

# **VIRGINIA INHALATION TOXICOLOGY ADVISORY GROUP**

## **MINUTES FOURTH MEETING May 21, 2009**

**TIME AND PLACE:** 9:00AM – 2:00 PM  
DEQ Central Office  
629 E. Main Street  
Richmond, VA 22469  
7<sup>th</sup> Floor Conference Room

**PRESIDING:** Patricia McMurray, DEQ Risk Assessor Program Manager

### **MEMBERS PRESENT:**

Jim Gould, Sierra Club  
Chris Bednar, Smurfit Stone  
John Morris, Ph.D., University of Connecticut (SOT) – by phone  
Debbie Mulrooney, DuPont (VMA) – by phone  
Kevin Wallace, M. D., University of Virginia  
Kimber White, Ph. D., Virginia Commonwealth University  
Dwight Flammia, Ph.D., Virginia Department of Health  
Robert Corley, Ph.D., Virginia State University

### **DEQ STAFF PRESENT:**

Patty Buonviri, Air Toxics Coordinator (Recorder)  
Alan Anthony, Ph.D., Risk Assessor, Air Toxics (Timekeeper)  
Michael Dowd, Air Director  
Michael Kiss, Coordinator, Air Quality Assessments Group  
Sonal Iyer, Risk Assessor, Office of Waste Technical Support

### **GUESTS PRESENT:**

Jennifer Boyle, UVA  
Thornton Newland, Virginia Coal Association

Net Connect was used to link those participating by telephone.

The meeting began with VINTAG members, DEQ staff, and visitors introducing themselves.

There was a short discussion on the role of visitors and how they should interact with the group. The group agreed that questions could be asked after each presentation but that

the minutes should differentiate the comments made by visitors from those made by the group.

There were no comments on the minutes from the previous meeting. A motion was made and seconded to approve the minutes as written. DEQ staff will post the minutes on the Virginia Town Hall within three days of approval. See <http://www.townhall.state.va.us/L/meetings.cfm> for the minutes from previous meetings.

The status of action items from the previous meeting was reviewed.

**ACTION:** DEQ questioned whether a memorandum of understanding (MOU) would be needed between DEQ and VDH for the review process. VDH will check.

VDH reported that an MOU would be a good mechanism to establish a review process. The group agreed that the review should be conducted every four years (unless petitioned sooner) and a decision would be made at that time whether the VINTAG would need to be reconvened. DEQ will take the lead on drafting the MOU.

**NEW ACTION:** DEQ

**ACTION:** For tetrachloroethylene (PCE), DEQ will try to identify how Cal EPA derived their number.

This will be discussed later in the meeting.

**ACTION:** DEQ will write a draft of what we need for the petition process including the minimum requirements.

Pending.

The following are the two remaining summaries of member's chemical specific review for chronic non-cancer inhalation toxicity that were postponed from the last meeting.

**Ethylene dichloride:** EPA's review was conducted in 2001 and was based on a 1990 rat inhalation study. The critical effect was liver histopathology. The study had a NOAEL and an uncertainty factor (UF) of 90. EPA's toxicity value is 2400 ug/m<sup>3</sup>. Cal EPA's review was conducted in 2000 and was based on a 1980 rat inhalation study. The target organs were the kidney and the liver with a critical effect of increased liver enzymes. This study had multiple exposure levels, both a NOAEL and a LOAEL and an UF of 30 (interspecies 3, and intraspecies 10). The younger study groups didn't show any cumulative effects while the older groups had more effects. Cal EPA's value is 400 ug/m<sup>3</sup>. The main difference between the two studies is the critical effect – liver pathology vs. enzymes.

One member noted that Cal EPA's critical effect based on the liver enzymes is more reflective of injury and that you will see functional changes before you see histological

ones. Although the group found no reason to disqualify either study, the group consensus was to choose the study with the more sensitive endpoint and the value that is more risk protective, Cal EPA's value of 400 ug/m<sup>3</sup>.

**Triethylamine (TEA):** The presenter provided some background information on TEA. Virginia ranks #9 nationwide for TEA emissions (33,542 lbs/yr). Consumer products that contain TEA include agricultural chemicals, miscellaneous paint-related products, other interior water thinned coatings, semi gloss, eggshell, satin water thinned interior paints and tinting bases, water thinned exterior undercoaters and primers, and water thinned interior undercoaters and primers. TEA is used as a catalyst in the production of polyurethane foam and in epoxy resins as well as a corrosion inhibitor for polymers. It is also emitted from cattle feedlots. It was noted that TEA can react with nitric acid to form amine nitrates that become part of atmospheric particulates.

The presenter stated that a literature review conducted by an EPA contractor in 2003 did not identify any critical new studies for TEA.

US EPA conducted their review in 1991 based on a 1990 Lynch study on rats. The exposure method was discontinuous whole-body inhalation and the critical effects included eye irritation and lung and liver toxicity. EPA used a UF of 3,000. The following factors result in low confidence in the value: a LOAEL could not be identified, only one species was used, only a single reproductive/developmental study exists which had an oral route and is therefore not useful for inhalation risk assessment. In addition, no chronic studies exist for this compound. EPA's value is 7.00 ug/m<sup>3</sup>.

Cal EPA conducted their review in 2002 using both the 1990 Lynch study on rats and the 1951 Brieger and Hodes study on rabbits. The exposure method was discontinuous whole-body inhalation and the critical effects included eye irritation and lung and liver toxicity. Cal EPA used a UF of 100. Cal EPA's value is 200 ug/m<sup>3</sup>.

The group debated about whether to use EPA's value, Cal EPA's value or something in between. However, the group decided that it shouldn't depart from methodology that has already been established. Although the agencies used the same study, the level that U. S. EPA considered a NOAEL was considered by CalEPA to have adverse effects. Accordingly, the more conservative number should be used if the basis for the less conservative number is not clear. One member noted that the group's charge is to protect human health. The group reached consensus to recommend the more conservative number (EPA value of 7.00 ug/m<sup>3</sup>).

A copy of the PowerPoint presentation will be posted on the VINTAG website.

#### **Follow up Information: Tetrachloroethylene (PCE)**

DEQ was able to determine that Cal EPA derived their REL by converting an IRIS oral number to an inhalation number. One member noted that while this approach is routinely used, it is not an acceptable approach when an inhalation-based value is available. Cal

EPA used the IRIS oral slope factor from 1987 (based on a drinking water study) and converted the number to establish an inhalation REL of 35 ug/m<sup>3</sup>.

EPA also has a draft value of 20 ug/m<sup>3</sup>. One member said that he was not comfortable using a draft document that hasn't been peer reviewed.

Currently EPA is using the ATSDR value of 270 ug/m<sup>3</sup> which is based on occupational exposure. The group recommends the ATSDR number since it is based on inhalation. One member mentioned that PCE is a probable carcinogen and may be the driving factor.

## **Mercury**

As requested from the previous meeting, VDH reviewed the studies used by EPA and Cal EPA. EPA's value is 0.3 ug/m<sup>3</sup> and Cal EPA's number is 0.03 ug/m<sup>3</sup>.

One member noted that Cal EPA added an UF for developmental effects. Another member found a 1996 study on squirrel monkeys (published after EPA's review) that included developmental effects. The group agreed that this study could be used to support a decision and may render the additional UF for developmental effects unnecessary.

VDH staff's review showed that if you eliminate the UF of 10 for developmental effects used in Cal EPA's evaluation, then the value is 0.3 ug/m<sup>3</sup>, the same as EPA's value. However, if the EPA number is used, the group wanted to clarify that this value should only be used when evaluating elemental mercury.

One member voiced a concern that bacteria can convert metallic mercury to organic mercury. That member also questioned whether inhalation is a pathway for elemental mercury. It was also noted that the female monkeys in the study were exposed during in utero period.

Members agreed that the squirrel monkey study is more relevant to human health than the rodent study. One member wondered whether it was convincing enough to take away the UF for developmental effects. Some members believed it was.

Both EPA and Cal EPA start with 9 ug/m<sup>3</sup> and the only difference is the application of the additional UF.

One member noted that the media can misinterpret results from studies as happened in the Minnesota Study. The media reported that the mercury in a single thermometer would pollute a 20 acre lake. What the study actually said was that the annual deposition in a 20 acre lake was equal to the amount of mercury in a thermometer.

Members discussed the different forms of mercury – organic, inorganic (elemental), and methyl mercury. One member stated that mercury bioaccumulates and may be a

contributing factor for establishing a value. It was mentioned that if the more conservative number is used, a petition to change the number could be submitted.

A guest observed that the group in the face of uncertainty seemed to select the lowest possible number. The guest thought that the group needs to be more certain before making a decision because it may have effects on industry that could be catastrophic.

The group recognized that DEQ, under the current resource constraints, can't do detailed study review, and may need to take the conservative number. DEQ noted that this group is only responsible for risk characterization and not risk management.

One member pointed out that the group did choose some less conservative numbers when the science supported it. Without data to support a value, the group is inclined to take the more conservative number. It was noted that DEQ's objective is to protect human health.

One member said that he does applied work and is aware of the effect on industry, but that science has to take precedence. He noted that this group is concerned with risk assessment issues and not risk management issues.

### **15 minute break**

The group continued their discussion on mercury. One member noted that EPA's number was only for elemental mercury and that it is the most prevalent in the atmosphere. DEQ staff informed the group that there is currently a separate SAAC for each form of mercury. One member noted that there are fewer studies on the elemental form of mercury and that if a number was being recommended for methyl mercury the most conservative approach would be appropriate

One member indicated that the coal and steel industry would be impacted by the decision and that evaluation of elemental mercury would require speciation of the emissions which can be very expensive.

A review of DEQ's, EPA's, and Cal EPA's current values ensued.

DEQ's SAAC's for mercury are based on the ACGIH TLVs and include alkyl ( $0.02 \text{ ug/m}^3$ ) (methyl mercury), aryl ( $0.2 \text{ ug/m}^3$ ) (aromatic), and elemental mercury ( $0.1 \text{ ug/m}^3$ ). One member stated that elemental mercury is used to extract gold and has been shown to cause acute lung injury.

One member commented that both EPA & Cal EPA only have values for elemental mercury and that this group is also only recommending values for elemental mercury and that DEQ staff would determine a number for other forms of mercury later if data become available. It was also mentioned that only small amounts of organic mercury is airborne and that may be why it's not being evaluated by other agencies.

The group summarized discussions. If the distinction was made that the value only referred to elemental mercury, a member remarked that he would be comfortable using the EPA number. Other members agreed to recommend the EPA number, emphasizing that it is for elemental mercury only.

DEQ action: DEQ noted that the group is now finished with the chronic numbers and will update the decision tree and distribute to the group.

### **Introduction to acute/short term exposures**

Alan Anthony presented a PowerPoint presentation “Introduction to Acute/Short Term Exposures.” The presentation is included as an attachment.

Pat McMurray presented a PowerPoint presentation that provided detail on how five different groups developed their short term values entitled “Derivation of Acute Toxicity Factors.” The presentation is included as an attachment.

DEQ noted that the group could use what others have already developed. In choosing values the group should consider how the number was derived and if it is consistent with DEQ’s needs. Other considerations voiced included whether or not the values were meant for the general population or did the evaluation take into consideration sensitive populations, should the group adjust numbers to fit DEQ’s needs or only use numbers that are appropriate and leave others blank.

One member said that emergency exposure limits are not appropriate and can be 10 to 100 times higher than numbers designed for expected exposures. It was noted that all number except for Cal EPA and ASTDR are for emergency exposure.

### **Break for lunch**

Pat McMurray presented a PowerPoint presentation which provided a chemical specific comparison of how each group derived their number. The presentation entitled “Chemical Specific Comparison of Acute Toxicity Factors” is attached.

DEQ staff noted that the Cal EPA numbers are used for the same purpose as DEQ’s. One member questioned whether emergency levels are appropriate for continuous intentional industrial releases? One member remarked on the principle of reversibility and if the chemical is only an irritant with transient effects, it may be appropriate to use emergency values. Another member argued that although the effects from an irritant may be transient if it results in an asthmatic attack, the effects would be problematic.

Another member stated that some chemicals like organic solvents are reversible and that emergency numbers may be acceptable

DEQ staff asked the group what other information is needed to answer these questions and what other questions are there.

One member thought that dividing the chemicals into two groups, irritant and non irritants may be a starting point. The member stated that for irritants there probably wouldn't be systemic effects beyond immediate symptoms.

Another member suggested that if Cal EPA has a 1 hour REL that this number could be used because we rely on them for other factors. It was noted that the Cal EPA REL is based on exposure occurring no more than once every two weeks.

DEQ questioned how this could be incorporated into a regulation for industry and how you would monitor a maximum hourly exposure that only can occur once every two weeks.

The group recommended that we should develop a 1 hour exposure concentration and leave the frequency of exposure to a risk management decision.

One member estimated that over 50% of the chemicals are irritants with transient effects, are less likely to have systemic effects, but could exacerbate an asthmatic.

Another member said that TEEL and AEGL are not appropriate because they don't consider sensitive populations.

One member suggested accepting the current SAAC values unless there is a Cal EPA number. One member questioned whether or not the group would be comfortable using a STEL as a point of departure.

DEQ mentioned that they had looked into getting the background documents from ACGIH at a cost of \$2,000, but funds were not available. The group thought that it was important that DEQ acquire these documents. The documents would also provide biologic exposure indices. These documents describe the basis for the STEL and TLV that were used to determine DEQ's current SAACs. They may help to determine whether 40 are sufficient for an uncertainty factor when there is no CalEPA value. One member noted that the STEL healthy worker exposure (15 minute exposure) does allow some sensory irritation. One member thought that 40 may not be appropriate for every chemical.

DEQ staff stated that the SAAC may be 10 to 1000 times higher (more permissive) than the Cal EPA value which suggests that a factor of 40 may not be adequate.

The group felt that they could derive an appropriate factor to use to convert from the STEL to an acceptable short term exposure level.

**Action DEQ:** DEQ will request funding for ACGIH documents based on group's recommendation. If the documents are acquired, DEQ will use the documents to determine which values are based on irritant effects and compare to the Cal EPA numbers. By looking at the difference between the ACGIH and Cal EPA numbers, we

may be able to determine if 40 is adequate and if not to develop an appropriate conversion factor.

One member thought that if the ACGIH number compared to the Cal EPA number is not more than 3 times then the difference wouldn't be significant. Current ACGIH numbers would be used and not the values that were used to develop the SAAC.

One member cautioned against using a human inhalation study with an irritant effect that also had odor aversion factors because it is likely that when the odor is detected it could trigger psychogenic effects. Some of these studies use odor blockers to prevent this.

One member observed that there are only 51 Cal EPA numbers to compare. One member suggested using the STEL, compare it to the Cal EPA number and use a modifying factor to establish a value for DEQ.

DEQ staff asked for any other ideas. DEQ also mentioned that the exposure period and frequency were considered by DEQ management and would prefer the short term exposure level be established for one hour, not to be exceeded. DEQ stated that most permits contain both short term and long term emission limits.

The next meeting is scheduled for July 30, 2009.

**ACTION DEQ:** One member requested an updated abbreviation list be distributed to each member.

Meeting adjourned at 2:00 p.m.