GEOLOGIC MAP OF THE IDITAROD C-3 QUADRANGLE, ALASKA

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DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

STREAM ALLUVIUM---Unconsolidated silt, sand, and gravel deposited by modern streams in mature valleys; commonly covered by sphagnum moss and extensive thickets of willow and alder. Thickness highly variable, ranging from 2 to 20 m.

Caf ALLUVIAL-FAN DEPOSITS-Poorly sorted, partially stratified silt, sand, and coarse gravel deposited as cones or fans. May contain significant colluvium. Thickness ranges from 4 to 25 m.

TERRACE ALLUVIUM---Poorly to moderately stratified sand, locally cemented by iron oxides; probably includes stripped strath terraces. Vegetated surfaces dissected by modern streams and mantled with eolian silt. Varies from 2- to 5-m thick. SILT-FAN DEPOSITS---Moderately stratified silt, sand, and minor stream gravels deposited by water on

hillsides and in stream gullies; generally reworked windblown sand and silt deposits; heavily vegetated. Thickness ranges from 2 to 8 m. Contacts with other Quaternary units based on aerial-photograph interpre-FAN AND TERRACE DEPOSITS---Composite unit containing poorly sorted, partially stratified silt, sand,

and gravel that form alluvial-colluvial fans and moderately sorted, well-stratified sand and gravel that compose terrace alluvium; locally include alluvial aprons near stream cuts. Probably formed by erosion of pediment uplifted by Nixon-Iditarod fault. Maximum thickness 30 m near Moore Creek. Contacts with other units covered by vegetation.

LANDSLIDE DEPOSITS---Unsorted diamictic material transported downslope by mass failure. Consist of angular bedrock blocks, vegetation mattes, stream gravels, and colluvial debris.

DRIFT---Unsorted diamicton deposited by glaciofluvial processes. In Maybe and Moose Creek valleys, stratified gravel, sand, and silt range from 1- to 5-m thick. Distal part of deposits grade into undifferentiated Quaternary deposits (Qu).

PLACER-MINE TAILINGS—Irregularly to symmetrically stacked piles of sorted, water-washed gravel and slabs of bedrock. Cobbles are dominantly rounded intrusive and mafic volcanic rock with minor sandstone and shale; fine silt to clay fraction artificially removed during placer-mining process. In Fourth of July Creek and Moore Creek drainages, unit generally 2- to 5-m thick.

QUATERNARY DEPOSITS, UNDIFFERENTIATED---Unconsolidated alluvial, colluvial, and eolian deposits, including bedrock-derived talus and alluvial aprons on moderate to steep hillsides; eolian deposits locally ice rich in valley fill. Thickness highly variable but may reach 100 m near valley floors. Contacts with other units commonly obscured by vegetation.

INTRUSIVE AND METAMORPHIC ROCKS

RIIYOLITE TO DACITE .-- Light-gray, bleached, aphanitic to very fine grained, biotite-bearing quartz dacite, rhyolite, and alaskite. Color index = 3 to 5. Units intruding Moore Creek fault display trachytic texture and contain minor hypersthene, apatite, and corundum(?) in groundmass.

MONZONITE AND MONZODIORITE-Light- to medium-gray, fine- to medium-grained, porphyritic to locally equigranular, tourmaline-bearing olivine-biotite-augite monzonite. Color index = 15 to 40. Feldspar phenocrysts commonly zoned in altered, finer grained groundmass; biotite rims augite. Tourmaline rosettes to 1-cm diam are particularly abundant in border phase. Very resistant, forming highest uplands in study area. Intrusive rock on Camelback Mountain is conspicuous fine-grained, phaneritic olivine-augite monzonite that contains up to 8-percent modal olivine.

TKdm DIKES-Gray to tan, aphanitic to fine-grained dikes of variable composition, usually extensively altered TKdi (table 4). Most are believed to have been mafic originally. TKdm, olivine-bearing mafic dike; TKdi, intermediate dike; and TKd, altered dike.

HORNFELS-Brown to gray, massive to porphyroblastic chlorite + biotite hornfels, locally tourmaline rich. Dark-gray varieties difficult to distinguish from aphanitic mafic and intermediate volcanic rocks of TKvm and Kyi units. Volcanic units at head of Maybe, Moose, and Moore Creeks have undergone extensive thermal alteration but are not shown on map as hornfels.

VOLCANIC AND SEDIMENTARY ROCKS

MAFIC VOLCANIC ROCKS-Dark-green-gray to maroon, aphanitic to fine-grained, porphyritic olivinepyroxene basalt, basaltic andesite, and mafic agglomerate; more mafic units commonly maroon to deep purple. Dominant pyroxene is euhedral augite with phenocrysts to 1-cm diam; olivine often weathered to antigorite. Unit hydrothermally altered near Maybe Creek and Moose Creek plutons. Ranges from 50- to

VOLCANIC AGGLOMERATE-Medium- to dark-green-gray lapilli tuff and agglomerate containing ellipical bombs and subangular to rounded fragments of basalt and andesite to 100-cm diam. Locally, agate-grade chalcedony fills fractures and amygdules. Unit ranges from 25- to 50-m thick. Moderately resistant.

PORPHYRITIC ANDESITE---Medium-green-gray, porphyritic augite andesite; feldspar phenocrysts to 2-cm long compose 35 percent of unit. Thickness unknown. Moderately resistant. In fault contact with other

INTERMEDIATE VOLCANIC ROCKS-Light- to medium-green-gray, aphanitic to fine-grained biotitepyroxene andesite, dacite, agglomerate, and flow breccia; latter two lithologies compose about 50 percent of unit. Amygdules and fractures in andesitic flows commonly infilled with prehnite and chlorite; andesitic agglomerate locally contains quartz-carbonate geodes. Unit about 50-m thick. Moderately resistant.

ALTERED INTERMEDIATE TO FELSIC VOLCANIC ROCKS AND SANDSTONE-Heterogeneous, ight-tan to iron-red, aphanitic to fine-grained, altered andesite, dacite, and welded(?) tuff; interbedded with quartzose sublithic sandstone near base. Groundmass of many volcanic samples altered to silica (tridymite), carbonate, and chlorite; pseudomorphs of augite in andesitic rocks. Fractures and amygdules infilled with prehnite, chlorite, quartz, and carbonate; in Moose Creek drainage, distinctive green to dark-blue gem-quality chalcedony in fractures up to 20-cm wide. Unit ranges from 200- to 300-m thick. Nonresistant. Forms gradational contact with underlying Kssq and Ks units.

FINE SUBLITHIC SANDSTONE AND SILTSTONE-Light-gray, tan-weathered, fine- to very fine grained quartzose sublithic sandstone and medium-gray, plant-rich siltstone. Exhibit cross-bedding in cosets from 3to 10-cm thick; graded bedding generally absent. Siltstone contains abundant stem and leaf fragments and rare Inoceramus shells. Point-count analyses (N=6) indicate grains are tightly packed and consist of chert and quartz (80 percent), white mica (2 to 6 percent), plagioclase (5 percent), volcanic rock and mineral fragments (5 percent), including pyroxene and hornblende, opaque grains (1 to 2 percent), and shale-argillite rip-up clasts (1 to 4 percent). Probably deposited in a shallow- or marginal-marine environment, although may have formed partly under nonmarine conditions. Unit about 500-m thick. Generally nonresistant.

VOLCANICLASTIC SANDSTONE---Medium-green-gray, medium- to coarse-grained volcaniclastic sandstone, locally silicified. Point count analyses (N=3) indicate clasts are subangular and consist of dacite and andesite (20 to 25 percent), chert (20 percent), quartz (20 percent), felsite (15 percent), chlorite (5 to 8 percent), white mica (3 to 10 percent), and opaque minerals (6 to 10 percent); clasts are less tightly packed than in Kssq and Ks units. Sandstone about 50- to 200-m thick but highly variable; generally interbedded with Ksc unit. Typically resistant.

COARSE SANDSTONE AND CONGLOMERATE-Medium-green-gray, indurated, coarse-grained volcaniclastic sandstone with local beds of pebble conglomerate from 1- to 3-m thick; interbedded with micaceous siltstone. Bouma Tabe divisions recognized in some areas. Inoceramus prisms abundant locally. Clast composition and shape generally similar to that of Ksv unit. Point-count estimates (N=3) indicate sandstone and conglomerate composed of quartz and chert (65 to 80 percent), plagioclase (2 to 5 percent), volcanic rock fragments (5 percent), and opaque grains and oxidized matrix (10 percent). Unit thickens and thins along strike, ranging from 200 to 400 m. Very resistant relative to other sedimentary sequences.

TAN CALCAREOUS SANDSTONE AND SILTSTONE-Gray to tan, fine- to coarse-grained, subangular to rounded, calcareous lithic sandstone and interbedded micaceous siltstone, similar to Ksv unit. Tan weathering, locally conspicuous, dependent on extent of oxidation or degree of dike-swarm intrusion. Exhibit rip-up clasts, Bouma Tabc divisions, and local scour and fill features, which suggest deposition by turbidity currents. Contain abundant Inoceramus shell fragments and rounded plant stems. Point-count analyses (N=5) indicate clasts consist of chert (20 percent), quartz (20 percent), mica (6 to 7 percent), clinopyroxene(?) (5 percent), and mafic and opaque grains (8 percent) in a carbonate matrix (40 percent). Unit at least 600-m thick. May be equivalent to Ksl unit in Iditarod D-2 Quadrangle (Bundtzen and Laird, 1982).

SHALE, SILTSTONE, AND FINE SANDSTONE---Medium- to dark-gray, finely laminated siltstone and shale with up to 15-percent fine-grained lithic wacke. Graded bedding and thin Bouma Tocde sequence present locally. In micaceous slate, traces of burrowing organisms found. Unit at least 250-m thick, but base not exposed. Extremely nonresistant.

AGGLOMERATE, CHERT, TUFF, AND SANDSTONE---Medium- to dark-green agglomerate, chert, apilli tuff, and volcaniclastic sandstone; similar to TKva but contain more chert and sandstone. Thickness to 100 m. Unit forms hogbacks and ridges.

LITHIC SANDSTONE-Medium- to dark-gray, subangular to subrounded, medium-grained lithic sandstone with minor siltstone and shale. Effectively identical to most clastic lithologies found in undifferentiated unit (Kus) south of Nixon-Iditarod Fault. Exhibits graded bedding, flute clasts, ripple marks, and Bouma Tabed and Tocde sequences, which suggest deposition by turbidity currents. Point-count analyses indicate sandstone (N=7) consists of chert (35 percent), quartz (30 percent), opaque grains (5 to 15 percent), white mica (2 to 4 percent), argillite-slate intraclasts (15 to 20 percent), and rare volcanic and calcareous fragments. Unit about 150-m thick. Generally nonresistant.

SEDIMENTARY ROCKS, UNDIFFERENTIATED---Heterogeneous unit of fine to coarse, calcareous to noncalcareous sandstone, shale, and micaceous siltstone. Contain characteristics of all previously described units but most similar to lithic turbidite sandstones (Ks and Kslt). Extensive Quaternary and vegetative cover prevented subdivision of units. Thickness unknown, but south of Nixon-Iditarod Fault at least 3,500 m. Generally nonresistant. Dashed lines indicate trend of beds.

CHERT, CHERT BRECCIA, AND SANDSTONE-Poorly exposed, fault-bounded sliver of medium-gray to green radiolarian(?) chert; light-green, fine-grained volcaniclastic(?) sandstone; and gray chert breccia. Thickness unknown. Unit equivalent to chert-clastic limestone unit (Pzs) in Iditarod D-1 and D-2 Quadrangles, which have yielded middle Mississippian conodonts and Triassic to Jurassic radiolaria (Bundtzen and Laird, 1982, 1983a; M.L. Miller, oral commun., 1985).

MAP SYMBOLS

PROFESSIONAL REPORT 96

* Table 1. Geochemical analyses of selected rock-chip samples, Iditarod C-3 Quadrangle, southwestern Alaska PP96-5H1

(Underlined values are anomalous results obtained by inspection)

-?- Contact--Approximately located; queried where doubtful Cu Pb Zn Ag Au As Mo Sb Sn W Hg Co Ni Cr Mn · ?- U High-angle fault--Dashed where approximately located; dotted where concealed; queried where doubtful. U, upthrown side; D, downthrown side. Arrows 116 1.50 Silicified zone near altered dike show direction of relative movement -?- + Anticline, showing trace of axial plane and direction of plunge. Dashed where inferred or concealed; queried where doubtful -?- + Syncline, showing trace of axial plane and direction of plunge. Dashed where inferred or concealed; queried where doubtful Strike and dip of beds 347 4.99 Ferricrete gossan with abundant blue chalcedony in 428 3.57 Same as site 10 above 170 3.26 Hornfels-tourmaline breccia zone adjacent to monzonite Strike and dip of foliation 622 3.70 Ferricrete gossan in monzonite-hornfels contact zone Strike and dip of cleavage Strike and dip of joints Trend and plunge of lineation Recumbent isoclinal fold 184 3.66 Broken Shovel silver-gold deposit (see sketch, this ND 3.90 sheet). 83BT430f (last sample under site 33) K-Ar age-date locality (table 2) Major-oxide sample locality (table 5) ☆ 1 Geochemical-sample locality at prospect or site of mineral × 1 Placer deposit (table 3) A Agate locality Fossil locality (table 4) 737 5.88 Pyrite-bearing sandstone and mafic dike Bearing of paleocurrent (see table in text)

> Analyses by M.K. Polly, M.R. Ashwell, and T.A. Benjamin, DGGS Minerals Laboratory, and by Bondar-Clegg, Ltd., Vancouver, Canada. Cu, Pb, Zn, Ag, Au, Mo, Sb, Co, Ni, Cr, Mn, and Fe were detected by inductively coupled plasma spectrophotometry and by atomic absorption spectrophotometry; Pt, Nb, Bi, Hg, Sn, and W, by X-ray fluorescence; and anomalous values, by inspection. Except where noted, Pt, Nb, and Bi were analyzed ND = Not detected. -- = Not analyzed

Table (2) K-Ar analyses for selected rock samples from Iditarod C-3 Quadrangle, southwestern Alaska

Map (field) no. Rock type	1 (82BT399) Monzodiorite	2 (82GL135) Monzonite	3 (82BT430) Monzonite	4 (82BT277) Olivine basalt	5 (84BT276) Olivine monzonite	6 (83BT76) Alaskite		
Mineral dated	Biotite	Biotite	Biotite	Whole rock	Biotite	Whole rock		
K ₂ O (wt%)	7.212	7.920	8.645	2.707	8.173	0.180		
Sample wt (g)	0.0666	0.0743	0.0719	2.5645	0.1506	2.0561		
$\frac{40}{\text{Ar}}^*$ (mol/g) x 10 ⁻¹¹	72.30	82.10	88.50	23.01	87.83	1.77		
$\frac{40_{\text{Ar}}^{*}}{40_{\text{K} \times 10^{-3}}}$	4.05	4.18	4.13	3.43	4.34	3.96		
40 _{Ar} * 40 _{Ar} (total)	0.439	0.718	0.416	0.335	0.100	0.371		
$Age^{b} + 1\sigma$ (m.y.)	68.3 <u>+</u> 2.0	70.6 <u>+</u> 2.1	69.8 <u>+</u> 2.1	58.1 <u>+</u> 1.9 ^c	73.2 <u>+</u> 2.2 ^c	67.0 <u>+</u> 2.0 ^c		

Analyses by J.D. Blum, DGGS-University of Alaska Cooperative Geochronology Laboratory, Fairbanks, Alaska. Constants used in age calculations: $\lambda_{c} = 0.581 \times 10^{-10} \text{ yr}^{-1}$; $\lambda_{\beta} = 4.962 \times 10^{-10} \text{ yr}^{-1}$; and ${}^{40}\text{K/K}_{total} = 1.167 \times 10^{-4} \text{ mol/mol.}$ Radiogenic isotope

X Table 3. Summary of beneficiation results from chromite-bearing placer deposits, Moore and Fourth of July Creeks, Iditarod C-3

ample wt (kg) 33.60 0.192	Ni 0.02 0.02	Fe 10.30 8.25	Co (wt%)	Cr 0.07	Ti 0.59	Pd ^c	Au (ppm)	A
33.60 0.192	0.02	10.30	(wt%)	0.07	0.59	_	(ppm)	A
0.192						ND	ND	
	0.02	8.25	ND	0.00				
254			140	0.23	0.52	0.07	14.30	6.1
3.54	-	-	-	0.06	-	0.04	ND	0.6
		Fourth of July Creek ^d						
ample wt	Ni	Fe	Co (wt%)	Cr	Ti	Pd ^c	Au (ppm)	A
33.41	0.03	8.42	0.05	0.17	0.53	ND	ND	NI
0.145	0.04	9.27	0.05	2.08	0.90	ND	8.97	2.0
2.17	-	-	-	-	-	0.06	ND	8.5
((kg) 33.41 0.145	(kg) 33.41 0.03 0.145 0.04	(kg) 33.41 0.03 8.42 0.145 0.04 9.27	mple wt Ni Fe Co (wt%) 33.41 0.03 8.42 0.05 0.145 0.04 9.27 0.05	mple wt Ni Fe Co Cr (kg) (wt%) 33.41 0.03 8.42 0.05 0.17 0.145 0.04 9.27 0.05 2.08	mple wt Ni Fe Co Cr Ti (kg) (wt%) 33.41 0.03 8.42 0.05 0.17 0.53 0.145 0.04 9.27 0.05 2.08 0.90	mple wt Ni Fe Co Cr Ti Pd ^C (kg) (wt%) 33.41 0.03 8.42 0.05 0.17 0.53 ND 0.145 0.04 9.27 0.05 2.08 0.90 ND	mple wt Ni Fe Co Cr Ti Pd ^C Au (ppm) 33.41 0.03 8.42 0.05 0.17 0.53 ND ND 0.145 0.04 9.27 0.05 2.08 0.90 ND 8.97

Seventy-five-kilogram gravel samples were collected from both sites by T.K. Bundtzen and M.S. Lockwood on or near bedrock pay surfaces in unmined placer gravels. Samples were subsequently shipped to the U.S. Bureau of Mines Research Center in Albany, Oregon, where they were processed. No field beneficiation was attempted.

For sample (84BT89) location, see placer-deposit site 4 on map.

^cOf the platinum metals, only palladium was detected and only in trace amounts. ^dFor sample (84BT90) location, see placer-deposit site 3 on map.

Map no.	Field no.	Collection site	Fossil description
1	83BT16	Lat 62°44'02" N., long 157°27'30" W.; along cutbank of Dishna River in shale to fine sandstone (Kssq)	Abundant wood chips, dicotyledon leaf fragments, and conifer needles of the Cretaceous form of Cephalotaxopsis heterophylla
2	82BT402	Lat 62°42'50" N., long 157°07'50" W.; just off upper right tributary of Maybe Creek at 1,520-ft elevation in tan- weathered sublithic quartzose sand- stone (Ks)	Nearly complete, 15-cm-long specimen of <i>Inoceramus hobetsensis</i> of Late Cretaceous (Turonian) age
3	83GL30A	Lat 62°37'30" N., long 157°28'40" W.; along north-trending ridge at 1,200-ft elevation in fine-grained volcaniclastic sandstone (Ksv)	Abundant dicotyledon leaves commonly found in North American flysch of Early Cretaceous (Albian) or younger age
4	83BT87	Lat 62°35'48" N., long 157°05'20" W.; along north cut of Moore Creek, 2 km downstream from end of placer tailings in classic turbidite section (Kus)	Abundant fragments and nearly complete specimens of dicotyledo leaves of Late Cretaceous age
5	83BT46	Lat 62°34'00" N., long 157°22'50" W.; along northwest ridge of Camelback Mountain at 2,150-ft elevation in siltstone and fine sublithic sandstone (Kssq)	Inoceramus shell fragments of Cretaceous age. Mertie (1936) discovered Inoceramus pelecepods of Late Cretaceous age at same locality
6	83BT47	Lat 62°33'40" N., long 157°22'45" W.;	Abundant dicotyledon leaf debris and a small fern similar to Aspl

about 1 km southwest of fossil- foersteri of Hollick (1930)

83MSL51 Lat 62°32'00" N., long 157°28'20" W.; Inoceramus prisms of Jurassic or Cretaceous age

9 83GL61 Lat 62°31'30" N., long 157°18'00" W.; Abundant *Inoceramus* prisms and shell fragments of *Inoceramus*

along summer trail 2 km southwest of to Laura family

83MSL48 Lat 62°33'00" N., long 157°22'45" W.; Large leaf fragment of mid-Cretaceous to Early Tertiary age, assigned

hobetsensis of Late Cretaceous (Turonian) age

locality 5 in calcareous sandstone and

Black Pass in siltstone (Kslt)

sandstone (Kslt)

at 2,152-ft elevation in calcareous

near head of Bonanza Creek at

stone and pebble conglomerate (Kus)

1,500-ft elevation in coarse sand-

Mountain at 1,500-ft elevation in

20-m-thick shale and siltstone inter-

val of sandstone section (Kus) 83BT71 Lat 62°30'40" N., long 157°10'00" W.; Inoceramus sp. of Cretaceous age at bend in George River in shale (Kus)

^aFlora identified by C.J. Smiley, University of Idaho, Moscow, Idaho; fauna, by J.W. Miller, U.S. Geological Survey, Menlo Park, California.

10 83BT59 Lat 62°31'00" N., long 157°20'00" W.; Inoceramus shell fragments of Jurassic or Cretaceous age

Table (5) Major-oxide analyses and CIPW normative mineralogy for selected igneous rocks, Iditarod C-3 Quadrangle, southwestern Alaska

Map no. Field no. Rock type	1 82GL105 Augite basalt	2 82GL107 Andesite	3 82BT396 Olivine basalt	4 82BT397 Quartz monzonite	5 82GL121 Rhyolite	6 82BT415 Altered andesite	7 82BT409 Altered dacite(?) ^b	8 82BT410 Andesite	9 Camp 2 Andesite	10 82GL136 Olivine basalt	11 82BT428 Silicified monzonite	12 85BT100 Olivine basalt	13 84BT277 Olivine basalt	14 82BT439 Andesite	15 83BT89 Augite basalt	16 82BT437 Quartz monzonite	17 83BT48 Tonalite	18 83BT72 Dacite	19 83MSL45 Dacite	83C Alt rhy
									1	Major oxides (w	t%)									
SiO ₂	54.44	59.66	53.77	63.53	72.14	51.07	50.67	57.07	56.27	51.49	80.63	54.37	54.95	57.01	54.12	57.13	54.14	61.64	49.32	7
	10.83	14.11	11.63	14.42	14.71	11.28	10.69	13.59	14.40	10.52	8.39	12.04	11.31	18.03	11.78	15.16	11.14	17.76	12.00	
Al ₂ Õ ₃ Fe ₂ O ₃	2.90	1.47	1.09	1.27	0.41	3.23	2.76	3.25	4.38	1.80	1.83	2.16	2.12	3.94	2.83	1.60	3.01	1.29	3.00	
FeO 3	5.68	5.25	7.54	3.84	0.78	4.16	3.71	3.64	2.39	7.32	2.18	5.97	5.43	1.97	5.77	3.99	7.09	3.80	5.25	
MnO	0.16	0.14	0.16	0.11	0.01	0.11	0.31	0.13	0.06	0.17	0.03	0.17	0.16	0.09	0.16	0.14	0.23	0.05	0.12	1
MgO	11.06	6.16	12.68	4.00	0.25	6.95	6.49	8.17	6.53	13.10	1.45	9.28	11.28	0.80	8.98	3.37	10.98	1.37	7.86	
CaO	7.66	4.92	6.66	3.61	0.72	4.21	5.71	6.41	6.76	8.93	0.43	8.68	6.68	5.02	8.52	5.29	6.25	5.57	6.58	1
Na ₂ O	1.69	2.63	2.02	2.65	3.59	0.34	0.23	2.25	2.50	1.63	0.96	1.85	1.79	3.57	2.04	2.39	1.19	4.05	2.18	
K,0	3.07	3.74	2.73	3.72	4.35	3.57	4.67	3.28	3.12	2.95	1.37	2.64	2.83	3.91	2.75	3.64	1.13	2.24	1.66	1
TiO,	0.64	0.77	0.73	0.70	0.12	0.76	0.64	0.66	0.76	0.69	0.78	0.66	0.62	1.27	0.70	0.71	0.68	0.60	0.73	1
P O	0.35	0.28	0.28	0.21	0.04	0.27	0.28	0.28	0.27	0.34	0.11	0.40	0.33	0.54	0.35	0.31	0.29	0.30	0.22	1
P ₂ O ₅ H ₂ O	0.44	0.44	0.19	0.21	0.10	0.26	0.21	0.53	0.91	0.23	0.19	0.00	0.50	0.37	0.30	0.17	0.68	0.93	0.47	1
LÖI	1.46	1.10	1.54	0.67	1.53	15.31	14.94	2.00	2.18	0.60	2.51	1.62	1.64	2.43	1.45	5.80	3.34	1.11	11.06	
					00.75	404.50	101.01	101.06	100.52	00.77	100.86	00.04	00.44	98.95	99.75	99.70	100.15	100.71	100.45	10
Total	100.38	100.67	101.02	98.94	98.75	101.52	101.31	101.26	100.53	99.77	100.86	99.84	99.64	98.93	99.13	99.70	100.15	100.71	100.43	10
									(CIPW norms (w	t%)									
Quartz	2.56	9.24	0.00	18.49	32.40	15.18	11.27	7.61	9.12	0.00	66.46	3.56	3.77	10.85	2.91	12.43	10.73	15.69	4.69	5
Orthoclase	18.14	22.10	16.13	21.98	25.70	21.09	27.59	19.38	18.44	17.43	8.09	15.88	17.15	23.10	16.25	21.50	6.68	13.23	9.80	
Albite	14.29	22.25	17.09	22.42	30.38	2.88	1.95	19.03	21.15	13.79	8.12	15.94	15.53	30.20	17.26	20.22	10.07	34.26	18.44	1
Anorthite	12.89	15.64	14.60	16.46	3.31	18.71	14.34	17.29	18.86	12.68	1.42	17.05	14.84	21.37	14.86	19.88	21.72	23.66	18.05	
Nepheline	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1
Diopside	18.19	5.60	13.35	0.06	0.00	0.33	9.66	10.02	10.05	23.57	4.87	19.37	13.51	0.00	20.15	3.52	5.95	1.64	10.56	1
Hypersthene	26.15	20.04	27.53	14.98	1.54	21.07	15.29	18.77	11.60	12.18	0.00	22.79	30.05	1.90	20.59	11.76	35.07	5.08	21.62	1
Olivine	0.00	0.00	6.96	0.00	0.00	0.00	0.00	0.00	0.00	14.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-
Magnetite	4.20	2.13	1.58	1.84	0.59	4.68	4.00	4.71	5.67	2.61	2.65	3.19	3.15	2.96	3.19	2.32	3.16	3.04	3.23	1
Ilmenite	1.21	1.46	1.39	1.33	0.23	1.44	1.21	1.25	1.44	1.31	1.48	1.28	1.21	2.41	1.32	1.34	1.30	1.14	1.39	
Corundum	0.00	0.00	0.00	0.00	2.88	0.00	0.00	0.00	0.00	0.00	4.80	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	
Differentiation	35.01	53.59	33.22	62.89	88.47	39.01	40.81	46.03	48.71	31.22	82.67	35.37	36.45	64.16	36.41	54.16	27.47	63.19	32.94	7
index	33.01	33.39	33.22	02.09	00.47	37.01	40.01	40.03	40.71	31.22	02.07	55.51	30.43	01.10	50.11	51120	2	33.25		,
mucx																				

Analyzed with X-ray fluorescence by N.C. Veach, DGGS Minerals Laboratory. Petrographic analyses indicate ubiquitous alteration of mafic dikes in TKd unit and volcanic rocks in Kvt unit. Normative calculations for these analyses questionable due to high loss on ignition.