Air Toxics Science Advisory Committee (ATSAC)

Meeting 8: May 14, 2025, 10:00 am-11:15 am PT

Meeting Minutes

Meeting Attendees

ATSAC Members	
John Budroe	California Environmental Protection Agency (retired)
John Stanek	Environmental Protection Agency (EPA)
John Vandenberg	Duke University
Qiaoxiang (Daisy) Dong	California Environmental Protection Agency
Susan Tilton	Oregon State University
Project Team	
Apollonia Goeckner	Oregon Department of Environmental Quality (DEQ)
Dana Crosby	Oregon Health Authority (OHA)
David Farrer	OHA
Holly Dixon	OHA
J. R. Giska	DEQ
Facilitation Team	
Ben Duncan	Kearns & West
Angela Hessenius	Kearns & West

Meeting slides can be found at https://www.oregon.gov/deq/aq/Documents/ATSACM8slides.pdf

Welcome

Ben Duncan, Kearns & West (K&W) facilitator, reviewed the Zoom webinar protocols and facilitated introductions from the ATSAC members and DEQ-OHA project team.

Holly Dixon, Oregon Health Authority (OHA), reviewed the meeting agenda, which included 1) Welcome, 2) ATSAC Discussion Period on Diesel Particulate Matter, and 3) Next Steps.

Holly reminded the ATSAC and attendees that all the ATSAC materials including the meeting recordings, meeting minutes, and compiled written responses from ATSAC members are publicly available on the ATSAC website.

ATSAC Discussion

In preparation for this discussion, the DEQ-OHA project team requested that ATSAC members review ATSAC Document 8: DEQ's Proposal for the Diesel Particulate Matter Cancer Toxicity Reference Value Framing Document for DEQ's ATSAC. The ATSAC discussion followed the five discussion questions provided in ATSAC Document 8.

1. Do you see additional uncertainties with the proposed cancer TRV not already covered in the DPM Framing Document?

Discussion:

- **John Vandenberg:** Found the framing document to be very well done. It was balanced, complete, and provided the information and resources necessary to be able to comment on the decisions that DEQ and OHA need to make. The Ramboll Environ white paper (2016) was not linked in the document, and that would be helpful to include. One additional uncertainty is that none of the cancer potency assessments reviewed in the DPM framing document fully consider age as a risk factor. The supplement to the 2005 EPA guidelines for carcinogen risk assessment identifies the potential for additional risk to children due to a variety of biological and exposure differences with adults. Therefore, age-dependent adjustment factors have been applied for about the last 20 years by EPA and other organizations. Those factors are applied for chemicals that have evidence of a mutagenic or genotoxic type of mode of action, which is relevant for DPM, as IARC has commented. John V stated that he is not recommending that the agencies modify the proposed TRV, but rather he recommends that this uncertainty be more explicitly described in the documention because none of the potency factors included have considered that. There were some calculations in the Vermeulen et al. 2014 paper that included from ages 5-80, so it covers part of that range but not the full range. The most important age range to cover would be from birth to six years. Recommended including a more extensive discussion about the specific concerns and quantitative aspect of children being exposed to diesel exhaust and DPM.
- **John Budroe:** Thought the DEQ-OHA did an excellent job in discussing everything including the uncertainties. One addition is that New Jersey Department of Environmental Protection (DEP) also adopted OEHHA's DPM IUR in the same way that Washington state did. Agreed with John V. to add a note about early life susceptibility. There are some differences in the way that US EPA and CalEPA approach age-dependent adjustment factors. CalEPA applies an early age adjustment factor to all carcinogens, not just the mutagenic or genotoxic carcinogens. OEHHA also does not adjust the potency factors, they adjust them after the fact in the site risk assessment part of the process.
    - **John B.:** Clarified that CalEPA's approach is carried out through the Hot Spots Program. In Hot Spots, age-dependent adjustment factors are applied to a risk assessment around a stationary source and is site-specific.
- **Susan Tilton:** Appreciated all the work that went into the framing document. Thought it did a good job of describing the underlying studies that went into the calculations and the uncertainty associated with those. One way to address uncertainty is through the Bradford-Hill criteria, which might be helpful to include.
- **Daisy Dong:** Thought that the framing document was very solid and all the information needed was there.
- **John Stanek:** Thought that the framing document was complete and well done. There are a few aspects of the uncertainty sections that could be a little more specific from the Ramboll paper and the full CalEPA writeup to add some clarity.
- **John Stanek:** Asked a clarifying question about the TRV in the DPM framing document.

- **Holly:** The framing document includes the proposed cancer TRV for DPM, which is 0.0033 µg/m^3 (which is adjusted for the one-in-one million risk). This DPM TRV comes from CalEPA's inhalation unit risk (IUR) for DPM, which is 0.0003 (µg/m^3)$^{-1}$.

2. It appears Ramboll Environ (see Table 1 of Ramboll Environ's white paper) calculated an inhalation unit risk (IUR) for Vermeulen et al. 2014 using an excess lifetime cancer risk of 17 per 10,000 at a DPM-proxy (Elemental Carbon) concentration of 1 µg/m^3 (see Table 2 of Vermeulen et al. 2014). What do you think about Ramboll's approach and DEQ's interpretation of where that IUR came from?

Questions 2 and 3 were asked together at the same time and ATSAC members answered and discussed them together. Responses to both questions are recorded under Question 3 below.

3. Is there another IUR from the Ramboll paper (or average of some or all of them) (Table 1 of Ramboll Environ's white paper) that you believe is more scientifically sound than CalEPA's IUR for DPM?

Holly shared that these two questions were posed to get specific feedback and focus on some of the more recent studies that have been published since the CalEPA IUR value was developed.

Discussion:

- **John V.:** Table 2 of the Vermeulen et al. 2014 paper shows estimates of lifetime risk per 10,000 for the general public aged 5-80 years and also for workers exposed at ages from 20-65 years. The estimate for the general public is most appropriate to evaluate an average exposure of 0.8 µg/m^3. The risk from age 5-80 is therefore 21 per 10,000. To calculate the risk for 1 µg/m^3, you take 21 and divide it by one over 0.8, which equals 16.8 and rounds to 17. This is consistent with what the DEQ-OHA team did, and it was calculated correctly. However, that derivation does not include consideration of age-dependent adjustment factors for ages 0-2 and 2-6, as mentioned earlier. Although that paper was published after the 2005 guidelines, they did not apply age-dependent adjustment factors, which would be appropriate here.
- **John V.**: When you look across Table 1 from the Ramboll paper, some of the different authors or reports provided a range of IURs. EPA was a range in 2002 from 10^{-3} to 10^{-5} [a], OEHHA was $3x10^{-4}$, the Vermeulen paper was $1.7x10^{-3}$ and then was revised based upon comments from Dr. Kenny Crump about ways to do additional analyses with a lag period that came out at $1.1x10^{-3}$. These values are all close together. It was useful to look at that table that they provided to see the different assessments that had been done.
- **John B.**: The interpretation of how Ramboll calculated their IUR from the Vermeulen data appears to be accurate, and it is interesting that the IUR that you get with or without the adjustments that Dr. Kenny Crump suggested still fall within the IUR range that OEHHA originally generated, so it is all within the same ballpark. There might be strengths associated with taking

[a] DEQ-OHA Note for Context: EPA's 2002 assessment did not include an IUR that it recommended for use in DPM cancer risk assessments. As the Ramboll white paper states, "The US EPA chose to take a set of exploratory approaches to estimate the possible magnitude of cancer risk…This exploratory analysis concluded that environmental cancer risks from exposure to diesel exhaust were possibly in the range of 10^{-5} to almost 10^{-3}, while acknowledging numerous uncertainties and assumptions in reaching this conclusion." Currently, the EPA does not have a recommended IUR for DPM.

the Vermeulen paper and turning it into an IUR, but it would be a long, complicated project, and is not likely worth investing the resources in that process. The Vermeulen data is available, and OEHHA has not decided to reevaluate diesel exhaust for cancer risk since 1998 and is not likely to do that anytime soon.

- **Daisy:** Suggested taking the Ramboll paper and using the range they provided instead of using the OEHHA value. The reason is because OEHHA's TRV is based on an older study and has a lot of limitations. The Ramboll review includes more recent studies. For example, the Vermeulen et al. 2014 was the most recent study included in the Ramboll review, and the Vermeulen paper is a relatively new study compared to OEHHA's critical study. Recommended using the information in the Ramboll review because it is newer, HEI already reviewed these studies. As a whole, the Ramboll white paper represents the most recent literature review on this topic, so recommended DEQ-OHA use the Ramboll white paper and take the lower end of the IUR range to calculate the TRV. Eventually, EPA or OEHHA will likely reevaluate these studies. There is still some debate in the Vermeulen study, but compared to the OEHHA study, think the Vermeulen study did a good job. The older diesel exhaust composition is also very different from the contemporary composition, so that is another reason to use the newer study. Also, no other agency besides OEHHA thinks that study is adequate to develop a quantitative estimate, so that study apparently has a lot of limitations, but at the time it was the only study available. This newer study is better science compared to the older study and it is better to base it on a newer study and take a range. Think that Ramboll did a good job.
- **Susan:** Felt one of the primary conclusions from the Ramboll paper was that there is not a consensus on the analysis approach for handling these newer studies and especially the meta-analysis. Saw these studies in a similar way to John V. and John B., that they provided confidence for the CalEPA value since they all converge within a similar range, but not necessarily providing a rationale for choosing a separate estimate. It would be helpful to incorporate more information about these ranges that have been proposed and that are available into the framing document so that the information is there.
- **John S.**: Agreed with Susan's approach. Reproducing the table from the Ramboll paper in the framing document, perhaps in an appendix, would add confidence. Even though DEQ selected a single value, it is in the middle of all the other cancer estimates. Providing it in context somewhere would help strengthen the rationale.

4. What other questions or concerns do you have related either to the proposed DPM cancer TRV or to the DPM Framing Document?

Questions 4 and 5 were asked together at the same time and ATSAC members answered and discussed them together. Responses to both questions are recorded under Question 5 below.

5. Do you agree with CalEPA's inhalation unit risk DEQ proposes to adopt to calculate a cancer TRV? If not, do you have an alternative suggestion?

Discussion:

- **John V.:** No other questions or comments. Agreed with the selection of CalEPA's IUR that DEQ proposes to adopt for the TRV derivation for DPM. CalEPA products are considered authoritative

and using the OEHHA value would be consistent with using such assessments as the basis for TRV derivation.

- **John B.**: No additional thoughts or concerns regarding the framing document. Agreed with using CalEPA's IUR for DPM. The studies that it is based on are well described and well conducted. The IUR received multiple rounds of public comment and peer review and was revised in response to those received comments. US EPA has enough confidence that it uses it in the regional screening level tables for Superfund site risk assessment, and the states of Washington and New Jersey also use the OEHHA diesel exhaust IUR, so it would be perfectly appropriate for DEQ and OHA to use the OEHHA DPM IUR as the basis for a TRV.
- **Susan:** Agreed with John V. and John B. Recommended adding a description of the derivation of the TRV from CalEPA's IUR. It would be helpful to include that in the framing document.
- **Daisy:** Recommended using the Ramboll paper and picking the lower end of the range. This is a more thorough consideration of more recent studies and current science, which is more robust than the study that OEHHA's value is based on.
- **John S.**: Agreed with DEQ's proposal for the cancer value and did not have any other alternative suggestions. Suggested adding the context of where this proposed value falls compared to the other analyses and proposed ranges.

Holly asked the ATSAC members an additional question about nomenclature related to diesel exhaust versus DPM. These terms have different meanings and there are differences in how they are used in different documents over time. DPM is the fraction of particulate matter that is used in relation to the TRV that DEQ is using from CalEPA and the non-cancer value from EPA. Diesel exhaust is used in a lot of more recent literature and a lot of chemicals like polycyclic aromatic hydrocarbons (PAHs) are not just on particulate matter but are also in the vapor phase. DEQ is currently proposing to continue using DPM as the nomenclature for the TRV, and Holly asked if the ATSAC had any thoughts or suggestions related to this proposal.

Discussion:

- **John V.:** Diesel exhaust is a complex mixture of particles and gases, and yet it is important to have an indicator that can be evaluated straightforwardly, which in this case is DPM. There is some similarity between this approach with photochemical oxidants in which ozone is used as the indicator for a whole class of photochemical oxidants. Using DPM in the TRV derivation is exactly what the DEQ-OHA team should do, and perhaps some rationale for that could be added. Another aspect of this is that as new requirements have been put on diesel engines, the nature of the emissions have changed somewhat. The composition of diesel exhaust has changed over time, and it becomes very complicated to track that since large diesel engines can last a long time, so it makes sense to focus on DPM as an indicator that can be measured and used. With newer diesel engines, there is perhaps a more significant effect of ultrafine particles, which are not measured very well. Overall, using DPM as an indicator for diesel exhaust is very appropriate.
    - **John V.**: The typical measurement methods do not capture ultrafine particles quantitatively. There is a lot of uncertainty about the health outcomes which could be significant for ultrafine particles, but there are a lot of gaps in the knowledge base whereas DPM is a known entity.

- **John B.:** When the OEHHA IUR was developed, there was a realization that even if it were possible to filter 100% of the particulates out of diesel exhaust, then the risk from diesel exhaust would likely be underestimated since there would still be gas phase chemicals (e.g., benzene, acrolein). DPM is still the best metric that can be used.
- **Susan:** No additional comments. Appreciated that DEQ provided the definitions within the framing document.
- **Daisy:** Agreed that DPM makes sense to use.
- **John S.:** Agreed with using DPM.

JR Giska, Oregon Department of Environmental Quality (DEQ), asked another additional question about the newer technology diesel engines have a lower overall loaded of DPM and their exhaust emissions, but the DEQ-OHA team could not find any great studies on the compositional differences for the newer exhaust versus older exhaust and asked the ATSAC members if they had feedback on how the team might consider that for their TRV.

Discussion:

- **John B.:** Back around the time of the Health Effects Institute (HEI) Advanced Collaborative Emissions Study (ACES) study, there were studies that looked at the genotoxicity of both old and new diesel engines. By volume of diesel engine exhaust, the new technology engines were much lower genotoxicity because they generate a lot less particulate matter. However, normalizing to microgram of particulate, the new technology engines were more genotoxic than the older engines. Not aware of any recent studies but have a sense that at a minimum, the particulate from a genotoxic standpoint is going to be the same between both the old engines and the new engines.
- **John V.:** One of the challenges with the new diesel engines is that the emissions have changed so much and if it has a well-functioning particulate trap and condensers, then it becomes very difficult to study them. They cannot do any controlled human studies of diesel exhaust because they cannot get the concentrations correct. It is a challenge in terms of research and was not aware of any recent studies that would provide good insights on this, except for on the monitoring side which indicates that the composition has changed and likely continues to change.

JR asked an additional question of the ATSAC members. Currently, DEQ assesses DPM, PAH, and metal emissions separately, which leads to PAH driving risk because of the current TRVs. Given the complex mixture of diesel exhaust, is it appropriate to count PAHs and metals if they are also going to be assessing DPM for risk, even though the DPM itself may be composed of some of those components?

- **John B.:** If diesel exhaust emissions were quantified, then California would not require a double count of risk from PAHs and metals. They would not have expected someone to speciate the PAH and metal content and add that to the diesel exhaust cancer risk.
    - **John V.:** Asked for clarification from John B. about how PAH and metals risks are considered if they are present in DPM, i.e., it is not double counting to consider all components of DPM as being part of DPM risks, and separately to have PAH and metals risk assessments. **(DEQ and OHA further clarified this point with John Budroe after the meeting. See Appendix A.)**

Ben opened the discussion to any final thoughts from the ATSAC members.

- **John V.:** The DEQ-OHA project team has done an excellent job providing information that the ATSAC members needed. The succinct summary provided and pointing to where the data is coming from is very helpful in supporting the ATSAC's evaluation and providing comments.

Next Steps

Holly reviewed next steps for the ATSAC members and thanked the ATSAC members for all the feedback they have provided to date which has been incredibly helpful. This meeting was the last scheduled meeting of the ATSAC on the TRV proposals. Holly requested that the ATSAC members submit their discussion question worksheets via email by May 28. The DEQ-OHA team will post all final materials to the ATSAC website and integrate the ATSAC feedback into the TRV proposals and documentation for the next rulemaking phase and will provide updates to the ATSAC for their awareness.

JR thanked the ATSAC members for their support, input, and time throughout the ATSAC process and reminded the ATSAC members of the next steps in the rulemaking process. The scientific review process is currently wrapping up and the next step in the process is to convene a rules and fiscal advisory committee. DEQ plans to convene these committees later this year, and those committees will be followed by a public hearing and public comment period. The DEQ-OHA team will review written comments received on the TRV proposal, and at that stage, they may reach out the ATSAC if there are any items they would like to solicit feedback from the ATSAC on via email or an ad hoc meeting if necessary. After reviewing the comments received, the final step of the process will be to present the proposed rules to the Oregon Environmental Quality Commission for consideration, which is anticipated to occur in 2026.

Holly outlined the criteria that the DEQ-OHA project team will use to determine when to seek additional feedback from the ATSAC during the rest of the rulemaking process that JR described. These criteria include if there is a new concept or process that comes up that had not previously been discussed with the ATSAC and that the team thinks is important to consult with the ATSAC on. Holly also shared that the team plans to send a short survey to the ATSAC members to solicit feedback on how to improve the ATSAC consultation process for the future.

John V. asked clarifying questions about whether the current ATSAC will be completed with the rest of this rulemaking process and if DEQ will convene a new ATSAC in the future during the next TRV review process and whether they would look for any of the current ATSAC members to continue through the next TRV review process. JR responded that the ATSAC members currently have three-year appointments in rule. The DEQ-OHA project team hopes that if there are any questions that fall outside of the three-year appointment timeframe for the current ATSAC members, that they would be open to answering those questions and DEQ could possibly extend that timeframe. DEQ would convene a new ATSAC for future rulemaking processes. JR also shared that they plan to consider language in the proposed rules to change the frequency of TRV review since the current requirement to complete the review process every three years feels too frequent.

John V. also commented that the work completed by the DEQ-OHA project team could be highly valued by other states. It might be useful to communicate with colleagues in other states and regions through larger state organizations or other forums about the process, analysis, and data that the team has put

together. It could be a useful model for other states to consider and could benefit from. Daisy echoed this comment and shared that the team did a great job consolidating all the values from different agencies and compiling the workbook which could be very useful for other states, especially since this work has already gone through quality assurance and quality control. Sharing this resource beyond Oregon could help to avoid redundant work by other states.

David Farrer, OHA, JR, and Holly shared thanks and appreciation for the ATSAC members for contributing their time, expertise, and input to support the ATSAC process.

Ben thanked everyone for participating and adjourned the meeting.

Appendix A: Clarification email from John Budroe to OHA on June 25th, 2025.

"California air districts would not require a Hot Spots risk assessment to speciate a diesel exhaust source into DPM + PAHs + metals. The cancer risk is considered to be associated with the total diesel exhaust (particulate + gas phase), with DPM being used as the surrogate metric. If a theoretical diesel exhaust source had a filter that removed 100% of the DPM from that source, then the calculated cancer risk from that source would be zero in a Hot Spots risk assessment (even though there would be a residual cancer risk from gas phase components like benzene). I agree with John Vandenberg that a diesel exhaust source risk assessment that includes PAH and metal speciation should not report:

DPM = 10 in a million

PAH = 1 in a million

Metals = 2 in a million,

and say the diesel exhaust cancer risk is 10-1-2 = 7 in a million. What I was trying to say was that the diesel exhaust source cancer risk in this case should be reported as 10/million, and not 10 + 1 + 2 = 13/million, unless the Oregon site risk assessment rules are different from the Hot Spots rules and require exhaust speciation."