Province of British Columbia
Ministry of Environment and Parks
WATER MANAGEMENT BRANCH
MEMORANDUM

A.P. Kohut
Senior Geological Engineer
Groundwater Section
Water Management Branch

Date: October 16, 1986

Our File: 0329563-A

Re: Groundwater Quality Monitoring and Assessment Program 1986/87
Cowichan-Koksilah Estuary - Fall, 1986 Field Survey

Introduction

The fall, 1986 survey of the above was carried out by F. Chwojka of our staff between September 17 and 23, 1986. I accompanied him on September 18, 1986. The quarterly field visits over the past year have allowed us to keep close track of the overall development and groundwater use in the estuary and to evaluate our present methods of monitoring and need for additional data. We are accumulating water chemistry data for each existing well in the estuary (Appendix 1) so that changes in these wells can be detected and characterized. However, more data, including water level data, and data points are needed to assess seawater intrusion on an estuary-wide scale. An observation well for monitoring the water level of the lower aquifer to determine its relationship with water quality is planned for this fiscal year.

There are discrepancies in the field pH measurements. The pH measured by myself in some cases are more than 1 1/2 orders of magnitude higher than F. Chwojka's and 1 order of magnitude higher than the lab pH. This is because the colour discs for measuring pH differ from one Hach kit to another.

Surface Water Sampling

Not done on this survey.

Groundwater Sampling

Location of the estuary wells and water quality data are shown in Figures 1, 2 and 3. An updated summary of the well status is shown in Table 1. The following are notes from the fall, 1986 survey (also refer to Figures 1 to 3, Table 1, and Appendix 1):

APK

. . . 2

Bernard	- not sampled since fall, 1985 - very little well information - not important for monitoring
Dinsdale Dug	- (NaCl) has gone up slightly from 25 mg/L to 88 mg/L but this may be due to tidal effects
I.R.9 Dug	- not sampled since fall, 1985 - high salinity and proximity to river suggest direct tidal influence on water quality - not important for monitoring
Blackeley Dug	- (NaCl) has gone down from 650 mg/L to 375 mg/L (40%) but may be because pumping has ended for the year - the decrease in (NaCl) and (Fe) and increase in (HCO_3) suggest the water may be stagnant
Doman Hog Fuel	- not sampled since fall, 1985 - Ray Empy has lone access to this well and he has not been associated with Doman for several years now. The well is still operable.
Johnstone	- (NaCl), (HCO_3) and (Hardness) have come back up since the spring and early summer of 1986 when the well flowed but are lower than in fall, 1985. The well is not flowing now - amongst the estuary wells, water quality of this well fluctuates widely
S.C.L.T. Club	- the (NaCl) has remained at a steady level near the detectable limit of our field kits - water quality is relatively constant
C.B.W.W.D.	- additional data from the District - the (NaCl) has generally dropped steadily to about 175 mg/L since the well's construction - the abnormally low (NaCl) values since summer, 1986 may be because the production pump broke down between June 9 and July 25. (NaCl) has since been creeping back up to the normal (175 mg/L) level - water quality is relatively constant

. . . 3

Johnstone 10"	- further testing and initial sampling will be done in the next week(s) - no well information - may be suitable as an observation well
Rook	- water quality is very constant and even improves slightly in early summer
S. Hagar	- water quality in fall, 1986 is similar to that in fall, 1985 but there were significant fluctuations in the period in between. More sampling is required to explain this.
Doman 2	- (NaCl) has risen slightly since last year from 163 mg/L to 200 mg/L. This may be due to increased withdrawal from the aquifer locally with the operation of the Doman 5 well in the summer for the temporary fish hatchery
Doman 3	- not sampled
Doman 4	- not sampled
Doman 5	- not sampled - well not in use since fish hatchery moved to Duncan at the end of summer
Sankey	- different groundwater than in the estuary - not important for monitoring

For most of the wells completed into the lower aquifer, the salinity level appears to rise slowly in the fall to a maximum level in the spring before it falls quickly to a minimum level by early summer. However, the salinity level in the Johnstone and Doman 2 wells seem to reach their maximum in the fall and decline through the winter and spring. Generally, the salinity levels in fall, 1986 are comparable to those of fall, 1985. There is a slight increase in the Dinsdale, S. Hagar and Doman 2 wells and marked decrease in the Blackeley, Johnstone, and C.B.W.W.D. wells. Except for the S. Hagar and Johnstone wells, these changes in salinity are explained in the above notes.

. . . 4

Of all the field parameters, salinity (Conductivity and NaCl) fluctuates the most. It is speculated that the salinity fluctuation in the lower aquifer depends on two main factors: the amount of flow through the aquifer from the recharge areas and the amount of pumping in the estuary. During periods of higher groundwater flow, the aquifer exists under a higher head which tends to push the saltwater interface in the aquifer seaward resulting in less salty water being pumped into the estuary wells. Thus salinity would be expected to decrease during the high water level period.

Recommendations

1) The quarterly field visits should be continued for at least another year.

2) Establishment of an observation well in the lower aquifer to monitor water level and water quality.

3) Establishment of the Dinsdale Dug well into an observation well to monitor the water level, water quality, and tidal effects in the upper aquifer.

4) The pH colour discs for the Hach kits and the conductivity meters should be calibrated.

Mike Wei

Mike Wei
Geological Engineer
Groundwater Section
Water Management Branch
387-9463

MW/dma

FIGURE 2

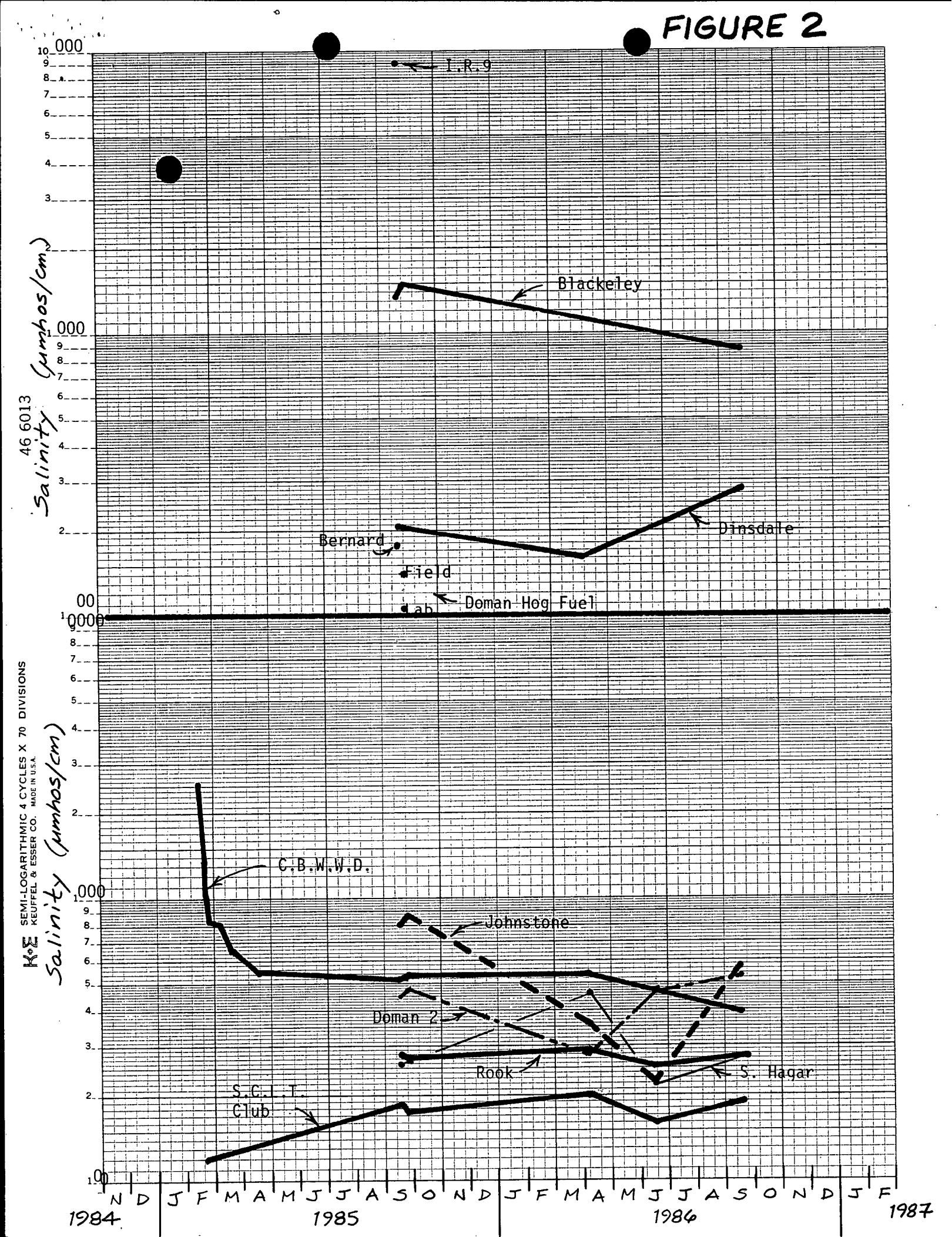
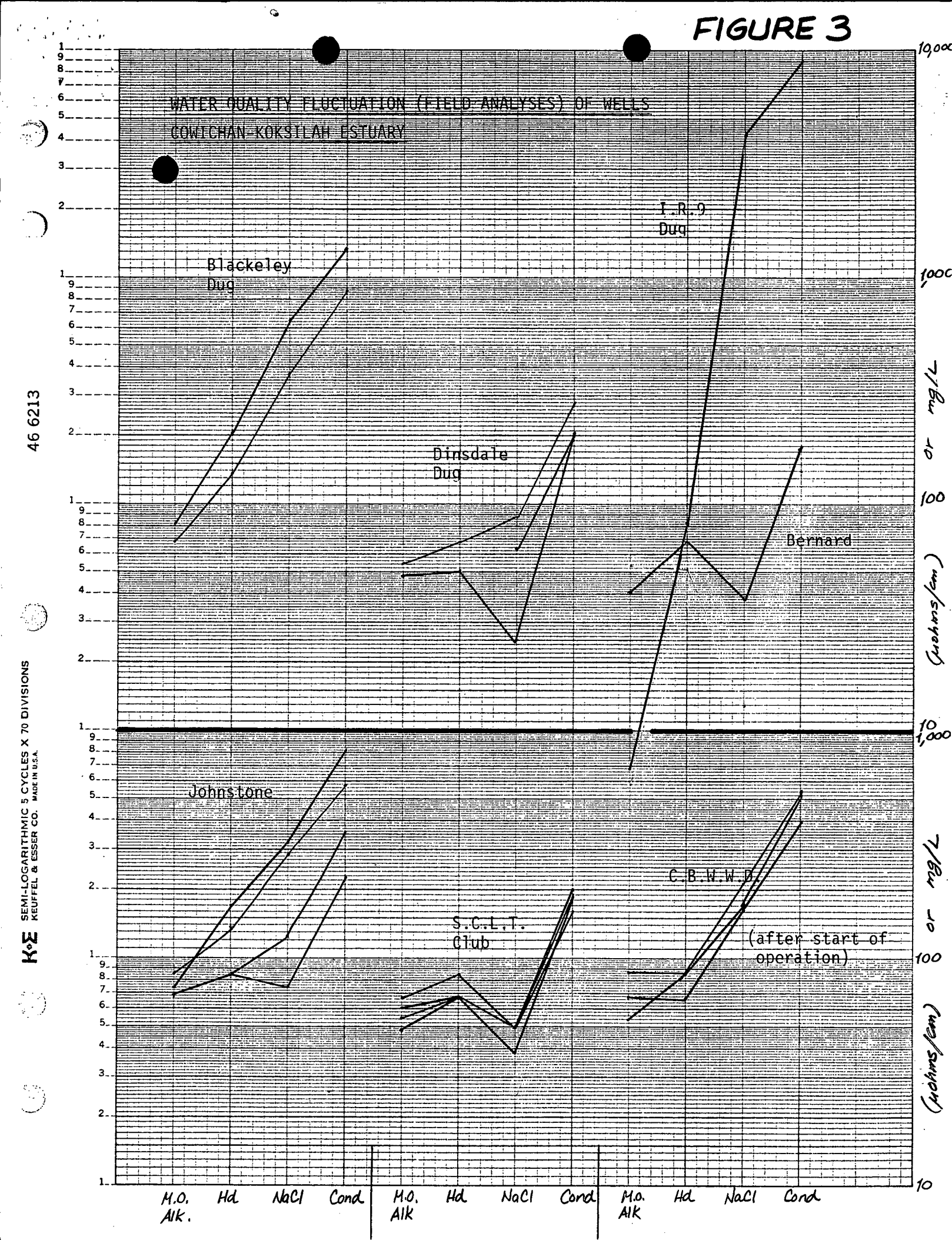

10 000
9
8
7
6
5
4
3
2
1 000
Salinity (µmhos/cm)
46 6013
I.R.9
Blackeley
Dinsdale
Bernard
Field
Lab
Doman Hog Fuel
00
1 0000
SEMI-LOGARITHMIC 4 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
Salinity (µmhos/cm)
C.B.W.W.D.
Johnstone
Doman 2
Rook
S. Hagar
S.C.I.T. Club
100
N D J F M A M J J A S O N D J F M A M J J A S O N D J F
1984
1985
1986
1987

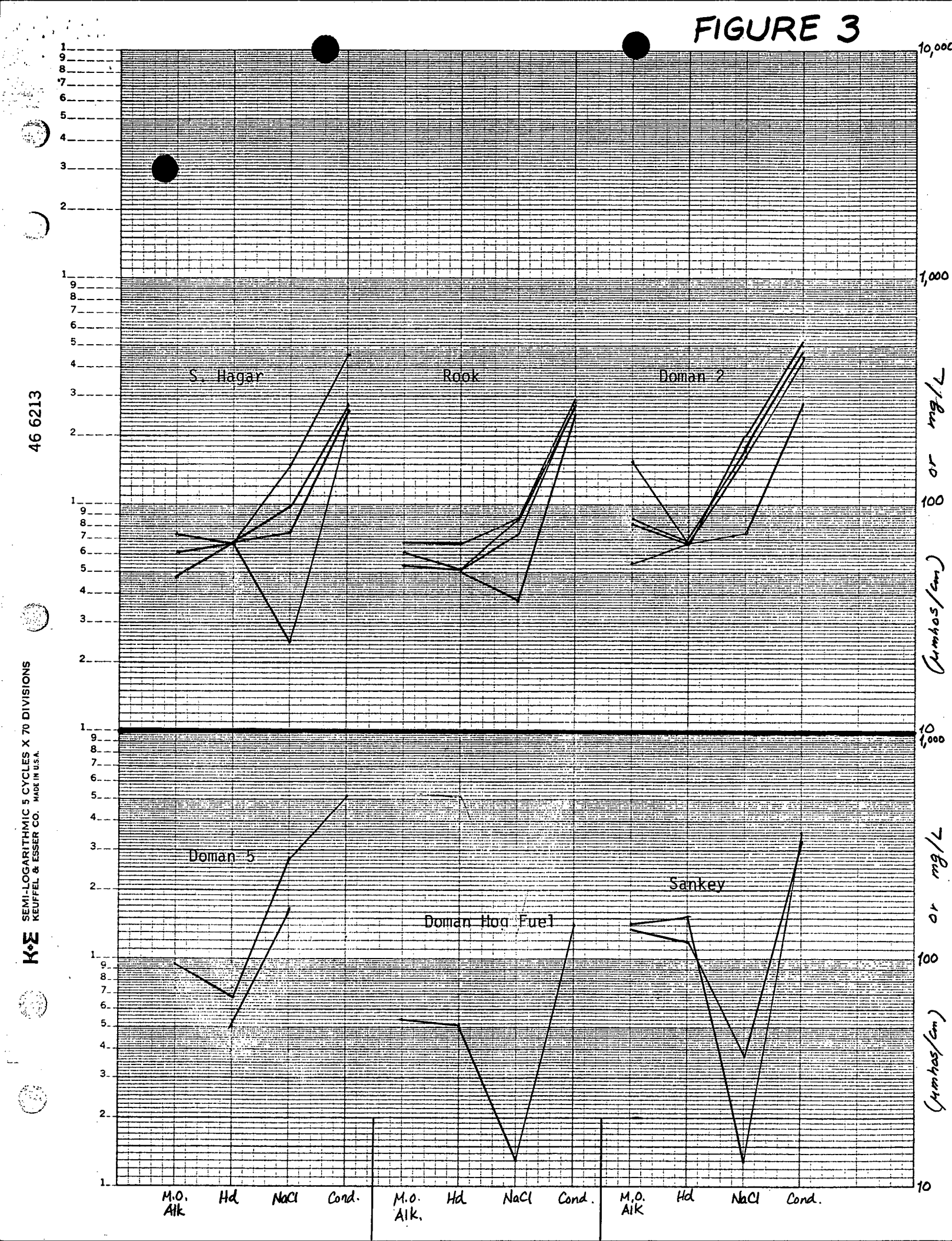
FIGURE 3



46 6213

KE SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

FIGURE 3



46 6213

K+E SEMI-LOGARITHMIC 5 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

LE 1

Summary of Status and Water Use of Existing Wells in the Cowichan-Koksilah Estuary - Fall, 1986

WELL	NUMBER	SOURCE OF WATER	STATUS	WATER USE	METHOD OF WATER SAMPLING	NOTES
Bernard	X1 Y10 #1	Upper aquifer	In use	Supplies a summer hostel	Tap	
Dinsdale dug well	X1 Y10 #3	Upper aquifer	Not in use	-	Tube sampler	Possible use as obs. well
I.R.#9 dug well	X2 Y11 #5	Upper aquifer	Not in use	-	Bailer	The high salinity suggests direct tidal influence
Blackeley dug well	X3 Y13 #6	Upper aquifer	In use	Used in the summers for irrigation, gardening, etc.	Tube sampler/ Pumping	The pump has been pulled out for the winter as of 86/09/18
Doman Hog Fuel	X1 Y12 #1	Middle aquifer	Not in use	-	Pumping	No one at the Doman Mill has access to this well anymore, but it is still operable
Johnstone	X2 Y10 #1	Lower aquifer	In use	Supplies house, R.V. campground and garden	Tap	
S.C.L.T. Club	X2 Y10 #4	Lower aquifer	In use	Domestic and garden use	Tap	
C.B.W.W.D.	X2 Y10 #5	Lower aquifer	In use	Supplies the community of Cowichan Bay	Pumping	Shutdown between 86/06/09 and 86/06/24, operate small pump between 86/06/24 and 86/07/25
Johnstone 10"	X2 Y10 #6		Not in use	-	-	Possible use as obs. well
Rook	X2 Y11 #3	Lower aquifer	In use	Domestic and irrigation	Tap	
S. Hagar	X2 Y11 #4	Lower aquifer	In use	Domestic	Tap	
Doman 2	X3 Y13 #2	Lower aquifer	In use	Industrial	Tap	
Doman 3	X3 Y13 #3	Lower aquifer	In use	Industrial	-	Pump kicks on only when large quantities are required
Doman 4	X3 Y13 #4	Lower aquifer	Not in use	Fire protection	-	Test run every Thursday
Doman 5	X3 Y13 #5	Lower aquifer	Not in use	-	-	Not in use since the fish hatchery was disbanded in the summer
Sankey	X2 Y9 #1	Bedrock	In use	Domestic	Tap	

APPENDIX 1

Water Quality Analyses
Cowichan-Koksilah Estuary Wells

BERNARD WELL X1 Y10 #1 ?

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
17/9/85	F	11.1	178	6.2	0	41	68	38	0.7	0	BY M.W.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

DINSDALE WELL X1 Y10 #3

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	Na.Cl (mg/L)	Fe (mg/L)	Nitr. N. (mg/L)	NOTES
	F		200					63			
19/9/85	F	13	207	8.2	0	48	51	25	0.5	2.0	BY MW BAILED SAMPLE
1/4/86	F	16	160	7.0	0	48	69	25	0.5	0	BY FC.
23/9/86	F	12	280	8.5	0	54	68	88	0.3	N/T	BY F.C.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG. No.

VAN CAL 15712

I.R.9 WELL X2 Y11 #5

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
19/9/[redacted]	F	11	9,000	6.0	0	6.8	83	4,300	N/T	N/T	BY M.W. BAILED SAMPLE

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

BLACKELEY WELL X3 Y12 #6

C = calc.
Hd = 2.5 Ca + 4.1 Mg + 1.8 (Fe + Mn)

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
19/9/[redacted]	F	13	1,350	6.5	0	68	205	630	>5.0	<1.0	BY MW mg/L meq/L
24/9/85	L		1,480	6.6	<0.5	60.7	198 C	627 C	7.17	—	Na = 204 (8.8) Cl = 380 (10.7) K = 11.8 (0.3)
23/9/86	F	14	880	6.8	0	82	137	375	2.5	—	BY F.C. PUMP PULLED STAGNANT WATER ?

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No. DWG. No.

VAN CAL 15712

DOMAN'S HOG FUEL WELL X1 Y12 #1

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	PH. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N (mg/L)	NOTES
24/9/8[redacted]	F	18	140	8.5	0	54	51	13	1	N/T	BY EC.
24/9/85	L		106	8.0	<0.5	50.6	53 C	4 C	0.09	—	Na = 2.9 (0.13) Cl = 2.1 (0.06) K = 1.3 (0.03)

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

JOHNSTONE WELL X2 Y10 #1

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
8/3/78	F		·	7.9			86	75	<0.5		BY F.C. & M.Z.
17/9/85	F	12	810	8.7	0	75	171	325	1.0	<2	BY. M.W. SWL BELOW G.L. V. SLIGHT R.E. SMLL
24/9/85	L		860	8.0	<0.5	92.1	146 C	332 C	<0.01	—	Na = 97.5 (4.2) Cl = 201 (5.7) K = 7.0 (1.8)
7/4/86	F	17	360	7.0	0	69	86	125	0.5	0	BY F.C. FLOWING
17/6/86	F	17	225	7.0	0	68	86	75	0.5	N/T	BY F.C. FLOWING
18/9/86	F	12½	575	8.8	0	≤ 86	137	288	1.1	N/T	BY MW NOT FLOWING R.E. SMLL

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

S. COWICHAN LAWN TENNIS CLUB WELL X2 Y10 #4

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
20/2/[redacted]	L		120					25 C			Cl = 15
17/9/85	F	13	188	8.7	0	48	68	38	0.6	≤ 1	BY M.W. SLIGHT R.E. SMELL
24/9/85	L		175	8.1	<0.5	58.7	52 C	31 C	0.04	—	Na = 12.1 (0.53) Cl = 18.8 (0.53) K = 1.9 (0.05)
7/4/86	F	17	200	7.5	0	55	51-69	50	0.8	0	BY F.C.
17/6/86	F	18	160	6.5	0	61	68	50	0.5	N/T	BY F.C.
17/9/86	F	12½	190	7.8	0	68	86	50	0.8	N/T	BY F.C.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

COWICHAN BAY WATERWORKS DISTRICT WELL X2 Y10 #5

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N (mg/L)	NOTES
15/2/8[redacted]	L		2,520	8.0		124	352 C	1,320 C	1.0		Na=412 (17.9) Cl=800 (22.6)
20/2/85	L		1,330					822 C			Cl=498
22/2/85	L		1,020					589 C			Cl=357
28/2/85	L		830					465 C			Cl=282
6/3/85	L		820	8.0		84	108 C	403 C	0.2		Na=135 (5.9) Cl=244 (6.9)
20/3/85	L		650					297 C			Na=117
16/4/85	L							239 C			Na=94
17/4/85	L		550					276 C			Na=94 (4.1) Cl=167 (4.7)
10/6/85	L							211 C			Na=83
24/6/85	L							211 C			Na=83
18/7/85	L							221 C			Na=87
14/8/85	L							191 C			Na=75
18/9/85	L							173 C			Na=68

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No DWG No

VAN CAL 15712

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
18/9/85	F	10	520	9.0	0	54	86	175	0.7	0	BY M.W. V. SLIGHT R.E. SMLL
24/9/85	L		530	8.1	<0.5	71.8	57 C	180 C	0.07	—	Na = 73.5 (3,2) Cl = 109 (3,1) K = 5.8 (0.1)
26/11/85	L							183 C			Na = 72
28/1/86	L							173 C			Na = 68
12/3/86	L							180 C			Na = 71
7/4/86	F	18	540	8.0	0	89	86	213	0.8	0	BY F.C.
28/5/86	L							178 C			Na = 70
7/7/86	L							137 C			Na = 54
19/8/86	L							150 C			Na = 59
18/9/86	F	12½	395	9.0	0	68	68	163	0.5	N/T	BY M.W. R.E. SMLL

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

ROOK WELL X2 Y11 #3

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N (mg/L)	NOTES
18/9/85	F	12	282	9.3	0	54	51	75	0.5	0	BY M.W. V. SLIGHT R.E. SMLL
25/9/85	L		271	8.0	<0.5	62.1	49[C]	77[C]	0.02	—	Na = 33.4 (1.5) Cl = 46.6 (1.3) K = 4.9 (0.1)
7/4/86	F	18	290	6.5	0	62	51	88	0.5	0	BY F.C.
17/6/86	F	18	250	7.0	0	61	51	38	0.3	N/T	BY. F.C.
18/9/86	F	15	275	9.0	0	68	68	≤88	0.5	N/T	BY MW R.E. SMLL

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No. DWG. No.

VAN CAL 15712

S. HAGAR WELL X2 Y11 #4

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N (mg/L)	NOTES
19/9/85	F	11	260	8.7	0	48	68	75	0.5	≤2	BY MW SLIGHT R.E. SMELL
25/9/85	L		265	8.0	<0.5	62.6	58[C]	74[C]	0.02	—	Na = 28.0 (1.2) Cl = 44.6 (1,3) K = 3.7 (0.1)
7/4/86	F	19	460	7.5	0	75	51-69	150	0.8	0	BY F.C.
17/6/86	F	17½	220	7.0	0	61	68	25	0.3	N/T	BY F.C.
23/9/86	F	14	275	7.0	0	61	68	100	1.0	N/T	BY F.C.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

DOMAN 2 WELL X3 Y13 #2

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
9/10/75	L		521	8.3		97	64 C	173 C	10.4		Na = 77.4 (3.4) Cl = 105 (3.0) K = 10.4 (0.3)
9/10/75	F	12	510	9.3							BY F.C.
17/9/85	F	17	450	8.5	0	154	68	163	0.5	0	BY MW EFFERVESES
24/9/85	L		475	7.9	<0.5	78.8	46 C	147 C	0.09	0.1	Na = 68.0 (3.0) Cl = 89.0 (2.5) K = 9.7 (0.3)
7/4/86	F	17	280	7.5	0	55	69	75	0.3	0	BY FC.
18/6/86	F	17½	475	8.0	0	82	68	175	1.5	N/T	BY FC.
17/9/86	F	16	530	8.0	0	88	68	200	1.0	N/T	BY F.C.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT. N/A
HOR. N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

DOMAN 5 WELL X3 Y13 #5

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N (mg/L)	NOTES
18/8/75	L			8.5	0	75	40 C	124 C	0.06		Cl = 75
18/8/75	L			8.6	0	80	40 C	124 C	0.14		Cl = 75
8/3/78	F			9.1			51	162	< 5		BY FC + MZ
18/6/86	F	17	515	8.0	0	95	68	275	Tr.	N/T	BY FC

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

SCALE: VERT N/A
HOR N/A

DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712

SANKEY WELL X2 Y9 #1

SAMPLING DATE	TYPE OF ANAL.	T°C	COND. (µS/cm)	pH	Ph. ALK. (mg/L)	M.O. ALK (mg/L)	HD. (mg/L)	NaCl (mg/L)	Fe (mg/L)	NITR. N. (mg/L)	NOTES
19/9/86	F	13	360	8.6	0	143	154	13	1.2	N/T	BY MW
23/9/86	F	13	330	6.8	0	136	120	38	1.0	N/T	BY F.C.

Province of British Columbia
Ministry of Environment
WATER MANAGEMENT BRANCH

TO ACCOMPANY REPORT ON

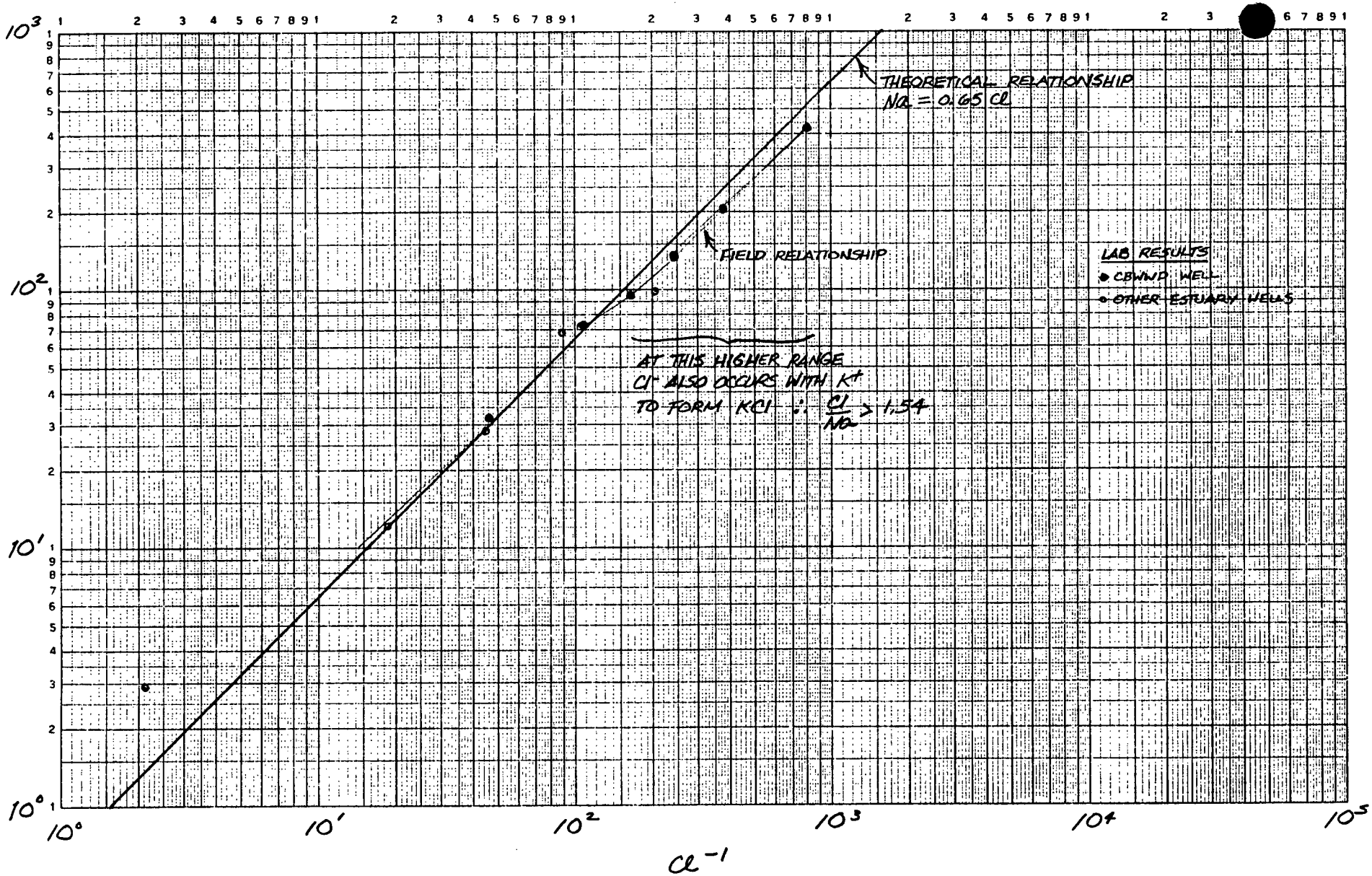
SCALE: VERT N/A
HOR N/A

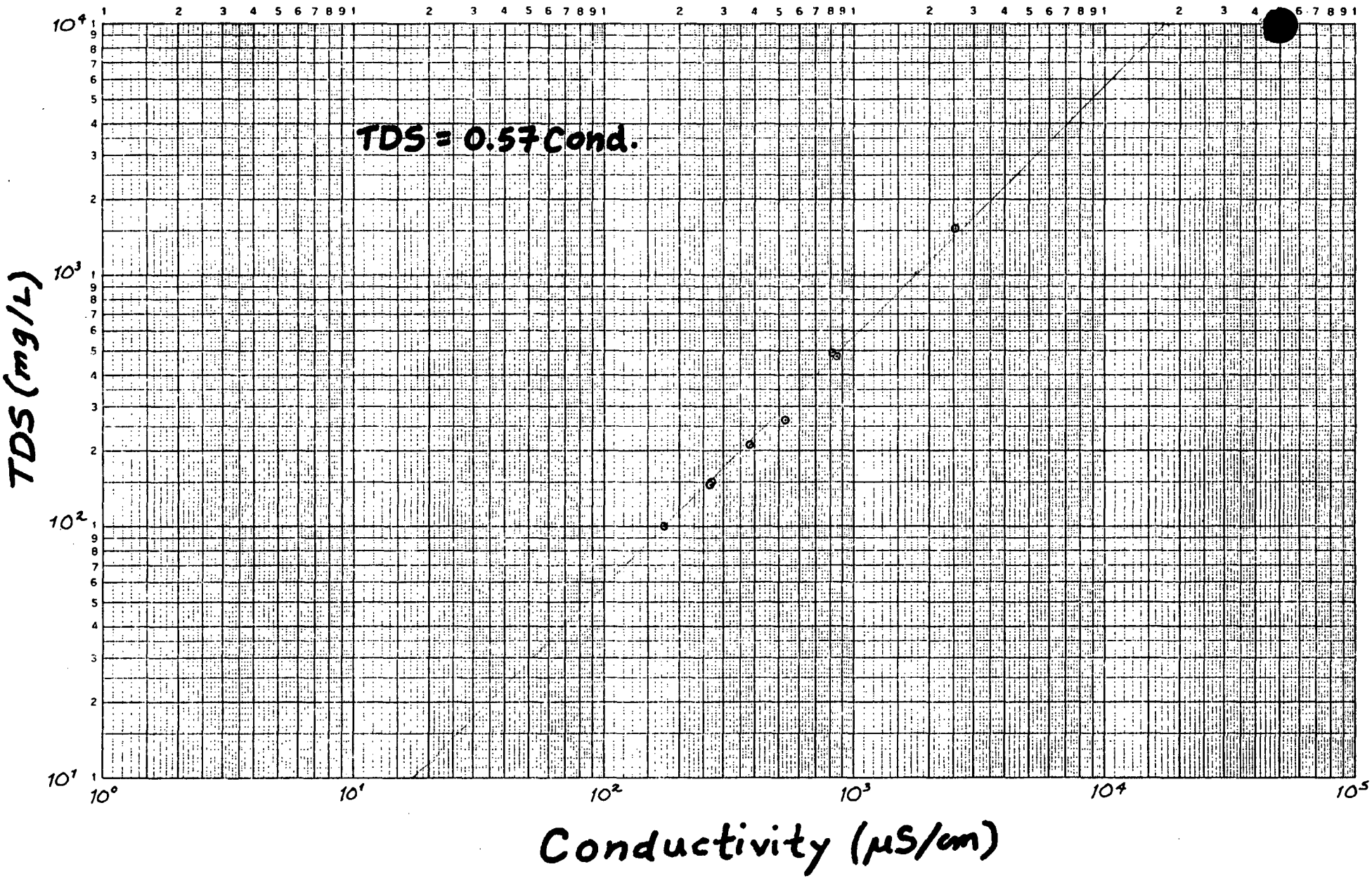
DATE

M. WEI ENGINEER

FILE No. DWG No.

VAN CAL 15712





File 0329563-A

0329563.

CBWWD Well

Sampling Date	Na		NaCl		Cl
Feb. 15, 1985	412		1047		634
March 6, 1985	135		343		208
March 20, 1985	117		297		180
April 16, 1985	94		239		145
June 10, 1985	83		211		128
June 24, 1985	83		211		
July 18, 1985	87		221		134
Aug. 14, 1985	75		191		116
Sept. 18, 1985	68		173		105
Nov. 26, 1985	72		183		111
Jan. 28, 1986	68		173		105
March 12, 1986	71		180		109
May 28, 1986	70	--- June 9 pulled pump --- June 24 small pump	178		108
July 7, 1986	54	--- July 25 new pump ---	137		83
August 19, 1986	59		150		91

Values may be low We are assuming all Cl goes with Na to form NaCl. There may be additional Cl to form KCl etc.

Values in mg/L

Na was measurd in the lab

NaCl and Cl were calculated

Information from K. Williams of C.B.W.W.D. and Willis Cunliff Tait/Delcan

$NaCl = 2.54\,Na$

$Cl = 1.54\,Na$