House of Representatives Standing Committee on Science and Innovation

Inquiry into coordination of the science to combat the nation's salinity problem

A submission from the Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME)

October 2003

TERMS OF REFERENCE

The House of Representatives Standing Committee on Science and Innovation shall inquire into and report on the Commonwealth's role in managing and coordinating the applications of the best science in relation to Australia's salinity programs.

In conducting the inquiry, the Committee will give particular consideration to the

A) Use of salinity science base and research data (including the development of new scientific, technical and engineering knowledge) in the management, coordination and implementation of salinity programs

B) Linkages between those conducting research and those implementing salinity solutions, including the coordination and dissemination of research and data across jurisdictions and agencies, and to all relevant decision makers (including catchment management bodies and land holders)

C) Adequacy of technical and scientific support in applying salinity management options.

BRIEF INTRODUCTION TO CRC LEME

CRC LEME – the CRC for Landscape Environments and Mineral Exploration was set up in July 2001 and its mission is to create breakthroughs in mineral exploration and environmental management through generating and applying new knowledge of the regolith. In so doing CRC LEME and its core partners will become world leaders in regolith research and its application to mineral exploration and natural resources management. With its geographic spread of partners, multi-disciplinary project teams and extensive student activities CRC LEME, is well placed to achieve its mission. See paragraph two of the introduction section of this submission for definition of regolith.

CRC LEME has been working on major NAPSWQ projects in South Australia, Queensland and Victoria and is involved in plans for new projects in these and other States.

Partners in CRC LEME are : Australian National University, CSIRO Divisions of Exploration & Mining and Land & Water, Curtin University of Technology, Geoscience Australia, Minerals Council of Australia, New South Wales Department of Mineral Resources, Primary Industry and Resources South Australia, and University of Adelaide.

CONTENTS

1. INTRODUCTION

The National Land and Water Resources Audit has estimated that 5.7 million hectares of land have high potential to develop dryland salinity, and this area could increase to 17 million hectares by 2050. This threat is now recognised as serious in all States and Territories. While there is a major threat to agricultural land, salinity is also a major threat to biodiversity and to regional and urban infrastructure. Water quality in a significant proportion of Australia's rivers is poor and groundwater resources are also being salinised.

In Australia, the regolith (the soil, sediments, and weathered bedrock, that lie between fresh air and fresh bedrock) is the major salt store in the landscape. Groundwaters move through these regolith materials, mobilising the salt which salinises our groundwaters, waterways and land. The regolith thickness is highly variable and ranges from zero (outcropping bedrock) to 200 metres. Most water and soil studies to date have been based on studies of the top couple of metres. This is clearly inadequate and needs to be rectified by harnessing geoscience knowledge and particularly the new discipline of regolith science.

Strategies to map, predict and mitigate salinity are urgently required. National reports have recognised that there are significant knowledge gaps in our understanding of salinity and its mitigation and remediation. It is recognised that if these knowledge gaps are not addressed now, they will reduce the effectiveness of the $ 1.4 billion investment in the National Action Plan for salinity and water quality (NAPSWQ).

Whilst there is an understandable desire to see more on-ground action this should be done with a good foundation of science on both the local causes of salinity and a scientific assessment of the proposed remediation strategies.

2. COMMENTS ON TERM OF REFERENCE A

A) Use of salinity science base and research data (including the development of new scientific, technical and engineering knowledge) in the management, coordination and implementation of salinity programs

2.1 The mapping of salinity hazards and the quantification of salinity processes in the context of groundwater flow systems are still in their infancy, in terms of the science. There is a need for further development and application of specialist techniques. In each area the groundwater and salinity processes and dynamics need to be understood within a three dimensional regolith framework

2.2 There is a need to utilise wider datasets - such as those acquired by Geoscience Australia (GA) and the State Geological Surveys. The national Geoscience Accord, between GA and the State Surveys, has been very positive in providing basic geoscientific information to help mineral exploration. Similar knowledge sharing could greatly assist in applications to Natural Resource Management (NRM).

2.3 A key issue in some States (eg WA and to a lesser extent SA) and in certain CMAs within other States, is a perceived desire to see on-ground actions rather than more science. This is illustrated by the profusion of drainage ditch schemes in WA, with the science struggling to keep up with the implications of on-ground actions. Essentially, while the concept of community-driven salinity actions is desirable, the lack of a strategic research capacity is leading to almost no new science at all, and certainly a lack of new science to underpin major public (and private) investments

2.4 Overselling of some aspects of science, in general by the Commonwealth, has undermined the science credibility with peer groups and ultimately with the communities. Examples include the labelling of airborne aeromagnetics as the 'ultrasound of the earth ', and latterly the rather simplistic 'five simple steps' to salinity management. Science credibility issues are the greatest challenge for the NAP and NHT.

2.5 At the level of Catchment Management Authorities there is a basic lack of new science advice from local science advisors to CMAs. Money is used to employ people (at CMA level) but they are not taking up new science. Furthermore there is potential for conflict of interest. There is a lack of separation between science advisors to CMAs from those benefiting directly or indirectly from the award of contracts. Often the same research groups or consultants are giving advice and benefiting from the contracts awarded.

2.6 Recent work by CRC LEME has shown that Airborne Electromagnetic (AEM) surveys could be flown with much wider line spacing than has been recognised or implemented to date without reducing their effectiveness. This brings a very significant cost reduction to these surveys which enables much larger areas to be covered for a given budget. This has been documented in a recent publication (Lawrie et al, 2003)

2.7 There is a lack of peer review of contracted work, and research in general. There is a need for an independent body that provides peer review to impartially assess science needs within a catchment, gaps in data, evaluation of tenders and contracts, and interpretation of results. All this needs to happen both at CMA level, and also at a more strategic level between Commonwealth and State organisations

2.8 There is a need for more scientific case studies to be made available as reference material to show the effectiveness of salinity investigations, their outcomes, and the links to remediation strategies. Recent work in which CRC LEME has had a major role in SA and Queensland will shortly become available as case studies. These have shown the crucial importance of asking appropriate questions for the research to answer and the need for multi-disciplinary studies between complementary groups working together.

3. COMMENTS ON TERM OF REFERENCE B

B) ***Linkages between those conducting research and those implementing salinity solutions, including the coordination and dissemination of research and data across jurisdictions and agencies, and to all relevant decision makers (including catchment management bodies and land holders)***

3.1 Each NAP project has links with CMAs, to facilitate community input and knowledge transfer, but it needs to be recognised that the science behind salinity solutions is not simple and each case is different. Uninformed oversimplification has raised community expectations unfairly particularly in describing the value of airborne electromagnetic methods.

3.2 There is a capacity issue - with so many new CMAs to service, how can individual CRCs and research agencies be expected to service such a diverse client base. ?

3.3 There is a need for better linkages between researchers working on biological and engineering solutions – and integrated catchment management solutions. The CRCs working on salinity need to collaborate more effectively, as is also required for NRM and research agencies in general. There are moves now between the CRCs to achieve closer linkages on future projects. This is important in making good use of the multi-disciplinary scientific skills required to tackle the issues.

3.4 The time taken to initiate research projects can be very lengthy - it can take two years to get a project started. This causes high overheads in time and resources, and can jeopardise the timely delivery of good science.

3.5 R&D corporations are fairly impenetrable to many new players. Decisions on research collaboration and support are not transparent, and can hamper the trialing of new methodologies. In general they appear to be resistant to new science.

3.6 New CRCs such as CRC LEME, although working on salinity, find it difficult to gain access to decision makers within State and Commonwealth agencies. This access is necessary to promote the value of scientific input.

4. COMMENTS ON TERM OF REFERENCE C

C) Adequacy of technical and scientific support in applying salinity management options.

4.1 There is a shortage of demonstrated case histories of 'new' science in salinity management. There have been successful outcomes of scientific applications in some specific landscapes. However few examples using geophysics have been documented to date. Existing examples include Lake Toolibin in WA and Riverland in SA.

4.2 CRCs working mainly on biological solutions do not appear to be using the new science from other CRCs as yet - plans are in progress to rectify this.

4.3 On the engineering side, some success has been achieved by LEME at Riverland and Loxton in SA but not many positive examples have been documented to date. Drainage ditches in WA are being emplaced without scientific reason and may prove to be a disaster in the long run. There needs to be scientific study of the value and effects of drainage ditches.

5. SUMMARY OF RECOMMENDATIONS

5.1 Coordinated planning, funding and implementation of major programs in support of NRM activities require effective coordination between the different levels of government at both Commonwealth and State levels.

One model that warrants consideration is the National Geoscience Agreement (NGA). The NGA covers collaboration between Commonwealth and State geoscience agencies – this has facilitated effective collaboration, avoids duplication, and works towards national standards and objectives. To address salinity issues, effective collaboration requires the inclusion of the above geoscience agencies, together with State NRM agencies, CSIRO and CRCs. Closer integration between the various CRCs working in salinity is required. Presently there is no mechanism to facilitate coordination.

5.2 Following on from recommendation 5.1 - a new model of funding to address salinity is required. The current model of devolution to CMAs is not delivering optimal or timely solutions. There is potential conflict of interest between advisors to CMAs and recipients of contract funds from CMAs. See also section 2.5 of this submission.

5.3 Future funding for NAPSWQ style salinity projects needs to address the link between research groups and implementers of solutions. Such research should be separated from any competitive bid process.

5.4 An integrated holistic approach needs to be applied to the design of future salinity projects. No one technology will provide all the answers. Careful consideration and articulation of project objectives are critical to successful projects. In addition frequent dialogue between research providers and users is also very important.

The current Riverland project in South Australia, in which CRC LEME has been working, is a successful model of project implementation

5.5 The design of future airborne electromagnetic (AEM) surveys as part of salinity investigations needs to consider recent research from CRC LEME on effective line spacings. This dramatically improves the project economics, and further strengthens the valuable role of AEM.

6. REFERENCES

Lawrie, K.L., Gray, M, Fitzpatrick, A., Wilkes, P.G and Lane, R.(2003) Reducing the acquisition costs of airborne electromagnetic surveys for salinity and groundwater mapping. Preview October 2003. Australian Society of Exploration Geophysicists.