

Environmental Protection in the Development of the Marcellus Shale

Areas of Environmental Protection

- Water sources
- Site development
- Water quality protection
- Dams and impoundments
- Well construction and completion
- Wastewater management
- Air quality
- Natural Resources

Water Sources

- Each Marcellus well can take up to 5 million gallons to hydraulically fracture
- Fresh water sources include streams lakes and other bodies of water
- Much of the water is consumptively “lost”
- How much water will be needed?
- How much water is available?

Site Development

- Well pads average 6 to 8 acres
- Erosion, sediment and stormwater pollution
- Protection of waterways and wetlands
- Protection of water quality from construction activities

Well Construction and Completion (Fracing)

- Proper casing to prevent gas migration and groundwater contamination
- Dams and Impoundments
- Site restoration

Wastewater - NORM

- Wastewater resulting from hydrofracking of wells in the Marcellus Shale formation contains quantities of Naturally Occurring Radiological Materials (NORM).
- NORM can present human health concerns if present in sufficient quantity, or if they are subsequently concentrated through treatment or processing operations.
- The types of NORM present in the wastewater have been identified, and safe levels of these types of NORM are known.

Wastewater - NORM

- No immediate hazard to human health has been identified.
- It is appropriate to establish precautionary controls and radiological monitoring to identify potential radiological hazards.
- NORM contained in treated wastewater discharges to rivers and streams must be controlled to avoid adverse effects on downstream drinking water supplies.

Wastewater – 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.

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.
- Growing demand for assimilative capacity strains our economic development potential.

Air Quality

- Pennsylvania Department of Environmental Protection (PA DEP or Department) short-term, screening-level air quality sampling initiative in the northeast and southwest regions in August 2010 culminating in October 2010.

Air Study Findings

- Concentrations of certain natural gas constituents including methane, ethane, propane and butane, and associated compounds, in the air near Marcellus Shale drilling operations were detected during the four sampling weeks.
- Elevated methane levels were detected in the ambient air during short-term sampling conducted at two compressor stations (the Lathrop and Teel compressor stations) and two well sites (Carter Road and Loomis well sites).
- Certain compounds, mainly methyl mercaptan, were detected at levels which generally produce odors.
- Results of the limited ambient air sampling initiative in the northeast region did not identify concentrations of any compound that would likely trigger air-related health issues associated with Marcellus Shale drilling activities.

Air Study Findings

- Sampling for carbon monoxide, nitrogen dioxide, sulfur dioxide and ozone, did not detect concentrations above National Ambient Air Quality Standards at any of the sampling sites.
- A specialized infrared camera did detect fugitive and direct emissions from the well equipment at one well site. These emissions may contribute to the ambient concentrations detected at the site.

Other Natural Resources

The Nature Conservancy Study

Pennsylvania Energy Impacts Assessment
Report 1: Marcellus Shale Natural Gas and Wind
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Author and Team Leader: Nels Johnson¹

Assessment Team: Tamara Gagnolet¹, Rachel Ralls¹, Ephraim Zimmerman², Brad Eichelberger², Chris Tracey², Ginny Kreidler³, Stephanie Orndorff³, Jim Tomlinson³, Scott Bearer¹, and Sarah Sargent³

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¹ The Nature Conservancy – Pennsylvania Chapter

² Western Pennsylvania Conservancy – Pennsylvania Natural Heritage Program

³ Audubon Pennsylvania

http://www.nature.org/media/pa/tnc_energy_analysis.pdf

Key Findings

- Nearly two thirds of well pads are projected to be in forest areas, with forest clearing projected to range between 34,000 and 83,000 acres
- An additional range of 80,000 to 200,000 acres of forest interior habitat impacts are projected due to new forest edges created by well pads and associated infrastructure (roads, water impoundments);
- On a statewide basis, the projected forest clearing from well pad development would affect less than one percent of the state's forests, but forest clearing and fragmentation could be much more pronounced in areas with intensive Marcellus development;
- Approximately one third of Pennsylvania's largest forest patches (>5,000 acres) are projected to have a range of between 1 and 17 well pads in the medium scenario

Key Findings

- Impacts on forest interior breeding bird habitats vary with the range and population densities of the species. The widely-distributed scarlet tanager would see relatively modest impacts to its statewide population while black-throated blue warblers, with a Pennsylvania range that largely overlaps with Marcellus development area, could see more significant population impacts
- Watersheds with healthy eastern brook trout populations substantially overlap with projected Marcellus development sites.
- Nearly a third of the species tracked by the Pennsylvania Natural Heritage Program are found in areas projected to have a high probability of Marcellus well development, with 132 considered to be globally rare or critically endangered or imperiled in Pennsylvania. Several of these species have all or most of their known populations in Pennsylvania in high probability Marcellus gas development areas.

Summary

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Contact Information

Dana Aunkst, P.E.

Acting Deputy Secretary for Field
Operations

Pennsylvania Department of Environmental
Protection

717-787-5028

daunkst@state.pa.us