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Supplemental File 1. Map numbers, sample numbers, location information, and detailed petrographic description of each SHRIMP U-Pb zircon sample from the Fortymile district, east-central Alaska.

Map No.	Sample No.	SHRIMP U-Pb zircon age ¹	Location / body name	Latitude in decimal degree	Longitude in decimal degree	Rock name (minerals listed in decreasing abundance)	Texture	Qtz (%)	Kfs (%)	Pl (%)	Bt (%)	Hbl (%)	Ms (%)	Cpx (%)	Accessory minerals (decreasing abundance)	Alteration (degree; minerals)
Late Triassic																
1	09AD-319	215.5 ± 3.4	small body E of Mt. Veta intrusion	64.11043	-143.18031	Metamorphically overprinted Hbl Qtz diorite	Medium-grained, hypidiomorphic granular, with weakly developed foliation defined by 1-3 (up to 7) mm Hbl laths. Greenschist facies alteration localized in shear bands	15		35		40			Ttn, Fe-Ti oxide, Ap, Zrn	Locally strong Hbl to Ep and Chl; Pl to Ser (green-schist facies minerals)
2	08ADb24	215.0 ± 3.5	pluton of Kechumstuk Mtn.	64.089167	-143.03778	Hbl-Bt granodiorite	Medium-grained, hypidiomorphic granula; weakly developed local alignment of Hbl laths	20	5	55	5	15		Trace	Mag, Ilm, Ttn, Zrn, Ap	Moderate; Hbl to Bt, Chl and Fe-Ti oxide; Fs to clay
3	79AFr2005	212.0 ± 3.3	Taylor Mtn. batholith	63.98111	-142.15222	Hbl-Bt Qtz monzodiorite	Medium-grained, hypidiomorphic granula; weakly developed local alignment of Hbl laths	10	5	60	10	15			Ttn, Mag, Ep, Zrn	Minor; Hbl to Ep or Zo
4	09AD-338	207.9 ± 2.9	small body within Mt. Veta intrusion	64.10511	-143.11206	Foliated Hbl leucotonalite	Medium-grained, hypidiomorphic granular, foliation defined by trains of 1 mm Hbl laths and elongate patches of polygonized and strained quartz; Kfs in interstitial sub-mm patches; euhedral Ttn to 0.5 mm	40	5	45		10			Ttn, Zrn, Ap	Minor; cores of largest (2 mm) Pl to clay; Hbl to Act
Early Jurassic																
5	09AD-240	190.5 ± 4.8 with ~1.0 – 2.0 Ga inherited cores	small body W of Mt. Veta intrusion	64.18772	-143.13098	Foliated, altered leucogranite	Foliated, medium-grained, hypidiomorphic granular, highly altered granitoid. Kfs mostly as interstitial masses and euhedral Pl is mostly altered to Ser. Trains of strained and polygonized Qtz and fibrous Chl (likely former Bt) define the foliation.	20	35	40					Ttn, Zrn, Ap	Intense; all mafic grains to Chl, Ep and Zo; most Pl to Ser and minor Ep
6	LWM 07-09-208	187.7 ± 2.3	sill in LWM drill core	64.23379	-142.82556	Altered Bt-bearing felsic dike	Fine-grained, carbonate- and Ser-altered rock containing thin, 0.5-1 mm long, aligned Bt books with Fe-rich margins and carbonate interiors. Fine-grained Qtz-Fs matrix interspersed with alteration Ser. Carbonate veins cut sample.	50	2	40	3				Ap	Intense; Pl to Ser and Ab; Bt to carbonate
7	08ADb22	186.2 ± 3.0	Mt. Veta intrusion	64.093	-143.1458	Hbl Qtz monzonite	Kfs present as megacrysts (0.5-2 cm, typically 1 cm but up to 5 cm in length) in a medium-grained matrix of Hbl, Kfs, Pl, and Qtz. Moderately to strongly foliated. Myrmekite partially rims K-spar megacrysts.	10	40	30		20			Ttn	Minor; Hbl to Chl or Ep
8	08AD-100	184.8 ± 2.9	dike W of Mt. Veta intrusion	64.1016	-143.1905	Cpx granodiorite dike	Fine-grained, hypidiomorphic granular texture with weakly developed foliation defined by aligned Cpx prisms and elongate patches of strained and polygonized Qtz	30	5	30		Trace		35	Ttn, Zrn, Ap	Minor; Pl to Zo-Czo and clay

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9	8A5-4	184.5 ± 3.0	Mt. Veta intrusion	64.0599	-143.1701	Foliated Hbl-Cpx monzonite	Coarse-grained monzonite in which aligned tabular Hbl, Ksf, and Pl all define a moderately developed foliation. Many Kfs grains have microcline twinning with locally developed myrmekite.	1	60	20		16		3 (pale green color suggests sodic composition)	Fe-Ti oxide, Ttn	
10	10AD368	183.4 ± 3.6	sill in hanging wall of W-vergent thrust, E of Kechumstuk fault zone	64.20405	-142.82817	Altered Kfs-megacrystic Hbl-Bt granite porphyry	Non-foliated, porphyritic. Kfs megacrysts (to 1 cm) occur in a fine-grained matrix of ~1-2 mm microphenocrysts of Bt books, Pl, and completely altered Hbl, and finer grained Ser and Qtz. Veinlets of Cal + Qtz	15	45	20	10	10				Intense; Hbl to Chl, FeTiO oxide, and Cal; groundmass Pl to Ser
11	08ADb08	181.2 ± 2.6	Mt. Veta intrusion	64.214444	-142.88417	Kfs-megacrystic Hbl Qtz monzonite	Kfs mostly present as megacrysts (average 2 cm but up to 4 cm in length) in a medium-grained matrix of Hbl, Pl, minor Kfs, and Qtz. Foliation defined by aligned Kfs megacrysts and Hbl laths.	5	35	25		35			Ttn, Ap,	Hbl and Kfs are generally unaltered, but Pl shows moderate alteration to clay and Ser
Mid-Cretaceous																
12	08ADb20	111.8 ± 1.5	Corner granite	64.008889	-143.30972	Leucogranite	Medium-grained, hypidiomorphic granular.	20	45	35	0.5					Moderate; Ksp to clay; Bt to Chl and Fe-Ti oxide
13	08AD-052	108.8 ± 1.7	Corner granite	64.0286	-143.2464	Altered Bt granite	Medium-grained, highly altered rock in which most primary minerals have been replaced by finer grained alteration products: Bt now forms 2 mm-wide clots of fibrous mats of Bt + Chl; matrix altered to clay + Ser + Fe-Ti oxide; Qtz has undulose extinction and irregular habit	20	40	25	13 (pre-alteration)	2				Intense; Fs to clay and Ser; Bt and Hbl to Chl and Fe-Ti oxide
14	10ADb23	103.2 ± 1.5	Mt. Harper batholith	64.238333	-143.810278	Bt granite	Medium-grained hypidiomorphic granular. Ksp forms interstitial anhedral grains up to 1 cm; avrg ~ 4 mm; commonly perthitic. Pl cores preferentially sericitized. Bt grains commonly form clots.	25	40	25	10				Zrn	Minor; Bt. to Chl; Pl to Ser bt gen. in fine-grd clots
15	10ADb26A	101.4 ± 1.4	dike cutting Mt. Harper batholith	64.208889	-143.798333	Aplitie dike cut by Qtz veinlets	Fine-grained matrix containing ~1 mm microphenocrysts of Qtz, Pl and Kfs	30	40	30					Trace amount of Fe-Ti oxide, Zrn	
16	10ADb25	96.2 ± 1.3	dike cutting Mt. Harper batholith	64.208889	-143.798889	Qtz-Pl granodioritic porphyry dike	Medium-grained, hypidiomorphic granular to weakly porphyritic; 1-2 mm glomeroporphyritic quartz phenos surrounded by completely altered ~1 mm Pl laths and 0.5-1 mm altered Bt	30	5?	40	3 (now Chl)	3			Zrn	Intense; Pl to Ser and Cal; Bt to Chl and Ser
17	09AD-343	95.8 ± 1.5	porphyry intrusion cutting Corner granite	64.03307	-143.22725	Altered Qtz-Fs-Bt granitic porphyry	Porphyritic texture with 1-3 mm Kfs and Pl phenocrysts (polycrystalline intergrowths of Fs grains common) and 1-3 mm (to 1 cm) euhedral and glomerocrystic Qtz set in a fine-grained matrix. Fs rarely to 2 cm long. Qtz appears "smokey" megascopically.	30	30	35	5 (pre-alteration)				Fe-Ti oxide, Zrn, Aln, Ep	Intense; all Bt to Chl and Fe-Ti oxide; Fs to clay and Ser (alteration of Pl > than that of Kfs).

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18	08AD-032A	93.9 ± 1.3	small porphyry within splays of Kechumstuk fault zone	64.0530	-143.1248	Altered Qtz-Pl rhyolite porphyry	Porphyritic texture with 3-5 mm diameter euhedral grains and glomerocrysts of Qtz and 3-8 mm-long altered Pl laths are set in a cryptocrystalline potassic matrix (likely altered Ksp and Qtz). Some Qtz grains have embayed margins.	30?	40?	30?					Zrn	Intense; Fs to clay or Ser; areas containing minute Fe-Ti oxide may have been Bt; only Qtz is unaltered
Late Cretaceous																
19	10ADb22	70.0 ± 1.2	Middle Fork caldera	64.296111	-143.111944	Qtz-Pl-Bt rhyolite tuff	Qtz, P, Bt and Ksp present as 1-2 mm long phenocrysts in a cryptocrystalline to fine-grained de-vitrified groundmass of Qtz and Kfs(?). Qtz Qtz phenocrysts are commonly irregular shaped, due to fracture along embayments and crystallized melt inclusions. Fiamme locally visible on weathered surfaces of outcrop.	40	20	35	5				Fe-Ti oxide, Zrn; Ttn, Ap	
20	10ADb17	69.7 ± 1.2	Middle Fork caldera	64.311389	-143.141667	Fs-Qtz-Bt granite porphyry	Pl, Kfs, Qtz, and Bt occur as 2-4 mm-long phenocrysts in fine-grained groundmass. of euhedral Qtz surrounded by Kfs. Qtz phenocrysts are commonly embayed with crystallized melt inclusions; Pl commonly as glomerocrysts. Ksp phenocrysts rarely up to 2.5 cm with Qtz and Bt inclusions.	30	30	30	10				Fe-Ti oxide, Zrn	
21	118A5	68.1 ± 0.8	dike within Kechumstuk fault near Mitchell prospect	64.09184	-143.03780	Qtz-Kfs rhyolite porphyry	Porphyritic with 1-2 mm long phenocrysts of Qtz and Pl , and 1-3 mm long Fe-stained laths of Kfs; Qtz grains range from euhedral to rounded to embayed to glomerocrystic to skeletal. Phenocrysts set in a fine-grained groundmass of Ser, Qtz, Fs and Fe-Ti oxide. Pyrite cubes up to 1 cm across observed locally in the field.	40	30	25			5		Zrn, Rt	Fe-staining of Kfs
22	81A5	67.9 ± 1.1	intrusion N of Mt Veta	64.21326	-143.00528	Bt-Hbl granite	Medium-grained, hypidiomorphic granular; Kfs mostly as anhedral masses between euhedral, 1-3 mm Pl laths and anhedral Qtz grains, and less commonly as 5 mm diameter subhedral phenocrysts; Bt books 1-3 mm and Hbl prisms 1-5 mm in diameter.	30	30	30	7	3			Fe-Ti oxide, Zrn, Ap	Minor and local Bt to Chl and Fs to clay
23	129A5	67.7 ± 0.7	intrusion between splays of Kechumstuk fault zone N of Mitchell prospect	64.11456	-143.01266	Fine-grained Bt granite	Fine-grained, hypidiomorphic equigranular texture composed of ~1 mm long euhedral Pl laths, anhedral Qtz, and interstitial Kfs. Scattered, uncommon, irregular subequant Kfs to 1 cm. Qtz grains are irregular in shape and poikilitic due to abundant embayments and former melt inclusions.	30	30	40	<1				FeTi oxide, Ttn, Ep	Moderate; Bt to Chl and Pl to clay

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24	08ADb14	67.0 ± 1.5	Mt. Fairplay	63.68194	-142.25806	Ksp-megacrystic Cpx-Hbl-Bt syenite	Gray, prismatic, aligned, 2-6 cm-long Ksp megacrysts make up ~30% of the rock and occur within a medium-grained, equigranular matrix of Ksp, Pl, Cpx (augite?) and fine-grained clots of Bt. Megacrysts contain striae of inclusion rich and inclusion free areas perpendicular to length of the megacryst.		55	30	2	3		10	Zrn, badlyite, Ttn, Ap	Moderate; Cpx to Hbl and Bt on rims; Fe-Ti oxide to Bt on rims (1 grain with Ep inbetween)
25	08ADb13	66.5 ± 1.1	Mt. Fairplay	63.65472	-142.29028	Equigranular Hbl-Bt Qtz monzonite	Medium-grained, hypidiomorphic granular; Hbl forms anhedral to subhedral grains up to 4 mm in diameter; Bt smaller grains within Hbl clots.	5	50	35	3	7		Trace	Fe-Ti oxide, Zrn	Strong for Kfs to clay; Moderate for Hbl and Bt to Chl and Pl to Ser
26	08ADb19	65.8 ± 1.5	intrusion N of Mt Veta	64.23611	-143.08278	Bt-Hbl granite	Medium-grained, hypidiomorphic granular; 2 mm phenocrysts of equant Bt and tabular Hbl grains; Pl mostly euhedral laths (aver. 4 mm, up to 8 mm); Kfs mostly interstitial, anhedral, but rare laths to 5 mm and rimmed with myrmekite	20	35	40	6	4		Trace (rimmed by Hbl)	Fe-Ti oxide, Ap, Zrn	Moderate; Hbl to Bt, and Pl to clay
27	08ADb03	65.8 ± 1.4	intrusion N of Mt Veta	64.2175	-142.90889	Bt granite	Medium-grained, hypidiomorphic granular; Qtz occurs as concentrations of subhedral to euhedral grains; Bt generally forms subhedral 1 mm equant grains; Kfs forms interstitial, anhedral, locally poikilitic masses up to 5 mm long; plagioclase occurs as ~1 mm laths	20	40	35	5	Trace				Minor; Kfs to clay
28	140A5	≤ ~ 65	dike adjacent to splay of Kechumstuk fault zone and cutting pluton of Kechumstuk Mtn.	64.02187	-143.09274	Fine-grained microporphyritic aplite	Fine-grained hypidiomorphic granular. Qtz commonly consists of composite 0.25 mm-long clots of subhedral grains; scattered larger Qtz phenocrysts to 2 mm impart a microporphyritic texture. Pl shows compositional zoning marked by greater clay alteration of cores. Ksp in patches of sub-equant grains. Narrow veinlets/shears of Ep.	30	32	35	3 (prior to alteration to Chl)				Act, Ep, Fe-Ti oxide, Zrn, Ap	Moderate Pl to clay. Strong Bt to Chl

¹ SHRIMP U-Pb zircon data for samples from the Middle Fork caldera (Map Nos. 19 and 20) are given in Bacon et al. (2014).

Mineral Abbreviations: Act, actinolite; Aln, allanite; Ap, apatite; Bt, biotite; Cal, calcite; Chl, chlorite; Cpx, clinopyroxene; Ep, epidote; Fs, feldspar; Hbl, hornblende; Ilm, ilmenite; Kfs, K-feldspar; Mag, magnetite; Ms, muscovite; Pl, plagioclase; Qtz, quartz; Rt, rutile; Ser, sericite; Ttn, titanite; Zo, zoisite; Zrn, zircon.