

## **Third Annual/Final Relinquishment Report, 2012**

### **SEL 57/2008 (Arthurs Lake)**

**13<sup>th</sup> April 2011 - 12<sup>th</sup> April 2012**

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## Summary

*KUTh Exploration Pty Ltd (KUTh) holds three Special Exploration Licences in Tasmania for Category 6 minerals (geothermal substances). The principle target of KUTh's work on these tenements is the location of high-temperature Hot Rock geothermal resources suitable for development as Enhanced Geothermal System (EGS) power generators. This report covers the period 13/4/2011 – 12/4/2012 on tenement SEL 57/2008 and is the final report to be lodged for this licence which has now been recommended for surrender.*

*No field work has been undertaken on the licence area in the current annual reporting period. Work previously completed on the licence during KUTh's 3-year tenure includes magnetotelluric geophysical surveys.*

*The combined results of work completed to date indicate that the potential for geothermal resource development within the tenement area is low. Whilst insulating sequences are present across the tenement, the area is now interpreted to be underlain by granite at depths too great to be feasible as geothermal development targets.*

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# 1 Introduction

KUTH Exploration Pty Ltd (KUTH) is a geothermal explorer and is the holder of three current geothermal exploration licences in Tasmania. The principle target of KUTH’s work is the location of high-temperature Hot Rock geothermal resources suitable for development as Enhanced Geothermal Systems (EGS) power generators. This report covers work completed in the period 13/4/2011 – 12/4/2012 on KUTH’s tenement SEL 57/2008. This is the third and final Annual Report lodged for this tenement which has now been recommended for full surrender.

## 1.1 Tenement Status

KUTH Exploration Pty Ltd (KUTH) is a subsidiary of KUTH Energy Ltd and is the sole holder and operator of SEL 57/2008 (Figure 1). The tenement was granted for an initial period of five years to search for geothermal substances (Category Type 6) on 13 May 2009. SEL 57/2008 originally comprised 3,980 km<sup>2</sup>, however, as a result of exploration during the first year most of the licence area was relinquished and it now comprises 1,070 km<sup>2</sup>. Tenure details of SEL 57/2008 are tabulated below.

Tenement Type	SEL
Number	57/2008
Commodity	Geothermal
Licensee	KUTH Exploration P/L
Operator	KUTH Exploration P/L
Area	1070km <sup>2</sup>
Date Granted	13/05/2009

Table 1: Tenure details for SEL 57/2008.

## 1.2 Location and access

SEL 57/2008 is located in the Arthurs Lake area, adjacent to the western boundary of SEL 26/2005. Access to the tenement is good and is via a number of formed roads, minor roads, farm, and powerline tracks.

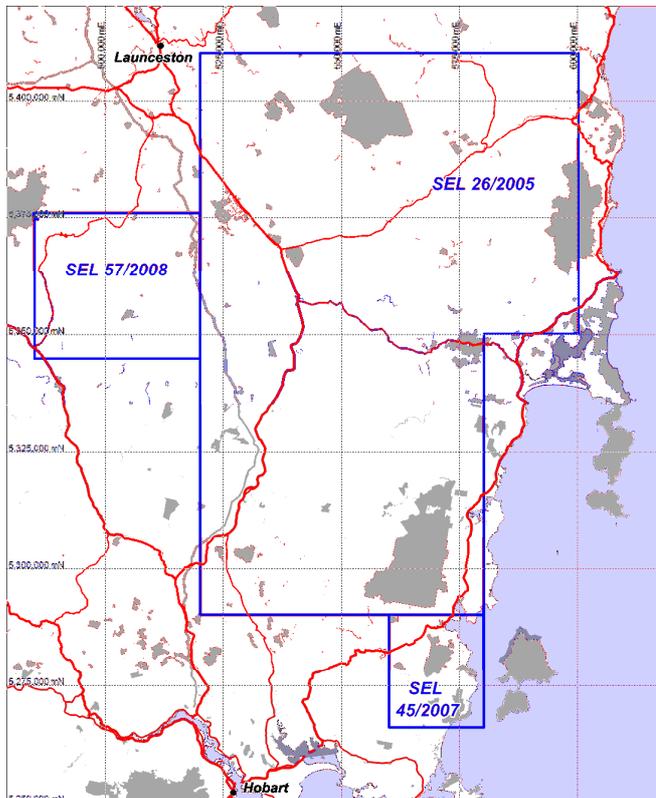


Figure 1: KUTH Energy tenement boundaries (blue) including restricted areas (exclusions within tenement boundaries; grey) and roads (red). Grid squares 25 x 25km; MGA 94 Zone 55.

### **1.3 Topography and vegetation**

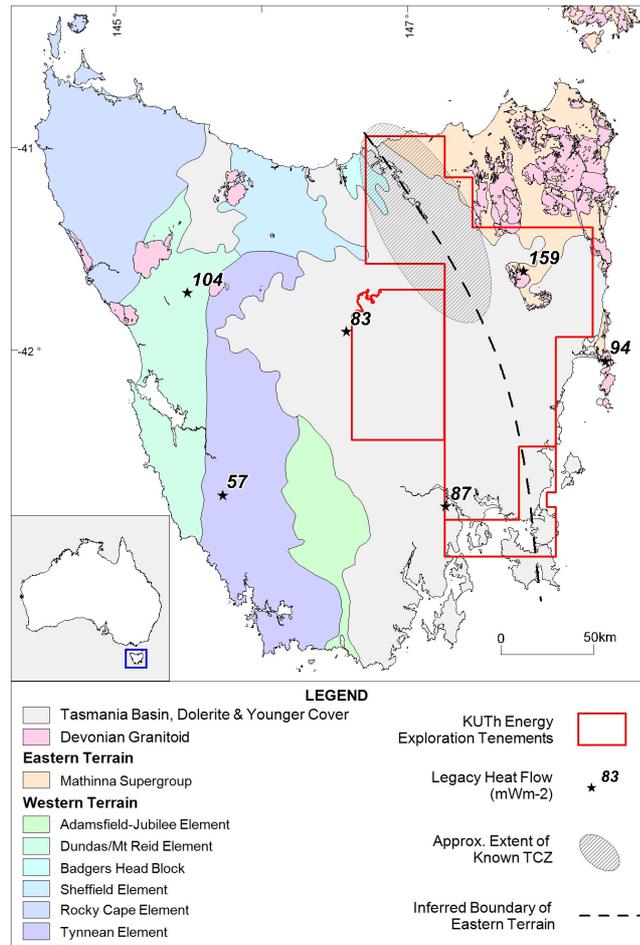
SEL 57/2008 is dominated by a broad dolerite plateau which extends across most of the licence area. Elevations are greatest in the north-west where the Great Western Tiers rise over 1000m above the low-lying country to the north. Elevations generally decrease southwards across the tenement area. Vegetation is controlled primarily by topography with dry eucalypt forest dominant across much of the tenement giving way to alpine heath and moorland in highland areas and native grasslands and developed pasture in lower lying valleys and plains.

### **1.4 Geological setting**

Tasmania is divided into two basement terrains located in the west and east of the State (Figure 2). Distinguished by age, lithology and deformation these two regions are 'believed to have been juxtaposed at a NNW trending dislocation' inferred to coincide with the Tamar Valley region in central Tasmania (Burrett & Martin, 1989). The Western Terrain comprises variably deformed and metamorphosed Pre-Cambrian basement, the now-deformed Cambrian volcanics and sediments of the Dundas Trough and Mt Read Volcanic Belt and the Ordovician-Silurian shelf sediments of the Wurrawina Supergroup. In the East, deformed low-grade meta-sediments of the Ordovician – Devonian Mathinna Supergroup comprise deep water turbidite deposits that are analogous to the ubiquitous Tasminide flysch of mainland eastern Australia. Similarities in the deformation and depositional style of the Mathinna Supergroup and mainland Tasminide units have led to numerous attempts to correlate the two, the Mathinna being compared variably to the Melbourne Trough and the Tabberabbera Zone of central and eastern Victoria (Powell & Baillie, 1992; Reed, 2001).

Across much of the state, basement is concealed by up to 1km of flat-lying Permian-Triassic sediments of the Tasmania Basin and the extensive thick (>300m) Jurassic dolerite sills which intruded these during Gondwana break-up. Mesozoic and Tertiary cover, including extensive dolerite, shale, silt and some coal formations, totally obscure the contact between the Pre-Cambrian Western and Palaeozoic Eastern terrains, which is inferred lie to the east of the tenement area.

Both Western and Eastern Terrains host Devonian granite, the most extensive intrusions being the slightly older batholiths in the East (Burrett & Martin, 1989). Exposures of Devonian-aged granite in the far north-east of the state are known to include highly-fractionated high-heat-producing (HHP) granites as part of three major suites (Figure 2; Burrett & Martin 1989). To the south and west of this area, the exposed granite plunges beneath cover which potentially provides the insulation necessary for a classic Hot Dry Rock or Enhanced Geothermal System (EGS) target. Complicating this picture is the presence of a known electrical conductivity anomaly observed in the northern Tamar Valley area and referred to as the Tamar Conductivity Zone (TCZ) (Figure 2; Hermanto, 1992). Coinciding broadly with the boundary of the East and West terrains, the TCZ has been interpreted an indicator of fluid in fractured permeable zones (Hermanto, 1992). Intersection between the TCZ and buried HHP granites may thus imply the presence of an existing fracture-permeable geothermal system in Eastern Tasmania.



**Figure 2:** Regional geology of Tasmania showing the major crustal elements. Legacy heat flow data are as summarised by Cull (1991). Also shown is the approximate extent of the known TCZ prior to recent MT survey work.

## 2 Previous Exploration

A detailed account of exploration across the area defined by SEL 57/2008 prior to KUTh’s tenure, including surface geology, seismic surveys, stratigraphic and exploratory drilling is provided in the 2010 Annual Report.

## 3 Work Completed in the Current Annual Reporting Period

No field work was undertaken on SEL 57/2008 in the period April 2011 and April 2012.

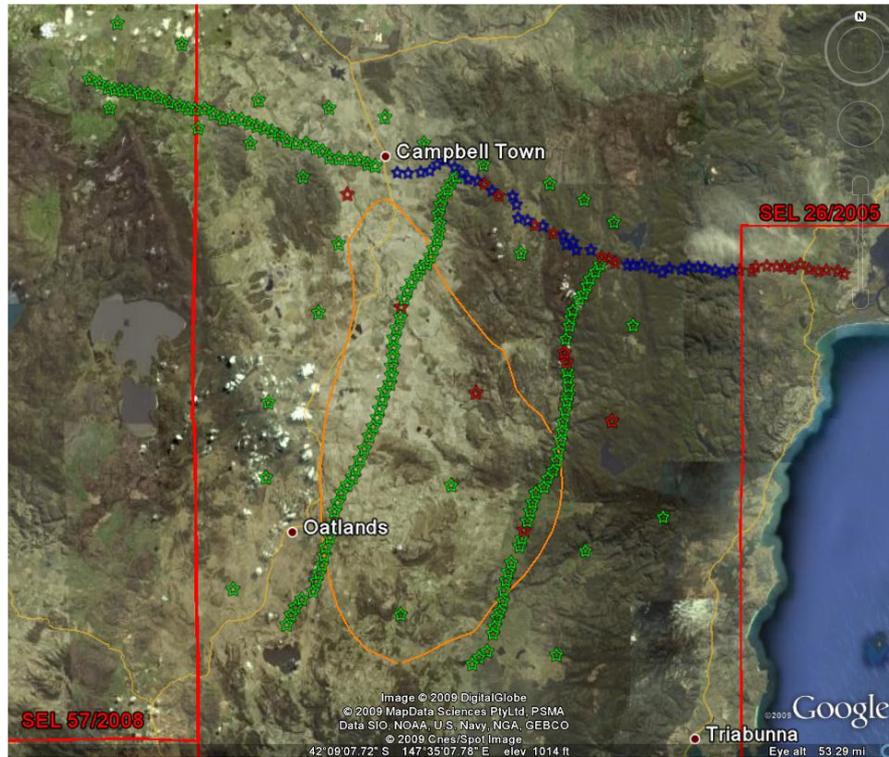
## 4 Summary of Work Completed During the Tenure

### 4.1 Re-interpretation of Legacy Seismic Data

As part of a program of legacy data assessment in 2009 KUTh commissioned Hot Dry Rocks PL (HDRPL) to undertake a reinterpretation of selected open-file 2D reflection seismic data previously acquired over Central Tasmania by Great South Land Minerals PL (GSLM) and by Geoscience Australia (GA). Results of the re-interpretation are provided in detail in the Annual Report 2010. Typical interpreted sections indicate a regional structural style that is dominated by NE-dipping, NNW-trending faults which sole into a major detachment interpreted between 7 - 8km depth (Figure 2).

**4.2 MT 2009**

In 2009 a total of 16 MT/TDEM stations were recorded along an east-west profile line extending west into the tenement from SEL 26/2005 (Figure 3). Details of the survey methodology including station location, data acquisition and interpretation are provided in the 2010 Annual Report. 3D modelling results (Figure 4) indicate that the electrically conductive feature known as the Tamar Conductivity Zone does not extend into SEL 57/2008.



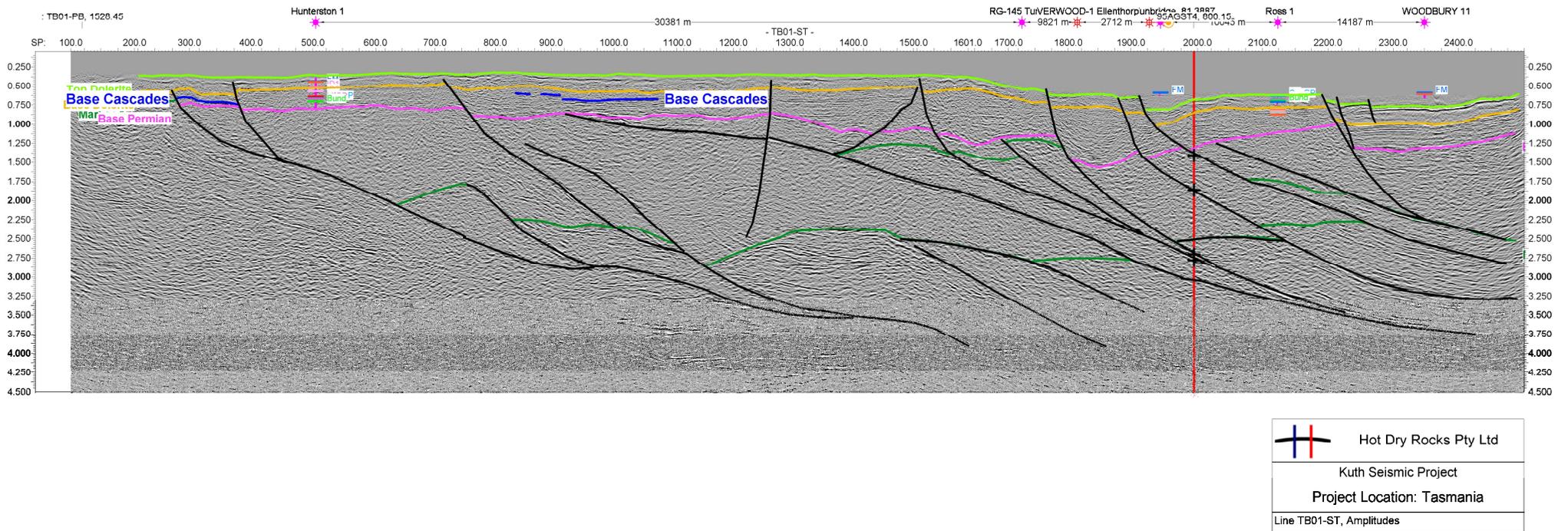
**Figure 4:** Location map of the 2009 3D MT/TDEM survey array across KUTH Energy’s Tasmanian tenements. Green stars represent 2009 MT and TDEM stations, blue 2008 MT stations for which TDEM data has now been collected and red all MT stations (2008 & 2009) for which TDEM data were not collected. Background Image ©Google Earth.

**4.3 Earthquake Data Review**

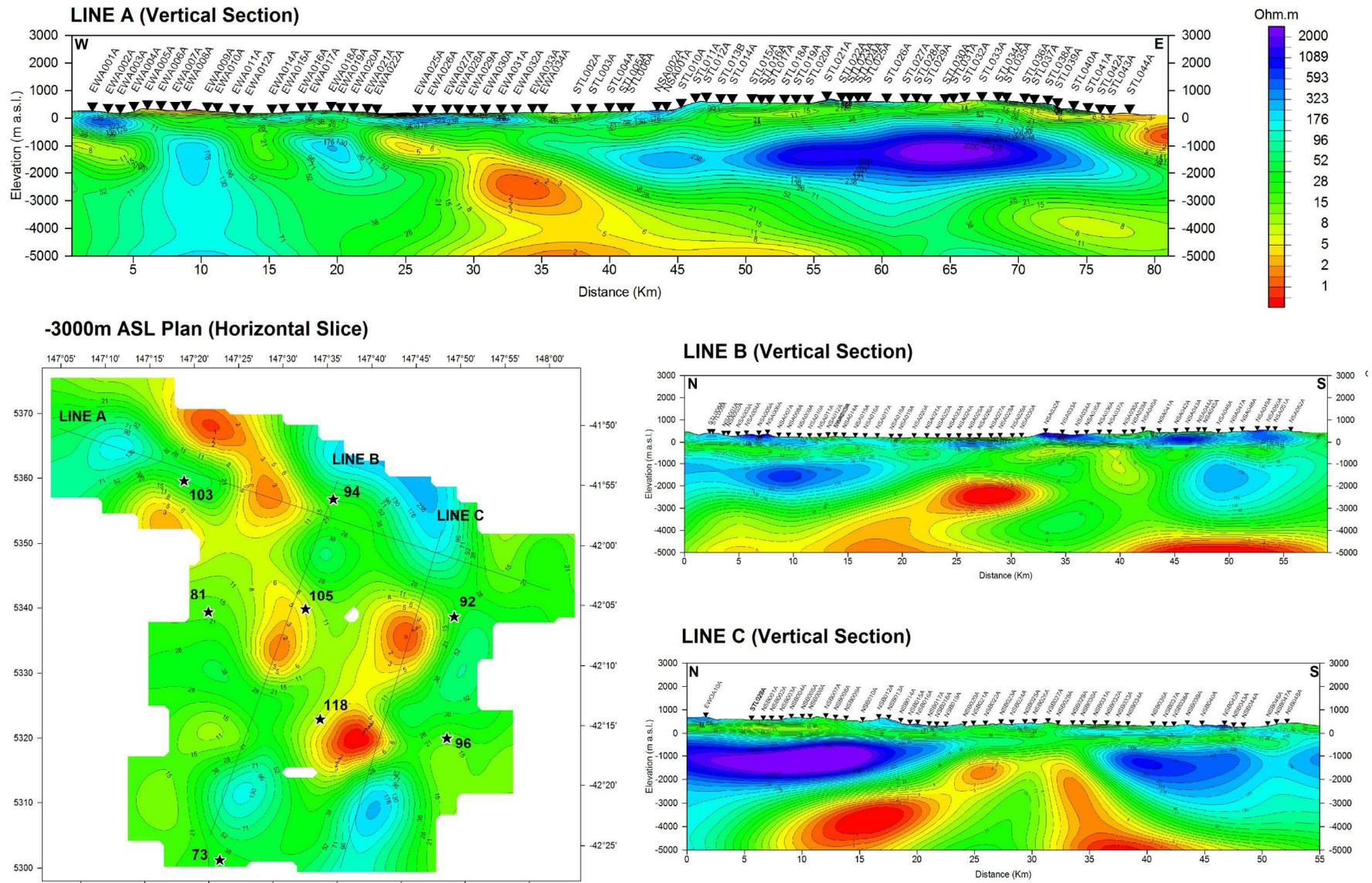
A review of available earthquake location and magnitude information for Tasmania was conducted as part of a company-sponsored student project at the University of Tasmania in 2009. Details of this review are provided in the Annual Report 2010.

**5 Discussion**

Review of the legacy geological data across SEL 57/2008 supports the presence of up to 1km of insulating Mesozoic sediments atop faulted PreCambrian basement units. Granite bodies have previously been predicted at depth within these rocks. Data available from the interpretation of recent gravity surveys on adjacent tenement SEL 26/2005 now indicate that predicted depths to granite beneath SEL 57/2008 are likely to be >8km. This is too deep to be viable targets for drilling and hot rock development. Data available from the 2009 magnetotelluric survey further indicate that the TCZ is not present within this tenement and it is consequently not a target for Lemont-style Naturally Fractured Hot Rock. The geothermal prospectivity of this tenement area is concluded to be very low.



**Figure 3:** Great South Land Mineral seismic line TB01-ST reinterpreted by HDR PL for KUTH Exploration in 2009.



**Figure 5:** Results from the 2009 3D magnetotelluric survey presented as resistivity images. All images share the same scale (shown); warmer colours indicate increased electrical conductivity. Vertical section lines are as located in on the -3000m ASL Plan. Vertical exaggeration of these sections is 2:1. The location of surface heat flow values ( $\text{mWm}^{-2}$ ) from KUTH's shallow heat flow program are shown on the plan as black stars.

## 6 Environment

There are no outstanding environmental or rehabilitation issues across SEL 57/2008. Ground disturbances during the tenure was limited to minor diggings associated with the temporary emplacement of MT survey equipment. All disturbances related to the MT survey were fully rehabilitated at the time of survey.

## 7 Expenditure

Details of final expenditure on SEL 57/2008 in the year 2011-2012 are captured in Table 2 below.

	SEL 57/2008
<b>Geoscience Costs</b>	\$
Geology	459
Geochemistry	
Geophysics	
Remote Sensing	
<b>Drilling &amp; Gridding</b>	
Gridding	
Drilling	
<b>Land Access Costs</b>	
<b>Rehabilitation Costs</b>	
<b>Feasibility Study Costs</b>	
<b>Other Costs</b>	2,607
<b>Administrative Costs</b>	3
<b>TOTAL</b>	3,069
<b>TOTAL ALL YEARS</b>	65,453

**Table 2:** Expenditure on KUTh tenement SEL 57/2008 in the year 2011-2012.

## 8 Conclusion and Recommendations

The combined results of work completed to date on SEL 57/2008 indicate that the potential for geothermal resource development within the tenement area is low. Whilst insulating sequences are present across the tenement, the area is now interpreted to be underlain by granite at depths too great to be feasible as geothermal development targets. Full surrender of the licence area is recommended.

## 9 References

Holgate F.L and Goh, H.K.H. (2010): Annual report SEL 57/2008. KUTh Exploration Pty Ltd, *Unpublished Report*.

## 10 Keywords

Geothermal exploration; HDR (Hot Dry Rock); EGS (Enhanced Geothermal System); High Heat Producing (HHP) granite; Tamar Conductivity Zone (TCZ); Magnetotelluric.