NOTES

The Skeena River sheet includes parts of Pacific Plate and Continental Shelf, Insular Belt, Coast Plutonic Complex, Intermontane Belt and, in Alaska, Alexander Terrane and Gravina Belt. The Coast Mountains, the offshore islands of Alaska and the Queen Charlotte Islands are deeply dissected by fiords or separated by long narrow inlets and straits. Forest cover is heavy up to 4000 feet. The Boundary Ranges are bare and rugged with large snow fields and glaciers. The Kitimat Ranges and adjacent Hazelton Mountains are relatively lower and free of ice. In the northeast are the lowlands of Nass Basin.

Pacific Continental Shelf of Cenozoic clastics is a narrow periorogenic shelf superimposed upon parts of insular Belt and Alexander Terrane. The continental slope and rise are steep and narrow, rising abruptly above the flat, abyssal ocean floor. The dextral transcurrent Queen Charlotte Fault is thought to represent the boundary between the Pacific and North American Plates; it connects northward with the Fairweather Fault and southward with the Juan de Fuca and allied oceanic ridges.

The oldest rocks in Insular Belt are thick sequences of Triassic tholeiitic basalts which were extruded in a deep ocean. These are overlain by marine argillites and limestones and a middle Jurassic island arc assemblage spatially related to the major faults consisting of andesitic pyroclastics, derived sediments, and mesozonal quartz diorite plutons. These rocks were affected by tilting, open folding along easterly and northwesterly trends, and contact metamorphism. Iron-copper deposits occur in Triassic skarn. Unconformably overlying Lower Cretaceous turbidites represent rapid accumulation in a northwesterly trending graben. A proximal conglomeratic facies was derived from the volcanic arc. The Upper Cretaceous clastics were deposited near land in a shallow marine basin and were derived from the maturely eroded arc, at times uplifted in fault blocks. The Cretaceous rocks have been gently folded and are succeeded by an early Tertiary volcanic arc of subaerial pyroclastics composed of alkali basalt and sodic rhyolites which were erupted through dykes and plugs aligned along the major faults. Late Tertiary marine and non-marine clastics, which were derived from the arc and also the uplifted Coast Plutonic Complex to the east, mantle much of Insular Belt and form Pacific Continental Shelf.

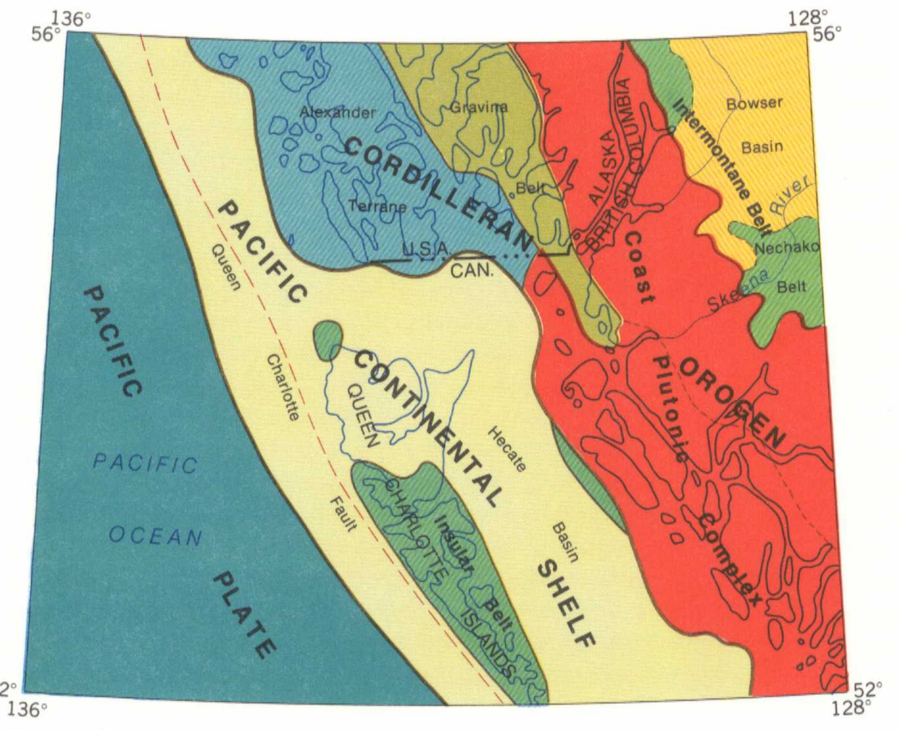
Alexander Terrane in southeastern Alaska includes sedimentary, volcanic and metamorphic rocks ranging in age from probable Precambrian to Upper Triassic. The strata are multiply deformed and intruded by granitic and ultramafic plutons of several ages, but are generally only gently folded and slightly metamorphosed. Locally, however, the rocks have been penetratively folded and subjected to at least two periods of metamorphism, one probably of early Paleozoic age and the other Cretaceous. Westerly directed thrusts occur, some juxtaposing rocks of contrasting structure and metamorphic grade. The terrane is segmented into several blocks by Tertiary, high-angle, probably transcurrent faults; some may have had earlier displacements. It is possible that the entire terrane, or part of it, is allochthonous with respect to more easterly components of Cordilleran Orogen. The Upper Jurassic to Lower Cretaceous clastics of the Gravina Belt overlie eastern Alexander Terrane with regional unconformity and were derived in part from the west, indicating that the two regions were contiguous by the Late Jurassic.

Rocks of the Gravina Belt consist of marine flysch-like argillite and greywacke, minor conglomerate, and interbedded thick lenses of fragmental andesite and basalt which are considered to be cogenetic with Jura-Cretaceous plutons intrusive into Alexander Terrane and the western part of Coast Plutonic Complex. Several Cretaceous zoned ultramafic complexes occur. The belt is part of an extensive, narrow, linear, late Mesozoic magmatic arc lying about 150 km inland from the continental shelf. The rocks have been penetratively deformed during mid-Cretaceous orogeny, the grade of metamorphism increasing eastward. The eastern boundary with Coast Plutonic Complex is possibly a zone of east-dipping reverse faults. It is drawn at the limit of Upper Paleozoic and Mesozoic mica schist, amphibolite and marble that may correlate with rocks of the Skolai Terrane of more northerly regions of Alaska.

The northwesterly trending Coast Plutonic Complex is dominated by three elements: intermediate granitic rocks, the central gneiss complex, and discontinuous zones of schists. The most abundant granitic rocks are quartz diorite and granodiorite; diorite and quartz monzonite are less common; gabbro and granite are rare. Some of the granitic rocks occur in partly allochthonous zoned plutons which may root within and form an integral part of the central gneiss complex. In the central gneiss complex migmatite is common and sillimanite is rare but widely distributed. Kyanite occurs west of Quottoon Pluton. Between Skeena and Nass Rivers the leucocratic nature of the gneisses suggests an original cratonic or a sialic derivation. Early major recumbent folds north of Skeena River have east-west axes and may verge north or south; younger structures trend north-northwest and usually have steep dips. Large recumbent structures between Douglas Channel and Skeena River verge west. The metasedimentary and metavolcanic schists form discontinuous northerly plunging synformal screens between plutons or within the central gneiss complex. Those that appear to be the southward continuation of the Gravina Belt of southeastern Alaska contain kyanite. West of Grenville and Princess Royal Channels the schists are characterized by micaceous quartzites.

In the Nechako Belt, Jurassic and andesitic volcanic rocks with locally derived clastics were deformed and intruded prior to the development of the Jura-Cretaceous Bowser Basin. Deposits of copper-silver-gold occur in the volcanics. Siltstone and greywacke accumulated in the successor basin. They are partly non-marine and mainly derived from the east. The strata are gently folded and intruded by small plutons and the easternmost granites of the Coast Plutonic Complex; some plutons yield molybdenum.

GEOLOGICAL PROVINCES



Province boundary
Subprovince boundary
Other

Geological contact (mapped, assumed)
Fault (mapped, assumed)
Transcurrent fault (mapped, assumed)
Thrust fault (teeth on hanging wall; mapped, assumed)
Volcano
Locality of isotopic age determination
by the G.S.C. bK139
by other laboratories bK139a
Igneous rock, metamorphic rock .... O, △
Method:
Potassium-argon, uranium-thorium-lead .... K, U
Material:
biotite, amphibole, muscovite, whole-rock, zircon .... b, a, m, w, z
Age in millions of years 139
Other Laboratories Designation
University of Alberta .... a
University of British Columbia .... b
United States Geological Survey - Menlo Park .... ad
Offshore wells (scale 1 inch = 10,000 feet)
well location
upper most layers not sampled
contact
base of unit not reached

Geology compiled by W.W. Hutchison, H.C. Berg and A.V. Okulitch, 1973.

British Columbia geology was compiled by W.W. Hutchison and A.V. Okulitch from published and unpublished maps of the Geological Survey of Canada and the British Columbia Department of Mines and Petroleum Resources, and from contributions by N.C. Carter, E.W. Grove and A. Sutherland Brown.

Alaska geology was compiled by H.C. Berg from published and unpublished maps of the United States Geological Survey and from contributions by D.A. Brew, G.D. Eberlein, A.T. Ovenshine and J.G. Smith.

Geological cartography by H.A. Thomson, Geological Survey of Canada

Computer-assisted and traditional cartographic techniques were used to produce the geological information portrayed on this map. Boundaries, faults, folds and isograds were digitized in the Computer Assisted Cartographic Unit of the Geological Survey

Under a co-operative arrangement Geological Survey of Canada staff used data processing and plotting services provided by the Automated Cartography Unit of the Surveys and Mapping Branch to generate plot files and the final reproduction material for lithography

Base-map assembled and generalized by the Geological Survey of Canada, from the IMW map NN-8/9 published at the same scale by the Surveys and Mapping Branch in 1969

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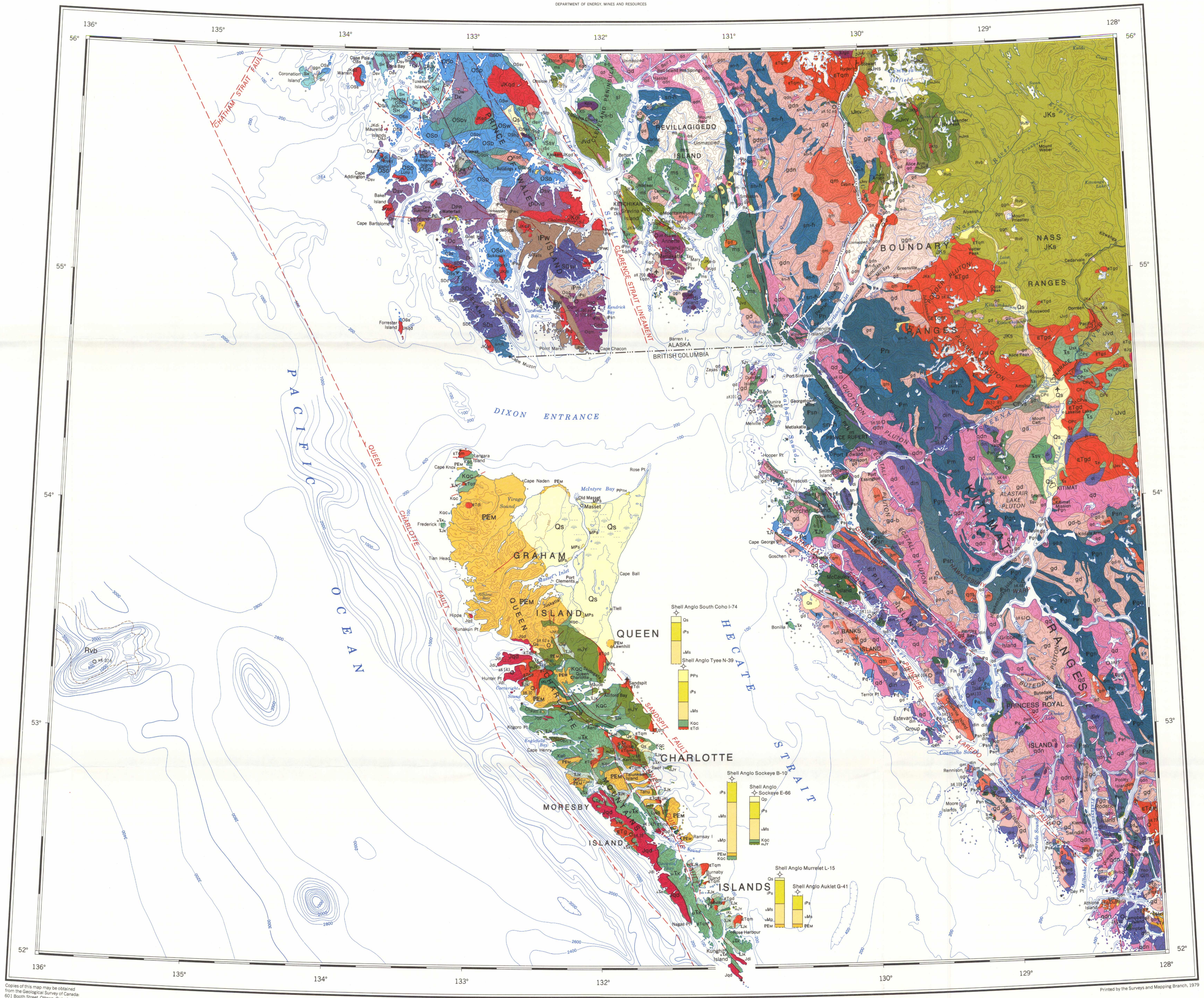
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



136°
135°
134°
133°
132°
131°
130°
129°
128°
56°
55°
54°
53°
52°
CHATHAM STRAIT FAULT
REVILLAGIGEDO ISLAND
BOUNDARY
RANGES
NASS
DIXON ENTRANCE
PACIFIC
OCEAN
QUEEN CHARLOTTE FAULT
GRAHAM
ISLAND
QUEEN
CHARLOTTE
MORESBY
ISLAND
ISLANDS
HECATE
STRAIT
SANDSPIT FAULT
PRINCESS ROYAL ISLAND
ALASKA
BRITISH COLUMBIA
Shell Anglo South Coho I-74
Shell Anglo Tyee N-39
Shell Anglo Sockeye B-10
Shell Anglo Sockeye E-66
Shell Anglo Murrelet L-15
Shell Anglo Auklet G-41

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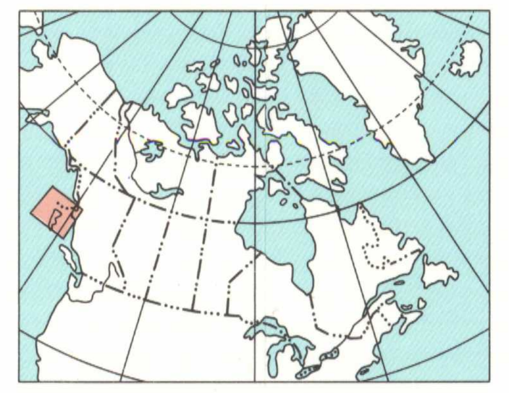


INDEX MAP

MAP 1385A

SKEENA RIVER

BRITISH COLUMBIA - ALASKA

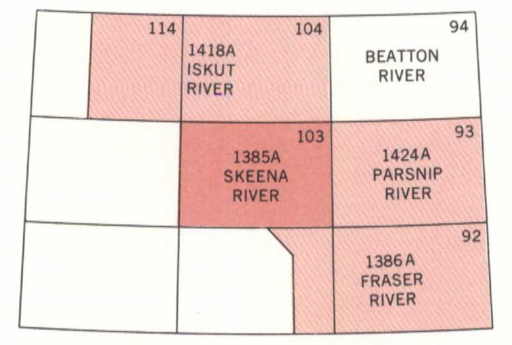
1:1,000,000 GEOLOGICAL ATLAS

SHEET 103

GENERAL CO-ORDINATOR: R.J.W. DOUGLAS

Kilometres 25 0 25 50 75 Kilometres
Miles 20 0 20 40 Miles

Lambert Conformal Projection, standard parallels 52°40′ and 55°20′



INDEX TO GEOLOGICAL ATLAS SHEETS AND REFERENCE TO NATIONAL TOPOGRAPHIC SYSTEM

LEGEND

BRITISH COLUMBIA

CENOZOIC

QUATERNARY
RECENT

Rvb	basalt, ash

PLEISTOCENE AND RECENT

Qp	non-marine shale
Qs	non-marine and marine sand, glacial deposits

TERTIARY AND QUATERNARY
PLIOCENE AND PLEISTOCENE

PPs	non-marine sand
PPTH	TOW HILL: olivine basalt sills

TERTIARY
LOWER PLIOCENE

lPs	non-marine sand, shale

MIOCENE AND PLIOCENE

MPs	SKONUN: sandstone, mudstone
MPvb	basalt, tuff

UPPER MIOCENE

uMp	marine and non-marine shale, coal
uMs	non-marine sand, coal, shale

OLIGOCENE AND MIOCENE

OMsv	andesite, agglomerate, greywacke, slate

PALEOCENE AND EOCENE

PEM	MASSET: basalt, rhyolite

TERTIARY
LATE TERTIARY

LTy	syenite, granite
LTg	granite
LTgd	granodiorite

EARLY TERTIARY

ETmz	monzonite
ETg	granite
ETqm	quartz monzonite
ETgd	granodiorite
ETqd	quartz diorite
ETdi	diorite

MESOZOIC

CRETACEOUS

KQC	QUEEN CHARLOTTE GROUP: shale, siltstone, sandstone

LOWER CRETACEOUS

lKL	LONGARM: siltstone, greywacke, conglomerate

JURASSIC AND CRETACEOUS

JKs	siltstone, argillite, greywacke, conglomerate (includes upper part of HAZELTON GROUP)

JURASSIC
MIDDLE JURASSIC

mJHS	HAZELTON GROUP: siltstone, greywacke, sandstone
mJY	YAKOUN: andesite, agglomerate
mJHV	HAZELTON GROUP: andesite, tuff, basalt
mJvr	rhyolite, breccia, tuff, andesite

LOWER JURASSIC

lJM	MAUDE: shale, argillite
lJc	limestone
lJHV	HAZELTON GROUP: andesite, basalt
lJvd	andesite, some rhyolite

TRIASSIC AND JURASSIC

TJK	KUNGA: limestone, argillite
TJv	meta-volcanic rocks

TRIASSIC

Ts	limestone conglomerate, greywacke, volcanic sandstone, chert
Tsv	andesite, breccia, tuff, greywacke, argillite

UPPER TRIASSIC AND/OR EARLIER

uTK	KARMUTSEN: basalt, pillow lava, breccia

JURASSIC AND CRETACEOUS

JKfp	feldspar, augite and hornblende porphyries

JURASSIC

Jqd	quartz diorite, diorite
Jdi	diorite, amphibolite, migmatite

EARLY JURASSIC

EJg	granite

PALEOZOIC

CARBONIFEROUS AND PERMIAN

CPc	limestone, chert
CPvs	greenstone, shale, limestone

PALEOZOIC
UPPER PALEOZOIC AND (?) OLDER

Pq	quartzite
Pc	limestone, quartzite, schist
Psc	crystalline limestone
Psn	meta-sediments, amphibolite, schist, gneiss of garnet to sillimanite grade
Pgn	granitoid gneiss, migmatite, schist, gneissic quartz diorite predominantly of sillimanite grade
Pm	amphibolite, gneiss, migmatite
Pn	biotite gneiss, gneissic granitic rocks, migmatite of almandine-amphibolite grade

BRITISH COLUMBIA AND ALASKA

AGE UNKNOWN
COAST PLUTONIC COMPLEX

ggn	acid and intermediate intrusive rocks
g	granite
gp	pegmatite
qm	quartz monzonite
gd	granodiorite
gd-b	biotite granodiorite
gdn	foliated granodiorite and gneiss
qd	quartz diorite
qdn	foliated quartz diorite and gneiss
di	diorite
din	foliated to gneissic diorite, migmatite, amphibolite
b	gabbro-diorite migmatite complex
ub	ultramafic rocks
m	amphibolite, gneiss
ms	amphibolite, schist, marble
ng	migmatitic complex
s-b	schist, phyllite, marble
sl	phyllite, quartzite, slate
sn-h	schist, gneiss, quartzite of amphibolite grade

ALASKA

CENOZOIC

QUATERNARY
RECENT

RK	KETCHIKAN Volcanics: basalt, andesite

PLEISTOCENE AND RECENT

Qs	continental and marine sands, glacial deposits

TERTIARY AND QUATERNARY
PLIOCENE AND PLEISTOCENE

PPT	TLEVAK Volcanics: olivine basalt

TERTIARY

Ts	sandstone, conglomerate, coal

LOWER TERTIARY

lTv	basalt, andesite

TERTIARY

Tqm	quartz monzonite
Tgd	granodiorite
Tb	gabbro

EARLY TERTIARY

ETqm	quartz monzonite

MESOZOIC

CRETACEOUS

Kqd	quartz diorite
Kqdn	gneissic quartz diorite
Kdi	diorite
Kb	gabbro
Kub	ultramafic rocks
Kpx	pyroxenite, some gabbro, diorite

JURASSIC AND CRETACEOUS

JKw	greywacke, argillite, siltstone, conglomerate
JKs-b	schist

JURASSIC AND CRETACEOUS

JKg	granite
JKqd	quartz diorite, diorite
JKdi	diorite

JURASSIC

Jp	slate, phyllite, greywacke
Jvd	andesite, dacite, volcanic clastics

LOWER JURASSIC

lJHV	HAZELTON GROUP: andesite, basalt

TRIASSIC AND JURASSIC

TJgd	TEXAS CREEK: granodiorite

TRIASSIC

Ts	sedimentary rocks
Tsv	sedimentary rocks, basalt

TRIASSIC

Tqdn	foliated quartz diorite

PALEOZOIC

PENNSYLVANIAN

PK	KLAWAK: calcareous siltstone
PL	LADRONES: limestone

MISSISSIPPIAN

MP	PERATROVICH: limestone, dolomite, chert

DEVONIAN

DW	WADLEIGH: limestone
Dcv	limestone, rhyolite, tuff
DK	KARHEEN: sandstone, conglomerate, shale, red beds
Ds	conglomerate, breccia, dolomite, phyllite, greywacke
Dc	CORONADOS Volcanics: basalt, limestone
DPR	PORT REFUGIO: greywacke, conglomerate siltstone, basalt
DSJI	SAINT JOSEPH ISLAND Volcanics: basaltic rocks, minor argillite, limestone
Dsv	greywacke, slate, conglomerate, limestone, lava flows, breccia, tuff (may include Silurian or older rocks)
Dvd	andesitic lava, breccia, conglomerate

MIDDLE DEVONIAN

mDc	limestone
mDvr	rhyolite and andesite flows

SILURIAN AND DEVONIAN

SDc	calcareous rocks
SDs	clastic sedimentary rocks
SDsv	sedimentary and volcanic rocks
SDv	volcanic rocks
SDvr	metarhyolite

SILURIAN

SH	HECETA Limestone: limestone, conglomerate, sandstone, shale

LOWER SILURIAN

lSc	marble
lScg	conglomerate
lStp	chert, argillite, tuff, greywacke
lSsv	volcanic greywacke, tuff, agglomerate, conglomerate
lSvd	andesite, clastic sedimentary rocks

ORDOVICIAN AND SILURIAN

OSD	DESCON: greywacke, mudstone, conglomerate, mafic volcanic rocks
OScg	conglomerate
OSp	slate, argillite
OSs	clastic sedimentary rocks
OSw	greywacke, slate, minor andesitic volcanic rocks
OSDv	DESCON: mafic volcanic rocks
OSsv	greywacke, tuff, agglomerate, conglomerate, lava

PALEOZOIC
LOWER PALEOZOIC AND/OR OLDER

lPm	amphibolite, hornfels, schist
lPsl	black slate
lPsn	schist, gneissic quartz monzonite
lPsv	greenstone, phyllite, limestone, greywacke
lPv	meta-volcanic rocks, schist, hornfels, gneiss, phyllite
lPw	WALES GROUP: schist, amphibolite
lPwc	WALES GROUP: marble

SILURIAN OR OLDER

Stj	trondhjemite

ORDOVICIAN AND SILURIAN

OSub	hornblendite, pyroxenite

ORDOVICIAN

Oqm	quartz monzonite
Ogd	granodiorite
Oqd	quartz diorite

SHEET 103
SKEENA RIVER
MAP 1385A