

Salinity Inquiry  
Submission No. 11.....

**The Committee Secretary  
Attention: The Honourable Mr. Gary Nairn,  
Chairman  
House of Representatives Standing Committee on Science and Innovation  
Suite R1 — 116  
Parliament House  
Canberra ACT 2600**

**October 14th 2003**

Dear Mr. Nairn,

**Submission from the Pelham Group to  
The House of Representatives Inquiry into coordination of the science to  
combat the nation's salinity problem**

The Pelham Group respectfully submits the attached document for consideration by the above Inquiry.

The submission relates to concerns held by the members of the Pelham Group that the need to acquire and interpret salinity data over the long-term is not being addressed adequately and, as a consequence, it may become impossible to analyse the data to assess the impact of engineering and other actions taken to control and remediate salinity.

We recently made a broader submission to the Review of Salinity Mapping Methods in the Australian Context for the Natural Resource Management Standing Committee.

In this Submission we address the specific issue of Technology Applied to Groundwater Salinity and propose that this matter be addressed by:

1. The development and definition of standards for data collection and interpretation that will be applied to all NAP (and other) geophysical surveys for salinity; and
2. The development of a Quality Assurance process that ensures that the standards are attained.

We urge the Inquiry to consider this proposal and remain available to assist the Inquiry in its deliberations

Yours sincerely,

Dr. Robin Greenwood-Smith  
Convenor  
The Pelham Group

## Submission on Technology Applied to Groundwater Salinity

This document is provided in response to the House of Representatives Standing Committee on Science and Innovation invitation to provide submissions to its Inquiry into Coordination of the Science to Combat the Nation's Salinity Problems.

The response is provided by the Pelham Group, which is an unincorporated association of professionals who have been studying salinity mapping methods for some years in anticipation of the application of geophysics to environmental measurement and monitoring and, in particular, to salinity mapping programs as part of the NAP for Salinity and Water Quality.

The Pelham Group was initiated, and led to this stage, by: -

- Robert J Smith F Aus IMM, FTS
- Robin Greenwood-Smith M Aus IMM
- Allan J Bremner FEIANZ, AFAIM

We are responding in particular to the Committee's stated concern regarding

*"the use of the 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."*

We concur with the Committee that good science is crucial for the nation to develop appropriate programs to deal with the problems presented by salinity. This submission addresses the conditions that need to be met in order to ensure the application of *"good science in the use of electromagnetic induction techniques and related mapping technologies in the NAP priority catchments for*

- *mapping and monitoring ground water systems and salinity hazards and*
- *determining the efficacy of various engineering interventions"*

The Pelham Group believes that there are significant issues which must be addressed in the current approaches to the measurement and monitoring of the remediation of dryland salinity. These are as follows:

- The onset of dryland salinity has been a slow, long-term process. There have been many short-term changes which have accelerated or slowed this trend, superimposed on this process. These include annual seasonal effects, longer-term climatic changes and variations in farming and other land management practices.
- Reversal of this long-term trend will predictably be a long-term process. Similarly the impact of short-term changes superimposed on the long-term trend will sometimes accelerate the improvements and perhaps provide false indications that the remediation measures are working. Conversely, they may indicate that correct measures are not working and hence discourage their continued application.

- Any methods put in place to measure and monitor changes in dryland salinity must be capable of repetition over time and the measurements must be robust enough to enable temporal trends to be established validly. If this is not achieved then it will be extremely difficult, if not impossible, to determine whether remediation methods are working, particularly since these trends will need to be determined in timescales of decades.
- Current geophysical methods which are being applied to mapping and monitoring groundwater salinity were primarily designed and developed for mineral exploration. In particular, electromagnetic methods have generally been designed to achieve greater depth penetration (and less depth discrimination) than is required for groundwater studies. Precise calibration and repeatability have, understandably, not been priorities in mineral exploration applications, but these will be crucial for monitoring long-term changes.
- The fundamental issues of calibration and repeatability of these geophysical methods must be given a high priority (and supported by appropriate research and operational funding) to underpin long-term efforts to reverse dryland salinity trends.
- A diverse range of geophysical methods exists now. They will no doubt continue to evolve and develop with time. The indicators of salinity measured by these future novel techniques may well be different to those currently in use. This means that either intercomparative programs must be maintained to ensure the valid comparison of the data or that all the data sets must be capable of being converted into a common model of the subsurface, with appropriate error estimates. If this is not done then comparison and recognition of significant temporal changes will not be possible.
- Base line studies should be completed as soon as possible over critical areas before remediation commences; and repeated at regular intervals to develop understanding of short and long-term trends in groundwater salinity.
- Standards must be defined and enforced on current data gathering (usually performed by contractors) to ensure that it will survive over time and enable the recognition of both short and long-term changes in the groundwater salinity profile.
- Raw data must be recorded and preserved to a standard which will permit further processing by new and improved interpretation methods, which will inevitably evolve, and to ensure that the data sets are comparable.

We submit that these matters are critical to ensure that geophysical surveys of salinity will meet the measurement and monitoring objectives of the NAP. We have four grounds for this assertion:

1. Geophysical methods for salinity measurement have not been properly optimised for measurement at shallow depth

2. The interpretation of the survey data must use methods that are valid at shallow depth
3. The calibration of the geophysical measurements must be sufficiently accurate for comparison with later data sets
4. The way in which the data are supplied and stored must render it capable of comparison with future measurements, including those taken using different measurement equipment

We propose that these critical issues be addressed by

1. The development and definition of standards for data collection and interpretation that will be applied for all NAP (and other) geophysical surveys for salinity; and
2. The development of a Quality Assurance process that ensures that the standards are attained.

These tasks will require adequate funding, management, and technical input from a multidisciplinary team of professionals to develop and implement the required standards.

The combined skills and experience of the Pelham Group members is well matched to address these technical and management issues in the measurement and monitoring of groundwater salinity by geophysical methods. We believe that the development of these solutions is best performed by a professional group, independent of those involved in survey and interpretation. We would welcome the opportunity to expand on our expertise and experience in this area in the near future.

C. Quinn  
13/12/03