Challenge:

Insufficient sweep efficiency can lead to inadequate pressure support to neighboring wells. Identifying zones which are not accepting injection fluid is key for planning remedial action to improve sweep efficiency and ultimately increase oil recovery.

Acoustic Logging Result:

One example of when acoustic logging was conducted to check acid stimulation efficiency is shown below:
The well was drilled in 2015 as a vertical water injector. The well was completed with a 9 5/8" surface casing and a 7" production casing. The 7" casing was perforated at 869-873 m to support the reservoir pressure in nearby production wells. The average injection rate was 200 m3/d. However, after 5 years of injection there was no improvement in pressure in the nearby production wells. It was decided to run an acoustic logging tool to identify the reservoir intake zones as the spinner tool can only identify the wellbore intake zones i.e., into the perforations and not flow behind the casing.
The SNL data together with the shut-in temperature curve indicated that all the injected water went into a very narrow interval of 1 m with a sweeping efficiency of 25% of the total perforated interval. This narrow zone correlates to a high permeability layer. Based on the acoustic log results it was decided to perform an acid stimulation of the perforated interval to improve sweep efficiency. After the acid stimulation the well was put on injection for 5 months. The acoustic log was then repeated. The SNL data indicated that after stimulation an extra intake interval was evident which was also confirmed by the temperature curve. This demonstrates that the acid stimulation was successful in improving the sweep efficiency. In addition, the SNL data showed a downward crossflow below the bottom of the perforated interval.

Conclusion:

Acoustic logging is a powerful technique to provide accurate reservoir flow behaviors behind the casing which would otherwise be missed if only using spinner data. This can aid the Client to determine how to improve sweep efficiency and improve 3D dynamic modelling.