

Outcrop Characteristics for the Woodford Shale

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The Woodford Shale is the foremost hydrocarbon source rock and unconventional reservoir in Oklahoma. Depending on current depth of burial and thermal maturity, it produces natural gas and/or oil. In the most active play areas, the Woodford varies in thickness from about 100 to 300 ft; limited production from intervals as thin as ~25 ft thick also occurs. From field observations, the Woodford contains a variety of strata that is relatively consistent throughout a large areal extent. It consists predominantly of dark gray to black organic-rich siliceous shale and interbedded chert. The shale is extremely resistant to weathering, is brittle, and non-calcareous. At certain locations, fractures and bedding planes within the shale (and chert) contain dead oil (bitumen). Rust-colored staining within these strata signifies the presence of altered pyrite. Small, unaltered cubic pyrite crystals and pseudomorphs are plentiful; locally some are larger than 1 in. diameter. The cherty beds are laterally continuous across most outcrops and are generally 1-3 in. thick. Normally, they are most abundant in the upper and lower parts of the formation and characteristically have numerous vertical fractures that tend to end vertically within the enclosing shale. The abundance of chert is due to cyclic deposition of radiolarian skeletal remains that can be seen locally with the aid of a hand lens. Within these same cherty intervals, phosphatic nodules ½ to 2 in. diameter may be abundant. Many are nearly perfectly spherical and contain concentric internal banding. The nodule core is typically calcareous. Thin siltstone and dolomitic beds ~1 ft thick may also be present in the middle to upper part of the formation. The Woodford always has anomalously high gamma-ray (GR) values that can be detected using a hand-held scintillometer.