

*U.S. Environmental Protection Agency*  
**CHILDREN'S HEALTH PROTECTION ADVISORY COMMITTEE**  
**May 17 & 18, 2022 from 10 a.m. – 5 p.m. EDT**  
**Hybrid Meeting held at EPA Headquarters and via Microsoft Teams**

The CHPAC is a chartered federal advisory committee, operating under the Federal Advisory Committee Act (FACA; 5 U.S.C., App. 2). The committee provides advice to the Administrator of the U.S. Environmental Protection Agency on children's health. The findings and recommendations of the Committee do not represent the views of the Agency, and this document does not represent information approved or disseminated by EPA.

– Meeting Summary –

On May 17 and 18, 2022 the Children's Health Protection Advisory Committee (CHPAC) met in a hybrid format. [See [Appendix A](#) for the meeting agenda and [Appendix B](#) for a list of the CHPAC members present.]

For questions regarding CHPAC, please contact the U.S. Environmental Protection Agency (EPA or the Agency) Designated Federal Official (DFO), Amelia Nguyen, at [Nguyen.Amelia@epa.gov](mailto:Nguyen.Amelia@epa.gov) or at 202-564-4268.

**I. Logistics and Agenda Review**

Amelia Nguyen, DFO, EPA Office of Children's Health Protection (OCHP), welcomed members, reviewed the Federal Advisory Committee Act (FACA) rules, and convened the meeting.

Deanna Scher, CHPAC Chair, welcomed members and gave an overview of the agenda.

**II. Welcome**

Janet McCabe, EPA Deputy Administrator, welcomed the CHPAC and noted that EPA is moving with a sense of urgency to protect children's health and safety. She added that children are often at greater risk from pollution than adults and that children living in highly exposed and underserved communities may have reduced resilience and lack the ability to recover from exposure to environmental hazards. EPA's strategic plan recognizes this fact and strengthens the commitment in protecting public health, in particular children's health. She noted that EPA has also incorporated children's health into the agency's Equity Action Plan in response to Executive Order (EO) 13985. This action plan states that developing a clear and consistent ability to apply cumulative impacts throughout the environmental and public health regulatory endeavors is a necessary precondition in protecting human health and the environment, including all communities and individuals at all life stages.

Janet continued, stating that this year marks 25 years of protecting children's environmental health at EPA, which provides the Agency the opportunity to pause and recognize its incredible progress. Janet noted that in the 1990s, children's health was declining, and many children suffered from health issues caused by environmental hazards, such as air pollution, lead, and contaminated drinking water. In 1997, Administrator Carol Browner established an office focused on protecting children's health. President Clinton signed an EO instructing all federal agencies to consider children's health in their activities. Since then, EPA has prioritized environmental health protection for children. Janet added that while many children are still exposed to air pollution, lead, and contaminated water, EPA has made, and continues to make, progress on these and other issues. She noted that the current Administration is taking aggressive action to address the climate crisis through mitigation, reduction of greenhouse gases, and resilience by preparing for the unavoidable climate changes. She provided examples of such activities, including the Clean Cars Program, phasing down of hydrofluorocarbons, delivering a strong proposal to reduce methane pollution, and helping communities prepare for the impacts of climate change.

Janet mentioned that EPA is using funding from the Bipartisan Infrastructure Law (BIL) to help progress on President Biden's goal of moving 100% of lead service lines across the country. Janet emphasized that this addresses one key source of lead exposure for children. EPA's agency-wide lead plan focuses on other sources of lead, in particular lead found in dust and paint. EPA ended the use of chlorpyrifos in food, ensuring all people are protected from the dangerous consequences of this pesticide. Additionally, Janet noted that EPA is looking closely at the national quality standards for both particle pollution and ozone to ensure they are protective of public health. EPA will partner with private and public organizations and use the most up to date information to further children's environmental health protections and strengthen EPA's efforts to protect children across the country. Janet emphasized the high maternal mortality rates in the United States, particularly among Black and Native American women, and noted that EPA will work to protect mothers. She highlighted Vice President Harris's call to action to help improve health outcomes for mothers and infants across the United States. The effort brings together agencies across the government to protect maternal health. Such partnerships and the subsequent exchange of information underline the importance of the CHPAC to EPA. Janet thanked the CHPAC members for their participation and service and ensured the members that the Biden-Harris Administration would use the committee's expertise to support EPA's mission in protecting public health and the environment, including children.

### **III. Office of Children's Health Protection Update**

Jeanne Briskin, Director, EPA Office of Children's Health Protection (OCHP), thanked the CHPAC members for joining the meeting and provided an overview of EO 13045: Protection of Children from Environmental Health Risks and Safety Risks. Jeanne noted that EO 13045 prioritizes identifying and assessing environmental health risks and safety risks that may disproportionately affect children and ensures that policies, programs, activities, and standards address disproportionate risks to children.

Jeanne provided background on the implementation of EO 13045, noting that this is an annual review that contributes to the development of 25 regulations, 25 risk assessments, and other policies which provides specialized skills for cross-agency coordination. Jeanne provided updates on EPA's children's health activities, which included hiring new employees. EPA's 2021 updated policies on children's health include improving the definition of children's environmental health, acknowledging that the effects of early life exposure to environmental contaminants may not become evident until adulthood, and recognizing that children living in highly polluted communities may have reduced resilience and ability to recover from exposure to environmental hazards.

Jeanne continued that EPA and OCHP Strategic Plans consider the health of children at all life stages and other vulnerable populations. The key aspects of the four-year strategic plan include using science and policy to strengthen the protection of children, strengthening and expanding partnerships, and addressing disparities. Jeanne highlighted that EPA is partnering with the National Academies of Sciences, Engineering, and Medicine (NASEM) on a public workshop, which will feature discussions of the state of knowledge on the vulnerabilities to environmental exposures at different life stages, science areas that are important in advancing understanding of vulnerabilities, opportunities that may be critical to addressing and improving consistent application of children's environmental health in risk assessments, and implications of the state-of-the-science to improve policies to protect children's environmental health.

Jeanne provided an overview of OCHP's contributions to American Rescue Plan. Contributions included providing an additional \$2.5M via an interagency agreement between EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) for the Pediatric Environmental Health Specialty Units' (PEHSU) work in support of children in underserved communities, offering new grants to support Children's Healthy Learning Environments in Low-Income and/or Minority Communities grantees, investing in evaluating economic benefits of reducing children's exposures which contribute to ADHD, and identifying best practices to address differences in susceptibility by life stage and in underserved communities.

Jeanne discussed the America's Children and Environment (ACE) updates, explaining that the indicators reflect the most recent children's health data available. The improved webpages are easier to read and

provide an interactive data display with a downloading option. The updated ACE indicators cover topics such as environments and contaminants, biomonitoring, and health.

Jeanne summarized additional actions by EPA since the last CHPAC plenary meeting. Actions included the creation of the Biden Harris Action Plan for Building Better School Infrastructure, taking steps to keep chlorpyrifos out of food by revoking uses, funding grants to reduce lead in drinking water, rebating \$17 million to fund clean school buses, and planning to protect the public from PFOA and PFOS in drinking water. Jeanne thanked and acknowledged EPA staff and contributing groups.

Following the presentation, CHPAC members asked the following questions:

- A CHPAC member asked for a specific date for the National Academies of Sciences, Engineering, and Medicine workshop in August. The member then asked what EPA's initial process is when looking at ADHD in relationship to lead.
  - Jeanne noted that the workshop would take place from August 1<sup>st</sup> through the 4<sup>th</sup> and that the CHPAC will be sent contact and sign-up information when it is finalized. In answering the second question, Jeanne noted that EPA is initially looking at lead exposure and decrements in performance and the economic consequences of ADHD caused by lead exposure. She added that EPA will begin with a literature review. Jeanne also added that linking lead exposures to ADHD outcomes will be a challenge.
- A CHPAC member noted that in a letter, there was thanks and acknowledgement for what CHPAC does for children's environmental health, but there are other entities that also work on this. The member asked if there is a way to give recognition to those other groups and initiatives.
  - Jeanne discussed that OCHP attempts to not only highlight CHPAC's work, but also activities across the entire agency. Jeanne added that there are other Federal Advisory Committees (FAC) that cover children's health, such as the Science Advisory Board (SAB) and the National Environmental Justice Advisory Committee (NEJAC). Jeanne continued that before COVID-19, CHPAC attended those meetings with other FACA members to discuss children's health topics with other committees. Jeanne extended an invitation to all CHPAC members to attend upcoming FACA meetings and noted that the CHPAC is also scanning across the horizon of what is going on with regards to EPA engagement with schools and trying to get caught up with re-engagement beyond small grants.
- A CHPAC member asked for an explanation of the next steps in the economic analyses of the ADHD initiative and asked if that is something that EPA is solely working on or if there are partnering agencies.
  - Jeanne explained that EPA is working with economists from the National Center for Economics. The economic side explores the cost families incur when children suffer from ADHD, such as missing work, paying for medication, therapy, tutoring, etc. Jeanne noted that EPA's first step is to find out what is available rather than produce assumptions on what those costs are.
  - The CHPAC member asked if those values will be vetted by people who are not economists and asked if there would be public input in the process to identify the costs.
  - Jeanne noted that this is an important suggestion but added that EPA's plans are not laid out that far. She added that this is a good place to start and appreciated the suggestion.

#### **IV. Review, Discuss, and Finalize CHPAC Response to the Take-Home Exposure Charge**

Deanna introduced Lori Byron, the CHPAC Take-Home Exposure Workgroup Chair, who provided a brief overview of the charge timeline, charge questions, and the overarching messages of the letter.

As Lori introduced the charge, she emphasized that EPA's consistent concerns about pesticide exposures reveal that the problem persists. She asked the members for overall comments and perspectives on the letter and its central messages.

The CHPAC members reviewed the introduction to the letter, noting that the section features a definition of children's health from the CHPAC's 2021 Toxic Substances Control Act charge response letter.

Members made the following comments on the introduction section:

- A CHPAC member suggested edits around the discussion of vulnerable communities and the proposition of a comprehensive framework through which the take-home pathway be considered. The member argued that pairing the two concepts weakened the individual points and suggested separating the two ideas.
  - Other members suggested varying replacement language that separated the concepts. The members concluded that the Take-Home Exposure workgroup would revise the sentence.
- A member suggested that one sentence with the estimated number of children working on farms be included in the introduction. This sentence would create a bridge between the take-home response letter and the previous dermal pesticide exposure response letter.
- Members suggested updated language about reducing harm to children.
- A member asked if there was evidence exploring if youth working in agriculture are more responsible for take-home exposures than adults. If youth also contribute to the take-home pathway, they should be included in the education and intervention campaigns that currently target adults.
  - One CHPAC member responded that there are no studies comparing residues on the clothing of adolescents to residues on the clothing of adults. Biomarkers of exposure suggest that adolescents and adults have the same levels of exposure to pesticides. Anecdotally, the member shared that youth may spend more time outside after work before entering the home.
  - Multiple CHPAC members suggested that this topic be re-visited in discussions of later sections of the letter. This may be an area that needs additional research.
- One CHPAC member asked about the content relating to child dependence on adults and noted that children depend on adults in the context of the take-home pathway and on the adults' engagement in specific behaviors to prevent take-home exposures.
- One CHPAC member suggested that ADHD be included as a potential health outcome resulting from pesticide exposures. This outcome was discussed by Jeanne Briskin in her opening remarks.
  - Members discussed the utility of keeping the information in the introduction broad and avoiding a list of specific health outcomes.
  - One member noted that if ADHD is included in the list of potential health outcomes, the reference should be updated with a more recent publication.
  - Another member wondered if the discussion of exposures during pregnancy should be broadened to include both pregnancy and childhood.

Lori moved the discussion to the response to the first charge question, which asked about the literature review that the Office of Pesticide Programs (OPP) conducted and literature that was not included in the initial review.

The CHPAC members made the following comments on the response to the first charge question:

- A member suggested the opening of the response be revised to eliminate an unnecessary dependent clause.
- One CHPAC member asked for opinions on the discussion of housing characteristics considering EPA does not have regulatory authority over housing.
  - Members generally supported the discussion of housing characteristics despite the limitations of EPA's authority. Characteristics related to housing, workplaces, vehicles, and hygiene all impact exposures and merit discussion in the letter.
- The group discussed including mode of transportation in a list of demographic characteristics.
  - A member clarified that mode of transportation was not included in this paragraph, as it deals specifically with demographic characteristics.

- Another CHPAC member asked about the regulations related to housing provided for workers by employers.
  - Members noted that they believed the Occupational Safety and Health Administration (OSHA) was responsible for such policies.
  - A member suggested that OSHA housing is likely relevant for a minority of farmworkers. Rental housing is regulated by state and local authorities. The members discussed the importance of discussing differences in housing regulations and the impact on take-home exposures.
- One CHPAC member wrote in the meeting chat that the sources of exposure that EPA does not have direct regulatory authority over are still worth emphasizing in the response letter.
  - Other members agreed, noting that CHPAC letters serve as educational sources and that the group can illuminate factors that need to be considered regardless of EPA's ability to regulate. The members agreed that the question asked for additional information important to the take-home exposure pathway, and factors such as housing, vehicle use, and hygiene conditions are relevant to answer the question.
  - A CHPAC member noted question three asks about information for regulatory purposes, but question two does not specifically ask for information about regulation. Therefore, the response to question two should not be bound by EPA's regulatory jurisdiction.
- A CHPAC member suggested an edit to line 70 to make it read, "...exposure pathway, which makes them important factors for EPA to consider."
- One CHPAC member noted the discussion of housing characteristics should also be connected to impacts on behavior change. The member noted housing modifies one's ability to engage in certain behaviors.
  - A member responded housing does influence behavior, but the physical characteristics of the building also influence the take-home pathway. Both of these influences should be discussed in the letter.
  - A member suggested eliminating the phrase "many of which are federal or state regulated." Another member agreed and added "market rate" should also be deleted.
- One CHPAC member asked about the discussion of take-home exposures related to the vehicle. The member asked if the information communicated that children may be exposed to pesticides in a vehicle and in their home, as their parents may bring residues from the vehicle into the home. There are two prongs to that potential exposure pathway.
  - Members suggested revisions to the section to make the message clearer, including deleting the phrase "both in the vehicle and the home".
- Another CHPAC member asked about the term "aggregate travel" and wondered if there were alternatives to this phrase.
  - Members suggested changing this language to "in carpool situations," "multiple occupancy travel," or "when traveling in groups."
- One CHPAC member suggested changing "in sum" to "in summary,"
- Another CHPAC member suggested combining sentences in lines 106 and 107 to reduce redundancy.
  - One CHPAC member responded that the Kalweit reference is informative and could be added to the first or second sentence of the paragraph.
  - Another member responded that the paper is already cited earlier in the response section.
  - The members discussed that the Kalweit reference was considered by EPA, but it was unclear to what extent the factors outlined by the CHPAC were considered in the EPA review.
    - A member added that the CHPAC recommends EPA review all literature related to the take-home exposure pathway, not just pesticides literature.

- Another member emphasized the frameworks used to assess the take-home pathway for other exposures should inform the assessment of pesticide exposures via the take-home pathway. These frameworks should include systemic and structural factors that influence take-home exposures.

Lori moved the discussion to the response to the second charge question, which asked about the strengths and limitations of the evidence on the take-home exposure pathway and about the effectiveness of behavioral interventions.

The CHPAC members made the following comments on the response to the second charge question:

- One CHPAC member suggested that “can” be deleted from the first sentence, making the phrase read “take-home exposures occur.”
- Another member suggested that on line 136 “the take-home pathway” be updated to “some take-home pathways” and a sentence on lines 137-138 be updated to read “...inability to isolate some take-home exposures...”.
- The members agreed to delete a phrase from line 138.
- A member suggested adding inhalational exposures to the sentence on line 139.
- One CHPAC member asked if pre-existing conditions that impact exposure levels, such as eczema or asthma, are worth mentioning.
  - A member responded that underlying health conditions that impact exposure could be included in the paragraph on demographic factors. The member continued and noted that open lesions on the skin will increase the dermal exposure levels. There is less information about how respiratory tract inflammation may influence exposure.
  - One CHPAC member suggested including this information in response to the next question on quantitative risk assessment.
  - A CHPAC member asked if anyone in the group had read a systematic review article by Gildan et al. on pesticide exposure and childhood asthma. The member sent the link to the article via the chat.
  - Another member suggested that the response to charge question three be adapted to include information on factors that influence take-home exposures and information on factors that influence the impact from take-home exposures (such as pre-existing conditions).
- One CHPAC member asked about the term “agricultural households” and if that referred to homes in proximity to agriculture or households where the family is participating in agriculture as an occupation.
  - A member responded that the phrase should be updated to “homes of agricultural workers and homes in agricultural communities.”
  - The group agreed that the second sentence in the paragraph should be deleted. Additionally, the first half of the third sentence was removed.
- The members discussed the importance of the section about exposures from pesticide drift. The strength and breadth of the evidence should be clear in this section.

Lori moved the discussion to the second half of the charge response beginning at line 166, which focuses on personal protective equipment (PPE).

- One CHPAC member critiqued that the section of PPE is not strong enough and that employers could disrupt the take-home pathway if clothing was changed at the workplace. If employers do not intervene at that point in the pathway, take-home exposures will continue. The member suggested including the sentence, “Currently EPA does not provide any requirements for making sure workers do not wear contaminated clothes home.”
  - Another member agreed that language needed to be made clearer that EPA does not require fieldworkers to be protected with specific clothing or PPE.
  - One CHPAC member suggested that the hierarchy of controls be used as a framing of the best ways to disrupt this pathway. The letter should focus on actions that would be the most

effective and explain that methods become less and less effective as the control moves away from the concept of eliminating the exposure altogether.

- Another member responded via the meeting chat that the hierarchy of controls is only mentioned at the end of the letter.
- One CHPAC member shared that PPE could be seen as primary prevention and should be the goal.
  - A CHPAC member responded that PPE is the last resort in the hierarchy of worker controls. The member summarized that the hierarchy includes first removing the source, then substituting the source, then using engineering and environmental area controls, and then administrative/behavioral controls and PPE.

The CHPAC returned to discuss the letter following the early closing of the Bipartisan Infrastructure Law session later in the day. They continued their discussion of the response to charge question two.

- One CHPAC member suggested that the hierarchy of controls be included as a framing device in the introduction of the letter.
- Another CHPAC member returned to the discussion of the recommendation that the EPA require the use of PPE. The member emphasized that the letter does not support such a strong position.
  - One CHPAC member responded that the discussion of PPE for farmworkers is complex. Among this occupational population, PPE may contribute to heat-related illness. EPA uses a calculated re-entry period to assess the safety of a field following pesticide applications assuming workers are wearing long sleeve shirts, pants, shoes, and socks.
    - Another member responded that the re-entry period was calculated to account for acute toxic exposures rather than chronic low-dose exposures. The member asked if there were other occupational groups that are similarly responsible for their own exposure protections.
    - A member responded that domestic and household cleaning workers also lack protection from chemical exposures, noting the lengthy history of exempting these workers from standard protections. The member suggested that more emphasis be placed on the environmental justice (EJ) element of this issue.
    - One CHPAC member noted the amount of gear that farmworkers are responsible for obtaining and emphasized that isolating farmworkers from protections provided to other industries is not sensible.
    - A CHPAC member suggested that if PPE is recommended in the letter, the complications around that policy also need to be discussed.
    - One member noted that the lack of worker protections for farmworkers directly benefits the profits of the agricultural industry.
      - Another CHPAC member responded that only small businesses or family-owned farms are exempt from worker protection standards. For larger entities, the employer must pay for and provide the necessary training and information.
      - One CHPAC member responded that large operations may hire multiple labor contracting companies. When the operation does not directly employ the workers, and each contractor keeps the employee number below the regulatory number for application of protections, such regulatory requirements may be avoided.
        - A CHPAC member shared [an article](#) in the meeting chat that outlines the labor protections from which agricultural workers are exempted.
      - A CHPAC member responded that some states do not have an approved monitoring and enforcement plan. Those with plans may be stricter.

- One CHPAC member suggested handwashing be included as an important behavioral intervention reducing pesticide exposures.

Deanna concluded the discussion of the response letter and noted that members would continue to discuss the letter during the second day of the plenary.

## **V. Public Comment**

### **Joshua Berman**

Joshua Berman, Senior Attorney, Sierra Club, thanked the CHPAC for their work. He noted that at the instigation of Administrator Regan, EPA initiated a reconsideration of the primary and secondary ozone ambient air quality standards. In April 2022, the Office of Air Quality Planning and Standards staff submitted to the Clean Air Scientific Advisory Committee (CASAC) a draft Policy Assessment proposing to retain the current primary standard of 70 parts per billion (ppb). He added that children have increased ventilatory rates and outdoor physical activity compared to adults but have lungs that are smaller and still developing, making them more vulnerable to the impacts of ozone exposure. During prior ozone reviews, CHPAC has provided written input to CASAC, making recommendations about the health-protective level of the ozone standard for children. Joshua noted that Sierra Club is deeply concerned about the EPA staff proposal to truncate its current review of the ozone primary standard and to retain the current 70 ppb standard. Sierra Club is particularly concerned about the reliance on EPA's exposure assessment to conclude that a 70 ppb standard protects children's health. The exposure assessment fails to simulate the exposures of the millions of children who attend outdoor camps during the summer ozone season. Joshua added that the premise of the exposure assessment is deeply troubling, as it uses the fact that many children do not have regular access to the outdoors to justify a less protective health standard, making it less safe for children to engage in outdoor activity. Joshua concluded that Sierra Club urges CHPAC to provide input regarding how EPA's current proposal would impact children's health and asked that members of the Committee testify at CASAC's public meeting on the ozone standard in June.

### **Hayley Roy**

Hayley Roy, Intern, Our Children's Trust, introduced herself and advised that the CHPAC recommend EPA align its strategies, policies, and initiatives to protect the fundamental constitutional rights of children, especially children in Environmental Justice (EJ) communities. Without the recognition of a fundamental right to a safe climate, environmental injustices and harms to children's health will persist and continue as the climate crisis pursues. In *Juliana vs United States*, 21 young plaintiffs, including 11 Black, Brown, and Indigenous youth, brought a constitutional climate lawsuit against the Executive Branch for its affirmative actions in knowingly causing the climate crisis through its National Energy system. Hayley noted that climate change is causing a public health emergency that adversely impacts the physical and mental health of America's children. Hayley added that children are uniquely vulnerable to human-caused climate change and other forms of environmental pollution. On behalf of Our Children's Trust, Hayley requested that the CHPAC urge EPA to use the best available science and recognize the available target of reducing total U.S. emissions of CO<sub>2</sub> to below 350 parts per million by 2100. Current increased average temperatures of one degree Celsius and greater are already dangerous, and alignment with temperature targets of 1.5 degree Celsius is exponentially more catastrophic for children and future generations and should not be used to guide U.S. policy. Hayley noted that young people across the nation, including the *Juliana* plaintiffs, have suffered increasingly from climate harm to their physical and mental health as they continue to experience devastating wildfires, drought, and heat waves. Air pollution, extreme weather, and wildfires exacerbated plaintiffs existing respiratory illnesses such as asthma and allergies. Coastline communities have been harmed by the climate change fueled superstorms and hurricanes that destroyed homes with flooding and left youth and their families without power for days. Hayley reiterated the request from Our Children's Trust that CHPAC recommend EPA incorporate into its work the protection of children's fundamental rights to a safe climate system defined by the best available science. She emphasized that human laws must respect the laws of nature. She concluded that the United States government ignores the natural laws of energy and balance in climate.



## VI. Bipartisan Infrastructure Law (BIL) Updates

Zealan Hoover, Senior Advisor to the EPA Administrator, presented on the Bipartisan Infrastructure Law (BIL) and its intersection with children's health. He expressed his excitement to present to the CHPAC and noted the magnitude of the BIL for EPA. Over 60 billion dollars were received from the BIL, which is more than a 150% increase in the agency's annual budget. Zealan outlined the three major areas that will receive allocations of the BIL funding: water infrastructure, environmental clean-up, and a clean school bus program.

The water infrastructure program will provide dedicated funding for lead pipe replacements, for protection from PFAS and emerging contaminants, and for a range of needs that are longstanding around water infrastructure.

The environmental clean-up funding will increase funding for the Superfund and Brownfield programs, which will increase both the speed and scale at which communities can be cleaned-up. The first billion dollars allocated to the Superfund program will be used to clear the backlog of Superfund sites that have lacked the funding to enter the initial construction phase. Most of the sites are in areas with environmental justice (EJ) concerns. Additionally, the Superfund Remedial Program will receive support from the Internal Revenue Service (IRS) to reinstate the Superfund excise taxes, which taxes the sale of a list of chemicals. The revenue raised through this tax further funds the Superfund program. Following reinstatement of the tax, 10-14 billion dollars of revenue are projected to be gained in the next decade. Additionally, over 250 million dollars will be allocated for Brownfield funding. Most of these funds will reach disadvantaged communities. A large portion of the funding will be dedicated to infrastructure projects in the first six months.

Five billion dollars will be dedicated to building the Clean School Bus program, a new program dedicated to diesel emissions reductions. While related to the diesel emissions reduction program, this program stands alone as a means of driving air quality improvements. Fewer than one percent of the 500,000 school buses in the United States are electric vehicles. Electrifying school buses will reduce the risk of children's health outcomes from diesel emissions exposures. While the funding will not be enough to fully convert the fleet of school buses, the funding will be used to bridge the current gap for manufacturers and to increase familiarity with electric buses on the roads.

The first ten billion dollars from the BIL will be made available in 2022. One billion dollars will be allocated for the clean-up programs, one billion for the Clean School Bus program, and the remaining funds for water infrastructure projects. Zealan stressed that the Agency will be intentional with program designs and ensure appropriate execution of the programs. He emphasized that the funding from the BIL will be released each year over the course of five years, which provides an opportunity for continuous improvement and feedback on program execution. Zealan expressed his interest in feedback from CHPAC members over the course of the programs.

Members asked the following questions after Zealan's remarks:

- One CHPAC member raised concern about lead exposures occurring in media other than water. The member asked if the funding from the infrastructure bill for environmental justice may help support the fight to eradicate lead exposures.
  - Zealan responded that three major programs will be leveraged by EPA to target lead exposures, including the BIL water infrastructure funding, which allocates 15 billion dollars for lead service pipeline replacement. The Drinking Water State Revolving Fund (DWSRF) broadly funds lead pipe replacements. Finally, the Brownfields and Superfund programs both address lead exposures via contaminated soils.
- Another CHPAC member asked about the use of BIL funding for water quality testing at the tap level.

- Zealan replied that the DWSRF funds are intended for capital investments, which could include some testing equipment capabilities. Funding of ongoing water testing operations is not typically allowed, though there is some variation by state.
- One CHPAC member asked about the use of electric bus batteries to stabilize electrical grids to help schools in communities with electrical power outages.
  - Zealan expressed excitement about the vehicle to grid potential for the buses as well as the grid decarbonization potential. He noted the buses could be used creatively in the evenings for grid stabilization. Zealan added that capturing the grid value of electric buses accelerates the point at which the cost of the vehicle is offset by the financial savings from use. EPA will encourage states and utilities companies to explore the usefulness of these buses as tools.
- A CHPAC member asked if the re-instatement of the Superfund excise tax was complete. The member continued by asking about what environmental justice considerations are being made when prioritizing communities for clean-up.
  - Zealan responded that the tax was passed into law and is in the process of being integrated. He also noted that the majority of Superfund dollars are spent in communities with the greatest needs. The program exceeds the goals set out in the Justice40 Initiative set by the White House. He continued that Superfund has a record of effectively reaching communities with the greatest need. With the additional funds, there will be more capacity to reach all communities in need.
- One CHPAC member noted that lead exposure commonly occurs through lead paint. Many living in homes with lead paint, such as those in small homes or multiple-person dwellings, cannot afford lead paint remediation. The issue disproportionately occurs in areas with Black and Brown people, who may also experience challenges getting loans to fund remediation work. The member asked if EPA was considering how to help this population of people who struggle to obtain funds for remediation.
  - Zealan highlighted that the DWSRF was launched in tandem with the Lead Action Plan. He explained that many of the lead paint initiatives are being driven by the Department of Housing and Urban Development (HUD). Zealan outlined his plans to share the Lead Action Plan with the CHPAC members following the meeting. He emphasized that there are cross-agency initiatives underway to address this issue and noted that agencies will take advantage of funding appropriated across the federal government.
- A CHPAC member asked about the list of chemicals subject to the Superfund excise tax and noted that the list is lengthy, includes chemicals and chemicals families, and does not specify abstract numbers. The member asked for more specificity from EPA and the IRS on the list of chemicals.
  - Zealan responded that EPA provides technical support to the IRS on the list of taxable chemicals. He suggested the member access the public comment portal managed by the IRS to provide feedback on the implementation of the tax.
  - Another member asked if the list of chemicals was revised since the tax was initially launched decades ago.
    - Zealan responded that IRS has discretion over the chemicals included and can answer questions about the chemicals included.
- One CHPAC member noted the central focus on children through the Clean School Bus program. The member wondered what specific attention is being paid to children's health across the lifespan through the funding for the Superfund and Brownfields programs.
  - Zealan explained that the Brownfields program is community-oriented in its design. He provided an overview of a suite of grants announced to clean-up old gas stations, vacant lots, and other sites on the individual block level. He noted that EPA relies on communities to identify and explain their needs for funding and propose a plan to move forward with the site clean-up. Twelve criteria are used to prioritize selection, and the demographics of the community is a major consideration. This provides an opportunity for communities to identify risks to children's health. He continued, explaining that Superfund clean-up

projects are often larger than Brownfields. As a result, they are tailored less to children but still provide community benefits.

- A CHPAC member asked about challenges for communities who struggle to raise matching funds for the DWSRF, such as low-income and small, rural communities.
  - Zealan responded by outlining a change in the funding received through the DWSRF. There is funding for the traditional clean drinking water initiatives, for lead pipe replacement, and for emerging contaminants in drinking water and clean water, such as per- and polyfluoroalkyl substance (PFAS) chemicals. He noted that the funding for the lead pipe replacements and addressing emerging contaminants in drinking water do not have match requirements. Congress recognized the difficulty of the matching requirement for many communities. For the more than 20 billion dollars that will go to the base Clean Water and Drinking Water State Revolving Fund programs, there is a reduced match requirement for the first two years, after which the matching requirements will return to normal. Forty nine percent of the funding, however, must be provided to communities as additional subsidization. Of the money accessed through the match, half of the amount can ultimately be written off as grants. EPA hopes that the additional subsidy will provide access for communities long shut out of the program to address longstanding gaps. Zealan concluded that the State Revolving Funds programs are complex.
- One CHPAC member asked if the BIL offers any funding for communities that do not have piped water infrastructure and wondered if there will be capital programs to expand services to those underserved communities.
  - Zealan noted that a specific set of communities have water infrastructure needs and face a challenge with the high maintenance costs that come with pipe connections. For some remote communities, there are concerns that the infrastructure cannot be sustained. He noted that EPA, including Region 10, is working to find the solution. He concluded that Alaska experts are further exploring the solutions.
- Another CHPAC member asked about the Brownfields and Superfund programs, noting that data suggests that funding historically does not reach as many EJ communities as it does whiter and wealthier communities. The member asked what would be done differently to ensure that those communities are not again neglected.
  - Zealan responded that EPA is proud of the Brownfields and Superfund programs and the communities they serve. He noted that large portions of the funding reach communities that meet the definition for disadvantaged. He emphasized that the EPA is interested in feedback and opportunities to further improve these programs. The additional funding presents a huge opportunity to maximize impact.
- One CHPAC member asked about EPA's status on updating the lead clean-up level to match that established by the Centers for Disease Control and Prevention (CDC). The member asked how the BIL funds will be used to help communities reach this lower level.
  - Zealan was unsure of the status of the lead clean-up level but offered to follow-up with the CHPAC with additional information following the meeting.
  - Zealan's colleagues, Amy Lamson and Emma Zinsmeister, worked with Agency experts to provide the following answer: EPA is working on updating its soil lead policy and guidance for contaminated sites to ensure cleanup decisions made under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) and Resource Conservation Recovery Act (RCRA) authorities protect our most vulnerable populations, children, and women of childbearing age. In accordance with the latest science regarding lead toxicology, the policy is expected to establish recommendations for residential sites to reduce lead exposure in communities.
- A CHPAC member discussed risks of salinization from sea level rise and flooding that could impact water infrastructure and asked about the opportunities to curb such damage.
  - Zealan noted EPA's excitement to expand climate resiliency and mitigation. The EPA Administrator released a policy directive in 2021 to instruct all offices to integrate climate

adaptation in program designs. For the SRF programs, eligible communities can submit applications to states. States then submit Intended Use Plans (IUP), which outline the communities to be funded to EPA, which then reviews and suggests adjustments for the programs to ultimately be funded. EPA is committed to ensuring that states set high standards and employ a 100-year outlook on climate risks. The Agency is working hard to ensure that funding is financially responsible in the face of climate risks. Additionally, the DWSRF program can be leveraged to address emissions among communities with EJ concerns. There are examples of states installing pumps or on- or off-site renewable energy, which reduces operating costs and contributes to climate benefits.

- Another CHPAC member asked about the movement to decarbonize housing by removing gas stoves.
  - Zealan noted that the Department of Energy (DOE) has investments in BIL dedicated to accelerating electrification.
  - The member continued by asking if contractors are given strong education around this topic.
  - Zealan responded that he would follow up with additional information.

Zealan summarized that he would follow-up with the CHPAC on the following items: lead testing in drinking water, the lead pipe and paint action plan, the status on the Superfund lead requirements, and the decarbonization in the home via the removal of gas stoves.

## **VII. Children's Health and Wildfire Smoke Exposure Workshop: Summary and Discussion**

Alison Savage, Biologist, EPA Office of Radiation and Indoor Air, provided an overview of the Children's Health and Wildfire Smoke Exposure workshop. Topics covered at the previous workshops included respirator use by children, indoor air quality in schools, use of air sensors, and school activity guidelines. The workshop group created recommendations for indoor air quality during wildfire smoke events for schools.

Alison mentioned that these recommendations also work for similar childcare facilities. Recommendations included creating a team and an Indoor Air Quality (IAQ) plan, to which Alison added that 50% of students go to schools without IAQ plans; minimizing the intrusion of outdoor air by closing windows and unnecessary doors; having adequate ventilation and filtration in schools; and avoiding activities that could add to indoor air pollution by changing school activities to be less active to reduce exposure. She also noted that while not always practical, accommodations for sensitive populations are essential. Alison highlighted important considerations, such as evaluations of HVAC systems, including filters, well before an instance of pollution. A system's ability to accommodate a higher-efficiency filter should also be determined. Additionally, prompt response to maintenance issues is necessary so that school activities can continue. If additional filtration is needed, schools should consider deploying portable air cleaners with consideration of room size, noise, and cost. Additional considerations include extreme heat, clean-up after smoke events, and COVID-19 filtration needs, which might go against some wildfire recommendations.

Alison provided an overview of additional EPA resources and activities that were discussed at the workshop. She presented a flow chart from the Wildfires and IAQ in Schools and Commercial Buildings document. She noted that the IAQ Tools for Schools kit takes a comprehensive approach that focuses on prevention. There are multiple resources in this kit, as well as a detailed walkthrough, assessment checklists, and a mobile app.

Amara Holder, Mechanical Engineer, EPA Office of Research Development discussed the use of air sensors during wildfire events. She noted that selecting the right sensor for the application is important. She mentioned tools with information on use of sensors, such as the Air Quality Sensor Performance Evaluation Center (AQ-SPEC) and the Air Sensor Toolbox. She also mentioned high time resolution data, which reports each minute to provide a real-time indication of air quality. Amara showed a screenshot from the sensor data and noted its utility for making short term decisions, such as deciding if recess or a soccer game is safe. Amara discussed the increasing number of school sensor networks. The Love My Air program in Denver was one of the first based in schools. Other locations that have implemented programs include the

Boston Public Schools and the Los Angeles Unified School District, both of which use sensors and programs developed by vendors who create dashboards to provide the schools with the data.

The workshop committee mentioned that features and performances can vary greatly across the air quality sensors. Sensors need to have the ability to measure PM<sub>2.5</sub> and CO<sub>2</sub> indoors. Amara noted that visual displays can be helpful in providing real-time feedback. A sensor that is not robust or accurate can be distracting and counterproductive. The committee also found that the location of sensors can impact data quality. There is some guidance on setting up sensors, but there are many considerations that impact quality. Sensors need to be in a secure location where they cannot be easily unplugged to avoid tampering. It is also important to put sensors in areas located away from school pick-up lines in some cases. Additionally, sufficient air supply is required to avoid inaccurate readings. Indoor and outdoor sensors should be away from HVAC systems. It was also noted that sensors have a limited lifespan. Additionally, commercial vendors now help with installations and dashboards, preventing schools from building networks from the ground up.

Amara noted that another challenge is interpreting the sensor data. Data are usually reported in short-term measurements, which can be difficult to interpret for public health impacts. Approaches identified to alleviate this issue include averaging and using a peak-to-mean ratio to relate to a 24-hour standard.

The sensors can be used for decision making to make comparisons around temporal changes, spatial changes, and indoor versus outdoor quality. One of the most important sensor applications aids in optimizing HVAC settings. Amara summarized a visual that displayed important considerations for safe air quality which included P for pollution, A for activity, T for temperature, and H for humidity.

Susan Stone, Senior Environmental Health Scientist, EPA Office of Air Quality, discussed how to engage with and use information gained from indoor air quality sensors. Susan stated that the data can be used to make decisions about children's activities.

She reviewed the factors that influence the inhaled dose of pollutants, which includes the concentration of the pollutant, the activity level of the child, and the duration of the activity. Reducing any of these will reduce the amount of pollutant inhaled. Some practical guidelines to reduce the inhaled levels include moving activities to times when pollution levels are low and moving activities indoors. Additionally, the amount of time that children are outdoors during these events can be shortened. Susan noted the importance of making space with acceptable IAQ available for children. Considering sports, practices can be moved to another time of day or indoors, activity levels can be reduced, or players can be substituted more frequently.

Susan emphasized that children with lung or cardiovascular diseases are more at risk and require additional considerations. Additionally, younger children are more at risk due to differences in their behaviors compared with older children. For example, younger children engage in increased hand and mouth activity or ingestion of soil, which could contain ash. Most agencies use the same activity guidance for children under 18, but a more cautionary approach is advisable for younger children. Susan noted that there are now more prolonged and repeated health events. The implementation of precautions for prolonged or repeated exposure are worthwhile. More precautions are merited to reduce health effects, especially in children.

Susan provided suggestions for better protection, which included implementing more precautionary approaches for events that last longer than a week, re-evaluating events and activities during fire season, and using a seasonal forecasting tool to help identify needed changes. Additionally, smoke-ready community programs can be developed. Susan noted the importance of employing best practices when developing plans for physical activities in alternative settings. For example, when moving children, the exposure scenarios in the new location need to be considered. Additionally, it is important to consider specific settings outside of schools, such as daycare and childcare facilities and summer camps. Further protective measures include having a smoke communication plan to help parents understand actions taken by schools to decrease potential exposures, developing these plans before the wildfire season, and posting frequently asked questions (FAQ) on websites.

Susan then recognized Mark Miller, a CHPAC member, for his contribution to the project.

Following the presentation, CHPAC members asked the following questions:

- A CHPAC member stated that The Washington Post reported 1/6th of communities are at risk for wildfires and most schools impacted serve minority children. The member noted that recommendations were no longer adequate for high-risk communities. The member worried about the health issues at under-resourced schools in need of aid.
  - Allison replied that there are current activities to create more resources, such as grants to help with ventilation needs.
  - Susan added that there has been discussion of a national movement to make schools the safest place to be. Air quality at school may be safer than home, so this should be a goal nationwide.
  - Amara also recognized that schools need help with HVAC systems, which is part of the work with The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE aims to have cleaner and cooler air indoors in other schools and is trying to build the knowledge base about HVAC systems.
- A CHPAC member raised concerns about splitting the age recommendations. The member agreed that younger children are more vulnerable but noted that there may be pregnant 16-year-olds who are more susceptible while carrying a fetus due to increased cardiac output.
  - Susan thanked the member for raising this concern.
- A CHPAC member wondered if there has been any thought at EPA to change AQI thresholds, especially on the west coast where there have been more instances of pollution.
  - Susan stated that EPA is reconsidering the PM<sub>2.5</sub> standards. She added that if there is a proposal to change the standard, breakpoints will be reassessed at that point.
- A CHPAC member noted that there is funding through federal agencies to do upgrades to schools regarding HVACs. With COVID ventilation there were people using the money for less than best practices. The member wondered how EPA can be a lead agency in providing consultative information to ensure that the money is well spent.
  - Alison replied that Tools for Schools worked with companies to make sure that funding was used properly. They are also working with ASHRAE to continue to develop beyond the previous framework. The full guidelines will be available early next year, which will facilitate connections. The guidelines will be well-informed for maintaining existing schools and building new schools.
- A CHPAC member mentioned that there are a lot of long-term air pollution issues. They wondered how each school can better implement information for parents and nurses on solving individual problems. Including these stakeholders may result in better uptake.
  - Alison replied with support for the recommendation and asked for examples of schools engaging in this approach so that EPA can highlight those with good systems in place.
- A CHPAC member stated that the idea of having low-cost sensors is great but wondered about the precision of the low-cost sensors compared to state-of-the-art ones.
  - Amara replied that there is a wide variety of different sensors that are quickly evaluated. Some sensors are extremely precise but not as accurate without correction. Purple Air is extremely precise but not accurate. EPA has applied corrections so that accurate data can be reported. Other sensors may have a precision of only 50%. Amara noted that accuracy is only valid for the analytes the sensors have been evaluated for. Not all sensors have been assessed for wildfire smoke, and corrections may not be valid for indoor pollution.

### **VIII. NIEHS and EPA Children's Center Grantees Presentation**

Kimberly Gray, Health Scientist Administrator at the National Institute of Environmental Health Sciences (NIEHS) Population Health Branch, thanked the CHPAC for the invitation to present and noted that she would provide an overview of the status of the Children's Center Grantees and the vision for the future.

Kimberly explained that the Children's Centers were established by NIEHS and EPA following an Executive Order from former President Bill Clinton to establish a national program. The Children's Center program fulfilled the science responses for EPA and the research and translation endeavors of NIEHS. An impact report outlining key impacts to children's health was published from the program.

There were concerns in 2018 that without longstanding support from EPA, children's environmental research would dissipate at NIEHS. From 2008-2020, a steady number of projects have been supported by children's environmental health at NIEHS. Anywhere from 20-50% of the science is emerging from one or two of the collaborators of the Children's Centers. NIEHS is committed to this level of funding. The funding for the program ended in 2019-2020, which would be the last year of active funding for some of the centers. The program is robust with over 120 million dollars in funding for Children's Environmental Health. Most of the funding is split between solicited funding, in the form of grants, and 66 million dollars are from unsolicited funding.

Kimberly outlined the programs funded by solicited awards, including the Environmental Influences on Child Health Outcomes (ECHO) program, Health Exposure Analysis Resource (CHEAR/HHEAR) program, ViCTER program, and Maintain and Enrich Resource Infrastructure for Existing Environmental Epidemiology Cohorts (R/U24). The ECHO program was created by Frances Collins using remaining funding from the Children's Study and includes many Children's Centers as members. 150 million dollars were received for the CHEAR program. The funds can be used by cohorts funded under the National Institutes of Health (NIH) that do not include environmental exposures. The CHEAR program is now funded by NIEHS and is called the HHEAR program. The Virtual Consortium for Translational/Transdisciplinary Environmental Research (ViCTER) program is dedicated to translational science. As funding ended for the Children's Center, the Maintain and Enrich Resource Infrastructure for Existing Environmental Epidemiology Cohorts (R/U24) infrastructure program was launched to alleviate concerns about obtaining Research Program Grants (R01). There is also a new Pediatric and Reproductive Environmental Health Scholars Program.

Kimberly emphasized the work by CHPAC member Mark Miller for its success in communicating with lay audiences. Lessons from this work will influence the future programs for Children's Environmental Health. Additionally, NIEHS is interested in making research results more accessible for integration into regular medical practice.

Lindsey Martin, Health Scientist Administrator at the NIEHS Population Health Branch, introduced the current activities with the Children's Centers at NIEHS. The Collaborative Centers in Children's Environmental Health, Research, and Translation (CEHRT), were created to capitalize on the strong evidence base built from earlier research. Goals for the new centers include increasing collaborations, synthesize information into communication tools, develop dissemination methods and education activities to be used by communities to improve children's health, stimulate pilot projects, test new methods, and develop intervention and prevention strategies.

To be eligible for the program, Centers must have multiple principal investigators (PI), a director and deputy director with appropriate experience, a strong base of children's environmental health research, a history of funding in that topic area, evidence of working with key children's environmental health partners, and collaborations with external institutions and other children's environmental health researchers.

The Centers have three cores, including administrative, which encompasses the management of centers to help foster activities; developmental, which encompasses the development of new science and of career pathways for emerging scientists; and translation, which is focused on moving findings into practice and fostering collaborations in fields not traditionally associated with children's environmental health. Additionally, the Centers have a national coordinating center to help with cross-center activities.

The new Centers were awarded in December 2021 and include Emory University, Johns Hopkins University, New York University (NYU) Center, Oregon State University, University of Pennsylvania, and the University of Southern California (USC). The coordinating center will be the Children's Environmental

Health Network (CEHN) in collaboration with NIEHS to establish a steering committee to guide functions and ensure the work is outward facing through the creation of a digital hub.

Lindsey provided an update on the activities of the new Centers since December 2021. She noted that University of Pennsylvania awarded their first catalyst pilot project on chronic lung disease and held kick-off meetings. NYU held their first catalyst seminar in April 2022 and launched a climate change and children's health interest group, which is open to all members of the public. Emory University launched an asynchronous journal club on core concepts of environmental justice (EJ) and is leveraging CDC investments by enhancing their virtual reality (VR) asthma experience and a PFAS clinician e-learning course with a module about exposure science and environmental health literature reviews. USC is in the early stages of planning a documentary theater curriculum called *Inhale/Exhale* that will focus on air pollution and respiratory health. USC is also organizing a community advisory board to create an EJ Youth Council as part of the center.

Sarah Mazur, the Principal Associate National Program Director in the Sustainable and Healthy Communities Research Program at EPA's Office of Research and Development (ORD), thanked the CHPAC for their work in children's health. She noted that after 20 years of successful collaboration with NIEHS to run the Children's Centers, the evidence was clear about the movement of translational science. EPA was unable to make commitments for future funding of the Children's Centers, but children's health has remained a top priority for the Sustainable and Healthy Communities Research Program at EPA.

Children's health is currently one of the six cross-cutting ORD research priorities, as is reflected in the Fiscal Year (FY) 2023-2026 Action Plans for intramural research. Children's health is also prioritized through extramural research, including two Science To Achieve Results (STAR) programs. One program seeks to estimate soil and dust ingestion rates for children, which will facilitate accurate and comprehensive measures to effectively assess risk and reduce, mitigate, and prevent exposures. A total of 9.3 million dollars have been distributed to seven research universities as part of the program.

The other STAR program funds the Center for Early Lifestage Vulnerabilities to Environmental Stressors, which was a joint effort between ORD, OCHP, the Office of Environmental Justice (OEJ) and the Office of Land and Emergency Management (OLEM) to establish transdisciplinary research centers aimed to understand more about chemical and non-chemical environmental stressors. Two centers were funded to assess outcomes such as ADHD, reduced IQ, lower memory function, and structural changes in the developing brain through epidemiology, toxicology, and exposure science evidence. The University of North Carolina (UNC) – Chapel Hill houses the Early Life Exposures and Neurotoxicity (CLEAN) program, which explores early life exposures to phthalates and their impact on development. Additionally, the Center examines neural substrates of prenatal and early life neurotoxicity. The Research Triangle Institute (RTI) International examines whether the caregiving environment moderates the influence of chemical exposures on neurodevelopment among children attending licensed childcare centers. Both Centers are funded through Fiscal Year 2025. Internal project meetings occur annually among EPA staff, and the results from all STAR research are posted on the EPA website.

Sarah summarized upcoming work in FY 2021-2022 including the continued funding of STAR research through an assessment of the cumulative health impacts at the intersection of climate change, EJ, and vulnerable populations and life stages. The research will emphasize solutions brought forward through community-based participatory research (CBPR). Selections under this Request for Applications (RFA) are currently being finalized and will be announced in the coming weeks.

In FY 2022, 1.9 million dollars will support the establishment of a new children's center related to the STAR Center for Early Lifestage Vulnerabilities to Environmental Stressors. This new RFA is currently in the early stages of development.

Following the presentation, CHPAC members asked the following questions:

- One CHPAC member asked how the translation centers overlap with the Clinical and Translational Science Awards (CTSA).



- Kimberly responded that they do not, adding that the CTSA model was considered but that NIEHS did not see a way to adapt the model to support their resources for children's environmental health. The current endeavor aims for experts to translate the science that is already published. Kimberly added that the centers are open, meaning others can join the pilot programs. The success of the centers will be measured in part by career development activities that move the science outside of the individual scientist's research.
- Another CHPAC member asked how members can learn about the pilot and catalyst programs and the resources that will emerge from the Centers.
  - Kimberly noted that while the funding was announced in December 2021, some Centers did not receive funding until February 2022. A centralized site, which will be housed outside of the National Institutes of Health (NIH) websites, has not yet been established but will be developed eventually. Currently, links to all individual Centers sites are available. Eventually all information will sit on a centralized portal. For the developmental core, there are a number of themes to be explored in the coming years. The message will be amplified via social media and the eventual centralized site.

There were no further questions, thus concluding the joint presentation of Children's Centers grantees from NIEHS and EPA.

### **IX. Wrap-up**

Deanna Scher, CHPAC Chair, ended the session for the day and expressed interest in feedback for the new hybrid format.

- One CHPAC member thanked the steering committee for soliciting speaker suggestions from members. The member noted that member interests seemed reflected in the agenda.
- One CHPAC member thanked EPA staff and ICF for navigating the technical challenges of a hybrid meeting and ensuring that all speakers and members could be heard.

Deanna noted that she would explore how to encourage active CHPAC participation in other Federal Advisory Committee Act (FACA) committees. She also noted that the letters about ozone cited during the public comment period will be reviewed for an understanding of how they relate to the current ozone standard proposed by the Office of Air and Radiation (OAR). Deanna asked if OCHP had additional updates on charge questions for the CHPAC.

Jeanne Briskin responded that there was no projection for when the new charge questions would be available. She noted that some conversations from the Day One sessions could inspire new questions. She added that a memo has been sent to offices across the Agency to invite the presentation of charge questions to the CHPAC, noting the need for cooperation between OCHP and external programs on potential charge questions.

Jeanne continued by thanking the members, speakers, and attendees for their participation in the meeting. She also acknowledged the work that committees have dedicated in the months leading up to the sessions. She expressed appreciation for the members' children's environmental health advocacy through partnerships with other organizations and noted her excitement to see so many attendees in person. She concluded by encouraging members to provide suggestions ahead of the next meeting to make the plenary experience as rewarding as possible.

Amelia Nguyen highlighted the OCHP updates sent to CHPAC members bi-weekly. The updates highlight opportunities for CHPAC participation across EPA.

### **X. Welcome**

Amelia Nguyen, DFO, EPA OCHP, welcomed the CHPAC to the second day of the plenary meeting.

Deanna Scher, CHPAC Chair, provided an overview of the day's agenda.

## **XI. Review, Discuss, and Finalize CHPAC Response to the Take-Home Exposure Charge**

Deanna reintroduced Lori Byron, the CHPAC Take-Home Exposure Workgroup Chair, to continue the discussion of the take-home pesticides exposure charge response letter.

Lori opened the discussion of the response letter with charge question two, where the discussion had ended the previous day.

- A member clarified her thoughts about farmworker PPE, noting that EPA recognizes the difficulty of providing PPE for agricultural workers. As a result, EPA has taken an approach to ensure that pesticide residue levels are not of concern for farmworker health during routine tasks. This is similar to the approach taken in the consumer context, with those pesticides sold for consumer use not requiring PPE use. The member noted the challenges of heat exposure and PPE use. She concluded with a reminder that farmworkers do not fall under the Food Quality Protection Act (FQPA). As a result, if the benefit of exposing a worker to pesticides at a level of health concern is considered to outweigh the risk to the worker's health, they may still approve the use. Those residues that the farmworkers are exposed to are then brought home, where children may be exposed.
  - One CHPAC member wondered if a farmworker would wear the PPE, if provided, on a typical working day.
  - Another CHPAC member responded that farmworkers routinely wear gear to protect them during routine tasks, such as hand protection. The member suggested that with training and oversight, the PPE could also become a routine use.
- One CHPAC member suggested that the letter include a recommendation that EPA convene a committee of farmworkers, farmworker groups, and relevant organizations to assess the feasibility of the use of PPE. The member noted that there is evidence that gloves impact the levels of take-home exposure, but it's unclear if their use is realistic and feasible for the workers.
  - Another CHPAC member agreed, noting that the letter does not include any recommendations related to farmworker representation. The member added that increased use of PPE may result in the approval of the use of more toxic substances. Thus, more PPE use may result in higher and riskier allowable exposures and residues due to the assumption that workers are protected by PPE.
  - One CHPAC member acknowledged the challenges with PPE recommendations but suggested that employers could provide clothing, such as lightweight shirt and pants, and boots to workers. The member also suggested that employers have industrial size washing machines to clean the clothing onsite and avoid workers wearing contaminated clothing home and keep residues at the worksite.
- Another CHPAC member asked if workers know the health risks associated with pesticide exposures.
  - A number of members responded that workers were provided this information in Worker Protection Standard (WPS) trainings. Members added that the real-world quality and frequency of the training was unclear.
- One CHPAC member discussed the research that contributed to the establishment of re-entry periods that protect farmworkers. Research has provided evidence that these periods are not fully protective. Additionally, there is no specific consideration of adolescent or pregnant farmworkers and their potential increased susceptibility to pesticide exposures. The member concluded that what is considered protective should change with changing evidence.
  - A member responded in the chat that the complexity of the issue underscores the idea that pesticide use is inherently unsafe for human health and needs to be limited.
  - Another member agreed in the chat, noting that beyond eliminating pesticide use, it should be made as easy as possible for workers to protect themselves.
  - Another member responded in the chat that requiring employers to provide clothing could be an important way to break the take-home pathway.

Lori moved the group to the second paragraph of the section, noting that the member who worked on this section had extensive historical knowledge of the field. Lori asked if the member could provide examples of the cultural factors that influence the adoption of recommended behaviors.

- The member responded that Hispanic cultures hold beliefs about transitions between hot and cold temperatures. There is a concern about cooling the body too fast and its impact on health. Thus, taking a shower immediately after work may not be a practice that Hispanic workers will choose to engage in. The member added that aggregate housing and cooking facilities often reinforce gender roles, with women more likely to shower immediately after work before they prepare dinner.
  - Another member agreed, noting that in many of these cultures there is a fear of becoming sick after cooling too quickly.
- One CHPAC member asked about the argument being made in the paragraph. The member noted that there is a sense that behavioral interventions have little effect on exposures. Simultaneously, the letter recommends additional study of behavioral interventions. The member asked if the group was recommending study of a different type of intervention as opposed to additional study of interventions that do not work.
  - A CHPAC member responded that the recommendation is focusing on upstream interventions, which have had little research.
  - The member asking the question suggested that the letter outline the consideration of the pathway in coherent and consistent ways. The member suggested that the letter be clear that the most desirable intervention is reducing the number of pesticides used. The next most desirable intervention occurs on farms during application. The final most desirable area for intervention is for daily workers in post-application scenarios, such as PPE education or other behavioral interventions.
  - Another CHPAC member agreed, suggesting that this type of framing be included in the introduction section of the paper.
- A CHPAC member discussed the section on the hierarchy of controls in the letter conclusion and noted the importance of discussing this concept along with pesticide use reduction in the introduction to the letter. The framing of the preferred areas for intervention along the pathway could be provided along with a recommendation to engage directly with farmworkers.
- One CHPAC member discussed the limitations of EPA's ability to educate farmworkers and suggested that United States Department of Agriculture (USDA) Extension Services could be leveraged to increase the delivery and effectiveness of education interventions.
- Another CHPAC member suggested emphasizing how interventions are implemented, as the evidence about community worker campaign success seems to imply that the delivery mechanism impacts the overall effectiveness of the intervention. The letter should emphasize engaging with individuals who are already integrated into farmworker communities.
  - A CHPAC member responded that the information about the community worker campaigns could be used to introduce the paragraph, thus emphasizing the interventions that do work.

There were no comments on the third paragraph of the section. Lori asked for comments on the fourth paragraph of the section. She mentioned the need to rework the first sentence of the paragraph to match the framing of upstream interventions. As there were no other comments on the fourth paragraph, the group discussed the fifth paragraph.

- One CHPAC member suggested an edit to emphasize both the content and form of delivery of farmworker outreach materials.
- Another CHPAC member suggested referencing the risk communication letter that the CHPAC wrote in 2020, as it provides advice to engage effectively with communities about risk.

The group discussed the charge question three response. CHPAC members made the following comments:

- One CHPAC member reminded the group that information will be added to this section about the factors that influence levels of exposure from the take-home pathway and about the factors that

impact susceptibility to the toxic effects of those exposures, such as pre-existing skin conditions. The section provides recommendations for changes in the risk assessment practices to properly account for the evidence and science around pesticide exposures and agricultural communities.

- The group discussed changing the word “multiple” to “established” in line 232.
- CHPAC members emphasized the importance of discussing both cumulative and aggregate exposures in the letter.

The group discussed the response to charge question four. CHPAC members made the following comments:

- A CHPAC member summarized the workgroup’s discussions about the onus for action historically being placed on workers who are already disempowered. As a result, the section begins with a discussion of the actions employers need to engage in and improve and the ways in which they are not complying with the WPS. Employer actions have the potential to reduce exposures most effectively from the take-home pathway.
- One CHPAC member suggested that language included in a previous draft about agricultural extension services be re-introduced to the section.
- Another CHPAC member asked if the discussion of health disparities will specify the relevant diagnoses and medical conditions.
  - A CHPAC member noted that those conditions are mentioned earlier in the letter and asked if those conditions should be re-emphasized in this later section.
  - Another CHPAC member suggested being cautious with the inclusion of specific health outcomes, as the discussion would need support from strong national data, which is likely not available at that scale.
- A member asked for clarification about the WPS related violations and if they apply to applicators or handlers.
  - One CHPAC member responded that these violations were related to handlers under the WPS. Handlers are provided PPE and additional training because they directly apply pesticides in the fields.
- A CHPAC member suggested adding specificity to the types of goals mentioned in this section.
- Another CHPAC member emphasized the opportunity for EPA to reconsider worker protection in the face of two major health insults – heat exposure and pesticide exposure – and discussed the possibility for protective clothing that addresses both concerns.
- One CHPAC member asked if current pesticide safety training is framed to emphasize reducing take-home exposures or if it solely emphasizes general health protection. The member suggested that if the information is not included, the CHPAC should recommend that the framing of the training emphasize the effects for children.
  - A CHPAC member responded that the training includes content about reducing take-home exposures but noted that it was unclear if there is emphasis placed on the impacts to children’s health.
  - Another CHPAC member suggested that the letter frame the recommended communications as “best practices” rather than “regulations”, as this language may improve the way the information is received by communities. Additionally, the language makes the discussion more holistic.
    - One member responded that the letter should clearly state these are two distinct concepts. Employers are currently not meeting the legally required expectations, which is unacceptable. Separately, there are best practices and the ideal approach for protecting workers.
- A member suggested clarifying that a section referring to “washing” refers to “handwashing”.
- One CHPAC member noted that the discussion of compliance monitoring introduces a sampling problem. The letter mentions that only 1% of farming operations are inspected for WPS compliance. However, there is no indication that that this 1% is representative of the diverse types of farming

operations that exist. As a result, it's possible that the results from this monitoring do not reflect the actual state of compliance in the industry.

- One CHPAC member agreed that the analyses should include information about the gaps in the inspections for each state. Additionally, the types of productions being inspected should be specified to reveal clear gaps.
- Another CHPAC member asked if there were enough inspectors to adequately inspect the operations.
- A CHPAC member shared the limited resources dedicated to inspection and compliance. The member suggested that the letter recommend that EPA dedicate resources to assess the amount of funding from the State and Tribal Assistance Grants (STAG) program dedicated to compliance monitoring. It's possible that EPA has information on the number of people executing inspections, but the data are not compiled.
- Another member suggested EPA track any other state monitoring programs that happen outside of EPA's jurisdiction.
- A member suggested that an EPA representative ask about the types of information the Office of Pesticide Programs (OPP) collects around monitoring. She wondered about the compliance levels among labor contractors who are responsible for WPS training. By law, these companies are required to provide the training, which should be emphasized in the letter. The member reviewed the "How to comply with the WPS" manual and found that an agricultural employer may hire a contractor, but if the labor contractor fails to provide WPS training, the agricultural employer is responsible for ensuring safety training is provided to workers.
- The members discussed that states and tribes are largely responsible for inspection and compliance monitoring and that the information on trainings should be documented in required records.
- A member added that often the training video is played in the background while employees complete paperwork. Information on whether employers merely complete the training is not enough. The training needs to be done properly.
  - Another member added that these trainings are often provided with minimal quality and provide little opportunity for employees to ask questions.
- One CHPAC member suggested that the introduction section of the letter include framing that there is clear evidence that children of farmworkers have higher blood levels of pesticide exposure than children of non-farmworkers followed by a presentation of the pathway and opportunities for intervention.
  - Members agreed that this could be moved from the conclusion to the introduction and discussed that the differential exposures are seen in people in agricultural communities broadly.
- One CHPAC member suggested that the committee recommend that a new WPS training model be developed. For example, training could be conducted by a trusted third-party community member.
  - A member noted that EPA funds other training models, such as those conducted by the Association of Farmworker Opportunity Programs (AFOP). The CHPAC could recommend the expansion of programs EPA already funds.
- Another CHPAC member suggested including a figure or diagram summarizing the exposure pathway and the points for potential interventions. The figure could include key government and organizational partnerships at different intervention points along the pathway. A member volunteered to draft some figures.

Lori moved the discussion to the next section of the charge question four response, emphasizing outreach to farmworkers and families.

- One CHPAC member cautioned against recommending roles for children that are inappropriate and place an undue burden on them to alter activities of their parents. The member emphasized that targeting children for education with the goal of those children then educating parents could be

problematic and intrusive. The member continued by stating that children should not be put in a position to be responsible for other protective pathways that have failed. Instead, the letter should emphasize the need to work with families to find the best approaches to education.

- A CHPAC member responded that children frequently influence their parents when they are taught new healthcare behaviors. The member suggested that educating children provides a way for them to begin protecting themselves. Additionally, caring for elders is an important component of Hispanic cultures.
- Other members suggested edits to soften the language in this section, such as switching the use of “parents” to “families”.

Following the review of the conclusion of the letter, CHPAC members made the following comments:

- A CHPAC member asked if the bulleted recommendations should be moved to the introduction section of the letter. Several members supported the idea.
  - Another member suggested keeping the bullets in the conclusion but providing a brief summary in a call out box in the introduction of the letter, similar to an executive summary.
- A member suggested that decreasing pesticide use be included as a distinct goal in the recommendations.
- Another member suggested that the development of partnerships with other government agencies and organizations be included as a formal recommendation.
- A member wondered if the recommendations should include information about employer supplied changing stations on worksites since it is discussed earlier in the letter.
- One CHPAC member shared their perspective on PPE from its use in their industry, which involves a strong emphasis on quality assurance and quality control of PPE in the workplace. These norms stand in contrast to the agricultural setting.
- A member shared that the EPA's Equity Action Plan discusses environmental justice but does not address farmworker communities specifically. Many of these communities are not spatially fixed, which needs to be considered when discussing equity for the population.
  - One CHPAC member suggested that the letter recommend a partnership between OPP and the Office of Environmental Justice (OEJ) to further explore the issue.
- Another CHPAC member wondered if EPA could require an industrial model of worker protection above a certain size of agricultural operation. For example, large agricultural operations could be held to a higher standard of protection as happens in other industries.

## **XII. EPA Update on response to recommendations from Dermal Exposure Letter**

Deanna introduced Shalu Shelat, Industrial Hygienist, EPA Office of Pesticide Programs (OPP), Health Effects Division (HED). Shalu provided a brief overview of the charge questions and analysis and presented a high-level summary of the CHPAC's recommendations.

Shalu explained that the May 2021 presentation of the charge questions aimed to provide an overview of the evaluation of exposure assessment methods used in OPP to account for legally working youth. The analysis included a background on the exposure assessment of post-application settings. Additionally, a reanalysis of monitoring data from several studies conducted by universities in the 1980s was conducted. A biomechanical analysis examined the biometrics, such as surface area and body weight, of legally working children. The evaluation was publicly released in 2016 as part of the *Organophosphate and Insecticide Risk Assessment: Response to Comments*.

Shalu briefly summarized the four charge questions presented to the CHPAC in May 2021. The first charge question asked if appropriate demographics were considered and whether the population of legally working children was characterized appropriately. The second charge question focused on the scientific studies used in the analyses and asked for additional information that had not been considered in the analyses. The third

question involved exposure factors, such as surface area, body weight, and other biometric factors that had been considered in the analyses. The fourth question involved the general strength and limitations of the methods used in the exposure assessment analyses.

Shalu then summarized OPP's interpretations of the recommendations from the CHPAC response letter. The CHPAC provided additional citations to supplement the previously identified studies characterizing the children legally working in agriculture and worker population demographics. Additional recommendations included suggestions for increased use of systematic review to collect and incorporate exposure data; updates to the statistical approaches used in the 2016 analyses; increased collaboration with external partners; and additional data that captures information on demographics and other factors that lead to differential exposures. Shalu noted that the CHPAC's letter began with an expression of the need to extend evaluations beyond the exposure assessment analyses, and a recommendation for EPA to spearhead committees that holistically examine exposures and risk reduction.

Shalu prefaced the discussion of OPP's workplan with an acknowledgment that the CHPAC recommendations focused beyond the scope of the exposure assessments. As a result, OPP organized their response to the recommendations into short-term action items and long-term action items.

Shalu summarized the approach to developing workplans to address the recommendations from the CHPAC. Shalu explained that short-term action items are items that were identified to be feasible actions that directly relate to the exposure analysis and existing collaborations in this realm. Long-term action items are anticipated to require more extensive collaboration with partners, to be more resource intensive, or to currently lack the necessary resources for execution. Some longer-term action items require stakeholder input prior to implementation. Shalu emphasized that long-term items are not being neglected, but that there is a resource constraint dictating what can be actively pursued. She noted that EPA supports continued engagement in existing collaborative Environmental Justice (EJ) efforts with the Farmworker Advocacy Community (CHPAC, Pesticide Program Dialogue Committee), and federal partners (White House Environmental Justice Advisory Council) and others.

Shalu summarized the CHPAC's recommendations related to the first charge question. First, the CHPAC recommended that EPA avoid relying exclusively on the results from the monitoring studies included in the assessment to make generalized conclusions about pesticide exposures within the current population of children legally working in agriculture. Additionally, the CHPAC recommended that EPA and its federal partners collect additional sociodemographic data for the population of children legally working in agriculture.

OPP's short-term workplan to address the charge question one recommendations includes reviewing the additional citations, literature, and recent National Health and Nutrition Examination Survey (NHANES) data to assess potential changes to the demographics of the farmworker community; considering the impact of the updated National Agricultural Worker Survey (NAWS) data (2015-2016 and 2017-2018) on the 2016 analysis; and examining whether the 2015 Agricultural Worker Protection Standard (WPS) updates address issues and limitations highlighted by the CHPAC in their recommendations.

OPP's long-term workplan to address the charge question one recommendations includes engaging with existing collaborative EJ efforts within the farmworker advocacy community to determine how to collect additional sociodemographic data; and monitoring the progress of initiatives from active EJ groups with the goal of reporting back to the CHPAC as promptly as possible.

Shalu summarized the CHPAC's recommendations related to the second charge question. The CHPAC recommended that EPA use an established, validated systematic review framework to evaluate current exposure-related evidence and the need for additional information. The reviews should incorporate studies

that use state-of-the-science monitoring approaches to capture the full range of environmental exposures. Additionally, the CHPAC recommended that EPA augment pre-existing and ongoing multisite programs, such as National Institutes of Health's (NIH) Environmental Influences on Child Health Outcomes Program (ECHO) and National Institutes of Environmental Health Science's (NIEHS) Human Health Exposure Analysis Resource (HHEAR), to assess pesticide exposure more completely among children working in agricultural settings.

OPP's short-term workplan to address the charge question two recommendations includes identifying gaps in the Agency's understanding of farmworker communities and collect information through literature searches to address the factors and methods identified as uncertainties by the CHPAC. Further analyses will thoroughly consider how exposure-related parameters correspond to current practices of legally working children. Shalu agreed with the CHPAC that concurrent measures of adults and children in the included studies was a strength. Few studies concurrently measure both adults and children.

OPP's long-term workplan to address the charge question two recommendations includes considering how to strengthen methods and approaches for future data collection efforts and examining how to feasibly strengthen and expand the lines of evidence evaluated in future studies.

Shalu summarized the CHPAC's recommendations related to the third charge question. The CHPAC recommended additional assessment of dermal surface area to body weight (SA/BW) ratios by age and the consideration of recent NHANES estimates that reflect the current population of children in the United States. Additionally, the CHPAC recommended that EPA conduct subpopulation analyses by race and ethnicity; use distributional biometric data to fully characterize children working in agriculture; assess potential increased exposure among children under 12 years of age; and evaluate exposure factors beyond SA/BW ratios that may result in differential exposures.

OPP's short-term workplan to address the charge question three recommendations includes reviewing the most current Exposure Factors Handbook; querying the available data for biometric values and demographics; examining the impact of the use of different exposure distributions on the exposure assessment analyses; and characterizing the relationship between productivity and exposure among age groups.

OPP's long-term workplan to address the charge question three recommendations includes considering differential factors highlighted in the CHPAC response letter when conducting future data collection, specifically considering different engagement levels between children and adults.

Shalu summarized the CHPAC's recommendations related to the fourth charge question. The CHPAC recommended that EPA use a validated systematic review framework; expand the use of existing biomonitoring and air monitoring data; consider alternative statistical approaches to increase sample size, use one-tailed statistical tests, and use approaches that account for other influential factors impacting exposure levels; fund new studies to generate data; and create a work group.

OPP's short-term workplan to address the charge question four recommendations includes identifying gaps in EPA's understanding of the farmworker community by collecting information through targeted literature searches and exploring how to improve the existing statistical analyses. Shalu explained that a targeted literature search may enable the strategic exploration of gaps while avoiding the resource intensive nature of a systematic review.

OPP's long-term workplan to address the charge question four recommendations includes meeting with stakeholder groups to engage farmworkers and related organizations on pesticide-related issues; and considering the development of a long-term strategy to accommodate a fit-for-purpose systematic review of



exposure among legally working children in agriculture. Considerations related to funding of new studies and reviews will be included in this long-term plan.

Shalu summarized the short-term and long-term plans developed to address the recommendations in the CHPAC response letter. She noted that OPP is in active discussion with the Office of Research and Development (ORD) and the OCHP about future research. Shalu assured the committee that CHPAC will be alerted to progress on actions related to each plan.

Following the presentation, CHPAC members asked the following questions:

- One CHPAC member referenced the discussion of the WPS and asked if an additional revision is in progress since the 2015 update.
  - Jeffrey Dawson, Science Advisor, Office of Pesticide Programs (OPP), noted that some aspects of the WPS are in litigation, such as the Application Exclusion Zone. The results of the litigation may influence how the information is included in the standards. He noted that he was not aware of an immediate plan for changes in the WPS.
  - Carolyn Schroeder, Chief of the Certification and Worker Protection Branch (CWPB), OPP, clarified that the presentation referenced the 2015 revisions to the WPS and reiterated that rulemaking specific to the Application Exclusion Zone is underway.
- Another CHPAC member asked how the NAWS survey reflects the changes in immigration since the 1980s and wondered if the number of youths working in agriculture has decreased.
  - Jeffrey responded that the assertion was likely accurate but noted that OPP could review the information and return to the CHPAC with current information.
  - Another member continued, speculating that the average age of farmworkers has likely increased since the 1990s. The member doubted that large growing operations and temporary workers include youth workers. As a result, the majority of adolescent workers may be concentrated in smaller or unique types of operations.
- A member asked representatives from OPP for comment on the feasibility of providing personal protective equipment (PPE) and portable changing stations for post-application workers.
  - Jeffrey explained that historically PPE is not used for post-application workers due to concerns about the maintenance and associated responsibilities of their use long-term. Jeffrey mentioned collaborations with Richard Fenske, a researcher who examined re-entry periods in the 1980s. He also noted that OPP is engaged with a group from the University of Maryland to examine clothing types and new material development related to heat protection.
- One CHPAC member asked about the opportunities for collaborations with the United States Department of Agriculture (USDA) extension services for community-based education outreach.
  - Shalu reported having limited experience with USDA extension service collaborations but noted that higher-level agency collaborations occur frequently.
  - Jeffrey responded that cross-agency collaborations are common with USDA, the Department of Labor, and a number of state led agencies. He noted that OPP is interested in better leveraging those collaborations. He added that the CHPAC's latest response letter will help OPP in discussions with potential collaborators.

### **XIII. America's Children and the Environment Indicators Update**

Christopher Brinkerhoff, Health Scientist, EPA Office of Children's Health Protection presented recent updates to the America's Children and the Environment (ACE) website. EPA has been reporting on ACE indicators since 2000 with a goal of understanding and tracking hazards in the environment that influence

children's health. The indicators were previously expanded in 2013, and an ACE update took place in 2019. Select indicators are updated every other year.

ACE includes 37 indicators across three main topic areas: environments and contaminants, biomonitoring, and health. Indicators are selected if they are important to children's health, national in scope, include population-based data, portray a data series over time, and can be stratified by demographic characteristics. Additionally, supplementary topic areas include measures that are not national in scope. Measures, which are included in the supplementary topic areas, do not meet all desired indicator requirements.

Chris summarized the CHPAC's historical involvement with the ACE indicators, noting that the committee has recommended revisions to the indicators and the inclusion of new topics. Previous CHPAC letters have discussed and made recommendations related to ACE, including in 2000, 2001, 2002, 2005, 2009, and 2011.

For the 2022 update, static images for all 37 indicators have been updated to dynamic graphics using the Qlik software. Chris emphasized that the interactivity of the graphics has been updated but noted that the site uses pre-existing graphs. Data were updated for 28 of the 37 indicators across the three topic areas. Chris summarized notable examples from the updates. For criteria air pollutants, PM<sub>2.5</sub> and ozone continued to decrease with statistical significance. Similarly, blood lead measures continued to decrease on average. Chris noted that for blood lead measures, the median may not be the most important metric and discussed the Center for Disease Control and Prevention's (CDC) updated recommendation level based on the highest percentile. Additional graphs display blood lead measures by race/ethnicity and income levels. In the health topic area, asthma indicators revealed an increase in incidence among children reported to have asthma. Additionally, differences by race/ethnicity and income have been observed.

Chris thanked the contributors to the ACE effort including Daniel Axelrad, Daniel Malashock, Christine Lloyd, and Deborah Burgin from EPA, contractors from ICF International, and data providers from EPA and CDC's National Center for Health Statistics.

Chris then provided a demonstration of three of the new graphs on the ACE website. The first graphic, displaying data on adverse birth outcomes, showed the percentage of pre-term babies born with stratification by race/ethnicity. Chris noted that data can be downloaded for use from the graphs. Additionally, Chris reviewed the graphics for criteria air pollutants, which included many trend lines. The dynamic version allows individuals to focus on single pollutant trends by eliminating the trend lines for other pollutants. Additionally, Chris highlighted a box with links for related indicators. These links take the user directly to the section of the ACE website discussing the related indicator. While the direct relationship may not be clear, the box reveals connections among the indicators. Finally, Chris provided an overview of the childhood cancer incidence figure. Like the criteria air pollutants graph, the figure included many trend lines for different types of childhood cancers. Chris noted that individual trend lines and combinations can be selected in addition to changes by year.

To conclude his presentation, Chris posed discussion questions to the CHPAC members. He specifically asked about the members' perspectives on the opportunities for additional enhancements of the interactive display, the development of additional topics for indicators, and the potential for other data sources.

Following the presentation, CHPAC members made the following comments:

- One CHPAC member asked about the stratification by race specific to health outcomes differentially impacting African Americans. The member asked if other health outcomes will include the racial and ethnic stratification.
  - Chris responded that most indicators have race-stratified data in the supplemental materials. He suggested that the transition to dynamic graphics provides the opportunity to show more of that information.
- Another member asked if the data were yearly and wondered if data on different timescales are accessible.

- Chris noted that all available data are reported for the indicators, adding that many are annual and that many of the biomarker indicators are from the National Health and Nutrition Examination Survey (NHANES).
  - A CHPAC member added that the data come from the National Center for Health Statistics. There are data that are accessible by month from state-to-state. The member added that it may be possible to compile monthly data on preterm birth or live birth outcomes.
- A CHPAC member asked for a description of the indicator's selection process. The member was curious about EPA's process for narrowing down the suggested list to those selected.
  - Chris explained that indicator selection occurred from 2009 to 2013. A group of CHPAC members developed a report and EPA compiled a list of potential candidates. Based on those candidates, CHPAC made suggestions for the indicators. Chris added that there is not currently a defined process for selection.
- One CHPAC member expressed their appreciation for the clean visual presentation of the data. The member asked about the target audiences for the indicator website and about the intended use of the presented data, adding that this information would be helpful for considering the prompted discussion questions.
  - Chris responded that there are multiple audiences for these indicators and opportunities for use at EPA and for use by members of the public.
- Another CHPAC member asked if mental health and cardiovascular disease risk factors are included under the health topic area. Under the environmental stressors area, the member asked if sleep or noise were considered. Finally, the member asked if factors that increase health, such as greenspace, are included as indicators.
  - Chris responded that neither tree cover nor cardiovascular measures are included in the list of indicators. He added that the selection of indicators includes a consideration if the indicators have data that are interesting to pursue.
- One CHPAC member suggested that arsenic be included as a biomonitoring indicator, as arsenic is a known carcinogen found in rice products, apples, and many child products.
  - Chris agreed that arsenic is a strong suggestion, and that the data are available in the NHANES data pool.
- Another CHPAC member inquired about the value added of the ACE indicators, noting that epidemiologists in the field already access much of the data. The member wondered if there was additional activity related to tracking and environmental health data integration because of the program.
  - Chris responded that all biomonitoring data are child focused. The ACE indicators takes the data from NHANES and compiles the information in one location with visual presentations. Chris clarified that the ACE website does not endeavor to execute risk assessment work. He reiterated that the website compiles nationally representative data and does not include state data.
- A CHPAC member asked about the usability of the data. The member asked if EPA has considered how to better include or collect state or local data and noted that the environmental health tracking network is only in 25 states. The member added that the Children's Environmental Health Network (CEHN) appreciates ACE's national perspective and the user-friendly representation.
  - Chris noted that the integration of more geographically focused data would require a high volume of work. However, he emphasized that there is hope for additional data sources that could be incorporated.
  - Another CHPAC member responded that all states have cancer and birth defect registries, which could mean that the data could be easily obtained. The member noted that respiratory diseases and biomonitoring data would likely be more difficult.
- One CHPAC member asked about the goal for the ACE indicators and the intended audience. The member suggested that information about how people use the indicators could be gained through small grants prompting recipients to share how the data are used.

- Another member expressed excitement about the utility of the data for clinicians. The member commented on the biomonitoring results for per- and polyfluoroalkyl substances (PFAS), noting that the data show that legacy PFAS levels have decreased, but the data do not include more recent/replacement PFAS that have increased in tandem. This could be misleading.
  - Chris responded that there has been a large decline in levels, but that the levels have been high compared to the levels in hazard assessments for those chemicals.
  - A CHPAC member responded that it is important to provide interpretation information for the data along with the visuals.
- One CHPAC member discussed the opportunity to bring multiple data sets together, noting that there are ways to get trends from publicly available NHANES data. The member continued that 30-40 states compile birth defect surveillance data, and 20 states compile data on autism. The member concluded that compiling such data in one location would provide a great sense of the status of children's environmental health in the United States.
- Another CHPAC member asked about data from umbilical cord blood samples. ICD-10 codes are used for early detection diagnoses. These codes are sent to insurance and Health and Human Services, and thus could potentially be accessed.
- Jeanne Briskin, the Director of the Office of Children's Health Protection, thanked the CHPAC for the information about data sources and ideas. She suggested that the CHPAC suggestions be grouped into categories. Jeanne provided historical context for the ACE indicators program. She explained that the ACE Indicators were a way to examine pre-existing data sets to create a set of relevant indicators for children's health that could be understandable for lay persons. The idea was to make progress to protect children's health. Asthma was the first indicator of interest with the hope of identifying if progress was being made. Jeanne added that the CHPAC should provide suggestions with information about those that are the most important and pressing.
  - A CHPAC member responded that there is an opportunity to create products that help interpret the data. Highlighting interpretations would be incredibly helpful.
  - Another CHPAC member responded that having additional information about where exposures are occurring would be useful to the public health field.
- A member suggested that a project plan be drafted to communicate the direction of the project and the goals of ACE. She continued that the states have made progress with indicators under the Environmental Health Tracking Program through CDC, which is providing finances to state and local programs to improve informatics. Deanna wondered if connections could be made with sister agencies, such as CDC to reveal the broader role of ACE.
  - Jeanne responded with support for the development of a project plan. The program is at an appropriate point to identify goals and potential goals that can be used to frame the data and opportunities sought moving forward. She continued that engagement with other programs across the Agency could be fostered to encourage the use and support for indicators. She summarized that internal indicator work will continue and that a comprehensive long-term plan to evolve the indicators will be developed.
- A CHPAC member suggested OCHP discuss with other offices across the Agency to develop the representation of health indicators with geographic information.
  - Jeanne responded that OCHP is in contact with OEJ, which supports ACE and the coming iteration of ACE. Jeanne acknowledged that state level data has expanded, and that the Agency is invested in digital mapping. Still, she noted that many surveys promise anonymity to respondents, and the databases would need to be explored to understand what is possible.

#### **XIV. Overview of Scientific Integrity at EPA**

Deanna introduced Francesca Grifo, Scientific Integrity Official, EPA Office of Research and Development (ORD).

Francesca thanked the committee and noted that her presentation would provide an overview of current events and advancements in scientific integrity related to advisory committees and relevant policies. She noted that 2022 marks the tenth year of scientific integrity policy implementation at EPA.

Francesca explained that EPA's Scientific Integrity Policy is intended to support a culture of scientific integrity, enhance transparency across the Agency, and ensure protection for government scientists. Francesca noted that EPA recently included scientific integrity in its strategic plan for the first time. All parts of the agency should be ensuring scientific integrity and science-based decision making and should be delivering rigorous scientific research and analyses to inform evidence-based decision making.

Francesca introduced the Scientific Integrity Committee, which is comprised of Deputy Scientific Integrity Officials, a group of senior-level career EPA staff across the agency. The Committee has been tasked with completing two implementation actions by September 2026 that will address three objectives: visibility of scientific integrity at EPA, how EPA embraces and models scientific integrity, and discuss the mechanisms to protect and maintain a culture of scientific integrity at EPA.

Francesca continued, noting that a White House Task Force was created following a 2021 Executive Memorandum about scientific integrity. The task force includes 50 officials across various agencies. Francesca serves as a co-chair. The group has gathered best practices and conducted analyses of policy enforcement failings. Ultimately, the task force will release a framework for the regular assessment and iterative improvement of scientific integrity policies and practices, which will include a logic model and metrics for measuring the adequacy of the assessment. The January 2022 report "Protecting the Integrity of Government Science" forms the basis of the framework. The report reflects existing best practices and agencies and outlines opportunities for growth.

As part of the 2021 Executive Memorandum, agency websites are required to undergo review for scientific accuracy. Additionally, agency heads are required to review their current and future needs for independent scientific and technological advice from the Federal Advisory Commission boards. These groups designate a chief scientist and a scientific integrity official. Francesca noted that EPA's Chief Scientist is Maureen Gwinn.

Francesca continued summarizing the requirements of the Executive Memorandum, explaining the requirement that agencies review data and agency materials issued or published since January 20, 2017, to assess inconsistencies with the principles of the Memorandum. At EPA, the Scientific Integrity Committee reviewed all units in the Agency and reported on the information reviewed, updated, and removed.

Additionally, the Executive Memorandum requires agencies to write or update their scientific integrity policies and the publication of annual reports. EPA updated the agency policy and implemented the training of agency employees in scientific integrity. Another new requirement outlines the need for biennial reporting and the ongoing assessment of scientific integrity work. EPA created a logic model in 2014 to outline such work. The Executive Memorandum also included a model scientific integrity policy with suggested language for key components of scientific integrity policies.

Francesca explained that the Executive Memorandum includes consideration of groups that have been historically under-represented in science and technology, with an emphasis on equitable delivery of federal programs on scientific integrity. The Memorandum also discusses the evidence-based and iterative development of policies, programs, and engagement of science with news and social media. Francesca acknowledged the new, specialized challenges with emerging technologies, such as machine learning and artificial intelligence. Finally, the Memorandum discussed the use of evolving scientific practices, such as citizen science and community inclusion.

Francesca summarized a federal definition of scientific integrity to be adopted by all agencies. The following principles are highlighted in the definition: honesty, objectivity, transparency, professional practices, and ethical behavior. A video outlining the Scientific Integrity Policy at EPA was played for CHPAC members.

Francesca discussed the appointment of some advisory committee members to the Special Government Employee (SGE) Federal Advisory Committee, which includes an intensive conflict of interest screening process. Francesca noted that any FAC member is expected to uphold the principles of scientific integrity outlined in agency policies and that all advice remains independent. Francesca summarized that scientific and technical advisory committee selection includes considerations of expertise, knowledge, contributions to relevant subject areas, balance of scientific/technical viewpoints represented by the members, and conflicts of interest. Reports, recommendations, and findings of FACs are not subject to agency editing. Additionally, information about FAC communication to the public is detailed in the policy.

Francesca discussed the Scientific Integrity Policy's discussion of contact with the press, with specific information provided about the deliberative phase, which has an exemption from the Freedom of Information Act (FOIA). Frequently, FACs choose the Chair as the spokesperson for the committee during the active phase and after finalization.

Francesca added that the Scientific Integrity Program at EPA writes and oversees policies and procedures; conducts outreach and training; and hears concerns, gives advice, and adjudicates allegations of scientific integrity policy violations. Francesca emphasized that the Scientific Integrity Committee facilitates, makes suggestions, answers questions, and resolves issues anonymously and confidentially. High profile allegations or threats to public health move to allegation. The five common policy violations include interference in science activities and products without scientific justification, manipulation or mischaracterization of science, suppression and delay of science and science products, research misconduct, and flawed scientific review or practice. Since 2012, 110 allegations were made, with roughly half substantiated. 361 requests were made for advice, with 33 requests occurring through the second quarter of 2022.

Francesca noted a policy related to differing scientific opinion that encourages scientists to reflect disagreeing views in writing with a justification. This written information will be included for consideration in the decision-making process. Such documentation of differing opinions helps to alleviate unexpected opinions that may be brought to legal teams.

Francesca concluded her presentation by noting that scientific integrity is an obligation for everyone at EPA to ensure high quality, independent science.

Following the presentation, CHPAC members asked the following questions:

- A member asked how the Scientific Integrity Committee may encourage people to be comfortable seeking allegations.
  - Francesca responded that the situation has improved considerably. Additionally, EPA has created a unit in the Inspector General's Office to address fear of reprisal, retaliation, and retribution. Francesca noted that this step will be helpful in continuing to eliminate concerns.
- One CHPAC member asked about the allegations and advice with respect to FACs.
  - Francesca explained that three to four of the allegations in the past ten years have been related to FACs. In one instance, the members of a committee were being prevented from speaking to the media, which led to the creation of media policies. She emphasized that the policies are designed to enact systemic change with appropriate policy language.

- Another member asked about work CHPAC members could engage in independently to support the work of the Scientific Integrity Committee.
  - Francesca reiterated the importance of transparency and documentation and encouraged members to engage in these actions.
- A CHPAC member asked about the policies in the face of changing administrations and federal politics.
  - Francesca noted that the emphasis on the culture of scientific integrity at the Agency is a key component of staying power. Leaders should be transparent in decision-making processes and provide justifications for their decisions. Francesca continued that the Subcommittee on Scientific Integrity, part of the National Science and Technology Policy Council, is currently being formed to examine integrity with more continuity. The subcommittee will explore plans for when senior officials interfere with science and will create a community of practice for sharing of information. She noted that the language regarding scientific integrity and interference is inconsistent in many environmental statutes. Francesca continued, noting that the current administration has engaged in activities to increase staying power.
- One CHPAC member discussed the challenges around reproducibility when conducting qualitative research with community members in a Community-Based Participatory Research (CBPR) context. These approaches should not be standardized, the member said, as the unique community experiences are the goal of the endeavor.
  - Francesca responded that community engaged research has been a key point of discussion related to scientific integrity, noting that the Centers for Disease Control and Prevention (CDC) helped the committee explore this topic.

## **XV. Wrap-Up**

Deanna Scher, CHPAC Chair, thanked the CHPAC members for their attendance and active participation during the meeting. She noted that she sent an email to members about EPA's review of the ozone standard and the opportunity to provide comment or submit to the open docket for the policy revision. The email included three previous CHPAC letters related to ozone. The current policy recommends a standard of 70 parts per billion (ppb). Deanna mentioned that Jeanne suggested a CHPAC member could serve as a liaison to other committees.

Amelia Nguyen, DFO, EPA, CHPAC, supported having CHPAC representation on other related Federal Advisory Committee Act committees. She noted that a Scientific Advisory Board (SAB) meeting is planned for later in June, which is another opportunity for integration across the Agency. Interested CHPAC members were asked to contact Deanna and Amelia.

A CHPAC member noted CHPAC member participation on the Board of Scientific Counselors (BOSC) and their ability to speak to children's health on that committee.

One CHPAC member expressed interest in the upcoming meeting about the ozone standard and noted that previously crafted letters could be references in a public comment from CHPAC. Another CHPAC member clarified that the crucial issue is about what is requisite to protect public health with an adequate margin of safety. The unique vulnerabilities of children are an important part of that conversation.

Kaythi Han, Director of Program Implementation and Coordination Division, OCHP, thanked the members and attendees on behalf of Jeanne Briskin and OCHP. She added that she looked forward to developing a new charge for the CHPAC following the take-home charge. After a final version of the letter is prepared, the committee will provide consensus. Kaythi thanked Amelia and congratulated her on her coordination of the meeting and thanked ICF for their support.

Amelia thanked the CHPAC members and members of the public for their patience and adaptability for the hybrid meeting. She added that a survey would be provided to all members about their experiences and desires for future meetings and opportunities for improvement.

In June, following the May Plenary meeting, a group of CHPAC members submitted comments to the Clean Air Scientific Advisory Committee (CASAC) on the proposed ozone National Ambient Air Quality Standards (NAAQS). The comment letter suggested that the standard be lowered from 70 parts per billion (ppb) to 60 ppb to adequately protect children.





***U.S. Environmental Protection Agency (EPA)***  
**Children's Health Protection Advisory Committee (CHPAC)**  
**May 17 and 18, 2022 | 10:00 a.m. – 5:00 p.m. EDT**

EPA Headquarters  
1200 Pennsylvania Avenue NW, Washington, DC, 20004  
*Virtual attendance available for public attendees*  
[Registration Link](#) | [Docket Number: 9748-01-OA](#) | [CHPAC Website](#)

**AGENDA**

**Meeting Objectives**

- Receive an update on [Office of Children's Health Protection](#) (OCHP) activities.
- Review, discuss, and finalize the CHPAC response letter to EPA Take-Home Pesticide Exposure Charge.
- Receive an update on the [Bipartisan Infrastructure Law](#) from EPA's Office of the Administrator.
- Learn about children's health and wildfire smoke from EPA's [Office of Air and Radiation](#) and [Office of Research and Development](#).
- Receive an update from EPA and NIEHS on the [Children's Center Grantees](#).
- Learn about the status of EPA's Office of Pesticide Programs' response to [CHPAC's dermal exposure recommendations](#).
- Receive an update on the [America's Children and Environment](#) indicators from OCHP and discuss potential enhancements such as interactive display, including other data sources and considering additional topics.
- Learn about [Scientific Integrity at EPA](#).

**Tuesday, May 17, 2022 (times are EDT)**

9:30 – 10:00 **Registration**

10:00 – 10:15 **Logistics and Agenda Review**

Amelia Nguyen, Designated Federal Official, EPA Office of Children's Health Protection

Deanna Scher, CHPAC Chair

10:15 – 10:30 **Welcome**

Janet McCabe, EPA Deputy Administrator

10:30 – 10:50 **Office of Children's Health Protection Update**

Jeanne Briskin, Director, EPA Office of Children's Health Protection

**Discussion**

10:50 – 12:20 **Overview, review, and discuss to finalize CHPAC response to EPA Office of Pesticide Programs Take Home Pesticide Exposure Charge**

Lori Byron, Workgroup Chair

**Discussion**

**Tuesday, May 17, 2022** (times are EDT)

- 12:20 – 12:50 **Public Comments**
- 12:50 – 2:00 **Lunch**
- 2:00 – 2:50 **Bipartisan Infrastructure Law (BIL) Updates**  
Zealan Hoover, Senior Advisor to the EPA Administrator, Office of the Administrator  
**Discussion**
- 2:50 – 3:40 **Children’s Health and Wildfire Smoke Exposure Workshop: Summary and Discussion**  
Alison Savage, Biologist, EPA Office of Radiation and Indoor Air  
Amara Holder, Mechanical Engineer, EPA Office of Research Development  
Susan Stone, Senior Environmental Health Scientist, EPA Office of Air Quality Planning and Standards  
**Discussion**
- 3:40 – 3:55 **Break**
- 3:55 – 4:45 **NIEHS and EPA Children’s Center Grantees Presentation**  
Kimberly Gray, Health Scientist Administrator, NIEHS Population Health Branch  
Lindsey Martin, Health Scientist Administrator, NIEHS Population Health Branch  
Sarah Mazur, Principal Associate National Program Director, Sustainable and Healthy Communities Research Program, EPA Office of Research and Development  
**Discussion**
- 4:45 – 5:00 **Day 1 Wrap-Up**  
Deanna Scher, CHPAC Chair

**Wednesday, May 18, 2022** (times are EDT)

- 9:30 – 10:00 **Registration**
- 10:00 – 10:10 **Welcome**  
Amelia Nguyen, Designated Federal Official, EPA Office of Children’s Health Protection  
Deanna Scher, CHPAC Chair
- 10:10 – 11:40 **Review and discuss to finalize CHPAC response to EPA Office of Pesticide Programs Take Home Pesticide Exposure Charge (continued)**  
Lori Byron, Workgroup Chair  
Veena Singla, Workgroup member  
**Discussion**
- 11:40 – 12:10 **EPA Update on response to recommendations from Dermal Exposure Letter**  
Shalu Shelat, Industrial Hygienist, EPA Office of Pesticides Programs  
**Discussion**

**Wednesday, May 18, 2022** (times are EDT)

12:10 – 1:30    **Lunch**

1:30 – 2:20    **America’s Children and the Environment Indicators Update**

Christopher Brinkerhoff, Health Scientist, EPA Office of Children’s Health Protection

**Discussion**

2:20 – 3:15    **Overview of Scientific Integrity at EPA**

Francesca Grifo, Scientific Integrity Official, EPA Office of Research and Development

**Discussion**

3:15 – 3:30    **Day 2 Wrap-Up**

Deanna Scher, CHPAC Chair

**U.S. Environmental Protection Agency (EPA)  
Children’s Health Protection Advisory Committee  
May 17 & 18, 2022  
CHPAC Members Present (Virtually and In-person)**

<b>Name</b>	<b>Affiliation</b>	<b>City</b>	<b>State</b>
Leif Albertson	University of Alaska Fairbanks	Fairbanks	AK
Rebecca Bratspies	CUNY School of Law	Long Island City	NY
Lori Byron	St. Vincent’s Hospital	Billings	MT
José Cordero	University of Georgia	Atlanta	GA
Natasha DeJarnett	University of Louisville's Environment Institute	Louisville	KY
Diana Felton	Hawaii Department of Health	Honolulu	HI
Julie Froelicher	The Procter & Gamble Company	Cincinnati	OH
Katie Huffling	Alliance of Nurses for Healthy Environments	Mount Rainier	MD
Maureen Little	NYC Department of Health and Mental Hygiene	New York	NY
Linda McCauley	Emory University	Atlanta	GA
Mark Miller	California Environmental Protection Agency	San Francisco	CA
Ruth Ann Norton	Green and Healthy Homes Initiative	Baltimore	MD
Daniel Price	University of Houston	Houston	TX
Virginia Rauh	Columbia University	New York	NY
Deanna Scher	Minnesota Department of Health	Saint Paul	MN
Perry E. Sheffield	Icahn School of Medicine at Mount Sinai	New York	NY
Derek G. Shendell	Rutgers School of Public Health	Piscataway	NJ
Veena Singla	Natural Resources Defense Council	San Francisco	CA
Shirlee Tan	Public Heath-Seattle & King County	Seattle	WA
Kristie Trousdale	Children’s Environmental Health Network	Washington	DC
Carmen M. Velez Vega	University of Puerto Rico	San Juan	Puerto Rico
Ke Yan	Medical College of Wisconsin	Milwaukee	WI
Marya Zlatnik	University of California	San Francisco	CA

**Federal Agency Employees and Other Participants Present (Virtually and In-person)**

<b>Name</b>	<b>Affiliation</b>
Maureen Ball	ICF
Justin Barry	GHHI
Isabella Bennett	EPA
Josh Berman	
Aiden Black	EPA
Lashon Blakely	EPA
Denali Boon	Corteva
Emily Brehm	EPA
Chris Brinkerhoff	EPA

APPENDIX B: CHPAC Members Present at May 2022 Meeting

Jeanne Briskin	EPA
Emily Brehm	EPA
Chris Brinkerhoff	EPA
Justin Bullock	EPA
Stephanie Burkhardt	EPA
Janet Camp	EPA
Edward Chikwana	Corteva
Meredith Clemons	ICF
Theodore Coopwood	EPA
Matthew Crowley	EPA
Nicholas Das	Nutrien
Jessica David	Corteva
Jeff Dawson	EPA
Rebecca Dzubow	EPA
Carrie Fleming	Corteva
Kimberly Gray	NIEHS
Lindsey Green	ICF
Carolyn Hammack	EPA
Kaythi Han	EPA
Cheryl Hawkins	EPA
Amara Holder	EPA
Anne Holleran	EPA
Ashely James	EPA
Towana Joseph	EPA
Afroditi Katsigiannakis	ICF
Victoria Kurker	EPA
Coz Lamore	
Liz	
Alyson Lorenz	EPA
Matthew Lloyd	EPA
Thomas Lopiano	EPA
Kelly Lowe	EPA
Lindsey Martin	NIEHS
Tanya Maslak	Battelle
Kelsey McClain	GHHi
David Miller	EPA
Gregory Miller	EPA
Jaycee Mayer	ICF
David Mayfield	Covance
Sarah Mazur	EPA
Sarah Moreno	EPA
Erin Morrow	Syngenta
Amelia Nguyen	EPA

APPENDIX B: CHPAC Members Present at May 2022 Meeting

Ruth Ann Norton	GHHI
James E. S. Nolan	
OMSHQ	CC-MississippiRiver-CL150F
OMSHQ	CC-ColoradoRiver-CL150G
Jennifer Park	EPA
Philip Parker	EPA
Alison Pecquet	Syngenta
Alli Phillips	EPA
Emily Prest	Georgetown University
Jennifer Reed	Bayer
Ana Rivera-Lupianez	EPA
Pat Rizzuto	Bloomberg Industry
Grace Robiou	EPA
Laura Romano	EPA
Anna-Marie Romero	EPA
Hayley Roy	
Alison Savage	EPA
Carolyn Schroeder	EPA
Manthan Shah	EPA
Shalu Shelat	EPA
Veena Singla	NRDC
Gretchen Stewart	EPA
Jane Stewart	BASF
Susan Stone	EPA
Mallory Turner	EPA
Virginia Vietti	EPA
Ryne Yarger	EPA
Matthew Zampariello	EPA