BOARD OF DIRECTORS
Advisory Council
March 16, 2026

Dr. Daniel Baldassare, Woodwell Climate Research Center
Professor Ann Marie Grover Carlton, Ph.D., University of California Irvine
Melanie Colburn, MBA, LEED AP BD+C, City of Oakland
Dr. Stephanie M. Holm, M.D., Ph.D., M.P.H., University of California San Francisco
Dr. Philip T. Martien, Ph.D.
Professor Michael T. Schmeltz, DrPH, M.S., California State University, East Bay
Dr. Garima Raheja, Ph.D.
Lynda Hopkins, Air District Board of Directors Liaison

MEETING LOCATION(S) FOR IN-PERSON ATTENDANCE BY COUNCIL MEMBERS AND MEMBERS OF THE PUBLIC

Bay Area Metro Center
1st Floor Yerba Buena
375 Beale Street
San Francisco, CA 94105

THE FOLLOWING STREAMING OPTIONS WILL ALSO BE PROVIDED

These streaming options are provided for convenience only. In the event that streaming connections malfunction for any reason, the Advisory Council reserves the right to conduct the meeting without remote webcast and/or Zoom access.

The public may observe this meeting through the webcast by clicking the link available on the air district's agenda webpage at www.baaqmd.gov/about-the-air-district/advisory-council/agendasreports

Members of the public may participate remotely via Zoom at https://bayareametro.zoom.us/j/87010337241 or may join Zoom by phone by dialing (669) 900-6833 or (408) 638-0968. The Webinar ID for this meeting is: 870 1033 7241

PUBLIC COMMENT ON AGENDA ITEMS

The public may comment on each item on the agenda as the item is taken up. Members of the public who wish to speak on a matter on the agenda will have two minutes each to address the Council on that agenda item, unless a different time limit is established by the Chairs. No speaker who has already spoken on an item will be entitled to speak to that item again.

Written public comments can be emailed to comments@baaqmd.gov or through the Air District's website via the "Submit a Comment" feature for this meeting. Written public comments emailed by 10:00 a.m. on the business day prior to this meeting will be provided to the Council members in advance of the meeting. Written public comments emailed after that deadline will be provided to the Council members following the meeting's adjournment. Unless directed by the Chair, written public comments will not be read aloud during the meeting.

The Council welcomes comments, including criticism, about the policies, procedures, programs, or services of the Air District, or of the acts or omissions of the Council. Speakers shall not use threatening, profane, or abusive language which disrupts, disturbs, or otherwise impedes the orderly conduct of a Council meeting. The Air District is committed to maintaining a workplace free of unlawful harassment and is mindful that Air District staff regularly attend Council meetings. Discriminatory statements or conduct that would potentially violate the Fair Employment and Housing Act – i.e., statements or conduct that is hostile, intimidating, oppressive, or abusive – is *per se* disruptive to a meeting and will not be tolerated.

ADVISORY COUNCIL
MEETING AGENDA

MONDAY, MARCH 16, 2026
9:00 AM

1. **Call to Order - Roll Call**

   The Facilitator, on behalf of the Council, shall call the meeting to order and the Clerk of the Boards shall take roll of the Council Members.

CONSENT CALENDAR (Item 2)

The Consent Calendar consists of routine items that may be approved together as a group by one action of the Council. Any Council member or member of the public may request that an item be removed and considered separately.

2. Approval of the Draft Minutes of the Advisory Council Meeting of December 8, 2025

   The Council will consider approving the draft minutes of the Advisory Council meeting of December 8, 2025.

ACTION ITEM(S)

3. Election of Officers

   The Council will consider electing a Chair and Vice Chair and such other officers as it deems necessary. The Council will discuss, nominate candidates, and vote on officers to serve for the duration of the 2026-2027 term. The item will be presented by Greg Nudd, Deputy Executive Officer of Policy.

INFORMATIONAL ITEM(S)

4. Overview of the Ralph M. Brown Act

   The Council will learn more about and discuss an overview of the Ralph M. Brown Act. Meetings of the Council are governed by the Ralph M. Brown Act. This item will be presented by Brian Case, Assistant Counsel in the Legal Division.

5. Overview of Cumulative Impacts Workplan

The Council will discuss an overview of the Cumulative Impacts Workplan, which was developed by the Advisory Council's Workplan Ad Hoc Subcommittee. The Workplan includes, in Appendix B, "The Advisory Council's Proposed Interim Key Findings," adopted July 2024, and "Working Draft Outline for Cumulative Impacts Findings and Recommendations," approved December 2025. This item will be presented by Council member Dr. Philip T. Martien.

OTHER BUSINESS

6. Report of the Executive Officer/APCO

7. Public Comment on Non-Agenda Matters

Pursuant to Government Code Section 54954.3, members of the public who wish to speak on matters not on the agenda will be given an opportunity to address the Council. Members of the public will have two minutes each to address the Council, unless a different time limit is established by the Chair. The Council welcomes comments, including criticism, about the policies, procedures, programs, or services of the Air District, or of the acts or omissions of the Council. Speakers shall not use threatening, profane, or abusive language which disrupts, disturbs, or otherwise impedes the orderly conduct of a Council meeting. The Air District is committed to maintaining a workplace free of unlawful harassment and is mindful that Air District staff regularly attend Board meetings. Discriminatory statements or conduct that would potentially violate the Fair Employment and Housing Act – i.e., statements or conduct that is hostile, intimidating, oppressive, or abusive – is per se disruptive to a meeting and will not be tolerated.

8. Council Member Comments / Other Business

Council members may make a brief announcement, provide a reference to staff about factual information, or ask questions about subsequent meetings.

9. Time and Place of Next Meeting

Monday, May 4, 2026, at 9:00 a.m. The meeting will be held in-person at the Bay Area Metro Center and at satellite locations as may be specified on the meeting agenda using a remote teleconferencing link. Members of the Advisory Council and the public may attend at any of those in-person locations, and members of the public may also attend virtually via webcast.

10. Adjournment

The Council meeting shall be adjourned by the Chair.

CONTACT:
MANAGER, EXECUTIVE OPERATIONS **(415) 749-4941**
375 BEALE STREET, SAN FRANCISCO, CA 94105 **FAX: (415) 928-8560**
vjohnson@baaqmd.gov **Air District homepage:**
www.baaqmd.gov

- Any writing relating to an open session item on this Agenda that is distributed to all, or a majority of all, members of the body less than 72 hours before the meeting shall be made available at the Air District's offices at 375 Beale Street, Suite 600, San Francisco, CA 94105, at the time such writing is made available to all, or a majority of all, members of that body.

Accessibility and Non-Discrimination Policy

The Bay Area Air District (Air District) does not discriminate on the basis of race, national origin, ethnic group identification, ancestry, religion, age, sex, sexual orientation, gender identity, gender expression, color, genetic information, medical condition, or mental or physical disability, or any other attribute or belief protected by law.

It is the Air District's policy to provide fair and equal access to the benefits of a program or activity administered by Air District. The Air District will not tolerate discrimination against any person(s) seeking to participate in, or receive the benefits of, any program or activity offered or conducted by the Air District. Members of the public who believe they or others were unlawfully denied full and equal access to an Air District program or activity may file a discrimination complaint under this policy. This non-discrimination policy also applies to other people or entities affiliated with Air District, including contractors or grantees that the Air District utilizes to provide benefits and services to members of the public.

Auxiliary aids and services including, for example, qualified interpreters and/or listening devices, to individuals who are deaf or hard of hearing, and to other individuals as necessary to ensure effective communication or an equal opportunity to participate fully in the benefits, activities, programs and services will be provided by the Air District in a timely manner and in such a way as to protect the privacy and independence of the individual. Please contact the Non-Discrimination Coordinator identified below at least three days in advance of a meeting so that arrangements can be made accordingly.

If you believe discrimination has occurred with respect to an Air District program or activity, you may contact the Non-Discrimination Coordinator identified below or visit our website at www.baaqmd.gov/accessibility to learn how and where to file a complaint of discrimination.

Questions regarding this Policy should be directed to the Air District's Non-Discrimination Coordinator, Kimberly Leefatt, Civil Rights Officer at 415-749-4610 or by email at non-discriminationcoordinator@baaqmd.gov.

BAY AREA AIR DISTRICT
375 BEALE STREET, SAN FRANCISCO, CA 94105
FOR QUESTIONS PLEASE CALL (415) 749-4941

EXECUTIVE OFFICE:
MONTHLY CALENDAR OF AIR DISTRICT MEETINGS

MARCH 2026

TYPE OF MEETING	DAY	DATE	TIME	ROOM
Advisory Council Meeting	Monday	16	9:00 a.m.	1st Floor, Yerba Buena Room
Board of Directors Policy, Grants and Technology Committee	Wednesday	18	10:00 a.m.	1st Floor Board Room
Board of Directors Finance and Administration Committee	Wednesday	18	1:00 p.m.	1st Floor Board Room
Community Advisory Council Meeting	Thursday	19	6:00 p.m.	Juntos Fruitvale 3357 International Boulevard Oakland, CA 94601

APRIL 2026

TYPE OF MEETING	DAY	DATE	TIME	ROOM
Board of Directors Meeting	Wednesday	1	10:00 a.m.	1st Floor Board Room
Board of Directors Stationary Source Committee	Wednesday	8	10:00 a.m.	1st Floor, Yerba Buena Room
Board of Directors Community Equity, Health, and Justice Committee	Wednesday	8	1:00 p.m.	1st Floor, Yerba Buena Room
Board of Directors Policy, Grants and Technology Committee	Wednesday	15	10:00 a.m.	1st Floor Board Room
Board of Directors Finance and Administration Committee	Wednesday	15	1:00 p.m.	1st Floor Board Room
Board of Directors Special Meeting Budget Hearing	Wednesday	29	10:00 a.m.	1st Floor Board Room
Board of Directors Special Meeting	Wednesday	29	11:00 a.m.	1st Floor Board Room

hl 3/11/26 – 4:20 p.m. G/Board/Executive Office/Moncal

AGENDA: 2.

BAY AREA AIR DISTRICT
Memorandum

To: Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: March 16, 2026

Re: Approval of the Draft Minutes of the Advisory Council Meeting of December 8, 2025

RECOMMENDED ACTION

Approve the attached draft minutes of the Advisory Council meeting of December 8, 2025.

BACKGROUND

None.

DISCUSSION

Attached for your review and approval are the draft minutes of the Advisory Council meeting of December 8, 2025.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: Marcy Hiratzka
Reviewed by: Vanessa Johnson

ATTACHMENT(S):

1. Draft Minutes of the Advisory Council Meeting of December 8, 2025

Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105
(415) 749-5073

Advisory Council Meeting
Monday, December 8, 2025

DRAFT MINUTES

CALL TO ORDER

1. **Opening Comments:** Advisory Council (Council) Chairperson Solomon called the meeting to order at 9:30 a.m.

   Roll Call:

   Present: Chairperson Dr. Gina Solomon; Vice Chairperson Dr. Phil Martien; and Members Professor Ann Marie Grover Carlton, Dr. Stephanie Holm, Professor Michael Kleinman, Dr. Garima Raheja, Dr. Michael Schmeltz.

   Absent: Board Liaison Lynda Hopkins.

CONSENT CALENDAR

2. **APPROVAL OF THE TWO SETS OF DRAFT MINUTES OF THE ADVISORY COUNCIL MEETINGS OF OCTOBER 6, 2025**

Public Comments

No requests received.

Council Comments

None.

Council Action

Dr. Holm made a motion, seconded by Professor Carlton, to **approve** the two sets of Draft Minutes of the Advisory Council meetings of October 6, 2025; and the motion **carried** by the following vote of the Council:

AYES: Carlton, Holm, Kleinman, Martien, Schmeltz, Solomon.
NOES: None.
ABSTAIN: None.
ABSENT: Raheja, Hopkins.

NOTED PRESENT: Dr. Raheja was noted present at 9:33 a.m.

INFORMATIONAL ITEMS

3. **ADVANCING RISK ASSESSMENT METHODOLOGIES**

The Council discussed advancing risk assessment methodologies, with a focus on applications in air quality regulation, with presentations from Dr. Keeve Nachman, Professor of Environmental Health and Engineering, Johns Hopkins University Bloomberg School of Public Health; and Dr. Rima Woods, Senior Toxicologist in the Air Toxicology and Risk Assessment Section in the Office of Environmental Health Hazard Assessment (OEHHA).

Prof. Nachman gave the presentation *Improving Methodologies for Cumulative Risk Assessment: A Case Study of Noncarcinogenic Health Risks from Volatile Organic Compounds in Fenceline Communities in Southeastern Pennsylvania,* including: goals of the Hazardous Air Pollutant Monitoring & Assessment (HAP-MAP) project; thesis statements;; multi-effect toxicity database (METDB); characterizing risk for each chemical; characterizing cumulative non-cancer risk; summary; what it means; and research.

Professor Peter DeCarlo also answered questions to this presentation.

Clarifying Questions

Vice-Chair Martien asked how much of the information presented by Dr. Nachman was already available in the current version of the Hot Spots Analysis and Reporting Program (HARP) software, and whether it could be applied to assessments beyond the most sensitive target organ, or if additional development would be required. Dr. Woods responded that additional development would be needed. She explained that HARP currently assigns one Reference Exposure Level (REL) value per exposure duration (acute, chronic, or 8-hour) to each chemical, and there may be several target organs associated with that. Expanding beyond that was, she thought, not currently possible in HARP. Dr. Woods commended Dr. Nachman's work and clarified that the Office of Environmental Health Hazard Assessment (OEHHA) regarded it as a strong approach, though implementation would require a larger discussion.

Chair Solomon then inquired about Dr. Woods's reference to collaborative work with the Program on Reproductive Health and the Environment. She asked whether the term "ACES" referred to adverse childhood experiences, which she noted would be highly relevant to the Air District's work, and requested clarification on what the project entailed, as well as whether there were other near-term efforts directly relevant to air pollution. Dr. Woods explained that a research scientist at OEHHA, Dr. Thilakaratne, was working on that contract with the University of California San Francisco (UCSF), focused on an in-depth systematic literature review of specific endpoints, adverse childhood experiences being one example. The goal, she explained, was to explore ways to quantify effects in order to apply an uncertainty factor. Whether this approach would ultimately scale to cover all non-chemical stressors, or instead be limited to certain stressors or chemicals, remained uncertain. Dr. Woods offered to reach out to Dr. Thilakaratne about the possibility of presenting this early-stage work to the Council. Chair Solomon indicated that such a presentation would be of strong interest, noting that in

previous meetings the Council had discussed the possibility of this type of work in general, including interactions between particulate matter and heat. She added that lead (Pb) could also be of interest, given its relevance as both an air toxic and a criteria pollutant. Dr. Woods agreed to follow up.

Council Discussion

Councilmember Schmeltz opened the discussion with a broad question about data availability in the context of cumulative impact assessments. He remarked that Dr. Nachman's work had drawn heavily on U.S. EPA datasets, but noted current concerns about the availability of those datasets, as well as the possible cessation of assessments under EPA's Integrated Risk Information System (IRIS) program. With respect to the data used by OEHHA, he asked about opportunities to move forward using other sources that would not rely on federal datasets but would still be sufficiently comprehensive for these types of assessments.

In response, Dr. Nachman provided additional detail on the CompTox dashboard used by his team. He explained that it functions as an aggregator: while many of the points of departure (PODs) his team relied on originated with EPA, others came from a range of non-EPA sources. The dashboard, he said, centralized access to those values, after which his team vetted them and selected the most appropriate POD for each chemical-outcome combination. He expected those data sources to remain generally available, and emphasized their diversity, noting that in some cases they came from the primary literature and in others from sources such as the European Chemicals Agency (ECHA). A key feature of the approach, he explained, was that once a POD had been developed for a given chemical-outcome pair, it would remain usable unless new toxicological information emerged. While there was an initial capital investment required, he continued, once that work was done, the entry for that chemical-outcome combination could live on. Looking ahead, he described his team's interest in developing a tool that would allow agencies to input a chemical concentration representing a level of chronic exposure, and use that to work with their Multi-Effects Toxicity Database (METDB) process. He noted that the CompTox dashboard remained online, and expressed hope that the sources of PODs for such an approach would remain easily available.

Dr. Woods added that OEHHA was also considering how to preserve information. She explained that OEHHA relies on a broad base of primary literature and considers all available evidence, including animal and human studies, mechanistic data, and related information, when deriving health-based values. She remarked that CompTox performs a valuable aggregation function, and noted that OEHHA was exploring the possibility of developing a similar, in-house dashboard to help ensure continuity and timely updates. She added that collaborations with research institutions and with other states would be important components of a sustainable approach.

Councilmember Raheja asked how the set of volatile organic compounds (VOCs) included in the analysis had been determined, and how many were ultimately included. Given that expanding the number of compounds can add to the complexity of modeling, she asked what constituted a practical stopping point. Dr. Nachman responded that the original set of chemicals his team had measured formed the basis of the Multi-Effects Toxicity Database (METDB), but emphasized that any additional chemical could be incorporated, provided there was either a direct measurement or a forecasted exposure available.

Chair Solomon then inquired whether there were plans to extend the work beyond the initial set of VOCs, for example to metals or potentially to particulate matter, as candidates for inclusion in METDB. Dr. Nachman affirmed that such extensions were under consideration and invited additional comment from his colleague, Dr. Peter DeCarlo. Dr. Nachman noted that his team had published work examining metals, although that study did not apply the METDB framework. With respect to particulate matter, he explained that they were attempting to disaggregate it in ways that could be integrated into their system, which posed challenges due to overlap between particulate matter composition and chemicals measured independently. He also described a subsequent measurement campaign in Louisiana's "Cancer Alley," where the team deployed expanded monitoring capabilities and added approximately 30 additional chemicals to their dataset. Dr. Nachman added that his students were also exploring applications involving different routes of exposure, such as combined dermal and inhalation pathways in the context of beauty parlor workers. He noted that there were many potential applications of the approach, each requiring some expansion of capacity, but emphasized that if exposure could be quantified, it could be incorporated.

Vice-Chair Martien addressed Dr. Woods with a question about the new toxicology evaluation section, focusing in particular on computational toxicology approaches. He asked how much of that work might be useful in expanding databases such as those under discussion. Dr. Woods responded that computational toxicology is often used to fill data gaps, for example in cases where there are no animal, human, or mechanistic studies, by identifying shared characteristics across a class of chemicals. Those approaches can help inform how we assess a chemical, she said, but it will be difficult in some cases to deal with a lack of animal or human testing; approaches like Dr. Nachman's are an excellent example of how computational toxicology can be used; the final step then becomes the applications in the regulatory framework. Dr. Woods added that the computational toxicology section, referred to as NTES, is actively engaged with a range of academic partners in thinking through how to bridge the gap from modeling to regulatory decision-making, and is continually seeking additional ideas and input.

Councilmember Carlton then remarked that, in reviewing papers by Dr. Nachman's team, she had observed notable differences between modeled risk estimates and measured values, with measurements consistently indicating higher risk than modeling suggested. She asked whether under-accounting for leaks might help explain that discrepancy, and whether the modeling approaches had only accounted for stack emissions. She further inquired what Dr. Nachman viewed as the primary limitation in developing a more quantitative understanding of risk: measurements, databases, or both.

Dr. Nachman responded by referencing a paper his team had published on ethylene oxide, which he suggested might be one of the cases Councilmember Carlton had in mind. He explained that the compound was difficult to measure in the field, but that his team had compared their measurements with modeled estimates of ambient concentrations derived from emissions data in the National Emissions Inventory (NEI). In nearly every case, and across almost all geographic units examined, the measured concentrations were higher than the modeled estimates, in some instances by orders of magnitude. This, he continued, has huge implications for on-the-ground, real-world exposure and risk; under-estimating exposures to single or multiple chemicals may be missing the burdens that communities are actually facing. Multiple dimensions of risk estimation highlighted by Dr. Carlton's question,

he concurred, are missed by the current approach. Dr. Nachman suggested that the use of modern measurement technologies at high spatial resolution could substantially improve understanding of what people are actually breathing. With the methods demonstrated in the study, he noted, there was significant opportunity to enhance exposure estimation, thanks in large part to the existence of these databases of toxicological information. He concluded that while his team had worked to demonstrate the value of better integration, independent improvements to both measurement and consideration of health effects were important and added to understandings of true impacts. He invited further comment from Dr. Peter DeCarlo.

Dr. DeCarlo added that most current modeling approaches rely on emissions inventories which, for hazardous air pollutants (HAPs), are often self-reported and in some cases incomplete. In response to Councilmember Carlton's questions, he noted that stack emissions are sometimes monitored, but primarily for criteria pollutants rather than for HAPs. As an example, he explained that estimates for formaldehyde emissions from combustion are typically based on the amount of natural gas combusted, using emissions factors drawn from U.S. EPA's AP-42 handbook. His team, he said, was finding that these are often optimistic. To better understand what communities are actually exposed to, he suggested that auditing facility emissions is necessary and that subsequent applications of tools like METDB can be helpful to understand implications in terms of community exposure and health around certain facilities.

Chair Solomon thanked the speakers and noted that while the presentations' focus had largely been on one aspect of risk assessment, the Council's discussion should also consider the exposure piece, which was equally important and valuable in the context of cumulative impacts, and specifically in the Council's report.

Chair Solomon recalled that perhaps 15 years ago, OEHHA had assembled a list of hazard traits for the Green Chemistry project, examining both traditional endpoints by organ system as well as some key-characteristics traits, that might bridge more conventional approaches with New Approach Methodologies (NAMs). She asked Dr. Woods whether that body of work was still active or potentially useful. Dr. Woods also recalled that work, as well as related efforts focused on key characteristics for carcinogens, though she noted there had been less development on the non-cancer side. She offered to explore whether that work could be revisited and used as a starting point. Chair Solomon observed that one advantage was that it had already been codified in regulations. She also noted that OEHHA had authored multiple papers on key characteristics relevant to reproductive toxicology, neurotoxicology, and immunotoxicology. She acknowledged that this line of discussion might extend beyond the Air District's immediate scope, but emphasized its importance for making substantive progress on cumulative impacts, and expressed appreciation for the progress made.

Returning to Dr. Woods's presentation, Chair Solomon drew attention to approaches used in the contaminated sites program, suggesting the potential of a useful analogy. She asked for clarification about screening-level assessment in that context, specifically whether it examined multiple endpoints and whether it was comparable to the approach described by Dr. Nachman's group, or instead involved extrapolating a single reference dose or concentration across multiple endpoints. Dr. Woods clarified that the approaches were different. She explained that the screening-level assessment was intended to provide a high-level indication of potential risk at a site, so that hazard quotients were calculated for each target organ system

and then summed, consistent with a conservative assumption that all chemicals affected the same target organ system. This approach, she explained, functioned as a rapid screening tool to determine whether a more comprehensive site assessment was warranted.

Councilmember Holm connected the discussion to Dr. Woods's earlier remarks on data availability within existing systems. Recognizing that the contaminated sites program relies on a conservative approach, she asked whether that framework could be leveraged sooner, rather than waiting to fill the data gaps required for an approach like Dr. Nachman's. Dr. Woods offered that it could perhaps be used for a high level screening, but that OEHHA was limited to including chemicals with values available to them; there was not a way for them to include chemicals without established Reference Exposure Levels (RELs) for California. She added that Dr. Nachman's approach was compelling because it could incorporate values that have not yet gone through the traditional Hot Spots REL development process, even if those values are interim in nature. For that reason, she said, it could be useful for rapid screening applications. She concluded that the structure of the Hot Spots program warranted care in considering the application of new methods, and also that conversations with the California Air Resources Board (CARB) and with Air Districts would be needed around worst-case scenarios.

Vice-Chair Martien suggested a discussion of next steps for this approach, which he observed increasingly appeared to offer a way to advance consideration of cumulative impacts, even beyond the place-based approaches presented by other states. He invited input from staff. Mr. Nudd responded that the discussion had identified a need for a capital investment, which would involve further engagement with Dr. Nachman's group and OEHHA to explore opportunities to bridge the associated resource gap. He noted that these conversations were still at an early stage, with details to be ironed out, but it seemed a promising approach for the Air District to help move forward.

Chair Solomon expressed support for pursuing this direction, noting the enthusiasm expressed by other Council members and by OEHHA. She emphasized that while additional effort would be required to move toward implementation, it seemed very doable. From a scientific perspective, she said, it was on a very solid foundation with established methods; nothing was changing the paradigm of the risk assessment process, but was instead expanding it in a way that was much needed and arguably overdue, and could make an on-the-ground difference. She added that it complemented other strands of the Council's discussion, including map-based approaches that address non-chemical stressors, as well as needed improvements to exposure assessment.

Public Comments

No requests received.

Committee Action

No action taken.

THE COUNCIL RECESSED AT 10:43 A.M., AND RESUMED AT 10:58 A.M.

4. CONSIDERATIONS FOR CUMULATIVE IMPACTS APPROACHES

Greg Nudd, Deputy Executive Officer for Policy, gave the staff presentation *Considerations for Cumulative Impacts Approaches*, including: outline; current landscape: policy and assessment tools – current cumulative impacts-driven policy, considerations from current implementation, health and demographic data considerations, assessment approaches, particulate matter (PM) exposure and toxics assessments, considerations and staff recommendations; considerations for future policy mechanisms – place-based approach, thresholds for permit issuance, community participation in permit actions; and discussion questions.

Clarifying Questions

Chair Solomon thanked staff and noted that the presentation raised several issues for the Council's consideration. She expressed caution about whether the Council should be opining on specific policy approaches, such as no-net-increase requirements or exemptions, but emphasized the importance of the Council understanding the underlying dilemmas, which she characterized as thorny.

Councilmember Raheja asked whether increased requirements for community meetings or the use of community benefit agreements would contribute to the existing permitting backlog or otherwise impose a significant workload. Mr. Nudd responded that they would. He explained that careful scoping and targeting would therefore be necessary, given that the Air District processes roughly 1,000 new permits each year, a substantial portion of which are in overburdened communities. Therefore, he said, the Air District would need to consider what kinds of facilities ought to trigger that kind of community participation.

Mr. Nudd then turned to Ms. Kelly Crawford, Deputy Executive Officer of Engineering and Compliance, noting that she had suggested beginning with AB 617 communities, where the Air District already has established relationships. Ms. Crawford elaborated that when confronting multiple problems simultaneously, the question of where to start could be simplified by leveraging AB 617 maps, since those have already involved a public process and community input. She emphasized that this would provide a practical starting point, allowing the Air District to implement some actionable measures that would actually drive reductions in air pollution, rather than attempting to resolve every issue at once. In response to Mr. Nudd's reference to community benefit agreements (CBAs), she also offered to share models for getting benefits to communities where the parties included communities themselves.

Council Discussion

Vice-Chair Martien acknowledged the permitting backlog and opined that a tiered approach made sense, starting with AB 617 communities, given the greater availability of information about those communities and their established relationships. With respect to whether certain pollutants should be prioritized at the outset, specifically air toxics and particulate matter, he expressed the view that they should. This view, he noted, was based both on what he had heard during the discussion and on his prior experience, as well as a recognition of the need to focus efforts and address pressing needs.

Recalling Mr. Nudd's slide on data needs, Vice-Chair Martien added that several of the issues raised were highly relevant, including how measurements might be integrated with modeling to estimate background concentrations. He then raised the question of how progress in addressing cumulative impacts might be tracked over time. He suggested that progress could be assessed in part through quantitative measures. He also observed that, even though the Council had not discussed qualitative approaches in depth, starting with AB 617 communities' experiences over time, and hearing stories or having conversations about how that is going, might serve as an initial way to assess progress.

Councilmember Schmeltz offered two additional comments. First, about issues with acquiring health data, and assuming that the Air District could work with the state to obtain it, he asked whether the Air District might partner with private organizations, such as Kaiser, to obtain enhanced data for the Bay Area. He acknowledged that data sharing with private entities could pose challenges. Mr. Nudd replied that it was a good question, and while that model had not been tried yet, the Air District had seen it work in West Oakland through partnerships involving Kaiser and the Environmental Defense Fund (EDF).

Prof. Schmeltz continued that, second, staff had mentioned a way of including community perception in permitting or in some of the data; his thinking was that this was a good idea, but that community perception does change over time, both as membership evolves, and when significant events take place. He wondered about feasibility and the frequency of assessment of community perception within permitting processes, and how nimble the agency could be in that assessment and related pivoting.

Mr. Nudd explained that he had been reflecting back what was heard consistently from environmental justice advocates; namely, that decisions about activities in their communities should not be made without consultation. He acknowledged that Councilmember Schmeltz had highlighted important practical and logistical concerns, and offered that if the Air District were to start with AB 617 communities, there would be at least some pre-existing community groups and trusted partners to work with, though that could have downsides as well. Mr. Nudd recalled that another idea was to require facilities to host their own public meetings, prior to applying for permits, if they wished to expand or locate operations in overburdened communities, so as to improve community awareness. He noted that there had been instances where permit applicants had proposed what they considered to be strong projects, only to encounter intense and unexpected community opposition. Such an approach, he suggested, could help avoid those situations, but it would have to be targeted to the right kinds of facilities.

Dr. Meredith Bauer, Principal Deputy Executive Officer, added that the Air District was rolling out a targeted inspection program initially focused on AB 617 communities. She explained that the program sought to connect with communities, mainly through AB 617 meetings, to identify priority facilities. She suggested that this could provide a sensible interface around permitting, subsequent to identifying facilities that communities are truly concerned by, which she thought would be similar from a permitting standpoint. She noted that Mr. Nudd had used the word "targeted" specifically and that there was strong alignment around leveraging the targeted inspection program for this purpose.

Dr. Philip M. Fine, Executive Officer, noted that the Air District's rules already required enhanced engagement in overburdened communities, and that in recent cases the agency

had gone beyond those requirements, including in areas bordering overburdened communities. He emphasized that this was particularly important from a procedural justice perspective, even though it could lengthen the process. He explained that the feedback was incorporated into the Air District's technical process for ensuring that control technologies have been evaluated correctly, or that outreach has been conducted correctly, but that in the absence of a policy or rule that allowed for alteration or denial of a permit based on that feedback, whether the permit could be issued or not remained largely non-discretionary.

Dr. Fine emphasized the value of a policy or analytical process that could lead to different outcomes, rather than just a more drawn-out process, given the implications for the permit backlog and resourcing. He expressed interest in a process wherein, early on, a facility could understand how difficult a path they were going down might be. He noted this would have value for multiple parties, in terms of saving time for the facility, the Air District, and the community. Early presence and touchpoints, he concluded, would create value for decisions upstream, before the process ended up spinning wheels and resulting in the same outcome.

Councilmember Holm agreed with the need to prioritize and the fact of limited resources. Returning to the previous point, Councilmember Holm acknowledged that the uniqueness of AB 617 communities, and the resources that could be leveraged, provided opportunity. She cautioned, however, that there had been a lack of discussion on how a pilot effort tailored to those circumstances could affect the generalizability of efforts to serve broader geographic areas. She suggested that it would be particularly important to explicitly consider, from the outset, how a pilot could transition and be scaled up for wider application. Chair Solomon concurred.

Chair Solomon seconded other Councilmembers' recommendations, including Vice-Chair Martien's recommendation to focus on particulate matter and air toxics. She noted that this already represented a substantial scope of work, and that attempting to take on more could be impractical. She also agreed that a geographic focus was reasonable, and that there were good arguments for beginning with AB 617 communities, while acknowledging the important caveat raised by Dr. Holm regarding scalability. She then asked whether identifying an additional round of AB 617 communities might create further opportunities for implementation.

Dr. Fine responded that the California Air Resources Board (CARB) had recently issued updated guidance for the AB 617 program that effectively paused the designation of new full AB 617 communities, while not ruling out that possibility in the future. He explained that CARB was instead shifting toward opening the program to all interested communities, though perhaps with a lower level of Air District engagement. Acknowledging that this approach had pros and cons, Dr. Fine explained that the Air District did not anticipate additional full AB 617 communities being nominated or approved under the new guidelines. In addition to the four existing AB 617 communities associated with the Bay Area Air District, he noted that several other Bay Area communities were working closely with the Air District and would likely be included under a broader framework, though with more limited resources and engagement.

Chair Solomon expressed her disappointment at the development, indicating that it would result in important communities being left in limbo. She reinforced her agreement with the other Council members that starting with a geographic focus made sense, and observed that

the selection of a starting point was ultimately the Air District's decision, whether with a strong existing partner, or with a community that might have been next on the list.

Returning to the earlier discussion of which pollutants to prioritize, Councilmember Kleinman remarked that particulate matter was very important, as were carcinogens and other hazardous compounds. He added that a significant portion of air quality exceedances and broader degradation are attributable to ozone. He did not argue that ozone should be an immediate focus, but expressed the view that it would eventually need to be addressed. Given that ozone is formed through atmospheric chemistry, he noted, it is more of a regional issue, but because it affects everyone, he cautioned against leaving it out of the Council's overall thinking.

Mr. Nudd responded that the Air District had not lost sight of ozone, noting that it had been the subject of several meetings that same week. He explained that ozone levels in the Bay Area had been fluctuating at or near the standard for some time. He added that many of the strategies being considered to reduce regional particulate matter would also yield substantial ozone benefits. Mr. Nudd affirmed that the Air District would continue working to ensure that it could stay in attainment. Councilmember Kleinman noted that, in the context of discussing detrimental effects, it should be kept in mind that all improvements in air quality led to health benefits, which should be credited.

Councilmember Raheja suggested that if the Air District were to begin with a geographically tiered approach, and initially focus on particulate matter before expanding to additional pollutants, future plans for expansion could be articulated as part of the pilot launch. Doing so, she explained, would help ensure that communities not included in the initial pilot would understand what was coming and on what timeline.

She added that this planning could also incorporate consideration of what constitutes essential services, offering gas stations as an example. While such facilities might currently be treated as essential, she noted, that could change over a longer timeframe. In this way, permit applicants would also have greater clarity and be better able to prepare for future requirements. She suggested that this approach could serve as a way to create a commitment to the community in terms of expected achievements and timelines. Chair Solomon agreed that this approach was generally reasonable, and emphasized the importance of signaling the direction of future efforts, particularly for communities that might otherwise feel excluded at the current stage.

Chair Solomon remarked that she had heard about substantial progress by the Air District on geographically focused cumulative impacts policy changes, noting that some of those efforts had already begun to affect permitting decisions, even as certain issues remained unresolved. She recalled earlier references to both the Port of San Francisco and the area around Schnitzer Steel, which were so heavily industrialized that they were not captured by CalEnviroScreen, and asked whether there had been discussion of how to address that gap. Mr. Nudd responded that in the case of Schnitzer, the Air District had required what would be required of sites in overburdened communities. With respect to sites at the Port of San Francisco, he said the issue had not yet arisen in the same way, but noted that staff were aware of the concern and were in ongoing conversations with the Bayview-Hunters Point community through the AB 617 process. Chair Solomon then asked whether the process

relevant to the Schnitzer Steel case might be extended more broadly. She observed that areas missing from CalEnviroScreen are often excluded because of small resident populations, which is frequently due to a high concentration of industrial sources. As a result, she suggested, adjacent communities could reasonably be presumed to be highly impacted. Mr. Nudd agreed that this perspective was sensible and should be considered when considering CalEnviroScreen maps and related updates.

Chair Solomon then invited any remaining questions from staff and asked whether they had received what they needed from the discussion. Mr. Nudd replied that they had, expressed appreciation for the input, and noted that staff looked forward to the upcoming workplan discussion and to reporting back on related policy developments.

Public Comments

No requests received.

Council Action

No action taken.

ACTION ITEM

5. **APPROVAL OF REFINEMENTS AND ADDITIONS TO THE PREVIOUSLY ADOPTED CUMULATIVE IMPACTS WORK PLAN**

The Council considered approving proposed refinements and additions to the Cumulative Impacts Work Plan, including a newly expanded Appendix B entitled, "The Advisory Council's Interim Findings (approved July 2024) and Working Draft Outline for Cumulative Impacts Findings and Recommendations (considered December 2025)," developed by the Work Plan Ad Hoc Subcommittee.

Vice-Chairperson Dr. Philip Martien presented the item and asked for revisions from the Council, which the Clerk captured live, on the screen.

Public Comments

No requests received.

Council Discussion

Vice-Chair Martien introduced the item, stating that the focus would be on updates to the workplan. He drew attention to new recommendations included in an appendix, which reflected discussion from the previous meeting, and suggested that live edits could be made during the discussion.

Beginning with the Summary, Vice-Chair Martien remarked that he viewed it as a living document. He reminded the Council that the workplan was intended to guide its work toward identifying and reducing cumulative impacts, with the primary objective of developing a set of

written recommendations to be delivered to the Air District's Board of Directors in the following year. He recalled that the Background section summarized key information about cumulative impacts identified to date, and described how existing Air District programs already take cumulative impacts into account. The Methods section, he continued, outlined proposed approaches for implementation, while the Products and Timeline section described goals in greater detail and identified when specific products were expected to be developed. The Appendix, he noted, contained supporting materials, including draft Findings and Recommendations that would ultimately be incorporated into a final document.

Vice-Chair Martien explained that most of the edits to date had addressed typographical issues or modest tightening of language, largely in response to the Community Advisory Council's (CAC) request for improved readability, and that additional work in that vein would likely be needed. He emphasized that the overall message of the workplan remained unchanged, with the most substantive revisions concentrated in Table 1, which addressed ideas related to assessment, and Table 2, which focused on actions to reduce impacts. He reminded the Council that, based on earlier discussion, a set of recommendations had been developed that drew from those tables, and that these were now presented in Appendix B alongside the Findings adopted at the July meeting.

Turning to Appendix B, Vice-Chair Martien first called attention to the Findings, noting that edits to them could be taken up at a later stage. He then proceeded to the Recommendations, beginning with the first. He explained that it called for the Air District to update its emissions inventory for Toxic Air Contaminants (TACs), including a proposed approach for prioritization. In addition, the recommendation proposed using that inventory for regional TAC modeling, and collecting TAC measurements; staff appeared to already be undertaking these activities. He noted the prospect of periodic updates, similar to the approach taken by the South Coast Air Quality Management District (SCAQMD).

Vice-Chair Martien continued that the second recommendation could leverage the information gained from the first to establish initial estimates of background levels that could be used to derive hazard quotients.

The third recommendation, he explained, related to the earlier discussion with Dr. Woods and Dr. Nachman, concerning the limitation in current risk assessments created by considering only a single target organ or system, and recommending expansion to multiple targets.

Acknowledging that the first three recommendations would require time to implement, he noted that the fourth recommendation concerned the adoption of tighter thresholds for hazard indexes (HIs), similar to what was being done in Rule 2-5 currently, where cancer-risk limits were tighter in OBCs than elsewhere.

The fifth recommendation addressed the need for a more comprehensive accounting of potential site-specific issues in the permitting process. This included, but was not limited to, more rigorous consideration of emissions during startup, shutdown, and upset conditions. Vice-Chair Martien noted that at the previous meeting there had been discussion of the ways in which the Air District already accounted for these emissions in certain circumstances, and he also referenced consideration of facility compliance history as part of permitting decisions. He also noted extensive discussion of the potential for emissions sources that may not be

accounted for, and the potential need to expand how such sources are accounted for or otherwise considered. He observed that further discussion could be needed regarding exactly what the idea of “un-inventoried” sources comprised.

Vice-Chair Martien continued that the sixth recommendation focused primarily on the Air District’s Rule 11-18. He reminded the Council that the rule addressed risks from existing sources, and that the Council had a favorable impression of it overall. He noted, however, that it had faced challenges in implementation, and that the Air District was understood to be developing updates to address those issues. The Council’s recommendation, he explained, was that updates to Rule 11-18 be brought periodically to the Council, so that the Council could offer input on how cumulative impacts might be more fully integrated into those revisions.

The seventh recommendation, he explained, addressed local near-field impacts from sources of fine particulate matter ($PM_{2.5}$). He noted that this topic had been discussed at length by both the current Council and the previous Council, with the idea being to have some consideration of $PM_{2.5}$in permitting for new and modified sources, and especially in OBCs. The best options for implementation, he suggested, could best be left to the Air District to determine.

The eighth recommendation, he said, was meant to voice support from the Council in terms of using CalEnviroScreen or a map-based approach generally, so as to identify communities where more protective actions would be required, but at the same time pointing out that such place-based approaches ought to be supplemented with the other recommendations, in order not to leave out communities that might not be covered by such an approach.

The ninth recommendation, he concluded, expressed support for the idea of no-net-increase in emissions in permitting new and modified sources in OBCs while recognizing the potential for challenges, as Mr. Nudd had discussed.

Vice-Chair Martien then invited additional explanation from Drs. Holm and Carlton, and discussion from the full Council.

Dr. Bauer asked a clarifying question, namely: regarding the second recommendation, and updated estimates becoming a new background, what the Council’s thoughts were on situations where that background level was decreasing, and whether anything above that lower level would then be considered additive. She pointed out that emission estimates change every year, so that those from certain sources might be lower than what had been thought. She also observed that the number of permitted sources remained relatively stable over time, with newer sources generally cleaner than those being retired. In conclusion, she stated that there were a number of reasons why the Air District should hope that the background level should be declining, and wondered about giving more cushion, or setting the background level lower.

Vice-Chair Martien responded that the Council had been thinking specifically of background level in the context of estimating hazard quotients or hazard indexes. For most applications, he said, the working assumption was that a source existed separately from other sources of a pollutant. Taking the example of a source of benzene, he pointed out that the reality is that

there is an existing background for benzene; the thought was that one could sum that background level together with the contribution of the new source.

Dr. Bauer responded that she could imagine a scenario where over two or three years, the background level of benzene had gone down, and then a new source with some benzene emissions was coming in; this left more than one possibility for determining the relevant background value. Vice-Chair Martien agreed that the details could be challenging, and that he would look to staff regarding the implementation. The idea, he noted, was simply to include a background level, rather than to assume that there was none. Hazard quotients are meant to indicate safe levels, he explained, but the way they are commonly applied is to look at an increment and compare that increment to a level that would be safe.

Chair Solomon suggested that the word “background” might be impeding the discussion, and that a different term might be warranted. To clarify the intent, she proposed a hypothetical example in which the ambient concentration of formaldehyde in a given community was X, and that a permit was sought for an emitter of formaldehyde. Under current practice, she explained, the emissions from that source would be evaluated on their own, and if the resulting hazard index were below one, the permit would typically move forward, but if combining that with the ambient level of formaldehyde in that community exceeded one, it would constitute a problem. The proposal, she explained, was to take an approach that would add in the ambient concentration; if that ambient concentration declined over time, that would be welcome, and the new and lower concentration would be included; perhaps then the facility would not trigger a level of concern, at that future time. She concluded that the Council could consider revising the wording for clarity.

Vice-Chair Martien suggested that this might already be understood by staff, and that the Council might not have fully engaged with the underlying issue being raised. Dr. Bauer responded that from a concentration standpoint, the approach posed fewer challenges than from an emissions standpoint. She explained that methodologies for estimating emissions can change over time, enough that one can observe artifacts that do not represent the real emissions. From a concentration standpoint, she indicated, the Council’s thinking made sense. Vice-Chair Martien expressed understanding, and indicated that the Council did not want to be so prescriptive as to recommend things that did not make sense. He reiterated that the Council’s goal was to work with staff to develop recommendations that were sufficiently specific to be useful, while remaining workable in practice.

Councilmember Kleinman remarked that this sounded to some extent like factoring in no-net-increase. He suggested that, much like ozone, there is an overall background level, along with an additional local increment arising from the cumulative effects of nearby sources. From that perspective, he said, a new source should not add further burden above that cumulative background, though this can be tricky to handle. He raised an additional concern, noting that while changing the threshold for a carcinogen is one way to address some of these things easily, it may be hard to communicate to a community that is not designated as overburdened that a certain increment of material would not contribute to causing cancer there, while it could have done so elsewhere. While potentially practical, he cautioned, such an approach could raise public communication concerns.

Councilmember Holm asked for clarification about which aspect of the proposal posed the communication challenge. Councilmember Kleinman responded that, for example, there were a compound with a [cancer] slope factor of X, and in the overburdened community, that were discounted to some extent because of other cumulative effects, just saying the threshold would be reduced from X to X minus Y, but the original X were still applied in other communities, then those communities might feel that their potential health effects were being discounted. Councilmember Holm acknowledged that she might be misunderstanding, but that she understood the proposal to be retaining the hazard index consistently in all communities, but that adding a permitted contribution to an ambient concentration would end up having a different outcome there. In that sense, she said, the public communication piece would be easier, because one would not be saying someone had risk X minus Y where they lived, while someone else had X risk where they lived; it would be a consistent hazard index, but acknowledging that there were other hazards. Councilmember Kleinman responded that the discussion had begun with lung cancer endpoints, but was transitioning to non-cancer endpoints, which would be treated differently. Vice-Chair Martien observed that the Air District already applied a lower cancer risk threshold in overburdened communities, suggesting that the relevant bridges may have already been crossed.

Councilmember Holm added that Recommendation 8 might be an appropriate place to incorporate the point raised earlier by Councilmember Raheja, specifically the inclusion of clearer plans for expanding beyond an initial set of communities.

Chair Solomon asked for clarification regarding Recommendation 4, specifically whether the ad hoc group viewed it as an interim recommendation, or as a measure that would be implemented first but continue to operate even after other recommendations were in place. Vice-Chair Martien responded that it was intended to be implemented first, but that the recommendation was silent on what would happen once Recommendations 1 through 3 were developed. In that respect, he explained, it was analogous to the current approach to cancer risk thresholds, which are set lower in overburdened communities without specifying how that policy might change as other measures are introduced.

Chair Solomon expressed some reservation about that framing, indicating that she would be more comfortable treating Recommendation 4 as explicitly interim, given that the other recommendations could take considerable time to develop. In the case of cancer risk, she explained, selecting a risk level is fundamentally a policy decision; hazard indices differ in that, at least in theory, a value of one represents a level below which there should be no appreciable risk from a given pollutant and source. From that perspective, she observed, justifying a threshold below that became difficult, since it implied moving from “below zero” to “below zero.” She noted that it is easier in contexts where no threshold is assumed, and that there is growing recognition that many non-cancer endpoints may not have the sharp thresholds they were originally thought to have. For that reason, she indicated, treating non-cancer endpoints more analogously to cancer within a risk assessment context made some sense. Even so, she remained concerned about picking a lower number. Vice-Chair Martien recalled that there was still no consideration of non-chemical stressors even in the approach proposed by Drs. Wood and Nachman. Chair Solomon agreed that there were many good reasons, and simply wished to ensure that the math could be justified. Councilmember Holm agreed, and added that Recommendation 4 had been intended as an interim item following extensive discussion of the persistent need for more scientific information, coupled with the notion that this should

not prevent action based on the information available. She wondered whether it would be useful to be less prescriptive in Recommendation 4, leaving open the possibility of other kinds of interim measures. She recalled earlier discussion with Dr. Woods about screening methods, and about existing data and systems. On the other hand, she thought, leaving it too broad would not supply adequate clarity from the Council to the Air District.

Chair Solomon responded that the Council could clearly justify Recommendation 4 from a science perspective as an interim measure, given that two things had already been established in Recommendations 2 and 3. The first was the existence of other sources in the community emitting many of the same chemicals, that are not currently accounted for, which would result in higher hazard indexes if they were. The second was that there are other target organ systems that are not accounted for, as had been discussed that morning, which would also increase hazard indexes. Since it was known that the hazard indexes are probably being systematically under-estimated in overburdened communities, she continued, interim measures were warranted until the exact numbers could be determined. Either the numerator or the denominator could, she suggested, be adjusted; Recommendation 4 was not focusing on the numerator or the denominator, but instead saying that if the ratio were less than 1, it could still be considered problematic in a community. This was justifiable, she continued, though it could get trickier once Recommendations 2 and 3 were online and accounting for some of the background and some of the other target organs.

Vice-Chair Martien agreed and offered an additional refinement. He recalled that there were already places where the Air District used hazard indexes less than 1: for example, in Rule 2-5 at the source level. Agreeing with Chair Solomon's point, he proposed that the recommendation explicitly state its interim nature and focus on tightening thresholds, rather than specifically on adopting thresholds less than one.

Councilmember Holm supported this approach and observed that while the Council had discussed three reasons for tightening hazard indexes, only two had been explicitly captured, leaving out the contribution of non-chemical stressors. Although it was mentioned elsewhere, she suggested revising Recommendation 4 to integrate some of the relevant uncertainty. Vice-Chair Martien expressed his support, and the Council directed staff to make the relevant edits.

Returning to Recommendation 1, Vice-Chair Martien suggested that the language specifying a tract-level threshold be replaced with a reference to designations made by the Air District, particularly in light of the potential release of a new version of CalEnviroScreen and the details of how the Air District designates overburdened communities. Chair Solomon then identified two typographical errors in Recommendation 2, and Councilmember Holm proposed more precise language regarding pre-existing ambient air pollution. Staff made the corresponding edits to the document. Chair Solomon asked whether the revised language clearly conveyed the Council's intent. Dr. Bauer responded that it did, and indicated that staff would follow up.

Turning to Recommendation 5, Councilmember Schmeltz expressed concern with the use of the word "possibility." He argued that it would be beneficial for the Air District to actively identify un-inventoried sources, noting that in discussions with community members, it was unlikely that residents distinguished between permitted and non-permitted facilities, or between inventoried and un-inventoried sources. He thought it would be important for the Air District to

have at least a working list or shared understanding of other pollution sources, so that when community members raised concerns about specific buildings, facilities, or businesses, those sources were acknowledged or at least recognized in the conversation. Framing this solely as a “possibility,” he suggested, did not fully capture that need.

Vice-Chair Martien agreed that the term “un-inventoried sources” had been a challenge. He suggested that part of the difficulty lay in clarifying whether the discussion referred to sources directly associated with a specific permit application, or to sources in the broader surrounding community.

Councilmember Schmeltz clarified that he was referring to the broader community, and to what he termed “non-permitted sources,” meaning contributors to the local air pollution burden that are often visible or salient to community members. He offered examples such as fast food restaurants, from which emissions may be visible or commonly associated with air pollution, even though such sources may not be subject to permitting by the Air District. He acknowledged uncertainty about the most appropriate terminology, whether “un-inventoried,” “un-permitted,” or another term, but emphasized the importance of some form of identification.

Councilmember Holm added that the intent of the last discussion had included multiple cases, including known but unpermitted sources, as well as unknown sources, and that there was persistent frustration among community members when academic or regulators say that the part that they have measured is the part that they can address. She suggested that the Council had been trying to get at both of those issues with Recommendation 5, but that she was still not confident it had been entirely captured.

Dr. Fine clarified that these were very different things (un-permitted; un-quantified; un-identified; un-inventoried), and offered to go into depth about the differences if the Council desired. Unpermitted, he explained, meant that a source did not require a permit; it could be identified and might be inventoried; it could also be unidentified, meaning the Air District did not know it was there, but it still would not require a permit. The Air District could also know that a source was there, that did not require a permit, yet the Air District could still include that source in its inventory. What the discussion was getting at, he indicated, was ensuring as full a consideration as possible of the background or baseline. He suggested there might be a way to helpfully bypass these terms.

Chair Solomon thanked Dr. Fine for the clarification. She added that in the previous discussion, where discussion of “background” had been reframed as “ambient,” the Council had been trying to surface several related but distinct concepts. These included what is measurable, what is currently measured, and what has yet to be measured, and she noted the importance of differentiating among them. She explained that one objective of Recommendation 5 was to address large and complex sites where many activities are occurring, and where not all sources may be fully captured. Startup, shutdown, upset conditions, and compliance issues, she observed, are site-specific considerations. Within a single facility, there may also be sources that are not permitted, which she distinguished from the broader community-level sources raised by Councilmember Schmeltz. She emphasized that both dimensions were important and that neither should be lost in refining the recommendation.

Dr. Fine returned to Rule 11-18, noting that it requires a facility-wide assessment of emissions, encompassing everything the Air District is aware of at a site. He contrasted this with the scope of an individual permit, which is typically limited to the specific unit being permitted and does not entail a sitewide assessment. He explained that if the Air District were to move toward a framework that more explicitly considers ambient concentrations, or background conditions, not only from other sources at the same facility but from surrounding sources as well, then those contributions would be treated equivalently. Dr. Fine offered fugitive dust as an illustrative example. Such sources are known to exist, he noted; some are permitted, but most are not; quantification is difficult; they are rarely included in emissions inventories; and they pose significant challenges for regulation. He posed the question of how such sources should be addressed within the framework the Council was discussing.

Vice-Chair Martien commended the discussion and reflected that his own thinking had focused on situations where the permitted unit is known, but the full set of emissions associated with that unit may not be. He agreed that many different things could fall under the umbrella of “un-inventoried sources,” and suggested that the language should be refined to better clarify what the Council intended to capture. Noting the importance of the item, Chair Solomon agreed that the language had been appropriately flagged as in need of refinement, and suggested that the Council could move forward.

For Recommendation 8, Councilmember Holm suggested adding language regarding the expansion of work beyond initially targeted communities. Vice-Chair Martien suggested replacing specific mention of CalEnviroScreen with “place-based approaches.” Staff made corresponding edits.

In Recommendation 9, Chair Solomon noted that “no net increase” moved discussion deeper into the policy realm, and cautioned that the Air District should be left with enough flexibility to address some of the issues raised in the prior presentation. As an example, she noted that sewage treatment plants should not be prevented from upgrading their water emission controls. She wondered whether the language of “some facility types” provided enough flexibility, and suggested changing “require” to “provide for,” which might allow for some exceptions. Vice-Chair Martien expressed his support.

Continuing to consider whether any recommendations were overly prescriptive, Vice-Chair Martien suggested removing a parenthetical clause in Recommendation 7, which he felt was unnecessary. Staff made note of the suggestion.

Returning to Recommendation 5, Councilmember Carlton commented that her thinking had included pressure-relief devices, which guard against explosions at certain facilities, which might have a perfect compliance history, yet leak with remarkable predictability. Chair Solomon expressed appreciation for the added context, noting that it provided helpful specificity and underscored an important point. She observed that, in part, the Council’s use of various descriptors had been an effort to capture conditions that are not adequately reflected in current regulatory practice.

Staff made corresponding edits to the recommendation. Vice-Chair Martien commented that the language had improved, though Chair Solomon indicated that it still did not fully capture the intent. She noted in particular that it missed the point raised earlier by Councilmember

Schmeltz regarding nearby sources such as restaurants. Councilmember Holm then suggested that an additional point might be introduced elsewhere, possibly in Recommendation 2, to capture related concerns. She proposed that this could encompass both non-chemical stressors and the broader issue raised by Councilmember Schmeltz and herself, namely consideration of pollution sources or stressors that are not currently measured but are salient to community members. She suggested that framing this as an element of uncertainty, analogous to an "uncertainty factor," might be one way to address that gap.

Returning to Recommendation 1, Chair Solomon observed that its focus on updating the emissions inventory addressed, at least in part, concerns about incomplete coverage. She questioned whether it should be expanded further, but agreed with Councilmember Holm that it was, to some extent, a distinct recommendation. Councilmember Holm noted general agreement on the need to improve exposure measurements and to include additional sources in inventories, while also recognizing that perfect measurements and inventories were not realistically achievable. Having some consideration of that, she indicated, was a good way to move forward without requiring perfection.

Councilmember Schmeltz drew attention to Finding 6 in the Council's Key Findings, which stated that "Methods for considering cumulative impacts and related policy changes should be developed in partnership with community members, notably those from marginalized populations." He noted that this language was intentionally broad and less prescriptive than requiring community members to identify specific sources they believed contributed to their burden. He suggested that the Council need not go that far in its recommendations, so long as it was understood that engaging with communities and understanding their contemporary perceptions of their pollution burden was an essential step towards understanding cumulative burden (whether inventoried, un-inventoried, permitted, etc.).

Vice-Chair Martien asked whether a recommendation was needed to more specifically address community perspectives. Councilmember Holm suggested that it was, given that it appeared in the Findings and could be an important means of addressing the related issues. Vice-Chair Martien suggested making a note to that effect, as a placeholder, rather than trying to craft such a recommendation in the moment, especially since the idea of the Recommendations was to pass the baton to the next Advisory Council. Staff made corresponding edits (denoting placeholder language with brackets, at the suggestion of the Air District's counsel).

Mr. Nudd requested clarification from the Council regarding Recommendation 5, about the meaning of "compliance history." He wondered whether it was consideration of compliance history with respect to the assessment of the accuracy of emissions included in the permitting process (to Councilmember Carlton's point about known leaks), or more about consideration of how to design permit conditions in light of a facility's compliance history. Vice-Chair Martien indicated that it had been the latter: not emissions, but other permitting factors.

Council Action

Dr. Raheja made a motion, seconded by Vice Chair Martien, to do the following:

Accept the report of the subgroup, including the Findings and Recommendations as amended by the Council, recognizing that this is an ongoing work in progress, and that the subgroup will go back and, with the aid of the transcript from this meeting, make some revisions to the Findings, especially the bracketed Recommendation that the Council did not have a chance to fully flesh out. Mr. Case, the Air District's counsel, indicated the word "approve" instead of "accept" was important. Chair Solomon restated as "to **approve** the report as it currently stands, recognizing that it will be further developed by the next Advisory Council."

The motion **carried** by the following vote of the Council:

AYES: Carlton, Holm, Kleinman, Martien, Raheja, Schmeltz, Solomon.
NOES: None.
ABSTAIN: None.
ABSENT: Hopkins.

OTHER BUSINESS

6. **REPORT OF THE EXECUTIVE OFFICER/AIR POLLUTION CONTROL OFFICER (APCO)**

- Dr. Philip M. Fine, Executive Officer/APCO, thanked the Council members for their service, as this was the final meeting of this particular cohort.
- At the Air District's Board of Directors' December 3, 2025 meeting, the five Advisory Council incumbents (Carlton, Holm, Martien, Raheja, and Schmeltz) who reapplied to the Council were reappointed. Councilmember Kleinman and Chair Solomon did not seek reappointment. Two new Council members (Melanie Colburn and Dr. Daniel Baldassare) were appointed, and the term of all seven Councilmembers is from January 1, 2026, to January 1, 2028.
- Mr. Nudd introduced the following new Air District executives to the Council: Kelly Crawford, Deputy Executive Officer of Engineering & Compliance, and Dr. Andrea Polidori, Deputy Executive Officer of Science.

7. **PUBLIC COMMENT ON NON-AGENDA MATTERS**

No requests received.

8. **COUNCIL MEMBER COMMENTS**

Councilmember Kleinman and Chair Solomon thanked the Air District for the honor of serving and contributing on the Council for so many years, adding that that the Air District is a very forward-looking organization, the work of which, saves lives.

Vice-Chair Martien thanked Councilmember Kleinman and Chair Solomon for their leadership and expertise.

9. TIME AND PLACE OF NEXT MEETING

At the end of the meeting, the next meeting of the Advisory Council was to be held at the Call of the Chair. After the meeting adjourned, the next meeting was scheduled for Monday, March 16, 2026, at 9:00 a.m. The meeting will be held in-person at the Bay Area Metro Center (Yerba Buena Room on 1st floor). Members of the Board of Directors and the public may attend, and members of the public may also attend virtually via webcast.

10. ADJOURNMENT

The meeting adjourned at 12:59 p.m.

Marcy Hiratzka
Clerk of the Boards
Executive Office

Dr. David Holstius
Sr. Advanced Projects Advisor
Assessment, Inventory, and Modeling

BAY AREA AIR DISTRICT
Memorandum

To: Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: March 16, 2026

Re: Election of Officers

RECOMMENDED ACTION

Elect officers to serve for the duration of the 2026-2027 term.

BACKGROUND

The Council has welcomed new members and begun new terms and will therefore consider members for leadership positions.

DISCUSSION

In accordance with Health & Safety Code section 40267, the Advisory Council will discuss, nominate candidates, and vote on a Chair, and Vice Chair and any other officers it deems necessary. Historically, the Chair of the Advisory Council has helped determine the cadence of Advisory Council meetings, including if a subcommittee of the Advisory Council needs to meet. Together with Air District staff, the Chair and Vice Chair help develop Advisory Council meeting agendas and materials. During Advisory Council meetings, the Chair will facilitate the meeting. This includes facilitating comments from fellow Advisory Council members and public comment on agenda items. In addition, the officers often provide reports to the Board of Directors on the work of the Advisory Council.

The Vice Chair of the Advisory Council has provided support to the Chair in their work and will act as Chair should the Chair be absent from a meeting. Going forward, the roles of the Chair and Vice Chair can be expanded to better suit the needs of the Advisory Council and the Air District.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: Sonam Shah-Paul
Reviewed by: Greg Nudd

ATTACHMENT(S):

None

BAY AREA AIR DISTRICT
Memorandum

To: Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: March 16, 2026

Re: Overview of the Ralph M. Brown Act

RECOMMENDED ACTION

None; the Council will discuss this item, but no action is requested at this time.

BACKGROUND

The Advisory Council of the Air District is subject to the requirements of the Ralph M. Brown Act. Air District staff will review the Ralph M. Brown Act and the legal requirements for open meetings and public access, including applicable procedural requirements.

DISCUSSION

Council members will discuss the requirements of the Ralph M. Brown Act and the legal requirements for open meetings, public access and applicable procedural requirements.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: Brian Case
Reviewed by: Alexander Crockett

ATTACHMENT(S):

1. Advisory Council Brown Act Presentation

Bay Area Air District

The Brown Act, as Applied to the Advisory Council

Advisory Council Meeting

March 16, 2026

Brian Case
Assistant Counsel
Legal Division

Topics to be Covered

1. Purpose of the Brown Act
2. Why The Advisory Council Is Covered
3. Which Meetings are Covered?
4. The Noticed Agenda
5. Conducting the Meeting
6. Pathways for Remote Participation by Council Member
7. Conduct Outside the Meeting – No “Serial Meetings”
8. Consequences for Brown Act Violations

Purpose of the Brown Act

"All meetings of the legislative body of a local agency shall be open and public, and all persons shall be permitted to attend any meeting of the legislative body of a local agency, except as otherwise provided in this chapter." (Cal. Gov. Code Section 54953(a).)

"That one sentence is by far the most important of the entire Brown. [. . . That sentence is the heart of the Brown Act." – California League of Cities Guide to the Brown Act, Updated January 2024

Why the Advisory Council is Covered?

YES, BECAUSE: Legislative bodies of local agencies, including boards, commissions, committees, and *advisory bodies*, and standing committees with continuing jurisdiction or fixed meeting schedules must hold public meetings under the Brown Act.

***EXCEPTION*:** Ad hoc committees composed of less than a quorum, created for a temporary and limited purpose, and dissolved when their task is complete are not "legislative bodies" and don't need to hold a public meeting.

Are All Meetings Covered?

COVERED: Gatherings of a majority to hear, discuss, deliberate, or act on agency business, even without final action; includes workshops, retreats, and study sessions.

STRICTLY DEFINED EXCEPTIONS: Individual conversations, public conferences, community meetings, attendance at other public meetings, and social or ceremonial events, provided no majority discussion of agency business occurs among members.

The Noticed Agenda

THE ROLE OF THE AGENDA: The noticed agenda limits what the body may discuss or act on, provides notice to the public, and defines the scope of permissible action at the meeting. Include a brief general description of each item with sufficient detail to inform the public; the description controls the permissible scope of discussion and action.

VERY LIMITED OFF-AGENDA EXCEPTION: Permissible off-agenda actions include *brief* responses to public comment, clarifying questions, referrals to staff, placement on a future agenda, and brief announcements, without broader discussion or action. (Rule of Thumb: 2-3 sentences max).

Conducting the Meeting: *Loss of Quorum*

Without a quorum there is no meeting; no action may be taken; any informal discussion must occur outside the meeting and without deliberation among a majority on agency business.

Conducting the Meeting: *Tips for Effective Meetings*

FOR THE CHAIR:

Outline any limitations on public participation (e.g., time limits) and assure people they will be allowed to share their views

FOR OTHER MEMBERS:

Address remarks and debate to the chair or presiding officer; wait for recognition by the chair before speaking / avoid cross-talk

Conducting the Meeting: *Tips for Effective Meetings (cont.)*

FOLLOW COMMON STRUCTURES:

1. Receive Staff Report
2. Questions from the Board/Commission
3. Receive Public Comment
4. Discuss/deliberate
5. Motions/action (if necessary) (*Note:* secret ballots prohibited)

ENCOURAGE CIVILITY: Remind all participants to be respectful of public speakers—do not allow heckling and to hold applause.

Conducting the Meeting: *Removal for Disruptive Conduct*

Removal is permitted *only after a warning* unless conduct constitutes the actual use of force or a true threat of force*; criticism or viewpoint alone is not disruption and cannot be the basis for removal or silencing.

- "True threat of force" is defined to mean a threat that has sufficient indicia of intent and seriousness, that a reasonable observer would perceive it to be an actual threat to use force by the person making the threat.
- ***New:*** It is now expressly stated that local agencies may remove or restrict participation by individuals engaging in disruptive behavior during teleconferenced or hybrid meetings, ensuring order even in virtual settings.

Conducting the Meeting: Public Comment

- Cannot require names or conditions for attendance
- Reasonable time limits on public comments allowed. However, when a legislative body limits time for public comment, the legislative body must provide at least twice the allotted time to a member of the public who utilizes a translator

Pathways for Remote Participation: Overview

- Just Cause Remote Participation
- Traditional Teleconferencing
- State of Emergency Teleconferencing – Not Covered In Further Detail
- Teleconferencing under the Americans with Disabilities Act (ADA) – *Contact Air District Staff, Not Covered In Further Detail*

Pathways for Remote Participation: Just Cause Remote Participation

Two uses* per year for qualifying reasons such as childcare, illness, disability, or official travel; disclosure of adults present in the room is required when participating remotely under these provisions. Just cause remote attendance retains the requirement that a quorum be physically present at a publicly accessible location and requires a verbal statement at the start of the meeting describing the justification for remote participation.

Practical Tip: Notify staff that wish to appear remotely. Then, at the beginning of the meeting, briefly state the circumstances for just cause.

*As limited by Brown Act, because the Advisory Council meets once per month or less

Conduct Outside Public Meetings

Serial meetings are prohibited, including through emails or intermediaries; a majority may not develop a collective concurrence outside a properly noticed meeting.

EXAMPLES:

1. Daisy chain" (A to B, B to C, C to D)
2. "Hub and spoke" (e.g. use of staff to communicate with members one by one for deliberation or a decision.)
3. Avoid converting permitted communications into serial meeting. (Example: A member of the public meets individually with each Board member about an issue. The member should avoid making inquiries about what the other members thought or said.)

Conduct Outside Public Meetings: *Email Risks*

Reply-all chains can violate the Brown Act; email may be used for scheduling or distributing information only; no deliberation, advocacy, or polling of member positions by email.

Conduct Outside Public Meetings: *Role of Staff*

Air District staff may provide information to members individually; staff may not relay member views among members; avoid facilitating a collective concurrence through staff communications or briefings.

Penalties for Brown Act Violations

Potential consequences include invalidation of actions, injunctions against violations, recovery of attorneys' fees, and potential criminal liability for intentional violations where elements are met.

Questions & Discussion

For more information:

Brian Case | Assistant Counsel | bcase@baaqmd.gov

BAY AREA AIR DISTRICT
Memorandum

To: Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: March 16, 2026

Re: Overview of Cumulative Impacts Workplan

RECOMMENDED ACTION

None; the Council will discuss this item, but no action is requested at this time.

BACKGROUND

Since early 2024, the previous term of the Advisory Council has been briefed on how cumulative impacts might be integrated more deeply into Air District policy development and programs. In 2025, the Council formed a Workplan Ad Hoc Subcommittee, developed and adopted the Cumulative Impacts Workplan, and approved a working draft outline for cumulative impacts findings and recommendations.

The purpose of the Cumulative Impacts Workplan is to provide a blueprint for the Advisory Council in developing recommendations on methods to identify, assess, and reduce the cumulative impacts of air pollution in the Bay Area, where such methods would account for impacts of both chemical and non-chemical stressors on health, well-being, and quality of life. Cumulative impacts of air pollution are most profound for frontline environmental justice communities.

DISCUSSION

The Advisory Council members will receive an overview of the Cumulative Impacts Workplan. The workplan is organized into four sections and several supporting appendices. The Introduction section includes workplan purpose, audience and collaborators, and a brief outline of workplan contents; the Background section provides an overview of cumulative impacts and highlights the existing Air District programs; the Method section includes key principles that the Advisory Council adopts to guide its work; and the Products and Timeline section presents the planned deliverables, focus area, and working steps.

The appendix in this Cumulative Impacts Workplan also contains the following supporting information:

- Appendix A: Focus areas considered by the Advisory Council in developing the workplan.
- Appendix B: The Advisory Council's Interim Findings (approved July 2024) and Draft Recommendations (considered December 2025).
- Appendix C: Options for considering cumulative impacts in permitting.
- Appendix D: The selected references reading list provided to and supplemented by members of the Advisory Council on the topic of cumulative impacts.

This workplan overview will be led by Council Member Dr. Philip T. Martien.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: David Holstius and Song Bai
Reviewed by: Greg Nudd

ATTACHMENT(S):

1. 2026-03-16 Advisory Council Workplan

Cumulative Impacts Workplan

Bay Area Air District Advisory Council

DRAFT – March 2026

Introduction

Advisory Council

The Bay Area Air District's Advisory Council consists of seven members with expertise in air pollution science, climate change, or the health impacts of air pollution. The Chair of the Bay Area Air District Board of Directors serves as an ex-officio member.

Workplan Purpose

The purpose of the *Cumulative Impacts Workplan* is to provide a blueprint for the Advisory Council in developing recommendations on methods to identify, assess, and reduce the cumulative impacts of air pollution in the Bay Area, where such methods would account for impacts of both chemical and non-chemical stressors on health, well-being, and quality of life. Cumulative impacts of air pollution are most profound for frontline environmental justice communities.

The goal of the *Workplan* is to guide the development of a specific set of written recommendations for the Air District's Board of Directors to consider adopting.

The *Workplan* is a working document subject to revision by the Advisory Council, as needed, to keep the development of recommendations on track.

The *Workplan* outlines a collaborative process. Specifically, the process will engage and have guidance from community members most impacted by air pollution.

Audience and Collaborators

Because the *Workplan* process will be collaborative, the *Workplan* should be understandable by those who wish to participate, including members of the Advisory Council, Air District staff, and members of the public. For addressing the cumulative impacts of air pollution, key collaborators will be another Air District advisory group, the Community Advisory Council, which since 2022 has advised the Air District on community-related matters to advance an equity-forward agenda.

To help make the *Workplan* accessible, its length is about 10 pages, not counting the Appendix.

Contents

The *Workplan* **Introduction** section is followed by four additional sections. The **Background** section briefly summarizes key information about cumulative impacts, how current Air District programs consider them, and how the Air District's strategic planning addresses them. The **Methods** section presents principles, roles, and general processes to guide and focus the Advisory Council's work. The **Products and Timeline** section outlines the goals and planned output of the Advisory Council's efforts in addressing cumulative impacts and the decision points needed to and steps needed to develop the output. The **Appendix** contains supplemental and supporting information.

Background

Cumulative Impacts Overview

Definitions, framing, and challenges. Cumulative impacts can be understood as describing the *total picture* of environmental stressors that shape people's health and quality of life. Instead of looking at one chemical pollutant at a time, a cumulative impacts perspective emphasizes the totality of exposures that people face: toxic air contaminants, water quality degradation, noise, heat, etc., as well as social factors like poverty or inadequate housing. It also emphasizes that, as research has shown, these factors can interact in ways that amplify harm. For example, psychosocial stress can make people more vulnerable to pollution, while poor housing quality can worsen exposures indoors. Yet U.S. environmental regulation has largely been constructed around one-by-one considerations of pollutants, sources, exposures, and standards. Lack of tools or data are cited as reasons why more decisive action on cumulative impacts is not possible. Related challenges include how to show sufficient proof of harm, how to agree on priorities, and how responsibility is distributed among various authorities.

History, progress, and present efforts. The idea of cumulative impacts has grown out of decades of scientific inquiry and community experience, closely linked with the environmental justice movement. Today, states across the U.S. are developing environmental justice screening tools and cumulative impact laws to identify and reduce disproportionate burdens. Regulators increasingly recognize that consideration of cumulative impacts does not need to be prohibitively complex or purely quantitative. Many of the emerging approaches are place-based. Laws and regulations are being used to designate areas for targeted interventions, tighter standards, or other health-protective actions.

Existing Air District Programs

The Air District currently considers certain aspects of cumulative impacts through existing programs and policies, including the use of CalEnviroScreen. The federal Clean Air Act and state law set overarching requirements, but the Air District has discretion: it can tighten certain standards or adopt region-specific rules, so long as these are grounded in evidence and can withstand legal and economic scrutiny.

Measurement and Modeling of Ambient Air. The Air District's monitoring network is designed to measure the combined mixture of pollution from many sources. The network's primary goals are to track exposure across the region. Combining measurement with modeling provides some information about what sources might bear more or less responsibility for levels and distributions of pollution in ambient air across the region. Community-focused monitoring efforts, as in AB 617 communities, add additional layers of information. Evidence and information gained from measurements and modeling support regional-scale efforts which aim to protect public health with an adequate margin of safety. Interventions aimed at meeting and maintaining standards differ by source type, with the most notable split being between state and federal jurisdiction (over mobile sources) and Air Districts (over stationary sources).

Regulation of Stationary Sources, Including Permitting. While the impacts of all sources are cumulative, permitting programs for stationary sources generally consider them one at a time. When an application for a new or modified source is submitted to the Air District, staff rely on

standardized protocols to identify a set of pollutants and estimate emission rates, given the nature and size of the source. This scope generally applies to normal operations, not including emergencies.

Under the Bay Area Air District's Rule 2-5, a permit to create or modify a source expected to emit toxic air contaminants (TACs) requires a health risk assessment (HRA), unless the estimated TAC emissions are below pollutant-specific trigger levels codified in Rule 2-5. The Air District has discretion over some aspects of HRA processes, such as threshold levels. Other aspects are mandated by external requirements. Somewhere in the middle are aspects determined by guidance that the Air District has elected to adopt. For example, whether an assessment is source-specific or facility-wide, the Air District relies on additive risk frameworks and key parameters specified in guidance from California's Office of Environmental Health Hazard Assessment (OEHHA) for calculating cancer and non-cancer risk. In considering where to calculate these and what benchmarks to use, the Air District's process focuses on maximum values across nearby receptor locations (rather than, e.g., local averages), and applies stricter cancer-risk thresholds and enhanced public notification in areas identified using CalEnviroScreen.

With limited exceptions, contributions from other equipment at the same facility, or other facilities, are outside the scope of these HRAs. An important exception to the source-by-source approach is the Air District's Rule 11-18, which targets existing TAC emissions from a high-impact facility in its entirety, including TACs that might not have been part of scoping processes when sources there were initially permitted. Such facilities are frequently located in overburdened communities.

For pollutants that are not classified as TACs, such as ozone or fine particulate matter ($PM_{2.5}$), the permitting process follows a different approach, relying mainly on regional attainment planning and offset requirements. Under this approach, requirements are framed in terms of expected emissions. Control of emissions is still emphasized: "Best Available Control Technology" (BACT) refers to the most stringent emission limit or commercially available technology that has been successfully applied to similar sources, considering both cost and practicality. The Air District has some latitude in determining what "best available" entails, as well as how uniform that standard might be across the region. After controls are applied, significant increases in anticipated rates of emissions of these pollutants, or their precursors, must be balanced by reductions somewhere else in the Bay Area. This is known as offsetting, and its lack of locality has often drawn objections from communities who point out that regional trade-offs do little to relieve their own situations.

Incentive Programs. Incentive programs also consider cumulative impacts, mainly by using place-based designations to prioritize and guide funding for initiatives like cleaner heavy-duty vehicle fleets or improving local infrastructure in disadvantaged/overburdened communities.

Guidance for Cities and Counties. Under the California Environmental Quality Act (CEQA), the Air District publishes non-binding guidance that cities and counties rely on when reviewing projects. This guidance includes thresholds of significance. Project-level analyses consider the impacts of new emissions in the context of impacts from all other sources in the area, and a

project's impact can be considered significant if it would cause the combined total to exceed a health-based standard or threshold. This means that a modest increase in emissions may be deemed significant where pollution levels are already high.

Alignment with Ongoing Air District Activities

This subsection identifies portions of the Air District's *2024-2029 Strategic Plan* and the Community Advisory Council's 2024 *Call to Action* that are most relevant to the *Workplan*.

Air District's *2024-2029 Strategic Plan*

The *2024-2029 Strategic Plan* includes[1]

> ***Cumulative Health Impacts****: [The Air District] will develop [its] understanding of the cumulative effects of air pollution and other stressors, and use this information to focus regulatory efforts in areas experiencing the most serious air pollution and related cumulative impacts.*
>
> ***Change Approach to Air Quality****: [The Air District] will change [its] approach to reducing air pollution so that [it] achieve[s] more meaningful improvements to air quality in communities, with a focus on those overburdened by air pollution.*

Community Advisory Council's *A Call to Action, Charting a New Course Toward Environmental Justice at the Bay Area Air Quality Management District,* 2024

The Community Council's *A Call to Action* includes nine environmental justice priorities including:

> ***Implement Environmental Justice Best Practices and Innovation:*** *The Air District must create and implement a strategy for incorporating environmental justice best practices and innovation into its day-to-day operations and core functions–including data collection and analysis; measurement and monitoring; permitting; environmental analysis; inspections; enforcement; and legal actions including litigation, mitigation, planning, rule making, and incentives funding.*

Methods

Principles

The Advisory Council is adopting the following key principles to guide its work:

- Follow a collaborative development process. Specifically, align with the Air District's *2024–2029 Strategic Plan,* the Community Advisory Council's 2024 *Call to Action* and seek community perspectives to help drive the process.
- Have a preference for protective actions, when faced with uncertainty. Prioritize work that can lead to tangible benefits for communities in a feasible time frame.
- Be transparent about how work is done and how decisions are reached.
- Identify resource needs for work product options.

[1] In the Strategic Plan, these are Strategies 2.11 and 1.1, respectively.

- Favor simple methods over more complex ones. Simple methods are more easily understood, adopted, defended, and maintained than complex ones.
- Adopt "best practices," as described in the Community Advisory Council's *2024 Call to Action.*

Roles and Process

Following the October 30, 2024, Advisory Council meeting, an ad hoc committee was formed to make progress on developing this *Workplan*. A subcommittee of the Advisory Council will develop draft products in partnership with Air District staff. At a relatively early stage, at least one meeting of the Advisory Council, or subcommittee of the Advisory Council, will meet with the Community Advisory Council, or subcommittee of the Community Advisory Council, to discuss this work and seek direction from the Community Advisory Council.

Draft products will be presented at public Advisory Council meetings, and the full Advisory Council will revise drafts and make decisions from options presented. A final draft set of recommendations will be presented to the Air District's Board of Directors for changes and/or finalization.

Products and Timeline

Goals and Deliverables

This *Workplan* is intended to result in the following products or output from the Advisory Council:

- A written list of findings for Air District staff to reference
- Recommendations for new methods that will:
    - minimize added burden to areas already suffering cumulative impacts,
    - reduce differential exposure to air pollution,
    - consider non-chemical stressors, and
    - reflect community concerns and understanding.
- A summary of the minutes of the Advisory Council meetings on the topics of cumulative impacts.

Before the end of 2026, the Advisory Council will deliver a draft *Cumulative Impacts Findings and Recommendations* written document for the Air District's Board of Directors to consider approving.

The *Findings and Recommendations* should be understandable by a broad audience, including members of the Advisory Council, Air District staff, the Community Advisory Council, and members of the public. The *Findings and Recommendations* should be less than 20 pages, not counting the Appendix.

Focus Area

At the October 30, 2024, Advisory Council meeting, the Council decided to focus on permitting. Meaningful consideration of cumulative impacts in permitting was highlighted as a top priority for community groups. Permitting was identified by the Community Advisory Council as one of seven areas where Environmental Justice best practices should be implemented. Strategy 4.3

of that document demands that air quality permits be “clear, consistent and enforceable so that air pollution affecting communities is minimized”.

The framework developed for permitting may also apply to other focus areas. Such applications may be discussed later, possibly by the next Advisory Council, whose term starts in 2026. A list of all focus areas considered by the Advisory Council is included in the Appendix.

Options for Considering Cumulative Impacts in Permitting

Options for Assessments and Actions

This section identifies options for assessing and actions for reducing cumulative impacts in permitting. The Advisory Council may consider adopting and expanding some of these options in recommending a cumulative impacts framework. Some of the options discussed in this section may be combined; that is, adopting one option does not exclude another.

As described in the **Background** section, regulators increasingly recognize that consideration of cumulative impacts does not need to be complex or purely quantitative. Options in this section include place-based approaches that recognize the persistent spatial patterns of disparate impacts evident in the Bay Area as in the rest of the U.S. These approaches designate areas for targeted interventions, tighter standards, or other health-protective actions and tend to background complex, causative models aimed at quantifying disparate harm.

More background related to this section and a more detailed discussion on approaches for enhancing the consideration of cumulative impacts in the Air District’s permitting process are included in Appendix C. For Example, Appendix C highlights several examples of jurisdictions that have adopted or are in the process of adopting regulations that address cumulative impacts in permitting, including the Air District. Information in this section and the related material in Appendix C are intended to provide a starting point for developing the *Cumulative Impacts Findings and Recommendations* document.

Table 1 below lists options for expanding or changing **impact assessments** related to permitting new and modified sources of air pollution to provide more consideration of cumulative impacts (options IA1-IA8). Table 2 below lists options for **actions to reduce cumulative impacts** (options AC1-AC11). Many actions in Table 2 assume that a place-based approach is adopted to identify overburdened communities.

Table 1. *Descriptions of options for expanding or changing impact assessments conducted in permitting new and modified sources of air pollution.*

Impact Assessment Option	**ID**	**Description**
Add a background concentration	IA-1	Accounting for background exposure concentration levels in calculating hazard indices in health risk assessments could help account for cumulative impacts.
Sum over multiple target organs	IA-2	The traditional approach to estimating hazard indices uses a single reference concentration (RfC), which considers the most sensitive target organ system only. Chiger et al (2025) showed that it is possible to extend this approach by summing hazard indices for multiple target organ systems associated with a chemical.
Include systematically exempted but quantifiable emissions	IA-3	More completely include emissions associated with startup, shutdowns, and accidental releases. In some cases, these non-routine emissions are significant and can be estimated approximately with reasonable assumptions.
Consider un-inventoried emission sources	IA-4	An assumption of zero emissions for un-inventoried sources may be unjustified for some source categories. Evaluations of case histories across various industry types could reveal more accurate estimates of emissions that may be missing.
Adopt a place-based approach	IA-5	This approach uses indicators to represent both chemical and non-chemical stressors and create maps of overburdened areas. All efforts to address cumulative impacts in permitting have used a place-based approach. Maps of overburdened communities, like CalEnviroScreen, are a starting point. Assessment of excessive impact and actions to reduce impacts are different within mapped areas than outside them. Note: Under this option, plans would be needed to prepare for updates in the boundaries to an overburdened community.
Include recognized stressors in precautionary hazard assessments	IA-6	For some source categories there are stressors and other factors not generally considered that could be used to trigger action in a hazard assessment. Such factors include odor, flaring, history of accidents, and a history of permit violations.
Conduct health impact assessments	IA-7	A *health impact assessment* is a combination of procedures, methods, and tools aimed at evaluating the potential effects of a proposed project, plan, or policy on the health of a population and the distribution of those effects within the population.
Increase community representation in conducting assessments	IA-8	For some source types and within overburdened communities (under a place-based approach) consider increasing the opportunities for nearby community members to express concerns and help identify stressors or other elements to the impact assessment.

Table 2. *Descriptions of options for actions to reduce cumulative impacts in permitting new and modified sources of air pollution.*

Action Option	ID	Description
Lower emissions thresholds for BACT	AC-1	Require best available control technology (BACT) at a lower level of emissions inside overburdened communities than outside.
Use emissions thresholds for TBACT	AC-2	Inside overburdened communities, require the best available control technology for toxics (TBACT) if emissions of toxic air contaminants for a new or modified source has the potential to exceed an established emissions limit (trigger level). Currently, the Air District applies risk-based thresholds for TBACT.
Tighten criteria for environmental review	AC-3	Set lower emission thresholds and tighten other screening criteria needed to trigger an environmental review, such as required by CEQA, inside overburdened communities. Such reviews may result in project modifications to reduce emissions of and exposures to air pollution.
Enhanced public engagement	AC-4	Inside overburdened communities, for some source types, lower trigger levels for public notification.
Consider facility compliance history	AC-5	For facilities with a poor compliance history, use emission trigger levels instead of risk thresholds as the basis for denying permits.
Limits on near-source $PM_{2.5}$ impacts	AC-6	Using assessment methods appropriate for a near-source analysis, set concentration requirements for $PM_{2.5}$ from new or modified sources inside overburdened communities. Set permit requirements for modeled PM increments over a set level of significance.
No-net-increase emission caps	AC-7	Within overburdened communities, establish emission caps for toxic air contaminants and $PM_{2.5}$. This could entail developing an emissions budget for facilities in overburdened communities. For some facility types, require no net increase in emissions.
Lower risk thresholds	AC-8	The Air District currently requires stricter cancer risk limits on new or modified sources located within an overburdened community. The Advisory Council may consider supporting lower cancer risk limits and may lower limits for chronic/acute hazard indices.
Renew efforts on reducing risk at existing facilities	AC-9	The Air District is currently amending its Regulation 11-18: Reduction of Risk from Air Toxic Emissions at Existing Facilities, which is needed to make progress in implementing this useful rule. The Advisory Council may consider whether the proposed amendments are sufficient.
Community benefit agreements	AC-10	A community benefit agreement could require measures to mitigate environmental impacts related to emissions from a permitted facility and changes designed to improve community health. See rule development underway in Minnesota, as discussed in Appendix C.
Prohibit select categories of permits	AC-11	Prohibit some permit types in overburdened communities.

Planned Steps

To develop and prepare a *Findings and Recommendations* document no later than the end of 2026, with a focus on cumulative impacts in permitting at the Air District, the Advisory Council will follow a sequence of five steps (I through V) shown in Table 3 and outlined below. Table 3 lists the sequence of planned Advisory Council meetings in 2025. Listed in Step I (first column) are meetings with the Community Advisory Council and/or other stakeholders. A meeting with the Air District's Board of Directors (last column) to present the *Findings and Recommendations* document will occur in 2026. Draft written summaries prepared for each of the steps outlined below will be incorporated into the *Findings and Recommendations* document.

Table 3. *Table of planned steps (I through V) to develop a set of recommendations for more fully incorporating consideration of cumulative impacts into the Air District's permitting process. The table lists the sequence of planned Advisory Council meetings in 2025.*

I. Seek collaborators	**II. Understand Air District process, progress in other states**	**III. Specify the desired outcomes**	**IV. Develop a framework, draft ideas**	**V. Draft recommendations**
● Present draft ideas to the Community Advisory Council, gauge interest in collaboration ● Develop preliminary Workplan	● Advisory Council Meeting 1 (Oct 6) ● Summarize the Air District's current permitting process ● Summarize progress in other states	● Advisory Council Meeting 2 (Oct 6) ● Discussion with members of the Community Advisory Council ● Review and update the Workplan	● Advisory Council Meeting 3 (Dec 8) ● Explore draft recommendations ● Review and update the Workplan ● Discuss transition plans for the next Advisory Council	● Further consider draft recommendations ● Presentation to the Board of Directors ● Finalize recommendations

Step I

In Step I, the Advisory Council will identify stakeholders with an interest in developing recommendations to more fully include cumulative impacts in the Air District's permitting processes. The Advisory Council meetings are all public meetings. Any member of the public can comment during the Advisory Council meetings, and Advisory Council members have expressed interest in exploring other ways to engage with stakeholders, beyond the Advisory Council meetings. For example, Advisory Council members have voiced a strong interest in soliciting input and guidance from the Community Advisory Council. This idea, along with other ways to engage stakeholders, will be explored in Step I.

Collaboration between Advisory Council and Community Advisory Council

Meeting(s) between the Advisory Council and the Community Advisory Council could be organized in different ways. Some possible options are listed below:

1. A meeting of a subcommittee of the Advisory Council with the full Community Advisory Council.

2. A meeting of a subcommittee of the Advisory Council with a subcommittee of the Community Advisory Council.
3. A meeting of a subcommittee of the Community Advisory Council with the full Advisory Council.
4. Joint meeting of the Advisory Council and Community Advisory Council. This option could be challenging to organize to match the schedule of this *Workplan*.

The Advisory Council ad hoc committee has made progress on these options:

- A member of the Advisory Council attended and presented at the Community Advisory Council's retreat on May 16-17, 2025, discussing the Advisory Council plans for this term and seeking Community Advisory Council members who might be willing to engage with the Advisory Council to develop draft ideas. An agenda for that meeting is here. The presentation, agenda item 4.C., is available here (presentation with Q&A times: 2:26:00 - 3:12:18).

- The Advisory Council ad hoc committee met with two Community Advisory Council members who expressed interest at the retreat to discuss this *Workplan* and solicit preliminary guidance.

- The Advisory Council scheduled time in Meeting 2 for discussions between the full Advisory Council and two Community Advisory Council members.

Step II

In Step II, the Advisory Council will seek to understand in more detail the current permitting process at the Air District and learn about progress in other states on developing and implementing regulations that consider cumulative impacts in permitting process.

To advance Step II goals, the Advisory Council ad hoc committee has worked with staff to develop materials summarizing the Air District's current permitting processes, including New Source Review for toxics and as well as for other pollutants. These materials describe ways in which the Air District already considers cumulative impacts in permitting new and modified sources.

Also, in pursuit of Step II goals, members of the Advisory Council ad hoc committee and Air District staff attended a virtual workshop on July 14 and 18 hosted by New York University on efforts by states across the U.S. to consider cumulative impacts in permitting.[2] Air District staff followed up with speakers at that workshop to present at Meeting 1. For the July 2024 Advisory Council meeting, staff provided a summary presentation on progress in other states related to addressing cumulative impacts in permitting. Presentations at Meeting 1 provided a more in-depth and up-to-date summary, covering many developments over the past 12 months.

Advisory Council Meeting 1

In Meeting 1, the Advisory Council

[2] Building on this workshop, the Tishman Center in New York hosted a free webinar on Developing Cumulative Impacts Permitting Protections: Policy Design, Decision Points, and Lessons Learned from a State-by- State Review on September 24, 2025, 2-3:30 pm EST.

- Received a presentation from staff on the Air District's current permitting procedures, for toxics and other air pollutants.
- Received presentations from representatives of other states and from others familiar with work in other states on progress in developing and implementing regulations that consider cumulative impacts in permitting processes.

Step III

In Step III, the Advisory Council will host discussions with members of the Community Advisory Council and will review and provide comments on this *Workplan* updated by the ad hoc committee.

Advisory Council Meeting 2

In Meeting 2, the Advisory Council

- Engaged in discussions with members of the Community Advisory Council on elements to consider in developing recommendations for considering cumulative impacts in the Air District's permitting process.
- Reviewed and commented on the draft *Workplan*. Provided needed revisions to the draft *Workplan*, including
    - The "Cumulative Impacts Overview" section, which sets the stage for recommendations to be developed;
    - The "Options for Considering Cumulative Impacts in Permitting" section;
    - The "Planned Steps" section, which estimates timelines.
- Provided direction to the ad hoc committee on drafting a *Findings and Recommendations* document.
- Developed ideas for Meeting 3.

Step IV

In Step IV, the Advisory Council will synthesize information gathered in Steps II and III to develop a set of draft recommendations for modifying the Air District's permitting process. Prior to Meeting 3, the ad hoc committee will provide a draft list of findings and recommendations to the full Council for discussion and review. Finally, the Council will make plans in preparation for handing off materials to next term's Advisory Council.

Advisory Council Meeting 3

The agenda of Advisory Council Meeting 3 will include the following:

- A presentation from staff on the Air District's on the status of developing background concentrations of toxic air pollutants and on applying health data to support options discussed by the Advisory Council.
- Presentations from academics and from the California Office of Environmental Health Hazard Assessment on advancing methods for estimating hazard indices.
- A discussion of a draft list *of findings and recommendations.*
- Approval of the list, with revisions as needed. (Action Item)
- Discussion of a transition plan for next term's Advisory Council.

Step V

Step V will be completed in 2026 by the next Advisory Council. Starting from the list of findings and recommendations discussed at Meeting 3, the Council will develop the *Cumulative Impacts Findings and Recommendations* document for the Air District's Board of Directors to consider. The next Council will also discuss the development of materials summarizing the *Cumulative Impacts Recommendations* for presentation to the Board.

Meetings of the Next Advisory Council

Meetings of the Next Advisory Council should include:

- Deliberation on the development of the *Findings and Recommendations* document.
- Discussion of options for meeting with the Board of Directors, which will include taking advice from staff on timing and on sequencing of meetings with the full Board vs. a Board Committee.
- Discussions on the development of presentation materials and/or talking points presentation to the Board and/or Board Committee. It's possible that a Committee of the Board may make recommendations for changes to the Advisory Council's document. The Advisory Council and staff should discuss in advance how to address such changes.

Board of Directors Meeting

Likely in 2026, a subcommittee of the Advisory Council will present its draft *Cumulative Impacts Recommendations* findings to the Air District's Board of Directors, or to a Subcommittee of the Board of Directors, or both. The Advisory Council will work with staff to determine the timing and Board meeting, or meetings, at which to present its findings.

Appendix

The Appendix contains supporting information. It includes the following:

- Appendix A: Focus areas considered by the Advisory Council in developing the *Workplan*.
- Appendix B: The Advisory Council's Interim Findings (adopted July 2024) and Draft Recommendations (considered December 2025).
- Appendix C: Options for considering cumulative impacts in permitting.
- Appendix D: The selected references reading list provided to and supplemented by members of the Advisory Council on the topic of cumulative impacts.
- Other supplemental material as needed.

This section is not counted toward the goal of an overall *Workplan* page limit.

A. Focus Areas Considered

Each item in this list could be an area of focus for the Advisory Council. For each, work products may include suggested methods to identify cumulative impacts, to assess the extent and character of the impacts, and to facilitate policies or actions to reduce the impacts.

- Permits (New and Modified Facilities)
  - Provide additional justification and documentation for the current regulatory approach (Air District Rule 2-5) of stricter risk limits in overburdened communities.
  - Make recommendations for streamlining the current health risk assessment methodology while addressing cumulative impacts. New methods may be less quantitative and/or may mix quantitative and qualitative methods.
  - Recommend ways to include the local, near-source impacts of $PM_{2.5}$, in addition to those from toxic air contaminants. This would incorporate prior work developed under the Advisory Council.

- Stationary Source Regulations (Existing Facilities)
  - Recommend ways to consider cumulative impacts when setting emission standards.
  - Recommend ways to simplify and streamline the current approach of implementing Air District Rule 11-18.
  - Recommend ways to include the local, near-source impacts of $PM_{2.5}$, in addition to those from toxic air contaminants. This would incorporate prior work developed under the Advisory Council.

- Air Quality Planning
  - Make recommendations for a community focused approach to air quality planning.

- California Environmental Quality Act (CEQA)
  - Make recommendations for more thorough consideration of cumulative impacts, balancing infill development with protecting community health.
- Compliance / Enforcement
  - Make recommendations for a community-focused approach to enforcement activities and the distribution of penalty funds.
  - Recommend ways to leverage compliance / enforcement data: for example, to inform other activities such as emissions characterization.
- Incentives
  - Recommend ways to expand, standardize, and/or streamline consideration of cumulative impacts across incentive programs.

B. Advisory Council Proposed Interim Key Findings and Draft Recommendations

Deliberation on the Key Findings in Existing Research on Cumulative Impacts

Advisory Council Meeting

July 29, 2024

Agenda Item 5

Proposed Interim Key Findings:

1. Despite resilience and adaptation, some communities are more vulnerable to the health impacts of air pollution than others.

2. Community health vulnerability is related to multiple stressors, including racism, poverty, historic environmental injustice, environmental exposures, housing insecurity, effects of climate change, and other factors.

3. Effects of exposure to multiple stressors can be greater than the sum of the individual effects.

4. The science on these issues is strong enough to justify science-based policy changes.

5. Additional quantitative, and qualitative data and methods, as well as community perspectives, are needed, even as we move forward with policy development, based on the current science.

6. Methods for considering cumulative impacts and related policy changes should be developed in partnership with community members, notably those from marginalized populations.

7. Methods for accounting for cumulative impacts can be simplified when targeted to specific policy actions.

1. The Air District should update its emissions inventory for toxic air contaminants (TAC) for the Bay Area. Using both monitoring and modeling, the Air District should estimate ambient TAC concentrations throughout the region, with an initial focus on AB 617 communities, followed by areas designated by the Air District as overburdened communities, but with the goal of estimating air concentrations across all of the Bay Area. Going forward, these estimates should be regularly updated.
2. The updated estimates of ambient TAC concentrations produced under recommendation #1 above, and the concentrations of criteria air pollutants, represent the existing ambient air pollution concentration in a given community prior to consideration of a permit. Any additional emissions from a single source should be considered additive to that background for permitting purposes, to account for the cumulative impacts of existing air pollution.
3. The Air District should work with academic partners and the California Office of Environmental Health Hazard Assessment (OEHHA) to develop an approach that will allow calculation of hazard indices (HI) using multiple target organ systems rather than only the most sensitive organ system target for each chemical. This will capture the cumulative impacts of multiple chemicals in non-cancer risk assessments. This approach should include multiple pollutants, including TAC and criteria air pollutants.
4. The Air District should tighten thresholds for hazard indices (HI), especially in overburdened communities at least until recommendations #1-3 can be completed, and considerations of nonchemical stressors can be included
5. The Air District should develop methods to more fully account for site-specific issues in the permitting process. This should include–but not necessarily be limited to–more rigorous regulation of emissions during start-up, shut-down and upset conditions; compliance history; and other conditions that currently may not be adequately captured.
6. The Air District should update Rule 11-18 to ensure that it more effectively addresses the concerns of communities facing cumulative impacts. The District should present the proposed updates to the Advisory Council well in advance of any rulemaking to allow the Council to advise on how cumulative impacts may be integrated into the revisions.
7. The Air District should develop and apply methods to account for local, near-source impacts of fine particulate matter ($PM_{2.5}$) from new and modified sources, especially in communities facing cumulative impacts. Possible methods for regulating near-source impacts of $PM_{2.5}$ have been discussed during this term of the Advisory Council and the prior one. Such methods include a risk-based approach, a hazard index approach, or a no net increase approach.
8. The Advisory Council supports the use of place-based approaches to identify communities for more health-protective actions in the permitting process, with an explicit plan for expanding work beyond the initially identified communities. However, a

place-based approach alone is insufficient to address cumulative impacts in the Bay Area, without the additional activities described above.

9. The Advisory Council supports the development of rules that provide for no net increase in emissions in permitting new and modified sources for some facility types in overburdened communities.
10. The Air District should continue to engage with its community partners to understand their perspectives and lived experiences, especially in areas designated by the Air District as overburdened communities and explore opportunities to expand engagement when developing new rules and assessment methods related to permitting.

C. Approaches for Considering Cumulative Impacts in Permitting: Assessments and Actions

Introduction

To help the Advisory Council develop a framework for considering cumulative impacts in the Air District's permitting process, this appendix section identifies options for assessing and actions for reducing cumulative impacts in a permitting context. In most cases, these options have been implemented or discussed in regulatory contexts, either at the Air District or within other jurisdictions. In a few cases, additional options are also explored. The Advisory Council may consider adopting and expanding some of these options in recommending a cumulative impacts framework. Some of the approaches discussed in this appendix section may be combined; that is, adopting one option need not exclude another.

This appendix section starts with an overview of impact assessments typical for air quality permitting. Then follows a discussion of ways that cumulative impacts can be incorporated into such assessments. Next, is an overview of general preventative actions to reduce or avoid impacts followed by a discussion focused on ways to tailor actions to account for cumulative impacts. Finally, this appendix section ends with an overview of examples from other states and steps that the Air District has already taken to consider cumulative impacts in permitting.

Regulators increasingly recognize that consideration of cumulative impacts does not need to be prohibitively complex or purely quantitative. Instead, it can be tailored to specific statutory or regulatory contexts. Many of the emerging approaches are place-based, recognizing the persistent spatial patterns of disparate impacts tied to national patterns of discrimination and disinvestment. Tools and statutes are being used to designate areas for targeted interventions, tighter standards, or other health-protective actions.

Impact Assessments

Definition of Terms

Many of the terms used in the context of impact assessment sound similar but have specialized, specific meanings. Since the usage of these terms can vary, some definitions used in this document are listed in Table C.1 below.

Table C.1. Definitions of terms used in the context of impact assessment.

Term	Definition
Impact	A generic adverse outcome, a harm to public health or the environment
Hazard	The potential of a substance to cause harm, to cause an impact
Risk	The calculated probability, or chance, that a hazard will cause harm, often to a specific or a hypothetical maximally exposed individual under a specific set of conditions
Burden	A quantification of the impact of diseases and injuries on a population. It measures the overall health loss due to specific risk factors for the population

Hazard Assessment

A *hazard assessment* is generally the first step in understanding the potential for impacts. For example, in a permitting context, a hazard assessment might determine whether a significant amount of air pollutants would be emitted in a location where people could be exposed and could suffer impacts.

Health Risk Assessment

A *health risk assessment* in the context of air pollution permitting typically refers to quantitative estimates of impact[3].

1. *Cancer Risk* is the estimated probability, or chance, that an individual will develop a cancer from long-term exposure risk to carcinogenic pollutants where the assumed duration of the exposure can depend on the type of assessment. Cancer risk from individual pollutants is summed to develop an overall cancer risk.
2. *Acute Hazard Index* is a measure of the potential for an individual to experience non-cancer health impacts resulting from a short-term (often one hour) exposure to toxic substances. The acute hazard index is a sum of impacts across different pollutants that have similar health endpoints; but, it is not a sum across different health endpoints for a given pollutant.
3. *Chronic Hazard Index* is a measure of the potential for an individual to experience long-term non-cancer health impacts, where the assessment period is greater than an hour and up to a year. The chronic hazard index is a sum of impacts across different pollutants that have similar health endpoints; but, it is not a sum across different health endpoints for a given pollutant.

Developing a health risk assessment requires significantly more information than identifying a hazard. For each of the three types of impacts in a health risk assessment, it is necessary to take additional steps beyond the hazard assessment:

1. An *exposure assessment* is needed to determine where people are exposed to a given pollutant, for how long, and at what concentrations. Typically, through a set of assumptions, one identifies an individual who is *most exposed*. The exposure assessment is usually done using computer-based modeling and requires information such as emission amounts and release characteristics, meteorological information—winds, atmospheric stability, and temperatures—and locations of people nearby.
2. A *dose-response assessment* for which one needs information about pollutant toxicity and characteristics of people exposed. For example, factors such as a compound's carcinogenicity and acute and chronic reference exposure levels along with breathing rates and individual sensitivities are needed.

[3] New Approach Methods (NAMs) are being developed to update traditional risk assessments. These methods are building on work at the National Research Council (NRC) and the National Academies of Sciences, Engineering, and Medicine for developing, improving, and validating NAMs to integrate and use the emerging results in evaluating chemical risk. See National Academies of Sciences, Engineering, and Medicine. 2022. New Approach Methods (NAMs) for Human Health Risk Assessment: Proceedings of a Workshop–in Brief. Washington, DC: The National Academies Press. https://doi.org/10.17226/26496.

3. A *risk characterization* combines the information from the steps above, to estimate the cancer risk and hazard indices, as described above. This step should also include a description of the assumptions and the information used to develop the risk assessment, and an estimate or characterization of the uncertainty associated with the assessment that may be considered by the public and by decision makers.

Burden Assessment

A *burden assessment* quantifies the impact of diseases and injuries for a defined population. It estimates the overall health loss due to specific risk factors. For example, a burden assessment might estimate the total number of additional cancer cases from the period of exposure, the number of premature deaths, or the number of extra emergency room visits for a population. As for a health risk assessment, the information needed for a burden assessment is substantial. An exposure assessment and an assessment of the toxicity or health impact of the pollutant is needed. Table C.2 below compares the focus and data needs of the three types of assessments discussed above.

Table C.2. Characteristics of common types of impact assessment.

Impact Assessment Type	**Purpose**	**Relative Data Needs**
Hazard Assessment	Identify the potential for impacts	Low
Health Risk Assessment	Estimate the probability of specific impacts	High
Burden Assessment	Estimate the number of specific health impacts for a population	High

Public Participation

Impact assessments often include public engagement. The level of engagement depends on the application and the organization developing the assessment. The practice of public engagement is evolving but the Air District has documented different levels of engagement. An appreciation of these different levels was developed, as shown in Table C.3, through reviews of public participation practices at other agencies and through discussions with community groups about meaningful engagement in different contexts. The Advisory Council may consider these levels in recommending a framework for considering cumulative impacts.

Table C.3. Levels of public engagement.

Level of Engagement	Description
Inform	Make the public aware of programs, policies, or decisions
Connect	Provide information for the public to understand programs, policies, or decisions
Comment	Create opportunities for the public to comment on programs, policies, or decisions
Involve	Hold meetings to allow the public to help shape programs, policies, or decisions
Collaborate	Co-develop programs, policies, and decisions with the public
Partner	Co-develop programs, policies, and decisions with the public via planned and structured relationships

Considering Cumulative Impacts in Impact Assessments

Developing a framework for incorporating cumulative impacts into impact assessments can be accomplished in different ways. One way would be to extend current quantitative methods by modeling causative links between various dimensions of existing impacts, both chemical and non-chemical, and revising quantitative measures of impact. Alternatively, one could develop a framework based on alternate types of analyses, more qualitative and precautionary in nature, to be more proactive in moving to action where cumulative impacts are identified or considered likely. Finally, one could also develop a framework that combined causative modeling with more precautionary approaches.

Causative Modeling and the Tension with Completeness

In impact assessments, quantifying impacts with numerical metrics is helpful, especially when determining whether an impact is significant. By establishing a causal link or model between a hazard and its health effects, decision-makers can feel confident that their choices are based on solid science.

Another key factor in impact assessments is completeness. This refers to ensuring that all relevant elements necessary to answer a specific question are included. Completeness is vital for making assessments reliable and ensuring that decisions grounded in those assessments are well-founded.

Both quantification via causative modeling and completeness are desirable aspects of an impact assessment but, in practice, there is often a tension between having the information needed for quantification with modeling and ensuring all the important information is represented. Current impact assessments tend to be quantitative but incomplete, leaving out important factors and impacts for which causative models cannot be applied, either due to incomplete information or underdeveloped understanding.

Developing causative, quantitative models for incorporating cumulative impacts has been discussed for decades but there are still significant gaps in the information base needed due to

the complexity of incorporating all the potentially relevant factors. In this sense, there is also a tension between developing causative models and acting sooner than later.

For the Advisory Council it will be important to recognize these tensions and develop recommendations that will neither face delays required for significant scientific advances in causative modeling nor omit important factors. To that end, the rest of this section focuses on approaches that broaden the scope of existing approaches by including additional factors; approaches for characterizing and incorporating cumulative impacts have been developed sufficiently to apply; and more precautionary hazard-assessment-type approaches that often include more community perspectives and representation.

Broaden the Scope of Current Impact Assessments

Hazard Indices—Add a Background Concentration (AI-1)

As discussed above, calculations of acute and chronic hazard indices are part of traditional health risk assessments. The hazard indices are calculated as a sum of *hazard quotients*, where the hazard quotient is the typically the ratio of an exposure concentration increment of a toxic pollutant divided by a *reference concentration* for that pollutant:

$$HQ_i = \Delta EC_i / RfC_i,$$

where HQ_i is the hazard quotient for pollutant i, ΔEC_i is the increment in exposure concentration for pollutant i contributed by a modeled source, and RfC_i is the reference concentration for pollutant i, a "safe level" below which no health effects are expected. Hazard indices are calculated for each target organ system by summing the HQs from all chemicals with an RfC for that target organ system as follows:

$$HI = \sum_i HQ_i,$$

where HI_i is the hazard index for pollutant I for the target organ system. Per U.S. EPA guidance, adverse health effects are possible if any hazard quotient or hazard index is above 1 (i.e., the environmental exposure is greater than the level determined to be likely without appreciable risk). But in the hazard quotient formula above, there is an assumption of zero background concentration for pollutant i:

$$EC_{i,total} = \Delta EC_i,$$

where $EC_{i,total}$ is the total exposure concentration for pollutant i. In fenceline communities with multiple air pollution sources nearby, a zero-background assumption may not be appropriate. Instead, a modeled increment in concentration added to an existing background concentration would be more appropriate:

$$EC_{i,total} = \Delta EC_i + EC_{i,background}.$$

Accounting for background exposure concentration levels in calculating hazard indices for traditional health risk assessments could help account for cumulative impacts.

Hazard Indices—Sum Over Multiple Target Organ Systems (AI-2)

As discussed above, in the traditional approach to health risk assessment, a hazard index is formed by summing hazard quotients across multiple chemicals, each with a reference concentration (RfC), which considers the most sensitive target organ system only. There may be

other health endpoints, other than the most sensitive system, but generally RfCs are only available for the most sensitive system for a given pollutant. However, it is possible to expand the traditional approach by considering multiple target organ systems associated with a chemical.

Chiger et al (2025) created a multi-effects toxicity database by compiling toxicological and epidemiological data from the Agency for Toxic Substances and Disease Registry's (ATSDR) Toxicological Profiles and the Environmental Protection Agency CompTox Chemicals Dashboard and developed a tiering system to prioritize identified data for use in developing toxicity values. They demonstrated differences between the traditional approach and their expanded approach, finding neurological, renal, respiratory, endocrine, and systemic risks (with hazard index >1) with their expanded approach in a fenceline community, whereas no risks were identified using a traditional approach limited to RfCs for the most sensitive target organ systems only.

Include Systematically Exempted but Quantifiable Emissions (AI-3)
In health risk assessments described above, the emissions used to estimate increments in exposure concentrations are emissions resulting from "routine" operations. Not included are emissions associated with startup, shutdowns, and accidental releases. In some cases, these non-routine emissions are significant and can be estimated approximately with reasonable assumptions.

Consider Un-inventoried Emission Sources (AI-4)
One way that traditional causative modeling approaches are incomplete is that some emission sources may not be identified, are not included in the emissions inventory, and are assumed to be zero. Given the history of identifying sources and pollutant compounds after a permit evaluation, at the Air District and at similar agencies across the nation, an assumption of zero emissions for un-inventoried sources seems unjustified, at least for some source categories. Evaluations of case histories across various industry types could reveal more reliable estimates of emissions that could be missing from the inventory.

Adopt a Place-Based Approach (AI-5)
Available examples for addressing cumulative impacts in permitting applications, at the Air District and at other jurisdictions, employ a "place-based" approach, whereby maps of overburdened communities, or maps of indicators associated with cumulative impacts, are a starting point. Assessment of excessive impact, rules to address those impacts, and associated actions are different within mapped areas than outside them.

Some implementations of place-based methods have used existing maps and methodologies. Other implementations create new maps from available datasets to suit their purposes. In all place-based approaches, the maps and associated methodologies come first, and the assessments of cumulative impacts and the actions to address the cumulative impacts follow, using the maps.

This approach, an alternative to a causative modeling approach, uses indicators that have been demonstrated or likely to be stressors, including both socio-economic stressors and chemical stressors to create maps of overburdened areas.

Some jurisdictions using this approach have cautioned that plans should be made in advance to prepare for updates to the boundaries of overburdened communities when conditions or methods change.

Include Recognized Stressors in Precautionary Hazard Assessments (AI-6)
Traditional approaches include hazard assessments based on the level of emissions from a source under consideration for permitting. In some cases, such hazard assessments also consider the proximity of people to the source. But, for some source categories there are other known stressors that are not considered but that could trigger action under a hazard assessment. Some known stressors that are not typically considered in hazard assessments include the following:

- Odor. Is the source likely to emit smelly compounds, even if emissions are under trigger levels?
- Flaring. Even if flares do not emit significant levels of toxic compounds, if they are visible, they can be a source of stress.
- History of Accidents. If the facility has a history of accidents, or if similar facilities have a history of accidents, adding sources to the facility may be a source of stress.
- Permit Violations. If a facility has a history of violating permit conditions for existing sources, adding to the sources could be a source of stress.

Consider Applying Elements of Health Impact Assessments
A *health impact assessment*[4] is a combination of procedures, methods, and tools aimed at evaluating the potential effects of a proposed project, plan, or policy on the health of a population and the distribution of those effects within the population. While the purpose of a health risk assessment, as described above, is to quantify the health risk from a change in exposure to a particular set of pollutants, the purpose of a health impact assessment is to make evidence-based judgments on the health impacts of a decision and to make health-promoting recommendations. Sometimes the only evidence available is qualitative. But to be complete, qualitative evidence can be part of a robust decision-making process. Health impact assessments should engage affected populations, especially during scoping and assessment steps.

Increase Community Perspective and Representation in Conducting Assessments
For some source types and within overburdened communities (under a place-based approach) consider increasing the opportunities for nearby community members to express concerns and help identify stressors or other elements to the impact assessment.

[4] For a discussion of health impact assessments and examples, see Winkler MS, Viliani F, Knoblauch AM, Cave B Divall, M Ramesh G, et al., Health Impact Assessment, International Best Practice Principles. *Int Assoc Impact Assess* (2021) 2021(5):551–5.

General Actions to Reduce or Avoid Impacts

This section summarizes general actions, that is, actions that are in effect generally, not including considerations in overburdened communities, and focusing on actions at the Air District currently to reduce or avoid impacts from a new or modified air pollution source under consideration for a permit. These actions are often triggered by exceeding thresholds as determined by an impact assessment. Actions listed below are organized by the type of impact assessment used to determine the need for the action.

Actions Triggered by Hazard-Based Thresholds

Require Best Available Control Technology

The Air District requires best available control technology (BACT) if emissions of designated pollutants for a new or modified source have the potential to exceed an established emissions limit.

Environmental Review

Based upon emission levels and other screening criteria, a permit applicant may be required to conduct an environmental review, such as required by the California Environmental Control Act (CEQA). Such reviews may result in project modifications to reduce emissions of and exposures to air pollution.

Prevention of Significant Deterioration[5]

The Air District requires an impact analysis to demonstrate that emissions of criteria pollutants from a new or modified source will not cause or contribute to a violation of any applicable state or federal ambient air quality standards or contribute a significant increment in ambient concentrations as prescribed by the Prevention of Significant Deterioration (PSD) federal requirements. These requirements are triggered by estimates of emissions levels for the new or modified project. PSD requirements are intended to preserve *regional-scale* air quality but are expected to have local health benefits as well, though the assessments conducted to make PSD determinations are generally not useful for determining impacts at a *community scale*.

Note that there typically are no regulations for permitted sources that address the local impacts of criteria pollutants. However, for evaluating new mobile sources, such as a new freeway, localized modeling is required as part of a *hotspot analysis* for fine and coarse particles, which compares the local contributions plus background contributions to ambient air quality standards.

Publication of Notice and Opportunity for Public Comment

If the project is expected to increase in emissions of criteria pollutants over a specified emissions limit, the Air District will invite public comment and provide the opportunity of a public hearing on the project.

California state law has set requirements for sources of hazardous air pollutants near schools. Proposed new or modified sources of “hazardous air emissions” located within 1,000 feet of a

[5] PSD evaluations require an assessment of concentrations, which may be considered a hazard-based assessment from the perspective that typically no evaluation of health impacts is included.

school must give public notice to the parents or guardians of children enrolled in schools located within one-quarter mile of the source and to all addresses within a 1,000-foot radius.

Actions Triggered by Risk-Based Thresholds

The Air District's regulation for new or modified sources of toxic air contaminants requires the application of best available control for toxics (TBACT) where, as determined by a health risk assessment, the source would result in a cancer risk greater than one (1.0) in a million or in a chronic hazard index greater than 0.20.

Under the same regulation, the Air District must deny the permits if cancer risk exceeds 10.0 in one million, a chronic hazard index exceeds 1.0, or an acute hazard index exceeds 1.0.

Considering Cumulative Impacts in Actions

This section examines existing examples and drafts new ideas for incorporating cumulative impacts into impact assessments into actions that work to reduce impacts. Many actions in this section are listed by the type of impact assessment used to determine the need for the action, as in the section above, while others are listed as "general considerations." Many of the draft actions in this section assume that a place-based approach is adopted to identify overburdened communities.

Some of the options listed below may be considered in combination. Other options are mutually exclusive.

Actions Triggered by Hazard-Based Thresholds

Lower Emissions Thresholds for Best Available Control Technology. (AC-1)

Require best available control technology (BACT) at a lower level of emissions inside overburdened communities than outside.

Emissions Thresholds for Best Available Control Technology for Toxics. (AC-2)

Inside overburdened communities, require the best available control technology for toxics (TBACT) if toxic emissions of toxic air contaminants for a new or modified source have the potential to exceed an established emissions limit (trigger level). Currently, the Air District applies risk-based thresholds for TBACT.

Relax Criteria for Environmental Review (AC-3)

Set lower emission thresholds and relax other screening criteria needed to trigger an environmental review, such as required by CEQA, inside overburdened communities. Such reviews may result in project modifications to reduce emissions of and exposures to air pollution.

Enhanced Public Processes (AC-4)

The Air District currently requires that for a new or modified source located within an overburdened community for which a health risk assessment is required, the agency will prepare a public notice that describes the proposed source and its emissions. The notice is distributed to each address located within 1,000 feet of any source within the project. The agency has committed to review and consider all comments received during the 30 days after

the notice is distributed and shall include a written response to the comments in the permit application file prior to taking final action on the application.

Lower emission trigger levels inside of overburdened communities, requiring a health risk assessment and public notification at lower emission levels than outside.

Consider Facility Compliance and Enforcement History (AC-5)
For facilities with a poor compliance history, with metrics for poor compliance to be determined by the Air District, use emission trigger levels instead of risk thresholds as the basis for denying permits. This option may be applied to some selected source types.

Limits on Near-Source $PM_{2.5}$ Impacts (AC-6)
Using assessment methods appropriate for a near-source analysis, set concentration requirements for $PM_{2.5}$ from new or modified sources inside overburdened communities. Set permit requirements for modeled PM increments over a set level of significance. Considering the past the Advisory Council's findings on health impacts from $PM_{2.5}$, a level of significance for this application should not exceed 0.1 mg/m^3. This option may be applied to some selected source types.

No-Net-Increase Emission Caps (AC-7)
Within overburdened communities, establish emission caps for toxic air contaminants and for $PM_{2.5}$. This could entail calculating an emissions budget for facilities in overburdened communities. No new or modified source could contribute emissions that would result in a net increase in emissions for the facility. In other words, require no net increase in emissions. This option may be applied to selected source or facility types.

<u>Actions Triggered by Risk-Based Thresholds</u>
Lower Risk Thresholds (AC-8)
The Air District currently requires that a new or modified source located within an overburdened community face more stringent limits on cancer risk. Sources inside an overburdened community cannot exceed an estimated cancer risk of six per million, whereas outside of overburdened communities the risk threshold is 10 per million.

The Advisory Council may consider justification to support this specific lower level, or a different level, based on reviews of scientific literature.

The Advisory Council may also consider support for a lower level for chronic and acute hazard indices within overburdened communities. As well as support for methodological revisions to the calculation of hazard indices, as suggested above.

<u>Other Actions and General Considerations</u>
Amendments to Regulations for Existing Facilities—Regulation 11-18 (AC-9)
Though not a permitting regulation, the Air District's Regulation 11-18 (Reduction of Risk from Air Toxic Emissions at Existing Facilities) is included as an option in this section because of its potential relevance for reducing impacts in overburdened communities from permitted sources. Regulation 11-18 is intended to identify existing facilities whose emissions of toxic air

contaminants pose an elevated risk and require emission reductions from them. However, it has faced implementation challenges, including extreme delays in completing facility risk assessments and risk reduction plans. To address these challenges, the Air District is developing amendments to Regulation 11-18 in phases: (1) a current phase to improve transparency and efficiency and (2) a future phase to evaluate and potentially increase stringency. More consideration of impacts in overburdened communities could be an option for the future phase. For more details on Regulation 11-18 see the "Existing Examples of Addressing Cumulative Impacts in Permitting" section below.

Community Benefit Agreements (AC-10)
Community benefits agreements are emerging as a tool in some fields for improving projects' environmental justice outcomes. They are legal agreements, often between a project proponent or developer and community-based organizations, stipulating the benefits that a developer must provide to a community during and after project implementation. Done well, community benefit agreements could be a powerful tool for achieving more equitable outcomes in air pollution permitting applications. Staff at the Minnesota Pollution Control Agency have been working with the public to develop a community benefit agreement process that actively engages and encourages affected residents to participate in developing an agreement unique to each neighborhood and community.

Prohibit Select Category of Permits (AC-11)
Prohibit some permit types in overburdened communities.

Existing Examples of Addressing Cumulative Impacts in Permitting

This section highlights several noteworthy examples of jurisdictions—in New Jersey, Massachusetts, Minnesota, New York, and the Bay Area Air District—that have adopted, or are in the process of adopting, regulations to address cumulative impacts in permitting. All the highlighted examples related to permitting adopt place-based approaches. For additional information, consult the extensive catalog of related state regulations and activities produced by the Tishman Environmental and Design Center at The New School in New York.

State of New Jersey and the New Jersey Department of Environmental Protection

New Jersey's Environmental Justice Law was the first of its kind and has been recognized as one of the nation's most empowering examples of environmental justice legislation. Other states have modeled similar laws after that of New Jersey.

Instrument/ status	S 32 (Enacted 2020) and N.J.A.C. 7:1C (Adopted 2023)
Scope	Permit applicants of major pollution sources in overburdened communities are subject to additional requirements: · Prepare an environmental justice impact statement that assesses the potential environmental and public health stressors associated with a new or modified source, or with an existing major source, as applicable · Transmit the environmental justice to the department and to the municipality in which the overburdened community is located for publication. · Conduct a public hearing in the overburdened community, publishing the hearing in at least two newspapers, including one local non-English language newspaper. "…the department shall…deny a permit for a new facility upon finding that approval of the permit would, together with other environmental or public health stressors affecting the overburdened community, cause or contribute to adverse cumulative environmental or public health stressors in the overburdened community that are higher than those borne by other communities within the State…except that where the department determines that a new facility will serve a compelling public interest in the community where it is to be located…" "…the department may grant a permit that imposes conditions on the construction and operation of the facility to protect public health."
Pollutant types	The EJ impact statement requires a health risk assessment for hazardous air pollutants. More review is needed to understand to what extent other pollutants, such as $PM_{2.5}$, are also considered.
Applicable facilities	Eight facility types are included: (1) Major source of air pollution; (2) Resource recovery facility or incinerator; (3) Sludge processing facility, combustor, or incinerator; 4() Larger sewage treatment plants; (5) Transfer station or other solid waste facility; (6) Scrap metal facilities; (7) Landfills; and (8) Some medical waste incinerators.
Overburdened communities	A census block group, as determined in accordance with the most recent US Census, in which: (1) at least 35 percent of the households qualify as low-income households; (2) at least 40 percent of the residents identify as minority or as members of a State recognized tribal community; or (3) at least 40 percent of the households have limited English proficiency.

Massachusetts Department of Environmental Protection (MassDEP)

MassDEP's regulation requires projects in or near environmental justice populations to conduct a cumulative impact analysis. MassDEP can deny a permit to such projects if the cumulative risk analysis reveals cancer and non-cancer risks exceeding specified thresholds.

Instrument/ status	310 CMR 7.02: Cumulative Impact Final Analysis Amendments (Adopted 2024)

Scope	For plan approval the Department must consider a cumulative impact analysis, if applicable. The Department may impose any reasonable conditions in a plan approval to reduce, minimize, or mitigate cumulative impacts. ● A cumulative impact analysis shall be required for a comprehensive plan application for a proposed new facility or emission unit that is (1) in an EJ population; (2) a non-major source within 1 mile of an EJ population; or (3) a major source within 5 miles of an EJ population. ● A cumulative impact analysis shall be required for a comprehensive plan application for an existing facility or emission unit if the proposal is to increase facility-wide potential emissions of criteria pollutants, hazardous air pollutants, or air toxics, excluding CO2e, individually or in the aggregate, by an amount equal to or greater than 1 ton per year, and the existing facility or emission unit is located (1) in an EJ population or (2) a non-major source within 1 mile of an EJ population; or (3) a major source within 5 miles of an EJ population. ● A 60-day public comment period is required if a cumulative impact analysis is required.

Pollutant types	Requires air dispersion modeling of criteria air pollutant and air toxic emissions to support the application. However, more review is needed to understand the criteria for determining impacts since no calculation of cumulative impacts is provided in the rule. The only thresholds for MassDEP to deny a plan application are if the cancer risk limit is greater than or equal to 10 per million or if a hazard index is greater than 1.

Applicable facilities	A plan approval is needed for any construction, substantial reconstruction, alteration or subsequent operation of a facility or emission unit that crosses a certain capacity threshold or potential to emit threshold. This includes sources with potential annual process (i.e., non-combustion) emissions ≥ 10 tons per year; combustion units that meet certain fuel input thresholds (e.g., ≥ 40 mmBTU/hour natural gas boiler); and non-emergency engines. A facility is a major source if it has potential annual emissions of: ● 50 tons of nitrogen oxides or volatile organic compounds, ● 100 tons of any other criteria pollutant (i.e., sulfur dioxide, particulate matter, carbon monoxide, lead), ● 25 tons of combined hazardous air pollutants (HAPs), ● 10 tons of any individual HAP.

EJ population	A neighborhood that meets one or more of the following criteria: (1) the annual median household income at or below 65% of the statewide annual median household income; (2) minorities comprise 40% or more of the population; (3) 25% or more of households lack English language proficiency; (4) minorities comprise 25% or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150% of the statewide annual median household income; or if a neighborhood does not meet these criteria, the secretary may designate that a geographic portion of the neighborhood as an EJ population upon the petition of at least 10 residents of the geographic portion of that neighborhood but with limits on the income, education, pollution levels, natural resources of the area. "Neighborhood" means "a census block group as defined by the US Census Bureau, excluding people who live in college dormitories and people who are under formally authorized, supervised care or custody, including federal, state or county prisons.

Minnesota Pollution Control Agency (MPCA)

The MPCA is developing new law to address Minnesotans' disproportionate exposure to pollutants. The law defines environmental justice areas and requires the MPCA to conduct a rulemaking process to address the cumulative impacts of pollution in its permitting processes.

Instrument/ status	MPCA rule development underway, pursuant to state law H.F. 2310, with a deadline set for 2026

Scope	Applies to permits for facilities that are: (1) located in or within one mile of a census tract that is part of an environmental justice (EJ) area; and (2) located: (i) in the Twin Cities seven-counties metro; or (ii) in a city of the first class (more than 100,000 residents. Additionally, if the permit application is in Indian Country, MPCA must consult with the Tribal government. A cumulative impacts analysis **is required** if: (1) facility is above benchmarks set in rule; or (2) MPCA determines that issuing the permit may substantially impact the environment or health of the residents of an environmental justice area. A cumulative impacts analysis **may be required** if: (1) the facility is below all the benchmarks established for conducting a cumulative impacts analysis and the commissioner determines that a cumulative impacts analysis is necessary and supported by material evidence; or (2) by petition by residents or property owners in the environmental justice area impacted by the facility and is supported by material evidence that demonstrates a potential adverse cumulative impact. Future rulemaking will include establishing benchmarks for determining the need for a cumulative impacts analysis and the methodology for that analysis. The rulemaking will also define substantial adverse impact. It will also establish content for **community benefits agreements**.

Pollutant types	The contents of the cumulative impacts analysis are still under development but could include evaluations of both criteria pollutants and toxic compounds.

Applicable facilities	Applies to major (Title V) and state air permit applications, includes new facilities, facility expansions, and reissuing a permit for an existing facility.

EJ areas	Census tracts in Minnesota: (1) in which, based on the most recent decennial US Census: (i) 40% or more of the population is nonwhite; (ii) 35% or more of the households have an income at or below 200% of the federal poverty level; or (iii) 40% or more of the population over the age of five has limited English proficiency; or (2) located within Indian Country.

New York

New York's Environmental Justice Siting Law, or Cumulative Impacts Law, requires the consideration of impacts and existing burdens in disadvantaged communities in some environmental decision-making. New York' Department of Environmental Conservation (DEC) was tasked with implementing the EJSL and developing guidelines and criteria for evaluating projects under this law.

Instrument/ status	Senate Bill 1317 (Enacted 2023), DEP 24-1 (Adopted 2024)

Scope	A project will be considered "likely to affect" a disadvantaged community if within one-half mile of each other or are otherwise in "close proximity" based on spatial data or air dispersion impact modeling. Project applicants must analyze whether DEC's approval of the permit would disproportionately burden a disadvantaged community. The analysis will be subject to enhanced public participation opportunities and must: (1) identify the direct and indirect greenhouse and co-pollutant emissions from the project that are likely to affect a disadvantaged community, (2) identify available and relevant baseline data on existing burdens in the community, (3) evaluate qualitatively and, if possible, quantitatively whether, and to what extent, the project's emissions would result in any air quality or air-related health effects on the community or increase an existing air quality or air-related health community burden, and (4) for any such increase, submit proposals for project design considerations that are "real, quantifiable, permanent, verifiable, and enforceable" to "reduce or eliminate disproportionate burdens." The policy provides certain examples of potential project design measures, including financial and operational mitigation options, and stipulates that design measures may be required for a project beyond what is already required by law or regulation.

Pollutant types	Evaluates impacts of increases in greenhouse gases or co-pollutants.

Applicable permits	Applies to certain permit applications designated as "major" project types including: (1) Applications for Air Title V permits and for certain types of Air State Facility permits, including projects that are subject to New Source Review, that involve emission sources subject to the National Emission Standards for Hazardous Air Pollutants, that require emission reduction credits, or that require the use of a federal enforceable emission cap, among others. This category may include not only industrial manufacturing facilities, but also expansion projects for existing facilities, such as hospitals and universities. (2) Permit applications for solid waste and industrial hazardous waste management, such as landfills, transfer stations, municipal solid waste processing facilities, composting facilities, and other material recovery facilities. (3) Permit applications for liquified natural gas and petroleum gas projects. (4) Permit applications for water withdrawal and use of over 20 million gallons of water for cooling purposes. In addition, the policy applies to any project requiring any permit from DEC involving the construction of energy production, generation, transmission, or storage facilities, and any project requiring any permit from DEC with sources and activities that may result in greenhouse emissions or co-pollutants, directly or indirectly, including those from mobile emissions from vehicular traffic.

Disadvantaged communities	Identified based on 25 indicators of population characteristics and health vulnerabilities, including indicators of income, race and ethnicity, health outcomes and sensitivities, housing and communications. https://climate.ny.gov/resources/disadvantaged-communities-criteria/

Bay Area Air District – Permitting

Amendments to Bay Area Air District Regulation 2-5 (New Source Review of Toxic Air Contaminants) include stricter cancer risk limits in overburdened communities.

Instrument/ status	Air District Regulation 2-5, (amended December 2021, effective July 2022)

Scope	Under adopted Regulation 2-5, permit applications for projects located within an overburdened community (as defined in Regulation 2-1), are subject to additional requirements for toxic air contaminants: · Additional fees (Regulation 3). · More stringent cancer risk limitations (Regulation 2-5). Sources inside an overburdened community cannot exceed an estimated cancer risk of 6 per million, whereas outside of overburdened communities the risk threshold is 10 per million. · Public notification requirements (Regulation 2-1).

Pollutant types	Toxic air contaminants only.

Applicable Facilities	All new and modified sources of toxic air contaminants subject to limited exemptions, for example for emissions below specified trigger levels and for emergency standby engines.

Overburdened communities	An area located (1) within or (2) within 1,000 feet of a census tract identified by the California Communities Environmental Health Screening Tool (CalEnviroScreen), Version 4.0, as having an overall CalEnviroScreen score at or above the 70th percentile. The Air District has developed an interactive mapping tool to allow users to determine if a project location is within an overburdened community: https://www.baaqmd.gov/en/about-air-quality/interactive-data-maps

Bay Area Air District – Existing Facilities

Though not a permitting regulation, the Air District's Regulation 11-18 (Reduction of Risk from Air Toxic Emissions at Existing Facilities) is included among these examples because of its potential relevance for reducing impacts in overburdened communities from permitted sources. Regulation 11-18 is intended to identify existing facilities whose emissions of toxic air contaminants pose an elevated risk and require emission reductions from them. However, it has faced implementation challenges, including extreme delays in completing facility risk assessments and risk reduction plans. To address these challenges, the Air District is developing amendments to Regulation 11-18 in two phases: (1) a current phase to improve transparency and efficiency and (2) a future phase to evaluate and potentially increase stringency.

Instrument/ status	Air District Regulation 11-18 (adopted 2017 with amendments in development)

Scope	Requires any existing facility with calculated health risk indicators above a defined risk action levels to reduce their impacts. The risk action levels are defined as a cancer risk of 10 per million, an acute hazard index of 1.0, or a chronic hazard index of 1.0. Affected facilities must either: (1) Reduce facility-wide health risks below all risk action levels; or (2) If the facility-wide health risk cannot be reduced below the RAL, install Best Available Retrofit Control Technology for Toxics (TBARCT) on all significant sources, defined as specific air toxics sources within the facility that exceed a cancer risk of 1 per million or an acute or chronic hazard index of 0.2.

Pollutant types	Toxic air contaminants only.

Applicable Facilities	With some narrow exceptions, Regulation 11-18 applies to all facilities whose emissions of toxic air contaminants may result in an elevated risk to nearby receptors. This includes a broad range of commercial, industrial, and municipal facilities, including refineries, chemical plants, wastewater treatment facilities, foundries, forges, landfill operations, hospitals, crematoria, power plants, colleges and universities, military installations, and airline operations.

Overburdened communities	Draft amendments to Regulation 11-18 seek to clarify that the Air District may prioritize health risk assessments for facilities located in overburdened communities, as defined in Regulation 2-1, and in communities selected for California Assembly Bill 617 Community Risk Reduction Plans.

Air District Advisory Council

Selected References on Cumulative Impacts

This document is a living document; Air District staff will continue to update as needed. This short list of selected references is intended to provide concise, broad information on the subject. It may also serve as a starting point for a more formal or extensive review.

Last updated: 2025-07-07. New entries (since the last meeting of the Advisory Council) are formatted in **blue** and marked with "**+**".

The living document can be found here: https://www.baaqmd.gov/en/about-the-air-district/advisory-council/reports

Conceptual Frameworks, Theory, Methods, Approaches, Tools

- Payne-Sturges, D. C., Sangaramoorthy, T., & Mittmann, H. (2021). Framing Environmental Health Decision-Making: The Struggle over Cumulative Impacts Policy. *International Journal of Environmental Research and Public Health*, *18*(8), 3947.
- Payne-Sturges, D. C., Scammell, M. K., Levy, J. I., Cory-Slechta, D. A., Symanski, E., Carr Shmool, J. L., ... & Clougherty, J. E. (2018). Methods for evaluating the combined effects of chemical and nonchemical exposures for cumulative environmental health risk assessment. *International Journal of Environmental Research and Public Health*, *15*(12), 2797.
- Gee, G. C., & Payne-Sturges, D. C. (2004). Environmental health disparities: a framework integrating psychosocial and environmental concepts. *Environmental health perspectives*, *112*(17), 1645-1653.
- Sexton, K. (2012). Cumulative risk assessment: an overview of methodological approaches for evaluating combined health effects from exposure to multiple environmental stressors. *International journal of environmental research and public health*, 9(2), 370-390.
- McHale, C. M., Osborne, G., Morello-Frosch, R., Salmon, A. G., Sandy, M. S., Solomon, G., Zhang, L., Smith, M. T., & Zeise, L. (2018). Assessing health risks from multiple environmental stressors: Moving from G×E to I×E. *Mutation Research/Reviews in Mutation Research, 775*, 11-20.
- Geronimus 2023. Weathering: The Extraordinary Stress of Ordinary Life on the Body in an Unjust Society.
    - o *Note: A shorter NPR interview is also available*
- US EPA 2021. Health Impact Assessment.
    - o *See* EPA 2021a, 09/15/2021 *below.*
- Tulve, N. S., Geller, A. M., Hagerthey, S., Julius, S. H., Lavoie, E. T., Mazur, S. L., ... & Frey,

H. C. (2024). Challenges and opportunities for research supporting cumulative impact assessments at the United States environmental protection agency's office of research and development. The Lancet Regional Health–Americas, 30.

• Union of Concerned Scientists (2024). The Community Guide to Cumulative Impacts: Using Science and Organizing to Advance Public Health Policy. • Boyd, W. (2024). De-Risking Environmental Law. *Harvard Environmental Law Review*, 48(153), 24-10.

• Health Effects Institute (2024). Regional and local perspectives related to cumulative impacts [webinar]. May 17, 2024. Available from: https://www.heienergy.org/event/regional-and-local-perspectives-related cumulative-impacts [accessed 2025-02-13].

• National Academies of Sciences, Engineering, and Medicine. (2024). Constructing Valid Geospatial Tools for Environmental Justice. doi:10.17226/27317

+ Varshavsky, J. R., et al. (2023). Current practice and recommendations for advancing how human variability and susceptibility are considered in chemical risk assessment. *Environmental Health* 21 (Suppl 1):133. https://doi.org/10.1186/s12940-022-00940-1

+ Chiger, A.A. et al (2025). Improving Methodologies for Cumulative Risk Assessment: A Case Study of Noncarcinogenic Health Risks from Volatile Organic Compounds in Fenceline Communities in Southeastern Pennsylvania. *Environmental Health Perspectives* 133(5). https://doi.org/10.1289/EHP14696

Items Specifically Addressed to Policymakers or Government Staff

• Sprinkle, R. H., & Payne-Sturges, D. C. (2021). Mixture toxicity, cumulative risk, and environmental justice in United States federal policy, 1980–2016: Why, with much known, was little done? *Environmental Health*, *20*(1), 104.

• Zrzavy, A., Blondell, M., Kobayashi, W., Redden, B., & Mohai, P. (2022). Addressing cumulative impacts: lessons from environmental justice screening tool development and resistance. *Env't L. Rep.*, *52*, 10111.

• Morello-Frosch, R., Zuk, M., Jerrett, M., Shamasunder, B., & Kyle, A. D. (2011). Understanding the cumulative impacts of inequalities in environmental health: implications for policy. *Health aLairs*, *30*(5), 879-887.

• Solomon, G. M., Morello-Frosch, R., Zeise, L., & Faust, J. B. (2016). Cumulative environmental impacts: science and policy to protect communities. *Annual review of public health*, *37*, 83-96.

• US EPA. 2022. Cumulative Impacts: Recommendations for ORD Research. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-22/014a, 2022. • Chiger, A. A., & Nachman, K. E. (2024). Invited perspective: Advancing cumulative approaches in regulatory decision making. Environmental Health Perspectives, 132(3).

Multi-Stressor Studies or Assessments

- Coffman, E., Rappold, A. G., Nethery, R. C., Anderton, J., Amend, M., Jackson, M. A., Roman, H., Fann, N., Baker, K. R., & Sacks, J. D. (2024). Quantifying multipollutant health impacts using the Environmental Benefits Mapping and Analysis Program Community Edition (BenMAP-CE): A case study in Atlanta, Georgia. *Environmental Health Perspectives*, 132(3). See also:
    - Chiger, A. A., & Nachman, K. E. (2024). Invited Perspective: Advancing Cumulative Approaches in Regulatory Decision Making. Environmental Health Perspectives, 132(3).
    - Winquist, A., Kirrane, E., Klein, M., Strickland, M., Darrow, L. A., Sarnat, S. E., ... & Tolbert, P. (2014). Joint effects of ambient air pollutants on pediatric asthma emergency department visits in Atlanta, 1998–2004. Epidemiology, 25(5), 666-673.
- Canterbury, A., Echouffo-Tcheugui, J. B., Shpilsky, D., Aiyer, A., Reis, S. E., & Erqou, S. (2020). Association between cumulative social risk, particulate matter environmental pollutant exposure, and cardiovascular disease risk. *BMC Cardiovascular Disorders*, 20(1).
- Erqou, S., Clougherty, J. E., Olafiranye, O., Magnani, J. W., Aiyer, A., Tripathy, S., Kinnee, E., Kip, K. E., & Reis, S. E. (2018). Particulate matter air pollution and racial differences in cardiovascular disease risk. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 38(4), 935–942.
- Stafoggia, M., Michelozzi, P., Schneider, A., Armstrong, B., Scortichini, M., Rai, M., et al. (2023). Joint effect of heat and air pollution on mortality in 620 cities of 36 countries. *Environment International*, 181.
- Rai, M., Stafoggia, M., de'Donato, F., Scortichini, M., Zafeiratou, S., Vazquez Fernandez, L., et al. (2023). Heat-related cardiorespiratory mortality: Effect modification by air pollution across 482 cities from 24 countries. *Environment International*, 174.
- Liu, C., Chen, R., Sera, F., Vicedo-Cabrera, A. M., Guo, Y., Tong, S., et al. (2023). Interactive effects of ambient fine particulate matter and ozone on daily mortality in 372 cities: Two-stage time series analysis. BMJ, 383.

Studies Focused on the Bay Area, California, and/or Air Pollution

- CBE 2008. Cumulative Impacts in East Oakland: Findings from a Community-Based Mapping Study.
- Houston, D., Wu, J., Ong, P., & Winer, A. (2004). Structural disparities of urban traffic in Southern California: implications for vehicle-related air pollution exposure in minority and high-poverty neighborhoods. *Journal of Urban ALairs*, *26*(5), 565-592.
- Lane, H. M., Morello-Frosch, R., Marshall, J. D., & Apte, J. S. (2022). Historical redlining is associated with present-day air pollution disparities in US cities. *Environmental science & technology letters*, *9*(4), 345-350.

Work of Other Agencies in the United States

National Academies of Science, Engineering, and Medicine

+ National Academies of Sciences, Engineering, and Medicine. (2025). State of the Science and the Future of Cumulative Impact Assessment: Proceedings of a Workshop—in Brief. https://nap.nationalacademies.org/download/29058

National Institute of Environmental Health Sciences

• Carlin, D. J., & Rider, C. V. (2024). Combined exposures and mixtures research: An enduring NIEHS priority. *Environmental Health Perspectives*, 132(7).

Colorado

+ Cumulative Impacts & Environmental Justice (HB 24-1338) (2024). https://leg.colorado.gov/bills/hb24-1338

Connecticut

+ Environmental Justice (SB 1147) (2023). https://www.cga.ct.gov/2023/act/pa/pdf/2023PA-00202-R00SB-01147-PA.pdf o Amendments (ongoing, 2025): https://portal.ct.gov/deep/environmental justice/environmental-justice-law-regulations-development

Maryland

+ CHERISH Our Communities Act (HB 1484) (2025). Cumulative impact analysis bill (2019). https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.140

Massachusetts Department of Environmental Protection

+ Massachusetts Department of Environmental Protection. (2021). Cumulative Impact Analysis in Air Quality Permitting. https://www.mass.gov/info details/cumulative-impact-analysis-in-air-quality-permitting

Minnesota Pollution Control Agency (MPCA)

+ MPCA. (updated 2025). Cumulative impacts rulemaking. https://www.pca.state.mn.us/get-engaged/cumulative-impacts-rulemaking

New Jersey Department of Environmental Protection (NJDEP)

+ Environmental Justice Law (S-232) https://dep.nj.gov/ej/law/

New York State

• Senate Bill S8830 (2023): https://www.ncelenviro.org/articles/new-york-legislature passes-cumulative-impacts-bill/

+ Siting law in permitting: https://dec.ny.gov/environmental protection/environmental-justice/the-environmental-justice-siting-law

North Carolina

+ Environmental Justice / Cumulative Impacts Permitting Bill (HB 77, DRH40068-MH 18A) (2025). https://www.ncleg.gov/Sessions/2025/Bills/House/PDF/H77v0.pdf

Pennsylvania

+ Issuance of Permits in Environmental Justice Areas (HB 109) (2025). https://www.palegis.us/legislation/bills/text/HTM/2025/0/HB0109/PN0087

Washington State

+ Cumulative impact analysis bill (2019). https://app.leg.wa.gov/RCW/default.aspx?cite=19.405.140

City of Chicago

- Chicago Department of Public Health: Chicago's Cumulative Impact Assessment. https://www.chicago.gov/city/en/depts/cdph/supp_info/Environment/cumulative impact-assessment.html

California Office of Environmental Health Hazard Assessment (OEHHA)

- Office of Environmental Health Hazard Assessment. (2010). *Cumulative Impacts: Building a Scientific Foundation.* Retrieved from https://oehha.ca.gov/media/downloads/calenviroscreen/report/cireport123110.pdf

The White House

- White House Environmental Justice Advisory Council 2014: White House Environmental Justice Advisory Council | US EPA
- National Environmental Justice Advisory Council 2004: National Environmental Justice Advisory Council Recommendations | US EPA

United States Department of Energy

- National Environmental Policy Act. Cumulative Effects. https://ceq.doe.gov/publications/cumulative_effects.html

United States Environmental Protection Agency

- EPA. (1999). *Consideration Of Cumulative Impacts In EPA Review of NEPA Documents* (EPA 315-R-99-002). Retrieved from epa.gov/sites/default/files/2014-08/documents/cumulative.pdf
- EPA. (2011). *Plan EJ 2014: Legal Tools*. Retrieved from epa.gov/sites/default/files/2015-02/documents/ej-legal-tools.pdf
- EPA. (2015). *Proctor Creek's Boone Boulevard Green Street Project Health Impact Assessment (HIA)*. Retrieved from epa.gov/sites/default/files/2015-07/documents/final_bbgsp_hia_report.pdf
- EPA. (2016). *Environmental Justice Research Roadmap.* Retrieved from epa.gov/sites/default/files/2017-01/documents/researchroadmap_environmentaljustice_508_compliant.pdf
- EPA. (2017). Using a Total Environment Framework (Built, Natural, Social

Environments) to Assess Lifelong Health Effects of Chemical Exposures. *Grantee Research Project* Retrieved from cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/recipients.display/rfa_id/630/records_per_page/ALL

- EPA. (2019a). *Guidelines for Human Exposure Assessment* (EPA/100/B-19/001). Retrieved from epa.gov/sites/default/files/2020-01/documents/guidelines_for_human_exposure_assessment_final2019.pdf
- EPA. (2019b). *Integrated Science Assessment (ISA) for Particulate Matter* (EPA/600/R-19/188). Retrieved from epa.gov/isa/integrated-science-assessment isa-particulate-matter
- EPA. (2020). Center for Early Lifestage Vulnerabilities to Environmental Stressors. *Grantee Research Project* Retrieved from cfpub.epa.gov/ncer_abstracts/index.cfm/fuseaction/recipients.display/rfa_id/669/records_per_page/ALL
- EPA. (2021a, 09/15/2021). Health Impact Assessments. Retrieved from epa.gov/healthresearch/health-impact-assessments
- EPA. (2021b). *U.S. Environmental Protection Agency Board of Scientific Counselors Executive Committee: Virtual Meeting Summary*. Retrieved from epa.gov/system/files/documents/2021-10/bosc_ec_summary_10-06-2021-amg_lbj.pdf
- EPA. (2022a). *EPA Legal Tools to Advance Environmental Justice*. Retrieved from epa.gov/system/files/documents/2022-05/EJ%20Legal%20Tools%20May%202022%20FINAL.pdf
- EPA. (2022b). *FY 2022-2026 EPA Strategic Plan*. Retrieved from epa.gov/system/files/documents/2022-03/fy-2022-2026-epa-strategic-plan.pdf
- EPA. (2022c). *Supplement to the 2019 Integrated Science Assessment for Particulate Matter (Final Report, 2022)* (EPA/635/R-22/028). Retrieved from cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=354490
- EPA. (2022d). *Using Participatory Science at EPA: Vision and Principles*. Retrieved from epa.gov/system/files/documents/2022-06/EPA%20Vision%20for%20Participatory%20Science%206.23.22.pdf
- EPA. (2022e). Cumulative Impacts: Recommendations for ORD Research. Retrieved from https://cfpub.epa.gov/si/si_public_record_report.cfm?dirEntryId=357832 + EPA (2023). EPA Legal Tools to Advance Environmental Justice. Retrieved from https://www.epa.gov/system/files/documents/2022-05/EJ%20Legal%20Tools%20May%202022%20FINAL.pdf
- EPA (2023). EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum. Retrieved from https://www.epa.gov/system/files/documents/2022-12/bh508-Cumulative%20Impacts%20Addendum%20Final%202022-11-28.pdf + EPA (2024). Interim Framework for Advancing Consideration of Cumulative Impacts. Retrieved from https://www.epa.gov/cumulative-impacts/interim-framework advancing-consideration-cumulative-impacts. See also the current (2024–2025) docket, with public comments: https://www.regulations.gov/docket/EPA-HQ-OLEM-2024-0360/document