

## **Applying 3-D Seismic in Marcellus Shale Development, Greene County Pennsylvania**

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The Marcellus Shale in the area of the Mather and Garards Fort quadrangles east of Waynesburg, Greene County, Pennsylvania is buried at an average depth of approximately 8,000'. The majority of the petroleum development activities in the area prior to the Marcellus Shale activity were focused on Upper Devonian tight gas sandstones.

Energy Corporation of America ("ECA") had drilled 110 wells in Greene County through the Bradford section to an average depth of 4,300'. Subsequent vertical drilling to the Marcellus in the area, proved greater structural variations in the depth to the Marcellus than were observed in the shallower Bradford section. There seemed to be little relation between the subsurface structural geologic maps of the Bradford and Marcellus intervals.

Given the structural variability that ECA observed in the Greene County vertical Marcellus wells, the decision was made to acquire a proprietary 3-D seismic survey early on to maximize horizontal well lateral length and wellbore placement within the Marcellus Shale. A proprietary 24 square mile 3-D seismic survey was acquired in January and February 2010.

The ECA 3-D seismic confirmed that the geologic structure at the Marcellus level included faulting in the Marcellus, that was not present in some shallower objectives, faults with throws on the order of 250' were observed in the data. Knowledge and understanding of the strike of these composite fault trends has changed plans for locating surface pad sites and the resulting horizontal well paths. These changes contributed significantly towards efficient field development.