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MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT AND GEOCHEMICAL DATA FROM ROCKS COLLECTED IN THE ALASKA HIGHWAY CORRIDOR MOUNT HAYES QUADRANGLE, ALASKA IN 2006 AND 2007

by

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Note: This report (including all analytical data and tables) is available in digital format from the DGGS web site (http://www.dggs.dnr.state.ak.us) at no charge. The digital data are available as PDF files and Excel spreadsheet.

MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT, AND GEOCHEMICAL DATA FROM ROCKS COLLECTED IN THE ALASKA HIGHWAY CORRIDOR, MOUNT HAYES QUADRANGLE, ALASKA IN 2006 AND 2007

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INTRODUCTION

Alaska Division of Geological & Geophysical Surveys (DGGS) personnel collected rock samples while mapping the bedrock geology along a 12-mile-wide swath following the Alaska Highway between Delta Junction and the eastern edge of the Mount Hayes Quadrangle near Dot Lake, Alaska. This mapping is one component of the multi-year DGGS project studying the geology, geohazards, and resources along the proposed gas pipeline corridor from Delta Junction to the Canadian border. We carried out field studies from August 8 to August 15, 2006, and from July 9 to August 3, 2007. In 2006, we collected ten samples for whole-rock (major and minor oxides, and petrogenetically important trace elements) analysis. In 2007, we collected 111 samples for whole-rock analysis and 36 rock samples for geochemical trace-element analysis. Location coordinates were collected using a hand-held GPS unit (no differential correction was applied), and coordinates are presented in latitude and longitude (based on the NAD 27 Alaska datum) and in UTM coordinates (based on the Clark 1866 spheroid, NAD 27 datum, UTM zone 6 projection). Sample numbers, location data, descriptions, and analytical results for each sample are tabulated in the accompanying tables.

Rock descriptions for major-oxide samples collected in 2007 (table 3b) are primarily based on field notes, with minor modifications based on stained slab modes and preliminary thin section inspection. In parentheses, rock names are given based on major-oxide plots using LeMaitre and others (1989) for volcanic-textured rocks, and de la Roche and others (1980) and Streckeisen and LeMaitre (1979) for rocks with plutonic and orthogneissic textures. Rock descriptions in table 1 and table 3a are based solely on field descriptions.

ANALYTICAL METHODS

All trace-element geochemical analyses on rocks collected in 2007 were performed by ALS Chemex. Rock samples were crushed with a Terminator jaw crusher with chrome steel alloy plates so that at least 70 percent of the material passed through a -10 (2 mm) mesh screen. Representative aliquots of 250 grams and 30 grams each were taken using a stainless steel riffle splitter. These samples were then pulverized in a chrome steel ring mill so that 85 percent of the sample passed through a -200 (75 micron) mesh screen. Most trace-element analyses were performed on the 250-gram split while gold analyses were performed on the 30-gram representative split.

Samples were assayed for gold by gravimetric finish following a fire assay fusion (FA-GRAV). All other trace-element geochemical analyses were performed by inductively coupled plasma–atomic emission spectroscopy (ICP-AES) methods following four-acid digestion. This method of digestion is possibly incomplete for some elements and may result in lower analytical results for certain elements.

The elements that may be affected by incomplete digestion as well as analytical methods, and lower and upper detection limits are noted in table 5.

All whole-rock major- and minor-element analyses on samples from 2006 and 2007 were performed by ALS Chemex. Major- and minor-element oxides were determined by X-ray fluorescence spectrometry following a lithium metaborate fusion (LBF-XRF). Analysis of trace elements (Nb, Rb, Sr, Y, and Zr) in 2006 were performed by ALS Chemex, using wavelength-dispersive X-ray fluorescence spectrometry on pressed pellets (PP-XRF).

Trace-element analyses on 2007 rock samples were performed by Dr. Rainer Newberry at the University of Alaska Fairbanks (UAF) Department of Geology and Geophysics. The analyses at UAF were conducted using wavelength-dispersive X-ray fluorescence spectrometry on pressed pellets using standard Norrish and Hutton (1969) procedures as described in Potts (1987) and as used by Cameron (2000). Well-calibrated international standards were used as a check of the analyses. The routine was customized for inter-elemental X-ray interferences in rocks of basaltic and felsic compositions. By comparing results on well-characterized rock standards, DGGS found in 2006 that the UAF routines yield more accurate trace-element results and in 2007 we chose to perform the Nb, Rb, Sr, Y, and Zr analyses using this procedure. Analytical methods and detection limits are tabulated in table 6.

ACKNOWLEDGMENTS

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REFERENCES CITED

de la Roche, H., Leterrier, J., Grande, C.P., and Marchal, M., 1980, A classification of volcanic and plutonic rocks using R1–R2 diagrams and major element analyses—its relationships and current nomenclature: Chemical Geology, v. 29, p. 183–210.

Cameron, C.E., 2000, Fault-hosted Au mineralization, Ester Dome, Alaska: Fairbanks, Alaska, M.S. thesis, University of Alaska Fairbanks, 115 p.

LeMaitre, R.W., Bateman, P., Dudek, A., Keller, J., Lameyre, J., Le Bas, M.J., Sabine, P.A., Schmid, R., Sorensen, H., Streckeisen, A., Woolley, A.R., and Zanettin, B., 1989, A classification of igneous rocks and glossary of terms: Blackwell Scientific Publications, Oxford, 193 p.

Norrish, K., and Hutton, J.T., 1969, An accurate X-ray spectrographic method for the analysis of a wide range of geologic samples: Geochimica et Cosmochimica Acta, v. 33, p. 431–453.

Potts, P.J., 1987, A handbook of silicate rock analysis: Glasgow, Blackie, 622 p.

Streckeisen, A.L., and LeMaitre, R.W., 1979, A chemical approximation to the modal QAPF classification of the igneous rocks: Neues Jahrbuch fur Mineralogie Abh., v. 136, p. 169–206.

Table 1. Location and description of rocks collected for trace-element geochemical analyses in the Alaska Highway corridor, Mount Hayes quadrangle, Alaska.

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
07DNS5A	63.6298	-144.7336	612305	7057559	Tiny quartz crystals line sparse vuggy openings in fractured, orange-weathering granite.
07DNS9A	63.6205	-144.7398	612035	7056510	Clayey, grussey unconsolidated, granite-derived gouge or weathered colluvial material. Near surface, clasts are entirely disaggregated and altered.
07DNS41A	63.7492	-144.4481	625916	7071389	Light greenish-gray, aphanitic rock with altered white feldspars up to 2 mm in length. Epidote on fracture faces.
07DNS105B	63.8211	-144.8804	604325	7078618	Orange-weathering fault zone in granodiorite, with 1.5-cm-thick brown alteration zone with open spaces and quartz crystals.
07LF275A	63.7936	-144.6077	617861	7076022	Leucocratic monzonite, possibly altered, with 2-3% bluish metallic mineral, 5-10% quartz in 1-5 mm diameter grains, 5% altered euhedral feldspar. Matrix is milky white granular feldspar.
07LF322A	63.6009	-144.1881	639467	7055410	Coarse-grained granite with 20% quartz (3-5 mm), 3-5 mm euhedral green plagioclase, 30% chlorite- & epidote-altered mafics. Chlorite-epidote-pyrite veins 2 - 10 mm wide.
07LF341A	63.6023	-144.0613	645747	7055850	Medium-grained hornblende-biotite monzonite with <10% quartz. Mafics altered to chlorite. 25% k-spar, pink-white, subhedral in waxy greenish plagioclase matrix. Moderate probable chlorite-epidote alteration.
07LF357A	63.6398	-144.0711	645065	7060007	Quartz vein, apparently 1" thick, with vitreous white, anhedral, coarsely crystalline quartz. Gossany pits after pyrite on one edge of vein.
07LF360A	63.6421	-144.0691	645153	7060264	Quartz feldspar porphyry with <5% euhedral quartz 1-2 mm in diameter, 30% kspar 1-3 mm in diameter, 1% hornblende(?) in waxy aphanitic matrix. Feldspars altered to clay; about 1-2% pyrite.
07LF364A	63.6451	-144.0650	645343	7060613	Clay altered granodiorite. 15-25% 1-2 mm quartz in waxy tan iron-stained grainy matrix.
07LF406A	63.7501	-144.2906	633681	7071806	Chloritized/sheared granodiorite/tonalite with 20% quartz, 10-20% biotite altered to chlorite. Fine-grained green zones are chloritized and aphanitic; may be altered mylonite/cataclasite.
07LF466A	63.8369	-144.6181	617164	7080830	Brown hornfels with relict schistose foliation, <0.5% very fine-grained pyrrhotite.
07LF476A	63.6671	-144.3228	632481	7062494	Strong chlorite ± epidote veining and alteration in granodiorite(?); veins irregular and anastamosing, may be occupying mylonite zone.

Table 1. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
07LF511B	63.7316	-144.8772	604816	7068653	Garnet quartz schist cut by quartz veins, iron-oxide veinlets and moderate to strong iron oxidation.
07LF269B	63.6437	-144.6936	614231	7059172	Fractured and oxidized granite with quartz veinlets as parallel and anastomosing in fractures, 1 to 5 mm wide.
07LF270B	63.6455	-144.6862	614592	7059386	Quartz breccia veins up to 5 cm thick as float in grus, very fine-grained sucrosic to chalcedonic with 5 - 20% lithic fragments about 1 cm across.
07LF274B	63.7930	-144.6047	618011	7075967	Altered biotite(?) granite, coarse-grained, feldspar waxy, grain boundaries diffuse, biotite altered to iron oxide.
07LF295B	63.7169	-144.8658	605430	7067037	Cryptocrystalline quartz; fragments of gneiss cemented with tan waxy conchoidal fractured aphanitic silica(?). 2% limonite cubic pits after pyrite.
07LF309B	63.5995	-144.2438	636713	7055135	Quartz tourmaline veins in granodioirite. Granodiorite is tourmaline-clay-altered, with iron oxide in mafics. Veins anastomosing in hairline fractures up to 2.5 cm wide.
07LF312B	63.6021	-144.2314	637316	7055454	Quartz-tourmaline veinlets, anastomosing fracture-fill to 1-cm-wide veinlets, strong clay(?)-altered, bleached and iron oxide-stained wallrock of coarse-grained biotite hornblende granodiorite.
07LF512C	63.7322	-144.8771	604818	7068714	Clay altered and strongly iron oxide-stained garnet+white mica+quartz schist
07LF543D	63.6404	-144.5477	621468	7059075	Quartz-feldspar-biotite±white mica-filled shears, 0.25 to 0.5 cm wide, with iron oxide and local pyrite.
07LF544C	63.6408	-144.5461	621544	7059128	Quartz-epidote-calcite amphibole vein, 5 cm thick, in biotite-amphibole-feldspar gneiss. Zonation in vein, from gneiss: quartz + amphibole to epidote+quartz+calcite to epidote + iron oxide gossany rock.
07MBW1076A	63.8398	-145.3712	580118	7079986	Pale green, fine-grained, equigranular, altered dike. Secondary(?) sericite is randomly oriented and disseminated throughout rock.
07MBW792A	63.6053	-144.2192	637902	7055837	Hornfelsed,well-healed, brecciated intrusive or orthogneiss. Orange and white roundish irregular areas of possible white feldspar intergrown with garnet(?)/quartz(?); both of which are cut by stringers of dark green, aphanitic chloritic(?) material. Also intergrown with the chlorite, which wraps around the feldspar + garnet(?) blebs. Stringers are anastomosing features,not planar.
07MBW831A	63.6369	-144.1439	641480	7059513	Altered granite(?); extensively fractured, faulted, slickensided and altered. Rock is an aphanitic pale green (sericite?); quartz is recrystallized(?) or redistributed (not in grains as seen nearby).

Table 1. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
07MBW836A	63.6362	-144.1293	642203	7059470	Intensely fractured, brecciated, faulted plutonic rock. Relict plutonic textures obliterated; now an aphanitic sericite(?) + quartz altered rock. Angular fragments to open-space fractures with minor movement. Some silica (clear, aphanitic) cementing breccia. Some vuggy areas with iron oxide coatings (formerly fillled with either iron sulfides(?) or carbonate(?)). One area of quartz/silica is bright green.
07MBW853A	63.6362	-144.0799	644649	7059588	Iron oxide-stained, pale green, kspar- and quartz-porphyritic granite(?). Highly altered with ~1% disseminated pyrite cubes up to 1 mm in diameter, average 0.3 mm in diameter; now altered to limonite. Large kspar phenocrysts (euhedral, up to 1.5 cm long, ~40% of rock) + quartz phenocrysts (~15%) + groundmass of quartz + feldspar + aphanitic pale green sericite(?). Some feldspars are altered to orange iron oxide + clay.
07MBW910A	63.7530	-144.4971	623481	7071713	Biotite granite, cut by planar chlorite ± iron oxide veins up to 0.5 cm wide. Granite is pink, fine- to medium-grained, either biotite-porphyritic with fine-grained groundmass or medium-grained and equigranular. Feldspars locally altered to trace sericite; mafics (biotite?) altered to chlorite and iron oxide.
07MBW938A	63.7347	-144.1557	640409	7070378	Granite/granodiorite(?) cut by quartz veins and chlorite-filled fractures. Chlorite veins have ~2.5-cm-wide alteration envelope of pink (clinozoisite(?)-altered) plagioclase(?) or kspar(?). Perhaps veining is related to large dike ~30 feet down hill.
07MBW834B	63.6373	-144.1326	642034	7059584	Pale gray, aphanitic silica with local chalcedonic banding and open space. Likely fault-fill material, but could be pluton-related and part of a system related to the extensive alteration of enclosing pluton. Contains ~1% pyrite cubes (gone to iron oxide) up to 1 mm in diameter, but generally ≤0.5 mm in diameter. Vugs look like they contain brecciated quartz that has druzy quartz coating, and then later light orange coating (now iron oxide, but may have been carbonate?). Likely a fault here because just uphill is fresh plutonic rock.
07RL322A	63.7733	-144.3865	628846	7074198	Breccia; altered gneiss and quartz
07RL334A	63.7468	-144.4611	625284	7071099	Breccia; white-green fresh surface, weathers gray.
07RL351A	63.7680	-144.1571	640173	7074081	Breccia; massive, vuggy with quartz and iron staining. Cataclasite.
07RL242C	63.6724	-144.8807	604860	7062048	Quartz vein following trend of possible fault at 80º in semischist.
07RN506A	63.5923	-144.1199	642889	7054609	Aphanitic felsic dike, ≥3 m wide, strongly altered with weathered-out cubes after pyrite.

Table 2. Trace-element geochemical analyses for rocks collected in the Alaska Highway corridor, Mount Hayes quadrangle, Alaska
Note: ppm = parts per million; % = percent; See table 5 for analytical methods.

Sample Number	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sr	Ti	V	W	Zn
	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	%	%	ppm	ppm	%	ppm	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm
07DNS5A	0.07	<0.5	6.84	157	850	1.9	108	0.27	<0.5	3	10	5	1.57	3.26	0.15	172	<1	1.83	2	330	9	<0.01	11	111	0.12	33	70	11
07DNS9A	0.07	<0.5	6.93	10	1240	1.8	<2	0.21	<0.5	4	5	3	1.85	3.42	0.19	1730	<1	0.73	<1	160	22	<0.01	17	97	0.13	23	<10	25
07DNS41A	<0.05	<0.5	8.76	<5	50	<0.5	2	12.6	<0.5	1	14	3	3.8	0.46	0.03	1030	<1	0.68	2	210	24	<0.01	5	1370	0.19	121	<10	6
07DNS105B	<0.05	<0.5	7.39	13	480	1.7	<2	0.7	<0.5	5	22	15	3.17	1.63	0.32	385	<1	0.51	1	470	23	0.01	16	178	0.25	72	<10	71
07LF275A	<0.05	<0.5	8.14	5	210	3.6	<2	0.36	<0.5	1	4	17	1.25	0.58	0.03	113	<1	6.57	2	200	13	0.03	5	130	0.15	15	<10	9
07LF322A	<0.05	<0.5	7.29	12	1430	1.4	<2	2.09	<0.5	6	9	49	2.62	2.95	0.64	655	<1	2.1	4	380	9	0.12	7	197	0.17	63	<10	33
07LF341A	<0.05	<0.5	7.79	<5	1170	1.1	<2	1.77	<0.5	7	8	3	2.87	2.36	0.78	625	<1	2.28	2	500	17	<0.01	<5	217	0.26	62	<10	41
07LF357A	<0.05	7.7	2.88	109	240	0.7	5	0.05	<0.5	3	14	25	2.49	1.11	0.09	148	<1	0.34	2	270	229	0.02	49	38	0.07	17	<10	114
07LF360A	<0.05	<0.5	7.94	<5	920	2.2	<2	0.1	<0.5	4	7	4	1.9	2.91	0.34	137	1	0.15	4	570	44	<0.01	<5	35	0.19	37	<10	134
07LF364A	<0.05	<0.5	7.02	16	500	1.2	<2	0.07	<0.5	6	7	7	1.85	2.67	0.19	371	<1	0.8	2	290	28	<0.01	<5	33	0.16	30	<10	86
07LF406A	<0.05	<0.5	7.52	<5	1210	1.4	<2	2.32	<0.5	4	6	13	2.75	1.84	0.53	870	<1	2.16	2	820	16	<0.01	<5	420	0.22	39	<10	79
07LF466A	<0.05	<0.5	8.76	<5	70	2.7	<2	5.14	<0.5	34	48	6	8.05	0.13	3.91	1450	<1	0.76	4	590	9	0.01	7	165	0.74	306	<10	131
07LF476A	<0.05	<0.5	8.03	<5	930	1.2	<2	2.59	<0.5	12	16	12	3.72	1.74	1.23	798	<1	1.98	7	680	19	<0.01	<5	327	0.35	90	<10	70
07LF511B	<0.05	<0.5	5.34	14	260	1.5	<2	0.38	<0.5	13	29	18	6.43	0.99	0.2	1410	<1	1.31	30	330	8	<0.01	<5	61	0.09	42	<10	70
07LF269B	0.07	<0.5	6.33	181	610	1.6	<2	0.63	<0.5	4	8	22	1.94	2.44	0.13	496	5	1.35	3	350	15	<0.01	28	62	0.14	22	10	26
07LF270B	<0.05	<0.5	1.3	7	90	1.1	<2	0.11	<0.5	2	12	3	0.53	0.35	0.03	221	<1	0.02	4	30	5	<0.01	61	9	0.01	6	<10	7
07LF274B	<0.05	<0.5	8.52	6	230	3.1	<2	0.7	<0.5	3	7	26	1.67	0.6	0.09	199	<1	6.14	<1	180	11	0.01	5	176	0.12	14	30	12
07LF295B	<0.05	<0.5	5.48	44	200	1.4	<2	0.02	<0.5	2	9	7	1.16	2.67	0.05	54	<1	0.05	3	30	13	<0.01	14	15	0.02	1	<10	12
07LF309B	<0.05	2.6	5.85	25	320	1.3	<2	0.59	<0.5	5	17	107	3.16	0.91	0.78	332	<1	1.4	4	660	12	0.01	<5	163	0.22	54	10	41
07LF312B	<0.05	<0.5	7.77	16	590	2	<2	0.31	<0.5	9	10	35	3.07	1.31	0.33	672	<1	1.3	10	670	17	<0.01	7	81	0.27	70	10	43
07LF512C	<0.05	<0.5	9.63	80	820	2.6	<2	0.49	<0.5	45	79	98	11	2.94	0.6	4100	<1	0.66	83	520	19	0.01	<5	100	0.24	90	<10	160
07LF543D	<0.05	<0.5	6.94	<5	690	1.5	<2	1.62	<0.5	4	15	11	2.74	2.79	0.5	338	<1	1.53	3	530	9	0.21	<5	263	0.2	50	<10	25
07LF544C	<0.05	<0.5	5.9	11	40	2.6	<2	8.52	<0.5	14	36	18	6.92	0.32	0.71	3210	<1	0.21	30	230	9	0.06	<5	267	0.13	33	60	61
07MBW1076A	<0.05	<0.5	9.65	32	1600	1.8	<2	0.39	<0.5	13	9	25	3.78	3.4	0.73	336	<1	1.24	7	1690	3	<0.01	<5	93	0.68	141	<10	28
07MBW792A	<0.05	<0.5	9.45	7	1130	1.2	<2	3.99	<0.5	9	23	6	4.88	1.51	1.64	1090	2	2.65	5	900	46	<0.01	<5	483	0.35	89	<10	92
07MBW831A	<0.05	<0.5	3.49	39	300	1.7	<2	0.06	0.6	4	13	16	1.81	1.15	0.22	387	1	0.04	4	200	125	<0.01	23	25	0.1	24	<10	104
07MBW836A	<0.05	<0.5	3.88	<5	330	1.2	<2	0.1	0.7	3	11	3	1.5	1.27	0.14	294	<1	0.04	2	290	12	<0.01	14	17	0.1	31	<10	191
07MBW853A	0.09	<0.5	8.53	29	1690	2	<2	0.11	<0.5	3	6	4	1.75	4	0.21	312	1	1.48	1	560	35	<0.01	<5	214	0.15	31	<10	261
07MBW910A	<0.05	<0.5	7.01	<5	950	0.8	<2	0.91	<0.5	6	19	4	2.84	1.76	0.78	549	1	3.02	5	470	19	<0.01	<5	161	0.25	61	<10	47
07MBW938A	<0.05	<0.5	8.06	<5	860	1.7	2	2.37	<0.5	4	26	13	2.09	4.33	0.62	462	1	1.79	8	1190	9	<0.01	<5	336	0.25	69	<10	21
07MBW834B	<0.05	0.5	4.17	75	430	1.7	<2	0.04	1	1	14	5	1.54	1.74	0.19	220	<1	0.03	1	180	142	0.01	16	17	0.1	20	<10	74
07RL322A	<0.05	<0.5	5.64	29	330	1.2	<2	0.04	<0.5	2	15	3	1.39	1.64	0.05	99	1	0.06	1	260	18	<0.01	<5	54	0.09	15	<10	21
07RL334A	<0.05	<0.5	9.01	<5	450	1.9	<2	8.03	<0.5	5	7	8	4.02	1.41	0.63	1340	1	1.69	2	440	20	0.02	<5	621	0.32	58	<10	52
07RL351A	<0.05	<0.5	3.57	12	840	1	<2	0.05	<0.5	1	16	5	1.37	0.88	0.1	152	1	0.03	2	210	20	0.02	9	88	0.06	15	<10	18
07RL242C	<0.05	<0.5	0.56	<5	60	<0.5	<2	0.02	<0.5	1	40	4	1.14	0.17	0.08	108	<1	0.02	5	50	3	<0.01	<5	6	0.03	6	<10	8
07RN506A	<0.05	<0.5	4.63	5	220	2.7	<2	2.24	<0.5	1	7	2	0.69	0.9	0.06	401	2	0.03	4	70	21	<0.01	16	41	0.01	<1	<10	25

Table 3a. Location and description of rocks collected in 2006 for major-oxide, minor-oxide, and trace-element analyses in the Mount Hayes Quadrangle, Alaska.

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
06MBW1A	63.6874	-144.4670	625258	7064467	Massive blocks of medium-gray, fine- to medium-grained, slightly porphyritic granite/granodiorite(?), with kspar and quartz phenoncrysts up to ~1 cm; ~15-20% mafic minerals, hornblende and biotite(?) with chlorite alteration; ≥20-30% quartz. Magnetic.
06MBW5C	63.6931	-144.3643	630308	7065304	Pink aplite dike up to 10 cm wide.
06MBW7A	63.6941	-144.3568	630675	7065434	Medium-gray, fine-grained, equigranular, mafic-rich granodiorite/tonalite(?). Feldspar mostly plagioclase; quartz >30%, biotite ~30%, trace hornblende.
06MBW802A	63.6361	-144.7349	612217	7058257	Dark greenish-gray, fine-grained, faintly porphyritic (feldspar up to 3 mm diameter) diorite(?). Biotite (~40%) + hornblende (~10%) + plagioclase (~50%) + trace chlorite + trace phenocrysts of quartz (up to 2 mm diameter). Comprises 10% of subcrop.
06RL7A	63.6368	-144.7284	612536	7058341	Very coarse-grained, porphyritic, feldspar (up to 2.5-3 cm), hornblende biotite granite
06RL24B	63.6225	-144.6452	616713	7056904	Dark gray, equigranular, dioritic dike with ~25% plagioclase, ~5% quartz, ~70% mafics.
06RL33A	63.6079	-144.6257	617742	7055310	Holocrystalline, porphyritic, light gray granite(?) with feldspar phenocrysts (1-2 cm) in a coarse-grained matrix of feldspar (~60%), quartz (~25%), hornblende (~10%), biotite (~5%). Mafic enclaves about 2 - 3 cm diameter.
06RL40B	63.6142	-144.6630	615868	7055940	Dark gray with white inclusions, porphyritic with feldspar and quartz up to 1 cm, in a matrix of foliated, mylonitic mafic rock.
06RL44A	63.7241	-144.3463	631054	7068792	Equigranular, feldspar (~45%), quartz (~35%), biotite (~15%), hornblende (~5%) granodiorite(?)
06RL53A	63.7259	-144.3659	630076	7068958	Foliated, medium- to fine-grained, plagioclase (~40%) hornblende (~60%) gabbro(?).

Table 3b. Location and description of rocks collected in 2007 for major-oxide, minor-oxide, and trace-element analyses in the Mount Hayes Quadrangle, Alaska.

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007DNS20A	63.6281	-144.3165	632974	7058166	Gray, fine- to medium-grained porphyritic biotite granodiorite (tonalite*), medium-grained phenocrysts variably distributed.
2007DNS25A	63.7607	-144.5721	619751	7072426	Tors of biotite ± hornblende granodiorite (granite*), fine- to medium-grained with scattered kspar phenocrysts and a hint of fabric.
2007DNS29A	63.7381	-144.5082	622999	7070031	Medium- to coarse-grained biotite granite/granodiorite (granite*), minor hornblende.
2007DNS74A	63.8113	-144.6844	614012	7077859	Tors of coarse-grained kspar-porphyritic hornblende monzogranite (quartz syenite*).
2007DNS76A	63.8414	-144.6979	613227	7081182	Kspar-porphyritic biotite hornblende monzogranite (granite*)
2007DNS84A	63.6365	-144.4176	627927	7058891	Fine-grained equigranular biotite monzogranite (granodiorite*), ~25% mafics, locally slightly chloritized.
2007DNS93A	63.6326	-144.4852	624597	7058332	Fine- to medium-grained biotite granodiorite (granodiorite*), locally slightly chloritized.
2007DNS101A	63.6830	-144.4503	626103	7064006	Coarse-grained granite(?) (granodiorite*) with sparse porphyritic kspar about 1 cm long, smokey quartz, biotite.
2007DNS105A	63.8211	-144.8804	604325	7078618	Medium- to coarse-grained, equigranular biotite hornblende granodiorite (granodiorite*); scattered fine-grained dark gray biotite-rich inclusions.
2007LF276A	63.7938	-144.6090	617793	7076041	Fine-grained monzogranite (granite*) with ~20% subhedral quartz (1-2 mm), ~10% iron oxide/chlorite after mafic minerals.
2007LF281A	63.7992	-144.6230	617081	7076627	Very fine-grained biotite monzogranite (granite*), dense, hard, tan rock with ~10% 1-mm diameter biotite flakes, sugary matrix.
2007LF287A	63.8065	-144.6399	616220	7077408	Fine-grained hornblende biotite syenogranite (syenite*), ~20% biotite.
2007LF296A	63.7172	-144.8621	605615	7067067	Garnet biotite white mica quartz feldspar syenogranitic (granite*) orthogneiss, well-banded, foliated, with estimated 1% pink garnet, 5% biotite partly gone to chlorite, 10% white mica, 30% quartz.
2007LF304A	63.7297	-144.8783	604768	7068442	Dark green feldspar amphibolite with estimated 10-20% feldspar.
2007LF306A	63.5976	-144.2537	636228	7054900	Coarse-grained biotite hornblende monzogranite (tonalite*); estimated 5-10% biotite books (1-2 mm), 10-15% hornblende (3-5 mm), 15% blocky phenocrysts quartz, feldspars (2-3 mm). Locally hornblende altered to chlorite-epidote.
2007LF309C	63.5995	-144.2438	636713	7055135	Very fine-grained aphanitic pyroxene basalt (basalt-andesite*) with ~10% 1-mm pyroxene(?) phenocrysts in grainy black-greenish groundmass.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007LF326A	63.5991	-144.1712	640311	7055246	Coarse-grained monzogranite (granite*) with estimated 5% kspar (2-4 cm), 20-25% quartz (2-5 mm), 5-15% biotite (2-3 mm), matrix feldspars (2-4 mm).
2007LF361A	63.6440	-144.0663	645282	7060479	Fine-grained biotite monzogranite (granodiorite*). Estimated 25% quartz, 15% biotite altered to chlorite.
2007LF365A	63.6461	-144.0655	645311	7060721	Fine-grained biotite granodiorite (granodiorite*). Estimated 15-25% euhedral quartz (1 mm), 10% euhedral plagioclase (2-4 mm), 10-20% biotite (1 mm), matrix is <1 mm, kspar<plagioclase.
2007LF384A	63.7635	-144.3444	630966	7073185	Dark gray feldspar-porphyritic felsic dike (granite*), with 20-25% 1-2 mm blocky feldspar phenocrysts, very fine-grained sugary matrix, brownish, possibly abundant biotite.
2007LF391A	63.7582	-144.3402	631196	7072604	Garnet biotite leucogranite (granite*), with 0.1% very fine-grained pink garnet, <5% biotite in fine-grained matrix w/ euhedral 1-mm feldspar.
2007LF431A	63.7413	-144.3827	629177	7070637	Feldspar amphibole gneiss, finely banded on 1-2 mm scale, with biotite partings, 30-40% plagioclase.
2007LF437A	63.8223	-144.8634	605157	7078773	Porphyritic syenite (syenite*). Estimated 5-10% greenish amphibole + pyroxene, 20% feldspar phenocrysts 1 cm long, 20% gray anhedral patches in pink feldspar (1-3 mm) matrix.
2007LF444A	63.8430	-144.6559	615284	7081442	Biotite hornblende porphyritic quartz syenite (quartz syenite*). Estimated 25% >2 cm-long kspar phenocrysts, 20-30% hornblende+biotite (h>b), 10% kspar (matrix), 15% quartz (matrix) 25% plagioclase (matrix).
2007LF468A	63.8340	-144.6255	616817	7080488	Leucocratic megacrystalline syenite (quartz syenite*). Estimated 30-60% 1-3 cm long kspar, 5% biotite, trace hornblende, 10-15% quartz, white feldspar, trace pyrite.
2007LF478A	63.6721	-144.3203	632579	7063056	Hornblende biotite granodiorite (tonalite*). Estimated 30% hornblende + biotite, 10% 2-10 mm feldspar phenocrysts, 20% quartz.
2007LF492A	63.6889	-144.2991	633547	7064968	Coarse-grained seriate hornblende biotite granodiorite (granodiorite*). Estimated 40% subhedral plagioclase (4-25 mm), 10% subhedral quartz (4-10 mm), 10% hornblende, 15% biotite, remainder is mixed feldspar.
2007LF493A	63.7072	-144.3261	632130	7066955	Medium-grained, equigranular hornblende biotite granodiorite (granodiorite*). Estimated 5-10% hornblende, 10-15% biotite, 20-25% quartz; remainder is white feldpar.
2007LF496A	63.7050	-144.3398	631465	7066678	Fine-grained biotite monzogranite (granite*). Estimated 5% biotite (1 mm), 20% quartz (<1 mm), mixed pink and white feldspars (1 mm).

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007LF499A	63.8229	-144.8382	606394	7078880	Coarse-grained seriate hornblende syenite (monzonite*). Estimated 30% blocky black hornblende (1 cm), 40% feldspar phenoncrysts, no quartz.
2007LF508A	63.8257	-144.7960	608462	7079262	Pink-weathering porphyritic quartz syenite (quartz syenite*). Estimated 15% kspar (1-2.5 cm), 10% quartz (2-3 mm), 10% elongate hornblende (2-3 mm), in feldspar matrix (1-3 mm). Minor biotite.
2007LF511A	63.7316	-144.8772	604816	7068653	Quartz(?) garnet amphibolite. Estimated <10% quartz, 10-15% garnet porphyroblasts up to 1 cm in diameter, remainder is dark green amphibole with strong lineation.
2007LF513B	63.7337	-144.8765	604842	7068887	Fine-grained garnet mica amphibolite. Estimated <5% pink garnet, 10% greenish mica, very fine-grained amphibole, ± feldspar(?).
2007LF526B	63.6765	-144.7796	609847	7062674	Fine-grained biotite feldspar amphibolite. Biotite forms planar partings; well-lineated amphibole, 5-20% feldspar in 1-2 mm bands of porphyroblasts.
2007LF527A	63.6791	-144.7813	609754	7062969	Fine-grained, sugary, probably hornfelsed white mica(?) biotite quartz feldspar gneiss. Feldspar>quartz, white mica + biotite ~5-10%. Local chlorite and epidote alteration.
2007LF528B	63.6796	-144.7812	609757	7063019	Fine-grained biotite feldspar amphibolite. Banded feldspar porphyroblasts.
2007LF534A	63.6829	-144.7739	610102	7063404	Tan-weathering, sugary, recrystallized gneiss with ~60% pink feldspars, 5-10% chlorite after biotite along foliation planes.
2007LF540A	63.6376	-144.5688	620434	7058729	Fine-grained, equigranular biotite granodiorite (granodiorite*) with ~25% fine grained biotite, subhedral granular quartz and feldspar (~1 mm).
2007LF553A	63.6497	-144.5120	623195	7060184	Fine- to medium-grained biotite granite (granodiorite*). Estimated ~20% biotite (1-3 mm flakes), ~30% subhedral quartz (1-2 mm), feldspars (1-3 mm), accessory magnetite. Red oxide on quartz-feldspar boundaries.
2007LF568A	63.6337	-144.8031	608847	7057870	Very coarse-grained biotite ± hornblende granite (granite*). Estimated 30% quartz (1-2 cm), 30% kspar (1-3 cm), matrix is quartz-feldspar (2-6 mm), 10% biotite (3-5 mm).
2007MBW741B	63.6346	-144.7109	613412	7058129	Pink, fine- to medium-grained with variable grain size (from <1 mm to ~8 mm; average ~1 mm) aplitic granite (granite*) dike(?); ~2-3% biotite as rusty brown spots, quartz, pink and white feldspars.
2007MBW793A	63.6055	-144.2176	637979	7055861	Medium-grained, black & white, equigranular tonalite (tonalite*); ~3% dark brown biotite, ~13% dark greenish black hornblende, ~20% clear to slightly pink quartz, ~64% white feldspar.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007MBW808A	63.6184	-144.1811	639727	7057371	Light gray, fine-grained, equigranular granodiorite (granodiorite*). Est. 15% black biotite, 22% glassy, pale orange quartz, 63% white feldspars. Cut by microfractures with ½"-wide sericite alteration envelopes.
2007MBW815A	63.6137	-144.1585	640870	7056906	Gray, fine-grained granite/granodiorite(?) (granite*) with alignment of biotite. Estimated 10% biotite, 15% quartz, feldspar.
2007MBW835A	63.6372	-144.1319	642071	7059572	Tan, fine-grained, mostly equigranular monzogranite(?) (granodiorite*) with large (≤1.5 cm) poikilitic orange feldspars. Est. 5% biotite (±altered to chlorite), 22% quartz, 38% orange to clear kspar, 35% plagioclase.
2007MBW844A	63.6358	-144.1053	643397	7059478	Green, fine-grained, amygdaloidal basalt dike, or possible andesite (basalt-andesite*).
2007MBW851A	63.6362	-144.0815	644571	7059578	Pink and green, medium-grained altered monzonite/monzodiorite(?) (granodiorite*). Estimated 35% dark green hornblende, 65% pink feldspar. Hornblende altered to chlorite ±epidote. Probably a dike.
2007MBW865A	63.6325	-144.0514	646079	7059230	Dark gray weathering, massive, jointed, dark green and white, fine-grained, slightly feldspar porphyritic (euhedral, up to 1 cm) tonalite (diorite?*). Estimated 30% biotite (altered to chlorite), 15% quartz, white feldspar.
2007MBW871A	63.7405	-144.1152	642379	7071116	Black and white, fine-grained, roughly equigranular tonalite(?) (granodiorite*) with ~1-cm-long poikilitic feldspars. Estimated 8% fresh, black bioitite, 25% quartz, 67% white feldspar.
2007MBW873A	63.7335	-144.1075	642794	7070358	Tannish green, porphyritic dacite(?) (granite*). Phenocrysts include estimated 16% rounded to euhedral (with pyramid faces), pale gray, quartz up to 3 mm diameter, 30% white, twinned plagioclase, 5% biotite altered to chlorite, 49% aphanitic groundmass. Possibly a dike.
2007MBW879A	63.7755	-144.4123	627561	7074391	Gray, medium-grained, foliated monzogranitic (granite*) orthogneiss(?). Estimated 6% brown biotite + green amphibole, 50% clear glassy quartz, 44% white feldspar
2007MBW891A	63.7615	-144.4425	626140	7072763	Dark green and white, fine-grained, foliated amphibolite with 15-20% plagioclase and 80-85% hornblende.
2007MBW895A	63.7599	-144.4496	625793	7072578	Green and white, fine-grained, foliated garnet amphibolite with ~10% plagioclase ± quartz.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007MBW900A	63.7560	-144.4691	624850	7072099	Dark green and white, fine-grained, foliated garnet amphibolite with ~10% plagioclase, ~90% hornblende, ± quartz.
2007MBW925A	63.7305	-144.4568	625571	7069286	Black, very fine-grained, plagioclase-phyric to equigranular gabbro(?) (basalt*) dike(?). Est. 1% bright glassy green olivine, 25% white plagioclase, 25% 1- to 1.5-mm-long hornblende(?), 49% dark green clinopyroxene+hornblende. Rare quartz-filled amygdules ≤4 mm.
2007MBW932A	63.7170	-144.4432	626300	7067810	Amphibolite with foliation-parallel quartz veins, some layers w/ more plagioclase than others. Est. 90% hornblende, 10% plagioclase.
2007MBW937A	63.7354	-144.1540	640489	7070467	Gray, fine-grained equigranular tonalite (diorite?*) with poikilitic feldspars up to 1 cm diameter. Estimated 10% biotite, 28% quartz, two feldspars. Locally cut by micro-fractures filled with chlorite.
2007MBW939A	63.7346	-144.1559	640402	7070368	Gray, very fine-grained, slightly feldspar porphyritic (~1.5 mm-long) intermediate dike (granite*). Estimated 40% feldspar phenocrysts, 1% quartz phenocrysts in 49% gray matrix.
2007MBW947A	63.7338	-144.1829	639070	7070219	Black & white, fine-grained, equigranular granodiorite (granodiorite*). Estimated 12% dark brown to black biotite, locally altered to chlorite, particularly near fractures, 25% quartz, ±1% hornblende, feldspars.
2007MBW968A	63.6390	-144.6694	615448	7058692	Coarse-grained, orange, white and pale gray, slightly foliated monzogranite (granite*). Estimated 7% biotite with longest dimension 3-7 mm, altered to chlorite, 27% pale gray quartz stretched to a planar shape, 30% pale orange megacrystic kspar with phenocrysts 3- to 7-cm-long, rotated parallel to foliation plane, 35% white plagioclase.
2007MBW972B	63.6404	-144.6680	615510	7058853	Dark brown weathering, dark gray on fresh surface, basalt (basalt*) or microgabbro dike/sill(?). ~20% ≤1 mm white plagioclase crystals (or amygdules?) in dark very fine-grained granular matrix.
2007MBW996A	63.6447	-144.3880	629359	7059867	Tan and black, fine-grained, subequigranular granodiorite (granodiorite*) with poikilitic kspar phenocrysts up to 1.5 cm diameter. Estimated >6% biotite, 1% hornblende, 20% quartz, two feldspars.
2007MBW1006A	63.6322	-144.7665	610668	7057766	Gray & white, coarse-grained, porphyritic (with kspar megacrysts up to 2.5 cm long) monzogranite (granite*). Estimated 3% biotite, 30% pale gray quartz, 30% kspar, 37% plagioclase.
2007MBW1008A	63.6272	-144.7732	610354	7057203	Pink, fine-grained, equigranular aplite granite (granite*) dike, with trace - 1% biotite.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007MBW1015A	63.6216	-144.7865	609718	7056556	Syenogranite (granite*) aplitic dike with <1% biotite, ~1% disseminated magnetite (with ±hematite alteration). Aplite is offset by mylonite zone fault.
2007MBW1048A	63.6038	-144.0896	644336	7055954	Whitish-orange weathering, light green porphyritic intermediate dike (granite*) with feldspar phenocrysts up to 4 mm long in aphanitic matrix.
2007MBW1067A	63.8321	-145.3684	580280	7079137	Black & white, medium-grained, equigranular monzogranite/granodiorite(?) (granodiorite*). Estimated 5% dark greenish to black equant-shaped hornblende, 1-2% biotite, 25% quartz, 27% tan feldspar, slightly larger than groundmass, up to 1 cm diameter, 43% white feldspar.
2007MBW1087A	63.8458	-145.3636	580476	7080670	Black & white, medium-grained, slightly foliated (slight alignment of biotite crystals), subequigranular tonalite (quartz diorite?*). Estimated 7% biotite, 1-2% hornblende, quartz, feldspars.
2007MBW1097A	63.6384	-144.6561	616110	7058651	Dark greenish-brown, fine-grained, gabbro (tephrite*) dike with chill margin up to 4 cm wide. Contains biotite that is shimmery brown, up to 3 mm, average ~1 mm diameter, pyroxene/hornblende(?) that is black and equant, and rare amygdules up to 1.5 cm diameter filled with calcite, in a granular matrix.
2007MBW1132A	63.6823	-144.4702	625120	7063888	Tan, fine-grained, kspar- & quartz-phyric, porphyritic, biotite granite (granite*). Matrix is pale greenish-gray, fine-grained, equigranular. Kspar phenocrysts are pale pink, euhedral to subhedral, up to 1.2 cm long. Quartz phenocrysts are pale glassy gray, subhedral, up to 4 mm diameter. Biotite is primarily in the matrix, average size ~0.5 mm or less, and ~3% of the rock. Slight chloritic alteration of biotite.
2007MBW1140A	63.7770	-144.5243	622036	7074336	Black & gray & white, coarse-grained (average grain size ~5 mm diameter), ~equigranular granodiorite (granodiorite*), with biotite (brown, 7%) + quartz (~28%, pale glassy gray) + hornblende (~1-2% dusty green) + two feldspars (white).
2007RL225B	63.6316	-144.7247	612739	7057768	Dark gray weathering, black & white fresh, massive hornblende (~50%), feldspar (~45%), quartz (~5%) diorite (diorite*) dike.
2007RL234A	63.7751	-144.6618	615272	7073872	Black & white, porphyritic, massive quartz syenite (syenite*) with 1-cm-diameter feldspar phenocrysts. Estimated 15% biotite + hornblende, 10% quartz, 25% plagioclase, 50% kspar.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007RL258A	63.6130	-144.2417	636752	7056639	Light gray, massive, equigranular, very coarse-grained granodiorite(?) (granite*) with estimated 55% feldspars, 30% quartz, 5% biotite, 1% hornblende.
2007RL261A	63.6191	-144.2367	636969	7057338	White with black specks, massive, very coarse-grained granodiorite(?) (granite*). Estimated 60% feldspars, 25% quartz, 10% biotite, ± hornblende.
2007RL328A	63.7529	-144.3593	630277	7071976	Bluish gray, porphyritic tonalite(?) (granite*) with 15% fresh plagioclase ± quartz phenocrysts (up to 0.5 cm) in a fine-grained matrix with biotite.
2007RL337A	63.7392	-144.4747	624646	7070224	Black & white, porphyritic monzogranite (granodiorite*) with phenocrysts of feldspar up to 1 cm. Estimated 15% mafics (biotite>hornblende), 30% quartz, 30% plagioclase, 25% kspar.
2007RL339A	63.7381	-144.4780	624490	7070088	Greenish gray, massive, porphyritic tonalite(?) (gabbro?*) with 3 mm plag. phenocrysts. Plagioclase, >40% hornblende, ± biotite, quartz.
2007RL346A	63.7395	-144.4974	623528	7070208	Dark gray aphanitic basalt (basalt*) with pyroxene/hornblende.
2007RL352A	63.7719	-144.1552	640249	7074523	Black & white, porphyritic granodiorite (diorite?*) with hornblende phenocrysts up to 2 cm. Estimated <15% kspar, 32% plagioclase, <28% quartz, 25% mafics (hornblende>>biotite).
2007RL363A	63.7592	-144.1358	641270	7073152	Dark gray, fine- to medium-grained hornblende tonalite(?) (quartz diorite?*). Chlorite-altered mafics.
2007RL365A	63.8442	-144.8010	608145	7081324	Black & white, coarse-grained equigranular granodiorite (granodiorite*). Est. 15% kspar, 40% plagioclase, 35% quartz, 10% mafics (hornblende+biotite).
2007RL373A	63.8560	-144.7965	608322	7082638	Light gray with black specks monzogranite (granite*). Estimated 40% kspar, 33% plagioclase, 20% quartz, 4% altered hornblende, 3% biotite.
2007RL379A	63.8115	-144.5510	620573	7078123	Gray, sub-equigranular, coarse-grained syenite (syenite*). Estimated 60% kspar, 29% plagioclase, 1% quartz, 10% mafics.
2007RL394A	63.6429	-144.3399	631745	7059768	White, sub-equigranular, coarse-grained granite (granite*). Estimated 33% quartz (5-8 mm), 65% feldspars (5-8 mm), 2% biotite (1-3 mm), trace garnet, white mica.
2007RL473C	63.6002	-144.5798	620047	7054539	Dark gray aphanitic amphibole basalt (basalt*) dike with quartz-feldspar inclusions.
2007RL484B	63.6134	-144.5579	621078	7056050	Dark gray to black, fine-grained basalt (basalt*) dike with plagioclase and amphibole.
2007RN311A	63.7034	-144.8553	606004	7065549	Medium-grained amphibolite with estimated 60% hornblende, 40% plagioclase, in layer about 3 m thick.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007RN314A	63.7035	-144.8620	605671	7065548	Medium-grained hornblende amphibolite, with ~70% hornblende, ~30% plagioclase.
2007RN325A	63.6038	-144.2448	636642	7055615	Sub-equigranular, medium- to coarse-grained, homogeneous granodiorite(?) (tonalite*) with 5 mm hornblende, 1-2 mm biotite, more biotite than hornblende.
2007RN336A	63.6397	-144.2711	635166	7059551	Sub-equigranular, medium- to coarse-grained, granodiorite (granodiorite*) with slightly porphyritic kspar. ~15% kspar (5 mm), 15-20% mafics (biotite>hornblende; biotite euhedral, 3-4 mm), subhedral quartz (3 mm)
2007RN356A	63.6605	-144.1232	642384	7062189	Medium-grained, equigranular biotite monzogranite (granodiorite*), slightly chloritized.
2007RN367A	63.6732	-144.1043	643256	7063647	Gray, very hard, rhyolite porphyry dike (granite*) with ~40% phenocrysts, 2-4 mm, of feldspar>chloritized biotite>quartz, in aphanitic groundmass.
2007RN392A	63.7589	-144.0777	644134	7073253	Fine- to medium-grained, sub-equigranular monzogranite (granodiorite*) with ~20% fresh biotite, ~30% quartz (1-3 mm).
2007RN397A	63.7524	-144.0345	646297	7072623	Fine- to medium-grained, almost equigranular monzogranite (granodiorite*) with slightly porphyritic kspar (to 0.4 cm). Estimated 10% biotite, 30% quartz.
2007RN402A	63.7520	-144.0059	647711	7072647	Light green felsic dike (granite*) with 25% phenocrysts (quartz, altered feldspar) in aphanitic groundmass. Some chloritized biotite.
2007RN417A	63.7653	-144.4822	624164	7073111	Massive, blocky amphibolite with ~60% hornblende, ~40% plagioclase (2-3 mm).
2007RN425B	63.7630	-144.5131	622650	7072794	Granitic aplite dike (granite*), ~1-2% mafics.
2007RN431A	63.7687	-144.3144	632417	7073833	Amphibolite with >80% green hornblende.
2007RN447A	63.7327	-144.3861	629051	7069667	Amphibolite with 60-70% hornblende, 30-40% plagioclase, no obvious chlorite.
2007RN450A	63.7309	-144.3743	629639	7069499	Amphibolite with 70-80% hornblende, 20-30% plagioclase, fractured but not obviously chloritized.
2007RN462A	63.8073	-144.7536	610622	7077290	Coarse-grained biotite granite (granite*), roughly equigranular, with 10-15% fresh biotite.
2007RN467A	63.8242	-144.5932	618444	7079457	Medium-grained hornblende monzonite (syenite*) with some alignment of hornblende crystals. No obvious quartz, ~15% hornblende (3-4 mm).
2007RN499A	63.6121	-144.3849	629660	7056240	Medium-grained, equigranular biotite granodiorite (granodiorite*), slightly chloritized.

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 3b. (continued).

Sample Number	Latitude	Longitude	UTM E	UTM N	Description
2007RN500A	63.6114	-144.3954	629141	7056148	Medium- to coarse-grained porphyritic granodiorite (granodiorite*) with ~20% mafics, biotite (to 5 mm) partially chloritized.
2007RN503A	63.6065	-144.3871	629577	7055622	Medium- to coarse-grained granodiorite (granodiorite*). Coarse-grained biotite partially chloritized, poikilitic feldspar.
2007RN524A	63.8066	-144.7265	611957	7077263	Fine-grained aplitic monzogranite (granite*).
2007RN530A	63.8270	-144.7679	609840	7079464	Medium- to coarse-grained megacrystic kspar monzogranite (granite*), with ~20% hornblende + biotite.
2007RN535A	63.6488	-144.4897	624305	7060119	Fine- to medium-grained, ~equigranular granodiorite (granodiorite*), with plagioclase oikocrysts, local large biotite crystals to 0.5 cm. Relatively free of chlorite.
2007RN543A	63.6590	-144.5407	621736	7061164	Medium-grained amphibolite with 60-70% hornblende (2-4 mm), 30-40% interstitial plagioclase.
2007RN545A	63.6617	-144.5413	621696	7061463	Fine- to medium-grained, ~equigranular biotite monzogranite (granodiorite*).

* Rock names in parentheses are based on major oxide geochemistry plots as described in text.

Table 4a. 2006 Major-oxide, minor-oxide, and trace-element analyses for rocks collected in the Mount Hayes quadrangle, Alaska.

Sample Number	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	Na2O %	K2O %	Cr2O3 %	TiO2 %	MnO %	P2O5 %	SrO %	BaO %	LOI %	Total %	Nb ppm	Rb ppm	Sr ppm	Y ppm	Zr ppm
06MBW1A	69.04	14.70	2.06	1.83	0.58	3.62	3.53	<0.01	0.29	0.07	0.09	0.08	0.25	2.40	98.52	11	143	618	7	172
06MBW5C	74.83	12.90	0.97	0.6	0.12	2.93	5.24	<0.01	0.03	<0.01	0.02	0.01	0.04	0.51	98.19	11	144	60	27	44
06MBW7A	55.71	17.28	6.50	6.83	3.82	2.56	2.22	<0.01	0.89	0.10	0.16	0.05	0.09	2.54	98.75	12	94	451	21	146
06MBW802A	55.41	16.62	7.13	6.08	5.22	3.07	1.20	0.02	0.97	0.11	0.21	0.06	0.09	2.50	98.68	6	68	507	19	133
06RL7A	68.94	14.89	2.92	2.12	0.78	3.35	3.81	<0.01	0.34	0.07	0.09	0.03	0.12	0.61	98.07	14	174	262	22	136
06RL24B	60.77	17.00	5.51	4.66	1.99	3.51	2.09	<0.01	0.79	0.09	0.31	0.08	0.19	1.25	98.23	11	62	691	13	226
06RL33A	69.95	14.16	2.98	2.26	0.88	2.97	3.63	<0.01	0.38	0.06	0.09	0.03	0.10	0.62	98.11	11	175	251	18	106
06RL40B	68.96	14.57	3.09	2.61	0.92	2.90	3.68	<0.01	0.36	0.10	0.08	0.03	0.16	0.80	98.26	11	152	249	19	133
06RL44A	65.38	16.54	4.21	3.59	1.59	3.10	2.57	<0.01	0.56	0.07	0.15	0.04	0.07	0.91	98.77	14	141	321	13	161
06RL53A	51.65	14.18	12.15	8.09	4.70	2.35	0.97	0.01	2.50	0.19	0.16	0.01	0.03	1.09	98.08	13	32	132	34	149

Table 4b. 2007 Major-oxide, minor-oxide, and trace-element analyses for rocks collected in the Mount Hayes quadrangle, Alaska.

Sample Number	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	Na2O %	K2O %	Cr2O3 %	TiO2 %	MnO %	P2O5 %	SrO %	BaO %	LOI %	Total %	Nb* ppm	Rb* ppm	Sr* ppm	Y* ppm	Zr* ppm
07DNS20A	64.06	17.30	5.24	4.34	1.87	3.15	2.37	<0.01	0.61	0.11	0.18	0.04	0.08	0.48	99.82	13	106	343	23	177
07DNS25A	71.36	14.77	2.88	2.38	0.85	3.03	3.77	<0.01	0.28	0.06	0.08	0.03	0.12	0.33	99.93	9	145	222	17	99
07DNS29A	71.63	14.17	3.12	2.18	0.90	2.67	4.39	<0.01	0.27	0.07	0.06	0.02	0.10	0.32	99.91	9	127	197	19	88
07DNS74A	67.46	16.07	3.23	2.55	0.92	3.79	4.53	<0.01	0.35	0.07	0.16	0.10	0.19	0.30	99.71	14	230	814	16	180
07DNS76A	69.01	15.68	3.05	2.22	0.79	3.82	4.34	<0.01	0.33	0.06	0.14	0.09	0.17	0.19	99.88	14	234	720	16	175
07DNS84A	69.48	15.32	3.40	2.63	0.99	2.98	3.25	<0.01	0.30	0.06	0.13	0.03	0.08	0.63	99.29	13	131	278	26	135
07DNS93A	69.23	15.72	3.50	2.84	0.90	3.03	3.30	<0.01	0.31	0.08	0.12	0.03	0.08	0.59	99.73	14	135	255	27	141
07DNS101A	73.00	14.64	1.99	1.27	0.36	3.64	4.30	<0.01	0.16	0.03	0.06	0.06	0.16	0.28	99.96	15	172	458	13	118
07DNS105A	67.13	15.74	4.46	3.84	1.59	3.08	2.85	<0.01	0.47	0.08	0.10	0.03	0.13	0.39	99.90	9	108	268	19	115
07LF276A	74.61	13.15	1.12	0.64	0.07	3.15	5.35	<0.01	0.08	0.01	0.02	0.02	0.05	0.32	98.58	12	241	185	8	117
07LF281A	76.17	12.54	1.30	0.73	0.08	3.39	4.34	<0.01	0.01	0.02	0.02	0.01	0.02	0.12	98.74	9	158	51	14	59
07LF287A	58.24	19.72	4.99	2.92	0.72	4.55	6.08	<0.01	0.64	0.16	0.15	0.25	0.46	0.50	99.38	44	221	2107	45	525
07LF296A	77.00	13.19	1.46	0.17	0.04	4.63	3.14	<0.01	<0.01	0.02	0.01	0.01	0.01	0.32	100.00	66	148	42	28	85
07LF304A	49.78	14.80	10.99	7.86	9.51	2.74	0.29	0.09	1.18	0.19	0.21	0.02	0.01	2.15	99.82	22	7	228	23	109
07LF306A	64.50	16.56	5.39	4.55	2.07	2.94	2.24	<0.01	0.53	0.10	0.14	0.04	0.11	0.69	99.86	7	88	359	18	112
07LF309C	53.26	13.72	8.72	8.43	9.04	1.66	2.13	0.10	0.59	0.19	0.13	0.04	0.06	1.76	99.83	4	295	345	28	78
07LF326A	71.64	14.56	3.03	2.10	0.76	3.25	3.54	<0.01	0.21	0.09	0.07	0.02	0.09	0.31	99.67	10	134	177	24	90
07LF361A	67.96	15.62	3.52	2.73	1.32	2.80	3.38	<0.01	0.42	0.06	0.12	0.03	0.09	1.19	99.25	16	146	257	25	150
07LF365A	68.00	15.69	3.79	2.99	1.35	3.05	3.31	<0.01	0.42	0.07	0.12	0.04	0.11	1.01	99.95	14	126	306	25	146
07LF384A	70.51	15.24	3.14	2.65	0.64	3.37	2.90	<0.01	0.23	0.08	0.08	0.04	0.15	0.58	99.61	10	87	331	19	135
07LF391A	73.70	14.78	1.28	1.43	0.13	2.98	5.16	<0.01	<0.01	0.09	0.02	0.02	0.03	0.10	99.71	10	156	132	64	47
07LF431A	47.22	15.61	11.17	10.41	8.23	2.36	0.91	0.03	2.18	0.22	0.18	0.02	0.02	1.19	99.75	8	37	233	43	142
07LF437A	64.63	17.89	3.10	1.57	0.45	4.65	6.33	<0.01	0.39	0.08	0.09	0.10	0.21	0.31	99.79	32	256	829	32	363
07LF444A	67.00	16.46	3.28	2.50	1.10	3.63	4.65	<0.01	0.40	0.07	0.18	0.10	0.20	0.28	99.84	15	230	838	17	180
07LF468A	68.00	17.81	1.51	1.78	0.27	4.09	5.41	<0.01	0.12	0.01	0.07	0.14	0.29	0.37	99.86	7	234	1095	9	95
07LF478A	63.00	16.84	5.90	5.02	2.38	2.80	2.22	<0.01	0.62	0.11	0.16	0.04	0.10	0.76	99.95	9	75	324	22	116
07LF492A	67.51	15.37	4.10	3.48	1.44	3.03	2.95	<0.01	0.37	0.09	0.11	0.03	0.11	0.46	99.05	9	111	269	23	103
07LF493A	66.23	16.35	4.47	3.95	1.70	3.19	2.58	<0.01	0.51	0.09	0.12	0.03	0.10	0.44	99.76	10	90	284	21	112
07LF496A	72.41	14.85	1.85	1.09	0.29	3.49	5.09	<0.01	0.13	0.04	0.05	0.02	0.10	0.20	99.61	12	143	161	45	97
07LF499A	55.61	17.68	7.30	5.65	2.23	3.82	5.03	<0.01	0.82	0.16	0.51	0.26	0.48	0.23	99.78	12	152	2280	36	152
07LF508A	68.48	15.81	2.91	2.27	0.78	3.68	4.55	<0.01	0.29	0.06	0.13	0.08	0.17	0.58	99.78	14	244	675	16	162
07LF511A	49.00	15.11	15.41	9.38	5.56	1.57	0.25	0.02	2.37	0.49	0.29	0.02	0.01	0.50	99.98	10	4	180	56	161
07LF513B	55.65	14.47	8.66	8.14	8.52	2.08	0.29	0.11	0.53	0.11	0.06	0.02	0.01	1.22	99.88	6	6	208	17	89
07LF526B	48.41	16.38	12.88	7.05	6.79	4.12	0.35	0.03	1.73	0.11	0.19	0.03	0.04	1.06	99.18	17	5	276	37	206
07LF527A	75.95	13.41	1.78	1.51	0.35	5.73	0.57	<0.01	0.17	0.02	0.02	0.02	0.05	0.32	99.89	29	13	147	60	315

Table 4b. (continued)

Sample Number	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	Na2O %	K2O %	Cr2O3 %	TiO2 %	MnO %	P2O5 %	SrO %	BaO %	LOI %	Total %	Nb* ppm	Rb* ppm	Sr* ppm	Y* ppm	Zr* ppm
07LF528B	52.20	16.60	11.03	7.34	5.70	3.24	0.82	0.02	1.34	0.13	0.17	0.04	0.16	1.00	99.80	17	19	424	38	255
07LF534A	76.49	12.82	1.77	0.64	0.21	5.24	1.91	0.01	0.21	0.01	0.04	0.01	0.10	0.37	99.83	23	51	69	54	279
07LF540A	69.17	15.82	3.38	2.58	1.01	3.08	3.67	<0.01	0.35	0.06	0.11	0.03	0.08	0.56	99.90	14	158	239	23	135
07LF553A	68.11	16.04	3.97	3.12	1.11	3.20	3.03	<0.01	0.37	0.07	0.14	0.04	0.09	0.52	99.81	12	115	306	25	154
07LF568A	72.76	14.43	2.50	1.56	0.44	3.27	4.35	<0.01	0.16	0.06	0.07	0.02	0.11	0.24	99.97	13	160	182	18	119
07MBW741B	76.21	13.25	1.08	0.98	0.08	3.33	4.49	<0.01	0.02	0.02	0.01	0.01	<0.01	0.03	99.51	10	175	59	13	44
07MBW793A	61.73	16.73	5.73	5.26	2.32	2.92	1.97	<0.01	0.59	0.11	0.15	0.04	0.10	1.08	98.73	7	83	356	21	120
07MBW808A	69.25	15.95	3.27	2.89	0.85	3.16	3.28	<0.01	0.28	0.07	0.10	0.03	0.10	0.53	99.75	12	115	243	23	144
07MBW815A	71.00	15.01	3.09	2.40	0.81	3.31	3.24	<0.01	0.33	0.06	0.09	0.03	0.12	0.46	99.94	12	127	221	29	147
07MBW835A	69.28	15.29	3.34	2.49	0.89	3.02	3.46	<0.01	0.31	0.07	0.11	0.03	0.10	0.83	99.22	15	146	264	23	137
07MBW844A	50.25	14.42	7.60	7.96	7.49	2.07	1.99	0.05	0.75	0.14	0.13	0.08	0.17	6.71	99.80	7	81	698	20	101
07MBW851A	65.08	15.99	5.08	3.17	1.73	3.24	2.50	<0.01	0.60	0.08	0.14	0.03	0.13	2.03	99.80	9	84	245	22	138
07MBW865A	53.36	19.29	7.17	7.04	4.73	3.13	1.95	0.01	0.84	0.11	0.19	0.05	0.07	1.80	99.74	13	94	421	31	185
07MBW871A	68.00	15.71	3.74	3.05	1.52	2.77	3.54	<0.01	0.48	0.06	0.11	0.03	0.08	0.79	99.89	15	158	241	26	161
07MBW873A	71.85	14.91	2.48	2.02	0.59	3.44	3.28	<0.01	0.24	0.05	0.07	0.03	0.12	0.86	99.93	12	123	208	27	138
07MBW879A	67.99	14.90	4.96	3.86	1.59	2.01	2.35	<0.01	0.44	0.08	0.07	0.02	0.06	1.27	99.59	10	84	157	25	138
07MBW891A	49.17	15.23	10.51	9.32	7.51	1.85	2.56	0.04	1.59	0.17	0.14	0.03	0.05	1.64	99.80	8	96	289	26	105
07MBW895A	49.34	14.97	14.63	8.90	5.84	1.50	0.41	0.02	2.82	0.26	0.35	0.02	0.01	0.68	99.75	17	12	173	46	215
07MBW900A	51.52	13.87	14.69	8.25	4.28	2.26	0.41	0.01	3.34	0.30	0.55	0.02	0.01	0.46	99.97	27	8	213	41	254
07MBW925A	50.86	13.99	14.90	8.33	4.33	2.28	0.40	0.01	3.38	0.30	0.55	0.02	0.01	0.44	99.80	26	8	212	40	252
07MBW932A	49.50	16.81	9.86	8.38	7.06	2.62	1.73	0.04	0.99	0.17	0.32	0.05	0.07	2.28	99.88	7	81	476	24	88
07MBW937A	52.59	16.76	10.04	10.53	6.22	1.36	0.56	<0.01	0.70	0.18	0.07	0.02	0.01	0.81	99.84	4	18	139	18	63
07MBW939A	71.82	14.47	2.99	2.53	0.37	2.64	3.68	<0.01	0.14	0.05	0.04	0.04	0.20	0.89	99.85	11	137	347	32	139
07MBW947A	66.79	16.14	4.36	3.11	1.28	3.24	2.98	<0.01	0.56	0.08	0.13	0.04	0.12	1.02	99.84	12	107	311	29	181
07MBW968A	72.07	14.53	2.68	1.57	0.55	3.31	4.26	<0.01	0.20	0.05	0.07	0.02	0.10	0.41	99.82	15	196	198	25	120
07MBW972B	47.54	15.37	8.42	11.28	3.45	2.70	1.39	0.03	2.29	0.22	0.51	0.05	0.08	5.77	99.10	21	36	468	48	275
07MBW996A	70.51	15.30	3.26	2.65	0.87	3.09	3.21	<0.01	0.28	0.07	0.11	0.03	0.09	0.45	99.92	14	121	269	27	138
07MBW1006A	69.80	15.19	3.41	2.08	0.81	3.23	4.15	<0.01	0.31	0.07	0.10	0.03	0.15	0.47	99.80	14	163	268	22	137
07MBW1008A	76.29	13.31	1.04	0.47	0.03	3.88	4.36	<0.01	<0.01	0.11	0.01	<0.01	0.01	0.15	99.66	42	446	17	75	115
07MBW1015A	75.85	12.97	1.14	0.63	0.05	3.32	4.83	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.18	98.99	34	270	14	34	72
07MBW1048A	74.05	14.14	2.07	0.67	0.36	3.45	3.72	<0.01	0.16	0.04	0.07	0.02	0.14	0.95	99.83	12	161	163	28	145
07MBW1067A	65.47	16.13	4.87	4.08	1.93	2.97	2.72	<0.01	0.55	0.09	0.13	0.04	0.14	0.74	99.85	10	93	343	17	122
07MBW1087A	60.65	19.67	4.80	5.49	1.65	3.51	2.04	<0.01	0.56	0.08	0.13	0.05	0.13	0.71	99.48	9	74	448	24	161
07MBW1097A	43.10	13.44	8.57	9.73	7.24	1.96	3.91	0.04	0.93	0.16	0.64	0.11	0.23	9.15	99.21	9	218	1079	31	176
07MBW1132A	70.48	15.47	2.30	1.73	0.63	3.91	3.49	<0.01	0.29	0.04	0.09	0.07	0.18	1.20	99.88	12	144	568	10	148

Table 4b. (continued)

Sample Number	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	Na2O %	K2O %	Cr2O3 %	TiO2 %	MnO %	P2O5 %	SrO %	BaO %	LOI %	Total %	Nb* ppm	Rb* ppm	Sr* ppm	Y* ppm	Zr* ppm
07MBW1140A	66.20	15.94	4.76	3.98	1.79	3.14	2.58	<0.01	0.56	0.09	0.12	0.03	0.12	0.54	99.84	11	106	277	22	127
07RL225B	53.28	17.88	8.01	7.93	5.62	2.83	1.42	0.03	1.10	0.13	0.27	0.06	0.09	1.21	99.87	9	55	572	20	125
07RL234A	66.02	17.58	2.53	1.53	0.48	4.80	5.72	<0.01	0.35	0.07	0.09	0.06	0.13	0.61	99.96	26	224	460	43	320
07RL258A	73.53	13.81	2.15	0.55	0.22	3.45	5.10	<0.01	0.13	0.03	0.03	0.01	0.04	0.63	99.67	29	338	82	30	155
07RL261A	74.33	13.69	1.82	0.50	0.21	3.38	5.08	<0.01	0.12	0.03	0.03	0.01	0.05	0.48	99.73	54	315	106	43	150
07RL328A	71.23	15.25	2.98	2.56	0.60	3.33	2.89	<0.01	0.25	0.05	0.08	0.04	0.15	0.45	99.86	11	90	334	19	140
07RL337A	66.26	16.11	4.64	3.39	1.52	3.31	3.08	<0.01	0.48	0.09	0.12	0.03	0.13	0.60	99.77	15	138	287	26	150
07RL339A	48.41	16.20	9.80	9.81	6.84	2.40	1.26	0.03	1.00	0.17	0.25	0.06	0.09	3.25	99.57	7	49	537	20	79
07RL346A	47.75	16.32	10.02	9.53	7.43	2.30	1.67	0.04	1.05	0.18	0.29	0.06	0.09	3.10	99.82	7	77	537	22	77
07RL352A	53.22	19.35	8.57	7.67	4.24	2.42	1.48	<0.01	0.94	0.15	0.24	0.06	0.10	1.32	99.76	8	52	540	23	113
07RL363A	59.88	16.70	6.35	5.03	2.50	3.16	2.23	<0.01	0.79	0.11	0.16	0.04	0.12	2.86	99.93	9	78	312	29	164
07RL365A	68.00	15.69	3.91	3.63	1.42	3.06	3.02	<0.01	0.43	0.07	0.10	0.03	0.13	0.47	99.96	9	118	276	19	109
07RL373A	71.28	14.73	2.87	2.28	0.74	3.24	3.61	<0.01	0.27	0.03	0.08	0.03	0.15	0.54	99.85	10	127	245	14	111
07RL379A	61.15	18.11	4.27	3.09	1.01	4.25	6.37	<0.01	0.56	0.11	0.21	0.18	0.34	0.33	99.98	22	221	1568	34	241
07RL394A	76.00	13.43	1.19	0.41	0.10	3.62	4.75	<0.01	0.02	0.06	0.03	<0.01	0.02	0.31	99.95	14	166	28	31	49
07RL473C	51.07	14.87	10.17	10.82	5.98	2.87	0.55	0.03	2.07	0.25	0.34	0.03	0.01	0.89	99.94	20	16	240	52	235
07RL484B	49.20	14.63	15.40	9.35	5.52	1.57	0.25	0.01	3.11	0.28	0.38	0.01	0.01	0.24	99.95	18	8	52	46	216
07RN311A	46.57	17.92	9.67	10.89	7.56	2.24	0.88	0.04	1.36	0.15	0.14	0.04	0.01	2.24	99.71	9	34	329	21	83
07RN314A	48.69	15.53	10.79	11.76	6.53	2.20	0.52	0.03	1.59	0.18	0.16	0.02	0.02	1.79	99.81	5	13	205	28	102
07RN325A	64.09	16.75	5.19	4.82	2.07	3.03	2.06	<0.01	0.54	0.09	0.14	0.04	0.11	0.87	99.80	8	87	363	17	114
07RN336A	64.66	16.25	5.07	4.52	2.10	2.71	2.35	<0.01	0.54	0.10	0.13	0.04	0.10	1.38	99.95	9	76	298	19	105
07RN356A	69.01	15.47	3.43	2.88	1.08	3.10	3.29	<0.01	0.36	0.07	0.12	0.03	0.09	0.95	99.88	12	129	268	24	133
07RN367A	71.28	15.05	2.51	1.57	0.58	3.48	3.49	<0.01	0.27	0.06	0.08	0.03	0.13	1.18	99.70	11	122	226	27	135
07RN392A	69.41	15.73	3.23	2.67	1.03	2.94	3.51	<0.01	0.36	0.06	0.11	0.03	0.08	0.83	99.99	14	154	236	23	139
07RN397A	69.55	15.48	3.06	2.40	0.91	2.92	4.05	<0.01	0.33	0.06	0.10	0.03	0.09	0.71	99.69	13	163	232	22	130
07RN402A	73.25	14.41	2.00	1.44	0.43	3.56	3.72	<0.01	0.19	0.05	0.06	0.02	0.12	0.65	99.90	11	151	183	27	120
07RN417A	46.39	17.10	9.65	12.25	8.93	1.84	0.48	0.07	1.45	0.13	0.13	0.07	0.01	1.32	99.82	9	13	668	14	70
07RN425B	76.41	13.19	0.67	0.76	0.13	2.64	5.83	<0.01	0.01	0.01	0.02	0.01	0.04	0.09	99.79	4	208	72	10	45
07RN431A	54.01	15.84	10.60	9.76	4.40	1.55	0.66	0.01	1.69	0.18	0.16	0.03	0.02	0.98	99.89	10	21	323	36	147
07RN447A	54.97	16.54	10.11	8.99	4.71	1.81	0.69	<0.01	0.79	0.18	0.07	0.02	0.03	0.99	99.90	4	24	153	16	61
07RN450A	52.63	15.42	10.00	8.86	6.22	2.80	1.06	0.04	1.36	0.17	0.11	0.03	0.04	1.18	99.94	14	32	311	35	218
07RN462A	75.95	13.25	1.50	1.38	0.28	2.98	4.16	<0.01	0.07	0.03	0.03	0.02	0.12	0.18	99.96	6	162	180	19	75
07RN467A	62.89	18.56	3.35	2.44	0.80	5.07	5.50	<0.01	0.45	0.09	0.13	0.10	0.17	0.26	99.82	44	292	848	32	538
07RN499A	68.07	15.81	3.81	2.83	1.48	2.90	3.59	<0.01	0.44	0.06	0.12	0.03	0.09	0.52	99.76	14	137	249	22	140

Table 4b. (continued)

Sample Number	SiO2 %	Al2O3 %	Fe2O3 %	CaO %	MgO %	Na2O %	K2O %	Cr2O3 %	TiO2 %	MnO %	P2O5 %	SrO %	BaO %	LOI %	Total %	Nb* ppm	Rb* ppm	Sr* ppm	Y* ppm	Zr* ppm
07RN500A	67.59	15.84	3.95	3.52	1.36	2.79	2.93	<0.01	0.36	0.08	0.10	0.04	0.13	1.20	99.89	9	121	307	15	118
07RN503A	69.53	15.37	3.47	3.17	1.12	2.71	2.97	<0.01	0.30	0.07	0.08	0.03	0.12	0.76	99.70	8	114	290	16	98
07RN524A	75.03	13.64	1.51	0.66	0.14	3.18	5.16	<0.01	0.08	0.01	0.02	0.03	0.05	0.29	99.79	11	270	230	7	162
07RN530A	70.91	15.06	2.14	1.58	0.49	3.71	4.68	<0.01	0.20	0.05	0.08	0.07	0.16	0.27	99.40	14	270	585	14	148
07RN535A	69.00	15.73	3.53	2.96	1.04	3.02	3.42	<0.01	0.32	0.07	0.12	0.03	0.09	0.57	99.90	12	131	271	26	145
07RN543A	49.38	17.21	9.33	10.80	6.33	2.69	0.84	0.03	1.80	0.17	0.21	0.05	0.04	0.94	99.81	15	28	470	25	100
07RN545A	68.11	15.71	4.07	3.21	1.42	2.87	3.09	<0.01	0.48	0.07	0.13	0.03	0.09	0.63	99.91	15	135	264	28	155

Table 5. Detection limits for geochemical analyses. Analytical methods include:
FA-GRAV = Au 30g Fire Assay-Gravimetric Finish,
ICP-AES = Inductively Coupled Plasma-Atomic Emission Spectroscopy, four acid digestion.
NOTE: * = possibly incomplete digestion dependent on mineralogy.

Element	Units	Lower Detection Limit	Upper Detection Limit	Analytical Method
Au	ppm	0.05	1,000	FA-GRAV
Ag	ppm	0.5	100	ICP-AES
Al*	percent	0.01	50	ICP-AES
As	ppm	5	10,000	ICP-AES
Ba*	ppm	10	10,000	ICP-AES
Be*	ppm	0.5	1,000	ICP-AES
Bi	ppm	2	10,000	ICP-AES
Ca*	percent	0.01	50	ICP-AES
Cd	ppm	0.5	1,000	ICP-AES
Co	ppm	1	10,000	ICP-AES
Cr*	ppm	1	10,000	ICP-AES
Cu	ppm	1	10,000	ICP-AES
Fe	percent	0.01	50	ICP-AES
K*	percent	0.01	10	ICP-AES
Mg*	percent	0.01	50	ICP-AES
Mn	ppm	5	100,000	ICP-AES
Mo	ppm	1	10,000	ICP-AES
Na*	percent	0.01	10	ICP-AES
Ni	ppm	1	10,000	ICP-AES
P	ppm	10	10,000	ICP-AES
Pb	ppm	2	10,000	ICP-AES
S	percent	0.01	10	ICP-AES
Sb	ppm	5	10,000	ICP-AES
Sr*	ppm	1	10,000	ICP-AES
Ti*	percent	0.01	10	ICP-AES
V	ppm	1	10,000	ICP-AES
W*	ppm	10	10,000	ICP-AES
Zn	ppm	2	10,000	ICP-AES

Table 6. Detection limits for major-oxide, minor-oxide, and trace-element analyses. Analytical methods include: LBF-XRF = Lithium metaborate fusion and X-ray fluorescence spectroscopy, and PP-XRF = wavelength dispersive X-ray fluorescence spectroscopy on a pressed pellet. Note: Fe_2O_3 = total iron as Fe_2O_3; LOI = loss on ignition.

Element	Units	Lower Detection Limit	Upper Detection Limit	Analytical Method
Al_2O_3	percent	0.01	100.00	LBF-XRF
BaO	percent	0.01	100.00	LBF-XRF
CaO	percent	0.01	100.00	LBF-XRF
Cr_2O_3	percent	0.01	100.00	LBF-XRF
Fe_2O_3	percent	0.01	100.00	LBF-XRF
K_2O	percent	0.01	100.00	LBF-XRF
MgO	percent	0.01	100.00	LBF-XRF
MnO	percent	0.01	100.00	LBF-XRF
Na_2O	percent	0.01	100.00	LBF-XRF
P_2O_5	percent	0.01	100.00	LBF-XRF
SiO_2	percent	0.01	100.00	LBF-XRF
SrO	percent	0.01	100.00	LBF-XRF
TiO_2	percent	0.01	100.00	LBF-XRF
LOI	percent	0.01	100.00	LBF-XRF
Total	percent	0.01	105.00	Calculation
Nb	ppm	2	10,000	PP-XRF
Rb	ppm	2	10,000	PP-XRF
Sr	ppm	2	10,000	PP-XRF
Y	ppm	2	10,000	PP-XRF
Zr	ppm	2	10,000	PP-XRF
Nb*	ppm	1	100,000	PP-XRF
Rb*	ppm	0.5	100,000	PP-XRF
Sr*	ppm	0.5	100,000	PP-XRF
Y*	ppm	1	100,000	PP-XRF
Zr*	ppm	1	100,000	PP-XRF

* = Pressed-pellet XRF analyses by UAF laboratory.