



MCNEILL DRILLING CO LTD

Since 1918

Specialist in Drilling, Piling, Water Pumping and Irrigation

Fax Cover Sheet

Date: 22.08.06

Time:

To: Terry Hughes

Phone:

Fax: 03 3746516

From: Graeme Stewart

Phone: 03 4487 049

Fax: 03 4489 420

Re: BORE LOGS - CARORONA. Page 1 of

TERRY

AVAILABLE BORE LOGS ATTACHED.

- ① CARORONA LTD LOCATED SOUTH OF HOTEL SITE
- ② GILBERT B SITE SOUTH OF HOTEL (CARORONA HOTEL BORE) BUT RETAINED BY GILBERT
- ③ B GILBERT NORTH OF HOTEL WAS UNSUCCESSFUL.
- ? ④ THOMPSON? COULD BE TIM SCURRS EXCAVATED WELL SITE FOR CARORONA TOWNSHIP SUPPLY
- ⑤ ROSS LANDLAW SHALLOW BORE HIGH IN IRON/MANGANESE
- ⑥ JOHN LEE WEST OF CARORONA - DON'T KNOW ABOUT THIS BORE BUT IT COULD BE A CREEK INTAKE
- ⑦ MOUNT CARORONA - NO DATA
- ⑧ THERE IS A SHALLOW EAST OF THE AIR STRIP
- ⑨ JOHN LEE BORE TO NORTH EAST OF ROAD IS IDENTIFIED ON BORE LOG - I DOUBT IF IT HAS CONSENT

GOOD LUCK

REGARDS GRAEME STEWART

Head Office:

● Alexandra
Boundary Road
PO Box 95
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Fax 03 448 9420

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151 Waterloo Road
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Phone 03 349 4443
Fax 03 349 4449

● Dunedin
Donald Street
PO Box 7021
Phone 03 488 4227
Fax 03 488 3042

● Invercargill
Otepunu Ave
PO Box 1041
Phone 03 216 6035
Fax 03 216 6010





MCNEILL DRILLING CO. LTD

WATER BORE/WELL SUMMARY FORM

CLIENTS NAME: Cardrona Ltd c/- Dean Franklin	RESOURCE CONSENT NO:
FULL ADDRESS: Cardrona	BORE SIZE: 150mm
RAPID NO:	START DATE: 18.03.05
GRID REFERENCE: E2194308 N5583995	FINISH DATE: 21.03.05
DRILLER: Mike Simmons	
MEASURED FROM: Ground Level	MACHINE: TH60
TOTAL DEPTH BORE: 14.27	DRILL METHOD: Tubex
TOP LEADER: 13.69	
STATIC WATER LEVEL: 7.85	
SCREEN: SLOT: 2.5mm	LENGTH: 1.50
TYPE: Stainless Steel	SIZE: 140mm
PVC SLOTTED: TOP:	BASE:
SCREEN/LEADER/SUMP: 1.58	SUMP SIZE:
TOTAL CASING USED: 13.14	
AIRLIFTED/PUMPED AT: 6 litres per second	
TEST PUMP PERIOD: 5 hours	
DRAWDOWN FROM SWL: Nil	
AIR/PUMP INTAKE: 9.80	
BACTERIAL WATER TEST: Citilab	
CHEMICAL WATER TEST: Citilab	
EXTRA NOTES:	
BORE LOG:	
0.00 – 1.80	Silts
1.80 – 6.80	Silty sandy gravels boulders
6.80 – 9.00	Sandy gravels
9.00 – 14.30	Very silty sandy angular gravels and boulders
14.30 – 14.50	Clay bound gravels

Citilab

Analysis
Consultants



McNeill Drilling
(Boundary Rd)
P.O. Box 95
ALEXANDRA

LABORATORY ANALYSIS REPORT

#21940

Thursday, 14 April 2005

ATTENTION: Graeme Stewart

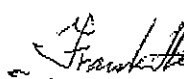
Your Order #- D61458

Job Start: 23/03/05 16:21:15

Test start:	Test complete:	ANALYSIS	RESULT	Analytical Method	Detection Limits
23/03/05 16:56:09	29/03/05 15:47:20	Acidity Requires CO2	38 g/m ³ as CaCO ₃	APHA 2310, B	1 g/m ³ as CaCO ₃
23/03/05 16:56:10	29/03/05 10:14:26	Alkalinity to pH 4.5	48 g/m ³ as CaCO ₃	APHA 2320, B	1 g/m ³ as CaCO ₃
24/03/05 09:21:10	29/03/05 10:14:53	Alkalinity to pH 8.3	<1 g/m ³ as CaCO ₃	APHA 2320, B	1 g/m ³ as CaCO ₃
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:15	24/04/05 10:54:31	Bromide (IC) Referral	<0.05 g/m ³	Ion Chromatography 0.05 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:19	24/04/05 10:54:38	Chloride (IC) Referral	1.0 g/m ³	Ion Chromatography 0.5 g/m ³
	23/03/05 16:56:37	31/03/05 17:11:20	Colour *	<0.5 C.P.U.	Spectrophotometer 0.5 C.P.U.
	23/03/05 16:56:38	24/03/05 12:53:30	Conductivity	11 mS/m	APHA 2510, B 0.01 mS/m
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:39	14/04/05 10:54:42	Fluoride (IC) Referral	0.13 g/m ³	Ion Chromatography 0.05 g/m ³
	13/04/05 16:33:51	14/04/05 10:54:58	Total Hardness By Calculation	46.2 g/m ³ as CaCO ₃	APHA 2340, C 2 g/m ³ as CaCO ₃
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:59	24/03/05 16:47:57	pH	8.32 @ 20°C	APHA 4500 - H+, B 0.02 pH unit
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:57:00	14/04/05 10:55:00	Phosphate (IC) Referral	<0.4 g/m ³	Ion Chromatography 0.4 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:57:03	14/04/05 10:55:08	Sulphate (IC) Referral	4.0 g/m ³	Ion Chromatography 0.5 g/m ³
	23/03/05 16:57:16	24/03/05 14:06:55	Turbidity - class 1	0.65 NTU	APHA 2130, B 0.05 NTU
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:12	14/04/05 10:55:13	Arsenic-Total Referral	<0.001 g/m ³	ICP-MS 0.001 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:16	14/04/05 10:55:18	Calcium-Total (ICP) ICP-MS (Referral)	15.2 g/m ³	ICP-MS 0.05 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:40	14/04/05 10:55:23	Iron-Total (ICP) ICP-MS (Referral)	0.08 g/m ³	ICP-MS 0.02 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:42	14/04/05 10:55:24	Magnesium-Total (ICP) ICP-MS (Referral)	2.00 g/m ³	ICP-MS 0.02 g/m ³
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:55	14/04/05 10:55:27	Manganese-Total (ICP) ICP-MS (Referral)	0.0030 g/m ³	ICP-MS 0.0005 g/m ³
	23/03/05 16:35:51	29/03/05 16:11:00	E. coli (Quanti-Tray)	<1.0 MPN/100 mL	Inhouse 1.0 MPN/100 mL
>> Referral: Hill Laboratories, Hamilton.	23/03/05 16:56:58	14/04/05 10:55:31	Nitrate (IC) Referral	1.5 g/m ³	Ion Chromatography 0.02 g/m ³

Analyst's Comments:

Units: In accordance with modern practice the previous 'mg/L' is now expressed as the equivalent 'g/m³'. These samples were collected by yourselves and analysed as received at the laboratory. The detection limits given are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. This report must not be reproduced except in full without the written consent of the signatory.


Dr. Frank Ho
Laboratory Services Manager



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The tests reported here have been performed in accordance with its terms of accreditation - with exception of any marked *, which are not accredited.


Richard Allan
Microbiology Technician

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Telephone (03) 455 7938, Fax (03) 455 7940
Email: mail@citilab.co.nz
Website: www.citilab.co.nz



Sample 85902 Cardrona Ltd

Batch 21940

Determinants	Results (mg/L or specified)	MAV ¹ or GV ²	Target range	Comments
Acidity	38	-	Low	Ok
Alkalinity	48	-	Low	Ok
Bromide	<0.05	-	Low	Ok
Chloride	1.0	250	<250	Ok
Colour	<0.5	10 (CPU)	<5 (CPU)	Ok
Conductivity	11	-	<40, low	Ok
Fluoride	0.13	1.5	<0.75	Ok
Total hardness	46.2	200	<200	Soft
pH	6.32	7.0 to 8.0	7.0 to 8.5	Low*
Phosphate	<0.4	-	low	Ok
Sulphate	4.0	250	<125	Ok
Turbidity (1)	0.65	<2.5 NTU	<2.5 NTU	Ok
Total arsenic	<0.001	0.01	<0.005	Ok
Total calcium	15.2	-	low	Ok
Total iron	0.08	0.2	<0.2	Ok
Total magnesium	2.00	-	low	Ok
Total manganese	0.003	0.5	<0.5	Ok
E.coli	<1.0	<1	<1	Ok
Nitrate	1.5	50	<25	Ok

¹MAV means Maximum Acceptable Values quoted from Drinking Water Standards for New Zealand 2000. ²GV means Guideline Values from the same source above. mg/L equals to g/L and is often quoted as ppm (parts per million).

Overall comment:

The water is deemed to be **SUITABLE** for drinking purpose with respect to the tested parameters according to the New Zealand Drinking Water Standards. The low pH indicated that the water was "aggressive" and as such may cause corrosion on metal surfaces under certain circumstances.

Dr. Frank Ho
Manager
Laboratory Services

INVERCARGILL CITY COUNCIL

WATER TESTING LABORATORY

Lake Street Invercargill
ph(03) 216 2189 fax (03) 216 2789



WORKS AND SERVICES
DIRECTORATE

When calling please ask for:

Your reference:

Our reference:

21-Sep-98

Lab Reference Number E 2004

McNeill Drilling Water Test Report: *Alexandra*

Name:	Cardrona Hotel	
Address:	Cardrona	
Order No:	13740	
Date Received:	17/09/98	11:30 AM
Date Sampled:	16/09/98	04:20 PM
Sample Description:	Water	

PHYSICAL

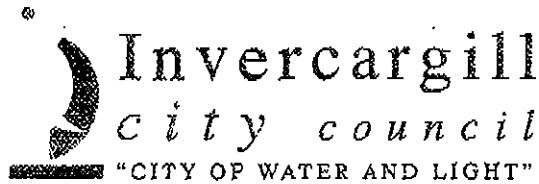
pH:		6.80
pH after Aeration:		7.92
Turbidity:	NTU	2.44
Total Hardness:	mg per litre as CaCO3	42
Calcium Hardness:	mg per litre as CaCO3	30
Magnesium Hardness:	mg per litre as CaCO3	12

CHEMICAL

Iron:	mg per litre	0.16
Nitrate:	mg per litre as N	0.53
Ammonia:	mg per litre as N	0.01
Chloride:	mg per litre	2
Manganese:	mg per litre	0.01

A soft water sample that was slightly corrosive.

P. A. Rodmell
City Chemist



WATER TESTING LABORATORY

Lake Street Invercargill
ph(03) 216 2189 fax (03) 216 2789

19-Apr-00

Lab Reference Number B 1364

McNeill Drilling Water Test Report: Alexandra

Name: Laidlaw R.
Address: Cardrona
Order No: 11964
Date Received: 23/04/97 12:35
Date Sampled: 22/04/97 12:00
Sample Description: Water

BACTERIOLOGICAL

Total Coliform: Colony Forming Units per 100ml
Faecal Coliform: Colony Forming Units per 100ml
Enterococci: Colony Forming Units per 100ml

PHYSICAL

pH: 7.03
pH after Aeration: 8.33
Turbidity: NTU 98
Total Hardness: mg per litre as CaCO₃ 70
Calcium Hardness: mg per litre as CaCO₃ 55
Magnesium Hardness: mg per litre as CaCO₃ 15

CHEMICAL

Iron: mg per litre 9.78
Nitrate: mg per litre as N 0.01
Ammonia: mg per litre as N 0.02
Chloride: mg per litre 6

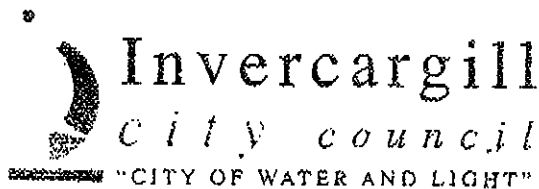
A moderately soft water sample. The iron was high and would lead to taste and staining problems. The high turbidity was probably due to the sand in the sample.

PN P. A. Rodmell
City Chemist

Works and Services Directorate

Civic Administration Building • 101 Esk Street • Private Bag 90104 • Invercargill 9520 • New Zealand
DX No. YA90023 • Telephone: (03) 218 1959 • Fax: (03) 214 3684





WATER TESTING LABORATORY

Lake Street Invercargill
ph(03) 216 2189 fax (03) 216 2789

15-May-00

Lab Reference Number B 3119

McNeill Drilling Water Test Report: Alexandra

Name: Laidlaw Ross
 Address:
 Order No: 17002
 Date Received: 12/05/00 11:30
 Date Sampled: 11/05/00
 Sample Description: Water

PHYSICAL

pH: 7.80
 pH after Aeration: 7.23
 Turbidity: NTU 99.6
 Total Hardness: mg per litre as CaCO3 70
 Calcium Hardness: mg per litre as CaCO3 46
 Magnesium Hardness: mg per litre as CaCO3 24

CHEMICAL

Iron: mg per litre 1.39
 Nitrate: mg per litre as N 0.19
 Ammonia: mg per litre as N 0.01
 Chloride: mg per litre 4
 Manganese: mg per litre 0.04

A moderately soft water. The iron and magannese levels may cause taste and staining problems.

PAV P. A. Rodmell
City Chemist

RCBWH



CitilabAnalysts
ConsultantsMcNeill Drilling
(Boundary Rd)

P.O. Box 95

ALEXANDRA

ATTENTION: Graeme Stewart

LABORATORY ANALYSIS REPORT

#25587

Wednesday, 15 March 2006

Your Order #: 62870


Job Start: 28/02/06 08:09:09

Test start:	Test complete:	ANALYSIS	RESULT	Analytical Method	Detection Limits	
5/03/06 13:57:41	6/03/06 09:10:01	Acidity Requires CO2	23 g/m ³ as CaCO ₃	APHA 2310, B	1 g/m ³ as CaCO ₃	
28/02/06 14:58:32	28/02/06 15:38:05	Alkalinity to pH 4.5	55 g/m ³ as CaCO ₃	APHA 2320, B	1 g/m ³ as CaCO ₃	
28/02/06 14:58:32	28/02/06 15:38:07	Alkalinity to pH 8.3	<1 g/m ³ as CaCO ₃	APHA 2320, B	1 g/m ³ as CaCO ₃	
3/03/06 18:28:37	5/03/06 14:11:08	Bromide (IC) Referral	0.08 g/m ³	Ion Chromatography	0.05 g/m ³	
3/03/06 18:29:53	5/03/06 14:11:12	Chloride (IC) Referral	0.93 g/m ³	Ion Chromatography	0.5 g/m ³	
28/02/06 14:58:34	28/02/06 15:09:55	Colour *	<0.5 C.P.U.	Spectrophotometer	0.5 C.P.U.	
28/02/06 17:29:39	1/03/06 13:22:12	Conductivity	12 mS/m	APHA 2510, B	0.01 mS/m	
3/03/06 18:28:22	5/03/06 14:11:06	Fluoride (IC) Referral	0.10 g/m ³	Ion Chromatography	0.05 g/m ³	
15/03/06 13:33:02	15/03/06 14:45:25	Total Hardness By Calculation	55.4 g/m ³ as CaCO ₃	APHA 2340, C	2 g/m ³ as CaCO ₃	
28/02/06 14:54:51	28/02/06 16:31:03	pH	6.81 @ 20°C	APHA 4500 - H+, B	0.02 pH unit	
3/03/06 18:28:08	5/03/06 14:11:04	Phosphate (IC) Referral	<0.4 g/m ³	Ion Chromatography	0.4 g/m ³	
3/03/06 18:30:02	5/03/06 14:11:14	Sulphate (IC) Referral	4.2 g/m ³	Ion Chromatography	0.5 g/m ³	
28/02/06 15:35:01	28/02/06 16:34:22	Turbidity - class 1	0.65 NTU	APHA 2130, B	0.05 NTU	
>> Referral: Hill Laboratories, Hamilton.	5/03/06 13:57:34	5/03/06 14:45:16	Arsenic-Total Referral	<0.001 g/m ³	ICP-MS	0.001 g/m ³
>> Referral: Hill Laboratories, Hamilton.	5/03/06 13:57:20	15/03/06 14:45:04	Calcium-Total (ICP) ICP-MS (Referral)	18.2 g/m ³	ICP-MS	0.05 g/m ³
>> Referral: Hill Laboratories, Hamilton.	5/03/06 13:57:53	15/03/06 14:45:31	Iron-Total (ICP) ICP-MS (Referral)	0.05 g/m ³	ICP-MS	0.02 g/m ³
>> Referral: Hill Laboratories, Hamilton.	5/03/06 13:57:22	15/03/06 14:45:10	Magnesium-Total (ICP) ICP-MS (Referral)	2.41 g/m ³	ICP-MS	0.02 g/m ³
>> Referral: Hill Laboratories, Hamilton.	5/03/06 13:57:19	15/03/06 14:45:07	Manganese-Total (ICP) ICP-MS (Referral)	0.0016 g/m ³	ICP-MS	0.0005 g/m ³
	28/02/06 10:07:54	2/03/06 09:04:34	E. coli (Quanti-Tray)	<1 MPN/100 mL	Inhouse	1.0 MPN/100 mL
	3/03/06 18:27:58	5/03/06 14:11:03	Nitrate (IC) Referral	0.60 g/m ³	Ion Chromatography	0.02 g/m ³

Analyst's Comments:

These samples were collected by yourselves and analysed as received at the laboratory. The detection limits given are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. This report must not be reproduced except in full without the written consent of the signatory.

Units: in accordance with modern practice the previous 'mg/L' is now expressed as the equivalent 'g/m³'.

 Dr. Frank Ho
 Laboratory Services Manager
Citilab is accredited by International Accreditation
New Zealand (IANZ).The tests reported here have been performed in
accordance with its terms of accreditation - with
exception of any marked *, which are not accredited.

 Richard Allan
 Microbiology Technician

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 Email: mail@citilab.co.nz
 Website: www.citilab.co.nz

16/03/06 12:06:34 1of28 #25587~ FormName:LAR,Issue#:10_040108,Approved:GKM.



Sample 10059 John Lee - bore water

Batch 25587

Determinants	Results (mg/L or specified)	MAV ¹ or GV ²	Target range	Comments
Acidity	23	-	Low	Ok
Alkalinity	55	-	Low	Ok
Bromide	0.08	-	Low	Ok
Chloride	0.93	250	<250	Ok
Colour	<0.5 CPU	10 (CPU)	<5 (CPU)	Ok
Conductivity	12 mS/m	-	<40, low	Ok
Fluoride	0.10	1.5	<0.75	Ok
Total hardness	55.4	200	<200	Soft
pH	6.81 pH unit	7.0 to 8.0	7.0 to 8.5	Low*
Phosphate	<0.4	-	low	Ok
Sulphate	4.2	250	<125	Ok
Turbidity (1)	0.65 NTU	<2.5 NTU	<2.5 NTU	Ok
Total arsenic	<0.001	0.01	<0.005	Ok
Total calcium	18.2	-	low	Ok
Total iron	0.05	0.2	<0.2	Ok
Total magnesium	2.41	-	low	Ok
Total manganese	0.0016	0.5	<0.5	Ok
E.coli	<1 per 100 mL	<1	<1	Ok
Nitrate	0.60	50	<25	Ok

¹MAV means Maximum Acceptable Values quoted from Drinking Water Standards for New Zealand 2000. ²GV means Guideline Values from the same source above. mg/L equals to g/m³ and is sometimes quoted as ppm (parts per million).

Overall comment:

The water is deemed to be **SUITABLE** for drinking purpose with respect to the tested parameters according to the guideline values in The New Zealand Drinking Water Standards (NZDWS). The pH was below the desirable range and as such may cause corrosion to metals under certain circumstances in the long run.

Dr. Frank Ho
Laboratory Services Manager