SHEETS 104A, B, G, H, I, J

DESCRIPTIVE NOTES

Telegraph Creek (1956 pop. 150), the largest settlement in the area, lies at the head of navigation on Stikine River, and is served from May to October by weekly river boat from Wrangell, Alaska. Trucking and taxi services are available at Telegraph Creek, from which a fair motor road, normally passable from June to November, extends 76 miles to the south end of Dease Lake. The north end of Dease Lake may be reached by good motor road, 128 miles long, connecting with mile 648 on the Alaska Highway. Barges suitable for transporting vehicles are normally available on Dease Lake. A tractor road, over which trucks have been taken with difficulty during dry weather, runs east from the south end of Dease Lake for 44 miles to Wheaton Creek in Turnagain River valley, and another tractor road connects Dease Lake with the Stikine River via the upper Tanzilla River and Gnat Creek valleys. The port of Stewart, B.C., served weekly by steamship and thrice weekly by float aircraft from Vancouver and Prince Rupert, B.C., lies 6 miles south of the map-area, and from Stewart motor roads extend into the map-area 20 miles up Bear River valley and 22 miles up Salmon River-Cascade River valley. Landing strips suitable for wheeled aircraft are maintained at Stewart, the Granduc mineral property, Telegraph Creek and Dease Lake. A modern airport with all facilities and thrice-weekly airline service is located at Watson Lake, 142 miles by road from the north end of Dease Lake. Wireless communication stations are established at Stewart, Telegraph Creek, the south end of Dease Lake, Cassiar (64 miles by road from the north end of Dease Lake), and Watson Lake, and Department of Transport meteorological stations are maintained at the south end of Dease Lake and at Watson Lake. The nearest charter aircraft bases are Watson Lake, Y.T., Atlin, B.C., Wrangell, Alaska, and Fort St. James, B.C.

The southwestern third of the map-area lies within the rugged Coast Mountains, which have a relief up to 10,000 feet and many extensive ice-fields and valley glaciers. These mountains are crossed by two broad, deep, heavily glaciated valleys, through which the Iskut and Stikine Rivers run nearly at grade. The climate of the Coast Mountains is typically humid, with unsettled weather, and very heavy winter snowfall at higher elevations. Forest growth is exceedingly dense up to about 3,000 feet above sea-level.

In the southern part of the map-area the Coast Mountains are succeeded to the east by the Skeena Mountains, of more subdued outline, and a local relief of about 4,000 feet. The climate of the Skeena Mountains is less humid than that of the Coast Mountains, and permanent ice is confined to scattered cirque glaciers and thin ice-caps on the broader summits. Except in the largest valleys, forest cover is moderate.

North of the Skeena Mountains and east of the Coast Mountains lies the Stikine Plateau, an irregular upland surface ranging in altitude from 4,000 to 6,000 feet. Isolated mountains rise to 4,000 feet above this surface, and the Stikine River and its tributaries have cut youthful canyons as much as 3,500 feet below it. Much of the plateau is deeply blanketed with unconsolidated material. The climate of the Stikine Plateau is relatively dry; forests, confined to places of less than 4,000 feet altitude, are sparse, and there are extensive areas of open grassland, muskeg, and tundra.

The Cassiar Mountains, in the northeastern part of the map-area, consist mainly of irregular mountain masses with local relief up to 4,500 feet and relatively rugged summits, separated by a commonly rectangular network of deep, smoothly glaciated valleys. The climate is fairly moist, and the region is well forested to altitudes of about 4,500 feet.

The oldest known rocks in the map-area, exposed north and south of Major Hart River in the Cassiar Mountains, are Lower Cambrian (1). They form a northwest-plunging anticline, overturned to the southwest. These rocks comprise an unknown thickness of limestone, dolomite, slate and phyllite, overlain by about 1,000 feet of purple, tan, and white quartzite with minor slate, succeeded by more than 1,000 feet of thick-bedded and massive limestone and dolomite with minor slate and shale. Near Major Hart River valley this unit is intruded by sills of diabase (not shown on map).

The Lower Cambrian strata (1) appear to be overlain conformably by highly contorted, dark, locally limy shale, phyllite and slate (2), containing an early Middle Cambrian fauna at the base and Lower Ordovician fossils at the top. Beds considered to be correlative with this map-unit but including thin layers of limestone and dolomite are exposed in the extreme northeast corner of the map-area.

Strata mapped as unit 3, continuous with beds which, in the McDame map-area to the north, contain fossils of Upper Ordovician, Lower Silurian, and (?) Devonian age, outcrop on the east flank of the Cassiar Mountains east of the Lower Cambrian rocks.

Middle Devonian strata (4) along Major Hart River are more than 1,500 feet thick, and comprise a lower unit of limestone and cross-bedded quartzite, a middle unit of well-bedded grey limestone, and an upper unit of well-bedded, fetid, dark grey to black, highly fossiliferous dolomite.

A thick sequence mapped as unit 5, continuous with Upper Devonian and Mississippian beds in the McDame map-area to the north, conformably overlies the Middle Devonian rocks (4). In most places however the two units are in fault contact.

A distinctive assemblage of volcanic and sedimentary rocks of Carboniferous or Permian age (6a) in a complex domal structure forms an inlier of about 75 square miles in the Oweegee Range of the Skeena Mountains, and outcrops in a north-south belt along Mess Creek and Schaft Creek at the east edge of the Coast Mountains. The principal rocks are green, purple, and reddish breccias, tuffs, and conglomerates of andesitic composition, with minor rhyolite, thin-bedded chert, dark grey-green greywacke, light grey fossiliferous limestone, shale, and siltstone. In Mess Creek valley these rocks are unconformably underlain by metamorphic rocks (Gb) and overlain with apparent unconformity by sedimentary rocks of probable Triassic age; in the Oweegee Range they are surrounded by younger strata and, in part at least, appear to have been faulted into their present position.

Permian and (?) older rocks (6) underlie much of the northern part of Stikine Plateau within the map-area, and extend along the southwest flank of the Cassiar Mountains. They outcrop at many places within the Coast Mountains, principally in lower Chutine River valley and in a large U-shaped belt covering parts of Mess Creek and Scud River valleys. West of Dease Lake, these rocks achieve a stratigraphic thickness of more than 10,000 feet in a complex, northwesterly plunging syncline. In this area the main, lower part of the unit consists of thin-bedded highly contorted chert, phyllitic quartzite, argillite, greenstone and greywacke, with at least two beds of massive limestone about 300 feet thick; the upper part is mainly interbedded greenstone and limestone. Elsewhere in the map-area the structures exhibited by the rocks of this unit are too complicated for the stratigraphic thickness or sequence to be determined. In the Mess Creek area the map-unit consists mainly of white-weathering, dark grey, crystalline limestone, with minor tuffaceous sandstone, siltstone, and shale. The unit, as mapped, may include limestone in several different stratigraphic positions. A measured section near the head of Mess Creek shows 2,500 feet of limestone to be present; the composite thickness may increase towards the west. On Misaujay Mountain, west of Stikine River, the unit unconformably overlies, with a basal conglomerate, metamorphic rocks (Gb).

A thick section of volcanic and sedimentary rocks of Permian and/or Triassic age (7) forms a belt along the southwest flank of Cassiar Mountains, and outcrops at many places around the southern and western edges of Stikine Plateau, including Klastline Plateau and part of Stikine River valley. Within the Coast Mountains it underlies a large region west and southwest of Telegraph Creek, and numerous areas between Scud and Unuk River valleys. The wide variety of rock types included is shown in the legend. Numerous bodies of greenstone of uncertain origin are mapped with the mainly volcanic unit (7a). The sedimentary facies include sections up to 4,000 feet thick (as east of Dease Lake) of well-bedded greywacke, phyllitic slate, and argillite (7b) with minor siltstone, conglomerate and greenstone, sections of interbedded clastic rocks and limestone, and several sections up to 1,000 feet thick principally of massive to well-bedded limestone (7c). Fossils are sparingly present at many places throughout the sedimentary assemblage. In the Cassiar Mountains, these rocks appear to be in contact with map-unit 6 along a major fault that coincides with the belt of ultramafic rocks (E) east and west of Turnagain Lake. West of Dease Lake map-units 6 and 7 may also be in fault contact, but southwesterly overturned folds in rocks of map-unit 6 on the south flank of the French Range suggest the possibility that in this area the contact may lie on the north limb of a syncline that has been overturned to the southwest. At many places in the Coast Mountains, the rocks of unit 7 unconformably overlie Permian and older rocks (6), but in other places the Triassic-Permian boundary may not have been recognized, and the unit as mapped may include Permian and older rocks.

Triassic sedimentary rocks (8), in part younger than but in part equivalent to map-unit 7, outcrop in Stikine River valley below Telegraph Creek, near Arctic Lake and Ball Creek at the south end of the Spectrum Range, and in a belt between Iskut and Unuk River valleys. The dominant rocks are argillite and siltstone, with intercalations of tuff, greywacke, grit, sedimentary breccia, conglomerate, limestone, and chert. Beds of limestone large enough to be shown on the accompanying map are designated separately as map-unit 7c. Many of the fine-grained clastic rocks and some of the limestones contain the remains of an abundant Triassic fauna. At Arctic Lake beds of this unit rest unconformably on Permian limestone (6), metamorphic rocks (Gb), and granodiorite (B); in the Stikine River valley they rest on different volcanic members of map-units 7 and 7a, in places with some evidence of erosional unconformity. In other places these rocks are cut by granitic material (B).

Volcanic and sedimentary rocks of pre-Upper Jurassic but otherwise indeterminate age (9, 10) underlie much of the Three Sisters and Hotailuh Ranges at the southwest edge of the Cassiar Mountains, outcrop in the canyons cutting the southern part of the Stikine Plateau, form a belt around the north and west borders of the Skeena Mountains, and constitute numerous bodies within the Coast Mountains. The typical volcanic rocks are grey, green, and purplish coarse angular breccias, tuffs, and flows of andesitic, basaltic, and dacitic composition. Porphyritic and amygdaloidal flows are present in places, and several bodies of massive greenstone are found north of Stikine River. The relatively fresh volcanic breccia is comparatively resistant to erosion, and forms many of the higher peaks west of Meziadin and Bowser Lakes, and in the Three Sisters Range. In much of the heavily drift-covered Hotailuh Range it forms the only outcrops, which probably give a misleading picture of the proportions of various rock types. West of Bowser Lake some lavas show well-developed pillow structure, associated with thinly laminated, white-weathering, black chert. The sedimentary rocks include much greywacke and argillite probably largely of volcanic derivation, with shale, sandstone, limestone, and conglomerate. Lower Jurassic and Triassic fossils have been collected from beds in this assemblage, but the age range of the map-unit is not known, beyond the fact that it underlies Upper Jurassic rocks (12). In most places the volcanic and sedimentary rocks are interbedded, and have been separated on the map solely on the basis of dominant lithology; near the south end of Dease Lake, however, most of the volcanic rocks (9) appear to be younger than the associated sedimentary rocks (10 and 11a). Most of the rocks mapped in units 9 and 10 will probably be found to be equivalent to parts of map-units 6, 7, 8, and 11 when more information becomes available.

Sedimentary rocks Lower and Middle Jurassic age (11) outcrop in a belt extending southeast from Dease Lake, north of Three Sisters Range, to Stikine River, and in an irregular area west of Iskut River near More Creek. East of Tanzilla River the assemblage comprises more than 9,000 feet of greywacke, conglomerate, siltstone, and shale. Early Jurassic fossils have been found in the lower part of the unit, whose upper part may at this place include rocks younger than Middle Jurassic (11a). East of McBride River this map-unit directly overlies fossiliferous late Palaeozoic limestone (6) with a basal limestone conglomerate that grades upward into conglomerate containing pebbles and boulders of greenstone, limestone, chert, and feldspar porphyry. West of Iskut River, the rocks (11) are lithologically similar to parts of map-units 7b and 8, and have been identified only where fossils are present. Near the mouth of More Creek a section more than 2,000 feet thick rests unconformably on siltstone of map-unit 7b, and comprises a thick basal shale-pebble conglomerate with Middle Jurassic ammonites, overlain by carbonaceous shale, siltstone containing coalified plant debris, and greywacke.

The southeast third of the map-area covers a part of a large basin of sedimentary rocks that extends about 200 miles northwest from near Hazelton, B.C., and is up to 100 miles wide. The rocks of this basin, which in the map-area comprise nearly all the Skeena Mountains and outcrop at many places in the Coast Mountains, contain numerous fossils of Upper Jurassic to Lower Cretaceous age (12). The principal rocks are black, fine-grained, commonly slaty argillite and shale, dark greywacke, and chert-fragment subgreywacke. In the Bowser Lake district the greywacke is very dark and fine-grained, but towards the north, east, and northwest it becomes coarser, more feldspathic and siliceous, and is frequently associated with intraformational, conglomeratic lenses composed of fragments of black argillite. The intercalation of argillite and greywacke produces a bedding conspicuous from a distance throughout the entire sedimentary basin. Minor rock types, most abundant in the northern and eastern parts of the Skeena Mountains, include calcareous argillite, chert-pebble conglomerate, and coal. Limestone or rocks directly of volcanic origin are virtually absent. Continental and marine beds interfinger in the northeast part of the Skeena Mountains, and in some places plant remains are found associated with marine fossils. Coarser clastic materials appear to the northwest; at first siltstone and greywacke, then grit and chert-pebble conglomerate, which occurs in thick, discontinuous lenses that make up more than half of a 5,000-foot section near Kinaskan Lake. Similar rocks are found in the Groundhog Range and west of Unuk River. The chert of these conglomeratic pebbles is lithologically similar to bedded chert in the Triassic formations (8). Sections about 10,000 feet thick have been measured in the Skeena Mountains, and the minimum total thickness of the unit is estimated to be of the order of 20,000 feet. Structures in this map-unit are extremely complex, with major folds averaging about four per mile and many overturned and recumbent structures. An exception may be parts of the Groundhog Range and upper Skeena River valley, and of the Eaglenest Range where broad open folds appear to predominate, although some of these structures may be isoclinal and recumbent. Typically, the valleys and saddles in the Skeena Mountains are characterized by tight, complex folding, whereas the broader massifs are commonly gently contorted or in places flat-lying. This is in part at least because structures in the easily eroded argillite are more complex than in the resistant peak-forming greywacke, and may be in part an indication that major longitudinal faults, to which the folding may be related, lie along the valleys. Most of the fold axes are nearly horizontal, or plunge gently northwest. Along their western border, rocks of this unit overlie pre-Upper Jurassic volcanic rocks (9) with structural conformity and local interfingering. In most other places, this unit is in fault contact with adjacent units, and east of Spatsizi River these formations appear, locally at least, to have been thrust over younger rocks (15) to the northeast.

Rocks containing fossils of probable Lower Cretaceous and possibly Upper Jurassic age which outcrop on Mount Kirk, southeast of Stikine River opposite Chutine River, have been assigned to map-unit 12a. These rocks are lithologically distinct from the Lower Cretaceous and Upper Jurassic formations in the Skeena Mountains (12). Map-unit 12a comprises a section of more than 3,000 feet of thick, massive andesite flows intercalated with banded jasper or chert, conglomerate, tuff, shale, and greywacke.

Mainly volcanic rocks of pre-Upper Cretaceous age, not otherwise differentiated, are included in map-unit 13. On the Klastline Plateau these rocks are equivalent to parts of map-units 6a, 7, 9 and 14, and have been so shown wherever sufficient information is available.

The Klastline Plateau and parts of surrounding areas are largely underlain by an assemblage of dark grey and greenish grey highly fractured pyroclastic rocks with minor flows (14). Most are andesite or basaltic andesite, but light grey felsitic breccia, banded tuff, and green marl are found locally. Some of the marl contains gastropods that suggest a late Cretaceous or early Tertiary age. The base of the unit is a dark grey agglomerate that rests unconformably on the chert-pebble conglomerate of map-unit 12 and older rocks. The relationship of this map-unit (14) with map-unit 15 is not known; both formations are overlain with structural discordance by the Tertiary basalts (17).

Sandstone, shale, conglomerate, and minor coal of Upper Cretaceous to Paleocene age (15) underlie most of Spatsizi Plateau at the southeast corner of Stikine Plateau, and extend westward into Stikine Canyon and the Tuya River valley. The total thickness of the unit is not known, but an estimated 5,000 feet of beds are exposed east of Gold Fish Lake. The most common rock, comprising about half the total, is thick-bedded, grey to greenish grey, light brown weathering sandstone, for the most part poorly indurated, composed largely of chert grains with lesser amounts of quartz, feldspar, chips of volcanic rocks, mica, and coaly material. Conglomerate makes up about one-quarter of the section, in beds as much as 200 feet but commonly less than 40 feet thick. Most of the conglomerate is very well sorted, with pebbles or cobbles of grey chert, and lesser amounts of vein quartz, various volcanic rocks, granitic material, and of chert-pebble conglomerate from map-unit 12, in a matrix similar to that of the adjacent sandstone. The shale ranges from light grey to black. Plant material is common and some beds are highly carbonaceous. Coalified logs and thin seams of coal are fairly common, and appear more abundant towards the north and west. The rocks of this map-unit (15) are mainly gently warped to flat-lying. Along their southwestern border, however, these strata have been folded across widths of a mile or more, with overturned and recumbent structures. This local folding is thought to be related to assumed fault movement along the contact with older rocks to the southwest, some of which have been thrust onto the younger strata. In the Stikine Canyon the rocks of this map-unit are mainly flat-lying, and pinch out against the valley walls in such a manner as to suggest that they were laid down in a valley whose position and shape locally approximates the present inner Stikine River valley. In Tuya River area also, deposition seems to have occurred in a basin roughly coinciding with the present topographic valley, although the rocks there have been locally flexed. The map-unit is overlain, in places conformably and in places with structural unconformity, by Tertiary basalt (17).

Volcanic and sedimentary rocks of late Eocene age (16) occur in Stikine River valley about 12 miles below Telegraph Creek. The largest exposed mass consists of about 100 feet of conglomerate, shale, sandstone, explosive breccia, and tuff, containing plant remains. This is overlain by up to 500 feet of lava flows, mainly fine-grained partly vesicular basalt, with minor andesite and latite. Many of the pyroclastics contain abundant glass. The relation of these rocks to other map-units is not known; it may be that the lavas are equivalent to rocks elsewhere included in map-units 13, 14, or 17, and that the fossiliferous Eocene sediments, apparently below them, represent canyon-bottom deposits formed subsequent to the erosion of a valley through the lavas.

Volcanic rocks of Pleistocene and probably earlier age (17) occur in almost all parts of the map-area except the southeast quarter, and are responsible for much of the distinctive topography of the region. The largest mass is found along the west side of the Stikine Plateau north of Stikine River, where Level Mountain (Nahlin Plateau) is formed by about 800 square miles of flat-lying basaltic flows, with minor pyroclastic deposits. The total thickness of flows in this area is not known, but appears to be less than 4,000 feet. The dominant rock in this mass is dark grey to black and greenish, fine-grained, olivine basalt, slightly porphyritic with olivine and less commonly plagioclase phenocrysts. Much of the rock shows excellent columnar jointing. Flows appear to be 20 to 100 feet thick; many have vesicular bases, and some are scoriaceous. Pyroclastic material is relatively scarce, but well-bedded brecia or agglomerate, in part consisting of amygdaloidal or spherulitic bombs with glassy selvages, is characteristic of some parts. South of Stikine River, rocks of this map-unit cover more than 500 square miles, including Edziza Peak and much of the Spectrum Range. The flows on Edziza Peak are black olivine basalt, in part porphyritic and vesicular, and pillow structure is abundant. The 9,140-foot peak is a composite volcano, but much of its mass appears to be made of older rocks, over which the flows lie probably in a relatively thin veneer. Part of the Spectrum Range is distinguished by flows of pink rhyolite, which alternate with black basalt to give a colourfully banded appearance to many cliffs. The rhyolite bodies are in general thinner and less abundant than the basalt, and probably comprise less than one-quarter of the assemblage, but many are continuous over considerable distances, and on the escarpment along the west side of the Spectrum Range a score or more basalt-rhyolite alternations can be followed for several miles. East of Mess Lake, the pile of flat-lying volcanic material of this unit is of the order of 1,700 feet thick, and rests unconformably on all older rock units. Most of the flows are from 25 to 100 feet thick. Light grey, greenish, to black obsidian, in masses up to 1 foot thick, is not uncommon at the chilled bases of the flows. Pyroclastic material, as tuff, agglomerate, and loose ash and bombs, is more abundant in this mass than on Level Mountain and it is difficult to tell whether some bodies, particularly some of the rhyolitic ones, are of flow or fragmental origin. Most of the basalts are fresh, or very slightly weathered, but much of the rhyolite is more or less altered, and the brilliant yellow, pink, red and purple hues of the Spectrum Range are the result of hydrothermal and weathering effects in the rhyolite.

Numerous remnants of once-extensive flows (17) cap isolated summits in the Klappan Range, the Klastline Plateau, and the Hotailuh Range. The typical rock is black, fine-grained olivine basalt; no rhyolite or pyroclastic material has been recognized. Some flows contain phenocrysts of plagioclase and olivine. Most of the remnants show good columnar jointing with vertical columns, suggesting that the original flows were roughly horizontal in their present position. Remnants on adjacent mountains, however, may differ in elevation by 1,000 feet or more. The remnants are, therefore, not the remains of a continuous blanket of basaltic lava but fragments of individual flows poured out on a surface of considerable relief.

Small, isolated outcrops of volcanic rocks of Tertiary to post-Glacial age, occurring at several places on the southwest flank of the Cassiar Mountains and in the east edge of the Stikine Plateau east and northwest of Dease Lake, have also been assigned to map-unit 17. For the most part these masses appear to be the products of small individual volcanoes, rather than the remnants of large eruptions. Many of the masses have been little altered by erosion, and cones, and individual flows following present valleys, are well preserved. Black olivine basalt is the dominant rock. The proportion of fragmental material increases towards the northwest, and several cones northwest of Dease Lake are composed principally of ash, tuff, and breccia, reinforced by basalt dykes. Flat-lying basalt flows cap outward-dipping ash and agglomerate beds in the tuyas northeast of Kawdy Mountain.

An unusual assemblage of fresh pink and light grey siliceous volcanic rocks (17a) outcrops north of Turnagain River on the east side of the Cassiar Mountains, in the northeast corner of the map-area. The exposures consist of well-banded flows, in part strongly pisolitic, intercalated with highly quartzose and chalcedonic breccias, pisolitic tuffs and pumicic material. The layering has a westerly dip, but does not appear to have been deformed. The rocks may be remnants of a stratovolcano.

Lava flows and volcanic ejectamenta of post-Glacial to modern age (18) form conspicuous bodies along the east side of and within the Coast Mountains from Telegraph Creek to Unuk River. Several flows, poured from outlets on the flanks of Edziza Peak, blanket the north, east, and south slopes of that mountain, and some have advanced into the present forest near Buckley Lake and Nuttlude Lake. Small flows and remnants of flows are confined to the inner canyon of the Stikine River, overlying glacial and river deposits. Cinder cones and breccia pipes, very friable but quite unmarred by erosion, are conspicuous features of the Edziza-Spectrum Range area. The Spectrum Range contains excellent examples of small volcanic craters, from which flows have spread over the present tundra surface. The post-Glacial flows on the Klastline Plateau are characterized by abundant pillows. The lavas are uniformly dark grey olivine basalt, mostly porphyritic with, in places, clear olivine phenocrysts up to 1 inch across. Much of the rock is scoriaceous with, in places, vesicle fillings of chalcedony and zeolites. Crystals of sanidine are common in the scoria pillows on Klastline Plateau. Feeder dykes and volcanic rocks on the Klastline Plateau contain inclusions of partly fused granitic material, crystals of chrome garnet, and olivine bombs. Ash and cinders are mainly black, slaggy to impalpable; no crystal ash was seen. Some bombs are reddish brown.

Hoodoo Mountain, on the north side of the lower Iskut River valley, appears to be mainly a volcanic pile. Although some and probably most of the mass is pre-Glacial in age (belonging to map-unit 17) the exposed flows and pyroclastic deposits are nearly all post-Pleistocene (18). In general the Hoodoo Mountain lavas are less basic than those of Edziza Peak and the Spectrum Range, and many are strikingly porphyritic, with sanidine and pyroxene phenocrysts. The youngest flows are scoriaceous to pumicious. Associated with these rocks are deposits of indurated pisolitic mud, composed mainly of very fine ash.

Three separate vents between the bend of Iskut River valley and Lava Fork on Unuk River have produced fine-grained black basalt and ash (18) during Recent times. The material from one vent has flowed onto a present glacier and the shattered breccia is still being carried on the ice.

Calcareous tufa (19) of Recent origin is associated with some of the thermal springs in the Edziza Peak-Spectrum Range area and Mess Creek valley. The tufa is being actively deposited, replacing present vegetation. None of the hot springs is boiling, but some appear to have temperatures of from 70°C. to 90°C. No radioactivity has been detected in the springs or deposits.

Several small bodies of fine-grained, light grey felsite or felsite porphyry (A) outcrop along the east edge of the Coast Mountains and around the northern rim of the Skeena Mountains. Most are rusty weathering, for they are almost invariably rich in finely disseminated pyrite, and many contain sufficient chalcopyrite to produce a noticeable copper stain on joint surfaces. Whenever age relationships could be determined, these bodies were found to be younger than the main mass of the Coast Intrusions (B and C).

Rocks of a general granitic aspect, but with many variations in texture and composition (B), are found in almost all parts of the map-area except the Skeena Mountains. The backbone of the Cassiar Mountains is a complex of many granitic bodies, to which the over-all name Cassiar batholith has been given. The eastern end of the Hotailuh Range and almost all of the Three Sisters Range are composed of an apparently single mass, the Hotailuh batholith. The Coast Mountains contain a great number of granitic bodies, known collectively as the Coast Intrusions. Some of these are of batholithic proportions and consist of an intimate complex of smaller masses, one intruding the other. Light grey medium- to coarse-grained quartz monzonite and granodiorite are the most abundant rocks in these intrusions, which range in composition from aplite and alaskite to very basic types, and from fine-grained sugary masses to coarsely porphyritic or pegmatitic varieties. True granite is fairly widespread but makes only a small amount of the total. The principal mafic mineral varies from place to place, to some extent with a regional distribution regardless of the rock type: for instance, biotite is the main mafic constituent of the Cassiar batholith, whereas hornblende dominates in the Hotailuh body. In the complex intrusions of the Coast Mountains some bodies (not differentiated on the accompanying map) contain principally hornblende, others mainly biotite, and a few are pyroxene-bearing. In places it has been possible to divide the complex into distinct units that appear to have consistent age relationships (see Memoir 246, Geol. Surv., Canada). Most of the rocks do not possess any obvious preferred textural orientation, though a few show lineation or foliation roughly conformable with the regional structure. In addition to the common granitic bodies, map-unit B includes small stocks in many parts of the map-area, with unique compositional and textural features, and in other places, intrusive masses so complex that their components cannot be differentiated on the scale of the present map.

The granitic rocks have been emplaced over an extended period of geological time. The large mass of hornblende-biotite quartz monzonite south of Arctic Lake was formed in pre-Triassic times whereas other bodies cut Lower Cretaceous formations. Some of the bodies were clearly forcibly intruded into older rocks; the contacts of others is characterized by a great deal of brecciation, with and without widespread assimilation; still other bodies present features that suggest they may be in part of metasomatic origin.

Dark rocks (C), mainly diorite and basic hornblende quartz diorite, with lesser amounts of quartz gabbro, gabbro, and hornblendite occur in several places, mainly in the Coast Mountains, in masses large enough to be shown on the map. Elsewhere these rocks are included in map-unit B. Hornblende is the dominant mafic mineral in nearly all of these bodies, most of which are clearly complementary to the light coloured rocks of map-unit B. The two map-units are considered to represent parts of a continuous succession of rock types. Many of the dark varieties have a pronounced gneissic texture. Some are heterogeneous in internal composition and texture and may consist in part of mixed, assimilated older rocks. In many places the diorites are older than the adjacent granitic rocks.

A number of small stocks of granite porphyry, granophyre, nordmarkite, and apparently syenite have been placed in a separate map-unit (D). Such bodies are found in the lower Iskut and Craig River areas, north of the Stikine River near Shakes Creek, in the Grand Canyon of the Stikine River, and around the north end of the Skeena Mountains. The most common rocks are rose-pink to light grey, with local dioritic phases ranging to dark green. Most of the bodies are highly feldspathic. They range from fine-grained to coarsely porphyritic, and some bodies in the lower Iskut River valley are composed principally of phenocrysts of orthoclase. Quartz is not or is rarely visible in the hand specimen, but microscopic examination shows that at least some specimens contain much granophyre, or quartz-feldspar intergrowth. Dark minerals, generally rare but patchily distributed and locally dominant, are chiefly hornblende, although the body in Stikine canyon is biotite-bearing. Some of the masses have been subjected to hydrothermal alteration. One stock on Iskut River has intensely altered the surrounding rocks.

Ultramafic bodies (E) are widespread throughout the map-area. Northeast of the Cassiar batholith (B) they appear restricted to the region underlain by Devonian and Mississippian rocks (5), and consist of elongate bodies of sheared serpentinite, associated with meta-andesite and meta-diorite, lying parallel with the regional structural trend. Southwest of the Cassiar batholith the ultramafic bodies (E) form a more or less continuous belt, or series of belts within a zone up to 15 miles wide, of small and large bodies of sheared serpentinite and peridotite intimately associated with meta-andesite and meta-diorite, ribbon chert, and limestone. Many of these bodies occur along fault zones. A number of small, irregular or rounded masses of unsheared, relatively fresh peridotite and dunite are found from Tanzilla Butte, southeast of Dease Lake, northwest to Tuya River valley. Northwest of Level Mountain, several large masses of serpentinized peridotite and serpentinite in Duddoutsi and Koshin River valleys extend beyond the area mapped and appear to be part of a large complex of ultramafic rocks to the northwest. Ultramafic rocks (E) are entirely enclosed by granitic rocks (B) on Mount Hickman, west of Schaft Creek, where a body of fresh dunite, surrounded by serpentinite, lies with sharp contact against meta-diorite which grades into quartz diorite and granodiorite, and also at Tachilta Lakes, where a U-shaped body of relatively fresh peridotite lies within biotite granite. Near the south end and northwest of Dease Lake several ultramafic bodies have been strongly carbonatized.

Metamorphic rocks of presumably Triassic or earlier age (F) are widespread south of Iskut River and west of Bowser River. Included in this assemblage are dark phyllite, silver-grey sericite schist, hornfels, granulite, and fine-grained quartz-feldspar-biotite-hornblende gneiss. Conspicuously rusty granulite and gneiss is found near some granitic contacts. The structure of these rocks is complex, but as the outcrops are not conspicuously banded, from a distance most bodies appear to be massive. The age of these rocks is doubtful. Some (F) appear to be separated from the pre-Upper Jurassic volcanic rocks (9) by a structural unconformity and other masses of similar lithology (Fa) may be equivalent to map-unit 9.

Gneisses of pre-Middle Permian age (Ga) outcrop in the Coast Mountains south of Stikine River west of Mess Creek, and near the Alaska boundary between Katete and Unuk Rivers. This map-unit embraces rocks of the greenschist, epidote-amphibolite and amphibolite metamorphic facies. Most of the rocks are quartzose, but chlorite schist, chlorite-epidote schist, and marble are present locally. In some places, as on Zagoddetchino Mountain, interbedded schistose quartzite and chlorite-epidote-amphibole schist can be traced through quartz-biotite schist into quartz-feldspar-biotite and quartz-feldspar-hornblende gneiss, and at other places, as in Craig River valley, the size and amount of quartz and feldspar in the gneiss increases until the rock has a granitic appearance. The metamorphism suffered by these rocks has been clearly regional and in large part at least it pre-dates the emplacement of the granitic rocks of the Coast Intrusions (B).

Intensely sheared rocks of pre-Middle Permian age and generally low metamorphic grade (Gb) are found in the Coast Mountains south of the lower Iskut River, near the headwaters of Mess Creek, and in a zone from Scud River to Chutine River valley. Slate, quartz-sericite phyllite, quartz-chlorite phyllite, quartzite, minor quartz-biotite schist and crystalline limestone are the common rock types. These are typically interbedded with sheared conglomerate, grit, greywacke, and volcanic rocks, that have undergone no obvious thermal metamorphism. The metamorphic alteration has been selective and a band of sericitic phyllite may be adjacent to a bed of conglomerate that has suffered no mineralogical change but in which the pebbles have been stretched until their average length is five times their width. These rocks are overlain unconformably by Carboniferous or Permian (6a) and younger formations. Their shearing does not appear to be related to stresses connected with the emplacement of the Coast Intrusions (B).

Within the Cassiar batholith and along its southwest border, northwest from Kutcho Creek, lie large areas of metamorphic rocks (H). Most of these rocks are probably equivalents of the Devono-Mississippian to Permian formations (5 and 6) altered by processes associated with the formation of the Cassiar batholith (B).

A distinctive metamorphic terrain (J) east of the Cassiar batholith and south of Turnagain River contains muscovite-biotite-quartz-feldspar gneiss, muscovite-biotite schist, crystalline limestone and dolomite, and is thought to represent the metamorphosed equivalent of the Devono-Mississippian (5) and older formations north of Turnagain River.

The map-area includes many regions favourable for metallic and non-metallic mineral deposits. Production from lode deposits has come mainly from the extreme southwest corner, where the Premier, Big Missouri, and several smaller mines in the Salmon River and Bear River districts have produced about 2 million ounces of gold, 50 million ounces of silver, 30 million pounds of lead, and several million pounds of copper and zinc. A large, low-grade copper deposit near Leduc Glacier is at present under development. Base and precious metal mineralization has been found west of Unuk River and in the lower Iskut River valley. Several copper deposits, some of which are now being developed, appear to indicate a "copper province" extending east from Stikine River between Porcupine and Scud Rivers, possibly as far as More and Ball Creeks. Other signs of base metal, principally copper, mineralization have been discovered in the Mess Creek area, the Little Iskut River-Kakiddi Creek valley, near Telegraph Creek, and the Tahltan River-Sheslay River valley. No lode deposits of consequence have been found in the Cassiar Mountains within the map-area, although signs of mineralization are fairly widespread, and claims have been staked for copper along the northwest edge of the Hotailuh batholith and at the head of Little Eagle River.

Placer gold has been recovered in substantial quantities from three main districts within the map-area. (1) The Dease Lake area, principally Dease and Thibert Creeks and their tributaries, has produced possibly $3,500,000, mostly between 1873 and 1880. (2) Wheaton Creek and nearby streams tributary to the Turnagain River in the Cassiar Mountains yielded several hundred thousand dollars for a few seasons after the discovery in 1935. Recently tested, moderately rich ground in this district is now being developed with a view to working by mechanical methods. (3) Barrington River, near the confluence of Chutine and Stikine Rivers, together with a few auriferous bars on Stikine River itself, has produced a few tens of thousands of dollars' worth of gold. A small amount of gold has been won also from Little Eagle River, and particularly from its tributary, Goldpan Creek.

The ultramafic bodies within the map-area contain several minerals of potential value. Chrysotile asbestos has been found at several places, and, as the mineral does not form conspicuous outcrops, there is every likelihood that thorough prospecting may uncover other deposits. A promising asbestos deposit is being developed east of Letain Lake on a tributary of Kutcho Creek in the Cassiar Mountains. Other occurrences are known east of the north end of Dease Lake, west of Kehlechoa River, and, in the Coast Mountains, on Mount Hickman. Some of the serpentinite bodies contain lenses of chromite with a high chrome-iron ratio but no large deposits are known. Nickel mineralization is reported from serpentine bodies east of Dease Lake, in Canyon Creek valley, and northwest of Tedideech Lake.

Coal is found in several formations within the map-area, but the only known deposits of potential importance appear to be those in the Upper Jurassic and Lower Cretaceous rocks (12) of the Skeena Mountains. An area extending from Muckaboo Creek across the Groundhog Range and Skeena River valley to or beyond the eastern limits of the map-area is underlain by beds containing several seams of coal, some of which is of bituminous to anthracite rank. It is probable that earlier reports of the thickness of seams and average quality of the coal were exaggerated, and, although a great deal of coal may be present, in view of the exceedingly complex structures of the region the possibility of finding seams of satisfactory purity, mineable width, and economical extent does not seem to be great.

The map-area has not been thoroughly prospected, and many of the most promising mineral discoveries have been made in the past few years. The most favourable areas for metallic mineral deposits appear to be the east border of the Coast Mountains, parts of the Klastline Plateau, and the Cassiar Mountains along the borders of the Hotailuh and Cassiar batholiths -- particularly near Turnagain and Cassiar Rivers.

9 - 1957 (E½)

RECD SEP 3 - 1957

MAP 9 - 1957 (E½)

STIKINE RIVER AREA
BRITISH COLUMBIA
SHEETS 104A, B, G, H, I, J

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