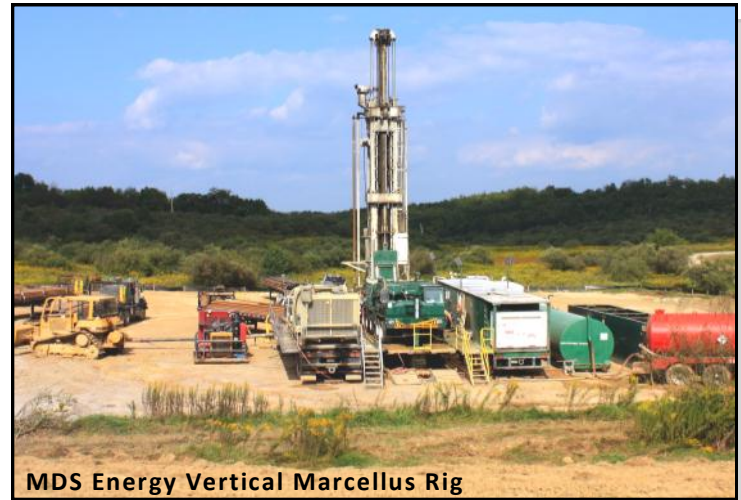


Marcellus Shale Drilling - Vertical vs. Horizontal

	Shallow	Vertical MS	Horizontal MS
Surface Disturbance	1-2 acres	3-5 acres	7-15 acres
Water Usage	30K gallons	750K gallons	5-7 Million gallons
Time to drill	4-6 days	7-10 days	Several months
Time to fracture	12 hours	12 hours	2-4 weeks
Style of rig	Standard Vertical Gas Rig	Standard Vertical Gas Rig	Larger "triple" sized rigs
Truck Trips	20-30	~200	~1,600



MDS Energy Vertical Marcellus Rig



Horizontal Drilling Rig



Well Pads
Horizontal vs Vertical

In Pennsylvania, there are two distinct and very different styles of Marcellus shale drilling, Vertical and Horizontal. Horizontal drilling is the style most people think of when they think of Marcellus drilling. Horizontal drilling is a fairly large industrial activity, with a large 150' rig, dozens of employees, cranes, generators, pumps, etc. Horizontal wells are vastly different from the shallow wells that Pennsylvania has been drilling since the 1850's. They are highly technical, very expensive, and take months to complete, many times drilling multiple wells from the same location. They are drilled mostly by large, out of state gas companies or multi-national oil conglomerates. While they have a larger footprint than vertical wells, they are able to drain a much larger subsurface area.

On the other hand, vertical wells are drilled mostly by local Pennsylvania companies. There is no difference at all between the actual drilling of traditional wells and vertical Marcellus wells. They are drilled with the same rig, the same amount of surface disturbance, with the Marcellus having a slightly longer drilling time due to the greater depth. The only difference comes during the hydraulic fracturing stage where the Marcellus well requires more water than a shallow well, but vertical wells still use 90% less water than a horizontal, and inject that water at lower pressures. Vertical well "fracs" only take 12 hours to complete and the smaller water volume means there is only a fraction of the truck traffic. This makes verticals wells much more suitable for sensitive areas, such as Indiana County conservation zones.