

## **Fact Sheet for the report:**

# ***Water Resource Reporting and Water Footprint from Marcellus Shale Development in West Virginia and Pennsylvania***

### **Key West Virginia Findings**

- Approximately 5 million gallons of fluid are injected per fractured well.
- Surface water taken directly from rivers and streams makes up over 80% of the water used in hydraulic fracturing and is by far the largest source of water for operators. Because most water used in Marcellus operations is withdrawn from surface waters, insufficient timing of withdrawals can result in dewatering and severe impacts on small streams and aquatic life.
- Reused flowback fluid accounts for approximately 8% of water used in hydraulic fracturing.
- On average, only 8% of injected fluid is recaptured. The remaining 92% remains underground, completely removed from the hydrologic cycle.
- The flowback fluid reported as waste in West Virginia represents only approximately 38% of total waste volume. Because of inadequate state reporting requirements, the fate of 62% of fracking waste is unknown.
- At present, the three-state region—West Virginia, Pennsylvania, and Ohio—is tightly connected in terms of waste disposal. Almost one-half of flowback fluid recovered in West Virginia is transported out of state. Between 2010 and 2012, 22% of recovered flowback fluid was sent to Pennsylvania, primarily to be reused in other Marcellus operations, and 21% was sent to Ohio, primarily for disposal via underground injection control (UIC) wells.

### **Key Pennsylvania Findings**

- Approximately 4.3 million gallons of fluid are injected per fractured well.
- On average, only 6% of injected fluid is recaptured. The remaining 94% remains underground, completely removed from the hydrologic cycle.
- In Pennsylvania, three primary waste categories are tracked: flowback fluid, brine, and drilling waste. Flowback fluid represents approximately 38% of the total.
- As Marcellus development has expanded, waste generation has increased. In Pennsylvania, operators reported an almost 70% increase in waste generated between 2010 and 2011, when they reported a total of 613 million gallons of waste.
- More than 50% of waste generated by Pennsylvania Marcellus wells is treated and discharged to surface waters—either through brine/industrial waste treatment plants or municipal sewage treatment plants. This stands in stark contrast to West Virginia, where virtually no flowback fluid is reported to be discharged to surface waters.
- There is significant potential for Marcellus development in Pennsylvania to impact water quality because a large percentage of waste is treated at plants that discharge to the state's rivers and streams.

- In Pennsylvania, approximately one-third of total waste is reused, although data are not available to determine whether it is reused in Pennsylvania or elsewhere. Approximately 5% of total Pennsylvania Marcellus waste is injected in UIC wells, mostly in Ohio.
- At present, the three-state region— West Virginia, Pennsylvania, and Ohio—is tightly connected in terms of waste disposal. While most Pennsylvania waste remains in-state, a significant amount of waste is shipped to UIC wells in Ohio, and Pennsylvania reuses flowback fluid received from West Virginia.

## Summary

The findings of this report suggest that the volumes of water used to fracture Marcellus Shale gas wells are substantial and the quantities of waste generated are significant. While West Virginia and Pennsylvania have recently taken steps to improve data collection and reporting related to gas development, critical gaps persist that prevent researchers, policymakers, and the public from attaining a full picture of trends. Given this, it is highly likely that much more water is being withdrawn and more waste is being generated than is known.

While a considerable amount of flowback fluid is now being reused and recycled, the data suggest that it still displaces only a small percentage of freshwater withdrawals. While West Virginia and Pennsylvania are generally water-rich states, these findings indicate that horizontal drilling and hydraulic fracturing operations could have significant impacts on water resources in more arid areas of the country.

In short, the true scale of water impacts can still only be estimated, and considerable improvements in industry reporting, data collection and sharing, and regulatory enforcement are needed. The challenge of appropriately handling a growing volume of waste to avoid environmental harm will continue to loom large unless such steps are taken.

## Recommendations

- Modify reporting systems so that operators report withdrawals by individual well, not by well site.
- Fix mistakes in databases, make data entry less error-prone, and provide searchable online datasets.
- Unify the two divisions of the West Virginia Department of Environmental Protection with responsibilities related to oil and gas.
- In Pennsylvania, make Marcellus-specific withdrawal data freely available from both inside and outside the Susquehanna River Basin.
- Require operators to report all aspects of water use and waste production, treatment, and disposal.
- Effectively enforce new rules governing surface water withdrawals and increase oversight of industry surface water withdrawals in order to protect rivers and streams.
- Develop new methods to reduce water and waste at all stages of shale gas production.

## For More Information

To download the full report: <http://bit.ly/MarcellusWaterUse>

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