HYDROGEOLOGY OF ARDMORE

AREA, NORTH SAANICH

BY

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ABSTRACT

A study of the occurrence, quantity and quality of the groundwater of the Ardmore area, Saanich Peninsula was conducted as part of a groundwater report on the Saanich Peninsula for the British Columbia Ministry of Environment.

Field work for this study included: the investigation of the surficial and bedrock geology, water level measurements both manually and with automatic water level recorders on a number of wells to aid in understanding groundwater movement and recharge, streamflow monitoring, and chemical sampling of groundwater.

Basically it was found that the groundwater source is from one aquifer, fractured granodiorite, as the yield from the drift is minor. Because of structural influence, zones of high yield of up to 100 g.p.m. and with a known yield of 250 g.p.m. from a nearby bedrock well on an adjacent map sheet exist.

The recharge is by local precipitation and groundwater movement is from high to low areas, this is confirmed by the change in water quality from bicarbonate to chloride type water. Groundwater quality may be described as calcium magnesium bicarbonate with a minor zone of high chloride in the toe of the peninsula.

Water levels seasonally drop 20 ft. and from what is generally known there is increased potential for domestic water supply development from deeper wells, but temporary salt water encroachment may occur in the fringe areas along the coast.

INTRODUCTION

LOCATION

The study area is located in the Saanich Peninsula on Vancouver Island, B.C. approximately 25 Kilometers north of Victoria, B.C. (Figure 1). For the groundwater study being conducted it comprises only the land within the National Topographic Series map 92B-063-2-3, commonly known as the Ardmore area.

PURPOSE

This groundwater study will form part of a hydrogeologic map and groundwater report for the Saanich Peninsula being undertaken by Mr. E. G. LeBreton, Senior Hydrogeologist with the Hydrology Section of the Ministry of Environment, Province of British Columbia.

The Saanich Peninsula Study comprises a pilot project for a hydrogeologic mapping program for the Province of British Columbia.

Hydrogeologic and hydrochemical data obtained during this study has added to the understanding of groundwater in the granodiorite bedrock of the Saanich Peninsula.

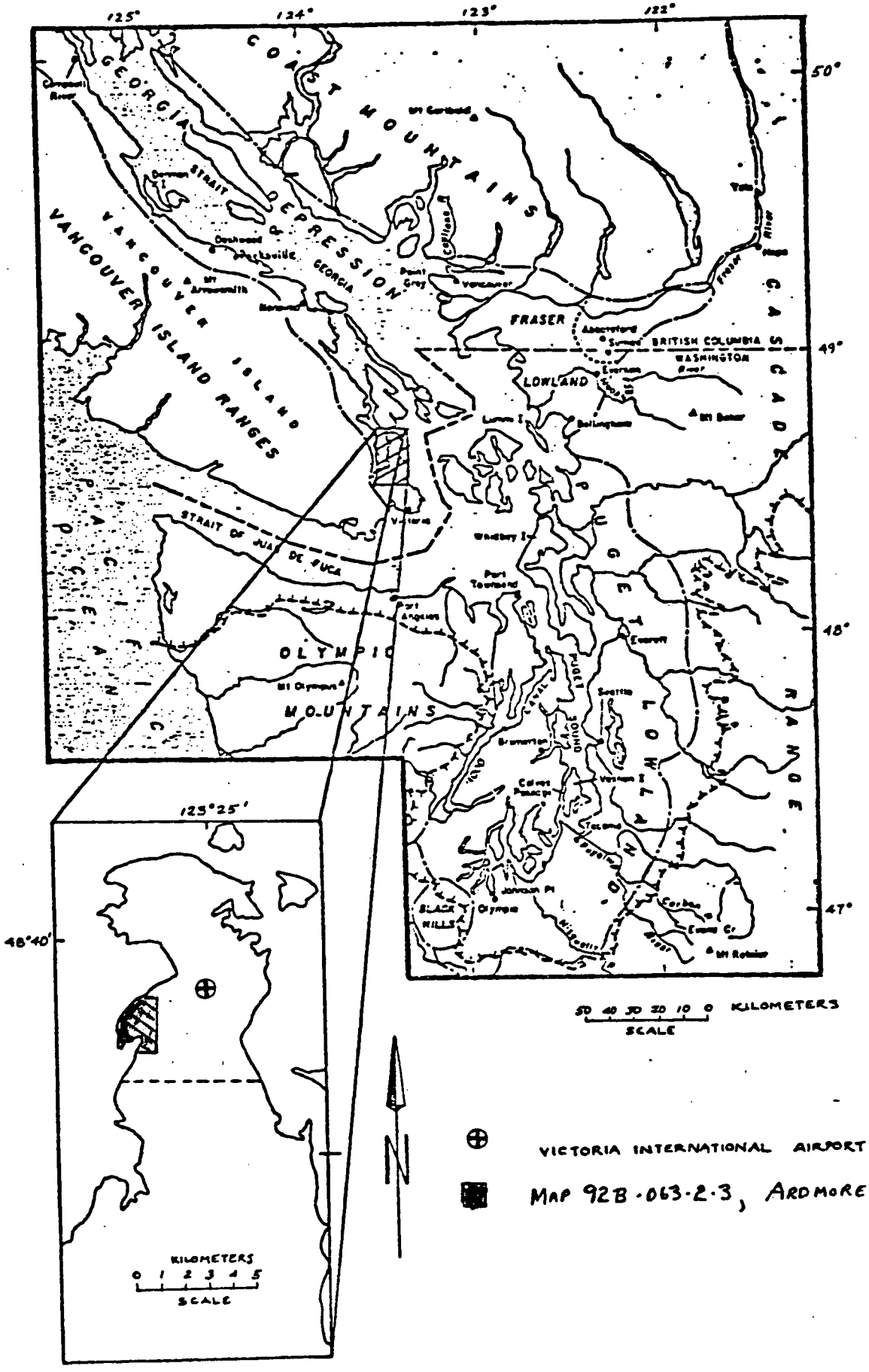


FIGURE 1 – INDEX MAP SHOWING LOCATION OF MAP 92B-063-2-3, ARDMORE AREA

PRESENT STUDY

Groundwater is an important water source for the Ardmore area as only minor sources of surface water are available. Importation of water from the Greater Victoria Regional District will eventually occur here but at this time all of the residents are serviced from individual wells.

Table 1 is a schedule of the water well drill logs, for the study area, on file with the Hydrology Section of the Ministry of Environment. There is a total of 347 wells listed in this schedule and it is understood that only one produces its water from the overburden, whereas all others produce from the bedrock. Figure 2 is a well location map to be used with the schedule of wells. they are located by giving each well an unique number within the legal Section and Range it occurs in.

PREVIOUS WORK

The bedrock geology of south Vancouver Island was originally mapped by Clapp (1912) at a scale of 1 inch to 6 miles. In the following year, Clapp mapped the surficial and bedrock geology of the Victoria and Saanich map areas at a scale of 1 inch to 1 mile (Clapp, 1913). Halstead (1967) prepared field maps of the surficial geology of Saanich, at a scale of 1:25000, and has a report in preparation on the hydrogeology of the coastal lowland of Vancouver Island south of Nanaimo.

LAND USE

The population and land-use of the study area are important in determining water requirements and in evaluating the effects of man on the hydrogeologic regime.

Ardmore, located on a peninsula that juts out into the Saanich Inlet, just north of Coles Bay is largely a residential area. Ardmore consists of 416 lots, approximately one acre in size. The District of North Saanich Official Community Plan (Oct. 77) sets the population of Ardmore at 630 persons for 1977 and projections by the Capital Regional District for the area are 2,360 persons by the year 2000.

To the east, bordered by the West Saanich Road, the lands are largely rural/agricultural, while to the south lies the Cole Bay Indian Reserve.

PHYSIOGRAPHY

TOPOGRAPHY

The topography of the area exerts an influence on groundwater movement, and in particular defines areas of recharge and areas of discharge. The area of study lies just to the Northwest of Mount Newton.

This is an area of under 200 ft. in relief and is outlined on the following map. (Figure 3).

DRAINAGE

The study of hydrogeology requires consideration of all aspects of the hydrologic cycle. An integral part of this cycle is surface drainage.

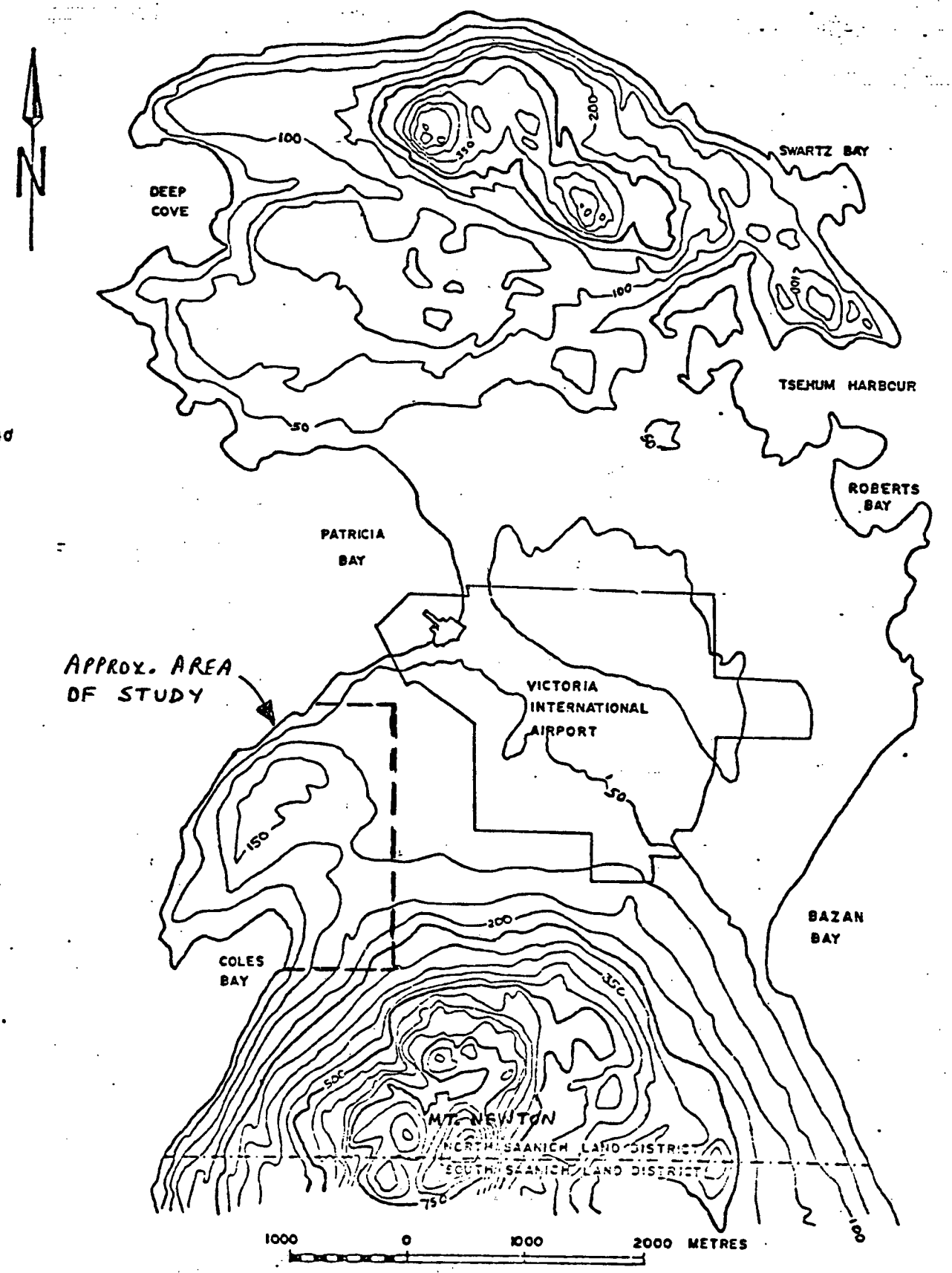
There were only two naturally occurring stream courses which could be identified in the study area (Figure 4). One stream flows off the northwest slope of Mount Newton and discharges into Coles Bay. Another natural stream flows south from the Ardmore Golf Course and discharges into Coles Bay also. These streams are intermittent. Also several drainage ditches have been constructed in the Ardmore Residential area so that flow can occur from this area to the ocean to the west. The streams and three ditches were measured monthly and hydrographs have been produced. These are analysed and located in a later section called Hydrographs.

123° 25'

FIGURE 3

SAANICH PENINSULA – VANCOUVER ISLAND

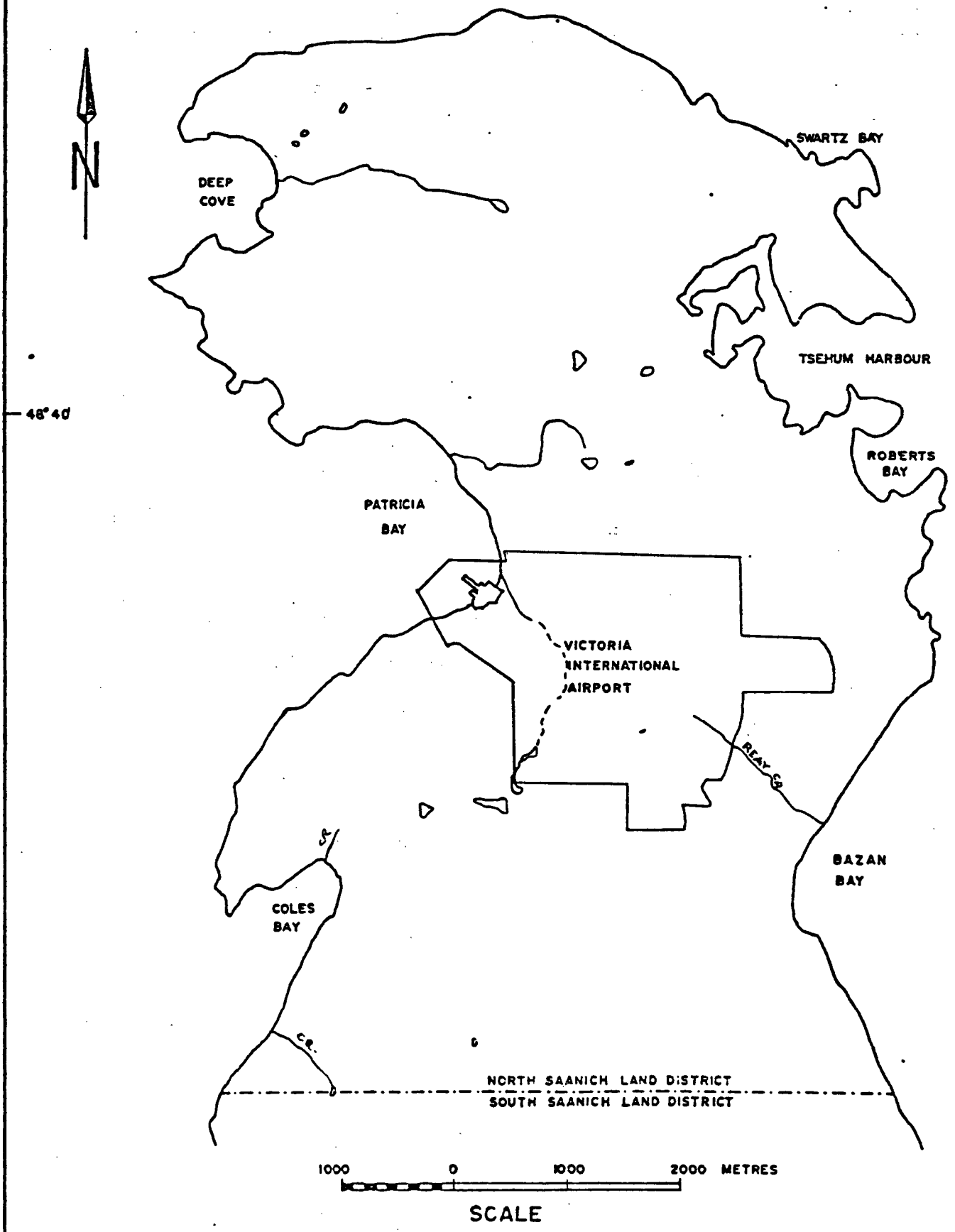
TOPOGRAPHY



SCALE

CONTOUR INTERVAL 50 FT.

FIGURE 4
SAANICH PENINSULA — VANCOUVER ISLAND
DRAINAGE



SOILS

The soils for the Ardmore area are described in Report Number 6, of the British Columbia Soil Survey, 1959, by J.H. Day, L. Farstad and D.G. Laird. The soils maps can be an indicator of the underlying parent surficial geological materials. Figure 5 is a reproduction of the soils map of the Ardmore area at a larger scale.

CLIMATE

The climate can be described as a cool Mediterranean (Day, Farstad, and Laird, 1959) and represent the farthest north poleward advance of a true Mediterranean climate.

The standard 1941 to 1970 averages from the Victoria International Airport weather station indicate an annual precipitation of 856 millimetres, and an average annual temperature of 9.4 degrees Celsius. The absolute extreme temperatures measured at this station were-15.6 degrees Celsius and 36.1 degrees Celsius (Environment Canada, Atmospheric Environment Service). Table 2 gives the monthly precipitation data, Victoria International Airport, for the years 1979 and 1980. Table 3 gives the daily precipitation data for these years.

TABLE 2

Precipitation Data Victoria International Airport

Year	Month	Total Precipitation in mm
1979	January	35.8
	February	157.1
	March	35.2
	April	36.8
	May	16.2
	June	14.8
	July	17.2
	August	14.0
	September	68.4
	October	87.3
	November	33.6
	December	264.3
	Total	780.7
1980	January	123.6
	February	129.1
	March	73.9
	April	34.0
	May	45.6
	June	67.1
	July	22.8
	August	12.4
	September	36.4
	October	26.6
	November	245.4
	December	205.3
	Total	1022.2

TABLE 3

VICTORIA INTERNATIONAL AIRPORT DAILY PRECIPITATION RECORDS IN M/M

1979	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
J									T	9.4	.6	.6	T			1.6		.2	4.4	15.8			.5			2.6	T				
F		7.7	2.9	7.3	.1	4.2	T	14.9	3.6	8.8	11.8	14.0	4.8		T	.4	15.2	1.0	1.5				6.8	19.2	24.2	1.6	6.2				
M	T		2.9	13.5	10.4	.5								T	1.4	1.2									T	.4			T	T	
A	.3		.2	T	T	T		6.8	4.2	.8	1.0	10.6	4.0	3.6	.6	2.6	1.0	.2	.8												
M			1.0	3.2	8.6	1.2			1.0	T		T	T				.4					T	T	-		T	.6				
J				2.6	.4						T		T	1.0	.8	4.4	1.2		4.0										T	.2	
J	7.6	T				T	T	T	4.7	3.1	1.4	.2	.2																		
A														T	T		.4	2.6	T	T	10.6	.4	T								T
S	4.0	3.1	9.0	7.6	5.4	1.4	13.3	20.5	5.9																	.2	4.8		T		
O	.2													1.2		2.6		12.0	4.5	3.6		9.0	1.2	20.4	14.9	6.1	8.1	2.2		T	
N		1.5	1.0	2.1	.8										1.0	7.8	1.6	3.4	T			8.0	.8	.8	T				T	T	
D	25.1	3.6	33.6	2.7	T	T	.4	T	.6		4.8	T	46.6	42.4		18.8	57.5	6.2	6.8	1.4	4.4	T	.2	.4	T	.2		.7	.4	3.5	3.4
1980	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
J	4.1	3.1	.5	T	2.4		6.2	6.8	5.1	11.4	18.1	29.3	.6	4.2	10.4		T			.4	T			T	1.0						13.4
F	16.0	11.8	14.0		7.0	1.9						T			T	2.6	2.8	6.2	T	8.4				.8	7.4	31.5	14.3	1.6	.2		
M		3.0	6.8	.2					T	1.8	2.1	4.4	20.1	6.8	2.4	3.2	9.8		.2	4.2		1.6		T	T	3.0		2.3	3.0		1.2
A	.5			T	3.2	2.3	T	2.2	4.2	.2				7.4			1.2	.6	9.8	.2				2.0	T	.2		.8			
M			14.0	.6	T					T	2.9		1.0						3.4												
J	.4	.6	T	2.3	.2	T	.6	31.0	T	T						14.2						2.6	T	.8	23.7	1.5	.2				
J			14.0	.6	1					T	3.8		1.0						3.4												
A	-	T															9.9					T				2.0	.3			.2	
S	12.8	.2	T			6.0						1.5	.2						6.7	.4	T	2.9						.5	5.1		
O											1.8	10.0							.2	.4	.5			4.6	.4						5.7
N	5.7	T	25.6	7.8	9.0	12.4	22.4	6.2	2.8	.2				3.1		1.8	5.2	10.2	1.6	15.9	59.0		T		5.2	.6	20.2	7.7	15.5	3.3		
D	12.1	10.0	.6	6.6	6.3	1.1		.8	2.8	14.6	3.4		.8	4.7	T	T	.4			11.5	20.1	1.5	T	12.4	16.8	45.2	9.4	T	1.6	19.6	8.0

GEOLOGY

BEDROCK GEOLOGY

The bedrock underlying the study area consists of a large batholith, called the Saanich Granodiorite (Clapp, 1913).

It is a light-coloured, medium grained granodiorite, grading towards quartz monzonite and quartz diorite. Extensive sills of dacite porphyry are also present in this unit (Muller, 1975).

The Saanich batholith is associated with the minor diorite and granodiorite porphyrites. These occur principally in the form of dykes (Clapp, 1913).

The granodiorite is very well exposed along the shore of the study area, where it is greatly jointed and fractured. Appendix 1 is shoreline geology notes for the study area. Figure 6 is a map showing the 70 observation points for the shoreline geology notes and also displays the dykes observed and strikes and dips of major jointing and fracturing.

Clapp (1913) noted that all of the intrusive rocks were greatly jointed and fractured, but it was only the Saanich granodiorite that has regular and large joints; although all of the batholith rocks are broken by joints which have a persistent north-south strike. He also noted the rocks have been more or less sheared, often greatly, developing wide shear zones and these usually correspond in strike with the foliation

and have, therefore, a general northwest-southeast strike. Transverse fractures also occur along which more or less movement has taken place.

SURFICIAL GEOLOGY

For the most part, in the study area, the surficial deposits are thin, commonly less than 20 ft. thick. This can be observed by studying the isopach map of the surficial deposits (Figure 7). This map was prepared from the water well drill logs on Table 1.

The isopach map shows readily a bedrock channel extending from the head of Coles Bay and trending north-east from there, to an unknown distance. From the borehole data it is known that in places this channel floor is covered with a depth of over 80 ft. of overburden.

Along the shore-line it was found that commonly the deposition was clay over till over granodiorite. Often the till layer is missing though. This till would be the Cordova Till which Clapp (1913) and Halstead (1967) have described as a buff to yellowish sandy till found lying directly upon bedrock or in bedrock crevices and depressions. Halstead (1967) suggests that this unit may represent the earliest glaciation of the area.

Inspecting the schedule of wells (Table 1) shows that the sequence: clay over till over granodiorite with the till missing at times is common to much of the area, the picture (Figure 8) is a good example of this sequence.

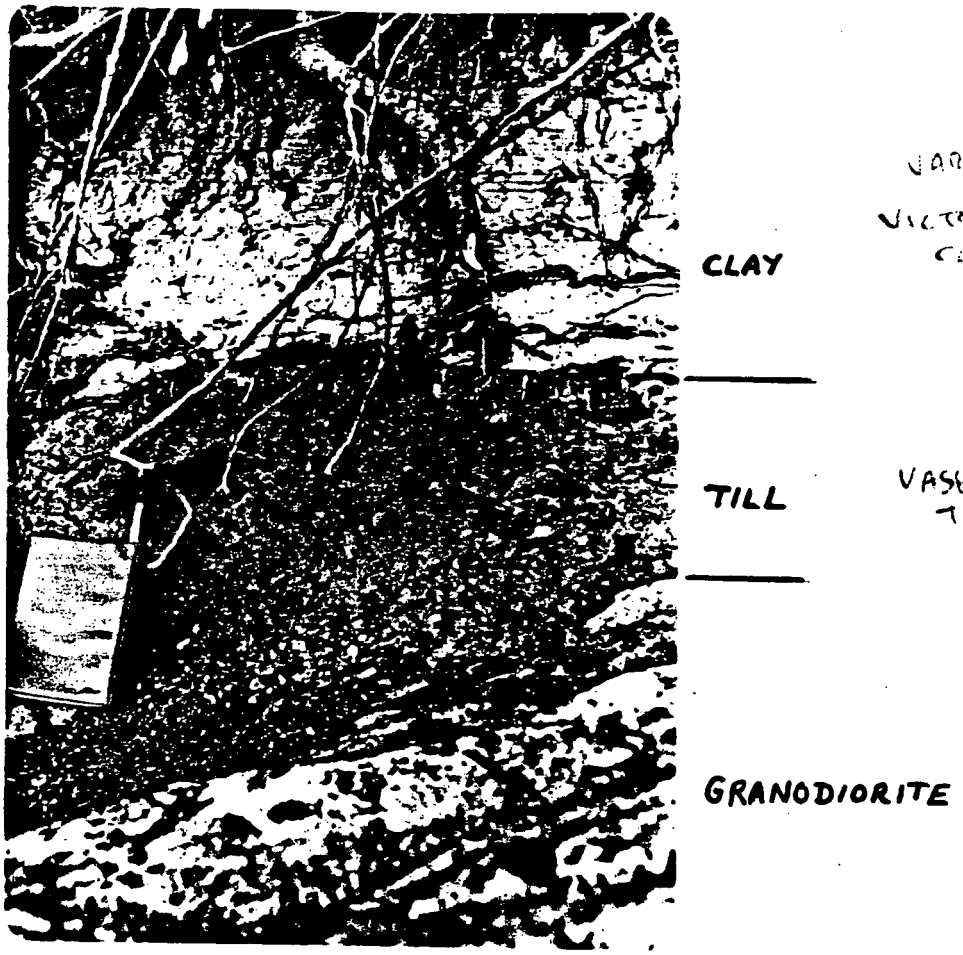


Figure 8 Shore-line picture showing the common geological sequence clay over till over granodiorite.

HYDROGEOLOGY

Hydrogeology refers to the application of geologic concepts to the understanding of hydrologic phenomena. Determining the hydrogeology of an aquifer consists of determining the geologic controls of its hydrologic behavior. More specifically, this involves assessing the relationship between the geologic characteristics of the aquifer and (1) the hydraulic nature of the aquifer (confined or unconfined), (2) the regional variability of its hydraulic properties, (3) the associated flow system, and (4) the quality of its ground water.

Fresh water is in contact with earth materials from the moment it strikes the lithosphere as precipitation. Some of this water is lost by evaportranspiration, which is governed in part by the nature and topographic expression of earth materials. The relative amount of water that enter, are stored in, and leave the surface, soil, and groundwater reservoir also depend upon the character of soil and rocks (Cooley, 1972).

OCCURRENCE OF GROUNDWATER IN IGNEOUS ROCKS

The occurrence of groundwater in usable quantities in many igneous rocks is governed by heterogeneously distributed zones of secondary porosity and permeability.

From field investigation and available well log data indications are that most of the wells in the Ardmore area are completed in faulted and fractured granodiorite bedrock. The productivity of such wells depends on the size and frequency of the fracture openings encountered. Since some fault zones contain more and larger open fractures than others, the cone of influence around a given well is not circular but has the shape of some type of ellipse that is determined by the fracture pattern. Because of this, two producing wells close together may not affect one another while a well some distance away along a fracture zone may be affected. Therefore, mutual well interference depends on the location of wells in relation to the fracture systems.

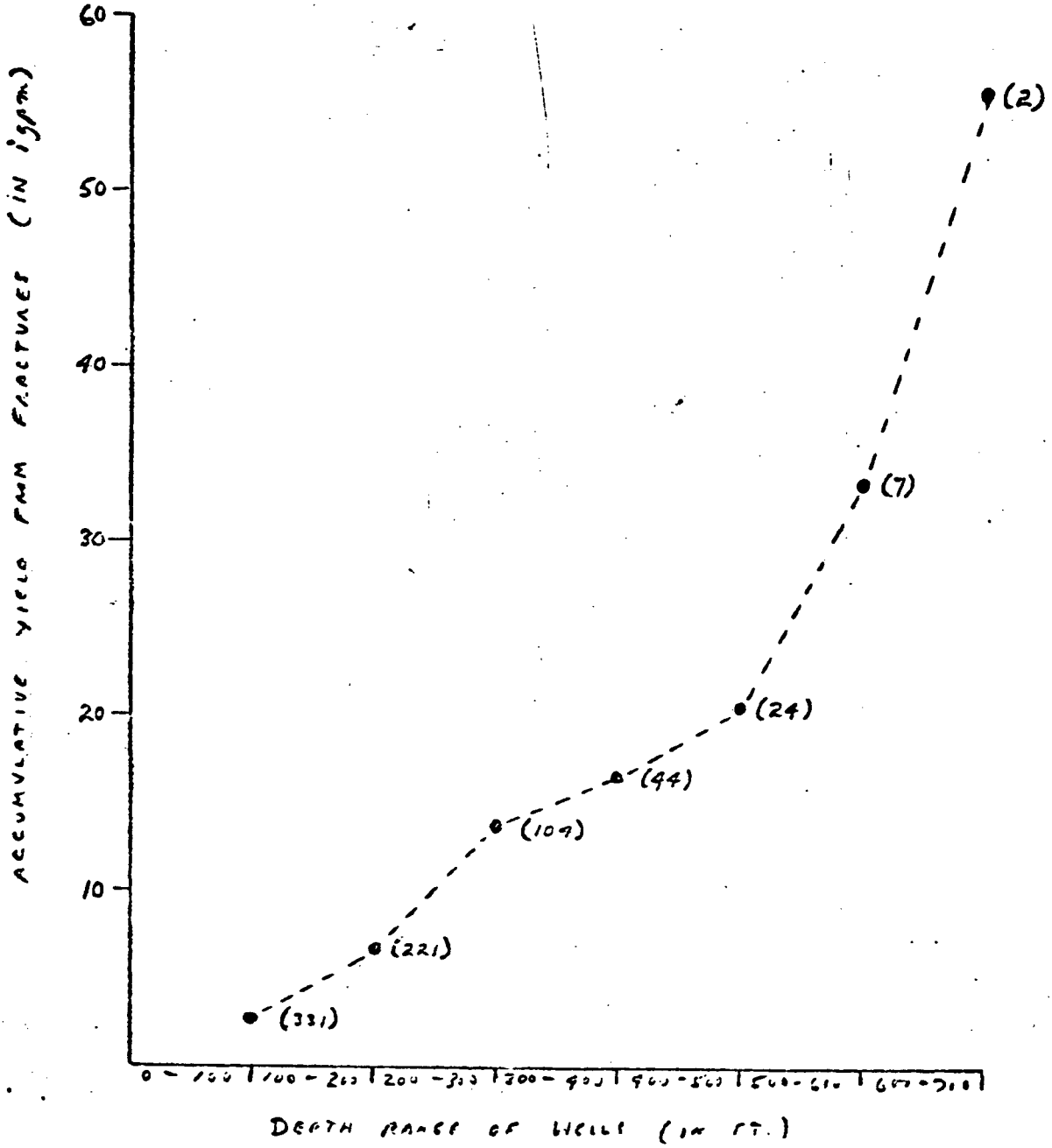
Figure 9 is a picture taken along the shore-line at Coles Bay and shows secondary porosity in the granodiorite. Groundwater discharges at 2-3 i.g.p.m. from this fracture in the winter months.

Fig. 9 Secondary Permeability in Granodiorite Along Shore at Cole Bay Indian Reserve

One of the characteristic features of the permeability of crystaline rocks is the general trend of permeability decrease with depth (Freeze). Freeze mentions studies by Le Grand in North Carolina and Summers in Wisconsin as verifying this quantitative relation between depth and well yield in crystalline rocks. He mentions that fractured crystalline rocks are less permeable at greater depths because stress variations that cause fractures are larger and, over geologic time, occur more frequently near the ground surface. He further states that fractures tend to close at depth because of vertical and lateral stresses imposed by overburden loads and "locked-in" horizontal stresses of tectonic origin, but rocks maintain much of their brittle character to depths of several kilometers, so fracture permeability can therefore exist to great depth.

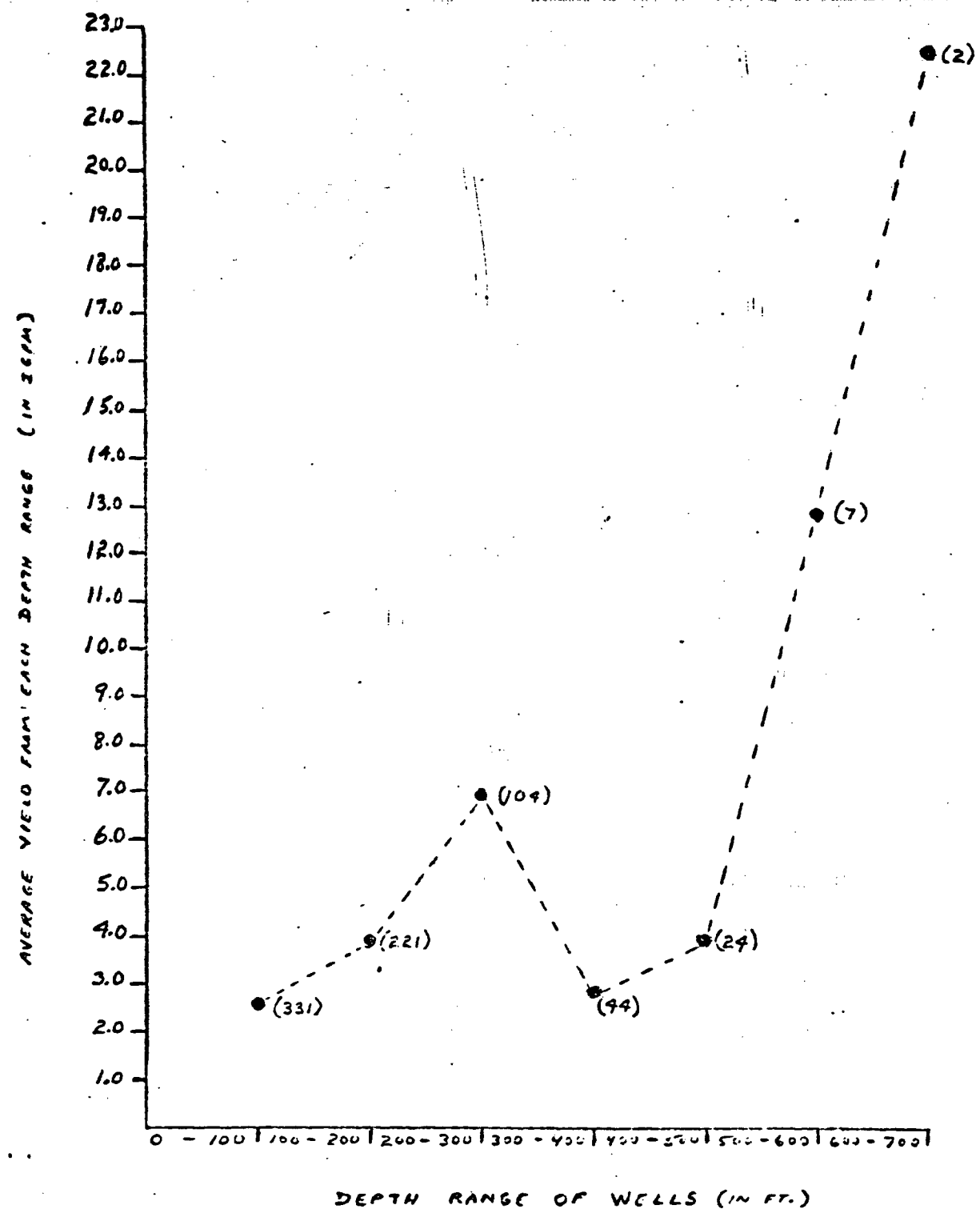
In the Ardmore area a study was made, using the schedule of wells in Table 1, of the yield from the granodiorite fractures in 100 foot depth ranges. From this data two graphs (Figures 10 and 11) were drawn.

Figure 10 is a graph drawn for the accumulated yield (in i.g.p.m.) from fractures for each 100 foot depth range penetrated by the wells, and Figure 11 is a graph of the average yield obtained from each 100 foot depth range. These graphs show that the yield increases for each 100 foot depth range to 300 feet. It then decreases, but not to less than the first 100 ft. depth range. The range 500-700 ft. shows the largest



NUMBERS NEAR POINTS INDICATE THE NUMBER OF WELLS USED TO OBTAIN THE AVERAGE YIELD.

FIGURE 10	TO ACCOMPANY REPORT ON ARDMORE GROUNDWATER STUDY
SCALE: VERT. HOR.	DATE Feb 1981
	D. JOHANSON
	FILE No DWG No



Numbers near points indicate the number of wells used to obtain the average yield.

FIGURE 11	TO ACCOMPANY REPORT ON ARDMORE GROUNDWATER STUDY
SCALE: VERT. HOR	DATE Feb 1981
	D. JOHANSON
	FILE No

increase in water entering the wells, but there are few wells penetrating this range so it is not certain if this would be representative of the whole Ardmore area.

Figure 12 is a graph of the accumulative yield of two deep wells in the Ardmore area and they both show this large increase in yield with depth.

From these graphs it would appear that the permeability of the crystalline rocks in the Ardmore area are increasing with depth, at least to 700 ft, but further data in the deeper ranges are required to verify this phenomena.

Sauveplane does state that the depth of fracturation is usually less than 300 meters (approx. 1,000 ft.) but can extend to 6,000 meters (approx. 20,000 ft.) deep. He further states the degree of fracturation may increase with depth under condition of continued uplift and erosional unloading. (Sauveplane, 1981).

In Ground-Water Studies it mentions the depth to which fracturing extends depends on the origin of the fractures. Faults may be deep, and some faults may even pass through the entire thickness of the earth's crust. Joints, on the other hand, may only permit movement of waters to depths of about 100 meters or less (Brown, 1977).

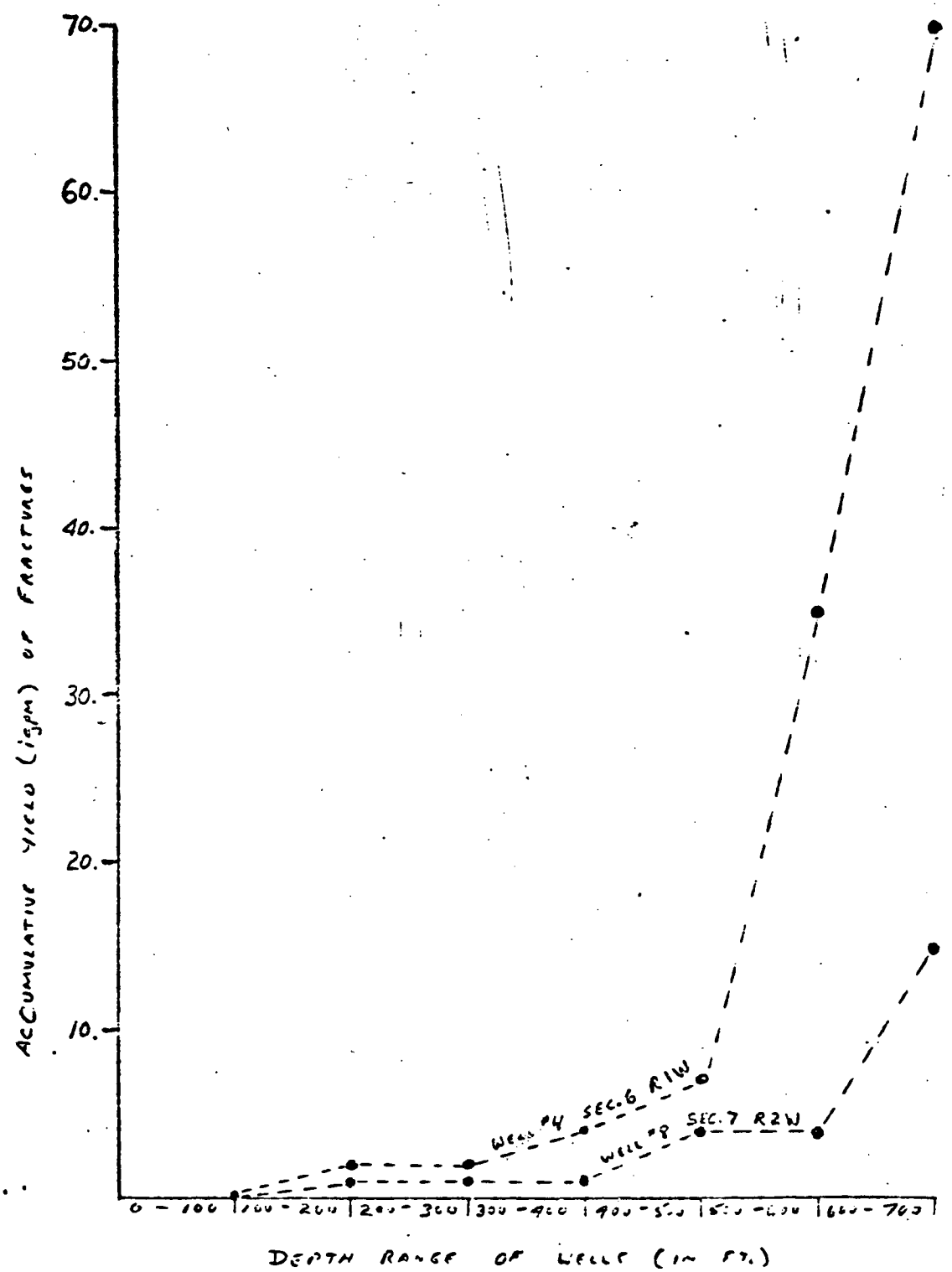


FIGURE 12

TO ACCOMPANY REPORT ON

ARDMORE GROUNDWATER STUDY

SCALE: VERT.

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DATE Feb 1981

D. JOHANSON

FILE No.

DWG No.

TRANSMISSIVITY OF THE BEDROCK AQUIFER

The coefficient of transmissivity of an aquifer is the rate at which water will flow through a vertical strip of the aquifer one foot wide and extending through the full saturated thickness, under a hydraulic gradient of 1.0 or 100 per cent (Groundwater and Wells, 1966).

Values of the coefficient of transmissivity, T, range from less than 1,000 to over 1,000,000 gallons per day per foot. An aquifer whose transmissivity is less than 1,000 can supply only enough water for domestic wells and the like. Where the transmissivity is on the order of 10,000 or more, well yield can be adequate for industrial, municipal or irrigation purposes (Groundwater and Wells, 1966).

Transmissivity values for two wells which had pump test data available were calculated. Figure 13 and Figure 14 are drawdown graphs of this data and transmissivity values of 271 U.S gpd/ft. to 4.2 U.S. gpd/ft. were obtained, indicating wells which are only adequate for domestic purposes. These are likely representative values for the bedrock wells in the Ardmore area as their reported yields of 2 i.g.p.m. and 70 i.g.p.m. covers the reported yield range of the bedrock wells reported.

The transmissivity values arrived at may not be valid for the Ardmore area as the study of the hydrogeology of fractured and fissured rocks differ greatly from the study of friable rocks with interstitial porosity. In the study of hydrogeology

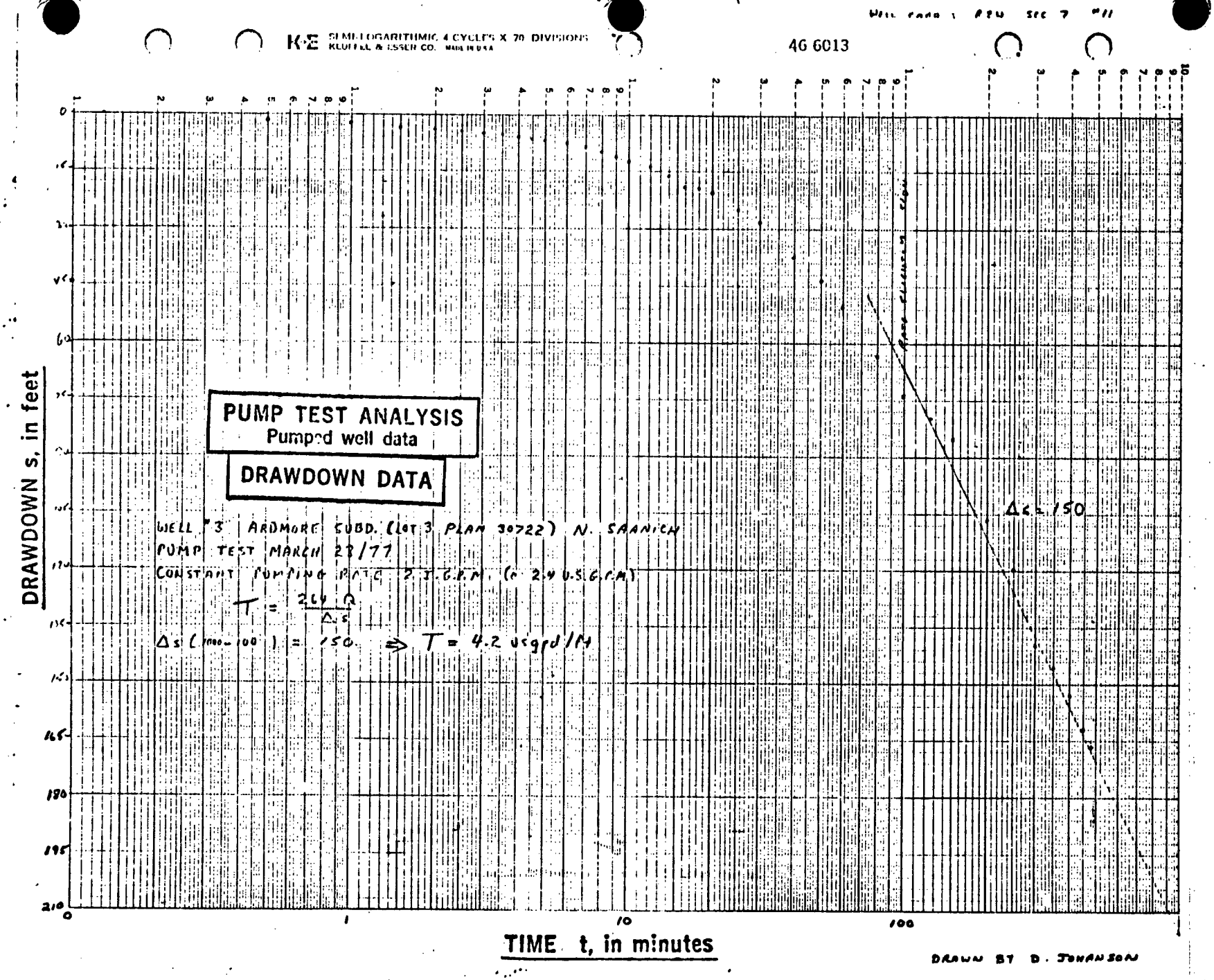

Figure 13 - Transmissivity Value for Well #11, Sec. 7, Rge. 2W

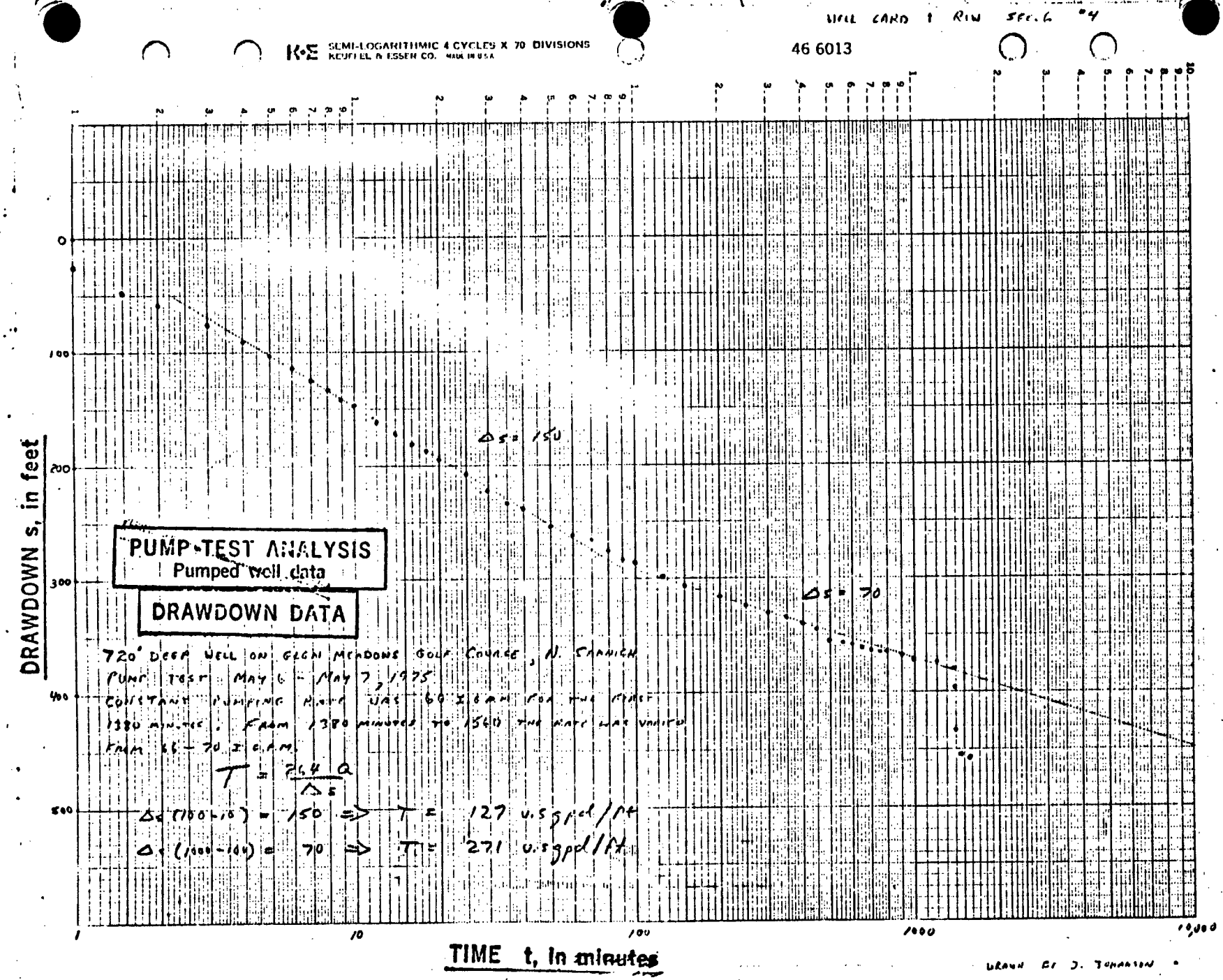

Figure 14 - Transmissivity Values for Well #4, Sec. 6, Rge. 1W

of friable rock aquifers we may begin with the measurement of porosity and permeability on a small volume of rock, the result of which can be extrapolated to the whole aquifer, but in the study of fractured and fissured rocks where the openings are widely separated, it may be necessary to change scale from a cubic decimetre of rock with interstitial porosity to a cubic hectometre or cubic kilometre of rock with fissure porosity (Brown, 1977).

Sauveplane mentions that macroscopic and microscopic laws governing the groundwater motion in fractured media are complex, in particular because of the frequent additional heterogencity of the rock material, and are largely unknown. Up to now, interpretation methods derived for porous media have been used with more or less success, leading very often to erroneous results (Sauveplane, 1981).

HYDROGRAPHS

As mentioned earlier in this report 2 streams and 3 ditches were measured monthly over a two year period. These are located on a map of the Ardmore area (figure15). Appendix 2 is the stream flow data obtained during 1979 and 1980. The hydrographs for the streams and ditches (Figures 16-20) show intermittant runoff, with large flows in the winter months

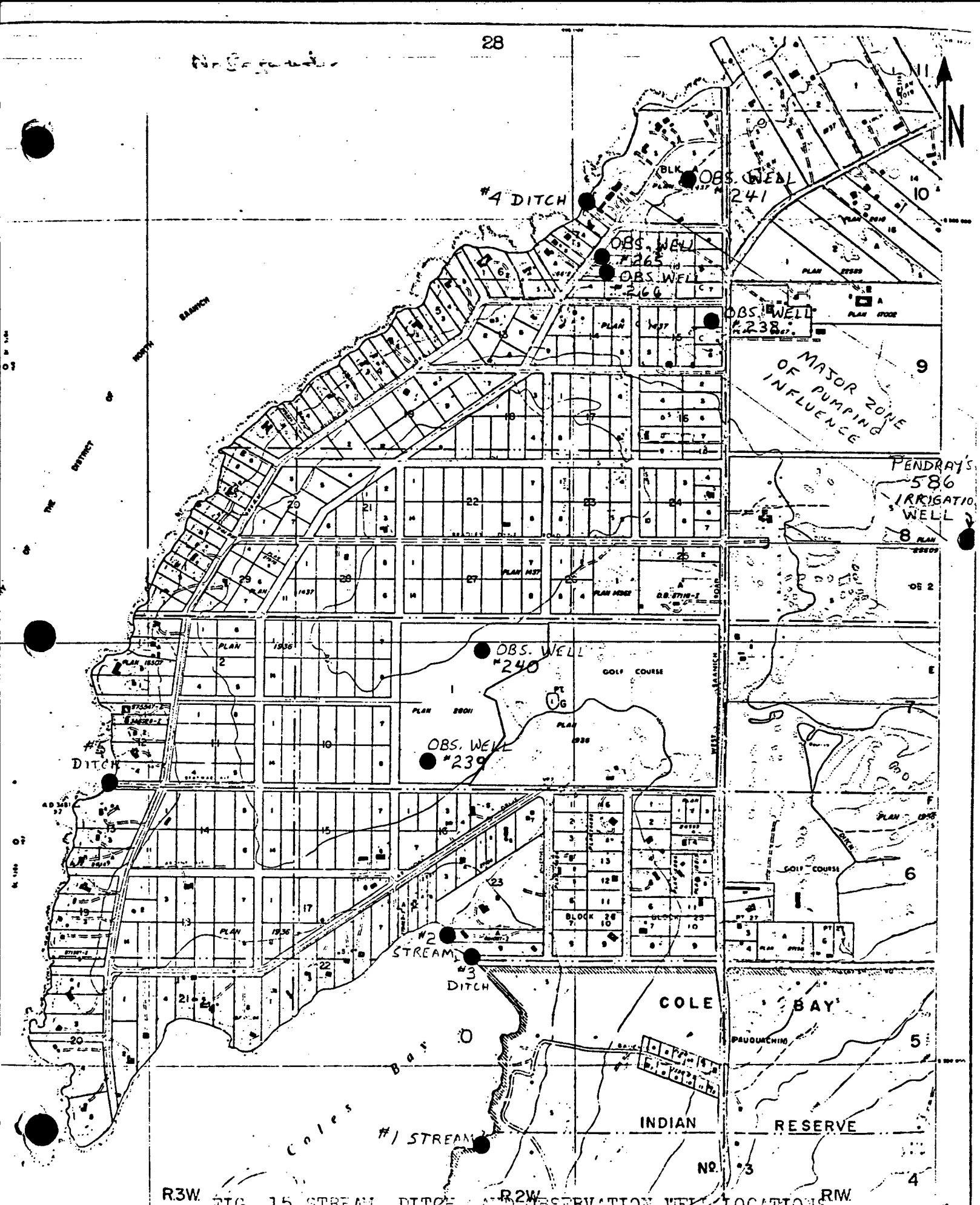

FIG. 15 STREAM, DITCH, AND OBSERVATION WELL LOCATIONS

NORTH SAANICH LAND DISTRICT COWICHAN LAND DISTRICT
VICTORIA LAND REGISTRATION DISTRICT

SCALE - 1:5000

CADASTRAL
92B·063·2·3

HYDROGRAPH OF STREAM #1 and #2

HYDROGRAPH OF DITCH #3, #4, and #5

PAGES 29-33

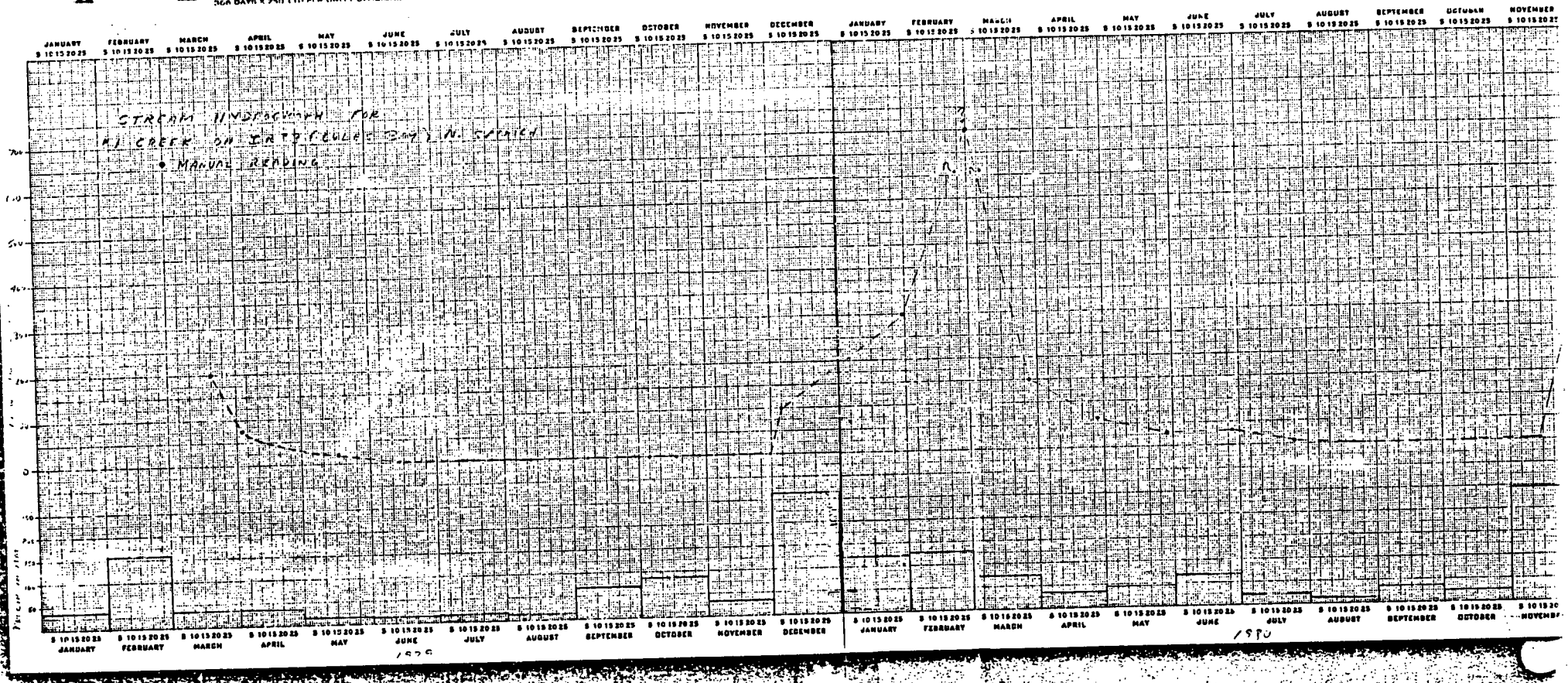
STREAM HYDROGRAPH FOR
A1 CREEK ON INTERCEPTOR 2 mi N. SYRACUSE
• MANUAL READING
JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER
1975
1976

FIG #16

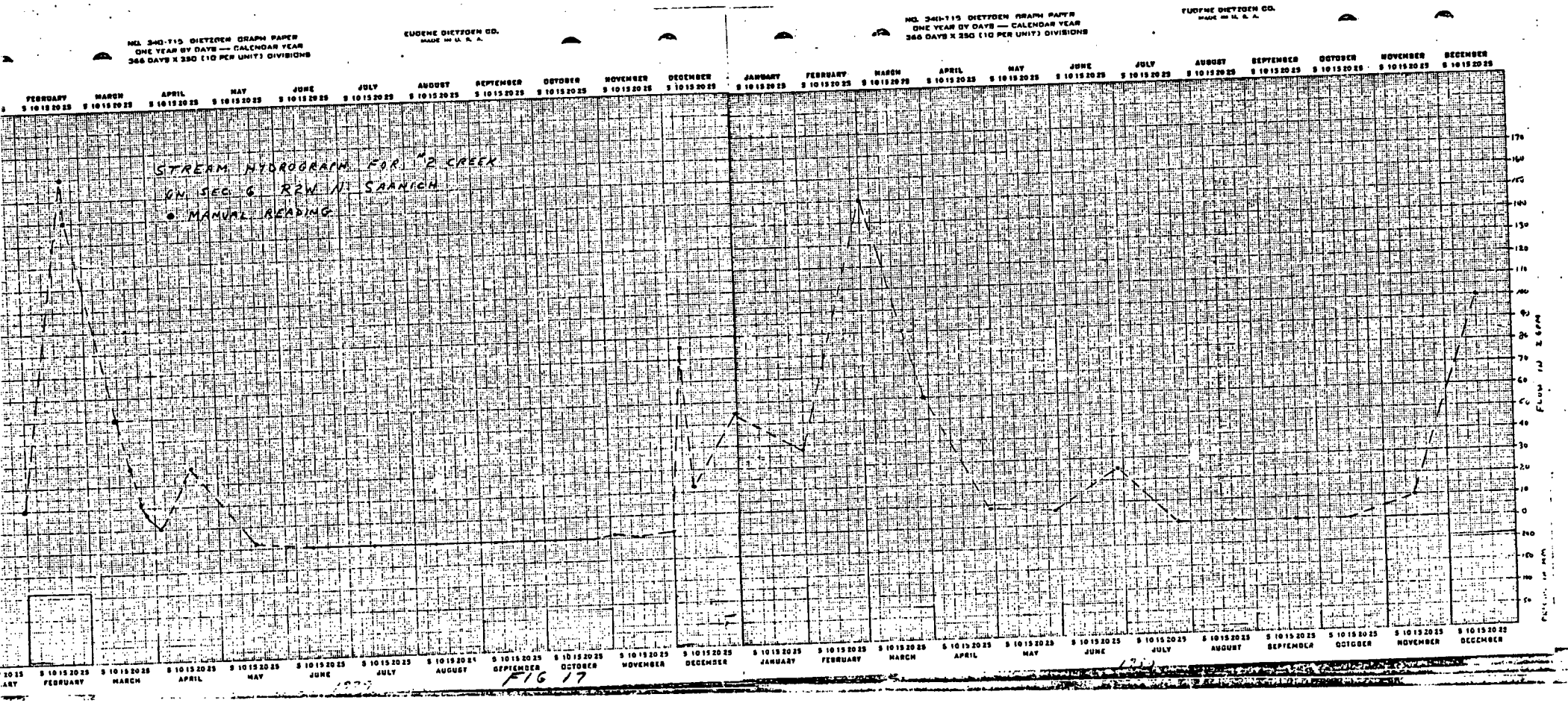
NO. 340-715 DIETZGEN GRAPH PAPER
ONE YEAR BY DAYS — CALENDAR YEAR
366 DAYS X 250 (10 PER UNIT) DIVISIONS
EUGENE DIETZGEN CO.
MADE IN U. S. A.
STREAM HYDROGRAPH FOR "2 CREEK
ON SEC. 6 R2W N. SAANICH
• MANUAL READING
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
FLOW IN L.P.M.

FIG 17

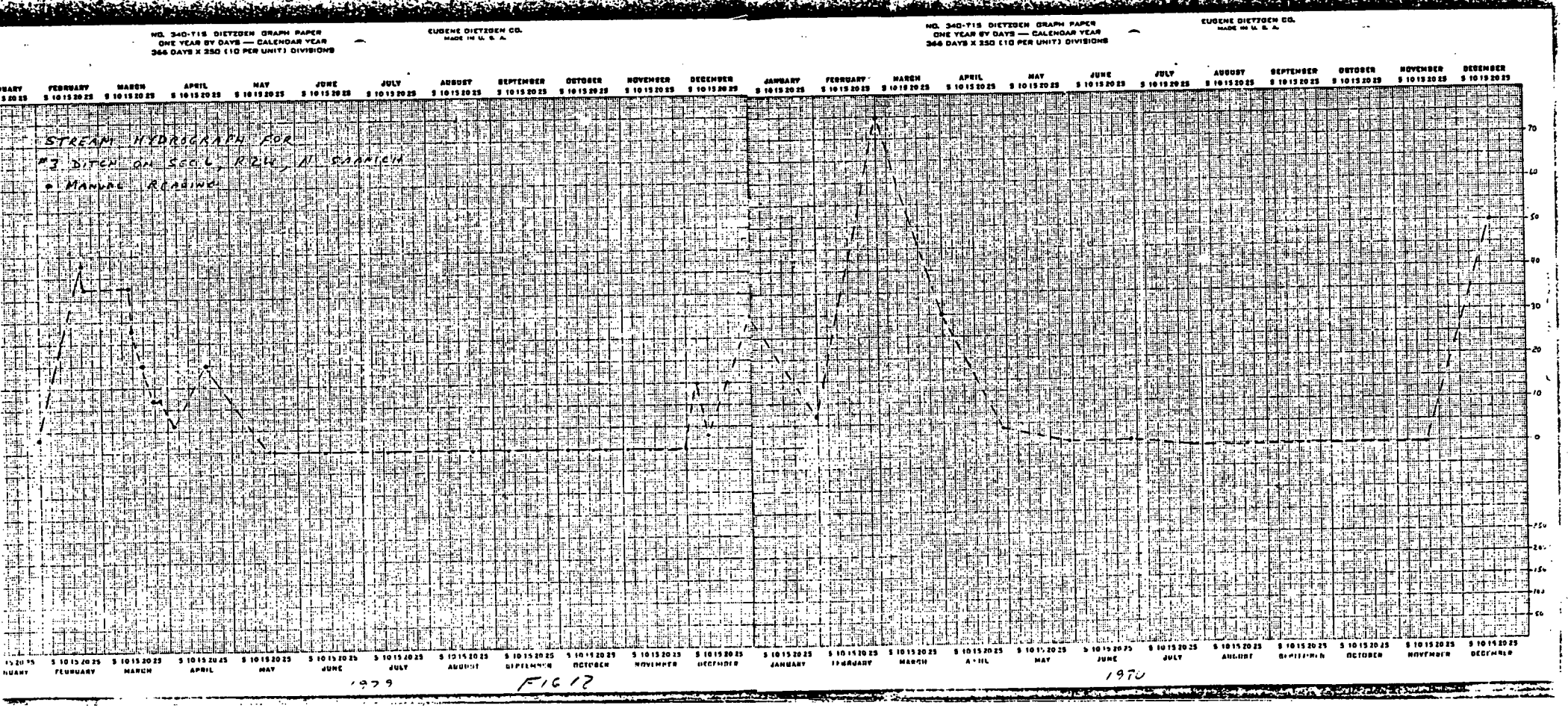
NO. 340-T1S DIETZGEN GRAPH PAPER
ONE YEAR BY DAYS — CALENDAR YEAR
366 DAYS X 250 (10 PER UNIT) DIVISIONS
EUGENE DIETZGEN CO.
MADE IN U. S. A.
STREAM HYDROGRAPH FOR
PJ DITCH ON SEC 6, R2W, T1S, GRANITE
• MANUAL READING
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
70
60
50
40
30
20
10
0
1979
1980

FIG 12

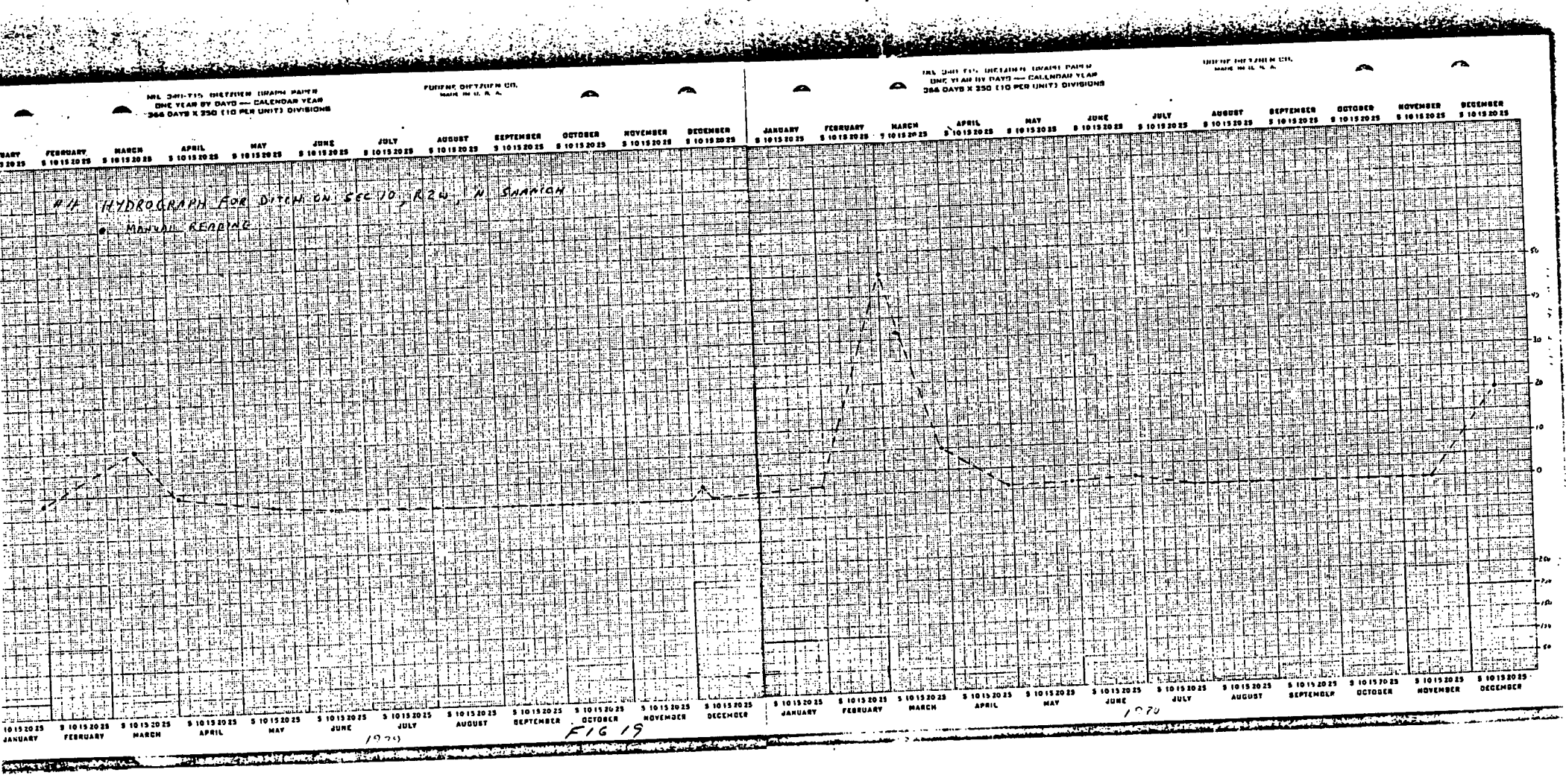
#11 HYDROGRAPH FOR DITCH ON SEC 10, R2W, N SWANTON
• MANUAL READING
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
1924
1925

FIG 19

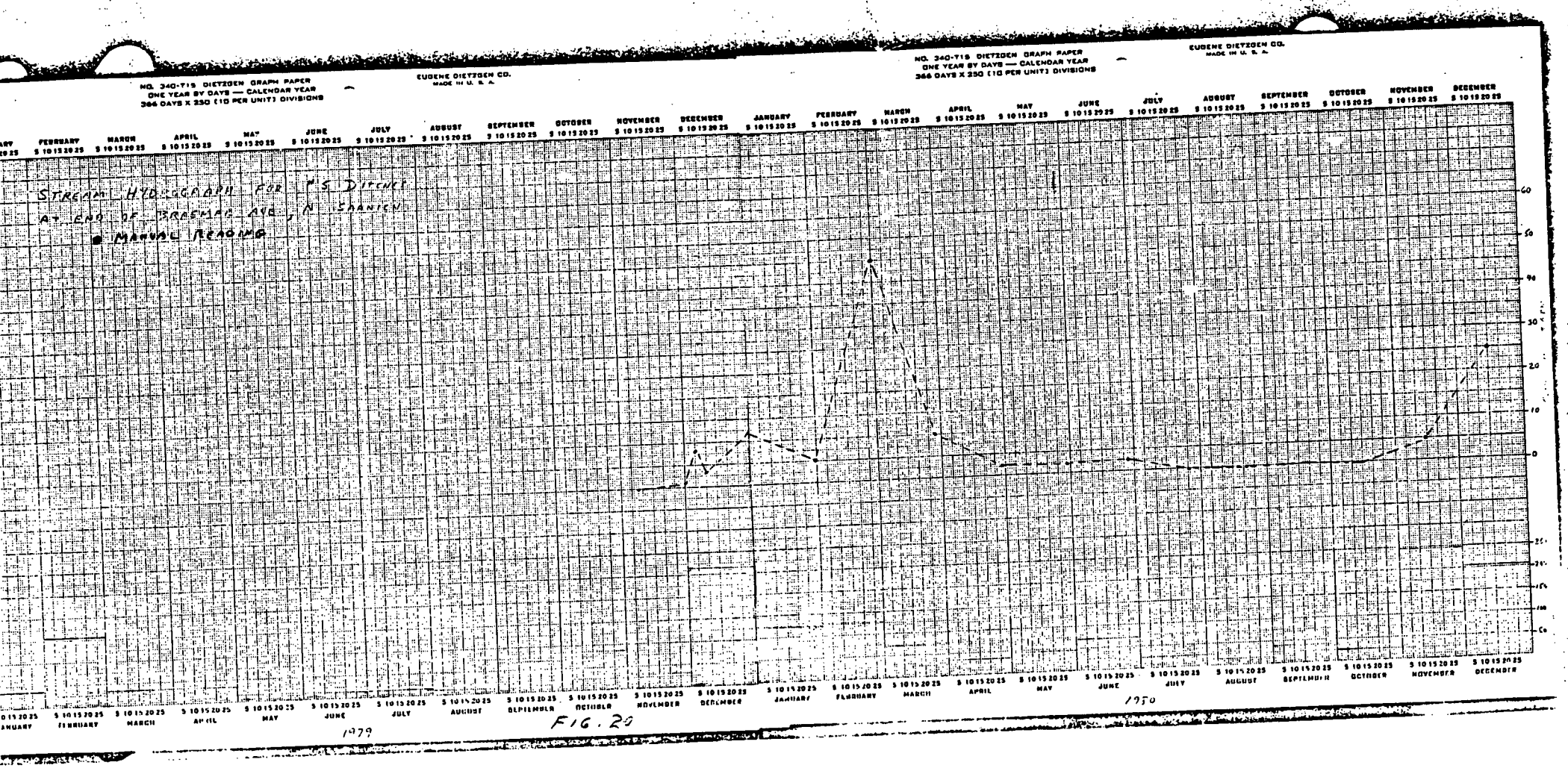
NO. 340-715 DIETZGEN GRAPH PAPER
ONE YEAR BY DAYS — CALENDAR YEAR
366 DAYS X 250 (10 PER UNIT) DIVISIONS
EUGENE DIETZGEN CO.
MADE IN U. S. A.
STREAM HYDROGRAPH FOR F.S. DITCH
AT END OF BRAEMAR AVE., N. SAANICH
MANUAL READING
1979
1980
60
50
40
30
20
10
0

FIG. 29

when the major precipitation occurs, and except for # 1 creek in 1980, they are all dry during much of the summer and fall when a water deficiency occurrs during the irrigation season extending through June, July and August.

Six observation well locations are shown also on Figure 15. Hydrographs for these six wells are prepared (Figures 21-26) from the automatic recorder graphs.

A well hydrograph, like a stream hydrograph, fluctuates in both a long and short term sense. The fluctuations recorded tell something about recharge rates, discharge rates, and the mechanical properties of the aquifer and the material overlying it (Cooley, 1972).

Observation well #240 (Figure 21) and #239 (Figure 22) are situated at a high elevation in the Ardmore area. These wells are situated in a groundwater recharge area, where that part of the rain and snowfall infiltrates into the ground and percolates downwards and recharges the area's groundwater. This can be observed beautifully on well #240 which has daily precipitation graphed below the hydrograph. Both of these wells respond almost immediately to any heavy or extended rainfall.

The hydrograph for observation well #238 (Figure 23) shows a marked 33 ft. drop in groundwater level during the two periods of pumping on a 586 ft. irrigation well, drilled also in fractured granodiorite, which is located 3,800 ft. southeast of this observation well. The irrigation well and major zone of pumping influence is shown on Figure 15. After allowing for

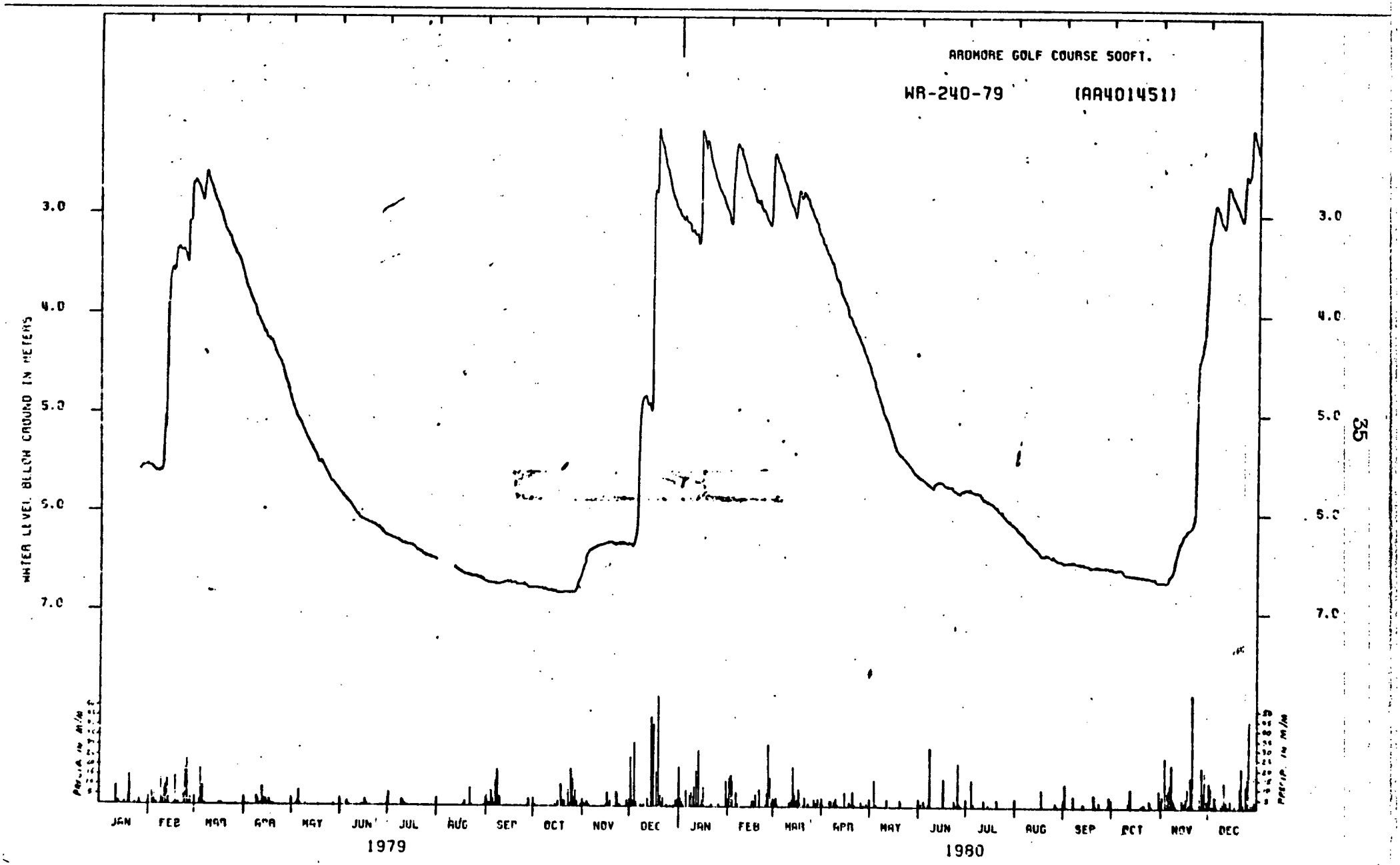

FIG.21 OBS. WELL 240

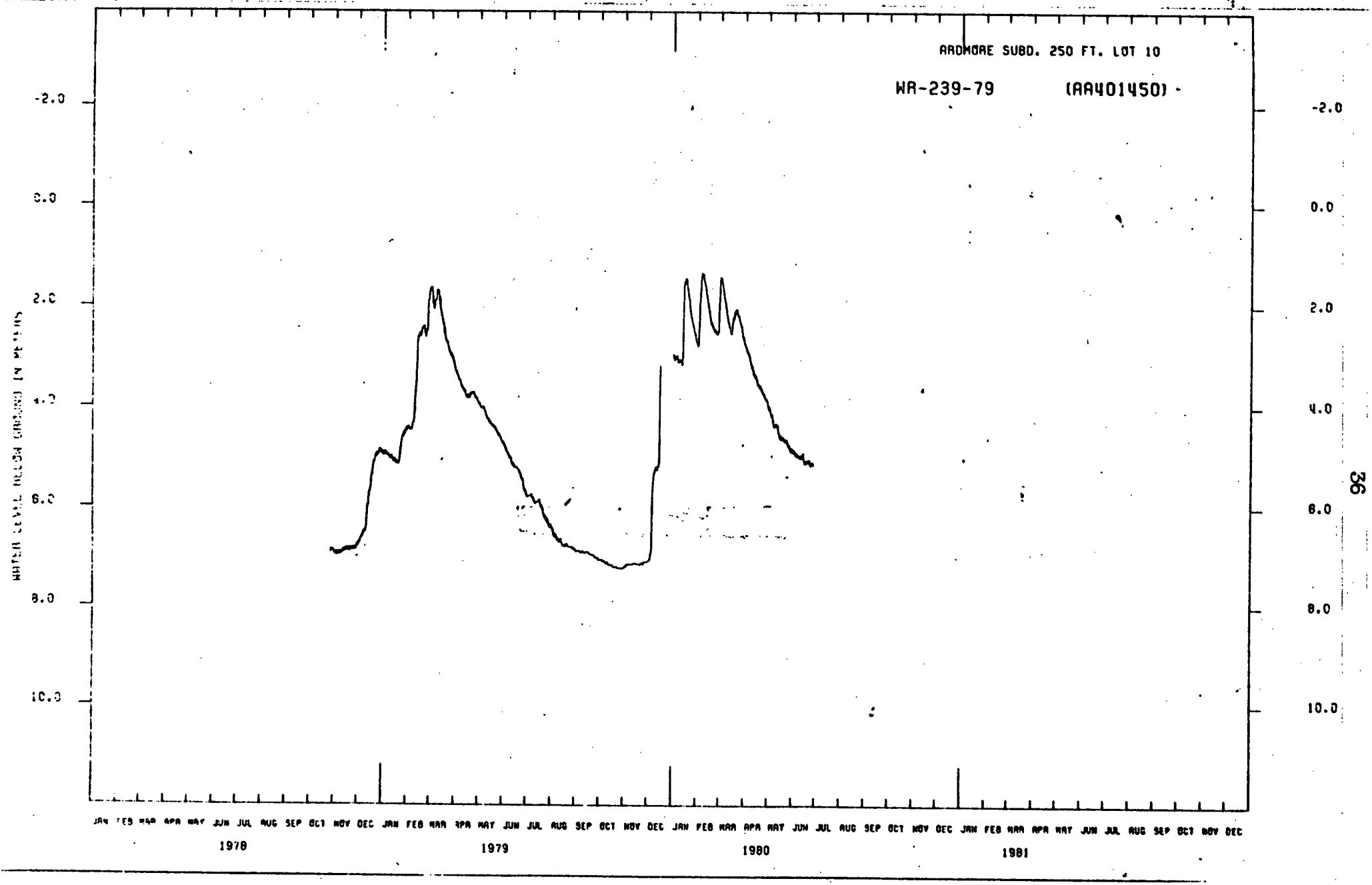

FIG. 22 OBS. WELL 239

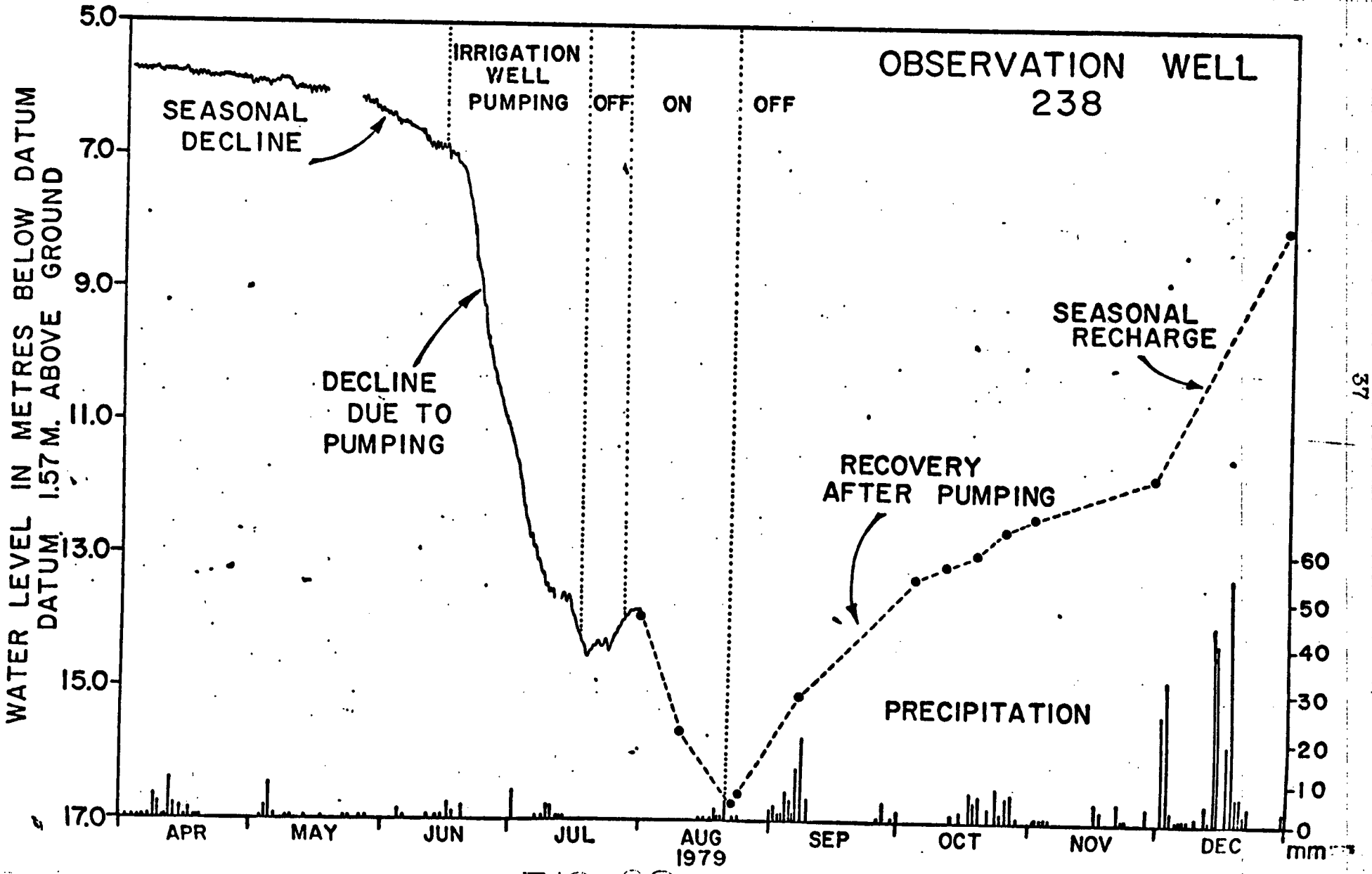
OBSERVATION WELL
238
WATER LEVEL IN METRES BELOW DATUM
DATUM 1.57 M. ABOVE GROUND
5.0
7.0
9.0
11.0
13.0
15.0
17.0
IRRIGATION WELL PUMPING
OFF
ON
OFF
SEASONAL DECLINE
DECLINE DUE TO PUMPING
SEASONAL RECHARGE
RECOVERY AFTER PUMPING
PRECIPITATION
APR
MAY
JUN
JUL
AUG
1979
SEP
OCT
NOV
DEC
60
50
40
30
20
10
0
mm

FIG. 23

a lag of 24 hours in the response curve one notes a striking correlation with the pumping periods and the shut off periods recorded for the irrigation well and plotted on this hydrograph.

Observation well #241 (Figure 24) shows far less decline in water level during the summer of 1980 than 1979. This likely is due to 1979 being a much drier summer then 1980 (see Table 2 and 3), but it may have also been effected by the pumping of the irrigation well in the summer of 1979, whereas, the irrigation well was pumped for only a short period during July and August 1980. During the summer of 1979 the water level in this well declined much more then the summer of 1980. If the irrigation well was causing part of this it could be very important to the subdivision to the west of observation well #241 as salt water intrusion could occur as a result of further reduction of water levels.

Observation wells #265 (Figure 25) and #266 (Figure 26) also are effected by the pumping of the irrigation well and verify the major zone of pumping influence as extending to the coast. The water levels in these two observation wells give evidence of a fault, or major zone of fracturing, being present as the water levels are quite different (ie: when well #266 flows one can observe on the hydrograph that well #265 has a water level of over 3 meters below ground level). Figure 27 is a picture of the geographical setting of these two wells and it can be observed that well #265 is at a slightly lower elevation

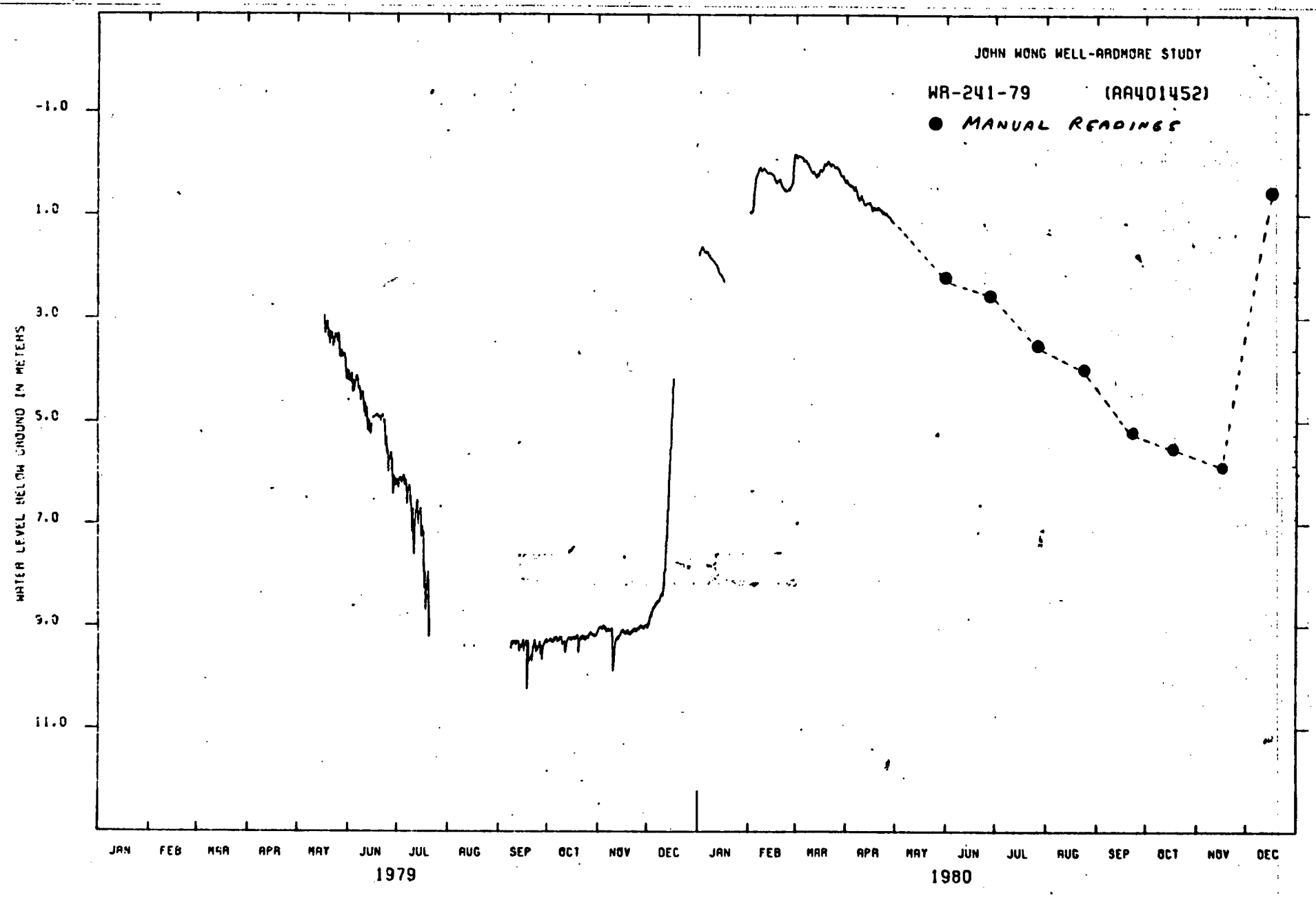

FIG. 24 OBS. WELL 241

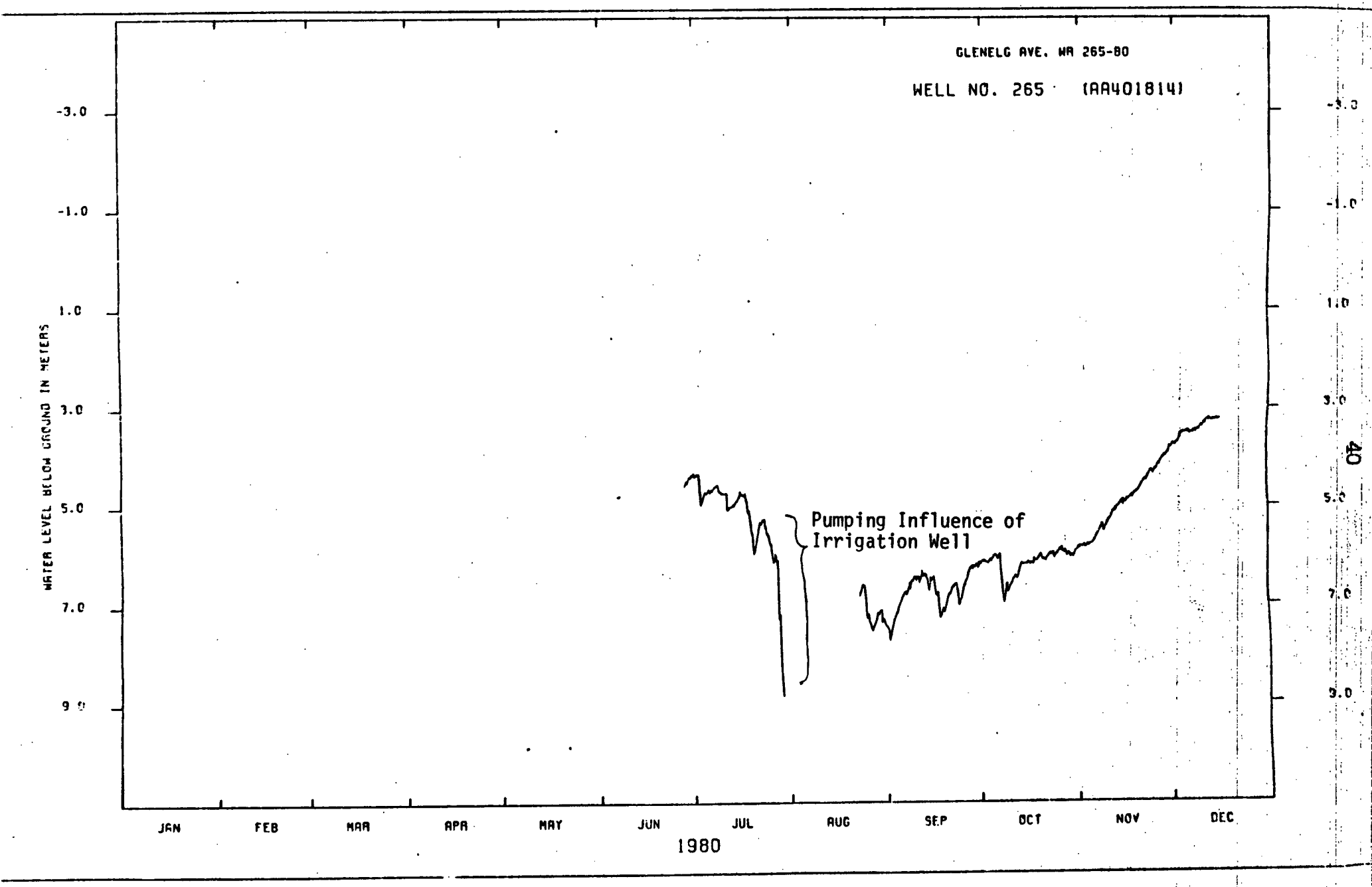

FIG. 25 OBS. WELL 265

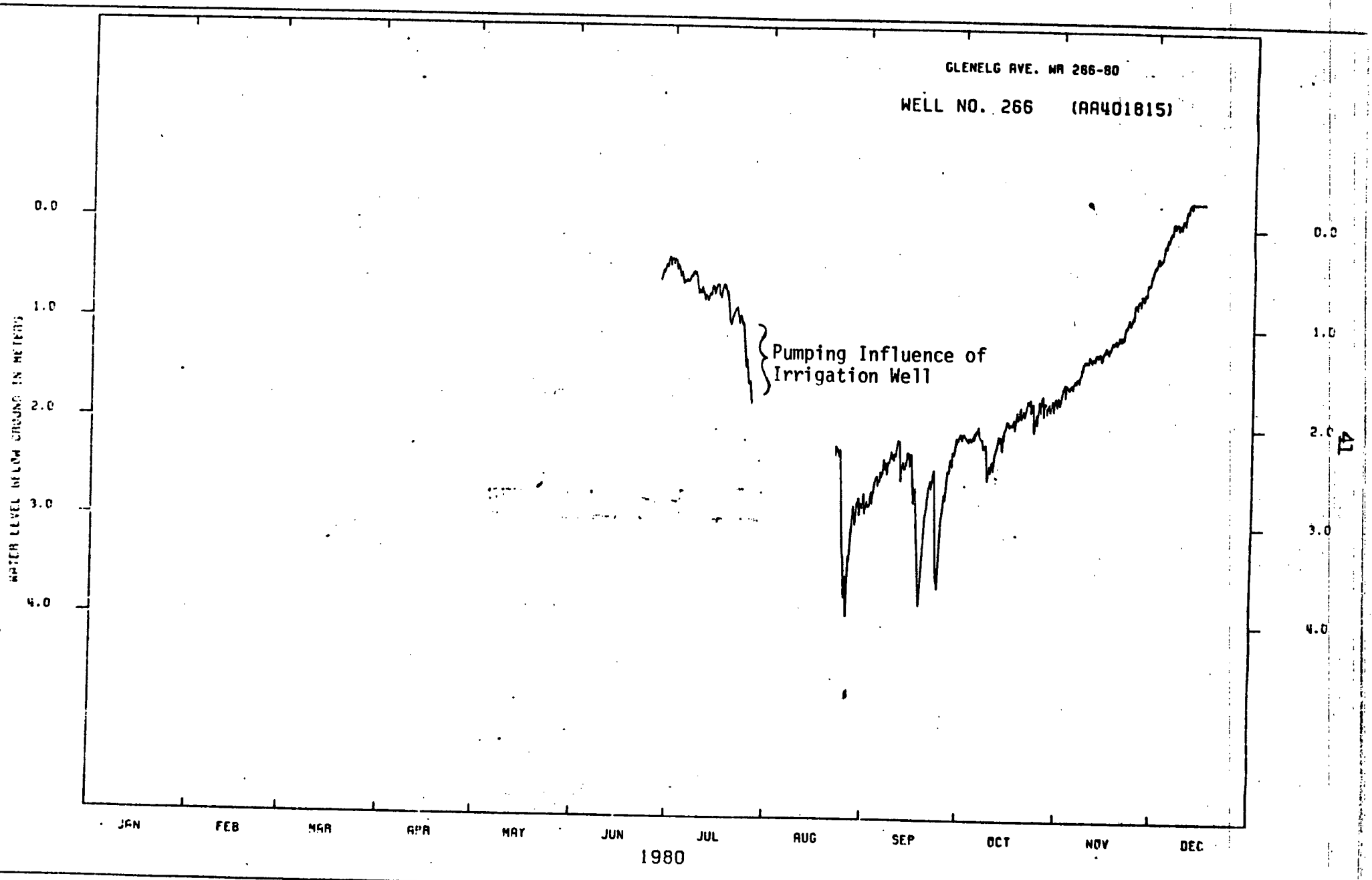

FIG. 26 OBS. WELL 266

and ordinarily this would lead one to believe that the water level in the well would be closer to ground surface than the well with a higher well head elevation. This phenomena also occurs with wells in the area of observation #241.

FIGURE 27

The development of faults in compressional areas commonly result in restricted zones of reduced permeability and in areas of tensional stress open fractures may develop through which water can move (Brown, 1977). By displacement of permeable formations, faults commonly become hydrologic boundaries of aquifers.

When rock masses are subjected to compressional or shear stresses, good joint systems may develop but these are more likely to be filled with fine-grained fragmental material which will not store or transmit water to any extent. In some rocks such gouge-filled joints may act as boundaries.

Fault zones, major or minor, may serve as conduits for free movement of water, or they may serve as a barrier for cross movement of water when they are marked by a tight gouge. Marked variations in the height of the water table in wells on opposite sides of a fault may provide an insight into the fact that impermeable gouge is present. Observation wells #265, 266, and #241 showed marked variations in water levels and high yielding wells are associated with the area which further confirm a fault may be present. Figure 28 is a cross-section ($A-A_1$) drawn through the Ardmore area and it shows up markedly these water level changes at the north end of the Ardmore area. The well location map (Figure 2) shows the location of this cross-section $A-A_1$.

THE WATER LEVEL SURFACE

A water level contour map (Figure 29) was prepared for the Ardmore area from water level data collected in the field and from that available with the Ministry of Environment.

As the water levels seasonally change approx. 20 ft. and the large irrigation well, shown on figure 15, effects wells in the north part of the Ardmore area it was decided that a winter-spring potentiometric map should be constructed. This map shows that the water levels generally conform to the surface topography.

The water table or the piezometric surface, as defined by the levels at which water stands in wells, slopes in the general direction of groundwater movement. The slopes of the water-table or piezometric surfaces afford some clues, therefore, concerning the nature not only of the water movement but also of the aquifer. A steep gradient as shown on the map prepared (Figure 29) of the potentiometric surface indicates low permeability.

Cross-Section A-A^{1} (Figure 28) shows the high water level as well as the low water level. One can observe at each end of the cross-section that the low water level is near sea level in the summer. Salt water intrusion could become a problem in these areas if additional groundwater withdrawal occurred in the areas or during a drought year.

HYDROCHEMISTRY

The hydrochemistry is an important consideration in the evaluation of the groundwater resource of an area. The water quality characteristics not only dictate the suitability of the waters for use but also can be useful in estimating the general groundwater flow patterns (Funk, 1977).

As the waters percolate through the rock, they are subject to a series of continuous reactive processes which tend to change their chemical composition. These changes either contribute additional ions or remove them depending on the chemical reactions which are involved. For instance the groundwater in the recharge area of Ardmore has a bicarbonate character while that in the lower discharge area has a more chloride character.

SAMPLING PROCEDURES AND ANALYSES

A total of 38 water samples were collected from wells in the Ardmore area, 3 were sampled in Oct. 1979 and 35 were sampled in Sept. of 1980 to establish the chemical characteristics of the groundwater. These were all sent to the Ministry of Environment, Environmental Laboratory at the University of British Columbia. The results of the water analyses are presented in Appendix 3.

In addition 187 wells were tested in the field for conductivity and sodium chloride content. Table 5 gives the test results.

For the conductivity readings a Bechman RB 3 Solu Bridge, with specific conductance scale range of 6,000 micromhos/cm at a reference temp. of 25 degrees C., was used. To measure the sodium chloride content the Hach Chemical Companies Model CD-52 WR kit was used. The sodium chloride content of the water in mg/l was found by multiplying the number of drops added by 12.5 and so the results are only as accurate as 12.5 p.p.m.

Sampling procedures consist of having the owner pump the well for a short while to ensure a fresh sample. No samples were taken from wells where a water softener could not be by-passed.

A sample is considered as being representative of all the fractures intersected.

HYDROCHEMISTRY OF THE GROUND WATER

The hydrochemistry of the Ardmore area is represented by chemical pie diagrams constructed from tabulated epm percentages for cations and anions for each of the 38 water samples sent to the Environmental Lab.

These chemical pie diagrams are constructed on the hydrochemistry map (Figure 30) and can be interpreted as calcium magnesium bicarbonate water with a minor zone of high chlorides in the toe of the peninsula. Two lines have been drawn on the map which may dilineate faults because of changes in water chemistry in the south end of the map near the toe of the peninsula, and because of water level changes and large yields recorded at the north part of the map. Some larger yields then usual are also associated with the southern line.

SPECIFIC CONDUCTANCE OF THE GROUND WATER

The property of water to conduct an electric current is related to the total dissolved solids the water contains. Pure distilled water is a poor electrical conductor, but the addition of small amounts of solid materials that readily ionize make it conductive.

Conductivity values for the 187 wells tested in the area have been used to prepare a conductivity isocon map, or lines of equal conductivity, (Figure 31). This map, as expected, shows the groundwater conductivity as being generally much lower in the recharge areas and becoming progressively higher towards the discharge areas. There are three areas along the coast where the conductivity rises above 700/mmhos/cm. and likely these are a sign of salt-water intrusion occurring.

Of interest is the low conductivity readings that occur beneath the bedrock channel that extend from the head of Coles Bay and trends north-east and may be associated with the much thicker overburden there.

SODIUM CHLORIDE CONTENT

The hack kit used to measure the sodium chloride of the field samples, actually tests for chloride but expresses it in mg/l sodium chloride.

Chloride is present in igneous rocks but on the whole, igneous rocks appear to be a minor source for the chloride content of natural waters (Hem, 1959). When porous rocks are submerged by the sea at any time after their formation, they are impregnated with soluble salts.

Chloride is present in rainwater in concentrations of an average 3.0 p.p.m. (Hem, 1959) and chloride is present in all natural waters, although in many areas the amounts are small.

Sodium Chloride values for the 187 wells tested in the area have been used to prepare a sodium chloride isocon map, or lines of equal sodium chloride concentrations, (Figure 32).

From this map one can readily observe that in the recharge areas, high ground in Ardmore and Mt. Newton areas, the groundwater is low in sodium chloride content, except for one anomelous well on Bradley Dyne Rd. that can't be explained at this time. As the groundwater moves away from these recharge areas the sodium chloride content slowly picks up sodium and chloride ions and gradually become more saline. This tendency to pick up salts and other dissolved ions is generally a very slow process particularly in rock, such as the granodiorite bedrock that underlies the Ardmore area.

In the recharge areas the groundwater has a low sodium chloride content even at great depth. For example an 870 ft. deep well (#8 well, R.2W, Sec.7) has only a chloride concentration of 9.8 mg/l and most of the water enters this well in the bottom section.

Three areas along the coast show areas of sodium chloride content over 100 p.p.m., and the area at the toe of the peninsula is known to be over 1,000 p.p.m. These are all likely areas of salt-water intrusion. The areas of over 100 p.p.m. sodium

chloride located inland are not produced by salt-water intrusion and are likely produced from waters that have travelled through long flow paths and to great depths and picked up additional sodium and chloride ions during this longer residence time. It is also possible that some leaching of marine sedimentary deposits occur. (ie: Victoria clay). Just back from the toe of the Peninsula (north-east) is an area which at first would appear to be salt-water intrusion associated with the salt-water intrusion problem at the toe, but on closer inspection it doesn't appear to be, as some of the wells do not go to a depth that would put them to sea-level. Possibly a fault and associated deep flow paths are involved here.

There were only 4 wells tested in the Ardmore area that exceeded the chloride criterion of 250 mg/l. The reason for the high chloride content in all these wells appears to be salt-water intrusion, as they are all near the coast.

SUMMARY

This hydrogeologic report on the National Topographic Series Map 92B-063-2-3, commonly known as the Ardmore area was undertaken as part of the hydrogeologic map and groundwater report being currently prepared by E.G. Le Breton, Senior Hydrogeologist with the Hydrology Section of the B.C. Ministry of Environment.

It is concluded that one aquifer is present, fractured granodiorite, as the sources from the overburden is minor and the yield from which is commonly low.

Because of structural influence the cone of influence around a given well is not circular but has the shape of some type of ellipse that is determined by the fracture pattern, and zones of high yield with wells up to 100 g.p.m. and with a known yield of 250 g.p.m. from a nearby well on an adjacent map sheet occur.

The recharge is from local precipitation and groundwater movement is from higher areas to lower areas, this is confirmed by automatic water level hydrographs and by the change in water quality from bicarbonate to a more chloride type water. Groundwater quality may be described as calcium-magnesium bicarbonate with a minor zone of high chloride in the toe of the peninsula. Basically the quality of groundwater is excellent, but a few wells near the shore show chloride content that exceed the standards and this is likely due to salt-water encroachment occurring.

Major fracturing of the granodiorite occurs to depths of over 870 ft., as data shows that the quantity of water supplied to the wells increases to that depth, and the water quality, especially in the recharge areas, is excellent to such depths.

Water levels seasonally decline 20 ft. and from what is generally known there is increased potential for domestic water supply development from deeper wells, although temporary salt-water encroachment may occur in the fringe areas along the coast.

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TABLE 1

SCHEDULE OF WELLS FOR

MAP SHEET 92B-063-2-3

PAGES 54-68

TABLE SCHEDULE OF WELLS FOR MAP SHEET 92B.063.2.3

RANGE #1 Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
5	2	500	180.	Flows in Winter Oct.20/76 13.70	?	21		2.0	50.	50.	50.	50.			A 55-hr.pump test was conducted on this well Oct. 1974. Initially the well was pumped at 60 Usgpm but after 92 minutes the flow had to be reduced to 40 Usgpm. After an additional 1800 minutes of pumping the flow rate had to be reduced to 30 Usgpm. Stabilization of the water level was not reached when pumping was terminated after 55 hours.
6	1	125	132.	?	till	42	6.6		6.6						
	2	60	133.	May 1967 9	1-5 sandy clay 5-31 till	31	4.2	4.2							
	3	67	135.	Oct.1965 8	1-10 clay 10-24 till	24	5.0	5.0							
	4	720	148.	flows		27		trace	2.0		4.0	7.0	35.	70.	This well was pump tested for 28 hours at a pumping rate which varied between 60 and 70 igpm. At completion of pumping the water level was 459.18 ft.
	6	200	145.		Soil & rock	12	12.	11	12						
	8	50	133.	7	1-13 clay 13-24 till	24	4.2	4.2							
	9	50	145	0	1-5 clay 5-31 till	31	3.3	3.3							
	12	510	130.			< 50	9	1.	3.		5.	9.			
7	1	26.5	108.	0 in winter											
	3	330	111.	16	red clay	23	20.	.25	.75	20.					
8	1	80	107.	0	0-2 clay 2-10 till	10									Yield reported as adequate for house, garden and stock.
	2	150	116.	Apr.1968 9	0-2 soil	2	.3		.3						
	3	105	114.	7	1-4 clay 4-8 till	8	4.0		4.0						
	4	615	105.		0-15 clay	15	20			3.0	4.0	5.0	20.		
9	1	118.5	93.		0-6 soil & clay 6-27 clay	27	4.3		4.3						
	2	150	93.												
	3	205	93.		clay	21	100		2.0	100.					
10	1	445	90.	Approx.20	clay	16	20	1.1			15.	20.			
	2	105	85.	Apr. 1966 10	clay	12	6.6	6.6							This well went dry March 1979, so now they obtain water from neighbours.
	3	60	78.		till	1.6	3.3	3.3							

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
RANGE W1															
10	4	100	80.	July 1964 13	0-14 clay 14-17 till	17.	3.3	3.3							In 1978 or 1979 this well was deepened to approx. 350 ft.
	5	220	82.		0-45 clay&gravel	45 ?	50		.5	50					
	6	290	90.	Approx.80	clay	23	30	Trace	Very Little	30					
	7	195	80.		clay	25	30	2.0	30						
	8	323	92.	May 31/79 13.10	0-7 clay, till 7-13 sand, clay	13	1.25	1.25							
	9	530	92.	25	clay	15	40					1.5	40		
11	3	176	46.		clay	5	3.3		3.3						
	5	55	45.	12	soil	2	5.0	5.0							
	6	130	34.		clay & till	20	2.6		2.6						
	7	36	40.	12	0-4 clay 4-10 till	10	8.3	8.3							
	12	129 ?	70.												
RANGE 2W															
4	1	87	185.	0	?	?	18	18							Pump tested for 19.5 hrs. at 19.5-24 gpm
	3	7	60.	Flows		7									Flows at 1 gpm and is reported to 60 day in the fall
5	1	110	30.		0-12 clay 12-14 till	14	10		10						
	2	100	30.		clay	18	7.5	7.5							
6	1	118	120.		0-8 soil 8-49 till	49	2.5		2.5						
	2	261	114.		till & boulders	80	.6			.6					
	3	120	88.	18.	till & boulders	48	1.6		1.6						
	4	88	89.	2' in winter June 20/72, 11.2	till	28	5.0	5.0							
	5	64	78.	June 20/72, 2.5	0-6 clay 6-29 till	29									Flowed at 1.0 gpm when drilled in 1959
	6	101	90.	20	till	62	1.6	1.6							
	7	92	25		0.4 clay 4-24 till	24	5.8	5.8							
	8	90	38.	26	0-11 clay & till 11-24 clay	24	2.8	2.8							
	9	58	73.		0-20 clay 20-31 till	31	5.0	5.0							
	10	120	70	0 in winter	0-20 clay 20-23 till	23	5.0		5.0						
	11	140	80.		clay & till	19	1.4		1.4						

RANGE 2W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
6	12	48	68.		till	5	1.5	1.5							
	13	90	20		0-12 clay & till 12-21 till	21	8.3	8.3							
	14	130	45		clay	17.5	2.1		2.1						
	15	87	58	5-6	clay	17	20	20							
	16	54	26		till		3.3	3.3							
	17	60	28		0-4 clay 4-10 clay & till	10	5.0	5.0							5 gpm in winter but inadequate supply in summer.
	18	75	40	0	0-17 clay 17-22.5 till	22.5	4.3	4.3							
	19	135	75	flows	0-12 clay 12-37 clay & till	37	3.5		3.5						
	20	135	80	Sept.18/74 3.5	0-8 clay 8-19 till	19									This well was test pumped for 5 days at rates of 18.6, 23.4 and 25 igpm.
	21	95	78	Sept.1963 7	2-12 clay 12-66 till	66	15	15							
✓	22	45	78	June 1963, 5;Overflows in the spring	0-9 clay 9-14 till	14	3.3	3.3							
✓	23	153	110	April 1963 18	1-3 clay 3-30 till 30-46 silt 46-48 till	48	.7		.7						
✓	24	103	112	Oct.1964 10	1-20 clay 20-49 till	49	4.5	4.5							
✓	25	104	74	May 1973 8	1-24 clay 24-48 till	48	3.3	3.3							
✓	26	100	25	6	clay	20?	7.5	7.5							The bedrock is described as a soft red rock.
✓	27	150	118	Aug.1965 30	till	69	1.3		1.3						
✓	28	88	66	July 1967 11	2-43 clay 43-58 till	58	5.0	5.0							
✓	29	84	60	July 1965 flows +3	1-8 clay 8-49 till	49	10	10							This well would flow all year until 1971. Now in 1980 it does't flow even in the winter. The water level rises to about ground level in winter.
✓	30	107	69		clay with some gravel	52	10	10							
✓	31	109	121	Jan.1970 20	till	67	16.6	16.6							

RANGE 2W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
6	32	125	125	Aug.1973 25	0-7 clay 7-13 till	13	1.6		1.6						
	33	128	63	flows	1-5 clay 5-47 till	47	6.6		6.6						
	34	108	116	15	till	14	5.0	5.0							
	35	91	38				5.0	5.0							
	36	84	111												
	37	160	51												
	38	74	120	Aug.1972 15	0-2 clay 2-8 till	8	8.3	8.3							
	39	75	80	Oct'72-8; overflows in winter.	0-5 clay 5-14 till	14	6.6	6.6							
	40	300	107	15	0-18 sand, silt 18-45 clay 45-68 till	68	2.0			2,0					Initially this well was 68 ft deep but it produced cloudy water from the overburden.
	41	47	108	15	0-7 soil & sand 7-42 silty clay 42-47 sand		15								Produces from the overburden. Completed with 5 ft. of .040" slot screen from 42-47 ft.
	42	215	110	40	5-30 till, some gravel; 30-78 till	78	.5		.5						
	43	125	108		clay	42	10	.5	10						
	44	140	126	Jan'79-15 Aug.21/79-34.7	0-15 brown clay	15	30	0	30						
	45	75	100		0-10 clay & rock	10	12	12							
	46	47	66	7	1-21 clay 21-24 till	24	4.0	4.0							
	47	47	70	Sept.1973 8	1-17 clay 17-19 till	19	5.8	5.8							
	48	74	128	Jan.1973 17	1-12 clay 12-18 till	18	5.0	5.0							
	49	90	128		red clay	23	6.0	6.0							
	50	445	66		0-45 clay 45-68 some gravel(N.R.)	68	2.0		1.0			2.0			
	51	425	105		0-15 clay 15-48 sand 48-80 clay	80	2.0					2.0			
	52	265	100		clay, gravel & sand	6	12.0		.5	12					
	53	150	44		clay	12	8.0		8.0						
	54	295	105			15	4.0		trace	4.0					
	55	145	105		clay	4	6.0	3	6.0						
	56	135	88	3 approx. in winter	0-28 clay 28-30 sand 30-40 clay	40	2.5	.25	2.5						
	57	245	65	Feb.28/80 +14; Aug.21 '79 ground level.	1 soil 20 till 10 gravel 4 clay	35	4.0			4.0					

RANGE 2W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
6	58	150	128		red clay	13	30	Trace	30						
	59	105	60	Nov.2/79 7.64 Feb.29/80 +1.3	0-20 brown clay 20-69 blue clay and rocks	69	6.0	6.0							This well flowed 6 gpm when drilled in Oct. 1975.
	60	305	64	Feb.29/80-1.0; Nov.2/79 -10.4.	0-69 clay, blue clay	2.0				2.0					Some water at 185'.
	61	150	45		0-11 red clay 11-16 gravel	16	3.0		3.0						
	62	150	30		0-18 red clay 17-20 sand&gravel	20	14	Trace @ 90'	14						
	63	300	34		0-7 clay 7-24 clay & gravel 24-43 gravel	43	2.0		.5	2.0					
	64	126	28	Nov.2/79 26.50	515 clay 15-34 till & granitic rock	34	20	Trace	20						The static water level may not be accurate as the well had been in use during the day of the reading.
	65	400	78		clay, blue clay	51	1.5				1.5				
	66	125	50		red clay & gravel	10	20		20						
	67	200	81		clay & rock	30	2.5	1.0	2.5						
	68	485	86		clay	29	6.0		.5		1.0	6.0			
	69	125	73		clay	40	6.0	1.0	6.0						
	70	425	66		0-40 brown clay 40-48 blue clay 48-66 till&gravel	66	2.0		.5		2.0				
7	1	147	88	Nov.12/68 6	1-7 sandy clay 7-27 blue clay 27-43 till	43	16.6		16.6						
	2	98	133		Clay & granite	27	3.5	3.5							
	3	198	130		clay	20	4.5		4.5						
	4	200	135		red clay,gravel & sand, boulders blue clay	38	7.5	Trace	7.5						
	5	500	140	Feb.21/79 5.9 Sept.7/79 21	red clay & boulders. gravel & sand blue clay	31	1.5			1.0	1.5	1.5			
	6	400	126	Feb.29/80 9.0 Oct.5/79 33.0	red clay boulders	4	1.5	.5	1.5						This well was pump tested at 1 igpm for 480 minutes. At the end of this time period the water level was 40.20 ft. A consultants report notes a granodiorite type rock was drilled from 6 to 125 feet and altered volcanics with granodiorite intrusions from 125 to 400 feet.
	7	250	122	Nov.2/79 23.5 Feb.29/80 4.7	Soil and granite	14	17	Trace	2.0	17					A pump test was run for a total of 1850 minutes at 12 igpm. The pumping level stabilized at a depth of 140.5 feet after 1500 minutes of pumping.

RANGE 2W

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
7	8	870	110	Flows in winter	clay	18	15		1.0			4.0		15	From 670-760' there were more fractures and the capacity increased from 4.gpm to 15.gpm. In May 1977 this well was pumped for 510 minutes. The last 465 minutes was at 13.igpm. At the end of this time the water level was 348.17 ft.
	9	108	136	Apr.20/77 10.37		2	5.0	5.0							April 1977 this well was pump tested at 2 igpm for 480 minutes. The water level at completion of pumping was 16.61 ft.
	10	86	148	Apr.19/77 17.10		2	6.0	6.0							April 1977 the well was pump tested at 2 igpm for 480 minutes. At the end of this period the pumping water level was 25.02 ft.
	11	450	138	Feb.29/80 4.8 Sep.7/79 21.2	red clay boulders	4	1.0		.5			1.0			March 1977 this well was pumped at 2 igpm for 480 minutes and the water level drewdown to 178.32 ft. at completion.
	12	350	132	Feb.29/80 4.3 Sep. 7/79 15.0	0-10 red clay 10-12 sand & gravel	12	2.0	Trace	1.0		2.0				Pump tested March 1977 for 480 minutes at 2 igpm and at completion of testing the water level was 74.08 ft.
	13	275	122	Feb.20/79 7.5 Oct.13/78 13.1	red clay & boulders	8	2.5	.5	1.0	2.5					Pump tested April 1977 for 480 minutes at 2.0 igpm. On completion of testing the water level was 31.37 ft.
	14	300	114	Apr.25/77 12.42	red clay & boulders	13	3.0		1.0	3.0					Pump tested April 1977 at 2 igpm for 480 minutes. The pumping water level was 28.63 ft. at completion.
	15	100	110	Mar.25/77 Flowing	red clay sand & gravel	4	6.0	6.0							Pump tested March 1977 for 480 minutes at 2 igpm. At completion of pumping the water level was 11.07 ft.
	16	475	104	May 13/77 8.94	red clay	18	1.5		.5	1.0	1.5				Pump tested May 1977 for 480 minutes at 1 igpm. The final water level measurement was 41.20 ft.
	17	200	111	Mar.25/77 13.78	soil	14	4.0	2.5	4.0						Pump tested March 1977 at 2 igpm for 480 minutes. The final water level reading was 19.16 ft.
	18	468	124	Apr.22/77 5.15	0-14.5 clay till 14.5-35 till	35	2.0	Trace	1.0			2.0			Pump tested April 77 for 480 minutes at 1.0 igpm and at completion of testing the water level was 41.70 ft.
	19	228	131	Apr.23/77 12.63	clay	11	2.0		2.0						April 1977 this well was pumped for 480 minutes at 2 igpm and the water level drew down to 30.66 ft.
	20	450	134	Apr. 23/77 8.65	red clay	17	1.5	.5			1.0	1.5			Pumped in April 1977 at 1 igpm for 480 minutes with a final water level of 30.85 ft.
	21	600	148	Dec. 6/77 24.1 Mar.14/79 8.8	clay	29	.5						.5		Pumped in May 1977 at 1 igpm for 480 minutes with a final water level reading of 109.01 ft.
	22	125	142	Nov.30/79 28.6 Feb.29/80 7.7	red clay	10	4.0	3.0	4.0						March 1977 this well was pumped for 480 minutes at 2 igpm with a final water level measurements of 19.39 ft.
	23	227	138	Apr.20/77 13.90	clay and rock	15	2-3	2.0		3.0					Pump tested April 1977 at 2 igpm for 480 minutes with a final water level reading of 53.17 ft.
	24	500	152	Apr.25/77 23.75	red clay & boulders	25	1.0	.5			.75	1.0			Pumped in April 1977 at 1 igpm for 480 minutes. The final water level measurement was 54.00 ft.
	25	200	160	May 5/77 29.19	red clay	12	30	.5	30						May 1977 this well was pumped for 480 minutes at 4 igpm with a final water level reading of 43.73 ft.

RANGE 2W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
7	26	408	168	Mar.30/77 27.61	clay and rock	15	1.5			.75	1.5				In March 1977 this well was pumped at 1 igpm for 480 minutes with a final pumping water level of 125.77 ft.
	27	525	172	Mar.30/77 24.77	red clay and boulders	17	1.0		.5		.75	1.0			This well was pumped March 1977 for 480 minutes at 1 igpm with a final water level reading of 126.61 ft.
	28	300	148			12	4.0			4.0					
8	1	325	172		red clay	5	1.0		Trace	.5	1.0				
	2	120	120	Oct. 1962 16	soil	2	8.3		8.3						
	3	175	172	Nov.30/79 29.5 Feb.29/80 11.0	clay	11	8.0		8.0						
	4	108	178	May 1965 17	clay	11	7.5	7.5							
	5	139	175	June 1968 14	1-4 clay 4-6 till	6	3.0		3.0						
	6	45	160	Oct.1968 18	1-10 clay 10-13 till	13	20	20							
	7	160	165	Aug. 1968 26	till	11	.66		.66						
	8	132	136	June 1969 11	1-12 clay 12-17 till	17	2.0		2.0						
	9	300	136	Flows in winter		9	12			12					Broken brown rock near the bottom of the well. The well flows about 5 gpm in the winter.
	10	85	118	June 22/72 1L5		20	10	10							
	11	82	145				4.2								
	12	150	150	July 1971 20	till	2	3.0		3.0						
	13	320	118	8 Approx.		12	3				3.0				
	14	200	166		clay	15	4.0	Trace	4.0						
	15	147	140		soil & soft granite	15	3.0	.5	3.0						
	16	395	177	Approx.18	clay	19.5	2.5	Trace			2.5				
	17	125	170			12.5	4.5	1.0	4.5						
	18	200	120			25	5.0	2.0	5.0						
	19	125	181			17	7.0	7.0							
	20	165	122	Feb.1973 3	1-10 clay 10-12 till	12	1.3		1.3						
	21	330	94		clay & rock	17	4.0	1-2	2	4					
	22	175	132	May 1976 10	brown clay	8	4.0	.75	4						
	23	160	142	Nov.7/79 32.5	brown clay	10	25	.25	25						
	24	300	158		0-2 soil 2-10 clay 10-13 till	13	3.0	1.0	2.0	3.0					
	25	120	128		red clay & boulder	17	8.0	7.0	8.0						

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
8	26	575	128		red & blue clay & boulders	12	1.0	.5		1.0	1.0		2.0		
	27	125	120	Approx.15	clay	12	5.0	1.0	5.0						
	28	155	116	Approx. 10-15		18	15		15						
	29	325	118	Approx.15		20	6.0			2.75	6.0				
	30	175	151	Nov.1/79 Approx.32	clay	9	7.0	Trace	7.0						
	31	350	172		red clay		2.0	nil	2.0						
	32	348	177		clay & till	17	2.0	Trace		1.5	2.0				
	33	298	181		clay	12	15		.25	15					
	34	173	182		clay	20	5.0	Trace	5.0						
	35	135	170		clay	9	5.0	2.0	5.0						
	36	130	129	Nov.6/79 20.0 Feb.29/80 +.50	clay	19	8.0	8.0							
	37	255	175		clay	19	6.0	nil	1.0		6.0				
	38	405	167			3	1-1.5	nil				1.5			
	39	275	168		red clay	4	4.5	Trace		4.5					
9	1	83	100	4	clay	21	4.1	4.1							
	2	160	118			0	1.6		1.6						
	3	57	50	Oct.19/79 8.70* flows in the winter	0-21 clay 21-25 till	25	1.6	1.6							*This well had been in use during the day of this reading
	4	160	80			2	1.6		1.6						
	5	275	50	31		0	8.0		.5	8.0					
	6	78	74	9		0	1.6	1.6							
	7	40	78			0	>20	>20							
	8	116	54			2	.5		.5						
	9	100	70	June 14/72 9.5 Oct.19/79 29.5*	clay	6.5	2.0	2.0							*The well had been in use during the day of the reading.
	10	150	123	Nov.1962 10		1	1.1		1.1						
	11	92	50	Mar.1963 8	2-17 clay 17-20 till	20	3.3	3.3							
	12	109	68	Dec.1963 2 Oct.1978 8-10	clay	8	5.0		5.0						

RANGE 2W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
9	13	78	166	May 1969 16		1	7.5	7.5							
	14	104	110	Nov.1967 17		2	3.6	3.6							
	15	150	104	July 1968 7	till	2	3.3		3.3						
	16	225	106	Aug.1969 22 Aug.21/79 52.7	1-3 till 3-7 clay	7	7.0		2.5	7.0					
	17	140	102	Oct.1969 26	2-12 clay 12-18 till	18	50	30	50						
	18	105	122	Apr.1969 15	1-4 till	4	3.0	3.0							
	19	150	42	Sept.1971 30	0-24 clay 24-36 till	36	2.0		2.0						
	20	85	150	Mar.1970 17	till	4	5.8	5.8							
	21	120	78	May 1970 8	clay	5	5.0		5.0						
	22	60	68	Flows	1-18 clay 18-27 till	27	20	20							
	23	70	70	July 1971 7	1-12 clay 12-13 till	13	4.1	4.1							
	24	150	52	Flows in winter. Oct.17/79 7.0	clay	33	25	Trace	25						
	25	77	45												
	26	18	60	flows part of year. Oct.19/79 approx.10.											Dug well.
	27	70	79	July 1973 20	1-12 clay 12-13 till	13	3.0	3.0							
	28	150	152	June 1977 approx.12			2.0	1.5	2.0						
	29	275	122		red clay	2	3.5	Trace	2.5	3.5					
	30	100	68			25	65	65							
	31	150	125		clay	10	2.0	1.0	2.0						
	32	185	155			6.0	2.0	Trace	2.0						
	33	275	50			8.0	4.0	Trace		4.0					
	34	440	115		clay & rock	16	4.0		1.0			4.0			
	35	41	50	Oct.1973 8 Flows in winter	clay	8	3.0	3.0							

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
9	36	125	84	Mar.1973 9.0	1-4 clay 4-10 till	10	8.3		8.3						
	37	100	60	+8.0 in winter; ground level in fall.	0-3 soil 3-8 gravel and sand 7-30 clay	30	30	30							
	38	220	70		red clay	5.0	2.0	Trace	1.5	2.0					
	39	325	75		red clay	1.0	6.0	Trace	2.0	6.0					
	40	385	110			5.0	12	Trace	.25	12					
	41	360	175			4.0	50				50				50 gpm was obtained within 35 ft. of surface but it was cemented off.
	42	450	144	Oct.31/79 77*		24	6.0		.5		1.0	6.0			*Owner felt this was a true non-pumping water level as this well had been pumped very little during the day.
	43	173	124	July 1973 20		0	.5		.5						
	44	285	65		red clay and boulders.	9	30	Trace	.5	30					
	45	355	55		4-18 red clay 18-20 sand & gravel	20	20	Trace	1.5	2.0	20				
	46	300	84		0-16 red clay 16-26 blue clay	26	5.0	.5	1.0	5.0					
	47	440	145			9	60		Trace	.5	1.0	60			
	48	200	80		red clay and boulders	7	4.0	Trace	4.0						
	49	425	71	Flows?	clay & gravel at 28	30-40	8.0		.5			8.0			
	50	245	89	Mar.13/79 12.8 Aug.21/79 50.4	red clay	11	75	Trace		75					
	51	275	55			6	15	nil	.5	15					
	52	350	172		red clay and boulders	18	10	.5		2.0	10				
	53	280	105	Sept.7/79 51.5 Feb.29/80 2.7	0-6 clay 6-8 till	8	20	8.0		20					
	54	325	110		soil	16	1.25				1.25				When initially drilled in April 1978 this well obtained 12 gpm at 55-60 feet but in Sept. of 1979 the owner had quantity problems and had the well deepened.
	55	273	145		soil	7	3.0		3.0						
	56	620	156	Approx.80	soil	4	20						20		
	57	90	55	Apr.4/79 43.7	clay	35	2.9	2.9							
	58	75	77	Apr. 1973 5	1-31 clay 31-44 till	44	7.0	7.0							

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to:							Remarks
								100	200	300	400	500	600	700	
10	1	70	35		clay	13	5.8	5.8							
	2	133	32	Sept.1962 9 Oct. 7/79 27.0*	1-19 clay 19-22 till	22	5.8		5.8						*Well may not have fully recovered as it was pumped for domestic purposes prior to this reading.
	3	77	45	June 1962 7	1-10 clay 10-15 till	15	5.8	5.8							
	4	75	25	July 1963 23	0-2 clay 2-11 till	11	3.1	3.1							
	5	85	33	Nov. 1963 6	0-14 clay 14-18 till	18	15	15							
	6	60	32	Dec.1964 6	clay	9	10	10							
	7	130	30	April 1965 20	0-11 clay 11-19 till	19	3.8		3.8						
	8	155	34	April 1965 8	2-16 clay 16-18 till	18	2.5		2.5						
	9	124	35	Aug.1966 19	1-16 clay 16-22 till	22	5.0		5.0						
	10	100	31	June 1967 20 Oct.11/79 28.3	0-9 clay 9-22 till	22	5.0	5.0							
	11	122	34	Sept.1968 15	1-8 clay 8-12 till	12	6.6		6.6						
	12	225	35	Sept.1967 15	2-11 clay 11-14 till	14	10	1.5	10						
	13	125	43	June 1972 10	1-21 clay 21-22	22	16.6		16.6						
	14	90	34	June 1970 20	1-10 clay 10-14 till	14	8.3	8.3							
	15	139	33	Mar.1970 6	0-6 clay 6-9 till	9	13		13						
	16	155	82	Oct.1972 22	1-16 clay 16-19 till	19	1.2		1.2						
	17	150	50	Oct.17/79 15.2 Feb.29/80 flowing	0-23 brown clay 23-26 gravel & sand	28	30	Trace	30						
	18	175	36		0-27 clay & gravel	27	6.0	nil	6.0						
	19	300	65		0-19.5 clay & gravel	19.5	8.0	Trace	4.0	8.0					
	20	100	42	Oct.12/79 26.5 Feb.29/80 10.9	0-22 brown clay 22-25.5 gravel	25.5	6.0	6.0							

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
RANGE 2W															
10	21	250	85	Apr.28/80 12.8 Oct.15/70 25.60	clay	10	4.0	.5	4.0						
	22	250	34		0-16 soil & clay	16	4.5	Trace	2.0	4.5					
	23	250	32		0-13 soil & clay	13	10	Trace	4.0	10					
	24	150	40		0-29 soil & clay 29-38 gravel & broken granite	38	4.0	Trace	4.0						
	25	150	35		0-13 clay	13	6.0	1.5	6.0						
	26	125	50	Flows in winter	0-14 clay	14	10	2.0	10						
	27	250	48	Aug.10/79 48.6 Feb.29/80 18.8	0-2 soil 2-10 till 10-15 clay & gravel	15	3.75		1.0	3.75					
	28	270	50	Aug.16/79 34.8 Feb.29/80 +.4	0-5 clay 5-11 gravel 11-16 till	16	4.0	.5	2.0	4.0					
	29	425	55	Flows in winter	0-15 brown soil	15	2.0			.5	.5	2.0			
	30	90	34	Oct.12/79 22.6 Apr.28/80 8.1											
RANGE 3W															
5	1	105	33	23	clay	10	+10	+10							Large flow at 95-100 ft. At 10 gpm bailing made little impression on water level.
	2	110	33	June 19/72 26.3	clay & till	14	+14		+14						Between 103-110 ft. a very large flow of water is reported.
	3	91	41		0-23 clay & till 23-42 till	42	5.0	5.0							
	4	130	20		0-16 clay 16-35 till	35	8.3		8.3						
	5	200	28	Approx.30	0-25 clay & till	25	3.3		3.3						
	6	120	22		0-4 clay 4-15 clay & till	15	1.25	1.25							
	7	112	30	Dec.10/79 27.5	0-19 clay	19	5.8		5.8						
	8	143	30			0	2.3		2.3						
	9	125	40		0-11 clay 11-14 till	14	1.0	1.0							
	10	145	26	10											Salt water problem occurs if well is pumped too long.
	11	150	30	....			.3		.3						

RANGE 3W

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
5	12	100	43	Mar.1967 13	0-7 clay 7-14 till	14	4.1	4.1							
	13	225	30		0-10 soil and broken rock	10	8.0	Trace	.75	8.0					
	14	220	41	Apr. 2/80 22.4 Sept.19/80 40.3	0-17 clay	17	2.5	Trace	2.0	2.5					
	15	110	32		clay	22	5.8		5.8						
	16	84	30		clay, till	12	2.0	2.0							
	17	280	41		0-19 clay	19	50	nil	2.0	50					Approx. 50 gpm of salt water at fracture at 280 ft.
6	1	125	36	Dec.1973 37	till	6	4.3		4.3						
	2	94.5	24		clay	6	1.6	1.6							
	3	100	30		soil	5	5.0	5.0							
	4	167	24			0	5.0		5.0						
	5	110	28	Approx. 12	till	5	1.8	1.8							
	6	115	26		clay	9.5	2.5		2.5						
	7	86	28		clay	6	10	10							
	8	142	21	Feb.1962 27	0-4 clay 4-9 till	9	3.0	.5	3.0						
	9	100	96	Oct.1965 16	0-13 clay 13-15 till	15	12	12							
	10	103	80	Nov.1965 16	clay	8	3.3	3.3							
	11	96	53	July 1967 8	0-15 clay 15-16 till	16	7.5	7.5							
	12	81	68	Aug.1967 18	clay	11	10	10							
	13	125	54	Mar.1972 8	1-17 clay 17-45 till	45	7.5		7.5						
	14	55	63	Sept.1968 20	1-10 clay 10-12 till	12	20	20							
	15	105	61	Oct.1968 18	1-20 clay 20-34 till	34	6.6		6.6						
	16	178	66	Dec.1969 8	1-15 clay 15-23 till	23	5.0		5.0						
	17	80	110	July 1969 14	0-4 clay 4-8 till	8	6.3	6.3							
	18	200	48	June 23/80 18.2	clay	8	1.5	.5	1.5						
	19	225	73		red clay & boulders	12	2.0	.25	2.0						

RANGE 3W Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
6	20	130	95		brown clay	8	7.0	Trace	7.0						
	21	200	118		red clay	87	4.5	1.0	4.5						
	22	335	64		clay	16	8.0	Trace	Trace	3.0	8.0				
	23	85	56	Approx.15	red clay	5	4.0	4.0							
	24	175	75		clay	13	5.0	1.0	5.0						
7	1	67	60	Overflow in winter	0-13 clay 13-20 clay, gravel	20	5.0	5.0							
	2	82	38		clay	10	3.3	3.3							
	3	110	24		0-5 clay 5-15 clay & till	15	5.0		5.0						
	4	90	30	15	0-13.5 clay 13.5-25 till	25	6.0	6.0							
	5	114	28	June23/80 3.9	0-16 clay 16-30 til	30	4.1		4.1						
	6	45	28		0-8 clay 8-23 till	23	1.3	1.3							
	7	120	50		clay	12	4.5		4.5						
	8	94	70	Aug.21/79 40.8 Feb.29/70 9.9	1-2 clay 2-9 till	9	1.6	1.6							
	9	140	91	June19/72 15.6			5.0		5.0						
	10	173	56	Sept.1969 15	0-23 clay 23-30 till	30	4.1		4.1						
	11	272	66			0	4.0		.75	4.0					
	12	200	122		clay & sand	30	1.0		1.0						
	13	44	70	Aug. 1972 10	soil	2	4.1	4.1							
	14	275	104		red clay	6	8	1.0	8.0						
	15	180	58	Flows in winter	red clay and boulders	9	5.0	1.0	5.0						
	16	220	72		red clay	7	3.0	Trace	1.25	3.0					
	17	175	70		red clay and boulders	3	4.0	2.5	4.0						
	18	150	100		red clay	5	4.0	Trace	4.0						
	19	402	100			11	3.0			1.5	3.0				
	20	272	70	Sept.79 Approx.5.0 July 8/80 flowing	0-2 soil 2-22 brown clay 22-25 blue clay & gravel	25	60		.75	60					

RANGE 3W

Section	Well No.	Depth (ft)	Surf. Elev. (AMSL) (ft)	Depth to Non-pumping Wtr. Level (ft)	Surficial Material (ft)	Depth to Bedrock (ft)	Reported Yield (igpm)	Cumulative Yield (igpm) of Fractures in Depth Ranges in feet from 0 to: 100	200	300	400	500	600	700	Remarks
7	21	303	128		0-12 clay	12	60		.25	60					
	22	200	136			10	4.0		4.0						
	23	243	114	May 1979 15	clay & brown soil	5	3.0	1.0	2.0	3.0					
8	1	87	60		soil	2	3.3	3.3							
	2	100	50		soil	1	3.3	3.3							
	3	65	60	20	soil	2	1.3	1.3							
	4	52	50		clay	16	7.5	7.5							Goes dry in summer
	5	280	60				4.0		2.0	4.0					
	6	64	40		soil	2	1.6	1.6							
	7	118	96	Jan.1965 16	0-5 clay 5-14 till	14	4.1		4.1						
	8	93	110	Sept.1971 20	1-8 clay 8-20 till	20	5.0	5.0							
	9	152	98				2.8		2.8						
	10	325	98		clay	17	5.5	5.5	5.5	5.5	5.5				
	11	300	110			26 ?	1.25		1.0	1.25					
	12	295	110		gravel & sand	25	5.0			5.0					
	13	275	122			27	1.0			1.0					
	14	250	115			12	4.0	.25	1.5	4.0					
	15	272	48				4.0		.5	4.0					
	16	325	50		soil & loose rock	12	12			.5	12				
	17	230	75		soil	4	25	Trace	25 ?	25					
	18	380	90		clay & soft rock	27	5.0		Trace		5.0				
	19	230	75			6	15			15					
9	1	120	65	June22/72 43.5											
	2	70	45		soil	6	8.3	8.3							
	3	60	45	April 4/79 33.90		0	10	10							The water level reading may be in error as the well had been pumped during the day and full recovery may not have occurred.

TABLE 4

Yield from Granordiorite Rock Fractures, Ardmore Area

The total wells recorded on Map Sheet 92B.063.2.3. is 347.

Depth Range (in ft.)	Total wells that penetrate that depth range	Average Igpm from the depth range
0-100	331.	2.62
100-200	221.	3.90
200-300	104.	7.0
300-400	44.	2.82
400-500	24.	3.98
500-600	7.	12.86
600-700	2.	22.5

TABLE 5

CONDUCTIVITY AND SODIUM CHLORIDE

VALUES FOR ARDMORE AREA WELLS,

SAANICH PENINSULA

PAGES 70-73

TABLE 5 CONDUCTIVITY AND SODIUM CHLORIDE VALUES
FOR ARDMORE AREA WELLS, SAANICH PENINSULA

Well No.	NaCl (In ppm)	Conductivity in Micro-Mhos/cm. At 25° C
R1W Sec. 5 #2	37.5	260
6 #1	37.5	430
6 #4	25.	330
6 #8	75.	490
6 #9	37.5	325
6 #12	37.5	382
7 #3	75.	640
8 #1	50.	430
8 #2	125.	650
8 #4	137.5	660
9 #3	68.7	640
10 #4	50.	580
10 #5	125.	720
10 #7	87.5	460
10 #8	75.	575
10 #9	62.5	500
11 #3	25.	362
11 #5	25.	258
11 #6	37.5	570
11 #7	50.	278
11 #12	50.	460
R2W Sec. 5 #1	50.	502
5 #2	50.	358
6 #2	37.5	285
6 #3	50.	325
6 #4	37.5	382
6 #5	37.5	330
6 #6	50.	380
6 #9	37.5	342
6 #10	37.5	340
6 #11	37.5	343
6 #12	37.5	259
6 #13	37.5	450
6 #14	37.5	458
6 #15	75.	390
6 #16	50.	399
6 #17	50.	398
6 #18	50.	365
6 #19	37.5	300
6 #20	37.5	344
6 #21	37.5	288
6 #22	112.5	395
6 #25	37.5	325
6 #26	50.	383
6 #27	50.	400
6 #29	25.	290
6 #30	37.5	298
6 #31	50.	362
6 #32	62.5	523
6 #33	25.	285
6 #37	37.5	338
6 #38	37.5	317
6 #39	87.5	565
6 #41	50.	460

Well No.	NaCl (In ppm)	Conductivity in Micro-Mhos/cm. At 25° C
R2W Sec. 6 #42	37.5	340
6 #43	50.	400
6 #45	25.	300
6 #46	37.5	378
6 #47	37.5	342
6 #48	87.5	652
6 #49	37.5	500
6 #50	37.5	242
6 #51	37.5	297
6 #56	50.	361
6 #57	25.	340
6 #58	37.5	500
6 #64	250.	700
6 #65	37.5	338
6 #66	37.5	425
6 #67	37.5	318
6 #68	50.	365
6 #69	50.	317
Rg2W Sec. 7 #1	50.	400
7 #2	62.5	725
7 #3	50.	395
7 #4	37.5	495
7 #9	37.5	445
7 #21	?	295
7 #23	25.	220
7 #25	25.	340
7 #26	25.	340
7 #27	25.	340
7 #28	25.	335
Rg2W Sec. 8 #1	25.	340
8 #2	25.	370
8 #3	?	440
8 #7	25.	420
8 #9	25.	400
8 #13	62.5	520
8 #14	125.	540
8 #15	25.	460
8 #16	25.	385
8 #18	25.	340
8 #20	37.5	500
8 #22	25.	430
8 #24	25.	430
8 #26	25.	460
8 #27	25.	450
8 #28	25.	420
8 #30	25.	440
8 #31	25.	360
8 #37	25.	430
8 #39	25.	383

Well No.		NaCl (In ppm)	Conductivity in Micro-Mhos/cm. At 25° C
R2W Sec.	9 #2	25.	460
	9 #3	25.	465
	9 #9	25.	425
	9 #12	25.	385
	9 #16	25.	370
	9 #17	37.5	440
	9 #21	25.	470
	9 #22	25.	370
	9 #24	25.	360
	9 #25	25.	360
	9 #28	25.	360
	9 #32	25.	440
	9 #33	37.5	500
	9 #37	25.	395
	9 #39	25.	402
	9 #40	37.5	520
	9 #41	25.	430
	9 #42	25.	400
	9 #44	25.	395
	9 #46	62.5	580
	9 #47	?	430
	9 #49	25.	415
	9 #50	50.	490
	9 #54	25.	260
	9 #56	25.	390
R2W Sec.	10 #1	25.	360
	10 #2	37.5	450
	10 #7	400.	1350 ←
	10 #12	62.5	600
	10 #13	37.5	400
	10 #19	87.5	650
	10 #23	75.	560
	10 #24	50.	540
	10 #26	87.5	440
	10 #29	50.	630
R3W Sec.	5 #1	62.5	598
	5 #2	75.	530
	5 #4	50.	539
	5 #5	1,050	2,150
	5 #6	1,100	2,150
	5 #7	>1,687.5	3,800
R3W Sec.	6 #1	75.	570
	6 #3	50.	545
	6 #4	175.	730
	6 #5	50.	482
	6 #6	75.	577
	6 #7	37.5	456

Well No.	NaCl (In ppm)	Conductivity in Micro-Mhos/cm. At 25° C
Rg3W Sec 6 #8	62.5	563
6 #10	125.	405
6 #11	37.5	465
6 #12	100.	559
6 #14	37.5	370
6 #15	37.5	600
6 #17	100.	505
6 #19	37.5	445
6 #20	37.5	380
6 #21	100.	477
6 #23	75.	458
6 #24	37.5	415
6 #25	50.	590
Rg3W Sec.7 #1	37.5	284
7 #2	50.	355
7 #4	37.5	465
7 #5	25.	422
7 #9	75.	440
7 #11	62.5	565
7 #13	50.	402
7 #14	37.5	490
7 #16	100.	510
7 #17	50.	325
7 #21	37.5	420
7 #23	25.	358
Rg3W Sec.8 #1	25.	465
8 #2	50.	345
8 #3	50.	365
8 #4	50.	?
8 #6	62.5	298
8 #9	62.5	705
8 #11	37.5	540
8 #12	37.5	?
8 #13	25.	440
8 #19	25.	440
R3W Sec. 9 #3	?	430
9 #4	?	225

B

APPENDIX 1

SHORELINE GEOLOGY NOTES

FOR MAP 92B-063-2-3

ARDMORE AREA

PAGES 74-80

APPENDIX I , SHORELINE GEOLOGY NOTES FOR MAP 92B.063.2.3, Ardmore Area

Each observation point (or in some cases a short stretch of the shore) has been given a number; these become progressively larger from the start of the traverse at Cole Bay I.R. #3 until the final observation point #70 is reached at the north end of the map sheet.

All compass readings are azimuth and turned clockwise off magnetic north.

Each double pace is very close to six feet in length.

The bedrock in the area mapped is all granodiorite except for some dykes which cut through it. Associated with the granodiorite are numerous rounded segregations which are composed of a fine grained, dark groundmass.

OBSERVATION POINT	OVERBURDEN	BEDROCK
1	Varies in thickness from 3-10 ft. It is a yellowish clay.	28 double paces north of south end of this stretch of shore is some major jointing with a strike of 200° and dip of 70°R, others strike at 225°.
2	3 to 6 ft. of clayey soil.	Much jointing, many strike at 10° dip steeply (almost 90° some just to left, others just to right).
3	8-10 ft. thick. A 3 ft. grayish, sandy till with many rounded pebbles & cobbles to 2" diameter exposed here.	
4	6-10 ft thick.	Very jointed rock. some of these joints have openings of 4-5 inches in width going into the rock face. In March 1979, groundwater was flowing from one of these at approx. 1.5-2.0 gpm. It has a dip reading of 30°R. Other major joints have strikes & dips of 50° 70°R and 40° 80° R.
5	6-10 ft. thick. Sandy clayey till (many rounded pebbles & cobbles, with some to 4 inches in diameter) over bedrock.	A large joint which is about 1 inch open is filled with a white marlish substance.

OBSERVATION POINT	OVERBURDEN	BEDROCK
6	5-8 ft. of yellowish brown, sandy, gravelly clay.	The granodiorite has been undercut by wave action for a strech of about 30 ft., along a joint which is horizontal to the face.
7	5-8 feet of yellowish brown, silty clay.	On this point two large joints were observed striking seaward at 240° and dipping 30° L. Quartz veins to 1 inch thick were observed.
8	Approx. 5-10 ft. thick. A 4 ft. thick exposure of till shows a sandy gravelly brownish till overlying a greyish brown till with boulders to 6" diameter.	
9	5 ft. thick and is a tan brown clay.	Reddish substance in some of the granodiorite.
10	10-15 ft. of tan brown clay.	
11	Approx. 5 ft. of silty tan brown clay.	Quiet a lot of joints and they are filled with a white substance (rock flour or calcium carbonate?
12	Tannish brown silty clay. Slippery when wet & crumbles easily when dry. No coarse material observed.	None observed.
13	Fat brown clay with many pebbles & fist size cobbles embedded in it (marine Till?). Just to the south 2 ft. of yellowish brown sandy till, with many round pebbles to fist size cobbles underlies 1 ft. of clay.	A dyke striking at 23° cuts through the granodiorite. A 30 ft. width of it is exposed and it is composed of a dark green fine grained rock. The dyke on the south edge is covered by the overburden so a total width could not be obtained. Much jointing in the bedrock here and they also strike at 23°, some zones are very shattered & crushed.

OBSERVATION POINT	OVERBURDEN	BEDROCK
14	10-12 ft. of clay	Has a reddish colour. Prounounce jointing which strike in many directions. Major joints strike at 355°.
15	5 ft. of silty brown clay	Some small joints with quartz in some a white soft substance in others. They tend to strike at 245° and dip 82° L.
16	5-10 ft. thick	Jointed heavily & tend to strike at 315° - 345°. There is much fine broken rock in these, joints of which some are 3-5 inches wide The major broken zone is about 20 ft. wide.
17	A 10-12 ft. cliff here is composed of a grey sandy till with many pebbles & cobbles.	
18	shallow	6 ft. high cliff face is broken into blocky chunks. Strikes at 195° and dips 75° R.
19	about 5 ft. thick	
20	4-5 ft. of sandy brown clay	Major joints strike at 240°
21	1-6 ft.	A ridge on the shore strikes at 220° and dips 55° R.
22	5-10 ft. thick	Some minor jointing.
23	4-6 ft. thick	Many minor joints strike in many directions.
24	4-10 ft. thick	Large joint right on point strikes at 220° and dips 55° L.
25	0-2 ft. thick	Highly fractured & jointed.
26.	about 4-6 ft. thick & becomes thicker to north west part the shattered zone.	Heavily jointed, and joints strike at 20°. This zone is about 20' wide and a few-spots are ground up badly. This shattered zone dissapears to the north under a extensive stretch of overburden which covers the shore.

OBSERVATION POINT	OVERBURDEN	BEDROCK
27	4-6 ft. of brownish silty clay.	The bedrock reappears here & is different as it is a darker colour & is porphyritic. This may be a dyke? It is quiet broken & jointed and strikes at 320°. Some of these joints are up to 1" wide and filled with a white material. Water has eroded some of this material to a considerable depth (one foot or so)
28	5-10 ft.	A major lineament strikes at 330° and dips 80° L.
29	3-6 ft. thick	
30	shallow	Major joints strike at 20°.
31	3-6 ft. of browinish clayey soil.	Wave action has worked on the joints to erode the rock to a block structure. Many of the segregation have not eroded as fast and they no stick out of the blocks. Major lineament strike at 330°
32	Little or none.	Some of the joints have been filled with quartz, which are up to 4 inches wide. The erosion process of the waves is causing these quartz veins to be left sticking out of the rock. There is much jointing in this area. A large widened joint, 1 1/2 ft, strikes at 220°.
33	Almost nil.	A large joint here is 3 ft. wide & is filled with broken, shattered rock. It strikes at 35° and dips 60° R.
34		A long running lineament strikes at 35° and dips 60° R.
35	5-10 ft. of yellowish brown, silty clay.	
36	0-3 ft.	A 50 ft. wide dyke strikes through at 235°. It is a dark fine grained rock. About 50 ft. south of the dyke, the granodiorite has joints that are also striking at 235°.
37	0-8 ft. of yellowish brown clay.	

OBSERVATION POINT	OVERBURDEN	BEDROCK
38	2-3 ft. thick	There is a darker rock here & it may be a dyke, but it was hard to observe. It appears to be about 1(ft. wide. At the south end where it contacts the granodiorite is a large joint with a 4 ft. wide opening which goes back into the 10 ft. high cliff about 5 ft. The rock is badly decomposed in this joint.
39	Thin drift of 1-4 ft. thickness but in a spot or so it does increase to nearly 10 ft.	Much minor jointing. A major joint at the north end of this area strikes at 70°.
40	Only a few feet of sandy brown soil.	Small outcrop of dark rock rock which may be a dyke. It must be less than 6-8 ft. wide as granodiorite could be observed on either side but the beach over-burden obscured any contacts.
41	1-3 ft. of sandy brown soil.	
42	3-4 ft. of soil	A 20-25 ft. wide dyke cuts through here on the point.
43	3-4 ft. of soil	The granodiorite is very jointed and many of the major ones strike at 170°.
44	3-4 ft. thick	This is a contact zone of a dyke & the granodiorite. Contact strikes at 225° and dips 70° R. The major joints in the granodiorite strike at 175° and some minor ones at 315° and 250°.
45	About 10 ft. thick & the same as at point #46 but the till is thicker here.	The dyke observed at point #42 and #44 passes through here. It is a dark fine grained rock and is porphyritic.
46	6-10 ft. thick. It is composed of a tannish, yellowish, brown silty clay which overlays a 6 inch layer of yellowish brown, sandy, pebbly till resting on the bedrock.	Many minor joints.

OBSERVATION POINT	OVERBURDEN	BEDROCK
47	6-10 ft. of yellowish brown till with quite a few cobbles in it.	No bedrock observed.
48	0-4 ft. thick.	Some major joints were observed. About 1/3 of the way from the south end of this point a major joint strikes at 190°. About 250 ft. north of this another one strikes at 200°, one at the north end of the area strikes at 230'.
49	0-4 ft. thick	A 50 ft. wide dyke cuts the granodiorite here. It is a dark rock which looks the same as at obs. point #44. On its south contact it strikes at 240° and dips 70° L. The north contact strikes 230°.
50	Thin, about 0-4 ft. thick.	All granodiorite except for one spot near the middle where a dyke cuts it.
51	Thin, about 0-4 ft. thick.	A dyke cuts through here. It is dark, fine grained, about 25 ft. wide and both contacts strike at 230° with a dip of 80° L.
52	2-8 ft. thick.	
53	Very thin (about 1 ft.)	well fractured & jointed
54	About 1 ft. thick.	A major joint strikes at 65° and dips 40° L.
55	less than 3 ft. thick.	
56	less than 1 ft. thick.	A large fracture at the base of the 20 ft. high granodiorite cliff runs parallel to the horizontal.
57	Almost nil.	A cliff of granodiorite extends al along this area. There are some major open joints in it but a strike could not be obtained.

OBSERVATION POINT	OVERBURDEN	BEDROCK
58	1 ft. thick.	The granodiorite cliff is about 20 ft. high. There was a small amount of groundwater seepage from a fracture and it stained reddish on the rock. There is a major joint just to the south of the seepage location.
59	Very little overburden.	The cliff is lower (6-10 ft.) in this area and at the north end it peters out.
60	3-4 ft. thick & it is clay.	
61	1-2 ft. of clay & soil.	
62	2 ft. of clay over grayish brown till.	None observed.
63	4-6 ft. of clay.	
64	Brownish grey clay.	None observed.
65	6-10 ft. thick. Clay where it could be observed.	
66		Major fracture strikes 100^{o} with a dip of 65^{o} L.
67	10-12 ft. thick of clay over till.	
68	Tannish yellow clay.	None observed.
69	2-5 ft. thick.	Some major fractures in the approx. 4 ft. high rock cliff run parallel to the base of it.
70	6-10 ft. of clay over till.	

APPENDIX 2

ARDMORE STREAM FLOW

MEASUREMENTS 1979-1980

PAGES 81-87

APPENDIX 2

Ardmore Stream Flow Measurements 1979-1980

#1 Creek on I.R.#3 (Coles Bay)

Measurement Point: Timed into 5 Igpm bucket at bedrock outlet of creek to ocean

Measurement Date		Flow in Igpm
March 20, 1979	11:55 a.m.	200.
April 3, 1979	10:30 a.m.	75.
May 17, 1979	10:30 a.m.	20.
June 13, 1979	10:05 a.m.	1.
July 12, 1979	10:40 a.m.	1.
August 12, 1979	9:52 a.m.	Nil
September 7, 1979	2:45 p.m.	Nil
October 5, 1979	10:25 a.m.	Nil
October 17, 1979	9:50 a.m.	Nil
October 23, 1979	11:07 a.m.	0.1
November 30, 1979	9:07 a.m.	.5
December 5, 1979	2:00 p.m.	100.
January 30, 1980	9:45 a.m.	300.
February 29, 1980	9:30 a.m.	500-1000.
March 28, 1980	10:05 a.m.	150.
April 28, 1980	10:05 a.m.	60.
May 29, 1980	9:20 a.m.	27.
June 27, 1980	10:15 a.m.	33.
July 25, 1980	10:10 a.m.	5.5
August 21, 1980	9:55 a.m.	.5
September 19, 1980	10:15 a.m.	.25
October 15, 1980	9:22 a.m.	1.
November 14, 1980	3:00 p.m.	3-4.
December 15, 1980	1:45 p.m.	600.

Ardmore Stream Flow Measurements 1979-1980

#2 Creek on Section 6, Range 2 West, North Saanich

Measurement Point: Timed into 5 Igpm bucket at end of 12" diameter stave pipe of outlet to ocean.

Measurement Date		Flow in Igpm	
January 30, 1979	9:35 a.m.	20.	
February 20, 1979	11:35 a.m.	170.	
February 21, 1979	3:00 p.m.	150.	
March 13, 1979	11:10 a.m.	60.	(Conductivity 190. at 25°C)
March 14, 1979	9:15 a.m.	60.	
March 20, 1979	11:05 a.m.	37.	
March 24, 1979	2:20 p.m.	21.	
March 27, 1979	10:25 a.m.	17.	
April 3, 1979	11:05 a.m.	10.	
April 18, 1979	8:45 a.m.	37.	
May 17, 1979	10:05 a.m.	2.	
June 13, 1979	9:35 a.m.	Nil	
July 12, 1979	10:25 a.m.	Nil	
August 10, 1979	9:38 a.m.	Nil	
September 7, 1979	2:33 p.m.	Nil	
October 5, 1979	10:10 a.m.	Nil	
October 17, 1979	9:33 a.m.	Nil	
October 23, 1979	10:50 a.m.	Nil	
November 2, 1979	2:02 p.m.	1.75	
November 13, 1979	9:00 a.m.	.25 - .5	
November 30, 1979	8:58 a.m.	2.5	
December 5, 1979	1:40 p.m.	86.	
December 10, 1979	9:45 a.m.	23.	
December 31, 1979	2:10 p.m.	55.	

Ardmore Stream Flow Measurements 1979-1980

#2 Creek on Section 6, Range 2 West, North Saanich (Continued)

Measurement Point: Timed into 5 Igpm bucket at end of 12" diameter stave pipe at outlet to ocean.

Measurement Date		Flow in Igpm
January 30, 1980	9:15 a.m.	37.
February 29, 1980	9:00 a.m.	150.
March 28, 1980	9:40 a.m.	60.
April 28, 1980	9:40 a.m.	8.5
May 29, 1980	8:55 a.m.	6.7
June 27, 1980	9:50 a.m.	25.
July 25, 1980	9:55 a.m.	Trickle
August 21, 1980	9:40 a.m.	Nil
September 19, 1980	10:05 a.m.	Nil
October 15, 1980	9:10 a.m.	Nil
November 14, 1980	10:00 a.m.	10.
December 15, 1980	9:00 a.m.	100.

Ardmore Stream Flow Measurements 1979-1980

#3 Ditch on Section 6, Range 2 West, North Saanich

Measurement Point: Timed into 5 Igpm bucket, at end of Inverness Road, at outlet to ocean.

Measurement Date		Flow in Igpm
January 30, 1979	9:30 a.m.	3.
February 20, 1979	11:30 a.m.	43.
February 21, 1979	2:55 p.m.	37.
March 13, 1979	9:40 a.m.	37.
March 14, 1979	9:10 a.m.	28.
March 20, 1979	10:15 a.m.	20.
March 24, 1979	2:10 p.m.	12.
March 27, 1979	10:20 a.m.	12.
April 3, 1979	9:55 a.m.	6.
April 18, 1979	8:40 a.m.	20.
May 17, 1979	10:00 a.m.	Trickle
June 13, 1979	9:30 a.m.	Dry
July 12, 1979	10:20 a.m.	Dry
August 10, 1979	9:37 a.m.	Dry
August 21, 1979	2:22 p.m.	Dry
September 7, 1979	2:30 p.m.	Dry
October 5, 1979	10:00 a.m.	Dry
October 17, 1979	9:30 p.m.	Dry
October 23, 1979	10:45 a.m.	Dry
November 2, 1979	2:00 p.m.	Dry
November 13, 1979	8:58 a.m.	Dry
November 30, 1979	8:53 a.m.	Dry
December 5, 1979	1:25 p.m.	15.
December 10, 1979	9:55 a.m.	3.
December 31, 1979	2:35 p.m.	30.

Ardmore Stream Flow Measurements 1979-1980

#3 Ditch on Section 6, Range 2 West, North Saanich (Continued)

Measurement Point: Timed into 5 Igpm bucket, at end of Inverness Road, at outlet to ocean.

Measurement Date		Flow in Igpm
January 30, 1980	9:25 a.m.	7.
February 29, 1980	9:15 a.m.	75.
March 28, 1980	9:50 a.m.	30.
April 28, 1980	9:50 a.m.	4.
May 29, 1980	9:05 a.m.	.7
June 27, 1980	10:00 a.m.	1.25
July 25, 1980	9:58 a.m.	Dry
August 21, 1980	9:45 p.m.	Dry
September 19, 1980	10:07 a.m.	Dry
October 15, 1980	9:10 a.m.	Dry
November 14, 1980	10:05 a.m.	Dry
December 15, 1980	9:15 a.m.	50.

Ardmore Stream Flow Measurements 1979-1980

#4 Ditch on Section 10, Range 2 West, North Saanich

Measurement Point: Timed into 5 Igpm bucket, at end of right-of-way, just off Glenelg Avenue, at outlet to ocean.

Measurement Date		Flow in Igpm
January 30, 1979		3.
March 14, 1979		15. ?
April 3, 1979	2:30 p.m.	4.
May 17, 1979	2:25 p.m.	1.5
June 13, 1979	12:02 p.m.	.25
August 10, 1979	11:45 a.m.	Dry
September 7, 1979	2:00 p.m.	Dry
October 5, 1979	11:00 a.m.	Dry
October 23, 1979	12:45 p.m.	Dry
November 2, 1979	9:45 a.m.	Dry
November 30, 1979	10:05 a.m.	Dry
December 5, 1979	2:40 p.m.	3.
December 10, 1979	9:15 a.m.	.25
January 30, 1980	11:05 p.m.	2.
February 29, 1980	10:32 a.m.	50.
March 28, 1980	11:05 a.m.	10.
April 28, 1980	11:35 a.m.	1.
May 29, 1980		1.5
June 27, 1980	11:50 a.m.	2.
July 25, 1980	12:10 p.m.	Dry
August 21, 1980	1:30 p.m.	Dry
September 19, 1980	10:30 p.m.	Dry
October 15, 1980	11:35 p.m.	Dry
November 14, 1980	11:25 a.m.	Dry
December 15, 1980	11:10 a.m.	20.

Ardmore Stream Flow Measurements 1979-1980

#5 Ditches at end of Braemar Avenue

Measurement Point: The flow from the two ditches at the outlet to the ocean at the end of Braemar Avenue were estimated, as the flow couldn't be captured.

Measurement Date		Combined Flow in Igpm
November 8, 1979	3:20 p.m.	Nil
November 30, 1979	9:40 a.m.	1.
December 5, 1979	2:30 p.m.	8.
December 10, 1979	9:25 a.m.	3.
December 31, 1979	12:00	60.
January 30, 1980	10:35 a.m.	5.
February 29, 1980	10:00 a.m.	50.
March 28, 1980	11:45 p.m.	10.
April 28, 1980	11:05 a.m.	2.
May 29, 1980	10:40 a.m.	2.
June 27, 1980	11:15 a.m.	2.5
July 25, 1980	11:10 a.m.	Dry
August 21, 1980	11:05 a.m.	Dry
September 19, 1980	11:20 a.m.	1.
October 15, 1980		Dry
November 14, 1980	10:45 p.m.	5.
December 15, 1980	10:30 a.m.	25.

APPENDIX 3

WATER QUALITY ANALYSES

PAGES 88-126

Final Connection

Table 6. Inorganic Chemical Analyses, Ardmore Area, North Saanich

Water Well Coordinates Rg.	Sec.	No.	Sample Date D	M	Y	pH	Specific Conduct. @ 25°C	Total Hardness as $CaCO_3$	Res: Filt. 105°C	Alkal-inity: PHNL	Alkal-inity: TOTAL	ANIONS Cl Diss.	Nitrogen: KJEL	Nitrogen: NO_2+NO_3	PO_4 Tot	SO_4 Diss.	F Diss.	CATIONS SiO_2 React.	Ca Diss.	Mg Diss.	K Diss.	Na Diss.	Fe Diss.	Mn Diss.
1W	6	4	2	9	80	8.3	320.	95.	186.	<0.5	141.	6.2	.06	<0.02	<.003	13.3	<0.1	15.	34.4	2.2	0.1	31.9		
1W	8	3	2	9	80	8.1	754.	351.	442.	<0.5	304.	56.4	.08	0.05	.003	17.6	0.15	18.1	87.5	32.2	0.5	27.6		
1W	9	3	16	9	80	7.9	627.	274.	368.	<0.5	308.	17.5	.26	<0.02	.006	11.8	0.14	19.5	66.	26.6	0.8	30.1		
1W	10	1	17	9	80	7.9	730.	317.	450.	<0.5	265.	59.2	.05	0.53	.004	33.3	0.27	17.4	74.	32.2	0.9	31.2		
1W	10	5	17	9	80	7.8	866.	367.	554.	<0.5	294.	99.	.05	0.3	.004	19.3	0.12	19.4	87.	36.3	0.9	34.7		
1W	10	6	17	9	80	7.8	590.	244.	338.	<0.5	248.	35.4	<.01	0.03	.005	9.2	0.10	18.4	66.	19.2	0.4	30.		
1W	10	7	17	9	80	7.5	527.	218.	334.	<0.5	154.	50.4	.01	6.10	.003	12.6	0.24	19.5	46.5	24.8	0.9	17.		
1W	10	8	16	9	80	7.8	590.	273.	360.	<0.5	236.	33.3	.12	0.47	.003	22.2	0.18	15.	77.	19.6	0.6	16.4		
1W	11	3	17	9	80	8.0	560.	221.	322.	<0.5	271.	16.2	<.01	0.03	.006	8.2	<.10	18.2	60.	17.4	0.5	33.		
2W	6	15	15	9	80	7.3	470.	197.	304.	<0.5	140.	48.6	.08	1.94	.005	16.4	0.14	26.2	46.8	19.4	0.5	15.9		
2W	6	31	3	9	80	8.3	432.	71.4	250.	<0.5	160.	23.9	.04	<0.02	.014	22.5	0.11	11.	22.	4.	0.8	67.		
2W	6	57	2	9	80	8.2	385.	157.	218.	<0.5	171.	14.	.13	<0.02	<.003	7.5	<0.1	18.2	44.2	11.4	0.2	19.2		
2W	6	58	3	9	80	7.8	590.	276.	332.	<0.5	281.	20.9	.13	<0.02	.004	7.5	.11	19.3	72.8	23.	0.7	18.9		
2W	6	64	15	9	80	8.2	802.	134.	434.	<0.5	125.	166.	.05	0.02	.034	12.1	0.1	13.1	48.4	3.3	0.9	110.		
2W	6	66	15	9	80	8.2	473.	218.	274.	<0.5	220.	11.5	.06	0.02	.005	16.2	<0.1	18.8	69.	11.2	0.4	16.4		
2W	7	1	3	9	79	8.1	465.	111.	286.	<0.5	209.	21.4	<.01	-	.009	10.4	<.10	16.2	36.3	4.98	0.6	59.	.01	.01
2W	7	8	31	5	77	8.5	351.	91.1	212.	0.9	173.	7.7	.01	<0.02	.003	7.2	-	15.1	29.9	4.0	0.2	43.8	<0.1	<0.02
2W	7	8	3	9	79	8.1	385.	105.	236.	<0.5	183.	9.8	1.	-	.011	9.5	.11	13.2	33.3	5.2	-	45.8	.02	.01
2W	7	21	16	9	80	8.0	350.	150.	200.	<0.5	163.	8.4	.06	0.51	<.003	5.3	<0.1	15.9	46.2	8.5	0.7	16.2		
2W	7	25	2	9	80	8.0	405.	186.	232.	<0.5	193.	8.6	<.01	<0.02	.004	5.9	<0.1	17.9	55.6	11.4	0.5	11.6		
2W	8	1	16	9	80	7.7	537.	267.	316.	<0.5	251.	9.8	.18	<0.02	<.003	21.5	<0.1	20.7	85.	13.2	0.1	9.7		
2W	8	14	2	9	80	7.9	587.	264.	410.	<0.5	198.	60.8	.03	0.05	.005	7.8	0.1	18.1	71.	21.1	0.7	13.7		
2W	8	18	16	9	80	8.0	447.	216.	258.	<0.5	216.	8.2	.14	<0.02	.011	8.5	<0.1	16.7	66.	12.4	0.2	7.9		
2W	8	22	3	9	80	7.9	500.	237.	288.	<0.5	238.	11.2	.04	<0.02	.004	12.8	0.11	19.6	66.2	17.4	0.2	13.6		
2W	8	33	16	9	80	8.0	462.	220.	264.	<0.5	222.	11.	.10	<0.02	.005	8.9	0.15	16.7	57.	18.8	0.5	13.2		
2W	9	37	2	9	80	8.2	462.	210.	264.	<0.5	216.	12.8	.03	<0.02	.015	9.2	<0.1	17.6	61.8	13.6	0.2	16.9		
2W	9	44	3	9	80	8.0	447.	194.	254.	<0.5	214.	7.4	.10	<0.02	.008	9.4	<0.1	17.7	58.8	11.5	0.1	20.1		
2W	9	47	3	9	80	7.9	520.	259.	302.	<0.5	247.	8.6	.15	<0.02	.006	19.6	<0.1	18.7	80.	14.5	0.1	11.5		
2W	9	50	3	10	79	8.0	555.	228.	336.	<0.5	262.	22.8	.08	<0.02	.017	11.4	-	-	61.7	17.9	0.9	31.3	.01	.31
2W	10	2	8	6	81	7.9	620.	253.	372.	<0.5	289.	30.	.02	<0.02	.006	19.8	<0.1	25.5	65.	22.	0.6	37.6	<.01	.02
2W	10	5	8	6	81	7.9	433.	201.	246.	<0.5	201.	14.	.02	<0.02	.011	10.3	<0.1	20.6	59.4	12.7	0.2	13.3	.02	.02
2W	10	7	9	6	81	7.8	1370.	278.	756.	<0.5	297.	221.	.08	<0.02	.006	49.1	<0.1	18.3	84.	16.5	0.8	180.	.03	.05
2W	10	12	9	6	81	7.6	559.	249.	324.	<0.5	232.	26.6	.12	0.26	.003	17.4	0.12	18.6	73.5	15.8	0.6	18.2	<0.01	.01
2W	10	23	17	9	80	7.8	668.	291.	384.	<0.5	298.	32.3	.02	<0.02	.006	15.4	<0.1	18.9	75.	25.2	0.3	33.6		
2W	10	23	9	6	81	7.8	645.	274.	366.	<0.5	302.	24.5	.05	<0.02	.007	14.1	0.1	19.6	73.	22.3	0.4	33.	.07	.08
2W	10	29	17	9	80	7.8	704.	280.	414.	<0.5	347.	22.3	<.01	.02	.004	11.1	<0.1	19.3	71.	25.	0.4	49.		
2W	10	30	8	6	81	7.9	540.	221.	322.	<0.5	236.	29.2	.03	.18	.011	16.5	<0.1	25.	61.	16.6	0.4	29.4	.01	.05
3W	5	7	15	9	80	7.7	2750.	1030.	2144.	<0.5	192.	750.	.10	.02	.003	52.8	.18	21.1	261.	91.	1.5	138.		
3W	5	7	8	6	81	7.0	2000.	564.	1350.	<0.5	171.	515.	.07	0.11	.005	24.6	.25	26.9	112.	69.2	1.3	168.	.02	<0.01
3W	5	10	8	6	81	7.3	550.	205.	314.	<0.5	192.	43.4	.05	<0.02	<.003	19.3	<0.1	17.7	61.8	12.4	0.9	31.2	.34	.29
3W	5	10	31	7	81	-	1020.	-	-	-	-	189.	-	-	-	-	-	-	-	-	-	-	-	-
3W	6	9	15	9	80	7.7	599.	264.	414.	<0.5	189.	63.	.09	.96	.007	15.7	<0.1	20.1	69.	22.4	0.9	15.2		
3W	6	10	15	9	80	7.3	550.	236.	376.	<0.5	171.	54.4	.19	.78	.004	21.	<0.1	24.4	65.	18.	0.6	16.5		
3W	6	12	15	9	80	7.8	657.	299.	402.	<0.5	260.	52.2	.05	.05	.003	10.1	.19	21.1	74.	27.8	0.8	21.1		
3W	6	24	15	9	80	8.0	516.	231.	316.	<0.5	204.	33.6	.05	<0.02	.003	12.8	<0.1	18.1	64.	17.4	0.5	16.8		
3W	7	16	16	9	80	7.8	697.	299.	434.	<0.5	246.	68.8	.08	<0.02	.004	11.6	<0.1	19.1	84.	21.8	0.7	26.2		
3W	7	21	16	9	80	7.9	487.	223.	280.	<0.5	226.	15.6	.08	<0.02	<.003	12.6	0.14	17.2	62.	16.5	0.5	14.4		
3W	8	19	16	9	80	8.1	488.	191.	290.	<0.5	239.	10.9	.03	<0.02	.007	7.3	<0.1	17.7	57.	11.8	0.4	32.8		
3W	5	16	8	6	81	7.5	643.	304.	418.	<0.5	249.	47.6	.03	.08	.005	28.8	<0.1	19.4	97.	15.1	0.6	15.	.01	.12

All analyses were carried out at the Environmental Laboratory of the B.C. Ministry of Environment.
All parameters in Mg/L except pH and Specific Conductance.

APPENDIX 3
PENDRAY'S IRRIGATION WELL

A

OCTOBER 23, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE D17252W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401421 RG 1W SEC 8 #5 N.SAANICH 586' DEEP. WELL
SEE FIG.15 FOR LOCATION.

SAMPLING DATE(S): OCT 1/80 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: OCT 02/80

0040101	PH	8.4 REL UNIT	0071701	RES:FILT.105C	414. MG/L
0110101	SPECIFIC CONDUC	792. UMHO/CM	0300101	COMP.DIL.COND.	846. UMHO/CM
1010101	ALKALINITY:PHNL	1.8 MG/L	1020101	ALKALINITY:TOT	97.4 MG/L
1041702	CHLORIDE:DISSOL	171. MG/L	1061701	FLUORIDE:DISSOL	0.15 MG/L
1070002	HARDNES.T:CACO3	72.8 MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.03 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.010 MG/L
1201702	SILICA:REACTIVE	6.7 MG/L	1211701	SULPHATE:DISSOL	21.7 MG/L
2541802	CALCIUM DISSOLVED	26.2 MG/L	2591801	MAGNESIUM DISSOLVED	1.8 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	129. MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

REMARKS:

Inventory & Engineering Branch

DISTRIBUTION	DATE ACCT	INITIALS
	OCT 29	
External		

FOR ENVIRONMENTAL LABORATORY

WATER QUALITY REPORT FOR SAMPLE 916556W

TO: W.I.B.- HYDROLOGY
SUITE 1-345 QUEBEC ST
VICTORIA BC V8V 1X5

FOR SITE: 1401483 DEBURGH'S WELL LOT 4

SAMPLING DATE(S): OCT 3/79 1340 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: W.I.B. - HYDROLOGY
DATE RECEIVED BY LABORATORY: OCT 04/79

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	336. MG/L
0110101	SPECIFIC CONDUC	555. UMHO/CM	0300101	COMP.DIL.COND.	614. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	242. MG/L
1041702	CHLORIDE:DISSOL	22.8* MG/L	1070002	HARDNES.T:CACO3	228.* MG/L
1091703	NITROGN:NO2 NO3	L 0.02 MG/L	1130101	NITROGN:KJELDAH	0.08 MG/L
1191703	PHOSPHORUS :TOT DISSOLVED	0.017 MG/L	1211701	SULPHATE:DISSOL	11.4* MG/L
2541413	CALCIUM DISSOLVED	✓ 61.7* MG/L	2571413	IRON DISSOLVED	0.01 MG/L
2591413	MAGNESIUM DISSOLVED	✓ 17.9* MG/L	2590309	MAGNESIUM TOTAL	18.1* MG/L
2601413	MANGANESE DISSOLVED	0.31 MG/L	2641703	POTASSIUM DISSOLVED	0.9* MG/L
2651703	SODIUM DISSOLVED	✓ 31.3* MG/L			

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 54.00

SAMPLE NO. 916556W CONTINUED ON NEXT PAGE.

R2W sec 7 #1

OCTOBER 26, 1979 ENVYRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 916557W

TO: W.I.B. - HYDROLOGY
SUITE 1-345 QUEBEC ST
VICTORIA BC V8V 1X5

FOR SITE: 1401484 ARDMORE GOLF COURSE Clubhouse Well

SAMPLING DATE(S): OCT 3/79 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: W.I.B. - HYDROLOGY
DATE RECEIVED BY LABORATORY: OCT 04/79

0040101	PH	8.1 REL UNIT	0071701	RES:FILT.105C	286. MG/L
0110101	SPECIFIC CONDUC	465. UMHO/CM	0300101	COMP.DIL.COND.	501.* UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	209. MG/L
1041702	CHLORIDE:DISSOL	21.4 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
0002	HARDNES.T:CACO3	111. MG/L	1130101	NITROGN:KJELDAH	L 0.0: MG/L
1191703	PHOSPHORUS :TOT DISSOLVED	0.009 MG/L	1201702	SILICA:REACTIVE	16.2 MG/L
1211701	SULPHATE:DISSOL	10.4 MG/L	2541413	CALCIUM DISSOLVED	36.3 MG/L
2571413	IRON DISSOLVED	0.01 MG/L	2591413	MAGNESIUM DISSOLVED	4.98 MG/L
2601413	MANGANESE DISSOLVED	0.010 MG/L	2641703	POTASSIUM DISSOLVED	0.6 MG/L
2651703	SODIUM DISSOLVED	59. MG/L			

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 57.20

SAMPLE NO. 916557W CONTINUED ON NEXT PAGE.

ENVIRONMENTAL LABORATORY
MINISTRY OF THE ENVIRONMENT

R2W SEC 7 #8

WATER QUALITY REPORT FOR SAMPLE 916558W

TO: W.I.B.- HYDROLOGY
SUITE 1-345 QUEBEC ST
VICTORIA BC V8V 1X5

FOR SITE: 1401482 ARDMORE GOLF COURSE 870'

SAMPLING DATE(S): OCT 3/79 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: W.I.B. - HYDROLOGY
DATE RECEIVED BY LABORATORY: OCT 04/79

0040101	PH	8.1 REL UNIT	0071701	RES:FILT.105C	236. MG/L
0110101	SPECIFIC CONDUC	385. UMHO/CM	1010101	ALKALINITY:PHNL	L 0.5 MG/L
1020101	ALKALINITY:TOT	183. MG/L	1061701	FLUORIDE:DISSOL	0.11 MG/L
1070002	HARDNES.T:CACO3	105.* MG/L	1130102	NITROGN:KJELDAH	1. MG/L
1191703	PHOSPHORUS :TOT DISSOLVED	0.011 MG/L	1201702	SILICA:REACTIVE	13.2 MG/L
1211701	SULPHATE:DISSOL	9.5* MG/L	2541702	CALCIUM DISSOLVED	33.3* MG/L
2571413	IRON DISSOLVED	0.02 MG/L	2591701	MAGNESIUM DISSOLVED	5.2* MG/L
2601413	MANGANESE DISSOLVED	0.01 MG/L	2651703	SODIUM DISSOLVED	45.8* MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 52.20

REMARKS:

Cl value 9.8 mg/l from Mary-Ann Paul

FOR ENVIRONMENTAL LABORATORY

SAMPLE NO. 916558W CONTINUED ON NEXT PAGE.

R2W SEC 10 #29

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016317W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

McDonalds 425' WELL
FOR SITE: 1401801 ~~MASTERS OUTSIDE TEST~~

SAMPLING DATE(S): SEP 17/80 1430 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT,105C	414. MG/L
0110101	SPECIFIC CONDUC	704. UMHO/CM	0300101	COMP.DIL.COND.	779. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	347. MG/L
1041702	CHLORIDE:DISSOL	22.3 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	280. MG/L	1091703	NITROGN:NO2 NO3	0.02 MG/L
1130101	NITROGN:KJELDAH	L 0.01 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	19.3 MG/L	1211701	SULPHATE:DISSOL	11.1 MG/L
2541802	CALCIUM DISSOLVED	71.0 MG/L	2591801	MAGNESIUM DISSOLVED	25.0 MG/L
2641703	POTASSIUM DISSOLVED	0.4 MG/L	2651703	SODIUM DISSOLVED	49.0 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016317W CONTINUED ON NEXT PAGE.

R2W SEC 10 #23

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016316W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401805 CALDWELL 250 FT WELL

SAMPLING DATE(S): SEP 17/80 1400 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	384. MG/L
0110101	SPECIFIC CONDUC	668. UMHO/CM	0300101	COMP.DIL.COND.	731. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	298. MG/L
1041702	CHLORIDE:DISSOL	32.3 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	291. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.02 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.006 MG/L
1201702	SILICA:REACTIVE	18.9 MG/L	1211701	SULPHATE:DISSOL	15.4 MG/L
2541802	CALCIUM DISSOLVED	75.0 MG/L	2591801	MAGNESIUM DISSOLVED	25.2 MG/L
2641703	POTASSIUM DISSOLVED	0.3 MG/L	2651703	SODIUM DISSOLVED	33.6 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016316W CONTINUED ON NEXT PAGE.

R2W SEC 9 N47 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 015109W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401780 BONNEAU 440 FT DEEP WELL

SAMPLING DATE(S): SEP 3/80 1114 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 04/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	302. MG/L
0110101	SPECIFIC CONDUC	520. UMHO/CM	0300101	COMP.DIL.COND.	560. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	247. MG/L
1041702	CHLORIDE:DISSOL	8.6 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	259. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.15 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.006 MG/L
1201702	SILICA:REACTIVE	18.7 MG/L	1211701	SULPHATE:DISSOL	19.6 MG/L
2541802	CALCIUM DISSOLVED	80. MG/L	2591801	MAGNESIUM DISSOLVED	14.5 MG/L
2641703	POTASSIUM DISSOLVED	0.1 MG/L	2651703	SODIUM DISSOLVED	11.5 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Specific cond. 374 µmhos at 13.2°C

SAMPLE NO. 015109W CONTINUED ON NEXT PAGE.

R2W SEC 9 #44 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 015108W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401781 HODGES 285 FT DEEP WELL

SAMPLING DATE(S): SEP 3/80 1330 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 04/80

0040101	PH	8.0 REL UNIT	0071701	RES;FILT.105C	254. MG/L
0110101	SPECIFIC CONDUC	447. UMHO/CM	0300101	COMP.DIL.COND.	465. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	214. MG/L
1041702	CHLORIDE:DISSOL	7.4 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	194. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.10 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.008 MG/L
1201702	SILICA:REACTIVE	17.7 MG/L	1211701	SULPHATE:DISSOL	9.4 MG/L
2541802	CALCIUM DISSOLVED	58.8 MG/L	2591801	MAGNESIUM DISSOLVED	11.5 MG/L
2641703	POTASSIUM DISSOLVED	0.1 MG/L	2651703	SODIUM DISSOLVED	20.1 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Cond. 302 @ 12.75°C

SAMPLE NO. 015108W CONTINUED ON NEXT PAGE.

R2W SEC 9 #37

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014984W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401772 CHARTERS WELL 95 FT DEEP

SAMPLING DATE(S): SEP 2/80 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	8.2 REL UNIT	0071701	RESIFILT,105C	264. MG/L
0110101	SPECIFIC CONDUC	462. UMHO/CM	0300101	COMP.DIL.COND.	490. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	216. MG/L
1041702	CHLORIDE:DISSOL	12.8 MG/L	1061701	FLUORIDE:DISSOL	L 0.1 MG/L
1070002	HARDNES,T:CACO3	210. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.03 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.015 MG/L
1201702	SILICA:REACTIVE	17.6 MG/L	1211701	SULPHATE:DISSOL	9.2 MG/L
2541802	CALCIUM DISSOLVED	61.8 MG/L	2591801	MAGNESIUM DISSOLVED	13.6 MG/L
2641703	POTASSIUM DISSOLVED	0.2 MG/L	2651703	SODIUM DISSOLVED	16.9 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Cond 277 at 12.5°C

SAMPLE NO. 014984W CONTINUED ON NEXT PAGE.

R2W SEC 8 #33 <

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016138W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401794 UTTKE 298 FT DEEP WELL

SAMPLING DATE(S): SEP 16/80 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	264. MG/L
0110101	SPECIFIC CONDUC	462. UMHO/CM	0300101	COMP.DIL.COND.	490. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	222. MG/L
1041702	CHLORIDE:DISSOL	11.0 MG/L	1061701	FLUORIDE:DISSOL	0.15 MG/L
1070002	HARDNES.T:CACO3	220. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.10 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.005 MG/L
1201702	SILICA:REACTIVE	16.7 MG/L	1211701	SULPHATE:DISSOL	8.9 MG/L
2541802	CALCIUM DISSOLVED	57.0 MG/L	2591801	MAGNESIUM DISSOLVED	18.8 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	13.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

SAMPLE NO. 016138W CONTINUED ON NEXT PAGE.

R2W SEC 8 #22 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 015112W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401779 WILLIAMS 175 FT DEEP WELL

SAMPLING DATE(S): SEP 3/80 1030 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 04/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	288. MG/L
0110101	SPECIFIC CONDUC	500. UMHO/CM	0300101	COMP.DIL.COND.	526. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	238. MG/L
1041702	CHLORIDE:DISSOL	11.2 MG/L	1061701	FLUORIDE:DISSOL	0.11 MG/L
1070002	HARDNES.T:CACO3	237. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.04 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	19.6 MG/L	1211701	SULPHATE:DISSOL	12.8 MG/L
2541802	CALCIUM DISSOLVED	66.2 MG/L	2591801	MAGNESIUM DISSOLVED	17.4 MG/L
2641703	POTASSIUM DISSOLVED	0.2 MG/L	2651703	SODIUM DISSOLVED	13.6 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Cond 332 at 13.5°C

SAMPLE NO. 015112W CONTINUED ON NEXT PAGE.

R2W SEC 8 #18 <

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016132W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401796 WILLIAMSON 200' DEEP WELL

SAMPLING DATE(S): SEP 16/80 1330 HRS

SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	258. MG/L
0110101	SPECIFIC CONDUC	447. UMHO/CM	0300101	COMP.DIL.COND.	465. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	216. MG/L
1041702	CHLORIDE:DISSOL	8.2 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	216. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.14 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.011 MG/L
1201702	SILICA:REACTIVE	16.7 MG/L	1211701	SULPHATE:DISSOL	8.5 MG/L
2541802	CALCIUM DISSOLVED	66.0 MG/L	2591801	MAGNESIUM DISSOLVED	12.4 MG/L
2641703	POTASSIUM DISSOLVED	0.2 MG/L	2651703	SODIUM DISSOLVED	7.9 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016132W CONTINUED ON NEXT PAGE.

R2W SEC 8 #14

SEPTEMBER 18, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014985W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401773 KERELUK WELL 200 FT DEEP

SAMPLING DATE(S): SEP 2/80 1110 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	410. MG/L
0110101	SPECIFIC CONDUC	587. UMHO/CM	0300101	COMP.DIL.COND.	623. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	198. MG/L
1041702	CHLORIDE:DISSOL	60.8 MG/L	1061701	FLUORIDE:DISSOL	0.10 MG/L
1070002	HARDNES,T:CACO3	264. MG/L	1091703	NITROGN:NO2 NO3	0.05 MG/L
1130101	NITROGN:KJELDAH	0.03 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.005 MG/L
1201702	SILICA:REACTIVE	18.1 MG/L	1211701	SULPHATE:DISSOL	7.8 MG/L
2541802	CALCIUM DISSOLVED	71. MG/L	2591801	MAGNESIUM DISSOLVED	21.1 MG/L
2641703	POTASSIUM DISSOLVED	0.7 MG/L	2651703	SODIUM DISSOLVED	13.7 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

9 well

Cond 370 @ 11.5°C

SAMPLE NO. 014985W CONTINUED ON NEXT PAGE.

R2W SEC 8 #1 C

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016139W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401793 NEWTON 325 FT DEEP WELL

SAMPLING DATE(S):-SEP 16/80 1230 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.7 REL UNIT	0071701	RES:FILT,105C	316. MG/L
0110101	SPECIFIC CONDUC	537. UMHO/CM	0300101	COMP.DIL.COND.	579. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	251. MG/L
1041702	CHLORIDE:DISSOL	9.8 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES,T:CACO3	267. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.18 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	L 0.003 MG/L
1201702	SILICA:REACTIVE	20.7 MG/L	1211701	SULPHATE:DISSOL	21.5 MG/L
2541802	CALCIUM DISSOLVED	85.0 MG/L	2591801	MAGNESIUM DISSOLVED	13.2 MG/L
2641703	POTASSIUM DISSOLVED	0.1 MG/L	2651703	SODIUM DISSOLVED	9.7 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

SAMPLE NO. 016139W CONTINUED ON NEXT PAGE.

SEC 2W SEC 7 #25 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014983W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401550 ARDMORE SUBD, WELL LT #19

SAMPLING DATE(S): SEP 2/80 0000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	232. MG/L
0110101	SPECIFIC CONDUC	405. UMHO/CM	0300101	COMP.DIL.COND.	414. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	193. MG/L
1041702	CHLORIDE:DISSOL	8.6 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	186. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	L 0.01 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	17.9 MG/L	1211701	SULPHATE:DISSOL	5.9 MG/L
2541802	CALCIUM DISSOLVED	55.6 MG/L	2591801	MAGNESIUM DISSOLVED	11.4 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	11.6 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Jell
Cal 272 14.25 E

SAMPLE NO. 014983W CONTINUED ON NEXT PAGE.

R2W SEC 7 #21

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016140W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401461 HENDERSON WELL #600

SAMPLING DATE(S): SEP 16/80 1130 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	200. MG/L
0110101	SPECIFIC CONDUC	350. UMHO/CM	0300101	COMP.DIL.COND.	361. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	163. MG/L
1041702	CHLORIDE:DISSOL	8.4 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	150. MG/L	1091703	NITROGN:NO2 NO3	0.51 MG/L
1130101	NITROGN:KJELDAH	0.06 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	L 0.003 MG/L
1201702	SILICA:REACTIVE	15.9 MG/L	1211701	SULPHATE:DISSOL	5.3 MG/L
2541802	CALCIUM DISSOLVED	46.2 MG/L	2591801	MAGNESIUM DISSOLVED	8.5 MG/L
2641703	POTASSIUM DISSOLVED	0.7 MG/L	2651703	SODIUM DISSOLVED	16.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016140W CONTINUED ON NEXT PAGE.

R2W SEC 6 "58 C

SEPTEMBER 18, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 015110W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401778 NEWMAN WELL 150 FT DEEP

SAMPLING DATE(S): SEP 3/80 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 04/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	332. MG/L
0110101	SPECIFIC CONDUC	590. UMHO/CM	0300101	COMP.DIL.COND.	639. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	281. MG/L
1041702	CHLORIDE:DISSOL	20.9 MG/L	1061701	FLUORIDE:DISSOL	0.11 MG/L
1070002	HARDNES.T:CACO3	276. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.13 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	19.3 MG/L	1211701	SULPHATE:DISSOL	7.5 MG/L
2541802	CALCIUM DISSOLVED	72.8 MG/L	2591801	MAGNESIUM DISSOLVED	23. MG/L
2641703	POTASSIUM DISSOLVED	0.7 MG/L	2651703	SODIUM DISSOLVED	18.9 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field

Cond 354 13.5°C

SAMPLE NO. 015110W CONTINUED ON NEXT PAGE.

R2W SEC 6 #66 C

SEPTEMBER 25, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016044W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401783 SRAITH 125 FT DEEP WELL

SAMPLING DATE(S):-SEP 15/80 1030 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	274. MG/L
0110101	SPECIFIC CONDUC	473. UMHO/CM	0300101	COMP.DIL.COND.	503. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	220. MG/L
1041702	CHLORIDE:DISSOL	11.5 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	218. MG/L	1091703	NITROGN:NO2 NO3	0.02 MG/L
1130101	NITROGN:KJELDAH	0.06 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.005 MG/L
1201702	SILICA:REACTIVE	18.8 MG/L	1211701	SULPHATE:DISSOL	16.2 MG/L
2541802	CALCIUM DISSOLVED	69.0 MG/L	2591801	MAGNESIUM DISSOLVED	11.2 MG/L
2641703	POTASSIUM DISSOLVED	0.4 MG/L	2651703	SODIUM DISSOLVED	16.4 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

Field
Cond 365 @ 14.5°C

SAMPLE NO. 016044W CONTINUED ON NEXT PAGE.

R2W SEC 6 #64

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016045W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401782 PALESEN 126 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	434. MG/L
0110101	SPECIFIC CONDUC	802. UMHO/CM	0300101	COMP.DIL.COND.	855. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	125. MG/L
1041702	CHLORIDE:DISSOL	166. MG/L	1061701	FLUORIDE:DISSOL	0.10 MG/L
1070002	HARDNES.T:CACO3	134. MG/L	1091703	NITROGN:NO2 NO3	0.02 MG/L
1130101	NITROGN:KJELDAH	0.05 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.034 MG/L
1201702	SILICA:REACTIVE	13.1 MG/L	1211701	SULPHATE:DISSOL	12.1 MG/L
2541802	CALCIUM DISSOLVED	48.4 MG/L	2591801	MAGNESIUM DISSOLVED	3.3 MG/L
2641703	POTASSIUM DISSOLVED	0.9 MG/L	2651703	SODIUM DISSOLVED	110. MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Cond 650 12.25°C

SAMPLE NO. 016045W CONTINUED ON NEXT PAGE.

R2W SEC 6 #57 C

SEPTEMBER 18, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014988W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401776 WINTER'S WELL ARTESIAN 245' dep.

SAMPLING DATE(S): SEP 2/80 1500 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	8.2 REL UNIT	0071701	RES:FILT.105C	218. MG/L
0110101	SPECIFIC CONDUC	385. UMHO/CM	0300101	COMP.DIL.COND.	395. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	171. MG/L
1041702	CHLORIDE:DISSOL	14.0 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	157. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.13 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	L 0.003 MG/L
1201702	SILICA:REACTIVE	18.2 MG/L	1211701	SULPHATE:DISSOL	7.5 MG/L
2541802	CALCIUM DISSOLVED	44.2 MG/L	2591801	MAGNESIUM DISSOLVED	11.4 MG/L
2641703	POTASSIUM DISSOLVED	0.2 MG/L	2651703	SODIUM DISSOLVED	19.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

Field
Cond 270 15.5°C

SAMPLE NO. 014988W CONTINUED ON NEXT PAGE.

R2W SEC 6 #31 C

SEPTEMBER 18, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 015111W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401777 STEPHEN WELL 109 FT DEEP

SAMPLING DATE(S): SEP 3/80 0930 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 04/80

0040101	PH	8.3 REL UNIT	0071701	RES:FILT.105C	250. MG/L
0110101	SPECIFIC CONDUC	432. UMHO/CM	0300101	COMP.DIL.COND.	446. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	160. MG/L
1041702	CHLORIDE:DISSOL	23.9 MG/L	1061701	FLUORIDE:DISSOL	0.11 MG/L
1070002	HARDNES.T:CACO3	71.4 MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.04 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.014 MG/L
1201702	SILICA:REACTIVE	11.0 MG/L	1211701	SULPHATE:DISSOL	22.5 MG/L
2541802	CALCIUM DISSOLVED	22.0 MG/L	2591801	MAGNESIUM DISSOLVED	4.0 MG/L
2641703	POTASSIUM DISSOLVED	0.8 MG/L	2651703	SODIUM DISSOLVED	67.0 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

Field

Cond. 270 14°C

SAMPLE NO. 015111W CONTINUED ON NEXT PAGE.

R2W SEC 6 #15 C

SEPTEMBER 29, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016046W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401784 PENNY 87 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.3 REL UNIT	0071701	RES:FILT.105C	304. MG/L
0110101	SPECIFIC CONDUC	470. UMHO/CM	0300101	COMP.DIL.COND.	488. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	140. MG/L
1041702	CHLORIDE:DISSOL	48.6 MG/L	1061701	FLUORIDE:DISSOL	0.14 MG/L
1070002	HARDNES.T:CACO3	197. MG/L	1091703	NITROGN:NO2 NO3	1.94 MG/L
1130101	NITROGN:KJELDAH	0.08 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.005 MG/L
1201702	SILICA:REACTIVE	26.2 MG/L	1211701	SULPHATE:DISSOL	16.4 MG/L
2541802	CALCIUM DISSOLVED	46.8 MG/L	2591801	MAGNESIUM DISSOLVED	19.4 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	15.9 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Well

Cond 430 12.5°C

SAMPLE NO. 016046W CONTINUED ON NEXT PAGE.

RIW SEC 11 #3

OCTOBER 7, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016322W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401804 TYE 176 FT DEEP WELL

SAMPLING DATE(S): SEP 17/80 1330 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	322. MG/L
0110101	SPECIFIC CONDUC	560. UMHO/CM	0300101	COMP.DIL.COND.	602. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	271. MG/L
1041702	CHLORIDE:DISSOL	16.2 MG/L	1061701	FLUORIDE:DISSOL	L 0.1 MG/L
1070002	HARDNES.T:CACO3	221. MG/L	1091703	NITROGN:NO2 NO3	0.03 MG/L
1130101	NITROGN:KJELDAH	L 0.01 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.006 MG/L
1201702	SILICA:REACTIVE	18.2 MG/L	1211701	SULPHATE:DISSOL	8.2 MG/L
2541802	CALCIUM DISSOLVED	60.0 MG/L	2591801	MAGNESIUM DISSOLVED	17.4 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	33.0 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016322W CONTINUED ON NEXT PAGE.

RIW SEC 10 PG C

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016133W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401798 STOFFELSMA 323' DEEP WELL

SAMPLING DATE(S): SEP 16/80 1430 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	360. MG/L
0110101	SPECIFIC CONDUC	590. UMHO/CM	0300101	COMP.DIL.COND.	623. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	236. MG/L
1041702	CHLORIDE:DISSOL	33.3 MG/L	1061701	FLUORIDE:DISSOL	0.18 MG/L
1070002	HARDNES.T:CACO3	273. MG/L	1091703	NITROGN:NO2 NO3	0.47 MG/L
1130101	NITROGN:KJELDAH	0.12 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L
1201702	SILICA:REACTIVE	15.0 MG/L	1211701	SULPHATE:DISSOL	22.2 MG/L
2541802	CALCIUM DISSOLVED	77.0 MG/L	2591801	MAGNESIUM DISSOLVED	19.6 MG/L
2641703	POTASSIUM DISSOLVED	0.6 MG/L	2651703	SODIUM DISSOLVED	16.4 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016133W CONTINUED ON NEXT PAGE.

RIW SEC 10 #7

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016321W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401803 JACK 175 FT DEEP WELL

SAMPLING DATE(S): SEP 17/80 1300 HRS

SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.5 REL UNIT	0071701	RES:FILT.105C	334. MG/L
0110101	SPECIFIC CONDUC	527. UMHO/CM	0300101	COMP.DIL.COND.	558. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	154. MG/L
1041702	CHLORIDE:DISSOL	50.4 MG/L	1061701	FLUORIDE:DISSOL	0.24 MG/L
1070002	HARDNES.T:CACO3	218. MG/L	1091703	NITROGN:NO2 NO3	6.10 MG/L
1130101	NITROGN:KJELDAH	0.01 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L
1201702	SILICA:REACTIVE	19.5 MG/L	1211701	SULPHATE:DISSOL	12.6 MG/L
2541802	CALCIUM DISSOLVED	46.5 MG/L	2591801	MAGNESIUM DISSOLVED	24.8 MG/L
2641703	POTASSIUM DISSOLVED	0.9 MG/L	2651703	SODIUM DISSOLVED	17.0 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016321W CONTINUED ON NEXT PAGE.

RIW SEC 10 #6

MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016318W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401799 CRUMP 290 FT DEEP WELL

SAMPLING DATE(S): SEP 17/80 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	338. MG/L
0110101	SPECIFIC CONDUC	590. UMHO/CM	0300101	COMP.DIL.COND.	639. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	248. MG/L
1041702	CHLORIDE:DISSOL	35.4 MG/L	1061701	FLUORIDE:DISSOL	0.10 MG/L
1070002	HARDNES.T:CACO3	244. MG/L	1091703	NITROGN:NO2 NO3	0.03 MG/L
1130101	NITROGN:KJELDAH	L 0.01 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.005 MG/L
1201702	SILICA:REACTIVE	18.4 MG/L	1211701	SULPHATE:DISSOL	9.2 MG/L
2541802	CALCIUM DISSOLVED	66.0 MG/L	2591801	MAGNESIUM DISSOLVED	19.2 MG/L
2641703	POTASSIUM DISSOLVED	0.4 MG/L	2651703	SODIUM DISSOLVED	30.0 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

SAMPLE NO. 016318W CONTINUED ON NEXT PAGE.

RIW SEC 10 "5

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016320W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401802 BROOM 220 FT DEEP WELL

SAMPLING DATE(S):-SEP 17/80 1130 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	554. MG/L
0110101	SPECIFIC CONDUC	866. UMHO/CM	0300101	COMP.DIL.COND.	959. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	294. MG/L
1041702	CHLORIDE:DISSOL	99. MG/L	1061701	FLUORIDE:DISSOL	0.12 MG/L
1070002	HARDNES.T:CACO3	367. MG/L	1091703	NITROGN:NO2 NO3	0.3 MG/L
1130101	NITROGN:KJELDAH	0.05 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	19.4 MG/L	1211701	SULPHATE:DISSOL	19.3 MG/L
2541802	CALCIUM DISSOLVED	87.0 MG/L	2591801	MAGNESIUM DISSOLVED	36.3 MG/L
2641703	POTASSIUM DISSOLVED	0.9 MG/L	2651703	SODIUM DISSOLVED	34.7 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016320W CONTINUED ON NEXT PAGE.

RIW SEC 10 #1

OCTOBER 1, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016319W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401800 LEESON 445 FT DEEP WELL

SAMPLING DATE(S): SEP 17/80 1030 HRS

SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 19/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	450. MG/L
0110101	SPECIFIC CONDUC	730. UMHO/CM	0300101	COMP.DIL.COND.	816. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	265. MG/L
1041702	CHLORIDE:DISSOL	59.2 MG/L	1061701	FLUORIDE:DISSOL	0.27 MG/L
1070002	HARDNES.T:CACO3	317. MG/L	1091703	NITROGN:NO2 NO3	0.53 MG/L
1130101	NITROGN:KJELDAH	0.05 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	17.4 MG/L	1211701	SULPHATE:DISSOL	33.3 MG/L
2541802	CALCIUM DISSOLVED	74.0 MG/L	2591801	MAGNESIUM DISSOLVED	32.2 MG/L
2641703	POTASSIUM DISSOLVED	0.9 MG/L	2651703	SODIUM DISSOLVED	31.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

SAMPLE NO. 016319W CONTINUED ON NEXT PAGE.

RIW SEC 9 #3 C

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016134W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401797 HAWKES 205 FT DEEP WELL

SAMPLING DATE(S): SEP 16/80 1400 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	368. MG/L
0110101	SPECIFIC CONDUC	627. UMHO/CM	0300101	COMP.DIL.COND.	677. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	308. MG/L
1041702	CHLORIDE:DISSOL	17.5 MG/L	1061701	FLUORIDE:DISSOL	0.14 MG/L
1070002	HARDNES.T:CACO3	274. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.26 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.006 MG/L
1201702	SILICA:REACTIVE	19.5 MG/L	1211701	SULPHATE:DISSOL	11.8 MG/L
2541802	CALCIUM DISSOLVED	66.0 MG/L	2591801	MAGNESIUM DISSOLVED	26.6 MG/L
2641703	POTASSIUM DISSOLVED	0.8 MG/L	2651703	SODIUM DISSOLVED	30.1 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016134W CONTINUED ON NEXT PAGE.

RIW SEC 8 #3 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014987W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401775 BOLTON WELL 185 FT DEEP

SAMPLING DATE(S): SEP 2/80 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	8.1 REL UNIT	0071701	RES:FILT.105C	442. MG/L
0110101	SPECIFIC CONDUC	754. UMHO/CM	0300101	COMP.DIL.COND.	826. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	304. MG/L
1041702	CHLORIDE:DISSOL	56.4 MG/L	1061701	FLUORIDE:DISSOL	0.15 MG/L
1070002	HARDNES.T:CACO3	351. MG/L	1091703	NITROGN:NO2 NO3	0.05 MG/L
1130101	NITROGN:KJELDAH	0.08 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L
1201702	SILICA:REACTIVE	18.1 MG/L	1211701	SULPHATE:DISSOL	17.6 MG/L
2541802	CALCIUM DISSOLVED	87.5 MG/L	2591801	MAGNESIUM DISSOLVED	32.2 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	27.6 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Cond 550 12.5°C

SAMPLE NO. 014987W CONTINUED ON NEXT PAGE.

RIW SEC 6 M4 C

SEPTEMBER 22, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 014986W

TO: WIB GROUNDWATER SECTION
PARLIAMENT BUILDINGS
VICTORIA BC V8V 1X5
ATTENTION OF: WIB GROUNDWATER SECTION

FOR SITE: 1401774 CRIDDLE WELL 720 FT DEEP

SAMPLING DATE(S): SEP 2/80 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 03/80

0040101	PH	8.3 REL UNIT	0071701	RES:FILT.105C	186. MG/L
0110101	SPECIFIC CONDUC	320. UMHO/CM	0300101	COMP.DIL.COND.	326. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	141. MG/L
1041702	CHLORIDE:DISSOL	6.2 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	95.0 MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.06 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	L 0.003 MG/L
1201702	SILICA:REACTIVE	15. MG/L	1211701	SULPHATE:DISSOL	13.3 MG/L
2541802	CALCIUM DISSOLVED	34.4 MG/L	2591801	MAGNESIUM DISSOLVED	2.2 MG/L
2641703	POTASSIUM DISSOLVED	0.1 MG/L	2651703	SODIUM DISSOLVED	31.9 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Well

Cond 215 12°C

SAMPLE NO. 014986W CONTINUED ON NEXT PAGE.

R3W sec 8 #19 C

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016137W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401792 POULSON 230 FT DEEP WELL

SAMPLING DATE(S): SEP 16/80 1100 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT, & ENGNRG BR,, MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.1 REL UNIT	0071701	RES:FILT,105C	290. MG/L
0110101	SPECIFIC CONDUC	488. UMHO/CM	0300101	COMP,DIL,COND,	517. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	239. MG/L
1041702	CHLORIDE:DISSOL	10.9 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES,T:CACO3	191. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.03 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.007 MG/L
1201702	SILICA:REACTIVE	17.7 MG/L	1211701	SULPHATE:DISSOL	7.3 MG/L
2541802	CALCIUM DISSOLVED	57.0 MG/L	2591801	MAGNESIUM DISSOLVED	11.8 MG/L
2641703	POTASSIUM DISSOLVED	0.4 MG/L	2651703	SODIUM DISSOLVED	32.8 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

257D	IRON	E	260D	MANGANESE	E

SAMPLE NO. 016137W CONTINUED ON NEXT PAGE.

R3W SEC 7 #21

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016136W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401790 PHILPOTT 303 FT DEEP WELL

SAMPLING DATE(S): SEP 16/80 1000 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.9 REL UNIT	0071701	RES:FILT.105C	280. MG/L
0110101	SPECIFIC CONDUC	487. UMHO/CM	0300101	COMP.DIL.COND.	513. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	226. MG/L
1041702	CHLORIDE:DISSOL	15.6 MG/L	1061701	FLUORIDE:DISSOL	0.14 MG/L
1070002	HARDNES,T:CACO3	223. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.08 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	L 0.003 MG/L
1201702	SILICA:REACTIVE	17.2 MG/L	1211701	SULPHATE:DISSOL	12.6 MG/L
2541802	CALCIUM DISSOLVED	62.0 MG/L	2591801	MAGNESIUM DISSOLVED	16.5 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	14.4 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016136W CONTINUED ON NEXT PAGE.

R3W SEC 7 #16 C

SEPTEMBER 30, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016135W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401791 PROCTER 220 FT DEEP WELL

SAMPLING DATE(S): SEP 16/80 1030 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	434. MG/L
0110101	SPECIFIC CONDUC	697. UMHO/CM	0300101	COMP.DIL.COND.	760. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	246. MG/L
1041702	CHLORIDE:DISSOL	68.8 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	299. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.08 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	19.1 MG/L	1211701	SULPHATE:DISSOL	11.6 MG/L
2541802	CALCIUM DISSOLVED	84.0 MG/L	2591801	MAGNESIUM DISSOLVED	21.8 MG/L
2641703	POTASSIUM DISSOLVED	0.7 MG/L	2651703	SODIUM DISSOLVED	26.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

SAMPLE NO. 016135W CONTINUED ON NEXT PAGE.

R3W SEC 6 #2K C

SEPTEMBER 25, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016047W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401787 CUNNINGHAM 175' DEEP WELL

SAMPLING DATE(S): SEP 15/80 1330 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	8.0 REL UNIT	0071701	RES:FILT.105C	316. MG/L
0110101	SPECIFIC CONDUC	516. UMHO/CM	0300101	COMP.DIL.COND.	545. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	204. MG/L
1041702	CHLORIDE:DISSOL	33.6 MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	231. MG/L	1091703	NITROGN:NO2 NO3	L 0.02 MG/L
1130101	NITROGN:KJELDAH	0.05 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L
1201702	SILICA:REACTIVE	18.1 MG/L	1211701	SULPHATE:DISSOL	12.8 MG/L
2541802	CALCIUM DISSOLVED	64.0 MG/L	2591801	MAGNESIUM DISSOLVED	17.4 MG/L
2641703	POTASSIUM DISSOLVED	0.5 MG/L	2651703	SODIUM DISSOLVED	16.8 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Jeel

Cond 11.75

SAMPLE NO. 016047W CONTINUED ON NEXT PAGE.

R3W SEC 6 #12 C

SEPTEMBER 29, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016048W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401786 TOWNSEND 81 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1300 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.8 REL UNIT	0071701	RES:FILT.105C	402. MG/L
0110101	SPECIFIC CONDUC	657. UMHO/CM	0300101	COMP.DIL.COND.	707. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	260. MG/L
1041702	CHLORIDE:DISSOL	52.2 MG/L	1061701	FLUORIDE:DISSOL	0.19 MG/L
1070002	HARDNES.T:CACO3	299. MG/L	1091703	NITROGN:NO2 NO3	0.05 MG/L
1130101	NITROGN:KJELDAH	0.05 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L
1201702	SILICA:REACTIVE	21.1 MG/L	1211701	SULPHATE:DISSOL	10.1 MG/L
2541802	CALCIUM DISSOLVED	74.0 MG/L	2591801	MAGNESIUM DISSOLVED	27.8 MG/L
2641703	POTASSIUM DISSOLVED	0.8 MG/L	2651703	SODIUM DISSOLVED	21.1 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field
Cond 475 12.75°C

SAMPLE NO. 016048W CONTINUED ON NEXT PAGE.

R3W SEC 6 #10 C

SEPTEMBER 29, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016050W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401789 NIXON 103 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1430 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.3 REL UNIT	0071701	RES:FILT,105C	376. MG/L
0110101	SPECIFIC CONDUC	550. UMHO/CM	0300101	COMP.DIL.COND.	580. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	171. MG/L
1041702	CHLORIDE:DISSOL	54.4 MG/L	1061701	FLUORIDE:DISSOL	L 0.1 MG/L
1070002	HARDNES.T:CACO3	236. MG/L	1091703	NITROGN:NO2 NO3	0.78 MG/L
1130101	NITROGN:KJELDAH	0.19 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.004 MG/L
1201702	SILICA:REACTIVE	24.4 MG/L	1211701	SULPHATE:DISSOL	21.0 MG/L
2541802	CALCIUM DISSOLVED	63.0 MG/L	2591801	MAGNESIUM DISSOLVED	18.0 MG/L
2641703	POTASSIUM DISSOLVED	0.6 MG/L	2651703	SODIUM DISSOLVED	16.5 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field

Cond 372 12.75°C

SAMPLE NO. 016050W CONTINUED ON NEXT PAGE.

R3W SEC 6 #9

SEPTEMBER 25, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016051W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401788 ORR 100 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1400 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.7 REL UNIT	0071701	RES:FILT.105C	414. MG/L
0110101	SPECIFIC CONDUC	599. UMHO/CM	0300101	COMP.DIL.COND.	639. UMHO/CM
1010101	ALKALINITY:PHNL	L 0.5 MG/L	1020101	ALKALINITY:TOT	189. MG/L
1041702	CHLORIDE:DISSOL	63. MG/L	1061701	FLUORIDE:DISSOL	L 0.10 MG/L
1070002	HARDNES.T:CACO3	264. MG/L	1091703	NITROGN:NO2 NO3	0.96 MG/L
1130101	NITROGN:KJELDAH	0.09 MG/L	1191703	PHOSPHORUS :TOT DISSOLVED	0.007 MG/L
1201702	SILICA:REACTIVE	20.1 MG/L	1211701	SULPHATE:DISSOL	15.7 MG/L
2541802	CALCIUM DISSOLVED	69.0 MG/L	2591801	MAGNESIUM DISSOLVED	22.4 MG/L
2641703	POTASSIUM DISSOLVED	0.9 MG/L	2651703	SODIUM DISSOLVED	15.2 MG/L

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

2570	IRON	E	2600	MANGANESE	E

Field

Cond 412 12.25°C

SAMPLE NO. 016051W CONTINUED ON NEXT PAGE.

R3W SEC 5 #7

OCTOBER 20, 1980 ENVIRONMENTAL LABORATORY PAGE 1
MINISTRY OF THE ENVIRONMENT

WATER QUALITY REPORT FOR SAMPLE 016049W

TO: INVENTORY-ENGINEERING
777 BROUGHTON ST-4FLOOR
VICTORIA B.C.

FOR SITE: 1401785 MCMULLEN 112 FT DEEP WELL

SAMPLING DATE(S): SEP 15/80 1130 HRS
SAMPLE TYPE: FRESH WATER
SAMPLING DEPTH: 0
SAMPLED BY: INVENT. & ENGNRG BR., MOE
DATE RECEIVED BY LABORATORY: SEP 17/80

0040101	PH	7.7 REL UNIT	0071701	RES:FILT.105C	2144. MG/L
0110101	SPECIFIC CONDUC	2750. UMHO/CM	1010101	ALKALINITY:PHNL	L 0.5 MG/L
1020101	ALKALINITY:TOT	192. MG/L	1041702	CHLORIDE:DISSOL	750. MG/L
1061701	FLUORIDE:DISSOL	0.18 MG/L	1070002	HARDNES.T:CACO3	1030.* MG/L
1091703	NITROGN:NO2 NO3	0.02 MG/L	1130101	NITROGN:KJELDAH	0.1C MG/L
1191703	PHOSPHORUS :TOT DISSOLVED	0.003 MG/L	1201702	SILICA:REACTIVE	21.1 MG/L
1211701	SULPHATE:DISSOL	52.8 MG/L	2541802	CALCIUM DISSOLVED	261. MG/L
2591801	MAGNESIUM DISSOLVED	91.* MG/L	2641703	POTASSIUM DISSOLVED	1.5 MG/L
2651703	SODIUM DISSOLVED	138. MG/L			

THE APPROXIMATE COST OF THE ABOVE TESTS IS $ 53.60

THERE IS NO CHARGE FOR THE FOLLOWING TESTS

0300101	COMP.DIL.COND.	N UMHO/CM	257D	IRON
260D	MANGANESE	E		

Inventory & Engineering Branch

DISTRIBUTION	DATE	INITIALS
	OCT 28 1980	E
Stencil	28-X	

Fill

Cond 1790 11°C

SAMPLE NO. 016049W CONTINUED ON NEXT PAGE.

LEGEND

- control point
- control point, flows
- 20 water-level contour, interval 10 feet to 100 foot elevation
- 50 topographic contour, interval 50 feet

SEC. NO.

11 10 9 8 7 6 5 4

123°27'00" 48°38'30" 48°37'30"

ARDMORE DR. GLENEG DRIVE DOGWOOD RD ARDMORE BRADLEY DYNE ROAD BRAEMAR AVE ABOYNE AVE ARDMORE DRIVE INVERNESS RD JURA RD CREEK SAANICH ROAD WEST SAANICH ROAD Res Reservoir Reservoir DITCH DITCH DAM McTAVISH ROAD Coles Bay Yarrow Pt

R.3W. R.2W. R.1W.

SCALE
Metres 100 0 100 200 300 400 500 Metres
Feet 400 0 400 800 1200 Feet

generalized winter-spring potentiometric surface
FIG 29 ARDMORE GROUNDWATER STUDY

92 B·063·2·3

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LEGEND

- CONTROL POINT

isocon values for sodium chloride in ppm.

25
50
75
100
1000

SEC. NO.
11
10
9
8
7
6
5
4

123°27'00"
48°38'30"

Reservoir
DAM
DITCH
McTAVISH ROAD
WEST SAANICH ROAD
BRADLEY DYNE ROAD
ARDMORE DRIVE
DOGWOOD RD
BRAEMAR AVE
ROBSON AVE
JURA RD
INVERNESS RD
Yarrow Pt
Coles Bay
R.3W.
R.2W.
R.1W.

SCALE
Metres 100 0 100 200 300 400 500 Metres
Feet 400 0 400 800 1200 Feet

FIG. 32 SODIUM CHLORIDE ISOCON MAP
ARDMORE GROUNDWATER STUDY

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123°30'00" 48°39'00"

464 000

166 000

123°27'00" 48°39'00"

5 388 000

S A A N I C H

I N L E T

BOUNDARY OF THE DISTRICT OF NORTH SAANICH

B.C. 5284

LEGEND

- Bedrock exposure along shore
- O.B. Overburden
- Dyke
- 130°R / 25° Strike and dip
- (5) Observation point

Shoreline geology: by D. Johanson. - 1980

BLK. A PLAN 1437

PLAN 1437

PLAN 2818

PLAN 22589

PLAN 17002

PLAN 5867

PLAN 1936

PLAN 28011

PLAN 14962

PLAN 25609

PLAN 1651

PLAN 2749

PLAN 16612

PLAN 24595

PLAN 27158

BRADLEY DUNE ROAD

BRAEMAR AVE

ARBUTUS AVE

BAUCHE ROAD

GOLF COURSE

COLE BAY

(PAUQUACHIN) INDIAN RESERVE No. 3

Cole's Bay

Yarrow Pt.

Large Creek

R.3W. R.2W. R.1W.

5 388 000

466 000

48°37'30" 123°27'00"

SURVEYS AND MAPPING BRANCH B. C. LANDS SERVICE, VICTORIA B. C. DEPARTMENT OF ENVIRONMENT.	U.T.M. GRID ZONE 10 (1975) BASE CONTROLLED PHOTOGRAMMETRIC SEE INDEX FOR ADDITIONAL INFORMATION	LATEST PLAN: 28011 REVISION DATE: OCT. 20, 1975	FIG. 6 SHORELINE GEOLOGY

SCALE - 1:5000

Metres 100 0 100 200 300 400 500 Metres

Feet 400 0 400 800 1200 Feet

CADASTRAL 92 B·063·2·3

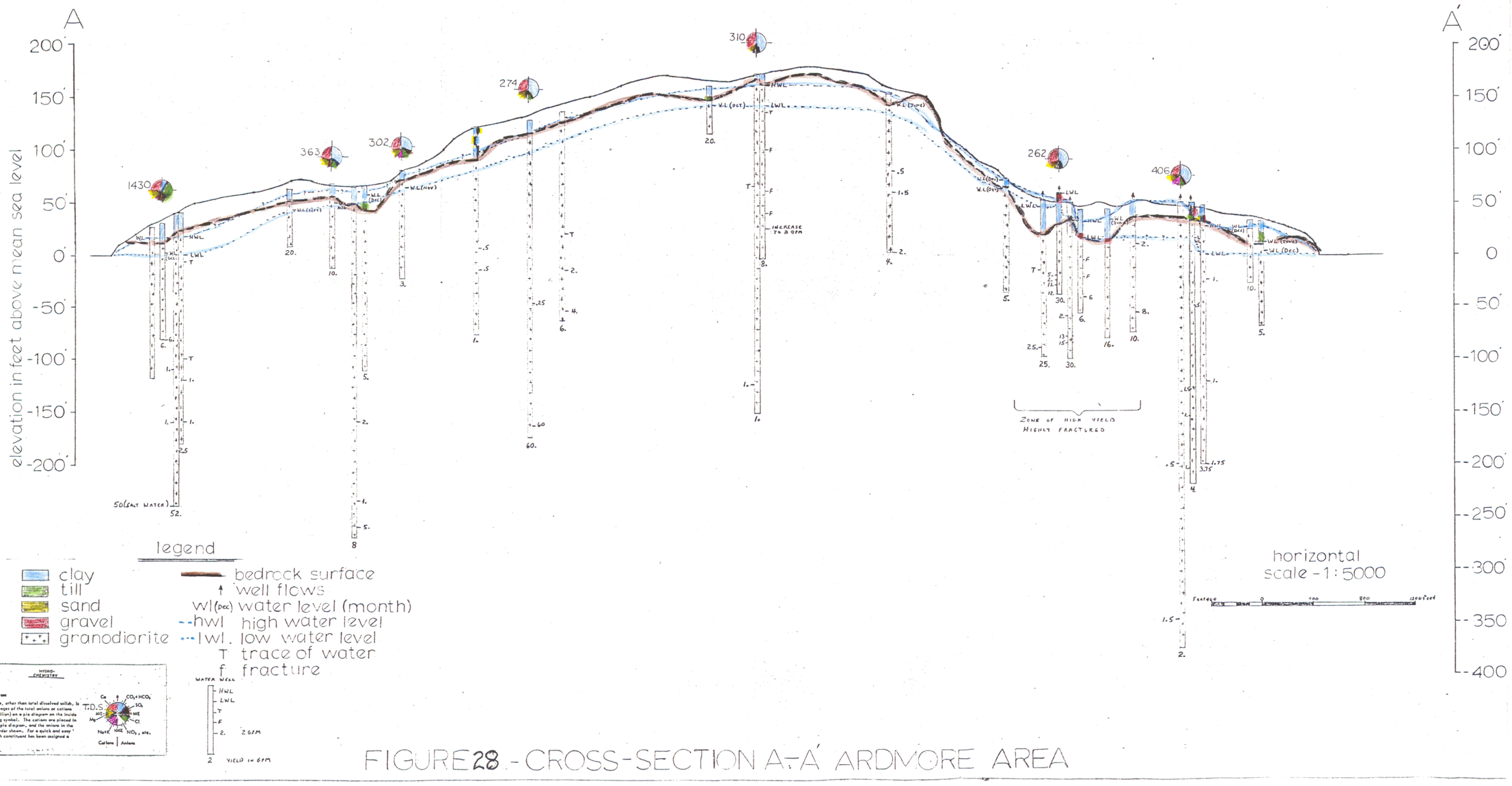


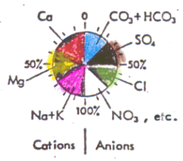
FIGURE 28 - CROSS-SECTION A-A' ARDMORE AREA

LEGEND

HYDRO-CHEMISTRY

Chemical Pie Diagram

Hydrochemical data, other than total dissolved solids, is recorded as percentages of the total anions or cations (equivalents per million) on a pie diagram on the inside of the well or spring symbol. The cations are placed in the left half of the pie diagram, and the anions in the right half, in the order shown. For a quick and easy interpretation, each constituent has been assigned a distinctive color.



HYDRO-GEOLOGY

MAJOR ZONE OF PUMPING INFLUENCE ?

FAULT ?

FAULT ?

Coles Bay

Yarrow Pt

Reservoir

DAM

SEC. NO.

11
10
9
8
7
6
5
4

R.3W.
R.2W.
R.1W.

123°27'00"
48°38'00"
48°37'30"

SCALE
Metres 100 0 100 200 300 400 500 Metres
Feet 400 0 400 800 1200 Feet

FIG. 30 HYDROCHEMISTRY
ARDMORE GROUNDWATER STUDY

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LEGEND

- CONTROL POINTS
- BEDROCK OUTCROPS
- ISOPACH LINES (in metres)

SEC. NO.

11 10 9 8 7 6 5 4

123°23'00" 48°38'00"

48°37'30" 123°27'00"

R.3W. R.2W. R.1W.

1

Eoles Bay

Yarrow Pt

Reservoir

SCALE

Metres 100 0 100 200 300 400 500 Metres

Feet 400 0 400 800 1200 Feet

FIG. 7 ISOPACHS OF SURFICIAL DEPOSITS
ARDMORE GROUNDWATER STUDY

92 B·063·2·3

WESTERN PART OF:
92 B·063·2·4

LEGEND

- CONTROL POINT

isocon values for conductivity (micromhos/cm at 25°c)

—300—
—400—
—500—
—600—
—700—
—1000—

SEC. NO.

11 10 9 8 7 6 5 4

123°27'00"
48°38'00"
48°37'30"

Coles Bay

Yarrow Pt

R.3W. R.2W. R.1W.

SCALE
Metres 100 0 100 200 300 400 500 Metres
Feet 400 0 400 800 1200 Feet

FIG. 31 CONDUCTIVITY ISOCON MAP
ARDMORE GROUNDWATER STUDY

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LEGEND

● WATER WELL LOCATION

S A A N I C H

I N L E T

BOUNDARY OF THE DISTRICT OF SAANICH

Coles Bay

COLE BAY

INDIAN RESERVE No. 3

(PAUQUACHIN)

GOLF COURSE

R.3W. R.2W. R.1W.

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FIG. 2 WELL LOCATION MAP
ARDMORE GROUNDWATER STUDY

SCALE - 1:5000

Metres 100 0 100 200 300 400 500 Metres

Feet 400 0 400 800 1200 Feet

CADASTRAL

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