C. M. Jewell & Associates Pty Ltd

OUR PRACTICE

- **Hydrogeology**
- **Land Contamination**
- **Environmental Audit**

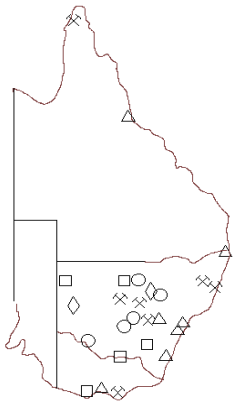
C. M. Jewell & Associates (CMJA) is a consultancy practice specialising in the field of hydrogeology and in the assessment and management of contaminated land and water. We began operating independently in mid 1992, and since that time have successfully completed well over 300 projects throughout eastern Australia.

The many, varied aspects of ***hydro-geology*** form the core of our practice. These include the assessment, development and management of groundwater as a resource for potable and irrigation supply, the protection of groundwater from pollution, and its control where it creates problems for mining and civil engineering excavation or slope stability or where it forms a transport pathway for chemical contaminants.

Hydrogeology is a multi-disciplinary science, involving aspects of chemistry, geophysics, soil science, surface water hydrology and wastewater engineering. Our experience and capability extends into the overlapping areas of these disciplines, and we have developed a network of associates in the related areas of geotechnical engineering, wastewater treatment and environmental planning.

We also practise extensively in the area of ***contaminated land assessment and management.*** Where it is appropriate and cost-effective for our clients, we can - and do - undertake site contamination assessment and remedial design in-house. Increasingly, however, our practice is focusing on the performance of external audits or reviews, and on the provision of specialist services within larger, multi-company consortiums.

Chris Jewell is an ***Environmental Auditor*** (Contaminated Land), appointed by the Environment Protection Authority (Victoria), and a ***Site Auditor*** accredited by the Environment Protection Authority (NSW). In this role he undertakes independent audits of contaminated land.



CMJA PROJECTS IN EASTERN AUSTRALIA

- ○ ***Agriculture***
- □ ***Waste Disposal***
- Δ ***Contaminated Land Assessment and Remediation***
- ◊ ***Water Resources***
- ⚒ ***Mining***

Mining Projects include: Weipa (bauxite) - dewatering system; Cobar (copper) - tailings dam piezometers; Attunga (limestone) - water supply - EIS; Cargo (gold) - groundwater supply; Dunmore (sand) - EIS; Hazelwood (coal) - privatisation due diligence; Peak Hill (groundwater supply).

Agricultural Projects include: The Mount feedlot - groundwater management plan, modelling and design of plume capture system; Wirrinya feedlot - EIS; Dubbo Abattoir and Wool Scour - EIS and groundwater management plan; Beemery Cotton Project - groundwater modelling, EIS studies; effluent irrigation projects in Victoria and western NSW.

Water Resources Projects include: Lower Darling River - assessment of groundwater/surface water interaction; Water Quality Monitoring in Australia - assessment of monitoring programs for CEPA; Macquarie Valley - exploration and development of groundwater irrigation supplies. Lachlan Valley - regional and borefield modelling.

SOME OF OUR CLIENTS

Agriculture

- Clyde Agriculture
- Fletcher International Exports
- Moxey Farms
- Twynam Pastoral Company

Mining

- ARCO Coal Australia
- Cobar Mines
- Comalco Minerals & Alumina
- David Mitchell-Melcann
- Tailings Treatment

Industry

- BHP
- Caltex
- Meriton Apartments
- Shell
- Thiess Contractors

Property Finance

- National Australia Bank
- AMP Asset Management

Commonwealth Government

- Commonwealth Environment Protection Agency
- Department of Defence

NSW Government

- Dept of Urban Affairs & Planning
- Dept of Public Works & Services
- Dept of Land and Water Conservation
- Roads & Traffic Authority

Local Government

- Bourke Shire Council
- Dubbo City Council
- Narromine Shire Council
- Parkes Shire Council
- Sutherland Shire Council
- Yarrowlumla Shire Council

C. M. JEWELL & ASSOCIATES PTY LTD

PO Box 10 Wentworth Falls NSW 2782 Ph: 02 4759 3251 Fax: 02 4759 3257 Email: postie@cm-jewell.com.au

OUR PEOPLE

Chris Jewell - BSc Geology, MSc Hydrogeology. 26 years' experience in hydrogeology, both in Australia and internationally. Extensive local experience in the assessment of contaminated sites, EPA-appointed Environmental Auditor (Contaminated Land).

Ian Brandes - BSc (Hons), (Geology & Geophysics), PhD School of Civil and Environmental Engineering. 3 years' experience in geological and hydrogeological investigations.

Caitlin Spiller - Dip Resource Mgmt. 2 years' experience environmental and wildlife services.

Craig Wicenciak - BSc (Geology & Environmental Management). 5 years' post-graduate experience in contaminated land assessment and management.

Natalie Addison, Jan Cadogan, Kathy Dobson, Toni Jewell, Kathy Palmer and Jenny Tully - our administrative and office support team.

OUR CAPABILITIES

Environmental Audit

In the specific context of contaminated land, "environmental audit" generally refers to an external review of a site assessment or validation reports prepared by other consultants, or review of the process of site remediation itself.

An audit may be statutory when carried out to comply with requirements imposed by legislation, a planning instrument, or a development consent. Alternately, an audit may be non-statutory when it is carried out for due diligence purposes or as a requirement of a civil contract or agreement.

On completion of an audit in NSW, the auditor issues a Site Audit Statement and a Summary Site Audit Report.

Chris Jewell was first appointed as an Environmental Auditor by the Environment Protection Authority (Vic.) in 1995 and by the Environment Protection Authority (NSW) in June 1998. Since accreditation he has carried out seven statutory audits in Victoria and well over 100 site audits in NSW.

Soil and Groundwater Contamination Assessment

We have participated in many soil and groundwater contamination assessment studies. Among the most interesting are:

- Homebush Bay and Newington - the 2000 Olympic venue. Chris Jewell was project manager for the investigation carried out by Coffey Partners in 1989-91, and CMJA was a major participant with CH2M HILL Australia in the Homebush/ Newington remedial investigation undertaken in 1993-95.
- Cockatoo Island Contamination Investigation (Department of Defence).
- RAAF Villawood (Department of Defence) - assessment of chlorobenzene contamination of groundwater.
- Katoomba-Leura Gasworks – a site with severe chemical contamination of shallow groundwater - investigation, modelling and development of remedial action plan.

Litigation Support

We have provided expert witness support to parties appearing before Commissions of Inquiry and Coronial Inquests, and in cases before the Land and Environment Court.

Examples include the Thredbo landslide inquest, the Parkville Piggery inquiry, the Cadia Goldmine inquiry, and the Tomago Sandbeds litigation. Chris Jewell has acted as a court-appointed expert for the NSW Supreme Court.

Groundwater Modelling

We use, in-house, a range of modern groundwater modelling and visualisation software. This includes:

- Visual MODFLOW
- INTERSAT

} - finite difference flow

- MODPATH - particle tracking
- SEEP-W - finite element flow and transport
- Visual GROUNDWATER - 3D visualisation
- MOC - method of characteristics
- PRINCE - analytical flow and transport

Examples of projects where we have used these models include: design of a plume capture system downgradient of a feedlot (INTERSAT), assessment of the impact of leakage from off-stream water storage (MODFLOW), risk assessment of leakage from effluent storage lagoons (PRINCE), Darling River surface-groundwater interaction (finite element), inflows to leachate control drain at Homebush Bay (finite element), Thredbo landslide (SEEP-W), Parkes Borefield (MODFLOW).

Groundwater Geophysics

We make extensive use of geophysical techniques, during groundwater and environmental investigations.

Examples include:

- Mapping of sand lenses beneath areas proposed for effluent irrigation and water storage in western NSW and Victoria - frequency-domain electromagnetics (EM34), DC resistivity.
- Groundwater exploration in the Macquarie Valley - DC resistivity, high-resolution aeromagnetics.
- Borehole logging - gamma, resistivity, SP and electromagnetic.
- Mapping of contaminant plume from leaking effluent storage lagoons - EM34, time-domain electromagnetics (Protem).
- Groundwater exploration in shallow river gravels - frequency domain electromagnetics (EM31).
- Searching for buried drums, pipes and tanks (EM31).

Groundwater Geochemistry

We operate a range of field measurement equipment, including pH, redox and conductivity meters; soil vapour probes; and a Hydrolab H20G down-hole hydrochemical probe.

We have also undertaken several acid-sulphate soil management studies in coastal areas of New South Wales.