

EARLY TERTIARY SUITE

Volcanic rocks Menik Formation

Sample number	778A-102	778A-18	789A-20	789A-31	789A-32	789A-38	789A-41	789A-96	789A-111	789A-134
Bulk chemistry:	48.59	49.14	51.47	55.24	52.71	57.49	41.58	49.57	48.58	59.88
SiO ₂	57.11	58.02	56.45	58.45	58.88	56.86	58.53	59.04	56.40	56.40
Al ₂ O ₃	4.97	5.62	4.37	3.43	2.90	4.26	4.03	2.64	4.51	2.88
FeO	6.23	3.63	4.47	3.39	4.33	2.87	1.64	1.78	6.04	2.84
MgO	6.49	4.75	2.21	4.34	2.84	3.70	1.96	3.85	4.80	3.57
CaO	12.13	9.53	6.21	7.98	6.81	6.49	5.53	5.77	10.30	6.40
Na ₂ O	1.96	3.03	3.21	3.23	2.64	2.93	3.31	2.41	2.68	3.52
K ₂ O	1.13	.81	1.25	1.21	.93	1.44	1.20	1.15	.83	1.08
TiO ₂	1.03	.74	.69	.75	.69	.80	.59	1.45	1.02	.77
P ₂ O ₅	.18	.10	.11	.14	.16	.19	.13	.15	.18	.19
MnO	.18	.20	.09	.13	.14	.08	.07	.15	.23	.11
H ₂ O ⁺	2.02	1.00	.71	.33	.81	1.01	.92	2.07	.72	.48
H ₂ O ⁻	1.21	2.45	1.62	.61	1.20	1.37	2.07	.41	1.42	1.20
CO ₂	.18	.11	.27	.05	.13	.20	.17	1.23	.08	.08
TOTAL	100.42	100.37	100.33	98.58	99.64	99.86	99.40	99.36	100.33	99.78

Ecume oligocene Intrusive rocks

Sample number	778A-30	778A-40	778A-74	778A-122	778A-137	778A-171	788A-5	788A-11	788A-17	788A-24	788A-35	788A-42
Bulk chemistry:	59.17	50.02	59.80	64.74	66.60	55.54	54.47	63.46	47.14	54.11	62.79	58.19
SiO ₂	57.44	18.15	15.40	18.18	16.12	17.58	18.02	15.60	17.11	17.47	16.40	17.53
Al ₂ O ₃	3.68	5.12	2.82	2.47	1.86	3.71	3.30	3.14	1.64	1.33	1.08	3.07
FeO	2.32	1.78	2.12	2.36	2.06	5.00	5.50	1.82	7.01	4.72	3.12	3.08
MgO	3.69	4.42	2.05	1.74	1.88	3.98	4.84	2.68	7.01	5.80	2.44	3.05
CaO	6.94	8.07	5.46	4.37	4.04	6.28	7.53	4.45	8.74	6.34	5.37	5.16
Na ₂ O	3.69	2.75	2.47	3.93	3.73	3.10	3.20	3.66	3.22	5.09	3.37	3.50
K ₂ O	1.12	1.19	2.45	1.37	1.99	.61	1.38	2.16	.49	.71	1.75	1.65
TiO ₂	.52	.53	.65	.53	.65	.95	1.04	.71	.96	.87	.55	.75
P ₂ O ₅	.23	.21	.21	.15	.17	.32	.13	.12	.11	.17	.13	.26
MnO	.13	.21	.09	.08	.03	.17	.16	.06	.55	.11	.13	.10
H ₂ O ⁺	1.22	2.43	2.18	.98	.97	1.68	.86	1.95	3.08	1.26	1.85	1.35
H ₂ O ⁻	.60	.56	.98	.13	.11	.16	.72	.53	.29	.21	.38	.12
CO ₂	.69	.34	3.51	.08	.05	.17	.24	.05	2.09	.20	.23	.05
TOTAL	100.26	100.88	99.91	98.75	100.55	101.23	99.42	100.42	99.44	98.88	100.42	98.86

MISCELLANEOUS

Granite cobble Chignik Formation

Sample number	778A-186
Bulk chemistry:	68.93
SiO ₂	66.37
Al ₂ O ₃	1.48
FeO	90
CaO	3.06
Na ₂ O	5.17
K ₂ O	1.17
TiO ₂	.28
P ₂ O ₅	.06
MnO	.04
H ₂ O ⁺	.74
H ₂ O ⁻	.16
CO ₂	.23
TOTAL	99.47

MISCELLANEOUS

Devils batholith

Sample number	778A-100	778A-125	789A-95
Bulk chemistry:	67.44	57.62	53.13
SiO ₂	65.49	58.76	58.63
Al ₂ O ₃	1.84	3.84	2.62
FeO	2.73	4.00	5.64
MgO	1.62	2.39	4.75
CaO	4.42	6.75	7.26
Na ₂ O	3.57	3.95	3.88
K ₂ O	2.19	1.52	1.45
TiO ₂	.53	.77	1.18
P ₂ O ₅	.10	.23	.11
MnO	.08	.11	.15
H ₂ O ⁺	.53	.58	1.34
H ₂ O ⁻	.07	.10	.17
CO ₂	.06	.05	.08
TOTAL	100.77	100.67	100.34

LATE TERTIARY SUITE

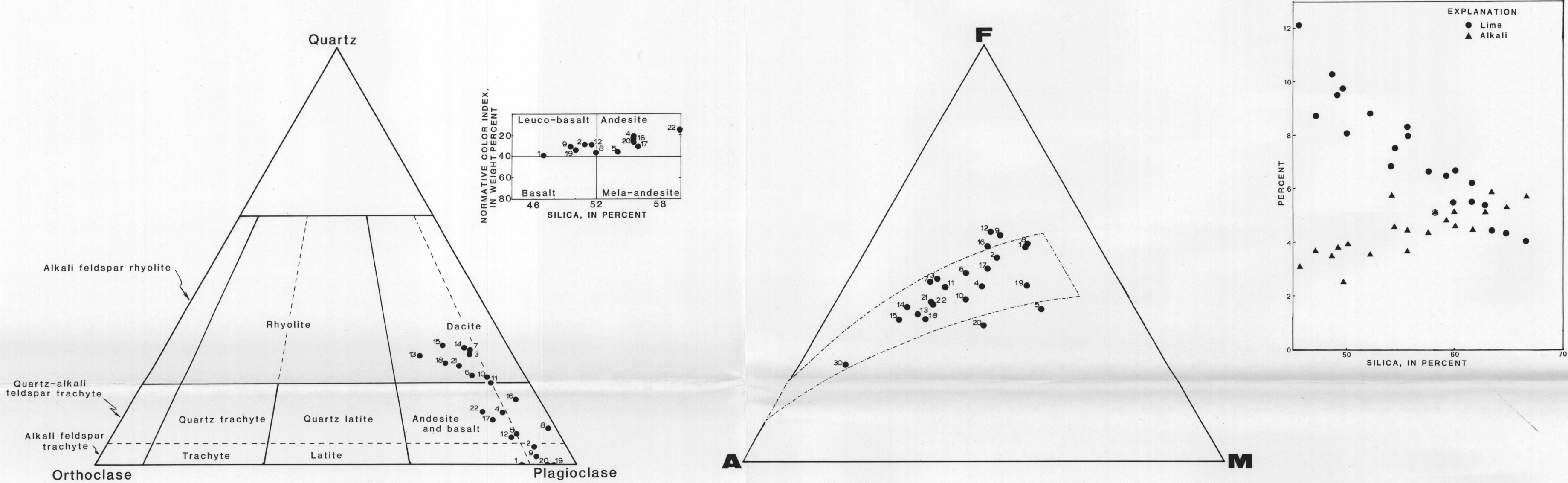
Late Tertiary volcanic rocks

Sample number	778A-112A	784A-4	784B-107	784B-90
Bulk chemistry:	49.28	37.70	61.31	55.34
SiO ₂	58.89	51.89	62.77	59.17
Al ₂ O ₃	17.08	17.29	16.54	17.05
FeO	3.78	5.99	3.04	3.57
MgO	2.56	3.35	3.94	2.51
CaO	1.18	2.09	2.56	3.48
Na ₂ O	6.21	4.53	2.76	5.78
K ₂ O	10.58	7.73	6.20	8.25
TiO ₂	3.01	2.82	3.54	2.90
P ₂ O ₅	.62	1.39	1.60	1.52
MnO	1.09	.91	.72	.94
H ₂ O ⁺	.34	.33	.26	.15
H ₂ O ⁻	.10	.14	.14	.14
CO ₂	.27	.26	.84	.64
TOTAL	101.10	100.62	100.46	100.52

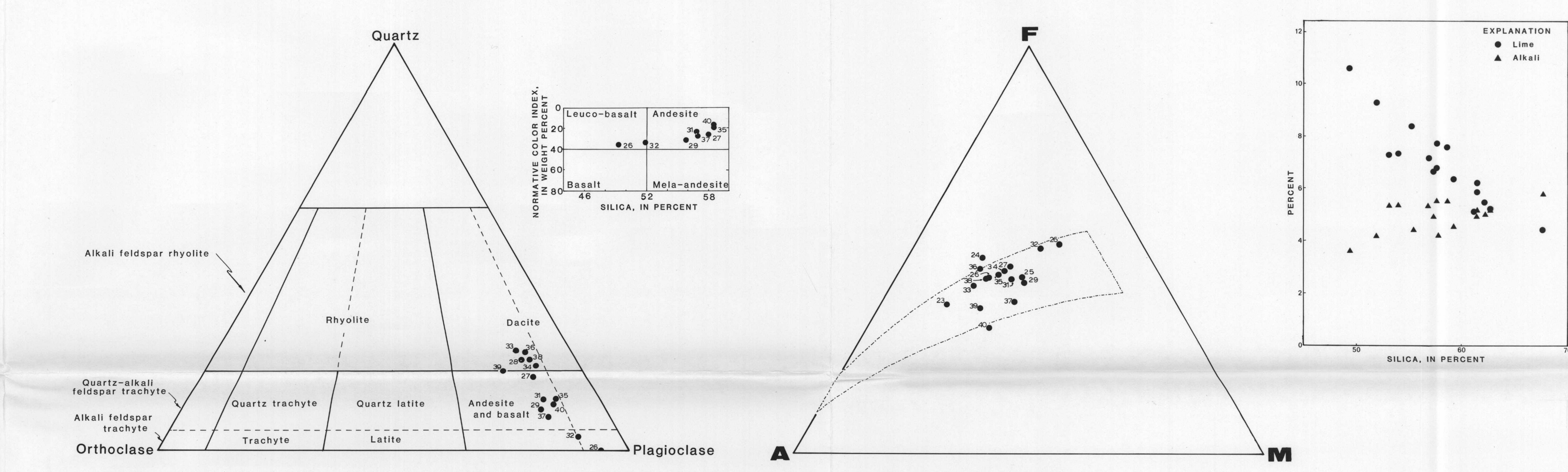
Late Tertiary Intrusive rocks

Sample number	778A-112A	778A-12	778A-124	778A-132	778A-190A	778A-215	778A-19	789A-125	789A-57	789A-58
Bulk chemistry:	56.89	51.89	62.77	59.17	57.28	62.20	53.96	61.30	61.10	58.54
SiO ₂	58.89	51.89	62.77	59.17	57.28	62.20	53.96	61.30	61.10	58.54
Al ₂ O ₃	3.78	5.99	3.04	3.57	1.41	3.62	2.15	3.61	2.84	1.86
FeO	2.56	3.35	3.94	2.51	3.68	2.23	4.32	2.54	2.98	3.31
MgO	1.18	2.09	2.56	3.48	3.03	5.03	5.03	5.03	7.27	7.58
CaO	3.58	3.17	3.48	3.29	3.67	3.68	3.73	3.60	3.64	4.05
Na ₂ O	1.72	1.01	1.71	1.27	1.24	1.43	1.53	1.44	1.44	2.43
K ₂ O	.98	1.23	.51	.66	.69	.59	.59	.54	.56	.66
TiO ₂	.25	.34	.16	.19	.28	.19	.20	.09	.11	.13
P ₂ O ₅	.11	.17	.11	.08	.14	.09	.11	.09	.17	.16
MnO	.48	.50	1.24	.78	2.32	.82	.45	1.08	1.59	1.01
H ₂ O ⁺	1.10	.62	.36	.46	.25	.20	.61	.34	.49	.18
H ₂ O ⁻	.09	.12	.16	.17	.23	.06	.53	.19	.42	.25
CO ₂	101.04	100.89	100.07	99.39	100.65	99.90	100.99	100.47	100.34	100.52

*Chemistry normalized before norm calculation. CO₂ and H₂O dropped before normalization.



TERNARY DIAGRAMS FOR EARLY TERTIARY IGNEOUS ROCKS



TERNARY DIAGRAMS FOR LATE TERTIARY IGNEOUS ROCKS

SAMPLE DESCRIPTIONS

- 778A5 9, andesite, Chignik Bay, 57 00.1'N, 156 40.4'W. Very dark gray andesite with clin- and orthopyroxene and plagioclase phenocrysts (An 55). Much of groundmass is composed of fine-grained opaque oxides and glass(?). Plagioclase phenocrysts are glomeroporphyritic.
- 778A12, leuco-basalt, Chignik Bay, 57 01.1'N, 156 41.2'W. Medium-grained dark-gray leuco-basalt. Cratinolite-biotite (An 63), clinopyroxene, and minor orthopyroxene. Subvolcanic texture.
- 778A13, andesite, Cape Kunik, 56 18.2'N, 156 35.1'W. Light-greenish-gray porphyritic andesite with hornblende phenocrysts and strongly zoned glomeroporphyritic plagioclase phenocrysts (about An 33) whose phenocrysts are An 19?. Calcite with chlorite or talc, possibly pseudomorphous pyroxene. Abundant accessory Mn-bearing purple apatite. Groundmass with abundant opaque oxides and possibly devitrified glass. Thoroughly fractured, probably protomylonitic texture.
- 778A14, leuco-basalt, Cape Kunik, 56 18.2'N, 156 35.1'W. Dark-green porphyritic leuco-basalt with hornblende phenocrysts as large as 10 mm. Altered plagioclase phenocrysts (An greater than 10). Abundant calcite, chlorite, and epidote. Hornblende phenocrysts partially altered to chlorite. Phenocrysts and groundmass fracture, may be cataclastic rather than protomylonitic. Dike in mineralized area.
- 778A16, andesite(?), Cape Kunik, 56 31.7'N, 157 27.7'W. Dark-green porphyritic andesite(?) with chloritized amphibole phenocrysts and altered zoned plagioclase phenocrysts (An 37 and An 59). Minor quartz. Rock is destructively altered, calcite is common. In mineralized area.
- 778A17, dacite, Sutwik Island, 56 12.5'N, 157 20'W. Relatively fresh biotite phenocrysts(?) in a thoroughly altered tan dacite. Hornblende phenocrysts altered to opaque oxides and calcite, sericitized plagioclase of indeterminate composition, quartz and abundant accessory apatite and sphene.
- 778A18, pegmatite, Warner Bay, 56 09.7'N, 158 24'W. Small pegmatite of feldspar and biotite formed in granodiorite of Devils batholith.
- 778A19, granodiorite, Beaver Bay, 56 05.0'N, 158 10.0'W. Light-gray medium-grained granodiorite. Major minerals are plagioclase (An 23-30), potassium feldspar, biotite, hornblende, and quartz. Minor minerals include pyroxene(?), chlorite, and opaque oxides. Accessory apatite. Very fresh rock, plagioclase zone-An 10 core. An 25 rim. Hypidiomorphic-mylonitic texture.
- 778A20, leuco-basalt, Tanco River, steeply NW quadrant, 55 57.0'N, 159 21.0'W. Dark-gray fine-grained leuco-basalt flow with laths of plagioclase (An 35-60) and phenocrysts of clinopyroxene in a groundmass of interstitial glass, hyalopilitic texture.
- 778A21, leuco-basalt, Kaseotook Rock, 56 01.7'N, 159 11.2'W. Dark-gray-black porphyritic leuco-basalt. Phenocrystic and groundmass plagioclase (An 60-70), clinopyroxene, and olivine(?). Flow structure, nearly opaque groundmass of devitrified glass(?)
- 778A22, dacite, Castle Bay, 56 11.7'N, 159 10.0'W. Light-gray iron-stained dacite with hornblende and plagioclase phenocrysts (An 19?) in a fine-grained groundmass. Some quartz, hydrothermal(?) alteration products are sparse granules distributed in flow laths. Hyalopilitic texture.
- 778A23, tonalite, Northwest Arm, Castle Bay, 56 11.2'N, 158 23.7'W. Light-gray medium-grained dacite with biotite and hornblende phenocrysts.
- 778A24, andesite, Warner Bay, 56 09.7'N, 158 24'W. Gray fine- to medium-grained andesite. Ortho- and clinopyroxene with unaltered plagioclase phenocrysts (An 45). Minor groundmass of opaque oxides. Pilositic texture.
- 778A25, andesite, Warner Bay, 56 09.7'N, 158 24'W. Gray fine- to medium-grained andesite. Ortho- and clinopyroxene with unaltered plagioclase phenocrysts (An 45). Minor groundmass of opaque oxides. Pilositic texture.
- 778A26, dacite, North edge, Sutwik Island quadrangle, 56 59.0'N, 157 07.5'W. Gray porphyritic dacite with phenocrysts of green hornblende and plagioclase. Strongly zoned and carthage-banded biotite and chlorite. Hornblende phenocrysts outlined in opaque oxides. Interspersed porphyritic porphyritic texture, phenocrysts are shattered and dislocated. Microfissile (?) cavities filled with quartz.
- 778A27, leuco-basalt, Kunik Island, 56 18.7'N, 157 25.0'W. Green porphyritic leuco-basalt. Large phenocrysts of hornblende (13 cm) and smaller hornblende and plagioclase. Hornblende phenocrysts are shattered and dislocated. Abundant calcite, chlorite and sericite in fine-grained groundmass.
- 778A28, leuco-basalt, Cape Kunik, 56 37.5'N, 157 34.5'W. Dark-green-gray porphyritic leuco-basalt. Plagioclase (An 55) phenocrysts and minor pyroxene in a groundmass largely composed of glass and devitrified glass. Hyalopilitic texture. Very minor idiopit(?) dike intruding sediments of the Tolstoi Formation.
- 778A29, dacite, North Port, Sukik Bay, 56 43.0'N, 157 49.5'W. Green-gray hornblende dacite sill or plug in Menik Formation. Hornblende and plagioclase (An 55) phenocrysts in a groundmass of glass. Plagioclase is glomeroporphyritic.
- 778A30, andesite, Cape Kunik, 56 47.3'N, 157 11.0'W. Light-gray porphyritic hornblende andesite. Green pleochroic hornblende phenocrysts in a groundmass of hornblende and sericitically altered plagioclase. Sphene and actinolite alteration products from pyroxene. Weakly developed flow structure. Same rock was collected from rubble mixed with hornblende, apparently upper contact of intrusion.
- 778A31, dacite, Cape Kunik, 56 47.9'N, 157 13.7'W. Coarse-grained dark-brown-black autolith composed of pyroxene and hornblende collected from a dacite(?) sill. Plagioclase in sill is strongly zoned with an 80 core. Autolith is almost entirely composed of pyroxene and hornblende with very minor interstitial plagioclase. Pyroxene was originally a sub-calcic aegirine, but it is now an aegirine orthopyroxene and hornblende texture.
- 778A32, andesite, Foggy Cape, 56 33.0'N, 156 59.6'W. Dark-gray porphyritic andesite with plagioclase phenocrysts (An 55) and phenocrysts of ortho- and clinopyroxene. Groundmass of very fine-grained plagioclase and pyroxene. Weak development of flow structure. Very minor alteration of flow structure.
- 778A33, andesite, Sutwik Island, 56 11.6'N, 157 17.7'W. Dark-gray andesite with phenocrysts of plagioclase (An 55-60) and minor clinopyroxene. Sarrotic texture with medium- to very fine-grained crystal sizes. Orthopyroxene phenocrysts are apparently altered to basaltite. Weak development of flow structure. Feldspar is unaltered.
- 778A34, dacite, Finicook Mountain, 56 49.1'N, 157 56.1'W. Light-gray dacite with phenocrysts of green pleochroic hornblende and plagioclase (An 60). Rare quartz phenocrysts(?), partially resorbed. Very fine-grained groundmass, primarily of feldspar. Most plagioclase phenocrysts are broken and dislocated; general alteration of hornblende phenocrysts indicate a weak development of flow structure.
- 778A35, andesite, Unvik Island, 56 10.4'N, 157 41.1'W. Gray porphyritic andesite with phenocrysts of plagioclase (An 55) hornblende and opaque oxides. Phenocrysts are variable in size from 4 mm to groundmass, and all show resorption. Plagioclase zone(?) alteration varies with zoning. Hyalopilitic porphyritic texture.
- 778A36, quartz-sericite altered andesite, Beak Rock, 56 33.0'N, 158 24.0'W. Iron-stained quartz-sericite altered andesite. Rock is completely altered to quartz, sericite, malindite, oxides, and clays. Phenocrysts of plagioclase and hornblende phenocrysts. Accessory apatite.
- 778A37, dacite, WARM TERRY, 56 30.4'N, 157 49.4'W. Gray-brown porphyritic dacite with hornblende and plagioclase (An 15) phenocrysts. Groundmass of fine-grained plagioclase, glass, and opaque oxides. Pilositic texture.
- 778A38, quartz-sericite altered andesite, Unvik Island, 56 10.4'N, 157 41.1'W. Gray porphyritic dacite. Phenocrysts of plagioclase and hornblende phenocrysts. Hornblende phenocrysts outlined in opaque oxides. Interiors of some plagioclase phenocrysts altered to quartz. Feldspar is completely altered to quartz, sericite, malindite, oxides, and clays.
- 778A39, dacite, WARM TERRY, 56 30.4'N, 157 49.4'W. Gray-brown porphyritic dacite with hornblende and plagioclase (An 15) phenocrysts. Groundmass of fine-grained plagioclase, glass, and opaque oxides. Pilositic texture.
- 778A40, andesite, Broad Creek, 56 30.7'N