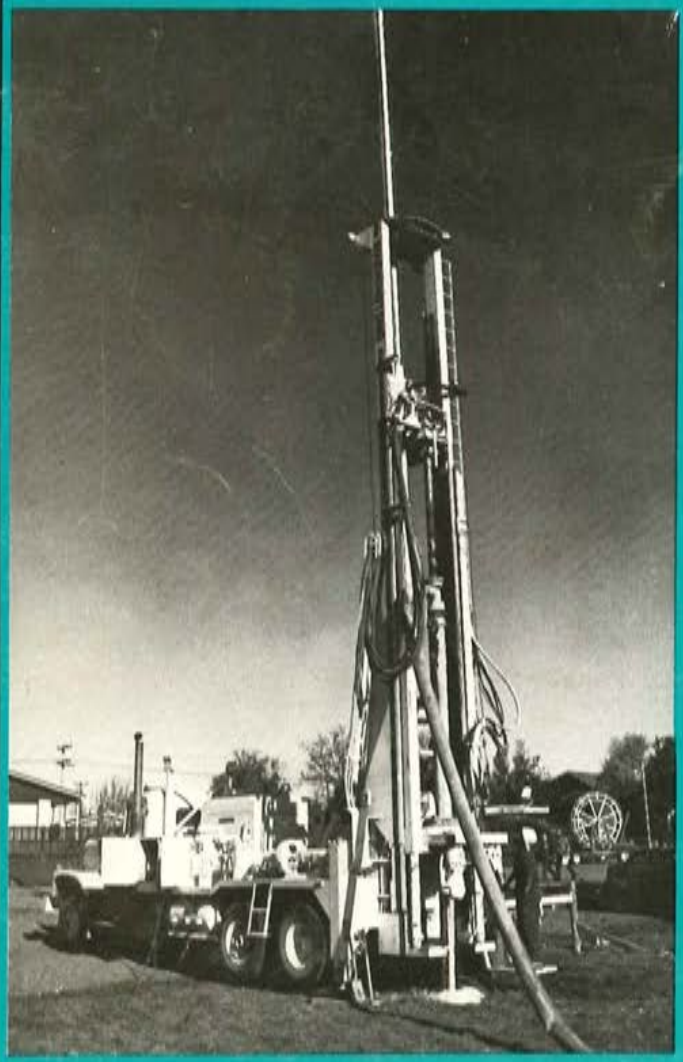
New Zealand

THE DRILLER

1984 CONFERENCE



The New Zealand Drillers Federation Inc.

SEPTEMBER 1984

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September 1984

New Zealand
THE DRILLER

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From the President

Conference hustle and bustle over

Things are now back to normal in Timaru after a hectic period leading up to and during the conference.

I would like to thank all federation membets and staff, trade associate firms, overseas visitors and guest speakers for making the conference such a success.

Many thanks to Lyell McMillan and his crew, to Barry McKenzie and his Ministry of Works' crew from Duntroon for making their drilling rigs available for the demonstrations.

Congratulations to all those who passed our conference examination. We hope you found the conference beneficial.

A special thanks to A M Bisley & Co Ltd and Johnson Screens for the award of a study scholarship to Australia. This award is greatly appreciated by the Drillers Federation and along with the training school, it's a great boost to the drilling industry.

The 1984 conference photograph is included in the magazine and copies may be obtained by writing direct to Carrick Studios Ltd, PO Box 326, Timaru.

On the subject of photos, I would appreciate it if any members who took photographs at the conference could send me the negatives as I would like to compile a conference record.

In your conference packs you received registration details for the Australian International Conference to be held in Bangkok in June 1985. If anyone was unable to attend the conference and requires details, please drop me a line.

If there is enough interest we may be able to make a bulk booking for this conference. Please let me know if you are interested in attending.

Hamish Pearson and Pat Garnett have stepped down from the Federation Executive and I would like to thank them for all their time and effort, since the formation of the Drillers Federation. Thanks also to John McCallion, who was unable to attend conference this year and welcome to Murray Carlyle and Bain Webster who were elected to Council at the Annual General Meeting.

I trust with the approach of spring all members can look forward to an upturn in work.

Good Drilling.

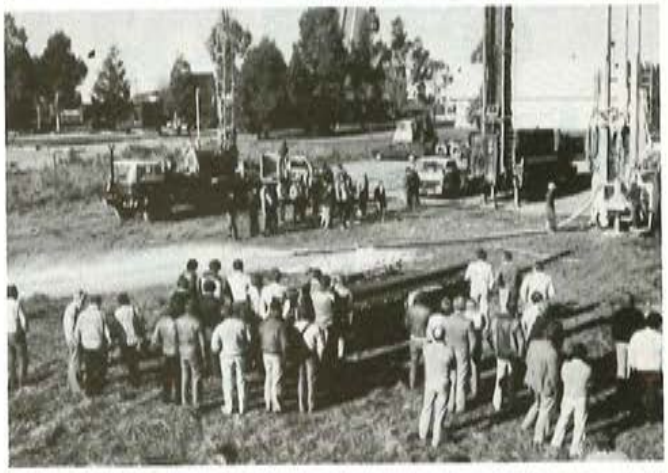
Bill Washington

Delegates of the New Zealand Drillers Federation 1984 conference take time out for a team shot.

Copies of this snap are available from Carrick Studios Ltd, PO Box 326, Timaru, phone 81-657. Prices are $5.50 for a 5x7, $8.50 for 8x10, and $12.50 for 14x11. This includes postage.

Annual get-together opens in

Record numbers of delegates and trade exhibitors turned up in Timaru late July to attend the 1984 New Zealand Drillers Federation annual conference.



Around 140 people attended the three-day meeting at the Chateau Timaru where the conference sessions, drilling demonstrations, trade display and social functions were held.

Outgoing Minister of Energy Bill Birch officially opened proceedings on the evening of 25 July with an address which expressed optimism for future drilling projects provided the Labour government continues with planned energy development programmes.

Business sessions began proper on Thursday morning with a talk on safety in the drilling industry by Paddy White, a construction safety inspector with the Labour Department.

Delegates were told that workers were most at risk in their first year on the job, in their fourth year, and again in their ninth year. Accidents often occur in year one because new employees are overawed by their new environment, overconfidence takes its toll in the fourth year, and by the ninth year a worker becomes complacent.

Mr White emphasised the importance of using the correct equipment, footwear and electrical fittings on work sites.

The next speaker was Groundwater Consultants' Alan Pattle who spoke about drilling contracts. John Beattie, a Wellington lawyer and director of Groundwater Consultants, then covered the legal aspects of contracts.

The Ministry of Works was well represented at the conference and Dr Mike Broadbent was their first speaker with a paper on geophysical surveys as a guide to coal exploration.

He spoke about the different types of geophysical testing used to determine physical properties in the earth. On or above surface, downhole, and rock specimen tests all reveal different information and can be used to confirm or negate what other tests have shown.

If test drilling is used in conjunction with surface surveys (magnetic, gravity, seismic refraction or reflection testing), then projects can become more cost-effective, he said.

Next on the agenda was a practical demonstration of one of McMillan Drilling's two Schramm rotary rigs.

After drilling out a layer of gravel, a shoe pipe was lowered and the locally-developed Suredrive downhole hammer went into action.

Managing director of Smith International (Australia) George Fyfe took the floor after lunch to speak about positive displacement motors or dynadrills. The dynadrill principle, he said, is used where you put a tool on a conventional drill string and don't have to rotate it.

Dynadrills are used extensively in the oilfields and also for small holes.

The importance of accurate drill logs was highlighted by the next speaker, Dr Hugh Thorpe, from the MWD Hydrology Centre in Christchurch. He spoke on his work to find out how much useable groundwater there is between the Rakaia and Ashburton Rivers.

Well logs from the area have supported geological data based on historical knowledge and now the MWD hopes to predict future groundwater behaviour.

To do this, the department plans to use and build a computer model.

"This is where drillers' logs are essential to provide information about the geometry of the aquifer, ie, elevation, thickness, standing water level, specific capacity etc.

"Then having those holes in the ground, we need longer term information on water level fluctuations. The more field information the better."

But in reference to that axiom of the computer world — garbage in, garbage out — Dr Thorpe said a wrong log was worse than no log. Information from wells must be accurate.

Next up was Morris Mathewson, also from the MWD in Christchurch. He too pointed out the importance of receiving detailed information from drillers.

He referred to contract forms used by the MWD — one for major work and a smaller form for minor work.

These contracts offer protection for both parties, he said.

The main things his department wanted to know about a well was soil type, location of aquifers and quantity and quality of water in those aquifers. Drillers should be prepared to carry out bailing and pumping tests when required.

"It's not good enough to work on a gut feeling." The MWD is interested in paying for information, and not just for holes in the ground, he said.

Timaru on optimistic note

In his fifth and final appearance for Petrocorp, Doug Chase presented an update on his company's operations on and offshore Taranaki. He also talked about Petrocorp's problems with the disposal of drill cuttings and waste.

A founding member of the Drillers Federation, Mr Chase, said he hoped to attend future conferences despite his retirement as Petrocorp's project manager next year. He expressed his satisfaction with the growing interest from outside groups in federation activities.

"We've come a long way since those formative night meetings in Hamilton about 12 years ago.

"Each year we become more knowledgeable through the subjects presented at this conference." As well as a wide variety of papers, the conferences had seen demonstrations of core drilling, casing, well screen, pump setting and cable tool, percussion, air percussion, and rotary rigs of all shapes and sizes.

Paul White of the MWD was next with a session on surface resistivity and water well location. Using examples of resistivity surveys he had done, he illustrated how surveys can aid drilling by indicating the density of material subsurface.

Greg Pemberton of Groundwater Consultants who had the gruelling task of chairing the conference sessions said resistivity costs were around $600 a day with a team of three.

Jonathon Turnbull of Shell-BP Todd concluded the first day's sessions with a paper on North Sea drilling and some of the problems drillers encounter.

Product sessions were held on both Thursday and Friday nights. Longyear's Simon Fitzgerald kicked off on the first night with a highly technical video on the exploits of Australian Calweld rig operators, though not much in the way of equipment was featured.

Final speaker that evening was Dave Morely who announced that this was his final appearance as a representative for Christchurch-based pump suppliers, Brown Brothers. After 14 or so years with the company, Dave is retiring.

Friday's sessions began with a paper on core handling and logs for hard rock and diamond drilling by Don McFarlane, MWD, Cromwell.

Bruce Lindhorst of Starite Pumps in the US spoke next, giving delegates what was perhaps their first ever chance to question a direct representative of a pump manufacturing company, rather than just a supplier.

Groundwater Consultants Chris Kidd followed with a session on location and development of aquifers.

A chance to see Washington Drilling's Barber dual rotary rig followed morning tea and delegates took to the great outdoors for this practical demonstration.

Time out for lunch. Two chaps from the BNZ started the afternoon off with a chat on finance in the drilling industry. Next up Longyear with Simon Fitzgerald demonstrated breakout equipment with a MWD Longyear rig.

Dave Moore of Mintech followed with a paper on basic mud and stiff foam systems. Afternoon tea and then George Strickland from Barios in Australia finished Friday's session with a paper on non-toxic mud systems.

The Drillers Federation AGM was next and after this, 63 delegates sat the annual Drilling School examination.

Next day, about 75 people jumped on to two buses for a trip to Mt Cook. Many of the delegates, particularly the overseas visitors, welcomed the opportunity to see Mt Cook and environs.

Saturday evening was the Dine and Dance at which Russell Harris, a director of A M Bisley, presented the first Bisley-Johnson Drillers Conference Scholarship to Bruce Washington of Timaru.

EXAM RESULTS

South Island drillers took top honours in the 1984 Drilling School Examination held in conjunction with the New Zealand Drillers Federation annual conference. Top of the class was Derek Brough from Waimea Drilling Co Ltd in Richmond. Second place went to Bruce Washington of Washington Drilling Ltd and Bain Webster of Webster Drilling came home third. Doug Smith of Southland Drilling and Piling Co was fourth.

Others who passed were (not in any order): Greg Honnor, George Simpson, Colin Simpson, John McLean, Dennis McIntyre, Kevin Jenkins, Dawson Murphy, Russell Baylis, Dave Jack, Terry Ferguson, Michael Howson, Wayne Bradley, Michael Simmons, Stuart Montgomerie, Dennis McErlane, Jeff Cowlin, Harley Winchester, Phil Mercer, Allan Marshall, Chris McGeorge, C Hight, Murray Irvine, Darryn Eves, John Stevenson, Roger Burgess, Dave Cleverley, Murray Carlyle, Alan Bray, Keith Brown, Peter Garnett, John Douglas, Jeff Baikie, Bob Hole, Bernie Breen, Brian Bell, Peter Moon, Harry Orpwood, Ray Stevenson, Clive McIlraith, Stephen Everitt, Neville Tierney, P Taylor, Peter Ward.

Minister performs final duty

To open Drill '84, the New Zealand Drillers Federation annual conference in Timaru on 25 July was Bill Birch's final duty as Minister of Energy.

His address on ongoing and proposed drilling programmes around the country was optimistic, as long as the new Labour government makes no major changes to ongoing energy projects.

And despite a recent downturn in work for North Island coalfield drillers, he believes coal drilling still has a positive future.

"It would not be true to say there is a bleak future for coal drilling in the North Island. Far from it, provided the incoming government continues with the expansion programme that was initiated by the National government," he said.

New coal programmes include an investigation programme at Maramarua to study coal resources for the North Island Thermal Power Station No 1. This is expected to generate considerable drilling opportunities, he said.

Field investigation work at Ohinewai is continuing and one of Mr Birch's last duties was to approve a four million dollar feasibility programme for the coalfield.

Drilling in the Kawhia and Tihiroa coalfields is almost finished and it's all go at Mokau.

"A decision will not be made until 1987 on the actual siting of North Island Thermal No 1. Although Maramarua is presently the preferred site, both Maramarua and the Mokau are being considered jointly by Mines Division and Electricity Division."

In the South Island, three rigs are currently at work in the Buller coalfield. At Kaitangata in Southland, an assessment has just been completed and further drilling may now be carried out, Mr Birch said.

Since 1974 when coal resources surveys began, over 20 million dollars has been spent on survey work, he said.

"Total expenditure last year alone was $4.6 million, of which direct drilling costs amounted to $2.1 million."

In the mineral exploration field over 7,000 metres has been drilled so far this year, Mr Birch said.

Diamond drilling for gold and silver in Coromandel accounted for most of this and around 5,000 metres have been drilled in the Waihi area.

Crusader Minerals NZ Ltd has been prospecting in the Thames goldfield and last year took over the Monowai licence, north of Thames. One hole to a depth of 117 metres was completed there last year, Mr Birch said.

"It's difficult to judge what the Labour government will do about that work.... They supported the Coromandel moratorium bill," he said.

Hydro investigation work has continued in five areas — Mohaka, lower Waitaki, upper and lower Clutha, and on the Kawerau.

Groundwater investigations too have continued and funding for resource surveys has increased to about $1 million for this financial year.

And despite the departure of the semi-submersible rig, Benreoch, following its unsuccessful sojourn off the New Zealand coastline, the oil and gas exploration industry is far from dead.

"It is expected that over the next 18 months, there may be something in the order of 10 to 12 wells drilled offshore and a similar number onshore," Mr Birch said.

Mr Birch ended his address by telling delegates that there is considerable scope for New Zealanders to market their skills and technology overseas and that Federation members should look at this option.

Search for resources continue says new Energy Minister

Most of the energy resource investigation projects begun by National, will continue unhindered by the Labour Government.

The Minister of Energy Bob Tizard was asked about Labour's intentions in the search for subterranean energy.

The investigation programme at Ohinewai for a coal source to supply NZ Steel will continue, Mr Tizard said.

It is essential, though, that pressure is taken off the Waikato's coal resources.

For this reason, investigations are underway to see if NZ Steel can obtain its coal from elsewhere, such as the West Coast, the Maramarua field, with its use of Weavers' coal in the interim, he said.

"As a further means of reducing the pressure on Waikato coals, the feasibility of using gas to fire the Huntly power station, instead of coal, is being investigated.

"Similarly, the feasibility of locating another coal-burning power station on the Mokau coalfield, instead of in the Waikato area, is also being investigated.

"As far as West Coast coal is concerned, we are also investigating the possibility of using it to run the Marsden A and B power stations," Mr Tizard said.

Pressure must be taken off the Waikato coalfields, and the Ohinewai development in particular, he said.

Production of coal from Ohinewai will be delayed for two years. Private coal mines will help out in taking the pressure off the Ohinewai development.

The Government believes that the supply of coal in the North Island has now reached critical status. The rapid increase in demand must be carefully examined to make sure present commitments can be met, Mr Tizard said.

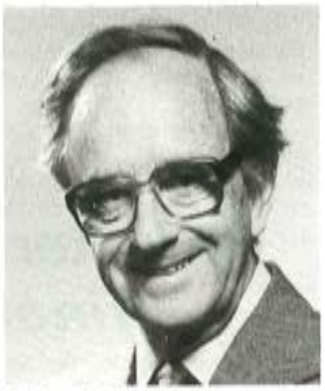
"Environmental aspects of proosed developments are also a high priority with the Labour Government, as well as the implications of proposed developments on other forms of land use."

Geothermal

The Government believes the management of New Zealand's geothermal resources should be coordinated in a more formal way, Mr Tizard said.

The monitoring of fields presently exploited will be extended and the possible interrelation of fields more closely studied. Developments at Ohaaki, and exploration of the Ngawha field, will continue, with multiple development of the energy source considered.

"Our policy is to make as much use as possible of renewable resources, and our hydro and geothermal policies reflect that. As far as geothermal energy is concerned, we favour multiple use of the energy, where it is possible for this to be done.



Rt Hon Bob Tizard

"As well, or instead of generating electricity the steam could be used to assist specialist horticulture and agriculture, as well as being used directly in the form of timber processing etc.

"The Mokai field, in particular, is being investigated to see if its steam could be used in timber processing, instead of (or as well as) electricity generation," Mr Tizard said.

"In geothermal and other electricity production, we are keen to see such developments related to regional development in the surrounding area."

Hydro power

The Government believes that hydro electricity development will continue, much of it in the South Island. The Clyde dam will be completed with the present workforce and surveys of the lower Waitaki and Clutha will continue, Mr Tizard said.

Future construction will be the responsibility of the Ministry of Works and Development. Regional development in the South Island will be supported through a pricing system based on the lower costs of generation, he said.

"Some rivers may have to be reserved for tourism and scenic importance. The Kawerau is one example. This is particularly so where engineering problems are likely," he said.

"Luggate and Queensberry may well be the last development in their area. The National Development Act will not be used to aid the construction of the Luggate dam."

The Government is now evaluating existing legislation to see if the dam can be built within the time scale allotted for it. "We are also evaluating the possible need for special legislation," Mr Tizard said.

Oil and gas

Active participation will be maintained by Government, through Petrocorp, in the exploration for new oil and gas fields both onshore and close offshore, Mr Tizard said.

"The aim of the exploration and gas purchase policies will be to ensure a gas supply for the lifetime of the reticulation system.

"The Labour Government will not sell off the assets of Petrocorp, but will guarantee the taxpayer a return from its continued operation of profitable schemes," he said.

"We will be assessing all exploration activity on its merits, and looking closely at whether there should be further drilling in the Great South Basin.

"It is common sense to concentrate on the more prospective areas, like on and offshore Taranaki, where the chances of success are greater and where the development times of any success would be shorter than in the Great South Basin."

Mineral exploration/ Coromandel

The Government will permit mineral exploration and prospecting, but not large scale open cast mining in the Coromandel, Mr Tizard said.

Mineral extraction by small scale quarrying, or small scale underground methods, is much more acceptable than mining over a widely diversified area.

"We are particularly concerned about native flora and fauna in the area, and because this is a high rainfall area with significant commercial and recreational fisheries in surrounding waters, we are determined to prevent any damaging leechate or damage from physical run off," Mr Tizard said.

Waihi is not considered part of the Coromandel Peninsula and applications would be considered on the normal basis, he said.

Local agents wanted to sell casing

A manufacturer of corrosion-resistant bore casing is looking for agents to market its product in New Zealand.

The bore casing produced by Polymains Pty Ltd in Australia is made from fibreglass reinforced plastic which has high strength-to-weight ratio and resists corrosion.

The Polymains casing, or tubing can also be used as pipelines for fluids distribution.

Fibreglass reinforced plastic (FRP) needs no protective coating as it resists acids, alkalis and many chemicals. The impervious nature of the material prohibits infiltration by surrounding fluids, says the manufacturer.

Smooth flow characteristics lessen the chance of encrustation build-up, and for this reason, it is often possible to use a smaller diameter casing than normally would be required.

The casing is available with nominal internal diameters ranging from 100mm to 300mm (4in to 12in) and is supplied in lengths up to 6m (20ft).

High-axial strength threads give pressure-tight joints, and pipes can be designed for internal and external pressure requirements.

Axial strength at the joints ranges from 4900kg to 28100kg (10,800lb to 62,000lb).

FRP slotted screens (filters) may be fitted to casing to prevent coarse materials from entering the pump.

Because of the lightness of the casing, installation procedures are simple. Also casings can be dismantled easily and re-assembled in another location.

The top of the casing can be screwed or flanged to suit distribution pipework. Ease of cutting and the availability of a large number of bends and fittings allows pipelines to be laid in the most economical route.

If desired, ultraviolet light absorbers can be incorporated in the FRP to prevent degradation by sunlight.

Further information is available from Polymains Pty Ltd, PO Box 198, Kwinana, WA 6167.

Wise Words

"All people can think, and nowhere is it chiselled in stone that those in management think best."

Randall S Schuler

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Water Divining: A Case

Is water divining a valid method of finding water?

Len Brown of the DSIR spotted this article by Frank Broad in an Australian magazine *Search*. Sceptics and believers alike should find it interesting.

The pioneers of most of Australia's dry outback owe much to the diviner/wellsinkers who found and sank shallow wells with hand tools. Water divining is still used today, even though there are claims that it is a delusion and achieves nothing of any value.

For example the Australian Skeptics, a group whose aims include 'research by objective and impartial inquirers', has carried out a 'test' which was claimed by one of its initiators as 'the most definitive, properly constructed and designed, ever done' (*The Skeptic*, March 1982).

The test employed ten buried pipes fitted with valves so that the water flow could be secretly altered. None of the eight diviners was successful.

All that this showed was that the requirements of this particular test could not be met. However, it was so far removed from real conditions that it could not be considered even as a simulation — and in any case there is no need for a simulation when the 'real McCoy' is readily available.

In fact, it would be very difficult to construct a model that could adequately demonstrate the limited potential of divining.

Divining is limited because it will not detect 'still' water. The bulk of underground water is stored in stable or still aquifers, and geology provides the only proven means of finding it.

Divining will locate 'streams' which are flowing into an aquifer, across the top of one, or out to the ocean. These usually provide the best quality and biggest supply at the depth concerned. Geology may locate water at the same depth but the supply will often be much lower.

In areas where streams flow out to the ocean from aquifers, divining is the only economic means of finding them. The plantation area at the mouth of the Gascoyne River is one example.

Here, the salt content can vary widely even at constant depth: I have divined water only a few metres apart with salt contents ranging from 170 to 1200ppm, only a short distance from a dry bore that went to twice that depth of this water.

Such evidence has never, as far as I know, been properly examined, and that is the reason for this article. It needs to be asked also why no researcher seems to have monitored the performance of boring contractors who do their own divining free of charge, and who have a vested pecuniary interest in protecting their reputations.

What is needed are tests carried out in the usual circumstances of water divining. The tests should aim at finding out what divining will do and what it will not do.

As far as I know, divining is capable of doing four things: point towards a stream; indicate when the diviner is directly over it; specify the direction of flow; and indicate when the water has been reached by the drill.

On this last point, in any test which I take part in I will say when the divined stream has been reached, and will acknowledge failure if no water is then obtained, even if drilling deeper subsequently finds water (which would be from the base aquifer which cannot be divined).

There are three other things which divining will not do: foretell the depth, the supply, or the quality. I have heard many claims to such abilities, but have encounterd none that are reliable and repeatable under varying conditions. (A person with experience in one area may make some accurate predictions there, but this in itself has nothing to do with divining ability.)

The hardest lesson to learn in divining is that the streams are rarely where one 'thinks' they are. It is sometimes very frustrating to have to walk over a geologically sound prospect, knowing all the time that there is plenty of water below (but either too deep or too salty), hoping to find a usable supply.

It is all the more frustrating, if one is walking away from a fenceline, knowing that each step will add to the cost of piping the water back to where it is needed.

I have walked and driven many miles over vast artesian basins that were too deep to sink an economical bore, searching for shallower streams that could provide a usable supply. It is during such times that one is reminded of the limitations of divining.

Unusable salt streams are inevitable in salt-prone areas. In such cases it is necessary to select new sites using whatever experience is applicable. I have had to abandon holes also becaue the plant could not drill hard rock.

In other cases heavy-duty drills have reached the streams, well down in granite and diorite.

In many areas the stream supply found by divining is too small. Drilling may then be continued deeper (which I call 'going down blind'). The next water-bearing level (if there is one) may be only slightly more saline, or it may be too saline even for livestock. For example, a 600ppm stream may be above an aquifer that has more than 8000ppm of salt.

Even so, the two waters can sometimes be shandied together to make a usable supply. It is very unlikely that geological methods could get the same result with only one bore in such a situation.

Thus, a bore can encounter several separate supplies, progressively more salty as depth increases, of which, in my experience, it is only the top stream which can be divined. (Incidentally, I have never found a site where 'two streams cross', as one hears about from time to time).

In a test situation, salt content analysis should be accepted as proof that each supply has reached a bore via separate pathways from different sections of the recharge zone.

How does divining work? I have no idea, and I have rejected all the theories and myths that have encouraged sceptics to be sceptics for thousands of years. Divining was an accepted practice in early biblical times and was later condemned — in an attempt, according to one suggestion, to prevent local diviners from working for the Romans, who needed water for their travelling armies.

Apparently some diviners could not perform satisfactorily in those days either, for the same source says that the Roman penalty for faulty divining was instant execution.

Before the sceptics go so far as recommending reinstatement of this measure, we should attempt to rest the procedure scientifically! To be constructively sceptical is to have one's mind open to new evidence and explanations.

My own type of scepticism is more in tune with the case put by Arthur S. Reber (a professor of psychology at Brooklyn College) on a matter which may be related to divining: '... quite frankly, there are no data I know of that could convince a sceptic of the existence of psi phenomena ... logic has essentially nothing to do with it.

As astronomer George Abell is fond of pointing out, ancient and medieval observers never disputed tidal actions even though they knew of no reasonable mechanism for them ... when effects are extraordinarily reliable, scientists will accept them as real and live, albeit uncomfortably, with the lack of a coherent mechanism' (Reber, 1983).

A possible test site

A 45,000ha pastoral lease I sold in 1981 would be ideal for tests. Large areas are unexplored, and there is a wide variety of geological formations. Salt contents range is from 400 to more than 20,000ppm even within a radius of one kilometre from the homestead.

Water depths range from two metres to thirty, and supplies from small trickles to more than 4,000 litres per hour. Some of the existing wells have been producing at the same rate and quality for more than one hundred years. (These were sunk over divined sites and can be pumped out so that the stream can be observed flowing in from the upstream side only.)

There are numerous 'cluster sites' on the property — places where a number of streams flow close together. At such sites a dry hole has sometimes been sunk between streams, due to inaccurate divining.

On one of these sites I sank a well only one metre from an existing bore, in search of a bigger supply. It resulted in a separate supply that is not affected by pumping out the bore alongside.

There is a jackhammer hole connecting the latter well to the bore, and there would be no difficulty in plugging this off for objective testing. (It was at this site that one geologist said that divining should be researched and that it would be very interesting to try to find out what it was that 'communicated' between the divining rods and the stream.)

The depth is only nine metres, so it would not be too costly to fully test this site, and would be of interest since there is an unusable bore only about one hundred metres away.

In a preliminary test, independent observers would assess the adequacy of procedures and compile results, which should include an economic comparison with other methods in terms of initial cost, operating and maintenance costs, including any added value for quality and supply.

After completion of this test, a more comprehensive evaluation could include the following procedures:

- A site would be picked by an independent group.

for Objective Tests

- The site should be geologically surveyed to give a profile of water availability, distribution, depth, etc.
- The tests should be conducted by a group of impartial observers who (like the subjects) are not in possession of the above knowledge.
- Divining procedures, physiology, psychology, etc. should be studied on the spot.
- A control group, comprising individuals who claim no divining experience, should be independently selected.
- Tests should be arranged so that the control personnel and diviners are randomised, with the observers not knowing who is a diviner and who is not.
- Assessment of the data by a separate body such as a research laboratory could lead to the design of a laboratory investigation.

The proposed testing property is virgin landscape on the border of the northeastern wheatbelt in the Morawa Shire. It could provide some information for comparison with the changed salinity levels in adjoining agricultural land resulting from large-scale clearing.

The latter were studied in some detail by D.J. Madden (1974) in a thesis aimed a providing a firm basis for 'further, more specific, research into the mechanism of salt-land development in the Morawa Shire'.

Madden wrote: 'It is essential to look more carefully into all three types of water movement — surface runoff, soil water movement and groundwater movement. This could perhaps be best achieved by a water balance study on the whole catchment.'

Aquifers and water supplies

Perth's demand for water, like that of most capital cities, is increasing as both population and per capita consumption increase. Present water strategies are based on economic considerations.

Water is obtained mainly from surface storages, but small though significant and growing proportions come from artesian bores and groundwater resources.

Future strategy will be alternate development of surface catchments and underground resources progressively further from Perth.

It appears that the harvestable yield from groundwater (that is, the quantity which may be withdrawn without any general lowering of the water table) is limited to only a fraction of the total underground reserves.

It is agreed that simply mining the groundwater would be environmentally unacceptable, and the Environmental Protection Authority, as a condition of agreeing to groundwater extraction schemes, requires routine monitoring of the water table to ensure that extraction does not exceed a 'harvesting' rate (Porter, 1978).

An update on the current state of knowledge is provided in the printed proceedings of the Land and Stream Salinity Seminar organised by the Government of Western Australia at Murdoch University in November, 1980 (18 papers presented plus 13 poster papers).

In the virgin landscape some salts are released when rocks weather to form soil. Rocks which arise from old marine sediments are often extremely saline and cause salt problems in the landscape.

However, close study of the salt problem in southwestern Australia has shown that the salt comes from the rainfall rather than rock weathering. The native vegetation uses the water but leaves most of the salt behind in the subsoil. The amount of salt stored even in some non-saline soils may reach 1800 tonnes per hectare.

Thus, from many of the wheatbelt subsoils, saline water percolates down into the groundwater. When clearing takes place, increased runoff and percolation increase the flow of stored salts into the groundwater (Malcolm, 1980).

Present understanding of the mechanisms of salinisation is largely qualitative — few quantitative data exist. The flow path in most groundwater systems in Western Australia consists of a shallow unconfined aquifer (referred to above, informally, as a 'stream') and a deeper semi-confined aquifer ('still' water).

Little information is available on the depth of the shallow unconfined aquifers, but there is evidence that the relatively fresh waters from these shallow aquifers leaks to the saline deeper aquifer. The size, extent and continuity of preferred pathways are largely unknown.

Given that the shallow, unconfined water is generally of fresher quality than the underlying main aquifer, there is a case for using divining to locate it, in the interests of harvesting the recharge in a more efficient way and maintaining quality as well. There are cases where this fresh water flows out to the ocean.

One case I would like to examine is the freshwater area in the Great Australian Bight which was used to replenish water tanks in the old sailing-ship days. It may be possible to use divining along with hydrogeological methods to find the source of this flow.

It seems therefore, that there are some grounds for carrying out scientific tests to evaluate the potential of divining to assist in solving many problems. Proof of the reality of water divining might upset some entrenched beliefs, but I submit that all honourable sceptics want to learn the truth.

If nothing else, it will help brain researchers and psychologists to learn more about how so-called 'idiomotor behaviour' operates.

Good gear needs proper care

Without good gear, a driller isn't much use to anyone.

Proper care of drilling equipment is important and taking time to keep it in good nick will always pay off.

Ingersoll-Rand has produced a useful booklet called Downhole Bit and Drill Operation/Training Manual. A section on preventive maintenance passes on the following useful tips.

Beware of several major sources of damaging pollutants to the downhole drill system: acid water; dirty water; bentonite; dirty drill-pipe (especially pipe that has been previously used for mud drilling); and, of course, a faulty check valve, which would allow water and dirt to back up into the hammer during steel changes.

When storing steel, keep ends capped to keep out dirt, rust, and birds' nests.

Periodic disassembly and inspection is an important part of preventive maintenance.

The drill must be inspected at regular intervals for worn or damaged parts, and replacement parts installed when necessary. Under normal drilling conditions, disassemble the drill and inspect the parts every 200 hours of operation.

In water well work and wet holes where mud is encountered, clean and inspect the drill parts every 100 hours of operation.

Remember to break the backhead and fronthead connections on the rig. Otherwise, the repair shop will not be able to break these connections.

Remember to secure any special tools such as internal snap ring pliers and brass drivers that may be required for your particular model DHD.

Remember to routinely replace simple parts like check valve springs and bit exhaust tubes. Don't wait for these parts to fail. Replace them every disassembly inspection.

Copies of the manual are available from Ingersoll-Rand, PO Box 19-127, Avondale, Auckland.

McKee appointment

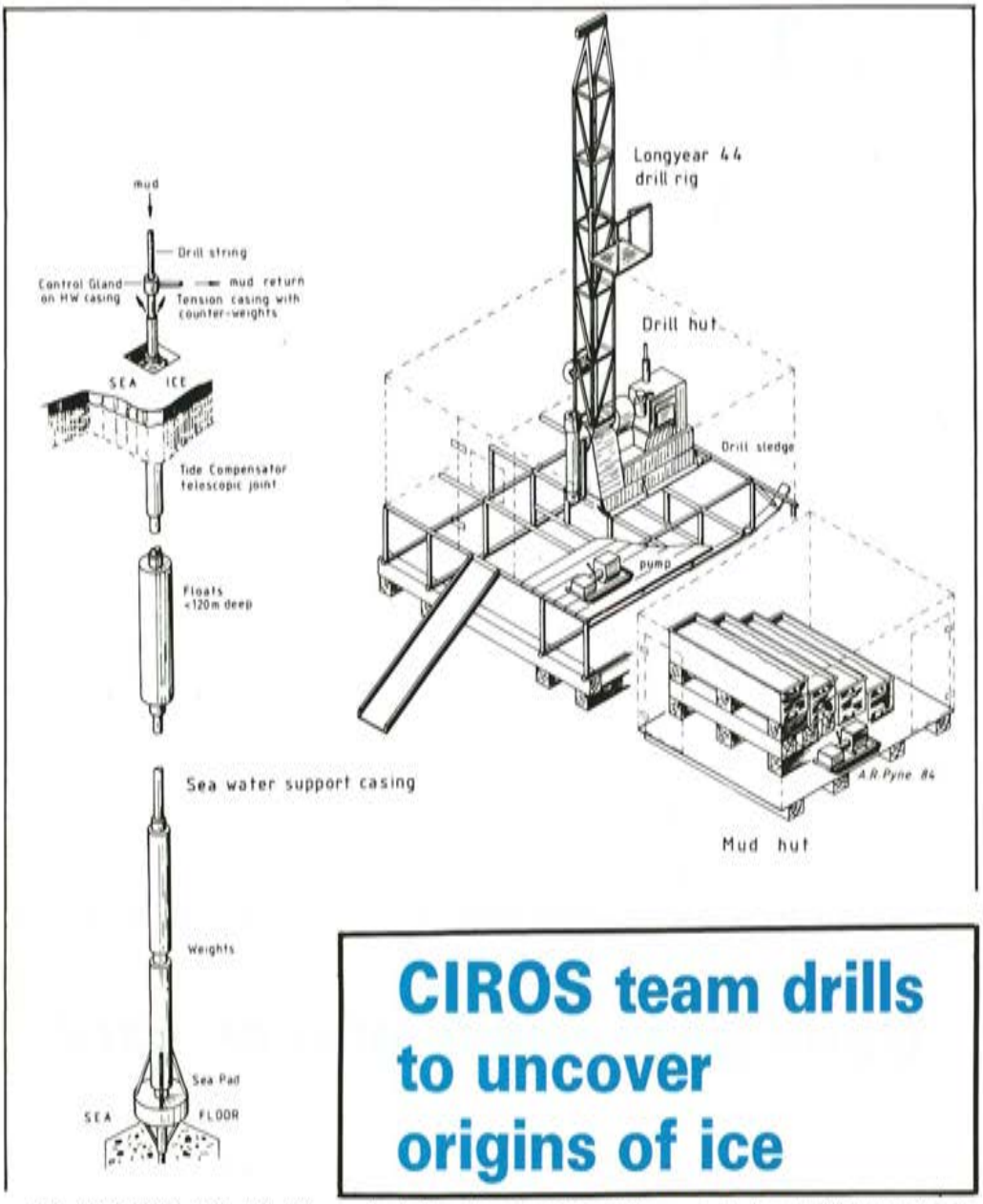
Maurice Loney, of Opunake, has been appointed by the Petroleum Corporation of New Zealand Ltd as operations superintendent for the McKee Oilfield Production Station in Taranaki.

Mr Loney, 40, the first person to be appointed to the permanent operations team for the McKee facility, took up the position in June.

The number of permanent staff associated with McKee operations will total 20, with 15 at the production site and five at the storage tank facilities at Omata.

Mr Loney was employed by Shell Refining Ltd in Australia for five years before to his move to New Zealand in 1973, when he joined with Shell BP and Todd Oil Services Ltd, firstly as a maintenance fitter and later as maintenance supervisor.

In 1980, he was seconded to Oman, where he served as relief production supervisor at several oilfields. On his return to New Zealand in 1983, Mr Loney was appointed platform superintendent on the Maui A Platform, located off the South Taranaki coast.



CIROS team drills to uncover origins of ice

Offshore drilling in the Western Ross Sea to investigate the origins of the region begins in Antarctica later this month.

The New Zealand-led CIROS field science programme proposes to drill two holes to 500 metres under the seabed this season and a further two during the 1985 season.

From core samples recovered, the scientific team from the DSIR, Victoria University, Japan and the US hopes to discover more about the growth of the Antarctic Ice Sheet and Transantarctic Mountains.

Expedition members will work in two 12-hour shifts, living at a base camp built last season 12km from the drill site.

Drilling overseer is the MOW's Jim Gupwell and Leon Oliver of the DSIR is camp manager. The drilling section of 17 personnel includes 10 drillers, three government and seven from the private sector.

As well as recovering core, the team will be taking regular measurements of ice thickness, movement, tides and gases from the holes.

The following programme outline by CIROS science co-ordinator Peter Barrett and science manager Alex Pyne sets out the proposed drilling procedures.

The programme will use the Longyear series Q wire line diamond coring system in which core is drilled with diamond impregnated bits and recovered by retrieving the inner core tube through the drill string. The drill rods remain in the hole until the bit needs to be replaced.

A Longyear model "44" mounted on a specially constructed drill sledge for sea ice drilling will be used. Because the drilling system was designed for use on land, a special drilling programme with the use of a sea water-based polymer mud system is required.

The main steps of the programme are set out in order below.

- ☐ The drilling sledge will be located and oriented at the selected site on smooth sea ice. Wooden bearers may be used to spread the load on the ice surface.
- ☐ The drilling hut will be erected around and on the sledge and its heating system set up. A heated hut for processing mud used in the circulation system will be set up nearby.
- ☐ Drill rod and other equipment and stores will then be assembled by the drilling hut.
- ☐ An access hole in the sea ice for drilling will be cut by chain saw. This will be kept open with heated sea water or air.
- ☐ The support casing will be lowered into the water column. This has a heavy steel sea pad at the base which rests on the sea floor as anchor.
- ☐ The first downhole casing (HW:OD = 114.3mm, ID = 101.6mm) is lowered through the water column support casing and rotated into about 20 metres below the sea floor which should prevent leakage of mud or formation fluids at the sea floor. This casing can be advanced deeper later if necessary.
- ☐ The coring begins with HQ drill rod (core diameter 63.5mm, hole diameter 96mm) and is expected to proceed down to 150m sub-bottom. At this depth the drill bit will be replaced with a casing bit and the HQ drill rod used as casing.
- ☐ Coring continues below the HQ casing to the target depth of 500m sub-bottom using NQ drill rod (core diameter 47.6mm, hole diameter 75.7mm).

The drilling fluid used to get rid of the chips from drilling and to control formation fluids found in the hole is a seawater-potassium chloride-polymer system. The polymer is a natural xanthan gum which is non-toxic and biodegradable.

Potassium chloride, a natural constituent of sea water, is used to lower the freezing point of the drilling fluid and the polymer is used to vary the weight and viscosity of the mud. The following non-toxic biodegradable additives may also be used:

Caustic soda (for pH control)
Sodium sulphide (an oxygen scavenger)
Cellulose viscosifer
Lubricant additive (a blend of biodegradable surfactants and polymers)

Possible hazards

Available geological information on the area and strata to be cored suggested that pockets of biochemical gas, including methane, may be encountered. And, although it is unlikely that any significant volumes of petroleum will be located, a petroleum monitoring programme and a contingency plan have been organised.

Contingency plan

Although abnormal downhole fluid pressures are not expected, the CIROS drilling programme is designed to control excess fluid pressures as high as twice the normal hydrostatic pressure. This is

achieved by increasing the density and viscosity of the mud.

To ensure that mud circulation is completely closed (except at the drill bit), the first casing (HW) is driven to a depth of around 20m sub-bottom into lithified strata. This prevents fracturing and the uncontrolled escape of formation fluids from around the casing if high pressures are encountered. Fluid can then only reach the surface within the casing.

At the top of the casing there is a control gland to seal off the space between the casing and the drill rods so the formation fluids can only escape through the mud return system where their rate of escape can be controlled.

Monitoring for the presence of petroleum and the anticipation of abnormally high fluid pressures downhole will consist of the following:-

1. The mud return will be checked for gas bubbles before each core is pulled (the most critical time in each run) and the flammable gas sensor in the mud hut will be checked for any slow gas build-up there.
2. Each core will be checked visually and with ultraviolet light for oil stains.
3. A sudden increase in downhole fluid pressure will be seen by the driller as the load on the drilling mast drops.

If petroleum is encountered under normal hydrostatic pressure, drilling will proceed cautiously.

If abnormal fluid pressures are encountered, drilling will stop but mud circulation will continue and the mud weighted up to equalise. If fluid flow declines (indicating only a small pocket) or if equalisation is successful with pressures only slightly above normal, drilling will proceed cautiously.

If fluid pressures are high and flow sustained, cement will be pumped to plug the hole and the hole abandoned.

If petroleum is encountered, some may reach the surface. Gas coming up through the mud system will, if in small quantities, be dispersed away from the rig and, if necessary, ignited in a controlled situation for safety. If oil also comes up through the mud system, it will be separated and stored in empty fuel drums and later incinerated.

Collecting oil on the sea ice for incineration may be necessary if larger volumes are released. In this way, very little oil or residue should be returned to the water column.

Italians hope to establish local market

Fraste drill rigs have recently been released onto the Australian market and now the Italian manufacturers are looking at New Zealand as a potential market.

Italy's sole trade representative in New Zealand, Mario Magaraggia, was at the 1984 New Zealand Drillers Federation conference to tell delegates about Fraste machines.

He believes the competitively priced Fraste rigs will become popular now that the price of US-sourced machines has risen with devaluation.

Fraste machines come in a variety of shapes and sizes — both truck-mounted and as separate units. Mr Magaraggia has more information on Fraste machines at 102 Kitchener Rd, Milford, Auckland, phone 499-611.

Aussie drillers visit

A post-conference tour to New Zealand will follow the National Waterwell & Drilling Association of Australia's annual conference in October.

A geothermal seminar and workshop is being held at Wairakei and the visitors will meet New Zealand Drillers Federation members in Rotorua on 17 October. Visits to the Bay of Islands, National Park and Bay of Plenty have also been included.

Mud additives acceptable elsewhere

Public fears about pollution from drilling operations are in many cases unfounded, says Petrocorp project manager Doug Chase.

"Business must work toward reducing environmental pollution and educating the public to understand that all discharges are not pollutants. Many discharges are beneficial.

"Gold mine tailings frequently yield other valuable minerals. Drilling fluid spread over farmland after well completion, provides excellent fertiliser," Mr Chase told delegates at the 1984 Drillers Federation conference.

And many chemicals found in drilling muds are perfectly acceptable when used in other industries. Bentonite is used as a suspending agent in medication, cosmetics and confectionery, Mr Chase said.

"Lignite is used in cosmetics, starch in the food industry, several polymers are used as soil looseners and doctors pump Baryte into patients when performing upper and lower gastro-intestinal series tests."

Mud components like this when used in high concentrations are generally non-toxic or have relatively low toxicity, he said.

Water-based drilling fluid not containing heavy metals has been found to be non-toxic at the low concentrations found after discharge to the ocean, Mr Chase said. Petrocorp uses only water-based muds.

Onshore, though, drilling muds and cuttings are more concentrated at specific locations and require different procedures for disposal.

"Petrocorp is very much aware of the public concern of pollution and every endeavour is made to prevent discharge in the highly productive farming area of Taranaki where water courses abound," Mr Chase said.

"Many of you may have already had problems with catchment authorities in obtaining water right permits to extract water and discharge wastes."

Penalties for improper discharge can be as much as $150,000, he said.

"Disposal systems in their various forms have become increasingly important to the drilling industry in recent years."

Large waste pits (sumps) at Petrocorp's drilling sites which collect excess mud and cuttings pose a major problem for the company, Mr Chase said.

"We are continuously moving these liquid wastes by truck to points of discharge authorised by the Taranaki Catchment Commission. When stormwaters rise too fast we have at times had no recourse but to discharge this stormwater from the sump surface into the flooded streams with the approval of the Catchment Commission."

Since the inception of Petrocorp in 1978, the company has drilled 21 wells, 20 in Taranaki. And it was with its very first well at Toko, that Petrocorp ran into trouble with the discharge of waste water, Mr Chase said.

"The site was swampy and the water table very close to the surface — a deep drain alongside the road kept picking up our overflow and transporting our muddy water through the dairy company's water intake."

"This led to further problems compounded by Taranaki's abundant rainfall. Since then, each well has presented us with some degree of problem with the drainage and disposal of fluid wastes."

Petrocorp has worked closely with the Taranaki Catchment Commission to establish a set of workable conditions.

But still problems arise. Petrocorp recently fought to overturn a special condition in its latest water right which required that drilling discharge be cleaner than New Plymouth's tap water. That has now been altered.

"So we're winning," he said.

DRILLER DEADLINES

The final issue of The Driller for 1984 will be published on December 3. All editorial contributions and advertising should be with the Editor, The NZ Driller, PO Box 1778, Wellington by November 10.

Ministry of Works and Development

Sale of surplus drilling equipment

A large range of surplus drilling equipment both used and unused will be included in a Dispersal Auction to be held at Turangi on 30 November/1 December 1984.
Items include:

NMLC Barrels and ancillary equipment.

NMS Barrels and ancillary equipment.

B, BW, BX Rods, adaptors and ancillary equipment.

N, NW, NX Rods, casing and ancillary equipment.

Sundry items of Mindrill origin.

Atlas Copco overburden equipment and sundry items.

Gardner Denver sundry items.

Miscellaneous items of E and A size rods and barrels.

Mission down-the-hole-hammer spare parts and bits.

Halco down-the-hole-hammer spare parts and bits.

Sundry rope thread extension rods, adaptors and couplings 1¼" and 1" size.

Various size tricone bits.

Casing HX size up to 10¾".

Sundry rod clamps and sheave blocks.

Treifus hydraulic packers and spares.

Sundry rope thread extension rods, adaptors and couplings 1½" size.

Sundry integral drill steels.

Boom mount drifters — Gardner Denver and Atlas Copco.

Catalogues will be available early October from:

Stores Officer
Ministry of Works and Development
Private Bag
TURANGI (Phone 7799)

and Eric Snowdon Auctions Ltd
PO Box 23-635
PAPATOETOE Phone 278-6027
A/Hrs 536-6039

Groundwater and mineral experts meet

Bangkok will be the meeting place for groundwater and mineral exploration experts in June next year.

Groundwater & Mineral Exploration 1985 (GAME '85), the third international conference of the National Waterwell and Drilling Association of Australia, will give delegates the chance to discuss and learn about the development of technology, equipment, training, legislation, and education within the groundwater and mineral industries.

NWDAA represents organisations involved in a range of technology within the water and mineral drilling industries in Australia and its members include consultants, contractors, manufacturers, suppliers and drillers.

The body was formed from the recent affiliation of the National Waterwell Association and the Australian Drilling Association.

Previous international conferences organised by the NWDAA were GROUNDWATER '81, held in Kuala Lumpur, and Groundwater for Developing Nations, held in 1978 in Singapore.

GAME '85 has as its main objectives:

- bring together senior people involved in groundwater and mineral exploration from both developing and developed nations.
- provide an international forum for the presentation of papers concerned with the development of technology, equipment, training, legislation and education in the groundwater and mineral industries, with special emphasis on coal.
- present distinguished guest speakers with practical experience in a wide variety of relevant topics
- provide a forum for open discussion on how the needs and constraints which apply to developing countries can be practically balanced
- exhibit a comprehensive range of equipment, technology and services for conference delegates and industry visitors to view first hand.

A topic of particular interest to countries confronting the development of groundwater from deep aquifers will be a session devoted specifically to deep hole technology.

The conference will be held at the Hyatt Central Plaza Hotel, Bangkok, Thailand from June 3-7, 1985.

Further information is available from The Conference Manager, GAME '85, PO Box 142, Chatswood 2067, NSW, Australia.

Timaru driller wins conference trip

Winner of the first Bisley-Johnson Drillers Conference Scholarship announced at the end of NZDF conference in Timaru was hometown driller Bruce Washington.

Bruce Washington

The scholarship for an eight-day trip to Australia to attend the National Waterwell & Drilling Association of Australia Drill '84 Conference in Canberra, is sponsored by New Zealand company A M Bisley & Co and Johnson Screens of Australia.

Bruce Washington was selected the winner by a panel of judges made up of Drillers Federation councillors, Russell Harris of A M Bisley and Peter Herbert of Johnson Screens.

Drillers who passed the drilling school examination held during conference were eligible for selection.

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