

## **Toxics Use Reduction Institute Science Advisory Board Meeting Minutes**

**February 10, 2023**

**Virtual Zoom Meeting**

**2:30 PM**

**Members Present:** Robin Dodson (Chair), Christine Rioux (Vice Chair), Heather Lynch, Lisa Cashins, Helen Poynton, Christy Foran

**Members not present:** Wendy Heiger-Bernays, Rich Gurney, Denise Kmetzo

**Program staff present:** Liz Harriman (TURI), Heather Tenney (TURI), Karen Thomas (TURI), Hayley Hudson (TURI), Caredwen Foley (OTA), Sandy Baird (Mass DEP), Kari Sasportas (OTA)

**Others present:** Carol Holahan (Foley Hoag ACC), Christina Bramante (Nano-C), Raza Ali (ACC), Katherine Robertson (MCTA), Jerome Lang (Nano-C), Laura Spark (Clean Water Massachusetts), Terry Hyland (Chemical Watch), Jill Vernes (Capaccio Environmental Engineering)

### ***Welcome & Introductions***

The chair noted that this meeting is being conducted remotely, consistent with *An Act Relative to Extending Certain State of Emergency Accommodations* signed by Governor Baker on June 16<sup>th</sup> 2022. This allows the extension of the remote meetings under the Open Meeting Law until March 31, 2023. Board members introduced themselves, program staff were announced, and attendees were asked to put their name and affiliation in the chat.

### ***Approve December Meeting Minutes***

A motion was made to approve the December meeting minutes, and there was a second. A roll call vote was conducted, and the minutes were unanimously approved by the six members present.

### ***Complete the Discussion of Carbon Nanofibers (vote)***

At our March 2022 meeting the board made a recommendation to list multi-walled carbon nanotubes (MWCNTs) based on the evidence of pulmonary toxicity, lung cancer, mesothelioma, and environmental persistence. Additional concerns for genotoxicity and toxic environmental degradation products were noted. At our December 2022 meeting the board made a recommendation to list single-walled carbon nanotubes (SWCNTs) based on evidence of pulmonary toxicity and environmental persistence. Additional concerns for reactive oxygen species (ROS) production and DNA damage were noted.

Finally, the nano petition also asked us to consider carbon nanofibers (CNF). We discussed CNF at our April 2022 meeting yet did not come to a conclusion. Today we will try to conclude our work on CNF.

Since the last meeting no new comments were received. All information for CNF was previously on the LibGuide, but a summary document was prepared with excerpts from CDC and abstracts from all studies.

### ***Pulmonary Toxicity***

- DeLorme (2012) and Murray (2012) papers were mentioned as particularly useful, as was Shvedova (2014). Effects post exposure were seen in Shvedova and Murray.
- Kisin (2011) found that nanofibers have more of an effect than SWCNT in a cell culture study. This was a genotox study but is worth noting.
- A board member had concerns with the Beard (2018) study design, including the use elemental carbon as a marker of exposure, and their assumptions when measurements were below detection.
- Overall, there are very few studies for CNF, however lack of data doesn't mean lack of hazard. The studies that we do have indicate concern and hazard, and they are seeing corollary effects of the CNT studies.
- A board member asked if nanofibers would be found without nanotubes? One study said that it might be a mixed dose and you won't find one without the other.
- Regarding co-occurrence in occupational settings, IARC monograph section 1.1 says CNF may be produced as impurities in the synthesis in CNT.
- Murray and Shvedova compared CNF to asbestos and CNF had worse effects.
- The CDC study really relies on the DeLorme and Murray studies. They separated manufacturing of just fibers and research on just fibers.

### ***Environmental Effects***

Our biggest concern has been persistence -are CNFs different than CNTs. CNTs are all connected but fibers have a lot of ends on them which may lead to better breakdown by organisms. There is not any literature to support this theory yet and thus hesitate to note persistence as a reason to recommend listing CNFs.

A member noted a study with concerns of uptake (Barrick 2019). However, the concentrations in that study are very high. There were concerns with the Gomes (2021) study methodology and the measurement of total organic carbon. They exposed earthworms that were then fed to zebrafish and then to tilapia where they then saw effects in the tilapia. It provides evidence of trophic transfer, although results are from just one research team. The effects are similar to CNTs. When exposed to high concentrations you do see chronic to sublethal effects.

### ***Genotoxicity***

Fraser (2020) and Kisin papers were highlighted as noting concerns for genotoxicity. Kisin did show more effects for CNFs than CNTs and asbestos. This was a cell culture study so it will not go through the inflammatory mechanism. It was stated in Kisin that CNFs are more like MWCNTs. MWCNTs are more asbestos-like than the SWCNT.

A member noted that the Abdo (2020) paper was interesting and saw significant adverse reproductive effects. However, that was the only study looking at reproductive effects.

### ***Visitor Questions/Comments***

The Chair asked for visitor input.

Christina Bramante mentioned that the highest dose in DeLorme was 25 mg/m<sup>3</sup> in and it was a repeated dose.

Jerome Lang mentioned that he did not see CNF as a byproduct in their production of SWCNT.

### ***Continued discussion***

There was discussion working toward the following summary statement.

**A limited number of studies were available for CNF. The limited data on pulmonary toxicity suggests effects similar to CNT. NIOSH recommends that all types of CNT and CNF should be considered a respiratory hazard. Ecotoxicity effects (acute and chronic toxicity) including trophic transfer are comparable to CNT.**

There was discussion around the summary statement. It was noted that the board would like to see more evidence. Two studies indicated that CNF are worse than asbestos – is that enough evidence to recommend to list? CNF were shown to cause pulmonary fibrosis and immune suppression.

There was a motion to list CNF based on pulmonary toxicity. Motion seconded.

There was a roll call vote and the vote was unanimously approved by the six members present.

### ***Background on Threshold Document***

The document has been distributed with background information on threshold determination under TURA and TRI. Liz summarized some of this information, including what was asked in the petition, TURA thresholds and EPA rationales for lowered thresholds. We will continue this discussion at the next meeting.

### ***Next Meeting***

The next meeting will be focused on flame retardants, and it is scheduled for March 10<sup>th</sup>.

### ***Adjourn***

#### ***Visitor Comments (inserted verbatim from zoom chat)***

From Laura Spark, Clean Water MA to Everyone 02:32 PM

Laura Spark, Clean Water Action

From Jerome Lang to Everyone 02:33 PM

Jerome Lang, Nano-C Inc.

From Terry Hyland to Everyone 02:33 PM

Terry Hyland, Chemical Watch

From Christina Bramante to Everyone 02:33 PM

Christina Bramante, representing Nano-C

From Raza Ali to Everyone 02:33 PM

Raza Ali, American Chemistry Council

From Carol Holahan to Everyone 02:33 PM

Carol Holahan, Foley Hoag

From Katherine Robertson to Everyone 02:33 PM

Katherine Robertson, MCTA

From Christina Bramante to Everyone 02:51 PM

Regarding the DeLorme Study, the high dose of 25 mg/m<sup>3</sup> was a repeated dose administration with a total of 65 days of exposures