WASHINGTON STATE DEPARTMENT OF ECOLOGY

MTCA Science Panel
August 25, 2010
Meeting Summary

Location

University of Washington, Botanical Gardens, Seattle, WA

MTCA Science Panel Members present

Dr. Bruce Duncan
Dr. Elaine Faustman
Dr. Teri Floyd
Dr. Mike Riley

Ecology staff

Chance Asher
Dave Bradley
Martha Hankins
Peter Kmet
Craig McCormack

MTCA Science Panel Members absent

Dr. Rosalind Schoof

Presenters

Russ McMillan, Ecology
Teresa Michelsen, Avocet Consulting
Dave Sternberg, Ecology

Audience members

Glenn St. Amant, Muckleshoot Indian Tribe
Larry Dunn, Lower Elwha Indian Tribe
Tom Winter, People for Puget Sound
Laura Inouye, Ecology

Meeting Summary

Handouts –

(1) List of acronyms
(2) Presentations
(3) Citations

Meeting began at 9:00 am. Martha Hankins welcomed Science Panel members and the audience, reviewed the agenda, and led introductions. Members approved the meeting summary from the March 25, 2010 Science Panel meeting.

Dr. Duncan spoke briefly about his participation in EPA's Urban Waters Initiative. The goal of this project is restore the connections between urban communities and their nearby water resources. Future pilot projects will target underserved areas, and EPA is interested in working with tribal governments.

Annual Meeting

The purpose of the annual meeting is to establish and review on an annual basis operating procedures for the Science Panel. This is the first annual meeting of the Science Panel; the panel was formed a year ago following the dissolution of the MTCA Science Advisory Board. The purpose of the Science Panel is to provide input to Ecology on scientific issues related to cleanup of hazardous substances.

Martha Hankins provided an overview of the Science Panel charter, and pointed out areas where the Science Panel differs from the MTCA Science Advisory Board. The major areas are: the Science Panel is established by the agency and as such has additional flexibility to address issues brought by Ecology, whereas the SAB was constrained by statutory direction. The role of the Science Panel is to advise Ecology on issues that Ecology brings forward. Members are not compensated for service on the Panel. Ecology will provide to Panel Members one month in advance notice of upcoming meetings.

Panel members requested that language be added to the charter acknowledging that public participation is valuable, and that audience members will enjoy the opportunity to speak at appropriate times during the meetings. It was noted that conducting business in public, and with public funds, includes public dialog and openness. Panel members requested that meeting materials be posted on Ecology website. Dr. Duncan's term as Chair was extended as provided in the charter.

Ecology reviewed potential topics for Science Panel discussion over the next one to two years, and Panel members identified potential conflicts of interest. Panel members all acknowledged the importance of disclosures both at the annual meeting and when topics arise.

Dr. Schoof is a risk assessor. She was unable to attend the meeting but indicated via a phone conversation that currently the majority of her clients are not in Washington. She has been and in the future expects to be involved with work on the upper Columbia River.

Dr. Riley is an engineer and consultant in private practice in Washington. Most of his work relates to fate and transport of chemical contaminants in the environment. He noted that any consultant in this field will encounter most of the topics being discussed but drew a distinction between his clients' interests and the ability to discuss theoretical and non-site specific scientific principles.

Dr. Floyd is a chemist in private practice. She noted that she also has encountered most of the topics Ecology is addressing at sites. While she doesn't expect any significant conflicts, she will recluse herself should a conflict arise.

Dr. Duncan is an ecologist/ecological risk assessor for EPA Region 10. He will be working on climate change. He noted that at times and at certain sites EPA and Ecology are not perfectly aligned but noted that the science panel discussions are typically outside of policy or site specific implementation issues.

Dr. Faustman is a professor in the University of Washington's School of Public Health. She noted that through her involvement with the Oregon Human Health Focus Group she is publicly on record as saying that fish consumption rates being proposed by that group are not protective with respect to tribal consumption scenarios. She also noted her work pertaining to arsenic on EPA's Science Advisory Board.

Topic 1: Freshwater Sediment Standards

Dave Bradley noted that Ecology is working on two rules, the MTCA rule and the SMS rule, and that work on the SMS rule includes multiple components: freshwater sediment chemical and biological standards; a narrative addressing bioaccumulatives and ecological risk; and a decision framework for addressing human health. What Ecology is bringing to the Science Panel at this time are specific science questions related to Ecology's proposed chemical and biological freshwater standards.

Panel members noted the importance of transparency in providing a rationale for how scientific questions are answered.

Dave introduced Chance Asher, Russ McMillan and Teresa Michelsen.

Presentation: Biological standards

Russ provided an overview of the proposed biological sediment standards. He described the confirmatory bioassays used, including descriptions of the two species – the amphipod *Hyalella azteca* and the midge *Chironomus dilutus* - and seven biological endpoints – 10 and 28 day mortality and 28 day growth for *Hyalella* and 10 day growth and mortality, and 20 day growth and mortality for the *Chironomus*.

Question 1

Is the proposed bioassay suite scientifically defensible as being appropriately protective of the benthic community?

Discussion

Panel members discussed the choice of the species, whether additional species could be added, the endpoints chosen, and whether reproductive endpoints could be considered. It was noted that the species chosen are highly sensitive and used widely for freshwater bioassays and that appropriate commercially available reproduction tests do not exist. Dr. Faustman asked about sensitivity curves for the bioassay species used and for Ecology to document why these species and endpoints are appropriate. It was noted that Ecology may need to provide flexibility in the regulations for environmental conditions where these test organisms may not be appropriate.

That is, for some very small lakes, estuarine or ephemeral systems, the proposed species may not be representative of the species comprising the macroinvertebrate benthic community being evaluated. Ecology noted these species are widely distributed across North America and found in both large and small freshwater systems.

Dr. Floyd asked about ephemeral wetlands, and potholes. Ecology staff noted that how sediments are defined may address some of these issues; for example the draft sediment definition includes a minimum period of inundation that is intended to include environments that would host the entire aquatic phase of an aquatic insect's life history.

Panel Response:

Yes, in general, the proposed bioassay suite is scientifically defensible as being appropriately protective of the benthic community. However, using only 2 species warrants further supporting evidence that the suite would be appropriately protective of aquatic macroinvertebrate communities found in a wide range of Washington state freshwater environments.

Question 2:

Is it scientifically defensible to base interpretation of a bioassay hit by using a comparison to control rather than a comparison to a reference sediment? Or, stated another way, is it scientifically defensible to base the designation of sediment quality on a suite of bioassays comparing test to control without the benefit of a reference sediment?

Discussion

Panel members acknowledged the difficulty in establishing reference sites for freshwater systems. They discussed the role of reference stations, the difference between marine and freshwater, and between reference and controls samples. It was noted that a control sediment sample serves to confirm that the batch of test organisms are healthy and able to withstand the rigors of the bioassay test and a reference sediment sample is intended to correct for toxicity that may be contributed by conditions of the sediment other than chemical insult (such as grain size or organic carbon).

Dr. Floyd asked for a table with the tolerance for the bioassay species, perhaps in guidance, to assist in determining the cause of sample failure. That is, without a reference it's occasionally difficult or impossible to determine the actual cause of bioassay failure.

Panel members asked Ecology to include information on the surrogate species (*Hyalella* and *Chironomus*) response to variations in sediment grain size, total organic carbon (TOC) content, and other relevant parameters.

Ecology noted that there are no adequately clean freshwater reference sites in Washington, and that an effort to find reference sites was unsuccessful. Ecology does, however, have criteria that could be used to establish a reference site if someone wanted to.

Response

Depending on the range of environmental conditions for which the tests are valid (salinity, pH, grain size, TOC, type of water body, etc.) Panel members agreed that not using reference sites is an acceptable approach.

Presentation: Chemical standards

Teresa provided an overview of the floating percentile method (FPM) used to develop the proposed chemical standards. She noted that the standards are designed to be protective of the benthic community and that these do not protect against long term bioaccumulative effects and trophic transfer.

Audience comment

Glen St. Amant noted that the species chosen for bioassays need to be predictive of the effects to the major groups of organisms comprising freshwater benthic communities for commonly encountered contaminants. He noted the importance of flexibility in considering additional bioassay species on a site specific basis, acknowledging Ecology's comment that rule language will be included regarding options to consider latest science. Glen spoke to the choice of starting with a 20% false negative rate as possibly missing effects to the environment.

Discussion:

Dr. Faustman (after excusing herself from 11 am – noon to participate in a phone conference) expressed concern regarding some of the underlying assumptions. She asked for more information regarding choice of the false positive and false negative rates chosen and how they relate to what is known about the mechanistic toxicity of the different chemicals of concern, especially for compounds like PAHs. Ecology explained that FPM criteria are based on direct observation of toxic effects in different organisms and therefore empirically derived. The general idea is to provide numeric criteria that predict toxicity rather than verifying if criteria follow theoretically derived patterns of toxic concentration. This approach was intended to serve as a predictor for the theoretical basis for toxic effects.

Panel members asked about the choice of the 20 percent false negative rate as a beginning point for running the FPM to establish protective concentrations and the possibility that Ecology could miss sites with this limit. Ecology responded that the derivation of the Sediment Quality Standard (SQS) numeric standard relies on the lowest value from up to 5 different bioassay endpoints, providing a very conservative value for each chemical. The draft report presents results for model runs at 5 percent intervals, from 5% to 30%, as the initial setting for false negatives. Panel members requested additional information on the basis for optimizing false negative and false positives. Members discussed risk management decisions being protective of the benthic community and requested additional information on how the optimization affects correlations.

Panel members asked Ecology to provide additional information on biological measures for false positive and false negative results, and the biological endpoints being measured. Ecology agreed to follow-up with phone conversations with individuals to better understand their questions and on this point.

Ecology staff went over the FPM and how, for a given false negative rate, the model adjusts chemical concentrations individually in order to minimize false positives. That is, the false negative rate chosen provides a baseline such that measured chemical concentrations do not incorrectly predict clean sediments that are in fact contaminated. The model stepwise adjusts the concentrations of all chemicals until – using the large data set of paired chemical and biological data – the number of false positive is minimized. That is, the data is matched against the bioassay data to minimize chemical data identifying contamination when the bioassay data indicates otherwise.

Of particular importance is how the model handles covariance. That is, how the toxicity of one chemical affects the toxicity of others. A major question is how to consider covariance in a field-derived data set. Panel members discussed covariance, co-location, and biological action for various chemicals. For example, selenium can mask the biological effects of mercury. Teresa noted that the FPM approach is empirical, developed from a substantial body of chemistry and bioassay data that represents conditions (including typical scenarios with covarying contaminants) at the majority of known contaminated freshwater sediment sites. Consequently the values derived take into account the typical effects of covarying contaminants and are expected to appropriately predict toxicity at new sites where covarying contaminants are present. Panel members asked Ecology to provide information pointing to where in the report or other meeting materials to find the concurrent chemistry and bioassay data.

Teresa described the validation of the FPM values using several measures of reliability, how these measures were calculated, and the performance goals that were used in the report. It was noted the ideal method for validation would be to use a new data set of co-located chemical and biological data from sites in Washington but that this would require years to acquire. Reliability measures used are; sensitivity (minimizing the number false negatives so that contaminated sites are not missed); efficiency (minimizing the number of false positives to avoid identifying clean sites as contaminated); predictability (being able to correctly predict whether a particular station will pass or fail a bioassay test); and overall reliability (total correct predictions).

Ecology reviewed table 3-3 in the report (reliability of the FPM results). Panel members asked for additional information on comparison of reliability of the FPM with other nationally recognized Sediment Quality Guideline (SQG) sets. Teresa noted the comparisons allowed an objective evaluation of how well the FPM and these other SQG sets performed in predicting toxicity at sites in Washington. This was appropriate, given that Ecology is asked to consider adopting other existing methods for deriving freshwater sediment standards.

The Panel did not get to the third question; Ecology indicated that members could expect to continue this topic at the next meeting.

Topic 2: Terrestrial Ecological Evaluations

As part of updating the MTCA cleanup regulation, Ecology is updating ecological screening values consistent with new scientific information on toxicity.

Ecology is not proposing to make any modifications to the MTCA wildlife exposure model itself; the updates are to the parameters values.

Dave Sternberg (Ecology) provided an overview of how Ecology is consistent with EPA's methodology and is relying on the extensive quality assurance conducted by EPA.

Discussion

Dr. Faustman asked about scaling and requested Ecology provide information on the problems/challenges and solutions. Dr. Floyd asked about why screening values are significantly decreasing for industrial and commercial sites and asked Ecology to further consider this scenario. She recommended that Ecology add to the screening tables a footnote providing context for the use of these values. She also noted that Ecology might consider conflicts between cleanup requirements and other requirements. For example allowing less stringent standards at paved sites may lead to more pavement, which may conflict with local landscaping regulations.

Audience comment

Tom Winter (PPS) requested that Ecology consider lessons learned from Bellingham Bay, specifically mentioning methyl mercury. He noted that the National Academy of Sciences recently published a report analyzing the effectiveness of caps in preventing exposure.

Larry Dunn noted differences in the approaches and standards used by EPA and Ecology. He asked which standard applies if Ecology is more stringent, or alternatively, if EPA is more stringent. Ecology staff responded by indicating the MTCA rule is an ARAR that must be used at EPA sites. So, if Ecology's standards are more stringent, they prevail. Ecology is not bound by EPA's guidance, although it is often considered during site cleanups.

Topic 3: Science Policy Choices pertaining to the MTCA rule update

Dave Bradley mentioned briefly that Ecology is currently engaged in making choices that involve synthesizing and prioritizing. This requires looking at resources, implementation issues, science and policy. Ecology staff indicated that this topic can be discussed further at the next meeting.

Meeting adjourned at 3:40 pm.

Meeting summary approved on May 20, 2011.