PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF LANDS AND FORESTS

HON. R. G. WILLISTON, *Minister* E. W. BASSETT, *Deputy Minister of Lands*

REPORT

of the

LANDS SERVICE

YEAR ENDED DECEMBER 31ST

1958

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1959

VICTORIA, B.C., January 31st, 1959.

To the Honourable FRANK MACKENZIE ROSS, C.M.G., M.C., LL.D.,
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, 1958.

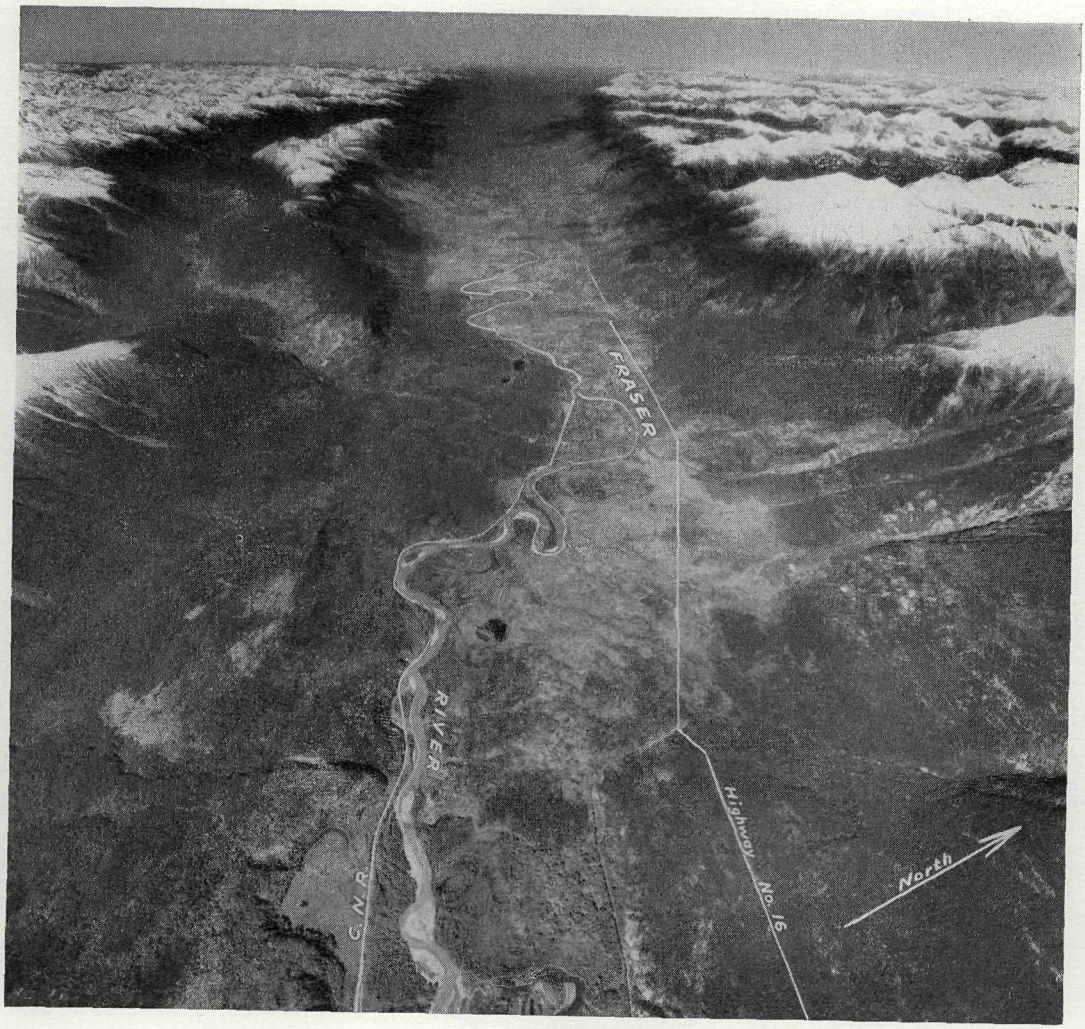
R. G. WILLISTON,
Minister of Lands and Forests.

VICTORIA, B.C., January 31st, 1959.

The Honourable R. G. Williston,
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, 1958.

E. W. BASSETT,
Deputy Minister of Lands.



Section of Rocky Mountain Trench looking *north-west from Tête Jaune Cache.* B.C. Government oblique air photo; altitude, 17,200 feet above sea-level.

CONTENTS

	Page
1. Introduction by the Deputy Minister of Lands	7
2. Lands Branch—	
Superintendent of Lands	11
Accounting Division	20
Land Inspection Division	23
3. Surveys and Mapping Branch—	
Surveyor-General	31
British Columbia-Yukon Boundary Survey	35
Legal Surveys Division	37
Topographic Division	42
Geographic Division	49
Air Division	55
4. Water Rights Branch—	
Comptroller of Water Rights	63
Operations Division	68
Hydraulic Investigations Division	75
5. University Endowment Lands	87
6. Personnel Office	91
7. Mail and File Room	95

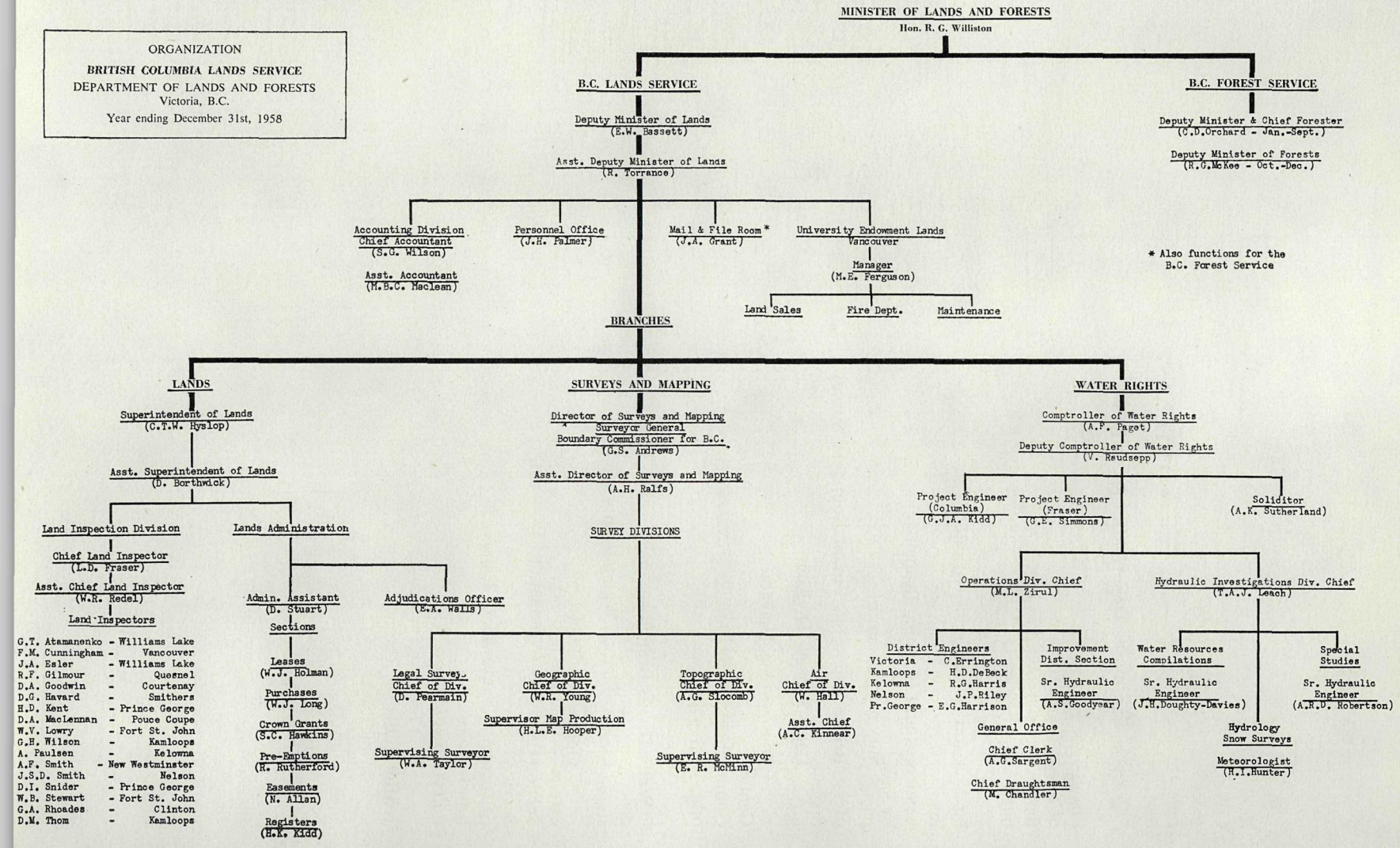
ORGANIZATION

BRITISH COLUMBIA LANDS SERVICE

DEPARTMENT OF LANDS AND FORESTS

Victoria, B.C.

Year ending December 31st, 1958



REPORT OF THE BRITISH COLUMBIA LANDS SERVICE

E. W. Bassett, Deputy Minister of Lands

It is fitting that the year 1958, which marked the close of the first century of progress in British Columbia, should also witness new summits of achievement by the British Columbia Lands Service on behalf of the people of this Province. The volume of activity recorded by the Lands, Surveys and Mapping, and Water Rights Branches of the Service reflect a steadily rising public interest in the land and water resources of British Columbia. While detailed reports of each branch may be found in the following pages, a review of some of their accomplishments will serve as an appropriate introduction.

The Lands Branch recorded a 31-per-cent increase over 1957 in revenue derived through the sale and lease of Crown lands. Supporting this upward trend was completion of a record number of land inspections. Interest in unalienated lands has become so keen that in order to ensure fair competition it has been advisable, in certain cases, to invite bids by public auction.

It is the object of the Lands Branch to keep abreast of the trend of public interest in lands and, if possible, to anticipate it. Toward this end, a major change of policy was instituted in 1958. It was announced that henceforth all Coast and Interior water-front lands having present or future public recreational value will be considered for disposition by leasehold only. An existing recreational reserve on all unalienated and unencumbered Crown islands in coastal waters was extended to cover all islands south of the 51st parallel of latitude rather than the 50th parallel as existed previously. The Branch also co-operated actively with other branches of government by selecting and recommending reserves for recreational use in all sections of the Province.

It is a special pleasure to record the contribution of the Lands Branch toward the Centenary of British Columbia. Crown lands were made available to various Centennial Committees for the purpose of the construction of community halls, playgrounds, and other such commemorative projects.

Where conditions indicate the benefit of such a measure, it has become policy to provide planned subdivision of Crown lots in unorganized areas in order to facilitate orderly urban development. Public auction of lands in this category disposed of fifty-five subdivision lots at Fort Nelson and eighty-eight lots at Little Prairie (Chetwynd).

Among the administrative accomplishments in the Lands Branch during 1958 were extension of the Kardex recording system into the Lease, Purchase, and Pre-emption Sections and the introduction of a training course in appraisal sponsored by the Civil Service Commission and the Canadian Vocational Training Branch. The Superintendent of Lands, Assistant Superintendent of Lands, and fourteen members of the Land Inspection Division participated in the course which ultimately leads to accreditation as Accredited Appraiser, Canadian Institute.

The four divisions of the Surveys and Mapping Branch experienced a very active year in 1958.

In the Legal Surveys Division, instructions to land surveyors rose nearly 25 per cent over 1957 and were 141 per cent higher than in 1955. The Blue-print and Photostat Section consumed the staggering total of 63½ miles of paper and linen in the production of more than 200,000 prints for use by Government departments and the general public.

The Tellurometer acquired by the Topographic Division in 1957 was employed on survey assignments for the first time last year. This complex, yet durable and portable electronic distance-measuring device produced results comparable to first-order triangulation. Its success indicates the possibility of achieving still greater perfection in topographic control. The Tellurometer is not only highly accurate, but also gives rapid results and is adaptable to all types of terrain.

The Geographic Division continued to emphasize production of the 1-inch-to-2-miles National Topographic Series, four maps of this series being published during the year. In addition, the revision and publication of one Land Series and three Pre-emptor Series maps was effected. A new two-section wall map of British Columbia at a scale of 1:1,000,000, which replaced a considerably outdated base map, has proven very popular, particularly with teachers and administrators. Map distribution continues to climb, reaching 62,544 sheets last year. Two new Land Series bulletins were published, bringing to six the number of areas of the Province thus covered.

A record total of 612 flying-hours was achieved when the Air Division hastened to take advantage of an unusually prolonged season of operational weather. A new wide-angle lens camera acquired early in 1958 proved very effective, and a total of 26,000 aerial photos were taken. While the major effort of the Air Division was directed to the forest inventory programme, a number of special projects were also undertaken, including photo work for forest-fire damage assessment and experimental research in connection with cadastral survey. Some 30,000 square miles of interim mapping was completed, increasing to 224,000 square miles the total area of British Columbia with interim-map coverage.

Worthy of special note was the completion, during 1958, of the British Columbia-Yukon-Northwest Territories Boundary Commission survey. Monument 187 was established near the edge of a huge glacier which blankets the extreme north-western corner of the Province. Only field inspection, a minor amount of residual checking, and completion of official plans and final report remain to be done.

At the request of the Colombo Plan administration in Canada, the Surveyor-General, Mr. G. S. Andrews, was honoured to undertake a three-month mission to South-east Asia for the purpose of assessing survey and mapping requirements for the Lower Mekong River development scheme.

Reorganization of the Water Rights Branch along lines of responsibility through sections and divisions was essentially completed during 1958. It is the responsibility of the Operations Division to perform the administrative duties arising from the "Water Act" and the regulations issued under that Act, while the Hydraulic Investigations Division is charged with maintaining an adequate inventory of existing and potential water use in British Columbia.

Notable events during 1958 included completion of a two-year study of the engineering and economic aspects of the hydro-electric power potential of the Columbia River in Canada. This project, for which a report has been completed and submitted to the Comptroller of Water Rights, was undertaken for the purpose of investigating the development of the Columbia River in the best interests of the Province. The past year also saw the culmination of a ten-year study by the Federal-Provincial Fraser River Board and its predecessor, the Dominion-Provincial Board, Fraser River Basin, in the form of the Preliminary Report on Flood Control and Hydro-Electric Power in the Fraser River Basin.

Applications for water licences in 1958 were the highest number received in a single year since the formation of the Water Rights Branch. As the result of an increasing interest in water, a new District Engineer's office was opened in Prince George. In addition to processing 977 water-licence applications, the Branch enlarged its services to the 235 improvement districts in British Columbia through the establishment of an audit accountant.

Tasks undertaken by the staff of the Water Rights Branch carried them to many parts of the Province. In the far north-west, for example, a survey of potential dam-sites was carried out along the Dease and Stikine Rivers, while in the south a reconnaissance report of erosion along a section of the Similkameen River was completed at the request of the groups concerned. Several large-scale domestic and irrigation water-supply problems, such as in North Okanagan, Prince George area, and Courtenay-Comox area, were also investigated.

Detailed reports of each branch of the British Columbia Lands Service follow.

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, Attorney-General, and now Agriculture.

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

C. T. W. HYSLOP, B.S.A., P.AG., SUPERINTENDENT OF LANDS

The development of British Columbia's basic natural resources is well reflected in the work of the Lands Branch. During the year 1958, Crown lands to the value of $676,627.48 were alienated by purchase; this represents an increase of 32 per cent over the previous year. Revenue from annual lease rentals was $431,509.28, an increase of 18 per cent over 1957. Total revenue collected from all sources, as authorized by the " Land Act," was $1,282,265.88, an increase of 30 per cent over the previous year.

Because of increased demands for Crown land, and the resulting conflicts, many applications require lengthy investigation, both in the field examination and adjudication processes. This increased demand has also resulted in the establishment of a trend toward offering lands for sale or lease by public competition. Fifty parcels were sold by tender, for which 143 bids were received.

The outstanding feature of the year 1958 in so far as this Branch is concerned was the announcement of a change in Government policy regarding the disposition of water-front lands. To ensure that all water-front lands, having present or future public recreational values, are controlled by the Crown, such lands are considered for disposition by leasehold only. Water-frontage is restricted to 3 chains frontage for private use and 10 chains frontage for commercial use. This change in policy has greatly increased the work load of our Lease Section. This policy has also resulted in additional work for the Land Inspectors, who are required to make reconnaissances of water-front lands adjacent to individual applications. This particular phase of the inspectional programme is somewhat handicapped because of a lack of boats and outboard motors.

The past year has been a particularly active one for our Reserve Section. Many old reserves have been reviewed and cancelled, as they were no longer necessary; for example, several old reserves placed on Crown lands in connection with the proposed development in Prince Rupert prior to World War I have been completely reviewed and have been cancelled. The reserve of all unalienated and unencumbered Crown islands in coastal waters lying south of the 50th parallel, north latitude, has been extended to include all islands lying south of the 51st parallel, north latitude. This reserve is for the use, recreation, and enjoyment of the public.

Our Land Inspection Division has been particularly active in selecting reserves for the use, recreation, and enjoyment of the public. Approximately one-third of these reserves are recommended by the Land Inspectors, and the balance by the Parks Branch, District Forester's office, or other interested agencies.

This Branch is currently negotiating with the Indian Affairs Branch of the Canada Department of Citizenship and Immigration regarding the selection of certain proposed Indian reserves for the use of the Slave Band of Indians, resident in North-eastern British Columbia. The establishment of these Indian reserves is in furtherance of Treaty No. 8.

It is the Branch's policy to provide planned Crown subdivision lots in unorganized areas when conditions indicate a trend toward urban development. Two successful public auction sales of lands in this category were held during 1958. Fifty-five subdivision lots were sold at Fort Nelson, Mile 300 on the Alaska Highway, and eighty-eight subdivision lots were sold at Little Prairie (Chetwynd), being the divisional point of the Pacific Great Eastern Railway where the main line divides and branches to Dawson Creek and Fort St. John.

During the past year the Branch has made Crown lands available to a private company to facilitate the development of the recreational potential of Garibaldi Park. These lands lie outside the actual park boundary, and will be used for construction of a hotel, dormitories, parking-lot, and golf-course. Separate easements have also been issued to

facilitate the construction of an aerial tramway and ski lift. This project, when completed, will provide a much-needed recreational outlet for the citizens of the Greater Vancouver area.

This Branch has contributed to the Centennial Year celebrations by placing a reserve on all Crown lands at Barkerville in connection with the proposed establishment of a "historic pioneer mining town." In addition, the Branch also made available Crown lands to various Centennial Committees, mainly in unorganized areas of the Province, to facilitate the construction of community halls, playgrounds, etc.

In February, 1958, the Superintendent of Lands, together with the Assistant Superintendent of Lands and members of the Inspection Division, attended and successfully completed the first part of a course in the appraisal of real estate, held at Parksville, B.C., under the auspices of the Civil Service Commission and the Canadian Vocational Training Branch. It is hoped that the same personnel will complete the second part of this course in February, 1959. These courses, together with project work, partially fulfil the requirements leading to accreditation as an Accredited Appraiser, Canadian Institute. Mr. F. C. Cunningham, Land Inspector, Vancouver, B.C., completed the requirements of the institute and became an Accredited Appraiser in the summer of 1958.

Two new Land Series bulletins were made available during 1958—Bulletin No. 6 (Kamloops) and Bulletin No. 2 (Okanagan). Bulletin No. 10 (Purchase and Lease of Crown Lands) was revised. It is hoped during the coming year that this bulletin will be completely rewritten, together with Bulletin No. 1 (Pre-emption of Crown Lands), to form a new bulletin entitled "Acquisition of Crown Lands."

The Superintendent of Lands, together with the Chief, Legal Surveys Division, visited the following agencies during the month of September, 1958: Vancouver, New Westminster, Clinton, Williams Lake, Quesnel, Prince George, Burns Lake, Smithers, Terrace, and Prince Rupert. Many problems were discussed with the individual Land Commissioners, and in a number of instances short field-trips were made with these officials to investigate various problems on the ground. It has been found from experience that personal discussion of policy matters is much preferable to lengthy correspondence, and provides an opportunity for discussion to establish a clear understanding of complicated issues.

During the past year the Kardex recording system in the Lands Branch general office has been completed, and the Lease, Purchase, and Pre-emption Sections have reorganized their recording system on this basis.

Due to the increased volume of work in connection with the disposition of Crown lands, and the increasing degree of complexity in their administration, it is considered that research personnel should be made available to the Administration Division. There is an urgent need for these personnel to do basic research in land and foreshore valuations and to study various aspects of improved land-use planning.

Most sections of the Administrative Division of the Lands Branch have shown a general increase in work performed during the past year. A brief outline of the highlights of the work performed in each section follows:—

Lease Section.—A total of 1,091 applications to lease Crown lands were processed during the year, an increase of 72 per cent over 1957. The number of applications to lease received in the Department increased from 707 in 1957 to 773 in 1958. The change in policy restricting water-front lands to leasehold tenure reflects the increase in work in this Section.

Purchase Section.—There were 2,390 applications to purchase Crown lands processed during the year. This represents a slight decrease from the previous year, when 2,465 applications were processed. The value of Crown lands sold during the year was $676,627, a marked increase of 32 per cent. Eighteen public auction sales of Crown lands involving 458 lots were held at various centres in the Province.

Crown Grant Section.—A total of 1,043 Crown grants were issued during the year. This is a decrease of 27 per cent over the previous year, and resulted from a marked decrease in the number of Crown grants issued for mineral claims caused by an amendment to the "Mineral Act." The number of certificates of purchase issued increased from 1,012 in 1957 to 1,151 in 1958.

Pre-emption and Reserve Section.—Four hundred and forty reserves were placed on Crown lands during the year, an increase of 18 per cent over the previous year. One hundred and forty-seven applications to pre-empt were processed in 1958, being an increase of 54 per cent over 1957. Over 90 per cent of applications to pre-empt are for lands in the Peace River District.

Status Section.—There was an 8-per-cent increase in land statuses during the past year, and a corresponding increase in the number of register entries made. This Section is not able to keep pace with the demands made on it as a result of the large number of special lake statuses required to implement the new policy laid down with respect to the disposition of Crown water-front lands.

Public interest in Crown lands has increased very greatly during the past year. This is reflected in the number of inquiries which require a special status of specific land; these totalled 3,343 during 1958, an increase of 100 per cent over the previous year. General correspondence has increased from 17,077 letters in 1957 to 18,800 letters in 1958. A total of 2,250 persons were personally interviewed in the head office at Victoria, as compared with 1,603 the previous year.

The present staff is hardly adequate in numbers to satisfy the demands made on it by increased work. This, together with cramped office quarters, has created a situation that is most undesirable, both from the point of view of rendering efficient public service and staff morale.

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

Table 1.—Country Land Sales, 1958

	Acres
Surveyed	48,776.96
Unsurveyed	9,434.69
Total	58,211.65

Table 2.—Certificates of Purchase Issued, 1958

Land Recording District	Total
Alberni	16
Atlin	---
Cranbrook	15
Fernie	14
Fort Fraser	43
Fort George	106
Golden	23
Kamloops	46
Kaslo	4
Lillooet	96
Nanaimo	21

Table 2.—Certificates of Purchase Issued, 1958—Continued

Land Recording District	Total
Nelson	11
New Westminster	29
Osoyoos	7
Peace River	241
Prince Rupert	36
Quesnel	68
Revelstoke	9
Similkameen	89
Smithers	83
Telegraph Creek	---
Vancouver	54
Victoria	40
Williams Lake	100
Total	1,151

Table 3.—Town Lots Sold, 1958

Town	Lots	Value
Alberni	2	$300.00
Athalmer	1	100.00
Beaton	1	35.00
Blue River	2	850.00
Clinton	9	2,455.00
Coalmont	5	375.00
Courtenay	41	1,500.00
Cowichan Lake	31	23,187.00
Cranbrook	6	1,490.00
Cumberland	2	550.00
Extension	2	150.00
Fernie	2	135.00
Finmore	5	125.00
Fort Fraser	14	845.00
Fort Nelson	55	22,795.00
Fort Steele	29	750.00
Fraser Lake	7	175.00
Grand Forks	74	1,160.00
Granthams Landing	13	3,150.00
Greenwood	1	35.00
Hall	1	40.00
Hazelton	186	2,800.00
Hedley	4	195.00
Hope	4	1,550.00
Hosmer	1	10.00
Houston	42	1,890.00
Kelowna	1	100.00
Le Jeune Lake	1	50.00
Little Prairie	47	18,065.00
Lone Butte	3	135.00
Lower Post	1	25.00
Merritt	10	1,660.00

Table 3.—Town Lots Sold, 1958—Continued

Town	Lots	Value
Midway	1	$50.00
Montrose	3	10.00
Nakusp	5	105.00
Port Clements	2	105.00
Port Coquitlam	113	2,485.04
Port Edward	3	665.00
Princeton	1	50.00
Prince George	33	11,796.01
Prince Rupert	10	3,290.00
Qualicum Beach	2	300.00
Queen Charlotte	8	240.00
Quesnel	8	400.00
Revelstoke	2	150.00
Rutland	1	250.00
Shawnigan Lake	4	725.00
Smithers	171	13,395.00
South Wellington	4	465.00
Stewart	20	5,980.00
Topley	3	75.00
Tulameen	60	5,785.00
Vananda	3	200.00
Vanderhoof	8	575.00
Wardner	2	50.00
Wells	7	553.75
Windermere	3	395.00
Willow River	2	100.00
Wilmer	9	305.00
Winter Harbour	4	400.00
Yale	1	110.00
Totals	1,096	$135,691.80

Table 4.—New Leases Issued, 1958

	Number	Acreage
Hay and grazing	218	70,229.38
Agriculture	11	2,298.84
Quarrying, sand, gravel, etc.	21	1,016.29
Home-site	15	218.80
Booming and log storage	78	1,420.88
Oyster, clam, and shell-fish	14	423.03
Cannery	4	23.26
Foreshore—miscellaneous	50	123.97
Land—miscellaneous	68	2,157.56
Totals	479	77,912.01

Table 5.—Temporary Tenure Leases Renewed, 1958

Number	66
Acreage	4,067.19

Table 6.—Land-use Permits Issued, 1958

Number	9
Acreage	42.42

Table 7.—Licences of Occupation Issued, 1958

Number	4
Acreage	3,017.50

Table 8.—Assignments Approved, 1958

Leases, land-use permits, licences of occupation	167

Table 9.—Easements Granted, 1958

	Number	Miles	Acres	Fees	
				Consideration	Annual
Southern Okanagan Lands Project					
Electric-power line	1	2.970	34.150	(1)	$42.69[2]
Foreshore					
Sewer outfall	3	1.043	1.100	.....	$15.00
Natural-gas line	1	0.137	1.220	$50.00	.....
Temporary road	2	1.400	5.540	276.20	.....
Bridge	2	0.265	4.785	.....	10.00
Access road	1	0.191	2.300	.....	69.00
Logging-road	1	0.361	4.500	.....	5.00
Sewage and plant waste-pipe	1	0.322	0.765	.....	5.00
Water pipe-line	1	0.472	3.220	.....	5.00
Totals	12	4.191	23.430	$326.20	$109.00
Land					
Conveyer-belt and access road	1	0.770	18.290	.....	$22.85
Oil pipe-lines	6	36.965	268.677	$5,915.00	.....
Natural-gas pipe-lines	11	89.200	642.106	16,226.47	.....
Water pipe-lines	1	0.256	0.616	.....	5.00
Access road and logging-road	1	3.577	17.340	.....	28.60
Electric-power lines	3	0.317	6.321	48.35	16.00
V.H.F. radio repeater site	1	.....	1.030	.....	25.75
Cable crossing tower and anchor	1	0.710	0.113	.....	10.00
Licences to occupy	2	30.356	120.500	.....	169.40
Totals	27	162.151	1,074.993	$22,189.82	$277.60
Consents pursuant to "Mines Rights-of-way Act"					
Tailings pipe-line	1	0.916	3.330	$25.00	.....
Aerial tramway	1	0.250	0.600	25.00	.....
Totals	2	1.166	3.930	$50.00	.....
Grand totals	42	170.478	1,136.503	$22,566.02	$386.60

[1] Fee payable to Minister of Agriculture.
[2] Not added to grand total.
Total moneys received, $22,952.62.
Partial cancellation of easements, 3.

Table 10.—Crown Grants Issued, 1958

Purchases (country lands)	540
Purchases (town lots)	291
Pre-emptions	58
Mineral claims (other than reverted)	30
Mineral claims (reverted)	53
Surface rights (" Mineral Act ")	11
" Public Schools Act "	10
" Veterans' Land Settlement Act "	7
Home-site leases	15
Pacific Great Eastern Railway	1
Supplementary timber grants	2
Miscellaneous	25
Total	1,043

Certified copies of Crown grants issued, 7.

Table 11.—Crown Grants Issued for Past Ten Years

1949	1,602
1950	1,580
1951	1,740
1952	1,872
1953	1,829
1954	1,276
1955	1,498
1956	1,518
1957	1,426
1958	1,043
Total	15,384

Ten-year average, 1,538.

Table 12.—Total Area Deeded by Crown Grant, 1958

	Acres
Purchases (country lands)	44,372.47
Pre-emptions	8,820.80
Mineral claims (other than reverted)	1,343.40
Mineral claims (reverted)	2,066.67
Surface rights (" Mineral Act ")	255.64
" Public Schools Act "	17.32
" Veterans' Land Settlement Act "	692.30
Home-site leases	172.35
Pacific Great Eastern Railway	12.70
Supplementary timber grants	142.70
Miscellaneous	902.12
Total	58,798.47

Table 13.—Pre-emption Records, 1958

Land Recording District	Pre-emptions		C. of I. Issued
	Allowed	Cancelled	
Alberni	---	---	---
Atlin	---	---	---
Cranbrook	---	1	---
Fernie	---	---	---
Fort Fraser (Burns Lake)	---	1	4
Fort George (Prince George)	3	8	1
Golden	1	1	2
Kamloops	---	4	---
Kaslo	---	---	---
Lillooet (Clinton)	---	2	4
Nanaimo	---	---	---
Nelson	---	---	---
New Westminster	---	1	1
Osoyoos (Vernon)	---	---	---
Peace River (Pouce Coupe)	93	55	43
Prince Rupert	1	---	2
Quesnel	1	2	5
Revelstoke	---	4	1
Similkameen (Penticton)	---	1	---
Smithers	---	2	1
Vancouver	---	---	2
Victoria	---	---	---
Williams Lake	---	3	1
Totals	99	85	67

Table 14.—General Summary of Pre-emption Records, 1949–58

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Total
Pre-emption Records Allowed	145	141	85	87	53	97	48	35	66	99	856
Certificates of Improvements Issued	109	133	92	69	77	71	41	52	46	67	757

Table 15.—Reserves, 1958

	Applications Received	Reserves Completed
Use, recreation, and enjoyment of the public	147	154
British Columbia Department of Highways (rights-of-way, gravel-pits, etc.)	93	95
Federal Government (defence purposes, wharf-sites, etc.)	40	35
British Columbia Forest Service (Ranger stations, grazing, radio-sites, reforestation, etc.)	96	80
Miscellaneous (Game Commission, water-power projects, garbage-dumps, school-sites, cemeteries, etc.)	78	76
Totals	454	440

General Summary

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	Ten-year Average
Pre-emption records issued	145	141	85	87	53	97	48	35	66	99	86
Certificates of improvements issued	109	133	92	69	77	71	41	52	43	67	75
Certificates of purchase issued	1,181	1,296	1,129	1,465	1,743	1,043	1,084	935	1,012	1,151	1,204
Crown grants issued	1,602	1,580	1,740	1,872	1,829	1,276	1,498	1,518	1,426	1,043	1,538
Total acreage deeded by Crown grants	219,662.12	75,712.61	77,516.18	98,602.84	99,036.36	73,461.69	65,941.81	80,308.03	89,907.01	58,798.47	93,894.71
New land sales—											
Number	1,181	1,296	1,129	1,429	1,743	1,043	1,084	935	1,012	1,151	1,200
Value	$358,009.05	$422,559.20	$398,561.63	$702,776.75	$745,874.44	$391,989.96	$578,487.16	$546,702.70	$511,895.02	$676,627.48	$533,348.34
Leases under "Land Act"	362	325	360	301	353	366	311	264	276	479	340
Acreage leases, "Land Act"	86,851.40	84,086.47	128,778.45	45,110.72	46,089.55	50,064.80	67,195.22	51,301.73	56,808.92	77,912.01	69,419.93
Temporary tenure leases renewed	----------	----------	----------	115	75	52	62	65	72	66	51
Land-use permits	9	8	18	14	28	27	25	21	22	9	18
Licences of occupation, easements, etc.	8	18	32	21	40	35	40	87	55	46	38
Clearances of reverted mineral claims	299	312	916	514	461	400	663	783	361	245	495
Reservations for use and enjoyment of public and other purposes	188	157	227	202	332	440	392	422	430	454	324
"Land Act" collections	$589,153.77	$614,310.94	$646,862.78	$923,228.41	$944,679.01	$818,700.58	$1,031,056.01	$1,140,178.27	$980,411.88	$1,282,265.85	$897,084.75

ACCOUNTING DIVISION

S. G. WILSON, CHIEF ACCOUNTANT

The following statements and graphic displays indicate the record of revenue collections for the past ten years. The noticeable increase in land leases, rentals, and fees can be attributed primarily to two factors: (1) 281 more leases were approved in 1958 than in the previous year, and (2) the upward revision in rental of those leases in which the revision period fell due in 1958. The increase in land sales revenue is mainly a result of (1) an increase in the number of certificates of purchase issued, (2) an upward revision of new sale land values, and (3) smaller monthly payments replacing the larger annual payments for those cases where delinquency occurred.

Table 1.—Summary of Revenue Collections for the Year Ended December 31st, 1958

Land leases, rentals, fees, etc.	$605,229.73
Land sales	677,036.15
Sale of maps and air photos	57,779.88
Water rentals and recording fees	1,256,004.37
Total	$2,596,050.13

Table 2.—Comparison of Revenue Collections for Ten-year Period 1949–58, Inclusive

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
1956	2,518,722.51
1957	2,454,435.40
1958	2,596,050.13
Total	$22,248,011.26

Ten-year average, $2,224,801.13.

Table 3.—Classification of Revenue Collections for Year Ended December 31st, 1958

Land sales—			
Country lands		$562,839.00	
Town lots		110,308.32	
Surface rights, mineral claims		1,227.90	
Indian reserve cut-off		2,660.93	
			$677,036.15
Land leases, rentals, fees, etc—foreshore leases—			
Booming and log storage	$160,695.62		
Commercial (marinas, etc.)	182,422.60		
Oyster	7,637.69		
Miscellaneous (foreshore protection, etc.)	714.00		
		$351,469.91	
Carried forward		$351,469.91	$677,036.15

Table 3.—Classification of Revenue Collections for Year Ended December 31st, 1958—Continued

Brought forward		$351,469.91	$677,036.15
Land leases—			
Grazing and (or) agriculture	$32,654.90		
Quarrying (limestone, sand and gravel)	17,497.06		
Camp-site (lodge, fishing)	2,238.10		
Home-site	2,320.94		
Miscellaneous (residential, etc.)	25,328.37		
		80,039.37	
Land-use permits		686.00	
Licences of occupation		2,280.06	
Royalty collections		33,757.42	
Easement collections—			
Annual rentals	$2,687.33		
Outright consideration payments	31,723.02		
		34,410.35	
Fees—			
Crown grant	$13,945.00		
Assignment	1,135.00		
Miscellaneous (lease, search, etc.)	3,114.50		
		18,194.50	
Sundry collections (occupational rental, survey charges, etc.)		84,392.12	
			605,229.73
Sale of maps and air photos—			
Legal Division		$23,810.55	
Geographic Division		17,437.86	
Air Division		16,531.47	
			57,779.88
Water rentals and recording fees			1,256,004.37
Gross revenue for year			$2,596,050.13

Table 4.—Comparison of Land Leases, Rentals, Fees, etc., Revenue for Ten-year Period 1949–58, Inclusive

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
1956	576,331.17
1957	472,415.55
1958	605,229.73
Total	$7,339,275.00

Ten-year average, $733,927.50.

NOTE.—The years 1951, 1952, 1953 include coal, petroleum and natural-gas revenue.

Table 5.—Comparison of Land Sales Revenue for Ten-year Period 1949–58, Inclusive

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
1956	573,976.49
1957	522,825.65
1958	677,036.15
Total	$5,204,848.53

Ten-year average, $520,484.85.

Table 6.—Comparison of Water Rentals and Recording Fees Revenue for Six-year Period 1953–58, Inclusive[1]

1953	$700,289.17
1954	813,413.61
1955	849,980.00
1956	1,081,592.07
1957	1,152,370.05
1958	1,256,004.37
Total	$5,853,649.27

Six-year average, $975,608.21.

[1] Revenue for years previous to 1953 available on fiscal basis only.

LAND INSPECTION DIVISION

L. D. FRASER, B.Sc.A., P.Ag., CHIEF LAND INSPECTOR

The 1958 field season proved to be one of the most successful years that the Land Inspection Division has yet experienced. The long dry field season enabled the Land Inspectors to commence work in the latter part of March and continue through to the end of November. More field examinations were completed this year than ever before in the history of the Division. The field staff completed 485 more land inspections in 1958 than in 1957 and 155 more than the number completed in 1956. It should also be kept in mind that an even better showing could have been made if the new Land Inspectors hired could have been appointed earlier in the year.

In addition to the 2,984 land examinations completed in the various land inspection districts, it should also be noted that the Forest Service completed forty-two examinations and the Department of Finance ten examinations in the remote coastal areas of the Province where no Land Inspector is located. The combined total of field inspections completed for the year is therefore 3,036.

A review of the number and type of inspections completed last year compared to the previous year showed some startling increases in certain categories. Grazing-lease applications and renewals increased by 52 per cent. Booming and log-storage lease applications and renewals increased by 27 per cent. Inspections made under section 53 of the " Land Act " increased by 65 per cent.

The following table is a comparison of the accomplishments in each district for the last two years:—

Land Inspection District	Number of Inspections Made in—		Outstanding Inspections at End of—	
	1957	1958	1957	1958
Clinton	196	173	48	49
Courtenay	158	168	19	31
Fort St. John	279	409	14	33
Kamloops	90	189	90	23
Kelowna	214	175	43	34
Nelson	143	177	26	22
New Westminster	129	149	37	6
Pouce Coupe	226	250	16	11
Prince George	305	342	64	34
Quesnel	111	123	23	14
Smithers	185	202	29	57
Vancouver	174	184	24	7
Victoria	96	116	14	3
Williams Lake	193	327	76	24
Totals	2,499	2,984	523	348

The following is a brief explanation of the figures shown in the above table:—

Clinton.—Summer assistance provided in 1957 for two months. No assistance in 1958.

Courtenay.—One-man district. No assistance provided in either year.

Fort St. John.—Two-man district. The 1958 achievement is a result of the long dry field season which enabled travel on all back roads.

Kamloops.—District office vacant early part of 1957 as a result of the death of Mr. Minion. Two men employed in 1958 but a change in staff made in middle of field season.

Kelowna.—Summer assistant provided in 1957. No assistance provided in 1958.

Nelson.—One-man district. No assistance.

New Westminster.—One-man district. No assistance provided.
Pouce Coupe.—One-man district. No assistance.
Prince George.—One-man district in 1957 but considerable part-time assistance provided. Two-man district in 1958.
Quesnel.—One-man district. No assistance provided.
Smithers.—One-man district. Assistance provided in fall of 1957. No assistance provided in 1958.
Vancouver.—One-man district. No assistance provided.
Victoria.—Head office district. Assistance provided by Inspectors from Vancouver and Courtenay.
Williams Lake.—Two-man district. No assistance provided in either 1957 or 1958. Dry season made back roads accessible.

STAFF

The large backlog of unexamined applications remaining at the end of each year for the past several years was a clear indication that the Division was unable, with the existing staff, to keep up with the public demand for Crown lands. As a result of this backlog and the Division's earnest desire to expedite the handling of outstanding applications, an effort was made to increase the number of permanent Land Inspectors in the field. In the past the Division had employed two or three university undergraduates to work on a temporary basis during the summer months. Although such assistance was valuable, it was felt that the time spent training summer assistants each year was a less efficient method than it would be to increase the permanent staff. Furthermore, the outstanding backlog of inspections was sufficient to keep at least two permanent men working on a full-time basis. As a result of this thinking, it was decided to dispense with temporary field help and acquire two permanent fieldmen.

In January, 1958, Mr. R. N. Mackenzie, Land Inspector at Fort St. John, resigned to accept a position with Pacific Petroleum Limited. Mr. W. V. Lowry, B.S.F., B.C.R.F., joined the staff on May 1st to fill the vacancy at Fort St. John. The heavy work load in the Prince George and Kamloops Districts predicated the need for placing additional help in these two areas. Mr. J. M. Bakewell, B.S.F., B.C.R.F., was appointed to Kamloops on May 1st, 1958, and Mr. H. D. Kent, B.S.F., B.C.R.F., was appointed to Prince George on April 23rd, 1958. Mr. Bakewell resigned, July 25th, 1958, to accept a position with the Fort St. John Lumber Company. The vacancy created by Mr. Bakewell's resignation was filled by Mr. D. M. Thom, B.S.F., B.C.R.F., on September 29th, 1958.

TRAINING

In the spring of 1958 all the Land Inspectors were given an opportunity to attend a two-week appraisal course sponsored by the Civil Service Commission and held at Parksville, B.C. Thirteen Inspectors attended and successfully passed the Appraisal I examinations held at the conclusion of the course. An Appraisal II course is scheduled for the spring of 1959, and arrangements have again been made for the Land Inspectors to participate. After the Inspectors have successfully completed the appraisal courses, it is hoped they will submit demonstration appraisals to the Appraisal Institute of Canada in order that each will become an Accredited Appraiser. The benefit of the training received at the first course is already showing up in the improved quality of report being turned in. The valuing of industrial and commercial lands for this Department is becoming standardized, and the Inspectors are now setting prices based on established market values in the area.

In recent years the Land Inspector has been called upon to suggest suitable subdivision plans in various areas throughout the Province. This work involves close liaison

with District Highway Engineers and various town planning authorities in order that the proposed plan of subdivision does not conflict with existing municipal ordinances and highway restrictions. There is a growing need for elementary instruction in town planning, and some thought is presently being given to this matter.

DISTRICT PROBLEMS

With more emphasis being placed on the recreational attributes of lakes, rivers, and coastal waters throughout the Province, the Lands Service instituted a policy whereby water-front properties would, in general, be leased rather than sold. The amount of frontage allowed each applicant was also restricted to 3 chains (198 feet) for private purposes and 10 chains (660 feet) for commercial purposes. Working in close co-operation with the Parks Division of the Department of Recreation and Conservation, it was decided that before any further water-front lands were disposed of, even by lease, a reconnaissance of remaining Crown water-front lands in the immediate vicinity of the application would be carried out by the Land Inspector to ascertain if the present and future needs of the public were adequately provided for. This policy has placed an added burden on the Land Inspector, since each lake on which an application is received must now be reconnoitred before further alienation by lease or purchase is entertained. Where possible, joint examinations by the Park Officer and Land Inspector are carried out.

In the Central Interior part of the Province, particularly in the Williams Lake, Kelowna, Kamloops, and Clinton areas, the right of the public to use roads and trails crossing both private and Crown lands and leading to recreational areas is becoming a real problem. Various Land Inspectors have requested detailed information on the public's right to use specific roads in their districts. This problem is not only one in which the Lands Service is interested, but also the Forest Service, the Department of Highways, the Department of Recreation and Conservation, and the Department of Mines. It is hoped that a co-ordinating committee composed of personnel from all the departments concerned can be set up this coming year to investigate and study the problem and make certain recommendations regarding rectification of same.

HEAD OFFICE PROBLEMS

Because of the increasing volume of work being forwarded to the field from head office, less time is available for administration and much-needed research projects. If the volume of work continues to increase, it is felt a part-time clerk should be employed to assist in processing the land applications in order that the Chief and Assistant Chief Land Inspector can spend more time offering guidance to the field staff and doing research work on various land-inspection problems.

SUMMARY

During the past year there has been a sizeable reduction in the number of outstanding inspections remaining at the end of the field season. It is hoped that by next fall this backlog will be further reduced, thus enabling more prompt handling of new applications as they are received.

Some assistance will be required in the Clinton and Smithers Districts as the volume of work in each of these two areas is more than can be handled by one man. It is planned to revise the district boundaries so that a part of each district is allocated to neighbouring Inspectors.

LAND INSPECTION

Land inspections carried out during the year 1958 are tabulated as follows:—

Purchases—	
Agricultural (other than grazing)	329
Access (roads, etc.)	5
Commercial (resorts, service-stations, hotels, airfields, etc.)	80
Community (cemeteries, church-sites, parking areas, etc.)	14
Grazing (pasture, range)	165
Home-sites (permanent)	407
Industrial (mill-sites, power-sites, manufacturing plants, etc.)	47
Summer home or camp-site	277
Wood-lots or tree-farms	14
Leases—	
Land—	
Agriculture (other than grazing)	49
Commercial (resorts, service-stations, hotels, airfields, etc.)	13
Community (parks, cemeteries, dump-sites, etc.)	9
Fur-farming	----
Grazing (pasture, range, hay-cutting, etc.)	254
Home-sites (section 83 of the "Land Act")	14
Home-sites (permanent, other than section 83 of "Land Act")	32
Industrial (mill-sites, power-sites, manufacturing plants, etc.)	31
Summer home or camp-site	11
Quarrying (sand, gravel, limestone, diatomaceous earth, etc.)	26
Foreshore—	
Booming and log storage or log dumping	156
Commercial (boat rentals, marine service-station, wharves, etc.)	77
Industrial (mill-sites, canneries, factory-sites, wharves, etc.)	18
Quarrying (sand and gravel from river-beds)	6
Oyster and shell-fish	18
Private (wharfage and boat-houses)	4
Land-use permits	29
Licence of occupation	4
Easements	12
Pre-emptions—	
Applications	95
Annual inspections (including applications for Crown grant)	210
Subdivisions—	
Valuations	19
Survey inspection	5
Plans cancellation	2
Proposals (lake-shore, residential, etc.)	12

Reserves—	
Grazing	5
Gravel-pits	8
Recreational	27
Other (state purpose)	20
"Veterans' Land Act"	11
Land Settlement Board—	
Classification	2
Valuations	6
Doukhobor lands	------
Miscellaneous inspections—	
Delinquent accounts	7
Land-use surveys	23
Land values (current market values)	24
Protests	28
Trespass (land and foreshore)	46
Lease rental reviews (not recorded above)—	
Land	4
Foreshore	23
Pre-Crown grants—	
Section 53 of the "Land Act"	278
Section 83 of the "Land Act"	6
Section 66 (1) of the "Land Act"	1
Property transferred to Crown valuations—	
Department of Health and Welfare	10
Repurchase (Section 135 of the "Land Act")	1
Applications under other Acts (Escheats, Quieting Titles, etc.)	10
Total	2,984[1]

[1] Included in this figure are 37 examinations completed by the Forest Service.

SURVEYS AND MAPPING BRANCH

Note 2 THE 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 and negative engraving, 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

Following the established pattern of recent years, budgetary limitations allowed the Surveys and Mapping Branch practically no expansion of staff or plant during 1958. Nevertheless, due to certain favourable influences outweighing those of unfavourable effect, a year of somewhat increased over-all accomplishment may be reported. A complete summary of Branch activities is offered in the four divisional sections which follow. A few general features of the year's operations have been selected for consideration here.

Abnormally fine weather dominated the whole field season. This resulted in one of the busiest years on record for the Air Division's photo flying operations. Due to practically the whole effort being absorbed by large-scale narrow-angle photography for the new forest inventory programme, the total area covered in square miles was not at all comparable to totals of past years when specifications were for wide-angle " basic cover " photography at the smaller 1:31,680 scale. The dry weather had a divided influence on the Topographic Division's field work, establishing mapping control. Clear skies and dry ground were a welcome change from the unusually wet and stormy season of 1957, but increasing smoke haze from forest fires became sufficiently bad as the season developed to interfere with visibility to distant stations. Access was denied to areas under fire-hazard closure in a few instances. One small party, near Bella Coola, was temporarily diverted to forest-fire suppression activities. Field parties of the Legal Surveys Division, working generally closer to the Provincial highway network and in some cases along it, and concerned with measurement of shorter lengths, escaped the worst penalties of smoke and forest-fire closures. But even in short-range work the intense heat of the long dry summer aggravated difficulties of sighting due to refractive turbulence of the air, and of lineal measurements due to extreme thermal effects on steel measuring-tapes. The remarkably fine weather, a welcome change from that of previous years, was thus not entirely an unmixed blessing.

One favourable influence on field operations of the Topographic Division was the full season's use of the new Tellurometer equipment for electronic measurement of distances, ranging from about one-half mile to 20 miles under normal conditions, and greater distances in certain favourable circumstances. This method, capable of precision far exceeding that of orthodox chaining procedures, requires only that the two extremities of the line be occupied simultaneously by an observer, each with a " master " or a " remote " Tellurometer instrument respectively, and that the two stations be electronically " intervisible " for short-wave radio transmission. A full set of readings may be completed and checked for a particular line in a few minutes by a trained crew, which is then ready to move to a new line. The equipment, while intricate, is sufficiently robust, compact, and light in weight for normal field movement. Thus an unprecedented facility for control surveys over extensive tracts of country has suddenly become available. It may well have revolutionary effects in methods, speed, accuracy, and economy of control surveys. Precise route traverses will not be an alternative to triangulation, which, since the advent of modern optical-reading theodolites four decades ago, has occupied an exclusive role in control surveys in British Columbia. The precise measurement of long lines with the Tellurometer will not, however, depose the precise measurement of angles as in triangulation. Both methods will be used in a complementary fashion to attain a measure of accuracy and efficiency heretofore unprecedented. It is a challenge to the specialists in the Topographic Division to work out new procedures to combine the complementary advantages of precise measurements of distance with those of angles, according to variables of terrain, weather, and field transport. During the 1958 season

the Tellurometer equipment was used mainly for precise control traverse in bush country fairly well served with roads.

The basic air-photo cover programme at ½-mile-per-inch scale (1:31,680) was inoperative due to lack of authorized funds to adapt the available Government-owned Anson aircraft CF-BCA for air-camera installation, and to man and operate it. For this reason the northern part of the Province between 57 and 60 degrees north latitudes still awaits this first prerequisite for effective mapping and development planning. An expenditure of less than $25,000 per year would cover allocation of one photo aircraft to complete the Northern British Columbia programme in about eight years. The new RC8 Wild air camera obtained early in 1958 is available for that work and would produce photo cover of unsurpassed quality and precision. Such photography could be used not only for the interim and standard topographic mapping at 1:31,680 scale, but also for detailed engineering mapping at large scales with close contours, as well as for cadastral surveys of isolated parcels, if processed in a first-order plotter such as the Wild A7.

Much thought and a modicum of field experiment has been devoted to certain cadastral surveys with aerial photogrammetry. Results of these trials indicate that photogrammetry of so-called third-order precision, which has been adequate for interim and topographic mapping at 1:31,680 scale, may not be quite rigorous enough for legal surveys of property. However, first-order photogrammetric procedures, now well established elsewhere, do offer definite scope for cadastral surveys. With such plotting equipment, a much more economical procedure of locating corners of sizeable parcels of Crown land for alienation by various tenures and patterns under the "Land Act," the "Petroleum and Natural Gas Act," and the "Mineral Act" would be possible, especially isolated parcels so costly to tie in by conventional methods.

Another application of first-order aerial photogrammetry which would speed up production and effect financial economy is that of bridging control across difficult country by aerial triangulation. True, the helicopter has been spectacular in gaining access to difficult areas for field survey crews, but at a high price. A lot of yet unmapped country in British Columbia is so high and rugged that even the helicopter can offer only marginal, costly, and even dangerous access to it. First-order aerial photogrammetry would carry both control and detailed mapping over these areas without the heavy expense of covering them completely with ground survey control.

An increasing demand for large-scale detailed topographic mapping has been experienced, and there is every indication that this trend will gather even greater momentum. Horizontal scales vary from 200 feet per inch (1:2,400) to 1,000 feet per inch (1:12,000) with contour intervals from 5 to 20 feet. Such mapping is required for pondage in hydro projects, drainage, irrigation, sewage design, road construction, and urban planning. Due to methods based on air photogrammetry and other improvements, a proportion of these demands has been dealt with by present staff and plant. However, without first-order plotting instruments or, alternatively, an increase in trained staff and accommodation, it will be impossible to cope with increasing urgent demands of this kind. With proper equipment, not only could the present staff and accommodation handle this type of work, but it could even speed up the standard topographic mapping, which has been the primary function of the Topographic Division since its inception some forty years ago.

Map compilation, reproduction, and distribution, by the Geographic Division, featuring the new wall map of the Province (Map 1A in two sheets), four new sheets of the popular 2-miles-per-inch series, reprintings of the south-east and south-west regional maps at 10 miles per inch, among others, have answered a demand from government and the public which quite surpassed anticipated volumes. Distribution of maps to all sources was up by 13 per cent over 1957. Budget restrictions have left insufficient funds to effect map printing at a rate to cope with these demands, such that some sheets originally programmed for publication in 1958 had to be put back for action in the next fiscal

year. Such economies are puzzling when it is realized that proceeds from the sale of maps adequately cover printing costs.

Surveys to establish the line of the British Columbia-Yukon Boundary along the 60th parallel of north latitude, west of the Tatshenshini River, were carried out by Mr. A. F. Swannell, B.C.L.S. The new segment extended the boundary westward 25½ miles to a terminal monument, No. 187, just beyond the Alsek River. West of this point to the Alaska Boundary, the 60th parallel is occupied by an enormous ice-field, offering no fixed ground for marking the line. Mr. Swannell, in establishing Monument 187, may claim then to have set the westernmost survey mark in British Columbia, a distinction which he may enjoy without challenge until such a time as the last remnants of the ice age in the Cordillera may have disappeared. It seems fitting that in British Columbia's Centennial Year, 1958, this final operation to mark her boundaries was completed. Only an over-all inspection of the whole north boundary and possibly some residual checking remain to be carried out in the field. Preparation of official boundary plans is in progress, and should approach finality by the end of the next calendar year, or soon after. Independent checking of the 1958 field returns will be done concurrently. The final report of the British Columbia-Yukon-Northwest Territories Boundary Commission and drafting of the necessary legislation for confirming the boundary, as surveyed and marked, may well project into the year 1960.

A favourable aspect of operations in this Branch, which applies to all divisions, both in and out of doors, is one which has come about so quietly and gradually that it escapes notice unless a retrospective view is taken. I refer to the over-all high level of training, experience, and skill now characterizing the main body of the staff. A decade has passed since the post-war rehabilitation period. All recruits of that period who have remained with the organization are now highly trained, with a good background of experience. A number of these have achieved professional status, mostly as British Columbia land surveyors, and are to be congratulated on their sustained application to duties and to self-improvement. In the same period, most of the old-timers have retired from the picture, and, with due tribute to their valuable service to the Province, over long years, a by-gone era has passed with them. Time marches on. Among the senior echelon of the present staff, only three members will reach statutory retirement age in the next ten years. The post-war organization of the Branch, while always capable of improvement and change by way of new procedures, or demands, has now had time to become smooth running in operation.

A wide variety of personalities making up the staff has had time to develop working compatibility, expressing itself in mutual tolerance and respect. This makes for a degree of harmony and good fellowship, which in turn contributes to high standards of service and work output. There is no doubt that the ability of the Branch as a whole to cope with a steady increase in the volume of work without increase of staff, on a fixed budget, is due to this increased efficiency of the personnel. There is a limit, of course, to what a strong and willing horse can do. The time may soon be at hand when, to cope with still increasing demands, a policy of modest carefully selected staff increase, with training, must be contemplated and authorized.

Extra-provincial travel during the year included three representatives at the fifty-first annual meeting of the Canadian Institute of Surveying at Ottawa in January—Mr. A. H. Ralfs, B.C.L.S., D.L.S., Assistant Director of the Branch; Mr. W. A. Taylor, B.C.L.S., Supervising Surveyor of the Legal Surveys Division; and Mr. A. C. Kinnear, B.C.R.F., Assistant Chief of the Air Division. Advantage was taken of Mr. Kinnear's presence in Ottawa in connection with a meeting of the Canadian Military Intelligence Association, which provided his travel expenses, to allow him to attend the survey meeting. He also looked after arrangements for a special display featuring British Columbia surveys and mapping, with the Centennial Year as a theme. Messrs. A. M. Barber, B.C.L.S., and A. D. Wight, B.C.L.S., attended a Tellurometer course in Ottawa, arranged

by the Department of Mines and Technical Surveys. This was an example of fine Federal-Provincial co-operation in surveys and mapping, and, as the course was held prior to the 1958 field season, the benefits of it were given full exercise.

Granted three months' leave of absence, June to August, inclusive, by Order in Council, the writer undertook a mission to South-east Asia for the Colombo Plan administration in Canada to assess surveys and mapping requirements of the Lower Mekong River development scheme, affecting four countries—Cambodia, Laos, Thailand, and Vietnam. The mission entailed two months' observational work in South-east Asia, with headquarters at the United Nations' Economic Commission for Asia and the Far East, in Bangkok. Consultations were also held in Ottawa, Washington, D.C., New York, Paris, and Tokyo. Salary and all travel expenses during the three-month period were paid by the Colombo Plan administration. It is appreciated that this tour of duty in the field of international co-operation was a compliment not only to the writer, but also to the Province, whose Surveys and Mapping Branch does enjoy an eminent reputation in extra-provincial and international fields. The writer is grateful to his Minister and the Executive Council for permission to undertake this stimulating assignment. He is also grateful to his Assistant Director, Mr. A. H. Ralfs, and staff in the Surveys and Mapping Branch for carrying on so ably during his absence.

BRITISH COLUMBIA-YUKON BOUNDARY SURVEY

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

This year's work on British Columbia's northern boundary, the 60th parallel of north latitude, was not a restoration and retracement survey as it was for the preceding two years, but was primarily an extension from the Tatshenshini River to just west of the Alsek River, the last major waterway which crosses the 60th parallel.

My instructions called for this westerly extension of the British Columbia boundary to be run as a series of 486 chain chords, properly monumented, commencing at Monument 166, the most western monument on the boundary, as previously established in 1907. I was to assume this position to be on the 60th parallel. I was also to continue westward with the previous year's triangulation, which terminated in the vicinity of the Hendon River, for the full extent of the season's survey. From the triangulation net, I was to tie in Monument 166 and, if practical, any other of the accepted boundary positions west of Monument 120; also, a tie was to be made to the pipe-line survey which follows along the Haines Cut-off Road, and to obtain a basis for elevations (and a check on the elevations carried from Bennett Lake in 1957) a tie was to be made to any Geodetic Survey of Canada bench-mark situated along this road.

The crew, besides myself and assistant, was comprised of the cook, an instrument man, and five survey hands, and also the helicopter pilot and mechanic, the helicopter being used as transport on the job.

As it had been planned, work commenced on the season's project on June 8th with camp established by the Takhanne River at Mile 103 on the Haines Road, at the military camp known locally as Million Dollar Camp. This camp is abandoned and is in disrepair, with most buildings either having fallen down or having been torn down.

This initial camp position was chosen in compromise because, in spite of the distance from the line work, the triangulation had to be brought ahead from the Hendon River. On June 22nd we moved camp to a small lake approximately 1 mile south of the boundary and 5 miles west of the Tatshenshini River. Here we were handier to the line work and the triangulation was sufficiently advanced to the Haines Road that it was within working distance. This proved to be our last camp, as it is at the most westerly lake to where supplies may be flown along the boundary.

Line work progressed more slowly than was anticipated. This, in part, was because the crew were mostly novices at this type of survey and were prone to making errors, necessitating considerable remeasuring of chainage bays, and also the timber being much bigger and more dense than advance information had led us to believe.

After much difficulty we obtained our initial observation for azimuth at Monument 166. On checking into the next controlling observation a 40-second error necessitated rerunning and rechecking the line.

By the third week in July the line was completed as far as Monument 180, approximately 5 miles along the second chord, beyond which it was impossible to run line because we now had reached a knife-ridged, precipitous glaciated mountain which attained an elevation of 8,000 feet above sea-level where the boundary traversed it. Consequently, as no further line-clearing or chainage was contemplated, two men were released.

Because of the barrier, it was necessary to establish a triangulation point on the western side of this mountain mass as near to the presumed 60th parallel as we could estimate ourselves. This was done, and by calculation we established on the ground the third deflection point from which the fourth chord was projected. The final westerly monument (No. 187) was also established on the fifth chord length by calculating its position from a previously placed triangulation station.

It might be noted here that the low clouds which continuously blanked the sky, making stellar observations a near impossibility all season, also retarded the triangulation

work considerably, extending the time by 25 per cent for this work, or, in terms of boundary-miles run, our daily average dropped to two-fifths of a mile per day as compared to the two-thirds of a mile per day average of the previous two seasons.

The season concluded with the completion of the assigned task on August 30th, when the party disbanded at Whitehorse.

During the summer we had established seventeen monuments and witnessed two other positions along 25½ miles of new boundary. Some thirty-six triangulation stations were set and occupied along the approximate 66 miles of triangulation completed. In conjunction with the triangulation, ties were made to three original boundary monuments set by Wallace—namely, Monument 141, approximately in the middle of his work, and Monuments 165 and 166, his two most westerly monuments. With the tie made to his two most easterly monuments, Nos. 119 and 120, in 1957, it may be noted that his over-all distance, Monument 119 to Monument 141, is very good, but that portion of his work west of Monument 141 to Monument 166 is of the order of less than 1 in 1,000 in accuracy. By our triangulation a gross error of some 28 chains was discovered in the distance from Monument 166 to Monument 165, and along this same course an agreement of 15 seconds in azimuth was found, comparing ours (by observation at Monument 166) to the azimuth quoted on the original survey plan.

As called for in the instructions, a tie was made to the pipe-line survey and also to Geodetic Bench-mark No. 485F, from which the elevation of Monument 120 compared to within 1 foot of that which was obtained the previous year.

A link was also made to the Army Survey Establishment triangulation net, this giving a closure to the triangulation carried along the boundary from Bennett Lake to as far west as the Haines Road. This 105 miles of triangulation shows a preliminary error 13 feet in latitude and 33 feet in longitude, having an error in azimuth on the closing line of 27 seconds. Final values of this portion of the triangulation may now be obtained, but unfortunately the 38 miles west of the Haines Road is still on non-closure values.

In concluding this report I wish to say that the chief difficulty of the work on the boundary is endeavouring to carry a bearing from one controlling azimuth observation to another within the prescribed limits, which, in my opinion, are too exacting. This season, this situation was aggravated by what appears to be attributable to the deviation of the plumb-line, which would affect the answer to our controlling observations. This, I feel, must be responsible for the anomalies in bearings that we experienced.

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 or adjacent surveys. After the completion of the survey, the returns are forwarded to this office for checking and plotting. Included in the above returns are all right-of-way surveys, such as for highways, railways, transmission-lines, etc. During the year, 608 sets of instructions were issued. This is an increase of 120 over last year and amounts to an increase of 24½ per cent.

A synopsis of this work for the past four years is as follows:—

Year	Instructions Prepared	Year	Instructions Prepared
1955	252	1957	488
1956	401	1958	608

In 1958, 469 sets of field-notes covering the survey of 641 lots were received in this office and duly indexed, checked, plotted, and official plans prepared therefrom. Of the above-mentioned surveys, 501 were made under the "Land Act" and 140 under the "Mineral Act." At the present time there are approximately 94,529 sets of field-notes on record in the Division's vaults.

There were 340 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, 210 in number, must be maintained, covering the whole of the Province. These show all cadastral surveys which are on file in the Department and are kept up to date by adding new information as it accrues from day to day. Prints of these maps are available to the public. (*See* Indexes 1 and 2, contained in envelope inside back cover of this Report.)

Over the past few years, owing to the large volume of work being processed by this Division, it had been found impossible to recompile and retrace, by hand, enough of the reference maps each year to keep them in clean and printable condition. This Division has been striving to find a mechanical process to reproduce a creased and dirty tracing and come up with a clean and sharp linen transparency. After a great deal of research and experimentation, the method was devised, making it possible to obtain a good-quality linen with a fine emulsion, and thus this year the Division has been able to reproduce fifty-two reference maps and is now in the happy position of having its 210 reference maps in good condition.

This Division has also been working toward the goal of renumbering the reference maps in accordance with the National Topographic Series. To accomplish this, certain reference maps in the south-east corner of the Province had to be recompiled and made to conform to the main meridional grid. This was completed this year, and as of January 1st, 1959, the reference maps will appear with the National Topographic Series numbers. This is a somewhat historic step. The old numbering of the reference maps was something of a hodge-podge, as it had just grown over the years. It is gratifying that this orderly and conformable numbering of these maps was finalized in British Columbia's Centennial Year.

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. From the 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 has been necessary during the year, for status and compilation purposes, to obtain 534 plans from the various Land Registry Offices; copies of these have been made, indexed, and filed as part of the Division's records.

This Division co-operates with the other departments of Government by preparing and checking legal descriptions which they require. Those assisted in this way were the Attorney-General's Department (descriptions of Small Debts Courts), the Agriculture Department (descriptions of disease-free areas and pound districts), the Department of Municipal Affairs (descriptions for the incorporation or amendment of municipal areas), the Forest Service (descriptions of tree-farm licences and working circles), and the Lands Branch (descriptions for gazetted reserves, etc.). This year it has taken 307 man-hours to prepare the descriptions referred to above.

BLUE-PRINT AND PHOTOSTAT SECTION

The Legal Surveys Division, through this 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 200,251, in the preparation of which 111,700 yards, or 63½ miles, of paper and linen were used. The increase in the number of prints made this year as against 1957 was 33,917, which is an increase of approximately 20 per cent. The number of photostats made during 1958 was 44,548.

As an example of the service supplied by this Division, it is interesting to note that of the 200,251 prints made during the year, 92,795 were for the Lands Service, 95,300 for other departments of Government, and 12,156 for the public. Likewise, of the 44,548 photostats made, 17,721 were for the Lands Service, 20,922 for other departments of Government, and 5,905 for the public.

COMPOSITE MAP SECTION

This Section is responsible for the compilation and tracing of composite maps, at a scale of 500 feet to 1 inch, of the more thickly subdivided areas of the Province and especially in unorganized territory. (*See* Index 3.)

Due to the urgency of compiling and retracing the Division's reference maps, it was necessary, two years ago, to suspend the compilation of the composite maps. This crisis has now passed, and it can be reported with much satisfaction that this Section, as from October 1st of this year, is once again working on composite maps, revising at present all completed composite maps by adding thereto the new subdivisions which have occurred during the last three and a half years. The fifteen Davenport maps covering the east coast of Vancouver Island have been revised as of the end of this year. On completion of the revision programmes, a start will be made on the composite mapping project covering the Columbia and Kootenay River valleys between Trail and Nelson.

LAND EXAMINATION PLAN SECTION

This Section is responsible for the preparation of plans for the use of the Land Inspectors in their inspection of applications for Crown lands. These plans are a consolidation of all the information available in this Department and pertinent to the application requiring inspection. This includes field-notes, Land Registry plans, triangulation information, etc. The increase of the work accomplished by this Section since its inception is shown as follows:—

Year	Plans Prepared	Year	Plans Prepared
1953	1,192	1956	2,340
1954	1,552	1957	2,290
1955	2,030	1958	2,192

GENERAL

Again this year this Division has assisted the Victoria Land Registry Office by preparing linen transparencies of certain registered plans which, through the passage of time and continual usage, have become tattered and torn. The number of plans renewed this year was 128. It is regretted that for financial reasons this programme cannot be carried on during the coming year.

The receiving and distribution of survey-posts, which are stored at the warehouse at 859 Devonshire Road, has operated smoothly and efficiently, and the following synopsis shows the quantities of posts shipped during the past year and to whom:—

	Standard Pipe	Standard Rock	B.C.L.S. Bars
Purchased by private surveyors from headquarters	272	273	590
Supplied to Departmental surveyors	892	101	3,235
Shipped to Government Agents for resale	2,310	360	8,692
Totals	3,474	734	12,517

Summary of Office Work for the Years 1957 and 1958, Legal Surveys Division

	1957	1958
Number of field-books received	508	469
,, lots surveyed	660	501
,, lots plotted	656	566
,, lots gazetted	566	454
,, lots cancelled	63	15
,, mineral-claim field-books prepared	194	155
,, reference maps compiled or renewed	11	52
,, applications for purchase cleared	2,473	2,582
,, applications for pre-emption cleared	156	174
,, applications for lease cleared	1,200	1,236
,, coal licences cleared	2	*Nil*
,, water licences cleared	49	59
,, timber sales cleared	6,330	5,450
,, Crown-grant applications cleared	1,258	1,078
,, cancellations made	5,582	5,554
,, inquiries cleared	1,806	2,025
,, placer-mining leases plotted on maps	*Nil*	271
,, letters received and dealt with	5,316	5,477
,, land-examination plans	2,299	2,192
,, Crown-grant and lease tracings made	1,660	2,145
,, miscellaneous tracings made	242	43
,, photostats made	48,290	44,548
,, blue-prints made	166,334	200,251
,, documents consulted and filed in vault	125,607	140,347

FIELD WORK

Sixty field assignments were completed by this Division in 1958. The work entailed in each assignment varied from two or three days to three or four months, and the location of the work was fairly well spread over the whole settled part of the Province.

The main classifications of the work show its varied nature and indicate at whose request the survey was made.

Subdivisions of Crown Land

These surveys, instigated by the Lands Department, naturally account for the greater number of surveys for home-site, agricultural, and commercial purposes. Home-site surveys without water-frontage were performed in Pemberton; Kamloops; Elko; 70 and 93 Mile Houses on the Cariboo Road; Beaver Harbour, V.I.; Clinton; Barriere; Lytton; and Lac la Hache, totalling 219 sites. Lake-front home-site lease surveys were made at Purden Lake, in the vicinity of Prince George; at Salmon Arm of Shuswap Lake and Dominic Lake, in the Kamloops area; at Tie Lake, near Wardner; at Murphy and Green Lakes, in the Cariboo country; and at Babine Lake, on the road in from Smithers, grossing 159 home-sites. Surveys of agricultural land and for commercial purposes occurred at Cherryville, east of Vernon; at Princeton; Invermere; Little Prairie; and Prince George, creating twenty-five parcels.

In the Peace River District nineteen surveys were made under one assignment, in an area from Hudson Hope east to the Beatton River road. These parcels were under application to lease or purchase and totalled 4,170 acres. The work was carried out by a land surveyor in private practice who was engaged for the season.

Public Recreational Reserves and Special Reserves

Areas for reserve under administration of the Lands Department were laid out at Purden Lake; Lakelse Lake; Hornet Lake, which is north of Princeton; Evans Lake, near Squamish; and on the Chilliwack River, the latter reserve being that for the Mount Slesse Memorial, erected by Trans-Canada Air Lines to commemorate the total loss of passengers and aircraft on the recent crash on that mountain.

Parks

Recreational areas controlled by the Parks Branch of the Department of Recreation and Conservation were surveyed in eight locations, made up of three marine park sites at Sandy Beach, V.I.; Thetis and Keats Islands; two lake-front parks at Green Lake and Evans Lake and three Interior parks with river-frontage at Rosebery, on Slocan Lake; at Hosmer, on the Elk River; and in the Crowsnest Pass.

Forest Service Sites

Ranger stations were surveyed at Purden Lake and on the Big Bend Highway, and a foreshore lot was laid out at Lund. A small right-of-way at Pemberton completed surveys for that department.

Highway Surveys

An important part of the work carried out by the staff of this Division are surveys of highways in their final location. Final costs are shared equally with the Department of Highways.

A great deal of the remonumentation of old survey corners that is possible each year is accomplished in conjunction with these surveys. The areas selected this year were in general through more densely subdivided land than has been normally experienced, resulting in slower progress, due to the more numerous ties required. A total of

49.5 miles were completed and an extra 3 miles nearly so. Completed sections were on the Southern Trans-Provincial Highway from Yahk to Kingsgate, 8.2 miles; the Okanagan Highway from West Summerland to Peachland, 9.2 miles; through a Federal Government Indian reserve at Westbank, 1.2 miles; two sections of the Northern Trans-Provincial Highway, 10 miles westerly from Burns Lake and 3 miles westerly from Houston; the Princeton–Merritt Road from Allison Lake northwards for 10 miles; and finally the John Hart Highway from Arras into Dawson Creek. This latest section was over a relocated and newly constructed road and completes the survey of the John Hart Highway.

Research

A comparison of methods of survey was participated in by this Division. Over a 5-mile section of completed highway survey in a fairly rugged and heavily treed part of the country, twenty-six photo points were targeted on previously monumented corners or surveyed reference points. From air pictures of these points, precision photogrammetry will produce a list of co-ordinates of these photo points, which will be compared against those already obtained by ground methods.

Inspection Surveys

Four subdivisions for deposit in Land Registry Offices were inspected at the request of three different Registrars of Title and reports prepared in each case. Locations of these surveys were in the Okanagan, Fraser Valley, Vancouver Island, and the West Kootenay country. One similar survey was inspected in the Esquimalt District, at the request of the Land Surveyors' Board of Examiners, and one survey of Crown land, submitted to this office, was examined at Pemberton.

Reposting

Old surveys, where the bulk of the land is still in the Crown, or where the absence of old survey evidence practically precludes any private surveys being made, are reposted every year on a very limited basis. The block outline of two areas of small town lots—one at Fort Fraser and the other at Extension on Vancouver Island—was completed, together with the remonumentation of eight sections in the vicinity of Cobble Hill, V.I., and seven district lots in the Willow River area, east of Prince George, and one district lot at Buckhorn Lake in the same general area.

In carrying out the various surveys, every opportunity is taken to replace old section and district lot corners with a standard brass-capped monument. All too frequently all that remains at present of some of the old corners is just a point of a post in the ground (even that may be burned); sometimes a fallen bearing-tree or two; sometimes just the stumps remain. Frequently nothing remains, and the point has to be established again by survey. During this year it was possible to remonument 251 such corners.

One particular corner which merited special treatment is situated on the summit of Mount Newton on the Saanich Peninsula. This was the original No. 1 post set on the boundary between North and South Saanich Land Districts and marking the initial ranges east and west, and was set by John Trutch, Colonial Surveyor, in 1858. Part of the original post and two of the original bearing-trees were still in evidence. As this survey point was 100 years old, it was felt that this should be suitably recorded for posterity, and no better year could be found than the 100th anniversary of the setting of the post which, by coincidence, was also British Columbia's Centennial Year. A standard concrete monument surrounded by a small rock cairn replaced the original post, and an imposing bronze tablet was set in the cairn. This was suitably worded to commemorate the transition from the old wood post of 1858 to the bronze monument of 1958—100 years of British Columbia's history.

TOPOGRAPHIC DIVISION

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

During the past year the Topographic Division completed field control for twenty standard National Topographic map-sheets covering approximately 7,600 square miles. In addition, control was established for 1,315 square miles by sixty-one multiplex extensions for 500-feet-to-1-inch mapping with 10-foot contours and forty-eight extensions 1,000 feet to 1 inch with 20-foot contours. Despite this fine showing, which was nearly double the previous year, it still fell far short of our expectations. A bad fire year, resulting in smoke, haze, and forest closures, hampered us considerably in two areas. Three helicopter mishaps within fourteen days stopped one crew during July, and earlier part of their area had to be curtailed because it had proved unsuitable for helicopter transport. Control of thirty map-sheets had been planned, using a system of Tellurometer traverse; however, eight map-sheets were dropped when it was discovered that due to heavy timber in part of the Clinton area it was uneconomical to use the helicopter there. Also dropped were those sheets covering the Homathko snow-field, on the advice of Okanagan Helicopters Limited. High jagged peaks, bad down-draughts, and elevations too high for the Bell Helicopter to operate safely were reasons enough. By use of a Wild A7 autograph, we could, however, complete both of these sections, bridging between existing control without having to revisit the areas.

Mr. A. D. Wight, B.C.L.S., was in charge of the Tellurometer party, transported by helicopter, that commenced operations in the vicinity of Clinton and later moved to Chilco Lake (*see* Fig. 1). He used the Tellurometer for control surveys, replacing the intricate system of triangulation with comparatively simple traverses, which were used to control both areas and proved to be an effective system of control surveying, adaptable to all types of terrain. The instrument measured lines ranging in length from 1 mile to 28 miles and produced distances comparable to Provincial first-order triangulation. A Wild T2 theodolite was used to measure a minimum of three pairs of angles between each traverse station for bearing. Although a second-reading instrument was used, the bearings proved more troublesome than the distances, due to the poor visibility caused by haze and heavy smoke. Nine map-sheets were controlled in the two areas.

Mr. Wight was replaced on this project by Mr. A. M. Barber, B.C.L.S., on August 1st following his selection to do the field work required for an experiment in posting petroleum and natural-gas lease corners in co-operation with the Federal Department of Mines and Technical Surveys. The area selected was approximately 40 miles east of Mile 210, Alaska Highway, in Map-sheet 94-H/13. The objective was to determine the accuracy to which a co-ordinated point could be established on the ground from identification in air survey photographs. A helicopter was used for transportation, and the triangulation towers constructed in 1953 were found to be still standing and in condition to be reoccupied. It is of interest to note that the helicopter landings cut out five years ago had completely overgrown and had to be recleared.

The experiment was carried out with a photogrammetric plot at 1:16,000 scale compiled by multiplex. The sharpness of the 1950 R.C.A.F. photographs used was poor, making detailed identifications difficult. The map compilation had not been undertaken for this particular job but was part of the Federal Government's standard 1:50,000 mapping programme. The lease corner co-ordinates were plotted on the compilation sheets and their relative positions transferred to the air photograph. To assist in the field identification of the corners, three co-ordinated reference points of strong topographic detail in the immediate vicinity of each lease corner had also been plotted and photo-identified. Of the eighteen lease corners with their corresponding reference points, four were finally selected by us for ease of ties to the existing triangulation rather than choosing the corners with the more prominent reference points. While the results were encouraging, it was

obvious that the photogrammetric plot supplied to us was not accurate enough for the purpose intended, so that the experiment had really developed into a map evaluation. To achieve more satisfactory results, a compilation from a first-order plotter using new first-order photography would be required and also, in most areas, some additional ground control. In some circumstances, targets could replace reference points and be co-ordinated from the photogrammetric plot, enabling the corners to be posted from the targeted positions.

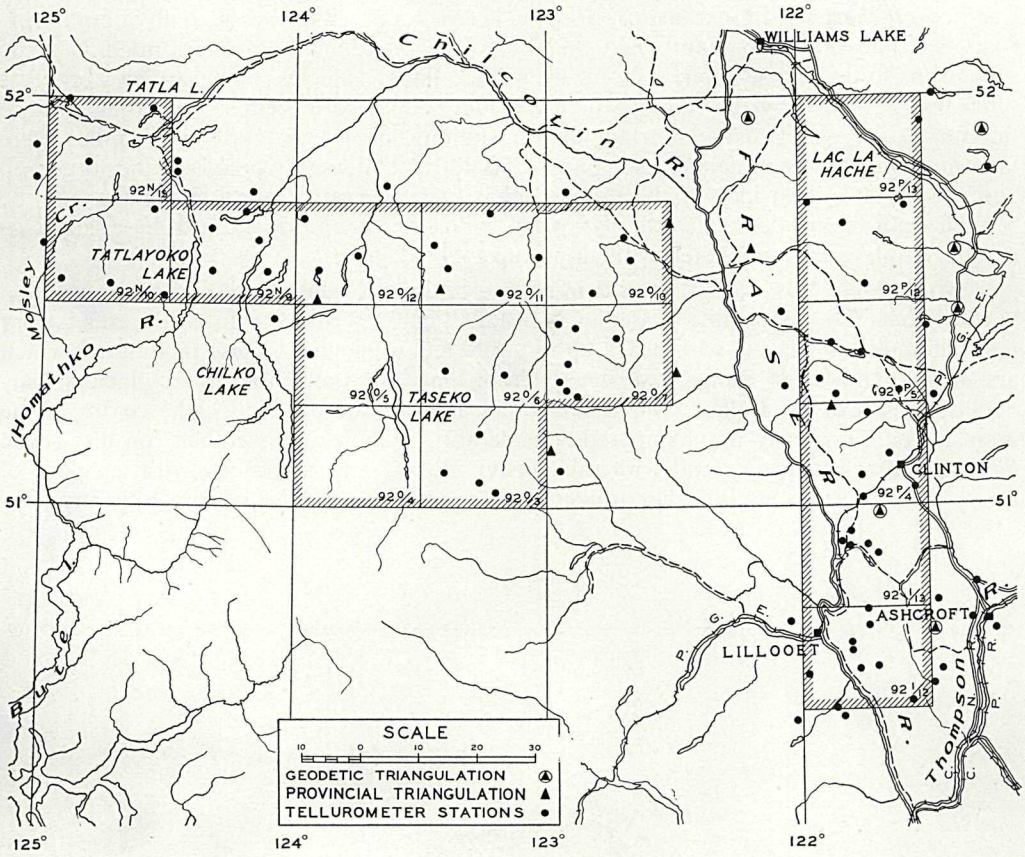


Fig. 1.

Mr. A. M. Barber, in company with Mr. Wight, attended a one-week Tellurometer course at Ottawa during the spring of 1958, organized by the Federal Government's Department of Mines and Technical Surveys. The Tellurometer is a new electronic instrument for measuring distances, and the course was designed for fieldmen in the use of this equipment and to review the experience gained in its use during the previous field season. Thus it was possible to formulate procedures to use in our first full field season based on the longer experience gained by the Federal Government.

Mr. Barber had charge of the Tellurometer crew of three that measured the length and bearing for a traverse of the British Columbia Power Commission transmission-line from the vicinity of Fauquier-Arrow Lake to the Koch Creek valley. This party also made trips to Duncan and Nanaimo to measure distances to assist Mr. F. O. Speed, B.C.L.S., and spent approximately two weeks doing the same for Mr. K. M. Bridge, B.C.L.S., in the Vernon area. From August 1st, Mr. Barber took over and continued Mr. Wight's project and completed it from a camp at Mons Lake, in all a total of eight

map-sheets. Following this he moved with his crew to Prince George and completed field control there of approximately 315 square miles that the Water Rights Branch requires for water-supply studies. This project will be mapped at 1,000 feet to the inch with 20-foot contours.

The transmission-line survey was the most interesting. This line runs south from Fauquier parallel to Arrow Lake for about 5 miles until it crosses Faite Creek. It then turns south-east to cross the mountains and rises 5,000 feet in about 4½ miles. From the summit it drops nearly 4,000 feet in another 6 miles of rugged terrain to Koch Creek. Land rovers were used for transport over the access road, which was actually a bulldozer-road that had not been maintained the previous winter and had deteriorated in some sections as to be almost impassable for even these hardy vehicles. The survey's progress often was governed by the rate at which the route could be travelled. In order to close the survey on two Provincial triangulation stations, distances totalling 63 miles were measured with a lineal closure of 1 part in 50,000. The crew worked on the job seven and a half days. An idea of the progress that such a traverse party can make may be formed from the results of the first day when, with the work fairly close to base, approximately 7 miles were completed with slopes up to 16 degrees.

Mr. George New, B.C.L.S., was in charge of a party which obtained horizontal and vertical control in the vicinity of Bella Coola (*see* Fig. 2). The terrain in this area is very mountainous and rugged, with peaks up to 9,500 feet in height. These mountains, which are in the main Coast Range, rise steeply from the valleys and hold many glaciers, particularly south of the Bella Coola River, which flows westerly through the centre of the map-sheet. This party was hampered considerably by inclement weather; on fifty-seven days the crew had to contend with rain, heavy clouds, and fog, along with ten days of heavy smoke haze. Finally, they fought fires for ten days during the forest closure.

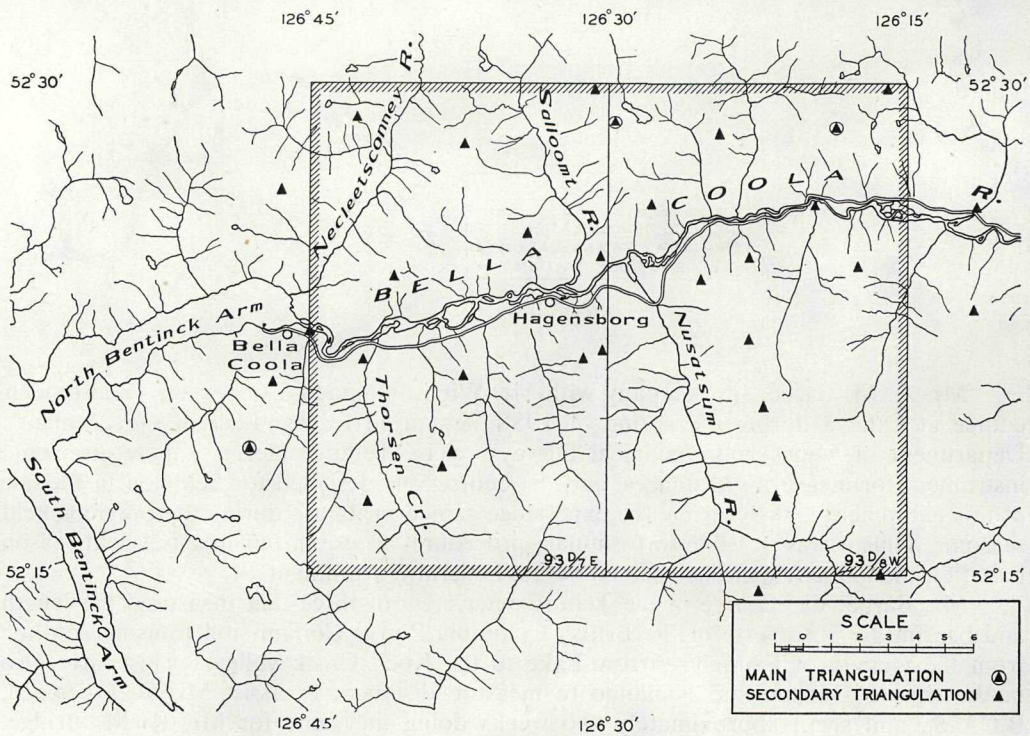


Fig. 2.

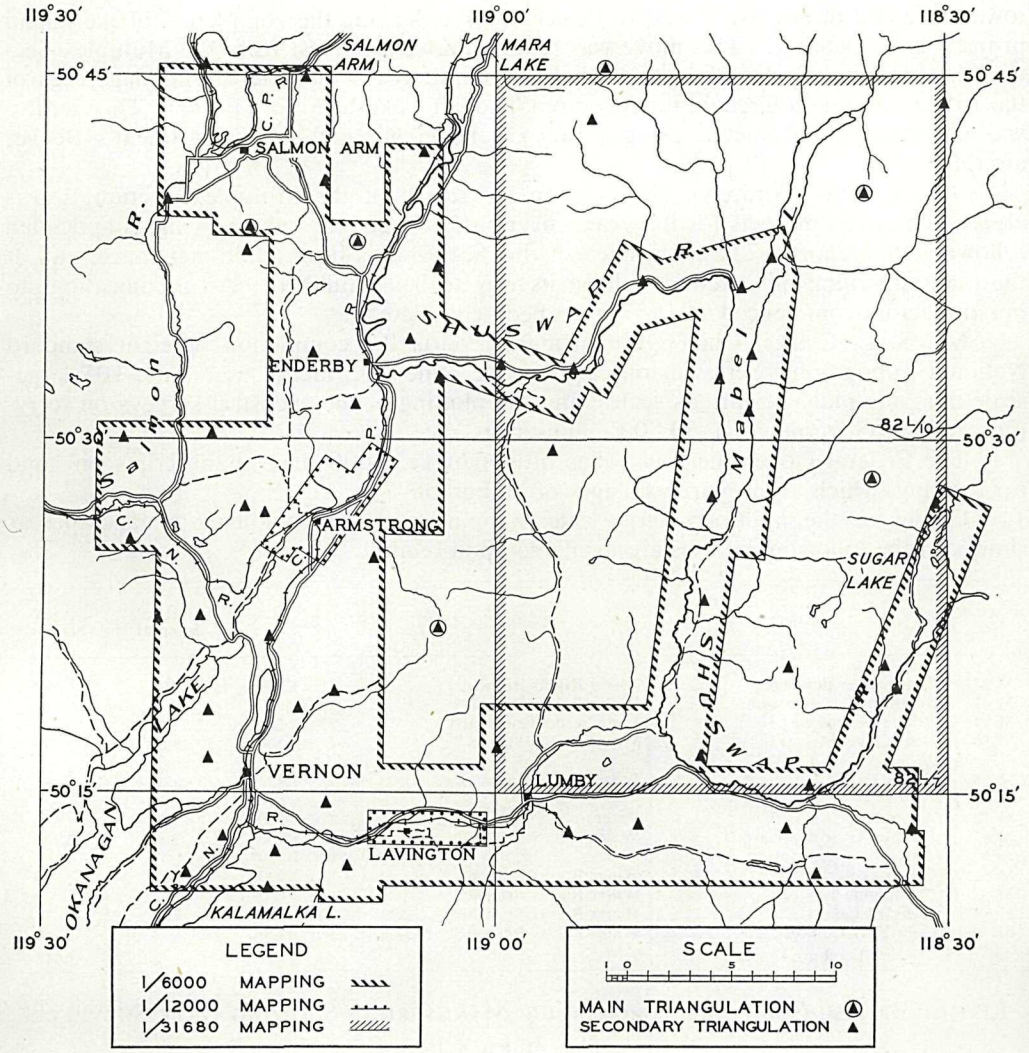


Fig. 3.

Mr. K. M. Bridge was in charge of a party operating in the Vernon district, obtaining control in the watersheds of Sugar and Mabel Lakes and the Shuswap River, up to the 2,000-foot contour (*see* Fig. 3). This request by the Water Rights Branch is to enable it to study the possibility of diverting a percentage of the water from the above areas into the Okanagan District for irrigation purposes. Additional control was obtained to control two standard Topographic map-sheets. Mr. Bridge's main problem was heat and haze, and to overcome this they had to commence work at first light and work through to 1 p.m. Transportation was made easy by the great number of jeep-roads provided by the many small logging operations. They were assisted by a Tellurometer crew under Mr. A. M. Barber, who came into the area when requested. The instrument worked to good advantage in this section and cut down considerably on Mr. Bridge's required field time.

Mr. F. O. Speed was in charge of the control surveys required for multiplex mapping of the areas around the Nanaimo, Cowichan, and Chemainus Rivers, requested by the Water Rights Branch. The RC8 camera was flown for special photographs of each section. Mr. Speed was hampered on several occasions by forest closures, and finally

toward the end of August moved to Prince George, leaving the completion of the Island projects until October. This move was required after a request from the Multiplex Section that additional vertical control would be required to complete the pondage area of the Rocky Mountain Trench, ranging from Tudyah Lake to Finlay Forks. This control was obtained by barometer, using a Bell G2 helicopter and the Department's Beaver aircraft.

Mr. E. S. W. Andrews, B.C.L.S., in his report of the Multiplex Section, shows eleven completed projects for the year, covering 3,042 square miles. A list is appended following this report. The main need of this Section has been additional space, and at the time of writing this need is well on its way to being fulfilled. All modifications to our projectors commenced in 1957 have been completed.

Mr. S. L. Clarke, Chief Draughtsman, reports the completion of eight standard National Topographic Series manuscripts at the scale of 2 inches to 1 mile, 105 large-scale mapping plans at various scales, and the plotting of the cadastral surveys on forty-four Federal Government 1:50,000 manuscripts.

The Federal Government now has fifty-eight 1:50,000 scale manuscripts on hand for printing, which are in various stages of lithography.

Copies of the multiplex large-scale mapping and the completed manuscripts as shown on the following indexes are available upon request.

Project No.	Project	Authority	Scale	Vertical Interval	Area (Sq. Mi.)
M 27	Peace River pondage	Water Rights Branch	1″=1,000′	20′	184
M 41	Summit Lake diversion	Water Rights Branch	1″=1,000′	20′	52
M 44	Prince George east	Land Settlement Board	1″= 200′	5′, 10′	1
M 56	Lac la Hache	Water Rights Branch	1″= 500′	20′ and spot heights	40
M 59	Eaglet Lake	Fraser River Board	1″=1,320′	20′ and spot heights	91
M 62	Alberni	Veterans' Land Act	1″= 500′	10′	12
M 63	Parsnip River pondage	Water Rights Branch	1″=1,000′ and 1″=1,320′	20′	2,189
M 66	Glen Lake	Water Rights Branch	1″= 400′	10′	20
M 67	Chemainus	Water Rights Branch	1″= 400′	10′	9
M 68	Hansard Lake	Water Rights Branch	1″=1,320′	20′	79
M 70	Courtenay-Comox	Water Rights Branch	1″=1,320′	20′	365
	Total area				3,042

List of British Columbia Topographic Manuscripts Showing Date Surveyed

(*See* Index 4.)

Sheet	Date
82 F/3	1951
82 F/4	1944, 1947
82 K/11, W.	1952
82 K/12	1952
82 L/7	1958
82 L/10	1958
92 B/5	1937, 1938, 1955
92 B/6, W.	1955
92 B/11, W.	1955
92 B/12	1938, 1955
92 B/13	1942, 1943, 1951
92 B/14	1951
92 C/8	1937, 1938
92 C/9	1937, 1938
92 C/10	1937, 1938
92 C/11	1938
92 C/13	1938
92 C/14	1938
92 C/15	1937, 1938
92 C/16	1937, 1938, 1942
92 E/1	1942
92 E/7	1946
92 E/8	1943, 1946
92 E/9	1938, 1946, 1947
92 E/10	1947
92 E/14	1948
92 E/16	1947
92 F/1	1942
92 F/2	1938, 1940, 1942
92 F/3	1938, 1940, 1941
92 F/4	1942
92 F/5	1937, 1938, 1943
92 F/6	1937, 1940, 1941, 1943
92 F/7	1942, 1943
92 F/8	1942, 1943, 1950
92 F/9	1950
92 F/10	1950, 1953
92 F/11	1934, 1935
92 F/12	1936, 1937, 1938
92 F/13	1935, 1936
92 F/14	1935
92 F/15, part	1950
92 F/16, part	1950
92 G/4	1942, 1943
92 G/5	1950, 1952
92 G/7, part	1940
92 G/10, part	1940
92 G/11	1952
92 G/12	1950, 1952
92 G/13	1950, 1952

List of British Columbia Topographic Manuscripts Showing Date Surveyed—*Continued*

Sheet	Date
92 G/14	1952
92 H/1	1920, 1923, 1949
92 H/2	1923, 1949
92 H/3	1924, 1931, 1948, 1949
92 H/4	1948, 1956
92 I/12	1958
92 I/13	1958
92 J/15	1948, 1949
92 J/16	1948, 1949
92 K/1, part	1950
92 K/3	1949
92 K/4	1949
92 K/5	1949
92 K/6	1949
92 L/1	1932
92 L/2	1931, 1932
92 L/3	1948
92 L/4	1948
92 L/6	1931, 1934
92 L/7	1931
92 L/8	1932
92 L/10	1931, 1940, 1956
92 L/11	1940
92 L/12	1935, 1936
92 L/13	1936
92 M/3	1957
92 M/4	1957
92 M/5	1957
92 N/9	1958
92 N/10	1958
92 N/15	1958
92 O/1	1950
92 O/2	1947
92 O/3	1958
92 O/4	1958
92 O/5	1958
92 O/6	1958
92 O/7	1950, 1958
92 O/8	1950
92 O/9	1951
92 O/10	1958
92 O/11	1958
92 O/12	1958
92 O/16	1951
92 P/5	1958
92 P/12	1958
92 P/13	1958
93 A/2, part	1936
93 A/5	1935
93 A/6	1935
93 A/7, part	1936
93 A/10, part	1934
93 A/11	1933, 1934
93 A/12	1931, 1933, 1934
93 A/13	1934
93 A/14	1933, 1934
93 A/15, part	1934
93 B/1	1951
93 B/8	1952
93 B/9	1950
93 B/16	1950
93 D/7, E.	1958
93 D/8, W.	1958
93 G/1, part	1933
93 G/2, part	1933
93 G/7, part	1933
93 G/8, part	1933
93 G/14	1948
93 H/3, part	1934
93 I/8	1956
93 I/9	1956
93 I/10	1956
93 I/15	1956
93 I/16	1956
93 J/2	1949
93 J/3	1949
93 K/1	1946
93 K/2	1946
93 L/2	1951
93 L/7	1951
93 L/8	1951
93 L/9	1951
93 L/10	1950, 1951
93 L/11	1950
93 L/14	1950
93 M/5	1949
93 M/14	1949
93 O/1	1957
93 O/6	1957
93 O/8	1957
93 O/11	1957
93 O/12	1957
93 O/13	1957
93 O/14	1957
93 P/1	1956
93 P/2	1956
93 P/3	1957
93 P/4	1957
93 P/5	1957
93 P/6	1957
93 P/7	1956
93 P/8	1956
94 B/4	1939, 1957
94 C, part	1939
94 E, part	1939
94 F, part	1939
94 L, part	1940, 1941
94 M, part	1941
102 I/8	1935, 1937
102 I/9	1935, 1936, 1937
102 I/15	1937
102 I/16	1936, 1937
103 I/2	1949
103 I/7	1948
103 I/10	1947
103 P/9	1949
103 P/10, E.	1950
103 P/14, E.	1950
103 P/15	1950
104 A/2, W.	1950
104 A/3	1950
104 A/5, E.	1950
104 A/6	1950
104 A/11, W.	1951
104 A/12	1951
104 A/13, W.	1951
104 B/16	1951
104 G/1	1951
104 G/8	1951
104 G/9	1951
104 G/14	1951
104 G/15	1951
104 G/16	1951
104 H/12, W.	1951
104 H/13, W.	1951
104 J/2, W.	1952
104 J/3	1952
104 J/4	1952
104 J/5	1952
104 J/12	1952
104 J/13	1952
104 K/16, E.	1952, 1953
104 N/1	1952, 1953
104 N/2	1953
104 N/3, E.	1953
104 N/5	1952
104 N/6	1952, 1953
104 N/7, part	1953
104 N/11, W.	1952
104 N/12	1952
104 N/13	1952
104 P, part	1941
104 P/15	1941
104 P/16, part	1941

List of Large-scale Mapping
(*See* Index 6.)

No.	Name	Scale	Contour Interval	Number of Sheets	Date
X 1	Goldfields	1″= 800′ 1″= 900′ 1″=1,000′ 1″=1,320′	100′	----	-------
S.P. 1	Richmond	1″= 200′ 1″= 600′	Mosaic	----	-------
S.P. 2	Lower Fraser Valley	1″=1,000′	5′–50′ then 50′	18	1957
S.P. 3	Lower Fraser Valley	1″=1,000′	5′–50′ then 50′	20	1958
1	Squamish	1″=20 ch.	20′	(1)	1952
2	Aleza Lake	1″= 550′	20′	----	1951/52
3	Tamihi Creek	1″=10 ch.	100′	----	1950
4	Earle Creek	1″=10 ch.	50′	----	1951/52
5	Lawless Creek	1″=10 ch.	50′	13	1951
6	Kemano	1″=1,300′	50′	----	1952/53
7	Mount Farrow	1″=13 ch.	500″	1	1951
8	Moran Dam-site	1″= 100′	5′	1	1951/52
9	Salmo	1″=1,000′	50′	38	1952
10	Moran Pondage	1″= 500′	20′–40′	8	1952
11	University Lands	1″= 100′	5′	----	1952
13	Trout Lake	1″=1,000′	50′	----	1953
14	Fraser Pondage	1″= 500′	10′–20′	6	1951
15	Fraser Pondage	1″= 500′	20′–40′	13	1953
16	Gulf Islands	1″=1,320′	50′	----	-------
17	Agassiz	1″= 200′	5′	28	1953
18	Delta Municipality	1″= 200′	Spot heights	73	1953/54
19	Doukhobor Lands (two areas)	1″= 400′	5′–10′–20′	----	1953/54
20	Brooks Peninsula	1″=1,320′	100′	----	1953/54
21	Agassiz (Extension)	1″= 400′	20′–100′	(2)	1954
24	Moran Pondage	1″= 500′	20′–40′	11	------
28	Clearwater	1″= 500′	20′–40′	12	-------
M 2	Morice Lake	1″=1,000′	50′	----	1954/55
M 3	Naver Creek	1″=1,320′	50′	----	1955
M 4	Chilcotin River	1″= 500′	20′–40′	6	1955
M 5	Gaspard Creek	1″= 500′	20′–40′	1	1955
M 6	Churn Creek	1″= 500′	20′–40′	1	1955
M 7	Willow River	1″=1,000′	50′	----	1955/56
M 8	Upper McGregor River	1″=1,000′	20′	3	1956
M 9	Sinclair Mills	1″= 500′	20′	39	1956
M 11	Hobson Lake	1″=1,000′	50′	8	1955
M 12	Moran-Lytton	1″= 500′	20′–40′	23	1955
M 13	Penticton-Osoyoos	1″= 500′	10′	11	1954
M 14	Kelowna	1″= 500′	10′	5	1954
M 15	Westbank	1″= 500′	10′	2	1954
M 16	Lower McGregor River	1″=1,000′	20′	7	1956
M 17	Creston	1″= 500′	5′–10′–15′	7	1954
M 21	Clearwater	1″= 500′	20′–40′	20	1955
M 24	San Jose	1″= 500′	10′	8	1956
M 26	Taghum	1″= 300′	5′–10′–20′	----	-------
M 27	Peace River Pondage	1″=1,000′	20′	11	1958
M 28	Stikine River Pondage	----------	----------	----	-------
M 29	Naramata	1″= 400′	10′	2	1956
M 30	Goat River	1″= 200′	Planimetric	4	1956
M 34	Fruitvale	1″= 500′	10′–20′	2	1957
M 36	Moose River	1″=1,000′	20′–40′	4	1957
M 37	Mount Robson	1″=1.000′	20′–40′	5	1956/57
M 38	McLennan River	1″=1,000′	20′–40′	3	1956/57
M 39	Dease River Dam-site	1″= 500′	20′	9	1956/57
M 40	Chilliwack River	1″= 600′	20′	7	1956
M 42	Peace River Dam-site	1″= 600′	20′	10	1957
M 43	Alert Bay	1″=1,320′	50′	----	1956
M 44	Prince George East	1″= 200′	5′	2	1958
M 45	Prince George West	1″= 200′	5′	8	1958
M 52	Ainsworth	1″= 500′	50′	----	-------
M 54	Big Bar	1″=2,640′	100′	1	1957
M 56	Lac la Hache	1″= 500′	20′	10	1958
M 59	Eaglet Lake	1″=1,320′	20′	2	1958
M 62	Alberni	1″= 500′	10′	2	1958
M 63	Parsnip River Pondage	1″=1,320′	20′–2,600′ then 50′	----	1958
M 66	Glen Lake	1″= 400′	10′	10	1958
M 67	Chemainus River	1″= 400′	10′	4	1958
M 68	Hansard Lake	1″=1,320′	20′	3	1958
M 70	Courtenay-Comox	1″=1,320′	25′	10	1958
M 73	Vernon	1″=1,000′	20′	----	-------
M 74	Glinz Lake	1″= 200′	10′	----	-------

[1] One of Map 5E. [2] *See* No. 17.

GEOGRAPHIC DIVISION

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

The publication (in June) of the two-section wall map of British Columbia was the culmination of this Division's efforts to recompile and produce the three base maps of the Province, which had been seriously outdated by the great strides in post-war mapping. This edition, together with smaller-scaled versions—for example, Maps 1J and 1C (published in 1957)—replace editions originally issued in 1933 and 1937 respectively.

Emphasis was again placed on the 1-inch-to-2-miles National Topographic Series maps, with which we are replacing the early-vintage degree series along the more heavily populated belt in the southern section of the Province. This 2-mile series shows land status in that area for the first time and is proving very useful to the Government Agencies concerned, as well as to the public.

A minimum of time was spent on the revision of four Pre-emptor and Land Series maps, again showing land status.

It has been gratifying to note the public and departmental enthusiasm for the new 10-mile series, but the increasing demand required the channelling of funds and labour into reissuing the maps of South-western and South-eastern British Columbia, which went out of print during the year, and, as a result, the publication of the new map of East Central British Columbia has been delayed; however, it is well advanced and will be published as early as possible in 1959.

The demand for maps during the year has been the heaviest yet recorded, and it is noted that an ever-increasing number of maps is being requested by recreational users.

With the slackening of the petroleum and natural-gas activity, the Trigonometric Control Section's efforts during the year returned largely to the calculation of the control initiated by the Branch's scattered and varied field parties.

Further details of the Division's activities follow.

ADMINISTRATION

Five resignations occurred during the year, notably the Division's geographer, who left to join the teaching faculty of the University of British Columbia. His duties were assumed by a research assistant.

Of the senior and two junior draughtsmen who resigned, the former was replaced and one of the latter returned to the Service. A junior replacement was obtained to fill the vacancy caused by the resignation of a member of the Trigonometric Control Section.

Two members of this Division followed with interest the activities of the Government committee investigating electronic data-processing and computing machines, particularly their application to processing our survey control data.

The volume of correspondence in 1958 once again reflects the large increase in the number of maps distributed.

COMPUTATIONS

Standard mapping-control activities by the Topographic Division's field parties accounted for the bulk of the work processed by the Trigonometric Control Section during the year. Adjustments were completed for the Rocky Mountain Trench net and calculations completed on the triangulation control for the topographic mapping of the Peace River pondage area. The extension of the British Columbia-Yukon Boundary control to the Geodetic network at Bennett Lake permitted the adjustment of the main Provincial net from Atlin through Telegraph Creek to the Turnagain River. Petroleum and natural-gas permit activities settled down to supplying control information to the

various oil and survey companies active in this field. Details are carried in the statistical tables following this report.

GEOGRAPHIC RESEARCH

Until his separation from the Service, the geographer continued to serve on a Centennial Year committee charged with the preparation of descriptive texts for historic sites throughout the Province.

The research assistant continued work on the new Land Series bulletins, of which two were published during the year—namely, No. 2 (Okanagan) and No. 6 (Kamloops). In addition, a field study was made in connection with the Kootenay Bulletin Area and the text for Bulletin No. 8 (Prince Rupert-Smithers) was completed by the end of the year. The popularity of the new land bulletins is indicated by the fact that during the year minor revisions were made for the third reprinting of Bulletin No. 7 (Fort Fraser-Fort George).

GEOGRAPHIC NAMING AND MAP-CHECKING

The total number of name-sheets checked for geographical names during the year equalled the number of requests, even with the loss of one of the two-member staff, but only because the number was well below previous years. If requests return to normal in 1959, there will undoubtedly be delays. It is interesting to note that a total of 2,514 new name-cards have been added to the records since the Gazetteer of British Columbia was published in 1953.

In co-operation with mapping agencies in the Departments of National Defence and Mines and Technical Surveys at Ottawa, proofs of fifty-one new maps of parts of British Columbia were checked and revised. In addition, culture revisions were carried out for three Federal map-sheets, and six Topographic Division manuscripts were checked before being shipped to Ottawa for reproduction.

A field culture check in connection with 1-inch-to-2-miles National Topographic Series mapping in the Kamloops-Shuswap area was also carried out, greatly assisted by new air-photo coverage supplied by the Air Division. This will result in new six-colour Provincial editions of Maps 82 L/NW and 92 I/NE. The present Federal editions of these maps, compiled in 1934 and 1928 respectively, are being abandoned in favour of the new 1:50,000 series in hand at Ottawa.

A culture survey for the revision of three Federal 1:50,000 sheets in the Vancouver area was expanded into the Vancouver map area of 92 G/SW, which, when printed, will provide complete coverage of the Lower Fraser Valley at 1-inch-to-2-miles scale in conjunction with existing sheets.

MAP COMPILATION AND REPRODUCTION

The highlight of the year's operations was the production of Map 1A, the new wall map of British Columbia in four colours at 1:1,000,000 scale, approximately 1 inch to 16 miles. This, together with Maps 1J and 1C published last year, was the result of a continuing project lasting from August, 1954, to June, 1958, utilizing information obtained from twelve years of intensive post-war mapping. All three maps will be available as the bases for depicting administrative and resource data for years to come. An orthographic (relief) map, using the 1J base, is already in hand.

The Cartographic Section completed a full year's programme with a total of thirteen maps published while work progressed on fourteen others. During the year the negative engraving method was further adapted to new maps in all series. The system of converting the interim and topographic 40-chain manuscripts into " patch-ups " for the preparation of scribe sheets at printing scale for the production of the 1-inch-to-2-miles series was also adopted for maps of the 1:250,000 scale series. Compilations of the 1-inch-to-

10-miles map of North-eastern British Columbia and the new relief map of the Province were also planned with scribing in mind.

With the time-saving techniques described above, the lack of modern and efficient photographic equipment of a size capable of handling the new compilations locally has been frustrating and time-consuming, to say the least. However, some hope is held that the Photographic Branch of the Government Printing Bureau will be obtaining the larger equipment soon.

Four sheets of the 1-inch-to-2-miles National Topographic Series were published during the year, leaving six sheets in various stages of production. Concentration on this programme necessitated marking time on the 1-inch-to-4-miles (1:250,000) series (which is replacing the Pre-emptor Series); however, work progressed on two of these sheets and we hope to publish them in 1959.

Maintaining present map coverage while converting to the National Topographic system continued to consume time and effort. One Land and two Pre-emptor Series maps were revised and published during the year, and a reprint of the popular Fort George pre-emption sheet was also necessary. In addition, as stated earlier, two of the 10-mile series in their various editions were reprinted, together with two new land bulletin maps.

Thirty-five Provincial topographic manuscripts were printed by the Army Survey Establishment, Ottawa, during the year; of these, fourteen were new publications and twenty-one were 1-inch-to-1-mile maps converted to 1:50,000 scale. We received major stocks of all but one of these in return for our co-operation in preparing manuscripts, also checking the colour proofs of the finished maps.

Additional maps in British Columbia published by Ottawa agencies consisted of four full colour at 1:250,000 scale and nineteen full colour at 1:50,000 scale, of which major stocks were received for seven of the maps dealt with under the co-operative terms mentioned above.

Seventy-four new Provincial topographic manuscripts remain in hand for publication at Ottawa.

The Army Survey Establishment continued to make its manuscript mapping available to the public in " provisional " form and last year produced some four sheets at 1:250,000 scale and forty sheets at 1:50,000 scale.

The Index to Published Maps, contained in a pocket inside the back cover of this Report, includes both Federal and Provincial mapping in the Province during 1958.

Miscellaneous map-draughting and work on the preparation of descriptions for administrative district boundaries for other Government departments amounted to fifty-five projects, consuming 658 man-hours for a work value of $1,447, in addition to assembling, editing, and distributing the Annual Report of the Lands Service.

MAP DISTRIBUTION

A very large increase in the demand for maps was noted with the distribution of 62,544 sheets during the year, the total value being $21,910.75. The pattern remained the same as for the last seven years, requests from the public reaching their peak from May to August, whilst departmental demands were highest in March-April and again in September-October, coinciding with field-work planning and reports on same. The noticeable difference is the increase in public requests, particularly during the summer months, whereas departmental requests have remained fairly constant over the years.

A map's usefulness is generally considered adequate for a five- to ten-year period, depending on industrial development, demand for land, and new survey data in that area. In a popular district, such as that covered by Quesnel Map 3G, records indicate that 5,000 copies of the map printed in 1946 were sufficient for a five-year period, whereas a 10,000 run of the same map a year ago may fall short of a like span if demands continue

to mount; for example, 2,500 copies have been distributed in one year. The total of 117,729 maps received into stock during 1958 reflects these increased runs of individual maps.

Details regarding maps published and in hand are contained in the tables following this report, and indexes to available published maps, together with information regarding prices, scales, dates of publication, etc. (Nos. 8 to 14, inclusive), are contained in a pocket inside the back cover of this Report.

STATISTICAL

COMPUTATIONS

Least-square Triangulation Adjustments Completed

Net	Locality	Type of Bearings	Number of Triangles Involved
Provincial Main	Rocky Mountain Trench (northern portion)	True	33
Provincial Main	Peace, Finlay, and Parsnip Rivers	True	36
Provincial Main	South-west of Peace River Block	True	47
Provincial Main	British Columbia-Yukon Boundary	True	288
Provincial Main	Prince George-British Columbia-Alberta Boundary (revision)	True	24
Provincial Main	Southerly Vancouver Island	True	22
Provincial Main	Telegraph Creek-Turnagain River	True	47
Provincial Main	Telegraph Creek-Atlin Lake	True	49
Provincial Ma'n	Bella Coola Valley	True	16

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

COMPUTATIONS

	1953	1954	1955	1956	1957	1958
Triangles adjusted by least squares	409	28	518	814	567	562
Stations calculated from rectangular co-ordinates	1,300	537	810	536	669	918
Ties to cadastral surveys	189	114	49	32	70	22
Elevations of stations determined	131	143	239	82	325	378
Index cards—						
New	1,561	1,192	1,415	1,093	1,637	1,173
Old (rewritten)	450	830	576	888	613	1,297
Total on file	20,952	22,144	23,559	24,652	26,289	27,462
Requests for control attended to	287	314	378	461	403	397

CANADIAN BOARD ON GEOGRAPHICAL NAMES

Number of map-sheets or charts checked	56	102	83	61	54	49
Number of names checked	7,052	11,683	8,766	6,664	8,884	4,698
Number of new names recorded	351	442	655	247	306	278

MAP STOCK AND DISTRIBUTION

Maps issued to departments and public	40,733	43,741	48,043	59,290	55,167	62,544
Maps received into stock	92,456	97,274	84,573	129,901	181,412	117,729
Total value of maps issued	$14,184	$17,382	$18,995	$20,525	$20,441	$21,911

GEOGRAPHICAL WORK FOR OTHER DEPARTMENTS AND PUBLIC

Total number of items	31	68	60	84	86	55
Total value of work	$4,400	$1,361	$1,990	$2,687	$2,654	$1,447

LETTERS

Letters received and attended to	4,987	7,356	5,783	5,419	5,516	6,545

MAPS PUBLISHED DURING 1958

Maps Reproduced and Printed by the Geographic Division, Victoria

Map No.	Name	Scale	Remarks
1A	British Columbia wall map (2 sheets)	1:1,000,000	New edition.
1E	South-eastern British Columbia, planimetric	1 in. to 10 mi.	Second edition.
1K	South-western British Columbia, planimetric	1 in. to 10 mi.	Reprint, minor revisions.
1KL	South-western British Columbia, landforms	1 in. to 10 mi.	Reprint, no revision.
1KLS	South-western British Columbia, landforms in brown	1 in. to 10 mi.	Reprint, no revision.
2C	Northerly Vancouver Island	1 in. to 4 mi.	New edition.
3A	Fort George	1 in. to 3 mi.	Reprint, no revision.
3F	Chilcotin	1 in. to 3 mi.	Reprint, status revision.
3H	Tête Jaune	1 in. to 3 mi.	New edition.
82 E/NE	Upper Kettle River (first edition)	1 in. to 2 mi.	Six colours, contoured.
92 G/SE	Langley (first edition)	1 in. to 2 mi.	Six colours, contoured.
92 I/NW	Ashcroft (first edition)	1 in. to 2 mi.	Six colours, contoured.
92 I/SW	Lytton (first edition)	1 in. to 2 mi.	Six colours, contoured.

Provincial Government Topographic Manuscripts Reproduced and Printed at 1:50,000 Scale by the Canadian Government, Ottawa

Map No.	Name	Map No.	Name
92 C/9, E. & W.	San Juan (second edition).	92 L/13, E. & W.	Shushartie (second edition).
92 E/14, E. & W.	Port Eliza (second edition).	102 I/8, E.	Cape Parkins (second edition).
92 F/1, E. & W.	Nanaimo Lakes (second edition).	103 I/2, E. & W.	Kitimat (first edition).
92 F/13, E. & W.	Upper Campbell (second edition).	103 I/7, E. & W.	Lakelse (second edition).
92 G/11, E. & W.	Squamish (first edition).	103, I/10, E. & W.	Terrace (second edition).
92 G/13, E. & W.	Jervis Inlet (first edition).	104 G/8, E. & W.	Refuge Lake (first edition).
92 L/1, E. & W.	Schoen Lake (third edition).	104 G/15, E. & W.	Buckley Lake (first edition).
92 L/11, E. & W.	Port McNeill (second edition).	104 J/4, E. & W.	Kennicott Lake (first edition).
92 L/12, E. & W.	Quatsino (second edition).	104 N/5, E. & W.	Teresa Island (first edition).

Maps in Course of Reproduction

Maps Being Reproduced by the Geographic Division, Victoria

Map No.	Name	Scale	Remarks
1JR	British Columbia relief map	1 in. to 30 mi.	In draughting.
1D	North-eastern British Columbia, planimetric	1 in. to 10 mi.	Compilation complete.
1G	East Central British Columbia, planimetric	1 in. to 10 mi.	In draughting.
1GL	East Central British Columbia, landforms	1 in. to 10 mi.	Draughting complete.
1GLS	East Central British Columbia, landforms in brown	1 in. to 10 mi.	Draughting complete.
92K	Bute Inlet (second status edition)	1:250,000	In draughting.
92O	Taseko Lakes (first status edition)	1:250,000	In compilation.
93C	Anahim Lake (first status edition)	1:250,000	In draughting.
82 E/SE	Grand Forks (first status edition)	1 in. to 2 mi.	In draughting.
82 F/SW	Trail (first status edition)	1 in. to 2 mi.	In draughting.
82 L/NW	Shuswap Lake (first status edition)	1 in. to 2 mi.	Compilation complete.
92 B/NW, SW	Victoria (first status edition)	1 in. to 2 mi.	In draughting.
92 G/SW	Vancouver (first status edition)	1 in. to 2 mi.	Compilation complete.
92 I/NE	Kamloops Lake (first status edition)	1 in. to 2 mi.	Compilation complete.

Provincial Government Manuscripts Being Reproduced by the Canadian Government, Ottawa, at 1:50,000 Scale

Map No.	Name	Map No.	Name
82 K/11, W.	Trout Lake (first edition).	93 B/8, E. & W.	Soda Creek (first edition).
82 K/12, E. & W.	Beaton (first edition).	104 A/2, W.	Kwinageese River (first edition).
92 B/5 E. & W.	Sooke (second edition).	104 A/5, E.	Bowser Lake (first edition).
92 B/6, W.	Victoria (second edition).	104 A/6, E. & W.	Bell-Irving River (first edition).
92 B/11, W.	Sidney (second edition).	104 A/11, W.	Taft Creek (first edition).
92 B/12, E. & W.	Shawnigan (second edition).	104 A/12, E. & W.	Delta Peak (first edition).
92 G/7, E. & W.	Coquitlam (second edition).	104 A/13, W.	Mount Alger (first edition).
92 G/12, E. & W.	Sechelt Inlet (first edition).	104 B/16, E. & W.	Bob Quinn Lake (first edition).
92 G/14, E. & W.	Cheakamus River (first edition).	104 G/14, E. & W.	Telegraph Creek (first edition).
92 H/1, E. & W.	Ashnola (first edition).	104 G/16, E. & W.	Klastline River (first edition).
92 H/2, E. & W.	Manning Park (first edition).	104 H/12, W.	Kluea River (first edition).
92 J/15, E. & W.	Bralorne (first edition).	104 H/13, W.	Ealue Lake (first edition).
92 J/16, E. & W.	Bridge River (first edition).	104 J/2, W.	Classy Creek (first edition).
92 L/2, E. & W.	Woss Lake (second edition).	104 J/3, E. & W.	Tahltan River (first edition).
92 L/3, E. & W.	Kyuquot (first edition).	104 J/5, E. & W.	Ketchum Lake (first edition).
92 L/4, E. & W.	Brooks Peninsula (first edition).	104 J/12, E. & W.	Dudidontu River (first edition).
92 L/10, E. & W.	Alert Bay (first edition).	104 J/13, E. & W.	Prairie Lake (first edition).
92 O/1, E. & W.	Yalakom River (first edition).	104 K/16, E.	Nahlin River (first edition).
92 O/8, E. & W.	Empire Valley (first edition).	104 N/1, E. & W.	Nakina Lake (first edition).
92 O/9, E. & W.	Dog Creek (first edition).	104 N/2, E. & W.	Nakina (first edition).
92 O/16, E. & W.	Springhouse (first edition).	104 N/3, E.	Sloko River (first edition).
93 B/1, E. & W.	Williams Lake (first edition).		

AIR DIVISION

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

AIR OPERATIONS

The weather during the 1958 photo season proved to be the most favourable that has been experienced since the Air Division began functioning in 1946.

A total of 612 flying-hours were logged by the two Anson V aircraft, well above the previous record total of 509 hours accomplished in 1955.

Because of the small area covered for the Forest Surveys Division during 1957, a direct result of the exceptionally poor photographic weather, the major effort of both our aircraft was given to the forest inventory programme during the 1958 season.

As a result, close to 20,000 square miles were covered by narrow-angle 20-chains-to-1-inch scale vertical photography for the Forest Surveys Division. A further 2,500 lineal miles of various types of photography were obtained for other branches of the Government. (*See* Indexes 15 to 18, contained in pocket inside back cover of this Report.)

A total of 26,000 photos were taken.

A new Wild RC 8 camera, equipped with the 6-inch focal-length wide-angle Aviogon lens, was acquired early in the year. This camera, which embodies the latest developments in air-camera optics and mechanisms, was used to photograph areas where detailed topographic mapping was required for engineering studies, primarily by the Water Rights Branch. The camera proved to be most satisfactory in all respects and the quality of the photographs obtained was excellent.

Special projects completed during the season covered many varied requirements. On March 24th tricamera photo cover was obtained of the Bear River Glacier area north of Stewart. These were taken for the Department of Mines and were used to assess snow conditions along the rout of the proposed Stewart–Dease Lake Highway to analyse probable slide conditions. Narrow-angle cover was obtained for twenty-eight separate forest areas damaged by fire during the year. These photos were used by the Forest Service to assess the extent of the damage and to study possible salvage operations for the fire-killed timber. An experimental strip of twelve photos was flown along the highway north of Princeton to be used for testing the accuracy of bridging with precision instruments in connection with cadastral survey.

PROCESSING LABORATORY

The excellent photographic weather during the year resulted in a total of 263 full and part rolls of air film and 183 rolls of topographic film to be processed. This was a heavy load on our facilities, and the staff was under heavy pressure throughout the season. The ventilation system of the laboratory proved to be quite inadequate to permit sustained effort by the personnel and was completely revamped during November and December, necessitating a three-week shut-down of the entire laboratory. At the time of writing, production has started again, and preliminary tests indicate the new system is completely satisfactory. A total of 139,700 prints of all types were produced despite unfavourable conditions.

There is still a very large backlog of reprints required for the district offices, and while there was a slackening of requests for loans and reprints through the Air Photo Library, the Processing Laboratory is still being worked to capacity.

COMPILATION AND MAPPING

During the year some 30,000 square miles of 40-chains-to-1-inch scale interim maps were completed, bringing the total area of the Province covered by this series to 224,000 square miles (*see* Index 5, inside back cover of this Report).

This completes the present requirements for this particular series of maps for the Forest Surveys Division, inasmuch as there is now complete coverage of all the economically important forest areas in the Province north to the 57th parallel of latitude.

The general usefulness of these maps is indicated by the fact that 15,000 ozalid prints were supplied for general use during the year.

Compilation of the 20-chains-to-1-inch scale photos obtained during the year was limited to preparing principal-point lay-downs. This work is well in hand, and with the completion of the 40-chain series it is anticipated that detailed 20-chains-to-1-inch scale mapping can be started early in 1959.

INSTRUMENT-SHOP

The Instrument-shop was busy throughout the year on routine maintenance and repair of cameras and general equipment. Most field instruments had been brought to a very good state of repair and little further work was required on them.

A prototype of the new fixed-focus enlarger, incorporating the LogEtron automatic dodger, was completed at the end of the year and initial tests have been very encouraging. It is expected to place this equipment in production early next year.

For details of the various operations, reference should be made to the accompanying appendices.

PRODUCTION RECORD, 1958, AIR PHOTO PROCESSING LABORATORY

	1946–55	1956	1957	1958	Grand Total
Processing completed—					
Air films (averaging 117 exposures)	1,855	111	148	238	2,352
Air films (averaging 220 exposures)	----------	----------	----------	5	5
Air films (obliques averaging 40 exposures)	33	10	6	11	60
Air films (test rolls)	----------	----------	----------	9	9
Mountain station films (6 exposures each)	2,510	387	278	183	3,358
Printing completed—					
Standard prints (5 by 5 inches enlarged to 9 by 9 inches)	942,098	137,190	152,556	135,326	1,367,170
Contact prints (5 by 5 inches)	42,829	731	1,172	423	45,155
Contact prints (9½ by 9½ inches)	----------	----------	----------	823	823
Contact prints (large to 20 by 24 inches)	1,271	384	463	453	2,571
Enlargements (various sizes to 30 by 30 inches)	11,107	1,524	2,018	1,190	15,839
Mountain station enlargements (11 by 14 inches)	13,627	2,926	1,561	908	19,025
Lantern-slides (2 by 2 inches)	346	*Nil*	22	4	372
Autopositive films (various sizes to 30 by 40 inches)	4,123	980	593	340	6,036
Miscellaneous photographs, copies, and Kelsh plates	1,102	538	338	248	2,226
Requisitions completed	11,914	2,526	2,270	1,934	18,644

ORDERS FOR STANDARD PRINTS (9 BY 9 INCHES) FROM BRITISH COLUMBIA NEGATIVES, 1958

	Reprints		Loans	
	Requisitions	Number	Requisitions	Number
Private—				
Individuals	476	3,435	324	3,278
Companies and organizations	125	1,862	68	1,201
Mining	86	5,614	23	506
Oil and natural gas	29	13,915	1	59
Schools and universities	29	835	15	356
Towns and cities	8	246	------	------
Commercial air survey	50	1,141	40	771
Forest industries	168	4,862	98	2,436
Real estate	13	203	13	39
Totals	984	32,131	582	8,646
Federal Government agencies—				
Department of Mines and Technical Surveys	15	1,426	3	44
Department of National Defence	6	750	5	55
Department of Agriculture	4	90	3	28
Department of Fisheries	16	717	4	99
Miscellaneous	8	557	4	31
Totals	49	3,540	19	257
Provincial Government—				
Surveys and Mapping Branch	153	9,345	457	42,435
Land Inspectors	40	4,674	12	103
Water Rights Branch	46	2,026	144	2,156
Lands Branch (miscellaneous)	2	4	8	32
Department of Public Works	6	65	9	65
Department of Highways	31	1,174	103	1,341
Forest Surveys	62	65,191	389	2,645
Forest districts	77	20,162	17	223
Forest Engineering	48	2,639	85	1,508
Forest Service (miscellaneous)	29	892	78	1,269
Department of Finance	30	1,138	30	297
Department of Agriculture	3	8	1	9
Department of Mines	18	1,014	39	1,247
British Columbia Power Commission	21	276	76	1,612
Regional Planning	3	8	33	224
Parks and Recreation	10	107	167	1,248
Pacific Great Eastern Railway	4	63	------	------
Totals	583	108,786	1,648	56,414
Grand totals	1,616	144,457	2,249	65,317

1958 Air Operations Cost Summary by Projects

	Aircraft-hours		Number of Photographs	Accomplishment: Square Miles	Accomplishment: Lineal Miles	Accomplishment: Stations	Flying Costs	Photographic Costs	Total Costs
A. Basic vertical cover—	Hr.	Min.							
1. New cover	---	---	---	---	---	---	---	---	---
2. Improvement flying, E. & N. Land Grant	1	15	5	---	10	---	$113.74	$8.35	$122.09
Average costs	---	---	$24.42	---	$12.21	---	---	---	---
B. Basic tricamera cover	---	---	---	---	---	---	---	---	---
C. Triangulation control identification	---	---	---	---	---	---	---	---	---
D. Forest inventory cover (approximately 20 chains to the inch)—									
1. New cover—									
Vancouver District, Sub-zone 910	17	50	770	850	---	---	$1,826.53	$1,452.22	$3,278.75
Vancouver District, Sub-zone 911	21	35	1,215	1,245	---	---	2,210.62	2,291.49	4,502.11
Vancouver District, Sub-zone 916	18	10	837	1,140	---	---	1,860.74	1,578.58	3,439.32
Vancouver District, Sub-zone 918	8	05	80	160	---	---	827.90	150.88	978.78
Prince George District, Sub-zone 934	24	20	1,990	1,580	---	---	2,492.28	3,753.14	6,245.42
Prince George District, Sub-zone 935	9	10	596	545	---	---	928.92	1,124.06	2,052.98
Prince George District, Sub-zone 940	28	00	1,571	1,645	---	---	2,867.87	2,962.91	5,830.78
Prince George District, Sub-zone 941	13	15	538	560	---	---	1,357.12	1,014.67	2,371.79
Prince Rupert District, Sub-zone 949	14	10	401	405	---	---	1,451.04	756.29	2,207.33
Prince Rupert District, Sub-zone 950	13	40	1,233	1,275	---	---	1,399.83	2,325.44	3,725.27
Kamloops District, Sub-zone 932	17	40	1,140	1,180	---	---	1,809.53	2,150.04	3,959.57
Kamloops District, Sub-zone 964	22	20	1,162	1,185	---	---	2,287.44	2,191.53	4,478.97
Kamloops District, Sub-zone 965	45	50	2,660	2,795	---	---	4,627.99	5,016.76	9,644.75
Kamloops District, Sub-zone 977	23	30	1,073	855	---	---	2,406.96	2,023.68	4,430.64
Nelson District, Sub-zone 971	31	50	2,109	1,800	---	---	3,260.46	3,977.57	7,238.03
Nelson District, Sub-zone 973	43	05	2,875	2,415	---	---	4,489.55	5,418.71	9,908.26
Sub-totals	352	30	20,250	19,635	---	---	$36,104.78	$38,187.97	$74,292.75
2. Improvement flying, all districts, 1958	44	15	2,623	---	---	---	[1]*4,026.30*	[1]*4,380.41*	---
Totals	396	45	22,873	19,635	---	---	$36,104.78	$38,187.97	$74,292.75
Average costs	---	---	$3.67	$3.78	---	---	---	---	---
E. Forest engineering projects—									
Horsethief Creek Road reconnaissance	1	50	71	---	50	---	$166.78	$118.57	$285.35
McGillivary Lake Road reconnaissance	2	00	10	---	8	---	181.98	16.70	198.68
Flyhills Road reconnaissance	2	00	8	---	5	---	181.98	13.36	195.34
Ahbau–Willow Road and Bridge reconnaissance	6	50	138	---	76	---	621.73	230.46	852.19
White River Road and Bridge reconnaissance	1	50	56	---	24	---	166.78	93.52	260.30
Canim Lake Access Road	7	40	305	---	202	---	697.62	509.35	1,206.97
Forest Service Marine Station, Vancouver	---	45	7	---	2	---	68.24	11.69	79.93
Nursery farm, Campbell River	1	15	19	---	16	---	113.74	31.73	145.47
Totals	24	10	614	---	383	---	$2,198.85	$1,025.38	$3,224.23
Average costs	---	---	$5.25	---	$8.42	---	---	---	---
F. Forest protection—									
Prince George District burns (6 areas)	3	55	120	86	---	---	$356.40	$200.40	$556.80
Nelson District burns (4 areas)	8	30	31	---	20	---	773.42	51.77	825.19
Vancouver District burns (18 areas)	8	05	202	---	130	---	735.47	337.34	1,072.81
Kamloops District reconnaissance	3	05	---	---	---	---	280.52	---	280.52
Totals	23	35	353	86	150	---	$2,145.81	$589.51	$2,735.32
Average costs	---	---	$6.95	$6.47	$12.65	---	---	---	---
G. Multiplex mapping projects—									
Cowichan River (RC8)	4	35	319	---	300	---	$417.01	$532.73	$949.74
Nanaimo Lakes (RC8)	3	35	217	---	210	---	326.02	362.39	688.41
North Okanagan (RC8)	10	50	270	---	355	---	985.70	450.90	1,436.60
Prince George (RC8)	9	55	103	---	130	---	902.35	172.01	1,074.36
Totals	28	55	909	---	995	---	$2,631.08	$1,518.03	$4,149.11
Average costs	---	---	$4.56	---	$4.17	---	---	---	---

[1] Charged to all districts.

1958 Air Operations Cost Summary by Projects—*Continued*

	Aircraft-hours		Number of Photographs	Accomplishment: Square Miles	Accomplishment: Lineal Miles	Accomplishment: Stations	Flying Costs	Photographic Costs	Total Costs
H. Special projects—	Hr.	Min.							
1. Vertical cover—									
Legal Surveys Division—									
Kelowna–Penticton Highway	1	00	72		40		$90.99	$120.24	$211.23
Cranbrook–Kingsgate Highway	2	55	149		60		265.42	248.83	514.25
Castlegar–Christina Lake Highway	1	45	110		48		159.23	183.70	342.93
Glinz Lake		35	4		1		53.05	6.68	59.73
St. Mary Lake		30	3	2			45.50	5.01	50.51
North shore, Saanich Peninsula		35	3	1			53.05	5.01	58.06
Geographic Division—									
Kamloops, map revision	12	15	312		495		1,114.63	521.04	1,635.67
Arrow Lakes, map revision	1	15	19		30		113.74	31.73	145.47
Richmond, map revision	1	45	47		80		159.23	78.49	237.72
Cascade–U.S. Border, map revision	1	25	14		2		128.93	23.38	152.31
Water Rights Branch—									
Keremeos–U.S. Border, erosion	2	25	30		34		219.92	50.10	270.02
Vedder River, erosion (RC8)	1	00	49		13		90.99	81.83	172.82
Squamish River, erosion (RC8)	1	00	30		16		90.99	50.10	141.09
Langford, map revision (RC8)		55	41		22		83.44	68.47	151.91
Regional Planning Board—									
Campbell River–Duncan Bay	1	15	23	11			113.74	38.41	152.15
University of British Columbia—									
Oyster River farms	1	15	20	7			113.74	33.40	147.14
Centennial Committee—									
Gorge Park		50	5	1			75.79	8.35	84.14
Totals	32	40	931	22	841		$2,972.38	$1,554.77	$4,527.15
Average costs			$4.86	$22.36	$4.80				
2. Tricamera cover—									
Department of Mines—									
Bear River and Kitsault Lake	26	40	210		60		$2,426.43	$350.70	$2,777.13
Average costs			$13.22		$46.28				
I. Miscellaneous flying projects—									
R.C.M.P.—									
Air search and investigation	1	40					$140.01		$140.01
Travel Bureau—									
Deas Island Tunnel	1	10					106.19		106.19
Vancouver and Lower Fraser Valley	3	00					272.97		272.97
Health Department—									
Clover Point sewage-disposal	1	55	6		1		174.43	$10.02	184.45
Fisheries Research Board—									
Herring spawn record (exp.)	1	20	84	4			121.29	140.28	261.57
Internal—									
Administrative flights	17	55					1,630.18		1,630.18
Comparison test (RC8/F24)	2	05	20				189.53	33.40	222.93
Incidental obliques	1	40	22				151.59	36.74	188.33
Aircraft maintenance	33	45					[2]*2,835.34*		
Camera maintenance	1	30					[2]*126.02*		
Base-line investigation test	2	35	59		36		[2]*217.02*	[2]*97.94*	
Camera test (RC8)	2	00	82				[2]*175.02*	[2]*33.20*	
Training aircrew	7	15					[2]*609.07*		
Totals	77	50	273	4	37		$2,786.19	$220.44	$3,006.63
Grand totals	611	50	26,168	19,747	2,476		$51,379.26	$43,455.15	[3]$94,834.41

[2] Charged to all other projects.

[3] Includes $1,200.76 charged to Department of Mines, $127.22 paid by Forest Protection Division, and $2,199.19 paid by Forest Surveys Division. Does not include purchase of RC8 camera.

WATER RIGHTS BRANCH

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. The common-law principle of riparian water right has been abolished.

(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 second dominant function of the Water Rights Branch is to supervise and assist the administration of the improvement districts which have been incorporated under the " Water Act " for irrigation, waterworks, drainage, street-lighting, providing financial aid to hospitals, and several other purposes. An improvement district is a self-governing public corporate body administered by elected trustees. The undertakings of the improvement districts can be financed by Provincially guaranteed debenture issues.

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

There is much correspondence, field investigation, and record-keeping of an exacting nature associated with this administration. The filing and recording of all the mass of data associated with the use of British Columbia water and the improvement districts 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. A large number of settlements have been incorporated into improvement districts to operate community projects and provide essential amenities. 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 and varied investigations and studies. The members of the Branch take an active part on a number of important committees and boards dealing with the disposition of the Province's water resources.

WATER RIGHTS BRANCH

A. F. PAGET, P.ENG., COMPTROLLER

The general period of recession that has beset so much of this Province's productivity has seemed to have had a reverse effect upon the activities of this Branch. By any yardstick that can be employed, an increased activity is demonstrated. As examples, the gross revenue increased 11½ per cent to another new high of $1,273,599.58, and the number of statutory procedures under the " Water Act " increased by about 10 per cent to a total of 4,057. This last matter has become of great significance as the magnitude of the present work is slowly passing the ability of the general office to deal promptly and efficiently with each item as it comes to hand.

As has been noted in the past, much work has been necessary in dealing with the improvement districts constituted under the " Water Act." The routine matters of administration of the district remain under the direction of Mr. A. K. Sutherland, solicitor, with an engineering section, headed by Mr. A. S. Goodyear, Senior Hydraulic Engineer, inquiring into matters of a technical nature and reporting on feasibility of projects and adequateness of planning.

Very satisfactory results were obtained once again from the snow-survey programme under the direction of Mr. H. I. Hunter, meteorologist, and some modest expansions were undertaken in line with the growing need within the Province for basic information of this nature.

A total of twenty-four reports were prepared within the several engineering sections, and work was continued on several large projects, such as the North Okanagan water-supply, the Greater Prince George water-supply, flooding on the Cowichan and Vedder Rivers, and power investigations, such as the assessment of the power potential of the Stikine River.

A major report upon which much Branch engineering has been done was the recently completed " Preliminary Report of the Fraser River Board on Flood Control and Hydroelectric Power in the Fraser River Basin." Another group of Branch engineers has been actively engaged on Columbia River development studies in order to keep the senior Departmental officials advised on these matters and to assist in the preparation of the consulting engineer's report This report is rapidly being completed.

The Comptroller served on several boards and committees of both formal and informal nature. Two of the more important groups were the Fraser River Board and the Pollution-control Board. During the month of February the Comptroller was loaned to the Government of the Yukon to report upon a flooding problem in the town of Mayo.

Reorganization of the Branch along lines of responsibility through sections and divisions has been substantially completed with the addition of an audit accountant who is specifically dealing with the financial affairs of the improvement districts, especially those matters in which Government guarantees have been granted relative to debenture issues. The effects of these steps has been to significantly improve the working arrangements within the Branch and to train a cadre of personnel in the experience of administration.

Excellent co-operation has been extended by the several branches and departments of the Provincial Government to the efforts of this organization, and especially the assistance of the geologists of the Department of Mines must be acknowledged.

IMPROVEMENT DISTRICTS

There are 235 improvement districts under the supervision of the Water Rights Branch. These districts are incorporated for various purposes, among which are: To extend financial aid to hospitals; irrigation; waterworks; fire protection; street-lighting; sewage-disposal; garbage collection and disposal; land protection; dyking; drainage;

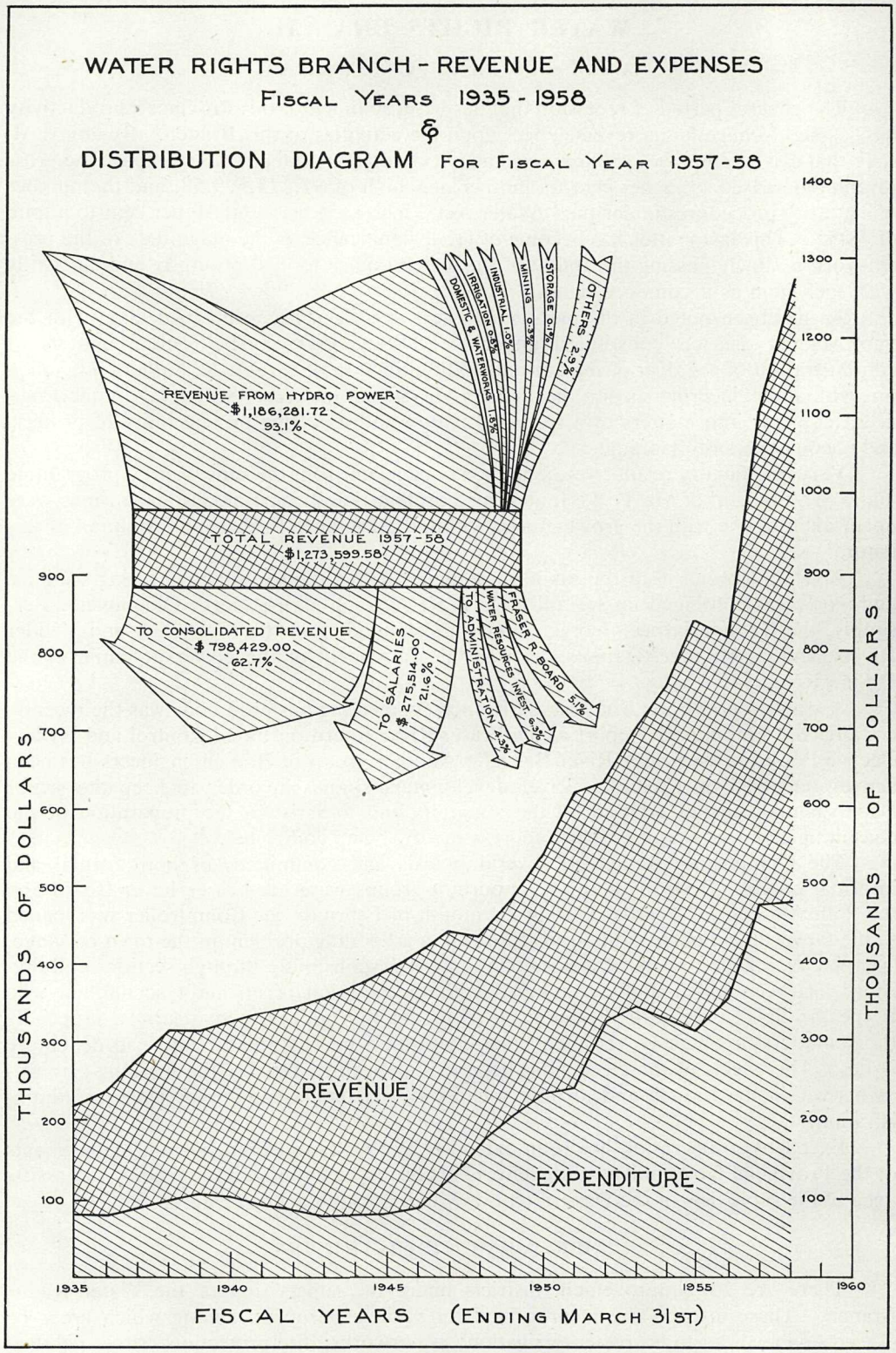

WATER RIGHTS BRANCH - REVENUE AND EXPENSES
FISCAL YEARS 1935 - 1958
&
DISTRIBUTION DIAGRAM FOR FISCAL YEAR 1957-58
REVENUE FROM HYDRO POWER
$1,186,281.72
93.1%
DOMESTIC & WATERWORKS 1.8%
IRRIGATION 0.3%
INDUSTRIAL 1.0%
MINING 0.3%
STORAGE 0.1%
OTHERS 2.9%
TOTAL REVENUE 1957-58
$1,273,599.58
TO CONSOLIDATED REVENUE
$ 798,429.00
62.7%
TO SALARIES
$ 275,514.00
21.6%
TO ADMINISTRATION 4.3%
WATER RESOURCES INVEST. 6.3%
FRASER R. BOARD 5.1%
THOUSANDS OF DOLLARS
REVENUE
EXPENDITURE
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
1935
1940
1945
1950
1955
1960
FISCAL YEARS (ENDING MARCH 31ST)

Plate 1.

the operation and maintenance of cemeteries; the provision and maintenance of parks and playgrounds; and the operation and maintenance of airports. Seventeen improvement districts were incorporated this year, as follows: Pine Tree Place Improvement District, Similkameen Improvement District, Koksilah Valley Hospital Improvement District No. 19, South Hazelton Waterworks District, North Wellington Waterworks District, Eagle Cliff (Bowen Island) Improvement District, South Central Vancouver Island Hospital Improvement District No. 20, Fort Nelson Hospital Improvement District No. 21, Savona Waterworks District, Highland Waterworks District, 100 Mile House Sewage District, North Canyon Improvement District, Waby Lake Drainage District, Hillcrest Waterworks District, Rutland Fire Protection District, Central Cariboo Hospital Improvement District No. 22, and Cumberland Street Lighting District.

Pursuant to section 58 of the " Water Act," $181,636.95 was advanced to improvement districts by the Province of British Columbia in 1958 to provide fire protection, financial aid to hospitals, and street-lighting, and will be collected by the Province by way of taxes over a period of time from one to twenty years, depending on the capability of the area to repay. The tax levy for 1958 to take care of previous advances and the aforementioned advances was $492,020.40.

Pursuant to the " Improvement Districts Assistance Loan Act," chapter 38 of the Statutes of British Columbia, 1945, and amendments thereto, the Province of British Columbia guaranteed debentures and temporary borrowings with respect to both principal and interest in the amount of $2,939,000 after this Branch recommended the feasibility of the projects and, further, that the areas could liquidate the debentures as they become due. Of this amount, $804,000 was used for the purpose of installing waterworks systems in certain improvement districts within the Province, and the balance of $2,135,000 was used for hospital purposes.

WATER-USERS' COMMUNITIES

There are fifty-one water-users' communities in the Province at the present time. They are incorporated by certificate of incorporation issued by the Comptroller of Water Rights and 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 the administration is carried out by a manager under the supervision of the Comptroller of Water Rights. Four water-users' communities were dissolved this year.

INTERNATIONAL WATERS

For background information and descriptions concerning rivers in British Columbia falling within the category of international streams, the reader is referred to the previous issues of the Lands Service Annual Report.

GENERAL

Early in 1957, as a result of agreement between the Governments of Canada and the United States, a move was made toward discussion at the diplomatic level of the problems associated with international rivers. Preliminary exploratory talks between the representatives of the two countries were actually carried out but were discontinued during 1958, awaiting the completion of various engineering and economic studies which were being effected by agencies in both countries.

The Province continues to strive to maintain a close contact with officials of the Canadian Government on these matters to provide every possible assistance and to ensure that the Provincial view-point receives adequate consideration.

PLANNING ACTIVITIES, COLUMBIA RIVER BASIN

There are many agencies and organizations involved in the planning activities associated with the potential development of the Columbia River. Individual organizations

are carrying out studies and preparing reports. Engineering committees and study groups, some of which are international, have been formed to investigate various aspects. The progress during the year of those of particular significance are summarized briefly in the following paragraphs.

Provincial Government Studies

During the past two years an engineering and economic review of the hydro-electric power potential of the Columbia River in Canada was carried out mainly through the services of a firm of consulting engineers under the direction of the Comptroller of Water Rights. These studies were completed during 1958 and the report submitted to the Provincial Government.

The report covers the potentialities of the various methods of developing the Columbia River in Canada, taking Provincial power requirements into consideration and the integration of Columbia projects with existing power systems and other resources within the Province. Important aspects were studied, such as stages of development, transmission requirements, load forecasts, operation, and the economics of individual projects as they fit into the over-all development schemes.

Preliminary designs and cost estimates were worked out for all sites, together with power studies, to allow comparisons between the various alternative methods of development.

The considerable assistance from other departments of the Provincial Government in carrying out certain phases of these studies is gratefully acknowledged. The Mineralogical Branch of the Department of Mines has carried out studies and provided advice on geological aspects, and the Bureau of Economics and Statistics has obtained data and assisted in the load forecast and power-market studies.

International Columbia River Engineering Committee

Under the joint reference of 1944 from the Governments of Canada and the United States, the International Joint Commission was directed to conduct studies and investigations to determine from an international point of view what might be ultimate plans of development of the water resources of the Columbia River. The International Columbia River Engineering Board, composed of senior officials from the Federal Government departments of both countries, was formed to co-ordinate these studies. A committee was then formed to carry out the necessary studies and investigations and prepare reports for submission to the International Joint Commission. The committee is composed of field representatives from the Federal Government departments of both countries together with the Deputy Minister of Lands representing the Province of British Columbia.

Until two years ago the efforts of the committee were directed primarily toward collecting the necessary basic data required for planning purposes. Since that time the committee has been carrying out engineering and economic studies and preparing a comprehensive report covering the water resources of the Columbia Basin. The comprehensive report will set forth alternative ultimate plans of development based on the assumption that all elements of each plan will be part of an international system with fully integrated operation. Preliminary designs and costing of each project, together with detailed system power studies, have been carried out. Power and flood-control benefits have been determined on a system basis. The report was mainly completed during 1958 and will be presented to the International Joint Commission early in 1959.

During the summer of 1958 the members of the International Joint Commission, accompanied by advisers and some members of the Board and committee, made an inspection tour of the Columbia Basin for purposes of familiarizing themselves with the physical features of the basin in preparation for receiving the comprehensive report.

The Pacific Northwest Governors Power Policy Committee

This group was formed in 1954 to study the problems associated with the development of adequate amounts of power to meet the estimated future loads of the Pacific Northwest region, and to recommend procedures and methods to expedite such development. The Minister of Lands and Forests for British Columbia sat with the Governors of the several north-western States at the policy level. The principal United States agencies concerned and public- and investor-owned utilities both in the north-west States and British Columbia were represented. An engineering committee and technical-staff nucleus was established.

Although the committee carried out useful studies, during the past few years it became evident that it duplicated, to some extent, the work of other organizations. This, together with differences in opinion at the policy level in the United States on subjects to be studied, resulted in the disbanding of the organization during 1958.

SKAGIT RIVER

At the October, 1958, meeting of the International Joint Commission, the City of Seattle submitted an application to the Commission for an order to supplement the order of the Commission dated January, 1942, covering flooding across the International Boundary as a result of development on the Skagit River in the United States. British Columbia was represented at the hearing by the Attorney-General and Deputy Attorney-General, with the Comptroller of Water Rights as technical adviser. Further action on this matter awaits additional written presentation on the subject by the principals involved.

FRASER RIVER BASIN

In October of this year the Fraser River Board presented to the Governments of Canada and British Columbia its preliminary report on "Flood Control and Hydro-electric Power in the Fraser River Basin." The report was compiled on direction from the two Governments and was the second and last of two completed by the Board under the same reference. The earlier report, submitted in 1956, made reference only to the aspects of flood-control, whereas this report, as suggested by the title, dealt with the control of flooding and the hydro-electric potential of the Fraser River system.

This work represents the culmination of investigations and studies made over a ten-year period by the Fraser River Board, and its predecessor, the Dominion-Provincial Board, Fraser River Basin. During that period the Comptroller of Water Rights was a continuing member of the Boards, and the Water Rights Branch, being one of the agencies concerned, was actively engaged in many of the investigations, both field and office. Latterly it was also in part responsible for a staff which completed preliminary plans for over forty storage and hydro-electric power projects.

The studies upon which the report was compiled covered the hydro-electric resource development of the basin under several alternatives. For those studies in which the whole basin was under consideration for power development it was found that the capacity of the necessary power reservoirs, if manipulated for spring freshet regulation, would be capable of providing flood-control without losing their ability to meet a firm demand for power. However, such development, particularly in respect to dams on the main stem, would conflict with the salmon runs of the Fraser River system. Lacking a solution to this problem, a partial development of the basin was studied whereby dams and control-works would operate on the more remote streams where fish runs were negligible or where adequate facilities for the passage of fish could probably be provided. The partial regulation or control of the river under this method, couplied with an adequate dyking system, particularly in the Lower Fraser Valley, would provide the necessary flood-control, and at the same time could be self-supporting by virtue of the power marketed from the hydro-electric plants.

OPERATIONS DIVISION

M. L. ZIRUL, P.ENG., CHIEF, OPERATIONS DIVISION

The Operations Division performs the administrative duties arising from the "Water Act" and the regulations issued under that Act. This Division also provides limited engineering assistance and accounting assistance and control to the improvement districts, water-users' communities, and individual water licensees. The organization of the Operations Division is as follows:—

(1) General office, supervised by Chief Clerk.
(2) Administrative draughting office, under supervision of Chief Draughtsman.
(3) Five district offices, each under supervision of a District Engineer, located at Nelson, Kelowna, Kamloops, Victoria, and Prince George. The latter commenced operation in June, 1958.
(4) Improvement Districts Engineering Section, under a Senior Hydraulic Engineer.
(5) An audit accountant, which position was added to the establishment in June, 1958.

The volume of work required to be handled by the Operations Division has continued to increase. The 977 applications for water licences received in 1958 is the highest number received in any single year since the formation of the Water Rights Branch and represents an increase of 42 per cent over the average of the preceding five years. This increase has resulted in a considerable backlog of work accumulating in some sections, especially in the district offices, where almost all applications must be investigated individually. There are now 15,762 active water licences on our records.

The Improvement Districts Engineering Section has continued its work of investigating new water-supply projects and has also given considerable engineering advice or assistance to older districts where the replacement of works has become an urgent matter.

To cope with the expanding interest in water occurring in the northerly part of the Province, a new district office was opened this year at Prince George. We have also added to the staff an Audit Accountant, whose chief function is to assist and supervise the improvement districts and water-users' communities in their accounting.

The following tables and reports outline the volume and types of work handled by the Operations Division.

GENERAL OFFICE

	1954	1955	1956	1957	1958
Applications for licences	584	635	747	687	977
Applications for apportionments	17	48	25	32	16
Applications for change of appurtenancy	16	30	11	16	25
Applications for change of works	33	27	17	45	54
Applications for extension of time	490	544	632	590	298
Change of ownership, address, etc.	965	618	794	1,902	2,299
Cancellations and abandonments	327	205	111	211	257
Right-of-way over Crown lands	137	108	93	125	131
Totals	2,569	2,215	2,430	3,608	4,057
Conditional licences issued	556	528	508	570	562
Final licences issued	485	347	324	364	275
Total licences issued	1,041	875	832	934	837

DRAUGHTING OFFICE

Water applications cleared and plotted on maps	977
Conditional-licence plats compiled and traced	562
Final-licence plats compiled and traced	275
New water-rights maps compiled and traced	29

DRAUGHTING OFFICE—*Continued*

Water-rights maps revised	30
Reference maps renewed	23
Water clearances (cancellations, change of ownership, etc.)	2,556
Land clearances (purchases, Crown grants, leases, timber sales, etc.)	4,759
New improvement district plans compiled and traced	15
Improvement districts (amended)	17
Land cancellations	2,450

During the year many inquiries by the public and other departments were taken care of. The usual requests for maps and other information by our District Engineers were also attended to.

Considerable time was spent during the year checking petitions and drawing up legal descriptions for improvement districts.

IMPROVEMENT DISTRICTS AUDIT ACCOUNTANT

To assist in the work concerned with the supervision of the administration of improvement districts, an audit accountant was added to the staff of the Water Rights Branch this year.

A complete review of all financial returns rendered by improvement districts was made, and action was taken to obtain the financial statements of prior years required to bring all files up to date. Many small districts, whose annual financial returns were not adequate to disclose a true financial position, were contacted and advice given to assist in the preparation of standard returns. To this end and to help the small districts in maintaining adequate records, a pamphlet was prepared and distributed to the secretaries of many small districts.

A system of notification of principal repayments and interest payments becoming due from districts under obligation to the Province of British Columbia through loans made or debenture issues guaranteed under the "Improvement Districts Assistance Loan Act" was instituted.

A number of districts were visited during the period, and assistance given in financial and administrative matters after investigation had been made into their current position.

IMPROVEMENT DISTRICTS ENGINEERING SECTION

During 1958 the Section carried out a number of investigations on water-supply and irrigation problems connected with the existing and proposed improvement districts. In some cases this involved the preparation of reports containing preliminary designs and cost estimates to determine the economic feasibility of the projects. Some of these investigations are described below.

Another important phase of the work has been the checking of the plans and specifications submitted by districts desiring Government guarantee of their debenture issues to finance their projects. The plans are normally prepared by consulting engineers engaged by the districts. In many instances these projects had been the subject of feasibility reports prepared by this Section.

Early in the year a considerable amount of information was compiled for submission to the Royal Commission appointed to study the tree-fruits industry. The findings of the Commission have not yet been released.

Major reports prepared during the year follow.

ARDEN IMPROVEMENT DISTRICT

An investigation was made and a report completed on a water-supply for Arden Improvement District, near Courtenay. The scheme was found not economically feasible

for the forty-three potential consumers then available. Since the report was written, the number of consumers has increased to fifty-six, making it possible for the district to proceed with construction. Picket Spring is the source of supply.

North Pemberton Water-supply

A field investigation was made and a report prepared for a community water-supply for an area immediately north of the Village of Pemberton in the Lillooet River valley. There are about fifteen homes and a four-room school in the vicinity. At present water is obtained from wells, but it is of very poor quality.

Our report indicates that it would be feasible to have a community water-supply if all the residents participated. The proposed source of supply is a small creek at the side of the valley about a mile from the settled area. The report has been delivered to the community, but it is not yet known if the project will proceed.

East Osoyoos Irrigation District

In late August the pumping main of East Osoyoos Irrigation District failed. The district was faced with the alternatives of repair or complete rehabilitation of its system. A report was prepared in which the cost of complete rehabilitation was estimated to cost $29,000. Financing complete rehabilitation would require the irrigation charges to be increased from $25 to $32 per acre.

The Trustees have decided to replace only the damaged portion of the system. The remainder of the system is in poor condition, and its eventual replacement must be faced.

Ellison Irrigation District

The Ellison Irrigation District requested the assistance of the Branch in planning the replacement of the system serving the 270 acres of orchard land at the south end of the district. The system was originally designed for furrow irrigation and is in poor condition. A field investigation was made, and a preliminary design for a proposed pressure system has been completed.

Tofino Water-supply

The water-supply for the Village of Tofino from a small creek failed due to an extended drought this summer. The village anticipated that it would be necessary to convey water from other more distant streams. It was found that the existing system could be improved.

Hagensborg Water-supply

A request was received for assistance in planning a community water-supply for the Hagensborg area of the Bella Coola Valley. An office study was made and a report prepared. About seventy homes would be served by a distribution system, with the intake being located on Snootshlee Creek. It is not yet known if the scheme will proceed.

Naramata Irrigation District Rehabilitation

The system rehabilitation scheme for the Naramata Irrigation District, which was the subject of a preliminary report in 1957, has now been completed. The installation closely followed the design proposed by the Water Rights Branch.

A screening and settling unit, designed for the district by this Section, was installed at the south intake. Its successful performance during this irrigation season has decided the growers to construct a similar installation at the north intake.

Fairview Heights Irrigation District

A report covering the operation and administration of the Fairview Heights Irrigation District was prepared at the request of the Trustees.

The district, located 4 miles from Keremeos, was formed in 1951 under the auspices of the V.L.A. and P.F.R.A. Operational problems had led to some dissatisfaction among the growers. The Water Rights Branch report investigated the complaints and suggested remedial measures to be taken.

B.C. Fruitlands Irrigation District

The plans and specifications, prepared by the P.F.R.A. and covering the complete rehabilitation of the system serving the B.C. Fruitlands Irrigation District, were studied.

This scheme has been the subject of several reports by Federal and Provincial agencies, and its implementation was finally made possible by grants from Federal and Provincial Governments. The works are presently under construction and are scheduled for completion before the beginning of the 1959 irrigation season.

Fulford Harbour Waterworks District

A report covering the feasibility of rehabilitating the domestic water-supply system serving the Fulford Harbour Waterworks District, Saltspring Island, was submitted to the Trustees.

The existing system, installed in 1946, is not winterized, and the water-supply is frequently interrupted by frozen pipe-lines.

The district's Trustees have accepted the recommendation contained in the Water Rights report and are proceeding with plans for system replacement.

VICTORIA DISTRICT OFFICE

C. Errington, P.Eng., District Engineer

The Victoria district office administers the "Water Act" in an area of approximately 50,000 square miles, which includes the relatively thickly populated and rapidly developing Lower Fraser Valley, the Sechelt Peninsula, Vancouver Island, and all the Gulf Islands, and extends from Vancouver up the coast for some 350 miles.

In 1958 an extremely dry season was experienced, so that minimum flows have occurred in most of the streams in the area. Many small streams have become fully recorded, and applications for irrigation-water from these have had to be declined. Some irrigation licences have been issued on a restricted basis—that is, April 1st to June 30th, when there is sufficient water available that can be of limited use for some types of agriculture.

Work Carried Out during the Year

During the period from November 1st, 1957, to October 31st, 1958, some thirty-six special studies, investigations, and reports were made—many of a controversial nature. Most of these were amicably settled.

There were 384 water-licence applications received, of which 274 were reported on, fifteen applications being recommended to be refused. The office is now entering the winter season with a greater backlog of unfinished work than ever before. Seventy-six final-licence surveys and reports were completed, and many more await plotting. One hundred and fifty-six extensions of time for completion of works were recommended, and 102 abandonments and cancellations of water licences were received. There are now 4,421 water licences in existence in the Victoria District. During the period of review, 239 conditional and ninety-seven final water licences were added to our register.

KELOWNA DISTRICT OFFICE

R. G. Harris, P.Eng., District Engineer

The Kelowna District office, administering an area of approximately 15,000 square miles, comprises the Kettle, Similkameen, and Okanagan drainage-basins, 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.

General

Above normal temperatures and below normal rainfall during the latter part of the season resulted in general water shortage throughout the area, several irrigation districts having insufficient water-supply. At least two districts are now proposing to increase their storage facilities. Numerous complaints caused by water shortage were received. Heavy irrigation in some areas resulted in several seepage problems.

Routine administrative work was curtailed to some extent by staff changes. Water-supply of many of the streams is now becoming limited, and new water applications on such sources require considerable time before recommendations are made. Demand for the services provided to the public is increasing.

Summary of Year's Routine Work

The following is a summary of routine work carried out by the Kelowna District office for the period November 1st, 1957, to October 31st, 1958:—

Applications received	131
Applications investigated	116
Final water-licence reports	40
Amendments to water licences	65
Dam inspections	50
Proposed dam-sites inspected	8
Miscellaneous investigations and surveys, water-supply, erosion, dams, etc.	62
Meetings with improvement districts and others	70

Major Engineering Investigations

Proposed East Princeton Waterworks District

In response to a request of the residents at a meeting in April, 1958, a preliminary survey and report was made on a waterworks system using water from Allison Creek. Later the community decided to drill a well. The project appears to be feasible and formation of a waterworks district is anticipated.

Albert Canyon Water-supply

Investigation of water-supply and the possibility of forming an improvement district was carried out. The completion of the Trans-Canada Highway is expected to increase the importance of a community water-supply scheme in this area, near Revelstoke.

Christina Waterworks District

This district, about 15 miles east of Grand Forks, is rehabilitating its existing system and preparing to serve additional areas, based on designs prepared by Kelowna District office.

Smithson-Alphonse Dam on Mission Creek

This dam diverts water into a ditch which serves four water-users' communities near Kelowna. The dam was originally constructed by the Provincial Government in connection with Mission Creek flood-control project. Because of heavy sediment movement, the dam had seriously deteriorated. Plans for a new structure were prepared by Kelowna District office and the dam was replaced in August, 1958. The Provincial Government contributed 50 per cent of the cost of repairs.

Illecillewaet River Erosion

During the freshet of 1958 an investigation was made of stream-bank erosion on the river at East Revelstoke. The erosion has been progressing over several years, and at present is confined to unimproved land.

KAMLOOPS DISTRICT OFFICE

H. D. DeBeck, P.Eng., District Engineer

The Kamloops District office covers the middle section of the Fraser River drainage-basin from Spuzzum to a point 20 miles north of Quesnel.

The past summer has been the hottest and driest for many years, and this resulted in a severe water shortage in the small streams used for irrigation, especially in the Dry Belt area south and west of Kamloops. This condition produced many conflicts among water-users who had not experienced such conditions before and did not know what their rights entitled them to. A great deal of staff time during the irrigation season was spent in resolving such conflicts.

The water shortage during the past summer resulted in an increased interest in the construction of storage dams. Four new dams were built and five were reconstructed or received major repairs. Plans for these dams were approved and inspections were made during construction to ensure that safe practices were followed in their construction.

The year's most important dam-construction project involved improvements to the Badger Lake system of the Vinsulla Irrigation District by the raising of the Badger Lake dams and the construction of a new earth dam and a concrete control dam. The new works triple the storage capacity available to the district and increase the safety factor on the system, which had been causing concern.

Summary of Year's Work

The following is a summary of work carried out by the staff of the Kamloops office for the period from November 1st, 1957, to October 31st, 1958:—

New applications investigated and reported on	135
Conditional licences inspected	112
Final-licence surveys made	55
Dam inspections	82
Proposed dam-sites inspected	9
Miscellaneous investigations and surveys	88
Well logs collected	17
Meetings attended	15

NELSON DISTRICT OFFICE

J. P. Riley, P.Eng., District Engineer

The Nelson District office administers Water Rights Branch matters over some 25,000 square miles in the south-eastern part of British Columbia, comprising all of the Kootenay Land District, excepting the Revelstoke area.

The below normal precipitation during the past summer and the subsequent low stream-flows resulted in a considerable increase in the number of applications received by this office. This condition also caused an upsurge in the number of other problems that required investigation and settlement by this office.

Summary of Year's Work

New applications received	206
New applications investigated and reported	71
Final-licence survey reports	60
Investigations, flooding, pollution	25
Meetings with improvement districts and water-users' communities	19
Miscellaneous meetings and investigations	54
Routine calls and problems	913

PRINCE GEORGE DISTRICT OFFICE

E. G. Harrison, P.Eng., District Engineer

The increasing demands for water use in North Central British Columbia necessitated the opening of the Prince George District office in 1958. This office administers the "Water Act" in five water districts—namely, the Prince George Water District, which was previously under the Kamloops District office, and the Peace River, Fort Fraser, Hazelton, and Prince Rupert Water Districts, which were formerly administered by the Victoria office.

The principal industries using water are mining and logging. Regarding agriculture, which is of major importance in the Peace River area, there is little irrigation practised thus far. It is estimated that only 3 per cent of the cultivated area of approximately 300,000 acres is presently under irrigation.

Besides organizing and preparing the office for its future role in the Water Rights Branch affairs, several community water-supply projects were investigated, existing hydraulic structures inspected, and land-drainage problems examined. Twelve water-licence applications have been inspected.

HYDRAULIC INVESTIGATION DIVISION

T. A. J. LEACH, P.ENG., CHIEF, HYDRAULIC INVESTIGATION DIVISION

A sound water-resource programme requires that an adequate inventory of existing and possible future water use in British Columbia be continuously maintained.

The Hydraulic Investigation Division of the Water Rights Branch has, through the years, carried out such a programme. In the more settled areas of the Province the problems under study have been those connected with the beneficial use of water or the protection of built-up areas from the ravages of flooding and erosion.

Thus during the past year the availability of water for domestic purposes has been reported upon for the Courtenay-Comox region of Vancouver Island, the Greater Prince George area, and the Lower Fraser Valley.

The destructive force of flood-waters becomes increasingly apparent as population centres invade the lower valley areas formerly considered as flood-plains for the rivers. In this field hydraulic engineers of the Branch have investigated flooding and erosion in such widely scattered areas as Chemainus River and Bilston Creek on Vancouver Island, the Vedder and Squamish Rivers on the Lower Mainland, and the Similkameen River within the Okanagan watershed.

An example of a completed multiple water-use project in British Columbia is the Okanagan flood-control works, a joint undertaking of the Federal and Provincial Governments. It was through the co-operation of these two agencies that the works were tested last spring prior to the 1958 freshet.

Irrigation has always played a prominent roll in the development of the Province, and to-day Water Rights engineers have under way an investigation of the North Okanagan. This will include both irrigation and domestic water for many thousands of acres. Closely related to this work has been a general study and survey of inflow to the Okanagan watershed.

Through some twenty-three years of study and experience the Snow Hydrology Section of the Division has built up a series of snow courses throughout the Province. These are sampled during the winter months, and the results are analysed in the snow-survey bulletins, which are supplied to the public on request. It is from these measurements that the total run-off to be expected during the period of April to July or April to August, inclusive, for the various watersheds are made.

While the foregoing has dealt with existing water uses, the undeveloped regions of the Province have, since early days, received careful attention, particularly with respect to hydro-electric power potential. Mention can be made of such developments as Campbell River, reported upon by Water Rights Branch engineers some thirty years ago, the Alcan project, investigated originally in the early thirties, and also the Whatshan power diversion.

In the last year, survey parties have been engaged on hydro-power investigations on the Dease-Stikine watersheds and also the Fraser. The early evaluation of the potential of major power-sites is basic to sound water administration. The resulting reports, available at a nominal assembly cost, are of value not only to the administrator, but also to industry seeking large blocks of hydro-electric power in particular areas.

WATER-RESOURCES COMPILATION

Composed of hydraulic engineers, technicians, and draughtsmen, the Hydraulic Surveys and Mapping Branch is charged with carrying out field investigations and preparing reports on hydro-power, irrigation, domestic water-supply, flooding, drainage, and allied subjects. In the Water Rights Branch library, there is now a total of 725 engineering reports. Further engineering advice, other than in report form, was given to

the public and other Government departments on many questions of a hydrologic or hydraulic nature.

This year fifty new reports were prepared and sent to interested parties. In addition to new reports, 225 reprints of older reports were assembled and distributed, also ninety-five requests for copies of "Water Powers of British Columbia" were answered.

The smoke pall that hung over the Province this past summer interfered with several of the survey projects and prevented completion of the Dease-Stikine dam-site mapping. One section of this survey party had to make an emergency exodus around one end of a mountain range when their normal route became cut off by a large forest fire. However, the survey equipment and all supplies were salvaged.

The investigations carried out under the direction of this section in 1958 are briefly described in the following pages.

Reconnaissance of Skeena River Hydro-power

In the light of more recent data it was felt that the potential hydro-power as envisaged twenty-five years ago justified further investigations on the Skeena River. Accordingly, an air-photo study followed by a field inspection trip was made.

Indications are that a further field study and survey is justified, since over 1,500,000 horse-power of potential hydro-power seem possible.

A report was written on the findings of the reconnaissance and filed in the library.

Reconnaissance of Erosion along Similkameen River

Following a request for information, an inspection trip was made to the Cawston–U.S. Border region of the Similkameen River. This trip, together with meetings with interested parties, produced suggestions on controlling the erosion as well as a rough estimate of costs.

A report was written and sent to the interested groups as well as being filed in the Water Rights Branch library.

Comox Valley Water-supply

Field work and the ground control for planimetric mapping of the Comox Valley was carried out in the summer of 1957, and, subsequent to the completion of the maps, an office study was instituted and a report on the feasibility of forming a greater water board for the valley was completed. Results of the study showed that adequate water is available to supply a greater water district within the valley encompassing the City of Courtenay, the Villages of Cumberland and Comox, and the Improvement Districts of Royston and Arden from either the Browns River or a combination of the Puntledge River and Allen Lake supplies, the latter being the more economical source.

Flooding in the Westholme Area

A report dealing with the flooding of low-lying areas in the vicinity of Westholme from flood-waters of the Chemainus River was completed, using information obtained from the surveys and field work carried out during the previous summer.

The cost of a dyking and drainage scheme to protect the area from flooding was found to be high, and it would not appear economically feasible to construct the works at the present time.

Greater Prince George Area Water-supply

Augmentation to the existing waterworks for the City of Prince George will shortly be necessary, and in order to determine the most suitable source for an additional supply, and in particular examine the feasibility of supplying water to the city by gravity flow,

field investigations were carried out in June, and a report subsequently compiled in the office.

The Willow River proved to be the only suitable source for a gravity supply in the area, but the cost of water from this source would prove excessively high, and it was recommended that either the existing pumping scheme on the Nechako River be expanded or that water be pumped from shallow wells in the gravel flats on the banks of the Nechako River a short distance up-stream of the present intake.

Flooding in the Squamish River Valley

A preliminary appraisal of the flooding and erosion problem in the Squamish Valley was made in the late fall of this year, and the relevant hydrographical and other data are now being collected and studied.

Okanagan Reservoir Investigation

The 1958 field season was spent investigating reservoirs located on tributary streams in the Okanagan watershed.

Twenty-six major sites were visited, these being located east and west of Okanagan Lake and range from Vernon in the north to Penticton in the south.

The primary purpose of the programme was to assist in a study of run-off conditions in the valley, and sites were selected to give representative study of the entire watershed area.

Run-off information reported from the sites could not be utilized until reservoir contour plans were made, gauges were installed, and spillway and outlet elevations were known.

Field work consisted of securing this information and making the necessary installations.

Visits to the sites presented an opportunity of obtaining complete measurements of in situ structures for comparison with existing plans, some of which have been almost entirely superseded by subsequent modification or reconstruction.

Two monuments, to serve as horizontal and vertical reference marks, were set at each of the dams, to be used as a base for measurement of future alterations.

In summation, the programme of field work should serve the following purposes:—

(1) Be the basis of a study of run-off conditions in the Okanagan watershed.
(2) Simplify and modernize existing reservoir plans.
(3) Establish permanent reference marks for future dam inspections.

Erosion by Kicking Horse River

On the north bank of the Kicking Horse River between its confluence with the Columbia River and the town of Golden, erosion has been occurring for the last forty years.

Limited efforts have been made in the past to prevent this erosion from becoming more widespread. These efforts have not been completely successful.

In October an engineer visited the site, and an office investigation is in progress using the information obtained, air photographs, and maps of the area dating back to 1920. From this investigation it is hoped a preventive plan may be formulated.

Investigation of North Okanagan Water Requirements

Early in 1957 representatives from the Municipalities of Vernon, Armstrong, Enderby, Lumby, Spallumcheen, and Coldstream petitioned the Provincial Government, through the Water Rights Branch, to ascertain the feasibility of the formation of a metropolitan water district that would ensure the future supply of domestic and irrigation water to the area.

At present, water-supply is generally from local sources, supplied to a population of 17,000 by municipalities, irrigation districts, waterworks districts, and water-users' communities. In addition, many individuals use water from adjacent streams or wells. The annual rainfall in the settled areas varies from 11 to 20 inches, and during a dry year many creeks and wells dry up completely. Agricultural development has been limited by this low precipitation to precarious dry farming, except in the areas which have assured irrigation supply, or which are adjacent to a river and thus enjoy a high water-table. It is estimated that the irrigated and marginal lands comprise 25 per cent of the possible 140,000 acres of arable soils in the area. Municipal services have been subject to frequent restrictions, and one city has been unable to guarantee water-supplies to potential users. These facts have engendered the belief among the petitioners that the future development of the area depends on an assured water-supply additional to that presently available.

The investigation commenced by the request to the Surveys and Mapping Branch to have the area photographed and supply topographic sheets at 1,000 feet to 1 inch. This work is well in hand and expected to be completed by next August.

Preliminary engineering investigations were started in the fall to assess the present state of the water-supplies and to study possible sources for future supplies. Inspections were made of reservoirs, canals, distribution systems, and possible dam-sites for storage and diversion. Existing irrigation methods were also studied.

Office studies have commenced on the hydrology, precipitation, and population of the area.

In 1959 it is hoped to make detailed surveys and studies of reservoirs and dam-sites, conduit location, ground-water potential, and to relate the agricultural and industrial economic possibilities of the area with the economics of proposed schemes.

Bilston Creek Flooding

Flooding within the Bilston Creek-Langford area on Southern Vancouver Island has been a perennial problem. In an effort to solve this, an improvement district has been formed within the watershed, and in turn an engineering report of the drainage-works required is under preparation by the Water Rights Branch.

Mapping of the area, of 400 feet to 1 inch, which shows 10-foot contour lines, was completed during the summer, and in the meantime hydrometric studies were started.

At the same time two internal drainage problems within the improvement district were given immediate attention so that the Department of Highways could carry out certain ditching.

The first project had to do with the drainage of the Hoffman and Atkins Road areas, which are poorly drained at present, due primarily to undersized pipe and poor maintenance, while the second project included the reconstruction of the lower reaches of the Centennial Park ditch.

Chilliwack-Vedder River and Vedder Canal Erosion

The Chilliwack River, which becomes the Vedder in its lower reaches and eventually the Vedder Canal, is typical of the Lower Fraser Valley tributaries. Such streams experience two peak floods throughout the year—one primarily due to heavy rainfalls which occur in the early winter months, with a second peak occurring in the spring as the results of snow melt. At such times a heavy debris and sediment load is carried by the water, and severe erosion takes place within a widely fluctuating channel.

It is thought that the Vedder may be an aggrading stream, at least in part, and because of its unpredictable behaviour a programme of investigation has been planned.

The river has been photographed and permanent cross-sections have been established, from which the future conditions of the river can be based. Considerable more study will be required before any tentative conclusions can be drawn.

Dease-Stikine Hydro-power Investigation

The Hydraulic Investigation Division continued the survey of possible dam-sites along the Dease and Stikine Rivers during the 1958 summer season.

This year's work for this power project progressed on two fronts, as follows: (*a*) Mapping for a possible dam-site on Dease River above and below its tributary French River, and (*b*) reservoir and dam-site mapping of the Stikine River from the Klappan River down-stream to Telegraph Creek. In both cases the party was instructed to obtain sufficient control to produce maps by multiplex at a scale of 500 feet to 1 inch.

A convoy of three vehicles and four members of the Branch left Victoria on May 20th for the base at Watson Lake, Y.T., to meet the packer, wrangler, and two local axemen. The party had excellent equipment, and their work was laid out beforehand on existing aerial photos. At the time of arrival, Dease Lake was still partly frozen, and it was decided to control the area of the Dease River first.

Shortly after arrival the area to be controlled was closed in by smoke from large forest fires near Lower Post and east of Dease Lake. These fires hampered the completion of the first part of the summer's project, and twenty days later the party prepared to move toward the Stikine River.

A few days were spent at the south end of Dease Lake, where the party established a new base for the rest of the season, installed an 85-watt radio set for communications and checked the two portable radios.

Due to the inaccessibility of the region in which the two sub-parties had to carry out the control, horses were the only means of transportation. On July 5th each group, equipped with nine horses and supplies for approximately fifteen days, started with the survey control near the Stikine Crossing, and proceeded to establish the horizontal control stations for a single flight line toward the confluence of Stikine and Tanzilla Rivers. During the first week a small fire north-west of the Gate of the Canyon developed into a conflagration. In addition, several other large forest fires were reported in the vicinity, located north of Telegraph Creek, south of Tuya Lake, Eagle River, and Kinishkan Lake. Under these conditions the party decided to leave the dangerous area and moved toward Telegraph Creek, where the survey could be continued.

By using the B.C. stations "Mankilled" and "Bear" as base line at Telegraph Creek, a network of thirty triangulation stations (four of them permanent) was set and observed. At the end of this section, the B.C. stations "Birch" and "Acme" will assure the closure of the final adjustment. "Old-timer" and "Tan" were re-established, permanently marked, and included in this network. The vertical control is based on geodetic datum, which was brought into this area during the 1957 field season. Although the work was badly hampered by smoke and continual strong wind from the coastal range, the section was completed by the end of August.

With a little time left for this field season, the parties returned to the Upper Stikine as the valley between the Klappan River and the Gate of the Canyon was untouched by fire. The lateness of the season, combined with an early fall, low clouds, fresh snow, and smoke blown in from the fire still burning along the canyon, made it very difficult for observations. With the help of a helicopter during the last week of the field season, the party was able to complete most of the project. A gap of approximately 25 miles was left to be completed in the future.

The elevation of the Stikine River at the proposed highway crossing, approximately 10 miles above the canyon, as determined by this year's survey, is 2,183 feet (September) and that of the confluence of Stikine and Tanzilla Rivers, 35 miles down-stream, is

976 feet. The total fall of the river through the canyon according to these figures is 1,206 feet, giving an average gradient of 34.4 feet per mile.

In spite of all its hardships during the field season, the party controlled a total of 132 photos, a ground coverage of approximately 146 square miles.

SNOW SURVEYS

A total of ninety-two snow courses will be in active operation on British Columbia watersheds in the coming 1959 snow-sampling season. Of these, half will be measured by co-operating agencies interested in snow-melt water-supply and the other half by paid volunteer snow surveyors.

The year 1958 has been a busy one for the two members of the Snow Survey Section. Briefly, the more important duties performed were: Publication of six snow bulletin issues, reactivation of one snow course and establishment of nine new ones, inspection and repair of fifty-three existing Mainland snow courses, instruction in proper snow-surveying technique at sixteen courses under actual field conditions during the 1958 sampling season, office studies pertaining to snow-course location and derivation of additional stream-flow forecasting procedures, and, of course, the many duties associated with the gathering, checking, and filing of the basic data.

One snow course (Gerrard) was reactivated, and seven new ones were established on the Columbia drainage-basin. High-elevation courses were located at Abbot Mountain in Glacier National Park, Koch Creek near Fauquier, Silver Star Mountain near Vernon, and Blackwall Mountain in Manning Park. The Whatshan Lake course, originally laid out in two sections at two different elevations, was changed to the two separate courses Upper and Lower Whatshan Lake. New Clacier and New Copper Mountain were established to replace the present Glacier and Copper Mountain courses, which are to be abandoned at some future date. On the Cowichan Lake watershed on Vancouver Island, two courses were surveyed at the request of British Columbia Forest Products Limited. These were Lyfer and Heather Mountains.

One important responsibility of the Snow Survey Section is to make sure all snow courses are measured according to the proper procedures of snow sampling. The reliability and the resultant application of the basic data depend to a large extent on the care and thoroughness with which the snow surveyor makes his measurements. By accompanying snow surveyors to their respective sampling sites at regular sampling dates, our field representative can, by verbal instruction and actual demonstration, keep observer error to a minimum. Four such snow-survey trips were made in 1958, which included visits to sixteen snow courses.

Another important responsibility is to make sure that existing courses are kept in excellent condition. This involves summer trips to the measurement sites, and on such visits the necessary maintenance work is completed. This past summer fifty-three Mainland snow courses were inspected.

In January the engineering assistant attached to the programme spent a week at the United States Department of Agriculture snow-survey training-school in Jackson, Wyo. In April the meteorologist in charge of the Section attended the Columbia River forecast meeting in Portland and the Western Snow Conference at Bozeman, Mont.

INVESTIGATION OF EXISTING HYDRO-POWER DEVELOPMENTS

The investigation of the hydro-power developments operating in the Province has been continued during the past year, with the objects of increasing the accuracy and serviceability of the statistical records maintained by the Water Rights Branch and of developing an improved rental structure. A report dealing with this study will shortly be completed.

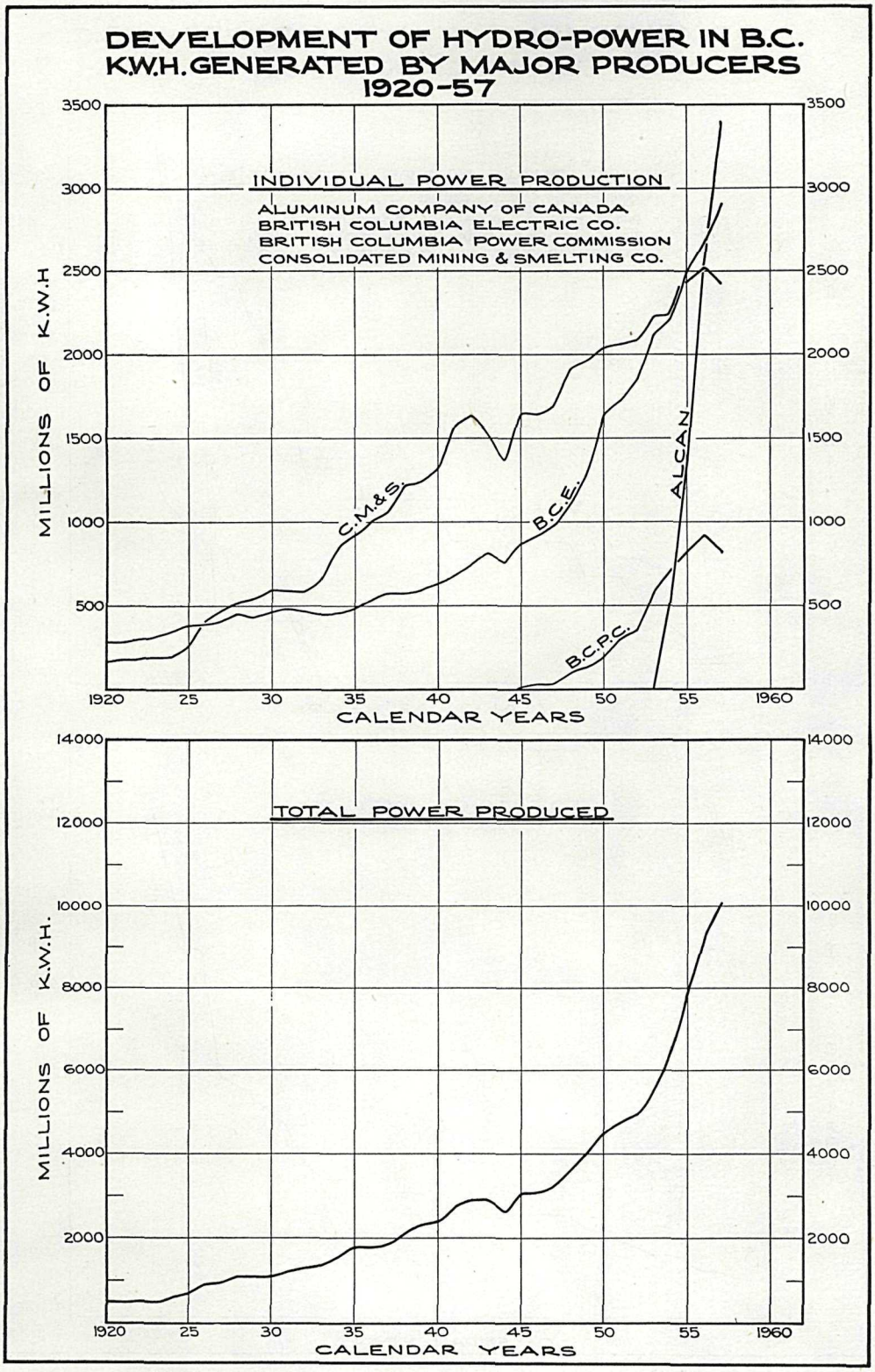

DEVELOPMENT OF HYDRO-POWER IN B.C.
K.W.H. GENERATED BY MAJOR PRODUCERS
1920-57
INDIVIDUAL POWER PRODUCTION
ALUMINUM COMPANY OF CANADA
BRITISH COLUMBIA ELECTRIC CO.
BRITISH COLUMBIA POWER COMMISSION
CONSOLIDATED MINING & SMELTING CO.
MILLIONS OF K.W.H
3500
3000
2500
2000
1500
1000
500
C.M.&S.
B.C.E.
ALCAN
B.C.P.C.
1920
25
30
35
40
45
50
55
1960
CALENDAR YEARS
TOTAL POWER PRODUCED
MILLIONS OF K.W.H.
14000
12000
10000
8000
6000
4000
2000
CALENDAR YEARS

Plate 2.

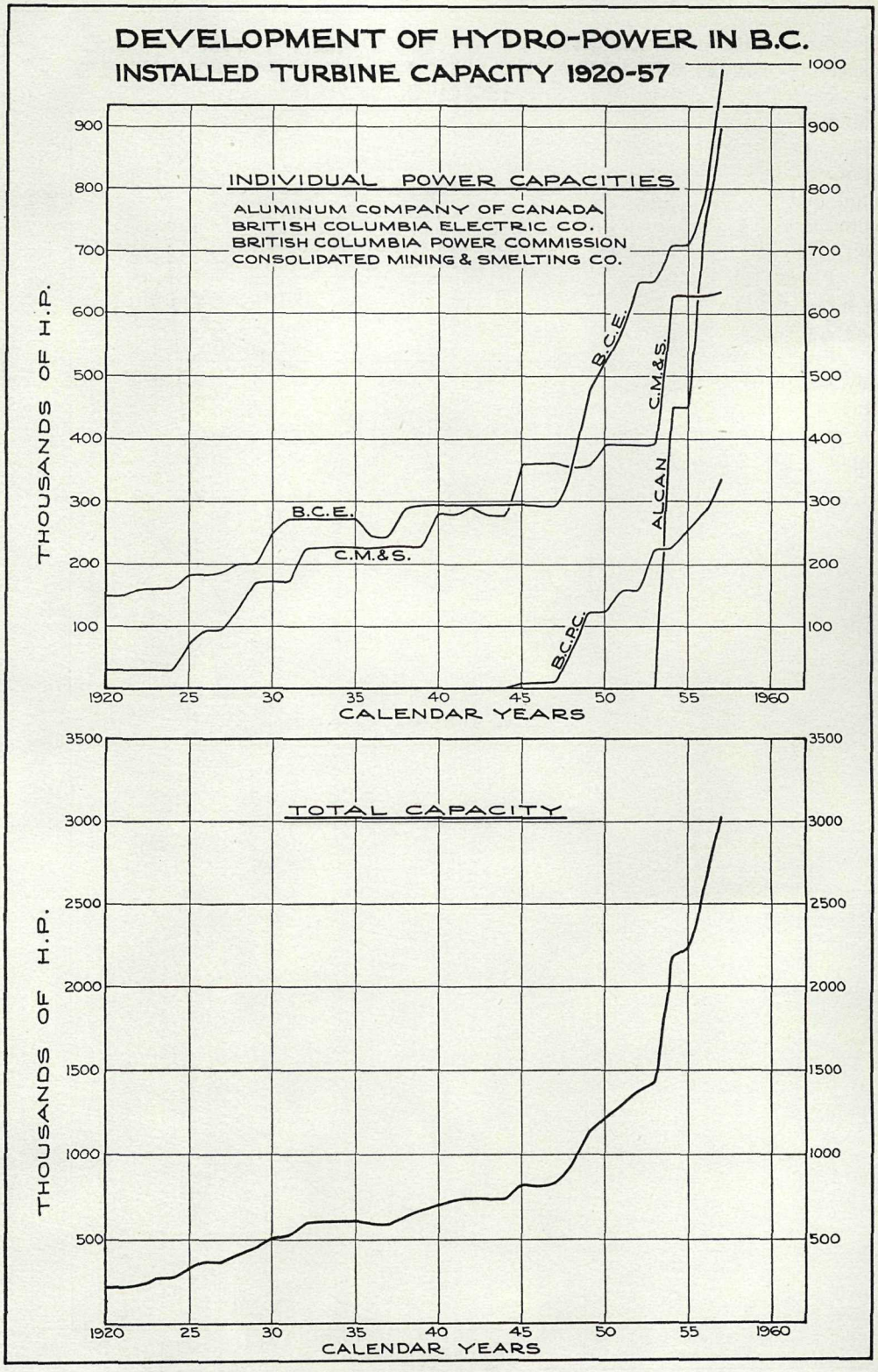

DEVELOPMENT OF HYDRO-POWER IN B.C.
INSTALLED TURBINE CAPACITY 1920-57
INDIVIDUAL POWER CAPACITIES
ALUMINUM COMPANY OF CANADA
BRITISH COLUMBIA ELECTRIC CO.
BRITISH COLUMBIA POWER COMMISSION
CONSOLIDATED MINING & SMELTING CO.
THOUSANDS OF H.P.
100
200
300
400
500
600
700
800
900
1000
B.C.E.
C.M.&S.
B.C.P.C.
ALCAN
1920
25
30
35
40
45
50
55
1960
CALENDAR YEARS
TOTAL CAPACITY
THOUSANDS OF H.P.
500
1000
1500
2000
2500
3000
3500
CALENDAR YEARS

Plate 3.

Up-to-date and accurate information has now been obtained on all the larger hydro developments in British Columbia, although the verification of this information by ground inspections has had to be curtailed.

Hydro-electric plants completed and now operating during 1958 include the British Columbia Power Commission's Strathcona development of 41,000 horse-power on Campbell River, while the installation of the seventh 150,000-horsepower unit at the Aluminum Company of Canada's Kemano plant in March, 1958, brings the total capacity of that plant to 1,050,000 horse-power. Work is continuing on the second Bridge River plant of the British Columbia Electric Company and on the British Columbia Power Commission's Ash River development on Vancouver Island.

Plates 2 and 3 illustrate the development of hydro-electric power from 1920 to 1957 in terms of annual generation in kilowatt-hours and of installed turbine capacity in horse-power.

Further and more recent commentary on new hydro developments during the year may be found in the nineteenth edition of the Department of Finance publication "A Review of Resources, Production and Governmental Finances," which should be released late in July, 1959, and is therefore normally available prior to publication of this Annual Report.

UNIVERSITY ENDOWMENT LANDS

UNIVERSITY ENDOWMENT LANDS

General operations for the year 1958 were rather normal, with very little of an exceptional nature occurring. This was only to be expected since, for reasons beyond our control, no decision was reached relative to future expansion or development.

During the past year an expanded maintenance programme was started. Since most of the services, such as roads, sewers, water-mains, etc., have been in operation for more than thirty years, it is only reasonable to expect them to present maintenance problems. It was felt that if a more extensive work schedule could be followed, we would eliminate future major repairs by more frequent minor servicing charges. Naturally it is too soon to determine how successful this new scheme will be, but there is little doubt a substantial saving in future maintenance will be effected.

Despite rapidly rising costs in wages and material, we were able to carry on, without reducing services, with only a 1.19-mill increase in the general taxes. Coupled with the increase of 1.60 mills for school tax, the total increase for 1958 general taxes over 1957 amounted to only 2.79 mills, the total general tax being still below 33 mills, which is quite good compared to surrounding municipalities.

Sharing the tremendous Centennial celebrations during the year was enjoyed by many of the residents. Numerous special functions were held at the University, and many of our residents participated in these functions, while others enjoyed the benefits of close proximity to such events.

As a memorial event to commemorate the Centennial events of 1958, we were able to returf the 3.5-acre playfield at the elementary school at a cost of just over $9,000. Such arrangements were made possible by the co-operation of the Centennial Committee, Ratepayers' Committee, School Board, and the University. At the time of writing the work has been completed, and only the dedication and unveiling of the Centennial plaque is left to finalize this project.

From the following tables it is quite obvious we enjoyed a normal average year of operation, considering there are no lots left to build on to create activity associated with building and expansion.

NUMBER AND VALUE OF BUILDING PERMITS ISSUED DURING THE YEARS ENDED DECEMBER 31ST, 1956, 1957, AND 1958

	1956		1957		1958	
	Number	Value	Number	Value	Number	Value
New schools	1	$149,681.00	----	----------	----	----------
Swimming-pools	3	23,500.00	1	$6,500.00	1	$4,500.00
New houses	3	115,000.00	3	67,000.00	----	----------
New apartments	----	----------	----	----------	----	----------
New fraternities	----	----------	1	42,000.00	----	----------
Alterations	12	58,100.00	14	31,100.00	8	16,350.00
New stores	----	----------	----	----------	----	----------
Garages, etc.	9	6,880.00	10	6,850.00	13	8,650.00
Totals	28	$353,161.00	29	$153,450.00	22	$29,500.00

Summary of Revenue Received during the Past Ten Years to December 31st, 1958

Year	Sales of Repossessed Houses		Local Improvement Taxes		Loans		Land Sales		99-year Lease Rentals	Water Accounts	Sundry Rents and Leases	Miscellaneous and Permits	Total
	Principal	Interest	Principal	Interest	Principal	Interest	Principal	Interest					
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
1956	----------	----------	7,487.45	29.94	8,719.99	2,713.73	1,575.00	----------	818.10	62,401.20	7,379.23	8,404.33	99,528.97
1957	----------	----------	7,819.29	36.77	5,908.69	1,022.42	1,000.00	135.00	----------	62,205.11	11,564.73	10,302.65	99,994.66
1958	----------	----------	8,832.53	17.97	11,067.28	544.28	2,000.00	92.50	146.10	67,388.26	13,768.93	2,223.97	85,619.76
Totals	$6,337.55	$984.52	$85,611.93	$1,172.92	$98,651.05	$28,551.31	$355,846.05	$11,208.73	$11,430.45	$398,369.79	$88,065.47	$436,831.21	$1,502,588.82

PERSONNEL OFFICE

PERSONNEL OFFICE

The estimates for the fiscal year beginning April 1st, 1958, showed a net decrease of two positions in Departmental establishment from the previous year. Although the strength of some units of the Department was reduced substantially as an economy move, this was counterbalanced to some extent by the addition of two Land Inspectors and two stenographers to the Land Inspection Division in an effort to keep up with the increased work resulting from a larger volume of applications for land. A further reduction, although it was not effected in time to reduce the estimates, was the appointment of our Director of Conservation, Dr. D. B. Turner, to head the new Department of Recreation and Conservation.

Separations from the permanent Civil Service staff of the Department showed a marked reduction—from sixty-nine in 1957 to forty for this year—thus reflecting the impact of recent economic conditions. The bulk of these consisted of employees resigning to accept other positions. Two were compulsory retirements, but, unfortunately, as the employees concerned had served for only relatively short periods, neither was entitled to receive a superannuation allowance. It is with regret that the death of three valued employees is recorded. Mrs. R. M. Pettman had over five years' service in the Water Rights Branch and Mr. R. M. M. Watson had served for almost three years in the University Endowment Lands. Also in the latter organization, the passing of Capt. G. Horridge was regretted. Captain Horridge had over twenty-nine years' service, was president of the Employees' Association, and was well respected throughout the Service.

A summary of personnel changes is given in the following table:—

Description	Permanent Staff	U.E.L.	Casual Staff, Excluding Field Staff and F.R.B.	Total
Resignations	33	2[1]	5	40
Retirements	2	-----	-----	2
Deaths	1	2	-----	3
Transfers and promotions to other departments	4	-----	2	6
New appointments	39	2	13	54
Departmental transfers	3	-----	-----	3
Competitive promotions, excluding original appointments	6	2	-----	8
Reclassifications	31	-----	1	32
Demotions (involuntary)	-----	1	-----	1
Demotions (voluntary)	2	-----	-----	2
Totals	121	9	21	151

[1] Includes one position deleted.

Lengthy negotiations were carried out with the Employees' Association, which represented the outside workers at the University Endowment Lands. These resulted in satisfactory settlement of wages for the employees concerned in amounts which were very close to the Department's original proposals. The question of salaries for the members of the Fire Department was settled more expeditiously. In both cases, amicable relations were maintained throughout, and substantial salary increases were granted. In addition, Government approval was obtained to the principle of allowing the application of the Civil Service practice of paying three months' salary gratuity to the widow or dependents of personnel dying in service in the University Endowment Lands in cases where employees had more than two years' service.

During the year numerous representations were made to the Civil Service Commission following various classification and organizational studies, etc. Many of these were accepted and some are still pending. The Personnel Officer participated on various committees organized by the Civil Service Commission. The office maintained routine personnel services, including the necessary activities connected with the staff changes, as listed above, and also as required in regard to temporary continuous and seasonal survey staff not included therein.

MAIL AND FILE ROOM

MAIL AND FILE ROOM

JOHN A. GRANT

Use of microfilmed files increased to such an extent during 1958 that it was necessary to install an extra reader in the Mail Room for use of the staff.

Filming of the Crown grants is nearing completion. The processed volumes, which are now stored in the basement vaults, are being referred to by film, a reader having been acquired for use in the upper vault.

Old year files dating from 1872 to 1905, stored in the Topaz Avenue vaults and the sub-basement of the Parliament Buildings, totalling 168,000, were microfilmed during the year.

Incoming letters to the Department of Lands and Forests totalled 215,618 during 1958, as compared to 197,137 in 1957.

The Department was saddened by the untimely death of Mr. J. A. Underwood, former supervisor of this office, in December of 1957. "Jim," as he was popularly known, was a veteran of thirty-seven years' service and left a host of friends to mourn his loss.

Letters Inward

Branch	1957	1958	10-year Average, 1949–58
Lands Service	37,335	38,299	33,798
Forest Service	132,889	134,483	85,625
Water Rights Branch	12,518	26,578	15,183
Surveys and Mapping	14,395	16,258	13,855
Totals	197,137	215,618	148,461

Letters Outward (Recorded)

Branch	1957	1958	10-year Average, 1949–58
Lands Service	9,609	11,000	15,787
Forest Service	2,138	1,460	9,510
Water Rights Branch	1,898	1,973	3,564
Surveys and Mapping	-------	-------	-------
Totals	13,645	14,433	28,861

Miscellaneous Reports Received

Designation	1957	1958	10-year Average, 1949–58
Forest-fire reports	3,238	8,240	3,324
Slash-disposal reports	540	384	577
Logging-inspection reports	16,002	13,814	15,340
Land-classification reports	2,490	2,984	2,255
Stumpage-adjustment notices	6,554	2,950	-------
Totals	28,824	28,372	21,496

New Files Created

Designation	1957	1958	10-year Average, 1949–58
" 0 " files	4,482	4,696	4,758
Timber-mark files	1,158	955	1,527
Timber-sale files	3,115	2,917	3,430
Totals	8,755	8,568	9,715

Printed by Don McDiarmid, Printer to the Queen's Most Excellent Majesty
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1959

1,060-159-7200