

SUMMARY

of

Water Quality Standards Workgroup - September 6th, 2007

Nutrients

The workgroup began with introductions and a welcome by Charles Maguire, section manager for the Water Quality Assessment Section.

Sidne Tiemann presented background information on nutrient criteria development, covering its history, where the data for the analyses came from, how the data was manipulated, how the criteria was calculated, and describing the handouts that contained more detailed information about the subjects.

Sidne Tiemann provided background information on the reservoirs for which criteria had been calculated and opened the discussion concerning the appropriate number of data points to use to set criteria for a reservoir. Many in the group seemed a little concerned if a minimum of 30 data points were required on a particular water body in order to develop criteria for that water body. Numbers 30 and 35 were proposed. Lial Tischler indicated that there were statistical ways to determine the appropriate number of data points to use for each reservoir and those should be used. A suggestion was made that the TCEQ should consider basing the number of data points on the mean and coefficient of variation (CV). It would be more appropriate. Wouldn't it be possible to use less data if it was taken at the proper times (scattered correctly) and/or had little deviation? Some suggested (including Lial Tischler) that all of the data sets should be looked at individually.

Miles Hall questioned not using outliers to calculate the criteria but using them in the assessment. Outliers are not used in assessments per Patrick Roques. Mr. Hall suggested that the outliers should be included in developing the criteria and/or the assessor could use their judgment in whether to include outliers or not in the assessment. If all of the data is "real" than shouldn't it all be used to calculate the criteria? One possibility offered up by Lial Tischler was to use the median of the data as opposed to the mean as this would dampen the impact of outliers and would actually be more statistically correct given the type of data we have (best measure of central tendency). Lial Tischler stated that using the mean was not an appropriate statistic unless the data were normally distributed.

Lial Tischler indicated that older data should be looked at with caution. He pointed out that data on the graphs that were the same and/or clustered were an indication that significant data was reported based on the detection limits rather than measured values. TPWD also pointed out that the detection limits were probably overestimating the values. Mr. Tischler indicated that TCEQ should look to see if detection limits are driving the criteria. For "less than" data, the group said it would be worthwhile to look at the number of data points for each reservoir to determine how much these values were driving the criteria and the assessment scenarios.

Patrick Roques asked what the plan was for revising criteria. During future WQS revisions, how will the nutrient criteria be updated? What period of record will be looked

at? TPWD suggested the previous 10 years. Will they be revised in a similar fashion as TDS criteria?

Why was only one station per water body being used to set the nutrient criteria for any given segment? Any other stations that are open water should also be used.

(*Personal communication* talking to SWQM staff, for evaluating nutrient concerns now, they typically only assess nutrients at the station nearest the dam, which are the same stations that were used to develop criteria.)

Pat Radloff asked what was the plan for developing criteria for reservoirs that won't have criteria assigned this time. They again suggested looking at only the last 10 years worth of data.

Peggy Glass questioned the reliability of the old data. She stated that a flat line data graph over time did not prove that the old data was reliable or of adequate quality.

Linda Broach suggested using additional main pool stations in the criteria development to increase the number of data points.

Lake Granbury has additional data that has not been included in the criteria calculation. It was stated that this has brought to our attention on more than one occasion. The TCEQ needs to be sure we have all of the data for every water body when we set criteria. Any data used would have to follow TCEQ QA/QC procedures.

Lauren Kalichek asked how will the nutrient criteria affect permits? That was discussed later.

Setting a minimum criterion was discussed. Pat Radloff commented that setting minimum chlorophyll *a* criterion could be done similar to water quality based limits in permits which is less than than a minimum analytical level (MAL). A limit is established in the permit, but compliance is established using the MAL. This preserves the calculated criterion. Include a clause in the standards. If a minimum criterion is a technology based limit, then is there any need for it? TPWD suggested that TCEQ preserve the original criterion value and if technology can't reach low enough to detect that number accurately, then put a clause in the permit stating that a "no detect" is considered compliance.

Data for chlorophyll *a* for Lake Tawakoni was shown to the group and it appeared that the last three assessment periods would have resulted in a listing. Someone in the audience said no, this only reflects the fact that they changed methods and were doing a better job at measuring chlorophyll *a* concentrations. TCEQ needs to talk to those who took the data so that TCEQ can be aware of these issues.

Glenn Clingenpeel questioned how a water body that was listed would be removed from the list if the next assessment did not exceed the criterion. Patrick Roques stated that the assessor would look at the confidence intervals around the median and would delist a reservoir if the upper confidence interval fell below the criterion. For listing and delisting, a confidence interval around the median was discussed.

TPWD suggested using nonparametric statistics for setting both the criteria and doing the assessment. Mr. Roques explained the two ways that assessments might be done, % exceedance and binomial. The group agreed that standards and assessment should be consistent.

There was concern about setting criteria on a reservoir that was healthy and requiring nutrient removal for a facility that had been discharging for a long time into the reservoir. There should be a way to evaluate the reservoir with the existing discharges.

Peggy Glass commented that TP would be a shadow criterion for setting discharge limits. The criterion is chlorophyll *a*. TP limits would not be based on chlorophyll *a* levels. TP limits less than 1.0 should be based on modeling and not on a simple mass balance. The total loading into the reservoir should be considered and nonpoint sources should also be considered. Lots of folks expressed that they had issue with TCEQ using older data to establish the criteria. Many are now using better methods of detection. This also makes them nervous about setting minimum criteria. They feel some of that less reliable older data may result in a falsely low criterion for any given water body. There is also issue with using data that was less than the detection limit. Ms. Tiemann said that in these cases we used half of the detection limit. Lial pointed out that if these types of data points were ruling the final criterion for a water body then that criterion isn't very defensible. It could easily be too stringent or not stringent enough.

Mr. Tischler commented that all nutrient parameters should be looked at as with DO which considers BOD, NH₃-N, etc.

Ms. Radloff asked if nonpoint sources would be considered/constrained since they can be significant inputs.

The group agreed that for some reservoirs the "owners" of the reservoir should be contacted to ensure that there was not any more data available and to collect information on known issues with the reservoir.

If permit limits are placed on TP to control nitrification, how does this mesh with the assessment since it uses chlorophyll *a* concentrations? The group felt that TCEQ would need more than just a mass balance equation (like modeling) if TCEQ was giving facilities a limit of < 1 mg/L TP. The group indicated that they want modeling to show the relationship between their limit and chlorophyll *a* concentrations. Another argument for modeling is that it considers other dischargers as well whereas a mass balance only considers a single facility. They also want some way to loop in nonpoint nutrient source impacts as well.

General discussion

Jim Davenport asked if the group thought we could use nitrate as a surrogate for TN in the analysis. One comment was that TCEQ should look for statistical differences in the data between stations before including them. Someone asked about seasonal variability. Someone questioned the purpose of the criteria, to maintain biology. In the future, there could be separate criteria for coves and arms.

Question I:

I. Selecting reservoirs for nutrient criteria:

TCEQ staff has expanded the reservoirs under consideration to include virtually all of those that have been assessed for their current trophic level in the Water Quality Inventory. We would like some additional suggestions and opinions on establishing the final proposed list.

- A. How many data points should be available for historical analysis and why?
25? 30? 35? Other?

Green - One number should not be used for all reservoirs. A process is needed to determine the appropriate number of data points, if the number of data points are too low, then use BPJ. Use a CV or other statistical method to derive the number of data points for each reservoir. Use only 1990 and forward data. The quality of the older data was brought up. TPWD indicated that labs in the 70's and 80's used different techniques. They suggest using 10 years because reservoirs are fine. One commenter suggested that it was better to have no criteria than criteria based on bad data.

Yellow - set a minimum of 25, but look at the statistics on a case by case basis. Or for reservoirs without sufficient data points, TCEQ could look at other reservoirs in the ecoregion that are similar and set an ecoregion number for those reservoirs. Everyone agreed that a statewide number would not be appropriate.

- B. For reservoir dam stations with less than x number of data points, should we:

- Add other open water stations?
- Add all stations in the reservoir?
- Include additional available data not in TCEQ TRACS? If so, where is it?

Green - Additional data could be added, but only if it was QA'd to TCEQ requirements. It would be appropriate to develop criteria on more than one station, but a method to limit the assessment to only those stations would need to be defined. The group suggested that the stations used for criteria development could be put in the standards with information in the Implementation Procedures about how they would be used. Some in the group had concerns about using other open water stations because they could be very different from the dam station. Someone pointed out that listing the stations in the standards could limit the data that was used in developing the criteria. The group agreed that more main pool stations could be used and nonTRACS data if it met data quality objectives.

Yellow - They concurred that adding stations would be appropriate as long as they were representative and the data was QA'd. Outside data could be included if it was based on a TCEQ approved QAPP.

Other - If more than one station is used, TCEQ should look at the other station data to see if they are significantly different as well as if the stations are significantly different physically. Additional discussion about how the assessment would be used if the criteria were developed using different stations. Using additional stations may also be problematic if the number of data points between the stations was large. Listing the stations in the standards would help and getting public input on which stations would be used in the assessment.

- C. Are there other factors that should be considered to withdraw selected reservoirs from the master list, such as unusually high data variability? If so, note specific reservoirs as examples.

Green – Consider removing single use reservoirs, ex. Playa lakes. Playa lakes may be removed if a CV is used to determine data points. Rita Blanca Lake was the only reservoir that was listed.

Yellow – Consider other valid data that TCEQ may not have, the size of the data set, the MAL, the period of record. If other data indicates that TCEQ data may not be valid, look further at the TCEQ data using the above list. Review the trends and graphs and confer with the River Authorities, etc.

- D. Should we have a minimum default criterion, such as 5.00 micrograms per liter, for reservoirs with very low historical concentrations of chlorophyll *a*? See page 5 of “Nutrient Criteria for Reservoirs” Handout.

Green – No. Set the criteria on the available data. For assessment, use the reporting limit and put it into the standards. Deal with nondetects in a consistent manner for all reservoirs and between standards and assessment. Possibly include a clause in the permit.

Yellow - Can't set criteria based on the laboratory limits. It would be more appropriate to set a site-specific criterion instead of the 5.0 mg/L.

Question II:

II. Addressing elevated nutrient/chlorophyll *a* concentrations:

Long-term exceedances of adopted numerical criteria for nutrients would eventually result in a listing on 303(d), a TMDL, and a TMDL implementation plan.

- A. Several reservoirs have shown an increasing trend in chlorophyll *a* and nutrients, and recent data indicates that they are not meeting the proposed criterion. Should the proposed criterion be adopted for these reservoirs?

- Reservoirs that median exceeds chlorophyll *a* median, Eagle Mountain, Inks, Lake Tawakoni, Toledo Bend, White River Lake
- Reservoirs that exceed TP medians, Amistad, Belton, Falcon, Lake Arrowhead, Lake Brownwood, Lake Cisco, Lake Coleman, Lake Colorado City, Lake Corpus Christi, Lake Houston, Lake Jacksonville, Lake Stamford, ...

Green – If TCEQ believes in the method used to set criteria then reservoirs exceeding the criteria should be listed. However, care should be taken in being sure that there is an issue. One question arose in the group about whether reservoirs would show an increase if data from 1990 was used? A member of the group suggested that TCEQ look at potentially listed reservoirs on a case-by-case basis. Some in the group felt that the reservoirs should not be listed due to bad data and that both TP and chlorophyll *a* needed to be developed.

Yellow – The group agreed to No for the proposed criteria, but yes for an appropriate criteria. Analytical techniques have changed and using older data may result in criteria being artificially low.

- B. There are also several reservoirs that show an increasing trend in chlorophyll *a*, but they are not currently exceeding the proposed criterion. Are there other measures TCEQ should consider, such as the development of a watershed rule in Chapter 30 TAC 311 or other options, to address increasing trends in nutrient loading?
- Chlorophyll *a* – Cedar Creek, Lake Ford Res, Lake Kickapoo, Lake Waco, Town Lake
 - TP – Cedar Creek Res, Toledo Bend, ...
 - Lake Buchanan – Chlorophyll *a* - Lake Buchanan already has a watershed rule for no discharge of point sources. What else would you propose?
- Green* – Use a watershed rule if there is an increasing trend. Lake managers should set a watershed rule outside the EPA requirements before there is an exceedance. Support third party watershed protection plans not funded by EPA. Reservoirs should only be listed if the criterion is exceeded.
- Yellow* – Look at causal effects as well. There could be two tiers with the TP as the second tier. Before a reservoir is listed consider all factors. Example, Lake Buchanan, with a current watershed rule, has no dischargers. Consider additional programs such as buffer zones, fertilizer application limits, septic tank rules, education, etc.
- C. What factors might be appropriate for deciding which, if any, reservoir watersheds to address with non-traditional measures such as a watershed rule?
- Green* – It should be up to the lake manager.
- Yellow* – TCEQ should look at the 75/90 rule that would trigger more aggressive regionalization in an attempt to address the issue. Look at the issue from a watershed perspective. Update the septic tank failure study. Maybe a watershed rule if nonpoint sources are impacting the reservoir even they are hard to do.

Question III.

III. Monitoring and assessing compliance of reservoirs with nutrient criteria:

“Sampling” the historical data for each reservoir indicates that there is relatively small but significant chance that the proposed criteria will not be attained over the 5 year period used for assessing monitoring data. TCEQ staff would therefore like comments and suggestions on the options below to minimize spurious noncompliance while still protecting water quality.

- A. Should the assessment be based simply on the long-term arithmetic mean over 5 years of data, as with other average criteria (human-health criteria, dissolved minerals)? No. The mean is not indicative of what we want to regulate from. The group answered a resounding “no”. Assessment should not be based on the mean. They were okay with 5 yrs. of data, but were also happy to go as far back as 10. Patrick Roques mentioned to the group that SWQM was proposing to look at 7 yrs. worth of data, and the group was satisfied with that.

- B. Should assessment be based on the arithmetic median of data collected over the 5-year assessment period?

Pink –Yes. The median of the data was preferred to the mean.

Orange – Not sure there is an arithmetic median, just a median. There is not a one size fits all answer. The criteria should be based on medians, but with reservations depending on the scatter of the data.

- C. Should TCEQ establish a “secondary” criterion for each reservoir based on total phosphorus (and perhaps eventually nitrogen), and stipulate that an exceedance of the chlorophyll *a* criterion is only an impairment for 303(d) if a secondary criterion for a nutrient is also exceeded?

Pink – If the criterion is exceeded, a reservoir should be listed. An exceedance of a nutrient is not required. C. This question got mixed responses at first. At first some thought yes, there should be a secondary criterion (like TP) in order to list a water body, but the more we discussed the more they all started to think you didn’t need secondary criteria. Lial Tischler made this point: you list a water body if it is not meeting its use. If chlorophyll *a* concentrations are keeping a water body from meeting its drinking water use, than it must be listed regardless of what any other data (like TP or TN) is saying. It is then SWQM’s job to look at other nutrient data to determine what is causing the chlorophyll *a* growth. By the time the discussion was through, all agreed that there was no need for secondary criteria.

Orange – A secondary criterion is needed. Some in the group wanted both TP and TN. They suggested that orthophosphorus would be a better measure than TP because TP gets bound into the sediments and can give an erroneous number. Chlorophyll *a* many not be indicative of problems on a reservoir if it is dominated by golden algae, blue green algae, or macrophytes. Any listing would be because of chlorophyll *a* when TP might be a concern. There would be no mechanism to address TP concerns if it was not assessed. Group suggested listing if either TP or chlorophyll *a* exceeded the criterion. Good science needed to backup the listings. The group agreed that a secondary criterion was needed, that other mechanisms and individual situations would need to be looked at before a listing. Each reservoir should be assigned a site-specific criterion. If there was a listing, the cause should be determined and the cause regulated.

- D. If a criterion is exceeded, should a second statistical test (such as a pooled t-test) be used to ensure that there’s a statistically significant difference between the sampling data and the historical data for the reservoir?

Pink – Not necessarily. Let SWQM decide whether to add additional data or not. The answer was a pretty quick group consensus of “no”. If your methodology for setting and assessing the criteria is sound, why would you do any other analysis to decide whether or not to list? It was also commented that this is what SWQM does already anyway. When a water body looks like it isn’t meeting a criterion, they dig a little deeper to see if this is accurate or not.

Orange – yes. Current data is more indicative of current conditions than the older data which may skew the criterion to the low side.

- E. Should the time period for assessment be increased, by (1) defining impairment as a criterion exceedance for two consecutive assessment periods, or by (2) increasing the period of data used for assessment from 5 years to 10 years?

Pink – Increase the time period to more than 5 years. The group quickly went with the second option of increasing the period of data used. Again it was stated that if your criteria and assessment methodologies were sound, why would you wait another assessment cycle to list a water body. Hardly looks proactive...

Pink - Another breakout group comment regarding the period of data used in the assessment: if you are only looking at a few years, that time period could solely reflect one unusual condition (like drought). But it was also noted that if you expanded the time period out too long you can miss important single events and trends. In the end the group seemed to think Patrick's suggestion of 7 yrs. seemed appropriate – long enough to cover different conditions, but not too long to miss more subtle events and trends.

Orange - Change to 10 years.

307.8 & 307.9 Standards Applicability and Assessing Attainment

Gregg Easley presented current issues and proposed revisions for describing standards applicability and assessment. Low flow exemptions: removal of some exemptions for below the 7Q2. See the handout for the list. A discussion began on how this would be applied under drought conditions when TDS could go up because of reduced flows that are natural occurrences because of the soils. Would natural conditions be considered? If the exemptions are removed and the mean is used, samples with high values will bias the results. Mr. Roques indicated that if the median is used, the concern would be addressed. The long period of record is also a factor. The proposal is to use the median for the assessment. Further discussion was held to the next workgroup meeting. Mr. Bayer clarified that current standards potentially allow for consideration of drought conditions, but that the assessment may need clarification.

There was a question how an exemption would affect bacteria. There was continued concern about bacteria and the levels used were for full body immersion even if there were only a couple of inches of water. Jim Davenport pointed out that TCEQ was considering how to apply the criteria to such small streams. Linda Broach indicated that the lowest flows typically got the most use in her area. Dave Buzan pointed out that in most parts of the state, during low flow the bacteria were typically low. Others agreed that the high flows were when the bacteria numbers were high. For rural streams with pasture land uses, one commenter stated that they saw high bacteria at high flows and at low flows. The low flow numbers were because the streams are used extensively by cattle during low flows.

Some were concerned with limiting the pool size for WQS application. A size of 20% of the longitudinal length of the reach was discussed. Pools are a refuge for fish and other species. TPWD stated that TCEQ needs to remember that even though there is no apparent surface flow some streams continue to have subsurface flow. Some also exist in hotter dryer months because of groundwater intrusion. Ms. Glass suggested a size and depth criteria. Mr. Roques indicated that 1 meter was considered significant and is currently in the assessment guidance. Dave Buzan suggested that TCEQ look at the fish kill information and that there may be pool size information available to provide a guide to the size of pool that's capable of supporting aquatic life.

One commenter said that the Edwards Aquifer recharge and other specific areas should not have exemptions.

Dave Buzan asked if there's value in having narrative criteria specifically for the protection of unclassified spring-fed systems? If we are treating the designated spring-fed segments differently, why not also address the unclassified ones as well? It was pointed out that this would be very difficult to do for several reasons, among which Jim Davenport pointed out that it would be hard for the criteria to be definitive enough to apply.

Concerning the topic of pointing to guidance outside the standards regarding representative sampling, Mr. Roques said he has language to present to the Assessment Guidance workgroup September 13, 2007 concerning bacteria, sampling, etc. to address

what is a representative sample. But Mr. Roques also stated that he wants to see more guidance in the standards as well. One gentleman said that he wants to see more guidance on appropriate bacteria sampling.

Using only surface water DO measurements only ensures that we are protecting the upper portion (maybe even only 1 meter or so) of a water body. There was an understanding that the DO WQS only applies to the mixed surface layer, but surely you can still use some profile data. And what about cases where the unmixed portion is enlarged and/or persists longer due to human factors? Shouldn't these water bodies be listed as impaired? A suggestion was made to allow for collection of mixed surface layer, but to add to allow for a surface sample only. The discussion continued about whether near surface or profile data was appropriate or whether a single sample grab would be appropriate. Ms. Glass suggested a different standard for profile data and surface only data. Dissolved oxygen uses the mean, but a suggestion was made to use the median as with pH. The group suggested that the profile can be examined by the assessor and as it goes down with depth can record it, but the standards only apply to the mixed surface layer. It was suggested that 0.3 or 0.5 meter as surface sample depth was reasonable to represent the mixed surface layer. Pat Radloff got confirmation that handling of the minimum DO sample would not change.

For dissolved solids and human health criteria, TCEQ is suggesting changing to the median for assessment since they're applied as or on a longer-term basis. The group questioned why TCEQ was using the median? Isn't the point to see the outliers? There was concern using the mean versus the median for assessment because it is possible that more significant problems would occur before they were noticed. Pat Radloff asked if there was a problem with using a median for assessment of dissolved solids criteria when the criteria themselves are derived using arithmetic means. Jim Davenport stated that it shouldn't make it worse.

For recreation TCEQ is suggesting using the geometric mean for assessment. The single sample maximum would be to protect swimmers and used in permitting.

SWQM commented that they want to be sure that no additions to this section would limit their flexibility in using 2-7 yrs. worth of data. They also asked whether we need to reference anything other than annual averages for all these criteria.

In regards to the natural background clause, some thought that what TCEQ currently has in the standards already was enough and that what Florida was using is too open and vague. Maybe instead TCEQ needed to simply add some examples (which are already in the SWQM manual). Some commenters didn't feel that enough weight was being given to specific aspects of some watersheds, example, wildlife contributions. Mr. Bayer explained that the change was suggested because waters had been listed for natural conditions and that the assessors did not feel they could take the conditions into account because of the wording in the standards. The group suggested that the standards language needed to be such that assessor could use BPJ and that current language did provide that flexibility. Patrick Roques said that it was interesting to hear the group's comments. SWQM and WQS will confer about any possible changes.

Endangered Species

The USFWS document that covers endangered species in Texas and their relationship with the water quality standards was introduced to the group. Patrick Connor was at the meeting to provide feedback and to listen to the workgroup comments on endangered species. The document is available as a link from the TCEQ website. TCEQ is reviewing the document and if anyone in the workgroup has specific suggestions concerning these comments, contact Ms. Tiemann. Ms. Tiemann also mentioned that TCEQ was looking into considering state endangered and threatened species, at least in permit reviews. TPWD will be providing additional information in the future.

Next meeting

The next workgroup will be set for the first of November depending on the availability of the room. Topics to be covered will include:

- (1) Recreational uses and criteria/bacteria update
- (2) Whole effluent testing (WET) update – TCEQ will attempt to get Phil Jennings to attend to answer any questions concerning WET from an EPA perspective.
- (3) Seagrass uses and standards determinations in permitting.