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Further insights on Induced Seismicity in the Duvernay East Shale Basin

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Summary

Vesta Energy has been operationally active in the Duvernay of the East Shale Basin since 2014.

Since March 2018, Vesta Energy has been operating a passive surface seismic array to monitor induced seismicity (IS) related to their hydraulic fracture operations on 22 well pads. The resultant 3 + year IS catalogue has 17,000 events; and this IS dataset has revealed numerous aspects to the character of seismicity in the Duvernay East Shale Basin.

One of the most striking points in this catalogue is that there is an asymmetrical distribution of induced seismicity events in Vesta's area of operation (fig. 1). Essentially, the fracking parameters are similar for all pads, but virtually all of the 17,000 events occur SW of this red, acoustic impedance contour line seen below. This talk will further examine the relationship between IS and acoustic impedance.

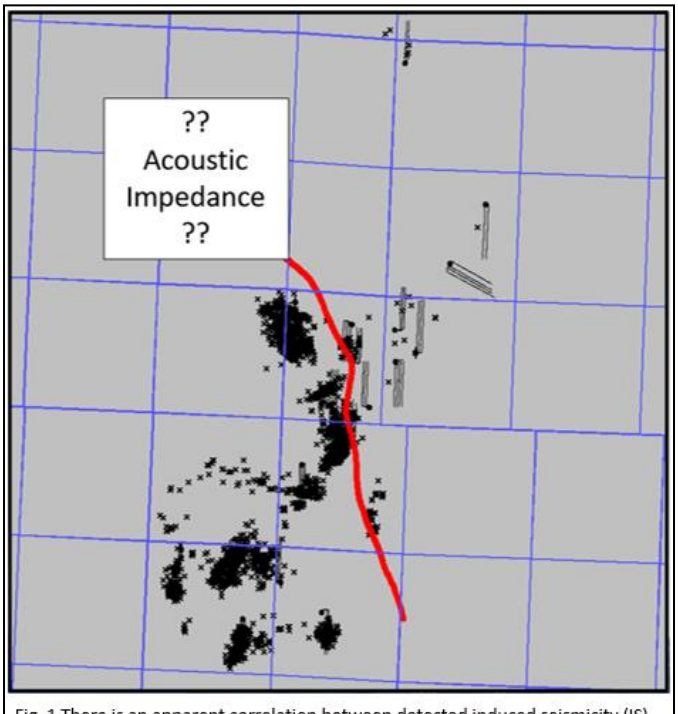

Fig. 1 There is an apparent correlation between detected induced seismicity (IS) and acoustic impedance. The vast majority of detected IS events are to the SW of the red acoustic impedance contour.

Vesta's IS catalogue has a Magnitude of Completeness of -0.4 Ml and the recorded smaller events usually highlight re-activated faults before they become a concern. Empirically, only faults (see Fig. 2) with an azimuth of 0-30^0 are likely to have ≥1.0 Ml events. With regard to mitigation, it is important to detect these small magnitude, initial events to successfully manage the faults that have the highest risk of inducing a larger magnitude event.

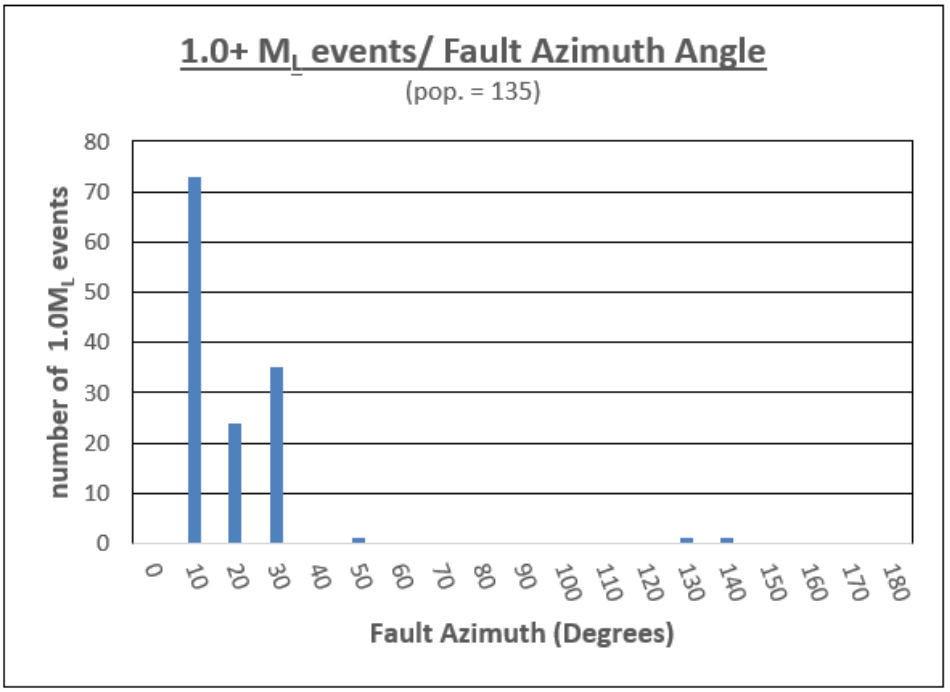

Fig. 2 The vast majority of 1.0+ events only occur on re-activated faults with an azimuth between 0-30^0.

This talk will provide an interim up-date of Vesta Energy's ongoing effort to understand and successfully manage the induced seismicity of the Duvernay East Shale Basin.