

Deep Slimhole Drilling for Geothermal Exploration – Confirming Conceptual Models based on Geophysical Surveys

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Outline

- Introduction
- Definition
- Advantages of deep slimhole drilling
- Disadvantages
- Examples
- Conclusions

Introduction

- Slimhole drilling has not been very common in the past, in fields where well targets have been readily identified
- In more challenging fields, the uncertainties in siting the initial wells are greater
- Recent technological advances and cost advantages have seen deep slimhole drilling become increasingly used in geothermal exploration and delineation
- Inclined slimholes can now be drilled deeper with smaller rigs and with improved well control to test the geothermal reservoir

Definition

Deep slimholes = diamond wireline cored slimholes that are designed to **reach and evaluate** the deep geothermal reservoir

(as distinct from temperature gradient holes)



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Advantages of deep slimhole drilling

- Cost
 - <30% of large wells
- Time to start
- Geology
 - Full core
- Chemistry
- Permeability
- Reservoir temperature and pressure



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Other Advantages

- Lower Impact
 - Less water for drilling
 - Minimal roads and pads
- Easier well control – small diameter
- Shorter mobilisation period
- Avoid need for formation imaging etc
 - Core provides better data
 - Can conduct rock properties measurements on core
- Use wells for later monitoring
 - Pressure changes
 - Interference testing while flowing larger wells nearby

Disadvantages of deep slimhole drilling

- Not for production /reinjection
 - Only small flows for production and injection
 - typically 10-20 kg/s is maximum
 - Pressure drop can cause scaling faster than large wells
 - Small diameter limits pump size (though it is possible to have a larger diameter upper hole if needed)
- Slower drilling
 - Coring is slower, though can use rotary drilling with the coring rig
- Drilling difficulties
 - Narrow diameter holes can mean stuck in hole in some swelling formations
- Depth Limits
 - Typically 2000 for HQ hole (about 3”) for common coring rigs
 - But much deeper coreholes have been drilled in South Africa and are possible for investigating some HSA and EGS systems in Australia

Conclusions

- There may be several reasons to drill deep slimhole wells in geothermal fields, including the relatively low cost, the shorter preparation time, and the greater geological detail that is obtained
- It may not be necessary or appropriate for all fields, but slimhole drilling is likely to become increasingly common, particularly for better defining well targets and improving the chances of success of deep production wells

Many thanks

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