Natural Gas Development in the Susquehanna River Basin

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Susquehanna River Basin

The Basin
• 27,510-square-mile watershed
• Comprises 43 percent of the Chesapeake Bay watershed
• 4.2 million population
• 60 percent forested
• 32,000+ miles of waterways
• 72% is underlain by Marcellus Shale

The Susquehanna River
• 444 miles, largest tributary to the Chesapeake Bay
• Supplies approximately 18 million gallons per minute to the Bay
Susquehanna River Basin Commission

- Federal-interstate compact commission established by the federal government (USACE) and the states of New York, Pennsylvania, and Maryland.

- Responsible for managing the basin’s water resources – charged with balancing water needs

- Regulatory authority – water withdrawals and consumptive use

- Water quality monitoring and coordination
Commission Regulations

• **Water withdrawals §806.4(a)(8)**
  - 100,000 gpd/30-day average (3,000,000 gallons)
  - Any natural gas well development project in the basin targeting the Marcellus or Utica shale formations, or any other formation identified in a determination issued by the Executive Director pursuant to § 806.5, for exploration or production of natural gas involving a withdrawal, diversion or consumptive use, regardless of the quantity.

• **Consumptive water use §806.4(a)(1)**
  - 20,000 gpd/30-day average (600,000 gallons)

• **Approval by Rule §806.22(f)(i)**

• **Diversions 806.4 (a)(3)**
  - 20,000 gpd or more out and any quantity in
  - For natural gas development, any quantity in or out of the basin
Water Withdrawal Review

- Environmental Screening
- Aquatic Resource Survey
- Passby Evaluation
- Aquifer Testing
- Cumulative Impact Evaluation
- Aquatic Invasive Species
- Intake Design & Metering Plan
- Compliance Activities
Review - Environmental Screenings

- Surface and Groundwater Withdrawals
- Stream Classifications
- 303(d) List or PWL Status
- Water Quality
- Adjacent Wetlands
- Wild/Scenic Rivers
- Natural Diversity Inventory
- Aquatic Nuisance Species
Review - Aquatic Resource Surveys

- No data available
- Obsolete information
- Special protection stream/RTE species
- State protocols

- Background data for enforcement
- Correct protection level
- Pass-by decisions – possible stream reclassification
Review - Groundwater Withdrawal

- Aquifer testing plans
  - Hydrogeologic setting
  - Groundwater availability analysis
  - Aquifer testing procedures
  - Monitoring network
- Hydrogeologic report
- Application
Review – Cumulative Impact Analysis
Review - Passby Flow Determination

Compare Cumulative Water Demand to Safe Yield

• If Cumulative Water Demand is:
  • \( \leq 10\% \) Q7-10 (\textit{de minimis} Standard), Passby Flow Not Required
  • > 10\% Q7-10, Passby Flow Required
    • Reduce Proposed Withdrawal Rate to \( \leq 10\% \) Q7-10, or
    • Determine Passby Flow Condition (SRBC Policy No. 2003-01)

• Passby Flow Analysis
  • IFIM Method – Coldwater Streams in Study Area with Drainage Area < 100 square miles
  • Tennant Method – Streams Not Covered by IFIM Criteria
Annual Hydrograph - Larrys Creek

- Full Range of Flow (P0 - P100) (cfs)
- Approved Withdrawal (cfs)
- Daily Median Flow (P50) (cfs)
- 7-Day, 10-Year Low Flow (7Q10) (cfs)
- 20% of Average Daily Flow (20% ADF) (cfs)
The Commission is moving toward a more environmentally protective management system based on ecological flows.
Ecological Flow Management

TNC Instream Flow Project in PA

Environmental Flow Study USACE & TNC

Low-flow Monitoring Plan

Aquatic Resource Survey Follow-up Work
Major flow types and flow needs of species and habitats in the Susquehanna River

- **High Flow Events**
- **Seasonal Flows**
- **Low Flows**

**SPRING**
- Channel maintenance and floodplain connectivity
- American Shad spawning migration, egg and larval development

**SUMMER**
- Vegetation growth
- Egg, larval, and juvenile growth of fishes and amphibians
- Mussel spawning
- Water quality maintenance

**FALL**
- Migratory fish outmigration
- Overwinter habitat for Fish and insects
- Resident fish spawning

**WINTER**
- Resident fish spawning
APPROVAL BY RULE (ABR) FOR NATURAL GAS PAD LOCATIONS
under 18CFR§806.22(f) in the Susquehanna River Basin, September 3, 2010
Maximum Approved Daily Consumptive Use (in mgd)

- Water Supply: Projected Maximum
- Power Generation
- Recreation
- Gas Drilling
- Irrigation
- Manufacturing
- Other
- Mining
- Education

Current Use
Susquehanna Basin Natural Gas Water Cycle
Issues & Concerns – Research Needs

• Withdrawals from headwater streams
• Withdrawals from Exceptional Value streams
• Ecological flows and changes to passby guidance & water planning activities
• Drought conditions – stream gages; public water supplies
• Flowback water reuse/recycling
• Flexibility for alternative sources
• Follow-up surveys for water withdrawal locations
• Invasive species
• Water quality/water quantity interactions
• Long-term planning & research priorities
• Communication & Coordination
Susquehanna River Basin Commission

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