

台灣北部地熱鑽井計畫

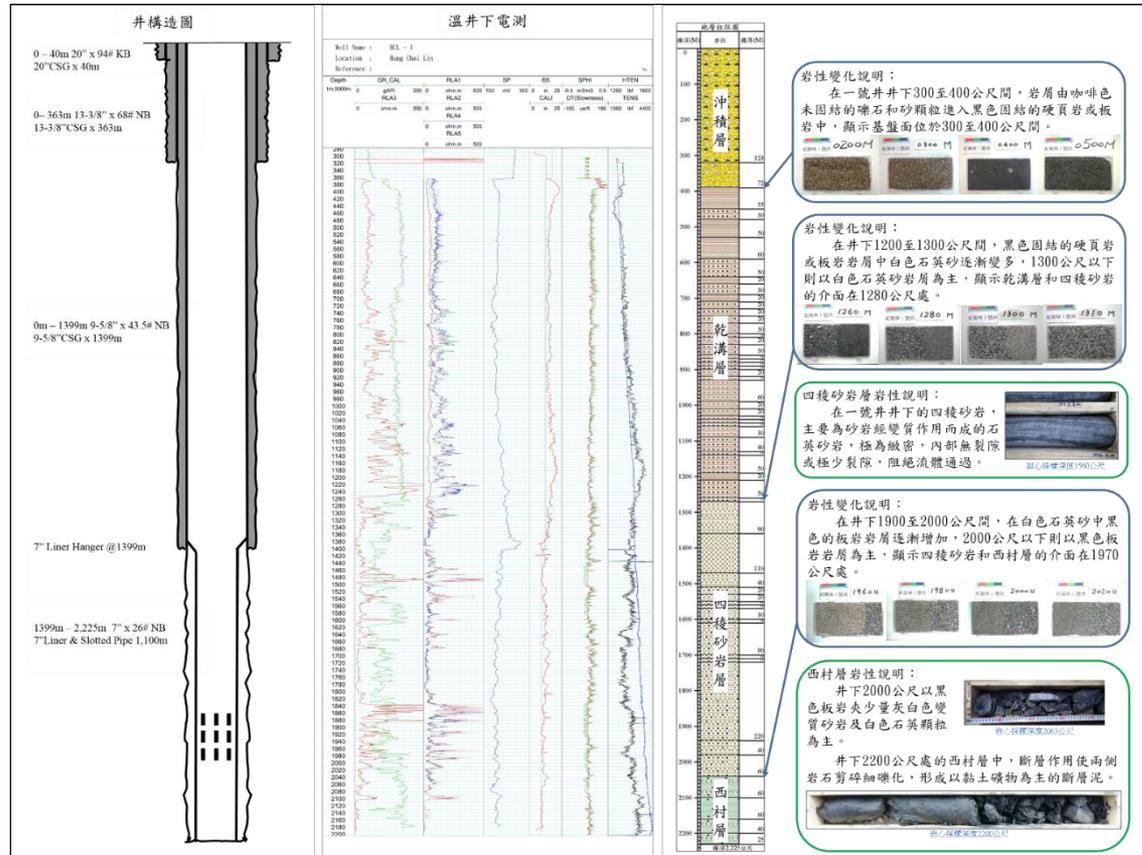
執行單位

國立中央大學

計畫主持人

王乾盈

本科技部計畫選定宜蘭三星紅柴林地區，沿蘭陽溪南岸鑽探紅柴林一號井及二號井，二井間隔1.5公里，中間為耕莘專校。鑽井工程由台灣中油公司鑽井隊執行，二井各花半年時間完成。一號井深2,200公尺，井底溫度80度，二號井2,800公尺，井底溫度120度。



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- 經岩心岩屑及井測分析，鑽遇之地層為沖積層(上半為沙泥層，下半為礫石)，乾溝層(板岩為主)，四稜砂岩(石英砂岩為主)及西村層(板岩為主)。四稜砂岩極為堅硬，鑽鑿不易，取樣更難。各地層鑽遇之深度分別為：一號井(330m, 1,280m, 1,970m)，二號井(470m, 1,310m, 2,280m)，一號井地層堅硬完整，無明顯裂隙，二號井則在1,800m至2,300m遇破裂帶，大量湧水(130噸/時)，水質乾淨無明顯鈣砂沉澱，研判有斷層通過(蘭陽溪斷層)。
- 主應力為南北向，產生走滑兼正斷層錯動，地層南傾45度。石英液包體顯示古溫度220~260°C。二井溫度垂直分布最明顯的特徵為：沖積層內迅速上升至40~60度，但進入乾溝及四稜砂岩，遇地下水流動帶，溫度不增，但更深進入西村層，又以6°C/100m以上之溫度梯度迅速升高，明顯接近地下熱源，預估在4,000m深可達200度。
- 本研究成果顯示蘭陽溪為極佳之深層地熱潛能區，往海方向，溫度愈高。台灣欲開發深層地熱，應以蘭陽溪沿岸為最佳選擇。

Deep Geothermal Drilling Project of Northern Taiwan

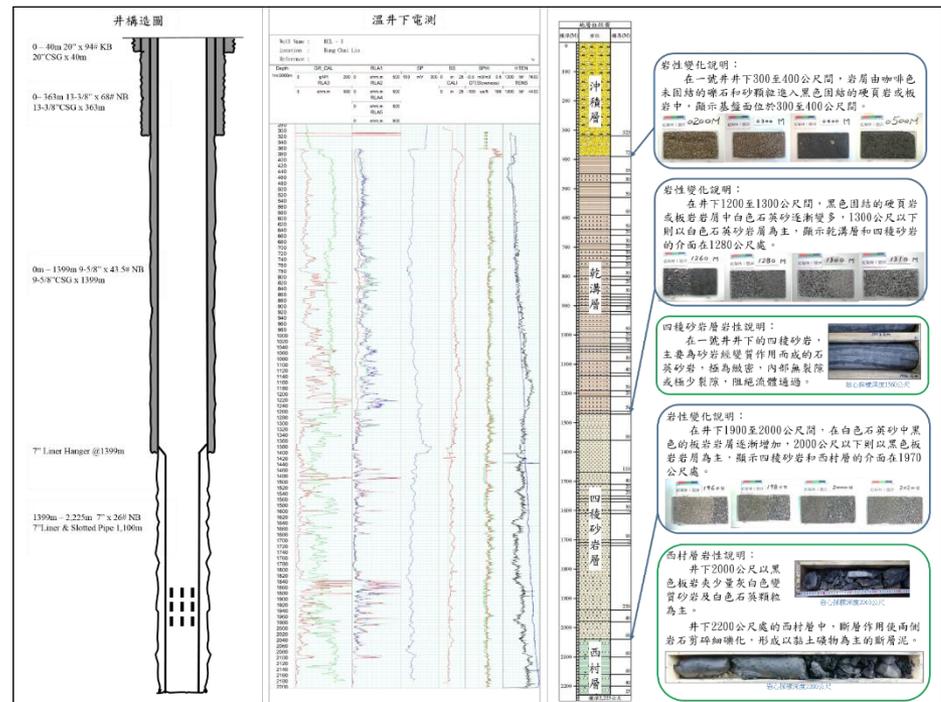
Execution Unit

National Central University

Project Director

Wang Chien-Ying

The project selects the HongChaiLin area (the ShanShin county) in the Ilan Plain to drill two deep wells: HCL-1 and HCL-2 along the south bank of the LanYang River. The drilling project is carried out by the CPS's drilling team. Each well spent six months to complete. The HCL-1 well has a depth of 2,200 meters with the bottom temperature 80°C and the HCL-2 well 2,800 meters deep and the bottom temperature 120°C.



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- According to the analysis of core cuttings and well logging, the strata encountered are 1) the alluvial layer (sandy mudstone in the upper half and gravel in the lower half), 2) KanKo formation (Kk, mainly slate), 3) the SuLin formation (Sl, mainly quartz sandstone) and 4) HsiChuan formation (Ht, slate-based). The Sl formation is quartz sandstone which is extremely hard and quite difficult to drill and sampled. The depths of these formations are: HCL-1 (330m, 1,280m, 1,970m) and HCL-2 (470m, 1,310m, 2,280m). HCL-1 is hard and complete with no obvious fractures. Otherwise, HCL-2 is quite fractured. It meets an obvious fracture zone between 1,800m and 2,300m. A large amount of clean water spurts out (130 tons / hour) without obvious calcium or silicate precipitation. It is judged to near a fault (the LanYangRiver fault).
- The main stress is found to be in the north-south direction, resulting in the strike-slip and normal fault dislocation. The stratigraphy bedding dips southward 45 degrees. Quartz liquid inclusions show an ancient temperature 220 ~ 260°C. The most significant vertical distribution of temperature in HCL-2 is as follows: in the alluvial layer rapidly rises to 40-60 degrees, but enters the Kk and Sl formations, encounters the groundwater circulation zone, thus without increasing the temperature. But when entering the deeper Ht formation, the temperature gradient increased rapidly, which implies close to the heat source. It is optimistically estimated able to reach 200°C at 4,000m depth.
- The results of this study show that LanYang River is an excellent deep geothermal potential area. Even higher temperatures could be found in the seaward direction. It is highly recommended to develop the deep geothermal along the LanYang River in the Ilan Plain.