

Province of British Columbia Ministry of Energy, Mines and Petroleum Resources
Ministry of Energy, Mines and Petroleum Resources
GEOLOGICAL SURVEY BRANCH

CRETACEOUS AND TERTIARY STRATIGRAPHY & INDUSTRIAL MINERALS, HAT CREEK, BRITISH COLUMBIA

Province of British Columbia Ministry of Energy, Mines and Petroleum Resources
Ministry of Energy, Mines and Petroleum Resources
GEOLOGICAL SURVEY BRANCH

CRETACEOUS AND TERTIARY STRATIGRAPHY AND INDUSTRIAL MINERALS, HAT CREEK, SOUTHERN B.C. (62°12' E., 49°30' N.)
P.B. Read

INTRODUCTION:
The Hat Creek valley is the most poorly exposed area of Tertiary sediments in southern B.C. The geological structure and history are well known because of more than 50 years of research. A detailed study of features of rotary drilling, 173 test ports, and detailed magnetometer and gamma-ray surveys have been contained in numerous private reports by Golder Associates and B.C. Hydro. These data were supplied to the author by P.T. McCullough of B.C. Hydro.
A significant thickness of coal-bearing Tertiary strata in Hat Creek valley dates from the late century (Dawson, 1879 and 1890), and MacKay (1926) was the first to describe the coal-bearing coal seams penetrated by drilling. These data were incorporated in the regional geological map of the area by McCaggars (1932), and Monger and McMillan (1982). In 1974 B.C. Hydro started extensive drilling, pitting, and geophysical investigation in the valley to support the establishment of a thermal power plant. Church (1977) presented a detailed geological map of the area, and determined the structure and stratigraphy of the Tertiary rocks. Drilling results to the end of 1975, B.C. Hydro's investigations, and the regional map. File results from a remapping of surface exposures augmented by all available pit and borehole physical data, and the incorporation of 167 new data points to determine the thicknesses of the proposed stratigraphy and structure.

At Hat Creek, Cretaceous sediments are overlain by basement composed of upper Paleozoic Cache Creek Complex and lower Paleozoic units of the Spences Bridge Group that form the slopes of the northerly trending Finney Range (Map A). Over 1600 metres of Eocene and (?) Oligocene sediments, including some 1000 metres of Middle Eocene volcanics, and as many as 400 metres of Cretaceous rocks are exposed beneath a 100 metres or less of overburden that rests on the basement floor. These rocks form two northerly trending synclines separated by a large, roughly east-west, northerly oriented strike-slip faults with minor dip-slip components have a total length of about 5000 metres. The Cretaceous and Tertiary rocks, including Miocene basaltic flows, are large-scale slide blocks of Quaternary age that are up to 4000 metres long and 1000 metres wide, and rest on bedrock at the present valley axis.

STRATIGRAPHY:

Subsequent to the Cretaceous sediments and Tertiary stratified rocks is light grey limestone, a thick sequence of iron-forming Marine Canyon Formation (Pkc). Grey phyllite and siliceous phyllite (Pk) are associated with the Cache Creek Complex underlie a subunit of the clay-rich pellitic exposures. Porphyritic amphibolite, dacite, andesite, and rare basalts (Evd) are found in the Spences Bridge Group that outcrops on the southwest side of the valley. The younger rocks, which form the valley, are mostly thin-bedded sandstone and dolomite.

Widely scattered exposures of bedrock, including fine-grained sandstone and grey siltstone of unit (lksp), and chert-rich pebbles (lk) are found in the valley. The Kamloops Group consists of a thick, laterally continuous, up to 300 metres in thickness, sequence of clastic rocks containing more than 1600 metres of talus and talus-like material. Of all the Tertiary units, the basal volcanic unit is best exposed. It underlies the bedrock syncline ridge along the east side of the valley, and a 5-kilometre-long ridge of talus and talus-like material, a basal unit of rhyolite consists of white, sparsely porphyritic (quartz, feldspar, and plagioclase) flows (Ev) which probably originated from a rhyolitic lava dome in the Trichyte Hills to the northeast. White-weathering rhyolite and dacite (Evd) overlying the rhyolitic flows has been intersected local waterlain lenses of sandstone and dolomite and sandstone and sandstone with the rhyolitic tephra. Palynological collections from the bedrock and talus units of the Middle Eocene age for the unit (Table 1) are consistent with a potassium-rich (K+) fauna (Church et al., 1979) determined from biological, lithological, and mineralogical evidence.

The Kamloops Group consists of a thick, laterally continuous, up to 300 metres in thickness, sequence of clastic rocks containing more than 1600 metres of talus and talus-like material. Of all the Tertiary units, the basal volcanic unit is best exposed. It underlies the bedrock syncline ridge along the east side of the valley, and a 5-kilometre-long ridge of talus and talus-like material, a basal unit of rhyolite consists of white, sparsely porphyritic (quartz, feldspar, and plagioclase) flows (Ev) which probably originated from a rhyolitic lava dome in the Trichyte Hills to the northeast. White-weathering rhyolite and dacite (Evd) overlying the rhyolitic flows has been intersected local waterlain lenses of sandstone and dolomite and sandstone and sandstone with the rhyolitic tephra. Palynological collections from the bedrock and talus units of the Middle Eocene age for the unit (Table 1) are consistent with a potassium-rich (K+) fauna (Church et al., 1979) determined from biological, lithological, and mineralogical evidence.

Table 1. Cretaceous facies and paleoflora

Table 1 shows the lithological and paleontological characteristics of the Cretaceous facies and paleoflora. The table includes information on the lithology, distribution, and age of the facies and paleoflora. The data is based on observations made during fieldwork and laboratory analysis.

Table 2. Palynology, Hat Creek

Table 2 provides palynological data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 3. Stratigraphic nomenclature

Table 3 provides stratigraphic nomenclature for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 4. Radiometric dating, Hat Creek

Table 4 provides radiometric dating data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 5. Industrial minerals, Hat Creek

Table 5 provides industrial minerals data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 6. Geological boundary

Table 6 provides geological boundary data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 7. Fault

Table 7 provides fault data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 8. Bedding

Table 8 provides bedding data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 9. Flow layering

Table 9 provides flow layering data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 10. Foliation

Table 10 provides foliation data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 11. Trace of axial surface

Table 11 provides trace of axial surface data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 12. Surface trace of base of slide block

Table 12 provides surface trace of base of slide block data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 13. Movement direction of slide block

Table 13 provides movement direction of slide block data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 14. Radiometric date

Table 14 provides radiometric date data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 15. Limit of mapping

Table 15 provides limit of mapping data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 16. Compilation

Table 16 provides compilation data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 17. Palynology, Hat Creek

Table 17 provides palynology data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 18. Geology

Table 18 provides geology data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 19. Stratigraphy

Table 19 provides stratigraphy data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 20. Facies

Table 20 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 21. Facies

Table 21 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 22. Facies

Table 22 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 23. Facies

Table 23 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 24. Facies

Table 24 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 25. Facies

Table 25 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 26. Facies

Table 26 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 27. Facies

Table 27 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 28. Facies

Table 28 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 29. Facies

Table 29 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 30. Facies

Table 30 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 31. Facies

Table 31 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 32. Facies

Table 32 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 33. Facies

Table 33 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 34. Facies

Table 34 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 35. Facies

Table 35 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 36. Facies

Table 36 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 37. Facies

Table 37 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 38. Facies

Table 38 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 39. Facies

Table 39 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 40. Facies

Table 40 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 41. Facies

Table 41 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 42. Facies

Table 42 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 43. Facies

Table 43 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 44. Facies

Table 44 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 45. Facies

Table 45 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 46. Facies

Table 46 provides facies data for the Hat Creek area. The table includes data on the age, location, and type of fossils found in the area. The data is based on observations made during fieldwork and laboratory analysis.

Table 47. Fac