

**AREAS OF EXPERTISE**

- project management
- contract management
- business management
- quality management
- health & safety
- water management
- hydrogeology
- water supply development and management
- water licensing
- wastewater & contaminant management
- mine water control
- groundwater modelling

**EDUCATION**

Flinders University of South Australia, Bachelor of Science (Geology), 1986

Deakin University/  
Association of Professional Engineers Scientists & Managers, Australia, MBA (Technology Management), progressive

**PROFESSIONAL HISTORY**

Saprolite Environmental,  
Senior Principal Consultant,  
2012 to present

Saprolite Pty Ltd, Managing Director, 2012 to present

Saprolite Environmental,  
Principal Consulting Hydrogeologist, 2009 to 2012

Saprolite Pty Ltd, General Manager, 2009 to 2012

Rich Consulting Services,  
Principal Consulting Hydrogeologist, '99 to 2009  
Richards & Associates (WA) Pty Limited, Company Director, '99 to present  
Woodward-Clyde, Senior

**REPRESENTATIVE EXPERIENCE**

Garth Richards, Principal Consultant, has worked in the industry since 1985. His fields of expertise are project management, water management, hydrogeology, geology, geophysics, and quality management. Much of his experience has been in the investigation, development and management of groundwater resources throughout Western Australia and in the Northern Territory. He also has considerable experience in mine water control/dewatering studies for the mining industry in Western Australia and Queensland. He has participated in a wide range of projects at all levels up to project management/direction, and in the last three to six years, management of staff, field and office.

**EXPERT WITNESS**

- Provision of expert advice in matters concerning search for groundwater associated with Murrin Murrin's water supply projects.

**STAKEHOLDER CONSULTATION**

- Stakeholder and community presentations on behalf of Murrin Murrin with respect to their water supply projects, general overview on the principals of hydrogeology, water resources and palaeochannel development within WA's NE Goldfields.

**WATER LICENSING**

- Direct liaison and lobbying with Department of Water (formerly Water and Rivers Commission) on behalf of clients. Work also includes preparation of licence applications and amendments, operating strategies, monitoring programs, DoIR tengraph plans, general tenement location plans, advertising requirements. Clients have included Lawlers, Murrin Murrin, Jundee, Simcoa, Norton Paddington Operations.
- Review and input into the preparation of Notice of Intent and Borefield Development Plan for Environmental Approvals for the proposed development of the Grey Mare Borefield at Murrin Murrin.

**WATER SUPPLY SCHEMES**

- Project Manager, Director and Field Supervisor for the development of an 18ML/day palaeochannel borefield at Grey Mare, 100km NW of Murrin Murrin (WA). Work included development of all technical work scopes, tender calls for drilling and test pumping. Stage 1 was completed in 2006 with 20 production bores and Stage 2 in 2007 with 18 production bores. The total project comprised 5-6 months each Stage with the management of a team of wellsite supervisors, 2 to 3 drilling rigs and 2 test pumping rigs, surveyors and earth moving contractors.
- Hydrogeological and water resource technical advisor to Murrin Murrin Operations, including provision of Borefield Performance Assessment on 4 palaeochannel borefields (NE Goldfields) that included 110+ production bores pumping in excess of 27ML/day.

Hydrogeologist, '96 to '99  
Woodward-Clyde, Project  
Hydrogeologist, '94 to '95

Hydro Resources / Resource  
Investigations,  
Hydrogeologist to Senior  
Hydrogeologist, '92 to '94  
Western Mining Corporation  
(Exploration Division)  
Geologist to Hydrogeologist,  
'87 to '92

Western Mining Corporation  
(Windarra Nickel Project),  
Geological Assistant, '86

CRA Exploration (South  
Australia), Field Assistant,  
'86

AMDEL (South Australia),  
Technical Assistant, '85

## TRAINING

Area Warden Course, '01  
Job Safety Analysis  
Training, '01

Mining and Resource  
Contractors Safety &  
Training Association  
(MARCSTA) Induction, '97,  
2000, '02, '04, '06

Internal Auditor Training ISO  
9001, 9002, 9003, Quality  
Assurance Services, '98

Senior First Aid Certificate, St  
Johns Ambulance, '97, '00

24 Hour Health and Safety  
Course, Woodward-Clyde,  
'96

Project Management Course,  
Woodward-Clyde, '95.

5 Day Fundamental of  
Supervision Course, AIM '90

3 Day 4WD Training, '92

1 day 4WD Training, '01

AMF 9th Groundwater  
School, Adelaide, '87

## WATER SUPPLY SCHEMES (CONTINUED)

- Ongoing advice for Murrin Murrin for total site water management, including scoping studies, test pumping analyses, overseeing technical works programs, reviewing work undertaken by others. Regional investigation desk-top studies and literature reviews.
- Supervision and reporting of drilling and testing exploration and production bores to supply process water to Bronzewing Gold Operations (WA).
- Hydrogeological and water resource technical advisor to Newmont Yandal Operations (Jundee/Nimary Gold Mines), including provision of Borefield Performance Assessments and Hydrogeological Review on 2 borefields that included 12 production bores pumping 4ML/d.
- Field management of drilling and testing two 300mmND subartesian production bores and two monitoring bores completed at depths of 350m at Eneabba (WA) for the North Mine mineral sand project. Pumping yields were in excess of 4.3 ML/day from each bore completed in the Yarragadee Formation of the Perth Basin.
- Project management and field management of drilling and testing two 200 mmND artesian bores to depths of 550 metres at Lake Macleod for the Dampier Salt Gypsum Project (WA). Total free flowing discharge is 3 ML/day, and water temperature is 50°C.
- Field management and site supervision of drilling and testing programmes including borefield development. Such projects include 3.5 ML/day borefield at McArthur River (NT) and 12 ML/day borefield at Paraburdoo (WA).
- Regional study and assessment of potable and process groundwater supply prospects within 50km of Honeymoon Well Joint Venture (WA). Supervision and reporting of drilling and testing exploration and production bores in various aquifers to supply potable water to a proposed 300 person camp and process water to a proposed nickel processing plant.
- Supervision and reporting of drilling and testing low yielding exploration and production bores to supply potable water to Forrestania (WA).
- Project management, supervision and reporting of supply & development of groundwater resources for process requirements (3 ML/day) for Leinster Nickel Op. and potable water for the mill/mine and Leinster township. This also involved regional groundwater investigations and the training of field personnel.
- Regional studies & assessments of water supply prospects & supervision of & reporting on exploration drilling & installation & testing of bores to supply process/potable groundwater to the following W.A. projects/areas: Agnew, Davyhurst, Jasper Hill, Kambalda, Lady Bountiful, New Mexico, Sand King/Siberia, Thiel Well.

**AFFILIATIONS**

International Association of Hydrogeologists

Geological Society of Australia

Australian Drilling Industry Association

**BOREFIELD REHABILITATION**

- Project Director, Manager and Peer Reviewer of bore rehabilitation of selected production bores at the Sandhill Well Borefield at Jundee Gold Mine.
- Supervision and reporting of the rehabilitation of five production bores that were affected by iron bacteria that were previously completed into the Yarragadee Formation of the Perth Basin Eneabba (WA).
- Design and partial supervision of rehabilitation of four production bores that were affected by iron encrustation in the Emu Borefield (Agnew, WA).

**GROUNDWATER MODELLING**

- Multi-layer groundwater flow model predictions, calibration, data auditing, and transient simulations for dewatering at Century Mine (Qld), and Ernest Henry (Qld).
- Multi-layer groundwater flow model development for use in long term pumping optimisation on palaeochannel sand aquifers at Leinster (WA) and in open cut dewatering scenarios in anisotropic fractured rock aquifers at Forrestania (WA).
- Multi-layer conceptual groundwater flow model design and set-up for numerical modelling at Murrin Murrin Borefields including overall project direction and management.

**HYDROLOGY AND SURFACE WATER STUDIES**

- Catchment mapping for surface water harvesting projects at Murrin Murrin and Jundee Gold Mine.
- Project direction and management of technical staff for surface water hydrology studies and drainage designs for water harvesting projects at Murrin Murrin and Jundee.

**PROJECT AND BUSINESS MANAGEMENT**

- EPCM Contractor role in management of a large water supply borefield project (Grey Mare – Murrin Murrin), including Camp Management in a remote area, Contractor Management, Logistics, Communications, Health and Safety. Capital cost for borefield was \$70M+
- Project management, in a non-technical role, over a 12-month period, for a landslide-engineering project. The project objectives included geotechnical investigation and assessment as part of review of major rock slope failure affecting a \$US1.98 billion Power Station and National Highway construction in Indonesia.

**QUALITY ASSURANCE**

- Design & implementation of Management Systems for Quality Assurance & Quality Control in Hydrological and Hydrogeological Work Practices to AS/NZSISO.9001, World Health Org and Aust. Drinking Water Guidelines.
- Design and implementation of work procedures, guidelines, checklists, and forms for work practises in hydrology and hydrogeology in accordance with AS/NZS 5667.

**GROUNDWATER MONITORING & WATER MANAGEMENT**

- Design, planning and implementation of Sampling, Measurement and Analysis Plans (SMAPs) using QA/QC management principals for monitoring surface water and ground water at various mining operations within WA. Including: Agnew, Lawlers, Three Springs, Mt Keith, Murrin Murrin, Tiwest (Kwinana). Also included a Job Management role at Mt Keith, Lawlers, and Murrin Murrin.
- Training of clients' monitoring staff and own staff in the implementation of the SMAPs, and in water monitoring and sampling techniques, including calibration of equipment, baseline testing, field water quality measurements, sample preservation, the use of sampling and monitoring equipment.
- Review and audit of Kalgoorlie Nickel Smelter and Kambalda Nickel Concentrator, in relation to their respective groundwater and surface water data, monitoring programmes, and issues (potential and otherwise) that are prevalent at these operations.
- Design, planning and implementation of Sampling, Measurement and Analysis Plans (SMAPs) using QA/QC management principals for monitoring potable water supply systems at various mining operations within WA. Including: Mt Keith and West Musgraves
- Implementation, supervision & reporting of groundwater monitoring programmes & procedures for water supply schemes at Agnew, Kambalda, Leinster & Sand King/Siberia, in W.A.
- Wellfield and aquifer systems assessment and regulatory reporting for major groundwater extraction schemes at Agnew, Bannockburn, Gidgee, Jubilee, Jundee/Nimary, Leinster, Meekatharra, Mt McClure, Mt Keith, Mt Monger, Mt Morgans, Mt Pleasant, Murrin Murrin, Ora Banda (W.A. Goldfields), Kemerton (south-west coast), Lake Macleod, Three Springs (west coast), Cadjebut, Paraburdoo, and Tom Price (Pilbara) in WA; & at McArthur River in NT.
- Groundwater monitoring compliance reports for Government environmental authorities for mining operations at Agnew, Bannockburn, Jundee/Nimary, Lawlers, Meekatharra, Mt Keith, Mt Morgans, Murrin Murrin (W.A. Goldfields), and Three Springs (west coast) in WA.

**WASTEWATER AND CONTAMINANT MANAGEMENT**

- Seepage management and hydrogeological investigations into the migration of contaminant seepage from tailings storage facilities in NE Goldfields, WA (Agnew, Lawlers, Murrin Murrin, Jundee).
- Project management, technical supervision of drilling and installation works for seepage recovery bores at Murrin Murrin's tailings storage facilities (WA), including site supervision of bore drilling, baseline chemical testing, trial testing and test pumping, modelling and reporting.
- Acid rock drainage investigations and seepage investigations of ore stockpiles and concentrate storage facilities for a confidential client in WA.

**WASTEWATER AND CONTAMINANT MANAGEMENT (CONT)**

- Environmental compliance reporting for a confidential industrial site at Kwinana, WA.
- Project management and specialist hydrogeological advice for Phase I and II Environmental Site Assessments, Groundwater Monitoring Events, Soil Validation, and Soil Remediation projects for selected Service Stations in Perth, and country WA.
- Site supervision and reporting of drilling and construction of experimental observation and production bores for recovery of contaminants beneath an industrial site at Baldivis (WA).

**MINE WATER CONTROL**

- Mine dewatering investigations at Simcoa's Moora Quartz Mine, including dewater and monitor bore installation, test pumping, hydraulic analyses, stakeholder liaison, hydrogeological reporting and licensing
- Preliminary investigations for pre-feasibility of pit dewatering from open pits at Murrin Murrin's laterite nickel project.
- Provision of expert technical advice in matters associated with groundwater, dewatering impacts, and water quality issues in relation to the Caijiaying Zinc-Gold Project, Hebei Province, China.
- Site supervision of drilling, installation and testing of dewatering bores in palaeochannel and fractured rock aquifers at Mt Pleasant Gold Operations (WA).
- Project management and field management of the Cockburn Pit dewatering borefield augmentation and operation at Mt McClure Gold Mine (WA).
- Project management and field management of drilling and testing of a dewatering wellfield (60 ML/d from 12 bores 300m deep) in a Cambrian limestone aquifer for the Century Mine (Queensland).
- Hydrogeological and dewatering studies of the Wedge Pit and Toedter Pit at Gidgee (WA) which included impact assessment of dewatering on other groundwater users.
- Dewatering investigations at open cut gold mines at Bronzewing (WA). This included supervision and reporting on the installation and testing of production dewatering bores.
- Pre-feasibility dewatering investigations at proposed open cut nickel mines at Honeymoon Well (WA). This also included supervision and reporting of installation and testing of test dewatering bores.
- Supervision and reporting of installation and testing of dewatering bores at open cut nickel and gold mines at Forrestania and Ora Banda (WA), and underground nickel mines at Forrestania.
- Investigations to assess potential groundwater inflows and dewatering requirements to established underground mines at Agnew and Leinster (WA).