



Horrane Fault

January 2019

The Horrane Fault is a sub-surface crack through rock layers, caused by deep-earth pressures over many millions of years. While faults occur across Arrow's Surat Basin tenure, the Horrane Fault is the largest.

Arrow has four existing coal seam gas (CSG) production fields in the Surat Basin – Tipton West, Daandine, Stratheden and Kogan North. Arrow has been commercially supplying CSG from the Surat Basin since 2004.

The Plainview Pilot is Arrow's most easterly appraisal production wells, and has deliberately been placed on the east side of a geological formation called the Horrane Fault.

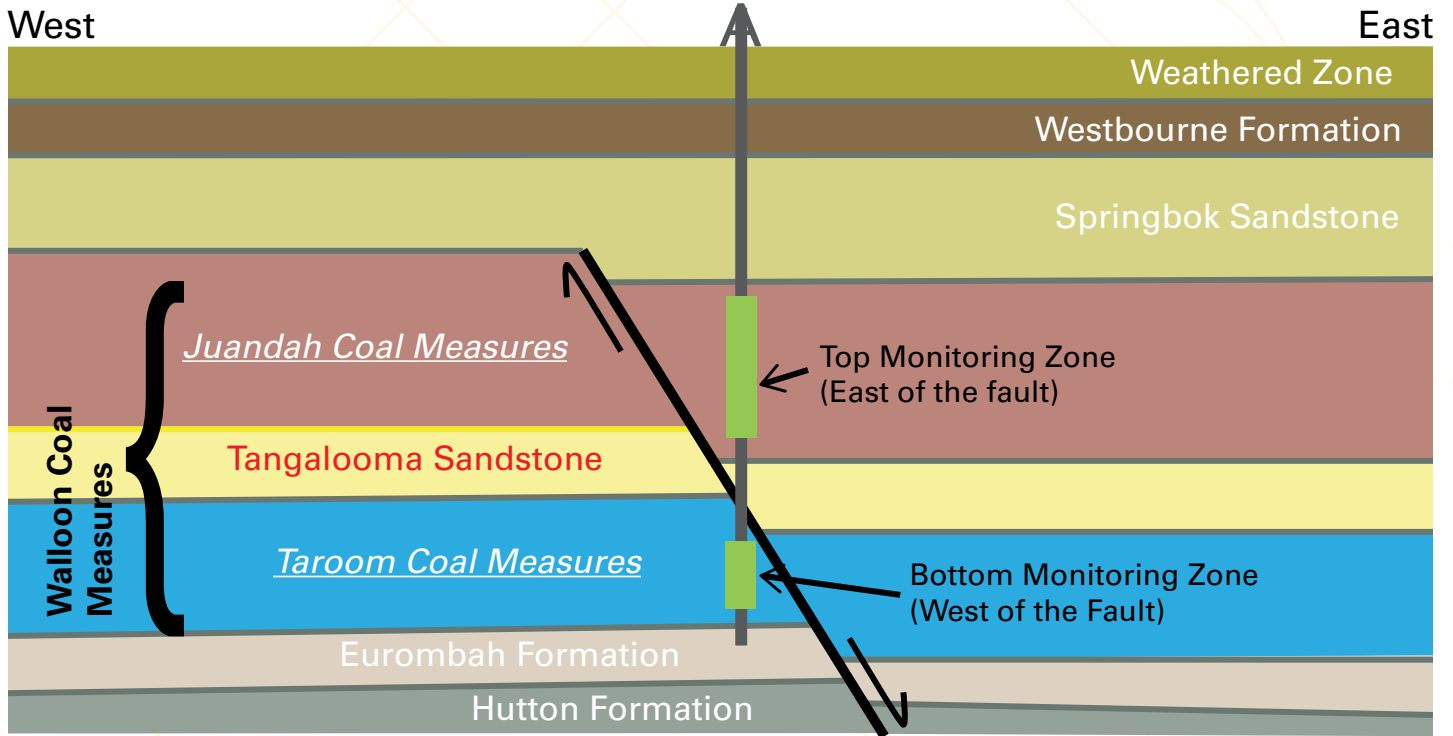
All of Arrow's current production wells are to the west of the fault.



Plainview 34 core showing the fault zone and 'fault gouge'

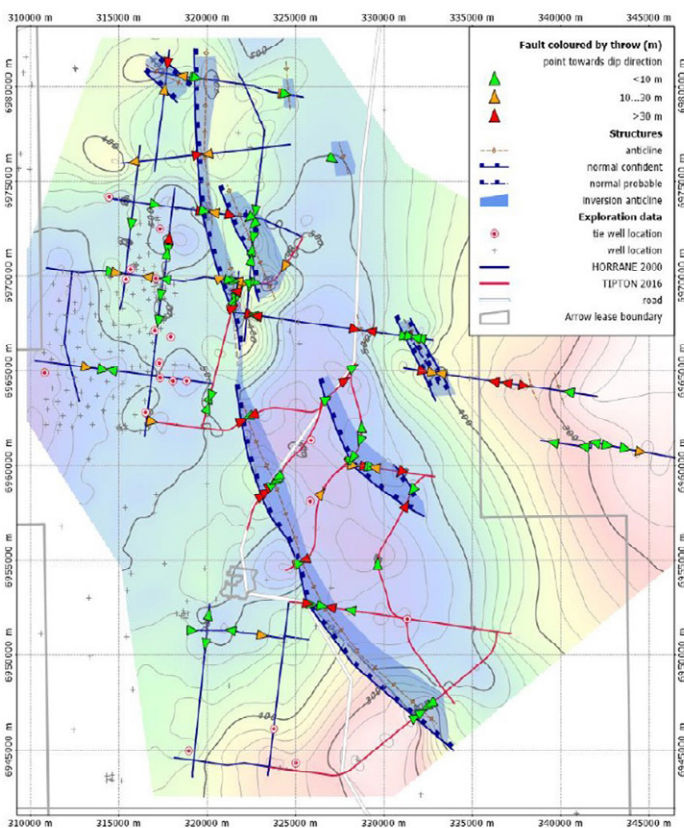
Research to date

- Early pressure monitoring at the commencement of coal seam gas (CSG) production in the Tipton production field showed negligible groundwater drawdown across the fault.
- In 2015, Arrow and the CSIRO did desktop modelling that pointed to little likelihood of the fault opening up as groundwater pressure dropped during future CSG operations.
- In 2017, Arrow's Tipton seismic survey further defined the fault's location, building on seismic information collected back in 2000 (one of Arrow's first seismic mapping programs).
- In 2017, Arrow drilled the Plainview 34 core hole, deliberately intersecting the fault (the first-known deliberate intersection of a fault in the Surat). The core (a cylinder of rock cut out of the ground) showed a fault zone of about 2.5m of highly-fractured rock with a 'fault gouge' of fine, clayey material which is quite impermeable.
- The gas content of the core sample was measured, showing lower gas on the western side (the Tipton production field) than on the eastern side; suggesting there has been no flow of gas across the fault, despite 10 years of CSG production.
- The fault was directly tested in the Plainview 34 core hole by isolating the fault zone with a series of seals, and pumping water at high pressure into a permeable coal seam closely above the fault. Pressure gauges around the fault showed no increase in pressure (which would have been expected if fluids could flow along the fault). This suggests that there are no leaks along the fault.



* Not to scale

Plainview 34 well schematic



Structural interpretation of the Tipton and Horraine seismic surveys. The background image and contours refer to the converted depth of the Eurombah horizon.

Research underway

- A series of shallow gas monitoring holes has been installed in the area. Early data will establish the background methane levels in the soil. After that, they will monitor for variations in that level as the Plainview Pilot wells begin producing gas and water.

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