

# ENVIRONMENTAL SAFETY AT THE WELL SITE

A strong regulatory framework enables the Ohio Department of Natural Resources (ODNR) Division of Oil and Gas Resources Management (DOGRM) to ensure the safety of Ohio's citizens and environment.

## REGULATORY SAFEGUARDS

DOGRM is responsible for regulating:

- Oil and gas drilling, production, plugging and reclamation operations
- Class III salt solution mining operations
- Class II underground injection well operations
- Plugging of orphan wells

## CAN WELL-SITE SAFETY BE GUARANTEED?

A strong regulatory framework enables ODNR to protect Ohio's citizens and environment as well as the safety of drill-site employees. Since 2010, several major revisions to oil and gas law have been enacted, providing Ohio with some of the most comprehensive standards in the nation.

These revisions include areas of:

- Well construction – ensuring that wells are properly designed and constructed, and that critical well construction activities are witnessed by an inspector
- Hydraulic fracturing – standards for monitoring and reporting hydraulic fracturing operations including chemical disclosure
- Horizontal well site construction – standards to ensure site stability and protection of surface water when constructing large well pads and access roads

The division has increased staff to ensure increased drilling activity is properly monitored; an ODNR inspector spends an average of 72 hours overseeing the development of each horizontal well.

## PROTECTION OF GROUNDWATER RESOURCES

During drilling, a series of steel casings are inserted into the wellbore and sealed with cement to protect and isolate specific zones. The cemented casings ensure that the fluid to be pumped through the well during hydraulic fracturing, and the oil and gas subsequently produced, remains isolated from underground sources of drinking water (USDW).

The casing and cement specifications and cementing process are based on the American Petroleum Institute's standards. DOGRM inspectors place a high priority on witnessing critical phases of well construction and cementing to make certain of proper installation.

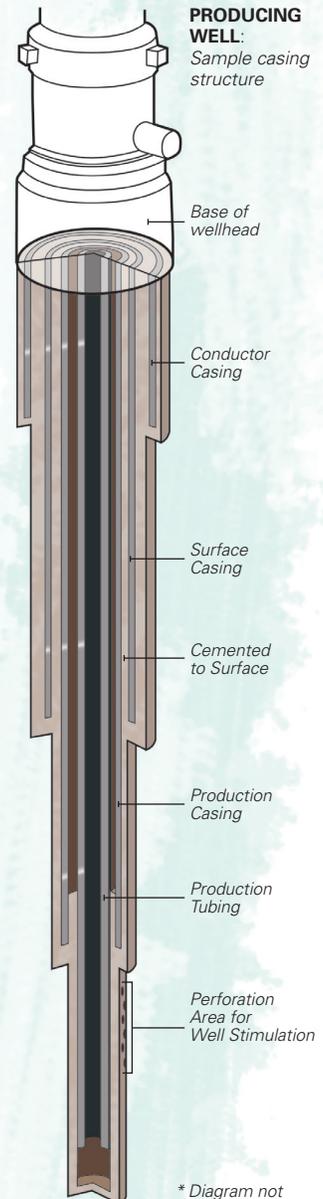
Once the casing has been run and cement has set, the drilling continues from the bottom of the cemented steel casing to the next depth. This process is repeated using smaller diameter steel casings each time until the oil and gas bearing reservoir is reached. A new well-construction rule package passed in 2012 requires a more protective casing program for wells in Ohio.

## CASING PROGRAM

The depth of Ohio's freshwater aquifers, including underground sources of drinking water, are mapped. Using maps prepared by the Division of Geological Survey and Division of Soil and Water Resources, the division's permitting geologists prescribe steel-and-cement casing programs that protect groundwater resources.

## DISPOSAL OF BRINE INCLUDING HYDRAULIC FRACTURING FLOWBACK FLUID AND PRODUCED WATER

Oil and gas operators must properly dispose of wastewaters, or brine, that return to the surface after the completion of hydraulic fracturing stimulations or during production operations. The disposal of brine in Class II injection wells is the safest, most environmentally friendly method of disposal. Through a primacy agreement with the U.S. Environmental Protection Agency, the DOGRM regulates all Class II injection wells within the state of Ohio.



\* Diagram not to scale. Depths of individual wells vary.



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