

CALIFORNIA ENVIRONMENTAL CONTAMINANT BIOMONITORING PROGRAM

(BIOMONITORING CALIFORNIA)

SCIENTIFIC GUIDANCE PANEL MEETING

CONVENED BY:

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

STATE OF CALIFORNIA

THE CALIFORNIA ENDOWMENT

LAUREL ROOM

2000 FRANKLIN STREET

OAKLAND, CALIFORNIA

THURSDAY, JULY 25, 2019

10:00 A.M.

JAMES F. PETERS, CSR  
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A P P E A R A N C E S

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Kathleen Attfield, Sc.D., Research Scientist, Exposure  
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CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL:

Anne Cooper Doherty, Ph.D., Senior Enviromental Scientist

PRESENTERS:

Rebecca Moran, S.M., Staff Research Associate, Department  
of Public Health Sciences, University of California, Davis

Gina Solomon, M.D., M.P.H., University of California, San  
Francisco

ALSO PRESENT:

Joe Charbonnet, Ph.D., Green Science Policy Institute

Gino Cortopassi, Ph.D., University of California, Davis

Sandipan Datta, Ph.D., University of California, Davis

Michael Lipsett, M.D., Retired, California Department of  
Public Health

Joel Tenney, Israel Chemicals

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## P R O C E E D I N G S

PANEL MEMBER BARTELL: Good morning, and welcome.  
My name is Russ Bartlett. I'm with the Office of  
Environmental Health Hazard Assessment.

Just go through a few logistics before we begin.  
All the meeting materials were supplied to our SGP Panel  
members, but there still are meeting materials available  
on the table outside where you signed in.

The restrooms are located to the door just to the  
left where the Panel members are and immediately to your  
left. You can also access the restrooms through a door  
that I'm pointing over there to that side of the room.  
And if you just go straight and to the left, the rest  
rooms will be there.

Emergency exit, if we do need to do that, you can  
go through that door, where I just pointed to, immediately  
turn left and you'll be back on Franklin Street. You can  
also access that here to the rest room door, turn left,  
and you'll be at the door to exit on Franklin Street.

So for the benefit of those who are joining us by  
webinar or teleconference, today is very important that  
speakers, if you're using the microphone, please speak  
very clearly, and also speak close to the microphone, and  
even hold the microphone like I am doing right now.

This is demonstrating that.

1 (Laughter.)

2 MR. BARTLETT: In addition, webinar and  
3 teleconference folks, you'll notice that when you joined  
4 the webinar today, you were automatically muted. We ask  
5 you to please stay muted for the duration of the meeting  
6 today. If you do somehow become unmuted, Biomonitoring  
7 California staff will immediately put you back into mute  
8 mode.

9 (Laughter.)

10 MR. BARTLETT: If you are muting -- unmuting more  
11 than one or twice, we can expel you from the webinar --

12 (Laughter.)

13 MR. BARTLETT: -- but let's not get to that.

14 (Laughter.)

15 MR. BARTLETT: Yes. Thank you.

16 And at this time, I would like to introduce the  
17 Director of the Office of Environmental Health Hazard  
18 Assessment, Dr. Lauren Zeise.

19 Thank you.

20 DIRECTOR ZEISE: Thank you, Russ. So I'd like to  
21 welcome the Panel and the audience to this summer meeting,  
22 summer 2019 meeting, of the Scientific Guidance Panel, of  
23 the California Environmental Contaminant Biomonitoring  
24 Program, also known as Biomonitoring California. Thank  
25 you all for participating, and sharing your expertise, and

1 time.

2           So just a quick overview of the spring meeting of  
3 the Biomonitoring Program Science Guidance Panel. The  
4 primary focus of that meeting was to discuss the Program's  
5 priorities, both near term and longer term. So after a  
6 Program update, the Panel provided input on projects to  
7 include under Biomonitoring California's submission to the  
8 Centers for Disease Control and Prevention, the CDC  
9 funding opportunity for the State Program.

10           And unfortunately, as many of you have heard,  
11 your proposal was not selected for CDC funding. So to let  
12 you know we're currently engaged in internal discussions  
13 on how to address the budget shortfall, and also how to  
14 adjust the Program, so those are ongoing internal  
15 discussions.

16           We heard presentations from our three newest  
17 Panel Members, Singla -- Veena Singla, Eunha Hoh, and José  
18 Suárez. And they discussed research around using  
19 measurements in dust to identify chemicals of concern in  
20 the indoor environment, applying non-targeted screening  
21 analysis to reveal compounds not traditionally  
22 biomonitored, and designing intervention studies to  
23 evaluate innovative ways for exposure reduction.

24           And the Panel also provided input on chemical  
25 groupings for possible future considerations as potential



1 designated chemicals, recommending that OEHHA conduct a  
2 preliminary screening of quaternary ammonium compounds, or  
3 QACs. And we're going to be hearing a presentation on  
4 that screening in the afternoon for those compounds and  
5 requesting -- and having the Panel look at recommending --  
6 recommendations in that regard and next steps.

7           So a summary of the input from the March of  
8 meeting along with a complete transcript is posted on the  
9 March SGP meeting page on [biomonitoring.ca.gov](http://biomonitoring.ca.gov). And now  
10 I'll hand over to our SGP Chair Meg Schwarzman, who will  
11 provide more details about today's meeting and begin the  
12 formal part of the meeting.

13           PANEL MEMBER SCHWARZMAN: Thank you.

14           Okay. Our adjustment method worked really well  
15 here. If you're not speaking right into the mic, I'll  
16 just glare at you.

17           (Laughter.)

18           CHAIRPERSON SCHWARZMAN: So if you see me glaring  
19 at you, that's my reminder with minimal interruption.

20           We'll try that.

21           (Laughter.)

22           CHAIRPERSON SCHWARZMAN: It worked here anyway.

23           So my job now - thank you, Lauren - is to just do  
24 a quick review of the day -- the day's agenda and what our  
25 goals are. So as usual, first, we'll receive a Program

1 update this morning. And then the Panel will provide  
2 input on the major Program priorities that are going to be  
3 included in the upcoming report to the Legislature from  
4 the Program.

5 The second part of the morning session, we will  
6 focus on biomonitoring results from the Foam Replacement  
7 Environmental Exposure Study, FREES. And from the dust  
8 and foam sampling that occurred in the larger study that  
9 was led by UC Davis.

10 And we'll have time for questions after each  
11 talk. Then we'll break for lunch. And after lunch, we'll  
12 hear a presentation about applying a class approach for  
13 evaluating hazards posed by organohalogen flame retardants  
14 based on a report that was sponsored by the Consumer  
15 Products Safety Commission and prepared by a Committee of  
16 the National Academy of Sciences.

17 The afternoon discussion session with our guest  
18 speakers and audience will focus on two things, one is  
19 drawing insights from the flame retardant findings that  
20 we'll hear about this morning, and looking ahead for the  
21 Program in terms of possible future work on flame  
22 retardants.

23 Following the afternoon break, we'll hear a  
24 presentation on the -- as Lauren just mentioned, on the  
25 preliminary screening of quaternary ammonium compounds for

1 possible consideration as a potential designated chemical  
2 class. And the Panel will provide input on their highest  
3 priority chemical group for preparation as a potential  
4 designated chemical document.

5           It could be QACs, based on today's presentation,  
6 or we can select from the many differ chemical groups that  
7 have been screened by the Program previously. So we'll  
8 outline what those possible selections are before the --  
9 before the Panel has to provide input.

10           So the last item of the day will be an open  
11 public comment period. If you want to provide comments  
12 during the meeting, please fill out a comment card  
13 available at the table just outside the door or from Russ  
14 also --

15           MR. BARTLETT: They're at the table outside the  
16 door.

17           CHAIRPERSON SCHWARZMAN: The table outside the  
18 door. Okay -- and turn it into Russ Bartlett.

19           Okay. I will call on you on the appropriate  
20 moment during the comment periods or in the afternoon  
21 discussion section session. And for the benefit of our  
22 transcriber, please clearly identify yourself before  
23 providing your comment and write your name and affiliation  
24 on the card, so that we can make those -- sorry, on the  
25 sign-in sheet, so we can make them correspond.

1           If you're joining the meeting via the webcast,  
2 you can provide comments via email. And the address is  
3 biomonitoring@oehha - O-E-H-H-A - .ca.gov. And we'll read  
4 relevant comments allowed, paraphrasing them when  
5 necessary. Please keep your comments brief and focused on  
6 the items under discussion. And we'll only impose time  
7 limits if we need to, based on the rest of the agenda  
8 items.

9           So our first item is the Program update  
10 presentation of the major priorities, which will be done  
11 by Robin Christensen. She is the Chief of the  
12 Biomonitoring Investigation and Outreach Unit in the  
13 Exposure Assessment Section in the Environmental Health  
14 Investigations Branch at CDPH, California Department of  
15 Public Health.

16           (Thereupon an overhead presentation was  
17 presented as follows.)

18           (Laughter.)

19           CHAIRPERSON SCHWARZMAN: She'll provide an update  
20 on current program activities and outline our -- the  
21 proposed major priorities that will be included in the  
22 upcoming report to the Legislature. And I flagged that  
23 because that, if you were listening to our goals for the  
24 day, is one of the things that we really want to get clear  
25 direction from the Panel. The Program wants clear

1 direction from the Panel about those priorities to be  
2 included in the report to the Legislature.

3 So listen carefully.

4 Robin.

5 MS. CHRISTENSEN: Hello. All right.

6 Hi, everybody. I'm Robin Christensen. As you  
7 mentioned, I am a Health Program Manager with the  
8 California Department of Public Health. I will be giving  
9 the Program update today. And before we begin, I wanted  
10 to say that due to my oversight, slides 20 and 22 are  
11 swapped in your materials. So same materials, just  
12 flip-flopped.

13 --o0o--

14 MS. CHRISTENSEN: I wanted to start off today  
15 talking about a few updates.

16 So first of you -- first, many of you know that  
17 we have had some leadership changes at CDPH. Dr. Karen  
18 Smith has recently stepped down and Susan Fanelli is our  
19 Acting Director. She's working with Dr. Charity Dean,  
20 Assistant Director, and recruitment is currently underway  
21 for Dr. Smith's replacement.

22 The Program has also had some recent staff  
23 changes as well. Dr. Juan VillaRomero has worked for  
24 three years with DTSC on the PFAS analyses. His position  
25 was funded through CDC through Sequoia Foundation. He is

1 currently still working with DTSC and he is now a State  
2 employee, but he is no longer working with the  
3 Biomonitoring California Program.

4 At EHLB, Dr. Ryszard Gajek has retired in June.  
5 He was the Supervisor of the Lead and Inorganic Testing  
6 Unit since 2012. And he supported both Biomonitoring  
7 California and also the Childhood Lead Poisoning  
8 Prevention Program. We really want to thank both Juan and  
9 Ryszard for their many contributions to the Program.

10 And we also want to welcome Marley Zalay who has  
11 joined OEHHA as a Senior Environmental Scientist. Marley  
12 has several years experience conducting exposure  
13 assessments for occupational and environmental exposures.  
14 And she received her M.P.H. from UC Berkeley.

15 And finally, as Lauren mentioned, we were not  
16 awarded a third round of CDC cooperative agreement  
17 funding. This is disappointing, but the summary statement  
18 that we received was actually fairly positive. We scored  
19 higher than we did in the two prior rounds of funding.  
20 And we have taken the feedback from the objective review  
21 panel and we are considering it. And we've asked for more  
22 detail from CDC.

23 The competition overall was quite strong. They  
24 had 17 competitive applications and Biomonitoring  
25 California would like to congratulate Iowa, Michigan,

1 Minnesota, New Hampshire, New Jersey, and New York State  
2 for receiving cooperative agreement funding through 2024.

3 --o0o--

4 MS. CHRISTENSEN: So this is a very big loss for  
5 our Program, but we did prepare for this possibility. And  
6 the CARE Study is currently on track for Region 3. We are  
7 looking for ways where we can save money. For example,  
8 looking for low-cost temporary office space. We are  
9 relying more on in-kind support. And we're trying to  
10 figure out how to reduce the time spent in the field,  
11 since field work itself can be quite a big cost. The  
12 design itself and the timeline are currently looking as  
13 though they remain on track.

14 --o0o--

15 MS. CHRISTENSEN: So just a little bit of a  
16 reminder of the CARE Study. This is our statewide  
17 surveillance study and it is one of the primary mandates  
18 of the Program. The purpose is to provide levels on  
19 background or baseline levels of chemicals, specifically  
20 metals and PFASs across the State. And we do that by  
21 recruiting a representative group of Californians across  
22 each of the eight regions in the state.

23 We've already been to Los Angeles County and we  
24 visited the Inland Valley our second region, and we're  
25 looking forward to visiting Region 3, San Diego and

1 Orange.

2 --o0o--

3 MS. CHRISTENSEN: So as I said, CARE L.A. was our  
4 first region. We conducted our field work here from  
5 February through June 2018. And this was metals and PFASs  
6 for everyone, and 1-NP in a subset of 159 individuals.  
7 Individual results were returned in January 2019. And for  
8 a subset of the population, 60 women, they received  
9 additional analyses for environmental phenols. And those  
10 results were returned to them in March 2019.

11 Data will be available to the public in  
12 September, both on the website and also at a public  
13 meeting. We are currently setting up to visit the South  
14 Coast Air Quality Management District's 5th Annual  
15 Environmental Justice Conference. It's a very good  
16 meeting. It is free and open to the public and it's in  
17 downtown Los Angeles.

18 --o0o--

19 MS. CHRISTENSEN: So this information here, how  
20 representative is CARE L.A. was actually shared at the  
21 March SGP. So it's here as a bit of a reminder. We found  
22 that CARE L.A. was fairly representative across races,  
23 with the exception of Hispanics. Thirty-five percent, or  
24 about 150 people, had some or no college. And that's less  
25 than half of what you'd expect in the population as a



1 whole. So these were two areas that we identified in CARE  
2 L.A. as needing room for improvement in Region 2.

3 Gender, not shown on this slide, was about 61  
4 percent female in the population. And the average age of  
5 CARE L.A. was about 50 years old.

6 --o0o--

7 MS. CHRISTENSEN: So our staff our currently in  
8 the process of doing further data analysis. They're  
9 examining distributions by demographics, and making  
10 comparisons between our regions, and with NHANES data.  
11 They're also looking at sources of exposure from the data  
12 collected from our exposure surveys.

13 Some of this information, as I said, will be  
14 available to the public in September, and we are all  
15 really excited to find out what CARE data can tell us  
16 about exposures in L.A. County.

17 --o0o--

18 MS. CHRISTENSEN: So all of this work in CARE  
19 L.A. is occurring simultaneously to the labs analyzing  
20 CARE 2 samples. CARE 2, which includes Riverside, San  
21 Bernardino, Imperial, Mono and Inyo counties started  
22 sample collection on February 14th, 2019 and wrapped up on  
23 April 30th.

24 This -- as I said, the labs are currently  
25 analyzing these samples, but I wanted to give you a little

1 bit of an update on how progress worked in the field.

2 --o0o--

3 MS. CHRISTENSEN: So as you know, CARE has a  
4 two-stage recruitment process in order to ensure that our  
5 sample reflects the population. The first stage involves  
6 completing a pre-screen. And the pre-screen surveys lets  
7 us know that people are interested in participating. From  
8 the pre-screen pool, we then invite -- select and invite  
9 individuals to participate in the study. And this  
10 resulted in almost 700 people interested in participating  
11 and 555 people who received invitations.

12 Of that group, 436 began enrollment and initiated  
13 the process. This means that they completed their  
14 informed consent form and completed at least some study  
15 steps. 331 people completed all of the study steps, which  
16 gives us a completion rate of 60 percent based off of  
17 those who were invited.

18 But based off of our experience in CARE L.A. and  
19 also based on the response to the pre-screen form, we knew  
20 as early as February that we were going to have some  
21 trouble achieving goals -- our selection goals for black  
22 and Hispanic males in the region. So you can look at this  
23 total number and see 331 looks good. It meets our goal of  
24 over 300 participants in the region, but it didn't reflect  
25 the population the way that we wanted it to.

1           So in CARE L.A. what we had done was we adopted  
2 all-in-one model, where we worked closely with community  
3 groups to help us recruit from their membership. They  
4 brought individuals in and we worked with them all at once  
5 in about a 45-minute meeting to collect their samples and  
6 all of their survey information.

7           So that worked really well in some respects, but  
8 it strayed from our surveillance model quite a bit, and it  
9 was more community based. So in CARE 2, we adopted what  
10 we call the walk-in model. Where we identified these  
11 groups that we were having difficult reaching and we  
12 recruited them directly. We said -- we made posters on --  
13 and fliers and hung them up in the community. We put  
14 postings on craigslist that targeted specifically black  
15 and Hispanic males, and we said come on in, but you don't  
16 need to complete the survey in advance. We're going to  
17 complete everything all at once.

18           It was similar to the walk-in but it had added  
19 flexibility for individuals. They were able to come in on  
20 their own time. They didn't have to make an appointment  
21 on any particular day. They would call the office and  
22 then they would drive in. And this actually helped quite  
23 a bit to help us meet our goals.

24                           --o0o--

25           MS. CHRISTENSEN: All right. So this slide here

1 is different from the prior slide, only that it shows the  
2 total number. So after the walk-ins along with the  
3 traditional pathway through the pre-screen we ended with  
4 359 individuals who completed the study steps.

5 --o0o--

6 MS. CHRISTENSEN: So how did people find out  
7 about CARE 2? Well, more than half found us through the  
8 postcard, which is double what we found in CARE L.A.

9 --o0o--

10 MS. CHRISTENSEN: So the postcard was very, very  
11 useful. And we plan on continuing to use that in the  
12 future. Friends, families, local groups, health fairs,  
13 meetings, craigslist. This all kind of falls into a  
14 looser category of networking. And that also contributed  
15 quite a bit, as you can see.

16 --o0o--

17 MS. CHRISTENSEN: In terms of representation in  
18 CARE 2, despite the walk-ins, we still came in a bit under  
19 on our goal for Hispanics in particular. Overall, we did  
20 do a much better job at reflecting the population in  
21 Region 2 than in L.A., and we even did a little bit better  
22 on education. There's still room for improvement there  
23 though.

24 Representation by gender also improved. Region  
25 2, 56 percent women, down from 61 percent in CARE L.A.

1 Our average age remained around -- right around 50.

2 --o0o--

3 MS. CHRISTENSEN: So our epidemiologists are  
4 analyzing CARE L.A. data. Our labs are analyzing CARE 2  
5 samples. And meanwhile, we are also planning for CARE 3  
6 field work to begin early next year.

7 Our outreach team has already visited Orange  
8 County. And we have two upcoming visits to San Diego  
9 County coming up. We are making minor changes to our  
10 survey tools and putting forth our IRB amendments. And we  
11 are hoping to set up in the field in January 2020 with  
12 sample collection beginning in February. This is a really  
13 rapid cycle. We're working hard to keep pace with the  
14 annual pace of the study.

15 --o0o--

16 MS. CHRISTENSEN: Okay. So I'm going to  
17 transition briefly to the East Bay Diesel Exposure  
18 Project, or EBDEP. EBDEP recruited 40 families with  
19 children living in the Oakland and Richmond area. They  
20 collected urine, dust, and air filters at two different  
21 time points.

22 Current progress Chris Simpson's lab has already  
23 completed analyses of the 1-NP metabolites in the urine  
24 samples and 1-NP in both the dust and the air filters.  
25 That data is currently under review, and it's being

1 processed. And EBDEP staff are currently working to get  
2 ready for results for return to participants in early  
3 September.

4           Following the September results return, they'll  
5 be holding a series of community meetings in October. And  
6 those are tentatively scheduled for West Oakland, East  
7 Oakland, and Richmond. The EBDEP participants and other  
8 stakeholders will also be invited to our November SGP  
9 meeting, where Dr. Asa Bradman will be presenting summary  
10 results on the study.

11                               --o0o--

12           MS. CHRISTENSEN: For the rest of my time with  
13 you today, I will be talking about draft priority language  
14 for Biomonitoring California.

15           So as a Program, we meet about annually to  
16 discuss strategies and priorities for the Program. And I  
17 think Michael DiBartolomeis and Nerissa has presented that  
18 information to you before.

19           At the March SGP, we also sought your suggestions  
20 for Program priorities. And we've taken your suggestions  
21 and we've taken our own and we have come back to you with  
22 six draft priority areas to help draft -- help guide our  
23 activities over the next few years.

24           We're bringing these priorities to you, so that  
25 you can give us any additional input, or edits, or ask any

1 clarifying questions.

2           So Priority 1 is about improving the CARE Study.  
3 I've already mentioned a couple of ways where we've tried  
4 to improve how we reflect the population. But one of the  
5 things that we really want to focus on is improving our  
6 study cycle timeline. The 8-year study timeline was  
7 already a compromise when the study design was conceived.  
8 And the plan was always to scale up the study, if we were  
9 ever able to do so.

10           Originally, the Program conceived of the  
11 statewide surveillance study as taking somewhere between  
12 two to three years and costing somewhere in the  
13 neighborhood of \$10 million. That was in 2006. We've  
14 never been able to achieve that. And it's not feasible  
15 with our current resources. In the absence of CDC  
16 funding, we are trying to reevaluate and proceed in a  
17 feasible manner and a feasible timeline.

18           So looking forward, we are trying to really  
19 consider how we can approach statewide surveillance for  
20 the state on our new time frame. Our study cycle is  
21 looking a little fuzzy beyond CARE 3. It could become an  
22 every other year cycle, for example. We could cluster  
23 three or four regions at a time and take a year for a  
24 break and make compromises in other areas of the Program.  
25 For example, urine-only collection, which would miss out

1 on valuable information on PFASs and on metals in blood.  
2 We could move to more of a convenience sample design,  
3 which would allow us to accept the first 300 people. It  
4 would certainly be easier, faster, and lower cost, but it  
5 would never reflect the California population.

6 So although these options are technically  
7 feasible, none of them are ideal, and all of them will  
8 fall short of the mandate in one way or another. And more  
9 importantly, all would probably add less value for  
10 stakeholders, researchers, and others.

11 Statewide surveillance is always going to be one  
12 of our driving priorities, in part because it provides  
13 useful baseline data to inform all of our other work,  
14 including --

15 --o0o--

16 MS. CHRISTENSEN: -- conducting biomonitoring  
17 studies that seek to better understand and mitigate  
18 environmental health inequities. EBDEP is a great example  
19 of this, and there's room for more exploration of some of  
20 the social determinants that play into our environment.  
21 We know that there is historical discrimination that has  
22 been institutionalized into our zoning, our housing, our  
23 industries, occupations and traffic patterns.

24 SGP has frequently mentioned pesticides in  
25 farming communities, immigrant groups, and occupational



1 groups. And that falls under this priority as well.

2 Where CARE surveillance data can provide the  
3 baseline, targeted biomonitoring studies can identify the  
4 communities that are most at risk of disproportionate  
5 exposures and harm from these chemicals.

6 --o0o--

7 MS. CHRISTENSEN: Priority 3, this is the one out  
8 of order. Priority 3, we would like to work with  
9 stakeholders to assist local environmental and public  
10 health responses. We currently already do this to some  
11 extent. And as a Program, we can expand our approach and  
12 be better prepared for future requests.

13 We know, for example, that counties frequently  
14 contact CDPH to request assistance on -- or guidance on  
15 local mercury or arsenic cases. And we have also begun to  
16 receive inquiries about exposures during wildfires.

17 There's still a lot that's unknown about  
18 exposures to dust and water after the fire. And that is  
19 something that we have also talked about within this  
20 group. So this priority is one way that our Program can  
21 add value to environmental and public health work that's  
22 already being carried out at the local level.

23 --o0o--

24 MS. CHRISTENSEN: Priority 4, maintaining our  
25 laboratories. And I want to say at this point, these are

1 not ranked in any order, because if they were, the  
2 Priority 4 should be Priority number 1.

3 Without maintaining our core laboratory  
4 capabilities and upgrading our capacity, we're going to be  
5 unable to address any of the other work, any of the other  
6 priorities on this list.

7 The SGP often recommends biomonitoring new  
8 classes of chemicals. And in order to do this, we really  
9 need to prioritize our laboratories and make sure that  
10 they are sustainable for the future.

11 --o0o--

12 MS. CHRISTENSEN: Priority 5 is about increasing  
13 public access to our data and to our findings.  
14 Biomonitoring California is a data-generating machine, but  
15 we are not yet a data-releasing machine. So as a program,  
16 we would like to prioritize releasing data to the public  
17 to help support evidence-based decision making. For  
18 example, our statewide PFAS data from CARE could go a long  
19 way to help inform the State's drinking water standards.  
20 And EBDEP could do the same with certain diesel -- certain  
21 policies on diesel.

22 --o0o--

23 MS. CHRISTENSEN: Scientific data itself is  
24 important, but it is also important for us to be expanding  
25 and translating these findings into meaningful guidance

1 and health education for individuals, health care  
2 providers, community organizations, and the lay public.  
3 The newsletter is one tool that is aimed at a lay audience  
4 and we are working hard to expand our content and  
5 materials. We are, for example, developing new materials  
6 to share at our public meetings, on our website, and with  
7 our participants.

8 So these are our draft priority areas heavily  
9 informed by your input from March. And we wanted to take  
10 this time today to report back to you and get any  
11 additional input you may have.

12 I think the elephant in the room is what do we do  
13 with these priorities in light of the loss of CDC  
14 cooperative agreement funding?

15 --o0o--

16 MS. CHRISTENSEN: Priorities will help to guide  
17 our activities, but the activities themselves will likely  
18 be scaled down. In other words, the Program will not stop  
19 trying to achieve our mandates, but we will adapt and we  
20 will be making some compromises.

21 As I've mentioned, Region 3 is more or less on  
22 track, but this change in funding does have clear and  
23 immediate impacts on our work. CDC funding helped to  
24 support CARE's Study field work including recruitment,  
25 phlebotomy, and participant stipends. It also provided

1 significant support and flexibility to our laboratories.

2 Certain technical supplies may be more difficult  
3 to acquire. It may take longer to acquire supplies and  
4 maintenance of instruments may become a challenge.

5 We may find that we need to scale back what we  
6 are able to take on. But CDC cooperative agreement  
7 funding by its nature was never meant to be a long-term,  
8 stable source of funding for the Program.

9 As Lauren mentioned, we are working internally to  
10 find solutions. But in the meantime, in the absence of  
11 CDC funding, our activities will remain pragmatic, while  
12 our priorities are going to be hopeful.

13 --o0o--

14 MS. CHRISTENSEN: So I'd like to thank everybody  
15 in the room today, and especially our Biomonitoring  
16 California staff who work very hard to accomplish this  
17 terrific Program.

18 Thank you.

19 CHAIRPERSON SCHWARZMAN: Thanks so much, Robin.  
20 I want to open it up to clarifying questions first and  
21 then we'll start a discussion. So clarifying questions  
22 from the Panel specifically?

23 Yes. Jenny.

24 PANEL MEMBER QUINTANA: Hi. Thank you for that.  
25 I just had a clarifying question about the CARE studies.

1 You didn't comment on the geographical representation.  
2 And I was wondering about that, because we have community  
3 meetings. They tend to be very geographically clustered.  
4 And so is that something you're going to look at in the  
5 future how geographically representative your sample was  
6 in L.A., for example, or is that something that you  
7 already know?

8 MS. CHRISTENSEN: You know, that's not something  
9 that I have offhand when I said that I'm excited to see  
10 what the CARE L.A. findings look like. I meant that truly  
11 from myself as well. I've been told that I will receive  
12 some of that information next week. But maybe somebody in  
13 this room would like to comment?

14 DR. WU: Hi. This Is Nerissa Wu, Biomonitoring  
15 California. When we set up our goals for sampling, we do  
16 create zones within the region, so that we are trying to  
17 represent across different geographic neighborhoods.

18 For example, L.A. County is broken down by the  
19 Service Provider Areas. And so we did have specific goals  
20 for each one of those SPAs in L.A. And within Region 2,  
21 which is geographically very wide spread, we had zones  
22 that represented the urban core, and then the more  
23 suburban ring, and then up into Inyo and Mono to make sure  
24 that we are getting geographic spread across each region.

25 We are concerned -- you alluded to -- sorry to

1 interrupt you. We are concerned with clustering. When we  
2 look at community groups and recruitment through, for  
3 example, the all-in-ones that Robin mentioned, where you  
4 might have people who have a -- who are already associated  
5 in some way and might have similar exposure patterns, and  
6 how that clustering might impact our data. So we are wary  
7 of that when we create our recruitment protocols.

8 PANEL MEMBER QUINTANA: So with the zones, do you  
9 know if you met those zone goals or not?

10 MS. CHRISTENSEN: Just very roughly, yes, that  
11 was one of the easiest ways to meet the goal. We did  
12 struggle a bit in Mono and Inyo counties. The population  
13 is very small. And so for our goals in those areas, we  
14 actually were trying to oversample, so that we could say  
15 something, because if it was in direct proportion to what  
16 was in the population, we'd end up with like one person  
17 from either county. So we came in under where we wanted  
18 to be, but we definitely over-shot the one person per  
19 county, yeah.

20 (Laughter.)

21 CHAIRPERSON SCHWARZMAN: Yeah, Carl.

22 PANEL MEMBER CRANOR: Carl Cranor. I want to  
23 look at your draft priorities here for second. Taking the  
24 biomonitoring information and moving forward -- sorry. Is  
25 the -- do you have good relationships with people that can

1 affect some of these priorities?

2 For example, I mean, sometimes it may be matter  
3 of what people eat that cause problems. But I'm wondering  
4 if you have a sense from your studies, to what extent can  
5 individuals control what happens to them, as opposed to  
6 our State and maybe private institutions that may call for  
7 changes in their behavior? Those are rather different  
8 things. I sometimes worry that there's too much emphasis  
9 on personal choices and not enough emphasis on  
10 institutional choices.

11 Thank you.

12 MS. CHRISTENSEN: Well, I am really sympathetic  
13 to that concern. I share that concern. We -- both are  
14 important. The individual has a lot -- has control over  
15 many things in their lives, but they do not have control  
16 over everything. We find like that in some situations  
17 regulation, policy change, may go further to removing  
18 chemicals from our lives.

19 That said, it's not in our -- we are not here to  
20 advocate for policy change or any regulations. We are  
21 providing individuals with helpful guidance, that -- so  
22 that they can make changes in their lives. And that is  
23 something that we can do, and it's also -- it's also  
24 something that people want. They -- after a person  
25 participates in a biomonitoring study, they are often

1 looking to what they can do first and foremost.

2 The bigger changes that you discuss, they take  
3 time, they take effort, and for the average participant,  
4 they want to know what changes they can make in the short  
5 term.

6 PANEL MEMBER CRANOR: Sure.

7 DIRECTOR ZEISE: I just wanted to add something.  
8 One of the -- in addition to your remarks. One of the  
9 major things as part of the Biomonitoring Program in  
10 establishing legislation was the issue of regulatory  
11 effectiveness. And I think information coming from the  
12 Program has been very useful in us understanding how  
13 different actions by the State, by the Legislature, by the  
14 agencies have affected exposures. So there is that as  
15 well.

16 MS. CHRISTENSEN: Thank you.

17 CHAIRPERSON SCHWARZMAN: Ulrike.

18 PANEL MEMBER LUDERER: Can you hear me?

19 Okay. Thank you very much for that presentation.  
20 I have a question about the draft priority maintaining  
21 core laboratory capabilities, which I agree is fundamental  
22 to all the other priorities. And I was wondering if you,  
23 or maybe the laboratory managers, I mean, can say  
24 something about how -- how that is going and how the --  
25 you know, the baseline funding, once you factor in



1 maintaining the core laboratory capabilities, you know,  
2 what -- how much room is there for -- how much is left  
3 over essentially?

4 CHAIRPERSON SCHWARZMAN: Can I expand on that  
5 question for just a sec to add a piece, because I was  
6 wondering a similar thing is I know the laboratories don't  
7 only exist for the purpose of Biomonitoring California.  
8 So how much is the Biomonitoring California responsible  
9 for maintaining those core functions? And, you know, the  
10 DTSC lab does lots of other work also and maintains some  
11 panels, and core functions. So if we could understand a  
12 little bit about that balance, that might be helpful.

13 MS. CHRISTENSEN: I am not the right person to  
14 answer that question at all, but I can say that I've heard  
15 from both the Jed and June-Soo and Sabrina that the  
16 existing Biomonitoring California budget that goes to the  
17 laboratories is probably already maxed out in terms of  
18 what they are able to do.

19 I have heard that they're -- it is often  
20 supplemented by other sources of funding when that's  
21 possible. Jed, do you want to weigh in any further?

22 DR. WU: This is Nerissa again. And I am also  
23 not a laboratorian, so maybe Jed will come up here  
24 afterwards, but it's not only in the total volume of  
25 money, it's also in the flexibility of what State funding

1 can do. So things like being able to support our  
2 instrumentation with preventive maintenance. We have  
3 instruments breaking down all the time and State funding  
4 is just not flexible enough to be able to, you know,  
5 support them over the long term to say, well, it makes  
6 sense for us to have a contract to have somebody come and  
7 support these machines.

8 We can't quickly get supplies. We can't quickly  
9 change direction. I mean, there's so many things we're  
10 interested in looking at, but we can't change staff  
11 quickly. We can't change equipment -- we can't go out and  
12 procure equipment quickly. There's things like --  
13 actually, Jed is up here now, so he'll be able to give you  
14 more detail.

15 Let me turn --

16 DR. WALDMAN: This is Jed Waldman for the  
17 Environmental Health Lab. I think Nerissa hit it pretty  
18 much on the head. We are always squeezed, you know,  
19 budget-wise. That's just part -- a fact of life for any  
20 State program. When we have the funding, we were  
21 squeezed. Without the funding, we'll be squeezed.

22 But the loss of flexibility to support the kind  
23 of project that we're describing here of CARE being in the  
24 field, trying to turn around samples quickly is -- that is  
25 probably the most devastating loss for us, because as some

1 of you who have collaborated with us there's a strict  
2 timeline.

3           Working with State funds can mean a long delay in  
4 instrument repair, unlike when we can use -- when we've  
5 been able to use CDC funds to turn that around much more  
6 quickly. An instrument breaks down between June and  
7 August, we're -- we don't even have access to State funds  
8 while the budget is changing. So I would say that's  
9 probably the biggest problem.

10           CHAIRPERSON SCHWARZMAN: Oh, great. One more.

11           DR. SHE: I think that at this moment the  
12 leverage between -- oh, Jianwen She, Biomonitoring  
13 Laboratory leader for CDPH.

14           So at this challenging times, I think we need to  
15 be able to think about the collaborations. And, for  
16 example, the leverage between the different programs, how  
17 we can benefit. Because the laboratory instrument not  
18 used for Biomonitoring Program alone. Some machine used  
19 by the lab to support other activities. So the leverage  
20 between the Program needs to be strengthened.

21           Second part regarding staffing, we always  
22 experience staffing come here, get trained, then move out,  
23 because we do not have the uphand movement for the staff,  
24 the opportunities. So I think that we still need to  
25 publish more scientifically. We are a world class

1 laboratory, attract young people, post docs, and fellows,  
2 which we did in the past, and to support the method  
3 development.

4           So that's -- there are other bureaucratic -- data  
5 purchase system. I think Jed already touched. We need to  
6 look for the way to compensate that flexibility with some  
7 more fund. So try to maintain majority of our laboratory  
8 capacity we already developed.

9           But regarding the new method, we may be need to  
10 slow down a little bit and think of what's our real focus.

11           CHAIRPERSON SCHWARZMAN: Can I ask one other  
12 related lab question, which is certain studies rely on  
13 collaborating labs, like current ones involve UC Davis  
14 that we'll hear about, and UW, you were just talking  
15 about, University of Washington.

16           MR. CHRISTENSEN: Um-hmm.

17           CHAIRPERSON SCHWARZMAN: Can you say anything  
18 more general about that, or anyone from the lab or the  
19 Program, who can reflect on the -- what those  
20 collaborating labs give the Program and what they don't  
21 give the Program? You know, like, what can be -- I  
22 realize you have to pay for the lab collaboration. It's  
23 not free. But in terms of this maintaining basic  
24 instrumentation and capacity, to what extent can those  
25 collaborations help with that versus there's no substitute

1 for, you know, our own lab?

2 MS. CHRISTENSEN: I will be happy to share my  
3 opinion, which is not necessarily the same as the opinion  
4 of others in the group. I think that the collaborations  
5 are particularly useful for the panels for which we don't  
6 have a method. It helps us to bring in things that are  
7 more on the boundary of research, or new or exciting  
8 things.

9 The burden of creating a new method is huge. It  
10 takes quite a bit of time. It's one analyst working like  
11 close to full time for at least a year. And that's not  
12 necessarily something that we want to prioritize our  
13 Program focusing its limited resources on.

14 But as others develop the new methods and we are  
15 able to make use of them, and then they become more  
16 commonplace, it is easier to transfer and learn from  
17 others. So that is one role that they can play.

18 It also can help us out in areas where we might  
19 not have a large volume or a continuous stream. Both the  
20 PFAS and the metals are two great examples of methods that  
21 we are always going to have within the Program, because  
22 there is a constant demand for it. So it would not make  
23 sense to shop those out.

24 You want to weigh in?

25 DR. WU: Sure. I mean, I think there's always

1 this tradeoff between building a Program that can do --  
2 that can be broad and one that can be deep. And we've  
3 wrestled with that here with our prioritization. Do we  
4 want to really focus and maintain our instruments,  
5 maintain our staff and have very few methods that are very  
6 reliable or do we want to be exploring all these?

7           And there are so many chemicals and new panels  
8 that we want to be exploring, but that does require method  
9 development, new staff, new equipment. So as Robin  
10 alluded to, sometimes it is great to be able to shop it  
11 out to, for example, University of Washington. There  
12 are -- there are tradeoffs with that as well though. I  
13 mean, for one thing the funding -- the flexibility of  
14 funding to contract with outside labs can be very  
15 difficult and it varies from year to year.

16           So if we're trying to do surveillance and collect  
17 data year to year, we don't -- it's not a reliable method.  
18 We don't know that we'll be able to contract out  
19 year-to-year to the same lab. And that comparability of  
20 data is another way that I worry about going to contract  
21 labs. When we have our staff, we have regular PT, we have  
22 very rigorous standards, and we can compare the data year  
23 to year. That's a very valuable part of surveillance.

24           If we're going between different labs and perhaps  
25 changing from one panel to another, we lose some of the

1 cohesion of surveillance. That's really important to us.

2 CHAIRPERSON SCHWARZMAN: Jenny.

3 PANEL MEMBER QUINTANA: Hi. This is a kind of a  
4 narrow clarifying question. But I thought I heard you say  
5 that the State funding, either it was difficult or  
6 impossible to get service contracts for the instruments.  
7 And when you're talking about turning samples around  
8 quickly, you know, it's a horrifying thought not to have a  
9 service contract for instruments. And I don't know anyone  
10 in a lab that's happy operating without a service  
11 contract. They're getting so complicated these  
12 instruments.

13 And so I just want to clarify that I heard that  
14 correctly and I want to also state I think it's very  
15 important that that funding be there for service  
16 contracts.

17 MS. CHRISTENSEN: This may vary between our lab  
18 at DTSC and the lab at CDPH, but Sabrina will weigh in.

19 DR. CRISPO SMITH: Hi. Sabrina Smith from DTSC.  
20 Can you hear me?

21 Is that good?

22 Sabrina Smith from DTSC.

23 I want to first speak a little bit to the  
24 original question, which is why I stood up, was DTSC  
25 funding. We have biomonitoring funding. We have other

1 funding. We share that other funding with the rest of the  
2 lab. And actually, particular biomonitoring studies need  
3 to be funded through specific funding. We can't grab  
4 funding from other sections to use for our purposes. We  
5 do sometimes work on similar instruments, so things like  
6 service contracts can be split.

7 But, yeah, there's not a way -- we do some  
8 in-kind work. A couple of the people listed up there are  
9 actually not under the Biomonitoring California staff, but  
10 we do in-kind work for -- with them

11 The second about service contracts. I don't  
12 know -- I can't speak to California Department of Public  
13 Health, but I do know that a large portion of my budget  
14 every year goes to service contracts through the State  
15 funding. And the reason for that, as you said, we do not  
16 want to be waiting weeks for our instruments to be fixed.  
17 But service contracts are expensive, and so that does take  
18 away from supply money.

19 And the CDC funding was something where we were  
20 like, oh, we always have this additional funding. If they  
21 come with an additional project for us to do, we can  
22 quickly bump up our supplies. But we do take into account  
23 service contracts, at least at DTSC.

24 CHAIRPERSON SCHWARZMAN: Yeah. Oliver.

25 PANEL MEMBER FIEHN: Woops.



1           My name is Oliver Fiehn. I am directing a  
2 laboratory with 17 mass spectrometers. We have two  
3 service contracts. And that means for 15 mass  
4 spectrometers, we do not use service contracts, because  
5 they don't break down very often. We have a history that  
6 we know for roughly how many machines will break down per  
7 year, and so we will call in engineers when we need them.

8           That is saving a lot of money. I would not be  
9 able to fund service contracts for 17 mass spectrometers.  
10 This is not a sustainable business model. Unless you have  
11 a machine that you know is so, how can I say, often  
12 breaking down, then you need obviously a service contract.  
13 But when you have enough machines and you have a budget  
14 that, you know, where you can pay an engineer to come when  
15 you need it, that engineer may be \$5,000, may be plus  
16 repair parts. It will be usually \$8,000 at the end. But  
17 it's much less than a service contract that easily comes  
18 for \$30,000 a piece, per year. So I am just saying that,  
19 you know, there might be savings possible.

20           DR. WALDMAN: Jed Waldman, Environmental Health  
21 Lab again.

22           I agree with you totally, we have more than a  
23 dozen mass spec instruments, and we don't have service --  
24 preventative maintenance on all of them. It would be  
25 prohibited. We have mostly staff who are Ph.D.s. And we

1 believe that most, especially in the ICP mass spec lab  
2 very good at maintaining themselves.

3 With a high resolution instrument, that's one  
4 that is relied on, we do spend the money and it's quite  
5 expensive. As you say, 30 to 50 thousand dollars per  
6 year. It gives us better service and it keeps the  
7 instruments that have a turnaround time issue.

8 However, the State makes those service contracts  
9 very challenging in the -- but without them, the  
10 arrangement when we have a breakdown can take weeks to  
11 months. And so it's a tradeoff in terms of timing versus  
12 money. I can have a doctorate -- doctoral level person  
13 spending a week going through the paperwork, and that's  
14 not a good use of their time.

15 So back to the CDC funds. And I think the  
16 question of some of our partners are also extramural  
17 funded collaborations and we can use those resources as  
18 well. Doing this sort of work within the State  
19 bureaucracy is a set of challenges and this hybrid program  
20 has really helped us to date.

21 CHAIRPERSON SCHWARZMAN: I think this is a useful  
22 conversation, but I want to make sure we get onto the  
23 discussion.

24 Tom, did you have a question or a discussion?

25 PANEL MEMBER McKONE: I was going to ask a

1 question. Are we moving now to discussion?

2 CHAIRPERSON SCHWARZMAN: Yes. Let's move --

3 Okay. Great. Our job till about 11:15 is to  
4 have a conversation about these priorities that the  
5 Program is proposing putting into the report today  
6 legislature, and see if there are any sort of edits or  
7 adjustments that we would suggest or other ideas. And  
8 before we wrap-up the conversation, we'll try to put a  
9 fine point on it. We don't -- we're not going to take a  
10 vote, but -- so that we get a concise set of  
11 recommendations back to the Program. So we can open it up  
12 to more discussion about these priorities going beyond the  
13 lab discussion.

14 Tom.

15 PANEL MEMBER McKONE: Okay. Right up to it.

16 So I would suggest, in looking at this, that  
17 there's two -- and I think the discussions we had  
18 afterwards led to this point, that there are two kind of  
19 overarching priorities. And then the other ones kind of  
20 fold under these or within them. And so the overarching  
21 to me I think are, A, which we talked, to keep the  
22 equipment running, to keep the capacity there. Because  
23 without that, you can't do much else.

24 But the other one is to keep the samples moving.  
25 And this is where I think in thinking about the priorities

1 is kind of this -- and I think this is a good point for  
2 discussion, do we try and follow the CARE plan or do we  
3 also try and set it up, given the funding constraints is  
4 finding opportunities to keep the samples flowing. And I  
5 think that was in the priorities. There were a number of  
6 cases where you talk about opportunities to collaborate  
7 with others.

8 And so I think the real tricky priority to keep  
9 the samples coming in is to spend time identifying  
10 partners, who -- maybe not funding partners, but partners  
11 who need the capacity to do biomonitoring or are very  
12 interested in it, and then figure out how to use that to  
13 meet the other priorities of the Program.

14 So a little bit different way, but I just think  
15 this -- the need to keep -- you know, you -- with the  
16 funding problems, you may not get the samples you  
17 necessarily want all the time, but it's worth it to go out  
18 and search for opportunities to keep samples moving,  
19 because I think the more information you get, the more it  
20 helps the Program, and also having a good partner. I  
21 mean, who knows, you may discover somebody, you know, an  
22 agency or a community, or something that really gets so  
23 invested in this that they have some political clout to  
24 get some more funding for it.

25 CHAIRPERSON SCHWARZMAN: Can I just tag onto

1 that, Tom, to say would you agree that part of keeping the  
2 samples moving is it's not just sample collection, right,  
3 it's analysis? So you're not just saying bring a bunch of  
4 data in?

5 PANEL MEMBER McKONE: No. Yeah, that's what I'm  
6 saying, you know, you want to have things coming -- I  
7 mean, like I'm thinking of the example of wildfires. I  
8 mean, it created a -- I mean, there are a lot of people  
9 really worried about what are the impacts. But there's a  
10 very important opportunity, and it may not fit necessarily  
11 with the plan that's there, parts of it. But seeing these  
12 opportunities and seeing a community who has a concern and  
13 maybe can leverage some funding, and say, look, we have a  
14 lot of samples, if you can analyze them, or we could pay  
15 for some of it.

16 And again, I don't know how that works. But in  
17 someways having the equipment there and also keeping the  
18 equipment busy are kind of two priorities to --

19 CHAIRPERSON SCHWARZMAN: I guess, what I was  
20 meaning to flag was not just the lab analysis, but the --  
21 do the epidemiology on it, because I think -- I just  
22 wanted to acknowledge that, because it's two distinct  
23 efforts within the Program. It requires different  
24 expertise and both requires funding, and you don't get  
25 output from the Program without both, right?

1           And it's one of the things that I think we've  
2 talked about on the Panel is kind of creative ways to say  
3 recruit more doctoral student labor, essentially. You  
4 know, doctoral students who need data sets to do their  
5 dissertations. And can -- is that a place that we can  
6 expand biomonitoring capacity without any more money to  
7 accomplish one of those two pieces. One is obtaining the  
8 samples and analyzing them in the lab and then the other  
9 is working with the data.

10           DR. WU: Can I ask a clarifying question?

11           Are you suggesting that we move away from  
12 surveillance? Because it sounds to -- we can keep samples  
13 moving by working with collaborators. And certainly,  
14 there is valuable biomonitoring information to be gained  
15 from the targeted studies that are done around the state  
16 by other entities.

17           But that does move us away from the CARE Study.  
18 And one of the values of it is its consistency and its --  
19 the time trend over -- you know, the swath of time over  
20 which we're collecting samples year after year to make  
21 this comparison. So we could move away from it and come  
22 back to it at some point. But it -- but then it sort of  
23 isolates our two first regions. And then when we come  
24 back, it's hard to know what that comparison means. Do we  
25 compare the same regions over time? Do we continue to

1 look around the state?

2 I mean, I guess I'm looking for clarification on  
3 whether you feel that surveillance should not be one of  
4 our priorities, because I'm not sure how to do -- how to  
5 fit what you're saying into the model we have right now,  
6 which I'm not saying is wrong, but --

7 PANEL MEMBER MCKONE: Well, I would say  
8 surveillance is really -- that was why the Program was  
9 established. I guess what I'm just asking in tight  
10 budgets is -- and I don't have the answer. I'm just --  
11 this is a discussion point. Is CARE the priority or is it  
12 CARE and other opportunities for surveillance,  
13 particularly those that would be complementary to CARE and  
14 maybe even fold into it.

15 And I say that because you were talking at one  
16 point about you may delay CARE for a year. And I would  
17 say, if that happens and you found another surveillance  
18 opportunity, you know, do you spend that year like pushing  
19 everything back or taking other surveillance  
20 opportunities, you know -- you know, where community  
21 has -- comes and says we need something or has a question?

22 And again, this is a bit hypothetical, but I  
23 thought -- you know, I guess the priority question is do  
24 you keep the Program as it's envisioned now with CARE --  
25 with -- well, I would say with surveillance, because we've

1 done a lot of very -- we've done a lot of very useful  
2 surveillance exercises in the past, which were the  
3 foundation for designing and building CARE.

4           So I guess that's the discussion point is how do  
5 we look for surveillance opportunities that may not be  
6 exactly what you want, but could keep the -- kind of the  
7 machinery of the Program going or stick with what you want  
8 and try and -- I mean, the other thing to do is look  
9 for -- you know, look for additional endowment funding or  
10 things like that.

11           CHAIRPERSON SCHWARZMAN: Veena.

12           PANEL MEMBER SINGLA: Hi. Good morning. This is  
13 Veena Singla. Thank you so much for that very informative  
14 presentation.

15           I had kind of an overarching comment and question  
16 just in thinking about the priorities and what's more  
17 important. You know, it's certainly sort of an  
18 intersection or cross-walk between a number of different  
19 factors: of course, the mandate of the Program and what's  
20 the most important for public health and those priorities,  
21 and then thinking about scientifically what are some of  
22 the priorities and advancing the science.

23           But I think also trying to understand a little  
24 bit better in terms of funding, thinking about priorities.  
25 So, you know, Robin, you mentioned that the CDC



1 cooperative funding was never seen as -- you know, meant  
2 to be or seen as long-term funding for the Program and  
3 that was understood.

4 So I'd like to understand better what is the  
5 vision for long-term funding for the Program? Is more  
6 State funding envisioned to play a role there? And I  
7 think that will help us think about how the long-term  
8 priorities for funding could intersect with the priorities  
9 for the Program, if that -- does that makes sense?

10 MS. CHRISTENSEN: Yes. And that's hard to  
11 answer. I can envision a lot of things for the Program.  
12 And it would -- I could envision a future where we have  
13 unlimited State funding that met our original goal, but we  
14 can't make that happen. And there are a number of other  
15 programs that are also in a similar boat.

16 So the people who are prioritizing these things  
17 will be weighing our needs against those of others and  
18 making decisions based on that.

19 CHAIRPERSON SCHWARZMAN: Carl.

20 I'm going to go right down the line, like this.

21 DR. LIPSETT: Actually, Meg, could I

22 CHAIRPERSON SCHWARZMAN: Oh, sorry, yes.

23 DR. LIPSETT: I know this is out of order here,  
24 but I think I can respond to -- oh, yes, I will.

25 I'm Michael Lipsett. I was involved with this

1 Program from the very beginning. And I think I can  
2 provide a little bit of clarity with respect to what the  
3 notions of long term and shorter term funding. So the  
4 legislation for this Program came into effect just before  
5 the recession of 2007/'08/'09. The Program would actually  
6 have been axed. It was initially under general funding.  
7 But for the intervention of some very dedicated people in  
8 the legislature, it shifted much of it to State funding as  
9 well.

10 We wrote the first grant to the CDC in, I think,  
11 about a year and a half after the Program started. And it  
12 was intended to provide, you know, the -- at least an  
13 interim type of support until this -- until the economy  
14 recovered. And the concept the thought at that time was  
15 that once the economy recovered, that the State would be  
16 funding the Program at a better level.

17 The Program really would not exist without the  
18 CDC funding. It was -- it really was an enormous help in  
19 getting everything established. And it was great that it  
20 continued for 10 years. But at this point, I think  
21 despite the sort of guarded optimism within the State  
22 staff here, this is really a catastrophe for the Program.  
23 And I think that -- I would like to suggest for the  
24 Panel's consideration that you might -- I know you're not  
25 political, but you might want to just weigh in as a Panel

1 and send some sort of letter to the Governor, or the heads  
2 of the different departments about the importance of the  
3 Program, and that there be strong consideration given to  
4 providing additional State funding for this Program.

5 CHAIRPERSON SCHWARZMAN: So I just want to  
6 encourage everybody to be quite concise in their comments.  
7 We only have until 11:15.

8 DR. LIPSETT: Sorry, Meg.

9 CHAIRPERSON SCHWARZMAN: No. Thank you for that.  
10 Thank you for that. It wasn't targeted at you, Michael.

11 (Laughter.)

12 CHAIRPERSON SCHWARZMAN: Because we need to  
13 wrap-up this conversation, but I want to make sure that  
14 all these ideas get together before we have to kind of  
15 make a formal recommen -- not formal, make a  
16 recommendation.

17 PANEL MEMBER LUDERER: Okay. I'll try to be very  
18 concise. So I just kind of wanted to continue on with  
19 this idea of the surveillance versus, you know, targeted  
20 studies and collaborations. And I really think that they  
21 are both important and they can really kind of synergize  
22 one another. And, you know, I think one of the things  
23 that we heard this morning already was about the  
24 usefulness of neighborhood groups in assisting with the  
25 recruitment for the different -- the different pieces of

1 CARE that are ongoing or have already happened.

2 And what -- and over time as you go back to some  
3 of these communities, you know, those relationships I  
4 think really have the potential to grow and for targeted  
5 studies to evolve out of those relationships. So I, you  
6 know, want to encourage maintaining those kinds of  
7 relationships over time.

8 CHAIRPERSON SCHWARZMAN: Jenny.

9 PANEL MEMBER QUINTANA: Hi. Two very concise  
10 comments. The first concise one was none of the  
11 priorities seem to include what Lauren Zeise brought up,  
12 which was the regulatory effectiveness of policies. And I  
13 would say that should be an explicit and separate  
14 priority, and that would really bring in, for example, the  
15 Diesel -- like East Bay Diesel Exposure Project and  
16 looking at reductions due to clean diesel. So that's one  
17 comment.

18 And then the other comment is, just to be blunt,  
19 I felt like the surveillance, the CARE studies were  
20 starting out very underfunded. They weren't a complete  
21 and perfect snapshot of the communities. And in so much  
22 as surveillance is not a perfect snapshot, they are less  
23 useful for surveillance purposes.

24 You know, if they're not a completely random  
25 population-based sample, and we see from the education

1 variable at least, they do not seem to reflect perfectly  
2 the communities, even though heroic efforts were made.  
3 But these things take a huge amount of funding and time --  
4 staff time, and calling people, and calling, you know, all  
5 these different stakeholders. It just takes a huge amount  
6 of time to do it.

7           And I just feel like I think that you should  
8 think about suspending that part personally, until there's  
9 actually funding to do it, because you can't do  
10 everything. You're stretched so thin. And I think the  
11 laboratory is a core piece. And I do think that there are  
12 projects going on that you can accomplish some of the same  
13 goals by getting samples to analyze. And I just think  
14 it's -- you can't do everything with less funding  
15 basically. And it's -- and this is -- I just want to add  
16 that you've done heroic and wonderful things, so not a  
17 criticism at all, but just the reality.

18           CHAIRPERSON SCHWARZMAN: Let's have a comment  
19 from Carl and then we need to call public comment and then  
20 we'll take the next step here.

21           PANEL MEMBER CRANOR: I'll try to be quick.

22           Budget. What's the sense. You may not want to  
23 talk about this, but the diagnosis. The Program was born  
24 in a recession and we're -- California in particular and  
25 California revenues are soaring, and the question is who

1 is or is not assisting the Biomonitoring Program? What  
2 barriers does one run into? I understand you may not want  
3 to talk about this, but it does seem to me we should -- we  
4 should be and are in a better State fiscal position, in  
5 terms of California GDP. We're the, what, 6th largest  
6 country in the world, or something like that, and the  
7 budget is a problem.

8 CHAIRPERSON SCHWARZMAN: I just want to check at  
9 this point for public comment, whether we have any cards  
10 or any comments online?

11 MR. BARTLETT: Thank you, Meg. And also, I just  
12 want to remind folks on the webinar that if you want to  
13 submit a question or comment, please do so by emailing at  
14 biomonitoring@oehha.ca.gov. The chat features are not  
15 operating on the webinar today.

16 Thank you.

17 CHAIRPERSON SCHWARZMAN: So, Russ, does that mean  
18 we have no public comment at this point?

19 MR. BARTLETT: So that's right. At this time, we  
20 have no online, we have no emails, for comments.

21 Thank you.

22 CHAIRPERSON SCHWARZMAN: Okay. Anyone in the  
23 audience who would like to make a comment with regard to  
24 this conversation?

25 Okay. There's one. Gina.

1 DR. SOLOMON: Just a quick question. This is  
2 Gina Solomon. Public Health Institute and UCSF. Just a  
3 quick question. I was trying to get a handle with the  
4 CARE study as to how much of the cost is actually getting  
5 teams into the field? Because if so, just looking at CARE  
6 4, just wondering if there would be any advantage to  
7 skipping ahead to the Bay Area and addressing the travel  
8 costs in that year while trying to get funding for the  
9 future?

10 (Laughter.)

11 MS. CHRISTENSEN: Oh, gosh. Well, yes, we did  
12 consider that. We did consider that. But the fact is for  
13 CARE 3, we have sufficient funding. We are looking to  
14 scale down. So I can give you numbers from CARE 2 and  
15 CARE L.A. But we are hoping to make sure that our model  
16 becomes a bit more economical.

17 I would say that field work probably costs on the  
18 level of about \$200,000, give or take. And that has to  
19 do -- it's about two months of time. It supports  
20 temporary staff, temporary skilled staff, all of the  
21 supplies, the locations that we need to book, and all of  
22 the costs associated with the participant incentives.

23 Moving to the Bay Area, I'm not actually sure  
24 that it would save much money, but it is something that  
25 would make it certainly easier for our staff to take on.

1 We would need less temporary staff for example, and we'd  
2 take on more in-kind work.

3 MS. HOOVER: Meg, can I just make a quick  
4 suggestion. We have about seven minutes left and we've  
5 heard some really good feedback. But could we just run  
6 through -- maybe you could click through the priorities --

7 MS. CHRISTENSEN: Sure.

8 MS. HOOVER: -- and just get, you know, the  
9 Panel's brief even nodding or shaking your head, and we'll  
10 track that in our notes about what -- you know, the idea  
11 is we want to know what you want us to include in the  
12 upcoming report to the Legislature. We would like formal  
13 input on that.

14 You can also email us after. That's fine. You  
15 can provide input, but we'd prefer to get your input in  
16 the public meeting with specific suggestions on these six.  
17 We've heard some, but if you'd just click through and give  
18 a nod.

19 CHAIRPERSON SCHWARZMAN: I want to -- okay. I  
20 have a clarifying issue. So to me it seems like there's  
21 two questions here. One is does the Panel agree with  
22 these priorities and recommend that the Program include  
23 them in the report to the Legislature as the Program's  
24 priorities. But another parallel conversation that's  
25 happening here is the budget is tight, there's less money



1 than we hoped there would be, what should the Program  
2 elevate and what should it step away from? And I'm  
3 confused currently about whether you need input on both at  
4 the same time.

5 MS. CHRISTENSEN: Well, this was put on the  
6 agenda with the thought to just the first. And it was put  
7 on the agenda before we found out about our funding.

8 So, primarily, I am looking for your input on the  
9 first part of your question. We have been taking notes on  
10 all of your concerns and the additions suggest --  
11 additional suggestions. So if there's time and you would  
12 like to weigh in further on how to prioritize within this  
13 set, I'm also all ears.

14 MS. HOOVER: And let me just add that in terms of  
15 all the comments about budget, as before, when you  
16 separately wrote a letter, brought it to the Panel for  
17 signature, you can make that choice as Chair with one  
18 other person. That's not something we want to talk about  
19 right now.

20 CHAIRPERSON SCHWARZMAN: Right.

21 Veena.

22 PANEL MEMBER SINGLA: Veena Singla. So in terms  
23 of thinking about priorities for the Leg Report, this  
24 relates to what my earlier comment, which I think I  
25 didn't -- I didn't say very well. But, you know, if the

1 thought is that the State would support the Program more  
2 in the future, there has to be a demonstrated value of the  
3 Program to those who are making those decisions.

4 So in thinking about what's going to be put  
5 forward in the Leg Report, I think that's a really  
6 important frame as to being able to show like what value  
7 this Program has brought and will bring in the priorities  
8 and information that's communicated in that report.

9 And I think in -- out of the -- these priorities,  
10 there's two that stand out to me in that regard. I think  
11 working with stakeholders, this is local environmental and  
12 public health responses, is one. And the understanding  
13 and mitigating environmental health inequities is the  
14 other.

15 CHAIRPERSON SCHWARZMAN: Could you just say I got  
16 the inequities is number -- here is number 2, but the  
17 other one that you said was number three, right?

18 PANEL MEMBER SINGLA: (Nods head.)

19 CHAIRPERSON SCHWARZMAN: It's in our -- it's  
20 numbered differently here, but it's like slide 22.

21 PANEL MEMBER SINGLA: Correct.

22 CHAIRPERSON SCHWARZMAN: All right. Okay. Just  
23 for clarity.

24 Okay. I withheld my comment while I was  
25 collecting them from the Panel. So I just want to say,

1 because it's a point that Jenny brought up, but I was  
2 having a couple other thoughts about it, is there's this  
3 inherent tension between surveillance and all the other  
4 things that the Program does. And I want to acknowledge  
5 like what Tom said about the Program was established with  
6 a clear goal of surveillance.

7 And I agree with Jenny that in light of how the  
8 Program is supported or not at this point and what the  
9 realities of how surveillance is done is performed in the  
10 state of -- or in the setting of really limited resources,  
11 and in the context of the existence of CDC biomonitoring,  
12 which doesn't accomplish state surveillance, but at least  
13 does some population-level U.S. surveillance, that my  
14 strong feeling is that California Biomonitoring can  
15 demonstrate its value more through the number 2 that Veena  
16 just flagged, conducting biomonitoring studies to better  
17 understand and mitigate environmental health inequities,  
18 because those are often specific to the state and to our  
19 regions.

20 And the -- another one that Jenny flagged, which  
21 is number 5, which is our slide 20, of increasing access  
22 to the findings. It's not -- it's not the individuals  
23 that I mean, because you already do a lot of individual  
24 report back. I mean, the -- the policy relevant research  
25 that -- where, for example, the PFAS findings could

1 support drinking water standards that are specific to the  
2 State or the East Bay Diesel Biomonitoring Project could  
3 support decisions about ports, and highways, and that kind  
4 of thing. That that's the place that California  
5 Biomonitoring could most demonstrate its value now in line  
6 with what Veena is saying.

7 So although I hate to recommend that this Program  
8 step away from its core, you know, reason for being when  
9 it was established of surveillance, in light of the  
10 Program having been essentially starved of sufficient  
11 budget to do that, that's my view on it.

12 So that's not exactly an edit of the priorities,  
13 but I feel like it's an important framing as you go into  
14 the Leg Report. That's my view of that.

15 So with that, would you please flip through the  
16 priorities that are here, and we can get -- this is not a  
17 formal vote, but we want an indication from each Panel  
18 member whether you think that that is a priority that  
19 should be included in the Leg Report.

20 Hands. Yeah, just hands. And you're allowed to  
21 vote for all of them, right? Like this is not --

22 (Laughter.)

23 CHAIRPERSON SCHWARZMAN: You don't have to choose  
24 your top 3 or something. Okay.

25 Clarifying question?

1 PANEL MEMBER QUINTANA: So just to clarify, this  
2 is -- I thought you said it was independent of our funding  
3 problems right now. Should we vote as if this was a --

4 CHAIRPERSON SCHWARZMAN: Yes. The question is  
5 the Program --

6 PANEL MEMBER QUINTANA: If we had more money, how  
7 would we do the priorities? I mean, bluntly.

8 CHAIRPERSON SCHWARZMAN: Yes. The Program is  
9 saying these are their priorities, do we support that?

10 MS. CHRISTENSEN: Priority one?

11 (Hands raised.)

12 CHAIRPERSON SCHWARZMAN: Does anyone -- do you  
13 support?

14 Okay. Great.

15 Two.

16 MS. CHRISTENSEN: Priority 2.

17 (Hands raised.)

18 (Laughter.)

19 CHAIRPERSON SCHWARZMAN: Priority 3?

20 (Hands raised.)

21 CHAIRPERSON SCHWARZMAN: Priority 4.

22 (Hands raised.)

23 (Laughter.)

24 CHAIRPERSON SCHWARZMAN: And priority 5?

25 (Hands raised.)

1 CHAIRPERSON SCHWARZMAN: Okay. Oh, one more.

2 Sorry about that. My error.

3 Priority 6?

4 (Laughter.)

5 (Hands raised.)

6 CHAIRPERSON SCHWARZMAN: So what I see from

7 this --

8 MS. HOOVER: Six, you have to do one more time.

9 CHAIRPERSON SCHWARZMAN: Oh, yeah, I think we did

10 that.

11 Six?

12 (Hands raised.)

13 PANEL MEMBER MCKONE: Do you have half votes on

14 that?

15 (Laughter.)

16 MS. HOOVER: Okay. Great.

17 CHAIRPERSON SCHWARZMAN: A little less enthusiasm

18 for number 6, but otherwise, I would say the Program has

19 the Panel's blessing to include these draft priorities in

20 the Leg Report.

21 MS. CHRISTENSEN: Thank you. And we've listened  
22 to your feedback and we'll put -- be including more in the  
23 narrative in the Leg Report.

24 Great.

25 CHAIRPERSON SCHWARZMAN: Oh, the question on the

1 Panel is should we indicate, as a Panel, that there's an  
2 additional interest in a priority that addresses  
3 regulatory effectiveness?

4 MS. HOOVER: We heard it.

5 CHAIRPERSON SCHWARZMAN: Okay. Program heard  
6 that and we don't need a show of hands it sounds like.  
7 Okay. So we've accomplished what we were meant to  
8 accomplish in this time.

9 Thank you. And that was a good discussion and  
10 lots of thought-provoking questions.

11 We are going to go -- move on to hear about the  
12 FREES Study. And so with that I'm going to introduce  
13 Rebecca Moran, who is a Staff Research Associate in the  
14 Department of Public Health Sciences at University of  
15 California, Davis.

16 Rebecca received her Master's in Environmental  
17 Health from the Harvard School of Public Health. She's  
18 been a project manager at UC Davis for the last 10 years,  
19 where her work focuses on the indoor environment,  
20 including studies on flame retardants, reducing  
21 particulate matter exposures through the use of air  
22 cleaners, cleaning product use patterns, and associations  
23 between biomarkers of exposure and other measures of  
24 indoor environmental contaminants, such as levels in dust.

25 Rebecca will be presenting on the flame retardant

1 concentrations in house dust before and after replacing  
2 foam containing furniture.

3 Thanks.

4 (Thereupon an overhead presentation was  
5 presented as follows.)

6 MS. MORAN: Thank you. So I'm going to be  
7 talking -- closer. Okay. I'm going to be talking today  
8 about a study we did at UC Davis looking at flame  
9 retardant concentrations -- sorry. Okay -- looking at  
10 retardant concentrations in house dust both before and  
11 after participants replaced upholstered furniture with  
12 flame retardant-free options in the main living area of  
13 their home.

14 --o0o--

15 MS. MORAN: Thank you.

16 So our main motivation for this study was  
17 California revised the State's furniture flammability  
18 standard known as TB117 to -- from an open flame standard  
19 to a smolder standard, which allowed manufacturers to meet  
20 the standard without adding chemical flame retardants to  
21 the foam and upholstered furniture. The revised standard  
22 is TB117 2013. And as a result of this, consumers can now  
23 purchase flame retardant-free couches for their home.

24 The main goal of our study was to determine  
25 whether flame retardant concentrations in house dust



1 decreased when the couches or the seat cushion foam was  
2 replaced with a flame retardant-free option.

3           Biomonitoring California collaborated with the  
4 study to measure flame retardant levels in biological  
5 samples, both blood and urine from a subset of the  
6 participants that were enrolled in the household dust  
7 study. And this will be discussed in the next  
8 presentation.

9                               --o0o--

10           MS. MORAN: Just briefly, a little background on  
11 the use of flame retardants over time. So when TB117  
12 first started in 1975, this required furniture  
13 manufacturers to meet an open flame standard. And the  
14 cheapest and easiest way for them to meet this standard  
15 was to add chemical flame retardants in the foam of  
16 upholstered furniture.

17           One of the first mixes -- one of the problems  
18 with these chemical flame retardants is that they're not  
19 bound to the foam. And so over time, they migrate out of  
20 the furniture into the house dust. Some of the first  
21 mixes were made up of polybrominated diphenyl ethers, or  
22 PBDEs. These were phased out in the mid-2000s due to  
23 human health concerns.

24           As these were phased out, we saw an increase in  
25 alternative flame retardants, preliminary mixes, one of

1 them known as Firemaster® 550 and other mixes of  
2 organophosphate flame retardants or OPFRs. In terms of  
3 this presentation, we're including both halogenated and  
4 non-halogenated flame retardants in this OPFR group.

5 In 2015, TB117 2013 went into full effect,  
6 allowing the manufacturers to meet a smolder standard by  
7 using resistant fabrics or barrier methods and no longer  
8 had to add chemical flame retardants to the foam. The new  
9 furniture was tagged with a new tag that indicated whether  
10 the item contained additional chemical flame retardants or  
11 did not, and this was important for the logistics of our  
12 study.

13 --o0o--

14 MS. MORAN: So in the study, we recruited two  
15 groups. When we started in mid-2015, we started  
16 recruiting participants in the Bay Area or Sacramento area  
17 of Northern California. These participants had to  
18 currently own a couch that was likely to contain flame  
19 retardants. We were able to do a telephone screener with  
20 interested participants and they had to either have a  
21 tag -- a TB117 tag on their couch or know the history of  
22 when their couch was purchased, so that we knew that it  
23 was likely to contain these flame retardant chemicals.

24 They also had to be planning to replace their  
25 couch or the foam in their couch within one year of

1 enrollment in the study. And they had to be replacing it  
2 with a flame retardant-free option. This was a bit of a  
3 challenge for some of the participants when we first  
4 started the study. So we gave them an entire year to  
5 accomplish this task.

6         Each of these participants was responsible for  
7 replacing their own couch or the foam in their couch. And  
8 so each household took a different amount of time to  
9 either find a couch that was flame retardant-free that  
10 they liked or decide whether they were going to just  
11 replace the foam in their couch.

12         About a year after we started the study, we  
13 recruited a second group from San Jose. All of these  
14 participants lived in one of two low-income apartment  
15 complexes that helped us with recruitment for the study.  
16 For this group, we went down and held community meetings  
17 to assist with recruitment. And these interested  
18 participants were able to be screened in person. This was  
19 particularly important for this group, because a lot of  
20 times they didn't know the history of the couch or any of  
21 the furniture in their home. It was either passed down to  
22 them through many people over time or it was purchased  
23 from a secondhand store.

24         So with this group, we could screen them in  
25 person and go walk through the home, take a look at their

1 couch, see if it had the TB117 tag, or if it had any other  
2 indications a tag that listed the manufacture date or any  
3 other way that we could tell when it was likely  
4 manufactured and whether it was likely to contain flame  
5 retardants. We did have several homes where we weren't  
6 able to make this determination and thus they weren't  
7 eligible for this study.

8           These homes did not have to replace their own  
9 couch. The study supplied a flame retardant-free option  
10 for them. So the way this worked was each household was  
11 given a budget that they could spend at Ikea, where we had  
12 determined which lines at Ikea had been turned over to  
13 have flame retardant-free options.

14           This was quite the feat in logistics, but we were  
15 able to pull it off with the help of Green Science Policy  
16 Institute. And each home that enrolled in the study was  
17 provided with a flame retardant-free couch of their  
18 choice. And oftentimes, they had enough money to get an  
19 additional chair, or maybe a coffee table, or some other  
20 furniture for their home.

21           All the homes in the study were on the same  
22 timeline, so all their visits occurred at the same time,  
23 usually within a day or two of each other and all the  
24 couches were replaced at the exact same time.

25                   --o0o--

1 MS. MORAN: Each home had four visits that  
2 consisted of us coming into their home, collecting a dust  
3 sample from their main living room, and asking questions  
4 about the furniture in their home, and doing a  
5 walk-through inventory of what was in each room in their  
6 home.

7 Dust was collected at a visit prior to them  
8 replacing their couch, and then one at 6 months, 12  
9 months, and 18 months after the couch was replaced in  
10 their home.

11 So if we look at the first group that we  
12 recruited, our Bay Area Sacramento group, all of their  
13 pre-replacement visits occurred between July 2015 and  
14 August 2016. This group, as I mentioned, took quite a  
15 while to replace the couches in their home as there were  
16 some logistic challenges for them. It took anywhere from  
17 18 days all the way up to the year that they had to  
18 replace their couch with a median time of 2.8 months.

19 The majority of participants in the study were  
20 able to replace their couch in under 6 months with  
21 approximately a quarter taking 7 to 12 months to replace  
22 their couch or the foam in their couch.

23 All the couches were replaced between August 2015  
24 and November 2016, and then their dust sample visits  
25 post-replacement occurred 6 months, 12 months, and 18

1 months after they replaced the couch in their home.

2 --o0o--

3 MS. MORAN: Our second group from San Jose we  
4 enrolled them about a year after we started their study.  
5 And their pre-replacement visits occurred in May 2016. It  
6 took us two months to arrange the logistics of gathering  
7 all the orders, placing the orders, and delivery of the  
8 couches. Every couch was replaced in July of 2016. They  
9 had their 6, 12, and 18 month post-replacement visits.  
10 And study concluded in February of 2018.

11 --o0o--

12 MS. MORAN: So overall, we enrolled 28 households  
13 in the Bay Area/Sacramento group. All 28 of the  
14 households completed the initial pre-replacement visit and  
15 had a dust sample collected. Twenty-two of the households  
16 actually completed the replacement of their couch. It  
17 ended up with over half of the households replacing the  
18 foam in their couch instead of the entire couch, with 8  
19 households replacing the couch, and 2 actually removing a  
20 couch with flame retardants from their living room.

21 So in these homes, it was interesting. One home  
22 had already a flame retardant-free couch plus one that  
23 contained flame retardants, so they just took the one out  
24 that contained flame retardants. Another one had some  
25 chairs that did not contain flame retardants. They were

1 very old chairs and so they decided to remove their couch.  
2 They didn't find a replacement that was suitable for them,  
3 and so that was how they stayed in the study.

4           In our -- I'm sorry, 21 of the households  
5 completed the entire study in this group, making it all  
6 the way to the 18-month dust collection. In our San Jose  
7 group, we enrolled 14 households, 13 of those households  
8 completed the initial dust sample collection visit prior  
9 to replacing their couch, 11 households had their couch  
10 replaced and completed the 6-month post-replacement visit,  
11 and the 12-month post-replacement visit. And 8 households  
12 completed the entire study.

13           This group was a little bit more challenging as  
14 it was difficult to contact many of the participants in  
15 between the visits, as phone numbers often changed or  
16 sometimes they moved units, and we had to track them down.

17                   --o0o--

18           MS. MORAN: There are many methods to collecting  
19 dusts in studies such as this. This study we used the  
20 Mighty-Mite Vacuum Method. This mostly collects surface  
21 dust. But it uses an easily readily-available Mighty-Mite  
22 Vacuum with a crevice tool attachment that comes with the  
23 vacuum. Dust is collected into a cellulose extraction  
24 thimble held into the crevice tool with an O ring.

25                   --o0o--

1 MS. MORAN: This is a pretty standard protocol  
2 for collecting dust. We collect dust from the main living  
3 area of the household. And the idea is to collect the  
4 equivalent of the room's floor surface area. So if  
5 there's a section of the floor that's covered that you  
6 can't vacuum because it's covered by furniture, you go up  
7 and over the furniture. But in this study, we did not  
8 want to sample the furniture, because we didn't want to  
9 falsely elevate those initial dust samples that we  
10 collected when the main source was going to be removed  
11 from the room.

12 Typically, in this protocol, you don't go  
13 underneath the furniture, so we didn't do that in this  
14 study either.

15 --o0o--

16 MS. MORAN: Okay. Once the dust samples were  
17 collected, they were transferred back to our lab at UC  
18 Davis and stored in minus 20 freezer until they were  
19 extracted and analyzed. The dust samples were sieved in a  
20 106 micron sieve. And 100 milligrams of dust was  
21 extracted with hexane and acetone using sonication and  
22 then extracted again with acetone.

23 The samples were run through a gas chromatography  
24 quadrupole time-of-flight mass spectrometer. Each run was  
25 80 minutes with an increase of temperature from 35 to 325



1 degrees Celsius in electron ionization mode. The samples  
2 were analyzed for 7 brominated flame retardants and 7  
3 non-brominated flame retardants.

4 --o0o--

5 MS. MORAN: We have just completed the analysis  
6 of all of the samples for this study. And so we only have  
7 preliminary data at this point that we are going to talk  
8 about today. And we're going to show data for four of the  
9 most common PBDEs found in upholstered furniture and 4  
10 OPFRs that are commonly shown in furniture. We'll be  
11 showing PBDE 47, 99, 100, and 153, and also TCIPP, TPHP --  
12 it's also know as TPP, TCEP, and TDCPP.

13 --o0o--

14 MS. MORAN: So if we just take our dust samples  
15 and look at them plotted over time, on this graph we see  
16 for each of these eight flame retardants that the black  
17 lines show an overall decrease in concentrations between  
18 the pre-replacement visit and the 18-month  
19 post-replacement visit. The dashed red lines show an  
20 overall increase.

21 There's not a clear picture here, but we do see  
22 overall a decrease between the pre-replacement and the  
23 6-months post-replacement visit. And we do see quite a  
24 bit of decrease throughout the study. Again, these are  
25 just preliminary results. And we haven't completed our

1 statistical analysis yet.

2 --o0o--

3 MS. MORAN: If we look at our second group, the  
4 San Jose group, there are less households in this group.  
5 It's a little more clear, but we do see a combination of  
6 decreases and increases over the course of the study.

7 --o0o--

8 MS. MORAN: One other piece of information that  
9 we had in the study was we collected some foam samples  
10 from the couches that were removed from the homes from as  
11 many people as we could. This was more difficult in the  
12 Bay Area Sacramento group, where they were replacing their  
13 own couch. There was a variable timeline to replace their  
14 couch and some people were replacing the foam in their  
15 couch only.

16 So we were able to get a small piece of seat  
17 cushion foam from some of the couches if the participant  
18 was willing and the foam was accessible. We successfully  
19 got 13 seat cushion samples out of the 22 households that  
20 replaced their couch.

21 The San Jose group was a little easier. Because  
22 we were replacing the couch for them, we took possession  
23 of their old couch when we moved the new couch in, so we  
24 were able to collect as many samples as we wanted from  
25 each of those couches.

1           We took a large block of the seat cushion foam.  
2 We took some armrest foam and fabric samples from the seat  
3 armrest, backing, and decking of the couch. And we got  
4 samples from all 11 of the households that replaced their  
5 couch.

6                               --o0o--

7           MS. MORAN: So if we just take a look at what was  
8 found in the couches themselves, we saw in the Bay Area/  
9 Sacramento group in the seat cushions that we had 3  
10 couches with PBDEs and many, many couches had the OPFRs.

11                              --o0o--

12           MS. MORAN: But what we have noticed is when we  
13 looked at what was found in the San Jose couches, here you  
14 can see that the dark blue rows show what was found in the  
15 seat cushion foam and the white rows show what was found  
16 in the other samples taken from the couch, so the other  
17 foam and fabric samples.

18           What we found interesting was we did not see  
19 agreement. So in a few of the couches, PBDEs were found  
20 in the other components of couch, but not in the seat  
21 cushion. And in many of the couches, some of the OPFRs  
22 that were not in the seat cushion were found in the other  
23 components of the couch.

24           So what we know is that we had more complete  
25 information about what was in the couches from the San

1 Jose group, then we do from the Bay Area group, as well as  
2 having information about every couch in the San Jose group  
3 compared to the Bay Area group.

4 --o0o--

5 MS. MORAN: So we wanted to look at just these  
6 homes where we knew what was in the couch to see if we had  
7 a clear picture. And for the San Jose homes, where we had  
8 information -- more detailed information about the couch  
9 and more complete information from every household that we  
10 see couches where PBDEs were detected clearly declined  
11 over time.

12 It's a little less clear for the OPFRs. TPHP had  
13 a clear decline over time, but the other OPFRs, we are not  
14 seeing a clear pattern.

15 When we look at the Bay Area group, and we plot  
16 the homes where we did have a foam sample and we knew what  
17 was likely in the couch, we also decided to look at a few  
18 of the homes where it -- we didn't have a sample of what  
19 was in the couch, and it was very obvious that they start  
20 out with a very high level of some of the flame retardants  
21 and they declined over time.

22 So we decided to look at both, just as an initial  
23 snapshot, what could we do to fill in some of the missing  
24 data? And we see a clear picture here of decline in flame  
25 retardants over the course of the study.

--o0o--

MS. MORAN: Again, this is just a snapshot. We have just gotten the results back. We have not yet been able to return them to the participants. And we are just beginning the statistical analysis for this data.

But so far what we've learned is that the timing for people to replace the foam or replace their couch was variable and complicated our logistics for completing this study. But overall, we did have good completion rates for the homes that replaced their own foam or bought their own couch.

We did overall see decreases in the dust concentrations after the homes replaced their couch or the foam in their couch. But incorporating the information of what flame retardants were detected in the actual couch helped us interpret the data. This is limited by the less detailed information that we have from the Bay Area group and the less samples that we were able to collect in that group.

We saw some of those unexpected increases in some of the homes for some of the flame retardants. And we hope to investigate this a little further using the survey data that we collected and home inventories that were collected as potential sources of other flame retardants in the home.

--o0o--

MS. MORAN: So we'd like to thank everybody that made the study possible. Our participants, we could not have done this study without them. Myrto Petreas and June-Soo Park analyzed all of the foam and fabric samples for our couches. Arlene Blum and her group at Green Science Policy were really instrumental in making this study happen and aiding in recruitment of participants, and all the logistics of replacing the couches in our San Jose group.

And Katya Roudneva and Tasha Stoiber collected many of the dust samples in the study. And Veronica Chin at Green Science Policy Institute really spearheaded the logistics of replacing all of the couches for San Jose.

CHAIRPERSON SCHWARZMAN: Thank you so much. We have about a little over 10 minutes for questions from the Panel and the audience. And this time I'm going to take the Chair's prerogative to ask the first question --

MS. MORAN: Sure.

CHAIRPERSON SCHWARZMAN: -- which is understanding -- thank you so much for this presentation, and understanding that this is preliminary data and you haven't finished working with it to the extent that you will --

MS. MORAN: Yes.

1 CHAIRPERSON SCHWARZMAN: -- the -- looking at  
2 slide 16. Slide 16, is it possible to put that back up?  
3 That -- let's see San Jose results. That one, yes.

4 It's nice to see this split out, that when you  
5 know there's brominated flame retardants in the coach, you  
6 see the decrease --

7 MS. MORAN: Yeah.

8 CHAIRPERSON SCHWARZMAN: -- in the first 6 months  
9 to a year, and -- but when there are the OPFRs, it's a lot  
10 more variable.

11 MS. MORAN: Yeah.

12 CHAIRPERSON SCHWARZMAN: And I'm wondering if you  
13 know, just off the top of your head, the other sources of  
14 the OPFRs that might be in the house that's contributing  
15 to this.

16 MS. MORAN: So that's an interesting question.  
17 It's something that we hope to look into a little bit more  
18 using the home inventory data that we have, what could  
19 have been brought into the home that would contain these  
20 other flame retardants. There's a lot of items in the  
21 home that -- particularly furniture and electronics --  
22 mostly the furniture that we want to look at to see what  
23 potentially was brought into the home or maybe moved to a  
24 different room in the home closer to the room that we were  
25 sampling.

1 CHAIRPERSON SCHWARZMAN: Do you know the product  
2 categories that tend to contain the OPFRs?

3 MS. MORAN: Off the top of my head, I don't know  
4 that we do.

5 CHAIRPERSON SCHWARZMAN: Thank you.

6 Other questions?

7 Yeah, Veena.

8 PANEL MEMBER SINGLA: Just a comment related to  
9 that is the children's products oftentimes can contain  
10 these particular OPFRs. So it would be interesting to  
11 see. I wonder if some of these households had babies  
12 and --

13 MS. MORAN: Many of them did. Most of our  
14 households had either children or grandchildren and had  
15 baby products. And we did inventory what baby products  
16 were in the home at each visit.

17 PANEL MEMBER SINGLA: Okay. Yeah. I think that  
18 would be really interesting to look at, because the  
19 strollers, high chairs, car seats, bassinet pads, sleeping  
20 pads, a lot of children's products have these particular  
21 flame retardants.

22 CHAIRPERSON SCHWARZMAN: Yeah.

23 MR. CHARBONNET: And just to tag onto that. This  
24 is Joe Charbonnet from the Green Science Policy Institute.

25 I'll add that the organophosphate esters that we



1 see used as flame retardants are probably even more  
2 abundantly used as plasticizers and plastics. So I  
3 would -- I would be aware of that, that you might be  
4 seeing in these applications other than just flame  
5 retardants.

6 Also, they are the oxidation product of organo --  
7 or of phosphites, which are antioxidants. So they might  
8 be coming from a completely unanticipated source in that  
9 regard, too, and they're used quite abundantly there,  
10 so -- I recognize that makes your work significantly  
11 harder.

12 (Laughter.)

13 CHAIRPERSON SCHWARZMAN: Thank you.

14 Other questions, panel or audience?

15 CHAIRPERSON SCHWARZMAN: Yes, in the back, but  
16 you have to come up to the microphone, please.

17 MR. TENNEY: Sure. Joel Tenney with -- okay.  
18 Good. Joel Tenny, Israel Chemicals.

19 How did you factor in --

20 CHAIRPERSON SCHWARZMAN: Closer, please.

21 MR. TENNEY: -- cleaning habits to something like  
22 this? Do people -- did they change their behaviors after  
23 they changed couches or was it consistent?

24 MS. MORAN: Sure. That's some of the data that  
25 we did collect in our questionnaire was cleaning habits

1 over time and we have not looked into that at this point  
2 in time.

3 MR. TENNEY: Okay. Good.

4 MS. MORAN: But we hope to.

5 CHAIRPERSON SCHWARZMAN: There was another --  
6 yes, please.

7 DR. SHE: Thank you, Rebecca. I have one  
8 question regarding the brominated flame retardants, you  
9 know, that's 200 aligned congeners. Which one you think  
10 the most dominant one? I think you didn't look at the  
11 PBDE two line, which might be a dominant one, and then you  
12 pick up 77, 99, 100. What's the logic behind you pick up  
13 different congeners?

14 MS. MORAN: So if I understand the question  
15 correctly, why did we pick to show these specific  
16 congeners, is that -- was that your question?

17 DR. SHE: Yes.

18 MS. MORAN: Okay. So one of the interesting  
19 things is that some studies have shown that the penta  
20 mixture of PBDEs, which is primarily 47, 99, and 100 were  
21 used in upholstered furniture kind of prior to the  
22 mid-2000s. So those were just the ones that we chose to  
23 look at initially when we looked at this data.

24 CHAIRPERSON SCHWARZMAN: Other questions?

25 Yes.

1 PANEL MEMBER QUINTANA: Hi. In some studies of  
2 house dust they've done, we've used a cyclone vacuum that  
3 can, you know, express the dust as -- in nanograms per  
4 gram of dust or also nanograms per meter squared, so  
5 loading versus concentration.

6 MS. MORAN: Like in AVS3?

7 PANEL MEMBER QUINTANA: Yeah, but -- so to get  
8 back to the other question, change in behavior, it looks  
9 like you did at least vacuum the same area with your  
10 vacuum --

11 MS. MORAN: Yes.

12 PANEL MEMBER QUINTANA: -- and so you might look  
13 at the amount of grams of dust collected as an issue  
14 whether or not you did perhaps change behavior, or become  
15 aware of dust or something.

16 DR. DORAN: Yes.

17 PANEL MEMBER QUINTANA: You might have that  
18 variable too.

19 MS. MORAN: Yes. Yeah, we have included that as  
20 well.

21 CHAIRPERSON SCHWARZMAN: Other questions and we  
22 have couple minutes for discussion too, in case anyone has  
23 any thoughts they want to contribute.

24 Yes, Kathleen.

25 DR. ATTFIELD: I was just going to add a comment

1 on additional sources for the TPP OPFR, that can also be a  
2 phthalate substitute. So it is showing up in some  
3 consumer products, like nail polish as well.

4 CHAIRPERSON SCHWARZMAN: That's the plasticizer  
5 application basically, yeah.

6 DR. ATTFIELD: Yeah.

7 CHAIRPERSON SCHWARZMAN: Questions or comments?

8 And if not, we will move on to Kathleen's  
9 presentation.

10 So, Kathleen Attfield is a Research Scientist in  
11 the Exposure Assessment Section in the Environmental  
12 Health Investigations Branch at CDPH. And we'll have  
13 another 10 minutes for questions and discussion after  
14 Kathleen's presentation.

15 (Thereupon an overhead presentation was  
16 presented as follows.)

17 DR. ATTFIELD: Good morning. Thank you very  
18 much. I'm Kathleen Attfield from CDPH. And today, I'm  
19 going to be talking about the biomonitoring portion of the  
20 study that Rebecca just presented to us.

21 --o0o--

22 DR. ATTFIELD: So as we've heard from Rebecca,  
23 the study was first conceived to be looking at dust in  
24 foam in homes where people have either replaced foam in  
25 their couches or the actual couches themselves.

1           And Biomonitoring California was able to  
2 complement this with the addition of urine and serum  
3 analyses in a subset of the people. And this portion of  
4 the study was entitled the Foam Replacement Environmental  
5 Exposure Study, FREES. So that's really referring to  
6 biomarkers going forward, just so you know.

7           And our DTSC laboratory did the analysis of the  
8 urine and the blood with the previously established  
9 methods.

10                           --o0o--

11           DR. ATTFIELD: So our biomonitoring analytes that  
12 we were able to look at reflect many, but not all, of the  
13 flame retardants that the dust study is looking at. So  
14 for the polybrominated diphenyl ethers, we are going to  
15 focus today on the congeners that were mentioned that  
16 were -- that have been very prominent in foam furnishings.  
17 So the 47, 99, 100, and 153. We did look at other  
18 congeners, which I will briefly mention later.

19           For the organophosphate flame retardants, I'll be  
20 presenting 3 metabolites of the 4 that Rebecca showed us  
21 earlier, though they did also look at a wider range of  
22 OPFRs. Just to help you navigate through all the  
23 wonderful acronyms, everything that she present -- well,  
24 the three that she presented, the parent metabolites, are  
25 all the tri versions, the triphenyl phosphate, the Tris

1 tris(1,3-dichloroisopropyl)phosphate, tris(2-chloroethyl)  
2 phosphate.

3 And what makes it rather easier for the  
4 metabolites is these all break down and we look at the di  
5 versions or the bi versions. So for TPP, you have 3  
6 phenyl groups here and we're going to be looking at the  
7 diphenyl phosphate, the DPP.

8 --o0o--

9 DR. ATTFIELD: So to quickly situate you in time  
10 of what is happening with biomarkers in the flame  
11 retardant realm, for the PBDEs, we know that in the United  
12 States two of the formulations, the penta and the octa  
13 PBDE formulations were phased out in 2005. And we are  
14 seeing decreased levels of these environmentally.

15 And also, it looks like these are mostly showing  
16 declines in biomarker levels, but not universally. There  
17 are some more recent studies that show that maybe things  
18 are beginning to plateau for some of these congeners.

19 Due to the ongoing presence in the environment of  
20 these very long-lived chemicals, it does pose a challenge  
21 for scientists to accurately assess and calculate the  
22 biological half-lives. So we've still got quite a range  
23 to get -- to have our estimates here for the BDEs 47, 99,  
24 100, between 0.4 and 5.4 years; and for BDE-153 has much  
25 longer half-life estimates of 3.5 to 11.7 years.

--o0o--

DR. ATTFIELD: For the OPFRs, as would be expected with the timeline that Rebecca showed, these are now increasing in environmental samples, since the PBDE partial phase-out.

And it looks like that biomarkers are following suit, but these are increasing in biological samples. So we only have data so far from one cycle of the U.S. National Health and Examination -- Nutrition and Examination study from the 2013-2014 cycle. Already seeing that the 4 OPFRs that Rebecca presented, their metabolites are detected in over 81 percent of those samples.

One thing to really keep in mind is the -- we've got two very different classes of chemicals going on here. These have much shorter half-lives. PBDE was years. These are in a matter of hours. So this -- any particular biomarker level you see for OPFRs is going to reflect a much shorter time period and a much more recent time period, so that will affect the analysis going forward that I show you.

--o0o--

DR. ATTFIELD: So our objectives for this analysis was to test if the changes in biological levels of these flame retardants were different between the couch

1 and foam replacers and a comparison group. So the  
2 wonderful thing about having this comparison group is that  
3 we can hopefully account for these general population  
4 trends that I just presented to you.

5 We're also going to be able to look at change  
6 within people so that can help us reduce the impact of  
7 between-person differences, hopefully those that might  
8 reflect from perhaps, sex, race -- race or age, for  
9 example.

10 --o0o--

11 DR. ATTFIELD: Our comparison group has the  
12 formal title of the Intraprogram Pilot Study, IPP. I'll  
13 try to call it comparison group, so it's not too many  
14 acronyms. It's essentially a periodic sampling of  
15 volunteers from the staff associated with Biomonitoring  
16 California, OEHHA, DTSC, and CDPH. This is for testing  
17 and demonstrating of our laboratory methods.

18 So, in 2016 to 2017, we were focusing on flame  
19 retardants. And for the analysis that I'm doing, I have  
20 removed anyone who perhaps moved or replaced their  
21 furniture. So we can sort of think of them as more stable  
22 group of people to compare to the FREES participants.

23 We will see that they have pretty much similar  
24 demographics and we hope that they are also comparable in  
25 having perhaps similar sort of environmental awareness to



1 our FREES participants that might affect aspects of  
2 behavior, such as was brought up by one of the commenters.

3 --o0o--

4 DR. ATTFIELD: Our participant numbers, so we're  
5 shifting from household to people. So we have 25 people  
6 from the dust study that also elected to participate in  
7 the biological sampling and made it to the 12-month  
8 sampling point as well. Just a side note, this includes  
9 the Bay Area as well as the San Jose participants, but it  
10 was only 3 of the folks from the San Jose group  
11 represented in the 25.

12 There's only 23 in the end that have overlap with  
13 the dust samples, because there were 2 people who didn't  
14 remain in the dust sampling to that 12-month timepoint.  
15 Our comparison group had 28 people.

16 --o0o--

17 DR. ATTFIELD: On our participant  
18 characteristics, it actually worked out that we have an  
19 identical proportion of female-to-male participants, 68  
20 percent female. For race, pretty similar proportions of  
21 white to Asian, sort of 60 to 70 percent. A little more  
22 diversity in our FREES group.

23 Now, we're going to revisit the timeline, because  
24 the timing of the samples is -- makes the comparison a  
25 little bit tricky.

--o0o--

DR. ATTFIELD: So for the dust we saw that there was a sample taken at the pre-couch replacement. There's a variable period of time before the couch replacement, hence the broken line, at 6 months, 12 months, and 18 months.

--o0o--

DR. ATTFIELD: For our FREES population, we tried to make these as contemporaneous as possible, so about the same time as the pre-couch replacement, 6 months, 12 months and 18 months. Of note, at 6 months, we only did the urine sample, so we only have OPFRs for that 6-month time point.

--o0o--

DR. ATTFIELD: Now, to compare this to our IPP, our comparison group, I slid down the FREES. So the first sample that was taken from our comparison group was a bit later. So it was sort of more time to have exactly a year timespan versus the more variable time period of the FREES. So a bit more around the time of the couch replacement and the second sample 12 months later, approximately.

--o0o--

DR. ATTFIELD: So to put that in tabular form, that did work out that the time period between the two

1 samples for FREES was about 1.23 years for median and just  
2 over 1 for our IPP group. The IPP group did start later  
3 for our first samples, so in August of 2016. Whereas, as  
4 Rebecca mentioned, it was a year time period for  
5 collecting that first sample, for us September 2015 to  
6 September 2016.

7 --o0o--

8 DR. ATTFIELD: Because of these small number of  
9 participants and the possibility of other sources that may  
10 be impacting results and these variable time periods, we  
11 started out with a pretty simple way of looking at these  
12 differences between the groups. So a testing of the  
13 slope, so the change in concentration over time.

14 So let me visualize this for you.

15 --o0o--

16 DR. ATTFIELD: So here's a schematic of a  
17 hypothetical PBDE. This is not real data.

18 (Laughter.)

19 DR. ATTFIELD: Don't get fixated on any  
20 particular points here. So we're calling 0 month that  
21 first measurement for this -- for the comparison group, so  
22 the dots on the left are the first sample. You see the  
23 slopes down to the dots on the right-hand side. Now, I'm  
24 making the assumption that we're all in the phase of  
25 eliminating PBDEs from our bodies using first order

1 kinetics, so we're expecting a log-linear decrease over  
2 time. So that's what's pictured there.

3 --o0o--

4 DR. ATTFIELD: And then adding FREES for  
5 comparison, again samples on the left are your first  
6 sample time points with time before couch replacement  
7 being negative months. And then on the right-hand side,  
8 the second measurements and the slopes in between.

9 --o0o--

10 DR. ATTFIELD: So then we're going to be able to  
11 compare the overall slopes, so that's what we're going to  
12 be looking at.

13 So I'm -- one thing of note also is this is kind  
14 of -- there's a bit of a conservative test, because we're  
15 going to have to average in the time before that couch  
16 replacement.

17 --o0o--

18 DR. ATTFIELD: So on to our preliminary results.  
19 So to compare our initial concentrations of PBDEs, so here  
20 I've represented the geometric means of the four  
21 congeners, combining FREES and IPP together. We can't, at  
22 this point in time, compare to NHANES, because they're  
23 just doing pooled samples after 2003, 2004. So here, I'm  
24 showing our best comparison, which is the California  
25 Teachers Study. So our levels are pretty comparable to

1 what's seen there, even though we're a bit, you know,  
2 later in time than the Teachers Study.

3 Quick nod to the other BDEs that were measured.  
4 Pretty low frequency of detection, mostly under 12  
5 percent.

6 --o0o--

7 DR. ATTFIELD: Breaking the two groups apart, our  
8 FREES participants did start higher than our IPP  
9 comparison group. But again, since we're looking at  
10 change over time, this should hopefully not have a lot of  
11 bearing.

12 --o0o--

13 DR. ATTFIELD: So now just showing that graphic  
14 again, but with real data. This our BDE-47. So  
15 hopefully, it should be pretty visually apparent. I'll  
16 show you tables in a second. But that we do see a greater  
17 change in the PBDE -- in BDE-47 for our FREES group.

18 --o0o--

19 DR. ATTFIELD: So in shifting to tabular result  
20 form, just -- I'm going to switch to percent change over  
21 one year. So this graphic is showing you log change, but  
22 we're going to go back to raw values, so it's a little  
23 easier to comprehend.

24 So for BDE-47, so that what you just saw  
25 translates into about a 21 percent change for our

1 comparison group versus a 43 percent decrease for our  
2 FREES population. Pretty similar in BDE-99. 100 is a bit  
3 smaller of a change, 16 percent for the comparison group,  
4 36 percent decrease with our FREES participants.

5 And there's actually a typo on this slide, it's  
6 BDE-153 there at the bottom is -- as you'll see, it's just  
7 about the same percentage of change. And that actually is  
8 not much of a surprise, since it has a much longer  
9 half-life for one, and it has much lower predominance in  
10 the mixture that's put into foam furnishings compared to  
11 the others.

12 --o0o--

13 DR. ATTFIELD: So moving on to our OPFRs, so  
14 these are initial OPFR concentrations. Take this  
15 comparison with a little grain of salt. They are  
16 unadjusted, because we're using specific gravity in this  
17 analysis, where as NHANES presents creatinine-adjusted.  
18 So our levels are a little higher here for our California  
19 samples. Also, it could have to do with that we're in  
20 California, but also it's a later time period.

21 --o0o--

22 DR. ATTFIELD: Again, breaking these out by our  
23 comparison group and FREES, we have higher levels in our  
24 FREES group for the BCEP and the DPP, and pretty similar  
25 levels for the BDCPP.

--o0o--

DR. ATTFIELD: So the analytical approach a little different than the other one, because of these such short half-lives the sort of passage of time is not really going to play as big a role. We might expect an initial drop and then pretty stable results, if you were to look at the 6-, 12-, and 18-month values. So I'm just showing you -- I'll be showing you linear regressions with repeated measurements accounting for the repeated measurements. And then because we do have data for FREES only and have this concern about the short half-lives involved, I will show you some correlations between those three different measurements.

--o0o--

DR. ATTFIELD: So our first one, BCEP. So for this one, we'll see that the FREES levels do go down a little bit. But that is not statistically significant. Whereas, for our IPP, we actually saw an increase in levels of over the 0 to the 12 months, an 84 percent increase.

--o0o--

DR. ATTFIELD: So we have the concern though of the short half-life chemicals and what kind of variability we might just sort of naturally see within people and their difference sources of exposure.

1           So these -- for BCEP for the 6-, 12-, and  
2 18-months samples, those had a kind of moderate level of  
3 correlation about 0.59 to 0.6 state. And if you look at  
4 intra-class correlations, which are the ratio of between  
5 variability to the between and within variability, it's  
6 about 0.57. To have excellent reliability, you'd want it  
7 to be above 0.8.

8                               --o0o--

9           DR. ATTFIELD: For BDCPP, we see -- for this one,  
10 we actually see a significant decline in our FREES  
11 participants, a 53 percent decrease, while our IPP  
12 comparison group declines by about 18 percent.

13                              --o0o--

14           DR. ATTFIELD: However, I'm afraid to say that it  
15 has even worse correlation between the 6, 12, and 18  
16 months. So again, these are some, you know, preliminary  
17 look at some of these data. So there's going to be a  
18 little interpretation work going forward. So the rhos the  
19 correlation being between 0.3 and 0.4.

20                              --o0o--

21           DR. ATTFIELD: For the DPP metabolite, our FREES  
22 levels actually stayed pretty stable, while the comparison  
23 group went down about 30 percent.

24                              --o0o--

25           DR. ATTFIELD: These also have moderate levels



1 correlations, about 0.4, 0.5. And the ICC shows that the  
2 within is rather dominant. So especially for these short  
3 half-life chemicals, in addition to the intervention, we  
4 need to think about what other aspects may be changing in  
5 the homes and in the lives and behaviors of our  
6 participants. So we also have quite an extensive  
7 questionnaire for our participants, both before and after.  
8 So there are some things we can begin to look at related  
9 to those.

10 --o0o--

11 DR. ATTFIELD: So some very generally obvious  
12 ones that people might want us to look at, just starting  
13 off with those. So handwashing frequency. We didn't  
14 actually see that that had much of an association with  
15 initial concentrations or change over time. And we didn't  
16 have many people telling us that they changed their  
17 handwashing frequency. Of course, that requires them  
18 being able to assess their own changes in handwashing over  
19 a year.

20 Its known that PBDEs can be enriched in meat --  
21 in animal products. So we did look at differences between  
22 vegetarians and meat eaters. And again, this is in our  
23 FREES population only, and did not see associations there,  
24 nor with hours at a work computer, another possible source  
25 of flame retardants into your breathed in or dermal

1 exposures of dust.

2 We did actually see an association with sleeping  
3 on a foam mattress with initial PBDE concentrations. This  
4 did not affect the change over time that we were looking  
5 at though.

6 --o0o--

7 DR. ATTFIELD: So the sensitivity test that I  
8 started to look at. Again, since it's a small "n" that  
9 we're dealing with, it's not possible to put lots of  
10 things into your model. But I did look at sex and race.  
11 We didn't see any differences with race, and gender/sex  
12 had very little bearing, though we saw a bit of a greater  
13 change in BDE-99 with being female.

14 I was a little concerned to look at the fact that  
15 our FREES population started higher in the PBDEs. And, of  
16 course, I'm assuming a log-linear decrease, but that's an  
17 assumption. So I did limit the FREES group just to those  
18 with a similar range of values to the IPP. And that  
19 actually didn't make -- didn't really make any change in  
20 the difference there.

21 Also, looking at clustering of people in the same  
22 homes, because we had about eight couples from the FREES  
23 group that participated in the biomarker portion of this  
24 study. There's that possibility by clustering and that  
25 actually didn't end up having much of an effect. We had

1 some couples who had very similar values, and we had other  
2 couples that really didn't have very similar values at  
3 all.

4 --o0o--

5 DR. ATTFIELD: So this -- while we're seeing a  
6 decrease in those PBDE values and sort of variable results  
7 in our OPFR values, I do believe we do have a fair amount  
8 of work in interpretation before we can think about saying  
9 that the couch was the sole contributor to this change,  
10 and that also, as we saw from Rebecca's results, not all  
11 of the couches that did end up getting biopsied showed  
12 PBDEs in those initial couches. So there's -- in the foam  
13 of the seat cushions. So there's some work to be done to  
14 look at this further.

15 So we will be coordinating with UC Davis and  
16 Silent Spring to look at these and complement our  
17 questionnaire data. We have some questions they don't  
18 have and they have some we don't. And that will help us  
19 to be able to interpret these results a little better.

20 --o0o--

21 DR. ATTFIELD: Some limitations. We have way  
22 more questionnaire information on our FREES participants  
23 than our comparison group. So that may limit our ability  
24 to think about some aspects of behavior change that could  
25

1 have happened.

2 Of course, this -- even with the most extensive  
3 questionnaire, you are asking people about change over a  
4 year's time, so we may not have captured all these  
5 behavior changes. That might be pertinent. And again,  
6 the small size and other sources of flame retardants may  
7 make it a bit difficult to assess other sources of  
8 confounding and variability.

9 --o0o--

10 DR. ATTFIELD: To situate this in the context of  
11 some other intervention or time-change studies, there was  
12 a study looking at interventions on handwashing and house  
13 cleaning, closely focusing on OPFRs, doing those one week  
14 each. They did see up to a 52 percent decrease in OPFRs.  
15 Our highest decrease for OPFRs was 53 percent, but they  
16 also saw some increases. So again, short half-life  
17 chemicals, there can be some variability that's difficult.

18 A study of looking at before and after a  
19 gymnastics practice can show that even in the space of a  
20 few hours, you can have a dramatic increase in an OPFR  
21 level, here a 50 percent increase in DPP.

22 For within person variability, there have been a  
23 few studies on OPFRs. Here, I just showed you one over  
24 five weeks. So again, the interclass correlations around  
25 the same range, a bit better actually than what we saw,

1 0.54 to 0.67. What -- again, what makes great reliability  
2 is over 0.8. And that you more often see in long-life  
3 half-life chemicals, such as PBDEs. So there was a study  
4 looking at variability over a year of three measurements  
5 and very excellent correlation over time showing between  
6 mostly predominating. And ours were -- our ICCs for PBDEs  
7 were like 0.81 to 0.97, so quite high similar to that.

8 --o0o--

9 DR. ATTFIELD: So to conclude, our PBDE  
10 measurements, we did see them decreasing at a faster rate  
11 in FREES compared to our comparison group, except for the  
12 BDE-153. Our OPFR measurements shows different patterns  
13 and could be complicated by their short half-lives.

14 And we're working further to understand how much  
15 we can attribute this intervention to any one of those  
16 particular changes.

17 --o0o--

18 DR. ATTFIELD: So I definitely would like to  
19 acknowledge our participants that had a lot of work to be  
20 a part of this study and the staff of Biomonitoring  
21 California, and our collaborators.

22 --o0o--

23 DR ATTFIELD: And with that, I can take  
24 questions.

25 CHAIRPERSON SCHWARZMAN: Questions from the Panel

1 or the audience?

2 Yeah, Ulrike.

3 PANEL MEMBER LUDERER: Thank you. That's a very  
4 interesting presentation. My question is you mentioned  
5 that you don't have very much data about -- from the  
6 comparison group. That might explain why they had lower  
7 levels to begin with of the PBDEs. But I'm wondering if  
8 you had any information, you know, maybe particularly  
9 about furniture with -- containing foam and presence of  
10 that or if you really just don't have that information.

11 DR. ATTFIELD: We really have very little  
12 information. The most we asked about the furniture again  
13 was did you replace major articles of items.

14 Yeah, I mean, one thing I think is of interest is  
15 the variability is lower in our comparison group. And  
16 that -- you know, to be completely postulating, perhaps  
17 it's, you know, having more of a shared daily environment.  
18 Those of us that sort of share office space and so have  
19 that sorts of dust in our environment.

20 CHAIRPERSON SCHWARZMAN: Go ahead, Jenny.

21 PANEL MEMBER QUINTANA: Very quickly. Since  
22 you're looking at a home-based exposure, do you have any  
23 information about how many hours they had spent in the  
24 home out of the last 24 hours prior to collection of the  
25 urine sample or the samples? Because that -- if they had

1 spent time away from home, that may have not  
2 contributed -- the home environment might not have  
3 contributed to the levels.

4 DR. ATTFIELD: Right. I actually don't think we  
5 have the previous 24-hour. We do have a lot of  
6 information sort of on your general patterns, you know,  
7 how much you work at home versus work at other places,  
8 travel in the car, travel in a plane. But I'm afraid I  
9 don't think we have the last 24 hours, but I'll look, and  
10 make sure. Good question.

11 CHAIRPERSON SCHWARZMAN: I had a question also  
12 about your discussion of association with behaviors. It's  
13 slide 33. And my question is just whether the study is  
14 actually powered to detect those. You know, you found  
15 basically not very many associations, except sleeping on a  
16 foam mattress affecting PBDE --

17 DR. ATTFIELD: RIGHT.

18 CHAIRPERSON SCHWARZMAN: -- initial PBDE levels.

19 DR. ATTFIELD: Right. So that's a very pertinent  
20 question and that is why you see four bullet points on  
21 this slide, that there are many other questions, but not  
22 really enough variability to really have any confidence in  
23 looking at those comparisons.

24 My hesitation on handwashing frequency is a  
25 little more on people's ability to accurately assess their

1 own patterns actually, than the power aspect to this  
2 question. This one was powered okay. That would be more  
3 my grain of salt.

4 CHAIRPERSON SCHWARZMAN: And I also wondered  
5 about slide 27, where the BCEP levels go down a bit, but  
6 not significantly. And I wondered if, you know, as with  
7 our discussion about some of the other OPFRs, if just the  
8 furniture isn't the main contributor to exposure to this  
9 flame retardant?

10 DR. ATTFIELD: Right. And we haven't combined --

11 CHAIRPERSON SCHWARZMAN: Chemical in general.

12 DR. ATTFIELD: -- the foam and dust data with the  
13 biomarker data yet. So I can't yet answer that question.  
14 Foam is tricky, because not everybody gave a foam biopsy  
15 of their couches, so -- but we will have dust to be able  
16 to look at.

17 CHAIRPERSON SCHWARZMAN: And sort same for  
18 anything where the FREES levels aren't changing  
19 significantly compared to the comparison group for OPFRs,  
20 you know, maybe -- maybe the intervention isn't the main  
21 driver of that exposure.

22 DR. ATTFIELD: Oh, it's completely possible,  
23 yeah.

24 CHAIRPERSON SCHWARZMAN: Other questions and  
25 comments?



1 Veena.

2 PANEL MEMBER SINGLA: Just a quick comment. I  
3 just wanted to say this is -- I think it's super  
4 interesting and exciting results. I'm really looking  
5 forward to seeing the further analysis. And I know this  
6 study was a lot of work to coordinate and complete, so --

7 DR. ATTFIELD: Thank you to my predecessors.

8 PANEL MEMBER SINGLA: Yeah. So --

9 DR. ATTFIELD: I was not one of the ones that --  
10 I had one field visit.

11 PANEL MEMBER SINGLA: I just wanted to offer my  
12 compliments and congratulations.

13 CHAIRPERSON SCHWARZMAN: All right. Anything  
14 else?

15 If we have nothing else, that means we get a few  
16 extra minutes for lunch.

17 MS. HOOVER: No public comment.

18 CHAIRPERSON SCHWARZMAN: Oh, no public comment.  
19 Okay.

20 So I have a couple things to say about lunch  
21 break and then we'll stop. One is that we have a little  
22 over an hour. We'll convene promptly at 1:25. Russ will  
23 start us off at 1:25. And so there's a handout in your  
24 packets with this map that shows some close by lunch  
25 places to help with that.

1           And for Panel Members, just a reminder to comply  
2 as usual with the Bagley-Keene requirements and not  
3 discuss Panel business during lunch, and also that holds  
4 for the afternoon break.

5           And with that, we'll conclude the morning session  
6 and reconvene at 1:25.

7           Thanks.

8           (Off record: 12:15 p.m.)

9           (Thereupon a lunch break was taken.)

## 1 A F T E R N O O N S E S S I O N

2 (On record: 1:26 p.m.)

3 CHAIRPERSON SCHWARZMAN: Thank you all for coming  
4 back on time. We are going to jump right into Gina  
5 Solomon's presentation. So I want to take a moment to  
6 introduce her.

7 Gina Solomon is a principal investigator at the  
8 Public Health Institute in Oakland and a clinical  
9 professor of medicine at the University of California, San  
10 Francisco. She served as the Deputy Secretary for Science  
11 and Health at the California Environmental Protection  
12 Agency from 2012 to 2017, and as a Senior Scientist at the  
13 Natural Resources Defense Council from 1996 to 2012.

14 Gina has worked on children's environmental  
15 health, reproductive toxicity, cumulative impacts and the  
16 use of novel data streams to screen chemicals for  
17 toxicity. She serves on multiple boards and committees at  
18 the National Academy of Sciences and on the U.S. EPA Board  
19 of Scientific Counselors Chemical Safety for  
20 Sustainability Subcommittee. She is a former member of  
21 the SGP as well.

22 Gina will be talking about an NAS report on  
23 organohalogen flame retardants and chemical classes.

24 Thank you, Gina.

25 (Thereupon an overhead presentation was

1           presented as follows.)

2           DR. SOLOMON: All right. Thank you for the  
3 invitation to come present before the Panel. And I'm glad  
4 to be here to continue the conversation on flame  
5 retardants.

6                               --o0o--

7           DR. SOLOMON: So just last month, a committee of  
8 the National Academies -- oh, right. This disclaimer.  
9 This is not the official presentation of the committee,  
10 though I did run the slides by the chair and the Academy  
11 staff, so that -- and they concurred that this reflects  
12 the report, but it also is tailored to this meeting and  
13 this group and my opinion.

14                              --o0o--

15           DR. SOLOMON: And so the Committee to address --  
16 to develop a scoping plan to assess the hazards of  
17 organohalogen flame retardants just finished up and the  
18 report came out just last month. And this is the  
19 Committee. It was actually a really -- it was my -- I  
20 have to say it was my favorite National Academies  
21 Committee. Am I allowed to say that?

22                              (Laughter.)

23           DR. SOLOMON: It was a really interdisciplinary  
24 group of people, and very enthusiastic and hard working  
25 group. So people put a lot of time and thought into the

1 report which was on a very tight timeline.

2 --o0o--

3 DR. SOLOMON: And here's the picture of the front  
4 of the report, but you can download it on the National  
5 Academies' website. The report came into being because of  
6 the Consumer Product Safety Commission, which was the  
7 sponsoring agency. But it really came into being, because  
8 CPSC was petitioned by a large and diverse group of  
9 organizations, including those you see listed here and a  
10 number of others, that requested that CPSC take a class  
11 approach to organohalogen flame retardants, and in fact  
12 ban them in four different categories of children's  
13 related products or products that kids might be exposed to  
14 in, one way or another, in the home.

15 And interestingly enough, the CPSC staff reviewed  
16 the petition - this was several years ago now -  
17 recommended to the Commission that the petition be denied.  
18 But the Commission, at that time, did -- in 2016, approved  
19 or voted to move forward with this petition. So the next  
20 step was to pull together and sponsor this National  
21 Academies committee to take a look at this issue and try  
22 to figure out -- or describe ways to approach the task.

23 --o0o--

24 DR. SOLOMON: And as many of you know or all of  
25 you know, the National Academies, you're sort of a slave

1 to your Statement of Task -- more than sort of. You are a  
2 slave to the Statement of Task. And so this is the  
3 Statement of Task sort of abbreviated: so surveying  
4 available data for flame retardants; identifying at least  
5 one approach for scientifically assessing OFRs as a class  
6 for hazard assessment; and then provide a plan on how to  
7 move forward.

8 But in the box is an important quote, that "CPSC  
9 needs the hazard assessment plan...when executed, to be  
10 readily integrated with a separate quantitative exposure  
11 assessment to complete a human health risk assessment".

12 And that's an important decision context, because  
13 it's very different from, for example, Biomonitoring  
14 California's decision context about listing chemicals as  
15 classes, where we're not expecting to have to do a risk  
16 assessment of those classes that are designated or  
17 prioritized.

18 --o0o--

19 DR. SOLOMON: The committee started out by  
20 looking at the general idea of approaching chemicals as  
21 classes. And there's a lot of, I think, pretty useful  
22 language in the report describing all the reasons why  
23 chemical-by-chemical risk assessment has serious problems.

24 You know, the -- and the whole row of reports at  
25 the bottom all are cited to make the point that actually

1 there's an entire thread by now of NAS reports that have  
2 made these points. You know, if you look at Science and  
3 Decisions, which talked about where insufficient data  
4 often results in this sort of unofficial default that a  
5 chemical is non-toxic. There is the problem of untested  
6 chemicals being substituted. And Dr. Mike Wilson's work  
7 was actually cited in the report as an -- you know, where  
8 one of the places that -- where that, you know, was sort  
9 of developed. And then this issue of cumulative risk and  
10 cumulative exposure tending to be ignored, if you're just  
11 looking at one chemical at a time.

12 And so the committee concluded that a class-based  
13 approach really makes a lot of sense. That there's a new  
14 approach to risk assessment that needs to be developed and  
15 it should be class based. So that I think was helpful.

16 --o0o--

17 DR. SOLOMON: The -- there's a sort of a nuance  
18 here, which is that the class that was defined for us of  
19 organohalogen flame retardants we sort of quickly looked  
20 at it and went, well, okay, you know, do we have to look  
21 at it all as a single class or is there the possibility of  
22 looking at smaller units or subclasses for conducting a  
23 hazard assessment?

24 And the committee concluded that it's still a  
25 class approach, even if you break a larger class down into

1 subclasses, though, you know, there's a certain point at  
2 which the subclasses become so small - and I'll get to  
3 that later - that it's almost the same as doing chemical  
4 by chemical.

5 --o0o--

6 DR. SOLOMON: There is a nod to Biomonitoring  
7 California in the report. So you guys and OEHHA should be  
8 proud of this work, because it talked about adopting the  
9 class approach in the Biomonitoring Program and then how  
10 that was further adopted in the Safer Consumer Products  
11 program. And there's even specific language about the  
12 flame retardant classes that were identified, designated  
13 and prioritized by this Panel. So -- but it makes the  
14 distinction that these have not been used to conduct risk  
15 assessments.

16 --o0o--

17 DR. SOLOMON: So the committee laid out a  
18 proposed approach to defining a chemical class, starting  
19 with the question of can you define a single class? And  
20 this is complicated and big, but it's not actually as bad  
21 as it looks when you start to go through it.

22 Because the first question is obvious, can you  
23 define a single class and can you do it based on  
24 physiochemical properties, or biology, or some combination  
25 of those two? And if not, then, you know, can you define



1 subclasses? And if not, then you may have to do  
2 individual assessments. But if you can, then you define  
3 your subclasses. You do a quick literature survey to get  
4 a sense of the data availability in each of those  
5 subclasses and whether there's any data at all on any  
6 subclass member. And if so, then you can potentially move  
7 forward and do a more in-depth hazard assessment as  
8 described in the lower part of this flowchart.

9           But, you know, it's pretty straightforward and we  
10 tried to actually sort of break it up into steps and then  
11 do it actually, and found it to be really an interesting  
12 exercise. So the first step for the flame retardants was  
13 to figure out, okay, what are the flame retardants? We  
14 asked CPSC. They said they couldn't provide us with a  
15 list. There was a list in -- appended to the petition, so  
16 we certainly looked and used that as one of the sources.  
17 We actually asked the American Chemistry Council, because  
18 they were very interested in engaging in the process,  
19 asked them if they could give us a list of organohalogen  
20 flame retardants. They were not willing to do that. So  
21 we had to make our own list.

22           And so we started -- and we called that list the  
23 seed set, because then we used it to generate what we  
24 called an expanded set of chemical analogs that were  
25 structurally similar. And then we did an exercise to see,

1 can you distinguish the chemicals that we think are being  
2 used as flame retardants from otherwise somewhat similar  
3 chemicals that we don't think are currently being used as  
4 flame retardants. And if we couldn't designate --  
5 couldn't distinguish, then it makes it a little hard to  
6 call it a single class and then move forward and define  
7 subclasses, which is what we ended up doing in this case.

8 --o0o--

9 DR. SOLOMON: So the seed set chemical list,  
10 there's seven data sources all listed at the bottom.  
11 Eastmond(2015) is the petition. The Danish EPA has done a  
12 lot of really useful work on this, and we used their work  
13 quite a bit. And we identified 161 organohalogen flame  
14 retardants in those sources and then got rid of the  
15 duplicates and mixtures and got down to 148 and published  
16 that list. So that's available now out there. It's the  
17 best we could do as a committee.

18 --o0o--

19 DR. SOLOMON: Then defining -- trying to define  
20 similar analogs, we took the full 200,000 organohalogens  
21 that are, you know, out there, used Tanimoto Similarity  
22 Index threshold of 80 percent to just sort of do a cut of  
23 what similar analogs are there and came up with a bit over  
24 1,000. And then looked at physicochemical properties and  
25 ToxPrint Chemotypes types to try to -- and I don't want to

1 get too into the details here. But it's basically this  
2 idea of, well, can -- you know, can we sort of break our  
3 148 out from this larger pool of over 1,000.

4 And it basically just showed that there's a lot  
5 of organohalogens out there that share really pretty much  
6 all the same chemical properties and structural properties  
7 as the known flame retardant ones. And so they could  
8 maybe in the future become flame retardants or they might  
9 not, but it's -- you can't distinguish them.

10 So it was really hard to call it a scientifically  
11 defined class, except by use. And use doesn't work in a  
12 risk assessment context. It works in other contexts, but  
13 not in a risk assessment context.

14 --o0o--

15 DR. SOLOMON: So all that is to say that we ended  
16 up defining subclasses. And there's lots of different  
17 ways to define subclasses. We ended up using a  
18 combination of structure and biology, but we also realized  
19 that you can define subclasses so narrowly that you can --  
20 you know, we could have ended up with 100 -- almost 148  
21 different subclasses. There's no point.

22 And so we cautioned against that and proposed  
23 defining them broadly. So we looked at predicted  
24 biological activity, came up with eight biology-informed  
25 categories. Also, looked at different chemotypes in the

1 seed set and merged the information and ended up coming up  
2 with 14 biological/structural subclasses.

3 The smallest class had four members. There could  
4 have been some classes that had one or two members and we  
5 ended up deciding to merge those into the most closely  
6 related classes.

7 That also meant that we had some chemicals that  
8 were in more than one class. That could be okay. They  
9 would just be assessed maybe twice or, you know, in two  
10 different classes.

11 --o0o--

12 DR. SOLOMON: And so this is our 14 subclasses.  
13 And so you sort of get a sense of the -- how we sort of  
14 defined them. And I don't know that there's too much we  
15 want to get into there, except for you could see some of  
16 the favorites there, the polyhalogenated diphenyl ethers  
17 there with 12 members. Polyhalogenated organophosphates  
18 just below them with 22 members and then a whole bunch of  
19 other subclasses that are -- you know that we're not --  
20 haven't been looking at as closely.

21 --o0o--

22 DR. SOLOMON: And in the next step, we did a data  
23 survey just looking at big data sets out there.  
24 Toxicogenomics Database, the EPA Chemical Dashboard,  
25 Hazardous Substances Data Bank, you know, IRIS, ToxCast.

1 ChEMBL, by the way, is a UK. I wasn't familiar with that,  
2 but it's a UK-based data source on chemicals.

3 And there's a much bigger table in the report,  
4 but this gives you a sense of how it looks. Our eight  
5 data sources going across the bottom on that X-axis. The  
6 number of seed chemicals with data in each of these  
7 classes. And you can see that, you know, most cases -- in  
8 a lot of cases there were zero data in any given data  
9 source. And in some cases, there was data on, you know,  
10 one or two chemicals in the subclass. And in a few cases,  
11 like the polyhalogenated organophosphates which is the  
12 second row down, you see that there were -- there's, you  
13 know, much more data available. Like in that Comparative  
14 Toxicogenomics Database, there was data on ten of them,  
15 and data -- a little data on some in most of the data  
16 sources.

17 So you get a sense of more data rich versus data  
18 poor subclasses by just sort of scanning this kind of  
19 quick almost like a data inventory or data survey.

20 --o0o--

21 DR. SOLOMON: And so we decided to pick two  
22 subclasses to focus on and to try to take further in a  
23 case study. And we picked the polyhalogenated  
24 organophosphates because they were relatively data rich,  
25 as I showed you from the previous slide. And the

1 bisphenol aliphatics, because they had some data, but  
2 not -- wait, are they on there?

3 Shoot. Sorry. They're not on this little clip  
4 from the table, but they're much more data poor, but not  
5 so data poor that we couldn't do anything with them.

6 --o0o--

7 DR. SOLOMON: So here's what we did. We did an  
8 in-depth literature search looking at traditional  
9 toxicology data. We did a big zebrafish deep dive,  
10 because we had a zebrafish expert on the Panel, and a  
11 ToxCast and Tox21 deep dive. And we focused, just to try  
12 to make it more manageable, on developmental toxicity -  
13 and in the case of the bisphenols, thyroid homeostasis -  
14 and tried to evaluate and integrate the data, and ended  
15 upcoming to the same conclusion for both subclasses, which  
16 was that the available data were too heterogenous and too  
17 inconsistent to come to a conclusion.

18 And it was super frustrating, which is why I put  
19 the bomb down in the lower right-hand corner. We were  
20 actually hoping that it would be a lot neater and tidier,  
21 and that we would see the same kinds of effects. But what  
22 we ended up seeing, and I don't want to get into too much  
23 detail, but, you know, were -- results that were actually  
24 diametrically opposed from one chemical to the next in the  
25 subclass, or, in some cases, very strong zebrafish data

1 with fairly negative rodent data.

2 And it was really, without getting really deep  
3 into each study and figuring out which ones were weak and  
4 further evaluating it, we weren't able to just, you know,  
5 immediately say, okay, there's consistent findings.

6 --o0o--

7 DR. SOLOMON: And so what we did, instead of  
8 going deeper at this point, because this was top level  
9 recommendations, we laid out options for what to do next.

10 So, you know, option 1 would be basically to say,  
11 okay, you know, you extend the most conservative  
12 conclusion regarding hazard to the entire subclass, and  
13 that would be reasonable, though it's sort of more of a  
14 policy decision. Option 2 is reclass. If you have some  
15 members that are sort of borderline and they're behaving a  
16 little differently, you might move them out of the class.  
17 Another is to dig in more deeply to the data to try to  
18 explain the discordance. It may be -- have something to  
19 do with study design or study quality, and that could  
20 allow the assessment to move forward. We didn't have the  
21 amount of time we would have needed to do that, or  
22 generate some more data that could increase clarity.

23 And we made really clear that that would not have  
24 to be, you know, traditional toxicology data. It could be  
25 high-throughput data. It could -- you know, that would

1 just sort of help explain the discordance.

2 --o0o--

3 DR. SOLOMON: We also laid out other possible  
4 options that we saw across the classes. There were some  
5 classes where there's basically no data on any member of  
6 the subclass. You can't go much further if you have  
7 nothing on any anything. And so there's a need to  
8 generate some data or to broaden the subclass, so that  
9 you're pulling -- maybe pulling in some of the non-flame  
10 retardant analogs for example or reclassify into a  
11 different subclass, or if you had data on just one or two  
12 chemicals in the subclass and nothing at all on the rest,  
13 you can make a fairly scientifically based, scientifically  
14 informed policy decision to treat them all like the ones  
15 with data, or try to, you know, extrapolate based on  
16 predictors or generate some data on the others to allow  
17 you the confidence to extrapolate, or there's the  
18 data-rich subclass.

19 We really only had one example here, which was  
20 the PBDEs among the flame retardants. And we actually  
21 concluded that for the PBDEs, you could, with a fair  
22 amount of scientific confidence, extrapolate across the  
23 entire subclass a designation of "potentially hazardous",  
24 which is what CPSC uses. So if you have concordant data  
25 that works well.



--o0o--

DR. SOLOMON: So just to wrap-up, things that I think came out of this report, a pretty strong statement that a class approach to chemicals is scientifically justifiable, and, in fact, useful in all kinds of decision contexts, including in risk assessment. The approach to forming classes may differ depending on the decision context. So in risk assessment, you might have to form narrower classes.

And then we recommended coming up with classes based on a combination of chemistry and biological indicators or predictors. And then we said basically if the data are relatively concordant, it's perfectly scientifically justifiable to extrapolate to chemicals in the same subclass with no data, but that, you know, when you have discordant data, it gets harder.

And then there was a real emphasis on using predictive high-throughput toxicology approaches to help, you know, extrapolate within or across classes. And the discordant data I think we were all hoping that we would be able to make some more -- some clearer conclusions about the subclasses that we focused on. And so that was a disappointment. But, you know, the results were what the results were.

And then we, you know, only had a certain amount

1 of time to take the analysis as far as we did. So there's  
2 a lot more I think that could be done to move this  
3 forward, and hopefully a CHAP panel which would be the  
4 next step in the CPSC process, will be able to, you know,  
5 get past that hurdle and move these assessments forward.

6 So, thank you very much and I'm happy to take any  
7 questions.

8 CHAIRPERSON SCHWARZMAN: Thank you, Gina. We  
9 have about 10 minutes for questions, a little bit more. I  
10 just wanted to start with one of my own, which is - slide  
11 with the bomb, where the data are too heterogeneous or  
12 inconsistent on biological activity. How do you define  
13 biological activity there? That is, is it -- they have to  
14 have the same endpoint or a similar mechanism, they work  
15 on the same, or can it be any of those, or a combination?

16 DR. SOLOMON: It could be any of those or a  
17 combination. I mean, we -- the main situation that we ran  
18 into was where we had -- well, actually, we had  
19 differences between the zebrafish studies and the rodent  
20 studies, where the zebrafish studies were indicating  
21 developmental toxicity, and the rodent studies were fairly  
22 negative for developmental tox.

23 And then in the case of the bisphenols, we had,  
24 especially for thyroid endpoints, we had some that were  
25 positive -- some zebrafish studies that were very positive

1 and some that were negative.

2 And so, you know, it -- so they were for the same  
3 endpoint and/or constellation of endpoints in pretty  
4 similar -- not exactly the same methods. You know,  
5 there's different methods for doing zebrafish studies.  
6 And so it was just to the point that it would have taken a  
7 lot more digging to figure out, okay, is there some reason  
8 why the studies out of this lab were positive and that lab  
9 were negative, or, you know -- and there may well be, we  
10 just couldn't do it.

11 CHAIRPERSON SCHWARZMAN: So the heterogeneity  
12 that you're talking about is mainly there's some that are  
13 positive and some that are negative, not that you're  
14 finding that within one of the classes you defined, some,  
15 you know, work on this receptor versus other's work on  
16 that receptor?

17 DR. SOLOMON: Not so much. Yeah, it was more --

18 CHAIRPERSON SCHWARZMAN: So it's positive versus  
19 negative.

20 DR. SOLOMON: Yeah, it was more that -- though  
21 that may be an explanation. There also were some possible  
22 explanations, you know, people were -- again, you know,  
23 you can come up with your hypotheses. It just was -- we  
24 need to dig deeper to test them. So, for example, some of  
25 these were much larger molecules than others. And so, you

1 know, were they actually getting into the organism. So  
2 there may be a difference of in the toxicity within a  
3 subclass based on molecular size with a little bit more  
4 digging probably could sort that out.

5 But then it becomes a little tricky, because  
6 they're all part of the same subclass. Then do you divide  
7 the subclass again based on size? Maybe, but, you know,  
8 then you start again slicing and dicing. And then that --  
9 again, if you're trying to move forward a class concept,  
10 it can start to get complicated.

11 CHAIRPERSON SCHWARZMAN: Thank you.

12 Tom.

13 PANEL MEMBER McKONE: All right. Now, it's on.

14 So I was curious about you didn't go into a deep  
15 dive on the structure activity classification and binning.  
16 I guess the point I'm curious about is not so much what  
17 methods, because there's so many different approaches, but  
18 is there a way of knowing is it like so non-specific -- I  
19 mean, the different SAR or QSA -- quantitative-structure  
20 activity, methods are going to do different binnings and  
21 classifications. Are you concerned that somebody using  
22 that, that there's such tremendous sensitivity, that it  
23 might not be useful as a way to organize bins or is it  
24 useful? Is there some sort of robustness that starts  
25 showing up among some of the methods?

1 DR. SOLOMON: I may not be the best person to  
2 answer that question. Some of the committee members who  
3 are like -- you know, were more steeped in this might be  
4 better. We -- the committee -- since there were several  
5 people in the committee who were very versed in these  
6 approaches, they actually ran -- looked at a number of  
7 different tools for doing that -- you know, doing the  
8 binning.

9 So we did -- you know, at least fully moved it  
10 through two completely different sort of approaches, and  
11 they didn't come out that different. I mean, then the  
12 groups had to reconcile. And it is useful. We discovered  
13 to look in a number of different databases and use a  
14 number of different tools. But that again emphasizes, you  
15 know, if you're going to do this, you know, our committee  
16 had like top people in some of these fields that were very  
17 versed in the methods.

18 But, you know, this -- and if you're going to do  
19 something like this here, we would need to have more  
20 expertise potentially in -- you know, like on the staff.

21 PANEL MEMBER MCKONE: I mean, just to follow up,  
22 so I guess the question that you answered actually is  
23 that -- is, you know, the opportunity for major  
24 misclassification, right? In what you're doing, a  
25 misclassification isn't the end of the world, because

1 you're just trying to get insight about organizing.

2 But the fact you said that they explored this and  
3 they tried to find, you know, multiple methods, and that  
4 they -- means that probably there isn't an opportunity --  
5 there is not an opportunity for like a significant  
6 misclassification because you explored alternative ways.

7 DR. SOLOMON: Hard to say. I mean, you know,  
8 there could be misclassifications. There were calls that  
9 border line and the two methods -- the methods that were  
10 done were not fully consistent with each other. And so  
11 there was this whole sort of resolution process where  
12 things, you know, sort of decisions about where to place  
13 chemicals.

14 But -- and then there's the question of, okay,  
15 you know, how -- we realize we were spending quite a bit  
16 of time on this and that it could become an endless  
17 do-loop for an agency. You know, if an agency is trying  
18 to form classes and subclasses, and then putting them out  
19 for comment, and then somebody saying, no, this should be  
20 in this class and that should be in this class, and then  
21 you get a little more data, and then you reclassify. And  
22 you might never actually do an assessment, if you're in  
23 this endless classification and reclassification.

24 And so there were -- actually, the language in  
25 the report saying avoid -- you know, once you settle on

1 your classes avoid reclassifying, at least until later in  
2 the process. Once you're, you know, down into the hazard  
3 assessment and you start -- you know, if you find  
4 discordant data, you might have to reclassify some at that  
5 point, but don't just kind of keep doing the exercise.

6 CHAIRPERSON SCHWARZMAN: Go ahead and then Carl.

7 PANEL MEMBER LUDERER: Thanks, Gina. That was a  
8 really great talk. My question is actually about the  
9 discordant data. And maybe this is, you can't say in  
10 general, necessarily. But, in general, were the  
11 discordant data among different chemicals within the class  
12 or even, you know, for same the chemical that you had a  
13 lot of discordant data or did both occur?

14 DR. SOLOMON: It was mostly different chemicals  
15 in the same class. That was what was so problematic about  
16 it from our perspective. It was that you, you know, have  
17 two chemicals that were in the same subclass that would  
18 have very -- you know, they had very different outcomes  
19 in very -- sometimes in the same study. So there were a  
20 number, for example, of zebrafish studies that looked at a  
21 whole bunch of different flame retardants. And they --  
22 you know, there were chemicals that were positive and  
23 chemicals that were negative. And sometimes those had  
24 been placed in the same class, so that was -- you've got  
25 the same lab, the same method, the same study, different

1 findings. Can you still class them? It's a question.

2 PANEL MEMBER LUDERER: A follow-up. I mean,  
3 another benefit though of this, even in that situation, if  
4 you're looking more chemical by chemical, is taking into  
5 account all of these data that are not the traditional  
6 toxicology data, you know, animal bioassays, et cetera,  
7 and really taking -- making use of all those mechanistic  
8 data that haven't traditionally been used as much in  
9 hazard identification.

10 CHAIRPERSON SCHWARZMAN: Carl.

11 DR. SOLOMON: Yeah. I think that came through in  
12 the report loud and clear, that -- and it was -- and  
13 that's going to -- it's a big shock to CPSC, because I  
14 think they have been a little bit not as -- not as much  
15 sort of at the forefront of adopting current methods,  
16 either in risk assessment or in toxicology.

17 So when they briefed us on their risk assessment  
18 methods, it was, you know, sort of consistent with how  
19 things were done here quite some years ago.

20 PANEL MEMBER CRANOR: Thank you, Gina.

21 I think this is a great idea. And there may be  
22 some ideas that can be borrowed from other fields that  
23 help here. The National Academy took up some of their new  
24 tests in November of 2017, I think, and it was just a  
25 workshop. It wasn't a publication. But there, I talked



1 and suggested some ideas you can borrow from the law to  
2 help organize this.

3           So in the law, the idea of a presumption is used,  
4 that you have a social goal that you may want to  
5 accomplish or a social goal you don't want to contravene.  
6 And then you use that to organize your law, unless there's  
7 evidence to the contrary. There's a rebuttable  
8 presumption.

9           But, in effect, that's already been used in the  
10 sciences. I think of a paper by Ron Melnick on epoxides.  
11 He says, boy, we've got, you know, 5 or 6 of these that  
12 are really carcinogenic. We don't know anything about the  
13 rest of them. He, in effect, said, let's presume or  
14 consider a default that the rest of them are pretty toxic,  
15 unless there's evidence to the contrary. And so this idea  
16 can be used to help organize this thought. So one  
17 suggestion, comment about something you said, if a  
18 substance causes reproductive problem in zebrafish but not  
19 in animals, it seems to me it's a bad idea to cause  
20 reproductive problems in anything.

21           And so that may put it on a warning list to  
22 organize -- help organize the thoughts. And so just a  
23 suggestion that I've already talked about at an event that  
24 might help.

25           DR. SOLOMON: Yeah. And our option 1, if the

1 data are discordant is to make a decision to extend the  
2 most conservative conclusion regarding hazard to the  
3 entire subclass. So that is -- was recognized as being a  
4 potentially viable approach, though it is more of a policy  
5 than a -- you know, it's more a policy decision.

6 PANEL MEMBER CRANOR: Right. Well, you -- in  
7 both regulatory law and science, sometimes those  
8 presumptions are -- well are often called defaults. And  
9 they have may be based on the science or they may be based  
10 on the policy. So, for example, linearized extrapolations  
11 is maybe largely policy. You don't want to underestimate  
12 the risks to subpopulations and so forth. So you've got  
13 two things in play there, if you keep it in mind.

14 CHAIRPERSON SCHWARZMAN: One thing I was hearing  
15 with that is that the epoxides example you give is where  
16 there's already an established class, right? And so  
17 that's making --

18 PANEL MEMBER CRANOR: There was some -- I think  
19 there was some things on his list that somebody said were  
20 not -- were not epoxides, but they were derivatives of  
21 benzene, for example. So there were some surprises, but  
22 he had a dozen.

23 MS. HOOVER: Carl.

24 PANEL MEMBER CRANOR: I'm sorry.

25 CHAIRPERSON SCHWARZMAN: Joe, did you have a

1 question or a --

2 And I just wanted to alert everybody that we have  
3 a discussion that follows this. So there will be lots  
4 more chance for discussion too, but please.

5 MR. CHARBONNET: Oh, well, maybe this is better  
6 for then than now.

7 So Joe Charbonnet, Green Science Policy.

8 My question relates to a lot of what's been  
9 talked about. And I'm wondering if you, Gina, or anyone  
10 is thinking about the EPA's recent move towards getting  
11 away from animal testing and eventually phasing it out.  
12 And a lot of that is being framed as animal wellness, but  
13 FOIA emails recommend there may be ulterior motives, and  
14 how could a dearth of in vivo data influence our ability  
15 to get concordant data around classes, and their behaviors  
16 in biological systems?

17 DR. SOLOMON: Well, my two cents on that is that  
18 I feel that the issue of concordant versus discordant data  
19 and the issue of animal testing versus higher throughput  
20 approaches might be more separate, because you can end up  
21 with discordant data in any kind of toxicology platform or  
22 concordant data in any kind of toxicology platform. And  
23 in fact, the high-throughput data can give you a little  
24 more insight into mechanism and things where you're able  
25 to get a better -- maybe better sense of what's going --

1 actually going on that might explain any discordance.

2           So -- but in terms of the phasing out of animal  
3 testing, it's -- yeah, that's something that's a longer  
4 term issue. And I think it's something that there's not a  
5 consensus on, but, you know, the Toxicity Testing in the  
6 21st Century Committee sort of helped launch this type of  
7 approach towards using more high-throughput testing. But  
8 there's plenty of language in that report that says we,  
9 you know, shouldn't be getting rid of animal testing  
10 certainly any time in the foreseeable future, because  
11 there's all kinds of really useful information that's  
12 provided in -- that -- you know, I can't speak for EPA's  
13 reasoning there, because it -- there's a lot of obvious  
14 gaps, as -- there have been a few studies that have come  
15 out from OEHHA and also DPR looking at some of the  
16 platforms like ToxCast and finding major holes. So until  
17 those are addressed, it wouldn't make sense to move away  
18 from animal testing for sure.

19           CHAIRPERSON SCHWARZMAN: Thank you. We can  
20 continue this conversation -- did you have a question for  
21 Gina?

22           PANEL MEMBER FIEHN: Yes.

23           CHAIRPERSON SCHWARZMAN: Okay. Great. We have a  
24 minute.

25           PANEL MEMBER FIEHN: Oliver Fiehn.

1 I wondered about the surprise of having  
2 discordant data between zebrafish and rodents. Obviously,  
3 the environments, the developmental stages, many things  
4 are very different. And that is true for any model  
5 system. There are model systems usually used for some  
6 purpose or another.

7 And, you know, I would biologically expect that.  
8 You know, the rodents -- or even within the rodents, there  
9 are mice, and, you know, rabbits, and there's like rats,  
10 and so on. They're all -- guinea pigs. They're all  
11 different. And you wouldn't even have -- they have  
12 discordant data, even if it was just rodents.

13 So the question really is have you ever discussed  
14 weighting of priorities within the hierarchies of data  
15 that allow risk assessments?

16 DR. SOLOMON: Good question. We didn't in the  
17 Committee. You know, historically, in toxicology, rodent  
18 data has tended to be the gold standard for whatever  
19 reasons. And, you know -- and in the situation with the  
20 organophosphate flame retardants, actually the rodent data  
21 were much -- much more tended to be negative than the  
22 zebrafish data.

23 And we as a committee were not totally sure that  
24 we believed the -- you know, all the rodent data are  
25 considered a gold standard. We weren't sure we believed

1 those studies more than the zebrafish studies. And so we  
2 didn't try to sort of come to any kind of weighting or  
3 hierarchy of conclusions.

4 But that could be done in the next phase. We  
5 basically -- our charge was very much to come up with an  
6 approach. And then actually, in some ways, you know,  
7 piloting the approach wasn't even required, but we thought  
8 that it would be helpful to show all the steps. And so  
9 the, you know, follow-on efforts are going to have to  
10 really get into those kinds of questions about, okay, if  
11 you truly have discordance, what are all the things to do?

12 And we came up with a set of sort of basic  
13 options, but there are a lot of suboptions under those,  
14 with a lot of detail, like especially option 3, which is  
15 performing analyses to explain the discordance could also  
16 involve, you know, coming up with, you know, decisions  
17 about how to weight certain studies over others.

18 CHAIRPERSON SCHWARZMAN: Gina, thank you so much.

19 DR. SOLOMON: Thank you.

20 CHAIRPERSON SCHWARZMAN: Really appreciate that.

21 So the next thing on our agenda is a discussion  
22 session that leads us up until the break, where we get to  
23 think about flame retardants. And Sara Hoover is going to  
24 introduce this discussion session. She's Chief of the  
25 Safe Alternatives Assessment and Biomonitoring Section of

1 OEHHA, and she'll introduce what we're going to do here.

2 (Thereupon an overhead presentation was  
3 presented as follows.)

4 MS. HOOVER: Hi, every -- hello, everyone. Thank  
5 you so much for the amazing talks. I'm so impressed and  
6 it's been really fascinating.

7 The purpose of this little intro is not to  
8 constrain any discussion, but just to give ideas for  
9 prompting discussion, if we need them. So you can  
10 consider anything from the morning or the afternoon with  
11 regard to the FREES presentation, the UCD presentation,  
12 and Gina's presentation. So just some ideas about things  
13 you can think about that would be potentially helpful to  
14 the Program.

15 If you think about the earlier presentations on  
16 FREES biomonitoring results and UCD's study of dust and  
17 furniture, are there any particular findings that you'd  
18 like to highlight? So thinking about the work that was  
19 presented. We could think about some of the lessons  
20 learned from conducting this type of pretty complex  
21 intervention study and what that might imply for the  
22 Program going forward.

23 Are there any initial recommendations for  
24 reducing exposures to flame retardants that might be drawn  
25 from the preliminary results? And as we heard, you know,

1 there's a lot more analysis to be done. So do you have  
2 any suggestions for additional data analysis that might  
3 help inform the concept of getting recommendations out of  
4 the study?

5 With regard to chemical selection, so Gina talked  
6 about this work that Gail and I worked on with Gina.  
7 Actually, she was a big motivator for the class work that  
8 we did. On the current list of designated chemicals for  
9 the Program, we include a number of flame retardant  
10 classes. Brominated and chlorinated organic compounds  
11 used as flame retardants, the entire class of those. We  
12 also have the entire class of non-halogenated aromatic  
13 phosphates. Those are not limited by their function as  
14 flame retardants. It's the entire class, including any  
15 function.

16 One was recently added, a non-halogenated,  
17 non-aromatic flame retardant, an OPFR, that's measured by  
18 CDC. So given what's on the list already, are there any  
19 other classes of flame retardants that you might want to  
20 point us to to consider. And one obvious example here is  
21 capturing all OPFRs and not just the aromatics.

22 --o0o--

23 MS. HOOVER: In terms of future biomonitoring  
24 efforts, this is something that Gina raised as a possible  
25 topic. So as I just said, the class that we have on the



1 list, the brominated and chlorinated class, was  
2 intentionally broad. We made it as broad as possible to  
3 capture every possible member. But as Gina was just  
4 talking about, there's value in potentially looking at  
5 subclasses. So should we look at subclasses? Is there  
6 any value in us trying to look at methods for specific  
7 subclasses of organohalogen flame retardants. And I'm  
8 talking about biomonitoring methods.

9 And do you have any input on what the Program  
10 should prioritize going forward for future biomonitoring  
11 studies of flame retardants? And I will put a caveat on  
12 all of this. This is not related to resources. This is  
13 related to conceptually what would be important to do,  
14 given adequate resources.

15 So over to you, Meg, and feel free to use any of  
16 these questions or just have an open discussion.

17 CHAIRPERSON SCHWARZMAN: Thank you.

18 I just want to ask first of all, does anyone want  
19 to see these slides again? I thought they went pretty  
20 fast.

21 MS. HOOVER: Sure. You can refer to them.  
22 They'll stay up and you can refer back to them.

23 And now I'm telling everyone to use the mic.

24 (Laughter.)

25 MS. HOOVER: In answer to your question, I was

1 intending that we can leave these slides up. You can ask  
2 Russ to move them back and forth as needed. And if, yeah,  
3 you want to go through them slowly now, that would be  
4 fine.

5 CHAIRPERSON SCHWARZMAN: I feel like I need a  
6 little bit more time with the questions. Is that only me?

7 Everyone wants a little more time with the  
8 questions. So maybe we could just leave each slide up for  
9 couple minutes and then we'll give everybody a chance to  
10 have some thoughts before we jump right into discussion.

11 Maybe you could move to the next slide.

12 Thanks.

13 MS. HOOVER: Let me just add, you don't have to  
14 memorize this one. You have the designated list in your  
15 packets and it's also on the table.

16 (Laughter.)

17 CHAIRPERSON SCHWARZMAN: Okay. Maybe it's  
18 reasonable to start a discussion, at that point. Thank  
19 you for the extra time.

20 One thing that I'm reflecting on just to start  
21 the conversation is an issue that Gina raised in  
22 presenting the NAS report, which is there are many ways to  
23 think about a class, right? And one of them that we're  
24 talking about here is use-specific. We're looking at the  
25 chemicals that are used in a particular application, which

1 they'll have some chemical similarities, because they're  
2 used to accomplish the same function, but they -- there  
3 may be huge heterogeneity in the -- in every other aspect  
4 of chemical structure, and performance, and biological  
5 effects, and all of that.

6 And that, you know, what Gina was raising is that  
7 you can't really do hazard assessment around a class of  
8 chemicals that are organized by a function. And that you  
9 have to do some finer subdivision about that. And if I  
10 understand this discussion right, a lot of the questions  
11 here are focusing around the actual function of looking at  
12 flame retardants, chemicals used as flame retardants.

13 And so I just kind of wanted to highlight that,  
14 because I think it's a complexity of the conversation of  
15 when we bring the FREES study results together with this  
16 idea about thinking about chemical classes, which is more  
17 structural and biological function than it is performance.  
18 That is the chemicals are grouped biological effect and by  
19 structure, not because of what they do in the world.

20 And that point was underscored also earlier with  
21 the OPFRs showing up in the dust, and biomonitoring  
22 studies, and how hard it is to tease apart the -- you know  
23 we may not be seeing some of the effects that we would  
24 expect to see with furniture replacement, because of the  
25 diversity of sources of exposure to those chemicals.

1 I'm not making one point here.

2 (Laughter.)

3 CHAIRPERSON SCHWARZMAN: I'm sort of  
4 complexifying the conversation which may or may not be  
5 helpful. But I just wanted to acknowledge those few  
6 underlying tensions.

7 MS. HOOVER: Yes. I will second those  
8 complexities. And I just want to clarify, you do not have  
9 to slavishly stick to talking about classes of flame  
10 retardants. And, in fact, that was something that Gail  
11 and I confronted with the non-halogenated aromatic  
12 phosphates, we specifically did not tag those as flame  
13 retardants, because we felt like some of their other uses  
14 were more significant.

15 Currently, we have this new tiny category --  
16 well, the other complexity on our list is we defined the  
17 group. We specifically called it not a class. The group  
18 of brominated and chlorinated organic compounds used as  
19 flame retardants, we're very well aware that it's not a  
20 chemical class. That's many, many chemical classes.

21 In that are also halogenated phosphates. So we  
22 have OPFRs that fall into that, because they're  
23 chlorinated, for example. Now, we have a new category,  
24 because CDC started measuring organophosphate flame  
25 retardants. That's the group they defined. And then they

1 added, you know, one that we don't have, which is one  
2 that's not chlorinated.

3           So I think that -- I mean, one of the reasons I  
4 posed the question about chemical selection is just that  
5 we're always interested. And I know the panel is always  
6 interested in emerging. You know, I think we've captured  
7 a lot just with OPFRs. We don't have all the OPFRs for  
8 sure. So that's one example.

9           We wouldn't necessarily have to define them as  
10 OPFRs, but are there chemicals of interest that we're not  
11 capturing?

12           CHAIRPERSON SCHWARZMAN: Great. So any other --  
13 more defined comments?

14           Oh, Joe, did you have something you wanted to  
15 add?

16           MR. CHARBONNET: Joe Charbonnet with Green  
17 Science Policy. I'm sure our stenographer is really  
18 appreciating having to spell my last name three times  
19 there.

20           (Laughter.)

21           MR. CHARBONNET: Just on the subject of  
22 designating emerging flame retardants, I'd really love to  
23 see a lot more work on the polymeric flame retardants. I  
24 think that's the direction that the industry is moving in  
25 a lot of ways with flame retardants, and there's very,

1 very little study done on them.

2 We know that, you know, at least in their  
3 polymeric state, of course, they're -- they're less  
4 likely -- they're less bioavailable. But what little  
5 research has been done shows that they break down. And  
6 seeing the increasingly high production volumes and  
7 diverse uses of these chemicals when they first came out  
8 in polystyrene insulation, but they're going other places  
9 too. And no one is thinking about these.

10 And not to say that PBDEs aren't important.  
11 Certainly, they are. But these are the things that are  
12 going to be poisoning my children. And maybe, you know,  
13 if we could think a little bit more about them and less  
14 the things that poisoned my parents.

15 (Laughter.)

16 MS. HOOVER: Let me just ask you a clarifying  
17 question. When you say the polymeric flame retardants,  
18 can you give a few specific examples of what you mean by  
19 that?

20 MR. CHARBONNET: Yeah. So the ones that seem the  
21 most used right now is kind of commonly called polyFR.  
22 It's polystyrene -- or it's styrene, butadiene, polymer,  
23 brominated.

24 MS. HOOVER: Brominated is captured.

25 MR. CHARBONNET: Yeah, so it is. But the

1 polymers are different in a lot of ways too. So that's --

2 MS. HOOVER: I hear you and I think what you're  
3 saying is you want to see more study of it and more  
4 highlight. What I'm saying is partially because of how we  
5 define the class, we've captured that one already, so it's  
6 on our list.

7 So the other thing I should clarify for people  
8 who are just looking at our list, we have the group and we  
9 have footnotes, and it indicates whether it's the entire  
10 group or just those listed. So on the list of brominated  
11 and chlorinated, we don't have everything on the list, but  
12 everything is included, whether or not it's on the list.  
13 So you can feel some reassurance based on that, we've got  
14 some of those.

15 MR. CHARBONNET: All right.

16 CHAIRPERSON SCHWARZMAN: But there is this  
17 difference between what's designated versus is there any  
18 study looking at it?

19 MS. HOOVER: Right.

20 CHAIRPERSON SCHWARZMAN: So you're asking a  
21 question about designated chemicals, which enables  
22 biomonitoring to look at them, but it doesn't mean that  
23 there will be a study looking at it, but we're allowed to  
24 recommend that.

25 MS. HOOVER: Yeah.

1 CHAIRPERSON SCHWARZMAN: So that kind of gets to  
2 that point.

3 Veena.

4 PANEL MEMBER SINGLA: Yes. I'd just add to the  
5 comment about the polymerics that there's -- as far as I  
6 know, there's not even methods developed for biomonitoring  
7 for polymerics. Very little is known even about potential  
8 exposure patterns. So I think that's certainly an  
9 emerging area.

10 And the other comment I wanted to make was  
11 related to the morning's discussion about one of the  
12 potential priorities for the Program looking at regulatory  
13 efficacy and thinking about the replacement -- PBDE  
14 replacement flame retardants. And I think what we saw  
15 with the results from the FREES study is that with some of  
16 these replacement flame retardants that are more  
17 short-lived like the organophosphate flame retardants and  
18 have a multitude of other uses, the exposure patterns are  
19 quite complicated.

20 So thinking about if there is a way to look at  
21 the California flame retardant ban that's going to be  
22 coming into effect in 2020, that would be targeting a lot  
23 of those replacement flame retardants and furniture,  
24 children's products, mattresses, and is there a way to  
25 potentially measure efficacy of that policy, you know,



1 looking at time trends?

2 We were able to see it with PBDEs, because of the  
3 kinds of chemicals they are and the particular uses. Is  
4 there a way we can try to look at that with the new flame  
5 retardant ban that's going to be coming into effect  
6 knowing that the exposures are a lot more complicated.

7 DR. WU: Well, of course, a great way to be able  
8 to look at the regulatory efficacy would be to have a  
9 surveillance program --

10 (Laughter.)

11 DR. WU: -- which was robust enough to include  
12 things like OPFRs. And we've always wanted to include  
13 additional analytes. But as we discussed this morning,  
14 we're kind of going in the wrong direction.

15 But that is, I mean, just another argument for  
16 having surveillance. I mean the targeted stuff is great,  
17 but we can't -- we don't have anything to compare it to,  
18 unless we have baseline data.

19 CHAIRPERSON SCHWARZMAN: Yeah, please.

20 PANEL MEMBER LUDERER: And actually the comment  
21 that I was going to make was very similar to that, was  
22 sort of in response to this -- the question about  
23 recommendations for interventions from the flame retardant  
24 study results that we've seen so far. And, to me, you  
25 know, I think the thing that was striking, and I think

1 that -- you know, that your comment just refers back to it  
2 is really showing the benefit of these like larger  
3 societal level interventions. You know, we could see the  
4 secular trend and the decline in PBDEs in the comparison  
5 population as well, you know.

6 And so that is a, you know, I think a plea to,  
7 you know, to continue doing, you know, the surveillance  
8 type of measurements. And even on some of those older  
9 compounds that we may think are no longer a problem just  
10 to be able to continue showing the benefits of those kinds  
11 of regulatory interventions.

12 DR. WU: Yeah, absolutely. I think also the  
13 FREES slides when Kathleen was showing the comparisons and  
14 levels between FREES and the IPP group, and NHANES from  
15 like 2003/04 is the last cycle. And we don't have  
16 California-specific data. And we all know that California  
17 looks different in terms of flame retardant exposure.

18 So without California-specific data, yes, we  
19 would turn to NHANES, but it's a really imperfect  
20 comparison.

21 CHAIRPERSON SCHWARZMAN: Maybe this is a moment  
22 for me to ask you, Nerissa, because one of the things that  
23 was coming up for me as we have this conversation that we  
24 don't want to have about the tradeoff between surveillance  
25 and more targeted studies. So just to acknowledge, we'd

1 like it all, because there's separate and very important  
2 roles for each.

3 But one of the things that I was running up  
4 against with the surveillance is that because of previous  
5 limitations, our current surveillance is like just the  
6 CARE Study even unaffected by the lack of CDC funding is  
7 like stretching over eight years. And the kinds of  
8 changes that we see over eight years in population trends  
9 in biomonitoring can be pretty dramatic. And I just  
10 wondered if you have any reflections on that.

11 DR. WU: It was -- it was our goal, when we set  
12 up CARE, that it would be scalable. In fact, the first  
13 description we wrote of the CARE Study was that we would  
14 have these eight regions, but be able to conduct  
15 biomonitoring in eight regions over two to three years,  
16 because we're really aware of not only that these trends  
17 happen, you know, faster than the eight-year cycle might  
18 be able to portray, but also because there are these time  
19 trends that are then introduced, which really limits our  
20 ability to do any kind of geographic comparison.

21 So we went into it hoping that we would be able  
22 to demonstrate the value and the need to accelerate the  
23 coverage of the CARE study from an eight-year cycle down  
24 to a three-year cycle. The eight-year cycle, I will say,  
25 even though it is imperfect and seems so slow, is like

1 killing our staff to try to even complete that kind of  
2 work. It's -- we're in three different regions right now  
3 and it's the same people doing the field work, and the epi  
4 work, and the outreach work. And so, it just -- it's so  
5 important to recognize how rigorous this work is and to do  
6 it well, to do the field work well, and the recruitment  
7 well in a way that we get representative participants. It  
8 is so labor intensive. And so, even to keep CARE at the  
9 level we are at, we just need more funding to do it well.

10 CHAIRPERSON SCHWARZMAN: Thank you.

11 Jenny.

12 PANEL MEMBER QUINTANA: We talked in the past a  
13 little bit about trying to do surveillance using  
14 previously collected samples throughout the state, and,  
15 you know, there's breast milk banks at all hospitals, and  
16 there's the -- you know, the alpha-fetoprotein blood  
17 samples, and there's all these things that we hadn't  
18 really explored very much, because of laboratory needs for  
19 a really nice sample collected in a nice tube, and -- but  
20 I'm wondering if we should be thinking about those again,  
21 because they're already collected and a lot of data is  
22 available, and could be chosen to be super representative,  
23 or if you had any discussions about that kind of thing.

24 DR. WU: So I think you're referring to the MAMAS  
25 study, which we started, looking at the maternal -- the

1 archived samples from the prenatal screening biobank. And  
2 that is still a resource that we would like to take  
3 advantage of. It's pregnant moms.

4 About 70 percent of pregnant women in California  
5 come in for prenatal screening through our Genetic Disease  
6 Screening Program. And that is a resource for things  
7 like -- we've talked about using it for some of the new  
8 PFASs or some of the new -- maybe some non-targeted  
9 screening where returning of results would not be a  
10 concern, and where it's kind of on the cutting edge of new  
11 emerging chemicals of concern.

12 It is difficult, because we have very little  
13 information on the participants themselves. There's very  
14 little information available to us on the demographics.  
15 And we have no information on the exposure from those  
16 people, so we don't -- we can't really say very much  
17 about, you know, where they might be exposed or what  
18 population they represent.

19 The other thing is that the samples are gathered  
20 for hormone -- hormonal and protein analyses and not for  
21 environmental sampling. So we can't use them for metals,  
22 because there's metal contamination in the serum separator  
23 gel. It's a very small volume that's left over, so there  
24 are very few analytes that we can actually look at in it.

25 There are a number of other -- yeah, it's only

1 women of reproductive age, which I know is a population of  
2 concern. And it is fairly thorough coverage of  
3 California, but it doesn't get to -- I mean, it doesn't  
4 get to reflection of our overall population, which is a  
5 goal of our surveillance.

6 PANEL MEMBER QUINTANA: So I guess my comment was  
7 more general, should we spend more time looking at  
8 everything like that there is and deciding what could be  
9 done? Because it's so expensive to get samples, it might  
10 be cheaper to do four times as many samples with less  
11 information about the person than, you know, fewer  
12 samples, with lots of information about the person. I  
13 don't know. I'm just brainstorming here.

14 MS. HOOVER: This is Sara again. I just wanted  
15 to give a pitch for the CARE study, regardless of the time  
16 scale. And we're already using that data on metals. So  
17 metals, you know, has been very interesting in terms of  
18 looking at different populations and the different  
19 exposures. Yes, there can be time trends, but you can  
20 also see differences regardless of time. So it's been  
21 incredibly valuable already to have CARE L.A. data to  
22 compare it to a firefighter's study, to compare it to the  
23 ACE Project results, which, breaking news, those will be  
24 posted all on our website probably in the next week, which  
25 you heard about at a past SGP meeting.

1 But, I mean, to me, I understand what everyone is  
2 saying about the limitations and the costs, but it's our  
3 fundamental mandate. And it's a really high priority for  
4 DPH, and it's -- you know, it's the major mandate of the  
5 law. So we're still going to keep plugging. And I still  
6 think there's great value. In spite of the difficulties  
7 with CARE, we've already seen that value.

8 Also, we get inquiries now about people wanting  
9 to join the CARE Study. So that's another thing. It's  
10 been a real presence for the program across the state.

11 PANEL MEMBER QUINTANA: My last comment. Sorry.

12 But I think we're skewing towards educated  
13 people. I mean, it's valuable, but I'm not sure it really  
14 represents the state in a way that was anticipated for the  
15 State.

16 MS. HOOVER: No, I mean, like we said, we hear  
17 you. We understand the limitations. And basically, I  
18 mean, I just have to give a plug to Nerissa, because the  
19 reason why we even have any of this is because of her  
20 creativity and how do we do something with -- we don't  
21 have a 10 million -- we don't have the program that was  
22 envisioned. We do not have a California HANES. We cannot  
23 afford a \$10 million program. So what can we do?

24 And with all of the limitations, we still are  
25 getting value out of it. So that's not to say we're not

1 doing targeted studies. We are. So we're continuing on  
2 targeted studies as well. You're going to hear more about  
3 that in November, some of our new work with AB 617  
4 communities.

5 So, yeah, I mean, we could talk about this all  
6 day, so we can move on from it. But we hear you, but I  
7 think we -- there's still a lot of value in it.

8 DR. SHE: One comment regarding evaluate the  
9 efficacy of regulation policy on the reduce of the --  
10 comment on the evaluation of the efficacy of the  
11 regulation policies on the chemical exposure.

12 I think given the fact that California do not  
13 have so much resource, we do need to consider the  
14 paradigms. Do we need to always do the individual  
15 samples? You can pool it. Otherwise, like Dr. Meg  
16 mentioned, if you did eight years, you still do not have a  
17 foundation on the same years after you did eight CARE  
18 regions. I think the paradigm switch, especially for  
19 persistent chemicals. Maybe use pooled strategies, as  
20 long as you do very little samples, but you pooled, maybe  
21 give you more information than we try to do with an  
22 individual.

23 So each paradigm, we're supposed to address  
24 different questions. CDC already do the pooled samples on  
25 dioxin-related compounds. That may be one option for the



1 Program to consider.

2 CHAIRPERSON SCHWARZMAN: Veena.

3 PANEL MEMBER SINGLA: I want to go back for a  
4 minute to PBDEs, because, you know, certainly agree that  
5 thinking about emerging and replacement flame retardants  
6 is super important. But unfortunately, the reality is  
7 PBDEs are still -- we are still all exposed to PBDEs, and  
8 they're not going away. And that a lot of the indications  
9 we have is that in the life cycle, as more and more  
10 PBDE-containing products go to landfill and disposal, that  
11 communities near those disposal sites could be exposed.

12 So I think that's a -- thinking about the PBDEs  
13 lifecycle and understanding that better, and which  
14 communities and populations may be vulnerable to those  
15 exposures would be important.

16 And somewhat related to that too is with more  
17 flooding, and fires, and natural disasters, what we're  
18 seeing in other places is persistent contaminants  
19 mobilized by those natural events. And so that might be  
20 another angle to consider with PBDEs and some of the  
21 persistent flame retardants. And also trying to  
22 understand flame retardant combustion byproducts, because  
23 there's a lot of concern when these products burn in these  
24 fires about brominated dioxins, and furans, and other  
25 toxic combustion byproducts that could be produced.

1           And my third thought about priorities for flame  
2 retardant studies would be to focus on infants and  
3 children as a population, where we know there's higher  
4 exposure patterns with PBDEs and some of the replacement  
5 flame retardants. So to understand if -- if we're  
6 continuing to see that pattern and if some of the policy  
7 interventions may be addressing some of those exposures  
8 with children's products potentially being a source of  
9 some of the high exposures.

10           CHAIRPERSON SCHWARZMAN: I want to pause for a  
11 second and see if there's public comment, either cards or  
12 on-line?

13           MR. BARTLETT: Just give me a second. We're  
14 checking. I'll flag you if there are.

15           CHAIRPERSON SCHWARZMAN: Okay. Other discussion  
16 points. We have a little more time before we have to move  
17 on to our next -- yeah, Gina, please.

18           DR. SOLOMON: This really relates to this -- this  
19 relates to the question about whether the Program should  
20 develop methods for specific subclasses of organohalogen  
21 flame retardants. In some ways, I'm thinking about it a  
22 little bit more broadly, which is that what the SGP has  
23 tended to do is, you know, boldly move forward which has  
24 been great, and designate, and prioritize entire classes.

25           But then there is this gulf - and, Meg, you

1 pointed this out - that, you know, between what is then,  
2 you know, the entire class that's identified and then what  
3 actually gets biomonitored in the end. And that's defined  
4 by the resources, the available lab methods, all kinds of  
5 different limitations.

6 But, you know -- and again, this is in an ideal  
7 world, if we were able to find more resources for it. It  
8 does seem like there could be a role potentially for this  
9 panel in looking -- you know, in revisiting periodically  
10 some of the broad groups of chemicals, and thinking about  
11 what do we know? You know, are some of these that are  
12 already on the list coming up, because we think that their  
13 use may be increasing. You know, is there something that  
14 would make us, you know, flag specific chemicals or  
15 subgroups of chemicals within these -- this larger  
16 grouping to kind of try to push those forward, get a  
17 little bit more attention to them?

18 And so I guess I'm just sort of wondering about  
19 whether there is a role to -- at this point, to reflect a  
20 little bit back on some of the big chemical classes or  
21 groups, and see if -- see sort of what we've learned and  
22 what we might have just sort of left behind that we might  
23 still need to learn instead of kind of saying, oh, yeah,  
24 that group is on the list, we're good. Because we might  
25 not be. Just a thought.

1 MS. HOOVER: And I also want to say - this is  
2 Sara again - Gina give us some good ideas about taking the  
3 information from the NAS report. So actually Russ and I  
4 have been working on looking at all the information in the  
5 NAS report, seeing if there's flame retardants that we  
6 should capture that are not specifically listed, so to  
7 highlight more. We did some of that back in February, but  
8 we're looking at that again. We're also making a list of  
9 the subclasses from NAS and which of the few that we do  
10 measure, which subclasses they fall into. So we are doing  
11 some of that work and we can share that when it's ready.

12 CHAIRPERSON SCHWARZMAN: And is that -- Sara, are  
13 you talking about designated chemicals or chemicals that  
14 have been in one or more studies?

15 MS. HOOVER: I'm talking about both actually.  
16 I'm talking about analyzing the designated list. So one  
17 of the filters that we've used for highlighting chemicals  
18 is we try to pick either well-known chemicals, you know,  
19 legacy chemicals that are important, chemicals that are  
20 currently produced and in use. So we don't -- you know,  
21 we don't list thousands of chemicals, even though there  
22 are thousands potentially in the classes.

23 So we're taking another look at the NAS chemicals  
24 to potentially add more just to highlight them on the  
25 list. But we're also looking at the current lab methods

1 available in ECL, for example, and what flame retardants  
2 we're currently measuring, and what classes they fall into  
3 by the NAS subclass classification.

4 CHAIRPERSON SCHWARZMAN: With the idea, if I  
5 could extend that just for a moment, that you might  
6 identify some subclasses that are not really very well  
7 represented in the --

8 MS. HOOVER: There's going to be a lot. Yeah, I  
9 mean, there's going to be a lot. Because the list of  
10 analytes that we measure is relatively small compared to  
11 the large list of flame retardants and classes. And I  
12 think that an interesting -- and, you know, again, caveat,  
13 we're limited by resources; methods development is  
14 difficult. But maybe there will be an opportunity where  
15 we have methods for certain types and there's a similar  
16 class, and maybe it would be interesting and possible to  
17 add something on, pending additional resources.

18 I will throw in one other plug that hasn't come  
19 up that would be of interest for flame retardants, and  
20 that is more non-targeted screening. And this is actually  
21 an opportunity with State funding, because that was  
22 something that CDC did not fund, because it's too -- it's  
23 not surveillance and it's more research. So again, this  
24 would be a really -- and that's something that was  
25 actually highlighted in the letter that you worked on

1 about the importance of State funding in order to look at  
2 that kind of information.

3 CHAIRPERSON SCHWARZMAN: Other comments?

4 Yes.

5 PANEL MEMBER QUINTANA: Just following up on  
6 non-targeted analysis and what Gina said, I mean, it seems  
7 to me it could be -- that could be employed to see what  
8 things are up and coming, because they're being detected  
9 or have you had discussions about using it to prioritize  
10 what's going to be biomonitored?

11 MS. HOOVER: I'm sorry?

12 PANEL MEMBER QUINTANA: Using non-targeted  
13 analysis to help prioritize and identify chemicals that  
14 are perhaps being more commonly detected --

15 MS. HOOVER: Are you asking me a question or are  
16 you --

17 PANEL MEMBER QUINTANA: I am asking you a  
18 question.

19 MS. HOOVER: Sounds like a good proposal to me.  
20 Are you asking me what I meant by non-targeted?

21 PANEL MEMBER QUINTANA: No, I'm asking you if you  
22 had thought about applying the non-targeted analysis in  
23 order to help prioritize new flame retardants that are  
24 being used with more frequency or ones we've never seen  
25 before, things like that?

1 MS. HOOVER: Yeah, I mean, that's kind of always  
2 been our -- I mean, I think -- Gail and I have been  
3 talking about this topic for 10 years and how exciting  
4 non-targeted analyses would be for all kinds of reasons.  
5 And instead of us searching the literature, trying to  
6 watch for emerging chemicals, let's do some measurements  
7 and see what's emerging, so -- and you heard -- you may  
8 remember Sabrina's talk where they talked about some of  
9 the fluorinated, you know, non-targeted screening they're  
10 doing and all the fluorinated features they see. So that  
11 is -- we don't have all of those. You know, we're not  
12 covering all of those, so that could be a similar angle  
13 potentially on some of the flame retardants or some of the  
14 halogen -- you know, you'd see halogenated compounds.  
15 You're not going to be looking by function. But it could  
16 be a good way to look for what do we think is important.  
17 Are we seeing peaks that we want to go and try to target  
18 and identify?

19 CHAIRPERSON SCHWARZMAN: Go ahead.

20 PANEL MEMBER LUDERER: Yeah. I wanted to just  
21 circle back a little bit to the comment that you started  
22 out with about the class, as -- you know, based on use in  
23 addition to chemical structure versus this idea that, you  
24 know, for hazard identification, the chemical  
25 similarities, as well as biological similarities, I think

1 make a lot of sense, but then I think we need to think  
2 about that classes that are defined in different ways may  
3 make more sense for the different applications. You know,  
4 if we're talking about hazard identification versus, here,  
5 we're talking about biomonitoring and looking at exposure.  
6 And there, you know, if you think about, okay, flame  
7 retardants, these may be very different chemicals and, you  
8 know, maybe in structure, you know, obviously, but the  
9 exposures may occur together. And so it makes sense to  
10 group them as a class from that exposure perspective. So  
11 I think that they have different uses in different  
12 situations, you know, how you define your class. I just  
13 wanted to bring that up.

14 CHAIRPERSON SCHWARZMAN: One question I have  
15 about that for the Program is just I'm getting the sense  
16 that you're using the term "group" for things that are  
17 not -- wouldn't be chemical classes, is that right?

18 Other comments, or questions, or proposals,  
19 ideas, musings?

20 (Laughter.)

21 CHAIRPERSON SCHWARZMAN: Yeah.

22 MS. HOOVER: Just to bring it back maybe to some  
23 of the morning talks. We heard, you know, it's still very  
24 preliminary, but is there anything anybody wants to raise  
25 about the talks from this morning or any of the speakers



1 want to raise to say more about the work that we've  
2 already done, and what we can draw from it, and where we  
3 might want to go?

4 CHAIRPERSON SCHWARZMAN: I had one thought  
5 about -- I really, really appreciated the -- all of the  
6 work that went into both elements of the study, the dust,  
7 intervention and the biomonitoring elements of the study.  
8 And it's so interesting to get to see the results. And  
9 one of the things that stuck with me in a sense is the  
10 limitations of the hypothesis-driven research, which has  
11 to do -- which I think we're mainly seeing -- we see it  
12 less maybe with the PBDEs, because we know how those were  
13 used. They stick around long enough that we can get a  
14 good measurement.

15 But as we were seeing with the OPFRs for multiple  
16 reasons, but the primary ones being short half-lives and a  
17 diversity of exposure sources, that it's so much harder to  
18 understand what's happening in the data. It's so much  
19 harder to understand what's driving the changes you're  
20 observing either in the dust or in the people. And it was  
21 just making me think more about what are the right  
22 applications, or what environments, and what questions are  
23 best answered by an intervention study like that. Like,  
24 we're all enamored of intervention studies, because we all  
25 want to take a picture, make a change, and then take

1 another picture and see if it's change -- if what we  
2 expected to change, changed.

3 But when the second picture is really  
4 confusing --

5 (Laughter.)

6 CHAIRPERSON SCHWARZMAN: -- you know, we haven't  
7 necessarily learned much. And I -- it just underscored  
8 for me the importance of designing -- when looking at an  
9 intervention study, choosing your -- two things. One is  
10 choosing the relevant questions really carefully to make  
11 sure they're ones that can -- that will be answered well  
12 by an intervention study, partly looking at things like  
13 the half-life of the chemical, things like that. And then  
14 the other is making sure that the -- in a sense, the  
15 narrowness of the questions suits the narrowness of the  
16 study.

17 And the -- I think this is something we've talked  
18 about a lot already with the studies. The diversity of  
19 exposure sources of the OPFRs beyond flame retardancy  
20 applications makes it really hard to tell when you only  
21 remove one of the uses of the chemical, like that -- those  
22 chemicals are used for flame retardants, but they're used  
23 for many other things also. So you only remove the source  
24 that's the flame retardant and it's so much harder to see  
25 what's happening.

1           So anyway, it's a very sort of targeted like  
2 closely design -- narrowly designed study for a reason.  
3 But looking back on it, maybe the OPFRs weren't a great  
4 match with the intervention. And I understand why it was  
5 done that way. It makes perfect sense.

6           MS. HOOVER: Actually, I just want to throw a  
7 little pitch in here for the people who designed the  
8 study. This is not a surprise. This was very expected.

9           CHAIRPERSON SCHWARZMAN: Right. No, no. I'm  
10 not --

11           MS. HOOVER: So -- but actually for me the -- and  
12 I know --

13           CHAIRPERSON SCHWARZMAN: I'm not pointing out  
14 flaws. I mean in thinking about --

15           MS. HOOVER: No. No. No. I understand. But I  
16 kind of want to highlight that as a finding of the study,  
17 because just the fact that you do see all -- that all over  
18 the map, that's interesting. You know, that's interesting  
19 to show and to try to ferret out, well, what is going on  
20 here. In fact, that there were any changes seen in OPFRs  
21 is actually very interesting.

22           So it's not a surprise. And we knew, in a way,  
23 we always called FREES kind of a pilot. I was amazed and  
24 impressed with the results so far. And I think there's  
25 more to be pulled out of it. But that being said, it was

1 a very complex, difficult intervention. And I know  
2 Nerissa, and maybe Kathleen, have comments on how hard it  
3 was and how you would do things differently.

4 DR. WU: Well, I actually have a comment on  
5 intervention studies in general. And they are a great  
6 illustration of what we do, and why we do it, and how  
7 people can make -- they can -- how their shopping  
8 preferences or their personal choices can impact their  
9 exposures. It's really immediate, very visceral kind of  
10 piece of data you can give people. And that's great.

11 And as much as our work is to illustrate and  
12 inform and educate people about exposure, I think  
13 intervention studies -- sure, we should do a whole bunch  
14 of them. I mean, even if it's not cutting edge. I mean,  
15 there's been a lot of work done on pesticides when you eat  
16 organic, or the HERMOSA Study was great.

17 But I mean, repeating studies like that have a  
18 lot of value in terms of story telling. In terms of  
19 trying to figure out the larger exposure picture and  
20 answer the question of what can I do though, the FREES  
21 Study was -- there are lots of things that make it maybe  
22 not the greatest match for intervention. I mean, you want  
23 something that is quick, so people don't have to do the  
24 intervention over this really long period of time, because  
25 you're going to have people falling out of compliance.

1           It has to be something easy. Replacing your  
2 furniture is not as easy as, you know, having somebody  
3 bring you organic meals every day. It's just a -- it's a  
4 more difficult intervention. The long -- the short  
5 half-lives, of course, created a whole issue.

6           So, I mean, I think it's something to be mindful  
7 of that we should do studies like this, you know,  
8 resources allowing, to illustrate the point of our  
9 importance, but we also have to pick the right match.

10           I do want to -- I know Kathleen and Rebecca also  
11 presented their data with caveats and caution. I mean,  
12 what we don't -- we also don't want to be  
13 over-interpreting our data and coming up with a finding  
14 that says, look, this is something you can do. We don't  
15 really know that yet and we don't want to recommend people  
16 do something that is potentially expensive and burdensome  
17 to them when we don't -- when we're not clear on what the  
18 result of that is. So hopefully we'll know more about the  
19 results of these.

20           CHAIRPERSON SCHWARZMAN: I appreciate that and I  
21 would expand on it too to say that it's an excellent  
22 story, but I would add to that story it, of course, goes  
23 well beyond individuals, because when you change the flame  
24 retardancy standard, it -- you don't have to change out  
25 your couch, you know.

1 (Laughter.)

2 CHAIRPERSON SCHWARZMAN: If there's societal  
3 solutions that that points to also. When you, you know,  
4 ban a pesticide, then people don't have to make the choice  
5 between which food they're going to buy and make, right?

6 DR. WU: Sure. I think it was Carl who made that  
7 point earlier about individual recommendations versus  
8 societal. And we, as a State Program, are not in the  
9 position of lobbying or advocating for policy change. But  
10 biomonitoring is often the first kind of politicizing  
11 moment or awareness moment for people, where they're like  
12 why is it that I have all this stuff in my body? Why is  
13 it that I have to know all these names of chemicals when I  
14 go shopping for things? Why is it that there are all  
15 these chemicals in everyone's drinking water?

16 I mean those are questions that we want people to  
17 be asking. And the ability to return results to  
18 individuals, and this gets to the whole biobank and pooled  
19 sample thing, our ability to tell people their individual  
20 chemical story really feeds into that in a way that I  
21 think pooled and biobank samples can't do.

22 CHAIRPERSON SCHWARZMAN: Yeah, I think it's very  
23 useful for that. I just wanted to say it's also useful,  
24 even though that's not what you're setting out to propose,  
25 that other people get to take the data and say, look, we

1 could do something at a societal level that doesn't rely  
2 on people making these choices for themselves.

3 DR. ATTFIELD: I was going to return to your  
4 point about looking at this hypothesis-driven part of the  
5 intervention. And just to put it out there that we're  
6 actually going to have sort of expanded ability to look at  
7 other things, because, you know, there were more people  
8 than the 25 that made it to the 12-month point. We have  
9 more samples at zero. We have like more than 45 people  
10 who gave a sample in the comparison group. Maybe they're  
11 not all matched.

12 So we're going to be able to look at other things  
13 beyond just the hypothesis, perhaps ratios and  
14 relationships with the dust. I think -- I think beyond  
15 perhaps the sort of limits of the intervention hypothesis  
16 test, there will be other good lessons on biomonitoring we  
17 can learn.

18 CHAIRPERSON SCHWARZMAN: It's wonderful to hear.  
19 And I know what we heard today was like the first pass at  
20 the first analyses you were able to do. And so it will be  
21 exciting to hear all the subsequent layers.

22 It's time for our break, but I realize I've just  
23 said a lot. And so if anyone has any final thoughts,  
24 that -- and I can turn the mic over for a moment.

25 In that case, we'll take a break at this point.

1 Like I said before lunch, just stay mindful of the  
2 Bagley-Keene requirements and we will gather at 3:10.

3 (Off record: 2:55 p.m.)

4 (Thereupon a recess was taken.)

5 (On record: 3:10 p.m.)

6 MR. BARTLETT: If you could go ahead and sit down  
7 and, we'll continue.

8 Thank you.

9 (Thereupon an overhead presentation was  
10 Presented as follows.)

11 CHAIRPERSON SCHWARZMAN: Now, to hear our final  
12 presentation about the potential designated chemicals for  
13 future consideration.

14 So Shoba Iyer is a staff toxicologist in the  
15 Safer Alternatives Assessment and Biomonitoring Section of  
16 OEHHA. She'll present the preliminary screening of  
17 quaternary ammonium compounds for possible future  
18 consideration as designated chemicals. She'll also remind  
19 us of the chemical groups that were previously reviewed by  
20 the Panel, which could also be prioritized for  
21 consideration.

22 And the point of today's present -- discussion --  
23 so at a previous meeting we had requested this first  
24 screening. And the point of today's conversation after  
25 this presentation is to choose one preferably, or at least



1 a top two, recommendations from the Panel about which  
2 chemicals to proceed with for future consideration.

3 So I'm just underscoring that because  
4 panelists -- ears open, we're going to ask you for a  
5 decision about this.

6 Thank you, Shoba.

7 DR. IYER: All right. This is working.

8 Yes.

9 --o0o--

10 DR. IYER: So I'll repeat a little bit of what  
11 Meg just said. The purpose of this agenda item is to  
12 respond to the Scientific Guidance Panel's request for a  
13 preliminary screening of quaternary ammonium compounds or  
14 QACs. At the March 2019 SGP meeting, the Panel expressed  
15 interest in this class, noting that QACs are abundant,  
16 produced in large volumes, and have known health effects.

17 We'll be inviting Panel and public input on next  
18 steps, which could include future consideration of QACs as  
19 potential designated chemicals. The SGP could instead  
20 recommend that we follow up on another chemical class that  
21 was previously screened such as a class of pesticides.

22 --o0o--

23 DR. IYER: Just as background for our discussion  
24 today, these are the criteria for recommending designated  
25 chemicals, which framed our preliminary research on QACs.

1 As you all know, the criteria cover these areas shown on  
2 the slide. I'll remind you that these criteria are not  
3 joined by the word "and". For this preliminary screen, we  
4 focused our research primarily on the first criterion,  
5 exposure or potential exposure to the public or specific  
6 subgroups.

7 --o0o--

8 DR. IYER: In my presentation today, I'll provide  
9 a description of QACs as a class. I'll cover information  
10 we located on the potential for exposure, including:  
11 example uses and products; volume of use and environmental  
12 detections; I'll note some possible health concerns  
13 associated with members of the class; and I'll talk about  
14 biomonitoring information.

15 --o0o--

16 DR. IYER: The general chemical structure of QACs  
17 includes the cation  $\text{NR}_4^+$ . These compounds contain a  
18 nitrogen atom with four covalent bonds. The R groups are  
19 often, but not always an alkyl chain or benzyl ring.  
20 These chemicals are used for a variety of applications  
21 including as antimicrobials, preservatives, anti-static  
22 agents, softening agents, and surfactants.

23 --o0o--

24 DR. IYER: Now, I'll show you the chemical  
25 structures of some QACs. This is the general chemical

1 structure for benzylalkyldimethyl ammonium compounds, or  
2 BACs. And this is the chemical structure for a specific  
3 BAC. This is the general chemical structure for  
4 dialkyldimethyl ammonium compounds, or DADMACs. And this  
5 is the specific chemical structure for a DADMAC,  
6 didecyldimethyl ammonium chloride.

7 This is the general chemical structure for  
8 alkyltrimethyl ammonium compounds or ATMACs. And this is  
9 the chemical structure for a specific ATMAC. The alkyl  
10 chain for BACs, DADMACs, and ATMACs is typically between 8  
11 and 22 carbons long.

12 --o0o--

13 DR. IYER: On this slide I'll show you the  
14 chemical structures of selected QACs that do not belong to  
15 any of the three subclasses I just reviewed. There are a  
16 number of polymers with quaternary ammonium centers called  
17 polyquaternium compounds. Shown here is an example,  
18 polyquaternium 42.

19 Esterquats are another subclass of QACs, in which  
20 the alkyl chains contain ester linkages. Esterquats were  
21 introduced because they biodegrade more readily than  
22 long-chain DADMACs, while still achieving the intended  
23 chemical function. Cetylpyridinium chloride is an example  
24 of a QAC containing a pyridinium ring. And the herbicides  
25 diquat dibromide and paraquat dichloride are other types

1 of QACs.

2 --o0o--

3 DR. IYER: We prepared a preliminary screening  
4 document that the Panel has in your packets and that we  
5 posted on the Biomonitoring California website. The  
6 document includes volume of use information for a variety  
7 of example QACs. On this slide, I'll cover some  
8 highlights on volume of QAC use.

9 Of the QACs we reviewed that have reported  
10 pesticide sales in California, about half have sales of  
11 more than 100,000 pounds in 2018. Of these, several had  
12 sales of over 1 million pounds. The QAC pesticides we  
13 reviewed that are used agriculturally in the state are  
14 generally applied at lower levels. The notable exception  
15 is paraquat dichloride. Over 1 million pounds were  
16 applied in 2017 and it was rank number 23 of the top 100  
17 pesticides applied agriculturally.

18 Of the QACs that I reviewed, the national  
19 production volume for 20 of them was over 100,000 pounds  
20 in 2015. Of these, 11 had production volume of over 1  
21 million pounds.

22 --o0o--

23 DR. IYER: We wanted to get a feel for what kinds  
24 of consumer products contained QAC ingredients. So we did  
25 a little field research by visiting a couple Bay Area

1 stores. I'll now walk you through example products we  
2 located containing QAC ingredients.

3 (Laughter.)

4 DR. IYER: It's not clicking.

5 MR. BARTLETT: Yeah, just a minute.

6 DR. IYER: Sorry for the technical difficulties.  
7 Let me try this one more time.

8 PANEL MEMBER LUDERER: Close it. Open it again.

9 MR. BARTLETT: It won't let me close it either.

10 MS. HOOVER: Diana is coming in.

11 (Thereupon a discussion occurred off the record.)

12 DR. IYER: All right. I really want you guys to  
13 see these animations. I spent a lot of time on them.

14 (Laughter.)

15 DR. IYER: So as I was saying, I'm going to walk  
16 you through example products we located containing QAC  
17 ingredients. Various cleaning products like disinfecting  
18 surface wipes and sprays and other surface cleaners  
19 include QAC ingredients. The ingredients listed here are  
20 displayed as they were shown on product packaging. These  
21 includes BACs, DADMACs and a polyquaternium. These  
22 ingredient names come from multiple product labels.

23 Antibacterial hand soaps have QAC ingredients.  
24 Benzalkonium chloride, which is a BAC, is the active  
25 antibacterial ingredient and is a replacement for

1 triclosan and triclocarban in these soaps. Cetrimonium  
2 chloride is a BAC with a 16-carbon alkyl chain and is  
3 listed as an inactive ingredient in these hand soaps.

4 QAC ingredients are in hair conditioners.  
5 Behentrimonium compounds are common ingredients on many  
6 hair conditioner labels. These are ATMACs with alkyl  
7 chains that are 22 carbons long. We identified QAC  
8 ingredients in a variety of other personal care products,  
9 like other hair care items, facial cleanser and body wash,  
10 lotions, including a baby cream and mouth wash.

11 We located QAC ingredients in cosmetics. You'll  
12 see that synonyms like quaternium 15 and quaternium 18 are  
13 used on the product labels. Quaternium 15 is a  
14 formaldehyde releaser which is its mechanism for its  
15 biocidal activity.

16 Benzalkonium chloride is a common preservative in  
17 eye drops. Topical antiseptics like antibacterial hand  
18 wipes and antiseptic wound wash include benzalkonium  
19 chloride and benzethonium chloride. We located some oral  
20 antiseptics for relief of cold sores, for example, that  
21 contain benzalkonium chloride. Benzalkonium chloride is  
22 sometimes listed as the active antiseptic ingredient and  
23 sometimes as an inactive ingredient in these products.

24 The literature we reviewed describes the use of  
25 QACs in fabric softeners, but we found identifying the

1 specific QACs used in these products to be a challenge.  
2 Fabric softener packaging, both the liquid and dryer sheet  
3 forms, have ingredient language like, "Contains cationic  
4 softeners", or, "ingredients include biodegradable fabric  
5 softening agents", which is of course not specific. This  
6 QAC, diethylesterdimethyl ammonium chloride, was obtained  
7 from ingredient details on the manufacturer's website.  
8 And it is an example of an esterquat.

9           Some pesticides used at home include QAC  
10 ingredients. We located weed and grass killers at a local  
11 home and garden store that contain diquat dibromide. And  
12 there are swimming pool algaecides containing QAC  
13 ingredients.

14                           --o0o--

15           DR. IYER: So all this gives you a flavor of the  
16 very broad variety of consumer products that contain QAC  
17 ingredients.

18                           --o0o--

19           DR. IYER: Also, they are widely used in oil and  
20 gas operations, which includes hydraulic fracturing.  
21 Their functional applications here include as oil field  
22 biocides, emulsifiers, surfactants, corrosion inhibitors  
23 and clay stabilizers.

24                           --o0o--

25           DR. IYER: QACs, specifically the subclasses of

1 BACs, DADMACs, and ATMACs have been widely detected in  
2 sediment, sludge, and wastewater treatment plant influent  
3 and effluent. Of the studies I located that report these  
4 detections, some described samples collected from the New  
5 York/New Jersey area and the others were international.

6 Preliminary analyses of sediment samples  
7 collected from the San Francisco Bay have been conducted  
8 in Bill Arnold's lab at the University of Minnesota.  
9 These are pro-bono analyses conducted for the San  
10 Francisco Estuary Institute's Regional Monitoring Program  
11 for Water Quality in San Francisco Bay.

12 BACs, DADMACs, and ATMACs were detected in the  
13 San Francisco Bay sediment samples. And these detections  
14 are comparable to what Bill Arnold's lab has observed in  
15 wastewater effluent and lake sediment samples in  
16 Minnesota.

17 Other environmental detections reported included  
18 indoor house dust samples in Germany; air samples from a  
19 hospital where QAC-containing disinfectants were being  
20 used; and fish samples from Nordic countries.

21 --o0o--

22 DR. IYER: There are health concerns associated  
23 with members of this class. Some QACs, including BACs,  
24 didecyldimethyl ammonium chloride and quaternium 15, which  
25 is a formaldehyde releaser, are linked with skin



1 irritation and sensitization.

2 Exposure to certain QACs is associated with  
3 respiratory effects. Increased risk of rhinitis and  
4 work-related asthma has been observed in studies of  
5 hospital and janitorial staff using cleaners and  
6 disinfectants with QAC ingredients.

7 The Association of Occupational and Environmental  
8 Clinics includes the class of quaternary ammonium  
9 compounds on their list of asthmagens. And I'll add that  
10 paraquat dichloride is a known lung toxicant.

11 Reproductive toxicity has been observed in mice  
12 exposed to a disinfectant that contained BACs and  
13 didecyldimethyl ammonium chloride. This exposure  
14 decreased fertility and impacted both male and female  
15 mouse reproductive functions. Developmental effects, such  
16 as decreased pup size and neural tube defects have been  
17 observed in multi-generational studies of mice and rats.

18 These studies found that the neural tube defects  
19 persisted in two generations after cessation of exposure  
20 to the disinfectant.

21 Assays in *C. elegans* and zebrafish provided  
22 evidence for reproductive and developmental effects  
23 respectively, of benzalkonium chloride and benzethonium  
24 chloride.

25 BACs and cetylpyridinium chloride have been found

1 to inhibit mitochondrial function in human cell culture.  
2 And BACs have been found to inhibit cholesterol  
3 biosynthesis in vitro.

4 Bacterial resistance to QACs is a concern  
5 reported in the literature. One particular study observed  
6 increased antibiotic resistance in microbes exposed to  
7 BACs, and they identified resistance genes in these  
8 microbial communities.

9 --o0o--

10 DR. IYER: We located very little biomonitoring  
11 data. We did find literature reporting the use of  
12 hydrophilic interaction liquid chromatography for  
13 quantifying polar substances like QACs. Although, these  
14 aren't biomonitoring studies, we located two methods  
15 papers applying hydrophilic interaction liquid  
16 chromatography. Whitehead et al. 2010 used this  
17 chromatographic approach for detecting diquat dibromide  
18 and paraquat dichloride spiked into human urine.

19 And this paper by Steuer et al. 2016 describes a  
20 method for detecting phosphatidylcholine-derived QACs in  
21 human plasma, blood, and urine. These compounds, which  
22 are choline, betaine, L-carnitine, and  
23 O-acetyl-L-carnitine are of clinical interest as  
24 predictors of cardiovascular and renal disease. They are  
25 not QACs, but they do contain a quaternary ammonium

1 center, so the methodology reported by this group could be  
2 relevant for biomonitoring.

3 Gino Cortopassi of UC Davis, Terry Hrubec of  
4 Virginia Polytechnic Institute and State University, and  
5 Libin Xu of the University of Washington are collaborating  
6 on a small biomonitoring study that is in progress. For  
7 this study, they developed and applied a method for  
8 detected benzalkonium chloride and didecyldimethyl  
9 ammonium chloride in serum samples.

10 --o0o--

11 DR. IYER: Now, I'm going to transition from the  
12 QACs preliminary screening portion of my talk and switch  
13 gears to review previously screened chemical classes.

14 In July 2016, one of the pesticide classes we  
15 screened was neonicotinoids. A publication released this  
16 June by CDC authors reported biomonitoring data for four  
17 neonicotinoids in NHANES. Consequently, these  
18 neonicotinoids, acetamiprid, clothianidin, imidacloprid,  
19 and thiacloprid are newly added to Biomonitoring  
20 California's designated chemical list.

21 In July 2016, we also screened the class of  
22 anilide pesticides, including propanil.

23 And in November 2016, we screened these chemical  
24 classes used in UV applications, benzophenones and  
25 phenolic benzotriazoles.

1                   --o0o--

2           DR. IYER: I'm now going to lay out the options  
3 for the Panel. The SGP could request that OEHHA prepare a  
4 potential designated chemical document on QACs. The Panel  
5 could request that OEHHA prepare a potential designated  
6 chemical document on a previously screened chemical class.  
7 They could advise no further action on any of these  
8 classes or suggest other chemical classes for possible  
9 consideration.

10           I'm happy to take any clarifying questions.

11           CHAIRPERSON SCHWARZMAN: Thank you so much for  
12 that presentation.

13           I have one question to launch the clarifying  
14 questions section, which is -- you may not know this yet,  
15 because it might require preparing a potential designated  
16 chemical document. But from what you've learned so far --  
17 so there's a diversity of QACs obviously, a large  
18 diversity of QACs, do you have any sense for how many  
19 biomonitoring analytical methods would be required to  
20 analyze a sample for QACs? You know, if we're just  
21 interested in QACs, but there's a lot of them, are  
22 there -- the methods that you've described here sounds  
23 like captures a couple at least or several. Do you have a  
24 sense for the scale difference between the diversity of  
25 QACs and the analytical methods that would be required to

1 detect them?

2 DR. IYER: That's a good question. I'm not sure.  
3 I think it would require looking in more depth at the  
4 literature, if this hydrophilic interaction liquid  
5 chromatography approach is similar to maybe what's used in  
6 environmental detections, which is a body of the  
7 literature that I found -- that's most of the literature I  
8 was easily able to find on QACs. So, yeah, it would take  
9 a little more digging to see.

10 CHAIRPERSON SCHWARZMAN: And when they're  
11 detecting them environmentally, are there -- do they have  
12 good ways of grouping those detection analytical  
13 processes?

14 DR. IYER: That's a good question. I'm wondering  
15 if anyone --

16 CHAIRPERSON SCHWARZMAN: Yeah. Someone here who  
17 has something to say about that.

18 DR. IYER: Some more about the technical details  
19 might respond to that.

20 DR. DATTA: So the way that --

21 CHAIRPERSON SCHWARZMAN: Can you state your name?

22 DR. DATTA: I'm Sandipan Datta. I'm a researcher  
23 from UC Davis. I've been researching on QACs bioactivity.  
24 So basically -- I have a pharmaceutical sciences  
25 background.

1           So QACs, depending on their chemical structure,  
2 so when you determine the thing, it's like kind of a  
3 general thing -- general procedure that you do. And then  
4 you spike the necessary QACs and see when it comes up and  
5 like what fragmentation it gives. And then you just look  
6 for that particular signature.

7           So I'm assuming the general overall procedure is  
8 going to be the same. It's just you put in whatever you  
9 want to look for, see its signature coming up through the  
10 LC-MS, and see if you can get that same signature coming  
11 up in your samples.

12           CHAIRPERSON SCHWARZMAN: And is there significant  
13 variation about the matrix you would have to evaluate,  
14 like blood, serum, urine?

15           DR. DATTA: Yes. So like each matrix needs to be  
16 standardized and you need to develop a standard curve of  
17 the species of interest of QACs. And then you can -- you  
18 go for it, like you can do that.

19           CHAIRPERSON SCHWARZMAN: And did you have -- oh,  
20 Oliver and then Anne.

21           PANEL MEMBER FIEHN: We frequently see those in  
22 untargeted assays. So usually five to ten different ones  
23 without even looking, without the dedication, just by --  
24 they show up in basically many, many matrices.

25           DR. DOHERTY: This is Anne Cooper Doherty with

1 DTSC. And I did my thesis on this however many years ago.

2 Is it working?

3 Okay. I did my thesis on QACs back in New York.  
4 So we did the -- some of the environmental analyses. And  
5 we could extract BACs, B-A-Cs, ATMACs, and the DADMACs  
6 from C8 to C18, in one extraction and run it with just two  
7 different dilutions and one method, and we were able to do  
8 it. The extraction could get a little dicey, because it's  
9 such a broad range of chemical properties, but we were  
10 able to do it for at least sediment and water.

11 CHAIRPERSON SCHWARZMAN: Thank you. Really  
12 helpful.

13 Other clarifying questions?

14 DR. CORTOPASSI: Yeah. I'm Gino Cortopassi.  
15 We've been studying the mitochondrial effects of the QAC.

16 CHAIRPERSON SCHWARZMAN: Can you hold your mic  
17 higher.

18 DR. CORTOPASSI: Sorry. Sorry about that.

19 We've been studying the mitochondrial effects of  
20 these QACs. And in this study with Terry Hrubec in  
21 Virginia and Libin Xu in University of Washington, we  
22 found that there was about -- there was about -- in a  
23 third of -- so we looked at 40 college students' blood  
24 from them. And in about a third of them, there was  
25 detectable QACs -- BAC and the DDAC at the 10 to 150

1 nanomolar level, so -- and these are college students who  
2 may not have been exposed to cleaning materials.

3 (Laughter.)

4 DR. CORTOPASSI: If they're like my college  
5 students.

6 (Laughter.)

7 DR. CORTOPASSI: So that's our kind of first  
8 estimate of -- that's our first estimate of the level in  
9 people, because it's never -- Oliver has -- finds it in  
10 matrices, but it's never been systematically looked at in  
11 humans what is the QAC level. So it's been assumed for 60  
12 years, because they've been used as disinfectants for 60  
13 years that they're used topically and they don't get  
14 inside to the body.

15 But they do aerosolize and they do cause repro  
16 tox and neurotox as aerosols. And so we looked in a  
17 systematic way. And there is a 10 to 150 nanomolar level  
18 of these in college students.

19 CHAIRPERSON SCHWARZMAN: Any other questions for  
20 Shoba?

21 Great. Thank you so much for the -- oh, sorry,  
22 Veena.

23 PANEL MEMBER SINGLA: Picking up a little bit on  
24 that comment. Is there a much known about potential  
25 exposure pathways from some of the products you've talked



1 about in terms of inhalation or dermal absorption?

2 DR. IYER: I didn't specifically review  
3 literature for that, but in examining the different types  
4 of products that they're in, you know, I can make like  
5 inferences. My guess is with cleaning products,  
6 particularly the sprays or I located scented disinfectant  
7 sprays, so that seems like it would be a likely source of  
8 higher exposure compared to I might think dermal.

9 But, you know, there's also -- some of the  
10 products I identified were like mouthwash, or the oral gel  
11 pain relievers where you might get oral exposure in those  
12 instances too. So the information I have is coming from  
13 the types of products we identified.

14 CHAIRPERSON SCHWARZMAN: Great. Thank you so  
15 much for that, Shoba.

16 Other things might occur, but you're off the hook  
17 for the moment.

18 So we have some time now to have a conversation  
19 as a Panel. And the questions that the Program would like  
20 us to answer are essentially what next steps, if any, the  
21 Program should take on quaternary ammonium compounds, and  
22 also considering the chemical groups that were previously  
23 screened, which may be we could end up back on that slide.

24 Russ, if you wouldn't mind, the list that  
25 includes the other chemical classes that were screened --

1 groups -- excuse me, chemical groups.

2 MR. BARTLETT: It's on 15. Okay.

3 CHAIRPERSON SCHWARZMAN: Great. Thank you.

4 So because the Program would like a  
5 recommendation from each of the Panel members about kind  
6 of top pick or top two picks for the groups of chemicals  
7 to proceed with taking to the next stage, and so this --  
8 we have a chance now for discussion of that.

9 Ulrike, did you want to start?

10 PANEL MEMBER LUDERER: Okay. Quick question  
11 actually. So the question is about the neonicotinoids.  
12 So those four aren't on the designated chemical list. So  
13 is the question for us whether the designated list should  
14 be expanded to include all neonicotinoids, or whether it's  
15 to move those to the priority list?

16 MS. HOOVER: No. I mean, we are -- so this  
17 particular item is about which potential designated  
18 chemical document do you want us to work on next. That's  
19 it. So the reason why we let you know about this, which  
20 was breaking news to us, is that we've now captured some  
21 of the major neonicotinoids on the designated list.

22 Now, it's not the class, so that would be a  
23 possible suggestion. If you want us to do the entire  
24 class, that would broaden the listing. So, yeah, we just  
25 want you -- you all at the last meeting felt QACs are

1 really important, but others raised what about the  
2 pesticides we'd screened. So here's your chance to say  
3 here's what we want you to pick for our one document next  
4 year. So that's the concept.

5 PANEL MEMBER LUDERER: Thank you.

6 CHAIRPERSON SCHWARZMAN: I was previously pretty  
7 interested in the chemicals used in UV applications. And  
8 in this process, though, I'm having a little bit of a  
9 sense of like what could Biomonitoring California add?  
10 And there's -- given how little there is happening with  
11 quaternary ammonium compounds, and in light of their large  
12 volume in commerce, their diversity of exposure sources,  
13 the -- those two are at such opposite ends of the spectrum  
14 how much we know about their occurrence in people and the  
15 environment versus how frequently they're used and in  
16 such -- so many different applications that I'm very  
17 interested in that.

18 And I'm also kind of reflecting -- I appreciate  
19 this list and the sort of update of what's happening in  
20 each of these categories, because the -- some of the  
21 chemicals used in UV applications are increasingly  
22 being -- like people are moving away from them partly to  
23 do with some of the bans that are happening around  
24 sunscreens like in Hawaii and other states that are  
25 picking that up.

1           And while there's some interesting changes that  
2 could be potentially tracked from that, I -- it's kind of  
3 tipping me a little bit towards the QACs. Anyway, I'd be  
4 happy for other people's ideas.

5           Carl.

6           PANEL MEMBER CRANOR: Okay. It's live.

7           Given what Sara said and given this in front of  
8 us, I guess the question is does this overburden the  
9 staff? It does seem to me that the presentation that was  
10 just made was, in some respects, shocking. We should  
11 just, you know, find out more about that, but don't want  
12 to overburden you, so...

13           CHAIRPERSON SCHWARZMAN: Well, I think we have  
14 our pick, right? We can choose one.

15           PANEL MEMBER CRANOR: Okay.

16           CHAIRPERSON SCHWARZMAN: We can choose one.  
17 That's why we're having the discussion --

18           (Laughter.)

19           CHAIRPERSON SCHWARZMAN: -- is we can choose, do  
20 we want to suggest that the Program proceed with the next  
21 step on the QACs, or do we want to have them go back and  
22 do the neonics at the next stage, or et cetera.

23           MS. HOOVER: I can tell you that Shoba has done  
24 an amazing job already gathering information on QACs. So  
25 no, that would not overburden us, if you picked QACs.

1 (Laughter.)

2 CHAIRPERSON SCHWARZMAN: Oliver.

3 PANEL MEMBER FIEHN: Yeah. This Committee  
4 doesn't like to pick one.

5 (Laughter.)

6 PANEL MEMBER FIEHN: I think we can say that,  
7 because we are always concerned, concerned scientists  
8 here.

9 But if I look at those, I am mostly concerned  
10 about chemicals that are produced in very high doses and  
11 have direct contact to humans. That is what I am very  
12 concerned. Now, QACs are made to be biologically active.  
13 That's their purpose. And we get into the high contact  
14 and they get into the body.

15 I am most concerned about the QACs, and I would  
16 favor these to be prioritized. It doesn't mean that any  
17 of the others, including the UV protectants, are less  
18 important, because they also get into contact with humans  
19 directly.

20 Neonics are also important as we had learned  
21 before. You know, but if their just basic tonnage is  
22 lower and they're not directly applied usually. So if I  
23 had to pick one and we -- as I said, we don't like to pick  
24 one --

25 (Laughter.)

1 PANEL MEMBER FIEHN: -- that would be my  
2 priority.

3 CHAIRPERSON SCHWARZMAN: Thank you. You're  
4 starting us off on our march down the Panel, which is  
5 ultimately what we'd like to do and hear each person's  
6 priorities.

7 PANEL MEMBER SINGLA: I don't have too much to  
8 add to that, except to say that's my feeling too with the  
9 QACs. I'm favoring those, but with the UV chemicals  
10 coming in very close behind.

11 CHAIRPERSON SCHWARZMAN: And since Tom was  
12 sitting between these two, I will note that he -- because  
13 he had to leave, he put in his vote -- not vote, but he --  
14 (Laughter.)

15 CHAIRPERSON SCHWARZMAN: -- he weighed in earlier  
16 in favor of a further assessment of the QACs.  
17 Go ahead.

18 PANEL MEMBER LUDERER: Well, I'm going to do the  
19 same thing, and also just to really highlight the many  
20 occupational exposures and opportunities for, you know,  
21 studies of occupational worker populations, you know,  
22 cleaners, and other workers who work with these things  
23 every day and are exposed to them by dermal exposure and  
24 inhalation.

25 CHAIRPERSON SCHWARZMAN: Jenny.

1 PANEL MEMBER QUINTANA: I have even less to add.

2 (Laughter.)

3 PANEL MEMBER QUINTANA: So I agree with all of  
4 the previous speakers, and especially the occupational  
5 piece is a very important and vulnerable population.

6 PANEL MEMBER CRANOR: I wasn't present maybe for  
7 some of these other discussions, so it's a bit unfair  
8 comparison, but I was strongly impressed with the  
9 presentation that was just done, and the -- was it Veena  
10 or with the point of close --

11 MS. HOOVER: Mic.

12 PANEL MEMBER CRANOR: Sorry -- the point about  
13 close human exposures strikes me as quite important. So  
14 I'd favor that.

15 CHAIRPERSON SCHWARZMAN: So that's what you  
16 needed, right?

17 Okay. We accomplished our goal.

18 Sara is happy. We're all happy.

19 (Laughter.)

20 CHAIRPERSON SCHWARZMAN: Okay. I want -- we're a  
21 little ahead of schedule. I want to check now for open  
22 public comment, because now is the time where we can have  
23 comment to the Program on any topic relevant to the  
24 Program, not just to the advancement of QACs or any other  
25 chemical class toward potential designated chemicals. So

1 let's -- let me leave a moment here to make sure we're not  
2 missing requests for public comment.

3 MR. BARTLETT: Nothing online.

4 CHAIRPERSON SCHWARZMAN: Okay. Nothing online.  
5 Anything else in the room?

6 Please. You'll need a microphone.

7 DR. DATTA: So I'm Sandipan Datta. And I'm a  
8 researcher at UC Davis. So I was just wondering like what  
9 are the next steps, like once you have something as a  
10 designated chemical, like what is the next -- what are the  
11 next steps that you take in terms of like the designated  
12 chemicals?

13 CHAIRPERSON SCHWARZMAN: So let me summarize  
14 something briefly and then Program staff can chime in if I  
15 get something wrong. But the Program cannot biomonitor  
16 something unless it's on the designated chemical list.  
17 But being on the designated chemical list doesn't mean  
18 that it is biomonitored. So it's necessary, but not  
19 sufficient to have a chemical biomonitored. Then you have  
20 to design and launch a study that biomonitors for that  
21 chemical.

22 Fair? Anything to add?

23 Any other questions or comments?

24 Because if not, we'll end a little early, right?

25 Anything else to get in before the end of the



1 meeting?

2           Okay. Sorry. An early end.

3           In that case, I will just announce that -- well,  
4 first of all, I want to thank the staff and all the  
5 presenters today who presented an amazing wealth of work.  
6 And it's so gratifying to see results coming out. And,  
7 you know, it's easy for us to find holes in them, but  
8 there's also such a tremendous amount of value that we saw  
9 in them, and we also -- I think the Panel really  
10 recognizes the constraints that the Program is operating  
11 under, and it makes even more impressive every bit of  
12 results and findings that come out of the Program.

13           And so I'm always in awe and very appreciative of  
14 what you bring to the meetings.

15           With that, I will say that from today, a  
16 transcript of this meeting will be posted to the website,  
17 the Biomonitoring California website, when it's available.  
18 The next SGP meeting is on November 6th. It will be here,  
19 same building, same room. And so thank you to  
20 Biomonitoring staff, and the Panel, and everyone else who  
21 participated, and we'll adjourn the meeting.

22           (Applause.)

23           (Thereupon the California Environmental  
24 Contaminant Biomonitoring Program, Scientific  
25 Guidance Panel meeting adjourned at 3:50 p.m.)

## C E R T I F I C A T E O F R E P O R T E R

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

That I am a disinterested person herein; that the foregoing California Environmental 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 4th day of August, 2019.



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