FESAus August 2022 Talk
New methods to estimate calliper in cased hole log data

Growth in the coal seam gas industry in Queensland, Australia, has been rapid over the past fifteen years, with annual production reaching about 40 Bscm of which approximately 80% of this coming from the Surat Basin and 20% from the Bowen Basin.

The Walloon Coal Measures of the Surat Basin are characterized by multiple thin coal seams making up approximately 10% of the total thickness. The coal seams are interbedded with lithic-rich sandstones, siltstones, and carbonaceous mudstones. The presence of such interburden within the primary production section has led to an unusual completion strategy. To maximize connection to the gas-bearing coals, uncemented slotted liners are used and to minimize fines production, external swellable packers and blank joints isolate larger intervals of interburden. Despite these efforts, significant fines production still occurs, which leads to failure of artificial lift systems and the need for expensive workovers or lost wells. Fines production has major economic implications, with anecdotal reports suggesting up to 40% of progressive cavity pump artificial lift systems in Walloon Coal Measures producers may be down at any one time.

The first step in solving this problem is to identify the extent and distribution of fines production. The wellbore completion strategy above, however, precludes use of mechanical calipers to identify fines production-related wellbore enlargement. A new caliper-behind-liner technique has therefore been developed using a multiple-detector density tool. Data from the shorter spacing detectors is used to characterize the properties of the liner as well as the density of the annular material. This is particularly important to evaluate as the annulus fill varies between gas, formation water, drilling and completion fluids, and accumulated fines. The longer spacing detector measurements are then used in conjunction with pre-existing open-hole formation density measurement to determine the thickness of the annulus, and hence hole size, compensating for liner and annulus properties.

This methodology has been applied to several wells completed in the Walloon Coal Measures. Results have demonstrated the ability to identify zones of borehole enlargement behind slotted liner, as well as intervals of either gas or fines accumulation in the annulus. In addition, the technique has been successful in verifying the placement of swellable packers and their integrity. The application of this solution has been used to drive improvements in the design of in-wellbore completion programs and in the future will help drive recompletion decisions and trigger proactive workovers.

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DATE:	**Tuesday August 09, 2022** - 13:30 – 14:30 PM (WAST, GMT+8)
VENUE:	**Online**
COST:	Members $10.00; Non Members $20.00; Students/Retirees $5.00; Online registration at www.fesaus.org