R E P O R T

ON

C O L U M B I A - K O O T E N A Y W A T E R S H E D

1961-1962
(1963-1964)

Prepared by

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Parliament Buildings
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CONTENTS

REPORT ON COLUMBIA-KOOTENAY WATERSHED

PREAMBLE

On April 1st, 1961, the Pollution Control Board assumed jurisdiction over the watershed area of the Columbia River in Canada. This comprises the drainage basins of the Columbia itself, plus the various tributaries: Similkameen, Okanagan, Kettle, Pend d'Oreille, Kootenay, Moyie and Flathead. At this time while some general information and unrelated data existed concerning these waters, it had never been correlated and of itself was insufficient to permit such correlation.

To obtain a general picture of conditions a limited sampling program was introduced on the principal Kootenay-Columbia chain. The purpose of this report is to give the results of this survey together with any other relevant information. It is limited to the Kootenay Basin and the Columbia River proper with emphasis on the lower reaches of the Arrow Lakes to the International Boundary.

Tests used are of two basic kinds, bacteriological and chemical.

Bacteriological tests determined the "Most Probable Number" (M.P.N.) counts of the indicator organisms, the coliforms. Tests were carried to the confirmed stage, in the manner designated by "Standard Methods". Such tests indicate the quality of water for domestic or other purposes, in terms of potential risk of transmitting disease. Water having an M.P.N. coliform count of under 50 per 100 ml. is generally accepted as satisfactory for domestic use with treatment by chlorination alone.

Chemical tests used in this survey were for Nitrates and Phosphates, some for pulp mill wastes and more complete coverage in the area of the Columbia-Kootenay confluence. Chemical quality is of concern from the health aspect only for toxic chemicals; no significant discharges of these are known in the area and therefore are not covered in this report. Where a specific chemical is suspected it is tested for, but sporadic tests of this kind have not produced measurable quantities of such substances. From the more general aspect of pollution control, the discharge of any substance physically or chemically detrimental, either directly or indirectly, to a receiving stream is of concern. Thus, this survey was aimed at obtaining an indication of the immediate and/or secondary effects of known domestic and industrial wastes on the waters into which they are discharged. Generally, because of the large size of streams in this area which afford high dilution, direct effects are not pronounced. However, it was suspected that secondary effects might be occurring whereby the character of the rivers and lakes downstream might be changed. Domestic wastes and some industrial wastes increase the input of nutrients to streams resulting in an increase in the yield of all forms of life in these waters. In small amounts the effect can be beneficial, but ultimately the balance is changed resulting in different forms or species predominating. The ideal level will vary with the aims and viewpoint of the observer, though it may be argued that any change to the natural

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balance is undesirable. Most important of the nutrients, because they tend to be "limiting" substances are nitrates and phosphates. These are basic chemicals needed for plant growth which is itself the foundation of fresh water as well as of terrestial and marine life cycles. Hence the limitation of much of the present survey to these substances.

Pulp mill waste tests were limited to lignins/tannins and sulphite waste liquor. These substances are strong taste producers and among the most harmful of pulp mill waste materials to water used for domestic purposes, in addition, they act as good indicators of the presence of pulp mill wastes.

On three key sampling points tests were increased to cover all principal constituents lest some important item should have been overlooked.

SOURCES OF POLLUTION - Domestic Wastes.

1. North Golden sewage discharged raw to Kicking Horse River thence to Columbia River.
   Connected population 200
   Outfalls 1

2. Alexander Park, Golden, sewage discharged after secondary treatment (lagoon) to Columbia River.
   Connected population 500
   Outfalls 1

3. Revelstoke sewage discharged raw to Columbia River.
   Connected population 3,500
   Outfalls. several

4. Revelstoke garbage dumped directly into Columbia River.

5. Celgar sewage discharged after secondary treatment (cavitator) and chlorination, to Columbia River.
   Connected population 350
   Outfalls 1

6. Kinnaird, Woodlawn Park, sewage discharged after secondary treatment (rated aeration and chlorination to Davidson Brook thence to Columbia River.
   Connected population 480
   Outfalls 1

7. Trail sewage discharged raw to Trail Creek and Columbia River.
   Connected population 11,300
   Outfalls numerous

8. Warfield sewage discharged raw to the covered portion of Trail Creek thence to Columbia River.
   Connected population 2,000
   Outfalls 1

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9. Tadanac and C.M.& S workforce sewage discharged raw to Columbia River.
   Connected population 350 plus.

10. Rossland sewage discharged raw to Trail Creek.
   Connected population 4,100
   Outfalls 2

11. Fruitvale sewage treated by lagoon and disposed by seepage.
   Connected population 1,000

12. Kimberley including Chapman Camp sewage discharged raw to St. Mary River.
   Connected population 8,000
   Outfalls 1

13. Marysville sewage discharged after primary treatment (septic tank) to Cow Creek thence to St. Mary River.
   Connected population 1,000
   Outfalls 1

14. Cranbrook sewage discharged after primary treatment (anaerobic lagoon) to St. Joseph Creek thence to St. Mary River.
   Connected population 5,000
   Outfalls 1

15. Fernie sewage discharged after primary treatment (septic tank) to Elk River.
   Connected population 2,700
   Outfalls 1

16. Creston sewage discharged after primary treatment (private septic tanks) to Deadhorse Creek thence to Goat River and Kootenay River.
   Connected population 2,000
   Outfalls 1

17. Nelson sewage discharged raw to Kootenay River.
   Connected population 8,000
   Outfalls 1

18. Nelson garbage dumped beside Kootenay River without confinement.

The above are the significant contributors to the Columbia-Kootenay. There are doubtless many small sources such as individual septic tanks, indiscriminate garbage dumping, land wash etc.; over these, where possible, the local health authorities exercise control.

During the past year some improvements have occurred:

1. Cranbrook is in the process of constructing new lagoons (17 acres) to give secondary quality effluent.

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2. Creston has secured land suitable for lagoon purposes.

3. Revelstoke has discontinued the practice of dumping garbage in the Columbia and is now using a land fill type operation on the river bank above high water.

SOURCES OF POLLUTION - Industrial Wastes.

1. Celgar Pulp Mill wastes discharged to Columbia River
   Quantity 25,000,000 g.p.d.

2. Trail smelter and fertilizer operations, wastes discharged to Topping Creek and Columbia River.

3. Michel wastes from the coal by-products plant of a bituminous or phenolic character reach Michel Creek in small continuous quantities.

4. Mineral King Mine, supernatant liquid from tailings pond discharges to Toby Creek.

5. Kimberley operations of C.M.& S.

During the past year the only significant improvement has been the addition of a "savealL" screen in the Celgar Mill to the effluent line carrying floor and other general drainage; this materially reduces the escapement of fibre to the river.

Construction is now underway to double the capacity of the Kimberley fertilizer plant.

BACTERIOLOGICAL CONDITIONS

The appended Table I lists the geometric mean M.P.N. coliform counts obtained during this survey, together with highest and lowest readings. As can be readily seen, high counts occur below the three major centres of Kimberley, Nelson and Trail. No figures were obtained for Revelstoke. The significance of these high counts varies with downstream uses.

Because of the relatively small dilution afforded by the St. Mary River, the bacterial pollution therein caused by the Kimberley group is very high. This water is not used domestically downstream (though it is for irrigation) while the presence of industrial wastes renders it the less likely to be so used, hence the danger from this pollution is not extreme.

Similarly, for a considerable distance downstream of Revelstoke or of the Trail group, no domestic use is known to be made of the Columbia, hence no great danger arises.

The situation arising from the discharge of sewage by Nelson is far more serious. There are numerous communities downstream; several of these, Kinnaird, Trail and Warfield obtain all or part of their domestic water supplies from the Columbia. At Kinnaird, the average count is approaching the acceptable limit for water receiving chlorination alone. The geometric mean count for the whole year being 35 per 100 cc. If, however, we consider only half the year, taking the six winter months of October through March when flow is least, a count of 68 is obtained.

CHEMICAL CONDITIONS

Chemical tests carried out during the period of study are divided into three groups.

First, all principal chemical constituents were determined for three samples taken monthly from the Columbia above the Celgar pulp mill, from the Kootenay above its confluence with the Columbia and from the Columbia at Kinnaird below both the confluence and the Celgar mill. At Kinnaird, samples were composited from 9 grab samples taken at three depths at each of three locations across the width of the river, the others were single surface grab samples. The mean results are listed and appended in Table II.

In these tests, no unusual concentrations are noted. Generally, the composition of samples at Kinnaird is intermediate between those taken from above Celgar and from the Kootenay River. Some Kinnaird results are somewhat higher, notably in suspended solids which may be attributed to Celgar wastes; others that show lower values at Kinnaird, such as silica and the nitrogen tests, cannot be so explained. It must be remembered that laboratory results are not absolute; many of the differences noted are close to or within the precision of the tests concerned, though multiple testing will have increased the reliability of the results obtained. For further comparison, a single set of analyses taken between Kootenay Lake and the boundary are included; these exhibit nothing unusual. (See Table III)

The second group of tests was specifically for pulp mill wastes. These were taken bi-weekly from above Celgar, below Celgar, at Kinnaird and sporadically from the Kootenay for control purposes. Throughout 1962, these tests were consistently negative, the last positive results having occurred in November, 1961. Occasional reports are still received of foam on the river originating at Celgar. Studies made by the B.C. Research Council for Celgar Ltd. confirm our findings that the effects of the Celgar pulp mill on the quality of Columbia River water are minimal.

The third group of tests for the determination of fertilizing chemicals cover a far greater range of the watershed from Skookumchuck in the East Kootenay to the Columbia at the International Boundary; 16 stations in all. The mean results are also tabulated and appended (see Table IV); interpretation of these results is considerably more complex due to their being at least three possible agents causing change in levels, dilution, biological assimilation, and chemical precipitation. Phosphate, in conjunction with iron, is precipitated as insoluble ferric phosphate under aerobic conditions. From the little information available on the South Arm of Kootenay Lake, summer stratification is poorly developed hence aerobic conditions should generally be maintained at all depths and precipitates be permanently removed from circulation; however, the iron content is generally low.

Examination of the results shows that nitrate concentrations are nowhere significant. Phosphates, however, show a marked increase after additions of industrial wastes at Kimberley and Trail. Reduction in concentration between Kimberley and Creston is caused partly by dilution but there is also a reduction in total quantity. At Creston, phosphate concentrations are still about four times the natural level, but after passing through the South Arm of Kootenay Lake the level has been reduced to an approximately natural level. On a daily tonnage basis there is a steady reduction from

Wycliffe to Harrop. However, in passing through the South Arm of Kootenay Lake there is a reduction about as large as that between Wardner and Creston. The fate of this phosphate is, therefore, uncertain, though it is suspected that it is giving rise to some increase in algal growth. Of this there is no firm evidence other than that lying in the observation of fisherman and others familiar with the area; no liminological or effective chemical studies have been made. No reports have been received indicating any excessive growth in Roosvelt Lake which has always received similar phosphate wastes from Trail. This suggests that an equilibrium state exists in which algae do not occur in troublesome proportions.

The Fish and Game Branch reports that some deposition of solids (gypsum) has been observed in the St. Mary River.

CONCLUSIONS

Except for downstream of the major centres, bacteriological conditions in the Columbia-Kootenay watershed are generally good and the water is suitable for domestic use with chlorination only. Because of the combination of high counts and downstream use the condition is most severe in the lower Kootenay below Nelson. The course of Trail Creek passing through Trail also renders the high pollution resulting from Rossland sewage unacceptable.

There is a suspicion that phosphates contained in industrial wastes from Kimberley are promoting increased algal growth in the South Arm of Kootenay Lake. No firm evidence of this is recognizable from this survey.

Small quantities of coal distillation wastes are entering Michel Creek from the plant in that community. Such wastes are strong taste producers and are very detrimental to fishlife. Only visual evidence exists of this discharge.

RECOMMENDATIONS

1. Improvement in the bacteriological quality of receiving streams below the major centres is desirable. Below Nelson, it is imperative because of downstream uses; below Rossland it is also highly desirable because of the course of Trail Creek. Such improvement requires primary treatment or better and chlorination.

2. The practice of dumping garbage into the river or on the river banks without confinement should cease immediately.

3. Means should be explored with C.M.& S. to find alternative means of disposing of waste products, particularly from the extension now under construction.

   Continued study of the effects of these wastes is needed. A limnological survey of the South Arm of Kootenay Lake would establish a record of present conditions. This is a long, painstaking and costly process but might be achieved in conjunction with the Department of Biology, University of British Columbia.

4. Means should be sought to eliminate the discharge of coal by-products wastes into Michel Creek.

March 26, 1963

C.A. Goldie

BACTERIOLOGICAL RESULTS TABLE I

1961-62 Series Coliform Counts, M.P.N. per 100 ml.

Sampling Point	River or Lake	No. of Samples	High M.P.N.	Low M.P.N.	Geometric Mean M.P.N.
Skookumchuk	Kootenay	28	> 2,400	< 1	5.6
St.Mary's Lake(C.M.&S.)	St.Mary	31	130	< 1	2.7
Wycliffe	St.Mary	32	54,000	23	1,640
Wardner	Kootenay	10	350	2	23
Morrissey	Elk	6	330	2	14
Creston	Kootenay	30	1,100	< 1	60
Bealby Point	Kootenay	24	8	< 1	1.6
Pulpit Rock	Kootenay	25	790	< 1	40
1st Island below Nelson	Kootenay	25	1,300	17	282
Taghum	Kootenay	25	1,700	11	180
Beasley	Kootenay	22	790	23	142
Corra Lynn	Kootenay	24	700	33	138
Slocan	Slocan	22	46	2	12
Glade W. Side	Kootenay	22	1,600	23	116
Glade E. Side	Kootenay	21	540	23	92
Brilliant	Kootenay	22	490	17	66
Donald	Columbia	12	240	< 1	39
Needles	Columbia	6			< 1
Above Celgar	Columbia	22	2	< 1	< 1
Below Celgar	Columbia	22	49	< 1	7.4
Kinnaird	Columbia	175	490	< 1	35
Kinnaird - West	Columbia	59	350	2	31
Kinnaird - Centre	Columbia	58	260	< 1	41
Kinnaird - East	Columbia	58	490	< 1	36
Birchbank	Columbia	21	130	< 1	25
Rock Island	Columbia	22	13,000	68	694
Fort Sheppard	Columbia	22	3,300	79	427

LOWER COLUMBIA

TABLE II

CHEMICAL ANALYSIS RESULTS

for Water Year Oct. 1961 to Sept. 1962

ITEM	Above Celgar	Kootenay above confluence (Brilliant)	Kinnaird (Composite or average from three locations)
pH in Field	7.8	8.2	8.0
pH on Arrival	7.5	7.6	7.7
Colour	5	5	5
Turbidity	5	5	5
Total solids	91	104	102
Fixed solids	56	68	63
Volatile Solids	35	36	39
Dissolved Solids - Determined	77.8	90.8	83.3
Dissolved Solids - Calculated	75.4	87.8	82.7
Suspended Solids	14.4	14.7	19.4
Phenolphthalein Alkalinity	0	0	0
Methyl Orange Alkalinity	55	61	60
Total Hardness	63	76	71
Carbonate Hardness	54.8	61.9	59.4
Non-Carbonate Hardness	8.2	14.1	11.6
Silica	3.6	3.4	2.7
Surfactants - ABS	0.05	0.05	Traces
Free CO_2	3.6	3.5	3.16
Calcium	19.8	23.9	22.3
Magnesium	3.23	3.76	3.69
Iron	0.042	0.041	0.053
Sulphate	11.3	14.6	13.1
Bicarbonate	33.2	37.1	36.1
Carbonate	0	0	0
Chloride	1.2	1.7	1.4
Fluoride	0.05	0.05	0.05
Albuminoid Nitrogen	0.055	0.073	0.051
Ammonia Nitrogen	0.075	0.108	0.071
Nitrite Nitrogen	0	0	0

Above values are arithmetic mean values of 12 samples taken at approximately monthly intervals throughout year.

Results in parts per million or units as applicable.

TABLE III

LOWER COLUMBIA SAMPLING RESULTS

Samples taken October 16, 1961 only, except for Kootenay Lake - mean of 3 samples taken Oct. 10, 1961, in each arm near junction

ITEM	Above Celgar	Below Celgar	Kootenay Lake	Kootenay above confluence
pH in field	7.6	7.6	-	7.5
pH on arrival	7.7	7.7	7.5	7.8
Colour	5	5	5	5
Turbidity	2	2	5	3
Total solids	75.0	78.0	96.0	88.0
Fixed solids	45.0	46.0	58.0	58.0
Volatile solids	30.0	32.0	38.0	30.0
Dissolved solids - determined	65.0	67.0	87.0	80.0
Dissolved solids - calculated	67.0	68.0	93.0	77.0
Suspended solids				
Phenolphthalein Alkalinity	0	0	0	0
Methyl Orange Alkalinity	53.0	53.0	72.0	56.0
Total hardness	60.0	60.0	81.0	70.0
Carbonate hardness	53.0	53.0	72.0	56.0
Non-Carbonate hardness	7.0	7.0	9.0	14.0
Silica	2.3	2.5	2.1	2.5
Surfactants - ABS				
Free CO_2	2.0	2.0	4.3	1.7
Calcium	16.9	16.9	23.9	23.6
Magnesium	4.2	4.2	5.0	2.6
Iron	Trace	0.08	0.01	Trace
Sulphate	8.5	8.5	13.5	11.0
Bicarbonate				
Carbonate				
Chloride	0.7	0.7	1.2	0.7
Fluoride	0	0	0.09	0
Albuminoid Nitrogen	0	0	0	0
Ammonia Nitrogen	0	0	0	0
Nitrite Nitrogen	0	0	0.004	0

Results in parts per million or units as applicable.

TABLE III

Kinnaird West	Kinnaird Centre	Kinnarid East	Birchbank	Rock Island	Fort Sheppard
7.6	7.6	7.6	-	7.6	7.6
7.8	7.8	7.8	7.8	7.6	7.65
5	5	5	5	5	5
3	4	4	4	4	4
82.0	82.0	81.0	82.0	98.0	94.0
54.0	52.0	52.0	53.0	65.0	60.0
28.0	30.0	29.0	29.0	33.0	34.0
75.0	78.0	78.0	75.0	88.0	85.0
72.0	75.0	74.0	72.0	87.0	85.0
0	0	0	0	0	0
56.0	56.0	56.0	56.0	58.0	59.0
66.0	67.0	67.0	67.0	73.0	74.0
56.0	56.0	56.0	56.0	58.0	59.0
10.0	11.0	11.0	11.0	15.0	15.0
2.5	2.5	2.5	2.7	2.7	2.7
1.6	1.5	4.0	1.6	3.2	3.0
19.5	20.0	20.0	20.0	22.1	22.2
4.1	4.0	4.0	4.0	4.2	4.3
0.08	0.08	0.06	0.08	0.04	0.08
9.5	10.0	10.0	10.0	17.0	17.1
0.7	0.7	0.7	0.7	0.7	0.7
0	0	0	0	0	0.15
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

PARTIAL CHEMICAL ANALYSIS RESULTS

TABLE IV

Arithmetic mean values

Sampling Point	River or Lake	No. of Samples	Nitrate ppm	Total Phosphate ppm	Ortho/Solvent Phosphate ppm
Donald	Columbia	11	.07	.104	.047
Skookumchuck	Kootenay	44	.053	.096	.056
St. Mary's Lake (CM & S. pumphouse)	St. Mary	37	.067	.075	.050
Wycliffe	St. Mary	42	.105	6.35	4.50
Wardner	Kootenay	34	.062	.828	5.96
Morrissey	Elk	13	.04	.082	.040
Creston	Kootenay	36	.057	.280	.190
Harrop	Kootenay	24	.038	.091	.049
Beasley (Corra Lynn)	Kootenay	24	.040	.086	.046
Above Confluence	Kootenay	22	.03	.087	.046
Above Celgar	Columbia	32	.05	.063	.035
Below Celgar	Columbia	22	.05	.078	.043
Kinnaird	Columbia	89	.03	.072	.039
Kinnaird West		30	.033	.073	.039
Kinnaird Centre		30	.030	.073	.040
Kinnaird East		29	.025	.070	.040
Birchbank	Columbia	22	.04	.330	.047
Rock Island	Columbia	22	.04	.330	.227
Fort Sheppard	Columbia	22	.04	.302	.200

Arithmetic mean values

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Above Confluence	Kootenay	22	.03	.087	.046
Above Celgar	Columbia	32	.05	.063	.035
Below Celgar	Columbia	22	.05	.078	.043
Kinnaird	Columbia	89	.03	.072	.039
Kinnaird West		30	.033	.073	.039
Kinnaird Centre		30	.030	.073	.040
Kinnaird East		29	.025	.070	.040
Birchbank	Columbia	22	.04	.330	.047
Rock Island	Columbia	22	.04	.330	.227
Fort Sheppard	Columbia	22	.04	.302	.200

ANALYSES DOWNSTREAM OF KIMBERLEY PLANT.
FROM CHAS. KEEMAN. NOV 1964.

Peak day 300 T/d P per dy. 13

BACTERIOLOGICAL RESULTS — TABLE V

1963-64 Series — Coliform Counts, M.P.N. per 100 ml.

Sampling Point	River or Lake	No. of Samples	High M.P.N.	Low M.P.N.	Geometric Mean M.P.N.
Athalmer	Columbia	11	920	11	51
Nicholson	Columbia	11	79	< 1	10
Donald	Columbia	8	> 2,400	2	124
Revelstoke above Hwy.	Columbia	19	540	< 1	9.2
Revelstoke below outfalls	Columbia	16	> 2,400	240	925
12 Mile Ferry	Columbia	22	1,600	79	425
Sidmouth Ferry	Columbia	22	> 2,400	13	306
Kimberley Hwy.	Joseph	11	54,000	490	5,880
Mission J	Joseph	11	33,000	240	931
Wycliffe	St.Mary	10	13,000	490	3,350
Mission M	St.Mary	11	7,000	230	2,070
Wardner	Kootenay	11	> 2,400	< 1	33
aldo K.	Kootenay	9	350	2	28
Michel	Michel	11	350	< 1	5.8
Above Fernie	Elk	11	33	< 1	6.1
Morrissey	Elk	11	2,600	240	740
Waldo E	Elk	10	490	14	148
Arrow Creek	Goat	10	49	< 1	1.8
Porthill Hwy.	Goat	11	140	< 1	5.4
Below Dead Horse Creek	Goat	1	-	-	130,000
Tagum	Kootenay	102	> 2,400	2	254
Brilliant	Kootenay	103	540	< 1	50

ADDENDUM TO THE "REPORT ON COLUMBIA-KOOTENAY WATERSHED" of March 26, 1963

INTRODUCTION

The report to which this is appended was written as a simple summary of the limited survey carried out on the Columbia-Kootenay during 1961-1962. For simplicity, survey data was reduced to a minimum in the form of the four tables that conclude that report.

This addendum serves to record first, all collected data in its original form. Secondly, the data is shown graphically, where suitable, to permit visual understanding of the basic statistical data. Finally, some attempt is made to analyze the phosphate content of the waters, these results also being demonstrated graphically.

Some additional field work is included in this addendum. It consists solely of bacteriological sampling results taken during 1963-64 to amplify the previous data.

BACTERIOLOGICAL SURVEY

The points and methods of sampling are indicated on the accumulated data sheets and are located on the appended map.

It may be noted that additional sampling was carried out with new stations at:

(a) Athalmere and Nicholson on the Columbia.

(b) In the Revelstoke area of the Columbia.

(c) The Joseph Creek-St. Mary River area.

(d) The Elk Creek series.

(e) At Waldo on the Kootenay.

(f) On the Goat River near Creston.

(g) At Taghum Bridge.

(h) At Brilliant Bridge.

So that these results may be related to those previously taken, certain stations were repeated, namely, at Donald, Wycliffe, Morrissey, and Wardner.

Series (b) at Revelstoke, covered an area previously omitted; while Series (f) was intended to show the effects of Creston and its environs on the Goat River. This last series produced only one M.P.N. count downstream of the Creston discharge due to difficult access and misjudged dilutions so gives but a poor indication of the effects. Series (g) and (h) consisting of nine samples each taken at three depths at three locations across the river at Taghum and Brilliant were intended to determine whether single surface samples taken in the original series were indeed representative of overall conditions.

The summarized results of these additional samplings follow in Table V. In general, where sampling at certain stations was repeated, the results obtained were reasonably similar to the originals, considering the small number of samples taken, and they would not indicate any radical changes in the conditions over the intervening year.

The tests at Taghum Bridge and Brilliant Bridge indicate that the river at these points, and particularly at the latter, is well mixed and that single surface samples do indeed give an adequate representation of the overall condition existing.

The summarized results at individual stations are represented by the geometric mean of the counts obtained. In calculating these means negative test results were assigned a value of one; where positive results were obtained giving counts greater than 2400 (or suitable multiple according to dilution); the value 2400 has been used except that in a few instances a commonly occurring higher number has been adopted, these are shown in brackets.

The combined results of both surveys are shown diagramatically on the diagram following Table V; this diagram includes an approximate representation of the river flows concerned.

CHEMICAL SURVEYS

The arithmetic mean values of analyses of principal physical and chemical constituents at Celgar, Brilliant and Kinnaird are tabulated in the original report. The individual test report sheets are appended to this addendum.

Partial chemical analyses (all individual results appended) covered the three phases of pulp mill wastes, nitrates and phosphates. Nothing can be added to the previous comments regarding pulp mill wastes and nitrates. Phosphates are further discussed.

The sampling stations are as noted for the relevant bacteriological series.

CHEMICAL SURVEYS - cont'd.

Because of the very important function of phophates as limiting nutrients and of their specific presence in the waters under study some additional analysis of these results was made to demonstrate their variations in a more comprehensible manner. Three graphical representations are used. The first is a simple graphical plotting of phosphate concentrations; these are shown against a background of river flow. The second series depicts the daily tonnage passing each sampling station. This representation removes the factor of variable flow and permits a direct quantity comparison between station and highlights local industrial contributions. It must be borne in mind that such a representation is a vast extrapolation of the chemical content of a small sample applied to the daily discharge at the station concerned. Such a representation cannot be taken as accurate, but it is nevertheless, valid for general comparison purposes. The validity of this interpretation is attested to by some of the closely comparative results obtained. This is noticeable particularly at Harrop and Beasley and at Birchbank and Kinnaird, but is also apparent in the general trends observed elsewhere as at Rock Island and Fort Sheppard or even Wycliffe and Wardner.

From these representations, geometric means were determined graphically by planimeter and are summarized as follows:

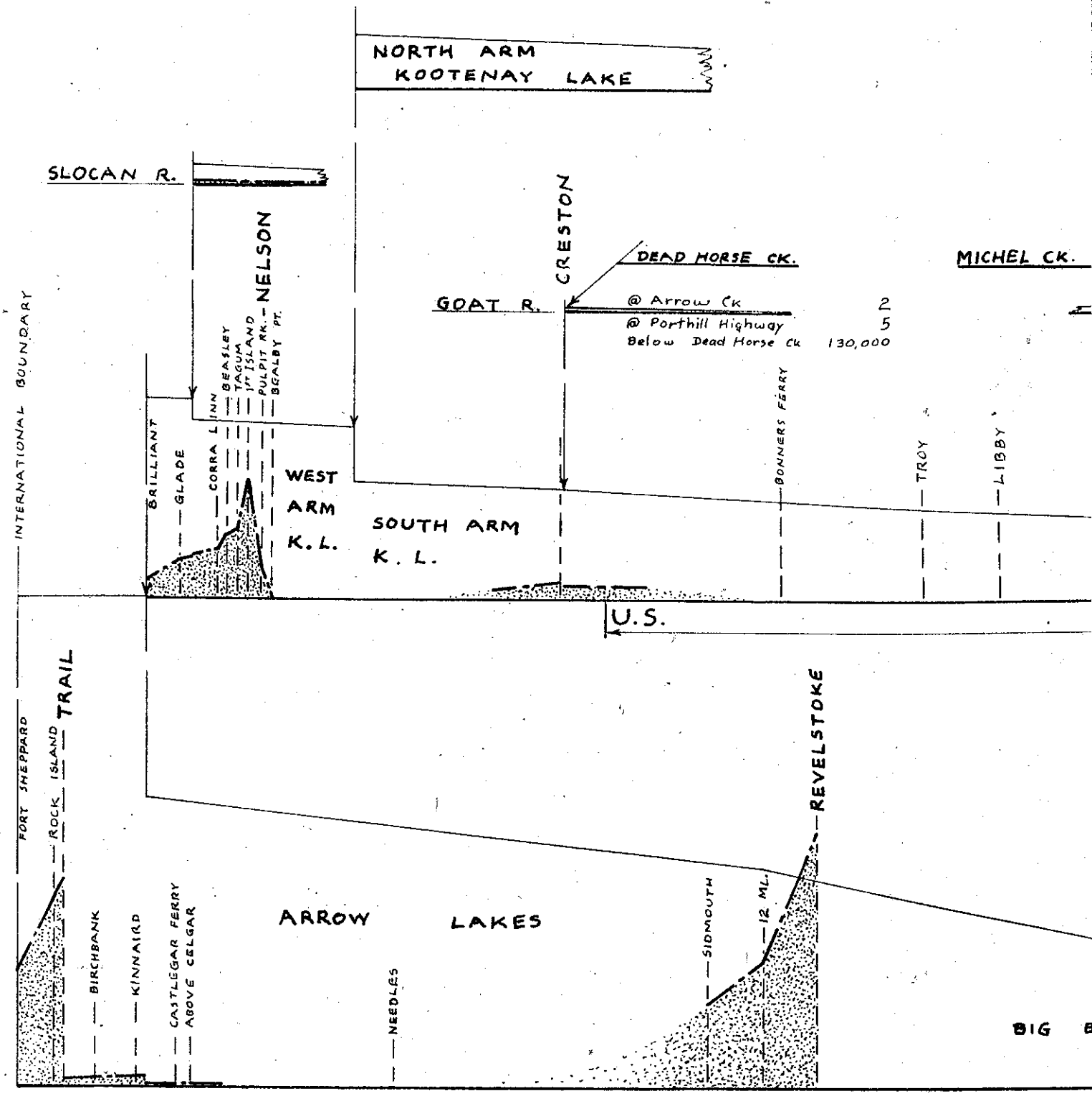
Station	Total Phosphates Tons per Day	Soluble Phosphates
Skookumchuck	0.9	0.4
Wycliffe	38.5	22.5
Wardner	12.6	8.5
Creston	9.7	6.1
Harrop	7.1	3.9
Beasley	7.3	3.9
Kinnaird	14.9	8.2
Birchbank	16.1	9.7
Rock Island	39.5	26.0
Fort Sheppard	31.0	23.6

The third series of graphical representations are designed to demonstrate the distribution of the determined phosphates into their soluble and complex fractions. These hystograms show the relative frequency of occurrence of the various ratios of soluble to total phosphates. Examination of the hystograms shows that a greater proportion of total phosphates is in the soluble form where high concentrations

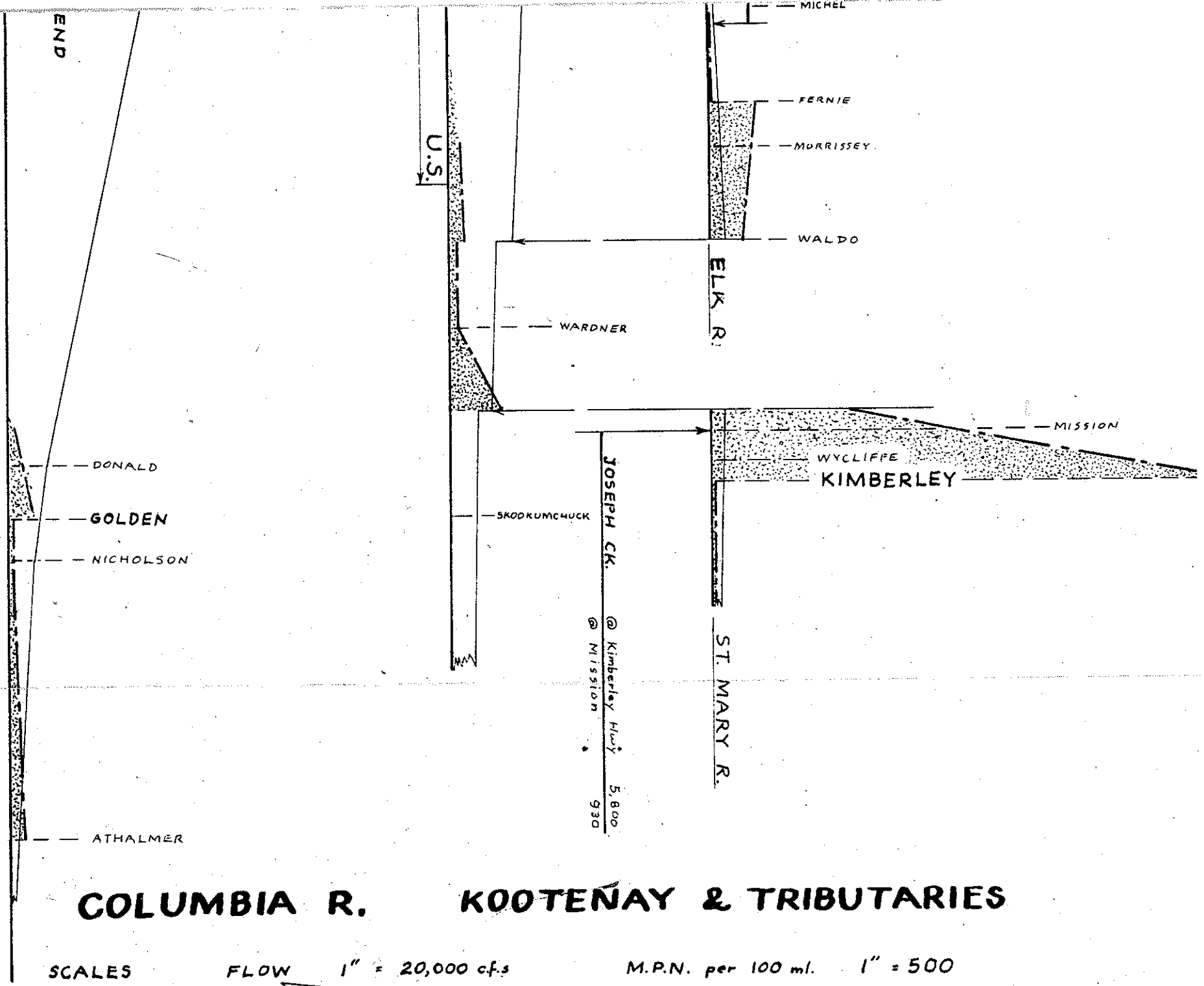
occur resulting from industrial wastes. Thus, not only is the total quantity of growth promoting phosphate greatly increased by the industrial discharges, but a larger proportion of this discharge is in the form most readily available for plant assimilation.

It is anticipated that further information will be forthcoming in the next few years on changing conditions in Kootenay Lake. An extensive three year study of the physical and chemical limnology and the ecology of the lake is presently being conducted by the Research Division of the Fish and Game Branch, operating from U.B.C. under the direction of Dr. T.G. Northcote, Division Fisheries Biologist. The first year's field work has just been completed. It is fortunate that a study was made of the lake prior to the introduction of industrial wastes; though not as expensive as the present study it is sufficient to serve as a good base for assessing the extent of changes. Though no exact measures are as yet forthcoming, it is understood from conversations that a marked change is readily evident.

* * *

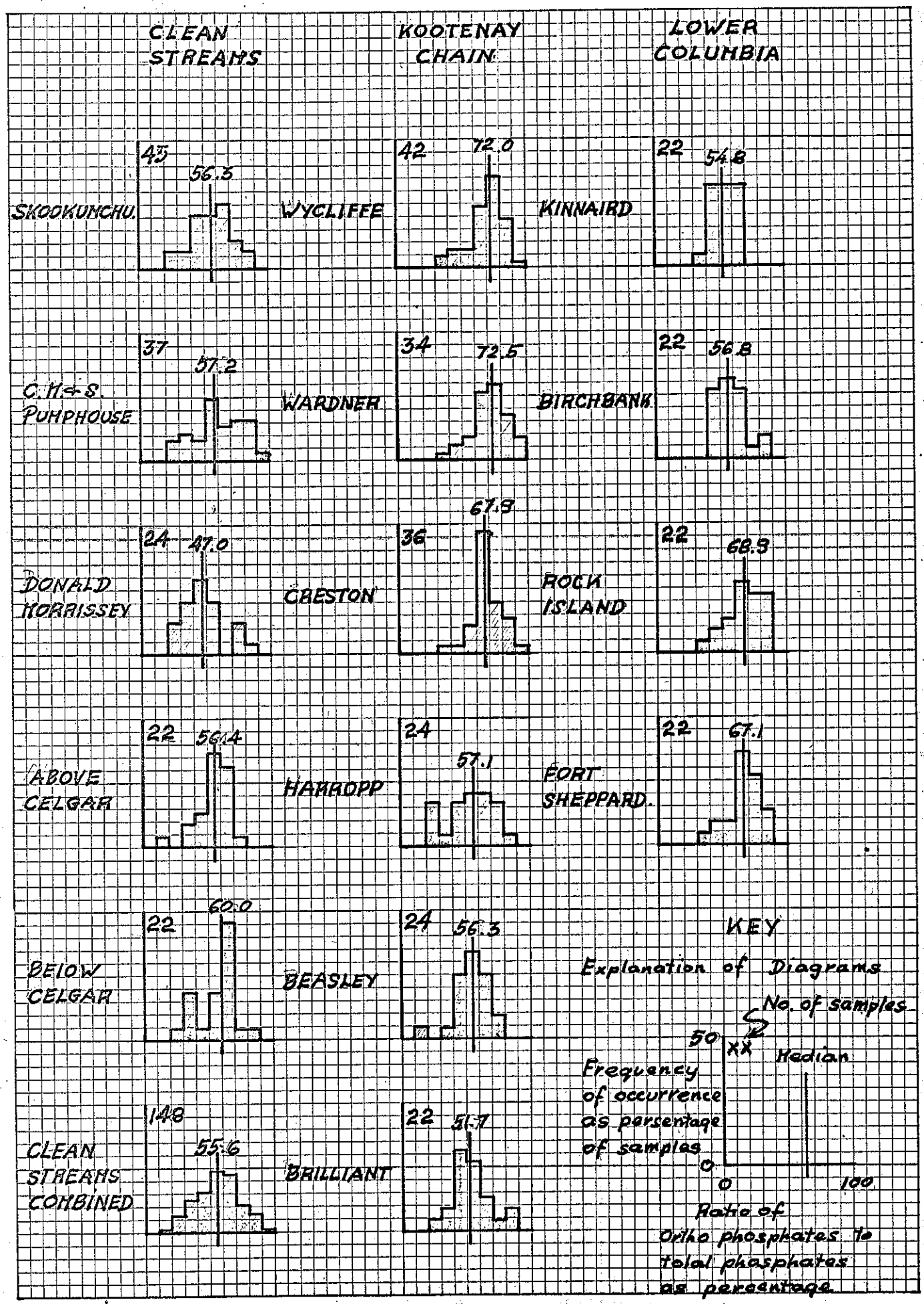

NORTH ARM
KOOTENAY LAKE
SLOCAN R.
NELSON
CRESTON
DEAD HORSE CK.
MICHEL CK.
GOAT R.
@ Arrow Ck 2
@ Porthill Highway 5
Below Dead Horse Ck 130,000
INTERNATIONAL BOUNDARY
BEASLEY
TAGUM
1st ISLAND
PULPIT RK.
BEALBY PT.
INN
BRILLIANT
GLADE
CORRA L
WEST
ARM
K.L.
SOUTH ARM
K. L.
BONNERS FERRY
TROY
LIBBY
U.S.
FORT SHEPPARD
ROCK ISLAND
TRAIL
BIRCHBANK
KINNAIRD
CASTLEGAR FERRY
ABOVE CELGAR
ARROW
LAKES
NEEDLES
SIDMOUTH
12 MI.
REVELSTOKE
BIG

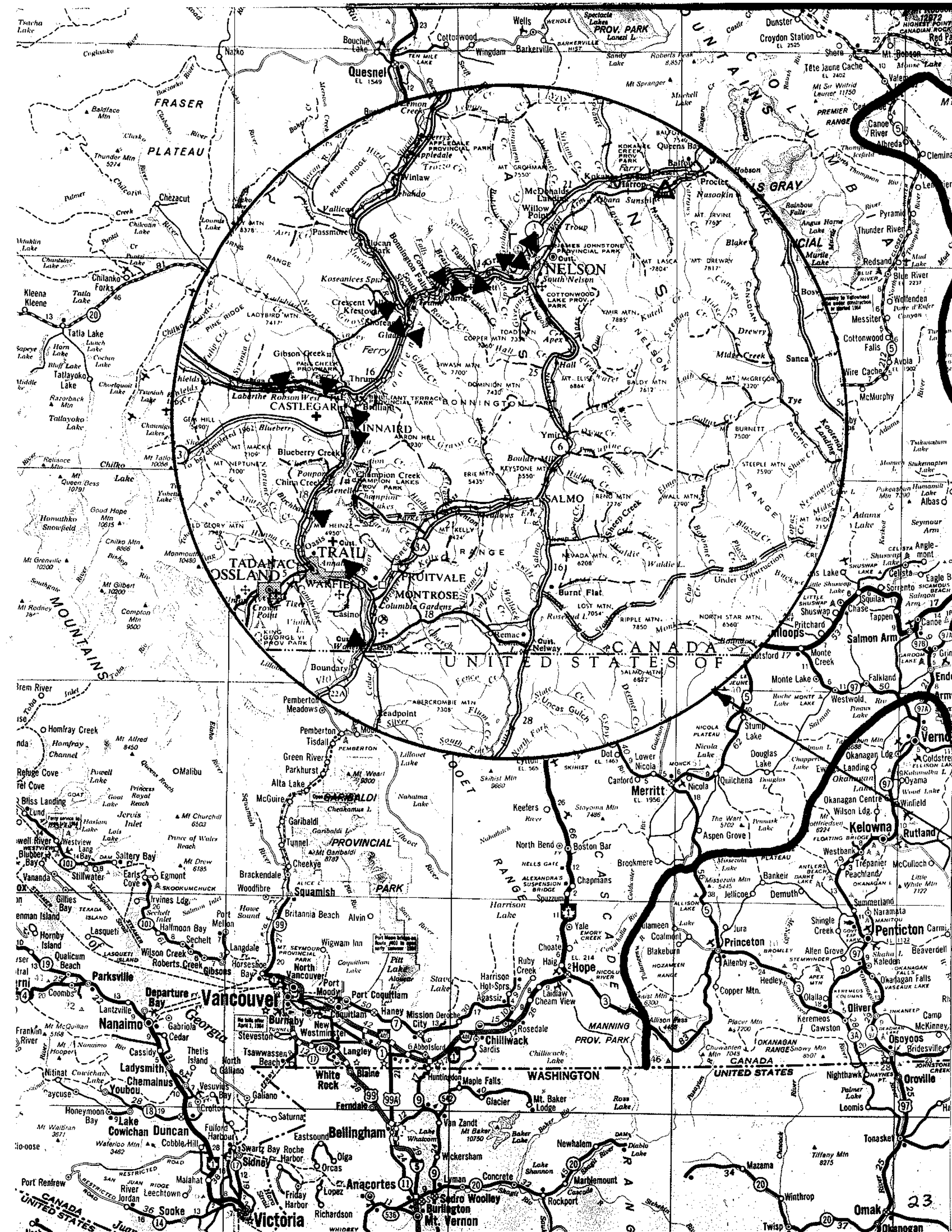
SCALE 1" =



COLUMBIA R. KOOTENAY & TRIBUTARIES

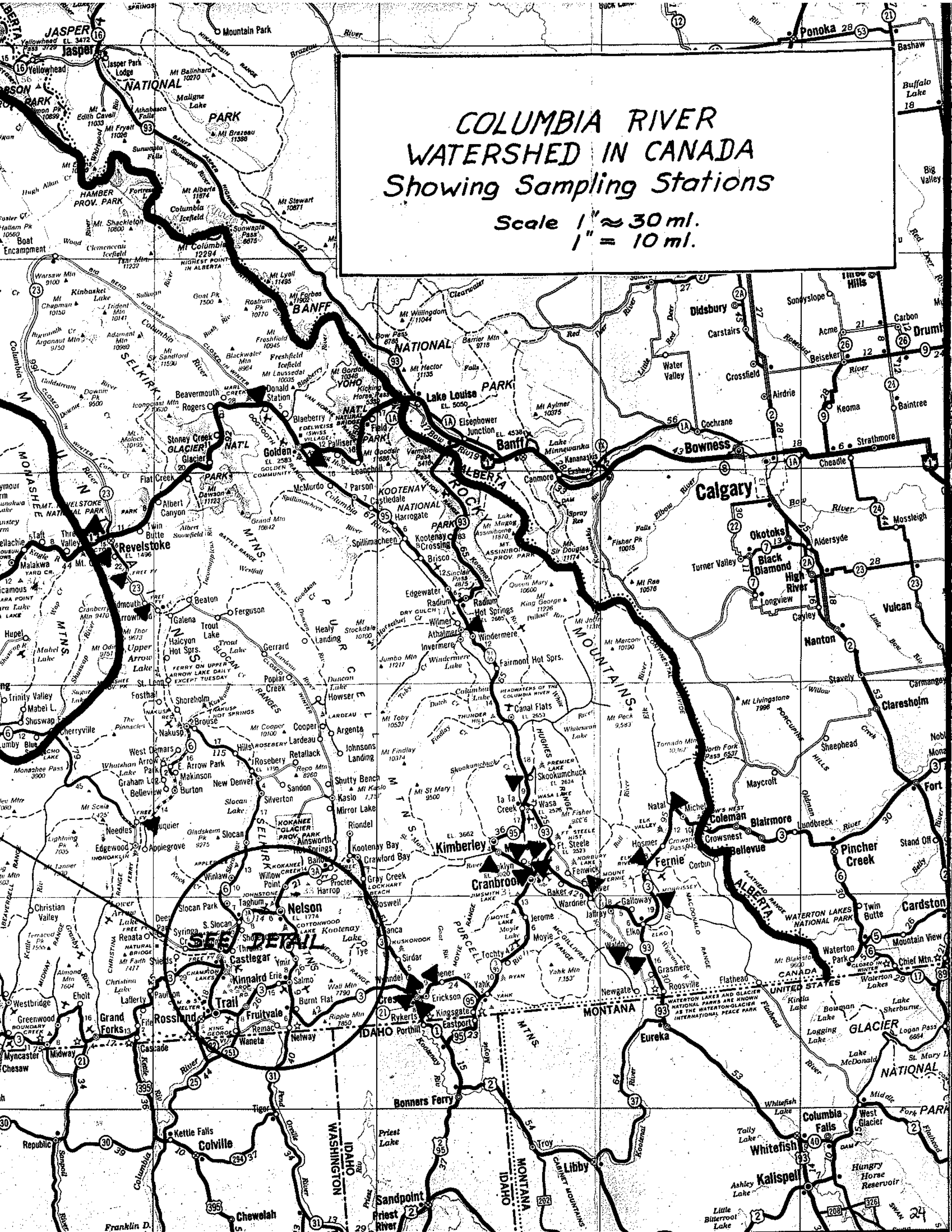
SCALES FLOW 1" = 20,000 c.f.s M.P.N. per 100 ml. 1" = 500





Quesnel
Wells
Barkerville
Cottonwood
Wingdam
Nazko
FRASER
PLATEAU
Chezacut
Tatla Lake
Kleena Kleene
Chilanko Forks
CASTLEGAR
KINNAIRD
NELSON
South Nelson
TRAIL
TADANAC
ROSSLAND
WARFIELD
FRUITVALE
MONTROSE
SALMO
Ymir
Burnt Flat
Nemac
Waneta Dam
Boundary
CANADA
UNITED STATES OF
Castlegar
Brilliant
Robson West
Blueberry Creek
Champion Creek
China Creek
Genelle
Appledale
Winlaw
Slocan Park
Passmore
Crescent Valley
Krestova
Thrums
Balfour
Kokanee Creek Prov Park
Procter
Harrop
Willow Point
Taghum
Bonnington Falls
Columbia Gardens
Casino
Oasis
BONNINGTON
RANGE
Kamloops
Salmon Arm
Vernon
Kelowna
Penticton
Merritt
Princeton
Hope
Oliver
Osoyoos
Oroville
Okanagan
Vancouver
North Vancouver
Burnaby
New Westminster
Squamish
Nanaimo
Ladysmith
Duncan
Victoria
Sidney
Sooke
Chilliwack
Abbotsford
Bellingham
Blaine
Anacortes
Sedro Woolley
Burlington
Mt. Vernon
WASHINGTON
UNITED STATES
Omak
Twisp
Winthrop
Tonasket
CASCADE
GARIBALDI PROVINCIAL PARK
MANNING PROV. PARK
Georgia

23


COLUMBIA RIVER
WATERSHED IN CANADA
Showing Sampling Stations
Scale 1" ≈ 30 ml.
1" = 10 ml.
SEE DETAIL

BACTERIOLOGICAL DATA
1961-62 Series

SKOOKUMCHUCK - On the Kootenay River approximately 25 river miles upstream from the confluence of the St. Mary River. Sampled by throwing a bottle from the bank on a line or lowering it from the highway bridge when stream edges frozen. Control sample.

Date	Count	Date	Count
4 Oct. 61	< 1	7 May 62	4
2 Nov.	< 1	14 May	2
16 Nov.	< 1	28 May	23
22 Nov.	< 1	4 June	13
13 Dec.	< 1	25 June	490
10 Jan. 62	2	2 July	23
24 Jan.	< 1	9 July	330
15 Feb.	6.8	23 July	< 1
12 March	23	30 July	6.8
26 March	< 1	13 Aug.	< 1
2 April	23	3 Sept.	< 1
9 April	< 1	10 Sept.	> 2400 (2400)
16 April	110	17 Sept.	< 1
30 April	11	24 Sept.	< 1

Geometric Mean (28 samples) 5.6

ST. MARY'S LAKE (C.M.& S.) - On the St. Mary's River, normally sampled at C.M.& S. pumphouse, 15 miles from confluence with Kootenay River, collected by throwing bottle on a line from the bank. Sampled from road bridge at outlet of St. Mary's Lake 25 miles from confluence when access to pumphouse impossible due to snow. Control sample.

Date	Count	Date	Count
25 Oct. 61	< 1	14 May 62	2
10 Nov.	2	21 May	33
22 Nov.	< 1	28 May	23
20 Dec.	4.5	4 June	11
10 Jan. 62	2	25 June	13
24 Jan.	2	2 July	4.5
14 Feb.	< 1	9 July	2
21 Feb.	< 1	23 July	< 1
12 March	< 1	30 July	23
19 March	2	13 Aug.	< 1
26 March	< 1	20 Aug.	130
2 April	7.8	3 Sept.	< 1
9 April	< 1	10 Sept.	7.8
16 April	4.5	17 Sept.	2
30 April	< 1	24 Sept.	< 1
7 May	2		

Geometric Mean (31 samples) 2.7

WYCLIFFE - On St. Mary's River, 9 miles from confluence with Kootenay and 6 miles below Kimberley. Sampled by throwing bottle on a line from the bank.

Date	Count	Date	Count
4 Oct. 61	4,600	30 April 62	2,400
12 Oct.	3,300	7 May	3,500
25 Oct.	7,900	14 May	3,500
2 Nov.	54,000	21 May	9,200
10 Nov.	790	28 May	9,200
22 Nov.	2,400	4 June	3,500
10 Jan. 62	3,300	2 July	490
24 Jan.	330	9 July	240
14 Feb.	1,300	23 July	490
21 Feb.	2,400	30 July	23
12 March	3,300	13 Aug.	1,300
19 March	2,400	20 Aug.	2,500
26 March	330	3 Sept.	790
2 April	3,500	10 Sept.	350
9 April	2,400	17 Sept.	240
16 April	2,400	24 Sept.	1,300

Geometric Mean (32 samples) 1,640

WARDNER - On the Kootenay River, 20 miles downstream of confluence of St. Mary's River. Sampled by lowering bottle from highway bridge.

Date	Count	Date	Count
19 Oct. 61	350	30 April 62	49
27 Oct.	23	14 May	130
22 Nov.	2	23 July	49
18 Jan. 62	7.8	13 Aug.	130
19 March	2	24 Sept.	4.5

Geometric Mean (10 samples) 23

MORRISSEY - On the Elk River, 22 miles from its confluence with the Kootenay and 10 miles below Fernie. Sampled from the river bank.

Date	Count	Date	Count
5 Oct. 61	33	2 April 62	13
22 Nov.	330	25 June	17
19 March 62	2	23 July	13

Geometric Mean (6 samples) 14

CRESTON - On Kootenay River, 16 Miles upstream of Kootenay Lake and 1 mile below the confluence of the Goat River. Sampled by dipping, by hand, from the West Creston ferry at about mid-stream.

Date	Count	Date	Count
19 Oct. 61	170	7 March 62	46
24 Oct.	70	13 March	1,100
1 Nov.	330	19 March	49
15 Nov.	49	2 April	170
6 Dec.	49	9 April	170
13 Dec.	23	16 April	17
20 Dec.	33	30 April	490
11 Jan. 62	79	14 May	170
17 Jan.	490	21 May	330
27 Jan.	33	2 July	23
30 Jan.	330	6 Aug.	23
7 Feb.	22	13 Aug.	13
14 Feb.	49	27 Aug.	13
21 Feb.	170	3 Sept.	< 1
1 March	79	17 Sept.	< 1

Geometric Mean (30 samples) 60

BEALBY POINT - On the West Arm of Kootenay Lake, one mile upstream of the Nelson Highway Bridge. Sampled at mid-stream by dipping from a small boat. A control point for the series of stations on the West Arm.

Date	Count	Date	Count
23 Oct. 61	8	21 April 62	< 1
6 Nov.	2	7 May	2
20 Nov.	2	24 May	2
4 Dec.	< 1	4 June	8
18 Dec.	< 1	18 June	< 1
3 Jan. 62	2	4 July	< 1
15 Jan.	5	16 July	< 1
12 Feb.	< 1	30 July	< 1
26 Feb.	< 1	6 Aug.	2
12 March	< 1	20 Aug.	< 1
26 March	2	4 Sept.	< 1
9 April	< 1	17 Sept.	< 1

Geometric Mean (24 samples) 1.6

PULPIT ROCK - On the West Arm of Kootenay River, one mile downstream of the Nelson highway bridge and approximately opposite the Nelson sewer outfall. Sampled at mid-stream by dipping from a small boat.

Date	Count	Date	Count
10 Oct. 61	130	21 April 62	< 1
23 Oct.	130	7 May	33
6 Nov.	130	28 May	2
20 Nov.	790	4 June	< 1
4 Dec.	130	18 June	2
18 Dec.	330	4 July	23
3 Jan. 62	230	16 July	2
15 Jan.	790	30 July	23
12 Feb.	490	6 Aug.	7.8
26 Feb.	330	20 Aug.	4.5
12 March	45	4 Sept.	33
26 March	140	17 Sept.	33
9 April	110		

Geometric Mean (25 samples) 40

FIRST ISLAND BELOW NELSON - On Kootenay River, 3 miles downstream of Nelson. Sampled by dipping from a small boat in the slack behind the island.

Date	Count	Date	Count
10 Oct. 61	330	21 April 62	230
23 Oct.	490	7 May	170
6 Nov.	490	28 May	130
20 Nov.	1,300	4 June	390
4 Dec.	1,300	18 June	17
18 Dec.	1,300	4 July	130
3 Jan. 62	1,300	16 July	79
15 Jan.	790	30 July	23
12 Feb.	170	6 Aug.	170
26 Feb.	790	20 Aug.	240
12 March	330	4 Sept.	540
26 March	790	17 Sept.	540
9 April	330		

Geometric Mean (25 samples) 282

TAGHUM - On Kootenay River, 5 miles downstream of Nelson. Sampled from a boat or the Taghum highway bridge at about mid-stream.

Date	Count	Date	Count
10 Oct. 61	230	21 April 62	45
23 Oct.	490	7 May	79
6 Nov.	490	28 May	11
20 Nov.	490	4 June	70
4 Dec.	790	18 June	23
18 Dec.	1,700	4 July	220
3 Jan. 62	330	16 July	79
15 Jan.	230	30 July	23
12 Feb.	490	6 Aug.	130
26 Feb.	490	20 Aug.	350
12 March	110	4 Sept.	79
26 March	790	17 Sept.	130
9 April	330		

Geometric Mean (25 samples) 180

BEASLEY - On Kootenay River, 7 miles below Nelson. Sampled from a small boat at mid-stream opposite Beasley Bluffs.

Date	Count	Date	Count
10 Oct. 61	170	26 March 62	110
23 Oct.	230	9 April	170
6 Nov.	230	21 April	45
20 Nov.	330	7 May	170
4 Dec.	790	28 May	23
18 Dec.	330	16 July	49
3 Jan. 62	490	30 July	23
15 Jan.	230	6 Aug.	95
12 Feb.	170	20 Aug.	130
26 Feb.	170	4 Sept.	70
12 March	220	17 Sept.	130

Geometric Mean (22 samples) 142

CORRALYNN - On Kootenay River, 8 miles below Nelson. Sampled from a small boat in the middle of the Corralynn Dam pool.

Date	Count	Date	Count
10 Oct. 61	78	21 April 62	45
23 Oct.	700	7 May	170
6 Nov.	170	28 May	79
20 Nov.	490	4 June	79
4 Dec.	330	18 June	49
18 Dec.	330	4 July	49
3 Jan. 62	490	16 July	49
12 Feb.	330	30 July	33
26 Feb.	68	6 Aug.	220
12 March	170	20 Aug.	540
26 March	170	4 Sept.	79
9 April	170	17 Sept.	49

Geometric Mean (24 samples) 138.

SLOCAN - On the Slocan River, 2 miles above its confluence with the Kootenay. Sampled by lowering a bottle from the Crescent Valley bridge.

Date	Count	Date	Count
23 Oct. 61	33	7 May. 62	23
6 Nov.	7.8	28 May	23
20 Nov.	33	4 Jun.	11
4 Dec.	23	18 Jun.	23
18 Dec.	23	4 Jul.	4.5
3 Jan. 62	11	16 Jul.	11
15 Jan.	4	30 Jul.	13
26 Feb.	2	6 Aug.	23
12 Mar.	2	20 Aug.	46
26 Mar.	7.8	4 Sep.	2
9 Apr.	4.5	17 Sep.	33

Geometric Mean (22 samples) 12

GLADE - On the Kootenay River, 16 miles downstream of Nelson and below 4 dams. Sampled in the East and West thirds of the river by dipping from the Glade ferry.

West Glade Results

Date	Count	Date	Count
23 Oct. 61	240	7 May. 62	110
6 Nov.	350	28 May.	49
20 Nov.	79	4 Jun.	49
4 Dec.	1,600	18 Jun.	130
18 Dec.	170	4 Jul.	49
3 Jan. 62	49	16 Jul.	49
15 Jan.	540	30 Jul.	23
26 Feb.	130	6 Aug.	240
12 Mar.	49	20 Aug.	240
26 Mar.	110	4 Sep.	33
9 Apr.	130	17 Sep.	170

Geometric Means (22 samples) 116

East Glade Results

Date	Count	Date	Count
23 Oct. 61	130	7 May. 62	33
6 Nov.	79	28 May	33
20 Nov.	540	4 Jun.	33
4 Dec.	350	4 Jul.	46
18 Dec.	350	16 Jul.	23
3 Jan. 62	350	30 Jul.	23
15 Jan.	29	6 Aug.	170
26 Feb.	350	20 Aug.	350
12 Mar.	79	4 Sep.	23
26 Mar.	130	17 Sep.	79
9 Apr.	79		

Geometric Means (21 samples) 92

BRILLIANT - On the Kootenay River immediately above its confluence with the Columbia. Sampled by hand dipping from a boat between the Columbia and the Brilliant bridge.

Date	Count	Date	Count
2 Oct. 61	79	19 Mar. 62	17
16 Oct.	240	10 Apr.	23
30 Oct.	33	7 May	33
14 Nov.	240	22 May	23
22 Nov.	490	11 Jun.	75
5 Dec.	330	26 Jun.	22
19 Dec.	330	11 Jul.	79
9 Jan. 62	130	28 Jul.	33
6 Feb.	33	14 Aug.	70
19 Feb.	110	11 Sep.	33
6 Mar.	33	25 Sep.	33

Geometric Means (22 samples) 66

MONALD - On the upper reaches of the Columbia River, 18 miles below Golden. Sampled from the Rogers Pass highway bridge; some winter samples taken after hacking through the ice.

Date	Count	Date	Count
9 Oct. 61	13	14 Mar. 62	14
6 Nov.	79	16 Apr.	< 1
15 Jan. 62	49	14 May	140
22 Jan.	110	4 Jun	240
19 Feb.	49	2 Jul	13
26 Feb.	49	10 Sep.	170

Geometric Means (12 samples) 39

Date	Count	Date	Count

NEEDLES - On the Columbia River between the Arrow Lakes. Sampled from the ferry.

Date	Count	Date	Count
13 Jul. 61	< 1	3 Oct. 61	< 1
2 Aug.	< 1	31 Nov.	< 1
7 Sep.	2	6 Dec.	< 1

ABOVE CELGAR - On the Columbia River immediately above the Celgar Pulp Mill and 2 miles west of Castlegar. Sampled by hand dipping from a boat at mid-stream.

Date	Count	Date	Count
2 Oct. 61	< 1	19 Mar. 62	< 1
16 Oct.	2	10 Apr.	< 1
30 Oct.	2	7 May	< 1
14 Nov.	2	22 May	< 1
22 Nov.	< 1	11 Jun.	< 1
5 Dec.	< 1	26 Jun.	< 1
19 Dec.	< 1	11 Jul.	< 1
9 Jan. 62	< 1	28 Jul.	< 1
6 Feb.	< 1	14 Aug.	2
19 Feb.	< 1	11 Sep.	< 1
6 Mar.	< 1	25 Sep.	< 1

Geometric Means (22 samples) 1

BELOW CELGAR - On the Columbia River immediately above Castlegar. Sampled from a boat at mid-stream.

Date	Count	Date	Count
2 Oct. 61	33	19 Mar. 62	33
16 Oct.	23	10 Apr.	4.5
30 Oct.	7.8	7 May	2
14 Nov.	49	22 May	4.5
22 Nov.	13	11 Jun.	< 1
5 Dec.	13	26 Jun.	< 1
19 Dec.	17	11 Jul.	< 1
9 Jan. 62	4.5	28 Jul.	< 1
6 Feb.	4.5	14 Aug.	33
19 Feb.	17	11 Sep.	< 1
6 Mar.	33	25 Sep.	49

Geometric Means (22 samples) 7.4

KINNAIRD - On the Columbia River near Kinnaird and beside the Kinnaird water intake. This is two miles below the confluence of the Kootenay River and the combined flow has passed through the Tin Cup rapids prior to this point. Samples taken by hand from a boat at three locations, near the east and west shores and at mid-stream. The west shore samples taken 20 to 40 feet distant from the Kinnaird water intake. At each point samples were taken at three depths, at one ft., 10 ft. and 20 ft., the last being close to the bottom, using an Hytech plastic depth sampler.

	Kinnaird West			Kinnaird Centre			Kinnaird East		
	1'	10'	20'	1'	10'	20'	1'	10'	20'
Oct. 2	23			49			33		
Oct. 16	23			130			79		
Oct. 30	13			23			33		
Nov. 14	33	130	350	68	79	110	79	110	130
Nov. 22	49	33	68	49	79	130	79	23	46
Dec. 5	240	170	140	49	110	130	170	170	350
Dec. 19	240	33	79	240	130	260	170	130	130
Jan. 9	130	240	130	130	79	33	70	49	79
Feb. 6	49	23		33			49		
Feb. 19	33	130	33	240	240	130	110	490	68
Mar. 6	49	33	33	79	49	40	49	23	33
Mar. 19	49	49	4.5	11	33	13	40	33	33
Apr. 10	33	11	6.8	23	49	22	6.1	6.8	11
May 7	11	23	23	33	130	49	49	79	49
May 22	23	33	7.8	33	49	33	130	79	33
Jun. 11	23	33	33	17	79	79	33	33	79
Jun. 26	22	13	23	4.5	33	7.8	130	13	6.8
Jul. 11	23	33	13	49	79	49	13	33	33
Jul 28	9.3	11	4	23	79	13	14	13	23
Aug. 14	33	2	13	7.8	33	33	33	49	4.5
Sep. 11	4.5	7.8	4.5	2	13	< 1	2	< 1	23
Sep. 25	49	33	13	49	33	11	4.5	2	33
Samples	22	19	18	22	18	18	22	18	18
G.M.	34	31	31	35	63	35	40	31	39
Samples		59			58			58	
G.M.		31			41.6			36	
Depth		1'			10'			20'	
Samples		66			55			54	
G.M.		35			39			34	

Overall Geometric Mean (175 samples) 35

BIRCHBANK - On the Columbia River, 10 miles downstream of the confluence of the Kootenay River. Samples taken by hand from a boat.

Date	Count	Date	Count
2 Oct. 61	13	10 Apr. 62	2
16 Oct.	130	7 May	79
30 Oct.	23	22 May	32
14 Nov.	49	11 Jun.	49
22 Nov.	1	26 Jun.	33
5 Dec.	79	11 Jul.	79
19 Dec.	40	28 Jul.	7.8
9 Jan. 62	79	14 Aug.	33
6 Feb.	23	11 Sep.	4.5
19 Feb.	49	25 Sep.	33
19 Mar.	13		

Geometric Means (21 samples) 25

ROCK ISLAND - On the Columbia River, immediately below Trail. Sampled by hand from a boat.

Date	Count	Date	Count
2 Oct. 61	540	19 Mar. 62	790
16 Oct.	790	10 Apr.	1,300
30 Oct.	790	7 May	330
14 Nov.	790	22 May	68
22 Nov.	4,900	11 Jun.	330
5 Dec.	1,300	26 Jun.	230
19 Dec.	790	11 Jul.	220
9 Jan. 62	790	28 Jul.	93
6 Feb.	2,400	14 Aug.	130
19 Feb.	13,000	11 Sep.	790
6 Mar.	1,700	25 Sep.	2,400

Geometric Means (22 samples) 696

WARFIELD - On the Columbia River, 10 miles downstream of Trail. Sampled by hand from a boat.

Date	Count	Date	Count
2 Oct. 61	790	19 Mar. 62	330
16 Oct.	1,600	10 Apr.	1,700
30 Oct.	790	7 May	490
14 Nov.	1,600	22 May	240
22 Nov.	3,300	11 Jun.	240
5 Dec.	790	26 Jun.	140
19 Dec.	490	11 Jul.	170
9 Jan.	330	28 Jul.	79
6 Feb.	79	14 Aug.	79
19 Feb.	490	11 Sep.	490
6 Mar.	490	25 Sep.	490

Geometric Means (22 samples) 427

BACTERIOLOGICAL DATA
1963-64 Series

ATHALMER - On the Columbia River at outlet of Windermere Lake. Taken from the road bridge by lowering bottle on line.

Date	Count	Date	Count
11 Oct. 63	22	10 Apr. 64	11
8 Nov.	920	28 May	33
6 Dec.	70	11 June	11
10 Jan. 64	22	9 July	540
7 Feb.	11	14 Aug.	240
26 Mar.	33		
Geometric Mean (11 samples)	51		

NICHOLSON - On Columbia River, 4 miles upstream of Golden. Taken from the road bridge by lowering bottle on line.

Date	Count	Date	Count
11 Oct. 63	13	10 Apr. 64	< 1
8 Nov.	13	28 May	4
7 Dec.	21	11 June	79
11 Jan. 64	6.8	9 July	79
8 Feb.	7.8	14 Aug.	2
5 March	13		
Geometric Mean (11 samples)	10		

DONALD - As previously

Date	Count	Date	Count
11 Oct. 63	350	10 Apr. 64	110
8 Nov.	130	29 May	2
7 Dec.	> 2,400 (2,400)	12 June	79
9 Jan. 64	920	15 Aug.	33
Geometric Mean (8 samples)	124		

REVELSTOKE above highway - On the Columbia River. Samples taken from the bank upstream of the highway bridge and any likely local sources of contamination. Control sample.

Date	Count	Date	Count
4 June 63	120	5 Nov. 63	7.8
18 June	70	19 Nov.	11
7 July	13	3 Dec.	< 1
16 July	7.8	26 Feb. 64	< 1
5 Aug.	< 1	19 Mar.	< 1
20 Aug	4	1 Apr.	6.8
10 Sept.	540	17 Apr.	4.5
24 Sept.	23	29 Apr.	2
15 Oct.	110	6 May	2
29 Oct.	49		
Geometric Mean (19 samples)	9.2		

REVELSTOKE below outfalls - On the Columbia River within a half mile of sewer outfalls. Samples taken from the bank by hand.

Date	Count	Date	Count
4 June 63	920	15 Oct. 63	540
18 June	> 2,400 (2,400)	29 Oct.	920
7 July	920	5 Nov.	1,600
16 July	540	19 Nov.	1,600
5 Aug.	350	3 Dec.	1,600
20 Aug.	> 2,400 (2,400)	17 Apr. 64	920
10 Sept.	240	29 Apr.	920
24 Sept.	350	6 May	> 2,400 (2,400)

Geometric Mean (16 samples) 925

12 MILE FERRY - On Columbia River, 12 miles downstream of Revelstoke. Sampled by hand from ferry at midstream.

Date	Count	Date	Count
4 June 63	170	19 Nov. 63	170
18 June	240	3 Dec.	1,600
7 July	920	8 Jan. 64	920
16 July	920	29 Jan.	130
5 Aug.	540	11 Feb.	920
20 Aug.	79	26 Feb.	350
10 Sept.	350	19 Mar.	920
24 Sept.	130	1 Apr.	920
15 Oct.	920	17 Apr.	350
29 Oct.	540	29 Apr.	1,600
5 Nov.	350	6 May	540

Geometric Mean (22 samples) 452

SIDMOUTH FERRY - On Columbia River, 24 miles downstream of Revelstoke. Sampled by hand from ferry at midstream

Date	Count	Date	Count
4 June 63	79	19 Nov. 63	540
18 June	280	3 Dec.	1,600
7 July	49	8 Jan. 64	920
16 July	79	29 Jan.	1,600
5 Aug.	13	11 Feb.	920
20 Aug.	110	26 Feb.	170
10 Sept.	540	19 Mar.	540
24 Sept.	350	1 Apr.	22
15 Oct.	> 2,400 (2,400)	17 Apr.	170
29 Oct.	1,600	29 Apr.	920
5 Nov.	920	6 May	350

Geometric Mean (22 samples) 306

KIMBERLEY HIGHWAY - On Joseph Creek, 7 miles above its confluence with the St. Mary River and immediately below Cranbrook sewage lagoon outfalls. Sampled by hand from the bank.

Date	Count	Date	Count
6 Nov. 63	3,300	7 May 64	490
4 Dec.	2,300	3 June	1,700
9 Jan. 64	54,000	8 July	7,000
5 Feb.	35,000	5 Aug.	1,600
4 Mar.	79,000	2 Sept.	1,600
2 Apr.	17,000		

Geometric Mean (11 samples) 5,880

MISSION J. - On Joseph Creek at St. Eugene Mission, immediately above its confluence with the St. Mary River and 7 miles downstream of Cranbrook lagoon outfalls. Sampled by hand from the bank.

Date	Count	Date	Count
6 Nov. 63	450	7 May 64	330
4 Dec.	33,000	3 June	240
9 Jan. 64	490	8 July	330
5 Feb.	4,900	5 Aug.	350
5 Mar.	2,400 (2,400)	2 Sept.	920
2 Apr.	700		

Geometric Mean (11 samples) 931

WYCLIFFE - As previously. This is 6 miles upstream of Joseph Creek confluence.

Date	Count	Date	Count
6 Nov. 63	7,900	2 Apr. 64	3,300
4 Dec.	13,000	3 June	490
9 Jan. 64	4,900	8 July	1,300
5 Feb.	4,900	5 Aug.	540
4 Mar.	13,000	2 Sept.	2,400 (4,900)

Geometric Mean (10 samples) 3,350

MISSION M. - On St. Mary River, a half-mile below confluence of Joseph Creek and 6 miles upstream of confluence with the Kootenay River. Sampled by lowering bottle on line from the road bridge.

Date	Count	Date	Count
6 Nov. 63	7,000	7 May 64	4,900
4 Dec.	4,900	3 June	4,900
9 Jan. 64	4,900	8 July	230
5 Feb.	1,300	5 Aug.	920
5 Mar.	> 2,400 (2,400)	2 Sept.	1,600
2 Apr.	700		

Geometric Mean (11 samples) 2,070

WARDNER - As previously

Date	Count	Date	Count
6 Nov. 63	4.5	7 May 64	68
5 Dec.	49	4 June	170
8 Jan. 64	49	9 July	130
6 Feb.	2	6 Aug.	170
5 Mar.	1	3 Sep.	2,400 (2,400)
3 Apr.	4.5		

Geometric Mean (11 samples) 33

WALDO K. - On the Kootenay River, 19 miles below Wardner and one mile upstream of the confluence of the Elk River. Sampled by hand from the bank.

Date	Count	Date	Count
6 Nov. 63	2	4 June 64	79
5 Dec.	46	9 July	350
5 Mar. 64	2	6 Aug.	68
3 Apr.	4.5	3 Sep.	49
7 May	130		

Geometric Mean (9 samples) 28

MICHEL - On Michel Creek, 2 miles upstream of its confluence with the Elk River. Sampled from the highway bridge near Natal.

Date	Count	Date	Count
6 Nov. 63	1	7 May 64	2
5 Dec.	1	4 June	33
8 Jan. 64	1	9 July	350
6 Feb.	2	6 Aug.	17
5 Mar.	2	3 Sep.	33
3 April.	2		

Geometric Mean (11 samples) 5.8

Above FERNIE - on the Elk River, immediately above Fernie. Sampled from the highway bridge.

Date	Count	Date	Count
6 Nov. 63	7.8	7 May 64	11
5 Dec.	1	4 June	33
8 Jan. 64	17	9 July	33
6 Feb.	1	7 Aug.	7.8
5 Mar.	1	3 Sept.	33
3 Apr.	1		

Geometric Mean (11 samples) 6.1

MORRISSEY - As previously

Date	Count	Date	Count
6 Nov. 63	700	7 May 64	400
5 Dec.	1,300	4 June	790
8 Jan. 64	2,600	9 July	1,300
6 Feb.	700	7 Aug.	240
5 Mar.	280	3 Sep.	2,400 (2,400)
3 Apr.	300		

Geometric Mean (11 samples)740

WALDO E - On the Elk River immediately before its confluence with the Kootenay River. Sampled from the road bridge by lowering bottle on line.

Date	Count	Date	Count
6 Nov. 63	49	3 April 64	14
5 Dec.	330	7 May	220
8 Jan. 64	490	4 June	240
6 Feb.	460	9 July	220
5 March	79	7 Aug.	110

Geometric Mean (10 samples) 148

ARROW CREEK - On the Goat River near Creston. Sampled from the bank just upstream from the confluence of Arrow Creek.

Date	Count	Date	Count
17 Oct. 63	< 1	8 April 64	< 1
14 Nov.	< 1	7 May	2
11 Dec.	< 1	10 June	2
14 Feb. 64	< 1	9 Aug.	2
11 March	< 1	12 Sept.	49

Geometric Mean (10 samples) 1.8

PORTHILL HIGHWAY - On the Goat River 2 miles from the Kootenay. Sampled from the Porthill (Idaho) highway bridge.

Date	Count	Date	Count
17 Oct. 63	4.5	8 April 64	2
14 Nov.	< 1	7 May	4.5
11 Dec.	7.8	10 June	17
23 Jan. 64	140	9 July	23
20 Feb.	2	12 Aug.	2
11 March	2		

Geometric Mean (11 samples) 5.4

BELOW DEAD HORSE CREEK - On the Goat River between Dead Horse Creek and Kootenay River. Dead Horse Creek receives Creston sewage. Single sample obtained from the bank.

M.P.N. count 130,000

TAGHUM - On the Kootenay River 5 miles below Nelson. This series of samples taken from the highway bridge using a Foerst brass body depth sampler. Samples taken at mid-stream and at mid-points of North and South thirds. At each location samples were taken near the surface, at estimated mid-depth and, as close as could be judged, at 5 ft. from the bottom. Strong current renders estimation of depth difficult.

	South End			Centre			North End		
Date	Surf.	Mid.	Bot.	Surf.	Mid.	Bot.	Surf.	Mid.	Bot.
21 Oct. 63	240	240	130	540	1600	920	920	540	350
25 Nov.	1000	240	110	46	170	350	240	240	540
16 Dec.	540	920	540	1600	540	540	540	1600	540
20 Jan. 64	1600	350	350	350	920	240	540	920	240
17 Feb.	27	>(2400)	240	350	79	350	130	350	920
16 March	540	240	920	240	540	1600	240	540	1600
13 April	350	540	240	240	540	920	920	920	1600
19 May	79	46	79	79	240	70	130	49	220
15 June	130	-	-	33	-	-	49	-	-
20 July	79	6.8	2	23	23	2	33	23	13
18 Aug.	110	350	23	350	49	240	350	540	540
21 Sept.	920	1600	24	1600	920	240	540	350	>(2400)
Samples	12	11	11	12	11	11	12	11	11
G.M.	258	285	102	214	278	242	254	340	464
Samples		34			34			34	
G.M.		197			242			340	

	Surface	Mid-depth	Bottom
Samples	36	33	33
G.M.	242	300	225

Overall Geometric Mean (102 samples) 254

BRILLIANT - On Kootenay River close to confluence with the Columbia. This series of samples taken from the airport road bridge as for preceding series at Taghum. In this location the flow is more rapid and estimation of depth difficult. During high water, velocity prevented taking samples near the bottom.

Date	South End			Centre			North End		
	Surf.	Mid.	Bot.	Surf.	Mid.	Bot.	Surf.	Mid.	Bot.
28 Oct. 63	130	240	240	350	350	240	79	240	49
18 Nov.	240	350	170	240	540	540	350	540	350
16 Dec.	70	79	79	79	79	79	79	240	79
28 Jan. 64	240	130	240	350	350	540	240	350	350
24 Feb.	13	33	4.5	17	23	23	23	13	13
16 March	49	130	49	79	46	23	49	33	49
20 April	11	< 1	< 1	33	17	33	7.8	7.8	13
19 May	49	70	23	49	79	49	79	130	140
22 June	33	-	-	11	-	-	23	23	-
27 July	49	13	11	33	13	33	33	33	13
25 Aug.	23	33	33	23	4.5	2	< 1	4.5	2
29 Sept.	49	130	49	240	540	79	170	49	79
Samples	12	11	11	12	11	11	12	12	11
G.M.	51	55	34	71	46	58	44	55	44
Samples		34			34			34	
G.M.		46			58			47	

	Surface	Mid-Depth	Bottom
Samples	36	34	35
G.M.	54	53	44

Overall Geometric Mean (103 samples) 50

Form L.76 w-Selkirk H.U
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. Russell Davis
Address: Selkirk Health Unit
Report to: Dir./ P.H.E.; Dir./S.H.U.
Waterworks System: -----
Sampling Point: Fraser's Narrows

Source of Water: Kootenay Lake

Treatment:

Laboratory Report No: 75
Date Sampled: October 10, 1961
Time Sampled: 11:00 A.M.
Tests done in field: Temperature
Temperature °C: 13.3°C
pH: ---
Residual Chlorine: ---
Other: ---
Date Shipped: October 11, 1961
Date Received: October 12, 1961
Date Tested: October 12-16, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1.	Colour (in units)	<5
2.	Turbidity (in units)	<5
3.	Temperature (°C.) (on arrival)	19°C
4.	pH (in units) (on arrival)	7.5
5.	Total Solids	95
6.	Fixed Solids	55
7.	Volatile Solids (calculated)	40
8.	Dissolved Solids (determined)	85
9.	Dissolved Solids (calculated)	91
10.	Suspended Solids (determined)	Nondeterminable
11.	Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12.	Methyl Orange (total) Alkalinity (as $CaCO_3$)	70
13.	Free Carbon Dioxide (as CO_2)(calculated)	4.5
14.	Total Hardness (as $CaCO_3$)	78
15.	Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	70
16.	Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	8.0
17.	Calcium (as Ca)	22.8
18.	Magnesium (as Mg)	4.9
19.	Sulphate (as SO_4)	13.0
20.	Chloride (as Cl)	1.2
21.	Silica (as SiO_2)	2.0
22.	Ammonia Nitrogen (as N)	Nil
23.	Albuminoid Nitrogen (as N)	Nil
24.	Nitrite Nitrogen (as N)	0.005
25.	Nitrate Nitrogen (as N)	0.03
26.	Fluoride (as F)	Nil
27.	Iron (total) (as Ferric ion)	0.01
28.	Phosphate (total) (as PO_4)	0.07
29.	Phosphate (ortho) (as PO_4)	0.02

W – E. Kootenay H.U.

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. N. Cox
Address: East Kootenay Health Unit
Report to: Dir./P.H.E.; Dir./E.K.H.U.
Waterworks System: ----
Sampling Point: Kootenay River at Springbrook
Source of Water: Mountain runoff
Treatment: ----

Laboratory Report No: 77
Date Sampled: October 10, 1961
Time Sampled: 2:00 A.M.
Tests done in field: Temperature & pH
Temperature °C: 8.9° C
pH: 7.4
Residual Chlorine: ---
Other: ---
Date Shipped: October 11, 1961
Date Received: October 12, 1961
Date Tested: October 12-16, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	5
3. Temperature (°C.) (on arrival)	17°C
4. pH (in units) (on arrival)	7.6
5. Total Solids	162
6. Fixed Solids	114
7. Volatile Solids (calculated)	48
8. Dissolved Solids (determined)	150
9. Dissolved Solids (calculated)	157
10. Suspended Solids (determined)	12
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	116
13. Free Carbon Dioxide (as CO_2)(calculated)	5.0
14. Total Hardness (as $CaCO_3$)	145
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	116
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	29
17. Calcium (as Ca)	39.5
18. Magnesium (as Mg)	11.1
19. Sulphate (as SO_4)	25.5
20. Chloride (as Cl)	4.6
21. Silica (as SiO_2)	4.4
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	0.01
25. Nitrate Nitrogen (as N)	0.02
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.04
28. Phosphate (total) (as PO_4)	0.1
29. Phosphate (ortho) (as PO_4)	0.06

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/ W.K.H.U.
Waterworks System: N.A.
Sampling Point: Above Celgar Pulp Mill

Source of Water: Columbia River

Treatment: None

Laboratory Report No: 79
Date Sampled: Oct. 16, 61
Time Sampled: 9:00 A.M.
Tests done in field: Temp. & pH
Temperature °C: 12.5°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: Oct. 16, 61
Date Received: Oct. 17, 61
Date Tested: Oct. 17-20, 61

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	2
3. Temperature (°C.) (on arrival)	18°C
4. pH (in units) (on arrival)	7.7
5. Total Solids	75.0
6. Fixed Solids	45.0
7. Volatile Solids (calculated)	30.0
8. Dissolved Solids (determined)	65.0
9. Dissolved Solids (calculated)	67.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	53.0
13. Free Carbon Dioxide (as CO_2)(calculated)	2.0
14. Total Hardness (as $CaCO_3$)	60.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	53.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	7.0
17. Calcium (as Ca)	16.9
18. Magnesium (as Mg)	4.2
19. Sulphate (as SO_4)	8.5
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.3
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.04
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	Trace
28. Phosphate (total) (as PO_4)	0.04
29. Phosphate (ortho) (as PO_4)	0.02

W-WKHU

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: Below Celgar Pulp Mill

Source of Water: Columbia River

Treatment: None

Laboratory Report No: 80
Date Sampled: October 16, 1961
Time Sampled: 9:15 A.M.
Tests done in field: Temperature & pH
Temperature °C: 12.5°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	2
3. Temperature (°C.) (on arrival)	18°C
4. pH (in units) (on arrival)	7.7
5. Total Solids	78.0
6. Fixed Solids	46.0
7. Volatile Solids (calculated)	32.0
8. Dissolved Solids (determined)	67.0
9. Dissolved Solids (calculated)	68.0
10. Suspended Solids (determined)	Nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	53.0
13. Free Carbon Dioxide (as CO_2)(calculated)	2.0
14. Total Hardness (as $CaCO_3$)	60.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	53.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	7.0
17. Calcium (as Ca)	16.9
18. Magnesium (as Mg)	4.2
19. Sulphate (as SO_4)	8.5
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.5
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.04
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.08
28. Phosphate (total) (as PO_4)	0.08
29. Phosphate (ortho) (as PO_4)	0.05

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: 1/8 Mile up Kootenay River
Source of Water: Kootenay River
Treatment: None

Laboratory Report No: 81
Date Sampled: October 16, 1961
Time Sampled: 9:30 A.M.
Tests done in field: Temperature & pH
Temperature °C: 14°C
pH: 7.5
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	3
3. Temperature (°C.) (on arrival)	18°C
4. pH (in units) (on arrival)	7.8
5. Total Solids	88.0
6. Fixed Solids	58.0
7. Volatile Solids (calculated)	30.0
8. Dissolved Solids (determined)	80.0
9. Dissolved Solids (calculated)	77.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	56.0
13. Free Carbon Dioxide (as CO_2)(calculated)	1.7
14. Total Hardness (as $CaCO_3$)	70.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	56.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	14.0
17. Calcium (as Ca)	23.6
18. Magnesium (as Mg)	2.6
19. Sulphate (as SO_4)	11.0
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.5
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.02
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	Trace
28. Phosphate (total) (as PO_4)	0.06
29. Phosphate (ortho) (as PO_4)	0.02

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: West side by Kinnaird Water Intake
Source of Water: Columbia River
Treatment: None

Laboratory Report No: 82
Date Sampled: October 16, 1961
Time Sampled: 9:45 A.M.
Tests done in field: Temperature & pH
Temperature °C: 13°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p p m) unless noted otherwise

1. Colour (in units)	< 5
2. Turbidity (in units)	3
3. Temperature (°C.) (on arrival)	19°C
4. pH (in units) (on arrival)	7.8
5. Total Solids	82.0
6. Fixed Solids	54.0
7. Volatile Solids (calculated)	28.0
8. Dissolved Solids (determined)	75.0
9. Dissolved Solids (calculated)	72.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	56.0
13. Free Carbon Dioxide (as CO_2)(calculated)	1.6
14. Total Hardness (as $CaCO_3$)	66.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	56.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	10.0
17. Calcium (as Ca)	19.5
18. Magnesium (as Mg)	4.1
19. Sulphate (as SO_4)	9.5
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.5
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.03
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.08
28. Phosphate (total) (as PO_4)	0.05
29. Phosphate (ortho) (as PO_4)	0.03

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: Mid stream of Columbia River at Kinnaird Water Intake
Source of Water: Columbia River
Treatment: None

Laboratory Report No: 83
Date Sampled: October 16, 1961
Time Sampled: 10:00 A.M.
Tests done in field: Temperature & pH
Temperature °C: 13°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20.1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	<5
2. Turbidity (in units)	4
3. Temperature (°C.) (on arrival)	19°C
4. pH (in units) (on arrival)	7.8
5. Total Solids	82.0
6. Fixed Solids	52.0
7. Volatile Solids (calculated)	30.0
8. Dissolved Solids (determined)	78.0
9. Dissolved Solids (calculated)	75.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	56.0
13. Free Carbon Dioxide (as CO_2)(calculated)	1.5
14. Total Hardness (as $CaCO_3$)	67.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	56.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	11.0
17. Calcium (as Ca)	20.0
18. Magnesium (as Mg)	4.0
19. Sulphate (as SO_4)	10.0
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.5
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.04
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.08
28. Phosphate (total) (as PO_4)	0.08
29. Phosphate (ortho) (as PO_4)	0.05

W - W K H U

Form L.76
Intr. 5'59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Mr. R. Bowering: Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: East Side Columbia River opposite Kinnaird Intake
Source of Water: Columbia River
Treatment:

Laboratory Report No: 84
Date Sampled: October 16, 1961
Time Sampled: 10:45 A.M.
Tests done in field: Temperature & pH
Temperature °C: 13.5°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise

1.	Colour (in units)	< 5
2.	Turbidity (in units)	4
3.	Temperature (°C.) (on arrival)	18°C
4.	pH (in units) (on arrival)	7.8
5.	Total Solids	81.0
6.	Fixed Solids	52.0
7.	Volatile Solids (calculated)	29.0
8.	Dissolved Solids (determined)	78.0
9.	Dissolved Solids (calculated)	74.0
10.	Suspended Solids (determined)	nondeterminable
11.	Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12.	Methyl Orange (total) Alkalinity (as $CaCO_3$)	56.0
13.	Free Carbon Dioxide (as CO_2)(calculated)	4.0
14.	Total Hardness (as $CaCO_3$)	67.0
15.	Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	56.0
16.	Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	11.0
17.	Calcium (as Ca)	20.0
18.	Magnesium (as Mg)	4.0
19.	Sulphate (as SO_4)	10.0
20.	Chloride (as Cl)	0.7
21.	Silica (as SiO_2)	2.5
22.	Ammonia Nitrogen (as N)	Nil
23.	Albuminoid Nitrogen (as N)	Nil
24.	Nitrite Nitrogen (as N)	Nil
25.	Nitrate Nitrogen (as N)	0.03
26.	Fluoride (as F)	Nil
27.	Iron (total) (as Ferric ion)	0.06
28.	Phosphate (total) (as PO_4)	0.07
29.	Phosphate (ortho) (as PO_4)	0.03

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: W.K.H.U.
Report to: Mr. R. Bowering; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: Birchbank-Midstream of Columbia River
Source of Water: Columbia River
Treatment:

Laboratory Report No: 85
Date Sampled: October 16, 1961
Time Sampled: 11:00 A.M.
Tests done in field: Temperature
Temperature °C: 13°C
pH: ---
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p p m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	4
3. Temperature (°C.) (on arrival)	18°C
4. pH (in units) (on arrival)	7.8
5. Total Solids	82.0
6. Fixed Solids	53.0
7. Volatile Solids (calculated)	29.0
8. Dissolved Solids (determined)	75.0
9. Dissolved Solids (calculated)	72.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	56.0
13. Free Carbon Dioxide (as CO_2)(calculated)	1.6
14. Total Hardness (as $CaCO_3$)	67.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	56.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	11.0
17. Calcium (as Ca)	20.0
18. Magnesium (as Mg)	4.0
19. Sulphate (as SO_4)	10.0
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.7
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.03
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.08
28. Phosphate (total) (as PO_4)	0.05
29. Phosphate (ortho) (as PO_4)	0.02

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: Rock Island below Trail

Source of Water: Columbia River

Treatment: None

Laboratory Report No: 86
Date Sampled: October 16, 1961
Time Sampled: 11:15 A.M.
Tests done in field: Temperature & pH
Temperature °C: 13°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	<5
2. Turbidity (in units)	4
3. Temperature (°C.) (on arrival)	19°C
4. pH (in units) (on arrival)	7.6
5. Total Solids	98.0
6. Fixed Solids	65.0
7. Volatile Solids (calculated)	33.0
8. Dissolved Solids (determined)	88.0
9. Dissolved Solids (calculated)	87.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	58.0
13. Free Carbon Dioxide (as CO_2)(calculated)	3.2
14. Total Hardness (as $CaCO_3$)	73.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	58.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	15.0
17. Calcium (as Ca)	22.1
18. Magnesium (as Mg)	4.2
19. Sulphate (as SO_4)	17.0
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.7
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.04
26. Fluoride (as F)	Nil
27. Iron (total) (as Ferric ion)	0.04
28. Phosphate (total) (as PO_4)	0.27
29. Phosphate (ortho) (as PO_4)	0.23

Form L.76
Intr. 5'59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/W.K.H.U.
Waterworks System: N.A.
Sampling Point: at Fort Shephard

Source of Water: Columbia River

Treatment: None

Laboratory Report No: 87
Date Sampled: October 16, 1961
Time Sampled: 11:45 A.M.
Tests done in field: Temperature & pH
Temperature °C: 13°C
pH: 7.6
Residual Chlorine: ---
Other: ---
Date Shipped: October 16, 1961
Date Received: October 17, 1961
Date Tested: October 17-20, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise

1. Colour (in units)	< 5
2. Turbidity (in units)	4
3. Temperature (°C.) (on arrival)	18.5°C
4. pH (in units) (on arrival)	7.65
5. Total Solids	94.0
6. Fixed Solids	60.0
7. Volatile Solids (calculated)	34.0
8. Dissolved Solids (determined)	85.0
9. Dissolved Solids (calculated)	85.0
10. Suspended Solids (determined)	nondeterminable
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	59.0
13. Free Carbon Dioxide (as CO_2)(calculated)	3.0
14. Total Hardness (as $CaCO_3$)	74.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	59.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	15.0
17. Calcium (as Ca)	22.2
18. Magnesium (as Mg)	4.3
19. Sulphate (as SO_4)	17.1
20. Chloride (as Cl)	0.7
21. Silica (as SiO_2)	2.7
22. Ammonia Nitrogen (as N)	Nil
23. Albuminoid Nitrogen (as N)	Nil
24. Nitrite Nitrogen (as N)	Nil
25. Nitrate Nitrogen (as N)	0.04
26. Fluoride (as F)	0.15
27. Iron (total) (as Ferric ion)	0.08
28. Phosphate (total) (as PO_4)	0.21
29. Phosphate (ortho) (as PO_4)	0.18

Form L.76
Intr. 5/59

W-E K H U

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. A.A. Hindley
Address: East Kootenay Health Unit
Report to: Dir./P.H.E.; Dir./E.K.H.U.
Waterworks System: N.A.
Sampling Point: Morrissey

Source of Water: Elk River

Treatment: None

Laboratory Report No: 90
Date Sampled: Oct. 24, 1961
Time Sampled: 11:00 a.m.
Tests done in field: Temp. & pH
Temperature °C: 2.77
pH: 7.5
Residual Chlorine: - -
Other:
Date Shipped: Oct. 24, 1961
Date Received: Oct. 25, 1961
Date Tested: Oct. 25 - 30, 1961

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	< 5
2. Turbidity (in units)	12
3. Temperature (°C.) (on arrival)	14° C
4. pH (in units) (on arrival)	8.0
5. Total Solids	220
6. Fixed Solids	125
7. Volatile Solids (calculated)	95
8. Dissolved Solids (determined)	175
9. Dissolved Solids (calculated)	170
10. Suspended Solids (determined)	45
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	138
13. Free Carbon Dioxide (as CO_2)(calculated)	12
14. Total Hardness (as $CaCO_3$)	160
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	138
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	22
17. Calcium (as Ca)	46.3
18. Magnesium (as Mg)	10.5
19. Sulphate (as SO_4)	21.0
20. Chloride (as Cl)	1.0
21. Silica (as SiO_2)	3.4
22. Ammonia Nitrogen (as N)	0.01
23. Albuminoid Nitrogen (as N)	0.05
24. Nitrite Nitrogen (as N)	0.008
25. Nitrate Nitrogen (as N)	0.02
26. Fluoride (as F)	0.15
27. Iron (total) (as Ferric ion)	0.06
28. Phosphate (total) (as PO_4)	0.08
29. Phosphate (ortho) (as PO_4)	0.04

W.E.K.H.U.

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. N. Cox
Address: East Kootenay Health Unit
Report to: Dir/P.H.E.; Dir/E.K.H.U.
Waterworks System: N.A.
Sampling Point: St. Mary's River at Wycliffe
Source of Water: St. Mary's River, Mountain Runoff, Domestic and Industrial wastes
Treatment: N.A.

Laboratory Report No: 92
Date Sampled: October 31, 61
Time Sampled: 2:30 P.M.
Tests done in field: Temperature & pH
Temperature °C: 3.88
pH: 6.7
Residual Chlorine: --
Other: --
Date Shipped: November 1, 61
Date Received: November 3, 61
Date Tested: November 3 - 7, 61

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	<5
2. Turbidity (in units)	18
3. Temperature (°C.) (on arrival)	18°C
4. pH (in units) (on arrival)	7.1
5. Total Solids	254
6. Fixed Solids	138
7. Volatile Solids (calculated)	116
8. Dissolved Solids (determined)	186
9. Dissolved Solids (calculated)	195
10. Suspended Solids (determined)	68
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	23.5
13. Free Carbon Dioxide (as CO_2)(calculated)	3.8
14. Total Hardness (as $CaCO_3$)	131.5
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	23.5
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	108.0
17. Calcium (as Ca)	44.6
18. Magnesium (as Mg)	4.7
19. Sulphate (as SO_4)	101.0
20. Chloride (as Cl)	1.0
21. Silica (as SiO_2)	9.6
22. Ammonia Nitrogen (as N)	0.05
23. Albuminoid Nitrogen (as N)	0.08
24. Nitrite Nitrogen (as N)	0.007
25. Nitrate Nitrogen (as N)	0.06
26. Fluoride (as F)	2.6
27. Iron (total) (as Ferric ion)	0.03
28. Phosphate (total) (as PO 4)	7.5
29. Phosphate (ortho) (as PO 4)	6.6

W-E.K.H.U.

Form L.76
Intr. 5/59

From Director, DIVISION OF LABORATORIES, 828 W. 10th Ave., Vancouver 9, B.C.

Report on Physical and Chemical Analysis of Water

Collector's Name: Mr. A. Hindley
Address: East Kootenay Health Unit
Report to: Dir./P.H.E.; Dir./E.K.H.U.
Waterworks System: N.A.
Sampling Point: Wardner, B.C.

Source of Water: Kootenay River

Treatment:

Laboratory Report No: 95
Date Sampled: 5.11.61
Time Sampled: 4:00 p.m.
Tests done in field: pH
Temperature °C: - -
pH: 7.5
Residual Chlorine: - -
Other: - -
Date Shipped: 6.11.61
Date Received: 8.11.61
Date Tested: 8 - 10.11.61

Determinations reported as mg./l. *(p.p.m.) unless noted otherwise.

1. Colour (in units)	5
2. Turbidity (in units)	10
3. Temperature (°C.) (on arrival)	14° C
4. pH (in units) (on arrival)	7.7
5. Total Solids	210.0
6. Fixed Solids	175.0
7. Volatile Solids (calculated)	35.0
8. Dissolved Solids (determined)	191.0
9. Dissolved Solids (calculated)	189.0
10. Suspended Solids (determined)	19.0
11. Phenolphthalein Alkalinity (as $CaCO_3$)	Nil
12. Methyl Orange (total) Alkalinity (as $CaCO_3$)	95.0
13. Free Carbon Dioxide (as CO_2)(calculated)	4.0
14. Total Hardness (as $CaCO_3$)	165.0
15. Carbonate Hardness (temporary)(as $CaCO_3$)(calculated)	95.0
16. Non-carbonate Hardness(permanent)(as $CaCO_3$)(calculated)	70.0
17. Calcium (as Ca)	47.6
18. Magnesium (as Mg)	10.9
19. Sulphate (as SO_4)	60.0
20. Chloride (as Cl)	3.0
21. Silica (as SiO_2)	2.6
22. Ammonia Nitrogen (as N)	0.05
23. Albuminoid Nitrogen (as N)	0.06
24. Nitrite Nitrogen (as N)	0.003
25. Nitrate Nitrogen (as N)	0.05
26. Fluoride (as F)	0.56
27. Iron (total) (as Ferric ion)	0.10
28. Phosphate (total) (as PO_4)	1.28
29. Phosphate (ortho) (as PO_4)	1.10

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTI

W - W.K.H.U.

TO: Director
West Kootenay Health Unit
1325 McGuarrie Street
Trail, B.C.

Report No.: 103
Date Reported: 29-11-61
Date Received: 23-11-61

COPY TO: Director, Division of Public Health Engineering

Collector's Name:	Mr. S.D. Husch	Date Sampled:	22-11-61
Address:	West Kootenay Health Unit	Time Sampled:	9:30 A.M.
Water Work System:	N.A.	Treatment:	None
Sampling Point:	Columbia River above dam site		
Source of Water:	Columbia River		
Test(s) done in field:	Temperature & pH	Temperature (°C):	7.0°C pH: 7.6
Residual chlorine:	-----	Other:	-----

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	<5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	2	Phenolphthalein	nil
Temperature (°C)(on arrival)	12°C	Methyl Orange (total)	54.0
pH (in units)(on arrival)	7.7	Free Carbon Dioxide (as CO_2)(calculated)	2.4
Total Solids	75.0	Hardness (as Ca CO_3)	
Fixed Solids	65.0	Total	63.0
Volatile Solids (calculated)	10.0	Carbonate(Temporary)(Calculated)	54.0
Dissolved Solids	69.0	Non-Carbonate(permanent)(Calculated)	9.0
Dissolved Solids(calculated)	73.0	Silica (as SiO_2)	1.8
		~~Surfactants (as A.B.S)~~	
Albuminoid Nitrogen (as N)	0.04	Nitrite Nitrogen (as N)	0.003
Ammonia Nitrogen (as N)	Nil	Nitrate Nitrogen (as N)	0.09
Calcium (as Ca)	21.3	~~Bicarbonate (as CO_3)(Calculated)~~	
Magnesium (as Mg)	2.3	~~Carbonate (as CO_3)(Calculated)~~	
Iron (total)(as Ferric ion)	0.01	Sulphate (as SO_4)	9.5
		Chloride (as Cl)	1.0
		Fluoride (as F)	Nil
		Ortho-phosphate (as PO_4)	0.03
		Phosphate (total) (as PO_4)	0.06

Remarks:

Analysed by:

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTI

W - W.K. H.U.

Report No.: 104
Date Reported: 30-11-61
Date Received: 23-11-61

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit

Date Sampled: 22-11-61
Time Sampled: 10:00AM

Water Work System: N.A.
Sampling Point: Columbia River above Celgar pulp mill
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual chlorine: -----

Temperature (°C): 7.0°C pH: 7.6
Other: ----

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	<5
Turbidity (in units)	5
Temperature (°C)(on arrival)	12°C
pH (in units)(on arrival)	7.8
Total Solids	74.0
Fixed Solids	58.0
Volatile Solids (calculated)	16.0
Dissolved Solids	65.0
Dissolved Solids(calculated)	70.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	55.0
Free Carbon Dioxide (as CO_2)(calculated)	2.2
Hardness (as Ca CO_3)	
Total	63.0
Carbonate(Temporary)(Calculated)	55.0
Non-Carbonate(permanent)(Calculated)	8.0
Silica (as SiO_2)	1.8
~~Surfactants~~ (as ~~A.B.S~~)	

Albuminoid Nitrogen (as N)	.01
Ammonia Nitrogen (as N)	.09
Calcium (as Ca)	21.3
Magnesium (as Mg)	2.3
Iron (total)(as Ferric ion)	0.01

Nitrite Nitrogen (as N)	.003
Nitrate Nitrogen (as N)	.03
~~Bicarbonate (as CO_3)(Calculated)~~	
~~Carbonate (as CO_3)(Calculated)~~	
Sulphate (as SO_4)	8.5
Chloride (as Cl)	1.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.03
Phosphate (total) (as PO_4)	0.05

Remarks:

Analysed by: [illegible] 59

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTI

W — W.K.H.U.

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 105
Date Reported: 30.11.61
Date Received: 23.11.61

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S. D. Husch
Address: West Kootenay H.U., Trail

Date Sampled: 22.11.61
Time Sampled: 10:30 a.m.

Water Work System: N.A.
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Treatment: None

Test(s) done in field: Temp. and pH
Residual chlorine: - -

Temperature (°C): 5° C pH: 7.8
Other: - -

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	<5
Turbidity (in units)	5
Temperature (°C)(on arrival)	12° C
pH (in units)(on arrival)	8.0
Total Solids	91.0
Fixed Solids	66.0
Volatile Solids (calculated)	25.0
Dissolved Solids	84.0
Dissolved Solids(calculated)	87.5

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	66.0
Free Carbon Dioxide (as CO_2)(calculated)	1.7
Hardness (as $Ca\ CO_3$)	
Total	78.5
Carbonate(Temporary)(Calculated)	66.0
Non-Carbonate(permanent)(Calculated)	12.5
Silica (as SiO_2)	1.0
~~Surfactants (as A.B.S)~~	

Albuminoid Nitrogen (as N)	0.25
Ammonia Nitrogen (as N)	0.03
Calcium (as Ca)	25.5
Magnesium (as Mg)	3.5
Iron (total)(as Ferric ion)	0.04

Nitrite Nitrogen (as N)	0.002
Nitrate Nitrogen (as N)	0.05
~~Bicarbonate (as CO_3)(Calculated)~~	
~~Carbonate (as CO_3)(Calculated)~~	
Sulphate (as SO_4)	14.0
Chloride (as Cl)	1.6
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.03
Phosphate (total) (as PO_4)	0.05

Remarks:

Analysed by: [illegible]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTI

W. W.K.M.U.

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 106
Date Reported: 30.11.61
Date Received: 23.11.61

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S. D. Husch
Address: West Kootenay H.U., Trail

Date Sampled: 22.11.61
Time Sampled: 11:00 a.m.

Water Work System: N.A.
Sampling Point: Kinnaird Inlet. *
Source of Water: Columbia River.

Treatment: None

Test(s) done in field: Temp. and pH
Residual chlorine: - -

Temperature (°C): 6° C pH: 7.8
Other: - -

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	10	Phenolphthalein	Nil
Temperature (°C)(on arrival)	12° C	Methyl Orange (total)	60.0
pH (in units)(on arrival)	7.7	Free Carbon Dioxide (as CO_2)(calculated)	2.9
Total Solids	103.0	Hardness (as $Ca\ CO_3$)	
Fixed Solids	62.0	Total	75.0
Volatile Solids (calculated)	41.0	Carbonate(Temporary)(Calculated)	60.0
Dissolved Solids	78.0	Non-Carbonate(permanent)(Calculated)	15.0
Dissolved Solids(calculated)	82.0	Silica (as SiO_2)	1.8
Suspended Solids (determined)	25.0	~~Surfactants (as A.B.S)~~	
Albuminoid Nitrogen (as N)	0.05	Nitrite Nitrogen (as N)	0.005
Ammonia Nitrogen (as N)	0.06	Nitrate Nitrogen (as N)	0.19
Calcium (as Ca)	23.8	~~Bicarbonate (as CO_3)(Calculated)~~	
Magnesium (as Mg)	3.7	~~Carbonate (as CO_3)(Calculated)~~	
Iron (total)(as Ferric ion)	0.03	Sulphate (as SO_4)	11.5
		Chloride (as Cl)	1.5
		Fluoride (as F)	Nil
		Ortho-phosphate (as PO_4)	0.04
		Phosphate (total) (as PO_4)	0.09

Remarks:

* Composited from 9 samples at 3 depths (10', 20' and 30') taken at west, east and mid-stream Kinnaird Inlet of Columbia River.

Analysed by:

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTINE

W - W.K.H.U.

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

Report No.: 112
Date Reported: 12/12/61
Date Received: 5/12/61

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S.D. Husch & Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail, B.C.

Date Sampled: 4/12/61
Time Sampled: 9:00 A.M.

Water Work System: N.A.
Sampling Point: Columbia River, above dam site
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temperature & pH
Residual chlorine: -

Temperature (°C): 6.0 pH: 7.4
Other: -

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	< 5
Turbidity (in units)	< 5
Temperature (°C)(on arrival)	15
pH (in units)(on arrival)	7.6
Total Solids	92
Fixed Solids	58
Volatile Solids (calculated)	34
Dissolved Solids	80
Dissolved Solids(calculated)	85.6

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	59
Free Carbon Dioxide (as CO_2)(calculated)	3.2
Hardness (as $Ca\ CO_3$)	
Total	77
Carbonate(Temporary)(Calculated)	59
Non-Carbonate(permanent)(Calculated)	18
Silica (as SiO_2)	2.0
Surfactants (as A.B.S)	nil

Albuminoid Nitrogen (as N)	0.03
Ammonia Nitrogen (as N)	0.1
Calcium (as Ca)	25.0
Magnesium (as Mg)	3.4
Iron (total)(as Ferric ion)	0.02

Nitrite Nitrogen (as N)	0.002
Nitrate Nitrogen (as N)	0.05
Bicarbonate (as CO_3)(Calculated)	35.4
Carbonate (as CO_3)(Calculated)	nil
Sulphate (as SO_4)	17.5
Chloride (as Cl)	1.0
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.02
Total-phosphate (as PO_4)	0.05

Remarks:

Analysed by: [illegible]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTINE

W. W.K.M.C.

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B.C.

Report No.: 113
Date Reported: 12-12-61
Date Received: 5-12-61

COPY TO: Director, Division of Public Health Engineering

Collector's Name:	Mr. S.D. Husch & Mr. J.L. Hiebert	Date Sampled:	4-12-61
Address:	West Kootenay Health Unit, Trail	Time Sampled:	9:15 AM
Water Work System:	N.A.	Treatment:	None
Sampling Point:	Columbia River above Celgar Pulp Mill		
Source of Water:	Columbia River		
Test(s) done in field:	Temperature & pH	Temperature (°C):	6.0 pH: 7.4
Residual chlorine:	-	Other:	

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	<5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	<5	Phenolphthalein	Nil
Temperature (°C)(on arrival)	15	Methyl Orange (total)	59.0
pH (in units)(on arrival)	7.4	Free Carbon Dioxide (as CO_2)(calculated)	5.4
Total Solids	90	Hardness (as $Ca\ CO_3$)	
Fixed Solids	57	Total	77.0
Volatile Solids (calculated)	33	Carbonate(Temporary)(Calculated)	59.0
Dissolved Solids	80	Non-Carbonate(permanent)(Calculated)	18.0
Dissolved Solids(calculated)	85	Silica (as SiO_2)	1.5
		Surfactants (as A.B.S)	Nil
Albuminoid Nitrogen (as N)	0.03	Nitrite Nitrogen (as N)	Trace
Ammonia Nitrogen (as N)	0.06	Nitrate Nitrogen (as N)	0.07
Calcium (as Ca)	25.0	Bicarbonate (as CO_3)(Calculated)	35.4
Magnesium (as Mg)	3.4	Carbonate (as CO_3)(Calculated)	Nil
Iron (total)(as Ferric ion)	0.02	Sulphate (as SO_4)	17.5
		Chloride (as Cl)	1.0
		Fluoride (as F)	Nil
		Ortho-phosphate (as PO_4)	0.02
		Total-phosphate (as PO_4)	0.05

Remarks:

Analysed by:

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTINE

W - W.K.H.U.

Report No.: 114
Date Reported: 12-12-61
Date Received: 5-12-61

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B.C.

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S. D. Husch & Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail.
Date Sampled: 4-12-61
Time Sampled: 9:45 AM

Water Work System: N.A.
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River
Treatment: None

Test(s) done in field: Temperature & pH
Residual chlorine: -
Temperature (°C): 5.0 pH: 7.8
Other: -

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	< 5
Turbidity (in units)	5
Temperature (°C)(on arrival)	15
pH (in units)(on arrival)	7.9
Total Solids	112
Fixed Solids	70
Volatile Solids (calculated)	42
Dissolved Solids	101
Dissolved Solids(calculated)	109

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	70.0
Free Carbon Dioxide (as CO_2)(calculated)	1.9
Hardness (as $Ca\ CO_3$)	
Total	95.0
Carbonate(Temporary)(Calculated)	70.0
Non-Carbonate(permanent)(Calculated)	25.0
Silica (as SiO_2)	1.8
Surfactants (as A.B.S)	Nil

Albuminoid Nitrogen (as N)	0.02
Ammonia Nitrogen (as N)	0.06
Calcium (as Ca)	30.6
Magnesium (as Mg)	4.4
Iron (total)(as Ferric ion)	0.02

Nitrite Nitrogen (as N)	Trace
Nitrate Nitrogen (as N)	0.03
Bicarbonate (as CO_3)(Calculated)	42.0
Carbonate (as CO_3)(Calculated)	Nil
Sulphate (as SO_4)	26.0
Chloride (as Cl)	2.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.03
Total-phosphate (as PO_4)	0.05

Remarks:

Analysed by:

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B.C.

Report Form L76 (Rev.10-61)
CHEMICAL ANALYSIS-ROUTINE

W. W.K.H.U.

Report No.: 115
Date Reported: 12-12-61
Date Received: 5-12-61

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

COPY TO: Director, Division of Public Health Engineering

Collector's Name: Mr. S.D. Husch & Mr. J.L. Hiebert
Address: West Kootenay Health Unit

Date Sampled: 4-12-61
Time Sampled: 10:15 A.M.

Water Work System: N.A.
Sampling Point: Columbia River, at Kinnaird Inlet *
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temperature & pH
Residual chlorine:

Temperature (°C): **, pH: 7.5
Other:

Determinations Reported as mg/l unless noted otherwise

Colour (in units)	5
Turbidity (in units)	<5
Temperature (°C)(on arrival)	15
pH (in units)(on arrival)	8.0
Total Solids	105
Fixed Solids	74
Volatile Solids (calculated)	31
Dissolved Solids	95
Dissolved Solids(calculated)	98

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	64
Free Carbon Dioxide (as CO_2)(calculated)	1.4
Hardness (as $Ca CO_3$)	
Total	86
Carbonate(Temporary)(Calculated)	64
Non-Carbonate(permanent)(Calculated)	22
Silica (as SiO_2)	1.8
Surfactants (as A.B.S)	Nil

Albuminoid Nitrogen (as N)	0.02
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	28.9
Magnesium (as Mg)	3.2
Iron (total)(as Ferric ion)	0.01

Nitrite Nitrogen (as N)	Trace
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3)(Calculated)	38.4
Carbonate (as CO_3)(Calculated)	Nil
Sulphate (as SO_4)	22.0
Chloride (as Cl)	2.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.03
Total-phosphate (as PO_4)	0.05

Remarks:

* Composited from 9 samples at 3 depths (10', 20' and 30') taken at West, East and mid-stream Kinnaird Inlet of Columbia River.

** Temperature (°C) (done in field): West side of Kinnaird Inlet, 5.5°C
East side " " " , 5.0°C
Mid-stream" " " , 5.0°C.

Analysed by:

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTIN

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Report No.: 8
Date Reported: 8-2-62
Date Received: 6-2-62

Collector's Name: Mr. S. D. Husch & Mr. J. L. Hebert
Address: West Kootenay Health Unit, Trail

Date Sampled: 5-2-62
Time Sampled: 9:00 A.M.

Water Works System: N.A.
Sampling Point: Columbia River above dam site.
Source of Water: Columbia River

Treatment: none

Test(s) done in field: Temp. and pH
Residual Chlorine: -

Temperature (°C): 34°F pH: 7.6
Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	14
pH (in units) (on arrival)	7.5
Total Solids	98.0
Fixed Solids	69.0
Volatile Solids (calculated)	29.0
Dissolved Solids	85.0
Dissolved Solids (calculated)	79.0
Suspended Solids	13.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	4.0
Hardness (as $CaCO_3$)	
Total	63.5
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	0.8
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	nil
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.2
Magnesium (as Mg)	3.7
Iron (total) (as Ferric ion)	nil

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.05
Bicarbonate (as CO_3) (calculated)	33.5
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	10.0
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.035
PO_4 (Total)	0.070

Remarks:

Analysed by: [signature] 66

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTIN

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

Report No.: 9
Date Reported: 8-2-62
Date Received: 6-2-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J. L. Hiebert — Date Sampled: 5-2-62

Address: West Kootenay Health Unit, Trail — Time Sampled: 9:15 A.M.

Water Works System: N.A. — Treatment: none

Sampling Point: Columbia River above Celgar Pulp Mill

Source of Water: Columbia River

Test(s) done in field: Temp. and pH — Temperature (°C): 34°F pH: 7.6

Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5.
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	14
pH (in units) (on arrival)	7.3
Total Solids	101.0
Fixed Solids	70.0
Volatile Solids (calculated)	31.0
Dissolved Solids	87.0
Dissolved Solids (calculated)	81.2
Suspended Solids	14.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	58.0
Free Carbon Dioxide (as CO_2) (calculated)	6.5
Hardness (as $CaCO_3$)	
Total	67.5
Carbonate (temperary) (calculated)	58.0
Non-Carbonate (permanent) (calculated)	9.5
Silica (as SiO_2)	1.3
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.13
Calcium (as Ca)	20.4
Magnesium (as Mg)	3.9
Iron (total) (as Ferric ion)	0.03

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.05
Bicarbonate (as CO_3) (calculated)	34.8
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	10.0
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.045
PO_4 (Total)	0.075

Remarks:

Analysed by: [illegible] 67

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

Report No.: 10
Date Reported: 8-2-62
Date Received: 6-2-62

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B. C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch and Mr. J. L. Hiebert — Date Sampled: 5-2-62
Address: West Kootenay Health Unit, Trail, B. C. — Time Sampled: 9:45 a.m.
Water Works System: N. A. — Treatment: None
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River
Test(s) done in field: Temp. and pH — Temperature (~~°C~~ °F): 35°F pH: 8.0
Residual Chlorine: - - — Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	5
Temperature (°C) (on arrival)	14
pH (in units) (on arrival)	7.4
Total Solids	112.0
Fixed Solids	75.0
Volatile Solids (calculated)	37.0
Dissolved Solids	92.0
Dissolved Solids (calculated)	88.5
Suspended Solids	20.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	62.0
Free Carbon Dioxide (as CO_2) (calculated)	5.5
Hardness (as $CaCO_3$)	
Total	87.7
Carbonate (temperary) (calculated)	62.0
Non-Carbonate (permanent) (calculated)	25.7
Silica (as SiO_2)	1.2
Surfactants (as A.B.S.)	0.05

Albuminoid Nitrogen (as N)	0.01
Ammonia Nitrogen (as N)	0.7
Calcium (as Ca)	26.3
Magnesium (as Mg)	4.7
Iron (total) (as Ferric ion)	0.1

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	37.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.5
Chloride (as Cl)	1.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.055
PO_4 (Total)	0.095

Remarks:

Analysed by: JHWS 68

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325, McQuarrie St., Trail, B.C.

Report No.: 11
Date Reported: 8-2-62
Date Received: 6-2-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail

Date Sampled: 5-2-62
Time Sampled: 10:15 A.M.

Water Works System: N.A.
Sampling Point: Columbia River at Kinnaird Inlet *
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. and pH
Residual Chlorine: -

Temperature (~~°C~~): 35°F pH: 7.4
Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	5
Temperature (°C) (on arrival)	14
pH (in units) (on arrival)	7.5
Total Solids	107.0
Fixed Solids	75.0
Volatile Solids (calculated)	32.0
Dissolved Solids	89.0
Dissolved Solids (calculated)	86.0
Suspended Solids	18.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	61.0
Free Carbon Dioxide (as CO_2) (calculated)	4.5
Hardness (as $CaCO_3$)	
Total	71.5
Carbonate (temperary) (calculated)	61.0
Non-Carbonate (permanent) (calculated)	10.5
Silica (as SiO_2)	1.0
Surfactants (as A.B.S.)	0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.15
Calcium (as Ca)	21.5
Magnesium (as Mg)	4.2
Iron (total) (as Ferric ion)	0.04

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	36.6
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	1.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.050
PO_4 (Total)	0.080

Remarks: * Composited from 9 samples at 3 depths (surface, 10' and 20') taken at West, East and Midstream Kinnaird Inlet of Columbia River.

Analysed by: [illegible]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTIN

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Report No.: 13
Date Reported: 21-2-62
Date Received: 15-2-62

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail, B.C.
Date Sampled: 14-2-62
Time Sampled: 10:00 A.M.

Water Works System: N.A.
Sampling Point: Above Celgar Pulp Mill
Source of Water: Columbia River
Treatment: none

Test(s) done in field: Temperature & pH
Residual Chlorine: -
Temperature (°C): 37°F pH: 7.6
Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	12
pH (in units) (on arrival)	7.6
Total Solids	95.0
Fixed Solids	64.0
Volatile Solids (calculated)	31.0
Dissolved Solids	78.0
Dissolved Solids (calculated)	74.0
Suspended Solids	17.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	56.0
Free Carbon Dioxide (as CO_2) (calculated)	3.4
Hardness (as $CaCO_3$)	
Total	70.0
Carbonate (temperary) (calculated)	56.0
Non-Carbonate (permanent) (calculated)	14.0
Silica (as SiO_2)	3.5
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.14
Calcium (as Ca)	20.4
Magnesium (as Mg)	4.5
Iron (total) (as Ferric ion)	0.05

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.08
Bicarbonate (as CO_3) (calculated)	33.6
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	11.0
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.03

Remarks:
Taken during B.C. Power Commission silt dumping tests off Robson, just below Celgar

Analysed by: [illegible]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTIN

w - w.k. H.U.

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B. C.

Report No.: 14
Date Reported: 21.2.62
Date Received: 15.2.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert
Address: West Kootenay Health Unit

Date Sampled: 14.2.62
Time Sampled: 10:15 a.m.

Water Works System: N.A.
Sampling Point: Below Castlegar Ferries
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine:

Temperature (°C): 37° F pH: 7.8
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	5
Turbidity (in units)	Less than 5
Temperature (°C) (on arrival)	12
pH (in units) (on arrival)	7.6
Total Solids	96.0
Fixed Solids	64.0
Volatile Solids (calculated)	32.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	76.0
Suspended Solids	16.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	3.5
Hardness (as $CaCO_3$)	
Total	71.5
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	14.5
Silica (as SiO_2)	3.5
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	0.08
Ammonia Nitrogen (as N)	0.16
Calcium (as Ca)	20.8
Magnesium (as Mg)	4.4
Iron (total) (as Ferric ion)	0.03

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.11
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	11.5
Chloride (as Cl)	0.8
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.04

Remarks: Taken during B.C. Power Commission silt dumping tests off Robson, just below Celgar

Analysed by: [signature]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTIN

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B. C.

Report No.: 15
Date Reported: 21.2.62
Date Received: 15.2.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail

Date Sampled: 14.2.62
Time Sampled: 10:45 a.m.

Water Works System: N.A.
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°C): 38° F pH: 7.8
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	13
pH (in units) (on arrival)	7.75
Total Solids	109.0
Fixed Solids	69.0
Volatile Solids (calculated)	40.0
Dissolved Solids	88.0
Dissolved Solids (calculated)	85.0
Suspended Solids	21.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	60.0
Free Carbon Dioxide (as CO_2) (calculated)	2.4
Hardness (as $CaCO_3$)	
Total	81.0
Carbonate (temperary) (calculated)	60.0
Non-Carbonate (permanent) (calculated)	21.0
Silica (as SiO_2)	3.6
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	23.8
Magnesium (as Mg)	5.1
Iron (total) (as Ferric ion)	0.01

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.09
Bicarbonate (as CO_3) (calculated)	36.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	13.8
Chloride (as Cl)	1.0
Fluoride (as F)	Nil
Ortho-phosphate (as PO_4)	0.04

Remarks:
Taken during B.C. Hydro silt dumping tests just below Kelgar

Analysed by: [illegible] 72

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - W.K.H.U

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

Report No.: 16
Date Reported: 21-2-62
Date Received: 15-2-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr.J.L. Hiebert
Address: West Kootenay Health Unit, Trail

Date Sampled: 14-2-62
Time Sampled: 11:00 A.M.

Water Works System: N.A.
Sampling Point: Mid stream Kinnaird Inlet
Source of Water: Columbia River

Treatment: none

Test(s) done in field: Temp. & pH
Residual Chlorine: -

Temperature (°C): 38°F pH: 7.8
Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	13
pH (in units) (on arrival)	7.7
Total Solids	110.0
Fixed Solids	65.0
Volatile Solids (calculated)	45.0
Dissolved Solids	90.0
Dissolved Solids (calculated)	88.5
Suspended Solids	20.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	66.0
Free Carbon Dioxide (as CO_2) (calculated)	3.2
Hardness (as $CaCO_3$)	
Total	85.0
Carbonate (temperary) (calculated)	66.0
Non-Carbonate (permanent) (calculated)	19.0
Silica (as SiO_2)	3.5
Surfactants (as A.B.S.)	less than 0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.09
Calcium (as Ca)	26.0
Magnesium (as Mg)	4.7
Iron (total) (as Ferric ion)	0.02

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.08
Bicarbonate (as CO_3) (calculated)	39.6
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	13.5
Chloride (as Cl)	1.0
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.05

Remarks:
Taken during silt dumping tests just below Calgar by B.C. Hydro

Analysed by: [illegible] 73

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

Report No.: 25
Date Reported: 26-3-62
Date Received: 20-3-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert — Date Sampled: 19-3-62
Address: West Kootenay Health Unit, Trail, B.C. — Time Sampled: 9:00 A.M.

Water Works System: N.A. — Treatment: None
Sampling Point: Columbia River above Proposed Dam site
Source of Water: Columbia River

Test(s) done in field: pH & Temperature — Temperature (°C): 36°F pH: 7.6
Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	22.0
pH (in units) (on arrival)	7.8
Total Solids	92.0
Fixed Solids	66.0
Volatile Solids (calculated)	26.0
Dissolved Solids	84.0
Dissolved Solids (calculated)	75.2
Suspended Solids	8.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	1.8
Hardness (as $CaCO_3$)	
Total	64.0
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	7.0
Silica (as SiO_2)	3.4
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.15
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.6
Magnesium (as Mg)	3.6
Iron (total) (as Ferric ion)	0.14

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	11.5
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.025

Remarks:

Analysed by: [illegible] 74

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

W — W K.H.U

Report No.: 26
Date Reported: 26-3-62
Date Received: 20-3-62

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch & Mr. J.L. Hiebert — Date Sampled: 19-3-62
Address: West Kootenay Health Unit, Trail, B.C. — Time Sampled: 9:15 A.M.

Water Works System: N.A. — Treatment: None
Sampling Point: Columbia River above Celgar pulpmill
Source of Water: Columbia River

Test(s) done in field: pH & Temperature — Temperature (°C): 36°F pH: 7.4
Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	22
pH (in units) (on arrival)	7.7
Total Solids	89.0
Fixed Solids	65.0
Volatile Solids (calculated)	24.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	75.5
Suspended Solids	9.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	2.1
Hardness (as $CaCO_3$)	
Total	64.0
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	7.0
Silica (as SiO_2)	3.2
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.12
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.6
Magnesium (as Mg)	3.6
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	11.8
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.025

Remarks:

Analysed by: [signature] 75

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

W - W.K.H.U.

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

Report No.: 27
Date Reported: 26-3-62
Date Received: 20-3-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert — Date Sampled: 19-3-62
Address: West Kootenay Health Unit, Trail, B.C. — Time Sampled: 9:30 A.M.

Water Works System: N.A. — Treatment: none
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Test(s) done in field: pH & Temperature — Temperature (°C): 38°F pH: 7.6
Residual Chlorine: — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	less than 5	Phenolphthalein	nil
Temperature (°C) (on arrival)	22	Methyl Orange (total)	62.0
pH (in units) (on arrival)	7.9	Free Carbon Dioxide (as CO_2) (calculated)	1.6
Total Solids	107	Hardness (as $CaCO_3$)	
Fixed Solids	70.0	Total	75.0
Volatile Solids (calculated)	37.0	Carbonate (temperary) (calculated)	62.0
Dissolved Solids	95.0	Non-Carbonate (permanent) (calculated)	13.0
Dissolved Solids (calculated)	85.0	Silica (as SiO_2)	3.5
Suspended Solids	12.0	Surfactants (as A.B.S.)	nil
Albuminoid Nitrogen (as N)	0.10	Nitrite Nitrogen (as N)	nil
Ammonia Nitrogen (as N)	0.05	Nitrate Nitrogen (as N)	0.02
Calcium (as Ca)	23.0	Bicarbonate (as CO_3) (calculated)	37.2
Magnesium (as Mg)	4.2	Carbonate (as CO_3) (calculated)	nil
Iron (total) (as Ferric ion)	0.04	Sulphate (as SO_4)	12.8
		Chloride (as Cl)	1.5
		Fluoride (as F)	nil
		Ortho-phosphate (as PO_4)	0.035

Remarks:

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Analysed by:

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

W - W. K. H. U.

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

Report No.: 28
Date Reported: 26-3-62
Date Received: 20-3-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert — Date Sampled: 19-3-62
Address: West Kootenay Health Unit, Trail, B.C. — Time Sampled: 10:00 A.M.

Water Works System: N.A. — Treatment: none
Sampling Point: Columbia River at Kinnaird Inlet*
Source of Water: Columbia River

Test(s) done in field: pH & Temperature — Temperature (~~°C~~): 38°F pH: 7.6
Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	less than 5	Phenolphthalein	nil
Temperature (°C) (on arrival)	22	Methyl Orange (total)	68.0
pH (in units) (on arrival)	7.9	Free Carbon Dioxide (as CO_2) (calculated)	1.7
Total Solids	98.0	Hardness (as $CaCO_3$)	
Fixed Solids	68.0	Total	79.0
Volatile Solids (calculated)	30.0	Carbonate (temperary) (calculated)	68.0
Dissolved Solids	82.0	Non-Carbonate (permanent) (calculated)	11.0
Dissolved Solids (calculated)	88.0	Silica (as SiO_2)	2.4
Suspended Solids	16.0	Surfactants (as A.B.S.)	nil
Albuminoid Nitrogen (as N)	0.08	Nitrite Nitrogen (as N)	nil
Ammonia Nitrogen (as N)	0.05	Nitrate Nitrogen (as N)	0.05
Calcium (as Ca)	24.0	Bicarbonate (as CO_3) (calculated)	40.8
Magnesium (as Mg)	4.5	Carbonate (as CO_3) (calculated)	nil
Iron (total) (as Ferric ion)	0.07	Sulphate (as SO_4)	12.5
		Chloride (as Cl)	1.2
		Fluoride (as F)	nil
		Ortho-phosphate (as PO_4)	0.03

Remarks: *Composited from 9 samples at 3 depths (surface, 10' & 20') taken at West, East and Midstream Kinnaird Inlet.

Analysed by: [illegible] 77

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W/- W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING

DEPUTY MINISTER OF HEALTH
APR 13 1962
VICTORIA, B. C.

Report No.: 34
Date Reported: 12-4-62
Date Received: 10-4-62

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert
Address: West Kootenay Health Unit, Trail

Date Sampled: 9-4-62
Time Sampled: 9:00 A.M.

Water Works System: N.A.
Sampling Point: Columbia River, above proposed dam site
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: ---

Temperature (°C): 40°F pH: 7.6
Other: ----

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	less than 5	Phenolphthalein	Nil
Temperature (°C) (on arrival)	18.0	Methyl Orange (total)	57.0
pH (in units) (on arrival)	7.7	Free Carbon Dioxide (as CO_2) (calculated)	2.4
Total Solids	80.0	Hardness (as $CaCO_3$)	
Fixed Solids	58.0	Total	63.0
Volatile Solids (calculated)	22.0	Carbonate (temperary) (calculated)	57.0
Dissolved Solids	72.0	Non-Carbonate (permanent) (calculated)	6.0
Dissolved Solids (calculated)	70.0	Silica (as SiO_2)	2.8
Suspended Solids	8.0	Surfactants (as A.B.S.)	Nil
Albuminoid Nitrogen (as N)	0.05	Nitrite Nitrogen (as N)	Nil
Ammonia Nitrogen (as N)	0.05	Nitrate Nitrogen (as N)	0.03
Calcium (as Ca)	20.0	Bicarbonate (as CO_3) (calculated)	34.2
Magnesium (as Mg)	3.1	Carbonate (as CO_3) (calculated)	Nil
Iron (total) (as Ferric ion)	Nil	Sulphate (as SO_4)	7.5
		Chloride (as Cl)	1.0
		Fluoride (as F)	Nil
		Ortho-phosphate (as PO_4)	0.04
		Total - phos	0.070

Remarks:

Analysed by: [signature] 78

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B.C.

Report No.: 35
Date Reported: 12-4-62
Date Received: 10-4-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. R.J. Hiebert — Date Sampled: 9-4-62
Address: West Kootenay Health Unit, Trail, B.C. — Time Sampled: 9:15 A.M.

Water Works System: N.A. — Treatment: None
Sampling Point: Columbia River above Celgar Pulp Mill
Source of Water: Columbia River

Test(s) done in field: Temperature & pH — Temperature (°C): 40°F pH: 7.6
Residual Chlorine: ---- — Other: ----

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	less than 5	Phenolphthalein	Nil
Temperature (°C) (on arrival)	18.0	Methyl Orange (total)	56.0
pH (in units) (on arrival)	7.7	Free Carbon Dioxide (as CO_2) (calculated)	2.4
Total Solids	84.0	Hardness (as $CaCO_3$)	
Fixed Solids	56.0	Total	63.7
Volatile Solids (calculated)	28.0	Carbonate (temperary) (calculated)	56.0
Dissolved Solids	74.0	Non-Carbonate (permanent) (calculated)	7.7
Dissolved Solids (calculated)	69.8	Silica (as SiO_2)	3.0
Suspended Solids	10.0	Surfactants (as A.B.S.)	Nil
Albuminoid Nitrogen (as N)	0.10	Nitrite Nitrogen (as N)	Nil
Ammonia Nitrogen (as N)	0.08	Nitrate Nitrogen (as N)	0.05
Calcium (as Ca)	20.0	Bicarbonate (as CO_3) (calculated)	33.6
Magnesium (as Mg)	3.2	Carbonate (as CO_3) (calculated)	Nil
Iron (total) (as Ferric ion)	0.03	Sulphate (as SO_4)	7.0
		Chloride (as Cl)	1.0
		Fluoride (as F)	Nil
		Ortho-phosphate (as PO_4)	0.04
		Total - phos	0.075

Remarks:

Analysed by: TMS

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

DEPUTY MINISTER OF HEALTH
APR 13 1962
VICTORIA, B.C.

Report No.: 37
Date Reported: 12-4-62
Date Received: 10-4-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.H. Hiebert — Date Sampled: 9-4-62

Address: West Kootenay Health Unit, Trail — Time Sampled: 10:00 A.M.

Water Works System: N.A. — Treatment: none
Sampling Point: Columbia River at Kinnaird Inlet*
Source of Water: Columbia River

Test(s) done in field: Temp. and pH — Temperature (°C): 42°F pH: 7.6
Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5	Alkalinity (as $CaCO_3$)	
Turbidity (in units)	less than 5	Phenolphthalein	nil
Temperature (°C) (on arrival)	19.0	Methyl Orange (total)	64.0
pH (in units) (on arrival)	7.8	Free Carbon Dioxide (as CO_2) (calculated)	2.1
Total Solids	97.0	Hardness (as $CaCO_3$)	
Fixed Solids	65.0	Total	75.5
Volatile Solids (calculated)	32.0	Carbonate (temperary) (calculated)	64.0
Dissolved Solids	85.0	Non-Carbonate (permanent) (calculated)	11.5
Dissolved Solids (calculated)	82.0	Silica (as SiO_2)	4.0
Suspended Solids	12.0	Surfactants (as A.B.S.)	nil
Albuminoid Nitrogen (as N)	0.12	Nitrite Nitrogen (as N)	nil
Ammonia Nitrogen (as N)	0.05	Nitrate Nitrogen (as N)	0.04
Calcium (as Ca)	22.5	Bicarbonate (as CO_3) (calculated)	38.4
Magnesium (as Mg)	4.6	Carbonate (as CO_3) (calculated)	nil
Iron (total) (as Ferric ion)	0.04	Sulphate (as SO_4)	9.5
		Chloride (as Cl)	1.2
		Fluoride (as F)	nil
		Ortho-phosphate (as PO_4)	0.04
		Total phos	0.065

Remarks:

* Composited from 9 samples at 3 depths (surface, 10' and 20') taken at West, East and Midstream Kinnaird Inlet.

Analysed by: [signature] 80

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS - ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St., Trail, B.C.

Report No.: 36
Date Reported: 12-4-62
Date Received: 10-4-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch and Mr. J.L. Hiebert — Date Sampled: 9-4-62
Address: West Kootenay Health Unit, Trail — Time Sampled: 9:45 A.M.

Water Works System: N.A. — Treatment: none
Sampling Point: Kootenay River above Confluence
Source of Water: Kootenay River

Test(s) done in field: Temp. & pH — Temperature (°C): 41°F pH: 7.6
Residual Chlorine: - — Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	19.0
pH (in units) (on arrival)	7.9
Total Solids	104
Fixed Solids	68.0
Volatile Solids (calculated)	36.0
Dissolved Solids	92.0
Dissolved Solids (calculated)	85.0
Suspended Solids	12.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	62.0
Free Carbon Dioxide (as CO_2) (calculated)	1.6
Hardness (as $CaCO_3$)	
Total	81.0
Carbonate (temperary) (calculated)	62.0
Non-Carbonate (permanent) (calculated)	19.0
Silica (as SiO_2)	4.2
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.10
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	24.2
Magnesium (as Mg)	4.9
Iron (total) (as Ferric ion)	0.04

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	37.2
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	10.0
Chloride (as Cl)	1.5
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.04
Total - phos	0.085

Remarks:

Analysed by: FWS

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.,
Trail, B.C.

Report No.: 50
Date Reported: 28-5-62
Date Received: 23-5-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B.C.

Date Sampled: 22-5-62
Time Sampled: 7:30 A.M.

Water Works System: N. A.
Sampling Point: Above Proposed Dam Site
Source of Water: Columbia River

Treatment: none

Test(s) done in field: Temperature & pH
Residual Chlorine: -

Temperature (°C): 50°F pH: 7.6
Other: -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	18.0
pH (in units) (on arrival)	7.4
Total Solids	89.0
Fixed Solids	60.0
Volatile Solids (calculated)	29.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	75.0
Suspended Solids	9.0

Alkalinity (as $CaCO_3$)

Phenolphthalein	nil
Methyl Orange (total)	56.0
Free Carbon Dioxide (as CO_2) (calculated)	4.5

Hardness (as $CaCO_3$)

Total	62.5
Carbonate (temperary) (calculated)	56.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	4.2
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	18.5
Magnesium (as Mg)	3.9
Iron (total) (as Ferric ion)	0.02

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	33.6
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	0.8
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.065
Total phos	0.105

Remarks:

Analysed by: FWS 82

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.,
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Report No.: 51
Date Reported: 28-5-62
Date Received: 23-5-62

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B.C.

Date Sampled: 22-5-62
Time Sampled: 7:45 A.M.

Water Works System: N.A.
Sampling Point: Above Celgar Pulp Mill
Source of Water: Columbia River

Treatment: none

Test(s) done in field: Temperature & pH
Residual Chlorine:

Temperature (°C): 50°F pH: 7.6
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	13.0
pH (in units) (on arrival)	7.4
Total Solids	95.0
Fixed Solids	62.0
Volatile Solids (calculated)	33.0
Dissolved Solids	85.0
Dissolved Solids (calculated)	78.0
Suspended Solids	10.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	58.0
Free Carbon Dioxide (as CO_2) (calculated)	4.5
Hardness (as $CaCO_3$)	
Total	64.5
Carbonate (temperary) (calculated)	58.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	4.0
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.10
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.1
Magnesium (as Mg)	4.0
Iron (total) (as Ferric ion)	0.01

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	34.8
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	0.3
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.05
Total phos	0.095

Remarks:

Analysed by: [illegible] 83

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

Report No.: 52
Date Reported: 28-5-62
Date Received: 23-5-62

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.,
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B.C.

Date Sampled: 22-5-62
Time Sampled: 8:00 A.M.

Water Works System: N.A.
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Treatment: none

Test(s) done in field: Temperature & pH
Residual Chlorine:

Temperature (°C): 48°F pH: 7.6
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	18.0
pH (in units) (on arrival)	7.4
Total Solids	105
Fixed Solids	65.0
Volatile Solids (calculated)	40.0
Dissolved Solids	92.0
Dissolved Solids (calculated)	88.0
Suspended Solids	13.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	65.0
Free Carbon Dioxide (as CO_2) (calculated)	5.0
Hardness (as $CaCO_3$)	
Total	68.5
Carbonate (temperary) (calculated)	65.0
Non-Carbonate (permanent) (calculated)	3.5
Silica (as SiO_2)	3.6
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.10
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	20.5
Magnesium (as Mg)	4.1
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.03
Bicarbonate (as CO_3) (calculated)	39.0
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	15.0
Chloride (as Cl)	1.5
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.090
Total phos	0.110

Remarks:

Analysed by: [illegible] 84

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie St.
Trail, B.C.

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Report No.: 53
Date Reported: 28-5-62
Date Received: 23-5-62

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B.C.

Date Sampled: 22-5-62
Time Sampled: 8:15 A.M.

Water Works System: N.A.
Sampling Point: Kinnaird Inlet (composited sample)
Source of Water: Columbia River

Treatment: none

Test(s) done in field: Temperature & pH
Residual Chlorine: -

Temperature (°C): 48°F pH: 7.6
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	18.0
pH (in units) (on arrival)	7.4
Total Solids	100
Fixed Solids	67.0
Volatile Solids (calculated)	33.0
Dissolved Solids	88.0
Dissolved Solids (calculated)	80.0
Suspended Solids	12.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	4.6
Hardness (as $CaCO_3$)	
Total	65.0
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	8.0
Silica (as SiO_2)	3.8
Surfactants (as A.B.S.)	nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.10
Calcium (as Ca)	19.3
Magnesium (as Mg)	4.0
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	nil
Sulphate (as SO_4)	13.0
Chloride (as Cl)	1.0
Fluoride (as F)	nil
Ortho-phosphate (as PO_4)	0.095
Total phos	0.160

Remarks:

Analysed by: [illegible]

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B. C.

Report No.: 56
Date Reported: 14.6.62
Date Received: 12.6.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: West Kootenay Health Unit, Trail

Date Sampled: 11.6.62
Time Sampled: 9:00 a.m.

Water Works System: N.A.
Sampling Point: Above proposed dam site
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°C): 50°F pH: 7.6
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	20
pH (in units) (on arrival)	7.8
Total Solids	100
Fixed Solids	75.0
Volatile Solids (calculated)	25.0
Dissolved Solids	91.0
Dissolved Solids (calculated)	88.5
Suspended Solids	9.0

Alkalinity (as $CaCO_3$)

Phenolphthalein	Nil
Methyl Orange (total)	58.0
Free Carbon Dioxide (as CO_2) (calculated)	1.9

Hardness (as $CaCO_3$)

Total	64.0
Carbonate (temperary) (calculated)	58.0
Non-Carbonate (permanent) (calculated)	6.0
Silica (as SiO_2)	13.2
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.8
Magnesium (as Mg)	3.4
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.02
Bicarbonate (as CO_3) (calculated)	34.8
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	11.5
Chloride (as Cl)	1.5
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.035
Total - phos	0.065

Remarks:

Analysed by: [signature] 86

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - WKHV

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B. C.

Report No.: 57
Date Reported: 14.6.62
Date Received: 12.6.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: West Kootenay Health Unit, Trail

Date Sampled: 11.6.62
Time Sampled: 9:15 a.m.

Water Works System: N.A.
Sampling Point: Above Celgar Pulp Mill
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. and pH
Residual Chlorine: ---

Temperature (°F): 50°F pH: 7.6
Other: ---

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	20
pH (in units) (on arrival)	7.9
Total Solids	105
Fixed Solids	72.0
Volatile Solids (calculated)	33.0
Dissolved Solids	90.0
Dissolved Solids (calculated)	86.5
Suspended Solids	15.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	56.0
Free Carbon Dioxide (as CO_2) (calculated)	1.5
Hardness (as $CaCO_3$)	
Total	64.0
Carbonate (temperary) (calculated)	56.0
Non-Carbonate (permanent) (calculated)	8.0
Silica (as SiO_2)	11.0
Surfactants (as A.B.S.)	0.50

Albuminoid Nitrogen (as N)	Trace
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.8
Magnesium (as Mg)	3.4
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.03
Bicarbonate (as CO_3) (calculated)	33.6
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	13.0
Chloride (as Cl)	1.5
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.040
Total phos	c.070

Remarks:

Analysed by: [illegible] 87

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 McQuarrie Street
Trail, B. C.

Report No.: 58
Date Reported: 14.6.62
Date Received: 12.6.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch
Address: West Kootenay Health Unit, Trail

Date Sampled: 11.6.62
Time Sampled: 9:40 a.m.

Water Works System: N.A.
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°C): 50°F pH: 7.8
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	20
pH (in units) (on arrival)	7.7
Total Solids	115
Fixed Solids	80.0
Volatile Solids (calculated)	35.0
Dissolved Solids	95.0
Dissolved Solids (calculated)	90.0
Suspended Solids	20.0

Alkalinity (as $CaCO_3$)

Phenolphthalein	Nil
Methyl Orange (total)	65.0
Free Carbon Dioxide (as CO_2) (calculated)	2.6

Hardness (as $CaCO_3$)

Total	71.5
Carbonate (temperary) (calculated)	65.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	9.5
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	21.8
Magnesium (as Mg)	4.0
Iron (total) (as Ferric ion)	0.05

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.01
Bicarbonate (as CO_3) (calculated)	39.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	17.5
Chloride (as Cl)	2.0
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.080
Total- phos "	0.105

Remarks:

Analysed by: [signature] 88

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W. - W.K.H.U

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
1325 Mcquarrie Street
Trail, B. C.

Report No.: 59
Date Reported: 14.6.62
Date Received: 12.6.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: West Kootenay Health Unit, Trail

Date Sampled: 11.6.62
Time Sampled: 10:00 a.m.

Water Works System: N.A.
Sampling Point: Kinnaird Inlet (composited sample) *
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine:

Temperature (°C): 50°F pH: 7.8
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	8
Temperature (°C) (on arrival)	20
pH (in units) (on arrival)	7.9
Total Solids	121
Fixed Solids	78.0
Volatile Solids (calculated)	43.0
Dissolved Solids	87.0
Dissolved Solids (calculated)	85.0
Suspended Solids	24.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	60.0
Free Carbon Dioxide (as CO_2) (calculated)	1.5
Hardness (as $CaCO_3$)	
Total	66.5
Carbonate (temperary) (calculated)	60.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	1.2
Surfactants (as A.B.S.)	0.85

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.10
Calcium (as Ca)	20.8
Magnesium (as Mg)	3.4
Iron (total) (as Ferric ion)	0.03

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.02
Bicarbonate (as CO_3) (calculated)	36.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	16.0
Chloride (as Cl)	2.0
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.045
Total - phos "	0.085

Remarks:
* Composited from 9 samples taken at surface, 10' and 20' depth at east, west and midstream of Columbia River at Kinnaird Inlet.

Analysed by: Fues

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DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 73
Date Reported: 31-7-62
Date Received: 26-7-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B. C.

Date Sampled: 24-7-62
Time Sampled: 2:00 P.M.

Water Works System: N. A.
Treatment: None
Sampling Point: Columbia River above proposed dam site.
Source of Water: Columbia River

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°F): 57° F pH: 7.6
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	25.0
pH (in units) (on arrival)	7.3
Total Solids	90.0
Fixed Solids	46.0
Volatile Solids (calculated)	44.0
Dissolved Solids	76.0
Dissolved Solids (calculated)	71.0
Suspended Solids	14.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	50.0
Free Carbon Dioxide (as CO_2) (calculated)	5.0
Hardness (as $CaCO_3$)	
Total	56.5
Carbonate (temperary) (calculated)	50.0
Non-Carbonate (permanent) (calculated)	6.5
Silica (as SiO_2)	4.2
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	18.2
Magnesium (as Mg)	2.6
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.09
Bicarbonate (as CO_3) (calculated)	30.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	1.0
Fluoride (as F)	0.5
Ortho-phosphate (as PO_4)	0.065
Total-phosphate (")	0.105

Remarks:

Analysed by: [signature] 90

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 74
Date Reported: 31-7-62
Date Received: 26-7-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B. C.

Date Sampled: 24-7-62
Time Sampled: 2:00 p.m.

Water Works System: N. A.
Sampling Point: Columbia River above Celgar Pulp Mill
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°C): 57° FpH: 7.8
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	25.0
pH (in units) (on arrival)	7.3
Total Solids	95.0
Fixed Solids	48.0
Volatile Solids (calculated)	47.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	75.0
Suspended Solids	15.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	51.0
Free Carbon Dioxide (as CO_2) (calculated)	4.5
Hardness (as $CaCO_3$)	
Total	53.5
Carbonate (temperary) (calculated)	51.0
Non-Carbonate (permanent) (calculated)	2.5
Silica (as SiO_2)	4.4
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	17.0
Magnesium (as Mg)	2.6
Iron (total) (as Ferric ion)	0.07

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	30.6
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	13.0
Chloride (as Cl)	1.5
Fluoride (as F)	0.2
Ortho-phosphate (as PO_4)	0.045
Total-phos	0.075

Remarks:

Analysed by: [signature] 91

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 75
Date Reported: 31-7-62
Date Received: 26-7-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B. C.

Date Sampled: 24-7-62
Time Sampled: 2:45 p.m.

Water Works System: N. A.
Sampling Point: Kootenay River above Confluence
Source of Water: Kootenay River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°F): 62° FpH: 8.2
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	25.0
pH (in units) (on arrival)	7.3
Total Solids	98.0
Fixed Solids	51.0
Volatile Solids (calculated)	47.0
Dissolved Solids	84.0
Dissolved Solids (calculated)	82.5
Suspended Solids	14.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	5.5
Hardness (as $CaCO_3$)	
Total	58.5
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	1.5
Silica (as SiO_2)	3.6
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.3
Magnesium (as Mg)	2.4
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.05
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	14.5
Chloride (as Cl)	2.0
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.040
Total - phos "	0.090

Remarks:

Analysed by: [signature] 92

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

W.-W. K. H. U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 76
Date Reported: 31-7-62
Date Received: 26-7-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail, B. C.

Date Sampled: 24-7-62
Time Sampled: 3:00 p.m.

Water Works System: N. A.
Sampling Point: Kinnaird Inlet (Composited sample)
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°F): 60° F pH: 8.2
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	5
Temperature (°C) (on arrival)	25.0
pH (in units) (on arrival)	7.4
Total Solids	102
Fixed Solids	49.0
Volatile Solids (calculated)	53.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	78.5
Suspended Solids	22.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	56.0
Free Carbon Dioxide (as CO_2) (calculated)	5.5
Hardness (as $CaCO_3$)	
Total	59.5
Carbonate (temperary) (calculated)	56.0
Non-Carbonate (permanent) (calculated)	3.5
Silica (as SiO_2)	3.3
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.0
Magnesium (as Mg)	2.3
Iron (total) (as Ferric ion)	0.06

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	33.6
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.5
Chloride (as Cl)	2.0
Fluoride (as F)	0.15
Ortho-phosphate (as PO_4)	0.075
Total phos	0.140

Remarks:

Analysed by: [illegible] 93

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B.C.

Report No.: 80
Date Reported: 21-8-62
Date Received: 15-8-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. J.L. Hiebert
Address: W.K.H.U.- Trail, B.C.

Date Sampled: 13-8-62
Time Sampled: ------

Water Works System: N.A.
Sampling Point: above proposed dam site
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temperature and pH
Residual Chlorine: ------

Temperature (°C): 57°F pH: 7.8
Other: -----

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	Less than 5
Turbidity (in units)	Less than 5
Temperature (°C) (on arrival)	24.0
pH (in units) (on arrival)	7.4
Total Solids	100.0
Fixed Solids	48.0
Volatile Solids (calculated)	52.0
Dissolved Solids	75.0
Dissolved Solids (calculated)	70.0
Suspended Solids	25.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	50.0
Free Carbon Dioxide (as CO_2) (calculated)	3.8
Hardness (as $CaCO_3$)	
Total	53.0
Carbonate (temperary) (calculated)	50.0
Non-Carbonate (permanent) (calculated)	3.0
Silica (as SiO_2)	3.0
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	19.3
Magnesium (as Mg)	1.1
Iron (total) (as Ferric ion)	0.09

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	30.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	11.5
Chloride (as Cl)	1.0
Fluoride (as F)	0.08
Ortho-phosphate (as PO_4)	0.025
Total phos "	0.045

Remarks:

Analysed by: [illegible] 94

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B.C.

Report No.: 81
Date Reported: 21-8-62
Date Received: 15-8-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. J.L. Hiebert
Address: W.K.H.U., Trail, B.C.

Date Sampled: 13-8-62
Time Sampled: --

Water Works System: N.A.
Sampling Point: Above Celgar Pulp Mill
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temperature and pH
Residual Chlorine:

Temperature (F): 57°F pH: 7.8
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	24.0
pH (in units) (on arrival)	7.2
Total Solids	95.0
Fixed Solids	42.0
Volatile Solids (calculated)	53.0
Dissolved Solids	70.0
Dissolved Solids (calculated)	70.0
Suspended Solids	25.0 0.05

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	18.5
Magnesium (as Mg)	1.1
Iron (total) (as Ferric ion)	0.08

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	51.0
Free Carbon Dioxide (as CO_2) (calculated)	5.5
Hardness (as $CaCO_3$)	
Total	52.0
Carbonate (temperary) (calculated)	51.0
Non-Carbonate (permanent) (calculated)	1.0
Silica (as SiO_2)	3.5
Surfactants (as A.B.S.)	Nil

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.0
Bicarbonate (as CO_3) (calculated)	30.6
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	11.0
Chloride (as Cl)	2.5
Fluoride (as F)	0.0
Ortho-phosphate (as PO_4)	0.03
Total phos	0.10

Remarks:

Analysed by: FWS 95

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W.-W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: **Director**
West Kootenay Health Unit
Trail, B. C.

Report No.: **82**
Date Reported: **21.8.62**
Date Received: **15.8.62**

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: **Mr. J. L. Hiebert**
Address: **W.K.H.U., Trail**

Date Sampled: **13.8.62**
Time Sampled: **- -**

Water Works System: **N.A.**
Sampling Point: **Kootenay River above confluence**
Source of Water: **Kootenay River**

Treatment: **None**

Test(s) done in field: ~~None~~ Temp. & pH
Residual Chlorine: **- -**

Temperature (~~°C~~): **62° F** pH: **8.2**
Other: **- -**

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	**less than 5**
Turbidity (in units)	**less than 5**
Temperature (°C) (on arrival)	**24.0**
pH (in units) (on arrival)	**7.3**
Total Solids	**105**
Fixed Solids	**75.0**
Volatile Solids (calculated)	**30.0**
Dissolved Solids	**95.0**
Dissolved Solids (calculated)	**93.0**
Suspended Solids	**10.0**

Alkalinity (as $CaCO_3$)	
Phenolphthalein	**Nil**
Methyl Orange (total)	**59.0**
Free Carbon Dioxide (as CO_2) (calculated)	**5.5**
Hardness (as $CaCO_3$)	
Total	**70.0**
Carbonate (temperary) (calculated)	**59.0**
Non-Carbonate (permanent) (calculated)	**11.0**
Silica (as SiO_2)	**3.2**
Surfactants (as A.B.S.)	**Nil**

Albuminoid Nitrogen (as N)	**0.05**
Ammonia Nitrogen (as N)	**0.05**
Calcium (as Ca)	**24.4**
Magnesium (as Mg)	**2.1**
Iron (total) (as Ferric ion)	**0.08**

Nitrite Nitrogen (as N)	**Nil**
Nitrate Nitrogen (as N)	**0.03**
Bicarbonate (as CO_3) (calculated)	**35.4**
Carbonate (as CO_3) (calculated)	**Nil**
Sulphate (as SO_4)	**13.0**
Chloride (as Cl)	**2.5**
Fluoride (as F)	**less than 0.05**
Ortho-phosphate (as PO_4)	**0.040**
Total phos "	0.095

Remarks:

Analysed by: [signature] 96

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W. W. K. H. U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B.C.

Report No.: 83
Date Reported: 21-8-62
Date Received: 15-8-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. J.L. Hiebert
Address: W.K.H.U., Trail
Date Sampled: 13-8-62
Time Sampled: --

Water Works System: N.A.
Sampling Point: Kinnaird Inlet, Composited sample
Source of Water: Columbia River
Treatment: None

Test(s) done in field: ~~None~~ Temp. & pH
Residual Chlorine:
Temperature (°F): 59°F pH: 8.0
Other:

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	24.0
pH (in units) (on arrival)	7.3
Total Solids	95.0
Fixed Solids	45.0
Volatile Solids (calculated)	50.0
Dissolved Solids	70.0
Dissolved Solids (calculated)	74.5
Suspended Solids	25.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	53.0
Free Carbon Dioxide (as CO_2) (calculated)	5.5
Hardness (as $CaCO_3$)	
Total	61.0
Carbonate (temperary) (calculated)	53.0
Non-Carbonate (permanent) (calculated)	8.0
Silica (as SiO_2)	3.4
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.05
Calcium (as Ca)	20.5
Magnesium (as Mg)	2.3
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.08
Bicarbonate (as CO_3) (calculated)	31.8
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	1.5
Fluoride (as F)	0.05
Ortho-phosphate (as PO_4)	0.020
Total phos "	0.045

Remarks:

Analysed by: [signature] 97

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 91
Date Reported: 27.9.62
Date Received: 25.9.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail

Date Sampled: 24.9.62
Time Sampled: - -

Water Works System: - -
Sampling Point: Above proposed dam site
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (°F): 58° F pH: 8.0
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	Less than 5
Turbidity (in units)	Less than 5
Temperature (°C) (on arrival)	19.0
pH (in units) (on arrival)	7.4
Total Solids	90.0
Fixed Solids	48.0
Volatile Solids (calculated)	42.0
Dissolved Solids	70.0
Dissolved Solids (calculated)	72.0
Suspended Solids	20.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	50.0
Free Carbon Dioxide (as CO_2) (calculated)	4.0
Hardness (as $CaCO_3$)	
Total	60.0
Carbonate (temperary) (calculated)	50.0
Non-Carbonate (permanent) (calculated)	10.0
Silica (as SiO_2)	3.2
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.10
Ammonia Nitrogen (as N)	0.15
Calcium (as Ca)	19.7
Magnesium (as Mg)	2.5
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.06
Bicarbonate (as CO_3) (calculated)	30.0
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.0
Chloride (as Cl)	2.0
Fluoride (as F)	0.10
Ortho-phosphate (as PO_4)	0.025
Total - phos	0.045

Remarks:

Analysed by: [illegible] 98

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61)

CHEMICAL ANALYSIS-ROUTINE

W.K.H.U.

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 92
Date Reported: 27.9.62
Date Received: 25.9.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail

Date Sampled: 24.9.62
Time Sampled: - -

Water Works System: - -
Sampling Point: Above Celgar Pulp Mill
Source of Water: Columbia River

Treatment: None

Test(s) done in field: Temp. and pH
Residual Chlorine: - -

Temperature (°C): 58° F pH: 8.0
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	Less than 5
Turbidity (in units)	Less than 5
Temperature (°C) (on arrival)	19.0
pH (in units) (on arrival)	7.4
Total Solids	95.0
Fixed Solids	55.0
Volatile Solids (calculated)	40.0
Dissolved Solids	80.0
Dissolved Solids (calculated)	73.0
Suspended Solids	15.0

Alkalinity (as $CaCO_3$)

Phenolphthalein	Nil
Methyl Orange (total)	52.0
Free Carbon Dioxide (as CO_2) (calculated)	4.0

Hardness (as $CaCO_3$)

Total	61.0
Carbonate (temperary) (calculated)	52.0
Non-Carbonate (permanent) (calculated)	9.0
Silica (as SiO_2)	3.6
Surfactants (as A.B.S.)	Nil

Albuminoid Nitrogen (as N)	0.10
Ammonia Nitrogen (as N)	0.15
Calcium (as Ca)	19.9
Magnesium (as Mg)	2.6
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.04
Bicarbonate (as CO_3) (calculated)	31.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	12.5
Chloride (as Cl)	2.0
Fluoride (as F)	0.08
Ortho-phosphate (as PO_4)	0.035
Total - phos	0.055

Remarks:

Analysed by: [illegible] 99

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W- W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B.C.

Report No.: 93
Date Reported: 27-9-62
Date Received: 25-9-62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S.D. Husch
Address: W.K.H.U., Trail

Date Sampled: 24-9-62
Time Sampled: --

Water Works System: --
Sampling Point: Kootenay River above confluence
Source of Water: Kootenay River

Treatment: None

Test(s) done in field: Temp. & pH
Residual Chlorine: --

Temperature (°C) 61°F pH: 8.6
Other: --

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	less than 5
Turbidity (in units)	less than 5
Temperature (°C) (on arrival)	19.0
pH (in units) (on arrival)	7.2
Total Solids	102
Fixed Solids	71.0
Volatile Solids (calculated)	31.0
Dissolved Solids	92.0
Dissolved Solids (calculated)	83.0
Suspended Solids	10.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	57.0
Free Carbon Dioxide (as CO_2) (calculated)	7.0
Hardness (as $CaCO_3$)	
Total	71.0
Carbonate (temperary) (calculated)	57.0
Non-Carbonate (permanent) (calculated)	14.0
Silica (as SiO_2)	3.0
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.10
Calcium (as Ca)	23.2
Magnesium (as Mg)	3.1
Iron (total) (as Ferric ion)	0.08

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.03
Bicarbonate (as CO_3) (calculated)	34.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	15.0
Chloride (as Cl)	3.0
Fluoride (as F)	less than 0.05
Ortho-phosphate (as PO_4)	0.045
Total - phos	0.095

Remarks:

Analysed by: [illegible]

100

DIVISION OF LABORATORIES
Health Branch
828 West Tenth Avenue
Vancouver 9, B. C.

Report Form L 76 (Rev. 11/61) W - W.K.H.U.

CHEMICAL ANALYSIS-ROUTINE

TO: Director
West Kootenay Health Unit
Trail, B. C.

Report No.: 94
Date Reported: 27.9.62
Date Received: 25.9.62

COPY TO: DIRECTOR, DIVISION OF PUBLIC HEALTH ENGINEERING.

Collector's Name: Mr. S. D. Husch
Address: W.K.H.U., Trail

Date Sampled: 24.9.62
Time Sampled: - -

Water Works System: - -
Sampling Point: Kinnaird Inlet, composited sample
Source of Water: Columbia River

Treatment: - -

Test(s) done in field: Temp. & pH
Residual Chlorine: - -

Temperature (9/11): 60° F pH: 8.4
Other: - -

Determinations Reported as mg/l unless noted otherwise.

Colour (in units)	Less than 5
Turbidity (in units)	Less than 5
Temperature (°C) (on arrival)	19.0
pH (in units) (on arrival)	7.6
Total Solids	98.0
Fixed Solids	50.0
Volatile Solids (calculated)	48.0
Dissolved Solids	78.0
Dissolved Solids (calculated)	75.0
Suspended Solids	20.0

Alkalinity (as $CaCO_3$)	
Phenolphthalein	Nil
Methyl Orange (total)	52.0
Free Carbon Dioxide (as CO_2) (calculated)	2.6
Hardness (as $CaCO_3$)	
Total	65.0
Carbonate (temperary) (calculated)	52.0
Non-Carbonate (permanent) (calculated)	13.0
Silica (as SiO_2)	3.5
Surfactants (as A.B.S.)	Trace

Albuminoid Nitrogen (as N)	0.05
Ammonia Nitrogen (as N)	0.10
Calcium (as Ca)	21.0
Magnesium (as Mg)	2.9
Iron (total) (as Ferric ion)	0.10

Nitrite Nitrogen (as N)	Nil
Nitrate Nitrogen (as N)	0.03
Bicarbonate (as CO_3) (calculated)	31.2
Carbonate (as CO_3) (calculated)	Nil
Sulphate (as SO_4)	13.0
Chloride (as Cl)	2.0
Fluoride (as F)	0.05
Ortho-phosphate (as PO_4)	0.030
Total - phos	0.055

Remarks:

Analysed by: [signature] 101

WATERSHED UPPER COLUMBIA
Columbia River

GAUGING STATION Donald ENB5

SAMPLING POINT DONALD
From road bridge

DATE 1961-2	TEMP. °F	pH	GAUGE - FT. FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	
11 Oct	46	7·6		0·02	0·08	0·03	Sampled by N. Cox EK.N.O.
- Nov	33	7·6		0·04	0·05	0·04	N.C. Ice on river.
20 Dec	34	7·6		0·05	0·08	0·03	21" Ice over river.
24 Jan	34	7·5		0·04	0·075	0·035	Poor sample taken at river edge ice to 3' of ice.
22 Feb	37	7·5		0·15	0·165	0·095	River completely iced in, hole cut away at edge.
20 Mar	39	7·6		0·04	0·085	0·025	Bottle thrown from bank
17 Apr	-	-		0·04	0·105	0·040	Bottle lowered from bridge Ice out, river Turbid.
15 May	-	7·4		0·10	0·125	0·095	
3 Jul	-	7·5		0·03	0·075	0·035	
21 Aug	-	7·4		0·20	0·210	0·045	Heavy rainfall causing Turbidity
11 Sep	-	7·4		0·04	0·095	0·045	
			11	·75	1·145	·515	
				·07	·104	·047	

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WATERSHED EAST KOOTENAY
Elk River
GAUGING STATION Phillips Bridge BNKs

SAMPLING POINT MORRISEY
sampled by lowering bottle from bridge

DATE 1961	TEMP. °F	pH	GAUGE - FT. FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by A. Hindley
3 Oct				0.02	0.09	0.04	
24	37	7.5		0.02	0.08	0.04	Full Chemical #90
5 Nov		7.6		0.05	0.08	0.04	
20		7.4		0.03	0.05	0.02	
18 Dec				0.09	0.08	0.03	Snow drifting in river
1962							
6 Feb				0.05	0.085	0.030	
20	37	7.5		0.05	0.080	0.060	
20 Mar	34	7.4		0.03	0.085	0.025	
3 Apr		7.6		0.03	0.115	0.055	
26 Jun		7.0		0.06	0.090	0.045	
4 Jul				0.02	0.095	0.045	
24		7.6		0.05	0.050	0.035	
25 Sep		7.6		0.03	0.085	0.050	
			Σ 13	.53	1.065	.515	
			Ave	.04	.082	.040	

WATERSHED East Kootenay
Kootenay River

GAUGING STATION Skookumchuck

SAMPLING POINT Skookumchuck
Springbrook
surface samples taken from Wasa bridge

DATE 1961	TEMP. °F	pH (2445.12)	~~GAUGE - FT.~~ FLOW - cfs (x 0.0283 = m³/sec; x 60x60x24 = m³/day) flow/m³/interval	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	Control samples. Samples taken by N. Cox	P-PO4 gm/interval
3 Oct			1,890	0·04 (1,293,970)	0·08	0·03 (970,177)	(assuming 7 day prior interval)	
10	47	7·4	2,380	0·02 (814,722)	0·1	0·06 (2,444,165)	Full Chemical #77	
17 (14)	46	7·6	3,650	0·03 (1,874,202)	0·1	0·07 (4,373,138)	12,080,473	3,938,234
31	37	7·4	2,090	0·03 (2,146,346) [6,129,240]	0·1	0·06 (4,292,693)		
6 Nov	36	7·4	1,500	0·05 (1,100,304)	0·05	0·04 (880,243)	Ice floating on river	
14 (6)	36	7·4	1,520	0·06 (1,783,959)	0·08	0·02 (594,653)	2,140,164	697,693
20	36	7·6	1,250	0·06 (1,100,304)	0·09	0·02 (366,768)	Ice	
27	35	7·5	872	0·10 (1,492,515) [5,479,082]	0·05	0·02 (298,500)	Snowing, ice floes	
4 Dec	35	7·6	1,250	0·05 (1,069,750)	0·05	0·04 (855,800)	Snowing, ice formations	
11	34	7·4	608	0·08 (832,522)	0·07	0·04 (416,261)	Air temp. −18°F	
19	34	7·6	985	0·08 (1,541,404) [5,253,065]	0·14	0·03 (578,026)	Heavy icing	
				·60	·91	·43 (8 hrs)	3,207,129	1,045,524

WATERSHED EAST KOOTENAY
Kootenay River
GAUGING STATION Skookumchuck

SAMPLING POINT SKOOKUMCHUCK
SPRINGBROOK
Sampled from Wasa bridge or bank at Springbrook

DATE 1962 Calc.	TEMP. °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s	NITRATE gm/centennial	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/centennial	Control samples P-PO4 Samples taken by N. Cox
8 Jan 20	34	7.4	925	0.04 1,809,389	0.075	0.030 1,357,042	Ice and snow
15 "	33	7.6	779	0.12 1,600,004	0.035	0.020 266,667	Icing 1,390,146
22 "	34	7.4	713	0.10 1,220,371	0.075	0.035 427,130	Heavy icing 453,416
29 "	38	7.5	925	0.04 633,292	0.025	0.015 237,484	Bottle thrown from ice edge
5 Feb "	36	7.6	895	0.04 612,753	0.050	0.030 459,565	Bottle thrown from ice edge
12 "	37	7.6	865	0.03 444,160	0.040	0.035 518,187	
19 "	38	7.5	772	0.05 660,678	0.045	0.035 462,474	1,475,142 480,896
26 "	37	7.6	642	0.10 1,098,847	0.080	0.045 494,481	
5 Mar "	38	7.4	706	0.02 241,678	0.080	0.025 302,097	
12 "	37	7.2	694	0.02 237,570	0.050	0.030 356,355	
19 "	39	7.4	779	0.03 400,001	0.055	0.035 466,668	1,815,751 591,935
26 "	39	7.4	807	0.03 414,378	0.090	0.050 690,631	
				.62	.700	.365	

Bottle thrown from bank - Skookumchuck

4,066,420
2,203,685
1,293,627

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WATERSHED EAST KOOTENAY
Kootenay River
GAUGING STATION Skookumchuck

SAMPLING POINT SKOOKUMCHUCK
SPRINGBROOK
Bottle thrown from bank

DATE 1962 Int.	TEMP. °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s	NITRATE gm/int	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int	Control samples Samples taken by N. Cox	P-PO4
2 Apr 7		7.4	865	0.04 592,214	0.090	0.050 740,267		
9 7		7.5	925	0.03 474,969	0.095	0.045 712,453	10,899,041	3,553,087
16 7			1,590	0.05 1,360,722	0.080	0.040 1,088,578	River turbid.	
30 14		7.5	2,570	0.01 879,762	0.150	0.095 8,357,743		
7 May 9			2,100	0.03 1,232,340	0.055	0.040 1,643,774		
14 7		7.6	2,620	0.03 1,345,318	0.070	0.050 2,242,196	23,634,115	7,704,721
22 8		7.6	7,370	0.05 7,208,214	0.110	0.080 11,533,142		
28 6		7.6	14,000	0.11 22,592,909	0.095	0.040 8,215,603		
4 Jun 7		7.4	10,100	0.07 12,101,012	0.105	0.050 8,643,358		
25 21			16,500	0.06 50,834,045	0.120	0.065 55,070,215	63,713,573	20,770,625
3 Jul 8		7.5	10,100	0.03 5,926,971	0.080	0.040 7,902,628		
9 6		7.6	8,480	0.07 8,908,539	0.085	0.055 6,842,424		

3,307,667
3,378,281
32,935,057

WATERSHED EAST KOOTENAY
Kootenay River
GAUGING STATION Skookumchuck

SAMPLING POINT SKOOKUMCHUCK
SPRINGBROOK
Bottle thrown from bank

DATE 1962	TEMP °F	pH	~~GAUGE - ft.~~ FLOW - c.f.s.	NITRATE gm/int.		PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int.		Control samples Samples taken by N. Cox	P-PO4
16 Jul 7			7,850	0.04 5,374,424		0.090	0.055 1,389,833			
23 7		7.6	6,460	0.03 3,317,081	28,938,179	0.050	0.030 3,317,081		28,830,664	9,398,796
30 7			6,580	0.05 5,631,164		0.080	0.030 3,378,698			
14 Aug 15	56	7.6	4,580	0.03 5,039,392		0.070	0.030 5,039,392			
20 6		7.6	3,820	0.17 9,527,165	22,840,943	0.050	0.030 1,681,264	3,620,000	10,340,656	3,321,054
4 Sep 15		7.6	2,820	0.08 8,274,286		0.850	0.695		(use 0.035 for approx)	
10 6		7.6	2,720	0.04 1,596,174		0.095	0.045 1,795,696			
17 7		7.6	2,500	0.06 2,567,400	6,243,168	0.105	0.050 2,139,500		6,014,790	1,960,821
24 7	50	7.6	2,430	0.05 2,079,594		0.095	0.050 2,079,594			
				Σ=174,427,034				Σ=	165,542,344	Σ= 53,966,804
				$\bar{x} = \frac{2.35}{44} = 0.0534$			$\bar{x} = \frac{1.820}{44} = 0.0414$			
									$\bar{x}$ P-PO4 =	0.013 mg/l

WATERSHED EAST KOOTENAY
St. Mary River
GAUGING STATION Wycliffe 8NG12

SAMPLING POINT C.M.&S. Pumphouse
In winter at outlet St Mary's Lake
Control Sample. Bottle cast on line from bank

DATE 1961	TEMP °F	pH	~~GAUGE - FT~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by N. Cox
10 Oct	46	7.3	769	0.03	0.05	0.04	
6 Nov	36	7.3	505	0.07	0.06	0.05	
20	34	7.2	410	0.06	0.09	0.02	Ice
4 Dec	35	7.2	454	0.04	0.30	0.28	Snowing
18	35	7.0	423	0.10	0.08	0.03	24" snowfall — St M.L.
1962							
8 Jan	34	7.1	396	0.04	0.045	0.040	Heavy snowfall & icing — Mid stream from pontoon
15	33	6.7	353	0.11	0.050	0.030	St M.L.
22	35	7.0	294	0.12	0.075	0.030	Icing, air temp −25°F — "
29	40	7.2	357	0.15	0.125	0.060	From ice at C.M.&S.P.
5 Feb	35	7.0	470	0.06	0.075	0.025	St M.L.
12	36	7.1	450	0.06	0.045	0.040	"
19	38	7.3	382	0.06	0.075	0.025	Mid stream from pontoon
26	37	7.5	332	0.16	0.035	0.030	
				1.06	.805	.700	

WATERSHED EAST KOOTENAY
St Mary River

GAUGING STATION Wycliffe BNG 12

SAMPLING POINT C.M.&S. Pumphouse
In winter at outlet St Mary's Lake
Control Sample. Bottle cast on line from bank

DATE 1961	TEMP °F	pH	~~GAUGE HT.~~ FLOW - c.f.s.	NITRATE gm/int.		PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int.	start Oct 1 Sampled by N. Cox	P-PO4	
10 Oct 10	46	7.3	769	0.03 564,989	397	0.05	0.04 752,119			
6 Nov 26	36	7.3	505	0.07 2,247,310	2,811	0.06	0.05 1,605,221	2,357,340	768,493	
20 14	34	7.2	410	0.06 842,099	1,508,150	0.09	0.02 280,760	Ice		
4 Dec 15	35	7.2	454	0.04 666,051		0.30	0.28 4,662,355	Snowing 4,943,055	1,611,436	
18 14	35	7.0	423	0.10 1,448,014		0.08	0.03 434,404	24" Snow fall		St M.L.
1962					2,223,628			1,209,018	394,140	
8 Jan 20	34	7.1	396	0.04 774,614		0.045	0.040 774,614	Heavy snowfall & icing		Mid stream from pontoon
15 7	33	6.7	353	0.11 664,614		0.050	0.030 181,258			St M.L.
22 7	35	7.0	294	0.12 603,852	928	0.075	0.030 150,963	Icing, air temp −25°F		"
29 7	40	7.2	357	0.15 916,562	2,185	0.125	0.060 366,624	698,845	227,823	From ice at C.M.&S.P.
5 Feb 7	35	7.0	470	0.06 482,671		0.075	0.025 201,113			St M.L.
12 7	36	7.1	450	0.06 462,132	1,246,304	0.045	0.040 308,088	843,134	274,862	"
19 7	38	7.3	392	0.06 392,299		0.075	0.025 163,458			Mid stream from pontoon
26 7	37	7.5	332	0.16 909,202		0.035	0.030 170,475			
				1.06		.805	.700			

WATERSHED East Kootenay — St Mary River

GAUGING STATION Wycliffe — 8NG12

SAMPLING POINT C M & S Pumphouse — 04937-11558

Control sample ½ mile above C.M.&S. outfall

DATE 1962	TEMP °F	pH	GAUGE - FT. FLOW - c.f.s.	NITRATE gm/int.	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int.	Samples by N. Cox	P-PO4
5 Mar	37	7.2	340	0.04 (232,778)	0.125	0.105 (611,041)	Bottle thrown from edge of ice River partially Sampled @ Pumphouse	Broken over
12	-	6.9	310	0.05 (265,298)	0.065	0.050 (265,298)	Bottle lowered from bridge at outlet to St Mary Lake.	
19	39	7.3	310	0.05 (265,298)	0.040	0.030 (159,179)	Bottle lowered from boom at C.M.&S Pumphouse	
26	39	7.2	334	0.06 (343,005) 1,392,558	0.075	0.050 (285,837)	Bottle lowered in midriver from boom at C.M.&S. pumphouse	
2 Apr	-	7.3	418	0.04 (286,179)	0.075	0.055 (393,497)	Bottle lowered from boom. 1,714,852	559,042
9	-	7.3	895	0.06 (919,129)	0.095	0.025 (382,970)	" " "	"
16	40	6.8+	1,830	0.08 (2,505,782) 7,644,293	0.070	0.040 (1,252,891)	9,016,280 " "	2,939,307
30 14	-	7.2	3,080	0.04 (4,217,382)	0.105	0.070 (2,380,419)	" " "	bank
7 May	-	-	1,540	0.06 (1,581,518)	0.045	0.025 (658,966)	" " "	"
14	-	7.2	2,020	0.05 (1,728,716)	0.075	0.055 (1,901,588)	" "	
22 8	-	7.0	4,940	0.11 (18,629,425) 27,988,340	0.105	0.070 (6,764,180)	15,178,351 " "	4,948,142
28 6	-	7.0	7,980	0.12 (14,048,681)	0.090	0.050 (5,853,617)	" " "	" Freak storm ½ hr before sampling
4 Jun	-	7.2	5,360	0.03 (2,752,253)	0.090	0.045 (4,128,379)		
26 22	-	-	7,110	0.03 (11,473,970) 16,202,805	0.070	0.050 (19,123,283)	23,254,662	7,580,042
3 Jul	-	7.0	3,990	0.03 (2,048,785)	0.070	0.040 (2,731,714)		
				.85	1.195	.750		

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WATERSHED East Kootenay
St Mary River

GAUGING STATION Wycliffe 8NG12

SAMPLING POINT C.M. & S. Pumphouse
Control Sample
1/4 mile above sewer & C.M.&S. outfalls

DATE 1962 (Jul 13, Aug 14, Sep 15)	TEMP °F	pH	~~GAUGE~~ FLOW - cfs	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	P-PO4 (Samples collected by N. Cox)	
16 Jul 13	-	-	2,790	0·03 (2,660,535)	0·065	0·040 (3,547,380)		
23 7	-	7·2	2,200	0·06 (2,259,312) [5,828,707]	0·070	0·030 (1,129,656)	5,585,896	1,821,002
30 7	-	-	1,770	0·03 (908,860)	0·080	0·030 (908,860)		
13 Aug 14	54	7·2	1,240	0·03 (1,273,430)	0·105	0·030 (1,273,430)		
20 7	-	7·2	1,020	0·25 (4,364,580) [6,397,220]	0·035	0·020 (349,166)	3,773,690	1,230,223
4 Sep 15	-	7·4	690	0·03 (759,210)	0·110	0·085 (2,151,094)		
10 6	-	7·3	642	0·05 (470,930)	0·105	0·055 (518,023)		
17 7	-	7·0	678	0·03 (348,139) [1,250,388]	0·115	0·060 (696,279)	1,602,489	522,411
23 6	50	-	588	0·05 (431,319)	0·080	0·045 (388,187)	Sampled at outlet St Marys Lake.	
				1·06	·805	·700		
				·85	1·195	·750		
			Σ 37	2·47	2·765	1·845		
				x̄ = ·067	·075	x̄ = ·050		
				Σ = 77,748,023		Σ = 70,174,612	Σ = 22,876,923 gm P-PO4/yr.	
						x̄ P-PO4 =	0·016 mg/l	

WATERSHED EAST KOOTENAY — St. Mary River

GAUGING STATION Wycliffe — BNG 12

SAMPLING POINT WYCLIFFE — Aprox 6 miles below Kimberley — Surface samples, bottle thrown from bank

DATE 1961	Temp °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s.	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	Samples taken by N. Cox	P-PO4
3 Oct 7	49		480	0.1 821,568	6.0	4.5 36,970,560		
10 7	46	7.1	769	0.05 658,110	3.8	2.75 36,156,061	385,670,549	125,728,599
17 7	46	7.1	1,920	0.01 328,627	6.0	4.8 157,741,056		
31 14	39	6.7	685	0.06 1,406,935	7.5	6.6 154,762,872	Full chemical # 92	
6 Nov 6	36	6.7	505	0.07 518,610	7.1	5.4 40,007,053		
14 8	37	7.0	510	0.11 1,097,369	6.7	4.2 41,899,876	175,348,598	52,163,643
20 6	34	6.7	410	0.03 180,450	9.0	6.9 41,503,467	Ice	
27 7	36	6.4	357	0.15 916,562	12.5	8.5 51,938,502	Snowing, ice on river	
11 Dec 15	34	6.4	235	0.15 1,292,857	12.0	9.8 84,466,670	Air temp -18°F	
18 7	34	6.6	423	0.16	9.5	5.5 39,820,374	Taken through ice at river edge, unable to get sample from main run.	

3,215,240

2,713,981

WATERSHED	EAST KOOTENAY / St Mary River	SAMPLING POINT	WYCLIFFE
GAUGING STATION	Wycliffe 8NG12		Aprox 6 miles below Kimberley Surface samples, bottle thrown from bank

DATE 1962	TEMP. °F	pH	~~GAUGE FT.~~ FLOW - c.fs	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	Samples taken by N. Cox	P-PO4
8 Jan	34	6·7	396	0·15 (3,050,043) [4,342,900]	5·65	4·50 (91,501,281)	Heavy icing and snow (215,788,375)	70,346,994
15	33	6·4	353	0·14 (845,873) [6,151,833]	15·0	11·2 (67,669,818)	Icing	
22	35	6·5	340	0·16 (931,110)	9·55	6·35 (36,953,444)	Severe icing - Air temp -25°F Stream open in centre only	
29	40	6·4	357	0·40 (2,444,165)	6·80	4·75 (29,024,437)	138,313,541	45,090,214
5 Feb	35	6·6	470	0·24 (1,930,685)	1·25	0·580 (4,665,822)		
12	36	6·8	450	0·18 (1,386,391) [2,439,029]	1·25	0·550 (4,236,210)		
19	38	6·6	382	0·03 (196,149)	11·2	9·50 (62,113,964)	209,946,568	68,442,581
26	36	6·4	332	0·12 (681,901)	22·5	13·8 (78,418,666)		
5 Mar	37	6·6	340	0·03 (174,583)	17·5	11·2 (65,177,728)	River frozen over except for centre stream	
7	Kootenay Lake power line destroyed.						Kimberley fertilizer plant shut down.	
12	37	6·9	310	0·06 (318,358)	0·950	0·550 (2,918,278)		
19	39	6·9	310	0·19 (1,008,132)	0·595	0·355 (1,883,616)		
26	39	6·8	334	0·04 (228,670)	0·120	0·085 (485,923)	Partial run-off, river 90% open	

WATERSHED East Kootenay — St Mary River

GAUGING STATION Wyeliffe — BNG 12

SAMPLING POINT Wycliffe — Aprox 6 miles below Kimberley — Surface samples, bottle thrown from bank

DATE 1962	TEMP °F	pH	~~GAUGE - ft.~~ FLOW - c.f.s.	NITRATE gm/interval		PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	P-PO4 Samples taken by N. Cox
2 Apr 7		7.0	418	0.06 / 429,269	1,284,269	0.260	0.095 / 679,676	5,967,493 — 1,945,403
3	Kootenay Lake power line replaced.							Kimberley fertilizer plant reopened.
9 7		6.8	895	0.12 / 1,838,258		15.0	9.50 / 145,528,790	
16 7		7.2	1,830	0.10 / 3,732,328	19,731,324	3.0	1.95 / 61,078,446	
30 14		6.6	3,080	0.14 / 14,760,838		3.45	2.30 / 242,499,488	449,106,724 — 146,408,792
7 May 7			1,540	0.12 / 3,163,037		8.00	6.5 / 171,331,160	
14 7		6.9	2,020	0.08 / 2,965,946		12.0	9.50 / 328,456,040	Cats working on river diversion at Cominco gypsum lagoons. Flushing may have started
22 8		6.9	4,940	0.08 / 7,730,491	34,732,496	23.0	14.0 / 1352,835,994	1969,685,540 — 642,120,746
28 6		6.9	7,980	0.18 / 21,073,022		3.0	1.00 / 117,072,346	Freak storm ½ hr before sampling - from boat. Cats working on lagoons probably freeing material.
4 Jun 7		7.0	5,360	0.09 / 8,256,758		1.35	1.00 / 123,851,376	Work of cleaning lagoons almost complete - work started officially on May 1st
25 21			7,110	0.04 / 14,603,235		1.40	1.00 / 365,080,867	

WATERSHED EAST KOOTENAY
St Mary River

GAUGING STATION Wycliffe 8NG12

SAMPLING POINT WYCLIFFE
Aprox 6 miles below Kimberley
surface samples, bottle thrown from bank

DATE 1962	TEMP °F	pH	~~GAUGE HT.~~ FLOW - c.f.s	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	Samples taken by N. Cox	P-PO4
3 Jul 8		7.0	3,990	0.05 (3,902,477) 24,762,704	1.05	0.850 (66,340,996)	555,273,239	181,019,076
16 13			2,790	0.03 (2,660,535)	1.35	1.00 (88,684,502)		
23 7		7.1	2,200	0.04 (1,506,208) 5,681,509	1.55	1.30 (48,951,760)	166,416,816	54,251,882
30 7			1,770	0.05 (1,514,766)	1.40	0.950 (28,780,554)		
13 Aug 14	54	6.9	1,240	0.02 (424,477)	1.10	0.850 (36,080,538)		
20 7		7.0	1,020	0.35 (6,110,472) 7,800,239	2.30	1.95 (34,643,754)	129,595,683	42,248,193
4 Sep 15		7.0	690	0.05 (1,265,350)	2.95	2.35 (59,471,443)		
10 6		6.8	642	0.06 (565,116)	3.90	2.76 (25,995,342)		
17 7		6.8	678	0.04 (464,186) 1,670,125	4.25	3.85 (44,677,895)	102,714,389	33,484,891
24 7	50	7.2	624	0.06 (640,823)	3.95	3.00 (32,054,152)		
				Σ= 117,224,519		Σ=188.075	Σ = 4503,837,465	1468,251,013
				n= 42		n = 42		
				x̄ = 4.39/42 = 0.104		x̄ = 4.478		
						= 1.460 P-PO4 mg/l		

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WATERSHED East Kootenay — Kootenay River

GAUGING STATION Wardner 8NG5

SAMPLING POINT Wardner — Aprox 42 miles below Kimberley. Surface samples, mid stream from bridge.

DATE 1961	Int.	TEMP. °F	pH	~~GAUGE FT.~~ FLOW - cfs	NITRATE	NITRATE gm/interval	NITRATE total gm (bracketed intervals)	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	PHOSPHATE ORTHO- gm/interval	Remarks (Samples taken by A. Hindley)	P-PO4
3 Oct	7			3,340	0·03	1,715,023	9,502,803 (3 Oct – 31 Oct)	0·8	0·58	33,757,115		
17	14	48	7·6	5,760	0·01	1,971,763		0·85	0·6	118,305,792	247,832,833 (3 Oct – 31 Oct) Sampled by N. Cox	80,793,503
24	7	40	7·6	4,860	0·03	2,495,513		0·65	0·44	36,600,854		
31	7	40	7·5	3,880	0·05	3,320,504		1·0	0·9	59,769,072		
5 Nov	6		7·5	3,200	0·05	1,956,096	16,006,290 (5 Nov – 27 Nov)	1·28	1·10	43,034,112	Full Chemical #95	
14	9	37	7·3	2,960	0·11	7,165,180		2·0	1·2	78,165,596		
20	6		7·0	2,280	0·06	2,006,954		0·78	0·61	20,404,037	Ice	
27	7	35	7·2	1,900	0·15	4,878,060		0·70	0·46	14,959,384	156,563,129 (5 Nov – 27 Nov)	51,039,580
18 Dec	21			2,110	0·06	6,500,596	10,050,910 (18 Dec – 9 Jan)	0·70	0·51	55,255,066	Snow drifting in river	
1962											89,870,630 (18 Dec – 9 Jan)	29,297,825
9 Jan	22		7·1	1,650	0·04	3,550,314		0·400	0·390	34,615,564		
16	7	33	7·6	1,600	0·11	3,012,416	10,932,680 (16 Jan – 31 Jan)	0·690	0·605	16,568,288	Sampled by N Cox. Severe icing and cold. Air temp -10°F	
23	7	34	7·0	1,640	0·12	3,368,429		0·695	0·485	13,614,066	Poor sample due to difficulty reaching water through ice	
31	8	38	7·4	1,790	0·13	4,551,835		0·965	0·840	29,411,859	Winter thaw	
											59,594,213 (16 Jan – 31 Jan)	19,427,713

WATERSHED East Kootenay – Kootenay River

GAUGING STATION Wardner – 8NG5

SAMPLING POINT WARDNER – Aprox 42 miles below Kimberley – Surface samples, mid stream from bridge

DATE 1962	TEMP °F	pH	~~GAUGE HT.~~ FLOW - c.f.s.	NITRATE gm/int	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int.	P-PO4 Samples taken by A. Hindley
6 Feb			1,500	0·06 1,320,365	0·105	0·055 1,210,334	
13		7·0	1,920	0·05 1,643,136	0·380	0·275 9,037,248	
20	38	7·4	1,620	0·07 1,940,954	0·550	0·500 13,843,960	48,652,722 — V5,860,787
26		7·4	1,230	0·11 1,984,984	1·58	1·36 24,341,180	
7 Mar	Kootenay lake power line destroyed. Kimberley fertilizer plant shut down						
12		7·2	1,430	0·05 2,447,588	0·250	0·165 8,077,048	
20	36	7·5	1,620	0·03 950,663	0·245	0·095 3,010,432	
27		7·3	1,770	0·04 1,211,813	0·215	0·105 3,184,009	16,245,379 — 5,295,993
3 Apr		7·5	2,100	0·03 1,078,308	0·125	0·055 1,976,898	
3	Kootenay lake power line restored. Kimberley fertilizer plant reopened.						
10		7·4	2,740	0·06 2,813,870	1·89	1·22 52,215,365	
17	36		5,320	0·05 4,552,856	0·630	0·465 42,341,567	

5,688,372 — 6,889,439

WATERSHED East Kootenay

Kootenay River

GAUGING STATION Wardner 8NG5

SAMPLING POINT WARDNER

Aprox 42 miles below Kimberley

Surface samples, mid stream from bridge

DATE 1962	TEMP °F	pH	~~GAUGE HT.~~ FLOW - c.f.s.	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/interval	Samples taken by A. Hindley	P-PO4
1 May/14		7.4	6,680	0.06 13,720,186 (24,086,912)	1.05	0.850 194,369,296	293,926,222	95,819,948
8 7			5,510	0.08 7,544,733	0.900	0.770 72,618,053		
15 7		7.4	7,550	0.03 3,876,774 (64,236,088)	4.10	2.25 290,758,050	652,095,873	212,583,254
23 8		7.3	18,000	0.15 52,814,592	1.20	0.820 288,719,770		
26 Jun/24		7.2	29,200	0.03 72,825,454	0.265	0.185 449,090,300	449,090,300	146,403,438
4 Jul/8			16,000	0.04 12,519,014 (33,819,582)	0.165	0.105 32,862,413		
30 26		7.4	11,200	0.03 21,360,568	0.185	0.105 74,761,989	107,624,402	35,085,555
14 Aug/15	56	7.6	7,310	0.02 53,621,482 (67,661,379)	0.950	0.720 193,037,334		
5 Sep/22		7.6	4,350	0.06 14,039,897	0.750	0.550 128,648,891	321,736,225	104,886,009
18 13			3,960	0.05 6,293,739 (10,103,761)	0.540	0.420 52,867,406		
25 7		7.4	3,710	0.06 3,810,022	0.550	0.415 26,352,649	79,220,055	25,825,738
				Σ = 256,038,227		Σ = 20.205	Σ = 2522,451,983	822,319,346
				n = 34		n = 34		
				$\bar{x} = \frac{2.11}{34} = 0.062$		$\bar{x} = 0.594$		
						= 0.194 mg/l P-PO4		

WATERSHED Kootenay Lake – South Arm

GAUGING STATION Porthill (Idaho) 8NH0-21

SAMPLING POINT CRESTON – West Creston Ferry – Surface samples from ferry

DATE 1961 (est.)	Temp °F	pH	~~Gauge – ft.~~ Flow – c.f.s.	Nitrate (gm/interval)	Phosphate Total	Phosphate Ortho- (gm/interval)	Sampled by J.R. Hehr	P-PO4
17 Oct 7	44		8,030	0·04 (5,497,659)	0·12	0·08 (10,995,318)	+ 1/3 (6985 cfs × 0.035 for 15 days)	= 1/3 (8,966,561)
23 7	42		9,260	0·02 (3,169,883) [13,980,348]	0·33	0·2 (31,698,832)	69,258,182 + 15 days (Sept 26/61 – Oct 10/61) based on est. flow of 6985 cfs (x̄ of 2 dates) + PO4 (similar) of 0.1375 mg/l	
30 7	36		7,760	0·04 (5,312,806)	0·3	0·2 (26,564,032)	23,146 / 92,21...	= 35,225,774 gm/int.
6 Nov 7	36		6,350	0·05 (5,434,330)	0·22	0·16 (17,389,856)		= 11,483,602
13 7	32		6,150	0·01 (1,052,634) [15,346,612]	0·4	0·2 (21,052,680)	50,255,400	16,383,260
4 Dec 22	29		5,490	0·03 (8,859,648)	0·05	0·04 (11,812,864)		
11 7	28		3,300	0·04 (2,259,312)	0·27	0·18 (10,166,904)	Air temp 0°F River iced	
18 7	28		4,260	0·07 (5,103,991)	0·36	0·30 (21,874,248)	Heavy snow	
				[26,978,595]			106,900,701	34,849,628
1962								
8 Jan 21	28		4,780	0·08 (19,635,292)	0·320	0·305 (74,859,549)		
15 7	28		3,440	0·10 (5,887,904)	0·295	0·200 (11,775,808)		
23 8	29		3,080	0·08 (4,819,820) [20,795,311]	0·495	0·345 (20,185,476)	58,620,884	19,110,408
29 6	28	7·6	5,730	0·12 (10,087,587)	0·405	0·310 (26,059,600)		

WATERSHED Kootenay Lake – South Arm

GAUGING STATION Porthill (Idaho) 8NH0.21

SAMPLING POINT Creston – West Creston Ferry – Surface samples from ferry

DATE 1962 Int.	TEMP. °F	pH	~~GAUGE — FT.~~ FLOW - c.f.s.	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO- gm/int.	Sampled by J.R. Mehr	P-PO4
5 Feb 7	28	7.6	7,320	0.11 13,781,803	0.390	0.335 40,991,853		
12 7	28	7.6	5,420	0.10 9,276,872	0.225	0.165 15,306,839		
19 7			5,620	0.09 8,657,273 (37,119,469)	0.080	0.065 6,252,475	85,390,868	27,837,423
26 7	29	7.6	4,100	0.05 3,508,780	0.260	0.145 10,175,462		
5 Mar 7	28	7.6	3,690	0.03 1,894,741	0.270	0.185 11,684,237		
7	Kootenay Lake power line destroyed. Kimberley fertilizer plant shut down.							
13 8	30	7.4	3,890	0.02 1,521,843	0.410	0.360 27,393,168		
20 7	30	7.6	4,210	0.03 2,161,757	0.380	0.295 21,257,216	71,354,337	23,261,514
26 6	33	7.6	5,250	0.04 3,080,851 (13,367,804)	0.215	0.145 11,168,086		
2 Apr 7	40	7.4	6,430	0.06 6,603,253	0.175	0.105 11,535,867		
3	Kootenay Lake power line replaced. Kimberley fertilizer plant reopened.							
10 8	38	7.4	14,600	0.03 8,567,200	0.255	0.165 47,122,353		
22 12	43	7.4	34,200	0.04 40,139,090 (82,849,446)	0.325	0.165 165,573,746	305,488,403	99,589,219
2 May 10	40	7.6	23,000	0.06 33,742,656	0.240	0.165 92,793,304		

WATERSHED Kootenay Lake – South Arm

GAUGING STATION Porthill (Idaho) 8NH0021

SAMPLING POINT CRESTON – West Creston Ferry – Surface samples from ferry

DATE 1962	TEMP °F	pH	~~GAUGE HT. FLOW cfs~~	NITRATE gm/interval	PHOSPHATE TOTAL	PHOSPHATE ORTHO gm/interval	Sampled by J.R. Hehr	P-PO4
8 May 6	42	7·6	23,300	0·06 20,509,667	0·400	0·265 90,584,367		
14 6	45	7·4	28,800	0·02 8,450,335	0·350	0·165 69,715,261	580,168,293	189,134,863
4 Jun 21	46	7·6	48,100	0·06 148,188,943	0·225	0·170 419,868,671		
26 22	54	7·6	42,600	0·03 68,746,994	0·245	0·165 378,108,466	467,247,761	152,322,770
4 Jul 8		7·5	29,400	0·02 11,501,844	0·235	0·155 89,139,295		
10 6			21,300	0·03 9,374,590	0·205	0·145 45,310,519		
13 Aug 30	64	7·6	11,300	0·09 84,547,359	0·145	0·095 89,244,435	134,554,954	43,864,915
21 8			9,390	0·10 18,367,741	0·145	0·080 14,694,193		
27 6	64	7·6	8,420	0·03 3,705,824	0·420	0·160 19,764,394	59,584,924	19,424,685
5 Sep 9	62	7·6	6,920	0·02 3,045,641	0·250	0·165 25,126,337		
17 12	58	8·4	6,710	0·03 5,906,432	0·400	0·285 56,111,103	Higher range pH disc in use	
25 8	60	8·4	5,940	0·03 3,485,963	0·280	0·195 23,657,460	78,768,563 + 11,730,182 (est. Sept 26–30) 90,498,745	29,502,591
							Σ = 2067,593,270 + 35,225,774 (est. interval missed) 2102,819,044	= 685,519,008
				Σ = 595,888,718 + 8,966,561 604,855,279				
			n = 36	·086	10·090 ✓	6·860 ✓		
				·057	·280	·190 ✓		

$\bar{x}$ P-PO4 = 0.138

$\bar{x}$ P-PO4 "

= 0.062 mg/l P-PO4; n = .080 → .360 PO4 = 0.026 → 0.117

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WATERSHED	KOOTENAY LAKE West Arm				SAMPLING POINT	FRASER'S NARROWS (Harrop Ferry)			
GAUGING STATION	Nelson 8NJ9					Surface samples at mid lake			

DATE 1961 (interval in days)	TEMP. °F	pH	GAUGE - FT. (~~FLOW - cfs~~) / discharge cfs	NITRATE (gm N-NO3/int)	PHOSPHATE TOTAL	PHOSPHATE ORTHO- (P-PO4)	Samples by R. Davis or S. Chamut	gm P (PO4)/interval	
10 Oct (10)	56		7752 / 45.15	5,688,418 / 0.03	0.07	0.00652 / 0.02	Full Chemical #75	1,137,883	R.D. @ F.N.
23 (13)	52		~~205800~~ 44.94 / 15,831	0.02 / 10,067,883	0.07	0.013 / 0.04		6,544,124	8,338,759 @ H.F.
8 Nov (15)	48		45.17 / 11,937	0.04 / 17,518,741	0.05	0.01 / 0.003		1,313,905	S.C. @ H.F.
20 (12)	44		45.12 / 8642	0.02 / 5,073,200	0.06	0.02 / 0.006		1,521,960	5,488,643 R.D @ H.F.
18 Dec (28)	42		44.58 / 8437	0.01 / 5,792,030	0.08	0.05 / 0.016	Snowing	9,267,248	S.C. @ H.F.
1962									11,502,422
3 Jan (16)	40		44.72 / 7458	0.06 / 17,510,229	0.10	0.06 / 0.019		5,544,906	R.D @ H.F.
15 (12)	38		44.44 / 8037	0.06 / 14,154,121	0.085	0.055 / 0.018		4,246,236	
29 (14)	38		43.68 / 8384	0.05 / 14,355,085	0.085	0.060 / 0.019	Lake & river frozen over elsewhere	5,454,932	9,701,168 "
12 Feb (14)	40		42.99 / 17,460	0.03 / 11,773,087	0.105	0.060 / 0.019		7,456,288	" 12,422,627
26 (14)	40		42.17 / 17,156	0.06 / 22,921,564	0.055	0.040 / 0.013		4,966,339	"
12 Mar (14)			40.96 / 10,576	0.05 / 18,108,227	0.075	0.035 / 0.011		3,983,810	"
26 (14)	42		39.72 / 11,156	0.04 / 15,281,042	0.085	0.070 / 0.023		8,786,599	12,770,409 "
9 Apr (13)	39		39.38 / 14,725	0.07 / 32,775,788	0.105	0.080 / 0.026		12,173,864	
7 May (28)			42.74 / 31,617	0.02 / 43,307,702	0.095	0.065 / 0.021		45,473,081	57,646,951
				56	1.120	.665 ✓			

Bracketed nitrate subtotals (written vertically): 24,515,671; 15,701,152 (?); 31,233,647 (?); 28,509,206; 34,894,651; 33,389,269; 76,083,480

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WATERSHED Kootenay Lake West Arm

GAUGING STATION Nelson 8NJ9

SAMPLING POINT Fraser's Narrows
Sampled at Harrop Ferry
Surface samples at mid lake

DATE 1962	TEMP. °F	pH	$\bar{x}$ cfs. GAUGE - FT. ~~FLOW - cfs~~	gm N-NO_3/int. NITRATE	PHOSPHATE TOTAL	P-PO_4 PHOSPHATE ORTHO-	Samples by R. Davis or S. Chamut. gm P-PO_4/int.
28 May 21			46.71 / 47,004	0.02 / 48,258,149	0.110	0.050 / 0.016	38,630,519 } 12,255,935
4 Jun 7	47		48.52 / 81,828	0.02 / 28,021,180 } 76,309,329	0.140	0.075 / 0.024	Heavy algal growth near shore reported just before runoff, now obscured by high water. 33,625,416
18 14	50		48.92 / 82,123	0.02 / 56,244,400	0.080	0.045 / 0.015	42,183,300 } 135,417,071
4 Jul 16	56		47.94 / 91,627	0.02 / 71,718,285 } 127,962,685	0.120	0.080 / 0.026	93,233,771
16 12	60		46.44 / 58,230	0.02 / 34,183,339	0.105	0.060 / 0.020	Sampled during heavy downpour. River flow reduced by impoundment at Corra Linn 34,183,339
31 15			44.86 / 43,287	0.04 / 63,410,593 } 97,593,932	0.090	0.040 / 0.013	20,608,443 } 54,791,782
7 Aug 7	60		44.20 / 36,624	0.03 / 18,812,284	0.125	0.035 / 0.011	6,897,837
24 17	68		43.25 / 22,873	0.10 / 11,590,151	0.095	0.025 / 0.008	9,272,121 } 22,806,298
5 Sep 12	65		43.65 / 15,073	0.06 / 26,545,362 } 56,947,797	0.095	0.045 / 0.015	Considerable algal growth 6,636,340
17 12	59		44.40 / 10,243	0.02 / 6,014,225	0.095	0.055 / 0.018	No water over dam spillways. 5,412,802
				.56	1.120	.665	
			Σ 24	.91	2.175	1.175	10,956,720
			Avg N-NO_3 mg/l = .038	6,159,908 } 12,174,133	.091	.0490	
17 - 30 (13)			9686	0.02		0.018	5,543,918
				Σ = 605,314,993			Σ = 414,098,787
				~~$\bar{x}$ N-NO_3 = 0.009~~			$\bar{x}$ P-PO_4 = 0.016 mg/l

$\bar{x}$ P-PO_4 =

WATERSHED Kootenay Lake – West Arm

GAUGING STATION Corra Linn

SAMPLING POINT Beasley (Corra Linn)

In mid-lake of forebay opposite Beasley bluffs.

DATE 1961	TEMP °F	pH	~~GAUGE - ft.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by R. Davis or S. Chamut
10 Oct			10,000	0·05	0·07	0·03	R.D.
23			13,000	0·04	0·07	0·04	
6 Nov			9,700	0·05	0·06	0·04	S.C.
20			7,800	0·02	0·05	0·02	S.C.
4 Dec			10,400	0·03	0·05	0·02	S.C.
18			8,400	0·01	0·07	0·03	
1962							
3 Jan			7,700	0·01	0·09	0·05	
15			8,500	0·05	0·065	0·040	River frozen over.
16 Feb			12,700	0·03	0·075	0·045	
26			9,300	0·08	0·070	0·050	
12 Mar			10,000	0·05	0·085	0·050	
26			12,600	0·02	0·065	0·050	
				·44	·220	·465	

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WATERSHED Kootenay Lake
West Arm

GAUGING STATION Corra Linn

SAMPLING POINT Beasley (Corra Linn)
In mid-lake of forebay opposite Beasley bluffs.

DATE 1962	TEMP °F	pH	~~GAUGE HT~~ FLOW - c.f.s	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	
							Sampled by R. Davis or S. Chamut
9 Apr	39		15,000	0·05	0·080	0·045	
7 May	39		41,800	0·02	0·080	0·050	
28	44		69,500	0·02	0·105	0·045	
3 Jun	47		85,600	0·02	0·145	0·080	
18			88,600	0·03	0·125	0·070	
3 Jul	54		82,600	0·03	0·110	0·070	
16	60		51,000	0·02	0·095	0·055	River flow reduced by impoundment at Corra Linn
29	62		40,000	0·04	0·075	0·035	Lake level still being raised by impoundment at Corra Linn
7 Aug	62		34,600	0·03	0·140	0·055	
24	67		22,900	0·17	0·095	0·015	
4 Sep	64		10,700	0·06	0·080	0·045	Considerable algae growth evident
18	61		12,200	0·02	0·105	0·065	No flow over spillways, lake levels being raised.
				·414	·820	·466	
			n=24	0·055	2·055	1·055 ✓	
				·040	·8[illegible]	0·046	

WATERSHED ARROW LAKES
Columbia River

GAUGING STATION Castlegar 8NE2

SAMPLING POINT COLUMBIA ABOVE ARROW DAM SITE
Surface samples at mid stream

DATE 1961	TEMP. °F	pH	GAUGE - FT. ~~FLOW - cfs~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Samples by S D Hyatt
22 Nov	45	7·6	72·19	0·09	0·06	0·03	Full Chemical # 103
4 Dec	43	7·4	71·19	0·05	0·05	0·02	Full Chemical # 112
1962							
5 Feb	34	7·6	69·61	0·05	0·070	0·045	Full Chemical # 81
19 Mar	36	7·6	69·48	0·04	0·045	0·025	Full Chemical # 25
9 Apr	40	7·6	70·08	0·03	0·070	0·040	Full Chemical # 34
22 May	50	7·6	79·37	0·06	0·105	0·065	Full Chemical # 50
11 Jun	50	7·6	87·64	0·02	0·065	0·035	Full Chemical # 56
24 Jul	57	7·6	86·07	0·09	0·105	0·065	Full Chemical # 73
13 Aug	57	7·8	84·52	0·06	0·045	0·025	Full Chemical # 80 Higher range pH dise in use
24 Sep	58	8·0	76·43	0·06	0·045	0·025	Full Chemical # 191

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WATERSHED Arrow Lakes
Columbia River

GAUGING STATION Castlegar 7 NE2

SAMPLING POINT Columbia above Arrow Dam site
Surface samples at mid stream

DATE 1961	TEMP °F	pH	GAUGE - FT. ~~FLOW - cfs~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Samples by S.D. Hugh
22 Nov	45	7·6	72·19	0·09	0·06	0·03	Full Chemical # 103
4 Dec	43	7·4	71·19	0·05	0·05	0·02	Full Chemical # 112
1962							
5 Feb	34	7·6	69·61	0·05	0·070	0·045	Full Chemical # 8
19 Mar	36	7·6	69·48	0·04	0·045	0·025	Full Chemical # 25
9 Apr	40	7·6	70·08	0·03	0·070	0·040	Full Chemical # 34
22 May	50	7·6	79·37	0·06	0·105	0·065	Full Chemical # 50
11 Jun	50	7·6	87·64	0·02	0·065	0·035	Full Chemical # 56
24 Jul	57	7·6	86·07	0·09	0·105	0·065	Full Chemical # 73
13 Aug	57	7·8	84·52	0·06	0·045	0·025	Full Chemical # 80 Higher range pH also in use
24 Sep	58	8·0	76·43	0·06	0·045	0·025	Full Chemical # 191
			E	·55	·66	·39	

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WATERSHED ARROW LAKES – Columbia River

GAUGING STATION Castlegar 8 NE2

SAMPLING POINT COLUMBIA ABOVE CELGAR – Surface Samples – Mid stream 1ml above Celgar

DATE 1961	TEMP °F	pH	GAUGE - FT. ~~FLOW - c.f.s~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Tannin/ Lignin	Sulphite waste liquor.	
2 Oct	58	7·6	74·14	0·03	0·05	0·03	Nil	Nil	Sampled by S.D. Hugh taken in company of P.C.B, R.B & E.G.
16	54·5	7·6	73·90	0·04	0·04	0·02	N	N	Full Chemical # 79
30	51	7·6	74·97	0·05	0·06	0·04	N	N	
14 Nov	48	7·6	72·90	0·05	0·06	0·01	N	N	
22	44·5	7·6	72·19	0·03	0·05	0·03	N	N	Full Chemical # 104
4 Dec	43	7·4	71·19	0·07	0·05	0·02	N	N	Full Chemical # 113
18	39	7·6	70·50	0·05	0·05	0·02	N	N	cold with snow flurries
1962									
8 Jan	40	7·6	70·17	0·02	0·060	0·025	N	N	
5 Feb	34	7·6	69·61	0·05	0·075	0·045	N	N	Full Chemical # 9
14	37	7·6	70·07	0·08	-	0·03	Full Chemical # 13		Sampled during silt dumping tests by B.C. Power Com.
19	37	7·5	70·22	0·06	0·045	0·015	Nil	Nil	
5 Mar	34	7·5	69·88	0·05	0·045	0·030	N	N	
19	36	7·4	69·48	0·04	0·045	0·025	N	N	Full Chemical # 26
9 Apr	40	7·6	70·08	0·05	0·075	0·040	N	N	Full Chemical # 35

WATERSHED ARROW LAKES
Columbia River
GAUGING STATION Castlegar 8NE2

SAMPLING POINT COLUMBIA ABOVE CELGAR
Surface Samples
Mid stream 1m above Celgar

DATE 1962	TEMP. °F	pH	GAUGE - FT. ~~FLOW - cfs~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Tannin/ Lignin	Sulphite waste liquor	Sampled by S.D Musch
7 May	-	-	77.07	0.06	0.055	0.040	Nil	Nil	
22	50	7.6	79.37	0.06	0.095	0.050	N	N	Full Chemical #51
11 Jun	50	7.6	87.64	0.03	0.070	0.040	N	N	Full Chemical #57
25	52	8.0	92.84	0.04	0.085	0.050	N	N	Higher range pH indicator used.
10 Jul	54	7.9	88.82	0.03	0.070	0.040	N	N	
24 Jul	57	7.8	86.07	0.06	0.075	0.045	N	N	Full Chemical #74
13 Aug	57	7.8	84.52	0.08	0.105	0.035	N	N	Full Chemical #81
10 Sep	58	7.7	78.99	0.02	0.055	0.030	N	N	
24	58	8.0	76.43	0.04	0.055	0.035	N	N	Full Chemical #92
			[illegible]	.12	.061	.035			

WATERSHED ARROW LAKES
Columbia River
GAUGING STATION Castlegar 7NE2

SAMPLING POINT COLUMBIA BELOW CELGAR
Surface samples at mid stream
3 m l below Celgar, just above ferry

DATE 1961	TEMP °F	pH	GAUGE - FT. ~~FLOW - cfs~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin / Tannin	Sulphite waste liquor	
2 Oct	58	-	74·14	0·04	0·13	0·05			Sampled by S D Husch In company of P.C.B., R.B & C.G.
16	54·5	7·6	73·90	0·04	0·08	0·05			Full Chemical # 80
30	51	7·6	74·97	0·04	0·08	0·05			
14 Nov	46	7·5	72·90	0·04	0·07	0·02			
22	45	7·8	72·19	0·05	0·09	0·03	2·8	4·9	Extreme foaming effluent from mill, marked colour
4 Dec	43	7·6	71·19	0·08	0·05	0·03	Trace	Trace	Cold & Snowing
18	39	7·8	70·50	0·08	0·06	0·02	Nil	Nil	Celgar mill shut down for 2 weeks on Dec 17
1962									
8 Jan	40	7·4	70·17	0·06	0·090	0·045	N	N	
5 Feb	35	7·4	69·61	0·04	0·085	0·045	N	N	
14	37	7·8	70·07	0·11	-	0·04	Sampled below ferry		Full Chemical # 14 During silt dumping tests
19	37	7·4	70·22	0·06	0·055	0·025	N	N	
5 Mar	34	7·4	69·88	0·04	0·065	0·040	N	N	
19	37	7·4	69·48	0·05	0·065	0·045	N	N	
9 Apr	40	7·4	70·08	0·05	0·095	0·060	N	N	
			2.	·67	1·015	·510			

WATERSHED ARROW LAKES
Columbia River

GAUGING STATION Castlegar 8NE2

SAMPLING POINT COLUMBIA BELOW CELGAR
Surface samples at mid stream
3 ml below Celgar, just above ferry

DATE 1962	TEMP °F	pH	GAUGE - FT. ~~FLOW - cfs~~	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Sampled by S D Husch
7 May	-	-	77·07	0·05	0·055	0·040	Nil	Nil	
22	50	7·6	79·37	0·08	0·120	0·100	N	N	
11 Jun	50	7·6	87·64	0·03	0·065	0·035	N	N	Sampled in mid stream ¼ mi downstream of CPR bridge
25	52	8·0	92·84	0·06	0·060	0·040	N	N	Higher range pH indicator in use
10 Jul	54	8·0	88·82	0·05	0·075	0·045	N	N	
24	57	7·9	86·07	0·04	0·135	0·075	N	N	
13 Aug	57	8·0	84·52	0·04	0·080	0·030	N	N	
10 Sep	58	7·8	78·99	0·03	0·050	0·030	N	N	
24	58	8·2	76·43	0·04	0·065	0·035	N	N	
			$\bar{x}_9$	·42	·705	·130			

WATERSHED Kootenay Lake
West Arm
GAUGING STATION Corra Linn, Crescent Valley

SAMPLING POINT Kootenay River, above confluence
Surface samples
Mid stream

DATE 1961	TEMP °F	pH	GAUGE - FT. FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	
2 Oct	58	7.4		0.02	0.12	0.04			Accompanied by P.E.S. R.B. & C.G.
16	57	7.5		0.02	0.06	0.02			Full Chemical # 81
30	49	7.6		0.04	0.10	0.05			
14 Nov	44.5	7.5		0.01	0.07	0.02			
22	41	7.8		0.05	0.05	0.03			Full Chemical # 105
4 Dec	41	7.8		0.03	0.05	0.03			Full Chemical # 111
18	37.5	8.0		0.03	0.065	0.035	Nil	Nil	Cold with snow
1962									
8 Jan	38	7.6		0.02	0.105	0.050			
5 Feb	35	8.0		0.04	0.095	0.055			Full Chemical # 10
14	38	7.8		0.09	-	0.04	Full Chemical # 15		Sampled during silt dumping tests by B.C.P.C.
19	39	7.6		0.04	0.085	0.050			
5 Mar	34	7.4		0.03	0.105	0.060			
19	38	7.6		0.02	0.075	0.035			Full Chemical # 27
9 Apr	41	7.6		0.06	0.085	0.040			Full Chemical # 36

WATERSHED KOOTENAY LAKE – West Arm

GAUGING STATION Corra Linn, Crescent Valley

SAMPLING POINT KOOTENAY RIVER, ABOVE CONFLUENCE – Surface samples – Mid stream

DATE 1962	TEMP. °F	pH	GAUGE - FT. FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	
7 May				0·05	0·095	0·080	Nil	Nil	
22	48	7·6		0·03	0·110	0·090	-	-	Full Chemical # 52
11 Jun	50	7·8		0·01	0·105	0·080	-	-	Full Chemical # 58
25	56	7·8		0·02	0·075	0·040	N	N	Higher range pH disc in use from 11 June
10 Jul	58	8·0		0·02	0·080	0·050	N	N	
24	62	8·2		0·05	0·090	0·040	-	-	Full Chemical # 75
13 Aug	62	8·2		0·03	0·095	0·040	N	N	Full Chemical # 82
10 Sep	62	8·2		0·02	0·095	0·040	N	N	
24	61	8·6		0·03	0·095	0·045	-	-	Full Chemical # 93
			2.9	·06	8/0	·505			

WATERSHED ARROW LAKES
Columbia River

GAUGING STATION Birchbank 8NE49

SAMPLING POINT KINNAIRD

Average results of samples from 3 locations (W, Centre, E.) and 3 depths (1', 10', 20') or composites

DATE 1961	TEMP °F	pH	~~GAUGE FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken
2 Oct	58	7·5	32,800	0·02	0·067	0·030	Nil	Nil	3 surface
16	55	7·6	37,700	0·03	0·067	0·037	N	N	3 surface
30	50	7·6	44,000	0·03	0·067	0·027	N	N	3 surface
14 Nov	46	7·6	32,800	0·03	0·073	0·029	0·5	< 1	9 1', 10' & 20' at East, Centre & West
Foam 22	43	7·8	25,400	0·19	0·09	0·04	0·9	1	9 sample composite Full chemical #106
Foam 4 Dec	41	7·5	24,700	0·04	0·05	0·03	Nil	Nil	9 Sample composite Full chemical #115
18	37	7·7	19,400	0·02	0·066	0·040	N	N	9 1', 10', 20' at East, Centre, West
1962									
8 Jan	39	7·5	18,500	0·03	0·084	0·035	N	N	9 1', 10', 20' at East, Centre, West.
5 Feb	35	7·4	18,600	0·04	0·080	0·050	N	N	9 Sample composite Full chemical # 11
14	38	7·8	23,300	0·08	-	0·05	-	-	Surface at mid stream only during Bl. Pr. Tests Full Chemical # 16
19	39	7·5	22,700	0·05	0·077	0·036	N	N	9 1', 10' & 20' at East, Centre, West
5 Mar	34	7·4	22,500	0·02	0·077	0·048	N	N	9 1', 10' & 20' at East, Centre, West
19	38	7·6	22,400	0·05	0·075	0·030	N	N	9 Sample composite Full Chemical # 28
9 Apr	42	7·6	26,500	0·04	0·065	0·040	N	N	9 Sample composite Full Chemical # 37

WATERSHED Arrow Lakes
Columbia River

GAUGING STATION Birchbank 8NE49

SAMPLING POINT KINNAIRD

Average results of samples from 3 locations (W, Centre, E) and 3 depths (1', 10', 20') or composites.

DATE 1962	TEMP °F	pH	~~GAUGE FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken
7 May	-	-	78,100	0·03	0·075	0·052	Nil	Nil	9 1', 10' & 20' at East, Centre & West
22	W 49 C 48 48 E 46	7·6	100,000	0·04	0·160	0·095	N	N	9 sample composite Full Chemical #53
11 Jun	50 50 50 50	7·8 7·5 7·8	173,000	0·02	0·085	0·045	N	N	9 Sample composite Full Chemical #59
25	52 54 55 54	7·6 7·0 7·8 7·9	228,000	0·02	0·073	0·046	N	N	9 1', 10' & 20' at East, Centre & West
10 Jul	54 56 57 56	7·9 7·6 7·9 8·0	171,000	0·03	0·071	0·040	N	N	9 1', 10', & 20' at West, Centre & East
24	58 60 60 60	8·2 7·1 7·2 8·2	140,000	0·04	0·140	0·075	N	N	9 Sample composite Full Chemical #76
13 Aug	58 59 60 59	7·2 7·0 7·0 8·1	113,000	0·08	0·045	0·020	N	N	9 Sample composite Full Chemical #83
10 Sep	58 60 60 60	7·9 8·0 8·0 8·0	57,000	0·02	0·058	0·032	N	N	9 1', 10' & 20' at West, Centre & East
24	58 60 60 60	8·2 8·6 8·4 8·4	44,700	0·03	0·055	0·030	N	N	9 Sample composite Full Chemical #94

WATERSHED	Arrow Lakes – Columbia River					SAMPLING POINT (Sampled by S. D. Hush, J. L. Hiebert)	Kinnaird West (Inlet) – On West side of river close to water supply inlet			
GAUGING STATION	Birchbank 8NE49									
DATE 1961	TEMP. °F	pH	~~GAUGE – FT.~~ FLOW – c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken	
2 Oct	58	7·6	32,800	0·02	0·08	0·03	Nil	Nil	Surface	P.C. Board visiting
16	55	7·6	37,300	0·03	0·05	0·03	N	N	"	[illegible] Chemical # 82
30	51	7·6	44,000	0·02	0·06	0·03	N	N	"	
14 Nov	47	7·6	32,000	0·03	0·08	0·02	0·5	<1	"	
	46	-		0·11	0·10	0·03	0·5	<1	10′	
	-	-		0·05	0·09	0·03	0·5	Nil	20′	
18 Dec	38	7·6	19,400	0·03	0·065	0·035	Nil	N	Surface	Celgar mill closed
		7·6		0·03	0·055	0·04	N	N	10′	17 Dec for 2 weeks
	-	7·6		0·05	0·065	0·04	N	N	20′	Cold & Snowing
1962										
8 Jan	39	7·5	18,500	0·03	0·080	0·035	N	N	Surface	
				0·03	0·085	0·040	N	N	10′	
				0·02	0·085	0·040	N	N	20′	
19 Feb	38	7·4	22,700	0·05	0·075	0·030	N	N	Surface	
				0·06	0·080	0·045	N	N	10′	
			Σ	0·05	0·075	0·035	N	N	20′	
				·61	1·123	·510				

WATERSHED Arrow Lakes — Columbia River

GAUGING STATION Birchbank — 8NE49

SAMPLING POINT Sampled by S.D. Mosch — Kinnaird-West (Inlet) On west side of river close to water supply inlet

DATE 1962	Temp. °F	pH	~~Gauge Ht.~~ Flow - c.f.s.	Nitrate	Phosphate total	Phosphate ortho-	Lignin/ Tannin	Sulphite waste liquor	Samples taken
5 Mar	34	7.4	22,500	0.02	0.070	0.050	Nil	Nil	Surface
	-	-		0.01	0.070	0.045	N	N	10'
	-	-		0.02	0.095	0.055	N	N	20'
7 May	-	-	78,100	0.04	0.065	0.050	N	N	1'
	-	-		0.02	0.085	0.050	N	N	10'
	-	-		0.03	0.070	0.050	N	N	20'
25 Jun	52	8.0	228,000	0.03	0.065	0.045	N	N	1' Higher range pH disc used
	52	8.0		0.03	0.070	0.045	N	N	10'
	52	8.0		0.02	0.070	0.045	N	N	20'
10 Jul	54	8.0	171,000	0.03	0.075	0.040	N	N	1'
		8.0		0.03	0.070	0.040	N	N	10'
		8.0		0.03	0.070	0.040	N	N	20'
10 Sep	58	7.9	57,000	0.01	0.050	0.025	N	N	1'
				0.03	0.060	0.030	N	N	10'
				0.04	0.070	0.035	N	N	20'
			Σ	.39	1.055	.645			

WATERSHED Arrow Lakes — Columbia River

GAUGING STATION Birchbank — 8NE49

SAMPLING POINT Kinnaird - Centre — Sampled in mid stream — opposite water supply intake

Sampled by S.D. Husch

DATE 1961	Temp °F	pH	~~Gauge - ft~~ Flow - c.f.s.	Nitrate	Phosphate total	Phosphate ortho-	Lignin / Tannin	Sulphite waste liquor	Samples taken	
2 Oct	58	7.4	32,800	0.03	0.06	0.03	Nil	Nil	Surface	
16	55	7.6	37,700	0.04	0.08	0.05	N	N	"	Full Chemical = 23
30	50	7.6	44,000	0.03	0.06	0.02	N	N	"	
14 Nov	46	7.6	32,800	0.03	0.08	0.02	0.5	< 1	"	
	-	-		0.03	0.06	0.03	< 0.5	Nil	10'	
	-	-		0.03	0.06	0.03	0.5	N	20'	
18 Dec	37	7.6	19,400	0.02	0.06	0.05	Nil	N	Surface	Celgar mill closed
	-	7.6		0.02	0.09	0.045	N	N	10'	Dec 17 for 2 weeks
	-	7.6		0.02	0.09	0.04	N	N	20'	Cold & snow
1962										
8 Jan	39	7.5	18,500	0.02	0.085	0.040	N	N	Surface	
	-	-		0.05	0.080	0.040	N	N	10'	
	-	-		0.02	0.085	0.040	N	N	20'	
14 Feb	38	7.8	23,300	0.08	-	0.05			Surface, during B.C.P.C. silt dumping Tests Full chemical = 16	
			$\bar{E}_{12}$	.31	.890	.135				

WATERSHED ARROW LAKES
Columbia River

GAUGING STATION Birchbank 8NE

SAMPLING POINT KINNAIRD CENTRE
Sampled by S.D. Huseh
Samples in mid stream
opposite water supply intake

DATE 1962	TEMP °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken
19 Feb	39	7·5	22,700	0·05	0·075	0·030	Nil	Nil	Surface
	-	-		0·06	0·080	0·040	N	N	10'
	-	-		0·04	0·075	0·030	N	N	20'
5 Mar	34	7·4	22,500	0·02	0·090	0·045	N	N	Surface
	-	-		0·04	0·065	0·045	N	N	10'
	-	-		0·04	0·065	0·045	N	N	20'
7 May	-	-	78,100	0·03	0·095	0·055	N	N	Surface
	-	-		0·03	0·065	0·055	N	N	10'
	-	-		0·03	0·095	0·055	N	N	20'
25 Jun	54	8·0	228,000	0·02	0·075	0·045	N	N	Surface Higher range pH disc used
	54	8·0		0·03	0·075	0·050	N	N	10'
	54	8·0		0·03	0·075	0·045	N	N	20'
10 Jul	56	8·0	171,000	0·03	0·070	0·040	N	N	Surface
				0·03	0·065	0·040	N	N	10'
				0·03	0·065	0·040	N	N	20'
			= 15	·51	1·130	·660			

WATERSHED Arrow Lakes
Columbia River

GAUGING STATION Birchbank 8NE49

SAMPLING POINT Kinnaird - Centre
Sampled by S.D. Husch
Sampled in mid stream opposite water supply intake

DATE 1962	TEMP. °F	pH	~~GAUGE ft.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken
10 Sep	60	8.0	57,000	0.01	0.055	0.030	Nil	Nil	surface
				0.02	0.055	0.030	N	N	10'
				0.02	0.055	0.030	N	N	20'

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WATERSHED Arrow Lakes – Columbia River

GAUGING STATION Birchbank 8NE49

SAMPLING POINT Kinnaird – East

Sampled on the east side opposite water supply intake

Sampled by S. D. Husch

DATE 1961	TEMP °F	pH	~~GAUGE ft~~ FLOW - cfs	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples Taken	
2 Oct	56	7·6	32,800	0·02	0·06	0·03	Nil	Nil	Surface	with visiting P.C. Board.
16	56	7·6	37,700	0·03	0·07	0·03	N	N	"	Full Chemical # 84
30	49	7·6	44,000	0·03	0·08	0·03	N	N	"	
14 Nov	46	7·6	32,800	0·01	0·08	0·05	N	N	"	
		-		0·01	0·06	0·02	0·5	<1	10'	
		-		0·01	0·05	0·03	0·5	<1	20'	
18 Dec	37	7·8	19,400	0·01	0·07	0·045	Nil	Nil	Surface	Celgar mill closed 17
		7·8		0·01	0·05	0·035	N	N	10'	Dec for 2 weeks
		7·8		0·03	0·05	0·03	N	N	20'	
1962										
8 Jan	38	7·5	18,500	0·02	~~0·660~~	~~0·560~~	N	N	Surface	
		-		0·02	0·085	0·040	N	N	10'	
		-		0·05	0·085	0·040	N	N	20'	
19 Feb	39	7·6	22,700	0·04	0·075	0·035	N	N	Surface	
				0·06	0·075	0·035	N	N	10'	
				0·04	0·080	0·040	N	N	20'	
				Σ ·32	·970	·490				

WATERSHED	ARROW LAKES — Columbia River					SAMPLING POINT	KINNAIRD - EAST — Sampled on the east side opposite water supply intake		
GAUGING STATION	Birchbank 8NE49								

DATE 1962	TEMP. °F	pH	~~GAUGE - FT~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Lignin/ Tannin	Sulphite waste liquor	Samples taken	
5 Mar.	34	7.5	22,500	0.01	0.065	0.045	Nil	Nil	Surface	
	-	-		0.03	0.085	0.050	N	N	10′	
	-	-		0.03	0.075	0.050	N	N	20′	
7 May	-	-	78,100	0.03	0.065	0.055	N	N	Surface	
	-	-		0.02	0.065	0.050	N	N	10′	
	-	-		0.02	0.070	0.050	N	N	20′	
25 Jun	55	7.8	228,000	0.02	0.075	0.045	N	N	Surface	Higher range pH disc used
	55	7.8		0.02	0.075	0.045	N	N	10′	
	55	7.8		0.02	0.075	0.045	N	N	20′	
10 Jul	57	8.0	171,000	0.04	0.075	0.045	N	N	Surface	
				0.03	0.075	0.040	N	N	10′	
				0.02	0.075	0.040	N	N	20′	
10 Sep	60	8.0	57,000	0.01	0.055	0.030	N	N		
				0.02	0.075	0.040	N	N		
				0.02	0.050	0.035	N	N		
			Σ15	.34	1.055	.665				

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WATERSHED Lower Columbia
Columbia River
GAUGING STATION Birchbank BNE 49

SAMPLING POINT Birchbank
Surface samples at mid stream

DATE 1961	TEMP °F	pH	~~GAUGE — FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Husch, where noted by J.L. Hiebert
2 Oct	58	7.6	32,800	0.03	0.10	0.04	Accompanied by P.C.B. and engineers.
16	55		37,700	0.03	0.05	0.02	Full Chemical #85
30	50	7.6	44,000	0.01	0.07	0.03	
14 Nov	46	7.6	32,800	0.04	0.06	0.03	
22	43	7.8	25,400	0.01	0.05	0.03	
4 Dec	41	8.0	24,700	0.05	0.05	0.03	Cold & snowing Arsenic <0.05 Lignin/Tannin - Nil Sulphite waste liquor - Nil
18	37	7.6	19,400	0.01	0.06	0.04	Cold with snow flurries Celgar Mill closed 17th.
1962							
8 Jan	39	7.6	18,500	0.05	0.095	0.055	
5 Feb	35	7.4	18,600	0.02	0.065	0.040	Apparent mislabeling - figures noted given for Fort Sheppard.
19	39	7.4	22,700	0.04	0.095	0.045	
5 Mar	34	7.4	22,500	0.01	0.080	0.060	
19	38	7.4	22,400	0.03	0.105	0.055	
9 Apr			26,500	0.04	0.055	0.045	
7 May			78,100	0.02	0.115	0.065	

WATERSHED LOWER COLUMBIA
Columbia River
GAUGING STATION Birchbank 8NE49

SAMPLING POINT BIRCHBANK
Surface samples at mid stream

DATE 1962	TEMP. °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Husch, where noted by J.L. Hiebert
22 May	49	7·6	100,000	0·06	0·095	0·050	
11 Jun	50	7·8	173,000	0·01	0·095	0·050	Higher range pH disc in use.
25	54	7·7	228,000	0·03	0·080	0·050	
10 Jul	55	8·0	171,000	0·04	0·075	0·050	
24	60	8·0	140,000	0·04	0·165	0·135	
13 Aug	59	8·1	113,000	0·03	0·065	0·030	
10 Sep	59	8·0	57,000	0·02	0·085	0·035	
24	59	8·4	44,700	0·03	0·070	0·040	

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WATERSHED LOWER COLUMBIA
Columbia River
GAUGING STATION Birchbank 8 NE49

SAMPLING POINT ROCK ISLAND
Surface sample in eddy below Rock I, 4 miles below Trail

DATE 1961	TEMP °F	pH	~~GAUGE - ft.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Husch, where noted by J.L. Hiebert
2 Oct	58	7.4	32,800	0.03	0.24	0.08	Accompanied by P.C.B and engineers
16	55	7.6	37,700	0.04	0.27	0.23	Full Chemical # 86
30	50	7.6	44,000	0.04	0.45	0.20	
14 Nov	46	7.6	32,800	0.03	0.33	0.19	
22	43	7.4	25,400	0.04	0.51	0.28	Extreme foaming and discoloration below Celgar.
4 Dec	41	7.5	24,700	0.06	0.36	0.28	Cold & snowing Arsenic < 0.05
18	38	7.6	19,400	0.01	0.53	0.42	Cold with snow flurries Celgar Mill closed 17th for 2 weeks
1962							
8 Jan	39	7.4	18,500	0.02	0.585	0.500	
5 Feb	35	7.4	18,600	0.04	0.450	0.290	Apparent mislabeling - figures noted given for Birchbank.
19	39	7.4	22,700	0.03	0.315	0.260	
5 Mar	35	7.4	22,500	0.04	0.315	0.265	
19	39	7.3	22,400	0.07	0.950	0.695	
9 Apr			26,500	0.05	0.450	0.315	
7 May			78,100	0.02	0.325	0.220	

WATERSHED LOWER COLUMBIA
Columbia River
GAUGING STATION Birchbank 8NE49

SAMPLING POINT ROCK ISLAND
Surface sample in eddy below Rock I., 4 mi below Trail

DATE 1962	TEMP °F	pH	~~GAUGE — FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Hoyer.
22 May	49	7.8	100,000	0.08	0.205	0.125	
11 Jun	50	7.6	173,000	0.02	0.145	0.100	Higher range pH meter in use.
25	54	7.6	228,000	0.04	0.110	0.065	
10 Jul	55	8.2	171,000	0.04	0.105	0.065	
24	60	7.8	140,000	0.06	0.150	0.095	
13 Aug	59	8.1	113,000	0.02	0.115	0.050	
10 Sep	59	7.8	57,000	0.02	0.215	0.175	
24	59	7.6	44,000	0.02	0.125	0.095	

WATERSHED LOWER COLUMBIA
Columbia River
GAUGING STATION Birchbank 8NE 40

SAMPLING POINT FORT SHEPPARD
surface samples at mid-stream

DATE 1961	TEMP. °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s.	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Husch
2 Oct	58	7.4	32,800	0.03	0.25	0.08	Accompanied by P.C.B. and engineers
16	55	7.6	37,700	0.04	0.21	0.18	Full Chemical # 87
30	50	7.6	44,000	0.04	0.31	0.16	
14 Nov	46	7.6	32,800	0.04	0.28	0.24	
22	43	7.4	25,400	0.03	0.85	0.37	Foaming and discoloration from Celgar visible to here.
4 Dec	41	7.5	24,700	0.06	0.36	0.28	Cold a snowing Arsenic < 0.05
18	38	7.6	19,400	0.03	0.37	0.32	Cold with snow flurries Celgar mill closed 17 for 2 weeks
1962							
8 Jan	39	7.2	18,500	0.02	0.780	0.620	
5 Feb	35	7.4	18,600	0.05	0.420	0.260	Apparent mislabeling - figures noted given for Rock Island.
19	39	7.4	22,700	0.03	0.420	0.305	
5 Mar	35	7.4	22,500	0.09	0.245	0.185	
19	39	7.3	22,400	0.06	0.350	0.235	
9 Apr			26,500	0.08	0.295	0.210	
7 May			78,100	0.04	0.290	0.195	

WATERSHED LOWER COLUMBIA
Columbia River

GAUGING STATION Birchbank 9NE49

SAMPLING POINT FORT SHEPPARD

Surface samples at mid stream

DATE 1962	TEMP °F	pH	~~GAUGE - FT.~~ FLOW - c.f.s	NITRATE	PHOSPHATE TOTAL	PHOSPHATE ORTHO-	Sampled by S. Husch
22 May	49	7.6	100,000	0.03	0.180	0.110	
11 Jun	50	7.8	173,000	0.03	0.140	0.095	Higher range pH disc in use
25	54	7.6	228,000	0.03	0.085	0.055	
10 Jul	55	8.0	171,000	0.03	0.080	0.050	
24	60	7.9	140,000	0.06	0.145	0.095	
13 Aug	59	8.1	113,000	0.04	0.105	0.045	
10 Sep	59	7.6	57,000	0.02	0.275	0.205	
24	59	8.0	44,700	0.04	0.195	0.105	

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