

PROVINCE OF BRITISH COLUMBIA  
DEPARTMENT OF LANDS AND FORESTS

HON. R. E. SOMMERS, *Minister*

E. W. BASSETT, *Deputy Minister of Lands*

---

Report of the Lands Service

*containing the reports of the*

Lands Branch, Surveys and Mapping Branch,  
and Water Rights Branch

*together with the*

Dyking Commissioner, Southern Okanagan Lands Project,  
and University Endowment Lands

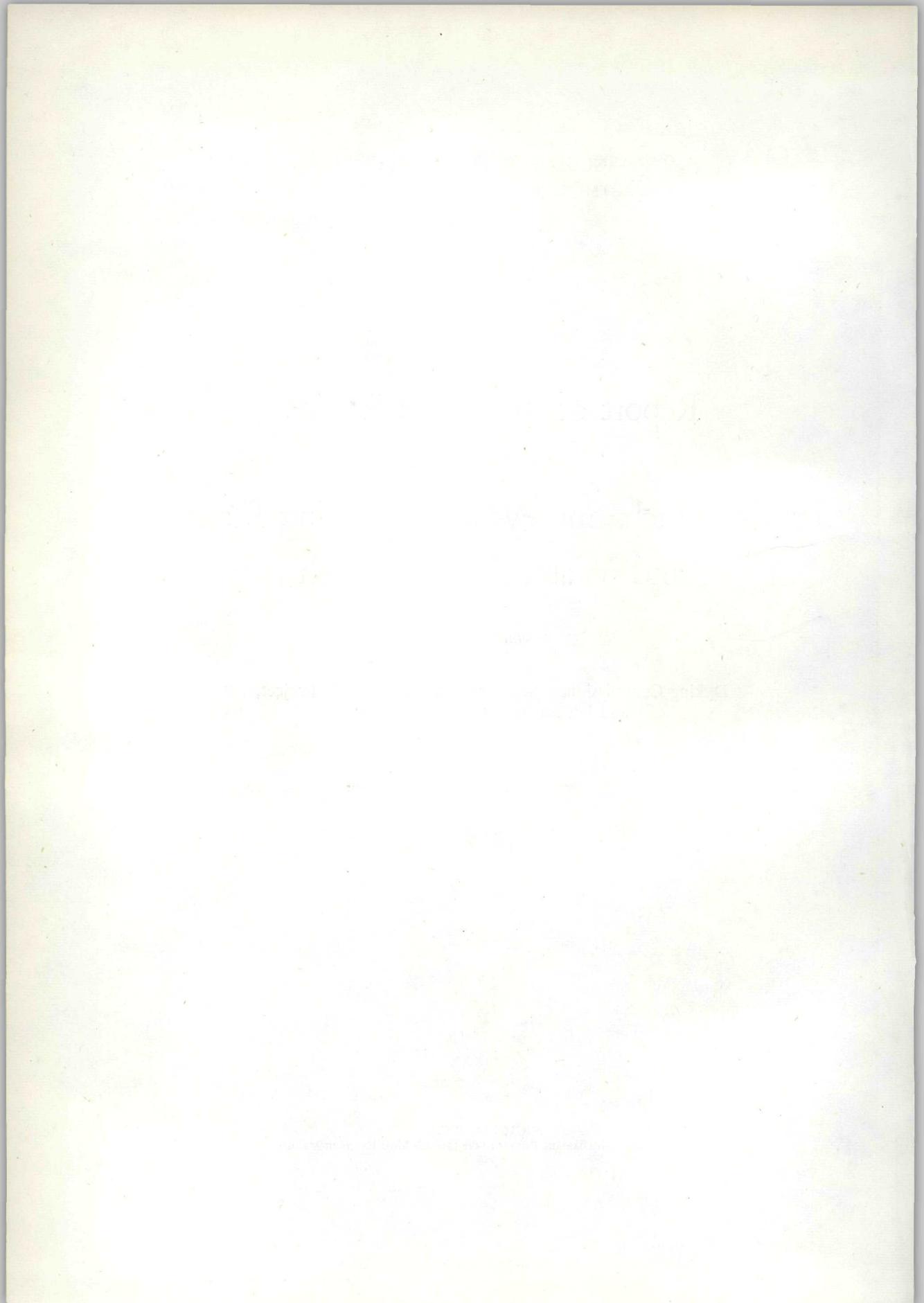
*Year Ended December 31st*

1955



VICTORIA, B.C.

Printed by DON MCDIARMID, Printer to the Queen's Most Excellent Majesty  
1956



# British Columbia Air Survey Photograph

## DAWSON CREEK, B.C.



Vertical view of Dawson Creek and airstrip. Junction of John Hart and Alaska Highways. Agricultural lands provide an interesting pattern. Altitude, 20,000 feet above sea-level, June 12th, 1955.

Group Company of the

DAWSON CREEK R.R.

VICTORIA, B.C., January 30th, 1956.

*To the Honourable FRANK MACKENZIE ROSS, C.M.G., M.C.,  
Lieutenant-Governor of the Province of British Columbia.*

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of the British Columbia Lands Service of the Department of Lands and Forests for the year ended December 31st, 1955.

R. E. SOMMERS,  
*Minister of Lands and Forests.*

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VICTORIA, B.C., January 30th, 1956.

*The Honourable R. E. Sommers,  
Minister of Lands and Forests, Victoria, B.C.*

SIR,—I have the honour to submit the Annual Report of the British Columbia Lands Service of the Department of Lands and Forests for the twelve months ended December 31st, 1955.

E. W. BASSETT,  
*Deputy Minister of Lands.*

1952

The Honorable J. Edgar Hoover  
Director  
Federal Bureau of Investigation  
Washington, D. C.

Dear Mr. Hoover:

I have the honor to acknowledge the receipt of your letter of the 11th instant regarding the matter mentioned therein.

I am sorry that I cannot advise you more fully at this time, but I am sure that you will understand the necessity of this.

I am, Sir, very respectfully,  
Yours truly,  
W. C. Sullivan

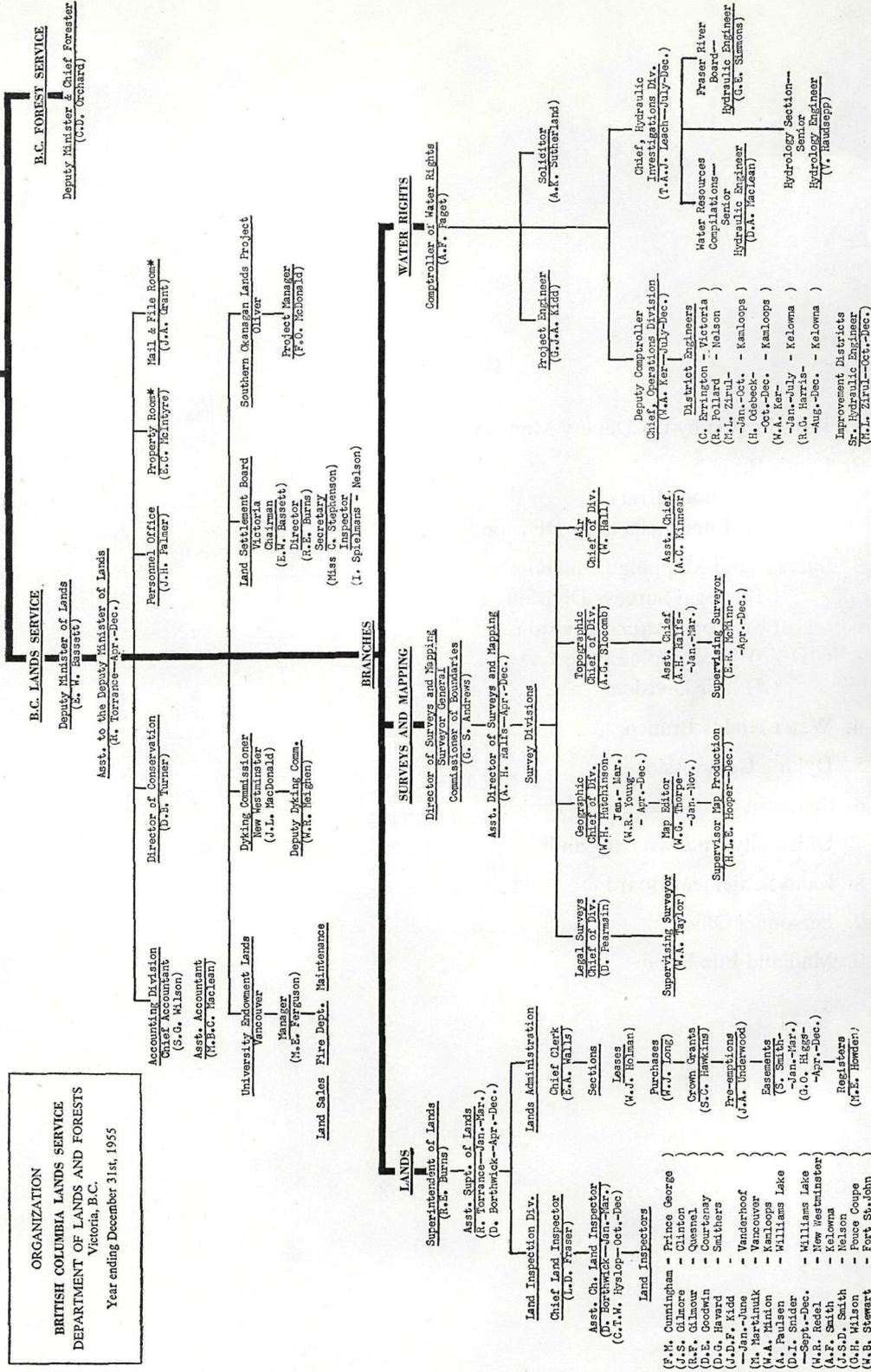
W. C. Sullivan  
Special Agent in Charge

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**ORGANIZATION**  
**BRITISH COLUMBIA LANDS SERVICE**  
 DEPARTMENT OF LANDS AND FORESTS  
 Victoria, B.C.  
 Year ending December 31st, 1955

**MINISTER OF LANDS AND FORESTS**  
 (Hon. R. F. Sommers)



\* Also functions for the B. C. Forest Service

# REPORT OF THE BRITISH COLUMBIA LANDS SERVICE

E. W. BASSETT, DEPUTY MINISTER OF LANDS

The people of British Columbia had their busiest year in history during 1955, and the volume and variety of land and water surveys, mapping, and alienations carried out by or transacted through the British Columbia Lands Service is incontrovertible truth of the record business accomplished. Activity was sustained throughout the year, and the tempo of development will not slacken but probably quicken again during 1956, judging by the number of requests for land and water examinations awaiting attention when the 1956 field-season arrives.

Three years ago the Surveys and Mapping Branch embarked on a programme of establishing ground control over 25,000 square miles of muskeg in the north-eastern part of the Province. It is a pleasure to report that this arduous work has been completed on schedule. The value of this control to British Columbia is immense, for it means that legally correct recording of oil, natural gas, and associated locations can be established from the Peace River District to the northern boundary of the Province. Further to this topographic achievement, it is interesting to record that the last gap of 66 miles has been completed in that section of the northern boundary of British Columbia east of Teslin Lake.

The Air Division in 1955 contributed a record total of basic data toward fundamental investigations in a variety of resource-development projects. Its air-photo production was for such major practical matters as forest public working circles, more intensive forest inventory survey, and new forest road locations. Greatly increased multiplex mapping services were extended to many agencies, such as the British Columbia Power Commission, the Water Rights Branch, the Fraser River Board, and the Forest Engineering Division. The production of interim base maps reached 43,000 square miles; such mapping is invaluable for any and all development studies in the initial stages.

The record of the Legal Surveys Division is noted as a yardstick for measuring current Provincial development activity. Photostats of plans and other documents jumped 97 per cent over the previous year. Land examination sketches totalled 2,000, representing a 60-per-cent increase over 1954. Legal survey of 72 miles of completed new highway right-of-way and of 335 parcels of Crown land for alienation and reserve further pin-point the surge of development all over the Province.

During 1955 the Geographic Division concentrated on the production and lithography of the new 2-miles-to-1-inch maps. A total of ten of these detailed maps are now published or in various stages of completion. They show the contouring, land status, buildings, and other improvements from the Okanagan to the Fraser Valley section of British Columbia. The Kelowna and Penticton sheets in this series were in press at the end of the year.

The Lands Administration Branch recorded an 11-per-cent increase for 1955 over 1954 in applications to purchase land, and a 21-per-cent increase in applications to lease. Preparation of major and complicated easements required much and detailed attention. Rights-of-way for the Westcoast Transmission pipe-line and for both the British Columbia Power Commission and the British Columbia Electric Company are cases in point. In the Lower Mainland region particularly, there was heavy demand for foreshore leases due to industrial activity and increased settlement. The sale of town lots nearly doubled, from approximately \$70,000 in 1954 to nearly \$130,000 in 1955. Almost 3,000 land inspections were made, and the duties of the Land Inspectors, who are stationed at key

centres throughout the Province, were expanded in the fields of arbitration, evaluation, and foreshore lease rentals. Continuing the policy of selecting suitable areas for the use and recreation of the public, alienation has been withheld and reservations made throughout the Province of lands found suitable for this purpose.

Because water is a fundamental consideration in the development and use of all natural resources, and because this development and use occupies the centre of the stage at this historic period in the growth of British Columbia, it is to be expected that the Water Rights Branch of the Service will be called upon to make even greater contribution toward the expanding of this resource.

Outstanding, perhaps, in the hydro field, was an important hearing of the objections to the application of the Northwest Power Industries Limited to divert and use the waters of the Yukon River, Teslin Lake, and Taku River for a proposed hydro-power development of enormous potential. This hearing was held in Atlin during August, 1955, and was followed by an inspection of the general area by air, boat, and rail.

In conjunction with the Fraser River Board, studies were continued by the Water Rights Branch to determine the potentialities of the Fraser River. A second research programme was followed for the Columbia River basin to obtain facts which would assist the British Columbia Government to formulate policy concerning the future use of these waters.

A master-plan survey of the University Endowment Lands was initiated in July, when Dr. D. B. Turner, Director of Conservation, was appointed to co-ordinate studies and prepare a plan for these lands. His terms of reference are twofold: (1) To devise a plan whereby the greatest possible endowment will accrue to the University of British Columbia, and (2) to so plan the development of the University Endowment Lands that the beauty and other high values of this unmatched site be retained permanently, in keeping with the prestige and dignity of a university setting. The report will be submitted to the Government of British Columbia during 1956.

Personnel numbers in the British Columbia Lands Service during the year 1955 showed little fluctuation. Change was perhaps most noticeable in the Geographic Division, where the record reveals that W. H. Hutchinson, after thirty-five years in service, retired as Chief, to be succeeded by W. R. Young, and a great loss was suffered in the death of W. G. Thorpe, Map Editor and member of the staff for thirty-five years.

LANDS BRANCH

Note 1

THE LANDS BRANCH

At the time of the Fraser River gold-rush in 1858 the demand for land in British Columbia was greatly intensified and pre-emptions predated surveys. Within four years 254 pre-emptors had taken up more than 50,000 acres of land. To facilitate the transfer of real estate and provide for the registration of titles, the "Land Registry Act" was passed in 1860. The Government of the Province of British Columbia was now in the real-estate business in a big way; the more than 366,000 square miles of land and water that constitutes British Columbia was the real estate in question.

With the entrance of British Columbia into Confederation in 1871, the demand for land quickened to a rush, and over the next thirty years the land-settler (and the promoter) succeeded the gold-miner in importance. Railroads were built and land grants passed, cities came into being, and companies became established. Land was at the core of all developments.

The task of land administration became very heavy and necessitated the formation of a Department of Lands in 1908. In 1912 a Forest Branch was included in the Department of Lands. To-day the Department of Lands and Forests exercises control of more than 90 per cent of the surface of British Columbia.

How does the Lands Branch fit into the total organization of the British Columbia Lands Service of to-day? The relation may be expressed briefly. **The Lands Branch has jurisdiction in matters pertaining to the disposition of Crown land, and is charged with so administering and disposing of the land that the general welfare, present and future, of the Province must be protected at all times.**

When an individual, or group, desires to purchase or lease Crown land, the application is directed to the Superintendent of Lands, head of the Lands Branch. His authority governs the following matters:—

Sale, lease, and pre-emption of Crown lands for such purposes as agricultural, industrial, commercial, and home-sites.

Preparation and issuance of Crown grants under the "Land Act," the "Mineral Act," and the "Taxation Act."

Preparation and issuance of right-of-way easements for power, telephone, pipe lines, etc.

Reservation of suitable Crown lands and foreshore for national defence, use and enjoyment of the public, forestry experimentation, fisheries research work, highways, etc.

Granting railway rights-of-way under various Statutes.

Protection of historic sites from alienation.

Reservation and conveying of Crown lands for such purposes as school-sites, cemeteries, and fair grounds.

Leasing of land and foreshore for such varied purposes as wharf-sites, booming-grounds, canneries, oyster and other mollusc fisheries, and for boat-houses, quarry-sites, cattle-ranching, trappers' cabins, ship-building, and aircraft bases.

To perform these and other functions efficiently, the Lands Branch works in close co-operation with a great number of other agencies, such as municipal and city administrations, town-planning authorities, the British Columbia Forest Service, the Branches of Water Rights and Surveys and Mapping within the British Columbia Lands Service, and all the departments in the Government of the Province, notably Public Works, Education, and Attorney-General.

Outside the Provincial departments there is much business transacted with Federal departments, such as the Department of National Defence, the Veterans' Land Settlement Act administration, the Public Works Department, and the Indian Affairs Branch of the Department of Citizenship and Immigration.

Direct service to the people of British Columbia is the first duty of the Lands Branch and this takes the bulk of the time of the Lands Branch personnel. Associated with this prime duty is the important function of the maintenance of the records, which in many cases are the only ones in British Columbia showing the correct legal status of the surface of the Province.—  
*Reprinted from 1952 Report.*

**LANDS BRANCH**

R. E. BURNS, SUPERINTENDENT OF LANDS

The continual development of British Columbia's natural resources during 1955 and the high general level of prosperity are reflected in the work of the Lands Branch, which has shown an appreciable increase during the past year.

Industrial activity has had an effect in the disposition of Crown lands in view of the fact that in various parts of the Province country lands have been changed to the category of urban and residential properties. This necessitates, in many cases, the cancellation of the plans of subdivision and a resubdivision of the lands into suitable lots of smaller areas.

The varied and extensive development in the forest industry has increased the demand for suitable foreshore for wharf-sites, booming, and log storage. These requirements and the operations of other industries have resulted in keen competition for the most favourable sites. Especially is this the case in the lower coastal area.

In the programme of expansion by the Department of Highways and Railways and the proposed hydro-electric development, various areas of Crown lands have been placed under reserve in addition to sites set apart for the Federal Departments of Transport, Public Works, etc.

Continuing the policy of selecting suitable areas for the use and recreation of the public, alienation is withheld and reservations made of lands found suitable for this purpose in all parts of the Province.

While all Crown lands disposed of require beneficial use of the same, lands disposed of under agreement for sale require the purchaser to carry out permanent improvements to a necessary value before title may be obtained.

By the maintenance of valuable records, an important service is given the public in research and status covering the alienation and titles of lands, especially in the matter of accretion and the beds of rivers and the change in their channels.

During the year, at the request of the Branch, an appraisal was carried out by the office of the Surveyor of Taxes of property comprised in the Industrial Reserve, Victoria City, within which leases are granted by this Branch. It is proposed to set lease rentals in accordance with the up-to-date valuations furnished. The co-operation of the Surveyor of Taxes in this matter is much appreciated.

The tables on the following pages indicate in detail the work carried out by the Administration Division of this Branch. The report of the Inspection Division is presented separately by the Chief Land Inspector.

Most sections of the Administration Division of the Lands Branch have shown an increase in the volume of work during the past year. A brief outline of each section follows:—

*Purchase Section.*—A total of 1,918 applications to purchase were received during the past year, an increase of 11 per cent over 1954. Sixteen public auction sales of Crown lands were held in 1955, as compared to eleven the previous year. The present staff of the Purchase Section is severely taxed to handle the increased volume of work, which shows no sign of decreasing. The situation has been kept in hand by additional temporary assistance.

*Lease Section.*—Eight hundred and forty-one applications to lease were received during the past year, an increase of 21 per cent over 1954. The number of leases issued is 454, an increase of forty-one over the previous year. There has been a marked increase in the number of contentious foreshore lease applications that are most time-consuming in adjudication.

*Crown Grant Section.*—A total of 1,498 Crown grants were prepared during 1955, an increase of 17 per cent over the previous year, and 1,196 certificates of purchase were prepared, an increase of 18 per cent over the previous year. There has been a marked increase in the number of Crown grants issued for mineral claims during 1955, which require more time in preparation than do grants issued under the "Land Act."

*Pre-emption and Reserve Section.*—The actual number of applications for reserves and pre-emption has decreased by 11 per cent during the present year. However, this has been offset by an increase in the complexity of reserves being requested, especially from the Department of Highways.

*Right-of-way Section.*—During the past year 101 applications for easement of right-of-way were received, and thirty-four applications allowed. Many of these applications are rather simple in nature; however, other applications for transmission-line rights-of-way and natural-gas line rights-of-way take many months to complete and require meticulous checking.

*Status Section.*—The present Status Section, comprising two men, has been functioning quite satisfactorily for the past year. During that time they stasured 4,914 acreage parcels and 8,489 town lots, in addition to carrying out 185 special status jobs of a more complicated nature; also they made 4,972 register entries.

The increase in work load of this Branch is also well illustrated by the number of letters received and handled. In 1955, 18,615 letters were received, as compared to 17,113 letters received in 1954, an increase of 9 per cent. During the past year approximately 4,010 members of the general public and other Government branches were accommodated at the counter in connection with general or specific land inquiries. The time spent on each inquiry varies greatly between five minutes and several hours, with the average being about twenty-five minutes. It can thus be seen that approximately 1,700 hours are spent on counter work. This represents the full-time services of one clerk for the entire year.

In addition to the actual increase in the number of applications received by this Branch, it is noted that there is a marked increase in the number of contentious applications and complex adjudications required. The amount of time spent on cases of this nature is much greater than on routine applications and requires the personal attention of the Superintendent and Assistant Superintendent.

It became evident early in the year that the permanent staff would have difficulty in keeping abreast of the work. Temporary assistance to assist in the Purchase Section was therefore obtained, and two senior clerks from the Surveys and Mapping Branch were loaned to this Branch on a full-time basis for four months and on a half-time basis for the last four months of the year. The co-operation extended by the Surveys and Mapping Branch and the services rendered by these men are much appreciated.

## STATISTICAL TABLES

## COLLECTIONS

*Table 1.—Summary of Recorded Collections for the Year Ended  
December 31st, 1955*

“Land Act”—		
Land leases, rentals, fees, etc.....	\$425,595.79	
Land sales .....	605,460.22	
Sale of maps and aerial photos.....	46,061.57	
Water rentals and recording fees.....	849,980.00	
		\$1,927,097.58
“Soldiers’ Land Act”—		
Southern Okanagan Lands Project.....	\$91,095.71	
Houses, South Vancouver.....	360.00	
		91,455.71
“University Endowment Lands Administration Act”.....		214,486.97
Refunds—advances and votes.....		15,252.90
Total collections .....		\$2,248,293.16

DEPARTMENT OF LANDS AND FORESTS

CHART 1. SOURCES OF COLLECTIONS, 1955  
SEE TABLE 1 FOR DETAILS

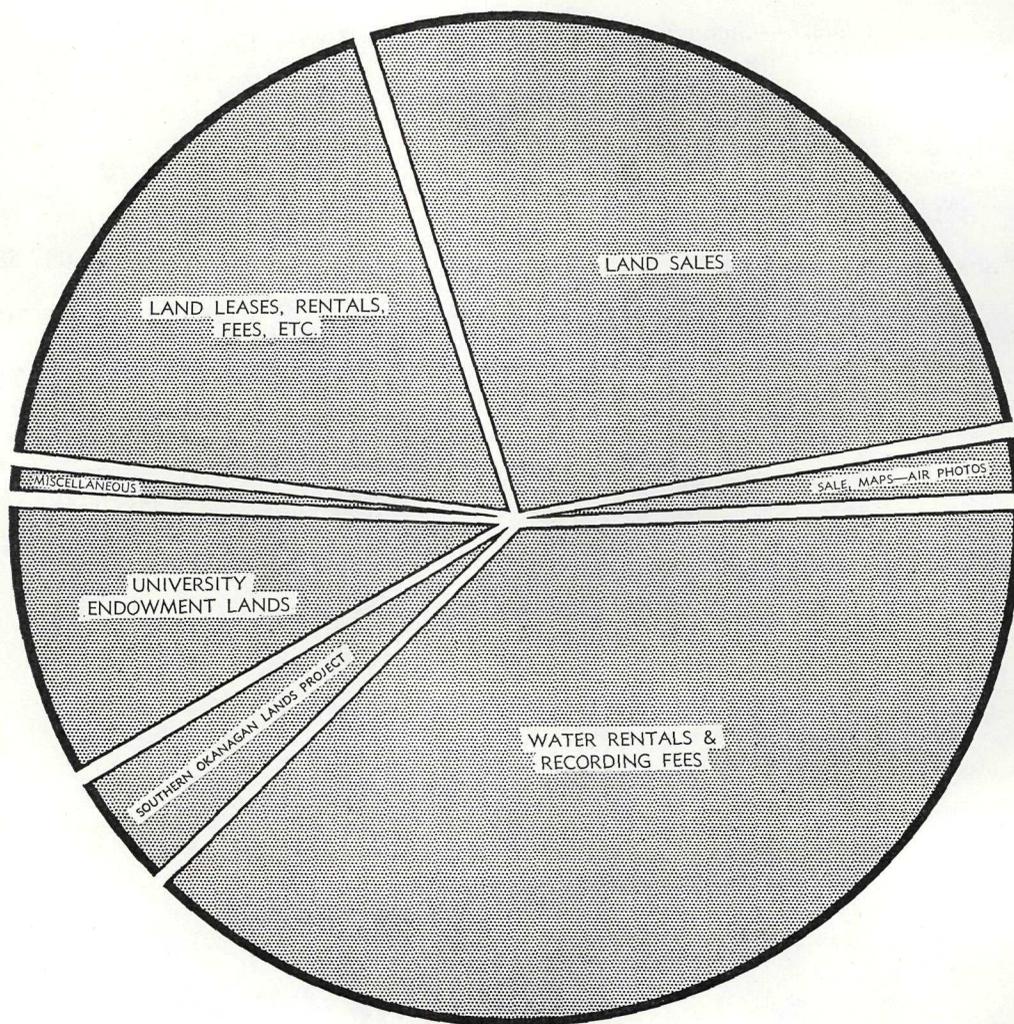


Table 2.—Summary of Total Collections for Ten-year Period  
1946–55, Inclusive

1946	████████████████████	\$992,201.70
1947	████████████████████████████	1,770,413.49
1948	████████████████	975,772.41
1949	████████████████████	1,045,969.03
1950	████████████████████████	1,159,988.86
1951	████████████████████████████	1,692,737.85
1952	████████████████████████████████	2,761,152.78
1953	████████████████████████████████████	3,705,480.02
1954	████████████████████████████	2,065,181.52
1955	████████████████████████████████	2,248,293.16
Total	-----	\$18,417,190.82
Ten-year average, \$1,841,719.08.		

Table 3.—Sundry Revenue for the Year Ended December 31st, 1955

Collections under "Land Act"—	
Leases, land-use permits, fees, etc.....	\$311,308.91
Crown-grant fees .....	20,695.00
Occupational rental .....	6,259.30
Improvements .....	215.00
Royalty .....	10,736.42
Reverted mineral claims .....	16,242.87
Survey fees .....	6,377.30
Sundry .....	53,760.99
Total .....	<u>\$425,595.79</u>

Table 4.—Summary of Sundry Revenue Collections for Ten-year Period 1946–55, Inclusive

1946		\$207,696.63
1947		262,760.93
1948		288,901.91
1949		322,683.92
1950		387,435.19
1951		916,338.98
1952		1,694,073.93
1953		1,608,773.65
1954		330,397.09
1955		425,595.79
Total .....		<u>\$6,444,658.02</u>
Ten-year average, \$644,465.80.		

Table 5.—Miscellaneous Collections, 1955

Collections under "Houses, South Vancouver"—	
Principal .....	
Interest .....	\$360.00
Administration .....	
Taxes .....	
Insurance .....	
	<u>\$360.00</u>
Refunds—advances and votes .....	15,252.90
Total .....	<u>\$15,612.90</u>

LAND SALES

Table 6.—New Lands Sales and Values during the Period January 1st to December 31st, 1955

Month	Country Land Sales						Town-Plot Sales		Sales under "Mineral Act"		Grand Total	
	Reverted		Crown		Total		No.	Value	No.	Value	No.	Value
	No.	Value	No.	Value	No.	Value						
January.....	17	\$4,803.50	27	\$14,560.00	44	\$19,363.50	12	\$4,015.00	2	\$325.50	58	\$23,704.00
February.....	23	11,178.47	46	30,844.72	69	42,023.19	24	2,722.27	.....	.....	93	44,745.46
March.....	31	13,527.50	50	25,927.50	81	39,455.00	23	7,460.00	4	620.40	108	47,535.40
April.....	15	7,255.07	38	20,934.40	53	28,189.47	15	3,550.00	.....	.....	68	31,739.47
May.....	29	13,133.60	35	17,873.10	64	31,006.70	28	7,610.00	.....	.....	92	38,616.70
June.....	30	18,167.78	37	16,042.66	67	34,210.44	39	19,521.00	.....	.....	106	53,731.44
July.....	14	4,761.42	22	6,958.80	36	11,720.22	29	18,630.00	.....	.....	65	30,350.22
August.....	30	22,060.00	70	41,994.10	100	64,054.10	20	9,325.00	.....	.....	120	73,379.10
September.....	9	4,005.00	21	18,164.75	30	22,169.75	24	8,970.00	1	258.25	55	31,398.00
October.....	37	15,625.00	46	24,014.32	83	39,639.32	40	13,165.00	.....	.....	123	52,804.32
November.....	1	825.00	31	49,560.12	32	50,385.12	5	1,090.00	.....	.....	37	51,475.12
December.....	34	20,636.86	63	48,616.07	97	69,252.93	62	29,755.00	.....	.....	159	99,007.93
Totals.....	270	\$135,979.20	486	\$315,490.54	756	\$451,469.74	321	\$125,813.27	7	\$1,204.15	1,084	\$578,487.16

1944: Total sales, 923; value, \$150,392.36.  
 1945: Total sales, 1,056; value, \$213,669.29.  
 1946: Total sales, 1,615; value, \$327,434.75.  
 1947: Total sales, 1,796; value, \$834,021.66.  
 1948: Total sales, 1,452; value, \$394,408.52.  
 1949: Total sales, 1,181; value, \$358,009.05.

1950: Total sales, 1,296; value, \$422,559.20.  
 1951: Total sales, 1,129; value, \$398,561.63.  
 1952: Total sales, 1,464; value, \$724,957.68.  
 1953: Total sales, 1,743; value, \$745,874.44.  
 1954: Total sales, 1,043; value, \$391,989.96.  
 1955: Total sales, 1,084; value, \$578,487.16.

Table 7.—Country Land Sales, 1955

Surveyed—	Acres
First class .....	3,256.94
Second class .....	24,532.32
Third class .....	30,341.34
	<hr/>
Unsurveyed .....	58,130.60
	<hr/>
Total .....	7,947.98
	<hr/>
	66,078.58

Table 8.—Certificates of Purchase Issued, 1955

Land Recording District	Number of Sales
Alberni .....	26
Atlin .....	15
Cranbrook .....	19
Fernie .....	6
Fort Fraser .....	49
Fort George .....	185
Golden .....	14
Kamloops .....	56
Kaslo .....	10
Lillooet .....	126
Nanaimo .....	30
Nelson .....	14
New Westminster .....	24
Osoyoos .....	29
Peace River .....	133
Prince Rupert .....	36
Quesnel .....	101
Revelstoke .....	10
Similkameen .....	61
Smithers .....	70
Telegraph Creek .....	-----
Vancouver .....	51
Victoria .....	19
	<hr/>
Total .....	1,084

Table 9.—Town Lots Sold, 1955

Town	Lots	Value
Alberni	70	\$785.00
Alice Arm	2	100.00
Anaconda	4	100.00
Athalmer	1	35.00
Atlin	28	1,970.00
Barriere	4	160.00
Beaverdell	2	60.00
Bella Coola	2	200.00
Blue River	11	1,750.00
Carmi	26	340.00
Clinton	37	3,160.00
Coalmont	2	100.00
Cranbrook	2	50.00
Cumberland	2	225.00
Endako	4	100.00
Esquimalt	2	900.00
Fernie	1	75.00
Finmore	2	40.00
Fort Fraser	8	300.00
Fruitvale	6	5.00
Golden	5	120.00
Hazelton	45	440.00
Hope	18	4,010.00
Hosmer	1	25.00
Houston	4	225.00
Invermere	1	190.00
Kaleden	3	175.00
Ladysmith	2	700.00
Lone Butte	2	100.00
Masset	6	150.00
Merritt	2	100.00
Midway	6	220.00
Moyie	4	300.00
Nakusp	3	425.00
Nanaimo	3	150.00
Naramata	8	200.00
Nelson	1	600.00
New Hazelton	63	320.00
Olalla	1	25.00
Port Edward	1	175.00
Port Hammond	1	10.95
Port Hardy	3	500.00
Pouce Coupe	3	265.00
Prince George	344	90,101.00
Prince Rupert	6	5,520.00
Princeton	9	265.00
Queen Charlotte	3	105.00
Quesnel	4	700.00
Shawnigan Lake	4	100.00
Sidney	4	160.00

Table 9.—Town Lots Sold, 1955—Continued

Town	Lots	Value
Skidegate .....	2	\$50.00
Smithers .....	145	3,370.00
South Wellington .....	12	650.00
Stewart .....	12	240.00
Taylor .....	2	150.00
Telegraph Creek .....	1	50.00
Telkwa .....	28	220.00
Topley .....	14	195.00
Trail .....	2	460.00
Tulameen .....	28	1,395.00
Vananda .....	10	745.00
Vancouver .....	1	175.00
Vanderhoof .....	1	135.00
Victoria .....	1	2,010.00
Walhachin .....	3	180.00
Wells .....	1	150.00
Wilmer .....	4	60.00
Yahk .....	5	75.00
Yale .....	1	150.00
Youbou .....	1	255.00
Miscellaneous .....	90	2,426.00
Totals .....	1,140	\$129,972.95

Table 10.—Land-sales Collections, 1955 (Collections under "Land Act" (Principal and Interest))

Country lands—		
Reverted .....	\$156,637.71	
Crown .....	295,878.74	
		\$452,516.45
Town lots .....		139,293.55
Surface rights of mineral claims .....		1,204.15
Pre-empted lands .....		655.27
Indian reserve cut-off .....		11,800.00
Total .....		\$605,469.42

CHART 2. SOURCES OF LAND SALES COLLECTIONS, 1955

SEE TABLE 10 FOR DETAILS

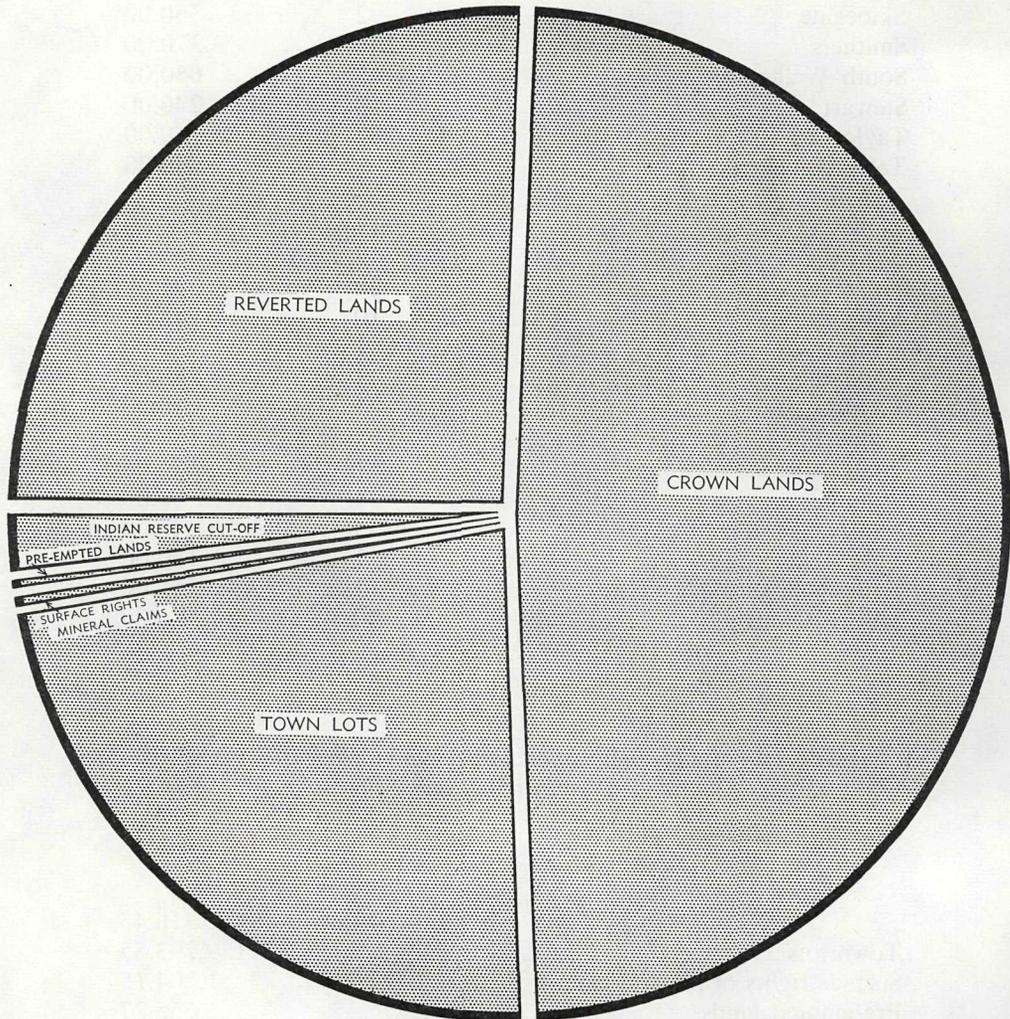


Table 11.—Summary of Land Sales for Ten-year Period  
1946–55, Inclusive

1946	████████████████████	\$368,088.19
1947	██	811,752.23
1948	████████████████████████████████	379,650.48
1949	████████████████████████████████	375,254.88
1950	████████████████████████████████	366,458.62
1951	████████████████████████████████	382,256.61
1952	██	619,263.14
1953	██	594,004.08
1954	████████████████████████████████████	488,303.49
1955	████████████████████████████████████	605,469.42
Total	-----	\$4,990,501.14
Ten-year average, \$499,050.11.		

## LEASES

*Table 12.—New Leases Issued, 1955*

	Number	Acreage
Hay and grazing .....	158	56,136.44
Agriculture .....	20	6,392.42
Quarrying, sand, gravel, etc. ....	16	2,651.06
Home-site .....	7	105.50
Booming and log storage .....	39	804.67
Oyster, clam, and shell-fish .....	13	373.88
Cannery .....	—	—
Fish-trap—salmon-fishing station .....	—	—
Foreshore—miscellaneous .....	24	165.97
Miscellaneous .....	34	565.28
Totals .....	311	67,195.22

*Table 13.—Temporary Tenure Leases Renewed, 1955*

Number .....	62
Acreage .....	3,625.38

*Table 14.—Land-use Permits Issued, 1955*

Number .....	25
Acreage .....	88.58

*Table 15.—Licences of Occupation Issued, 1955*

Number .....	18
Acreage .....	201.69

*Table 16.—Assignments Approved, 1955*

Leases, land-use permits, licences of occupation, etc. ....	189
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*Table 17.—Easements Granted, 1955*

	Number	Miles	Acres
<b>Foreshore—</b>			
Electric-power lines .....	7	2.322	9.702
Sewer outlet .....	1	0.144	0.28
Totals .....	8	2.466	9.982
	=	=	=
<b>Land—</b>			
Electric-power lines .....	9	57.307	1,281.043
Oil pipe-lines .....	1	0.008	0.005
Telephone-lines .....	2	1.130	3.987
Access road .....	1	22.600	—
Water pipe-line .....	1	0.025	0.090
Totals .....	14	81.070	1,284.125
	=	=	=
Grand totals .....	22	83.536	1,294.107

## DEPARTMENT OF LANDS AND FORESTS

Table 18.—Sundry Lease Collections ("Land Act")

Leases, land-use permits, fees, etc.	\$311,308.91
Occupational rentals	6,259.30
Royalty	10,736.42
<b>Total</b>	<b>\$328,304.63</b>

Table 19.—Summary of Home-site Lease Collections for Ten-year Period, 1946-55, Inclusive

1946	\$2,109.86
1947	2,932.25
1948	2,265.74
1949	1,926.99
1950	2,040.33
1951	2,123.65
1952	1,398.80
1953	1,394.30
1954	1,562.60
1955	1,267.52
<b>Total</b>	<b>\$19,022.04</b>
Ten-year average, \$1,902.20	

## PRE-EMPTIONS

Table 20.—Pre-emption Records, 1955

Land Recording District	Pre-emption Records Allowed		Pre-emption Records Cancelled		Certificates of Improvements Issued	
	Number	Ten-year Average	Number	Ten-year Average	Number	Ten-year Average
Alberni	—	0.3	—	—	—	0.1
Atlin	—	—	—	0.9	—	—
Cranbrook	—	0.3	—	—	—	0.7
Fernie	—	0.1	—	—	—	0.1
Fort Fraser	—	4.5	2	7.3	2	3.8
Fort George	7	13.5	2	22.6	—	9.2
Golden	—	2.1	2	2.2	—	1.5
Kamloops	1	3.7	1	7.6	—	5.6
Kaslo	—	—	—	—	—	0.1
Lillooet	1	13.3	5	19.8	4	9.0
Nanaimo	—	0.7	—	1.5	—	0.7
Nelson	1	0.2	—	0.8	—	0.3
New Westminster	—	0.9	1	5.8	—	3.1
Osoyoos	—	0.9	—	1.5	1	2.1
Peace River	32	79.3	36	49.2	32	40.9
Prince Rupert	—	0.3	1	0.1	—	0.6
Quesnel	5	16.1	2	21.2	2	10.2
Revelstoke	—	—	—	—	—	1.3
Similkameen	1	1.0	—	5.4	—	1.8
Smithers	—	1.6	—	2.1	—	1.0
Telegraph Creek	—	—	—	—	—	—
Vancouver	—	0.6	—	2.0	—	1.2
Victoria	—	—	—	—	—	0.3
<b>Totals</b>	<b>48</b>	<b>139.4</b>	<b>52</b>	<b>150.0</b>	<b>41</b>	<b>93.6</b>



## DEPARTMENT OF LANDS AND FORESTS

Table 24.—Total Area Deeded by Crown Grant, 1955

	Acres
Purchases of surveyed Crown land (other than town lots)	44,033.55
Pre-emptions .....	6,756.12
Mineral claims (other than reverted) .....	6,070.86
Mineral claims (reverted) .....	5,860.81
"Public Schools Act" .....	36.48
Supplementary timber grants .....	187.00
Pacific Great Eastern Railway .....	360.21
"Veterans' Land Settlement Act" .....	1,481.28
Home-site leases .....	148.50
Surface rights ("Mineral Act") .....	308.58
Miscellaneous .....	698.42
	<hr/>
Total .....	65,941.81

## RESERVES

Table 25.—Reserves Established, 1955

Use, recreation, and enjoyment of the public .....	206
British Columbia Public Works Department (rights-of-way, gravel-pits, warehouses, etc.) .....	61
Federal Government (defence purposes, wharf-sites, etc.) .....	39
Miscellaneous (Forest Service Ranger stations, road access, re- forestation, etc., Game Commission, water-power projects) .....	86
	<hr/>
Total .....	392

## SUNDRY COLLECTIONS, 1955

Table 26.—Collections under the "Soldiers' Land Act"—  
Southern Okanagan Lands Project

Principal .....	\$8,670.85
Interest .....	1,031.40
Lease rentals .....	1,176.00
Realizations .....	3,636.33
Water rates—	
Oliver domestic .....	\$22,536.62
Irrigation .....	54,044.51
	<hr/>
	76,581.13
	<hr/>
Total .....	\$91,095.71

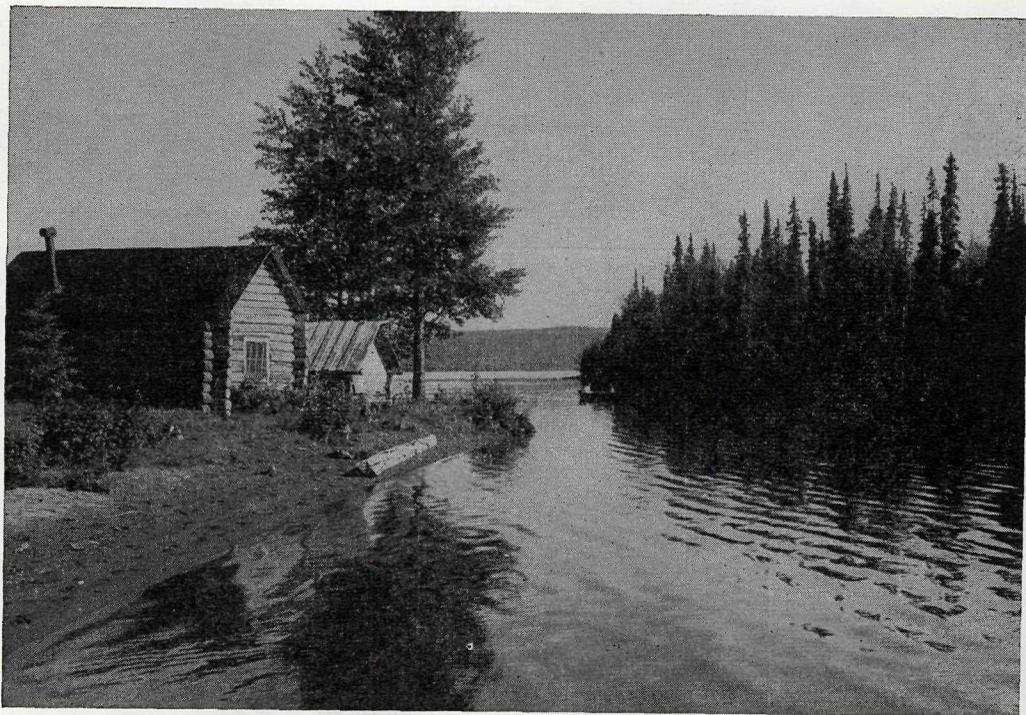
LANDS BRANCH

GENERAL SUMMARY

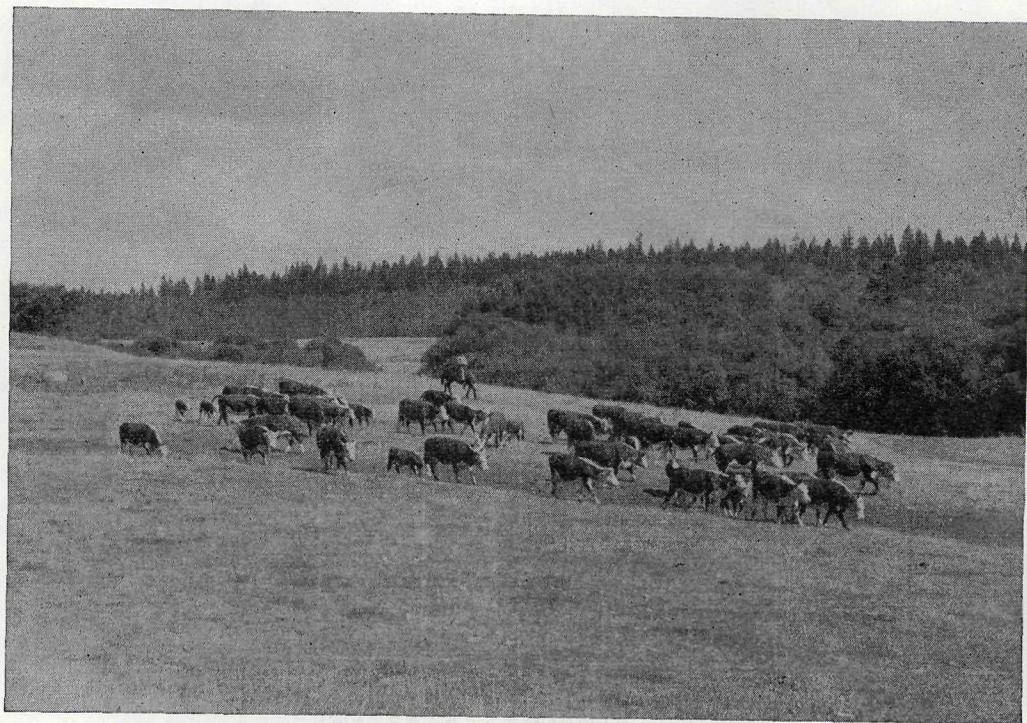
	Ten Years											
	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	Total	Average
Pre-emption records issued.....	283	284	171	145	141	85	87	53	97	48	1,394	139.4
Certificates of improvements issued	131	105	108	109	133	92	69	77	71	41	936	93.6
Certificates of purchase issued	1,615	1,795	1,452	1,181	1,296	1,129	1,465	1,743	1,043	1,084	13,803	1,380
Crown grants issued	2,203	2,577	2,063	1,602	1,580	1,740	1,872	1,829	1,276	1,498	18,240	1,824.0
Total acreage decided by Crown grants	110,191.41	111,575.04	85,083.97	219,662.12	75,712.61	77,516.18	98,602.84	99,036.36	73,461.69	65,941.81	1,016,784.03	101,678.4
New land sales—												
Number.....	1,615	1,796	1,452	1,181	1,296	1,129	1,429	1,743	1,043	1,084	13,768.0	1,376.8
Value.....	\$327,434.75	\$834,021.66	\$394,408.52	\$358,009.05	\$422,559.20	\$398,561.63	\$702,776.75	\$745,874.44	\$391,989.96	\$578,487.16	\$5,154,123.12	\$515,412.31
Leases under "Land Act"	219	367	333	362	325	360	301	353	366	311	3,297	329.7
Acreage leases, "Land Act"	29,424.35	97,238.41	113,600.07	86,851.40	84,086.47	128,778.45	45,110.72	46,089.55	50,064.80	67,195.22	748,439.44	74,843.94
Temporary tenure leases renewed							115	75	52	62		
Land-use permits					8	18	14	28	27	25		
Licences of occupation, easements, etc.					18	32	21	40	35	40		
Clearances of reverted mineral claims					312	916	514	461	400	663		
Reservations for use and enjoyment of public and other purposes					188	227	202	332	440	392		
Land-revenue collections	\$605,020.33	\$1,103,025.50	\$689,296.72	\$730,333.12	\$792,880.30	\$1,334,941.72	\$2,346,204.42	\$2,948,803.88	\$1,667,772.96	\$1,927,097.58	\$14,145,376.53	\$1,414,537.65
Gross collections	\$992,201.70	\$1,770,413.49	\$975,772.41	\$1,045,969.03	\$1,159,988.86	\$1,692,737.85	\$2,761,152.78	\$3,705,480.02	\$2,065,181.52	\$2,248,293.16	\$18,417,190.82	\$1,841,719.08

# *Land Inspection Division*

**Photographs Illustrating Typical Land Examinations Made  
Throughout the Province**



Summer camp-site at Francois Lake in Central British Columbia.



Grazing lease in ranching country near Williams Lake.

## LAND INSPECTION DIVISION

L. D. FRASER, B.SC.A., P.AG., CHIEF LAND INSPECTOR

In reporting on the various activities of this Division over the past year, it is revealed once again that the demand for Crown land is keeping pace with the expanding economy of the Province. Access to the hinterland is being made possible through the network of new and improved roads. Fresh-water lakes heretofore only visited by the trapper or prospector are becoming increasingly popular for summer-home sites and recreational purposes. Access to the rich undeveloped agricultural land in the Peace River Block of British Columbia is being aided greatly by oil and gas exploration companies. In many sections of the Province rural electrification is making it possible for the farmer and industrialist alike to enjoy the conveniences of the city dweller.

The important function that the Land Inspection Division performs was further recognized this year when several members of the staff were assigned special duties in addition to land examination work. Several of the more important of these special assignments included serving on the Board of Arbitration under the "Petroleum and Natural Gas Act"; evaluating lands, buildings, and services for remunerative purposes in the area encompassed by the proposed Libby Dam project; research work in co-operation with the Department of Finance on a formula for computing foreshore lease rentals to bring them in line with true values; and a survey of alternate booming-grounds in the Vancouver-Pender Harbour area.

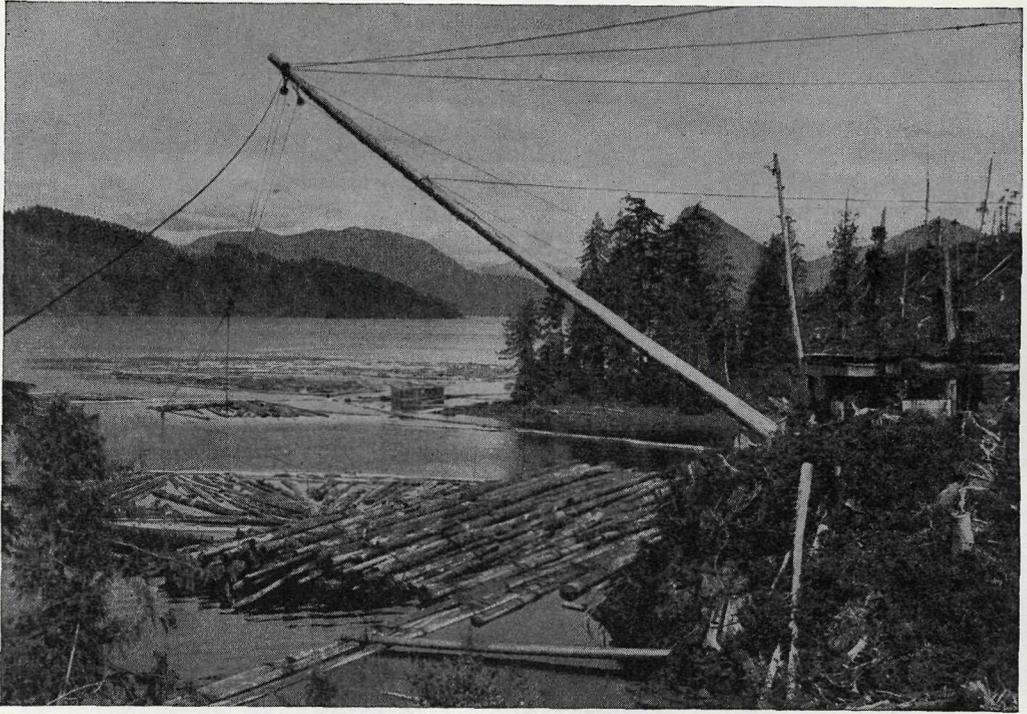
Competitive and contentious applications for Crown land are on the increase. This can be attributed to the over-all expanding economy of the Province in relationship to the desirable Crown land available. This type of examination entails more field work and correspondence than routine inspections to enable the Land Inspector to present all aspects of the case, thereby assisting in lightening the load of adjudication. In the lower coastal areas there is keen competition between towing and logging industries for log-booming grounds and other industrial use of foreshore. Since many of these applications are within densely populated municipalities, many agencies are involved and it takes several weeks, or even months in some instances, to arrive at an amicable settlement satisfactory to all parties concerned.

### STAFF

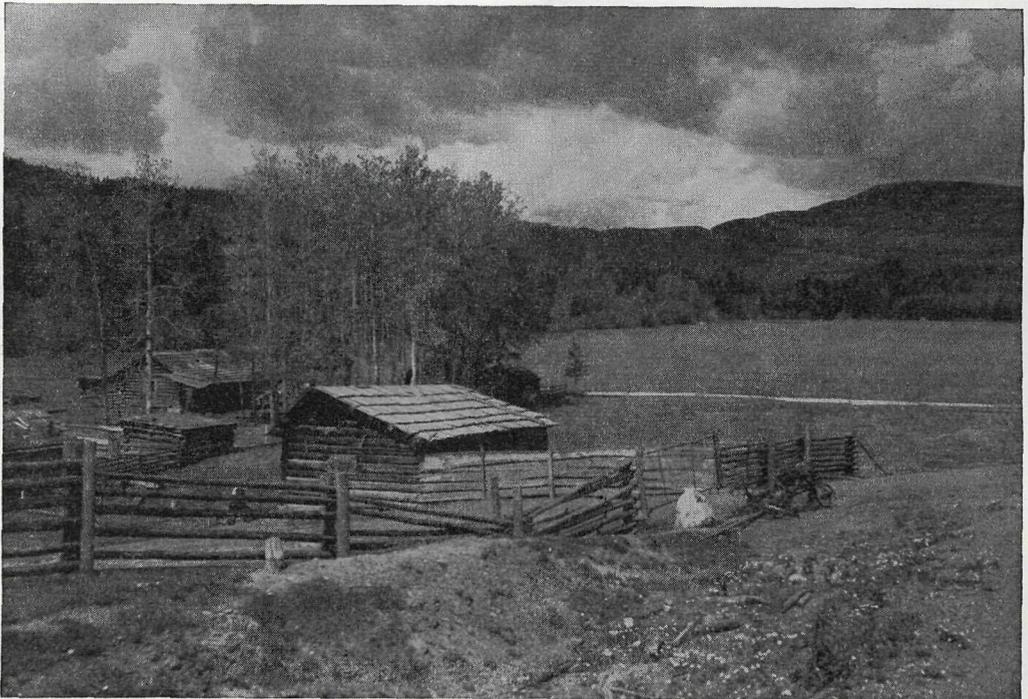
C. T. W. Hyslop, formerly Land Inspector—Grade 2, New Westminster, was appointed Assistant Chief Land Inspector, effective October 1st, 1955, to replace D. Borthwick, who had been acting in the capacity of Assistant Superintendent of Lands since June, 1954, and was appointed Assistant Superintendent of Lands, effective April 1st, 1955. In effect, the Inspection Division headquarters necessarily operated for fifteen months without the benefit of an Assistant Chief Land Inspector prior to October 1st, 1955.

J. D. F. Kidd, Land Inspector—Grade 1, Vanderhoof, left the service June 24th, 1955, to accept employment with the Federal Government service. Following Mr. Kidd's resignation, the Vanderhoof office was temporarily closed as there was not sufficient local work to warrant keeping a full-time Land Inspector in this district. The Vanderhoof work is now handled from the Prince George Land Inspection Office, and the vacancy on the staff complement was transferred to Williams Lake, as noted below.

Two Assistant Land Inspectors—namely, K. Berza and D. I. Snider, both university graduates in agriculture—were employed for four months during the summer to aid inspection work in the Kootenay and Cariboo areas. D. I. Snider was later appointed Land Inspector—Grade 1, with headquarters at Williams Lake, effective September 1st, 1955, to fill the vacancy created by the resignation of J. D. F. Kidd.



Foreshore lease for booming and log storage in coastal waters.



Pre-emption in the Peace River District.

The Inspection Division followed the usual practice of transferring senior men to preferred districts when vacancies occurred through promotions or resignations. As the result of C. T. W. Hyslop's promotion to Assistant Chief Land Inspector, Victoria, four other Land Inspectors' headquarters were affected; namely, G. H. Wilson was transferred from Fort St. John to Pouce Coupe, J. S. Gilmore from Pouce Coupe to Clinton, J. S. D. Smith from Clinton to Nelson, and W. R. Redel from Nelson to New Westminster.

Land Inspectors W. A. Minion, Kamloops, and R. F. Gilmour, Quesnel, were promoted from Grade 1 to Grade 2 Land Inspectors, effective April 1st, 1955, and Land Inspector W. B. Stewart was promoted from Grade 1 to Grade 2, effective October 1st, 1955, due to a Grade 2 vacancy being created in the establishment through the promotion of C. T. W. Hyslop. As the result of W. B. Stewart's promotion from Grade 1 to Grade 2 Land Inspector, there exists one Grade 1 Land Inspector vacancy on the staff which has not been filled to date due to a delay in finding a suitable candidate.

#### PUBLIC RELATIONS AND INSTRUCTION

A three-day conference was held in Victoria, March 9th to 11th, 1955, to fulfil the pressing need of instruction and training in policy and procedure to improve the liaison between the field and administrative level of the Lands Service staff. To emphasize the wide range of problems encountered by the Land Inspectors during the course of their duties, papers were presented by E. S. Jones, Deputy Minister of Highways; W. F. Veitch, Surveyor of Taxes, Department of Finance; R. G. McKee, Assistant Chief Forester; and other senior Forest Service personnel. In addition to participants from other branches of the Government service, senior members of the Lands Service presented a wide range of papers on various functions of the Department. The conference was climaxed by a timber-cruising field-trip supervised by Forest Service personnel.

The conference was most fruitful in that it provided a thorough discussion on policy and problems involved in land examination work. The end result has been a higher standard of efficiency and work performance by the Land Inspection staff.

## LAND INSPECTION

Land inspections carried out during the year 1955 are tabulated as follows:—

Purchases—		
Agricultural and grazing .....	463	
Home-sites .....	281	
Industrial and commercial .....	70	
Camp-sites and resorts .....	110	
Wood-lots .....	8	
Miscellaneous .....	88	
	—	1,020
Leases—		
Land—		
Agricultural .....	73	
Home-sites .....	24	
Industrial and commercial .....	28	
Quarrying, sand, gravel, limestone, etc. ....	21	
Grazing (including hay-cutting) .....	158	
Miscellaneous .....	14	
	—	318
Foreshore—		
Booming and log storage .....	96	
Industrial and commercial .....	58	
Oyster and shell-fish .....	10	
Miscellaneous .....	33	
	—	197
Land-use permits, licences of occupation, easements, etc. ....		34
Pre-emptions—		
Applications .....	51	
Annual inspections .....	231	
	—	282
Subdivisions—		
Valuations .....	48	
Survey inspections .....	3	
Plans cancellation .....	2	
	—	53
Reserves .....		22
“Veterans’ Land Settlement Act” .....		13
Land Settlement Board—		
Land classification .....	4	
Valuations .....	8	
	—	12
Miscellaneous inspections .....		213
		<hr/>
Total .....		2,164

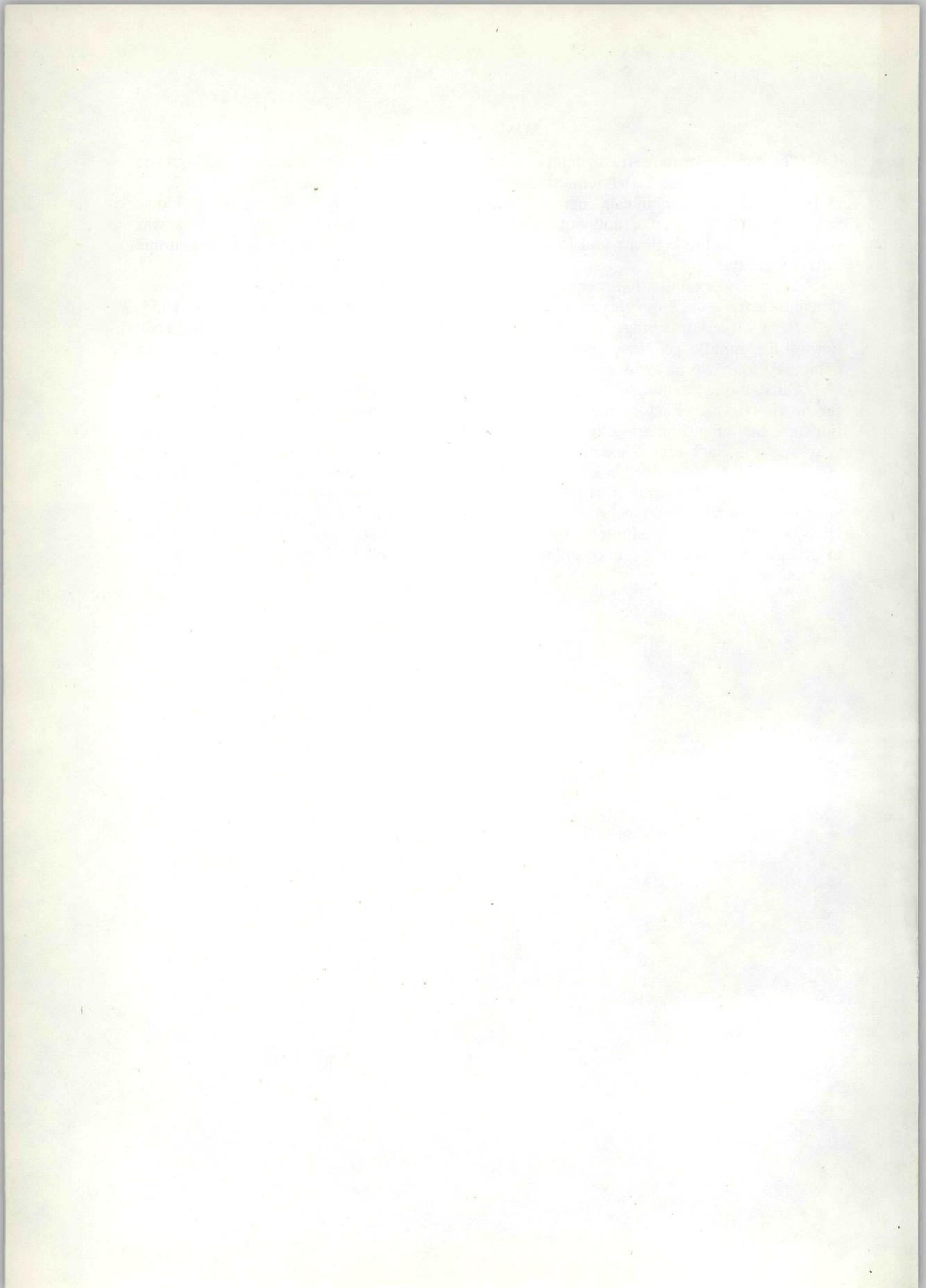
## SUMMARY

The number of requests for land examinations remained fairly steady throughout the Province. There were 2,151 requests for examinations this year, as compared to 2,313 in 1954. The most significant increase in applications for Crown land was in the Howe Sound, Sechelt Peninsula, and Squamish areas of the Vancouver District. This was probably due to the highway and Pacific Great Eastern Railway construction programme in this vicinity.

Total land examinations required this year, inclusive of annual pre-emption inspections and carry-over from the previous year, was 2,957, as compared to 3,187 in 1954.

Despite the late spring, wet summer, early snowfall in October, and very cold spell during the middle of November, 2,164 examinations were completed this year, as compared to 2,196 in 1954.

Outstanding examinations at November 30th, 1955, were 846, as compared to 631 the previous year. Factors contributing to this year's up-swing in outstanding examinations are the large number of requests sent to the field staff during the latter part of the year and the back-log of examinations due to poor road conditions as the result of inclement weather, unfilled vacancy on the staff due to a delay in finding a suitable replacement, and the transfer of field personnel during the summer working season when vacancies occurred through promotions or resignations. It is hoped that the Inspection Division will be in a position to operate this coming season with a full staff in order to reduce the number of outstanding inspections as well as keep pace with current examinations.



**SURVEYS AND MAPPING BRANCH**

Because the activities of man are kept orderly through a well-defined system of land surveys, the Surveys and Mapping Branch is called upon to act as the connecting-link that binds together many primary operations within departments of government and between government and the general public.

Specifically, through land surveys, Crown and other lands, including water, are located and identified accurately on the surface of the Province, and so made ready for alienation in any of a variety of different ways. Further, a background of suitable maps and survey data is provided to assist in the intelligent development of lands so acquired, and in the wise administration of the natural resources associated with them.

In post-war years a great upsurge in the economic development of British Columbia's natural resources has taken place. Each year shows increased activity in the disposition of Crown lands for various purposes, ranging from the smallest individual application for a home-site to industrial requirements involving many square miles of land.

In any of these transactions the Surveys and Mapping Branch plays an important part, because it has the responsibility of clearing, as to status, all such applications for Crown lands, whether small or large. This function involves complete record-keeping of all official survey data by all sources, including a graphic record of all Crown-land alienations, whether surveyed or unsurveyed.

Equally important, on the other hand, is the responsibility for the establishment, extension, and recording of mapping control. These basic duties prescribe, among other things, the preparation of basic triangulation networks and aerial photography at suitable scales, the making of control traverses, the delineation and maintenance of interprovincial boundaries, and the production of standard photo-topographic mapping, interim base-mapping, and cadastral surveys of Crown lands. The data are then condensed and presented in lithograph map form.

**The main objectives, then, of the Surveys and Mapping Branch are first to provide complete, accurate, and readily available maps on adequate scales with allied data, for administrative control of resources and Crown-land transactions, and, secondly, to maintain this information up to date by keeping abreast of continuous cultural development.**

A survey inventory of such a standard is obviously of primary advantage in encouraging the present development of our natural resources, and further developments which seem "just around the corner."

A brief summary of the functions of the Branch follows, and the breakdown is provided by Divisions:—

*I. Administration.*—General co-ordination of the four Divisions of the Branch, being Legal, Geographic, Topographic, and Air; delineation and maintenance of boundaries under the Provincial Boundary Commissioner—namely, (a) Alberta-British Columbia Boundary and (b) British Columbia-Yukon-Northwest Territories Boundary.

*II. Legal Division.*—Regulations for surveys under the various Provincial Acts, such as Land, Land Registry, Mineral, Petroleum and Natural Gas; instructions to British Columbia land surveyors regarding surveys of Crown lands and subsequent check of field-notes and plan returns of same; preparation and custody of official plans; preparation and maintenance of Departmental reference maps, mineral reference maps, and composite (cadastral) maps; clearance by status of all applications concerning Crown lands; field surveys and inspections of Crown lands, highway rights-of-way, etc.; preparation of legal descriptions as required; operation of blue-print and photostat sections.

*III. Geographic Division.*—Map compilation, drawing, editing, and reproduction; map checking, distribution, geographical naming—Gazetteer of British Columbia; field and culture surveys for preparation of lands bulletins and map areas; preparation of legal descriptions for and delineating administrative boundaries; editing and distribution of annual Lands Report; trigonometric computation and recording of same; general liaison between this Department and Federal and other mapping agencies on exchange of survey and mapping data.

*IV. Topographic Division.*—Propagation of field control—namely, triangulation, traverses, photo-topographic control; compilation and fair drawing of manuscripts for standard topographic mapping; special field control for composite and multiplex mapping and other special projects.

*V. Air Division.*—Aerial photographic operations involving maintenance and operation of three aircraft; photographic processing, air-photo distribution, and Provincial air-photo library; compilation of interim aerial base maps, primarily for British Columbia forest inventory; tri-camera control propagation; multiplex aerial mapping of precise large-scale detail projects; instrument-shop for repairs, maintenance, and development of technical equipment.

**SURVEYS AND MAPPING BRANCH**

G. S. ANDREWS, M.B.E., B.Sc.F., P.ENG., B.C.R.F., B.C.L.S., F.R.G.S.,  
DIRECTOR, SURVEYOR-GENERAL, AND BOUNDARIES COMMISSIONER

Activity in the Surveys and Mapping Branch continued unabated during 1955, and in some phases showed appreciable increase.

The extensive network of triangulation commenced three years ago in North-eastern British Columbia was completed by the Topographic Division. It was designed to provide survey control, over some 25,000 square miles of previously unsurveyed lands, for locations under the "Petroleum and Natural Gas Act." The unusual features of this programme have been described in previous Reports and are further summarized in the report of the Topographic Division herewith. Another season of this work is anticipated to tidy up an unsurveyed tract lying south of the Peace River Block and east of the Rocky Mountain divide, where interest under the "Petroleum and Natural Gas Act" is active.

Prevalence of cloudy weather reduced the 1955 harvest of basic high-altitude air-photo cover, but the Air Division drew from its store of photography garnered in years of more benign weather for a record production of interim maps, covering some 43,000 square miles. Low-altitude photography for special engineering projects, less fastidious in weather requirements, reached an all-time high in small sporadic areas over the Province. The basic-cover air-photo programme is now progressing into the northern third of the Province, between the 56th and 60 parallels of north latitude. The importance of obtaining good air-photo cover of this region for resources inventories and development planning will be appreciated. A serious handicap is the non-existence there of landing-strips for the photo aircraft. This large tract of country, comprising the watersheds of the Stikine and Finlay Rivers and the headwaters of the Nass and Skeena Rivers, some 54,000 square miles, is in its entirety farther than 100 miles from any standard air base. This situation adds materially to the cost and danger of air-photo operations from airfields along the Alaska Highway to the north and east, or from those along the Canadian National Railway to the south. Possibilities of building a preliminary airstrip long enough for the Anson V aircraft at the south end of Dease Lake are being investigated. Such a strip would mitigate the difficulty considerably in the west, but would still leave a large void centred on the Upper Finlay River area.

The Geographic Division, performing a wide variety of services, had a busy and productive year. The Computing Section has not only kept pace with preliminary and final adjustment of the Topographic Division's accelerated triangulation returns, but has computed precise geographic co-ordinates for a large number of permit corner specifications under section 34 (2) of the "Petroleum and Natural Gas Act." The publication of Map 1K, Southwest British Columbia, second in the series of six sheets, at 10-miles-per-inch scale, has been favourably received by all map-users. Map distribution to the public reached an all-time high during 1955.

The Legal Surveys Division showed a pronounced increase in most of its activities during the year. Demand for blue-print services was up 40 per cent over 1954, and photostats were practically doubled. Clearances for purchase and lease of Crown lands increased by 14 and 56 per cent respectively, and output of land examination sketches was up by 60 per cent. The new regulation under section 80 of the "Land Registry Act" providing for inspection of surveys and plans became effective early in the year. Two field inspections and thirty-one plan examinations were made, most of which showed that the requests for this service were well conceived.

Field work under the authority of the British Columbia-Yukon-Northwest Territories Boundary Commission was carried out by a party under the direction of W. N. Papove, B.C.L.S., D.L.S., ALS. This party successfully closed a 66-mile gap in the north boundary of British Columbia between Astrofix F 1 on the Beaver River, 30 miles west of the

Liard River, and Astrofix N 6 at Smith River where this stream crosses the 60th parallel of north latitude. By virtue of special efforts made in 1953 to tie in the east and west terminals of the gap to the triangulation structure, and further work on the latter during 1954, it was possible to compute predicted chords and bearings for the new boundary, such that the usual practice of having to first run a trial line over the gap between the terminal points was eliminated. Advantage was taken, however, of the availability of a helicopter for a week at the beginning of the 1955 season to carry through an azimuth check along the proximity of the projected line by instrumental observations from high ground propitiously situated. This check indicated a small correction of some 13 seconds of arc to the predicted over-all azimuth. The final closure achieved at the west end after the boundary was run on this basis was less than 3 feet in a total distance of 66 miles, a remarkable result which confirmed the value of triangulation structures progressively being established in the Province, the intelligent use of them for a specific case such as this, and the high quality of the survey done by Mr. Papove and his party, under difficult and arduous circumstances.

Remaining work to be done on the British Columbia-Yukon Boundary is a retracement survey of the section from Teslin Lake west to the Tatshenshini River, a distance of some 160 miles, which may take three or four seasons by a single party. This section was originally surveyed shortly after the Klondyke gold-rush some fifty years ago. The accuracy, the condition of the monuments, and the growth of timber on the old line all indicate the necessity for resurvey to meet present-day standards. By the time this retracement is completed, a decision may be in order whether to tackle the furthestmost westerly 80 miles, beyond the Tatshenshini River, which has never been surveyed, due to extreme inaccessibility, and to the prevalence of high, ice-burdened mountains in that region.

Field surveys to complete the establishment of the Alberta-British Columbia Boundary along the northern part of the 120th meridian were commenced in 1950 and concluded in January, 1953. Field inspection, preparation of twelve final map-sheets, and the Commission's report followed. Early in 1955 the necessary legislation to accept the boundary as surveyed and established was prepared for and was enacted by the two Provincial Legislatures, following which the boundary was duly confirmed by Act of the Parliament of Canada. This boundary divides an enormous tract of country, until recent years considered an abject wilderness but now believed to contain a high potential of petroleum and natural-gas resources, between the two Provinces. It will also serve as a strong member of survey control on which tenures for exploration and extraction of hydrocarbon resources may be tied. It is noteworthy that the triangulation scheme recently completed on the British Columbia side of this boundary has tied in to the boundary monuments at several points, and in particular to the terminal point at the 60th parallel, marking the north-east corner of British Columbia and the north-west corner of Alberta. Preliminary computations of the 1955 triangulation indicate that this end point is some 153 feet north and 58 feet east of the true intersection of the geodetic meridian and parallel, based on the 1927 North American Datum. It should be explained that both the 120th meridian and 60th parallel in the original instance for boundary purposes were by necessity fixed by astronomic positions, which are subject to anomalies sufficiently large to contain the theoretic closure quoted above. Then, too, the triangulation tie itself is subject to a certain residual probable error, but of appreciably less magnitude than that of the astrofixes.

#### ADMINISTRATION

Although satisfaction is felt that the Branch as a whole has met the challenge of work and problems expected of it during the past year with a degree of success, it is necessary to report that this has been achieved in the face of difficulties, and at the cost of having to leave some important activities in abeyance, to a degree approaching neglect in some instances.

The Legal Surveys Division has been unable to maintain the proper upkeep of its indispensable stock of Departmental reference maps, such that wear and tear of the master tracings begin to compromise their legibility, a vital hazard to status clearances for all dealings in Crown lands. The Geographic Division has had to postpone revision of such a valuable map as the 1948 edition of the 27-miles-per-inch 1J of the Province on one sheet, now obsolescent. The Topographic Division has been diverted for a third year from its traditional and primary function of standard topographic mapping. The Air Division, while quoting an impressive output of its interim maps, has not been able to advance its procedures to include a much-desired modicum of contouring on these valuable maps.

Offsetting the benefits of improved organization, advancement of training, and accumulation of experience, all of which contribute to efficiency, losses of staff during the year have been unprecedented. Exclusive of involuntary separations, such as statutory retirements and the regrettable death of one senior employee, thirty-one resignations were sustained, representing an aggregate of 139 years' service in the Branch, or an average of four and one-half years each. These losses occurred in the following categories: Draughtsmen, 9; technical survey assistants, 9; clerical, 2; secretarial, 3; aircraft pilot, 1; aircraft mechanics, 2; blue-print assistants, 2; and British Columbia land surveyors (senior), 3. Four of these people transferred to better positions in the Provincial Civil Service, six went into public service other than the Provincial Civil Service, and the balance went to private industry. The total of thirty-one represents more than 15 per cent of the permanent establishment of the Branch.

It was also necessary to lend the part-time services of two senior supervisory men to another branch in the Department to help liquidate a mounting back-log of routine work there.

The appointment of A. H. Ralfs, B.C.L.S., D.L.S., as Assistant Director of Surveys and Mapping, effective from April 1st, 1955, was a primary gain in the problem of administration of this large and complicated Branch. Mr. Ralfs joined the Service in 1930 as apprentice in the Geographic Division, and served with distinction as well in the Legal Surveys and Topographic Divisions. Besides helping with general supervision of the Branch, he gives special attention to staff relations, co-ordination of operations among the four divisions, and to survey problems arising from new legislation such as the "Petroleum and Natural Gas Act" and arising from new developments as affected by the older Statutes.

By Order in Council No. 1151, the Director of Surveys and Mapping was appointed to the Fraser River Board as of April 1st, 1955.

The retirement of W. H. Hutchinson and H. A. Tomalin on superannuation occurred during the year. Mr. Hutchinson was Chief of the Geographic Division and accredited member for British Columbia of the Canadian Board on Geographical Names. He joined the Branch in 1920 and specialized in the mathematical computations of adjusting survey control to the spheroidal North American Datum (1927). The fact that he left a skilled and well-trained staff to carry on the highly specialized work of the Geographic Division is eloquent testimony of his high attainments and the esteem with which he was regarded by all. Mr. Hutchinson was succeeded by W. R. Young, B.C.L.S.

Mr. Tomalin joined the Surveys and Mapping Branch as Chief Clerk in 1953 after some forty years' prior service in the Department. He was noted for thorough and meticulous attention to the records under his charge.

The untimely death of W. G. Thorpe, Supervisor of Map Production in the Geographic Division, with over thirty-five years' service was a grievous loss to the Branch.

Respectfully submitted herewith are the usual separate reports of each of the four divisions of the Branch and a special report on some survey problems by A. H. Ralfs, Assistant Director.

## ON PROBLEMS OF THE SURVEYS AND MAPPING BRANCH

BY A. H. RALFS, B.C.L.S., D.L.S., ASSISTANT DIRECTOR,  
SURVEYS AND MAPPING BRANCH

It would seem quite normal that a large branch such as this should encounter problems in connection with the many activities with which it is concerned, particularly during the post-war period of such great and increasing activity. Many of the problems, of course, concern other branches or departments equally as much as this one, but the service nature of the Surveys and Mapping Branch finds it in closer co-operation with other departments than would normally be the case, and seems to ensure that as well as experiencing satisfaction over projects successfully completed, it must also share in the worry of solving problems sometimes created thereby.

One of the most interesting problems with which we have been concerned for the past three years has been that of propagating control for oil and gas locations over some 25,000 square miles of muskeg lands in North-east British Columbia. This project has been described quite fully in previous Reports but deserves brief mention here for two reasons: Firstly, the past year has seen the completion on schedule of our objective set in the spring of 1953 and, secondly, a few problems have arisen thereby.

Throughout the course of this great project, and since its completion, our Geographic Division has carried a large share of the load, inasmuch as besides normal duties it is called upon to meet all requests for control for the oil industry. Besides being able to supply co-ordinates for the hundreds of triangulation stations and other points over the area, calculations have been made for the thousands of centizone unit corners comprising the underlying geographical grid as well as calculating the areas of each centizone unit. Most of the oil permits in North-east British Columbia were located before the adoption of the grid system, so that some minor revisions to certain permit boundaries have had to be made to eliminate small gaps and overlaps inadvertently created. These are now being gazetted as specifications of permit boundaries prepared over the Surveyor-General's signature, under authority of section 34 (2) of the "Petroleum and Natural Gas Act."

Because of the extreme urgency of the oil industry, another problem has been created in that at the present time two sets of co-ordinates are having to be calculated and maintained.

When the oil activity began there was no basic geodetic control throughout the area, much less such control being on a final datum. All of the calculations accordingly have been based on what is known as the "Prince George non-closure final," on which datum the positions are preliminary only and differ in varying amounts up to about 90 feet from the final datum positions. Concurrent with our own programme, the Geodetic Survey of Canada has been active and has recently produced a final datum adjustment throughout the area, which is now enabling all adjacent survey data to be converted to same in the normal course of procedure.

In the meantime, of course, our heavy programme of the last three years has produced a tremendous crop of triangulation and other control, but, as explained, this has all been calculated on the preliminary datum. On this datum necessarily are based all of the oil permits, many co-ordinates of which are already calculated. The demand for this data is currently heavy and increasing, so that there is no alternative but to continue calculating consistently on this same datum. At the same time the triangulation control is being systematically converted to final datum, so that in effect we are committed at present, and until the pressure eases, to maintaining two systems of co-ordinates—one for temporary use in oil locations and the other for standard mapping control and all other requirements.

Another allied problem, not yet too much of a reality, but one which can now be foreseen, concerns the great amount of impending work for British Columbia land sur-

veyors in connection with anticipated surveys of oil and gas leases, as well as continuing activity in well-site surveys. Although the Branch is justifiably proud of the rapid introduction of a sound survey structure to this area, previously devoid in this respect, by normal standards it must nevertheless be classified as sparse compared to many other areas of the Province. Individual surveys correspondingly will take longer to complete, and this, coupled with a looming shortage of British Columbia land surveyors, confirms this particular problem. The solution is not yet evident, but some thought is being given to the possibility of using photogrammetric plotting methods to break down the gaps, which average 12 to 15 miles between the existing stations. Special photography and precision bridging-machines would be required, which would be able to plot the long strips of territory between any two existing controls. This would result in co-ordinates being available to the surveyor for any points visible on the photographs. The points chosen would be ones in the area of oil locations to be surveyed and, of course, would be very definite ones which could be located on the ground. Possibly such positions would check out to be accurate to within 100 feet in horizontal position, which would seem to be acceptable for the particular oil-industry requirements involved. The greatest concern, however, over such a solution lies with that one important step, namely, that of accurate identification on the ground of the air-photo point.

Another most interesting problem which has been giving considerable trouble and involves our Legal Surveys Division is that of the location of high-water mark both on tidal and inland waters. Since the recent introduction of the Surveyor-General's Regulation No. 29, issued under the authority of the "Land Registry Act" and covering the inspection of surveys and (or) plans by the Surveyor-General, many more cases involving this trouble are coming to light.

Basically the problem is that in making certain subdivisions of parcels of land containing water boundaries, the total of the subdivided area is more than was in the original title being subdivided. Under the Torrens system of land registration as adopted by this Province, it is stated that "the registration of land shall in the first instance be according to the description contained in the Crown grant thereof (section 72, "Land Registry Act"). That is to say, the original Crown grant, to whatever waterwards boundary it may have extended, sets up the title, which then becomes a matter under the charge of the Land Registry Office concerned. A subdivision may involve a portion of the parcel or the whole of the parcel, but certainly not more than the parcel, otherwise the basic concept of the Torrens system has been contravened.

It is quite obvious that the current interpretation of average high-water mark is the proper criterion for current surveys of new Crown grants, but no such assumption is authorized under the "Land Registry Act" for subdivision surveys of existing titles. In other words, the surveyor should not expect the legal limits of his subdivision to necessarily conform to the average high-water mark as he finds it.

In the great majority of these cases, the encroachment beyond the original parcel's boundary is upon a strip of Crown land, be it unsurveyed land, foreshore, or bed of water for which no Crown grant has yet been issued, and, therefore, for which no title has been set up in the Land Registry Office. Apart from such cases being a direct contravention of the "Land Registry Act," this Branch is most concerned because, by the registration of such a subdivision plan, the title to the strip of land in question automatically passes from the Crown to the subdivider and thus eliminates potential Crown revenue from the sale or lease of the said strip. As might be expected, the value of such lost lands being water-front strips is generally now comparatively high. Once registered, very little chance exists for this property to be returned to the Crown unless by a decision of a Court of law.

It is readily admitted that differences of opinion exist as to the extent of title of parcels bordering on inland waters where most of these difficulties occur. Although most opinions, including those of Government departments concerned, believe that average

high-water mark is the limit, there are others who favour low-water mark, and many of the cases giving trouble are merely manifestations of this latter concept. After reading the "Land Registry Act," no one can deny that the original Crown grant is the root of the title, and that subsequent subdivisions must therefore conform to the limits, whatever they may be, of this Crown grant.

Actually for current Crown-land surveys the requirements, including delineation of water boundaries, are sufficient to subsequently enable accurate retracements to be made. Unfortunately some of the older Crown grants are very difficult, if not impossible, for accurate retracement, especially along their water boundaries. Subdivisions of such grants have undoubtedly resulted in considerable encroachment on Crown lands in the manner already described. The Registrars in the past unfortunately have not had sufficient data to check, or for that matter suspect that this encroachment was taking place, so that the plans became registered in due course, ensuring the new titles of relative invulnerability to attack.

It should be remarked that the above-mentioned encroachments on Crown land can be accounted for in several ways:—

- (a) At the time of the original Crown-grant survey, when land was plentiful and cheap, the strip could have been considered marginal land and simply excluded from the survey and grant:
- (b) Formed by natural accretion subsequent to the original survey:
- (c) Formed by man-made fill subsequent to the original survey:
- (d) The result of denudation; that is, formed by the lowering of the adjoining body of water subsequent to the original survey:—
  - (i) From natural causes:
  - (ii) From man-made causes such as flood-control:
- (e) As portions of the foreshore and bed of the water body; that is, land below the average high-water mark.

The objective of this Branch is merely to find a way to ensure that no short cuts to acquire title at the expense of the Crown are used which contravene the "Land Registry Act," and which, if allowed to stand, create very undesirable precedents. Suffice it to say that this problem is now receiving considerable attention, with full co-operation from the Attorney-General's Department. It is hoped to be able to correct certain outstanding cases, and also perhaps to introduce new legislation which will clarify some of the difficulties presently associated with such water boundary surveys and possibly allow of broader scope in determining such boundaries.

The above perhaps will give an indication of problems arising and being dealt with, or assisted with, by this Branch. There are, of course, others, a few of which are indicated in the divisions' reports that follow, and it is realized, as development of the Province continues, that the appearance of still more is inevitable. All of these problems are annoying because much valuable staff time is lost over them, but, even so, they do present an interesting challenge to those whose duty it is to find the means of solving them.

**LEGAL SURVEYS DIVISION**

*Legal Surveys Division*



Long Beach, west coast of Vancouver Island.



Home-site surveys along the Pasayten River south of Princeton.

**LEGAL SURVEYS DIVISION**

D. PEARMAIN, CHIEF

The Legal Surveys Division, under the direction of the Surveyor-General, is responsible for cadastral surveys of all Crown lands of the Province. This entails the issuing of instructions to the land surveyors engaged to make each survey and supplying them with copies of the field-notes and plans of adjoining surveys. After the completion of the survey, the returns are forwarded to this office for checking and plotting. Included in these returns are all right-of-way surveys, such as for highways, railways, transmission-lines, etc. During the year 252 sets of instructions were issued.

In 1955, 308 sets of field-notes were received in this office and duly indexed, checked, and plotted, and official plans prepared therefrom. Of the above-mentioned surveys, 324 were made under the "Land Act" and fifty-two under the "Mineral Act." At the present time there are approximately 93,230 sets of field-notes on record in our vaults.

There were 222 plans received from surveyors covering surveys made under the "Land Registry Act." These were duly checked and indexed, and certified copies deposited in the respective Land Registry Offices.

In order that a graphic record may be kept of alienations of both surveyed and unsurveyed Crown lands, a set of reference maps must be maintained covering the whole of the Province. These show all cadastral surveys which are on file in the Department. Keeping these maps up to date by adding new information as it accrues day to day and renewing the master tracings when they become worn by constant handling form a considerable portion of the work of this Division. (See Appendix 1.)

From the above reference maps, together with other information and facilities maintained by this Division, it is possible to give an up-to-the-minute status on any parcel of Crown land in the Province.

It had been hoped that a start could have been made during the past year on the recompilation of certain reference maps covering the south-east corner of the Province, within geographic grids which could eventually be more easily designated under the National Topographic Series. However, owing to the pressure of work under which this Division has laboured during the past year, it has not been possible to make a start on this phase of the work.

All applications to purchase or lease Crown lands or foreshore which are received by the Lands Branch, and all applications to purchase Crown timber received by the Forest Service, are channelled through this Division for clearance. The orderly processing of these applications requires that an exhaustive status be made from the reference maps, official plans, and Land Registry Office plans. A synopsis of these clearances processed during the year will be found in Table A, attached.

It has been necessary during the year to obtain from the various Land Registry Offices 1,401 plans; copies of these have been made, indexed, and filed as part of our records.

As in the past, this Division has co-operated with other departments of Government, at their request, by preparing and checking legal descriptions. Those assisted in this way were the Attorney-General's Department, descriptions of boundaries of Small Debts Courts; the Agriculture Department, descriptions of disease-free areas and pound districts; the Department of Municipal Affairs, descriptions for the incorporation of municipal areas; the Forest Service, descriptions for forest management licences; and our own Lands Branch, descriptions for gazetted reserves of lands from alienation, etc. During this year it has taken approximately 242 man-hours to prepare the descriptions referred to above.

## BLUE-PRINT AND PHOTOSTAT SECTION

The Blue-print and Photostat Section continues to supply a service to all departments of Government, as well as supplying all the prints and photostats required by the Surveys and Mapping Branch. The total number of prints made during the year was 144,777, in the preparation of which 110,285 yards of paper and linen were used. The increase in the number of prints made this year as against 1954 is approximately 40 per cent.

The number of photostats made during this year was 42,233; this is an increase of approximately 97 per cent over last year.

Early this year an electrically operated revolute "Unicop" machine was purchased for the Photostat Room. This has greatly increased the speed and efficiency of the copying of documents and letters. With no increase in manpower the Photostat Room has handled the 97-per-cent increase of work and kept same flowing in an orderly and speedy manner.

## COMPOSITE MAP SECTION

This Section is responsible for the compilation and tracing of composite maps, at a scale of 1 inch to 500 feet, of the more thickly subdivided areas of the Province, generally in unorganized territory.

During the year composite maps covering the area from Penticton to Osoyoos, comprising thirty-nine sheets, were completed.

The next project for this type of mapping covers the area between Trail and Nelson, along the Columbia and Kootenay River valleys. The plan searches in the Land Registry Office at Nelson have been completed, and part of the necessary control, both triangulation and photographic, has been completed.

However, on September 1st of this year it became necessary to suspend our composite mapping and to use the draughtsmen in that Section on the retracing of some of the more badly worn reference maps. It is regrettable that this step was necessary, but for the orderly processing of the large volume of land-application clearances, it is imperative that the reference maps be kept in the best condition possible. It appears that it will be at least a year before we can again commence our composite mapping.

## LAND-EXAMINATION PLANS

The small section charged with the responsibility of preparing plans for the use of the Land Inspectors for their inspection of applications for Crown land has again had a busy year. The type and quantity of information being placed on these plans is proving most valuable to the Inspectors when they are on the ground.

## INCIPIENT VILLAGES

During the past year certain work was undertaken at the instigation and request of groups of people living in the vicinity of Valemount and Muskwa (Fort Nelson, Mile 300).

In the case of Valemount it appeared that land transactions had been taking place but title could not be produced until certain survey work was done, also the question of road access to certain of these areas was of the utmost importance.

Reports were received from the Land Inspector at Prince George, also the Divisional Engineer, Department of Highways, giving suggestions as to the proposed layout of the necessary roads.

P. M. Monckton, B.C.L.S., of the Legal Surveys Division staff, visited Valemount and surveyed and monumented the required roads. The necessary plan was prepared and deposited in the Land Registry Office at Kamloops, thus dedicating these roads and making it possible for the finalization of the land transactions mentioned above.

The co-operation and suggestions of Mr. Roberts, Divisional Engineer, Department of Highways, and Mr. Cunningham, Land Inspector, Department of Lands and Forests, in assisting in this project is much appreciated by this Division.

Regarding Muskwa (Fort Nelson, Mile 300), the request received was for the laying-out of town lots in this vicinity. The lots previously laid out were of 5 acres area, and it was felt that what is required now are building-sites (town lots). Certain of the 5-acre lots were in the Crown, and a proposed pattern of subdivision was laid out and surveyed, and when the adjoining privately owned 5-acre lots are subdivided, they will follow the pattern of the Government subdivision. Also a part of Lot 1535, Peace River District, which was under reserve to the Department of Transport for airport purposes, was released, and part of this area was also subdivided.

The question of narrowing the right-of-way of the Alaska Highway at Fort Nelson was raised by the Northwest Highway System. It was their wish to reduce the width of the highway at this point from 300 to 150 feet. This matter was referred to the Highway Board, Department of Highways, for their consideration, and they have now advised as follows: "This Board does not consider that the right-of-way of the Alaska Highway through Fort Nelson should be reduced. Also that it would not be advisable for the Northwest Highway System to issue any more permits for the construction of buildings within the highway right-of-way, and that when buildings are being reconstructed, they should be moved back off the right-of-way." This opinion is concurred in by this Division.

#### GENERAL

Since the former Dominion Railway Belt was returned to Provincial jurisdiction in 1930, this Department has been endeavouring to obtain the field-notes of the surveys made therein between the years 1884 and 1930. Through the co-operation of the Surveyor-General at Ottawa, this deal was finally consummated this year. This Department has received from Ottawa on permanent loan 958 field-books covering such surveys. There still remain 260 field-books, which will be forwarded to us after certain copies have been made in Ottawa.

These field-notes have been indexed and become part of our survey records.

As the duties of the draughtsmen in the Legal Surveys Division are of such a diversified nature, it has been felt for some time that written instructions should be prepared regarding certain problems involved in these duties, and also to assist in the training of the junior personnel.

During the year this need was recognized. After much thought and discussion, a manual was prepared which encompassed such subjects as administration and filing records, examples of descriptions, office policy on alienation of land by description or survey, office policy on plotting foreshore leases, notes on land without potential access, instructions for plotting mineral claims, etc.

The members of the staff collaborating in the preparation of this manual are as follows: W. A. Taylor, Supervising Land Surveyor; A. J. Baker, Chief Draughtsman; M. Chandler, Supervising Draughtsman; D. H. Stuart, Supervising Draughtsman; J. A. Hawes, Supervising Draughtsman; and J. Edward, Technical Draughtsman.

Continuing the programme of disseminating mapping information to Government Agencies, the writer made a visit to the Government Agents, Provincial Assessors, Land Inspectors, and certain other Government officials at Lillooet, Clinton, Williams Lake, Quesnel, Prince George, Burns Lake, Smithers, and Terrace, with the object of ascertaining their requirements for maps and aerial photographs.

Samples of the different types of mapping were shown them, and in the subsequent discussions the uses to which they could be put in their own particular field of endeavour were ascertained. Copies of the maps requested were prepared and forwarded to the respective officials.

A detailed synopsis of the surveys made by this Division is as follows:—

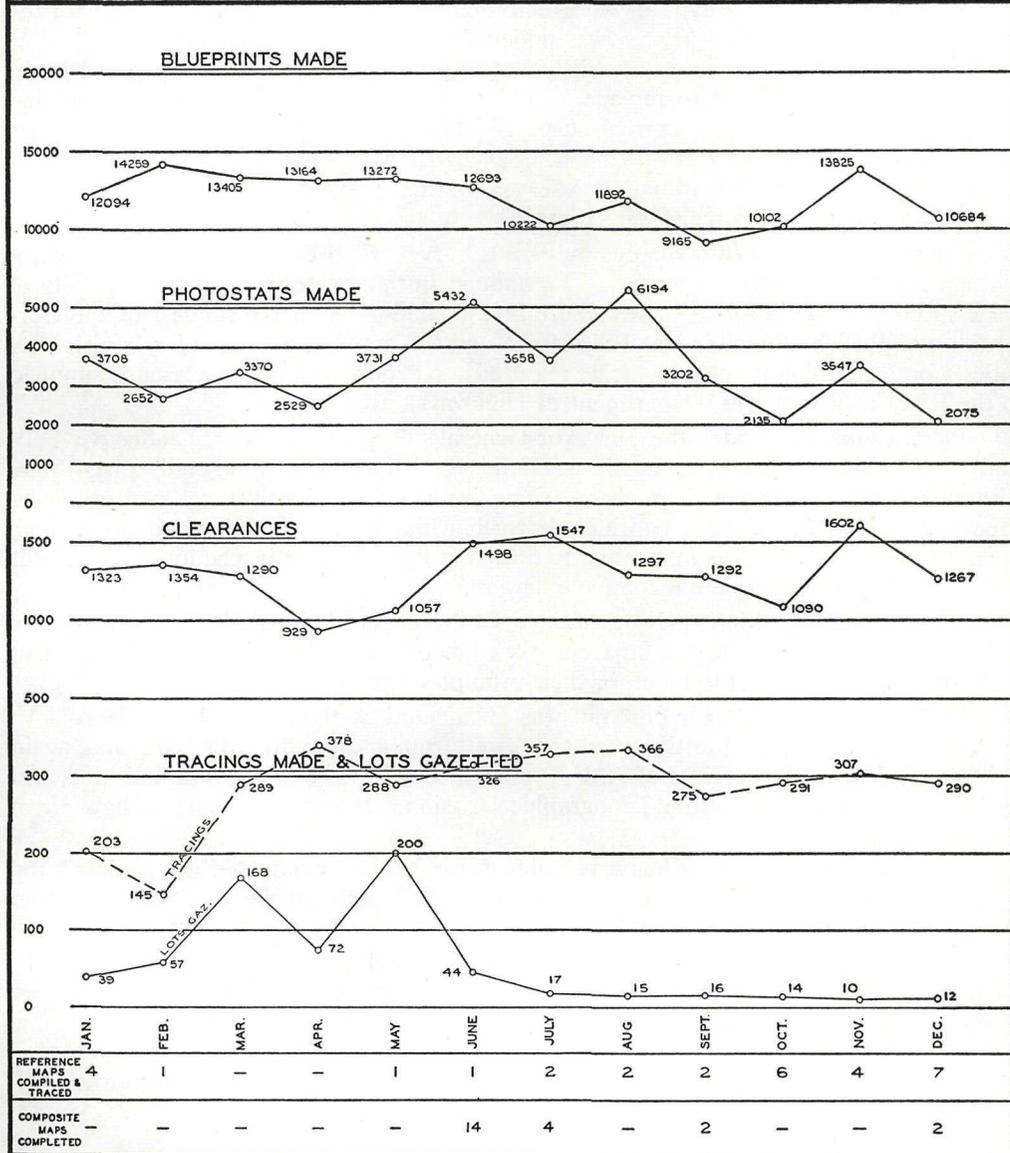
TABLE A.—SUMMARY OF OFFICE WORK FOR THE YEARS 1954 AND 1955  
LEGAL SURVEYS DIVISION

	1954	1955
Number of field-books received .....	399	308
„ lots surveyed .....	490	324
„ lots plotted .....	498	425
„ lots gazetted .....	585	664
„ lots cancelled .....	22	11
„ mineral-claim field-books prepared .....	168	79
„ reference maps compiled or renewed .....	30	30
„ applications for purchase cleared .....	2,148	2,448
„ applications for pre-emption cleared .....	125	99
„ applications for lease cleared .....	760	1,186
„ coal licences cleared .....	64	23
„ water licences cleared .....	101	105
„ timber sales cleared .....	6,616	8,103
„ Crown-grant applications cleared .....	1,200	1,709
„ reverted-land clearances .....	432	648
„ cancellations made .....	3,673	3,011
„ inquiries cleared .....	1,271	1,763
„ placer-mining leases plotted on maps .....	15	2
„ letters received and dealt with .....	—	4,892
„ land-examination sketches .....	1,266	2,030
„ Crown-grant and lease tracings made .....	1,037	1,062
„ miscellaneous tracings made .....	42	63
„ Government Agents' tracings made .....	215	358
„ photostats made .....	21,446	42,233
„ blue-prints made .....	103,771	144,777
„ documents consulted and filed in vault .....	59,080	66,675

# 1955

## LEGAL SURVEYS DIVISION

### SURVEY AND MAPPING BRANCH



REFERENCE MAPS COMPILED & TRACED	4	1	-	-	1	1	2	2	2	6	4	7
COMPOSITE MAPS COMPLETED	-	-	-	-	-	14	4	-	2	-	-	2

## FIELD WORK

W. A. TAYLOR, B.C.L.S., SUPERVISING SURVEYOR

Field work conducted by the staff of this Division totalled fifty-seven separate surveys, varying in extent from a few days' field work up to four and a half months. Twelve of these surveys were done at the request of the Forest Service, consuming seventy field days.

A very representative type of work embracing every form of legal survey, with the exception of mineral-claim surveys, was undertaken. Although it has not been possible to undertake a programme of re-establishment of old survey corners on a planned basis, every opportunity is seized to replace an old corner with a permanent monument that occurs in conjunction with a current survey. This Division replaced 284 such corners this year, the oldest dating back to 1870. Seventy-two miles of road right-of-way were surveyed, and lots for alienation and reserve, varying in size from half an acre to 640 acres and totalling 335 parcels, were created.

Four investigations into surveys by private surveyors of Crown lands were made at the request of the Surveyor-General. The findings in three cases proved the necessity of the inspection. Two private surveys were investigated—one at the request of the Corporation of British Columbia Land Surveyors and the other on request of a Registrar of Titles—both resulting in resurvey being required. A report on a survey was also supplied to the Right-of-way Agent, Department of Highways.

Plans examined, under the Surveyor-General's Regulation No. 29, effective February 1st, 1955, at the request of the Land Registry Office numbered thirty-three. Although the time consumed on these exhaustive checks seriously taxes our power to cope with them, the effort is considered worth while by assisting to maintain a high standard of surveying. It is interesting to note that the extensive inspection noted in our report for 1954 is resulting in a complete new survey being obtained.

The services of various private surveyors were engaged, for limited surveys, where their local knowledge or current adjacent work made it advantageous to the Department to do so. We are grateful to them for their prompt service rendered.

In December of this year our staff was augmented by the acquisition of Harold V. Buckley, B.C.L.S., whose position was transferred from another division. We were again fortunate in having the services of A. F. Swannell, B.C.L.S., together with assistants and equipment, loaned to us by the Topographic Division. It was a pleasure to have them with us.

The expenses of the four highway right-of-way surveys conducted are again shared on a 50-50 basis with the Department of Highways. Staff salaries and all equipment are supplied in addition by this Division.

The individual reports of the staff surveyors and one private surveyor, R. E. Chapman, B.C.L.S., who was engaged on a right-of-way survey for this Division, are presented below under three general headings.

## SUBDIVISION, RIGHT-OF-WAY RE-ESTABLISHMENT, AND INSPECTION SURVEYS

P. M. Monckton, B.C.L.S.

The 1955 programme commenced in January with the laying-out of six building lots at Clinton. Later a park was surveyed at Lillooet.

Near Alberni, work was done relocating six old corners, laying out Maplehurst Park, and dividing up an area previously covered by a subdivision.

At Valemount the skeleton of a future townsite was completed, in co-operation with the Department of Highways.

The subdivision at Fairview, South Okanagan, was finalized and registered, after five years of encountering various obstacles. This included twelve lots and a site for another park.

On the outskirts of Summerland a foreshore lot on Okanagan Lake was posted, which the municipality intends to fill in for a recreation ground.

Near Prince George, at Summit Lake, 2 miles of line was run for the Forest Service, in connection with a timber sale and possible future subdivision. Here, too, assistance was given to N. C. Stewart, B.C.L.S., in a local triangulation survey. Some blocks in the townsite were reposted, and also at Endako a small reposting job was undertaken.

Three hundred miles north of the Peace River, 105 building lots were delineated at Fort Nelson (Mile 300), where there is a big demand, and also a graveyard-site 3 miles north of the townsite was surveyed.

The Forest Service is constructing a new Ranger station at Mile 101, Alaska Highway (Blueberry); this was surveyed.

Seventeen lake-shore home-sites were created at Charlie Lake, a few miles from Fort St. John.

Another Ranger station at Squamish, another park at Hope, and a lot for the local troop of Boy Scouts at Hope were surveyed. The Crown land adjoining this park might be surveyed into about fifteen very desirable building lots in the 1956 season.

A few lake-shore home-sites at Pitt Lake, not yet completed, finished the season.

#### R. W. Thorpe, B.C.L.S.

During the early part of the field season a district lot of 433 acres was surveyed in the University Endowment Lands as an addition to the grounds of the University. The flat, heavily bushed area extends easterly to the southerly production of Acadia Road and southerly to Marine Drive.

An extensive Crown-land survey was conducted at Gun Lake, where forty-three summer-home site lots of from 3 to 6 acres each were created, together with five public reserves. It is interesting to note that, previous to this survey, much of the lake-shore property was held under mineral claims, Crown grants to which were unobtainable by reason of a Government policy preventing monopolization of large areas of desirable water-frontage. As these claims were obviously not being mined, but retained solely for summer-home site purposes, agreement was made with the owners whereby, upon relinquishment and subsequent subdivision of the mineral claims, they would be entitled to purchase a lot of their choice within their former claim, the balance of the lots surveyed to be auctioned.

In the office considerable additional work was entailed this year by the response of Land Registry Offices to the new item 29 of the Surveyor-General's regulations.

#### D. W. Carrier, B.C.L.S.

The field season for 1955 commenced in March with a "Land Registry Act" subdivision of Crown land at Cowichan Lake. Thirty-one small lots were created, all with water-frontage.

A control survey was carried out in May in the Nelson-Trail area for the purpose of composite mapping, and at this time an inspection survey was done at the request of the Registrar at Nelson.

July and August were spent west of Prince George subdividing reverted Crown land at Babine Lake under the "Land Registry Act," where twenty-six water-front lots averaging 5 acres were created. Two right-of-way surveys were done for the British Columbia Forest Service. At Houston the Morice Forest development road was surveyed through private lands, and north of Hazelton the Babine Slide road was surveyed through three Indian reserves. Also on this trip a gravel-pit was surveyed for the Department of Highways at Terrace.

In September three subdivisions of Crown land were carried out in the Pemberton area. Nine lots were created to accommodate persons in residence, one for a park reserve, and seventeen for new development.

In October and November a subdivision of private land at Sayward for the British Columbia Forest Service provided a site for a new forestry station in that area, and, also for the Forest Service, approximately 100 chains of line was retraced to decide a trespass action.

For the most part it was possible to locate evidence on all old surveys encountered. One of the oldest was the Kisgegas Indian Reserve, surveyed in 1897, on which three out of four old corners were found. Thirty-four such corners were renewed in all during the 140-day field season.

G. T. Mullin, B.C.L.S.

The 1955 field season consisted of thirteen surveys, which were spread over the southern portion of the Province from Tofino to Kingsgate. Three Crown-land subdivisions were made along the Pasayten River, Otter Lake, and Eagan Lake, producing thirty water-front lots. Three subdivisions were carried out under the "Land Registry Act," two of these being parks for the British Columbia Forest Service at Long Beach, Vancouver Island, and Cottonwood Lake, 4 miles south of Nelson, and the other being a subdivision of part of the airport at Salmo, which produced fifteen lots. West Vancouver was the scene of a re-establishment survey which consisted of putting back on the ground the boundaries of the Capilano Indian Reserve cut-off, which was originally surveyed in 1924. The re-establishment of a city block at Greenwood was made at the request of the British Columbia Forest Service. Four inspection surveys were carried out at the request of the Surveyor-General—at Kingsgate, Pilot Bay, which is on Kootenay Lake, Apex, which is about 5 miles south of Nelson, and at Westbridge. Ten days were spent running profile level over the south-easterly portion of the University Endowment Lands so that a check could be made of the contours shown on the Cleveland plan of the University Endowment Lands. During the season fifteen old lot corners were renewed.

#### HIGHWAY SURVEYS

M. Perks, M.A., A.R.I.C.S., B.C.L.S.

Sections of the Southern Trans-Provincial Highway from Fort Steele Junction to Wardner, east of Cranbrook, and through Lot 31, west of Cranbrook, were surveyed. The total centre-line chainage of the two sections amounted to 17 $\frac{1}{3}$  miles.

In the course of these surveys, thirty-seven lot and sub-lot corners were re-established with permanent monuments. At only seven of these corners were old or previously re-established corner posts found in place. At fourteen corners, re-establishment was possible from bearing-trees or stumps corresponding to bearing-trees recorded in the original field-notes. The remaining corners were re-established either from evidence of owner or under the provisions of the "Official Surveys Act."

The considerable time spent on corner re-establishment and the extra ties and posting necessitated by railway and power-line rights-of-way either adjacent to or overlapping the highway right-of-way markedly restricted the mileage completed during the season.

A 1-acre subdivision of Section 18, Range 5, Somenos District, adjacent to the Island Highway, was surveyed as a picnic-site for the Forest Service.

Some reposting was carried out in the vicinity of Section 69, Goldstream District, near the Sooke Road.

At the request of the board of management of the Corporation of British Columbia Land Surveyors, an inspection survey was made of parts of the right-of-way of Henry Road near Chemainus.



141 Mile House, Old Cariboo Road, with Canadian Government Astronomic Pier No. 12 on the high bank.

#### A. P. McLaughlin, B.C.L.S.

The season's work consisted primarily of a road survey on the Cariboo Highway from 144 Mile Ranch to Williams Lake, where a tie was made to J. C. A. Long's road survey.

The party, consisting of A. P. McLaughlin, with A. C. Bridge as assistant, and four survey helpers, left Victoria on May 24th and returned on September 25th. Camp was made at 141 Mile Ranch.

A distance of  $13\frac{3}{4}$  miles of centre line was run and boundary monumented.

A total of fifty-two lot corners were replaced with pipe posts.

Considerable trouble was encountered, especially in the vicinity of 150 Mile House and Williams Lake, with missing lot corners, both of district lots and of new subdivisions.

In the San Jose Valley a survey made in 1883 by W. D. Patterson was found to be almost intact, generally the original bearing-trees with a stone cairn being the evidence found on the ground; however, in one instance an original quarter-section post was found in place, 72 years old.

Besides the highway survey, a preliminary survey was carried out for a proposed subdivision on the Chilcotin Road, approximately 3 miles west of Williams Lake. Also a trigonometrical tie was made between J. C. A. Long's road survey and the Central British Columbia network Stations Will and Allison.

#### R. W. Leak, B.C.L.S., D.L.S.

The right-of-way survey of a portion of the Cariboo Highway from Lac la Hache village to the old 144 Mile House commenced May 26th and was completed October 23rd.

The intersection of seventy-seven district lot or subdivision outline boundaries along the 27 miles of surveyed centre line required the renewal by permanent monument of

120 lot corners, twenty-six of these being re-establishments. A further 154 permanent monuments were erected on the right-of-way boundary, forty of which were of concrete. Approximately 500 iron posts were also planted.

Several surveys were dealt with which dated back to 1870, 1878, and 1881. Fortunately, however, the outlines of district lots governed by these surveys have been resurveyed by surrounding township or district lot surveys of more recent date.

R. E. Chapman, B.C.L.S.

The highway from Pender Harbour to Earls Cove on Jervis Inlet was opened to traffic in the late summer of 1954 and is the newest portion of the highway which now extends the full length of the Sechelt Peninsula.

The 10½ miles surveyed are on the rocky lower slopes of the mountain range which forms the backbone of the peninsula. The broken nature of the country necessitates one of the most meandering highways we have. There are sixty-nine curves, many with deflection angles over 45 degrees. One of the longer curves required three traverse courses to make a connection between tangents. At the northern end of Ruby Lake, where the road is crowded between the lake-shore and high rock bluffs, it makes two successive sharp curves with deflections over 140 degrees which combine to make a complete "S" turn.

Our main monumenting has been done on the centre, which has quite an advantage over posting on the right-of-way limits, especially where the tangents are very short or non-existent. Over thirty rock posts have been set; in fact, so many monument positions came in rock that we found it necessary to set only two concrete posts—one at the beginning or south end of the project and one at the second P.I.

#### CROWN-LAND SURVEYS FOR DEVELOPMENT

A. F. Swannell, B.C.L.S.

Apart from one lot, the land surveyed and to be surveyed lies north of the Blueberry River. It is west of the Beatton River, adjoining and north and east of Townships 110, 112, 113, and 115, and is 30 miles due north of Fort St. John to the southern boundary. The only existing access, by truck, is to the western boundary via the Alaska Highway and the Beatton Airport Road. This is some 60 miles.

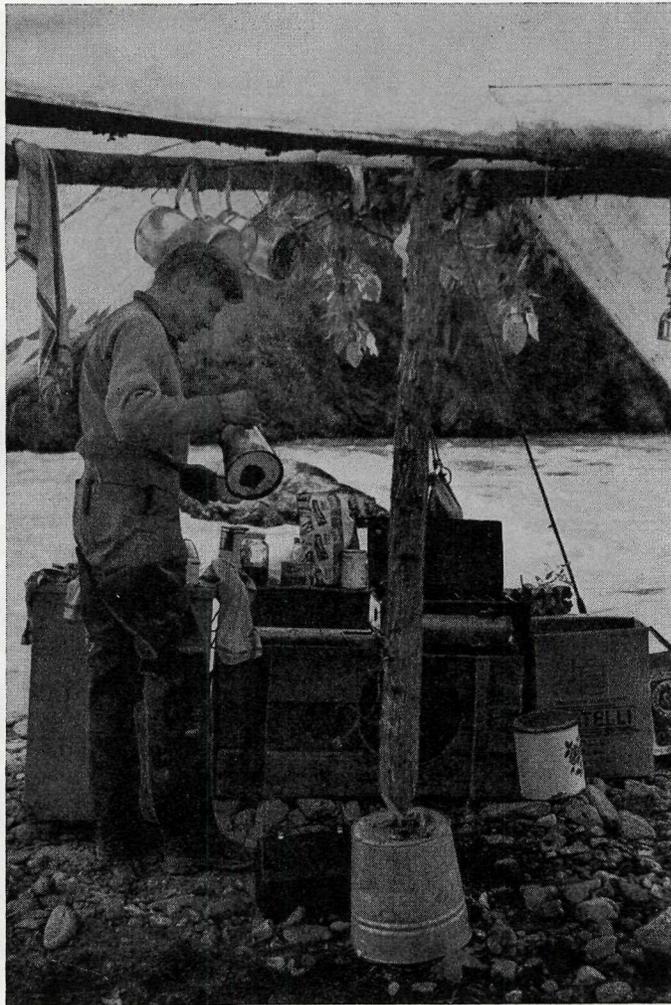
Initially it was hoped to complete the survey of seventy-six lots of approximately 640 acres each, or some 48,000 acres of land. To accomplish this it was planned to operate two line crews, with the total complement being twelve to the party. This plan of attack was frustrated at the outset, with a rash of hired help quitting due to not liking the walking the job entailed, the monotonous aspect of the burned land with its fire-blackened trees, and at the time the continuous hot and oppressive days we were experiencing. Also sickness and axe cuts had their toll on man-power. These factors resulted in operating two crews for one month only of the four and one-half months we were away, and in the final analysis forty lots were surveyed, with an area slightly in excess of 26,000 acres. This acreage was run in lots, equivalent in size to a section, being 1 mile square, with the centre lines run, so dividing each lot into quarter-lots. This necessitated running 144 miles of line along with 7½ miles of traverse in the Blueberry and Beatton River canyons which formed natural boundaries to some lots. This acreage included two applications to purchase, which previously had been allowed with the reserve. Some 197 standard pipe posts were set, accompanied by the arduous and lengthy chore of digging the required pits. In spite of the fire that had burned through the area, on the retracement of the northerly boundary of Townships 113 and 115 definite evidence was found of twelve out of fourteen wooden posts set in 1911.

At present the land surveyed is part and parcel of reserved Crown lands, and the intention is to release it for sale by auction. This summer great interest was shown in the land by many persons anxious to acquire new land by purchase.

This block, which will be released from the reserve, is gently rolling with average grades of 3 to 5 per cent and being the valleys of Umbach and Prespatou Creeks. These two creeks, as is typical of the country, become rapidly more and more deeply entrenched until they are gorges of 200 to 250 feet in depth. The natural boundaries of the Blueberry and Beatton Rivers have sandstone walls which are approximately 300 feet high. Near the top of these walls there is a line of rimrock 50 feet high. All these waterways have an extremely meandering course; the two main rivers have larger sweeps, for their route, than the indecisive abrupt courses of Umbach and Prespatou Creeks.

On either side of the Umbach and Prespatou Creeks and above their steep banks is a varied width of flat land, with enough slope for easy drainage. Here over the clay subsoil is a good layer of black topsoil which diminishes in depth as one ascends the gentle slopes. Immediately adjacent to the creeks now exists open grassy land, and the hills are covered by fire-killed, blackened stands of aspen, spruce, and pine. The whole terrain was severely burned in recent years, but forest reproduction is rapidly taking place with dense carpets of pine seedlings springing up in the timbered areas and aspen reproducing in the open sections.

This summer the weather was exceptionally dry and hot, with strong arid westerly winds drying up many obvious marshes and semi-bog land. The days were hot but the nights cold, with sharp heavy frosts occurring as late as July 1st and commencing again on August 12th. Because of this short frost-free period, it would appear that this area would be poor for crop-raising, other than for stock-feed. For stock-raising it would be ideal, with the lush, hardy-type grasses that are native and profuse even within the timber. Both Prespatou and Umbach Creeks flowed continuously in spite of the dry season, and, except for perhaps the southerly mile of Prespatou Creek, access for cattle to the water is easy. Hence the water problem prevalent in much of the Peace River Block is not significant.



Surveying on the Babine Slide Road. Camp on Cariboo Creek,  
Indian Reserve No. 6 (Sedina), Lot 4718, Cassiar District.

TOPOGRAPHIC DIVISION

## *Topographic Division*



The Liard River country, westward from station "Uchuck."



Looking westward along the 60th parallel from station "Snorker."

**TOPOGRAPHIC DIVISION**

A. G. SLOCOMB, B.C.L.S., CHIEF

The seemingly impossible has become a reality. Three years ago this Division was confronted with the task of obtaining ground control for some 25,000 square miles of territory situated in the north-eastern corner of British Columbia. When it was realized that most of it was relatively flat and, to a large extent, covered by muskeg with hardly a prominent feature in the whole area, it was labelled impossible; that is, considering the resources available, time, size, and the amount of control required. But, like most things apparently impossible, there is usually an answer if you have the wit to see and the will to do. Tower-building was the magic solution, the helicopter was the magic carpet, and a group of agile, fearless young men, most certainly akin to squirrels, were the magicians. Twenty-six thousand square miles of controlled territory was the final score, and one to be proud of. Certainly all those men involved, whether they be staff members or temporary summer helpers, are to be highly commended for a job well and truly done. The report of E. R. McMinn, B.C.L.S., that follows is the concluding chapter of a three-year epic.

F. O. Speed, B.C.L.S., was in charge of a control survey for multiplex mapping along the Fraser River from Lillooet to Lytton, assisted by R. P. Justice, B.C.L.S. Mr. Speed suffered an attack of jaundice early in July and was relieved by Mr. Justice, who completed the job and moved with the party to Prince George. Assisted by D. G. Alexander, he obtained control for two multiplex projects—one at the headwaters of the Willow River and the other in the vicinity of Purden Lake. Mr. Justice himself was incapacitated for a week during this operation by an attack of pleurisy, during which time Mr. Alexander was in charge.

W. H. Stilwell, D.L.S., was in charge of several miscellaneous surveys; namely, replacing two destroyed monuments on the British Columbia-Alberta Boundary, checking bearings on the British Columbia-Yukon Boundary in the vicinity of Astrofixes N 8 and N 9, and finally was in charge of a control traverse along the Monkman Pass Road.

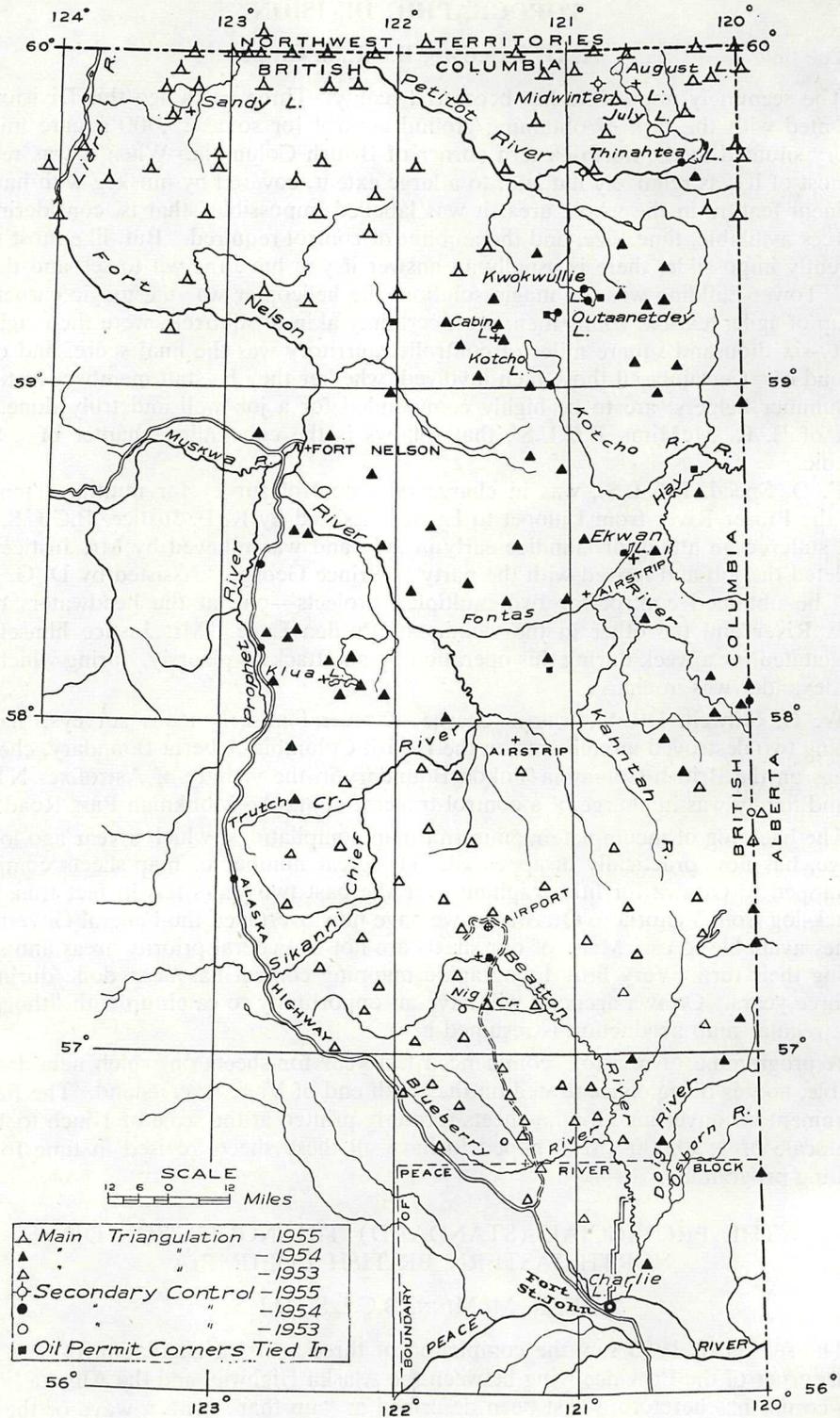
The back-log of incomplete manuscript map compilations, which a year ago loomed so large, has now practically disappeared. The great number of map-sheets completed and shipped to Ottawa for lithographing over the past two years has in fact transferred the back-log from Victoria to Ottawa, as we have now overtaxed the Federal Government facilities available to us. Many of our sheets are not in Federal priority areas and so are awaiting their turn. Very little topographic mapping control has been done during the past three years. Ottawa agencies will have an opportunity to catch up with lithography before regular map production is resumed here.

A programme of revision, commenced last year for sheets on which new data are available, now is being concentrated on the south end of Vancouver Island. The Federal Government is converting all map-sheets formerly printed at the scale of 1 inch to 1 mile to the scale of 1:50,000. It is hoped to have all these sheets revised in time for this reprinting programme.

**THE PROVINCIAL (STANDARD) TRIANGULATION OF  
NORTH-EASTERN BRITISH COLUMBIA**

BY E. R. McMINN, B.C.L.S., D.L.S.

The season of 1955 saw the completion of three years' triangulation of that little-known corner of the Province lying between the Alaska Highway and the Alberta border, which corner has heretofore best been described as "up thar" with a wave of the hand to the north-east. The survey party of forty-one men, including A. D. Wight, B.C.L.S., and W. H. Stilwell, D.L.S., and with one Okanagan helicopter CF-HLW and our Beaver



CF-FHF, left Victoria on a schedule starting May 29th. The party returned to Victoria on October 15th.

The field work was planned in the winter at Victoria to deal with operational problems such as transportation, supply, communication, tower construction, and observation of angles. The man-power problem was solved neatly by asking each of our tried and true men to bring in a friend.

Spring, and the survey party came to Fort Nelson on the second day of June to find the great river already humming with activity. Four float-planes, using the muddy stream as a base, were servicing oil exploration crews and an Army survey party. The 60th parallel survey crew under W. N. Papove, B.C.L.S., D.L.S., were caulking and tarring their two freight-boats preparatory to their 200-mile access trip to the Beaver River. River-barges were loading supplies for Aklavik. Our six-truck convoy unloaded 10 tons of equipment at the river-bank and the two 3-ton trucks left immediately for Dawson Creek on the first of many 600-mile trips for food and gasoline.

Under the spruce-trees near Fort Nelson a supply and transit camp of eleven tents was erected. A road was bulldozed down to the river's edge, where a serviceable log float and refueling facilities were completed just as our yellow Beaver FHF came in on schedule from Victoria. The next day was cold, bright, and windy as the first load went out 110 miles to Midwinter Lake, the site for the first advance camp selected the previous year. By June 6th this camp was built and all of the gasoline and supplies flown in.

The advance camp had a 110-volt generating plant and a 75-watt radio which was on the air twelve hours a day every day from June 6th to October 10th. The six to fourteen fly camps of two to four men each kept in daily contact with portable 2½-watt radio sets. Radio contact was also maintained with the 25-watt set at Fort Nelson camp, as well as with the Beaver aircraft, the helicopter, the Forest Service, and Mr. Papove's boundary survey. The supply trips or camp moves for the helicopter and Beaver were planned each night for the next day—that is, planned in so far as planning was possible—in practice we moved from crisis to crisis. Essentially the work consisted of reconnaissance by helicopter and Beaver for triangulation sites, moving crews out, supplying them, moving them on again, and moving the observing crews along behind them. At no time was the helicopter without work to do; bad weather and necessary maintenance work caused the loss of twenty-four flying-days for the helicopter and fifteen days for the Beaver. Tommy Gurr and Lock Madill, helicopter pilot and mechanic respectively, of the Okanagan Air Services, did a fine job and were welcome members of the party.

Considerable work was done for the boundary survey party under W. N. Papove, B.C.L.S., D.L.S., involving forty flying-hours on the helicopter and some fifty flying-hours on the Beaver, which made about fifteen freight trips to Larsen Lake and Tightfit Lake, in addition to delivering supplies direct to the line camp by parachute drops.

By June 6th all forty-one men had arrived at two-day intervals, and were at work preparing for the initial fly camps. The new men were taken out by truck to Stations Fish and Nelson, to be given a course on the towers and in the bush. No mosquito ointment was supplied on these work-outs; three men were sent home.

On June 9th the Okanagan helicopter piloted by Tommy Gurr returned from Mr. Papove's 60th parallel boundary survey and commenced the following day the task of moving and supplying tower crews that was to continue day by day, seven days a week, until October 10th. The helicopter work, totalling 467 hours and 1,462 landings, began when the trees were in new leaf, went through the brief, hot, fly-infested summer, through the incredible colours of September, and into October with the geese flying south and snow whistling through the leafless trees and caribou pawing moss on the muskeg.

From our camp on the lake, which we named "Midwinter" (from a note on the door of a derelict cabin), the building crews were scattered from the Kotcho Lake plateau at Stations Hipper and Peggo, northerly to Stations Jonvan and Starbright, and on the north-east corner of the Province. Here, in a little muskeg where the Boundary Com-

mission pipe post indicates the intersection of  $120^{\circ}$  west longitude and  $60^{\circ}$  latitude, a 57-foot tower was built and named "Artieboy," after our good companion of two seasons, Arthur Coles, who died in the crash of his helicopter this summer in Ontario.

After reaching the objective of our three seasons' work, we turned westward toward the Liard River. Observing parties commenced a rear-guard action, completing the angle reading as we moved along. At this time, progress was threatened by a forest fire which



The 113-foot tower station "Fancy Free."

had been burning for two weeks along the Alberta boundary and which now paid us a visit, loading the atmosphere with smoke, and reaching 30 miles into our area. It burned one side of the 90-foot tower "Peggo."

Our Beaver pilot, C. A. E. Matson, B.C.L.S., resigned to take a job on the DEW line supply work and Harry Brown, his replacement, proved very competent.

From June, when the sun rose and set in the same northern sky, the triangulation network was woven across over 8,000 square miles of potentially valuable muskeg lands, until we reached and crossed the Simpson Trail in August—August with its lengthening

darkness and nightly display of the aurora borealis. In this month we moved camp to the sandy shore of Maxhamish Lake, the only clear-water lake in this north-eastern corner. The mountains west of the Liard were just visible.

By the first week of September, student helpers were leaving to return to school, but the tower-builders were at their last stations—Glory, Tattoo, Donnamarie, and Shannon. On the other hand, the instrument observing work was lagging, mostly because of the loss of experienced men. Two towers on exposed ridges, Petitot and Dilly, blew over in the August gales and were rebuilt. The bright, hot sunlight of June and the eighteen hours of daylight were gone; we finished the angle reading in autumn with its pale, hazy sunlight and its eleven-hour day. Night observing from the towers was tried, using 500-candle-power gas lights and with a radio hook-up, but with only fair results, mostly because of the freezing weather. Eventually the observing programme was completed satisfactorily, if not perfectly, in the light snow-storms of October. Troubles with horizontal closures in the windy days of August were more than matched by those with vertical angles read to towers distorted and inverted by mirages.

The season's work covered 8,000 square miles with sixty-two stations; five ties were made to the monuments of the Alberta boundary and ten ties to those of the 60th parallel. The key reference point of the petroleum and natural-gas permits in the western section—namely, the old Hudson Bay Company post at Nelson Forks—was also fixed.

In three years 26,000 square miles of country have been covered, using 184 stations, most of which were towers. The total combined height of these towers is 11,400 feet; twenty-four stations were over 100 feet. Flying-time on the helicopters was 1,588 hours; on the Beaver, 1,042 hours. Nearly a million pounds of freight, including 40,000 gallons of aviation fuel, was transported by truck, Beaver, and helicopter; 10 tons of spikes, 4,000 yards of signal cotton, and 7 tons of cement were used. The triangulation network, which involved some 212 stations and the reading of about 26,000 angles, included the Geodetic stations from Fort St. John to Fort Nelson and ties to the Alberta boundary, 60th parallel monuments, the bench-marks on the Alaska Highway, Beatton Road, and Simpson Trail, and to all location-posts established under the "Petroleum and Natural Gas Act." It is understood that the mapping of this area is to be undertaken by the Federal Government. To date, the available field survey information—co-ordinates, azimuths, elevations, and photo identification—has been supplied to many oil exploration companies and commercial mapping organizations.

### CONTROL SURVEY ALONG THE FRASER RIVER FROM MORAN TO LYTTON

BY F. O. SPEED, B.C.L.S.

Under instructions of the Director of Surveys and Mapping and Surveyor-General, control was obtained for mapping along the Fraser River from Moran to Lytton.

This map was requested by the Water Rights Branch, to be compiled by the Multiplex Section at a scale of 500 feet to 1 inch with 20-foot contours from river-level to elevation 2,000 feet in the main valley and to elevation 1,800 feet in the tributary streams.

As the area required to be mapped was a river-valley, horizontal control was most economically obtained by a network of twenty-eight main triangulation stations extending southwards to Lytton from the Triangulation Stations Cole and New South Base, which were set in 1951 by W. R. Young, B.C.L.S.

Most of the main triangulation stations were located along the valley-sides to facilitate the location of secondary triangulation stations in the valley.

The thirty-two secondary triangulation stations tied in two Geodetic bench-mark monuments, the P.G.E. right-of-way, eight cadastral lot corners, and the B.C. Electric

Company's dam-site and installations at Seton Lake. Four ties were also made to the 1954 right-of-way survey of the Lytton-Lillooet Road by J. H. Drewry, B.C.L.S.

Base-lines were laid out both at the centre and the south end of the triangulation network to enable adjustment to be made to the quadrilaterals.

Stations Stein and Rifle were set near Lytton for a future extension and tie to the Provincial triangulation network.

Vertical control was obtained over the complete area by trigonometric levelling, carried forward via the triangulation stations.

To strengthen and extend vertical control, a line of double-run spirit-levels was carried from the Geodetic Survey of Canada Bench-mark 624J at Lillooet southwards along the Lillooet-Lytton Highway to the Geodetic Bench-mark 63J at Lytton, a distance of 44 miles. A total of twenty-nine new bench-mark monuments were established. Permission was obtained to use as bench-marks the concrete highway traverse monuments set by J. H. Drewry, B.C.L.S.

Spirit-levels were run to nine of the triangulation stations to assist in the adjustment of vertical elevations.

The elevation of Triangulation Station Rey, obtained by trigonometric levels carried over 54 miles, was calculated to be 558.3 feet, and the elevation obtained by spirit-levels was 558.95 feet. To obtain vertical control on the air photographs, vertical elevations were read from the triangulation stations to points identified on the air photographs. It was also necessary to run 22 miles of levels to obtain six of the vertical points.

The Geodetic elevation was carried by spirit-levels to the Water Resources bench-mark located at its cable crossing and gauging-station on the Fraser River.

The multiplex plotter, using the 194 controlled air photographs, will map the Fraser River from Moran to Lytton.

Numerous roads gave good access in the area, and the highway bridge at Lillooet and the reaction-ferry at Lytton eliminated most of the difficulties of crossing the Fraser River. In July, when the ferry was not in operation because of the high-water level, we used the Canadian National Railway bridge to cross the Fraser River.

For transportation, three Land Rovers and a Willys truck were used. Difficulties in sighting due to heat haze were minimized because of cool weather and heavy cloud overcasts.

Forest-cover was very sparse in the lower valleys, consisting mostly of ponderosa pine, while blue Douglas fir was found at higher altitudes. At present the lumbering industry is making extensive use of the fir-trees only.

Wildlife consisted mostly of birds—robins, Wilson nutcrackers, mosquito hawks—with only an occasional deer and bear being sighted. In the southern half of the area, rattlesnakes were encountered on three or four occasions.

## CONTROL SURVEY OF THE WILLOW RIVER AND PURDEN LAKE AREAS

BY R. P. JUSTICE, B.C.L.S.

The purpose of the survey, made at the request of the Forest Service, was to provide vertical control and possibly thicken the existing horizontal control for multiplex mapping of the Willow River and Purden Lake Public Working Circles, at a scale of 1,320 feet to 1 inch with 50-foot contours, located south-east of Prince George.

It was proposed that vertical control could be obtained by rounds of ground photographs taken from some nine points whose elevations were to be determined by vertical angles from existing triangulation stations and Army Survey Establishment "cut in" points. The occupied positions were to be positively identified on the air photographs. If it were possible to horizontally fix the two points to be occupied in the area immedi-

ately north of Narrow Lake and at the head of George Creek from existing stations, the necessary observations were to be made and the stations permanently marked in the conventional manner.

Working from existing Triangulation Stations Tabor and Eaglet, four new stations and one Army Survey station were occupied. Fifteen rolls of film were exposed from these stations. The two points Narrow and George, in the southern portion of the Willow River area, were fixed horizontally and permanently marked with brass bolts. Eleven stations were occupied—seven horizontal and four vertical—all of which were identified on the air photographs. Although the purpose of the survey was to provide vertical control, horizontal angles were read and new co-ordinates calculated for the three Army stations.

While sufficient crew members to run two three-man parties were recruited from F. O. Speed's party at the completion of the Moran-Lytton survey, there occurred two cases of jaundice, one of pleurisy, and one infected leg, which resulted in only one three-man party in operation for practically the whole job. The lack of unemployed and the shortness of the job made it impossible to find replacements. The party arrived in the area on July 31st and left for Victoria on September 7th.

During the latter part of July one week was spent in the office at Victoria in preparation for this survey. At this time, in discussion with W. K. MacDonald, Air Survey Division, it was proposed to occupy a total of nine stations—three Army Survey "cut in" points, three Army Survey stations, one Geodetic station, and two new stations. The main object of these stations was to carry elevations through the two areas and provide points from which horizontal photographs could be taken and vertical angles read to identifiable points on air photographs. The cameras were tested at the Patricia Bay instrument-shop; considerable work, both mechanical and optical, is needed before these instruments become reliable tools on a mapping survey.

On arrival in the area the plan was changed; two of the original stations were dropped and one Provincial triangulation station was added. This made a total of eight, six of which formed a network to horizontally fix the two points in the southern portion of the Willow River area. Seven of these were occupied and the high point of the eighth (Curly) was intersected only; it could not be occupied because the Beaver aircraft, supplied by the Forest Service, had crashed while flying for them, and no other suitable aircraft was available to us.

The camera stations were not prominent and commanded a poor outlook over the rolling forested country. Distances to the areas where points are wanted are in excess of an 8-mile maximum, and at this distance the haze obscures all detail. The quality of the pictures is also poor. Some vertical points will be computed from these pictures, but it is not expected to get checks on points from other stations. In general, these points will be close to the station and hence of little use in setting up the multiplex models. It was nearly impossible to find identifiable ground points on the air photographs of this country, which is blanketed with dense forest-growth. Duplicate sets of photographs should be supplied for this work as almost a complete set must be carried to each station. However, five of these points were obtained as well as sixteen points to which horizontal and vertical angles were read, although the points were not identifiable on the air photographs. The problem of getting accurate field control for multiplex mapping in this kind of country appears to be both difficult and expensive. Despite the access problem, triangulation possibly with towers and always exploiting the possibility of identifiable photo points seems to offer the best solution, although precise barometer work by helicopter or bush traverses by tape or subtense can be used in some areas.

The use of horizontal photographs can be of assistance even in this type of country, particularly if a dominant station is available, but reliance should not be wholly placed

in pictures which may not turn out successfully. In this type of country enough methods must be used to ensure that the party leaves the field confident that they have sufficient control for the projected map.

### MISCELLANEOUS SURVEYS

By W. H. STILWELL, D.L.S.

Several separate surveys were undertaken in widely separated sections of the northeasterly portion of British Columbia. The first was on the British Columbia-Alberta Boundary in the vicinity of the Red Willow River, latitude  $55^{\circ} 02'$  approximately. The second entailed the establishing of a monument at the junction of Mill Creek and the Tetsa River near Mile-post 363, approximately, of the Alaska Highway. The next surveys were for the purpose of checking bearings in the vicinity of Astrofixes N 8 and N 9 along the British Columbia-Northwest Territories Boundary at longitudes  $122^{\circ} 59'$  and  $122^{\circ} 13'$  respectively. The final jobs were the completion of the British Columbia-Alberta Boundary survey mentioned above and, following its completion, a control traverse along the Monkman Pass Road westerly from the British Columbia-Alberta Boundary to the vicinity of Stony Lake, about 33 miles to the west.

The initial attempt to replace Monument 70-3 on the British Columbia-Alberta Boundary was unsuccessful because of the extremely wet and soggy conditions encountered along the line. In the course of the reconnaissance it was found that Monument 70-1 had also been damaged and moved, though slightly, apparently by a bulldozer. This discovery was reported to the Surveyor-General. It was decided to leave the replacement of these monuments until later in the summer, when the ground would probably be drier.

The second task was the establishing of a standard rock post at the junction of the Tetsa River and Mill Creek and the connection by traverse of this monument to East Base through the Alaska Highway right-of-way survey. This monument is situated on the left bank of the Tetsa River and the right bank of Mill Creek and is a basic reference point for permits under the "Petroleum and Natural Gas Act."

The third survey was in the vicinity of Astrofix N 8 and comprised astronomic observations for azimuth, the angles between adjacent monuments, a tie traverse between Monument 19 and Astrofix N 8, and an inspection, on the ground, of various hubs and monuments as found.

The survey at Astrofix N 9 was similar to that at Astrofix N 8 but not so extensive. In addition, Triangulation Station Ney, over Monument 65A, was occupied and angles to other available stations were read.

A witness monument was established according to instruction, to replace Monument 70-3, destroyed probably by a bulldozer in the spring of 1953 and deposited on the west side of the boundary and toward the Red Willow River. Monument 70-1 was restored to its original position.

The traverse along the Monkman Pass Road between the British Columbia-Alberta Boundary and Stony Lake was double-chained, in feet and links; the angles between traverse stations were read and checked and trigonometric elevations were carried throughout. In addition, ties were made to three oil-permit posts adjacent to the road. The inaccessible ones were left, as per instructions, for determination, if required, by the triangulation. Photo identification was made all along the traverse.

The last assignment was completed on October 25th. Several snow flurries, rain, and generally poor weather were experienced throughout, and it was uncertain at times whether conditions would prevent its completion.

## DRAUGHTING OFFICE

BY S. L. CLARKE, CHIEF DRAUGHTSMAN

This draughting office, with a staff of nine men, is responsible for the inking, compilation of cadastral surveys, and the completion of topographic manuscripts, as well as for the compilation of cadastral surveys on the Federal Government manuscripts.

This year the back-log of incomplete manuscripts has been very much reduced. To date forty-seven of the old photo-topographic, twenty-three part sheets, and 145 of the new topographic manuscripts have been completed, of which forty were completed this year. The Federal Government now has 101 manuscripts on hand for the purpose of printing; they are in various stages of lithography.

Prints from the above-mentioned manuscripts, as shown in Appendix 2A, Topographic Surveys, are available on request, at the scale of both 40 and 80 chains to the inch.

Cadastral surveys were plotted on sixty-three Federal Government manuscripts; fifty-five of these were on a scale of 1 inch to 40 chains and the balance on a scale of 1 inch to 2 miles.

A tracing was prepared to show the triangulation stations in the north-east corner of British Columbia; this tracing shows the location, co-ordinates, elevation, etc., of the triangulation in that area and is proving very valuable to the petroleum and natural-gas interests in the Province.

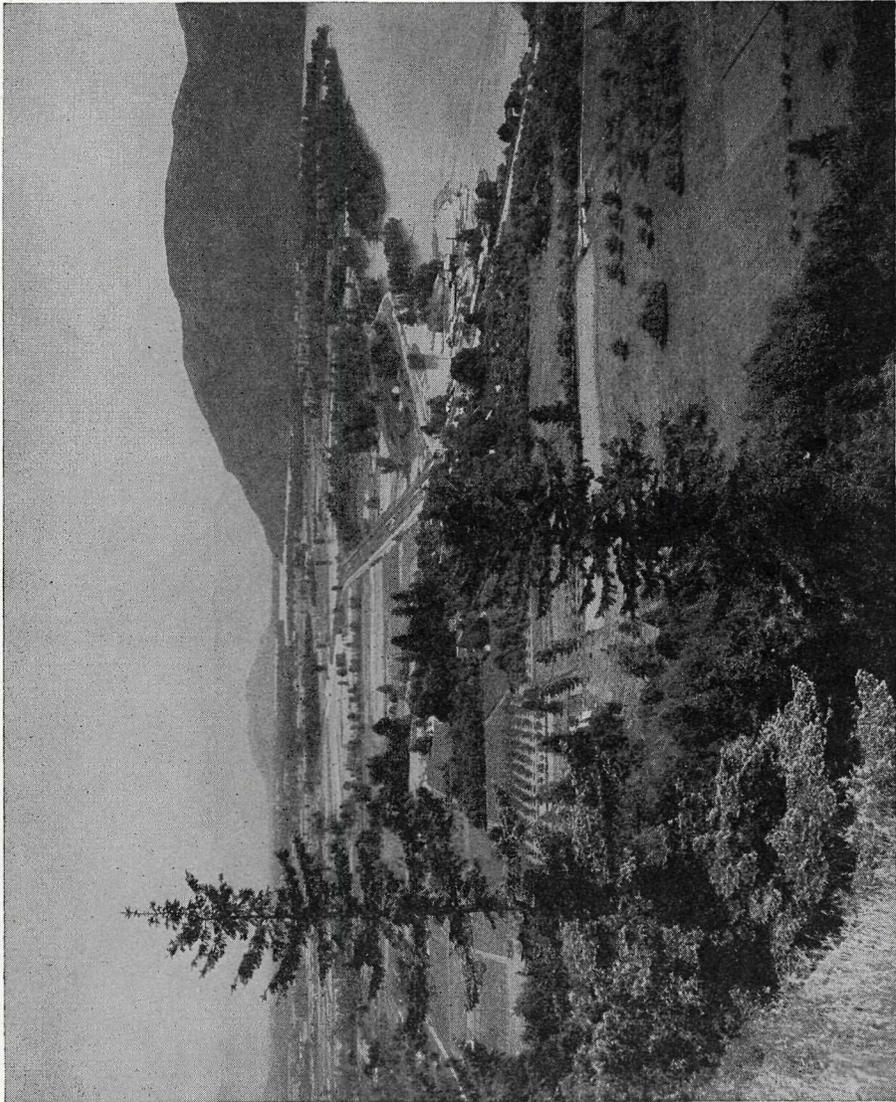
A member of our staff was granted leave of absence to assist as a member on one of the United Nations truce teams in Indo-China.

The services of a senior staff member were lost through transfer to another department.

During the year one of our senior draughtsmen had the opportunity to take a course at Ottawa in the new mapping technique of scribing. As yet this Division has made no attempt to convert to this technique. All Federal Government departments at Ottawa have now accepted and are using this new method of map reproduction. To prepare our staff for such a possibility in the near future, it is proposed to instigate a training programme early in 1956.

## *Geographic Division*

### **Field Culture Check**



Farm lands in Fraser Valley, looking east from Mission. Hatzic Station in centre.

## GEOGRAPHIC DIVISION

W. R. YOUNG, B.C.L.S., CHIEF, AND PROVINCIAL REPRESENTATIVE ON  
CANADIAN BOARD ON GEOGRAPHICAL NAMES

During the past year the task of calculating geographic positions for the corners of oil and gas permits granted under authority of the "Petroleum and Natural Gas Act," which the Division has assumed as an additional responsibility, has increased in importance and volume in comparison to our normal function of producing and distributing lithographed maps.

The increased activity in oil- and gas-bearing areas is only one phase in the general increase in the economic development of the Province, which is reflected in an increased number of maps distributed.

A field culture check was carried out this year in the Lower Fraser Valley and brings to ten the number of 2-miles-to-1-inch maps in the National Topographic Series undertaken by the Division in this manner.

The second map in the new 10-miles-to-1-inch series was also published this year, and considerable interest has been shown by the public in the continuation of the series.

In addition to the retirement of W. H. Hutchinson as Chief of the Division, we suffered deep loss in the death of W. G. Thorpe, Map Editor. The loss of the abilities of two such skilled and experienced men will present a challenge in maintaining the high standards set by them in their work in the Division.

The various activities of the Division are dealt with in more detailed form under the following headings.

### ADMINISTRATION

W. H. Hutchinson, Chief of this Division and Provincial representative on the Canadian Board on Geographical Names, retired on superannuation in February. Responsible for the organization and operation of the Trigonometric Control Section of the Division when it was formed in 1920 under the name of "Base Maps Section," Mr. Hutchinson developed a triangulation control system of records and trained a staff in computing methods and procedures noted for efficiency and accuracy, characteristics which he carried into the operation of the Division as a whole when he assumed charge in 1950.

The untimely death of W. G. Thorpe in October will be keenly felt by all his associates. Joining the staff of the Division in 1920, he employed his wide knowledge and many skills in all phases of map compilation and reproduction and, in addition, undertook the arduous tasks of drawing up descriptions for the boundaries of many of the administrative districts within the Province and the technical editing for publication of the Lands Service Annual Reports. At the time of his death Mr. Thorpe held the position of Map Editor.

T. Hinton was promoted to the position of Supervisor of Map Distribution in April, and in December H. L. E. Hooper was appointed to the new position of Supervisor of Map Reproduction to carry out the duties performed previously by Mr. Thorpe. G. F. Hill was promoted from Senior Draughtsman to Chief Draughtsman, the position held previously by Mr. Hooper.

Other staff changes involved the addition of one Senior Draughtsman, the appointment of E. J. Carter as Assistant Mathematical Computer, and several changes in the junior staff gradings—draughtsmen, clerical, and technical.

While showing a decrease from the volume dealt with in 1954, correspondence was still heavy. It is difficult to account for the decrease, since the number of maps distributed during the past twelve months and involving the largest part of the correspondence shows considerable increase.

## COMPUTATIONS

Once again the computations resulting from the extension of Provincial main and secondary triangulation networks have been below the 1952 level, the last year during which full topographic field parties were engaged in standard mapping control. However, least-square adjustments and triangles computed from rectangular co-ordinates are considerably in excess of 1954.

Control in North-eastern British Columbia, primarily for petroleum and natural-gas permit positioning, was extended to the north boundary of the Province during the year, and preliminary values for the new stations are progressing favourably, together with final values for the previous season's work.

Computing of oil- and gas-permit positions has increased greatly in volume, due to additional demands for such information, and due also to the expansion of the control network in the areas concerned making the computations possible. The Section has been kept extremely busy, and though one addition to the temporary staff was made, it has still been necessary to enlist aid from the Topographic Division during rush periods in the fall when field personnel are available.

Rectangular co-ordinates for centizone corners in all potential oil areas have now been calculated, and the information so obtained is being used to an increasing extent in checking well-site positions at the request of the Department of Mines. As was stated in last year's Report, the above-mentioned task involved 9,600 separate calculations for each quadrangle of 1 degree extent in latitude and longitude, and seven such quadrangles were calculated.

In addition to the above outline of work considerable computing was undertaken and more is in hand in connection with the completion of the British Columbia-Northwest Territories Boundary survey and with triangulation ties made to various boundary monuments.

## GEOGRAPHER

Geographic field studies were carried out in Central British Columbia, to bring up to date the land bulletin for the Prince Rupert-Smithers area started in 1952, and to complete the Quesnel-Lillooet bulletin undertaken in 1953. Kamloops, the Lower Coast, and Vancouver Island bulletins are in hand.

Due to a reorganization of the Fraser River Board's terms of reference, work ceased on the land-use cover maps being compiled within the Fraser River watershed, but additional duties in an advisory capacity were undertaken in the editing and compilation of the new Atlas of British Columbia Resources, sponsored by the British Columbia Natural Resources Conference.

The preparation of the land-forms edition of Map 1k (South-western British Columbia) was completed during the year, as was a land-use cover compilation for the same sheet, but the latter has been held in abeyance due to lack of funds for printing.

## GEOGRAPHICAL NAMING AND MAP-CHECKING

Besides maintaining a comprehensive record of all geographical names within our borders, the duties of this Section include the preparation of name-sheets for submission to the Canadian Board on Geographical Names at Ottawa for all maps to be published by this Department, as well as checking name-sheets which are submitted to the Provincial representative by all Federal agencies mapping in British Columbia.

This year we have been able to deal with a large back-log of such name-sheets which resulted from the extensive post-war topographic mapping projects carried out by the above-mentioned agencies. The field surveys reached a peak in 1951-52, but have now levelled off and we hope to keep abreast of present production. A comparison of the map-sheets and names checked will be seen in the accompanying tables.

Preparatory to printing or reprinting, the work of checking and revising maps and colour proofs for this Department as well as the several Federal offices preparing maps of British Columbia is carried out by this Section. In addition to our own new editions, forty-four maps were revised or colour-proved for the Army Survey Establishment and Department of Mines and Technical Surveys, Ottawa, and twenty Topographic Division manuscripts were checked prior to shipment to Ottawa for reproduction.

A field culture check was carried out this year for Map 92 G/SE (Langley), comprising some 1,410 square miles, half of which is in the densely populated Fraser River valley. The requirement for this sheet became increasingly urgent with our present Map 4P (Lower Fraser Valley) going out of print.

### MAP COMPILATION AND REPRODUCTION

The adoption this year of the negative engraving method, an advanced and faster process in which the skill of scribing with a steel point is used in place of pen drawing, marks another milestone in this Division's progress from its pre-war work of compiling base manuscripts, drawing, and hand-lettering.

Compilations now consist of combinations of topographic and interim planimetric manuscripts where available, together with all other reliable base material (including the most recent culture), and the whole reduced to a working scale for scribing.

Draughting work at present remains essentially the same, minus the time-consuming hand-lettering, but due to rising costs of lithography since the war we have added to our skills the techniques allied to the photo-mechanical phases of map reproduction which were formerly tendered out to commercial firms. Master and type patch-up, negative colour separation, vinylite colour transparencies, the touching-up of negatives and positives, etc., and all work preparatory to actual plate-making is now handled by this office with the skilled co-operation of the Photographic Branch of the Government Printing Bureau.

H. L. Hooper, Supervisor of Map Reproduction, attended a special course at Ottawa in October, 1954, to familiarize himself with the latest negative engraving techniques, and during 1955 instruments and other necessary material were procured and a training programme instituted. The first map-sheet—82 L/SE (Sugar Lake)—is now being reproduced by this method.

Our map production remains approximately the same as last year, since five of the twelve maps published were reprints necessitating a minimum of draughting work. Only five Provincial Topographic Division manuscripts were reproduced and printed at Ottawa this year, but forty other maps of portions of British Columbia were printed by Canadian Government agencies, for all of which we received considerable stock in return for our co-operation and work contributed. All but the 1:250,000 series show lot divisions where such exist. A back-log of 130 Provincial Topographic Division manuscripts are now in various stages of reproduction at Ottawa. Details and prices of the lithographed maps are contained on Indexes 5 to 11 included in this Report, and 1955 production referred to above is detailed in the adjoining tables.

Mounted blue or paper impressions of all new Canadian Government and Provincial topographic maps being reproduced at Ottawa, on which lot overprints are to appear, are supplied to this office. The Topographic Division is responsible for compiling the lots; the impressions are then checked by this Section, inked, type numbers set on the mounted impressions, boundaries of land districts, parks, municipalities, and forests outlined, and the sheets returned to Ottawa either when completed or upon receipt of a colour proof. Some twenty-seven such map-sheets were dealt with this year.

Miscellaneous draughting and special work for other departments, such as preparing map bases for the Government Travel Bureau, describing and delineating administrative boundaries, etc., undertaken by this Section amounted to sixty requests involving 1,069 man-hours for a total of \$1,990.

In addition, assistance was given in assembling, editing, procuring, and distributing the Annual Report for 1954.

#### MAP DISTRIBUTION—PUBLIC RELATIONS

Some 48,000 maps were distributed during the past year, and more than 84,000 maps were taken into stock during the same period. The first figure denotes an increase of 4,300 over 1954, and is an all-time high in the history of the Division; the latter figure is some 14 per cent less than last year's, but, similar to last year, largely comprises new maps rather than stock replenishments.

The total value of maps distributed during 1955 was, as shown in the accompanying tables, \$18,995, of which nearly \$12,000 was received in actual cash and returned to Consolidated Revenue. Once again it is perhaps as well to point out that the difference in the last two sums represents the value of maps issued departmentally together with map stocks issued to Government Agents and as yet not sold.

It is of interest to note that, while the number of maps distributed increased during the year, those issued departmentally were less than the totals of each of the past two years, denoting a definite increase in map demands from public sources.

Indexes 5 to 11, included in Appendix 3, accompanying this Report show all published maps available from this Division, together with all pertinent information regarding scales, printing sources, prices, etc.

As in 1954, the Lands Service maintained a series of exhibits in the British Columbia Building on the Pacific National Exhibition grounds in Vancouver, and representatives from all divisions conferred regarding changes and additions made to that part relating to the Surveys and Mapping Branch.

STATISTICAL  
COMPUTATIONS

*Least-square Triangulation Adjustments Completed*

Net	Locality	Type of Bearings	Number of Triangles Involved
Provincial Main.....	Peace River.....	True	201
Provincial Main.....	Victoria.....	True	13
Provincial Main.....	Willow River.....	True	8
Provincial Main.....	British Columbia-Yukon Boundary.....	True	62
Provincial Secondary.....	Peace River.....	Local grid	10
Provincial Secondary.....	Lytton-Lillooet.....	Local grid	28
Provincial Coast.....	Kyuquot Sound.....	Local grid	94
Canadian Hydrographic Service.....	Douglas-Devastation Channels.....	Local grid	102

The following tables give comparisons with the previous five-year period:—

COMPUTATIONS

	1950	1951	1952	1953	1954	1955
Triangles adjusted by least squares.....	512	696	614	409	28	518
Stations calculated from rectangular co-ordinates.....	1,137	1,431	1,484	1,300	537	810
Ties to cadastral surveys.....	326	248	170	189	114	49
Elevations of stations determined.....	528	439	643	131	143	239
Index cards—						
New.....	1,888	1,676	1,342	1,561	1,192	1,415
Old (rewritten).....	924	586	506	450	830	576
Total on file.....	16,373	18,049	19,391	20,952	22,144	23,559
Requests for control attended to.....	212	225	272	287	314	378

CANADIAN BOARD ON GEOGRAPHICAL NAMES

	1950	1951	1952	1953	1954	1955
Number of map-sheets or charts checked.....	63	49	39	56	102	83
Number of names checked.....	5,457	3,686	6,403	7,052	11,683	8,766
Number of new names recorded.....	831	298	252	351	442	655

MAP STOCK AND DISTRIBUTION

	1950	1951	1952	1953	1954	1955
Maps issued to departments and public.....	34,244	41,581	45,724	40,733	43,741	48,043
Maps received into stock.....	36,021	45,369	73,981	92,456	97,274	84,573
Total value of printed maps issued.....	\$11,794	\$14,205	\$13,450	\$14,184	\$17,382	\$18,995

GEOGRAPHICAL WORK FOR OTHER DEPARTMENTS AND PUBLIC

	1950	1951	1952	1953	1954	1955
Total number of items.....	62	53	40	31	68	60
Total value of work.....	\$1,315	\$1,485	\$1,024	\$4,400	\$1,361	\$1,990

LETTERS

	1950	1951	1952	1953	1954	1955
Letters received and attended to.....	3,202	3,985	5,234	4,987	7,356	5,783

## MAPS

Published during 1955

Name	Map No.	Scale	Remarks
<i>Maps Reproduced and Printed by the Surveys and Mapping Branch, Victoria</i>			
British Columbia land recording districts	1CX	1 in. to 55 mi.	Reprint.
British Columbia showing post-offices, railways, main roads, trails, parks, distance charts, etc.	1J	1 in. to 27 mi.	Reprint.
South-eastern British Columbia showing land-forms	1EL	1 in. to 10 mi.	Reprint.
South-western British Columbia	1K	1 in. to 10 mi.	New edition.
South-western British Columbia showing land-forms	1KL	1 in. to 10 mi.	New edition.
South-western British Columbia showing only water features, place-names, and brown relief	1KLS	1 in. to 10 mi.	New edition.
Peace River	3E	1 in. to 4 mi.	Reprint.
Vancouver	92 G	1:250,000	Reprint.
Rivers Inlet	92 M	1:250,000	First edition.
Bonaparte River	92 P	1:250,000	First edition.
Fort Fraser	93 K	1:250,000	Second edition.
Charlie Lake	94 A	1:250,000	Second edition.
<i>Provincial Government Topographic Manuscripts Reproduced and Printed by the Canadian Government, Ottawa</i>			
Nanaimo	92 G/4	1 in. to 1 mi.	First edition.
Alexandria, east half	93 B/9, E. ½	1:50,000	First edition.
Alexandria, west half	93 B/9, W. ½	1:50,000	First edition.
Quesnel River, east half	93 B/16, E. ½	1:50,000	First edition.
Quesnel River, west half	93 B/16, W. ½	1:50,000	First edition.
<i>Maps Reproduced and Printed by the Canadian Government, Ottawa</i>			
Nootka Sound	92 E	1:250,000	First edition.
Dawson Creek	93 P	1:250,000	First edition.
Halfway River	94 B	1:250,000	Second edition.
Fort Grahame	94 C	1:250,000	First edition.
McConnell Creek	94 D	1:250,000	Third edition.
Ware	94 F	1:250,000	First edition.
Tuchodi Lakes	94 K	1:250,000	First edition.
Bowser Lake	104 A	1:250,000	First edition.
Telegraph Creek	104 G	1:250,000	First edition.
Tulsequah	104 K	1:250,000	First edition.
Shuswap	82 L/NW	1 in. to 2 mi.	Third edition.
Canal Flats, east half	82 J/4, E. ½	1:50,000	First edition.
Canal Flats, west half	82 J/4, W. ½	1:50,000	First edition.
Mount Urquhart, east half	92 H/12, E. ½	1:50,000	First edition.
Aikman Creek, east half	94 B/9, E. ½	1:50,000	First edition.
Aikman Creek, west half	94 B/9, W. ½	1:50,000	First edition.
Blair Creek, east half	94 B/16, E. ½	1:50,000	First edition.
Blair Creek, west half	94 B/16, W. ½	1:50,000	First edition.
North Beaton, east half	94 G/1, E. ½	1:50,000	First edition.
North Beaton, west half	94 G/1, W. ½	1:50,000	First edition.
Pink Mountain, east half	94 G/2, E. ½	1:50,000	First edition.
Pink Mountain, west half	94 G/2, W. ½	1:50,000	First edition.
Prophet, east half	94 J/2, E. ½	1:50,000	First edition.
Prophet, west half	94 J/2, W. ½	1:50,000	First edition.
MacDonald Creek, east half	94 K/10, E. ½	1:50,000	First edition.
MacDonald Creek, west half	94 K/10, W. ½	1:50,000	First edition.
Toad Hotsprings, east half	94 K/14, E. ½	1:50,000	First edition.
Toad Hotsprings, west half	94 K/14, W. ½	1:50,000	First edition.
Vents River, east half	94 M/8, E. ½	1:50,000	First edition.
Vents River, west half	94 M/8, W. ½	1:50,000	First edition.
Egnell Lakes, east half	94 M/13, E. ½	1:50,000	First edition.
Egnell Lakes, west half	94 M/13, W. ½	1:50,000	First edition.
Port Edward, east half	103 J/1, E. ½	1:50,000	Second edition.
Port Edward, west half	103 J/1, W. ½	1:50,000	Second edition.
Stephens Island, east half	103 J/2, E. ½	1:50,000	Second edition.
Stephens Island, west half	103 J/2, W. ½	1:50,000	Second edition.
Gladys River, east half	104 N/16, E. ½	1:50,000	First edition.
Gladys River, west half	104 N/16, W. ½	1:50,000	First edition.
Smart River, east half	104 O/13, E. ½	1:50,000	First edition.
Smart River, west half	104 O/13, W. ½	1:50,000	First edition.

MAPS—Continued  
In Course of Compilation

Name	Map No.	Scale	Remarks
<i>Maps Being Reproduced for Printing by Surveys and Mapping Branch, Victoria</i>			
British Columbia	1cx	1 in. to 55 mi.	New edition.
British Columbia	1j	1 in. to 30 mi.	New edition.
South-western British Columbia showing land-use cover	1kc	1 in. to 10 mi.	New edition.
West Central British Columbia	1f	1 in. to 10 mi.	New edition.
West Central British Columbia showing land-forms	1fl	1 in. to 10 mi.	New edition.
Upper Kettle River	82 E/NE	1 in. to 2 mi.	First edition.
Kelowna	82 E/NW	1 in. to 2 mi.	First edition.
Penticton	82 E/SW	1 in. to 2 mi.	First edition.
Sugar Lake	82 L/SE	1 in. to 2 mi.	First edition.
Langley	92 G/SE	1 in. to 2 mi.	First edition.
Yale	92 H/NW	1 in. to 2 mi.	First edition.
Chilliwack Lake	92 H/SW	1 in. to 2 mi.	First edition.
Merritt	92 I/SE	1 in. to 2 mi.	Second edition.
<i>Provincial Government Manuscripts Being Reproduced for Printing by the Canadian Government, Ottawa</i>			
Galiano Island, east half	92 B/14, E. ½	1:50,000	First edition.
Galiano Island, west half	92 B/14, W. ½	1:50,000	First edition.
Carmanah, east half	92 C/10, E. ½	1:50,000	Second edition.
Carmanah, west half	92 C/10, W. ½	1:50,000	Second edition.
Ucluellet, east half	92 C/13, E. ½	1:50,000	Second edition.
Barkley Sound, east half	92 C/14, E. ½	1:50,000	Second edition.
Barkley Sound, west half	92 C/14, W. ½	1:50,000	Second edition.
Nitinat, east half	92 C/15, E. ½	1:50,000	Second edition.
Nitinat, west half	92 C/15, W. ½	1:50,000	Second edition.
Vargas Island, east half	92 E/1, E. ½	1:50,000	Second edition.
Estevan Point, east half	92 E/7, E. ½	1:50,000	Second edition.
Hesquiat, east half	92 E/8, E. ½	1:50,000	Second edition.
Hesquiat, west half	92 E/8, W. ½	1:50,000	Second edition.
Alberni Inlet, east half	92 F/2, E. ½	1:50,000	Second edition.
Alberni Inlet, west half	92 F/2, W. ½	1:50,000	Second edition.
Effingham, east half	92 F/3, E. ½	1:50,000	Second edition.
Effingham, west half	92 F/3, W. ½	1:50,000	Second edition.
Tofino, east half	92 F/4, E. ½	1:50,000	Second edition.
Tofino, west half	92 F/4, W. ½	1:50,000	Second edition.
Bedwell, east half	92 F/5, E. ½	1:50,000	Second edition.
Bedwell, west half	92 F/5, W. ½	1:50,000	Second edition.
Great Central, east half	92 F/6, E. ½	1:50,000	Second edition.
Great Central, west half	92 F/6, W. ½	1:50,000	Second edition.
Horne Lake, east half	92 F/7, E. ½	1:50,000	Second edition.
Horne Lake, west half	92 F/7, W. ½	1:50,000	Second edition.
Texada Island, east half	92 F/9, E. ½	1:50,000	First edition.
Texada Island, west half	92 F/9, W. ½	1:50,000	First edition.
Comox	92 F/10	1 in. to 1 mi.	First edition.
Forbidden Plateau, east half	92 F/11, E. ½	1:50,000	Second edition.
Forbidden Plateau, west half	92 F/11, W. ½	1:50,000	Second edition.
Sechelt, east half	92 G/5, E. ½	1:50,000	First edition.
Sechelt, west half	92 G/5, W. ½	1:50,000	First edition.
Squamish, east half	92 G/11, E. ½	1:50,000	First edition.
Squamish, west half	92 G/11, W. ½	1:50,000	First edition.
Sechelt Inlet, east half	92 G/12, E. ½	1:50,000	First edition.
Sechelt Inlet, west half	92 G/12, W. ½	1:50,000	First edition.
Jervis Inlet, east half	92 G/13, E. ½	1:50,000	First edition.
Jervis Inlet, west half	92 G/13, W. ½	1:50,000	First edition.
Ashnola, east half	92 H/1, E. ½	1:50,000	First edition.
Ashnola, west half	92 H/1, W. ½	1:50,000	First edition.
Manning Park, east half	92 H/2, E. ½	1:50,000	First edition.
Manning Park, west half	92 H/2, W. ½	1:50,000	First edition.
Quadra Island	92 K/3	1 in. to 1 mi.	First edition.
Salmon River	92 K/4	1 in. to 1 mi.	First edition.
Sayward	92 K/5	1 in. to 1 mi.	First edition.
Sonora Island	92 K/6	1 in. to 1 mi.	First edition.
Kyuquot	92 L/3	1 in. to 1 mi.	First edition.
Alice Lake, east half	92 L/6, E. ½	1:50,000	Second edition.
Alice Lake, west half	92 L/6, W. ½	1:50,000	Second edition.
Nimpkish, east half	92 L/7, E. ½	1:50,000	Second edition.
Nimpkish, west half	92 L/7, W. ½	1:50,000	Second edition.
Adam River, east half	92 L/8, E. ½	1:50,000	Second edition.
Adam River, west half	92 L/8, W. ½	1:50,000	Second edition.
Yalakom River, east half	92 O/1, E. ½	1:50,000	First edition.
Yalakom River, west half	92 O/1, W. ½	1:50,000	First edition.
Empire Valley, east half	92 O/8, E. ½	1:50,000	First edition.

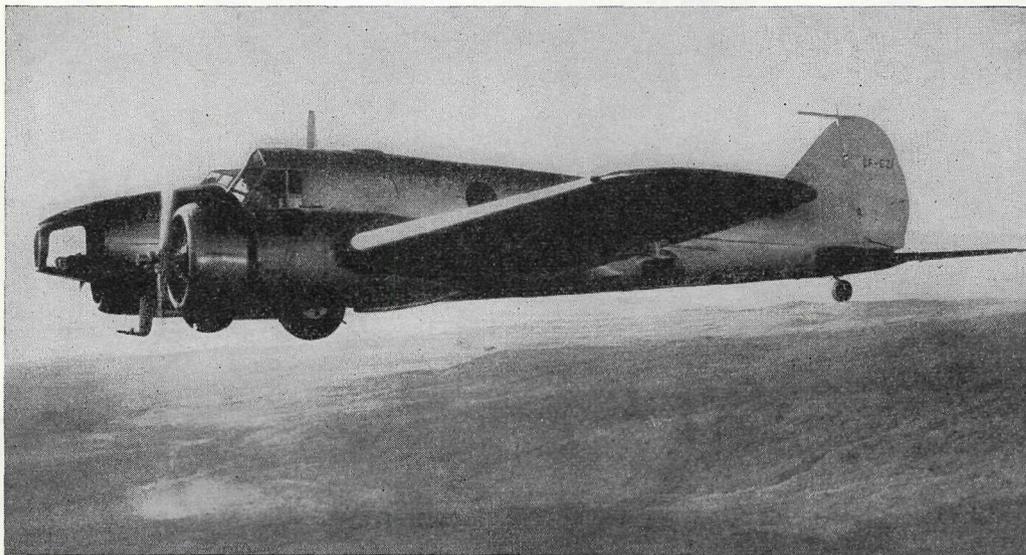
## MAPS—Continued

## In Course of Compilation—Continued

Name	Map No.	Scale	Remarks
Empire Valley, west half	92 O/8, W. ½	1:50,000	First edition.
Springhouse, east half	92 O/16, E. ½	1:50,000	First edition.
Springhouse, west half	92 O/16, W. ½	1:50,000	First edition.
Owen Lake, east half	93 L/2, E. ½	1:50,000	First edition.
Owen Lake, west half	93 L/2, W. ½	1:50,000	First edition.
Houston, east half	93 L/7, E. ½	1:50,000	First edition.
Houston, west half	93 L/7, W. ½	1:50,000	First edition.
Forestdale, east half	93 L/8, E. ½	1:50,000	First edition.
Forestdale, west half	93 L/8, W. ½	1:50,000	First edition.
Topley, east half	93 L/9, E. ½	1:50,000	First edition.
Topley, west half	93 L/9, W. ½	1:50,000	First edition.
Quick, east half	93 L/10, E. ½	1:50,000	First edition.
Quick, west half	93 L/10, W. ½	1:50,000	First edition.
Telkwa, east half	93 L/11, E. ½	1:50,000	First edition.
Telkwa, west half	93 L/11, W. ½	1:50,000	First edition.
Smithers, east half	93 L/14, E. ½	1:50,000	First edition.
Smithers, west half	93 L/14, W. ½	1:50,000	First edition.
Cape Scott, east half	102 I/16, E. ½	1:50,000	Second edition.
Cape Scott, west half	102 I/16, W. ½	1:50,000	Second edition.
Kitimat, east half	103 I/2, E. ½	1:50,000	First edition.
Kitimat, west half	103 I/2, W. ½	1:50,000	First edition.
Kispiox River, east half	103 P/9, E. ½	1:50,000	First edition.
Kispiox River, west half	103 P/9, W. ½	1:50,000	First edition.
Cranberry River, east half	103 P/10, E. ½	1:50,000	First edition.
White River, east half	103 P/14, E. ½	1:50,000	First edition.
Brown Bear Lake, east half	103 P/15, E. ½	1:50,000	First edition.
Brown Bear Lake, west half	103 P/15, W. ½	1:50,000	First edition.
Kwinageese River, west half	104 A/2, W. ½	1:50,000	First edition.
Meziadin Lake, east half	104 A/3, E. ½	1:50,000	First edition.
Meziadin Lake, west half	104 A/3, W. ½	1:50,000	First edition.
Bowser Lake, east half	104 A/5, E. ½	1:50,000	First edition.
Bell Irving River, east half	104 A/6, E. ½	1:50,000	First edition.
Bell Irving River, west half	104 A/6, W. ½	1:50,000	First edition.
Taft Creek, west half	104 A/11, W. ½	1:50,000	First edition.
Delta Peak, east half	104 A/12, E. ½	1:50,000	First edition.
Delta Peak, west half	104 A/12, W. ½	1:50,000	First edition.
Mount Alger, west half	104 A/13, W. ½	1:50,000	First edition.
Bob Quinn Lake, east half	104 B/16, E. ½	1:50,000	First edition.
Bob Quinn Lake, west half	104 B/16, W. ½	1:50,000	First edition.
Iskut River, east half	104 G/1, E. ½	1:50,000	First edition.
Iskut River, west half	104 G/1, W. ½	1:50,000	First edition.
Refuge Lake, east half	104 G/8, E. ½	1:50,000	First edition.
Refuge Lake, west half	104 G/8, W. ½	1:50,000	First edition.
Kinaskan Lake, east half	104 G/9, E. ½	1:50,000	First edition.
Kinaskan Lake, west half	104 G/9, W. ½	1:50,000	First edition.
Telegraph Creek, east half	104 G/14, E. ½	1:50,000	First edition.
Telegraph Creek, west half	104 G/14, W. ½	1:50,000	First edition.
Buckley Lake, east half	104 G/15, E. ½	1:50,000	First edition.
Buckley Lake, west half	104 G/15, W. ½	1:50,000	First edition.
Klastline River, east half	104 G/16, E. ½	1:50,000	First edition.
Klastline River, west half	104 G/16, W. ½	1:50,000	First edition.
Kluea Lake, west half	104 H/12, W. ½	1:50,000	First edition.
Ealue Lake, west half	104 H/13, W. ½	1:50,000	First edition.
Classy Creek, west half	104 J/2, W. ½	1:50,000	First edition.
Tahltan River, east half	104 J/3, E. ½	1:50,000	First edition.
Tahltan River, west half	104 J/3, W. ½	1:50,000	First edition.
Kennicott Lake, east half	104 J/4, E. ½	1:50,000	First edition.
Kennicott Lake, west half	104 J/4, W. ½	1:50,000	First edition.
Ketchum Lake, east half	104 J/5, E. ½	1:50,000	First edition.
Ketchum Lake, west half	104 J/5, W. ½	1:50,000	First edition.
Dudidontu River, east half	104 J/12, E. ½	1:50,000	First edition.
Dudidontu River, west half	104 J/12, W. ½	1:50,000	First edition.
Prairie Lake, east half	104 J/13, E. ½	1:50,000	First edition.
Prairie Lake, west half	104 J/13, W. ½	1:50,000	First edition.
Teresa Island, east half	104 N/5, E. ½	1:50,000	First edition.
Teresa Island, west half	104 N/5, W. ½	1:50,000	First edition.
O'Donnel River, east half	104 N/6, E. ½	1:50,000	First edition.
O'Donnel River, west half	104 N/6, W. ½	1:50,000	First edition.
Bell Lake, west half	104 N/7, W. ½	1:50,000	First edition.
Surprise Lake, west half	104 N/11, W. ½	1:50,000	First edition.
Atlin, east half	104 N/12, E. ½	1:50,000	First edition.
Atlin, west half	104 N/12, W. ½	1:50,000	First edition.
Mount Minto, east half	104 N/13, E. ½	1:50,000	First edition.
Mount Minto, west half	104 N/13, W. ½	1:50,000	First edition.

AIR DIVISION

## *Air Division*



Anson Aircraft, taken from approximately 10,000 feet. This is the type of aircraft used by the Air Survey Division. Illustrated below is an example of air photography taken from the Anson.



Waneta Power Dam, junction of Pend d'Oreille and Columbia Rivers.  
Altitude 7,200 feet above sea-level.

## AIR DIVISION

W. HALL, P.ENG., B.C.R.F.

During the calendar year 1955 the work and accomplishment of the Air Division continued in much the same general pattern as during 1954.

Flying operations to obtain 40-chains-to-1-inch basic vertical photography for the forest inventory programme were extended to the area north of Prince George in the Peace River drainage, with some rephotography of areas in the vicinity of the McGregor River where existing photography was unsuitable (*see* Appendix 4).

Poor weather was encountered in this northerly region and only sixteen days suitable for photography were obtained. As a result, only 18,000 square miles were covered with new photography.

Because of the scarcity of suitable photographic weather, as is apparent from meteorological records and from our own personal experience, and of the long distances from suitable airfields, causing much deadhead flying, in this northern part of the Province, it will be necessary to make full use of our two Anson V aircraft during the months of August and September in order to obtain the 30,000 square miles of new photography required each year. Other projects will have to be done before that time. This is a quite feasible arrangement providing requests for photography are submitted early in the year so the full season's programme can be planned well ahead.

Two 8-inch-focal-length narrow-angle Williamson cameras were rebuilt and fitted with Dallemeyer Pentac lenses early in the year at the Air Division instrument-shop. These were used to obtain large-scale photo coverage of some 5,000 square miles of public working circles for more intensive forest inventory work. The resulting photographs were of excellent quality and proved invaluable, not only to Forest Surveys, but also to Forest Engineering for road-location work.

Apart from the major job of obtaining photographs for Forest Surveys, many other projects in various parts of the Province were completed, including coverage of new road construction for map revision, special photography for multiplex mapping, rephotographing areas requested by the Taxation Branch for assessment work, a complete coverage of the route of the proposed road from Dease Lake to Stewart, and identification photographs of triangulation stations in the north-east section of the Province.

Two areas were photographed—one near Smithers and the other near Dog Creek—using a Wilde RC 5 cartographic camera which had been loaned to us by the National Research Council. This project was carried out at the request of the National Research Council to test its camera, and in return will compile maps of the two areas which will serve as checks against our own existing topographic maps.

A total of 508 hours of flying-time was accomplished during the season by the two aircraft, which is the highest total of any year to date. It is significant that only 224 hours were spent on large- and small-scale block vertical photography for the Forest Surveys, which shows the increasing demand on the Air Division for photography of special requirements by other branches of the Lands Department and other departments of the Government.

In the office the mapping programme continued much the same as during 1954, with the addition of the preparation of principal point lay-downs of the large-scale photographs mentioned above. These were plotted at a scale of 20 chains to 1 inch and were tied in to the existing 40-chains-to-1-inch interim maps so the two series will be in sympathy.

A total of 43,000 square miles of 40-chains-to-1-inch interim maps were completed during the year, almost up to last year's record output (*see* Appendix 5A).

In the Multiplex Section 968 square miles of large-scale contoured maps were produced—205 square miles for the Fraser River Board, 194 square miles for the Water Rights Branch, 539 square miles for the Forest Service Engineering Division, and 30 square miles for the British Columbia Power Commission.

The maps for the Forest Engineering Division involved a departure from normal procedure of topographic mapping by use of the multiplex. As the maps were required early in the summer by the field parties responsible for road location, no time was available to establish the ground control, either horizontal or vertical, necessary to produce maps to standard specifications. However, an examination of the required areas indicated that by using existing triangulation stations and levelled traverse routes for vertical and horizontal control, and the 40-chains-to-1-inch interim maps to hold over-all scale, maps could be produced at a scale of 20 chains to 1 inch, with a 50-foot contour interval, which would be quite suitable for the purpose. This procedure was adopted, and judging by reports from the field location parties it would appear that a quite satisfactory answer was obtained.

It is unfortunate that expedients such as this must be resorted to in order to meet dead-lines set by the field crews, but it would appear that the time element will always be the deciding factor in many of these projects, and that it will be necessary for us to produce this type of map to serve the needs. Reconnaissance maps might be an appropriate title for them.

The controlled photo mosaics covering Richmond Municipality mentioned in last year's Report were completed early in the year.

The total Air Photo Library traffic for loans and reprints remained about the same as for 1954, with a decrease in requests from Government agencies more than offset by an increase in requests from private companies and individuals. These latter totalled 48,698 prints, as compared to 31,570 during 1954.

As a follow-up to the rebuilding and calibration of the Eagle V air-survey cameras which was completed last year, work was started during 1955 on reconditioning and calibrating the allied optical equipment consisting of the reduction printer for diapositive plates and the individual projectors on the multiplex plotters.

The principle behind this work is to ensure that the combination of the three optical systems involved—namely, the air-survey cameras used to obtain the original negative, the reduction printer for making the diapositive plates from the original negatives, and the multiplex projector units that enlarge the diapositive plates on to the mapping-table—all combine to produce an undistorted final model of the ground area originally photographed.

Work is still in progress, and so far the results are most encouraging and indicate that basically our equipment is sound and that with a few minor modifications, well within our ability to handle, the efficiency and accuracy of our mapping equipment can be materially improved.

At the 1954 meeting of the International Society of Photogrammetry, held in Rome, it was decided to establish a test mapping area in France and invite interested mapping organizations to participate in a comparative mapping test with a view to obtaining data on the accuracies and costs of mapping using different types of cameras and plotting-machines.

It was felt that participation in such a test would be most valuable to the Air Division as it will provide, in effect, a measure of the accuracy we can expect from our equipment.

Accordingly, arrangements were made with the Institut Geographique National in Paris to have the test area photographed using one of our air-survey cameras. This was done and the resulting negatives, developed in our own laboratory, are of very good quality, and the actual mapping will be commenced as soon as time is available.

During the year three senior personnel—C. A. Matson, B.C.L.S., E. A. Rothery, F.R.I.C.S., B.C.L.S., and W. K. MacDonald, D.L.S.—left the Division for positions outside the Government, necessitating some reallocation of duties and responsibilities within the Division. It is difficult for an organization such as the Air Division, with its many and varied activities, to maintain a rigid organization, and it has been found necessary to distribute the work to conform with the abilities and experience of available personnel in order to maintain a workable unit.

Nine other personnel left the Division during the year, making a total of 16 per cent of the staff requiring replacement.

During the year, arrangements were made by the Government to rent Hangar No. 1 to Pacific Western Airlines and to turn over all servicing of aircraft to that company. As a result of this, our two aircraft mechanics left the Division to join Pacific Western Airlines. In view of this change, plans are being made to move the instrument-shop from Patricia Bay to a location near the head office in Victoria to facilitate administration.

For further details of Air Division activities during 1955, reference should be made to the separate reports and appendices that follow.

## AIR OPERATIONS

By A. S. LUKINUK

The 1955 field season produced a notable variation in photographic accomplishment, indicative of the limitations to which flying operations are subjected in northern latitudes of the Province.

Eighteen thousand square miles of new cover completed in the Peace River, Tête Jaune, and Atlin areas represents a near-maximum effort on the part of both Anson detachments to extend basic vertical cover into these regions. The average output of the past few seasons—well above this figure—illustrates the advantages that were enjoyed in Southern British Columbia, where a fairly selective range of airfields and weather-reporting stations, as well as generally more favourable weather and maintenance facilities, enabled the air crews to operate with comparative ease. Although the persistence of snow on higher ground delayed this phase of the summer's operations until mid-July, the 16,000 square miles completed in the Peace River drainage were sufficient to provide our base-mapping staff with two sizeable laydowns (including low-level photographic identification of triangulation control points within the areas).

However, as restrictions impaired progress with the main priority of basic vertical cover, both aircraft were able to undertake a full programme of special miscellaneous projects, completing an unusually large number of these requests, as was opportune. The 282.22 aircraft hours spent on this phase of the operations—a record accomplishment—represent 55 per cent of the total flying for the season.

Forest Service demands for special large-scale photography were a primary alternative to the block vertical programme. A total of 6,197 exposures, taken with an 8-inch lens cone at a scale of 20 chains to 1 inch, provided photographic cover for detailed forest interpretation in public working circles throughout the Province, and an additional 954 reconnaissance photographs of access roads and bridge-sites were provided as required for allied engineering projects. These demands for which special cover was completed involved sixteen separate areas of activity. Total of areas flown, by districts, is as follows: Prince Rupert, 950 square miles; Prince George, 3,191 square miles; Kamloops, 250 square miles; and Nelson, 460 square miles.

The combined total of 4,851 square miles of large-scale photographic cover was procured at a unit cost of \$4.24 per square mile, plus 324 lineal miles of reconnaissance cover at a unit cost of \$10.14 per lineal mile.

Special photographic cover was also provided for multiplex mapping projects and survey crews engaged in the field control necessary for these areas. A total of 2,590 exposures were taken to specifications as required for irrigation, pondage, dam-sites, town planning, or contouring. The eighteen separate projects completed cover an area of 2,433 square miles in the Okanagan and Kootenay Valleys, Cariboo Mountains, Babine Lake, Lower Fraser Valley, and Saanich Peninsula, and 931 lineal miles along the Fraser River watershed.

Fifteen additional miscellaneous projects were flown, the most notable being reconnaissance photography of the proposed highway route extending from Dease Lake to Stewart.

Total cost of air operations, including salaries, amounted to \$73,138.97, an increase of less than 1 per cent over the 1953 and 1954 seasons.

For details of 1955 air operations costs and accomplishment *see* Appendices 6 and 7.

As the scene of photographic activity progresses northward into the remotest regions of the Province, several normal operating factors become critical enough for special consideration. Foremost amongst these is the extended range of operation, adding to time-consuming deadhead flying and risk to air crew personnel in event of aircraft failure hundreds of miles from the nearest emergency airstrip. The possibility of establishing a suitable landing-strip in the vicinity of Dease Lake is currently under investigation with the Department of Transport. The acquisition of long-range V.H.F. radio equipment and a recently developed search and rescue homing unit are strongly recommended.

## PROCESSING LABORATORY

By T. H. BELL

The total output of the Processing Laboratory was slightly higher than that of 1954, with much the same general distribution of product.

The ventilation of the darkrooms, which has never been satisfactory, is currently the subject of serious study, and it is hoped that alterations in the present arrangement of sinks, fans, and printers can be made early in 1956 to greatly improve the situation.

Reference should be made to the following tabulation for detail of production:—

### PRODUCTION RECORD

	1946-50	1951	1952	1953	1954	1955 <sup>1</sup>	Grand Totals, 1946-55
Processing completed—							
Air films (Eagle V rolls, averaging 115 exposures).....	1,010	192	161	163	161	168	1,855
Air films (tests—part rolls).....	—	—	—	—	13	14	27
Air films (K 20 rolls, averaging 40 exposures).....	—	2	13	8	4	5	32
Mountain-station films <sup>2</sup> (6 exposures each).....	542	830	605	235	183	115	2,510
Printing completed—							
Standard prints (5 by 5 inches enlarged to 9 by 9 inches)....	238,867	112,435	165,976	151,249	136,342	138,000	942,869
Contact prints (5 by 5 inches).....	39,370	921	135	1,201	715	450	42,792
Contact prints (large to 20 by 24 inches).....	—	—	—	102	459	550	1,211
Enlargements (various sizes to 30 by 30 inches).....	3,079	1,849	1,568	2,457	1,135	860	10,948
Mountain-station enlargements <sup>2</sup> (11 by 14 inches).....	3,297	4,656	3,445	1,788	48	400	13,634
Lantern-slides (2 by 2 inches).....	96	78	3	119	35	15	346
Autopositive films (various sizes to 30 by 40 inches).....	88	185	100	278	1,859	1,650	4,160
Miscellaneous photographs, copies, and Kelsh plates.....	164	84	114	91	94	100	647
Positives (films or glass plates).....	—	—	—	203	25	60	288
Requisitions completed.....	2,451	1,446	1,569	1,726	2,215	2,400	11,807

<sup>1</sup> Estimated.

<sup>2</sup> For Topographic Survey Division.

### MULTIPLEX SECTION

Requests for large-scale topographic maps prepared by use of the multiplex plotters increased during the year to an extent well beyond the capacity of existing equipment and trained personnel.

Ten full-time operators, working in two shifts, plus two trainees, one photographer for processing diapositive plates, and one supervisor are employed in this Section, making up 20 per cent of the total strength of the Air Division.

One of the problems encountered in this phase of the work of the Division is the constant need to train new operators, which normally requires about six months, to replace

experienced personnel leaving to go to private companies engaged in the same type of work. During 1955 two such experienced operators left the Section.

During the year the Section moved to new quarters especially built to house the multiplex equipment. These have proved very satisfactory in all respects.

The mosaics of Richmond Municipality mentioned in last year's Report were successfully completed early in the year, together with standard mapping projects as listed in the following summary:—

Square Miles	Project	Authority	Scale	Vancouver Island	State of Completion
				Ft.	Per Cent
346.0	Morice Lake.....	Forest Engineering Division.....	1: 1,000	50	100
193.0	Naver Creek.....	Forest Engineering Division.....	1: 1,320	50	100
20.8	Chilcotin River.....	Water Rights Branch.....	1: 500	20-40	100
1.0	Gaspard Creek.....	Water Rights Branch.....	1: 500	20-40	100
3.8	Churn Creek.....	Water Rights Branch.....	1: 500	20-40	100
140.0	Hobson Lake.....	"Prairie Farms Rehabilitation Act"	1: 1,000	50	25
128.0	Moran-Lytton.....	Water Rights Branch.....	1: 500	20-40	100
57.8	Penticton-Osoyoos.....	Water Rights Branch.....	1: 500	5, 10, 20	100
33.4	Kelowna.....	Water Rights Branch.....	1: 500	5, 10, 20	100
12.0	Westbank.....	Water Rights Branch.....	1: 500	5, 10, 20	100
29.3	Creston.....	Water Rights Branch.....	1: 500	5, 10, 20	100
51.4	Clearwater River.....	"Prairie Farms Rehabilitation Act"	1: 500	20-40	100
				50-100	
30.0	Dam-sites (various).....	British Columbia Power Commission.....	1: 660	20-40	100
0.6	Taghum.....	Water Rights Branch.....	1: 300	5, 10, 20	100
61.2	Richmond Municipality.....	Water Rights Branch.....	1: 200	Spot heights	100
			(mosaic)		

The two projects for Forest Engineering—Morice Lake and Naver Creek—were not done to the standard normally set for this type of mapping as time was not available to establish the necessary ground control.

However, with the control available and by using water-bodies for levelling and the 40-chains-to-1-inch interim maps for over-all scale, maps suitable to the purpose were compiled.

#### INSTRUMENT-SHOP

The instrument-shop at Patricia Bay Airport handled a wide variety of projects during the year.

Forty-six field transits and levels and twenty-two barometers were repaired and adjusted, two 8-inch-focal-length Williamson cameras were rebuilt and fitted with reconditioned Dallmeyer Pentac f.2.9 lenses, and twenty-seven multiplex projectors were tested and adjusted. Work was started on fitting a Forest Service epidiascope with an automatic focus linkage, and it would appear at this stage that a practical solution can be obtained to this problem using the Peaucellier inversor principle.

#### AIR PHOTO LIBRARY

BY R. J. COSIER

Demands for reprints of standard British Columbia Government air photographs in 1955 will reach an estimated 140,000. This will by no means approach the 1952 figure, which reached a record 165,976, but will surpass the 1954 total by nearly 15,000. This increase compensated for a reduction in the number of loan photographs handled this year.

The total number of prints issued on loan during the year was down 11,000 from the 52,349 total of 1954. This decrease is entirely accounted for by reduced demands on the part of Provincial Government departments. Actually the loans to individuals and private companies increased some 4,000 prints, from 15,262 to 19,111.

Standing out in the breakdown of orders for standard reprints are the heavy demands for photographic work made by the public in 1955. The estimated figure of 30,000 for

this year is nearly double the 1954 total. Forest industries, as usual, top the list with a demand for 7,722 photographs. Private individuals ordered 5,089 copies for their personal use, and the balance was requested by companies and organizations.

In this latter category came many varied requests from unusual sources. Most unusual, perhaps, was the letter from a committee in Summerland. This committee plans to reproduce contact prints on table mats and other items in conjunction with the celebration of Summerland's golden jubilee in 1956.

A writer preparing a brief for the Royal Canadian Flying Club Association in connection with a proposed satellite airport sought photographs of English Bay and Spanish Banks in Vancouver.

Another man wrote for a photograph because he believed someone was building on his island lot in error. Still another desired photographs in certain areas of the Province in his task of making gold-placer summaries, while a member of the Marine Medical Mission wanted an enlargement of Thetis Island as he prepared to make a soil and type map of the island.

Uses of aerial photographs have been highlighted in previous Reports and, except for the few examples above, a repetition of these uses will not be made. However, reference should be made to the emergence of the air photograph into a new field as outstanding exhibits in legal cases. They have been used in Court of Appeal exhibits, in determining the nature of trespasses made on private property, in right-of-way legal suits, and for other legal purposes.

Correspondence into the Air Photo Library remains at a high level. This being the case, the Library was divided into two functional sections during the past twelve months. This was in the form of an experiment but is likely to continue.

The Reference Section, under the guidance of K. S. Walker, continued to provide service to visitors to the Library. During visits, customers are given an analysis of air photographs, many of which are purchased or borrowed. Telephone calls, including many long-distance calls and radiograms from the British Columbia Forest Service, are received and acknowledged by this Section. Accurate ledgers, film reports, and a well-defined special file are of assistance in providing ready information on altitudes, scales, and interesting photographs. In the early months of the year the shipper was changed constantly, with accompanying difficulties. This situation rapidly improved with the appointment of a permanent shipper during the peak summer period.

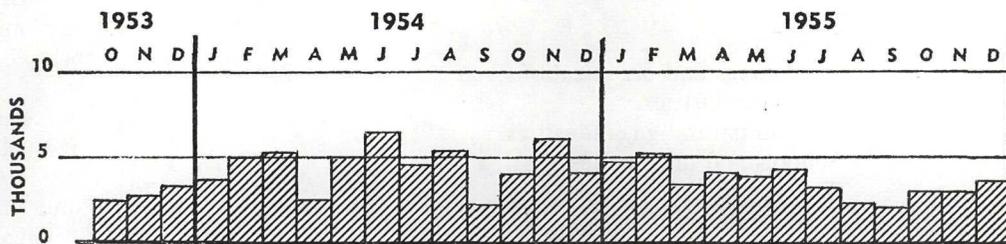
To facilitate the handling of large volumes of mail, a Correspondence Section was introduced, whereby the incoming mail could be handled without interruption. This Section handled letters, telegrams, etc. A permanent stockroom clerk-typist was added in April, greatly improving the efficiency of Library files and cardex indices. This Section recorded the flow of Library traffic and compiled monthly and annual report figures. Approximately from 250 to 300 letters per month are received.

In yet another section, indexing on autopositive bases was carried out. This indexing, we are happy to relate, kept well abreast of the processing, and 1955 photographs were therefore available for early release to the public and to official sources.

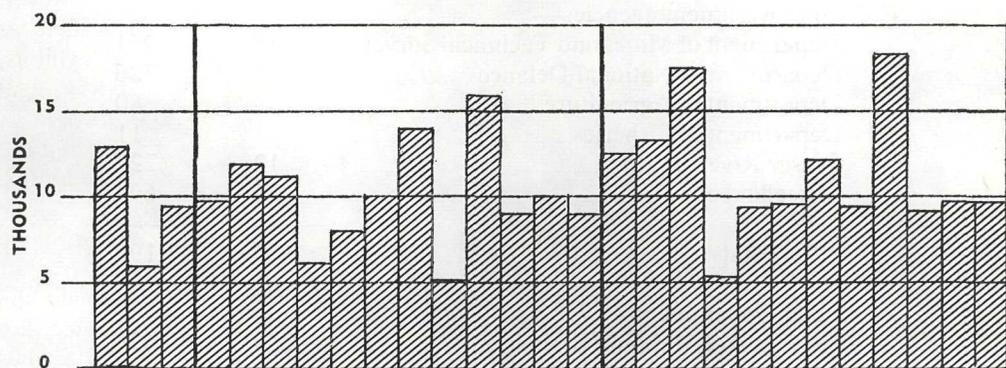
For the first time since the Air Photo Library opened its doors in 1946, there are more British Columbia Government photographs on file than Canadian Government photographs.

For new photography obtained during 1955, reference should be made to Appendix 4 following this report.

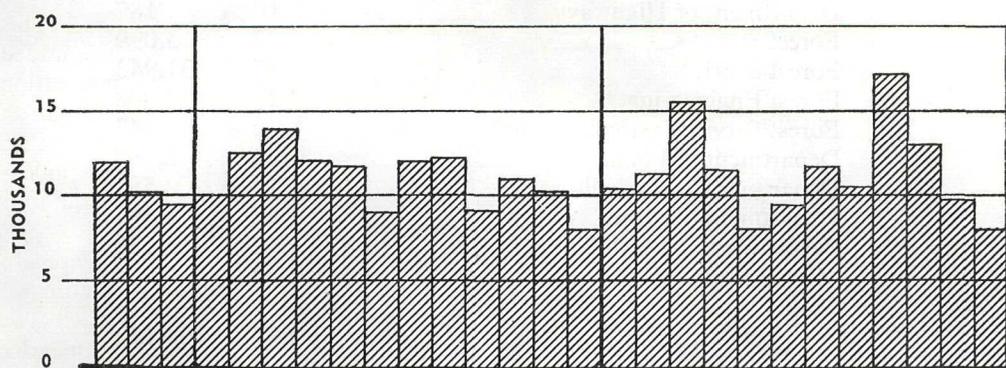
AIR PHOTO LIBRARY TRAFFIC



LOANS FROM LIBRARY



DEMANDS FOR REPRINTS



PRODUCTION OF 9" X 9" PRINTS

## DEPARTMENT OF LANDS AND FORESTS

ORDERS FOR STANDARD PRINTS (9 BY 9 INCHES) FROM BRITISH  
COLUMBIA AIR-PHOTO NEGATIVES, 1955

	Photographs	
	Requisitions (Estimated)	Reprints (Estimated)
<b>Private—</b>		
Individuals.....	541	5,089
Companies and organizations.....	231	7,088
Mining industries.....	59	2,997
Oil and natural-gas industries.....	15	2,161
Schools and universities.....	35	1,915
Towns and cities.....	22	701
Real-estate companies.....	29	225
Commercial air-survey companies.....	58	2,771
Forest industries.....	258	7,722
<b>Totals.....</b>	<b>1,248</b>	<b>30,669</b>
<b>Federal Government agencies—</b>		
Department of Mines and Technical Surveys.....	16	961
Department of National Defence.....	12	726
Department of Agriculture.....	8	80
Department of Fisheries.....	1	11
Fraser River Board.....	12	727
Miscellaneous.....	26	694
<b>Totals.....</b>	<b>75</b>	<b>3,199</b>
<b>Provincial Government—</b>		
Surveys and Mapping Branch.....	259	30,633
Library copies.....	23	13,144
Land Inspection Division.....	22	2,736
Water Rights Branch.....	38	1,172
Lands Branch (miscellaneous).....	5	19
Department of Public Works.....	13	130
Department of Highways.....	10	187
Forest Surveys.....	33	13,099
Forest districts.....	67	31,943
Forest Engineering.....	28	3,008
Forest Service (miscellaneous).....	32	443
Department of Finance.....	63	2,667
Department of Agriculture.....	13	581
Department of Mines.....	27	3,397
Pacific National Exhibition.....	2	139
Miscellaneous.....	42	834
<b>Totals.....</b>	<b>697</b>	<b>104,132</b>
<b>Grand totals.....</b>	<b>2,020</b>	<b>138,000</b>

## LOAN TRAFFIC, 1955

	Photographs	
	Issued (Estimated)	Returned (Estimated)
<b>Private—</b>		
Individuals.....	5,041	4,436
Companies and organizations.....	3,798	4,208
Mining industries.....	445	275
Oil and natural-gas industries.....	217	217
Schools and universities.....	1,302	1,559
Towns and cities.....	257	220
Real-estate companies.....	168	229
Commercial air-survey companies.....	1,780	1,242
Forest industries.....	6,103	5,922
Totals.....	19,111	18,308
<b>Federal Government agencies—</b>		
Department of Mines and Technical Surveys.....	864	864
Department of National Defence.....	106	139
Department of Agriculture.....	104	101
Department of Fisheries.....	329	329
Fraser River Board.....	326	738
Miscellaneous.....	127	66
Totals.....	1,856	2,237
<b>Provincial Government—</b>		
Surveys and Mapping Branch.....	9,769	9,934
Land Inspection Division.....	166	464
Water Rights Branch.....	2,000	1,666
Lands Branch (miscellaneous).....	32	43
Department of Public Works.....	298	292
Department of Highways.....	347	178
Forest Surveys.....	190	445
Forest districts.....	343	366
Forest Engineering.....	741	594
Forest Service (miscellaneous).....	2,352	2,522
Department of Finance.....	256	226
Department of Agriculture.....	186	178
Department of Mines.....	1,729	2,088
Miscellaneous.....	2,081	2,273
Totals.....	20,490	21,269
Grand totals.....	41,457	41,814

## DEPARTMENT OF LANDS AND FORESTS

## SUMMARY OF LOAN TRAFFIC, 1955

	Issued	Returned
Out on loan, December 31st, 1954.....	4,770	-----
Loaned out during 1955.....	41,457	-----
Returned during 1955.....	-----	41,814
<b>Totals, December 31st, 1955.....</b>	<b>46,227</b>	<b>41,814</b>
Net photographs out on loan, December 31st, 1955.....	-----	4,413
<b>Totals.....</b>	<b>46,227</b>	<b>46,227</b>

## LIBRARY COPIES OF AERIAL PHOTOGRAPHS OF BRITISH COLUMBIA

	Federal	Provincial	Total
On hand, December 31st, 1954.....	206,293	195,848	402,141
Accessions, 1955.....	-----	13,144	13,144
Total photographs of British Columbia on hand, December 31st, 1955.....	206,293	208,992	415,285

## APPENDICES

## APPENDIX 6.—1955 AIR OPERATIONS COSTS AND DISTRIBUTION

*Flying Operations*

	Total Cost
Aircraft operations (salaries—pilots and engineers; field expenses—pilots and engineers; field transport; gas and oil; oxygen; insurance—personnel and aircraft; miscellaneous).....	\$21,997.17
Aircraft maintenance and overhead (salaries—engineers; hangar—rental and utilities; equipment and parts; material and supplies; services; miscellaneous).....	16,289.14
Administration and organization (general administration and operations organization).....	4,371.36
	<hr/>
Total, flying operations.....	\$42,657.67
	<hr/> <hr/>

*Photographic Operations*

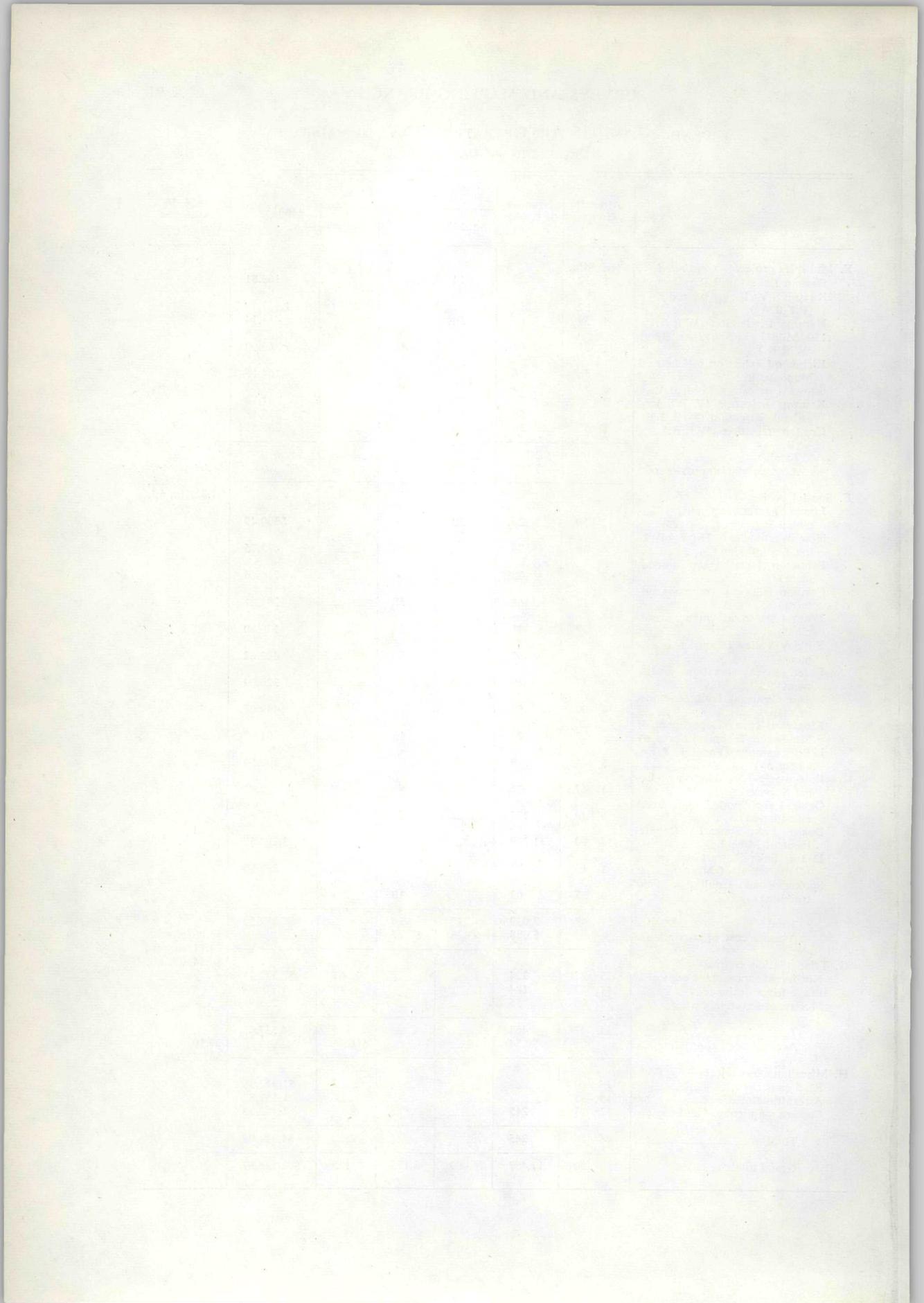
Field operations (salaries—navigator and camera operator; field expenses—navigator and camera operator; field transport; air film; insurance — personnel; miscellaneous).....	\$15,353.46
Camera maintenance (salaries; equipment and parts; material and supplies).....	5,514.99
Processing and prints (dark room—development; air photo library—annotation and prints (one set 9 by 9 inches)).....	5,241.49
Administration and organization (general administration and operations organization).....	4,371.36
	<hr/>
Total, photographic operations.....	\$30,481.30
	<hr/> <hr/>
Grand total.....	\$73,138.97
	<hr/> <hr/>

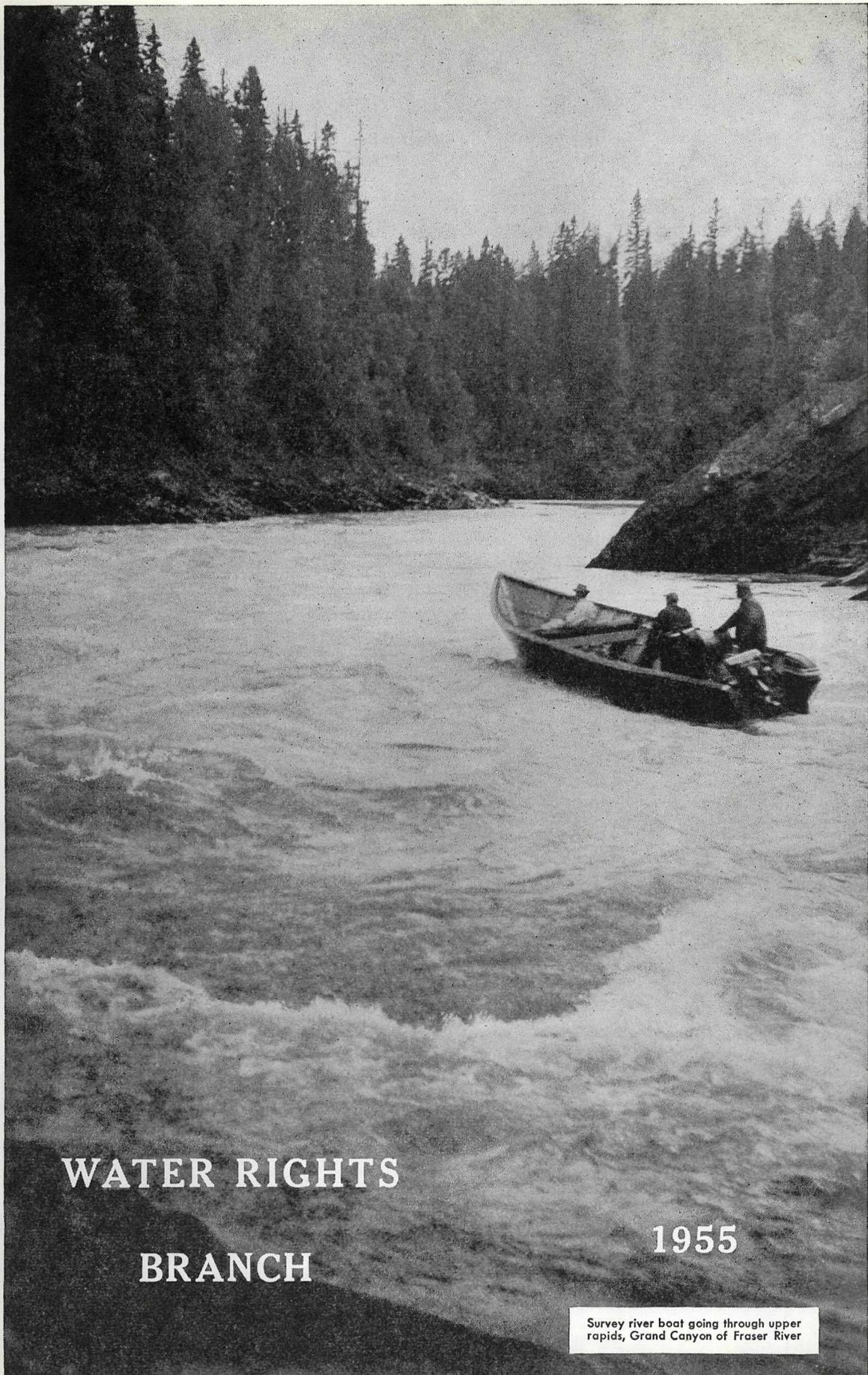
## APPENDIX 7.—1955 AIR OPERATIONS COST SUMMARY BY PROJECTS

	Aircraft Hours	Number of Photos	Accomplishment			Total Cost	1951-54 Averages
			Sq. Mi.	Lin. Mi.	Stations		
<b>A. Basic vertical cover (approximately 40 chains to the inch)—</b>							
	Hr. Min.						
1. Peace River drainage.....	114 40	4,275	16,000	-----	-----	\$17,052.61	
Tête Jaune.....	10 28	409	1,000	-----	-----	1,593.20	
Atlin.....	2 00	-----	-----	-----	-----	167.66	
Victoria-Saanich, revision.....	8 10	295	1,500	-----	-----	1,200.89	
Total.....	135 18	4,979	18,500	-----	-----	\$20,014.36	
Average cost, approximate.....	-----	\$4.02	\$1.08	-----	-----	-----	\$4.25/photo, \$1.44/sq. mi.
2. Improvement flying.....	-----	-----	-----	-----	-----	-----	
<b>B. Basic tricamera control.....</b>							
<b>C. Forest Inventory projects (approximately 20 chains to the inch)—</b>							
Willow River—field photographs.....	10 16	386	324	-----	-----	\$1,536.18	
Willow River-Purden Lake.....	22 36	1,300	1,070	-----	-----	4,156.51	
Naver Creek.....	3 47	247	136	-----	-----	749.38	
Carp Lake-Chief Lake.....	17 04	1,123	950	-----	-----	3,395.93	
Cottonwood River.....	15 00	818	525	-----	-----	2,688.90	
Polley Lake.....	7 43	360	250	-----	-----	1,276.92	
Babine Lake.....	10 52	812	650	-----	-----	2,331.96	
Morice Lake.....	5 16	388	300	-----	-----	1,120.53	
Hallmark Creek-Kianuko Creek.....	3 04	239	125	-----	-----	675.36	
Summit Creek.....	6 18	203	120	-----	-----	883.38	
Windermere Creek.....	1 51	111	75	-----	-----	349.33	
Cochrane Creek.....	1 31	101	70	-----	-----	303.92	
Palliser River.....	1 31	109	70	-----	-----	317.92	
Total.....	106 49	6,197	4,665	-----	-----	\$19,786.22	
Average cost, approximate.....	-----	\$3.19	\$4.24	-----	-----	-----	\$7.18/photo, \$7.09/sq. mi.
<b>D. Forest Engineering projects—</b>							
Willow River bridge-sites.....	2 32	46	-----	36	-----	\$292.84	
Willow River road.....	3 23	51	-----	30	-----	372.85	
Stuart Lake road.....	3 41	147	185	-----	-----	565.99	
Carp Lake road.....	3 01	59	-----	50	-----	356.17	
Carp Lake bridge-sites.....	1 06	39	-----	12	-----	160.46	
Bowron River road.....	5 29	342	-----	55	-----	1,058.13	
Summit Creek road.....	1 25	57	-----	36	-----	218.54	
Palliser River road.....	1 25	73	-----	30	-----	246.54	
Babine Lake road.....	1 51	73	-----	45	-----	282.84	
White River road.....	1 31	31	-----	20	-----	181.42	
Hallmark Creek road.....	--- 45	30	-----	10	-----	115.37	
George Creek flood.....	--- 30	6	1	-----	-----	52.42	
Total.....	26 39	954	186	324	-----	\$3,903.57	
Average cost, approximate.....	-----	\$4.09	\$3.32	\$10.14	-----	-----	
<b>E. Multiplex projects—</b>							
Sinclair Mills-Loos (W.R.B.).....	6 34	256	-----	140	-----	\$998.51	
Giscome Canyon (P.F.R.A.).....	--- 30	56	-----	9	-----	139.92	
Giscome pondage (P.F.R.A.).....	4 49	123	-----	45	-----	619.06	
McGregor River dam-site (P.F.R.A.).....	--- 35	11	-----	3	-----	68.12	
McGregor River pondage (P.F.R.A.).....	1 14	24	-----	28	-----	145.36	
McGregor River (1954) (P.F.R.A.).....	3 18	68	-----	60	-----	395.64	
Hobson Lake dam-site (P.F.R.A.).....	4 37	113	-----	11	-----	584.79	
Hobson Lake pondage (P.F.R.A.).....	14 47	126	-----	50	-----	1,459.80	
Babine Lake P.W.C. (Forest Engineering).....	3 46	137	650	-----	-----	555.54	
Willow River-Purden Lake P.W.C. (Forest Engineering).....	18 13	454	1,500	-----	-----	2,321.68	
Royal Oak (Town Planning Commission).....	1 25	83	35	-----	-----	264.04	
Lytton-Moran pondage (W.R.B.).....	10 30	495	-----	300	-----	1,746.47	

APPENDIX 7.—1955 AIR OPERATIONS COST SUMMARY BY PROJECTS—Continued

	Aircraft Hours	Number of Photos	Accomplishment			Total Cost	1951-54 Averages
			Sq. Mi.	Lin. Mi.	Stations		
<b>E. Multiplex projects—Continued</b>	Hr. Min.						
Dragon Lake (W.R.B.)	1 32	20	14	—	—	163.51	
Raush Valley pondage (P.F.R.A.)	7 32	232	—	240	—	1,037.49	
Naramata irrigation (W.R.B.)	3 59	67	50	—	—	451.14	
130 Mile Lake-San Jose River (W.R.B.)	2 21	68	—	45	—	316.00	
Richmond extension (Richmond Municipality)	1 50	6	2	—	—	164.16	
Osoyoos irrigation (W.R.B.)	2 33	99	85	—	—	387.02	
Kelowna irrigation (W.R.B.)	2 50	71	50	—	—	361.74	
Westbank irrigation (W.R.B.)	2 17	25	12	—	—	235.13	
Creston irrigation (W.R.B.)	1 53	56	35	—	—	255.85	
Total	97 05	2,590	2,433	931	—	\$12,670.97	
Average cost, approximate	—	\$4.89	\$2.12	\$8.07	—	—	\$4.08/photo, \$6.64/sq. mi., \$7.82/lin. mi.
<b>F. Special projects—</b>							
Lower Fraser gap strip (Regional Planning)	2 50	36	20	—	—	\$300.49	
New Westminster-Hope (Dyking Commission)	4 20	74	—	84	—	492.75	
Penticton River (map amendment)	2 00	28	—	4	—	216.66	
Cariboo Highway (map amendment)	3 17	68	—	58	—	394.21	
Trout Lake road (map amendment)	1 27	11	—	10	—	140.80	
Bulkley Valley (taxation assessment)	2 53	92	—	70	—	402.68	
Peace River (taxation assessment)	2 52	49	200	30	—	326.09	
Nelson-Castlegar-Trail (composite maps)	4 00	65	—	45	—	449.08	
Kingsgate-Ryan (Department of Mines and Technical Surveys)	— 37	23	—	16	—	91.97	
U.B.C. campus (Faculty of Engineering)	1 05	9	5	—	—	106.54	
Fort Steele-Elko Highway (Legal Surveys)	1 47	76	—	46	—	282.47	
Ootsa Lake flooded area (map amendment)	5 30	123	—	204	—	676.34	
Dease Lake-Stewart (Department of Mines)	14 00	1,219	—	300	—	3,294.67	
Dease Lake-Stewart tricamera (Department of Mines)	1 16	93	—	43	—	268.96	
Sooke Road (multiplex field training)	3 55	63	—	10	—	438.61	
Total	51 49	2,029	225	920	—	\$7,882.32	
Average cost, approximate	—	\$3.88	\$3.26	\$7.77	—	—	\$3.76/photo, \$4.11/sq. mi., \$6.34/lin. mi.
<b>G. Triangulation control—</b>							
North-east topographic control	25 25	224	—	—	67	\$2,522.71	
Peace River drainage	17 17	184	—	—	49	1,770.83	
McGregor River	2 00	55	—	—	9	263.91	
Total	44 42	463	—	—	125	\$4,557.45	
Average cost, approximate	—	\$9.84	—	—	\$36.46	—	\$9.10/photo, \$31.82/stn.
<b>H. Miscellaneous projects—</b>							
RC 5 camera test	15 40	—	—	—	—	\$1,313.36	
Aircraft maintenance	18 35	—	—	—	—	1,557.82	
Camera maintenance and testing	12 13	245	—	—	—	1,452.90	
Total	46 28	245	—	—	—	\$4,324.08	
Grand total	508 50	17,457	26,009	2,175	125	\$73,138.97	





**WATER RIGHTS**

**BRANCH**

**1955**

Survey river boat going through upper rapids, Grand Canyon of Fraser River

### Note 3

### THE WATER RIGHTS BRANCH

As the title of the Water Rights Branch suggests, the people and industries of British Columbia have a "right" to the "use" of water in this Province. At first reflection, the right to use water might be considered as basic as the right to use air or to admire the scenery. And so it is, but because it is a commodity which everyone must have, it becomes necessary for government to control its use or the "haves" would be making a great deal of money selling it to the "have nots." The Water Rights Branch is the agency of the Provincial Government which administers the control of the use of water. The Branch administers the "Water Act," which has been developed by legislation into an excellent administrative vehicle, used as a model in the initiation of other similar Acts in other countries.

The main principles of the "Water Act" are:—

- (1) The property in and the right to the use and flow of all water at any time in any stream in the Province are for all purposes vested in the Crown in the right of the Province.
- (2) Licence-holders have a right to the use of water under the terms and conditions of the licence.
- (3) A licence-holder's priority of right is generally based upon the date his application was recorded by a Water Recorder. Earlier licences have priority over licences issued later.
- (4) Retention of a water licence is dependent upon the beneficial use of the water, payment of the rentals, and observance of the regulations of the "Water Act." No one can adopt a "dog in the manger" attitude to this Province's water.
- (5) Every licence and permit that is made appurtenant to any land, mine, or undertaking shall pass with any conveyance or other disposition thereof. Ownerships of licences are therefore automatically transferred with their appurtenant land, mine, or undertaking.

The administration of the "Water Act" is carried out by the Comptroller of Water Rights. He and his staff are located at a headquarters office in Victoria, and at district offices in Victoria, Kamloops, Kelowna, and Nelson.

There is much correspondence, field investigation, and record-keeping of an exacting nature associated with this administration because all details of every application must be carefully reviewed before licences are issued. The filing and recording of all the mass of data associated with water use is, in itself, an assignment of no small magnitude.

Much of the vast industrial expansion presently occurring in this Province is associated with the use of British Columbia water, and the Government and its Civil Service are therefore called upon to assist and direct this expansion in the public interest.

The Water Rights Branch therefore has a technical function as well as an administrative one and is called upon to carry out many investigations and studies of a scientific nature. The fact that almost every executive in the Water Rights Branch is a professional engineer is indicative of the technical nature of the work. These executives of the Branch take active part on a number of important boards and committees dealing with the disposition of the Province's water resources.

The Comptroller of Water Rights has a technical staff consisting of a Deputy Comptroller and Chief, Operations Division; Chief, Hydraulic Investigations Division; District Engineers; Senior Hydraulic Engineers; Project Engineer; and a number of hydraulic engineers, technicians, and draughtsmen. This staff carries out many assignments in the irrigation, domestic water-supply, hydro-electric, dyking and drainage, and other fields.

**WATER RIGHTS BRANCH**

A. F. PAGET, M.E.I.C., P.ENG., COMPTROLLER OF WATER RIGHTS

## INTRODUCTION

The duties of the Water Rights Branch are twofold—to administer the “Water Act” and to carry out investigations dealing with the water resources of British Columbia.

To further these objects the establishment of the Branch was changed during the year to provide two separate divisions: (1) Operating Division and (2) Hydraulic Investigations Division.

Each of these divisions is supervised by a Chief Engineer, who is directly responsible to the Comptroller of Water Rights. The functions of the two divisions will be explained more fully in the following sections.

In addition to these divisions, the Comptroller is advised by the Branch Solicitor and the Project Engineer.

The Comptroller of Water Rights is required from time to time to be a member of certain advisory boards and committees and during the past year was a member of the following: (1) International Kootenay Lake Board of Control, (2) Fraser River Board (this replaced the former Fraser River Basin Board under new terms of reference), (3) Dominion-Provincial Co-ordinating Committee on Land Reclamation in British Columbia, (4) Western Snow Conference, and (5) British Columbia Natural Resources Conference.

In the course of administration of the “Water Act” the Comptroller is required, where necessary, to conduct hearings in regard to application for water licences of a contentious nature. Most important of these held during the past year was the hearing of objections to the application of Northwest Power Industries Limited to divert and use waters of the Yukon River, Teslin Lake, and Taku River for a proposed power development of enormous potential. This hearing was held in Atlin during August and was followed by an inspection of this general area by air, boat, and rail.

### OPERATIONS DIVISION

W. A. KER, B.A.Sc., M.E.I.C., P.ENG., DEPUTY COMPTROLLER AND CHIEF,  
OPERATIONS DIVISION

The Operations Division was established in July, 1955, under the direction of the Chief, Operations Division, and comprises the following:—

- (1) Four district offices, located at Nelson, Kelowna, Kamloops, and Victoria, each office staffed by a District Engineer, Assistant District Engineer, and clerk-stenographer, plus such additional temporary survey help as is required for surveys:
- (2) A Senior Hydraulic Engineer to supervise improvement districts and water-users' communities:
- (3) A Senior Hydraulic Engineer to supervise inspection of dams and other hydraulic structures (position not filled):
- (4) Water Rights draughting office, supervised by Chief Draughtsman:
- (5) General office staff, supervised by Chief Clerk.

The prime function of this Division is to carry out the administrative duties of the Water Rights Branch and to provide engineering assistance to improvement districts, water-users' communities, and individual licensees.

#### "WATER ACT" ADMINISTRATION STATISTICS

The following table provides statistical information illustrating the large volume of detailed work which the Operations Division has carried out during the year. For comparison purposes, certain statistics for the three previous years are also shown.

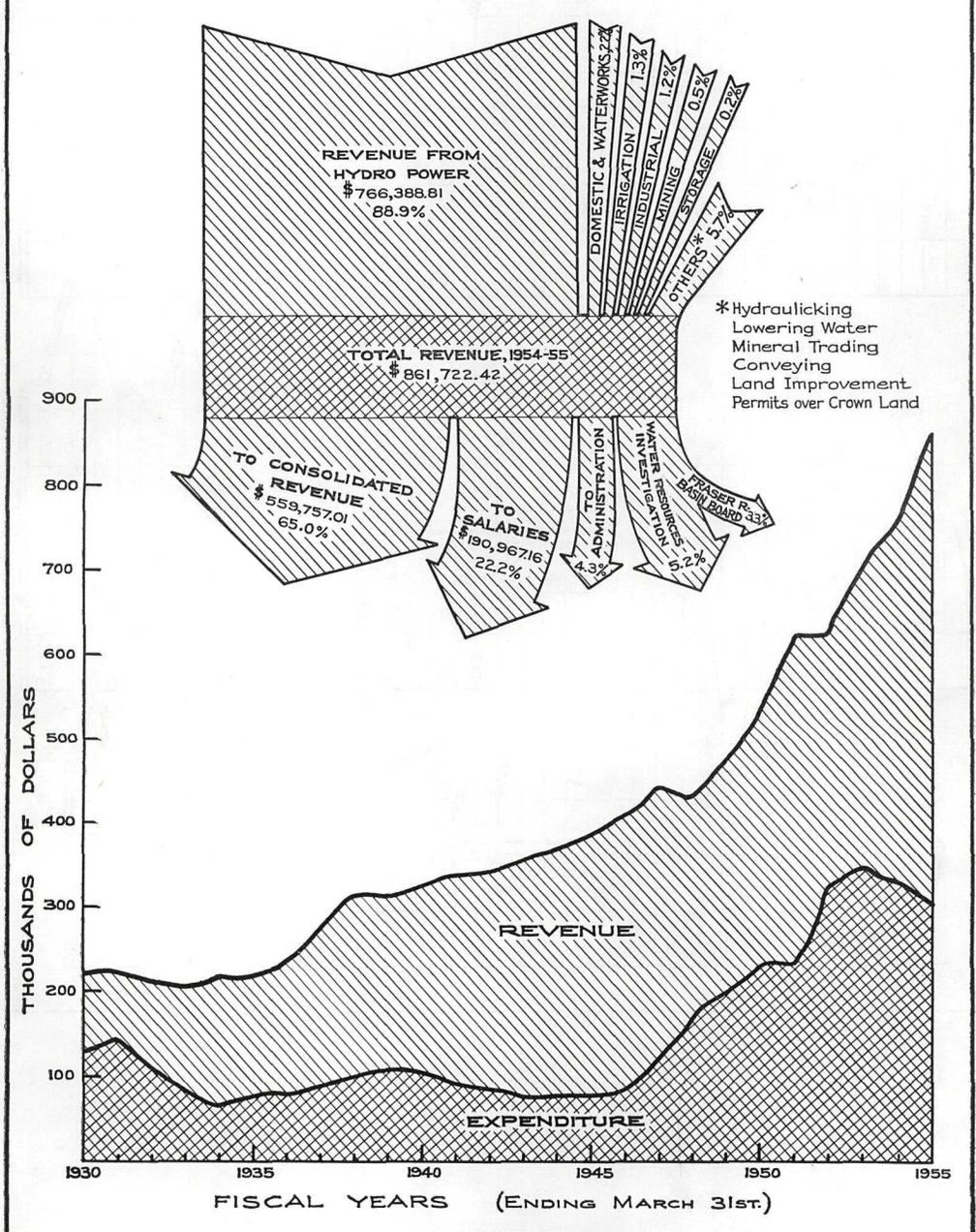
Certain of these statistics are also shown in a visual way, on Plates 1, 2, and 3.

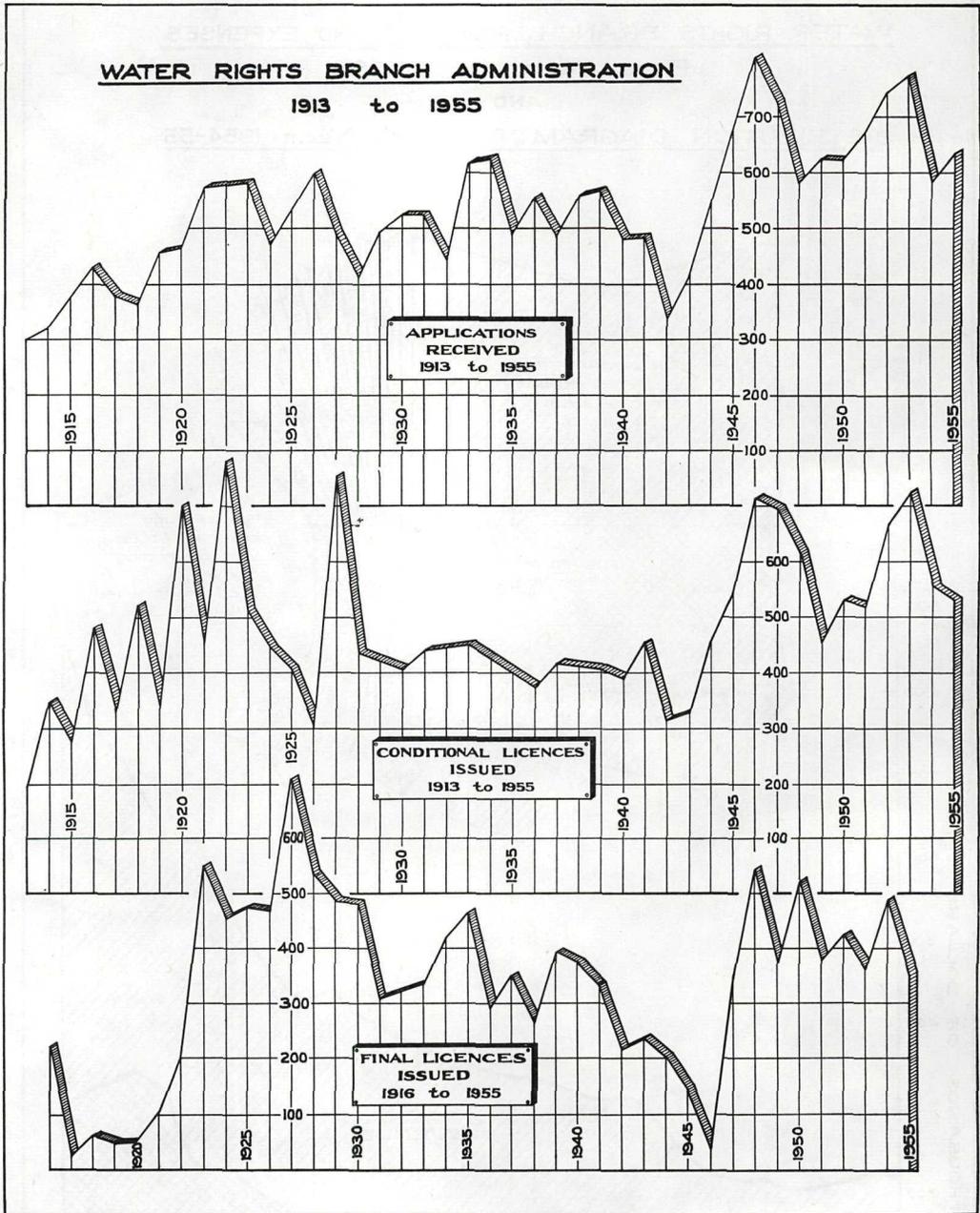
	1952	1953	1954	1955
Applications for licences.....	744	775	584	635
Applications for apportionments.....	23	30	17	48
Applications for change of appurtenancy.....	11	22	16	30
Applications for change of works.....	36	42	33	27
Applications for extension of time.....	397	422	490	544
Change of ownership.....	734	766	965	618
Cancellations and abandonments.....	183	292	327	205
Right-of-way over Crown lands.....	147	137	137	108
Total, November 1st to October 31st.....	2,275	2,486	2,569	2,215
Conditional licences issued.....	668	724	556	528
Final licences issued.....	425	363	485	347
Total licences issued, November 1st to October 31st.....	1,093	1,087	1,041	875

#### *Draughting-room*

Water applications cleared and platted on maps.....	635
Conditional-licence plats compiled and drawn.....	528
Final-licence plats compiled and drawn.....	347
Water-rights maps compiled and drawn.....	13
Water-rights maps revised.....	11
Reference maps renewed.....	39
Improvement-district maps compiled and drawn.....	8
Improvement-district maps revised.....	5
Water clearances (cancellations, change of ownership, extension of time).....	1,360
Land clearances (purchases, leases, revisions, Crown grants, timber sales, cancellations).....	6,000

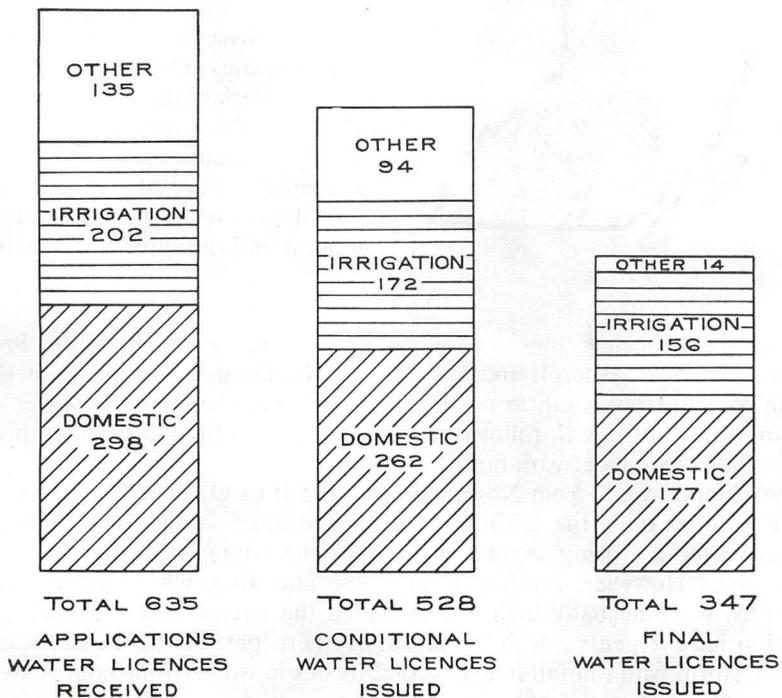
**WATER RIGHTS BRANCH, REVENUE AND EXPENSES**  
**Fiscal Years 1930 - 1955**  
**AND**  
**DISTRIBUTION DIAGRAM For Fiscal Year 1954-55**





**WATER RIGHTS BRANCH ADMINISTRATION**

Nov. 1<sup>st</sup>. 1954 to Oct. 31<sup>st</sup>. 1955



OTHER : Waterworks, Industrial, Power, Mining, Land Improvement, Storage & River Improvement.

## KAMLOOPS DISTRICT OFFICE

H. D. DEBECK, B.A., B.A.Sc., M.E.I.C., P. ENG., DISTRICT ENGINEER



The Kamloops office administers the "Water Act" throughout an area of approximately 75,000 square miles of Central British Columbia, comprising the drainage-basin of the Fraser River and its tributaries from Spuzzum up-stream, with the exception of the watersheds of the Shuswap River and the Stuart and Nechako Rivers above their confluence. This area is divided for administrative purposes into eight water districts—Ashcroft, Barkerville, Cariboo, Kamloops, Lillooet, Nicola, Prince George, and Quesnel. The City of Kamloops, although not at the geographical centre of this area, is near the centre of the Dry Belt, where the water use is greatest and the supply most critical.

## CLIMATE

As might be expected, the climate within this area varies widely. Precipitation ranges from 7 inches at Ashcroft and 10 inches at Kamloops to 40 inches at Barkerville, increasing in general from south to north and from lower elevations to higher elevations. Mean temperatures, in general, follow the same patterns, although both temperature and precipitation show wide local variations.

For the climatic year, from November 1st, 1954, to October 31st, 1955, based on figures for Kamloops only, the mean monthly temperature varied only slightly from the fifty-eight-year average, being slightly warmer in the winter and slightly cooler in the summer months. However, rainfall during June and July, which are normally heavy rainfall months, was unusually high and provided the stream-flow required to meet the main irrigation requirements. Rainfall in the northern part of the district was excessive in June, and a storm with rainfall in excess of 2 inches in twenty-four hours caused serious damage in the Quesnel area.

The critical factor in the water-supply picture is the flow during the late summer in the small streams, which are the main source of the water-supply for domestic and irrigation purposes, and this is greatly affected by variations in climate from year to year. Although precipitation was only 62 per cent of average, no serious shortages were experienced in irrigation streams during the summer of 1955. This appears to have been due to the unusually late spring, to heavy rains during the early part of the summer, and to a large carry-over of water in storage reservoirs from the preceding season.

## WATER USE

The types of use to which water is put in the Kamloops District are as varied as the district itself. In the southern area, irrigation is of primary importance; in the north, industrial use of water by the logging industry is the most important; in the Barkerville District and the mining areas of the Quesnel and Lillooet Districts, most licences are for mining purposes. Domestic use is important throughout the whole area, although a larger proportion of the domestic-water users have sought the protection afforded by licensing in the southern districts, where shortage of water is greatest.

Where water is seasonally in short supply, many users have constructed dams to level out the seasonal fluctuation in stream-flow and in some cases to retain the whole flow

of a stream for use during the irrigation season. About 400 storage-dams are under licence in the district, and many of the small streams are fully controlled or are controlled to the full extent of the economically feasible storage-sites.

Except for use by major power developments, by far the greatest quantity of water is used for irrigation. Agriculture in the district is almost entirely dependent on irrigation, except in the northern part or at very high altitudes. With the exception of small areas in the Kamloops, Ashcroft, and Lillooet Districts where fruit, vegetables, and other specialized crops can be grown, practically all irrigated land in the area is devoted to the cattle industry for the growing of hay and feed crops and irrigated pasture. Owing to the broken nature of the area and the large holdings which are required for this type of agriculture, most irrigation licences are for individual use. There are only nine irrigation districts in the area, and most of these are comparatively small.

In practice, the amount of water required for irrigation depends on many factors, including soil types, ground-water level, temperature and precipitation during the growing season, type of crop, and method of application of irrigation-water. For administrative purposes, however, an arbitrary figure is used for duty of water based on the estimated effect of these factors. A duty of 3 acre-feet per acre is used generally for the valley-bottom lands of the Kamloops, Nicola, and Ashcroft Districts, reducing to 2 or 2½ acre-feet for the higher land. In areas where the rainfall is greater and the growing season shorter, such as parts of the Cariboo and Quesnel Districts, the duty is further reduced to 1 or 1½ acre-feet per acre.

With regard to the prospects for the expansion of water use within the district, the development of water-supplies for domestic, waterworks, industrial, and similar uses will undoubtedly follow the expansion of other activities in the area. Water-supplies for these purposes are usually economically available, and the development of their use depends on other factors. However, development of use for irrigation is another matter, for the cost of irrigation is usually a deciding factor in agricultural development. Most of the readily available supplies have long since been utilized, and recent irrigation developments have largely resulted from the storage of water on small streams or the pumping of water from the large streams in valley-bottoms. Recent extensions of electric-power supplies have given new impetus to irrigation pumping, and during the past year conditional licences have been issued for several fairly extensive pumping schemes. Of particular interest in this regard is a project at Lillooet for which a licence was issued during the past year. Its aim is the irrigation of a 650-acre tract of Fraser River bench-land which rises in three steps of about 100 feet each above the Fraser River. The project is sponsored by the British Columbia Electric Company and is regarded as a pilot scheme to demonstrate the feasibility of similar pumping projects to serve the bench-lands along the Fraser and Thompson Rivers, featuring the pumping of water to an elevation of about 350 feet by the use of power from the British Columbia Electric Bridge River power plant. The results of this development will be watched with interest as a key to future irrigation development in the area.



Fig. 1. Small storage dam being constructed at outlet of Hughes Lake, 8 miles west of Kamloops. Photo from left bank shows bulldozer on earth-fill dam in centre, borrow-pit in upper centre; rubber-tire tractor on right bank used for compacting earth fill.

#### SUMMARY OF THE YEAR'S WORK

The following is a summary of the routine work carried out by the staff of the Kamloops office for the period November 1st, 1954, to October 31st, 1955:—

New applications investigated and reported on .....	86
Conditional licences inspected .....	194
Final-licence surveys made .....	70
Resurveys for amendment of existing final licences .....	7
Miscellaneous surveys and investigations .....	6
Routine dam inspections .....	32
Dam repairs and maintenance inspected .....	11
New dam construction inspected .....	3
Proposed dam-sites inspected .....	4
Complaints investigated .....	21

Of the seventy final-licence surveys made, twenty-one were for irrigation licences, and beneficial use of water was found to have been established on 385 acres. The remainder of the licences surveyed included storage and power licences, but most were for domestic use.

New conditional licences issued during the period authorize the development of irrigation on 3,724 acres.

In general, the summer of 1955 was one of a series of seasons of better than average flow in the smaller streams. As a result, there were comparatively few complaints regarding the distribution of water. However, as the summary above shows, considerably more attention was given to storage-dams, several of which were severely taxed by large spillway discharges resulting from heavy summer rains.

## KELOWNA DISTRICT OFFICE

R. G. HARRIS, B.A.Sc., B.C.L.S., M.E.I.C., P.ENG., DISTRICT ENGINEER



The Kelowna office, administering an area of approximately 15,000 square miles, includes the Grand Forks, Fairview, Princeton, Vernon, and Revelstoke Water Districts. This area comprises the Kettle River, Similkameen, and Okanagan drainage-basins and, in addition, the Shuswap River drainage-basin from Sicamous to its source, and that part of the Columbia River drainage-basin from Boat Encampment, the northerly limit of the Columbia River, to a point about 15 miles south of Arrowhead on the Upper Arrow Lake.

Kelowna is centrally situated with regard to serving its administrative area, and most of the important centres are readily accessible within a few hours' drive.

The principal industries of this district are agriculture, lumbering, and mining, with agriculture predominating. The Okanagan Valley, which has one of the mildest climates in Canada, is best known for its production of tree-fruits and early vegetables. The Similkameen and Kettle River valleys are basically agricultural areas also, although of lesser importance than the Okanagan. The main economy of the Revelstoke area is mining and logging.

## CLIMATE

The climate is the governing factor in establishing the use of water for agricultural purposes. Ranges of temperature, precipitation, the number of frost-free days, and the length of growing season are the more important factors. Average figures for the main centres are given in the following table:—

Station	Temperature			Annual Precipita- tion	Frost-free Period	Length of Growing Season	Altitude
	High	Low	Yearly Average				
	Deg. F.	Deg. F.	Deg. F.	In.	Days	Days	In.
Revelstoke.....	105	-30	44	40.27	126	.....	1,494
Armstrong.....	105	-44	44	16.89	114	194	1,187
Vernon.....	104	-31	45	15.71	152	200	1,383
Kelowna.....	102	-24	46	12.38	144	200	1,160
Penticton.....	105	-16	48	11.35	149	217	1,200
Oliver.....	111	-23	49	9.79	152	226	995
Princeton.....	107	-42	42	14.24	85	188	2,098
Keremeos.....	106	-22	49	9.90	184	221	1,165
Grand Forks.....	110	-38	45	16.26	130	204	1,746

As seen from the above table, the precipitation in most of the southern areas is very light, owing to the influence of the Coast Range system, especially during the summer when the prevailing westerly winds are comparatively cloud-free.

An important factor in the precipitation pattern are the June rains, which are higher than the monthly average and are of considerable importance to agriculture. In general, with the exception of the June rains, the summer precipitation in the southern area is negligible. This deficiency must be supplemented, where possible, by irrigation to provide sufficient water during the growing season.

## DUTY OF WATER

The duty of water can be defined as the amount of irrigation-water required during the growing season, and is usually expressed in acre-feet per acre per annum. The maximum demand, or peak demand, can be defined as the maximum rate of flow of irrigation-water required and is usually expressed in acre-feet per day. The acre-foot is the unit most generally used in irrigation for both diversion and storage and represents the quantity of water covering 1 acre 1 foot in depth, and is equivalent to 43,560 cubic feet.

The duty of water is based on several factors, such as climate, soil type, type of crop, ground-water level, and water losses. In general, for administrative purposes, a liberal value is established for specific areas, based on the above factors and, in addition, recommendations from the Department of Agriculture.

The duty of water in this district varies from a maximum of 6 acre-feet per acre in the southerly part of the Okanagan Valley to a minimum of 1 acre-foot per acre in the northerly part. In the Similkameen and Kettle River valleys and the central part of the Okanagan Valley, the average water duty is approximately 2.5 acre-feet per acre. For lands at a higher elevation than the valley-bottoms or where lands are partly sub-irrigated, lower water duties are recommended.

## WATER RESOURCES

Many of the streams in the water districts are already fully recorded for their low flow. Where possible, storage has been developed to make up the deficiency. The amount of storage varies from a few acre-feet to several thousand. For example, the largest storage developed in this district is 8,200 acre-feet, which is held in McCulloch Lake, east of Kelowna.

In most areas electric power is now available, and the trend is toward pumping water under pressure for sprinkler irrigation, in particular on lands bordering lakes or streams.

Ground-water from wells is used extensively for domestic supply and in some instances for irrigation. In the Similkameen Valley the Cawston Irrigation District has abandoned its gravity system and is pumping water from individual wells for irrigation purpose.

A few dugouts, noticeably in the Armstrong area, are being used for irrigation supply.

As the economy and well-being of the people in this Province are dependent, more or less, on the availability of water, the work carried out by the Water Rights Branch is highly important.

## ADMINISTRATION OF DISTRICT OFFICE

The district office is responsible for administering the "Water Act" in the area under its jurisdiction. The routine work consists of such matters as investigation of new water applications, inspection, survey and reports of existing licences, regulation and measurement of water to conform with the priority of licences, inspection of distribution-works, settling of disputes between licensees over water problems, attending meetings, and giving general advice. Added to these are the inspection of works involving public safety, such as storage-dams, which are inspected periodically, and, if necessary, instruction or recommendations are given for their repair. Water-users are assisted in storage-dam development and, in this regard, services include an examination of storage-site and design of dam, arrangements for soil tests where required, and loan of a sheep's-foot roller upon request.

In addition to the above, this office is called upon to make various engineering investigations, principally for irrigation and domestic waterworks proposals. This work is carried out for the purpose of determining the feasibility and approximate cost of such a scheme, and is part of the public service provided by the Water Rights Branch.

The district office also acts in an advisory capacity to the various improvement districts and water-users' communities and assists in the formation of new ones.

#### PERSONNEL

There has been one staff change in the Kelowna office staff during the past year, as follows: R. G. Harris, B.A.Sc., B.C.L.S., P.Eng., appointed in July to succeed W. A. Ker as District Engineer, and E. G. Harrison, B.A.Sc., P.Eng., appointed September 1st to succeed R. G. Harris as Assistant District Engineer.

#### SUMMARY OF YEAR'S WORK

*Routine Work.*—The following is a report of the routine work carried out by the staff of the Kelowna office for the period November 1st, 1954, to October 31st, 1955:—

Final-licence survey reports .....	31
Apportionments and resurvey of existing final licences .....	13
Amendments and change of works .....	6
New licences recommended from apportionments and resurvey of existing final licences .....	64
Total licences recommended .....	93
Applications received .....	107
Applications inspected .....	76
Applications refused .....	9
Routine dam inspections .....	2
Proposed dam-sites inspected .....	4

*Engineering Investigations.*—See Water Resources Compilation section of report.

#### GENERAL

The latter part of the 1955 season was exceptionally dry, and longer irrigation periods were required in some areas. Consequently shortages were experienced in many of the streams influenced by the dry period.

As a good part of this year's work consisted of engineering investigations, the number of surveys for licence purposes was considerably less than in previous years.

During the latter part of July the Kelowna office was moved into offices in the newly constructed Court-house, which should provide for more efficient administration and better public service.

#### NELSON DISTRICT OFFICE

R. POLLARD, M.E.I.C., P.ENG., DISTRICT ENGINEER



The Nelson office administers Water Rights Branch matters over some 25,000 square miles comprising Kootenay Land District, except Revelstoke, which area is more easily reached from the Okanagan. The year drawing to a close has followed the general pattern of ample available water, which has become the order of things now for some ten years. The work of the Branch is strongly influenced by the vagaries of the weather as, if there is ample water, there is always the danger of local floods. Major flood damage has generally taken place when the snow cover has been exceptionally heavy, and the weather has been the factor in the incidence or otherwise of out-of-hand freshet flow.

Since the inception of district office administration of water rights some forty-five years ago, water shortages for irrigators and other users were normal to the summer season until about ten years ago, when the definite change in weather pattern took place. Although it is necessary at times to design measuring-boxes for installation at intakes where separate lines are used, or by means of rotation of hours of irrigation and by other means, the percentage of time that it has been found necessary to devote to this work has been noticeably less than in the years preceding 1945. Figures show that there are fewer water applications now than in previous years, but there are more applications for apportionments of licences, which indicates increased settlement along the already crowded marginal land characteristic of the West Kootenay in particular.

In the summer season of 1947 we began to use undergraduate engineers in the field for the purpose of making final-licence and other routine surveys, the Assistant District Engineer acting in a supervisory capacity. Production this year, while inclined to be lower than for some previous years, was good. In addition to some small non-routine jobs, the field staff conducted a land-classification survey of the Blueberry Creek Irrigation District and revised one for the Vermilion Irrigation District at Edgewater which had been undertaken the previous season.

#### ROUTINE WORK

The following is a résumé of the work performed by the Nelson office since the 1954 Report was prepared:—

Applications .....	70
Final-licence surveys .....	74
Special investigations—	
Duck Lake Dyking District.	
Reclamation Committee meeting.	
Blueberry Creek Irrigation district.	
Beaver Creek flooding.	
Consolidated Mining and Smelting Company licences, Riondel.	
Coutts Creek—new concrete division tank.	
Montrose Utilities—meeting.	
Sproule Creek proposed improvement district.	
Vermilion Irrigation District—supplementary water-supply design.	
Mirror Lake district—alternative scheme for pipe-line.	
Westside Improvement District—estimate for alternative pipe-line.	
Myers Springs.	
Walkley vs. Podmeroff—further studies.	
Westside Improvement District—survey for supplementary data.	
Duhamel Waterworks District—alternative estimate.	
Duck Lake Dyking District—test-holes <i>re</i> water-levels.	
Elko Village water-supply problem.	
Flooding—	
Feeney vs. F. R. Rotter—flooding and erosion, Salmo River.	
Canadian Exploration vs. F. R. Rotter—tailings pond, ownership of river-bottom and dyke.	
Beaver Creek flooding.	
D. F. Thorpe vs. D. B. Merry Lumber Company—log-jams, etc., Big Sheep Creek.	
Soloveoff vs. Kenville Gold Mines—flooding from mine adit.	

## VICTORIA DISTRICT OFFICE

C. ERRINGTON, P.ENG., DISTRICT ENGINEER



The Victoria District office administers the "Water Act" in five water districts, namely, Victoria, Alberni, Nanaimo (which cover most of Vancouver Island), New Westminster (the Lower Fraser River valley as far east as Spuzzum), and Vancouver (which extends from Vancouver northward up the west coast of British Columbia some 350 miles and includes also the north-eastern section of Vancouver Island).

RAINFALL TABLE FOR SUMMER OF 1955, COMPARED WITH LONG-TERM AVERAGE

Water District	1955			Long-term Average		
	July	Aug.	Sept.	July	Aug.	Sept.
Nanaimo.....	2.38	0.31	1.52	1.00	1.01	1.87
Victoria.....	1.31	0.03	0.55	0.47	0.66	1.39
Chilliwack.....	3.06	0.28	2.73	1.51	1.77	3.89
New Westminster.....	3.45	0.21	2.44	1.36	1.62	3.45
Vancouver.....	2.97	0.31	1.87	1.38	1.68	3.46
District average.....	2.63	0.23	1.82	1.14	1.35	2.81

## IRRIGATION

From the above table it will be seen that July was a very wet month. More than twice the normal rainfall of the long-term average was recorded in each of the districts during the month. As this is the month of maximum growth, the usual irrigation problems did not occur this year until well into August, when dugouts and reservoirs were full and plenty of water remained in the streams. In fact, the whole season produced a minimum of complaints about water shortage to this office.

## STORAGE

As the low flow of many streams becomes fully recorded, there is a desire to create more storage, both on the streams themselves by means of dams and adjacent to the streams by means of dugouts. On the majority of coastal streams, the potential to create storage is almost untouched.

In Saanich, where there are few creeks, the tendency continues for enterprising farmers to hold back sufficient of the winter run-off to meet their irrigation needs for the year. This is done by the further creation of dugouts, some running to 2 or 3 acres in area. Licences are still being granted even after the stream is fully recorded to store water for irrigation. Such a licence bears the proviso that the water must be diverted from the streams before the irrigation season commences. This tendency to store winter water for later irrigation is encouraged, otherwise it would run to waste.

## DUTY OF WATER

In co-operation with the Department of Agriculture, a duty of 1 acre-foot (that is, 1 foot of water per acre each year) has been considered satisfactory for the normal coastal crop, with a normal rainfall. Water in excess of 12 inches per year is sometimes granted in special cases; for example, where a light sandy soil is encountered or where special crops are grown. So far, few farmers have required more than the normal 1 foot per acre; in fact, where clayey loam is encountered, they have sometimes been content with a duty of one-half acre-foot (that is, 6 inches of irrigation-water) in the irrigation season. Special crops include such things as cranberries, where a duty of 3 acre-feet has been granted. Cranberries are totally submerged during part of the growing season, and a duty of 3 acre-feet for this crop appears to be the bare minimum under which it can be successfully grown.

## DRAINAGE

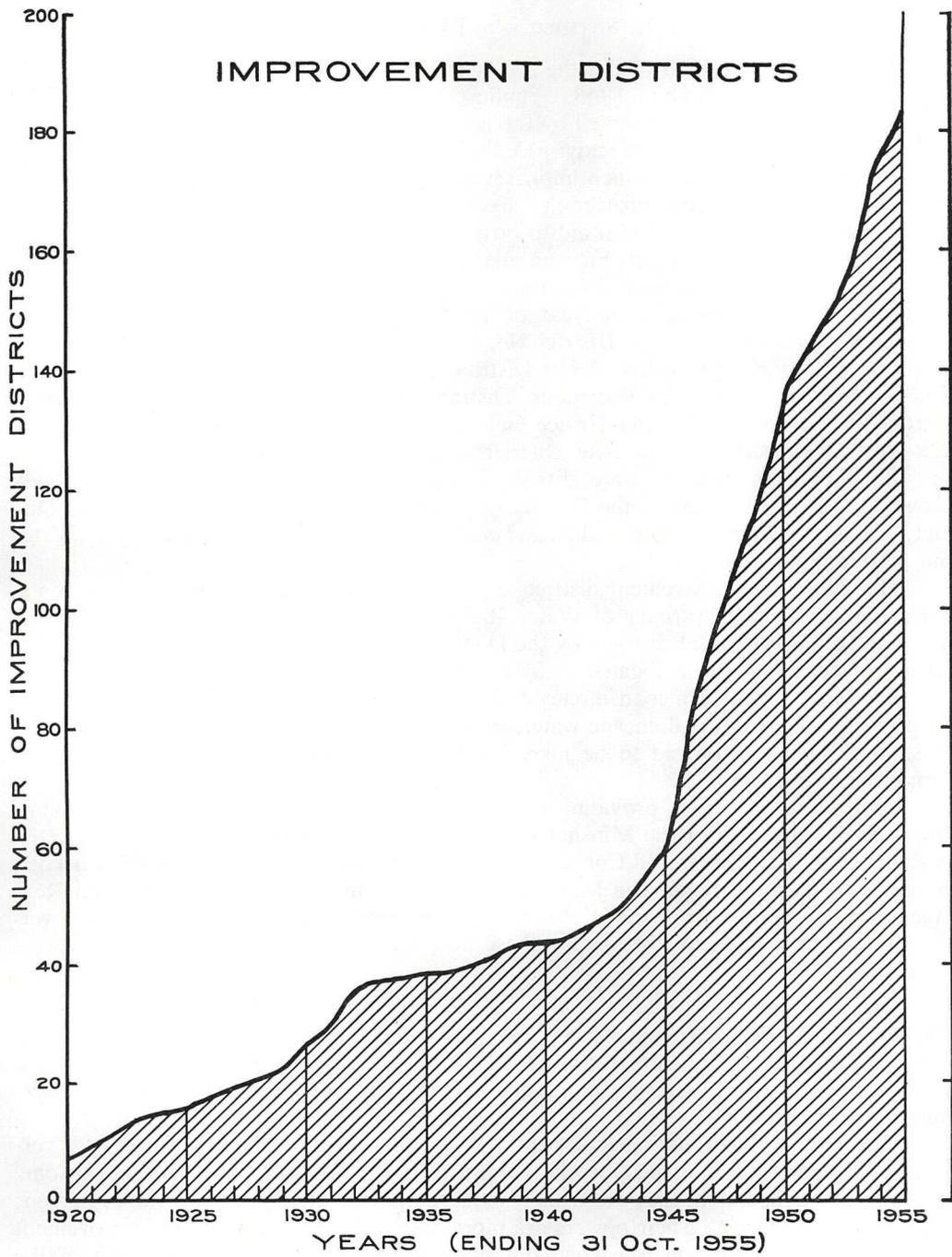
Many more complaints regarding drainage and flooding are reaching this office in recent years than formerly. During the year we made eight special studies and reports dealing with this phase of the operation.

## GENERAL

During the period November 1st, 1954, to October 31st, 1955, some twenty-eight special reports were made, covering miscellaneous disputes, advice regarding forming of improvement districts, dam inspections, unauthorized use of water, flooding and drainage problems, etc.

The usual summer programme of final-licence surveying was pursued; ninety-eight final licences were issued and 184 new conditional licences were granted. The year's work is summarized in the following table:—

Applications received .....	253
Applications refused .....	9
Final-licence reports .....	98
Conditional-licence reports .....	184
Recommendations <i>re</i> extension of time .....	202
Recommendations <i>re</i> amendment of licences .....	18
Abandonments .....	32
Cancellations .....	20



## IMPROVEMENT DISTRICTS

A. K. SUTHERLAND, LL.B., SOLICITOR

Pursuant to section 50 (1) of the "Water Act," being chapter 361 of the "Revised Statutes of British Columbia, 1948," public corporate bodies may be incorporated by the Lieutenant-Governor in Council by the issuance of Letters Patent "under such name and with such objects as appear advisable."

The main purposes for which improvement districts are incorporated are irrigation, domestic water-supply, fire protection, street-lighting, sewage-disposal, garbage collection, and the granting of financial aid to hospitals.

There were eleven districts incorporated and three districts dissolved in 1955, making a total of 183 districts now in operation. The following improvement districts were incorporated during the calendar year of 1955: Arden Improvement District, Fraser Canyon Hospital Improvement District No. 8, Gulf Islands Hospital Improvement District No. 9, Lantzville Fire Protection District, Lillooet Hospital Improvement District No. 11, Martin Valley Fire Protection District, Parksville East Waterworks District, Petroglyph Waterworks District, Prince George and District Hospital Improvement District No. 10, Royston Improvement District, and Willow Point Waterworks District.

The following districts were dissolved and incorporated into a municipal body known as The Corporation of the District of Powell River: Cranberry Waterworks District; Westview Light, Power and Waterworks District; and Wildwood Light, Water and Sewerage District.

The affairs of improvement districts are administered by elected trustees under the supervision of the Comptroller of Water Rights. Technical and administrative help is also given to improvement districts by the District Engineer of the water district in which the improvement district is located or by the Victoria office.

The Government can loan money to improvement districts having as their objects the purposes of providing domestic water, irrigation of land, or sewage-disposal. A total of \$296,327 was authorized to be loaned to improvement districts for these purposes during the year 1955.

Improvement districts providing fire protection, street-lighting, or aid to hospitals can, with the approval of the Minister of Finance, have their taxes levied and collected by the Provincial Assessor and Collector, and if a substantial amount of money is needed to carry out these purposes, the Minister can advance moneys from Consolidated Revenue, to be collected over a period of time. An amount of approximately \$685,696 was advanced to improvement districts for these purposes during 1955.

## WATER-USERS' COMMUNITIES

There are forty-eight water users' communities in the Province at the present time. Two were incorporated during 1955, namely, Clearwater Water Users' Community and Gibson-MacNeal Water Users' Community. One (Bentom Brook Water Users' Community) was disbanded.

The communities function under the "Water Act" and are incorporated by a certificate of incorporation issued by the Comptroller of Water Rights. Although some have a large membership, they are usually small corporate bodies of six or more persons holding water licences. Their powers are more restricted than those of an improvement district, and administration is carried out by a manager under the supervision of the Comptroller of Water Rights.

## INTERNATIONAL WATERS

G. J. A. KIDD, B.Sc., P.ENG., PROJECT ENGINEER

Previous descriptions bearing upon rivers falling within the category of international waters, which have appeared in the Annual Reports of the Lands Service to date, have dealt solely with the Columbia River basin. This has been due primarily to the attention which has been focused on the Columbia because of the complex international problems of immediate importance which are involved in its development.

The Columbia, the main drainage-basin in British Columbia with international complications, is not the only river drainage of this type, and attention is also drawn to other rivers which rise in Canada and flow into the United States or some portion of its territories. These are discussed briefly as follows:—

*Skagit River.*—Rising in the south-western portion of the Province, the Skagit River flows through the north-western corner of the State of Washington on its way to the sea. The City of Seattle has extensive hydro-power developments on the United States portion of the river, of which Ross Dam, below the International Border, is planned to eventually back water into British Columbia to a depth of 130 feet at the border, subject to agreement with the Province in conformity with the International Joint Commission order dated January 27th, 1942. The area which may be flooded in British Columbia is not large, amounting to 5,475 acres.

*Stikine River.*—By far the largest portion of the Stikine drainage lies entirely within British Columbia, but the river flows to salt water through the Alaska Panhandle. The power potential of the stream with diversion from the Liard River is estimated at 2,000,000 horse-power.

*Yukon-Taku Project.*—This potential development is at present under study by a Canadian metallurgical firm. The proposed method of development envisions the use of water from a series of lakes and rivers tributary to the Yukon River in the Yukon Territory and British Columbia, with diversion into the Taku River in British Columbia to eventually develop about 4,900,000 horse-power. The Yukon River flows to the sea through Alaska, and its diversion may necessarily be the subject of international negotiation. The Taku River is similar to the Stikine in that it flows through the Alaska Panhandle to the sea.

*Others.*—Other smaller streams rise in British Columbia to flow across the Alaska Panhandle to the sea. These include the Unuk, Whiting, and Alesk Rivers. The power potentials of these streams are not known.

*Columbia River and Tributaries.*—A full description of the Columbia basin, together with the international problems involved, was presented in the 1954 Report of the Lands Service, and the reader is referred to this source for greater detail. To recapitulate briefly, the main-stem Columbia and its major tributaries—the Kootenay, Okanagan, Similkameen, and Kettle Rivers—all rise in British Columbia and cross the International Boundary en route to the Pacific shore. Only 15 per cent of the total Columbia River drainage is in British Columbia, but this area is highly productive, contributing approximately 45 per cent of the total flow of the river.

Extensive hydro-power developments have taken place or are planned on the Columbia main stem in the United States, and because of widely varying seasonal run-off, storage of water and subsequent release to create more uniform flow conditions are of considerable advantage for the production of hydro power. Thus any storage project in the Columbia basin in British Columbia will benefit down-stream hydro projects in the United States, and it has been maintained by all Canadian representatives that British Columbia should share in any benefits so created with a return to the Province of a portion of the additional power produced from release of the stored water in British Columbia.

It is therefore readily apparent that problems involved in the best plan of development of the Columbia are complex, and as yet no solution, acceptable internationally, has been indicated.

These problems have become increasingly complicated as a result of various plans for diversion of the Kootenay into the Columbia at Canal Flats and of the Columbia into the Fraser, which are now under investigation by Federal agencies.



Fig. 2. The close proximity of the Kootenay River to the Columbia River at Canal Flats is clearly illustrated. It is readily apparent that the proposed diversion of the Kootenay to the Columbia is physically possible either directly at Canal Flats by dyke and ditch or by damming the river at down-stream dam-sites. Such a diversion would considerably increase the power potential of the main stem of the Columbia River.

#### DIVERSION PROPOSALS

The diversion of the Kootenay River into the Columbia River is physically possible because of the proximity of the two streams at Canal Flats, where they are about a mile apart, occupying the same valley but flowing in opposite directions (see Fig. 2). The diversion would allow British Columbia to utilize the water so diverted through approxi-

mately 570 feet of head, which would ordinarily be lost in that portion of the Kootenay River which flows through the United States.

Under consideration are three possible diversions of the Kootenay as follows:—

- (1) Diversion at Canal Flats directly by channel or by use of a regulating reservoir with dams at Copper Creek on the Kootenay and at Luxor on the Columbia. On an average, the flow at the International Boundary would be reduced by about 30 per cent, which would not seriously affect the economic feasibility of the presently proposed Libby Dam in the United States.
- (2) Diversion at Canal Flats by a regulating reservoir with dams at Bull River on the Kootenay and Luxor on the Columbia. Average flow of the Kootenay River at the International Boundary would be reduced by about 50 per cent, which would make the economic feasibility of the presently proposed Libby Dam very doubtful.
- (3) Diversion of the Kootenay River at the Dorr Dam site just above the International Boundary by pumping into the Bull River-Luxor regulating reservoir and hence to the Columbia has been mooted as another consideration. The major portion of the run-off to the Kootenay above the International Boundary would be diverted by such a scheme.

During the past year the possibilities of diverting the excess flow of the Columbia River into the Fraser basin, thus enabling the use of that water within British Columbia through the major portion of the head to sea-level, has been under investigation by Federal Government agencies. Two alternative schemes are being considered, both of which would divert water stored at Mica Creek by long large-capacity tunnels into the Thompson-Fraser system. These alternative proposals, as presently contemplated, are described briefly as follows:—

- (1) Diversion to take place by tunnel from Little Dalles Dam on the Columbia above Revelstoke to Eagle Creek and hence into Shuswap Lake and the Thompson-Fraser system.
- (2) Diversion by tunnel from Downie Creek Dam, up-stream from Little Dalles site, to Ratchford Creek and thence into Shuswap Lake and the Thompson-Fraser system.

A number of possible low-head dam-sites on the Thompson River below Kamloops and the Fraser River below Lytton are being investigated for hydro-power development as a complementary study to the diversion investigations. A sketch-plan showing the approximate location of the proposed diversions, together with potential power developments in the Columbia basin, are shown on Plate 5.

It is understood investigations as to feasibility of the various diversion proposals will require about two years to complete, and it is apparent that a host of complex technical and economic problems, many of which are controversial in nature, will have to be considered. Among these are the problems associated with the Fraser River salmon industry and the effect which hydro-power development and diversion of Columbia water may have on the movements, spawning-grounds, and environment of the migrant salmon.

#### INTERNATIONAL PLANNING

Many governmental and private agencies from both countries are vitally interested in planning for the development of the Columbia basin. Several engineering committees and task forces have been formed to study various aspects from both the international and domestic points of view of both countries. Of these, the most important is the International Columbia River Engineering Board with committee and work group.

These agencies were established to co-ordinate and carry out studies under the reference of 1944 from the Governments of Canada and the United States to the Inter-



national Joint Commission "to determine whether, in its judgment, further development of the water resources of the river basin would be practicable and in the public interest from the points of view of the two governments." The Board has been charged with the responsibility of producing an over-all Columbia River basin report with plan of development. Activities of Canadian agencies (the Province has representation on the committee and work group) to date have been devoted largely toward securing the necessary basic data upon which planning can be based. Much of the similar information has already been collected for the United States portion of the basin by United States agencies.

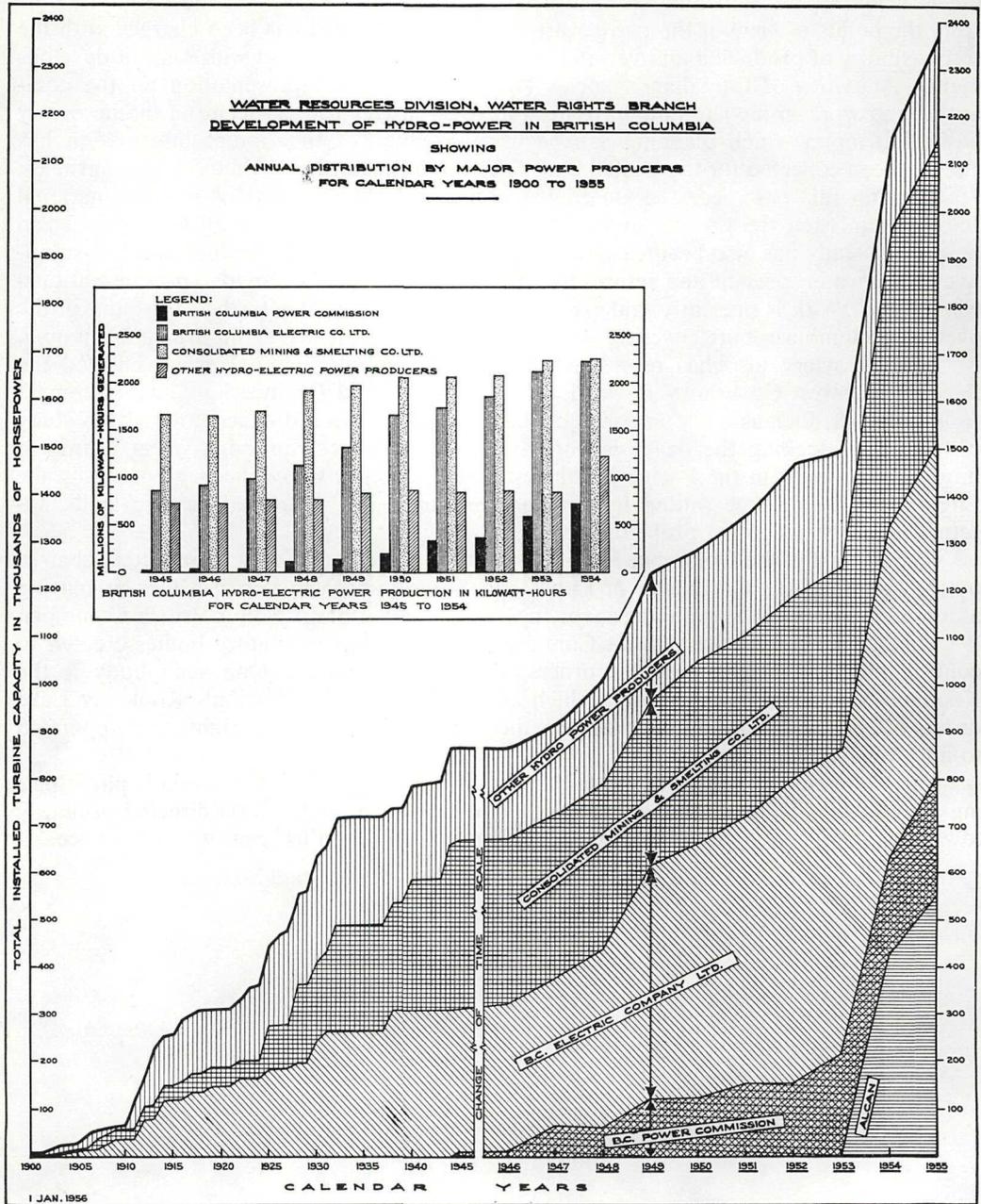
During this past year the Board has completed for approval of the International Joint Commission the Okanagan-Similkameen appendix of the over-all Columbia basin report. A study has also been carried out to estimate the flow depletions from consumptive use of water, present and future, for the Columbia basin in Canada and international tributaries. Work is presently under way on the preparation of a further appendix of the over-all Columbia report covering the main-stem Columbia River in British Columbia.

The Province also has representation on another international group entitled the Pacific Northwest Governors' Power Policy Committee and Engineering Committee with technical staff nucleus. The energies of this group have been directed toward the study of obstacles blocking the development of power resources required to meet estimated future power loads in the Pacific Northwest. Several reports have been prepared by the Engineering Committee setting forth future resources and estimated electric loads, together with discussions of problems involved.

Additionally, the Columbia River Basin Development Advisory Committee, chaired by the Honourable the Minister of Lands and Forests and Minister of Mines, is playing a continuing part in the planning involving the Columbia basin within British Columbia.

Under the International Joint Commission are various regulatory bodies created to control and administer particular orders of the Commission. One such body is the Kootenay Lake Board of Control, which administers the Commission's Kootenay Lake orders of approval. During the past year the Comptroller of Water Rights was appointed to fill a vacancy on this Board.

It will be readily seen, therefore, that the Province of British Columbia is participating actively in the planning phases of the Columbia basin, with efforts directed primarily toward the most beneficial plan of development possible for this great water resource.



**HYDRAULIC INVESTIGATIONS DIVISION**

T. A. J. LEACH, B.Sc.(ENG.), M.E.I.C., ASSOC.M.A.S.C.E., P.ENG.,  
CHIEF, HYDRAULIC INVESTIGATIONS DIVISION

The growth and economic development of British Columbia from the simple agricultural endeavour to the most complex of industrial developments depends primarily on water resources.

The inventory of these resources and their evaluation has been one of the main functions of the Water Rights Branch. In the early days, before and after the First World War, the main effort was expended in obtaining preliminary information on our hydro-electric resources. The latest summary of this work is contained in the publication "Water Power of British Columbia," published in 1954. More-detailed information on a number of the power-sites mentioned in this publication can be found in the Water Rights Library in the form of individual reports.

With the growth of the Province, hydraulic investigations were expanded to include not only other water uses such as irrigation, municipal and domestic water-supplies, and ground-water, but also interrelated problems such as flood-control, dyking and drainage, and the problems of international water use.

This research has paid off by indicating to interested parties the likely site for a particular water use. It has also pointed up the desirability of obtaining hydrometric and basic topographic information well ahead of the opening-up of the newer portions of the Province. Such prior information allows those charged with water licensing to assess the amount and distribution of water within a region and the value of the various alternative uses to which it may be put. This is of particular importance in interprovincial or international rivers where the problems of upstream-downstream benefits are involved.

The information which follows describes some of the major investigations carried out by the engineers of the Hydraulic Investigations Division and is indicative of the diversity of hydraulic problems which are being met in British Columbia to-day. The increasing rate of growth, particularly in the central and northern areas of the Province, will be accompanied by expanding water use, and an early appraisal of several of these areas has been planned for 1956.

**FRASER RIVER BOARD WORKING GROUP**

G. E. SIMMONS, B.A.Sc., P.ENG., HYDRAULIC ENGINEER, MEMBER

Although the Fraser River is well down on the list of great rivers of the world, its 850 miles of main stem stretching into the Interior of the Province in a vast loop and its extensive tributary system drain an area of 89,000 square miles, or approximately one-quarter of the total area of British Columbia. Within the drainage-basin and including the Greater Vancouver area lives more than one-half of the population of the Province. It contains within its boundaries nearly half the arable land and nearly a fifth of the timber available to the people of British Columbia. Around it revolves a large part of the economy of the Province. The lower reaches are a waterway to the expanding industrial area south and east of Vancouver; the tributaries bear logs to mills and produce hydro-electric power for communities and industry; and extensive stretches of the many streams, both large and small, provide spawning-beds for the salmon to sustain the second principal industry of the Province.

While use is already being made of the river and its tribuaries, the potential of the Fraser has hardly been tapped. With the increasing demand for cheap electrical energy, the possibilities of power development on a very large scale on this river are becoming more and more attractive.

On the debit side, however, there are many problems which demand consideration. Prime of these is the annual threat of floods, particularly in the Lower Fraser Valley, where population density is high and all available arable land is intensively cultivated. Each spring the melting snows in the drainage-basin pour down the main stream to spill into the delta area of the Lower Fraser Valley and place in jeopardy the cultivated fields, the communities, and the great and small industries which stand along the banks.

The wealth which the Fraser has to offer the people of British Columbia and the attendant problems of flooding are potentialities which have been under consideration in government circles for some years.

On March 19th, 1949, by agreement between the Federal and Provincial Governments, the Dominion-Provincial Board, Fraser River Basin, was jointly formed. This agreement said in part:—

“Whereas it is desirable in the public interest to make a survey and report on the water resources and requirements of the area comprising the Fraser River watershed,” and that “the Board shall determine what developments and controls of the water and other resources of the Fraser River Basin, in its judgment, would be advisable and in the public interest,” and further, “the Board shall also investigate and report upon all existing dams, irrigation systems, hydro-electric plants, aids to navigation, fishways, dykes, sanitary systems, sources of pollution, and all other works located in the Fraser River basin in so far as these may be germane to the developments and controls proposed.”

In May, 1955, the Board was reconstituted with a reduced membership and renamed the Fraser River Board. The Comptroller of Water Rights continued to serve as an active permanent member and an engineer from the Water Rights Branch remained on the working group which had originally been established under a previous committee of the old Board.

#### FLOOD-CONTROL AND POWER

Although several small areas in the upper reaches of the Fraser system are subjected to flooding during high spring flows, the most serious conditions occur in the Lower Fraser Valley. As early as 1873, Statutes were enacted to provide the means of protection for this area annually threatened by spring flows. Since that time the most susceptible and the most valuable land has been given some measure of protection by a growing system of dykes on both sides of the river from Agassiz to the mouth. This method of flood protection has been used for many hundreds of years with varying degrees of success. With the advent of new construction methods and the erection of large dams principally for power purposes, the idea of utilizing these artificial storage-basins to contain floodwaters during the critical period and release them during the natural low flow of the river has gained force. Already many structures in other parts of the world have been built for multi-purpose use, namely, power, flood-control, recreation, irrigation, navigation.

Surveys and investigations carried out by the Water Rights Branch and Federal engineering agencies under the 1949 agreement have produced information on several sites on the Fraser where dams could be constructed to develop large storage-reservoirs. On the main these include Moran site near Pavilion, Cottonwood site near Quesnel, Fort George Canyon, and Grand Canyon near Longworth. On the tributaries there are many sites, some of the more outstanding of which are the Clearwater site on the Clearwater River, the McGregor River site, the Isle Pierre site on the Nechako River, and the Lillooet River site north of Harrison Lake.

Preliminary estimates place the power potential of the Fraser River system at 8,000,000 horse-power. Storage-reservoirs to develop all or any part of this vast amount would range in size from small lakes of a few square miles in area to the 185-mile-long lake which would form behind a 720-foot-high dam at Moran. With logical control of the operation of these reservoirs, provision could be made for the retention of the high

spring flows in order to reduce the threat of flooding in the built-up areas. However, such a possible system of flood-control does not preclude the necessity for dykes in localized areas.

The problem of potential flood-control storage being operated in conjunction with the existing dyking system in the Lower Fraser Valley is now the primary consideration of the Fraser River Board. Other problems which must be given very close attention include the passage of migratory fish around high dams, the increasing threat of pollution, and the provision of sufficient flow in the lower industrial area of the river for navigation purposes.

Much study and investigation is yet to be done before all the contentious questions have been settled and any plan for development of the Fraser River system is evolved.

### WATER RESOURCES COMPILATION SECTION

DUART A. MACLEAN, B.Sc.(ENG.), ASSOC.M.A.S.C.E., P.ENG.,  
SENIOR HYDRAULIC ENGINEER

The Water Resources Compilation Section is composed of hydraulic engineers, technicians, and draughtsmen. The Section is charged with carrying out field investigations and preparing engineering reports on irrigation, hydro power, domestic water-supply, flooding, drainage, and allied subjects.

The Section also keeps a library of these engineering reports and maintains records of various types of hydrologic and hydro-power data. Administrative and technical data are also recorded and kept in this Section.

Apart from the normal work of this Section—that is, of compiling information on this Province's water resources—it also does work on behalf of the Fraser River Board. The investigations carried out during 1955 and being in part reported on are shown on Plate 7, and described as follows:—

### Provincial Water-resource Investigations

#### IRRIGATION AND DOMESTIC WATER-SUPPLY

Several large-scale water-supply investigations were made during the summer of 1955. Some of them consisted of evaluating existing systems, which included detail mapping of the areas at a scale of 500 feet equals 1 inch. Two investigations involved considerable design work.

Much of the work carried out during the past year was office studies, some of which was completion of projects carried over from 1954.

The following reports consist of summaries describing the major irrigation and water-supply investigations made during 1955 and written by the hydraulic engineers who were given the assignments.

#### *South Okanagan Lands Project Evaluation Survey*

J. BUCHANAN, B.Sc., A.M.I.C.E., P.ENG., HYDRAULIC ENGINEER

Following the passing of the "Soldiers' Land Act" (British Columbia) in 1918, the Government purchased the 22,000 acres now known as the South Okanagan Lands Project. Occupying most of the floor of the Okanagan Valley for 20 miles north of the International Boundary, the area is one of the few Canadian localities ideally suited for the production of soft fruits. Irrigation was introduced into the area in 1919, and to-day 4,800 acres are being irrigated by a system which includes 23 miles of main canal, eight pump-houses, and 42 miles of laterals and distribution-pipe (*see* Plate 8). The Project is administered by the British Columbia Lands Service, a project manager, two

office and thirteen field personnel, and financed by votes from the Legislature and by an annual charge of \$12.50 per acre for irrigation-water.

The irrigation system is now operating to almost full capacity and the Project is in the position of having to refuse applications for water to irrigate additional lands. In addition, the neighbouring irrigation districts—Black Sage, Osoyoos, and East Osoyoos—have filed applications to be included within the Project. Problems such as these instigated the decision to re-evaluate the Project area and the irrigation system.

Previous surveys of the area were examined and were found to be lacking in sufficient detail for an over-all irrigation evaluation. Triangulation networks established by the Surveys and Mapping Branch in 1953 and by the Okanagan Flood-control Project

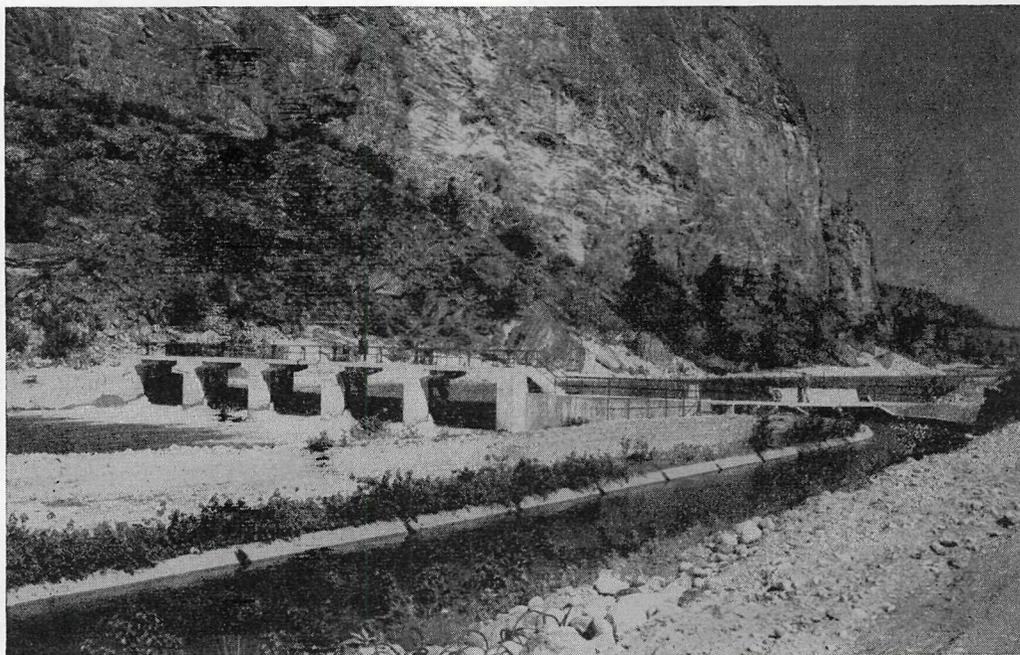


Fig. 3. The intake dam of the Southern Okanagan Lands Project. Reconstructed during the winter of 1954–55, this dam also serves as a flood-control structure controlling the floodwaters of the Okanagan River. In the right foreground is the main canal of the Southern Okanagan irrigation system.

in 1941 were used as a basis for horizontal and vertical control for aerial photographic mapping. The control survey occupied a four-man crew for about two months, during which 90 miles of levels were run, most of the original triangulation stations reoccupied, and several additional stations established.

The area was reflowed for photographic mapping on June 3rd, and by early August the Multiplex Section had completed the first contour maps to a scale of 500 feet equals 1 inch and with a 10-foot contour interval. On the valley-floor and benches a 5-foot contour interval was interpolated by multiplex. An index of these maps will be included in the 1956 Annual Report.

From records available in the office of the Southern Okanagan Lands Project at Oliver, it was possible to place on the maps the location and sizes of all canals, laterals, and distribution-lines. An attempt was also made to assess the age and condition of the various parts of the irrigation system. The knowledge and experience of the operation and maintenance personnel was most helpful in this respect.

Throughout the summer a close watch was maintained on the main canals and laterals. The flow was measured at frequent intervals at different points in an attempt to determine the consumption of water in different areas and to assess the effect of aquatic growths on the carrying capacity of the main canal. The 1955 season was unusual in that the irrigation system remained comparatively free of water weeds and algæ. More than the usual quantity of copper sulphate was used, but it is doubtful if this was entirely responsible. During the previous winter the channel of the Okanagan River above the intake dam was enlarged and riprapped by the Okanagan Flood-control. Flood-control structures stabilized the spring run-off, and the water being diverted into the S.O.L.P. intake was unusually free of silt and debris and possibly had a somewhat lower temperature than in previous years.

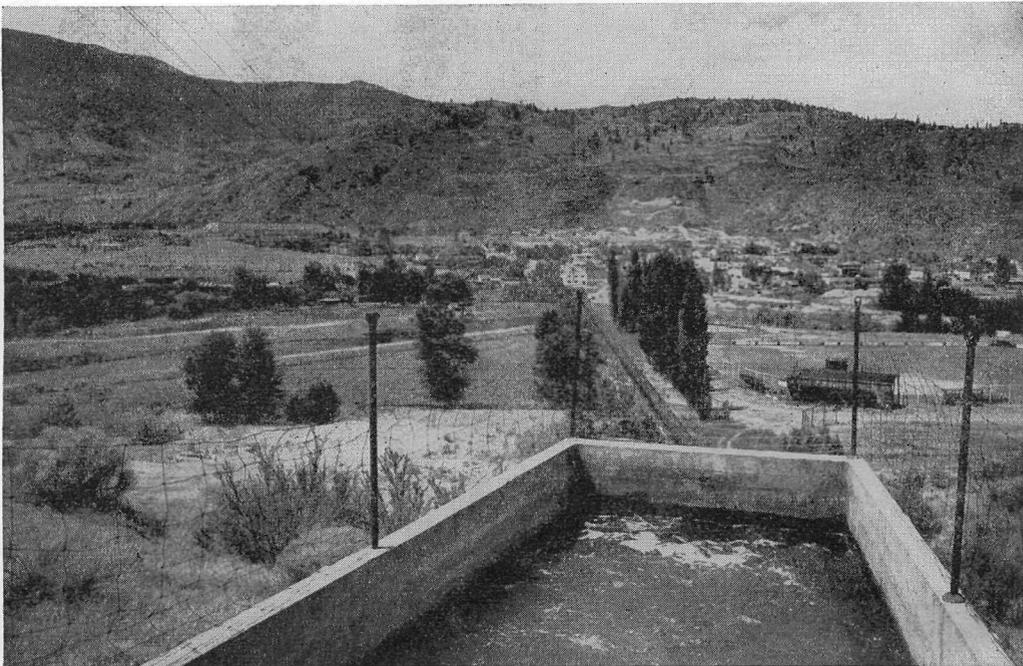


Fig. 4. A view of Oliver looking west from the intake end of the main syphon of the Southern Okanagan irrigation system. The main syphon is a 78-inch-diameter pipe-line which carries the full flow of the main canal of the system on the east side of the valley over the Okanagan River and below Oliver to emerge in the main canal on the west side of the valley.

The possibility of irrigating additional land is now being considered. As the existing system is operating to almost full capacity, the water for the additional land would have to be obtained by reallocating or adjusting the supply to existing irrigated lands or by introducing fresh supplies pumped from the Okanagan River. With a few exceptions the cost per acre of irrigating any appreciable amount of new land would be exorbitant. Most of the suitable land is too far removed from a source of water-supply or is at an elevation which would make pumping prohibitive.

The irrigation districts of Black Sage, Osoyoos, and East Osoyoos are being operated and maintained by the Southern Okanagan Lands Project, and the cost of operation and maintenance is paid by the districts. Irrigation rates within the districts are higher than those in force within the Southern Okanagan Lands Project and their renewal reserves are inadequate. They would benefit considerably by being included within the Project. In this event it has been proposed the pumping systems of Southern Okanagan Lands Project No. 2 and the Black Sage Irrigation District be interconnected, and that

the Osoyoos and East Osoyoos Irrigation Districts be joined to make full use of the Haynes Creek water-supply.

Special attention was given to the Haynes Creek diversion and storage-reservoir of the Osoyoos Irrigation District. Due to the failure of the storage-dam in 1949, the storage facilities have not been used in recent years. As the district is pumping to an elevation of 370 feet above Osoyoos Lake, the Haynes Creek storage could reduce the pumping costs considerably. This advantage is offset to a large extent by the local power authority requiring annually a three months' minimum operating charge for irrigation-pumps. Pumps are required to augment the Haynes Creek supply during the latter months of the irrigation season.

Preliminary reconnaissances were made of possible additional sources of irrigation-water such as Siddley Meadows, Sawmill Lake, and McIntyre Creek. Elevations were established in McIntyre Creek canyon, and these would be of considerable value in any future survey.

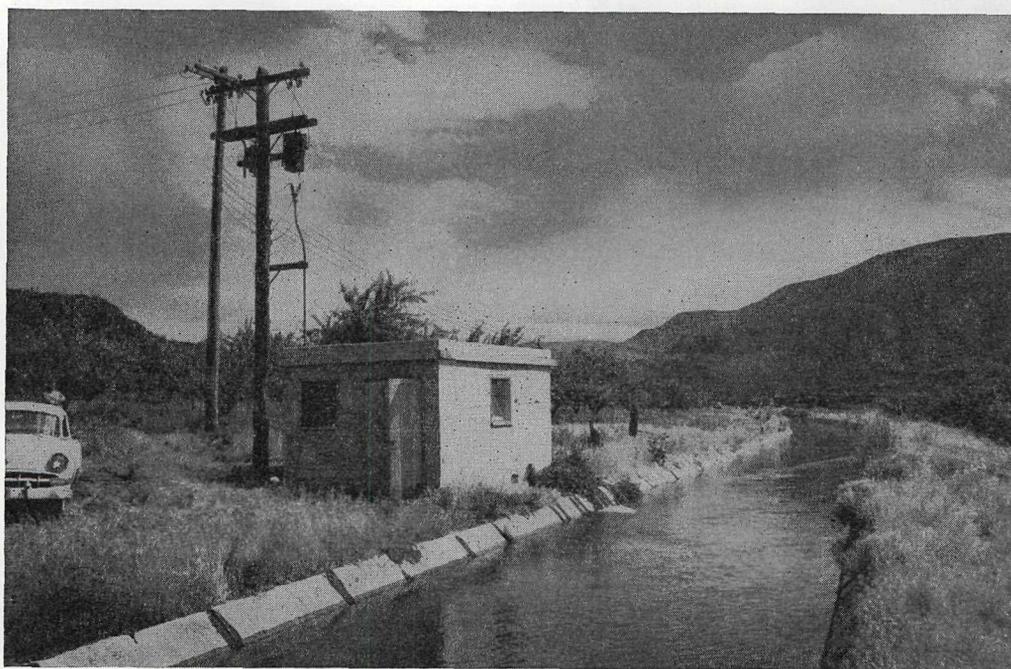


Fig. 5. Pump-house No. 1 of the Southern Okanagan irrigation system. Constructed during the early twenties, this pump-house continues to supply 173 acres of fruit land with irrigation-water. In the foreground is the main canal of the irrigation system.

#### *Irrigation Investigations for B.C. Fruitlands Irrigation District and Doukhobor Lands*

M. ARNOLD, B.Sc.(ENG.), ASSOC.M.S.A.I.C.E., P.ENG., HYDRAULIC ENGINEER

*B.C. Fruitlands Irrigation District.*—The B.C. Fruitlands Irrigation District includes approximately 4,000 acres of land near the confluence of the North and South Thompson Rivers at Kamloops, the soils being for the most part water-deposited sand and silt forming the flood-plain of the two rivers.

In 1912 the B.C. Fruitlands Company Limited built an irrigation system to supply gravity water by concrete canal, flume, and pipe from Jamieson Creek, and in the years following several different companies owned and operated the system, but none established a fund for the renewal of the works. As might be expected, by the early 1940's the system had deteriorated to such an extent that for any given year there could be no

guarantee that water would be available for the crops. Therefore, in June, 1946, the farmers within the area petitioned the Government of British Columbia to form an irrigation district under the Provincial "Water Act."

The B.C. Fruitlands District was thus formed in 1947, and since then has, under extreme difficulties, supplied water to the area. Because of the deteriorated condition of the system and lack of capital for replacements, the supply has been both inadequate and uncertain.

This situation prompted the district to approach both the Federal and the Provincial Governments for assistance, and in February, 1954, the Minister of Lands and Forests requested that the Branch prepare a design for a new irrigation system.

Owing to the high estimated capital cost and annual running costs of all previous proposals, both those submitted by the Federal "Prairie Farms Rehabilitation Act" and by the Water Rights Branch, it was decided to prepare a further revision of the scheme submitted by P. Riley (the Water Rights Branch hydraulic engineer) with a view to reducing costs wherever practicable in order to produce a workable scheme at the lowest possible cost. Accordingly, it was established that the area known as Westsyde, situated on the west bank of the North Thompson River just north of Halston Siding on the C.N.R. line, could be fed from Jamieson Creek by means of the existing canal, which would, however, require general repairs. The area known as Brocklehurst, situated on the north bank of the Thompson River west of the North Thompson River, would still be served by a pump which would be located in a somewhat more favourable position than that previously recommended, and, in addition, certain urbanized areas adjacent to the North Thompson River and the Village of North Kamloops would be omitted from the proposals.

On this basis a very rapid investigation was made and a new tentative design proposal submitted at short notice, utilizing data from the previous reports, and at a public meeting of the members of the district and the Minister of Lands this tentative design was approved and the Water Rights Branch was requested to produce a complete design based thereon, together with specifications and cost estimates. By the end of the year, work on this design was well advanced.

*Doukhobor Lands Irrigation.*—The term "Doukhobor lands" applies to approximately 18,500 acres of Crown land located in the vicinity of Grand Forks and also in the vicinity of Castlegar and generally in the area along the Kootenay River below Kootenay Lake; that is, from a few miles north of Trail up the Kootenay and Slocan Rivers as far as Perry Siding.

The Doukhobor lands were originally held in the name of the Christian Community of Universal Brotherhood, a corporate body established by the Doukhobors shortly after the arrival of the group in Canada more than forty years ago.

The Christian Community of Universal Brotherhood borrowed funds from private loan companies to construct irrigation systems. Large tracts of orchard were planted and even a successful jam-factory established. After prospering for a few years, the Community began a slow decline which culminated in its bankruptcy in 1937. The loan companies to whom the Christian Community of Universal Brotherhood owed money were attempting to recover their debts by foreclosure when the Provincial Government, to avert mass evictions, assumed control of the Doukhobor lands by an Act of Legislature in 1939.

To assist the Doukhobor Research Committee, which was set up by the Provincial Government in 1950, the Branch conducted a survey of the engineering aspects of supplying irrigation-water to the Doukhobor lands. The survey has been completed for the larger blocks of former C.C.U.B. holdings, and the information thus gathered, which includes preliminary designs and estimates of cost together with material supplied by the former Land Utilization Research and Survey Division of the British Columbia Lands

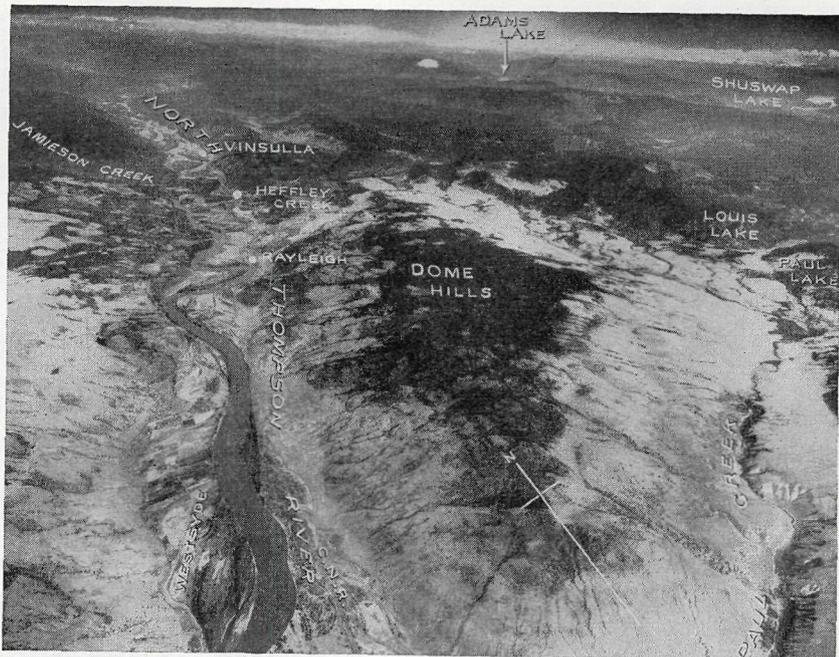


Fig. 6. Aerial view of the northern portion of the B.C. Fruitlands Irrigation District, showing the Westsyde and Jamieson Creek areas.



Fig. 7. Aerial view of the southern portion of the B.C. Fruitlands Irrigation District, showing the Brocklehurst area. The Village of North Kamloops is situated at the junction of the two rivers.

Service, is now being compiled into a report which is expected to be ready for publication early in 1956.

*Creston Area Domestic and Irrigation Water-supply and Sproule Creek  
Irrigation District Investigation*

A. R. D. ROBERTSON, B.A.Sc., M.E.I.C., P.ENG., HYDRAULIC ENGINEER

*Creston Area Water-supply and Irrigation Investigation.*—Following representations by The Corporation of the Village of Creston and by residents of the Alice Siding area north of the village, the Water Rights Branch undertook a comprehensive examination of



Fig. 8. Oblique air photograph showing the Creston area. The Water Rights Branch conducted an investigation in the summer of 1955 to improve the water-supply to the Village of Creston, and to bring water to the Alice Siding area to the north. Arrow Creek is the present source of supply for the East Creston Irrigation District and the Village of Creston.

the problems of this area during the summer of 1955. A preliminary investigation was made in the autumn of 1954, with special reference to the Alice Siding area; this instigated the more complete survey of the area during the past summer.

Creston Village, obtaining its water-supply from Arrow Creek via the main pipe-line of the East Creston Irrigation District, has difficulty maintaining full service during the summer months. Service to the north of the village suffers seriously, some homes at times getting water only one hour in twenty-four. The southern portion of Alice Siding

is developing as a suburb of the Village of Creston (it should be noted that more than 100 of the 700 connections to the village water system are outside the village limits), and logical expansion of this residential section is handicapped by water shortage. Homes are consequently being built to the east within the boundaries of the East Creston Irrigation District, reducing acreage under orchard and thus cutting down the main revenue of the area.

The north end of the Alice Siding area is good orchard land, provided that there is an adequate supply of water; farmers in this region, however, are satisfied with their present supplies from springs on Goat Mountain, but a comparison with the trees in the East Creston Irrigation District makes it obvious that crops could be improved in quality and quantity with adequate irrigation.

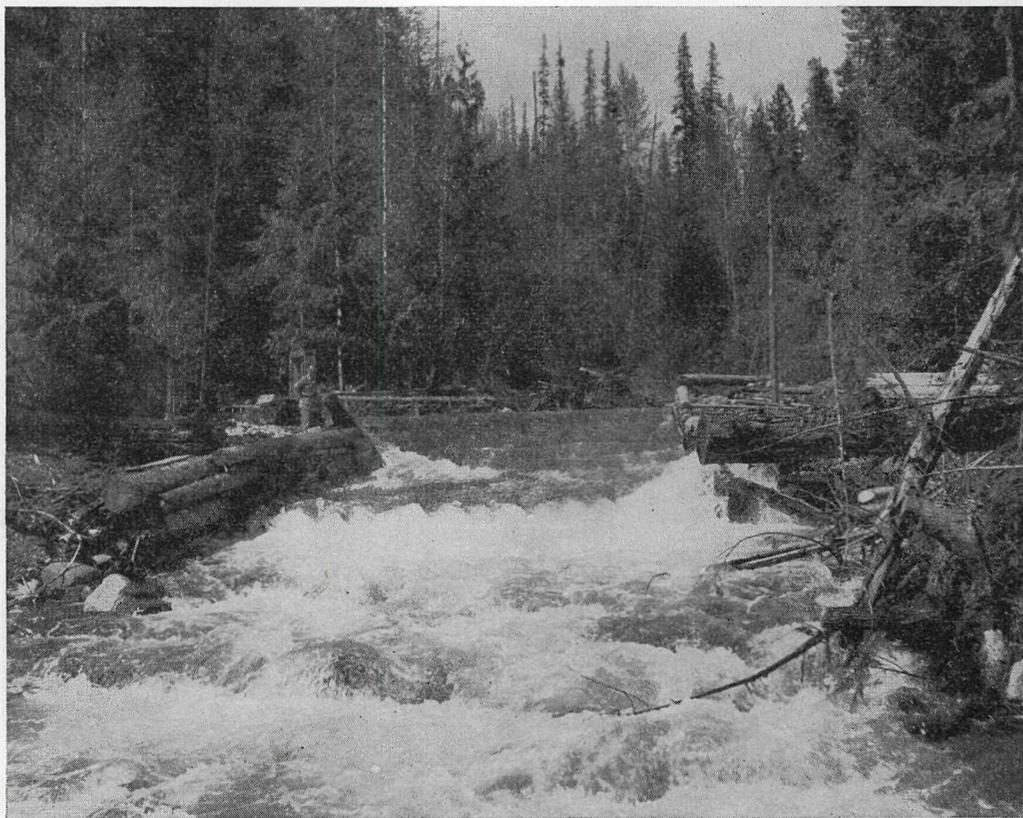


Fig. 9. Arrow Creek near Creston. View of the diversion-works of the East Creston Irrigation District, showing excess water coming over the spillway. The sluice-gate at left centre controls the amount of water admitted to the intake-works farther down-stream.

Several pipe-line routes and reservoir-sites were surveyed during the summer, and the major water sources of the area were examined. Daily measurements were made of the volume of water supplied to the Village of Creston and the East Creston Irrigation District, to establish the capacity of the present pipe-lines and the consumption rates. The Creston area was photographed by the Air Division of the British Columbia Lands Service on June 8th, 1955, and topographical maps are being prepared at a scale of 500 feet equals 1 inch from these photographs by the Multiplex Section of that Division; ground control was established by personnel of the Water Rights Branch.

A report is presently being prepared suggesting alternative schemes for improvement of the water-supply situation for the Creston area, with particular emphasis on the domes-

tic water use; expansion of irrigated land in the Alice Siding area and land to the south of the village is also considered. Attention is being given to the ultimate development of the Creston Valley and the utilization of available water sources in the area.

*Sproule Creek Irrigation District.*—Taghum, a settlement on the north bank of the Kootenay River about 6 miles west of Nelson, was incorporated into the Sproule Creek Irrigation District on November 6th, 1954, for purposes of domestic water-supply and irrigation. Following incorporation, the officers of the district requested engineering advice from the Water Rights Branch, the proposal being to provide domestic supply and to irrigate some 80 acres of the 250 acres within the boundaries of the district; the requirements are a pipe-line route from Sproule Creek and a distribution-system layout.



Fig. 10. The Sproule Creek Irrigation District near Nelson, a newly formed district whose objects are irrigation and water-supply. A preliminary survey of the possibilities of supplying this irrigation district from Sproule Creek was made in August, 1955.

A limited survey of the irrigation district was conducted in late August, 1955, and a contour map of the area was made from low-level air photographs. Alternative schemes and the estimated cost of each will be presented in a later report.

*Telkwa Village Water-supply.*—A preliminary survey was made to supply data pertinent to the selection of a water-supply for domestic purposes for the Village of Telkwa. Two possible schemes were developed for costing purposes only.

The present water-supply system is by individual wells; the suggested systems would bring the water in from near-by Maclure (Tyhee) Lake or by pumping from the Bulkley River.

The investigation was conducted and the report prepared by J. H. Doughty-Davies, hydraulic engineer.

*Naramata Irrigation District Investigation*

M. L. ZIRUL, B.A.SC., M.E.I.C., P.ENG., SENIOR HYDRAULIC ENGINEER

The Naramata Irrigation District is situated on the east side of the Okanagan Lake, approximately 10 miles north of the City of Penticton. Almost the whole of the irrigated area is developed in orchards, producing both apples and soft fruits.

The trustees of the irrigation district are faced with the problem that their replacement programme is insufficient to cope with the deterioration of the very old system. They have requested that the Water Rights Branch carry out a survey and draw up plans for a complete replacement system, together with a schedule for replacement, giving attention to the completely expended portions first. A plan for financing the replacement is also required, with the possibility of obtaining a Government loan.



Fig. 11. This photo shows Highway No. 16 as it passes through the Village Municipality of Telkwa. A preliminary survey for a domestic water-supply was carried out here. The source of water is Maclure Lake, which lies over the hill in the background.

The trustees are also desirous of bringing in any further irrigable acreage within or adjacent to the boundaries of the district and have requested that the investigation include the possibility of developing extra storage to increase the supply of water during the limiting low-flow period to supply this extra acreage.

Of the approximately 1,336 acres noted on the district's assessment roll, there are 914 acres noted as irrigated, with a further 63 acres irrigable, the remainder being rocky or gully land. The trustees consider that their boundaries could be extended to include a further 400 acres if sufficient storage could be developed to serve the arable land within that area.

A reconnaissance of a proposed storage-site on Lequime (Chute) Creek was made on October 27th. Winter conditions had already set in at this elevation on that date,

preventing a thorough investigation being made. However, the reconnaissance indicated that the proposed storage-site was not favourable because of the restricted reservoir area, lack of a favourable dam-site, and lack of favourable materials for earth-fill dam construction.

There is the possibility of increasing the storage slightly on the district's present Naramata Lake reservoir. Since one section of the existing dam is already giving trouble with seepage, any raising of the storage level will require very careful consideration, with the possibility of extensive modification to the existing dam structure.

At the request of the Water Rights Branch, the Surveys and Mapping Branch flew a low-level air-photo strip over the Naramata area this fall and had one of its staff obtain the necessary field control for multiplex mapping of the area. This will supply the Water Rights Branch with a detailed large-scale topographic map of the area which may be used in the layout and design of a new system.

Studies and design will be carried as far as possible during the winter season so that use can be made of the additional information as soon as it becomes available next season.

*Irrigation and Domestic Water-supply Investigations Carried Out  
by Kelowna District Office*

R. G. HARRIS, B.A.Sc., B.C.L.S., M.E.I.C., P.ENG., DISTRICT ENGINEER

*Westbank Irrigation District.*—An evaluation of the Westbank Irrigation District's irrigation system is currently being made by our district office at Kelowna.

During the summer of 1955 the area has been air-photographed, and Mr. Fernyhough, of this Division, has carried out the control surveys necessary to map the area by the Multiplex Section, Air Division.

The Multiplex Section has completed the mapping at a scale of 500 feet equals 1 inch. The finished draughting and field checks have yet to be completed.

The Kelowna office has almost completed its investigations, which has involved evaluating the system with a view to making it an all-pressure system for sprinkler irrigation, and designing the system. Further work will include a study of potential storage-sites, completion of mapping draughting, and design of new system.

*Blue Bird Bay Waterworks System.*—An investigation was carried out during 1955 of a water-supply for an area known as Blue Bird Bay. This area lies a few miles south of Kelowna and involves, at present, fifty-five houses plus fifteen auto courts.

The present water-supply consists of individual pumping systems from Okanagan Lake, and the proposed system is a joint pumping system from Okanagan Lake.

The proposed system was given a preliminary design for costing purposes only, based on 100 service connections and a peak demand of 100 U.S. gallons per minute. This included water for secondary protection only. A serious fire could be handled by bringing in portable pumps and pumping from Okanagan Lake.

A preliminary report has been completed providing estimated costs and recommendations.

FLOODING INVESTIGATIONS

The year 1955 was notable for several damaging storms. Near the end of June, high-intensity rains occurred in the vicinity of Quesnel and also in the area east of the south end of Kootenay Lake.

These high-intensity rainfalls produced flows greater than highway culverts could handle, and many of them washed out (see Figs. 17 and 18). Several investigations have been made this year on areas with flooding problems. These are described below.

*Lac la Hache, San Jose River*

Lac la Hache (lake) during high water causes flooding difficulties to water-front property which includes the Pacific Great Eastern Railway right-of-way and to a num-

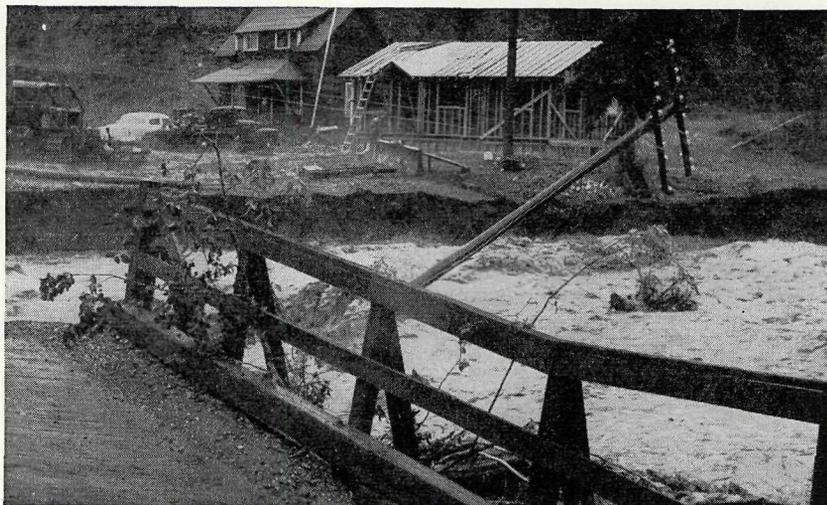


Fig. 17. Main highway bridge (Quesnel to Prince George) at Stone Creek on the verge of washing out. This happened as a result of a severe flash flood on June 28th, 1955. High-intensity rainfall occurred north and south of Quesnel on this date, washing out several main bridges.

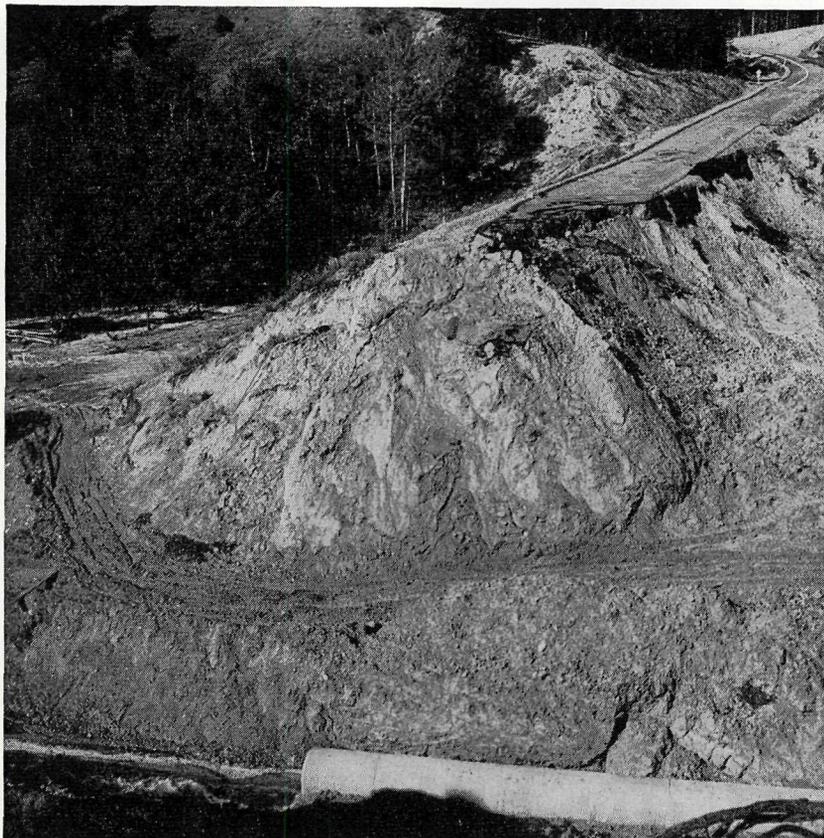


Fig. 18. One of the main breaks in the Quesnel-Prince George Highway that occurred in late June, 1955. The culvert pipe in the base of the road fill was unable to carry away enough water, with the result that Australian Creek backed up behind the fill until it overflowed the highway. The water then poured down the side of the fill until it was washed away sufficiently to fail. The size of the washout can be gauged by comparison with the pavement of the two-lane highway.

ber of recently constructed auto courts. San Jose River, which drains the lake, is a small-capacity stream which meanders to a certain extent over the flood-plain of the valley-floor. This flood-plain is utilized for hay-farming by the local ranchers. The Pacific Great Eastern Railway also traverses the valley-floor.

Since an application to replace a dam which had been at the lake outlet is in hand, our approval of the design is governed by our knowledge of the lake outlet and of the San Jose River. It was therefore decided to carry out field investigations on the matter.

The area concerned was air-photographed and enough field control was obtained to map the area by multiplex to a scale of 500 feet equals 1 inch. A traverse made by the Legal Surveys Division along the new Cache Creek-Prince George Highway was used to supplement our surveys. The multiplex work has yet to be done on this project, although the survey calculations are almost completed.

#### *Kelowna (Mill) Creek Flooding*

R. G. HARRIS, B.A.Sc., B.C.L.S., M.E.I.C., P.ENG., DISTRICT ENGINEER, KELOWNA

Kelowna (Mill) Creek has, in the past, caused damage to property in the City of Kelowna and in areas outside the city limits as well.

A complete field investigation has been made by the Kelowna office. The area has been air-photographed; these air photographs have been controlled both horizontally and vertically; the multiplex mapping has been completed; and the finished draughting is almost completed.

This project will be completed when a design has been made which will alleviate the flooding, cost has been estimated, and a report has been prepared giving recommendations.

#### *Flooding of Beaver Creek near Fruitvale*

Beaver Creek, a tributary of the Columbia River, rises just west of Lake Erie near Salmo, and flows in a general south-westerly direction for approximately 15 miles to its confluence with the Columbia.

Between Parks Siding and the Village of Fruitvale the creek has caused considerable damage by its annual flooding of adjacent meadow lands, and the Water Rights Branch was instructed to investigate the possibility of preventing the recurring flooding. A site investigation revealed that it would cost about \$60,000 to straighten and widen the channel sufficiently to contain the annual floods. As the total assessed value of the property involved is only \$47,000, the proposed scheme was uneconomic and impracticable.

#### HYDRO-POWER INVESTIGATIONS

The only Provincial investigation on power made during 1955 was a reconnaissance made by V. Raudsepp on the proposed Yukon-Teslin-Taku Rivers power development. Mr. Raudsepp's description follows.

#### *Yukon-Teslin-Taku Rivers Power Development*

V. RAUDSEPP, C.E., P.ENG., SENIOR HYDRAULIC ENGINEER

The Northwest Power Industries Limited continued in 1954 its surveys on the power project which was outlined in the 1954 Annual Report. It is noted that some of the remarks in the 1954 Annual Report concerning the potential power development are no longer pertinent as the company's planning has progressed and some aspects, especially those concerning the later stages of the development, have been changed.

A reconnaissance survey of the water resources of the area involved was undertaken in the summer of 1954.

In connection with the application for a water licence by the Northwest Power Industries Limited, a public hearing was held by the Comptroller of Water Rights at Atlin in August, 1954.

It is expected that the company will have obtained enough detailed information by the fall of 1956 to permit the commencement of construction of the initial stage of power development in the spring of 1957.

The initial stage, under present plans, will involve the development of some 270,000 horse-power at the power-site on the Nakonake River, a tributary to the Taku River. Only the Atlin Lake waters will be utilized in the initial stage by erecting a temporary timber crib dam on the Atlinto River near its outlet from Atlin Lake. This temporary dam will raise Atlin Lake to a maximum of 12 feet above its high-water level of 2,195 feet. The storage-reservoir thus created will be sufficient to make available a constant flow of 2,500 to 2,700 cubic feet per second.

The impounded water will be carried from Atlin Lake by a short tunnel to Sloko Lake, the waters of which will be lowered to the same level as that of Atlin Lake. Another tunnel will be driven through to the Nakonake River to give a head of approximately 1,090 feet and provide for the development of some 270,000 horse-power.

The temporary Atlinto River dam will not be needed after the Whitehorse dam is built, as planned in the later stages of the development.

This initial stage of the development will supply the first metallurgical plants and also provide ample power for future construction operations.

The company's surveys have shown that a suitable industrial site is available on the south bank of the Taku River just east of the International Boundary, on the Canadian side. Power to this area will be carried from the Nakonake power-site by a 45-mile transmission-line. A deep-water wharf will be constructed on the Taku Inlet, in Alaska, and will be connected by a road or railway with the industrial site.

#### MISCELLANEOUS

##### *Ram Creek Hot Springs*

A small group of hot springs, tributary to Ram Creek, about 40 miles north-east of Kimberley, was the subject of an inquiry to the Water Rights Branch in the spring of 1955. A report has been made of the reconnaissance carried out in August, 1955, by A. R. D. Robertson, hydraulic engineer, indicating that development of these thermal waters may be feasible.

#### **Water-resource Investigations Made for the Fraser River Board**

As in the past few years a large share of the work performed during 1955 by the Water Resources Compilation Section was done for the Fraser River Board.

The Water Rights Branch was involved with this Board on all levels during the past year: the Comptroller, being a member of the Board, was very active, dealing with policy matters; the Chief of the Hydraulics Investigation Division acted as alternate on the Board; a hydraulic engineer worked almost full time as a member of the Board's working group, principally on planning; and the Water Resources Compilation Section carried out a number of actual field investigations on behalf of the Board.

The part played by the Branch on policy and general planning is covered elsewhere in this Report. The following is a general description of the field investigations carried out by or for the Water Resources Compilation Section on behalf of the Board.

##### *Grand Canyon Project*

One of the survey parties spent the entire field season in the Upper Fraser River area in the vicinity of Longworth, between Prince George and McBride.

A dam built on one of the dam-sites in the Grand Canyon of the Fraser River, impounding the water to an elevation of about 2,120 feet, would create a large reservoir extending up-stream to about Crescent Spur. This reservoir would be about 48 miles in length (86 river miles) and have an average width of perhaps 1 mile.

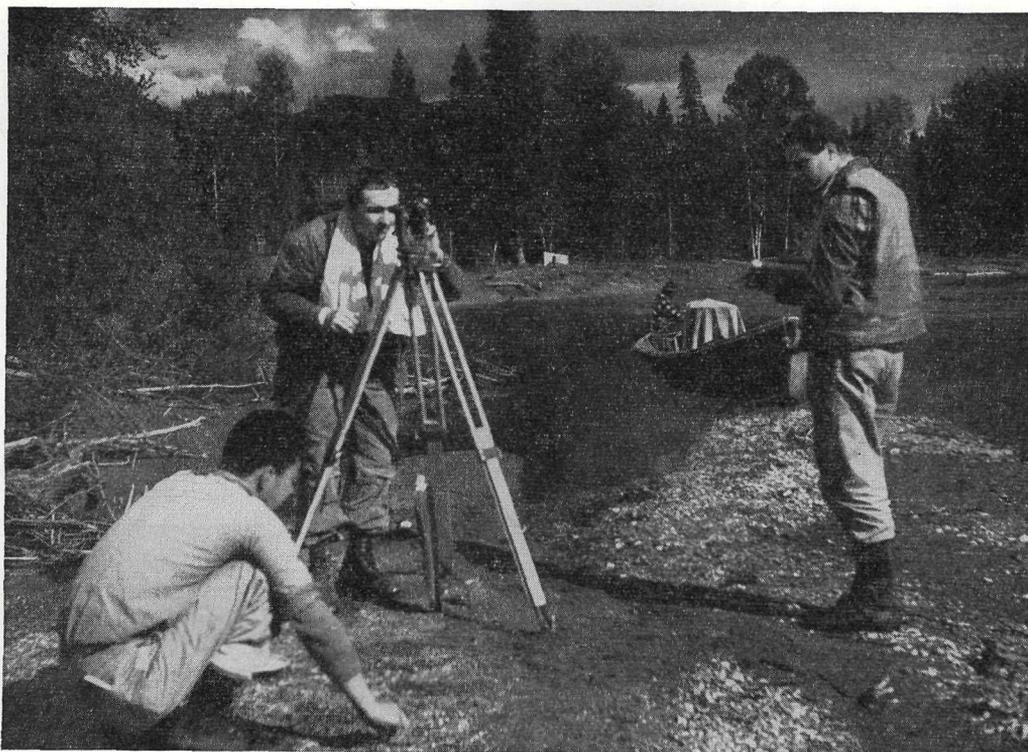


Fig. 12. Hydraulic engineering survey party traversing along the Torpy River on the Grand Canyon project. River-boat was used for transportation.



Fig. 13. River-boat used on the Grand Canyon project. This 30-foot freighter, powered by two 25-horsepower outboard motors, was able to carry large amounts of survey and camping gear.

The reservoir area was mapped from the Grand Canyon to about Uchling during 1951, 1952, and 1953. This entailed considerable field work, as the mapping was done without the aid of photogrammetry. Maps are currently available at a scale of 500 feet equals 1 inch with a contour interval of 20 feet. A key plan of these sheets is included in the 1954 Annual Report.

This year's work in this area progressed on five fronts, as follows:—

- (a) *Completion of Reservoir Mapping.*—This entailed the field surveys which will provide the horizontal and vertical control for multiplex mapping of the remaining reservoir area which lies between Uhring and Crescent Spur, a matter of about 17 river miles. This mapping would close the 2,120-foot contour.
- (b) *Mapping for Canadian National Railways Relocation.*—Were a dam to be constructed in the Grand Canyon, some of the C.N.R. trackage would be required to be relocated. The areas in which this relocation might be required (depending on reservoir top water-level) will be mapped by multiplex at a scale of 500 feet equals 1 inch. Our survey party has provided the horizontal and vertical field control for this mapping.
- (c) *Spillway Diversion Mapping.*—Were a dam to be constructed in the Grand Canyon, an attractive separate spillway location presents itself. This location is by way of Toneko Lake and Moxley Creek. This area will be mapped by multiplex also, at a scale of 500 feet equals 1 inch, and our survey party has provided the necessary field control.
- (d) *Geological Mapping, Grand Canyon Dam-sites.*—A geologist from the Provincial Department of Mines, J. W. McCammon, in company with a small mobile survey party under D. E. Smuin, of the Branch, geologically mapped the dam-sites. Five dam-sites were reported upon, only two of which showed very great promise.
- (e) *Capacity Calculations, Grand Canyon Reservoir.*—Although the mapping has not been completed, several men were employed for some time taking out areas with planimeters and preparing a capacity curve for the portion of the reservoir which has already been mapped.

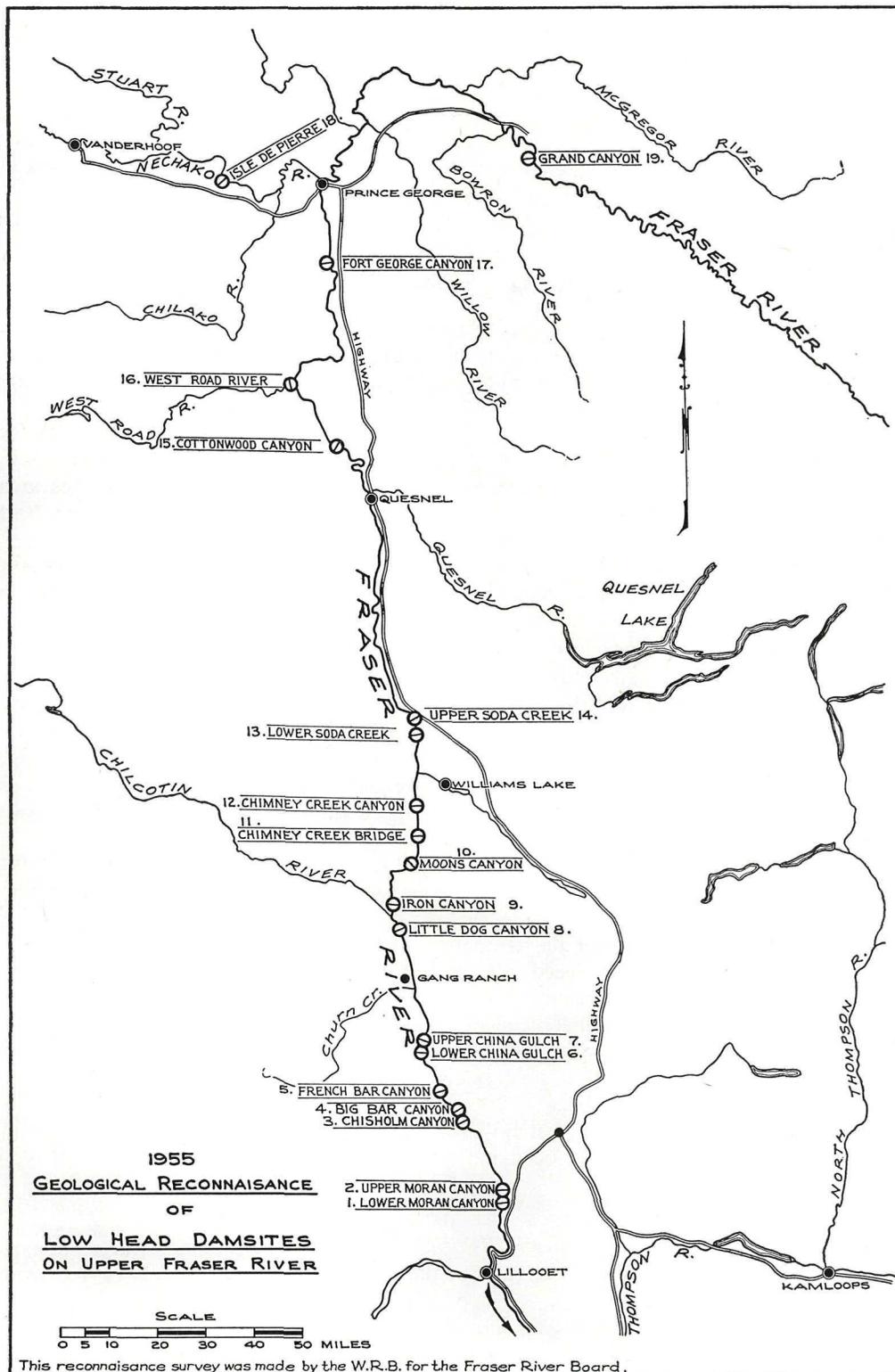
#### *Geological Reconnaissance, Fraser River above Moran*

A small, mobile survey party, with D. E. Smuin as chief, provided surveys, transportation, and housekeeping for two geologists from the Provincial Department of Mines, Hugh Nasmith and J. W. McCammon. The former geologist was available for only the first part of the season, the latter remaining until the end.

Since the Fraser River from Moran Dam site north to Prince George had already been mapped by the Water Rights Branch, the Fraser River Board assigned the Water Rights Branch the task of re-examining the same stretch of the river for low-head dam-sites and to geologically map these sites, and to place monuments on the more promising locations.

This party, travelling by motor-vehicles and large river-boats, examined the following dam-sites which are presently being reported upon (*see* Plates 9, 11, and 12) (the numbering progresses in an up-stream direction): 1, Lower Moran; 2, Upper Moran; 3, Lower Chisholm Canyon; 4, Upper Chisholm Canyon; 5, French Bar Canyon; 6, Lower China Gulch; 7, Upper China Gulch; 8, Little Dog Canyon; 9, Iron Canyon; 10, Moons; 11, Chimney Creek Bridge; 12, Chimney Creek Canyon; 13, Lower Soda Creek; 14, Upper Soda Creek; 15, Cottonwood Canyon; 16, Westroad River Canyon; 17, Fort George Canyon; 18, Isle de Pierre (Nechako P.); and 19, Grand Canyon.

Little can be said as to the conclusions reached by these reports at this time because of their stage of completion. In general, however, it appears that there are few good dam-sites as the rock appears to be badly shattered and faulted with few exceptions.



*Lytton to Moran Mapping*

The Fraser River has now been mapped at a scale of 500 feet equals 1 inch from Prince George continuously down-stream to the Moran Dam site. The Fraser River Board decided to continue this mapping south to the confluence of the Thompson River at Lytton. Field control for this survey was carried out during the 1955 field season by the Topographical Division of the Surveys and Mapping Branch. The chief of party was Frank O. Speed.

The Multiplex, using Speed's control, has completed the mapping at a scale of 500 feet equals 1 inch and with a contour interval of 40 feet.

The Water Rights Branch will prepare the finished maps. An index of these finished maps will be included in the 1956 Annual Report.

*Moran Dam Reservoir*

A reservoir area and capacity curve has been prepared in 1955 following considerable detailed taking off areas by planimeter from the sixty-one map-sheets making up the reservoir mapping. A dam, constructed on the Moran site, would store about 13,350,000 acre-feet, assuming a top water elevation of 1,540 feet.

*Cottonwood Canyon Dam Reservoir*

A reservoir area and capacity curve has been remeasured, recalculated, and redrawn for the Cottonwood reservoir. A reservoir backing the water up to the foot of the Fort George Canyon dam-site (elevation 1,800 feet) would store about 1,307,000 acre-feet. A higher dam built on the Cottonwood site and backing up the river to Prince George, thus flooding out the Fort George dam-site, would create a reservoir holding about 2,500,000 acre-feet.

*Raush River Dam-site, Fraser River*

A dam-site was examined briefly by Dr. J. D. Mollard, P.F.R.A. geologist, and on the basis of this report it was decided to carry out investigations on a dam-site on the Fraser River immediately up-stream from the confluence of the Raush River.

A small party, under James Buchanan, hydraulic engineer, visited the site and gathered the topographical information required to prepare a dam-site plan.

The reservoir behind this dam was also mapped this year by a private photogrammetric company.

## HYDROLOGY SECTION

## V. RAUDSEPP, C.E., P.ENG., SENIOR HYDRAULIC ENGINEER

With the reorganization of the structure of the Water Rights Branch in July, one senior hydraulic engineer was placed in charge of investigations in the field of hydrology, snow surveys, sedimentation, ground-water, etc.

One senior hydraulic engineer and one hydraulic engineer together with one part-time assistant form this section. The hydraulic engineer and the assistant are, as they have been, carrying out the snow surveys and sediment sampling, and reports on those activities can be found elsewhere.

As for the new section, as yet no programme has been formulated. The senior hydraulic engineer has been fully occupied with special assignments of various nature.

## GROUND-WATER INVESTIGATIONS

*Extent of Use of Ground-water in British Columbia.*—The report on the reconnaissance survey was completed. A synopsis of the findings of the survey was published in the 1954 Annual Report.

*Ground-water Studies in the Agassiz-Harrison Lake Area and the Cawston Irrigation District.*—Groundwater-level observation programmes, as reported in the 1953 and

1954 Annual Reports, were continued. A review of the drainage and ground-water conditions of the Agassiz-Harrison Lake area indicated that the observation programme in that area could be curtailed.

#### DYKING AND DRAINAGE

*November, 1954, Flood in Lower Mainland.*—In order to keep the Comptroller of Water Rights informed about the functioning of the reclamation works in the Lower Mainland, a short study of the November, 1954, flood was carried out.

*A Study of Electric-power Rates for Drainage Pumping in the Lower Mainland.*—The dyking authorities in the Lower Mainland had suggested that the power rates for drainage pumping are unduly high. A short study of the installed motor capacity, consumed energy, and the cost of pumping was undertaken and recommendations made for further action.

*A Review of Drainage and Dyking in British Columbia.*—In conjunction with the preparation of a brief on Federal-Provincial co-operation in developing the Provincial agriculture, a review was prepared on dyke-land reclamation and its future problems.

*Study of a Proposal to Replace the Nicomen Slough Bridge by Fills Containing Culverts.*—It has been proposed to replace the existing bridges at Dewdney and Deroche by fills equipped with culverts. The proposed structures would have adverse effects with respect to drainage of the dyked areas bordering the Nicomen Slough. It will be recommended that the bridges be replaced by fill-and-bridge structures. The study is continuing.

#### SNOW SURVEYS AND WATER FORECASTING, SEDIMENTATION SURVEY

J. H. DOUGHTY-DAVIES, B.A.Sc., P.ENG., HYDRAULIC ENGINEER

##### *Snow Surveys and Water Forecasting*

Two extensive field-trips were made in connection with the snow courses throughout the Province. On these trips eight snow courses were inspected and twenty observers were instructed. The McBride Snow Course was reopened, a new observer having been found. Five snow courses were discontinued, the majority of these by the Powell River Company. Two new courses were established—one on Le Jeune Lake near Kamloops and the other on Mount Anglemont near Shuswap Lake. These two new courses will increase the snow data in the South Thompson and Nicola watershed.

A reconnaissance trip was made into the Horsefly and Likely areas to try to find suitable locations for new snow courses. Unfortunately no areas from which the snow data information could be sent in winter could be found.

*Accuracy of the 1955 Spring Run-off Forecasts Based on Snow-survey Data.*—The number of forecasts made this year was increased by the forecast for the Fraser River at Hope.

The winter snow-pack did not reach its maximum depth and water content until four or five weeks past the usual date of March 31st. The run-off was correspondingly late, and the over-all effect was that the actual spring run-off was greater than normal in the greater part of Central and Southern British Columbia.

Since the run-off forecasts are issued on the assumption that the spring run-off will be normal, the forecasts this year were generally less than the actual run-offs. Therefore, in order to make an accurate comparison between the forecast and actual run-offs, the actual run-offs were normalized, based on the snow-survey data.

In general the results of this year's forecasts were found to be as follows: 94 per cent of the forecasts made were within 15 per cent; 87 per cent of the forecasts made were within 10 per cent; and 25 per cent of the forecasts made were within 5 per cent.

The following table supplies the data on the comparison of the run-off forecasts with the normalized run-off. The figures for the actual run-offs are also shown.

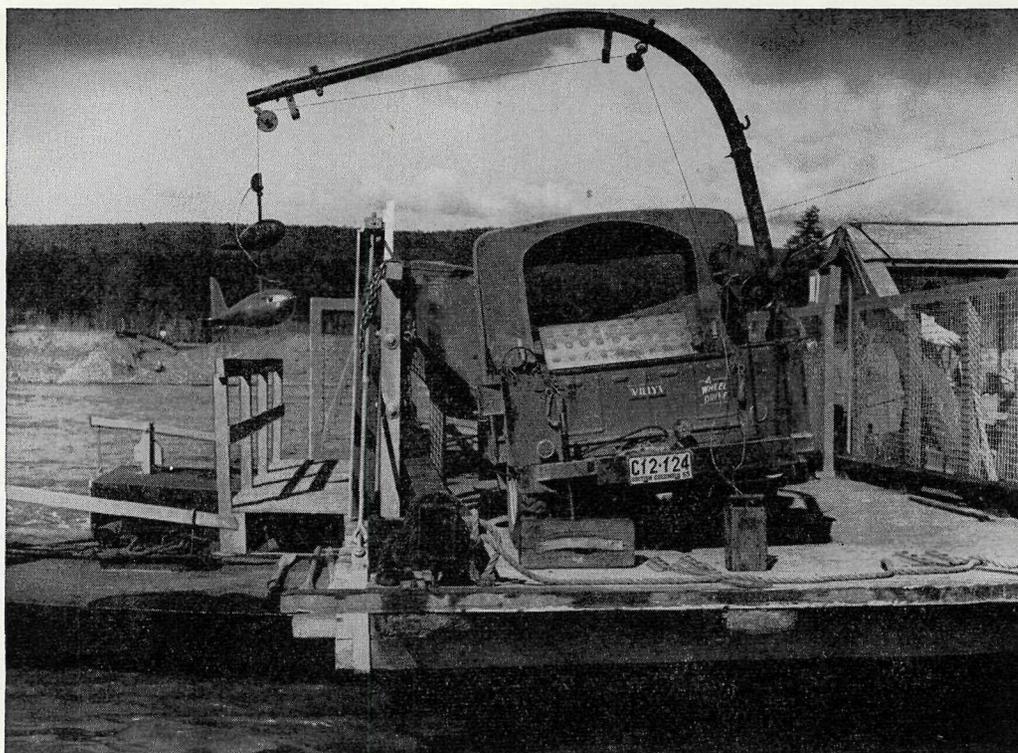


Fig. 14. Sediment-sampler in operating position. The jeep is shown on the Marguerite Ferry with the boom swung out ready to lower the sampler into the water.



Fig. 15. Sediment-sampler and derrick in its travelling position on the jeep. The Marguerite Ferry, which crosses the Fraser River, from which the sampling was done, is seen in the background.

## ACCURACY OF RUN-OFF FORECASTS, 1955

Stations Forecast	Forecast	Actual	Normalized	Difference	Difference
	Acre-feet	Acre-feet	Acre-feet	Acre-feet	Per Cent
1. Columbia at Nicholson <sup>1</sup> .....	1,937,000	2,157,000	2,021,000	84,000	4.2
2. Columbia at Revelstoke <sup>1</sup> .....	15,400,000	17,529,000	16,423,000	1,023,000	6.3
3. Columbia at Birchbank <sup>1</sup> .....	36,300,000	39,880,000	36,695,000	395,000	0.1
4. Kootenay at Wardner <sup>1</sup> .....	3,710,000	4,407,000	4,152,000	442,000	10.6
5. Elk at Stanley Park <sup>1</sup> .....	1,293,000	1,190,000	1,190,000	-103,000	-8.6
6. Lardeau at Gerrard <sup>1</sup> .....	595,000	600,000	600,000 <sup>2</sup>	5,000	1.2
7. Duncan at Howser <sup>1</sup> .....	1,830,000	1,928,000	1,928,000	98,000	5.1
8. Slocan at Crescent Valley <sup>1</sup> .....	1,704,000	1,965,000	1,847,000	143,000	7.7
9. Inflow to Kootenay Lake <sup>1</sup> .....	15,425,000	17,284,000	16,423,000	998,000	6.1
10. Inflow to Okanagan Lake <sup>3</sup> .....	297,000	388,000	360,000	63,000	17.5
11. North Thompson at Barriere <sup>3</sup> .....	6,550,000	7,433,000	6,837,000	287,000	4.2
12. Fraser at Hope <sup>1</sup> .....	45,000,000	54,216,000	49,341,000	4,341,000	8.8
13. Inflow to Stave Lake <sup>3</sup> .....	1,040,000	1,195,000	1,135,000	95,000	8.4
14. Capilano at North Vancouver intake <sup>3</sup> .....	179,000	166,000	166,000 <sup>4</sup>	-13,000	-7.9
15. Inflow to Powell Lake <sup>3</sup> .....	950,000	1,031,000	1,031,000	81,000	7.9
16. Inflow to Lois Lake <sup>3</sup> .....	235,000	259,000	259,000	24,000	9.3

<sup>1</sup> April to August, inclusive, flows.

<sup>2</sup> Flow for July estimated.

<sup>3</sup> April to July, inclusive, flows.

<sup>4</sup> Corrected for storage.

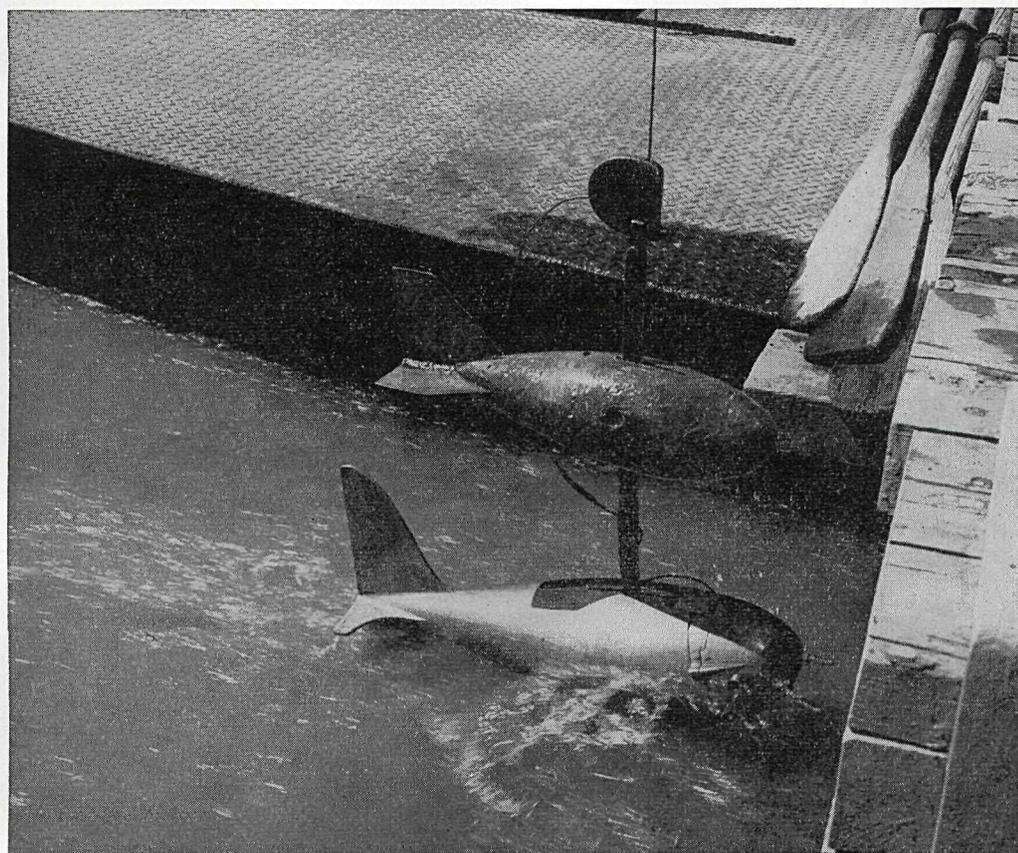


Fig. 16. The suspended sediment-sampler is shown being lowered into the Fraser River. The lower "fish" is the sampler, while the lead weight is shown mounted above it. This arrangement allows the sediment load to be sampled practically on the river-bottom.

*Sedimentation Survey, Fraser River*

The modified sediment sampling programme was continued for the spring of 1955. Only the stations at Hope and Marguerite were sampled.

The sampling equipment was changed in some details and is now improved and samples are obtained with greater efficiency.

Listed below are the stations with the number of measurements made and samples taken in 1955:—

Sampling Station	Number of Measurements	Number of Samples
Marguerite .....	6	72
Hope .....	7	252
	—	—
Totals .....	13	324

An instruction booklet for the operation and maintenance of the sampling equipment and power-hoist is under preparation.

*Miscellaneous*

The flooding and damage caused by the severe November rain-storm in North Vancouver and on the south side of the Fraser River was inspected. Attempts were made to obtain data on the crest height of the flood-water. Also some stream-velocity measurements were made.

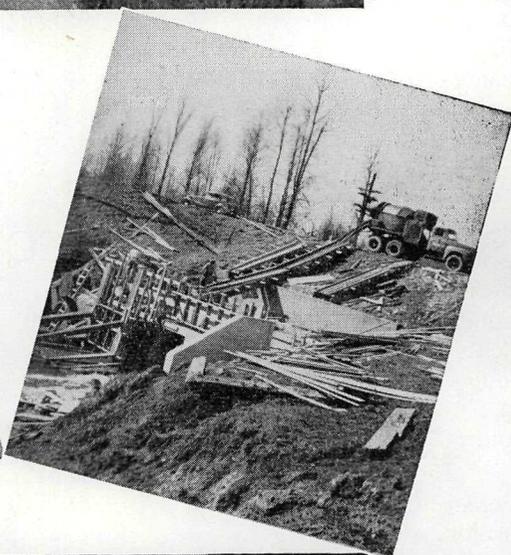
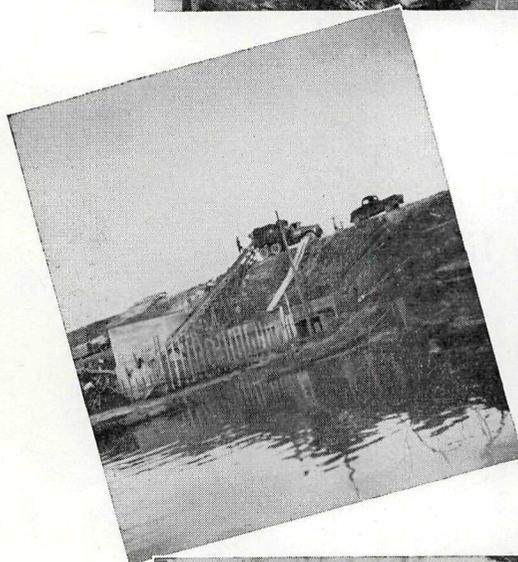
The Western Snow Conference was attended, and several mutual problems discussed concerning the co-operation between the United States and British Columbia snow surveyors. It was also decided to hold the 1956 Conference in Penticton. A. F. Paget was placed on the Programme Committee and J. H. Doughty-Davies was nominated as chairman of local arrangements.

Mr. Doughty-Davies was asked to serve on the sub-committee of ice and snow for the National Research Council. This was agreed to, and co-operation with the National Research Council is anticipated.

**DYKING COMMISSIONER**

# *Dyking Commissioner*

Flooding of Alouette River, Maple Ridge area, November 3rd, 1955.



Results of failure of private dyke, Alouette River flooding,  
November 3rd, 1955.

Centre left: Reconstruction of wing-wall,  
No. 1 Pump-house, Matsqui District.

Centre right: Extension of flood-boxes,  
No. 2 Pump-house, Matsqui District.

**DYKING COMMISSIONER**

J. L. MACDONALD, B.Sc., P.ENG., DYKING COMMISSIONER AND  
INSPECTOR OF DYKES

It is not generally recognized that each dyking and drainage district is a registered separate corporate body, and that the financial and other affairs of each must be kept entirely separate from the others. This means that bank accounts must be kept for the renewal reserve fund, sinking fund, and maintenance fund for each of the fifteen districts administered by this office.

Also there is the matter of keeping up to date the fifteen assessment rolls for the 4,520 owners; the mailing of Court of Revision notices to each owner, followed by tax notices; the collection of taxes and issuing of receipts. These duties, along with others too numerous to name, keep the efficient office staff of two fully occupied. The reason that such a small staff can cope with such a volume of detailed work is that the dates of tax notices for the different districts are spaced to fall on different months of the year.

There is never sufficient money in any district to do all the maintenance and construction work that needs to be done. To get the work done as cheaply as possible, it is done for the most part by day-labour and the district's or hired equipment. This means that planning and supervision must be given to the work in connection with the maintenance of dykes, the cleaning and improvement of many miles of drainage-ditches, the constant inspection of flood-boxes and the twenty-six pumping plants with combined connected horse-power of 6,279 and capacity of 828,000 imperial gallons per minute in all districts.

Besides the regular inspections of the areas and the works, there is always a waiting-list of calls from individuals in the various districts with drainage problems or grievances who must be contacted and an inspection made. Then, in addition to the regular prescribed annual general meetings and the Courts of Revisions in each district, there are numerous evening meetings each month called by the Reeves of municipalities or presidents of ratepayers' associations to discuss affairs of the districts. These meetings and individual calls account for quite an amount of effort and time, but they are welcomed as it is one sure way of clearing up many misunderstandings and retaining the confidence and co-operation of the farmers in the districts.

The annual threat from the spring freshet of the Fraser is always a busy time of organization and preparation. The duration of this threat the last two years has been prolonged due to the heavy snow-pack and late slow run-off. Constant vigilance and readiness for action was necessary for four months this year. Organizations are set up in each district composed of experienced competent leaders and men skilled in the various endeavours needed. Men are alerted for call when wanted; sources of equipment such as power-loaders, bulldozers, trucks, etc., are tabulated; and stock-piles of sand-bags, sand, gravel, clay, and quarried rock are set up. At times when the situation is considered acute, a headquarters is maintained at Mission, which is about central for all the districts in the Fraser Valley. At such times this Mission headquarters functions under the provisions of the Flood Relief Act and directs the forces to combat the flood threat of the Fraser Valley area under the over-all supervision of the Deputy Minister of Highways. A system of communications is set up in all districts and from the districts to the headquarters. Fortunately this year the full scheme did not have to be put into operation, and the office at Mission was only open a matter of days. Nevertheless the threat remained for four months, and a constant system of dyke patrol and state of readiness had to be maintained. This interfered with the maintenance and other regular work of the districts and has left many jobs uncompleted that would have been done.

The "Dykes Maintenance Act," 1950, enacted following the expenditure of large sums by the two senior governments in rebuilding the dykes after the 1948 flood, has now

come into general use. The intent of the Act was to provide for an over-all inspection of all dykes in the Province in an attempt to ensure proper maintenance and to prevent them falling into disrepair so as to contribute to conditions likely to result in a disaster such as occurred in 1948. Until recently the newly reconstructed dykes did not require much repair. Now they are beginning to require more maintenance and repair. Requests are becoming frequent for inspections and consultations regarding maintenance, rock protection, drainage, increased pumping capacity, etc., not only from the thirty-five districts in the Fraser Valley not administered by this office, but by districts throughout the Province, such as Pemberton and the four districts in the Kootenays.

The following tables are given outlining physical and financial characteristics of the various districts administered by this office.

## FINANCIAL DATA

Dyking or Drainage District	Tax Rate per Acre	Total Taxes Collected	Allocation of Taxes		1954 Power Costs
			Capital Charges	District Operating Costs	
Coquitlam Dyking .....	\$3.70	\$11,280	\$2,110	\$9,170	\$6,860
Dewdney Dyking .....	1.75-2.52	7,175	2,160	5,015	3,640
South Dewdney Dyking .....	3.65 <sup>1</sup>	6,460	-----	-----	1,960
East Nicomen Dyking .....	1.50	1,770	590	1,180	-----
West Nicomen Dyking .....	2.70	10,820	4,310	6,510	1,100
North Nicomen Dyking .....	5.10	850	-----	-----	-----
Harrison Mills Dyking .....	2.32 <sup>1</sup>	2,060	-----	-----	-----
Maple Ridge Dyking .....	3.00	24,560	4,860	19,700	7,630
Maple Ridge Drainage .....	.17-.68	2,570	1,030	1,540	-----
Matsqui Dyking .....	2.00	20,200	5,000	15,200	6,750
Matsqui Drainage .....	.60-.90	3,320	1,320	2,000	-----
Pitt Meadows No. 2 Dyking .....	5.35	5,670	2,220	3,450	2,710
Sumas Drainage, Dyking, and Development .....	.68-4.10	85,700	22,870	62,830	28,100
South Westminster Dyking .....	2.60-13.03	14,820	4,240	10,580	1,200
Silverdale Dyking .....	1.44	575	100	475	-----

<sup>1</sup> South Dewdney and Harrison Mills tax on assessed values of land and improvements.

Capital charges include repayment of debt, payments to sinking funds, and payments to renewal reserve accounts. Tax rate is converted to an average rate per acre in the above table.

## PHYSICAL INVENTORY

Dyking or Drainage District	Assessed Area	Drainage Area	Dyke	Pumping Plants			Capacity of Water Removed over Drainage Area in 24 Hr.
				No.	Total H.P.	Total Capacity (1,000 I.G.P.M.)	
Coquitlam .....	Acres 3,050	Acres 4,250	Miles 8.4	5	420	90.0	In. 1.36
Dewdney (3,356 acres)	} 5,161	22,400	7.4	1	700	80.0	0.23
South Dewdney (1,805 acres)							
East Nicomen .....	1,180	2,000	5.4	-----	-----	-----	-----
West Nicomen .....	4,138	4,200	13.62	3	105	9.5	0.15
North Nicomen .....	250	300	3.4	1	15	2.0	0.60
Harrison Mills .....	1,100	2,300	4.8	2	40	4.5	0.13
Maple Ridge .....	8,380	9,600	14.4	4	464	120.0	0.81
Matsqui .....	10,039	25,800	7.2	2	755	120.0	0.30
Pitt Meadows No. 2 .....	1,060	1,150	7.2	2	200	30.0	1.60
Sumas .....	28,029	82,000	27.7	2	3,500	350.0	0.33
South Westminster .....	1,400	3,740	4.6	3	40	15.0	0.26
Silverdale .....	900	1,830	2.6	1	40	7.0	0.25

## DYKING DISTRICTS

Brief remarks follow on the individual districts administered by this office.

## SOUTH WESTMINSTER

The dykes in this area have had two weak sections raised and widened: one section was between the Timberland Mill and the grain-elevator, and the other from Yale Road to the Pattullo Bridge. The programme of cleaning all the drainage-ditches included in the dyking system has been completed this year. During the record rainfall in November of this year, considerable distress was experienced in the area. The ditches and pumps are not of sufficient capacity to carry the quick run-off from the now urban adjacent highland. Two new pumps with combined capacity of 20,000 imperial gallons per minute provided by the Department of Highways to relieve the flooding of highways in the area will be installed in the near future. This additional pumping capacity will improve conditions but will not give 100 per cent protection during winter flash storms. The only feasible way to give this insurance would be by means of a gravity ditch to divert the waters from the high lands.

## COQUITLAM

This district has a stretch of dyke with an unfilled borrow-ditch on the inside. A small section of this dyke sluffed during this year's high water. It was discovered in time and repaired quickly to prevent flooding of the area. This borrow-ditch should be filled and the cross-section of the dyke widened to give adequate protection.

This district, relatively speaking, has a high pumping capacity capable of lowering the water-table 1.36 inches in twenty-four hours over the entire drainage area. Unfortunately the pumping costs are high, costing over the past year approximately \$7,000, leaving a very small margin in the \$9,000 levied for all maintenance purposes. This means only a fraction of the required cleaning of the drainage-ways can be done each year. The main canal from the south dyke to the Dominion Avenue pump was cleaned this year. The possibility of diverting the water from Mary Hill by gravity will be investigated.

## MAPLE RIDGE DYKING

The dykes in this area are adequate against the waters of the Fraser. Some sections with sandy subsoil are very porous and give trouble through seepage when the water-level stays up a long time. The dykes along the Alouette River are not high enough nor of sufficient cross-section to withstand flash winter storms of the Alouette watershed. Considerable anxiety was experienced during the recent storm in November when at one stage a section of dyke had only 1 foot of free-board. Fortunately the storm slackened at this time and possible disaster was averted. Had the dam farther up the river failed at this time, which it did approximately thirty-six hours later, it is doubtful if any of the dyked areas along the Alouette would have escaped disaster. A study of the general situation—the dam, river clearance, and the dykes—is now under way by the Water Rights Branch.

There is a demand in the district for more winter drainage and pumping. In anticipation of this demand a new pump with a capacity of 30,000 imperial gallons per minute has been ordered and will be installed in the near future. This pump is being financed from the district's renewal reserve fund.

## MAPLE RIDGE DRAINAGE

The work in this district consists chiefly in reconditioning as many miles of ditch each year as the funds will allow. This policy has been continued this year.

## SILVERDALE FLATS

This small district is organized under the "Water Act." The elected trustees of the district decide matters of policy and programme of works. They were having difficulty assessing and collecting so they petitioned this office to do the office management for them. The district's affairs are in good shape. They have a very real threat to their dykes caused by the continuous erosion of the river-banks. A solution to this problem has not yet been found.

## DEWDNEY AND SOUTH DEWDNEY

These two districts are protected by the one dyke and pumping-station, although their financial set-up is separate. The dam at the pump-house constructed across the mouth of the slough has shown signs of weakness during the past two freshets. The concrete in the flood-boxes cracked in several places and water seeped through in an alarming way during the freshet. Similar conditions were experienced at the dam in Matsqui. This was corrected by gunite shot in under pressure. This job is now being done on the Dewdney dam by the Keyes Construction Company.

## WEST NICOMEN ISLAND

The main concern of this district is drainage during continued high level of the Fraser during freshet time. The soil of the island is deposited on porous gravel and sand seepage is severe after the river reaches 18 feet. It is not considered wise to attempt to pump too much of this seepage water out while the river remains high as the more that is removed the greater the seepage. When the Fraser level recedes, every attempt is made to remove the inside water as quickly as possible. The pumping capacity was increased by the addition of a 12-inch pump for this purpose this year.

## EAST NICOMEN

This district was organized after 1950. It has no improved drainage system nor pumps. The internal waters go out through flood-gates located in natural sloughs when the Fraser drops. The growth of cottonwood bushes on the dykes is causing concern. Yearly chemical sprays have not held this growth in check. It is now necessary for a brushing job to be done.

## HARRISON MILLS

The district was organized after 1950. For one reason or another the trustees did not act. Before this year's freshet, responsible people in the district were approached and told that they should put their affairs in order and make certain repairs to the works before freshet time. New trustees were elected. The district petitioned to have this office do the assessing and collecting. Miss Palm, of this office, was appointed assessor and collector. The repairs were made in good time before the high water.

## MATSQUI DYKING

Major repairs were made to the works at the two pump-houses before the spring high water. At No. 1 Pump-house the wing wall had broken away from the head wall of the pump-discharges and flood-boxes, threatening to fall and render the flood-gates and pump-discharges useless. It was necessary to remove the wing wall and replace it with one 30 feet in length and 20 feet high on new footings. The spillway from pumps and gates was also extended several feet.

At No. 2 Pump-house the cross-section of the dyke was too narrow, and the possibility of its crumbling from the weight of water gave considerable concern during the freshet of the year before. The four 5- by 6-foot flood-boxes were extended 22 feet and the dyke widened to conform.

The seepage problem in the sandy stretch west of the Sumas Mountain was present again in an aggravated degree this year. This condition is hard to correct as test-holes show that the sand stratum goes down 30 feet or more. An experiment will be made this coming year on a trial section of this sandy stretch in an attempt to core the outside of the dyke with clayey material.

#### MATSQUI DRAINAGE

Very minor works were done in this district this year. The reason for this was to permit the district's funds to accumulate so that a rather major job could be undertaken. Several wild mountain streams carry a great amount of sediment during winter storms. This sediment fills one of the main drainage-canals of the district. Previously this canal has been dredged, only to be filled again during the first winter freshet. It is hoped to provide a catchment basin for this sediment so that it will not pass into the canal.

#### SUMAS

The usual maintenance programme was carried out in this district. Several miles of drainage-ditches were reconditioned over the area. Works of a major nature were started in the area east of the Vedder Canal. Parts of this area were always subject to winter flooding. By means of improving the ditch along Hopedale Road, the waters from the east are conducted by gravity to Wilson Creek. A new 6-foot-diameter culvert was installed at this point to handle this extra water. Except in prolonged storms causing the Fraser to rise, closing the flood-gates, all this water is passed out by gravity without aid from the pumps. In the event of the flood-gates closing at Wilson Creek, the water must then still go west and be taken care of by the pumps at McGillivray Creek. It was realized that the pumping capacity at McGillivray, 15,000 imperial gallons per minute, was far too low for winter storms. Two new pumps are being added with a combined total capacity of 60,000 or 75,000 imperial gallons per minute.

This work and the cost of the pumps is being financed from the renewal reserve fund of the district. It is hoped that funds will be available in order to increase the pumping capacity at the main pumping plant west of the Vedder by one unit to take care of the winter waters from the lake-bottom and the Sumas River.

#### PITT MEADOWS DISTRICT NO. 2

This small district of approximately 1,000 acres has always been handicapped by insufficient drainage. Last year \$25,000 was made available by the Government of British Columbia by means of a combined loan and grant for the purpose of improving the system. A new ditch was constructed around the extra 5 miles of dyke. This ditch was located well back from the old borrow-pit ditch which had been filled by the Fraser Valley Dyking Board. The purpose of this ditch is to intercept the seepage-waters when the Fraser is high and prevent them from spreading over the entire area. In addition, all ditches in the district were widened and deepened. In all approximately 25 miles of ditches were either dug or improved. The results are very satisfactory, and the residents in the area now have a more hopeful attitude to carry on the cultivation of the rich land in this district.

#### KOOTENAY DISTRICTS

The four districts in this area—namely, Creston Dyking District, Reclamation Dyking District, Nicks Island Dyking District, and Duck Lake Dyking District—were visited during the year. The main concern of all the districts is the loss of land and threat to the dykes caused by erosion. In the past when erosion occurred, the dyke has been moved back. This has been done several times both on Nicks Island and the Creston Dyking District, with resultant loss of valuable land and only temporary safety. This method of protection cannot continue. The situation of the Nicks Island Dyking

District is especially critical. Due to the nature of the soil along the banks and the great depth of the water at the banks, the method of rocking the banks used along the Fraser would not be physically sound or financially possible in this area. This erosion will continue, and it would seem that the best method to combat it would be by means of a floating dredge with a long boom and bucket.

This equipment could first be used to remove the bars formed in the river and responsible for the erosion, placing the material from them in the eroded sections of the bank and dyke. The first operation of cleaning the entire channel would be a considerable operation. Thereafter it is thought that one or two months' operation after each freshet would keep the channel free from bars and also build up and repair any damage to the dykes. It is not thought that the cost, spread over the entire acreage of the area, would be prohibitive. Unless some method is adopted to combat the threat, a large amount of land will be lost.

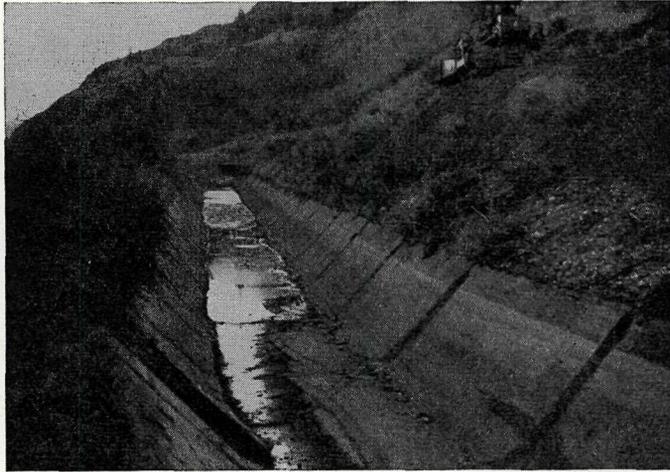
#### GENERAL

There are some problems common to all dyked areas. One of these is protection of the river-banks from erosion. This subject, it is understood, is being given priority study by the Fraser River Board for the areas within the Fraser watershed. Their recommendations are being awaited with interest and hope by all concerned. Another is protection from and removal of the waters caused by winter storms. Times and conditions are rapidly changing. Land is being divided into smaller holdings and must be farmed more intensively. This causes a demand for more and more winter pumping. To supply pumps of sufficient capacity to take care of any winter storm of unpredictable severity would seem to be economically impossible. Also to operate pumps practically continuously puts a great burden of overhead on the land. This is shown by the power costs of the districts given previously.

The question must be studied and a decision must be made as to the amount of winter pumping that is economically justified. If the proposed legislation concerned with highland waters should become law, it will have considerable bearing on the drainage studies of the low lands.

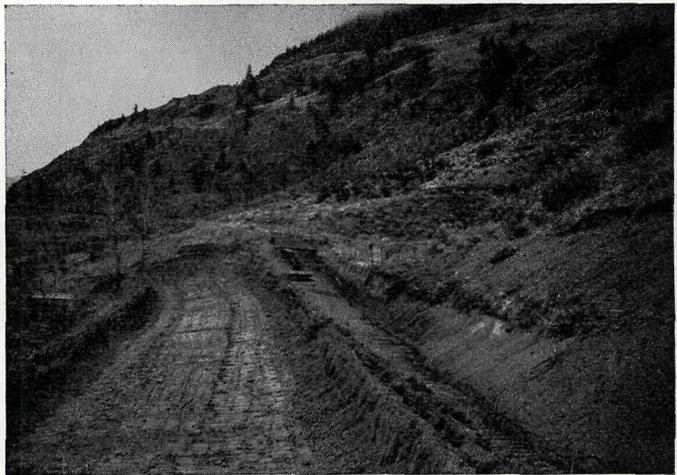
**SOUTHERN OKANAGAN LANDS PROJECT**

## *Southern Okanagan Lands Project*



North Flume No. 14.—Bulldozer at work removing soil from upper side of ditch to buttress lower side.

North Flume No. 14.—Work on lower side.



North Flume No. 14.—N.B. subsidence as evidenced by water in low point of ditch.

## SOUTHERN OKANAGAN LANDS PROJECT

F. O. McDONALD, PROJECT MANAGER

### GENERAL

The year under review has been particularly trouble-free, with no major shut-downs. Water-supply has been ample in all areas. The water itself has been very clear and free of foreign matter, such as weeds, algæ, silt, etc. Despite a hot, dry summer, no trouble was experienced in keeping the orchardists satisfied. The water was turned out of the main canal on October 17th, somewhat earlier than heretofore because the contractors were anxious to proceed with pouring of concrete on the siphon bridge, the water in the siphon being too great a burden for easy jacking up.

### LAND SALES

During 1955, sales of lands were as follows:—

Town lots (18).....	\$4,750.00
Farm lots (2).....	2,450.00
	<hr/>
	\$7,200.00

### 1955 CROP RETURNS

Although fruit prices are generally lower this year, there has been a marked increase in volume. In the case of apples, the increase in volume over 1954 is in the neighbourhood of 60 per cent, and, for the first time in three years, the soft-fruit crop volume has not been affected by frost. With the exception of cherries, which suffered splitting from spring rains, the crop volume has been normal.

Fruit-growers should, therefore, receive a larger gross return for their 1955 crop than that enjoyed for any of the previous three years, and, although final payments for the crop will not be received until the spring of 1956, advances on the crop already received have doubtless accounted for the better collections in 1955, which are \$8,880 larger than in 1954 and are as follows:—

#### COLLECTIONS FOR 1955 (ESTIMATED FOR MONTH OF DECEMBER)

Land—	
Principal .....	\$8,030.00
Interest .....	935.00
Lease rentals .....	1,200.00
Sundry realizations .....	3,735.00
Water rates—	
Oliver domestic .....	16,430.00
Irrigation .....	58,550.00
	<hr/>
Total.....	\$88,880.00

### ACCOMPLISHMENTS DURING THE YEAR UNDER REVIEW

1. *Roads.*—Approximately 40,000 feet of new road was constructed alongside the main ditch to provide access for men, material, and machinery for repairs and maintenance. This work was done with the TD-14, prior to turning it in on new and smaller equipment.

2. *New Intake.*—The new dam and intake constructed in 1954 included powering the Southern Okanagan Lands Project headgates. Operation was very satisfactory and

enabled volume to be regulated within close limits. Control of flow from the upper lakes was accomplished without difficulty, necessitating only one or two visits per day.

3. *Pitching Main Canal.*—The use of the new kettle purchased in 1954 was one of the main contributing factors in the trouble-free ditch operation, as pitch could be maintained at constant temperatures. The fact that the rubber-tired kettle was highly mobile and could in most places be operated in the ditch itself produced a really good job of pitching. The use of 145-degree asphalt is proving more satisfactory than the higher melt point previously used of 170 degrees; brittleness is avoided, and with the use of foundation seal the reinforcing strips of burlap remained, for the most part, in place all season. The above pitching of cracks, joints, and weak spots contributed to a reduction in loss of water and could be a factor in the opening-up of further irrigable acreages within the Project.

4. *No. 5 Pump.*—A 7½-horsepower motor and suitable pump were substituted in this location east of Oliver. Previously insufficient water was available to the users under No. 5. The new pump provides ample water, and the users have expressed their satisfaction.

5. *Hester Creek Spillway.*—This open concrete flume (about 1,500 feet long) is a hazard to residents of this area. It is proposed, therefore, to cover the spillway with lumber. To determine costs and feasibility of this project, the spillway has already been covered where it crosses the main highway south of Oliver.

6. *No. 7 Pump.*—This pump (15 horse-power) supplies four veterans, each farming about 15 acres. In the system originally installed, water was pumped to an open-ended 8-inch line, each user having his own pressure-pump for sprinklers. The pump itself required extensive repairs, so it was decided to pressurize the system, and accordingly a new pump was installed, designed to give each grower 20 to 25 pounds pressure. Unfortunately the 8-inch pipe failed, due to rot in the wood staves, and many pipe replacements became necessary. It will be necessary to replace the main pipe-line before another season. With this done there should be no further trouble.

7. *Topsoil Stock-piling.*—In the Richter Pass area three large stock-piles of soil were established. This was done in an effort to curb the pilfering of topsoil which was going on in areas where vacant land existed. A charge of 25 cents per yard was established, permits being available in the main office or from the Osoyoos ditch-rider. The arrangement worked admirably and prevented, for the most part, soil "scalping." The revenue from the sale of soil amounted to \$135. It should be noted here that the topsoil used for stock-piling was largely hillside areas above the irrigated lands.

8. *Trestle No. 21A.*—This trestle, washed out in 1953, being replaced hurriedly during the season, required some permanent work to make it safe for the season's operation. Accordingly concrete footings were poured and the flume itself was extended 30 feet to the north because the terrain was dangerous and liable to further cave-in.

9. *Pacific Silica Limited.*—A new bridge was designed and constructed where the entrance to the new pit crosses our west lateral flume. The design had to be such that heavy transport vehicles could be safely used. The work was done under our supervision and by our crews. This new bridge will enable the concrete ditch to be renewed at the point of crossing where collapse has occurred due to inadequate underpinning.

10. *Bridge at No. 22.*—This is a permanent bridge crossing the main canal in the vicinity of Flume No. 22 and gives access to about one-half mile of ditch in a particularly difficult section. Already substantial savings have been effected by being able to place timber above the ditch, where it is located on side-hill terrain, preparatory to floating it down the canal to location.

11. *Cattle-guard.*—A cattle-guard was installed, using our crew, with material being supplied by the Oliver Sawmills Limited. The location is at the Inkaneep Indian Reserve, boundary of District Lot 2450 (S.). Since the Oliver Sawmills use the Indian reserve

for log supply and transportation and the Southern Okanagan Lands Project do not own the right-of-way through the reserve, the above arrangement was concluded as the road is in constant use by Southern Okanagan Lands Project crews and by the sawmill trucks.

12. *Deer-escapes*.—A new type of deer-ladder, termed the "Richmond escape," after Lorne Richmond, foreman, who designed same, was put into operation at the head of the main siphon. With slight alterations it should prove adequate and much more satisfactory than the ladder type. It consists of dropping one of the slabs of the ditch wall to an easy gradient so that the animals can easily climb out despite their exhausted condition. Quite a few deer were known to escape without injury from this Richmond escape. It may be possible to alter the design slightly so that the Project's new OC-6 Caterpillar can also get in and out of the canal during off-season repairs.

13. *Buttressing of Ditch*.—The photographs clearly show this construction, north of Flume No. 14 in the Testalinda area. Ditch-sides were raised to again conform to ditch grade, as fill settlement had posed a problem. Raising the bottom to grade and filling in on the low side of the ditch was a necessary measure but very expensive. As funds permit, more of this kind of repair in critical locations is indicated.

14. *Peanut Lake*.—Peanut Lake, which acts as a drainage-basin near Osoyoos, latterly filled up to the point where some orchards were becoming water-logged. A careful check was made on the outflow, and the drain was found to be carrying its capacity. The irrigation lateral supplying the area was shut off, and in a few days the level of Peanut Lake had subsided to a point where the orchards were no longer endangered.

#### INDIAN RESERVE LANDS OF RITCHIE FARMS LIMITED

An area of approximately 60 acres situated on Inkaneep Indian Reserve, south of Tuc-el-nuit Lake and west of the main ditch, was fenced and put into tomatoes by Ritchie Farms Limited.

Water was supplied by the Project by gravity from the main ditch, on the understanding that continuity of supply depended on first satisfying the present users under the system. However, it was found possible to maintain supply during the whole season. It is calculated that the four boxes drew a total of 4 cubic feet per second when running to capacity.

It is interesting to note that the quality of tomatoes grown was excellent, and the volume would have been satisfactory except for an early freeze-up. Payroll, transportation, etc., helped the economy of the Oliver area, and encouragement of prime industry as above noted is clearly pointed up.

#### DOMESTIC WATER SYSTEM

At no time during the year was it necessary to restrict water use, despite the hot weather prevailing.

Certain changes were made at the pump-house. A new discharge manifold was designed and put into operation. Briefly the main 10-inch line was extended, thus allowing an unrestricted discharge system from the pumps.

An entirely new electrical set-up was installed. It would appear that voltage delivery to motor terminals is now such that overheating of the motor windings is eliminated. Metering of the consumption is through one instead of two meters. This installation now meets the requirements of the Inspector of Electrical Energy.

#### NEW SUMP

Water for the Oliver domestic system is obtained from the Okanagan River. However, due to work of the Okanagan Flood-control, water going into the system was found to contain foreign material. It was necessary, therefore, to rectify this matter. Accord-

ingly a dragline was employed to dig a sump. Fortunately water-bearing gravel was struck at about 10 feet, and two sump pumps of a combined capacity of 1,000 gallons per minute were employed to unwater this sump hole. A perforated pipe 10 inches in diameter and 100 feet in length was buried in the clean coarse gravel. The well on test gave completely clear water of sufficient quantity for the needs of the village.

#### CULVERT AT MILL

A drainage-culvert 30 inches in diameter was put in place where it crosses the mill domestic water-supply line. This was a particularly difficult job, but the new backhoe accomplished the digging, which was in gumbo. A leak was discovered in the supply-line, and apparently water has been going to waste over a long period. The plugging of this leak should have a beneficial effect on the volume of water available for the village.

#### WATER RIGHTS BRANCH SURVEY

J. Buchanan and party of three assistants worked all summer on the Project providing control points for the Multiplex Section, which was perhaps the most important development in 1955. Rough copies of the topographical maps are presently available and are proving very useful to the Project. In addition, Mr. Buchanan's survey will include recommendations on the following subjects: (a) Evaluation of the adequacy of the present system; (b) adequacy of the present maintenance methods; and (c) the feasibility of supplying water to other lands in the area not presently being supplied with water.

This report should prove very valuable to the Project management and to the Government.

#### SOUTHERN OKANAGAN LANDS PROJECT No. 2

This is a closed system and gave little operating trouble during the season under review. Lack of pressure on the upper level section of the Project calls for study, and a booster pump may have to be installed. One length of wood-stave pipe which had not been pressure-creosoted was replaced.

The Project supplies seventeen growers, all of whom use sprinklers for irrigation. It has been noted, however, that the water, which is pumped from the Okanagan River, carries a heavy load of silt, and this has caused sprinkler-heads to wear out faster than should normally occur. The silt also has an abrasive effect on the pump runner, casing, and wearing sleeves. It is expected that clearer water will be obtained when Okanagan River control work is completed.

#### TYPHOON PRIMER AT No. 8

This large pump (150 horse-power), on Southern Okanagan Lands Project No. 2 on the east side of the river, was hard to prime, and being of such a large capacity, loss of prime was a serious matter. However, one of four old Typhoon pumps which have been in storage for years has now proven useful as a priming agent for this pump. Eventually, all of these old Typhoon pumps will be put to use in similar situations.

#### WATER TOLL COLLECTIONS

Under the provisions of an amendment to the "Soldiers' Land Act" passed during 1955, water charges which are in arrear will be placed on taxation rolls and shall be subject to all the like incidents as are ordinary taxes. In general, this legislation will have the endorsement of residents in the area and will be of considerable assistance to the management of the Southern Okanagan Lands Project in the matter of collections.

## NEW EQUIPMENT

In 1955 the Project purchased an OC-6 tractor, 42-inch tread, equipped with dozer blade, Henry backhoe, Henry bucket loader, and power rotary broom. This equipment is designed to do general light bulldozing, such as in road-building, filling ditches, and levelling. The backhoe is invaluable for trenching, laying culverts and pipes, and deep excavating. The backhoe loading-bucket is used for loading gravel and soil. The power-broom will be used for cleaning the inside of the main ditch.

## WEATHER

Precipitation by the month was as follows: January, 0.79 inch; February, 0.44 inch; March, 0.65 inch; April, 0.95 inch; May, 0.82 inch; June, 1.23 inches; July, 0.95 inch; August, *nil*; September, 0.78 inch; October, 0.93 inch; November, 1.45 inches. Thus the total for the year is 8.99 inches. Figures for December were not available at time of submitting this report. Average rainfall for the past twenty-seven years is 9.79 inches. It is seen, therefore, that the present year is more or less average. It should be noted that August was without precipitation. It would appear that November produced another record, as minimum temperatures were the lowest since 1925, namely: Average maximum, 33.4, and average minimum, 23.2.

The following table gives the high, low, and mean temperatures for the years 1941 to date:—

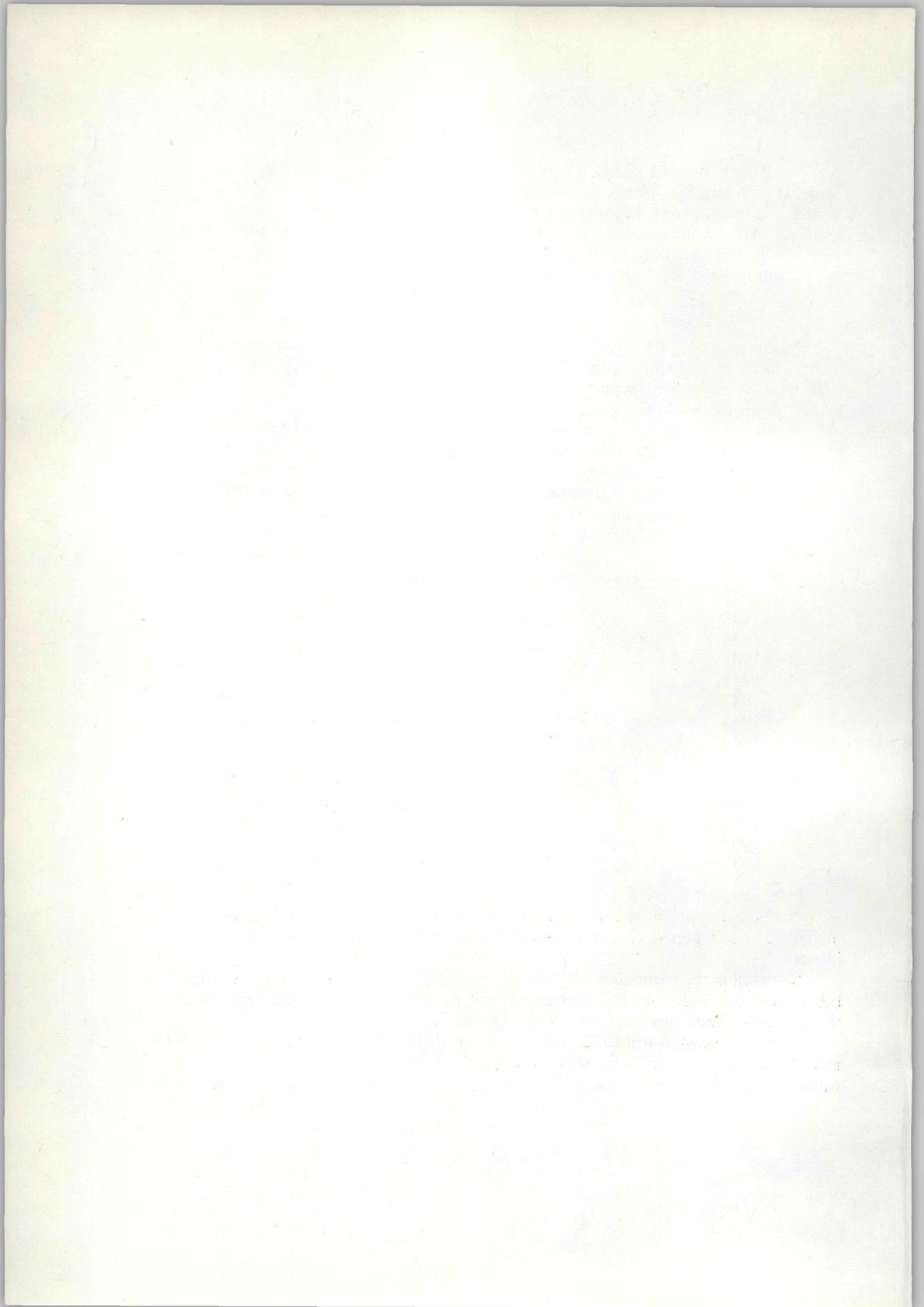
	High	Low	Mean
1941.....	111	3	52.5
1942.....	108	3	50.7
1943.....	103	2	50.4
1944.....	105	4	49.0
1945.....	104	10	50.0
1946.....	103	—8	48.0
1947.....	104	—8	49.0
1948.....	98	—8	47.0
1949.....	102	—12	46.0
1950.....	101	—18	48.4
1951.....	100	—8	47.0
1952.....	102	—10	49.6
1953.....	101	16	51.3
1954.....	97	—10	47.0
1955 <sup>1</sup> .....	103	—1	-----

<sup>1</sup> To November only.

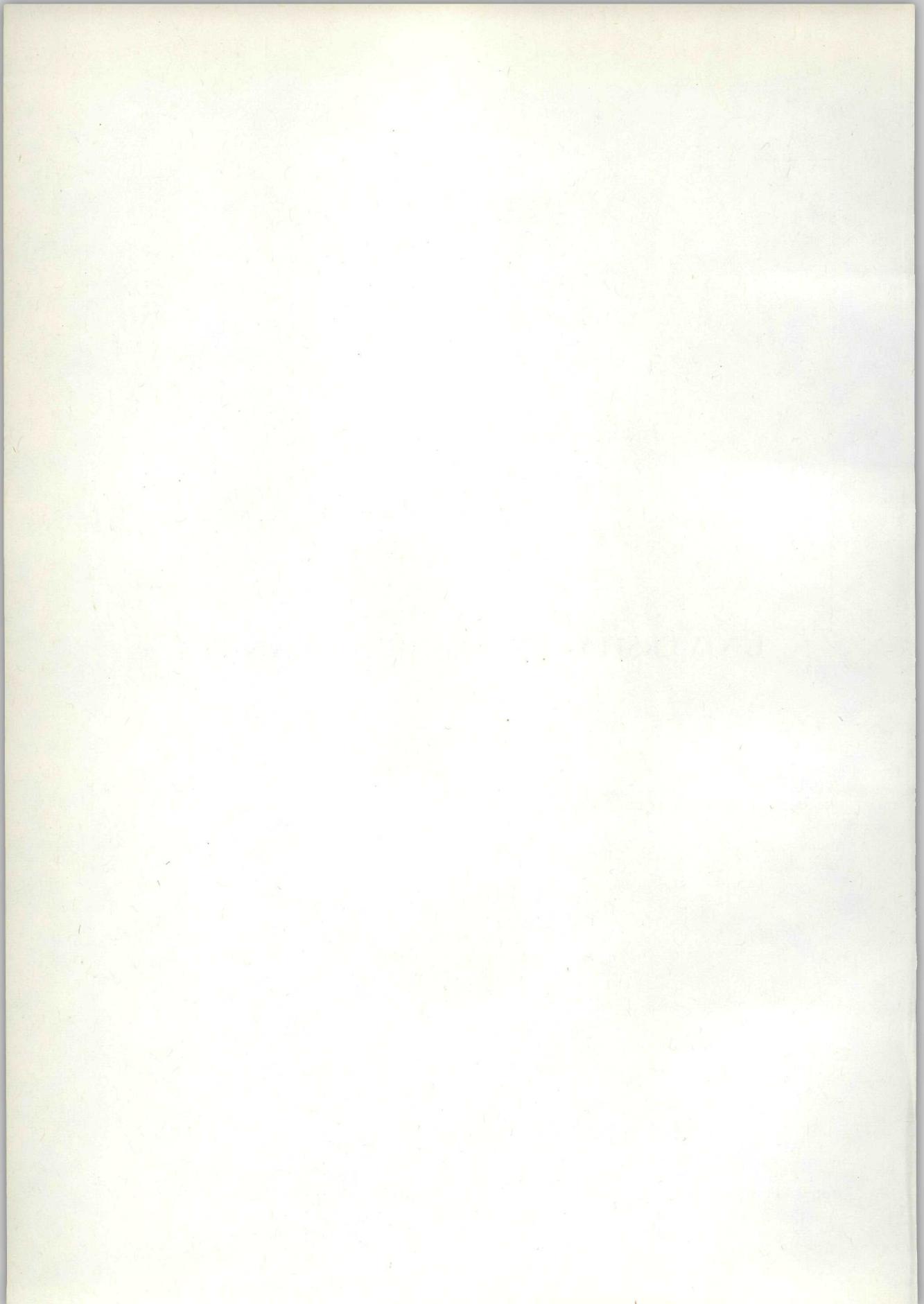
November snowfall should be mentioned, as a record was established, namely, 13.3 inches. The last period of heavy snowfall in November occurred in 1927, namely, 7.5 inches.

Snowfall in the mountains (1954 winter and 1955 spring) was, on most ranges, well below average. This fact may account for the present low level of the valley lakes and the extremely small discharge from Lake Okanagan.

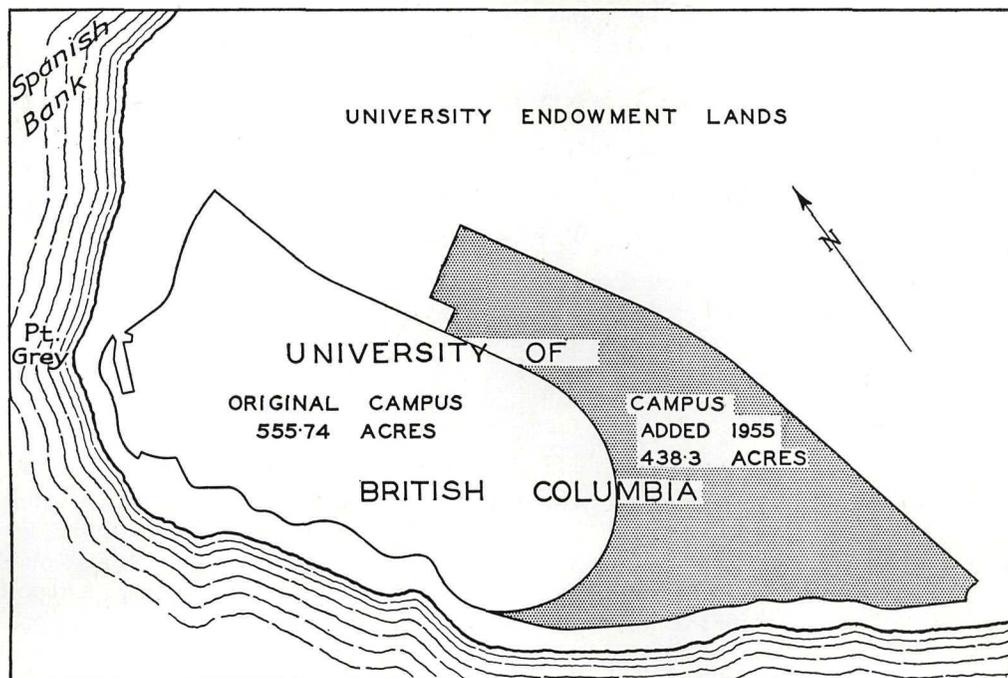
The first snowfall for 1955–56, November 19th to 28th, combined to make this a record for the month of November since 1925. This indicates a good snow cover this winter, which will fill lakes, reservoirs, and restore the ground-water level to normal.



**UNIVERSITY ENDOWMENT LANDS**



### University Campus Expands to Meet Present and Future Needs



University of British Columbia campus, 1955—994.04 acres.

## UNIVERSITY ENDOWMENT LANDS

M. E. FERGUSON, MANAGER

We have again reached another milestone along the way, which means an annual report of events and accomplishments of our activities for the past year along with our forecasts for the coming year. A reasonable prognosis of the past year's endeavours would indicate that, in spite of the growing pressures for further expansion and development, a definite policy is being carefully planned to prevent recurrence of mistakes made in earlier years of our development. This will be covered more fully later in the report.

### LOT SALES

Although we were in the position of not having any property for sale for the second successive year, the number of inquiries and requests for property remained encouragingly heavy, which should indicate a need for early servicing of additional property to meet these demands.

### BUILDING

Naturally there was very little in the way of new buildings during the past year, since the building-sites were not available. We had quite a fair amount of improvements and additions to existing homes, such as swimming-pools, garages, outdoor living areas, etc.

### SEWERS

The major sewer programme which was started in 1953 with the commencement of our trunk sewer on Marine Drive, which was followed in order by the extension of the Acadia relief sewer and the discontinuance of the Acadia outfall at Spanish Banks, at the

same time constructing storm and sanitary sewers to the areas not previously served, was finished in 1955. The completion of this work brought all our presently developed land up to the high standard one would expect to find in such a choice residential district.

### WATERWORKS

Once again our recently completed water-mains proved quite a boon during the dry spell last summer, to the extent no major sprinkling restrictions were necessary for the second year in succession.

### TAXATION

Considering the fact we added special-levy taxes to consolidated major sewer charges on a twenty-year amortized payment plus normal increased cost of services, our mill rate did reach the mill rate on comparable property in adjoining districts of the Lower Mainland. Should we find such a condition can be maintained, there should be no doubt as to the continued desirability this land will hold for the potential purchaser.

### GENERAL

During the early months of the year careful study and thought was given regarding the establishment of a progressive over-all development programme, with the result Dr. D. B. Turner was appointed co-ordinator of a master-plan survey. With the assistance of a small staff, Dr. Turner is presently gathering data with which to prepare a report early in the new year with the hope a long-term development and detailed planning programme will result. At this time it is too early to forecast when or what the results will be, but one thing is certain—we are well on the way to formulating policies and planning that will permit orderly development in the near future and at the same time ensure a maximum endowment for the University.

During the year it was decided to grant additional land to the University for campus, and after careful consideration an additional 438 acres were deeded to the University, bringing the total campus area to just under 1,000 acres. This was rather an important event for the University, since it now permits them to proceed with their master plan of campus development, which is extremely important in light of the current arrangement by the Government to advance several million dollars for new buildings, and such a programme can only be properly planned by knowing exactly what the total campus area is to be comprised of and its location.

Considering what has happened during this current year, there is no doubt the coming year should prove of extreme interest and importance.

## STATISTICAL

TABLE A.—LOT SALES

	1953		1954		1955	
	Number	Value	Number	Value	Number	Value
Unit 1.....	2	\$5,940.00	---	-----	---	-----
Unit 2.....	1	8,820.00	1	\$10,541.25	---	-----
Totals.....	3	\$14,760.00	1	\$10,541.25	---	-----

TABLE B.—NUMBER AND VALUE OF BUILDING PERMITS ISSUED DURING THE YEARS ENDED DECEMBER 31ST, 1953, 1954, AND 1955

	1953		1954		1955	
	Number	Value	Number	Value	Number	Value
New schools.....	---	-----	1	\$368,565.00	1	\$54,654.00
New houses.....	13	\$263,000.00	7	187,500.00	3	116,000.00
New apartments.....	---	-----	---	-----	---	-----
Swimming-pools.....	---	-----	---	-----	2	7,700.00
Fraternities.....	1	40,000.00	---	-----	---	-----
Alterations.....	3	4,750.00	11	28,100.00	10	91,990.00
New stores.....	1	50,000.00	1	19,857.00	---	-----
Garages, etc.....	18	16,475.00	8	4,450.00	7	6,450.00
Totals.....	36	\$374,225.00	28	\$608,472.00	23	\$276,794.00

TABLE C.—SUMMARY OF REVENUE RECEIVED DURING PAST TEN YEARS TO DECEMBER 31ST, 1955

Year	Sale of Repossessed Houses		Local Improvement Taxes		Loans		Land Sales		99-year Lease Rentals	Water Accounts	Sundry Rents or Leases	Miscellaneous	Total
	Principal	Interest	Principal	Interest	Principal	Interest	Principal	Interest					
1946	\$7,354.86	\$1,186.88	\$12,459.04	\$21.08	\$21,457.55	\$6,629.34	\$137,674.36	\$2,058.34	\$2,033.88	\$10,699.73	\$5,073.15	\$15,531.26	\$222,179.47
1947	6,857.19	1,042.58	15,447.00	48.67	9,606.29	5,490.01	79,473.75	3,533.18	2,112.99	14,001.64	7,804.40	26,843.94	171,261.64
1948	8,204.84	690.98	16,220.80	79.25	22,670.47	5,043.26	44,722.29	1,885.19	1,763.17	16,700.35	6,958.35	21,817.18	146,756.13
1949	1,497.77	301.11	7,738.75	296.25	10,490.64	3,844.78	53,728.77	2,164.24	2,124.35	19,575.15	4,920.85	67,993.74	174,676.40
1950	893.96	196.60	6,907.25	132.22	9,277.24	4,112.89	103,706.07	3,141.09	2,636.89	24,426.14	4,751.00	51,551.79	211,732.14
1951	1,077.09	180.71	7,486.32	281.84	10,283.18	4,337.31	51,526.79	1,963.96	1,888.52	31,543.82	8,926.00	118,433.58	237,929.12
1952	1,007.57	127.37	7,795.55	58.12	5,790.49	3,672.77	77,500.20	2,325.31	1,364.13	33,339.72	8,201.00	151,758.28	292,940.51
1953	898.82	64.72	10,762.31	100.54	10,353.55	3,426.02	37,652.77	868.48	914.57	32,260.34	10,261.49	11,835.99	119,399.60
1954	430.70	107.41	9,532.13	92.99	21,254.60	2,806.22	11,612.02	106.36	976.26	22,151.77	10,981.01	7,693.94	87,736.31
1955	531.64	6.60	11,250.35	126.28	5,505.39	2,070.89	15,544.43	411.79	561.53	43,078.28	7,311.23	6,632.94	93,031.35
Totals	\$28,754.44	\$3,904.96	\$105,599.50	\$1,237.24	\$126,689.40	\$41,433.49	\$613,141.45	\$18,457.94	\$16,376.29	\$247,776.94	\$75,188.48	\$480,092.64	\$1,757,462.67

**LAND SETTLEMENT BOARD**

CHAPTER 10

**LAND SETTLEMENT BOARD**

CLARA STEPHENSON, SECRETARY

The Land Settlement Board was formed in the year 1917 under the provisions of the "Land Settlement and Development Act," superseding the Agricultural Credit Commission. It was empowered to advance money by way of loans secured by mortgage, to purchase, develop, and colonize lands considered suitable for settlement, and to declare settlement areas, having for its main purpose the promotion of increased agricultural production.

Settlement areas were established in Central British Columbia—namely, in the Bulkley Valley, Nechako Valley, Francois Lake district, and the Upper Fraser River valley—where land had been taken up as speculation by non-resident owners, which was retarding the settlement and development of these districts. Establishing settlement areas throughout these districts on those unoccupied alienated lands helped to relieve this situation and to bring the land within reach of the actual settler at reasonable prices.

Development areas were established at Merville on Vancouver Island, Lister, Fernie, and Kelowna. The development area at Kelowna is under lease to a tenant for a term of years.

The Board has under its jurisdiction the administration of the former Doukhobor lands, which were acquired by the Government under authority of the "Doukhobor Lands Acquisition Act" of 1939. These lands are largely occupied by Doukhobors on a rental basis. They are reserved from sale at the present time.

The Board holds approximately 7,000 acres scattered through the various parts of the Province, representing properties on which it held mortgages and to which it obtained title through tax-sale proceedings. Several of these properties were sold this year.

The Board's balance-sheets appear in the Public Accounts of the Province, as in the past. The following is a brief summary of the Board's activities and collections for 1955:—

During the year the sales made by the Board amounted to \$8,748.25. Fifty purchasers completed payment and received title deeds, and two borrowers paid up in full and received release of mortgage.

## COLLECTIONS

Loans .....	\$3,285.93
Land sales .....	40,056.26
Dyking loan refunds, etc. ....	9,993.19
Foreclosed properties and areas—stumpage, rentals, etc. ....	8,604.46
	<hr/>
	\$61,939.84

The above figures include proceeds received from the sale and rental of Doukhobor lands.

## REPORT BY I. SPIELMANS, INSPECTOR

As in previous years, the collection of rentals from occupants of Land Settlement Board lands has constituted the main part of my duties. In addition to rentals submitted direct to Victoria, the total collections through this office for the year ended December 31st, 1955, amounted to \$6,414.11.

The amounts collected by localities are tabled hereunder:—

Crescent Valley .....	\$55.00
Perry Siding .....	75.00
Slocan Park .....	100.00
Brilliant .....	725.00
Pass Creek .....	80.35
Winlaw .....	125.00
Kamminæ .....	90.00
Ootishenia .....	502.65
Shoreacres .....	243.90
Glade .....	150.00
Krestova .....	60.00
Clay Brick .....	105.00
Perepelkins .....	50.00
Raspberry .....	910.00
Brilliant Co-operative .....	90.00
Grand Forks .....	3,052.21
	<hr/>
Total .....	\$6,414.11

As authorized, I have co-operated with the Commissioner, His Honour Judge Lord, and his staff in matters pertaining to investigations in relation to these lands.

**PERSONNEL OFFICE**

THE UNIVERSITY OF CHICAGO

**PERSONNEL OFFICE**

J. H. PALMER

**SERVICES**

During the year 1955 the functions that were carried out by the Personnel Office included the following: Employment office for staff recruitment, selection, placement, handling inquiries, correspondence and documents regarding employment; providing information regarding location or service of present or former employees; administrative procedures in connection with leave, retirement, establishment control, efficiency reports, salary and classifications; maintenance of personnel records; liaison between the Lands Service and the Civil Service Commission in staff matters; and in distributing advice regarding personnel policies and information about changes in regulations. In addition to the induction interview with each new employee, the Personnel Assistant conducted numerous counselling sessions with various employees. The Personnel Assistant attended meetings in the Civil Service Commission on various topics of concern to the Department and acted in an advisory capacity for the Department's representatives on the Professional Salary Board.

The Personnel Assistant was appointed to the Civil Service staff survey team for the Lands Service to make a check of the organization and efficiency of the Lands Service. This team was under the chairmanship of Miss J. M. Campbell, Personnel Officer, Civil Service Commission, and R. Torrance, the Assistant to the Deputy Minister of Lands, was the other member. All Civil Service establishments within the Lands Service were visited and studied over the course of five months, and a lengthy report ensued containing recommendations, many of which have been implemented and some of which are awaiting ministerial review. The greatest co-operation from the employees of the Department at all levels was received.

**ORGANIZATION**

Two positions were added to the permanent staff of the Lands Service during the fiscal year beginning April 1st, 1955, the total permanent establishment now being 326.

The only major organizational change occurred in the Water Rights Branch, which was divided into two divisions—one concerned with hydraulic investigations and the other with water-rights administration. The appointment of a Deputy Comptroller, who is also the Chief of the Operations Division, fills a long-standing need for a split in the administrative functions within the Water Rights Branch.

The appointment of an Assistant Director of Surveys and Mapping confirms what had been a *de facto* organization for some time.

**RECRUITMENT, CLASSIFICATION, AND STAFF TURNOVER**

The year just concluded was particularly active so far as staff changes are concerned. Forty-eight members left the service during the year, and fifteen more were transferred to other departments for various reasons. Of the separations, three were terminations, two retirements, and one death.

Forty-two new employees were inducted into the permanent staff of the Department, and nine internal transfers occurred. Twenty-five in-service promotions were effected as a result of Civil Service competitions for vacancies, and twenty-eight position reclassifications were implemented. Twenty-five persons were hired on a casual basis for varying lengths of time under temporary assistance, and approximately eighty young men were hired principally by the Surveys and Mapping Branch and the Water Rights Branch for the summer season on field surveys.

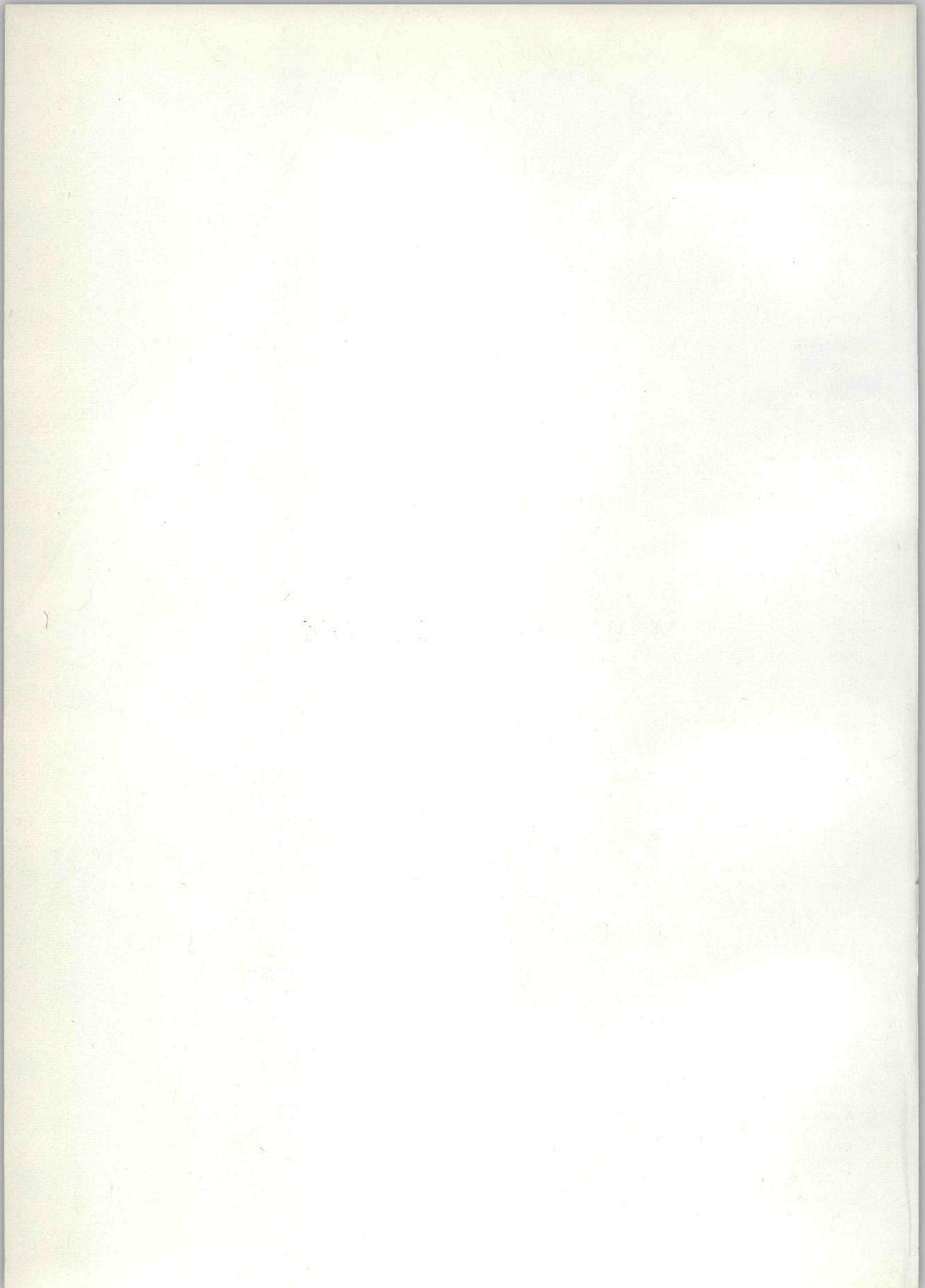
In addition to the permanent and summer staff referred to above, seventy-five persons were employed by the University Endowment Lands, the Southern Okanagan Lands

Project, and the Fraser River Board, which are non-Civil Service establishments. A minor reorganization of the outside staff of the University Endowment Lands was effected, and personnel actions in these units were limited in number.

Protracted negotiations were carried on between the Department and the British Columbia University Area Fire Fighters, Local No. 901, International Association of Fire Fighters (A.F.L.), resulting in increased salaries being granted. Wages for outside workers on the University Endowment Lands staff were also reviewed.

In all of the foregoing activities the Personnel Office participated in a staff capacity and in the administrative functions related to the functions outlined.

**MAIL AND FILE ROOM**



## MAIL AND FILE ROOM

JOHN A. GRANT

During May of 1955 the Civil Service survey teams recommended that most of the mail of the Forest Service and a large proportion of the Lands Service mail be no longer numbered by the File Room. This recommendation was put into immediate effect. However, as the number of letters recorded by the numbering-machines would be only about 30 per cent of the total mail, it was decided to make an actual count each day. This explains the apparently tremendous increase during 1955 of letters received—179,546, as compared to 87,913 letters in 1954.

Early in the year a committee was appointed by Mr. Bassett, Deputy Minister of Lands, under the chairmanship of Mr. Torrance, to study methods to modernize the filing system and status records of the Department.

As a result of the deliberations of this committee, it was decided to separate the "0" file series in active and non-active categories with a view to microfilming and destroying all non-active files. The work has already commenced, and to date 112,000 "0" files have been processed. Estimates would indicate that 60 per cent of valuable vault space will be saved when the job is completed.

It will be of interest to know that the Microfilming Bureau has in the past few years microfilmed 473,000 files exclusive of the "0" series. When the "0" series has been completed, the estimated total will be 623,000 files.

The combined collections of all branches of the Department amounted to \$30,797,000.

## LETTERS INWARD

Branch	1955	1954	10-year Average, 1946-55
Lands Service.....	43,250	24,266	32,073
Forest Service.....	94,652	35,264	61,518
Water Rights Branch.....	23,976	13,223	11,555
Surveys and Mapping Branch.....	17,668	15,160	11,568
Totals.....	179,546	87,913	116,714

## LETTERS OUTWARD (RECORDED)

Branch	1955	1954	10-year Average, 1946-55
Lands Service.....	9,144	8,847	21,242
Forest Service.....	3,000	8,183	13,145
Water Rights Branch.....	984	1,793	5,227
Surveys and Mapping Branch.....	.....	23	4,270
Totals.....	13,128	18,846	43,884

## MISCELLANEOUS REPORTS RECEIVED

Designation	1955	1954	10-year Average, 1946-55
Forest-fire reports.....	2,772	1,538	1,997
Slash-disposal reports.....	420	458	817
Logging-inspection reports.....	15,360	14,148	14,719
Land-classification reports.....	2,264	2,196	2,043
Totals.....	20,816	18,340	19,576
Cruise reports.....	4,214	2,915	.....
Stumpage-adjustment notices.....	4,200	11,300	.....
Totals.....	8,414	14,215	.....

## NEW FILES CREATED

Designation	1955	1954	10-year Average, 1946-55
"0" files.....	4,128	3,991	5,228
Timber-mark files.....	1,860	1,456	1,645
Timber-sale files.....	4,344	3,700	3,200
Totals.....	10,332	9,147	10,073

VICTORIA, B.C.

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