# **PETRATHERM LIMITED**



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REPORT FOR THE QUARTER ENDING 30 September 2007

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# HIGHLIGHTS

- Commencement of the initial deep well design, rig specification and selection process for the Paralana Project using Australian Drilling Associates and US geothermal energy experts Global Power Solutions.
- Commencement of the Paralana Seismic Survey during the quarter (subsequently completed during October), enabling a reduction in risk in siting and locating of the deep wells at the Paralana Project.
- First mover advantage in Spain with projects near the large markets of Madrid and Barcelona – and the granting of key permits on the islands of Tenerife and Gran Canaria in the Canary Islands giving access to conventional geothermal projects, allowing Petratherm to have a project portfolio diversified across geothermal technologies as well as across markets.
- Strengthening of the Company's skills base through consultancy agreements with Professor Richard Hillis and Associate Professor Dr. Martin Hand both from the University of Adelaide.
- At the end of the quarter the Company held \$7,478,000 in cash

### **REVIEW OF OPERATIONS**

The focus for the Company during the quarter has been one of consolidation, with the careful planning and preparation of the Paralana deep geothermal wells, and the strengthening of the Company's emerging Spanish portfolio. The Company has sought the best local and international expertise to develop a drilling, evaluation, and sub-surface heat exchanger development plan for Paralana. The plan contains many innovations which differentiate it from other competitors. Underpinning this plan is the Company's key desire to lower risk, lower costs, and maximise returns. The Paralana project has the ability to be commercial at all stages of development

In Spain the Company has expanded is project portfolio to four projects, comprising two conventional geothermal exploration areas in the Canary Islands and two engineered geothermal (Hot Dry Rock) project areas on mainland Spain (Barcelona and Madrid, Figure 3). Having first mover advantage in Spain, the Company has attracted great corporate, government and public interest. The Company is now actively developing its project areas and corporate business strategies for Spain.

At the end of the quarter, the Company held \$7,478,000 in cash. Exploration and evaluation expenditures amounted to \$504,000 for the quarter reflecting the prelimary well design and rig selection work in preparation for the deep drilling at the Paralana Project and the Company's project portfolio expansion in Spain. Ongoing adminstration costs of \$453,000 during the quarter reflect the recent expansion of staff and new geothermal projects.

In early 2007, the Company established a joint venture with Beach Petroleum for up to \$30M for its Paralana Project. This was closely followed by a \$5M renewable energy development initiative grant from the Federal Government to prove Petratherm's Heat Exchanger Within Insulator (HEWI) model at Paralana. The joint venture and grant arrangements, together with the Company's strong cash position have provided Petratherm with the financial capacity to proceed with the next phase of the Paralana project and to concurrently develop new high value opportunities in Spain and China. The JV and REDI grant provided \$108,000 toward operating activities while interest received from cash invested amounted to \$128,000.

#### Paralana Project (GELs 156, 178, 180, 254)

During the quarter a new GEL (254) was secured at Paralana to cover the total project area where it is expected there is a high quality geothermal resource (Figure 2). The next phase of major works at Paralana involves the drilling of an injector and a producer well and the subsequent development of a fluid circulation cell (the sub-surface heat exchanger) between these two wells. The drilling and circulation work will be a precursor to constructing an electricity generation plant (of around 7.5 MW) to meet local power needs at the neighbouring Beverley Uranium Mine.

The Company completed the first deep well design and drilling rig selection work aided by external consultants with experience in both the petroleum and geothermal industries. The first deep well will be drilled to between 3.5 and 4.0 kilometres depth where bottom-hole temperatures are approximately 200°C. The program will then move to characterizing a fluid circulation system within the underground heat exchanger. Depending on these findings mechanical or chemical enhancement of the sub-surface fluid circulation cell may need to be undertaken prior to drilling of the second deep well and completion of the circulation system.

A seismic survey grid over the interpreted high temperature zone of the Paralana Geothermal Project is planned for the next quarter (Fig 1). Limited historical reconnaissance seismic data captured in 1984 over the Paralana region indicate that numerous faults occur within potential deep reservoir horizons. These structures may greatly improve local permeability and fluid circulation. The seismic study aims to more accurately constrain the geometry of these reservoir horizons and the faults. This will enable optimal placement of the scheduled deep geothermal well to target these high permeability zones.

In support of the seismic reservoir characterization work, a magneto-telluric survey is also scheduled for the next quater. The magneto-telluric survey will provide further information on the geometry of the reservoir, and may also define naturally occurring fluid pathways already present within the reservoir.

These important pre-drill studies greatly increase the probability of a successful first production well. Subject to rig availability, spudding of the first deep well at Paralana is anticipated in the second to third quarter of the 2008 calendar year.



Figure 1 Planned seismic survey lines over the Paralana Thermal Resource.

# Paralana Commercialization Plan – viable at all stages of development

The Paralana Project is uniquely positioned to enable commercial viability at small scale (7.5MW building over time to 30MW), an important factor in the development, expansion and subsequent "bedding down process" of any new technology. This is a direct result of the close proximity of the Beverly Uranium Mine and their current 'off-grid' prices.

Large-scale development of the Paralana site – following the development and "bedding down process" - also provides a unique opportunity for Petratherm's Paralana Project with flexibility and significant cost benefits associated with potential large-scale transmission network solutions to competitively access the NEM at Port Augusta and/or Olympic Dam (Figure 2)



**Figure 2** Petratherm's geothermal licence areas (new licence in yellow) and possible transmission connection routes for the Paralana Geothermal Energy Project site.

The planned delivery of large-scale power (up to 520MW) has taken into account the capacity of the market to digest large increments of generation competition from other geothermal and indeed traditional sources of power generation and the cost of delivery (transmission network) of electricity to the 'on-grid' market (NEM).

Petratherm's two basic network solutions include:

 A double circuit 275kV transmission line from Paralana to Port Augusta capable of delivering 520MW into the NEM at Port Augusta. ("Radial network solution").  A single circuit 275kV transmission line from Paralana to Port Augusta and a single circuit 275kV transmission line from Paralana to Olympic Dam, each capable of delivering 260MW to those entry points. ("Meshed network solution").

The latter network arrangement would create a "meshed" transmission network in the north of the State and provide a backbone of electricity infrastructure for the remote community, but in particular the State's growing resources sector. Importantly, the "meshed" network solution has the potential to provide substantial broader community benefits and hence has the potential for the inclusion of a proportion of assets (and costs) into the regulated asset base of a registered transmission owner under the Australian National Electricity Rules (NER). Accordingly, there is unique opportunity for substantially reducing the overall project network connection costs.

Similar opportunities exist for the radial network connection where the prime cost reduction occurs through the utilization of a single electricity tower carrying both 275kV electricity circuits.

### Spain Project Update

The entry into Spain is a strategic move that is consistent with the Company's stated objective of pursuing opportunities in areas where the geology, energy market and regulatory environment are conducive to commercially viable geothermal energy projects. Petratherm has applied its innovative approach to "exploring for shallow hot rocks, close to market" and during February and March 2007, secured two engineered geothermal (also known has Hot Dry Rock) project areas that meet the Company's commercial criteria, adjacent to Spain's two largest cities, Madrid and Barcelona. In July 2007 the Company secured a conventional geothermal project on the Island of Tenerife in Spain's Canary Islands. Most recently in early October the Company announced that it had been successful in securing another licence in the Canary Islands, on the Island of Gran Canaria (Figure 3).

Petratherm's strategy is to continue its geothermal evaluation program in the European Union with a focus on Spain. As a result of this ongoing effort, it is anticipated that the Spanish geothermal portfolio will increase to around 7 or 8 projects in the foreseeable future.

Petratherm's strategic move into Spain has secured a significant "first mover" advantage in one of the most attractive countries in the world for developing renewable energy projects. This comes at a time when, across the world, there is a renewed focus on geothermal energy (Conventional and Engineered Geothermal) as a key part of the solution to the challenge of Climate Change.

The latest tenement acquisition on Gran Canaria is targeting a conventional geothermal energy resource, similar to that secured by the Company on the nearby island of Tenerife. The award of the licence is another step in the

Company's strategy of developing a portfolio of geothermal projects in commercially attractive jurisdictions, across the full spectrum of geothermal energy supply opportunities.

Gran Canaria supports a large local and tourist population of approximately 1 million people placing a large demand on peak power generation, in excess of 800 MW. The island has substantial transmission infrastructure within close proximity of Petratherm's Geothermal Exploration Licence. Power consumption on the island has grown three times over the last 20 years, due to the large population growth. Existing power generation is 94% dependent on expensive fossil fuels from fuel-oil and gas-oil which have very high carbon dioxide emissions.

Gran Canaria, an active volcanic island, is the central island of the Canarian Archipelago, and is located 200 km west of the North African coastline. Three main volcanic-magmatic stages have been defined on the island formed approximately 14 Million years ago. Recent volcanic activity to the east of the island is thought to relate to a mantle hotspot over which the oceanic crust is slowly moving across.

The tenement spans an area of 277 Km<sup>2</sup> over the region of most recent volcanism, and where historical geothermal research undertaken by the Spanish geological survey identified high geothermal temperature gradients in excess of 70 degrees per kilometre.



Figure 3 Petratherm's Spanish Tenement holdings.

Initial exploration work on both Tenerife and Gran Canaria will involve geochemical assessment of thermal waters to ascertain fluid temperatures at depth. This will be followed with magneto-telluric surveys that will map out subterranean hot aquifers and identify any shallow magma sources prior to test drilling.



**Figure 4** Petratherm's Manager for Spain, Raul Hidalgo, surveying historical geothermal test wells on Gran Canaria.

### China – Geothermal Exploration Program

During the quarter the Company has been involved in negotiating a collaborative work agreement with the China Geothermal Energy Society, China Geological Survey, China Institute of Geo-Environment Monitoring and the Chinese Academy of Sciences. This agreement is near finalization and it is anticipated that it will be formally ratified by both parties in the next quarter.

Under the work agreement a high level assessment of the geothermal resource potential of engineered geothermal systems in China will be established. The project aims to stimulate future cooperation and development of China's large engineered geothermal resource potential. It is anticipated several geothermal exploration licences will be granted on completion of the study over high prospect sites. The geothermal study is scheduled to begin in November 2007 and take approximately 12 months to complete.

# Key Experts Appointed

Petratherm has further strengthened the Company's skills base through consultancy agreements with Professor Richard Hillis and Associate Professor Dr. Martin Hand – both from the University of Adelaide.

Both Richard and Martin were instrumental in the initial collaborative development of Petratherm's exploration and HEWI models. They have now expanded their relationship with Petratherm as the Company prepares for its next phase of work at Paralana and the expansion of its project portfolio in Australia and overseas.

Professor Hillis is the Head of the Australian School of Petroleum and Professor of Petroleum Geology. He is also a Director of Petratherm. His research expertise is in the area of tectonics and present-day stresses of sedimentary basins and their impact on petroleum and geothermal exploration and development. Richard's consultancy work will focus on Petratherm's Paralana Geothermal Energy Project – a Joint Venture project with Beach Petroleum.

Dr Hand is an Associate Professor in Geology and Geophysics in the School of Earth and Environmental Sciences. His research has focused on the record of Proterozoic tectonics in Antarctica and central Australia. Martin's consultancy work will focus on new project exploration in Australia and overseas.