

# DRILLING A WELL

Tuscaloosa Marine Shale (TMS)



## Encana USA's Commitment

- we are committed to maintaining or exceeding best available practices in safety and environmental stewardship
- we strive to create the smallest environmental footprint possible
- we strive to employ the best available industry technologies

After Encana Oil & Gas (USA) Inc.'s team of engineers, geologists and geophysicists identify a location for an oil well, a permit is required before drilling operations can begin. As part of the process, we consult with the surface owner regarding the location of our well sites and facilities by often entering into a surface use agreement with the landowner. All permits must be in place before operations can begin. Once we have all required permits, we're ready to prepare the drill site for activity. After access roads and well pad construction are complete, the drilling rig is moved on location and will remain approximately 45-55 days for each well drilled in the Tuscaloosa Marine Shale (TMS).

## Wells are engineered & built for integrity

We begin by drilling a surface hole hundreds of feet below potable water tables at a depth to comply with existing regulations. Encana USA applies a rotary drilling technique, in which a sharp, rotating drill bit digs down through the surface. As the drill pipe turns, the bit's sharp teeth penetrate the hard subsurface layers of sandstone and shale. Wells in the TMS are drilled to depths of between 19,000-21,500 feet deep within the formation.

Drilling mud, made up of water and bentonite clay, is used to lubricate the drill bit, control well pressure, remove formation cuttings from the hole, and stabilize the walls of the well until the steel casing is installed. The mud is mixed and stored in steel tanks on the ground beside the rig. When possible, Encana USA utilizes closed loop mud systems to recycle the mud throughout the drilling process and contain the cuttings removed from the wellbore.

### Surface Casing

Before any oil is produced from the well, a multi-layered barrier of steel and concrete is constructed inside the wellbore to seal it off from freshwater aquifers. After the surface hole is drilled below any potable water zone,

the drill string is removed and surface casing is run down the length of the wellbore. The surface casing must then be set and cemented. We center the casing in the wellbore with centralizers that then pump cement down the inside of the casing, to the bottom, and then circulate it up around the outside of the casing to seal the space between the surface pipe and the wellbore, back up to the surface. Surface casing protects and isolates the freshwater aquifer from the wellbore.

### Production Casing

The final step is running production casing down the wellbore to total depth. Then, we cement the production casing into place, in the same way that the surface and intermediate casing were cemented, to a minimum of 1000 - 2500 feet inside the intermediate string. The area between the wellbore and the casing is completely sealed to prevent gas and fluids from migrating into other areas in the wellbore.

## What is the typical level of activity during drilling in the TMS?

A drilling rig is not a permanent fixture on a well site. To maintain the integrity of the wellbore, drilling is a 24-hours-per-day operation that typically lasts 45-55 days per well. The company man and/or tool pusher remains on site at all times. At Encana USA drill sites, the drilling rig is typically operated by two crews of five people each. During the drilling period, approximately 10-20 trucks per day bring in supplies such as water, materials needed to mix the drilling mud, along with well casing and cementing materials.

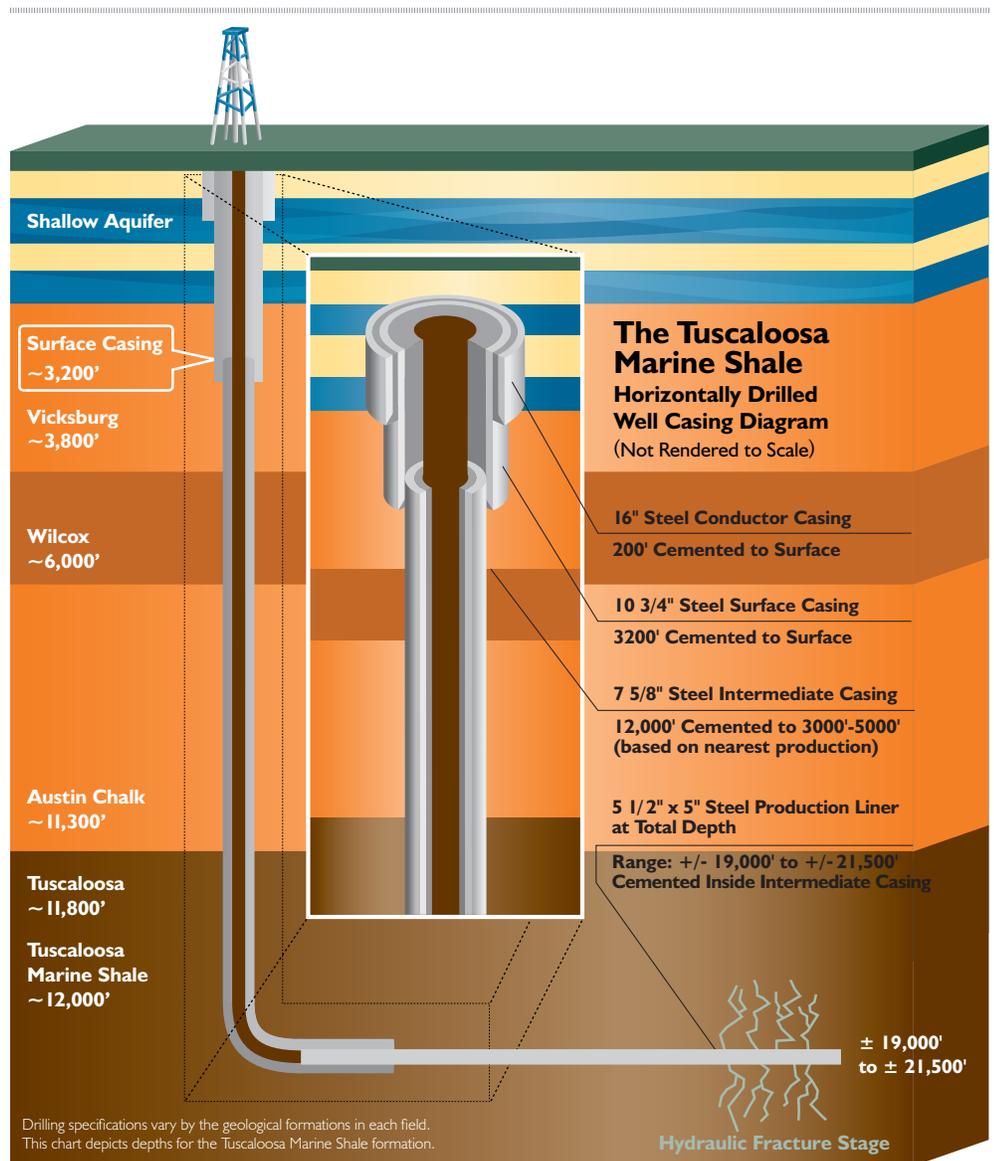
For more information about completion and drilling see:

- [encana.com/operations](http://encana.com/operations)

## Drilling in the TMS

Technological advances allow Encana USA to efficiently steer the direction of the wellbore. Horizontal drilling allows us to drill multiple wells (typically two to six wells or more) from the same pad, greatly reducing our environmental footprint and creating efficiencies.

## Horizontal well diagram



There are up to six layers of cement and steel protecting the freshwater aquifer.

### Best practices

The most common impacts to nearby residents during the drilling process are sound, dust, lights and traffic. Encana USA works to minimize these disturbances and to address environmental concerns in many operating locations by:

- installing hospital grade mufflers on rig engines to reduce noise
- installing sound-absorbing barriers near residences
- redirecting lights after dark
- identifying water resources as close to locations as possible to help reduce truck traffic

**FOR MORE INFORMATION CONTACT:** Community Relations at 866.896.6371

