Microseismic Case Study: A deeper look into the microseismic events. What events are really related to stimulated reservoir

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Abstract

Yangarra Resources Ltd. (Yangarra) was preparing to develop the Cardium sand on their acreage in the Willesden Green area of Alberta. To optimally drain the acreage, horizontal well density and the number of frac stages employed using multi stage fracture stimulation was questioned. To answer this, Yangarra contracted Reservoir Imagining Ltd. (Reservoir Imaging) to acquire downhole microseismic (MS) data in a vertical well they drilled near the initial proposed horizontal well. In addition to the MS data it was decided to acquire a VSP survey to refine the velocity model, tie an existing 3D reflection seismic survey and confirm the phase and integrity of the 3D seismic processing.

One of the basic questions that a microseismic survey addresses is the fracture length achieved during a fracture stimulation operation. The 'first look' results of the MS survey showed microseismic events were reaching as far as 250 meters from the well bore and up to 250 meters above and 175 meters below the Cardium sand. The question was 'to what extent were the observed microseismic events linked and stimulated and therefore actually contributing to production'. By analyzing the timing and amplitude of the microseismic events it became apparent that not all events should be used in estimating the stimulated rock volume. By making a series of assumptions and filtering the data, we were able to come up with a more reasonable estimate for stimulated rock volume and thus provide data that would yield an appropriate well density to efficiently drain the reservoir.