



New Zealand  
**THE DRILLER**

OFFICIAL PUBLICATION OF THE NZ DRILLERS FEDERATION, WINTER 1982, No 4



*Cover story: The drill in the china shop .... P7*

# Don't waste money down the well see Bisleys the Specialists.

New Zealand Agents for

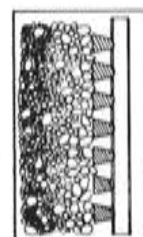
## PLEUGER PUMPS



Pleuger pumps are unbeatable for quality, efficiency, dependability. They are built to last. From our extensive stocks we have pumps for duties up to 4000 L/min from depths of up to 200m; plus many more available on indent. Pleuger Pumps are suitable for Municipal, Industrial, Irrigation or Domestic supply, either verticle, horizontal or as inline boosters.

## JOHNSON WELLSCREENS

- Low Pumping Cost due to reduced draw down
- Low Maintenance cost due to reduced corrosion, encrustation and plugging.
- No replacement cost due to no sand pumping.
- High well efficiency due to a maximum open area.



Water moves in a direct course giving maximum output.

Water is your lifeline. Be sure of your source of supply—draw on the hidden reservoir below your farm with submersible pumps from A.M. Bisley & Co. Ltd.

Phone

Brian Alcock/Lawrie Watson  
Russ Farquhar

(071) 56 179 Hamilton  
(03) 499 009 Chch

# **Bisleys**

PHONE 499-009 BOX 16044 CHRISTCHURCH

## Conference content has variety

THE FULL programme for the 1982 New Zealand Drillers' Federation conference and drilling school has a varied and exciting content, mixing the practical and theoretical.

The conference will be held at Nelson's DB Rutherford Hotel, from July 28-31.

With 12 lecture sessions on two mornings, and evenings set aside for industry suppliers to talk about new products, the conference workload will be one of the heaviest in the NZDF's history.

Two field trips are planned.

The first will visit a rig demonstrating soil sample recovery methods, and a water well site where one rig will demonstrate setting a well screen using the Revert mud system and another will develop a 250mm diameter well before test pumping.

Friday's trip will take in a diamond coring demonstration, using several different muds, and return to the water well site for the start of a pump testing run.

The lecture sessions cover drilling projects and techniques, and the groundwater systems of the Nelson-Marlborough regions.

Projects to be discussed include lignite exploration, progress on Petrocorp's Taranaki operations and shifting digs by helicopter.

Techniques covered include a consultant engineer's requirements for soil samples and how to obtain them, well screen setting using Revert mud systems, reverse circulation drilling, basic mud drilling, wire line coring,

problems with submersible pumps, and safety around drilling rigs.

The usual drilling school examination will be held on Saturday July 31. Candidates achieving the pass mark will receive a certification of attainment.

The annual meeting of the New Zealand Drillers' Federation is to be held at 5.30pm on Friday, July 30.

Registration forms and conference programmes were distributed last month but late registrations and inquiries from other interested people are still being accepted. Those seeking further information should contact

**Mr Mel Ouston**  
NZ Drillers' Federation  
P O Box 1318  
HAMILTON  
Ph (071) 390 069

## Training on the road

THE FIRST steps down the long road toward introduction of formal training for drillers in New Zealand came at a meeting held in Wellington on May 26.

State organisations at the meeting included the Labour Department, the Ministry of Works and Development, the Ministry of Energy and Petrocorp.

The New Zealand Drillers' Federation was represented by its president, Mr Hamish Pearson, vice-president Mr Bill Washington, executive members Messrs Dick Baylis and Woody Woodford, and secretary Mr Mel Ouston.

Other federation members in attendance included Mr Dave Moore, of Mintech (NZ) Ltd, and Mr Jim Fitzgerald of Longyear (NZ) Ltd.

Mr Bill Washington said the meeting generally agreed that an apprenticeship scheme is desirable, and all the parties went away with "a little bit of homework to do".

The NZDF is to contract its Australian counterpart to seek training information and establish whether or not New Zealand can tap into their system.

"This training is something we have been talking about for years and we're still a long way from getting it going — that might still take upwards of two years.

"But to get all these people around the

**Continued on P5**

The Driller is the official publication of the New Zealand Drillers' Federation Inc.

### EDITORIAL

All editorial inquiries, including manuscripts, should be directed to

**The Editor**  
The NZ Driller  
P O Box 245  
WELLINGTON  
Ph (04) 729 924

The New Zealand Driller is produced by The Contract Editorial Company Ltd on behalf of The New Zealand Drillers' Federation.

Editor: Greg Newton

### ADVERTISING

Advertising inquiries, material should be directed to

**The Advertising Manager**  
The NZ Driller  
P O Box 245  
WELLINGTON  
Ph (04) 729 924

### Advertising rates

Full page	\$200
Half page	\$120
Quarter page	\$75
Specified pos	+ 20 per cent
Two colour	\$40 extra
Classified	\$3/col cm
Columns 26cm deep x 13 cms	

### SUBSCRIPTIONS

Inquiries to

**The Circulation Manager**  
The NZ Driller  
P O Box 1318  
HAMILTON  
Ph (071) 390 069

Cost \$10 for four issues

The NZ Driller is circulated free of charge to all members, employee members and associate members of the New Zealand Drillers' Federation, and to selected catchment authorities, territorial local regional water boards and government departments.

Information published in The NZ Driller may be republished, provided that the source is acknowledged.

## Next issue

The Spring 1982 issue of the New Zealand Driller will be published on October 1, 1982.

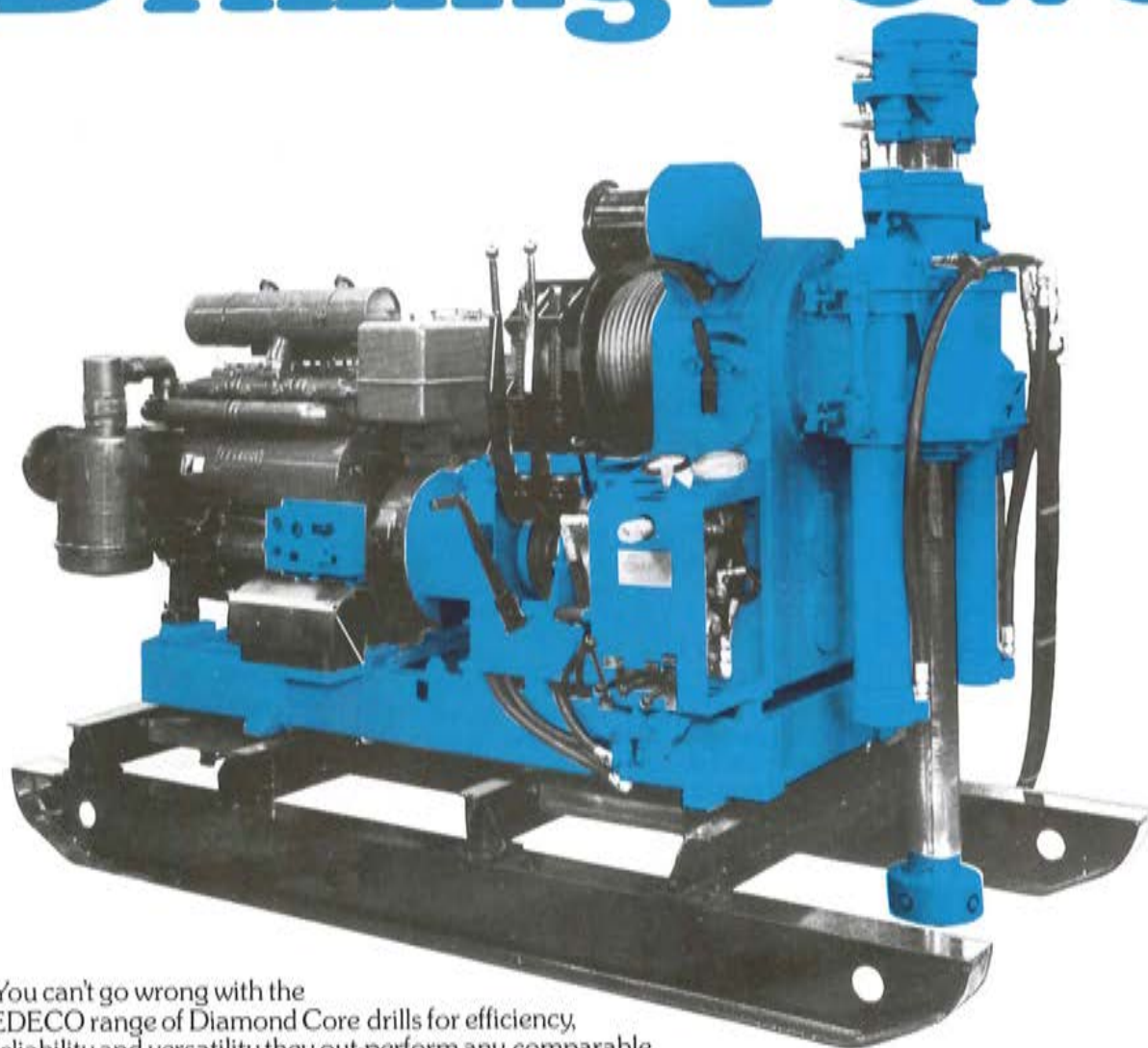
Advertising material for this issue should be in the hands of

**The Advertising Manager**  
The NZ Driller  
P O Box 245  
WELLINGTON  
Ph (04) 729 925

by September 10, 1982

The deadline for editorial submissions, including new products and services information, is September 1, 1982.

# Drilling Power



You can't go wrong with the EDECO range of Diamond Core drills for efficiency, reliability and versatility they out-perform any comparable machine we know.

Skid mounted — trailer mounted — truck mounted — 4.5 metre swivel mast or 12 metre derrick. *For full information send for descriptive literature.*

**ABMEC**



Member of  
the Association of British  
Mining Equipment Companies



## Diamond Core Drills

New Zealand Agents: The Dominion Construction Co Ltd P O Box 11 077 Wellington Ph (04) 843 671  
English Drilling Equipment Co Ltd, Lindley Moor Road, Huddersfield, Yorkshire HD3 3RW, England Tel: (0422) 72843 Telex 51687

## Continued from P3

table, and to get them all agreeing it's desirable, that was the big hurdle.

"We had to co-opt the government departments for their help, and they seemed to be pleased with the efforts we were making to get the show on the road," Mr Washington said.

Reaction from both Ministry of Works and Development and Ministry of Energy representatives was enthusiastic, he said, while the Department of Labour offered to provide all the assistance it could.

"Everybody was behind us."

Mr Washington said consideration was given to establishment of an annual week-long in-house training course, perhaps involving an Australian drilling training officer.

"Our conference would stay with two or three days of lectures and field trips. But the idea is that we'd all send a guy to a central location to learn about the latest developments."

That concept may prove easier to get off the ground than the more formal alternatives.

## Drying out Motonui

ONE OF the largest drilling contracts to go to tender in New Zealand's history has been up for grabs over recent weeks.

It's the massive dewatering contract at the Motonui synthetic petrol plant site, in Taranaki.

Tenders were invited by project manager Bechtel Pacific Ltd for a contract estimated by some sources to be possible worth as much as \$10 million.

The contract involves drilling 650 holes, each 30cm in diameter. Most are 28 metres deep. Tenders were originally to close in mid June, but the date was extended.

The aim of the dewatering is to create dry foundation conditions on land which will support massive plant and storage facilities.

## Pressure on Ngawha

THE PACE of geothermal investigation work around Northland's Ngawha thermal springs has quickened with plans for a new power station to begin operation in 1990.

The Ministry of Works and Development is doing further investigations to confirm the field can support a 100MW power station.

The MWD uses its own fleet for all deep hole investigation and production drilling. Contractors don't miss out entirely — they are usually used for the foundation investigations before a power station is built.

The MWD's fleet includes

- A Continental Emsco GC350 rig, with a nominal drilling capability of 3 000 metres. The machine is currently being refurbished and will be despatched to Ngawha when recommissioned.
- Two National Ideal T12 rigs. One is currently working Ngawha while the other is at Wairakei. Their nominal capability is 1 000 metres but they regularly work down to 1 500 metres below the ground.
- And three Failing 1500s, with nominal 500 metre capacity. One machine is on geothermal well drilling, one consolidation grounding at Wairakei, and the third is on standby.

Chief geothermal engineer Mr Dick Bolton says about 60 wells, between 500 metres and 1 500 metres deep, will be required before the Ngawha power station begins producing at full capacity.

That number includes spares, and holes needed for the reinjection of condensed steam and other fluids. The number of replacement holes required, and the rate at which they must be installed, will not be known until the field begins producing.

In geothermal drilling, investigation and production holes are the same thing.

The only concession is for fields about which absolutely nothing is known, when an extra string of casing will be run until something is known.

"As the well is completed we take a full series of downhole measurements, and for about a month afterward we'll take regular pressure and temperature runs to indicate the build up.

"This gives us a reasonable indication of whether a well is going to be good enough to produce commercially.

"Once the well is heated and stable it can be used, but the discharge is subject to us getting water rights for use of the steam," Mr Bolton said.

Ngawha appears to have two production horizons, with some wells producing from about 600 metres and others from about 1,350 metres.

"It's not like Wairakei where you drill down to 2 000 feet and know if you haven't struck anything by the time you get to 2 200 feet you're not going to strike anything — none of our other fields are like that."

## Other fields developed

DEVELOPMENT OF New Zealand's geothermal energy resource is a continuing process which shows no signs of slowing.

While maintenance of the producing Wairakei field gets priority the Ministry of Works and Development are nibbling away at other regions.

The Broadlands field, about 15km north of Wairakei, is next scheduled for power development. Final approvals for the Ohaki power station are expected before long, and more production wells will have to be drilled before the station begins operation.

The Kawerau field was recently subject to further investigation. More wells will be drilled within the next year or two.

Long-term indications are that its potential exceeds the capacity of Tasman's giant paper plant to use the steam, so other development options may be considered.

On the Waikato River, downstream from Atiamuri is the Mokai Valley field, where one shallow and one deep well showing considerable promise. It will be subject to further attention when equipment can be freed from more pressing demands.

MWD chief geothermal engineer Mr Dick Bolton said the ministry's drilling teams will be kept busy for the foreseeable future.

## Cutting gas in hot seat

A CUTTING gas made in New Zealand is used to cut slots in J55 steel pipes used for lining geothermal wells.

Flamex is a propane-based fuel gas manufactured by Mesco Gas Ltd, a Ceramco subsidiary. It is more effective than acetylene and propane used for the application in the past.

It cuts four 50mm x 20mm slots in 22 seconds, completing an 11-metre-long pipe in 2¼ hours. The clean burning gas gives an average 35 hours continuous tip use. One run used only eight tips in slotting 6 000 metres of pipe.

N. Z. POST OFFICE  
TELEX MESSAGE



TNL GRP NZ3653  
MINTECH NZ21051

ATTN WATERWELL DRILLERS

AS A WATERWELL DRILLER, YOU WILL BE MOST CONCERNED WITH THE DOLLAR RETURN TO YOU. WITH THE EXPANSION OF THE HORTICULTURAL INDUSTRY, MORE WELLS WILL BE REQUIRED OVER THE NEXT FIVE YEARS.

AS WITH ANY DRILLING OPERATION, THE DRILLER MUST KEEP THE HOLE IN GOOD CONDITION. CUTTINGS MUST BE REMOVED FROM THE HOLE IF YOU ARE GOING TO MAKE FAST THE HOLE.

MOST SMALL DRILLERS WOULD LIKE A SIMPLE FIX. BAROID HAVE DESIGNED A PRODUCT TO MEET THIS NEED.

'BIOPOLYMER' COMBINED WITH THE BREAKBACK SYSTEM WILL MAXIMISE YOUR DOLLAR RETURN.

THE MIX IS SIMPLE TO OPERATE.

UP TO 1/2 KG PER BARREL. BREAKBACK 1/8 KG/BBL.

BARIOD ARE OFFERING FREE ADVICE FOR YOUR DRILLING PROBLEMS. THE BARIOD BIO POLYMER SYSTEM IS JUST ONE EXAMPLE OF THE TECHNICAL ADVICE THAT IS AVAILABLE TO YOU, THE DRILLER.

RGDS DAVE MOORE 4.7.82.

MINTECH NZ21051  
TNL GRP NZ3653

MINTECH (N.Z.) LTD.  
P.O. BOX 62-118,  
SYLVIA PARK,  
AUCKLAND.

PHONE: 578-966  
----- OR  
577-174

MINTECH (N.Z.) LTD.  
P.O. BOX 440,  
NELSON.

PHONE: 80-092  
-----

## A drill in a china shop — or how to beat the winter

WHILE WELLINGTON'S winter arrived gift-wrapped in a freezing southerly, a couple of drillers in the town were quite happy to admit they're getting a bit soft on it.

The biggest building boom in the southern hemisphere is changing the face of the capital as effectively as any bombing raid, and the foundation drilling rigs operated by Lemmon Piling and Drilling Co Ltd are pounding away with nary a break.

But in James Smith department store, on the corner of Cuba Street and Manners Street, Bob Hannigan and Mark Ayre well protected from the elements.

Where the china department used to be, and will be again within a few months, their crawler drilling rig is beating away with the contented roar of a diesel whose silencer has heard better days.

A shear wall will eventually tie a building extension erected in 1965 to the much older structure, built in the early 1900s, as part of an earthquake protection project.

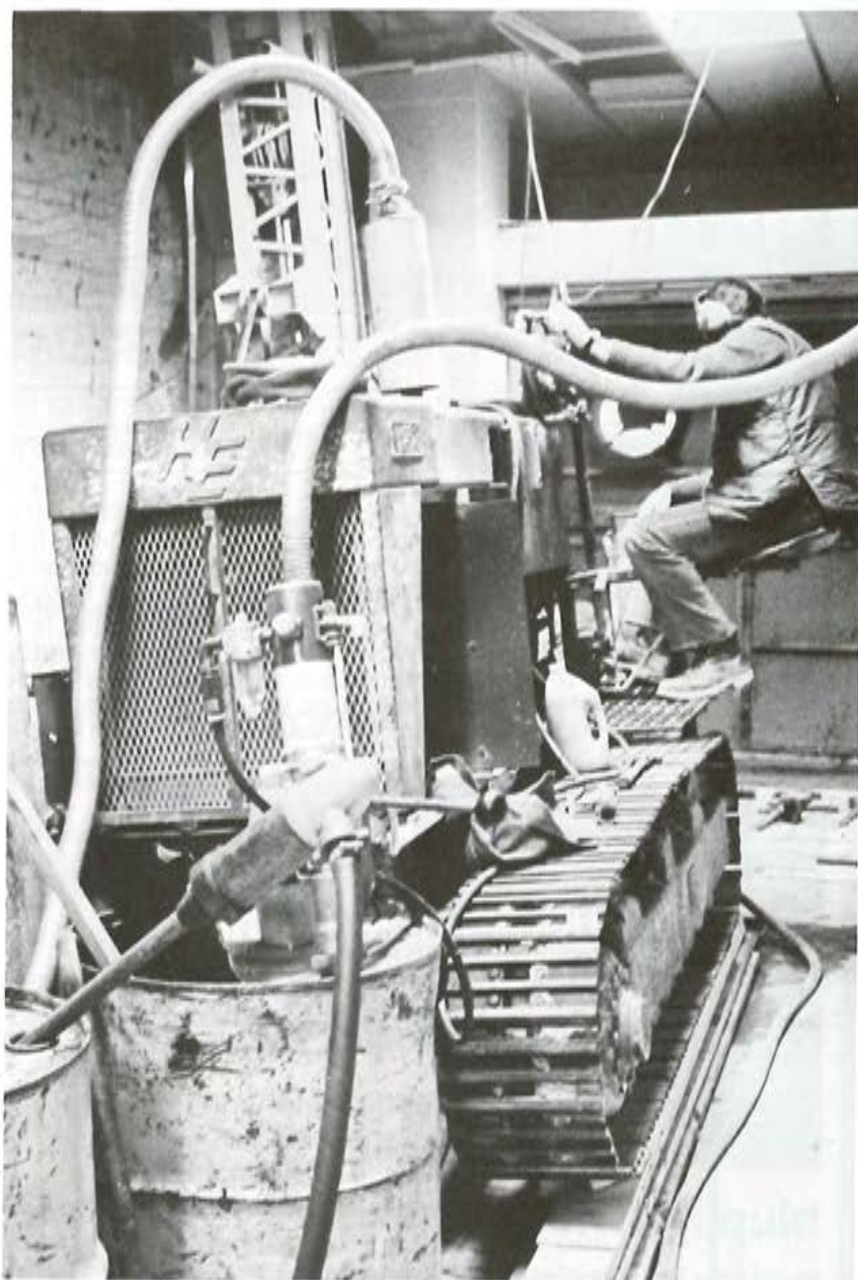
The drilling assignment seemed simple enough at first glance; install eight rock anchors, four at each end of the proposed wall, drill 150mm diameter holes to 15 metres below shop basement level.

"We didn't think it was going to be much of a problem," says Bob. Famous last words.

Before work could even start the rig had to be modified. It got a new mast which allows the hydraulic top-drive assembly only 1.5 metres of travel, instead of the three metres it had with the old mast.

Since then, it's been further modified with its exhaust stack feeding pipes that blow warm diesel fumes onto people standing outside, waiting for their buses.

Two large extractor fans suck up a minor gale of their own when fired up and help keep the working area free of fumes.



Lemmon Piling and Drilling's rig inside James Smith's downtown Wellington department store... where the china shop used to be. To the left of the operator Bob Hannigan can be seen the specially-built mast which allows the hydraulic top-drive unit only 1.5 metres of travel

The rig approached its task in the most direct manner possible, straight through a display window.

Work started with high velocity air drilling.

The first nasty surprise came a few metres below the shop's basement-level concrete floor. An aquifer producing impressive volumes, at a fortunately unimpressive head, was encountered.

That obstacle passed, yet another

aquifer was encountered another few metres down. It produced moderate flows at a head of about two metres.

Then, near the bottom of the hole, yet another aquifer was encountered. It produced about 300 litres an hour at a head of about four metres... the drill bit was held on the bottom of the hole overnight, to control the flow and allow it to stabilise, before the anchor was installed the next morning.

Continued on P8



A view from the basement floor, showing the 200mm diameter casing, splattered with foam. The casing, higher than the maximum water head, stops the basement being flooded



A view of the basement showing a completed anchor in the foreground and the foam-splattered casing in the background

#### Continued from P7

After the horrors of that first hole, it was decided to put in a couple of test bores, taking raymond samples at 200mm intervals down to 15 metres.

One of those holes, being drilled by a 14cm down-the-hole hammer, struck water in a big way, filling the basement pit in less than five minutes and threatening a major flood.

Pumping equipment came from all over town to battle the inflow, while a method of dealing with the problems was worked out.

High velocity air drilling was obviously out, because it encourages development of the water flow.

Lemmon chose low velocity foam drilling as the most preferable alternative. The technique had been experimented with on past projects and was ideal for the James Smith site, because it helped stabilise the head against water flows.

Working out how to prevent the water inflow was the next problem.

In the end it was decided to drive a 200mm steel casing to the bottom of the basement slab, holding it in place with Dyna bolts and neoprene seals.

The casing was made long enough to prevent any water inflows overtopping it and flowing into the basement pit.

A diamond drill was then used to go almost through the concrete slab, while a down-the-hole hammer punched through, and carried on down to the final depth.

The experience on the James Smiths job may come in handy soon because Lemmon has picked up a similar job involving work on the AMP building on Customhouse Quay.

Managing director Mr Peter Lemmon said that it would be hard to tell what will happen on that job until work starts.

"The foam drilling is pretty interesting because it's such a new technique, and it certainly got us over a problem on the James Smith job."

Meanwhile, Bob and Mark will not be getting any chance to get any softer on the job. Some crews got swapped around and another will be responsible for the AMP contract.

Drilling's not the business to be in if it's the ghastly prison pallor look you're after encouraging.



## EBARA submersible pumps for 75mm (3in) bores

Suitable for agriculture, irrigation and domestic applications. The exclusive use of stainless steel for casing, ensures long life and reliability, in the deepest installations, and most aggressive water.

Capacities to .045m<sup>3</sup>/min (10 gpm)

Heads to 50 metres (160 ft)

75mm (3 in) bores

Single phase 0.25/0.4 kW, 240 volt, 50 cycles



### Russell Pool, pump merchants Ltd.

PO Box 548, Rotorua. Telephone 87-516 & 86-829 or PO Box 38-128, Howick.  
Telephone Auck 5356-236

Sole NZ Importers and Distributors

# AIR DRILLING PRODUCTS

**DRILL FLUID**



## **Detergent and wetting agent Surfactant blend for air drilling**

For cuttings removal and dust suppression a mixing ratio of 1-3 litres/1000 litres is suggested.

DRIL DET may also be used on connections or by slugging

Available in 20 litre and 200 litre drums

## **Misting agents in liquid form for complete mist construction**

DRIL MIST need only have water added at the drilling site. 0.7-1 litre of DRIL MIST added to 200 litres of water is suggested.

Available in 20 litre and 200 litre drums



## **Polymers and misting agent in liquid form for complete foam construction**

DRIL FOAM need only have water added at the drilling site. For a good quality stable foam a ratio of 3kg/200 litres of water is recommended.

Available in 5kg and 22kg pails

CONTACT

### **DRILLING SERVICES AND SUPPLIES LTD**

66 Vivian Street, P.O. Box 15, New Plymouth, New Zealand

Telephone — 84397 Telex — NZ31383 Cable — Drill Fluid

# Mist and foam extend applications for air drilling

by John Hadfield  
Technical Services  
Drilling Supplies & Services Ltd

MIST AND foam drilling extend applications for air drilling and are faster, more economic, alternatives to drilling with water and mud.

Compressed air is not a new drilling medium. But fast drilling rates and quicker well turnover are making it more popular.

Experience and theory shows the lighter the drilling fluid, the faster the possible penetration rate. Light fluids allow maximum pressure relief for the formation so bit teeth can cut with the maximum efficiency.

With correct annular velocity the hole is quickly and efficiently cleaned. Air is the ideal medium for drilling as it needs only to be compressed before use.

The Confusion often centres on which air drilling technique to use in a given situation. Often, straight air cannot be used in New Zealand because of water or formation problems.

In this article air, mist and foam are defined

- Air - compressed air
- Mist - mist or foaming agent mixed with water and injected into the air stream

- Foam - stable foam formed by injection of a mixture of water, foaming agents and polymers into the compressed air stream.

Straight air drilling or dusting is only possible when the formation is dry, or when intruding water can be absorbed by the air flow. Annular velocities of 3 000ft/min are usually adequate for air drilling (see table 1a). A good indication that enough air is being used is how long it takes to clear the hole after drilling is stopped - no more than one minute for each thousand feet of hole.

When water intrusion exceeds the ability of air to remove it, problems start. Mud rings may form, or the bit will ball and water can cause back pressure. Slugging on connections with a good drilling detergent can prevent such problems.

Mist drilling may be the answer in formations too wet for straight air drilling.

The technique involves injecting a misting agent with water into the airstream, still in the continuous phase. Large volumes of water can be removed up to 150 bbl/hr has been reported.

**TABLE 1**  
**AIR REQUIREMENTS FOR PENETRATION RATE OF 60 FT/HR**  
a) Straight Air Drilling (cfm)      b) Mist Drilling (cfm)

Hole Size (ins)	Drill Pipe (ins)	Depth (feet)			Depth (feet)		
		500	1000	2000	500	1000	2000
4							
4 3/4	2.3/8	293	316	360	390	420	480
	2.3/8	254	278	328	338	370	436
6 1/4	2.7/8	523	551	608	696	733	809
	3.1/2	462	494	557	614	657	741
6 3/4	3.1/2	568	601	667	755	799	887
7 3/8	3.1/2	711	746	816	946	992	1085
7 7/8	3.1/2	834	870	943	1109	1157	1254
	4.1/2	711	753	835	946	1001	1111
8 3/4	3.1/2	1071	1109	1187	1424	1475	1579
	4.1/2	947	990	1078	1250	1317	1434
	5	874	920	1013	1162	1224	1347
9	3.1/2	1143	1182	1261	1520	1572	1677
	4.1/2	1019	1063	1152	1355	1414	1532
	5	945	992	1087	1257	1319	1446
9 7/8	4.1/2	1287	1333	1427	1712	1773	1898
	5	1212	1262	1360	1612	1678	1809
	5.1/2	1131	1183	1287	1504	1573	1712
11	4.1/2	1666	1717	1818	2216	2284	2418
	5.1/2	1511	1566	1676	2010	2083	2229
	6.5/8	1299	1361	1485	1728	1810	1975
12 1/4	4.1/2	2135	2190	2301	2840	2913	3060
	5.1/2	2027	2037	2156	2696	2709	2867
	6.5/8	1765	1830	1960	2347	2434	2607

• All measurements in imperial quantities

A good injection rate is important, demanding a good injection pump. An initial rate of 50-80 litres/hour is suggested, with adjustments depending on the condition of the hole.

Air requirements increase by 30-40 per cent with mist drilling (see table 1b). This overcomes the heavier damp air column, and higher annular velocities are required to move damp cuttings.

One common problem in both dry air and mist drilling is too little air for high penetration rates, when more air is required to efficiently remove cuttings.

Both dry air and mist drilling need high annular velocities, and are not practical in unconsolidated formations. These are places for foam drilling. Drill foam is a low density, low velocity medium which has excellent ability to stabilize such formations.

Foam drilling has the great advantage of requiring very low annular velocities, normally about 100-200 ft/min. Foam's very high carrying capacity, due to its viscosity and structure, allows it to clean the hole with low velocities.

In foam, the air is in the discontinuous phase (see figure 1).

The quality of a foam and its stability determine performance. A good foam has a low liquid volume fraction (LVF) but is strong enough to contain the air without breaking down too quickly. The graph below shows the effect of foam quality on lifting capacity (figure 2).

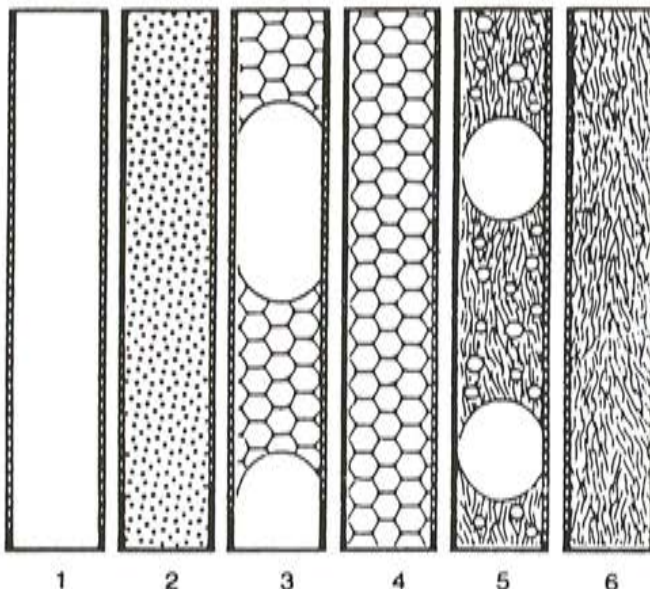
As a general rule, one volume of injection fluid should be used for the same volume of formation drilled; the injection rate should match the rate of penetration, while the desired foam consistency is that of aerosol shaving cream.

The best indication of downhole conditions are pressure gauge readings and foam condition at the blowie line.

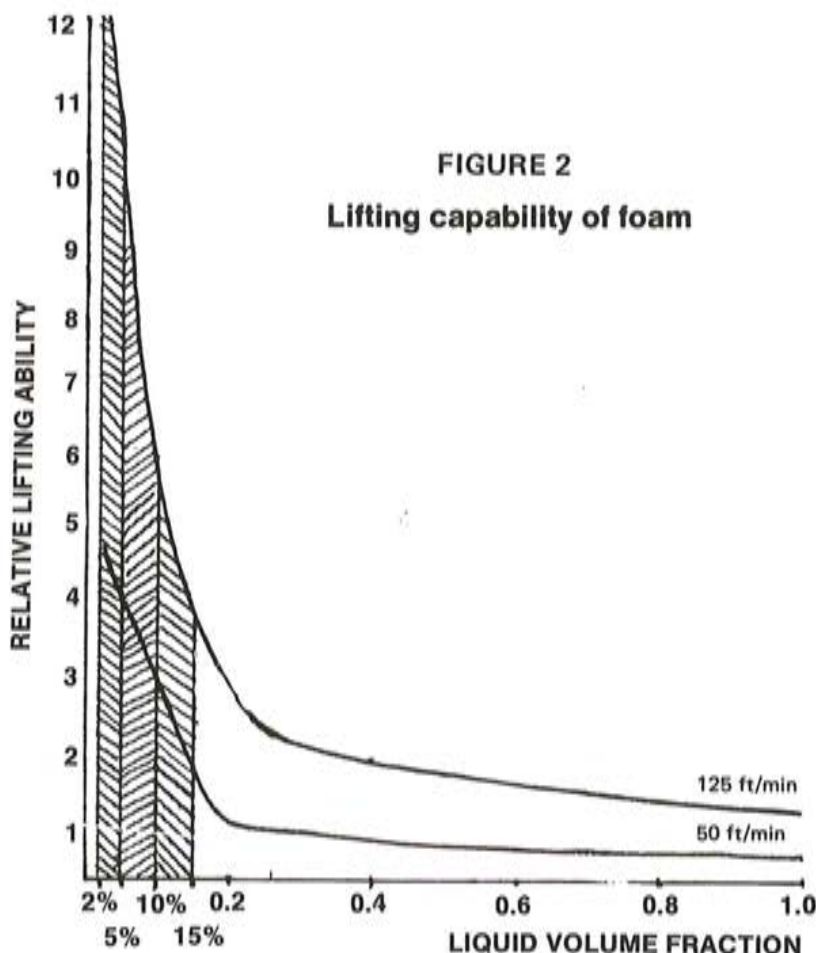
Maximum efficiency is achieved when all inflowing water is converted to foam on entering the hole, and the foam remains stable just long enough to reach the surface.

Sudden decreases in pressure are probably due to air breaking through

**FIGURE 1**



1. Air or gas flow; 2. Mist flow; 3. Stable foam with gas slugs; 4. Stable foam; 5. Liquid flow with gas slugs and interspersed bubbles; 6. Liquid flow.



Continued on P12

## Drilling scene

the foam. Air would also be noticed blowing free at the blooie. Treatment requires increased foam injection or decreased air injection.

If a sudden pressure increase occurs the bit has balled, or mud rings have developed, and must be slug treated and the pipe worked.

Gradually increasing pressure is probably due to increased drilled cuttings, and may be compensated by increased air volume.

## Advantages

## and disadvantages

## Foam

### Advantages

- High penetration rate
- Reduced compressor air requirements
- Low water requirements
- High solid carrying capacity
- Good hole cleaning capability
- Can handle large flows of water

### Disadvantages

- Careful proportioning required
- Chemical additive cost

## Easier ground

The use of foam products allows air drilling to include fragile formations and large hole drilling otherwise impossible. It also greatly reduces required compressor capacity.

A drilling product to take all the hassles out of foam drilling is now available in New Zealand. It is a special construction of polymers and misting agents in liquid form, providing a high quality stable foam which must only be added to water on site.

## Air

### Advantages

- High penetration rate
- Low water requirement
- Low chemical additive cost

### Disadvantages

- Problems arise if water encountered
- Hole erodes if formation loosley consolidated

## Mist

### Advantages

- Same as air except chemical additive cost rises
- Can handle considerable formation water

### Disadvantages

- Same as air, except can handle some water flow
- Air requirements 30 per cent higher

## AIR REQUIREMENTS FOR FOAM DRILLING

Hole size (ins)	Drill pipe (ins)	Air (cfm)
3	2 3/8	5-10
4	2 3/8	6-11
	2 7/8	4-8
	3 1/2	2-4
5	2 3/8	10-21
	2 7/8	9-18
	3 1/2	7-14
	4	5-10
6	2 3/8	16-33
	2 7/8	15-30
	3 1/2	13-26
	4	11-22
	4 1/2	8-17
7	2 3/8	24-47
	2 7/8	22-44
	3 1/2	20-40
	4	18-36
	4 1/2	16-33
7 7/8	2 3/8	25-50
	2 7/8	23-45
	3 1/2	19-37
	4	16-31
	4 1/2	11-12
9 7/8	2 3/8	44-88
	2 7/8	42-84
	3 1/2	39-79
	4	35-70
	4 1/2	30-60
	5	26-53
11	2 7/8	66-122
	4 1/2	55-109
	5	52-104
	6 5/8	42-84
12 1/2	2 7/8	77-154
	4 1/2	70-140
	5	66-136
	5 1/2	65-131
	6 5/8	58-115



# Get it straight



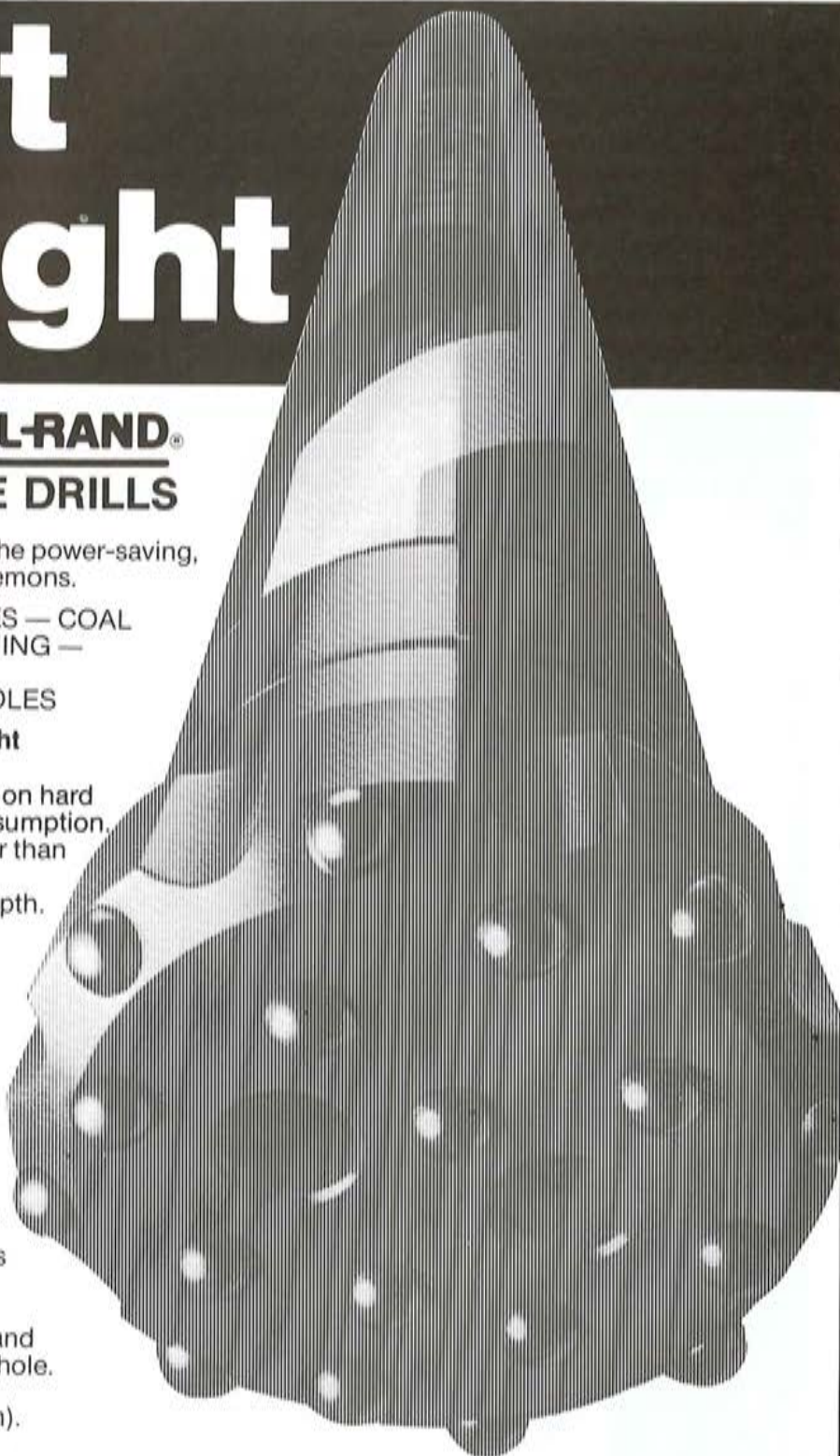
## INGERSOLL-RAND® DOWNHOLE DRILLS

With a worldwide reputation as the power-saving, fuel-saving, time-saving speed demons.

CONSTRUCTION BLAST HOLES — COAL STRIPPING — OPEN CAST MINING — WATER WELL DRILLING — CONSTRUCTION FOOTING HOLES

### INGERSOLL-RAND Cuts straight through the problems.

- Outperforming any other drills on hard rock holes with far less air consumption.
- Drilling straight — far straighter than drifters or rotary drills.
- Delivering full impact at any depth.
- Offering uniquely long rod life. The rig supplies only rotation, downfeed and airpower, and impact is **not** transmitted through coupled rods.
- Giving top results with a smaller compressor, less fuel and far less maintenance — because the piston is **the only moving part**.
- Letting you forget the hassle of hole cleaning. Exhaust air vents at the bit face, carrying broken rock right out of the hole.
- Cutting noise levels — impact and exhaust noise is muffled in the hole.
- Drilling straight and speedy from 4 to 30 inches (102-762 cm).



## INGERSOLL-RAND DOWNHOLE DRILLS Really reach rockbottom.



Full technical information and service from NZ distributors,

# DALHOFF & KING

(N.Z.) Limited

Auckland 278-3039  
Palmerston North 73-193  
Christchurch 495-389

Rotorua 79-179  
Napier 57-147  
Invercargill 4389

New Plymouth 87-689  
Wellington 721-067

W & M 31975

## Years of development turn up with small button bit

by Valter Harr  
Sandvik AB, Sweden

SMALL BUTTON bits have proved a competitive alternative in rock drilling since 1978.

This development has created a considerable potential for improved performance and lower costs with the market turning to replace regular insert bits with the new button bit design.

It became possible to use this type of bit in operations where smaller dimensions are called for when Sandvik introduces a second generation of small button bits with a 50 per cent increase in life compared to the previous generation.

The introduction of cemented carbide into rock drilling techniques in the 1940s was an important step forward. Penetration rates and service lives were increased, thus enabling more economical use of the equipment.

However, even cemented carbide insert bits need resharpener. Re-grinding is a costly process, since it interrupts the drilling cycle.

When more powerful rock drills were introduced, the demands on drill steels and bits became higher. Economy began to play an increasingly important role in drilling operations, especially when expensive equipment became idle, for example during bit changes.

Research and development was concentrated more and more on wear-resistant cemented carbide grades to increase product life. But gains in wear-resistance properties also meant inserts became more brittle.

Cement carbide has its limitations with regard to wear-resistance properties.

When those border lines were ap-

proached, development efforts were directed towards modifying the design of the bits. This also resulted in redesign of cemented carbide inserts.

It was found that button-shaped inserts gave far better resistance to stress and wear.

New steel grades also had to be developed, with properties suitable for button bits. These new, high grades are alloyed with chromium, nickel and molybdenum and are easy to machine to close tolerances.

### DTH bits

The first bits redesigned were large down-the-hole (DTH) bits. The size of the body allowed the buttons to be made heavy and strong, and permitted the powerful hammers to make them penetrate into the rock, at a good rate.

### Threaded bits

As the production of large DTH bits increased, the manufacturing technique was improved. Also the diameter of button bits with competitive performance could be reduced. Threaded button bits in the diameter range 64-102 mm became economical to use.

From initial development of button bits, the service lives of the bits have been improved dramatically at the same time as penetration rates have increased from 0.3 m/min to 1.0 m/min, indicating more stress on the bits.

Today Sandvik make button bits as small as 31 mm in diameter. But it was not until 1976 that the technique of buttons in a comparatively small bit body was refined.

The buttons had to be smaller to admit less powerful impact waves from the drills to drive them into the rock. Smaller bits also have less steel to support the buttons.

Several kilometres of test drilling paid off. The results showed that life lengths of well above 200 metres could be achieved. By using more powerful hydraulic drills, the penetration rate has also doubled to about two metres/min.

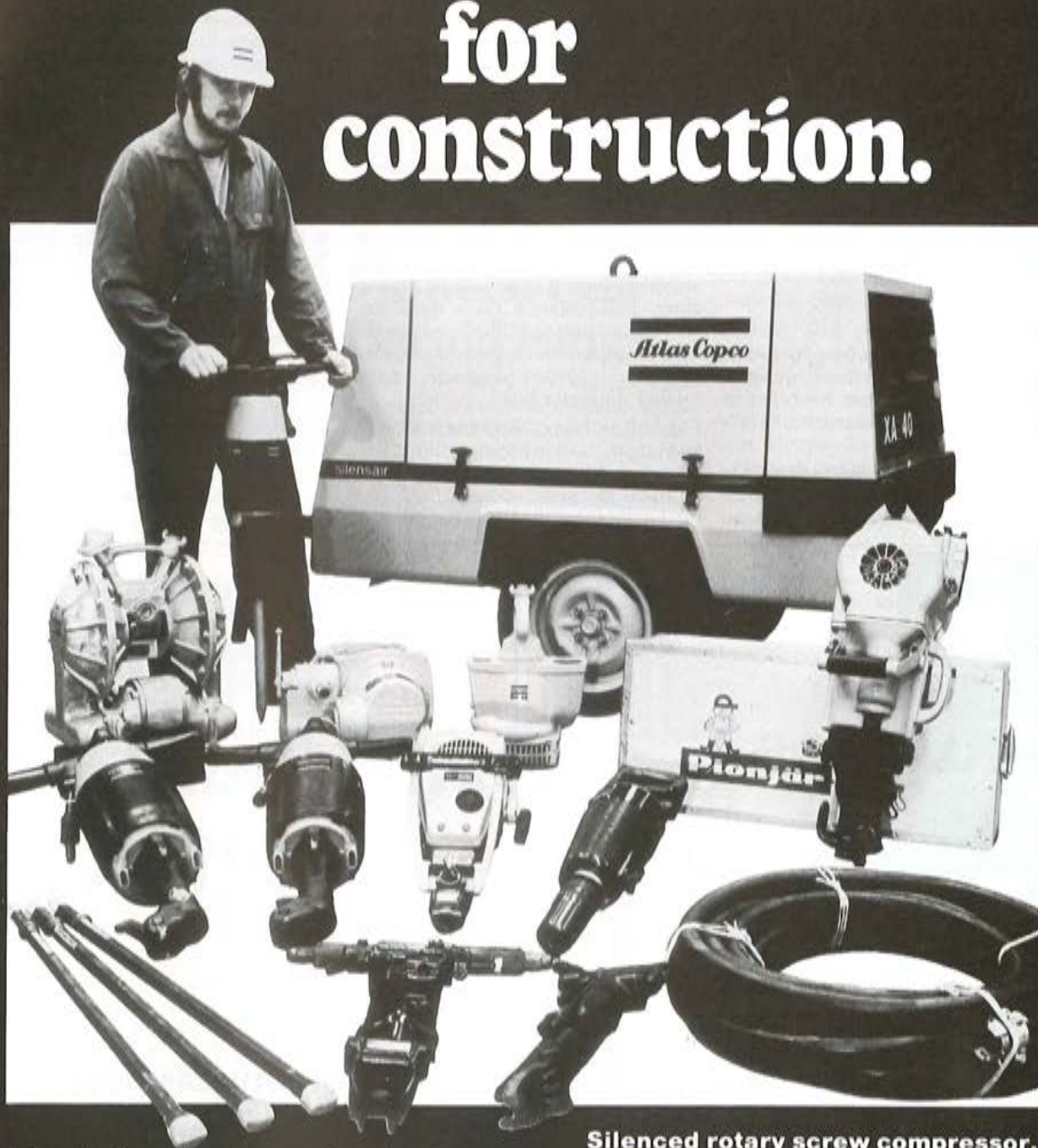
This permitted the introduction of button bits for mechanised drifting and tunnelling as well as long-hole production drilling, with diameters as



The new generation of small button bits from Sandvik, developed in three basic designs, is available in sizes from 35-57mm diameter

Continued on P16

# Atlas Copco: Mechanised muscle for construction.



**Tools for that tough job.  
Knowledge, reliability and  
energy for backup.**

**Silenced rotary screw compressor,  
DIP/DOP pumps, Super TEX paving  
breakers, Pionjar and Pico motor  
drills, RH rockdrills, Sandvik  
Coromant drill steels, LHB  
winches, hose and fittings.**

**Atlas Copco**

Atlas Copco (N.Z.) Limited  
Head Office: Tunnel Grove, Gracefield, Lower Hutt.  
Compressed Air Centres at:  
Auckland, Hamilton,  
Lower Hutt, Christchurch, Dunedin.

**ATLAS COPCO-TRUST THE NAME**

AC 152

**Continued from P14**

small as 41 mm. Two main designs were launched in 1978 — the two-wing design for drifting and tunnelling and the three-wing design for long-hole production drilling.

**New generation**

Under specific conditions, however, regular insert bits were still an economic choice. One reason for this was that the life of small button bits was limited by steel cracks as well as by other failures, i.e. broken buttons.

Research and test efforts resulted in the second generation of small button bits, with improved life and performance and the ability to withstand very abrasive rock.

**The new range**

The new small button bit generation is developed in three basic designs, comprising 14 different bit types in sizes from 35-57mm diameter. (1½"-2¼").

The smallest bits have four gauge buttons and a centered middle button. Bits in sizes 38-51mm have been

given a two-wing design, basically intended for drifting under tough conditions. The programme ranging from 45mm and up also includes a three-wing design bit, which has proved to give excellent performance especially in long-hole drilling where the hole shape is important. This is also true when drilling in fissured rock.

**No regrinding**

A central feature in the development of button bits has been to make them competitive without regrinding, since this operation is disruptive and costly.

For many years button bits — without resharpener — have been used together with the COP 1038 rock drill in drilling tests at Sandvik's Bodas test mine. Performance rates were improved and button failures reduced to such an extent that regrinding can no longer be regarded justifiable on the smaller diameter bits.

For button bits of diameters 64 mm and larger, used in bench drilling, it is, however, still economical to grind the buttons in most cases. This can further increase the life of the bits and

the penetration rate, especially when using older drills, with limited impact energy.

With the new generation of small button bits, the performance level has now been increased by 50-60 per cent as compared to the previous range. This implies that many work sites where insert bits are used today, would benefit from switching over to the newly developed small button bits.

## **Grundfos to Dunedin firm**

A DUNEDIN-based company is the New Zealand distributor for Grundfos multi-stage and submersible pumps.

The multi-stage range covers capacities from 0.5-75 cubic metres/hour with heads up to 230 metres.

Stainless steel manufacture makes them particularly suitable for use with corrosive water. They are widely accepted throughout the industrial and farming scenes.



# **GRUNDFOS**

**THE RIGHT PUMP**

- Multistage to suit all duties
- Submersible models
- Stainless steel construction
- Models from 0.25hp-75hp
- Applications include
  - Farm reticulation
  - Rural water schemes
  - Boiler feed duties
  - High pressure cleaning and washdown
  - Suitable for corrosive waters

NZ importers and distributors

**DON HALL MACHINERY LTD**  
**P O BOX 7021 DUNEDIN NZ**

**PHONE (024) 30 689**  
**TELEX NZ 5204**



## **W. H. PRICE & SON LTD**

ENGINEERS

34-36 MANCHESTER STREET  
CHRISTCHURCH, 1  
NEW ZEALAND

CABLE & TELEGRAPHIC ADDRESS  
"PRICEBRASS" CHRISTCHURCH

TELEPHONE 69-174  
P.O. BOX 22084

**PUMP MANUFACTURERS SINCE 1879**  
**CENTRIFUGAL, PLUNGER, GEARED ROTARY,**  
**DEEP WELL, DIAPHRAGM, STA-RITE SUBMERSIBLE PUMPS.**  
**DEEP WELL CYLINDERS UP TO 4" BORE, FILTERS, STRAINERS AND OTHER PUMPING ACCESSORIES.**

The agents hold over 300 pumps in stock, covering centrifugal, multi-stage, submersible, bore hole, gear, diaphragm, rotary, bulldozer and sewage pumps.

Long experience in all aspects of pumping enables it to offer expert advice on pump selection. After sales service and parts are a feature of the company's operation. Information from

**Don Hall Machinery Ltd**  
P O Box 7021  
DUNEDIN  
Ph (024) 30 689

## Pump maker changes

TRW REDA recently sold its complete 100mm (four inch) pump range to Standard Pumps Inc.

The sale was made so Reda could specialise in developing on its larger low temperature oil well and water pump units, used in more than 104 countries.

Standard took over the manufacture and marketing of the 75mm and 100mm models, and by employing

technical and works staff from Reda will now specialise in those models. Design improvements since the change includes new stainless steel casings. Delivery times are also better.

Reda's New Zealand distributor McNeill Drilling Co Ltd, of Invercargill, has added the Standard range to its pumping lines. They already carry 11 models of 75mm and 100mm units, and by stocking pumps from both Reda and standard can offer one of the widest selections in the country. Information from

**McNeill Drilling Co Ltd**  
P O Box 1041  
INVERCARGILL  
Ph (021) 66 035

## Mintech gets Baroid range

MINTECH (NZ) Ltd was last year appointed sole New Zealand agent for the Baroid division of NL Industries.

Baroid is the leading manufacturer and supplier of drilling chemicals and engineering consultancy services to the drilling industry.

Through a long association with oil drilling worldwide, Baroid has developed a network of offices and agents for their products and expertise, which includes seismic, water and mineral exploration drilling.

Similar problems occur in all types of drilling so similar technology is required.

As Baroid's New Zealand agent, Mintech manufactures and packs under licence many of the specially formulated Baroid chemicals used in drilling.

It carries stocks of regularly-used chemicals and basic equipment, but can call on stock in Australia, Singapore or Houston. Stocks are held at Auckland, Nelson and Christchurch, and new stores may be strategically located as required.

Mintech also employs a Houston-trained mud engineer, Mr Dave Moore, to advise New Zealand drillers on the use of Baroid's speciality chemicals and mud systems. He may be contacted at

**Mintech (NZ) Ltd**  
AUCKLAND  
Ph (09) 578 966  
(09) 577 174

# ROTORUA WELLDRIILLING CO LTD



**Geothermal and Coldwater Welldrilling Engineers**  
Tally Ho St, Rotorua  
P O Box 727, Rotorua  
Ph (073) 87 687

Geothermal energy utilisation specialists  
Rural and domestic water supplies  
Pumping systems and associated engineering

North Island stockists and agents for Gruner Williams drilling bits, and Reda deepwell submersible pumps.

Manufacturers and suppliers of drill rod couplings, screens and fishing tools.

Stockists of Mastport Onga and Davies pumps, Hitachi and Kitizaqa stainless steel valves, bandit stainless steel strapping, preformed clamps and tools, Stocks Camlock couplings, Flexible hoses and G.F. pipe fittings.



## Members

### ALLNATT, R.J.

18 Lyndhurst St  
Gisborne  
Ph 85475

### BAYLIS BROS LTD

Box 5003  
Greenmeadows, Napier  
Ph 442 167

Water wells 75-500mm, foundation and seismic drilling, drilling supplies.

### BISLEY, A.M. LTD

Box 16 044  
Christchurch  
Ph 499009

Water wells, large drilling

### BURGESS DRILLING CO

56 Grey st  
Dargaville  
Ph 7993

Water bores, test drilling, lifting down-hole pumps

### CAMERON, EWEN WELLDRILLING

141 Ohauiti Rd  
Tauranga RD3  
Ph 89 840

Water wells, test drilling

### CARLYLE WELLDRILLING LTD

Box 413  
Te Puke  
Ph 37 078

Domestic, irrigation, hot water bores

### CONSOLIDATED DRILLERS LTD

Meachen St, Seaview  
Lower Hutt  
Ph 684 352

### DRILLWELL EXPLORATION (NZ) LTD

Box 360  
Manurewa  
Ph 298 9434

### FARM SERVICES (NZ) LTD

P O Box 377  
Taupo  
Ph 85 105

Geothermal, hot or cold water bores, water pump sales and service, heat exchangers

### FAULKNER DRILLWELL (NZ) LTD

Box 576  
Manurewa  
Ph 298 3166

### FORDS WELLDRILLING LTD

9 Cryer St  
Southbridge, Canterbury  
Ph 890 Leeston

### GARNETT, J.P. & CO LTD

Box 52  
Putaruru  
Ph 7869

Farm supplies, pump lifting and repairs, sales and service, water wells

### GARNHAM WELLDRILLERS

297 Harbour Rd  
Ohope  
Ph 629

Well drilling, bore servicing

### GRIFFITHS DRILLING CO LTD

Box 40 422  
Upper Hutt  
Ph 269 943

Diamond drilling, site investigations, well drilling

### HILL WELLDRILLERS LTD

Ormond Rd  
Hastings RD5  
Ph 797 777

Production water wells 80mm-500mm, test drilling

### HONNOR WELLDRILLERS LTD

208 Charles St  
Hastings  
Ph 86731

Cast-in-situ piling, concrete core drilling, offal pits, pole houses, site investigation, water well drilling

### KELLY, G.L.

26D Cowling Rd  
New Plymouth  
Ph 33 104

### McCALLION, J.W.

Box 11  
Opotiki  
Ph 561A

Domestic, farm and industrial wells, irrigation, diamond core and foundation test drilling

### McMILLAN WATER WELLS LTD

17 St Johns St  
Southbridge, Canterbury  
Ph SOU 571

Farm supplies, foundation testing, investigation drilling, household wells, irrigation wells 150mm-500mm, town supplies

### McNEILL DRILLING CO LTD

Box 1041  
Invercargill  
Ph 66 035

Bridge and building foundations, pump sales and service, test drilling, water supplies

### McCONNELL DOWELL

### CONSTRUCTORS LTD

Box 9371 Newmarket  
Ph 686 970 Auckland  
Geothermal, oil, gas, and water drilling; parent company international contractors

### NOVA SUPPLIES LTD

Box 338  
Masterton  
Ph 81 571

Blast note drilling, anchor and investigation drilling

### RICHARDS DRILLING

Box 1398  
Dunedin  
Ph 730 358

### RICHARDSON'S DRILLING CO LTD

Box 1001  
Palmerston North  
Ph 80 145

Well drilling, pile drilling and driving, core and investigation drilling

### ROTORUA WELLDRILLING CO LTD

Box 727  
Rotorua  
Ph 87 687

Geothermal and water well drilling, pump service and sales, Smith Gruner bits and Bandit industrial hose and couplings

### RURAL WELLDRILLING LTD

45 Robinson St  
Cambridge  
Ph 4709

Irrigation, industrial and farm bores, core sampling

### TAUPO DRILLERS LTD

Box 676  
Taupo  
Ph 85 414

Investigation and diamond drilling, soil in-situ testing, cement grouting

### THAMES VALLEY WELLDRILLERS LTD

Box 28  
Thames  
Ph 87 652

Bore and pump servicing, test drilling, water bores

### TRIGG WELLDRILLING

Box 7086  
Whangarei  
Ph 73 275

Offal pits, site work, water drilling

### WAIMEA DRILLING CO LTD

Richmond RD1  
Ph 8381

Water wells 125-300mm, site and mineral investigation, in-situ vane testing, pressure flow testing, test pumping, small and deep well pumps

### WANGANUI WELLDRILLERS LTD

Box 8058  
Wanganui  
Ph 45 870

Water wells, testing drilling, site investigation, diamond coring

### WASHINGTON DRILLING LTD

Box 2045  
Washdyke, Timaru

Branches at Rangiora, Christchurch, Oamaru

Ph TIU 82 383

Bridge and building foundations, diamond drilling, disposal bores, pump sales and service, soak pits, test drilling, water wells 75mm-900mm

### WEBB, N. & SON LTD

Box 1155  
Levin  
Ph 85 829

Water well drilling, site investigation

### WESTERN WELLDRILLING LTD

Box 15 214  
New Lynn, Auckland  
Ph 818 6353

### WILSON, E.D. CONSTRUCTION LTD

Box 10  
Nelson  
Ph Richmond 8157

## Associate Members

### AUSTRALASIAN DIAMOND TOOLS

Box 5334

Hamilton

Ph 77 407

### ATLAS COPCO (NZ) LTD

Private Bag

Lower Hutt

Ph 686 049

### BAY WATER PUMPS

Quarry Rd

Tauranga RD6

Ph 89 840

Pump sales and service

### BROWN BROS ENGINEERING LTD

Box 548

Christchurch

Ph 50 279

### DALHOFF & KING (NZ) LTD

Ingersoll Rand Division

Box 3040

Wellington

Ph 721 067

### DAVIES, D.H. & CO LTD

Box 12 029

Penrose, Auckland

Ph 592 159

### DOMINION CONSTRUCTION CO

Box 11 077

Wellington

### DRILLING SERVICE & SUPPLIES

Box 15

New Plymouth

Ph 84 397

Drilling fluid engineering and products, drilling equipment

### GARDNER DENVER LTD

Box 61 022

Otara Auckland

Ph 274 7196

### HALL, DON MACHINERY LTD

Box 7021

Dunedin

Ph 34 702

Pumps, wellscreens

### LONGYEAR NZ LTD

Box 43 030

Mangere Auckland

Ph 275 4049

### MONO PUMPS NZ LTD

Box 71 021

Auckland

Ph 889 053

Agricultural, bore hole, mud and high pressure pumps, pump manufacturers

### MINTECH (NZ) LTD

Box 440 Box 22 388

Nelson Otahuhu

Ph 80 092 Ph 276 6428

Drilling fluid products, mud engineering assistance

### RUSSELL POOL PUMP MERCHANTS LTD

Box 548

Rotorua

Ph 87 516

### SUBSOIL ENGINEERING CO LTD

Box 35 163

Browns Bay Auckland

Ph 478 5140

### TASMAN OIL TOOLS LTD

Box 37 075

Parnell, Auckland

Ph 778 285

Tools, equipment

## Membership information

The Secretary

New Zealand Drillers' Federation

P O Box 1318

HAMILTON, NZ

Ph (071) 390 069



We've gone and changed our phone numbers and address and if you're in industry you'll need to know:

Mintech NZ Limited, 11 Bowden Road, Mt Wellington.  
P.O. Box 62-118, Sylvia Park, Auckland.

Phone: 578-966 or 577-174 Telex 21051

Head office: P.O. Box 440, Nelson. Phone 80-092.

*Wouldn't  
it rock you!*  
We've moved again

Before installing your next  
pump contact the experts



Proud to be New Zealand agents for world renowned

**T.R.W. Reda**

and

**Standard**  
**submersible pumps**

T.R.W. Reda have pumps operating in 108 countries. And in New Zealand, McNeill Drilling now stocks a range from three inch 0.5hp to ten inch 100hp pumps. . .

Contact McNeill for more information on these outstanding performance of these pumps, as well as the TRADE DISCOUNT associated with T.R.W. Reda pumps.

McNeills also stock other leading brands including

**Grundfos   Aturia   Brown Bros   Renown   Posiflo**



McNeill Drilling is also  
South Island distributor for  
Gruner Williams rock bits  
BUILT TO BITE

Contact

**McNeill Drilling Co Ltd**  
**P O Box 1041 Invercargill**  
**Ph (021) 66 035**