

MEETING  
STATE OF CALIFORNIA  
ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT  
SYNTHETIC TURF SCIENTIFIC ADVISORY PANEL

CALEPA HEADQUARTERS BUILDING  
SIERRA HEARING ROOM  
1001 I STREET  
SACRAMENTO, CALIFORNIA

FRIDAY, MAY 25, 2018  
9:30 A.M.

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A P P E A R A N C E S

PANEL MEMBERS:

John Balmes, M.D., Chairperson

Edward Avol, M.S.

Deborah Bennett, Ph.D.

Sandy Eckel, Ph.D.

Amy Kyle, Ph.D.

Thomas McKone, Ph.D.

Linda Sheldon, Ph.D.

OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT:

Lauren Zeise, Ph.D., Director

Rebecca Belloso, M.P.H., Environmental Scientist, Special Investigations Section, Pesticide and Environmental Toxicology Branch

Jocelyn Claude, Ph.D., Associate Toxicologist, Special Investigations Section, Pesticide and Environmental Toxicology Branch

Carl DeNigris, Staff Counsel, Office of the Chief Counsel

Allan Hirsch, Chief Deputy Director

David Ting, Ph.D., Chief, Pesticide and Environmental Toxicology Branch

Patty Wong, Ph.D., Chief, Special Investigations Section, Pesticide and Environmental Toxicology Branch

PRESENTERS:

Paloma Beamer, Ph.D., University of Arizona

Asa Bradman, Ph.D., University of California Berkeley

A P P E A R A N C E S C O N T I N U E D

PRESENTERS:

Wood Delp, Ph.D., Lawrence Berkeley National Laboratory,  
Department of Energy

Hugo Destailats, Ph.D., Lawrence Berkeley National  
Laboratory, Department of Energy

Randy Maddalena, Ph.D., Lawrence Berkeley National  
Laboratory, Department of Energy

Marion Russell, M.S., Lawrence Berkeley National  
Laboratory, Department of Energy

ALSO PRESENT:

Amy Brackin, Synthetic Turf Council

Denise Kennedy, P.K. Enterprises

Steve Krauss, CRM Company

Nick Lapis, Californians Against Waste

Kathleen McCowin, Heath Soccer San Francisco

Robina Suwol, California Safe Schools

Kelley Watts

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

1  
2 CHIEF DEPUTY DIRECTOR HIRSCH: Okay. Good  
3 morning. I think we're going to get started now. So if  
4 you can take your seats, we'd appreciate it. So my name  
5 is Allan Hirsch. I'm Chief Deputy Director for the Office  
6 of Environmental Health Hazard Assessment stepping in  
7 temporarily for our Director Dr. Lauren Zeise, who will be  
8 here. She is stuck in traffic. There is apparently an  
9 accident in the East Bay on Interstate 80. So when  
10 traffic allows, she will get here, and we'll take -- and  
11 will take her seat here.

12 So I'd like to welcome the Panel and the  
13 audience. This is the third meeting of our Scientific --  
14 of our, excuse me, our Synthetic Turf Scientific Advisory  
15 Panel.

16 And so I'd just like to introduce the Panel  
17 members quickly. I was going to introduce Dr. Tom McKone  
18 over on the left. I -- we believe he's stuck in traffic  
19 too. So as far as we know he should be here when traffic  
20 allows as well. And he sent a note saying that.

21 Okay. Great.

22 Dr. Amy Kyle, Mr. Ed Avol, and then our Chair Dr.  
23 John Balmes, Dr. Linda Sheldon, Dr. Debbie Bennett, and  
24 Dr. Sandy Eckel. So thanks again for making the effort to  
25 be here. We really appreciate it.

1           So I'd also like to introduce OEHHA staff. And  
2 they can kind of raise their hands as I call their names.  
3 Our staff attorney Carl DeNigris, Branch Chief, Dr. David  
4 Ting, staff member Ms. Rebecca Bellosso. We have section  
5 Chief Dr. Patty Wong. Then I know there's Dr. Jocelyn  
6 Claude is in the audience. And we have an intern in the  
7 audience, okay. Ms. Ladan Khandel. Okay. Great. There  
8 you are. Great.

9           And this project is truly a team effort, as they  
10 say in the sports world. So we also have scientists here  
11 from the Lawrence Berkeley National Laboratory. Dr. Randy  
12 Maddalena, Dr. Hugo Destailats, Dr. Woody Delp, and Ms.  
13 Marion Russell. And we also have one -- we also have from  
14 the University of California, Berkeley Dr. Asa Bradman.  
15 And from the University of Arizona Dr. Paloma Beamer.

16           So we just need to go over a few housekeeping  
17 items first. There is -- if you need to use either  
18 drinking fountain or the restrooms, they are located out  
19 of the back door and left down the hall, then located on  
20 the right side. So basically, two lefts and then a right.  
21 In the event of a fire alarm - and the CalEPA building  
22 here does tend to have fire drills during the spring. But  
23 it's Friday, and it's raining, so we'll keep our fingers  
24 crossed that we don't have any.

25           But in the event there is a fire alarm, or any

1 other reason to evacuate this room, you would leave by  
2 going out of the exit doors there, take the steps down to  
3 the first floor, and then go directly outside of the  
4 building.

5           Just a note, this is a day-long meeting, but we  
6 will be taking breaks for lunch and in the afternoon. And  
7 we're going to have a public comment period. It's on the  
8 agenda for the end of the meeting. So if you're here to  
9 speak during the public comment period, and you have --  
10 you have digital media that you want to show during your  
11 three-minute comment period, we would ask that you bring  
12 USB sticks or any external devices that you might have to  
13 the -- to the OEHHA staff before the lunch break, so that  
14 we can upload those files and have them all -- all ready  
15 to go.

16           And also, just to be aware, the meeting is being  
17 recorded and transcribed. And it's also being broadcast  
18 via the Internet. If you wanted to text a colleague and  
19 let them know how they can get -- how they can tune on to  
20 the webcast, they can go to [video.calepa.ca.gov](http://video.calepa.ca.gov). So a  
21 reminder too that as people speak, if you can identify  
22 yourselves and speak clearly into the mics, that would be  
23 very helpful.

24           Okay. So with that, I'd like to turn the meeting  
25 over to our Chair, Dr. John Balmes.

1           CHAIRPERSON BALMES: Thank you, Allan. And I  
2 would like to welcome everyone who is participating both  
3 here in the room and those on the web. This is our third  
4 meeting of the Panel. And I think our last meeting was  
5 about a year ago. And a lot has happened in terms of the  
6 field work and laboratory work. And it's exciting to hear  
7 about progress that's been made. And I think the main  
8 purpose of this meeting is for the Panel to hear what's  
9 been done. You know, we've obviously read materials and  
10 to then respond to the questions that staff and some of  
11 the collaborating scientists have about the work that's  
12 been done to date.

13           And I just also have to apologize for the fact  
14 that I'll be in and out, because I'm also the physician  
15 member of the California Air Resources Board, and we're  
16 meeting.

17           And here's Lauren, now we can really start.

18           (Laughter.)

19           CHAIRPERSON BALMES: So I have to go fortunately  
20 only a door or two down to participate in the Air  
21 Resources Board. So I'm going to be going in and out.  
22 And Dr. Sheldon is going to fill-in for me as Chair when I  
23 have to be present for a vote over in the Air Resources  
24 Board meeting.

25           Originally, I thought the Air Resources Board

1 meeting would be Thursday, which it usually is. And so I  
2 suggested Friday for this meeting, and I was just going to  
3 stay overnight. But, of course, CARB had to move their  
4 meeting to Friday.

5           So I think with that, welcome, Lauren. I'm glad  
6 I took the train.

7           (Laughter.)

8           CHAIRPERSON BALMES: We live near each other in  
9 Berkeley. And I think we should get started.

10          Patty, if you're ready with the overview?

11          (Thereupon an overhead presentation was  
12 presented as follows.)

13          DR. WONG: I'm going to introduce myself, Patty  
14 Wong. I work for OEHHA. It's our section that do the  
15 study. So I'm going to start by providing an overview of  
16 the study.

17          The OEHHA study has a multi-task. So just trying  
18 to bring everyone's memories, since it's been a year. The  
19 first task is we consult with the -- communicate with the  
20 public, consult with the expert. In the past few years,  
21 we have been in constant communication with our Panel.  
22 This is our third meeting. We have three meetings  
23 including today. So we also have been in constant  
24 communication with federal agency, with European agency  
25 that are involved in turf crumb rubber study.

1           And also, in the early stage of this study, we  
2 have a series of workshops, which we communicate with  
3 public community stakeholder and to listen for the input.

4           And then our next task is to look at and identify  
5 the chemical of interest and the hazard. So this is the  
6 step we have discussed in detail last year. On how do we  
7 do the chemical -- compilation of the chemical list.

8           And the next task is developing the exposure  
9 scenario. This task involve looking at the pathway of  
10 exposure, identify the receptor category, and we work  
11 closely with our collaborator on this. And we will report  
12 some of the results today in one of the section.

13           The next task is the field characterization --  
14 characterization, including playground and synthetic turf  
15 field. It also include chemical characterization of the  
16 material. So we work closely with our collaborator, and  
17 we are presenting some of the preliminary data today.

18           The next task is biomonitoring and personal  
19 monitoring protocol. This step we have a contract with  
20 the UC Berkeley to come up with the protocol. The last  
21 one is our risk assessment itself. At the end, we have --  
22 we will have a report. At the conclusion of the study, we  
23 will release a report in 2019 to summarize the human  
24 health risk potential exposed to chemical on synthetic  
25 turf field and playground.

1           So we are here today, as you see, we are May  
2 2019 -- 2018, and we have almost every task are ongoing  
3 and keep us very busy.

4                               --o0o--

5           DR. WONG: So before we start, I would like to  
6 give you some overview on each task how we work together,  
7 and what are the activity, and the results, and how they  
8 relate to each other.

9           So we start with the five tasks that I have just  
10 introduced, and we'll go down in detail.

11           So the first one is the hazard identification.  
12 This involving literature review to identify lists of  
13 chemical that are tire related. And we have discussed in  
14 depth last year on the approach and some -- name some of  
15 the chemical. It's still an ongoing process, because  
16 based on the chemical database we generate, we are doing  
17 literature search to come up with the chemical property,  
18 chemical toxicity.

19           So at the same time, last year, we spent a lot of  
20 time on the road. In 2017, we team up with the Lawrence  
21 Berkeley National Lab, the scientists on my left-side  
22 here. We traveled across California. I call it a  
23 adventure. And we visit a lot of fields. So before we  
24 start, we had come up with a sampling strategy. And we  
25 put it up for the Panel discussion last year. We get very

1 good input, and we put it in place.

2           We contact field owner. We recruit people. And  
3 we go onto the field. We sample for the environment. So  
4 I'm trying to see if the -- will it work? Oh, yeah, it  
5 works. So we collect multimedia sample, which we'll go in  
6 detail later. But we use the established protocol that we  
7 discussed last year to sample. And this year, we are  
8 going to talk about the preliminary study. We're going to  
9 talk about the field summary, what we did. And then we  
10 also discussed the targeted and non-targeted chemical  
11 analysis process. Based on what we discussed, we are --  
12 Dr. Maddalena's group in Lawrence Berkeley Lab is doing  
13 the analysis.

14           So information come from the database, the  
15 chemical database here. We used it to guide our targeted  
16 analysis for the sample. And if we identify any  
17 non-targeted chemical, we add that chemical back to our  
18 chemical database. So that's how one of -- two of the  
19 tasks how they relate to each other.

20           And then once we get the chemical analysis going  
21 on, we start collecting chemical concentration in each of  
22 the media. And we are setting up a chemical concentration  
23 database.

24           And next. At the same time, late last year and  
25 early this year, we have teamed up with scientists from

1 University of California, Berkeley, UC Berkeley, and  
2 University of Arizona, UA. And we have proposed time  
3 activity study last year to the Panel. And we have a  
4 discussion on how we should approach. And we applied the  
5 protocol we have learned here, and we discuss in detail.

6 So we do our on-line survey, and it has just been  
7 completed about two weeks ago. And then we have -- went  
8 out to the soccer game and practice to videotape player in  
9 games with different age, different gender.

10 So today -- today, we're going to talk about the  
11 pathway we have identified from the OEHHA staff, and  
12 receptor category that we are interested, and for the  
13 discussion. And also, we will present the preliminary  
14 data our on-line survey for the Panel to comment.

15 So the data from the on-line survey is going to  
16 provide feedback information to how we modify our pathway  
17 and our receptor. And further down, we're hoping that all  
18 the data we will -- not hope. We will use this data to  
19 compile -- sorry not yet -- to compile activity parameter  
20 database that are specific for California and specific for  
21 soccer player, and -- for soccer activity, including coach  
22 and bystander.

23 So we will use the data -- the video footage that  
24 are being decoded now in UA to fit the measure data to our  
25 database. And also, we will look into literature to find

1 any of the appropriate receptor -- appropriate  
2 receptor-specific and pathway-specific parameter to enrich  
3 our database.

4           And by using the database, we -- I'm sorry -- we  
5 are going to combine with the chemical database here to  
6 estimate the multi-route exposure dose. So I want -- I  
7 don't want to shine anyone here.

8           So by -- so we are going to estimate an exposure  
9 dose. And by looking at the cancer potency, the hazard,  
10 reference dose, and also some of the dose response  
11 functions, we're going to derive hazard. We're going to  
12 look at cancer risk. So we will characterize the human  
13 exposure and risks on synthetic turf field and playground.

14           And then, one, we'll compile all the results and  
15 put it into our final report, the Human Health Risk  
16 Assessment Report for the turf field and the playground.  
17 And information collect from the concentration, from the  
18 chemical, and also from the activity, from the physical  
19 chemical property, and exposure property, it is going to  
20 fit in -- into the biomonitoring protocol development and  
21 the personal exposure -- personal monitoring protocol  
22 development.

23           So this complete the task of our study, and the  
24 activity we anticipate could happen, and how they're  
25 related.



1 printed version is too small for me to read. But could  
2 you just -- I'm not -- I don't have a -- I don't know if I  
3 miss this, or I might have missed this or forgotten it.  
4 And if so, I apologize. But how exact -- how is the  
5 biomonitoring going to fit in exactly? I'm not quite  
6 understanding that.

7 DR. WONG: Okay. For this particular study,  
8 we're going to use all the information we generate here  
9 and the data to come up with a protocol. So is the  
10 development of the protocol how if it is needed, what kind  
11 of biomonitoring or what kind of personal monitoring  
12 procedure and detailed steps that might be involved. So  
13 it's not the actual study, it's the protocol development.

14 ADVISORY PANEL MEMBER KYLE: Okay. Then maybe I  
15 didn't miss it or misunderstand it. So what -- you're  
16 only going to do a protocol, but then what would the  
17 purpose of the protocol be if you're not actually going to  
18 execute it then?

19 DR. WONG: Okay. For the time limit of the  
20 study, part of it and the goal of this preliminary -- the  
21 first step of the study, we are collecting information to  
22 support if -- the need and what kind of detail to do it.  
23 So just by doing the chemical analysis all the  
24 characterization, we are under the third year already.

25 So we are doing this step basis, and we are going

1 to evaluate at the end what we find out in the field, what  
2 we find out in the exposure, how we're going to move  
3 forward, if it is needed.

4 So we don't have a concrete idea or -- I wouldn't  
5 say concrete idea. We don't have designed step path going  
6 down there, but we'll develop the protocol and look at  
7 what is -- evaluate what is the next step if it's needed.

8 ADVISORY PANEL MEMBER KYLE: So let me see if I  
9 understand this correctly then. So for the purple box at  
10 the bottom corner, human health risk assessment report,  
11 you would then not expect to rely on any biomonitoring  
12 data for your exposure -- to confirm your exposure  
13 estimates or anything like that, is that correct?

14 DR. WONG: Correct.

15 ADVISORY PANEL MEMBER KYLE: Okay. And this is  
16 because of time and resource constraints primarily or  
17 because you don't think that you need that?

18 DR. WONG: We don't know, I would say, at this  
19 point. It's a step process. We try to do the best we can  
20 within the resources and time. If it's needed, I'm sure  
21 that we'll bring the Panel back, and you -- we'll listen  
22 to you what your suggestion is. I -- we work on it as  
23 step basis.

24 But I want also to bring up the attention, U.S.  
25 EPA also are doing a similar study in parallel. So we are

1 constantly communicate with each to see what is the need  
2 and how we best approach it.

3           ADVISORY PANEL MEMBER KYLE: And I'm not trying  
4 to be critical. I'm just trying to understand the logic  
5 behind it, because that's my job, right, you know.

6           DR. WONG: Definitely.

7           ADVISORY PANEL MEMBER KYLE: So when you say if  
8 it would be needed, what would be something that would  
9 make it needed in your mind to the best that you can  
10 comment at this point in time.

11           DR. WONG: I think I would wait until we have the  
12 chemical data at least come out. And I haven't seen all  
13 of them. I don't want to draw any conclusion before I  
14 even know what we are finding in our chemical, in our  
15 material. So I can't really have a guess on what's going  
16 to happen, and how it's going to happen.

17           CHAIRPERSON BALMES: Dr. Sheldon.

18           ADVISORY PANEL MEMBER SHELDON: In the past, we  
19 have tried to use biomonitoring to help verify the  
20 exposure measurements we've made. It's really quite  
21 tricky. If you can find the appropriate chemical that the  
22 exposure is unique or high enough for, you know, kids  
23 playing on turf, it gives you the opportunity to sort of  
24 help close the loop.

25           But you have to be very, very careful in the

1 selection and the way that you conduct the study. But  
2 that I think would be one potential use. But I also warn  
3 against it a little, because it can be quite difficult.

4 CHAIRPERSON BALMES: Mr. Avol.

5 ADVISORY PANEL MEMBER AVOL: Just because you  
6 opened the door about the EPA study. We're not going to  
7 have that discussion here, I don't think, because that  
8 report has not been released yet. You may have access to  
9 some of that, but I think that we ought to be careful  
10 about what information is and what the focus of that  
11 investigation is, because I think they may not be looking  
12 at exactly the same kinds of fields, et cetera, exposures,  
13 population that you are looking at here.

14 DR. WONG: I totally agree. Sounds like you also  
15 have inside information. I do not have access to the  
16 report. And we have been in communication with them.  
17 According to our discussion, their report should be coming  
18 out very soon. They're drafting the report. And I agree  
19 with you, from what we learned, they are not doing exactly  
20 what we're doing. There's some overlap, but with  
21 different -- different approach, definitely. That makes  
22 the beauty of collaboration.

23 CHAIRPERSON BALMES: On that basic topic, you  
24 mentioned that there was a European Union effort too?

25 DR. WONG: Yeah, and I forgot actually. I lost

1 my notes, so that's why I lost it.

2           The ECHA, the European Chemical Agency, they did  
3 study, and they also did a risk assessment in the past few  
4 years. We have been talking to them, and they are waiting  
5 for our data to update the risk assessment. So we're  
6 hoping to have more continued communication with them.  
7 And we also have nominated our chemical for NTP  
8 evaluation. And the report should be coming out very  
9 soon.

10           CHAIRPERSON BALMES: So Lauren pointed out that  
11 we're a minute over time. So can we move on to the next  
12 topic?

13           DR. WONG: Okay. While we're Waiting for the  
14 slide to work. The next section is the field  
15 characterization study of synthetic turf fields. The  
16 Presenter is Ms. Rebecca Belloso from OEHHA. And then  
17 followed by the team of the Lawrence Berkeley National  
18 Lab. Dr. Randy Maddalena, Dr. Woody Delp, Dr. Hugo  
19 Destailats, and Ms. Marion Russell.

20           So we'll start with Rebecca Belloso.

21           (Thereupon an overhead presentation was  
22 presented as follows.)

23           MS. BELLOSO: Good morning. Thank you.

24                           --o0o--

25           MS. BELLOSO: Today, I will be presenting

1 regarding the field selection and sample collection with  
2 the synthetic turf study.

3 --o0o--

4 MS. BELLOSO: So here we have a timeline of the  
5 study. Today is May 25th, 2018. And our phase one began  
6 in January of 2016. And it involved the protocol  
7 development for chemical analysis, as well as sample  
8 collection. Additionally, during this period, initial  
9 crumb rubber samples were collected and used for further  
10 protocol development.

11 In phase two, which took place in early 2017, we  
12 tested and finalized the sampling protocol.

13 Our focus today will be on phase three, field  
14 sampling. This took place throughout 2017 and involved  
15 field sampling to cate -- to characterize field conditions  
16 in California. In the next section, Dr. Maddalena will  
17 present some preliminary data for the sample analysis.

18 --o0o--

19 MS. BELLOSO: This is a map of the target number  
20 of fields that we set out to sample in California. We  
21 used a random stratified method to select fields, as  
22 discussed in the last Panel meeting. Ultimately, we  
23 stratified by two main factors. The first is climate  
24 zones and regions. And as you can see in this map of  
25 California, we have grouped five different climate

1 regions, according to the climate zones.

2 We also stratified by age of field, categorizing  
3 fields as old or new. Our target number of fields were  
4 five new, and five old fields for regions 1, 2, and 3, and  
5 a target of five fields total for the combined regions of  
6 4 and 5.

7 And as a reminder, we combined regions 4 and 5  
8 because they have fewer fields located in these regions.  
9 Our total target was to sample 35 fields throughout  
10 California. Our stratified random sampling protocol also  
11 involved randomly sorting fields in each region, and  
12 contacting fields by order of the random list until our  
13 quota was met.

14 --o0o--

15 MS. BELLOSO: Our field study goal was to collect  
16 samples to quantify chemicals that may be released from  
17 synthetic turf fields. Samples of infill crumb rubber and  
18 environmental matrices were collected from 35 synthetic  
19 turf fields across California. Here, we have a picture of  
20 Dr. Maddalena along with the equipment used for sampling.

21 --o0o--

22 MS. BELLOSO: And this next photo is a typical  
23 set-up of the equipment on the field. And as you can see,  
24 we have a soccer goal, net, some activity on the field,  
25 and samplers set up around the goal to collect

1 environmental data, of which Dr. Maddalena will be  
2 discussing more in detail in the next section.

3 And we also collected infill crumb rubber in 7 to  
4 10 pre-selected locations throughout the field.

5 --o0o--

6 MS. BELLOSO: The following tables will show the  
7 actual number of fields sampled in each subgroup. Region  
8 one shown here covers the southern coastal areas. We  
9 sampled a total of eight new fields, and three old fields  
10 in this region.

11 New fields were categorized as zero to nine years  
12 old -- to less than nine years old. And old fields were  
13 categorized as age nine or above. We did not sample any  
14 fields from the unknown age category. We sampled two  
15 fields that contain a cork and crumb rubber mix infill.  
16 So the total number of fields sampled in region one was 13  
17 or 3.5 percent of all fields in region one.

18 As you may notice, we oversampled fields in this  
19 region. Part of this reason is due to a discrepancy with  
20 the field age reporting. For example, we were assured a  
21 field was a certain age. And post-sampling, it was  
22 brought to our attention that fields were newer than  
23 originally thought. And due to this discrepancy, we moved  
24 some fields from the old age group to the new age group  
25 after sampling.

1           And during recruitment, sometimes we did not get  
2 responses or came to find out that fields were removed or  
3 replaced. And this is how we came to know of the cork and  
4 crumb rubber mixed fields. So these fields -- these  
5 fields were listed as older fields in our database. And  
6 upon contact, we were told that they were recently  
7 replaced with this new infill type.

8           We decided to sample these fields as we began to  
9 hear more about cork and crumb rubber as an infill option.

10           --o0o--

11           MS. BELLOSO: Region two shown here covers the  
12 northern and central coast areas. We sampled a total of  
13 four new fields, and five old fields in this region. We  
14 did not sample any fields from the unknown age category.  
15 The total number of fields sampled in region two was nine,  
16 or 3.3 percent of all fields in region two.

17           As you can see, we were unable to recruit one  
18 additional new field, but we were very close to our goal  
19 of 10 fields in this region.

20           --o0o--

21           MS. BELLOSO: Region three shown here covers the  
22 southern interior valley and northern central valley. We  
23 sampled a total of five new fields and six old fields in  
24 this region. And we did not sample any fields from the  
25 unknown age group.

1           A total -- the total number of fields sampled in  
2 region three was 11, or 4.7 percent of all the fields in  
3 region three. Again, we oversampled in the old field  
4 category by one field.

5                           --o0o--

6           MS. BELLOSO: Here, we see the combined region  
7 four and five, which covers the southern high and low  
8 deserts and mountainous areas of California. We sampled  
9 one new and one old field in this region. We did not  
10 sample any fields from the unknown age category. We  
11 reached out to field owners of all the fields in this  
12 region, and only received two agreements to sample two  
13 fields. Therefore, our total -- our total sampled are two  
14 fields in region four and five.

15           This seems like a small number, but I would like  
16 to point out that there were so few fields in this region  
17 compared to other regions. And our final sampling  
18 percentage was actually Higher than all the other regions  
19 at 8.3 percent.

20                           --o0o--

21           MS. BELLOSO: Here's a map of California  
22 summarizing the number of fields sampled per region.  
23 Overall, OEHHA with the Lawrence Berkeley National  
24 Laboratory sampled 35 fields. Thirty-three were crumb  
25 rubber infill fields, and two were new synthetic turf

1 fields containing cork and crumb rubber mixed infill.

2 --o0o--

3 MS. BELLOSO: And here are the figures showing  
4 the age distribution of the fields. In Figure A, the blue  
5 represents the cumulative distribution of field age in  
6 California, according to our field database. After  
7 sampling all 35 fields, we plotted their cumulative age  
8 distribution in orange.

9 Coincidentally, the age distribution of sampled  
10 fields follows a similar trend to the age distribution of  
11 fields in our database.

12 I would like to point out that it is possible  
13 that the blue curve representing the overall field age  
14 distribution may be shifted due to some fields being  
15 mislabeled as older in our database.

16 Figure B shows the age distribution among the  
17 fields sampled. The age distribution of the new field  
18 group is spread out. We did not sample fields less than  
19 one year old.

20 In the old fields group, most of the fields  
21 sampled were between 9 and 11 years old. This is likely  
22 because, according to field owners that we interviewed,  
23 replacement of fields tend to begin when the field is  
24 approximately 10 years old. By age 14, most of the fields  
25 have been replaced. This may be one of the reasons why

1 there are relatively few fields 14 years or older in the  
2 old fields group that we sampled.

3 I'd like to thank you for your time. And I would  
4 like to introduce our next presenter, Dr. Maddalena from  
5 the Lawrence Berkeley National Laboratory.

6 DR. MADDALENA: Okay. I'm on now.

7 --o0o--

8 DR. MADDALENA: Thank you again for coming out  
9 and spending your time with us, and give us a chance to  
10 catch up on what we've done. The first presentation I  
11 think was very effective at talking about what we wanted  
12 to do.

13 --o0o--

14 DR. MADDALENA: And now I'm going to, in the next  
15 few minutes or 15 minutes or so, try and tell you what we  
16 did do, what we did see, what we did find, which is always  
17 some -- you know what you try and do and what you do get  
18 done is sometimes slightly different, but at least we know  
19 what we did. So I want to share that over the next few  
20 minutes. I did change the --

21 ADVISORY PANEL MEMBER AVOL: Could I interrupt  
22 you just for a moment?

23 DR. MADDALENA: Yeah.

24 ADVISORY MEMBER AVOL: Dr. Sheldon, can we ask  
25 questions at this point.

1 Well, it depends on their answer, I guess.

2 (Laughter.)

3 ADVISORY PANEL MEMBER AVOL: Okay.

4 ADVISORY PANEL MEMBER SHELDON: Let's wait till  
5 the end. Sorry.

6 ADVISORY PANEL MEMBER AVOL: Okay.

7 DR. MADDALENA: Yeah. Okay. Just make sure you  
8 don't forget that question.

9 So I did change the title from the agenda  
10 slightly. It's more of an overview of environmental and  
11 physical conditions in this talk. And then I'll hand off  
12 to the rest of the day we'll be spend talking about  
13 preliminary results, things we actually found.

14 But right now I want to give a good sense of what  
15 we saw out there, when we were collecting measurements to  
16 give you a feel for what the measurements might represent.  
17 Like I said, the previous presentation did a nice job  
18 telling how we stratified on the age and recruited and  
19 selected. And I'm going to show how those -- that  
20 distribution plays out towards the sampling schedule, what  
21 months and temperatures and such we sampled in. Show you  
22 a little bit of typical on-field conditions and how all of  
23 the things we measured in interact.

24 Then we're going to step back and start looking  
25 at the distribution of conditions that we found on the

1 field, wind speed, temperature, solar radiation things  
2 like that that might affect the outcome. When we have  
3 samples, we'll come back with numbers that we'll know  
4 where those numbers came from.

5           And then I'll finish with the distribution of  
6 sort of the human input to the problem. At the last  
7 meeting we talked about bringing humans into the fact --  
8 into the equation, having them conducting activities in  
9 the field while we're doing measurements and try and make  
10 them more representative, so I'll finish with that.

11                           --o0o--

12           DR. MADDALENA: So starting with the distribution  
13 of monitoring events, we started -- the two first bars on  
14 the top are from our pilot study, so prior to the last  
15 meeting that we had. And then we jumped out and started  
16 doing the study in the field. And the monitoring events  
17 are shown on the access up to -- in October, we had the  
18 most sampling events eight. So that's how you read the  
19 chart. There were one in February, one in April.

20           Scheduling was, as Rebecca indicated, dictated by  
21 response from the field owners, but also dictated to a  
22 certain degree by weather conditions. We didn't want to  
23 work in the rain, because we had a lot of expensive  
24 equipment out there. Travel logistics, trying to get from  
25 point A to point B in a hurry, and getting things to the

1 field for us to collect measurements. The sampling media  
2 had to be sent back to the lab, processed, reloaded, and  
3 sent back to us in the field. And we only had so fast  
4 that we could turn that around. So some of that kind of  
5 controlled the few times we had to skip a day or two. But  
6 that's basically what drove this.

7           The warmer weather -- fortunately for us, last  
8 year the warmer weather tended to shift towards later in  
9 the year. We had a lot of rain earlier in the year. And  
10 then the warmer weather shifted. So we still got a lot of  
11 good warm days, I wanted to show that here by a summary of  
12 the temperature.

13           On the first column on your left is the noon-time  
14 temperature, which is probably most relevant to when we're  
15 collecting the sample. But then I also wanted to capture  
16 the daily high and low just to see -- give you a sense of  
17 the range. And so as you move down into again looking in  
18 October and that region, it was a fairly warm month. And  
19 we had the noon time temperature going from 63, depending  
20 on what region we were in, up to 103 so -- degrees  
21 Fahrenheit. So there were some fairly warm days out there,  
22 when we were collecting samples.

23           The highs actually went up to 111 on the one  
24 monitoring event day. Although, we were trying to get out  
25 of the field by then and get back to the shade. But that

1 gives you a sense of the -- you know, there is some  
2 indication that we wanted to be out there on warmer days,  
3 because off-gassing from the surfaces. So we accomplished  
4 that I think in across the board, even though the sampling  
5 itself may have shifted a little later in the year than we  
6 wanted to.

7 --o0o--

8 DR. MADDALENA: So on-field conditions. What did  
9 it really look like out there. And we did a lot of  
10 measurements -- ancillary measurements, you know,  
11 subsequent -- you know, in addition to the chemical  
12 measurements, we did a lot of measurements just to see  
13 what the environment looked like, mostly centered around  
14 meteorology, and things that force the temperature and  
15 such. So on the figure on the -- on my left, I guess on  
16 your left looking at the screen, is a tower that -- we  
17 used a stratification tower to track temperature basically  
18 starting at the very bottom of the crumb looking at the  
19 probes in the lower center picture.

20 So the temperature is measured right at the  
21 bottom of the crumb, and then somewhere in the middle of  
22 the crumb infill layer. Then moving up, we measured  
23 infrared temperature on the surface, so we got three  
24 different levels before we even get off of the grass of  
25 the turf surface of temperatures.

1           And then stratified going up with distance --  
2 continuing to go up with distance, we measure temperature  
3 at different elevations above the field. And finally, we  
4 measured the solar energy input to the field to try and  
5 make sense of all of these temperature measurements.

6           Those measurements and following a theme that  
7 you'll see throughout the day, were collected in various  
8 levels of orientation, so we measured things from the  
9 ground up, and we measured things across space  
10 horizontally. And we also measured things through time.  
11 So we had these three different dimensions of measurements  
12 and we'll come back to that as we -- as present data  
13 throughout -- throughout the -- there we go.

14                               --o0o--

15           DR. MADDALENA: Broke the slide.

16           Okay. This one shows a lot of information. So  
17 let me spend a few minutes on this. Upper left side is an  
18 indication -- and this is just a typical field. We just  
19 grabbed this one out of the data set to try and show the  
20 interaction or the interrelationship between the things  
21 we're measuring. And we're going to overlay top of  
22 this -- all of this information the chemical measurements  
23 as well.

24           But to start out just by saying what does the  
25 field look like? The upper left gives you a sense of the

1 wind movement across the field during the day and during a  
2 particular monitoring event. And you can see as you read  
3 this --

4           Back. Okay. And that's -- as you read this to  
5 the left of this first figure on the upper left of your  
6 screen, you can see that the wind speed is very calm. And  
7 with it's calm, you get a lot of variation in direction.  
8 And as the day progressed towards the end of the  
9 monitoring period, and it often happened, the wind would  
10 sort of develop and generate later in the day, and the  
11 direction would sort of stabilize.

12           If you look down to the next one down, that's  
13 just a measure of ozone. And in this case we're including  
14 ozone not as a pollutant, but as just an indicator of the  
15 environment. And you can see that the wind mass -- the  
16 air mass tends to change as you move through the day.  
17 Depending on the direction the wind is blowing, things  
18 change. And so you pick up different off-field conditions  
19 that are coming across that field.

20           So then if we look over at the temperature, and  
21 I'm going to start at the bottom and work my way up, the  
22 temperature probes on the bottom right were inserted deep  
23 into the sur -- into the turf, and basically it hit the  
24 bottom of the turf crumb infill layer, the first probe.  
25 So that upper line the -- I guess if you look at the

1 deep -- the blue line is the -- generally, throughout the  
2 day is the cooler of the lines. And as you move towards  
3 the surface, the very surface tends to be the hottest  
4 place on the field, because of the solar energy.

5           And you also look at -- we've got the -- on a  
6 secondary axis there, the insolation which is the solar  
7 input, the energy input into that field. And the  
8 temperature of the field tends to track that. Moving up  
9 to the upper chart, we see the stratification of  
10 temperature over the field. And you can see as you move  
11 away from the field from 8 inches to 24, 45 and up, you  
12 fairly quickly approach a fairly constant well-mixed  
13 environment. So the temperature tends to approach what  
14 you would measure at a local met station nearby. So it  
15 does tend to approach the background fairly quickly  
16 because of mixing.

17           So I want to talk a little bit about the wind,  
18 because the next chart is going to probably cause  
19 seizures. The wind speed I want to convert into just a  
20 single picture of each field. And so doing that, looking  
21 at just direction and speed we can capture that all in a  
22 wind rose. Just very quickly for everyone, the wind rose  
23 is -- essentially, in the case, it's designed or built  
24 showing the wind direction. So the bar -- longer bar  
25 pointing in one direction is basically more percentage of

1 time going in that direction. And then the color of the  
2 bar as you move out is the wind speed.

3 So you can kind of just -- at a glance, once you  
4 get used to these figures a little bit, you can kind of  
5 see the general air mass, which direction and how fast  
6 it's moving throughout the day. And I wanted to give you  
7 a sense of that, because then we -- the last meeting we  
8 came to, the half of the fields that I had already done,  
9 or we'd already accomplished, I had put the net or the  
10 experimental unit in exactly the opposite place that I  
11 wanted to.

12 But we got better at that as the day -- as the  
13 season progressed. We still had to predict in advance  
14 where that wind was going to come from. And we generally  
15 did a pretty good job. So the green globe that I put on  
16 the wind rose gives you a sense of where we placed that  
17 experimental unit throughout the day.

18 --o0o--

19 DR. MADDALENA: So now this chart -- the goal of  
20 these large matrices that kind of show you all of the  
21 fields at a glance is to give you -- one, just to give you  
22 a sense of the variability that we captured in our data  
23 set. And then you can actually go through and assess  
24 these individually like the second in from the upper left  
25 shows a very constant relatively high wind day. And the

1 experimental unit was basically where we wanted it down  
2 wind from that. There was some others that we still did  
3 get a little bit off, but note that the color of the bars  
4 is wind speed. And so a lot of time the wind is going  
5 lots of different directions, but it's not going very  
6 fast.

7           And so we did get a nice stable day to collect  
8 measurements. There are a few missing data points here,  
9 things happen in the field. So when we don't get all the  
10 wind rose data, but we do have some -- essentially, we did  
11 things in replicate almost every time. So in this case,  
12 we just -- this figure is -- it captures a single location  
13 on field, and we've got multiple locations. So we'll  
14 finish populating that database as we move forward. This  
15 is just for your initial glance of the variability that we  
16 see.

17                           --o0o--

18           DR. MADDALENA: I wanted to also show that the  
19 solar insolation measure that we did, the energy hitting  
20 the field, the picture on the left-hand side shows you how  
21 we measure that. It's just a simple device. We set out  
22 that measures watts per square unit of area. What's  
23 interesting about this data, again, we have a few missing  
24 datas. And in this case, we -- that is truly missing  
25 data, because the instrument wasn't available or had

1 broken in those days.

2           But what this does show us, in addition to sort  
3 of the range of energy throughout the season that we  
4 captured, but it also shows cloudy days and clear days.  
5 So we've got a lot of different dynamics going on in the  
6 field that these things show. And you can relate these  
7 all back to the results on individual fields.

8                               --o0o--

9           DR. MADDALENA: I've already showed you that  
10 stratified temperature. I wanted to expand that to all  
11 the fields now, so you can have a sense of the range of  
12 temperatures that we were working in, and the difference  
13 in -- you know, on a cloudy day, you get temperatures that  
14 elevate and come back down. So it was a very interesting  
15 and fairly rich data set to show differences in the field.

16                               --o0o--

17           DR. MADDALENA: We took ozone out of one of our  
18 stratifications, sort of selection criteria, but we still  
19 did capture a wide range of ozone environments. And there  
20 was some conversation early on that higher ozone may  
21 interact with the crumb and alter or change the aerosol  
22 resuspension, different particle dynamics and such. So I  
23 just wanted to show that we did capture a wide range of  
24 ozone conditions in -- and this is just during our  
25 sampling days.

1           So we had this measurement collected in the -- in  
2 sort of the center of our sampling unit and track that.

3                           --o0o--

4           DR. MADDALENA: We rolled this idea out sort of  
5 late in the game, but we're able to go back and assess the  
6 fields. But the idea here is we were seeing a lot of  
7 variation in the surface itself. And that's what we were  
8 studying. We were studying the surface of this synthetic  
9 turf. And so we wanted a way to very systematically  
10 capture that variation. And I think it's a lot better.  
11 I'm hoping it's better on your screen, but these are --  
12 what these are, are high resolution images that are in --  
13 it is. Okay. Good.

14                           (Laughter.)

15           DR. MADDALENA: -- that are taken in a portable  
16 studio. Essentially, an LED lit studio with a uniform  
17 card. We always had this color card in with the crumb,  
18 and allowed to us color grade these images. So these  
19 images are quantitatively comparable. You can look at one  
20 and look at the other, and it's not just an artifact of  
21 the daylight, or the time of day, or who took the picture.  
22 They're all -- they're color graded and in a way we can  
23 look across them and see, you know, age, the amount of  
24 crumb, the difference in the overlaying turf, the  
25 thickness of the material over the top.



1 from the field, and we have these samples in front of you  
2 that you could pass around and take a look -- but from the  
3 field themselves essentially, this is the same mass of  
4 material.

5           So how far it fills up that little vile in the  
6 picture gives you a sense of the density. The stuff  
7 that's not filling as much has already compacted or has  
8 more dense material in it. So again, it's a nice way to  
9 look at the variation across all the fields, and what we  
10 actually measured in the field when we got there.

11                           --o0o--

12           DR. MADDALENA: So this matrix following the same  
13 theme. It's a visual comparison, but it's very  
14 quantitative, because the images themselves have been  
15 standardized. So just visualizing what the conditions at  
16 the field might have been, this, in fact, is a PM2.5  
17 measurement on a glass fiber filter, high volume  
18 measurements, that have been essentially clipped down. We  
19 didn't clip the filter. But we clipped the pictures just  
20 to show you this is all off-site measurements to show you  
21 the range of conditions that we saw when we went to the  
22 field.

23           So some of these may be closer to a freeway than  
24 others. Some of these may be out in rural areas, whether  
25 it's dusty or not. And so -- so it really captures -- if

1 you just glance across that and look at the different  
2 densities or darkness of those filters it gives you a  
3 sense of the conditions in the field, regardless of where  
4 they might be.

5 --o0o--

6 DR. MADDALENA: Thing go. Click the middle.

7 Okay. So it will run now.

8 So I want to talk about the human factor now.

9 And this is just a video clip that kind of gives you a  
10 sense of what we had going on. But overall is, in  
11 summary, we did recruit up -- 74 different players that  
12 came out. And this was a human subjects approved  
13 protocol, so we followed the scripted -- you know, the  
14 idea on how do you recruit in a fair and uniform way.

15 The 74 players participated in 122 events, or 122  
16 times, so that's about 3.5 players per field. Sometimes  
17 we had a few more, sometimes a few less, depending on how  
18 the recruiting went.

19 And the experience range, it was really  
20 interesting, that we had from -- I mean, we had one young  
21 guy show up in cowboy boots, and worked his tail off, and  
22 then we had actually professional soccer players out there  
23 doing things that I just couldn't imagine doing.

24 And so it was a very broad spectrum of talent  
25 that we had out there. And, in general, what they did was

1 interact with this ball-kicking machine that you see. The  
2 ball-kicking machine was used to kind of get the pace  
3 right. So about every 10 seconds a ball was launched to  
4 land somewhere towards the front of the net. And it was  
5 up to the recruited player to do whatever they wanted with  
6 that ball as it came in, and used it for a little while,  
7 and then kick it back to the machine.

8           So you could see the activity that goes on, this  
9 is just one example. But you could see that clearly  
10 there's turf -- the energy driven into the field is  
11 clearly resuspending the large crumb material. And it  
12 gives us a chance to -- like right there you could see in  
13 the video.

14           So it's -- you know, there's a lot of activity  
15 going on there. And then we're sampling all around that  
16 experimental unit, not out in front obviously, but on each  
17 side.

18           This little image here happened on a day after a  
19 rainy event and our kicking machine failed us. And so the  
20 players were very happy to go out and improvise, and so we  
21 let them improvise. And they set up and worked real hard  
22 for the rest of that period.

23   --o0o--

24           DR. MADDALENA: So I hope that kind of gives you  
25 a sense of what we wanted to get, what we did get, and now

1 we're going to start talking about the results. And I  
2 think we're going to -- we're going to move to Dr. Woody  
3 Delp next to talk about particles. We got a -- that's the  
4 video sorry. On the upper black box, is a failed --  
5 that's missing data on the matrix.

6 No, no, no.

7 (Laughter.)

8 DR. MADDALENA: That was right outside the -- as  
9 a diesel exhaust right there. Yeah. No. No. That was  
10 missing data on that filter. We didn't get that picture.

11 DR. DELP: An example of where not to place a  
12 sampler.

13 DR. MADDALENA: Yeah. So, yeah, that's what that  
14 is. The other one was a video. So anyways, I'll  
15 introduce Dr. Woody Delp. Will talk about -- start  
16 talking about results, and it just keeps building and  
17 getting more and more detailed and data rich. So we want  
18 to kind of ease into that. And then at the end of this  
19 section, I think we're scheduled for the questions at end  
20 of Woody's talk, so I'll turn it over to you.

21 DR. DELP: I don't think there's any easing into  
22 the data that I'm going to show here, because we've got  
23 quite a bit, and it's going to be kind of -- it can be  
24 data dense. So, can you hear me?

25 --o0o--

1 DR. DELP: So I'm going to just go through the  
2 particle data itself, sort of a preliminary look at the  
3 particle data. And I didn't have the pleasure of going  
4 out into the field with these guys, but I've had the  
5 pleasure of playing with the data. And it is a rather  
6 deep data set.

7 And so we -- I think by now we understand a bit  
8 on the sampling strategy. We were looking mainly for the  
9 temporal variability. Did we see anything change during  
10 these kicking events? So we had a sampling period  
11 beforehand, kicking, and a sampling period afterwards.

12 We're also looking generally for spatial  
13 variability on/off the field, up/down. So we need to go  
14 through the particle instruments that we had here and then  
15 some results. And I'm going to have to go through things  
16 fairly quickly here.

17 --o0o--

18 DR. DELP: So what I just mentioned for the  
19 temporal variability, we had a -- we would show up on a  
20 field on a particular day, get the instruments set up and  
21 running, and then essentially do nothing for an hour to  
22 allow to get background concentrations.

23 Then we would start the kicking activities, the  
24 scripted activities, and that would run for the three-hour  
25 period. Then we would have another, you know, quiet

1 period for an hour afterwards.

2 --o0o--

3 DR. DELP: Showing a -- the net picture that  
4 we've already seen. So we had carts on either side of the  
5 net, as well as a cart directly behind the net, and a cart  
6 well off of the field. And that would allow us to deal  
7 with our various -- in the vertical stack -- our vertical  
8 monitoring was accompanied with a cart directly behind the  
9 net. We're calling that one cart two. So carts one and  
10 three were off to the side. And cart 4 was well off of  
11 the field.

12 --o0o--

13 DR. DELP: Before our particle instruments that  
14 we used, some of you are familiar with these, some of you  
15 may not be. We used an APS, and an optical particle  
16 counter to deal with sizing issues. And an APS instrument  
17 is called an aerodynamic particle sizer. It gives us 52  
18 bins of information, in particle sizes from 0.5 micron up  
19 to 20 micrometers.

20 It gives us one minute resolution. We just had  
21 it on the field, down low, you know, just off of the turf.  
22 And it's native units that we -- that it reports out are  
23 particle counts per cubic centimeter. The MetOne optical  
24 particle counters that we used gives us six channels of  
25 resolution. Now, they are optical, so it's a very



1 calibrated to different particles. So again, getting the  
2 absolute A/B comparison is -- requires a little bit of  
3 effort, which we can do.

4 An then we also had PEM sample, a gravimetric  
5 sample, using the glass fiber filters both on and off the  
6 field with a high volume pump.

7 --o0o--

8 DR. DELP: So this is showing that a cart set-up,  
9 that was the cart two directly behind the net, and we can  
10 see the APS was sitting on the field. And the sample  
11 height on it was roughly nine inches above the turf.

12 --o0o--

13 DR. DELP: And I've taken, and I've binned some  
14 data here, so I'm showing you the larger set of bins that  
15 would represent larger size particles, and a set of bins  
16 that would represent smaller size particles for a  
17 particular field. And we see that there's changes during  
18 the kicking, but it was -- changed -- it was starting to  
19 change in the period beforehand. And it's different  
20 period after, you know, our post-kicking than it was a  
21 pre-kicking.

22 So getting some of the time information as far as  
23 the temporal variability, we're going to be looking at  
24 things that are going on in this sort of -- this gray band  
25 in between.

1                   --o0o--

2           DR. DELP: Now, if we use an APS, we can also get  
3 what a lot of particle scientists are used to normalized  
4 particle distribution. So it gets you an idea of the  
5 range of particles that are out there. And I'm just  
6 building up what a particle distribution looks like here.  
7 So if we use all 52 of the bins, we take a slice here at  
8 the one point in time. We'd get a particle distribution  
9 that looks like the one we see on the right-hand side.  
10 Take another slice we get this, and we take another slice  
11 and we get this.

12           So things are a bit different post-kicking than  
13 it was pre- and during the kicking. Is this environmental  
14 or is this on-field? We're going to have to dig into that  
15 a little bit.

16                   --o0o--

17           DR. DELP: Now, this is a very busy slide. This  
18 is showing the particle -- the normalized particle  
19 distributions across all 35 of our fields. And what we're  
20 basically looking for on the left-hand side is the  
21 particle count distribution. And on the right-hand side  
22 is particle mass distribution, assuming a unit density of  
23 the particles. And a brighter color indicates more  
24 particles in that size.

25           And the size is determined by on the Y axis on

1 each on of these little grids shows you the particle size  
2 going from the 0.5 micron up to 20 micron, and roughly  
3 halfway across one of those grid plots is the 2.5 number.  
4 So -- and the lower part of that would be -- represent  
5 respirable particles and the upper part of it would  
6 represent the larger particles.

7           ADVISORY PANEL MEMBER KYLE: Each one of these  
8 swatches is a separate field, is that right?

9           DR. DELP: Correct.

10          ADVISORY PANEL MEMBER KYLE: Okay.

11          DR. DELP: Correct.

12                 So it's a very busy plot, so maybe we'll look at  
13 that later on, you know, if you're tired at night and want  
14 to pop open the slides and look at it.

15                 (Laughter.)

16           DR. DELP: So we can look at some spatial  
17 variability here the -- our real-time measurements with a  
18 DustTrak and this MetOne gave us a pretty good opportunity  
19 to look at the spatial variability.

20                                 --o0o--

21          CHAIRPERSON BALMES: Can I just ask, why did you  
22 have to switch from the DustTrak to the MetOne?

23          DR. DELP: Prior commitments for other projects.

24          CHAIRPERSON BALMES: Okay.

25          DR. DELP: And so we can look at some of the

1 on-field off-field with the PEMs. Again Randy showed you  
2 the same grid picture earlier on the off-field. Now, this  
3 is overlaying the on-field and off-field samples on the  
4 same plot. And again, these are color graded. We can get  
5 some quant -- you know, we can quantify the numbers here,  
6 but we also know what the masses of these filters are.

7 And so you can see on the really dirty filters  
8 that were collected, you know, it's indicating that there  
9 was, you know, a lot of, you know, ambient particulate  
10 matter in the air. And this was a P -- a 2.5 cut on it.

11 But we also see some where, you know, there's not  
12 that much difference between the on- and off-field from a  
13 visual point of view.

14 --o0o--

15 DR. DELP: If we use on of our -- I clicked too  
16 quickly. So this is using three example fields with our  
17 MetOne instruments. And on the far left, I mean, we can  
18 see the scales are different on each one of these. On the  
19 far left, the way it's making these changes, we see these  
20 distinct bands. It's actually a very clean environment.  
21 It was a clean field.

22 And we -- things were coming down to becoming  
23 even cleaner during the kicking activity. The middle  
24 figure here shows that things were changing. The change  
25 had dropped down in the middle of the kicking activity,

1 came back up again, but we were seeing roughly the same on  
2 or off the field types of responses from the instrument.

3 And on the furthest on our right here, that  
4 figure was quite a dirty day. And we see things that were  
5 gradually increasing throughout the day. And we see the  
6 same rough numbers on or off of the field.

7 --o0o--

8 DR. DELP: We take all of the data, and we -- so  
9 I took all of the data that was available using all of my  
10 PM2.5 instruments. And I did hourly averages on the  
11 real-time instruments. And so I had five different  
12 potential averaging periods. The one hour for the  
13 pre-kicking. I had the three different hours for the  
14 kicking activities. Then I had the one hour for the  
15 post-kicking.

16 And I'm plotting here on the off-field  
17 measurement is on the X axis, and then the on-field  
18 measurements are on the Y axis.

19 From what the one-to-one line is shown in the  
20 middle, and then I've got a gray band here that's  
21 representing a plus or minus 25 percent band from that.  
22 And for the DustTrak's, I was getting a little bit of  
23 variability where it was showing that I'm on the -- it  
24 perhaps a bit higher, somewhere in the, you know, a little  
25 bit to 25 percent higher off the field than it was on the

1 field.

2           Using the other instruments, we don't quite see  
3 that same behavior. It looks more like they're much  
4 closer and clustered around the one-to-one line.

5                               --o0o--

6           DR. DELP: We move on to a particle counter. You  
7 know another particle counter assumes that we had our  
8 MetOne instruments that were on the vertical stack, we had  
9 one 18 inches above the deck, we had one at 35 inches, and  
10 we had one at 60 inches.

11                              --o0o--

12           DR. DELP: This is showing a profile for a single  
13 bin, the 0.4 to 0.5 micron size range for all of those.  
14 And we don't have anything for the one grid there, but all  
15 the others we do. We also are missing a couple of,  
16 because as Randy said, this was out in the field. I think  
17 one of the instruments got kicked one time, so we lost  
18 data for one of them.

19           But for the most part, we see a slight trend in  
20 the numbers, you know. At this point in state, I can say  
21 that it looks like the numbers are slightly higher down  
22 low than they are a little bit less as we move up on the  
23 stack.

24                              --o0o--

25           DR. DELP: And taking that same one-to-one

1 approach - so I've done an hourly averaging on the numbers  
2 - and this sort of shows that for that same particle size  
3 bin, the 0.4 to 0.5 microns, that at 60 inches up, they're  
4 approximately 25 percent lower than they were at 18  
5 inches.

6 --o0o--

7 DR. DELP: If I look at all the size bins from  
8 that same instrument, we see that behavior on the smaller  
9 channels, but not as much on the larger channels.

10 --o0o--

11 DR. DELP: And if we take the same instrument you  
12 can come up with an estimated mass, if we assume spherical  
13 particles, if we assume a density with it -- you know, I  
14 think I did assume a density of 1.6 grams per CC, which is  
15 what people use oftentimes if you don't know anything  
16 about the stuff that you're dealing with.

17 But I see the same sort of trend that, you know,  
18 the estimated mass would show that -- with this that it's  
19 a little bit higher down at 18 inches than it is at 60  
20 inches.

21 --o0o--

22 DR. DELP: I'd like to close-out with this, that  
23 we clearly see we're moving stuff around. Randy is --

24 DR. MADDALENA: Those aren't my feet.

25 (Laughter.)

1 DR. DELP: I hope he's washed them since then,  
2 but -- but the videos also clearly showed that the crumb  
3 was being moved with the kicking, you know, the players  
4 feet here showing that the stuff was definitely moving  
5 around. But also on the little pictures of the trays of  
6 the crumb, you know, this crumb size is pretty large from  
7 an aerosolized point of view.

8 We're talking about stuff that's probably in the  
9 millimeter size range rather than, you know, a respirable  
10 size range.

11 So I think that's it.

12 --o0o--

13 DR. DELP: Moving it on.

14 ADVISORY PANEL MEMBER KYLE: If I may?

15 CHAIRPERSON BALMES: You may.

16 ADVISORY PANEL MEMBER KYLE: I think we need to  
17 just repeat that point for people who maybe are not hip to  
18 the lingo here. Would you like to do that or would you  
19 like me to try to do that?

20 Because, I mean, I think -- maybe I'll try to do  
21 it. That these particle monitoring gizmos are measuring  
22 small particles of the size that might get into your  
23 lungs, and were a relatively -- it's the smaller part of  
24 particles that come up in the air, and a lot of the crumb  
25 rubber is bigger than that.

1           And so you wouldn't expect it to be picked up  
2 here necessarily, correct?

3           DR. DELP: We're -- what we -- well, it's  
4 generally referred to as respirable size ranges is 2.5  
5 micron or lower. Our instrument -- we had instruments  
6 that were measured -- okay. Deep recesses. We'll get  
7 those in the upper. Okay. Sorry. Okay.

8           We are -- we're measuring -- we're measuring up  
9 20 mic -- we're measuring up to 20 microns with the APS at  
10 the on-field. We were using the OPCs that would give us  
11 size information -- size result information.

12           Now, the largest bin goes from 2.5 micron to 10  
13 micron. And our gravimetric samples had a 2.5 micron cut  
14 on them. So we are measuring things that are -- that  
15 would cover what are common respirable ranges. But -- so  
16 -- you're correct in that what we normally think of as the  
17 largest risks are the smaller size particles, which is --  
18 sorry, I don't want to --

19           CHAIRPERSON BALMES: To correct you, respirable  
20 fraction is 10 microns and less, so -- but between 10 and  
21 2.5, you get deposition below the vocal chords. And for  
22 somebody with asthma, what deposits on the airways is  
23 actually very important. But, you know, the size that  
24 gets into the alveoli, the deep lung, is 2.5 and less.

25           ADVISORY PANEL MEMBER KYLE: And if I may, but my

1 point is that I think it could be obscure to people who  
2 are not hip to this whole discussion. And I didn't mean  
3 to get into the respirable argument, only into the --  
4 we're measuring relatively small particles that we think  
5 about when we look at air pollution, and not the bigger  
6 particles, which could also be bouncing around as we saw  
7 in the video.

8           So we don't want people to think that we think  
9 that there's actually necessarily less particles on the  
10 field, because we're only measuring very small ones, you  
11 know, compared to elsewhere. And the very small ones  
12 elsewhere could be because it's a parking lot, right, you  
13 know?

14           So, you know, I think that you're -- you're --  
15 this is a very elegant presentation, and I appreciate it,  
16 and I think I got most of it. But the way you talk about  
17 it excludes those non-measured larger parts of the crumb  
18 rubber that are also flying around. And I just wanted to  
19 bring that point out for people who may not have studied  
20 this as much.

21           CHAIRPERSON BALMES: So with that, I'm opening up  
22 to the Panel for any comments or questions.

23           Dr. Eckel.

24           ADVISORY PANEL MEMBER ECKEL: Excellent. There  
25 we go.

1           Thank you. Okay. So -- again, so data is very  
2 exciting. I'm very excited. So I have a couple of  
3 questions. To start things off, I really like the  
4 stratified sampling design that you had, the randomized  
5 stratified sampling design. And, you know, that's a  
6 really strong design for getting representation of the  
7 fields across the state. So I think that's excellent.

8           And you did mention a little bit, especially for  
9 regions four and five, which I understand it was very hard  
10 to get samples in the small number of fields to draw from.  
11 You mentioned a little bit that it was hard to get owners  
12 of fields to agree to participate. I was wondering if you  
13 could comment a little bit more on whether or not you  
14 actually looked at potential non-response bias, or people  
15 refusing? Were there certain characteristics of field  
16 owners who didn't want to participate to give us some  
17 sense of generalizable this sample is, you know, even  
18 though it was a randomized design. Some people chose to  
19 participate, some people didn't. You know, that might be  
20 something to look at in the future.

21           DR. WONG: Definitely. We haven't got to that,  
22 but we did just kind of bring back our memory when we  
23 recruit. There's a lot of public entity refuse to or they  
24 don't have time to participate, because the field usually  
25 are very highly frequently used. So we have to respect

1 people who do not allow us to go.

2           We -- I don't remember any specific pattern.  
3 Especially, most of the field are very expensive. They're  
4 owned by schools, city, not individual kind of mom and pop  
5 shop. So they are all kind of public field that we --  
6 community field we sample. In our database, we have only  
7 field that are -- go through the process of CalRecycle to  
8 get the funding, or we have the biggest installer who  
9 provide us the database.

10           So these are all community public access or  
11 school access kind of field. We will definitely look at  
12 the data when we get down to that level.

13           ADVISORY PANEL MEMBER ECKEL: Thank you. And let  
14 me ask just a few other kind of brief questions. I mean,  
15 these are sort of outside my area of expertise, and so  
16 others might comment more on this.

17           But at one point we had the wind -- beautiful  
18 wind roses, and you mentioned the location of the sampling  
19 unit. And I was wondering was that the sort of sampling  
20 units right around the net, and where was the off-field  
21 location relative to those and...

22           DR. MADDALENA: Yeah, the green globe, the  
23 sampling location relative to wind rose was the -- what we  
24 call the experimental unit, which is kind of dictated by  
25 the net. So in a perfect world, the opening of the net

1 would be facing into the largest fastest bar, and we got  
2 close. I mean, we got close a lot of the times. The  
3 off-field, the sense that how well we did on that  
4 placement of the net also gives you a sense of how well we  
5 did on off-field, because we, in advance, decided the  
6 direction of the wind, and we would try and get the  
7 off-field upwind of the field -- the off-field location  
8 upwind of the field.

9           There were a lot of factors that came into that.  
10 Availability of power was one. Safety was one. You know,  
11 security, we didn't want things leaving when they're not  
12 visually available to look at.

13           So those things affected a little bit, but in  
14 general, the green dot -- how well we did on the green dot  
15 is also how well we did on the off-field, because if we  
16 got the wind wrong, we put it in the wrong place. But, in  
17 general, we did pretty good, so.

18           ADVISORY PANEL MEMBER ECKEL: And then as sort of  
19 a related question also, the sampling was five hours long.  
20 Did you try to always start around the same time of day,  
21 because I know there's diurnal patterns in these  
22 exposures.

23           DR. MADDALENA: Within an hour, I think we  
24 shifted roughly an hour over the course of the entire  
25 study. So we did try and start, in general, at the same

1 time of day. There was a factor involved. You know, we  
2 didn't want to -- we wanted to capture the warm part of  
3 the day, but we also didn't want to overstress the  
4 subjects that we were using, so we tried to captured the  
5 active period sometimes ending around noon, in the most  
6 part. So, yeah.

7           ADVISORY PANEL MEMBER ECKEL: Great. Thank you.  
8 And then one minor question is it was on one of the slides  
9 you showed the pictures of all the samples. And I was  
10 wondering, is it possible to tell us which of those were  
11 the cork and rubber mixture? Because, you know, it looked  
12 like perhaps maybe there was sand or something. But some  
13 of them looked like they were mixed colors and some looked  
14 pretty black. And I know that there were two, the cork  
15 and rubber ones.

16           DR. WONG: Yeah, the appearance of the sample we  
17 collected is very diverse. We have blades in it. Some of  
18 the field the blades are broken down. Some are the  
19 earlier younger, field is broken down. Some are older.  
20 They had more debris. It depends on how well the field  
21 are maintained.

22           We have leaves. We have all kind of debris. But  
23 also, sand -- some of the field are fully rubber, some are  
24 sand mix. So we did hit a diverse spectrum of the infill  
25 we can see.

1           ADVISORY PANEL MEMBER ECKEL: All right. And my  
2 final comment is more on this statistical analysis. So I  
3 can see that we have really rich data within field, you  
4 know, looking at this temporal and spatial variability,  
5 and that's very exciting. But I know with sort of this  
6 stratified, you know, factorial design of sampling, I'm  
7 hoping we can also do some across-field comparisons. I  
8 know our sample size is limited, but I'd be very curious  
9 to see some analyses looking at whether the age of the  
10 field has an impact on some of these quantities that are  
11 being measured and also, you know, region.

12           You know, I know it's going to be very hard to  
13 tell region four and five from the others, because there's  
14 only two fields in that strata, but...

15           DR. WONG: Yeah, definitely. We -- that's the  
16 purpose of stratifying, and getting a visual picture as  
17 well. We're going to combine our data even within a  
18 region that's -- sometimes, there's a diversity in the  
19 geography. So we do have the locations, so we can compare  
20 and see the ocean coastal versus the high mountain,  
21 different comparisons.

22           ADVISORY PANEL MEMBER ECKEL: Thank you.

23           CHAIRPERSON BALMES: Thank you, Dr. Eckel.

24           I should have said at the start of this that  
25 staff would really like us to focus on the discussion

1 questions that are above. They also welcome any other  
2 comments, so I'm not -- I'm not chastising you in any way.  
3 Those were good questions, but I want to make sure that we  
4 do at least address the staff questions as well.

5 So, Dr. Bennett, do you have anything too you  
6 want to say at this point?

7 ADVISORY PANEL MEMBER BENNETT: I do have some  
8 questions, but I didn't. I don't have time to switch them  
9 to make sure they match the discussion questions.

10 CHAIRPERSON BALMES: Oh, that's okay.

11 (Laughter.)

12 ADVISORY PANEL MEMBER BENNETT: I'm not that  
13 fast.

14 I just had a question on the temperature  
15 distributions. In October, it looked like that was the  
16 hottest date, but did you tend to have quite a few days in  
17 October that were sort of warm like over 75 at noon or...

18 DR. MADDALENA: I mean, we'll be able to say that  
19 with a lot of precision, because we have the temperature  
20 data. But just qualitatively, yes, it was hot.

21 ADVISORY PANEL MEMBER BENNETT: Okay. Great.

22 DR. MADDALENA: It was generally hot.

23 ADVISORY PANEL MEMBER BENNETT: I was slightly  
24 confused on the temperature distributions on the Y axis,  
25 because it didn't seem like they were absolute

1 temperatures. It just seemed like it was --

2 DR. MADDALENA: Yeah, we wanted to show you  
3 trends without kind of muddying the water of getting in a  
4 conversation about a single field. So essentially, I  
5 wanted to really focus on the trends at that point.

6 ADVISORY PANEL MEMBER BENNETT: Okay. Great.  
7 Thank you. And then on the infill density, is that -- it  
8 seems like it would be interesting to see if the denser  
9 ones was correlated with the older fields. Is that  
10 something that you looked at or were thinking of looking  
11 at?

12 DR. MADDALENA: I haven't looked at that yet.  
13 We're looking in the chemical side right now. Pretty  
14 buried in that, so...

15 ADVISORY PANEL MEMBER BENNETT: Okay. Great.  
16 Thanks.

17 Oh, I was curious, on the concentrations being  
18 lower -- or, I'm sorry, being higher closer to the field,  
19 especially given that some of these were the really small  
20 size fractions, and also that you saw the trend of being a  
21 stronger vertical gradient on these really small  
22 particles. And so are we thinking that there's like some  
23 kind of secondary reactions going on or what do we think?

24 DR. DELP: It's too soon to tell for sure.

25 ADVISORY PANEL MEMBER BENNETT: Okay.

1 DR. DELP: If there were secondary reactions  
2 going on, I would anticipate that trend to go down as we  
3 got into dirtier ambient air. So if -- because then the  
4 secondary -- secondary reactions that are going on, that  
5 are the formation of the particles, you would anticipate  
6 to be closer to a fixed sort of like source term.

7 And if we're putting a fixed source term into a  
8 dirtier blob of air --

9 ADVISORY PANEL MEMBER BENNETT: Right.

10 DR. DELP: -- we'd expect to see less of a  
11 change. So that's something that, you know, was on our  
12 list to look into more.

13 ADVISORY PANEL MEMBER BENNETT: Great. And then  
14 I'll go -- I'll look at these discussion questions and  
15 raise my hand again later after that.

16 CHAIRPERSON BALMES: Thanks, Dr. Bennett. Dr.  
17 Sheldon, do you have any comments at this point?

18 ADVISORY PANEL MEMBER SHELDON: Yeah. Actually,  
19 the visual data that you showed was very interesting, both  
20 Randy's feet and --

21 (Laughter.)

22 ADVISORY PANEL MEMBER SHELDON: No, no, no -- and  
23 the ball kicking -- when the ball hit the turf, and also  
24 when somebody kicked the turf. What I have seen with  
25 house dust is it's the much smaller particles that adhere

1 to the skin, which was what we were seeing on your legs.  
2 Also, the much smaller particles tend to have a different  
3 chemical composition. And, you know, I know this can add  
4 a whole new level of complexity. And I don't know how you  
5 reconcile that.

6           But I think that there needs to be, given the  
7 human exposure both inhalation and dermal uptake, some  
8 kind of consideration of what particle sizes are going to  
9 adhere and be exposed to most. The second thing was, with  
10 the ball with the ball hitting the ground or the person  
11 kicking the ground, that seemed to be a very localized  
12 kind of cloud that went up in the air.

13           And again, I sort of am a little reluctant to  
14 bring these things up, because it adds a lot more  
15 complexity, because where you're monitoring is not close  
16 to where that is occurring. I think it provides very good  
17 and useful data. But how do we -- you know, it's a thing  
18 to think about, and not to do, but how -- how can -- it's  
19 under this for the purpose of evaluating exposure. You  
20 know, how do you evaluate that better? I don't have  
21 answers. It is very complex.

22           Do you have thoughts?

23           DR. MADDALENA: Yeah, I appreciate you bringing  
24 that up, because, you know, our goal was to get the  
25 measurement of exposure concentrations as close to the

1 receptor as we could. But for obvious reasons, we could  
2 not get closer than the outside of the net --

3 ADVISORY PANEL MEMBER SHELDON: Right, other than  
4 your feet.

5 DR. MADDALENA: -- and still have equipment to  
6 work with.

7 (Laughter.)

8 DR. MADDALENA: So, yeah, that's a very good  
9 point. And both points actually, the size issue -- I  
10 mean, the visually seeing the crumb being stirred up is  
11 what, you know, is a really strong visual image.

12 ADVISORY PANEL MEMBER SHELDON: Yeah.

13 DR. MADDALENA: But as aerosol scientists, I  
14 think we're fairly comfortable that those things we see  
15 are falling right back down to the ground, and they're  
16 not -- they're not participating necessarily in the  
17 exposure pathway. But the smaller things that we don't  
18 see may be. And did we capture those or can we -- can we  
19 relate what we did capture to what those are likely to be?

20 CHAIRPERSON BALMES: And just to clarify, the  
21 particles that you saw on whosever feet they were, those  
22 are also as big particles. They may have small ones.

23 ADVISORY PANEL MEMBER SHELDON: But they are  
24 adhering to the skin --

25 CHAIRPERSON BALMES: But they're --

1           ADVISORY PANEL MEMBER SHELDON:  -- which provides  
2 an opportunity for dermal exposure.

3           CHAIRPERSON BALMES:  But they're big.

4           ADVISORY PANEL MEMBER SHELDON:  Yeah.  Well,  
5 they're not -- they're not -- they're not, yes, respirable  
6 or inhalable, but they are what is -- what is there.  Did  
7 you ever have people who were diving on the ground during  
8 this, they were just kicking?

9           DR. MADDALENA:  That actually -- that's actually  
10 an activity pattern.  We did.  Yeah.

11          ADVISORY PANEL MEMBER SHELDON:  Okay.

12          DR. MADDALENA:  We had sliding, and diving, and  
13 what do they call it when you go upside down and kick.  I  
14 mean, they were just having a blast.

15          ADVISORY PANEL MEMBER SHELDON:  Right, right.  
16 Okay.

17          DR. MADDALENA:  And we paid them to do it and  
18 they still had fun.  It was great.

19          ADVISORY PANEL MEMBER SHELDON:  Of course, that  
20 would reflect maybe personal exposure.  It wouldn't  
21 reflect so much what's there, because that's where it  
22 kicks back.

23          DR. MADDALENA:  Yeah, so our goal was activity,  
24 energy into that service.

25          ADVISORY PANEL MEMBER SHELDON:  Yeah.  No, I

1 understand, but -- okay.

2 CHAIRPERSON BALMES: In terms of the diving, you  
3 know, my son was a goalie in soccer, it really improved  
4 his ability as a short stop in terms of diving.

5 ADVISORY PANEL MEMBER SHELDON: There you go.

6 (Laughter.)

7 CHAIRPERSON BALMES: No, I'm -- not at this  
8 point. So maybe I'll start with Dr. McKone. Do you --  
9 Okay.

10 ADVISORY PANEL MEMBER MCKONE: So I'm going to  
11 focus directly on the questions and help you out. And the  
12 first one, on question number one, there was one thing.  
13 So you said you reversed the wind rose, right? Because  
14 typically it would -- in your presentation, you reversed.

15 I mean, the standard wind rose shows where the  
16 wind is coming from. But you -- and I know everybody gets  
17 totally confused when they see those, because they  
18 immediately interpret it as where the wind is going. So I  
19 think that's a great idea for presenting this.

20 But then, on the other hand, you have to be  
21 careful. I think you have to put a warning there, because  
22 anyone who knows meteorology or does air dispersion will  
23 say this guy has got it wrong. You know, they're talking  
24 about the wind blowing in -- I mean, just to be careful.

25 DR. MADDALENA: It's a great idea. We realized

1 that that was a mistake and we couldn't fix it in time,  
2 because as I put all the green globes on there, I'm like I  
3 got them all wrong. This is crazy. And then I -- we  
4 realized it was an instrument interpretation.

5           ADVISORY PANEL MEMBER MCKONE: Right. So you  
6 just have to make clear to people what -- because for  
7 those who know, it's going to be confusing. For those who  
8 don't, they're going to go, oh, that makes sense. You  
9 know, this is where the wind is going. Okay. Minor.

10           And then on figure 46, sorry, I take you away  
11 from the questions. But this is about the other two  
12 questions about interpretation and binning. So I thought  
13 I would -- so figure 46 is the one with the -- it's like  
14 this, only the other one, or slide -- yeah, this one.

15           So when you -- when you get to this question of  
16 whether you can start aggregating things, so this is --  
17 it's very interesting, because, I mean, to me, I just --  
18 one of the things I see in this, if I'm not overreading it  
19 is, is as the PM concentrations get higher, you get a  
20 little tighter fit, right? And those are likely to be  
21 place -- I don't -- I'm guessing those might be places  
22 where the background is contributing a lot, because  
23 otherwise -- I mean, those -- those sites stand out.

24           But I'm not sure it's because they're dirtiest  
25 sites in terms of the emission from the field. So if it's

1 possible to begin -- and it makes sense, because you would  
2 see less variability where the levels are driven more by  
3 background, right? And you'd see a lot more variability  
4 down on the left, right, lower left, where the background  
5 is pretty clean air. So you're really picking up.

6           And I think that might be something you can use  
7 to begin -- it deals with this discussion point about are  
8 there ways to aggregate fields. And I think you might  
9 take this diagram and see where there's sort of an  
10 inflection point or a change, where there's less  
11 variability and more variability and start commenting  
12 about what that -- or speculating what that might be.

13           And again, I think it is background. I don't  
14 think -- you know, from what you've seen, I don't know how  
15 the crumb -- stirring up the dust can actually suddenly  
16 stand out and go way to 100, you know, near close to  
17 whatever that is, 50 micrograms per cubic meter. I think  
18 you have to be in an air district where that might be  
19 happening, where somebody is burning wood nearby, or  
20 something like that.

21           And I think I'll quit. That was the -- those are  
22 the two -- I mean, that one is basically discussion points  
23 two and three which were about better ways to aggregate  
24 among the different sites, and then interpretation of the  
25 data. So I think this one is one that has some

1 opportunity, and I'll focus on that one and not go  
2 anywhere else.

3 CHAIRPERSON BALMES: So before -- no, could you  
4 keep that one up, 46. So the question I had it follows my  
5 interruption during your presentation, so that the  
6 DustTrak, MetOne, have you actually co --  
7 cross-calibrated, thank you.

8 DR. DELP: I have and we -- I would -- the slide  
9 didn't make the cut, but we had some attempts to do  
10 cross-calibrations using the gravimetric sample as the  
11 gold standard. And we see the deeper you always go with  
12 trying to compare particle instruments, the more -- it can  
13 be an exercise in frustration at times. I mean, we see  
14 different calibration constants -- calibration  
15 coefficients that would apply for different fields.

16 And so generally as other people have seen the  
17 DustTrak's were reporting higher in the vicinity of around  
18 a factor of 2. I mean, it's calibrated to an Arizona road  
19 dust. The MetOne instrument is calibrated to a PSL  
20 standard. It's a -- it uses a different scattering angle.  
21 And it's generally closer to what the gravimetric sample  
22 is.

23 But so -- and the plot on this one is showing the  
24 as-reported values. There was no attempt to do  
25 cross-calibrations on them yet.

1 CHAIRPERSON BALMES: Thank you.

2 Dr. Kyle.

3 Oh.

4 ADVISORY PANEL MEMBER ECKEL: One quick comment  
5 while we're still on this slide. One sensitivity analysis  
6 might be nice to see related to this kind of figure would  
7 be to maybe subset to those fields where you had the wind  
8 placement right to see if the signal is stronger or just  
9 as an idea.

10 CHAIRPERSON BALMES: Dr. Bennett.

11 ADVISORY PANEL MEMBER BENNETT: In terms of the  
12 equipment, I was also -- I forgot to ask this earlier.  
13 Did you -- were the two DustTrak's always the same upwind  
14 and the same downwind? And was their evaluation of the  
15 two of them side by side?

16 DR. DELP: The same instrument was used in each  
17 location each time. And at one point, you know, I've just  
18 got to come right out and say it, Randy is bad with  
19 instruments. He can kill any instrument. He killed one  
20 of the DustTrak's that happened --

21 CHAIRPERSON BALMES: Oh, he's the one that kicked  
22 it?

23 (Laughter.)

24 DR. DELP: We never do know what happens with  
25 Randy whenever he grabs the instruments.

1 (Laughter.)

2 DR. DELP: We had the -- one of the instruments  
3 went out about halfway through the period, and it happened  
4 to be one of the off-field DustTrak's. And I saw this  
5 same response, you know, with the two different DustTrak's  
6 there. And we do have periods of time where they were  
7 located side by side I believe in a lab at LBL.

8 And we haven't had the chance to go back and  
9 really look in detail at those side-by-side data points.  
10 But it's on the -- it's on my list.

11 DR. MADDALENA: Yeah, I'll just -- for my own  
12 defense, I don't always break instruments.

13 (Laughter.)

14 DR. MADDALENA: But we did purposely co-deploy  
15 all of the instruments at different conditions to try and  
16 get this cross-calibration issue worked out. So, yeah.

17 CHAIRPERSON BALMES: Dr. Kyle. Thank you for  
18 being patient.

19 ADVISORY PANEL MEMBER KYLE: You're welcome. I  
20 have four kind of somewhat random comments. And one of  
21 them is just a presentation one, and it's the picture with  
22 the green dots. And I also I loved the visual  
23 presentation of this, except for one thing, which I'll get  
24 to in a minute.

25 But I wonder what this would look like if you put

1 all the dots aligned in the same direction, so that you  
2 could actually compare these. I mean, because I can't  
3 compare these in my mind, because there's too many  
4 directions of the dots. So that's just a comment about  
5 how can we make -- help distill yet another picture from  
6 this. And I agree with what Tom said about the wind rose,  
7 blah, blah, blah, so I won't go into that.

8           Then my second thing is -- this is a bigger  
9 question, but I think the presentation in this work has a  
10 little bit, I don't want to say obscured, but maybe not  
11 brought forward enough. This issue of what we're talking  
12 about here I think is direct impact of particles that are  
13 relevant to respiration, right?

14           That's really what this is trying to measure.  
15 And that's part of it, but there are other ways to look at  
16 it too. So in presenting this, I think you could just be  
17 a little clearer about what piece of this it is, because  
18 it's not really Measuring necessarily the particles that  
19 adhere and take home, which I think are the larger ones,  
20 you know, in contrast to the comment about the indoor  
21 dust. Maybe it's the smaller ones that adhere.

22           The particles people are worried about are the  
23 ones that are still in their clothes when they get home,  
24 you know. So I mean that could be true or false, but it's  
25 not what you're looking at here. So something about

1 separating out different parts of this particle  
2 discussion, I think will be helpful to people  
3 understanding what you're talking about in different parts  
4 of the study that all sound a little bit the same and  
5 they're not. Does that make sense? That's kind of an  
6 overarching comment.

7 All right. And then my next thing is, well, how  
8 to analyze this. So you have all these pictures with all  
9 the fields, which are cool. You don't have any pictures  
10 with all the stuff about one field, right? So you have  
11 all these pictures that are -- that show the differ --  
12 what you're seeing across the range of fields you call it,  
13 which is actually just all the fields.

14 But we don't -- we're not looking at how anything  
15 is related for a field in here. And so that's what I  
16 would do next is pull this apart and take all the slides  
17 for a few fields and see what that looked like.

18 And until I do that, I can't talk to you about  
19 how to aggregate, because I can't see that next step. So  
20 that's my reaction. I don't know. And we haven't talked  
21 about exactly what your outcome variables are here anyway,  
22 right? I mean, how you're going to -- assuming at some  
23 point, there will be some sort of multivariate model that  
24 you'll look at.

25 What are the outcome variables to that be --

1 going to be in terms of different things that you're  
2 representing visually here. That would be another thing  
3 just -- I'm sure you've thought of this already, but to  
4 try to distill and maybe share to help us think about, you  
5 know, what -- what's occurring to you as you've looked at  
6 this in this way, and probably other ways that you haven't  
7 yet shown us, because it's not done blah, blah, blah. So  
8 that's where I would go to try to figure out what to do  
9 about aggregating and further work.

10           And then another -- this is just a worry I have.  
11 And that is you excluded all the water, but what if water  
12 matters, or are we sure that it doesn't? Because you want  
13 to -- didn't get -- want to get your instruments wet and  
14 everything.

15           I understand all that. But are we -- there's  
16 some suggestion in some studies that water matters in  
17 this. And so I'm -- I'm a little -- just I raise that as  
18 something we've excluded here. Maybe it doesn't matter  
19 for particles or, you know, I don't know, but that is one  
20 thing -- that's a question.

21           DR. MADDALENA: Yeah, it's a good questions. We  
22 didn't necessary exclude water. Wet surfaces were okay.  
23 We started often when the surfaces were still wet, and  
24 they dried throughout the day. We just excluded rain for  
25 the obvious reason.

1           ADVISOR PANEL MEMBER KYLE: Yes.

2           DR. MADDALENA: We tried to do avoid that as --  
3 at all costs. So, yeah, so that's a good point though as  
4 far as the water. And that pathway is important. Often,  
5 it's an ecological pathway and not a human pathway, the  
6 water runoff. But other studies are delving into that, I  
7 think.

8           ADVISORY PANEL MEMBER KYLE: Yeah. So, okay.

9           DR. WONG: So in response to the larger particle,  
10 I want to bring a broader view here, the particle that we  
11 sample in the air may are mainly cover from the inhalation  
12 pathway, but we also collecting sample raw from the field  
13 from multiple locations spread out in each field. And  
14 those are being looked at, and we will definitely cover  
15 the larger particle or smaller particle from those sample  
16 actually. That is potential for dermal adhesion, for  
17 inhalation ingestion pathway even at that level.

18           So we are not -- not looking at it, but it will  
19 go as the presentation today. You will hear more about  
20 these -- the behavior of these larger particles that we  
21 are being analyzed -- that are being analyzed.

22           And also, we are also collecting relative  
23 humidity data in the field. So it does have an impact on  
24 how particle suspend, how the other behavior of VOC, so I  
25 want to make sure that it's out here to we discussed as

1 well.

2           ADVISORY PANEL MEMBER KYLE: No. Thank you for  
3 that. And I didn't mean to suggest that it's not being  
4 done. It's just that the way this is talked about I think  
5 is confusing about this is one piece and there's another  
6 piece over here. So, you know, I'm trying to speak to our  
7 public audience too about how can we explain this in ways  
8 that tend to de-confuse rather than confuse. That's  
9 really what that came from.

10           So thank you.

11           DR. WONG: Appreciate.

12           ADVISORY PANEL MEMBER KYLE: I did look through  
13 the rest of the materials.

14           (Laughter.)

15           DR. WONG: Appreciate that.

16           CHAIRPERSON BALMES: Mr. Avol.

17           ADVISORY PANEL MEMBER AVOL: I have several pages  
18 of comments actually, which I won't share with you in the  
19 interest of time, because I've been warned by the Chair  
20 that we're trying to keep this moving.

21           But, I mean, addressing the discussion questions.  
22 So, first, I think there's an important aspect of this  
23 that we all want to consider, which is that we want to  
24 have the technical details provided in the report, so  
25 people can follow the information and interpret it. We

1 also need to have it in a way that's understandable by the  
2 public, that they can actually read this, and get the  
3 information from it.

4           And I think there are a lot of -- right now, on  
5 the materials that were provided in the meeting, there are  
6 a lot inconsistencies in the report. And I'll provide you  
7 with the documentation, at least what I thought were  
8 inconsistencies that just need to be resolved. And so in  
9 terms of the presentations that have been done today, I  
10 just have a couple of questions.

11           One is with regard to the age of the field and  
12 the exclusion or inclusion criteria, you spoke a little  
13 about bit that. You said that there was there were no  
14 fields that were included that were less than at least a  
15 year old. And I just raise the issue for you. I know  
16 we're not going to go back in sampling.

17           And parenthetically, I just want to say I've very  
18 impressed by the amount of sampling that was done and the  
19 difficulty to do those. So I appreciate all the work that  
20 is in the field to get this done.

21           That not withstanding however, you did not sample  
22 any new fields that was less than a year old. And I just  
23 offer for you consideration that, you know, in the indoor  
24 sampling world for air pollution, for example, one might  
25 be concerned with a sick building syndrome type thing,

1 where fresh materials outgas at higher rates until they  
2 reach some period of equilibrium. And I don't know that  
3 that happens or doesn't happen on a newly deployed field.

4 But, I mean, it's quite possible that it could  
5 and you don't have the -- you know, we can't face that  
6 here, so we don't know. But there certainly are fields  
7 out there that are, you know, within a year of age. So I  
8 just offer that.

9 You made a lot of measurements with regard to  
10 temperature variation and, you know, wind direction, wind  
11 speed and so forth. It would be useful in the report, if  
12 it's possible, to relate that to whether these are  
13 representative of temperature and weather patterns in the  
14 last couple of years, if this was a -- you know, an  
15 outlier type of year. I mean, how does this fit into the  
16 range of information? As it -- because people are going  
17 to try to take this and use this. And so the question is  
18 how does it fit in with what we are likely to encounter in  
19 the scheme of things?

20 And on the issue of temperature while on it, I  
21 was sort of surprised. You know, anecdotally, we've  
22 always seen -- we've seen reports about, you know, very  
23 high temperatures at the field, 120, 140 degrees. I've  
24 even heard from professional players 150 degrees on the  
25 field on hot days. And it doesn't seem -- again, it's a

1 function of where you are on the field, but I assume,  
2 because you're talking about the air temperature, even up  
3 to 111 seems like it's pretty low compared to the kinds of  
4 air temperatures that are seen and that will relate to  
5 outgassing, and potential chemical interactions.

6           So I'm not sure how that gets played out. But  
7 again, it comes back to the description in the report, as  
8 to how it's -- you know, how that information is related.

9           Similarly, your video that you showed were very  
10 interesting, and looked like they were all men or young  
11 men that were doing that sort of activity that you did.  
12 And I don't know if there's a range of ages, height,  
13 weight, sex, et cetera. And so I'm trying to understand  
14 this, and if there are even different patterns of  
15 behavior. Maybe at the activity portion of it we would  
16 capture some of that, but it's worth thinking about.

17           Your particle size information is very  
18 fascinating, and there's going to be, you know, probably  
19 years of data to look at with regard to that. But I just  
20 would note that you don't have anything smaller than 0.3.  
21 And there's a lot of concern about smaller particle sizes.  
22 And, you know, the things -- everybody has been talking  
23 about the things you can see, and what sticks to you. I'm  
24 actually worried about the things you can't see that  
25 people breathe. And so I don't know what -- you know, how

1 we do that, but I think that's an unmet need in terms of  
2 Patty's comment about where we go from here, and what --  
3 you know, what we think about what might be in the future.

4           Because there's so much variability in terms of  
5 wind speed, wind direction, temperature, et cetera, field  
6 to field, it's for hard me to grasp how you're going to  
7 compare this across fields. And so I think Amy is exactly  
8 right, you know, some paradigm whether we try to sort of  
9 refocus this and look at it from a different dimension.

10           It's hard for me to think about how you compare  
11 them, because they're all sort of unique individual  
12 experiments to look at the data. And in your description,  
13 you talked -- in the slides and in your verbal description  
14 you talked about larger, smaller, clean, et cetera. But  
15 those are not defined terminologies. And so, if you're  
16 going to use those terminologies, especially in the  
17 report, I think you need to define it, because you can  
18 consider -- what some might consider large or small  
19 particles are very different, depending on who you're  
20 talking to. And clean is a real problem for many  
21 researchers. And so I think we've just got to be careful  
22 about how we call that.

23           And then again finally, I think it's a little  
24 misleading to provide these plots. I understand why you  
25 do that and I appreciate it. The data is there, but I

1 think it's a little misleading to have the plots of  
2 different kinds of instruments that are not  
3 cross-calibrated, so that you're not comparing -- you  
4 know, not comparing sort of apples to apples. It's hard  
5 for me to conclude. So are we seeing smaller particles or  
6 large particles over this range or is it just because the  
7 different instrument, you know, how it relates.

8           So if it is at all -- I would encourage you to  
9 look at the gravimetric data from the PEMs and see if  
10 there's some way to sort of adjust these or maybe even do a  
11 post calibration of instrumentation, because I think often  
12 what happens is the factor sort of does move data up or  
13 down and may change the way we think about the data that's  
14 been presented. I mean, it's a tremendous amount of data,  
15 and tremendous data set just trying to understand how to  
16 interpret it, I think is an issue.

17           Thank you.

18           CHAIRPERSON BALMES: Any comments, Patty, before  
19 we move on?

20           DR. WONG: Just a few quick comment to address  
21 Mr. Avol's comments. We do sample -- we did have sample  
22 field that are less than one year old. The reason it  
23 wasn't shown on the bar graph, because that was the crumb  
24 mix field. And the bar graph wasn't for that purpose. So  
25 we did, in our database in the last year, there's no field

1 installed in our database. We had updated.

2 It's an indication that we don't know what  
3 happened, but we just don't have the database. So we did  
4 not sample any full crumb rubber field with less than one  
5 year old, but we have manufacturers sample. Those are  
6 fresh from the tire being shred. And we are looking at  
7 those samples for VOC for all other chemicals as a  
8 supplement.

9 But also the cork field itself has crumb rubber  
10 in it. And that one was only a few months old when we get  
11 there. So we're hoping that that can provide a little bit  
12 more on the data gap.

13 CHAIRPERSON BALMES: Okay. I think we need to  
14 move on to the next presentation

15 --o0o--

16 DR. DESTAILLATS: I guess that's for me. Good  
17 morning.

18 Is this on?

19 Yeah.

20 My name is Hugo Destailats. And I'm going to  
21 describe -- well, we have now two presentations on the  
22 chemical composition. My presentation here will be about  
23 the inorganic constituents of the infill materials.

24 On the title, we have crumb rubber. And in some  
25 of the slides you will see also crumb rubber, but the

1 reality is the material we analyze is the whole infill  
2 material, which is mostly crumb rubber, but also has sand  
3 and all the other various materials that were mentioned  
4 before, and also the other atmospheric deposition. These  
5 fields have been out there for years, and there is a lot  
6 of other stuff there.

7 --o0o--

8 DR. DESTAILLATS: So that said, I wanted to also  
9 acknowledge -- switch here to the title slide properly. I  
10 want to acknowledge our colleagues from OEHHA who actually  
11 did all the sampling on this. And also our LBNL  
12 colleagues, particularly Marion Russell, Sharon Chen, Jin  
13 Pan, and Wenming Dong who did all the extraction and  
14 analysis of these samples.

15 --o0o--

16 DR. DESTAILLATS: As an overview for this  
17 presentation we're going to talk briefly about the sample  
18 collection and handling. Then the three methods that were  
19 used to extract the samples. And then I will show results  
20 for about 19 percent of those samples. We are in the  
21 process of going through these many, many samples. And we  
22 have enough data now to show something that I think is  
23 statistically significant. And then we have some  
24 discussions at the end.

25 --o0o--

1 DR. DESTAILLATS: In terms of the sampling, we --  
2 in each field, we had identified ten locations, which were  
3 all over the field near the goal, where you saw the photos  
4 before with all the equipment, but also farther away in  
5 the middle of the field, et cetera. So we kind of cover  
6 the whole area.

7 In each position, there was an area delineated,  
8 which was about a square meter. And the material that was  
9 collected there was scoped with clean plastic material  
10 into polyethylene bottles. And those bottles were then  
11 staged during the rest of the sampling and then brought  
12 back to the lab, fairly simple.

13 --o0o--

14 DR. DESTAILLATS: And then at the lab we store  
15 them in the dark, and the ambient temperature and humidity  
16 conditions. And we -- from each of the samples that were  
17 analyzed we took fractions of about three grams each that  
18 were placed in the plastic bottles that are shown on the  
19 photo, which are the same plastic bottles that you have  
20 there on your -- in here for -- you know, take a look  
21 later. And those were labeled separately with blind codes  
22 before the analysis. And the analysis was done by ICP-MS,  
23 which is inductively coupled plasma mass spectrometry at  
24 LBNL.

25 --o0o--

1 DR. DESTAILLATS: So briefly about the three  
2 extraction methods that were used. One, first method, was  
3 the EPA 3051A for total digestion, this method essentially  
4 characterizes the total content of any particular  
5 inorganic constituents, and can be used for calculating  
6 oral bioaccessibility.

7 The second method is ASTM F3188. In this case,  
8 there's a specific method designed for synthetic turf,  
9 and -- in the situation in which it is ingested. So he  
10 tries to simulate the gastric condition. And again, this  
11 data is appropriate for oral bioaccessibility  
12 calculations. And the third method is one that we  
13 developed here between our team and OEHHA. And it was  
14 presented and discussed at the previous meetings, so you  
15 probably remember.

16 We had a fully -- a couple of presentations about  
17 this. We used biofluids that were developed from  
18 information in the literature that are commonly used in  
19 pharmaceutical testing. And that simulate physiological  
20 conditions. And again, this method is applicable to the  
21 same oral bioaccessibility measurements.

22 --o0o--

23 DR. DESTAILLATS: So more details about each of  
24 those methods. In the first one, the EPA method, it's  
25 microwave assisted digestion. We use a point gram of each

1 sample. It was dissolved in a mixture of concentrated  
2 nitric and hydrochloric acid. Then the extra was heated  
3 to 175 Celsius for -- the ramp was about 5.5 minutes, and  
4 then was digested for about 10 minutes, and cooled  
5 overnight before being filtered and diluted.

6 And we used different dilution factors,  
7 considering that zinc is an element that was present in a  
8 fairly high concentration. Had to be diluted further, and  
9 then another lower factor for the rest of the elements.

10 Mercury is an element that had to be treated  
11 separately, because it is a well-known problem with  
12 stability of mercury in the samples. So it has to be  
13 add -- gold and salt has to be added to extract before  
14 being processed to stabilize mercury by oxidizing --  
15 oxidizing it to a cation analysis stabilizing solution. So  
16 that additional step was done for mercury, and then we had  
17 a separate round of measurements for mercury itself.

18 --o0o--

19 DR. DESTAILLATS: On the ASTM method, again this  
20 is specifically for methods in synthetic turf that are  
21 ingested, so it's a very applicable method for what we are  
22 looking at here. The conditions of both extraction times,  
23 and temperature and pH, all of them simulate a digestive  
24 process. In this case, we also used point gram 0.2 grams  
25 of each sample, in this case, added to 10 milliliters of

1 much more diluted hydrochloric acid at about pH 1 or 1.5,  
2 shaken for about an hour, 37 Celsius, and then staying  
3 just -- yeah, just holding for another hour at the same  
4 temperature before extracting and filtering.

5           The dilution factor here is lower, only 10,  
6 because as we will see next, concentrations are lower in  
7 this method. Also, in this case, mercury for the reasons  
8 mentioned before, mercury had to be treated separately,  
9 differently with gold, salt, and nitric acid just to  
10 preserve the mercury before analysis.

11                           --o0o--

12           DR. DESTAILLATS: Finally, the third method is  
13 our simulated saliva, gastric fluids, and intestinal  
14 fluids. Here, we used a slightly larger amount, 0.5  
15 grams, added first to 5 milliliters of artificial saliva  
16 buffer, incubated for 5 minutes at 37 °C, followed by an  
17 additional 20 milliliters of simulated fasted gastric  
18 fluid, which was further incubated for 2 hours at the same  
19 temperature. And then an additional 20 milliliters of  
20 fasted intestinal fluids, which was also incubated  
21 overnight at the same temperature.

22           Everything else the same treatment as the other  
23 extracts of filtration, and the analysis by ICP-MS. And  
24 in this case the mercury was treated the same way.

25                           --o0o--

1 DR. DESTAILLATS: So here is a -- the status of  
2 the analysis to date. We have -- we're talking about the  
3 total of 400 -- a little more than 400 samples from the  
4 fields. And also, we have samples from manufacturers.  
5 These are fully field manufacturers that provide us with  
6 crumb rubber that -- we call it pre-installed. This is  
7 material that has never been in the field.

8 So we have all of our samples that have been  
9 analyzed so far correspond to all of the fields we have  
10 been to, and also all of the manufacturers. And the  
11 details are shown in the table.

12 We have -- for three fields, we have measured all  
13 10 of the samples that were collected for four other  
14 fields, we measure only three of the samples that were  
15 collected. For three of the fields, we measured just one,  
16 but we did twice. We had a duplicate of the same sample  
17 there. And then the majority of the 25 samples were -- we  
18 analyzed only one of the 10 samples in each of them.

19 And then for the manufacturers, we just did one  
20 analysis for each of them. So that's a total of 77  
21 analyses, both on the EPA method and on the ASTM method.  
22 So we had done the same on each of the samples on both  
23 methods.

24 So that's -- that amounts overall to 19 percent  
25 of the bar on the bottom, that's our current status, 19

1 percent. It is enough samples to start looking at trends,  
2 and what we find, and perhaps making decisions on how to  
3 proceed, you know, whether we need to measure all the  
4 other remaining 81 percent or should we maybe look at some  
5 things in more detail.

6 --o0o--

7 DR. DESTAILLATS: So there's a lot of information  
8 in these slides. I'm going to take some time to go  
9 through it. We have here the average of all of those  
10 samples, as we are already analyzed for -- on the top  
11 figure is the EPA method. On the bottom figure is the  
12 ASTM method. And we go from those that are in the highest  
13 concentration on the left, to the lowest concentration on  
14 the right.

15 The concentration ratio -- well the values are  
16 the average, and the arrow bar corresponds to the standard  
17 Deviation for the whole 70 samples. And then the  
18 concentration range is, as you see, between 6 and 7 orders  
19 of magnitude in both of them. So the analysis covers  
20 really wide range of concentrations. And what we did was  
21 we color coded a few of the analytes that are of  
22 particular interest from the toxicological point of view.  
23 And those are also useful to guide -- if you want to  
24 compare across the two methods, you will see that easily  
25 that the order in which they come up in terms of



1 which means the ASTM method extracts really much, much  
2 more smaller fraction of those elements than the...

3 --o0o--

4 DR. DESTAILLATS: The other comparison we have  
5 done is between the ASTM method, which intends to simulate  
6 the gastric fluid or extraction in the gastric system,  
7 with our own approach to simulate also the gastric and  
8 intestinal fluid. Additional, the oral pathway we have  
9 both saliva and gastric and intestinal fluids.

10 So this is a much more limited comparison. We  
11 are talking about here eight samples only instead of 70.  
12 But the results are, I think, very convincing. We see  
13 that with a couple of exceptions, outliers there, the vast  
14 majority of the elements really fall well within the  
15 one-to-one line. And you can see okay, but this is a log,  
16 log plot, so what about the linear plots.

17 So we did a linear plot too, which is here.

18 --o0o--

19 DR. DESTAILLATS: And on the linear plot -- yeah,  
20 on the linear plot we see that the one line there is where  
21 we expect to see -- obviously, ideally, we would like to  
22 see all of the analytes falling there. But we see a vast  
23 majority of them are not far from that, if you consider  
24 the arrow bars and everything.

25 So again, for the analytes of concern, I would

1 say all of them, perhaps with the exception of arsenic,  
2 which is a little lower at all in the right range.

3 --o0o--

4 DR. DESTAILLATS: With respect to mercury what we  
5 can say is that mercury is at a very low concentration in  
6 both methods. And we have here that square, that orange  
7 square is our method of -- method detection limit. So  
8 essentially, what we see is that for the ASTM method if  
9 you look at the cumulative frequency of our results, the  
10 majority, almost all of the data for below the limit of  
11 detection.

12 So it's hard really to quantify -- quantify for  
13 the -- comparative terms with the EPA method for which we  
14 have, on the contrary, a good quantification, even though  
15 these are really low levels.

16 --o0o--

17 DR. DESTAILLATS: And finally, what I have is a  
18 set of six slides which look all the same. We just  
19 changed the element on each of them, but you will see on  
20 all of them we have the EPA method on the left, the ASTM  
21 method on the right. And in each of them, you see four  
22 data sets which correspond to three different fields, A,  
23 B, and C. And then the bulk, all of the samples  
24 integrated in just one figure. So what we show here is --  
25 and again, if you look at the -- the units are different,

1 so we're not comparing levels between one method and the  
2 other. We're just comparing the distribution.

3 We have -- in each of the fields there, we have  
4 all 10 data points. And you will see the majority of  
5 them, all of the data points fall well within the 1.5 of  
6 the interquartile distribution. And then, of course, for  
7 the -- when you look at the whole set, they all tested  
8 sample, and collection of data that we have a larger  
9 number of outliers over there.

10 So this is for arsenic on our first slide. And  
11 let me show you now for cadmium.

12 --o0o--

13 DR. DESTAILLATS: Very similar trends. We don't  
14 see -- when we switch from one method to the other, the  
15 actual position of the box plots shifts, which represents  
16 clearly that not all fields are the same, but they are  
17 roughly within really the same ballpark, I would say.

18 --o0o--

19 DR. DESTAILLATS: This is for chromium. In this  
20 case, we have all quite similar results for all of them.

21 --o0o--

22 DR. DESTAILLATS: For Manganese, the same thing,  
23 that is Field B seems to have it higher in the ASTM method  
24 for most of these elements, but...

25 --o0o--

1 DR. DESTAILLATS: This is nickel. Again, very  
2 tight distribution on the EPA method.

3 --o0o--

4 DR. DESTAILLATS: And finally, I think we have  
5 lead. Similar description here for lead.

6 --o0o--

7 DR. DESTAILLATS: And finally we have our  
8 discussion questions.

9 CHAIRPERSON BALMES: So it's time for Panel  
10 comments. And just I would ask the Panel members to, you  
11 know, look at the questions that staff has put up for  
12 discussion. But feel free to say whatever you feel like.  
13 I know you would do that anyway.

14 Tom.

15 ADVISORY PANEL MEMBER MCKONE: Well, I'll just  
16 start with -- I mean, I'll let other people go into  
17 detail. But I was -- in terms of just communicating this,  
18 if we could look at like 64 and 65, and some of the other  
19 slides. So let's start with like 64.

20 I actually think it would be useful to pick -- to  
21 start with one order of chemicals, whether it's the EPA  
22 method or the ASTM. But I would keep the same order of  
23 chemicals than -- rather than doing the highest from left  
24 to right.

25 I mean, you could start with one. It gets hard

1 to really track the shift, particularly when you go to the  
2 next slide, 65, and now we have a whole other order of  
3 chemicals.

4           So, you know, when somebody is trying to track  
5 this, you just have to go down to the bottom line and go,  
6 well, wait, what chemical it is, where did everything --  
7 and so if you keep the same order, at least people can see  
8 what chemicals are where, and have a kind of a memory, and  
9 then can make that comparison more easily.

10           Also, I -- and again, this is more in terms of  
11 communication. So I'd do the same thing in slides 67,  
12 keep your order.

13           And then for slides -- that set of slides that  
14 start with 69, those are different scales, right? And I  
15 know you rescale it, because it's hard to the spread. But  
16 again, it would be useful if it was the same scale. You  
17 would probably see more -- I mean, it's hard to -- it's  
18 hard to interpret how close these actually are, because  
19 like here, for example, it looks like the center point of  
20 the scale is 5 micrograms per gram on the left, and then  
21 0.10 to the minus 3 micrograms -- 5 times 10 to minus 3  
22 Micrograms per gram.

23           And so my brain can't really shift enough to see  
24 how close those really are. I have others, but I think  
25 I'll just pass on, so we don't all ask five questions and

1 then -- oh, sure, I'm sorry.

2 DR. DESTAILLATS: Well. No, thanks for the  
3 comments. And I agree that what -- the reason why we  
4 are -- order them decreasing concentration is just one  
5 criterion. The idea for those plots was to show the range  
6 of concentrations, and the fact that you have, more or  
7 less, continuous distribution of concentration of  
8 constituents.

9 I did mention the fact that mass majority of the  
10 elements that were on the left side, the highest  
11 concentration ones, are most likely related with the sand,  
12 or some of the more inert fractions that are not so  
13 relevant from the health point of view, but I mean it's --  
14 it was interesting that those were a group that -- at that  
15 level. So the only -- except for zinc that is an  
16 ingredient or constituent of crumb rubber, we have the  
17 majority of the analytes that were of health concern were  
18 from the center to the lower range of the concentration.

19 So, I mean, that's -- I thought that was  
20 interesting to show. But I agree with you that if want to  
21 start tracking one particular analyte, it is easier to  
22 have more.

23 ADVISORY PANEL MEMBER MCKONE: Can I -- just a  
24 question. I think you might have said it, but it wasn't  
25 clear. The ones that are gray on the -- I'm sorry, on 64.

1 Let's go back to 64. The ones that are gray, I mean,  
2 there's some in color and then the rest are gray.

3 DR. DESTAILLATS: Exactly, right. So we use the  
4 color coding --

5 ADVISORY PANEL MEMBER MCKONE: That's the ones  
6 that are --

7 DR. DESTAILLATS: -- in a way to help guide the  
8 eye. So if you're interested in something on say lead,  
9 and lead is on brown, and this right down, then you --

10 ADVISORY PANEL MEMBER MCKONE: Like --

11 DR. DESTAILLATS: -- you look forward down there,  
12 it's incredibly easier to find it. I know 31 different  
13 analytes, so it's kind of hard to plot them one way or  
14 another. But, I agree, that that's a very good idea for,  
15 you know...

16 ADVISORY PANEL MEMBER MCKONE: Yeah, I think the  
17 ones that are colored certainly have a standard. I mean,  
18 so like nobody is going to worry about, right, calcium?

19 DR. DESTAILLATS: And those are -- calcium,  
20 aluminum, iron, silicon, potassium, manganese, all of  
21 those are mostly on the left side. Those are really high  
22 concentration analytes.

23 And then the ones that we will be mostly looking  
24 at are from the center to the right. But this one  
25 criterion to plot, and you're right that for -- from -- we

1 could possibly underreport. I think we should probably  
2 also tabulate all of this. And when it's tabulated you  
3 should probably go by say atomic element.

4 DR. WONG: I would like to interject here. I  
5 think that I want to bring it up, this is the preliminary  
6 data. And each graph has its purpose. And I understand  
7 it's hard to gauge what's going on with 31 chemicals. So  
8 you -- if you don't mind, I would like to bring it back to  
9 the box and whisker plot, because that's -- there's a  
10 question really orient about it -- around it. The U.S.  
11 EPA method has a lot higher concentrations. So we cannot  
12 bring it at the same scale as the ASTM method.

13 But what we are trying to show here is we would  
14 like the Panel to look at for each field -- each field, we  
15 have fully analyzed. The first three boxes on the left  
16 side are mine on the screen. They are fully analyzed and  
17 for each metal that potential of concern, we would like to  
18 look at the distribution, how tight is it. It represent  
19 within field variability.

20 We are aware of this variability across field.  
21 And we want to see the Panel's opinion on within field  
22 distribution here. That's our reason we, on purpose, not  
23 giving the full scale of everything, because we want you  
24 to see how tight the number is within a field. And that's  
25 a question associated with it.

1 CHAIRPERSON BALMES: Dr. Kyle.

2 ADVISORY PANEL MEMBER KYLE: Thank you.

3 So the graphs are mostly about what method to  
4 use, but the questions are not. So, to me, there's  
5 something missing here about looking at what the data  
6 looks like within and between fields to help you make this  
7 decision that you didn't do.

8 And I don't know which method you should use.  
9 And I can't figure out these graphs on different scales.  
10 You know, I just -- I don't -- I can't understand them. I  
11 met with Tom only maybe worse.

12 So I can't give you any feedback on that, but I  
13 don't know. You know, you didn't -- I mean, maybe you  
14 would analyze it using either method and look at the  
15 distribution within and between fields, and see what that  
16 looks like.

17 And then that might shed some light on whether  
18 you need -- whether you can combine them or not, from a  
19 statistical point of view, rather than picking method  
20 point of view. That's a different question, that -- to  
21 me, that I don't -- I don't see what basis you gave us to  
22 answer that. So maybe that's because I don't  
23 understand -- I can't read the graphs on different scales.

24 So those are my comments.

25 DR. WONG: So the different method here we are

1 serving different purposes. The EPA method give us what  
2 is the total content in the rubber. So that's the  
3 baseline what we're trying to look at. And then we have  
4 two different buffers here that we are trying to compare.

5 So one of the questions is between the two  
6 different buffers, more physiological relevant buffer, how  
7 they behave. So we have the bar graph there between the  
8 two methods. And then the next question is did we use one  
9 of the buffer? Here is the behavior within field where we  
10 so the box plot.

11 So I'm -- hopefully, I'm clarify a little bit  
12 about the presentation. But definitely, we see your point  
13 here. Appreciate it.

14 ADVISORY PANEL MEMBER KYLE: But then why would  
15 you choose one method or the other. They're answering  
16 different questions. It's still -- I still don't -- I'm  
17 still missing this, I guess.

18 ADVISORY PANEL MEMBER SHELDON: Can I make some  
19 comments on this?

20 DR. WONG: Yeah.

21 ADVISORY PANEL MEMBER SHELDON: When we started  
22 out, either it was last meeting or the meeting before,  
23 there was a question of just doing bioaccessible data.  
24 And we said, well, that's probably not a really good idea.  
25 You need to do some total, because a lot of the data we

1 showed with bioaccessible just showed nothing.

2 I think your goal is to look for bioaccessible  
3 data. So I sort of think that you could -- seeing as you  
4 are detecting enough, that you could probably just do the  
5 bioaccessible data, rather than the total. Because I  
6 think you're right, one doesn't know how to relate that  
7 total data to what you're going to do in your exposure  
8 models. Now -- so that would be my vote.

9 My other vote would be I would go with the ASTM  
10 method. And the reason I would go with that is that you  
11 probably want data that's comparable to what other  
12 laboratories are doing. And it is an ASTM method. I  
13 think more laboratories will be willing to pick that up.  
14 And so therefore, that's probably the one that I would do.

15 If you're talking about -- then you're asking us  
16 the question also do we just, you know, lump all the  
17 samples from one field together? And again, I -- I know a  
18 lot of this. Yes, you could do every sample all of the  
19 time. It's very expensive. It's very labor intensive.  
20 You're coming down to the end of the study. There's a  
21 crunch, and where is it best to put resources?

22 I have -- I think that my opinion is is that  
23 people are running all over the field. You just don't  
24 have a soccer -- well I had a five-year old that stood by  
25 the -- you know stood there, and I eventually told him,

1 I'll give you candy if you run.

2 (Laughter.)

3 ADVISORY PANEL MEMBER SHELDON: Great mothering  
4 technique.

5 (Laughter.)

6 ADVISORY PANEL MEMBER SHELDON: But people are  
7 running all over the field. I think you're trying to get  
8 a vision of what's on the field. I think it's okay to  
9 probably put all the samples together. What you might do  
10 is in 10 percent of the fields, you know, do the  
11 individual -- you know, do some individual samples, so  
12 that you do have some of that data.

13 So I think those are the questions that you are  
14 getting at. However, I have one other place where again,  
15 I would like to see a few more samples. Again, this goes  
16 back to the size of the crumb. And that's really what I  
17 was referring to, not for inhalable, but for some of these  
18 other particles.

19 In some samples, I think it would be useful to  
20 fractionate the size of the crumb with one of the methods,  
21 and see if there is a difference in crumb size range to  
22 see if you're going to get dramatically different results  
23 with one size or another.

24 So anyway, those are my opinions.

25 CHAIRPERSON BALMES: Thank you, Dr. Sheldon.

1 Well, okay. Dr. Bennett.

2 ADVISORY PANEL MEMBER BENNETT: I was looking at  
3 the bar charts, and it seems that, in some cases, I wasn't  
4 totally in agreement that the range was small within an  
5 individual sample. But it did seem that sometimes you  
6 were getting a single high one. And I would think on the  
7 ones you wanted to subsample and do more individual  
8 markers, I would think you would purposely select those  
9 from the ones that tended to have the higher  
10 concentrations to see if those are isolated points, or if  
11 those are truly fields that have much higher  
12 concentrations, because it seems that there -- there seems  
13 to be some variability on some of those.

14 So that's the only thing I wanted to add on  
15 number one, because I agree, you don't need to do them all  
16 individually. But I think some of those ones that have  
17 the single samples that are high, particularly on these --  
18 and I don't -- the other thing that's hard to tell, I  
19 don't know that the fields that are high in arsenic are  
20 also the ones that are high in chromium. So I don't know  
21 if that's possible to sort of see if those are correlated,  
22 and then pick the ones that are higher.

23 DR. WONG: We'll definitely have the data look at  
24 it when we start matching data, looking at field age as  
25 well, and location.

1 CHAIRPERSON BALMES: Mr. Avol.

2 ADVISORY PANEL MEMBER AVOL: Yeah. So I don't  
3 have much more to add, except to note that, I mean, you  
4 sort of focused on quantity and toxicity separately. But  
5 I think, you know, showing plots of quantity is probably  
6 not so informative, because we have to interpret it in  
7 terms of toxicity. And so what I think we'd rather know,  
8 all things considered, is not that there's a lot more  
9 calcium than there is chromium, but, you know, how the  
10 chromium relates to what you see and compare to what sort  
11 of the health -- what is known about the health levels  
12 concentrations.

13 And so I think getting at that and being clear in  
14 the communication of that, I think, would be helpful.

15 CHAIRPERSON BALMES: Dr. Eckel.

16 ADVISORY PANEL MEMBER ECKEL: Just one final  
17 comment on question one. You know, I think -- I think  
18 it's good to keep in mind, you know, what are the research  
19 questions, what do we lose if we do pool all the samples.  
20 And, you know, I think, you know, one question to think  
21 about is most of the players probably are moving around  
22 the field, but there are a few positions where they do  
23 stay -- like, you know, a goalie stays more in one area.  
24 And so is that an important question or not to address?  
25 You know, just think about what do we gain, what do we

1 lose from pooling?

2           ADVISORY PANEL MEMBER SHELDON: You do have a  
3 goalie sample, don't you, one right in front of the goal?  
4 So then you might do two per field. I mean, I know that  
5 when we have done, again with pesticides indoors, we find  
6 huge differences. And then all of a sudden you're like so  
7 how do I combine this whole thing into an exposure  
8 assessment?

9           And that is the problem. And so pretty soon you  
10 just average the data and say -- I mean, but I do think  
11 keeping something extra for a goalie area might be -- is a  
12 good idea.

13           DR. MADDALENA: So I apologize. I nodded yes,  
14 but the gold area in our experimental design moved all  
15 over the field. It depended on the wind direction, power,  
16 availability, things like that, if that's what we meant.

17           Oh, when we actually collected it, we did. Okay.  
18 Yeah.

19           DR. WONG: One interesting, when we go out to --  
20 that's the beauty part of this study is we actually go out  
21 on the field and see people practice. And the goal -- the  
22 goalie practice, yeah, they practice throughout the field  
23 too. They run around. And a lot of time they do drill in  
24 the field, not necessarily in the goal.

25           So during the practice, they actually dive more

1 than they are during the game. We interview people. So  
2 that come back to the question that should we separate the  
3 one in front of the goal box for analysis? I think we  
4 should give it a try, definitely. But also, bear in mind  
5 that the exposure for goalie is -- it's actually more  
6 diverse than what we think when we go to look at these  
7 games, and see them running around. Interesting. And  
8 some people actually play multiple position.

9 CHAIRPERSON BALMES: Mr. Avol, another comment?

10 ADVISORY PANEL MEMBER AVOL: So I think that's  
11 true, but I think you don't want to lose sight of the fact  
12 that, yeah, during a game or during matches for most of  
13 these children, adults, et cetera, they're going to be --  
14 the goalies are going to be in the goal box, and they're  
15 going to be impacting that material there.

16 And that material -- that part of the field where  
17 there -- a lot more diving and so forth occurs, and a lot  
18 more movement occurs in terms of the goal keeper potential  
19 exposure. It's going to be different potentially than  
20 other parts of this, sort of the general field. And so it  
21 may be more compacted. It may be more diffuse. It may be  
22 more torn up, whatever the case is.

23 I mean, just anecdotally, looking at a field, you  
24 see that the field is usually bare in front of the  
25 goalkeepers spot there on the field. And so I think that

1 is a separate part. So I would echo Linda Sheldon's  
2 comments that, you know, you may want to think about the  
3 goalkeeper sort of area as a separate area, because you  
4 may find something different there.

5 CHAIRPERSON BALMES: So thank you. So I want to  
6 ask staff have we answered questions 1 through 3  
7 adequately for you. I know question 4 we haven't really  
8 addressed about mercury.

9 DR. WONG: I agree.

10 CHAIRPERSON BALMES: Any other questions, Patty?  
11 Any remaining issues?

12 DR. WONG: I agree.

13 CHAIRPERSON BALMES: Okay. So with regard to  
14 mercury, you know, basically since they didn't find very  
15 much in terms of mercury -- they -- I think the point is  
16 here they'd sort of like to stop measuring it.

17 Debbie.

18 ADVISORY PANEL MEMBER BENNETT: Have they done it  
19 -- you guys have done at least one mercury sample per  
20 field at this point, right?

21 DR. WONG: Yes. Yes.

22 ADVISORY PANEL MEMBER BENNETT: Okay.

23 CHAIRPERSON BALMES: So what does the Panel feel  
24 about, you know, question 4? Have we done enough to  
25 understand the mercury content in crumb rubber used on

1 synthetic turf fields?

2           ADVISORY PANEL MEMBER SHELDON: Can I ask a  
3 question?

4           And I'm not familiar with this -- with that  
5 literature. I mean, people tend to do metals when they do  
6 pilot studies or whatever -- study. Have many of them  
7 done mercury before? Do we have much literature data for  
8 mercury on fields, and is it considered a problem?

9           DR. WONG: For the recording purpose sorry. It  
10 has been studied before. When we do initial literature  
11 search, mercury has been looked at in a lot of other  
12 study, and it hasn't been popping up as a concern.

13           ADVISORY PANEL MEMBER SHELDON: Then I would  
14 think that if we have data on -- one piece of data on each  
15 field, and it has not been raised as a concern, that we  
16 could -- you could probably drop it.

17           CHAIRPERSON BALMES: That's my take, but I wanted  
18 the rest of the Panel's -- Dr. Kyle, do you feel  
19 differently?

20           ADVISORY PANEL MEMBER KYLE: I'm not sure what  
21 the data is.

22           DR. WONG: Can you go to slide number 68. So as  
23 it shows here, it's in nanogram per gram rubber  
24 concentration we have been seeing in most of the data are  
25 below the one. The method detection limit is a 100 part

1 per trillion.

2 CHAIRPERSON BALMES: Yeah. I was reasonably  
3 convinced by this plot, but I'm relatively naive about  
4 this as well.

5 Tom, I'll pick on you. What do you think?

6 ADVISORY PANEL MEMBER MCKONE: What I'm  
7 struggling with is whether in the context of impact,  
8 whether -- you know, this is going to be -- whether this  
9 is going to be something we worry about for the  
10 population, right? Is this going to be an important  
11 source of mercury, and do we have enough evidence to say,  
12 look, that's not what we're really going to be dwelling on  
13 is the dominant contributor to health impacts? And if  
14 there's a way to sort of come to that point, you know,  
15 with the preliminary data we have, it would be nice to  
16 discount it, because it really opens up a lot of  
17 difficulties.

18 ADVISORY PANEL MEMBER KYLE: Well, the -- so the  
19 total number -- the total amounts of mercury are in the  
20 microgram per kilogram range.

21 DR. WONG: Is in nanogram per kilogram --  
22 nanogram per gram, yeah.

23 ADVISORY PANEL MEMBER KYLE: Microgram per  
24 kilogram?

25 DR. WONG: Per kilogram, yes.

1           ADVISORY PANEL MEMBER KYLE: Which is an  
2 environmentally relevant range. And so you're -- it's the  
3 ASTM method that's below detect. So it somewhat turns on  
4 how good that method really is. And I'm dubious, because  
5 there's been a lot of issues about what -- when mercury  
6 really is or isn't bioavailable, and what turns it from  
7 one state to the other.

8           And, you know, for a long time we thought mercury  
9 wasn't bioavailable or didn't methylated, et cetera. And  
10 then it turns out it does in settings where we thought it  
11 didn't. Now, I don't know enough about your method to say  
12 that it's good enough to say this doesn't matter. So  
13 that's where I -- you know, I look at this and I say,  
14 well, maybe we need to just look at this a little bit more  
15 carefully.

16           Because I don't know why you would exclude  
17 mercury just based on these data, vis-à-vis the numbers  
18 actually in the turf material or is that what you're  
19 saying you would do, the blue numbers?

20           DR. WONG: We -- what we are trying to propose  
21 here is -- to show here is the level. We are not  
22 excluding mercury in our discussion or exposure evaluation  
23 or risk evaluation. These numbers will be here for our  
24 report, and will be assessed. What we are saying that do  
25 we have enough data now, knowing that it's a lower concern

1 and the amount of effort to go in for a chemical with a  
2 very low level that's been fluctuated in the background.  
3 Are we getting meaningful data from it to get more data?  
4 That was the focus we have.

5           ADVISORY PANEL MEMBER KYLE: And the more data is  
6 analyzing more of the samples that you have?

7           DR. WONG: Correct.

8           ADVISORY PANEL MEMBER SHELDON: Can I ask a  
9 questions about your method. I mean, I know that to do  
10 mercury you have to use clean rooms, and all kinds of  
11 clean techniques. And how much contamination do you see  
12 with your mercury samples? Are you really close to the  
13 level that, you know, you're clean handling -- you know,  
14 some of it could be really just handling contamination.  
15 How certain are you of that data? And I'm not trying to  
16 insult you as an analytical chemist. I'm just trying  
17 to --

18           DR. DESTAILLATS: Oh, no. No, it's an Excellent  
19 question, because we know metal analysis in an ICP-MS has  
20 gotten so good at PPT level, that it has to be run in a  
21 very clean environment.

22           ADVISORY PANEL MEMBER SHELDON: Right. Right.

23           DR. DESTAILLATS: People that run ICP-MS  
24 laboratories are extremely careful with contamination and  
25 that is a real issue.

1           So we looked at the blanks. We have blanks for  
2 each of the -- the analysis for the 70 plus samples has  
3 been done in five different batches, so it wasn't all done  
4 together. And we looked at the blanks for each of those  
5 batches, and those differ. So we can see that say from  
6 one month to other, the same laboratory and everything  
7 else gives you maybe one day gives you 20 PPTs, and a  
8 month gives you 70 PPTs. So there is some fluctuation on  
9 the blank. These are really low levels for a blank, but  
10 that's what it is.

11           And then the samples that are analyzed side by  
12 side with those blanks are about the same level for the  
13 most part, for the ASTM method.

14           ADVISORY PANEL MEMBER SHELDON: Okay. So  
15 oftentimes, at low levels, and it's really very rigorous,  
16 is that we will take the standard deviation in the blank,  
17 and, you know, take the average plus three times the  
18 standard deviation to say this is what the method  
19 detection limit is, because that's when you are 95 percent  
20 sure whatever it is that you are actually measuring what  
21 is in the sample, and not in the blanks.

22           Is this detection limit more an instrumental  
23 detection limit or is this based on the contamination in  
24 the background. Because if it is, you may not really be  
25 detecting any mercury at all.

1 DR. DESTAILLATS: Yeah. We went back and forth  
2 on this in terms of which criterion to use. And this one  
3 that is shown there is based on the -- on the -- on the --

4 DR. WONG: I think what I heard was is the 10 PPT  
5 is the instrument detection limit. So the instruments,  
6 that ICP-MS is 10 PPT trillion, and we have a 10-fold  
7 dilution in our sample. That bring up the instrument  
8 method to become 100 PPT detection limit. This is what we  
9 draw here. It wasn't the blank.

10 ADVISORY PANEL MEMBER SHELDON: Okay.

11 DR. WONG: It wasn't the standard deviation plus  
12 the blank.

13 ADVISORY PANEL MEMBER SHELDON: Okay. So you  
14 might look at that and really see if any of those are  
15 really -- would meet that more rigorous detection limit,  
16 because I think there's -- there's always the danger that  
17 if you start reporting sort of just random contamination,  
18 mercury can, you know, send up a lot of signals, so I  
19 might -- you might also consider that.

20 DR. DESTAILLATS: Absolutely. Thanks very much  
21 and we agree that -- you know, we looked at a few criteria  
22 and definitely for example for the EPA, they had -- with a  
23 more strict criteria, you could have 20, 30 percent of the  
24 lower level data fall under the limit of detection.  
25 Definitely, that would be the case.

1 CHAIRPERSON BALMES: Mr. Avol.

2 ADVISORY PANEL MEMBER AVOL: Just in terms of  
3 looking and trying to make decisions about your data for  
4 these 10 or 12 samples that are detectible, have you  
5 looked to see if they associate with anything else that --  
6 in your data set? I mean, are those characteristic of  
7 some other that could be used as a marker for these?

8 DR. DESTAILLATS: You mean, correlation with  
9 another analyte. No, we haven't done that analysis.

10 DR. WONG: This is the 70 sample we have plot.  
11 So they cover all the 35 field, and some of them cover the  
12 whole field, the 10 sample per field. So it is what we  
13 present at the beginning, the 19 percent of the sample.  
14 It has multiple field -- all the field actually, and  
15 different level will compete in this per field. Each data  
16 point here represents a sample, so we have 70-something  
17 samples.

18 CHAIRPERSON BALMES: Dr. Bennett.

19 ADVISORY PANEL MEMBER BENNETT: There are two  
20 points that were above 20 on the ASTM method. I don't  
21 know if those are individual fields. I mean, maybe if  
22 those were one sample from each of those fields, those two  
23 fields may be the ones to dig in on and see more spots on  
24 that field, because maybe that was random contamination,  
25 or maybe you do truly have as couple fields that are high.

1 DR. DESTAILLATS: Yeah, that's a good point. And  
2 we did think along those lines, in reviewing this data for  
3 the data for this plot exactly.

4 CHAIRPERSON BALMES: Any other Panel comments?  
5 Patty, you feel comfortable with the responses  
6 you got?

7 DR. WONG: Definitely.

8 CHAIRPERSON BALMES: Okay. Maybe it's time for a  
9 lunch break?

10 I've been -- so we could either stop now, or the  
11 next presentation is on the VOCs and aldehydes.

12 Does the panel have a reference?

13 Plow forward or take a break?

14 Pardon?

15 Okay. I think that's a good point. So it will  
16 be quick if we're before lunch.

17 (Laughter.)

18 CHAIRPERSON BALMES: So let's go on to the next  
19 presentation on aldehydes and VOCs.

20 (Thereupon an overhead presentation was  
21 presented as follows.)

22 MS. RUSSELL: All right. I'll try to be quick  
23 then.

24 (Laughter.)

25 MS. RUSSELL: So I am presenting a preliminary

1 analysis of --

2 --o0o--

3 MS. RUSSELL: -- volatile organic compounds,  
4 which I'll refer to as VOCs at the synthetic turf fields.  
5 And I'd like to give a big thank you to our student  
6 assistants, Sarah and Jin. They worked very hard for us  
7 last year. And in a six-month period, we processed about  
8 800 volatile chemical samples. And so that created a very  
9 large database. And I'm going to be presenting just a  
10 small percentage of that data today.

11 --o0o--

12 MS. RUSSELL: Okay. So a quick overview. And  
13 some of these you've seen with woody and the particle  
14 sampling. Our chemical samples were deployed in much the  
15 same manner. So I'm going to quickly go over the sampling  
16 strategy, brief look at our analysis methods, and I'll go  
17 right to the results on VOCs, and some formaldehyde  
18 results.

19 --o0o--

20 MS. RUSSELL: So again, here's the same figure  
21 showing our goal for the sampling event -- the goal box.  
22 So we measured in four places on the field. Positions 1  
23 and 3 represented our spatial or horizontal measurements  
24 across the field. Position, or cart 4, was off field, and  
25 cart 2 was directly behind the field.

1                                   --o0o--

2                   MS. RUSSELL:  So cart 2 was our unique sampling  
3 position.  It was -- we called it the sampling tower.  And  
4 this allowed us to get the vertical variability on the  
5 field.  We sampled at four different levels.  The level 4  
6 representing adult breathing zone at about 65 inches.  
7 Levels 3 and 2 representing perhaps a teen or a child's  
8 breathing zone, and level 1 being closest to the field at  
9 4 inches.

10                                   --o0o--

11                   MS. RUSSELL:  Here is again our activity's  
12 timeline for what was going on in the field, and  
13 represents the temporal resolution in our VOC and aldehyde  
14 sampling.  So the gray arrow shows the duration of the  
15 sampling event, which lasted about five hours.  The red  
16 arrow is showing the activity period, which lasted for  
17 three hours from periods -- between hours 2, 3, and 4.

18                   So VOC sampling took place every hour.  We used a  
19 specially designed sampling box, which is shown in the  
20 upper left corner.  And here, you can see the thermal  
21 desorption tubes which are deployed in the ports of the  
22 box.

23                   The sampling box contained pumps, valves, and  
24 electronics to automatically sample in sequential order  
25 from VOC number 1 to VOC number 5 at the last hour.

1           And you can see labeled on there the blank tube,  
2 which was in position 6. This allowed us to include a  
3 field blank with every sampling box. So five VOC samples  
4 were collected in this manner at the three different  
5 locations, carts 1 and 3, which were next to goalie --  
6 goal box, and cart 4 off field. Boxes were also  
7 synchronized to begin the sampling event simultaneously at  
8 these three locations, though sampling on the tower  
9 position happened only during the final hour of activity,  
10 as indicated in VOC number 4. So all four levels of the  
11 tower were collected simultaneously just during the fourth  
12 hour.

13           Finally, the aldehyde sample consisted of one  
14 3-hour integrated sample taken during the active period.  
15 So these were taken in duplicate at positions 1 and 3 on  
16 either side of the goal box.

17                           --o0o--

18           MS. RUSSELL: So the volatile organic compounds,  
19 which were collected on the thermal desorption tubes were  
20 analyzed by thermal desorption gas chromatography mass  
21 spectroscopy. And that's EPA method TO-17.

22           Our volatile aldehyde species were collected on a  
23 commercially available cartridge. And these were  
24 projected with an ozone scrubber, since aldehydes are  
25 sensitive to ozone. And we used EPA method 8315A.

1           So sample integrity was protected by a variety of  
2 quality control steps, including travel and field blanks,  
3 bar coded sample IDs, sample tracking database, and chain  
4 of custody forms included with each package.

5                           --o0o--

6           MS. RUSSELL: So next, I'll show some results on  
7 the VOCs. I'm going to take a look at the vertical and  
8 temporal distribution of the VOCs, and then some  
9 formaldehyde results.

10                           --o0o--

11           MS. RUSSELL: Here's the first data slide. So to  
12 look at the spatial variability found on a typical field,  
13 I'm showing a one-to-one plot showing the relationship  
14 between on-field, and off-field Samples. This graph uses  
15 the VOC sample collected during hour four, the last hour  
16 of activity. And I'm showing results from cart 1 and cart  
17 3. It's labeled here position 1 and 3.

18           So position 1 is the blue dots. Position 3 is  
19 the open circles. So these are plotted on the Y axis, and  
20 compared to the off-field cart on the X axis. So each  
21 circle here represents a specific VOC. In a typical VOC  
22 sample, we can identify about 100 VOCs. And this is using  
23 a NIST database, which matches the mass spectral data that  
24 we've collected.

25           Air concentrations are normalized, so we're just

1 looking at relative differences among the VOCs collected  
2 in these samples. So we can identify three categories of  
3 compounds. The first category is on the one-to-one line.  
4 And these represents chemicals that were present in equal  
5 amounts found both on field and off field.

6 The second category, you'll see a group of  
7 chemicals that lie only on the Y axis. These are a subset  
8 of chemicals that were found only in the on-field samples  
9 in both positions, cart 1 and 3.

10 And finally, the last category there will be a  
11 subset of chemicals found only in off field.

12 Okay. So from the on-field chemicals, we've  
13 identified a subset -- we're going to -- I'm going to  
14 focus on only two of them that we've identified, one is  
15 benzothiazole, and the other is methyl isobutyl ketone.

16 --o0o--

17 MS. RUSSELL: Their structures are shown here on  
18 the right. Both of these chemicals are also known Markers  
19 of tires. So this slide is looking at the vertical  
20 distribution for these two chemicals. And what I'm  
21 showing here is an average of five fields. And I've  
22 normalized the relative response for these. So we're just  
23 looking at the changes among the four levels that were  
24 collected on our sampling tower.

25 And you can see at level one, which was the level

1 closest to the field, we have our highest amounts. And  
2 you can see the decreasing concentration as we move away  
3 from the field.

4 --o0o--

5 MS. RUSSELL: So now the temporal distribution of  
6 these two chemicals, benzothiazole and methyl isobutyl  
7 ketone, is shown here. And again, this is looking at an  
8 average of five fields, and reporting a normalized  
9 response. So we're just looking at changes that occur  
10 during the sampling event.

11 You can see on the X axis is the time from the  
12 first hour through the fifth hour of act -- of the  
13 sampling event. The activity occurring between hours two,  
14 three, and four. Methyl isobutyl ketone is in orange.  
15 And you can see it remains relatively stable throughout  
16 this sampling event, while there are changes occurring for  
17 the benzothiazole.

18 --o0o--

19 MS. RUSSELL: And now some formaldehyde results.  
20 This is showing a distribution among 30 fields. So we  
21 took two samples at each field, and we averaged those.  
22 And I'm just showing here the distribution for all fields  
23 through the concentration. And none of our samples  
24 exceeded 6 parts per billion.

25 So we measured a range from 0.4 parts per billion

1 to I believe the highest was 5.3 parts per billion. And  
2 you can see the incidence of the concentration ranges  
3 here. But overall, it was quite low

4 --o0o--

5 MS. RUSSELL: That is all I have today. And  
6 there's a couple of discussion questions.

7 ADVISORY PANEL MEMBER SHELDON: Okay. So John  
8 has left and I'm taking over for John. How about we go  
9 left to right. And so, Sandy, do you have some comments  
10 here?

11 ADVISORY PANEL MEMBER ECKEL: So I haven't quite  
12 had enough time to finish reading the discussion  
13 questions --

14 ADVISORY PANEL MEMBER SHELDON: Oh, okay.

15 ADVISORY PANEL MEMBER ECKEL: -- but I think  
16 they're a bit outside my expertise area. So I'll make one  
17 other comment.

18 ADVISORY PANEL MEMBER SHELDON: Okay.

19 ADVISORY PANEL MEMBER ECKEL: So just in terms of  
20 statistical presentation on the results. I think it would  
21 be nice, especially for these results like on slides 84  
22 through 86, if we -- when there's sort averages of a  
23 number of fields, if we could maybe see the variability  
24 between fields by displaying the actual data points or  
25 some sort of error bars, that might be helpful for -- help

1 us understand the trends.

2           ADVISORY PANEL MEMBER BENNETT: If you could put  
3 it to the slide 83. Yeah, you can put the circles back.  
4 Oh, I'm sorry, 82.

5           ADVISORY PANEL MEMBER SHELDON: Put the circles  
6 back on it.

7           (Laughter.)

8           ADVISORY PANEL MEMBER BENNETT: Yeah, this one.  
9 This one with the circles.

10          (Laughter.)

11          ADVISORY PANEL MEMBER BENNETT: Yeah, so there we  
12 go. We've got a different --

13          MS. RUSSELL: The presentation was not an  
14 average. So this is just one field.

15          ADVISORY PANEL MEMBER BENNETT: No, I understand.  
16 So what I'm thinking, and I'm like kind of dangerous when  
17 I talk about non-target, because I know not very much.  
18 But I know in some of the analysis work that we've done  
19 with dust, we've looked for consistency of chemicals with  
20 certain patterns. And so I'm wondering if really the  
21 answer to number one is if you plot -- but these are ones  
22 you've already identified or are these the ones you have a  
23 peak location?

24          MS. RUSSELL: It's both. They're matching  
25 retention times, and they've been identified, and --

1           ADVISORY PANEL MEMBER BENNETT: And then do you  
2 have some other where you just have the retention times,  
3 but you haven't identified them?

4           MS. RUSSELL: Those do exist. They are not on  
5 this plot. And those, in general, are very low peaks with  
6 poor signal to noise. They're going to be hard to get a  
7 NIST match with a strong confidence.

8           ADVISORY PANEL MEMBER BENNETT: But what I  
9 thought might make sense on those is if you have some of  
10 those where you have peak locations where the on -- at the  
11 on-field, but not the off-field, and you have a  
12 consistent, albeit not that well defined, at a consistent  
13 retention time, and looking to see like if I'm seeing that  
14 retention time is one that's in that sort of orange circle  
15 on over half my fields, then maybe it's worth the time to  
16 dig on those.

17           But if it's just a one-time thing, it doesn't  
18 make any sense to me, you know. But if you're seeing that  
19 retention time on field consistently, that could be  
20 something of interest. And because -- you know, if it's  
21 showing up commonly would be my thought on number one.

22           MS. RUSSELL: I agree. I think that would be a  
23 good approach to look for a signature of on-field  
24 presentation.

25           ADVISORY PANEL MEMBER BENNETT: Yeah, because

1 then maybe it's some chemical you do care about even  
2 though you haven't been able to figure out what it is at  
3 this point. So that's my thought on number one.

4 And then my thought on number two is, again,  
5 those ones that were in that orange vertical box looking  
6 to see how often those same chemicals were popping up on  
7 various fields. Because if you -- you're consistently  
8 getting in that vertical orange box, then that seems to me  
9 that that would definitely be a crumb rubber marker.

10 ADVISORY PANEL MEMBER SHELDON: Okay. Ed.

11 ADVISORY PANEL MEMBER AVOL: So if you're  
12 implicitly assuming that the benzothiazole is the --  
13 your -- effectively a marker for the crumb rubber for  
14 tires, have you looked at this -- I mean, there's only  
15 five fields, so it's hard for me to sort of interpret  
16 this, because I don't understand the temperature paradigm  
17 here, or the wind direction wind speed temp, but it looks  
18 sort of like over the course of five hours basically are  
19 we saying that it's getting hotter in the afternoon and  
20 then wind is coming up?

21 MS. RUSSELL: Yes, exactly. I think that's very  
22 important that we need to start overlaying all these parts  
23 that we've collected especially temperature and wind.

24 ADVISORY PANEL MEMBER AVOL: I mean, I think it's  
25 hard to -- hard for me to understand it without that

1 interpretation.

2           ADVISORY PANEL MEMBER SHELDON: Amy.

3           ADVISORY PANEL MEMBER KYLE: I second the comment  
4 about considering frequency of occurrence as maybe the  
5 most important thing when you decide how much effort to  
6 put into tracking these down. That makes perfect sense to  
7 me.

8           A question I have is what do you mean by crumb  
9 rubber marker? I mean, why is that -- what concept is  
10 that? Because we're trying to find pollutants that come  
11 off crumb rubber, so we know we have -- so I'm just not  
12 sure, is that something different than that, or is it the  
13 same thing?

14           MS. RUSSELL: It's the same thing. And what  
15 we've done in-house, you know, we have the crumb rubber  
16 samples from the manufacturer. We can put an emission  
17 chamber, and we can see what chemicals do come off of it,  
18 so we can confirm what we see on the field, and say this  
19 is our signature.

20           ADVISORY PANEL MEMBER KYLE: So you're just  
21 trying to distinguish those from other background  
22 influence.

23           MS. RUSSELL: Exactly, from the environment.

24           ADVISORY PANEL MEMBER KYLE: Okay. I just wanted  
25 to clarify that.

1           ADVISORY PANEL MEMBER SHELDON: Tom.

2           ADVISORY PANEL MEMBER MCKONE: So one thought,  
3 these are volatile chemicals coming from crumb rubber.  
4 And I know there wasn't a lot of work on aging, but you  
5 must have some sense of the age of the different fields.  
6 And if you could look at a trend line. In a way, I think  
7 this is a way to deal with number two, things that are  
8 showing -- they should show or you -- you probably will  
9 see a decrease in time. I'm guessing the volatile  
10 inventory is going to decrease in time as the field ages.

11           And, I mean, that might be a way to confirm that  
12 these are crumb rubber, if they're showing this -- the  
13 things that show that trend with time particularly when  
14 they show the on-field trend in falling off with time.  
15 Just a thought.

16           I mean, I --

17           MS. RUSSELL: And I think that's --

18           ADVISORY PANEL MEMBER MCKONE: -- but it would be  
19 interesting to do a little bit of the trend line for the  
20 age of the field, because for volatiles I would expect --  
21 for semi-volatiles, probably not. You know, that would be  
22 difficult. But for volatiles, they should start depleting  
23 their inventory within a year or so, right?

24           MS. RUSSELL: Yeah, agreed.

25           ADVISORY PANEL MEMBER SHELDON: Okay. Do you

1 have a comment? I was going to -- you go first.

2           ADVISORY PANEL MEMBER BENNETT: The other  
3 thing -- there is a -- was a recent ES&T paper that talks  
4 about some semi-volatile markers of tires. And if you  
5 guys send me a note, I can send that back to you, because  
6 there's somebody that was just looking at some of those  
7 markers. And they were using a non-target method of  
8 things that weren't commonly studied so that might be  
9 another useful resource.

10           ADVISORY PANEL MEMBER SHELDON: Okay. I have a  
11 few comments here. One is I think it would be  
12 interesting, and maybe you've already done it, is just  
13 look at the total ion chromatogram plot, both on field and  
14 off field. You know, that will tell you -- it's sort of  
15 like indoor/outdoor air. You know, even though the  
16 chemical concentrations may not be different, you see a  
17 whole lot more stuff indoors.

18           And so even that would tell you whether or not  
19 you need to spend a lot more time worrying with the tire  
20 crumb markers. And so I would try doing that on the  
21 indoor/outdoors.

22           I really would like to see some, you know,  
23 pattern recognition. I used to do a lot of work with  
24 PCBs. And, you know, what they do with PCBs is you look  
25 at the pattern recognition, and you say, oh, yeah, that's

1 a PCB, and this is the way I'm going to quantify it. And  
2 if you can develop some -- I can't remember how I did it.  
3 I just --

4 (Laughter.)

5 ADVISORY PANEL MEMBER SHELDON: This was many  
6 years ago.

7 But again, I think that since you have the tire  
8 crumb from the manufacturers, you should be able to get  
9 some kind of pattern recognition, either on the total plot  
10 or looking at specific ions in the plot, and see if you  
11 can carry it that way. I think this is something the  
12 statistician could have great fun with, or that's what I  
13 keep telling myself -- I used to tell statisticians.

14 But I think that might be one of the ways to go.  
15 And then for those things that tend to look like they are  
16 a real issue, then you might try to identify them, yes. I  
17 mean, once you've got all these little peaks in the middle  
18 of nowhere, it's almost impossible.

19 And again, I think that you don't want to be  
20 identifying chemicals where you've got a great deal of  
21 uncertainty about what that chemical is. And so, you  
22 know, if you think of the chemical of concern, if you  
23 think you've got a pretty good idea about it, then I think  
24 you've got to get standards, and you've got to run it, and  
25 then you have to do some matching.

1           But again, you are addressing a public concern.  
2 And so you do need to be careful. You need to be  
3 thorough, but you also need to be careful.

4           Okay. So any other comments? Did you read  
5 yours?

6           (Laughter.)

7           ADVISORY PANEL MEMBER SHELDON: Not your field.  
8 Okay. Any other comments by the --

9           ADVISORY PANEL MEMBER AVOL: Just one. So did I  
10 misunderstand you? You have the crumb rubber samples from  
11 each field, and you've run those in the lab at different  
12 temperatures, or...

13           MS. RUSSELL: We haven't done that. We did some  
14 initial studies with crumb rubber that was uninstalled new  
15 from the manufacturer. And we have emission chambers, so  
16 we --

17           ADVISORY PANEL MEMBER AVOL: So for whatever data  
18 you have for the data set of the crumb rubber from the  
19 manufacturer, have you -- for a given field, have you  
20 looked to see what the characteristics of that data is  
21 from the sample and from the field?

22           MS. RUSSELL: Not completely. There's definitely  
23 more to do. But as far as identifying, you know, some of  
24 the top chemicals, like the benzothiazole and methyl  
25 isobutyl ketone. So we've -- there's been some

1 preliminary work with that.

2           ADVISORY PANEL MEMBER AVOL: Thank you.

3           ADVISORY PANEL MEMBER SHELDON: So Lauren tells  
4 me that we can come back at 10 after, or we should be back  
5 at 10 after. I think that's what she meant to say.

6           DIRECTOR ZEISE: 1:05.

7           (Laughter.)

8           ADVISORY PANEL MEMBER SHELDON: Right, 1:05, and  
9 we'll convene at 1:10.

10           Thank you.

11           (Thereupon a lunch break was taken.)

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

2                   ADVISORY PANEL MEMBER SHELDON:  It's exactly  
3 1:10, and we're ready to reconvene.

4                   We are now going to talk about exposure scenarios  
5 of turf fields.  And that's going to be Jocelyn and Asa.  
6 And I will let Patty introduce them.

7                   DR. WONG:  Okay.  As we discussed in the early  
8 section, we have collaborated with the Lawrence Berkeley  
9 National Lab, and also with scientists in UC Berkeley.  
10 And Dr. Asa Bradman is our collaborator doing the time  
11 activity study, and he will give the presentation.

12                   But also, before the presentation, I want to  
13 introduce -- we have -- we have Dr. Paloma Beamer.  And  
14 she's on the phone with us, and she is the author on the  
15 last part of the study.  And so she's going to tune in.  
16 She's also involved in the time-activity study.

17                   Okay.  Let's start the presentation.

18                   (Thereupon an overhead presentation was  
19 presented as follows.)

20                   DR. WONG:  We will start by discussing the  
21 exposure scenario development by introducing the exposure  
22 pathways and receptors category for synthetic turf field.  
23 The speaker is Dr. Jocelyn Claude from OEHHA, and then it  
24 will be followed by Dr. Asa Bradman to describe and give  
25 preliminary data on the on-line survey data related to

1 soccer player.

2 So Jocelyn Claude.

3 --o0o--

4 DR. CLAUDE: Okay. Thank you.

5 So as Dr. Wong said, we'll talk about the  
6 exposure scenarios. So this slide just shows a timeline  
7 of the exposure scenario task. So we're collaborating  
8 with UC Berkeley and University of Arizona to do a  
9 time-activity behavior study. So the details of the study  
10 follow the recommendations we received from the panel at  
11 the last SAP meeting.

12 And using IRB-approved study designs and  
13 protocols, activity data was collected from synthetic turf  
14 fields from users either through a survey or through  
15 videotaping.

16 Dr. Asa Bradman will provide more specific  
17 details on the study and present some of the data  
18 collected later on. Information from the results of this  
19 study will be used in OEHHA's exposure assessment of  
20 synthetic turf fields.

21 --o0o--

22 DR. CLAUDE: So before we actually talk about the  
23 study, I would like to introduce the receptor groups that  
24 we were evaluating, and also the pathways of exposure.

25 Can you hear me okay?



1 ago. And some -- some of the preliminary data results  
2 from this study will be discussed in the next section.

3 So the coaches and -- are the team leaders and  
4 trainers. And the referees are the officials who enforce  
5 the rules and provide arbitration on the fields.

6 They may be current or former players themselves,  
7 and are assumed to be adults. The bystanders can be the  
8 family or friends of the athletes, who are present at the  
9 field to observe the activities, whether it be a practice  
10 or a game. And they may range in age from young babies to  
11 adults as well.

12 For each of these groups, we will evaluate the  
13 three main exposure pathways, while we will look at  
14 inhalation, dermal, and ingestion.

15 --o0o--

16 DR. CLAUDE: So for the inhalation pathway,  
17 exposure occurs when chemical vapors from the field, or  
18 fine particulate matter is released into the area. And  
19 synthetic turf users or bystanders at the field breathe it  
20 in. This is a pathway that cannot be avoided, if you're  
21 at or on the field. So we expect that each receptor group  
22 will be exposed through this pathway to some varying  
23 degree level.

24 Athletes are expected to have the highest  
25 exposures since they may run, slide, fall on the field,

1 which can kick-up particles for inhalation.

2           Goal keepers, in particular, can have high  
3 exposures from constantly diving onto the field and  
4 inhaling close to the surface.

5           Coach and the referees may also have high  
6 inhalation exposures. They do engage in moderate to high  
7 intensity activities. They may run up and down the field,  
8 the referees for example, to follow the field activity.  
9 Bystanders are expected to have lower exposure, since they  
10 participate in lower level activities, such as sitting or  
11 standing on the sidelines and cheering.

12   --o0o--

13           DR. CLAUDE: So moving on to the dermal pathway.  
14 So dermal exposure occurs when chemicals are transferred  
15 from the field onto the skin, and then enter the body  
16 through the skin. So this can occur directly through skin  
17 contact with the field surface where the crumb rubber  
18 particles adhere to the skin.

19           Athletes they may often wear short pants and  
20 short sleeves in California with moderate climates. And  
21 so when they have contact with the turf and practices,  
22 during games they may have contact. During warm-up  
23 exercises, such as sit-ups and push-ups, they may be  
24 directly on the field. They may also push off the field  
25 with their hands, if they fall. And they also lunge,



1 transferred to the skin by an object. For example, the  
2 soccer ball, soccer gloves, and shoes are in constant  
3 contact with the field. Athletes have been observed  
4 touching their cleats on the field, sort of knocking off  
5 the crumb. And goalies may touch -- hold their gloves in  
6 their hand, which frequently contact the ball.

7 Coaches and referees may also have frequent  
8 contact with the ball, and also similarly with their  
9 shoes. Bystanders may play with the soccer ball or other  
10 kinds of soccer equipment, such as like the little soccer  
11 cones after practices or games. And they may also have  
12 water bottles which they rest on the field, while  
13 watching. And then they may pick those up and have  
14 exposure that way.

15 --o0o--

16 DR. CLAUDE: So ingestion exposure occurs when  
17 crumb rubber particles get into the mouth, and are  
18 swallowed. This can be a direct pathway, which is  
19 incidental or intentional. Incidental ingestion occurs  
20 when particles accidentally get into the mouth and they're  
21 swallowed. Athletes are expected to be exposed through  
22 this pathway through falling or diving onto the field.  
23 Particles may be dispersed into air and get into the mouth  
24 and be swallowed. For goalies who dive frequently, this  
25 may be an especially important pathway.

1           We assume that coaches, referees and the adult  
2 bystanders will not dive or fall into the field, and may  
3 have negligible exposure through this pathway.

4 Intentional ingestion is when the receptor knowingly or  
5 purposely puts crumb rubber into their mouth and swallows  
6 it. Toddlers and young children who play on the sidelines  
7 and play with the crumb rubber may ingest small amounts  
8 during games or practices.

9           For athletes, coaches, referees and the adult  
10 bystanders, intentional ingestion is expected to be a  
11 negligible pathway.

12                           --o0o--

13           DR. CLAUDE: So ingestion can also occur  
14 indirectly in which chemicals or particles get transferred  
15 from the field into the mouth through an -- through some  
16 kind of carrier. So for hand-to-mouth pathway, this  
17 occurs when fingers or hands come in contact with the  
18 field or an object can come into contact with the field,  
19 and then the hands or fingers can touch the mouth or face,  
20 or hands that have touched the object can touch the mouth  
21 or face.

22           All receptors are expected to have exposure  
23 through this pathway to varying degree levels. After  
24 contact with field surface athletes or bystanders they can  
25 bite their nails, or just touch their face, or use their

1 hands to wipe away sweat on -- while they're on the field.

2 Coaches and referees can touch the soccer ball  
3 and then touch their mouth or face. And toddlers and  
4 young children who crawl around the sidelines may touch  
5 the rubber, the field surface, and then suck their  
6 fingers.

7 --o0o--

8 DR. CLAUDE: The next pathway is hand to object  
9 to mouth. So this occurs when the hands come into contact  
10 with the field, and then touch an object, and then the  
11 object is put into the mouth. This is a very indirect  
12 pathway that all receptors may have some exposure through.  
13 For athletes and bystanders, they may touch the surf --  
14 field surface and then handle or eat food with unwashed  
15 hands or touch the drinking spout of a water bottle and  
16 then drink through it.

17 Bystanders on the sidelines, they may put the  
18 arm's of their sunglasses into their mouths while  
19 watching. And toddlers and young children may -- who  
20 touch the field, may use their unwashed hands to pick up  
21 food or an object such as a pacifier and a toy, which then  
22 goes into the mouth to cause exposure.

23 Coaches and referees can exhibit  
24 hand-to-object-to-mouth activity through whistle blowing  
25 activities. Their hands may touch the surface and they

1 touch the whistle, which they then blow through.

2 --o0o--

3 DR. CLAUDE: Object-to-mouth exposure occurs when  
4 objects that come into contact with the field are put into  
5 the mouth or touched to the face. We expect all three  
6 receptor groups to be exposed through this pathway.

7 Athletes may use clothes which have contacted the  
8 field to wipe sweat off their face. Goalies have been  
9 observed using their teeth to take off their gloves, which  
10 frequently contact the ball. They may also drink water  
11 from bottles which have contacted the field surface.

12 Coach and referees may drop their whistles onto  
13 the field and blow through them, while they're still  
14 unclean. And young children may touch their face or mouth  
15 with objects such as toys that have been on the field or  
16 put them into their mouth.

17 --o0o--

18 DR. CLAUDE: So kind of to summarize, we've  
19 discussed the individual receptors, and we've discussed  
20 the pathways. So this slide kind of shows and on-field  
21 pathways model to bring them all together.

22 So you can see on the left side, the synthetic  
23 turf field would be the source of exposures. And then the  
24 next column shows possible environmental releases from the  
25 field. Then through some exposure media or transfer

1 activity, exposures may occur in one of three pathways:  
2 Inhalation, dermal, or ingestion.

3 And we anticipate that for -- that different  
4 exposure pathways may or may not occur for some receptor  
5 groups, and that some pathways may not be as predominant  
6 as others.

7 --o0o--

8 DR. CLAUDE: So then now in this next section,  
9 Dr. Asa Bradman will give a presentation to discuss the  
10 time-activity behavior study that is being conducted, and  
11 share some of the results of the California survey soccer  
12 players

13 DR. BRADMAN: Pause for question, or we just keep  
14 going at this point?

15 Okay. Well, thank you Dr. Claude. And thank you  
16 for the opportunity to present to the Panel.

17 So I'm going to be talking today in the first  
18 part about our project characterizing exposure-related  
19 behaviors for the turf project. I want to thank  
20 co-authors and also contributors to this project. Carly  
21 Hyland and Rosemary Castorina from Berkeley, and both  
22 Paloma Beamer and Nicolas Lopez-Galvez, who I believe are  
23 on the phone, are -- were also very involved in this  
24 project. Also, many OEHHA and CalRecycle staff who helped  
25 us videotape. I think too numerous to mention right now.

1                   --o0o--

2           DR. BRADMAN:  So the objective of our project was  
3 to, in simple terms, characterize exposure-related human  
4 activity patterns to support OEHHA's effort to model  
5 exposures, resulting from use of synthetic turf field.

6                   --o0o--

7           DR. BRADMAN:  To provide kind of a little  
8 context, this is California.  We wanted to generate  
9 information for California.  So our goals here were to  
10 provide current statewide information specific to  
11 California.  We also wanted to work with real soccer  
12 players.  And to date, there's really nothing in the  
13 literature with this level of detail.  So we're trying to  
14 both add to the literature and really form a solid base of  
15 information that could be used for the exposure and risk  
16 assessment.

17           We collected information from a wide  
18 cross-section of California soccer players, across many  
19 different demographic factors, geographic area, ages and  
20 player positions to try to get a comprehensive picture of  
21 the population.

22                   --o0o--

23           DR. BRADMAN:  Just to give a quick overview of  
24 the soccer population in California, there's about 450,000  
25 people estimated to be currently participating in soccer.

1 Many of them are youth, many in recreational or  
2 competitive teams associated with high schools or clubs.  
3 The numbers go down as you get older, as you probably get  
4 into high school. We have more students playing on  
5 probably JV teams, which are more selective. And the  
6 numbers dwindle a little bit more as we get into adults.

7 But still a really important point should be  
8 taken here is that adults -- many people often play soccer  
9 into adulthood. And for many it's a life-long sport. And  
10 it's also very, as was mentioned earlier, pretty evenly  
11 balanced between men and women. So it's really an  
12 important activity in California, recreational activity,  
13 and it also is growing.

14 --o0o--

15 DR. BRADMAN: To give a sense of what we've done  
16 so far. There were two components of the study. One was  
17 an online survey, where we solicited soccer players and  
18 their parents throughout California, and asked them a  
19 series of questions. I'll be reporting on that. Our goal  
20 there was to get at least a thousand responses online.

21 And then the second component also involved a  
22 questionnaire. But more importantly we also did  
23 videotaping of the games and practices to really quantify  
24 and look at behaviors.

25 This data is currently being analyzed by the

1 University of Arizona, so we don't have it. It was  
2 mentioned earlier that we just completed our online survey  
3 just a few weeks ago. So our data really -- analysis to  
4 date is preliminary.

5 I also want to mention too that our data today  
6 will be for the full set of data we have, whereas the  
7 information in the study -- in the meeting materials was a  
8 preliminary sample of about 650 or 700 participants.

9 For the in-person survey, we administered a  
10 questionnaire to players or parents. And our goal there  
11 was get to 40 participants from up to 10 games, under a  
12 variety of positions.

13 --o0o--

14 DR. BRADMAN: To develop the questionnaire, we  
15 had a lot of intensive discussions among ourselves, and  
16 with OEHHA, and also soccer players and coaches around the  
17 state. We focused on people using crumb rubber --  
18 synthetic turf fields with crumb rubber. Again, we  
19 collected information: Demographics, contact frequency,  
20 potent -- information to inform potential dermal and  
21 ingestion exposures, information on exertion to inform  
22 inhalation exposures, also hygiene practices and player  
23 history. And you'll see we're going to report on a few of  
24 these things today.

25 --o0o--

1 DR. BRADMAN: Recruitment. We contacted all the  
2 major clubs in California, and also other populations  
3 active in soccer. We left fliers at in-person events, and  
4 we had a Facebook page. We also targeted both competitive  
5 and recreational softball teams. So we really tried to  
6 make a broad effort and sent thousands of emails over --  
7 emails were sent to over 10,000 addresses in both English  
8 and Spanish.

9 --o0o--

10 DR. BRADMAN: And I should mention too that  
11 because of our IRB constraints and consent procedures, we  
12 asked parents to respond for children under 18, and then  
13 adults 18 or over responded for themselves. And this was  
14 done between December and April 2008.

15 --o0o--

16 DR. BRADMAN: For the in-person questionnaire and  
17 videotaping, recruitment was similar. We contacted  
18 coaches and managers in both the San Francisco and  
19 Sacramento areas. Usually, the coach helped us identify  
20 potential participants, and then we obtained permission to  
21 attend the schedule or game and then we coordinated  
22 consent to compliance based on our IRB protocols.

23 --o0o--

24 DR. BRADMAN: So the videotaping was quite labor  
25 intensive. Involved two team members for each player, one

1 to record and one to take notes. For the questionnaire,  
2 children under 14 we administered the questionnaire to  
3 their parents. If they were older than 14, it was  
4 completed by the player themselves. And for the  
5 videotaping, we also were in the same time period as the  
6 online questionnaire, December through just last month, in  
7 April.

8 --o0o--

9 DR. BRADMAN: Some preliminary information now.  
10 What, we found I should -- we were successful in obtaining  
11 many responses. We had over a thousand responses for the  
12 questionnaire online, about 1,028 or 29. And with our  
13 videotaping, we have almost 1,070 responses for  
14 questionnaires. And we did successfully videotape 40 --  
15 40 soccer players.

16 --o0o--

17 DR. BRADMAN: Just to give a brief overview of  
18 the participants we videotaped -- and again, this  
19 information is being analyzed as we speak, so I won't be  
20 talking about the videotape today. But in general, we got  
21 very good balance between both games and practices, and  
22 also a broad age range from the U9 or the kids down to  
23 eight years old and then through young adulthood.

24 --o0o--

25 DR. BRADMAN: This gives a sense of where our

1 respondents lived. For the online questionnaire, in  
2 general, we have good representation for California. And  
3 also, this tends to represent the distribution of  
4 synthetic turf fields in California. It's a little bit  
5 brighter in the Bay Area. I think that might be perhaps  
6 because we were doing our videotaping here, and there was  
7 a little more word-to-mouth outreach. And maybe we had a  
8 higher response. But overall, we have pretty good  
9 geographic balance.

10 --o0o--

11 DR. BRADMAN: Now, just a brief summary of some  
12 of the demographic information. We have good breakdown of  
13 ages. About 80 percent you see in that group are between  
14 about 9 and 25, so kind of youth young adult is the  
15 biggest proportion of our response. And that's actually  
16 pretty proportional to what we found when we looked at the  
17 soccer population in California. So we do have good  
18 representation of that specific age group, but also a wide  
19 range of ages as well. Good balance in gender in terms  
20 male and female. And we also have a fairly good balance  
21 in terms of demographics.

22 --o0o--

23 DR. BRADMAN: If you look at this carefully I  
24 don't have a highlight there. But if you see we had about  
25 60 percent identified themselves as Caucasian, about 15

1 percent as Hispanic, and then another 13 percent as mixed.  
2 In generally, I think we are a little underweighted in  
3 terms of Latino and Spanish speaking. But overall, I  
4 think we have pretty good representation here.

5 We did do everything in English and Spanish, but  
6 you see down at the bottom that the vast majority of  
7 respondents were English speakers.

8 --o0o--

9 DR. BRADMAN: In terms of positions, again I  
10 think we have very good balance here in terms of the key  
11 soccer game positions. And particularly, I know there's a  
12 lot of interest in potential exposures to goalies. And we  
13 have about 120 responses for that population.  
14 Proportionally, that's actually about what you see on the  
15 team. You have 9 or 10 players and one goalie on the  
16 field at any given time. So about 10 percent, 11 percent  
17 are goalies. So we have a good representation there.

18 We also see that many of the people responded  
19 were involved in competitive soccer. And many also were  
20 played year-round. So I think many of our respondents  
21 were pretty hard core soccer players. And perhaps that  
22 motivated them to participate here.

23 --o0o--

24 DR. BRADMAN: In terms of player characteristics,  
25 and -- there's some additional information. So this --

1 this slide here gives you a reported proportion of  
2 practices on turf -- synthetic turf fields, that the --  
3 that they self-reported that they played on it. Just to  
4 make the point here, about 40 percent were in our highest  
5 category. So over 70 percent -- so five percent of the  
6 time, they were -- that was where their practices took  
7 place, and then similar to -- for games. So a significant  
8 proportion are spending most or perhaps even all of their  
9 practicing games on synthetic turf fields.

10 --o0o--

11 DR. BRADMAN: So here's some information that  
12 hopefully will be helpful when we start talking about  
13 developing models. Here we have some information about  
14 average weeks per year. Children played on synthetic turf  
15 fields. And, in general, you can see if there's any  
16 pattern in the state. And I don't want people to focus on  
17 individual numbers here. But some of the points here is  
18 that, you know, when they're young, they're playing a  
19 couple weeks a year. As they go older it goes up, and I  
20 think that makes sense, because one, they're more active  
21 and they're on more competitive teams. And I've heard  
22 from colleagues that often the younger kids are more  
23 likely to be on grass.

24 And then also, if we look at the upper range  
25 here, many of these children in all age categories are

1 spending a lot of weeks per year. Even some of the young  
2 kids 40 weeks per year, and the older kids are playing  
3 every week. So there's a wide range of engagement with  
4 soccer and synthetic turf fields.

5 Now, we're talking about average hours per week  
6 played on synthetic turf fields. Again, something we can  
7 use to develop parameters for exposure models, and very  
8 similar results. Kind of the point being that as they get  
9 older, the people who stick with the sport are playing  
10 more. And then as we look at the upper range there's a  
11 significant proportion that are spending a lot of time on  
12 those fields.

13 --o0o--

14 DR. BRADMAN: Here now we're talking about adult  
15 player life history, because we're asking adults about  
16 their -- you know, what they may have done 20, 30 years  
17 ago. We had slightly different categories. But again, we  
18 kind of repeat we have found earlier. If your -- earlier  
19 you see here that at the median level, for example, they  
20 report actually in their youth relatively low use of  
21 synthetic turf fields. But if we look at the higher 95th  
22 percentile up there, we see many of them do report  
23 spending, you know, 40 weeks a year when they were younger  
24 playing on those fields.

25 Another point here is that for some of these

1 adults who are older, maybe when they were playing as  
2 youth, there weren't that many synthetic turf fields,  
3 because they're a relatively recent phenomenon.

4 --o0o--

5 DR. BRADMAN: And then again, more information  
6 about hours per week for the adults and what they report.  
7 And again, similar pattern here we have -- that we had the  
8 weeks. We had a few hours a week on the median level.  
9 But then again at the higher range, many adults reported  
10 spending significant amount of times historically that  
11 they spent playing on synthetic fields.

12 --o0o--

13 DR. BRADMAN: We also asked people just to  
14 categorize what was their longest time played on a single  
15 day. And some of the key points here is that again when  
16 we look at our highest category, you know, a good five to  
17 ten percent of people are spending a significant amount of  
18 time on synthetic turf fields. And we can use -- again,  
19 use this information to help build exposure scenarios.

20 --o0o--

21 DR. BRADMAN: We also asked about exertion. And  
22 exertion, of course, is tied to inhalation. This can  
23 support better understanding of inhalation exposures.  
24 Again, I know there's a lot of numbers up here. So just  
25 to give you kind of a sense of the range. You know, if we

1 look for practices, for example, the median reported  
2 resting period. So these categories are actually very  
3 similar to some of the U.S. EPA guidelines for exertion  
4 level.

5           If we look at the self-reported period of resting  
6 say during practice, you know, the average was that they  
7 spent about ten percent of the time resting. Some people  
8 as much as 55 percent. And then if you look at the highly  
9 active on the right, you know, on average, they're  
10 reporting that they're about very active 35 percent of the  
11 time. But then there's the real go-getter people who are  
12 saying they're extremely active for 100 percent of the  
13 time.

14           So again, we can use this to build exposure  
15 models. And then you can see some of the numbers in  
16 between. For each participant, these proportions add up  
17 to hundred percent. So we can actually develop say  
18 participant-specific exertion, and potentially inhalation  
19 exposure estimates. And then look at those distributions.  
20 And I won't belabor too much the findings for games. But  
21 again, it was similar in terms of a wide range of numbers.

22           Median was -- again was about 10 percent of the  
23 time resting during a game. Although, I noticed the max  
24 here was a little higher at 90 percent. Maybe that's  
25 somebody who's benched a lot of the time. And then at the

1 highly active, we have the stars who are out in the field  
2 a hundred percent of the time.

3           So again, a lot of the information we're  
4 presenting today, we're kind of presenting averages, but  
5 we also want to look at the distribution.

6                               --o0o--

7           DR. BRADMAN: We also asked some questions about  
8 contact with crumb rubber during practices and games. So  
9 these were some questions about crumb rubber in --  
10 reported crumb rubber in their mouths. And that's  
11 actually, I think, very relevant to Dr. Claude's  
12 presentation a few minutes ago. And also, crumb rubber in  
13 eyes, and whether also they're fiddling and playing with  
14 crumb rubber. That might apply to some of the younger  
15 kids.

16           But if we look here say on the left for  
17 practices, you know, about a little under 20 percent of  
18 the respondents are saying they got crumb rubber in their  
19 mouth at least sometimes, some people more frequently.  
20 You can look at the stacked bar there and the legend.  
21 About 12 percent said they got it in their eyes sometimes,  
22 and 18 percent they at least fiddle or play with it  
23 sometimes too.

24           And very similar results when we looked at the  
25 findings for games, although a little more reported that

1 they were playing with it. Maybe they're -- they're bored  
2 when they're on the sidelines or nervous with the game and  
3 a little more active with their environment.

4 --o0o--

5 DR. BRADMAN: So now we took that though and we  
6 looked at whether there were differences in positions.  
7 And particular, I know there's a lot of interest in  
8 goalies versus other positions. The goalies here were  
9 actually distinctly different in the proportions that  
10 reported getting material in their mouth or their eyes.  
11 The other positions were actually all very similar, and so  
12 we combined them.

13 And you can see there the goalies reported at  
14 least about 40 percent of the time they got it in their  
15 mouth at least sometimes. And for the others, it was  
16 about positions about 16 percent.

17 So about -- if we look at that cutoff of at least  
18 sometimes, they're about three times more common for the  
19 goalies getting it in their mouth, and a similar ratio  
20 actually for getting crumb rubber in their eyes. So I  
21 think that is informative for some of the discussions we  
22 can have later.

23 --o0o--

24 DR. BRADMAN: An important relative to Dr.  
25 Claude's presentation, so there's little arrows to kind of

1 make it a little easier to see. Sorry.

2           So we also -- related to that, we also asked  
3 about dive frequency. And again, we're comparing goalies  
4 versus other positions. The other positions were all very  
5 similar, except for the goalies. And if you'll see here,  
6 for example, you look at practices and games, and many of  
7 the goalies 50 or 60 percent of the -- 50 or 60 percent of  
8 them are reporting that they dive, you know, more than 10  
9 times during a practice or game.

10           So just to make the point here that, as has been  
11 suggested, that goalies are very likely to have more  
12 contact with the material on the fields.

13                           --o0o--

14           DR. BRADMAN: We also asked questions about how  
15 frequently they observed crumb rubber on kind of personal  
16 objects for themselves. And again, you can see that  
17 pretty significant. We asked about water bottles, and  
18 again this is what people can see. Of course, there may  
19 be other residues there. A few percent talked about  
20 water, but about half report seeing crumb rubber on their  
21 clothes, and about a third on their body. And this is  
22 clearly fairly common phenomena.

23                           --o0o--

24           DR. BRADMAN: We also asked them about whether  
25 they might be seeing crumb rubber in their homes. I know

1 from a personal anecdote point of view, I noticed crumb  
2 rubber in my house after videotaping. Many -- many of the  
3 participants report seeing crumb rubber in their garage,  
4 and laundry room, probably where they're taking off their  
5 shoes or just coming into the house, but also a  
6 significant portion report seeing crumb rubber in -- more  
7 interior regions of the house. So that's some information  
8 we should think about in terms of perhaps exposures and  
9 route home, and perhaps in the home. But that's something  
10 that was again commonly reported.

11 --o0o--

12 DR. BRADMAN: So when we start -- we had -- this  
13 is fairly qualitative, but we wanted to get a sense of  
14 like what the volume of material or people coming home.  
15 Most people are saying less than a tablespoon. We had  
16 some guidelines for them to make a selection. But a few  
17 of them are talking about getting a quarter or even half a  
18 cup of material. And I know many people end up dumping  
19 the material out of their shoes after games. So there's  
20 the potential for -- anyway, you just -- you know,  
21 consistent with our understanding of it, getting carried  
22 in clothing and the potential for exposures after they  
23 leave the field.

24 --o0o--

25 DR. BRADMAN: We also asked some questions about

1 potential health concerns. And again, I want to emphasize  
2 that this is not an epidemiologic study. And this is very  
3 qualitative. Some of the concerns that people mentioned  
4 were about being overheated sometime. In fact, that was  
5 almost 80 percent of participants responded to that as a  
6 concern. Others mentioned odors, headaches, eye and nose  
7 irritation or nausea.

8 But again, I'm sure these things occur on a grass  
9 field too on a hot day, so we can't say that this is  
10 specific, but it perhaps gives us some things to think  
11 about when we consider some of the exposure issues.

12 --o0o--

13 DR. BRADMAN: In terms of next steps, we'll be  
14 analyzing the time activity video data this summer. We  
15 hope to get it in the next few weeks from the University  
16 of Arizona. Analyses, of course, will include evaluation  
17 of contact with objects, activities and intensity, time  
18 spent on fields. We'll probably be looking at that --  
19 some of some videotape data in relation to questionnaire  
20 information.

21 And then this data will be helpful and will be  
22 important to inform some of the exposure modeling with  
23 OEHHA. Thank you.

24 I think I'm just about 10 seconds over.

25 --o0o--

1 CHAIRPERSON BALMES: Than you, Asa.

2 So now we can open up the Panel discussion of  
3 both the time-activity study, and the pathways of exposure  
4 presentation of Dr. Claude.

5 So -- and, Tom, are you ready to go? You look  
6 like --

7 DR. BRADMAN: Tom is your mic on?

8 ADVISORY PANEL MEMBER MCKONE: There we go. Now.  
9 Just to repeat, I'll start with the presentation on  
10 pathways and kind of go in order. I thought the pathway  
11 diagram was very informative, and I really don't think  
12 anything is missing, but I suppose we can struggle and  
13 find something. But I think it's a very useful way to  
14 show the various pathways. And I think it's very  
15 important to disaggregate the different ingestion  
16 pathways.

17 I mean, I think it's useful and it ties in well  
18 with the activity patterns. I think -- I mean ultimately  
19 it looks like this is going to fit together pretty well.  
20 I think that's important. It doesn't look like  
21 somebody -- often, you see these studies and the time  
22 activity doesn't make sense with basic overall framework  
23 of exposure model. And then you go how are you going to  
24 fit it all together? But here, it looks like things are  
25 going to integrate well.

1           Let's see, so I don't think anything is -- you  
2 know, from my perspective I don't know about pathways  
3 being overlooked, receptor categories. And at this point,  
4 I didn't notice anything sticking out. I guess the one  
5 thing I was -- that struck me was I looked at the number  
6 of your first slide, number of people engaged in  
7 California actually is 400,000. That's only like one  
8 percent of the population, right?

9           I assume that's okay. That's your data. But I  
10 thought maybe more people would be involved in the sport  
11 than just one percent. I know that most of it is in  
12 children, so it goes up. That's probably -- when you look  
13 at the numbers, it's probably more like four or five  
14 percent, which -- of the population between, you know,  
15 four and 18, which maybe makes sense. Again I, thought it  
16 might be a little higher.

17           But I don't know if there's -- if somebody asked  
18 or if it comes up if there's a way to compare that to  
19 other sports. Like, I actually think football is lower,  
20 tackle football, which is a very popular sport. But the  
21 engage -- the level of engagement is low. I think  
22 baseball is probably comparable or basketball, some of  
23 those. But I don't know if you want to, just for  
24 comparison, put that in.

25           DR. BRADMAN: We have a -- that is something that

1 we've thought about. We have a little bit of narrative in  
2 our report. And probably, we'll have a little bit more in  
3 the final report. The thing about soccer is it's a little  
4 bit more broadly played. Whereas, football and baseball  
5 often narrow down into -- you know, often into like high  
6 school and other teams. And kids who aren't on those  
7 teams usually don't play.

8           There's less recreational or clubs outside say  
9 the high school or school environment. And so it kind of  
10 funnels down to a much smaller population. I think that's  
11 overall why we see more kids playing soccer, especially as  
12 they get older. And then there's this trend again of  
13 increasing soccer playing. And there's also a trend of  
14 decreasing football playing. So we have kind of a, I  
15 think, a shift going on.

16           ADVISORY PANEL MEMBER MCKONE: Yeah. I mean, I'm  
17 a little out of this range. Although, we have a lot of  
18 kids in our neighborhood that I -- I mean my own children  
19 are older. But I guess it doesn't matter that much. But  
20 it seems to me that it's hard to get the numbers. Soccer  
21 is much more easy to just engage in without a formal  
22 sport. I think the other -- I mean, certainly tackle  
23 football is a very exclusive sport now. Basketball much  
24 less so. It's very informal. And I don't know whether  
25 soccer -- there's a lot that wouldn't be counted, because

1 people just play it in the local parks.

2 DR. BRADMAN: Yeah, I think that's probably true.

3 ADVISORY PANEL MEMBER MCKONE: But it's probably  
4 not relevant for -- they're probably not going to be  
5 playing on synthetic turf --

6 DR. BRADMAN: Right.

7 ADVISORY PANEL MEMBER MCKONS: -- if they're just  
8 going to the park and kicking a ball around.

9 DR. BRADMAN: Right.

10 ADVISORY PANEL MEMBER MCKONE: Okay.

11 DR. BRADMAN: One thing we found is synthetic  
12 turf fields are highly scheduled, and in high demand.

13 ADVISORY PANEL MEMBER MCKONE: Well, I ride my  
14 bike down by the water in Berkeley and it's always --  
15 those soccer fields are always occupied no matter when I'm  
16 down there riding My bike for recreation. That's just  
17 anecdotal, but it is fascinating. They are --

18 DR. WONG: Just trying to provide some  
19 supplemental observation we have when we're out in the  
20 field. Randy and I when we go to the field, we -- a lot  
21 of time we have to fight with the people who occasionally  
22 drop in and just want to kick the soccer. And so there's  
23 a lot of people that are not captured in this table who  
24 are just dropping in. And a lot of them actually do it  
25 more like a day-to-day basis. They just kick the ball

1 before they had to go to work in the afternoon. We see a  
2 lot of those adults that do unstructured or club activity  
3 kind of player.

4           ADVISORY PANEL MEMBER MCKONE: So I guess I'll  
5 just end my comments with it says please comment on the  
6 activity -- time-activity behavior study. I think it's  
7 really useful and very well done. I think the one thing  
8 to think about now is as this moves towards a risk  
9 assessment, you know, we're going to have concentration  
10 data, we're going to have the exposure pathways. We're  
11 going to have the activity. But ultimately, we're going  
12 to have to -- and I'm jumping ahead. But we're going to  
13 have to think about the unit intake or uptake or the  
14 loading associated with each of these -- with the  
15 co-occurrence of a pathway, and a concentration, and an  
16 activity. I mean, that's -- that's going to be where the  
17 rubber hits the road, so to speak, or -- anyway. Thanks.

18           ADVISORY PANEL MEMBER KYLE: Thank you for all  
19 the excellent presentations. I think overall it's  
20 reasonable.

21           The things -- I don't know if they've been  
22 overlooked. The things that stuck out to me is maybe  
23 deserving a little more intention -- attention are the  
24 infants and toddlers. Because I mean kids can pick up a  
25 whole handful of stuff and put it in their mouth.

1           So they're not exactly in the same as other kinds  
2 of bystanders. And so I wondered if maybe they deserve  
3 their own category, or a little bit more attention in some  
4 appropriate way. I know you mentioned it, so I know  
5 you're aware of it. But it didn't quite seem to come  
6 across in the structure of this in a way that it might  
7 deserve, I wondered.

8           The second thing is I think everything --  
9 everything that you've laid out makes sense. I wonder  
10 again if there's another emphasis, or pathway, or  
11 something having to do to this take-home concept of --  
12 it's not just if it's on the water bottle or something.  
13 It's also once it gets into your vehicle, your house, your  
14 washing machine, you know, which is where I used to find  
15 crumb rubbers in my car crumbled more and then in the  
16 washer.

17           So I wonder just looking at it through those lens  
18 across your pathways whether that would be informative.  
19 And Asa is thinking about that also, and has introduced  
20 this take-home idea. And I think it's just something I  
21 think it could be important to look at.

22           I'm a little shocked to see how much some people  
23 report having it home. I mean, that's a lot of stuff, you  
24 know. So that might be worth considering.

25           Let's see. Oh, this is a small point, but is

1 synthetic turf the same as crumb rubber, because there was  
2 an era where synthetic turf was AstroTurf?

3 DR. BRADMAN: For -- all of our focus was on  
4 synthetic turf fields containing crumb rubber.

5 ADVISORY PANEL MEMBER KYLE: Okay.

6 DR. BRADMAN: So we only did videotaping, and  
7 asked questions. And in some cases, I kind of shortened  
8 the sentence because it's kind of a mouthful.

9 ADVISORY PANEL MEMBER KYLE: Okay. It's s small  
10 point. I just -- you know, I just wondered a little bit  
11 about that. So -- and then my last comment is that the  
12 technical term for people who show up randomly, play  
13 soccer is pick-up games.

14 DR. WONG: Thank you. Synthetic turf include  
15 non-grass field. So they have -- they can have different  
16 infill. So our study focused on crumb rubber as one of  
17 the ingredients. And -- and Astro -- and AstroTurf is one  
18 of the big manufacturers who manufactures synthetic turf.

19 ADVISORY PANEL MEMBER AVOL: So I just have a  
20 couple questions. I also appreciated the layout in the  
21 pathways. But I do have one question, especially I guess  
22 substantiated in a way by Asa's comment about what he  
23 brings home just having videotaped this. And that is that  
24 I think that you might want to take another look at your  
25 referee X's and checks on your pathway, because I think in

1 the -- in the direct dermal pathway for -- certainly for  
2 the center ref, who runs up and down the field the whole  
3 time, I think they -- my guess is if you ask that -- if  
4 you got an informal survey and asked a dozen of them sort  
5 of how -- what do you take home, you find out they have  
6 the same sort of feet picture that were not Randy's feet,  
7 you know, often as well.

8           So I think there's an exposure there. The rest  
9 of my points are maybe less -- are more trivial in the  
10 sense of being clear about the communication and the  
11 limitations of the discussion that you're going to -- or  
12 the report you're going to make in writing.

13           And that is you made a comment -- somebody made a  
14 comment, I guess, maybe Asa said it both ways. First,  
15 that under 18 was done by parent questionnaire, but then  
16 on the plots under 14 was done parent questionnaire. So  
17 it's one or the other, I guess, potentially. What  
18 happened -- and the only reason I bring it up is the 13 to  
19 17 age range that you had another table had, you know, a  
20 fair amount of time spent and hours spent on the field.

21           So whether the -- you know, our experience has  
22 been that, you know, if you ask a kid what they've been  
23 doing, and you asked their parent what they've been doing,  
24 you get different answers. And so I think he's got to be  
25 careful about, you know, who you're asking, especially in

1 those early adolescent, you know, teen years.

2 DR. BRADMAN: Right. And that was a challenge to  
3 this. In -- for the online questionnaire -- well,  
4 actually, let me say it in reverse order. For the  
5 in-person, we have our IRB protocol, and we can get  
6 consent from the parent and assent from the child. And  
7 for the online, basically they said to us, because we  
8 can't -- we don't have a mechanism to verify, we had to  
9 say you can only fill out this form, if you're over 18,  
10 but you can fill it out for your child. So that's --

11 ADVISORY PANEL MEMBER AVOL: So that was my  
12 confusion. I think you just need to be clear in your  
13 report --

14 DR. BRADMAN: Yeah.

15 ADVISORY PANEL MEMBER AVOL: -- which is online  
16 which is an actual interview, because it looks like  
17 there's a conflict there that isn't -- it's not internally  
18 consistent.

19 DR. BRADMAN: Right.

20 ADVISORY PANEL MEMBER AVOL: On the ethnicity  
21 question, I assume those are self-described?

22 DR. BRADMAN: Correct.

23 ADVISORY PANEL MEMBER AVOL: Okay. On the --  
24 again, careful about -- careful about general statements.  
25 On the adult player life history, I think you're probably

1 right, that depending on what the age was of the adults  
2 that you're talking about, probably the availability of  
3 synthetic fields when they were youth was much lower. And  
4 so you sort of -- you may think that it looks like they're  
5 increasing with age, but it really isn't the case.

6           And then finally on overheated, a comment about,  
7 you know, how often overheating -- you made some passing  
8 comment about, well, probably people get overheated  
9 playing grass fields as well. But I think part of the  
10 concern with the synthetic fields is the fact that the  
11 heat load and retention on them. And so my guess is -- I  
12 guess I could be disproved by your activity data, but my  
13 guess is that people that play on synthetic fields, there  
14 probably is a higher reporting of overheating, because in  
15 fact it is warmer on those fields.

16           DR. BRADMAN: Right, yeah.

17           ADVISORY PANEL MEMBER BENNETT: I thought it  
18 would be good on the -- some of the questions to break it  
19 down by age group. So, you know, questions like how often  
20 do they play with the crumb rubber during the games?

21           Like, that would be a really good one to break  
22 down by age. And then also on something like percent  
23 seeing crumb rubber on their water bottle or on their  
24 clothes or whatever, it seemed like you had about 25  
25 percent of the population that doesn't regularly play on

1 crumb rubber. So I think you might want to stratify that  
2 by people that primarily play on crumb rubber and those  
3 that don't, because I'm curious if that -- there might be  
4 some big differences there.

5           On the categorization of the pathways, I had a  
6 comment on the refs too, because I know in our  
7 neighborhood, the competitive rec players ref for the  
8 recreational kids. So sometimes the refs are also kids  
9 that are, you know, players as well.

10           And then I was a little confused on the -- when  
11 Tom was asking about the player's table. I decided I was  
12 confused on that too, because the 14 to 18 seemed to be  
13 overlapping. I think it -- because you had the rec  
14 players and the high school players.

15           DR. BRADMAN: So if you look at these slides and  
16 you add them up --

17           ADVISORY PANEL MEMBER BENNETT: No, not that one.  
18 The -- at the beginning, how many players there are. That  
19 one. So I think probably -- I'm guessing you've got some  
20 competitive -- I guess it's because the way you had  
21 information to the leagues. It's just you've got 14 to 18  
22 year olds in there twice, but I guess that's because of  
23 the high school -- those aren't high schoolers. Those are  
24 high school teams.

25           DR. BRADMAN: Correct.

1           ADVISORY PANEL MEMBER BENNETT: And then you  
2 could have high school players in them.

3           DR. BRADMAN: Yeah.

4           ADVISORY PANEL MEMBER BENNETT: Okay. Yeah. And  
5 I was just really surprised by the high number of the  
6 people complaining about being overheated and the odor.  
7 And was that ever, or frequently, or that just, their  
8 concerns or --

9           DR. BRADMAN: Ever.

10          ADVISORY PANEL MEMBER BENNETT: Okay. Yeah,  
11 they're just -- they're big numbers. They're much higher  
12 than I would have expected.

13          ADVISORY PANEL MEMBER ECKEL: Thank you. So I  
14 echo the comments of everyone else on the Panel. Just two  
15 additional comments. You know, I think it was a nice idea  
16 to decide to focus on soccer players to really target the  
17 questions, and be able to do a very thorough analyses of  
18 this study population, so I think that was a good idea.

19          And so I had a related question is -- were all  
20 the fields that were studied, were they all soccer fields  
21 or were some of them football fields, you know, from the  
22 earlier discussion this morning?

23          DR. WONG: No. They're not all soccer field.  
24 They are -- a lot of them are multiple purpose field,  
25 because the price of getting these fields. They have

1 different color sets, so we have been to fields that are  
2 purely football, purely soccer. A lot of them are soccer  
3 and football with multiple lines. The most surprisingly  
4 we saw is football field drawn on top of a soccer field,  
5 and on the side there's baseball field.

6           ADVISORY PANEL MEMBER ECKEL: Wow.

7           DR. WONG: So it is multi-use, because of --  
8 that's why it's so hard to get on the field, because it so  
9 highly used, yeah, so -- but in terms of material, we have  
10 been seeing that they are fairly similar in terms of  
11 structure and the crumb rubber.

12           So that's our observation.

13           ADVISORY PANEL MEMBER ECKEL: Thank you. And  
14 then my second comment is that -- if I'm understanding  
15 right, I think the online survey and the in-person surveys  
16 were all only of athletes. And the pathways study is of  
17 athletes, and bystanders, and refs, and coaches. So was  
18 that a conscious decision to only be doing the survey of  
19 athletes? And I guess do you have any thoughts on that?

20           DR. BRADMAN: That was a big focus for our  
21 videotaping. And so it -- and so we asked lots of  
22 questions about, you know, player history and things like  
23 that. We're going to be talking about in a bit some of  
24 the playground activities. So we actually are going to  
25 have some information that can inform looking at different

1 age groups. So I'm not sure if that answers all of your  
2 questions.

3           ADVISORY PANEL MEMBER ECKEL: You know, kind of  
4 related to some comments earlier from the Panel that, you  
5 know, maybe the refs are doing behaviors that, you know --  
6 you know, I guess the question is how well are they  
7 represented by the conceptual pathways. You know, we  
8 don't have quite data to back that up at this point.

9           DR. WONG: Yeah. Part of it is the study design,  
10 because we believe athlete has most exposure, so we focus  
11 on it. And also it was easier to recruit athletes. So we  
12 have to admit that.

13           And also, the other, like Dr. Bradman has said,  
14 we are also have ongoing archive video to look at  
15 children, their behavior on playground, and grass turf.  
16 So try to get some idea of behavior being outdoor to model  
17 the bystander part of it, address Dr. Kyle's address that  
18 bystander young people, especially toddler, we're going to  
19 have some contact frequency data come out from archive  
20 study, because it's very hard to do IRB approval for young  
21 kids.

22           ADVISORY PANEL MEMBER ECKEL: As the mom of a one  
23 and a half year old who just had his first kick and play  
24 soccer lesson last week --

25           (Laughter.)

1           ADVISORY PANEL MEMBER ECKEL: -- I appreciate  
2 focusing on the younger children also. SO thank you.

3           DR. WONG: Yes. Thank you.

4           ADVISORY PANEL MEMBER SHELDON: I have one  
5 question. I think there's a tremendous amount of data  
6 here in this time-activity behavior study. I do think you  
7 need to verify the answers to some of those questions. I  
8 mean, the fact that you are asking an adult, a mother or a  
9 father, to answer questions about the level of play of  
10 their child, whether or not they were overheated or  
11 nauseous, whether or not they observed crumb rubber on  
12 their water bottle while playing. You know, I think that  
13 it's a perception of what they've done, but I do think  
14 that you need to do something that sort of says, which  
15 are -- you know, how believable are these answers? And  
16 you know, I don't have a problem with saying so. This is  
17 the perception -- you know, it's not the actual. It's the  
18 perception.

19           But I do think that if there is something you can  
20 do that is not, you know, a whole another study in itself,  
21 but what are those -- you know, once you get to modeling,  
22 what are going to be the most important questions, and is  
23 there a way that you can back it up with your video data,  
24 with, you know, somebody going out and observing more --  
25 you know, doing something?

1           ADVISORY PANEL MEMBER BENNETT: I mean, also  
2 something like the water bottle. It's going to stick to  
3 the water bottle the same if you're an adult or a kid. So  
4 you could break it out between the adult responders and  
5 the kid -- the kids, because then you know that the adults  
6 are responding for themselves that might be a thought.

7           ADVISORY PANEL MEMBER ECKEL: And I just have a  
8 quick follow-up. I wonder if those -- those 40  
9 children -- or I think were they all children who did the  
10 in-person study? I wonder if you could just administer  
11 the survey to their parents and see what the  
12 correspondence is between those kids.

13           ADVISORY PANEL MEMBER SHELDON: Okay. Last  
14 question here, because we're behind. We've gotten behind  
15 now.

16           ADVISORY PANEL MEMBER AVOL: So one quick  
17 comment. Again, going back to the communication aspect.  
18 In the materials from this morning, in the introduction of  
19 the fields, there is this talk about the fields that were  
20 laid out in pictures of the diamonds, and the football  
21 field, and the soccer field.

22           And I'll just point because the baseball diamond  
23 typically has a dirt infield, and then the -- the sort of  
24 the synthetic other part, that if, in fact, you're  
25 focusing on the soccer field, you should just say so at

1 the outset and why you did it that way, which I think is  
2 defensible. Just say it.

3           ADVISORY PANEL MEMBER SHELDON: Okay. And I  
4 lied. I have one more question and comment.

5           (Laughter.)

6           ADVISORY PANEL MEMBER SHELDON: So how are you  
7 going to do the modeling? Actually, this goes back to one  
8 of the questions this morning. When I think of -- you  
9 know, is it going to be a probabilistic model? Is it  
10 going to be a micro-activity model? And the reason I ask  
11 this is that I did a lot of measurements. I worked with a  
12 lot of modelers. They always wanted me to have  
13 measurements in 80 locations across whatever area I was  
14 measuring, so that they could understand the  
15 variability -- especially the variability.

16           And so I don't know how you're going to model.  
17 But I do think that when it goes back to the monitoring  
18 and the analysis of the samples, make sure that you have  
19 at least -- it doesn't have to be all the samples, but  
20 enough samples so that you can bring in variability on the  
21 field.

22           So no more questions are allowed now. So our  
23 next set of talks is the playground characterization  
24 study. And Randy is going to present it.

25           (Thereupon an overhead presentation was

1           presented as follows.)

2           DR. MADDALENA: We're actually in the  
3 experimental design stage again. So we had the  
4 opportunity to address questions like that for the pilot  
5 playground study that we have coming up. And so we had  
6 the advantage of having been to the field, done  
7 measurements over crumb rubber infill material on play --  
8 on playing fields. And now we're going to transfer that  
9 experience to the question of can we do a good job  
10 measuring exposure concentrations on playgrounds?

11           And so we do have an advantage of doing it now.  
12 And so we're going to run through --

13                           --o0o--

14           DR. MADDALENA: Backwards

15           (Laughter.)

16           DR. MADDALENA: It's just that one, right?

17           That one. That one.

18           Okay. We'll jump right to the questions.

19           No, I can't do that. We have -- there's some  
20 slides going from there to the questions and then --

21           (Laughter.)

22           DR. MADDALENA: You see what he's saying about  
23 the equipment. Sometimes -- well, I can just talk a  
24 little bit. In grad school I was told to always be  
25 prepared to talk without slides, so -- and I'll show you

1 pictures, and we'll work through the pictures when we get  
2 there. But I could start by saying there are some key  
3 differences between the playgrounds and the sports fields.

4 One of them is they're typically smaller, more  
5 contained, often with trees, or pavement, or other media  
6 around them. Many times we see them shaded in the area,  
7 and they have play structures in them, so it's not nice --  
8 a nice flat field. So you've got all these other things  
9 going on on -- in the area. The cushion itself, what  
10 we're interested in, is there for safety. It's there for  
11 if you fall on it, it gives a cushioning effect.

12 And so it's a poured-in-place material made from  
13 the crumb rubber products that has a cushioning texture.  
14 So that's the one part that's new to this experiment than  
15 what we did previously. So we want to capture the  
16 advantage here, as we have some exposure activities  
17 information. We have an idea of who our receptors are  
18 going to be. They're going to be kids.

19 And so we want to be able to capture both the  
20 inhalation pathway, like we did from the field, but also  
21 the surfaces, because clearly kids are going to be playing  
22 on these surfaces. They're going to get hit on the pads.  
23 Anybody that has children knows they're going to get right  
24 down into the -- into dirt or the pads themselves.

25 So to save some time when the slides do come up,

1 I'll just suggest that what we're planning on doing for  
2 the air pathway is essentially transferring all of our  
3 experience from the fields to these playgrounds. So what  
4 we talked about -- what?

5 I could stop now. So I'll -- when I come back --  
6 (Laughter.)

7 DR. MADDALENA: -- to you, I'll jump right into  
8 the air measurements. And then we'll move to the surface  
9 measurements. That's what's new, so we'll go to that  
10 point.

11 DR. BRADMAN: Should I get going at this point?

12 Okay. So I'm going to then describe some of the  
13 information we have for micro-level activities of children  
14 in playgrounds. And does everyone have -- oh, it just  
15 went blank on the screen.

16 I'll get started now. Is this -- okay. So I  
17 just wanted to acknowledge the contributors to this. And  
18 also, especially Paloma Beamer and Nicholas Lopez-Galvez.  
19 Of course, they helped us on the other videotaping work.  
20 They're at the University of Arizona. And they've done --  
21 they've really done this work, and I'm kind of presenting  
22 it for them, and -- but they're really the lead on this  
23 and should get credit for it.

24 So just to give some context to this information  
25 that we do have, and -- which we hope to use to inform

1 some of the exposure modeling. As many of you know, it's  
2 a challenge to collect time activity data for young  
3 children. And we had an opportunity here with work that  
4 Dr. Beamer had done at Stanford some years ago to obtain  
5 California specific data for young children. And we want  
6 to take advantage of this data and use it.

7 --o0o--

8 DR. BRADMAN: So our objectives here was to use  
9 this information to quantify dermal and mouthing activity  
10 in young children playing in playground environments. And  
11 Stanford had existing micro level activity time series  
12 data, and video footage for 24 children collected by their  
13 group in late 1998 and 2000. So these were archived  
14 material. They also actually worked with us on some of  
15 our work in the Salinas Valley, and this built on that.

16 For this project, the videotapes were  
17 transcribed, so they had to provide a second-by-second  
18 time series of everything a child contacted with their  
19 hands or mouth, as well as location activity level. So a  
20 pretty detailed data set. And not too many like these are  
21 available for young children.

22 --o0o--

23 DR. BRADMAN: If we look at the next slide, you  
24 can get a sense of the characteristics of those children.  
25 Many of them are very young, one to two years old, and

1 then went up to -- well, most actually were well up to age  
2 10, but most of the children were in -- were one to six  
3 years old. So again, about 24 kids in a fairly good  
4 cross-section.

5 --o0o--

6 DR. BRADMAN: Just to give an example of how they  
7 coded some of the data. And this is also an example for  
8 the work they'll be doing with our videotape data of  
9 soccer players. This is an example palette of software  
10 that they developed back then and have since updated and  
11 used it in a number of different contexts. But when the  
12 videotapes are scored by students, they have this palette  
13 of information. And when events occur, they can code what  
14 type of surface, what type of object, the location, and  
15 the contact type.

16 --o0o--

17 DR. BRADMAN: And so then this goes into a data  
18 set that then can be extracted and analyzed. And they can  
19 use this to quantify behaviors and activities. And  
20 specifically for this analysis, the group looked at both  
21 contact frequency and also duration of contact. So if say  
22 a child is putting something in their mouth, but they're  
23 also sucking on it for, you know, a period of time, that  
24 information will be recorded too.

25 --o0o--

1 DR. BRADMAN: So again they analyzed these  
2 archived videotapes. And if you look at the table on the  
3 right, this gives you an idea of some of the different  
4 objects and surfaces that were evaluated. And if you look  
5 at outdoor, we talk about yard, park, garden, patio, and  
6 also driveway/parking to just explain that a little bit.  
7 Some of these environments were, for example, in a  
8 apartment complex. So there might be driveway or kind of  
9 street like avenues nearby, but we're not talking about  
10 being out in the street, but there could be these  
11 playground environments, also adjacent to, you know,  
12 other -- other types of, I guess, landscaping or  
13 infrastructure. But this, again, gives you a sense of  
14 what information was available.

15 --o0o--

16 DR. BRADMAN: And with that, they quantified  
17 activities including right hand, left hand, and mouth  
18 contact frequency. As I mentioned, we looked at the  
19 contact with specific object and the total. Also,  
20 determined how long the total time the child was in view,  
21 and then -- and then of the duration of contact. And the  
22 data were summarized by age and also looked at it a little  
23 bit by gender.

24 --o0o--

25 DR. BRADMAN: So the total time available was

1 about nine hours of observation period. About a little  
2 over half an hour was not in view. And, as you, know  
3 sometimes kids are behind trees or under playground  
4 structures, and you can't reach them. And for each kid,  
5 there was at least about 20 minutes of video time.

6 So this was the source information for their work  
7 with this data. There were no significant differences in  
8 contact frequency or duration with objects and surfaces  
9 between the right hand and the left hand.

10 So for the data, we're going to be talking about  
11 going forward, we summarized them together.

12 --o0o--

13 DR. BRADMAN: So again, there's a lot of numbers  
14 here. And I don't want you to focus on any specific  
15 number here, but just to get a sense that we have kind of  
16 a wide range of information. In this case, we're looking  
17 at contact frequency of their hands with different  
18 surfaces or objects in their environment, including both  
19 floor environments. So that could be like a deck, or a  
20 playground mat, or another floor surface in the playground  
21 environment. Dietary objects for food and different  
22 things they may be eating during the filming period. And  
23 then a whole range of non-dietary objects. And, of  
24 course, all objects here is a -- is a sum.

25 And again, some of the key points here is that,

1 you know, if we look at say the median value, we get some  
2 numbers, and they're quite high. I mean, if we look at  
3 the number of contacts, for example, that the child has  
4 with their hands and surfaces and objects in their  
5 environments, it's often, you know, dozens and up to  
6 hundreds.

7           And if we look at the maximum values, you know,  
8 kids are very busy in their environment. So there's a lot  
9 of opportunity for contact, and transfer, and exposure.  
10 Similarly, if we looked at their mouth contact. Again, up  
11 in the upper range, you know, we're talking about hundreds  
12 of contacts with different objects. Most of this in terms  
13 of the mouth was for dietary. You can see at the maximum  
14 level, of course, the big ones were for diet.

15           But still, you know, they're putting their hands  
16 in their mouth, they're putting other objects in their  
17 mouth. Fortunately, they weren't putting their mouth on  
18 the floor too often. One child was doing it. But again,  
19 just a sense here, that this pathway, both in terms of  
20 hand to mouth, or object to mouth are potentially  
21 important.

22                           --o0o--

23           DR. BRADMAN: And again, another piece of this  
24 that I think the folks at Arizona have really pioneered is  
25 also not just looking at contact, but also duration. And



1                   --o0o--

2           DR. BRADMAN:  And similarly with dura -- mouthing  
3 duration.  It's also longer in younger kids.  And  
4 particularly non-food objects, so they're putting some  
5 things in their mouth, or other interactions.  So this  
6 things that we all know from, you know, why we're  
7 concerned about young children, and exposure, and risk to  
8 potentially hazardous materials.

9           And this information from their data set helps  
10 confirm that.  And this is again specific to California  
11 children in playground environments.

12                   --o0o--

13          DR. BRADMAN:  So just a brief summary.  Wide  
14 variability in children's interaction with playground  
15 environments, differences observed by age.  And this  
16 information will be important that can form exposure  
17 modeling.  And there is a plan also to do some additional  
18 work with this data, and look at contacts with other body  
19 parts than just the hand-in-mouth.

20                   --o0o--

21          DR. BRADMAN:  And we actually have specific  
22 charge questions.  But any comments and discussion are  
23 welcome, or you can also possibly wait until Randy is done  
24 with his piece.

25          ADVISORY PANEL MEMBER SHELDON:  Why don't we

1 wait. So, Randy, you go ahead.

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

4 DR. MADDALENA: Time is up. All right. I'm out  
5 of here.

6 ADVISORY PANEL MEMBER SHELDON: Does anybody have  
7 some discussion questions or questions for Asa?

8 Okay. Tom.

9 ADVISORY PANEL MEMBER MCKONE: Well, it's a  
10 broader comment. I think it's really useful information.  
11 It's quite comprehensive. I guess what I worry about  
12 further down the road is you have a number of contacts,  
13 duration of contacts, but ultimately, it's going to  
14 depend -- in terms of getting the real intake of the  
15 chemical substance from the crumb rubber, or the crumb  
16 rubber itself is we need a loading or a transfer factor.  
17 And it's always dependent on that.

18 So you can have this table of, you know, 10  
19 minutes per hour or five minutes per hour of contact with  
20 your hands. And there's crumb rubber on your hands, but  
21 we still won't know -- I mean, we still have to work to  
22 figure out what the loading factor is, A, for the crumb  
23 rubber, and then B for the chemicals of interest that are  
24 in the crumb rubber. So I think it's -- its ultimate  
25 utility will depend not so much on the resolution you have

1 in time and activity, which you can get from videos really  
2 wonderful. In you videotape, you can disaggregate it down  
3 to the second-by-second activity.

4 But still, it's going to be constrained by  
5 transfer and loading on the hands or the objects children  
6 are contacting, in terms of -- because we want to know not  
7 just, you know, how many times they lick the floor. A  
8 lot, but, you know --

9 (Laughter.)

10 ADVISORY PANEL MEMBER MCKONE: -- what goes in  
11 after the -- you know, as a result of that activity. And  
12 that really is -- unless you can, at the same time, do a  
13 lot of biomonitoring and measure what's in the child that  
14 does that, it's hard to calibrate the transfer of chemical  
15 or crumb rubber to the child for that specific activity.

16 ADVISORY PANEL MEMBER SHELDON: Ed.

17 ADVISORY PANEL MEMBER KYLE: I pass.

18 ADVISORY PANEL MEMBER SHELDON: I wasn't calling  
19 you in order. Ed.

20 ADVISORY PANEL MEMBER AVOL: So I think I agree,  
21 this is an incredibly valuable data set. And I can't  
22 believe it's been 15 years since Paloma did this as a grad  
23 student.

24 But my question sort of on the generalizability  
25 and the represent -- representativeness of this when

1 you -- because you said something about this relates to  
2 California children. And so I assume is there some  
3 seasonality to this, or is it just restricted. So are you  
4 thinking about this in terms of sort of being the higher  
5 level of sort of warm temperature exposures, or is this  
6 also done as -- is there a range of this? I don't  
7 remember from the papers. Maybe I could have answered my  
8 own question by looking at the manuscripts.

9 DR. WONG: Paloma is on the phone.

10 DR. BRADMAN: Yeah. Is Paloma on the phone, and  
11 she could respond?

12 DR. BEAMER: Yes, I'm here. Can you hear me?

13 DR. BRADMAN: Yes.

14 DR. BEAMER: All right. So I just want to  
15 acknowledge that this was all data collected by Jim  
16 Leckie's group at Stanford in the late nineties. So  
17 actually even before I was a grad student, I just get to  
18 be the repository.

19 But they -- I believe from looking at the footage  
20 it was over two years, and it was through all seasons.  
21 And it was everywhere in the Peninsula to San Jose. So  
22 there was kids that are out in Pescadero that were really  
23 cold environments, all the way to, you know, some very hot  
24 days in Mountain View represented in this data set.

25 I haven't gone back and looked at the specific

1 children to make sure which ones they are, but I think you  
2 do have some of the Bay Area seasons in there.

3           ADVISORY PANEL MEMBER AVOL: Okay. Thank you.

4           ADVISORY PANEL MEMBER ECKEL: So I had one quick  
5 question. So I'm trying to understand big picture-wise.  
6 So this -- this videotape data is going inform on exposure  
7 of young children to playground environments, but are you  
8 also -- I think there's maybe mention of breaking it down  
9 by kind of time spent on turf-like environments. And is  
10 that going to be used also for the turf study or is there  
11 no data like that in part of the videotaping?

12           DR. WONG: Those data are being collected. Yes,  
13 in turf environment, it's going to be inform the bystander  
14 scenario --

15           ADVISORY PANEL MEMBER ECKEL: Okay.

16           DR. WONG: -- how they interact with outdoor  
17 environment, kind of grassy environment, what do they play  
18 in, how they interact.

19           ADVISORY PANEL MEMBER ECKEL: Thank you.

20           DR. BEAMER: She's gone ahead and quantified from  
21 the same videotapes all the times that children were  
22 playing on turf environments, and what they were doing,  
23 whether in a park or in their backyard, so to kind of  
24 represent bystanders.

25           DR. MADDALENA: All right. Thank you for your

1 patience. So I'll jump right into it. We've already had  
2 the introduction, the difference between playgrounds we  
3 had talked about that. These playgrounds are often  
4 shaded, they're more contained, and there's a lot of stuff  
5 in the way -- or a lot of stuff in there.

6 --o0o--

7 DR. MADDALENA: But feeding back to the exposure  
8 scenarios and activity patterns, we now -- we have a good  
9 sense of what goes on in these. So my question as we move  
10 forward is we have an opportunity to make measurements.  
11 Let's make them relevant, as close to we can -- as we can  
12 to exposure concentrations.

13 So I'm going to go through three things. Really,  
14 just I -- the description of the playground is pretty well  
15 done, and talk about the environmental and air samples,  
16 which we already have a good sense of. We've done that  
17 already. But the new thing is sampling the surfaces, and  
18 I'd like to get some feedback on that. So I'll talk about  
19 what our ideas are, and then we'll try and get some  
20 feedback.

21 --o0o--

22 DR. MADDALENA: So the air sampling idea --  
23 overall, the sampling idea would be to arrive at one of  
24 these playgrounds with the idea of putting together a  
25 three-hour monitoring event with the -- with the -- the

1 fields, we used five, because we wanted three hours of  
2 activity. Three hours is kind of the window that's  
3 dictated by our SVOC sample. I want to collect samples  
4 for that period of time. So that's an integrated sample  
5 over time. So that's where the three-hour window came.

6           The intent is to collect the air samples from  
7 somewhere towards the center or towards the middle of this  
8 environment, this playground area with another sampler  
9 off -- off the playground just to get some background,  
10 some reference and add to that database.

11           We do plan to collect temperature data, hopefully  
12 in shaded and sun areas, if that's feasible. Sometimes  
13 these things are totally in the shade for the entire  
14 period of time, and we'll get the off-site temperature as  
15 well.

16           A thing to keep in mind is we won't have any  
17 subjects performing any activities on the deck at this  
18 time while we're doing measurements. But the researchers  
19 are going to be active, and that will be ongoing at the  
20 area. We're not going to step off and just let the  
21 samplers run. So we'll be doing other things. So I'll  
22 jump right to the punch line.

23   --o0o--

24           DR. MADDALENA: The question really about these  
25 samples that I -- we've talked a lot about what we're

1 measuring. But the question is what's a good relevant  
2 sampling height for these samples that we're going to  
3 collect. We're proposing or suggesting -- we did get to  
4 one field or one playground just as a quick in and out to  
5 kind of get a sense of how it would be to work in that  
6 area.

7           And as Marion showed earlier, we have a similar  
8 pattern as you move up away from the surface of a  
9 decreasing concentrations. Again, this is benzothiazole  
10 and the MIK chemical that -- ones that we know are in tire  
11 material. And so we do still see this same trend to a  
12 certain degree moving up away from surface of the  
13 material, the pad itself.

14           And so our thought is it might be a good idea,  
15 rather than go right to the 42 inches, you know, roughly a  
16 meter high for a child's breathing zone, we're thinking  
17 let's drop that down to 20. Let's drop it down about half  
18 right about in the middle. We don't want to go all the  
19 way to the deck, because there's probably a lot of  
20 variability there. But if we get up into a bit of mixing  
21 zone in the 20-inch range, that's kind of our intent for  
22 all these samples.

23           Obviously, the stratified samples will be taken  
24 at different depths, and then the particle instruments,  
25 because there -- it's just -- there's just too much stuff

1 to work with, we'll probably put those up at a meter  
2 height as well that -- to get that sense.

3 So that's one of the questions we'll cycle --  
4 circle back to at the end of the talk, but that's kind of  
5 the background and rationale for what we're planning to do  
6 with the air samples.

7 --o0o--

8 DR. MADDALENA: What's new with the playgrounds  
9 that we didn't do in the sports field is the surfaces. We  
10 didn't take any direct measurements of the surfaces. We  
11 collected crumb infill, brought it back to the lab, and  
12 we're looking at that. But we didn't really do anything  
13 to try and characterize this adhesion rate, or this  
14 contact rate, or this residues on the surface that kids  
15 might come in contact with.

16 And we want to try that here. We want to do that  
17 at this -- at this level.

18 --o0o--

19 DR. MADDALENA: So I wanted to point out -- I  
20 wanted to point out there was a picture at the top. I  
21 guess you just don't see it, because it -- I wanted to  
22 point out that the sponginess of these surfaces. And the  
23 video here is just to show you that -- that sort of  
24 sponginess. And the top image was sort of to show you  
25 that -- the texture. So those are two things that we're



1           So the idea would be to use that in conjunction  
2 with a roller tool that uses polyurethane foam, or  
3 depending on if you're doing metals or not. If you're  
4 doing metals, we'll use a cellulose fiber on or roller  
5 that is weighted to represent the number -- the pressure,  
6 9000 Pascals. The pressure of a child pushing on stuff,  
7 or getting on surfaces, so that you can calibrate the  
8 pressure on the surface, as this roll goes across the  
9 surface more of standardized way.

10           And so what we're -- what we're hoping to do or  
11 leaning towards, and we like the Panel's, you know,  
12 feedback on is in using those two standard method -- we're  
13 not developing something new. We're just applying  
14 something that's pretty well established to a new  
15 application. If we do this, can we use these two pieces  
16 of information to try and educate or inform us about what  
17 these exposures might be on the surface.

18           We're going to be analyzing for the semi-volatile  
19 chemicals that will, you know, essentially be on the  
20 surfaces.

21                           --o0o--

22           DR. MADDALENA: If they're going to be there,  
23 that's what we'll pick up. But we'll also pick up dust,  
24 and residue fine material as well. The approach that  
25 we're proposing to do is to use two zones. Use one for

1 metals, because we don't want to use any metals in that  
2 sample, use the other one for organics, because, you know,  
3 it's just -- they're two very different sampling  
4 techniques.

5           So once we identify the two zones as you see on  
6 the screen here, we would collect multiple samples. The  
7 first being a sample that uses the roller. I've got the  
8 prototype -- well, it's not the -- it's the one we're  
9 using over here on the ground, if we want to take a look  
10 at it. But we use the roller with the polyurethane foam  
11 on side B and with the fiber cloth on side A, and collect  
12 a sample with the roller on an unvacuumed just as you find  
13 it surface. So you're going to have all kinds of stuff on  
14 that surface. It's going to collect all that it can  
15 sticking to that simulated skin, which is the polyurethane  
16 foam or the cellulose fiber.

17           And then in C and D is where we're going to use  
18 the vacuum, and actually vacuum up dust, stuff that can be  
19 re-suspended, or however the vacuum it pulls up the dust  
20 fraction. And we're going to call it the dust fraction.

21           And then once that's done, we'll come back with E  
22 and F, meaning metals and organics, and re-roll that  
23 surface that's been vacuumed. So we're going to have  
24 three different samples here representing qualitatively in  
25 a way three different things that we hope or plan to put

1 back together to make sense of what these dermal contacts  
2 would be for children.

3 --o0o--

4 DR. MADDALENA: So that's kind of an overview of  
5 what we're thinking as we move forward. I don't the know  
6 timeline still is -- I guess we're waiting for it to warm  
7 up a bit, and it's getting there. It's coming up fast.  
8 So we'll be out in the field soon enough. But I wanted to  
9 kind of run this plan past you guys and see what kind of  
10 feedback we got.

11 DR. WONG: The goal is to go out this summer  
12 around June to July in a very hot day.

13 (No mic on.)

14 ADVISORY PANEL MEMBER SHELDON: We're ready for  
15 all the Panel discussion, and we want to be done by 3:05.

16 ADVISORY PANEL MEMBER KYLE: I just wanted to ask  
17 a question first, before discussion.

18 ADVISORY PANEL MEMBER SHELDON: Well, that's part  
19 of the discussion.

20 ADVISORY PANEL MEMBER KYLE: Okay. Well, then we  
21 can discuss my question, but -- so the idea is that this  
22 stuff is more sealed in a sense than the turf fields, is  
23 that what you mean when you talk about the surface, that  
24 there's not -- like if you jumped on it, the poof wouldn't  
25 come up?

1 DR. MADDALENA: Exactly. It's a poured-in-place  
2 material. And so it's a spongy type material, so it  
3 doesn't have -- like if you slid your foot across it, you  
4 don't see this -- the crumb coming back up, because  
5 there's no loose material in general.

6 ADVISORY PANEL MEMBER KYLE: Okay. Thank you. I  
7 didn't know what poured-in-place meant in this context.  
8 So I --

9 DR. MADDALENA: Is that right words there. I  
10 don't know if that's the right terminology.

11 DR. WONG: Yes.

12 DR. MADDALENA: Yeah, it actually creates a foam  
13 pad essentially. It feels like a spongy pad.

14 DR. WONG: It's similar material in some of the  
15 gym you go for a weight training, those kind of pad. Like  
16 a mat, yes. It's a playground mat itself. It's a  
17 continuous layer with rubber on the top.

18 ADVISORY PANEL MEMBER SHELDON: Okay. Ed.

19 ADVISORY PANEL MEMBER AVOL: I have two comments  
20 or questions on -- with regard to your first question  
21 about whether it should be at 20 inches or 40 inches, et  
22 cetera. I mean, I think in some ways, I'm sort of  
23 inclined to look for the extremes, or at least the  
24 potential for higher exposures. So I would argue for the  
25 20 inches, because I think you're liable to get younger

1 children playing on this, and they're going to be shorter.  
2 And I think that based on what we've seen at least for  
3 some of the VOCs and so forth, there is going to be a  
4 gradient with distance from the surface. And so I think  
5 that you want to be closer. And I think that's a good  
6 compromise. So I would argue for 20 inches.

7           On the other -- on another aspect of the -- your  
8 little clever sampling machine, there's use at 9000  
9 Pascals, the paper says 8000.

10           DR. MADDALENA: Eight thousand Pascals. Yeah.  
11 Thank you.

12           ADVISORY PANEL MEMBER AVOL: But either way I  
13 have question about that, because it seems like that's  
14 sort of evenly distributes, and sort of rolls over in  
15 smooth fashion. And I think little kids running around  
16 and jumping on these things, in terms of planting and  
17 coming off of their feet may exert more than that.

18           I don't know whether that's true or not, but I  
19 think somebody ought to check on -- you know, on string  
20 gauge or -- you know, I mean, it's fairly straightforward  
21 certainly in a physical thera -- physical laboratory to be  
22 able to check, you know, what that driving force is just  
23 to reflect that -- if you have a 20 or 30, 40 pound child  
24 running around on this what the pressure is. And  
25 that's -- maybe that's what you ought to set this to in

1 terms of weighting it down.

2 DR. MADDALENA: Can I respond with as a  
3 conversation as we go?

4 Yeah. The tradeoff -- I agree with what you say.  
5 And I -- and we do have like sit machines in the lab,  
6 where we have a machine that just sits and stands up or  
7 jumps on a couch or whatever. It's robotic. And those  
8 tools are available for aging materials and things. But  
9 our goal is to get something -- it's kind of like using  
10 the LD50, we want to -- we want to go for something that's  
11 really repeatable, and as consistent, and as relevant as  
12 possible.

13 And then we could make our adjustments or our  
14 projections as far as what a higher or a lower. I think  
15 what we're discussing here is like impact, not  
16 necessarily --

17 ADVISORY PANEL MEMBER AVOL: Right.

18 DR. MADDALENA: -- the constant touching.

19 ADVISORY PANEL MEMBER AVOL: But I think in terms  
20 of exposure, when a child is running over it, they're  
21 going to have that impact --

22 DR. MADDALENA: Yeah.

23 ADVISORY PANEL MEMBER AVOL: -- that may lead to  
24 the exposure sticking to them -- their shoes, or their  
25 material, or them. And so that's why I say, again,

1 leaning it towards more potentially the higher extreme  
2 risk. It maybe just a philosophical difference.

3           ADVISORY PANEL MEMBER AVOL: Yeah. At some point  
4 if you actually -- the actual use of it, you completely  
5 smash out your polyurethane foam and you actually -- you  
6 know, you're basically just pushing it into the cushion.  
7 So that may, in fact, be a -- you know, a good way --  
8 something to consider.

9           ADVISORY PANEL MEMBER AVOL: Yeah, maybe if I  
10 play on a children's thing. I don't know about a 20 or 30  
11 pound kid.

12           ADVISORY PANEL MEMBER SHELDON: Tom.

13           ADVISORY PANEL MEMBER MCKONE: Kind of really an  
14 extension I think of my last comment, which is -- again,  
15 this is, in a way, what you have as a way to get loading  
16 or transfer. This is going to be it. I mean, I know --  
17 you don't have human subjects opportunities here. I mean  
18 you can't take a couple of children and wipe their feet  
19 and hands after you see them. Right, that probably would  
20 give us more insight than a lot.

21           I guess that's -- I mean, and again, it's a  
22 question. I don't think it has an answer, but it's just  
23 to think about this kind of impedance matching, you might  
24 call, it. You know matching up what we have on activity  
25 base. We're going to have some really good information,

1 generically at least, not for specific populations at  
2 playgrounds, but generic information about how children  
3 interact with surfaces.

4           And you're going to have these experiments that  
5 tell us a lot about the transferability the -- how well  
6 the surfaces give up dust and chemicals when contacted.  
7 And I still think it's going to be a bit of a challenge to  
8 put these pieces together to do the actual quantitative  
9 transfer of chemical.

10           And again, I don't know what the answer is. It's  
11 just something we have to focus on to keep that as  
12 reliable as possible, and to see what -- where the  
13 uncertainty and the -- particularly the uncertainties  
14 about how we model that, because I think we're going to  
15 have to do the model when we do the risk assessment.  
16 We -- I mean you guys. We're not going to do it, but we  
17 have to think about what it means.

18           ADVISORY PANEL MEMBER SHELDON: Actually, along  
19 those lines, about 10 years ago, EPA did have to do a risk  
20 assessment for arsenic with arsenic treated wood  
21 preservatives and kids on playgrounds. And Valerie  
22 Zartarian and Jian Xue did it. And that is in the  
23 literature, and it was also went through the Science  
24 Advisory Board at EPA, because it was sort of a big deal  
25 risk assessment.

1           They used the SHEDS model. They developed what  
2 were the biggest uncertainties. And I think it was --  
3 part of it was thickness of the layer, and how much stuff  
4 stayed on -- I think on the hand, but it is in the  
5 literature. And I think you can also get it. But it's a  
6 good place to start, at least on kids and playgrounds.  
7 And, you know, if you decide to use that model or some  
8 other model, what are the -- what did they predict as the  
9 greatest uncertainties? So that -- that could be useful  
10 to you.

11           ADVISORY PANEL MEMBER MCKONE: Yeah, I agree.  
12 That's a good point. I mean that would be the SHEDS type  
13 modeling would probably be the best you could do as a  
14 precedent. And it was. And Valerie brought in. --

15           ADVISORY PANEL MEMBER SHELDON: Um-hmm.

16           ADVISORY PANEL MEMBER MCKONE: -- the Stanford  
17 time activity data. So it's already a precedent for that.

18           ADVISORY PANEL MEMBER SHELDON: Right. So it  
19 would be useful. I mean, there may be things you want to  
20 change about it, but at least it's a starting place,  
21 especially for uncertainty in the model.

22           Amy, do you have any other comments?

23           Go ahead, Debbie.

24           ADVISORY PANEL MEMBER BENNETT: I just really  
25 think it's important to do the 20 inches. And I think

1 it's really important -- it's going to be really important  
2 to get a hot day, because I mean, I remember taking my  
3 kids to these things when they were little. And, I mean,  
4 coaches are smart. Like coaches don't let their teams  
5 practice when it gets too hot. Parents, we're not  
6 professionals. We're not necessarily smart like that.

7 (Laughter.)

8 ADVISORY PANEL MEMBER BENNETT: We're sitting  
9 there going oh, oh, it really smells.

10 (Laughter.)

11 ADVISORY PANEL MEMBER BENNETT: Anyhow.

12 And I don't -- I guess I don't understand what's  
13 wrong with -- I'm just struggling to see how the HVS3 is  
14 going to work on this surface, and what it's going to be  
15 picking up, because I feel like it's going to be picking  
16 up, you know, dirt that got blown over from the grass that  
17 was nearby, and random things. And I don't understand  
18 what's wrong with the blotting, and how the drag sled  
19 thing is going to be better than the blotting.

20 Because I feel like if you're worried that it's  
21 too porous to blot, isn't also too porous -- I mean,  
22 unless that has more pressure applied than you can apply  
23 with your hand. And also the kids -- I mean, I understand  
24 Ed is right they're going to really pound down on their --  
25 when they're jumping, but they're predominantly in shoes

1 at that point.

2 So what they're contacting is with their hand.  
3 And I would think your hand blotting is going to be better  
4 able to replicate the pressure a kid would apply to some  
5 degree. So I don't know. I'm struggling a little bit  
6 with the surface.

7 DR. MADDALENA: Yeah. No, that's goo -- very  
8 good thoughts. When you arrive at one of these --

9 ADVISORY PANEL MEMBER BENNETT: I didn't get from  
10 the picture -- it looked like you were doing a great job  
11 blotting in that video.

12 (Laughter.)

13 DR. MADDALENA: Yeah, I mean, that's how you do  
14 it. It just -- as we did that the first thing --

15 ADVISORY PANEL MEMBER SHELDON: You didn't break  
16 the equipment

17 DR. MADDALENA: I didn't break a thing. Yeah, I  
18 didn't.

19 But the first thing is you pick up a lot you just  
20 said. How do you separate the stuff that's blowing onto  
21 the field, or onto this pad, and otherwise? And that's  
22 why we kind of thought about if we brought in something  
23 that was more of a systematic approach to collecting that  
24 first, and then see what remains. And then in order to  
25 make sense of those two, go ahead and try and collect it

1 without doing that pre-cleaning of the surface. Because  
2 all of those factors, or all of those fractions, if you  
3 want to call them that, are important.

4           They're contact media. The dust, even if it came  
5 from elsewhere, has been residing with the poured -- the  
6 surface for some period of time, and exchanging friends  
7 back and forth to a point where the dust that you're  
8 picking up off of that surface may be relevant to it as an  
9 exposure pathway or contact media.

10           And so we wanted to make sure we captured that.  
11 And the blotting didn't really do a good job capturing  
12 that, because, I mean, there's -- there's pieces of fibers  
13 and things there. And I just -- for me, I needed to just  
14 step back and try and get something more systematic. And  
15 that's why that sort of roller --

16           ADVISORY PANEL MEMBER BENNETT: So you felt when  
17 you were blotting you could see dirt that you were unable  
18 to pick up is what you're saying?

19           DR. MADDALENA: Either that, or you were picking  
20 up -- or either some large chunk of material was coming  
21 into the fabric when you were picking it up. So it was  
22 just -- it was not very consistent.

23           ADVISORY PANEL MEMBER BENNETT: Okay.

24           DR. MADDALENA: That was what I was struggling  
25 with trying to get a consistent repeatable approach.

1           And I'm not even -- you know --

2           ADVISORY PANEL MEMBER BENNETT: Did you guys  
3 analyze that blot --

4           DR. MADDALENA: No, we haven't yet.

5           ADVISORY PANEL MEMBER BENNETT: -- to see what  
6 kind of things you're getting yet?

7           DR. MADDALENA: We haven't done that, no. No.

8           ADVISORY PANEL MEMBER BENNETT: I mean, it might  
9 make sense to -- I mean, because obviously, you're going  
10 to lineup a few of these playgrounds. Only three.

11          DR. MADDALENA: The plan is three, if I'm not  
12 correct, right?

13          DR. WONG: Yeah. Part of it is because of the  
14 time issue, and how much resources we have. We are laying  
15 more for the sample analysis now. We can see in the data  
16 analysis. The playground studies is signed is preliminary  
17 pilot scale to look at, instead of the potential concerns.  
18 So we are target to find very hot area with different age  
19 of the surface. I know it's n equal to one, but it will  
20 give us some idea on what are we looking at in terms of  
21 playground.

22          ADVISORY PANEL MEMBER BENNETT: So it sounds like  
23 you're not going to have -- like you're not going to be  
24 able to analyze anything in between. Like it's just you  
25 go -- I think maybe you do another strip on either side

1 that's also a blot, because I think --

2 DR. MADDALENA: That's what I'm hearing you say,  
3 yeah.

4 ADVISORY PANEL MEMBER BENNETT: Yeah, I mean, I  
5 think you've only got one shot there. And so it might  
6 make sense just to anal -- just to have more, you know,  
7 because I'm just worried you won't pick anything up with  
8 the others. So maybe a purple stripe on either side of  
9 your picture that represents the blot.

10 DR. MADDALENA: That's a good suggestion, because  
11 it's not hard to collect the sample, I mean, if you have  
12 it, right?

13 DR. WONG: And one other scenario we're here  
14 trying to look at is children crawling on the surface. So  
15 that is more like a rolling kind of scenario than jumping  
16 and bouncing. Because little kids, they are kind of like  
17 a little bit dragging. But be aware, these surface are  
18 very rough. So I would say, they would -- the pain would  
19 tell them to drag yourself, but kind of crawling around  
20 gently, I hope.

21 ADVISORY PANEL MEMBER SHELDON: Sandy doesn't  
22 have any questions. And I agree with Debbie, you need to  
23 do something that allows you to look at various ways to do  
24 the surface samples. When I left EPA, Dan Stout was the  
25 person who was looking at all of this. You know, I can't

1 remember, but I just remember that I didn't like using the  
2 PUF roller.

3           And I actually went back and looked at some of  
4 our CTEP data, because I thought we weren't detecting  
5 anything, but that wasn't the case. But it seemed to me  
6 that there were a lot of places where it didn't work well.  
7 But, you know, this was a long time ago again.

8           But you might try contacting Dan Stout, because  
9 he was the one who was spending a lot of time looking at,  
10 you know, potential surface -- I mean, this has been a  
11 problem that's gone on as long as people thought they  
12 needed to take surface measurements.

13           ADVISORY PANEL MEMBER BENNETT: And you're  
14 pre-cleaning all this stuff, right? You're extracting the  
15 puffs --

16           DR. MADDALENA: Yeah, yeah. Oh, yes.

17           ADVISORY PANEL MEMBER BENNETT: -- and all that?  
18 Okay. Good. Before.

19           DR. MADDALENA: For sure, yeah. In fact, that's  
20 another -- that's another -- it's not a driving factor,  
21 but the fact that the method is well developed for  
22 polyurethane foam in our lab is another -- another -- I  
23 mean, if you know how to fly a plane, then you're much  
24 better off. You're less likely to make a mistake, right?

25           And we didn't want to get -- we didn't want to

1 get too far into method development, so that's why we're  
2 trying to select existing methods, and put together a  
3 puzzle that way. So, yeah, everything is pre-cleaned and  
4 blanks are used and...

5           ADVISORY PANEL MEMBER SHELDON: We now -- oh, go  
6 ahead. Yes. Okay. We'll be back at 3:10 for public  
7 comments

8           (Thereupon a recess was taken.)

9           ADVISORY PANEL MEMBER SHELDON: And it is time  
10 for the public comments. We have -- yeah, I do, but --  
11 okay. So there will be an opportunity for everybody to  
12 speak. We've got blue cards here. Please fill one out,  
13 if you would like to speak, turn it in to Rebecca and she  
14 will bring it up to us. And each speaker has three  
15 minutes. And there -- on the phone, you will also have an  
16 opportunity to speak.

17           And I have two cards here. Kelley Watts.

18           MR. WATTS: At the very first meeting, a  
19 Synthetic Turf Scientific Advisory Panel member  
20 postulated, even with the best research we can't have  
21 completely definitive resolution. And maybe we should say  
22 that now and not three years from now. I couldn't agree  
23 more.

24           This will probably be the last Panel of this high  
25 caliber that will be convened in the United States for

1 many years to come regarding synthetic turf risks.

2 I've been reporting on turf studies like this one  
3 for news outlets for over a decade. Across our country,  
4 I've met families and public health advocates who are  
5 deeply frustrated. They borrow the words of the students  
6 today in voicing their anger about shortsighted politics  
7 and feel that it is appropriate and fair, with all due  
8 respect, to call out nonsense for the following reasons:

9 They call nonsense on the plastic synthetic turf  
10 and rubber manufacturing lobbyists and salesmen, who  
11 repeatedly claim that introducing pulverized tire waste  
12 into children's play areas has been proven to be safe, and  
13 it is not.

14 They call it on the third, virtually identical,  
15 CalEPA turf study, which once again uses the same  
16 inconclusive methodology, which primarily involves testing  
17 minuscule teaspoon size samples of enormous acres of  
18 chemical-rich material that is heterogeneous and highly  
19 variable.

20 They call it on the claim that the study is  
21 practicing transparency, when it refuses to post for  
22 review the transcripts of all of these meetings, and not  
23 just some at the very end. And also for refusing to allow  
24 the media and the public to observe any sampling and  
25 testing, even when human test subjects and locations

1 willingly volunteer to participate in the study for the  
2 public record.

3           They call it on the study's claims of  
4 inclusiveness. Nancy Alderman conducted the Yale  
5 University Turf Study, and volunteered to serve on this  
6 Panel. Athletes and scientific experts with years of  
7 experience on this topic were also excluded.

8           They call it on the study timeline that could  
9 have taken a couple of years at most, that is being  
10 dragged out for four years, allowing the industry more  
11 time to expand their business footprint.

12           They call it on anybody who holds in higher  
13 regard the interests of the synthetic turf industry, the  
14 rubber manufacturing industries, or the recycling  
15 industries over the health and welfare of the tens of the  
16 thousands of families that are exposed to the chemicals on  
17 these fields daily.

18           They call it on any argument which tries to  
19 justify not requiring basic warning signs in California,  
20 where one chemical in coffee requires warning signs to be  
21 posted. Plastic and crumb turf, with the dozens of  
22 chemicals and toxins being released into the environment  
23 and into human bodies is curiously being given a free  
24 pass.

25           I thank all of the Panel members for the

1 important responsibility you've taken upon yourselves, as  
2 you are now considered to be the de facto experts for the  
3 people, and count on you to stand up for our most  
4 vulnerable, and for our children.

5 Thank you.

6 ADVISORY PANEL MEMBER SHELDON: Okay. Our next  
7 comment comes from Amy Brackin.

8 MS. BRACKIN: Hi. I just have a real quick one.  
9 I want to thank everyone today for the Panel. I think you  
10 guys have done a fantastic job. The meeting has been very  
11 informative for those of us who aren't scientists. Easier  
12 to understand perhaps than some of the prior ones when we  
13 were talking about methodologies and things that tend to  
14 go over our heads. So I really appreciate that.

15 We're grateful for the work that's been done,  
16 both by the researchers and the panelists. I really just  
17 want to note that there's been so much good verbal  
18 feedback today, commentary on the slides and  
19 presentations, that we would like to ask and understand  
20 that these slides, as they're made available to the  
21 public, would simply be caveat, if you will, as what they  
22 are. That these slides today are here to -- we're here to  
23 address public concern, and that we're clear about  
24 releasing the slides to make sure that they're taken into  
25 context, and they're really not left to interpretation as,

1 you know, a finding of any kind risk.

2           Some of the words that were used, some of the  
3 big/small, large/small particles, high/low, things like  
4 that, can -- you know, we've seen this topic as very  
5 contentious and sometimes things get taken out of context  
6 or a specific slide gets taken and blown out of  
7 proportion. So we simply ask that when they're released  
8 to the public, that there is some kind of statement that  
9 goes along with that to help explain what today's slides  
10 are all about.

11           We had a brief discussion on this, but in the  
12 playground component, it was mentioned that the surfaces  
13 being looked at are poured-in-place surfaces.  
14 Poured-in-place surfaces typically, from the industry, are  
15 a tire rubber on the lower part of the surface, an EPDM  
16 top layer, oftentimes, because they want those to look  
17 really nice and they've got bright colors on them and that  
18 kind of thing. So I simply want to make that statement  
19 that we make sure - I mean it's kind of an obvious one -  
20 that we're actually testing tire rubber on these, and  
21 perhaps not some other surface, you know, topical areas.

22           And then finally, you know, I just need to ask --  
23 I think we've mentioned this before, but we're focused  
24 very much on crumb rubber, recycled tire rubber in this  
25 presentation. Hopefully, when this risk assessment is

1 done, there is some reference point, some baseline to  
2 these studies to help individuals, parents of young  
3 children understand, you know, where this falls in the  
4 entire picture of playing surface, the whole, whether it  
5 be natural grass or comparative surfaces.

6 Thank you.

7 ADVISORY PANEL MEMBER SHELDON: Okay. Our next  
8 commenter is Denise Kennedy. And if any of you want to  
9 state the organization you're from, feel free to, but you  
10 don't have to.

11 MS. KENNEDY: My name is Denise Kennedy, DK  
12 Enterprises. I've been in the tire recycling industry 30  
13 years.

14 And I wanted to first focus on playgrounds.  
15 Pretty much Amy just said a lot of what I was going to  
16 say. But I do think we need some controlled measurement  
17 on the playgrounds. We have loose fill nuggets that are  
18 in playgrounds have not been discussed at all, and that's  
19 loose fill. So pretty similar to taking infill, but about  
20 a 3/8th inch piece of rubber. So if you're going to look  
21 at, I would do a comparative controlled study. I would  
22 also look at engineered wood fiber, if you're going to do  
23 this, and sand, because it's like a cat box.

24 So it's not one that's bad. It's -- there's --  
25 there's areas of concern of probably any one of them. So

1 I just need to say that.

2           The other thing just to explain to people is that  
3 when you take this rubber that they're talking about  
4 running a piece of equipment over, or taking a sample from  
5 it, the top surface is one half inch -- about an inch to  
6 three inches thick. It's usually EPDM rubber, which is a  
7 synthetic rubber. It's not tire rubber. So as you start  
8 taking off the top, it's going to have nothing to do with  
9 tire rubber. Then you go down about three inches and then  
10 you're going to have buffings. Buffings come from truck  
11 tires. They're not crumb rubber, just so you know. So  
12 crumb rubber from a tire, not from the buffings of a truck  
13 tire. So that's a difference of what are we going to be  
14 looking at, so I think that's important.

15           I'm not aware of maybe just one company that just  
16 does solid rubber for a playground. And we also have to  
17 meet specifications for the head injury level. The reason  
18 the thickness of that material on the playgrounds is based  
19 on the fall height of the equipment, and the potential of  
20 a head injury, which is called the HIC value, of about a  
21 thousand. So that's about 18 percent possibility of a  
22 head injury. So I just need to say that. That's really  
23 important, as you look at this.

24           And then my other thing would be as you've done a  
25 great job today, and Amy, I love your questions. As a

1 panel, they have been great, so -- per the other ones that  
2 are working on it. The one that I -- because I just left  
3 ASTM meetings this week on turf and on playgrounds, I've  
4 kind of been listening to different people have some  
5 concerns.

6           One of them that I kind of hear is, you know, we  
7 have testing facilities that are really, really into how  
8 many different locations on a field that they do tests.  
9 You may have already talked to them, but if you would like  
10 a few of those top companies that do most of it for the  
11 big players, I'm happy to give it to you, if you want to  
12 talk to them as well.

13           And then my last point that I kept hearing, and I  
14 didn't hear it, because I missed an hour, is there's a lot  
15 of concern about what you guys are testing at heat level.  
16 Somebody it was 300 C, and that's like 700 degrees I think  
17 they said. I just heard this discussion quite a bit. Big  
18 concern and why are we doing that when no field ever gets  
19 that hot.

20           And by the way, back to playgrounds. It's the  
21 equipment that gets really hot. So you don't want to play  
22 on the equipment. The rubber might be warm and hot, but  
23 the playground equipment is terrible. So I just want to  
24 say that.

25           Okay. I'm done.

1           ADVISORY PANEL MEMBER SHELDON: Thank you.

2           Okay. Nick Lapis.

3           MR. LAPIS: Hi. Good afternoon. Nick Lapis with  
4 the environmental group, Californians Against Waste.

5           Sorry about that.

6           Following up on the last two comments --  
7 actually, a very similar comment to what I was going to  
8 make. The biggest flaw that I see in the methodology  
9 right now is the lack of a control. You can't really make  
10 any claims about the impacts of the chemical on a  
11 synthetic turf field, if you don't test the soil adjacent  
12 to the field, and if you don't use a grass field as a  
13 comparison, similarly with the playgrounds and looking at  
14 traditional playgrounds that don't have the pour-in-place  
15 rubber.

16           I mean, really you're setting yourself up for a  
17 situation, where no matter what the results are both sides  
18 are going to claim that it proves their point, because one  
19 side is going to say, yes, there are XYZ chemicals, and  
20 the other side will say, but they didn't compare it to  
21 soil, and so therefore, it's meaningless.

22           And that seems like a glaring omission. It's one  
23 we've not taken up since the first scoping meeting you've  
24 had on this issue, and I've brought up personally about  
25 three or four times now. I'm surprised that it still

1 hasn't been addressed. I know it's hard methodologically  
2 to compare soil with the turf, but it's worth figuring it  
3 out.

4 Thank you.

5 ADVISORY PANEL MEMBER SHELDON: Okay. Our next  
6 commenter is Steve Krauss

7 MR. KRAUSS: Hi. I'm Steve Krauss with CRM  
8 Company. Thank you for the opportunity to speak. We  
9 would like to recognize everybody's efforts in the study,  
10 your approaches, your hard work and dedication. And we  
11 really look forward to the conclusions and outcomes, what  
12 we can take away from the study. Very important that we  
13 really look after our -- the people -- all people, whether  
14 it's children or adults that are playing and utilizing  
15 these fields.

16 I'm a little concerned as some of the other  
17 previous comments are on the lack of control, that we  
18 don't compare these fields to native field -- or grass,  
19 with soil contamination, and that working at the other  
20 alternatives within synthetic turf fields are being  
21 utilized, such as EPDM, the sand, husk, or cork. So  
22 there's other materials that are being utilized as infill.

23 So it seems like we -- if we're really interested  
24 in what's the safest mechanism, we should look at all of  
25 these options, and evaluate them all for what they are.

1           And then how do we differentiate the VOCs and the  
2 contaminants that are associated with -- that are native  
3 to the crumb rubber, as opposed to hand infill that's  
4 mixed in with the crumb, or the carpet, the blade, the  
5 other aspects of the synthetic turf solution. So being  
6 able to truly isolate those and say with a high degree of  
7 certainty that those are native to the crumb rubber, or  
8 whatever part of the infill is very important, and that we  
9 communicate that in our findings.

10           Thank you.

11           ADVISORY PANEL MEMBER SHELDON: Okay. Our next  
12 commenter is Robina Suwol.

13           MS. SUWOL: Hi. Good afternoon. It's Robina  
14 Suwol. I'm the Executive Director of California Safe  
15 Schools. I want to thank OEHHA, and the Science Advisory  
16 Panel, and everyone that worked so diligently and  
17 enthusiastically on this study. Thank you so much.

18           And I also just want to add that I really  
19 appreciate comments made by the panelists to help the  
20 public a better understanding of a lot of this data. And  
21 I appreciate your efforts on that as well.

22           We all know that tires are considered to be too  
23 toxic to be placed in landfills. Yet, when they're  
24 shredded, they're allowed to be used on playgrounds, and  
25 athletic field, and pathways.

1           And this -- and the State also continues to have  
2 fields. And this continues to be troubling, given the  
3 known chemicals that have been identified in tires, and  
4 the extreme vulnerability of children, and adults, and  
5 athletes who play on these tire crumb fields, as well as  
6 illnesses that have been reported of more than 200 plus  
7 soccer players, who have played on fields that contain  
8 tire crumb.

9           I have just a few other comments. That is, given  
10 the toxicity of mercury, even at low levels, we would hope  
11 that you would continue to include mercury when you're  
12 sampling. And we'd also like you to please also consider  
13 the synergist impacts of chemicals that include, but may  
14 not be limited to zinc, chromium, arsenic, carbon black,  
15 benzene, lead, cadmium, mercury, and hydrocarbons.

16           And we didn't -- you were talking about the mats,  
17 the children's mats. And a lot of them do disintegrate  
18 really easily either from wet - a lot of use. So I do  
19 hope that you can continue to do some testing where these  
20 materials tend to wear away.

21           And then I have just one last question. And that  
22 is since testing was performed on samples of tire crumb,  
23 that was taken directly at the source where tires are  
24 shredded, were Prop 65 chemicals found at this, when they  
25 did the testing? And if so, have the facilities, where

1 these samples were taken, and if they contained Prop 65  
2 chemicals, did they follow protocols and notifications  
3 that are required?

4 Thank you so very much.

5 ADVISORY PANEL MEMBER SHELDON: Okay. Kathleen  
6 McCowin

7 MS. McCOWIN: I'm Kathleen KcCowin. I'm  
8 President of Health Soccer, San Francisco. It's a soccer  
9 coach and soccer parent organization. First, I'd like to  
10 thank you for your service to California's children.

11 I'm providing an update -- Woops, I'm already  
12 done?

13 (Laughter.)

14 MS. McCOWIN: I'm providing an update on recent  
15 changes to the use and construction of Bay Area soccer  
16 fields. These were spurred by concerned parents and  
17 players on the health risks of tire crumb infill, but  
18 particularly for pre-schoolers. We ask that the OEHHA  
19 study the everyday use of crumb fields by many thousands  
20 of toddlers and pre-schoolers all over California with  
21 particular consideration to their high vulnerability  
22 exposure, which has been mentioned today.

23 By example, San Francisco is a crowded city with  
24 limited park space, so pre-schoolers regularly play on  
25 these tire crumb fields. These often very young children

1 typically play with and lie and roll in the tire crumb, at  
2 least in my experience. At my local park alone five  
3 different Chinese pre-schools brought their children to  
4 these fields every day for years. So pre-schoolers are  
5 not just observers, but they're primary users of these  
6 fields.

7           When a local reporter's two-year old came home  
8 with tire crumb in his hair, and she voiced her concerns  
9 in our San Francisco -- in her San Francisco Examiner  
10 column. Healthy Soccer San Francisco had the article  
11 translated into Chinese, and provided to the pre-schools.  
12 These children now play in the toddler playgrounds, which  
13 you are now going to be looking at, no longer brought to  
14 these fields.

15           Note today's report of toddlers both indirectly  
16 and intentionally ingesting tire crumb. Please consider  
17 expanding the playgrounds study to include exposure for  
18 this vulnerable group to the actual tire crumb fields.

19           Thank you very much.

20           ADVISORY PANEL MEMBER SHELDON: Do we have  
21 anybody on the phone?

22           No.

23           Okay. So we have some -- we have no one on the  
24 phone. We do have comments sent in to the website that  
25 Jocelyn will read to us.

1 DR. CLAUDE: We. Okay. We have-- the first  
2 comment we have is from Dr. Mary Zakrasek.

3 And her comment is, "The question I'd like to ask  
4 is about toxins. Typically, each toxin is studied for  
5 what its individual toxicity might be. But studies have  
6 found that there are synergistic relationships, such that  
7 one toxin can make others more toxic.

8 "Example: In this study, the synergistic  
9 relationship between lead 0.01 milligrams per liter,  
10 mercury, 0.001 milligrams per liter, cadmium, 0.005  
11 milligrams per liter, and arsenic 0.1 milligrams per liter  
12 were looked into. Individually, the dose is considered  
13 very low and safe for the mice. Although, when they are  
14 combined, it induced toxicity to the brain, liver, and  
15 kidney of mice. Is this being taken into consideration?"

16 The next comment we have is from Mr. Nicholas  
17 Baker.

18 The question is, "Given what OEHHA does know  
19 about the turf, that it contains lead, black carbon, and  
20 other toxic chemicals, and that there are dangers of  
21 materials overheating on hot days, when will you begin to  
22 post signs advising those who come in contact by playing  
23 on these fields or paths of the dangers"?

24 "Also, when do you plan to do the actual bio  
25 monitoring"?

1           The next comment is from Dr. Claudio Sorrentino.

2           And his comment is, "Having been a soccer referee  
3 myself, after officiating on synthetic turf fields, I was  
4 always amazed by the amount of rubber particles that came  
5 out from my shoes. Interesting enough, although the feet  
6 were protected by socks and..." -- "...when I took..." --  
7 ..."shoes and socks..." -- sorry.

8           Interesting enough, although the feet were  
9 protected by shoes and socks, when I took shoes and  
10 socks...", 'off', I believe, "...when it was time to go  
11 home, the feet were at least in part covered by the black  
12 very fine particles. Keep in mind, that the shoes are in  
13 contact with the turf that in the summer can get very hot.

14           "In addition, feet get sweaty inside the shoes  
15 and the moisture does not evaporate as much from -- as  
16 from other areas of the body".

17           And the last comment we have is from Dr. Robert  
18 Blink. And the comment is, "In the meeting materials for  
19 this meeting in Section 3.1.2, figures 1 and 2 on pages 35  
20 and 36 dM over dlogDp is shown as color contour plots with  
21 a spectrum key at lower right, but no values for the  
22 scales are shown. What are the numerical values for the  
23 color contour plots"?

24           That's all we have from Internet comments.

25           DIRECTOR ZEISE: So we received a mix of

1 questions and comments, including some on the -- from the  
2 web. And to the extent that we can, we'll respond to  
3 those questions. I think some of the questions would take  
4 a good deal of discussion. The Panel had various issues  
5 raised. So I'm wondering if in the final remarks, if the  
6 Panel want to reflect on some of what they've heard from  
7 the public, and if you have any further advice to give us,  
8 we'd love to hear it.

9 Thank you.

10 ADVISORY PANEL MEMBER SHELDON: Okay. At this  
11 point. We can now have our final Panel discussion. I  
12 will -- I think it's sort of a general -- as Lauren said,  
13 anybody who has comments to any particular questions by  
14 the commenters, that would be good. Any general feelings  
15 or anything specific that you didn't have the ability --  
16 that you didn't say before or hadn't thought of before,  
17 please bring up.

18 So is there somebody that would like to comment  
19 first or am I going to start with Tom?

20 (Laughter.)

21 ADVISORY PANEL MEMBER MCKONE: Well, I think it's  
22 important -- I mean, the comments are very useful. And I  
23 think we need some time, you know, to digest them a bit  
24 and meet with staff. I think I did -- there were a couple  
25 of comments about setting up a control. And although, I

1 mean, that sounds -- that sounds very appealing to  
2 basically set up control, I think what that would be would  
3 be very challenging. Is it -- you know, it could be  
4 another whole study bigger than this one, because the  
5 controls are so large. I don't even know what a control  
6 would be.

7           But I think, I mean, for me, my sense of it, it's  
8 not that you need a control. You need something to  
9 benchmark the final observations against. And I think  
10 because this is an exposure study, it's not that we want  
11 to compare the exposure to some other comparable  
12 situation, but we want to look at the exposures we know to  
13 be harmful.

14           And again, I think that's in the risk assessment  
15 plan, but I would suggest that that's an important step is  
16 how to make sense of this. Because if somebody came in  
17 and, you know, told you you just ingested, you know, 10  
18 micrograms of zabilium, right, you'd go oops, you know  
19 what -- I mean, you'd have to know what that substance is,  
20 and what we know about it, and have a way to benchmark  
21 what that means. It might be totally harmless or it could  
22 be the most toxic substance that we've ever known. You'd  
23 have to figure something out about it.

24           And to me, that's the kind of study this is, is  
25 to really get information about the -- sort of the

1 absolute measure of exposure, and then get some relative  
2 terms in terms of toxicology to make sense of whether  
3 there's a level of harm associated with it.

4           ADVISORY PANEL MEMBER KYLE: I'm going to touch  
5 on a couple of the public comments we heard in these  
6 comments.

7           To add onto what Tom said, the issue of what you  
8 know from your data is always tricky isn't it? You can  
9 have an endless amount of data and still not know  
10 anything. And we've seen that movie before, and we don't  
11 want to see it again, you know. And it's not the risk  
12 part of it, it's also, well, what's causing this. You  
13 know, is what we observe related to the rubber, or, you  
14 know, the weather, or what.

15           And I feel that the analytics to allow us to sort  
16 that all out is still yet not completely developed, and  
17 needs to focus attention now. A lot of times it's done by  
18 hypothesis. You know, you'll hypothesize this, and then  
19 you collect your data and analyze it to answer that  
20 question.

21           And I think we're still lacking a little bit of  
22 that kind of analytic structure here. And I've mentioned  
23 it in the sense of, well, maybe we should look at -- for  
24 some of the fields and figure out what the relationships  
25 are at that level. There are other sort of stratified

1 analyses discussions that we've heard, and collection of  
2 data. But it hasn't quite been translated into how are we  
3 going to analyze the stratified data to answer a question?  
4 So -- and there have been some examples of that.

5           So I don't want to belabor that. But to get at  
6 this question of, well, what does this mean? What can we  
7 conclude, whether we do -- we're not -- we're not maybe  
8 not doing a -- looking at different kinds of fields. But  
9 there is -- I think there is still some development needed  
10 here. And I'm not quite sure who's doing that.

11           So that's something that has been on my mind. I  
12 think I commented on this the last time. It still seems  
13 to be there.

14           Now, I have two things that I want to go back to  
15 from the meeting briefly. One is the mercury issue and  
16 the other is this question about the two methods, which  
17 are related. Remember that presentation, with the graphs  
18 that we didn't like?

19           Okay. So I figured out why I really can't stand  
20 those graphs, because to me, the two methods should be  
21 decided based on what question you're trying to answer.  
22 Remember the ASTM method or -- and the EPA method. It's  
23 not based -- you can't decide that by comparing the  
24 outcome data. It should be decided on, well, are we  
25 trying to measure what's in -- everything in there what

1 comes out, given these parameters in the ASTM method?

2           And so -- and I still don't have an answer to  
3 that. It seems like that also needs some further thought  
4 in light of what we're trying to accomplish here or what's  
5 going to be most meaningful to the public, et cetera.

6           So I flagged that as something we've talked about  
7 before that seems unsettled still.

8           Now, the thing about that -- I also want to go  
9 back to the mercury. So I looked at the mercury data  
10 again. And, you know, it's left, well, what should we do  
11 about the mercury. And I think that given that the method  
12 that's showing the blue dots, you know, or that pulls all  
13 this stuff out of the sample is still showing numbers that  
14 are environmentally relevant, if it were in soil or  
15 something like that.

16           I don't see a basis not to continue to look at  
17 the mercury, because mercury is a known neurotoxicant that  
18 is important for kids. And so maybe there is a basis  
19 for -- and, you know, maybe it's in the realm of someone  
20 else on this panel. But I don't -- I don't see it, so  
21 I'll just leave it at that.

22           Okay. And then when we get into this issue about  
23 how we approach the risk assessment, you know, that's  
24 going to be the big -- that's going to be the hardest part  
25 of this probably, right? And we've known that from the

1 beginning. And we're not quite talking about that yet,  
2 and maybe we should be.

3           But one thing I would like to suggest at this  
4 time for you all to consider before that's all done when  
5 we have our next meeting, is that I think that to address  
6 some of the public concerns there needs to be not only a  
7 risk assessment, but also some discussion of, well -- what  
8 are people getting from this that is separated out, so  
9 that they can understand it in two parts. You know, that  
10 we've concluded that these are chemicals are coming off  
11 this stuff in some kind of amounts. And if you're a high  
12 user, you know, soccer player, you know, it's this kind of  
13 level. If you're a casual user, it's this kind of level.  
14 Stop.

15           And then the second question is, well, what do we  
16 conclude about the risk, et cetera, which brings in a lot  
17 of assumptions and, et cetera. And people will interpret  
18 that in different ways too. So I'd like to think of that  
19 in two stages.

20           Related to that is this question of are we going  
21 to look at cumulative exposures, multiple pollutants, or  
22 not? Are we going to consider synergistic effects?

23           And again, that's -- we've flagged that as  
24 something we haven't decided. And it's still out there to  
25 be decided, and I'm going to flag that again, I guess.

1           And then my last -- my last point is looking to  
2 the future beyond this study. Something that we don't  
3 have is a method for deciding or being able to detect  
4 whether these results remain relevant in the future, you  
5 know, what -- for whatever collection of materials and  
6 fields we looked at now, how will we know if conditions  
7 are changing so they're relevant to turf and the crumb  
8 rubber in the future?

9           And I -- you know, again, I've raised this. I  
10 realize it's sort of out of the scope of OEHHA. But I  
11 think we need to think a little bit that way. You know,  
12 maybe it's CalRecycle or somebody else needs to monitor  
13 whether the conditions that have created what we studied  
14 are still the later -- whether things have changed.

15           And so there's been some discussion about why  
16 we'd think that the rubber composition will change. And I  
17 don't know whether it will or not, but it does seem like  
18 that kind of onward looking revisiting the conditions that  
19 the study was based on would be important to -- concern.

20           Unless, of course, we decide there's nothing  
21 here. You know, maybe we'll decide that. So those are my  
22 comments. Thank you.

23           ADVISORY PANEL MEMBER AVOL: So I only have a few  
24 more items to suggest, and maybe a different framework for  
25 talking about it. Again, coming back to sort of this

1 communication of what this study is about, how it's  
2 described acknowledging both the strengths and limitations  
3 of it in a way that is understandable to both the public  
4 and the technical community that will review and look at  
5 this data. I think there's been a substantial amount of  
6 data collected here, and/or is in the process of being  
7 collected.

8           And so there's obviously a lot of work that's  
9 gone into this. But I think maybe some of the gaps that  
10 I'm still having a little trouble with is trying to  
11 connect, and it was touched upon here in the various  
12 comments throughout the day, what the connection is  
13 between the -- how the data has been collected, and how  
14 it's going to be used, how it's going to be connected,  
15 sort of from the raw data collection, the analysis through  
16 the application of it in -- that will actually lead to a  
17 risk assessment.

18           So I think we need to sort of be thinking about  
19 as the data moves forward communicating what this is in  
20 terms of the study, but also what it isn't, what you have,  
21 and also acknowledging what the -- some of the limitations  
22 of this are, because otherwise you set up for expectations  
23 that will be frustrating for a lot of people.

24           There has been talk, and I think it's appropriate  
25 that there should be some consideration of synergisms in

1 the data in terms of potential exposures. I think that  
2 needs a little bit of thought.

3           It may be that the -- in terms of the analyses in  
4 thinking about the -- particularly with regard to the risk  
5 assessment looking forward that, you know,  
6 understanding -- or applying what we know or what we think  
7 we know about some of these gases, metals exposures, et  
8 cetera, could be informative, because otherwise we may  
9 just dismiss individual elements, individuals just sort of  
10 being relatively unimportant, except in the context of  
11 multiple simultaneous exposures, and the synergistic  
12 opportunities for it. So I acknowledge and applaud the  
13 work that's been done. I think there's a lot of -- a lot  
14 more work that needs to be done to sort of interpret, and  
15 analyze, and think about how -- this data in a way that is  
16 both understandable to the technical community and to the  
17 public.

18           ADVISORY PANEL MEMBER BENNETT: On the risk  
19 assessment, because, I mean, one of the -- trying to do is  
20 to identify some of the compounds that we might not have  
21 already studied. And so I'm just not sure what we're  
22 doing in the risk assessment in terms of trying to  
23 understand some of the toxicity of the compounds that are  
24 less -- that we know less about. And I didn't know if we  
25 were going to use ToxCast or something like that.

1           And then I was just also thinking what else we  
2 don't know. It -- you know, one thing that it seems I  
3 guess we're not doing at all is -- and maybe is looking at  
4 any sort of non-metals in the rubber. I mean, I guess in  
5 a way we're getting compounds that would be semi-volatile  
6 on the playground surface, because we're doing wipes.

7           But I didn't know if we were getting any of the  
8 non-metal components in the rubber themselves relevant  
9 towards the biomonitoring. And I just wanted to make a  
10 comment on that.

11           On the biomarker study, I'm just still concerned  
12 that it's going to be really difficult to do that,  
13 because, I'm just worried that there's not very many  
14 unique biomarkers that we're -- but I guess once we do the  
15 risk assessment and look at the chemicals that we find in  
16 the VOCs and so forth that question will be easier to  
17 answer.

18           And then in regard to the controls, I mean, I  
19 think the fact that we're looking at the upwind, and I  
20 think it was made really clear what the upwind chemical --  
21 I think that the Panel -- the group -- you guys are doing  
22 a really good job at trying to separate that out. And I  
23 think that that's important. And I guess that's all of my  
24 additional comments.

25           ADVISORY PANEL MEMBER ECKEL: Thank you. So I

1 just wanted to sort of echo everyone else on the Panel so  
2 far, that, you know, I think this is really great work,  
3 and I'm excited to really see the data coming in. I can  
4 see the products of this -- this work paying off.

5           Just two broad comments. You know, again to help  
6 the public understand the study, I think it's important to  
7 present sort of the focused research questions and to  
8 keep -- keep an eye the prize of these focused research --  
9 answer with this study at hand, and sort of presenting  
10 hypotheses, presenting analysis plans for how we're going  
11 to address these hypotheses with the type of data that are  
12 being collected.

13           And then just a second comment sort of related to  
14 those statistical analyses that will be done, you know,  
15 there was a lot of discussion about how there are -- were  
16 different conditions under which the fields were sampled,  
17 different meteorological conditions, placement of the  
18 carts in relation to the field -- the wind direction of  
19 that day.

20           And so I just wanted to encourage, you know,  
21 thinking of more sophisticated multivariate models, rather  
22 than most of the bivariate models that we looked at today  
23 to -- you know, if we're pooling data across fields to  
24 account for those differences in conditions, and to  
25 address these targeted questions.

1           ADVISORY PANEL MEMBER SHELDON: Okay. First of  
2 all, I think you guys are -- okay. Oh, I --

3           ADVISORY PANEL MEMBER AVOL: I'll just confuse it  
4 and come back in.

5           There is one more comment I forgot to mention --

6           ADVISORY PANEL MEMBER SHELDON: I was on such a  
7 roll.

8           (Laughter.)

9           ADVISORY PANEL MEMBER AVOL: I know, I didn't  
10 want to preempt you -- and that is on the area of PM2.5.  
11 I mean I think there was a lot of data that was presented.  
12 There's a lot of data that will be done. It's important  
13 to note that PM2.5 is both a regional and local -- has  
14 regional and local impacts. It is considered a regional  
15 pollutant. And so some of the issues in terms of thinking  
16 about it, and separating out what the local contribution  
17 is is a challenge.

18           But we know from other health studies that there  
19 are both regional and local contributions. And so it's  
20 not surprising why we see in what seemed like clean areas  
21 that we see effects, and that it -- sometimes those  
22 effects are equivalent to what we see in dirty areas. And  
23 again, it raises the issues of how we define the terms and  
24 use them. So I would just encourage you to think about  
25 this aspect of -- focus on PM2.5, because of the

1 regulatory implications of it. But I think that it's  
2 important to sort of think about how we identify and  
3 assign value and importance of it in reflection.

4           ADVISORY PANEL MEMBER SHELDON: Okay. First of  
5 all, I want to say that you guys have worked really hard  
6 and done a very good job. Having done a lot of this  
7 myself, I know how hard it is. And I do think you're  
8 doing a great job.

9           Listening to the comments from the people that  
10 commented, and also the questions and the comments we've  
11 had, I think one of the things you need to do next is  
12 develop your exposure modeling framework that you're going  
13 to use. How are you going to model this?

14           And really, I do think that you need to do some  
15 kind of probabilistic model that allow the range of the  
16 datas to be able to estimate what are the percentage of  
17 exposure, be able to give information on the uncertainty.

18           So you've got a model -- a modeling framework to  
19 fit your data in. And then -- what data you need, what  
20 kind of data you're going to need, and how you're going to  
21 input it.

22           And I think that when you do this, the other  
23 thing that you have to consider is the exposure routes,  
24 because different chemicals will have different  
25 toxicities, depending upon the route exposed to for -- one

1 time I was doing styrene and looking at it through  
2 ingestion. And one of our dose modelers says, yeah, but  
3 you know that's immediately detoxified in the liver, or  
4 something that -- so it's not the same thing as inhaling  
5 it.

6 And so I think that people need to understand  
7 that a PAH that is eaten isn't nearly as toxic as a PAH  
8 that is inhaled. And I think our models need to take into  
9 account.

10 So again, I think the first thing you need to do  
11 is start to look at how you're going to model, what data  
12 you need, and how you're going to put it together, because  
13 I think that's what's missing right now -- planning on  
14 doing the modeling, but I think now is the time to do it.

15 I think that the other thing is is that you need  
16 to think about, you know, once you have your results, how  
17 are you going to verify that you've gotten some place  
18 close to the truth. And I think that, you know, again, if  
19 bio -- if you can do it with biomonitoring, that's great.  
20 That's always a hard thing, but is there another -- you  
21 know, if not, is there another way, because you've done  
22 all of this modeling, but how are you going to give  
23 confidence in the way that you've pulled it all together.

24 That's why I wouldn't even call it a  
25 biomonitoring study. I would probably call it a

1 verification study of whatever it needs to be, because  
2 that's what people want to be able to see.

3 I think that there is, you know, this question of  
4 how are we distinguished between what is tire crumb, what  
5 are other components of what's being manufactured, and  
6 what is just part of the environment?

7 And I think that, again, one needs to look at --  
8 I mean, we had some discussions today about when you're  
9 doing your analyses, can you do sort of -- you know, you  
10 can take your material and you can do outgassing, and you  
11 can fingerprint from that or something. But again, I  
12 think that that's one of those questions that everybody  
13 has, you know, how do you develop controls, or how do you  
14 really demonstrate that it is from tire crumb?

15 And then I do think that you need to put that --  
16 of some other environmental exposures. I mean, I did a  
17 lot of kids exposures in homes. And house dust in homes,  
18 one would believe is deadly to all children. I don't --  
19 it's not, but there are just a lot of pollutants in house  
20 dust in homes.

21 So again, I think that that needs to be the  
22 context that's looked at there. But I think those are the  
23 important things as you move forward and start thinking of  
24 the way that you pull the data together, and make people  
25 feel comfortable with the way that you are pulling it

1 together, and how you're thinking about it.

2 So those are -- that's really my comments.

3 Anybody else want to have another round?

4 Okay. I hand it over to Lauren.

5 DIRECTOR ZEISE: Well, let me -- before I say  
6 some huge thank you's, let me ask Patty to say a few words  
7 about the transcript, and the posting of that, and the  
8 posting of the slides, and what the next steps are for  
9 that, so that the public knows how they can access that.

10 DR. WONG: The meeting is webcast as we know.  
11 It's also audio and video recorded. And the recording we  
12 send to a Certified Court Reporter. We will have the  
13 transcription posted on the website once it's fully  
14 certified.

15 And also, we will post the video like we --  
16 YouTube and the link will be on our website. And we will  
17 post all the slides that we present today. We have to  
18 format it for accessibility reading. So give us some  
19 time. We will work on it, and it will be on our website.

20 Also, we will collect the comments we receive  
21 today, and maybe the end of the day, and we will put it on  
22 our website, and we will discuss internally, and provide  
23 as much as we can, response to those comments.

24 These are all going to be on our website for  
25 public review.

1           DIRECTOR ZEISE: Thanks very much. So you've  
2 given. This has been a really fruitful meeting. You've  
3 given us a tremendous amount to think about, and to think  
4 forward on what our next steps are. I think coming out of  
5 the last meeting, we had a pretty long -- incorporating  
6 some of the input into our next steps. And I think this  
7 meeting we have a bigger list. So I do want to -- and --

8           (Laughter.)

9           DIRECTOR ZEISE: So I do want to -- I do want to  
10 thank everyone, including the Panel certainly, as well as  
11 the public for we receive -- you've given us a tremendous  
12 amount to think about and work with coming up -- and I  
13 think also John Balmes as well.

14           CHAIRPERSON BALMES: Even though I played hooky.

15           DIRECTOR ZEISE: Yeah. So thank you, everyone.  
16 And I do want to make a special thanks to the staff, to  
17 the lab, and to UC Berkeley, and University of Arizona. I  
18 don't think I've forgotten anyone, have I, Patty?

19           DR. WONG: All the other help we recruit from  
20 OEHHA.

21           DIRECTOR ZEISE: And all the other help from  
22 OEHHA. And our -- so thank you all so much for all the  
23 hard work, for having such a rich meeting. And it will  
24 only improve.

25           I think we may, in fact -- I don't want to make

1 any commitments, but I would envision that we might be  
2 meeting in less than one year meeting as we follow through  
3 on your comments, and put together a framework and a  
4 structure to discuss, in terms of our exposure, as well as  
5 risk assessment. So thank you all, and we're two minutes  
6 early, so very good.

7 Oh, and John, did you have any closing remarks?

8 CHAIRPERSON BALMES: Well, I do want to thank  
9 staff and Panel members, and the public commenters that I  
10 didn't hear. But I guess there will be a record, so I can  
11 look at it. I was next door at the California Air  
12 Resource Board, where we had a big -- I wouldn't -- we had  
13 a lot of discussion about how to spend settlement  
14 mitigation funds, and I couldn't miss that.

15 But anyway, thanks for your patients with me  
16 going in and out. And I'm sure the Panel did it's job  
17 without me.

18 DIRECTOR ZEISE: Meeting is adjourned.

19 Thank you.

20 (Thereupon the Synthetic Turf Scientific  
21 Advisory Panel Meeting adjourned at 4:00 p.m.)

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## 1 C E R T I F I C A T E O F R E P O R T E R

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

4 That I am a disinterested person herein; that the  
5 foregoing OEHHA Synthetic Turf Scientific Advisory Panel  
6 meeting was reported in shorthand by me, James F. Peters,  
7 a Certified Shorthand Reporter of the State of California,  
8 and thereafter transcribed under my direction, by  
9 computer-assisted transcription.

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

13 IN WITNESS WHEREOF, I have hereunto set my hand  
14 this 30th day of June, 2018.

15  
16  
17  
18   
19  
20

21 JAMES F. PETERS, CSR  
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