

**U.S. Environmental Protection Agency  
Science Advisory Board  
COVID-19 Review Panel**

**Summary Minutes for the Public Meeting  
held on  
April 30, 2020**

**Meeting Participants:**

Science Advisory Board (SAB) COVID-19 Review Panel Members

Dr. Michael Honeycutt, Chair  
Dr. Craig Adams  
Dr. Hugh A. Barton  
Dr. Deborah Hall Bennett  
Dr. Harvey Clewell  
Dr. Alison C. Cullen  
Dr. Jacqueline Hughes-Oliver  
Dr. Michael Jayjock  
Dr. Wayne Landis  
Dr. Mark W. LeChevallier  
Dr. Robert Phalen  
Dr. Tara L. Sabo-Attwood  
Dr. Richard Sakaji  
Dr. Mara Seeley  
Dr. June Weintraub  
Dr. Mark Weisner  
Dr. Lloyd Wilson

SAB Staff Office

Dr. Zaida Figueroa, Designated Federal Officer (DFO) for the SAB COVID-19 Review Panel  
Mr. Thomas Brennan, SAB Staff Office Director  
Ms. Khanna Johnston, SAB Staff Office Deputy Director

Other Attendees

See Appendix A for a complete list of the meeting attendees.

**Meeting Summary:**

Convene the meeting

The Science Advisory Board (SAB) COVID-19 Review Panel held a public teleconference on April 30, 2020. Dr. Zaida Figueroa, DFO for the SAB COVID-19 Review Panel, convened the teleconference at approximately 1:00 pm (Eastern Time) and noted that the Panel was meeting

by teleconference to receive an agency briefing, review charge questions and discuss EPA's document titled: "*Identifying Research Needs to Address the Environmental and Human Health Impacts of COVID-19.*" Dr. Figueroa provided introductory remarks in her capacity as DFO. She stated that the SAB is an independent Federal Advisory Committee chartered under the Federal Advisory Committee Act (FACA). She indicated that the SAB is empowered by law to provide scientific and technical advice to the EPA Administrator. Dr. Figueroa noted that summary minutes of the teleconferences would be prepared and certified by the SAB COVID-19 Review Panel Chair following the meetings and noted the SAB's compliance with ethics requirements.

Dr. Figueroa indicated that all meeting materials were available on the SAB website. Meeting materials included the SAB COVID-19 Review Panel roster, meeting agenda, public written comments received and EPA's briefing materials. Dr. Figueroa noted that, as required by FACA, written public comments had been received, posted on the SAB website, and made available to all Panel members. Dr. Figueroa also indicated that public access to the meeting had been provided through a telephone line only. Dr. Figueroa proceeded with a roll call of the Panel members. Then, she turned the meeting over to Mr. Thomas Brennan, Director of the EPA SAB Staff Office, for some opening remarks, and to Dr. Michael Honeycutt, Chair of the SAB COVID-19 Review Panel.

#### Purpose of the Teleconference and Review of the Agenda

Dr. Honeycutt welcomed SAB COVID-19 Review Panel members, EPA Staff, and others to the teleconference. He indicated that the Panel was holding the teleconference to receive briefings from the EPA on the document titled: "*Identifying Research Needs to Address the Environmental and Human Health Impacts of COVID-19.*" Dr. Honeycutt also mentioned that the Panel members were going to review the charge questions and discuss EPA's materials to provide advice on research activities that might enhance EPA's response to SARS-CoV-2. He indicated that the Panel received 3 written public comments available on the SAB website. Dr. Honeycutt reviewed the agenda and asked the Panel if there were any questions. No questions were raised.

#### EPA Presentations

Dr. Honeycutt thanked members of the public for their comments. He stated that the Panel would next receive a briefing from the EPA on the document titled: "Identifying Research Needs to Address the Environmental and Human Health Impacts of COVID-19." Dr. Honeycutt then invited Jennifer Orme-Zavaleta, Principal Deputy Assistant Administrator for Science and EPA Science Advisor in the Office of Research and Development (ORD), to provide some remarks.

Dr. Orme-Zavaleta thanked the SAB COVID-19 Review Panel for their commitment to provide a rapid review of research needs identified by EPA. Dr. Orme-Zavaleta noted that the Agency mobilized all resources to identify current and future EPA research activities that might enhance and inform EPA's current and any future responses to SARS-CoV-2. She mentioned that this peer review activity was an experiment in terms of having SAB members come together so quickly to review EPA's materials, engage in this conversation, provide advice and recommendations. With the COVID-19 pandemic, EPA realized that identifying research needs

was a priority for the United States and the world. EPA asked the SAB to consider the science and technical issues related to the epidemic that might enhance EPA's ability to respond to this pandemic. EPA's goal is to provide the best science and research tools. Dr. Orme-Zavaleta mentioned that the Agency has been working cross-agencies, particularly with Centers for Disease Control and Prevention (CDC). She noted that EPA is working to prioritize a variety of research needs and determining if the Agency is asking and answering the right questions.

Then, Dr. Orme-Zavaleta turned over the discussion to Dr. Greg Sayles, Director of the EPA's Center for Environmental Solutions and Emergency Response and the lead for coordinating SARS-CoV-2 research in ORD. Dr. Sayles thanked the SAB panelists and noted that the EPA was looking forward to their feedback. Dr. Sayles introduced the science research questions table, along with the charge, and provided an introduction about EPA's research projects. He noted that the EPA responds to environmental emergencies almost every day and that the Agency has great ability to address biological contamination. He mentioned that this virus is a new phenomenon in many ways and that the EPA has the expertise to add knowledge in the areas of exposure, cleaning, wastewater, disinfection, etc. The table was developed by a group of subject matter experts from across EPA, he noted. It was a heavy lift, completed quickly, so that the Administrator could have this information. Dr. Sayles stated that the 3rd column of the table lists the research and science questions that could enhance capabilities in responding to the virus. In the 2nd column, EPA tried to capture the current state of knowledge. Dr. Sayles mentioned that the Panel charge addresses the contents of the table. He highlighted the research areas that EPA was already embarking upon. He discussed the slide titled: "ORD Research Underway", which shows all the initiated applied research within ORD to enhance the nation's ability to respond to SARS-CoV-2. Dr. Sayles also discussed the charge questions:

1. Within each research category, are the questions in the 3rd column suited to EPA's missions and the Agency's role in responding to the pandemic? Are some of these research questions more effectively addressed by other federal partners, private sector, academia, etc.
2. Are there any research questions missing that should be added to this table.
3. Within each research category, how might this work be prioritized? We're asking for criteria that might be useful in prioritizing the work.
4. Have we really missed a big piece associated with EPA's mission that would help the country?

Then, Dr. Sayles introduced Ms. Charlotte Bertrand, Deputy Assistant Administrator for Water.

Ms. Charlotte Bertrand provided an overview of EPA's supporting efforts related to the water sector. She noted that responding to COVID-19 has been a top priority for the Office of Water (OW) over the past weeks. Ms. Bertrand mentioned that the EPA engaged with CDC, tribes, state partners, water utility companies and that the Agency was supporting them during this challenging time. She mentioned that the risk to the water supply is low. According to the CDC, the virus has not been detected in drinking water, she stated. Ms. Bertrand said that the current water treatment should remove or inactivate the SARS-CoV-2 virus. She also mentioned that the World Health Organization (WHO) has stated that the presence of COVID-19 virus has not been

detected in drinking water supplies and noted that the EPA has been letting Americans know they can continue to drink water from their tap as usual. Ms. Bertrand also provided an overview of the regulatory protections under Clean Water Act and the Safe Drinking Water Act (SDWA). The SDWA addresses waterborne pathogens and EPA's regulations on surface water treatment work to ensure that drinking water is safe. She also noted that the surface water treatment rule requires the systems to filter and disinfect all the surface water sources. States must perform regular sanitary surveys. She explained that in the current groundwater rule for systems that use ground water as a source of drinking water, the systems must conduct regular monitoring for fecal contamination and, if found, actions must be found to remove the cause or contamination. States must perform sanitary surveys and inform the public. The EPA also has a total coliform rule that all systems must comply with. Ms. Bertrand also mentioned that the EPA has a maximum contaminant level for Escherichia coli (E-coli) and that all these regulations neutralize SARS-CoV-2.

Ms. Bertrand also provided an overview of the National Pollutant Discharge Elimination System (NPDES) Program and stated that to date, there was no known transmission of the SARS-CoV-2 virus to wastewater and that wastewater treatment was effective in inactivating the virus, if present. She noted some of the standard practices and hygiene precautions, PPE, etc. She mentioned that there are areas of research EPA was conducting that are bolstering our understanding of the virus.

Ms. Bertrand also discussed another area of research (i.e., how long does the virus remain viable in untreated wastewater). She noted that EPA was evaluating whether any measures are needed to protect operators at water and wastewater plants from the virus. The OW was collaborating with ORD and other agencies to support research on virus levels in wastewater as an indicator of the virus in communities. She stated that OW was working with entire water sector to support drinking water and wastewater services that are critical to reducing SARS-CoV-2. Ms. Bertrand mentioned that the EPA Administrator has sent letters to governors in all 50 states to let them know that water/wastewater employees are considered "essential" employees when implementing policies and responding to natural disaster with technical assistance. The EPA encouraged utilities to keep the water on for all Americans and mentioned that the water utility workforce are unsung heroes. Ms. Bertrand stated that the statutory requirements EPA has in place will continue to ensure the viability of the nation's drinking water supplies. She acknowledged that the continued relationship with the water sector and participation in ORD's research, as well as their collaboration with the CDC, will increase EPA's understanding of the pandemic.

Then Ms. Becki Clark, Deputy Director, Office of Emergency Management located in the Office of Land and Emergency Management (OLEM) offered some remarks. She stated that OLEM strives to preserve land and clean up communities and that they have statutory authorities for cleanup and emergency response under Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). She explained that OLEM oversees the Superfund Program, and that EPA's mission includes preventing disasters associated with man-made spills or biological disasters. She mentioned that OLEM hosts two of EPA's special teams which provide guidance

and response to support state and local responders and that EPA's work in emergency response and cleanup continues amid the pandemic. She stated that OLEM and ORD work closely together and OLEM serves as a link to the regional response program. OLEM participates in ORD's research planning process and research projects. OLEM also forms technical working groups to provide advice and guidance. Ms. Clark noted that OLEM has an internal technical working group across the Agency and they have responded quickly to a wide variety of questions from EPA's regional offices and elsewhere, including internal guidance on site fieldwork decisions due to the impact of SARS-CoV-2. She stated that OLEM has a role in developing guidance between EPA and CDC for re-opening America considering the impacts of COVID-19. Ms. Clark also discussed OLEM's work with OCSPP when developing guidance on cleaning public spaces and work with ORD when identifying research needs so that the EPA can continue to provide high quality operational advice to the response community.

Lastly, Mr. Rick Keigwin, Director of the Office of Pesticide Programs (OPP) provided an overview of the two statutes that regulate pesticides: the Federal Insecticide Fungicide and Rodenticide Act (FIFRA) and the Federal Food, Drug and Cosmetic Act (FFDCA). The products used in the disinfection of surfaces are considered pesticides under federal law. OPP has an anti-microbial division that performs these functions for EPA. For the most part, if the intended site for the product is not on a human being, then EPA would regulate that product. If the product is intended for use on animals, then those products would be regulated by the Food and Drug Administration (FDA).

Mr. Keigwin noted that in the case of anti-microbial products, new application techniques would require new exposure data and that personal protective equipment (PPE) must be worn. He specifically explained OPP's efforts on the pandemic including activities focused on ensuring availability of disinfectants that have demonstrated capability against viruses and the coronavirus testing program. For example, on March 3, 2020, EPA published a list of disinfectants that OPP believed are effective against SARS-CoV-2, a first list of 50 products, now expanded to 400 products. All products are EPA-approved as demonstrated efficacy. Mr. Keigwin clarified that OPP has not reviewed data specific to SARS CoV-2, but that they were heading in that direction. OPP began this process after the most recent Ebola outbreak as pesticide registrants can make off-label uses against the virus. It's a pre-qualification program used with a pandemic. Mr. Keigwin stated that the EPA has been hearing about supply chain issues from the stakeholder community and that typically the EPA requires manufacturers to submit data of efficacy against viruses. He also stated that OPP was interested in expanding the efficacy methods to work against softer, porous surfaces (e.g., mattresses, carpets, etc.). Mr. Keigwin mentioned that the EPA microbiology lab located in Ft. Meade, MD has been working on a method to issue regulatory guidance.

Dr. Honeycutt asked the Panel if there were any questions; none were raised.

#### Review of Charge Questions

Dr. Honeycutt reviewed the charge questions as shown in the slides. One member requested clarification about EPA's mission. Dr. Orme-Zavaleta stated that EPA's mission is to protect

public health and the environment. The member asked clarification about what EPA is looking for related to Charge Question 1.

Another member requested clarification about occupational exposures and stated that the line is blurred between EPA's responsibilities and other agencies. Other members stated that some of the charge questions relate to CDC's mission, NIOSH's, OSHA's, etc, and that there are some nexuses between these authorities. One member mentioned a specific example of diesel exhaust, as it relates to vulnerability of populations for individuals with underlying chronic disease who might be more susceptible to particulate matter. The member stated that the SAB tends to look at that example in the context of populations, while NIOSH or CDC would look at it in the context of occupation. The member acknowledged that there is a blurry line between the two.

No more questions were raised.

### Panel Discussion

Dr. Honeycutt stated that to guide the discussion, the Panel was going to use EPA's charge questions. To prepare the draft report, Dr. Honeycutt reminded all panelists to review the materials and draft responses to the charge questions. Each panelist should comment on two or more research categories. Dr. Honeycutt encouraged all Panel members to review the memo sent on April 22, 2020. He requested that all members coordinate with the lead writers and provide responses to charge questions 1–3 and question 4 for each of their assigned research categories.

Dr. Honeycutt acknowledged that due time constraints, he was going to lead the Panel through the discussion of the 11 research categories listed by the EPA. He requested that the Panel members provide the highlights of their thoughts and follow up with written responses.

### Research Category: Environmental Disinfection

Dr. Honeycutt introduced the lead writer for this research category, Dr. Mark LeChevallier, and the group members, Dr. Craig Adams, Dr. Harvey Clewell, and Dr. Mark Wiesner.

Members mentioned that the questions were well-formed. Specifically, good questions to figure out are related to the extent soap inactivates the virus. Members noted that UV-ozone generators are disinfectants, but that it would be very unlikely they would result in effective disinfection as long-lasting disinfectants. Members noted that other federal partners that might be involved include Consumer Product Safety Commission.

There were some comments from members in terms of additional questions and clarifications related to the treatment of surfaces and fabrics. Members mentioned that they will provide specifics in the written response. Some of the issues discussed include additional information about nanomaterials and their incorporation in fabrics, which could be short-term or long-term research needs.

On disinfection, members stated that the EPA needs to think about contact concentrations and times (i.e., concentration X time because individuals need guidance on how long a disinfectant need to be on surfaces). Members were impressed with how much the EPA can bring to bear to

these issues. Dr. Honeycutt asked the members to identify what the EPA could do to prioritize these ideas.

A member stated that in upstate New York where the virus is low, individuals asked about disinfecting the interior of cars. The member asked the Panel - how do we disinfect the interior of our cars? He stated that some of these research questions have daily implications.

Another member asked if the EPA has investigated nano-metals for disinfecting surfaces, such as nano silver. He stated that later, the Panel was going to discuss inhalation exposure and that the possibility of disinfecting the air might need to be addressed.

In terms of additional categories needed, members noted that there was nothing to add at this moment.

Research Category: Environmental Sample Collection Methods

Dr. Honeycutt introduced the lead writer for this research category, Dr. Michael Jayjock, and the group members, Dr. Richard Sakaji, Dr. Jacqueline Hughes-Oliver, Dr. Harvey Clewell, and Dr. Mark LeChevallier.

Members acknowledged that several questions listed under short-term activities were relevant and mentioned that establishing detection limits for SARS-CoV-2 (which are derived from environmental samples) will be critical to determine the fate and transport of the virus in some media (e.g., water, wastewater, air). Members noted that exploring other non-traditional Gaussian statistics may be prudent, as this situation is different from what scientists do for chemicals. Members noted that the questions that EPA listed will be sufficient to address other questions with respect to environmental sampling.

Another member agreed that the question on detection limits has the highest priority. Without detection limits it is hard to know whether a method is effective or not and that should be priority #1. The member also commented on the question regarding surface sample collection and which methods are most appropriate. The “most appropriate” methods might be difficult to identify without having determined the infectious dose level for the virus, the member noted. Identifying virus particles below the infectious dose might require resources that aren’t necessarily useful. The member also raised the question - under what situation does environmental contamination needs to be assessed? This question was going to be captured in the written response.

Members also mentioned that the EPA identified that the infectious dose for SARS-CoV-2 is less than for SARS (estimated for SARS as an average of 240 viral particles). Members stated that the EPA should proceed with caution if the EPA can’t measure 240 viral particles. Members noted that the EPA can start working with that viral value given the uncertainty about SARS-CoV-2. They acknowledged that doing swabs and wipes in hard surfaces is a straightforward approach, but the real question was how to proceed with porous surfaces.

Another member agreed that these are good short-term research questions. Coronavirus ribonucleic acid (RNA) doesn’t equate to an exposure risk because it isn’t necessarily infectious.

Researchers need to know the infection level of the surface first. Echoing other comments, another member mentioned that these short-term objectives are good assuming droplets are the sole source of infection. If aerosols are infectious, then the questions need to be adjusted. Overall, members agreed with that comment and noted that sampling methodologies are also long-term research needs.

A member mentioned that 25 years ago, individuals didn't think that having a personal monitor for PM2.5 and PM10 was viable and asked the Panel if the EPA and/or scientists should be working toward having personal monitors.

Dr. Honeycutt asked the Panel if there were any more comments or questions; none were raised.

Research Category: Environmental Sampling Analysis

Dr. Honeycutt introduced the lead writer for this research category, Dr. Jacqueline Hughes-Oliver, and the group members, Dr. Mark LeChevallier, Dr. Michael Jayjock, Dr. Harvey Clewell, and Dr. Richard Sakaji.

Overall, members stated that the research questions were a good start and that nothing was particularly missed by the Agency. Members acknowledged that the questions related to this research category were not going to be accomplished independently of the environmental collection issues. Members assumed that the EPA has already identified a sampling collection method first.

Since Dr. Sayles commented that the EPA is looking at a rapid viability PCR assay, members noted that assay could go under the current state of knowledge, as it exists, and it is being modified for SARS-CoV-2.

Members wanted to acknowledge that the collection and sampling research categories complement each other, and therefore, all previous comments were appropriate.

Members also noted that if the EPA was ramping up environmental analysis, they need to account for the current lab capability. If the EPA is looking into the future, perhaps monitoring wastewater for trends may or may not be appropriate on a national scale. Members mentioned that the EPA should evaluate what would it take to complete this research work nationwide. Determining the incidence of infection, including QA/QC protocols, variability in methods and platforms, is a big undertaking for the Agency, the members stated.

Another member asked the EPA several questions: 1) When EPA is developing these testing methodologies? 2) Can EPA look at other tests for other media? 3) Can other tests be used for environmental samples? and 4) Can EPA extend food sampling methodologies to environmental sampling? The member noted that some of these questions will be captured in the written response.

Dr. Honeycutt asked the Panel if there were any more comments or questions; none were raised.

Research Category: Environmental Stability/Persistence on Surfaces

Dr. Honeycutt introduced the lead writer for this research category, Dr. Mara Seeley, and the group members, Dr. Mark LeChevallier, Dr. Michael Jayjock, Dr. Harvey Clewell, and Dr. Deborah Bennett.

In general, the members found that the research questions provided by the EPA were great. Members mentioned that it will be helpful for the EPA to consider other surfaces that individuals might be in contact with (e.g., playground equipment, soccer balls, footballs, artificial turf, natural turf, among others). Members noted that the EPA may want to consider stability and persistence on those surfaces, as well as interactions between heat and humidity on different surfaces. Members also stated that this is one of the key research areas where the EPA can be of assistance. The real question is viability of the virus on different surfaces and how often a surface needs to be cleaned. This is one of the first things the EPA should evaluate.

Another member expressed interest on whether surface coatings with nanomaterials would affect the life span of the virus or whether the surface coating would influence the viability of the virus. These questions are important as they might reduce the sampling requirements. These questions could be incorporated to address fabrics as well.

One member mentioned that many research questions are focused on indoor environments and that only one bullet mentions outdoor activities. The member expressed that the role of sunlight has been discussed in the media and that validation studies about temperature and humidity conducted by the EPA would be appropriate. Also, the member stated the need for more information about what conditions the public can change at their home (e.g., temperature, humidity, etc.) that would prevent or reduce the persistence of the virus.

Another member mentioned that there were no indoor air research questions as part of EPA's list. Perhaps indoor air research needs could be incorporated in the next section on Environmental Exposure, the member said. Another member agreed with that idea and noted that the EPA may want to think in terms of air exchange rate (or how many units of air are turned over per hour) to understand exchange rate in determining air quality. The member also mentioned that the ideal way to evaluate indoor air will be using a computational fluid dynamics analysis. If air flow is too high, you can have turbulence in a room. You need to simulate it in a computer that looks at air flow and then evaluate the areas where there is not an adequate exchange rate.

Another member raised concerns regarding indoor and outdoor air and stated that individuals can't go back to work if they can't send their kids to camp and/or school. Other environments such as sailboats, restrooms at trailheads, and camping cabins should also be considered.

Dr. Honeycutt noted that indoor air is a bear from a regulator's perspective and suggested that the Panel should add another research category. Another panelist suggested to name the new research category "Indoor Air and the Built Environment."

Multiple members stated that the indoor air discussion was appropriate and mentioned that perhaps should be included as part of the Environmental Exposure research category. It would be

a big benefit to have a separate category for the indoor air exposure scenarios (e.g., SARS-CoV-2 settles on carpets) and to separate environmental exposures outdoors.

Dr. Honeycutt asked Dr. Bennett if she could be the lead writer on the indoor air research category and she agreed. Dr. Honeycutt also clarified that the Panel was creating an additional research category named “Indoor Air and the Built Environment” and that the Panel will review this idea again once all the comments were discussed.

Dr. Honeycutt asked the Panel if there were any more comments or questions; none were raised.

#### Research Category: Environmental Exposure

Dr. Honeycutt introduced the lead writer for this research category, Dr. Lloyd Wilson, and the group members, Dr. Mara Seeley, Dr. Deborah Bennett, Dr. Michael Jayjock, and Dr. Alison Cullen.

Dr. Honeycutt stated that on this topic, Dr. Jayjock submitted some slides and that he was going to present his slides first before starting the discussion. Dr. Jayjock started his presentation titled “Inhalation as a Probably Important (perhaps predominant) source of COVID-19 Infection.” He discussed important aspects about the potential for inhalation exposure to the virus. Dr. Jayjock also mentioned that the COVID-19 exposure assessment is inextricably connected to a hazard assessment. He noted that if inhalation of aerosols was indeed a significant source of exposure, that hypothesis needed to be tested as discussed in his slides.

Members debated about aerosol deposition in the lungs, respirable fraction of the virus and particles sizes when sampling. One member specifically stated that the Environmental Exposure research category is where this discussion belongs and that both, surfaces and airborne transfer of the virus, should be addressed. The member noted that there was a research issue related to how susceptible is the pulmonary region versus the upper respiratory tract to COVID-19 and that focusing on respirable mass would be appropriate.

Another member agreed that pulling the virus out of the air is an important question. Also, re-aerosolization of the virus from surfaces is a viable research area to think about, especially after vacuuming or sweeping. Also, members expressed that the EPA might want to evaluate this research category in the context of schools, public areas, etc.

In addition, a member proposed an additional research question related to human interaction with wildlife and/or domestic animals as potential vectors. Some members questioned this issue. Dr. Honeycutt clarified that the EPA does eco-toxicology and requested that this discussion be further developed in the written comments.

Dr. Honeycutt asked the Panel if there were any more comments or questions; none were raised.

#### Research Category: Water/Wastewater

Dr. Honeycutt introduced the lead writer for this research category, Dr. Richard Sakaji, and the group members, Dr. Lloyd Wilson, Dr. Craig Adams, Dr. June Weintraub, and Dr. Mark Wiesner.

Members discussed several fate and transport studies and agreed that those studies are good ideas for a variety of reasons. Members also mentioned that some fate and transport studies are trying to use the presence of the virus in sewage to track infections in the community. Moving sewage from home to sewage treatment plant involves long residence times and distances. Members also noted that evaluating biosolids was a good research activity.

One member mentioned the need for collecting viral loads in urine or feces. Feces are in swimming pools, the member noted. Some pools have no disinfectant and there is the need to think about what sort of vector pools, spas or swimming areas are for the public. The oral route should be considered when addressing fluids, fingers, and food.

Another member circled back to the community-level water testing comment, as several groups have been successful in monitoring opioids in wastewater systems. It was noted that this is a method that could be important for more than just this pandemic. Members agreed that wastewater monitoring had been used to evaluate other public health concerns (e.g., smoking and vaping).

Dr. Honeycutt asked the Panel if there were any more comments or questions. Some members acknowledged that there is an overlap between research categories and that the Panel should reference those connections in the draft report.

#### Research Category: Air

Dr. Honeycutt introduced the lead writer for this research category, Dr. Wayne Landis, and the group members, Dr. Hugh Barton, Dr. Tara L. Sabo-Attwood, and Dr. Robert Phalen. The lead writer mentioned that the group members sent their preliminary thoughts to the Panel Chair.

Members recommended that the EPA defines the research “metric” (e.g., a virus particle, a water droplet or the residual genomic RNA, among others). Members agreed that the EPA needs to start building a matrix with environmental variables and mentioned that some of the research questions were not systematic. For example, particle size will be important to address, they noted. Some panelists also noted that there are multiple air systems for multiple uses and that the EPA may need to look at a larger number of systems. Some questions were raised: 1) Can vented air carry an infectious load? and 2) Does CoV-2 remain viable through a heating, ventilation, and air conditioning (HVAC) system? Members mentioned that when there are large numbers of individuals congregating outside, air transmission could be important and discussed whether this is within EPA’s scope. Members also stated that the research questions about aerosolization were important and recognized the need for datasets.

Members also discussed how aerosol risks can be reduced indoors. Members suggested that the EPA could set some clear goals and develop a probabilistic risk assessment to identify confounders. Members strongly stated that all the questions proposed by the Agency were important, particularly the questions related to children’s activities. Members agreed that a risk assessment could help the Agency in the identification of high research priorities and help determine what adults and children are being exposed to. Also, members noted that the setting is significant (e.g., schools) when prioritizing the sampling of indoor air. A member expressed

concerns about children going back to school and some children getting sick while the air is circulating through the HVAC system.

Some members expressed concerns about aerosol transmission to water and whether the public was at risk of the virus after exposure to contaminating water. They noted that certain populations seem to have higher exposures, and air transmission of the virus to water might be a component. It is not clear how persistent the virus is in the air or in water bodies as there are several interactions that could occur (i.e., pH, nutrients, etc.) and a range of characteristics could alter transmission into water bodies.

On another topic, one member stated that might be good to think about the effectiveness of portable air cleaners and noted that if the EPA made any recommendation, there is the potential to have a supply chain issue.

Another member expressed how impressive the compiled EPA's list of 400 disinfectants was. The member noted that the EPA should focus on what kind of treatments can be used in schools, office buildings, hotels, conference centers, etc. Accounting for the potential of aerosol exposures is important and the EPA could provide guidance to the public about treatments, including a list of bio-treatments. The lead writer stated that the group will add this recommendation to their list of short-term priorities. Dr. Honeycutt also mentioned that the Panel could propose that action to the EPA.

One member stated that viruses can be carried on whatever particles are available in the air, but ozone can decrease the viability. Air pollution can be both a vector and an agent of alteration. Another member mentioned that particulate matter in the atmosphere and the interaction with SARS-CoV-2 is an area of research.

One member wanted to support the call for personal monitors and reiterated this idea which was discussed during the Air research category. Personal monitors lead to all sorts of research and could be effective. Also, kids are breathing at a different height than adults. Development of a personal monitor would be good for the EPA in terms of its interaction with CDC and other agencies. Another member suggested to add that idea to the short-term research list, yet advised to use some precaution when referring to personal monitors until scientists know more about the virus.

Dr. Honeycutt asked the Panel if there were any more comments or questions. One member raised the issue of PPE re-use and how should also be acknowledged in this research category.

*Research Categories: Environmental and Human Health Factors affecting transmission and severity of COVID-19*

Dr. Honeycutt introduced the lead writer for these two research categories, Dr. Alison Cullen, and the group members, Dr. Deborah Bennett, Dr. Robert Phalen, Dr. June Weintraub, Dr. Wayne Landis, and Dr. Tara L. Sabo-Attwood.

Members acknowledged that many factors affecting the transmission and severity of COVID-19 were previously discussed and that overlapping comments could help emphasize important

points in the draft report. Members agreed that the EPA would want to work closely with National Institute of Environmental Health Sciences (NIEHS) on human health risk factors affecting transmission and severity of the virus. They also noted that the older population has distinctive exposure scenarios (e.g., individuals holding onto handrails).

Members also discussed how some of the factors previously discussed could impact the “severity” of illness (e.g., temperature and humidity). Some members mentioned that addressing the research “metric” issue could be helpful as it could be a platform for including severity.

One member commented on human health risk factors related to socioeconomic status (SES) and the built environment. For example, the member noted that how individuals recreate is related to their SES (e.g., swimming pools, playground equipment, etc). Members agreed that this is an area that the Panel should consider as there are lots of different opportunities for exposure in the environment that individuals are creating when they are outside.

Dr. Honeycutt asked the Panel if there were any more comments or questions. None were raised.

#### Research Category: Personal Protective Equipment (PPE)

Dr. Honeycutt introduced the lead writer for this research category, Dr. Tara L. Sabo-Attwood, and the group members, Dr. Robert Phalen, Dr. Harvey Clewell, and Dr. Craig Adams.

The lead writer mentioned that all the questions seem to be relevant. With respect to the first bullet, members recommended procedures for disinfecting PPE for re-use, including consideration of the PP material. It was noted that scientists don’t have a good handle on live virus release or the PPE as an agent of infection. Members acknowledged that there are interesting ideas among researchers on how to decontaminate or disinfect PPE, but that the EPA should understand the live virus release first.

One member commented along the lines of multiple disinfectants available for use with PPE. Yet, the member noted that disinfection is a function of exposure concentration X time to the disinfectant, and therefore, achieving disinfection without degrading the mask or PPE was critical in this case. Members agreed that thermal disinfection was a short-term research need, including the use of devices such as microwaves. Members also discussed temperature to disinfect PPE.

Researchers have found that a great number of human exposures occur when individuals, that are using PPE, are in a room taking their protective clothing off and get into their street clothes. Members noted that the PPE can become an exposure source and expressed concerns. This scenario could also be applicable to children.

Members agreed that comparing professional masks (e.g., N95 masks) to those used by the public (i.e., homemade cloth masks) is a complex issue and that some research should be completed to compare effectiveness and disinfection across materials. Members noted that homemade cloth masks and N95 masks are clearly being reused many times; some are low-tech and some are high-tech. They also stated that face shields are also common among healthcare workers. Members agreed that protocols should be developed for the public and our health care

system. Some members mentioned that the EPA should work with National Institute for Occupational Safety and Health (NIOSH) and other federal agencies.

Dr. Honeycutt asked the Panel if there were any more comments or questions. Some members mentioned that they sent comments to the lead writer.

#### Research Category: Human Health Risks of Exposure to Disinfectants

Dr. Honeycutt introduced the lead writer for this research category, Dr. Mara Seeley, and the group members, Dr. Alison Cullen, Dr. Deborah Bennett, and Dr. Hugh Barton.

Members agreed that the EPA needs to consider human health risks of disinfectants. There may be a special sensitivity among the elderly and young individuals to these products. Many FIFRA pesticides are Type 4 contact allergens and that's something that should be considered. Human health risks and the interaction with ozone should also be considered. Members discussed several examples of individuals enduring occupational exposure to disinfectants (e.g., employees cleaning the New York subway system).

Members agreed that there should be research on public education on proper use of disinfectants, which is also an indoor air issue. Dr. Bennett agreed to join the members of the Air research category to address some of the indoor air issues. Along the lines of public education, a member expressed that the EPA and CDC work well together as government agencies. Yet, the research that comes out of ORD is critical and should get transmitted to the CDC to be incorporated in their education materials for the general public.

Dr. Honeycutt asked the Panel if there were any more comments or questions. None were raised.

#### Summary and Next Steps

Dr. Honeycutt thanked the Panel for all their hard work and recapped the action items from the teleconference. He reiterated that the Panel has work to complete and asked all panelists to provide comments to their lead writer by Wednesday May 6, 2020. He clarified that each lead writer will then compile all the comments and send them to Dr. Figueroa, by Friday May 8, 2020.

Given short the timeline, Dr. Honeycutt requested high-level comments and recommendations from the members. Given the amount of ideas discussed during the teleconference, Dr. Honeycutt also encouraged the panelists to provide or list some research priorities. He noted that even though the EPA is a big organization, the Panel should prioritize the recommendations and think of ways to help EPA prioritize their research. Also, Dr. Honeycutt requested that the members identify opportunities available for the EPA to interact with other groups and agencies.

Dr. Honeycutt asked the Panel if there were any more questions.

A member requested clarification about what the EPA is doing related to air research since no information was presented to the Panel. Dr. Honeycutt requested clarification from the EPA. Dr. Sayles mentioned that the Panel heard presentations from several Program Offices about their on-going research based on their statutory obligations and how that pertains to helping EPA's

response to COVID-19. He mentioned that there is a handful of EPA research projects related to air; however, the EPA didn't identify those in this first round as being a priority.

Dr. Honeycutt also reminded the Panel members that a full teleconference of the Chartered SAB was going to be held on May 20, 2020 in order to discuss the Panel's draft report and for the Chartered SAB to conduct a Quality Review. This draft report should be forwarded to the Chartered SAB by May 13, 2020.

Members requested clarification about the preferred format for the responses. Dr. Honeycutt mentioned that for each research category, the members should address the charge questions the way they're written. He acknowledged that SABSO and the Panel Chair can do some formatting once the responses are received.

Mr. Thomas Brennan also thanked everyone for their ideas and a great conversation. He mentioned that the Panel was well-positioned to deliver great advice to the Agency.

Meeting adjourned

Dr. Figueroa shared that a federal register notice is available announcing the next meeting date, scheduled for Wednesday May 20, 2020. She thanked all Panel members for their contribution and patience, and then adjourned the meeting at approximately 5:15 p.m. (Eastern Time).

On behalf of the Panel,

Respectfully Submitted and Certified as Accurate,

/s/

\_\_\_\_\_  
Dr. Zaida Figueroa  
Designated Federal Officer  
for the SAB COVID-19 Review Panel

/s/

\_\_\_\_\_  
Dr. Michael Honeycutt  
SAB COVID-19 Review Panel Chair

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

**Appendix A: Meeting participation – SAB members, SAB liaisons and additional meeting participants who requested the teleconference call-in number.**

AARON WEOW	ALEX GUILLEN	HEATHER COLLINS	MARUSIA POPOVECH
ALISON CULLEN	ALEXANDRA GRAYSON	HOLLY STALLWORTH	MARY ROSS
ANDREW SAWYERS	ALISA FISHER	IRENE BANAS	MEGAN FLEMING
ANNA LOWIT	ALLISON KRENZIEN	JACQUELINE MEADOWS	MICHAEL ANDERSON
BECKI CLARK	ANDREA MOJICA	JAMIE QUON	MICHAEL STEWART
BOB PHALEN	ANDY ROBINSON	JASON PLAUTZ	NEAL SOROKIN
BRUCE RODAN	ANGELA STARKS	JEAN FRUCI	OMOBOLA MUDASIRU
CHARLOTTE BERTRAND	ANITA DESIKAN	JEDIN TEICHMAN	OWEN MCDONOUGH
CHRISTINE TOMLISON	ARIA KOVALOVICH	JEFF GORD	PATRICK MULROONEY
CLIVE ORMSBY	ARIANA FIGUEROA	JEREMIAH GRAY	PATRICK QUINN
CRAIG ADAMS	ARTHUR TOURIS	JIM KENDZEL	PATSY ROOT
DAVID DUNLAP	BEN MORRIS	JIM PAOLELLA	PATTY SENEAL
DEBBIE BENNETT	BESTY BOOREN	JOANNE ENGLISH	PHIL ZAHREDDINE
GINA PEROVICH	BETSY BRIEN	JOCEPH GORD	PHYLLIS VITOLO
GREGORY SAYLES	BOB PHALEN	JODI FELD	PRIYANKA HOOGHAN
HARVEY CLEWELL	BRIAN BLOOMER	JOE HUBBARD	REBECCA CAMPBELL
HUGH BARTON	BRUCE COPLEY	JOHN TINKHAM	RHONDA JONES
JACQUELINE HUGHES	BRYAN HUBBELL	JOHN VANDENBERG	ROBIN RIDGEWAY
JAY GARLAND	CARMEN ALVAREZ	JON MONGER	RUSSELL OWEN
JEFF DAWSON	CARMEN CORREA	JORGE MUNIZ ORTIZ	RYAN BOWLEY
JENNIFER ORME	CLIDE ORMSDY	JOSHUA SCHNEIDER	SARA PALASIPS
JUNE WEINTRAUB	CLIVE ORMSBY	JUDY FACEY	SHERRI HUNT
KEVIN OSHIMA	DAN BYERS	JULIAN ROSENBERG	STACEY KATZ
KHANNA JOHNSTON	DAVID JONES	JULIE NARIMATSU	STEPHANIE RICHARDS
KURD ALI	DAVID BARDIN	KATE SANDE	STEPHEN TOMASINO
LLOYD WILSON	DAVID BENNETT	KATHERYN KORTHAUER	STEVE BENNETT
LOUIS DAMICO	DAVID MORSE	KATLYN TOVAR	SUE SHALLAL
MARA SEELEY	DAVID PAVLICH	KEN STEVENS	SUSAN LAWRENCE
MARK LECHEVALLIER	DAVID RISLEY	KENT EDIGER	SUZANNE VANDRUNICK
MARK WIESNER	DEBBIE BENNETT	KEVIN SHEFFIELD	SYLVIA CARIGNAN
MELISSA PANGER	DENISE BURNSIDE	KEVIN TEICHMAN	TANIA SOLE
MICHAEL HONEYCUT	DUSTIN POPPENDIECK	KIMBERLY NESCI	TED STEICHEN
MICHAEL JAYJOCK	ELAINE BLACK	KUKI HANSEN	THOMAS ARMITAGE
RICHARD SAKAJI	ELIANA PERRMUTTER	KURD ALI	TIFFANY JONES
RICK KEIGWIN	ENID CHIU	LAURA KOLB	TIFFANY ROBERTS
SHAUNTA HILLMOND	ERIC BUTT	LISA DREILINGER	TIMOTHY DOLE
SHAWN RYAN	ERIK JANUS	LLOYD WILSON	TIMOTHY LEIGHTON
TARA SABO-ATTWOOD	ERIN BARNES-WEAVER	LOUIS CIAMPI	TINA BAHADORI
TIM WABE	EVAN BROOKS	LUMINITA VELEA	UNI BLAKE
TIM WATKINS	FRANCIS SYLVESTER	MANNY A GONZALEZ	VALERIE RICHARDSON

TOM BRENNAN  
WAYNE CASCIO  
WAYNE LANDIS  
WILLIAM KING  
YU-TING GUILARA  
ZAIDA FIGUEROA  
WYNNE MILLER

GABBY FEKETE  
GAIL ROBARGE  
GLENNER RICHARDS  
GLORIA ALVAREZ  
GRISHMA DESAI  
HAL AMBUTER  
ZACHARY CIKANEK

MANUEL GONZALEZ  
MANUELA PETRISOR  
MARIA HEGSTAD  
MARIA LOPEZ CARBO  
MARIANNE LAVELLE  
MARK HODGSON  
ZAIDA CORREA

VIJAY LINAYE  
VIKRAM KAMMUKHLA  
VITO ILACQUA  
WAYNE LANDIS  
WILLIAM JORDAN  
WILLIAM KING

## **Appendix B: Meeting Materials**

All meeting materials are available on the SAB website (<http://www.epa.gov/sab>) at the page for the April 30, 2020 teleconference. The direct web link is:

<https://yosemite.epa.gov/sab/sabproduct.nsf/a84bfee16cc358ad85256ccd006b0b4b/afbb297a2e1c38258525854c005ad300!OpenDocument&Date=2020-04-30>