

## PUBLISHED REPORTS - MINERALS EXPLORATION

[For overseas customers, please include an additional \$50 Australian to cover bank fees, postage and handling costs.]

**REPORT 4 BUTT, C .R. M. and GOLE, M. J, 1984. "Helium surveys of the Manyingee and Bennett Well uranium deposits, WA".** **MERIWA Project 17**

[Fiche \$5.00, Hardcopy \$32.00]

A survey of the He content of overburden gas and groundwater, which may be a pathfinder for U, was conducted in the area of the Manyingee and Bennett Well U deposits, two deeply buried roll front type deposits.

**KEYWORDS:** Uranium/helium/palaeochannel/groundwater/Western Australia.

**REPORT 6 CHUCK, R. G, 1984. "Sedimentary and Tectonic Development of the Bangemall Basin and Implications for Mineral Exploration".** **MERIWA Project 26**

[DVD \$50, Fiche \$20.00]

The middle Proterozoic Bangemall Group is subdivided into three vertically juxtaposed subgroups which reflect major phases of the basin's tectono-sedimentary evolution. The distribution of sedimentary environments in time and space was controlled by regional tectonic events, and shows a cyclic pattern. The evolution of the basin shows similarities to that of failed rifts.

**KEYWORDS:** Bangemall Basin/proterozoic/regional geology/sedimentation/stratigraphy/tectonics.

**REPORT 11 GROVES, D. I., DAHL, N. and McNAUGHTON, N. J, 1985. "Genetic concepts as aids to development of gold exploration models: Lead isotope constraints on source and genesis of Archaean gold deposits in Western Australia".** **MERIWA Project 23**

[Hardcopy \$23.00]

The potential of the technique of determining the age and source of Archaean gold mineralisation in Western Australia through lead isotope studies of galenas and Fe-sulphides is confirmed, and a basis is provided against which data from gold deposits can be compared. The study also indicates the potential of lead isotopic compositions to discriminate large deposits from small.

**KEYWORDS:** Lead isotope/gold deposits/Archaean greenstones.

**REPORT 13 BETTENAY, L. F., PARTINGTON, G. A., and GROVES, D. I, 1985. "Development of exploration concepts for Sn-Ta Pegmatites: Use of host rock associations and alteration haloes".** **MERIWA Project 4**

[Fiche \$10.00, Hardcopy \$59.00]

The pegmatite of this study is in a Barrovian-style terrain, localised in a major shear zone, and in or near mafic-ultramafic sequences, thus explaining many of the anomalous features in its mineralogy, texture and structure. Exploration parameters defined are mineral geochemistry, geochemical dispersion haloes and geochemically anomalous cross-cutting mafic dykes.

**KEYWORDS:** Pegmatites/alteration haloes/zoning/cassiterite/tantalite/spodumene.

**REPORT 14 SMITH, B. H. and GILKES, R. J, 1985. "Mineralogy and geochemistry of the weathered zone over some Archaean base-metal deposits in Western Australia".** **MERIWA Project 33**

[Fiche \$10.00, Hardcopy \$51.50]

Copper is a useful pathfinder for nickel sulphide mineralisation and some styles of gold mineralisation. An understanding of copper's geochemistry and its dispersion in deep, highly weathered and often polygenic soils particularly widespread in WA is developed.

**KEYWORDS:** Geochemistry/nickel sulphides/Archaean.

**REPORT 16 TERRY, K. W., VAN RIESSEN, A. and LEE, D. C, 1985. "Semi-micro analytical technique in mineral exploration and ore genesis studies".** **MERIWA Project 14**

[Fiche \$10.00, Hardcopy \$47.00]

Using X-ray excitation and a scanning electron microscope, the detection limit for some elements in certain matrices was extended down to 30 ppm, thus enabling individual mineral grains to be analysed rather than whole rock. The technique was exercised on 310 samples covering chrome diopside, chromite, garnet, ilmenite, olivine and zircon from kimberlitic and non-kimberlitic rock sources.

**KEYWORDS:** Chrome diopside/garnet/ilmenite rock source prediction/X-ray fluorescence.

**REPORT 18 HUDSON, D. R., CROMELLIN, P. and CHAN, M. A, 1985. "Nature, distribution and recovery of platinum group minerals in Kambalda nickel ores".** **MERIWA Project 7**

[Fiche \$5.00, Hardcopy \$30.50]

Study of concentrates and ore samples from the Kambalda nickel deposits has demonstrated the existence of a number of discrete platinum group element minerals. Sperrylite occurs within massive ores whereas a number of discrete palladium minerals are concentrated in veins and alteration zones. There is some scope for recovery of PGE minerals by gravity methods.

**KEYWORDS:** Kambalda/nickel deposits/platinum group elements/sperrylite/sudburyite.

**REPORT 22 DAHL, N., McNAUGHTON, N. J. and GROVES, D, 1987. "Trace-element and lead isotopic compositions of pyrites as guides to gold and base-metal mineralisation - a pilot study".** **MERIWA Project 62**

[Fiche \$5.00, Hardcopy \$31.50]

Reconnaissance studies indicated the potential of integrated Pb-isotope and trace-element studies of pyrites to help resolve the genesis of Archaean gold deposits and to provide information on their economic significance.

**KEYWORDS:** Archaean/gold exploration/lead isotopes/pyrites.

**REPORT 23 DUNN, J. G., MEAGHER, L and WARREN, L. J, 1986. "The exfoliation of vermiculite".** **MERIWA Project 57**

[Fiche \$5.00, Hardcopy \$32.00]

The chemical and physical properties of two vermiculites were determined and compared, one from Young River W.A. (primarily a chlorite-vermiculite mixed layer system) and the other from Palabora, South Africa (a vermiculite-biotite mixed layer system).

**KEYWORDS:** Vermiculite/exfoliation/cation exchange.

## PUBLISHED REPORTS - MINERALS EXPLORATION ... Cont'd.

[For overseas customers, please include an additional \$50 Australian to cover bank fees, postage and handling costs.]

<b>REPORT 24</b>	<b>COGGON, J. H., 1986. "Coincident loop and in-loop transient electromagnetic interpretation for sheet conductors".</b>	<b>MERIWA Project 36</b> [Fiche \$10.00, Hardcopy \$49.50]
<p>This report gives a graphical interpretation scheme for use with coincident loop and in-loop transient electromagnetic data, based on analysis of responses calculated for a finite thin sheet conductor in free space, and designed for use in areas of moderately conductive overburden. An anomaly is described in terms of: (a) the transient decay of the peak response, and (b) the amplitude pattern observed at a characteristic delay time. Four examples are given to illustrate application of the interpretation method. <b>KEYWORDS:</b> TEM interpretation/coincident loop interpretation/in-loop interpretation.</p>		
<b>REPORT 26</b>	<b>SAPPAL, K.K., 1986. "Petrography of Collie coal, Collie Basin, Western Australia".</b>	<b>MERIWA Project 20</b> [Fiche \$15.00, Hardcopy \$78.00]
<p>The petrographic composition of the coal has been determined. Both maceral and mineral matter compositions of the individual seams are variable; the dominant maceral groups are vitrinite and inertinite, and the exinite and mineral matter contents are low. <b>KEYWORDS:</b> Collie Basin/coal petrography/lithotype.</p>		
<b>REPORT 27</b>	<b>PIDGEON, R. T., 1987. "Correlation of acid volcanics in the Archaean of Western Australia".</b>	<b>MERIWA Project 24</b> [Fiche \$10.00, Hardcopy \$41.50]
<p>This is the first extensive U-Pb geochronological study of volcanics from the greenstone belts of the Archaean Yilgarn Block. Twenty three felsic samples of about 50 kg, were processed for zircons and over forty zircon samples were analysed. The isotopic results provide information on the uranium and thorium contents of the zircons as well as the age of the volcanic rocks. <b>KEYWORDS:</b> Archaean/Yilgarn/felsic volcanics/zircon.</p>		
<b>REPORT 29</b>	<b>CLARKE, E. H and COGGON, J. H., 1986. "The application of drill hole electromagnetic techniques for delineation of conductive mineralisation".</b>	<b>MERIWA Project 41</b> [Fiche \$25.00, Hardcopy \$143.50, CD-Rom \$50.00]
<p>A new method of down-hole electromagnetic surveying, called the fixed receiver electromagnetic method, was investigated by both theoretical modelling and field surveys on three massive sulphide deposits in the weathered terrain of the Yilgarn Block. <b>KEYWORDS:</b> Electromagnetic surveying/electromagnetic interpretation/drill-hole work/conductive mineralisation.</p>		
<b>REPORT 30</b>	<b>WILD, S. A. and PIDGEON, R. T., 1986. "U--Pb geochronology, geothermometry and petrology of the main areas of gold mineralisation in the "Wheat Belt" region of W.A".</b>	<b>MERIWA Project 30</b> [Fiche \$15.00, Hardcopy \$61.50]
<p>Using principally the U-Pb isotopic systems in zircons, this study provides the first precise age determinations on rocks of the "wheat belt" region of Western Australia. Whole-rock samples were processed to extract zircons and a total of 57 fractions were analysed. <b>KEYWORDS:</b> U-Pb geochronology/gold mineralisation/geothermometry.</p>		
<b>REPORT 32</b>	<b>BARNES, S. J., GOLE, M. J. and HILL, R. E .T, 1987. "The Agnew nickel deposit, Yilgarn Block, W A - stratigraphy, structure, geochemistry and origin".</b>	<b>MERIWA Project 38</b> [Fiche \$20.00, Hardcopy \$103.55, CD-Rom \$50.00]
<p>The Agnew nickel deposit in the Agnew - Wiluna greenstone belt of the Yilgarn Block, has previously been assigned to the category of "intrusive dunite associated" deposits. On the basis of a detailed re-interpretation of the geology of the deposit, this report concludes that the nickel sulphide mineralisation is hosted by komatiite flows which pre-date the dunite lens. <b>KEYWORDS:</b> Nickel/sulphides/komatiites/adcumulates.</p>		
<b>REPORT 38</b>	<b>GILKES, R. J, 1988. "Mineralogy of Darling Range bauxite".</b>	<b>MERIWA Project 51</b> [Fiche \$5.00, Hardcopy \$32.00]
<p>The lateritic bauxites of the Darling Range of southwestern Australia vary greatly in chemical and mineralogical properties. This study describes the occurrence and properties of the minerals that constitute Darling Range bauxite and relates these data to the Bayer process. <b>KEYWORDS:</b> Bauxite/laterite/Bayer process/Darling Range/alumina.</p>		
<b>REPORT 42</b>	<b>COLLINS, L. B. and HAMILTON, N. T., 1989. "Holocene sedimentation and heavy mineral accumulation, Minnipup shoreline, Geographe Bay".</b>	<b>MERIWA Project 73</b> [Fiche \$20.00, Hardcopy \$122.50]
<p>The Minnipup Shoreline is a Holocene barrier system on the modern coastline between Bunbury and Busselton in Western Australia. Barrier sediments consist of the Safety Bay Sand (7 units) overlying the estuarine Leschenault Formation. Economic accumulations of heavy minerals occur in dune, fossil and modern beach, and nearshore sediments. The refracted, shoaling, swell wave regime, microtidal conditions, onshore winds, and nearshore topography, all affect sedimentation and heavy mineral concentration. <b>KEYWORDS:</b> Heavy mineral/shorelines/sedimentology/barrier stratigraphy/segregation/coastal dynamics.</p>		
<b>REPORT 43</b>	<b>BARLEY, M. E. and GROVES, D. I, 1989. "Exploration significance of regional and local scale hydrothermal alteration patterns in greenstone belts".</b>	<b>MERIWA Project 65</b> [Fiche \$15.00, Hardcopy \$71.00]
<p>Gold mineralisation is particularly related to the evolution of shear zones and fault systems during and following regional deformation and metamorphism. Because hydrothermal alteration and related mineralisation are a direct result of the thermal evolution of these terranes, the mineralisation potential of a greenstone belt may be indicated by examining its pattern and history of alteration. Therefore, this project focussed on the complex alteration history of Archaean Western Australian greenstone belts. <b>KEYWORDS:</b> Metamorphism/hydrothermal/gold/shear zones/Archaean/supracrustal/greenstones.</p>		

## PUBLISHED REPORTS - MINERALS EXPLORATION ... Cont'd.

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<b>REPORT 47 EISENLOHR, B, 1989. "The structural development and controls on mineralisation of the northern sector of the Norseman – Wiluna Belt, Western Australia".</b>	<b>MERIWA Project 61</b> [Fiche \$30.00, Hardcopy \$146.50]
Supracrustal rocks in the Kathleen Valley – Lawlers District comprise mafic and ultramafic volcanic rocks with intercalated felsic volcanogenic rocks and black slates that are overlain by conglomerate – a typical succession in an Archaean greenstone belt. There is an older association of theoleiitic sills and lavas with some komatiites; and a younger syngenetic komatiite-associated nickel sulphide mineralisation occurs. Three structural domains are recognized. <b>KEYWORDS:</b> Archaean/greenstone belt/structural evolution/deformation/mineralisation/gold/nickel.	
<b>REPORT 61 NELSON, D. R., TRENDALL, A. F. and DE LAETER, J. R, 1990. "Correlation of the Fortescue Group".</b>	<b>MERIWA Project 82</b> [Fiche \$10.00, Hardcopy \$44.50]
A reliable age of 2765 Ma for a massive regional volcanic event which initiated deposition of the Fortescue Group has been established by using the Sensitive High-Resolution Ion Microprobe to measure U-Pb zircon ages from 10 samples. <b>KEYWORDS:</b> Geochronology/Fortescue Group/Witwatersrand Supergroup/Ventersdorp Supergroup.	
<b>REPORT 67 AYLMOORE, M. G. and GILKES, R. J, 1991. "Mineralogy of Darling Range bauxites in relation to chemical reactivity - new ore types".</b>	<b>MERIWA Project 90</b> [Fiche \$10.00, CD-ROM \$50.00, Hardcopy \$78.50]
Bauxite with lower than normal (approx 15%) iron content has been encountered in drill samples from the Huntly minesite of Alcoa of Australia Ltd. The study compares the distribution of both mineralogical and elemental analyses of Huntly North bauxites with bauxite from other operating minesites. <b>KEYWORDS:</b> Bauxite/mineralogy/alumina/ore types/extraction.	
<b>REPORT 68 GOLE, M. and HILL, R, 1991. "The refinement of extrusive models for the genesis of nickel deposits: implications from case studies at Honeymoon Well and the Walter Williams Formation".</b>	<b>MERIWA Project 79</b> [Fiche \$10.00, Hardcopy \$60.50]
Komatiite sequences at Honeymoon Well (in the northern part of the Agnew - Wiluna belt) and in the Walter Williams Formation (in the Siberia - Menzies - Mt. Ida region), with contrasting styles of komatiite volcanism, have been studied to add to the understanding of the physical volcanology of komatiites and improve recognition of varied volcanic environments in which nickel sulphides occur. <b>KEYWORDS:</b> Nickel genesis/models/extrusive/komatiite/dunite/lavas.	
<b>REPORT 72 COGGON, J and FLEMING, K, 1991. "Comprehensive interpretation of drill hole electromagnetic data".</b>	<b>MERIWA Project 71</b> [Fiche \$10.00, Hardcopy \$46.50]
A computer program to improve the interpretation of downhole electromagnetic survey data has been developed to run on an IBM compatible PC, and designed to comprehensively model the responses of conductive host rock, overburden, and a range of target bodies (mineralisation). Its use was demonstrated with data collected from a variety of survey configurations. <b>KEYWORDS:</b> Downhole/electromagnetic survey/interpretation.	
<b>REPORT 78 ROCK, N. M. S., KNOX-ROBINSON, C., WHEATLEY, M. R., HALLAM, T and GROVES, D. I, 1991. "Merigold: a database for Archaean gold deposits in the Yilgarn Block".</b>	<b>MERIWA Project 95</b> [Fiche \$5.00, Hardcopy \$36.50]
<i>Merigold</i> is a computerised database currently containing geographical, geological and mineralogical information for over 200 gold deposits from the Archaean Yilgarn Block, together with geochemical analyses of over 1000 rock samples. <b>KEYWORDS:</b> Merigold/database/gold/Yilgarn Block.	
<b>REPORT 82 PERRING, C. S., GROVES, D. I. and SHELLABEAR, J. N, 1992. "The geochemistry of Archaean gold ores from the Yilgarn Block of Western Australia: implications for gold metallogeny".</b>	<b>MERIWA Project M123</b> [Fiche \$10.00, CD-ROM \$50.00, Hardcopy \$57.50]
In order to create a consistent database comprising high-quality analyses of Archaean lode-gold deposits, which could provide further insight into the genesis of and exploration for such deposits, bulk ore samples from 28 well-documented gold deposits in the Yilgarn Block were analysed for 62 elements using ICP-ES, AAS, and ICP-MS techniques. The great majority of Archaean gold occurrences in the Yilgarn have certain geochemical features in common, and the few deposits that are anomalous in their ore geochemistry also exhibit differences independent of geochemistry. <b>KEYWORDS:</b> Geochemistry/gold ores/Yilgarn Block/metallogeny.	
<b>REPORT 102 LAI, Q., COGGON, J. and KEELE, R, 1994. "Advanced structural interpretation using magnetic data".</b>	<b>MERIWA Project M143</b> [Fiche \$10.00, Hardcopy \$54.00]
Use is made of magnetic data for quantitative interpretation of geological structure. Several slab, fold and fault models have been developed to provide a reasonably realistic approximation to real geological structures. Each model consists of one or two polyhedra, defined in terms of about ten parameters. The magnetic responses of the polyhedral models are calculated analytically, and software developed to provide profile and contour displays that may be used in qualitative as well as quantitative interpretation. <b>KEYWORDS:</b> Geophysics/magnetic data/structure/interpretation.	
<b>REPORT 106 DOUGLAS, G. B., GRAY, D. J. and BUTT, C. R. M, 1993. "Geochemistry, mineralogy and hydrogeochemistry of the Ambassador multi-element lignite deposit, Western Australia".</b>	<b>MERIWA Project M178</b> [Fiche \$15.00, CD-ROM \$50.00, Hardcopy \$92.00]
Mid-Eocene lignites in palaeochannels at Mulga Rock in the SW Officer Basin are strongly enriched in a wide range of chemical elements, including base metals, rare earths and uranium at potential ore grades. Two potential sources for the multi-element suite that forms the mineralisation of the organic matter at Mulga Rock are investigated. <b>KEYWORDS:</b> Geochemistry/mineralogy/hydrogeochemistry/lignite/Officer Basin.	

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**REPORT 109 BEESON, J. B., GROVES, D. I. and RIDLEY, J. R., 1993. "Controls on mineralisation and tectonic development of the central part of the northern Yilgarn Craton".**

**MERIWA Project M203**  
[Fiche \$15.00, Hardcopy \$101.50]

The northern central Yilgarn Craton comprises greenstones formed during two phases of tectonothermal activity at 2.95 Ga and 2.7 Ga. Greenstones deposited at 2.9 Ga were laid down in ensialic rifts associated with continental extension caused by either mantle plume impact and decompression melting of the lower crust, or subduction at a destructive Archaean plate margin. Later greenstones (2.7 Ga) were deposited by similar mechanisms, with the thickest sequences deposited in the Norseman-Wiluna Belt. Multiple deformation has affected both greenstone sequences, and was accompanied by extensive granitoid plutonism.

**KEYWORDS:** VHMS mineralisation/gold mineralisation/tectonic development/greenstones.

**REPORT 122 EISENLOHR, B. N., GROVES, D. I., LIBBY, J and VEARNCOMBE, J. R., 1994. "The nature of large scale shear zones and their relevance to gold mineralisation, Yilgarn Block".**

**MERIWA Project M121**  
[Fiche \$15.00, Hardcopy \$80.50]

Lineaments that transect the Yilgarn Block represent fundamental shear zones in the craton and were of paramount importance in controlling its geologic evolution. In this study, the central Southern Cross Province was selected as a type area to determine the extent, origin and significance of shear zones in the Yilgarn Block.

**KEYWORDS:** Yilgarn Block/lineaments/tectonics/shear zones/gold mineralisation.

**REPORT 123 HABTESELASSIE, M. M., 1994. "Vanadium distribution in the Shephards Discordant Zone, Windimurra Complex, Western Australia".**

**MERIWA Project M202**  
[Fiche \$10.00, Hardcopy \$79.00, CD-Rom \$50.00]

This research examines the Shephards Discordant Zone in the Windimurra Complex, which is divided into lower (olivine-bearing; 150 m thick), middle (magnetite rich and olivine lacking; 250 to 300 m thick), and upper parts (magnetites absent; less than 50 m thick). As vanadium is associated almost exclusively with magnetite and magnetitites (rocks with >70% magnetite), the middle unit, which has a 2-metre-thick basal magnetite layer and thinner stratiform and lenticular magnetite bodies, is the unit of principal economic interest.

**KEYWORDS:** Vanadium/mineralogy/regolith/geochemistry/distribution.

**REPORT 142 RIDLEY, J. R., GROVES, D. I. and HAGEMANN, S. G., 1995. "Exploration and deposit models for gold deposits in amphibolite/granulite facies terranes".**

**MERIWA Project M154**  
[Fiche \$10.00, Hardcopy \$60.50]

Deposit geochemistry and fluid chemistry show that gold deposits in amphibolite/granulite facies terranes are high-temperature analogues of mesothermal deposits. The metamorphic grade during mineralisation influenced the structural style, host rocks and siting of deposits. Three classes of deposit are distinguished on the basis of alteration mineralogy in mafic and ultramafic host rocks: the amphibole class, the diopside class, and the diopside-K-feldspar class. These classes reflect increasing temperatures of metamorphism and mineralisation.

**KEYWORDS:** Amphibolite-granulite facies/gold mineralisation/structure/alteration.

**REPORT 145 VEARNCOMBE, J. R., DORLING, S. L., DENTITH, M. C., CHISNALL, A. W., CHRISTENSEN, J. N., McNAUGHTON, N. J., PLAYFORD, P. E., RAYNER, M. J. and REED, A. R., 1995. "Tectonic, structural and depositional controls on zinc-lead mineralisation on the Lennard Shelf, Canning Basin".**

**MERIWA Project M201**  
[Fiche \$15.00, Hardcopy \$123.50, CD-Rom \$100.00]

The distribution of lithofacies in the Devonian limestones of the Lennard Shelf is controlled by basement-hosted faults, with reef and platform facies confined to palaeohighs. Geophysical data show the Lennard Shelf to be defined by strike-extensive NW-trending listric normal faults that parallel the basin margin, but are offset within NE-trending accommodation zones, e.g., the Fossil Downs Graben. Initiation of deformation was contemporaneous with Middle Devonian sedimentation and continued into the Upper Devonian or early Carboniferous. Depositional sites for MVT mineralisation on the Lennard Shelf were examined.

**KEYWORDS:** MVT mineralisation/faulting/evaporites/karsting/Lennard Shelf/Canning Basin.

**REPORT 146 AMANN, W and COGGON, J., 1993. "Induced polarisation characteristics of gold mineralisation".**

**MERIWA Project M83**

[Fiche \$15.00, Hardcopy \$85.50, CD-Rom \$50.00]

The induced polarisation (IP) characteristics of gold mineralisation were examined at three sites in the Eastern Goldfields. The deposits surveyed covered a range of host rock types and oxidation states, viz: Panglo (supergene gold), Paddington One (sulphide ore), Paddington Two (oxidised ore) and Granny Smith (both fresh and oxidised, sediment-hosted and intrusive-hosted, ore).

**KEYWORDS:** Induced polarisation/gold/mineralisation/Eastern Goldfields.

**REPORT 153 MANN, A. W., GAY, L. M., BIRRELL, R. G., WEBSTER, J. G., BROWN, K. L., MANN, A. T., HUMPHREYS, D. B. and PERDRIX, J. L., 1995. "Mechanism of formation of mobile metal ion anomalies".**

**MERIWA Project M219**

[Fiche \$30.00, CDRom \$50.00]

Mobile Metal Ion (MMI) responses were demonstrated on soil samples from sponsors' sites, and showed subtle anomalies in active depositional environments where conventional geochemical methods had failed. The MMI anomalies are sharp and located vertically above and/or on the up-dip projection of mineralisation vapor sampling, and simulated rain water leaches indicate that movement of MMI is very recent and is independent of the soil system.

**KEYWORDS:** Mobile metal ions/mineral exploration/soil geochemistry/regolith.

**REPORT 157 GILKES, R.J. and SINGH, B., 1995. "Mineralogy of Darling Range bauxites-forms of A1 in pisolitic ore".**

**MERIWA Project 90**

[Fiche \$5.00, Hardcopy \$33.50]

The pisolites in bauxitic laterites of the Darling Range were investigated using a range of techniques to determine the major Al-containing phase present. The results were significant for evaluating the ore grade and processing of these bauxites. The  $\chi$ -alumina phase present would dilute higher-grade ore if these ores are mixed.

**KEYWORDS:** Pisolites/Al/bauxite/laterite.

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**REPORT 165 KNOX-ROBINSON, C., GROVES, D. I., ROBINSON, D. C. and WHEATLEY M. R, 1996. "Improved resource evaluation using geoscientific information systems - a pilot study".**  
**MERIWA Project M194**

[Fiche \$15.00, Hardcopy \$66.00]

This project had two major aims. The first aim was to develop methodology for the production of semi-quantitative prospectivity maps from geologic data using Geoscientific Information Systems (GIS). The second was to use geologic parameters derived in the GIS studies that are important to the siting of gold deposits, to test current models for the formation of gold deposits, thus introducing a new mineral exploration tool.

**KEYWORDS:** Geoscientific Information Systems/GIS/mineral exploration/gold exploration/gold deposits.

**REPORT 176 EILU, P and MIKUCKI, J, 1996. "Primary geochemical and isotopic dispersion haloes in Archaean lode-gold systems: Assessment of alteration indices for use in district and mine-scale exploration".**  
**MERIWA Project M243**

[Fiche \$35.00, CD Rom \$100.00 Volumes 1-6 & Arcview Data Set]

The objective was to assess the use of alteration and primary geochemical dispersion as exploration tools. The results showed that mineralogical and geochemical indicators for lode-gold mineralisation may vary according to host rock, metamorphic grade, and style of deformation. Therefore, a systematic scientific approach in applying such methods must be taken.

**KEYWORDS:** Lode-gold/geochemical dispersion/gold mineralisation/alteration.

**REPORT 181 RASMUSSEN, B., KRAPEZ, B., and GROVES, D I, 1997. "Assessment of base-metal prospectivity in sedimentary basins based on the association between hydrocarbon and metalliferous brine migration: A feasibility study based on the Fitzroy Trough/Lennard Shelf, Western Australia".**  
**MERIWA Project M244**

[Fiche \$15.00, Hardcopy \$107.50]

This was a pilot study on sedimentary rocks of the Fitzroy Trough and Lennard Shelf in the Canning Basin, with the objective of understanding how hydrocarbon and metalliferous fluid migration are related in depositional basins. Specifically, the aim was to find out if sandstones in the vicinity of the Cadjebut Mississippi Valley-type (MVT) deposit had acted as aquifers for both hydrocarbons and metalliferous brines. A major conclusion is that fluid flow in the Fitzroy Trough and probably the Barbwire Terrace was along stratigraphic horizons. Upon reaching the Lennard Shelf, the fluids flowed along structural pathways, sometimes into porous horizons. It is uncertain if the hydrocarbons pre-dated or post-dated the metalliferous brines. The study suggests that hydrocarbons and metalliferous brines were focussed along structural conduits, and it led to a better understanding of the architecture of the hydrothermal system that produced the MVT deposits on the Lennard Shelf.

**KEYWORDS:** Hydrocarbon migration/fluid migration/structural conduits/migration pathways/Canning Basin/Lennard Shelf.

**REPORT 184 MANN, A W., MANN, A T., HUMPHREYS, D B., DOWLING, S E., STALTARI, S., and MYERS, L, 1997. "Soil geochemical anomalies - their dynamic nature and interpretation".**  
**MERIWA Project M267**

[Fiche \$30.00, CD-Rom \$100.00]

Previous studies suggested that the relationship between Mobile Metal Ions (MMI) and conventional geochemical anomalies could be explained using a simple three-stage conceptual model. This model in turn pointed to a dynamic balance between unbound and bound metals in the solum. In this study that dynamic balance was investigated. In all cases it was shown that the sharp MMI anomalies occurred within a broad conventional "envelope", consistent with the theory. For gold, in all cases coherent MMI Au anomalies were recorded; in cases with active transported cover the absolute levels of the anomalies were of the order of 1 - 2 ppb, with backgrounds one-tenth that value, thus providing an acceptable contrast.

**KEYWORDS:** Geochemical anomaly/mobile metal/soil geochemistry/geochemical prospecting.

**REPORT 193 VANDERHOR, F and GROVES, D I, 1998. "Systematic documentation of Archaean gold deposits of the Yilgarn block".**  
**MERIWA Project M195**

[Part 1 "Overview" only - Hardcopy \$32.50, CD-ROM \$50.00]

The project was undertaken to provide systematic documentation of the gold deposits in the eastern part of the Yilgarn block of Western Australia, and its major output was complete data-sheets for 33 gold deposits in the Eastern Goldfields and Southern Cross. These data sheets are available for purchase only through the Centre for Strategic Mineral Deposits of UWA, and Part 1 of report 193 provides a geological overview of these lode-gold type deposits and examples of controls on mineralization.

**KEYWORDS:** Gold deposits/Yilgarn/lode-gold mineralization.

**REPORT 198 MANN, A W., MANN, A T., and STALTARI, S, 1998. "Gold solubility in neutral-alkaline solutions".**  
**MERIWA Project M311**

[Fiche \$5.00, Hardcopy \$49.50, CD-Rom \$50]

Previous observations suggested that Au was soluble in organic, carbonated soils under present-day conditions. Another project found that solutions in the pH range 5.5 to 9 retained above 500 ppb of Au in solution. This project thus undertook to investigate Au solubility in reagents such as sodium carbonate, ammonium carbonate, and sodium hydroxide. Solids evaporating from an ammonium carbonate solution containing 10 ppm Au and saturated with respect to calcium carbonate were observed in the Scanning Electron Microscope. Gold was observed to be precipitated without accompanying calcium carbonate early in the evaporation sequence, and together with calcium carbonate late in the evaporation sequence. In experiments in which natural Au-containing samples were implanted into barren silica sand, Au was transferred from the natural auriferous soils to the surface layer of the sand, and accumulations of up to 40 ppb were observed in the surface layer after relatively short periods of time. Specification experiments suggested that Au is likely to be soluble as the hydroxide species Au (OH)<sub>2</sub> or as the carbonate complex Au (CO<sub>3</sub>)<sub>2</sub><sup>3-</sup>.

**KEYWORDS:** Gold solubility/Au solubility/remobilization/alkaline.

**REPORT 199 LI, Z X, GUO, W and POWELL, C McA, 2000. "Timing and genesis of Hamersley BIF-hosted iron deposits: a new palaeomagnetic interpretation".**  
**MERIWA Project M242**

[Fiche \$15.00, Hardcopy \$106.50, CD-Rom \$50.00]

A systematic palaeomagnetic/rock magnetic investigation involving detailed palaeomagnetic and petrophysical analysis of 578 oriented samples was done in the late Archaean-Palaeoproterozoic rocks *in situ* iron deposits of the Hamersley Province. five phases of magnetic remanence were identified. These results in turn suggest there were two major phases of martite-microplaty hematite formation or recrystallisation, and therefore iron ore magnetisation, in the Hamersley Province. The older event at about 2400 - 2200 Ma is thought to have been important for ore formation in the eastern and central parts of the province, whereas the second phase at about 1800 - 1650 Ma is said to be dominant in the western central part of the province. The younger event has caused reworking of iron deposits in the central Hamersley Province but not in its east. The palaeomagnetism results also suggest that the first phase of ore genesis occurred while the Pilbara was at a palaeolatitude of c.50°, whereas the second -phase occurred at a tropical palaeolatitude. The report further asserts that the results fail to support the supergene model of iron ore formation for several reasons.

**KEYWORDS:** Geochemical anomaly/mobile metal/soil geochemistry/geochemical prospecting.

## PUBLISHED REPORTS - MINERALS EXPLORATION

[For overseas customers, please include an additional \$50 Australian to cover bank fees, postage and handling costs.]

**REPORT 205 CUDAHY, T., OKADA, K., UEDA, K., BRAUHART, C., MORANT, P., HUSTON, D., COCKS, T., WILSON, J., MASON, P and HUNTINGTON, U F, 1999. "Mapping the Panorama VMS-style alteration and host rock mineralogy, Pilbara Block, using airborne Hyperspectral VNIR-SWIR data".**

**MERIWA Project M322**

[Fiche \$10.00, CD-Rom \$100.00]

The purpose of this project was to use a West Australian case history to demonstrate the potential of the new hyperspectral mapping technology. The new generation of these remote sensing systems is becoming available for mineral exploration as a tool to identify and map detailed surface mineralogy. This study aimed to generate a benchmark application evaluating and demonstrating the use of the Australian HyMap hyperspectral scanner in the Panorama VMS deposits in the Pilbara. The results demonstrated that HyMap data offer explorers a truly operational system for rapid measurement of selected alteration mineralogy, allowing maps to be made in hours which formerly required years. The HyMap products in this study included maps showing the distribution of numerous alteration minerals, which matched the published geology and alteration. It was shown that HyMap has high spectral resolution, signal to noise ratio, and geometric fidelity, and was well calibrated.

**KEYWORDS:** Hyperspectral/mineral exploration/alteration mineralogy/HyMap.

**REPORT 206 MANN, A W., BIRRELL, R D and STALTARI, S, 2000. "Comparison of mobile metal ion (MMI) geochemistry and conventional geochemistry at mineralized sites in different geological, climatological and regolith settings".**

**MERIWA Project M323**

[CD-ROM \$50.00]

Mobile Metal Ion (MMI) and conventional (total digestion) geochemical responses for nine different sites were compared for this study. The results followed previous trends with 60% of cases having superior contrast and resolution for elements after partial digestion. The case histories are included in an Atlas of MMI imprints.

**KEYWORDS:** Mobile metal ions/geochemical survey/regolith.

**REPORT 216 DENTITH, M., SHI, S and COWAN, D, 2000. "Texture-based enhancement and classification of aeromagnetic data".**

**MERIWA Project M303**

[Hardcopy \$40.50, CD-ROM \$50.00]

Integration of aeromagnetic data can be based on two fundamental variations in the data, in amplitude and texture, giving the rationale behind this project. These two characteristics were used to identify boundaries based on changes in one or both properties, areas with similar characteristics being mapped as the same geological entity. Findings from the study include: the grey-level co-occurrence matrix (GLCM) method of textural analysis is very robust, and the textural component reflects in mainly shallow magnetic sources.

**KEYWORDS:** Aeromagnetic data/co-occurrence matrix/texture-based enhancement.

**REPORT 222 CASSIDY, K F., CHAMPION, D C., McNAUGHTON, N J., FLETCHER, I R., WHITAKER, A J., BASTRAKOVA I V and BUDD, A R, 2002. "The Characterisation and Metallogenic Significance of Archaean Granitoids of the Yilgarn Craton".**

**MERIWA Project M281**

[Hardcopy \$215.50,

This lengthy report from AMIRA Project P482 contains chapters on the geophysical overview of the Yilgarn, granite groups by province, SHRIMP geochronology, isotopic data and results, an overview of the granites including tectonothermal history and granite metallogenesis. Seven different authors contributed, and data acquired in the study are also included as well as an appended paper on Archaean orogenic lode gold deposits.

**KEYWORDS:** Archaean/Yilgarn/lode-gold/granites/gold mineralisation/granitoid.

**REPORT 228 CAWOOD, P A and HOLLINGSWORTH, D A, 2002. "Resolution of the subsurface structure of the Hamersley Province by multi-channel seismic reflection".**

**MERIWA Project M282**

[CD-ROM \$50.00]

Deep crustal seismic reflection data and surface mapping were undertaken to attempt to image three-dimensional structural relationships within the Hamersley Province of Western Australia. In areas where good data were acquired, there are indications in the seismic data of folds linked to a sub-horizontal detachment which cuts up-section northward.

**KEYWORDS:** Deep crustal seismic/Hamersley Province/mining exploration.

**REPORT 229 BURNS, F E, 2002. "Middle Jurassic and lower cretaceous trace fossils, North West Shelf".**

**MERIWA Project M335**

[CD-ROM \$50.00]

The project was undertaken to characterize and document the diverse trace fossil assemblages within the deltaic, estuarine and shallow marine Jurassic and Cretaceous sediments in the Northern Carnarvon Lower Basin, to produce a comprehensive trace fossil Atlas. Brief text accompanies the Atlas on the value of trace fossils, their classification, and how their characteristics can be used to interpret stratal surfaces.

**KEYWORDS:** Trace fossils/sequence stratigraphy/chronostratigraphic surface/trace fossil atlas.

**REPORT 231 BARLEY, M E., KRAPEZ, B and PICKARD, A L, 2003. "Genetic stratigraphic analysis of the Hamersley group".**

**MERIWA Project M304**

[Hardcopy \$107.50, CD-Rom \$50.00]

To test the hypothesis that original facies of Pilbara banded iron formations were carbonate-rich, new dedicated lithofacies and sequence-stratigraphic analysis of the Hamersley Province was undertaken in this project. Key findings from the project include: 1. precursor sediments were hydrothermal muds. 2. the depositional site was deep-marine and 3. the precursor sediments to BIFs were deposited by deep-marine bottom density currents.

**KEYWORDS:** Banded iron formation/Pilbara/Brockman/diagenesis/hydrothermal and iron ore supersequence.

**REPORT 239 KEEP, M., CROWE, W., HARROWFIELD, M., PALMER, N and A WHITE, 2003/2004. "Cretaceous & Neogene Reactivation & Inversion History of the Northern Carnarvon Basin & the Role of Basement Highs in the Distribution of Cretaceous & Neogene Strain in the Carnarvon Basin & Browse Basin/Timor Sea".**

**MERIWA Projects M338 & M338A**

[CD-Rom \$50.00]

This project and its extension documented the nature, timing and distribution of Neogene deformation along the North West Shelf and attempted to relate them to basement architecture. From its numerous findings, a tectonic model is developed of the Australian plate behaving as an articulated body in the region of NW Cape, with the Pilbara and Kimberley blocks moving independently.

**KEYWORDS:** North West Shelf tectonics/Neogene deformation/Northern Carnarvon basin/Browse Basin/basin inversion history

## PUBLISHED REPORTS - MINERALS EXPLORATION

**REPORT 240 COX, S, 2004. "XMML – online data transfer for the exploration and mining industry".**

**MERIWA Project M340**

[Hardcopy \$103.50, CD-Rom \$50.00]

The project aim was to develop a XML-based encoding for geoscience and exploration information, for exchange between software packages on the desktop and between users and organisations. XMML is standardized and is freely available on the website: <http://www.seegrid.csiro.au/xmml>.

**KEYWORDS:** XML/geospatial information/exploration data/exploration software.

**REPORT 246 GOLEBY, B., KORSCH, R., FOMIN, T., CASSIDY, K., DENTITH, M., SMITH, R., CHRISTIE, M and WILSON M, 2005. "Upper crustal structure of the Laverton Tectonic Zone adjacent to major gold deposits from seismic reflection profiling".**

**MERIWA Project M346**

[Hardcopy \$80, CD-Rom \$50.00]

The locations of world-class gold deposits in the Yilgarn Craton appear spatially associated with several major shear zones. In this project 70km of deep seismic reflection data along sub-parallel traverses were acquired and processed, and interpreted to improve on understanding the 3D geometry of the shear zones, to enhance exploration.

**KEYWORDS:** Yilgarn Craton/Eastern Goldfields/deep seismic reflection/crustal shear zones/gold exploration.

**REPORT 252 CUDAHY, T., CACCETTA, M., CORNELIUS, A., HEWSON, R., WELLS, M., SKWARNECKI, M., HALLEY, S., HAUSKNECHT, P., MASON, P and QUIGLEY M, 2005. "Regolith, geology and alteration mineral MAPS from new generation airborne and satellite remote sensing technologies".**

**MERIWA Project M370**

[Hardcopy \$99, DVD \$50.00]

Airborne and satellite spectral data for the Kalgoorlie-Boulder 1:100 000 sheet were processed in this year-long collaborative project, to demonstrate the potential to produce useful new-generation maps of alteration mineralogy. Twenty-three mineral maps from HyMap™ imagery were made, which are available through the Geological Survey of Western Australia.

**KEYWORDS:** Hyperspectral/alteration mineralogy/remote spectral data/regolith.

**REPORT 255 FIORENTINI, M L., BARLEY, M E., PICKARD, A., BERESFORD, S W., ROSENGREN, N., CAS R., and DUURING P, 2005. "Age constraints of the structural and stratigraphic architecture of the Agnew-Wiluna Greenstone Belt: Implications for the age of komatiite-felsic association and interaction in the Eastern Goldfields Province, Western Australia".**

**MERIWA Project M356**

[Hardcopy \$36.00, CD \$50.00]

New U-Pb dates from SHRIMP analysis were obtained for late Archaean volcanic and volcanoclastic successions interlayered with komatiites in the Agnew-Wiluna Greenstone Belt of the Yilgarn Craton. The age relations of multiple komatiite horizons in the Mount Keith and Albion Downs regions were re-interpreted, which led to a re-assessment made of the emplacement model for the Mount Keith Ultramafic Complex.

**KEYWORDS:** Agnew Wiluna Belt/Yilgarn Craton/U-Pb dating/SHRIMP dating/zircon dating/komatiite/Mount Keith ultramafic.

**REPORT 256 WALSHE, J., NEUMAYR, P., and PETERSEN K, 2006. "Scale-integrated, architectural and geodynamic controls on alteration and geochemistry of gold systems in the Eastern Goldfields Province, Yilgarn Craton".**

**MERIWA Project M358**

[CD \$50.00]

The premise of this project was that the fluid history of an ore system is reflected by the thermo-chemical gradients and consequently, research on alteration and geochemistry of gold systems combined with research on their architecture and dynamics would enhance explorationists' ability to predict large tonnage, high-grade gold occurrences. The numerous report conclusions include improved understanding of multi-fluid flow in ore systems, and mechanisms of high-grade deposition.

**KEYWORDS:** Gold deposits/ore system fluid/mineral fluid flow/high-grade gold ore/giant ore deposits.

**REPORT 259 SQUIRE, R J, and CAS R A F, 2006. "Stratigraphic and structural architecture of late-basin depositional systems in the Eastern Goldfields Province, Yilgarn Craton".**

**MERIWA Project M376**

[CD \$50.00]

With the aim of unraveling the stratigraphic and structural development of "late basin" depositional systems in the eastern Yilgarn Craton, this project undertook a new U-Pb age-dating technique for detrital zircons. The method successfully yielded dates more cheaply and as much as ten times faster than SHRIMP dating, which in turn led the researchers to a dramatically revised interpretation of how the late basins developed.

**KEYWORDS:** Eastern Goldfields/Yilgarn Craton/U-Pb dating/detrital zircon/late clastic basins.

**REPORT 266 CORNELIUS, M., ROBERTSON, I., CORNELIUS, A., and MORRIS, P, 2007. "Laterite geochemical database for the western Yilgarn Craton, Western Australia"**

**MERIWA Project M371**

[Hardcopy \$49.50, CD \$50.00]

The report presents a 53-element dataset for over 3000 laterite samples from the western Yilgarn Craton. It provides a regional geochemical framework dense enough to recognize regional geochemical trends and major lithological differences.

**KEYWORDS:** Archaean/Yilgarn Craton/Western Australia/laterite/geochemistry.

**REPORT 267 UROSEVIC, M., and EVANS, B, 2007. "Feasibility of seismic methods for imaging gold deposits in Western Australia"**

**MERIWA Project M363**

[CD \$50.00]

Seismic reflection data were acquired and used successfully in hard rock terrain in a gold exploration campaign. An indirect approach was assumed which aimed to detect and delineate favorable structures which could have been fluid conduits and thus enabled precipitation of gold. The results indicated a valuable new exploration approach for the gold mining industry.

**KEYWORDS:** Gold exploration/hard rock seismic/seismic reflection processing/hard rock structure/seismic imaging method/Yilgarn Craton.

**REPORT 269 HUNTINGTON, J F., WHITBOURN, L B., QUIGLEY, M A., YANG, K., MASON, P., CUDAHY, T J., CONNOR, P., COWARD, D., HEWSON, R and PHILLIPS, R, 2008. "Development and implementation of advanced automated core logging technology for enhanced mine feasibility and development in Western Australia"**

**MERIWA Project M373**

[Hardcopy \$100, CD \$50.00]

The report summarises research to introduce, expand and develop new automated drill-core and chip logging technologies for routine application in Western Australian mines, to technically and economically benefit the WA mining industry.

**KEYWORDS:** Hylogging™/drill-core logging/chip logging/TIR-Logger/ore mineralogy.

## PUBLISHED REPORTS - MINERALS EXPLORATION

**REPORT 275 WALSHE, J L, and NEUMAYR, P, 2009. "Scale-integrated, architecturally, geodynamically and geochemically constrained targeting models for gold deposits in the eastern goldfields province, Yilgarn Craton"**

**MERIWA Project M377**

**[CD \$50.00]**

Following on Project M358 (Report No. 256) this study focused on understanding the interaction of fluids with the deposit architecture, to enhance exploration. A preliminary fluid flow model for targeting in a gold area is presented.

**KEYWORDS:** Gold exploration/deposit targeting/mineral systems/mineral fluid flow.

**REPORT 280 GRAY, D., NOBLE, R, and REID, N, 2009. "Hydrogeochemical mapping of the Northeast Yilgarn"**

**MERIWA Project M402**

**[CD \$50.00]**

The objectives of the project were to compile background hydrogeochemical data and to develop reliable regional hydrogeochemical prospectivity maps for mineralization in the Yilgarn Craton. The results showed that analysis of groundwater chemical samples can map mineralization and help reduce uncertainty about prospectivity of areas.

**KEYWORDS:** Yilgarn craton/geochemistry/hydrogeochemistry/mineralization.

**REPORT 283 REID, N., LINTERN, M., ANAND, R., PINCHAND, T., GRAY, D., NOBLE. R., SUTTON, G. and JARRETT, R. 2010, "North East Yilgarn biogeochemistry project."**

**MERIWA Project M402**

**[CD \$50.00]**

Mulga foliage collected previously during a water well sampling campaign was prepared into 1281 samples in CSIRO in Kensington WA and analysed for 69 elements using ICP-MS and ICP-OES. Several outcomes useful to the mineral exploration industry were obtained and a comparison between ground water and biogeochemistry was also undertaken.

**KEYWORDS:** Biogeochemistry/mineral exploration/Yilgarn groundwater/mulga chemistry/North East Yilgarn exploration.

**REPORT 285 ROACHE, T.J., WALSHE, J.L. and HUNTINGTON, J.F., 2010. On-site validation and implementation of new Hy-logging technologies – technology transfer and re-skilling."**

**MERIWA Project-M400**

**[CD \$50.00]**

This project had the objectives of validating existing Hylogging results and collaborating with mine site staff to equip them with skills in Hylogging mineralogical interpretations and interpreting chemical architectures implied by their deposit samples. Results included validation mineralogically and spatially of the significance of interpreted hydrothermal assemblages and developing 3D models at three gold deposits, as well as assisting knowledge transfer.

**KEYWORDS;** 3D deposit architecture/Hylogging/Hydrothermal assemblages/Silicate alteration mineralogy/gold mineralization

**REPORT 286 LOCMELIS, M. PEARSON, N.J., BARNES, S.J. and FIORENTINI, M.L. 2010. Controls on platinum group element variation in mafic and ultramafic magmatic systems.**

**MERIWA Project M388**

**[CD \$50.00]**

**Not Yet Published  
Confidential Until December 2011**