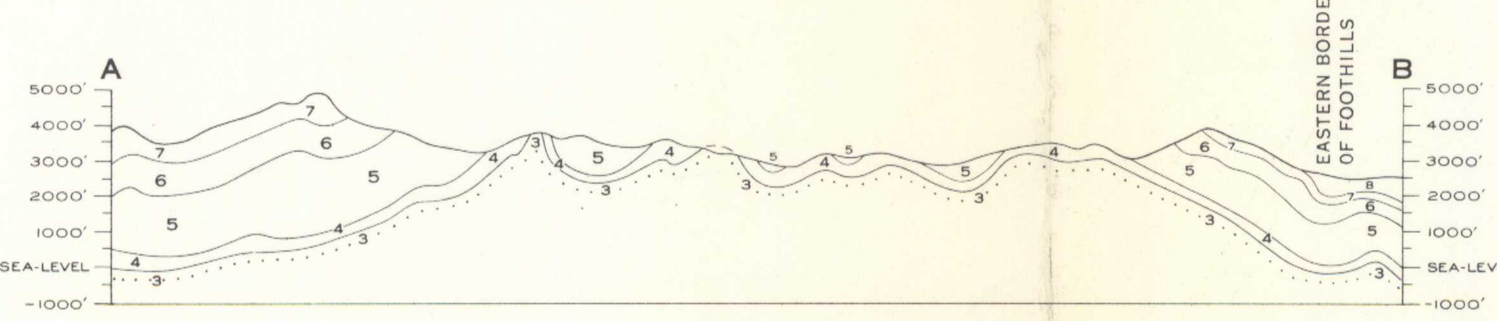
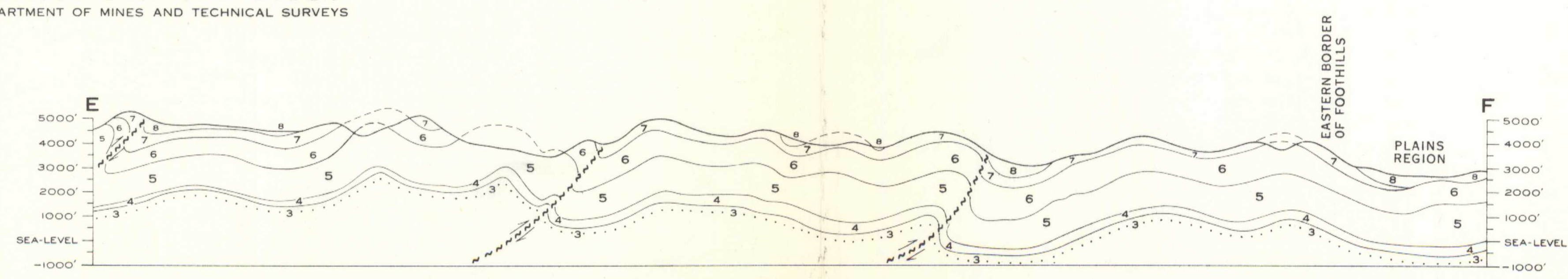
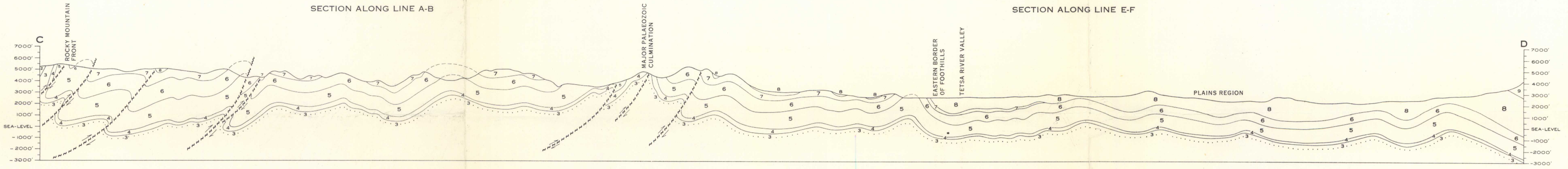
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS



SECTION ALONG LINE A-B



SECTION ALONG LINE E-F



SECTION ALONG LINE C-D

LEGEND

MESOZOIC

CRETACEOUS
LOWER CRETACEOUS

- 9 — SIKANNI FORMATION: sandstone and shale
- 8 — BUCKINGHORSE FORMATION: dark grey shales

TRIASSIC
MIDDLE TRIASSIC

- 7 — LIARD FORMATION: medium-to-coarse-grained sandstone; minor siltstone and limestone

LOWER AND MIDDLE TRIASSIC

- 6 — TOAD FORMATION: fine sandstone, siltstone and mudstone; minor limestone

LOWER TRIASSIC

- 5 — GRAYLING FORMATION: shale, siltstone, and mudstone; minor limestone and sandstone

PALAEOZOIC

PERMIAN (?)

- 4 — Chert, massive; dark bluish grey

MISSISSIPPIAN

- 3 — KINDLE FORMATION: limestone and sandstone; minor black shale

DEVONIAN AND MISSISSIPPIAN (?)

- 2 — Shale, hard, siliceous

DEVONIAN
MIDDLE DEVONIAN

- 1 — Limestone, grey, massive in upper part

Geological boundary (defined, approximate assumed)

Bedding (inclined, overturned)

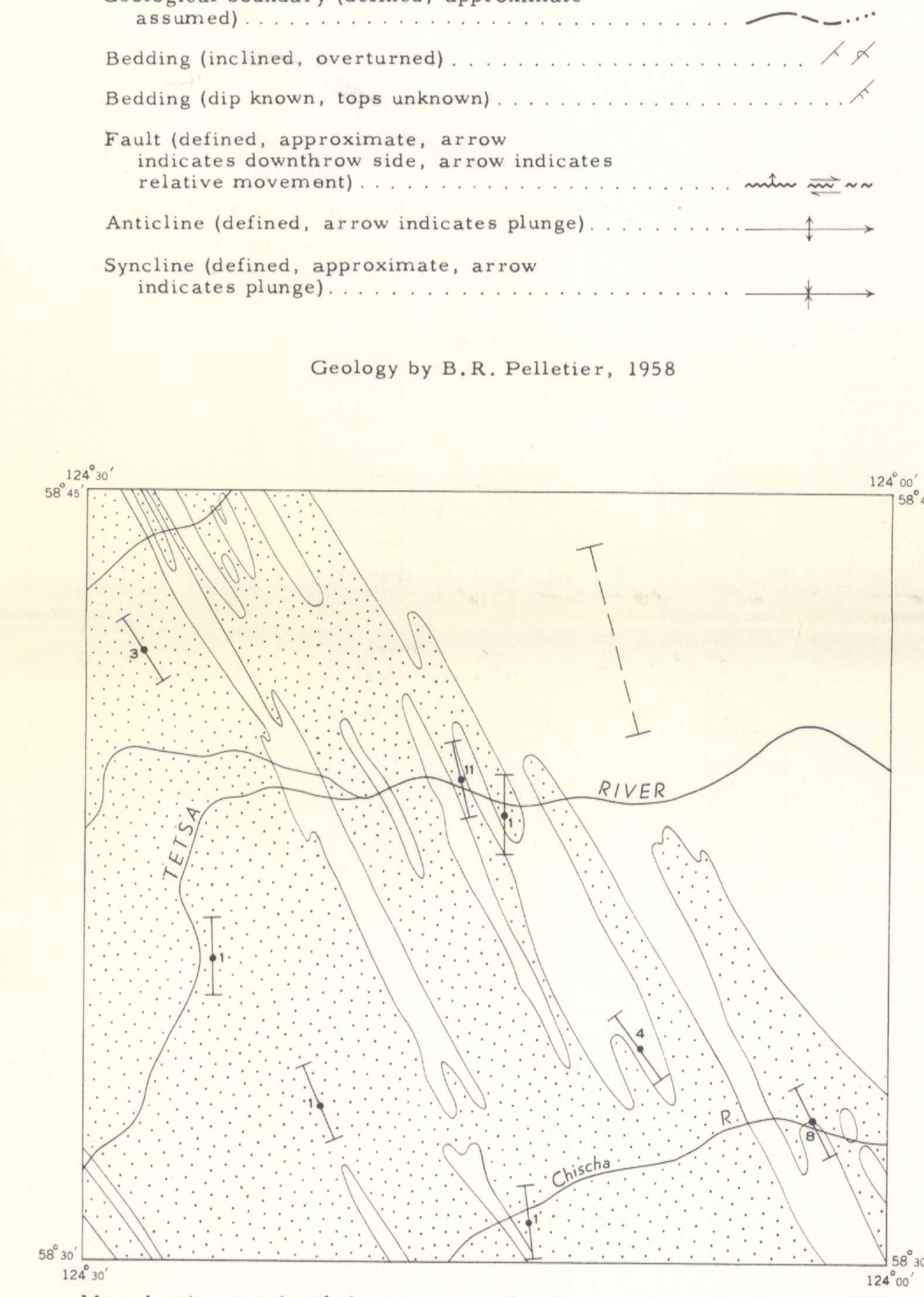
Bedding (dip known, tops unknown)

Fault (defined, approximate, arrow indicates downthrow side, arrow indicates relative movement)

Anticline (defined, arrow indicates plunge)

Syncline (defined, approximate, arrow indicates plunge)

Geology by B.R. Pelletier, 1958



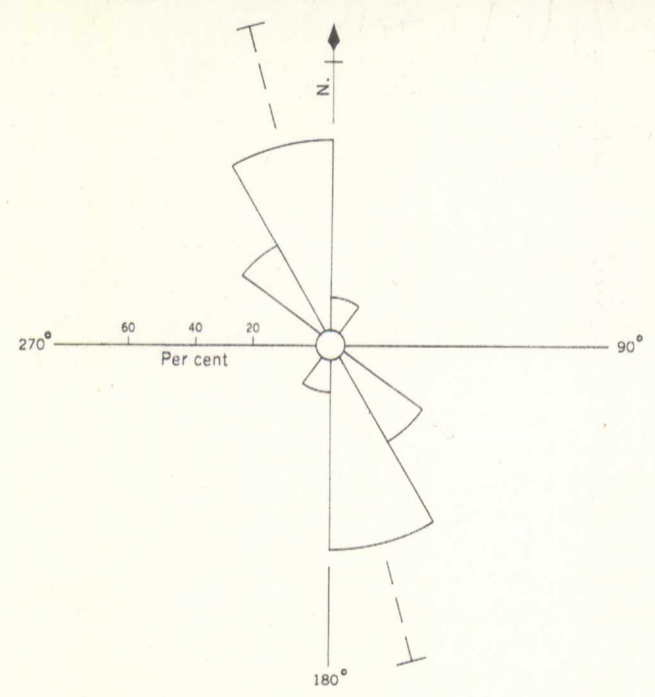
Map showing trends of shore zones and sedimentation belts during Middle Triassic times deduced from variation in bedding thickness (not shown) and trends of wave ripple marks

Scale: 1 inch to 4 miles

Approximate area of Triassic outcrops

Mean trends of wave ripple marks (corrected for folding) numerals indicate number of measurements

Mean presumed shore zone and sedimentary trends based on 30 measurements of wave ripple marks



Rose diagram showing frequency distribution (in per cent) of 30 ripple mark trends

PRELIMINARY SERIES

SHEET 94 K/9

PUBLISHED, 1959
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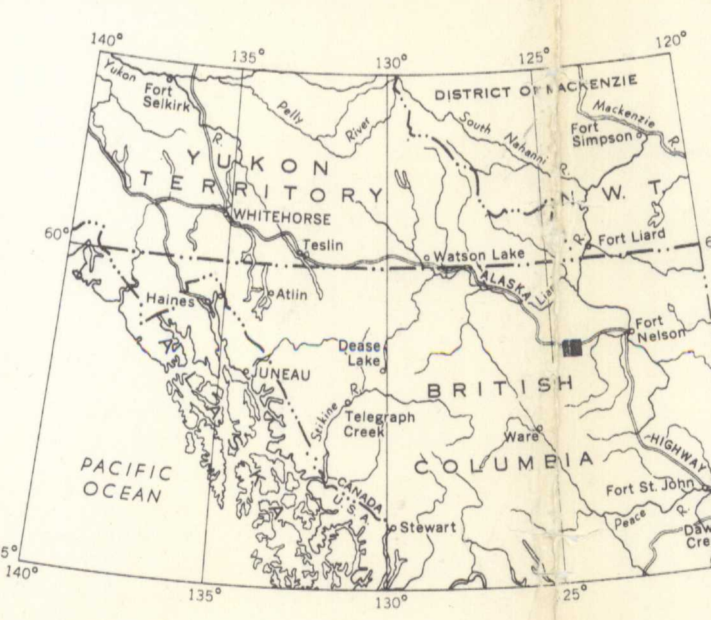

INDEX MAP

MAP 29-1959
GEOLOGY
TETSA RIVER
PEACE RIVER DISTRICT
BRITISH COLUMBIA

Scale: One Inch to One Mile = $\frac{1}{63,360}$

Miles

1 ½ 0 1 2 3

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa, Ontario

LEGEND

Main highway

Other roads

Intermittent stream

Marsh

Contours (interval 500 feet)

Approximate magnetic declination, 30° 44' East

Cartography by the Geological Survey of Canada, 1959

In response to public demand for earlier publication, Preliminary Series maps are now being issued in this simplified form, thereby effecting a substantial saving in time. There is no loss of information, but the maps will be clearer to read if all or some of the map-units are hand-coloured.

DESCRIPTIVE NOTES

The map-area lies 75 miles west of Fort Nelson, British Columbia; it is reached by road along the Alaska Highway. Old trails extend north and south of the road giving access to the area for pack-horses.

Three major physiographic subdivisions are recognized: (1) the plains region in the northeast corner, characterized by high buttes and mesas of Cretaceous sandstones; (2) the foothills belt consisting of an eastern half, of low, rolling hills and low-lying swampy terrain underlain chiefly by Cretaceous shales, and a western half which is a typical valley and ridge province, mainly of folded upper Palaeozoic and Triassic strata trending northwesterly; and (3) the front ranges of the Rocky Mountains in the extreme southwest. The mountains are composed of Palaeozoic and presumably older rocks. Due to stream dissection and later modification by valley glaciers, the physiography is expressed as sharp peaks, aretes and cirques. Many local snow fields occur several miles to the west.

Tree-line extends to the 4,700-foot contour in the eastern foothills and almost to the 5,000-foot contour in the west. Slopes and valleys are heavily wooded, and are covered in some areas with thick brush or deep moss.

Drainage consists of three parallel stream systems flowing easterly and transecting the regional physiographic trends. These stream systems are as follows: the Dunedin in the north, the Tetsa in the upper third of the area, and the Chischa in the south. The pattern is trellis, modified at the mountain headwaters to dendritic. Lakes are rare and small.

Glaciation has affected even the highest hills and has modified the major river valleys. Toward the west, till deposits are 300 feet thick in the river valleys but decrease to 15 feet, or less, in the east. The abundance of limestone, dolomite and sandstone blocks in the ice-borne debris indicates that it is derived from the mountains to the west, where these rocks outcrop. However, some blocks of sandstone and conglomerate found in high-level creeks in the western foothills belt were derived from outcrops of the plains region to the east so that a westerly marginal limit to continental glaciation is established in this area.

All formations are of sedimentary origin. The oldest formation (1), a grey, massive limestone, has abundant corals of middle Devonian age in the upper beds. Overlying the limestone are black shales and siliceous mudstones (2) commonly pyritic and weathering a rusty orange-brown. They are separated from the limestone by a sharp disconformable contact. The upper contact was not examined but the unit appears to be overlain by the Mississippian Kindle formation. Within the Kindle formation (3) the limestone may be coarsely crystalline and crinoidal, or dense and unfossiliferous. Some light brown weathering sandstone occurs in the upper beds while the lower part contains light brown weathering grey limestone and interbedded black shales in intervals 2 to 3 feet thick. The Kindle formation is overlain disconformably by 165 feet of dark bluish grey blocky chert (4) assumed to be of Permian age. The overlying Triassic strata, in disconformable contact with the chert, comprises three formations. The oldest is the Grayling formation (5), consisting of approximately 1,500 feet of dark grey shale and minor siltstones. The Grayling passes gradationally into the Toad formation (6) which includes minor dark grey shales and limestone, considerable mudstone and several resistant units of siltstone and fine sandstone. In the west, the Toad is more than 1,200 feet thick but decreases to less than 800 feet in the east. It passes gradationally upward into the Liard formation (7) which also contains minor shales, siltstones, and limestone. The Liard has coarser-grained sandstones which weather a deeper brown than sandstones of the Toad formation and form resistant ledges on the hills and ridges. The Liard formation is more than 250 feet thick in the west and decreases to 25 feet in its most easterly exposure; it disappears a few miles farther east. This disappearance may be due to erosion. The presence of marine fossils throughout the Triassic formations indicates a marine origin of those beds in this area. The average of 30 ripple-mark trends indicates a Middle Triassic shore zone trending north-northwest (see insert map). Trend of the ripple-marks has been corrected for folding so that values represent original trends. The rose diagram shows these trends plotted for every 30 degrees of arc, and on both semicircles as the trend can be read from either end of the needle. Two feet of conglomerate overlies the Triassic and this in turn is overlain by a few feet of dark grey shale containing poorly preserved woody material. These beds are structurally conformable with the underlying Liard and overlying Buckinghorse formations. Their age is not known but they are tentatively included in the Cretaceous. The Cretaceous Buckinghorse formation (8) consists of soft black shale, which is pyritic, and weathering rusty brown and may be more than 2,300 feet thick. The basal 400 feet contains ironstone concretions. Fossils from above the concretionary shales and from the overlying Sikanni sandstones (9) are of Albian age.

Structure is the fundamental control of the physiography. Major and minor fold axes trend northwesterly so that trends of valleys and ridges may coincide with those of fold axes. Many folds extend across the entire map sheet either as single or en echelon compound structures.

Beds underlying the plains region are almost flat lying. Troughs and crests of folds in the eastern foothills are highly contorted and disrupted by several minor dislocations. In this region, faulting is confined to the noses of folds and appears to be of minor extent. In the western foothills belt where compound folding is well developed, the strata are openly folded and show mild asymmetry. Where faulted the beds are contorted and overturned to the east. As the faults disappear along the strike, the folds assume normal, open attitudes. The faults occur at only a few localities and are about 1 to 10 miles in extent. There are several culminations in which rocks as old as the Kindle formation are exposed. One of the largest occurs in the southeast corner on a broad compound anticline; another occurs on the Tetsa River on a closely folded compound anticline which is faulted on its eastern flank; other minor folds exposing Mississippian rocks lie to the north. In the western foothills belt, synclinal valleys are normally occupied by Cretaceous beds, and the anticlinal valleys by the Grayling formation. The front ranges of the Rocky Mountains are essentially a major anticline overturned to the east and severely contorted where Palaeozoic and possibly lower Triassic strata are in fault contact with the Triassic strata of the foothills.

Conjugate jointing is best developed in the chert, limestone, and sandstone but is present in all formations over the entire area. Mean strike of one set is N55°E and of a second set is N35°W. Cleavage is prominent in zones of faulting, and in beds which are steeply folded or overturned. In cross-sections of folds, the cleavage traces generally fan about the axes of folds.

A deposit of barite occurs near mile 397 on the Alaska Highway. Some copper showings have been reported a few miles southwest of the map-area. Tar was found along bedding planes in the Toad formation along the south fork of the Tetsa River south of mile 382. Numerous cold sulphur springs are associated with the Toad and Grayling formations at low elevations in the western foothills belt.

Sedimentation trends in the plains region are probably parallel to isopachs and shore-zone trends as indicated by ripple-marks. Consideration of these trends and their relationships with proven gas fields may indicate areas for profitable petroleum exploration.

The nature of the several folds in the Cretaceous and Triassic beds suggests that Devonian and older strata may be involved in folds of comparable magnitude to those observed in the foothills belt that reach culminations in the vicinity of the culminations evident at the surface.

MAP 29-1959
TETSA RIVER
BRITISH COLUMBIA
SHEET 94 K/9