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A. Sutherland Brown

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Résumé de l'article

Après des débuts incertains au tempsdes colonies, le Geological SurveyBranch (Secteur des levés géologiques)de Colombie-Britannique a fêté ses centans d'existence en 1995. Les ressourcesminérales ayant été l'un des facteursdéterminant de l'évolution politique de-puis les colonies jusqu'au statut de prov-ince, il est un peu étonnant que des ser-vices géologiques n'aient pas été cré-és plus tôt. Depuis 1895, les servicesgéologiques se sont développes en cinqétapes, d'un Bureau of mines (Bureaudes mines) composé d'un minéralogisteet de cinq employés pour, éventuelle-ment, devenir l'important organisme desannées 1990. En 1917, ingénieurs etgéologues résidents de différentes lo-calités à travers la province ont étéregroupés pour former un organisme deservices géologiques semi-autonome,le Mineral Survey (Service d'explorationminérale). Au milieu des années 30, leBureau of mines (Bureau des mines) etle Mineral Survey (Service d'explorationminérale) ont été fondus pour former leMineralogical Branch (Secteur des res-sources minérales), un service de levésgéologiques axé sur les ressources etcentralisé à Victoria. Au milieu des an-nées 60, une fonction d'évaluation desressources s'y est ajoutée et l'ensembleest devenu la Geological Division (Divi-sion géologique). Finalement, cette der-nière est devenu le Geological SurveyBranch (Secteur des levés géologiques),lequel assume le mandat d'une car-tographie générale à l'échelle 1 : 50 000en plus de nombreuses autres fonctionsà caractère non-minéral.

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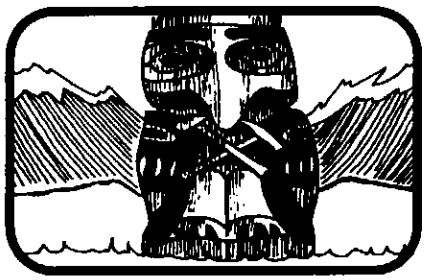

A Century of Service: A Brief History of British Columbia's Geological Surveys[1]

A. Sutherland Brown
546 Newport Avenue
Victoria, British Columbia V8S 5C7
atholl@bc.sympatico.ca

SUMMARY

The British Columbia Geological Survey Branch reached a centenary of continuous service in 1995 following fitful earlier ventures reaching back to colonial days. As mineral resources were a principal spur to the political developments from colony to province, perhaps it is surprising that a geological survey was not started sooner. Beginning in 1895 the Survey developed in five stages from a Provincial Mineralogist and his staff of five, forming the Bureau of Mines, to the significant organization of the 1990s. In 1917 six resident engineers and geologists based in various localities throughout the province were grouped to form the semi-independent Mineral Survey. In the mid-1930s the Bureau of Mines and the Mineral Survey were combined to form the Mineralogical Branch, a resource-oriented geological survey centralized in Victoria. This in turn, in the mid-1960s, added a resource appraisal function and became known as the Geological Division. Finally it became the Geological Survey Branch of today with a broad mandate in 1:50,000-scale mapping as well as many non-mineral functions.

RÉSUMÉ

Après des débuts incertains au temps des colonies, le Geological Survey Branch (Secteur des levés géologiques) de Colombie-Britannique a fêté ses cent ans d'existence en 1995. Les ressources minérales ayant été l'un des facteurs déterminant de l'évolution politique depuis les colonies jusqu'au statut de province, il est un peu étonnant que des services géologiques n'aient pas été créés plus tôt. Depuis 1895, les services géologiques se sont développés en cinq étapes, d'un Bureau of mines (Bureau des mines) composé d'un minéralogiste et de cinq employés pour, éventuellement, devenir l'important organisme des années 1990. En 1917, ingénieurs et géologues résidents de différentes localités à travers la province ont été regroupés pour former un organisme de services géologiques semi-autonome, le Mineral Survey (Service d'exploration minérale). Au milieu des années 30, le Bureau of mines (Bureau des mines) et le Mineral Survey (Service d'exploration minérale) ont été fondus pour former le Mineralogical Branch (Secteur des ressources minérales), un service de levés géologiques axé sur les ressources et centralisé à Victoria. Au milieu des années 60, une fonction d'évaluation des ressources s'y est ajoutée et l'ensemble est devenu la Geological Division (Division géologique). Finalement, cette dernière est devenu le Geological Survey Branch (Secteur des levés géologiques), lequel assume le mandat d'une cartographie générale à l'échelle 1 : 50 000 en plus de nombreuses autres fonctions à caractère non-minéral.

COLONIAL PERIOD

The territory that became the Province of British Columbia began developing after the signing of the Oregon Treaty of 1846, an event that resolved the conflicting aims of the United States and those of Britain, as represented in British North America. There was a brief "sovereignty dance" among two Colonies (Vancouver Island and British Columbia), two Territories (the Queen Charlotte Islands and Stikine Territory), the United States government, and the Hudson Bay Company that resulted in the creation of a single Crown Colony in 1866, and, following heated debate, the Province of British Columbia in 1871. The spur for these political developments was the perceived potential mineral wealth of the northern Cordillera following the discovery of coal on Vancouver Island in 1835, lode gold on the Queen Charlotte Islands in 1850, and placer gold on many interior rivers from 1855 onwards.

Mineral development in the mainland colony was driven by prospectors and entrepreneurs, while the government tried to control and to profit from the gold rush. Although the Vancouver Island colony languished, the first attempt at a geological survey in British Columbia took place on the Island, by the Vancouver Island Exploring Expedition. This body was formed in 1864 to explore the area and evaluate the mineral potential of the Island, and to stimulate prospecting and development. The initial expedition was led by Dr. Robert Brown, a curious, talented and eccentric young man who headed an equally talented and eccentric international crew. Considering the personalities and the difficulties encountered, it was amazing that the expedition was effective, although only a 1-year wonder. The expedition discovered gold on Leech River, named after its discoverer Lt. Peter Leech, ex-Royal Engineers, and second in command of the expedition. Copper deposits were discovered on Alberni Inlet and, most importantly, the expedition also found a major thickness of coal at Comox, later to become the Comox coalfield.

During this period of British Columbia's history, the science of geology was developing around the world and geological surveys were being established in many countries. The need for technical data and advice in British Columbia was recognized early, with the result that analytical laboratories were created in Barkerville and New Westminster, and a Government Assayer was appointed in 1858. There was interest in having geoscientific surveys of the province, but in a manner that became characteristic, governments of British Columbia recoiled from the costs so that a condition of the union with Canada in 1871 was that the latter would bear the expense. A way station *en route* to a permanent geological survey was the establishment of a Minister of Mines in 1874: his Annual Report soon became the vehicle for disseminating news, statistics and technical reports of the min-

[1]This article is a précis of a new history of the British Columbia Geological Survey Branch prepared to commemorate its recent centenary, and published by the Pacific Section of the Geological Association of Canada aided by grants from the Canadian Geological Foundation and the British Columbia Heritage Trust of Victoria (Sutherland Brown, 1998). The staff of the Geological Survey Branch have been vital in support of the publication of this new history. Particular thanks must be given to Brian Grant.

ing industry. In spite of the requirement for federal funding of geological surveys, the province jointly financed early studies such as those of Amos Bowman of the Geological Survey of Canada in mapping the Cariboo goldfields in 1885. A decade later a Provincial Mineralogist and a Provincial Assayer/Analyst were appointed in Victoria, and from this small beginning the provincial geological survey developed.

DEVELOPMENT OF THE BRITISH COLUMBIA GEOLOGICAL SURVEY BRANCH

The development of the survey occurred in stages related to changes in legislative mandate, to a succession of Provincial Mineralogists or Chief Geologists, to the several titles that the organization was called, and to the development of mining, particularly mineral exploration. Not unexpectedly, there was some coincidence among the successive changes in these fields (Fig. 1). As shown, the organization has had a variety of titles starting in 1895 with a Provincial Mineralogist and his small staff, which formed the Bureau of Mines. The Bureau was joined in 1917 by a group of six mining engineers and geologists called "Resident Engineers," who were collectively designated as the Mineral Survey, a semi-independent entity. In 1937 these two organizations, the Bureau of Mines and the Mineral Survey, were united to form the Mineralogical Branch, a small mineral resource-oriented geological survey that continued until 1966, and was the true forerunner of the present survey. Subsequently the organization slowly grew and developed; it was called the Geological Division (1966-1984) and finally the Geological Survey Branch (from 1984).

PROVINCIAL MINERALOGIST AND THE BUREAU OF MINES

The first Provincial Mineralogist was W.A. Carlyle, appointed in 1895. He gave shape to the new organization, and initiated many of its activities and its operational style. Unfortunately, Carlyle stayed only 3 years, leaving to become a mine manager in Rossland and later an internationally known consultant in London, England. He was succeeded by W. Fleet Robertson, who stayed for 27 years, during which he developed the roles of the early agency with few resources but great vigour. Robertson's staff grew to five toward the end of his tenure, including the Assistant Provincial Mineralogist, a technical assistant, the Provincial Analyst/Assayer, a laboratory assistant and a statistical clerk (Fig. 2).

The staff of the Bureau of Mines was involved principally in the exploration and mineral reconnaissance of the province. It also compiled mineral statistics, authored the Minister's Annual Report, encouraged promotion of the mining potential of the province, and additionally, established a library and a geological museum. Mineral reconnaissance involved both geographic and geological exploration, with property examination

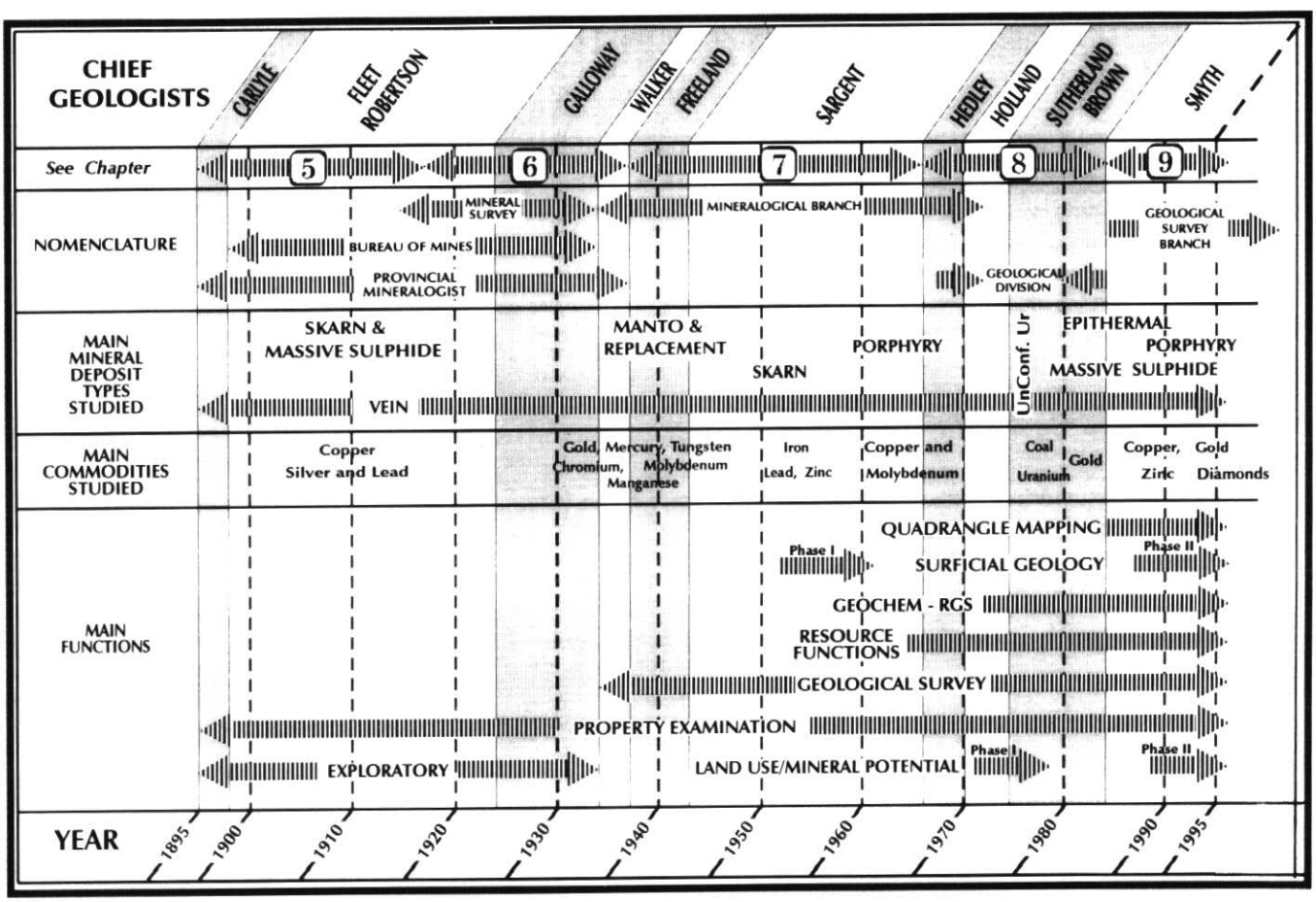

Figure 1 Chronology of the Provincial Mineralogists and Chief Geologists, nomenclature of the Survey, Chapters of the History (Sutherland Brown, 1998), geological survey functions, and main commodities and deposit types studied (from Sutherland Brown, 1998, p. 2).

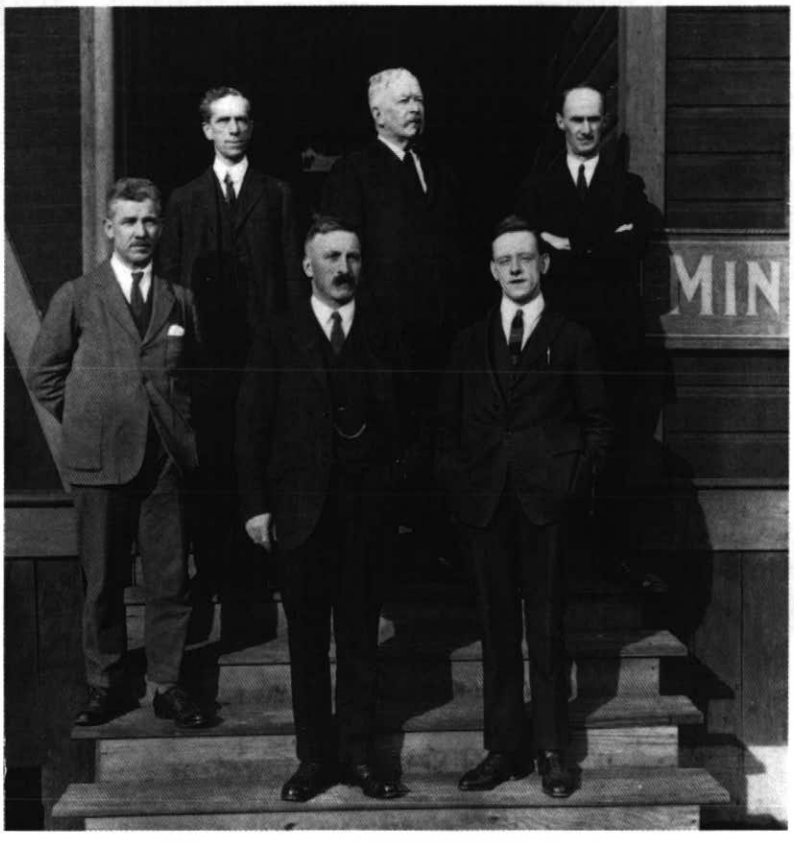

Figure 2 Staff of the Bureau of Mines at the entrance of the Birdcage Building in 1924, just before Fleet Robertson (back row centre) retired. His successor, Jack Galloway, is to his left and D.E. Whittaker, Provincial Analyst, to his right. Front row, left to right: J.B Adams, laboratory assistant; Major H.T. Nation, office engineer and librarian; H. Pearson, clerk and statistician (British Columbia Archives and Record Service HP 99022).

Figure 3 Fleet Robertson (foreground) in 1908, portaging down Deserter's Canyon, Finlay River, an area that was very remote at that time. The canyon is now flooded by Lake Williston behind the W.A.C. Bennett Dam (BCARS HP 99014).

and development advice being provided as a service. The rugged, summer-long small expeditions led by Fleet Robertson (Fig. 3), with Harold Nation as his technical assistant and generally two wranglers or canoemen, surveyed the northern half of the province between 1898 and 1912. Herbert Carmichael, Provincial Analyst/Assayer, also had geological skills and training: he surveyed Vancouver Island as well as the Queen Charlottes and Stewart areas during this time.

THE MINERAL SURVEY

In 1917, in the middle of World War I, the government strengthened its role in mineral resource exploration by creating the Mineral Survey, a unit of six semi-independent mining engineers and geologists. They were to provide technical advice to prospectors and developers, and to the government on the mineral potential of their district as well as recommendations regarding the possible provision of grants for roads and trails. Mineral Survey personnel also carried out significant geological research projects, such as Douglas Lay's studies of the capture of the upper Fraser River from the Peace River drainage, completed during study of the Cariboo placer gold deposits.

The Mineral Survey and the Bureau of Mines had cumbersome administrative arrangements because the Resident Engineers were employed "at the pleasure of the Crown." In effect they were contractors to the Minister, but reported to the Deputy Minister on grants and to the Provincial Mineralogist on technical matters and reports. A further complication was that the Resident Engineers had offices widely scattered throughout the province. In contrast, the Provincial Mineralogist and the Bureau of Mines staff were based in Victoria in the old Colonial Legislative Assembly, the "Birdcage Building," and were civil servants rather than contractors. Curiously, during the booming 1920s these arrangements worked fairly well. After Fleet Robertson retired in 1925, the Provincial Mineralogist was Jack Galloway, who had been assistant to Robertson as well as a Resident Engineer (Fig. 4). While he was Assistant Provincial Mineralogist, Galloway proposed and carried out a remarkable geological and resource reconnaissance of the east flank of the Coast Range. He was a competent, understanding and forceful

man who advanced the work of both staffs. The Annual Report of this period is about 500 pages long, and is a treasure trove of resource information.

THE MINERALOGICAL BRANCH

Galloway resigned to become a consultant in 1934 during the Great Depression, a difficult time for all government agencies. He was replaced by John F. Walker, who had been in charge of the Vancouver office of the Geological Survey of Canada (GSC). Almost immediately on his arrival Walker was broadsided by the Hedley Amalgamated scandal, as large in its day as the recent Bre-X scandal, and with very similar causes and effects. It differed in that not only was the original core salted, but the check drill core was also cleverly salted during the time it was under Departmental care! Walker was forever after wary of promoters!

Walker reconstituted these organizations into one that was a small reflection of the GSC, but without the paleontological component, and hence, called the Mineralogical Branch. This was accomplished in 3 years with all staff centralized in Victoria and strongly focussed geologically. Walker's compassion and foresight were evident from his creation of prospecting camps for young unemployed males during the Depression, and his thrust to inventory and develop strategic minerals in the immediate pre- and early World War II period. Walker also saw that his staff were properly housed in the new Douglas Building in Victoria. He became Deputy Minister in 1937, but maintained control of the Branch under his first successor, P.B. Freeland, a mining engineer, and also to some degree under his second successor, Hartley Sargent, who took over in 1943.

After World War II mining languished for a time, as did the Branch. Mining activity picked up at the end of the 1950s with a move toward open-pit mining of small magnetite and copper skarn deposits of the coast, with sales to a new customer, Japan. This was followed by a veritable tsunami of private sector exploration for porphyry copper and metallurgical coal deposits. The Mineralogical Branch was drawn into this activity with no growth and little realization of how or where to swim, and with a seemingly uninterested and uninformed government. The Branch did, however, continue its program of perceptive geological mapping with its small group of 10

Figure 4 Mineral Survey staff in May, 1929, on the steps of the Legislature building with their Minister, W.A. MacKenzie in the bowler hat; his Deputy, Robert Dunn, to his right; and the Provincial Mineralogist, Jack Galloway, to his left. To Dunn's right is Resident Engineer B.T. O'Grady. Back row, left to right: G.A. Clothier, Nanaimo; P.B. Freeland, Grand Forks; H.T. Nichols, Kamloops; and A.G. Langley, Nelson. Northern Resident Engineers are not present.

Figure 5 Geologist J.G. (Jim) Fyles surveying by plane table near Zincton in the Kootenays, 1948 (M.S. Hedley).

Figure 6 The Victoria-based professional staff of the Geological Division outside one of its houses in the Legislative Precinct, March, 1977. Deputy Minister J.G. Fyles is fourth from the right, lower row; Chief Geologist A. Sutherland Brown is on the right, upper row. Staff members shown are identified in Sutherland Brown (1998, p. 113) (R.E. Player).

Figure 7 Regional geochemical surveys depend heavily on helicopter access to remote areas. Photograph shows a silt-sampling survey, northern Coast Mountains, 1978.

field geologists. Their work, such as that of Jim Fyles (Fig. 5) and his colleagues in southwestern British Columbia, was centred on mining districts and thus very useful in its own right. This valuable work provided significant by-products in the form of new interpretations of Cordilleran structure and stratigraphy, with their revelation of the nature and origin of the Kootenay Arc.

GEOLOGICAL DIVISION

Something had to be done to keep abreast of the mass of new exploration data being generated and to initiate necessary resource functions of mineral inventory and mineral potential studies, as well as geoscientific work on porphyries and coal. The government of the day gave in slowly to urgent requests for new staff positions and funding. It was not until the era of the Geological

Division (Fig. 1) that this was accomplished in at least a small way. The Chief Geologists of this era were Matthew S. Hedley (1966-1970), Stuart S. Holland (1970-1974), followed by Atholl Sutherland Brown (1975-1984).

New mineral resource programs that received only minimal support were initiated under Hedley and Holland. As a result, mineral exploration was monitored and analyzed, land-use and mineral potential studies were started, laboratory facilities were modernized, and district geologists were placed in the field. Unfortunately it was a game of catch-up, with the many requirements commonly being filled by robbing geological field mapping and research programs. At the same time, the slight growth and perceptible Departmental negativity toward the Geological Division meant that it was moved out of the Douglas Building into old houses in the Legislative Precinct (Fig. 6). Under Sutherland Brown, the same programs and pressures continued, but land-use problems grew exponentially to engulf much of the effort of mineral inventory, mineral potential studies, and the district geologists. To its detriment, the publication process was taken out of the Division's hands, and access to publication was restricted, so that products of research and mineral inventory became hopelessly delayed.

In spite of these problems a number

Figure 8 Geological Survey Branch staff in the rotunda of the Legislature, December, 1989. Chief Geologist W. Ronald Smyth is front and centre in the striped tie. Staff members shown are identified in Sutherland Brown (1998, p. 114, 115).

Figure 9 Jack Davis Building, Victoria, occupied by the Ministry of Mines and Petroleum Resources in 1993 (now the Ministry of Energy and Mines), with the Geological Survey Branch located mainly on the fifth floor (F. Ferri).

of significant new initiatives were launched under Sutherland Brown; for example, regional geochemical surveys (Fig. 7) were started in cooperation, initially with the GSC, and conducted largely by external competitively bid contracts. These geochemical surveys provided a prized addition to the exploration data bank that the Geological Division produced. An innovative series of geological mapping and geoscientific projects were conducted on porphyries, coal, and for a brief period, uranium resources. The latter disappeared overnight upon the government's declaration of a moratorium on uranium exploration and mining. Other projects continued, however, such as the series of geological, petrologic and geophysical studies of the Guichon Creek batholith by Bill McMillan, Mike Carr, Chuck Ager, Ken Northcote and others. These studies made the Highland Valley District one of the best understood porphyry copper and molybdenum camps in the world, leading to the production of realistic models of copper-molybdenum deposit types for the Cordillera. At the same time, the Geological Division broadened its contact with other provincial surveys as well as with the GSC, other national surveys, and universities, so that not only did it become less parochial but also its accomplishments were more broadly recognized. A. Sutherland Brown resigned in 1984 to become a consultant.

GEOLOGICAL SURVEY BRANCH

The last decade of the survey's first 100 years was as turbulent as any in its history, with many successes as well as many alarms and reverses. W. Ronald Smyth, a relative newcomer to the organization, became the Chief Geologist after a brief interregnum. He arrived from Newfoundland to be a senior geologist without the possible prejudices that long-time staff might have held. From his experience in Newfoundland, Smyth was successful in negotiating two Mineral Development Agreements (MDAs) with federal government agencies, and this enabled the organization to make a significant leap forward. Success on the MDA front was accompanied by major increases in provincial funding and a doubling of staff with a new generation of young geologists being hired (Fig. 8). Eventually the whole Branch was housed in a well-planned modern building named after a capable former Minister of Mines, Jack Davis (Fig. 9).

At different times the Geological Branch, threatened by privatization, was partly dismembered, and eventually was significantly down-sized immediately following its 100th anniversary in 1995. Meanwhile the mining and exploration industry in British Columbia had virtually imploded as a result of the cancellation of the right to mine the world-class polymetallic Windy Craggy deposit, and the downturn in metal prices that continues to the present.

The Geological Survey Branch has logged a host of accomplishments during the 1985-1995 decade. The publication backlog was quickly eliminated and significant new publications were issued rapidly; 1:50,000-scale mapping was started with vigour, surficial geological studies were renewed, and industrial mineral studies given a major boost. Regional geochemical surveys were taken over completely from the Geological Survey of Canada and were released in a timely fashion. Major modelling, regional tectonics, and metallogenic studies have been completed, leading to a widely recognized publication, *Ore Deposits, Tectonics and Metallogeny in the Canadian Cordillera* (McMillan *et al.*, 1991). A new and more rigorous methodology for mineral potential studies was developed, and production rapidly carried out. The Branch is now highly involved in assessing geological hazards in the urban areas of the southern mainland and Vancouver Island, and is a leading player in public education on these matters and on the geology of public parks. A brief account of the Branch's activities in 1998-1999 may be seen in Boon (1998, p. 150-152).

CONCLUSIONS

Despite the importance of mineral resources, British Columbia was slow to establish any sort of geological agency. When it did so in 1895, it was reluctant to provide the level of funding required for early success. The history of the geological survey in its various forms may be seen as a sine curve of care and neglect. Periods of governmental understanding and support were followed just as surely by periods of restraint and neglect. Nevertheless, the survey has in most respects prospered and the populace of British Columbia and Canada has benefited. It is noteworthy that this has happened partly because the geological survey in its various identities has been staffed by remarkable people who accomplished major feats in putting before the public, industry and government an array of geological studies of great quality and relevance.

SOURCES

There is a wealth of information contained in three regularly compiled documents published by the British Columbia Ministry of Mines and its successor agencies. These are the Annual Reports of the Minister of Mines, 1874-1979; Geological Field Work, 1974-1998, an account of each season's field activities; and Summary of Operations, 1980-1984. These documents were the source of much of the content in Sutherland Brown (1998), and for the present brief account.

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British Columbia's Geological Surveys, 1895-1995 – A Century of Science and Dedication is available from Pacific Section, GAC, P.O. Box 8017, Victoria, BC V8W 3R7. The cost is $18 (GAC-Pacific Section members), $20 (non-members) plus $2.50 for shipping.