Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Steve Hill

Date submitted: 10 October 2007

Project name: Curnamona Mineral Exploration : Christmas ball prospect Biogeochemistry

Abbreviated title: Christmas Ball biogeochem

Type of project Centre *(Centre or Industry/Commercial):*

Program: 1

Themes:

Project Leader: Adrian Fabris

Start date and duration: November 2007 (4 months)

Participants: Steve Hill & Adrian Fabris

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*
Funding is sort for sample preparation and assay of plant samples from the Christmas Ball prospect, SA. Approximately 100 chenopod samples were collected in April 2007 from the CRC LEME project area at Christmas Ball prospect in the Curnamona Province. These samples coincide with a soil sampling transect previously collected by Adrian Fabris as part of CRC LEME's Curnamona Mineral exploration project. The preparation and assay of these samples will enable the plant biogeochemistry results to be compared with the existing soil chemical assays from this site. The results can be integrated into the existing Curnamona data set (both for soil sampling and existing chenopod sampling programs from sites with more shallow transported cover), but would also stand alone as a publishable account in both report and journal manuscript form. The results should also be ready in time to be integrated into the phyto-exploration minerals explorers guide and possibly the Curnamona Explorers Guide.

Deliverables (outputs) and expected impacts of research (outcomes):
Outputs:

1. CRC LEME Open File report of preliminary results and comparison with soil sampling media;
2. Contributions to Phyto-exploration and Curnamona Explorers Guides;
3. MESA Journal and scientific journal manuscript publication:

a) Hill, S.M, & Fabris, A., Comparison of phytoexploration expression of buried mineralisation with soil sampling techniques at Christmas Ball prospect. MESA Journal.
b) Hill, S.M., Phyto-exploration of chenopod shrublands in southeastern central Australia. Journal of Geochemical Exploration

Outcomes:
Increased knowledge and confidence in biogeochemical exploration techniques in Curnamona Province

Milestones: *(to reflect delivery and payment time lines)*
November 2007: sample preparation (milling) and submission for analysis
December 2007: Assay results received, potential fast-track integration into explorers guides
January 2007: CRC LEME Open File report of preliminary results
February 2007: submission of journal manuscripts

Confidentiality requirements
None

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Steve Hill	In-kind		.10							.10
Adrian Fabris	In-kind		.						.05	.05
TOTAL			.10							**.15**

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	3.5	
Committed (definite) external funds	0	
Total Project Opex	3.5	

Possible additional external funds (for info)	0	

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Sample preparation		$0.5k							
Sample analysis		$3k							
TOTAL		**$3.5k**							

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by:
David Haberlah, Steven M. Hill, Martin A.J. Williams, Vic Gostin, Andreas Schmidt-Mumm

Date submitted:
26/09/2007

Project name:
Establishing a high-resolution Last Glacial Maximum (LGM) multi-proxy loess-derived palaeoflood record for southern Australia

Abbreviated title:
LGM loess and flood record

Type of project
Centre (part of PhD student project)

Program:
Regolith Geoscience (P1)

Themes:
History of Aridity

Project Leader:
Lisa Worrall

Start date and duration:
PhD dates: 02/2006 – 02/2009
This research component: **Nov. 2007 – Feb. 2008**

Participants:
David Haberlah (CRC LEME, UA PhD student)
Dr Steven Hill (CRC LEME, UA supervision)
Prof Martin A.J. Williams (CRC LEME, UA supervision)
Prof Vic Gostin (UA supervision)
Dr Andreas Schmidt-Mumm (CRC LEME, UA supervision)
Prof Grant McTainsh (Griffith University, Multisizer granulometric study)
Dr Galen Halverson (UA, stable isotope analysis)

Brief project description:

1) Objectives
Support of CRC LEME for the final stages and publication of an AMS dating program and directly linked multi-proxy analyses that will pioneer a world-class

chronology of regolith forming events in southern Australia throughout the dramatic palaeo-environmental changes associated with the onset and termination of the Last Glacial Maximum (LGM).

2) Scope of work

The aeolian provenance and exceptional preservation of a laminated flood record from the Flinders Ranges (Fig. 01) allow differentiating and quantifying the timing and extend of regolith mobilisation by both wind and water from ~34 ka to ~18 ka calBP (Williams et al. 2001 *QI* **83-85**;129, Fig. 02). Direct correlation with independent proxies from closely-spaced veneers of organic debris will link so far undated intervals of LGM instabilities which account for meters-thick aggradation of fine-grained regolith filling valleys, floodplains and lacustrine basins in large parts of southern Australia to palaeo-circulation patterns, sources of rainfall and vegetational changes.

3) Knowledge to date

The latest review of palaeo-environmental records for the southern hemisphere highlights a notable lack of terrestrial high-resolution multi-proxy chronologies from Australia (Sylvestre et al. 2007 *QI* **167-178**:409). This is especially prominent for the LGM in a comparison of the most recent INTIMATE reports (INTegration of Ice, MArine and TErrestrial records; a core programme of the INQUA Palaeoclimate Commission) from Australia (Turney et al. 2007 *JQS* 21(7):751) and New Zealand (Alloway et al. 2007 *JQS* 22(1):9). Without such an expressive palaeo-environmental continental record, our understanding of what landscape processes operated during the interval of most dramatic climate change over the last glacial cycle remains limited at best.

4) What is new

Over the past year, LEME has indirectly supported a range of studies performed on a full-length monolith from the 8 meter stratigraphic section, including spectral scanning, stable isotope analysis of distinct layers of organic debris and a submicron granulometric study. The depositional question posed by Haberlah on the LEME symposium (www.crcleme.org.au/Pubs/Monographs/regolith2006/Haberlah_D.pdf) in Hahndorf last year can now be answered with the Brachina section presenting a proximal dust (loess)-derived flood record, registering periods of aeolian activity and disturbed surfaces during episodes of aggradation of alluvially redistributed but pure loess (Haberlah 2007 *AREA* 39(2):224), all major precipitation events over the Last Glacial Maximum leading to the accumulation of flood couplets (Haberlah et al. 2007 *QI* 167-178:150), and periods of relative surface stability witnessed by stacked cambic palaeosols.

5) Interactions with other projects

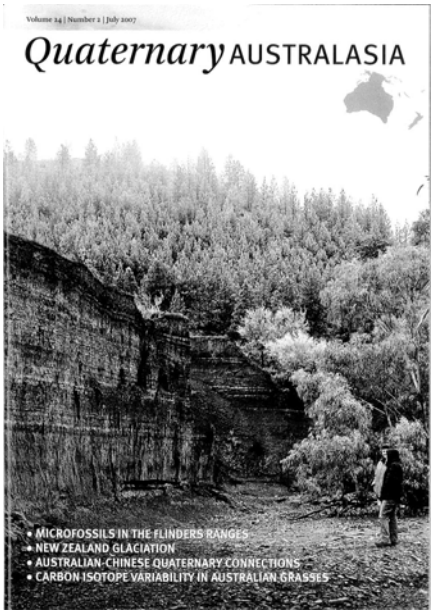
Last month, LEME in corporation with the new ANU AMS facility supported a proposal to date the stratigraphic section by **22 AMS samples** selected from ~60 collected veneers of organic debris. However, from the $4400 required to cover compulsory pre-treatment costs arising from combustion and graphitisation, **$2400** remain outstanding while Martin Williams managed to attract an external $2000.

Stable N and C isotopic composition of the organic veneers are analysed to establish the nature of plant coverage and the source of precipitation. Half of the costs of

consumables amounting to $1200 (60 x $20) is covered by Galen Halverson, with only **$600** outstanding to conclude this multi-proxy approach.

The first part of the **granulometric study** on this section was funded by an EFN ARC grant and departmental money. The final analyses are scheduled for the first three weeks of November 2007, however **$500** of consumables still need to be covered.

As a sequel to Haberlah's LEME presentation at INQUA 2007, the results of this project are to be presented at the **ANZGG conference** in February 2008. The student registration fee of **$325** remains outstanding.



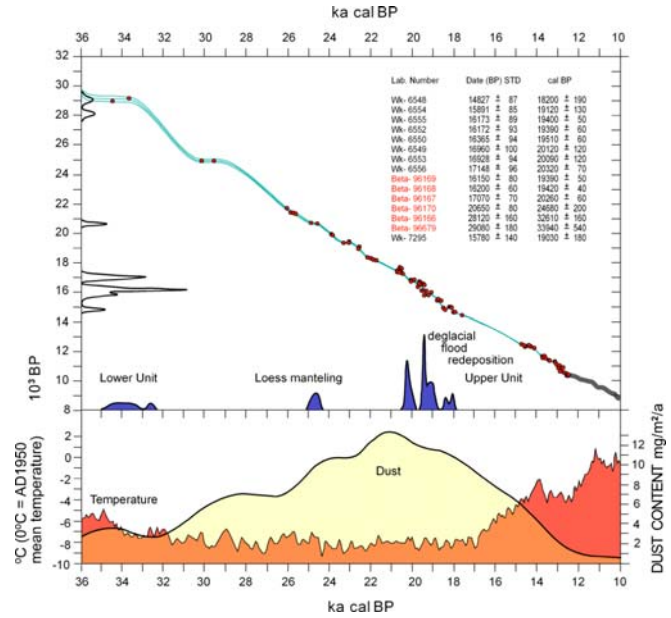


Fig. 1 Brachina type section on the cover of latest edition of Quaternary Australasia (photo: D. Haberlah)
Fig. 2 Initial numeric and cluster distribution of published preliminary AMS dates from the Brachina catchment, those of type section are indicated in red (unpublished)

Deliverables (outputs) and expected impacts of research (outcomes):

1) First results will be presented on the Geological Society of Australia **5th Sprigg Symposium** (theme: Regolith: "Mineral Deposits & Environment") on Thursday **29 November 2007** in Adelaide.

2) Data will be summarised and submitted **to a leading international journal** as soon as the remaining AMS dates are granted and processed, and the accompanying **laboratory studies are concluded by the end of November 2007**. Accelerator bookings are discussed with Stewart Fallon from the ANU SSAMS Radiocarbon Dating Laboratory.

3) Final results will be presented on **13th Conference of the The Australian and New Zealand Geomorphology Group** (ANZGG) (theme: "Ancient and modern: late

Cainozoic modification of Australia's relict landscapes") between the **10th and 15th February 2008** in Tasmania.

4) The key paper will be followed by **three to four further publications** highlighting the implications of the established regolith models, sources and depositional rates for the palaeo-environment and the mining industry, all likely to be submitted **prior to June the 30th 2008**.

(For research outcomes please refer to objectives and scope of project description)

Milestones:
If payment of items listed above follows shortly after announcement of successful proposals the following milestones will be met:

Nov. 2007	conclusion of all dating and laboratory analyses
Nov. 2007	presentation of first results on GSA Australia 5th Sprigg Symposium
Jan. 2008	submission of key paper to international journal such as Geology (Thomson ISI JCR: 3.477)
Feb. 2008	presentation at 13th ANZGG conference in Tasmania
Feb.–June 08	submission of three related papers outlined below

1) *Chronometric study on the deposition of MIS3 and LGM loess-derived valley-fills in the Flinders Ranges.*
Data: 9 OSL and 8 AMS dates from the two Wilkawillina type sections, sedimentological and geomorphological description
Co-authors: Tim Pietsch, Frances Williams, John Prescott
Journal: AJES (Thomson ISI JCR: 1.333)

2) *Calcareous palaeosol record of a loess-derived floodplain from the western piedmont plain of the Flinders Ranges*
Data: 11 OSL ages and ~ 50 carbon stable isotope samples from the two Hookina type sections, sedimentological and geomorphological description
Co-authors: Ed Rhodes, Galen Halverson, Mark Quigley
Journal: QSR (Thomson ISI JCR: 4.113)

3) *Loess-derived slackwater deposits from the Flinders Ranges and their implications for the granulometric studies of Silts*
Data: 100 Multisizer3 samples in partially dispersed (and partly fully dispersed mode) from Aroona, Slippery Dip and Wilkawillina Gorge)
Co-authors: Grant McTainsh, Craig Strong, David Chittleborough, Steven Hill
Journal: ESPL (Thomson ISI JCR: 1.784)

Confidentiality requirements
none

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Martin A.J. Williams			0.1							
Steve M. Hill			0.1							
Andreas Schmidt-Mumm			0.05							
TOTAL			0.25							

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*
David Haberlah	**University of Adelaide**	**PhD**

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	**3.825**	
Committed (definite) external funds	***4.6**	
Total Project Opex	**3.825**	

* 4.6k external derived from supervisors: MW ($2K); SH ($2K); GH (0.6K)

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Pre-treatment for outstanding contingent of 12 AMS samples		2.4							
Outstanding consumables of for 60 stable isotope analysis		0.6							
Outstanding consumables of remaining Multisizer 3 granulometric study		0.5							
ANZGG conference student registration fee for presentation of results		0.325							
TOTAL		**$3.825 K**							

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **HO-170105**

Project No: *(Issued by LEME Head Office)*

Submitted by:Tony Eggleton/ Graham Taylor

Date submitted: 11/10/07

Project name: The Weipa Bauxite: advancing exploration and grade control through research into character and evolution

Abbreviated title: The Weipa Bauxite

Type of project Centre+Industry *(Centre or Industry/Commercial):*

Program: 1

Themes: 1 and 2

Project Leader: Tony Eggleton/GrahamTaylor

Start date and duration: Nov 2004 for 4 years

Participants: Honorary fellows, ANU, Industry

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*
Bauxite accumulations in Australia are common regolith features, extending across the whole continent. Three accumulations are mined, Weipa in Queensland, Gove in Arnhem Land and those of the Darling Ranges in W.A. The Weipa bauxite is unique in that it consists almost entirely of free-running bauxitic pisoliths with little or no matrix. Although many theories have been proposed for its formation, few answer the major question "how did it form".

Our research into the deposit has limited the possible answers to chemical and biological processes associated with high, seasonal rainfall. But such processes occur all over the tropics. Why is the bauxite at Weipa, and not everywhere? We will investigate the biochemical reactions from the activities of macrobiota to see how these influence alumina and other element solubilities.

Value of the research

The Weipa bauxite can be viewed as an archetype for deep weathering such as is common over much of Australia. As such, understanding Weipa will have application to the understanding of much of the landscape and regolith processes across the continent.

Bauxite is a valuable commodity. Understanding the age and processes of formation of the Weipa bauxite will benefit mineral exploration across tropical north Australia, as well as having direct benefit to more efficient mining of the deposit itself.

Late development: The excavation by Rio Tinto Alumina in July 2007 of a 3 m deep, 30 m long trench in the sub-bauxite mine floor opened previously inaccessible parts of the profile. Samples from this trench are yielding valuable new insights into the processes occurring at the top of the wet-season water table (= mine floor). Analysis of these samples will greatly benefit the final paper of the 5 planned from this work.

Budget share
The budget of $2,000 sought in this application is for XRD and electron probe analyses.

Deliverables (outputs) and expected impacts of research (outcomes):
5 scientific papers describing the deposit and its origin
Advice to Comalco on ore search.

Milestones: *(dates of significant events marking scientific progress)*

Date	Milestone/Review
November 2007	Draft manuscripts compiled
December 2007	5 complete manuscripts sent to AJES

Confidentiality requirements
As COMALCO requires

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2006-2007

STAFFING-FTEs

(eg 0.50) for **2006-2007** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Eggleton (Hon Fellow)	CRC									
Taylor (Hon Fellow)	CRC									
TOTAL										

All LEME STUDENTS contributing to Project **2006-2007**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2006-2007**

	$K	Source external funds
CRC Opex funds requested	2,000	
Committed (definite) external funds		COMALCO
Total Project Opex	2,000	

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2006-2007**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
X-ray diffraction	1500								
Other preparation costs	500								
Total	2,000								

Cooperative Research Centre for Landscape Environments and Mineral Exploration

REVISED PROJECT SUMMARY **HO-170105**

Project No: *(Issued by LEME Head Office)*

Submitted by: David J Gray

Date submitted: 3rd September 2007 V2 - Updated RRA 22.10.07

Project name: Hydrogeochemical Mapping of the Northeast Yilgarn Craton

Abbreviated title: Hydrogeochemical Mapping

Type of project: Industry/Commercial

Program: 2

Themes:

Project Leader: David J Gray

Start date and duration: Ongoing until 30th June 2008

Participants: David J Gray, Ryan Noble

Brief project description:
The objective of this project is to further develop hydrogeochemistry as a tool for mineral exploration under cover (areas and commodities). In the main this will be through targeted Industry-funded projects so as to develop robust exploration methods for specific commodities in particular environments. Particular technologies developed within this project include use of isotope technology, enhanced chemical modelling, sampling development and Industry partnership.

One "Legacy" product from this project will be a "Practical guide for hydrogeochemistry for mineral exploration" report. This will be important to transfer the results for the previous 6 years to a general exploration audience, including the practical methodology and examples of successful application of hydrogeochemistry. This should be a "How To" for explorers. Allied to this will be an extensive, industry and other agency funded project, on the utility of groundwater for large scale geochemical mapping, based in the NE Yilgarn Craton. To data we have organised more than $140K external funding plus additional in-kind analytical support.

Note that this is a revision of the previous hydrogeochemistry proposal, so is a change from a $9K to a $14.5 request, not for additional funds.

Deliverables (outputs) and expected impacts of research (outcomes):
Outputs:
- Sampling for "Hydrogeochemistry of the Northeastern Yilgarn Craton"

- Open File report on “Practical guide for hydrogeochemistry for mineral exploration”
- Critical input into understanding of groundwater geographical variation and impact on exploration strategies, which will also form a component into a P3 project into 4D modelling of Yilgarn groundwaters
- Release of results for Gold exploration from AMF project at Esperance / Salmon Gums
- Release of results for NiS exploration from Echo Project in Yandal Belt
-Final Report: September 2008 (presentation to be made in June 2008).

Outcomes:

1. Broaden spectrum of commodities for which hydrogeochemical exploration has been trialled
2. Apply hydrogeochemical exploration expertise to new areas in different geology, regolith and landscape settings
3. Apply geochemical and hydrogeological modelling to gain better understanding of processes affecting dispersion, footprint size, and the development of geochemical and isotopic vectors

Milestones: *(dates of significant events marking scientific progress)*
Sampling Leinster area – Release of $7K
Sampling Yeelirrie area – Release of $6.5K
Report releases

Confidentiality requirements
None

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
McPhail		0.2								
De Caritat							.075			
Gray					0.35					
Noble					0.35					
Hydrogeochemist					0.65					
TOTAL					1.35					

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	14.5	
Committed (definite) external funds	$160K	Various companies
Total Project Opex		

Possible additional external funds (for info)	$50K	GSWA & DoW

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
ANU/GA Reports	1K								
Groundwater sampling and analysis				13.5K					
TOTAL	**1K**			**13.5K**					

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Mel Lintern

Date submitted: 4th October

Project name: **Sprigg Symposium Presentation**

Abbreviated title: **Sprigg - Lintern**

Type of project Centre *(Centre or Industry/Commercial):*

Program: 2

Themes: **Understanding Regolith Processes**

Project Leader: Mel Lintern

Start date and duration: 28th November - 30th November

Participants: Mel Lintern

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*
Preparation and presentation of past and current calcrete research at the Sprigg Symposium in Adelaide. The symposium will give an opportunity to update researchers in Adelaide on past and current research into calcrete studies from Western Australia. The following day is the Explorers Conference in Adelaide.

The meetings will also provide an opportunity to network with researchers and mineral exploration companies.

Deliverables (outputs) and expected impacts of research (outcomes):
Extended abstract and oral presentation.

Milestones: *(to reflect delivery and payment time lines)*
NA

Confidentiality requirements
NA

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
TOTAL										

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested		
Committed (definite) external funds		
Total Project Opex		

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Airfares									542
Accommodation									280
Food									100
Taxis									100
Per Diem									30
Meeting fees									220
TOTAL									**1272**

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY
Project No: *(Issued by LEME Head Office)*

Submitted by: Robert Hough

Date submitted: October 2007

Project name: Metal migration: Tracing, timing and Modelling

Abbreviated title: T.R.I.M.M (A) (Supplement to TRIMM)

Type of project Centre *(Centre or Industry/Commercial):*

Program: 2

Themes: 1, 4, 5 and 9

Project Leader: Robert Hough

Start date and duration: I July 2007, 1 year.

Participants: CSIRO, ANU, PIRSA

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*
In focussing on the **delivery** of key components from Mineral Hosts and metal migration type studies that have been undertaken we have the opportunity to assist in the improvement of 3 publications before end June 08 by covering journal colour page charges ($3,000 AUD) and some additional data collection to improve one ($2,000 AUD).

In summary, in agreement with the original TRIMM objectives we are providing outputs through peer reviewed publications from: 1. A study of phreatic mineral deposits such as alunite acting as a mineral host including a detailed description of how such minerals incorporate or adsorb metals. 2. Dating element dispersion by combining in-situ geochronological and geochemical analyses of the same samples. 3. Utilising gold crystallography to decipher supergene and primary origins and combined with chemistry to determine the effects of weathering on native gold occurring at or near the surface and how this modifies bulk gold chemistry. 4. Advanced study of gold anomaly formation in calcrete. 5. Exploration methodology in interpreting anomaly formation and anomaly significance.

In this supplementary proposal we are requesting support to cover colour page charges from journals for 2 publications ($3k) and some new microscopy observations of nanoparticulate colloidal gold for a 3rd as recommended by a journal editor after submission ($2k).

Aim: To deliver key products on the timing and role of hydromorphic dispersion in metal transport (including supergene gold) and the mineralogy of anomaly formation with a focus on peer-reviewed literature.

Deliverables (outputs) *Includes staged delivery and invoicing of budget*
Priority Outputs
Peer Reviewed Papers

TRIMM part A deliverables (Supplement to TRIMM)

Noble and Stanley, 2007. A comparison of novel and traditional extractions over a Copper Zinc soil anomaly, NW Victoria. Chemical Geology. Internal review September (complete), journal submission November*. (Now on track for submission by end October – note change of journal.)
Much has been made of selective extractions in exploration geochemistry, this study assesses their efficacy.

Hough, Reddy, Hitchen, Vaughan, Anand, Saunders, Clode, Hart, Verrall, Noble, Gray, Natural ultra thin gold nanoplates. Proceedings of the National Academy of Sciences. (Submit to journal December 07). (Revised deliverable with $2,000 AUD for field emission and confocal microscopy to improve manuscript)

Noble, Hough and Watkins, 2008. The nature and distribution of As, Cd and Pb in soils from the Stawell Gold Mine, Victoria, Australia: Implications for health. Journal of Environmental Geochemistry and Health; Internal review in January 2008, Submission in February 2008. (Colour page charges of $1,900 AUD)

Butt and Hough, 2008. The Liversidge gold nugget collection. Proceedings of the Royal Society (?). Internal review in January 2008, submitted February 2008. (Colour page charges of $1,100 AUD)

Noble Hough, Ryan and Watkins, 2008. Synchrotron XRF mapping of Arsenic and other metals in soils from the Stawell Gold Deposit, Victoria, Australia. Journal of Synchrotron Radiation. Internal Review March 2008, submitted April 2008.

For info: STAGE 1 for TRIMM to End September 2007: CSIRO to invoice for $2500 deliverables to date.

1. Stanley and Noble, 2007, Quantitative assessment of the accuracy and precision of exploration techniques using minimum probability methods. **Accepted, in press.**

A statistical study of exploration techniques.

2. Hough, Butt, Reddy, Verrall, 2007, Gold nuggets: Hypogene or Supergene, AJES. (Online publication September*)

The internal crystallography and composition of gold nuggets are described and a hypogene origin is proposed. Internal depletion of silver within the gold is crystallographically

controlled and proposed to occur by a process akin to depletion gilding. **(PUBLISHED and complete)**

3. Hough, Reddy, Hitchen, Vaughan, Anand, Saunders, Clode, Hart, Verrall, Noble, Gray, Natural ultra thin gold nanoplates. Nature. (Internal review July 07, Submit to journal September 07*).

Gold occurs as ultra thin nanoplates in saprock at this site, a nanoparticulate gold population has also been discovered here and probably represents the 'invisible' gold detected in clays as a the ppm level enrichment. An inorganic mode of formation is proposed through the evaporation of gold and chloride rich groundwater. **(Submitted successfully to both Nature and Science but not accepted but see revised below in Supp bid)**

4. Lintern, M.J., 2007. Vegetation controls on the formation of gold anomalies in calcrete and other materials at the Barns Gold Prospect, Eyre Peninsula, South Australia. In review. GEEA. (**Accepted**)

The role of vegetation in the formation of gold anomalism at the Barns prospect is described.

Outcomes

- Identification and analyses of minerals related to phreatic processes (e.g. sulfates) as a vector for exploration. Be able to determine the timing of metal dispersion which is pivotal to understanding the origin and formation of anomalies and palaeoenvironments
- A new understanding of alluvial/lateritic gold grain provenance based on combined crystallography and chemistry.
- Build a chemical (reactive transport) numerical modelling tool which will enable prediction of the location and relative tenor of geochemical anomalism in different regolith units depending on such factors as the:

  Size, grade, sulphide content and attitude of the target orebody.

  Chemical characteristics of the rock units that might host the target orebody.

  Thickness and nature the regolith overlying the ore.
- An ability to date metal dispersion through combined *insitu* microchemical and geochronological analyses.
- International recognition and call for collaboration with gold grain studies worldwide.

Confidentiality requirements
None

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

RESOURCES 2007-2008

STAFFING-FTEs (e.g. 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Hough	IK				0.60					0.60
Lintern	IK				0.25					0.25
Noble	IK				0.3					0.3
Gray	IK				0.05					0.05
Butt	IK				0.30					0.30
Anand	IK				0.10					0.10
Keeling	IK								0.15	0.15
McQueen	CRC	0.10								0.10
Dr Chris Ryan Dr Barbara Etschmann Paul Roberts Dr Fiona Elemer Dr Peter Hornby Dr Ray Smith Dr Martin Saunders Dr Steve Reddy,	Collaborators CSIRO E&M UWA Curtin									
TOTAL										**1.85**

PROJECT OPERATING COSTS $K **2007-2008**

	$K	
CRC Opex funds requested	**5.5**	
Committed (definite) external funds		
Total Project Opex	**5.5**	

Some outputs dependant on budget in07/08.

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**
Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Journal colour page charges				3000					3000
Figure preparation (VRU) Gold nanoplate Field emission SEM, Confocal imaging				500 2000					500 2000
Total				**5500**					**5500**

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **HO-81205**

Project No: *(Issued by LEME Head Office)*

Submitted by: Rob Fitzpatrick

Date submitted: October 2007

Project name: **Booklet to assess, monitor and manage Acid Sulfate Soils in wetlands below Lock 1, Blanchetown, South Australia**

Abbreviated title: **Acid sulfate soil booklet**

Type of project Centre *(Centre or Industry/Commercial):*

Program: P3

Themes: **Acid Sulfate and Alkali Soils**
Environmental geochemistry and the regolith

Project Leader: Rob Fitzpatrick

Start date and duration: October 2007 – June 2008

Participants: Rob Fitzpatrick (CSIRO Land and Water), Paul Shand (CSIRO Land and Water), Warren Hicks (CSIRO Land and Water) and Richard Merry (Research Fellow in CSIRO Land and Water), Russell Seaman (wetland vegetation expert, DEH SA)..

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*

- The aim of the project is to publish an easy-to-follow pictorial booklet incorporating a "pictorial soil identification key" for local advisers and farmers to easily identify the various ASS types in wetlands below Lock 1 (Blanchetown). The pictorial manual will assist in the identification of ASS types at local and regional scales and allocate a suitability assessment.
- The pictorial manual will include a suite of robust ASS indicators, which can reliably predict the direction and extent of changes that are occurring in the wetlands (based on Fitzpatrick et al 2003a;b).
- The indicators will have meaning to local and regional community/committee groups and to policy developers. The ASS indicators will be based on intermediate quality (easily collected/inexpensive) but dense (extensive) data and will be particularly useful as an early warning of wetland system decline or improvement.
- Linking the soil and vegetation indicators to a pictorial soil-landscape and vegetation key and thereby matching to locally practised on-farm management options.

Deliverables (outputs) and expected impacts of research (outcomes):

- The ASS indicators will become central for benchmarking and monitoring of ASS in wetlands for the whole Murray Darling Basin. As such, the approach seeks to assist communities assess their local wetlands using the best techniques developed to date. The adoption and regular use of these ASS indicators will also:
  - Identify site-specific constraints to productivity.
  - Identify risks for future degradation of regional soil and water resources.
  - Aid future property planning.
  - Generate spatial information for reporting on the state of local wetland environments.
- This project links directly with the CRC LEME National Inland ASS project led by Dr Rob Fitzpatrick and interacts with similar project interests in drained areas of Western Australia.

Impacts

- The approach will seek to develop and encourage a community-based ethos for monitoring ASS in local wetland environments and for assessing the sustainability of current farming practices. To make this technology bring about change in practice at the local scale and improve sustainability at regional and local scale and will involve working closely with decision makers and opinion leaders (e.g. local community groups and state planning committees) at different levels of responsibility. People from these groups will consult with staff from CSIRO and CRC LEME during all stages of the project and provide key bridging to accomplish the final project aims.
- Contribute to changes in government agency and industry practice to assess inland ASS (i.e. describe, sample, characerise, analyse and map) for improved environmental risk assessment and management strategies.
- This six month LEME / CSIRO funded project is an opportunity to showcase LEME's ability to effectively integrate and summarise research expertise in soil science, regolith, geology, mineralogy, biogeochemistry, policy and to investigate a potential natural hazard in the soil-regolith-water environment. The project is likely to lead to further client-funded research and publications in post LEME, especially 2009-2010.

Background

Due to falling river levels in the Murray, 51 wetlands below lock 1 have become disconnected at 0.1m AHD from the main channel. A further 23 wetlands are at various levels of drying at 0.1m AHD. CSIRO have completed surveys on around 20 of these wetlands between Lock 1 and Wellington. CSIRO have also completed surveys of Lakes Alexandrina and Albert. Initial results between Lock 1 and Wellington indicate that:

- Most of the subaqueous soil materials sampled in the Murray River contained high contents of pyrite with an ASS hazard risk ranging from moderate to severe. It is estimated that large quantities of sulfuric acid will be produced in the subaqueous ASS to a depth of > 50 cm if the river levels lowered significantly and the adjacent wet soils were allowed to dry. In addition, salinity, wind erosion (e.g. aerial transport of fine granular surface flakes containing sulfuric material and salt

efflorescences), mobilisation by rainfall events and malodorous problems may become serious issues.

- It is expected that the greatest potential for acid generation will be where no calcrete deposits exist, that is, with increasing distance from the soft limestones that occur along the margins of the incised river valley.
- The sulfidic material has the potential to produce sulfuric acid in amounts that are beyond the capacity of the soil materials to neutralise.
- Around 75% of samples investigated have a net acid generation potential. Hence, the sulfidic material has an ASS hazard ranging from ***moderate*** to ***severe***).

Milestones: *(dates of significant events marking scientific progress)*

November 2007: Collate >20 ASS published case history studies conducted by CSIRO and construct two to five toposequence / cross sections

December 2007: Construct draft booklet with photographs of key ASS indicators / ASS profiles and colour cross sections/ toposequence models, ASS Maps of key areas.

June 2008: Edit and preparation for publication and printing direct from LEME Web.

Confidentiality and IP requirements:

Soil and regolith analyses and metadata developed from several ASS studies conducted by CSIRO from Lock 1 to Lower Lakes; and 'regional seepage geochemistry' studies and Stages 1 to 4 from the National Atlas of ASS project (NatCASS steering committee) currently jointly owned by CSIRO Land & Water, Land & Water Australia (NDSP II; NAP; ASRIS) and LEME 1 and 2. Prior ownership of this IP will need to be recognised in any future IP generated from this specific project.

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Rob Fitzpatrick	in kind					0.10				0.10
Warren Hicks	In kind					0.05				0.05
Paul Shand	in kind					0.05				0.05
Phil Slade (editorial)	Industry as required									
Richard Merry (Editorial)	Industry as required									
Doug Reuter (editorial)	Industry as required									
TOTAL										**0.20**

All LEME Students contributing to Project - **2007 - 2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2006-2007**

	$K	Source external funds
CRC Opex funds requested	14	
Committed (definite) external funds		
Total Project Opex	14	

Possible additional external funds (for info)	10	

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Specialized graphics to produce soil/ water / regolith toposequences					4				4
Specialized graphics and typing to produce booklet – in colour					4				4
Publish booklet					6				6
Total					**14**				**14**

LEME funds sought (a single $ figure only): $ 14K

Funding will be required to:

(i) Undertake drafting of diagrams, tables to help produce uniform/standard format.

(i) Undertake production of soil/ water / regolith toposequences.

(iii) Publishing of booklet in colour: run training program.

External funding provided/sought: $ 10K (in-kind contributions from several community groups and state agencies.

Appendix

Stage 1: Interpretation of field and laboratory data

Construct soil-water process models:

We will construct cross-section diagrams and mechanistic models of paired sites (subaqueous ASS, drained ASS and re-flooded ASS) at each case study wetland site (approx 20 wetlands previously studied by CSIRO). The mechanistic model is a schematic cross sectional diagram illustrating the soil-water change processes occurring in each soil layer (i.e. losses and gains of salts, solutes, colloids, water and other constituents). This necessitates recognizing specific soil features, interpreting pH, EC, geochemical and mineralogical data and then grouping the similar soil characteristics into a fewer number of layers using the structural analysis approach (Fitzpatrick et al. 2003a). The toposequence (soil landscape cross-sections) is suitable for constructing such mechanistic models of spatial and temporal soil-regolith changes in drained and reflooded marshland soils, because each of the vertical and lateral changes can be linked to hydrological and biogeochemical processes. These soil-regolith models will be used to generate rough soil maps and help to produce practical soil-landscape and vegetation field keys for land mangers in this region.

To integrate field and laboratory experimental data (described above) we will use the pedogeomorphic models to describe and interpret pedogenic processes continuing across different soil layers in the paired sites ("structural approach" outlined in Fitzpatrick et al 2003a).

Stage 2: Publication of ASS booklet with maps

Procedures (based on Fitzpatrick et al 2003a) for identifying the best set of soil-landscape and vegetation field indicators for marshland soils will include:

- Using an idealised soil toposequence to encompass a compilation of the main features present within most of the major toposequences of a specific region.
- Linking the soil and vegetation indicators to a pictorial soil-landscape and vegetation key and thereby matching to locally practised on-farm management options.
- Publishing a practical soil classification system in a user-friendly pictorial booklet to help land managers assess, monitor, and manage ASS in wetlands.

References:

McVicar, T.R., Rui, L., Walker, J., Fitzpatrick, R.W**.** and Liu Changming (Editors) (2002) Regional Water and Soil Assessment for Managing Sustainable Agriculture in China and Australia. **ACIAR** Monograph 84. CSIRO Publishing, Melbourne, Australia. 384 pp.

Fitzpatrick R.W., J.W Cox, B. Munday, and J. Bourne, (2003a). Development of soil-landscape and vegetation indicators for managing waterlogged and saline catchments.

Australian Journal of Experimental Agriculture: Special Issue on “Application of Sustainability Indicators” 43 245-252.

Fitzpatrick, R.W., Merry R.H, Cox J.W., Rengasamy P and P.J. Davies (2003b). Assessment of physico-chemical changes in dryland saline soils when drained or disturbed for developing management options. CSIRO Land and Water Technical Report 02/03. CSIRO, 56pp. http://www.clw.csiro.au/publications/technical2003/tr2-03.pdf

Fitzpatrick, R.W., Merry R.H, Shand, P. & Raven, M. 2007 Information paper on environmental and management issues associated with subaqueous and wetland soil drying between Wellington and Lock 1: acidification, contaminant mobilisation and degree of odour production.

Fitzpatrick R.W., J.W. Cox, and J. Bourne (1997). Managing waterlogged and saline catchments in the Mt. Lofty Ranges, South Australia: A soil-landscape and vegetation key with on-farm management options. Catchment Management Series. CRC for Soil and Land Management. CSIRO Publishing, Melbourne, Australia, 36 pp.

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Sara Beavis

Date submitted: Oct 12 2007 V2 - updated 22.10.07

Project name: Loveday Basin Rehabilitation

Abbreviated title: Loveday

Type of project Center *(Centre or Industry/Commercial):*

Program: 3

Themes: Acid sulfate soils

Project Leader: Sara Beavis

Start date and duration: November 2007 8 months

Participants: Sara Beavis, Andrew Higgins, Sue Welch, David Ellis, Uli Troitzsch

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*

The purpose of the project is to characterise the changes in the chemistry of sediments and water in the Loveday Basin that have occurred as a result of remediation. The flooding of the site in June 2006 has resulted in extensive algal blooms, anoxic conditions in the sediments, and widespread formation of sulfidic sediments associated with the decomposing algal mats. We propose to determine how the distribution of oxidized and reduced sulfur species has changed as a result of flooding and subsequent drying of the site. This is important because oxidation of the newly formed reduced sulfur species poses environmental risk of acidification, increased metal mobility, surface water anoxia, and degradation of water quality. The oxidation of reduced sulfur compounds can also impose socio-economic impacts due to the noxious odours that emanate from the site.

This work will be achieved by analysing surficial sediments and water throughout the basin and comparing the results with our previous baseline studies. The results of this work will provide information to managers on the efficacy of flooding as a remediation strategy. This is particularly relevant given the changes in river management associated with prolonged drought and the need to optimise the value associated with water allocations to wetlands.

Deliverables (outputs) and expected impacts of research (outcomes):

Outputs

- A data report describing spatial temporal variability in sediment and water chemistry as a function of recent controlled flooding
- A map of the distribution of sulfidic sediments and risk of acidification
- A journal paper on the redistribution of sulfidic sediments submitted to Science of the Total Environment before May 31 2008
- A journal paper on the implications for management of salt disposal basins submitted to the Journal of Environmental Management by May 15 2008

Several journal papers are currently in prep from this work including-

Wallace et al 2008 Micro-morphology and distribution of pyrite and jarosite in inland sulfidic sediments of the Loveday Basin, Lower Murray floodplains, South Australia.
Welch et al 2008 S And Salt Flux From An Inland Sulfidic System- The Loveday Basin. To be submitted to Science of the Total Environment.
Beavis et al 2008 Morphology and Mineralogy of Pedal Structures in the Loveday Basin. To be submitted to Geomorphology.

Outcomes

- Information for environmental managers on the efficacy of flooding saline basins

Milestones: *(to reflect delivery and payment time lines)*

January 2008 field work at the site to collect water and sediment samples.
January- March 2008 Analyse sediment and water samples
Feb –April 2008 Experiments to determine sulfate reduction
April –Jun write papers and reports

Confidentiality requirements
none

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Sara Beavis	In kind	0.2								
Sue Welch	CRC	0.05								
David Ellis	In kind	0.05								
Uli Troitzsch	In kind	0.05								
TOTAL		0.35								

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*
Andrew Higgins	ANU	PhD

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	6	7
Committed (definite) external funds		
Total Project Opex	6	

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Field work	1.5K								
Isotopic analysis	1 K								
Sediment and water analysis	3.5 K								
TOTAL	**6K**								

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Ken Lawrie

Date submitted: 12th October 2008

Project name: Australian Earth Sciences Convention 2008

Abbreviated title: AESC 08

Type of project Centre *(Centre or Industry/Commercial):*

Program: 4 (and 3)

Themes: Themes 1, 2, 3, 6, 7, 9

Project Leader: Ken Lawrie

Start date and duration: October 07-July 08

Participants: GA, CSIRO

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*

The Australian Earth Sciences Convention (AESC) 2008 is to be held in Perth from 20th – 24th July, 2008. This is the premier national Australian geoscience conference, and is held bi-annually. CRC LEME staff are involved in the organisation of the science program for 4 of the 5 themes for the Convention, and following on from the success of the 'Environmental Hazards and Risks to Australasia Symposium' convened by CRC LEME at AESC 2006, Ken Lawrie has been asked to convene the science program for the Earths Environments: Past, Present and Future Theme. Three Symposia are planned:

1. **Geoscience essential for underpinning terrestrial ecosystem research and management**

   This Symposium aims to include geospatial mapping techniques for mapping near-surface regolith, water, and water quality, and other remote sensing techniques for characterisation and monitoring of ecosystems; regolith characterisation; relevant earth systems science understanding including biogeochemical functioning of regolith environments; predicting ecosystem responses to climate change; landscape-climate interactions, dynamics and feedbacks; the terrestrial carbon cycle; surface-groundwater-plant functioning; relevant indicators, data and techniques for monitoring ecosystem health etc.

2. **Palaeo-climate research to assist with calibrating and predicting future climate change and impacts**

   This symposium will include an update on IPCC, but will largely focus on the use of high resolution terrestrial and ocean records to reconstruct past environments.

3. **Environmental hazards- mapping, characterisation, monitoring, modelling and prediction**
   A range of current and future threats to the environment from slow onset hazards: often groundwater related, but not restricted to these: Salinity, acidity, soil loss, dust, etc. The symposia will also include environmental mapping, baseline geochemical surveys, water quality studies etc.

It is recognised that a number of LEME staff hope to attend the conference in both an organising capacity and to present papers the conference. In this draft proposal, the funding sought is specifically to cover the registration and /or T/A for those involved in the organising and running of the Symposia in the Earths Environments: Past, Present and Future Theme and those presenting CRC LEME science in invited oral presentations in these symposia.

Deliverables (outputs) and expected impacts of research (outcomes):

Deliverables will include:

- Abstracts from CRC LEME staff in the conference proceedings
- Keynote presentations from CRC LEME staff as well as contributed talks
- It is proposed to produce a thematic volume from invited papers from the conference proceedings, to be submitted by end June 2008

The aim of the Geoscience-Ecosystem Symposium is to improve the dialogue between the respective disciplines in an area of growing importance in the face of climate change (and in the immediate context of the NCRIS/TERN process). In this context, the symposium is an important step in bringing CRC LEME research to the attention of key peer groups. CRC LEME will gain recognition as convenors of the Symposia and through scientific papers.

In this and the other symposia, this forum provides the opportunity to expose the higher learning from LEME's 7-year research program to our science peers at Australia's principal national geoscience gathering.

Milestones: *(to reflect delivery and payment time lines)*

- Abstracts due 11th December 07 (exceptions for the invited symposium)
- Presentations 20th – 24th July 08
- Proposed papers submitted by end June 2008

Confidentiality requirements
Nil

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Ken Lawrie	IK						0.15			0.15
Colin Pain	IK						0.05			0.05
John Wilford	IK						0.05			0.05
Tim Munday	IK				0.05					0.05
Steve Rogers	CRC					0.05				0.05
TOTAL					0.05	0.05	0.25			**0.35**

*** It is recognised that other staff from other programs may also be attending the conference, but I have no details on this.**

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	7k	
Committed (definite) external funds	1.5k	GA for registration
Total Project Opex		

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Travel and accommodation for 3 staff						6k			6k
Registration (estimate only)				0.5k	0.5k				0.5k
TOTAL				**0.5k**	**0.5k**	**6k**			**7k**

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Ken Lawrie

Date submitted: 12th October 2007

Project name: International Geological Congress 2008

Abbreviated title: IGC 08

Type of project Centre *(Centre or Industry/Commercial):*

Program: 4 (and 3)

Themes:

Theme 6: Geophysical mapping and modelling;
Theme 7: Salinity systems in regolith and groundwater
Theme 9: Environmental geochemistry and the regolith

Project Leader: Ken Lawrie

Start date and duration: October 07- August 08

Participants: GA, CSIRO

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*

The 33rd International Geological Congress is to be held from 5th – 14th August 2008, at the Norway Congress Centre at Lillestrom, just outside Oslo. It is hoped that there will be a strong contingent of Australian, New Zealand and other regional geoscientists to help promote the 34th IGC which we will be hosting in Brisbane, 2-9th August 2012.

The Oslo IGC is to include a series of symposia highlighting geoscience activities and features of the various regions of the world. The Oceania Symposia, which is being convened by Neil Williams, Des Darby (GNS New Zealand) and Ian Lambert, will provide a flavour of what is to come at our IGC. It is currently scheduled for 1.5 days, on 12th and 13th August, 2008. This Symposium will include invited review papers on a range of topics, with 30 minutes allocated for major review presentations, and 15 minutes for other papers.

The convenors have invited Ken Lawrie to give a presentation around the general theme of "Geoscience for natural resource management" for the Oceania Symposium. To this end, Ken Lawrie, Colin Pain, Steve Rogers and Richard Cresswell have agreed to collaborate on producing a paper for the Symposium. This paper will

highlight the contribution of CRC LEME's science to Natural Resource Management in Australia.

In addition, it is proposed to submit research papers to other sessions on hydrogeology/geophysics, and for Ken Lawrie to co-host an IUGS GEM workshop on communicating environmental geoscience to decision makers.

Funds have been set aside in GA for Ken Lawrie's conference registration and travel to the event to present the paper, however funds are required to cover accommodation and meal costs (estimated $5,021 for the 13 days including travel). Funds are sought from CRC LEME for this purpose.

Deliverables (outputs) and expected impacts of research (outcomes):

Deliverables include:

- An abstract in the conference proceedings
- A review paper for journal submission
- A half hour oral presentation at the Oceania Symposium
- The opportunity to present other papers in other conference sessions and workshops

The conference is the largest gathering of geoscientists, and is an opportunity to showcase LEME research to the broadest possible cross-section of scientific peers.

Milestones: *(to reflect delivery and payment time lines)*

- Abstracts due in March 08
- Review paper for journal submission- end June08
- Conference commences on 5th August 08

Confidentiality requirements
Nil

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Ken Lawrie	IK						0.05			0.05
Colin Pain	IK						0.05			0.05
Steve Rogers	CRC						0.05			0.05
Richard Cresswell	CRC						0.05			0.05
Heike Apps	IK						0.05			0.05
TOTAL							0.25			**0.25**

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	5k	
Committed (definite) external funds	5.5k	GA
Total Project Opex	10.5k	

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Accommodation and meals in Norway (13 days including travel)						5k			5k
TOTAL						**5k**			**5k**

Cooperative Research Centre for Landscape Environments and Mineral Exploration

PROJECT SUMMARY **2007-2008**

Project No: *(Issued by LEME Head Office)*

Submitted by: Ken Lawrie

Date submitted: 12th October 2007

Project name: Digital capture of Program 4 outputs

Abbreviated title: P4 output capture

Type of project Centre *(Centre or Industry/Commercial):*

Program: 4

Themes: Salinity

Project Leader: Ken Lawrie

Start date and duration: November 07- end March 08

Participants: GA, CSIRO, ANU, AU, CUT

Brief project description: *(in no more than 500 words address objectives, scope of work, knowledge to date, what is new, interactions with other projects)*

It is estimated that >160 technical reports and conference papers produced by Program 4 staff over the life of P4 are not readily accessible (ie not available either as hard copy through the LEME and core party offices, or in digital formats on the LEME website). Many technical reports in P4 were produced in collaboration with State and other agencies, and as such were produced as reports by collaborating agencies or by individual core parties (LEME badged, but not as LEME open file reports). Others were produced as LEME restricted reports, and could now be converted to LEME open file reports. A significant number of reports were produced within core parties and copies not transferred to Head Office. Likewise, the significant number of papers produced (for conference proceedings in particular), have not been centrally collated, and the websites these were available through are often no longer accessible. The 22 submissions produced for the national Salinity Mapping Review in 2003 are also no longer available through DAFF. Many of these reports and papers are a valuable resource, and if more accessible would provide a significant legacy from CRC LEME.

It is intended to attempt to collate as many of these reports and papers as possible, and release these on DVDs at the 2nd ISF conference in Adelaide in March 2008. It is also the intention to PDF versions of these publications made available online through the LEME website.

In order to achieve this, temporary employees (likely to be vacation students) will be employed through GA to undertake this task, including chasing up individual scientists from P4 (in all core parties). GA is funding the salaries of these temporary employees, however funds are required for one of these employees to travel to Perth to complete the search for publications, and to ensure there is a satisfactory transfer of publications to Head Office.

Deliverables (outputs) and expected impacts of research (outcomes):

- Conversion of P4 outputs (eg technical reports and conference publications) into digital formats (PDFs) for web delivery
- Release of DVDs containing P4 publications at 2nd ISF

Milestones: *(to reflect delivery and payment time lines)*

- Release of products at 2nd International Salinity Forum, March 08
- PDFs available on the LEME website by March 08

Confidentiality requirements
Nil

Date submitted to Executive:
Date approved by CEO:
Date approved by Board:

Note: Out-of-Budget revisions/updates to the approved Project Summary are to be submitted by Program Leader to Susan Game HO Perth for approval by CEO and advice to Business Manager.

RESOURCES 2007-2008

STAFFING-FTEs

(eg 0.50) for **2007-2008** (minimal fractional contribution should be 0.05)

Staff name	In-kind, CRC or Industry	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LWr**	**GA**	**NSW DPI**	**PIRSA**	**Total**
Vacation student	GA						0.3			0.3
Vacation student	GA						0.3			0.3
TOTAL							0.6			**0.6**

All LEME STUDENTS contributing to Project **2007-2008**

Students Name	*University*	*PhD or Honours*

PROJECT OPERATING COSTS $K **2007-2008**

	$K	Source external funds
CRC Opex funds requested	4k	
Committed (definite) external funds	16k	GA
Total Project Opex	20k	

Possible additional external funds (for info)		

DISTRIBUTION OF TOTAL PROJECT OPERATING COSTS **2007-2008**

Show major expenditure items and allocation to core parties

Expenditure Item	**ANU**	**AU**	**CUT**	**CSIRO EM**	**CSIRO LW**	**GA**	**NSW DPI**	**PIRSA**	**Total**
T/A for one student to travel to Perth						4k			4k
TOTAL						**4k**			**4k**