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23 February 2009 **ASX ANNOUNCEMENT**

Penola Project – Australia's First Conventional Geothermal "Measured Resource"

Panax Geothermal ("Panax") is pleased to announce that further work carried out by Dr. Graeme Beardsmore of Hot Dry Rocks Pty Ltd ("HDRPL") has led to a substantial upgrade of the Penola Trough Geothermal Resources*). More importantly, HDRPL's new assessment has also led to the conversion of a substantial part of the "Inferred Resource" to the "Indicated" and "Measured" categories, as follows:

Penola Trough – GEL 223

- **Total Geothermal Resources of 132,000 PJ** of which:
  - **89,000 PJ** is classified as **"Inferred Resources"**;
  - **32,000 PJ** is classified as **"Indicated Resources"**;
  - **11,000 PJ** is classified **"Measured Resources"**.

The large increase in the total Geothermal Resources as compared to the previous announcements is directly related to the result of new work carried out by HDRPL. The conversion of a large proportion of the "Inferred Resource" to the **"Indicated"** and **"Measured"** categories reflects the fact that Panax's target reservoir is relatively well known from previous petroleum data (including temperature and porosity/permeability).

Penola Project – "Measured Resource" in Context

"A **"Measured Geothermal Resource"** is that part of a Geothermal Resource for which Thermal Energy in place can be estimated with a high level of confidence.

The determination of a relatively large **"Measured Resource"** of **11,000 PJ** relating to a Hot Sedimentary Aquifer (HSA) project is a first for Australia. The Measured Resource is more than five times larger than that announced by any other Australian geothermal company. HSA projects can be developed using "off the shelf" conventional binary geothermal power plants, which are in production throughout the world. The fact that this "Measured Resource" is directly associated with a HSA is very promising, as this type of project relies on hot water, contained in an existing aquifer or reservoir (= conventional geothermal). Measured reservoir properties, based on data

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*) in accordance with the Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves, 2008 edition.

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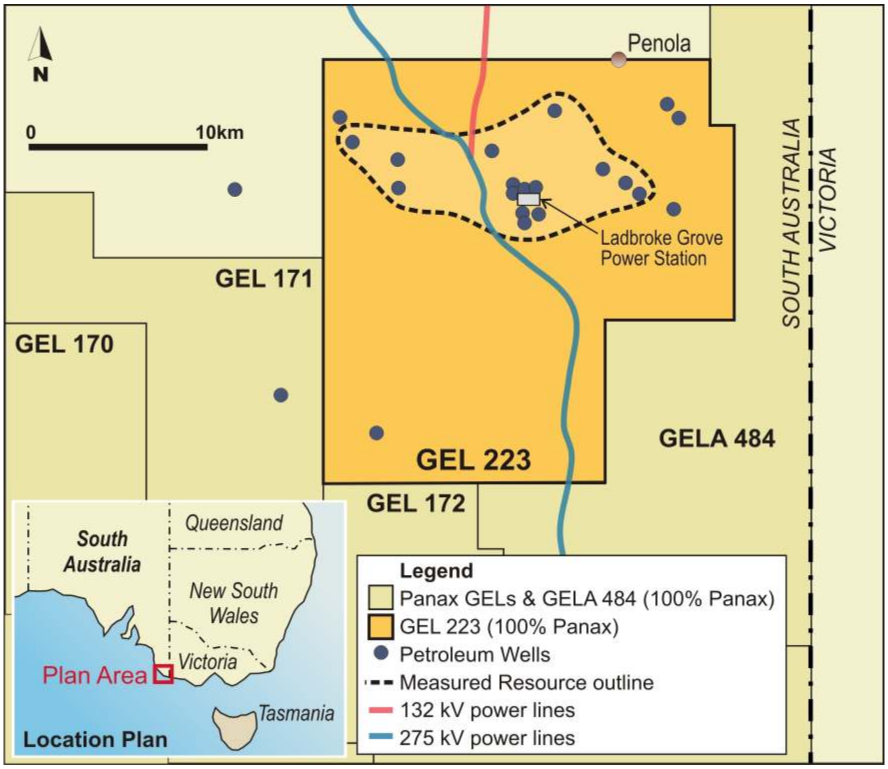
from existing petroleum wells, indicate that the contained hot water (or "brine") could be extracted at temperatures and flow rates sufficient for conversion to electricity in a binary geothermal power plant. By any standard, the **"Measured Resource"** of **11,000 PJ** is, in theory, large enough for operating a 1,000 MWe power station for 30 years (e.g. sufficient for more than 500,000 homes). Future drilling and feasibility studies will determine the actual proportion of the "Measured Resource" that can be converted to "Reserves". Success will largely depend only on whether future wells can deliver the expected flow rates and temperature. The latter is well known, leaving only the question whether future wells have the porosity and permeability values as established by existing petroleum wells.



The Measured Resource is located underneath existing power lines of the national grid.

The above reflects the advanced nature of the Penola Project as well as the overall scope of the greater Limestone Coast Geothermal Project, which contains three other troughs. The total **Geothermal Resources** for the greater Limestone Coast Geothermal Project now total **202,000 PJ**, as detailed in the table below. This excludes a resource assessment for the Tantanoola Trough, which is currently underway.

Trough	**Measured (PJ)**	**Indicated (PJ)**	**Inferred (PJ)**	**Total (PJ)**	**Report Date**
Penola	11,000	32,000	89,000	132.000	18/02/2009
Rivoli & St Clair			53,000	53,000	28/01/2009
Rendelsham			17,000	17,000	28/02/2009
Total	**11,000**	**32,000**	**159,000**	**202,000**	

(Note: all Resource Statements were prepared by Dr. Graeme Beardsmore, of HDRPL)

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To advance the status of the Penola Project, Panax is currently in the process of:

- Preparing for spudding a 4,000m deep production well (Salamader-1) in mid-2009, for which a 2,000 hp drilling rig has been secured;
- Completing an independently reviewed pre-feasibility study, scheduled for release during this quarter.

The drilling is expected to lead directly to the establishment of an initial Geothermal Reserve, whilst the pre-feasibility study will indicate the commercial feasibility and potential. Economic modeling with present data indicate that total power generating costs of the Penola Project (capital and operating costs) will be highly competitive with wind power and will be “base-load”. The fact that the Penola Project is within sight of the national grid, further adds to the overall potential.
For details of the resource estimation methodology, please refer to the appendix of this announcement.

Glossary

PJ = Peta Joule (10^{15} Joule)
1J = 1Ws (one Joule = one Watt sec)
3.6kJ = 1kWh (3.6 kilo Joule = 1 kilo Watt hour
1PJ = 278 GWh (one Peta Joule = 278 Giga Watt hour)

Bertus de Graaf
Managing Director

The information in this Statement that relates to the estimation of Geothermal Resources has been compiled by Dr Graeme Beardsmore, an employee of Hot Dry Rocks Pty Ltd. Dr Beardsmore has over 15 years experience in the measurement and estimation of crustal temperatures and stored heat for the style of geothermal play under consideration. He is a member of the Australian Society of Exploration Geologists and abides by the Code of Ethics of that organization.

Dr Beardsmore qualifies as a Competent Person as defined by the Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves (2008 Edition). Dr Beardsmore consents to the public release of this report in the form and context in which it appears.

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APPENDIX

PANAX GEOTHERMAL LTD

Statement of estimated Geothermal Resources
Penola Geothermal Play, GEL 223, 23 February 2009

The Penola Geothermal Play, South Australia

The Penola Geothermal Play lies in Geothermal Exploration Licence (GEL) 223, approximately 40 km north of Mount Gambier in South Australia and within the broader Panax Geothermal (PAX) 'Limestone Coast' project area (Figure 1). PAX controls 100% of GEL 223. The Play is within the Pretty Hill Formation, a hot sedimentary aquifer within the Penola Trough, from which PAX plans to produce geothermal fluids for the purpose of electrical power generation. A 275 kV transmission line runs directly through GEL 223.

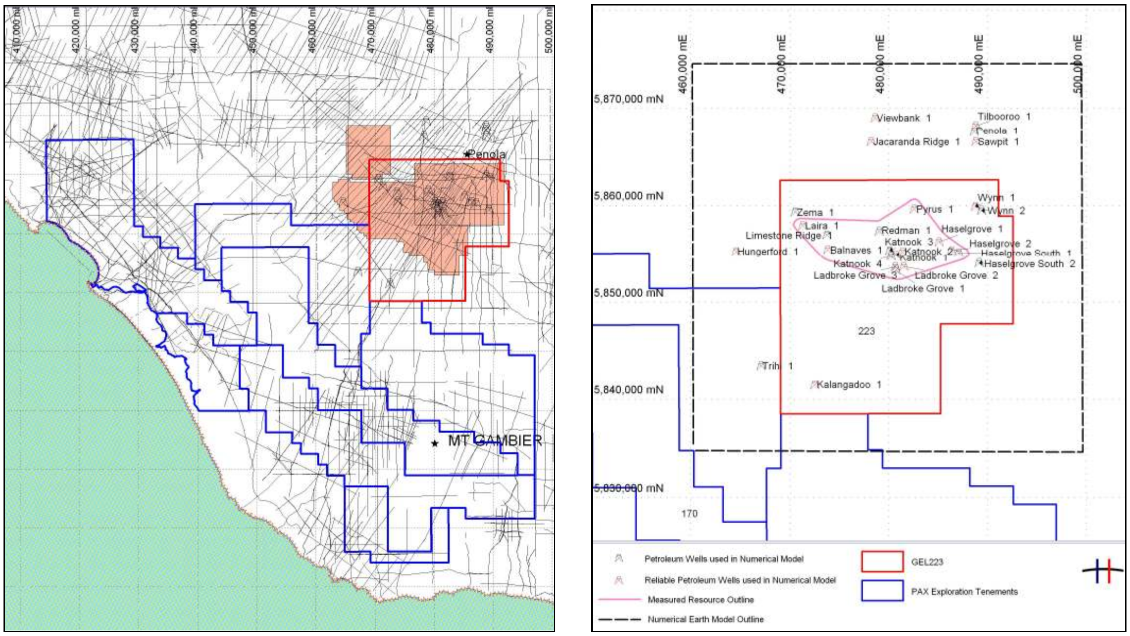

Figure 1. GEL 223 (red) and other PAX geothermal licences (blue) in SE South Australia. *Left*: 2D seismic lines (grey) and areas covered by 3D seismic (pink). *Right*: Petroleum wells used to estimate the Geothermal Resource. Grid spacing is 10 km.

Historical petroleum exploration activities in and around GEL 223 have produced seismic data and numerous boreholes (Figure 1). From these data, the geological structure of the Penola Trough is known with high confidence, and the temperature and physical characteristics of the Pretty Hill Formation have been directly revealed.

Since PAX announced a Geothermal Resource estimate for the Penola Geothermal Play on 21st January 2009, new work by Hot Dry Rocks Pty Ltd has refined and partially reclassified the Resource estimate. A new seismic interpretation has delineated the contact between the shaly Laira Formation and the sandy Pretty Hill Formation within the Crayfish Group. The Laira Formation is a thermally insulating unit while the Pretty Hill Formation is the target reservoir. The previous Resource estimate assumed that the Crayfish Group was all relatively thermally conductive. This approach resulted in conservative estimates of temperature and stored heat in the target reservoir. It is now possible to estimate both the temperature and volume of the Pretty Hill Formation with greater confidence.

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The Pretty Hill Formation—a deeply buried sedimentary aquifer

Sedimentary aquifers are naturally porous and permeable sandstone rocks from which water can be extracted without the need for ‘enhancing’ their permeability. When these aquifers are buried beneath thick sections of thermally insulating rocks, the natural heat of the earth can warm the contained water to 150°C or higher. Such aquifers are attractive geothermal energy targets. The Pretty Hill Formation (PHF) in the Penola Trough represents such a target.

The Penola Trough lies in the Otway Basin, formed during the Cretaceous on the now southern margin of the Australian mainland. Seismic data suggest that the sediment pile, much of which is PHF, is six kilometres thick or more in the deepest sections of the trough (Figure 2), and that the PHF is lithologically similar in all locations. This interpretation is supported by data from 18 wells that have penetrated the PHF within and near GEL 223—the thickest intersection equal to 882 m. Sandstone units are also documented throughout the underlying Sawpit Sequence and Casterton Formation. All units between the top of the Pretty Hill Formation to the Basement are, therefore, potential reservoir targets.

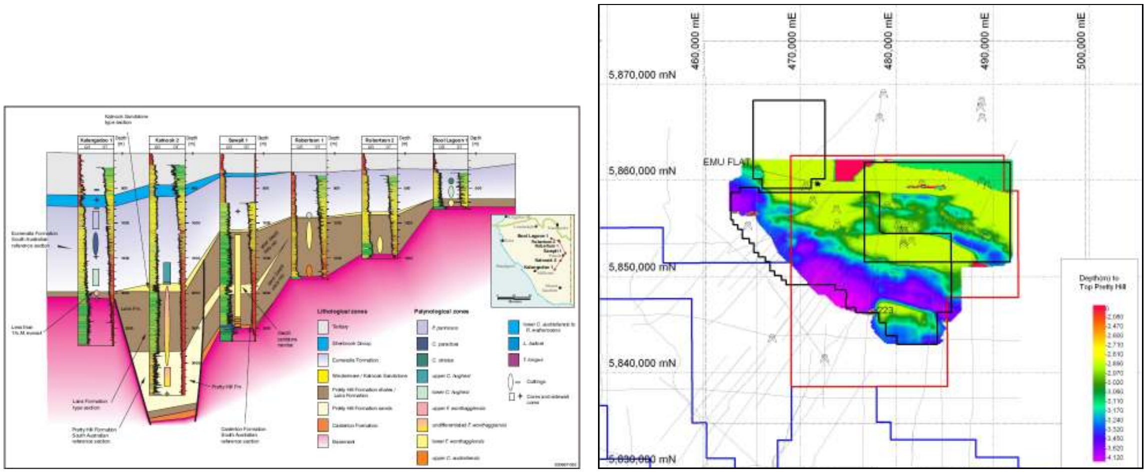

Figure 2. *Left:* S–N cross-section through the Penola Trough. *Right:* Depth to top of the Pretty Hill Formation.

Drill stem tests from eight wells have flowed water from the PHF (Balnaves 1, Haselgroves South sidetrack 1, Haselgrove 1, Katnook 2, Katnook 3, Katnook 4, Ladbroke Grove 1 and Laira.) An additional two wells (Wynn 1 and Jacaranda Ridge 1) flowed water from the Sawpit Sandstone. The drill stem test data provide direct evidence that hot water can be extracted from the deep sedimentary aquifers, confirming them as viable geothermal targets.

Resource estimation

Stored heat assessment

HDRPL used a ‘stored heat’ method to estimate the Geothermal Resource in the target reservoir. The method requires the estimation of the **volume**, **density**, **specific heat capacity** and **temperature** of the target reservoir formations, a consideration of the realistic lowest economically extractable temperature (‘**cut-off temperature**’) and the amount of thermal energy that might be extracted from the resource fluids (related to the ‘**base temperature**’).

A numerical ‘earth model’ (Figure 3) was built to estimate the stored heat within the target reservoir, based on depth converted and gridded seismic data from the Penola Trough as interpreted and provided by PAX. The earth model divided the stratigraphy of the Geothermal Play into six (6) units: **Tertiary**, **Sherbrook Group**, **Eumeralla Formation**, **Laira Formation**, **Pretty Hill Formation**, **Basement**. PAX supplied HDRPL with grid files of the depths to the tops of each of these units. Note that although the earth model extends beyond the licence boundaries, the Resource was estimated **only within GEL 223**.

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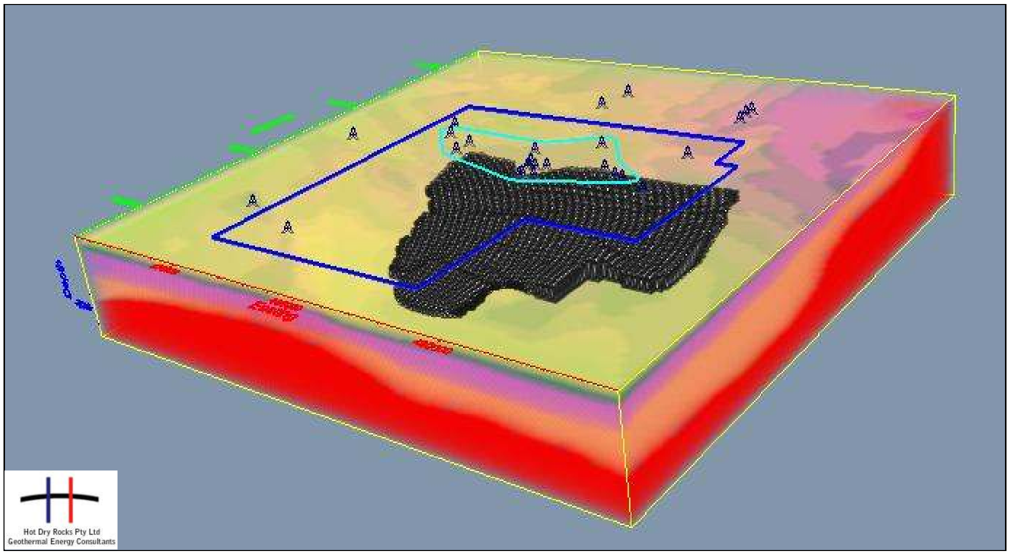

Figure 3. Image of the earth model developed for this Resource estimate. The reservoir (dark grey body) is defined within GEL 223 (dark blue polygon). Well locations also shown. The light-blue polygon represents the area of Measured Resource. North is to the upper right of the figure. The earth model measures 40 km x 40 km x 7 km.

HDRPL assigned thermal conductivity and heat generation values to the units, based on measured open file data, according to Table 1. Thermal conductivity is assumed to be isotropic for all units.

Table 1. Values for thermal conductivity (at 25°C) and heat generation assigned to earth model units

Unit	Thermal conductivity (W/mK)	Heat generation (μW/m^3)
Tertiary Units	2.12 ± 0.10	0.0
Sherbrook Group	2.70 ± 0.15	0.0
Eumeralla Formation	1.95 ± 0.15	1.0
Upper Crayfish (Laira)	1.95 ± 0.15	1.0
Pretty Hill Fm	2.90 ± 0.15	0.0
Basement	3.81 ± 0.25	0.0

Cut-off and base temperature

For the purposes of this stored heat assessment, HDRPL defines the cut-off temperature as *the minimum economic reservoir fluid temperature for commercial energy extraction*, and the base temperature as *the temperature of the geothermal fluid once it has passed through a power conversion process, prior to re-injection*. HDRPL assumed a **cut-off temperature of 125°C** and a **base temperature of 70°C**. These are appropriate for low-temperature organic rankine cycle (ORC) technology that PAX proposes to use for power generation. Should technological advances decrease the base temperature, the estimated Resource may increase over time.

Reservoir volume

For the purpose of reservoir volume estimates the PHF, Sawpit Sandstone and Casterton Formation are all included. The top of the reservoir is the deepest of: a) the cut-off isotherm (125°C), or b) the top of the Pretty Hill Formation. The base of the reservoir is the shallowest of: a) 5000 m, or b) the top Basement. (Note that this approach varies from the Resource Statement issued 21st January 2009, in which only 34% of the Crayfish Group was assumed to be a viable reservoir target.) The estimated reservoir volume is **520 km^3**.

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Reservoir density and specific heat

The density and specific heat of the Pretty Hill Formation (and deeper reservoir units) were estimated based on a simple quartz-water mix in the ratio 95:05. The density of a 95:05 quartz-water mixture is about **2590 kg/m^3**. The specific heat of a 95:05 quartz-water mix over the temperature range **T** = 50–250°C is approximated by the equation:

$$c_p = 910.6 + 1.228 \times \mathbf{T} \quad \text{J/kgK}$$

Reservoir temperature

HDRPL used the principle of 'inversion' to estimate reservoir temperature. Known information about surface temperature (15°C) and surface heat flow was entered into a software module. A numerical process computed in three dimensions the distribution of temperature that best matched the observed surface heat flow distribution, while respecting the laws of conductive heat transfer and the thermal properties of the geological strata. The model predicts that the temperature is relatively constant around 160°C at 4,000 m within most of the Penola Trough, consistent with observations in well Katnook 2 (Figure 4; note that the apparent elevated temperature in the southeast is most likely an artefact of the inversion algorithm as it is not constrained by any well data.)

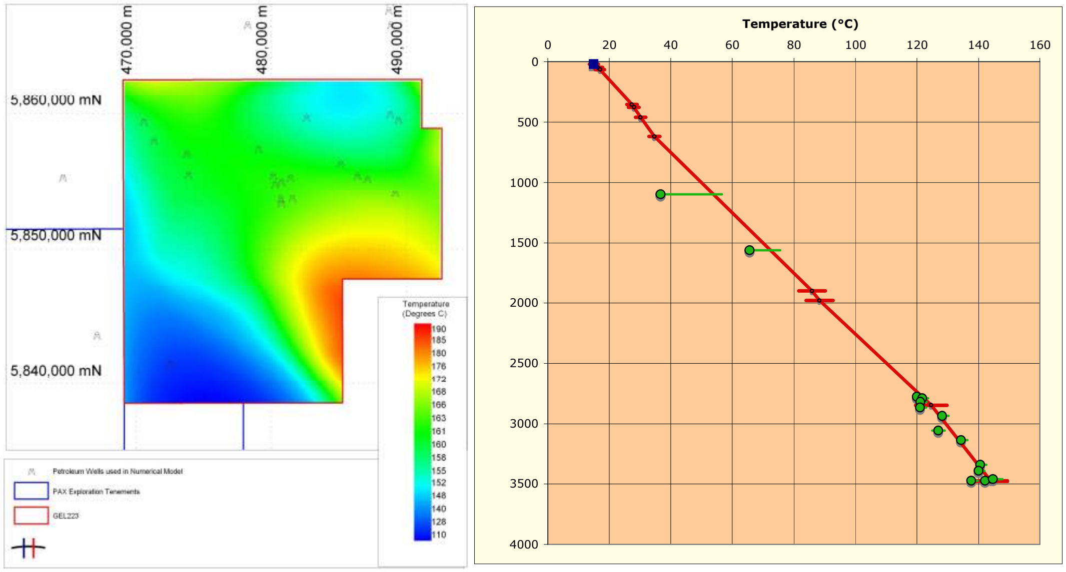

Figure 4. *Left*: Predicted temperature at 4,000 m beneath GEL 223. *Right*: Observed (green) and modelled (red) temperature in well Katnook 2.

Surface heat flow was constrained by one-dimensional heat flow models of fifteen petroleum exploration wells for which measured borehole temperature data were considered reliable (Table 2). The well with the most temperature data was Katnook 2, illustrated on Figure 4. The temperature data fit a conductive model (within uncertainty limits) through the full depth of the well. This suggests that the thermal state of the well is conductive, with no evidence of convection.

Total Resource

The total stored heat estimated within the target reservoir units is 130,700 PJ, occupying a volume of 516 km^3.

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Table 2. Heat flow constraints on the 3D temperature inversion. Eastings and Northings are in projection GDA94 Zone 54. Note that uncertainty values do not take temperature uncertainty into account.

Well Name	Depth (m)	Easting (m)	Northing (m)	Heat flow (mW/m^2)
Balnaves 1	2832	473860	5855458	72.0 ± 3.0
Haselgrove 1	3290	485128	5856251	74.0 ± 3.0
Haselgrove 2	3053	486383	5855360	71.0 ± 3.0
Hungerford 1	2196	464582	5855250	68.0 ± 2.6
Jacaranda Ridge 1	2951	478122	5866359	71.0 ± 2.7
Katnook 1	2520	480757	5854918	73.0 ± 3.3
Katnook 2	3478	481425	5855243	75.0 ± 3.0
Ladbroke Grove 1	3415	480744	5853286	76.0 ± 2.8
Ladbroke Grove 2	2725	481563	5853661	73.0 ± 3.0
Laira 1	3003	471330	5857932	73.0 ± 2.9
Pyrus 1	3150	482610	5859617	70.0 ± 2.3
Sawpit 1	2699	488873	5866525	81.0 ± 3.0
Tilbooroo 1	2492	488831	5868211	82.0 ± 3.6
Viewbank 1	2504	478653	5869003	76.0 ± 2.7
Wynn 1	3066	488810	5859892	75.0 ± 2.9

Classification of Resource

Resource classifications are listed in Table 3, below. In judging what proportion of the Geothermal Resource may be classified as ‘Measured’, HDRPL took into account the following points:

- 18 wells have intersected the reservoir within GEL 223. These wells prove the existence of a viable geothermal reservoir, and confirm reservoir temperature.
- 12 wells in GEL 223 have published flow data from DST or other production tests from the Pretty Hill Formation. These data indicate that the target reservoir will flow fluid.
- The reservoir has been penetrated to greater than 800 m in one well, and seismic data suggest that the character of the formation is similar throughout GEL 223.

HDRPL judged the **Measured Geothermal Resource to be that part of the Resource that lies in the top 800 m of the Pretty Hill Formation and within a 1 km radius around the group of wells for which evidence of fluid flow has been demonstrated.**

In judging what proportion of the remaining Geothermal Resource may be classified as ‘Indicated’, HDRPL took into account the following points:

- 18 wells intersecting the reservoir indicate the extensive distribution of the unit within GEL 223.
- 15 wells provide direct indications of reservoir temperature in and around GEL 223 and show no evidence of convective heat transfer within the sequence.
- The reservoir has been penetrated to greater than 800 m in one well, and seismic data indicate similar character throughout the Penola Trough.

HDRPL judged the **Indicated Geothermal Resource to be that part of the Resource that lies outside the Measured Resource area but in the top 800 m of the reservoir unit.**

In judging that the remaining portion of stored heat can be classified as Inferred, HDRPL took into account the following points:

- The extent and thickness of the Pretty Hill Formation is defined with relatively high confidence by good quality 3D seismic data.
- The seismic character of the Pretty Hill Formation is consistent horizontally and vertically throughout its extent.

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- There is evidence from well Katnook 2 that convection plays no significant role in heat transfer within the Pretty Hill Formation.

HDRPL judged the **Inferred Geothermal Resource to be that part of the Resource that lies deeper than 800 m in the reservoir units.**

Table 3. Estimated Geothermal Resource within the Pretty Hill Formation and deeper reservoir units for the Penola Geothermal Play. Resource estimates rounded to two significant figures.

	Total	**Inferred Resource**	**Indicated Resource**	**Measured Resource**
Stored Heat	131,700 PJ	**89,000 PJ**	**32,000 PJ**	**11,000 PJ**
Volume	516 km^3	310 km^3	150 km^3	56 km^3

Key Assumptions and Geological Constraints

The following key assumptions underpin this Inferred Geothermal Resource assessment.

- The proposed product to be generated from the Geothermal Resource is electricity produced by commercially available organic rankine cycle binary plants utilizing air-cooling fans and pumps.
- The stated Geothermal Resource assumes that convection transfers no significant heat within the Geothermal Play. No evidence of such processes has been observed in previously drilled wells, but if present such processes tend to suppress geothermal gradients and reduce the stored heat resource.
- This work is based on a numerical model of a section of the Earth's crust. A model necessarily simplifies the true complexity of the Earth and as such is inherently prone to error. The results of modelling stated within this report have been generated using the best available estimates of critical parameters, but future work may yield new information that modifies or falsifies some of these assumptions. All modelling results should be treated as provisional.
- The existence of an economically extractable Geothermal Energy Resource remains speculative until production testing has been conducted in the target reservoir. Likewise, there is no good basis yet for determining the proportion of thermal energy that might be recovered and converted to electrical energy.

This report has been prepared under the direction of Dr Graeme Beardsmore, an employee of HDRPL. Dr Beardsmore was assisted by other employees within Hot Dry Rocks Pty Ltd but takes sole responsibility and is accountable for the report as a Competent Person as defined by the Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves (2008 Edition). Dr Beardsmore is a member of the Australian Society of Exploration Geophysicists and abides by the Code of Ethics of that organization.

Dr Beardsmore consents to the public release of this Statement in the form and context in which it appears.

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Glossary of terms in their context as used in this report

Base temperature	The temperature of the geothermal fluid once it has passed through a power conversion process, prior to re-injection.
Basement	The deepest geological horizon considered in an assessment.
Basin	A three dimensional accumulation of sediments, usually thicker on the down-thrown side of a major fault or in the centre.
Cut-off temperature	The minimum fluid temperature for commercial energy extraction.
Conductivity	A measured property of a rock indicating its ability to transfer or "conduct" heat energy, usually measured directly in Watts per metre Kelvin (W/mK).
Density	A physical property of matter, such as rocks, measured in mass per unit volume (eg kilograms per cubic metre, kg/m^3).
Earth model	A three-dimensional computer model of part the earth based on grided inputs such as depth maps from well data, gravity data or seismic mapping.
Heat Flow	The amount of thermal energy passing through a square metre at the earth's surface, usually expressed as milliwatts per square metre (mW/m^2).
Heat Generation	The production of heat by a rock from the natural decay of radioactive elements, usually expressed as microwatts per cubic metre (µW/m^3).
Isotherm	A line or surface joining points of equal temperature.
Organic rankine cycle	An electricity production process whereby heat can be exchanged from a hot fluid to a cooler one and vice versa via the use of a liquid organic compound which has a lower boiling point than the source fluid. Used in certain geothermal electricity generating plants where the fluid temperature is suitable.
Permeability	The ability of a rock to flow fluid, such as water, usually expressed in millidarcies (mD).
Geothermal Play	A conceptual geothermal exploration target consisting of four principal components; heat flow, thermal insulation, reservoir and access to water.
Porosity	The 'free' space in a rock, not occupied by minerals, cement or clay. A dimensionless unit, expressed as the % of rock volume that may hold fluid.
Reservoir	A body of rock with certain permeability and porosity characteristics which enable it to hold fluids of economic interest.
Sandstone	A coarse grained sedimentary rock chiefly composed of silica grains.
Seismic line	A line across the ground surface along which a seismic survey (involving the reading of vibrations induced in the shallow earth by a source) has or will be read.
Specific heat	The amount of energy required to raise the temperature of 1kg of substance by 1°C; otherwise known as relative heat capacity, usually measured in Joules per kilogram per degree Kelvin (J/kg^{-1}K^{-1}).
Stored heat	The amount of geothermal energy "trapped" as heat within a volume of rock. Quantified as in-place petajoules (PJ).
Trough	A geological depression in which sediments accumulate (c.f. "basin").
Well	A bore hole.