Bay Area Air District

BOARD OF DIRECTORS
ADVISORY COUNCIL
December 8, 2025

COUNCIL MEMBERS

Professor Ann Marie Grover Carlton, Ph.D., University of California Irvine
Dr. Stephanie M. Holm, M.D., Ph.D., M.P.H., University of California San Francisco
Dr. Michael T. Kleinman, Ph.D., University of California Irvine
Dr. Philip T. Martien. Ph.D.
Professor Michael T. Schmeltz, DrPH, M.S., California State University, East Bay
Dr. Gina Solomon, M.D., M.P.H., University of California San Francisco
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 Board Room
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/81250882369, or may join Zoom by phone by dialing (669) 900-6833 or (408) 638-0968. The Webinar ID for this meeting is: 812 5088 2369

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 Co-Chairs. No speaker who has already spoken on an item will be entitled to speak to that item again.

The Council welcomes comments, including criticism, about the policies, procedures, programs, or services of the 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 District is committed to maintaining a workplace free of unlawful harassment and is mindful that 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.

ADVISORY COUNCIL
MEETING AGENDA

MONDAY, DECEMBER 8, 2025
9:30 AM

Chairperson, Gina Solomon

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

   The Council Chair 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 Two Sets of Draft Minutes of the Advisory Council Meetings of October 6, 2025

   The Council will consider approving the two sets of Draft Minutes of the Advisory Council meetings of October 6, 2025.

INFORMATIONAL ITEM(S)

3. Advancing Risk Assessment Methodologies

   The Council will discuss 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; and Dr. Rima Woods, Senior Toxicologist in the Air Toxicology and Risk Assessment Section in the Office of Environmental Health Hazard Assessment.

4. Considerations for Cumulative Impacts Approaches

   The Council will discuss considerations and approaches to cumulative impacts evaluations and policy design. This item will be presented by Gregory H. Nudd, Deputy Executive Officer for Policy.

ACTION ITEM(S)

5. Approval of Refinements and Additions to the Previously Adopted Cumulative Impacts Work Plan

The Council will consider approving 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. This item will be presented by Vice-Chairperson Dr. Philip 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 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 District is committed to maintaining a workplace free of unlawful harassment and is mindful that 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

At the Call of the Chair.

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 to which this Agenda relates 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, Diana Ruiz, Acting Environmental Justice and Community Engagement Officer at (415) 749-8840 or by email at druiz@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

DECEMBER 2025

TYPE OF MEETING	DAY	DATE	TIME	ROOM
Advisory Council Meeting	Monday	8	10:00 a.m.	1st Floor Board Room
Advisory Council Meeting - CANCELLED	Monday	8	1:00 p.m.	1st Floor Board Room
Board of Directors Stationary Source Committee	Wednesday	10	10:00 a.m.	1st Floor, Yerba Buena Room
Board of Directors Community Equity, Health, and Justice Committee - CANCELLED	Wednesday	10	1:00 p.m.	1st Floor, Yerba Buena Room
Board of Directors Policy, Grants and Technology Committee	Wednesday	17	10:00 a.m.	1st Floor Board Room
Board of Directors Finance and Administration Committee	Wednesday	17	1:00 p.m.	1st Floor Board Room

JMB 12/3/25 – 9:29 a.m. G/Board/Executive Office/Moncal

BAY AREA AIR DISTRICT
Memorandum

To: Chairperson Gina Solomon and Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: December 8, 2025

Re: Approval of the Two Sets of Draft Minutes of the Advisory Council Meetings of October 6, 2025

RECOMMENDED ACTION

Approve the attached two sets of Draft Minutes of the Advisory Council meetings of October 6, 2025.

BACKGROUND

None.

DISCUSSION

Attached for your review and approval are the two sets of Draft Minutes of the Advisory Council meetings of October 6, 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 October 6, 2025 9:00 a.m.
2. Draft Minutes of the Advisory Council Meeting of October 6, 2025 1:00 p.m.

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

9:00 a.m. Advisory Council Meeting
Wednesday, October 6, 2025

DRAFT MINUTES

CALL TO ORDER

1. **Opening Comments:** Advisory Council (Council) Chairperson Solomon called the meeting to order at 9:03 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 DRAFT MINUTES OF THE ADVISORY COUNCIL MEETING MINUTES OF OCTOBER 30, 2024**

Public Comments

No requests received.

Council Comments

None.

Council Action

Dr. Holm made a motion, seconded by Professor Kleinman, to **approve** the Draft Minutes of the Advisory Council Meeting Minutes of October 30, 2024; and the motion **carried** by the following vote of the Council:

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

INFORMATIONAL ITEMS

NOTED PRESENT: Professor Carlton was noted present at 9:09 a.m.

3. AGENCY EXPERIENCES WITH CUMULATIVE IMPACTS IN PERMITTING

The Council held a panel discussion, together with members of the Air District's Community Advisory Council, about cumulative impacts in permitting, with a focus on air quality regulation by state-level and regional agencies.

A. Air District

Ayah Hassan, Principal Air Quality Engineer in the Air District's Engineering Division, gave the staff presentation *Air District Permitting Overview,* including: outline; permitting overview: Air Quality Management Toolkit, permits help achieve clean air for all, why issue air permits, what requires a permit, what does not require a permit, evaluations informing the permitting process, permitting process overview; evaluations in Air District permitting: Regulation 2 (Permitting), components of permitting process, California Environmental Quality Act (CEQA), when is a project exempt from CEQA, source of pollutant-specific rules, example: backup diesel generator, New Source Review (NSR): best available control technology (BACT), toxics NSR: Health Risk Assessments (HRA) and best available control technology for toxic air contaminants (TBACT), NSR: "overburdened community" definition, public notice, and summary of cumulative impact considerations in permitting.

B. Minnesota Pollution Control Agency

Hassan M. Bouchareb, Engineer at the Minnesota Pollution Control Agency (MPCA), gave the presentation *Minnesota's Cumulative Impacts Analysis Rulemaking,* including: agenda; cumulative impacts; MPCA rulemaking resources; applicability; environmental justice maps; creating a cumulative impact analysis process; key definitions from Minnesota Statue § 116.065; environmental stressors; mandatory versus discretionary; cumulative impact analysis evaluation and substantial adverse impacts; permit decisions and addressing impacts; community benefit agreements (CBA); decision regarding proposed CBA; public participation requirements; methods for public participation; tribal consultation and considerations; considerations for your own rulemaking; and some areas to think about.

C. New Jersey Department of Environmental Protection

Kandyce Perry, Director of the Office of Environmental Justice at the Department of Environmental Protection in New Jersey, gave the presentation *Environmental Protection Justice Law & Regulations,* including: signing of New Jersey's Environmental Justice Law (September 18, 2020); definition of "overburdened community"; framing environmental justice in New Jersey; Environmental Justice Mapping, Assessment, and Protection Tool; environmental and public health stressors; overburdened community stressor summary; Step 1 (applicability determination – 3 criteria); Step 2 (Environmental Justice Impact Statement and meaningful public participation); Step 3 (department decision); compelling public interest; and considerations, recommendations, and lessons learned.

Public Comments

No requests received.

Council Comments

Clarifying Questions for Item 3A

Chair Solomon invited questions from the Advisory Council and visiting members of the Community Advisory Council.

Councilmember Raheja asked about banking rules and whether banked emission credits can be applied elsewhere. Ms. Leong, Director of Engineering, explained that Regulation 2-4 operates with Regulation 2-2 (New Source Review) to require offsets for facilities emitting more than 10 tons per year. The Air District maintains a small facility bank that can supply 10–35 tons per year of nitrogen oxides or organics; facilities exceeding that must obtain offsets on the market.

Mr. Nudd, Deputy Executive Officer of Science and Policy, added that this banking is intended to maintain a regional cap on ozone precursor emissions; this is relevant where mixing and long-range transport are significant, and it does not apply to air toxics. Ms. Leong and Mr. Nudd noted that while things might change as the agency prepares a new plan for particulate matter, most new sources do not currently trigger offset requirements for PM or sulfur dioxide, for which thresholds are 100 tons per year.

Councilmember Holm asked how the CalEnviroScreen threshold used in the designation of overburdened communities is set and how often it is updated. Mr. Nudd responded that census tracts scoring at or above the 70th percentile are included, plus a 1,000 foot buffer, and that this accounts for the higher cost of living in the Bay Area, compared to the 75th percentile; he added that this will likely be reviewed when CalEnviroScreen is updated. He added that the Advisory Council's work could inform future permitting rule revisions to better incorporate cumulative impacts, at which point the geographic definitions might be re-examined.

Clarifying Questions for Item 3B

Dr. Schmeltz asked whether MPCA is the entity that ultimately signs community benefit agreements (CBAs). Mr. Bouchareb confirmed that MPCA and the facility are the signatories, adding that some community members have expressed interest in being formal parties as well.

Dr. Kleinman asked whether MPCA had developed a framework for balancing the subjective and objective elements of CBAs. Chair Solomon suggested returning to that topic during the broader discussion.

Dr. Raheja inquired whether environmental stressors are ranked or weighted. Mr. Bouchareb said they are considered individually, without a formal weighting scheme. The intent was to minimize overlap among factors and avoid over-emphasizing any single issue, such as air quality.

Ms. Mayra Pelagio, Co-Chair of the CAC, noted that MPCA's process uniquely incorporates demographic criteria, specifically the proportion of non-white residents. She asked how such provisions might fare under the current federal administration. Mr. Bouchareb responded that the demographic component is defined by statute and could only be changed by Minnesota's

legislature. He acknowledged broader uncertainty about intergovernmental coordination and data availability, citing the recent removal of the federal EJScreen tool as an example.

Clarifying Questions for Item 3C, and Council Discussion

Chair Solomon invited clarifying questions and comments, beginning with Community Advisory Council (CAC) member Kevin Ruano Hernandez. Mr. Ruano Hernandez expressed appreciation for the presentation, noting that the discussion aligned with CAC priorities and that he continued to follow and support New Jersey's efforts.

Councilmember Raheja asked which aspects of New Jersey's cumulative-impacts initiative had faced the most significant challenges from industry. Ms. Perry responded that the strongest pushback during rule development concerned the treatment of economic impacts. Industry representatives urged inclusion of economic considerations; NJDEP had responded by clarifying that the legislature had explicitly directed that economic impacts not be a deciding factor. She added that advocacy and community support had helped to resolve that issue. Following rule adoption, she said, the primary legal challenge now concerned the "adjacency" provision (inclusion of zero-population block groups bordering overburdened communities). She advised other states to address such definitions early through legislation. Remaining legal challenges, she noted, centered on what NJDEP's attorneys viewed as well-defensible points.
Referring to the earlier staff presentation, Dr. Martien asked whether decisions under the Minnesota and New Jersey frameworks would be considered ministerial. Mr. Nudd responded that it seemed likely to strengthen the argument to say that these were non-ministerial decisions, considering how that might involve CEQA, but that there were other CEQA-related complications, such as with land-use approval. Dr. Martien invited staff guidance in formulating recommendations. Looking ahead to the workplan discussion, Mr. Nudd remarked, the workplan contained a number of high-level ideas to be explored and fleshed out, after which staff might return with recommendations.

Chair Solomon asked about the stoppage of the permitting clock in the New Jersey context and how that was playing out in practice. She observed that the approach seemed promising but potentially double-edged, balancing the need for community engagement against concerns about lengthy permitting processes. Ms. Perry said business and industry had expressed concern over extended reviews, while community members welcomed the additional time to ensure a comprehensive, meaningful, and accurate process to avoid disproportionate pollution. She noted that there is inevitably tension surrounding the duration, that the duration varies with project complexity, that no specific statutory timeframes apply to the stoppage, and that applicants can expedite review by submitting well-prepared, compliant drafts that propose control measures.

Vice-Chair Martien inquired about the requirement that permit applicants, rather than NJDEP, host public meetings; he asked whether the agency had received pushback and whether the meetings had been productive. Ms. Perry acknowledged pros and cons: requiring NJDEP to host would have been impractical given staffing constraints, while delegating to applicants risked inconsistent public participation quality. Echoing Mr. Bouchareb's earlier point, she recommended that regulations specify participation requirements clearly but not rigidly. She emphasized the importance of consulting overburdened communities early when shaping these provisions to ensure feasibility and effectiveness. Ms. Perry offered two examples of specific provisions that, in retrospect, could have improved public participation. First, she explained that while it is difficult to mandate "intelligibility" in regulation, given varying levels of technical understanding, requiring applicants to include executive summaries might substantially enhance accessibility for

community members. Second, she suggested that requirements might include provision of direct links to meeting registrations, rather than the current process in which applicants provide access only after receiving individual email requests, which may delay participation or deter interested attendees. Ms. Perry added that NJDEP provides applicants with agency-developed public participation guidance created with community input.

Council Action

No action taken.

THE COUNCIL RECESSED AT 11:08 A.M., AND RESUMED AT 11:14 A.M.

4. **INTEGRATION OF CUMULATIVE IMPACTS INTO STATE ENVIRONMENTAL PERMITTING FRAMEWORKS**

The Council, together with members of the Air District's Community Advisory Council, discussed developing cumulative impacts permitting protections, including policy design, decision points, and lessons learned. Researchers shared key findings from a first-of-its-kind policy review and database designed to support the integration of cumulative impacts into state environmental permitting frameworks.

Dr. Ana Isabel Baptista, Director of the Tishman Environment & Design Center, and Dr. Yukyan Lam, Research Director and Senior Scientist at the Tishman Environment & Design Center, gave the presentation *Developing Cumulative Impacts Permitting Protections – Policy Design, Decision Points, and Lessons Learned from a State-by-State Review,* including: new policy database and article; New Jersey law inspires state policymaking; common three-part structure of cumulative impacts permitting policies; policy elements – scope of protection and decision on permit; identifying environmental justice communities; cumulative impacts assessment methodology; other policy elements; and key takeaways and considerations for the Bay Area Air District.

Dr. Nicky Sheats, Director of the Center for the Urban Environment at the John S. Watson Institute for Urban Policy and Research at Kean University, gave the presentation *Bay Area Air District Advisory Council on Cumulative Impacts,* including: New Jersey EJ and cumulative impacts law; who I am and what I do; cumulative impacts; problems; relationship between cumulative impact and social/economic indicators; a preliminary screening method to estimate cumulative environmental impact; indicators; New Jersey statewide cumulative impacts law key features; old issues - compelling public interest exception, defining an overburdened community, including permit renewals, how much pollution is enough to trigger a denial or conditions; new issues - public hearings, can existing pollution be decreased through the permitting process, new versus expansion, underregulated industry; community input is essential; environmental and public health stressors; facilities; regulations; cumulative policies for cumulative impacts; and New Jersey Environmental Justice Alliance (NJEJA) Statewide Cumulative Impacts Policy.

Public Comments

No requests received.

Council Comments

Chair Solomon highlighted a distinction noted by Dr. Sheats between “overburdened” and “disadvantaged” communities, observing its relevance to subsequent discussion. She then invited questions.

Dr. Schmeltz remarked that community benefit agreements (CBAs) can be problematic and asked about their intended role; specifically, why public-interest exceptions and CBAs arise in these types of laws. Dr. Baptista responded that, across several states, environmental justice (EJ) advocates have reported that pressure for CBAs often originates not from the EJ community but from industry groups or labor unions seeking to limit the scope of proposed cumulative-impacts legislation. She noted that these provisions are sometimes framed as compromises balancing economic and protective goals. How CBAs function, she said, seems to vary according to when they are introduced (during the legislative phase, rulemaking, or implementation) and how much influence EJ communities have in shaping the language around them. Often, she added, EJ advocates are excluded from those negotiations and may even oppose the CBAs being proposed in their name.

Mr. Ruano Hernandez asked Dr. Sheats whether, when it comes to public hearings that industry is supposed to be running, that sound more procedural and not so participatory: are there workarounds that he has observed? Dr. Sheats offered that there had only been a few hearings to date, so he could not definitively say that they had been lacking, and there had been efforts to ensure they were working; also, there was a question of whether there were certain hearings that deserved special focus. Dr. Sheats reported that he was aware of low participation at some meetings, but that there were many potential explanations. To an extent, he stated, the law is there to ensure that communities are protected even if community members do not have time or if the meeting time is difficult. Although there was not a large enough sample yet to draw conclusions, he reiterated, concerns remained, and what had happened in the meetings so far had not allayed them.

Vice-Chair Martien invited Dr. Lam to elaborate on the role of screening tools, noting that CalEnviroScreen is used for community identification but not for assessing project impacts, whereas New Jersey’s “matrix method” serves both purposes. Dr. Lam agreed that this distinction is important, adding that New York’s law may be most comparable to California’s, given its “mini-NEPA” aspect and the use of an identification tool supporting its climate law. She reframed the question as, when an identification tool does get at some of the environmental issues, whether that information should be set aside during analysis. Regarding CBAs, she clarified that she had not intended to overemphasize their role, since most state laws reviewed by the Tishman Center did not reference CBAs at all, with Connecticut as the sole exception.

Vice-Chair Martien asked about the treatment of permit renewals versus new or modified source permitting, noting that renewals had been discussed by MPCA and NJDEP but not by the Air District. Ms. Leong sought clarification from Ms. Perry on what was meant by “renewal” in the New Jersey context and its relation to Title V. Dr. Martien then asked what scoping only to Title V would entail. Ms. Leong explained that Title V permits are renewed every five years and incorporate all minor permits issued since, whereas major modifications trigger immediate updates. The New Source Review process, Ms. Leong explained, is rigorous in itself, and Title V functions simply as a centralized compilation of requirements; the only thing that might be updated there is monitoring. Ms. Leong added that the Air District has over 10,000 permitted facilities, but only 75 total major source facilities, with usually over 100 tons per year of criteria pollutant emissions, or over 25 tons

per year of hazardous air pollutants (HAP) emissions. She further explained that the Air District collects annual update information every year, to keep its emission inventory current, and collects fees; this is also an occasion for the Air District to update permit conditions if applicable rules have changed.

Dr. Sheats remarked that if there is a cumulative impacts policy, then denying new permits will protect already-overburdened EJ communities from new pollution. However, he emphasized, there is too much pollution in those communities already, which is why the idea of reducing existing pollution when permits come up for renewal is attractive to EJ communities and might warrant incorporation into cumulative impacts policy.

Dr. Schmeltz asked how the US EPA's recent federal exemption for certain facilities had affected state permitting, noting that one such facility operates in Sussex County, New Jersey. Dr. Baptista responded that her organization had not received information from NJDEP on implementation but understood that these facilities remain subject to the state's EJ law.

Council Action

No action taken.

OTHER BUSINESS

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

This report was waived by Greg Nudd, Deputy Executive Officer of Policy.

6. PUBLIC COMMENT ON NON-AGENDA MATTERS

No requests received.

7. COUNCIL MEMBER COMMENTS

Councilmember Schmeltz offered items of information for the Council: first, a Health Effects Institute's Energy Report (September 2025) titled "Roadmap to Health: Assessing Adverse and Beneficial Environmental, Social, and Economic Cumulative Exposures"; second, a National Academies report release (October 9, 2025) on "State-of-the-Science and the Future of Cumulative Impact Assessment; finally a report from the EPA Office of the Inspector General indicating systematic increases in emissions when monitors go down.

8. TIME AND PLACE OF NEXT MEETING

Monday, October 6, 2025, no sooner than 1:00 p.m. at 375 Beale Street, San Francisco, CA 94105. The meeting will be in-person for the Advisory Council members and members of the public will be able to either join in-person or via webcast.

9. ADJOURNMENT

The meeting adjourned at 12:23 p.m.

Marcy Hiratzka
Clerk of the Boards
Executive Office

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

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

1:00 p.m. Advisory Council Meeting
Wednesday, October 6, 2025

DRAFT MINUTES

CALL TO ORDER

1. **Opening Comments:** Advisory Council (Council) Chairperson Solomon called the meeting to order at 1:00 p.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, and Dr. Michael Schmeltz.

   Absent: Board Liaison Lynda Hopkins.

INFORMATIONAL ITEMS

2. REVIEW OF RECENT ADVISORY COUNCIL MEETINGS

Dr. David Holstius, Senior Advanced Projects Advisor, gave the staff presentation *Review of Recent Advisory Council Meetings,* including: overview and purpose; March 2024: introduction and orientation; July 2024: establishing foundations; September 2024: locating potential; and October 2024: alignment and direction.

Public Comments

No requests received.

Council Comments

Reflecting on the recap of Council work presented by Dr. Holstius and on prior meeting discussions, Chair Solomon suggested that a useful distinction could be made among three types of approaches: place-based approaches, such as those emphasized earlier in the day; broader changes to scientific methods or permitting approaches that could have more general applicability; and process-oriented changes, particularly those related to community engagement, which had been highlighted by speakers and the subject of considerable discussion. She noted that the draft workplan included examples of both the place-based and

general approaches, and that pursuing them in parallel might be appropriate. While recognizing the importance of engagement and process improvements, she expressed a wish to defer that topic to Community Advisory Council (CAC) colleagues, whose expertise lies in that area, and to focus discussion on the more technical dimensions.

Introducing CAC Co-Chair Mayra Pelagio, who joined via Zoom, Chair Solomon invited reactions to the proposed framework. Vice-Chair Martien agreed that it seemed useful.

Turning to priorities, Chair Solomon recalled that previous discussions had established the need for work that is science-based, defensible, responsive to community concerns, and reasonably efficient. She invited suggestions for additional criteria.

Dr. Schmeltz indicated that it might be helpful to articulate some limitations or bounds to how the Advisory Council should be considering cumulative impacts, to support realism about what the Air District can achieve; for example, he indicated, the Air District has limits on its jurisdiction and authority. He added that there are also scientific limitations in considering cumulative impact assessments.

Dr. Raheja added that, beyond scientific and legal defensibility, the Council should consider the cultural sensitivities of proposed approaches, in relation to the different communities that comprise the Bay Area.

Chair Solomon invited comment from CAC Co-Chair Pelagio and clarified that the discussion was now turning to the draft workplan. Ms. Pelagio observed that an important question is whether CalEnviroScreen (CES) truly reflects all of the impacts that communities face. Drawing on her experience in East San Jose and input from colleagues, including other organizers, she related that CES sometimes fails to reflect the multi-layered burdens certain communities face. She expressed interest in learning more about the tools and methods being developed in other states and in exploring opportunities for collaboration to ensure CES provides adequate coverage when used to identify or analyze impacts. Chair Solomon thanked Ms. Pelagio for the comment, noting its importance in the context of the workplan and place-based approaches.

Council Action

No action taken.

ACTION ITEM

3. APPROVAL OF CUMULATIVE IMPACTS WORK PLAN

The Advisory Council reviewed and considered approving the Cumulative Impacts Work Plan developed by the Work Plan Ad Hoc Subcommittee (Martien, Carlson, Holm.) This item was presented by Vice Chair Martien.

Public Comments

Public comments were given by Charles Davidson, Hercules resident.

Chair Solomon appreciated that the commenter seemed to be seeing something at the community level that the data also show, which is the fact that certain communities are much more disproportionately burdened.

Council Comments

Chair Solomon expressed appreciation for the subcommittee's work in developing the draft workplan and invited Vice-Chair Martien to present it.

Vice-Chair Martien stated that he would begin with a summary, followed by input from other subcommittee members regarding any omissions. He noted that several tables merited particular attention, as they outlined key options for the Council's consideration. Chair Solomon agreed, identifying Tables 1 and 2 and their corresponding entries in the Appendix as central to the discussion. Vice-Chair Martien requested that the workplan be displayed on screen to facilitate comments that could inform revisions for the upcoming December meeting.

Recalling the earlier presentation by Dr. Holstius, Vice-Chair Martien recollected that the subcommittee had been formed in October 2024 to develop a draft workplan from an initial outline. He described the document as a "living" framework, subject to revision as needed, and serving as a blueprint to guide the Advisory Council's development of written recommendations through the three steps identified in prior discussions: identification, assessment, and action. He reminded members that the Council's written recommendations would ultimately be delivered to the Air District's Board of Directors.

Vice-Chair Martien explained that the subcommittee aimed to make the workplan concise and accessible, with more detailed material placed in the Appendix. He then reviewed each section of its main body. The *Background*, he said, provided relevant definitions, summarized challenges associated with incorporating cumulative impacts into regulatory processes, and reviewed historical progress. It also described existing efforts to reduce cumulative impacts, some of which had been presented earlier in the day, as well as current Air District programs and their alignment with the Strategic Plan and the 2024 *Call to Action* document. The *Methods* section, he continued, outlined approaches for maintaining a collaborative and transparent process, an emphasis echoed throughout the Council's prior deliberations. The *Roles and Process* component specified how the Advisory Council was to work internally, coordinate with staff, engage community members, and collaborate with the Community Advisory Council (CAC). While aspirational in parts, he said, these descriptions set helpful expectations. The *Products and Timeline* section specified goals and deliverables. In addition to written recommendations, Vice-Chair Martien noted, it contained the key findings already developed and discussed in July 2024, as well as records of meetings and deliberations.

Vice-Chair Martien emphasized that the workplan contained an extensive focus on permitting but also pointed to other areas for consideration within the Appendix, ensuring a record of broader topics would remain available for future exploration. Finally, he noted that the draft workplan set the end of 2026 as the target date for delivering final recommendations to the Air District's Board of Directors.

Turning to page 6 of the draft workplan, Vice-Chair Martien highlighted the sections outlining options for assessment and action, summarized in Tables 1 and 2. He observed that the first

four items in Table 1 correspond to the broader approaches previously described by Chair Solomon, in that they did not require a place-based framework or elements thereof. The remaining items, he said, appeared more directly related to place-based approaches. He noted Table 2's enumeration of potential actions to reduce cumulative impacts, with supporting details provided in the Appendix. He then referred to Table 3, which presented key steps and an accompanying timeline. Some steps, he explained, were already complete or underway. As an example, efforts to seek collaborators were advanced by his May presentation to the Community Advisory Council (CAC) and by the subsequent expression of interest from CAC members Ms. Pelagio and Mr. Ruano-Hernandez. And, on September 30, the Advisory Council subcommittee had held a joint Zoom call with them, during which both offered valuable ideas and feedback.

Vice-Chair Martien noted that Step 2 in Table 3 corresponded to the morning's meeting, and that the Council was now engaged in Step 3. Step 4, he said, was less clearly defined, but a period between the current meeting and the upcoming December 8 session was envisioned, for members to review and refine the draft workplan in light of the day's presentations and discussion. He encouraged members to bring edits or suggestions that could be shared with staff in advance, adding that the forthcoming National Academies report on cumulative impact assessment might provide helpful additional context. Finally, Vice-Chair Martien explained that Step 5 indicated a time at the December meeting for gathering ideas to support the Council's recommendations. While final recommendations were unlikely to be completed by that date, he said, it could be valuable to spend time summarize key insights and themes to pass along to the next term of the Advisory Council.

Councilmembers Dr. Holm and Councilmember Carlton expressed agreement with the discussion and thanked the members of the CAC for their constructive feedback during the September meeting with the Advisory Council subcommittee. Vice-Chair Martien asked whether it would be an appropriate time to summarize that feedback.

Chair Solomon commended the quality of the draft workplan and invited CAC Co-Chair Pelagio to offer additional remarks, recalling Ms. Pelagio's earlier observation that CalEnviroScreen (CES) does not necessarily capture all communities in the Bay Area experiencing cumulative impacts.

Ms. Pelagio noted that CAC member Mr. Kevin Ruano-Hernandez had shared several points with which she concurred. One, she said, concerned Table 2 and the topic of community benefit agreements (CBAs): ensuring that community members are contacted from the very beginning of the process is crucial, and even now, if there were a set of people to ideally be engaged, she stated that would be important. She asked whether Dr. Martien recalled anything else.

Vice-Chair Martien recounted four principal themes he recalled from the CAC's feedback. First, while the subcommittee had aimed to make the workplan accessible, CAC members indicated that it remained too technical, and that perhaps a Glossary, brief section summaries, or even a PowerPoint version could help communicate its content more broadly. Second, CAC members had recommended including specific and concrete examples to illustrate what certain proposed actions might entail. While it was challenging to do that now because the ideas were still high level, Dr. Martien continued, it was agreed that providing tangible

examples would be helpful. Third, the CAC had emphasized the importance of clear timelines and accountability mechanisms. Finally, members had observed that the details of community representation were still somewhat vague and needed improvement.

Ms. Pelagio agreed that this aligned with her recollections of the September meeting.

Chair Solomon recalled the three-part framework offered earlier: place-based; general; and procedural. She emphasized her interest in general approaches that would integrate the concept of cumulative impacts throughout the permitting process. Such approaches, she observed, need not vary by location, since cumulative impacts can occur anywhere.

Referring to the CAC's earlier feedback on CalEnviroScreen (CES), Chair Solomon noted that the main issue may not lie with the tool itself but rather in the way policymakers apply it, using a "bright-line" approach that classifies areas as either in or out. The use of strict thresholds, she said, can exclude communities that experience real cumulative impacts but fall just below a cutoff. In that context, she expressed particular interest in exploring the first three items in Table 1. She highlighted the second item in Table 1, concerning the summation of non-cancer impacts across multiple target organ systems, and said she appreciated being made aware of the recent work by Dr. Keeve Nachman and colleagues on that topic. She regarded these items as potentially actionable and invited comment, encouraging members to consider them against the criteria of legal and scientific defensibility, responsiveness to community concerns, and feasibility.

Councilmember Raheja inquired about item IA-3, noting that legal challenges can arise, regardless of whether "reasonable assumptions" are believed by the Council to be justifiable or have precedent in similar work. Chair Solomon invited comment from staff, noting that she had heard extensively from many communities that emissions on startup and shutdown, or accidental releases, were not considered. This was a constant source of frustration to them, and scientifically to her as well, since such events can contribute substantially to total emissions.

Greg Nudd, Deputy Executive Officer of Policy, responded that, as overall context, staff and counsel had reviewed the items and found them appropriately high-level to merit further exploration, though not specific enough to identify particular legal challenges at this stage. Regarding IA-3, he said there was more of a practical concern, since it was not work routinely done by the Air District. While it is possible to estimate what those emissions and what their impacts would be, he explained, the uncertainty range would be high. He suggested that a systematic approach might be needed for certain classes of facilities. Large facilities might merit more bespoke analysis, which might be done somewhat in advance, but could also involve iterations with industry. Whenever one is in a situation where reasonable people can make different assumptions, Mr. Nudd continued, it can become difficult to settle the final number.

Vice-Chair Martien agreed, noting that while historical data can help characterize startup and shutdown activity at existing facilities, predicting emissions for new or modified sources without operational history is more complex. At the same time, he could see that it would probably not be zero, so that having some estimate seemed reasonable, and that it would be helpful to work with staff to see how realistic this might be.

Councilmember Holm suggested that item IA-3 might also be a logical place to incorporate Councilmember Schmeltz's earlier point regarding the likelihood that emission increases occur during periods when monitoring is limited or absent.

Dr. Schmeltz connected IA-3 to IA-1 in terms of accounting for background concentrations and exposures. He reiterated his earlier comment about the limitations of available datasets and emphasized that many types of data could inform understanding of background exposures, whether indoors or outdoors, that were related to health outcomes. He asked whether the Council intended to limit its scope to outdoor exposures or to consider a broader range. It is important, he continued, to look far and wide for various data sources that could help identify background exposures in different types of communities.

Regarding IA-1, Chair Solomon remarked that accounting for background concentrations makes strong scientific and intuitive sense. Regardless of location, she noted, no one breathes pure air except for emissions from one source; there is always an underlying background level, and this varies by community. She suggested that considerable information about this is currently offered by the Air District's monitoring network, at least for criteria pollutants and some air toxics. She concluded that it was difficult to justify why that would not be taken into consideration, and she agreed with this item being at the top of the list.

Councilmember Holm added that incorporating IA-1 into a non-place-based approach might also help address concerns raised by Ms. Pelagio regarding communities not identified by CalEnviroScreen. Chair Solomon agreed.

Vice-Chair Martien commented that the way hazard indices are developed assumes a background concentration, yet it is treated as an increment, like cancer risk.

Chair Solomon expressed less enthusiasm for item IA-4, noting that un-inventoried emission sources conceptually overlap with the idea of background concentration but may be more difficult to address in practice. This was owing in part to questions about what would count as an emission source, and the extent to which the Air District would need to find them, which might be easier in areas where more information has been developed, such as in AB617 communities, but more difficult in other places.

Councilmember Holm noted that one advantage of item IA-4 was its acknowledgment of sources that may be recognized but with uncertain details: for example, in terms of compounds that cannot yet be measured adequately.

About IA-4, Vice-Chair Martien offered that one idea had been to capture un-inventoried sources, or pollutants not considered toxic in the context of new or modified permits, but that probably are toxic. He wondered if there could be a way to account for the things that are likely indicated by more general knowledge about a sector or certain types of permits, but that nevertheless do not appear in an emission inventory. Developing this approach, he added, would likely require close consultation with Air District staff.

Councilmember Kleinman observed that many small sources fall below regulatory thresholds yet may contribute meaningfully to cumulative impacts, compounding existing regional

background levels. As an example, he mentioned backyard barbecue pits: minor, unregulated emitters that could nonetheless be estimated collectively.

Vice-Chair Martien clarified that the focus of IA-4 had been somewhat different: more in terms of new permit applications, where there may be some emissions that the Air District has not estimated, but they are associated with a permitted source. He posed the question of whether past encounters with un-inventoried sources at facilities could be applied in the context of new sources, informing future estimates of likely un-inventoried emissions.

Chair Solomon remarked that she had heard two slightly different interpretations of IA-4: one addressing additional nearby sources, and another focusing on uncharacterized hazards from the same source. She suggested that clarifying this distinction in the description of IA-4 would be helpful.

Chair Solomon turned to item IA-2, noting that a new methodology described in a May 2025 publication, and an accompanying dataset of information covering the full suite of compounds assessed, appeared to offer a promising and publicly available resource. She summarized the paper's central finding: under the traditional method for developing a hazard index, only the most sensitive target organ for each compound is considered, while other organs affected by the same compound are disregarded. The new approach, by contrast, sums the toxic effects across all affected organ systems for each relevant compound.

Chair Solomon emphasized that this approach made strong scientific and intuitive sense, and that she had initially expected it to be technically challenging to implement, but the published work demonstrated that could work and was worth exploring. She described it as an important correction to a longstanding gap in risk assessment practice, observing that the researchers found substantially higher combined effects of volatile organic compounds (VOCs) compared to results derived from the traditional method. Because the new approach could be applied broadly to any site or permit, she expressed enthusiasm for pursuing this item and invited feedback from Council members.

Councilmember Holm voiced her support for the proposal. As a pediatrician, she said, she appreciated the broader scope across organ systems but noted that the method did not explicitly account for particularly sensitive receptors, such as children, who are more susceptible for behavioral, physiological, and other reasons.

Councilmember Schmeltz observed that traditional assessments rely heavily on animal models and noted that newer work increasingly employs computational toxicology. He asked whether there were any issues that might preclude relying on such methods, given their potential to accelerate the derivation of reference concentrations.

Chair Solomon responded that the authors had used standard points of departure from the Agency for Toxic Substances and Disease Registry (ATSDR) and the U.S. EPA whenever available, along with established reference concentrations. In cases lacking such data, they applied new approach methodologies (NAMs) and predictive modeling to generate equivalent values. She acknowledged that these predictive methods are not peer-reviewed in the same manner as reference concentrations but follow standard conventions for applying interspecies and intraspecies uncertainty factors and other established procedures.

Chair Solomon clarified that the authors had used standard points of departure from the Agency for Toxic Substances and Disease Registry (ATSDR) and US EPA when available, and reference concentrations where available, but that in many cases they were using new approach methodologies (NAMs) and predictive data to generate numbers. She acknowledged this had not involved peer review in the same way that typical derivation of a reference concentration would, but that the approach was not unusual, and followed standard conventions for uncertainty factors.

Vice-Chair Martien noted the footnotes in Appendix C, on page 17, which describe the ongoing development of these NAMs to modernize risk assessment. He remarked that tracking such advances could enable the Air District to strengthen future non-cancer risk evaluations.

Before moving on to discussion of place-based approaches, Chair Solomon invited additional comments from CAC Co-Chair Pelagio. Ms. Pelagio declined but expressed appreciation for the discussion.

Vice-Chair Martien drew attention to the potential role for $PM_{2.5}$ in non-place-based assessments. While $PM_{2.5}$ was addressed under options for actions (Table 2), he noted, it was not addressed under options for assessments. He reminded the Council that previous iterations of the Advisory Council had examined $PM_{2.5}$ extensively in relation to local exposure increments and associated health risks. Chair Solomon agreed that $PM_{2.5}$ could certainly fit and be relevant.

Summarizing the discussion to that point, Chair Solomon observed broad support for further developing and operationalizing items IA-1 through IA-4, with the previously noted caveats regarding IA-4. She remarked that the items collectively address community concerns and, after considering their feasibility and scientific and legal defensibility, recommended that the Council move forward, noting apparent agreement among other Councilmembers while acknowledging that a broader discussion would still be appropriate.

The discussion then shifted to place-based approaches. Chair Solomon observed that many other states are advancing such approaches and that the Air District should consider them as well. She reiterated, however, the caveats voiced by CAC colleagues in terms of exclusively leaning into a purely place-based approach like Minnesota's or New Jersey's without complementary efforts. Either the definition of designated areas should be re-examined, she said, which would constitute a significant undertaking, or place-based methods should be viewed as a complementary component, not a sole approach. Referring to Table 2, Chair Solomon noted that many of its elements could be implemented through a place-based approach. Vice-Chair Martien concurred.

Reflecting on the remaining items in Table 1, Chair Solomon said she was pleased that health impact assessments (IA-7) were included for completeness but noted that, given their complexity and duration, they may not be the most efficient tools for addressing the Air District's current challenges. Vice-Chair Martien agreed that their inclusion was primarily for completeness. Continuing on, Chair Solomon characterized IA-7 and IA-8 as primarily process issues, not necessarily changing the outcome per se, but important. She regarded IA-6, concerning histories of odor, flaring, accidents, histories of violations and so forth, as primarily place-based, and deserving of consideration.

Vice-Chair Martien reflected that the morning's presentations on place-based approaches had suggested some flexibility in how affected communities might self-identify. He raised the question of what a process for demonstrating community concerns could look like. As an example, he referenced CAC Co-Chair Pelagio's mention of East San Jose, where proximity to an airport results in lead emissions not captured in CalEnviroScreen, which considers lead exposures related to housing. While acknowledging concerns about open-endedness, he suggested that an approach combining CalEnviroScreen data with community self-identification could be promising, in the context of what other states were doing.

Councilmember Carlton recalled the handling, in New Jersey's approach, of "adjacent" block groups. Chair Solomon noted that the Air District includes a 1,000 foot buffer around designated tracts. Mr. Nudd stated that there are some obvious problems, where CalEnviroScreen may not provide a score in the absence of data for some components, a case in point being a particular tract in Bayview-Hunters Point. He also noted that while no one resides on Port of Oakland property, it can still be considered part of that overburdened community.

Councilmember Schmeltz agreed with Dr. Martien on the importance of a means for community input into designations. Having worked with vulnerability mapping for a long time, he noted, one of the major place-based approaches is that data collection systems have already been designed without community input, and now those systems are being used again, to identify place-based vulnerability without community input. He characterized this as a "double flaw," again emphasizing the importance of incorporating community-driven data and community-driven identification in any place-based cumulative impacts assessment.

Councilmember Holm stated that she shared the concern that communities not identified by rigid criteria should still be identified, but that putting an onus on those communities would constitute an additional burden.

Chair Solomon agreed, noting that some communities may lack the political resources or organizational capacity to raise their concerns, or may be preoccupied with other pressing stressors. As a result, they could remain unrecognized. Conversely, she observed, other communities with greater resources and greater voice might more readily draw attention to their issues: for instance, a Marin County community that has voiced concerns about woodsmoke exposure. While such a community may indeed face cumulative impacts from woodsmoke, she questioned whether it should be designated as an overburdened or environmental justice community. This "squeaky wheel" dynamic, she said, highlights the absence of a perfect tool for identifying affected places and the tradeoffs inherent in refining such tools. She added that despite its limitations, CalEnviroScreen has proven useful for identifying many communities and making progress.

Councilmember Raheja proposed that while the Council may not be able within the next year to define all the characteristics that make a community overburdened, it could initiate that effort and establish an iterative process. Annual updates, she suggested, could incorporate community input and evolving understandings of what it means to be overburdened, reflecting the changing conditions of the Bay Area. Such a process would provide a structured, progressive alternative to ad hoc or case-by-case determinations.

Vice-Chair Martien commented that although he found the lack of generality in place-based approaches somewhat unsatisfying, two factors weighed in their favor. First, every other state that has enacted cumulative impacts legislation has employed a place-based framework; second, how to account for all of the impacts known to be important, including non-chemical stressors, was an open question. He suggested that the Council might explore whether sufficient studies exist on differential air pollution impacts to support development of an alternative scoring system based on available population data. Even so, he said, place-based approaches offer practical value by bundling multiple known factors into a single framework, serving as an effective representational "shortcut."

Chair Solomon offered another possibility, observing that several items in Tables 1 and 2 are inherently place-based but need not depend on a binary inclusion or exclusion under CalEnviroScreen. These included IA-6, regarding flaring and histories of accidents, which is place-based but would not necessarily need to be carried out only in certain communities; similarly, considering facility compliance history (as in IA-5) or focusing on near-source $PM_{2.5}$ (as in AC-6) can be done anywhere; further, Rule 11-18 (AC-9) is not restricted to certain communities. Dr. Solomon suggested that certain communities could serve as starting points for such approaches, with subsequent expansion to more areas.

Councilmember Holm agreed that it would be prudent to develop recommendations combining both place-based and broader methods. The latter, she said, are less likely to overlook impacted areas, while history demonstrates that the failure to identify especially overburdened communities has contributed to current inequities. Councilmember Schmeltz concurred, adding that a "CalEnviroScreen plus" approach could provide a practical way to move forward.

Chair Solomon asked whether the Council was prepared to approve the draft workplan with the understanding that it remained a living document, open to continued refinement and expansion.

Councilmember Kleinman reflected on the potential for addressing permit renewals in overburdened communities, as referenced in AC-1, which proposed lower thresholds for Best Available Control Technology (BACT) in such areas. He observed that applying this concept to BACT determinations would be challenging but noted that, recalling the non-degradation context, renewals or modifications of existing permits present opportunities for meaningful improvement.

Councilmember Holm drew attention to Table 2, specifically regarding community benefit agreements (AC-10). She recalled that several speakers had emphasized that benefits should extend beyond the economic sphere and suggested that language to that effect should perhaps be explicitly incorporated into the workplan. Chair Solomon agreed, remarking that in her experience, planting trees in compensation for increased carcinogenic emissions did not necessarily seem like a good tradeoff. She shared her longstanding reservations about CBAs but acknowledged that, when carefully structured, they might be mutually beneficial. However, she emphasized that any such agreements must be approached thoughtfully and that it should be made clear that economic benefits alone were insufficient.

Councilmember Raheja asked whether the recommended changes were to be implemented all at once or as a series of incremental changes, and whether that structure should be

reflected in the written workplan. Councilmember Holm asked if this referred to prioritizing the order of recommendations. Councilmember Raheja clarified that she was referring to prioritization in terms of development, implementation, and enforcement. Both Councilmember Holm and Chair Solomon expressed support.

Chair Solomon added that she encouraged giving high priority to several of the non-place-based items for further exploration at the next meeting, while acknowledging the continued importance of the place-based elements. She then invited Councilmembers to identify any specific items they viewed as especially high priority.

Vice-Chair Martien noted that the lists of options were intentionally broad, encompassing measures observed in other jurisdictions, such as community benefit agreements, without implying strong endorsements. He expressed support for prioritizing items as a group rather than individually.

Chair Solomon clarified that no items were being removed from consideration at this meeting; all would remain part of the workplan. However, she indicated, identifying a set of high-priority items would provide valuable guidance to staff as the work progressed.

Mr. Nudd thanked the Chair and, noting that some suggestions would change the standard risk methodology that OEHHA has developed, invited the Council to consider offering recommendations on related items that could be packaged up and taken to OEHHA. He expressed that this would constitute a helpful early deliverable from the Council.

Councilmember Schmeltz asked how the Air District intended to evaluate the outcomes of cumulative impact assessment efforts: for example, in terms of changes in permitting activity, improvements in health outcomes, or progress on process-related goals. He observed that while the overarching objective is to protect communities, specific metrics for assessing success had not yet been clearly identified. Without requiring that immediately, he suggested that it would be helpful for the Council to consider, sooner rather than later, what its initial recommendations were ultimately working toward.

Vice-Chair Martien asked whether Dr. Schmeltz was encouraging clarification of the Advisory Council's goals, or seeking comment from staff on how they would weigh the Council's recommendations.

Chair Solomon clarified that the question concerned how the Council itself might evaluate success in reducing cumulative impacts. From her perspective, there was a good deal of emissions inventory data and air quality monitoring data. She expressed a desire to see improvements over time in terms of reductions in emissions and air quality concentrations, especially in the most overburdened communities in the Bay Area. If steeper improvements were observed in those areas over time, she said, that would constitute success. Evaluating health outcomes, she added, would be more difficult due to noise in those data, suggesting that the Air District's exposure and emissions data should remain a primary focus.

Councilmember Holm proposed that the Council's final recommendations include a process-oriented element outlining how success could be measured and what key metrics should look like. Chair Solomon agreed.

Chair Solomon then noted that since the Council's last meeting, the Office of Environmental Health Hazard Assessment (OEHHA) had appointed a new Director, Dr. Kris Thayer. She suggested that the Council should meet with Dr. Thayer soon and possibly invite her to speak at the December meeting. Chair Solomon remarked that Dr. Thayer would bring substantial relevant expertise and that presenting her with a focused set of questions would be valuable, consistent with OEHHA's important role as a partner in making progress.

Councilmember Raheja observed that IA-8 had not been extensively discussed, and re-emphasized its importance regardless of the place-based distinction. Chair Solomon agreed, noting that while community participation was more central to the expertise of the Community Advisory Council, it remained non-negotiable and should be underscored by the Advisory Council as well.

Mr. Brian Case, Air District counsel, offered a suggestion with regard to IA-3, to create clarity in the record: the text contained in the draft workplan read "[i]nclude emissions associated with startup, shutdowns, and accidental releases." He suggested that the intent might be better reflected by "more extensively include emissions associated with startup, shutdowns, and accidental releases" since such emissions are already considered.

Ms. Leong, Director of Engineering, added that accidental releases are hard to quantify ahead of time, but that startup emissions are quantified and limited when predictable. For example, if a facility knows it will cycle a boiler five times per year, and the emissions are higher at startup, the Air District will cap the emissions at startup at a higher level, quantify them, and count them toward an annual emission limit; the same is done for refineries when they are predictable, and the Air District will try to restrict and quantify said emissions whenever it can. Ms. Leong also offered the example of a power plant's commissioning, which is somewhat longer and is a context for which separate BACT limits exist.

Vice-Chair Martien thanked staff, noting that he had not been aware of those practices and asking for suggested revisions to clarify the intent. Mr. Case restated the proposal to add "more extensively" to IA-3. Chair Solomon suggested "more completely include emissions associated with" or a similar phrasing.

Vice-Chair Martien remarked that, given the number of desired edits, it would be important for the Council to capture as many revisions as possible before the next meeting, with the understanding that additional refinements could continue as discussion and learning progressed. Chair Solomon agreed, indicating that the purpose of voting on and approving the workplan document included recognition that it was a living document, reflecting the Council's current thinking and direction while authorizing further exploration.

Chair Solomon then recognized CAC Co-Chair Pelagio. Ms. Pelagio expressed enthusiasm for the progress made on the workplan and support for recognizing it as a living document. She asked whether there was guidance on how often such documents should be revisited, noting earlier comments about the importance of ensuring continued impact. She also inquired whether, following approval, there would be further opportunities for collaboration between the Advisory Council and the CAC in developing the identified areas and recommendations, perhaps with a timeline for revisiting the document, such as by October 2026.

Chair Solomon responded that the workplan would be revisited at the next meeting, in December 2025. By that time, she said, a revised version would reflect the day's discussion, incorporate minor corrections, and include more developed concepts for how to advance specific items that were discussed; this would support Council deliberations on feasibility of implementation, though this would also require more information from staff.

Vice-Chair Martien suggested three items for clarification in preparation for the December meeting. First, he noted that during the September meeting between the Advisory Council subcommittee and CAC members, participants had expressed a strong interest in continued collaboration. Reflecting that ongoing partnership in the *Timelines* section, he said, would be helpful. Second, he observed that while a revised version of the workplan would be presented at the December meeting, further revisions beyond that point were foreseeable. Third, he sought guidance on when the Council should think specifically about rating or prioritizing individual items, and specifically whether that discussion should occur at the December meeting or begin sooner.

Councilmember Holm recommended beginning some prioritization at the current meeting, suggesting that subsequent work would benefit from establishing focus areas early.

Chair Solomon acknowledged that beginning prioritization immediately would likely extend the meeting beyond its scheduled 3:00 p.m. adjournment but sought input from members on continuing. Seeing general agreement, she proposed to proceed no later than 3:30 or 4:00 p.m. Vice-Chair Martien suggested calling for formal approval of the workplan first and then continuing with the prioritization discussion while quorum remained. Chair Solomon agreed.

Chair Solomon clarified that the vote would be limited to Advisory Council members and invited a motion to approve the workplan with the caveats discussed: namely, that further refinements and edits would be incorporated moving into the implementation phase, and that approval at this stage signified the Council's readiness to advance the workplan toward execution.

Council Action

Dr. Kleinman made a motion, seconded by Councilmember Carlton, to **adopt** the proposed Cumulative Impacts Work Plan developed by the Work Plan Ad Hoc Subcommittee, with caveats and with the understanding that the subcommittee would recommend further refinements. and the motion **carried** by the following vote of the Council:

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

After the motion was passed, the Council prioritized (up and down) elements of the work plan for the subcommittee's further development.

Chair Solomon commended the subcommittee for its work and transitioned the discussion to prioritization. Councilmember Holm suggested using the three-part framework proposed

earlier (place-based, non-place-based, and process-oriented) as an organizing structure, and within each, coming to some agreement as to the highest-priority items. Chair Solomon concurred and recalled three criteria for prioritization: scientific and legal defensibility; responsiveness to community concerns; and feasibility. Considering these, she said, she had mentally categorized some items as receiving “three pluses,” others as mixed or uncertain, and some as lower priority, and she suggested that the Council apply this process as a group.

Addressing the question of practical implementation, Mr. Nudd encouraged the Council to reflect on prioritization within the population of permitting actions. He recalled that the scope in New Jersey had been restricted to Title V facilities, and noted that Title V facilities are not necessarily the highest-risk facilities in communities from a cumulative impacts standpoint. When thinking about practical applicability, he continued, what may be practically applicable to a subset of permitting actions may not be practically applicable to the ten thousand renewals that the Air District processes every year.

CAC Co-Chair Pelagio noted that she needed to depart and thanked the Council for their time spent diving deeply into the issues. She expressed hope that collaboration between the CAC and the Advisory Council would continue through December, with opportunities for CAC members who would want to participate in prioritization. Chair Solomon thanked Ms. Pelagio for her time and emphasized the value of her contributions.

Turning to the items in Table 1, Chair Solomon began with item IA-1 (“non-zero background”), which she characterized as a “triple-plus” item, and noting the need for collaboration with OEHHA. She rated Item IA-2 (“sum of hazard indices”) a double-plus, owing to its strong scientific foundation and responsiveness to community concerns, while expressing uncertainty about feasibility, particularly given its reliance on new approach methodologies and non-standard reference concentrations. For IA-3, she noted that she had originally rated it as a triple-plus, but having heard that some of it was already incorporated, she was less certain about the last plus, in terms of efficiency; given questions about bringing historical accidental release data to bear, or additional things regarding startup and shutdown, it would need to be a follow-up conversation.

In terms of place-based options, Chair Solomon noted some scientific concerns had been raised, yet that CalEnviroScreen and other tools had been widely used for some time; at the same time, though mapping tools responded to community concerns, community concerns about the tools remained. About other stressors (IA-6), Dr. Solomon characterized the scientific foundation as mixed (“plus/minus”), noting that a case can be made for odor as a health issue, and that a history of violations should be considered relevant; it was clearly responsive to community concerns, and also seemed implementable. She regarded health impact assessment (IA-7) as “yes-yes-no”; community participation (IA-8) she regarded as a given.

Vice-Chair Martien expressed general agreement with Chair Solomon’s assessments and sought clarification on her ratings of IA-3 and IA-4. Chair Solomon responded that she had rated IA-3 as a triple-plus but wanted to learn more given the new context supplied by staff about existing practices. She stated that she had rated IA-4 as “plus-plus-question mark” owing to uncertainty about feasibility, and that it might benefit from being reworked into two ideas.

Councilmember Schmeltz remarked that, particularly in relation to IA-1, he had intended to ask during the morning's session why Minnesota and New Jersey selected the specific indicators used in their cumulative impact assessments. He suggested that a similar question could be directed to OEHHA: namely, why certain indicators were chosen for CalEnviroScreen and whether other potential indicators relevant to background exposures might be identified and incorporated in a cumulative impact assessment.

Chair Solomon agreed that time constraints had limited such questions. She added that she would have liked to ask the Minnesota and New Jersey representatives whether they were receiving significant feedback from communities that believed they should have been included but were not. She surmised that New Jersey likely was, given its mention of community self-identification as an emerging priority.

Drawing on her experience in the development of CalEnviroScreen, Chair Solomon noted that the addition, removal, or substitution of individual indicators generally had not produced major differences to CalEnviroScreen, with overall spatial patterns remaining largely consistent. She observed that both Minnesota and New Jersey included race as an indicator in their screening tools, and that race had also been included in the original CalEnviroScreen (version 1.0) but was removed in version 1.1 for a variety of reasons, and though there had been concern about removing race for an EJ screening tool, in fact removing it did not really change the maps. Similar to what Dr. Sheats had shown in his data for New Jersey, Chair Solomon indicated, when one looked at the impacted communities, and the racial makeup of those communities, one found that they were the same EJ communities. Even though CalEnviroScreen is "race-blind," she continued, it is still identifying communities that have suffered from decades of racism and environmental injustice.

Vice-Chair Martien agreed, noting that because CalEnviroScreen contains many correlated indicators, it is relatively insensitive to the removal of any single one. While some edge cases do shift, he said, the overall identification of impacted areas tends to remain stable. He added that differences can emerge depending on percentile cutoffs, such as using the top 25 versus top 30 or 35 percent. Reinforcing Dr. Schmeltz's earlier point, he emphasized that community input into such threshold and indicator decisions could be an important component as the Council evaluates place-based tools.

Chair Solomon asked whether the workgroup had received the input it needed or if an assessment of Table 2 would be helpful for determining next steps.

Councilmember Holm responded that she had heard general agreement regarding the non-place-based options, with IA-1 being high priority, as well as support for expanding community representation. However, she said she was not yet certain which place-based options should be identified as the highest priorities.

Vice-Chair Martien noted that an open question was whether the Council wanted to think about $PM_{2.5}$ in the assessment approaches, or simply in a place-based context, as an action. He pointed out that "limits on near-source $PM_{2.5}$" appeared via AC-6 [Table 2], but that there was no mention of $PM_{2.5}$ in the impact assessment options [Table 1]. He asked whether the Council found this acceptable and, given the work of the previous Advisory Council, whether it would

be desirable to include an assessment item focused on localized $PM_{2.5}$ exposure, perhaps in connection with new permit applications.

Councilmember Holm asked Vice-Chair Martien whether, for an item like IA-1, $PM_{2.5}$ should explicitly be called out as part of the prioritization as opposed to part of the process of developing priorities.

Vice-Chair Martien clarified that Tables 1 and 2 served distinct purposes, with Table 1 addressing impact assessment and Table 2 addressing actions. He asked whether the Council should include a specific recommendation on how $PM_{2.5}$ impacts are to be assessed.

Chair Solomon responded that the Council had broken important ground on $PM_{2.5}$, which is a critical pollutant in the Bay Area, and reminded the group that the Council had made strongly worded recommendations to the Board and the staff about prioritizing $PM_{2.5}$. She emphasized that $PM_{2.5}$ should be critical for the cumulative impacts discussion, cutting across both place-based and non-place-based approaches. Therefore, she concluded, it need not stand as a separate item in Table 1, but should be integrated into the consideration of IA-1 (“background”) and related elements where its relevance is already implicit.

Chair Solomon observed that several items in Table 2 appeared more engineering-oriented than would fall within her own expertise. For instance, decisions about thresholds for applying BACT or TBACT would be better guided by engineering staff. Nonetheless, she noted that these seemed feasible for staff to implement if the Council provided recommendations along those lines.

Vice-Chair Martien noted concerns about community benefit agreements (AC-10) and asked whether the Council should note caveats, for example, clarifying that benefits should not be limited to economic considerations. He also asked whether there were any items the Council wished to de-emphasize in a revised version for December.

Chair Solomon stated that she was not inclined to support imposing CEQA requirements specifically on communities within CalEnviroScreen-identified zones, as appeared to be suggested by AC-3. She questioned whether such an approach would ultimately be beneficial or would simply add procedural complexity, while noting that she was not a CEQA expert and expressing a desire to hear from others.

With the Chair’s permission, Mr. Nudd explained that the Air District sets significance thresholds for air quality impacts in CEQA, which local governments use in determining whether a full CEQA analysis is required, though they may still approve a project that exceeds those thresholds. If the Air District were to lower thresholds in communities determined to be more vulnerable, he indicated, it might influence the land-use decisions that underly siting decisions for many industrial facilities, or at least would compel deeper consideration by local governments. Chair Solomon found this interesting and asked whether it would be most helpful for new facilities. Mr. Nudd indicated that it would.

Chair Solomon remarked that it was difficult to identify items to de-emphasize. Vice-Chair Martien agreed, saying that items could continue to be developed further unless they raised significant concerns.

Chair Solomon commented that she wished to positively emphasize AC-9, noting that Rule 11-18 had represented a significant effort to advance environmental justice goals. Although it had not yet achieved all that had been hoped, she was not ready to set it aside and encouraged renewed attention to strengthening its effectiveness. Vice-Chair Martien invited comment from Mr. Nudd, observing that the Appendix referenced ongoing rule-development efforts and progress related to Rule 11-18, and that the Council might consider recommending support for those initiatives. Mr. Nudd responded that related amendments were currently out for public comment, with the comment period closing on October 13. He explained that the current phase of this work focused on streamlining and accelerating the process to get to emission-reduction plans, with a subsequent phase expected to examine rule stringency and health protectiveness.

Councilmember Holm suggested that the Council might de-emphasize AC-4 ("enhanced public engagement"). While she supported the principle, she suggested spending less energy on AC-4 could be warranted given the extent of "notification fatigue."

Chair Solomon asked whether the lower risk thresholds mentioned in AC-8 already existed to some extent, for cancer risk. She suggested de-emphasizing AC-8, and indicated that changing the overall approach to hazard indices (as in IA-2) would be preferable to having numeric thresholds that varied by location.

Chair Solomon observed that "shifting the burden of proof" could require statutory action, and considered that it might be easier said than done. Vice-Chair Martien agreed and clarified that the current version of AC-11 had been retitled in Table 2 as "[p]rohibit select category of permits" and rewritten as "[p]rohibit some permit types in overburdened communities." This revision, he said, reflected recent discussions within the subcommittee to improve clarity.

Regarding AC-8, Vice-Chair Martien explained that the subcommittee's intent had been aimed toward the provision of additional justification to support the lower cancer-risk limit of six in one million for overburdened communities, or alternatively, whether it would be appropriate to lower the limits for acute or chronic hazard indices. He added that he would look to staff to see whether stronger support for the current risk threshold would be useful; if not, the Council could focus on evaluating lower limits for hazard indices under AC-8.

OTHER BUSINESS

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

Mr. Nudd provided a status update on various Air District permitting regulations, including the permitting backlog and the Board's desire to address the efficiency of the permitting process.

5. PUBLIC COMMENT ON NON-AGENDA MATTERS

No requests received.

6. COUNCIL MEMBER COMMENTS

None.

7. TIME AND PLACE OF NEXT MEETING

Monday, December 8, 2025, at 10:00 a.m. at 375 Beale Street, San Francisco, CA 94105.The meeting will be in-person for the Advisory Council members and members of the public will be able to either join in-person or via webcast.

8. ADJOURNMENT

The meeting adjourned at 3:27 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: Chairperson Gina Solomon and Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: December 8, 2025

Re: Advancing Risk Assessment Methodologies

RECOMMENDED ACTION

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

BACKGROUND

The Air District's Advisory Council has been researching and discussing cumulative impacts and permitting since 2024. During the July 2024 meeting of the Advisory Council, the Council proposed a set of Key Interim Findings. The Council learned more about cumulative impacts in permitting from the experiences and perspectives of peer agencies in Minnesota and New Jersey, as well as from the Air District at its morning meeting on October 6, 2025. The Council will learn more and discuss advancing risk assessment methodologies, with a focus on applications in air quality regulation.

DISCUSSION

The Council will discuss presentations from Dr. Keeve Nachman and Dr. Rima Woods.

Dr. Keeve Nachman, Ph.D., is the Robert S. Lawrence Professor and Associate Chair of Environmental Health and Engineering at the Johns Hopkins Bloomberg School of Public Health, where he is on the faculty of the Risk Sciences and Public Policy Institute and serves as the Associate Director of the Johns Hopkins Center for a Livable Future. Nachman has rigorous training and extensive practical experience in the risk sciences, regulatory toxicology, exposure science, epidemiology, occupational and environmental health, and environmental policy and communication. He has over twenty years of experience in the field of public health, with experience working in two federal agencies (EPA and DOD/USACE) on issues related to toxicology, epidemiology, exposure science, and risk assessment. Nachman has a Ph.D. in Environmental and Occupational Health Policy ('06) and an MHS in Environmental Health Science ('01) from the Johns Hopkins Bloomberg School of Public Health. Nachman's research is funded by the EPA, USDA, NIH, and foundations. He has active projects focused on the development of novel methods to quantify infants' and children's soil and dust

exposures, prioritization of novel contaminants in human biosolids, and development of occupational exposure factors in the agriculture sector. He has served on multiple consensus panels and planning committees for the National Academies of Science, Engineering, and Medicine.

Dr. Rima Woods is a Senior Toxicologist in the Air Toxicology and Risk Assessment Section in the Office of Environmental Health Hazard Assessment (OEHHA). She has investigated the health effects of pesticides and air pollutants for over 15 years, with an emphasis on susceptible subpopulations and risk communication. In her current position, she works to develop cancer and noncancer health guidance values under the Air Toxics Hot Spots Program, oversees the review of stationary facility health risk assessments, and coordinates the work of CalEPA's Children's Environmental Health Center.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: David Holstius
Reviewed by: Gregory H. Nudd

ATTACHMENT(S):

1. Presentation of Dr. Nachman, Johns Hopkins University
2. Presentation of Dr. Rima Woods, California Office of Environmental Health Hazard Assessment

Improving Methodologies for Cumulative Risk Assessment: A Case Study of Noncarcinogenic Health Risks from Volatile Organic Compounds in Fenceline Communities in Southeastern Pennsylvania

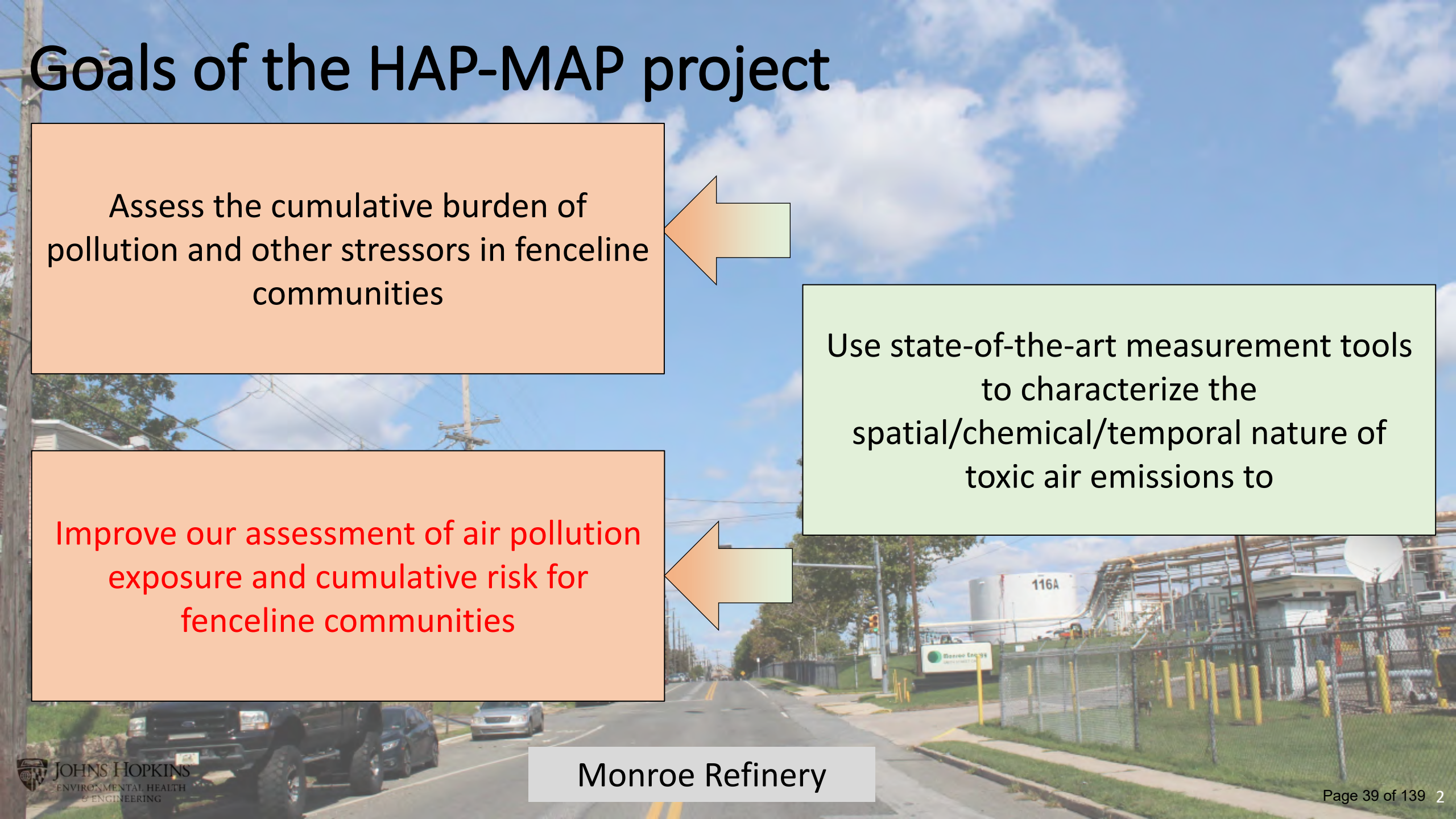
Johns Hopkins University Team: Peter DeCarlo, **Keeve Nachman**, Tom Burke, Kirsten Koehler, Ana Rule, Ellis Robinson, Mina Tehrani, Sara Lupolt, Andrea Chiger, Carolyn Gigot, Roger Sheu, Amira Yassine, Shivang Agarwal
Widener University: Scott Van Bremer
Aerodyne Mobile Lab Team: Megan Claflin, Edward Fortner, Manjula R Canagaratna, Conner Daube, Benjamin Werden, Joseph R Roscioli, Jordan Krechmer, Harald Stark, Scott C. Herndon, Tara Irene Yacovitch

Goals of the HAP-MAP project

Assess the cumulative burden of pollution and other stressors in fenceline communities

Use state-of-the-art measurement tools to characterize the spatial/chemical/temporal nature of toxic air emissions to

Improve our assessment of air pollution exposure and cumulative risk for fenceline communities



Monroe Refinery

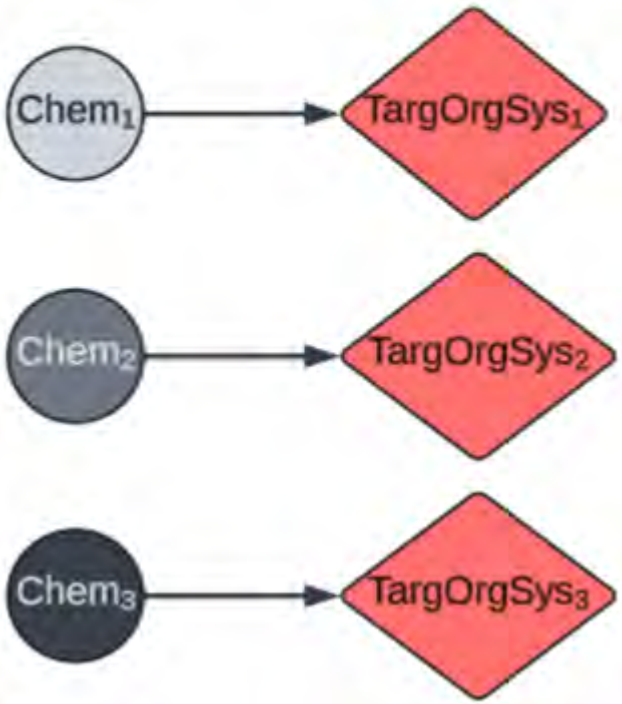
Thesis statements

- Traditional regulatory risk assessments do not adequately account for the population health burden imposed by chemical mixtures

- A more holistic approach to quantifying the impact of exposures will better characterize population health burdens

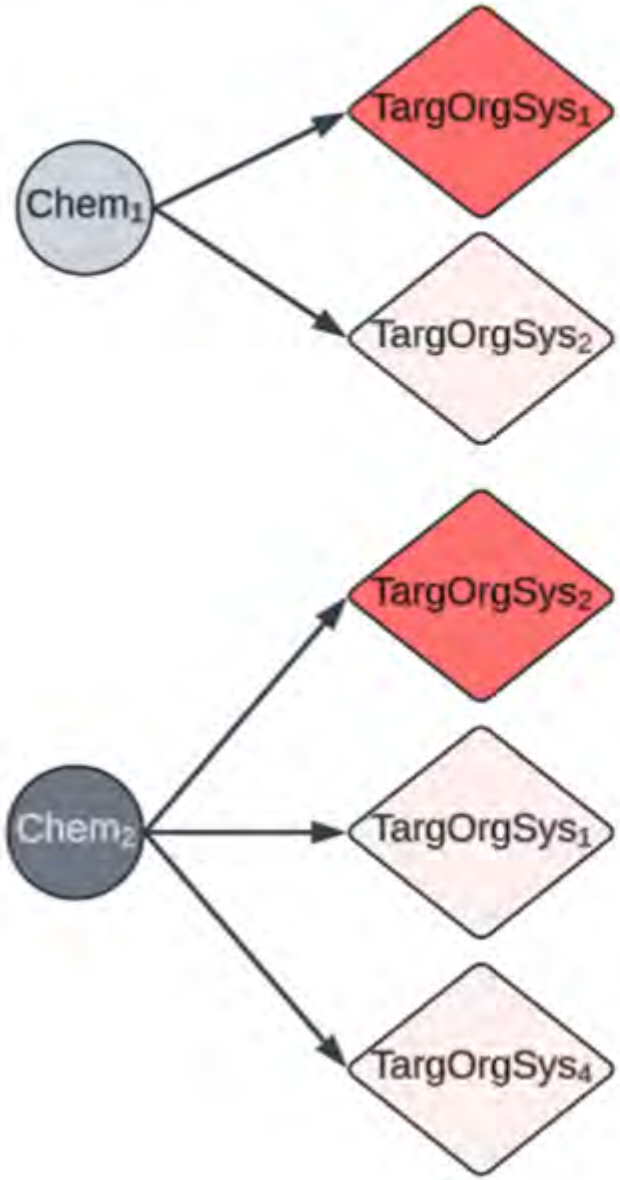
- Applying this kind of approach may lead to different conclusions about risk and support more aggressive risk management

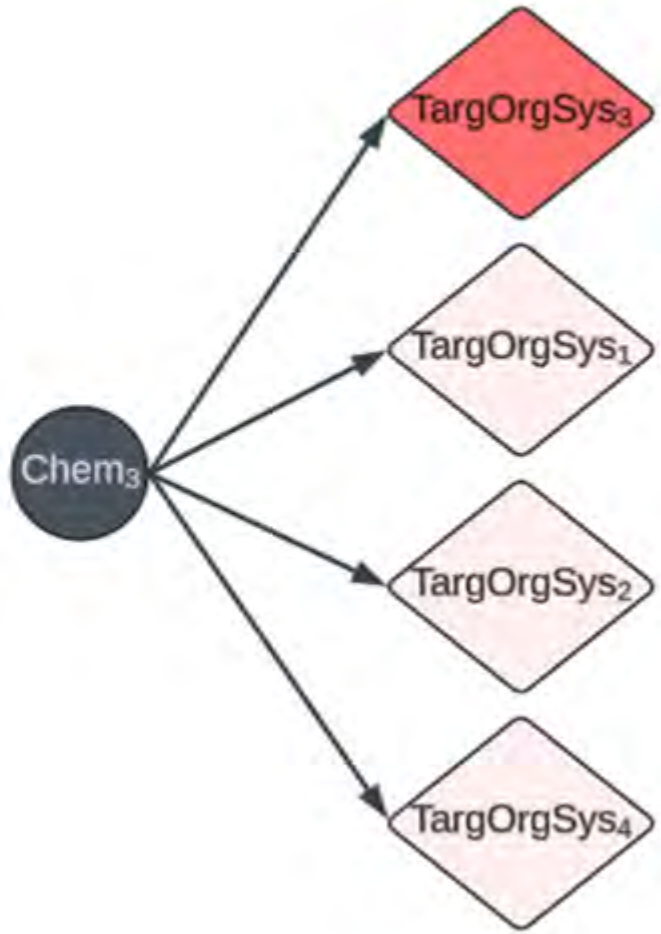
A: Traditional



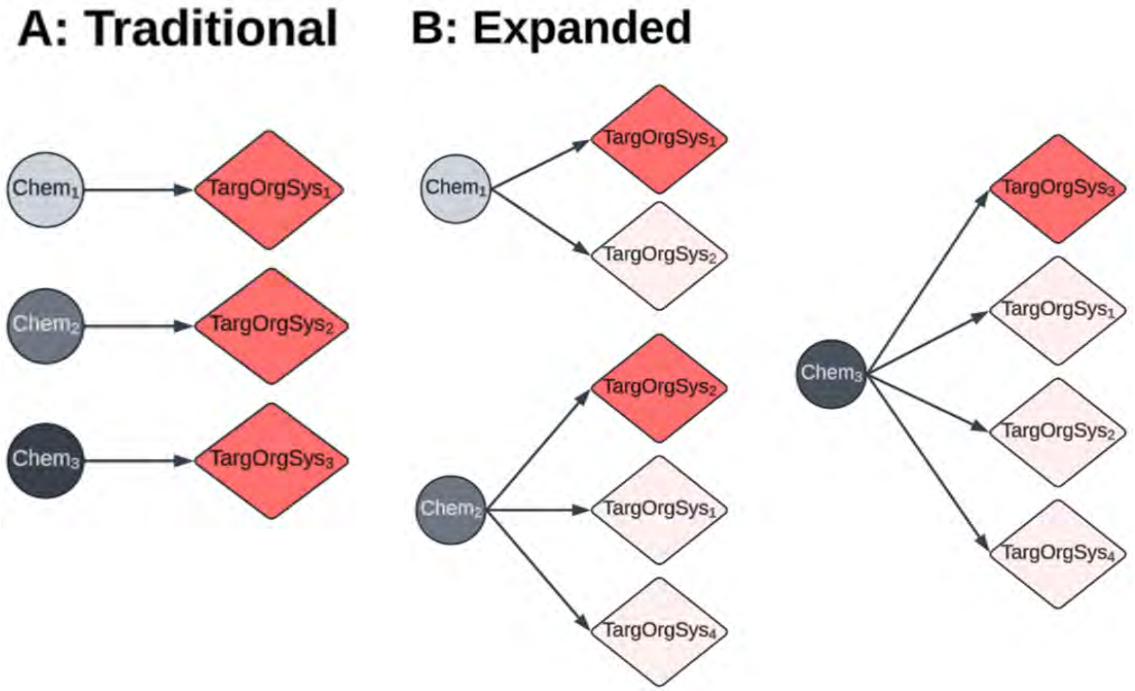
Only the most sensitive organ system (health effect) for each chemical is considered; other effects are ignored.

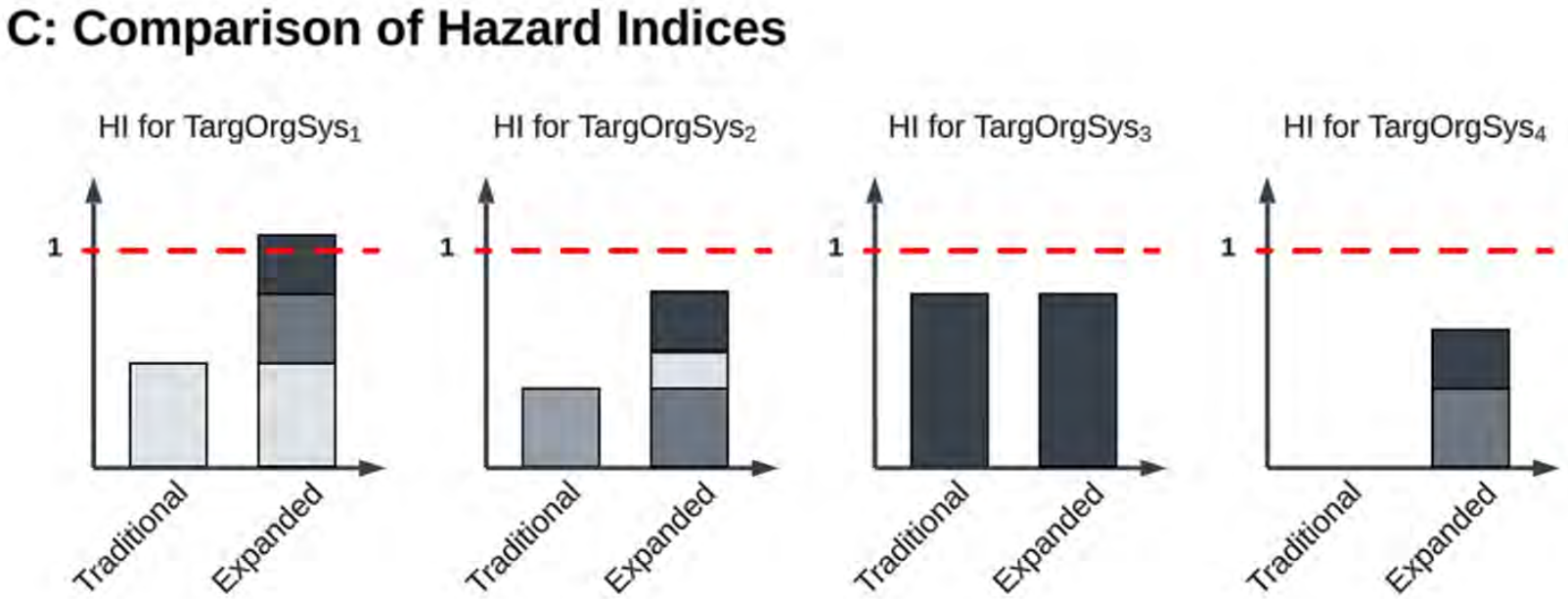
B: Expanded

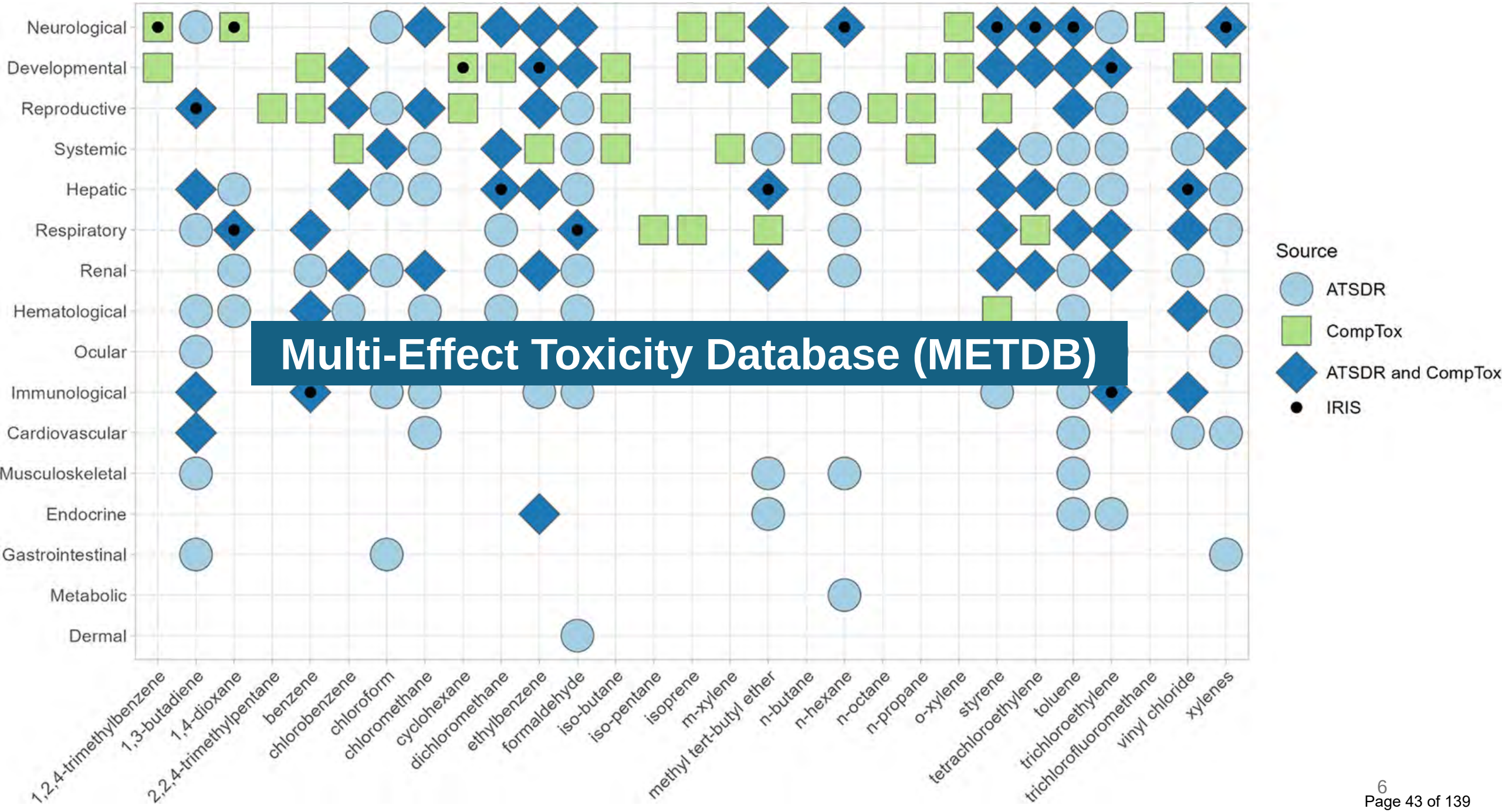




All of the organ systems affected by each chemical are considered.


A: Traditional
B: Expanded
Chem1
Chem2
Chem3
TargOrgSys1
TargOrgSys2
TargOrgSys3
TargOrgSys4


C: Comparison of Hazard Indices
HI for TargOrgSys1
HI for TargOrgSys2
HI for TargOrgSys3
HI for TargOrgSys4
1
Traditional
Expanded


Multi-Effect Toxicity Database (METDB)
Neurological
Developmental
Reproductive
Systemic
Hepatic
Respiratory
Renal
Hematological
Ocular
Immunological
Cardiovascular
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Endocrine
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Dermal
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
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chloroform
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cyclohexane
dichloromethane
ethylbenzene
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m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
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vinyl chloride
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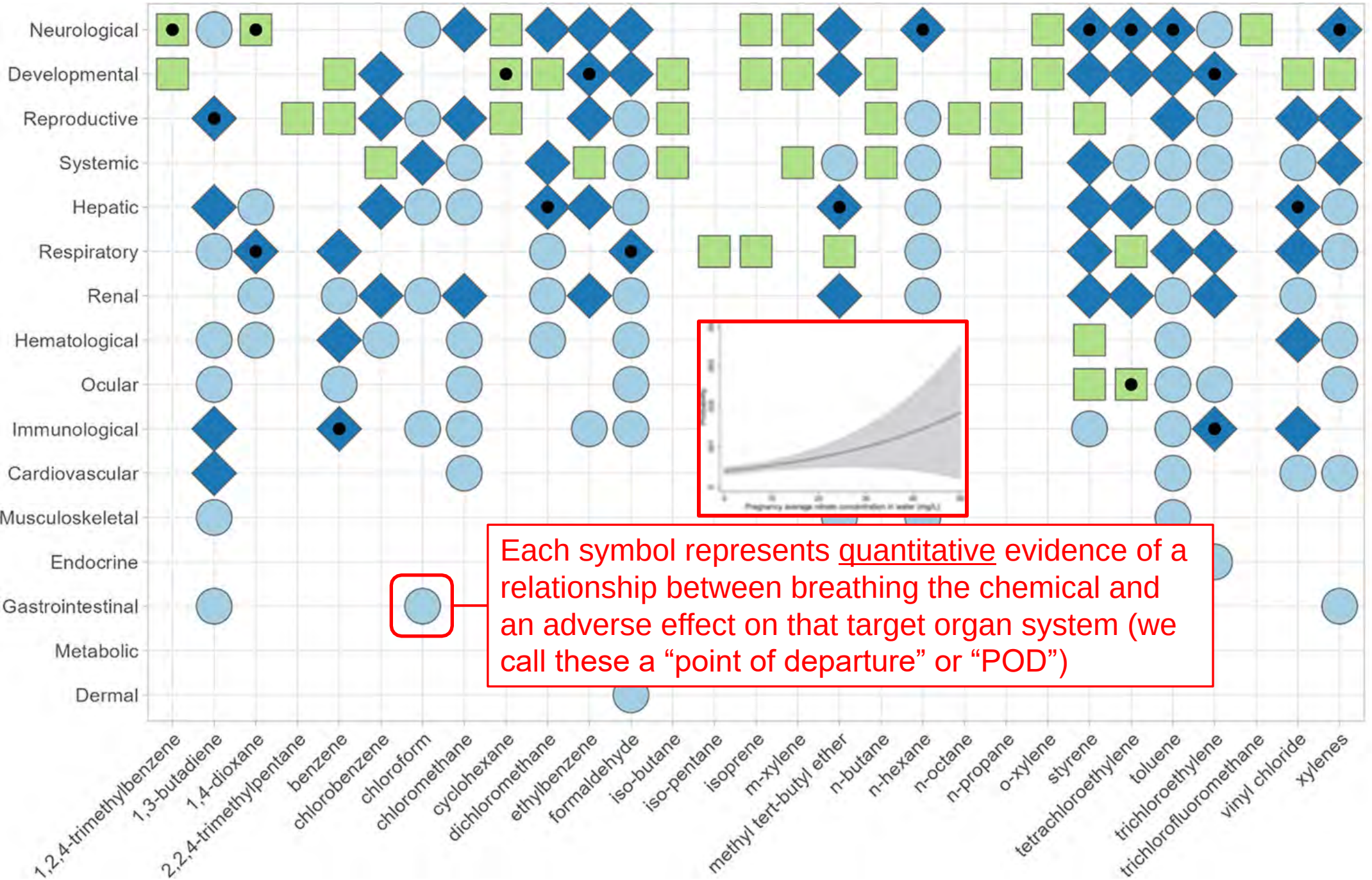
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS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2,2,4-trimethylpentane
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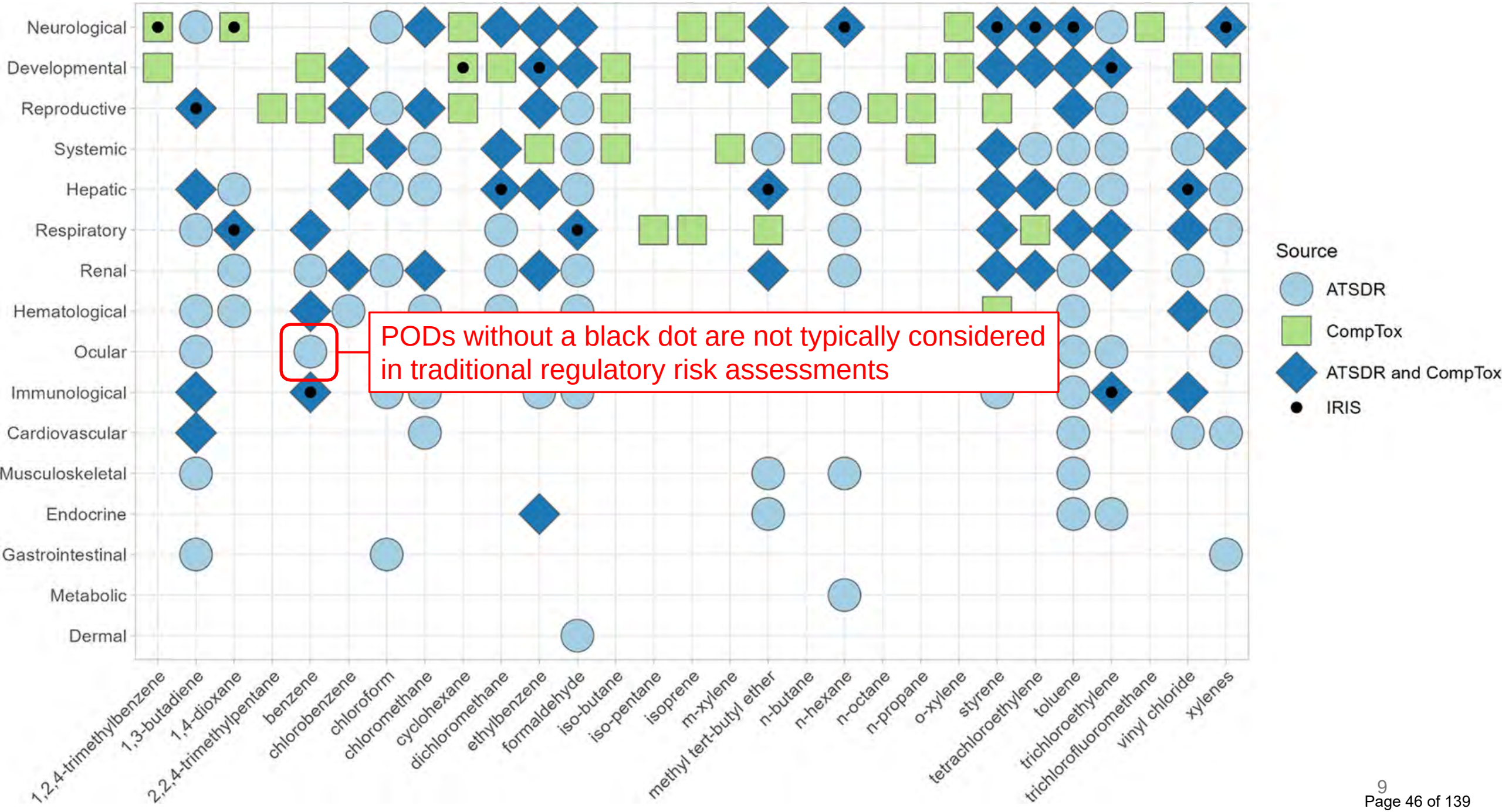
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS
Each symbol represents quantitative evidence of a relationship between breathing the chemical and an adverse effect on that target organ system (we call these a “point of departure” or “POD”)


Neurological
Developmental
Reproductive
Systemic
Hepatic
Respiratory
Renal
Hematological
Ocular
Immunological
Cardiovascular
Musculoskeletal
Endocrine
Gastrointestinal
Metabolic
Dermal
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
PODs that have a black dot in them would be used as the basis for the traditional regulatory approach to risk assessment.
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS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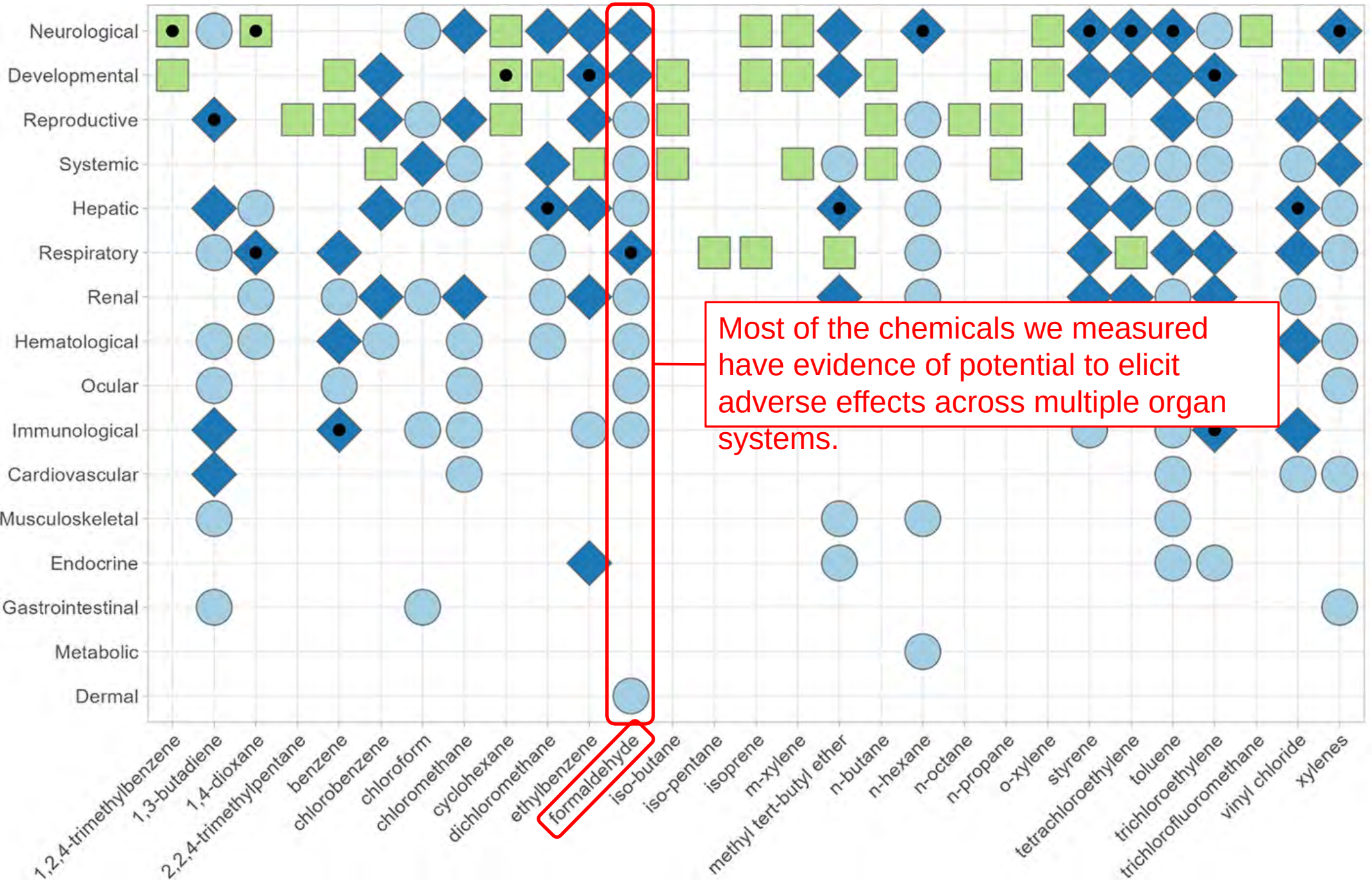
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
PODs without a black dot are not typically considered in traditional regulatory risk assessments
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS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ethylbenzene
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isoprene
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n-hexane
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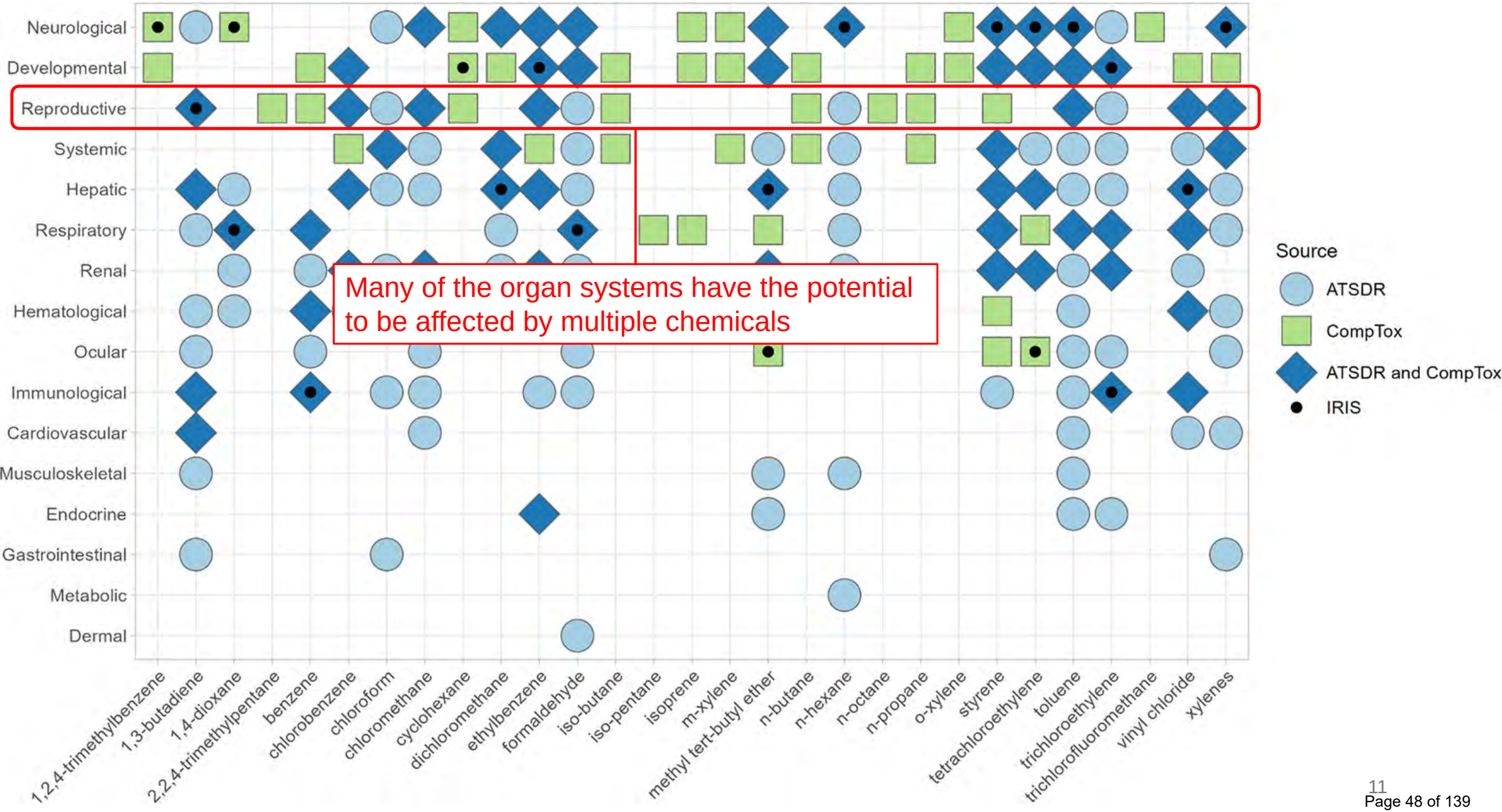
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
Most of the chemicals we measured have evidence of potential to elicit adverse effects across multiple organ systems.
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS


Neurological
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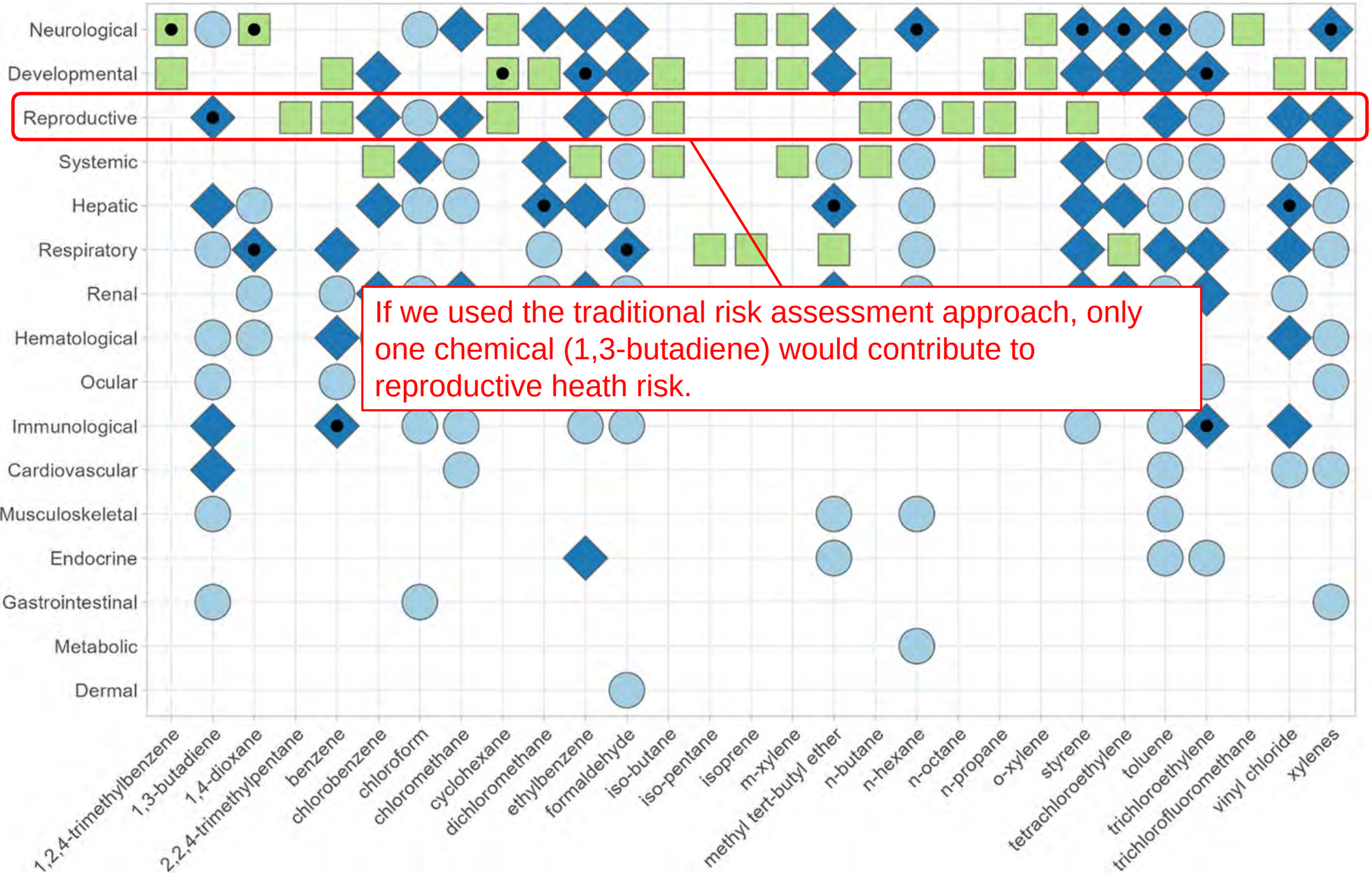
Cardiovascular
Musculoskeletal
Endocrine
Gastrointestinal
Metabolic
Dermal
Many of the organ systems have the potential to be affected by multiple chemicals
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS


Neurological
Developmental
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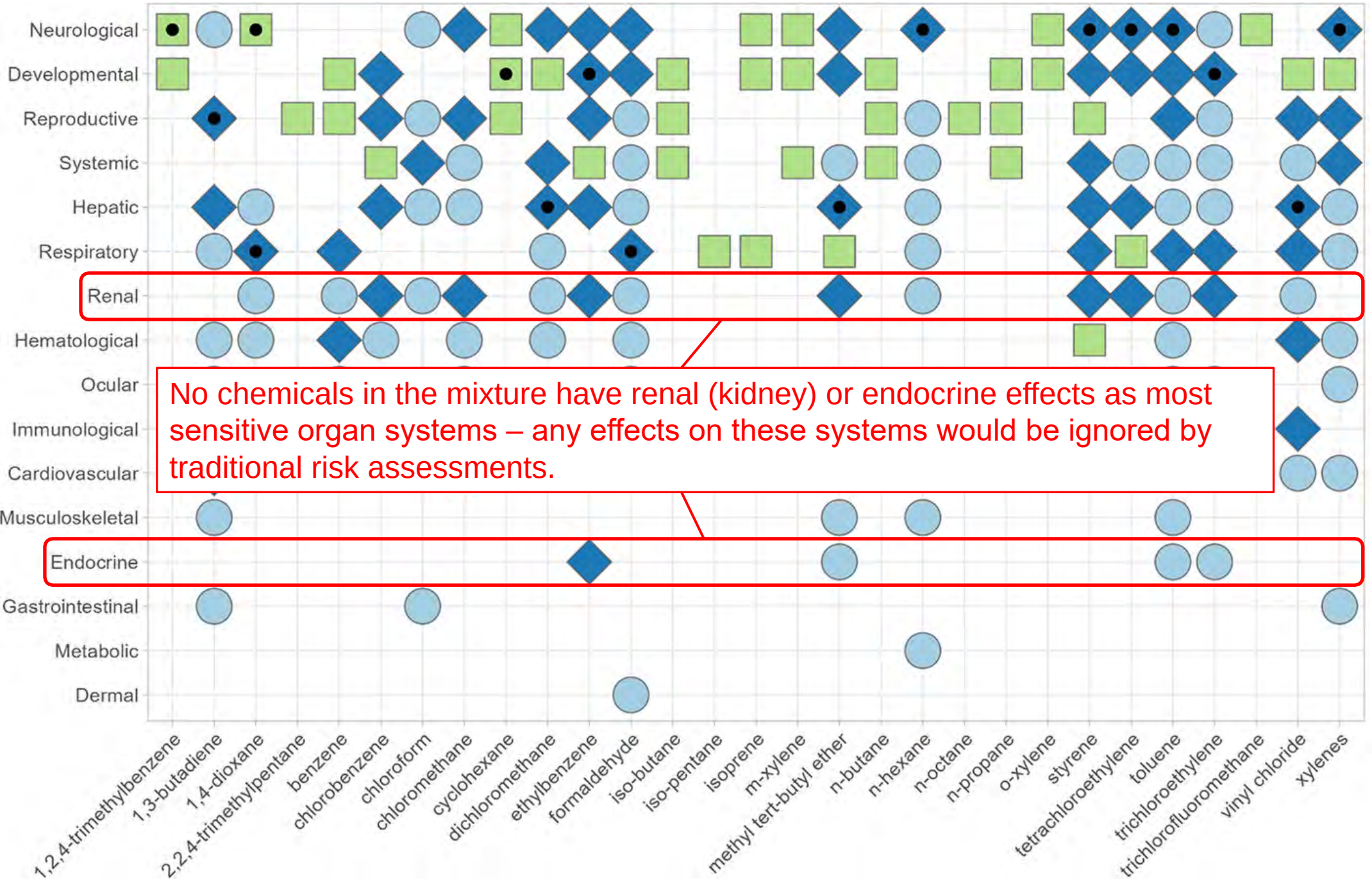
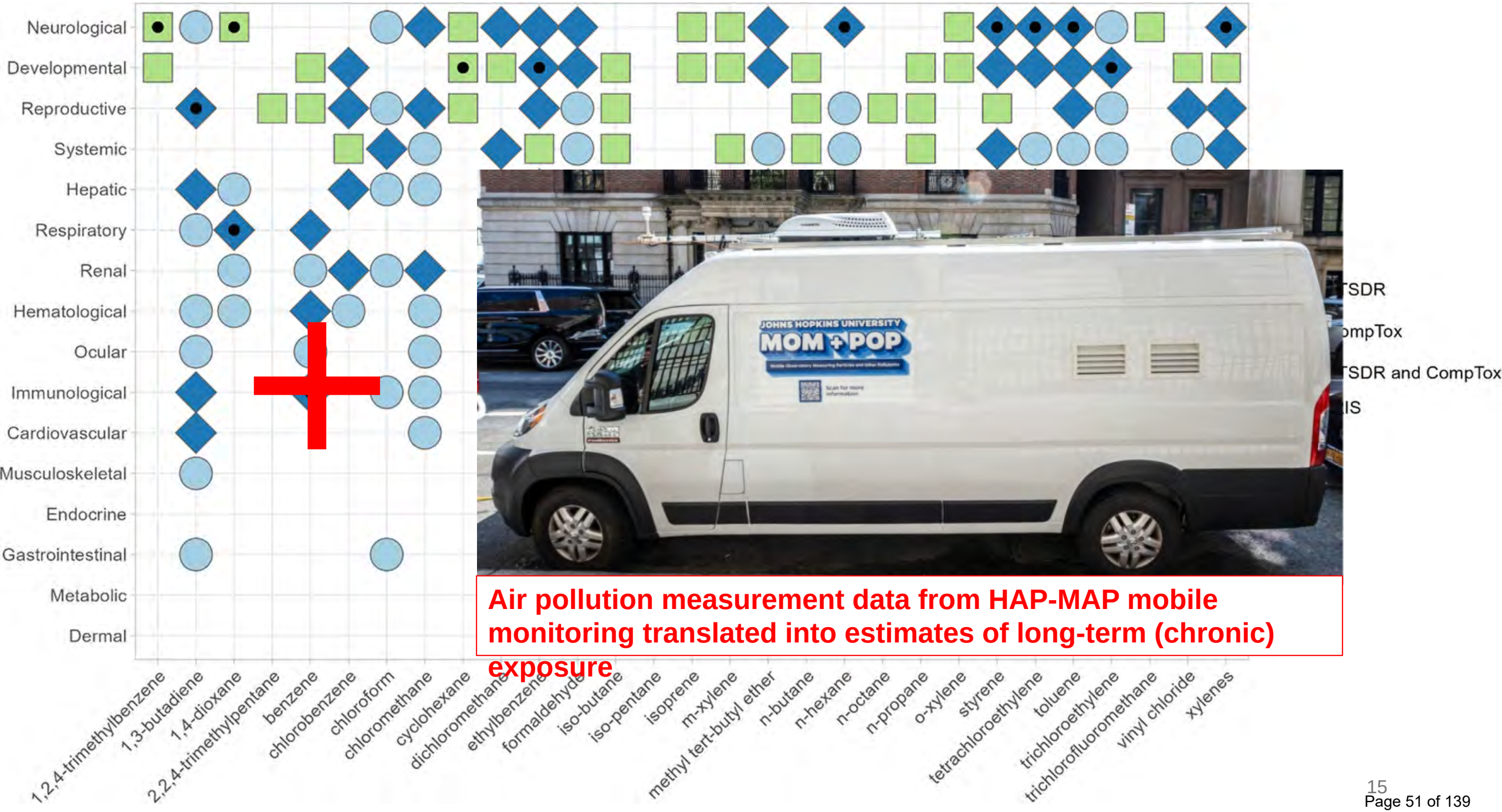
Systemic
Hepatic
Respiratory
Renal
Hematological
Ocular
Immunological
Cardiovascular
Musculoskeletal
Endocrine
Gastrointestinal
Metabolic
Dermal
If we used the traditional risk assessment approach, only one chemical (1,3-butadiene) would contribute to reproductive heath risk.
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS


Neurological
Developmental
Reproductive
Systemic
Hepatic
Respiratory
Renal
Hematological
Ocular
Immunological
Cardiovascular
Musculoskeletal
Endocrine
Gastrointestinal
Metabolic
Dermal
No chemicals in the mixture have renal (kidney) or endocrine effects as most sensitive organ systems – any effects on these systems would be ignored by traditional risk assessments.
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
m-xylene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
Source
ATSDR
CompTox
ATSDR and CompTox
IRIS



Air pollution measurement data from HAP-MAP mobile monitoring translated into estimates of long-term (chronic) exposure

Characterizing risk for each chemical

We want to determine whether a population's exposures will increase their risk of an adverse effect

We do this by calculating a Hazard Quotient (HQ) for each chemical-organ system combination

The HQ is calculated by dividing the chemical's concentration in air by the corresponding target toxicity concentration (from METDB)

Interpretation:

HQ ≥ 1: Increased risk of effect

HQ < 1: Effect assumed unlikely

Characterizing cumulative non-cancer risk

For each organ system in the body, we want to account for the collective action of all of the chemicals in the mixture.

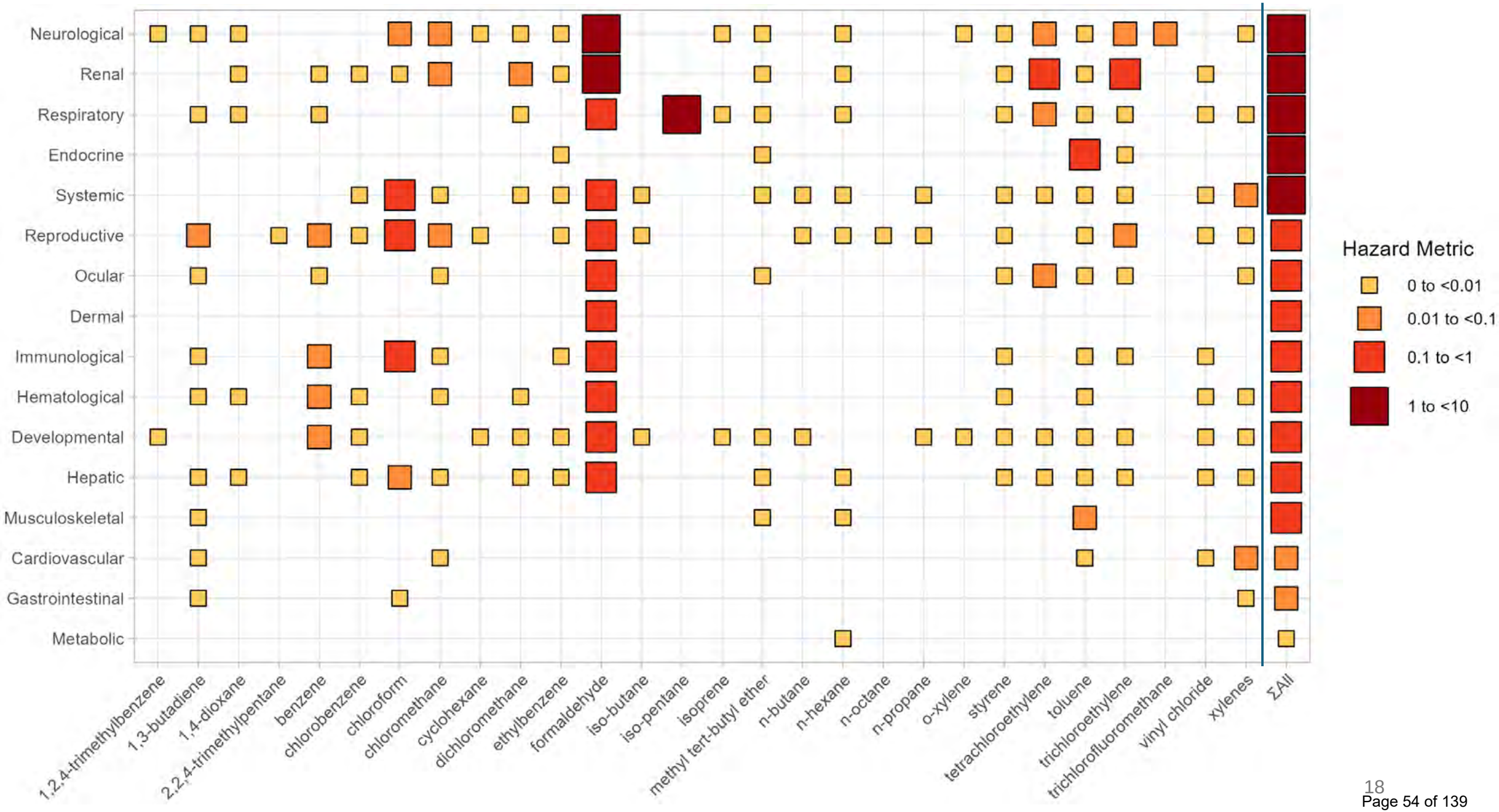
To do this, we calculate a Hazard Index (HI) for each organ system.

The HI is the sum of all of the HQs for a given organ system.

Interpretation:

HI ≥ 1: Increased risk of effect

HI < 1: Effect assumed unlikely


Neurological
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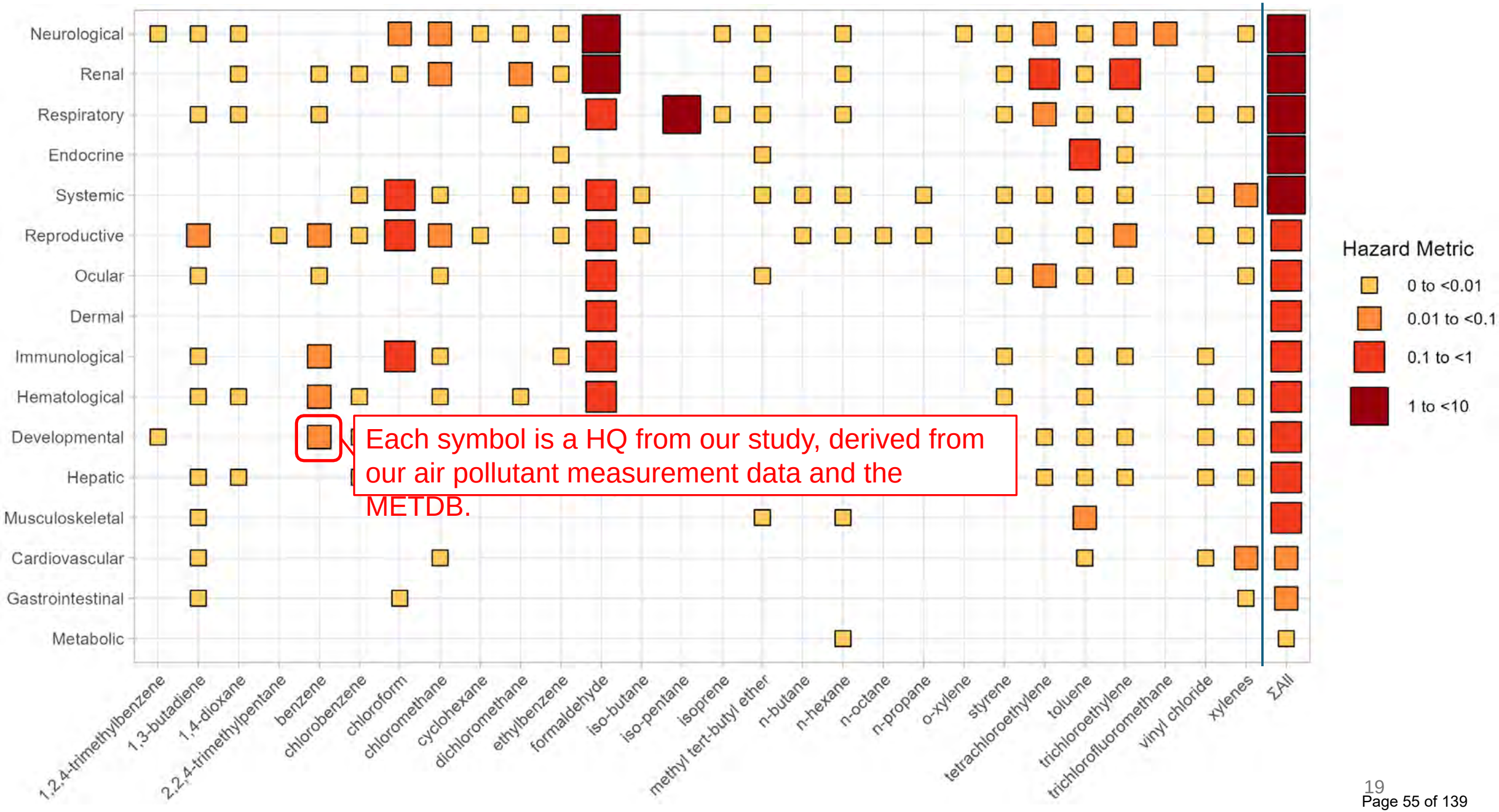
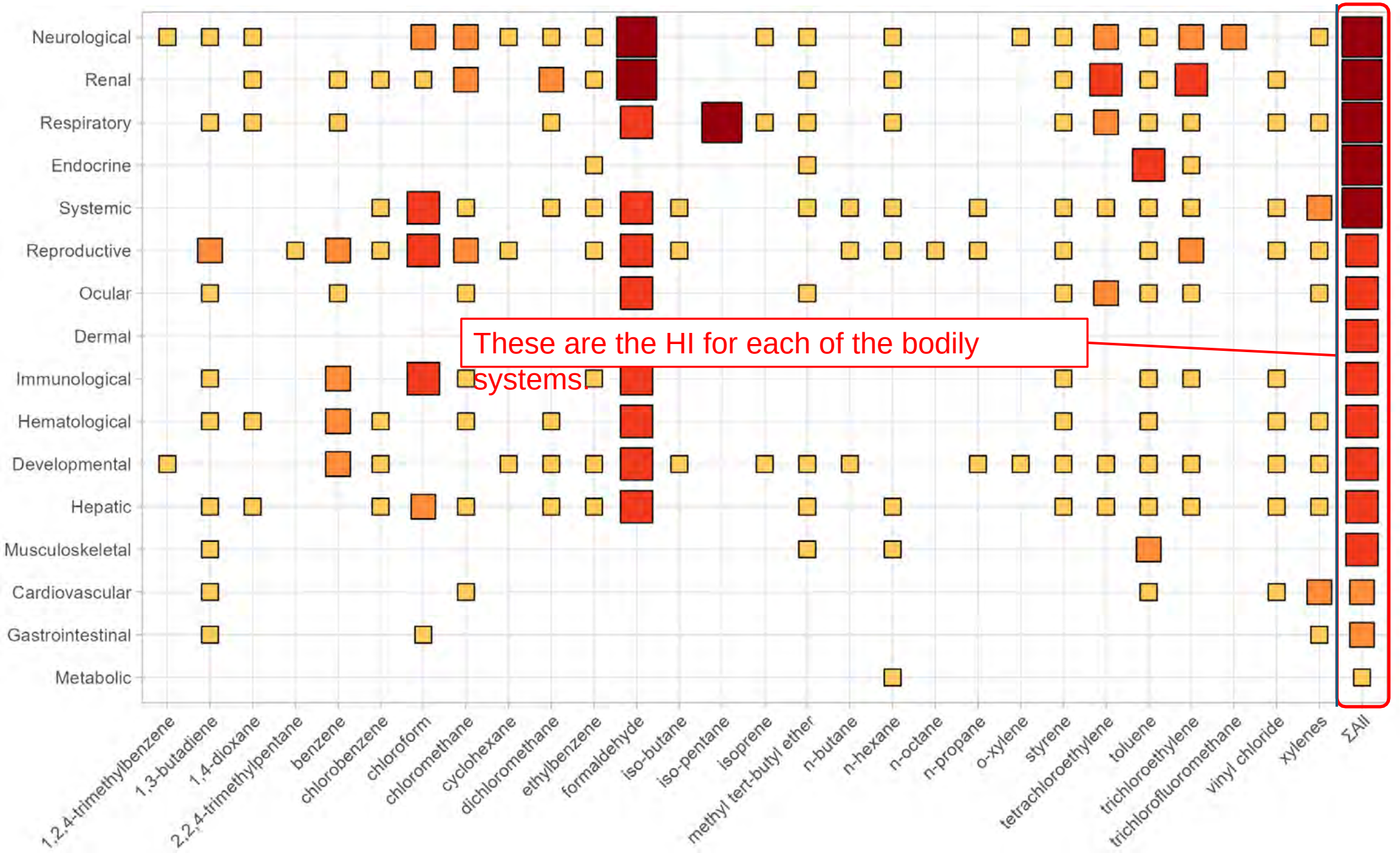
Gastrointestinal
Metabolic
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
ΣAll
Hazard Metric
0 to <0.01
0.01 to <0.1
0.1 to <1
1 to <10


Neurological
Renal
Respiratory
Endocrine
Systemic
Reproductive
Ocular
Dermal
Immunological
Hematological
Developmental
Hepatic
Musculoskeletal
Cardiovascular
Gastrointestinal
Metabolic
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
ΣAll
Each symbol is a HQ from our study, derived from our air pollutant measurement data and the METDB.
Hazard Metric
0 to <0.01
0.01 to <0.1
0.1 to <1
1 to <10


Neurological
Renal
Respiratory
Endocrine
Systemic
Reproductive
Ocular
Dermal
Immunological
Hematological
Developmental
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Cardiovascular
Gastrointestinal
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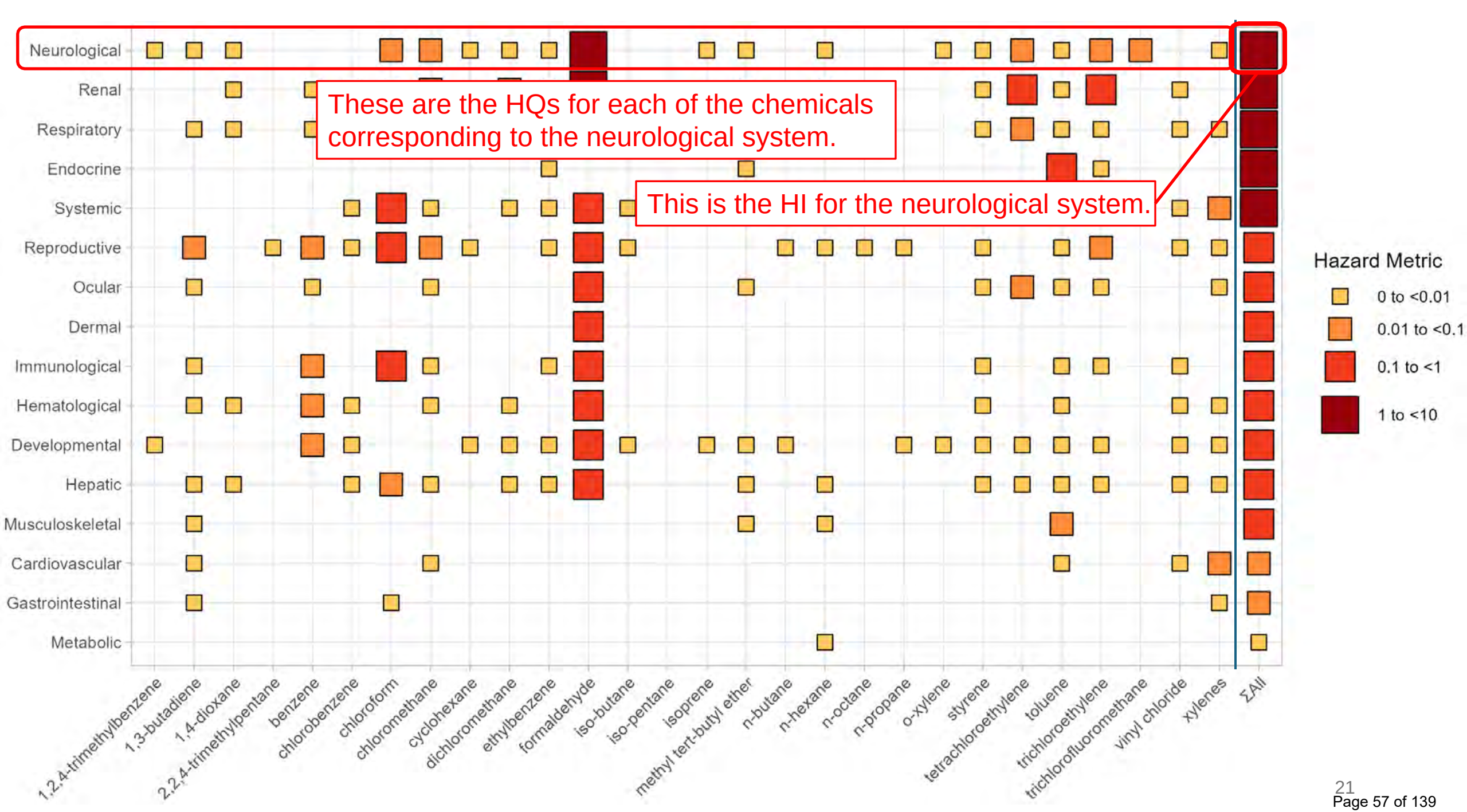
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
ΣAll
These are the HI for each of the bodily systems.
Hazard Metric
0 to <0.01
0.01 to <0.1
0.1 to <1
1 to <10


Neurological
Renal
Respiratory
Endocrine
Systemic
Reproductive
Ocular
Dermal
Immunological
Hematological
Developmental
Hepatic
Musculoskeletal
Cardiovascular
Gastrointestinal
Metabolic
1,2,4-trimethylbenzene
1,3-butadiene
1,4-dioxane
2,2,4-trimethylpentane
benzene
chlorobenzene
chloroform
chloromethane
cyclohexane
dichloromethane
ethylbenzene
formaldehyde
iso-butane
iso-pentane
isoprene
methyl tert-butyl ether
n-butane
n-hexane
n-octane
n-propane
o-xylene
styrene
tetrachloroethylene
toluene
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes
ΣAll
These are the HQs for each of the chemicals corresponding to the neurological system.
This is the HI for the neurological system.
Hazard Metric
0 to <0.01
0.01 to <0.1
0.1 to <1
1 to <10

(HI)

Table 2. Comparison of hazard indices calculated using traditional (IRIS RfC only) and expanded (METDB) approaches to cumulative risk assessment.

	Hazard indices[a]				
End point	Traditional approach (IRIS RfCs[c] only)	Expanded approach (METDB[b])	CompTox excluded	Chronic assumption	Total uncertainty factor <3,000
Neurological	0.04				
Renal	—				
Respiratory	0.38				
Endocrine	—				
Systemic	—				
Reproductive	0.09				
Ocular	0.02				
Dermal	—				
Immunological	0.10				
Hematological	—				
Developmental	0.05				
Hepatic	0.00				
Musculoskeletal	—				
Cardiovascular	—				
Gastrointestinal	—				
Metabolic	—				

No HI>1

Note:—, no data; IRIS, Integrated Risk Information System; RfC, reference concentration; METDB, Mult-Effect Toxicity Database; US EPA, US Environmental Protection Agency.
[a]A Hazard index above 1 indicates adverse effects are possible.
[b]METDB, multi-effects toxicity database.
[c]IRIS RfC, Reference concentrations from the US EPA's IRIS.

Interpretation?
No effects expected.

(HI)

Table 2. Comparison of hazard indices calculated using traditional (IRIS RfC only) and expanded (METDB) approaches to cumulative risk assessment.

End point	Hazard indices[a]				
	Traditional approach (IRIS RfCs[c] only)	Expanded approach (METDB[b])	CompTox excluded	Chronic assumption	Total uncertainty factor <3,000
Neurological	0.04	9.22[a]			
Renal	—	4.16[a]			
Respiratory	0.38	1.54[a]			
Endocrine	—	1.43[a]			
Systemic	—	1.09[a]			
Reproductive	0.09	0.74			
Ocular	0.02	0.64			
Dermal	—	0.60			
Immunological	0.10	0.58			
Hematological	—	0.46			
Developmental	0.05	0.44			
Hepatic	0.00	0.40			
Musculoskeletal	—	0.10			
Cardiovascular	—	0.02			
Gastrointestinal	—	0.01			
Metabolic	—	0.01			

Note:—, no data; IRIS, Integrated Risk Information System; RfC, reference concentration; METDB, Mult-Effect Toxicity Database; US EPA, US Environmental Protection Agency.
[a]A Hazard index above 1 indicates adverse effects are possible.
[b]METDB, multi-effects toxicity database.
[c]IRIS RfC, Reference concentrations from the US EPA's IRIS.

No HI>1

Interpretation?
No effects expected.

HI>1

Interpretation?
Increased risk of neurological, renal, respiratory, endocrine, and systemic outcomes. Management of risk likely warranted.

What it means

- Regulatory risk assessments often rely on lower quality air pollutant measurement data and overly simplistic consideration of complex chemical mixtures

- Our novel approach to characterizing non-cancer risks paints a more holistic and realistic picture of burdens faced by fenceline communities

- A fuller characterization of these cumulative burdens could support management of risks for fenceline communities that truly reflect the science and protect public health.

Research

Environmental Health Perspectives

A Section 508–conformant HTML version of this article is available at https://doi.org/10.1289/EHP14696.

Improving Methodologies for Cumulative Risk Assessment: A Case Study of Noncarcinogenic Health Risks from Volatile Organic Compounds in Fenceline Communities in Southeastern Pennsylvania

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[2]Risk Sciences and Public Policy Institute, Johns Hopkins University, Baltimore, Maryland, USA
[3]Aerodyne Research Inc., Billerica, Massachusetts, USA
[4]Department of Health Policy and Management, Johns Hopkins University, Baltimore, Maryland, USA

Background: Cumulative risk assessment (CRA) is key to characterizing health risks in fenceline and disadvantaged communities, which face environmental pollution and challenging socioeconomic conditions. Traditional approaches for inclusion of mixtures in CRA are limited and only assess the most sensitive target organ system for each chemical.

Methods: We developed an expanded approach to cumulative risk assessment that considers all known target organ systems associated with a chemical. Specifically, we created a multi-effects toxicity database by *a*) compiling toxicological and epidemiological data from the Agency for Toxic Substances and Disease Registry's (ATSDR) Toxicological Profiles and the Environmental Protection Agency (US EPA) CompTox Chemicals Dashboard; *b*) developing a tiering system to prioritize identified data for use in developing toxicity values; and *c*) accounting for uncertainty to create toxicity values for additional target organ systems. We demonstrated differences between the traditional approach and our expanded approach by using state-of-the-art mobile

Thank you!

Keeve E. Nachman, PhD, MHS (he/his)

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Cumulative Risk Assessment and Air Quality

Rima Woods, PhD

Air Toxicology and Risk Assessment Section

Office of Environmental Health Hazard Assessment

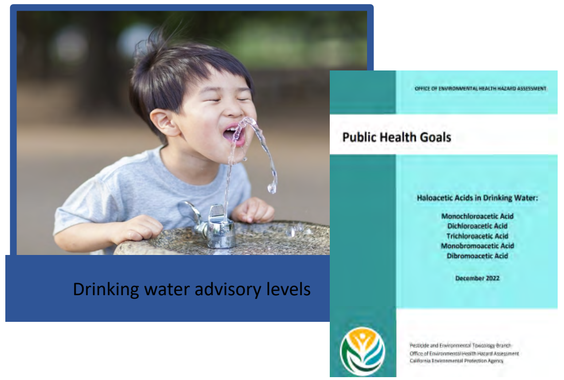
Outline

- Introduction to OEHHA
- Development of Health Guidance Values for air toxics
- Application of Hazard Index approach in our work
- Cumulative Impacts
- New Approach Methodologies (NAMs)
- Opportunities for collaboration

OEHHA's mission is to protect and enhance the health of Californians and our state's environment through scientific evaluations that inform, support and guide regulatory and other actions.

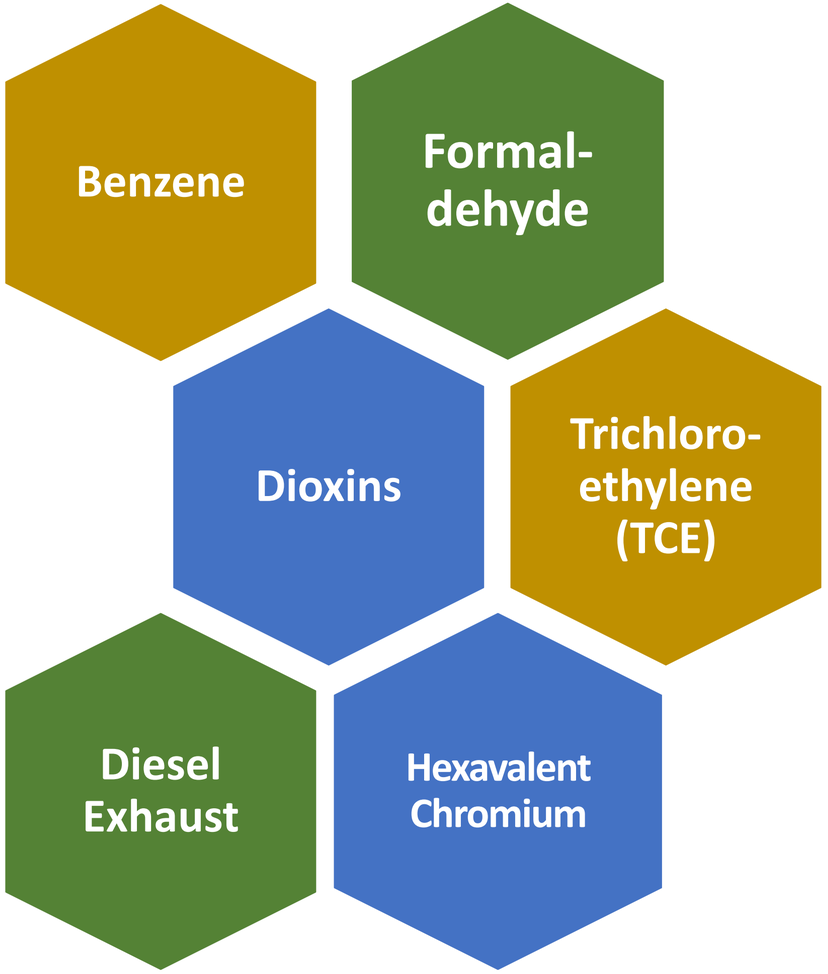
OEHHA: What we do

- Lead state agency for conducting human health risk assessments for contaminants in air, water, and soil (cancer and noncancer)
- Implements Proposition 65 (the state's right-to-know law)
- Epidemiological research on health effects of heat and air pollution
- Climate change research and evaluations
- Cumulative impacts and community science



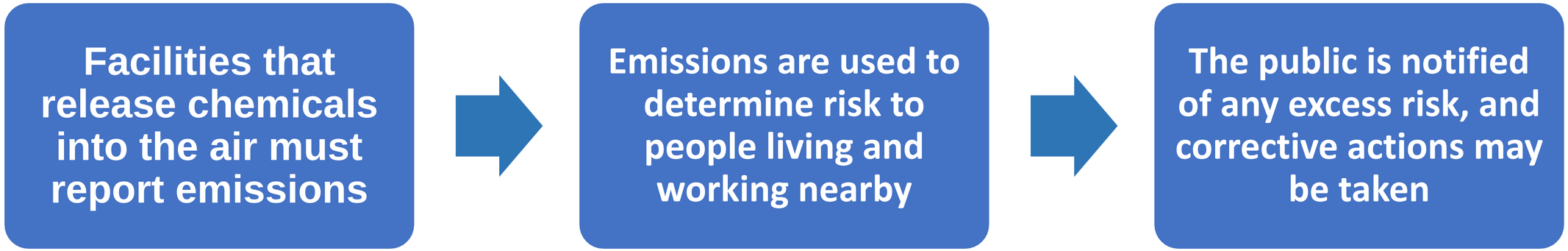
Air Toxics Health Guidance Values

- OEHHA evaluates airborne chemicals that may pose a present or potential hazard to human health including cancer
- 200+ air chemicals have been evaluated for cancer and non-cancer health effects to date
- OEHHA develops and adopts health guidance values for risk analysis purposes for the State of California
  - Reference Exposure Levels (RELs) are used to calculate risk of noncancer health effects
  - Cancer Slope Factors and Unit Risks are used in the cancer risk assessment of carcinogenic chemicals released into the air



Air Toxics "Hot Spots" Program

- This program informs and protects communities from air pollution emitted by nearby stationary sources



- OEHHA reviews health risk assessments submitted by facilities and develops guidelines for conducting health risk assessments
  - OEHHA's health guidance values are used to estimate risk
  - Hazard Index approach is used to estimate the risk of noncancer health effects

Development of noncancer RELs

- Derived according to methodologies contained in Technical Support Document for Developing Noncancer Reference Exposure Levels (2008)
  - Most sensitive endpoint (i.e., lowest dose at which statistically/biologically significant health effect is observed) – identify target organ
  - Apply uncertainty factors → REL
  - If additional endpoints are within a factor of ~3, the included may also be included as target organs

TABLE H1. EXAMPLES OF TARGET ORGANS OR SYSTEMS USED IN ACUTE, 8-HOUR AND CHRONIC HAZARD INDEX CALCULATIONS

Hazard Index target organ catergories	Specific health effects currently used in deriving at least one acute REL	Specific health effects currently used in deriving at least one chronic REL
Hematological System	Hemolysis; anemia; platelet abnormalities; adverse effects on hematopoietic stem cells	Lowered red and white blood cell counts
Cardiovascular System	Aggravation of angina	Elevated carboxyhemoglobin levels
Nervous System	Abnormal electroencephalograph (EEG) results; altered performance on neurobehavioral or neuropsychological tests; lightheadedness; clinical neurological exam; headache	Abnormal EEG results; astrogliosis; altered performance on neurobehavioral tests; tremor; lightheadedness; memory disturbances; headache
Eyes	Irritation; histological changes to eye tissue	Irritation of eyes
Alimentary Tract	Hepatotoxicity; nausea; vomiting	Hepatotoxicity; kidney lesions; urinary porphyrins; liver enzymes
Immune System	Abnormal lymphocyte proliferation; impaired host resistance to infection	Macrophage hyperplasia
Reproductive	Anovulation; decreased ovulation, preimplantation loss; altered copulatory behavior; azoospermia; oligospermia; spontaneous abortion	Testicular degeneration

Development of Noncancer RELs

- Most RELs list a single target organ, but several have two or more

OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary[1]					
Substance	REL type[1]	Inhalation REL (ug/m^3)	Oral REL (ug/kg BW^{-day})	Hazard Index Target Organs	Species[2]
Dichlorobenzene (1,4-) (106-46-7)	**A**	8,700		Development	R
	8	5		Respiratory system; Male Reproductive system	R, M
	C	10		Respiratory system; Male Reproductive system	R, M
Trimethylbenzenes (25551-13-7): 1,3,5- (108-67-8), 1,2,4- (95-63-6), 1,2,3- (526-73-8)	**A**	2400[4, 5]		Nervous System	R
	8	8[4, 5]		Nervous system	R
	C	4[4, 5]		Nervous system	R

Application of Hazard Index – Hot Spots Health Risk Assessments

- Stationary facilities may be required to conduct an HRA
  - Identify and quantify chemicals emitted
  - Specify Target Organ(s) for each chemical

Substance Name	CAS No.	Acute Target Organs													Chronic Target Organs													8-Hour Chronic Target Organs												
		CV	CNS	IMMUN	KIDN	GILV	REPRO	RESP	SKIN	EYE	BONE	ENDO	HEM	ODOR	CV	CNS	IMMUN	KIDN	GILV	REPRO	RESP	SKIN	EYE	BONE	ENDO	HEM	ODOR	CV	CNS	IMMUN	KIDN	GILV	REPRO	RESP	SKIN	EYE	BONE	ENDO	HEM	ODOR
Cumene	98828																																							
Toluene	108883		X					X		X													X													X				
Ethyl Benzene	100414																	X	X	X					X															
Xylenes	1330207		X					X		X						X					X		X																	
Naphthalene	91203																				X																			
p-DiClBenzene	106467															X		X	X		X																			
o-Xylene	95476		X					X		X						X					X		X																	
TriMeBenzns	25551137																																							
2MeNaphthalene	91576																																							
Diethanolamine	111422																				X						X													
Chlorine	7782505							X		X											X																			
Acrolein	107028							X		X											X															X				
Benzene	71432			X			X						X													X												X	

Application of Hazard Index – Hot Spots Health Risk Assessments

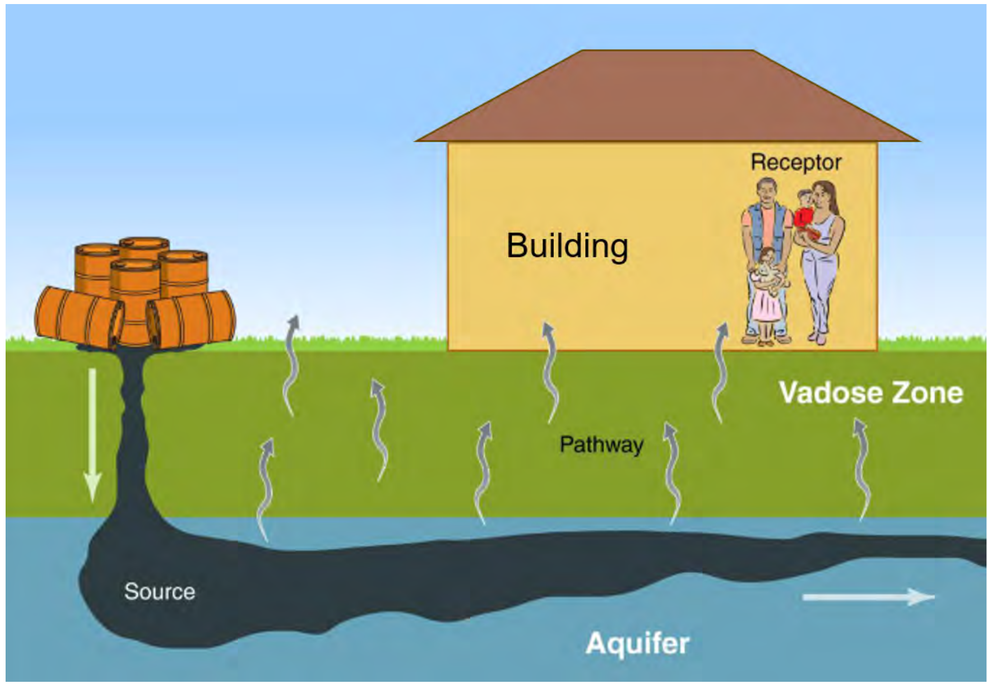
- Stationary facilities may be required to conduct an HRA
  - Calculate acute, 8-hour, and chronic Hazard Index for residents and off-site workers
  - Current methods limit the Hazard Index to a **single REL value** per chemical/exposure duration

Chemical Name	CAS	Average Annual Concentration ($\mu g/m^3$)	Cardiovascular System	Central Nervous System	Immune System	Kidney	GILV	Reproductive System	Respiratory System	Skin	Eye	Bone/ Teeth	Endocrine System	Blood	Odor	Max Target Organ	Total Chronic HI @ Max Target Organ	Contribution[1]
Arsenic	7440382	3.48E-04	2.26E+00	2.26E+00	0.00E+00	0.00E+00	0.00E+00	2.26E+00	2.26E+00	2.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		2.26E+00	95.74%
Manganese	7439965	1.39E-03	0.00E+00	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Beryllium	7440417	2.03E-06	0.00E+00	0.00E+00	2.90E-04	0.00E+00	1.30E-05	0.00E+00	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		2.90E-04	0.01%
Mercury	7439976	1.30E-05	0.00E+00	1.78E-03	0.00E+00	1.78E-03	0.00E+00	1.78E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
2,2,4TriMePentn	540841	1.15E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Hexane	110543	8.60E-05	0.00E+00	1.23E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
DieselExhPM	9901	4.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		8.20E-04	0.03%
Cr(VI)	18540299	4.71E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E-07	0.00E+00		2.36E-07	0.00%
Lead	7439921	4.43E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Aluminum	7429905	1.49E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Chromium	7440473	4.41E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Cadmium	7440439	1.09E-06	0.00E+00	0.00E+00	0.00E+00	1.14E-04	0.00E+00	0.00E+00	5.46E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		5.46E-05	0.00%
Copper	7440508	3.29E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Nickel	7440020	3.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.25E-04	2.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.63E-02	0.00E+00		2.63E-02	1.11%
Selenium	7782492	2.77E-06	3.12E-05	3.12E-05	0.00E+00	0.00E+00	3.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Zinc	7440666	4.58E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Silica, Crystln	1175	1.85E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.18E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		6.18E-02	2.62%
Barium	7440393	4.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Cobalt	7440484	2.85E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
Acrolein	107028	3.17E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		9.06E-06	0.00%
1,3-Butadiene	106990	1.46E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.31E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
1,2,4TriMeBenze	95636	2.22E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00%
		Total:	**2.26E+00**	**2.28E+00**	**2.90E-04**	**1.89E-03**	**4.53E-05**	**2.26E+00**	**2.36E+00**	**2.26E+00**	**1.52E-06**	**0.00E+00**	**6.14E-08**	**2.80E-02**	**0.00E+00**		**2.36E+00**	**100.00%**

1. Contribution by pollutant is based on the target organ with the maximum chronic hazard.

Application of Hazard Index – Contaminated Site Assessments

- OEHHA provides risk assessment and toxicological support for about 100 sites undergoing investigation and cleanup each year.
- Examples of sites: Dry cleaners; aerospace manufacturing, metal plating; printing facilities
- Common chemicals of concern: Dry cleaning related chemicals, such as tetrachloroethene (PCE) and trichloroethene (TCE); heavy metals; starting to see PFOA & PFOS
- Media assessed includes indoor air (vapor intrusion) & soil gas, soil, groundwater, tap water



Vapor intrusion diagram

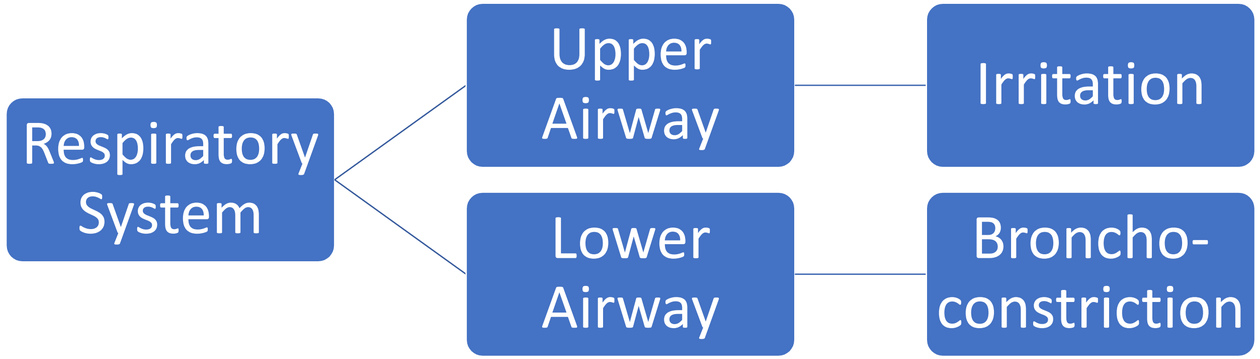
Contaminated Site Assessments

Hazard quotient - signals whether chronic non-cancer health effects are likely from exposure to a chemical

- Hazard index (HI) = sum of hazard quotients from individual chemicals
- If HI ≤1, an adverse effect is unlikely (acceptable threshold)
- Guidance supports separation of hazard quotients based on the target organ
- Screening-level risk assessment may not separate based on target organ

Considerations for Hazard Index approach

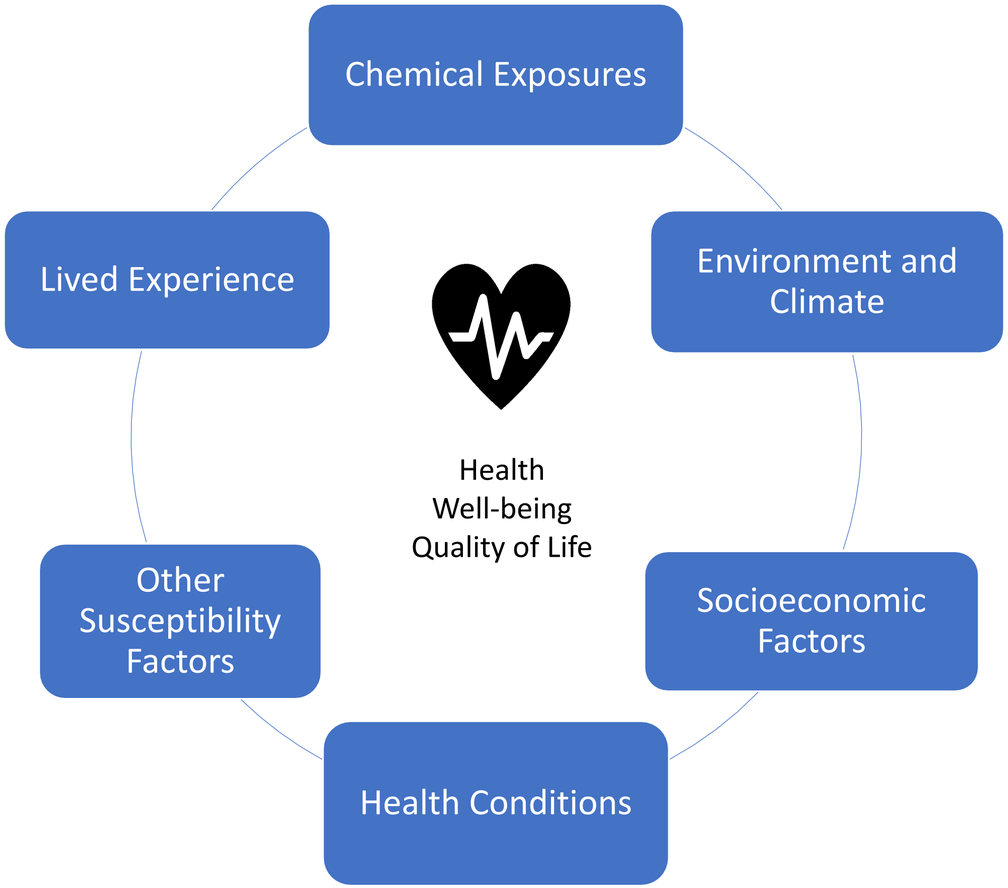
- SB25[1] required OEHHA to consider the “interaction between multiple pollutants”
  - Hazard Index approach using ‘same’ toxicological endpoint based on anatomical unit
- Target organs or systems can include multiple tissue types and multiple effects

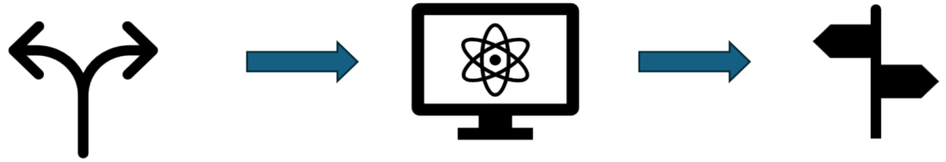


- Assumes additivity on the target organ or biochemical target
  - Could be independent, synergistic, or antagonistic
- Does not account for potential impacts of non-chemical stressors

[1] SB 25, Escutia. (1999) Environmental health protection: children.

Cumulative Impacts Assessment



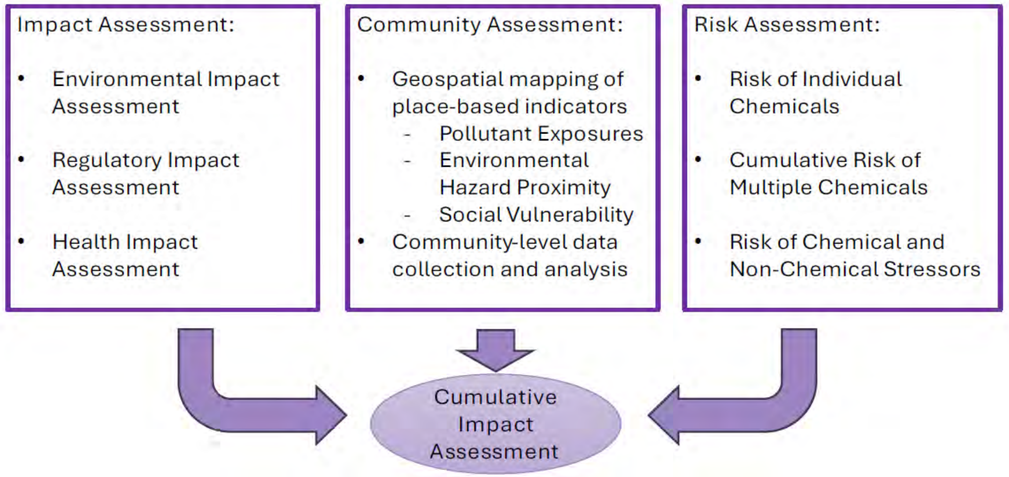


Decision context
- Rulemaking and standard setting
- Permitting
- Etc.

CI Assessment
- Fit-for-purpose
- Community input and lived experience

CalEnviroScreen

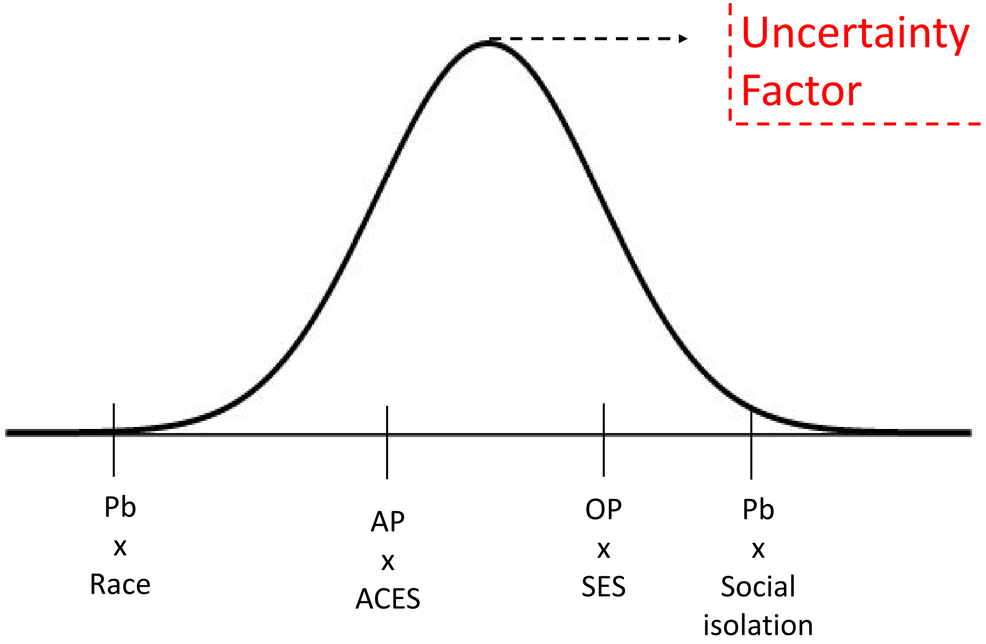
Action
- Reduce CI or avoid increasing CI → equity
- Prioritize highly-impacted populations



National Academies of Sciences, Engineering, and Medicine. 2025. State of the Science and the Future of Cumulative Impact Assessment. Washington, DC: The National Academies Press. https://doi.org/10.17226/29182.

Quantifying psychosocial stressors in risk assessment

Program on Reproductive Health and the Environment



Psychosocial stressors (racism, poverty, etc.)

UF = strength of arrow

Prenatal/early life chemicals (Pb, etc.)

Neurodevelopment

Computational Toxicology

- Computational Toxicology (CompTox) and New approach methodologies (NAMs) are becoming part of landscape of tools for informed decision-making for data-poor chemicals
- OEHHA created a New Toxicology Evaluations Section in 2023 to build expertise and collaborate with academics and external stakeholders
- Tools under development for use in risk assessment:
  - Read-across approaches to inform risk assessments for data-poor chemicals
  - Quantitative structure activity relationship (QSAR) models
  - Toxicokinetic models
  - Bioinformatics analysis (e.g., transcriptomic data)
  - Molecular docking approaches

Future Opportunities

- Hazard Index is a useful tool for determining potential noncancer health effects from exposure to multiple chemicals
  - Requires identification of target organ or system
  - RELs are often limited to the most sensitive target organ(s)

- Expanding list of target organs beyond the most sensitive can better protect public health
  - Better understand the risk to overburdened communities

Thank you!

BAY AREA AIR DISTRICT
Memorandum

To: Chairperson Gina Solomon and Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: December 8, 2025

Re: Considerations for Cumulative Impacts Approaches

RECOMMENDED ACTION

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

BACKGROUND

The Council has been researching and discussing cumulative impacts and permitting since 2024. At its morning meeting on October 6, 2025, the Council heard presentations from Air District staff as well as perspectives and experiences from peer agencies in Minnesota and New Jersey on their approaches to cumulative impacts in permitting. At its afternoon meeting on October 6, 2025 the Council also discussed its Cumulative Impacts Work Plan. The Council discussed a desire to understand how Air District staff is considering the issues presented by different approaches to address cumulative impacts.

DISCUSSION

The Air District and peer organizations are using a map-based approach for addressing cumulative impacts in permitting programs. That is, a geography is defined and different permit requirements are implemented inside that geography. The intent is to provide additional protections from air pollution for those communities who bear a disproportionate share of total pollution and are also subject to non-chemical stressors such as housing and food insecurity that impact their health and can worsen the impacts of pollution exposure.

The problem with these place-based approaches is that the maps are never perfect and often communities which are deserving of protection are left out. An alternative approach would be to have the same permitting requirements everywhere, but use a more sophisticated risk calculation methodology that accounts for existing levels of pollution exposure and existing health conditions in the community where a facility is requesting a permit.

Air District staff will provide information about the following:

- The Air District's current map-based approach to permitting in overburdened communities.
- A brief assessment of the adequacy and readiness of data regarding background exposures and health conditions.
- Some ideas on how the current map-based approach could be made more protective while pursuing improved risk assessment methods.

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: Jennifer Lam
Reviewed by: Gregory H. Nudd

ATTACHMENT(S):

1. Considerations for Cumulative Impacts Approaches Presentation

Bay Area Air District

Considerations for Cumulative Impacts Approaches

Advisory Council Meeting

December 8, 2025

Gregory H. Nudd
Deputy Executive Officer of Policy

Outline

- Current Landscape
  - Current policy to address of cumulative impacts in Air District permitting
  - Adequacy of data on background exposure and baseline health conditions
- Considerations for Future Place-Based Policy Mechanisms
  - Identification
  - Thresholds
  - Community input

Bay Area Air District

Current Landscape: Policy and Assessment Tools

Current Cumulative Impacts-Driven Policy

Permitting:

- Amendments adopted in 2021 in response to community concern about cumulative impacts in overburdened communities (OBCs)
- Lower cancer-risk thresholds for projects in OBCs
  - Cancer risk threshold ≤6 in a million for OBCs vs. ≤10 in a million otherwise
  - OBC defined as: Area located within a census tract identified by CalEnviroScreen 4.0 as having a score at or above the 70th percentile or within 1,000 feet of any such census tract

Considerations from Current Implementation

Existing Permitting Program:

- Relies on currently mapped OBCs – new rulemaking is required to respond to demographic and environmental changes
- Current map of OBCs leaves out some areas of concern/where large facilities are located (e.g. some parts of West Oakland)
- Does not explicitly consider facility-by-facility assessments
- Only applicable in permitting decisions where toxic/cancer causing emissions are above the threshold, does not consider particulate matter (PM)

Considerations: Health and Demographic Data

Demographic Data:

- How recent is it?
- Is it reliable at the census tract level? How about census block?

Health Data

- How often is it updated?
- How does the geographic resolution compare to census tracts and blocks?
- What health endpoints are covered?

Assessment Approaches

Current Practice:

- Screening/mapping assessment
- Risk Assessment

Potential Future Approaches

- Facility specific assessment based on background concentrations
- Potential for monitoring-based approaches to recommend further focus on different areas/facilities

Assessment: PM Exposure

Existing Understanding

- Annual average fine particulate matter ($PM_{2.5}$) exposure modeling updates underway associated with attainment planning (expected Quarter 2 (Q2) 2026)

More Work Needed

- Currently Air District staff has estimates for 24-hour $PM_{2.5}$ although annual modeling is more robust
- Impacts of PM_{10} and Ultra-Fine Particulate Matter
- Impacts of intermittent PM exposure (dust)

Assessment: Toxics

Existing Understanding

- Regional modeling (could be outdated), newer CARB state-wide work
- Recent modeling for regional diesel particulate matter exposure from roadways
- Modeling completed and ongoing for Assembly Bill (AB) 617 communities; includes mobile and stationary sources

More Work Needed

- Comparison of monitoring network data with existing modeling
  - Some detailed, neighborhood-scale work has been done or will be done soon in AB 617 communities

Considerations/Staff Recommendations

- Air District staff intends to move forward in evaluating toxics and PM but no other pollutants for cumulative impact analysis
- Air District staff to evaluate improvement of assessments and merging of monitoring and modeling information to improve understanding

Bay Area Air District

Considerations for Future Policy Mechanisms

Place-Based Approach

Identification

Build on existing permitting framework

- Considerations:
  - Permit backlog and maintaining resource efficiency, especially if individualized assessments are considered
  - Potential for tiered evaluation including stricter requirements in “excessively overburdened” areas
  - Very strict risk limits could have the effect of a localized permit moratorium and require consideration of exceptions
  - Need to evaluate other sources for drawing maps or complimentary data sets to CalEnviroScreen, consideration of community input (and recognition there likely will not be consensus)

Thresholds for Permit Issuance

Threshold

Evaluate Options for:

- No net increase in PM
- Toxic risk approach
- Exceptions to thresholds for “essential” services – recognition that this may be difficult to define and different communities may have different perspectives

Community Participation in Permit Actions

Action

Potential Avenues for Involvement:

- Early intervention (meeting or application) ideally at time of city land use permit to ensure awareness of requirements and early community notification
- Facility-led informational meeting prior to permit process
- Community benefits agreement – would have to determine who would be party to this and who would enforce it

Discussion

Are there other factors Air District staff should be considering?

Is there additional data the Advisory Council needs from Air District staff in order to inform the Council's work?

Questions & Discussion

For more information:

Gregory Nudd | Deputy Executive Officer for Policy | gnudd@baaqmd.gov

BAY AREA AIR DISTRICT
Memorandum

To: Chairperson Gina Solomon and Members of the Advisory Council

From: Philip M. Fine
Executive Officer/APCO

Date: December 8, 2025

Re: Approval of Refinements and Additions to the Previously Adopted Cumulative Impacts Work Plan

RECOMMENDED ACTION

Approve 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)."

BACKGROUND

The Council has been discussing the topic of cumulative impacts during its regular meetings since early 2024. Given the range of possibilities considered, it was suggested at the September 2024 meeting that a work plan be developed to focus on the most efficient and necessary connections between the Air District's needs and the Advisory Council's expertise. At its afternoon meeting on October 6, 2025, the Council voted to adopt the Cumulative Impacts Work Plan with direction to the Work Plan Ad Hoc Subcommittee to make further refinements.

DISCUSSION

The Council will review and consider approving the further refined 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)."

BUDGET CONSIDERATION/FINANCIAL IMPACT

None.

Respectfully submitted,

Philip M. Fine
Executive Officer/APCO

Prepared by: David Holstius
Reviewed by: Gregory H. Nudd

ATTACHMENT(S):

1. Advisory Council Work Plan

Cumulative Impacts Workplan

Bay Area Air District Advisory Council

DRAFT – December 2025

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

[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.

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

- 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 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 (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.
- 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.

Working Draft Outline for Cumulative Impacts Findings and Recommendations

Advisory Council Meeting
December 8, 2025
Agenda Item 5

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 CalEnviroScreen communities above the 70th percentile, 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 of produced under recommendation #1 above, and the concentrations of criteria air pollutants, represent the "background" air pollution in a given community. Any additional emissions 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 adopt thresholds for hazard indices (HI) that are less than one, especially in overburdened communities before recommendations #1-3 can be completed.
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 the possibility of un-inventoried sources.
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 (where a reference level might be the annual standard for $PM_{2.5}$), or a no net increase approach.
8. The Advisory Council supports the use of CalEnviroScreen to identify communities for more health-protective actions in the permitting process. However, this 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 require no net increase in emissions in permitting new and modified sources for some facility types in overburdened communities.

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

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o See also the current (2024–2025) docket, with public comments: https://www.regulations.gov/docket/EPA-HQ-OLEM-2024-0360/document