

Wastewater Management for High-TDS Wastewaters in Pennsylvania



Total Dissolved Solids (TDS):

- Are a measurement of inorganic salts, organic matter and other dissolved materials in water.
- Are a secondary drinking water contaminant.
- Can cause operational problems for drinking water systems.
- Can cause toxicity to aquatic life through increases in salinity, changes in the ionic composition of the water, and the toxicity of individual ions.



Large Sources of TDS

- Steel Industry
- Pharmaceutical Manufacturing
- Mining Operations
- Oil & Gas Extraction
- Some Power Plants
- Landfills
- Food Processing Facilities
- Others



Water Quality Considerations

- Water quality analyses show that Pennsylvania's rivers and streams have a very limited ability to assimilate additional TDS.
- Growing demand for assimilative capacity strains our ability to protect water quality.
- Fall 2008, actual water quality issues related to TDS emerged in the Monongahela River basin.

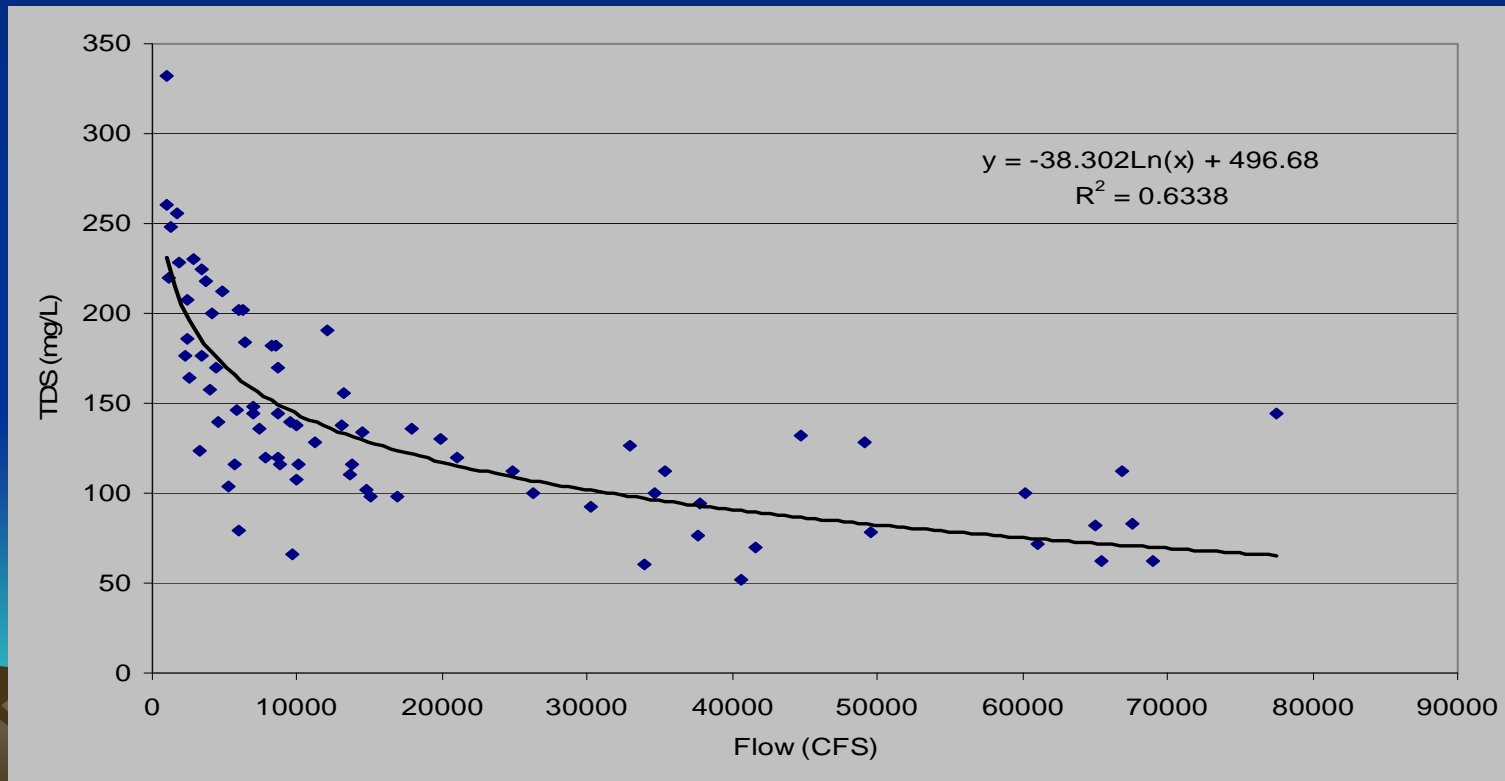


West Branch Susquehanna River

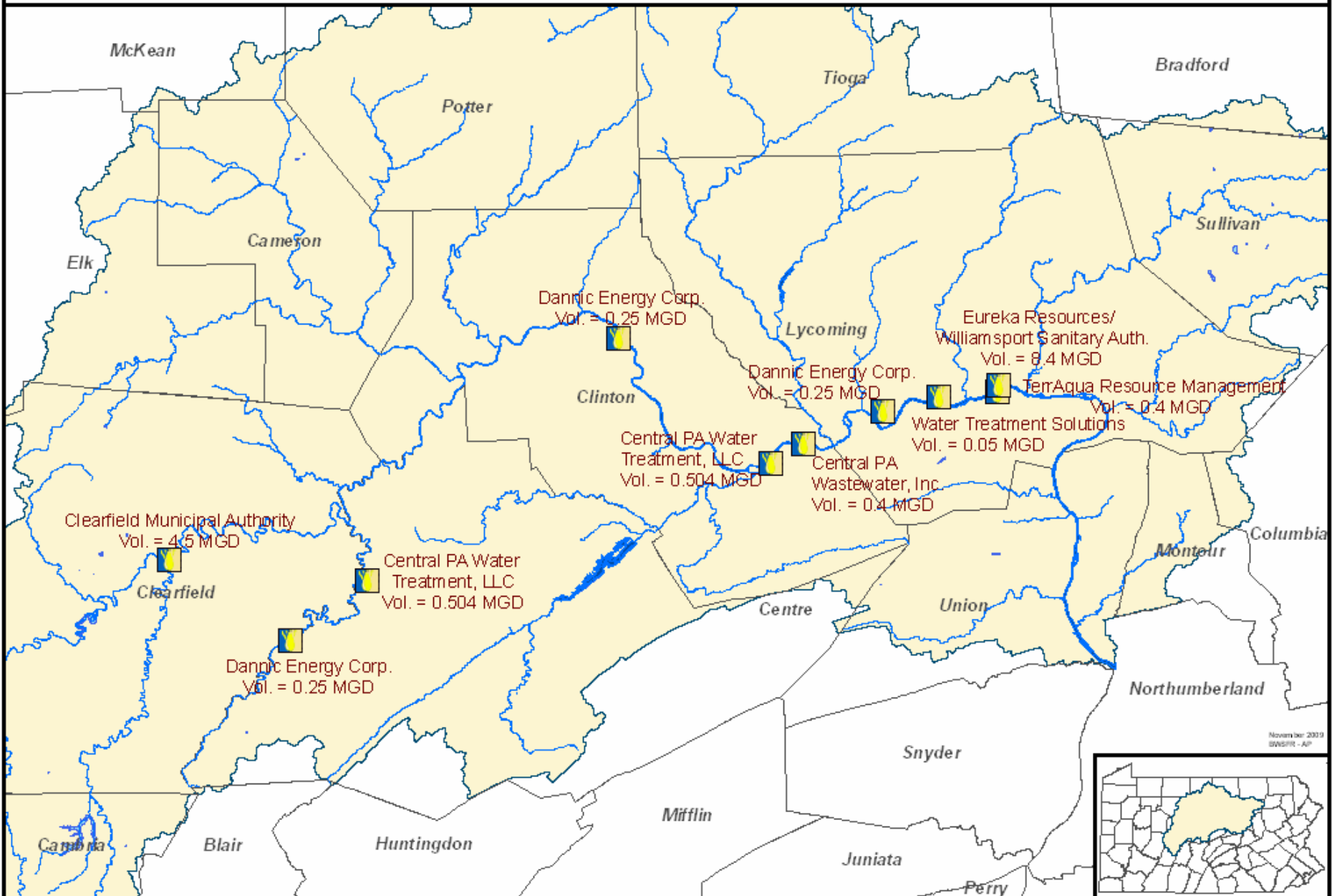
- TDS in the West Branch is already 48% of the 500 mg/L water quality criterion during design-flow conditions.

TDS REGRESSION WQN 401 WEST BRANCH
FLOW DATA FROM WEST BRANCH AT LEWISBURG, PA

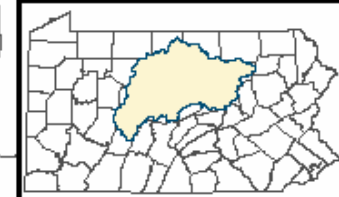
Q7-10 of 764 cfs is equivalent to 242 mg/L TDS



West Branch Susquehanna River Watershed



November 2010
BWSRPA - AP

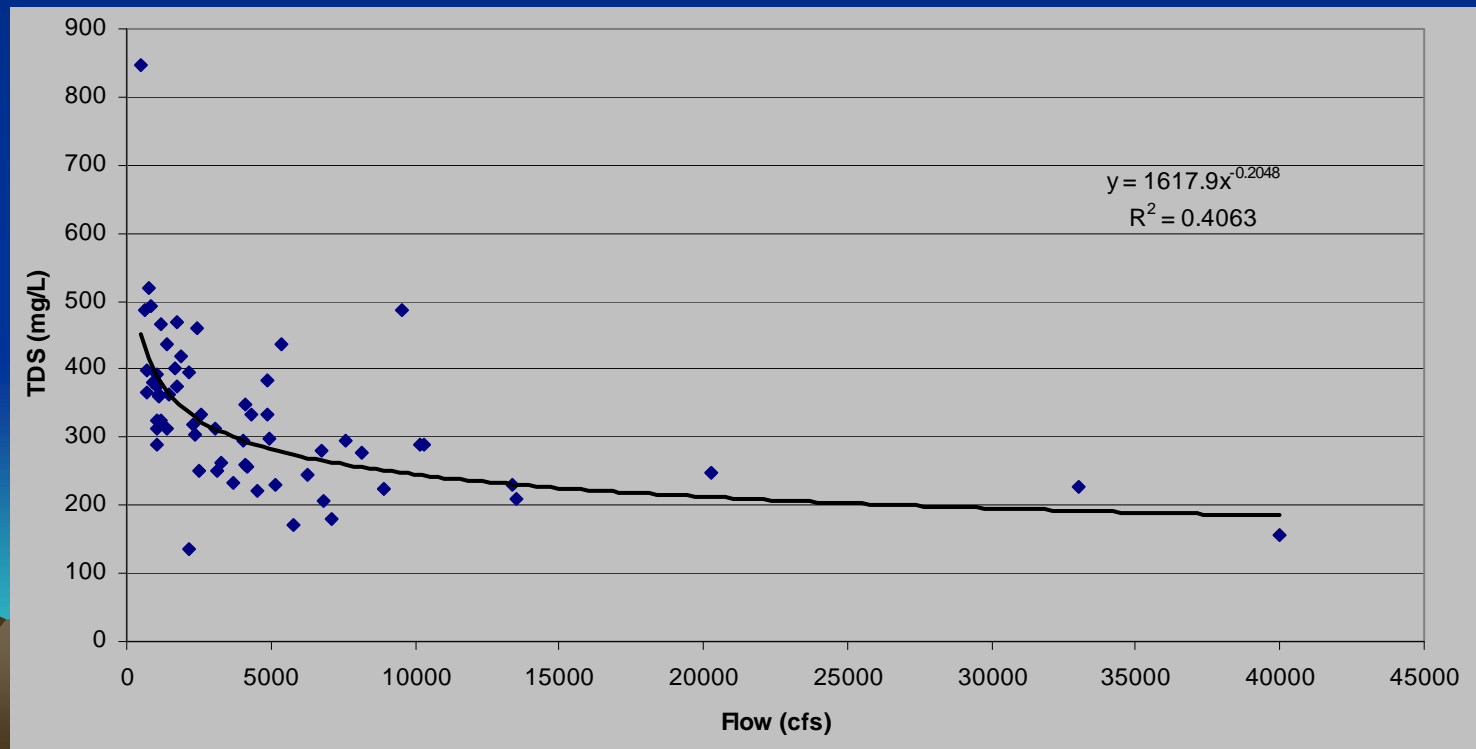


Beaver River

- TDS in the Beaver River is already 90% of the 500 mg/L water quality criterion during design-flow conditions.


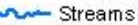

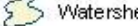
TDS REGRESSION WQN 905 BEAVER RIVER
FLOW DATA FROM BEAVER FALLS, PA

Q7-10 of 530 cfs is equivalent to 448 mg/L TDS



Beaver River Watershed



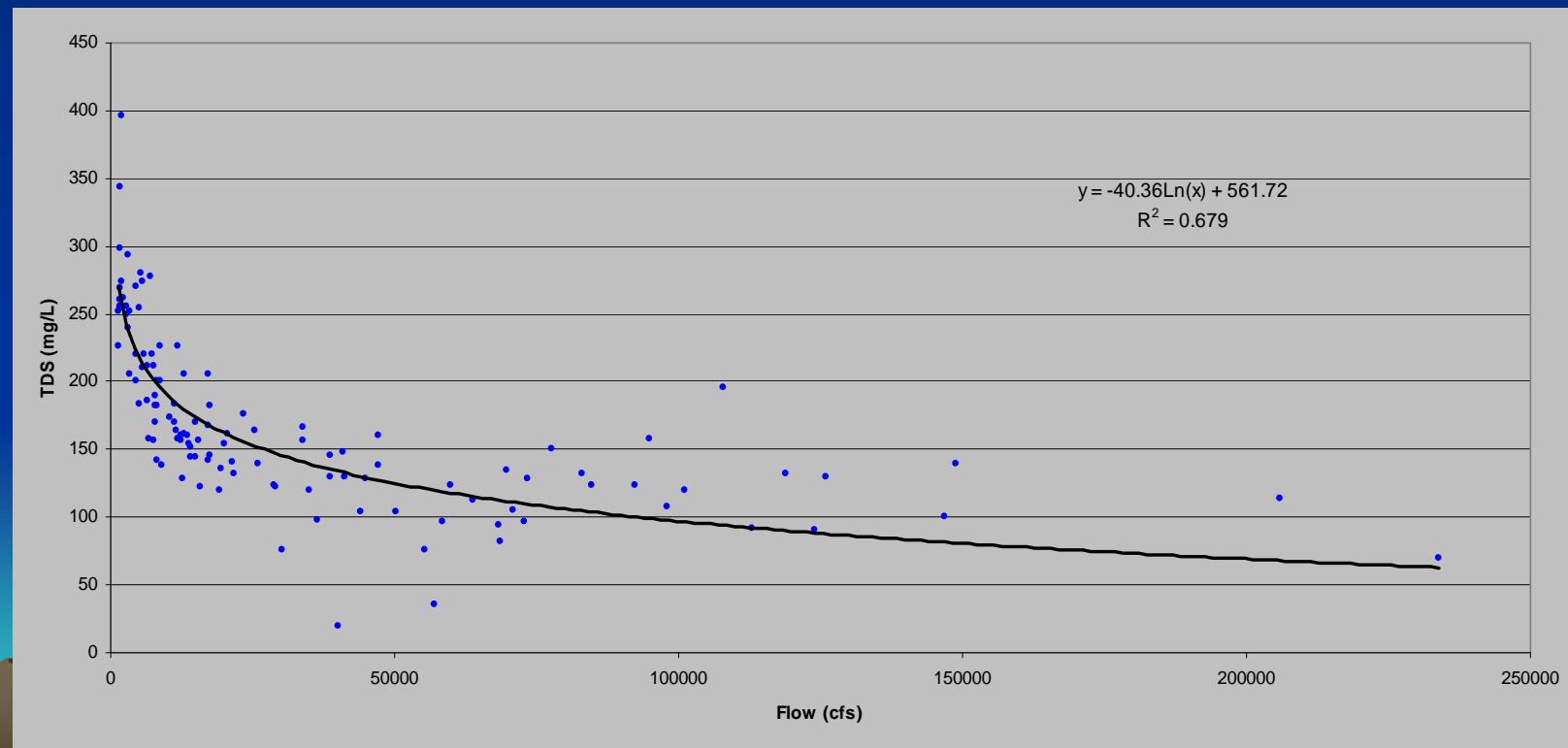
 Proposed Oil & Gas Facilities	 Streams
 County Boundaries	 Watershed

North Branch Susquehanna River

- TDS in the North Branch is already 56% of the 500 mg/L water quality criterion during design-flow conditions.

TDS REGRESSION WQN 301 NORTH BRANCH
FLOW DATA FROM NORTH BRANCH AT DANVILLE, PA

Q7-10 of 1,130 cfs is equivalent to 278 mg/L TDS

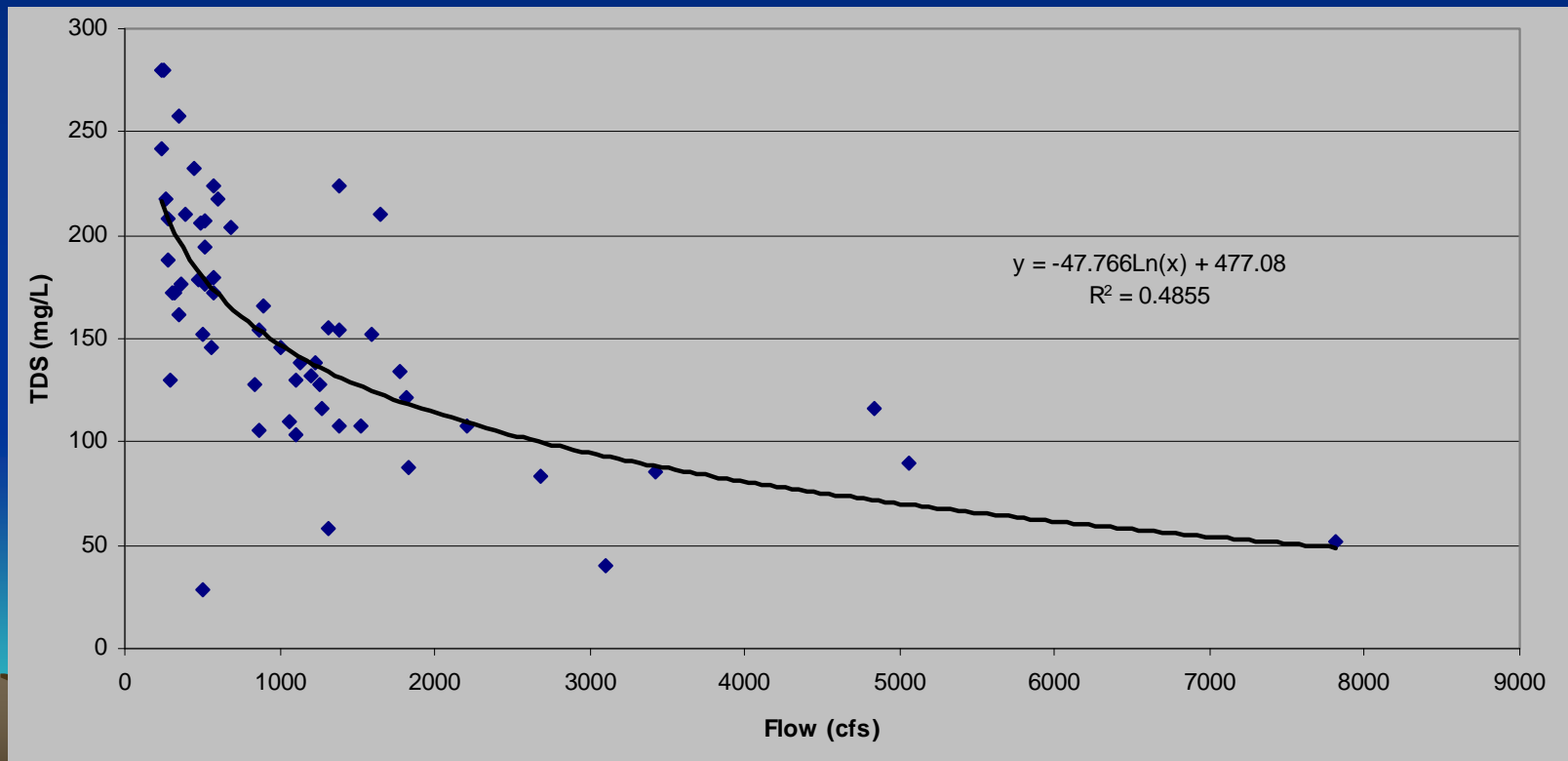


Clarion River

- TDS in the Clarion River is already 51% of the 500 mg/L water quality criterion during design-flow conditions.

TDS REGRESSION WQN 822 AT CLARION RIVER
FLOW DATA FROM COOKSBURG, PA, PA

Q7-10 of 105 cfs is equivalent to 255 mg/L TDS



Management Strategy

Two-tiered approach for TDS:

- Establish effluent standards to level the playing field
- Provide additional protection for most sensitive water use through instream criteria
- Prevent criteria violations

Separate strategy for Monongahela River

- Criteria violations have already occurred
- Must be brought into compliance with criteria



Regulatory Changes

Changes to Chapter 93 were presented to the EQB as proposed rulemaking in January 2010

Nationally–recommended criteria for Fish and Aquatic Life protection

West Virginia currently uses these criteria to establish effluent limitations in NPDES permits



Water Quality Standards

- DEP regulations currently have a numeric criterion for Osmotic Pressure (OP) in Chapter 93.
 - OP effects can vary from effluent to effluent, depending on the actual constituents present.
- DEP is proposing numeric criteria (in-stream concentrations) for chlorides.
- Requires regulatory changes to Chapter 93.



Effluent Standards

- A treatment-based management approach that addresses TDS relies on the Pennsylvania Clean Streams Law.
- Effluent standards have been established in regulation through revisions to Chapter 95.



Regulatory Changes

Changes to Chapter 95 were approved by the Environmental Quality Board (EQB) as proposed rulemaking on August 18 and published in the PA Bulletin on November 7.

90-day Public Comment period ended on Feb. 12, 2010

Four Public hearings held – Cranberry Twp, Ebensburg, Williamsport, Allentown



Purpose of Rulemaking

- Existing treatment practice provides for the removal of heavy metals, but does not actually treat for TDS, sulfates and chlorides.
- Control of TDS, chlorides and sulfates is currently through dilution.
 - *Dilution is not treatment.*
- Chapter 95 will control new and expanding TDS discharges.



Effluent TDS Standards

- Natural Gas Industry
 - 500 mg/l
- Other Industries
 - 2,000 mg/l
 - Optional watershed-based Variance



Natural Gas Sector

- Selection of the treatment technology is driven by the raw extraordinarily high wastewater TDS concentration.
- Treatment technologies are currently available.
- Regulatory certainty provided with this final rule will drive investment in and development of new technologies.
- Expansion of the Marcellus Shale play could place existing industries at an economic disadvantage.
- This industry has shown an ability to respond appropriately in addressing potential impacts to our natural resources.
- Options currently exist for other disposal pathways.



Existing Sources of High-TDS Wastewater

- Will be able to continue to operate under their existing permit limits and conditions until they **expand or to increase their existing daily discharge load.**
- If expanding, the more stringent of the applicable effluent standards or water quality based effluent limitations apply.



POTWs

- POTWs are discouraged from accepting this wastewater without pretreatment.
- POTWs must obtain EPA approval of a Pretreatment Program and install appropriate pre-treatment facilities.
- Pretreatment facilities are CWTs.
- Wastewaters discharged from POTWs also must meet any other applicable requirements.



Existing Pretreatment Facilities

Existing pretreatment facilities will be able to continue to operate under their existing permit limits and conditions until such time as they propose to expand their existing daily discharge load of any pollutant of concern.



Results of Proposal

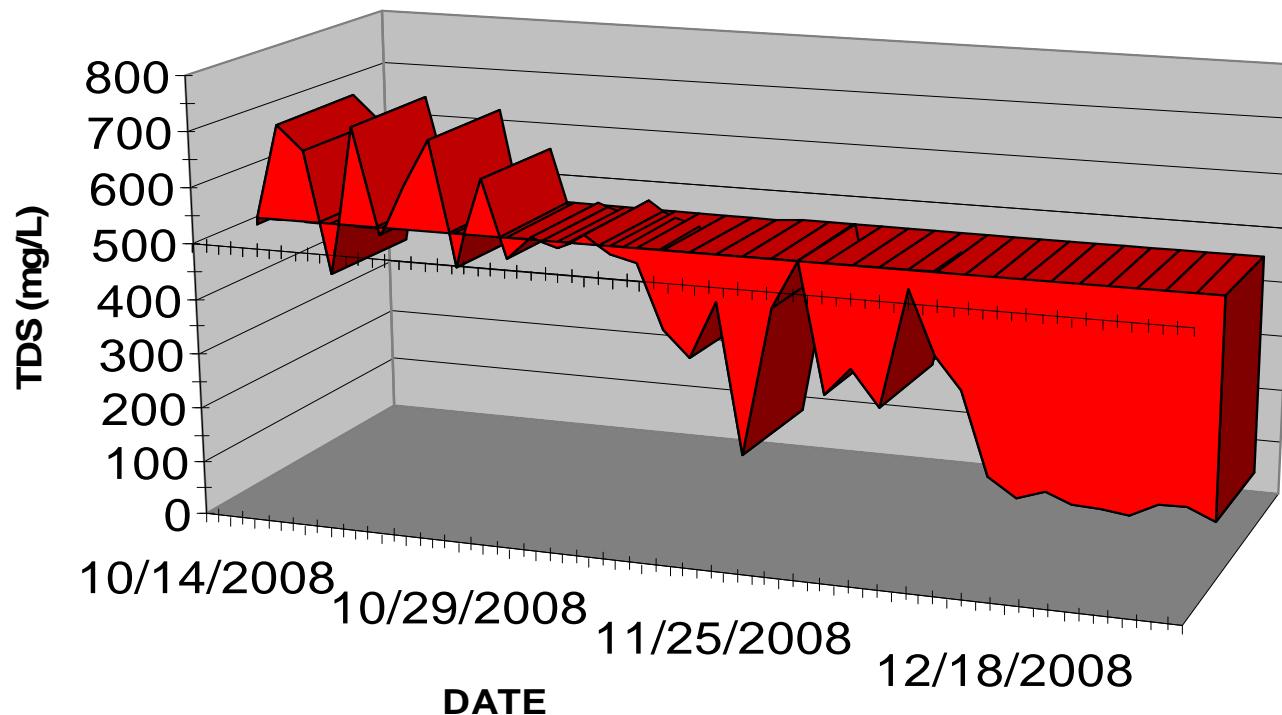
- Drilling and Fracturing Companies have invested in Recycle and Reuse
- Range Resources Announced 100% Recycle and Reuse
- Other Industries Taking a Hard Look at TDS



Monongahela Strategy

- TDS concentration in the Monongahela River has exceeded the water quality criteria.

**TDS Concentration In The Monongahela River at
Grays Landing In Relation to 500 mg/L**



TDS Criteria and Data Determination

- Regulations require the TDS water quality criteria to be achieved 99% of the time (Chapter 96.3) expressed as a 30 day average.
- The Department has years of ambient data analysis along with an adequate sample size to determine the long term TDS criteria in the Monongahela.
- The intensive targeted sampling over the past few years indicate criteria for TDS is not being achieved under low flow conditions.
- The Department plans to list the Monongahela River as impaired for TDS.



Monongahela Strategy

Based on determination of contribution to violation of water quality standard for TDS or sulfate

- No contribution results in no effluent limits
- Pre-existing discharges covered by mining regulations receive limits according to the mining regulations
- Insignificant contributors receive permit with limits
- Discharges that contribute to exceedances will receive limits at criteria



Wastewater Management for High-TDS Wastewaters in Pennsylvania

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