

MAIN MAP LEGEND

**Topography**  
Surface contours and elevation in feet (interval 500 feet)

**Geology**  
Geological boundary

**QUATERNARY**  
Unconsolidated deposits

**QUATERNARY AND TERTIARY**  
Tertiary and/or Quaternary sand and gravel

**CRETACEOUS**

**Wapiti Formation**  
Kw1

**Puwakawau Formation**  
Kw2

**Bad Heart Formation**  
Ksh

**Kaskapau Formation**  
Kk

**Kaskapau Formation, Lower Member**  
Kk1

**Durvergan Formation**  
Kd

**Shafsbury Formation, Upper Member**  
Kshu

**Base of the Fish Scales marker horizon**  
Kshf

**Shafsbury Formation, Lower Member**  
Kshl

**Peace River Formation, Cadotte Member**  
Kpc

**Peace River Formation, Norman Member**  
Kpn

**Peace River Formation, Nodkin Member**  
Knm

**Loon River Formation**  
Kl

**Basal Concretion, Bluskey and Getting Formations**  
M

**MISSISSIPPIAN**  
Mississippian

**Lithology**

Sand and gravel  
Shale  
Shale and sandstone  
Sandstone and siltstone  
Limestone

**Hydrography**  
Lake or slough, permanent  
Lake or slough, seasonal  
Stream, perennial  
Stream, intermittent  
Natural pond or water hole  
Surface water divide  
Area of noticeable salt precipitates

**Hydrogeology**  
Spring, flow rate unknown  
Spring, flow rate known, L's (gpm)  
Direction of groundwater flow

**Groundwater Probability?**  
Range of average expected yield of wells in L's (gpm)

Probable: estimated from quantitative information (pump tests, bail tests, etc.)  
Possible: estimated from qualitative information (flow regime, lithology, etc.)

1-2 (25-100)  
0.1-0.4 (1-5)  
<0.1 (<1)

**Wells and Other Artificial Works**  
Depth Scale

Water well, nonflowing  
Water well, shallow depth  
Alberta Research Council test well  
Water well, 20-year safe yield calculated from apparent transmissivity  
Water well, 20-year safe yield calculated from a good bail test or a short pump test  
Water well, 20-year safe yield calculated from a pump test of sufficient length to reflect regional hydraulic conditions  
Water well, feature was dry when visited  
Shot hole  
Shot hole, flowed, known depth  
Dugout or borrow pit  
Gas well  
Abandoned well, drilled for oil or gas  
Structure, metallic  
Depth of test hole

**Hydrochemistry**

Calcium + magnesium + bicarbonate  
Sulfate + potassium + nitrate

Note: When the sodium + potassium is shown, Ca + Mg are represented as a unit for the test log.

Total dissolved solids in milligrams per litre (mg/l)  
defined  
approximate

Isogram along which calcium + magnesium constitutes 60 percent of total cations; teeth indicate direction of lesser calcium + magnesium content  
defined  
approximate

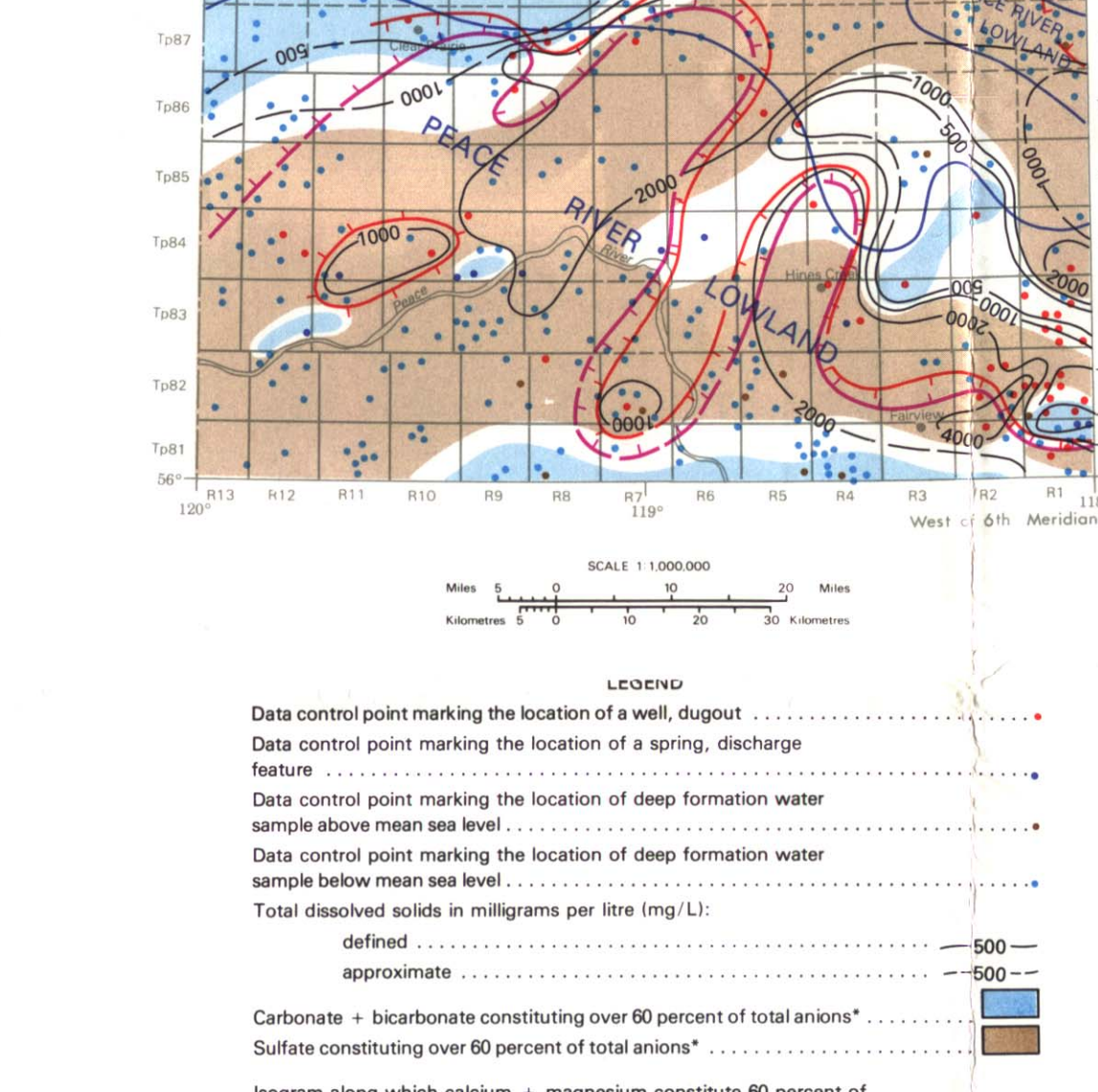
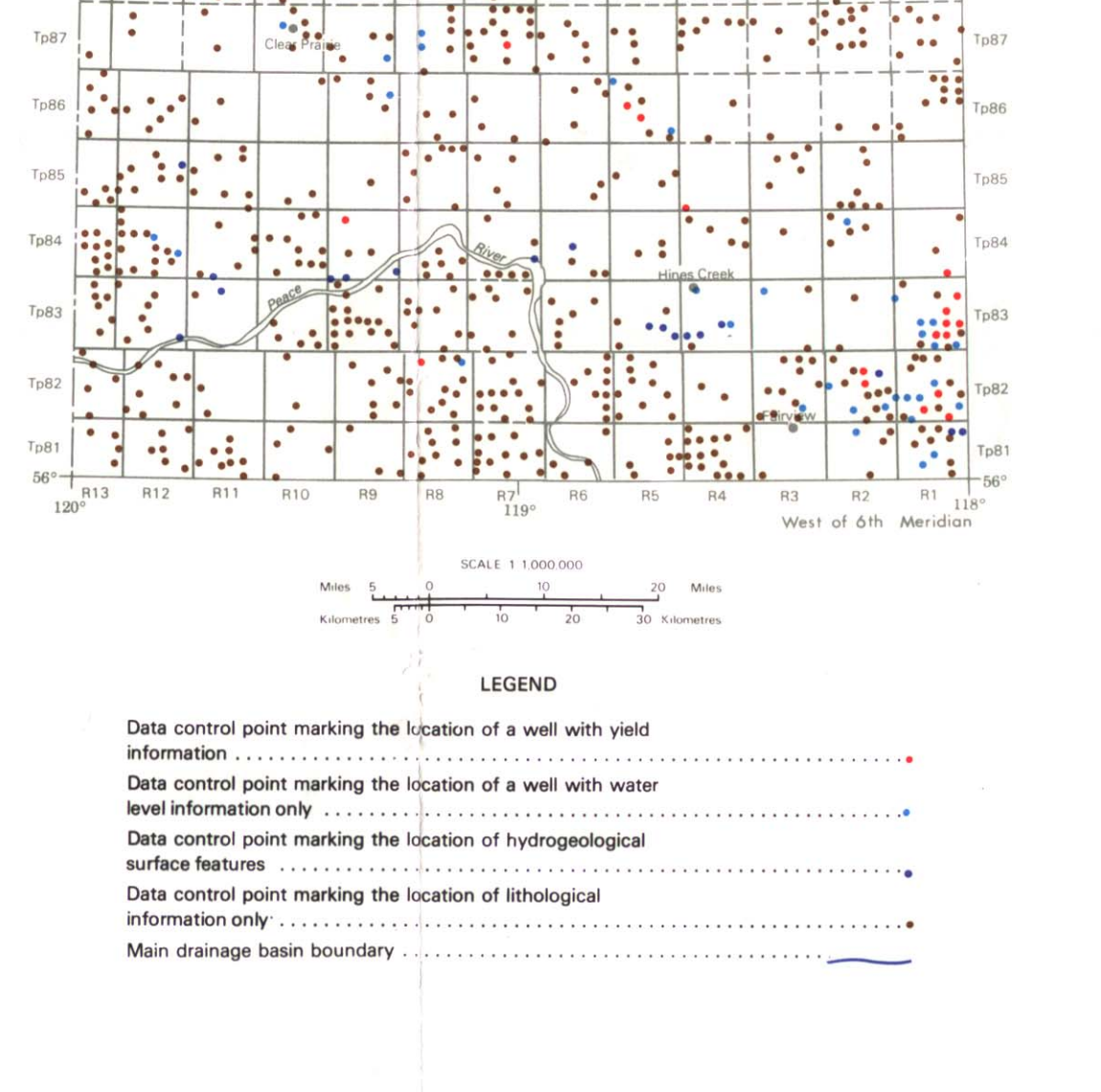
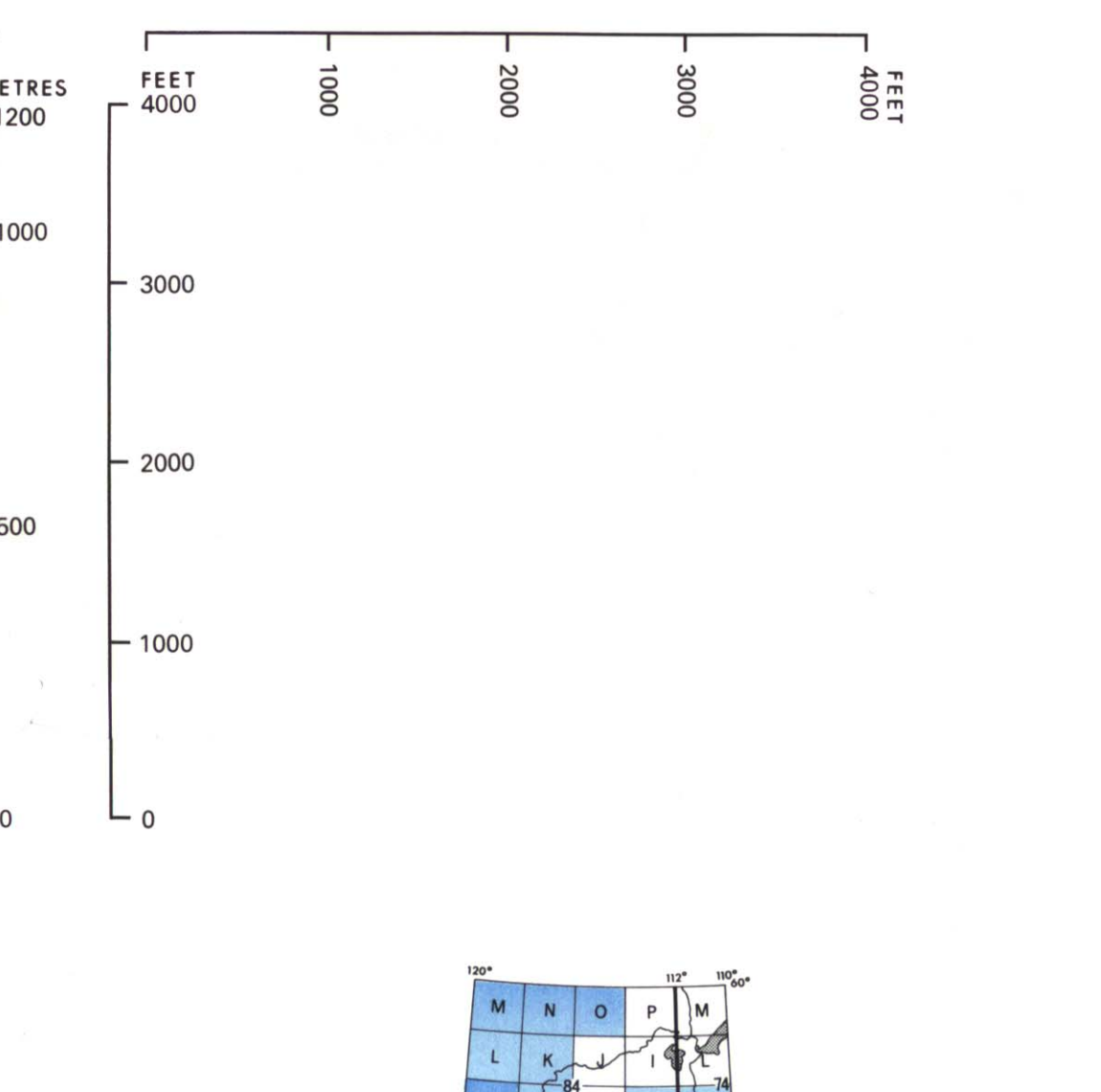
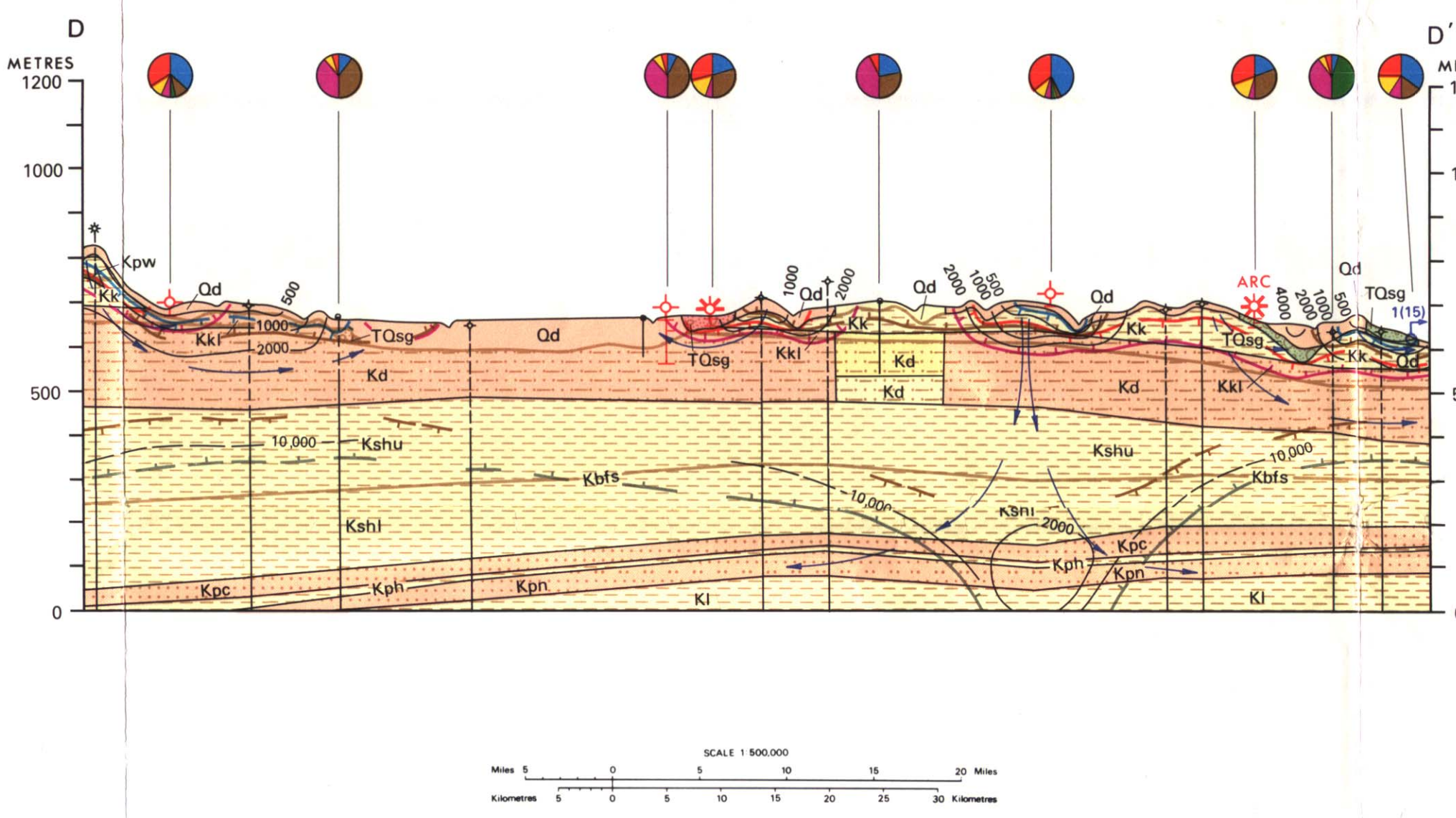
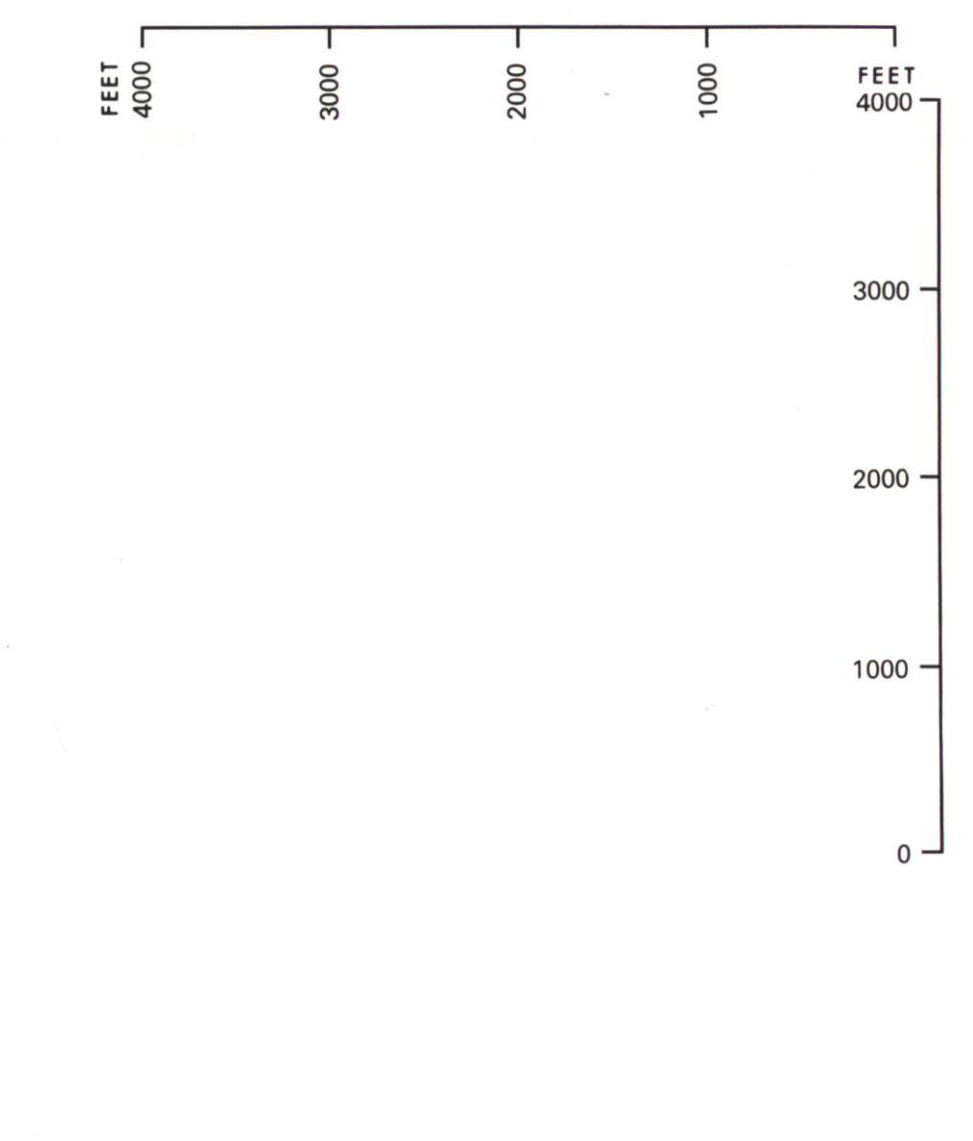
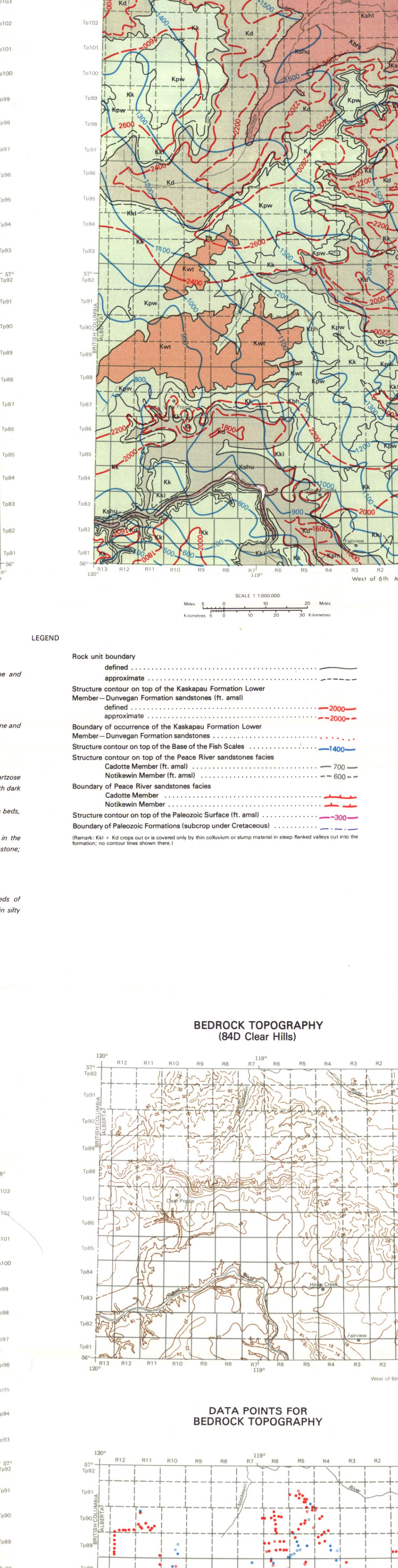
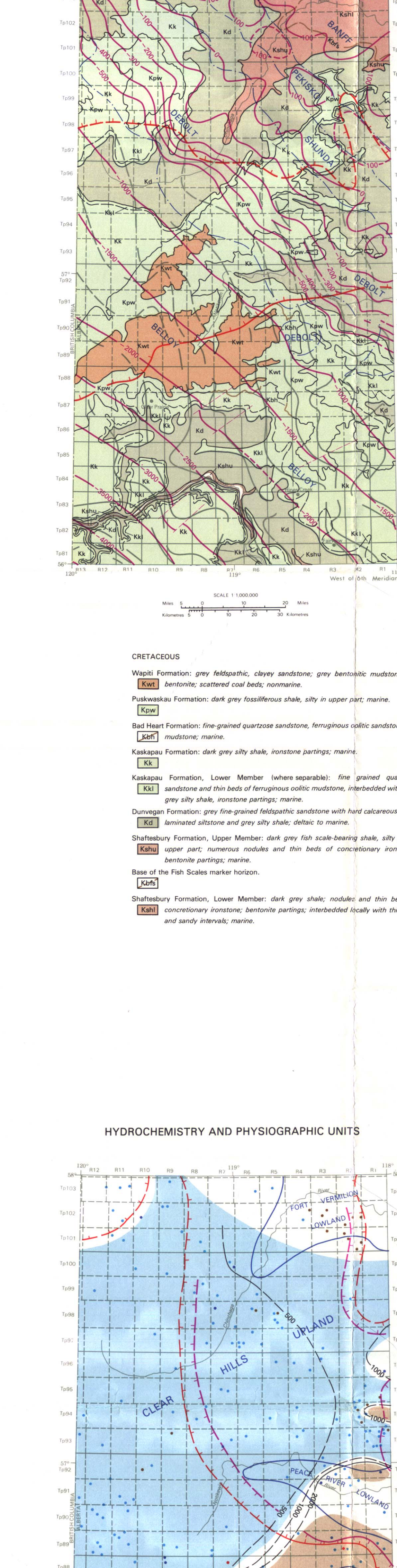
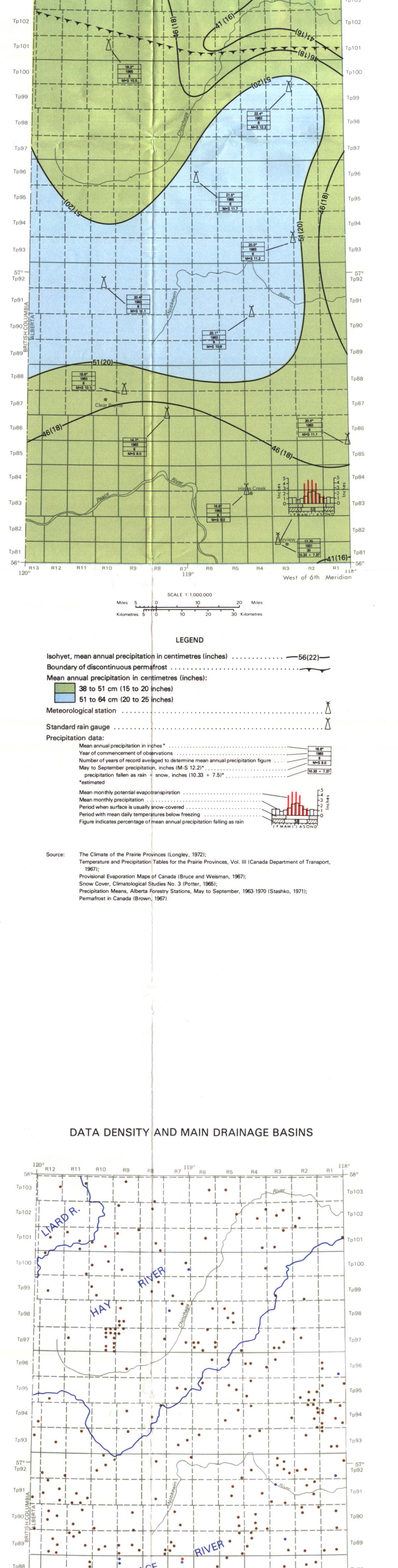
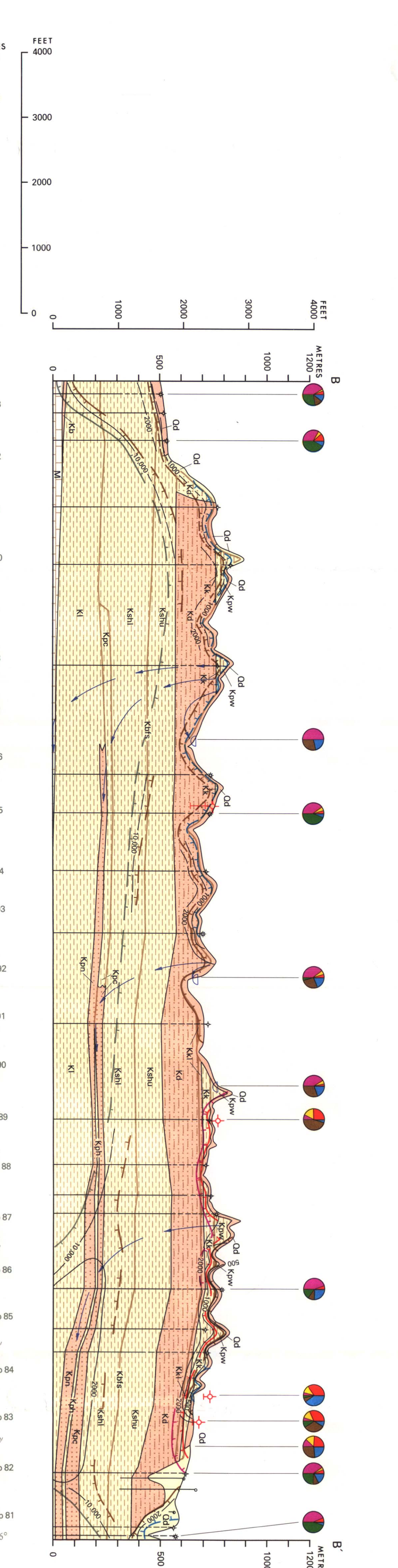
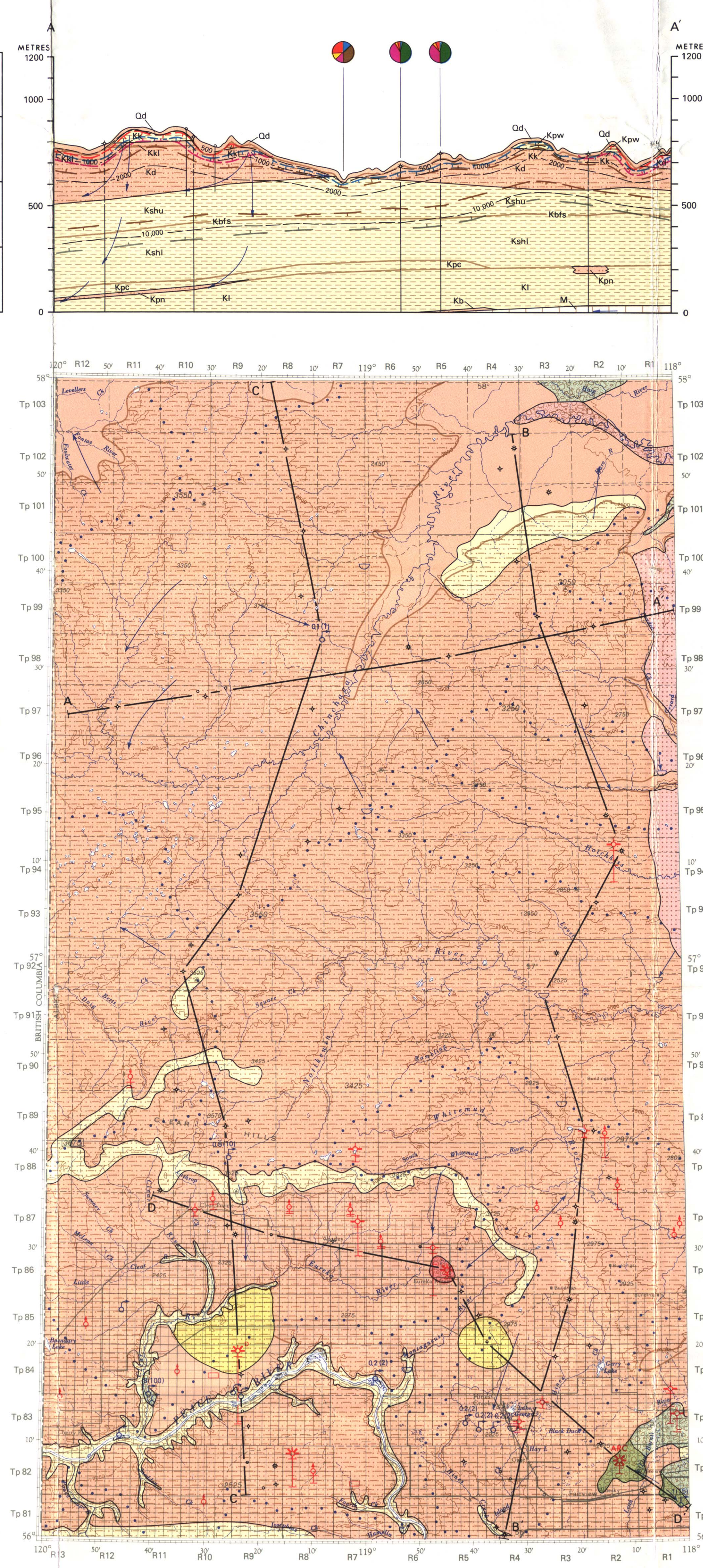
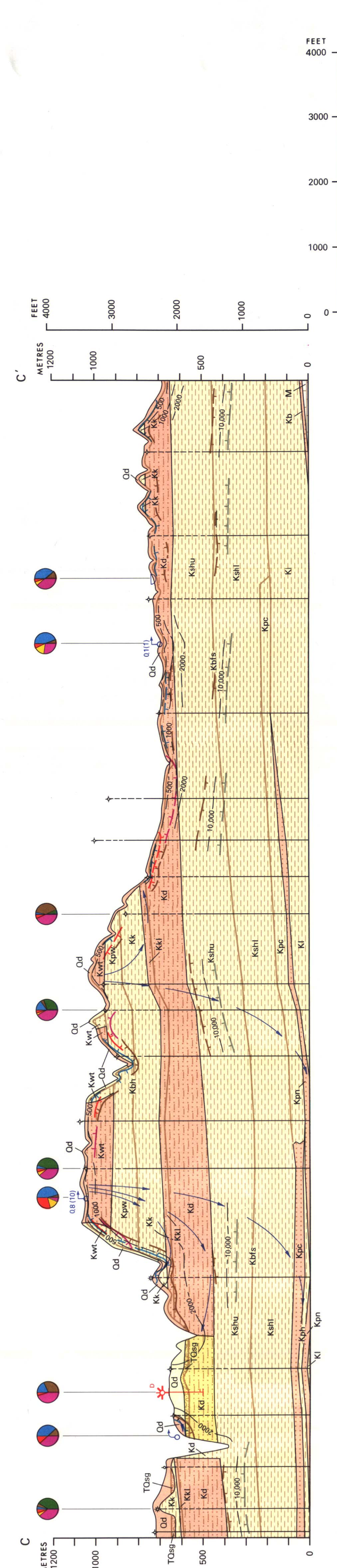
Isogram along which sodium + potassium constitutes 60 percent of total cations; teeth indicate direction of lesser sodium + potassium content  
defined  
approximate

Isogram along which carbonate + bicarbonate constitutes 60 percent of total anions; teeth indicate direction of lesser carbonate + bicarbonate content  
defined  
approximate

Isogram along which sulfate constitutes 60 percent of total anions; teeth indicate direction of lesser sulfate content  
defined  
approximate

Isogram along which chloride constitutes 60 percent of total anions; teeth indicate direction of lesser chloride content  
defined  
approximate

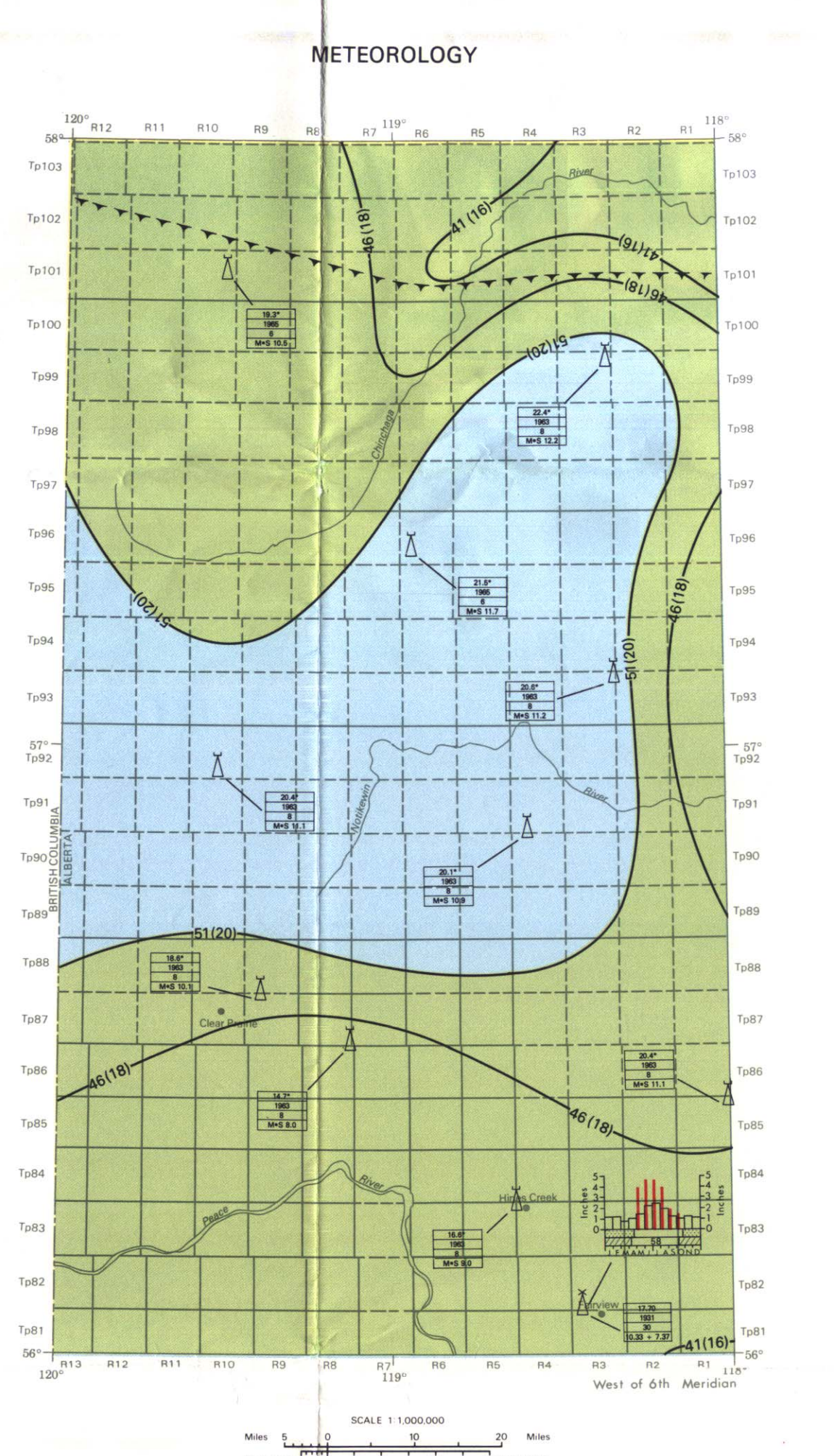
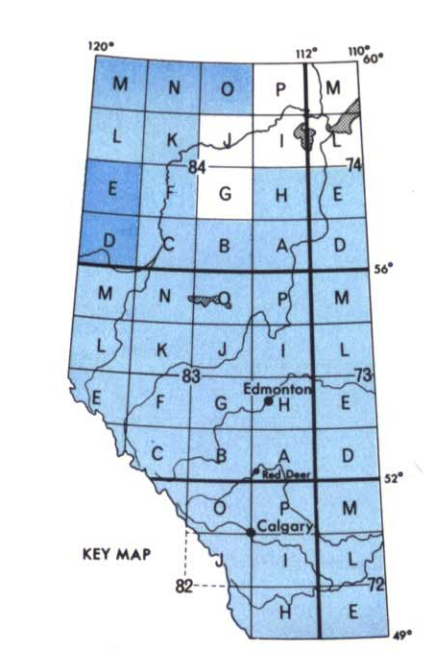
\*Interpolated or estimated per million base



All elevations in feet and metres above mean sea level.  
Vertical exaggeration of the hydrogeological profiles is approximately 40X.  
An expanded legend and explanatory notes (Earth Science Report 72-12) for use with this hydrogeological map series is available from Alberta Research Council, Edmonton, Alberta, Canada.  
Map to accompany Earth Science Report  
Hydrogeology by G. Osroy.

**HYDROGEOLOGICAL MAP  
CLEAR HILLS - CHINCHAGA RIVER  
ALBERTA**

NTS B4-D-E



**LEGEND**

Isopleth, mean annual precipitation in centimetres (inches) ..... 5622

Boundary of discontinuous permafrost

Mean annual precipitation in centimetres (inches):  
38 to 51 cm (15 to 20 inches)  
51 to 64 cm (20 to 25 inches)

**Meteorological station**

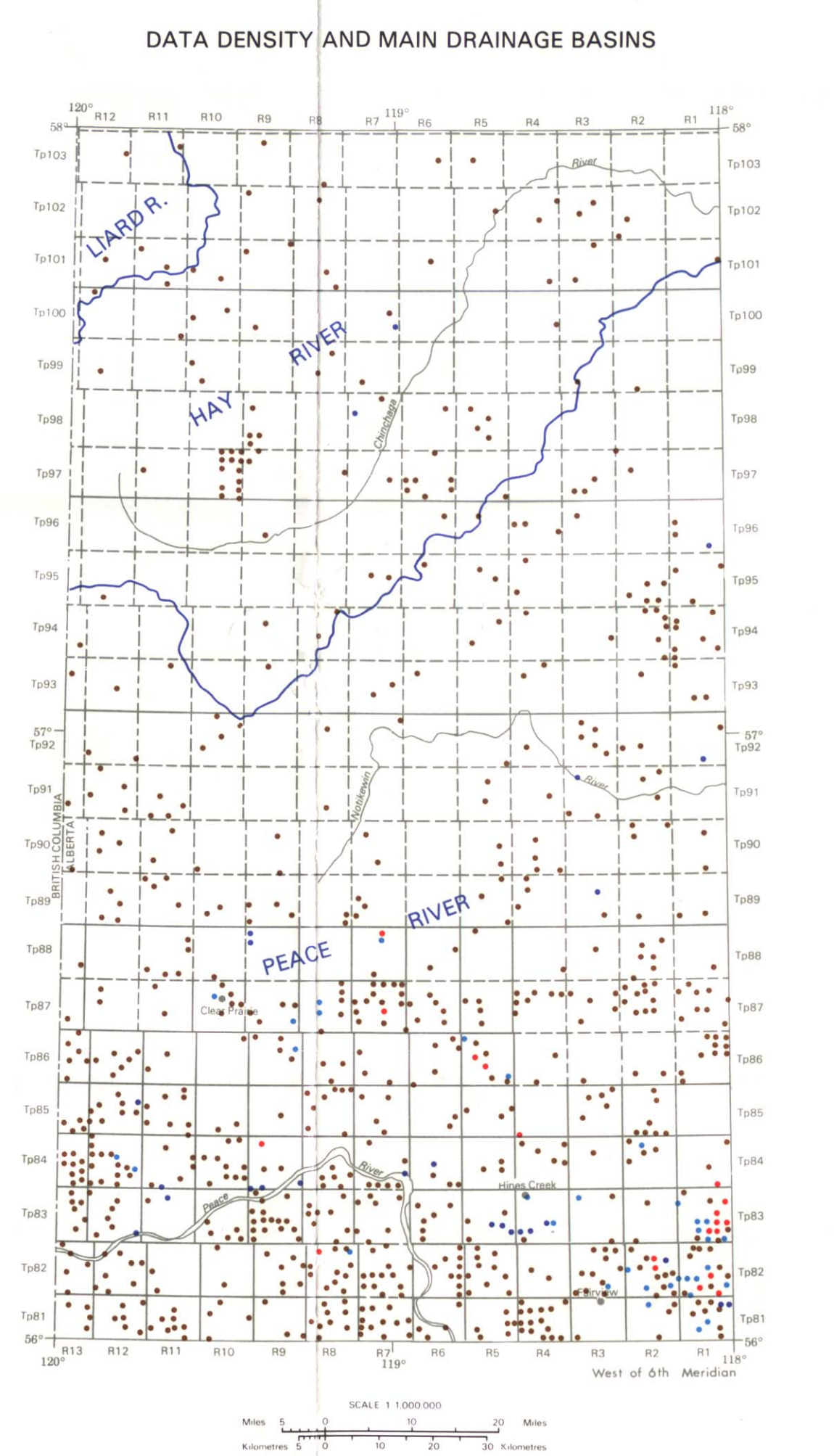
Standard rain gauge

Precipitation data

Year of commencement of operation  
Number of years of recorded precipitation  
Max to September precipitation (inches) (6.5 to 2.0")  
Annual average (inches) (16.8 to 7.5")

Mean monthly potential evapotranspiration  
Potential evapotranspiration (inches) covered  
Potential evapotranspiration (inches) remaining  
Figure indicates percentage of mean annual precipitation being in use

Source:  
The Climate of the Peace Province (Langley, 1952);  
Temperature and Precipitation Tables for the Peace Province, Vol. 41 (Canadian Department of Transport, Provisional Publication Office of Canada (Brace and Wadsworth, 1967);  
From Census, Climatological Series No. 37 (1952);  
Precipitation Means, Alberta Weather Station, May to September, 1963-1970 (Edmonton, 1971);  
Permafrost in Canada (Barnes, 1967)



**LEGEND**

Data control point marking the location of a well with yield information

Data control point marking the location of a spring, discharge feature

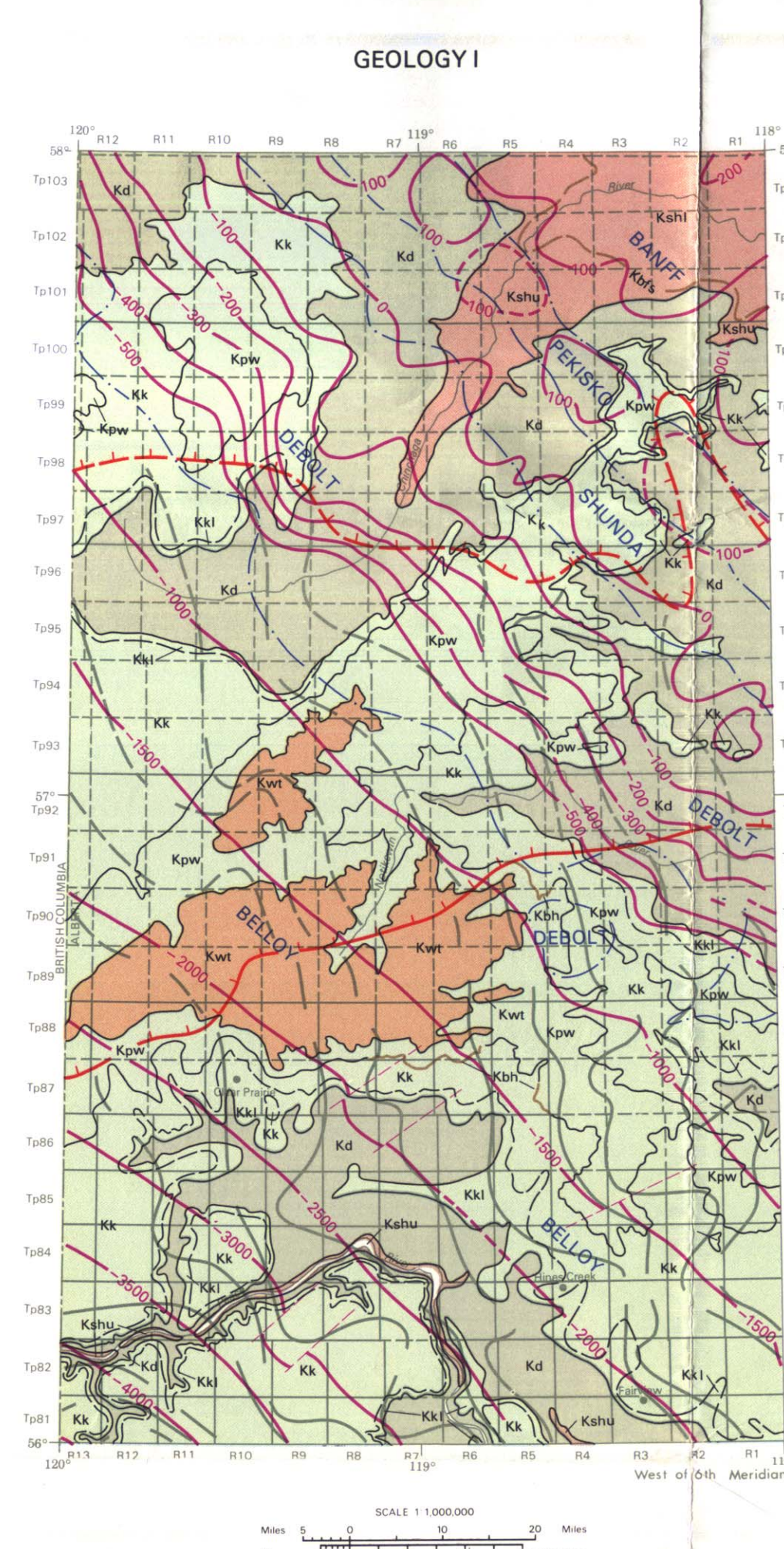
Data control point marking the location of a well with water level information only

Data control point marking the location of hydrogeological surface features

Data control point marking the location of deep formation water sample below mean sea level

Data control point marking the location of lithological information only

Main drainage basin boundary



**LEGEND**

**CRETACEOUS**

Wapiti Formation: grey siltstone, clayey sandstone; grey arenaceous mudstone and siltstone; scattered coal beds; nonmarine

Puwakawau Formation: dark grey fossiliferous shales, silty in upper part; marine

Bad Heart Formation: fine-grained quartzose sandstone, arenaceous siltstone and mudstone; marine

Kaskapau Formation: dark grey silty shales, siltstone partings; marine

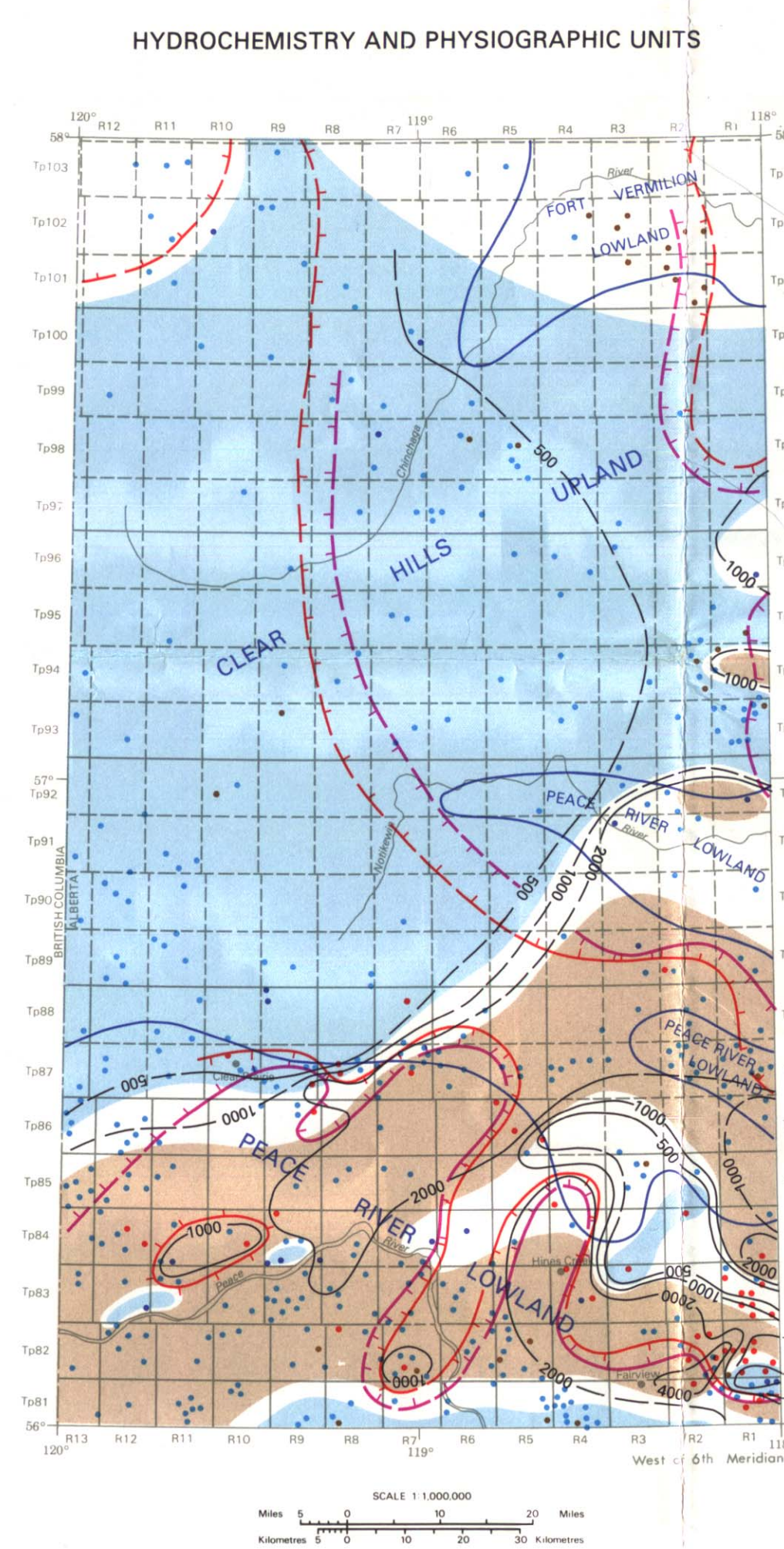
Kaskapau Formation, Lower Member (where separable): fine-grained quartzose sandstone and thin beds of ferruginous calcareous mudstone, interbedded with dark grey silty shales, siltstone partings; marine

Durvergan Formation: grey fine-grained siltstone with fossil calcareous beds, silty in upper part; arenaceous mudstone and thin beds of concretionary sandstone; arenaceous partings; marine

Shafsbury Formation, Upper Member: dark grey fish scale-bearing shales, silty in upper part; arenaceous mudstone and thin beds of concretionary sandstone; arenaceous partings; marine

Base of the Fish Scales marker horizon

Shafsbury Formation, Lower Member: dark grey shales, nodules and thin beds of concretionary sandstone; arenaceous partings; interbedded locally with silty and sandy interturbidite; marine



**LEGEND**

Data control point marking the location of a well, dugout

Data control point marking the location of a spring, discharge feature

Data control point marking the location of deep formation water sample above mean sea level

Data control point marking the location of deep formation water sample below mean sea level

Total dissolved solids in milligrams per litre (mg/l)  
defined  
approximate

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defined  
approximate

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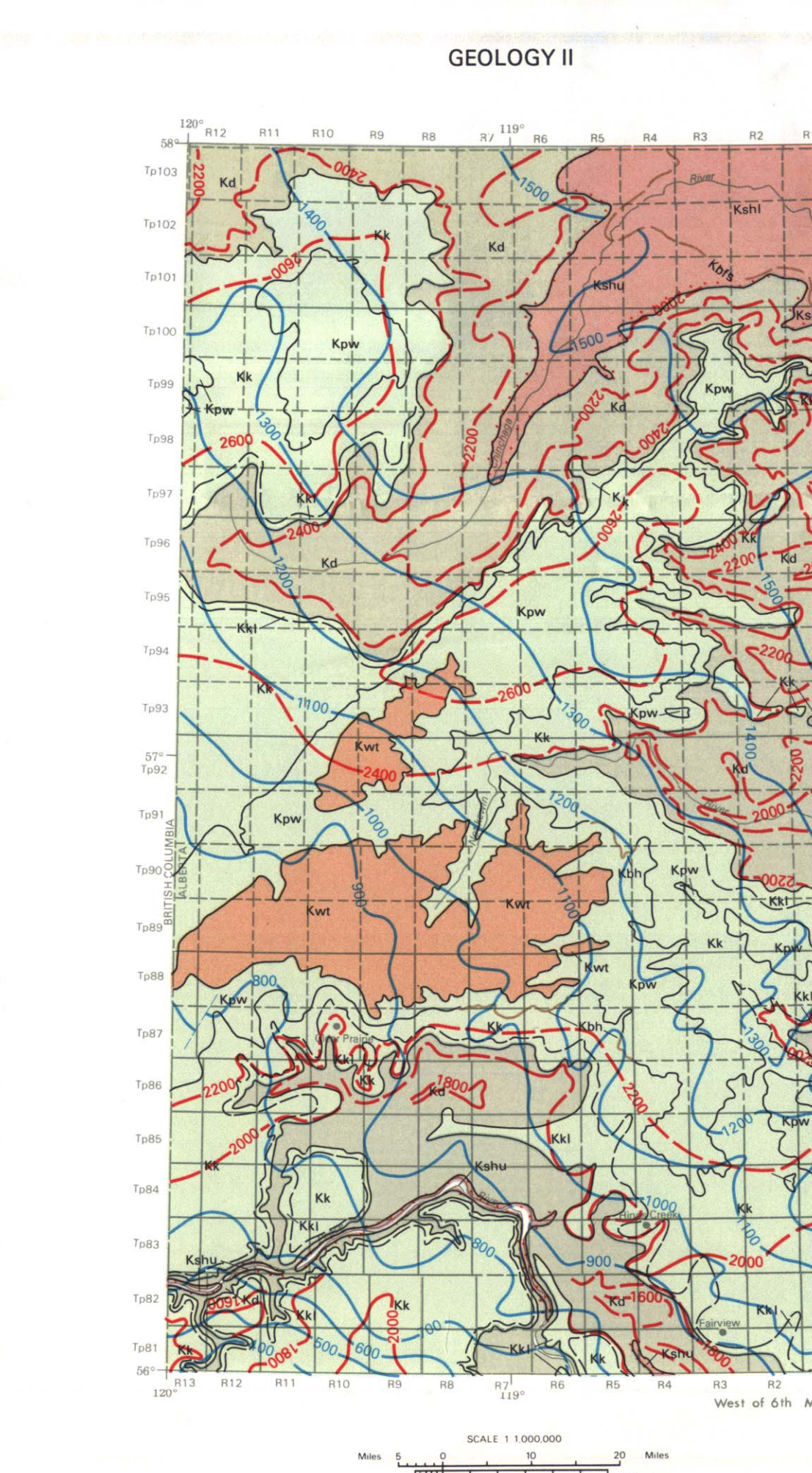
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defined  
approximate

Isogram along which sulfate constitutes 60 percent of total anions; teeth indicate direction of lesser sulfate content  
defined  
approximate

Isogram along which chloride constitutes 60 percent of total anions; teeth indicate direction of lesser chloride content  
defined  
approximate

Boundary of physiographic unit

\*Interpolated or estimated per million base



**LEGEND**

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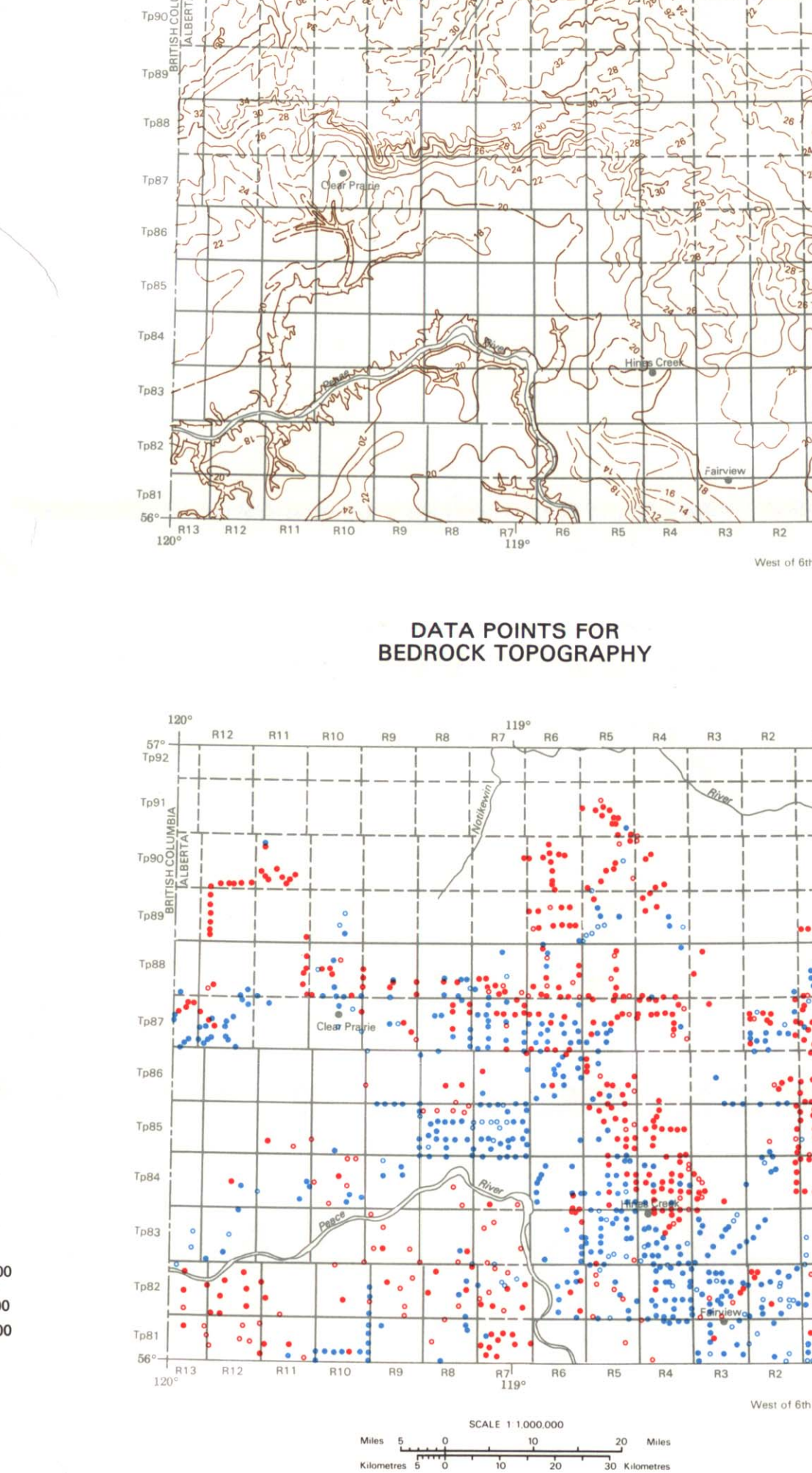
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**LEGEND**

Steep-floored valley cut into bedrock on the slopes bedrock crops out, or is covered only by thin calcareous or silty material

Contour line (numbers in hundred feet)  
defined  
approximate

Hole with lithologic or electric log:  
reached bedrock  
reached bedrock with more than 10 feet of sand, sand + gravel or gravel observed  
stopped in surficial deposits with more than 10 feet of sand, sand + gravel or gravel observed