Toxics Use Reduction Institute Science Advisory Board Meeting Minutes
April 11, 2025
Virtual Zoom Meeting
10:30 AM

Members Present: Robin Dodson (Chair), Rich Gurney (Vice Chair), Heather Lynch, Christy Foran, Denise Kmetzo, Ryan Bouldin, Alicia Timme-Laragy, Helen Poynton

Program staff present: Heather Tenney (TURI), Karen Thomas (TURI), Hayley Hudson (TURI), Colin Hannahan (TURI), Baskut Tuncak (TURI), Caredwen Foley (OTA), Sandra Baird (MassDEP), John Raschko (OTA), Tiffany Skogstrom (OTA), Daniel Burstein (MassDEP), Kari Sasportas (OTA), Nicole Moody (DEP), Yuna Choi (EEA),

Others present: Katherine Robertson (MCTA), Carol Holahan (Foley Hoag LLP), Liz Harriman (LCSP), Raza Ali (ACC), Steve Scherrer (Lanxess), Bob Rio (RAR Strategies LLC), Jerome Lang (Nano-C), Christina Bramante (Nano-C), Sergei Levchik (consultant to ACC), Laura Spark (Clean Water Action), Owen Jappen (ACC)

Welcome & Introductions

Please note that this meeting is being conducted remotely as the provisions to allow remote meetings under the Open Meeting Law have been extended to June 30, 2027. Board members and program staff were introduced, and visitors were asked to put their name and affiliation in the chat.

Approve February Meeting Minutes

There was a motion to approve the February meeting minutes as written, and there was a second. A roll call vote was conducted, and there were six members in favor and one abstention.

Multi-walled Carbon Nanotubes Threshold

The TURA program received a petition in June 2020 to list multi-walled carbon nanotubes (MWCNTs), single-walled nanotubes (SWCNTs), and carbon nanofibers (CNFs) as a group and at a 100g reporting threshold. The SAB reviewed nanomaterials between 2021 and 2023 and the Board made recommendations to list the three categories (MWCNT, SWCNT, CNF). Each recommendation made by the Board was reviewed. Endpoints of concern and key pieces of information reviewed when making the nanomaterials recommendations were presented.

In addition to a recommendation for listing, MWCNTs were also recommended to be listed as a higher hazard substance and SWCNTs and CNF were recommended to be added to the more hazardous list. The more hazardous list is informational (non-regulatory).

The decision-making steps for additions to the TURA list and where nanomaterials stand in the process were discussed. TURI has been preparing a policy analysis since the Board first made those recommendations. TURI has presented select overviews to the TURA Advisory Committee and the TURA Administrative Council and requested input on thresholds. TURI also consulted with EPA on thresholds to learn about the methods they used for threshold determinations. EPA shared that they lower the thresholds by orders of magnitude in order to capture the majority of releases. The typical thresholds for regular TURA-listed chemicals were reviewed.

The question for the Board is: does the SAB recommend lowering the threshold for MWCNTs? It was then opened up for discussion by the Board.

As MWCNTs were recommended as a higher hazard substance, it would automatically get a 1,000 pound threshold unless the Board recommends lowering it. If the Board does recommend lowering it, the TURA program would be following EPA's method of considering thresholds with lower orders of magnitude (so 100, 10, or 1 pound). The petitioner asked for 100 grams, which is approximately a quarter of a pound.

A Board member asked whether a 1,000 pound threshold would capture much use in Massachusetts. TURI has been doing a lot of work to estimate users and amounts used in Massachusetts. Most users, except for manufacturers, are likely using less than 100 pounds, probably more in the 1 to 10 pound range.

One member noted that 100 grams seems a little low, but they would be in favor of lowering the threshold given there is really no safe limit of exposure to a carcinogen. It was noted that there are approaches to determining "safe" limits by dividing the LD50 by 100 or even by 100 again to add an uncertainty factor. There was discussion about purchasing amounts and realistic quantities that academic labs may be purchasing. Program staff noted that academic labs are not covered under TURA, so universities will not have to report, but the perspective is still helpful.

One member stated that they would be comfortable lowering the threshold for this substance but not across the board (i.e., not for all carcinogens).

Another member stated that from a worker exposure standpoint there is a minimal difference between one thousand and one hundred pounds. Another member wondered about the relationship between the amount used and the amount in the air since inhalation exposure is the primary route of exposure for this substance.

The meeting continued with discussion around the wording and what the impacts would be if recommended. Lowering the threshold would allow the program the opportunity to provide more resources to users.

Visitor Comments

There was an opportunity for visitor comments.

A visitor commented, a chemical or chemistry is hazardous whether it's used in an industry, a lab or a college or a university. The exemption of colleges and universities in labs seems to increase the comfort level of listing or lowering the thresholds of these and has been really frustrating to industry. What's good for industry is also good for colleges and universities. At the end of the day everyone needs the same protection from hazardous chemistries or substances, if indeed they are hazardous.

Another visitor suggested putting out an advisory or request for reporting from non-TURA filers (e.g., universities, labs) to help the state understand use. That doesn't mean people will comply, but it may be worth considering.

Another visitor put a question in the chat that they "would like to confirm the SAB recommendation will state clearly the threshold will be lowered to capture the user population?" Program staff answered that the recommendation is still up for Board discussion at this time.

Multi-walled Carbon Nanotubes Discussion continued

A Board member made a motion to lower the threshold for multiwalled carbon nanotubes.

There was a second and there was discussion around the wording. Program staff made a document visible on the screen to edit the motion. There was extensive discussion and edits to the motion.

"The SAB recommends lowering the reporting threshold for MWCNT below the 1000-pound threshold because many companies handling these materials use less than 1000 pounds per year. The SAB recognizes the carcinogenicity of MWCNT and our previous recommendation to designate MWCNT as a Higher Hazard Substance.

The SAB notes that the exposure and potential associated hazard may be similar across the range of use volumes from grams to 1,000 lbs."

There was a motion to approve the above motion, and there was a second.

There was a roll call vote with six members in favor and one abstention. The motion was then posted in the chat.

Aryl Phosphates Esters Category

TURI presented information on the consideration of the aryl phosphate esters (APEs) as a category addition to the TURA list. TURI reviewed the various reasons why categories are proposed and how they are defined. The possible rationales for defining a category are:

1. Structure – similar structure or functional group
2. Precursors – similar set of hazardous transformation products

3. Cumulative effects – cause a cumulative negative impact
4. Large groups – too many to review individually
5. CAS # limitations – CAS #s do not adequately capture the chemicals
6. Mixtures – used as mixtures

The SAB Guidelines for Listing and Delisting were reviewed.

TURI reviewed the grouping of the aryl phosphate esters and the five sub-groups we have been considering (TPP & derivatives including "leggy", methyl, butyl, isopropyl, di-phosphates). TURI reviewed the previous three meetings and what were discussed at each.

TURI reviewed the Bajard et al (2019) article that brought the APEs to TURI's attention.

Two tables of physical/chemical data were presented grouped like this:

- Number of phenyl groups then number of additional total carbons
- Type of addition to the phenyl groups then the number of phenyl groups

APEs shown are all TSCA active CAS numbers except in the few instances where additional data were available using a different (TSCA inactive) CAS number with the same chemical name. This occurred in a few cases for a mixture and an ill-defined substance ("ill-defined" according to CompTox).

A discussion of physical and chemical properties followed.

A member plotted Log K_{ow} vs the number of carbons in the added side chains (excluding phenyl groups) and there is a correlation. The more carbons (i.e., the increased hydrophobicity of the groups) the higher the log K_{ow}.

It was suggested that if the Board determines that there is some toxicity relationship between the log K_{ow} and the number of added carbons then this process could be used as a measure saying that there is a trend line. The same could then be repeated with the phenyl groups.

Although high log K_{ow} (e.g., 6 or 7) often accompanies substances with high toxicity, it is not necessarily toxicity that is correlated with log $K_{ow,}$ but bioaccumulation and maybe biomagnification. The high toxicity may be a coincidence, but it is often true.

Coincidentally, the chemicals that are very, very hydrophobic also tend to have toxic properties like carcinogenicity or endocrine disruption.

In human bodies, some of the larger substances still get in the tissues, if they have transporters, like PFAS sticking to proteins. Sometimes these can have low log K_{ow} so sometimes that is variable with regard to relative toxicity.

A Board member suggested that the trend of log K_{ow} might present an opportunity of how to consider these chemicals as a category.

The meeting continued on to chronic aquatic toxicity information for APEs. Looking at many policy documents, TURI identified 36 unique research articles and obtained 25 of them. TURI summarized the articles and had one member screen them to choose the best with regard to 1) transparency and validity of study design and 2) measured concentration of the chemical in the actual exposure.

TURI summarized each of the policy/regulatory reports that were conducted on APEs over the years which were used to source the aquatic toxicity studies. Which members of the category were studied and the key conclusions from each report were also summarized.

The Board then moved on to discussing four studies of chronic aquatic toxicity. In Cleveland (1986) triphenyl phosphate was common to all the testing in this study and then there were additional substances that were in common and some that were unique. Some of the outcomes show an inverted "U" shape relationship which can indicate endocrine disruption properties.

Van Den Dikkenberg (1989) studied the effects of tricresyl phosphate. The chronic aquatic toxicity outcomes were very low for four of the five species tested. All of the NOEC values are very low, except for the guppy value, which is 1 mg/L but the others are 100 times lower than that.

Mayer (1981) looked at 2 blends of hydraulic fluid. They saw higher toxicity for issues having to do with collagen development in the vertebrae. Researchers also noted that cataracts were identified in the rainbow trout, lake trout and fathead minnows. The cataract impacts were being identified at lower levels for the NDP and the propyl groups. For TPP, the cataracts were not identified in the trout species. Some of these chronic effects were definitely being seen at lower concentrations for the NDP and propyl groups relative to the TPP.

Liu (2013) studied TPP and TDCPP for the regular kind of reproduction and growth, both compounds reduced egg production and decreased fertilization and hatching success and results were dose dependent. Impaired reproductive capacity increased plasma E2 and VTG levels in both male and female fish and influence the transcription of genes of the HPG axis in a sex-dependent manner. The effective concentrations that were identified to decrease the fish reproduction or hormone balance were only an order of magnitude greater than the concentrations reported in effluent. They were a little higher than what might be considered environmental environmentally relevant but not too much. Because of that, increasing use might justify monitoring them in the aquatic environment because that sort of margin of safety between what they were seeing in 2013 in the environment was only an order of magnitude different.

The use of APEs is likely increasing because they have been used as a substitute. For example, TPP and IPTPP are components of Firemaster 550, which is one of the most common substitutes for the Penta BDE.

There was discussion regarding concern that these chemicals are going to be persistent and bioaccumulative and in the food chain.

A member asked if we think that higher logK_{ow} are likely to be more persistent and the lower ones are already showing toxicity, can we combine these two trains of thought together to say that these (TPP, TCP) are a group and we do have long-term toxicity concerns.

A member shared his screen with more information in the graph for chemical/physical properties and these few chronic aquatic toxicity studies and again, there is correlation.

The Board attempted to articulate next steps in the last few minutes of the meeting:

-TURI will make an effort to show the toxicity study results on the graph showing the log K_{ow}s and number of added carbons.

-TURI will check for ToxCast positive hits and show that on the graph.

-TURI will look at acute toxicity research study results for potential category members as well.

Next Meeting

Program staff will send out a poll for possible meeting dates sometime in June.

Handouts

Petition for Nanomaterials
CDC 2013: Current Intelligence Bulletin
IARC 2017: Some nanomaterials and nanofibers
Endpoints of Concern for Existing HHS and CNT/F
TURI Nano Threshold Background Information
Physical/Chemical Properties by Number of Phenyl Groups and by Types of Added Groups
Summaries of Chronic Aquatic Toxicity Studies for Aryl Phosphate Esters
Aryl Phosphate Esters Presentation for April Meeting
Nanotube Threshold Presentation for April Meeting

Chat (inserted verbatim from Zoom)

Bramante, Christina - MA to Everyone 10:31 AM
Hello,
Christina Bramante, representing Nano-C is in attendance.

Katherine Robertson to Everyone 10:32 AM
Katherine Robertson, Massachusetts Chemistry & Technology Alliance (MCTA)

Raza Ali to Everyone 10:33 AM
Raza Ali, American Chemistry Council

Liz Harriman to Everyone 10:33 AM
Liz Harriman, Lowell Center for Sustainable Production, UMass Lowell

Jerome Lang to Everyone 10:33 AM
Jerome Lang, Nano-C

Colin Hannahan - Toxics Use Reduction Institute to Everyone 10:33 AM
Colin Hannahan, TURI

Carol Holahan to Everyone 10:33 AM
Carol Holahan, Foley Hoag LLP

Yuna.Choi to Everyone 10:33 AM
Yuna Choi, EEA

Laura Spark to Everyone 10:34 AM
Laura Spark, Clean Water Action

Sandra Baird (MassDEP) to Everyone 10:34 AM
Sandra Baird, Office of Research and Standards, MassDEP

Daniel Burstein (MassDEP) to Everyone 10:35 AM
Dan Burstein, MassDEP

Steve Scherrer to Everyone 10:36 AM
Steve Scherrer, Lanxess

Sergei Levchik to Everyone 10:36 AM
Sergei Levchik, Consultant to ACC

Bob Rio - RAR Strategies LLC to Everyone 10:43 AM
Bob Rio, RAR Strategies for MCTA

Bramante, Christina - MA to Everyone 11:13 AM
Hello, would like to confirm the SAB recommendation will state clearly the threshold will be

lowered to capture the user population?
Apologies, I do not see the hand icon
Not sure I understand your response Heather
Understood. Thank you!

Katherine Robertson to Everyone 11:16 AM
"This higher hazard substance only refers to multi-walled carbon nano tubes, correct?

You to Everyone 11:17 AM
Yes

Rich Gurney (Simmons U) to Everyone 11:21 AM
Given the carcinogenicity of MWCNT and the SAB recommendation to designate MWCNT as a Higher Hazardous substance, I move that the reporting threshold for MWCNT be lowered below the 1000 pound current amount to capture a greater number of users, as it is unlikely to require reporting by a majority MA users. Further, 100 grams may be too low but an order of magnitude higher may be relevant.
Given the carcinogenicity of MWCNT and the SAB recommendation to designate MWCNT as a Higher Hazardous substance, I move that the reporting threshold for MWCNT be lowered below the 1000 pound current amount to capture a greater number of users, as it is unlikely to require reporting by a majority MA users.

Rich Gurney (Simmons U) to Everyone 11:27 AM
Given the carcinogenicity of MWCNT and the SAB recommendation to designate MWCNT as a Higher Hazardous substance, I move that the reporting threshold for MWCNT be lowered below the 1000 pound current amount to capture a greater number of users, as it is unlikely to require reporting by a majority MA users. We recommend capturing the lower volume user because of the hazard.

Heather Lynch to Everyone 11:32 AM
However, the SAB notes that the exposure and potential associated hazard is expected to be similar across the range of use volumes up to and including 1000 lbs.

Katherine Robertson to Everyone 11:37 AM
Can someone read the motion before the vote? Soooo confused.

Caredwen Foley, MA OTA to Everyone 11:39 AM
I believe “higher hazardous” should read “higher hazard” based on the language in the statute

Heather Lynch to Everyone 11:44 AM
The SAB recommends

lowering the reporting threshold for MWCNT below the
1000-pound threshold because many companies handling these materials use less than 1000 pounds per year.

Christy Foran to Everyone 11:50 AM
".... the range of use volumes from grams to 100s of kg."

Katherine Robertson to Everyone 11:54 AM
Can you put the motion in the chat?

Heather Tenney 11:56 AM
The SAB recommends lowering the reporting threshold for MWCNT below the1,000-pound threshold because many companies handling these materials use less than 1,000 pounds per year. The SAB recognizes the carcinogenicity of MWCNT and our previous recommendation to designate MWCNT as a Higher Hazard substance.
The SAB notes that the exposure and potential associated hazard may be similar across the range of use volumes from grams to 1,000 lbs.