# BULLETIN 60 – GEOLOGY OF THE AKOLKOLEX RIVER AREA AN ADDENDUM

By P. B. Read
Geotex Consultants Limited, Vancouver, British Columbia
and
R. I. Thompson
The Institute of Sedimentary and Petroleum Geology, Calgary, Alberta

In the interval between submission of the manuscript and maps for Bulletin 60, Geology of the Akolkolex River Area, and its publication, mapping in the northern part of the Kootenay Arc and Clachnacudainn Salient permits an alternative interpretation for stratigraphic correlations and regional structural associations to that proposed by Thompson for the Akolkolex River area.

Thompson (1978) subdivided rocks of the Akolkolex River area into two fundamental tectono-stratigraphic assemblages: an upper structural level composed of Lower Paleozoic units of the Kootenay Arc and a lower structural level, called the Clachnacudainn Salient (Wheeler, 1965), consisting of schist, micaceous quartzite, quartzite, marble, and minor amphibolite. Rocks of the lower structural level were correlated on the basis of gross lithology with the Hamill Group. Separating the two levels is the gentle southeasterly dipping Standfast Creek fault or slide that cuts down structurally from northeast to southwest. This fault should be extended beneath the klippe of unit €bd on Ghost Peak as on Figure 60.

It is proposed here that the stratified metamorphic rocks of the lower structural level or Clachnacudainn Salient may represent an inverted sequence comprising the Lardeau Group, Badshot Formation, and the upper part of the Hamill Group. This interpretation hinges on correlation of a 10 to 30-metre-thick amphibolite layer (unit B4c) of the Clachnacudainn Salient with the Jowett Formation of the Kootenay Arc. As the Jowett Formation is traced northwestward along Kootenay Arc, it thins rapidly from about 400 metres of amphibolite, biotite-chlorite-calcite schist, and spatially associated marble near Comaplix Mountain to 30 metres south of Akolkolex River (Fig. 59). The thickness and lithology agree well with those of the amphibolite unit B4c beneath Sandfast Creek slide and lead to the interpretation that unit B4c is the northerly extension of the Jowett Formation. Recent mapping (Read, 1980) has defined an additional amphibolite layer with similar characteristics that is approximately 300 metres structurally below amphibolite B4c shown on Figure 59 (Thompson, 1978). At present, uncertainty exists as to whether the new amphibolite is a structural repetition of Thompson's amphibolite; however, the distribution of map units shown on Figure 60 is based on the assumption of a single, folded amphibolite layer as with the Jowett Formation of the arc. Rock units adjacent to amphibolite B4c comprise mica and quartz-rich mica schist and some micaceous quartzite. These lithologies are similar to those found on either side of the Jowett Formation in the arc where quartz grit occurs in the upper part of the Index Formation as well as in the overlying Broadview Formation (Read, 1975; Read and Wheeler, 1976). The dominant grey mica schist of unit B4 and marble of unit C are lithologically similar to the lower part of the Index Formation and Badshot Formation respectively of the arc. In the northeastern part of the map-area, grey mica schist of unit D and a structurally overlying, thick quartzite of unit Da form the footwall of Standfast Creek slide. The quartzite thickens eastward into the Albert Peak area where Sears (1979, p. 27) tentatively correlated it with the Hamill Group. Using only the quartzite (unit Da), Sears correlated the stratigraphic succession structurally below the quartzite with the Horsethief Creek Group (see accompanying table, column B). If the quartzite is overturned, the succession in Clachnacudainn Salient would represent

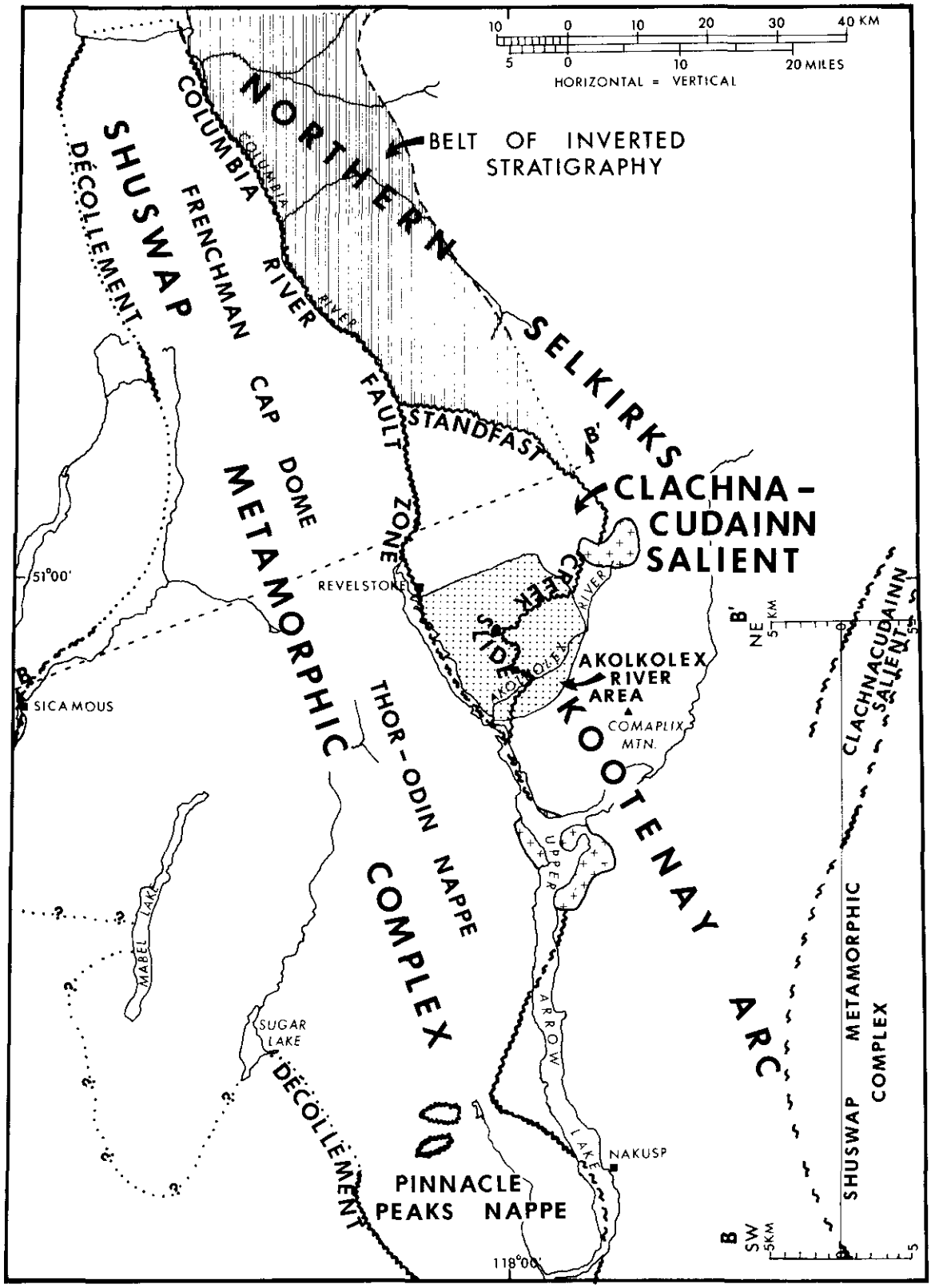


Figure 59. Regional map showing Kootenay Arc and northern Selkirk Mountains, Shuswap Metamorphic Complex, Clachnacudainn Salient, and location of the Akolkolex River area. Position of the decollement northwest of Revelstoke modified from Brown (1980) and southwest of Revelstoke taken from Okulitch (1979).

of the salient where a belt of inverted stratigraphy up to 20 kilometres wide underlies the northern Selkirk Mountains on their western side against the Shuswap Metamorphic Complex (Read and Brown, 1979 and Fig 59). Unfinished work and some problems still remain: (1) amphibolite B4c is incompletely mapped southwest of Ghost Peak and may be missing northwest of the peak (Fig. 60); (2) a unique equivalent to the Badshot Formation does not exist among the marble layers which comprise unit C; and (3) Sears (1979, p. 23) noted that one graded bed within the quartzite of unit Da is upright, but in these structurally complicated rocks more facing data are needed.

**CORRELATION SCHEMES FOR THE STRATIFIED METAMORPHIC ROCKS OF CLACHNACUDAINN SALIENT**

| STRATIGRAPHY OF KOOTENAY ARC AND SELKIRK MOUNTAINS | A<br>AKOLKOLEX RIVER AREA<br>(Thompson, 1978) | B<br>ALBERT PEAKS AREA<br>(Sears, 1979) |
|---|---|---|
| LARDEAU GROUP | | |
| Broadview Formation | A3, part of A1, B1, B3, and B4 | |
| Jowett Formation | unit B4c | |
| Index Formation | B4a, B4b, and part of B4 | |
| Badshot Formation | unit C | |
| HAMILL GROUP | | |
| Mohican Formation | unit D | |
| Marsh Adams Formation<br>Mount Gainer Formation | unit Da | unit Da (Ꞓh ?)* |
| HORSETHIEF CREEK GROUP | | |
| Upper pelite | | absent |
| Middle carbonate | | units C and D (m, s, and p)* |
| Lower pelite | | absent |
| Quartzofeldspathic grit | | units A1, A2, A3, B1, B2, B3, B4, B4a, B4b, and B4c (qs, sc, qt)* |

*Map unit symbols within brackets are those used by Sears, 1979.

Although Clachnacudainn Salient has been considered a part of the Shuswap Metamorphic Complex by workers such as Wheeler (1965), Ross (1968), and Read (1977a and 1977b), recent data indicate that it is an eastward dipping allochthon lying on the eastern side of the complex (Read, 1979a and 1979b; Brown and Read, 1979). Standfast Creek slide confines the salient on its north, east, and southern sides, but its amount and direction of displacement are unknown. The recognition that the stratigraphy within the salient is probably correlative with that of the arc suggests that displacement relative to the arc is not major. Movement on the fault is after Middle Jurassic deformation but prior to or synchronous with metamorphism because the movement does not disrupt the simple westward increase in metamorphic grade toward the Shuswap Metamorphic Complex (Fig. 60). The major structural break is the post-metamorphic decollement lying along the Columbia River fault zone which separates the arc and salient from the stratigraphically dissimilar rocks of the Shuswap Metamorphic Complex. It dips gently eastward for over 150 kilometres along the eastern side of the complex and may warp up over Thor-Odin and Pinnacle Peaks nappes (formerly capped domes, *see* Read, 1980) and Frenchman Cap dome. If the gneiss 'dome' terrain of the Shuswap Metamorphic Complex is arbitrarily considered autochthonous, the decollement is the break with an allochthonous cover which includes Clachnacudainn Salient, the northern Selkirk Mountains, and Kootenay Arc (Fig. 59).

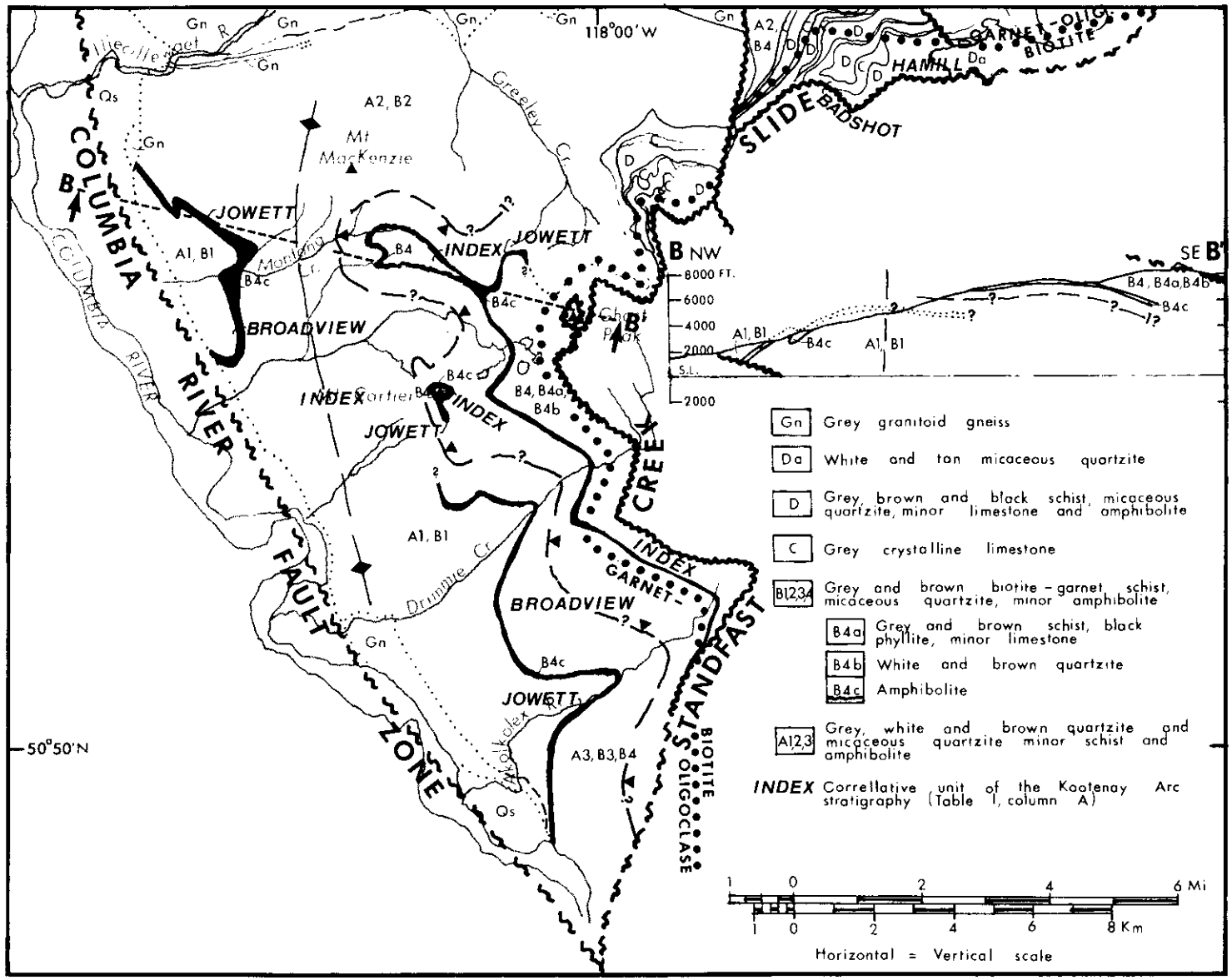


Figure 60. Simplified geological map of the southern part of Clachnacudainn Salient showing the distribution of rock units and their correlation with units of the Kootenay Arc.

## REFERENCES


Brown, R. L. (1980, in press): Frenchman Cap Dome, Shuswap Metamorphic Complex, British Columbia: A Progress Report, *in* Current Research, *Geol. Surv., Canada,* Paper 80-1A.

Brown, R. L. and Read, P. B. (1979): Basement-cover Interaction: Shuswap Metamorphic Complex and the Kootenay Arc-Northern Selkirks, *in* Evolution of the Cratonic Margin and Related Mineral Deposits, *Geol. Assoc. Canada,* Cordilleran Section, Program and Abstracts, p. 9.

Okulitch, A. V. (1979): Shuswap-Thompson-Okanagan, British Columbia, *Geol. Surv., Canada,* Open File 637.

Read, P. B. (1975): Lardeau Group, Lardeau Map-Area West Half (82K West Half), British Columbia, *in* Report of Activities, *Geol. Surv., Canada,* Paper 75-1, Pt. A, pp. 29, 30.

..... (1977a): Lardeau Map-Area, British Columbia, *in* Report of Activities, *Geol. Surv., Canada,* Paper 77-1A, pp. 295, 296.

..... (1977b): Relationship of the Kootenay Arc to the Shuswap Metamorphic Complex, Southern British Columbia, *in* Program with Abstracts, *Geol. Assoc. Canada,* Vol. 2, p. 43.

..... (1979a) Relationship between the Shuswap Metamorphic Complex and Kootenay Arc, Vernon East Half, Southern British Columbia, *in* Current Research, *Geol. Surv., Canada,* Paper 79-1A, pp. 37-40.

..... (1979b): Geology and Mineral Deposits, Eastern Part of Vernon East Half, British Columbia, *Geol. Surv., Canada,* Open File 658.

..... (1980, in press): Stratigraphy and Structure: Thor-Odin to Frenchman Cap 'Domes,' Southern British Columbia, *in* Current Research, *Geol. Surv., Canada,* Paper 80-1A.

Read, P. B. and Brown, R. L. (1979): Inverted Stratigraphy and Structures, Downie Creek, Southern British Columbia, *in* Current Research, *Geol. Surv., Canada,* Paper 79-1A, pp. 33, 34.

Read, P. B. and Wheeler, J. O. (1976): Geology, Lardeau West Half, British Columbia, *Geol. Surv., Canada,* Open File 432.

Sears, J. W. (1979): Tectonic Contrasts between the Infrastructure and Suprastructure of the Columbian Orogen, Albert Peak Area, Western Selkirk Mountains, British Columbia, unpubl. Ph.D. thesis, Department of Geological Sciences, *Queen's University,* Kingston, Ontario, 154 pp.

Thompson, R. I. (1972): Geology of the Akolkolex River Area near Revelstoke, British Columbia, unpubl. Ph.D. thesis, Department of Geological Sciences, *Queen's University,* Kingston, Ontario, 125 pp.

..... (1978): Geology of the Akolkolex River Area, *B.C. Ministry of Energy, Mines & Pet. Res.,* Bull. 60.

Wheeler, J. O. (1965): Big Bend Map-Area, British Columbia, *Geol. Surv., Canada,* Paper 64-32.

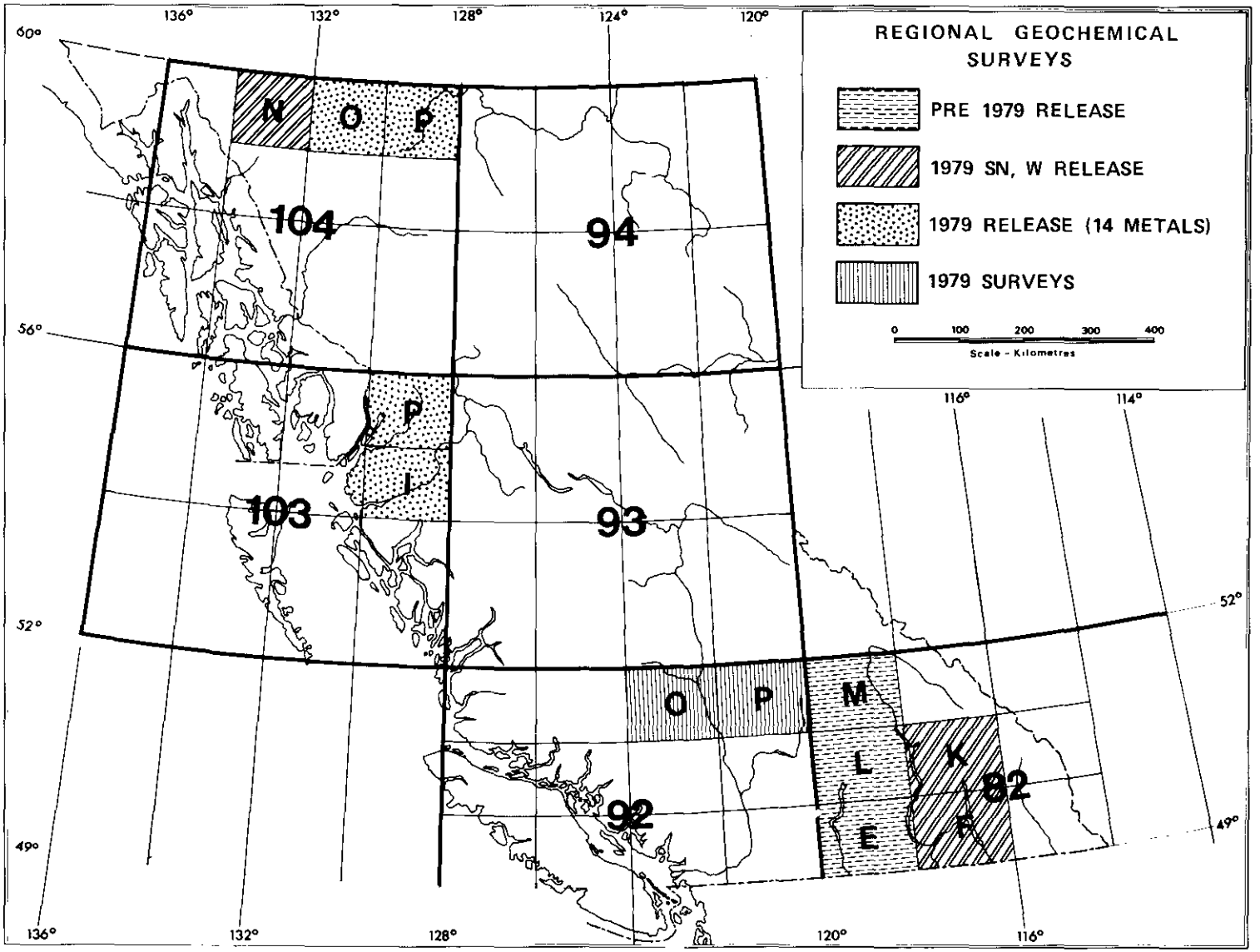


Figure 61. Index map — regional geochemical surveys.