



M E R I W A

## MERIWA Annual Report 2010-2011

MINERALS AND ENERGY RESEARCH INSTITUTE  
OF WESTERN AUSTRALIA

“To encourage the development of the  
Minerals and Energy Industries within the  
State by fostering and promoting all  
aspects of minerals and energy research”





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## Letter of Transmittal

### MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA

#### Annual Report 2010-2011

Hon. Norman Moore MLC  
Minister for Mines and Petroleum  
Parliament House  
PERTH WA 6000

On behalf of the Board of Directors, I am pleased to submit the Annual Report of the Minerals and Energy Research Institute of Western Australia (MERIWA) for the year ending 30 June 2011, for your information and presentation to Parliament.

MERIWA's objectives are to promote and co-ordinate research for the development of the minerals and energy industries in this State, and the Board is satisfied with the results of MERIWA's operations for the year and its performance towards the achievement of these objectives.

The Board acknowledges the valuable support given to the Institute by your office and by the Department of Mines and Petroleum during the year, and by the Minerals Research Advisory Committee, many of the members of which have contributed their time and assistance in an honorary capacity.

P C Lockyer  
Chairman  
Board of Directors

13 September 2011



## Statement of Compliance with Relevant Written Law

### Enabling Legislation

The Minerals and Energy Research Institute of Western Australia is established under the Minerals and Energy Research Act, 1987, as amended by The Energy Legislation Amendment Act, 2003 and the Minerals and Energy Research Amendment Bill, 2006.

### Legislation Administered

The Institute does not administer legislation.

### Legislation Impacting on the Institute's Activities

In the performance of its functions, the Institute complies with all relevant written laws including the following:

- ◆ Financial Management Act, 2006; (FMA)
- ◆ Public Sector Management Act 1994
- ◆ Equal Opportunity Act 1984
- ◆ Occupational Safety and Health Act 1984
- ◆ State Records Act 2000
- ◆ Government Financial Responsibility Act 2000
- ◆ Interpretation Act 1984
- ◆ Minimum Conditions of Employment Act 1993
- ◆ Industrial Relations Act 1979
- ◆ Library Board of Western Australia Act 1951
- ◆ Disability Services Act 1993
- ◆ Freedom of Information Act 1992
- ◆ Public Interest Disclosure Act 2003
- ◆ Electoral Act 1907
- ◆ Superannuation Guarantee (Administration) Act 1992

In the financial administration of the Minerals and Energy Research Institute of Western Australia we have complied with the requirements of the FMA and every other relevant written law, and exercised controls which provide reasonable assurance that the receipt and expenditure of moneys, the acquisition and disposal of public property and incurring of liabilities have been in accordance with legislative provisions.

In its general administration, MERIWA has also complied with public sector standards for human resource management and the code of ethics and code of conduct, as required by the Public Sector Management Act 1994, and report that no applications for breaches of these standards have been lodged during the 2010/2011 year.

The Board continues to support regional research centres, particularly the Western Australian School of Mines at Kalgoorlie.



## Statement of Compliance with Relevant Written Law

### Compliance Statements

#### Advertising and Sponsorship

Expenditure incurred by the Minerals and Energy Research Institute of Western Australia during 2010/2011 in relation to section 175ZE of the Electoral Act 1907 was as follows:

	\$
Advertising agencies	Nil
Market research organisations	Nil
Polling organisations	Nil
Direct mail organisations	Nil
- West Australian Newspapers	2,731

#### Freedom of Information

There were no applications under the Freedom of Information Act during the year. A copy of the Information Statement is available by contacting the Executive Officer on 9222 3397 or by writing to the Minerals and Energy Research Institute of Western Australia, 100 Plain Street, East Perth 6004.

#### Disability Services Plan

The Institute is housed within the Department of Mines and Petroleum building, Mineral House, 100 Plain Street, East Perth, which has a comprehensive and effective plan to ensure compliance with the Disability Services Act, 1993.

#### Customer Group Outcomes

Due to the small size of the Institute matters concerning women, family and domestic violence, equal employment opportunities, language, cultural diversity and youth will be addressed on an individual basis as required.

#### Corruption Prevention

The Board of MERIWA is satisfied that the processes and procedures followed by the Institute, its staff and committees are robust and effective in the requirement to eliminate the possibility of corruption.

#### Information Systems and Services

In accordance with the State Records Act of 2000, the effectiveness and efficiency of the record keeping and disposal schedule was approved in 2009 and will be reviewed in 2014.

- ◆ Staff were familiarised with the Plan.
- ◆ Due to the small size of the Agency, training and familiarisation for new employees will be undertaken on a “one on one” basis as required.
- ◆ The effectiveness of the Plan was reviewed and the plan updated to reflect name changes to government departments.



## Statement of Compliance with Relevant Written Law

All research completed is published as reports that are available to the public at cost of production. Reports are available in both CD-ROM and hardcopy formats. Some earlier copies are only available as hardcopies or microfiche.

At the date of signing, we are not aware of any circumstances which would render the particulars included in this statement misleading or inaccurate.

P C Lockyer  
CHAIRMAN,  
BOARD OF DIRECTORS

A Davies  
DIRECTOR

13 September 2011



## Functions

The Minerals and Energy Research Institute of Western Australia (MERIWA) was established under the Minerals and Energy Research Act, 1987 (No. 89 of 1987), and is a statutory authority. The function of the Institute is to encourage the development of the minerals and energy industries for the benefit of the State by fostering and promoting all aspects of minerals research and energy research through:-

- (a) undertaking, in its own right or in conjunction with other persons, such research projects as it thinks fit, and evaluating research projects so undertaken;
- (b) investigating matters, and undertaking research projects relevant to the development of those industries, referred to it by the Minister;
- (c) co-ordinating, when appropriate and practicable, research projects undertaken by persons who -
  - (i) have received financial assistance or any other form of support from; or
  - (ii) seek or agree to have their research projects co-ordinated by,
 the Institute;
- (d) receiving and considering applications from persons undertaking or wishing to undertake research projects and seeking financial assistance from the Institute;
- (e) allocating, at its discretion to persons, out of the Account, financial assistance to enable or assist persons referred to in paragraph (d) to undertake or continue research projects;
- (f) entering into agreements with persons to whom the Institute has allocated financial assistance with respect to the terms and conditions of the allocation of that financial assistance, which terms and conditions may include a condition that such a person shall comply with any directions or guidelines issued by the Institute in relation to the conduct of a research project;
- (g) monitoring and evaluating research projects in respect of which the Institute has allocated financial assistance and other minerals research work or energy research work within the State and elsewhere;
- (h) maintaining a collection of all reports or other literature or information issued or compiled by the Institute or by the Mining Institute;
  - (i) the reports produced by the Institute; and
  - (ii) the reports produced by the Mining Institute formerly established by the *Mining and Petroleum Research Act 1981*;
- (i) conferring and collaborating on matters relating to minerals research and energy research with the Department and other appropriate authorities and institutions within the State and elsewhere; and
- (j) promoting public awareness of matters relating to minerals research and energy research, informing the public concerning the latest developments in the fields of minerals research and energy research and receiving and considering submissions from the public concerning -
  - (i) the performance by the Institute of its function; or
  - (ii) matters relating to minerals research and energy research in general.

[Section 5 amended by No. 89 of 1994s. 109; No. 53 of 2003s. 76 and 90]



## Structure



**MINISTER FOR MINES AND PETROLEUM  
THE HON NORMAN MOORE MLC**

### BOARD OF DIRECTORS



**MR P C LOCKYER  
CHAIRMAN**



**MR S D ELLIS  
DIRECTOR FOR WA – AUSTRALIAN PETROLEUM  
PRODUCTION & EXPLORATION ASSOCIATION LTD**



**MS A DAVIES  
SENIOR SESSIONAL MEMBER (LAWYER),  
STATE ADMINISTRATIVE TRIBUNAL**



**PROFESSOR B EVANS  
HEAD – PETROLEUM ENGINEERING  
CURTIN UNIVERSITY OF TECHNOLOGY**

**MINERALS RESEARCH ADVISORY COMMITTEE  
CHAIRMAN: PROFESSOR ODWYN JONES**

**EXECUTIVE OFFICER  
MR ROSS MARSHALL**

**CHIEF FINANCE OFFICER  
MR JOE FORTUNA**

**PROJECT COORDINATOR  
DR PAMELA SMITH**





## Board of Directors' Report

MERIWA is a Statutory Authority established under the Minerals and Energy Research Act (1987) to promote minerals and energy research which will encourage the development of the Minerals and Energy Industries in this State. The desired outcome is that the amount of research undertaken will achieve the level of technological advancement required to meet the future technical challenges of these industries, ensuring their competitiveness and hence continued development.

MERIWA's financial results and research achievement for 2010/2011 are summarised in this report from the Board. The outputs produced and performance indicators, as well as the detailed financial statements for the 2010/2011 year are examined in more detail in a later section of the report.

### Overview

MERIWA's financial results and research achievement for 2010/2011 for minerals research are summarised and compared with the results for 2009/2010 in Table 1. Points of note for the year are -

- ◆ Total value of new minerals research projects was \$2.432 million, an increase of \$0.07 million on the 2009/2010 figure of \$2.366 million.
- ◆ Industry sponsorship committed was \$1.773 million compared to \$2.225 million in 2009/2010. The proportion of industry sponsorship for minerals research was 73% against a target of 65%.
- ◆ For every dollar expended by the Government through MERIWA, \$3.81 of minerals research was generated.
- ◆ Administration costs were 8.85% of the value of research generated.

### Research Activities

MERIWA's minerals and petroleum research results are identified in Table 4 (refer "Operating Report"). Eight new research projects were commenced in 2010/2011 for a total value of \$2.432 million. This compares with \$2.366 million in 2009/2010. It is evident that there is an increase in geoscience and mineral processing projects.

New industry sponsorship committed to MERIWA for the year was \$1.773 million, while at year's end the sponsorship vested under MERIWA control was \$1,203 909.

**TABLE 1: Summary of Results**

	2010/11 \$'000	2009/10 \$'000
<b>FINANCIAL</b>		
ACCUMULATED FUNDS		
Opening balance at 1 July	*3 014	*3 831
Plus funds received and sponsorship committed	**2669	**3 104
Less funds expended and committed	***2164	***3 117
ACCUMULATED FUNDS		
As at 30 June	3 515	3 014
<b>Total value of research commenced</b>	<b>2 432</b>	<b>2 366</b>
% sponsorship to new research commenced	73%	86%
Ratio of research value to government funds utilised (grants and administration)	3.81	2.83

\* Cash plus investments held in trust or yet to be collected from industry sponsors for committed research activities over the next three years.

\*\* Government funding, industry sponsorship, interest.

\*\*\* Research grants, scholarships, administration

Industry sponsorship for the year in review was 73% of the research value of projects against a target of 65%.

No projects were abandoned or completed below budget during the year. Government funds utilised by MERIWA for minerals research, including funds brought forward from 2009/2010 and resources received free of charge, totalled \$706 025 of which \$377 707 was applied to research grants and \$50 000 to scholarships with the remainder for administration.

The actual administration cost of \$277 570 was 8.85% of the value of research generated. Funding committed for new projects was \$658 594.

Table 2 shows the allocation of funds among different research areas as well as the industry support achieved in each, while Table 3 shows the organisations that have contracted to undertake MERIWA research projects and the recipients of MERIWA post-graduate scholarships this year. The quality of research projects, their innovation and potential benefits to Western Australia continue at a very high standard.



## Board of Directors' Report (Continued)

**TABLE 2: Allocation of Funds**

Research categories	No. projects	MERIWA \$'000	Industry \$'000	Total \$'000
Geoscience	4	575	1 416	1 991
Hydrocarbons	1	-	100	100
Engineering	1	-	50	50
Minerals processing	2	84	207	291
Environmental-rehabilitation	-	-	-	-
<b>Total</b>	<b>8</b>	<b>659</b>	<b>1 773</b>	<b>2 432</b>

This year four projects totalling \$2,353,581 that were approved by the Board are not contracted to receive MERIWA funding this financial year but will be carried forward to 2011/12. One project carried forward from last year and seven projects approved this year, totalling \$2,431,570, are all contracted to receive funding this financial year. This year the research activities involved CSIRO with four projects, Curtin University of Technology with two, the University of Western Australia and Central Chemical Consulting with one project each. The minerals sector has continued its research resurgence with all of the projects being related to this area.

### Projects

Eight projects were approved by the Board during the year, covering a variety of research themes. These included processes for predicting new high grade gold deposits, novel geochemical techniques for improving exploration success in the Yilgarn Craton, an investigation into the geomechanical properties of the gas shales in the Perth Basin, using mixed integer programming to optimise waste dump design, the dynamic testing of mine surface support systems and an examination of the role of zeta potentials in the fine particle agglomeration properties of slurry pulps.

#### *M410 – High Grade Au Deposits: Process to Prediction.*

This study, set up in three modules, will link microscale data with data and research activities at deposit-to-district scales, to provide a scale-integrated, process-based understanding of gold deposition. In Module 1, four-dimensional chemical architectures of the minesites at St Ives and Wattle Dam will be developed. Modules 2 and 3 will be focused on understanding the distribution of gold within the architectures of these minesites, the Wattle Dam site being a unique opportunity to study the distribution of extremely high-grade, nuggety ore. The 3-year project is intended to transfer the benefits of scale-integrated mineral system models of gold deposit formation to exploration of the Eastern Gold Fields

**TABLE 3: Allocation of Mineral Research Funds to Research Organisations**

Research Organisation	No. projects	Funding \$'000
C.S.I.R.O.	4	1 731
Curtin University	2	150
The University of Western Australia	1	385
Central Chemical Consulting	1	166
<b>Total research</b>	<b>8</b>	<b>2 432</b>
<b>SCHOLARSHIPS</b>		
The University of Western Australia	3	20
Murdoch University	-	-
Curtin University of Technology	1	10
Edith Cowan University	-	-
WA School of Mines	2	20
<b>Total scholarships</b>	<b>6</b>	<b>50</b>
<b>Total funding</b>		<b>2 482</b>

Province, to greatly enhance exploration effectiveness. Applying new tools, such as the synchrotron and nuclear microprobe, to analyse gold grains to quantitatively map trace element distribution at thin-section scale will produce new information that enables CSIRO researchers Dr John Walshe and Dr Rob Hough to develop improved understanding of deposit geochemistry and fluid flow history for exploration targeting across a range of scales. Sponsorship for this cutting-edge study has been committed from two companies: \$570 000 from Gold Fields St Ives and \$62 000 from Ramelius Resources, with MERIWA contributing \$300 000 for a total project value of \$932 000 at this stage.

#### *M411 – Geochemical Greenfields exploration in Regolith Dominated Terrane: The Yilgarn Margin-Albany-Fraser Belt: Implications for Mineral Systems Prospectivity*

The mineral potential of the Albany-Fraser-southeastern Yilgarn margin will undergo evaluation based on a variety of data sets at terrane to district scales, to be assembled for this three-year study. These data sets will be used to (1) evaluate constraints on regolith evolution (2) selectively characterize dispersion of key elements from basement through cover, and (3) design a greenfields exploration strategy for geochemical sampling. Seven sponsor companies are in this venture into a largely underexplored yet highly prospective frontier terrane at the margin of the metal-rich Yilgarn craton. Because this margin and prospective belt are largely covered in thick regolith, recognizing distal portions of alteration systems is vital to identify buried mineral systems. Thus the focus will be alteration-



## Board of Directors' Report

### (Continued)

related mineral assemblages and multi-element geochemical signals along selective traverses based on drill-holes and fresh bedrock sample data. Dr Rob Hough along with Dr John Walshe and Dr Ravi Anand will carry out the research at CSIRO/ESRE. The sponsoring companies are: Sipa Resources, Triton Gold Ltd, Integra Mining Ltd, Mark Creasy, Beadell Resources, Corvette Resources and AngloGold Ashanti, each contributing \$60,000, with MERIWA for \$150 000 to total \$570 000.

#### *M412 –A Study of Shale Gas Geomechanics in the Perth Basin*

Global natural gas consumption is projected to increase significantly in the coming decades, and governments are encouraging its use in place of other fossil fuels since its combustion produces less CO<sub>2</sub>. Gas-shales in the Perth Basin are thought to have untapped frontier potential, perhaps highly prospective given their range from Permian to Cretaceous. These Perth Basin formations, rich in organic material and thermally mature, would nevertheless have to be fractured to allow gas production. This three-year project is concerned with such production problems, and will construct rock mechanical models (RMM) that correspond to existing wells. The RMM use wire-line logs and other data to construct logs then used to estimate the rock formation mechanical properties, and local stress field magnitude and orientation. Core will also be used where obtainable for laboratory tests to compare with wireline logs for fracking design. Drs Vamegh Rasouli and Reza Rezaee at Curtin University's Department of Petroleum Engineering will direct this research, which is funded by Carnarvon Petroleum Ltd, Woodside Energy Ltd and Norwest Energy NL at \$150 000 each, and MERIWA at \$169 082.

#### *M413 –Hydrothermal Footprints of Magmatic Nickel Sulphide Deposits*

To support exploration targeting of magmatic nickel sulphide deposits which characteristically lack large-scale haloes, in brownfields terrane a new approach is urgently needed. Geophysical EM may miss such deposits and primary magmatic chemical haloes in host rocks are only effective in some environments, with the result that the rate of new discoveries slowed dramatically since the 1970's. To enlarge the detectable footprint of deep, probably deformed, altered and offset deposits, this study is focussing on mineralogical and lithogeochemical footprints around syngenetic magmatic nickel sulphide deposits. Such hydrothermal footprints, often targeted in gold exploration but so far little used in

nickel exploration, develop from interaction with post- or syn-magmatic fluids that can leave a deposit-scale 'stain' in the surrounding rocks. The fluids are likely to be focussed along major fractures and shear systems active during deformation of the orebody. Dr Steve Barnes of CSIRO/ESRE and Dr Marco Fiorentini of UWA will direct this research aimed at understanding the nature and timing of deformation and alteration of the ore bodies used as sponsors' case studies and relating their alteration history to their structure in 3D. The three sponsoring companies of this three year project are BHPB Nickel West for \$150,000, Mincor for \$90,000 and First Quantum Minerals for \$20,000. MERIWA's funding of \$125 000 brings the total project cash value to \$385 000.

#### *M414 –Improved Hydrogeochemical Exploration in the Northwest Yilgarn – Adding Value to Underexplored Areas*

The northwest Yilgarn is significantly untenemented for mineral exploration, and this 21-month project is intended to create a hydrogeochemical map of the region. This map will allow ranking of areas of interest for mineral exploration, understanding of baseline chemistry for environmental management, and recognition of prospective zones. An innovative aspect of the project is to develop the utility of isotopes in groundwater for exploration and prospectivity analyses. Drs D Gray and R Noble at CSIRO/ESRE are carrying out the study, which will include the training of government and company personnel in water sampling. A consortium of 15 companies and government agencies is supporting this research, which is expected to also result in 1) direct concentrations of target metals that commonly have small anomaly sizes but are known pathfinders such as Au and Cu, 2) four distinct derived exploration indices for sulphides, 3) Specific Mineralization Indices providing larger, more robust anomalies, and 4) elements such as As and Cr for environmental backgrounds and water quality assessment - among other results. The sponsor companies and agencies are: GSWA for \$40 000, Venus Metals for \$34 800, Department of Water for \$18 000; Geotech Int'l, AngloGold Ashanti, Spark Energy, Enterprise Metals, Resource Mining, Oz Minerals, Doray Minerals, Mindax Ltd, Areva NC, Minjar Gold, Independence Group and Cameco Australia for \$7 800 each, and MERIWA for \$91 900, totalling \$278 300.



## Board of Directors' Report

### (Continued)

#### *M415 – Mine Waste Rock Dump Design Using Mixed Integer Programming (MIP)*

Waste rock dumps are the largest remnant structures of open pit mining operations and their construction and operation can absorb over 50% of the mine operating costs affecting the financial viability of an operation. This 3-year research project will utilise Mixed Integer Programming to develop methodologies to generate faster and better quality solutions to minimise waste haulage costs, design better dump profiles (improved dump geometry, number of lifts, selective placement of reactive waste, etc.) and reduce dump failures. The research is being conducted by Professor Erkan Topal of Curtin University and Professor David Williams of the University of Queensland and is being supported by AngloGold Ashanti, Kalgoorlie Consolidated Gold Mines and Rio Tinto Iron Ore at \$45 000 each and by MERIWA at \$45 599 for a total cash value of \$180 599.

#### *M416 –Fine Particle Agglomeration in Process Slurries*

This study will be undertaken at Central Chemical Consulting in Malaga, WA where for the first time zeta potentials in high sulphide pulp densities and at high ionic strengths will be measured. These conditions replicate those realistically experienced in some mineral processing streams. Fine particle agglomeration of solids including pyrite, chalcopyrite, pentlandite, quartz and iron oxide will be investigated, with the aim of identifying the conditions that could increase agglomeration. In addition to making these measurements on slurries from the sponsors' plants, the effect of sponsor companies' water supply on zeta potential and fines agglomeration will be tested. The research is being conducted by Dr E Karakyriakos and Dr V Patrick of Central Chemical Consulting, over 15 months, and is being supported by Barrick (Australia Pacific) Ltd., Savannah Nickel Mines, Western Areas, Jabiru Metals Ltd (Jaguar), Xstrata Nickel Australia and Birla Nifty Copper Operation at \$19 500 each, and by MERIWA at \$48 649, for a total of \$165 649.

#### *M417 –Dynamic Testing of Surface Support Systems*

Two previous MERIWA research projects funded to a total of \$712,690 have helped WA School of Mines researchers develop a unique dynamic test facility able to simulate the performance of rock reinforcement and surface support systems under mine conditions. Eight companies are supporting researchers Prof. Ernesto Villaescusa and Dr Alan Thompson to expand this facility to investigate the dynamic energy absorption of different configurations, thicknesses and combinations of shotcrete (with and without fibre reinforcement, and embedded mesh) and rock bolts. Such absorption data is

required by geotechnical engineers to design safer ground support schemes such as those expected at increasing mine depths or under high induced stresses. This 3-year research program is being sponsored by; CMTE Development Ltd for \$240 000, Newcrest Mining, Codelco El Teniente, BHP Nickel West, Geobruigg AG, DYWIDAG-Systems International Pty Ltd and Lightning Nickel each \$150 000 with MERIWA contributing \$120 000 for a total project value of \$1.26 million.

### **Scholarships**

In keeping with its policy to encourage PhD students to embark upon careers in the minerals and petroleum industry, MERIWA has again offered Supplementary Scholarships to help finance students and their projects. The selection committee awarded six scholarships; Mr Amin Nabipour of Curtin University of Technology, Mr Simon Assmann and Mr David Grimsey both from the WA School of Mines and Ms Talitha Santini, Ms Zoja Vukmanovic and Ms Kerry Chia of the University of Western Australia. Four consist of a \$5 000 stipend and \$5 000 for project maintenance and two consist of a \$5 000 stipend.

#### **Amin Nabipour**

Amin is in his second year of his PhD at the Department of Petroleum Engineering, Curtin University of Technology. His thesis topic is "Numerical and Experimental Study of Ultrasonic Monitoring of Hydraulic Fracture Propagation" and he is supervised by Professor Brian Evans. The primary objective of Amin's research is to better understand the interaction of elastic waves generated during a hydraulic fracture in tight gas reservoirs. Hydraulic fracturing is one of the most common operations performed in oil and gas wells in order to maximise hydrocarbon production. However, there are many instances in which the fracturing treatment fails. By simulating the initiation and propagation of a hydraulic fracture inside modelled granular rock samples Amin is attempting to create realistic conditions of bottom-hole pressure and stresses. He has already had two research papers accepted for publication.

#### **Simon Assmann**

Simon received a MERIWA scholarship in 2009, 2010 and 2011 to undertake his PhD research on *Improving Mass Transfer in Electrostatic Liquid-Liquid Extraction (ELX) Contactors*, under Associate Professor Don Ibana at Curtin University's Western Australian School of Mines (WASM) in Kalgoorlie. His project's goal is to improve upon current technology used to achieve phase dispersion, which uses mechanical agitation, and one





## Board of Directors' Report

### (Continued)

aspect that remains poorly understood is mass transfer. Objectives of Simon's PhD study thus include investigating the fundamentals of electrostatically induced dispersion, and using experimental data to optimise mass transfer in an ELX contactor, for hydrometallurgical application. A prototype of an ELX contactor will be designed which exploits the advantage of electrostatic agitation, using the data obtained.

#### David Grimsey

David was awarded a scholarship last year and is in the third year of post-graduate studies at Curtin's WASM where his topic is *Application of Segregation Roasting to Western Australian Laterites*. He is supervised in this project by Associate Professor Don Ibana of WASM. The research concerns the amenability of Western Australian laterites to the extraction of nickel using a segregation process, a novel in-situ chlorination and a reduction process, discovered over 85 years ago but yet to be fully tested and optimised for nickel extraction. The main focus of this project will be to determine the effect of key segregation parameters such as roasting temperature, reaction time and reagent type on nickel extraction, not only to categorise optimum extraction conditions for local WA ores, but also to develop an improved understanding of the process through the correlation of these data with appropriate thermodynamic, kinetic and heat balance models of the process with a view to optimising process economics.

#### Talitha Santini

Talitha received a MERIWA scholarship in 2009, 2010 and 2011 and is in her third year of PhD studies at UWA's School of Earth and Environment. She is supervised by Professors Martin Fey and Christoph Hinz and Associate Professor Andrew Rate of that department. The scope of her project *A Pedogenic Treatment for Rehabilitation of Bauxite Residue Mud* has become focused onto geochemical aspects of soil formation upon bauxite residue. Successful completion of the project should result in improved rehabilitation outcomes associated with bauxite residue deposits and improved knowledge of controls and thresholds involved in soil forming processes, particularly in human-modified environments. There will also be the opportunity to apply the findings to improve rehabilitation outcomes and minimise the environmental risk associated with other types of tailings and waste rock deposits.

#### Zoja Vukmanovic

Zoja's research project, *Micromechanical and Geochemical Analysis of Remobilization of Komatiite-Hosted Ni Sulphide Ores*, also promises an important contribution to the development of WA's nickel resources. Primary nickel sulphide ores often were remobilized in shear zones, and a detailed understanding of the micro-scale environment in which this occurs is lacking. Zoja's research is supervised by Dr Steven Barnes of CSIRO and Dr Florian Füsseis and Dr Marco Fiorentini of UWA and is in its second year.

#### Kerryn Chia

Kerryn is in her second, part-time year of her PhD at the University of Western Australia where her thesis topic is "Ecology, Seed Dormancy and Germination Biology of *Persoonia longifolia* for Use in Land Restoration and Horticulture". The research will investigate methods to reduce dormancy loss and improve germination in *Persoonia longifolia* (Snottygobble) seeds. Successful completion of this long term project should result in improved densities of the plant in rehabilitated jarrah forests. The tree has proved a difficult species to return to rehabilitated areas following bauxite mining and is defined as a recalcitrant species (i.e. common in the forest but absent or in low densities in rehabilitated minesites). This project is ideally suited to part-time research as buried seeds can take up to 18 months before germination commences (even under laboratory conditions).

#### Finance

The financial statements for MERIWA for 2010/2011 appear later in the report.

The net assets reflect industry sponsorship yet to be received of \$1 203 909, contracted for the next 3 years. The total cost of services was \$2 164 385 (\$3 117 147 in 2009-10) of which \$1 836 067 was paid for research grants. Revenue of \$1 458 360 was received from industry and \$67 448 from interest and other income related to services. The net cost of services was thus \$638 577 (\$836 164 in 2009-10) which was funded by government appropriation and resources free-of-charge of \$1 291 585 (\$863 667 in 2009-10). The surplus was added to previous accumulated surplus.



## Board of Directors' Report

### (Continued)

#### Publications

Six final reports on minerals projects were published during the year and distributed in CD-ROM form to technical libraries in Western Australia and interstate. A synopsis of each of the reports is included in later pages of this document.

The number of reports published by MERIWA since its inception now totals 287, and it has been pleasing to see an ongoing demand for copies of them. Reports in hard copy, microfiche or CD-ROM are provided to companies or private individuals on request, at nominal prices, sufficient to recover the cost of reproduction. In 20010/2011 27 hard copy and 17 CD-ROM reports were sold, producing revenue of \$2 416.75.

#### Office Services

Services provided by the Department of Mines and Petroleum, notably the provision of office space, along with its continued support in associated areas, are much appreciated by the Board.

#### Code of Conduct for Government Boards and Committees

The Board and the Minerals Research Advisory Committee adopted individual Codes of Conduct in accordance with the recommendations of the Commissioner of Public Sector Standards.

#### Staff and Committees

The Board again acknowledges the valuable assistance that has been provided to the Institute by the Minerals Research Advisory Committee under the able Chairmanship of Professor Odwyn Jones.

Both the members and deputy members met on a regular basis during the year, in sub-committee or in committee, to assess the research proposals received, and to advise the Board of their suitability and technical merit before grants were approved. This takes considerable time, and as the great majority is provided on an honorary basis, MERIWA is most appreciative of this contribution.

Finally, the Board acknowledges the contribution and competence of the MERIWA Staff and contract staff in coordinating and administering the affairs of the Institute.

P C Lockyer  
CHAIRMAN,  
BOARD OF DIRECTORS





## Operating Report

### MERIWA's Minerals Research Program

MERIWA's mission is:

*"To encourage the development of minerals and energy industries within the State by fostering and promoting all aspects of minerals and energy research".*

Mineral deposits and oil and gas accumulations are finite, and new discoveries must continue to be made and developed to replace depleted deposits. If this is not achieved, and the industry does not sustain itself but slowly degenerates, the effects on the State's economy would be quite disastrous.

Much of the industry is international, and companies operating internationally will compare the prospectivity and exploration and mining costs in Western Australia with those applying in other countries, before deciding on where their exploration budget will be most profitably spent. Investment in mining project development is also based on the quality and cost of supporting services, such as infrastructure, but also in the downstream processing-orientated industries and the availability of highly skilled technical "problem solvers".

Western Australia has established itself as a reliable provider of not only physical resources to the world but also as centre for excellence in many areas of mineral and hydrocarbon research. The Board of MERIWA continues to foster and encourage this "intellectual" development process knowing from past experiences that industry, research institutes, government and individuals profit from investments in "ideas".

There is also a continuing need to promote research on regulatory issues of concern to the community at large, such as minesite rehabilitation, tailings disposal and containment, and occupational health and safety issues in the industry. The advances made in these fields and the support from the mining industry in undertaking this research, have been excellent over recent years.

To achieve its mission, MERIWA aims for an outcome by which the amount and quality of research undertaken by the Minerals and Petroleum Industries achieves the

level of technological advancement required to meet the future technical challenges of these industries, and helps ensure their competitiveness and continued development.

### Promotion of Research

The key incentive provided by governments to encourage more research is to subsidise its cost. MERIWA's policy has been to retain the magnitude of the subsidy to a maximum of 35% of the cash cost, encouraging a higher level of participation from industry. This allows a larger volume of research to be supported and ensures that the key objective of promoting research relevant to industry is achieved.

The level of subsidy must be such, however, to allow MERIWA to maintain the authority to rigorously assess research programs and to establish "Conditions of Grant" that facilitate coordination and accountability, and ensure that final reports can be published and widely distributed. The subsidy must be of a level to enable promotion of research on regulatory issues such as occupational health and safety and minesite rehabilitation.

### Value of Minerals Research Financed Jointly with the Minerals and Petroleum Industries

The table below compares the value of research commenced for each of the last five years, jointly financed by MERIWA and industry sponsorship. The level of research funding has fluctuated over the period, a direct reflection of industry's economic performance. The variation in commodity prices, exchange rates and levels of activity continues to be erratic across all sectors. Continued consolidation in the corporate sector has also changed research investment patterns. It is expected that the levels of investment will remain within these limits for the foreseeable future capped mainly by the limited funds available from budget appropriation.

	\$'000				
	2010-11	2009-10	2008-09	2007-08	2006-07
Value of minerals research commenced	2 432	2 366	3 408	1 189	2 911
Scholarships	50	50	40	50	30
<b>Total</b>	<b>2 482</b>	<b>2 416</b>	<b>3 448</b>	<b>1 239</b>	<b>2 941</b>



## Operating Report (Continued)

	2010-11	2009-10	2008-09	2007-08	2006-07
Industry sponsorship achieved	73%	86%	81%	81%	75%
Target	65%	65%	65%	65%	65%

### Industry Participation

Industry participation is encouraged by MERIWA through every phase of a project.

- ◆ Industry involvement from the initial draft proposal stage ensures that the project is focussed to its particular needs.
- ◆ Industry sponsorship encourages ongoing participation through regular sponsor meetings; this creates closer communications between industry and the research groups and is beneficial to both sides.
- ◆ Its investment in the research means that the research results are more likely to be applied.
- ◆ Its participation facilitates the provision and availability of data to the research group, and by working closely with researchers, creates a more research and technically oriented industry, and a more practical research group attuned to the technical challenges faced by industry.

The table above shows the average level of industry sponsorship achieved as a percentage of the research value.

### Technology Transfer

Research benefits will best eventuate if the results are made widely available and are applied. The importance of this aspect of MERIWA's operations is recognised in the functions of the Institute as listed in the Minerals and Energy Research Act (1987). Because of their financial commitment and participation throughout the study, sponsoring companies require a return on their research investment by application of the results. In a broader, industry-wide sense, however, technology transfer is encouraged by publication of the final reports and their distribution to most universities, CSIRO and state technical libraries, or by the provision of copies directly by MERIWA.

The benefits of publication are two-fold:

- ◆ Publication of reports gives all companies relatively cheap access to the technology.
- ◆ Publication benefits the researchers and their institutions, by enabling their work to be acknowledged internationally and increasing their profile professionally. This attracts students and external funding, which in turn is beneficial to both industry and the State.

MERIWA has published 287 reports on the research projects it has supported since its inception. CD-ROM copies are distributed widely to all relevant technical libraries in Western Australia and to most Australian universities. Reports in microfiche, CD-ROM or hard copy format are sold to industry at prices which cover production and distribution costs. The table below shows that 1,914 research project reports have been distributed or sold to industry and technical libraries over the past 5 years.

Synopses of all reports published during 20010/11 are included in this annual report, and complete lists of reports available are included with the publication "Research News" and on the MERIWA webpage at: [www.dmp.wa.gov.au/meriwa/reports/reports.html](http://www.dmp.wa.gov.au/meriwa/reports/reports.html)

### Measures of Performance

The predominant measure of performance is the value of research undertaken, but as MERIWA is often limited by the funds available, its effectiveness is measured by the ratio of the total value of research commenced to the Government funds utilised.

MERIWA measures its efficiency by the administration cost as a percentage of the value of research generated. This is calculated on a three-year moving average basis to reflect the average duration of projects, covering the project development assessment and funding phase, coordination while in progress, and the final reporting and publication phase of the project.

No. of reports distributed or sold	2010-2011	2009-2010	2008-2009	2007-2008	2006-2007
Microfiche	0	1	2	2	8
Hard copy	95	96	121	83	99
CD-ROM	187	282	369	267	302
<b>Total</b>	<b>282</b>	<b>379</b>	<b>492</b>	<b>352</b>	<b>409</b>





## Operating Report

### (Continued)

#### Effectiveness

The table below indicates that for every dollar of government funds expended on research in 2010/2011 (excluding scholarships), \$3.81 of research was commenced.

	2010-2011	2009-2010	2008-2009	2007-2008	2006-2007
Ratio of research value to government funds utilised	3.81	2.83	2.81	2.82	1.99

#### Efficiency

MERIWA's overall efficiency increased slightly in 2010/2011 due to a high value of research commenced. (Three year moving average).

	2010-2011	2009-2010	2008-2009	2007-2008	2006-2007
Administration cost as a percentage of value of research generated	8.85	9.48	8.23	9.09	12.18

Table 4 summarises the key components of MERIWA's performance over the past five years.



## Operating Report

TABLE 4: MERIWA Results

Factors	2010/11	2009/10 [Restated]	2008/09	2007/08	2006/07
<b>PROJECTS</b>					
Applications received	8	4	2	8	10
Projects approved	8	3	3	7	7
Projects completed	6	6	9	6	7
<b>TECHNOLOGY TRANSFER</b>					
No. reports published	6	6	9	6	7
No. microfiche issued or sold	-	1	2	2	8
No. hard copies issued or sold	95	96	121	83	99
No. CD ROM copies issued or sold	187	282	369	267	302
Other publications (Research News)	2	2	1	2	2
<b>FUNDS UTILISED (\$'000)</b>					
Budget appropriation - Consolidated Revenue Fund	907	480	633	630	657
- Exploration Incentive Scheme	350	350	0	0	0
Interest on cash flow	65	56	89	119	77
Other income	2	2	3	3	3
Transferred from (to) reserves	653	27	487	(330)	725
<b>Total Government funds utilised</b>	<b>639</b>	<b>836</b>	<b>1 212</b>	<b>422</b>	<b>1 462</b>
Less administration costs	*278	*244	* 205	*211	*203
<b>Funds utilised to support research</b>	<b>361</b>	<b>592</b>	<b>1 007</b>	<b>211</b>	<b>1 259</b>
<b>MERIWA GRANTS</b>					
For research projects	659	341	641	222	725
For scholarship	50	50	40	50	30
<b>Total grants</b>	<b>709</b>	<b>391</b>	<b>681</b>	<b>272</b>	<b>755</b>
<b>INDUSTRY SPONSORSHIP</b>					
Total industry sponsorship committed to MERIWA	1 773	2 225	2 767	967	2 186
<b>Total value of new research projects</b>	<b>2 432</b>	<b>2 366</b>	<b>3 408</b>	<b>1 189</b>	<b>2 911</b>
<b>Value of research generated to government funds utilised</b>	<b>3.81</b>	<b>2.83</b>	<b>2.81</b>	<b>2.82</b>	<b>1.99</b>
<b>Administration cost to value of research generated**</b>	<b>8.85%</b>	<b>9.48%</b>	<b>8.23%</b>	<b>9.09%</b>	<b>12.18%</b>

\* Three-year moving average.



## Minerals Research Advisory Committee

Nominated by the Minister	Professor I O Jones (Chairman)	Consulting Mining Engineer
	Mr I M Suckling	Director – Underground Mine Engineer, Newmont Australia Limited
	Dr J Kyle (Deputy Member)	Group Leader Research, Murdoch University
	Mr J Cucuzza	Director Project Delivery, AMIRA International Limited
	Mr D Flanagan (Deputy Member)	Managing Director, Atlas Iron Limited
	Ms D Lord	Senior Consultant - Geologist, SRK Consulting
	Mr B Staunton (Deputy Member)	Manager, Gold Technology Group, WA School of Mines
	Professor W Stock	Centre for Ecosystem Management, Edith Cowan University
	Dr E van Etten (Deputy Member)	Faculty of Computing, Health & Science, Edith Cowan University
	Dr B Smith	Consulting Geologist – Geochemist (AMEC)
Nominated by: Department of Mines and Petroleum	Mr P Bewick (Deputy Member)	Exploration Director, Encounter Resources Limited
	Ms B S Bower	General Manager – Petroleum Tenure & Land Access
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Dr I Roberts (Deputy Member)	Executive Director – Mineral Titles
	Dr R Hough	Senior Research Scientist – Stream Leader
The University of Western Australia	Dr J Cleverley (Deputy Member)	Senior Geochemist – Stream Leader and Project Leader
	W/Professor M B Bush	Winthrop Professor of Mechanical Engineering
Murdoch University	W/Professor J Dell (Deputy Member)	Faculty of Engineering, Computing and Mathematics
	Professor P Bahri	School of Electrical, Energy and Process Engineering
Curtin University of Technology	Dr G Senanayake (Deputy Member)	Faculty of Minerals & Energy, Chemical & Mathematical Sciences, Extractive Metallurgy
	Professor K Wright	Faculty of Science and Engineering
Chamber of Commerce and Industry of WA	Dr A Thompson (Deputy Member)	Principal Research Fellow and Consulting Engineer, WA School of Mines
	Dr C L Baker	Program Manager, Impurity Removal, Alcoa World Alumina
Chamber of Minerals and Energy of WA (Inc.)	* Ms S Dignard (Deputy Member)	Senior Adviser Business Policy
	Mr G Danckert	General Manager – Resource Development, Rio Tinto Iron Ore
Australian Petroleum Production and Exploration Association	<i>Position Vacant</i> (Deputy Member)	
	Mr N Fitzgerald	Chief Geophysicist, Woodside Energy Ltd
	* Dr J D Gorter (Deputy Member)	New Ventures Manager, Eni Australia Limited



## Minerals Research Advisory Committee

The Minerals and Energy Research Institute of Western Australia (MERIWA) is currently celebrating thirty years of its existence and it has been my privilege to have been a member of its Minerals Research Advisory Committee (MRAC) since its establishment in 1981. MERIWA is, of course, one of the State's Statutory Authorities and its prime function is to "encourage the development of the minerals and energy industries by fostering and promoting all aspects of relevant research". In pursuit of this objective the Institute has over the past thirty years evaluated over 400 research projects with a total cumulative cash value of those approved being in excess of \$ 50 million, of which \$ 30 million came from industry sponsors with the remainder coming from the State Government. During this time the Institute has placed 287 research reports in the public domain, thereby furthering the knowledge and/or skills of those responsible for developing, operating and processing the various commodities produced by the State's minerals and energy industries.

The Minerals Research Advisory Committee (MRAC) has the responsibility of advising the Institute's Board of Directors on a variety of issues, albeit its main function has always been to assess the scientific and technical merit of research proposals in order to ensure the best use is made of the available resources. MRAC met on seven occasions during the past year when it considered a total of eight proposals, all of which were recommended to the Board for funding. These projects had a total cash value of \$ 4.4 million of which \$ 3.4 million came from industry sponsors and \$ 1.0 million from the State Government grant. Five of them were in the field of geoscience, two in engineering and one in mineral processing.

In keeping with past practice MERIWA allocated a small proportion of its funds for supplementary PhD scholarships for locally based researchers pursuing minerals related projects. On this occasion we had 22 applicants and six awards were granted, four at the full value of \$ 10,000 per annum and two at half value. Four of the recipients are based at the University of Western Australia and two at Curtin University's WA School of Mines campus in Kalgoorlie.

M410 – building on outcomes in part from M358, M377 and M400, this study seeks to provide a scale-integrated, process-based understanding of gold deposition.

M411 – this project will evaluate the mineral potential of the Albany-Fraser-south-eastern Yilgarn margin using assembled data sets from terrane to district scales.

M412 – to assess production problems that would arise in shale gas development, in this project rock mechanical models will be constructed of the fracturing process in Perth Basin shales.

M413 – A new approach to target syngenetic magmatic nickel sulphide deposits in brownfields terranes will be developed using mineralogical and lithogeochemical footprints around them.

M414 – A new hydrogeochemical map of the significantly un-tenemented North West Yilgarn will be the deliverable of this project, along with development of the use of isotopes in groundwater for exploration and prospectivity analyses.

M415 – Using Mixed Integer Programming, this project will develop methodologies to generate faster and better quality solutions to minimise waste haulage costs, improve dump profiles, and reduce dump failures.

M416 – In this study, for the first time the zeta potentials in some high sulphide pulp densities and at high ionic strengths will be measured.

M417 – Expanding on M349 and M349A, the dynamic testing facility at WASM in Kalgoorlie will be upgraded to evaluate shotcrete and rock bolts.



## Minerals Research Advisory Committee

(Continued)

My sincere thanks to all my colleagues on MRAC, most of whom give of their time at no cost to the Institute in assessing research proposals at the sub-committee and advisory committee stages. Finally, I also acknowledge the invaluable support provided by our small group of dedicated part-time employees which include our Executive Officer, Ross Marshall, Projects Coordinator, Dr Pam Smith, and our Secretary, Ms Gwen Davies, who after 20 years of dedicated service has recently retired. In wishing her all the best for many years of enjoyable retirement we also warmly welcome her replacement, Ms Yvonne R. Lewis.

Emeritus Professor Odwyn Jones, AO  
Chairman.





## Reports Published in 2010/11

### M349A DYNAMIC TESTING OF GROUND CONTROL SYSTEMS

#### Report No. 287

**Grantee:** Curtin University – WASM  
**Applicants:** Prof. E Villaescusa / Dr A Thompson  
**Grant Amount:** \$474 000  
**Duration:** 3 years  
**Commenced:** April, 2005  
**Sponsors:** Atlas Copco Australia Pty Ltd,  
 Codelco – Division of El Teniente,  
 Barrick (Kanowna) Limited,  
 BHP Billiton,  
 DYWIDAG–Systems Int'l. Pty Limited,  
 Geobrugg AG,  
 Newmont Australia Limited,  
 Strata Control Systems,  
 WA School of Mines.

Following from Project M349 in which a unique, Australian dynamic testing facility was designed, built and commissioned in Kalgoorlie, this project was developed to undertake modifications that were needed to the test equipment and instrumentation, and to perform tests on surface support systems as currently used or as could potentially be used by Western Australian mines. This applied research is aimed at overcoming the difficult local ground conditions as mines become deeper. Effective ground support design schemes can address violent rock failures caused by high *in situ* and mining-induced stresses. The main achievements of this project have included: (1) a procedure to better simulate a borehole in rock, particularly where borehole wall/element interactions are important, (2) completion of over 80 tests on reinforcement systems and (3) evaluation of proposed new reinforcement systems. Modifications to the test facility have made test preparation safer and more efficient, and enhancements to the data analysis software were also made. A program of work on static testing of surface support systems was also undertaken outside the MERIWA project, results of which are included in the Appendices of the M349A report (MERIWA Report No. 287), since the resulting techniques could be adopted for the dynamic test facility. The facility also was enhanced to include dynamic testing of woven and welded mesh and shotcrete panels, and a new 'punch' test configuration to evaluate adhesion of shotcrete to rock was developed. The testing facility developed in M349 and M349A is unique in concept and design, and will continue to be used to evaluate responses of ground support systems. Both the numerous company sponsors and the mining industry in general will realize the benefits for safety, productivity and economics from the establishment of the test facility.

### M390 MEASURING PARTICLE SURFACE CHARGE AND PARTICLE INTER-ACTIONS IN PROCESS LIQUORS

#### Report No. 282

**Grantee:** Central Chemical Consulting P/L  
**Applicant:** Dr V Patrick / Dr E Karakyriakos  
**Grant Amount:** \$474 000  
**Duration:** 3 years  
**Commenced:** November, 2006  
**Sponsors:** Alcan International Ltd,  
 Alcoa World Alumina Australia,  
 Central Chemical Consulting P/L,  
 Worsley Alumina Pty Ltd.

Building on positive outcomes in zeta potential measurements during Project M367, in which the Dispersion Technology DT1200 instrument was acquired and tested, this project undertook to further develop the DT1200's capability for making measurements in industrial systems. Together these can improve sponsors' knowledge of the surface potential of particles in process liquors. An unanticipated outcome of this project was the usefulness of colour of a red mud slurry to determine its relative degree of flocculation. The effect of both monovalent cations such as Li, Na, and K and divalent ones such as Ca, Sr and Ba on the zeta potential and rheology of solids in caustic solutions was determined. The software 'SAMUEL' Monte Carlo simulation was used to model surfaces in water and in some high caustic aqueous solutions, and provided useful information.

The fundamental research outcomes show that increasing the aluminate, caustic or organics concentration in a slurry shifts its zeta potential to more positive values, and reduces the slurry's elasticity. They also include modelling results that show a hydroxide-rich region in caustic liquors occurs 1 nm from a surface, and that the concentration of hydroxides there largely determines zeta potential; together with a diffuse 3 nm region beneath in which cations adsorb at various rates, this provides an early description of the 'electrical double layer' in concentrated aqueous alkalis. Work was also done toward measuring the zeta potential of solids in slurries through use of asymmetric radio frequency waves, which showed that temperature fluctuation, solution conductivity, cell capacitance and associated circuit resonances all interfered with attempts to make such measurements. More work would be needed in this area to establish a working technique for zeta potential measurement. It also remains to investigate what effect modification of the non-zero zeta potential in Bayer process liquors would have on process outcomes in industrial plants.



## Reports Published in 2010/11

### **M397 IMPACT OF LOW LIQUID HOLD-UP LEVELS WITHIN NATURAL GAS TRANSMISSION PIPELINES AND THE INFLUENCE ON PARTICLE DEPOSITION**

#### **Report No. 284**

**Grantee:** Curtin University of Technology  
**Applicant:** Prof. D Pack / Prof. R Amin  
**Grant Amount:** \$75 000  
**Duration:** 3 years  
**Commenced:** October, 2007  
**Sponsors:** Verve Energy.

Elemental sulfur is a natural gas contaminant which is deposited in pipelines, and has been known to stop gas flow supply and cause damage to pressure regulation, metering and rotating plant equipment. Both small bore and large bore pipe can be affected. Reliability of supply of the natural gas used at a significant number of the State's resource projects and at remote town sites as well as in the majority of its interconnected power stations for primary power generation is thus paramount. Therefore this study had the aim of determining why there exists a 'preferential site selection process' for the formation and deposition of elemental sulfur. Results from prior research suggest a significant contributing factor to its formation may be the conditions at upstream 'T' junctions from an affected site. Studies have simulated actual cases, using CFD modelling and practical experiments, of fluid dynamics of high-pressure gas streams at specific locations on natural gas transmission pipelines and delivery systems with very low levels of liquid hold-up.

Supporting experimental studies that were part of M397 included purpose-building a high-pressure small bore natural gas flow loop and operating it, to study fluid flow behaviour at pipe 'T' junctions. Investigation of flow pattern maps and flow regimes was also carried out in an attempt to predict the fluid flow patterns under specific flowing conditions where gas/liquid flow exists; stratified and annular mist flow were considered. The flow pattern map application clearly showed why variations can occur in the location of elemental sulfur formation and deposition, and suggests annular flow pattern being implicated in the formation. The project findings are in agreement with field observations, and will better assist designers and operators of natural gas transmission pipelines in their handling of this potentially costly contamination problem. Benefits will be realised in having more reliable gas supplies, but further studies into this complex problem are recommended.

### **M400 ON-SITE VALIDATION AND IMPLEMENTATION OF NEW HYLOGGING TECHNOLOGIES – TECHNOLOGY TRANSFER AND RE-SKILLING**

#### **Report No. 285**

**Grantee:** CSIRO Exploration and Mining  
**Applicant:** Dr T Roache / Dr J Walshe  
**Grant Amount:** \$390 000  
**Duration:** 2 years  
**Commenced:** April, 2008  
**Sponsors:** Gold Fields – St Ives Gold Mine, Heron Resources, Kalgoorlie Consolidated Gold Mines.

After Project M373 had advanced the development of a hyperspectral logging tool, the HyLogger™, this project utilised the expertise of a new Regional HyLogging Researcher based at Kalgoorlie to focus hylogging capabilities on the Western Australian Goldfields. Four main objectives were proposed for the two-year research effort: (1) validate existing HyLogging mineralogical results from each sponsor, by QXRD, electron microprobe and petrological methods, on samples from highlighted mineralogical domains, (2) collaborate with mine-site staff to equip them with skills in HyLogging mineralogical interpretations, software use and interpretation of chemical architectures implied by their deposit samples, (3) up-skill mine-site staff in new procedures and competencies, and (4) increase the value returned from drilling investments. Studies were focused on the hydrous silicate alteration mineralogy associated with gold mineralisation. New sets of imported or calculated values associated with the spectral data, termed 'TGS™ scalars', were developed to distinguish clinozoisite from epidote, and hydrothermal Al-amphiboles from hydrothermal Si-amphiboles and metamorphic amphiboles. This research has now placed HyLogging results within the context of Archean gold mineral systems. It has also validated mineralogically and spatially the significance of interpreted hydrothermal assemblages, and developed 3D models at Victory-Defiance, Wallaby and Bullant gold deposits. In addition, this work has assisted knowledge transfer to the nickel and phosphate industries as well as to the gold industry. Correlations between stable isotopic characteristics and silicate mineralogy, as mapped by short wavelength infrared spectroscopy HyLogger/HyChips technologies, confirmed that systematic changes in the silicate alteration mineralogy reflect changes in the redox state of Late Archean gold systems, and associated changes in fluid acidity. Both the mineralogical and isotopic patterns provide opportunities to map from barren to productive parts of gold systems.





## Reports Published in 2010/11

### M407 NORTH EAST YILGARN BIO-GEOCHEMISTRY PROJECT

#### Report No. 283

**Grantee:** CSIRO Exploration and Mining  
**Applicant:** Mr M Lintern / Dr R Anand  
**Grant Amount:** \$226 067  
**Duration:** 1 year  
**Commenced:** July, 2009  
**Sponsors:** Agnew Gold Mining Company, Anglo American PLC, AngloGold Ashanti Australia Ltd, AREVA NC-Mining BU-Geosciences Dept, Barrick – (Darlot Gold Mine, Lawlers Gold Mine, Granny Smith), Cameco Australia Pty Ltd, Department of Water, Emu Nickel NL, Encounter Resources Ltd, Geological Survey of WA, Heron Resources Limited, Minara Resources Limited, Newmont Mining Corporation, Regalpoint Exploration Ltd, Teck Australia Pty Ltd, Toro Energy Limited, Triton Gold Ltd, Troy Resources NL.

Biogeochemical samples of mulga foliage were opportunistically collected in the North East Yilgarn M402 project and analysed in this project for their elemental contents including metals of economic and environmental interest, some of which may reveal the presence of buried mineral deposits. For this study there was co-location at each sampling site of groundwater and vegetations samples, providing an opportunity to test the validity of their correlation, in addition to correlation between vegetation and bedrock, regolith, soil and/or known mineral occurrences.

The more than 1250 samples of mulga were analysed after processing for about 60 elements using ICP-MS and ICP-OES, and the data were statistically and spatially analysed to investigate geochemical trends, element correlations and metal anomalies. The regional biogeochemistry of the North East Yilgarn was mapped. Lithologic signatures over this region distinguish between greenstones and granites. Several other outcomes of the project were: (1) detection of gold prospects or deposits across the region, (2) identification of nickel prospects at the regional scale where samples were within 1-2 km of them, or possibly the cover thickness was less, (3) anomalies in Ni, Co, Cr and Fe that highlighted the Leinster and Murrin Murrin areas and extended their footprints up to 20km or more, and (4) insufficient correlation among hydrogeochemistry, laterite, soil and biogeochemistry to suggest one could act as surrogate for another.

### M408 ENHANCED ELECTROSTATIC SEPARATION BY REDUCING STAINS ON HT ROLL SEPARATORS

#### Report No. 288

**Grantee:** Central Chemical Consulting P/L  
**Applicants:** Dr B van Emden / Dr V Patrick  
**Grant Amount:** \$87 000  
**Duration:** 8 months  
**Commenced:** January, 2010  
**Sponsors:** Bemax Resources Incorp. Cable Sands, Doral Mineral Sands Pty Ltd, Tiwest Joint Venture

Mineral sands are an important Western Australian product and the four major producers recover rutile, ilmenite, leucoxene and zircon sands here. In the mineral sands dry separation processing stage, non-conducting grains such as zircon or kyanite are separated from rutile, ilmenite and other conducting minerals by electrostatic separation on high tension (HT) rolls.

Some of the fine clay and related material on mineral grains which adheres to the surface of mild steel HT rolls reduces the transfer of electrostatic charge. Eliminating unwanted mineral stains on HT roll separators was the aim of this work, which sought to identify suitable electrically conductive materials and coatings for HT rolls that will not form mineral stains or oxidative films under the conditions used in mineral sands separation. Approaches included evaluating selected conductive materials in the laboratory and applying coatings or attaching test strips of promising materials to the surface of sponsors' HT roll separators.

Good wear resistance was obtained using tungsten carbide coatings formulated in the laboratory; selected for plant testing on full scale electrostatic rolls was a tungsten carbide-polyurethane-teflon coating. The plant trials also were intended to determine the length of time enhanced mineral separation could be achieved by maintaining an electrically conductive surface on a roll coated with this material. Full scale plant trials demonstrated that this coating improved the efficiency of separation on the electrostatic HT rolls by up to 12%. Increasing coating thickness and providing a cloth fibre support for the coating made significant improvements in the laboratory to the wearing lifetime of the tungsten carbide coating.





## Projects in Progress: 30 June 2011

No.	Project Title	Applicants	Institute	Term (years)	Cash Cost (\$)	Notional Value (\$)
M381	Ecohydrological characterisation of the natural and rehabilitation ecosystems at Newcrest's Telfer Gold Mine	Prof H Lambers Dr C Hinz	UWA	4	650 000	2 175 000
M389	A four-dimensional interpretation of the geological evolution of the Proterozoic West Tanami Region and its mineral systems	Prof. C McCuaigF	UWA	3	242 363	242 363
M393	Banded iron formations and iron ores of the Hamersley Province: New insights from field, petrographic and geochemical studies	Dr B Rasmussen Dr B Krapez	UWA	3	435 000	435 000
M394	Integrating novel tools to mitigate total grazing pressure following fire and mining. 1: Olfactory fear cues	Dr M Parsons Mr K Dods	Murdoch	3	213 318	218 318
M395	Modelling of submarine landslides and their impact on pipelines	Dr D White Prof M Randolph	UWA	3	1 124 000	2 033 000
M396	Establishing a chronostratigraphic framework for the Devonian Canning Basin Reef Complex	Dr E Tohver	UWA	3	440 000	650 160
M399	Susceptibility to <i>Phytophthora cinnamomi</i> and sensitivity to phosphate in native Australian plants: why are they linked?	Prof H Lambers A/Prof G Hardy	UWA / Murdoch	5 yrs	700 000	1 375 000
M405	Application of U-Th-Pb-He double-dating techniques to diamond exploration	Dr B McInnes Dr N Evans	CSIRO	2	188 800	628 800
M406	Advancing the strategic use of seismic data in mines	Prof Y Potvin Dr J Wesseloo	ACG	3	1 140 000	1 140 000
M409	In-place leaching of oxidised gold ores	Mr P Roberts	CSIRO	9 mths	125,000	637,000
M410	High grade Au deposits: Processes to prediction	Dr J Walshe Dr R Hough	CSIRO	3	977,000	1,495,000
M411	Geochemical greenfields exploration in a regolith dominated terrane: The Yilgarn Margin-Albany-Fraser Belt. Implications for mineral system prospectivity	Dr R Hough Dr J Walshe	CSIRO	3	570,000	870,000
M412	A study of shale gas geomechanics in the Perth basin	A/Prof. V Rasouli A/Prof. R Rezaee	Curtin	3	619,082	619,082
M413	Hydrothermal footprints of magmatic nickel sulphide deposits	Dr S Barnes Dr M Fiorentini	UWA	3	384,945	501,945
M414	Improved hydrogeochemical exploration in the northwest Yilgarn – adding value to underexplored areas	Dr D Gray Dr R Noble	CSIRO	21 mths	293,900	380,300



## Projects in Progress: 30 June 2011

(Continued)

No.	Project Title	Applicants	Institute	Term (yrs)	Cash Cost (\$)	Notional Value (\$)
M415	Mine waste rock dump design using mixed integer programming (MIP)	Dr E Topal Dr D Williams	WASM	3	180,599	180,599
M416	Fine particle agglomeration in process slurries	Dr E Karakyriakos Dr V Patrick	Central Chemical Consulting	15 mths	165,649	165,649
M417	Dynamic testing of surface support systems	Prof. E Villaescusa Dr A Thompson	WASM	3	1,260,000	1,260,000

### Research Assistance

The function of the Institute is to encourage the development of the minerals and petroleum industries in Western Australia by fostering and promoting research in the exploration, development and production of minerals, hydrocarbons and fossil fuels.

Applications for financial assistance for funding of projects may be submitted to the Executive Officer at any time throughout the year. The approval process generally takes 3 to 4 months. These are scrutinised first by the Minerals Research Advisory Committee before its recommendations are considered by the Board.

Organisations with research proposals that have the potential to benefit the minerals or petroleum industries in this State may seek further information by contacting:

The Executive Officer, MERIWA  
3<sup>rd</sup> Floor, Mineral House  
100 Plain Street  
EAST PERTH WA 6004

Telephone: (08) 9222 3397  
Facsimile: (08) 9222 3727  
Email address: [Yvonne.LEWIS@dmp.wa.gov.au](mailto:Yvonne.LEWIS@dmp.wa.gov.au)  
Website: [www.dmp.wa.gov.au/meriwa](http://www.dmp.wa.gov.au/meriwa)



## Financial Assistance from Industry

The following list is of companies and organisations which provided financial sponsorship in 2010/11 for projects in progress. The Board of Directors thank these groups for their sponsorship and support.

### MINERALS RESEARCH

Agnew Gold Mining Company	Kirkland Lake Gold Inc.
Agnico-Eagle Mines Ltd	Lightning Nickel Pty Ltd
Alcoa World Alumina Australia	Luossavaara-Kiirunavaara AB
AngloGold Ashanti Australia Limited	Mark Creasy
AREVA NC-Mining BU-Geosciences Dept.	Mincor Resources
Athena Resources	Mindax Limited
Barrick (Australia Pacific) Limited	Minjar Gold Pty Ltd
BCD Resources (Operations) NL	MMG Golden Grove Pty Ltd
BEADELL Resources Limited	MMG (Minerals and Metals Group)
BEMAX Resources Incorporating Cable Sands	Newcrest Mining Limited
BHP Billiton Nickel West	Newcrest Mining Limited, Ridgeway Operations
BHP Billiton Olympic Dam	Newmont Mining Corporation Asia Pacific
Birla Nifty Pty Ltd	Newmont USA Limited
Carnarvon Petroleum Limited	Norwest Energy NL
Cameco Australia Pty Ltd	OZ Minerals
Chemistry Centre WA	Perilya Broken Hill Limited
Codelco Chile, Division El Teniente	Primary Industries and Resources SA (PIRSA)
Corvette Resources Ltd	Ramelius Resources Limited
CMTE Development Ltd (CRC Mining)	Resource Mining Corporation Ltd
Department of Water	RioTinto Iron Ore
Doray Mineral Ltd	Savannah Nickel Mines
Dywidag Systems International Pty Ltd	Sipa Resources Ltd
Enterprise Metals Ltd	Spark Energy Pty Ltd
First Quantum Minerals (Australia) Pty Ltd	St Ives Gold Mining Company Pty Ltd
Geobrugg Australia Pty Ltd	Tiwest Pty Ltd
Geological Survey of Western Australia	Triton Gold Limited
Geotech International Pty Ltd	Venus Metals Corporation Pty Ltd
Gold Fields Australia Pty Ltd	WA-ERA
Iluka Resources Limited	Woodside Energy Ltd
Independence Group NL	Xstrata Copper - Kidd Creek Mine
Integra Mining Limited	Xstrata Nickel Australasia
Jabiru Metals Ltd – Jaguar	Xstrata Nickel (Cosmos Nickel Project)
Kalgoorlie Consolidated Gold Mines	



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## Performance Indicators for the year ended 30 June 2011

### Minerals Research Program

#### Outcome

*"Promote all aspects of minerals research"*

The key incentive provided by governments to encourage more research is to subsidise its cost. Government research funding schemes generally provide this subsidy on a dollar-for-dollar basis, in which case the amount of research undertaken is theoretically doubled. MERIWA's policy is that the magnitude of the subsidy is nominally 35% of the cash cost, encouraging a higher level of participation from industry.

The subsidy level must be such, however, to give MERIWA the authority to rigorously assess research programs and to establish "Conditions of Grant" that facilitate coordination and accountability, and ensure that final reports can be published and widely distributed. The subsidy must be of a level to enable promotion of research on regulatory issues such as occupational health and safety, and minesite rehabilitation.

In addition, research at PhD level is encouraged by the awarding of six supplementary research scholarships this year.

#### Effectiveness Indicator

Research was promoted by subsidy to the extent of the funds available. To maximise the effectiveness of this investment, sponsorship was maximised and the involvement of industry in each phase of the research was promoted to focus the scope of the study on the needs of industry and maximise technology transfer. By publishing reports, the research results were disseminated as widely as possible.

The average level of industry sponsorship as a percentage of research value in 2010/2011 was 73% against a target of 65%. The target was exceeded due to the attraction of a strong level of industry sponsorship. Whilst exceeding the target level of 65%, the 2010/11 level of industry sponsorship was down on previous years, principally due to three significant projects being approved in the 4<sup>th</sup> quarter and for which in each case there was a minority of sponsorship funding uncommitted on 30<sup>th</sup> June. These funds have since been formally committed.

The effectiveness of postgraduate doctoral research scholarships in promoting research will be gauged by the success of students in ultimately achieving their PhDs and in presentations of technical papers and posters at Australian and international symposia. Six scholarships were awarded in 2010/2011.

#### Service

*"Finance and coordinate minerals research"*

#### Efficiency Indicator:

The indicator is a function of the number of projects and administration costs. Costs of administration are rising due to normal indexed increases to wages and supplies. This year the administration costs have risen to \$277 570 from \$244,169 in the previous year, due to increased salary and superannuation costs, board and committee fees, equipment upgrades, accommodation expenses and administration fees, all of which have risen from the previous year. The current trend is for fewer projects that cost more to be funded. This year the target of \$11,000 was exceeded due to a one off substantial Long Service leave payment and less than anticipated numbers of potential proposals proceeding to funded projects resulting in an overall increase in the cost of each grant administered.

Effectiveness Indicator – Outcome	2010/2011	2009/2010	2008/2009	2007/2008	2006/2007
% Industry sponsorship achieved	73%	86%	81%	81%	75%
Target	65%	65%	65%	65%	65%
Research value	2 431 570	2 366 385	3 407 752	1 189 334	2 911 164

  

Efficiency Indicator – Service	2010/2011	2009/2010	2008/2009	2007/2008	2006/2007
\$cost per minerals research grant administered	13 218	13 565	10 226	8 435	8 114
Target	11 000	11 000	10 000	10 000	10 000



**Certification of Performance Indicators**  
**for the year ended 30 June 2011**

We hereby certify that the performance indicators are based on proper records, are relevant and appropriate for assisting users to assess the Minerals and Energy Research Institute of Western Australia's performance, and fairly represent the performance of the Minerals and Energy Research Institute of Western Australia for the financial year ended 30 June 2011.

P C Lockyer  
CHAIRMAN,  
BOARD OF DIRECTORS

A Davies  
DIRECTOR

13 September 2010



## **Auditor General**

### **INDEPENDENT AUDITOR'S REPORT**

**To the Parliament of Western Australia**

**MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA**

#### **Report on the Financial Statements**

I have audited the accounts and financial statements of the Minerals and Energy Research Institute of Western Australia.

The financial statements comprise the Statement of Financial Position as at 30 June 2011, the Statement of Comprehensive Income, Statement of Changes in Equity and Statement of Cash Flows for the year then ended, and Notes comprising a summary of significant accounting policies and other explanatory information.

#### ***Board's Responsibility for the Financial Statements***

The Board is responsible for keeping proper accounts, and the preparation and fair presentation of the financial statements in accordance with Australian Accounting Standards and the Treasurer's Instructions, and for such internal control as the Board determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### ***Auditor's Responsibility***

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the financial statements based on my audit. The audit was conducted in accordance with Australian Auditing Standards. Those Standards require compliance with relevant ethical requirements relating to audit engagements and that the audit be planned and performed to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Institute's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the Board, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence obtained is sufficient and appropriate to provide a basis for my audit opinion.

***Opinion***

In my opinion, the financial statements are based on proper accounts and present fairly, in all material respects, the financial position of the Minerals and Energy Research Institute of Western Australia at 30 June 2011 and its financial performance and cash flows for the year then ended. They are in accordance with Australian Accounting Standards and the Treasurer's Instructions.

**Minerals and Energy Research Institute of Western Australia  
Report on Controls**

I have audited the controls exercised by the Minerals and Energy Research Institute of Western Australia. The Board is responsible for ensuring that adequate control is maintained over the receipt, expenditure and investment of money, the acquisition and disposal of public and other property, and the incurring of liabilities in accordance with the Financial Management Act 2006 and the Treasurer's Instructions, and other relevant written law.

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the controls exercised by the Board based on my audit conducted in accordance with Australian Auditing Standards.

***Opinion***

In my opinion, the controls exercised by the Minerals and Energy Research Institute of Western Australia are sufficiently adequate to provide reasonable assurance that the receipt, expenditure and investment of money, the acquisition and disposal of property, and the incurring of liabilities have been in accordance with legislative provisions.

**Report on the Key Performance Indicators**

I have audited the key performance indicators of the Minerals and Energy Research Institute of Western Australia. The Board is responsible for the preparation and fair presentation of the key performance indicators in accordance with the Financial Management Act 2006 and the Treasurer's Instructions.

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the key performance indicators based on my audit conducted in accordance with Australian Auditing Standards.

***Opinion***

In my opinion, the key performance indicators of the Minerals and Energy Research Institute of Western Australia are relevant and appropriate to assist users to assess the Institute's performance and fairly represent indicated performance for the year ended 30 June 2011.

**Independence**

In conducting this audit, I have complied with the independence requirements of the Auditor General Act 2006 and the Australian Auditing Standards, and other relevant ethical requirements.



COLIN MURPHY  
AUDITOR GENERAL  
20 September 2011







## Statement of Comprehensive Income for the year ended 30 June 2011

	Note	2011 \$	2010 Restated \$
<b>COST OF SERVICES</b>			
<b>Expenses</b>			
Research grants	6	1,836,067	2,821,818
Scholarships	7	49,918	49,960
Employee Costs	8	131,817	99,838
Institute Contractor fees	9	29,410	29,783
Superannuation expense	10	14,130	11,666
Board and committee fees and costs	11	42,861	42,929
Administration expenses	12	25,017	27,036
Accommodation expenses	13	34,335	32,917
Depreciation expense	14	830	801
Loss on disposal of non-current assets	15	-	399
<b>Total Cost of Services</b>		<b>2,164,385</b>	<b>3,117,147</b>
<b>Income</b>			
Interest Revenue	16	65,039	55,550
Other Revenue	17	2,409	2,167
Revenues from Industry Sponsorship	18	1,458,360	2,223,266
<b>Total income other than income from State Government</b>		<b>1,525,808</b>	<b>2,280,983</b>
<b>NET COST OF SERVICES</b>		<b>638,577</b>	<b>836,164</b>
<b>Income from State Government</b>			
State Government Grant	19	1,257,250	830,750
Resources received free of charge	20	34,335	32,917
<b>Total income from State Government</b>		<b>1,291,585</b>	<b>863,667</b>
<b>SURPLUS/(DEFICIT) FOR THE PERIOD</b>		<b>653,008</b>	<b>27,503</b>
<b>OTHER COMPREHENSIVE INCOME</b>			
Other		-	-
<b>Total other comprehensive income</b>		<b>-</b>	<b>-</b>
<b>TOTAL COMPREHENSIVE INCOME FOR THE PERIOD</b>		<b>653,008</b>	<b>27,503</b>

The 2009-10 comparative amounts are restated in accordance with AASB 101 'Presentation of Financial Statements' due to the change in accounting treatment for Revenues from Industry Sponsorship and State Government Funding.

Refer to Note 5 (ii) 'Voluntary changes in accounting policy'.

The Statement of Comprehensive Income should be read in conjunction with the accompanying notes.



## Statement of Financial Position as at 30 June 2011

	Note	2011 \$	2010 Restated \$	As at 1 July 2009 Restated \$
<b>ASSETS</b>				
<b>Current Assets</b>				
Cash and cash equivalents	21	1,000,724	525,110	361,496
Restricted cash and cash equivalents	22	1,707,363	1,707,237	2,131,220
Receivables	23	802,060	777,211	1,299,150
Other Current Assets	24	5,158	4,423	38,693
<b>Total current assets</b>		<b>3,515,305</b>	<b>3,013,981</b>	<b>3,830,559</b>
<b>Non-current Assets</b>				
Receivables	23	461,000	173,811	35,000
Plant and equipment	25	4,562	5,392	1,061
<b>Total non-current assets</b>		<b>465,562</b>	<b>179,203</b>	<b>36,061</b>
<b>TOTAL ASSETS</b>		<b>3,980,867</b>	<b>3,193,184</b>	<b>3,866,620</b>
<b>LIABILITIES</b>				
<b>Current liabilities</b>				
Payables	27	167,670	393,969	728,508
Provision for Leave	28	23,941	-	-
Other Current Liabilities	29	57,585	15,168	10,902
Deferred Revenue	30	1,291,246	1,042,074	1,766,888
<b>Total current liabilities</b>		<b>1,540,442</b>	<b>1,451,211</b>	<b>2,506,298</b>
<b>Non-Current liabilities</b>				
Deferred Revenue	30	1,206,627	1,161,183	807,035
		<b>1,206,627</b>	<b>1,161,183</b>	<b>807,035</b>
<b>TOTAL LIABILITIES</b>		<b>2,747,069</b>	<b>2,612,394</b>	<b>3,313,333</b>
<b>NET ASSETS</b>		<b>1,233,798</b>	<b>580,790</b>	<b>553,287</b>
<b>EQUITY</b>				
Accumulated Surplus	31	1,233,798	580,790	553,287
<b>TOTAL EQUITY</b>		<b>1,233,798</b>	<b>580,790</b>	<b>553,287</b>

The 2009-10 comparative amounts are restated in accordance with AASB 101 'Presentation of Financial Statements' due to the change in accounting treatment for Revenues from Industry Sponsorship and State Government Funding.

Refer to Note 5 (ii) 'Voluntary changes in accounting policy'.

The Statement of Financial Position should be read in conjunction with the accompanying notes.



## Statement of Changes in Equity for the year ended 30 June 2011

2010	Note	Accumulated Surplus
		\$
<b>Balance at 1 July 2009</b>	31	2,776,960
Changes in accounting policy or correction of prior period errors		(2,223,673)
<b>Balance at 1 July 2009 restated</b>		<u>553,287</u>
Total comprehensive income for the year		27,503
<b>Balance at 30 June 2010 restated</b>		<u><u>580,790</u></u>
 <b>2011</b>		
		\$
<b>Balance at 1 July 2010 restated</b>	31	<u>580,790</u>
Total comprehensive income for the year		653,008
<b>Balance at 30 June 2011</b>		<u><u>1,233,798</u></u>

The 2009-10 comparative amounts are restated in accordance with AASB 101 '*Presentation of Financial Statements*' due to the change in accounting treatment for Revenues from Industry Sponsorship and State Government Funding.

Refer to Note 5 (ii) 'Voluntary changes in accounting policy'.

The Statement of Changes in Equity should be read in conjunction with the accompanying notes.



## Statement of Cash Flows for the year ended 30 June 2011

	Note	2011	2010
		\$	\$
<b>CASH FLOWS FROM STATE GOVERNMENT</b>			
State Government Grant	2(d)	1,257,250	830,750
<b>Net cash provided by State Government</b>		<b>1,257,250</b>	<b>830,750</b>
<b>Utilised as follows:</b>			
<b>CASH FLOWS FROM OPERATING ACTIVITIES</b>			
<b>Payments</b>			
Research Grant payments		(2,091,323)	(3,142,244)
Employee costs		(102,527)	(97,902)
Institute Contractor Fees		(29,734)	(27,804)
Other Operating Payments		(79,416)	(81,280)
GST Payments on Purchases		(240,790)	(377,571)
GST payments to Taxation Institute			-
<b>Receipts</b>			
Receipts from Sponsors		1,402,019	2,189,748
Interest received		64,305	56,120
Other receipts		2,408	2,167
GST receipts on sales		130,039	178,949
GST receipts from Taxation Institute		163,509	214,228
<b>Net cash provided by/(used in) operating activities</b>	32 (b)	<b>(781,510)</b>	<b>(1,085,589)</b>
<b>CASH FLOWS FROM INVESTING ACTIVITIES</b>			
Purchase of non-current physical assets		-	(5,530)
<b>Net cash provided by/(used in) investing activities</b>		<b>-</b>	<b>(5,530)</b>
<b>Net increase/(decrease) in cash and cash equivalents</b>		<b>475,740</b>	<b>(260,369)</b>
Cash and cash equivalents at the beginning of period		2,232,347	2,492,716
<b>Cash and cash equivalents at the end of period</b>	32 (a)	<b>2,708,087</b>	<b>2,232,347</b>

The Statement of Cash Flows should be read in conjunction with the accompanying notes



## Notes to the Financial Statements for the year ended 30 June 2011

### 1. Australian Accounting Standards

#### General

The Institute's financial statements for the year ended 30 June 2011 have been prepared in accordance with Australian Accounting Standards. The term 'Australian Accounting Standards' includes Standards and Interpretations issued by the Australian Accounting Standards Board (AASB).

The Institute has adopted any applicable, new and revised Australian Accounting Standards from their operative dates.

#### Early adoption of Standards

The Institute cannot early adopt an Australian Accounting Standard unless specifically permitted by TI 1101 'Application of Australian Accounting Standards and Other Pronouncements'. No Australian Accounting Standards that have been issued or amended but not operative have been early adopted by the Institute for the annual reporting period ended 30 June 2011.

### 2. Summary of significant accounting policies

#### (a) General Statement

The financial statements constitute general purpose financial statements that have been prepared in accordance with the Australian Accounting Standards, the Framework, Statements of Accounting Concepts and other authoritative pronouncements of the Australian Accounting Standards Board as applied by the Treasurer's Instructions. Several of these are modified by the Treasurer's Instructions to vary application, disclosure, format and wording.

The Financial Management Act and the Treasurer's Instructions are legislative provisions governing the preparation of financial statements and take precedence over the Australian Accounting Standards, the Framework, Statements of Accounting Concepts and other authoritative pronouncements of the Australian Accounting Standards Board.

Where modification is required and has had a material or significant financial effect upon the reported results, details of that modification and the resulting financial effect are disclosed in the notes to the financial statements.

#### (b) Basis of Preparation

The financial statements have been prepared on the accrual basis of accounting using the historical cost convention.

The accounting policies adopted in the preparation of the financial statements have been consistently applied throughout all periods presented unless otherwise stated.

The financial statements are presented in Australian dollars and all values are rounded to the nearest dollar.

Note 3 'Judgements made by management in applying accounting policies' discloses judgements that have been made in the process of applying the Institute's accounting policies resulting in the most significant effect on amounts recognised in the financial statements.



## Notes to the Financial Statements for the year ended 30 June 2011

Note 4 'Key sources of estimation uncertainty' discloses key assumptions made concerning the future, and other key sources of estimation uncertainty at the end of the reporting period, that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year.

### (c) Reporting Entity

The reporting entity comprises the Institute. There are no related bodies.

### (d) Income

#### Revenue recognition

Revenue is recognised and measured at the fair value of consideration received or receivable. The below specific recognition criteria must also be met before revenue is recognised for the major business activities as follows:

#### Interest

Revenue is recognised as the interest accrues.

#### Sponsorship Revenue

Sponsorship from Industry is recognised as revenue by reference to the stage of completion of the transaction. This policy has changed from previous years where Sponsorship from Industry was recognised as revenue when the Institute obtained control over the assets comprising the contributions which was normally obtained upon signing of the sponsorship agreement.

See note 5 (ii) 'Voluntary changes in accounting policy'.

#### State Government Grant

State Government Grant is recognised as revenue at fair value in the period in which the Institute gains control of the appropriated funds. The Institute gains control of appropriated funds at the time those funds are deposited to the bank account.

#### Sale of goods

Revenue is recognised from the sale of goods when the significant risks and rewards of ownership transfer to the purchaser and can be measured reliably.

### (e) Plant and Equipment

#### Capitalisation/Expensing of assets

Items of plant and equipment costing \$5,000 or more are recognised as assets and the cost of utilising assets is expensed (depreciated) over their useful lives. Items of plant and equipment costing less than \$5,000 are immediately expensed direct to the Statement of Comprehensive Income (other than where they form part of a group of similar items which are significant in total).

#### Initial recognition and measurement

All items of plant and equipment are initially recognised at cost.

For items of plant and equipment acquired at no cost or for nominal cost, the cost is their fair value at the date of acquisition.



## Notes to the Financial Statements for the year ended 30 June 2011

### Subsequent measurement

After recognition as an asset, the historical cost model is used for the measurement of plant and equipment and stated at cost less accumulated depreciation and accumulated impairment losses.

### Derecognition

Upon disposal or derecognition of an item of plant and equipment, any revaluation surplus relating to that asset is retained in the asset revaluation surplus.

### Depreciation

All non-current assets having a limited useful life are systematically depreciated over their estimated useful lives in a manner that reflects the consumption of their future economic benefits.

Depreciation is calculated using the straight line method, using rates which are reviewed annually. The expected useful life for plant and equipment is 3 to 7 years.

### (f) Impairment of assets

Plant and equipment assets are tested for any indication of impairment at the end of each reporting period. Where there is an indication of impairment, the recoverable amount is estimated. Where the recoverable amount is less than the carrying amount, the asset is considered impaired and is written down to the recoverable amount and an impairment loss is recognised. As the Institute is a not-for-profit entity, unless an asset has been identified as a surplus asset, the recoverable amount is the higher of an asset's fair value less costs to sell and depreciated replacement cost.

The risk of impairment is generally limited to circumstances where an asset's depreciation is materially understated, where the replacement cost is falling or where there is a significant change in useful life. Each relevant class of assets is reviewed annually to verify that the accumulated depreciation reflects the level of consumption or expiration of asset's future economic benefits and to evaluate any impairment risk from falling replacement costs.

The recoverable amount of assets identified as surplus assets is the higher of fair value less costs to sell and the present value of future cash flows expected to be derived from the asset. Surplus assets carried at fair value have no risk of material impairment where fair value is determined by reference to market-based evidence. Where fair value is determined by reference to depreciated replacement cost, surplus assets are at risk of impairment and the recoverable amount is measured. Surplus assets at cost are tested for indications of impairment at the end of each reporting period.

See note 26 'Impairment of assets' for the outcome of impairment reviews and testing.

### (g) Financial Instruments

In addition to cash, the Institute has two categories of financial instrument:

- Loans and Receivables; and
- Financial liabilities measured at amortised cost.

Financial Instruments have been disaggregated into the following classes:

#### Financial Assets

- Cash and cash equivalents
- Restricted cash and cash equivalents
- Receivables





## Notes to the Financial Statements for the year ended 30 June 2011

### Financial Liabilities

- Payables
- Other Liabilities

Initial recognition and measurement of financial instruments is at fair value which normally equates to the transaction cost or the face value. Subsequent measurement is at amortised cost using the effective interest method.

The fair value of short-term receivables and payables is the transaction cost or the face value because there is no interest rate applicable and subsequent measurement is not required as the effect of discounting is not material.

### (h) Cash and cash equivalents

For the purpose of the Statement of Cash Flows, cash and cash equivalents (and restricted cash and cash equivalents) assets comprise cash on hand and short-term deposits with original maturities of three months or less that are readily convertible to a known amount of cash and which are subject to insignificant risk of changes in value.

More specifically, the Institute has Short term investments comprised of term deposits and bank bills invested in such securities as approved by the Treasurer.

### (i) Receivables

Receivables are recognised and carried at original invoice amount less an allowance for any uncollectible amounts (ie impairment). The collectability of receivables is reviewed on an ongoing basis and any receivables identified as uncollectible are written-off against the allowance account. The allowance for uncollectible amounts (doubtful debts) is raised when there is objective evidence that the Institute will not be able to collect the debts. The carrying amount is equivalent to fair value as it is due for settlement within 30 days. See note 2(g) 'Financial Instruments' and note 23 'Receivables'.

### (j) Payables, Accrued Expenses and Provisions

Payables including accruals not yet billed are recognised at the amounts payable when the Institute becomes obliged to make future payments as a result of a purchase of assets or services at fair value, as they are generally settled within 30 days. See note 2(g) 'Financial Instruments', note 26 'Payables' and note 28 Provision for Leave.

### (k) Research Grants

Grants expense is recognised when the Institute becomes obliged to make payment to the grantee. The Institute becomes obliged to make payment when the grantee has met the conditions of the grant agreement, normally on a quarterly basis.

### (l) Scholarships

Scholarships represent the Institute's obligation to fund approved scholarships.

Current liabilities include payments expected to be made within the next 12 months from the reporting date.



## Notes to the Financial Statements for the year ended 30 June 2011

### (m) Provision for Leave

All annual leave and long service leave provisions are in respect of employee's services up to the end of the reporting period.

There is no annual leave provision as this leave is settled within the reporting period.

The liability for long service leave expected to be settled within 12 months after the reporting period is recognised and measured at the undiscounted amounts expected to be paid when the liability is settled.

Long service leave not expected to be settled within 12 months after the reporting period is recognised and measured at the present value of amounts expected to be paid when the liabilities are settled using the remuneration rate expected to apply at the time of settlement.

When assessing expected future payments consideration is given to expected future wage and salary levels including non-salary components such as employer superannuation contributions as well as the experience of employee departures and periods of service. The expected future payments are discounted using market yields at the end of the reporting period on national government bonds with terms to maturity that match, as closely as possible, the estimated future cash outflows.

Unconditional long service leave provisions are classified as current liabilities as the Institute does not have an unconditional right to defer settlement of the liability for at least 12 months after the reporting period. Conditional long service leave provisions are classified as non-current liabilities because the Institute has an unconditional right to defer the settlement of the liability until the employee has completed the requisite period.

### (n) Superannuation

The Government Employees Superannuation Board (GESB) administers public sector superannuation arrangements in Western Australia in accordance with legislative requirements.

The superannuation expense in the Statement of Comprehensive Income comprise solely of employer contributions paid to the West State Superannuation (WSS) Scheme and the GESB Super Scheme (GESBS). The Institute's staff (employees and contractors) are non-contributory members of the WSS and GESBS, both accumulation schemes. The Institute makes concurrent contributions to the GESB on behalf of Contract Staff in compliance with the Commonwealth Government's Superannuation Guarantee (Administration) Act 1992. These contributions extinguish the liability for superannuation charges in respect of the WSS and the GESBS.

### (o) Resources Received Free of Charge

Resources received free of charge or for nominal cost that can be reliably measured are recognised as income at fair value. Where the resource received represents a service that the Institute would otherwise pay for, a corresponding expense is recognised. Receipts of assets are recognised in the Statement of Financial Position.

Assets and services rendered from other State Government agencies are separately disclosed under Income from State Government in the Statement of Comprehensive Income.

### (p) Comparative Figures

Comparative figures are, where appropriate, reclassified to be comparable with the figures presented in the current financial year.



## Notes to the Financial Statements for the year ended 30 June 2011

### 3. Judgements made by management in applying accounting policies

The judgements that have been made by management in the process of applying accounting policies will have no significant effect on the amounts recognised in the financial statements.

### 4. Key sources of estimation uncertainty

There were no key assumptions made concerning the future, and no other key sources of estimation uncertainty at the reporting period that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year.

### 5. Disclosure of changes in Accounting policy and Estimates

#### (i) Initial application of an Australian Accounting Standard

The Institute has applied the following Australian Accounting Standards effective for annual reporting periods beginning on or after 1 July 2010 that impacted on the Institute:

AASB 2009-5 *Further Amendments to Australian Accounting Standards arising from the Annual Improvements Project [AASB 5, 8, 101, 107, 117, 118, 136, & 139].*

Under amendments to AASB 117, the classification of land elements of all existing leases has been reassessed to determine whether they are in the nature of operating or finance leases. As leases of land & buildings recognised in the financial statements have not been found to significantly expose the Institute to the risks/rewards attributable to control of land, no changes to accounting estimates have been included in the Financial Statements and Notes to the Financial Statements.

Under amendments to AASB 107, only expenditures that result in a recognised asset are eligible for classification as investing activities in the Statement of Cash Flows. All investing cash flows recognised in the Institute's Statement of Cash Flows relate to increases in recognised assets.

#### (ii) Voluntary changes in accounting policy

All minerals research projects are funded partly by MERIWA grants and partly by Industry sponsorship. Sponsorship is allocated by a company (the sponsor) to a research project, which by agreement, is paid through MERIWA, who on behalf of the sponsor, maintain financial control over the project and progressively advance the funds to the research grantee.

The Institute undertook a review of the accounting treatment for Revenue from Industry Sponsorship, which has revealed that sponsorship funds are reciprocal grants and should be classified under Australian Accounting Standard AASB 118 *Revenue* rather than AASB 1004 *'Contributions'*. Accordingly the accounting policy 'Sponsorship Revenue' has been amended to recognise Revenue from Industry Sponsorship by reference to the stage of completion of the transaction.

Under Australian Accounting Standard AASB 108 *'Accounting policies, Changes in Accounting Estimates and Errors'* this change must be accounted for retrospectively.



## Notes to the Financial Statements for the year ended 30 June 2011

### (ii) Voluntary changes in accounting policy – cont'd

As a consequence of this review and changes being made retrospectively, it was highlighted that a State Government Grant received in advance for the reporting date of 1 July 2009 was required to be amended to adhere to Australian Accounting Standard AASB 1004 'Contributions'.

Accordingly, the above change in accounting policy and the required amendment have been made by restating each of the affected financial statement line items for the prior periods as follows:

	30 June 2010 \$ (extract)	Increase/ (Decrease) \$	30 June 2010 (Restated) \$	1 July 2009 \$	Increase/ (Decrease) \$	1 July 2009 (Restated) \$
<b>Statement of Financial Position</b>						
Other current Liabilities	35,168	(20,000)	15,168	361,152	(350,250)	10,902
Deferred Revenue Liability	-	2,203,257	2,203,257	-	2,573,923	2,573,923
Equity	2,764,047	(2,183,257)	580,790	2,776,960	(2,223,673)	553,287
<b>Statement of Comprehensive Income</b>						
Revenues from Industry Sponsorship	2,022,600	200,666	2,223,266			
State Government Funding	991,000	(160,250)	830,750			

### (iii) Future impact of Australian Accounting Standards not yet operative

The Institute cannot early adopt an Australian Accounting Standard unless specifically permitted by TI 1101 'Application of Australian Accounting Standards and Other Pronouncements'. Consequently, the Institute has not applied early any of the following Australian Accounting Standards that have been issued that may impact the Institute. Where applicable, the Institute plans to apply these Australian Accounting Standards from their application date:





## Notes to the Financial Statements

### for the year ended 30 June 2011

Australian Accounting Standard	Operative for reporting periods beginning on/after
<p>AASB 2009-11 <i>Amendments to Australian Accounting Standards arising from AASB 9 [AASB 1, 3, 4, 5, 7, 101, 102, 108, 112, 118, 121, 127, 128, 131, 132, 136, 139, 1023 &amp; 1038 and Interpretations 10 &amp; 12].</i></p> <p>The amendment to AASB 7 <i>Financial Instruments: Disclosures</i> requires modification to the disclosure of categories of financial assets. The Institute does not expect any financial impact when the Standard is first applied. The disclosure of categories of financial assets in the notes will change.</p>	1 Jan 2013
<p>AASB 2009-12 <i>Amendments to Australian Accounting Standards [AASB 5, 8, 108, 110, 112, 119, 133, 137, 139, 1023 &amp; 1031 and Interpretations 2, 4, 16, 1039 &amp; 1052]</i></p> <p>This Standard introduces a number of terminology changes. There is no financial impact resulting from the application of the revised Standard.</p>	1 Jan 2011
<p>AASB 1053 <i>Application of Tiers of Australian Accounting Standards</i></p> <p>This Standard establishes a differential financial reporting framework consisting of two tiers of reporting requirements for preparing general purpose financial statements.</p> <p>The Standard does not have any financial impact on the Institute. However it may affect disclosures in the financial statements of the Institute if the reduced disclosure requirements apply. The Department of Treasury and Finance (DTF) has not yet determined the application or the potential impact of the new Standard for agencies.</p>	1 July 2013
<p>AASB 2010-2 <i>Amendments to Australian Accounting Standards arising from Reduced Disclosure Requirements</i></p> <p>This Standard makes amendments to many Australian Accounting Standards, including Interpretations, to introduce reduced disclosure requirements into these pronouncements for application by certain types of entities.</p> <p>The Standard is not expected to have any financial impact on the Institute. However this Standard may reduce some note disclosures in the financial statements of the Institute. DTF has not yet determined the application or the potential impact of the amendments to these Standards for agencies.</p>	1 July 2013







## Notes to the Financial Statements

### for the year ended 30 June 2011

Australian Accounting Standard		Operative for reporting periods beginning on/after
AASB 2011-2	<p><i>Amendments to Australian Accounting Standards arising from the Trans-Tasman Convergence Project – Reduced Disclosure Requirements [AASB 101 &amp; 1054]</i></p> <p>This amending Standard removes disclosure requirements from other Standards and incorporates them in a single Standard to achieve convergence between Australian and New Zealand Accounting Standards for reduced disclosure reporting. DTF has not yet determined the application or the potential impact of the amendments to these Standards for agencies.</p>	1 July 2013
AASB 2010-5	<p><i>Amendments to Australian Accounting Standards [AASB 1, 3, 4, 5, 101, 107, 112, 118, 119, 121, 132, 133, 134, 137, 139, 140, 1023 &amp; 1038 and Interpretations 112, 115, 127, 132 &amp; 1042] (October 2010)</i></p> <p>This Standard introduces a number of terminology changes as well as minor presentation changes to the Notes to the Financial Statements. There is no financial impact resulting from the application of this revised Standard.</p>	1 Jan 2011
AASB 2010-6	<p><i>Amendments to Australian Accounting Standards – Disclosures on Transfers of Financial Assets [AASB 1 &amp; AASB 7]</i></p> <p>This Standard makes amendments to Australian Accounting Standards, introducing additional presentation and disclosure requirements for Financial Assets.</p> <p>The Standard is not expected to have any financial impact on the Institute. DTF has not yet determined the application or the potential impact of the amendments to these Standards for agencies.</p>	1 July 2011





## Notes to the Financial Statements for the year ended 30 June 2011

Australian Accounting Standard		Operative for reporting periods beginning on/after
AASB 9	<p><i>Financial Instruments</i></p> <p>This Standard supersedes AASB 139 <i>Financial Instruments: Recognition and Measurement</i>, introducing a number of changes to accounting treatments.</p> <p>The Standard was reissued on 6 Dec 2010 and the Institute is currently determining the impact of the Standard. DTF has not yet determined the application or the potential impact of the Standard for agencies.</p>	1 Jan 2013
AASB 2010-7	<p><i>Amendments to Australian Accounting Standards arising from AASB 9 (Dec 2010) [AASB 1, 3, 4, 5, 7, 101, 102, 108, 112, 118, 120, 121, 127, 128, 131, 132, 136, 137, 139, 1023 &amp; 1038 and Interpretations 2, 5, 10, 12, 19 &amp; 127]</i></p> <p>This Amending Standard makes consequential adjustments to other Standards as a result of issuing AASB 9 <i>Financial Instruments</i> in December 2010. DTF has not yet determined the application or the potential impact of the Standard for agencies.</p>	1 Jan 2013
AASB 1054	<p><i>Australian Additional Disclosures</i></p> <p>This Standard, in conjunction with AASB 2011-1 amendments to Australian Accounting Standards arising from the Trans-Tasman Convergence Project, removes disclosure requirements from other Standards and incorporates them in a single Standard to achieve convergence between Australian and New Zealand Accounting Standards.</p>	1 July 2011
AASB 2011-1	<p><i>Amendments to Australian Accounting Standards arising from the Trans-Tasman Convergence Project [[AASB 1, 5, 101, 107, 108, 121, 128, 132 &amp; 134 and Interpretations 2, 112 &amp; 113].</i></p> <p>This Amending Standard, in conjunction with AASB 1054 <i>Australian Additional Disclosures</i>, removes disclosure requirements from other Standards and incorporates them in a single Standard to achieve convergence between Australian and New Zealand Accounting Standards.</p>	1 July 2011

#### (iv) Changes in accounting estimates

There were no changes in accounting estimates that will have an effect in the current period or is expected to have an effect in future periods.





## Notes to the Financial Statements

### for the year ended 30 June 2011

	2011 \$	2010 \$
<b>6. Research Grants</b>		
Research Grants – MERIWA	377,707	598,552
Research Grants – Industry Sponsorship	1,458,360	2,223,266
	<u>1,836,067</u>	<u>2,821,818</u>
<b>7. Scholarships</b>		
Scholarships	49,918	49,960
	<u>49,918</u>	<u>49,960</u>
<b>8. Employee Costs</b>		
Salaries and wages	131,817	99,838
	<u>131,817</u>	<u>99,838</u>
<b>9. Institute Contractor Fees</b>		
Institute Contract Staff Fees	29,410	29,783
	<u>29,410</u>	<u>29,783</u>
<b>10. Superannuation expense</b>		
Superannuation expense	14,130	11,666
	<u>14,130</u>	<u>11,666</u>
<b>11. Board and Committee fees and costs</b>		
Board of Director's remuneration	36,625	40,700
Advisory Committee attendance fees	5,180	1,680
Board and Advisory Committee's expenses	1,056	549
	<u>42,861</u>	<u>42,929</u>
<b>12. Administration expenses</b>		
Printing and Stationery	1,590	1,717
Advertising	2,731	2,942
Audit fees	14,950	14,300
Worker's Compensation premium	1,848	2,048
Other	3,898	6,029
	<u>25,017</u>	<u>27,036</u>
<b>13. Accommodation expenses</b>		
Rental (notional)	34,335	32,917
	<u>34,335</u>	<u>32,917</u>
<b>14 Depreciation expense</b>		
Plant and Equipment	830	801
	<u>830</u>	<u>801</u>





## Notes to the Financial Statements for the year ended 30 June 2011

	2011 \$	2010 \$
<b>15. Loss on disposal of non-current assets</b>		
Cost of disposal of non-current assets – Plant and Equipment	-	399
Proceeds from Disposal of non-current assets – Plant and Equipment	-	-
	<u>-</u>	<u>399</u>
<b>16 Interest Revenue</b>		
Interest on Investments – Term Deposits	65,039	55,550
	<u>65,039</u>	<u>55,550</u>
<b>17. Other Revenue</b>		
Sale of Publications	2,409	2,167
	<u>2,409</u>	<u>2,167</u>
<b>18. Revenue from Industry Sponsorship</b>		
Sponsorship from Industry	1,458,360	2,222,266
	<u>1,458,360</u>	<u>2,222,266</u>
The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.		
<b>19. State Government Grant</b>		
State Government Grant	1,257,250	830,750
	<u>1,257,250</u>	<u>830,750</u>
The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.		
<b>20. Resources received free of charge</b>		
Resources received free of charge have been determined on the basis of the following estimates provided by agencies.		
Department of Mines and Petroleum	34,335	32,917
	<u>34,335</u>	<u>32,917</u>

Where services have been received free of charge or for nominal cost, the Institute recognises revenues equivalent to the fair value of the services that can be reliably determined and which would have been purchased if not donated, and those fair values shall be recognised as expenses. Where the contributions of services are in the nature of contributions by owners the Institute makes an adjustment direct to equity.





## Notes to the Financial Statements for the year ended 30 June 2011

	2011 \$	2010 \$
<b>21. Cash and cash equivalents</b>		
Cash at bank	1,000,524	524,910
Cash on hand	200	200
	<b>1,000,724</b>	<b>525,110</b>
<b>22. Restricted cash and cash equivalents</b>		
Research Grants	1,707,363	1,707,237
	<b>1,707,363</b>	<b>1,707,237</b>
Cash held in the account is to be used only for the purpose of providing grants for research and development of projects to grantees.		
<b>23. Receivables</b>		
<u>Current</u>		
Grants Receivable – Sponsorship	793,080	665,115
GST Receivable	8,980	112,096
	<b>802,060</b>	<b>777,211</b>
<u>Non – Current</u>		
Grants Receivable – Sponsorship	461,000	173,811
	<b>461,000</b>	<b>173,811</b>
There are no receivables individually determined as impaired at the end of the reporting period. See also note 2(i) 'Receivables', 2(d) 'Sponsorship Revenue', and note 35 'Financial Instruments'		
<b>24. Other Current Assets</b>		
Accrued Interest on Short Term Investments	5,158	4,423
	<b>5,158</b>	<b>4,423</b>
<b>25. Plant and equipment</b>		
Plant and equipment		
At cost	5,530	5,530
Accumulated depreciation	(968)	(138)
	<b>4,562</b>	<b>5,392</b>
Reconciliation of the carrying amounts of plant and equipment at the beginning and end of the reporting period are set out below:		
<b>Plant and equipment</b>		
Carrying amount at start of year	5,392	1,061
Additions	-	5,531
Depreciation	(830)	(801)
Disposals	-	(399)
Carrying amount at end of year	<b>4,562</b>	<b>5,392</b>
<b>26. Impairment of assets</b>		

There were no indications of impairment to plant and equipment assets at 30 June 2011.  
The Institute held no goodwill or intangible assets or surplus assets at the end of the reporting period.



## Notes to the Financial Statements for the year ended 30 June 2011

	2011 \$	2010 \$
<b>27. Payables</b>		
<u>Current</u>		
Grants Payable – Research	138,291	368,872
Grants Payable – Scholarship	29,379	25,097
	<b>167,670</b>	<b>393,969</b>

See also note 2(j) 'Payables', 2(k) 'Research Grants', 2(l) 'Scholarships' and note 35 'Financial Instruments'

## 28. Provision for Leave

<u>Current</u>		
Long Service Leave	23,941	-
	<b>23,941</b>	<b>-</b>

Long service leave liabilities have been classified as current where there is no unconditional right to defer settlement for at least 12 months after the reporting period. Settlement of the liability will occur in July 2011.

## 29. Other Current Liabilities

<u>Accrued Expenses</u>		
Employee costs	14,768	9,420
Institute Contractor fees	3,965	4,289
Superannuation	3,841	1,252
Administration expenses	211	207
	<b>22,785</b>	<b>15,168</b>
<u>Miscellaneous Liabilities</u>		
Sponsorship funds – Projects not yet approved	34,800	-
	<b>34,800</b>	<b>-</b>

See also note 2(j) 'Payables' and note 35 'Financial Instruments'

## 30. Deferred Revenue

<u>Current</u>		
Deferred Revenue – Sponsorship	1,291,246	1,042,074
<u>Non – Current</u>		
Deferred Revenue – Sponsorship	1,206,627	1,161,183
	<b>2,497,873</b>	<b>2,203,257</b>

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.

## 31. Equity

Equity represents the residual interest in net assets of the Institute. The Government holds the equity interest in the Institute on behalf of the community.

<u>Accumulated Surplus</u>		
Balance at start of year	580,790	553,287
Result for the period	653,008	27,503
Balance at end of year	<b>1,233,798</b>	<b>580,790</b>

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.



## Notes to the Financial Statements for the year ended 30 June 2011

### 32. Notes to the Statement of Cash Flows

#### (a) Reconciliation of Cash

Cash at the end of the financial year as shown in the Statement of Cash Flows is reconciled to the related items in the Statement of Financial Position as follows:

Cash at bank	1,000,524	524,710
Cash on hand	200	200
Restricted Cash and cash equivalents	1,707,363	1,707,237
	<u>2,708,087</u>	<u>2,232,347</u>

#### (b) Reconciliation of Net Cost of Services to Net Cash Flows Used In Operating Activities

	2011	2010
	\$	\$
<b>Net cost of services</b>	(638,577)	(836,164)
<b>Non-cash items:</b>		
Resources received free of charge	34,335	32,917
Depreciation	830	801
Net loss on disposal of non-current assets	-	399
<b>(Increase)/Decrease in assets:</b>		
Accrued Interest	(735)	570
Grants Receivable – Sponsorship	(415,154)	377,630
Prepayments	-	33,700
<b>Increase/(Decrease) in liabilities:</b>		
Grants Payable –Research and Scholarship	(226,299)	(334,539)
Deferred Revenue	294,616	(370,666)
Revenue received in Advance	34,800	-
Accrued expenses	31,558	4,266
<b>Net GST (receipts)/payments</b>	52,758	15,606
<b>Change in GST in receivables/payables</b>	50,358	(10,109)
<b>Net Cash used in operating activities</b>	<u>(781,510)</u>	<u>(1,085,589)</u>

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.

### 33. Commitments

At the end of the reporting period the Institute has \$2,911,272 (2010 \$2,525,389) of research grant commitments that are not recognised in the Income Statement. The Institute is obliged to make payment when the grantee has met the conditions of grant (see note 2k) and are payable as follows:

	2011	2010
	\$	\$
Within 1 year	1,745,042	1,384,377
Later than 1 year but not later than 5 years	1,166,230	1,141,012
Total	<u>2,911,272</u>	<u>2,525,389</u>

These commitments are not inclusive of GST





## Notes to the Financial Statements for the year ended 30 June 2011

### 34. Explanatory Statement

This statement provides details of any significant variations between estimates and actual results for 2011 and between the actual results for 2010 and 2011. Significant variations are considered to be those greater than 10% and \$2,000.

#### (i) Significant variances between estimated and actual result for 2011

	2011 Estimate \$	2011 Actual \$	Variation \$
Research Grants	2,850,000	1,836,067	1,013,933
Employee Costs	102,500	131,817	29,317
Interest revenue	85,000	65,039	19,961
Revenue from Industry Sponsorship	2,020,000	1,458,360	561,640
State Government Grant	1,003,000	1,257,250	254,250

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.

- Research Grants expense was lower than the estimate due to a lower value of projects being processed during the year.
- Employee costs were higher than expected due to the payment of long service leave as a consequence of the retirement of a staff member.
- Interest revenue was lower than the estimate due to commercial interest rates remaining lower than anticipated.
- Revenue from Industry Sponsorship was lower than the estimate due to a lower value of projects being processed during the year.
- State Government Grant was higher than the estimate due to the 2011/12 first quarter payment being made in advance.

#### (ii) Significant variances between actual results for 2010 and 2011

	2011 \$	2010 \$	Variance \$
Research Grants	1,836,067	2,821,818	985,751
Employee costs	131,817	99,838	31,979
Superannuation expense	14,130	11,666	2,464
Interest revenue	65,039	55,550	9,489
Revenue from Industry Sponsorship	1,458,360	2,223,266	764,906
State Government Grant	1,257,250	830,750	426,500

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.

- Research Grants expense - the variance is due to a lower value of projects being processed during the year.
- Employee costs - the variance is due to the payment of long service leave as a consequence of the retirement of a staff member.
- Superannuation expense - the variance is as a consequence of the final payment to an exiting staff member.
- Interest revenue - the variance is due to higher commercial interest rates than the previous year.
- Revenue from Industry Sponsorship - the variance is due to a lower value of projects being processed during the year.

**MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA**

- State Government Grant – the variance is due to the 2011/12 first quarter payment being made in advance.







## Notes to the Financial Statements for the year ended 30 June 2011

### 35. Financial Instruments

#### (a) Financial Risk Management Objectives and Policies

Financial instruments held by the Institute are cash and cash equivalents, restricted cash and cash equivalents, receivables and payables. The Institute has limited exposure to financial risks. The Institute's overall risk management program focuses on managing the risks identified below.

##### *Credit Risk*

Credit risk arises when there is the possibility of the Institute's receivables defaulting on their contractual obligations resulting in financial loss to the Institute.

The maximum exposure to credit risk at the end of the reporting period in relation to each class of recognised financial assets is the gross carrying amount of those assets inclusive of any provisions for impairment as shown in the table at Note 34(c) 'Financial Instrument Disclosures' and Note 23 'Receivables'.

The Institute trades only with recognised, creditworthy third parties. The Institute has policies in place to ensure that sale of products and services are made to customers with an appropriate credit history. In addition, receivable balances are monitored on an ongoing basis with the result that the Institute's exposure to bad debts is minimal. At the end of the reporting period there are no significant concentrations of credit risk.

Allowance for impairment of financial assets is calculated based on objective evidence such as observable data in client credit ratings. For financial assets that are either past due or impaired, refer to Note 34 (c) 'Financial Instrument Disclosures'.

##### *Liquidity risk*

Liquidity risk arises when the Institute is unable to meet its financial obligations as they fall due. The Institute is exposed to liquidity risk through its trading in the normal course of business.

The Institute has appropriate procedures to manage cash flows including draw downs of appropriations by monitoring forecast cash flows to ensure that sufficient funds are available to meet commitments.

##### *Market risk*

Market risk is the risk that changes in market prices such as foreign exchange rates and interest rates will affect the Institute's income or the value of its holdings of financial instruments. The Institute does not trade in foreign currency and is not materially exposed to other price risks. The Institute's exposure to market risk for changes in interest rates relate primarily to Short-term investments comprised of term deposits and bank bills. The risk is managed by the Institute through diversification and variation in maturity dates.





## Notes to the Financial Statements for the year ended 30 June 2011

### (b) Categories of Financial Instruments

In addition to cash, the carrying amounts of each of the following categories of financial assets and financial liabilities at the end of the reporting period are as follows:

	2011 \$	2010 \$
<b>Financial Assets</b>		
Cash and cash equivalents	1,000,724	525,110
Restricted cash and cash equivalents	1,707,363	1,707,237
Loans and Receivables <sup>(a)</sup>	1,254,080	838,926
<b>Financial Liabilities</b>		
Financial liabilities measured at amortised cost	2,747,069	2,612,394
The 2009-10 comparative amount has been restated – see Note 5 (ii) ‘Voluntary changes in accounting policy’		

(a) The amount of Receivables excludes GST recoverable from the ATO (statutory receivable).

### (c) Financial Instrument disclosures

#### *Credit Risk and Interest Rate Risk Exposure*

The following table discloses the Institute’s maximum exposure to credit risk, interest rate exposures and the ageing analysis of financial assets. The Institute’s maximum exposure to credit risk at the end of the reporting period is the carrying amount of the financial assets as shown below. The table discloses the ageing of financial assets that are past due but not impaired and impaired financial assets. The table is based on information provided to senior management of the Institute.

The Institute does not hold any collateral as security or other credit enhancements relating to the financial assets it holds.

The Institute does not hold any financial assets that had to have their terms renegotiated that would have otherwise resulted in them being past due or impaired.

#### Interest rate exposures and ageing analysis of financial assets <sup>(a)</sup>

	<u>Interest rate exposure</u>		<u>Past due but not impaired</u>				
	Weighted average effective interest rate %	Carrying Amount \$	Variable Interest Rate \$	Non-interest Bearing \$	Up to 3 months \$	3 – 12 months \$	1 – 2 years \$
<b>2011</b>							
Cash and cash equivalents	1.08	1,000,724	1,000,724				
Restricted cash and cash equivalents	1.10	1,707,363	1,707,363				
Receivables		1,254,080		1,254,080	107,000	145,100	5,000
Other assets		5,158		5,158			
<b>Total</b>		<b>3,967,325</b>	<b>2,708,087</b>	<b>1,259,238</b>	<b>107,000</b>	<b>145,100</b>	<b>5,000</b>

(a) The amount of Receivables excludes GST recoverable from the ATO (statutory receivable).



## Notes to the Financial Statements for the year ended 30 June 2011

### Interest rate exposures and ageing analysis of financial assets (a) – cont'd

	Weighted average effective interest rate %	Interest rate exposure		Non- interest Bearing	Past due but not impaired		
		Carrying Amount	Variable Interest Rate		Up to 3 months	3 – 12 months	1 – 2 years
		\$	\$	\$	\$	\$	\$
<b>2010</b>							
Cash and cash equivalents	0.20	525,110	525,110				
Restricted cash and cash equivalents	1.05	1,707,237	1,707,237				
Receivables		838,927		838,927		68,800	10,000
Other assets		4,423		4,423			
<b>Total</b>		<b>3,075,697</b>	<b>2,232,347</b>	<b>843,350</b>	<b>-</b>	<b>68,800</b>	<b>10,000</b>

(a) The amount of Receivables excludes GST recoverable from the ATO (statutory receivable).

### Liquidity Risk

The following table details the contractual maturity analysis for financial liabilities. The table includes interest and principal cash flows. An adjustment has been made where material.

### Interest rate exposures and maturity analysis of financial liabilities (a)

	Weighted average effective interest rate %	Interest rate exposure		Non- interest Bearing	Maturity dates		
		Carrying Amount	Variable Interest Rate		Up to 3 months	3 – 12 months	More than 1 year
		\$	\$	\$	\$	\$	\$
<b>Financial Liabilities</b>							
<b>2011</b>							
Payables	-	167,670		167,670	167,670		
Deferred Revenue	-	2,497,873		2,497,873	322,812	968,435	1,206,627
Other Liabilities	-	57,585		57,585	57,585		
<b>Total</b>		<b>2,723,128</b>		<b>2,723,128</b>	<b>548,067</b>	<b>968,435</b>	<b>1,206,627</b>
<b>2010</b>							
Payables	-	393,969		393,969	393,969		
Deferred Revenue	-	2,203,257		2,203,257	260,519	781,556	1,161,183
Other Liabilities	-	15,168		15,168	15,168		
<b>Total</b>		<b>2,612,394</b>		<b>2,612,394</b>	<b>669,656</b>	<b>781,556</b>	<b>1,161,183</b>

The 2009-10 comparative amount has been restated - see Note 5 (ii) 'Voluntary changes in accounting policy'.

(a) The amounts disclosed are the contractual undiscounted cash flows of each class of financial liabilities at the end of the reporting period.

### Interest rate sensitivity analysis

The following table represents a summary of the interest rate sensitivity of the Institute's financial assets and liabilities at the end of the reporting period on the surplus for the period and equity for a 1% change in interest rates. It is assumed that the change in interest rates is held constant throughout the reporting

**MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA**

period.





## Notes to the Financial Statements for the year ended 30 June 2011

### Interest rate sensitivity analysis – cont'd

	Carrying Amount	-100 basis Points	+100 basis Points
	\$	Surplus \$	Equity \$
<b>2011</b>			
<b>Financial Assets</b>			
Cash and cash equivalents	1,000,724	(10,007)	10,007
Restricted cash and cash equivalents	1,707,363	(17,074)	17,074
<b>2010</b>			
<b>Financial Assets</b>			
Cash and cash equivalents	525,110	(5,251)	5,251
Restricted cash and cash equivalents	1,707,237	(17,072)	17,072

### Fair values

All financial assets and liabilities recognised in the Statement of Financial Position, whether they are carried at cost or fair value, are recognised at amounts that represent a reasonable approximation of fair value unless otherwise stated in the applicable notes.

## 36. Remuneration of members of the Accountable Institute and Senior Officers

### Remuneration of Members of the Accountable Institute

The number of members of the Accountable Institute whose total of fees, salaries, superannuation, non-monetary benefits and other benefits for the financial year, fall within the following bands are:

	2011	2010
\$ 0 - \$ 10,000	3	3
\$ 10,001 - \$ 20,000	1	1

The total remuneration of the members of the Accountable Institute is:

\$	\$
<b>36,625</b>	<b>40,700</b>

No amounts were paid or become payable to any superannuation fund for the financial year for any of the members of the Accountable Institute.

No members of the Accountable Institute are members of the Pension Scheme.







## Notes to the Financial Statements for the year ended 30 June 2011

### 36. Remuneration of members of the Accountable Institute and Senior Officers – cont'd

#### Remuneration of Senior Officers

The number of Senior Officers other than senior officers reported as members of the Accountable Institute whose total fees, salaries, superannuation, non-monetary benefits and other benefits for the financial year, fall within the following bands are:

			2011	2010
\$ 0	-	\$20,000	-	1
\$ 30,001	-	\$ 40,000	-	1
\$ 40,001	-	\$ 50,000	1	-

The total remuneration of Senior Officers of the Accountable Institute is:

\$	\$
<b>43,550</b>	<b>50,089</b>

The total remuneration includes the superannuation expense incurred by the Institute in respect of Senior Officers other than senior officers reported as members of the Accountable Institute.

No Senior Officers are members of the Pension Scheme.

### 37. Remuneration of Auditor

Remuneration payable to the Auditor General for the financial year is as follows:

	2011	2010
	\$	\$
Auditing the accounts, financial statements and performance indicators	14,000	14,950
	<b>14,000</b>	<b>14,950</b>

The expense is included at note 12 'Administration expenses'

### 38. Supplementary Information

The Institute has no contingent liabilities and contingent assets, or any related or affiliated bodies.

There were no events occurring after the end of the reporting period, or write-offs or losses through theft, defaults and other causes.

No gifts of public property were provided by the Institute.

### 39. Schedule of Income and Expenses by Service

Treasurer's Instruction 1101(9) requires that statutory authorities provide segment information in the form of services.

MERIWA has one sole activity (or service) which is to finance and coordinate minerals and energy research.

No schedule is prepared as this information is reported in the Statement of Comprehensive Income.



## Certification of Financial Statements for the year ended 30 June 2011

The accompanying financial statements of the Minerals and Energy Research Institute of Western Australia have been prepared in compliance with the provisions of the Financial Management Act 2006 from proper accounts and records to present fairly the financial transactions for the financial year ended 30 June 2011 and the financial position as at 30 June 2011.

At the date of signing we are not aware of any circumstances which would render the particulars included in the financial statements misleading or inaccurate.

P. Lockyer  
CHAIRMAN,  
BOARD OF DIRECTORS

A Davies  
DIRECTOR

J Fortuna  
CHIEF FINANCE OFFICER

15 September 2011



## **Auditor General**

### **INDEPENDENT AUDITOR'S REPORT**

**To the Parliament of Western Australia**

**MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA**

#### **Report on the Financial Statements**

I have audited the accounts and financial statements of the Minerals and Energy Research Institute of Western Australia.

The financial statements comprise the Statement of Financial Position as at 30 June 2011, the Statement of Comprehensive Income, Statement of Changes in Equity and Statement of Cash Flows for the year then ended, and Notes comprising a summary of significant accounting policies and other explanatory information.

#### ***Board's Responsibility for the Financial Statements***

The Board is responsible for keeping proper accounts, and the preparation and fair presentation of the financial statements in accordance with Australian Accounting Standards and the Treasurer's Instructions, and for such internal control as the Board determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

#### ***Auditor's Responsibility***

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the financial statements based on my audit. The audit was conducted in accordance with Australian Auditing Standards. Those Standards require compliance with relevant ethical requirements relating to audit engagements and that the audit be planned and performed to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the Institute's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of accounting estimates made by the Board, as well as evaluating the overall presentation of the financial statements.

I believe that the audit evidence obtained is sufficient and appropriate to provide a basis for my audit opinion.

## **MINERALS AND ENERGY RESEARCH INSTITUTE OF WESTERN AUSTRALIA**

### ***Opinion***

In my opinion, the financial statements are based on proper accounts and present fairly, in all material respects, the financial position of the Minerals and Energy Research Institute of Western Australia at 30 June 2011 and its financial performance and cash flows for the year then ended. They are in accordance with Australian Accounting Standards and the Treasurer's Instructions.

### **Minerals and Energy Research Institute of Western Australia Report on Controls**

I have audited the controls exercised by the Minerals and Energy Research Institute of Western Australia. The Board is responsible for ensuring that adequate control is maintained over the receipt, expenditure and investment of money, the acquisition and disposal of public and other property, and the incurring of liabilities in accordance with the Financial Management Act 2006 and the Treasurer's Instructions, and other relevant written law.

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the controls exercised by the Board based on my audit conducted in accordance with Australian Auditing Standards.

### ***Opinion***

In my opinion, the controls exercised by the Minerals and Energy Research Institute of Western Australia are sufficiently adequate to provide reasonable assurance that the receipt, expenditure and investment of money, the acquisition and disposal of property, and the incurring of liabilities have been in accordance with legislative provisions.

### **Report on the Key Performance Indicators**

I have audited the key performance indicators of the Minerals and Energy Research Institute of Western Australia. The Board is responsible for the preparation and fair presentation of the key performance indicators in accordance with the Financial Management Act 2006 and the Treasurer's Instructions.

As required by the Auditor General Act 2006, my responsibility is to express an opinion on the key performance indicators based on my audit conducted in accordance with Australian Auditing Standards.

### ***Opinion***

In my opinion, the key performance indicators of the Minerals and Energy Research Institute of Western Australia are relevant and appropriate to assist users to assess the Institute's performance and fairly represent indicated performance for the year ended 30 June 2011.

### **Independence**

In conducting this audit, I have complied with the independence requirements of the Auditor General Act 2006 and the Australian Auditing Standards, and other relevant ethical requirements.



COLIN MURPHY  
AUDITOR GENERAL  
20 September 2011



MERIWA

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ISSN 1032-111X