Cooperative Research Centre for Landscape Environments and Mineral Exploration

QUARTERLY REPORT TO LEME STAFF AND STUDENTS
1 JULY TO 30 SEPTEMBER 2002

Dennis Gee, Chief Executive Officer
18 November 2002

1 Centre Overview

Highlights

- Publication of Monograph*: Calcrete: characteristics, distribution and use in mineral exploration*. Authors - XY Chen, MJ Lintern and IC Roach.
- *16th Australian Geological Conference, Adelaide, 30 June - 3 July 2002.* LEME - silver sponsors, booth, coordinator of the Regolith Symposium and major presence. Some 50 LEME staff and students attended contributing 29 talks and 15 poster presentations on LEME activities.
- *10th Australian-New Zealand Geomorphology Group Conference* in Kalgoorlie 30th September-4th October. Coordinated by Colin Pain, and underwritten by CRC LEME. Twelve LEME researchers attended, nine gave talks and two organised the field trip.
- *17th World Congress of Soil Science, Bangkok, 14-21 August*. Major conference with 2500 attendees from 98 countries, including five from CRC LEME who all presented. Keith Scott made a poster presentation - Mineralogy and Geochemistry of the Regolith, and the poster, produced by Travis Naughton of the LEME Visual Resources Unit won one of the outstanding poster awards. Rob Fitzpatrick a was elected chairman of the International Union of Soil Sciences Commission Vii: Soil Mineralogy.
- Publication and distribution of the 2001-2002 Annual Report October/November
- Launch of new look CRC LEME home page web site 2 October. http://www.crcleme.org.au

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2. RESEARCH REPORTS

2.1 Program 1: Regolith Geoscience Program Leader: Dr Ravi Anand

OVERVIEW

- Spectral data (350-2500 nm) of some 14000 samples from the Gidgee (WA) and Challenger (SA) gold districts were collected using FieldSpec Pro Spectroradiometer (ASD) to construct 3D models of regolith mineralogy coupled with 3D regolith distribution.
- A collaborative project was developed between Newmont Australia, CRC LEME and CSIRO. The main objective of the project is to combine 3D regolith models of the Yandal belt with bedrock geology and geophysical data sets to investigate regolith processes including controls on palaeochannel development, controls on supergene enrichment and relationships between basement rock types, structures, and mineralisation styles on depth of weathering.

- A collaborative project between the Department of Conservation and Land Management (CALM) and CRC LEME was developed to investigate the soil, regolith and landscape indicators for defining oil mallee site suitability. Application for funding was submitted to Rural Industries Research and Development Corporation.
- Samples from Golden Grove, Lawlers, Mt McClure and Mt Gibson deposits were prepared for *in situ* mineralogical and geochemical analysis using scanning electron microscope, electron backscattered diffraction, microRAMAN, electron microprobe, proton probe and laser ablation inductively coupled plasma mass spectrometry. This was done to investigate the mineral hosts for Au and trace elements in regolith leading to the understanding of mechanisms of metals migration.
- Field work was done in SA to collect samples for determining the geochronology of weathering.
- Monograph on "Calcrete: characteristics, distribution and use in mineral exploration" was printed. It is a comprehensive book that will be a benchmark on calcretes for use by regolith geologists and mineral explorers.
- Draft report on synthesis of sedimentary deposition and landscape models for the northern Murray Basin was completed and is currently being reviewed.
- Workshops on regolith geology and geochemistry were conducted for Sons of Gwalia and Metals and Mining Agencies of Japan.
- A number of papers on regolith geology by LEME staff were presented at the 16th AGC in Adelaide.

THEME: MODELS OF REGOLITH-LANDSCAPE EVOLUTION

Geochronology and quantitative models of landscape evolution (Project Leader: Brad Pillans)

Project aims:
To provide reliable numerical ages for regolith materials, and to develop quantitative models of landscape evolution in regions which are important for mineral exploration and land management.

Work plan for the Quarter:
- Laboratory analyses of samples already collected from field sites.
- Fieldwork in South Australia (Pillans & Chappell)
- Attend Australian Geological Convention in Adelaide (Pillans, Smith, Chappell)

Progress:
- Successful completion of fieldwork in SA – samples from Beltana, northern Flinders Ranges, Coober Pedy and Oodnadatta areas
- Measurement of palaeomagnetic samples from South Australia
- Attended AGC conference, Adelaide
- Analysis of luminescence results from quartz in basaltic soils, North Qld (Pillans, Spooner, Chappell)
- Development of new beryllium carrier to enable measurement of low erosion rates using Be-10 (Fabel)

- Laboratory analysis of silcrete samples from western NSW (Christy, Smith, Ellis)

Issues and comments:

- Pillans was involved in geological investigations at Lucas Heights, Sydney; palaeomagnetic dating of regolith played a crucial role in establishing the timing of movement on faults exposed in excavations for the new nuclear reactor. Results are confidential at this stage, but will be published in due course.

Outlook and work plan for next Quarter:

- Fieldwork by Smith in western NSW (with Steve Hill and Ken McQueen).
- Participate in LEME conference, Canberra (all)
- Participate in Australia-New Zealand Geomorphology Conference, Kalgoorlie (Pillans, Fabel, Chappell)
- Laboratory analysis of samples (all)
- Hold workshop to establish priority field sites for 2003

PhD Project: Regolith-Landscape Evolution of the Dundas Tableland-Implications for Land Management (M. Paine).

Project aims:

To establish the Tertiary regolith-landform evolution of the Dundas Tableland, particularly the depositional environment, weathering and heavy mineral distribution within Late Miocene to Pliocene sediments.

Work plan:

The project plan for this quarter was to:

- Complete particle size analysis for selected holes.
- Commence heavy mineral analysis.

Progress:

- Particle size analyses of approximately 160 samples has been completed to date. Twenty remaining samples will be sieved by mid October. Preliminary results have been encouraging with previously unrecognised units being identified through interpretation of the sieve data.
- Heavy mineral analysis is yet to be completed
- A short field visit to Iluka's heavy minerals mine at Capel was undertaken in August to compare and contrast West Australian heavy mineral sand deposits to those on the flanks of the Dundas Tableland.

Issues and comments:

No Comments.

Outlook and work plan for the next Quarter:

- Complete particle size analysis.
- Establish depositional environments of units established from the interpretation of particle size analysis, geometry of units and petrology.
- Commence heavy mineral separations for further analysis.

PhD project: Landscape evolution Eastern Goldfields, Yilgarn (M. Craig).

Project aims:
The aim of the research is to formulate, describe, test and explain a range of suitable regional and local models which may best account for the variable character and evolution of regolith and associated landforms in the Eastern Goldfields of the Yilgarn Craton, in Western Australia that are consistent with field observations.

Work plan for the Quarter:
- Compilation of regolith maps and GIS data construction;
- Continue with 1: 5million scale Yilgarn Regolith map in GIS ready format

Progress:
- Compilation bases for remaining three 250k sheets constructed and printed
- GIS data continues to be constructed

Issues and comments
No comments

Outlook and work plan for the next Quarter:
Complete remaining regolith map compilation and GIS data construction.

South Australia (SA) sediments (Project Leader: John Keeling)

Project aims:
Through investigations of regolith cover in areas of the Curnamona Province, Gawler Craton and Musgrave Block of South Australia, develop models of evolution of landscape and sediment accumulation that will aid prediction of element mobility associated with mineral deposits.

Work plan for the Quarter:
- Continue regolith mapping in the Mingary area of the Olary Block, Curnamona Province (Crooks).
- Finalise reports on northern Murray Basin drilling (Fabris).
- Complete drilling program in the Harris Greenstone Belt, Gawler Craton; commence core logging and sampling (Sheard).
- Prepare report on palaeochannel recognition and mapping using Gawler Craton examples (Hou)
- Sedimentary cover Musgrave Block: compile data for Wintinna 1:125,000 map sheet (P Rogers).
- Complete reconnaissance drilling program in the Musgrave Block.
- Review regolith work program in the Curnamona Province (Keeling , Fabris, Crooks).
- Workshop on regolith mapping Olary (Crooks, Fabris, Mauger)
- Finalise PIRSA contribution to LEME staff operating budget.

Progress:

- Regolith mapping continues in the Mingary area in conjunction with bedrock mapping program. Production of Radium Hill North 1:25K map commenced (Crooks).
- Report on northern Murray Basin drilling reviewed and plans being drafted (Fabris).
- Draft report on synthesis of sedimentary deposition and landscape models for the northern Murray Basin completed and being reviewed (Fabris).
- Paper on "North-western Murray Basin, South Australia: stratigraphy, sedimentology & geomorphology" prepared for publication in MESA Journal (Fabris)
- 16th AGC presentations
  - Northern Murray Basin, South Australia: stratigraphy, sedimentology & geomorphology (Fabris).
  - Hydrothermal alteration in deeply weathered terrains (Keeling, Mauger, Raven and Gates).
  - Palaeochannel study models and their significance: example from the Gawler Craton, South Australia (Hou, Frakes, Alley).

- Harris Greenstone drilling program completed.
- Palaeochannel studies on Gawler Craton: commenced paper for publication on models of heavy mineral accumulation in strandlines associated with palaeodrainage discharge into Eucla Basin (Hou).
- Musgrave drilling program completed.
- Compilation of sedimentary cover on Wintinna 1:250,000 sheet 80% complete and line scanning and polygon labelling continuing for map production (P Rogers).
- Olary regolith mapping workshop attended. Brief report prepared and comments presented at LEME Node meeting (Crooks).
- PIRSA operating budget for LEME staff finalised.

Issues and comment:
No Comments

Outlook and work plan for the next Quarter
- Prepare overviews of sedimentary cover and regolith landscape for presentation at Gawler Craton Seminar 5-6 December 2002 (Sheard, P Rogers, Hou)
- Regolith contributions to Explorer's Guide for South Australia (P Rogers, Hou, Fabris)
- Curnamona field camp (16-18 Oct) to review work program and plan new projects (Anand, Keeling, Fabris, Crooks, Schmidt-Mumm, James).

Regolith-landscape evolution volume (Project Leader: Ravi Anand)

Project aims
To provide a framework of regolith-landscape evolution across Australia and show its relevance to mineral exploration and environmental issues.

Work Plan for the Quarter:
- Continue to receive manuscripts
- To complete the first editorial pass through the draft manuscripts.

Progress

About fifty manuscripts have been received, edited and returned to authors for significant revision. Some are received after revision.

Issues and comments

- Departure of Matthew Killick has left Project Leader without much assistance. Assistance is needed in editing case histories, writing synthesis chapters and the chapters common to all three thematic volumes.
- Generally the texts are good to reasonable. A major issue is the general lack of sections.

Outlook and work plan for the next Quarter

- Continue to receive and editing manuscripts.

Commence synthesis of case histories.

THEME: UNDERSTANDING REGOLITH PROCESSES

Objective Regolith Logging (Project Leader: Ravi Anand)

Project aims:

To develop a practical technology for accurate and rapid logging of regolith in drill chips and pulps.

Work plan for the Quarter:

- Field trip to log regolith samples from drill spoils and to collect samples for characterisation.
- Selection of weathering profiles from different lithologies for characterisation aimed at building a library of information.
- Continue conductivity and magnetic susceptibility measurements on samples.

Progress:

- About a hundred drill intersections were logged around Gidgee Gold Mine, WA around several prospects to construct 3D regolith model. Spectral data (350-2500 nm) of 1910 samples were collected using ASD (Analytical Spectral Device) from selected 69 drill intersections contained in chip trays using ASD of CSIRO Mineral Mapping Group.
- Spectral data of some 12000 samples from Challenger district were collected using ASD to construct 3D model of regolith mineralogy.
- CSIRO Rapid Core-logging System, proto-type development – preliminary assessment of Vis-IR spectra of drill core in transported cover (Garford Palaeochannel, Gawler Craton) and weathered basement (Tarcoola Gold Mine, Gawler Craton).
- Published brief report on the trial of the spectral core logging system at PIRSA Core library: "Keeling, J.L. & Mauger, A.J., 2002. New drill-core logger. *MESA Journal 26*:15".
- Correlation of data acquired from contact electrode measurements of electrical conductivity and pH, and magnetic susceptibility from

magnetic susceptibility meter for ultramafic, basaltic, dolerite and granite lithologies are being processed.
- Twelve test samples sent to Becquerel to gauge expected range of K, Th, U from different lithologies show only detection of Th in some of the test samples.

Issues and comments:
- Pending purchase of ASD equipment, spectral acquisition on colour measurement will be done as when ASD instrument is available from CSIRO Mineral Mapping Group. Conversion of files and acquisition of spectral library are needed for processing of data and are currently being investigated.

Outlook and work plan for the next Quarter
- Field trip to collect samples.
- Selection of existing weathering profiles from different lithologies for further physical characterisation aimed at building a library of information.
- Purchase of ASD and Bartington MS2 magnetic susceptibility meter when funding from the WA Government is finalised.

Mineral Mapping, South Australia (Leader: Alan Mauger)

Project aims
Mapping previously unrecognised saprolite at the surface; establishing which minerals survive the weathering process enabling determination of basement mineralogy.

Work plan for the Quarter:
- July - 16th AGC; CRCLEME Excursion to Olary with Steve Hill; Assist PIMA NL in mapping magnesite through regolith.
- August- Tarcoola field trip with Sean Mahoney mapping regolith; ASD Field Spec measurements of Tarcoola and Gibraltar surface samples; Analysis of Hyperion data over Willouran Ranges.
- September - 11th ARSPC; 2nd Geological Hyperspectral Focus Group excursion to Northern Flinders; Completing contribution to AMIRA P685 Automated Core Logging project.

Progress
- 16th AGC Presentations:
  - "Hydrothermal alteration in deeply weathered terrains" (Keeling, Mauger, Raven and Gates).
  - "Mineral Mapping Technology Applied in the Tarcoola District, S.Aust." (Mauger and McConachy).
- 11th Australasian Remote Sensing & Photogrammetry Conference presentation:
  - "Evaluating spaceborne Hyperion hyperspectral data for mapping carbonates in the Willouran Ranges, South Australia" (Mauger, Keeling and Quigley)

- Participation in 2nd Geological Hyperspectral Workshop to the Flinders Ranges.
- Surface samples received from John Howard, Flinders Diamonds for PIMA (ASD) analysis to support hyperspectral survey over Pine Creek kimberlite.
- Study of magnesite using HyMap over Mt Remarkable in conjunction with PIMA NL.
- Core from the Garford Palaeochannel have been scanned with CSIRO's Automatic Core Logger. Preliminary results for discriminating palygorskite, dolomite and illite are very encouraging.
- Student poster papers at 11th ARSPC - Sean Mahoney won a prize for best poster on his work using Hyperion Data to map regolith near Tarcoola. Ian Lau co-authored a poster paper with Cassie Gabell on the Hymap studies being undertaken over White Dam in the Olary district.

Issues and comments

- The 2nd Geological Hyperspectral Workshop was highly successful in that participants could relate spectral analysis to ground truth and address issues faced in image processing. It enabled the comparison of various systems as well.

Outlook and work plan for the next Quarter

- Sean Mahoney to complete Honours Thesis.
- Further work to be undertaken on Pine Creek Hymap data.
- Paper on Automated Core Logger to be prepared and circulated among sponsors of AMIRA P685 for approval.
- Paper on Hyperspectral data analysis over Screechowl Creek to be prepared.

Mineral Hosts (Project Leader: Ravi Anand)

Project Aims:

This project investigates the association between regolith minerals and trace elements from various mineral deposits. Emphasis is placed on both in situ (including amorphous phases) and transported materials as well as developing innovative techniques to separate desirable mineral phases. Research will provide an insight into the dispersion processes for trace elements into mineral hosts, the probable mechanisms involved and recommendations for exploration procedures.

Work plan for the Quarter:

- Identify sample sites of interest, and undertake sample selection for detailed study from new fieldwork, and existing mineral data / sample holdings from LEME 1 and other projects.
- Sample preparation: sub-sampling of existing sample sets and making polished thin sections.
- Begin optical petrography, SEM and electron microbe studies of polished thin sections.

Progress:

- Samples of in situ weathering profiles and transported cover from Lawlers, Mt McClure and Mt Gibson are currently being prepared. Optical petrographic examinations have begun on the thin sections, in preparation for detailed mineralogical and geochemical characterisation.
- Negotiation with key partners, the use of the most modern analytical techniques for geochemical and mineralogical analyses. These include use of the scanning electron microscope, electron backscattered diffraction for quantifiable microstructural analyses, microRAMAN, electron microprobe and laser ablation inductively coupled plasma mass spectrometry.
- SEM and electron microprobe analyses were done on samples from Golden Grove.

Issues and Comments:

No Comments

Outlook and work plan for the next Quarter

We will undertake detailed mineralogical and geochemical analyses (using the techniques below), and these will dominate the next quarter.

- Scanning electron microscopy on the Philips XL-40 SEM
- Electron Backscattered diffraction and orientation contrast imaging
- Electron microprobe point analyses of key phases identified
- Preliminary microRAMAN study of mineralogical associations

We envisage using the results from this quarter to further target key phases for more detailed, in-situ, geochemical and mineralogical analyses.

PhD Project: Gold in calcrete (M. Lintern)

Project aim

The principal objective of the project is "to better understand the formation of Au-in-calcrete anomalies in the regolith and develop more effective procedures for their use in mineral deposit detection".

Work plan for the Quarter

- Complete details of project proposal.
- Submit candidacy to Curtin University.
- Further scope project and evaluate suitability of sites and samples for inclusion in study.

Progress

- Submitted draft candidacy proposal to supervisors for comment. Received favourable comments back from three of four supervisors. No comment from fourth.
- Review of use of calcrete in mineral exploration published (Lintern, 2002). Calcrete sampling for mineral exploration. In (Editors X.Y. Chen, M.J. Lintern and I.C. Roach) Calcrete: characteristics, distribution and use in mineral exploration. CRC LEME Perth. 150 pp.).
- Submitted annual progress report to Curtin University.

- Preliminary analytical results indicate presence of gold in calcrete from both study sites.
- Continued to formulate ideas and scope for project

Issues and comments

Some delay in discussing and submitting candidacy proposal due to unavailability of supervisors.

Outlook and work plan for the next Quarter

- Continue to formulate ideas for project
- Submit final candidacy proposal
- Undertake more analyses on samples from two proposed study sites and further consider suitability for inclusion in project.

THEME: ACID SULPHATE SOILS: REGOLITH PROCESSES AND IMPLICATIONS

Processes in inland acid sulphate soils (Project Leader: Rob Fitzpatrick)

Project aims:

The objective is to develop through better knowledge of pedological, geochemical, isotopic, mineralogical, hydrological and biological mechanisms of acid sulfate soil formation within a regolith-landform framework across Australia to develop new mineral exploration, risk assessment and land management techniques.

Work plan for the Quarter:

- Andrew Baker (PhD student) to commence scoping new project.
- Finalise new CRC LEME geochemist and geomicrobiologist appointments.
- Prepare abstract and present invited keynote address "Inland acid sulfate soils a big growth area" at 5th International Acid Sulfate Soils Congress at Tweed Heads.
- Present poster and oral presentations at the International Union of Soil Science (IUSS), 17th World Congress of Soil Science in August 2002 in Bangkok:
  - Biogeochemical and mineralogical processes in acid sulfate soils: implications for environmental significance.
  - Redox changes in a small wetland with potential acid sulfate, saline and sodic soils.
- Develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications.

Progress:

- Literature review in progress, entitled: “Isotopes in the weathering environment and their relevance for mineral exploration”
- Field orientation of study sites undertaken.
- Prepared and presented invited keynote address "Inland acid sulfate soils a big growth area" at 5th International Acid Sulfate Soils Congress at Tweed Heads (25-28 August).

- The following poster and a paper was presented and an oral presentation made at the International Union of Soil Science (IUSS), 17th World Congress of Soil Science in August 2002 in Bangkok (14-21 August):
  - Merry R.H., Fitzpatrick R.W., Bonifacio E, Spouncer L.R. and Davies P.J. (2002). Redox changes in a small wetland with potential acid sulfate, saline and sodic soils. Proceedings of the International Union of Soil Science, 17th World Congress of Soil Science, Bangkok, Thailand. 14-21 August, 2002. Symposium No. 25; 13pp. CD-ROM.
  - Fitzpatrick R.W, Skwarnecki M, Raven M, Merry R. and Bonifacio E. (2002). Biogeochemical and mineralogical processes in acid sulfate soils: implications for environmental significance. 17th World Congress of Soil Science, Bangkok, Thailand. 14-21 August, 2002. International Union of Soil Science, Book of Abstracts: V p. 1896.
- Continued to complete report/paper with Dr Eleonora Bonifacio: Mineral transformations during laboratory oxidation of inland sulfidic materials.

Issues and comments:

- Dr Skwarnecki's contract has been extended to end of November. An application has been made by Rob Fitzpatrick and John Keeling via Paul Wilkes to extend this to end of December.
- Finalise appointments of new CRC LEME geochemist and geomicrobiologist in Adelaide and advertise these positions.
- Rob Fitzpatrick appointed Chairperson of Commission C2.4 (Soil Mineralogy) of the International Union of Soil Science (2002-2006).
- Prof Del Fanning, a world authority on Acid Sulfate Soils from the University of Maryland, USA visited field sites in the Mt. Lofty Ranges (5th to 8th September).

Outlook and work plan for the next Quarter:

- Commence mapping distribution of Acid Sulfate Soils in the Mt. Lofty Ranges and Dundas Tablelands.
- Andrew Baker (PhD student) to commence detailed sampling program in the Dairy Creek area, Mt Torrens, SA.
- Continue discussions with Paul Wilkes (acting CEO), John Keeling, Ravi Anand, Charles Butt, Wayne Meyer, Mirko Stauffacher and Steve Rogers to finalise the high-priority new CRC LEME geochemist and geomicrobiologist appointments in Adelaide.
- Present overview of "Geochemical and mineralogical processes in acid sulfate soils: implications for environmental and mineral exploration significance" at the CSIRO Glass Earth workshop in Sydney on 6-7 December.
- Continue to develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications.

Continue to complete report/paper with Dr Eleonora Bonifacio: Mineral

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2.2 Program 2: Mineral exploration in areas of cover Program Leader: Professor Nigel Radford

OVERALL WORK PLAN FOR QUARTER

Work plans for individual Projects are included in the appropriate project summaries.

PROJECT SUMMARIES

Regolith Expressions of Australian Ore Deposits (LEME 1)
(Charles Butt, CSIRO E & M, Project Leader).

I apologise to Dr Butt for failing to include his report last quarter. I miss-filed the report and overlooked it when compiling my report. The fault lies with me, not Charles. The following report covers the period from April to present.

1. Project aims

To assemble and publish:
1: a compilation of full length papers on exploration in the Yilgarn Craton in special issues of Geochemistry: Exploration, Environment Analysis (GEEA)
2: a monograph summarizing the characteristic expression of bedrock ore systems in the Australian regolith, as a series of conceptual dispersion, process and exploration models, illustrated by relevant case histories.

2. Work plan

GEEA special issues: completed. Second issue published during April.
Thematic volume: work plan in the past quarter has been to continue to seek, collect, collate and edit relevant case histories from all sources.

3. Progress

GEEA special issues. Publication of second issue was delayed for six months by the publisher for unknown internal reasons. This part of the project has now concluded.
Thematic volume. Requests for over 200 selected case histories were made to potential authors, of which 178 were agreed upon. We now received 65 contributions, with 58 undergoing review; at least 30 more are anticipated, several by LEME authors.

4. Issues and comments

Progress of the Thematic volume is dictated by the provision of case histories by authors. As anticipated, the ongoing changes in the industry have adversely affected many potential authors from accessing material or finding time to complete their papers, so that most are behind schedule and others have been withdrawn. Accordingly, compilation has had to be extended into a further year.

5. Outlook and work plan for the next Quarter

Project staff and 'outside authors' will continue to write case histories and special chapters. During the next quarter, we shall review the case history coverage and assess the commitment of potential authors to providing their contributions.

Girilambone Project.

(Ken McQueen, Univ Canberra, Project Leader).

Work Plan

Work planned for the June-September quarter 2002 included:

- An informal planning meeting to be held in early July at GA in Canberra.
- Preparation of final report on the Stage 2 (Hermidale) regolith landform mapping and drilling results.
- Preparation of a joint LEME-GSC open file report by Dr Alejandra Duk-Rodkin on the drainage history project (Girilambone-Cobar) carried out as part of the LEME-GSC exchange program.
- Presentation of the results of palaeomagnetic dating for the Cobar-Girilambone area at 16th AGC Adelaide.
- Presentation of results of Stage 2 to industry at AusIMM-CWEDG meeting in Orange, NSW.
- Planning of drill traverses and initial field work on the next stage of the project in the Byrock-Glenariff area.
- Presentation of a paper on the landscape evolution of the Girilambone region at the 10th Australian-New Zealand Geomorphology Group Conference to be held in Kalgoorlie in September 2002.

Work Done

- Ken McQueen and joint authors Martin Smith and Brad Pillans gave an oral presentation on the results of palaeomagnetic dating in the Cobar-Girilambone area as part of the LEME contribution to the 16th AGC in Adelaide, 1st-5th July. Project staff and students also helped man the CRC LEME booth at the 16th AGC.
- A number of geophysical data sets for the study area were prepared by Paul Wilkes and personnel at Geoscience Australia.
- An informal update meeting was held in Canberra at Geoscience Australia on the 17th July to discuss progress and plan future activities in the project. This meeting was attended by almost all members of the project including participants from the NSW Geological Survey, the two PhD students and in addition Mr Peter Lewis, NSW Geological Survey.
- Presentations on the latest findings of the Girilambone project were made to a combined meeting of the AusIMM and Central West Exploration Discussion Group held in Orange on the 21st August. The meeting was well attended by about 50 industry and survey geologist. Ken McQueen, Roslyn Chan, Guy Fleming, Peter Buckley and Mike Hicks made presentations on all aspects of the project.
- Roslyn Chan gave an oral presentation on the regolith and landform evolution processes in the northwest Lachlan Fold Belt, NSW, at the 10th Australian-New Zealand Geomorphology Group Conference in Kalgoorlie 30th September-4th October September 2002.
- Keith Scott completed a critical evaluation of the geochemical data from the Stage 2 drilling, and established the cause for low K values in the multi-acid digest ICP results. He has also characterised and interpreted the geochemical changes through the weathering profiles, particularly for mafic lithologies.

- Ken McQueen assessed the precision and accuracy of the latest geochemical data and carried out an assessment of regolith-related element associations in the studied profiles from the Stage 2 drilling.
- Roslyn Chan and Ben Maly have completed 3D characterisation and interpretation of the regolith over the Hermidale sheet area and established the landscape history in terms of the regional geomorphic evolution.
- The final report on the regolith, geomorphology, and geochemistry of the Hermidale area has now been completed ready for printing. The accompanying regolith-landform map of the Hermidale 1:100 000 area has also been completed.
- Dr Alejandra Duk-Rodkin has completed preparation of a series of drainage history maps for the Cobar region as part of her exchange study, conducted from April to July.
- Peter Buckley (NSW Geological Survey) spent 5 days (16th-20th September) at Geoscience Australia, working with Ben Maly on field planning and photo interpretation of the Byrock-Glenariff area.
- Ben Maly and Peter Buckley completed a 1 week field trip from 28th September to 6th October. This trip involved regolith-landform mapping of the Byrock Glenariff area and reconnaissance planning for the next stage of drilling to be conducted in early 2003.
- As part of his PhD study, Kamal Khider has completed statistical analysis of the geochemical results from the Stage 2 drilling.
- Joe Schifano is making good progress on the data collection and analytical stages of his PhD project, related to the project.

Major Issues

- Preparation of the final Hermidale report has taken longer than anticipated.
- Ms Roslyn Chan took 4 weeks leave during the quarter
- Dr Ken McQueen spent 3 weeks of the period at the IMA conference in Edinburgh and on field trips in the UK, as well as 2 weeks on leave.

Outlook and work plan

A large part of the last quarter was spent in compiling data from the previous quarter and presenting results to industry and at scientific meetings. Although there has been a delay in completing the final Hermidale report, progress on the data collection, compilation and new field work has been good and according to plan. Work planned for the next quarter includes a 1 week field trip to the Cobar-Bourke area in November to sample additional sites for palaeomagnetic dating, planning for the next stage of drilling in early 2003 and initial assessment of available data and imagery for the Byrock-Glenariff area.

Gawler-Harris Greenstone Belt.
(Malcolm Sheard – PIRSA-MRG, Geological Survey Branch, Project Leader).

Work Plan

- **Overall Project:** Regolith geology and geochemistry of the Harris Greenstone Belt (HGSB), Gawler Craton, South Australia. Refer to first report for details.

Work Aims this Quarter

- Complete Phase 2 drilling, log & photograph the ~134m of regolith core from 3 holes, sample for detailed geochem.
- Attend the 16th AGC & present regolith paper.

Work Done

- The drilling of HGSB Phase 2 fully cored HQ diamond holes was completed in early August. Core transportation to Adelaide occurred in mid August. Core recovery averaged ~90% through the weathered greenstone and transported cover materials.
- Summary logs and good first pass logs from each hole have been prepared. Detailed core photography is 1/3 completed, core sampling for detailed geochemistry has not yet begun.
- Photography done so far (~100 images) has been scanned and forwarded to Ian Robertson (Perth) via CD-ROM, for inclusion in the proposed Weathered Rock Atlas for this area.
- Geochemical analysis of field-collected regolith samples from the March site visit plus the drillhole cuttings from the 56 selected aircore holes drilled in mid 2001 has been completed with interpretive analysis plots done and further interpretation-editing is underway.
- Attended the 16th AGC in Adelaide & presented joint authored paper: M.J. Sheard & M.J. Lintern, "*Exploration through transported cover and deeply weathered regolith, ET gold prospect, Gawler Craton, SA.*".

Major Issues

- Some delays in achieving milestones due to the intrusion of other government business matters, administration issues, requests for information and various meetings.

Lessons Learned

- No change from previous reports.

Outlook

- **Post September**: continue to work on the 3 x HQ diamond drill cores (detailed logging, photography, assay sampling. mineralogy etc).
- Photography of ~100 chiptrays still to do.
- Begin compilation of report text + data files & regolith atlas.
- Continued PIRSA funding of this work is now assured through additional funding for this Financial Year of a similar magnitude to last FY. New projects will also be taken on with the renewed funds.

South Australian Regolith and ET Regional Projects (LEME1 commitment). (Mel Lintern – CSIRO E & M, Project Leader).

Project aim

To develop techniques for exploration in regions of transported overburden in the Gawler Craton by understanding the relationships between geochemical dispersion patterns, weathering processes and evolutionary stages of regolith and landform development over a nominated site of concealed materialisation.

Work plan for the Quarter
Publish ET and SAR Final Reports

Progress (include progress against milestones)
No progress made on ET report as I am awaiting the review from Michael Schwarz (PIRSA). SAR Final Report nearing completion. Diagrams from drafting mostly completed.

Issues and comments
As before. Difficulties experienced in completing ET Regolith Project Final Report as this project is now overdue and project staff are committing themselves to other projects while waiting for the remaining contributors comments of the report to be addressed and circulated again.

Outlook and work plan for the next Quarter
Complete ET Regolith Project Final Report.
Complete SAR Final Report – this will be a synthesis of all work undertaken as part of this project. A GIS (including metadata) may be constructed given funding.

Gawler AEM Project (LEME1 commitment).
(David Gray, CSIRO E & M Project Leader).

Project aims
This project is using geophysical (mainly AEM) and geochemical techniques to map geochemical dispersion within the regolith at a number of key prospects in the Gawler Craton, with the aim of making specific recommendations with respect to the design of regional geochemical sampling surveys.

Work plan for the Quarter
Little work was planned this quarter as awaiting data from Companies.

Progress
Research underway

Issues and comments
This project is a LEME component of a larger Geoscience Australia (GA) project. Reduction in GA funding for research has restricted the opportunity to achieve the original goals.

Outlook and work plan for the next Quarter

Research next quarter will hopefully recommence once data is made available. Presentations of research to date will be made in the Gawler Workshop in December 2002.

Western New South Wales Regolith project.
(Steve Hill, UC, Project Leader).

Project aims
Stimulate mineral exploration in western NSW through greater understanding of the regolith and landscape evolution

Work plan for the Quarter
i) Commence new three month GA graduate rotations from Matilda Thomas and Karen Earl. They will be working on the Silverton 1:25K regolith-landform map area. This project will be important for considering the near surface expression of bedrock in an area of deep transported cover. Fieldwork for this will be from June 29-July 19.
ii) Regolith mapping shortcourse / workshop by Steve Hill and Kylie Foster in Olary region (July 8-10)
iii) Continue with Wahratta 1:25k map and Teilta 1:100K map.
iv) Regolith geochemistry data analysis and interpretation
v) continued hydrogeochemistry sampling and analysis
vi) release of NSW DMR Broken Hill CD including the Broken Hill 1:100K regolith-landform map

Progress
i) GA graduate rotations complete. Silverton project postponed, instead they worked on detailed regolith-landform mapping and regolith geochemistry and biogeochemistry of the Flying Doctor mineralisation. Report draft completed and about to be distributed for review. Extended abstract of results submit to the Eastern Australia Regolith Conference for presentation and publication. Geochemical and biogeochemical results require further examination.
ii) Regolith mapping shortcourse successfully completed in the Olary.
iii) draft of Wahratta 1:25K map completed, now being scanned. Teilta 1:100K map still being compiled and due for completion in 2003
iv) Pinnacles RCA samples assayed including up to 770 ppb Au result from the SE part of the map sheet, which is now being resampled. Wahratta RCA samples submitted for analysis. Flying Doctor chemistry still to be examined in detail, but early results are extremely encouraging.
v) Patrice deCaritat and Dirk Kirste undertook a sampling field trip in September.
vi) Broken Hill 1:100K regolith-landform map included on NSW DMR CD release.

Issues and comments
i) GA graduates have been an excellent addition to the project, and the results from this work are very exciting. The Silverton project had to be postponed because land leaseholders did not allow access because of the sensitivity of the

stock in the present drought. If time permits this may now be undertaken in 2003.
ii) regolith mapping course was very successful and there is expected to be demand for further courses of this type (see work plan below)
iii) 2003 will be a very exciting year for the release of this year's regolith geochemistry and biogeochemistry results.

Outlook and work plan for the next Quarter
i) Official release by NSW minister of Pinnacles, Mt Gipps and Tibooburra 1:25K maps.
ii) Steve Hill to visit NSW DMR and give a presentation on Monday October 21
iii) Completion of Wahratta 1:25K map, and further work on Teilta 1:100K, Thackaringa, Rockwell, and Balaclava (2nd ed), 1:25K regolith-landform maps
iv) conference presentation at Eastern Australia Regolith Conference. This project plans to be well represented.
v) write landscape evolution overview of western NSW for Ravi's landscape evolution volume
vi) regolith geochemistry, biogeochemistry and hydrogeochemistry projects continue, including release of some of the Flying Dr project results.
vii) UC potential Honours student Daniel Glanville, proposing to undertake Honours project on silicified palaeochannels near the Kayrunnera diatremes and Williams Peak Au mine in 2003. Co-supervisors will be Ian Roach and Steve Hill.

Regional seepage exploration geochemistry, Mt Lofty ranges.
(Rob Fitzpatrick, CSIRO L & W, Project Leader).

Project aims
a) Geochemical dispersion in acid sulfate soils, seeps and regolith Mt Torrens prospect:
The principal objective of this project is to determine whether saline acid sulfate seeps and regolith can be used as exploration sampling media.
b) Regional geochemistry of acid sulphate soils and saline seepages: a potential new exploration tool for detecting base-metal mineralization: To determine whether regional sampling of acid sulphate soils and seeps can detect base-metal mineralization.

Work plan for the Quarter
a) Geochemical dispersion in acid sulfate soils, seeps and regolith Mt Torrens prospect:
- Copies of the CRC LEME report 174 are being made.
- Present report to PIMA Mining and Star Mining and discuss further work.
- Present two posters and one oral presentation at the 16th AGC.

b) Regional geochemistry of acid sulphate soils and saline seepages: a potential new exploration tool for detecting base-metal mineralization:

- Complete sampling of acid sulfate seeps in the Kanmantoo and Woodlawn/Dicks Creek areas, submit samples for analysis. Commence writing of final report.

c) Other

- Job description and advertisement to be finalised with Ravi Anand for the new CRC LEME geochemist appointment in Adelaide.

Progress

a) Geochemical dispersion in acid sulfate soils, seeps and regolith Mt Torrens prospect:

- CRC LEME Report No. 174 "Geochemical dispersion at the Mount Torrens lead-zinc prospect, South Australia, with emphasis on acid sulfate soils" by M Skwarnecki, R.W. Fitzpatrick and P.J. Davies has been published and distributed.
- The following two posters were presented and an oral presentation made at the 16th AGC.
  Skwarnecki M. and R. W. Fitzpatrick (2002) Mineralogy of the Mt Torrens gossan, South Australia. *In* Press, V.P. (ed.). 2002. Geoscience 2002: Expanding Horizons. Abstracts of the 16th Australian Geological Convention, Adelaide Convention Centre, Adelaide, SA, Australia. July 1-4 2002, No. 67, p.341.
  Skwarnecki M., R. W. Fitzpatrick and M. Raven (2002) Secondary lead minerals in acid sulfate soils, Mount Torrens prospect: implications for mineral exploration. *In* Preiss, V.P. (ed.). 2002. Geoscience 2002: Expanding Horizons. Abstracts of the 16th Australian Geological Convention, Adelaide Convention Centre, Adelaide, SA, Australia. July 1-4 2002, No. 67, p.340.
  Fitzpatrick R. W., Skwarnecki M. and M. Raven (2002) Contribution of scapolite and pyrite weathering to salinity in the Mount Torrens region, South Australia. *In* Preiss, V.P. (ed.). 2002. Geoscience 2002: Expanding Horizons. Abstracts of the 16th Australian Geological Convention, Adelaide Convention Centre, Adelaide, SA, Australia. July 1-4 2002, No. 67, p.412.

  - Two papers on Acid Sulfate Soils incorporating the above investigations are being written for international journals.
  - Presented CRC LEME Report No. 174 to Mr Lindsay Owler from PIMA Mining and Star Mining (now Argonaut Resources NL) and discussed opportunities for further work. In particular Argonaut are interested in pursuing further LEME collaboration at the Mt Torrens and Alford (near Moonta) prospects.

b) Regional geochemistry of acid sulphate soils and saline seepages: a potential new exploration tool for detecting base-metal mineralization

- Completed sampling of acid sulfate soil in saline seeps and creeks in the Mt Torrens – Strathalbyn areas (SA) /Dicks Creek areas (NSW). Submitted about 200 soil samples for analysis. Approximately 100 water samples, were also collected, where available. Have set-up a data-base with sample locations, photographs of samples and localities and available data. Two thirds of the sample analyses have been completed.

c) Other

- Continued discussions were held with Paul Wilkes (acting CEO), John Keeling, Ravi Anand, Charles Butt, Wayne Meyer and Mirko Stauffacher to finalise the high-priority new CRC LEME geochemist appointment in Adelaide.
- Prepared and presented invited keynote address "Inland acid sulfate soils a big growth area" at 5th International Acid Sulfate Soils Congress at Tweed Heads (25-28 August). Aspects of mineral exploration opportunities were included.
- Presented the following oral presentation at the International Union of Soil Science (IUSS), 17th World Congress of Soil Science in August 2002 in Bangkok:
- Biogeochemical and mineralogical processes in acid sulfate soils: implications for environmental significance. Aspects of mineral exploration opportunities were also included.
- Continue to develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications. Aspects of mineral exploration opportunities are included.
- Submitted the following paper, which incorporates sampling specific soil classes or materials for mineral exploration and environmental opportunities (e.g. saline seeps, acid sulfate soils):

  Fitzpatrick R.W., B Powell, N.J. McKenzie, D.J. Maschmedt, N. Schoknecht and D.W. Jacquier. (2002). Demands on Soil Classification in Australia. *In* Eswaran et al. (Eds) Soil Classification: A Global Desk Reference. CRC Press Lewis Publishers. Boco Raton. FL Proceedings of the International Symposium on "Soil Classification: Contributions to Advances in Pedology" at 2001 American Society of Agronomy Annual Meeting, Charlotte, North Carolina 21-23 October, 2002 (In Press).

Addendum: Rob Fitzpatrick reports that electron microscopy work completed since the above was drafted has revealed the presence of secondary galena and sphalerite as well as pyrite, in several samples studied from seepages with anomalous base metal values.

Issues and comments

Regional geochemistry of acid sulphate soils and saline seepages: a potential new exploration tool for detecting base-metal mineralization

Staff matters and appointments

- Dr Skwarnecki's contract has been extended to end of November. An application has been made by Rob Fitzpatrick and John Keeling via Paul Wilkes to extend this to end of December.
- Finalise the appointment of new CRC LEME geochemist in Adelaide and advertise the position.

Outlook and work plan for the next Quarter.

a) Geochemical dispersion in acid sulfate soils, seeps and regolith Mt Torrens prospect:

- Two papers on Acid Sulfate Soils to be completed for international journals.

b) Regional geochemistry of acid sulphate soils and saline seepages: a potential new exploration tool for detecting base-metal mineralization.

- Interpretation of geochemical data and completion of final report.
- Continue discussions with Paul Wilkes (acting CEO), John Keeling, Ravi Anand, Charles Butt, Wayne Meyer and Mirko Stauffacher to finalise the high-priority new CRC LEME geochemist appointment in Adelaide.
- Prepare and present keynote address "Environmental Science and the Agriculture Industry with emphasis on soils and agronomy: Time Bomb or New opportunities?" at the Australian Synchrotron Project Workshop on New Opportunities for Soil and Environmental Science (3-4 October, Melbourne).
- Present overview of "Geochemical and mineralogical processes in acid sulfate soils: implications for environmental and mineral exploration significance" at the CSIRO Glass Earth workshop in Sydney in early December.
- Continue to develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications.

Lithogeochemical haloes in the regolith (M Whitbread PhD)
(Ken McQuen, UC, Supervisor)

Mike Whitbread has been undertaking consultancy work for Anglo American in Ireland, and for Newcrest at Cadia Hill. Work on writing up the PhD thesis is progressing.

AMIRA P618 - Isotopic Discrimination of Partial Leach Geochemical Anomalies in Covered Terranes. Geoff Denton (CSIRO E&M) Project Leader.

No report has been received to date (21 October) for this project due to field work commitments.

Project: Laterite geochemical reconnaissance survey of the Yilgarn Craton. Project leader Matthias Cornelius, CSIRO, Perth.

No report received this quarter.

CRC LEME/Triako Collaborative Project on Regolith at Mineral Hill
Project Leader: Keith Scott

Work Plan

To document regolith profiles in base metal and Au-rich profiles at Mineral Hill.

Progress

- 68 samples from profiles provided by TMH 184 and 186 at Parkers Hill and TMH 201 and 204, through Au mineralization in the Missing Link

area have been analysed by ICP/ICP-MS and Neutron Activation Analysis (NAA) and X-ray diffractometry (XRD).

- Based on the mineralogy and geochemistry, the profiles at Parkers Hill appear to show a progression from sphalerite-galena rich mineralization into partially weathered sulfides with anglesite and capped by a thin tetrahedrite-rich interval before passing into a 30-40 m thick zone dominated by cerussite and an upper (20 m thick) Fe oxide zone.
- For the Au mineralization at Missing Link, Ag, (As**)**, **Bi**, **Cu**, (Mo), **Pb**, Sb, Tl and Zn appear to be useful pathfinder elements with the elements in bold being the most useful.
- These results have been reported to the mine-based geologists at Mineral Hill on 10 September and to other geological staff, including the CEO, on 20 September at North Sydney.

Major Issues and Comments
This research project was completed ahead of schedule and results reported to the company in two workshops (as indicated above).

Outlook and plan for the next Quarter
Based on discussions of the results and their implications, a further programme of research with Triako will be undertaken. This will involve mineralogical documentation along additional sections of weathered base metal mineralization at Parkers Hill and mineralogical /geochemical study along a section at the Pearse epithermal Au mineralization.

Challenger gold deposit - further research and integration with other investigations. Project Leader, David Gray.

Project aims
This project is aimed at improving interpretation of geochemical, logging and geophysical data for Au exploration in the Challenger area and to develop further the 3D geochemical and regolith modelling, and integrate this with previous investigations.

Work plan for the Quarter
The project commenced this quarter. It was envisioned that most of the drill holes be relogged and the mineralogical analysis of selected chip tray samples by PIMA be initiated. EC 1:5 soil analyses were also expected to have been commenced.

Progress
The relogging has been substantially completed during this quarter. Given the availability of the ASD spectrometer, which is both superior (in terms of spectral range) and faster than the PIMA, all of the available chip tray samples were analysed. Processing of the spectral data will commence next quarter. EC 1:5 soil analyses have been commenced.

Issues and comments
Spectral analysis of all chip tray samples has produced a 3D spectral data-set which may be an extremely useful research resource. Logistic considerations

precluded using powders in this instance, but these would clearly give much better results, which could be manipulated usefully much more than spectra from chip trays.

Outlook and work plan for the next Quarter
Spectral data will be processed and mineralogical information developed. This will be integrated with logging and a 3D regolith model developed. This model will be integrated with AEM data and 3D geochemistry.

Project: Nifty Copper. Project Leader Matthias Cornelius.

Project aims
Pilot project to assess the regolith-landform setting and potential for geochemical exploration

Work plan for the Quarter
Visited Nifty mine. Completed analytical work and draft report.

Progress
Final report to be submitted in early October.

Issues and comments
Use of lag and soil sampling

Outlook and work plan for the next Quarter
Continue collaboration with Straits Resources Ltd.

WORK COMPLETED, PROGRAM LEADER.

Several versions of the Strategic Plan have been prepared and revised both before and after the Board meeting in August. The latest version is a consensus view that represents the aspirations of the CRC. It is proposed to use it as the foundation for a review of all projects by the new CEO.

I presented a paper on exploration through transported overburden at the meeting in Ballarat of the Victorian Minerals and Energy Council. The paper was used to stimulate a workshop discussion on the problems of mineral exploration in regolith dominated terranes. A visit to Stawell was also included to further the possible Western Victoria regional project.

Two proposals have been submitted to AMIRA for industry consideration. These are the P778 project entitled Predictive Geochemistry in areas of transported overburden, and P779 Lithogeochemistry of alteration halos in regolith on mafic rocks. Further detailed proposals will be developed with AMIRA once initial industry reaction has been received.

I presented a half day session on exploration geochemistry to the MSc class students under the MTEC project in Canberra in mid August, and visited CSIRO North Ryde at the same time.

I have felt compelled to tender my resignation from CRC LEME effective 25th October. My reasons have been given elsewhere. Suffice to say here that I wish all in LEME enormous success. I believe the combination of Dennis Gee as CEO and Paul Wilkes as Deputy CEO will be very beneficial. There is much vital work to be done, and LEME has the people to do it. Good Luck to you all, thanks for your assistance, and I apologise for letting you all down in this way, but I know that for me, this is the right move.

FUNDING.

The Nifty Copper regolith geochemistry project has brought external funding of $13,500 into the CRC, and a follow up project is likely.

Additional work on behalf of Triako Minerals is also now likely.

WORK PLAN FOR NEXT QUARTER.

Projects within Program 2 will continue according to schedules already established.

2.3 Program 3: Environmental applications of regolith geoscience Program Leader: Dr Colin Pain

Work plan for the Quarter

Salt in the regolith

This project has been combined with the "Salt in erosional landscapes" project.

Salt in erosional landscapes

The relationships between regolith materials and the concentration/mobility of salts will be explored through a series of DC resistivity traverses and shallow drilling (approx 20 meters). The ground geophysics will be completed by the end of July, and the drilling by the 20th August.

Alex King, a new scientist working for Geoscience Australia, will be working at the more detailed sub-catchment scale looking at the correlations between regolith materials including their textural and gamma-ray properties and salt loads.

DLWC (NSW) will become an increasingly important partner in the project in terms for sharing data, providing local knowledge for validating results and product customisation and potential cost sharing.

Perth regolith

Following discussions with GA Cities Project staff in early August, a plan for further work on this project will be developed.

Baseline geochemistry

Development of a proposal for regional geochemical work.

Science communication

Continue writing papers etc.

Work done against the work plan

Salt in erosional landscapes

A series of DC resistivity traverses has been carried out, and shallow drilling (approx 20 meters) undertaken. The ground geophysics was completed in July, and the drilling took place in August.

Alex King, a new scientist working for Geoscience Australia, worked at the more detailed sub-catchment scale looking at the correlations between regolith materials including their textural and gamma-ray properties and salt loads. Her report will be available next quarter.

Perth regolith:

No progress

Baseline geochemistry

Patrice de Caritat has prepared a proposal for a pilot study of regional geochemistry in part of the Murray Darling Basin. If the project gets up, Geoscience Australia will provide the geochemical analyses as an in-kind contribution.

Science communication

Income

Significant events

Issues and comments

The Program Leader has spent much of this quarter working with Ken Lawrie to ensure that LEME salinity work under the NAP continues. This has involved visits to a number of interested parties and stakeholders, and the preparation of a number of project proposals, for both Programs 3 and 4. There is also the issue of the distinction between Programs 3 and 4 – this will be considered very carefully during the next quarter.

Outlook and work plan for next Quarter

Salt in erosional landscapes

Perth regolith

Baseline geochemistry

Science communication

Other

Appendices:

Program staff and percentages

Name	% in Program
Andreas Schmidt-Mumm	20
Heinson	20
Stewart Greenhalgh	5
Tim Munday	40
P Davies	10
Richard Merry	10
Rob Fitzpatrick	30
Skwarnecki M	40
Elisabeth Bui	20

A Kepic	25
Jason Meyers	20
Paul Wilkes	15
Watkins	
Colin Pain, Program Leader	40
David Gibson	20
John Wilford	20
Ken Lawrie	20
Patrice de Caritat	15
Penny Kilgour	50
KP Tan	20

Projects:

Project	Leader	Comments
Geologically constrained AEM interpretation	Tim Munday	Waiting for better project definition
Salt in erosional landscapes	John Wilford	On track
Salt in the regolith		Combined with salt in erosional landscapes
Salinity communication	Ken Lawrie	On track
Perth city regolith		To be re-negotiated, and a new schedule prepared
Baseline geochemistry in Australia	Elizabeth Bui	Waiting for PhD student

List of students involved in the Program and show in which project each study lies.

Mark Thomas

1. Project aims

Project in development in Sub-program 3.1 "The regolith background to dryland salinity"

Project title ***Development of soil-regolith toposequence based methods for predicting the variability in saline processes at point to regional scale***
Rob Fitzpatrick – project leader.

Objective: Develop methodology for predicting soil–water landscape degradation processes (i.e. salinity, acidity and waterlogging) at catchment and regional (i.e. within a "ground flow system") scales using landscape elements/ toposequences, topographic indices, airborne radiometrics & magnetics, remote sensing, geochemical and mineralogical methods and integration with other spatial datasets (e.g. geology, soils and hydrology). Initial work will be carried out in saline areas in South Australia.

a) "Combining remote sensing and terrain analysis methods with soil-regolith toposequence models in two transient salinity affected areas (Jamestown and Mt Lofty Ranges) for upscaling root zone constraints
Sub-component: Mark Thomas PhD topic

- Develop remote sensing and terrain analysis techniques for predicting occurrence of root zone constraints within soil-regolith units in two South Australian upland project areas. Work will focus on transient salinity, for which there is a growing level of understanding of the toposequence ("point") processes involved. The project will apply the toposequence knowledge to spatially predict – i.e. "upscale" - the occurrence of transient salinity, from catchment to regional scales. Where available, this will involve using: :(i) airborne radiometrics and magnetics and (ii) topographic indices, (iii) existing datasets (e.g. State soil landscape mapping, land cover, groundwater and salt distribution networks, etc.), (iv) ground truthing down toposequences using hand held EM methods (e.g. EM38, 31) mass & volume magnetic susceptibility and mineralogy/soil chemistry for calibration and validation purposes and (vi) where available and if time permits, hyperspectral remote sensing will also be assessed. This information will be used to develop pedotransfer functions of near surface regolith attributes for predicting transient salinity and other rootzone contraints (e.g. root barriers, gravel layers, soil depth, waterlogging, sodicity, etc). Outcomes will include a better understanding of the nature and distribution of transient salinity and other soil-regolith constraining attributes for management purposes, and the capability to predict their occurrences in other upland areas.

b) The use of terrain indices for predicting the variability in salinity at catchment scale
Sub-component: Phil Davies proposed Masters
The project would extend previous work, which was done in the Mt Lofty Ranges using the "classic" topographic index and compare/contrast a number of more complex indices.
The outcomes will include a terrain index that is more sensitive to physical environmental parameters specific in local landscapes and one that models salinity well at the catchment scale.

c) Baseline geochemistry and mineralogy of South Australian saline soils
Sub-component XRD studies: (30% - *Mark Raven*: XRD/ mineralogy)
Sub-component XRF studies (100% *Mark Fritz*: PhD student/ XRF/ geochemistry)
For details see DRAFT Position paper (attached document)
To map the distribution of elements and minerals in saline soils, regolith and stream sediments in Australia.

- Develop a national geo-referenced database of baseline geochemistry (majors, traces and isotopes) and mineralogy (e.g. salt efflorescence suites in sulfide-, gypsum-, halide-, carbonate- bearing materials, layer silicates, heavy minerals) from a wide range of saline regolith (e.g. soils, marshes, lake and stream sediments) in Australia.
- Investigate new XRF and XRD methods for quantifying elements (e.g. majors including Cl and S, and trace elements in highly saline environments) and minerals (often complex salt efflorescence suites) over a wide range of saline seeps (e.g. sulfidic, gypsic and halitic),
- Test and develop predictive GIS model(s) for element and mineral distribution in saline regolith. Investigate new methods for predicting the spatial distribution of trace elements over large areas.
- Quantify the effect of soil drainage on chemical and mineralogical properties. Construct conceptual mechanistic models to elucidate past and present mineralo-

chemical changes in soils to aid in prediction of future changes. This information will be used to point to optimum management conditions to prevent degradation and improve productivity.

2. Work plan for the Quarter

- Mark Thomas (PhD student) to commence scoping new project.
- Further develop project and finalise some sub-components (e.g. XRD and XRF) by having further discussions staff from PIRSA, CLW, CRC LEME, CLW, GA, BRS, University of Adelaide, University of SA and CRC LEME: Mark Thomas; Graham Heinson; Megan Lewis; David Maschmedt; Phil Davies; Mark Raven; Mark Fritz; Richard Merry; Colin Pain Wilford, Richard Cresswell, Ken Lawrie; Jim Cox; Mirko Stauffacher; Alan Mauger, John Keeling; Ian Tapley, Elizabeth Bui, Patrice de Caritat, David Bruce, Keith Norrish, Glen Walker, Glen Gale.
- Finalise new CRC LEME geochemist appointment.
- Develop a colour brochure on the CRC LEME theme entitled: "Acid sulfate soils: regolith processes and implications". This theme incorporates the use of Acid Sulfate soils in mineral exploration and land management (dryland salinity and water quality issues).

3. Progress (include progress against milestones)

- Presented the following paper at the 8th National Conference on "Productive use and rehabilitation of saline lands (PURSL) (16-20 September in Perth):
    - "Effects of drainage on processes in saline soil profiles in the South East of South Australia" by Rob Fitzpatrick, Richard Merry, Jim Cox and Jock McFarlane".
    -

a) Mark Thomas PhD project "Combining remote sensing and terrain analysis methods with soil-regolith toposequence models in two transient salinity affected areas (Jamestown and Mt Lofty Ranges) for upscaling root zone constraints"

- *Commenced six-month formal Structured Program, planned in* consultation with Graham Heinson and Rob Fitzpatrick.
- Literature review in progress, entitled: "The utility of magnetic and radiometric data is soil mapping", containing review on: (a) soil magnetic properties and radioelement concentrations; (b) soil chemistry relationships with slope and weathering processes; and (c) airborne radiometric and magnetic detection systems and methods.
- Field orientation of study sites undertaken.
- Routine weekly review meetings with supervisors commenced.

b) The use of terrain indices for predicting the variability in salinity at catchment scale

Sub-component: Phil Davies proposed Masters

- Rob Fitzpatrick had positive discussions with John Gallant and Neil McKenzie in Canberra to develop linkages with Phil Davies to further develop the proposed project in the Mt Lofty Ranges. These outcomes were communicated to Phil Davies, Mirko Stauffacher, Jim Cox and Colin Pain.

c) Baseline geochemistry and mineralogy of South Australian saline soils

- A draft position paper for project "Baseline geochemistry and mineralogy of Australian saline soils" has been developed and circulated for comment to Colin Pain, John Keeling, Mirko Stauffacher, Jim Cox, Ken Lawrie, Keith Norrish, David Dent, Graham Heinson, Pat James, Wayne Meyer, Paul Wilkes for

comment (including staff: – Rob Fitzpatrick Phil Davies; Mark Raven; Mark Fritz; Mark Thomas, Richard Merry, Patrice de Caritat and Swanny Skwarnecki).

d) Other

- Continued discussions with Paul Wilkes (acting CEO), John Keeling, Steve Rogers, Ravi Anand, Charles Butt, Wayne Meyer and Mirko Stauffacher to finalise the high-priority new CRC LEME geochemist and geomicrobiologist appointments in Adelaide.
- Prepared and presented invited keynote address "Inland acid sulfate soils a big growth area" at 5th International Acid Sulfate Soils Congress at Tweed Heads (25-28 August). Included several aspects relating to saline soils and saline stream water quality.
- The following poster was presented and an oral presentation made at the International Union of Soil Science (IUSS), 17th World Congress of Soil Science in August 2002 in Bangkok (14-21 August):

  Merry R.H., Fitzpatrick R.W., Bonifacio E, Spouncer L.R. and Davies P.J. (2002). Redox changes in a small wetland with potential acid sulfate, saline and sodic soils. Proceedings of the International Union of Soil Science, 17th World Congress of Soil Science, Bangkok, Thailand. 14-21 Aug, 2002. Symposium No. 25; 13pp. CD-ROM.

  Fitzpatrick R.W, Skwarnecki M, Raven M, Merry R. and Bonifacio E. (2002). Biogeochemical and mineralogical processes in acid sulfate soils: implications for environmental significance. 17th World Congress of Soil Science, Bangkok, Thailand. 14-21 Aug., 2002. International Union of Soil Science, Book of Abstracts: V p. 1896.
- Continued to develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications.
- NAP programs in the Mt. Lofty Ranges and Jamestown areas: continued to have discussions with staff from PIRSA (Glen Walker), CLW (Rob Fitzpatrick, Jim Cox, Phil Davies, Richard Merry, Mark Thomas), BRS (Richard Cresswell and David Dent) and GA (John Wilford) to plan projects (contractual agreements confirmed).
- Rob Fitzpatrick presented paper "Upscaling from points to catchments to regions via toposequence models to support land use planning" (by Fitzpatrick R.W., P.J. Davies, R.H. Merry, D.A. Bruce and J.W. Cox). *In* Solutions for Catchment Management Report of a Collaborative Workshop. *Ed* Kim Ritman, 17 July 2002, Bureau of Rural Sciences (BRS), Canberra. p17-18.
- Published the following two papers:

  Brouwer J. and R.W. Fitzpatrick (2002). Interpretation of morphological features in a salt-affected duplex soil toposequence with an altered soil water regime in western Victoria. Aust. J. Soil Research. 40: 903-926.

  Brouwer J. and R.W. Fitzpatrick (2002) Restricting layers, flow paths and correlation between duration of soil saturation and soil morphological features along a hillslope with an altered soil water regime in western Victoria. Aust. J. Soil Research. 40: 927-946.

4. Issues and comments

Staff matters and appointments

- Dr Skwarnecki's contract has been extended to end of November. An application has been made by Rob Fitzpatrick and John Keeling via Paul Wilkes to extend this to end of December.
- Finalise appointments of new CRC LEME geochemist and geomicrobiologist in Adelaide and advertise these positions.

Other

- Rob Fitzpatrick appointed Chairperson of Commission C2.4 (Soil Mineralogy) of the International Union of Soil Science.
- Prof Del Fanning, a world authority on Acid Sulfate Soils from the University of Maryland, USA visited field sites in the Mt. Lofty Ranges (5-8 September).

5. Outlook and work plan for the next Quarter.

- Mark Thomas (PhD student) to:
    - Complete and submit literature review.
    - Submit and present research proposal.
    - Familiarisation of NAP airborne geophysics datasets once delivered. Delivery expected in November.
    - Assess feasibility of acquiring additional high resolution magspec for Keyneton (Evans catchment) validation site.
    - Continue field orientation / familiarisation, particularly for Jamestown study area.
    - Identify the possibility of participating on pedology course.
    - Pursue publication opportunities for literature review.
- Continue discussions with Paul Wilkes (acting CEO), John Keeling, Ravi Anand, Charles Butt, Wayne Meyer, Mirko Stauffacher and Steve Rogers to finalise the high-priority new CRC LEME geochemist and geomicrobiologist appointments in Adelaide.
- Prepare and present keynote address "Environmental Science and the Agriculture Industry with emphasis on soils and agronomy: Time Bomb or New opportunities?" at the Australian Synchrotron Project Workshop on New Opportunities for Soil and Environmental Science (3-4 October, Melbourne).
- Present overview of "Geochemical and mineralogical processes in acid sulfate soils: implications for environmental and mineral exploration significance" at the CSIRO Glass Earth workshop in Sydney on 6-7 December.

Continue to develop a colour brochure on Theme: Acid sulfate soils: regolith processes and implications. This theme incorporates the use of Acid Sulfate soils in land management (dryland salinity and water quality issues).

2.4 Program 4: Salinity mapping and hazard assessment Program Leader: Dr Ken Lawrie

OVERVIEW

During this period the BRS issue was resolved, with BRS asked to leave the CRC. A new framework agreement between BRS and the Centre was reached, with the two organisations agreeing to collaborate and/or work independently on a case by case basis in the future. The separation from BRS led to the need to define the contract arrangements for the South Australian and Queensland (St George) NAP projects. After detailed negotiations with BRS, agreement was reached on a split of contract monies, outputs, milestones and responsibilities for South Australia. The Centre is to receive $540,000 for this work. A similar agreement is being forged in Queensland for work on the St George project, with $160,000 earmarked for the Centre. In this quarter, staff continued to work towards outputs on South Australia (first output due in November).

In this period Ken Lawrie, Colin Pain and Paul Wilkes undertook visits to potential clients and stakeholders in Western Australia, South Australia, Victoria, New South Wales and Queensland. Contact was also made with potential clients in Tasmania. Presentations were made at all locations, and favourable response to potential collaborative working arrangements and joint project submissions received. This led immediately to the submission of five generic salinity-related proposals to the Victorian NAP Board, and 3 proposals submitted to the Rural Industries Research and Development Corporation. The Centre also contributed to the development of a State-wide proposal for airborne geophysics to tackle salinity and other land use issues in Victoria, and scoped several potential projects in NSW in collaboration with colleagues from BRS and NSW government agencies. Other potential projects have been identified, and are in early stages of development.

In addition, a draft Strategic Action Plan for the Centre's Salinity work was produced for presentation to the Land Use Advisory Council. Input was also made to the Centre's Strategic Plan. Negotiations commenced with CSIRO Land & Water Division to re-focus their participation within the Centre.

On the science front, staff completed their contributions to the draft GILMORE report, and are awaiting feedback on peer review and discussions with BRS on how to advance this report to publication. Ken Lawrie gave a presentation on salinity mapping at the 16th AGC in Adelaide.

1. Work plan for the Quarter

Work in the first quarter of the 2002-2003 financial year saw the wrapping up of significant work on the GILMORE technical report, and commencement of substantive work on the South Australian and Queensland (St George) datasets. The workplan for the quarter was to focus on the following main tasks:

- Workplan development and agreement on outputs in 6 projects (Project management, Jamestown, Angas-Bremer Hills, Angas Bremer Plains, Riverland and Tintinara) in S. Australia;
- Commencement of work towards the outputs identified in the South Australian project;
- Communication of CRC LEME's Salinity science to peers and potential clients;
- On-going discussions on a strategic plan for Victoria;
- Development of a workplan and agreement for the Queensland (St George) project, and work towards delivering on that workplan.
- Presentation of papers at the 16th AGC in Adelaide.
- Development of a draft strategic plan for LEME's salinity science and business.

2. Work done against the work plan

The workplan was essentially followed.

In summary, main highlights in this quarter were:

- Detailed technical workplans refined. AEM, radiometrics and airborne magnetics data acquisition completed. Agreement reached with BRS, with workplans signed off by the South Australia NAP Board.
- In Victoria, a strategic plan for salinity mapping with NRE Victoria was progressed to a third draft; 5 project proposals for salinity mapping in different landscapes and scales (joint with NREVic) were submitted to the Victorian NAP Board in early August;
- GILMORE report. This draft document sets out the methodology for salinity mapping in a few different landscapes. Sections of the LEME contribution have been submitted for

peer review, and submitted as extended abstracts to the ASEG conference in February 2003. Still awaiting agreement with BRS on next steps for publication of this report.

- Qld (St. George area) outputs and milestones agreed with BRS and QDNRM. Draft agreement on split of monies, responsibilities, outputs and milestones reached, but signing of contract awaiting completion of discussions on products (late October).

3. Technical lessons learned.

- Program 4 staff completed the write-up of the GILMORE report that documents a systems approach to mapping and assessing salinity hazards. This involves the integration of regolith, hydrogeology and geophysics. Progress on this report is now awaiting BRS input. The technical finding and significance of this work were summarised in the previous quarterly report.
- Other projects: at preliminary stage only.

4. Potential Income

After protracted negotiations with BRS, the Centre settled on an agreement on work totalling $540,000 for the South Australian contracts. Given that the contracts had already been signed off between BRS and South Australia, LEME was unable to negotiate for a larger proportion of the work. Similarly, with agreements already having been reached between BRS and Queensland, LEME was in a position to secure a contract for $160,000 for work in the St George project.

Proposals for work in several States, totalling several million dollars have been submitted and/or are being developed with various clients.

5. Significant events

The departure of BRS impacted significantly on Program 4 in this quarter. However an amicable agreement has been reached with BRS on a way forward, and negotiations with CSIRO Land and Water on a re-focussing of staff into salinity issues will benefit Program 4 in the future.

6. Issues and comments

External

Funding through the NAPSWQ is still bedevilled by the complexities of the process of developing projects at several levels of government and community engagement. However, the separation from BRS has been received positively by external clients, and a large number of joint proposals suggested to us by colleagues and clients. Program 4 staff have been engaged in developing new project proposals during this quarter to create a pipeline of projects to replace those secured in this quarter.

Internal

The separation from BRS has ironically enable the development of detailed workplans for all projects, with clear identification of outputs and milestones. The amount of work identified in the first quarter requires additional staff to be employed (as per the Program 4 budget) and Centre Agreement. Staff hiring will

commence in the second quarter. Dr. Tim Munday (CSIRO) has been re-located from Canberra to Perth, effective from early August.

The draft strategic plan for salinity recommends a concentration of the Centre's salinity R&D business in one program (4), with non-salinity-related NRM issues to be tackled in Program 3.

7. Outlook and work plan for next Quarter

A draft strategic action /business plan for work in the area of salinity mapping, assessment and prediction was developed and sent out for comment. A second draft is being produced for submission to the Board. While the events leading up to the separation from BRS were fairly traumatic for Program 4 staff in particular, the response from external clients has been most favourable. The agreement that outlines a way ahead for BRS and LEME in this area is also encouraging.

Project: South Australian Salinity Mapping and Monitoring Support Project

1. ***Project aim***

The SA-SMMSP is using a combination of airborne electromagnetic, magnetic and radiometric (magspec) techniques allied with ground studies and hydrogeological modelling to improve our understanding of five strategically important catchments/areas within National Action Plan priority regions of South Australia.

2. ***Work plan for the Quarter***
   - Internal review and completion of Workplan and associated Project Schedules for Commonwealth Component of SA –SMMSP
   - Submission of CRCLEME component of workplan to LEME executive
   - Submission of Commonwealth Component of Project management and Project Schedules for sign off by SA – Nap Project Board
   - Initiate publicity of survey and work program with State partners
   - Initiate field program in SA (Jamestown, Riverland and Tintinara)
   - Develop Tech Transfer options with State partners

3. ***Progress***
   - Reviewed RESOLVE test swath data for Riverland Project area against available ground drilling and information on Blanchetown Clay unit.
   - Re-arranged data acquisition schedules for the SA-SMMSP in Riverland and Tintinara with aid of Ross Brodie and Ian Hone of GA, following review.
   - Planned and arranged ground geophysical data acquisition program to help resolve ambiguities in Test swathe results from RESOLVE system.
   - Worked with GA, PIRSA and CSIRO L&W staff in managing a review of new drilling and ground geophysics data.
   - Drafted a set of recommendations based on outcomes from review to progress the surveys for all areas originally defined in the scoping of the SA-SMMSP Project.
   - Assisted BRS in developing a project management strategy for the commonwealth component of the SA-SMMSP.

- Development and submission of CRCLEME Project schedules was put on hold pending review of working relationship between BRS and CRCLEME. This also affected planning for preliminary field studies.
- Tech transfer options discussed with SA-SMMSP Project coordinator and agreement reached trhat this would be revisited later in the year pending details on delivery of airborne geophysical data.
- Managed the postponement of an agreement on Commonwealth schedules at SA-SMMSP Board Meeting in August, pending future arrangements between BRS and LEME.
- Undertook a revision of the SA-SMMSP project schedules and budgets spread sheets to reflect changed business arrangement between BRS and CRCLEME. These documents form the basis for an agreement between BRS and CRCLEME.
- Completed collation of details of CRCLEME SA-SMMSP Project outputs for Program Leader and CEO. As with the project schedules, this document forms the basis for agreement between CRCLEME and BRS.
- Contributed to the negotiations between BRS and CRCLEME over responsibilities and duties for the SA-SMMSP, and was instrumental in helping secure a successful outcome from these discussions, through the preparation of documents detailing outputs and responsibilities for CRCLEME and project staff.
- Oversaw acceptance of schedules by SA-SMMS Project Board paving the way for CRCLEME to be in receipt of $541K from the overall project budget.
- Geophysical data acquisition completed for South Australian study areas.
- Preliminary data received for some areas.
- Began compilation of biophysical data for Riverland and Tintinara areas.

4. Issues and comments

- The management structure and protocols for the operation of the SA-SMMSP remains undefined.
- Communication between the Board/the Executive/ Program Leaders and Program staff lacks clarity and transparency making it difficult to appreciate underpinning rationale for decisions and direction.
- The roles and responsibilities of individuals at a project level is still to be resolved in some areas.
- The employment of an airborne geophysicist and "sign-on" by that individual to the proposed project outputs and responsibilities remains an issue requiring urget attention and resolution. The absence of this individual from the staff of the SA project could significantly affect our ability to delivery in a timely manner into this project.

5. Outlook and work plan for the next Quarter

- Collate project schedules/budgets refined by Project Area Coordinators and supply to Project Leader.
- Assist Project Leader in the submission of project schedules to CRCLEME Executive, CEO and Board for approval
- Participate in technical review of projects and review progress against miletones set by project schedules.
- Complete Project reviews for Riverland and Tintinara and collate similar reviews for other project areas and forward to Project Leader.

- Capture the outcomes from work done on forward modelling as CRCLEME reports for submission to SA-SMMSP Technical committee. This will be in the form of two reports – one each for Riverland and Tintinara.
- Complete summary report on scoping exercise done on DIGHAM test area in Riverland and outcomes from field study.
- Prepare, plan and execute field program for late November –early December, to include:
    - Logging representative core – Blanchetown Clay
    - Collation of additional borehole data – Riverland and Tintinara
    - Plan borehole logging and ground geophysics program for Riverland and Tintinara with BRS staff.
- Assist Andy Green and Ross Brodie in initiating developing Constrained Inversion project for Riverland and Tintinara.

Other activities:

- Prepare Extended abstracts for ASEG conference – Februrary 2003.
- Develop interactions in CSIRO's Healthy Country activities in WA, including contributions to Project plans.

General Comment

- There is a greater need to align the rationale, thinking and direction that underpins the environmental programs and activities of CRCLEME.

2.5 Program 5: Education and Training Program Leader: Associate Professor Pat James

Work Plan for the Quarter

- Attend conferences and workshops for promotion, student recruitment and research.
- Assist with organisation of LEME support for students to attend 16th AGC
- Help to develop and prepare LEME strategic plan
- Assist with advertisement and appointment of cash-funded and in-kind lecturers at Adelaide University
- Appoint administrative support staff for Adelaide node and develop administrative and support strategies for students and staff across all nodes
- Continue update of student database, respond to student requests for extensions, support etc. Confirm location of students within Programmes & Themes
- Visit students and staff at Adelaide, Perth and Canberra Nodes
- Develop program of student interaction across nodes, but within Themes, develop computer communication and Internet chat areas
- Encourage development of new workshops and short courses in conjunction with MTEC, VIEPS (Geophysics, GIS etc)
- Continue promotion and implementation of Virtual Regolith Worlds project

Work Done against the Work Plan

- Coordinated LEME activities and presented at the 16th AGC
- Organised Regolith Mapping workshop (Olary) for AU staff/students
- Set up LEME Adelaide office, attended AU node meeting, reported on E&T

- Submitted paper for ASCILITE conference in Auckland (accepted as poster)
- Attended 11th Australian Remote Sensing conference in Brisbane
- Attended 2nd Hyperspectral Remote Sensing Field excursion to Flinders Ranges
- Hosted international visitor (Dr Bob Kirby, UK) – sediments & environments
- Presented at Land User Advisory Council meeting in Canberra
- Chaired committee for LEME/AU staff appointments (Barovich, plus Direen & Joseph appointed)
- Developed strategies for Virtual Regolith Worlds and MTEC projects
- Developed and coordinated documents for advertisement of 30 LEME Scholarships
- Carried out research and supervision within the Mineral Mapping/Remote Sensing project
- Attended ANZ Geomorphology conference in Kalgoorlie as LEME promotion
- Submitted application for AU Stephen Cole the Elder teaching prize (successful)

16th AGC Adelaide – I assisted with organising and hosting this significant LEME event, attended by many LEME staff and students from 1-5 July. A LEME welcoming function was held at the Adelaide Rowing club. The LEME booth was a focus of activity all week. Along with other LEME staff and students, I presented at a LEME session.

Landform and Regolith mapping workshop – on 7-10 July I coordinated and then attended 2 days of this workshop held in Tikalina, Luxemburg and Cockburn, Curnamona Province, NW SA. This LEME workshop was organised and lead by Steve Hill with Kylie Foster. There were 15 students and staff attending from Adelaide University and from PIRSA. The workshop was highly successful.

Adelaide Node activity, Node Visits and LEME E&T activity – During the reporting period Maureen Blake accepted an appointment part time (4 days), part funded by LEME & PIRSA as administrative officer for the E&T office and the Adelaide node. Subsequently Maureen & I moved into a newly refurbished suite of offices on the ground floor of the Mawson Laboratories and began to set up a LEME node office, support centre and library of LEME-related publications. A meeting for all Adelaide node members was convened on by John Keeling on 28 August. I presented a summary of E&T activities. Short research presentations were then made by 7-8 PIRSA and Adelaide researchers. The E&T committee has not met during the reporting period, though I have met with all members individually (excepting Mehrooz Aspandiar). Communication has been via email, telephone and videoconferencing. Discussion and approval of individual student requests (top-ups, extensions, interim scholarships) have been carried out. The main task was the development and distribution of information, rules, and application forms for the forthcoming found of 2003 LEME scholarships (see topic on students and scholarships).

Research Paper Submission – I submitted a paper entitled "Full steam ahead": Managing the learning environment of an Australia-wide complex multi-institution research and research training programme in the earth and environmental sciences, with technology" to the forthcoming ASCILITE conference in Auckland in December. The paper has been accepted to be presented as a poster at the conference.

11th Australian Remote Sensing and Photogrammetry Conference (Brisbane). I attended the conference from 2-5 September with Alan Mauger and two LEME students (Ian Lau and Sean Mahoney). Two papers were presented and two posters. Sean Mahoney won the prize for the best student poster at the conference. (note – attendance associated with potential student projects and project 1.2 – Mineral Mapping South Australia)

Hyperspectral Focus Group – the second meeting of the Adelaide Hyperspectral Remote Sensing Focus group was held as a field excursion through Beltana, Mt Fitton and Arkaroola from 9-12 September. I attended the excursion with John Keeling and Alan Mauger. PIMA Mining (Stephen Biggins) and Perilya Ltd (Ian Gregory) representatives attended the field workshop and demonstrated the value of both airborne (HyMap) and satellite (Hyperion) hyperspectral datasets in the exploration for their key targets, being SAMag/magnesite and Zinc silicate-oxide, respectively (note – attendance associated potential student projects and with project 1.2 – Mineral Mapping South Australia)

International Visitor – Dr Bob Kirby, Ravensrodd Consultants Ltd, UK visited AU node from 9-23 September. Dr Kirby attended part of the Flinders Ranges Hyperspectral workshop. He also presented a Departmental Seminar, which included topics ranging from engineering solutions to estuarine siltation, coastal zone management practices and the management and rehabilitation of toxic pollution in soils and landfill.

Executive duties – I participated in various Executive meeting and phone conferences. I presented regular reports to the executive and HQ. I assisted with the preparation of the draft strategic plan and attended a day long session of the Land User Advisory Council in Canberra which reviewed the progress of the plan. I assisted the the new Project Officer (Ian Roberts) in the preparation of the LEME 2001/2 Annual Report.

Adelaide Cash funded lecturing positions - finalised. –.The Level A Exploration Geophysics position (AU) was offered to and accepted by Dr Nick Direen. Nick took up his position on 30 September, to join with Karin Barovich as the 2 Adelaide University funded, but 100% in kind LEME staff. Nick and Karin are currently developing research proposals to work within the LEME strategic directions. The two LEME funded Level C lecturing positions have now been released by the acting CEO. Offers of appointment have been made and John Joseph has accepted the Exploration Geophysics Lectureship, and he hopes to arrive in Adelaide in early November. The final lectureship and second Level C (Regolith Geology) position has now been accepted by Steve Hill.

Short Courses and Workshops –
5 courses ran in this period: -

- **Regolith-Landform Mapping Shortcourse** 7-10 July – Tikalina, Curnamona Province presented by Steve Hill and Kylie Foster with 15 students and staff attending from Adelaide University and from PIRSA.
- **Environmental Mineralogy** Honours shortcourse 8-12 July at ANU (Prof Tony Eggleton (ANU Dept Geology) assisted by Dr Ulrike Troisch and Ms

Berlinda Crowther). 9 registered attendees including 2 LEME PhD, 1 LEME Hons, 4 VIEPS Hons, 1 LEME MSc.

- **Regolith Geology, Regolith Applications & Mineral Exploration** MSc shortcourse 12-23 August at UC (Dr Ian Roach, Assoc. Prof Graham Taylor, Assoc Prof Ken McQueen, Dr Steven Hill, Ms Leanne Hill, Dr Leah Moore, Dr Richard Greene, Dr Neil Rutherford (Rutherford Mineral Resource Consultants), Dr Nigel Radford, Dr Patrice De Caritat & Dr Dirk Kirste (Geoscience Australia)). 11 students attended including 4 Adelaide MSc/Hons, 1 UC PhD, 1 South Africa professional (Council for Geoscience) and 5 NGTN MSc (CODES & UWA).
- **Workshop on Regolith Geology and Geochemistry.** - Sons of Gwalia Ltd. Held at Leonora. 4 days workshop: lectures and field work. 10 SOG staff from all exploration offices across WA. Given by Charles Butt and David Gray. (Organized by Ravi Anand)
- **Workshop on Regolith Geology and Geochemistry.** Metal Mining Agency of Japan.13 day workshop: lectures and practicals held at ARRC, plus field visits. Given by: Charles Butt, Ravi Anand, Ian Robertson, David Gray, Cajetan Phang, Ian Tapley and Tim Munday. Originally for 6, but in the end only one came, from Tokyo.
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Other than those documented elsewhere, I have begun discussions with a number of LEME members about the development of future short courses, including Graham Heinson (Airborne geophysics), Ron Watkins (Environmental geochemistry), Steve Hill (further Regolith/landform mapping), Ian Robertson/Charles Butt/Ravi Anand (regolith mapping/exploration geochemistry), Vic Gostin and others (Clastic fluviatile sedimentology), Brad Pillans (Regolith Dating), Alan Chivas and others (Stable isotope geochemistry) and anticipate other courses in remote sensing, 3D visualisation/modelling and GIS

Virtual Regolith Worlds –4 Polycom ViaVideo desktop conferencing systems were purchased and distributed one each to Adelaide (node office), Perth (Aspandiar) and Canberra (UC – Roach, ANU - McPhail). These systems will allow multiple conferencing via the AU Bridge and also links to videoconference teaching suites. Using network IP sytems, they are much cheaper to run than via ISDN phone lines. The aim is to start with few high quality systems and then to develop multiple (and cheaper) sytsems for students and staff. Other components of the project include the following. Leah Moore has agreed to produce a DSHMP website. John Wilford has requested VRW funds to complete programming of the CAL module on "Radiometrics". Andreas Schmidt-Mumm requested funds to purchase a site licence for Micromine software for geochemical modelling, but was successful in requesting this funding from Adelaide Geology & Geophysics Department. Joel Brugger requested VRW funds to buy a site licence for "Matlab" to aid in the development of geochemical modelling teaching packages. However, this software is already available with Graham Heinson's Geophysics group.

LEME students and scholarships - Scholarships - Papers were prepared including revised rules for Postgraduate and Honours scholarships, introductory information for Postgraduate and Honours scholarships, application forms for Postgraduate and Honours scholarships and an advertisement for the "Australian" newspaper. These documents were circulated for approval by the Education and Training committee and

by the Executive. I have also prepared similar rules and application forms for Undergraduate Summer Scholarships. It is anticipated that there will be two Summer Scholarships per University pa. These documents advertising 30 Geoscience scholarships were released on October 1.

Students – During the reporting period the Admin. Officer completed the new office system for recording and communicating new and/or altered student contracts. I have dealt with correspondence from the following students –

- Kirsty Beckett (CUT Geophysics) regarding approval of her scholarship (implemented with supporting documentation sent to HO),
- Louisa Roberts (SRES, ANU) request to become LEME Honours student with funding from Program 3 (response in preparation);
- request from Andrew McPherson for 5 month extension of LEME scholarship and operating (response in preparation);
- Leanne Hill has not yet received the scholarship extension previously approved for 6 month PhD extension (under investigation)
- Chris Gunton – top-up funding to APA PhD Scholarship (implemented)
- Greg Shirtliff – top-up funding for 6 month extension of PhD Scholarship (implemented)

Income

None

Significant Events

Sean Mahoney (AU Honours) won prize for best student poster at Brisbane ARSPC.
PRJ won AU Stephen Cole the Elder teaching prize.
LEME advertised for 30 Geoscience scholarships in the Australian and elsewhere.
Publication of excellent Annual Report.

Issues and Comments

Frustration due to continued lack of Communications Officer support for LEME promotion communication and E&T, insufficiently useful website, difficulties in liaison with HO especially regarding budgets, constant need to rebuff concerns regarding instability in LEME.

Outlook and workplan for the next Quarter

- Receive, filter, rank and offer LEME scholarships
- Continue revision of SRD and increase access and communication across nodes. Attend SE Australia Regolith conference in Canberra
- Continue operation of new E&T projects (VRW, MTEC)
- Develop liaisons with other CRC E&T programmes
- Present at ASCILITE conference, submit papers to IGARSS (Toulouse) and ALT (Samos) conferences for July 2003

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3. ASSISTANT DIRECTORS - CENTRE CULTURE AND LIAISON

3.3 Assistant Director, Adelaide: Mr John Keeling.

Development Centre Culture

- 16th AGC (1-5 July) was a major event for the Adelaide Node with LEME as a silver sponsor, booth exhibitor, and co-ordinator of the Regolith Symposium. Some 50 LEME staff and students attended contributing 29 talks and 15 poster presentations on LEME activities. A social evening was held at the SA Rowing Club and an executive meeting was convened on the 5th July.

Communication

- Adelaide Node meeting was held on 28 August. Update provided on LEME Board and Executive activities. Presentations on recent activities and project updates were given by A Crooks, B Hou, V Stamoulis, A Fabris, I Lau, S Mahoney and H Carey.
- Maureen Blake (Administration E&T Program 50%) has been extended to 80% with topup funding from PIRSA. This will allow Maureen to act as a point of contact and information for the Adelaide Node in addition to her administrative duties.
- Field camp planned on Ticklina Station (16-18 Oct) to review current and future project activities in the Curnamona district.

Issues

- Delays with the LEME web page have set back opportunities to improve communication and networking between the Adelaide Node and other LEME participants.

3.4 Executive Committee Member, Canberra/ANU - Dr Bear McPhail

Meetings

During the July-to-September quarter I was involved in LEME executive meetings in Adelaide at the 16th AGC and phone hookups subsequently.

LEME Annual Report

I assisted with the report by harassing ANU LEME researchers to provide details for last year's publications, reports and activities, as well as checking the accuracy of the report.

Supervision of Honours and Ph.D. students

Supervising several LEME students, i.e., Will Kimber and Katie Dowell (Honours), and Chris Gunton and Frank Reith (Ph.D.).

Research Fellows at the ANU (LEME cash-funded positions)

During the last quarter, the selection committee (de Deckker, McPhail, Chappell, McQueen, Pain and Allen) decided on a short list of five applicants, out of the original 24, to interview for the two positions at the ANU. Four of the applicants gave seminars and had interviews with the selection committee and human resources people. The fifth person accepted another position. Two

candidates were chosen unanimously and subsequently sent offers in the present quarter.

Teaching
I was, and am, active in coordinating and teaching undergraduate courses, i.e., 3rd-year Regolith, 2nd-year Earth Resources and 1st-year Earth Sciences.

Forward Planning - October to December quarter
ANU Facilities Audit
I have offered to compile a list of facilities available to LEME researchers at the ANU. This is in progress at present.
Research Fellows at the ANU
I will be actively helping the new research fellows to develop research projects, in conjunction with others in LEME. When they have accepted I will announce them to LEME and provide details of their backgrounds and skills.
Honours and Post-graduate students
Present LEME Honours students will submit in mid-November. LEME Post-graduate students will continue their research and several are in the writing up stages and should submit in the near future. We are actively searching for good applicants for the present round of applications.
Regolith conference in Canberra
I have been actively promoting this conference (November 20-21) and will participate as a reviewer of abstracts and as an attendee.

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4. OPERATIONS

4.1 Business Manager : Mr Gary Kong

A) SAFETY
No work related lost time injuries, accidents or major threats of such were reported.

B) WORK PLAN (and associated progress and outcomes) for the Quarter

1) **Visit: UNIVERSITY OF CANBERRA (July 16)**
The amount of block research funding derived by the University of Canberra through CRC LEME was discussed. I was tasked to assess whether the amount of block research funding (including IGS Income) derived by University of Canberra through CRC LEME in this year is equivalent to or in excess of A$100,000. The end result of the subject exercise indicates that the annual financial return for the University of Canberra is in excess of A$100,000.

2) Visit: BUREAU OF RURAL SCIENCES, BRS (July 17)
Scheduled cash commitment to the CRC from BRS as well as conflict of interest in relation to salinity activities were discussed.

3) Special Board Meeting in Adelaide (August 2)

Unanimous resolutions concerning BRS were passed by the Governing Board:

a) BRS would fully withdraw from CRC LEME with immediate effect;
b) BRS and CRC LEME would cooperate in the future on a project-by-project basis as appropriate to either party's interests; and
c) CRC LEME will continue to provide technical and policy advice to Government through BRS provided this does not prejudice the position of CRC LEME.

4) Implementation of Cash Funded Positions

Taking into account the funding shortfall of BRS, the Board endorsed the recommendation of executives that the implementation of cash funded appointments be postponed until funding and budgetary issues had been clarified and resolved.

5) Advice to CRC Secretariat and Ministers Concerning Withdrawal of BRS

Assistance was provided to formulate official advice to Ministers and CRC Secretariat regarding the withdrawal of BRS.

6) Meeting with Dr Wendy Jarvis, Deputy Departmental Secretary

Professor Nigel Radford and myself met with Dr Wendy Jarvis on 19 August to discuss the withdrawal of BRS and the associated implications.

7) Liaison with South Australian State Agency

Terms and conditions concerning prospective salinity work in South Australia were discussed and examined.

6) Unsound Financial Management and Reporting Practices of Core Participants

Concern was expressed as to the unsound financial management and reporting practices of many core participants and hence the necessary management reporting to Executives, the Board and to the relevant authorities.

7) Review of In-Kind Contributions Claimed by Core Participants and Review of Allocation of CRC Resources Across Core Participants

For quality assurance purposes, a Review Committee was established by the Board to assess in-kind contributions of core participants. The Committee will also seek to assess the allocation of CRC resources across core participants. The composition of the Committee includes Dr David Garnett (Committee Chair), a representative from each of the four universities, and Mr Gary Kong (or another with the appropriate knowledge and expertise).

8) Advertising and Recruitment for the Post of LEME CEO

Recruitment activities took place in August for the selection of LEME CEO.

9) Board Meeting, Audit Sub-Committee Meeting, and Annual General Meeting

Above meetings were held in Perth on 29 August.

10) Portfolio of Projects

It was resolved at the Board Meeting that all projects be reviewed by Executives and the new CEO, with a view to maintaining effective resource allocation and balancing competing demands. The complete portfolio of projects was approved and funding for the projects concerned was endorsed for the current financial year only.

It was also noted that all projects would be reviewed by the new CEO and be subject to further review by Executives and the Board in February 2003, when the Strategic Plan has becomes more finalised.

11) Commercialisation

Taking into account the importance of commercialisation, it was resolved at the Board Meeting that mechanisms for commercialisation are to be developed.

12) Operating Budget 2002/2003

The Board approved the Centre Budget for 2002/2003 (Year 2) and noted the allocation of funds across core participants for Year 2.

The Board resolved that the overall Centre Budget should be carefully managed in terms of staff appointment and allocation of operating funds for projects.

13) Financial Statements 2001/2002

The Board approved the audited Financial Statements for the year ended 30 June 2002, which was presented in the format required by the CRC Secretariat for Annual Reporting purposes and for audit purposes.

14) Audit Report 2001/2002

The Board accepted the 2001/2002 Audit Report from PricewaterhouseCoopers. The Audit Report for Year 1 of CRC LEME 2 is unqualified and that the Auditor had provided assurance to the Commonwealth that CRC LEME met all the relevant legislation, accounting standards; and necessary obligations defined in the Commonwealth Agreement in the reporting year. In the opinions of the Auditor, the financial management systems of LEME are effective and can be relied upon to provide information required to meet obligations under the Commonwealth Agreement and other relevant legislation.

15) GST Audit

A Goods & Services Tax (GST) Audit was undertaken in August at the CRC by the Australian Taxation Office (ATO) and the Auditor from ATO had confirmed that CRC LEME met all the GST requirements and legislation.

16) Annual Report 2001/2002

The Board endorsed in principle the draft Annual Report for 2001/2002, and the final version of the Annual Report was submitted to the CRC Secretariat on time.

17) Prospective Retirement of Board Chair

Dr Ross Fardon, Chair of CRC LEME Governing Board, announced his prospective retirement at the end of the current financial year

18) LEME2 Trade Mark Registration

LEME1 trademark was originally registered by CSIRO on behalf of the participants in CRC LEME 1. The application to register the CRC LEME 2 trademark has been rejected on the basis that it is substantially similar to the registered trademark of CRC LEME 1.

Hence a deed of assignment has been prepared and this assignment has become necessary as the assignment provides for the transfer of LEME1 trademark to the participants of the CRC for Landscape Environments and Mineral Exploration ("CRC LEME 2"). The advice we have received from IP Australia is that they will reconsider the application if both trademarks are registered in the same names, in this case the participants of CRC LEME 2.

19) WA State Government funds

To date, a formal reply has not been received as to when WA State Government funds will be provided to LEME. I was advised that the proposal for funding has been submitted to the Minister for consideration.

20) Management Data Questionnaire

As per the requirements of the CRC Secretariat, the Management Data Questionnaire which is a mechanism designed to annually capture and assess the performance of the CRC, was submitted on time.

21) Withdrawal of Cash Contribution from the University of Canberra

Discussions have been under way at the Board level as to the prospective withdrawal of cash contribution from the University of Canberra to CRC LEME.

C) MANAGEMENT, DEVELOPMENT OF SYSTEMS AND POLICY

Assistance has been provided by the Headquarters to core participants for establishing systems to meet the monthly reporting requirements of core participants.

D) HUMAN RESOURCES

i) Secretary / Centre Support Officer was on annual leave from 8 August to 12 August
ii) Dr Dennis Gee was offered the position of LEME CEO to commence 5 November 2002.
iii) Professor Nigel Radford resigned on 1 October, effective 25 October
iv) [Mr Keith Scott subsequently appointed Acting Program 2 Leader]

E) FINANCES

Monthly statements from core participants for the month of July have recently been received by Headquarters; hence financial statements are not yet available.

F) COMMERCIALISATION

Contract:

- Straits Resources - The potential use of geochemistry for base metal exploration at Nifty, WA: $13,527 (excluding GST).

G) OUTLOOK

- Implementation of Cash Funded Appointments
- Review of In-Kind Commitments of Core Participants
- Review of Allocation of CRC Resources Across Core Participants
- Prospective Withdrawal of Cash Contribution from the University of Canberra
- Confirmation of Withdrawal from BRS and the associated Deed of Release
- Confirmation of WA State Government Funding to CRC LEME
- Deed of Assignment – Trade Mark

4.2 Centre Support Officer: Mrs Sue Game

Role:
The role of the Centre Support Officer combines that of Personal Assistant to the Chief Executive Officer, Secretary to the Executive Committee, Admin Assistant to the Business Manager. The CSO and Admin Assistant coordinate the CRC LEME Headquarters office activities (travel arrangements, meetings, stationery, equipment, filing, correspondence, reports). The LEME Publications are managed from Head Office - ie production, stock control, sales and statutory distribution, maintenance of a LEME Library. LEME Publications include Open File Reports, confidential research reports, LEME News, Annual Reports, Conference Proceedings, maps, and so on.

Headquarters personnel comprise: [arriving 5.11.02 CEO - Dr Dennis Gee], Deputy CEO - Mr Paul Wilkes, Business Manager - Mr Gary Kong, CSO - Mrs Sue Game, Accountant - Mr John Mills, Admin Assistant - Ms Jennie Campbell.

Highlights and specific events and task during the quarter:

- *16th AGC, 1-5 July, Adelaide*. Paul Wilkes, in his role as Operations Manager, was heavily involved in arrangements for registration and travel for LEMErs, $30K was set aside to assist LEME researchers and students to participate in the Conference. Paul also presented the paper jointed prepared by himself and Dr Smith on "A Vision for Regolith Research in Australia". There was a major LEME presence at this Conference, which is reported on within Program Reports.
- *Dowerin Field Day (WA), 2829 August.* LEME booth organised by Sue, manned by Dr Mehrooz Aspandiar and Dr Ron Watkins from Curtin Geology.
- *The Board met in Perth on Thu 29 August*. All HO staff were involved in the extensive preparation of meeting documents. Sue arranged venue, catering and travel/accommodation for Board Members and also a display of LEME products and posters for the Board and Visitors to view.
  - Meeting documents prepared for the approval of the Board included of Project Summaries, the 2002-2003 Budget, draft text for the Annual Report and draft Strategic Plan.
- *Professor Gerry Govett, the CRC Visitor,* came to Perth 28-30 August . He attended the Board meeting and met with LEME personnel.

- *CRC LEME Web Page*. On request from ACEO, Sue expedited and coordinated the upgrade and launch of the CRC LEME web site. Jennie dropped her usual duties to concentrate on the web. Because the web site had been designed but left unfinished by the previous Communications Officer on a Macintosh Powerbook, this involved getting the equipment set up, becoming familiar with the software "Adobe Go Live", locating and manipulating the trial web page, receiving input from Executives, then liaising with Brian Harrold at ANU to 'go live'. This we achieved by our stated deadline of end September (2nd October actually).
  - One of the first things to go on the web was extensive material from the E&T Program Leader, Pat James, advertising scholarships, scholarship guidelines, applications forms and so on.
  - the CRC LEME home page will be continuously updated. The latest is a list of staff contacts, next will be Project information, taken directly from the Project Summaries and placed under the respective Research Programs.
  - Congratulations to Jennie on a job well done - an extraordinary learning curve was required. Jennie will continue to maintain until the appointment of a new Communications Officer.
- *The Executive Committee* met four times per teleconference during the quarter, and all but he Business Manager had a meeting in Canberra in July.
  - *Changes in Executive personnel*. With former Operations Manager, Mr Paul Wilkes being appointed Acting CEO by the Board, Prof Nigel Radford was appointed Deputy CEO, with Prof Lindsay Collins continuing as Assistant Director, Perth. The position of Operations Manager lapsed.
- *Appointment of new CEO.* Dr R Dennis Gee was appointed, and will commence 5 November 2002. This followed the advertising and selection process, which took place during August. Sue was involved in arrangements for Selection Panel, their paperwork and meetings.
- A modest amount of liaison took place with *incoming CEO, Dr Gee*, prior to his official commencement, with Sue providing a lot of background material on LEME for Dr Gee, as well as organising some travel for him, a mobile phone, a computer and a car.
- *Land Use Advisory Council* met 23/24 September at University House and GA in Canberra. Board Member Mr Kevin Goss chaired this inaugural workshop. The Council was supported in Canberra by Chris Pigram's PA, Judy Dunn. Sue organised venues, catering, travel of delegates, distributed meeting documentation and so on.
- *Annual Report 2001-2002*. Mr Ian Roberts, based at Adelaide University, was contracted to produce this year's report. Sue and Jennie collated statistics and provided all sorts of information for Ian, and helped with the proofing. We retained the same WA based designer as previous years, DesignMine. A .pdf copy of the Annual Report was lodged with the CRC Secretariat by the due date of 30 September 2002.
- *CRC LEME Management Data Questionnaire*. John Mills and Sue provided the material for the MDQ - mentioned by the Business Manager under item 20). Statistics are taken from the Annual Report information and other financial and staffing records. The CRC Secretariat asks CRCs to record the amount of time taken to prepare the MDQ. For CRC LEME it took two people, seven hours in all.
- *Communications Officer*. Advertisement, Job Description and Selection Criteria were revamped, ready for new appointment mechanisms to commence mid October.

Outlook

- Commencement of new Chief Executive Officer - 5 November 2002
- Update of PR mailing list for LEME News and Annual Reports
- Receipt and Distribution of Annual reports
- Collating articles for LEME News to go out by end December 02
- Finalisation and distribution of Strategic Plan
- Commencement of new Communications Officer
- Christmas Break
- Major workshop early 2003 for LEME Executives and researchers to review Project in line with finalised Strategic Plan