

November 3, 1970

NOTES ON GROUNDWATER SUPPLIES

IN COWICHAN INDIAN RESERVE NO. 1, DUNCAN B. C.

1. REFERENCES

1. Letter to Mr. Leach, Assistant Chief Engineer, from Mr. F. A. Clark, Regional Director, B. C. - Yukon Region, Department of Indian Affairs, dated July 15th, 1970, file No. 0239013 and 974/8-2-3-1(T).
2. Letter to Mr. Dennis Alphonse, Chief and Band Manager, Cowichan Indian Reserve #1, Duncan, from Chief Engineer, Water Investigations Branch, dated July 28th, 1970, file No. 0254128/0239013.
3. Letters to J. C. Foweraker from Region Director (per Mr. N. VanderGiessen) dated August 14th and 26th, 1970, file Nos. 0239013 and 974/8-2-3-1(T).

2. DESCRIPTION OF WELLS SUPPLYING AREAS VISITED ON COWICHAN INDIAN RESERVE NO. 1

The following Sections of the Cowichan Indian Reserve No. 1 were the subject of a brief field investigation by the writer on the 11th and 12th of August, 1970.

BOYS ROAD SUBDIVISION (photo No. 1)

MISSION ROAD QUAMICHAN COMMUNITY (photo No. 1)

KOKSILAH SECTION (photo No. 3)

CLEMCLEMALITS SECTION (photo No. 2)
(including Tyup)

The following were present at the field inspection on August 11th, 1970.

Mr. N. VanderGiessen
Department of Indian Affairs
Vancouver

Mr. Dennis Alphonse
Band Leader
Cowichan Indian Reserve No. 1

Mr. J. Abraham
Councillor

Mr. L. Antoine
Councillor

Dr. J. C. Foweraker, Chief
Groundwater Division
Water Investigations Branch
B. C. Water Resources Service

Mr. J. Abraham also accompanied the writer on a further field investigation on August 12th.

A. BOYS ROAD SUBDIVISION (See photo No. 1 and index map)

Well log No. 1, attached, gives details of the well log, well yield and construction. Location of the well is given at "6" photo No. 1. Possible 30-40 connections are on this well. No details on the length of the recorded pumping test are given. However, the well appears adequate for present subdivision needs.

East of this large subdivision is another small well (see "5" photo No. 1) which serves a number of homes near the main Island Highway.

B. MISSION ROAD QUAMICHAN COMMUNITY (See photo No. 1 and index map)

This water system would appear to be the one referred to as "Koksilah Village" in Report No. 1477 and plan No. 176-25 dated April 20th, 1960 by P. C. Olding of Indian Affairs Branch.

Separate wells were constructed at the east and west ends of the area. The history of well construction and subsequent improvements in this area are not clear. However, the following observations have been made on the water quality in the well located at west end of above system. See "3" in photo No. 1.

1. The iron concentration in the water is high.
2. A sample of water was taken from a connection at 2 (in photo No. 1). The water was allowed to run from the connection for some time before the sample was taken and tested with the Hach Kit. Result: 0.6 ppm iron. An adjacent private well, "2" on photo No. 1 was also tested. Result: 0.4 ppm iron.

The well servicing a small system at the east end (see "1" in photo No. 1) was not in operation at the time of the visit and no sample could be taken. The pump house is subject to flooding and possible contamination and repairs among other things, are required on the pumps. The water quality in the well was reported by the councillors to be high in iron.

In summary, both wells would therefore appear to be unsatisfactory in regards to water quality and the east end pump system may require extensive modifications and repairs. The councillors report that many residents have given up on using the present system and haul water from elsewhere.

C. KOKSILAH SECTION (See photo No. 3 and index map)

This section should not be confused with the "Koksilah Village" of Report No. 1477 and Plan 176-25, dated April 20th, 1960, by P. D. Olding of Indian Affairs Branch which I refer to in this report as Mission Road Quamichan Community.

This community consists of 4 houses, only one of which is supplied with water, coming from a small spring developed with a shallow dug well situated at the base of a terrace at the back of the house (see "1" of photo No. 3). The residents of the other 3 houses haul water, usually from the nearby Koksilah River. A city garbage dump is situated higher up the hill (see "3" on photo No. 3).

D. CLEMCLEMALITS SECTION (See photo No. 2 and index map)

The Clemclemalits Village well is located adjacent to the Koksilah River at "1" in photo No. 2. A log No. 2 for this well is attached. The yield is adequate, but the water quality is poor. I ran a quality test from a connection near the well, and after allowing the water to run clear, took a sample and obtained the following results: iron 7.5 ppm, chloride 50 ppm. The water quality is extremely unsatisfactory and many residents haul water when they are able to.

E. TYUP (See photo No. 2 and index map)

Mr. Leslie Wilson, a resident at Tyup has no water supply; he hauls his from the Koksilah River nearby. His house is located at C on photo No. 2.

3. SURFICIAL GEOLOGY AND GROUNDWATER CONDITIONS GENERALLY IN THE AREAS VISITED

For convenience only a copy of the pertinent part of the surficial geology map No. 14-1965 by E. C. Halstead is attached. A legend to describe the geological features coloured in yellow, green and blue, is also attached.

A. BOYS ROAD SUBDIVISION

This area lies within the yellow area ¹⁰8a of the surficial geology map and consists of mixed deposits of gravel, sand, silt, clay. Groundwater table is close to the surface and shallow wells of good yield can be constructed. Water quality on the Boys Road Subdivision appears good.

B. MISSION ROAD QUAMICHAN COMMUNITY

This area lies within the yellow area ¹⁰8a on the surficial geology map and consists of mixed deposits of gravel, sand, silt, and clay. Unfortunately, the iron content of the groundwater is high in this general area. Rusty gravels are reported at the 40 foot level in the Koksilah Nursery wells to south west (approximately located at A and B in photo No. 1), which leads us to suspect that water quality can not be expected to improve with depth in this immediate area. Therefore, there would not appear to be any valid reason for deepening wells for this community.

C. KOKSILAH SECTION

This area lies near the geological boundary of the blue, 6a, and yellow, 10, areas shown on the surficial geology map. The house on the higher terrace served by the spring would therefore be located within 6a--glacial fluvial deposits--gravel, sand, etc., whereas the remaining three houses are located in the lower, more recent fluvial and shore deposits of the valley bottom. Both types of deposits contain sand and gravel which, if water bearing, would be suitable for construction of a good well. Photo No. 3 shows areas where extensive gravel pits have been opened up in the sands and gravels of the glacio-fluvial deposits.

To the north of the city garbage dump, see "4" photo No. 3, a deep 176 foot hole was drilled by the Department of Indian Affairs. The log of this hole is attached and the deposits may be more indicative of marine and glacio-marine silts and clays.

A successful, 15 gpm, shallow well was completed for the Department of Highways Weigh Scale at "2" photo No. 3 in recent sands and gravels. See log attached.

D. CLEMCLEMALITS SECTION

The surficial geology map shows this area (and Tyup) to lie within the fluvial and shore deposits of 10. Possibly, these deposits overlie older fluvial sand and gravel deposits of 8a. The log of the CNR well (see "2" of photo No. 2) is attached. This log indicates that plenty of coarse grained water bearing material is present near surface, but the description of "brown" sand may be indicative of iron contaminated groundwater.

4. RECOMMENDATIONS FOR FURTHER GROUNDWATER DEVELOPMENT

A. BOYS ROAD SUBDIVISION AND MISSION ROAD QUAMICHAN COMMUNITY

1. It is recommended that no further well drilling, groundwater exploration, well modification or pump repairs be carried out on the east and west end wells of the Mission Road Quamichan Community, until an economic and engineering study is carried out by the Indian Affairs Branch on the feasibility of connecting the Mission Road Quamichan Community systems up to the Boys Road subdivision well. See "7" photo No. 1 for location of a proposed pipe line extension necessary for this scheme.

I am against further groundwater expenditure on the present wells or water treatment equipment or on new test wells in the immediate Mission Road Quamichan area (photo No. 1) because of the undesirable iron concentration that exists in the groundwater in this area and a strong possibility that these conditions will also exist at depth in that immediate area.

2. If the above proposed study shows a pipeline to be a feasible alternative, then it may be advisable to consider a further, more detailed pump test on the Boys Road subdivision well. Arrangements would have to be made, however, for a suitable alternative source of water for the subdivision residents until the test or recovery period is completed; perhaps a period of 48 to 60 hours. The cost of this pumping test can be minimized by using the existing pumping facilities and by using local labour to take the well readings, etc.

The Groundwater Division of the Water Investigations Branch is prepared, if requested, to discuss general details of the test with representatives of the Indian Affairs Department and/or the Indian Band, but no responsibility, financial or otherwise, can be made to carry out or manage the actual test. However, the Division will undertake, staff permitting, to have an observer present for part of the test and to make an analyses of the pumping test results.

C. KOKSILAH SECTION

It is recommended that one, or as many as two test production wells be drilled in this area (see photo No. 3, well sites Nos. 1 and 2,

Estimated costs for cable tool method for two cased holes with one completed as a well are as follows:

150 feet of 6-inch cased hole at \$13.50 a foot	\$2025
1 4-foot section of well screen	200
8 hours for well development at \$20.00 an hour	160
12 hours for pumping test at \$20.00 an hour	240
Mobilization	<u>400</u>
Total	<u>\$3025</u>

To the above costs would, of course, have to be added the cost of a pump, electric power, pump house, pipe, etc.

The above approximate estimate could be balanced against cost of a pipe line from a shallow 30-foot well sunk, say, near the Department of Highways weigh scales.

The reason for the selection of well site No. 1 is as follows:

- (i) it is centrally located
- (ii) There is a good chance of obtaining gravels at less than 50 feet.
- (iii) recharge might come either from the terraced gravels or from the river.

The well should not exceed 50 feet in depth unless indications show there would be an advantage to go deeper.

Site No. 2 is located on the glacial fluvial deposits and may encounter groundwater at the depth of the spring, behind which it is sited. Alternatively, there may be an aquifer present lower down between 75 and 100 feet in depth.

A less attractive, but more economically feasible idea would be to further develop the spring area ("1" of photo No. 3) with horizontal sand packed well screens and a covered sump, from which the system would flow by gravity to the other houses.

The writer was not able, in the time available, to measure the spring flow but it would be questionable, from brief observations made, if enough water could be obtained even with spring development for the 4 houses. However, the Groundwater Division of the Water Investigations Branch, would be prepared, if feasible, to design on an experimental basis, a horizontal sand packed screen and covered sump in the spring area. However, no financial or construction responsibility could be undertaken. The Division could, staff permitting, have an observer present at the site during part of the construction period.

The most undesirable feature in this area is contamination from the nearby city garbage dump. Bacteriological tests should be periodically run on the groundwater supplies in this immediate area.

D. CLEMCLEMALITS SECTION

The high iron and low chloride content in the groundwater in this area, make expenditure of further funds on groundwater development unattractive. Deeper wells may encounter further brackish conditions and indications are that further shallow wells in this area may encounter iron concentrations in the groundwater. A shallow test well might, perhaps, be tried at the north east end of the community near the Cowichan River Bridge but the possibilities of iron or salt water contamination are considerable. Apart from this, I do not see that further groundwater development and expenditure is really justifiable here. The writer does not have any information on the results of any water quality tests run on the CNR well. However, if the owners are agreeable to renting this well, a sample could be taken for analyses after pumping this well for say two hours. The log evidence would indicate that groundwater from this well could also be somewhat high in iron.

Alternative outside sources of water supply may be the final solution for this village.

Tyup could be served by a shallow well constructed by the cable tool method and located outside of the area subject to flooding. Approximate cost for well construction excluding electric power, pump, pumphouse, etc. would be as follows:

30 feet of 4-inch at \$11.00 a foot	\$330
4 feet of 4-inch stainless steel screen	100
Well development and testing 5 hours at \$20.00 an hour	100
Mobilization (if part of contract for Koksilah Section)	100
	<hr/>
	\$630

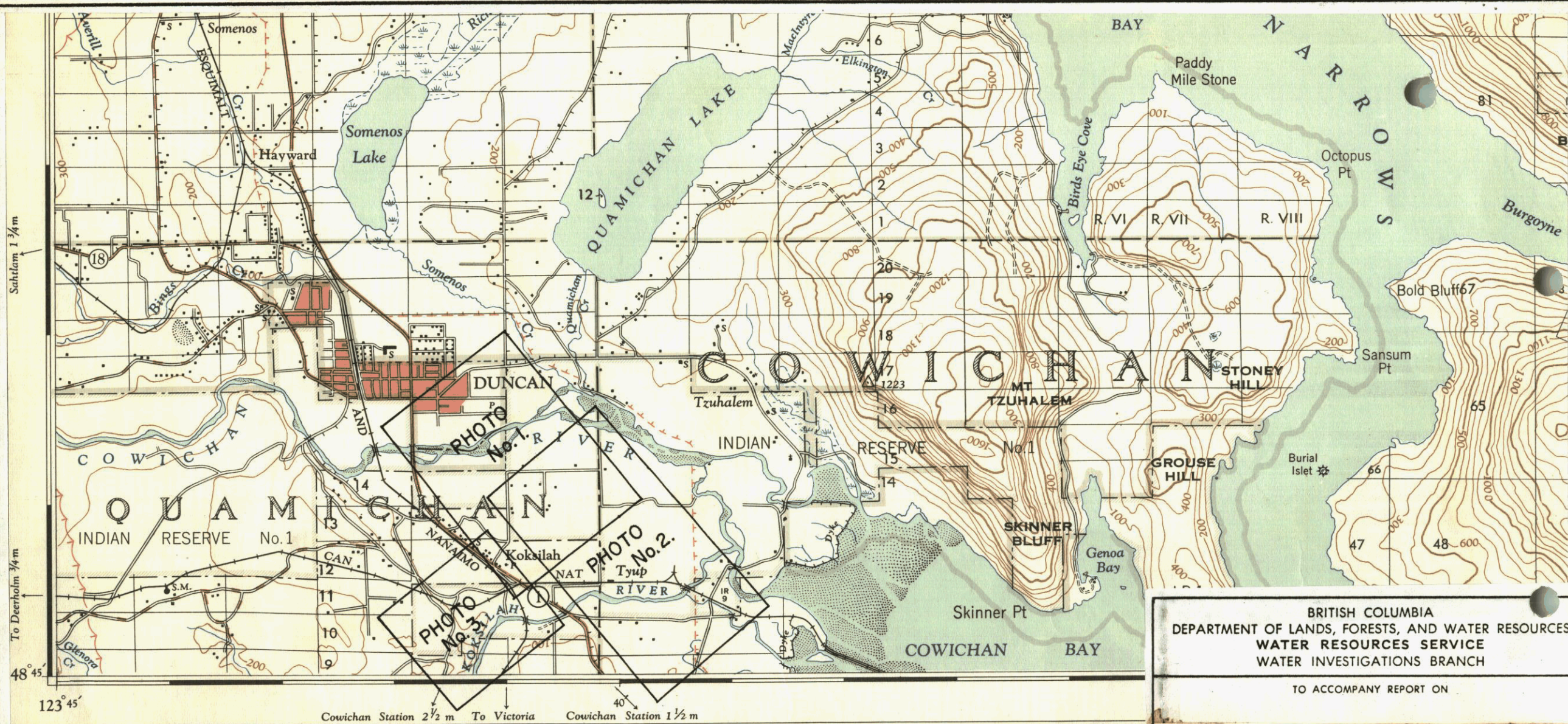
An unsuccessful attempt was made to drive a well point in this area some years ago. Possibly a combination of washing down and driving a small 1 3/4 inch diameter well point could be considered a cheaper but more unreliable alternative and it is not recommended here.



J. C. Foweraker, Chief
Groundwater Division

JCF:ph

Encls.



To Sahtlam 1 3/4 m
 To Deerholm 3/4 m
 48° 45'

123° 45'
 Cowichan Station 2 1/2 m To Victoria
 Cowichan Station 1 1/2 m

BRITISH COLUMBIA
 DEPARTMENT OF LANDS, FORESTS, AND WATER RESOURCES
 WATER RESOURCES SERVICE
 WATER INVESTIGATIONS BRANCH

TO ACCOMPANY REPORT ON

INDEX MAP
 To accompany "Notes on Groundwater
 Supplies in Cowichan Indian Reserve
 No. 1, Duncan, B. C."

November 3rd, 1970; File No. 0239013

Surveyed and compiled by the Surveys and Mapping Branch,
 Department of Lands and Forests, British Columbia. 1942
 Cartography and reproduction by the Army Survey Establishment, R.C.E.
 Department of National Defence, 1952-53. Partially revised and
 Converted from the 1:63,360 map to 1:50,000 by the A.S.E. 1955.

DUNCAN

BRITISH COLUMBIA

Scale 1:50,000
 1.25 Inches to 1 Mile approximately

BOYS ROAD SUBDIVISION (1)

7 4 2 1	7 4 2 1	6 5 4 3 2 1	2 1	7 4 2 1	2 1	7 4
TENS	UNITS	MERIDIAN	TENS	UNITS	TENS	UNITS
TOWNSHIP			RANGE		SECTION	

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FOREST,

LOCATION DUNCAN B.C. BOYES Rd. Sec 141 RGE 81 QUAMISHAN
(COMPLETE LEGAL DESCRIPTION)

OWNER'S NAME Dept Indian Affairs ADDRESS Nanaimo B.C.

DRILLER'S NAME Pacific ADDRESS Langley DATE OF COMPLETION _____

DEPTH 40' ELEVATION OF COLLAR _____ CASING DIAM. _____ LENGTH 28' TYPE Standard

METHOD OF DIGGING Drilled SCREEN SIZE #40 LENGTH 4'10" TYPE Johnson

LOCATION OF SCREEN 26'2" - 31' DEVELOPED DESCRIBE Bailed & pumped

PERFORATED CASING LENGTH _____ LOCATION OF PERFORATIONS _____

GRAVEL PACK LENGTH _____ DIAM. _____ SIZE GRAVEL, ETC. _____

PUMP TYPE _____ POWER _____

CAPACITY _____ OTHER DATA _____

COSTS WELL _____ PUMP _____ PUMP HOUSE, ETC. _____

MAINTENANCE _____

DISTANCE TO WATER FROM TOP OF CASING 9.85' ESTIMATED MEASURED ELEVATION _____ FLUCTUATION _____

HIGH WATER _____ MONTH _____ LOW WATER _____ MONTH _____ OBSERVATION DATA FILE No. _____

WATER USE _____

MAX. RATE WITHDRAWAL ESTIMATED MEASURED

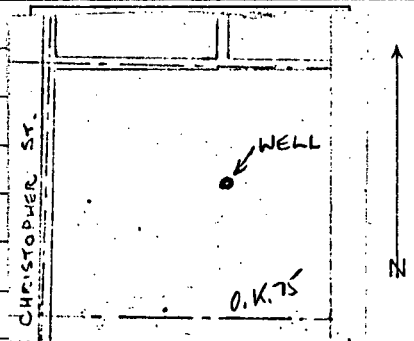
TEMPERATURE _____ PUMPS SAND

CLOGS SCREEN TYPE DEPOSIT _____ AQUIFER DATA gravel, sand

LICENSE No. _____ DATE LICENSE _____ AMOUNT _____

DATE APPLICATION _____ USE _____

Location: Koksilut River?



METHOD	DUG
	DRIVEN
	DRILLED
	JETTED
DEPTH	BORED
	0 — 25
	25 — 50
	50 — 100
	100 — 200
	200 — 400
TYPE WELL	> 400
	OBSERVATION
	ABANDONED
	DEVELOPED
	SCREEN
	PERF. CASING
	GRAVEL ENV.
	PUMP
FLOWING	
NON-FLOW ARTESIAN	
WATER TABLE	
PART CONFINED	

MUNICIPALITY
 WATERSHIP
 SULPHUR
 WATER QUALITY
 CAPACITY GPD
 10³
 10⁴
 10⁵
 10⁶
 10⁷

VISI-record®

12708

OTHER AQUIFER PRESENT		OTHER AQUIFER PRESENT		OTHER AQUIFER PRESENT		CHARACTER OF SUPPLY AQUIFER	WATER USE							RELIABILITY OF DATA	ROCK					
TENS	UNITS	TENS	UNITS	TENS	UNITS		SAND	GRAVEL	TILL	DOMESTIC	GARDEN	STOCK	COOLING			IRRIGATION	INDUSTRIAL	WATERWORKS	GOOD	FAIR
7	4	2	1	7	4	2	1	7	4	2	1	7	4	2	1	7	4	2	1	
7	4	2	1	7	4	2	1	7	4	2	1	7	4	2	1	7	4	2	1	

CLEM CLEMALITS VILLAGE WELL (2)

7	6	5	4	3	2	1	7	6	5	4	3	2	1	7	6	5	4	3	2	1	7	6	5	4	3	2	1
TOWNSHIP				RANGE				SECTION				UNIT															

GROUND WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LAND, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

XI, 411

LOCATION Part of SEC. 11, RG. 1.

COWICHAN DISTRICT

OWNER'S NAME Indian Dept. (Ken Kema-uts) ADDRESS

DRILLER'S NAME Ken Slade ADDRESS Duncan

DATE OF COMPLETION

DEPTH 26' DIAMETER OF CASING 6" LENGTH 27' TYPE PLASTIC

METHOD OF DRILLING DRILLED SCREEN SIZE #25? LENGTH TYPE PLASTIC VENT

WELL DEVELOPED DISCLOSED

LOCATION OF PERFORATIONS

WELL PUMP LENGTH DIAM. SIZE GRAVEL, ETC.

WELL TYPE POWER

CAPACITY OTHER DATA

WELL PUMP PUMP HOUSE, ETC.

WELL

DEPTH TO WATER 6' ESTIMATED MEASURED ELEVATION FLUCTUATION

WATER FLOW NORTH OBSERVATION FILE NO

WELL ESTIMATED

WELL WITHDRAWAL MEASURED

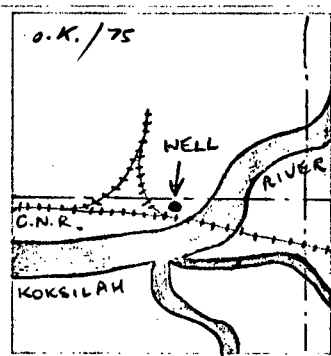
TEMPERATURE FORMS SAND

WELL TYPE DEPOSIT AQUIFER DATA

WELL DATE LICENSE AMOUNT

WELL APPLICATION USE

OPPOSITE OLD PUMP HOUSE (WEST SIDE)



METHOD	<input type="checkbox"/> DRIVEN
	<input type="checkbox"/> DRILLED
	<input type="checkbox"/> BITED
	<input type="checkbox"/> BORED
	<input type="checkbox"/> OTHER
DEPTH	0 - 25
	25 - 50
	50 - 100
	100 - 200
	200 - 400
	> 400
OBSERVATION	<input type="checkbox"/> ABANDONED
	<input type="checkbox"/> DEVELOPED
	<input type="checkbox"/> SCREEN
	<input type="checkbox"/> PLUMB CASING
	<input type="checkbox"/> GRAVEL ENV.
TYPE WELL	<input type="checkbox"/> PUMP
	<input type="checkbox"/> FLOWING
	<input type="checkbox"/> NON-FLOW ARTESIAN
	<input type="checkbox"/> WATER TABLE
	<input type="checkbox"/> PART CONFINED

CHARACTER OF AQUIFER	<input type="checkbox"/> SAND
	<input type="checkbox"/> GRAVEL
	<input type="checkbox"/> TILL
CHARACTER OF DATA	<input type="checkbox"/> DOMESTIC
	<input type="checkbox"/> IRRIGATION
	<input type="checkbox"/> INDUSTRIAL
	<input type="checkbox"/> WATERWORKS
	<input type="checkbox"/> COOLING
	<input type="checkbox"/> SPRING
	<input type="checkbox"/> OTHER
	<input type="checkbox"/> RIVER
	<input type="checkbox"/> POOL
	<input type="checkbox"/> OTHER

34

LOG

FROM	TO	DESCRIPTION	NAME
0	2	TOP SOIL	
2	4	SILTY GRAVEL	
4	12	SILTY LIGHTLY BOUND GRAVEL	
12	24	LOOSE COARSE MED. GRAVEL	
24	26	BECOMING FINE & SILTY	

Ind. Dept. Ken Vlamants

SAMPL _____
 LAB. _____
 CO. _____
 TC. _____
 COLO. _____
 TASTE _____
 TEST _____

Depth - 26' Screen - 6" plastic
 Yield - 35 gpm for 1' PP casing - 6" plastic
 S.L. - 6' 27"

0-2 Top soil - 2-4 silty gravel 4-12
 silty lightly bound gravel 12-24 - loose
 coarse med gravel 24-26 - becoming fine
 & silty

DATE _____ FILE No. _____
 SPECIFIC CAPACITY _____ PERMEABILITY _____
 STORAGE COEFF _____ TRANSMISSIBILITY _____
 REMARKS Yield 35 gpm. for 1' P.P.
 of Drawdown

Cl	
SO ₄	
NO ₃	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	

OTHER DATA

SIZE ANALYSIS, ETC. _____

CARD BY D.J. DATE May 66
 SOURCES INFORMATION Ken Slade

DEPT. OF HIGHWAYS WELL (4)

7	4	2	1	7	4	2	1	6	5	4	C	E	2	1	7	4	2	1	2	1	7	4	
TENS				UNITS				MERIDIAN				TENS				UNITS				TENS		UNITS	
TOWNSHIP								RANGE								SECTION							

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

LOCATION S.W. 1/4 SEC. 12, R. 8 QUAMICHAN DIST

OWNER'S NAME DUNCAN WEIGH SCALE ADDRESS DUNCAN

DRILLER'S NAME Ken Seade ADDRESS Duncan DATE OF COMPLETION Feb 66

DEPTH 21' ELEVATION OF COLLAR _____ CASING DIAM _____ LENGTH 19' TYPE LIGHT 6" OUT 2" UNDERGROUND

METHOD OF DIGGING Drilled SCREEN SIZE _____ LENGTH _____ TYPE _____

LOCATION OF SCREEN _____ DEVELOPED DESCRIBE _____

PERFORATED CASING LENGTH 6' LOCATION OF PERFORATIONS _____

GRAVEL PACK LENGTH _____ DIAM _____ SIZE GRAVEL, ETC. _____

PUMP TYPE _____ POWER _____

CAPACITY _____ OTHER DATA _____

COSTS WELL _____ PUMP _____ PUMP HOUSE, ETC. _____

MAINTENANCE _____

DISTANCE TO WATER FROM TOP OF CASING 8' ESTIMATED MEASURED ELEVATION _____ FLUCTUATION _____

HIGH WATER _____ MONTH _____ LOW WATER _____ MONTH _____ OBSERVATION DATA FILE No. _____

WATER USE _____

MAX. RATE WITHDRAWAL ESTIMATED MEASURED _____

TEMPERATURE _____ PUMPS SAND _____

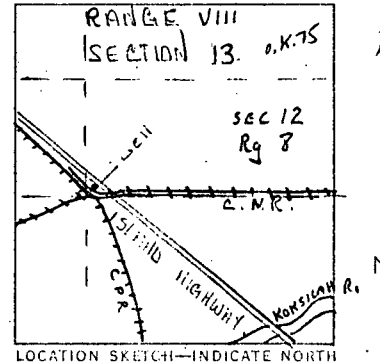
CLOGS SCREEN TYPE DEPOSIT _____ AQUIFER DATA GRAVEL

LICENSE NO _____ DATE LICENSE _____ AMOUNT _____

DATE APPLICATION _____ USE _____

N. END OF SCALE HOUSE - 6' OUT

DRILLED FOR GRIFFITHS PLUMBING



METHOD	DUG
	DRIVEN
	DRILLED
	JETTED
	BORED
DEPTH	0 — 25
	25 — 50
	50 — 100
	100 — 200
	200 — 400
	> 400
OBSERVATION	ABANDONED
	DEVELOPED
	SCREEN
	PERF. CASING
	GRAVEL PACK
	PUMP
	FLOWING
TYPE WELL	NON-FLOW ARTESIAN
	WATER TABLE
	PART CONFINED

WATER QUALITY

CAPACITY GPD.

OTHER AQUIFER PRESENT				OTHER AQUIFER PRESENT				OTHER AQUIFER PRESENT			
TENS	UNITS	TENS	UNITS	TENS	UNITS	TENS	UNITS	TENS	UNITS	TENS	UNITS
7	4	2	1	7	4	2	1	7	4	2	1

CHARACTER OF SUPPLY AQUIFER	WATER USE							RELIABILITY OF DATA			ROCK
	DOMESTIC	GARDEN	STOCK	COOLING	IRRIGATION	INDUSTRIAL	WATERWORKS	GOOD	FAIR	POOR	
SAND											SPRING
GRAVEL											
TILL											

7 4 2 1	7 4 2 1	5 5 4 C E	2 1	7 4 2 1	2 1	7 4 2 1	NE
TENS	UNITS	MERIDIAN	TENS	UNITS	TENS	UNITS	
TOWNSHIP			RANGE		SECTION		

C.N. RAILWAY WELL (5)

GROUND — WATER DIVISION, WATER INVESTIGATIONS BRANCH, DEPT. OF LANDS, FORESTS, and WATER RESOURCES, VICTORIA, B.C.

LOCATION PART OF SEC. 11 T6.1 COWICHAN DIST.

OWNER'S NAME C.N. RAILWAY ADDRESS VANCOUVER

DRILLER'S NAME PACIFIC WATER WELLS ADDRESS NANAIMO DATE OF COMPLETION Nov. 65

DEPTH 43' ELEVATION OF COLLAR _____ CASING DIAM. 8" LENGTH 42' TYPE _____

METHOD OF DIGGING DRILLED SCREEN SIZE #60 SECT LENGTH 10' TYPE TORRENT EUCORD

LOCATION OF SCREEN 27' - 37' DEVELOPED DESCRIBE _____

PERFORATED CASING LENGTH _____ LOCATION OF PERFORATIONS _____

GRAVEL PACK LENGTH _____ DIAM. _____ SIZE GRAVEL, ETC. _____

PUMP TYPE _____ POWER _____

CAPACITY _____ OTHER DATA _____

COSTS WELL _____ PUMP _____ PUMP HOUSE, ETC. _____

MAINTENANCE _____

DISTANCE TO WATER FROM TOP OF CASING 6.7 FT. ESTIMATED MEASURED ELEVATION _____ FLUCTUATION _____

HIGH WATER _____ MONTH _____ LOW WATER _____ MONTH _____ OBSERVATION DATA FILE No. _____

WATER USE _____

MAX. RATE WITHDRAWAL ESTIMATED MEASURED _____

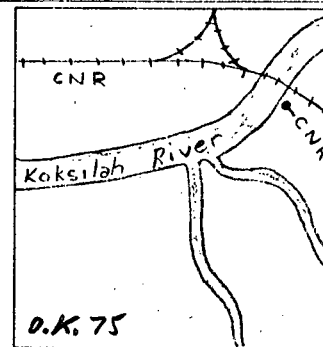
TEMPERATURE _____ PUMPS SAND

CLOGS SCREEN TYPE DEPOSIT _____ AQUIFER DATA GRAVEL & SAND

LICENSE No. _____ DATE LICENSE _____ AMOUNT _____

DATE APPLICATION _____ USE _____

LOCATION - KOKSILAH RIVER CHECK WITH CNR. AT KOKSILAH OR DUNCAN



LOCATION SKETCH—INDICATE NORTH

METHOD	DUG
	DRIVEN
	DRILLED
	JETTED
DEPTH	BORED
	0 - 25
	25 - 50
	50 - 100
	100 - 200
	200 - 400
TYPE WELL	> 400
	OBSERVATION
	ABANDONED
	DEVELOPED
	SCREEN
	PERF. CASING
	GRAVEL EN
	PUMP
FLOWING	
NON-FLOW ARTESIAN	
WATER TABLE	
PART CONFINED	

CHARACTER OF SUPPLY AQUIFER	WATER USE				RELIABILITY OF DATA	ROCK
	DOMESTIC	GARDEN	STOCK	COOLING		
SAND					GOOD	
GRAVEL					FAIR	
TILL					POOR	

LOG

FROM	TO	DESCRIPTION	NAME
0	6	SAND & GRAVEL	
6	17	COARSE GRAVEL SOME SAND (TIGHT)	
17	26	MEDIUM TO COARSE GRAVEL & SAND.	
26	26	FINE TO MEDIUM GRAVEL, & BROWN SAND	
26	37	FINE GRAVEL & BROWN SAND	
37	43	GRAVEL & SAND WITH LAPS OF CLAY & SILT.	

PUMP TEST

TIME	C.P.M.	READING LEVEL	TIME	WATER LEVEL
9:00	425	22.4 FT. START		
9:01	"	22.4 FT.		
9:04	"	22.6 FT.		
9:25	"	22.9 FT.		
10:00	"	23 FT.	10:10	7.3 FT.
12:00	"	23.2 FT.	10:11	7.2 "
1:00	"	23.2 FT.	10:12	7.1 "
2:00	"	24 FT.	10:15	7.0 "
12:00	"	24.3 FT.	10:30	6.9 "
4:00	"	24.3 FT.	10:45	6.9 "
5:00	"	24.3 FT.	11:15	6.9 "
12:00	"	24.2 FT.	11:30	6.8 "
4:00	"	24.2 FT.	12:30	6.8 "
7:00	"	24.3 FT.	1:30	6.7 "
12:00	"	24.2 FT.		
4:00	"	24.2 FT.		
7:00	"	24.2 FT.		
12:00	"	23.9 FT.		
4:00	"	24 FT.		
8:00	"	24.2 FT.		
10:00	"	24.1 FT.		

RECOVERY

SAMPLE No. _____ DATE _____

LAB. _____

COLIFORM ORGANISMS _____

TOTAL BACTERIA _____

COLOUR _____ ODOUR _____

TASTE _____

PUMPING TEST SUMMARY

TEST BY _____

DATE _____ FILE No. _____

SPECIFIC CAPACITY _____ PERMIABILITY _____

STORAGE COEFF _____ TRANSMISSIBILITY _____

REMARKS 400 U.S. G.P.M. WITH A

PUMPING LEVEL OF 24.2 FT. FROM SURFACE.

OTHER DATA

SIZE ANALYSIS, ETC. _____

CARD BY DJ DATE May 66

SOURCES INFORMATION Pacific W.W.

ANALYSIS

	PPM
Total Hardness	
Carbonate Hard	
Magnesium Hard	
Fe	
SO ₂	
Ca	
Mg	
Na	
K	
HCO ₃	
CO ₃	
Cl	
SO ₄	
NO ₃	
B	
E	
Total Dis-solids	
Total Alkalinity	
Suspended Solids	
Ph	



**"MISSION ROAD"
QUAMICHAN
COMMUNITY"**

Named in Report 14
& Plan 176-25 as
Koksilah Village

① Well
(not in use)

② Private Well with
hand pump

INDIAN COOP POND

③ Well & Pump house

NURSERY POND EAST

④ Irrigation Well

NURSERY POND WEST

PHOTO
No. 1.

Updated 1975
F.C.

**BOYS RD.
SUBDIVISION**

Suggested Pipe Line
Extension - ⑦

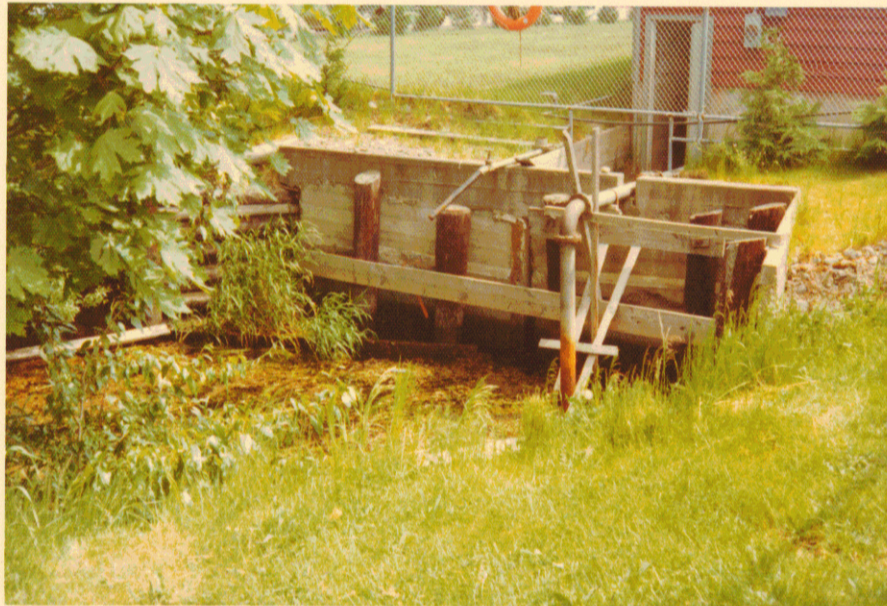
Boys Road Subdivision
Well - ⑥

Well - 5

NORTH COWICHAN AQUIFER



NURSERY POND - EAST



NURSERY POND - WEST



INDIAN COOP POND



**"MISSION ROAD"
QUAMICHAN
COMMUNITY"**

Named in Report I477
& Plan I76-25 as
Kokilah Village

- ① Well (not in use)
- ② Private Well with hand pump
- ③ Well & Pumphouse
- ④ Irrigation Well

**BOYS RD.
SUBDIVISION**

Suggested Pipe Line
Extension - ⑦

Boys Road Subdivision
Well - ⑥

Well - 5

(A)

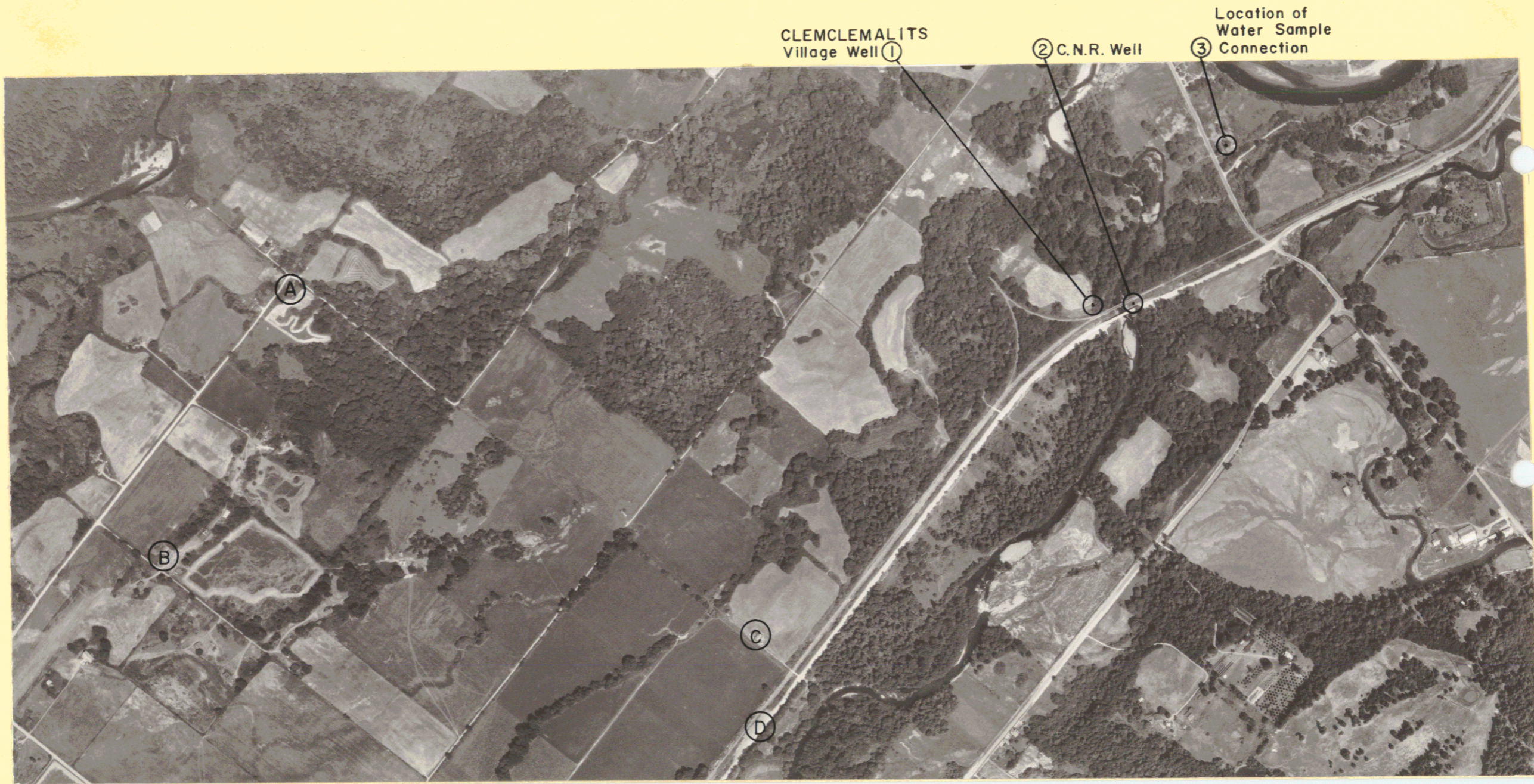
(B)

(C)

**PHOTO
No. I.**

COWICHAN INDIAN RESERVE No.1
CLEMCLEMALITS SECTION

PHOTO No. 2.



COWICHA INDIAN RESERVE No.1.
KOKSILAH SECTION



PHOTO No.3.