

# Changes in the West Virginia Aluminum Criteria

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April 18, 2006



# West Virginia Water Quality Standards

- WQS (designated use + numeric criteria) are now established by WV DEP
- WQS are reassessed every three years to meet the mandate of the Clean Water Act
- DEP can either adopt EPA's proposed criteria or develop its own scientifically defensible criteria.
- Changes to the WQS must be approved by the West Virginia Legislature.
- Final rule must be approved by US EPA

# How are Water Quality Criteria Implemented?

## ➤ Stream Monitoring and Assessment

- 303(d) listing for impaired streams
- TMDL development

## ➤ Permitting

- Water-quality based effluent limits
  - Implementation of TMDLs
- 
- The background of the slide features several concentric circles representing ripples on water, rendered in a lighter blue shade than the background. These ripples are positioned in the lower right and bottom center areas of the slide.

# EPA's Recommended Criteria

- Set forth in *Ambient Aquatic Life Water Quality Criteria for Aluminum* (1988)
  - Acute exposure limit<sup>[1]</sup> - 750 µg/l
  - Chronic exposure limit<sup>[2]</sup> - 87 µg/l
- EPA's aluminum water quality criteria are **acid soluble concentrations**
- How good are these numbers?
  - Questions on the scientific validity of the studies used to develop the chronic criterion (brook trout and striped bass studies)
  - EPA did not follow its own protocol in preparing the aluminum criteria
  - There is no approved EPA method for analysis of acid soluble aluminum, so it cannot be implemented in permits or for enforcement
- West Virginia originally adopted the proposed EPA criteria as total aluminum concentrations, which was overprotective of aquatic life.

<sup>[1]</sup> The acute exposure limit is a one hour average concentration which is not to be exceeded more than once every three years on the average.

<sup>[2]</sup> The chronic exposure limit is a four day average concentration which is not to be exceeded more than once every three years on the average.

# Why the Focus on Aluminum?

- The EQB adopted EPA's recommended aluminum criteria in the 1993 triennial review.
- At that time, West Virginia and Delaware were the only two states to adopt EPA's criteria.
- In 1996, DEP asked the EQB to reevaluate the aluminum criteria based on data available in STORET for 1990 to 1996.
  - 87.6% of WV streams samples violated the chronic aluminum criterion.
  - 28.5% of WV stream samples violated acute aluminum criterion.
- DEP expressed its belief that these exceedances were not linked to aquatic life impairment and promised to study this issue.

# Sources of Aluminum in Water

- Third most abundant element
- Exists in many forms in the environment
- Light; precipitants are slow to settle out of solution
- Much of aluminum in WV soils is occluded in clay.
- pH can greatly affect solubility of aluminum.
- Potential sources of aluminum include:
  - Minerals (clay, feldspar, granite)
  - Earth disturbances
  - Wastewater treatment
  - Pulp & paper mills
  - Industrial sources
  - Acid mine drainage

# 1997 Triennial Review

- Effort to change the aluminum criteria in the 1997 triennial review
- Challenge centered on the validity of the chronic aluminum criteria.
- Following EPA's protocol for deriving aquatic life criteria, the chronic criterion should have been equal to the acute criterion of 750  $\mu\text{g/l}$ .
- EPA's protocol provides an alternative to adopt the final chronic value for a commercially or recreationally important species as the chronic criterion.
- The two studies relied upon by EPA to set the chronic criterion are of questionable validity.
- EQB voted to delete the chronic criterion, and Legislature approved the change.

# EPA's Review of 1997 Criteria

- EQB justification submitted to EPA did not cite the inadequate science on which the criterion was based.
- EQB rationale cites only two reasons:
  - "...data collected by [DEP] indicates that the chronic aluminum value is exceeded in numerous streams ... however, the streams appear to support healthy populations of aquatic life."
  - "EPA is currently reviewing the existing chronic aluminum value [and] may change the criterion as a result of that review."
- In 1999, EPA disapproved the deletion, stating that "West Virginia has not provided EPA with a scientific rationale to support the removal of the aquatic life chronic criterion for aluminum."
- EPA provided two options:
  - Adopt the EPA recommended chronic criterion of 87 µg/l
  - Adopt a scientifically defensible alternate chronic criterion.



# 2000 Triennial Review

- Efforts to respond to EPA disapproval.
  - Faulty rationale letter which did not reflect science in record in 1997.
  - Most other states had not adopted or rejected EPA's aluminum criteria.
  - EPA did not include aluminum criteria in the WQS for states where EPA has enforcement authority.
- Encouraged the EQB to adopt alternate chronic criterion of 750  $\mu\text{g/l}$ .
  - scientifically justifiable
  - same ultimate effect as the deletion of the chronic criterion.
- If EQB believed it must reinstate 87  $\mu\text{g/l}$  chronic criterion, urged EQB to adopt it as an acid soluble or dissolved concentration.
- EQB decided ultimately to adopt 87  $\mu\text{g/l}$  as a dissolved criterion.
- EPA approved the change to the chronic criterion.

# Why the 2004 Review?

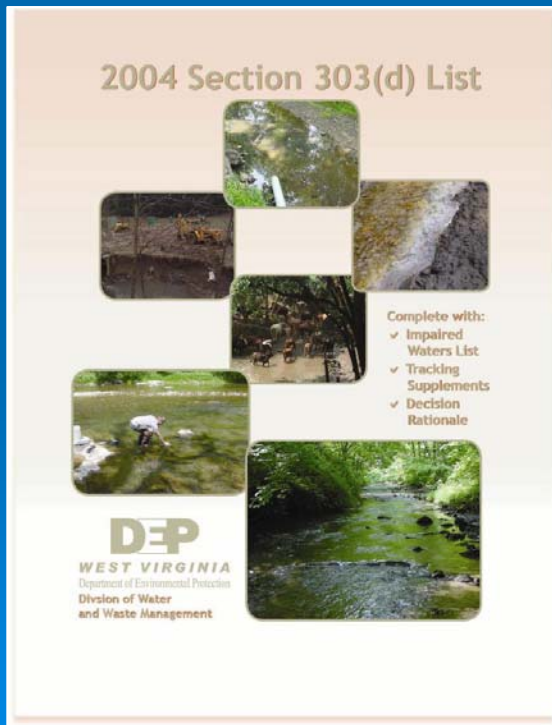
- During its 2004 session, the WV Legislature passed H.B. 4193, which mandated that the EQB propose an emergency and legislative rule to revise the aluminum criteria.
- Many streams still exceed chronic criterion.
  - 303(d) Listing
  - TMDL development
- Permitting issues
  - Implementation of dissolved criterion in NPDES permits on small streams.
  - Cost and time for translator studies
- No indication that exceedances of 87 µg/l based on dissolved concentrations result in impairment to fisheries.
- In presentation to EQB, DEP stated:
  - 87 ug/l for warmwater streams appears overprotective
  - 87 ug/l for coldwater streams needs further evaluation
  - Evaluation of pH / hardness associations needed.

# DEP Summary of Streams Violating Chronic Criterion:

(Reprinted with permission of Pat Campbell of DEP)

~ 165 streams (~2100 miles) on draft 303(d) list

Noteworthy streams listed:



Greenbrier River

South Branch Potomac River

Elk River

Cacapon River

New River (Lower)

Birch River

Gauley River

Williams River

Cranberry River

Shenandoah River

# Other States' Aluminum Criteria (2004)

- Nineteen states have adopted some form of aluminum criteria.
- Only five states adopted both EPA's proposed chronic and acute criteria as total aluminum concentrations.
- Four additional states, including WV, adopted EPA's proposed aluminum criteria as dissolved concentrations.
- The remaining ten states have a variety of aluminum criteria.
  - Approximately five of the remaining ten adopted dissolved aluminum criteria
  - Texas, Utah, and Missouri have no chronic criterion and a dissolved acute criterion of 750 ug/l or greater.
- Of the states surrounding West Virginia and the EPA Region III states, only Pennsylvania and Delaware have aluminum criteria.
  - Delaware adopted EPA's proposed criteria.
  - Pennsylvania adopted EPA's acute criterion, but formally rejected EPA's chronic criterion because of the flawed science on which it is based.
  - In 2001, EPA accepted Pennsylvania's rejection of the chronic criterion

# 2004 EQB Action

- EQB modified the aluminum criteria in light the following:
  - questions regarding the scientific validity of the 87 ug/l chronic criterion
  - DEP stream data demonstrating no impairment in high quality waters with more than 87 ug/l aluminum
  - the disparity with the aluminum criteria adopted by other states.
- EQB added the following footnote to its water quality standards rule:

“Until July 7, 2007, the aluminum criteria will be implemented as follows: the chronic aluminum criterion shall be 87 ug/l for trout waters (as defined in section 2.20 of this rule) and shall be 750 ug/l for all other waters of the State. The implementation of the interim criteria provides time for a study to develop aluminum criteria for waters of the State which are based upon sound science and are protective of aquatic life.”
- The aluminum criteria remain as dissolved concentrations.
- EPA approved the 2004 revised criteria on January 9, 2006, stating that EPA’s approval “is based on a finding that the criteria are protective of the aquatic life use regardless of whether they apply temporarily or permanently.”

# The Advent/Environ Study

- A group of industries (TRINET) worked together to fund an aluminum study as set forth in the revised aluminum criteria.
- Based on comments from an EQB study group, TRINET selected Advent/Environ to perform the study.
- Study was to be conducted in three phases
  - Phase I – Prepare study plan
  - Phase II – Conduct literature review for chronic aluminum toxicity studies
  - Phase III – Conduct toxicity tests to resolve any gaps in chronic aluminum database
  - Phase IV – Recalculate the chronic aluminum criteria
- Phase II revealed that no qualifying chronic aluminum toxicity studies have been performed to date.
- This would require substantial toxicity testing and effectively preparing a national aluminum criteria
- Outside the TRINET scope of work/ability to fund.
- First do no harm – no more bad science.

# Where are we now?

- Implementation in industry permit – coal and noncoal
- Coal permits – modification request due by May 31, 2006.
- Does not apply to trout waters!
  - “sustain year-round trout populations”
  - Expanded list used by DEP in permit decisions
- 2006 DEP Triennial Review
  - Aluminum criteria will revert unless made final in 2006
  - Trout water listing also on the agenda
  - Next meeting April 28, 2006
- If more relief is needed:
  - Translator studies (filter size?)
  - Mixing zone studies (bigger streams)
  - Site-specific water quality criterion
  - Variance



# Questions, Comments, Complaints?

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