HEAVY MINERAL SANDS IN THE EUCLA BASIN: A PLACER DEPOSIT STUDY

Luisa Ruperto

CRC LEME, Geoscience Australia, GPO Box 378, Canberra ACT 2601, Australia

The Eucla Basin is a ~2000 km wide marginal marine basin straddling the South Australia and Western Australia border, with a thickness of approximately 300 m of Tertiary marine sediments. It is a landward extension of the Eyre Sub-basin depocentre (offshore) in the Great Australian Bight, and encompasses a series of palaeochannels, drainage networks and a broad limestone shelf (the Bunda Plateau), commonly known as the Nullarbor Plain. The Eucla Basin is underlain and surrounded by Archaean and Middle Proterozoic crystalline granitic and intrusive basement rocks: the Musgraves to the north; the Gawler Craton to the north-east; and, the Yilgarn Craton to the west.

Recent studies in the Eucla Basin (Hou *et al.* 2003; Hou *et al.* 2004) and in south-west Victoria (Paine *et al.* 2005) indicate that strandlines of Eocene age in southern Australia host placer deposits of heavy mineral sands resulting from multiple sea level transgressions. Evidence for Eocene shorelines in the Eucla Basin tend to be best preserved in the eastern part of the Basin.

The Eucla Basin has been explored extensively for a range of purposes, but principally for mineral sands since the 1970s (Ferris 1994). More recently, the Eucla Basin margins, particularly in South Australia, have been the target of extensive research and exploration by various exploration companies seeking to exploit this heavy mineral-rich province. Iluka Resources Ltd. has collaborated with CRC LEME to seek unique research-based approaches to heavy mineral exploration and characterisation of the heavy mineral sands (HMS) deposits at Jacinth, Ambrosia, Tripitaka and surrounding areas in the eastern Eucla Basin.

Previous research by Hou *et al.* (2003) shows that the Ooldea and Barton Range barriers host placers of significant mineral potential. CRC LEME research has targeted these strandlines specifically for stratigraphic analysis and heavy mineral analysis. The stratigraphic approach has used heavy mineral-bearing facies to define the zones of mineralisation. This has allowed us to model the deposit in three dimensions to identify the spatial relationships between all the facies. Conversely, the heavy mineral approach set about defining heavy mineral domains on the basis of ages of the grains and provenance.

As well as working at the deposit scale, the project also looked at the heavy mineral potential of the Eucla Basin as a whole, something which has rarely been undertaken across the state border. The basin-scale study follows a palaeogeographic approach to predicting placer deposit locations through shoreline reconstruction and highlighting sediment transport pathways.

The CRC LEME/Iluka Project finishes in November 2006 with a final project meeting and delivery of the final Project report. The results of the project will be available once confidentiality ceases in Nov 2008.

REFERENCES

FERRIS G.M. 1994. Review of Heavy Mineral Sand Exploration in South Australia – the Eucla Basin. *Department of Mines and Energy Geological Survey South Australia* **Report Book 94/22**.

HOU B., FRAKES L.A., ALLEY N.F., HEITHERSAY P. 2003. Evolution of beach placer shorelines and heavy-mineral deposition in the eastern Eucla Basin, South Australia. *Australian Journal of Earth Sciences* **50**, 955-965.

HOU B. & WARLAND I. 2005. Heavy mineral sands potential in the Eucla Basin in South Australia. *MESA Journal* **37**, May 2005.

PAINE M.D., ANAND R.R., ASPANDIAR M., FITZPATRICK R.R. & VERRALL M.R. 2005. Quantitative heavy-mineral analysis of a Pliocene beach placer deposit in southeastern Australia using the AutoGeoSEM. *Journal of Sedimentary Research* **75**, 742-759.