

**Memorandum To:** Ian Faris  
**From:** Phil Hawke

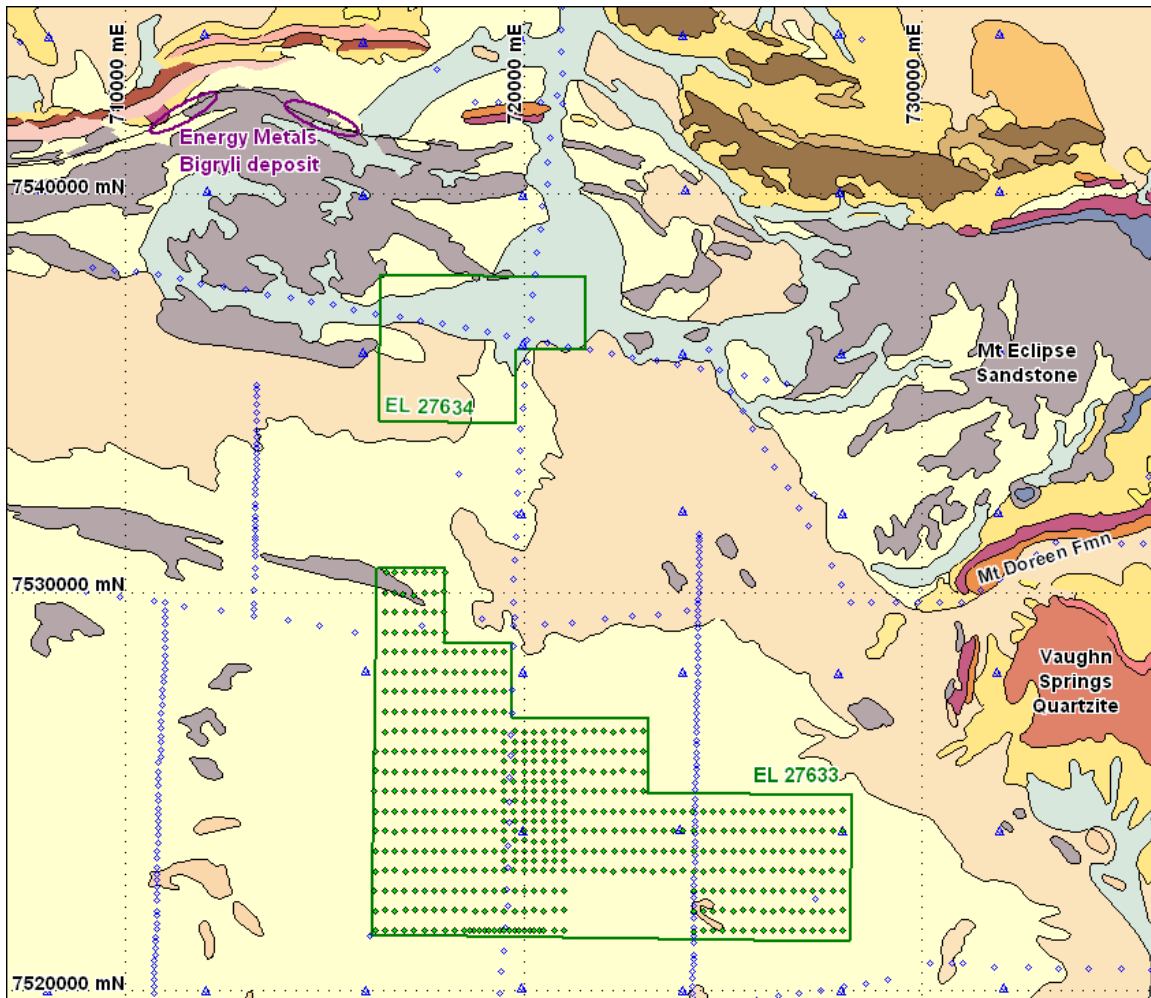
**Date:** 29 August 2011

**Re:** Results of a gravity survey for paleochannel mapping at the Ngalia Project

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Background

Gravity surveying was completed in EL 27633 of the Ngalia Project to assist in the interpretation of paleochannels which may potentially host (rollfront-style) uranium mineralisation.



**Figure 1: Regional geology map showing the location of EL 27633 and gravity survey coverage (blue diamonds = historic gravity, blue triangles = 2010 regional data, green diamonds = this survey).**

EL 27633 is located in the Ngalia Basin, approximately 15km to the SSE of Energy Metals Bigryli uranium / vanadium resource (Figure 1). The mineralisation target, however, is similar to the paleochannel targets identified by Thundellara Resources to the south and west, where both the gravity and airborne electromagnetic techniques have been successfully used to identify Tertiary paleochannels hosting uranium mineralisation: <http://www.thundellarra.com/documents/8%20June%202011%20Drilling%20Extends%20Ngalia%20Basin%20Mineralisation.pdf>

A paleochannel identified by Thundellara is open and is likely to extend into EL 27633 from the southern boundary of the tenement. The main objectives of this survey are to help map out the extent of this paleochannel system and identify potential targets for drill testing.

### Regional Geology and Geophysics

EL 27633 is located within an area of recent alluvial cover overlying sediments of the Ngalia Basin (Figure 1). Regional geological interpretations suggest that the (Proterozoic) basement stratigraphy within the tenement area is most likely to be the Mt Eclipse Sandstone.

Historic gravity data were collected along (government) seismic survey traverses in the Ngalia Basin during the 1970s. While these data appear to merge with modern survey data quite well, positioning errors of up to 100m due to the large scale optical surveying techniques used in locating these data are likely.

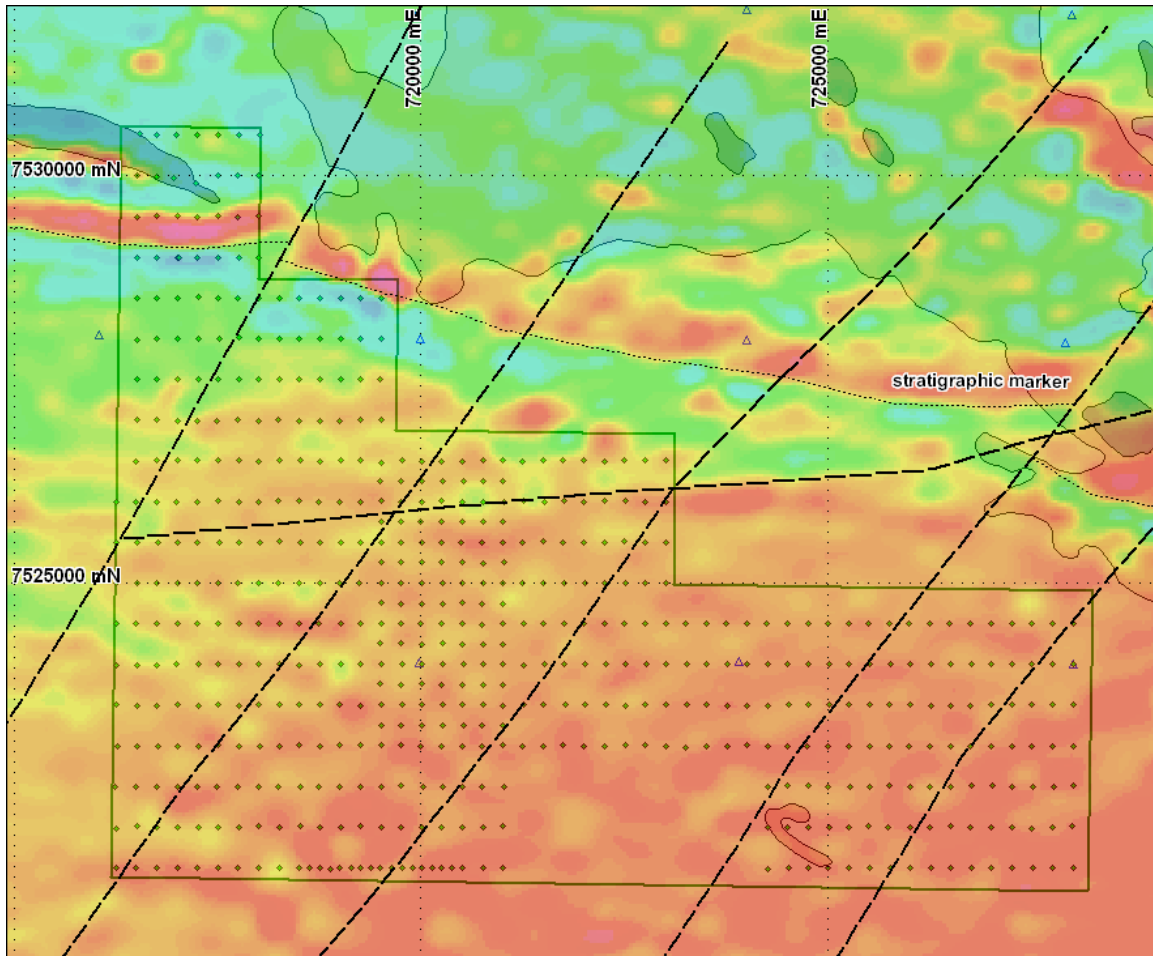
Regional gravity coverage on a 4 x 4 km station spacing were collected as part of government sponsored survey in 2010.

Regional magnetic and radiometric data were extracted from government regional geophysical survey compilations for the Northern Territory. These surveys have a typical flying specification of 400m line spacing and 60m height.

An image of the first vertical derivative of magnetic data over EL 27633 is shown in Figure 2. A WNW trending magnetic marker through the north end of the project area shows some correlation with outcrops of the Eclipse Sandstone and probably reflects a stratigraphic marker within the basement stratigraphy.

Several NE and one ENE trending faults have been interpreted by minor offsets and trends in the subtle magnetic character of the basement stratigraphy.

While a number of radiometric anomalies are identified within the outcropping Proterozoic stratigraphy to the north of EL 27633, with the largest anomalies associated with granites although lesser U anomalies correlate with the Bigryli mineralisation, EL 27633 contains no anomalous radiometric response (radiometric data not shown, but included on attached CD). This is attributed to extensive Quaternary sedimentary cover which is expected to conceal the response from a paleochannel hosted uranium occurrence.



**Figure 2: First vertical derivate of regional magnetic data with simplified structural interperation.**

### 2011 Gravity Survey – Data Acquisition and Processing

A total of 548 new stations of gravity data were collected by Atlas Geophysics during July 2011. Data were collected initially collected over the tenement area (with the exception of an aboriginal heritage area along the southern boundary of the tenement) at a 250 x 500m station spacing (Figure 1).

Infill of a single traverse to a 125m station spacing was planned along the southern margin of the tenement where the paleochannel identified by Thundellara to the south was expected to enter EL 27633.

A 1.5 x 3.5 km area near the centre of the tenement area where the initial survey data indicated the likely presence of a paleochannel was infilled to a 250 x 250m station spacing to give better definition of the geometry of this feature.

Gravity measurements were made using a Scintrex CG5 gravimeter. Station position information was recorded using a Leika 1200 real-time kinematic GPS system.

Data quality was established by reoccupation of approximately 2.5% of stations, suggesting a measurement precision of 25 mm (elevation) and 0.025 mGals (gravity reading) for the survey.

Gravity data have been levelled by base station tie to the National Gravity Network. Historic government surveys, including the 2010 regional survey and older data collected along seismic lines, have been levelled as closely as possible to the 2011 data. The compiled gravity data was gridded to a 200m cell size.

An image of the first vertical derivative of the gravity is shown in Figure 3.

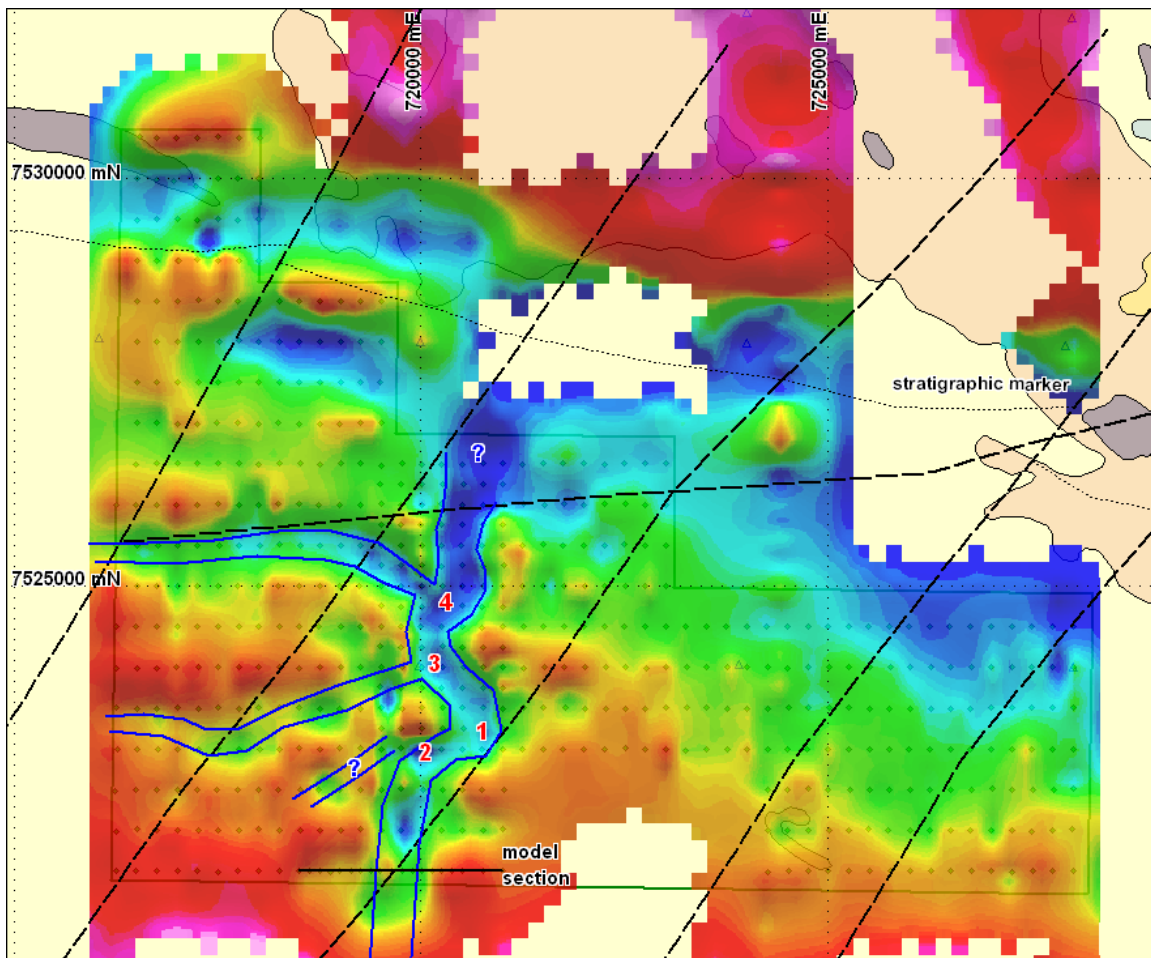


Figure 3: First vertical derivative of gravity data compiled from the 2011 and historic gravity surveys. A blue outline shows the extent of the interpreted paleochannel system. Suggested uranium targets are labeled 1-4.

### Interpretation

An interpreted paleochannel system, identified by a strong gravity low due to an increased thickness of low-density alluvium, is shown in Figure 3.

This interpretation lines up well with the expected location of the paleochannel previously interpreted by Thundelarra to the south. In addition to the main north-south trending paleochannel, two minor channels (tributaries?) are interpreted to enter from the west at 7524000mN and 7524900mN. A third tributary may intersect the main channel at 7522850mN, but is poorly defined by the existing data.

Toward the northern margin of the tenure, two gravity lows trend parallel the magnetic marker interpreted to reflect lithology within the basement stratigraphy. It is considered likely that these may also reflect a low-density basement unit (black shale?). It is not clear where the interpreted paleochannel extends to the north of 7526500mN.

Four target areas are suggested based on locations where redox fronts may be expected to occur:

Target 1 (720770mE, 7523180mN): Occurs on the outside of a broad meander in the paleochannel system which is suggested as a place where organic material may have accumulated, generating a low pH, reducing environment.

Target 2 (720080mE, 7523000mN): The expected entry point for the (poorly defined) smaller tributary to enter the main paleochannel. The mixing of waters is suggested as a point where a redox front may occur.

Target 3 (720140mE, 7524000mN): Entry point for the southern tributary to the main channel.

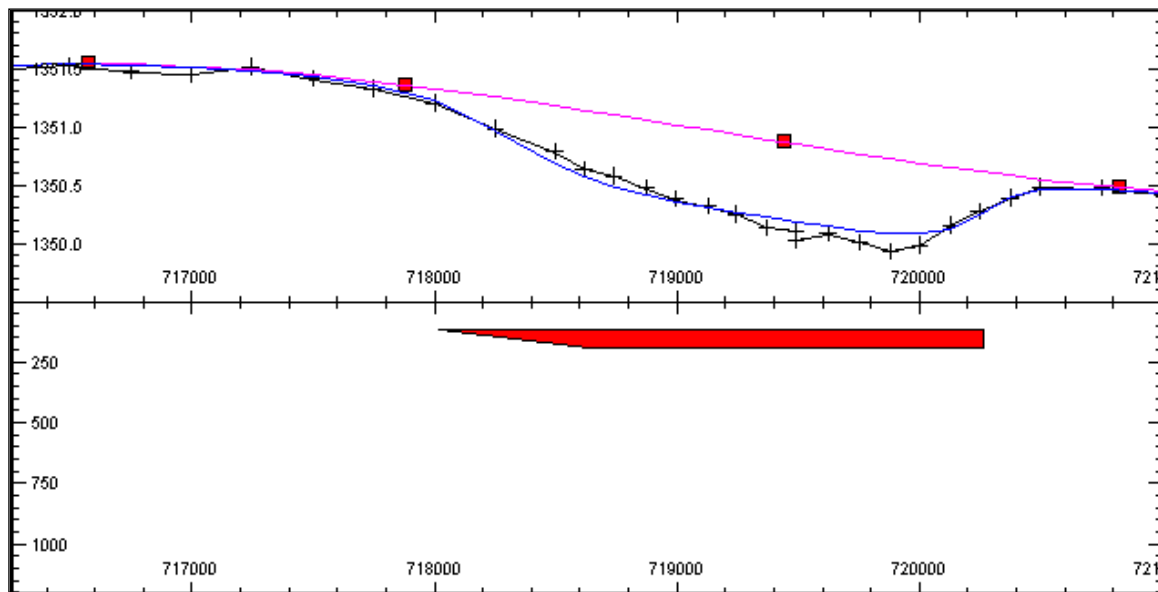
Target 4 (720180mE, 7524800mN): Entry point for the northern tributary to the main channel.

### Gravity modelling

An attempt was made to predict the likely depth to the top of the paleochannel by modelling of the gravity data.

A forward gravity model was created for the 125m spaced station traverse along 7521500mN (Figure 4). Due to inherent ambiguity in modelling gravity data, the model was simplified by assuming a simple prism shape for the (low density) source of the gravity anomaly, with a vertical edge assumed for the sharper (eastern) contact. A density of 2.4 g/cc was assumed for the alluvial material filling the paleochannel with a density of 2.67 g/cc for the basement.

The key feature that was used in depth determination for this model was the slope at the eastern end of the gravity low (the fit of the western margin was aided by reshaping the low-density source into a wedge). This gives a best fit for a depth to top of the source of 115m, which is interpreted to represent the (maximum) likely depth to basement.



**Figure 4: Forward gravity model – 7521500mN (location in Figure 3)**

An attempt was made to verify the results by inversion modelling of the data using the UBC code. However this tool tried to model the gravity low units as vertical low density sources as opposed to irregularities on an essentially layered earth and does not help constrain target depth.