking into structure activity. So there is a lot of information. A lot of people are looking at that for chemicals related to BPA. And what we're going to do here is just give you a flavor of the type of literature that's available.

So we haven't actually done the literature review and analyzed it, but we're pulling out a couple studies as

examples to show you what's out there.

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MS. HOOVER: So this is one study by Kitamura et al., comparative study of the endocrine-disrupting activity of bisphenol A and 19 related compounds. And so this is one approach that's in the literature. This is just one example where authors will test a large number of chemicals, related chemicals in a variety of assays shown here, some in vitro assays and in vivo assays. And they tested many bisphenol related compounds. And then they try to draw conclusions empirically from their data. So that's what this paper is and there's other papers like that.

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MS. HOOVER: So this slide is just showing you an excerpt from their figure, in which they sum up the empirical conclusions that they drew from their data. And this is only part of what they talked about. So I'm just showing you a small excerpt.

Next click.

So they concluded that the hydroxy group is essential for estrogenic and anti-androgenic activities.

Next.

They concluded that the substituents that are next to the hydroxy group are regulating for estrogenic and anti-androgenic activities. So it can have different effects, whether the substituent is present or absent.

Next click.

And they concluded that the substituent on the carbon bridge is also regulating for estrogenic and anti-androgenic activities. So the type and nature of that substituent has an effect.

So this is just, you know, a sampling of what kinds of work is out in the literature. They also looked at thyroid, but we're not showing that here.

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MS. HOOVER: So another approach has been to actually try to develop a QSAR model, based on some in vitro data. And this is a paper by Coleman et al.

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So what they did is they took available data on some in vitro assays, and they developed models for the interaction of BPA analogs with the estrogen receptor.

Next slide.

Sorry, next click.

So based on their analysis, which obviously is not comprehensive, they suggested that the most estrogenic

bisphenols have 2 unencumbered para phenolic rings.

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And with multiple longer chain alkyl substituents bound to the ring-linking carbon. So they found that there was an effect of the longer alkyl substituents were more estrogenic. And, you know, these are their broad conclusions. This doesn't hold up 100 percent, but these are the broad conclusions that they drew. And then another important conclusion -- next click -- was that compounds with halogens attached to the carbon bridge were more estrogenic.

So that's really all I want to say about these papers. If you're interested in the papers, I can provide them to you. We're planning to look more deeply at the literature and look further and talk to experts. And I'll be talking about that later.

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MS. HOOVER: So the other thing that was suggested by Dr. Gina Solomon was that we actually contact the Food and Drug Administration. She was aware that FDA was receiving many petitions for new food contact substances that were likely to be substitutes for BPA.

So I contacted FDA, and it turns out they are receiving many petitions. They do have this food contact

substance review program. And I can share people -- I can share anyone interested in the details of this program, which is complicated, I can share that off-line with you.

But in the end, if they have a petition and they agree with the manufacturer with their conclusions about safety, then they approve the food contact substance, and those are listed in an on-line database. And this approval is based on a data submission. So the manufacturer actually has to submit data to FDA for them to make that determination.

And once they make that approval, it's actually available on-line. So we can go into a database, we can look at the identity of approved food contact substances, the manufacturer, the intended use, and the approval date. So that is available for us to look into further.

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MS. HOOVER: And then I also wanted to update you. We had mentioned that the U.S. EPA's Design for the Environment has been conducting alternatives assessment for BPA and thermal paper. And they were supposed to be posting it last spring, and then it became July, then it became July 23rd, and now it has become July 31st. So we'll see when it actually comes out. So the posting has been delayed.

But a really wonderful outcome of this is Dr. Cal Baier-Anderson of U.S. EPA has been very helpful. And she's offered to provide us with ongoing advice on our further screening of BPA related compounds. So we'll be able to draw on their assessment, but also on her expertise.

So next slide.

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MS. HOOVER: So next steps. So our plan is to continue mapping out the pilot laboratory screening. We're going to delve into the structure activity review more further, so we'll be looking at additional literature and contacting experts. And really with the goal of determining whether this is a profitable avenue for looking at chemicals that we think are probably being used, but that we don't have any data on, and that we might be concerned about. So we're going to -- that's going to be the purpose of that.

We're planning to actually go in and start searching the FDA food contact database to see if we find things of interest in there, and then we'll report back to you on our findings. But I did want to mention that, you know, our screening process is not formal in anyway. So you could suggest candidates for future consideration as potential designated chemicals to us. You can do that

today. You could do that at the next meeting. We're looking for your input on that.

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MS. HOOVER: So in terms of upcoming chemical selection activities, based on our resources, we're hoping to, for the November meeting, prepare a screening document on one set of chemicals. Some options are listed here. We could do a screening document on selected pesticides from the Department of Pesticide Regulation Top 100 List. We could do a screening document on synthetic musks, which came up at the last meeting.

We could consider a potential designated chemical document on selected organotins, which we've also done -- we've shown this screening document to the SGP already. We could proceed with some selected BPA related compounds if the SGP so desired. And that's the end of my presentation.

Any questions?

CHAIRPERSON LUDERER: Any clarifying questions?

Dr. Cranor.

PANEL MEMBER CRANOR: Yes, I had a question, Sara, about the -- you had tested the potency in some in vitro assays of the substitutes. How do they compare with bisphenol A itself?

MS. HOOVER: So just to be clear, we didn't test -- we didn't do any testing.

PANEL MEMBER CRANOR: You didn't.

MS. HOOVER: No. No. No. No.

PANEL MEMBER CRANOR: Sorry.

MS. HOOVER: All we're doing is reporting what other people have done. And we actually haven't -- so actually Dr. Krowech was just looking at that very issue about ranking of potency. So that's something that you could do and people have done. I didn't talk about that today, but that could be one element of our further structure activity review is to rank them, in terms of potency.

PANEL MEMBER CRANOR: You don't know the answer to the question at the moment?

MS. HOOVER: I do not have the precise answer. I could, you know, give you some ideas, but I'd rather just hold off until we've done the analysis.

CHAIRPERSON LUDERER: Dr. Quint.

PANEL MEMBER QUINT: Yeah. I just had a -- this is Julia Quint. I had a clarification question. It seems like we are monitoring the FDA's program to look at things that they are approving, the BPA chemicals that they're approving as substances for food contact, or in products that are made to be in contact with food. Is that --

MS. HOOVER: So is that your question or is that a 2-part question?

PANEL MEMBER QUINT: Well, I'm trying to figure out, it seems that -- I guess I'm a little bit confused about the criteria that FDA is using to determine approval of these BPA compounds.

MS. HOOVER: Yeah. They have a whole guidance document, so I can talk about that.

PANEL MEMBER QUINT: Well, I'm not interested in reading it, per se, but I'm just interested in finding out whether or not we think it's stringent enough, so that when they approve something, we won't think it's toxic, you know, because it looks like we're using --

MS. HOOVER: No. Okay. So let me clarify what the purpose of that was for.

PANEL MEMBER QUINT: Okay.

MS. HOOVER: So what Dr. Solomon was suggesting is really there's a huge number of chemicals out there, and there's a huge number of possible uses of these chemicals. And she had suggested to us 2 avenues. One was we might want to look at the hard plastic uses, partly because of the recent ban in California, and she also said food contact uses.

And really, this was just this narrow item that we wanted to get back to you on, which is can you call the

FDA and have them give you a list, which they couldn't really do, but as they approve it, they post it in a database. So that's -- all I'm doing is reporting back to you and letting you know that we can look in the database and see. So we did a little bit of looking. There's a lot of polymers, you know, for example.

So it's not like -- it doesn't -- nothing jumps out as immediately obvious of, "Oh, this looks like an important one or one that we might be concerned about". Really, the point more was to try to get a feel for emerging, what's emerging. So it's that question, which the SGP is always interested in, what's the next thing?

So what the next thing is going to be in food. Now, I'm not saying there's going to be chemicals of concern in there necessarily, it's more just identifying what things are moving to.

PANEL MEMBER QUINT: Right. I guess I was trying to figure out whether or not there's anything predictive that could happen, in terms of monitoring what the FDA is approving or not approving, in terms of either structure activity or anything like that. And from what you said, yeah.

MS. HOOVER: I mean, yeah, you know, they get -- I mean, for example, there's a minimum database they have to submit, right? We could look at the minimum database

and see how does that minimum database relate to what our concerns are? And then we'd be able to see are our concerns being addressed?

We haven't done that, at this point. We're just reporting to you that that's an option.

PANEL MEMBER QUINT: Okay.

MS. HOOVER: In the initial screening, I mean, like I said, there's a lot of polymers in there. We'd have to really go through carefully and see are there things that pop out.

PANEL MEMBER QUINT: Right. And the other thing I wanted to get some clarity on is the relationship between the in vitro activity and the in vivo activity. I mean, for some of these, you had in vitro activity, and others you had in vivo activity, and some, I guess, have both. And I'm wondering how predictive the in vitro activity is of in vivo activity, if you know that?

MS. HOOVER: Like I said, you know, I don't think we would -- this is something we're just starting to look into. So that's the kind of thing that the structure activity analyses are doing, actually looking at that.

I would say though that, like we've already said many times, for example, it might be there's in vitro activity. They just haven't done the in vivo assay --

PANEL MEMBER QUINT: Right.

MS. HOOVER: -- or it's just not tested at all. So we have to look, you know, more carefully at the full database and what people are predicting about that.

PANEL MEMBER QUINT: Right. Yeah, because it sounds -- I mean it looks, from what you put -- I mean, from the ones that you showed us and the various -- the screening you've done so far, it looks like there are a lot of these -- there's a lot to be concerned about.

And usually what happens, as soon as, you know, there is a fair amount of data and negative data or toxicity data on one, we switch to another one.

MS. HOOVER: Exactly.

PANEL MEMBER QUINT: So I'm trying to figure out how to get ahead of that a little bit.

MS. HOOVER: Exactly. So, yeah, that's exactly the aim of if we look more into structure activity --

PANEL MEMBER QUINT: Right. Okay.

MS. HOOVER: -- the things that haven't been tested --

PANEL MEMBER QUINT: Right.

MS. HOOVER: -- can we pick out something that looks like already it might be a problem.

PANEL MEMBER QUINT: Right. Exactly. Okay. Thanks.

CHAIRPERSON LUDERER: Dr. McKone.

PANEL MEMBER McKONE: Thank you. It's a very interesting. I appreciate you made a foray into structure activity. The question that I have is in extending that or making more use of it. I mean, so you've gotten into the -- there's a literature on toxicity, but there's also a literature on persistence or metrics of exposure. And because I think in a screen, there's 3 things that probably matter if something is going to end up in people and do harm. One, is how much, right? You got that.

The second really is does it get to people?

And the pathways are very complicated and complex. But one of the things a lot of -- I mean, there's been a literature suggesting that the longer a chemical lasts, whether indoors or outdoors, the more likely it is to end up in a population.

So one of the early screening metrics for exposure is just persistence. You know, overall persistence, does the chemical last a long time? Because you can make a billion tons of it, but if it only lasts 2 seconds, right, it's not going to get into anybody. But if you make a small amount and it lasts forever, you know, it's got a high likelihood. So that tips that screening.

And then the final one that you're getting at is does it do harm given exposure?

And so I would just suggest a little more effort

in that middle column about screening on persistence or finding metrics --

MS. HOOVER: So you do remember what we presented last time, right, where we did that --

PANEL MEMBER McKONE: Oh, that's right.

MS. HOOVER: -- and ran the PBT profiler.

PANEL MEMBER McKONE: Yeah. Oh, you did do it then.

MS. HOOVER: Yeah, so we already did that.

PANEL MEMBER McKONE: That was in -- was that in one of your early slides?

MS. HOOVER: I didn't actually -- yeah. I didn't actually -- I don't know if I showed that exact piece of it.

PANEL MEMBER McKONE: That's why I remember that.

MS. HOOVER: Yeah. Right. We're out ahead of you. We're before the emerging concern of the Panel.

So we actually ran it using PBT profiler, but I thought that maybe where you were taking that is to, you know, even look further at the ones that maybe we couldn't screen in PBT profiler or haven't screened. So, you know, that's definitely something we can look at further.

PANEL MEMBER McKONE: But doesn't the PBT Profiler -- well, that's what I'm thinking in QSAR, but doesn't the PBT Profiler -- no, that's not the one that

has the SMILES --

MS. HOOVER: It has persistence, half-lives. Yeah, it has all that. Yeah, it has SMILES.

PANEL MEMBER McKONE: But if it doesn't have it -- but I'm thinking of new molecules, right?

MS. HOOVER: Yeah, I think -- I mean, in theory, there's certain restrictions on the PBT profiler, like, you know, polymers or certain complicated chemicals. They might come back and say can't do it, but for a chemical related to BPA, I think it's very likely that you could run it.

So I think that the only thing missing from what we did is there are more. We're finding out more BPA-related compounds that have been detected now that weren't in our original table. So we could extend it.

PANEL MEMBER McKONE: So just to refresh my memory, the PBT Profiler, do you enter the chemical name or do you do a SMILES locater?

MS. HOOVER: You can do CAS number, name, SMILES. You can enter it a bunch of different ways.

PANEL MEMBER McKONE: So if you do SMILES and there's no data, it can actually use a structure activity to construct estimates of --

MS. HOOVER: It will predict, yes. It will predict.

PANEL MEMBER McKONE: Well, that's -- we were just reviewing old territory.

MS. HOOVER: Yeah, I can send you the link again. I should maybe have done that already, but, you know, the previous screening document contains all of that work.

CHAIRPERSON LUDERER: I just have a quick follow-up -- Ulrike Luderer -- to Dr. Quint's question about the FDA database. In your quick look through the FDA database, did any of the compounds that you have put some work into and showed us, you know, the toxicity results and other results for today come up there?

MS. HOOVER: No. So Laurel -- I'm going to defer that to Laurel too, because I think you looked as well. We didn't find any of the specific chemicals, no. So we actually -- but, you know, literally all we really did was I talked to the FDA. I identified the website. We went in. We did a couple searches with the keyword bisphenol. Nothing from our table came up. Some polymers came up, and that's it. That's as far as we took it so far.

CHAIRPERSON LUDERER: A quick question or -- because we're going to have time for more discussion. I just wanted to see if we had any public comments.

One.

MS. STONE: Hi. LeVonne Stone again. I just -- we had heard that the FDA does not test anything, that the

producer of the chemical usually does the testing and they sign off. And the reason we're saying that is because we're seeing all these drugs that are being recalled after people die or they're seriously injured by these drugs. And it just comes on television with somebody telling you you could get reimbursed.

And I'm wondering what is that all about, and who is responsible and what does the FDA do? They just sign off on stuff and wait for something to happen?

That's my...

MS. HOOVER: Yeah, it's really not part of the topic of discussion today, but I can -- you know, I can provide you with some more background information on that. You can give me your contact information.

CHAIRPERSON LUDERER: Thank you very much for that comment.

Do we have other comments or questions?

Dr. Quint, did you have a question.

PANEL MEMBER QUINT: I just had a quick question again. So the DFE -- EPA DFE is working on this issue as well. I'm just wondering is there any cross talk between FDA and the EPA about how they're looking and screening? I guess, I'm just --

MS. HOOVER: I can find that out for you.

PANEL MEMBER QUINT: Okay. Yeah.

MS. HOOVER: I think the answer is yes, because Dr. Baier-Anderson just sent me a link about a tool -- I believe it was from the FDA -- about endocrine disruption. So I think that she is aware of what's going on at the FDA, and I'm guessing there's some cross talk, but I'd have to look into that for you and get back to you.

PANEL MEMBER QUINT: Yeah, because we -- you know, we have a whole program in EPA on endocrine disruption. And, you know, and it has moved very slowly, so I'm just wondering -- hoping that people are, you know, on the same wavelength or on the same page with all of this and we don't have disparate criteria and -- you know, by which we are looking at these things.

MS. HOOVER: Yeah, that's a good question. I can find out for you.

PANEL MEMBER QUINT: Sure.

PANEL MEMBER McKONE: Just to extend this. It's an interesting topic. DFE, what part of EPA are they at? Are they in the same OPPT or are the in --

MS. HOOVER: Oh, I actually don't know that off the top of my head.

PANEL MEMBER McKONE: Because communication has a lot to do with -- at EPA, it has to do with what office they're in.

MS. HOOVER: Lauren, do you know -- here. Yeah,

mic.

DR. ZEISE: Yeah. It's -- I can't remember the new name of the Program, but it's the old OPPTS, the Office of --

PANEL MEMBER McKONE: Oh. Okay. It is. All right.

DR. ZEISE: Yeah.

PANEL MEMBER McKONE: And I guess the other one is, the other agency that takes an interest in chemicals for different reasons is the Consumer Products Safety Commission, which is worried about what goes into consumer products and building materials and such things. And I'm not sure. I actually haven't -- we've had some -- we had interactions with them on the wallboard issue, which was a post facto, you know, how did this -- tried to figure out what was wrong.

But they do have a whole program in risk assessment and anticipating hazards, so you might see if they have any QSAR or activity out there.

MS. HOOVER: Yeah, definitely. That's a good -- I've also interacted with them in other issues, and so, yeah, this would be a good one to check with them on.

PANEL MEMBER McKONE: Just see how they do this, because they may actually -- I think they do some of the same thing as FDA, which means they monitor the

monitoring, as opposed to doing a lot of foresight themselves.

CHAIRPERSON LUDERER: Dr. Alexeeff.

OEHHA DIRECTOR ALEXEEFF: I just want to make a comment on the pesticides. And just to mention that in another part of OEHHA, we're looking at pesticide use and exposure. And so we'll be coming out with a little analysis sometime soon. So probably -- and the idea was -- the question was, you could look at the pesticide use database, but then what's the likelihood of exposure, and taking into account volatility and some things like that. And Department of Pesticide Regulation had done some analysis themselves, because they wanted to set up a more expanded monitoring network.

So it might be good the next time we report on pesticides, we can also bring that in too, just because it would be useful to know what they're monitoring for and maybe as well as what we found might also be likely chemicals of exposure, and then one could think about all those things.

CHAIRPERSON LUDERER: I saw a lot of nods from the Panel in response to that. I think the Panel thinks that's an excellent idea.

Do we have any other comments related to the BPA or BPA substitutes?

PANEL MEMBER BRADMAN: I just had one question for Sara. And it looks like you've already maybe exhausted the resources for this, but you had some information from 2006 on production and use. Is there any way to get more recent information, because that seems like that's one of the pieces that's missing, too.

MS. HOOVER: I mean, I think it's now -- maybe someone can correct me if I'm wrong. I think it's now a 6 year gap. I think the next batch comes out for 2012. And I know that when we -- or, Julia, do you know, is it -- or is it 5 years?

PANEL MEMBER QUINT: I thought there was -- they had data for 2010, but I may be wrong.

MS. HOOVER: Okay. I thought they had spread it a little bit beyond, but it used to be every 4 years and then they extended it, so I don't know if it's 5 or 6. But I do know that when they published the 2006 data, it took us many years after 2006 to get that data.

That being said though, I wouldn't say that it's necessarily exhausted. I definitely have people that I can contact to look into that further. And, you know, there's other ways to get a feel for that, even looking on the web and seeing what chemicals are being offered for sale and that sort of stuff.

So there's a -- you know, that's a little bit

trickier to interpret, but I can pursue that further.

PANEL MEMBER BRADMAN: I wonder too, if it would be worth a call to the American Chemistry Council, if they would --

(Laughter.)

PANEL MEMBER BRADMAN: I mean, that's their job, in a way, to serve that industry, so maybe they could provide some information.

MS. HOOVER: I can check into that --

(Laughter.)

MS. HOOVER: -- yeah, and see if we can get information. Yeah, they should know actually. That's true.

CHAIRPERSON LUDERER: Actually, I had 2 questions. Ulrike Luderer. One of them relates to, or I guess is more of a comment, and that is about your proposal to use the -- whether or not some of these BPA substitutes or BPA-related chemicals come up in multiple different kinds of screens, and to sort of use that as a way of prioritizing them. So are the estrogenic, androgenic, in vivo, in vitro assays?

And I just wanted to kind of draw your attention to maybe another set of in vitro assays that there's been quite a bit of literature about related to both. I know of BPA and BADGE looking at their adipogenicity. So using

3T3L3 cells, which are preadipocyte cell line. Both BPA and BADGE are adipogenic in that cell line. And then using multi-potent stromal stem cells. Bruce Blumberg's lab at UCI has done some work showing that BADGE is very adipogenic at nanomolar concentrations in those cells, but BPA isn't.

So, you know, there do seem to be some similarities and some differences. And I don't know if there are other papers in that emerging literature.

MS. HOOVER: Okay. Great. Thank you.

CHAIRPERSON LUDERER: And then my other -- I was really intrigued about the pilot laboratory screening that you mentioned. And I thought maybe the Panel would be interested in just maybe hearing a little bit more from Dr. She about what that is -- what they're thinking of there.

MS. HOOVER: Yeah. So, Jianwen, do you want to say a few words or Wei -- I don't know if Wei wants -- you know, whatever.

DR. SHE: To do the -- like complete screening laboratory don't have the ideal tool set that I mentioned before in the past. Personally, I work with an IST, Dr. Stephen Stein's group. We developed a very general tool we call the ASES/MS Automatic Structure Elucidation Systems using mass spectrometer data, which is old, but

NIST able to use some of the tools that we developed.

But since this is kind of old things, today to address the new issues use the new information, we recruited Dr. Wei Zou. Dr. Wei is from the world famous UC Davis, Dr. Fiehn's Laboratory. He has much more knowledge than I do. And then also he was working with Dr. Myrto Petreas' laboratory before.

So I think he can update the Panel more about this BPA, like a predictive MRM approach.

DR. ZOU: Thank you, Panel members. Basically, for this BPA pilot screening, Dr. She and I, we were thinking about -- we have been thinking about using predictive MRM technology to do that screening. It is just like as the slide shows, it's called a predictive multiple reaction monitoring. It is the latest -- it is based on the latest mass spec technology.

So we have to use the API 4000 QTRAP or API 5500 QTRAP. I have 4 papers published before, when I was working at UC Davis, using this predictive MRM technology.

And then, at that time, I was collaborating with a research group at UC Davis Environmental Toxicology Department. And we were trying to do the clomazone -- screening the clomazone in the rice.

So the same technology platform can be applied to the screening for the bisphenol A and the derivative, as

only the parent compound is different, but the idea and the approach will be the same.

So basically, like we can calculate -- use the software to calculate -- okay. So the idea is urine is best sink for xenobiotics metabolite. So the xenobiotics will be metabolized in the liver through the Phase 1 biotransformation and the Phase 2 biotransformation. So if the BPA and the derivative -- even as long as we know is some kind of compound BPA derivative, then it is going to go through the Phase 1 and Phase 2 metabolite.

Phase 1, typically like methylation, hydroxylation this contains and the Phase 2 glucuronide and glycoside. So the purpose of Phase 1 and Phase 2 biotransformation is to make the compound more hydrophilic and then can be solved into the urine, which is typically water and blood also.

So, in this case, when we screen the compound in the urine, typically like right now the way is to use the enzyme to cleave the congeners of the Phase 2 product of the -- like bisphenol A derivatives. But sometimes if the parent compound goes through the Phase 1, then even after cleavage, then it is still not the same as the parent compound. In that case, you may miss.

So the predictive MRM is going to go through to check all the possibilities of Phase 1 and the Phase 2

combination. Go through that, use the most sensitive LC-MS, the mass spec technology, called the triple quadrupole.

So the triple quadrupole mass spectrometer is going to screen all this MRM list. And then when we get a hit, then it is very possibly the parent compound exists in the urine. So in that case, it's a very comprehensive screening of the unknown in the urine.

My previous experience is very sensitive, is the most sensitive way to screen the unknowns. And also there are other ways, like full scan in mass spectrometry, but that's not as sensitive as this one.

CHAIRPERSON LUDERER: Thank you very much. It is very interesting.

Any additional comments or discussion from the Panel?

Are there any other considerations the Panel would like to suggest to the Program as far as moving forward with screening the BPA potential substitutes and BPA related chemicals?

MS. HOOVER: And actually, Dr. Luderer, if anyone has, you know, particular priorities for November, you can also express those. I mean, these are all in the queue, so they're all good candidates, if anyone has a particular interest.

CHAIRPERSON LUDERER: Dr. Cranor.

PANEL MEMBER CRANOR: Yes, Dr. Hoover. Of those, where is the potential for the greatest exposure? I mean, on the one hand you might say pesticides, but synthetic musks if lots of women are putting them on their skin, that might be greater. I guess I would worry -- perhaps worry about those more than organotins. Can you speak to these?

MS. HOOVER: I think -- I don't know, Gail, did you want to say anything about that?

DR. KROWECH: I actually would agree with you that synthetics musks are important, and the potential for exposure is greater than some of the others. So I'm not sure about the organotins. There is some use, but I think the synthetic musks would be a good option.

MS. HOOVER: And just to clarify, Carl, that I oriented you a little bit, but it's a lot to take in. The screening document is where we bring, like, the kind of information I brought to you today, and then we choose what should we move forward on for a potential designated document.

And then the bottom 2 have actually been through that process, and they're considering reasonable candidates, but you're right that we could jump the queue with things that seem more important. I mean, there isn't

an official queue, let me just put it that way. It's based on scientific judgment and Panel input.

PANEL MEMBER CRANOR: I'm not sure. I was just raising the question. I know that there has been real worry about an older organotin. I don't know how much they're used, but I would think either pesticides or the musks would create a lot more exposure, but that's just, you know, shooting from the hip.

MS. HOOVER: Yeah, great. Thank you.

CHAIRPERSON LUDERER: Okay. And certainly today from what you presented to us, we've heard a lot about the BPA-related compounds and that there does seem to be quite a -- there's evidence for exposure, and --

MS. HOOVER: Yeah, clearly

CHAIRPERSON LUDERER: -- evidence for toxicity. And I think that various Panel members expressed, you know, support for moving forward with that maybe with a designated chemical document.

MS. HOOVER: Yeah. So what -- I realize that with the kind of information before you, it's again still hard to pick out which ones. So what we might say is that you think that it's good idea to move forward with something, and that you can direct us to or suggest that we try to pick out a subset that looks like the best subset to move forward with first.

CHAIRPERSON LUDERER: Yeah, and I think based on the screening approach that you outlined today, which I think is a very good approach, you know, that using that to select the chemicals to focus on.

Other comments?

Dr. Quint.

PANEL MEMBER QUINT: Yeah. I would just say that BPS comes really high to the top of the list. We know it's being used now, and we know that we have a lot of concerns about it. So in lieu of waiting until we get a complete information on the whole package, I would really want to, you know, select that one out, and put it at the top of whatever list we're putting things at the top of. That's my own --

MS. HOOVER: Thank you for that.

CHAIRPERSON LUDERER: Okay.

MS. HOOVER: So actually, I just wanted to make one last clarification. An earlier version of this presentation was posted maybe a day ago. This has been updated and revised. So if anybody has downloaded it, throw that one away. We'll put the new one up in a couple days.

CHAIRPERSON LUDERER: All right. Thank you very much.

So now I'm just going to actually introduce Sara

Hoover again, who's going to introduce our next speaker.

MS. HOOVER: Okay. So all I'm going to do is give you a little bit of context before I turn it over to Dr. Bradman.

So this item is called Biomonitoring Chemicals With Short Half-Lives in Humans: Issues Interpreting and Communicating Individual Results.

And we did post and send to the Panel a little bit of background information on this, some discussion questions, and some background references. And as we explained, we're actually now in the process of developing materials to return results on chemicals with short half-lives. And needless to say, as all of you are aware, there's many issues in biomonitoring these types of chemicals, so we really wanted to take some time to interact with the Panel in more detail.

We've actually talked about this issue. In previous Panel meetings, it's come up. It came up in our workshop on interpreting and understanding biomonitoring results, it's come up from guest speakers. Dr. Bradman has briefly spoken on it, but we've always just sort of touched on it. Yes, this is important, but we've never had time to really discuss it.

So that's really the purpose of this agenda item is to give us some time to actually get into the issue,

talk about it in more detail. And we've given you some specific discussion questions that we'll put up after Dr. Bradman's introductory talk. And I just want to encourage you, you know, you can respond to these specific questions, but if anything else comes to mind that you think is important to feel free to bring that up as well.

So that being said, I'd like to introduce, as you all know, Dr. Asa Bradman, who is Associate Director and co-founder of the Center for Environmental Research and Children's Health of the School of Public Health at UC Berkeley. And I really want to thank Dr. Bradman profusely for taking this on in his busy schedule and doing this talk for us.

Dr. Bradman.

(Thereupon an overhead presentation was presented as follows.)

PANEL MEMBER BRADMAN: Thank you. I don't know if it would be helpful, can we turn the lights down a little bit up front. I know it's after lunch, but --

(Laughter.)

PANEL MEMBER BRADMAN: So again, just to follow up, this is an issue that we've talked a bit about before, but the goal here is to provide a little bit more detail on some of the challenges, and again discuss issues around returning results. So I hope I don't have too much

detail. If I do, raise your hand. We'll move ahead.

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PANEL MEMBER BRADMAN: So just very quickly. I'm going to talk about what a metabolite is and how it's used as a biomarker. And then in more detail, I want to talk about within and between subject variability and the implications of that for communicating results and interpreting biomonitoring results.

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PANEL MEMBER BRADMAN: So just a reminder, we've been talking today about measuring chemicals in a number of media. Urine is often the most common media used for biomonitoring. Probably the next one is blood. Urine is very commonly used, because it's easy to collect. It's non-invasive. It's readily available. There's often laboratory methods available and it's especially useful for children.

So many of the compounds we're talking about today are measured in urine. Some of the issues I'm talking about for nonpersistent compounds will also apply to blood and other media, but I'm going to be talking a lot about urine and some of the challenges that it raises.

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PANEL MEMBER BRADMAN: So again, what is a metabolite?

And realizing this isn't very clear with this lighting, basically this is just an example of diazinon breaking down in a few different pathways to what are called dialkyl phosphate metabolites. Diazinon breaks up into 2 parts, one that is class specific to organophosphates, and that's the DAPs that I just mentioned.

And then at the bottom of the screen there, you'll see that they also break down into pesticide specific metabolites. I'm not going to go into the details here, but you'll see that on one pathway, looking to the right, it goes directly via hydrolysis, to these metabolites, which can be excreted from the body.

When it goes to the left, it actually gets oxidized to the oxon form, which is the actually active form that interacts with cholinesterase. In that state, it may also go -- be broken down into a metabolite or it may bind with cholinesterase and have the toxic effect.

So when we measure a metabolite, we're offering -- often getting information about exposure, but we're actually measuring the pieces that didn't cause, in this case, the toxic effect. So they're an indicator of

exposure. They may not necessarily directly reflect toxic effects.

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PANEL MEMBER BRADMAN: I'm going to be using organophosphates as an example. We've concentrated on them, and it's part of our research from many years, but also some other examples. Anyway, very common insecticide. We don't need to talk about it in detail.

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Can you click that again.

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PANEL MEMBER BRADMAN: Again, I mentioned earlier that the diazinon broke down into these -- click again -- into these dialkyl phosphates. In general, for OPs, there's 2 major classes of dialkyl phosphates, the methyls and the ethyls. Just remember that they're a little bit different, and we'll see later on that they behave differently in the body.

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PANEL MEMBER BRADMAN: So some of our data comes from the CHAMACOS Study, long-term cohort study. We collected samples at many different time points and measured them for a lot of different exposures starting

prenatally and now our kids are 12 years old.

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PANEL MEMBER BRADMAN: So just an example of how we can use biomonitoring data. Here, we're comparing levels in CHAMACOS, which is blue, to levels of the same chemicals samples by NHANES. If we just focus on the bars to the left, the green one is NHANES women of reproductive age and the blue bars that are slightly higher on the left are participants in the CHAMACOS study.

This is a group comparison. There's an indication here that the women in our study had higher exposures than the national reference data, and you can see as the kids get older, if we look to the right, the blue bars increase the levels go up as they get older. It's a little hard to read that axis there.

So information about exposure, comparison to groups, basic use of a metabolite.

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PANEL MEMBER BRADMAN: Here, we're looking at the relationship of fruit juice intake in metabolites. With higher fruit juice intake, we had higher levels of these metabolites in urine. Now, we're getting information more

at the individual level that, yes, there's -- we can actually learn about some sources of exposure. Another use of metabolites.

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PANEL MEMBER BRADMAN: And then -- we lost some titling up there, but this is the relationship of prenatal exposure and IQ in the children. And you can see as the exposures get higher to the right, the IQ levels go down. So we also seem to have good exposure classification data that allowed us to look at those exposures in outcomes in the children 7 years later. So these are levels in the mothers.

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PANEL MEMBER BRADMAN: So just a summary, at least for OPs and other metabolites, we're talking about measurements of these things in urine seem to give us valuable information about relationships to health effects and also exposure, but there is a lot of challenges.

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PANEL MEMBER BRADMAN: And one of those key challenges is variability, and are we really measuring what we want to measure?

There's a lot of sources of variability in biomonitoring measurements, particularly with respect to short half-life compounds in the body. The exposures may be intermittent. Again, these compounds have a very short half-life in the body. There's differences in metabolic capacity between people, and there's also differences in pharmacokinetic characteristics between people.

They can also vary within people over time. For example, during pregnancy, circumstances are very different than when you're not pregnant, so there's a lot of sources of noise in our data.

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PANEL MEMBER BRADMAN: Here's an example of levels of these metabolites in 24-hour urine samples collected three days apart. You can see they're not very correlated. For the total DAPs, they have a correlation of just 0.35. That means just a few days apart. When you collect a measurement on one day, a few days later, the levels can be very different. They're not related to what they were just a few days before. Hard to classify exposure.

And you'll notice there the ethyls are worse than the dimethyls. So they're even a weaker indicator of long-term exposure.

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PANEL MEMBER BRADMAN: This is kind of a visual of those numbers. If you look at each bar, the top bar is the high level, the bottom of each bar is the low level of those 2 samples taken three days apart.

This is on a logarithmic scale. So if you look at the big bars, you'll notice that just 3 days apart, there's differences of up to 2 orders of magnitude in metabolite concentrations. Huge variability. You'll see a little tiny bar on the lower right. That individual 3 days apart didn't change at all.

So what this reflects is different kinds of variability. You'll notice that the 2 kinds of variability that we're concerned about here are what's called "between" and "within" subject variability. So we're talking about between variability, we're talking about the differences between the kids. If you look at that bar on the upper right that's higher, versus that little tiny one on the right below it, the one that's higher had a higher exposure. It's different from the other child. So we're quantifying between difference variability there.

If you look at the bars that are very tall themselves, we're looking at very wide variability over

short timeframes in a single child. That's what's known as within child variability. And you'll see here that the within child variability, if you look down, if you look at the total variance, 65 percent of the total variance in this data is attributed to within child variability.

So most of the variability in the data set is noise going on within an individual not between them, an important issue for exposure, risk, and epidemiology.

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PANEL MEMBER BRADMAN: So here we're now looking at correlations of spot samples collected from 1 to 6 days apart. If you look to the right, you'll see like the 24-hour samples that after a few days the correlations get very low. One day apart they're around 0.5 and then they drop down very rapidly.

If you look at the red circles there, that first column is for samples collected on the same day. So for many of these kids we collected multiple spot samples on the same day, and the correlations among those was only also around 0.5. Again, a measure of high within child variability.

Ideally, we would like, if we're taking multiple samples on a given day from a child, we would like them to be all the same, so we have a good indicator of exposure,

but they're not. We've seen some similar data, for example, from Antonia Calafat for some of the consumer product chemicals. Again, this is an important issue for interpretation that we'll talk about in a minute or 2.

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PANEL MEMBER BRADMAN: So if you look here, we went further with our data, and then also used some of the references that are mentioned in the there to look at other kinds of metabolites, where researchers tried to quantify not just the between child, but also the within child between day, and the within child within day, where the within child within day variability is that bouncing around that goes on inside a given child or a given person during the day.

You'll see here, first, I'm going to look at the column on the far right, where we're looking at phthalate -- metabolite for phthalate -- the phthalate DEP. You'll see, in this case, 77 percent of the variability -- I should say between subject. This is not for a child. The phthalates in BPA are for adults.

In that case, 77 percent of the variability was between subject. That means when you take a measurement from one of those people, you're actually able to classify differences between people, because that's where the

variability occurs.

If you look at the compounds on the lower left, including OPs, BPA, and now a different phthalate metabolite, the total variability within the child is higher than the between child.

So, in this case, it's going to be very difficult from an individual measurement to know where that individual child stands and where that individual child stands or subject stands compared to other people in the study.

So the kind of take-home message here is that when we're talking about exposure classification, how the variability is distributed in a population for a given compound raises challenges. And also between the column on the right and the other columns on the left, that it varies among chemicals. In fact, even within phthalates, it varied. And so that's an important point to take away.

Another example is triclosan, which tends to be more persistent, as a given measurement, is meaningful. Whereas, something like OP, as a given measurement, is less meaningful.

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PANEL MEMBER BRADMAN: So this is just a picture. You've seen some of this from Antonia Calafat's

presentation.

Levels of over a week for BPA. The point here is that they bounce around a lot. And many of those measurements are within day and there's a high variability during the day. Often, in this case, distinctive patterns because of specific exposure events like using a product that contains these.

So anyway, the point here it's not easy to see, but the point is that there's just a lot of noise over a given time period.

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PANEL MEMBER BRADMAN: Another piece of that then is to say well how well does a given sample actually classify exposure?

So we looked at that, in our data. And if you look at the 2 circles in red there, you'll see that if we take one spot sample and then compare that to the average exposure over a week, we can classify high exposure -- in this case, we defined as the top 20 percent. We can correctly classify that exposure about 46 percent of the time. So we're basically running at 50 percent or not much better than chance, with a single measurement. So we had relatively poor sensitivity. With 2 or 3 samples, we got up to a sensitivity of about 60 or 65 percent.

So again to underscore, even with more spot samples, over a week period, we could only correctly classify high exposure in just a little bit better than by chance.

Although we did have fairly good specificity, in that we could classify lower exposure more accurately. So again though, this just underscores -- next slide.

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PANEL MEMBER BRADMAN: -- some of the limitations of these measurements, both for exposure to risk assessment epidemiology and then raise challenges about returning results.

So just to summarize some of these implications. One, we've mentioned that some metabolites show little intra-individual variability, i.e. the DEP metabolite, but for others this high variability makes providing exposure information to participants very challenging.

When you have a given measurement, in some cases, you may not know whether it represents an acute exposure over a day, or just a momentary exposure, and whether or not it provides any information about chronic exposures. It also raises challenges about comparing an individual measurement to a larger population, i.e. maybe the group in the study or a reference population like NHANES.

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PANEL MEMBER BRADMAN: So just to summarize some of the approaches to returning results that we've employed in CHAMACOS that have been successful and I think are relevant here. One, I want to emphasize that for us returning results begins with the consent process, where we explain the purpose of this study, we emphasize these tests are from our -- whether they're a medical or non-medical test. For example, we've tested for lead, which has guidelines, but most of these research compounds do not. We've informed them that results will be available, and that there are -- and that we can't really know what they mean, in terms of both their exposure and the health effects, that the purpose is for research.

We return the results of each visit, if it's requested. We're in a situation where we have a cohort study, so we see people on repeated bases. We have a one-on-one meeting, and we offer repeat testing, which is something that I think is beneficial to us. If the result is high, we have the capacity to go back and take an individual measurement to reassure that the levels are not persistently high.

In most cases, there have been -- actually, there's basically been no request for follow-up testing, because we often return levels collected over several

sampling events, so there's usually a low level, and that provides a reassurance that there's not a chronic high exposure here.

We also provide education about reducing exposures. I want to emphasize here that to date, we've had no problems or concerns among our participants about receiving results.

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PANEL MEMBER BRADMAN: So again, just to summarize some of the technical challenges. They're a valuable tool these metabolites -- measuring these metabolites in urine are a valuable tool to access exposure to non-persistent pesticides.

Again, ease of collection, good laboratory methods, but there's real issues around the potential for exposure misclassification that have to be considered.

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PANEL MEMBER BRADMAN: I won't repeat myself too much here, but again this high intra-individual within subject or intra-individual variability suggests that cross-sectional sampling may, for some compounds, give a range of population exposure, but are not necessarily indicators of individual chronic exposure, and that single

measurements may be relevant to acute exposures, but not chronic exposures. And that acute exposure may be on a very short time scale.

Again, if you're doing research and looking at outcomes, studies need to consider these factors to be adequately powered.

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PANEL MEMBER BRADMAN: So again, all of this I think summarizes, 1, some challenges for the Program and also emphasizes that more research is needed to evaluate intra and inter-person variability of these exposure biomarkers.

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PANEL MEMBER BRADMAN: So thanks to my funders. I also want to thank Katie Kogut. She's been working on the paper with me that should be coming in EHP soon on variability.

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PANEL MEMBER BRADMAN: So I think we're now open for questions and discussion.

CHAIRPERSON LUDERER: Thank you very much, Asa.

We have time for some clarifying questions and

then we'll take public comments and then we'll do more panel discussion and comment.

So do we have any clarifying questions from the Panel?

Dr. Quint.

PANEL MEMBER QUINT: Julia Quint.

When you return results, you do it -- it sounds like, you know, you have many interactions with your cohort, but do you often return results with -- of chemicals or that have longer half-lives, so that they're looking at maybe an OP result with like lead or something that, you know, doesn't turnover quickly?

PANEL MEMBER BRADMAN: Right. Not yet.

PANEL MEMBER QUINT: Okay.

PANEL MEMBER BRADMAN: We actually have PBDE and DDT and other results for persistent compounds. And there was kind of a IRB and legal issue at the University that kind of delayed us, but we're actually now in the process of going through and getting approvals to return all results for the other chemicals. But we haven't yet dealt with the flame retardants and other persistent compounds yet.

PANEL MEMBER QUINT: Because I think a bigger challenge is when you have one of these short half-life chemicals and then you have one that isn't that -- in that

category as the comparison between the 2 groups.

PANEL MEMBER BRADMAN: Right.

CHAIRPERSON LUDERER: Dr. McKone.

PANEL MEMBER McKONE: This is more generic. So you -- if I get the sense of this, it's really about how to deal with interpreting information when there's high variability. And I guess another question that didn't come up quite as much, but always bothers me, is how you actually sort out or manage some of the variability. I mean we'd call it managing uncertainty in this context, and that is, you know, some of the variability, -- so some of these have short half-lives, but everyone has a different half-life. There's inter-individual variability in half-life, but the same individual can have variability in exposure day to day living in the same environment. There's seasonal variability, age variability, et cetera.

Is there, you know, any sort of thought about how to systematically begin to characterize what level is associated with those different kinds of variability that might some day lead us to better interpretation of knowing what they are and how to sort them out or is it just always going to be, you know, a broad across-the-board type variability that we have to deal.

PANEL MEMBER BRADMAN: Well, I mean, I think there are approaches being considered on a very technical

basis, for, you know, exposure and risk and epidemiologic studies. I mean, certainly there's diurnal variation that's pretty predictable for some of these consumer products.

So in Lesa's letter and some of her work, you know, emphasizes looking at pharmacokinetics and can that, you know, provide information on individual measurements that can be used to back calculate exposures.

We've also, in our work, looked at things like paraoxonase and metabolic -- differences in metabolism and whether that affects metabolite levels and whether we should consider that in some of our analyses.

I think for cross-sectional studies, where you're reporting results back or getting survey information, it's going to be nearly impossible to account for some of those sources.

But that's --

PANEL MEMBER McKONE: Well, let me -- it just occurred to me, there's another side of this, which is there are certain things that it goes back to this paper we did, I don't know when, 4 or 5 years ago, when we looked at the one we published in ES&E with Rosemary.

And remember what we found though was there was actually a surprisingly low variability for some of the indoor pathways, and that's because the house buffered it

out, right? So if the house is controlling the exposure -- the indoor environment, controls the exposure, they're very persistent in the household environment, so it doesn't matter that the person has a lot of oscillation because the house is smoothing it out.

(Laughter.)

PANEL MEMBER McKONE: Because the house is delivering a constant dose, so you can cut some of the variability. So I guess that's a reverse question is there are opportunities to say, even things with short half-lives, if the environment manages the variability, then we have an advantage to actually cut our uncertainties down in an epi study, because there's another factor.

I suppose if we haven't -- I'm just thinking out loud, but I think that's something to look at is the reverse of this is there's things that dampen the variability so we can actually not have to throw up our arms and walk away from things that are very short lived, because they actually have something else that will deliver a constant dose.

CHAIRPERSON LUDERER: Anyway. Just a thought.

Dr. Alexeeff and then Dr. Cranor.

OEHHA DIRECTOR ALEXEEFF: Thanks. I had a clarifying type of question. It has to do with some of

the terms you used. And you were talking about a given measurement whether it's meaningful or not. And one of the things that I was wondering if you could clarify, there's 2 issues.

One is that if -- it seems to me that based upon the information you've provided, that the possibility is that you have a false positive -- I mean, a false negative. In other words, basically, you would not have a result because of metabolism when the exposure could have been yesterday or something like that. But it's not likely that you have the opposite, that basically you're likely to be detecting things that the person is not exposed to.

So, in one sense, if you -- the concern is that if you actually measure it with the idea that it could be metabolized very quickly, but you actually found something, then that does support the fact that there is an exposure. That's kind of one thing.

PANEL MEMBER BRADMAN: Correct.

OEHHA DIRECTOR ALEXEEFF: And then the other thing is if you're doing epidemiologic studies looking at exposure and outcome, then this type of issue is likely to result in a misclassification of exposure that will result in the likelihood of a null association, because people who are actually highly exposed and showing an effect, it

might come up that it looks like they weren't exposed because they metabolized it quickly.

PANEL MEMBER BRADMAN: Yeah. That's exactly true. I mean, it results in non-differential exposure misclassification, which, by definition, biases things towards the null.

Your point about detection versus non-detection, you know, we had some discussions about this before the meeting. Yes, detecting it versus non-detection does provide information about exposure. I think where the challenge is beyond that is trying to provide context when, you know, you have 100 percent detection rate.

And, you know, does a low mean low? Does a high mean high? How does somebody receive that information and then compare it to NHANES, say when you have a single cross-sectional measurement.

CHAIRPERSON LUDERER: Dr. Cranor.

PANEL MEMBER CRANOR: Yes. Thank you. This is a difficult question, but do you ever combine the information about the substance with the exposure information?

And here's what I have in mind. Some things might be much worse if they came in pulses. You know, you get a heavy dose now and then nothing, and then another heavy dose, and then nothing or they might be worse if

they were at a continuous moderate level of dosage.

I'm not quite sure where to go with that, but if you knew something about the chemical that it did more damage in a pulse like delivery than in a constant delivery, that might give you some information from your exposures as well.

Anything to comment on about that?

PANEL MEMBER BRADMAN: Well, I think in the kind of sampling that we've done the time frame, you know, we don't have the information really. And in a biomonitoring context, I don't think you would either, about whether a given exposure was a dose or, you know, kind of a -- I don't know the word I'm looking for -- but, you know, it wasn't like a pulse of exposure. We just don't have that information.

I mean a good example would be like I guess like smoking where if you smoke 2 or 3 cigarettes a day, you're getting -- you know, you're going to measure cotinine in pulses versus someone who smokes a pack a day all the time.

But that's something that I don't think we have the capacity to look at in our data. And maybe that's something for discussion, but whether that would be challenging I think in the kind of biomonitoring work that the Program does.

CHAIRPERSON LUDERER: Okay. Before we continue with more Panel discussion, I just wanted to stop and check whether we have any public comments.

MS. DUNN: Yes.

CHAIRPERSON LUDERER: All right. It looks like we have 3 comments. One that was sent in and 2 in-person. And we have 10 minutes. So if you could try to keep it to about 3 minutes, that would be lovely. Thank you.

Our first commenter is Mr. Davis Baltz from Commonweal.

MR. BALTZ: Thank you. Davis Baltz with Commonweal. Thank you, Dr. Bradman for that presentation.

In terms of your discussion questions, which probably have more discussion from the Panel on, but one thing I think, as you're reporting results, I mean, as Dr. Lipsett pointed out, the Program is legally obligated to report results per the statute. And that's based on an ethical consideration that you're going to ask people to participate in the study and have them give body tissues. There's an obligation to follow-up with them.

And so I know that as the Program has unfolded, this is, you know, creating more delays and more work than maybe we had anticipated in the beginning, but it's an important part of the Program, and it's going to remain. So we have to grapple with it.

So in terms of what you tell people when the variability in their sample or across similar people in their group is so different, you know, obviously providing information on the range of values that are found across a cohort that are similar, most agree, you think about farm workers in the Salinas Valley, for example. Someone may have a very low measurement, but if they look at the range of values that are measured in people who are similar to them, I think that would be important to share, so that they can see that there's a relatively good chance that over the course of their daily or weekly living of their lives that they are also, even though they may have had a low or a high exposure, they're going to come away with the understanding that they are exposed perhaps on an ongoing and continuing basis.

And if there was some way to compare single samples with, you know, 24-hour collections, that might also help them see that over the course of time that this is a chemical or substance that they're likely to be exposed to repeatedly.

So I guess the key message is that we need to convey to people that these chemicals are in the world, that people are exposed to them, and there's not necessarily a magic answer to give to people on what they can do about it.

Repeat testing for the Biomonitoring Program is not going to be possible, but one of your recommendations is to provide education on reducing exposure. I think that's important.

Also, if, you know, your slide showing high fruit juice consumption was correlated with higher exposure, that needs to be -- in addition to providing that, we also need to emphasize the benefits that one would get from ingesting fruit. And if the Program ever gets around to biomonitoring breast milk, it would be another example where the value and benefits of breast feeding would need to be explained and shared, so that people aren't driven away from drinking fruit juice or breast feeding, because they're afraid of the exposure.

And that kind of leads into my last point, which is maybe the most important one, and I think I've made this before, is that the more that we at Commonweal and others who have done community-based biomonitoring have talked with people who are in cohorts, the more they can ask questions and understand what biomonitoring offers, but also what it doesn't offer, what it can't answer, the more comfortable they feel with participating in studies, and the more value they get out of the information that is provided.

People can understand nuance and they're not

going to panic. And it can help create a more informed, you know, public on what the implications are for the multiple exposures that we all experience day in and day out and hopefully activate sectors outside the, you know, Biomonitoring Program to then advocate for some policy solutions that would reduce exposure.

So thanks again.

CHAIRPERSON LUDERER: Thank you very much. Our next commenter is Ms. LeVonne Stone from the Fort Ord Environmental Justice Network.

Ms. Stone.

MS. STONE: Okay. It's mostly clarifying a concern about when do you know if testing is happening in the first place and how do you choose the participants to participate in the program. And then when we're talking about short life chemicals, what if the chemical or the toxin is -- has no relay with something that has a longer life or stay around longer?

And it seems as though, from my understanding, that things are tested, people are tested for exposure to dangerous chemicals, but most of the time it's said that okay, this particular thing you will expel from your body in so many days or whatever the case may be, but if there's like a constant exposure in daily exposures to these particular chemicals, and especially when they're in

the environment, it seems to me that somebody needs to be responsible for taking it off the market and not having it available or stopping the action that's producing the toxin.

And another thing I don't understand why it takes so long or so many years to find out that something is very, very dangerous for children, babies, and your families.

And when it comes to pesticides, we were sprayed by the -- because we were a test area, I found out, for the Light Brown Apple Moth, because we don't have grapevines and all that, even though we have strawberries. And the bromide was taken out, and now we have something that they've discovered is almost as bad as the bromide. And so I'm just a little confused as to how things are being done and why these different chemicals are being put on the market knowing that they are going to affect people and that they're dangerous.

So that's my concern.

CHAIRPERSON LUDERER: Thank you very much.

I'm going to just now take some time to read a comment that came in from Dr. Lesa Aylward and Sean Hays from Summit Toxicology. So this is a document that I'm going to just read some excerpts from, because it's a rather lengthy document to save time.

So the document is regarding variability discussion at today's meeting.

"We commend the Biomonitoring California staff for recognizing the need to deal with the issue of intra-individual variability as an important issue for interpreting biomonitoring results and for communicating results to participants.

"...Recent studies that have collected repeat samples of urine voids over an extended time period for the first time, show that intra-individual variability can be quite high for some compounds due to a short half-life in the body and in frequent exposure events. Our recent review paper on this topic highlights the available data and the precautions that should be taken when interpreting concentrations of chemicals in spot urine voids or single blood samples for chemicals that have a short half-life of elimination from the body relative to the intervals between exposure events.

"The draft communication materials being considered by the California Biomonitoring Program provide a good start for communicating results to participants. For compounds with

short half-lives, it would be useful to provide some context as to how much variability might be expected for an individual, reasons for such variability and the language about the limitations of measurements of the concentration of a chemical in a spot sample for assessing an individual's longer term average levels or exposure rates. Examples of ways to address these issues are provided below."

So for, "Degree of Variability. For any compound for which published data exists on intra-individual variability, some indication on the extent of variability could be provided." And then examples are given.

"When such data do not exist, a pharmacokinetic model could be used to provide some predictions of variability resulting from infrequent exposures."

And under, "Reasons for Variability. There are numerous factors that contribute to intra-individual variability. Recognizing that it is appropriate for the current draft communication materials to be presented at a fairly high level, a detailed discussion of the factors contributing to variability would not

match the current level of detail in the draft communication materials. However, we recommend that the California Biomonitoring Program consider developing web-based communication materials to provide a more detailed discussion and a link could be provided or offered in print format for those participants wishing more information."

Under "Generic Language on Variability. More generic language could also be provided to help volunteers appreciate that if their measured levels are at the high end of the range, a different subsequent urine void may indicate much lower levels. Conversely, someone with very low measured levels may have higher levels in a different void."

Finally, "We hope these comments are helpful to the California Biomonitoring Program staff and the SGP. Please feel free to contact either of us if you would like additional information about our paper (Aylward 2012)...", which was one of the citations in the documents that we received, "...or the modeling tool provided."

Sean Hays and Lesa Aylward.

All right. We now have some time to continue the

discussion. And I believe that Sara was going to put up some discussion questions that the panel can address, but of course also any other additional comments the Panel members have to also provide now.

MS. HOOVER: Yeah, exactly. And I also wanted to mention that we've now posted the comments from Dr. Hays and Dr. Aylward. So those are available on-line for people.

Yeah, so this was great. Thanks again, Asa, for that really excellent summary of the problem we're confronting. And we just put together some discussion questions to guide the discussion of the Panel.

So the first one is what additional context, if any, might be important to provide to participants on interpreting their individual results for chemicals with short half-lives beyond the standard template. And actually in the document we received, we provided a link to an example template that was used for the Round 1 of FOX results return.

And if you believe that some context should be provided what basic messages do you suggest the Program try to convey. And as Dr. Hays brought up, you know, what we're dealing with is a very small amount of space, very lay language that we have to give this information in, so that's why we're emphasizing basic messages.

So what I'll do now is just run through the questions and then you can go back and I'll turn it back over to Dr. Luderer to facilitate.

So the next slide.

--o0o--

MS. HOOVER: If the Program chose to give information to participants about how the half-life of a chemical could affect their individual results, what type of information would be most important to include on half-life, how do you suggest the information be framed?

Next slide.

--o0o--

MS. HOOVER: Half-life is obviously only one of many factors that affect an individual's results for a given chemical as we've just heard. Which other relevant factors do you think would be important to explain to participants?

For example, repeated exposures, such as via routine product use, timing of when a biological sample is taken, such as after a meal.

Next slide.

--o0o--

MS. HOOVER: And then just wanting to keep it open, do you have any other comments on interpreting or communicating biomonitoring results for chemicals with

short half-lives from year background reading or your own experience?

So, Dr. Luderer, back to you.

CHAIRPERSON LUDERER: Thank you. Dr. McKone.

PANEL MEMBER McKONE: I guess in terms of explaining things to people, I'm not sure, focusing on half-life, you know, how long something lasts. And what I think is more important is for people to understand the burden, what we would call, you know, the level that's in their body. And I think kind of like in drug therapies and everything, nobody -- you know, you -- the dose is only a mechanism to get to the right body burden.

I think here what we want to explain to people is the amount of chemical in your body, you know, it's like explaining to people, you know, the DMV about drinking, right, and how many drinks you can have, you know, on your driver's license. They gave you a little card that says if you drink this many drinks in 2 hours -- and that's all about burden, right -- or about alcohol level and what controls it.

And it says you can drink a lot, but if you spread it out, it won't go as high or you can drink a little, and -- but it tries to get you to think about what determines the alcohol level in your body. Maybe it's that kind of thing that's easier to communicate is the

level of a chemical in your body will depend upon how frequently you're exposed to it and how long it lasts in your body.

And just say those are 2 factors that matter. And something that lasts a long time, you don't have to be exposed very often or very much. Something that's short, you know, if we find it in your body, either you were recently exposed or it's something you're continuously exposed to. You know, try to explain those things in a way other than focusing -- because I'm not sure half-life is the real critical parameter.

But again, I'm just thinking -- you know, just trying to throw something out for discussion.

CHAIRPERSON LUDERER: I mean, if I could just maybe make an interpretation or ask a clarifying question. Are you -- it sounds like you're advocating to me a more sort of general approach, like here's a general way that you can think about the levels of different chemicals in your body. Some of them, you know, last a long time in your body and others don't, rather than a chemical by chemical kind of a description or --

PANEL MEMBER McKONE: So, yeah. And I guess, again, I didn't articulate it very well, because I didn't think about it too much. But what I'm thinking -- you know, the question was in communicating biomonitoring

results, it seems like your earlier slide said how do we figure out how do we explain to people half-life and what it means. And I'm not sure that's the right question. I think the question should be how do we explain to people what determines the levels we're finding their body, and maybe not try to explain half-life, but instead try and explain burden.

MS. HOOVER: Exactly. So I just want to give a follow up, because I know the questions only convey a piece of our thinking. We've given it a lot of thought. The reason why we're -- and actually, the text -- the kind of general text that you just stated is the kind of text that we're trying to craft.

But one of the issues and the reason why we're bringing up half-life is part of what you said was for chemicals that last a long time in your body versus for chemicals that don't last a long time in your body, we're giving them a mixture of those chemicals, how are -- how do they know or should they know or do we -- that's why we're talking about -- so I'm not necessarily saying specific half-life or even explaining the term half-life, but more -- if you go back another slide.

You know, that's why I'm saying about half -- you know, about how the half-life could affect their results. It's not really using -- we would not use the term

half-life. We wouldn't attempt that, but it's more like -- you know, we're -- it's a big challenge. It's a big challenge that if you give people a mixture, because before it wasn't a big issue on metals and on PFCs even, which tend to have longer half-lives. We didn't really confront the issue, but now we're looking at, you know, mixtures of chemicals, some with very short half-lives, how do we -- so that's what we're grappling with, even at the level of very general. So that's --

CHAIRPERSON LUDERER: Dr. Quint.

PANEL MEMBER QUINT: Julia Quint. Yeah, that's why I asked Asa if they had the experience of returning mixed results of short and long half-life chemicals, because I think it's only when you get to that point that you really have to get into this issue more. And I think -- and another reason is in the materials so far, from my -- I wasn't here at the last meeting, but, you know, one of the things that you are telling them about results is that looking at their results relative to other people within their group, like for FOX, and then relative to NHANES.

So there, you know, there will be a comparison. So with the short half-life chemicals, you know, if somebody is low, and somebody else is in the group is really high, then that's a comparison that people will

make.

So I think simple things like, you know, for some of these chemicals they break down -- you know, they enter your body and leave your body more quickly. And, you know, I think you have to get into a little bit of the kinds of things that influence that. Like, you know, one example was eating barbecued chicken or something. I mean, people can relate to that, because they know that certain things that -- I mean, it also sends out a very -- in a way, it's even more important.

These short half-life chemicals represent an opportunity really to get into exposure versus what's in your body, because, you know, in the instance of the short half-lives, you can really -- they kind of demonstrate the fact that an exposure is causing a level to be high or sometimes, you know, you might not see it.

So I think you have to sort of -- for those chemicals that we know, you know, what affects the exposure, I think you sort of have to give examples, like, you know, that some foods or some things that you eat might affect, you know, the amount that's in your body at a given time, or something like that, but all relative to the fact that it's a mixed bag of results that you're giving them.

I don't know -- I mean, I agree with Dr. McKone

that going into the -- and you can't do pharmacokinetics. We're not doing pharmacokinetics. We're not doing repeat measurements, because we can't afford to. We're not doing 24-hour urines near as I can tell comparing them to spot urines. So we're -- you know, we are limited in what we can do.

But given that limitation, I think there is an opportunity with the short half-life chemicals of just really being able to say a little bit about where we know it, you know, the types of exposures that can influence the levels. And, you know, we just have to get into it at some very, very basic level, just because of the fact that they will be comparing. And the exact way to do that, I'm not offering a clue, because I don't know.

(Laughter.)

CHAIRPERSON LUDERER: Okay. We have 3 here, so Dr. Bradman, Dr. Cranor, Dr. McKone and Dr. Lipsett, did you also have a -- no.

DR. LIPSETT: If you want, sure.

(Laughter.)

CHAIRPERSON LUDERER: It just looked like you were inching towards the mic.

PANEL MEMBER BRADMAN: Just to summarize a little bit what Dr. Quint just said. I mean, it sounds like what your were suggesting and maybe it's necessary to have

slightly different language and perhaps separation. And maybe an information package for persistent compounds or even moderately persistent, like lead, and then a set of information materials that are specific to short half-life non-persistent compounds.

And that -- you know, there could be 2 parts to a return result letter. And the second part that dealt with short half-life compounds would provide some context. I thought Davis Baltz's comment about, you know, some explanation that, you know, for these compounds you fall here, but because of variability, you're likely results over time might cover the full range of what we've measured. And I think that's an important concept as well.

CHAIRPERSON LUDERER: Dr. Cranor.

PANEL MEMBER CRANOR: I think I want to echo those ideas in the following way:

One has to be a little careful with this suggestion. But for things with short half-lives, you -- there might be a way to say this gracefully, your result might be either misleadingly high or misleadingly low because of the variation or if it's an average, that may be misleading too. And that's less likely to be true for more persistent compounds that hang around the body for long periods of time.

So maybe it would be useful to separate the categorization have, roughly speaking, short lived compounds, moderately lived compounds, long lived. It may be too complicated, but I think that's the risk of the short half-life compounds is somebody either might relax or panic and either one might be a mistaken reaction.

CHAIRPERSON LUDERER: Dr. McKone.

PANEL MEMBER McKONE: I would think probably it's best to just explain the way we would think when we look at it. Like if I looked at a list of things in a dioxin was at a certain level, because it's so persistent in the body, I wouldn't expect a repeat would change that much, unless there was an error. An organophosphate, on the other hand, if it were high, could say, well, they might have just recently been exposed or they could have an intermittent continuous source, but you don't know which one of those it is.

And the analogy would be like body weight. If somebody weighed 160 pounds today, I wouldn't expect them to way 140 tomorrow, unless there was some really odd thing going on.

But blood pleasure, you know, if you took somebody's blood pressure and it's high today, you would repeat it, because it's one of those things that it could be high because it's consistently high, or it could be

high because you're just really stressed out today, and tomorrow it will drop back down.

And if you explain those sorts of measure -- you know there are certain measurements that we don't have to repeat them because it's unlikely they'll change, because they're very persistent things. Like body weight doesn't change dramatically, but -- and we -- I don't know if that's a good analogy, but something like that to say there are certain things that when they're high, we don't know if they really are high. And there are other things that when they're high, we wouldn't expect them ever to go low, because it's the sort of thing that doesn't oscillate sometimes.

CHAIRPERSON LUDERER: Dr. Bradman, or Dr. Lipsett.

PANEL MEMBER BRADMAN: Go ahead.

DR. LIPSETT: Go ahead Asa.

PANEL MEMBER BRADMAN: I actually want to respond to the public comment, and I can wait on that.

CHAIRPERSON LUDERER: Dr. Lipsett.

DR. LIPSETT: Okay. Yeah, I just want to thank the Panel for this input and discussion and also for the public comments as well. As you can see, this is really challenging, as I mentioned before, with the usability testing in any case, because we're dealing with the lay

public.

And don't forget also, we have -- we're going to be looking at dozens of chemicals in people and providing fact sheets with their results, and then with -- we're currently giving information about potential sources of these chemicals. And it's going to be a real challenge. You know, we'll be coming back to you as well. This is one of the issues that we're really struggling with as well, in terms of trying to give people an indication of how much control they really have over their exposure.

But I just want to say just a gut reaction to including additional statements saying well -- you know, we're already saying we don't know what the medical implications of these things are. And then if we add additional statements saying, well, here's your result, but we don't really know if this is your result. It could be higher, it could be lower.

(Laughter.)

DR. LIPSETT: And so it makes it, you know, much less meaningful for people to put in a lot of these caveats. I mean, I understand scientifically they're important, but I just want to stress to you how challenging this is going to be to try and implement this.

So thank you.

CHAIRPERSON LUDERER: Thank you.

Dr. Bradman.

PANEL MEMBER BRADMAN: I just wanted to respond to the public comment earlier. And there were some questions that were raised about who participates in the studies and that there's constant exposures. Specifically, I wanted to say that, you know, our research was funded through grants from the federal government to develop a partnership with the community we work in in the Salinas Valley to look at exposures.

And this project is different from the State Biomonitoring Program, which is mandated by legislation to ideally get a representative sample of California residents, but given funding is more focusing on community based studies, but there's some history there that's available from previous meetings and from the Program that can help clarify that.

So I just wanted to mention that about our work and differentiate that from the State work.

CHAIRPERSON LUDERER: Sara.

MS. HOOVER: Yeah, I just wanted to say thanks to Michael for raising some of the difficulty, because we've actually talked around a lot of these ideas. This is really great input, but I want to punt back some of the complications to you and see how you would chew on some of these complications.

One is, as I -- we actually contemplated that language of, you know, for this particular chemical, your result might be higher or lower if your sample was taken at a, you know, different time of day or on another day. And we actually briefly tested that, you know, with a small group, and that wasn't really understandable.

And then I actually started doing more research as well, and something Asa just said too and George was saying is, if you find the chemical, that still has meaning. You know, there's not -- like, if you have a high result, you can't necessarily brush that aside. That means you are being exposed. So unless it's like a problem with the actual measurement, which is unlikely with the quality of our lab, that still does give you some information.

And, in fact, there's been studies, for example, with triclosan where you can reach a steady state level. You know, you're using say your toothpaste 3 times a day that has triclosan in it, your result is going to have some meaning. So I think, in part, that's what you were indicating with your data that you can show these differences between people. And so at a very broad level if you find the chemical and then they go to the information and they say, okay, I have this chemical, where could it be coming from, what might be the concerns,

and what could I possibly do about it? So that's really -- like, we're at that sort of basic communication level.

One of the things we've been contemplating more and to make the cut, you know, the idea of -- we also thought of that idea like make the cut between shorter half-lives and longer half-lives. Okay. Where do you make the cut for a group of chemicals that have widely varying half-lives, you have PFCs, some have much short half-lives, some have very long half-lives. How do you make that cut and make it meaningful?

So one idea that came up from a staff person at DPH is, well, what about -- and it was really good actually. Sandy also contributed to this idea of try to be right 95 percent of the time. Like some of the stuff we're saying, it's hard to make it clear in lay language and be 100 percent scientifically accurate. So one of the things we started playing with was a cut between, well, most of the chemicals that we measure in your blood tend to be chemicals that last longer. Whereas, most of the chemicals we measure in your urine tend to be more, you know, short lived. The differences that you'll see depend on many factors, including, you know, how recently you've been exposed, how often, how high, this kind of thing.

Now, of course, that's -- you know, there's

complications in even making that statement, because you can measure some phenols in blood. You know, so there's -- we're not necessarily reporting that, but I'm just saying it's not 100 percent correct, but that's one possible cut, because we were struggling with the idea of well, what do -- do we tell them something about each and every chemical, do we make a cut and regroup the chemicals, or can we somehow say something more broadly. So that's our new avenue. And this was actually Laura Fenster's idea to give her credit, because I hadn't been thinking along those lines. So I just wanted to put that out there to you guys and see what you think of that.

CHAIRPERSON LUDERER: Dr. Quint.

PANEL MEMBER QUINT: Yeah. I think something like that would really be preferable to too much detail, because you're going to lose everybody and you're never going to get the mesh between lay language and, you know, scientific reality or certainty of what we would like to see as scientists completely meshed. It's just not going to happen.

I guess what I was mostly concerned about with -- I mean, my major concern is people looking at their results in the context of other people that they're being measured with and seeing somebody with a really high level, and then other -- and their level maybe -- if

theirs is really high and everybody else's is, you know, lower or something like that, that's my main concern, not -- because I would agree that if it's measured in whatever media, it's in your body, it's an exposure. And we're not talking about health concerns, we're talking about exposure here.

But when you invite them to compare, they will compare. And if there is an explanation that isn't going to scare the bejesus out of them because their result is really, really high compared to the rest of the people in the cohort, I think there's an obligation to provide a little bit more information in that circumstance, so that they can put that into context, they're own -- you know, that it could be different the next time. You know, whatever, however you want to say it.

But that's the real concern is just the comparison not the absolute measurements that -- you know, not the absolute values themselves. And I certainly agree that I wouldn't try to figure out all these batches of -- you know, the toxicokinetics of all those chemicals and batch them into different groups. I just think, you know, it's already complicated. And you already have examples with high mercuries where people aren't coming back to you asking for an explanation. So, you know, maybe this is more of a concern for us than it is for other people. I

don't really know.

PANEL MEMBER BRADMAN: I wanted to just comment about there was a brief comment before about, you know, the good laboratory quality and unlikely to be an incorrect result, but there's also always the potential for contamination of the sample during collection and processing. And that's just something to consider. I mean even if, you know, you have field -- you want to have some blanks and make sure that you're not picking up contamination, and -- you know, you may have, you know, 100 blanks and 99 are blank. So you know your overall data is good, but that one -- maybe that one sample was contaminated, and that could happen to a participant's sample too. So that also, you know, has some implications with respect to the offering the follow-up testing. But that's always a possibility.

CHAIRPERSON LUDERER: Dr. Quint, I just wanted to follow up on your comment, whether your suggesting was that if there was a particular participant who had a high level of something that was, say, a short half-life chemical that there should be kind of a targeted response to that person or more generally just -- I mean, we are -- people are already being provided with a number or a contact that they can make, if they do have a question.

PANEL MEMBER QUINT: I just thought more general

than that, if you're -- and it may be complicated, because I don't how many results of mixed, you know, chemicals will be returned. But if you had say an OP return in a batch with, you know, persistent chemicals, that you would just have a general footnote, maybe an asterisk by the OP saying that those can be variable because of -- you know, however you want to craft that language, but that you wouldn't target that person, but you could say for that result when you compare, that there are reasons why those results -- some results may be really high and some may be really low or something like that.

In other words, more target the analyte as opposed to the person, in terms of the explanation. You know, if you had in a batch of 10 results and you had, you know, 3 or 4 that were the short half-life chemicals, then you would put an asterisk by those or some marker by those in saying that -- you know, something to alert them that the comparison, you know, when you compare or when you look at this result, you know, it reflects X, you know, changes in -- you know, that certain things could temper that result in a certain way, either what you ate or, you know, what you used or something like that.

That's where you would get into the short half-life, you know, if that would work. But not -- yeah, but I wouldn't invite individuals to call, because I don't

think we have the -- I mean, it's not like the mercury situation where you have a health concern or the lead, you have to separate these chemicals from those where you are going to have a concern about a potential adverse health effect, because they are different.

I mean, it's not like having, you know, a 10 microliters -- you know, that you have a high lead or a high mercury. We don't know what the high -- you know, what these values mean, medically or health wise.

So it's a challenge. I don't know how you do it.

(Laughter.)

PANEL MEMBER QUINT: When it comes right down to it.

PANEL MEMBER BRADMAN: I'll add one other comment to that just to echo Davis Baltz's comments about people understanding nuance. And that's been our experience in Salinas and my experience and other contexts as well that, you know, we talk about lay audiences and we talk about low literacy, but, you know, low literacy doesn't mean low intelligence.

And that it's possible to include some complexity. And some people won't get it, and many will. So I think your idea of 95 percent is a good one, but maybe -- but, you know, we can come up with language that will work for most people. That would be another way of

looking at it as well.

CHAIRPERSON LUDERER: Dr. Alexeeff.

OEHHA DIRECTOR ALEXEEFF: Yeah. I've been thinking about Dr. Bradman's presentation about inter-individual and intra-individual variability, and also Davis Baltz's comment about the cohort. And so I was thinking about the Fire FOX -- did I get the right?

(Laughter.)

OEHHA DIRECTOR ALEXEEFF: The FOX study, sorry.

(Laughter.)

OEHHA DIRECTOR ALEXEEFF: Anyway, the FOX study. That's good.

So the FOX study where we have a cohort of firefighters essentially. And I don't remember all the chemicals we were looking at, but if there were chemicals that were short half-life chemicals, it could be -- it would be very logical to explain that for those chemicals that have short half-life, that they can look at their exposure that was measured for that particular day, but it's also important to look at the exposure for the whole group, which I guess you'll be reporting as a range, because the variation that occurs day to day, that also provides information of their possible exposure over time.

And contrast to some other chemicals where they're more persistent -- and then that would be a

separate thing. These chemicals are likely to reflect not just your exposure that day, but probably some measure of your exposure over time.

CHAIRPERSON LUDERER: So it seems to me that just to kind of try to summarize maybe some of what we're hearing from the Panel, that there is a -- kind of a consensus on the Panel that providing some sort of context maybe about half-life is important, but the question is kind of at what level?

You know, so the one proposal that you mentioned was really kind of like basically urine versus blood as kind of sort of the least specific level, but it sounds like what I'm hearing from the Panel members is for something a little bit more specific than that, possibly by chemical class. But then you, of course -- Sara raised the issue that even within a class of chemicals that may be structurally similar, there can be a pretty wide range of half-lives. And so how -- I wonder if we could have a little bit more discussion from the Panel about that, you know, how -- at what level do we think that this information should be conveyed to the participants?

MS. HOOVER: Could I just add one thing to that?

So I think actually everything I was hearing from Julia that was a great suggestion from George. It's possible to still put it in that same framework of most of

the chemicals in urine and most of the chemicals in blood. And you can -- we actually -- some of the language we're thinking about is will my chemical -- will the levels of the chemicals in my body change over time? And then, you know, yes, it will change over time.

And then we're actually talking about both circumstances for most of the chemicals in urine language. You know, for most of the chemicals in blood can buildup in your body, you know, then we're struggling even, because there's that message too, that you need to convey. And some of the factors that -- but I really like this idea of for the chemicals in urine, you know, looking at the group exposure might give you an idea of the range of your exposures. That's a really great suggestion that we hadn't come up with.

But so I'm wondering, and also some of the things that Julia was talking about, I still think we could potentially incorporate those concepts into this split if people -- like, there's complications with the split, right, because you have lead in blood, you have lead in urine. You have mercury in blood, you have mercury in urine. So it's not perfect, so it doesn't give people 100 percent of the information, and we are giving them a phone number to call.

So I just want to get a sense from the Panel

about is that a reasonable path to pursue in spite of these complications?

CHAIRPERSON LUDERER: Dr. Bradman.

PANEL MEMBER BRADMAN: We probably all have things to say, but -- my first gut responses is, yes. You know, I think that's definitely reasonable.

Also, maybe the Program should consider not testing lead and mercury in urine, because it's measurable in blood, and especially if you're in a population where you're doing both, and there are guidelines, which are based on blood levels not on urine levels.

So if you're doing both, lead in urine -- I'm sorry, if you're doing blood in urine, it seems to me there might be an issue there that's another level of complication, that's not necessary.

MS. HOOVER: Sorry. Just to add. I think that that's a really good point for certain ones. For mercury there's a reason. You know, if you have a high mercury in blood, you actually want to measure it in urine, because that gives you an idea about are we right that it's probably fish, or could it be inorganic.

So there's, you know, a basis for doing that, but point well taken. I mean, I -- that's actually something we're talking about right now is returning results for metals in urine. So I think that this is an important

point about what value does it give, and that's something we're looking at.

CHAIRPERSON LUDERER: Well, I think I saw a lot of yeses and nods from the Panel members agreeing with Dr. Bradman, that that approach -- that the Panel members favor using that kind of a dichotomous approach, urine versus blood, and then providing, you know, explanations of the different reasons why most of the urine measured compounds would be more variable, and then making the comparison with the other members of your group. And I don't hear much in favor from the Panel about doing it on a chemical-by-chemical kind of a basis.

So are there other discussion questions that we haven't really addressed I guess is the --

MS. HOOVER: I don't think so.

CHAIRPERSON LUDERER: All right.

MS. HOOVER: That, yeah, was really good.

CHAIRPERSON LUDERER: Okay. Great. All right.

So that was a very interesting discussion.

Our last, I believe, item for the day is an open public comment period?

So I wanted to ask Amy if we have any requests for comments?

MS. DUNN: We have one at least. Two. Okay.

I guess we have Davis Baltz.

CHAIRPERSON LUDERER: So we have 3?

MS. DUNN: I guess, yes, we have 3.

CHAIRPERSON LUDERER: Okay. All right. And I think we have 15 minutes for this. And could you please identify yourself.

MS. MAYENO: I'm Amiko Mayeno with the Biomonitoring California Program at EHIB, California Department of Public Health.

And I just wanted to mention that in these discussions that obviously have been very complicated and challenging around how to communicate these results in a way that's understandable. We did show them some -- we did some usability testing showing them some of this generic language similar to what we're talking about, although it wasn't specific about urine in blood. It was just about the variability that you can find.

And in that, you know, very limited usability testing that we did with very few people, people really didn't see that information when it was in the general information section, because there's general information in the first couple pages, and then there's specific information including their results.

So we tried -- once we pointed it out and said, "Okay, read this paragraph", they read it and they got it, but they missed it. And so that was one of our concerns

by not including something connected to the individual chemicals. So that's just a challenge that we're dealing with, and I don't know if you have any suggestions.

Thank you.

CHAIRPERSON LUDERER: We'll mull that over while we're listening to the other comments.

Mr. Davis Baltz from Commonweal.

MR. BALTZ: Thank you. Davis Baltz, Commonweal.

I just wanted to make one more remark about the previous discussion about sharing results and what we can say. And, you know, we're not going to be able to answer everyone's questions and provide assurance that everything is okay. If people want that, they can go to the American Chemistry Council.

(Laughter.)

MR. BALTZ: I'm not recommending that we send them there, but there's something intrinsically disturbing and unsettling about learning that you have pesticides and industrial chemicals and heavy metals in your body that don't belong there, and people are going to have to, you know, learn to sit with that.

And when I was talking about people can appreciate nuance, that's part of what I was getting at. It could be another follow up for the ACC, did you anticipate that your products were going to migrate into

my body, and what was your plan?

And so the Biomonitoring Program's purpose is to gather data and make it available on body burdens, and let most of the conversation about what we do after that be, you know, passed on to other fora. It's important that the Program's labs and the data that we provide is scientifically unimpeachable, so that the Program can't be attacked for taking political views. Let the policy discussions, in many ways, happen after you continue to generate data. I just want to remind us that that is ultimately the purpose of the Program.

CHAIRPERSON LUDERER: Thank you very much. And our last comment is Ms. LeVonne Stone?

MS. STONE: Yes.

CHAIRPERSON LUDERER: Yes -- from Fort Ord Environmental Justice Network.

MS. STONE: I agree with the previous speaker. I might say it a little differently being the director of a community-based organization and hearing from people. And most people those days are very conscious of their health. And they realize that health insurance is a problem, and they don't want to go to a hospital they've to find out what's wrong with them and what they might be exposed to.

And what people are looking for these days is the things that are most important that might be affecting

there are impacting them, you know, cancers, shutdown of your kidneys, and all that kind of stuff, that's what people want to know. And I don't think making comparisons -- I haven't heard too much about making comparisons, because everybody knows that everybody's body is differently. We all react differently to certain things unless there's some type of poison or something that's going to knock people out. But I think it will be less complicated if we just think about what people need to know, what they want to know.

The most important thing to you, if you talk to people, they will tell you -- you know, there might be 100 or who knows, but the thing that's most impacting them. And then what -- you know, I heard somebody say that if you want to know what you might -- what the exposure might do to you, then you can look at, you know, the toxicological profile or something like that, which is true.

But basically people don't even know what's happening to them. And they sometimes they know what they're exposed to, but they don't really have the evidence. They don't really have the information. And we're always told that we need to provide scientific information. And especially when you're at a military site, where there's a lot of air stuff going on and maybe

soil and even skin exposures too. So I think that if we think about it in that manner, that it would be less complicated. It would be less hard, because people just want to know.

Thank you.

MS. DUNN: We do have one more comment.

CHAIRPERSON LUDERER: Okay. Thank you.

Thank you, Ms. Stone, too.

MS. WASHBURN: Hi. My name is Rachel Washburn.

I'm at Loyola-Marymount University. I'm a Medical Sociologist and I've been studying biomonitoring since about 2005 as a sociologist. And I just have one comment to throw out there for consideration about reporting the data for the nonpersistent compounds. I wonder if it would still fit within the guidelines of the statute to just let people know that there was a detect and give them the range of the group, as opposed to giving them a number?

I don't know if that is in breach -- okay. Perhaps that's in breach and so that wouldn't work, but otherwise when you give a number, we expect that there's meaning with a number, right? Otherwise, what's the point of a number.

And so if you said detect and here's the range in your group, you may fall somewhere in that range. That

may be a way to get away from some of these questions, because people will make comparisons with other people. And if they're high, they're going to think that that's a real problem.

And particularly if you're looking at, you know, chemicals that have short half-lives that are associated with consumer products, it's very different when you have a cohort and they're going to think about their exposures associated with their occupation. And they could say, okay, this occupational group, if we're looking at chemicals that are associated with this job, then perhaps that falls somewhere within that range, but if you're looking at consumer products, they're going to start to think about their consumer habits. And that's very sort of individual level, tends to be at least. So just for what it's worth.

CHAIRPERSON LUDERER: Thank you very much. Do we have any additional comments?

Okay. Great.

So that brings our meeting to a close. Again, I would like to thank everyone today for coming and for participating. And I wanted to announce that the next Scientific Guidance Panel meeting is going to be in Sacramento and that will be on November 8th. And, as always, those materials will be -- the agenda will be

posted on the website and the emails will go out to the listserv about that.

Okay. And we look forward to seeing you all November 8th. The meeting is adjourned.

(Thereupon the California Environmental Contaminant Biomonitoring Program, Scientific Guidance Panel meeting adjourned at 3:24 p.m.)

CERTIFICATE OF REPORTER

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

That I am a disinterested person herein; that the foregoing California Environmental Contamination 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 6th day of August, 2012.

JAMES F. PETERS, CSR, RPR
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