



# ONSHORE *Energy Security* *Program underway*

*New insights will encourage exploration*

*James Johnson*



A program to acquire pre-competitive geoscience information for onshore energy prospects has begun following the Prime Minister's Energy Security Initiative.

The initiative provides \$58.9 million over five years for the acquisition of new seismic, radiometric, magneto-telluric and airborne electromagnetic (EM) data to attract investment in exploration for onshore petroleum, geothermal, uranium and thorium energy sources. A further \$75 million will fund data acquisition to encourage offshore petroleum exploration.

Many of Geoscience Australia's Minerals Division scientists have been scoping programs for the onshore initiative, which will run to June 2011. A 'first-pass' program detailing work to be done, where and in what order, is close to completion. The initial scope will be modified through several iterations in consultation with industry stakeholders.

- Projects will be of national or strategic importance.

Consultation with the states and Northern Territory was completed in November. A draft plan for the program includes ~7000 line kilometres of new seismic data, around 190 000 kilometres of airborne EM data and 140 000 kilometres of new gamma-ray spectrometric (commonly referred to as radiometric) data.

“The proposed radiometrics program will significantly increase the value of the National Gamma-ray Spectrometric and Magnetic databases.”

## **Key criteria identified**

All onshore elements of the program will be under the banner of the National Geoscience Agreement between the states, the Northern Territory and the Commonwealth Government, requiring a high degree of consultation between Geoscience Australia and state and territory geological surveys.

A set of principles has been circulated, listing the criteria that will be used to decide which programs will proceed. Key criteria are:

- Projects will produce outputs aimed at promoting investment in exploration for energy-related resources, especially in greenfields areas.
- Project outputs will be aimed at improving discovery rates for energy-related resources.

## **Radiometrics to track geothermal energy sources**

Radiometric data are useful in the detection of concentrations of uranium, thorium and potassium, all of which are indicators of high-heat-producing granites that are potential sources of geothermal energy.

The proposed radiometrics program will significantly increase the value of the National Gamma-ray Spectrometric and Magnetic databases. Existing airborne gamma-ray surveys contained in the National Radiometric Database are not consistent with a common datum. This severely limits their usefulness because surveys are not easily combined

into regional-scale compilations and quantitative between-survey comparisons of radiometric signatures are difficult. The solution is to ‘back-calibrate’ all surveys in the database using a well-calibrated airborne spectrometer system. While Australia has a world-class airborne magnetic database, wavelengths in the 100 to 500 kilometre band are not accurately represented because of the nature of the original data acquisition. Long traverses at 75-kilometre spacing would allow these wavelengths to be accurately recovered for a variety of valuable scientific purposes.

The solution to both these problems is to fly an Australia-wide airborne geophysical tie-line survey (AWAGS 2). Acquisition will take place in 1:1 000 000 map sheet blocks with 400-kilometre line segments separated by 75-kilometre line spacing (figure 1). The AWAGS 2 data will be used to match all gamma-ray spectrometric data to the same common datum and to recover the wavelengths that are currently corrupt in the National Magnetic Database.

“The AWAGS 2 data will be used to match all gamma-ray spectrometric data to the same common datum”

The improved datasets will lead to an increased understanding of the geology, structure, geochemistry and geomorphology of the continent.

Levelled and calibrated datasets will directly assist uranium and thorium exploration by allowing quantitative comparisons of radiometric signatures from different surveys. Furthermore, in areas of solid rock outcrop, knowledge of the distribution of potassium, uranium and thorium in absolute concentrations is important in determining absolute heat production and modelling heat flow.

These data will also aid research in land-use modelling,

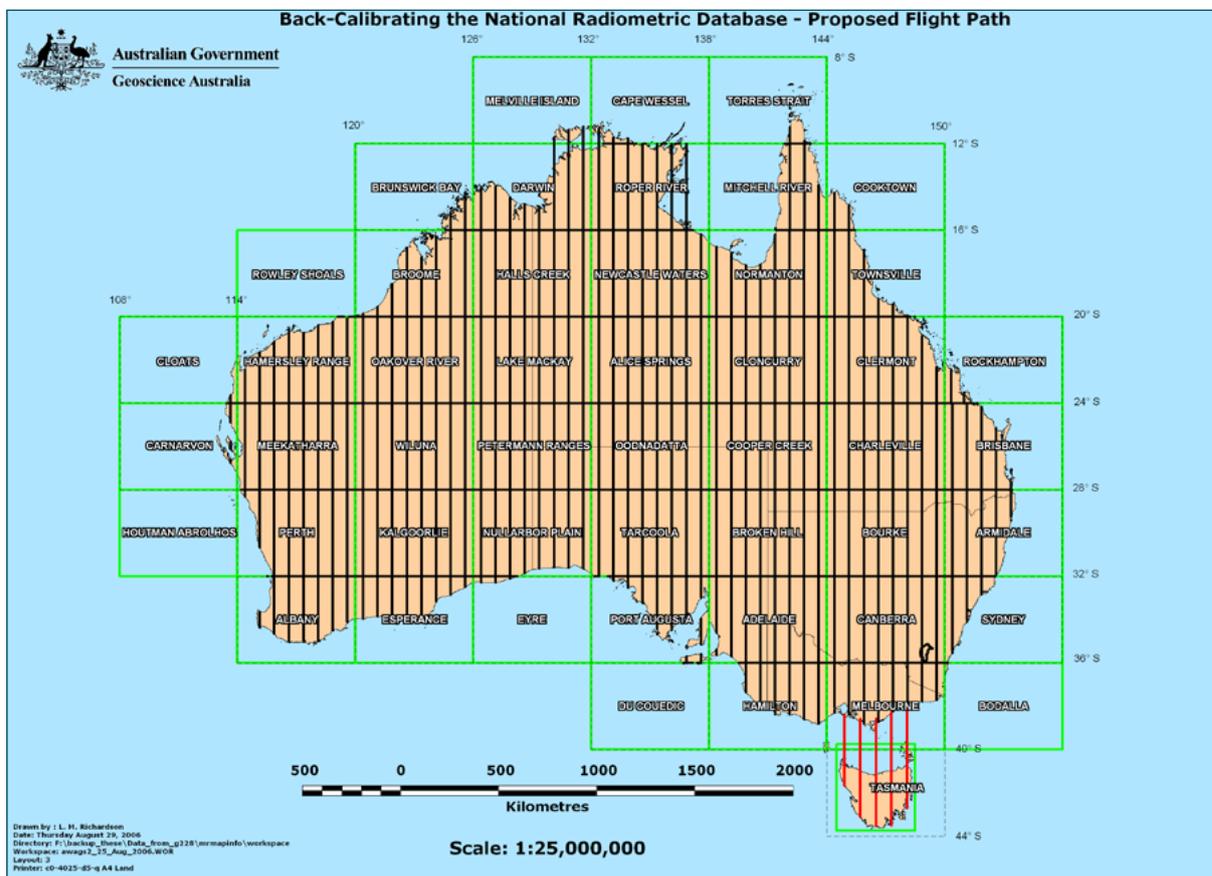


Figure 1. Proposed flight line pattern for the AWAGS 2 magnetics and radiometrics survey to back-calibrate the National Radiometric Database



sustainability, agricultural and forest productivity, radiation risk, mineral exploration, regional geology, regolith and soils.

Improvements in the airborne magnetics dataset will provide increased resolution of the magnetic structure in the lower crust and large geologic features, an accurate regional magnetic field for shallower crustal studies, and further refine our understanding of mechanical properties of the lithosphere. These benefits will help to identify favourable areas for energy, thermal and mineral resources, and aid in the mitigation of geological hazards.

### **Seismic acquisition for minerals and hydrocarbons**

The seismic acquisition program will provide a whole-of-crust, structural understanding of regions with enhanced mineral and hydrocarbon energy potential. Seismic acquisition will be used in Palaeoproterozoic provinces with higher uranium potential and high-heat-producing granites as possible sources of geothermal energy. These include the Curnamona, Gawler, Pine Creek–Rum Jungle, Capricorn, Mt Isa and Georgetown regions. Seismic acquisition began in the Eastern Succession of the Mt Isa Block in November 2006, and will move to Georgetown in 2007.

The program will also target basins with perceived hydrocarbon potential where a seismic stimulus is required to encourage exploration. The Lander Trough in Central Australia, the Kidson and Gregory sub-basins of the Canning Basin, and the Arrowie Basin are currently high priorities.

“The work will reduce the technical risks of exploration, especially in terrains where the current level of information is poor due to old or substandard basic datasets.”

### **Airborne EM for uranium**

Airborne EM acquisition will target palaeochannels and seek to identify graphitic horizons in schists buried beneath unconformities, both of which have potential for uranium mineralisation. Regions of enhanced uranium prospectivity where airborne EM acquisition will be used include the Western Gawler, Curnamona–Mt Painter, Rum Jungle, Mt Isa–Georgetown, Paterson and Pine Creek regions. Acquisition parameters will vary, but the emphasis will include regional surveys with wide line spacing to provide a better regional framework for exploration.

### **Tenders called**

Tenders for the Australia-wide radiometrics program closed on 1 November 2006. Geoscience Australia expects acquisition to begin in February–March 2007 and to be completed by May 2008. The request for tender document for the airborne EM and seismic programs will involve separate deeds of standing offer arrangements, similar to the current system for airborne magnetics, radiometrics and gravity acquisition.

We expect airborne EM acquisition to begin by March–April 2007. Seismic surveys in the 2006–07 financial year will involve acquisition under the current Australian National Seismic Imaging Resource arrangements, while the deeds of standing offer document will be used to arrange contracts in subsequent years. Over the coming months, tenders will be let for data acquisition programs to cover the first stage of the program, the locations of initial surveys will be finalised, and magneto-telluric programs will be scoped.

### **National benefit**

This marks the start of an exciting period of national data acquisition to benefit the Australian energy and minerals sectors. The work will reduce the technical risks of exploration, especially in terrains where the current level of information is poor due to old or substandard basic datasets.



The new data will give explorers new insights into Australian's petroleum and mineral potential, and are expected to identify new exploration plays and encourage exploration in greenfields provinces.

The data will also provide a substantial input to new regional and continental-scale geological syntheses and research that will provide new insights into controls on Australia's mineral and petroleum systems and their potential.

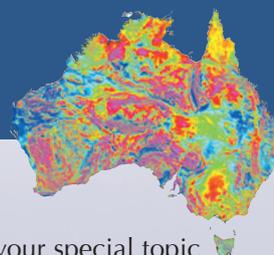
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Australian Geoscience References



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