

Further Comments on Geothermal Exploration

In Northeast Tasmania.

The Lyndhurst-Mathinna strip

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Summary

The strip of Mathinna sediments lying between the Scottsdale batholith to the west and the Poimena, Mt Paris and Pyengana plutons to the east is an area that should be considered for geothermal exploration. This lies along the “Lyndhurst-Mathinna” line of gold occurrences associated with a proposed major ENE-dipping thrust fault (Reed, 2004).

Two possible areas for geothermal exploration (A and B) are indicated on the road map in figure 1.

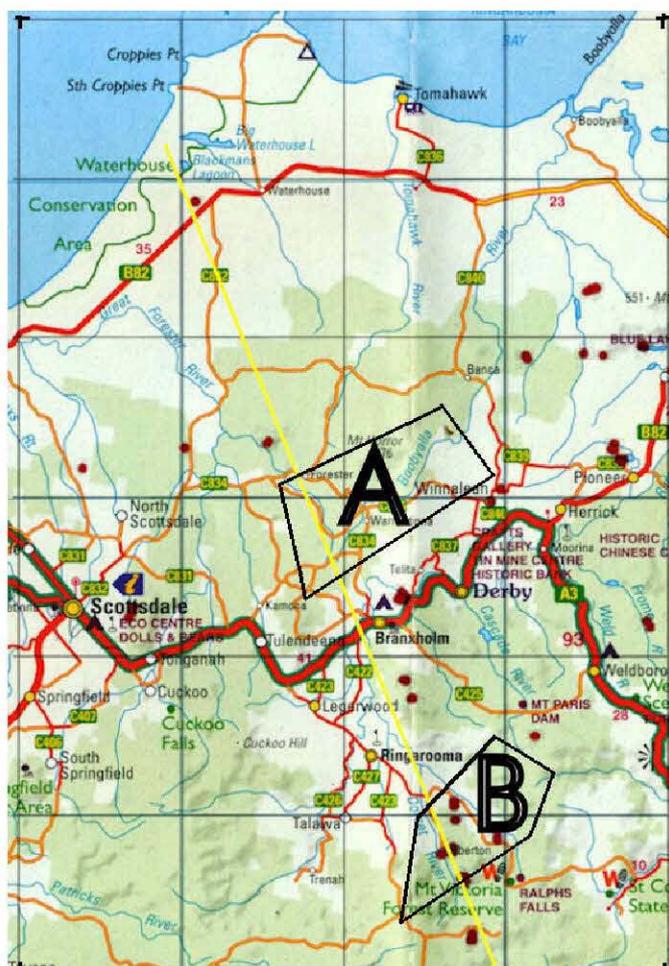


Figure 1. Two possible geothermal exploration areas

The two areas are above and below the radioactive Mt Paris pluton, with coverings of Mathinna sediments to depths of around (at a rough “educated” guess) less than 1 km for area A, and (more firmly based) 1 to 1.5 km for area B.

Some initial structural modelling, based on available gravity and magnetic data, is suggested for area A, and, although this has already been carried out (Roach and Richardson, 1995) for just south of area B, also for area B. It is suggested that this could be carried out at the University of Tasmania, where M. Roach, who carried out the original modelling to the south, is currently in charge of geophysics.

(Of course, drilling to granite in these areas may also answer some other interesting questions.)

Location and surface geology

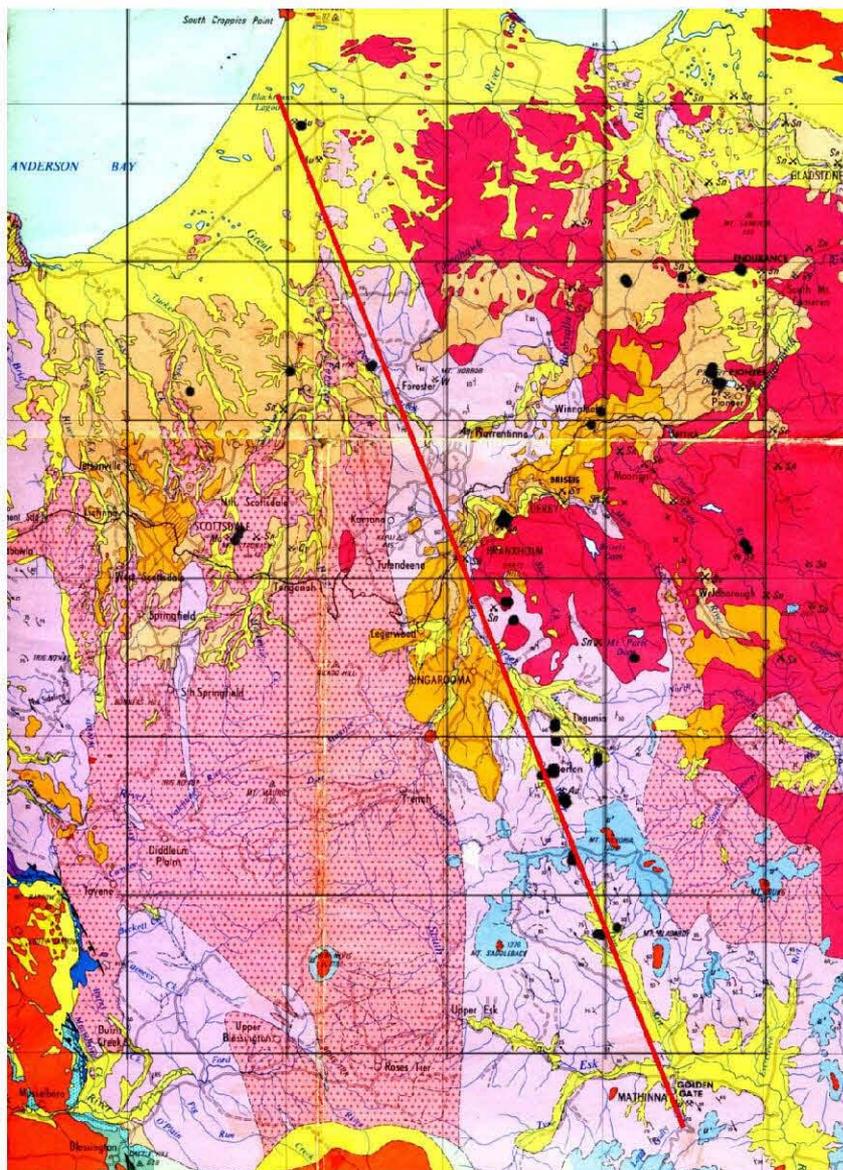


Figure 2. The Mathinna sediments (light purple) along the Lynhurst-Alberton line (shown in red). Recorded diamond drill holes are shown as black dots.

Gravity

Gravity results indicate a continuation of the granites beneath the Mathinna sediments. Figure 3 shows the location of the Lynhurst-Alberton line and the diamond drill holes superimposed on the gravity map. Of some interest is the apparent higher gravity ridge that runs sub-parallel (more N-S) to the Lynhurst-Alberton line. This appears to mark the eastern border of the Scottsdale Batholith, which is pretty well confirmed in figure 4. Thus the granite implied by gravity below the Mathinna must belong to the Blue Tier Batholith.

This part of the Mathinna sediments (Figure 2), lying between the Scottsdale Batholith on the west and the Blue Tier Batholith to the east, has been extensively studied and mined for gold since the middle 1800's. Nearly all the exploration has centred around the search for gold lode deposits, with the result that, in contrast to the tin areas further east, much of the drilling has been diamond rather than auger or similar. Early diamond drill records go back to the 1920's.

While the available drill results record little that is now of geothermal interest, at least they do give a minimum depth to granite (greater than 300m), and tell something of the structure.

Figure 3 also places some of the lowest gravity in the NE, and probably some of the deepest granite, just north of Alberton and associated with (or beneath) the Mt Paris pluton.

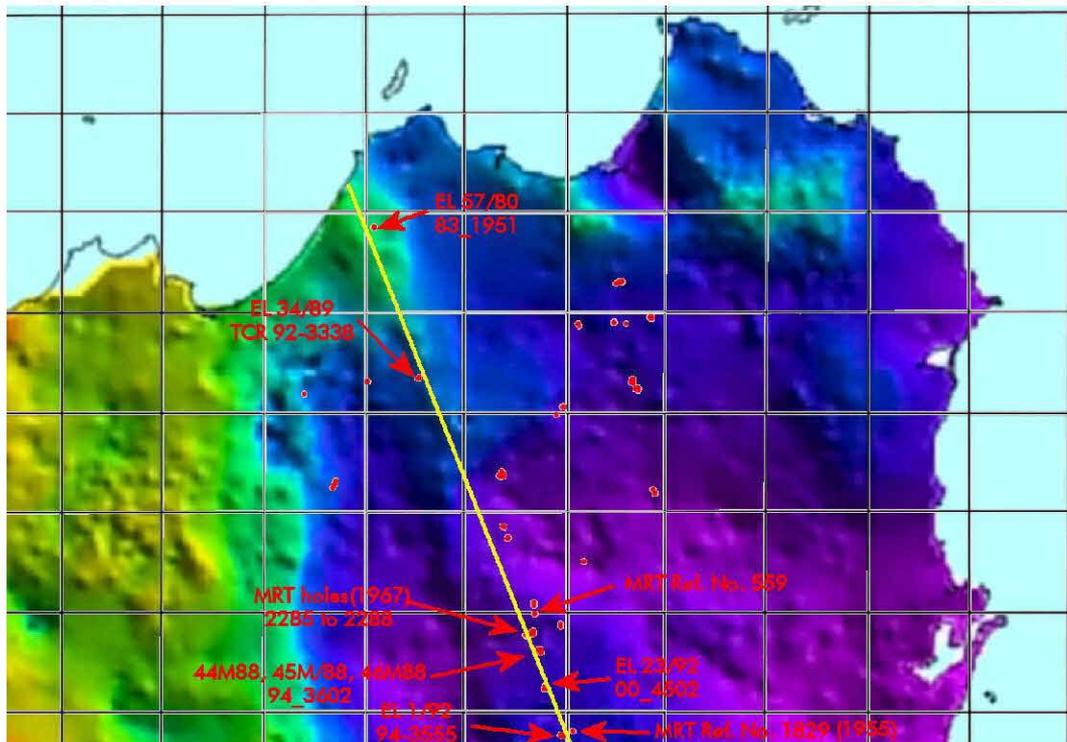


Figure 3. Gravity map of NE Tasmania showing Lyndhurst-Alberton line and drill hole locations. Drill holes of possible interest here are indicated by the exploration or mining lease number and the MRT report reference number. Some of the old drill records consist of little more than photocopied barely legible scribbled driller's comments.

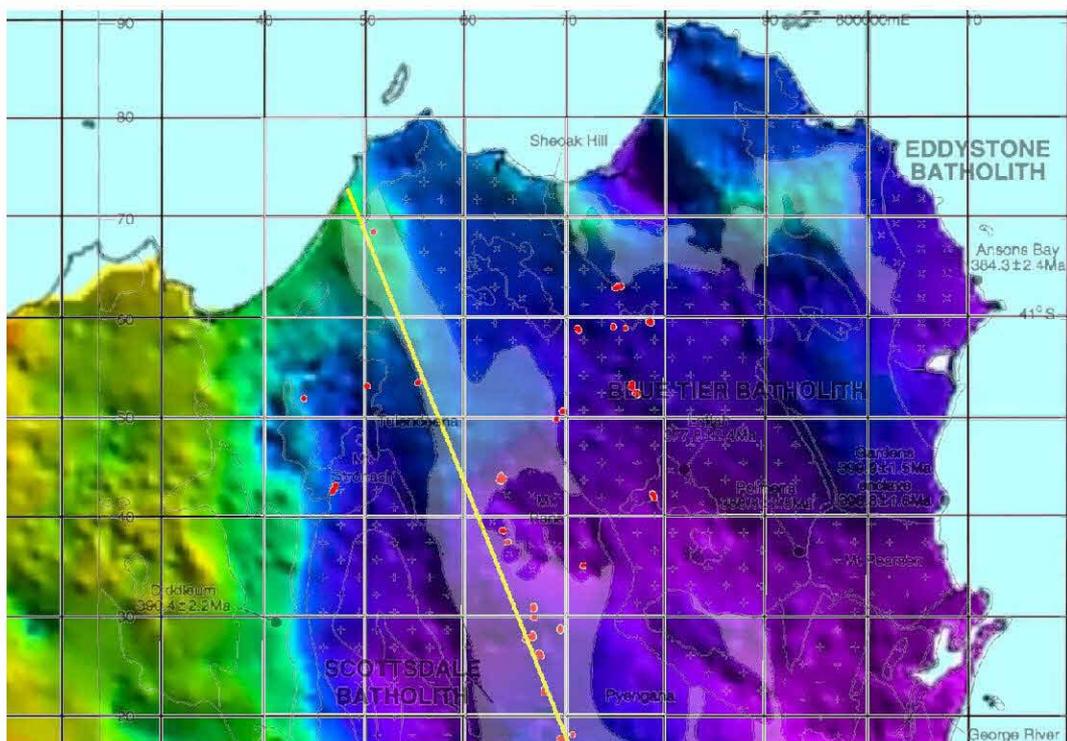


Figure 4. Mathinna sediments (white areas) superimposed on figure 3 gravity map.

Radiation

The pluton radiation in this area is strongest for the U channel. The Mt Paris pluton shows up prominently (see figure 5), suggesting that the area around this pluton would be the most likely area for hot (or warm) rocks.

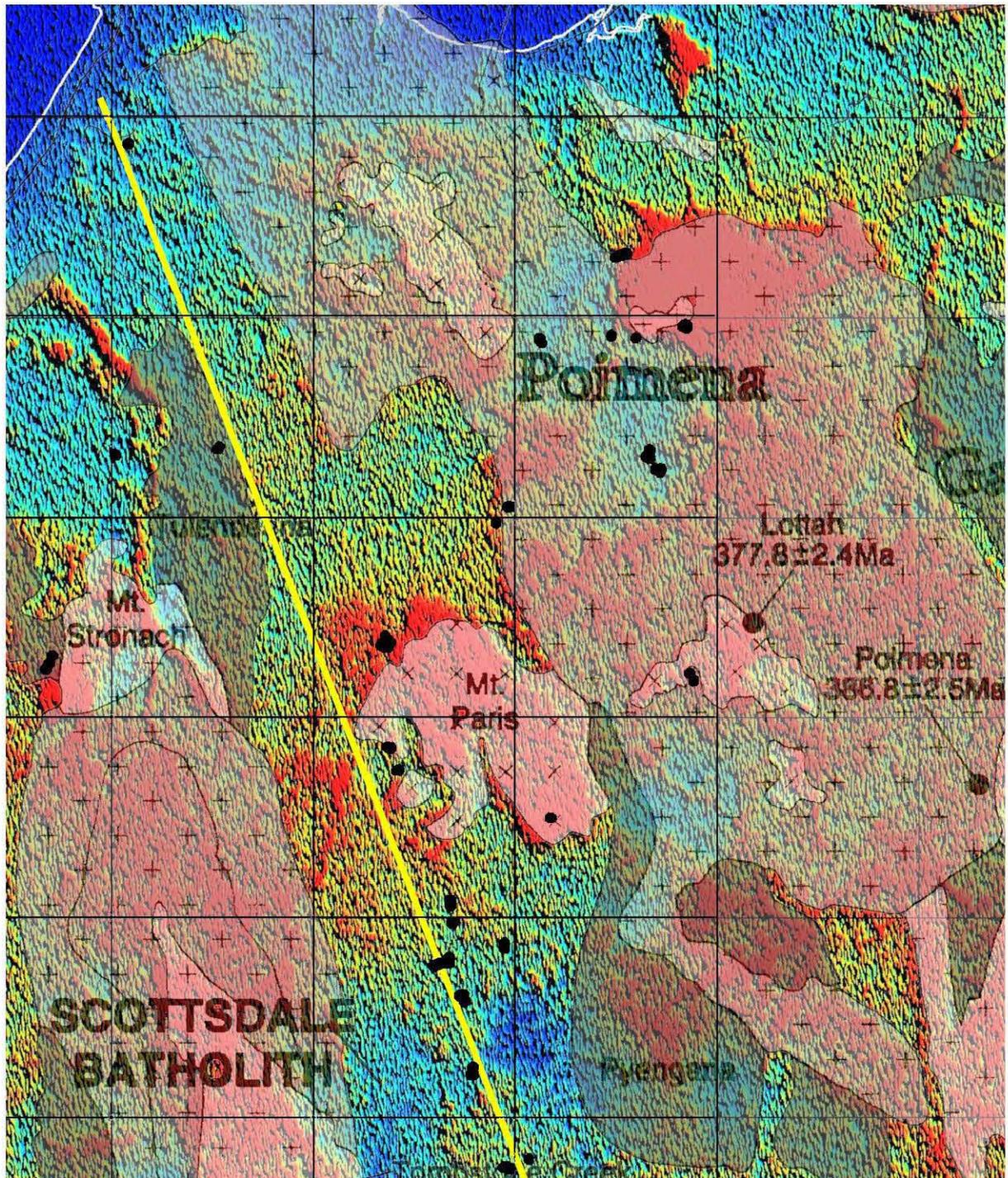


Figure 5. U-radiation map showing surface granites and drill hole locations.

Magnetics

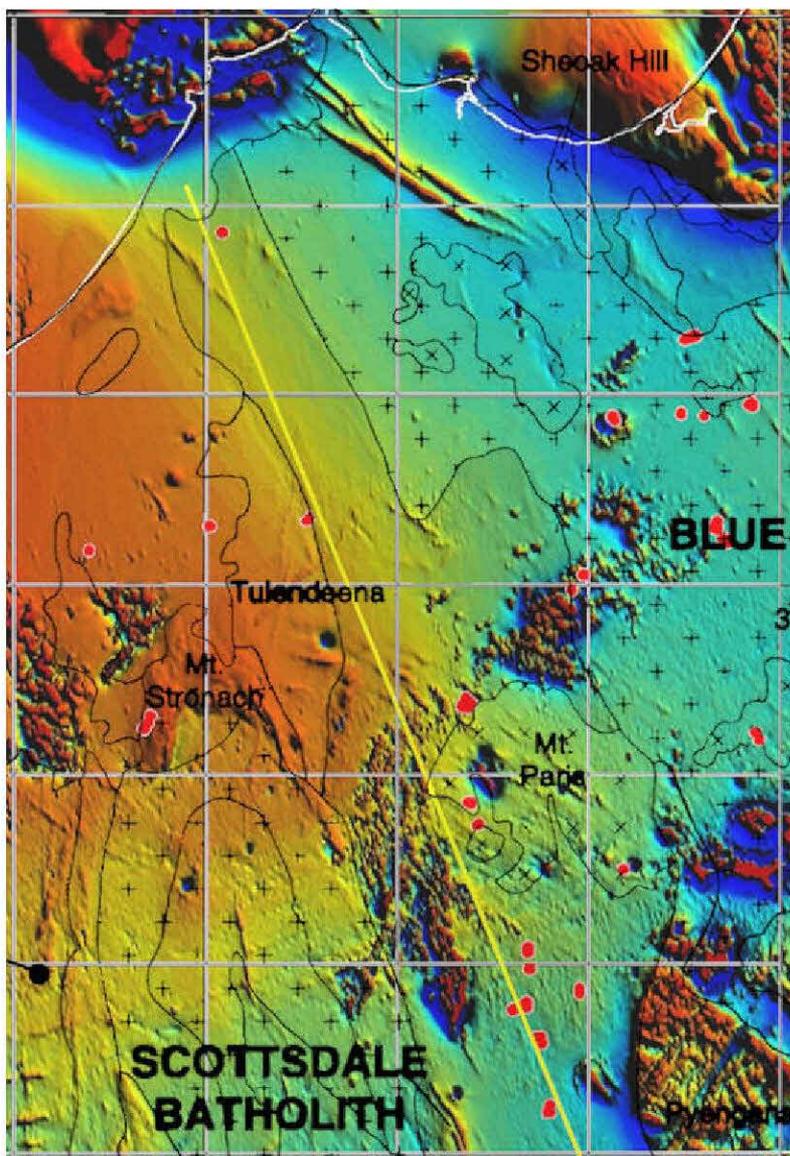


Figure 6. Pluton and drill hole locations superimposed on the magnetics map.

Except for the Tertiary basalts which curve around the Mt Paris pluton (figure 6), and which also appear to carry some uranium (see also figure 5), the magnetics appear at first glance to show little of interest.

However, there is a curious “change of grain” in the magnetics just below the Mt Paris pluton, where the magnetic lineations change from a dominant NW trend within the Mt Paris pluton to a fainter ENE trend below it (no explanation).

Both the above areas retain the small-scale NNW trend of magnetic lows and highs that give the “pock-marked” appearance characteristic of the highly greisenised (and generally exposed) tin-bearing areas to the east and north-east.

This magnetic “pock-marked” appearance occurs again, but with a more N-S trend, in an approximate E-W trending band, about 3 to 4 km wide, located about 10 km to the N of the Mt Paris pluton. In between this band and the N extent of the Mt Paris pluton, with the exception of some isolated magnetic high points (probably associated with Tertiary basalts), the magnetic signal smooths out. The absence of “older and deeper” magnetic signal here may indicate an area of geothermal interest.

Some geophysics of the Alberton area

A 1995 paper by Roach and Richardson uses modelling based on available magnetics and gravity data to construct a possible E-W geological section across the Mathinna roughly half way between Alberton and Mathinna (figures 7 and 8).

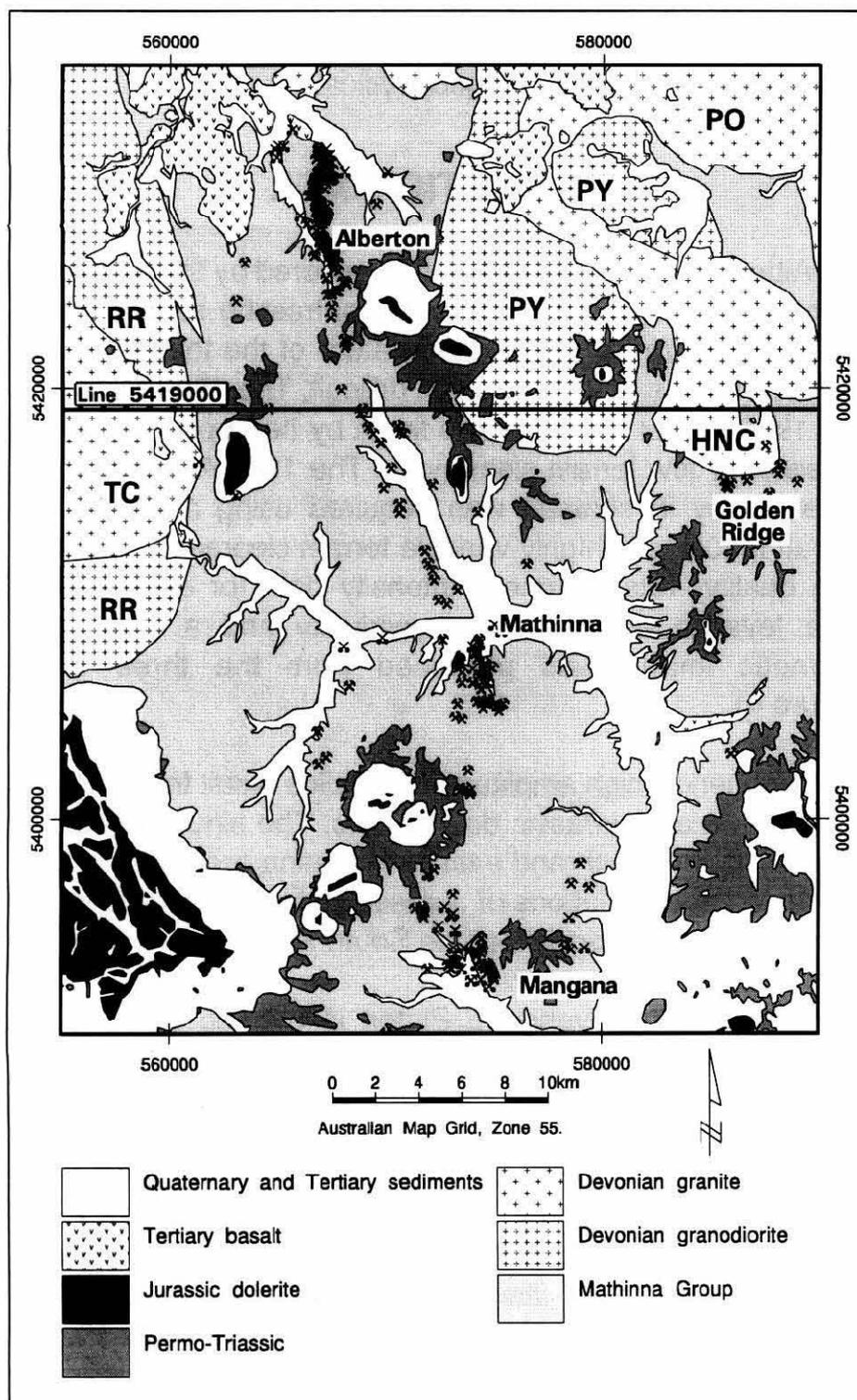


Figure 7. Location of modelled geological section across the Dan Rivulet. From Roach and Richardson (1995).

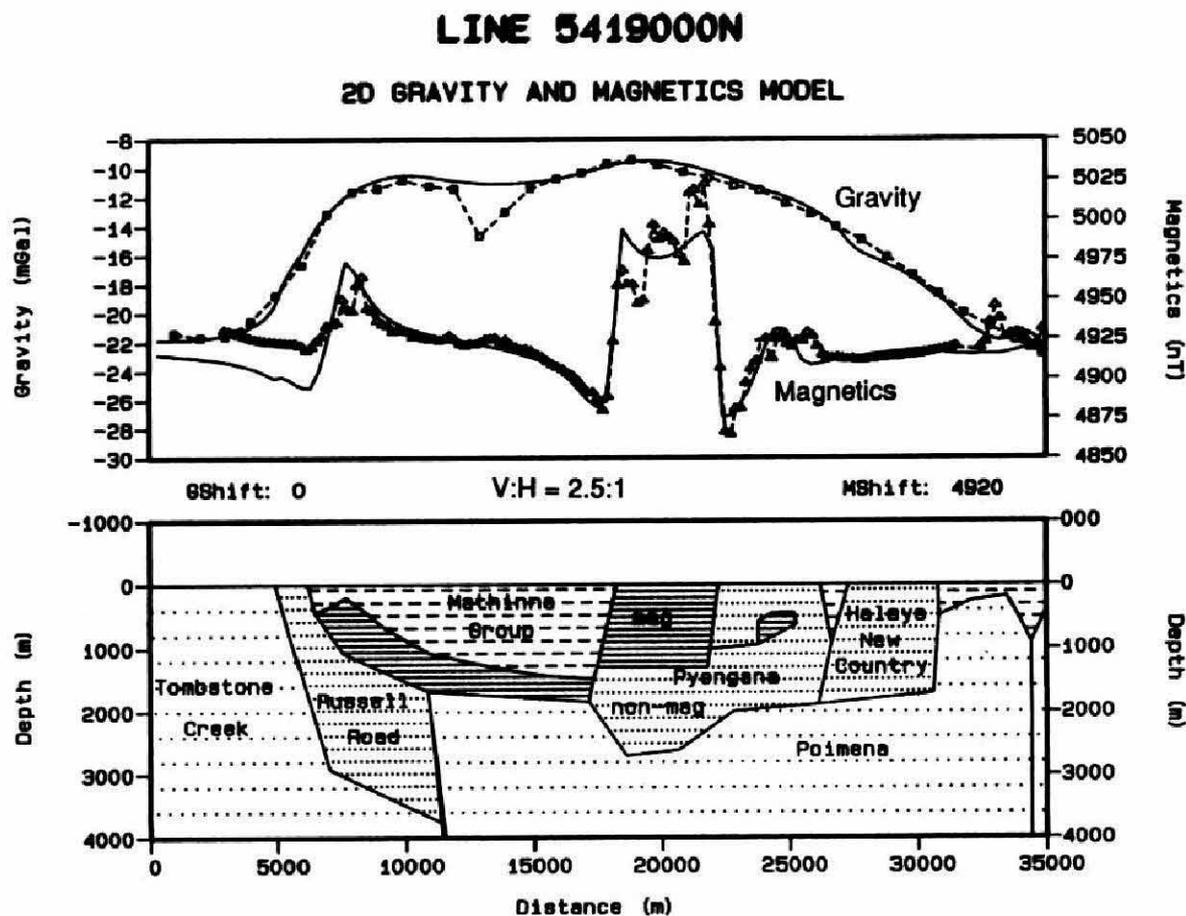


Figure 8. Modelled geological E-W section at 5419000mN.

The depth to the granite is estimated (Roach and Richardson, 1995) as varying from around 1 km near Alberton in the north to more than 3 km near Mathinna in the south. In the model above it is a bit less than 2 km. The dark horizontally-hatched magnetic rocks in figure 7 are not identified, but are hypothesised to be either a magnetic granodiorite or magnetic mathinna rocks. In the figure 8 section the central shallow occurrence of these rocks lies below a thin Permian-Triassic cover.

The value of this section for proposed geothermal exploration is that it sets an approximate depth of thermally-insulating cover over the Poimena granite, and indicates that, for Geopower's purposes (shallower sources), exploration would need to be limited to the north of this area (nearer to Alberton).

Drill hole results

There are probably two main areas of initial geothermal interest along the Lyndhurst to Mathinna line. One of these would be the area immediately north of the Mt Paris pluton and the Tertiary basalts, and the other would be in the vicinity of Alberton.

Northern area

Diamond drill holes in the northern area, north of the Mt Paris pluton, are limited to two, one on EL 57/80 and two others on EL 34/89. All of these are really outside the area of initial interest (close to Mt Paris pluton), and give no information of interest anyway, but are mentioned below.

EL 57/80. One well-documented hole was drilled to a vertical depth of about 85m through shales, sandstones and siltstones with frequent “quartzites” and quartz veins. No comments were made about any increasing metamorphism, alteration or other effects that may imply proximity to underlying granites.

EL 34/89. Two shallow holes were drilled through metamorphosed Mathinna sediments just east of the Scottsdale batholith. One hole went to 25m and the other to 40m. There were no actual core logs here, just summaries of gold-oriented observations.

Thus there are no drilling results in the northern area that provide any information of use to Geopower (or apparently of value to the gold explorers either).

Southern area

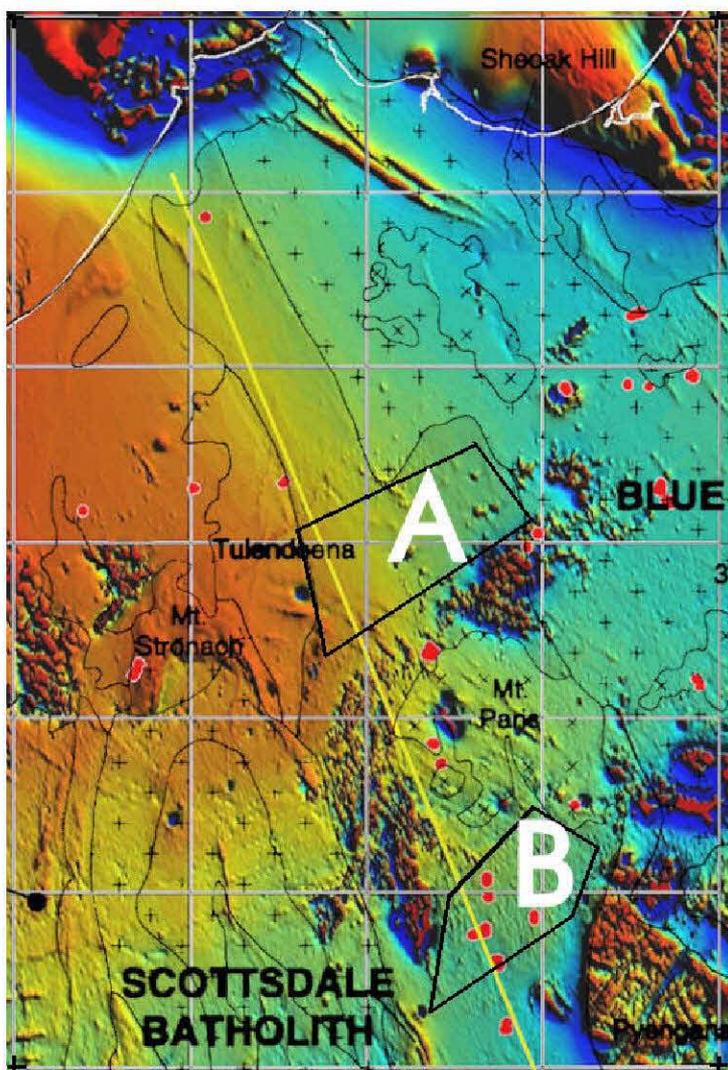
Most of the holes south of the Mt Paris pluton were either drilled horizontally from within adits or were less than 50m in vertical depth (as against hole length). None of these, as might be expected, indicated proximity to granite.

The longest series of holes were those drilled by MRT (or the old Dept of Mines) between 1967 and 1970. These were between 220 and 300 m in length (between 140 and 200m depth). None of these recorded anything of real geothermal interest, except that one hole (Alberton No. 1), at about 190m depth, recorded intersecting about 60cm of “mud” which was, apparently in a later handwritten comment, identified as a basic intrusive (and followed, in the report, by an exclamation mark). Another, slightly longer hole, with the same azimuth and dip but only 60m away, did not intersect this.

Suggested areas to consider for geothermal exploration

Two possible exploration areas are shown in figure 9. Both are close to a high radiation granite (Mt Paris pluton) and to a granite area that probably extends to considerable depth.

The first of these (A) is selected partly because of the absence of magnetic signal, which may indicate higher temperatures sufficient to disrupt magnetism, and also because the depth of the Mathinna here may be less than a km. The latter is probably more in the realm of guesswork at present, but based on extrapolation from Roach and Richardson's 1995 modelling further south.



The second area (B) involves a deeper Mathinna covering, at a probable depth of between 1 and 1.5 km. As it involves proximity to the same granite, it should have similar to better geothermal prospects as area (A), but the presence of a detailed magnetic signal is concerning. The magnetic signal weakens just south of area B, but depth of Mathinna is becoming greater than Geopower would like.

Some geological structure modelling has already been carried just south of area (B) (Roach and Richardson, 1995). Perhaps, as an initial step in any exploration, similar modelling can be carried out for area (A), and, depending on topographic limitations, repeated further north for area (B).

Figure 9. Two suggested geothermal target areas.

Seismic methods, for reasons mentioned in the previous comments, may not produce definitive results, especially for area (B) where the magnetic signature may be implying a heavily greisenised and chemically altered upper granite surface. However, a limited trial may be in order.

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