

GEOLOGIC MAP OF THE SEWARD PENINSULA, ALASKA

Published in cooperation with BERING STRAITS NATIVE CORPORATION

Compiled by

M.S. ROBINSON and D.L. STEVENS

CORRELATION OF MAP UNITS REFERENCES CITED

Quaternary to Tertiary

Cretaceous

Jurassic to Permian

Mississippian

Silurian to Ordovician

Ordovician

Ordovician to

Precambrian

pre-Ordoviciani

to Precambrian

IGNEOUS ROCKS

DESCRIPTION OF MAP UNITS

SEDIMENTARY ROCKS

coastal plain; flood-plain and tidal-flat deposits; and deposits in low-lying areas covered by

LIMESTONE, DOLOMITIC LIMESTONE, AND SHALE-Intensely deformed, medium- to dark-

LIMESTONE, SHALE, AND DOLOMITE-Dark-gray, black, and white limestone with subordi-

on poorly preserved brachiopods and corals of Devonian(?) age (Sainsbury, 1974).

(Sainsbury, Dutro, and Churkin, 1971; Sainsbury, 1969b).

siphuncles and brachiopods of Early Ordovician age.

STONE, UNDIFFERENTIATED.

m.y. (Turner and others, 1981).

tains nepheline locally.

and others, 1972).

medium-gray massive marble, and schistose marble of Paleozoic age.

and others, 1981) and 5.85 \pm 0.2 m.y. (Hopkins and others, 1971).

based on a K-Ar date of 86.1 \pm 3 m.y. (Miller and others, 1972).

range from 81.4 \pm 3 to 92.1 \pm 2.8 m.y. (Miller and others, 1972).

porphyritic biotite granite and biotite quartz monzonite.

dates range from 75.1 to 108 m.y. (Hudson and Arth, 1983).

cataclastic biotite granite and miarolitic biotite granite locally.

hornblende-biotite quartz monzonite.

coarse-grained biotite quartz monzonite of the Kuzitrin batholith.

nate shale and chert; dark-gray calcareous shale; and thin-bedded dolomite and dolomitic lime-

stone. Includes some dark-gray phyllite and schistose marble locally. Age assignment based

IMESTONE AND DOLOMITIC LIMESTONE-Includes light-brownish-gray, medium-bedded

sparry limestone and medium- to light-gray, medium-bedded limestone of Silurian age; age assignment based on presence of corals (Favosites sp., Hexismia? sp., Multisolenia sp., cf. M. tortuosa Fritz, Parastriatopora sp., and Cystiphyllum sp.). Also includes medium- to dark-gray,

medium- to thick-bedded sparry limestone of Silurian and Ordovician age. Age assignment based

on presence of: a) massive and Labechiid stromatoporoid; b) corals (Catenipora sp. cf C. rubra, Paleofavosites sp., 'streptelasma'); c) gastropods (Maclurites aff. M. logani Salter, Clathrospira

sp., Trochonema sp., Holopea sp., Liospira aff. L. vitruvia Billings, Pleurotomariacean, indef., ?Hormotoma sp. indet., Ectomaria or Hormotoma sp. indet); and d) brachiopods (Austinella sp.)

LIMESTONE AND ARGILLACEOUS LIMESTONE-Massive to thick-bedded micritic limestone with minor interbeds of argillaceous limestone and thick-bedded calcitic limestone with sparse

chert nodules. Upper 200 ft of unit consists of white to pinkish-gray limestone that contains

trilobites of Early Ordovician age (Sainsbury, 1969b). Age assignment based on cephalopod

ARGILLACEOUS LIMESTONE AND LIMESTONE-Thin-bedded, rudaceous, argillaceous lime-

stone and dolomitic limestone, carbonaceous limestone, and subordinate massive, micritic

limestone that contain chert, abundant ripple marks, swash marks, worm burrows, cross-bedding,

limestone clasts, and stromatolites. Contains fossils of Early Ordovician age (Sainsbury, 1969a).

LIMESTONE, MARBLE, AND SCHISTOSE MARBLE-Medium- to dark-gray bedded limestone,

IGNEOUS ROCKS LOST JIM LAVA FLOW-Gray-black vesicular basalt, olivine basalt, and basaltic andesite. Youngest

volcanic rocks in the Lost Jim Lava Flow. Dated by K-Ar methods at 0.82 \pm 0.8 and 0.91 \pm 0.09

IMURUK VOLCANICS—Dark-gray to black basaltic lava flows, pyroclastic material, and agglomer-

ALKALIC BASALT, ASH, AND TUFF-Basalt, pyroclastic material, and scoriaceous basalt; con-

GRANODIORITE AND MONZONITE-Leucocratic, massive to porphyritic, medium-grained

granodiorite and leucocratic to mesocratic, medium- to coarse-grained, gneissic to porphyritic to

trachytoid hornblende-biotite monzonite of the Kachuaik pluton. Assigned a Late Cretaceous age

MONZONITE AND SYENITE-Leucocratic to mesocratic, porphyritic to trachytoid, medium- to coarse-grained hornblende-biotite monzonite and hornblende syenite of the Kachauik pluton.

Cut by lamprophyric and alkalic dikes that contain pseudolucite locally. Rocks of this unit have

a high background radioactivity and may be the source of uranium concentrations in adjacent

sedimentary basins. Assigned a mid-Cretaceous age based on a K-Ar date of 97.5 ± 3 m.y. (Miller

QUARTZ MONZONITE (DARBY PLUTON AND BENDELEBEN BATHOLITH)-Leucocratic,

massive, locally porphyritic to trachytoid, medium to coarse-grained quartz monzonite of the southern Darby pluton; mixed leucocratic, massive to porphyritic, medium- to coarse-grained hornblende-biotite quartz monzonite and coarse-grained, seriate porphyry granite of the central

Darby pluton; and leucocratic, massive, medium- to fine-grained hornblende-biotite quartz

monzonite of the Bendeleben batholith. Assigned a Late Cretaceous age based on K-Ar dates that

GRANITE AND QUARTZ MONZONITE-Fine- to medium-grained, unfoliated, equigranular to

GRANITE-Leucocratic, massive, locally porphyritic to trachytoid, unfoliated, medium- to fine-

grained biotite-hornblende quartz monzonite and granite of the Windy Creek stock and leucocratic, massive to porphyritic, medium- to coarse-grained biotite granite of the Serpentine stock. Assigned a Late Cretaceous age based on K-Ar dates of 67.5 ± 2 m.y. and 69.4 ± 2 m.y. (Hudson,

1977a). Also includes leucocratic, porphyritic, fine- to coarse-grained biotite granite that con-

tains tourmaline as veins, clots, and fine disseminations and local greisenization that hosts tin and tungsten mineralization (Ear Mountain, Brooks Mountain, Black Mountain, and Cape Mountain).

Includes leucocratic, medium- to fine-grained biotite granite of the Kigluaik Mountains. K-Ar

MONZONITE, DIORITE, AND GRANITE-Leucocratic to mesocratic, medium- to coarse-grained monzonite near core of the Kigluaik igneous complex; grades to mesocratic, medium-grained biotite diorite border phase. Includes fine- to medium-grained, equigranular to porphyritic,

BIOTITE QUARTZ MONZONITE—Leucocratic to mesocratic, massive to porphyritic, medium- to

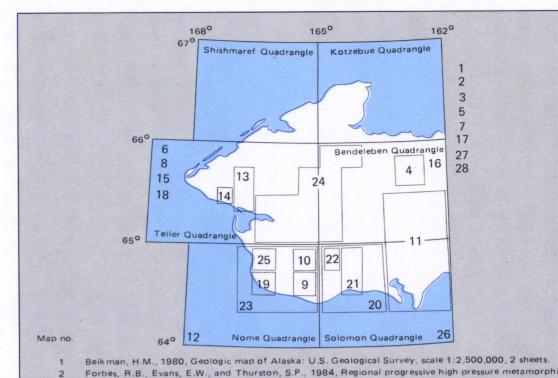
QUARTZ MONZONITE—Leucocratic, massive to locally porphyritic, medium to fine-grained

ate cones that underlie the Gosling Volcanics. Dated by K-Ar methods at 2.2 \pm 0.2 m.y. (Turner

lava flow in the Imuruk Lake area; probably 10,000 to 15,000 yr old (Hopkins, 1963).

gray limestone, dolomitic limestone, and marble with interbeds of siliceous shale and chert.

they cross modern beaches.



SR34-5H1

2 Forbes, R.B., Evans, E.W., and Thurston, S.P., 1984, Regional progressive high-pressure metamorphism, Seward Peninsula, Alaska: Journal of Metamorphic Geology [in press]. 3 Hawley, C.C., 1978, Uranium evaluation of the Seward-Selawik area, Alaska: Washington, U.S. Department of

Energy Report GJBX 105 (78).

Bulletin 1141-C, p. C1-C101. 5 Hopkins, D.M., Mathews, J.A., Wolfe, J.A., and Silberman, M.L., 1971; A Pliocene flora and insect fauna from the Bering Strait region: Palaeogeography, Palaeoclimatology, Palaeoecology, v. 9, p. 211-231. 6 Hudson, Travis, 1977a, Genesis of a zoned granitic stock, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 77-35, 188 p.

4 Hopkins, D.M., 1963, Geology of the Imuruk Lake area, Seward Peninsula, Alaska: U.S. Geological Survey

, 1977b, Geologic map of the Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 77-796A, scale 1:1,000,000. 8 Hudson, Travis, and Arth, J.E., 1983, Tin granites of the Seward Peninsula, Alaska: Geological Society of America Bulletin, v. 94, no. 6, p. 768-790. 9 Hummel, C.L., 1962a, Preliminary geologic map of the Nome C-1 Quadrangle, Seward Peninsula, Alaska: U.S.

Geological Survey Miscellaneous Field Studies Map MF-247, scale 1:63,360. , 1962b, Preliminary geologic map of the Nome D 1 Quadrangle, Seward Peninsula, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF 248, scale 1:63,360. 11 Miller, T.P., Grybeck, D.G., Elliot, R.L., and Hudson, Travis, 1972, Preliminary geologic map of the eastern Solomon and southeastern Bendeleben Quadrangles, eastern Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 72-256, 11 p., scale 1:250,000.

12 Moffit, F.H., 1913, Geology of the Nome and Grand Central Quadrangles, Alaska: U.S. Geological Survey Bulletin 533, 140 p., scale 1:62,500, 4 sheets. 13 Sainsbury, C.L., 1969a, Geologic map of the Teller C-4 and the southern part of the Teller B-4 Quadrangles, western Seward Peninsula Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-572, , 1969b, Geology and ore deposits of the central York Mountains, western Seward Peninsula, Alaska:

U.S. Geological Survey Bulletin 1287, 101 p., scale 1:63,360, 1 sheet. , 1972, Geologic map of the Teller Quadrangle, Alaska: U.S. Geological Survey Map I-685, scale , 1974, Geologic map of the Bendeleben Quadrangle, Seward Peninsula, Alaska: Anchorage, The Map-

makers, Inc., 29 p., scale 1:250,000. , 1975, Geology, ore deposits, and mineral potential of the Seward Peninsula, Alaska: U.S. Bureau of Mines Open-file Report 23-75, 108 p., scale 1:250,000, 3 sheets. 18 Sainsbury, C.L., Dutro, J.T., Jr., and Churkin, Michael, Jr., 1971, The Ordovician-Silurian boundary in the York

Mountains, western Seward Peninsula, Alaska, in U.S. Geological Survey Research 1971: U.S. Geological Survey Professional Paper 750 C, p. C52 C57. 19 Sainsbury, C.L., Hudson, Travis, Ewing, Rodney, and Marsh, W.R., 1972a, Reconnaissance geologic map of the Nome C-3 Quadrangle, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 72-322, 9 p.,

, 1972b, Reconnaissance geologic map of the west half of the Solomon Quadrangle, Alaska: U.S. Geological Survey Open-file Report 72-324, 10 p., scale 1:250,000. , 1972c, Reconnaissance geologic maps of the Solomon D-5 and C-5 Quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 72-323, 10 p., scale 1:63,360, 2 sheets. 22 Sainsbury, C.L., Hudson, Travis, Ewing, Rodney, and Richards, Thomas, 1972, Reconnaissance geologic map of

the Solomon D-6 Quadrangle, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 72-325, 17 p., scale 1:63,360. 23 Sainsbury, C.L., Hummel, C.L., and Hudson, Travis, 1972, Reconnaissance geologic map of the Nome Quadrangle, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 72:326, 28 p., scale 1:250,000. 24 Sainsbury, C.L., Kachadoorian, Reuben, Hudson, Travis, Smith, T.E., Richards, T.R., and Todd, T.E., 1969, Reconnaissance geologic maps and sample data, Teller A-1, A-2, A-3, B-1, B-2, B-3, and C-1, and Bendele-

ben A 6, B 6, C 6, D 5, and D 6 Quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Open-file Report 69-236, 49 p., scale 1:63,360, 12 sheets 25 Sainsbury, C.L., Smith, T.E., and Kachadoorian, Reuben, 1972, Reconnaissance geologic map of the Nome D 3 Quadrangle: U.S. Geological Survey Open file Report 72-327, 10 p., scale 1:63,360.

central Seward Peninsula: Geothermal Resources Council Transactions, v. 5, p. 213-216.

26 Smith, P.S., 1910, Geology and mineral resources of the Solomon and Casadepaga Quadrangles, Seward Peninsula, Alaska: U.S. Geological Survey Bulletin 433, 234 p., scale 1:62,500, 4 sheets.

Peninsula; new insight: Alaska Miners Association Convention, Anchorage, October 1982.

27 Till, A.B., Dumoulin, J.A., Aleinikoff, John, Harris, Anita, and Carroll, P.I., 1982, Paleozoic rocks of the Seward 28 Turner, D.L., Swanson, S.E., and Wescott, Eugene, 1981, Continental rifting-A new tectonic model for the

METAMORPHIC ROCKS

AFIC METAVOLCANIC AND METAVOLCANOCLASTIC ROCKS—Strongly sheared and altered

mafic metavolcanic and hypabyssal rocks composed chiefly of chlorite + epidote + albite \pm actinolite ± glaucophane ± pumpellyite ± relict augite. Also includes schistose mafic metasediments composed of albite + actinolite + chlorite + quartz ± garnet ± glaucophane. K-Ar dates suggest a Jurassic to Permian blueschist-facies metamorphic event (Forbes and others, 1984). MARBLE AND SCHISTOSE MARBLE-Gray to greenish-gray impure marble and schistose marble

with local relict bedding.

ABBRO, METAGABBRO, DIABASE, AND HORNBLENDITE-Irregular bodies of gray-green, serpentinized gabbro with relict, coarse-grained igneous texture; may contain garnet-glaucophane rocks locally. Includes numerous diabase dikes and sills. Absolute age unknown, but gabbro intrudes rocks of Early Ordovician age.

PARAGNEISS AND ORTHOGNEISS-Light-brownish-gray, fine- to medium-grained paragneiss composed of quartz + plagioclase + biotite with minor chlorite + calcite + muscovite + green amphibole + zircon; light-gray, fine-grained orthogneiss composed of muscovite + plagioclase + quartz + microcline near Serpentine Hot Springs; and light-gray, medium-grained granitic orthogneiss of Kiwalik Mountain. A preliminary U-Pb zircon date of 381 m.y. is reported from the orthogneiss of Kiwalik Mountain (Till and others, 1982). K-Ar dates consistently yield Mesozoic ages, which may reflect blueschist and greenschist metamorphic events (Forbes and others,

IMESTONE AND MARBLE—Medium-light-gray to dark-gray and olive-gray, thin-bedded to massive limestone and massive, highly deformed marble.

MARBLE AND SCHISTOSE MARBLE—Massive to schistose marble that locally includes calcareous

QUARTZ GNEISS—Medium- to dark-gray, layered biotite-quartz gneiss, graphitic quartz schist, and

SCHISTOSE LIMESTONE AND SHALE-Dark-gray schistose limestone and shale. May be highly deformed limestone and shale (DI) of Devonian age (Sainsbury, 1974). ORK SLATE-Brown to gray-brown, fine- to very fine grained, carbonaceous quartz siltite, slate, graywacke, and phyllite. Moderately metamorphosed locally. In the York Mountains, this unit

probably pre-Ordovician in age (Sainsbury, 1969b). Elsewhere on the Seward Peninsula, this unit is included in metamorphic-rock sequences, and the relationship between the metamorphic sequences and the unmetamorphosed rocks of the York Mountains is unclear. GRAPHITE SCHIST WITH MARBLE-Steel-gray to bluish-black, medium- to very fine grained, well-foliated quartz-biotite-graphite schist; graphitic, siliceous calc-silicate rock, and andalusite-

tectonically underlies the Port Clarence Limestone (OI, OaI) of Early Ordovician age and is

biotite schist that commonly includes marble intercalations. CASADEPAGA SCHIST—Medium-light-gray to light-green, feldspathic chloritic schist; includes some garnet-glaucophane-bearing rocks. May be in part equivalent to rocks of the Nome Group

TIGARAHA SCHIST-Dark-gray, medium-grained biotite-quartz schist composed of quartz + biotite \pm graphite \pm garnet \pm staurolite \pm hornblende \pm augite \pm orthoclase \pm plagioclase. Includes

SCHISTOSE MARBLE-Thin-bedded, schistose calcite + albite + muscovite marble with minor graphitic and chloritic schist and calc-schist. Age unknown.

LIMESTONE AND SHALE—Dark-gray, interbedded, coarsely crystalline limestone and quartz-

AMPHIBOLE SCHIST AND MARBLE-Chlorite-albite-epidote-amphibole schist, epidote-plagioclase-amphibole schist, blueschist, and retrograded blueschist-facies rocks. May contain marble,

CHLORITE SCHIST AND MARBLE, UNDIFFERENTIATED—Medium-dark-gray to greenish-gray, ine- to medium-grained chlorite schist and gray schistose and massive marble.

pcls LIMESTONE—Thin-bedded, dark-gray limestone intercalated with graphitic siltite, calcareous graywacke, and chlorite schist. May represent limestone intercalated in a volcaniclastic sequence.

AMPHIBOLE SCHIST-Chlorite-epidote-amphibole schist that locally includes retrograded blueschist-facies rocks. Intensely deformed and locally graphitic with subordinate schistose limestone.

CHLORITE SCHIST—Quartz-rich chlorite and phengitic schist with some graphite.

SCHISTOSE LIMESTONE-Dark-gray schistose limestone intercalated with subordinate chloritic PELITIC SCHIST AND GNEISS-Pelitic schist and gneiss composed of quartz + plagioclase

gneiss, and minor amphibolite. Calc-silicate gneiss is medium-grained and composed of calcite + quartz + diopside ± garnet ± scapolite ± plagioclase. QUARTZ-MICA SCHIST-Quartz + chlorite + muscovite ± albite ± chloritoid ± garnet ± calcite

biotite + muscovite + almandine ± sillimanite ± staurolite ± potassium feldspar ± clinopyroxene

± hornblende, cordierite, and andalusite. Locally contains intercalated marble, calc-silicate

quartz-mica schist. Also contains metavolcanic rocks composed chiefly of albite + actinolite + chlorite + epidote ± quartz ± calcite ± garnet with thin intercalations of graphitic schist and

GRAPHITE SCHIST-Gray to black quartz-muscovite-graphite schist with minor schistose marble, gray to black metasiltstone and marble, and gray-green, calcareous metagraywacke.

METAMORPHIC ROCKS, UNDIFFERENTIATED—Biotite paragneiss and biotite schist, undif-PARAGNEISS—Quartz-biotite-graphite-plagioclase-garnet paragneiss and semigneiss with local

mi MIGMATITE-Lithologically similar to pelitic schist and gneiss (pCmc) with granitic dikes, stocks, and bosses. Intimately associated with other metamorphic rocks. Age unknown.