Meeting Minutes

AIR TOXICS SCIENCE ADVISORY COMMITTEE MEETING NO. 12

March 22, 2017, 9 a.m. to Noon
Oregon Dept. of Transportation Conference Room A-B
123 N.W. Flanders Street
Portland, Oregon, 97209

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

List of Attendees

All five remaining Air Toxics Science Advisory Committee (ATSAC) members attended: Bill Lambert, Dean Atkinson, Kent Norville, Max Hueftle and Dave Farrer. Dave Stone and Bruce Hope have both retired from the ATSAC.

DEQ staff: Sue MacMillan (DEQ lead for ATSAC), Kevin Downing, Phil Allen, Chris Swab, Jeffrey Stocum.

Introduction

The meeting began shortly after 9 a.m., and agenda items for this meeting were described. Sue MacMillan, DEQ lead for the ATSAC, stated that today's meeting (March 22, 2017) will probably be the final meeting of the Air Toxics Science Advisory Committee for this term. The meeting is being held in Conference Room A+B of the ODOT building, located at 123 NW Flanders Street.

Most of the discussions today will be related to summaries of the ATSAC's work since December 2014. Because of the long gap between previous ATSAC meeting in January 2016, and this meeting in March 2017, Sue MacMillan decided to re-check all available toxicity information for the 52 ABCs, whether they were reviewed during this term of the ATSAC or not, in order to ensure that the committee is ending this ATSAC term with the most-current toxicity information in place. New toxicity information for four chemicals: ammonia, benzo(a)pyrene (which serves as the basis for the ABC for polycyclic aromatic hydrocarbons), 2,4-/2,6-toluene diisocyanate mixture, and xylenes. All relevant information on this new toxicity information for these four chemicals was sent to the ATSAC yesterday. Committee members also received hard copies of a brief summary of toxicity information for the four chemicals, including what parameters were used in each study, and how each value was calculated.

Administrative Items

The October 2015 meeting minutes were approved by the committee. Sue MacMillan stated that she had incorporated the comments that she had received from Max Hueftle. None of the committee members present had any further comments on the minutes, and approved them unanimously.

Summary of ATSAC Policy Decisions

The meeting agenda was presented, followed by Administrative Items for the ATSAC, which mainly concerned clarifying previous policy decisions the ATSAC had made.

- *Rounding policy* – In many cases, rounding to one significant digit. David Farrer suggested rounding to "nearest non-zero post-decimal digit", so that the policy wouldn't cause us to round to a value of zero. The use of too many significant digits will

incorrectly imply a degree of precision that isn't actually there. In practice, rounding decisions have occurred on a case-by-case basis, especially in cases where a vetted value from an external authoritative body was available. This occurred in the case of lead, where the ATSAC chose to use the established National Ambient Air Quality Standard of 0.15 ug/m^3 for lead, a value which has two significant digits, as the ABC for lead, rather than round up to 0.2 ug/m^3. In cases where a toxicity value originates with a source agency or authoritative body, that toxicity value will be used as presented by the source or body.

- *ADAF policy* – Age-dependent adjustment factors, or ADAFs, are used to assess the exposure toxicity of mutagenic carcinogens, due to the fact that children are much more susceptible to the effects of a mutagenic toxics than are adults. Earlier ATSAC discussions had considered whether ADAFs should be applied to ABCs recommended by the committee. The ATSAC decided not to apply ADAFs to ABCs, but to encourage the use of ADAFs in any related human health risk assessments.

- *Short-term guideline concentrations* – the ATSAC confirmed the recommendation they made at the January 2016 meeting: that agency toxicologists could review and choose from short-term values already vetted and published by recognized authoritative bodies, such as the Agency for Toxics Substances and Disease Control Minimal Risk Levels. Max Hueftle pointed out that the pending Cleaner Air Oregon rules would regulate a much larger list of chemicals than the 52 that ATSAC has dealt with. Bill Lambert reminded the committee that there is no credible way to extrapolate short-term protective values from existing chronic ABCs; if there had been a credible way, it would have made the task easy to accomplish. But because evaluation of short-term concentrations of hundreds of chemicals would make the performance of this task by the ATSAC overwhelming due to volunteer time constraints, they recommended that Oregon DEQ and the Oregon Health Authority do the work.

- *Two values based on same study* – In cases where two different toxicity values are available from two different agencies, but both are based on the same scientific study, the ATSAC will decide which of the two values to use. In the past, if it appeared that one agency had simply added uncertainty factors that did not seem to be defensible, then the ATSAC tended to choose the toxicity value associated with the less-manipulated approach. Also, in cases where added uncertainty factors are the only difference between the two studies, and there is less than an order-of-magnitude difference between the two values, then the higher (less-stringent) toxicity value is chosen.

  One committee member said he thought this applied in cases where the two values came from the same study, and the resulting ABCs were within an order of magnitude of each other in value. It was also pointed out that this kind of a decision only became an issue when non-cancer toxicity effects for a chemical were being discussed.

  The committee stated they want to be consistent with the hierarchy of authoritative sources agreed to early in this term. Sue MacMillan reminded them that in many cases, the ATSAC had not necessarily followed the hierarchy in terms of sequence, but had chosen a value based on how current it was, or how technically strong the related studies were, and that didn't always mean that the EPA Integrated Risk Information System value was automatically chosen, in spite of an IRIS value being available and IRIS being the first choice in the hierarchy list.

- *Multi-pathway effects* - The ATSAC will not alter ABCs in order to account for possible multi-pathway effects of a chemical. Sophisticated modeling performed by Bruce Hope circa 2006 indicated that the ABCs chosen for mercury, PCBs, and dioxins and furans were also protective of health effects related to exposure pathways other than inhalation

of air. Kent Norville pointed out mercury as an example of a chemical for which the ABC was set based on potential health effects through inhalation of air, although mercury was present in the Willamette River and had impacted fish tissue, and therefore the people consuming fish. Thus, the inhalation toxicity value used to set the ABC was based on exposure to air, not on consumption of fish. Therefore, the ABCs should be assumed to be related to the potential exposure of people through inhalation of chemicals in the air, without consideration of health effects from other pathways.

Bill Lambert emphasized that in the ATSAC's choice of each ABC, the ATSAC has always considered protection of the most-sensitive population groups that may be exposed to a particular chemical. Therefore, the ATSAC has never applied an adjustment to the ABCs that reflects potential multi-pathway impacts. As with applications of ADAFs, consideration of possible multi-pathways effects are more appropriate to consider once a risk assessment is conducted.

Summary of Diesel Particulate Matter Work Conducted by the ATSAC

Summary of diesel particulate matter work performed by the ATSAC was presented, related to understanding the science behind DPM in order to try to identify a new ABC value to recommend for DPM. In May 2015, the committee talked about polycyclic aromatic hydrocarbons and DPM, focusing on chemical characteristics and dispersion in the environment. In June 2015 the ATSAC talked about analytical considerations and ways in which to detect and measure DPM and related compounds including black carbon, elemental carbon, and organic carbon, and the ways in which these compounds are monitored. Epidemiological evidence for DPM was presented, as well.

In July 2015, the committee continued discussion of alternative approaches to develop a new ABC for DPM. In addition, Sue MacMillan and Bruce Hope presented a listing of the historical quantification of risk related to DPM and related compounds, and the related human and animal studies, and committee discussed an approach using a geometric mean for the combined studies in order to identify a unit risk estimate, referred to as a URE. However, the ATSAC was concerned about the appropriateness of combining studies with differing research designs, and how credible the outcome of such an approach would be. The committee then decided to rely only on epidemiological data and not on animal data, as the mechanics of inhalation uptake of DPM by rodents does not accurately represent the same sort of uptake by humans.

The discussion of these issues continued in the September 2015 meeting, with the committee coming to the conclusion that the only credible path to identifying a new ABC for DPM would be for the ATSAC to come up with their own calculations; but then all members immediately acknowledged this was probably too complex and too time-consuming a task to attempt. Bill Lambert then offered to attempt to generate a URE value for DPM using some of the information he had obtained from Dr. Robert Parks during a conference in 2014, and produce a draft memorandum for the other ATSAC members to review and then discuss at a future committee meeting.

Diesel exhaust is a complex mixture of gases and ultrafine particles, and involves nitrogen oxides, sulfur oxides, sulfate absorbed onto these particles, volatile organic compounds, and PAHs. Ultrafine particles are very small particles in terms of average aerodynamic diameter, much smaller than 0.1 micron in diameter, and these physical characteristics mean that ultrafine particles behave much like a gas and are able to reach the deep lung. The health issue for Oregon is that a large and substantial amount of diesel activity takes place in Oregon, and earlier we talked about the air Emission Inventory, which provided a general characterization of the distribution of diesel emissions around the state. Most of those emissions were found to be in metropolitan areas, particularly in Portland, and the committee was concerned about diesel exposure because of the large numbers of people living in proximity to this activity. The

Emissions Inventory provided a general picture, and we expect to continue to see growing truck and rail traffic and off-road activity (for example, construction activities) that will utilize diesel engines. As the population and economic growth in metropolitan areas in Oregon continue to increase, we expect to see related increases in related diesel emissions.

The committee recognizes that the use of new diesel engines and fuels, beginning in approximately 2007, produced substantially reduced emissions of toxic compounds. But there is not yet good information on how many of the older diesel engines are still in use in Oregon, and the committee's goal is to be protective of the emissions that people are actually experiencing. Older diesel engines are very durable, and because replacement of old engines with new ones is very expensive, we know that heavy-duty-vehicle fleet turnover will be slow.

Bill Lambert reiterated two ways to approach the control of diesel emissions:

1) Use a constituent approach where, rather than pinpointing diesel toxicity, DPM is controlled indirectly by evaluating the toxicity of related components, such as particles and gases. For example, particulate matter with an aerodynamic diameter of 2.5 (PM 2.5), already has an available protective criterion in its National Ambient Air Quality Standard, and there are ABCs available for the PAHs. In addition, specific epidemiological data exists for these DPM-related compounds, with quantified, numeric results. So each component could be assigned its own ABC, and uncertainty factors could be applied to try to account for the unknown potential chemical interactions of these compounds with each other. The constituent approach discussed here is the method that is used currently by the federal government.

2) Set a standard for DPM, including considering what the appropriate marker compounds for DPM would be. Choosing an appropriate marker is extremely challenging, because no single chemical in the DPM mixture serves as a unique marker of actual DPM exposure. The more-recently published and credible occupational worker studies use elemental carbon as a measure, or marker, of DPM exposure. These occupational studies of truckers and miners are the studies we would probably rely on in our evaluation of DPM toxicity, as they offer a much better and valid assessment of human exposure than do earlier studies. These studies included evaluation of older populations, due to the fact that there is a long wait, or lag time, between exposure and the actual appearance of the outcome of interest, which is lung cancer. This is a retrospective approach which looks at historical exposures of workers, reconstructs their dosage history, and then measures the occurrences of lung cancer. It should be noted that these occupational worker studies are based on human exposure that is higher than that observed in the general community with ambient levels.

   Many of these studies present their results in term of Relative Risk, which is the measure of association of exposure levels with physical outcomes. Unfortunately, there is no defensible approach for using Relative Risk values and related hazard ratios to generate a credible URE for DPM. Relative Risk results in these studies are based on respirable elemental carbon levels, rather than DPM levels. However, as was discussed in past ATSAC meetings, the measurement of elemental carbon is impractical.

The previously published range of UREs from the World Health Organization (1996) that the ATSAC used in 2005 from which to draw the ABC for DPM (0.1 ug/m^3), has since been withdrawn, due to the concerns with the uncertainty of the data. The URE published by the USEPA in IRIS at that time for DPM, of 5×10^{-6} per microgram per cubic meter (typically abbreviated as per ug/m^3), has also been withdrawn.

The one published URE that is currently available is from California's Office of Environmental Health Hazard Assessment, which is a URE value of 0.0003 per ug/m^3 from 1998; when converted to a concentration that is protective at a 1 in 1 million risk, the value 0.003 ug/m^3 is obtained. Other states, such as Washington, have adopted this value. Twice, the ATSAC has reviewed the documentation behind the OEHHA value and found it to be incomplete, as did other experts in the field. Because the OEHHA value is nearly 20 years old and because the ATSAC has not been able to determine exactly how the value was calculated, the committee has refused to consider the OEHHA URE value as a basis for a new ABC for DPM.

In 2005, the ATSAC recommended an ABC for DPM that was obtained from the range of URE values provided by the World Health Organization in 1996, and that is the basis of the current ABC value for DPM today. Currently, the most-recent science on DPM became available in 2012 and after, and included epidemiologic studies done by Garshick, Silverman, and Attfield on miners and truckers. The results of these studies have been published in peer-reviewed scientific journals, and the Health Effects Institute convened an expert panel which generally endorsed the quality and validity of these approaches. A small excess relative risk of lung cancer was seen at the highest levels of the occupational exposures. However, the Health Effects Institute did not generate a URE numeric value, which is what is needed to calculate a new risk-based concentration. Choosing not to identify a URE is related to concerns about extrapolating from the worker studies down to the community level, and how ambient levels of exposure to DPM might fit in. Also, uncertainty factors of some kind would have to be applied to these worker study results in order to be able to use them to protect non-worker communities. Interpretation of these studies may also be complicated by what is referred to as the "healthy worker effect", which means that working people are actually healthy enough to work. Therefore, safety factors would have to be researched that would allow application of worker-based results to potentially not-as-healthy general populations, which include vulnerable or sensitive groups.

Bill Lambert attempted to work with a method for considering the use of a Relative Risk value to estimate a URE for DPM, but that approach proved not to be successful. At this point in time, there doesn't seem to be a way to quantitatively support a revision of the current ABC for DPM. Even though Bill Lambert cannot recommend a revision of the current ABC for DPM, he believes that a combination of existing ABCs available for the individual volatile organic compounds and PAHs present in DPM, in concert with National Ambient Air Quality Standards, could provide adequate health protection in regard to exposure to DPM. Some committee members disagreed with this idea. The NAAQS for PM 2.5 is very different from the NAAQS for certain VOCs and the ABCs for other VOCs and for PAHs, and so suggesting that these differing types of values should be combined together to create a protective group of values that would protect people from exposure to DPM is not adequately supported.

A committee member suggested concentrating on the literature that's available for the toxicity of diesel particles that are small enough to be drawn deeply into the lungs. Bill Lambert said that these kinds of studies still have a lot of uncertainty associated with them, and added that respirable particles are associated with a number of potential sources (like motor vehicles, internal combustion engines, wood smoke), any of which are hard to pin down as "the" source of contamination in a particular region. This is an emerging area of science that is still in development. There are a variety of other health effects that have been measured as well, such as with children in Los Angeles who exhibit reduced lung growth, which results in smaller lung volumes and flows for those who are living within 1,500 feet of a roadway. Asthma risks increase, as well. The newest information that's coming forward now is that there may be additional DPM exposure concerns for cognitive development in children; aspects related to dementia; and carbon soot particles have been found, during autopsies, to have been transported to not only the heart, but also into the brain, crossing the blood brain barrier. Thus, we are still in the process of learning a lot more new information about particles. Nonetheless, it is important to

work toward the prevention of lung cancer, and so the current DPM for ABC represents a satisfactory position in regard to prevention of lung cancer.

Retaining the ABC we currently have for DPM is useful as a screening tool that the DEQ can use to make decisions about the potential DPM hazards throughout communities, and then to prioritize areas for more-focused control of DPM and the protection of human health. In addition, the DEQ is combatting levels of DPM in air through other programs.

Max Hueftle asked whether, in light of the fact that rodent respiratory systems aren't comparable to human respiratory systems, if it would be possible to conduct a study where rats are exposed to diesel compounds via inhalation in a specialized chamber that would accurately simulate upper respiratory tract inhalation uptake by humans. Bill Lambert responded by saying that those types of studies have been attempted. But the particulate loading necessary to generate a cancer effect in those animal models was so high that they basically overloaded the rodents' respiratory tracts in a mechanical, rather than toxicological, sense. Thus, organ damage was observed long before the development of tumors, which was the effect that the study leaders were trying to simulate. So, the rat model doesn't work well as a representation of the human lung. This is why the Health Effects Institute closely evaluated the trucker and miner epidemiological studies, rather than animal studies. They have certified the quality of these studies, and determined that the retrospective assembly of a quantitative exposure estimate for DPM was done using established methods in a careful way and that these studies do establish a small excess risk of lung cancer in these workers. This is a very important result, because it establishes diesel exhaust as a human carcinogen.

Some of these studies have been criticized because they are based on emissions from old diesel engines and technology. But we don't currently have enough new diesel technology in use, nor has the new technology been in use long enough to generate credible epidemiological results. There is a 10-to-15-year lag time between exposure to diesel and the development of lung cancer, and the new diesel technology has not yet been in use for a long enough period of time.

Therefore, we have to accept that the older diesel technology studies are all that we have to work with at this point in time. Importantly, this means that a large segment of Oregon's populations is still exposed to emissions from older diesel technology, and this is the situation for which the committee must choose a protective value.

Dean Atkinson asked if, when EPA and the World Health Organization withdrew their DPM values from the literature, these agencies provided an explanation as to why they pulled the values. Bill Lambert responded by saying he had looked for this information, but had not found any related documentation. Sue MacMillan tried to find this kind of documentation in 2015, and even tried calling some people who were supposed to have been connected with the withdrawals of the values, but found nothing and got no response. Dean Atkinson then commented that it was irresponsible of those agencies not to provide an explanation for the withdrawn values, and he recommends that the ATSAC not do the same thing. Along these lines, he had a problem with a bullet point on one of Bill Lambert's slides. Dean Atkinson does agree, however, that the ATSAC doesn't have enough new information to recommend a revision of the current ABC for DPM at this time.

During an earlier ATSAC meeting, Anthony Barnack of DEQ had talked about the types of air contaminants the lab could measure and the ones the lab couldn't. Certain assumptions have to be made that would allow a person to relate the measurement of elemental carbon to detections of DPM, so there is uncertainty with that kind of an approach. DEQ has utilized an aethelometer to measure black carbon, and then used a proportionate factor to estimate what portion of the black carbon might be attributable to elemental carbon, based on their general knowledge of the compounds likely to be present, including comparing elemental carbon to total carbon. With related monitoring, you can say that the result is an estimate of the concentration of diesel

particulates, specifically. As discussed in a 2015 ATSAC meeting, certain specialty labs can use thermo-optical measurement methods to attempt to measure the amount of black carbon and elemental carbon in a sample through the use of temperature cut-points, for lack of a better term. But the results do not appear to be consistent between different laboratories, and so the method is not routinely practical to use, because results are not specific to diesel.

One committee member wondered if the moss studies used in 2015 to identify the presence of metals around the city of Portland could somehow be used to detect DPM. Sue MacMillan said the moss method is able to identify metals and PAHs. But that will simply show that PAHs are present, but fail to show us where they are coming from. However, moss results could be used to determine where the best locations are to place air monitors.

To summarize, in 2005 the ATSAC chose an ABC for DPM and made a statement that, at the time, the committee's pick was a reasonable choice, particularly because it recognized at that time that diesel particulate matter was a carcinogen. The committee set the standard near World Health Organization values that were available at that time. Other, newer information on DPM has become available, but so far none of the new information allows the ATSAC to quantitatively identify a new URE for DPM. That is why the committee is choosing today to retain the current ABC for DPM.

Because Bill Lambert had discussed the potential of DPM to be neurotoxic during his slide presentation, another committee member asked if we wanted to add language about DPM to indicate that it is a neurotoxin as well as a carcinogen. Bill Lambert said not at this time, since his input in regard to the neurotoxicity of DPM was presumptive, and based on emerging evidence involving, for example, the possible link of dementia to prior exposures to traffic pollution. But it is too early to make definitive statements about this.

Bill Lambert then called for a vote by the committee to retain the current ABC for DPM. The committee voted unanimously to retain the current ABC for DPM.

Response from DEQ staff present:
Kevin Downing of DEQ thanked the committee for the long hours and deep discussion that revolved around evaluating past and more recent reports relating to diesel particulate matter. He identified three observations he had made:

1) While it is difficult to identify particles from diesel engines in typical ambient monitoring techniques, it is incorrect to say that there are no chemical markers indicating unique exposure to diesel PM. At least two studies that he is aware of have reported a unique biomarker for human exposure to diesel exhaust, distinct from other combustion sources like tobacco smoke, for instance.
2) Second, the observation that NAAQS is part of a complete protective strategy misses a critical point. While most of the criteria pollutants are named and distinctive chemicals, e.g., carbon monoxide, lead, sulfur oxides, two stand out for representing a broader range of chemically constituents. Ozone is a secondary pollutant with a multitude of precursors among hydrocarbons, many of which have distinct and separate health endpoints, like benzene. Particulate matter consists of a variety of chemicals with varying toxicities that are nonetheless united by the fact that they are aerosols of a certain size. To the extent that NAAQS control strategies have reduced concentration levels over time, at the same time it is not true that all risk from ozone precursors or the extensive range of material that qualifies as PM fine is also present at acceptable levels. The primary motivation behind looking at air toxics comes from trying to resolve this fundamental question and deliver the benefits that NAAQS standards were meant to address.
3) Third, although diesel PM has limitations as a toxic from a monitoring perspective, it still has value as a screening measure as compared to the alternative, whole diesel exhaust which is the air toxic constituent that the International Agency for Research on Cancer (known as the IARC) concluded was a known human carcinogen. When considering

protective strategies, the determination that whole diesel exhaust is the carcinogen suggests that the effective control measure is to completely eliminate diesel exhaust. Relying on diesel PM as the air toxic of concern suggests strategies that substantially eliminate risk while not explicitly removing diesel engines altogether.

Review of New Toxicity Information Available for Four Compounds

Information was presented for four chemicals for which new toxicity information had become available over the past year, including ammonia, benzo(a)pyrene, 2,4/2,6-toluene diisocyanate mixtures, and xylenes. Sue MacMillan explained that in the past, researching the new toxicity information for each of these chemicals would have been assigned to committee members, but there was no time prior to this meeting. Instead, she has tried to provide the committee with the necessary information on each chemical in her slides and related hand-outs, so that they can decide whether to choose new toxicity values for the related ABCs, or to retain the current ABCs. She also provided these materials to the committee prior to today's meeting. She said that if the committee members feel they need more time to go over this information, an additional ATSAC meeting can be held in the near future.

Ammonia

Bill Lambert pointed out that a new IRIS publication of a Reference Concentration of 500 ug/m^3 became available for ammonia in September 2016. Previously the committee set the ABC for ammonia at 200 ug/m^3, based on the OEHHA Reference Effect Level. Both values use the same study as their basis, which is the occupational worker study by Holness et al. The new IRIS value would be advantageous because it represents a new look at this information 16 years later, so it is a much more recent number. Thus, it is one of those cases where the same base study is used, but different uncertainty factors are applied, as well as a different toxicological point of departure: the no-observed-adverse-effect level is 13.6 ppm (equivalent to 9,500 ug/m^3), as opposed to the previous NOAEL of 9.2 ppm
(equivalent to 6,400 ug/m^3).

Dean Atkinson asked what the odor threshold for ammonia is, and whether it is a carcinogen. Bill Lambert said the odor threshold ranges from 5 to 50 parts per million (equivalent to 3,500 to 35,000 ug/m^3), and that ammonia is not a carcinogen. Also, the new IRIS value is within an order of magnitude of the OEHHA value that was used for the current ABC for ammonia. Bill Lambert pointed out that in the study, the critical end points were subjective, due to the fact that the test subjects had self-reported upper respiratory tract irritation and discomfort. This might be the rationale for IRIS using the 95% lower confidence bound on the mean exposure concentration in the high exposure group.

A committee member moved to recommend the new IRIS value as the ABC for ammonia; the motion was seconded. Bill Lambert said that we want to use the most current review available from IRIS, and the committee has always prioritized IRIS over OEHHA. The committee unanimously voted to recommend that the ABC for ammonia be set at 500 ug/m^3.

Benzo(a)Pyrene

A new inhalation URE became available from IRIS for benzo(a)pyrene in January 2017. Because the benzo(a)pyrene toxicity value serves as the basis for calculating the carcinogenicity of total PAHs using a toxic equivalency factor approach, the toxicological information for benzo(a)pyrene is critically important. Recall that there is not a separate ABC for benzo(a)pyrene in our list of ABCs; instead, you would refer to the ABC for total PAHs.

In response to a committee member's question about the non-carcinogenic

effects of benzo(a)pyrene, Sue MacMillan explained if we use the more-stringent toxicity value that is based on cancer effects, then that same value would be automatically be protective of non-cancer effects as well.

David Farrer said that he had looked at the benzo(a)pyrene information especially carefully, and found the new number to be a much newer number, and one that uses a much more modern method, that is, a benchmark dose, a benchmark concentration. He favors the new number.

Bill Lambert pointed out that we're talking about our current ABC for total PAHs being 0.0009 ug/m^3, which rounds up to 0.001 ug/m^3, and so the new number of 0.002 ug/m^3 is not much different. The committee discussed at some length whether to retain the current ABC for total PAHs and wait until the next assemblage of the ATSAC in 2020 to make a decision on the new IRIS number, or go ahead and use the new IRIS number as the ABC for total PAHs, because IRIS had utilized all the data in the study, while the 1999 OEHHA value was based on a portion of the study data.

The committee voted unanimously to use the new IRIS-based protective concentration of 0.002 ug/m3 benzo(a)pyrene as the new ABC for total PAHs.

2,4-/2,6-toluene diisocyanate (mixture)

Bill Lambert stated that the current ambient benchmark for a 2,4-/2,6-toluene diisocyanate mixture is 0.07 ug/m^3, and this value is based on the 1995 IRIS review. In September 2015, ATSDR updates became available, including a Minimum Risk Level (MRL) of 0.02 ug/$m^3$for 2,4/2,6-toluene diisocynate mixtures. The 1995 IRIS value relied upon the Diem et al. study as its basis; ATSDR, on the other hand, considered the Diem study but then chose instead to use the Clark et al. study from 1998 as the basis of their MRL. The Clark study wasn't available to IRIS originally. So the 2015 ATSDR MRL represents essentially a 20-year update, using a more-recent study. A committee member said that ATSDR had focused on a more-sensitive endpoint with a lower-observed-adverse effect level; he thought this was very important to note.

The ATSAC voted unanimously to change the current ABC for 2,4/2,6-toluene diisocyanate to 0.02 ug/m^3.

Xylene

A new toxicological value for xylenes became available from ATSDR as a Minimal Risk Level in 2007. The current ABC for xylene is 700 ug/m^3. The ATSDR MRL of 200 ug/m^3 is about 3.5-fold less (more stringent) than the current.

A committee member said that the Uchida et al. study, upon which both toxicity values are based, looks like it's the best study available. It's an occupational study where the subjects were exposed to some other chemicals, but xylene was the predominant one that they were exposed to. The critical endpoints were based on the subjective self-reports of the workers for respiratory and neurologic effects. Respiratory effects include respiratory irritation, mucus membrane irritation, headache. So ATSDR applied uncertainty factors of 10 for use of a LOAEL, 10 for human variability, and 3 for lack of supporting studies evaluating the neurotoxicity of xylene. ATSDR used the LOAEL value of 14.2, and then divided it by the total uncertainty factor of 300 to get 0.05. A committee member agreed and added that OEHHA had applied an uncertainty factor to adjust the LOAEL value of 14.2 down to 5.1, based on the presumption of continuous exposure. ATSDR had not adjusted their value to reflect continuous exposure.

Kent Norville pointed out that if ATSDR had chosen to use an uncertainty factor of 3 to account for the use of a LOAEL, rather than the uncertainty factor of 10 that they did use, then the ATSDR value would then be about 600 ug/m^3, rather than 200 ug/m^3. OEHHA applied an

uncertainty factor of 10 to their use of a LOAEL and got a value of 700 ug/m^3. David Farrer agreed, and pointed out that usually, when ATSDR chooses an uncertainty factor of 3 rather than 10, it is likely because they considered the severity of the effect to be less, and also they used the adjusted LOAEL as a point of departure. Dave Farrer is inclined to use the ATSDR value because it is newer, and it's more protective.

In some ways there is convergence between the two approaches. The 3.5-fold difference between 200 ug/m^3 and 700 ug/m^3 is not large. Keep in mind that not only the same study was used to obtain both values, but even the actual departure point used to calculate both values was the same. ATSDR chose to add an uncertainty factor of 3 because of the lack of supporting studies for xylene to cause neurotoxic effects. Although the respiratory and neurologic effects in the Uchida study are subjective endpoints that were identified by the study participants, there are animal models and considerable other toxicological evidence to support the idea that exposure to xylene results in impaired neurologic function, even in the animal studies.

David Farrer is comfortable with the ATSDR 2007 value of 200 ug/m^3 as it is more protective He acknowledges Kent Norville's concern about the committee not following ATSAC policy with this decision in regard to the fact that both values come from the same study, and different uncertainty factors are the only thing that caused the two values to be different. But if the ATSAC compares the three numbers for xylene available from IRIS, ATSDR and OEHHA, the choice of the ATSDR value moves the value more to the middle on the health-protective side. Bill Lambert is also comfortable choosing the ATSDR value but asked David Farrer whether he thought that the application of the continuous exposure factor by OEHHA is an important and offsetting consideration. David Farrer replied it isn't, because of ATSDR's extra exposure factor.

The committee voted unanimously to use the ATSDR value of 200 ug/m^3 as the new ABC for xylene. It should be noted that Kent Norville still had some reservations about how and why the ATSDR value was chosen, rather than simply retaining the existing ABC for xylene of 700 ug/m^3. His particular concern is related to the uncertainty and assumptions about the chronic neurotoxicity of xylene.

Next Steps for the ATSAC

Sue MacMillan told the committee she would create draft meeting minutes and distribute them to the group for editing, prior to posting the minutes on the DEQ ATSAC website.

Bill Lambert asked Sue MacMillan to describe the process of how the ATSAC's recommendations move forward to approval by the Environmental Quality Commission. She directed the committee to look at the handout she had created that documents all of the ATSAC's recommendations over the past two years, and pointed out that some of the numbers on the handout would change, based on decisions made at today's meeting. Sue MacMillan pointed out that the committee had also identified ABCs for three new chemicals at the request of DEQ: styrene, n-propyl bromide, and phosgene.

Bill Lambert urged Sue MacMillan to explain to the Environmental Quality Commission that science doesn't always work to create more-stringent ABCs; in some cases, the best science available indicates that an ABC should be less stringent. Also, in many cases, the ATSAC decided to retain the existing ABC value for a chemical. As the science changes over time, some ABCs will be less stringent than they are now, some will be more stringent – but there will be a trend as our overall understanding of the toxicological effects of these chemicals improves. He also thinks it will be important to emphasize to the Environmental Quality Commission the ATSAC's more-involved work in 2015 with nickel compounds and polycyclic aromatic hydrocarbons.

Sue MacMillan then explained that she is planning to get the ATSAC rulemaking completed and then present it to the Environmental Quality Commission in November 2017; thus, the public comment period is probably going to occur in late summer 2017. Because of the ongoing work related to creating the new Cleaner Air Oregon program and related rules, the role that the ATSAC will play is an item that's still being discussed by the agency rulemaking team. Assuming that the ATSAC continues in its current role, the next round of reviews of ABCs by the ATSAC will occur in 2020.

Bill Lambert asked if the Cleaner Air Oregon rulemaking team is thinking of proposing a change to the legislation on air toxics that established this committee; in other words, is there a law that talks about the makeup of this committee and when we will meet, what our scope of work will be? Might Cleaner Air Oregon potentially work with legislators and then change the committee's role? Sue MacMillan said it is possible that the role of the ATSAC might change, based on decisions made through the Cleaner Air Oregon program, but the Cleaner Air Oregon rulemaking team just hasn't gotten that far yet in its deliberations.

Bill Lambert said that, based on his knowledge of the proposed Cleaner Air Oregon rules so far, a much bigger list of chemicals than the 52 or so associated with the ATSAC will likely be regulated. The amount of work that this committee would have to do to review all those is probably impractical. As noted above, this is why ATSAC recommends that agency staff choose concentrations from among published values.

One committee member pointed out that if, during the Cleaner Air Oregon process, the ABCs change from their current status as a goal to a regulatory standard, committee members would have to be very aware of that shift, because it might result in some members not wanting to continue as part of the ATSAC. If this change occurs, it would have to be made very clear to the next iteration of the ATSAC.

Bill Lambert asked if that kind of a change would require federal action, because wouldn't that cause a change in how air toxics are regulated in Oregon? Couldn't Oregon just simply adopt federal ABCs, or ABC-equivalents? Most states defer to the EPA and don't set up a panel like this ATSAC committee. The ATSAC was an initiative that was entirely unique to Oregon in 2004. Sue MacMillan mentioned that in Oregon so far, the ABCs have been goals, rather than enforceable standards. The group discussed how the EPA and other state agencies handle this issue. Sue MacMillan explained that one of the ideas being discussed by Cleaner Air Oregon is to choose benchmark concentrations for the larger proposed list of chemicals from other established, recognized, authoritative bodies, such as EPA's IRIS, California's OEHHA, and the ATSDR. Agency resources and future funding decisions will play a part in all this.

Bill Lambert thanked everyone on the committee for their hard work and service the last couple of years; and said that the committee will wait to find out where the ATSAC will go from here. Sue MacMillan will share the ATSAC rules materials (such as the Staff Report) with the committee, when ready. Bill Lambert asked the audience if they had any comments or questions, but there were none. He officially closed the meeting.