

## CHALLENGE

To provide the operator with EM signal through the Onondaga Limestone, Oriskany Sandstone, Salina Salt and Lockport Dolomite formations in air drilling application.

## SOLUTION

Use EvoOne EM telemetry with its multi antenna array surface receiver to overcome historically difficult EM signal transmission areas in the Utica.

## OUTCOME

1. Effective transmission EM signal through limestone, sandstone and salt formations in the Utica.
2. Delivered EM decoding at equivalent or faster data rates than other providers without EM signal interruption.
3. Provided superior performance at a lower battery cost.

## EvoOne EM Out Performs The Competition

EvoOne was tasked with providing our client with better EM signal decoding on Utica wells in Pennsylvania and Ohio. Two intermediate sections were drilled on air in Monroe County Ohio to 10,200' and in Greene County Pennsylvania to 11,200'. EvoOne EM signal decoding was outstanding with no signal loss observed on either well. EM signal above the Salina was 5-25 millivolts with signal to noise ratio of 15-25dB, signal in the Salina was 0.23-2.5 millivolts with signal to noise ratio of 10-16dB and EM signal in the Lockport was 0.1-3.4 millivolts with signal to noise ratio of 8-16dB.

## EvoOne EM Data Rates & Flexibility

EvoOne was able to provide 4hz wavelength at a 5-watt power configuration providing a 4 bits per second data rate. The versatility of having EM down link capable EvoOne tool makes it quick to adjust tool configurations and takes less than one minute, whereas flow and rotary down links can take up to 15 minutes. This time savings to the operator can be significant when drilling in the areas like the Utica where multiple down links are often necessary to change tool configurations.

## EvoOne Battery Management

Using our most common power setting of 5 watts, EvoOne mitigated battery cost through the most challenging formations of the Utica where other providers are often required to use 30 watts with poor decoding results. EvoOne's standard tool configurations also includes real-time battery updates which eliminates the need for cumbersome excel based battery estimates that are susceptible to interpretation and planning errors. Using EvoOne's DaVis™ Software to visualize the Monroe well (graph below) demonstrates that even as formation resistance increases (in the Salina Salt and Lockport Dolomite), EM signal strength only drops to 0.1mV whereas EvoOne's EM decoding threshold on surface is 10 times lower (.01mV).

