

2020 Listing Methodology Meeting  
Department of Natural Resources  
1101 Riverside Drive  
Jefferson City, Mo  
January 4, 2017

**Meeting Attendees:**

- Robert Brundage, Newman, Comley & Ruth P.C.
- Jim Bureks, City of Springfield
- Lynne Hopper, Boone County
- Nick Muenks, Geosyntec Consultants
- Randy Sarver, Missouri Department of Natural Resources, Environmental Services Program
- Mohsen Dkhili, Missouri Department of Natural Resources, Water Protection Program
- John Hoke, Missouri Department of Natural Resources, Water Protection Program
- Tim Rielly, Missouri Department of Natural Resources, Division of Environmental Quality
- Leslie Holloway, Missouri Farm Bureau
- Colleen Meredith, Missouri Department of Natural Resources, Soil and Water Program
- David Carani, HDR, Inc.
- Trent Stober, HDR, Inc.
- Dave Michaelson, Missouri Department of Natural Resources, Environmental Services Program
- John Besser, U.S. Geological Survey
- Lynn Milberg, Missouri Department of Natural Resources, Environmental Services Program
- Sam McCord, Missouri Department of Natural Resources, Water Protection Program
- Trish Rielly, Missouri Department of Natural Resources, Water Protection Program

**Meeting Purpose:**

A technical group meeting to discuss a revised assessment process of sediments for metals and polycyclic aromatic hydrocarbons (PAHs).

**Summary of the Meeting Discussions:**

A general overview of the meeting was provided regarding the assessment of sediments for metals and PAHs, and the consideration of other parameters to include as part of the weight of evidence approach.

The meeting started with an overview of a few of the documents reviewed to determine how the weight of evidence approach could be used with or without available biological data [aquatic community (fish and macroinvertebrates) and toxicity]. The biological data itself would be given the greatest weight of evidence of an aquatic life impairment. Sediment data would be assessed the same as in the past, however, if additional chemical data is available (such as, total/fractional organic carbon (TOC) or acid volatile sulfides (AVS)), the flow chart would be used to show how the information would be incorporated into the assessment determination. The U.S. Environmental Protection Agency (EPA) guidance and other reference documents were used to develop the proposed flow charts for metals and PAH assessments. EPA provided guidelines for probable effect concentrations (PECs), fractional organic, acid volatile sulfides (AVS), and simultaneously extracted metals (SEM) in metals. The flow charts are broken up into two categories. Referencing the flow chart: No aquatic life impairment, AVS and SEMs available. If the AVS minus the SEM is less than zero, then metals are bound to organic content and assumed not available for toxicity to occur. In this case, the data would be assessed as no

impairment. If greater than zero and TOC is available, then you would need to continue down the flow chart. According to the EPA document; if TOC is less than 130, then there is no toxicity; if TOC is between 130 and 3000, there is potential toxicity (but unknown); if TOC is over 3000, then there is toxicity occurring. The main take away, is the department is not changing the assessment procedures, still using the biological data as the strongest weight of evidence. Will still need to have biological data along with the PEC data to show an impairment. In the absence of biological data, and sediment data exceeding the PEC threshold, the assessment would be considered inconclusive and flagged for additional monitoring. Again, the biological data would be given the same weight as previous assessment cycles.

The biological data has to be available and has to show an impairment before a stream would be listed as impaired. All other determinations would indicate no impairment, inconclusive, or potentially impaired. If inconclusive or potentially impaired, additional data would be needed.

The PAH flow chart follows the same procedure (with supporting biological community, PEC >150%): If TOC data is available, the PEC values normalized based on the percent of TOC present, does that change the assessment conclusion? For example, if the PECs are greater than 150%, the data is then normalized by TOC; does this bring the PEC value below the 150% threshold or does it not change the assessment decision. If below the 150% threshold, it would be considered inconclusive.

If TOC data is not available, the department would follow the same assessment process as in the past.

John Besser, with U.S. Geological Survey (USGS) provided an overview of the AVS and SEM process. The reason to look at TOC, AVS and SEM is to reduce the uncertainty of the PEC value. The data used to generate the PECs had on average a 1% TOC. Therefore, if the sediment deviated from that substantially one direction or the other, the PEC may be over or under protective. A sediment sample with high TOC has a greater metals binding capacity, and therefore, have lower toxicity potential. While a sediment sample with low TOC has a low metals binding capacity, therefore, a higher toxicity potential. The AVS is a strong binding phase for metals, it (equally) immobilizes each concentration of metal for each molar concentration of AVS. Overall, AVS subtracts that fraction of metal and assuming it is unavailable. You would still divide by the TOC to determine any additional control of bioavailability above and beyond the AVS calculation.

Further discussions occurred related to how TOC would be used. If between the %TOC is calculated between 1%-5%, then the actual %TOC calculation would be used; If below %TOC is calculated below 1%, 1% TOC would be used; if the % TOC is calculated greater than 5% TOC, than 5% TOC would be used. Seasonality not as much of a factor for TOC as it is for AVS.

For PAH assessment, the department is looking at assessing against the Total PAH PEC threshold instead of the individual PAH PECs. The EPA document references 34 PAHs, assuming this will allow one to recover the high percentage of total PAHs. If a lower number of PAHs are used (e.g. 50%), you are not really measuring total PAHs and, therefore, may be underestimating the risk. The McDonald paper provides PEC for a subset of PAHs and total PAHs.

For assessments with less than 34 PAHs and the total is over the PEC threshold, it would be assumed any additional PAH data would increase the total PAH value. However, if a dataset has results for 16 PAHs and the total PAH is below the PEC threshold, then the data would likely be considered inconclusive.

Inconclusive because you don't know if the addition of the other PAHs would cause the total PAH value to exceed the PEC threshold.

This is how the department would assess PAH data if available.

An overview of information presented in a PAH study completed by Ozarks Environmental and Water Resources Institute (OEWRI) in 2012 was discussed along with types of sediment studies completed by USGS nationally and within the state.

Regarding toxicity testing, the department stated reviewing traditional toxicity tests looking at both acute and chronic effects (standard 10-day midge, and 28-day amphipod).

The numeric criteria assessment would be the primary assessment for causing a biological impairment, but sediment could also be contributing.

The department would still be assessing for the quotient. In addition, metals would also be assessed against the individual metals as well.

The department would not be analyzing sediments for AVS. If the data is available, it will be considered for assessments. The department sediment collection efforts will include sieving sediment samples to less than 2 mm and requesting TOC analysis on each sediment sample.

The department would like feedback on other major topics to discuss regarding the 2020 Listing Methodology. Feel free to send those topics to Trish Rielly at [trish.rielly@dnr.mo.gov](mailto:trish.rielly@dnr.mo.gov).