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**MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT, AND GEOCHEMICAL DATA FROM
ROCKS COLLECTED IN 2010 IN THE TOLOVANA MINING DISTRICT, LIVENGOOD B-3 AND
B-4 QUADRANGLES, ALASKA**

by

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Brent A. Elliott, and Melanie B. Werdon

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Note: This report (including all analytical data and tables) is available in digital format from the DGGs web site (<http://alaska.gov>) at no charge. The digital data are available as PDF files and Excel spreadsheets.

MAJOR-OXIDE, MINOR-OXIDE, TRACE-ELEMENT, AND GEOCHEMICAL DATA FROM ROCKS COLLECTED IN 2010 IN THE TOLOVANA MINING DISTRICT, LIVENGOOD B-3 AND B-4 QUADRANGLES, ALASKA

by
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Brent A. Elliot¹, and Melanie B. Werdon¹

INTRODUCTION

Mineral-resources personnel from the Alaska Division of Geological & Geophysical Surveys carried out a geological field survey, including mapping and sampling near Livengood in the Livengood B-3 and B-4 quadrangles, Alaska from June 10 to June 30, 2010. The fieldwork provides basic information critical to building an understanding of Alaska's geology and is part of an integrated program of airborne geophysical surveys followed by geological mapping. During 2010, 130 rock samples were collected for geochemical trace-element analysis, and 20 rock samples were collected for whole rock (major- and minor-oxide) analysis. Petrogenetically important trace elements for additional rock samples will be analyzed and published with the final map and report for this area. Location coordinates were collected using hand-held GPS units (no differential correction was applied). Coordinates are presented in latitude and longitude (based on the NAD 27 Alaska datum) and in UTM coordinates (based on the Clark 1866 spheroid, NAD27 datum, UTM zone 6 projection). Additional details about the sampling program can be found in the metadata file associated with the digital version of this report. Sample numbers, location data, descriptions, and analytical results for each sample are tabulated in tables 1–4.

SAMPLE COLLECTION TECHNIQUES

Samples of visibly mineralized rock, or rock exhibiting features associated with mineralization, were preferentially collected and analyzed for geochemical trace elements. Rock samples collected for major oxide, minor oxide, and trace elements include samples representative of a typical lithology, igneous or possible meta-igneous samples in order to determine composition, and samples whose petrogenetically important trace elements could indicate their original tectonic setting. These rocks were collected in a random distribution across the study area.

ANALYTICAL METHODS

Trace-element geochemical analyses (table 2) and whole rock analyses (table 4) on rock samples collected in 2010 were performed by ALS Chemex. Rock samples were crushed with a Terminator oscillating jaw crusher with chrome steel alloy plates so that at least 70 percent of the material passes through a -10 mesh (2 mm) screen. Representative aliquots of 250 g 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 mesh (75 μ) screen. Trace-element analyses, the whole rock major element analyses, and the gold analyses were performed using representative splits of each 250 g pulp. Initially, all samples were assayed for gold by inductively coupled plasma-atomic emission spectroscopy following a 30 g fire assay fusion (FA-ICP). Trace-element geochemical analyses were performed by inductively coupled plasma-atomic emission spectroscopy (ICPAES) and inductively coupled plasma-mass spectroscopy (ICPMS) methods after four-acid, near-total digestion. This method of digestion is possibly incomplete for some elements and may result in lower analytical results for these elements. The elements

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that may be affected by incomplete digestion, analytical methods, and lower and upper reporting limits are tabulated in table 5. Major- and minor-element oxides for whole rock analyses were determined by X-ray fluorescence spectrometry following a lithium borate fusion (WEI-GRA06). Whole rock trace-element analyses were determined by pressed-pellet X-ray fluorescence spectrometry. Analytical methods and detection limits for whole rock samples are tabulated in table 6.

ACKNOWLEDGMENTS

This project is part of the Alaska Airborne Geophysical/Geological Mineral Inventory (AGGMI) program funded by the state of Alaska and managed by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys.

Table 1. Location and description of rocks collected for trace-element analysis in the Tolovana mining district, Livengood Quadrangle, Alaska.

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10BAE052A	65.3853	-148.5775	426686	7252126	06N	<u>Quartz Vein</u> : Cuts through fractured sandstone.
10BAE183A	65.4814	-148.7939	416936	7263102	06N	<u>Chert</u> : Grey to green, late breccia-veins filled by light-colored chert.
10BAE191A	65.4808	-148.8455	414547	7263096	06N	<u>Chert</u> : Interbedded brecciated chert, black to grey, shows parting/cleavage.
10BAE233A	65.4901	-148.4015	435125	7263608	06N	<u>Gabbro</u> : Dark grey to black with green color present on surface as alteration and within fresh fractured surfaces.
10BAE255C	65.4273	-148.3400	437823	7256546	06N	<u>Quartz Vein</u> : Massive piece of quartz vein with finely laminated shale/siltstone (90 percent) and felsic hypabyssal dike (10 percent).
10GG010B	65.4435	-148.5189	429568	7258542	06N	<u>Conglomerate</u> : Poorly sorted, matrix-supported conglomerate, with 2- to 6-cm-diameter subangular clasts; quartz fills fractures and/or vugs.
10GG017B	65.4173	-148.5409	428475	7255644	06N	<u>Quartz Vein</u> : Weathers white to tan, fresh faces bright white with orange and brown iron oxide staining, vugs filled with crystalline quartz and orange mm-scale stockwork.
10GG023A	65.4214	-148.5793	426705	7256150	06N	<u>Felsic Dike</u> : Altered quartz-rich dike/sill with weathered/altered feldspars.
10GG051A	65.4330	-148.3451	437600	7257187	06N	<u>Porphyry</u> : Weathers grey and black, commonly lichen covered, fresh faces light grey with lots of pink to orange alteration, localized zones of unknown red mineral. Quartz (20-30 percent) and feldspar (30 percent) phenocrysts are highly weathered and removed; the rest of the rock is fine groundmass or weathered material.
10GG173A	65.4255	-148.5323	428895	7256552	06N	<u>Quartz Vein</u> : Highly iron oxide-stained quartz vein from folded flysch outcrop along TAPS oil pipeline.
10GG175B	65.4659	-148.3402	437903	7260847	06N	<u>Quartz Vein</u> : White, "clean" quartz vein that is perpendicular to and cut by prominent joint set within conglomerate outcrop.
10GG178A	65.4698	-148.3158	439042	7261255	06N	<u>Quartz Vein</u> : Iron oxide-stained quartz vein from an outcrop of flysch and conglomerate.
10GG301A	65.4561	-148.3644	436760	7259780	06N	<u>Quartz Vein</u> : Various pieces of quartz vein, milky white, massive, iron oxide staining, cuts unaltered flysch.
10GG304A	65.4216	-148.5224	429343	7256108	06N	<u>Quartz Vein</u> : Leached and iron oxide-stained sandstone with 6- to 15-cm-wide quartz vein, milky white, massive, iron oxide staining.
10LF003A	65.4632	-148.2466	442233	7260458	06N	<u>Sandstone</u> : Orange-weathering sandstone, weakly silicified, carbonate altered, cut by quartz-calcite veins with pale-grey, fine-grained quartz and central parts of carbonate grains.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10LF004A	65.4628	-148.2468	442227	7260420	06N	<u>Quartz Vein</u> : Vein in flysch, irregular folded and mutually cross-cutting white to translucent quartz vein with 10-15 percent brown carbonate.
10LF012A	65.4353	-148.5061	430139	7257617	06N	<u>Drill Sample</u> : Composite grab sample of drill cuttings (RH90-15) from old rotary drill site.
10LF012B	65.4353	-148.5061	430139	7257617	06N	<u>Drill Sample</u> : Composite grab sample of drill cuttings (RH90-15) from old rotary drill site.
10LF013A	65.4355	-148.5059	430146	7257636	06N	<u>Breccia</u> : High-angle fault breccia that cuts moderately-dipping bedding of iron oxide-stained, interbedded quartzite, shale and siltstone that are sugary and hornfelsed.
10LF027A	65.4542	-148.5090	430054	7259718	06N	<u>Phyllite</u> : Grey, rusty weathering, siliceous phyllite, with shiny phyllitic foliation surfaces and quartz veins perpendicular to foliation, pyrites in veins and within foliation.
10LF049B	65.3817	-148.5292	428923	7251669	06N	<u>Quartz Vein</u> : White quartz cobbles and chips, some open-euhedral textures in parts of vein, minor iron oxide staining.
10LF060B	65.3670	-148.5003	430223	7249997	06N	<u>Quartz Vein</u> : White quartz vein, some iron oxide-filled open spaces with euhedral quartz pyramids; grab sample 20-cm thick.
10LF070A	65.3720	-148.5485	428000	7250612	06N	<u>Wacke</u> : Arkosic wacke, calcareous, green, contains 20-40 percent, 0.2-mm-diameter, possibly relict feldspars cut by rare quartz-carbonate veins up to 1 cm in width; sample is select grab of veined sandstone.
10LF089B	65.3367	-148.5889	426018	7246720	06N	<u>Quartz Vein</u> : White, massive quartz vein in flysch with some 1-cm-wide open spaces with euhedral quartz crystals.
10LF102B	65.4351	-148.9097	411417	7258094	06N	<u>Serpentinite</u> : Rusty, gossanous rock with silica bands; suspect it is a carbonate-silica-altered serpentinite.
10LF106B	65.4272	-148.9318	410366	7257248	06N	<u>Sandstone</u> : Fine-grained sandstone with pervasive iron oxide staining within weathered feldspars and lithic clasts, occasional 2-mm-wide quartz veins.
10LF114B	65.4228	-148.9585	409114	7256795	06N	<u>Monzonite</u> : As per 10LF114A (see major-oxide description of monzonite in Table 3). Contains silicified zones and veins with 5-20 percent irregular cavities with botryoidal brown mineral, some cavities lined with black mineral, others with a white zeolite?
10LF120A	65.4185	-148.9851	407864	7256357	06N	<u>Porphyry</u> : Contains 2 percent feldspar and 2 percent quartz phenocrysts up to 1.5 mm in diameter in a brown aphanitic groundmass cut by quartz veinlets, possible sericite alteration.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10LF123B	65.4187	-148.9925	407524	7256388	06N	<u>Porphyry</u> : As per 10LF123A (see major-oxide description of monzonite in Table 3). This sample cut by 2-mm-wide quartz vein, stockwork, moderate limonite coating in fractures, feldspars altered.
10LF156B	65.4836	-148.9596	409274	7263576	06N	<u>Chert</u> : Iron oxide-stained chert, broken chert with iron oxide-filled hairline fractures and open spaces.
10LF191A	65.4589	-148.4953	430703	7260226	06N	<u>Greenstone?</u> : Very fine-grained, dark-grey rock, strongly iron oxide-stained on fractures, 0.2-mm-diameter pyrite in concentrated patches
10LF192B	65.4600	-148.4932	430801	7260350	06N	<u>Siltstone</u> : Bleached siltstone cut by indistinct quartz vein lenses of gossan-like iron oxide, grey patches and hairline fractures may be very fine-grained sulfide.
10LF193A	65.4613	-148.4909	430912	7260488	06N	<u>Siltstone</u> : Brownish-green siltstone with somewhat indistinct planar partings, minor quartz veining, weathered cavities with strong, orange, iron oxide irregular staining.
10LF194A	65.4619	-148.4905	430931	7260560	06N	<u>Monzonite</u> : Brown crumbly rock, strongly altered and oxidized, contains 5 percent quartz grains up to 2 mm in diameter, 5 percent euhedral biotite altered to sericite, groundmass is tan, waxy, and contains altered feldspars?
10LF195B	65.4626	-148.4910	430912	7260634	06N	<u>Breccia</u> : Matrix of quartz monzonite and 20 percent angular fragments of matrix-supported siltstone.
10LF196B	65.4626	-148.4899	430961	7260637	06N	<u>Siltstone</u> : In contact with quartz monzonite, siltstone is cut by 5-mm-wide, sugary quartz vein and parallel to 2-mm-wide irregular gossan cavities.
10LF197A	65.4626	-148.4886	431019	7260641	06N	<u>Monzonite</u> : 15 percent of rock cut by 1- to 5-mm-wide, sugary quartz veins; entire rock is quartz-sericite altered.
10LF208B	65.4908	-148.4165	434432	7263702	06N	<u>Greenstone</u> : Fine-grained, hard, dark-green rock, with 5 percent, cubic, 1-mm-diameter pyrite.
10LF217A	65.4315	-148.5115	429875	7257191	06N	<u>Siltstone</u> : Fault-brecciated siltstone with quartz veins, iron oxides in cavities and fractures.
10LF218B	65.4312	-148.5124	429834	7257162	06N	<u>Siltstone</u> : Bleached siltstone cut by quartz, sericite, and pyrite veinlets, with 3 percent iron oxide-lined pits after pyrite.
10LF219A	65.4310	-148.5126	429824	7257146	06N	<u>Flysch</u> : Fine-grained, interbedded siltstone and sandstone, with 10 percent, 3-mm-diameter, round-oval iron oxide-lined pits parallel to bedding, strong sericite alteration.
10LF220A	65.4304	-148.5150	429711	7257076	06N	<u>Flysch</u> : Strongly altered, contains sericite-quartz veinlets and carbonate(?) 3 percent iron oxide-filled pyrite pits.
10LF221A	65.4293	-148.5180	429569	7256955	06N	<u>Siltstone</u> : Spotty siltstone, altered to sericite and carbonate, 2 percent quartz veinlets, and less than 1 percent pits from weathered-out pyrites.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10LF222A	65.4285	-148.5219	429386	7256868	06N	<u>Siltstone</u> : Weakly altered siltstone, iron oxide-lined pits along bedding, strong iron oxide coatings on fractures.
10LF233B	65.4298	-148.5430	428411	7257043	06N	<u>Intrusive rock</u> : Contains 25 percent tourmaline pseudomorphs of 1- to 2-mm-long feldspar and/or mafic phenocrysts. Groundmass is waxy, tan, sericite-altered, and of unknown original composition, and contains 3-mm-diameter biotite crystals altered to sericite.
10LF233D	65.4298	-148.5430	428411	7257043	06N	<u>Quartz vein</u> : Brecciated and sheared, strong iron oxide coating on fractures.
10LF234B	65.4307	-148.5466	428246	7257147	06N	<u>Intrusive rock</u> : Altered intrusive rock with 5 percent iron oxide, 1-mm-diameter pseudomorphs of feldspar and/or mafic mineral, and less than 5 percent, 2-mm-diameter biotite phenocrysts altered to sericite, strong orange/brown iron oxide and manganese oxide on weathered surfaces.
10LF247C	65.4128	-148.3905	435445	7254980	06N	<u>Wacke</u> : Sericite-altered, very fine-grained wacke, moderate quartz veining, with veins 2 mm thick.
10LF248A	65.4138	-148.3834	435778	7255088	06N	<u>Siltstone</u> : Pale-green, sericite(?) -altered, very fine-grained rock, probably strongly altered siltstone with faint relict bedding and cleavage, weak orange iron oxide stains.
10MBW002A	65.4529	-148.5414	428547	7259614	06N	<u>Slate</u> : Medium grey with maroon, very fine-grained, looks hornfelsed but is soft, poor planar fabric, possible slate? Lightly iron oxide-coated fractures. Contains less than 1 percent disseminated iron sulfide (pyrite?), both within the rock and on microfractures.
10MBW003A	65.4529	-148.5408	428576	7259609	06N	<u>Felsic dike</u> : Pale-green, fine-grained, porphyritic dike? Contains variable proportions of quartz, biotite and feldspar phenocrysts. Prominent clay alteration of biotite and feldspar. Dike is cut by quartz veins with open spaces filled with quartz crystals.
10MBW004A	65.4526	-148.5410	428568	7259578	06N	<u>Siltstone?</u> : Pale-green, quartz-veined material with soft foliated(?) micaceous areas and cut by iron oxide micro-veinlets, some relict cubic shapes suggest pyrite.
10MBW010A	65.4482	-148.5481	428227	7259095	06N	<u>Felsic rock</u> : Pale-grey, fine-grained, slightly porphyritic, hypabyssal felsic dike(?). Phenocrysts of feldspar up to 5 mm in length, but most are less than 3 mm in length and altered to clay or sericite. Contains 1-2 percent, very fine-grained, disseminated, silvery mineral (specular hematite or arsenopyrite?).

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10MBW038A	65.3844	-148.4552	432365	7251883	06N	<u>Quartz Vein</u> : White, massive quartz vein with very sparse, brown, iron oxide staining.
10MBW044A	65.3883	-148.4372	433215	7252298	06N	<u>Felsic</u> : Pale-tan, fine-grained, porphyritic hypabyssal sill. Phenocrysts of euhedral, almost-square quartz (15 percent) up to 4 mm in diameter, and weathered, tan, feldspar (20 percent) up to 3 mm in length, and biotite>chlorite (5 percent), matrix likely altered too.
10MBW045A	65.3885	-148.4375	433199	7252318	06N	<u>Igneous rock</u> : Weathers dark to light grey with a little orange, fresh faces white and pinkish. Porphyritic felsic intrusion, phenocrysts include slightly altered, 1- to 2-mm-diameter subhedral to euhedral biotite, 15 percent clear-glassy quartz up to 3 mm in diameter, and K-feldspar. One fracture contains 1-cm-diameter patches of pyrite and likely chalcopyrite.
10MBW047A	65.3888	-148.4381	433174	7252362	06N	<u>Intrusive rock</u> : Quartz-veined (up to 1.5 cm in width) felsic intrusion with quartz, feldspar and biotite phenocrysts, locally iron oxide stained.
10RN053C	65.4329	-148.8658	413450	7257795	06N	<u>Quartz vein</u> : Vuggy vein, 0.5- to 1-cm wide with carbonate(?) ± pyrite, vein cuts sandstone.
10RN057A	65.4354	-148.5061	430138	7257619	06N	<u>Quartzite</u> : Contains 3- to 10-mm-thick quartz veins.
10RN057B	65.4354	-148.5061	430138	7257619	06N	<u>Wacke</u> : Quartz veined and altered wacke with 1-cm-diameter cubic holes of weathered pyrite now filled with gypsum.
10RN058A	65.4349	-148.5075	430070	7257566	06N	<u>Siltstone</u> : Drill cuttings, mostly grey to black siltstone and pyritic siltstone, pyrites less than 1 mm in diameter.
10RN058B	65.4349	-148.5075	430070	7257566	06N	<u>Quartz vein</u> : 1-cm-diameter cubic holes of weathered pyrite now filled with gypsum.
10RN058C	65.4349	-148.5075	430070	7257566	06N	<u>Flysch</u> : Silicified layers of wacke and quartz-rich sandstone with 1-cm-diameter former pyrite cubes weathered out.
10RN060A	65.4329	-148.5089	430001	7257344	06N	<u>Siltstone</u> : White to grey chips from Asarco drill hole; former pyritic siltstone with weathering to kaolinite.
10RN061B	65.4314	-148.5089	429999	7257178	06N	<u>Quartzite</u> : Quartzite with 2- to 5-mm-wide quartz veinlets with iron oxide staining after pyrite.
10RN068A	65.4216	-148.5210	429411	7256100	06N	<u>Gouge</u> : Strongly iron oxide-stained rock and quartz vein, altered to mostly slime or gouge(?)
10RN069A	65.4226	-148.5239	429280	7256215	06N	<u>Sandstone</u> : Altered rubbly sandstone.
10RN077A	65.4085	-148.5446	428277	7254674	06N	<u>Quartz vein</u> : Slightly vuggy, weathered-out carbonate(?), greater than 95 percent white quartz, up to 30 cm wide.
10RN083A	65.4337	-148.5075	430069	7257431	06N	<u>Flysch</u> : Drill cuttings, softer of the two types present, pyrite casts 1- to 2-mm wide.
10RN083A1	65.4337	-148.5075	430069	7257431	06N	<u>Sandstone</u> : Drill cuttings, more siliceous and harder of the two types present.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10RN083C	65.4337	-148.5075	430069	7257431	06N	<u>Conglomerate</u> : Iron oxide-coated conglomerate.
10RN089C	65.4277	-148.4778	431429	7256730	06N	<u>Quartz Vein</u> : Quartz vein 2- to 5-mm thick in conglomerate.
10RN122A	65.3538	-148.5453	428096	7248577	06N	<u>Monzonite</u> : Strongly altered and weathered, complexly crystalline, medium-grained, 2- to 3-mm-long, feldspar-rich, quartz-bearing, felsic igneous rock; possibly quartz monzonite.
10RN126A	65.3534	-148.5434	428184	7248534	06N	<u>Monzonite</u> : Weathered and altered, complexly crystalline plutonic rock, with 3-5 percent quartz, and the rest is altered feldspars and biotite, probably quartz monzonite dike.
10RN128A	65.3433	-148.5446	428102	7247403	06N	<u>Felsic rock</u> : Weathered felsic dike with no obvious phenocrysts; aphanitic, tan rock resembles rhyolite, breaks along planes.
10RN130A	65.3430	-148.5448	428092	7247370	06N	<u>Quartz vein</u> : Quartz vein material with weathered-out carbonate pieces up to 10 cm in maximum dimension by 5 cm.
10RN135A	65.4357	-148.5071	430091	7257662	06N	<u>Flysch</u> : Drill cuttings, messed up by repeated running over by vehicles, not sure if it is 100 percent cuttings, grey, no obvious pyrite pits.
10RN136A	65.4379	-148.5047	430207	7257897	06N	<u>Felsic rock</u> : Altered, fine-grained (greater than 0.3 mm) felsic rock with sericite.
10RN137A	65.4365	-148.5058	430153	7257741	06N	<u>Flysch</u> : Cuttings from RH 2, chips are yellow with pyrite holes, mostly looks like siltstone.
10RN140A	65.4348	-148.5058	430150	7257560	06N	<u>Flysch</u> : Cuttings from RH 15, small quartz-rich layer, most is very black.
10RN184A	65.4165	-148.9009	411766	7256017	06N	<u>Flysch</u> : Black siltstone.
10RN251A	65.4343	-148.5073	430080	7257499	06N	<u>Flysch</u> : Dark grey to black chips from RH 10 locally pyritic.
10RN252A	65.4342	-148.5090	430000	7257496	06N	<u>Flysch</u> : Chips from RH 11, lots of tiny holes from former pyrites.
10RN253A	65.4322	-148.5069	430094	7257264	06N	<u>Flysch</u> : Chips from RH 20, uniformly grey, siliceous, former pyrite holes.
10RN254A	65.4335	-148.5100	429951	7257413	06N	<u>Flysch</u> : Chips from RH 20, no pile present, but chips on the ground are the right size and shape, spread out over 5-meter-diameter area in this part of road.
10RN255A	65.4342	-148.5102	429946	7257499	06N	<u>Flysch</u> : Chips from RH 6 and 7, upper part of hole more oxidized ± pyrite or former pyrite.
10RN255B	65.4342	-148.5102	429946	7257499	06N	<u>Flysch</u> : Chips from RH 6&7, from pyrite-rich deeper part of hole, pyrites as loose crystals 5 mm in diameter.
10RN256A	65.4354	-148.5095	429980	7257625	06N	<u>Flysch</u> : Chips from RH 3, mostly grey, black with orange from higher up.
10RN257A	65.4345	-148.5050	430185	7257525	06N	<u>Flysch</u> : Chips from hole RH 90-16, bottom of hole looks tan to black but minimal pyrite, other parts of hole tan to orange.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10RN258A	65.4354	-148.5039	430240	7257625	06N	<u>Flysch</u> : Chips from RH-17, grey to black near the bottom with no obvious pyrite, tan-orange portion higher up with 1-mm-diameter pyrites.
10RN259A	65.4361	-148.5043	430224	7257696	06N	<u>Flysch</u> : Chips from RH-18, grey-black at the bottom, no obvious pyrite, orange material closer to the surface.
10RN279A	65.4426	-148.4799	431374	7258396	06N	<u>Quartz vein</u> : 10- by 10- by 20-cm white, milky quartz vein with no obvious sulfides. Possibly related to Steel Creek fault?
10RN288A	65.4838	-148.6747	422460	7263219	06N	<u>Quartz vein</u> : Quartz vein in mudstone, iron oxide stained.
10RN310C	65.3738	-148.9353	410023	7251308	06N	<u>Quartz vein</u> : Quartz ± iron oxide veins 1- to 3-cm wide along joint set that strikes 250 degrees (azimuth) and dips 79 degrees, and up to 10-cm-thick where folded.
10RN315C	65.4521	-148.7382	419427	7259759	06N	<u>Quartz vein</u> : Quartz ± pyrite(?) veins 1- to 3-cm thick, cutting sandstone, pyrite as cubic weathered-out holes.
10RN316C	65.4516	-148.7477	418981	7259713	06N	<u>Quartz vein</u> : Vuggy quartz veins 1- to 4-cm wide cuts mostly sandstone, vugs from weathered out carbonate or pyrite?
10RN319C	65.4517	-148.7410	419295	7259716	06N	<u>Quartz vein</u> : Vuggy quartz veins 1- to 4-cm wide cut mostly sandstone, vugs from weathered out calcite?
10RN320A	65.4843	-148.4243	434056	7262980	06N	<u>Monzonite</u> : Large granite boulder (5 m in diameter) isolated in float, dark veinlets crosscut it, altered.
10Z021C	65.4358	-148.5658	427368	7257732	06N	<u>Sandstone</u> : Orange to brown sandstone with massive to vuggy quartz and iron oxide veinlets up to 5-mm thick, some quartz crystals in vugs are subhedral.
10Z028B	65.4436	-148.5202	429506	7258550	06N	<u>Conglomerate</u> : Quartz-veined conglomerate, semi-massive to vuggy quartz veins that vary from 1- to 6-mm thick, vugs with iron oxide and subhedral quartz crystals.
10Z031A	65.4491	-148.5375	428719	7259189	06N	<u>Sandstone</u> : Weathers orange-brown, fresh faces light grey to tan. Well indurated sandstone, almost looks like quartzite. Abundant quartz veinlets vary from hairline to 1-mm wide. Semi-vuggy with abundant subhedral quartz crystals, moderate iron oxide staining, and localized very fine-grained sulfides.
10Z032A	65.4500	-148.5377	428711	7259285	06N	<u>Hornfels</u> : Angular, weakly to moderately iron oxide-stained, highly fractured, hornfelsed(?) sandstone, dark brownish-grey color. Very fine-grained, quartz-iron oxide veinlets throughout.
10Z036A	65.4524	-148.5415	428541	7259563	06N	<u>Sandstone</u> : Light grey to white, wispy to matted texture, very fine-grained siliceous rock. Possibly well-indurated sandstone, looks more like quartzite. Commonly stained light yellow and orange on fracture surfaces, thin quartz veinlets are slightly vuggy and moderately iron oxide stained.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10Z037A	65.4531	-148.5417	428533	7259637	06N	<u>Sandstone</u> : Light grey to white, wispy to matted texture, very fine-grained siliceous rock. Possible well-indurated sandstone, looks more like quartzite. Commonly stained, light yellow and orange on fracture surfaces, thin quartz veinlets slightly vuggy and moderately iron oxide stained.
10Z053D	65.3990	-148.4509	432604	7253510	06N	<u>Quartz vein</u> : Massive quartz veins with occasional vugs lined with anhedral to subhedral quartz crystals, moderate iron oxide staining.
10Z057C	65.3964	-148.4649	431947	7253237	06N	<u>Quartz vein</u> : Massive, white quartz vein, no iron oxide.
10Z073A	65.3933	-148.5129	429709	7252943	06N	<u>Greywacke</u> : Brown weathering, slightly greenish grey when broken, breaks into blocks, contains 1 percent, 1- to 3-mm-thick vuggy quartz-iron oxide veinlets with subhedral quartz crystals.
10Z079A	65.4002	-148.5124	429752	7253705	06N	<u>Greywacke</u> : Brown, blocky greywacke, fresh faces greenish-gray color, fine-grained sand with abundant lithics, one piece with hairline quartz veinlet.
10Z101A	65.4419	-148.8764	412988	7258812	06N	<u>Serpentinite</u> : Dark grey-weathering, black fresh faces. Contains 10 percent ghost phenocrysts, 1-2 percent, 1-mm-thick veinlets that are silver to light brown in color depending orientation, breaks easily, strongly foliated.
10Z112B	65.4429	-148.8692	413322	7258915	06N	<u>Vein</u> : Dense, white (fresh faces), very hard rock with vugs with quartz linings, possibly barite-bearing quartz vein? Rock covers 6-foot by 2-foot area.
10Z122A	65.4615	-148.8177	415773	7260918	06N	<u>Serpentinite</u> : Dark grey to black outcrop with occasional dark green patches.
10Z123B	65.4629	-148.8175	415786	7261068	06N	<u>Greenstone</u> : Portions of outcrop have shattered greenstone that has been filled with clear to grey drusy quartz, and possibly calcite (moderate HCL reaction).
10Z124A	65.4635	-148.8182	415756	7261136	06N	<u>Greenstone</u> : Weathers light brown, fresh faces dull darker brown. Vuggy rock with tiny euhedral quartz crystals within vugs, discontinuous quartz veins up to 1 cm wide.
10Z143A	65.4398	-148.9846	407962	7258725	06N	<u>Conglomerate</u> : High silica content, clast-supported conglomerate with white quartz veinlets.
10Z148A	65.4422	-148.9987	407317	7259022	06N	<u>Greenstone</u> : Dark grey to green-grey speckled, very fine-grained matted texture, trace of disseminated pyrite.
10Z148B	65.4422	-148.9987	407317	7259022	06N	<u>Chert</u> : Dark grey to black chert, conchoidal fracture, locally cut by fractures and filled with quartz + drusy quartz crystals and orange iron oxide.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10Z151A	65.4872	-148.9101	411579	7263899	06N	<u>Chert</u> : White, tan and reddish-brown chert, color banding varies from 0.2- to 15-cm-thick, with white, 1- to 3-mm-wide quartz veinlets that cut banding.
10Z178A	65.4987	-148.7773	417761	7265000	06N	<u>Chert</u> : Light grey, occasionally tan, moderately fractured chert. Less than 5 percent of pieces have thin (1- to 2-mm-wide), white quartz veinlets.
10Z182A	65.4951	-148.8013	416637	7264639	06N	<u>Chert</u> : Grey and mostly dark grey chert with occasional tan. Areas of outcrop have network of fine-grained quartz veinlets, some of which are slightly vuggy most are solid quartz.
10Z189A	65.4987	-148.8114	416180	7265049	06N	<u>Chert</u> : Light grey and grey chert with orange iron oxide staining on some fractures, patches of networked white quartz veinlets (microveinlets up to 1-mm thick).
10Z195D	65.4511	-148.5476	428258	7259416	06N	<u>Quartz vein</u> : Pebbles of white quartz vein material with subhedral to euhedral quartz crystals lining vugs, weak iron oxide staining.
10Z198B	65.4540	-148.5524	428042	7259750	06N	<u>Siltstone</u> : Highly iron oxide-stained and funky altered rock (possibly siltstone or fine-grained igneous? rock), commonly vuggy.
10Z199A	65.4549	-148.5545	427947	7259855	06N	<u>Felsic pluton</u> : Weathers into brown slabs and irregular angular boulders, fresh faces light grey with hint of greenish-grey. Possibly fine-grained quartz phenocrysts in granular matrix, iron oxide stained throughout with pitted appearance.
10Z202C	65.4590	-148.5582	427786	7260311	06N	<u>Quartz vein</u> : Pebbles of white quartz vein up to 3 cm thick, mostly massive, weak iron oxide staining.
10Z207B	65.4983	-148.3588	437120	7264483	06N	<u>Quartz vein</u> : White quartz veinlets up to 5 mm thick, also fracture/joint surfaces with subhedral to euhedral quartz coatings, joints and open spaces up to 5 mm wide.
10Z228B	65.4234	-148.5265	429159	7256305	06N	<u>Breccia</u> : Strongly iron oxide-stained, dark-orange, open-space breccia. At least some clasts are fine-grained sandstone, possibly a brecciated conglomerate?
10Z239A	65.4352	-148.7718	417816	7257920	06N	<u>Monzonite</u> : Orange-brown soil and orangish-brown rock, strongly altered, equigranular, fine-grained plutonic rock. No obvious quartz phenocrysts, feldspars altered to sericite, mafic minerals altered to chlorite? Moderate orange iron oxide staining.
10Z241A	65.4558	-148.3614	436900	7259748	06N	<u>Quartz vein</u> : Veins and veinlets up to 1 cm thick, mostly 0.5 cm thick, typically massive but occasional vugs, trace disseminated, very fine-grained, iron oxide after pyrite.

Table 1. (continued)

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
10Z243A	65.4552	-148.3663	436670	7259681	06N	<u>Conglomerate</u> : Dark greenish-grey to black, matrix supported, poorly sorted, clasts are subrounded to subangular. Abundant white quartz veins varying from 1- to 2-mm up to 3.5 cm in width, massive to vuggy, subhedral interlocking crystals. No iron oxide staining, no sulfides.
10Z246C	65.4217	-148.5213	429395	7256117	06N	<u>Quartz vein</u> : Thin fracture-fills and veins and up to 2 cm thick, quartz is anhedral, vuggy to subhedral, interlocking elongate crystals. Some pieces with trace to 1 percent, fine-grained arsenopyrite disseminated in quartz with scorodite staining. Other quartz veins stained orange and red by iron oxide, not found in outcrop.

Table 2. Trace-element geochemical analyses for rocks collected in the Tolovana mining district, Livengood Quadrangle, Alaska.																				
ppm = parts per million, % = percent																				
Sample Number	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K
	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
10BAE052A	0.002	0.08	6.85	12.6	430	0.91	0.07	0.61	0.14	28.9	16.7	109	2.02	45.9	4.73	14.7	0.16	1.3	0.054	1
10BAE183A	0.006	0.3	2.28	4.9	130	0.73	0.15	0.14	0.07	25.8	3.1	54	1.66	45.3	1.45	6.18	<0.05	1	0.021	0.96
10BAE191A	0.006	2.19	1.92	12.4	720	0.84	0.14	0.06	1.49	14.6	3.3	67	4.86	65.6	0.41	6.25	<0.05	0.9	0.018	0.43
10BAE233A	0.002	0.05	7.96	<5	80	0.27	0.02	13.85	0.15	9.56	32.9	78	0.14	93.2	7.33	17.5	0.1	1.5	0.065	0.05
10BAE255C	0.004	1.08	0.63	50.5	200	0.25	0.16	0.1	3.3	5.61	11.5	38	1.24	63.5	2.67	2.48	<0.05	0.2	0.135	0.16
10GG010B	<0.001	0.14	7.65	13	920	0.69	0.17	2.71	0.15	27	24.6	81	9.76	78.3	5.9	17.35	0.19	1.6	0.063	0.93
10GG017B	0.056	2.33	1.96	488	180	0.45	21.7	0.22	0.3	6.5	2.5	38	1.55	86	5.49	5.58	0.05	0.3	0.02	0.83
10GG023A	0.003	2.23	7.75	457	510	2.21	4.44	0.04	0.06	97.4	1.3	30	4.65	15.6	1.38	21.5	0.12	2.9	0.109	3.65
10GG051A	0.002	0.29	7.94	32.6	890	2.39	1.25	0.02	0.06	47.2	0.5	14	4.28	13.8	1.55	21	0.08	2.1	0.245	3.45
10GG173A	0.011	0.27	4.33	274	260	0.66	13.65	0.23	0.03	42.5	8.8	83	5.79	208	5.92	10.95	0.14	0.9	0.095	1.03
10GG175B	0.006	0.04	1.97	6	220	0.19	0.17	11.75	0.07	8.11	5.7	23	0.84	14.1	1.74	4.02	0.06	0.5	0.014	0.3
10GG178A	<0.001	0.04	0.76	2.3	70	0.1	0.1	9.07	0.11	4.48	3.8	15	0.28	14.1	1.07	1.74	<0.05	0.2	0.007	0.08
10GG301A	0.001	0.12	6.01	13.8	340	0.82	0.17	2.23	0.18	22	15.8	70	1.21	47.9	4.25	14.05	0.13	1.4	0.045	0.72
10GG304A	0.018	0.97	0.25	219	30	0.13	9.65	0.02	0.07	2.45	9.2	17	0.42	164.5	2.97	0.94	<0.05	0.1	0.05	0.05
10LF003A	0.001	0.38	5.04	27.8	240	0.54	2.05	6	0.1	22	11.2	76	3.5	27.2	3.46	8.31	0.19	1	0.038	0.72
10LF004A	<0.001	0.49	1.22	15.6	60	0.28	4.07	5.31	0.6	5.15	4.4	24	1.06	19.3	2.34	2.44	0.07	0.2	0.016	0.18
10LF012A	0.734	10.1	4.31	6130	230	1.31	476	0.04	<0.02	45.5	6.4	65	1.68	247	9.81	17.55	0.22	1.5	0.398	1.46
10LF012B	0.218	2.61	5.29	2520	300	1.6	199.5	0.05	<0.02	52.8	1.3	85	2.54	97.7	4.68	18.75	0.17	1.8	0.139	1.5
10LF013A	2.2	51.9	3.02	3870	110	1.24	3730	0.07	<0.02	45.2	0.8	58	0.49	45.7	10.8	12.35	0.4	1.2	0.143	1.55
10LF027A	0.003	1.24	3.82	26.3	370	1.07	1.98	0.02	0.85	32	6.1	52	5.29	131.5	4.12	11	0.17	1	0.178	1.28
10LF049B	0.001	0.24	0.3	32.4	40	0.16	2.58	0.03	0.47	2.96	3	18	0.52	7.5	1.16	0.94	<0.05	0.1	<0.005	0.07
10LF060B	<0.001	0.09	0.48	16.7	80	0.23	1.52	0.03	0.16	7.82	4.5	23	0.58	10.6	1.65	1.46	0.06	0.1	0.013	0.09
10LF070A	0.001	0.08	6.37	16	390	0.78	0.66	1.02	0.33	37.3	18.1	103	2.11	38.6	4.43	12.8	0.11	1.1	0.049	0.92
10LF089B	<0.001	0.07	0.15	19.2	20	0.14	1.87	0.02	0.06	0.83	1	27	0.2	4.1	0.88	0.64	<0.05	<0.1	<0.005	0.03
10LF102B	0.005	0.13	5.21	49.8	190	0.41	3.51	0.12	0.22	11.3	101	2240	0.44	86.4	8.36	11	0.18	0.4	0.036	0.16
10LF106B	<0.001	0.06	5.56	14.7	280	1.25	1.3	0.22	0.15	30.9	12.8	143	1.19	13.1	4.8	12.4	0.1	1.9	0.019	0.8
10LF114B	<0.001	0.05	7.08	4.8	330	2.36	0.29	0.2	0.07	118.5	2.9	4	0.45	2.9	6.09	28.1	0.24	6.1	0.137	3.59
10LF120A	<0.001	0.13	5.65	8	1820	3.55	0.43	0.01	0.38	186	0.9	15	0.69	19.2	2.56	27.3	0.12	19.4	0.113	2.48
10LF123B	<0.001	0.1	6.01	3	790	1.63	0.21	0.01	0.1	191	0.7	8	0.55	9.1	3.16	26.3	0.1	10.1	0.096	3.01
10LF156B	<0.001	0.57	0.6	53	90	0.4	0.18	0.01	0.19	9.07	2.1	18	0.27	262	6.12	2.41	<0.05	0.2	0.017	0.14
10LF191A	0.002	0.34	8.61	8.8	1160	1.99	0.28	0.19	1.12	89.7	28.1	85	27.5	49	6.44	24.3	0.11	2	0.07	2.45
10LF192B	0.002	0.32	2.93	6.5	540	0.74	1.11	0.11	1.49	32.1	4.6	39	3.51	76.7	2.16	8.03	<0.05	1.2	0.051	0.92
10LF193A	<0.001	2.25	7.25	65.5	1040	1.44	1.73	0.9	1.32	49	10.5	94	9.94	26.6	5.11	16.9	<0.05	1.6	0.469	2.13
10LF194A	<0.001	0.5	7.68	21.9	1690	1.59	1.32	0.2	8.86	77.6	10	30	25.3	25.8	4.89	21.2	0.14	1.8	0.325	4.21
10LF195B	0.003	24.9	7.38	34.7	410	1.3	2.29	0.05	3.45	89.8	2.2	54	3.23	71.8	6.72	20.1	0.21	2	6.57	2.29
10LF196B	0.003	0.9	5.19	396	250	1.12	2.74	0.62	1.52	276	33.2	83	4.2	62.5	5.57	14.75	0.22	1	0.644	1.34
10LF197A	<0.001	1.68	5.32	23.4	220	0.99	0.79	0.03	3.15	48.8	6.5	22	6.42	78.2	4.12	16.2	<0.05	0.9	1.22	1.97
10LF208B	<0.001	0.05	7.68	14.8	60	0.28	1.42	1.31	0.03	10.5	14.2	47	0.8	36.2	4.38	13.55	0.12	1.5	0.077	0.38
10LF217A	0.008	0.1	5.98	281	230	1.68	23.4	0.03	0.05	35.1	17.3	95	4.91	240	8.49	17.35	0.16	1	0.145	1.5

Sample Number	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th
	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10BAE052A	13.4	33	1.75	1020	0.35	2.53	6.7	42.9	880	5.7	38.6	<0.002	0.01	1.11	20.9	2	1	88.7	0.39	<0.05	2.3
10BAE183A	12.4	9.9	0.35	80	0.9	0.14	3.3	17.3	840	9.7	42.3	0.009	0.09	0.9	5.2	3	0.8	30.1	0.21	0.07	3.6
10BAE191A	8.7	11.1	0.17	50	16.1	0.03	3	23.8	310	11	23.7	0.062	0.04	15.8	4.3	7	0.6	69.9	0.2	0.1	2.3
10BAE233A	3.4	2.6	3.45	1250	0.25	0.25	1	67.4	360	0.9	1.6	0.002	<0.01	0.21	34.4	2	0.6	26.6	0.05	<0.05	0.5
10BAE255C	3.5	4.2	0.08	1670	4.75	0.02	1.5	28.3	210	9.8	8.5	0.011	0.01	6.05	2.4	4	0.7	20.9	<0.05	0.05	0.5
10GG010B	12.7	43.5	2.12	1580	0.82	3.06	8	45.7	1210	4.2	26.3	0.003	0.01	0.34	26.5	2	0.9	342	0.47	0.07	1.6
10GG017B	3.4	2.6	0.15	189	0.61	0.06	0.7	5.8	440	135	68.5	<0.002	0.14	10.25	4.8	5	5.5	10.2	<0.05	1.39	0.8
10GG023A	57.1	23	0.49	58	1.31	0.15	4.6	1.8	380	18.2	253	0.003	0.24	1.62	9	6	22.7	19.4	0.25	0.55	12.3
10GG051A	29.1	18	0.43	87	1.91	0.06	6.7	1.8	340	49.6	182.5	<0.002	<0.01	6.26	4.1	2	17.1	12.7	0.54	<0.05	13
10GG173A	20.4	12.4	0.89	282	2	1.08	4.5	30	670	3.9	73.5	<0.002	0.12	0.78	11.8	4	8.4	53.6	0.25	0.2	2.4
10GG175B	3.8	8.2	0.3	727	0.42	0.77	1.7	10.4	280	1.8	10.4	<0.002	<0.01	0.2	5.5	1	0.3	1575	0.08	<0.05	0.5
10GG178A	2.2	6.5	0.09	922	0.42	0.25	0.6	6.9	120	1.6	2.6	<0.002	<0.01	0.21	2.9	1	0.2	712	<0.05	<0.05	0.2
10GG301A	9.8	48.8	1.6	1120	0.52	2.19	4.8	36.5	870	4.5	31.4	0.002	0.06	0.39	17.6	2	0.9	257	0.28	0.06	2.1
10GG304A	1.3	4.3	0.03	151	0.78	0.02	0.4	21.1	200	18	4.4	<0.002	0.01	5.54	0.9	4	4.7	3.4	<0.05	1.47	0.2
10LF003A	12.1	73.3	1.59	1350	0.93	1.63	3.8	29.8	660	12.3	29.7	<0.002	0.11	3.36	14.4	1	1.1	429	0.22	<0.05	1.1
10LF004A	2.7	12.4	1.97	1720	0.38	0.42	1.3	10.5	140	62.2	8.5	<0.002	0.04	2.26	3.1	2	1.1	430	0.05	<0.05	0.4
10LF012A	24.1	4.8	0.56	28	1.76	0.19	1.9	2.3	580	104	120	0.002	0.54	49.7	16.5	8	105	30.8	0.1	3.57	6.4
10LF012B	28.6	5.6	0.8	60	2.56	0.24	3.1	5.6	620	39.4	123	0.003	0.51	12.6	16.2	4	67.5	21.1	0.18	0.74	5.9
10LF013A	34	13.1	0.68	35	2.37	0.28	1.2	2.1	1310	232	56.9	0.007	2.85	106	9.6	9	124	43.4	0.05	4.55	3.2
10LF027A	16.4	219	0.16	412	0.96	0.03	4.5	35.6	310	570	78.8	0.002	0.02	37.2	10.4	4	3.6	12.8	0.28	0.15	4.2
10LF049B	1	4.9	0.04	563	0.51	0.04	0.8	4.5	40	83.2	4.6	<0.002	0.01	1.24	0.8	<1	1.1	5.5	<0.05	<0.05	0.2
10LF060B	2.4	3.5	0.06	1330	1.25	0.09	1	14.5	70	39.1	5.8	<0.002	<0.01	0.65	1.5	1	0.5	9	<0.05	<0.05	0.5
10LF070A	18.8	40.4	1.51	1600	0.76	2.32	6	47.4	830	7.3	35.9	0.002	0.02	1.45	19.2	1	0.9	126	0.36	<0.05	2.3
10LF089B	<0.5	2.6	0.03	131	0.4	0.02	0.6	3.2	20	2.3	2	<0.002	<0.01	0.97	0.4	<1	0.6	3.1	<0.05	<0.05	<0.2
10LF102B	3.4	42.8	5.09	2460	1.23	0.04	1.2	1330	190	4.8	10.4	<0.002	0.01	1.28	15.6	1	1.4	17	0.06	0.07	1
10LF106B	15.3	25.3	0.47	1060	0.81	2.05	4.4	71.8	580	2.4	32.8	<0.002	<0.01	0.52	15.3	1	1.4	60.8	0.25	<0.05	5.7
10LF114B	55	4.1	0.32	2460	1.89	3.46	46.2	3.5	380	23.9	101.5	0.002	0.01	0.26	1.8	2	4.7	36.1	2.67	0.06	12.7
10LF120A	90.1	5.3	0.07	326	3.22	2.66	72.7	3.8	90	63.4	120	<0.002	0.03	0.88	1	3	12	18.7	5.69	0.05	34.8
10LF123B	93.1	2	0.03	601	1.03	2.86	71.2	2.6	130	17.7	124.5	<0.002	<0.01	0.29	0.8	2	9.9	13.9	4.43	<0.05	25.6
10LF156B	3.1	3.4	0.04	128	1.04	0.02	0.6	5.5	1120	5.2	5.7	<0.002	0.01	0.69	2	3	0.4	9.1	<0.05	0.05	0.7
10LF191A	36.4	108.5	1.34	1230	0.47	0.32	39.3	80.4	540	13.7	122.5	<0.002	0.03	1.05	17.7	1	1.6	104.5	1.96	0.07	11.6
10LF192B	15.7	19.6	0.43	259	1.32	0.12	4.2	19	350	111	56	<0.002	0.15	1.16	8.2	3	1.1	34.7	0.29	0.5	4.2
10LF193A	23	45.8	2.09	1660	1.17	1.12	9.3	52.7	950	361	87.4	<0.002	0.01	4.36	19.3	2	6.2	147.5	0.62	0.31	5.6
10LF194A	36.7	91	0.73	4390	2.47	0.11	14.3	20.6	1050	165	160	<0.002	0.01	5.93	7.6	1	8.9	70.3	0.77	<0.05	13.2
10LF195B	46.2	51.5	0.21	1960	3.78	0.04	10.3	10.7	1100	195.5	102	<0.002	0.03	8.26	11	2	78.4	901	0.59	0.09	12.3
10LF196B	153	32	1.13	2090	281	0.06	7.8	76.5	2960	60.3	57.3	0.025	0.03	9.04	12.1	2	13.6	18.9	0.42	0.58	11
10LF197A	26.9	23.9	0.2	4340	0.93	0.03	7.1	9.7	260	255	92.4	<0.002	0.01	6.13	4.3	1	15.5	118	0.49	0.05	8.8
10LF208B	3.6	9.5	1.02	637	0.16	4.94	1.3	27.3	390	1.4	10.7	<0.002	<0.01	0.59	19	1	0.9	109	0.08	<0.05	0.8
10LF217A	15.9	38.2	0.41	188	2.18	0.08	1.9	39.7	940	4.9	169	0.002	0.04	1.35	14.9	1	28.9	14.1	0.1	0.12	3.7

Sample Number	Ti	Tl	U	V	W	Y	Zn	Zr
	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10BAE052A	0.444	0.28	0.8	160	0.5	14.7	84	36.7
10BAE183A	0.113	0.25	4.2	112	0.5	12.3	21	34.9
10BAE191A	0.114	2.72	11.4	842	0.8	9.1	53	30.4
10BAE233A	0.47	0.02	0.2	324	0.1	16.9	83	41.8
10BAE255C	0.031	0.73	2.3	170	1.6	3.9	56	6.9
10GG010B	0.593	0.19	0.7	220	0.6	22.4	87	43.6
10GG017B	0.034	0.43	0.3	49	3.7	1.9	57	10.6
10GG023A	0.161	1.52	3.4	92	40.5	7.4	6	87.6
10GG051A	0.16	1.21	3.9	33	2.9	5.2	63	60.2
10GG173A	0.24	0.67	0.7	101	8.9	7	19	33.2
10GG175B	0.108	0.07	0.2	44	0.4	9.7	20	17.7
10GG178A	0.03	0.03	0.1	18	0.3	8.3	12	5.8
10GG301A	0.38	0.18	1	134	0.9	16.1	76	36.7
10GG304A	0.009	1.04	0.1	6	3.5	0.9	66	2.3
10LF003A	0.312	0.23	0.5	113	0.9	12.1	64	29.2
10LF004A	0.051	0.12	0.2	23	0.3	5.7	238	7.2
10LF012A	0.129	0.78	1.2	127	47.2	5.9	13	51.2
10LF012B	0.159	0.86	1.5	142	29.3	6.4	6	60.7
10LF013A	0.06	3.89	1.3	90	18.6	4.2	2	37
10LF027A	0.163	0.99	1.4	70	1.1	10.5	970	36.2
10LF049B	0.015	0.08	0.1	8	0.4	0.6	48	2.3
10LF060B	0.021	0.05	0.3	11	0.3	2	34	4.4
10LF070A	0.392	0.21	0.7	145	0.7	18.9	84	34.2
10LF089B	0.009	<0.02	<0.1	4	0.3	0.3	23	1.5
10LF102B	0.212	0.08	0.4	122	0.6	4.3	91	14.5
10LF106B	0.251	0.2	1.9	126	0.4	14.1	51	67.5
10LF114B	0.35	0.38	2.9	1	1.6	38	221	324
10LF120A	0.137	0.65	13.7	5	0.6	75.4	139	>500
10LF123B	0.142	0.44	5.2	3	0.5	46.3	155	>500
10LF156B	0.027	0.03	11.8	279	0.2	2.5	30	9.2
10LF191A	0.551	1.08	1.6	177	1.8	14.2	326	77.5
10LF192B	0.159	0.59	1.4	59	1.1	7.9	89	46.6
10LF193A	0.407	1.2	1.6	195	3.2	26	348	60.5
10LF194A	0.286	2.11	3.1	77	2.8	10.8	3510	58
10LF195B	0.266	0.88	4	107	5.9	9.9	4510	60.7
10LF196B	0.23	0.49	2.2	130	5.6	41.4	693	37.3
10LF197A	0.206	0.75	1.5	50	2.4	3.3	1320	28.6
10LF208B	0.327	0.02	0.1	84	0.6	16.6	103	33.3
10LF217A	0.119	0.96	1.1	151	21.1	6.9	18	37.7

Table 2. (continued)																				
Sample Number	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K
	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
10LF218B	0.637	3.98	4.29	2630	120	1.62	448	0.05	<0.02	50.8	1.1	71	1.5	177.5	4.87	16	0.18	1.3	0.114	1.05
10LF219A	0.047	2.67	4.81	>10000	190	1.64	237	0.05	0.05	35.6	1.4	76	1.03	139	4.25	16.1	0.16	1.8	0.243	0.89
10LF220A	0.004	0.93	5.8	868	130	1.99	39	0.06	0.06	76.1	1.5	48	1.52	55.8	2.62	19.4	0.19	2.7	0.042	1.39
10LF221A	0.027	1.55	4.96	1240	60	2.25	143	0.09	0.17	59	2.3	74	0.64	46.3	3.18	16.5	0.16	1.5	0.108	0.14
10LF222A	<0.001	2.17	5.21	373	80	2.58	33.9	0.08	<0.02	64.1	1.7	74	0.54	18.6	2.12	16.8	0.1	1.7	0.083	0.34
10LF233B	<0.001	0.07	8.21	8.9	890	1.66	0.27	0.14	0.07	85.9	13.2	23	8.97	7.5	2.94	22.6	0.18	2.9	0.061	2.38
10LF233D	0.015	0.46	0.69	583	50	0.14	1.07	0.02	0.17	5.15	6.8	16	1.16	272	11.1	1.8	0.15	0.1	0.525	0.11
10LF234B	<0.001	0.06	7.98	21.1	850	1.74	0.36	0.38	0.47	95.1	15.8	30	7.61	8	3.18	22.3	0.18	2.8	0.041	2.23
10LF247C	0.003	0.55	5.35	14	370	1.36	3.5	0.06	2.55	32.8	11	132	3.27	108.5	6.73	13.9	0.17	1.4	0.045	1.15
10LF248A	0.002	0.21	6.84	3	500	1.12	4.17	0.09	0.22	40.5	4.2	106	4.7	65.8	3.55	16.8	0.14	1.4	0.045	1.55
10MBW002A	<0.001	0.05	7.79	5.1	1160	1.8	0.45	0.46	5.29	54.3	26.2	97	13.15	121	3.89	21.8	0.24	2.3	0.023	3.95
10MBW003A	0.001	0.62	7.27	11.5	880	1.63	41.9	0.03	0.1	76.8	1.9	82	4.97	82.1	2.18	24.2	0.16	2.2	0.034	3.78
10MBW004A	<0.001	0.96	5.97	4.5	730	0.97	2.12	0.01	0.11	18.25	0.7	78	3	39.8	1.42	22.4	0.09	2.1	0.064	3.06
10MBW010A	0.001	1.29	7.37	31.8	1700	1.13	2.72	0.14	<0.02	76	0.8	18	3.3	61.6	1.89	23	0.18	1.3	0.082	4.91
10MBW038A	<0.001	0.13	0.11	14	20	0.16	1.45	0.01	0.07	0.53	7.9	13	0.15	63.1	1.8	0.6	0.07	<0.1	0.01	0.03
10MBW044A	0.03	4.12	6.49	114.5	500	2.8	3.22	0.12	1.71	35.9	1.2	12	4.9	73.8	1.19	13.15	0.11	2	0.085	2.66
10MBW045A	<0.001	0.22	7.54	5.5	1160	1.83	0.88	0.99	2.17	54.6	3.8	14	3.56	44.8	1.33	18.95	0.13	1.5	0.02	2.81
10MBW047A	0.004	1.86	6.31	180.5	700	2.27	7.76	0.07	4.01	44.8	1.2	12	4.77	203	1.57	16.05	0.1	1.1	0.075	3.3
10RN053C	<0.001	0.1	2.39	12.2	130	0.38	0.66	0.09	0.3	17.7	6.9	104	0.59	20.1	2.85	5.15	0.11	0.8	0.015	0.25
10RN057A	0.107	5.72	3.78	1600	60	1.52	75.6	0.05	<0.02	45.2	1.2	56	0.59	40.2	3.9	12.7	0.15	1	0.089	0.44
10RN057B	0.109	7.93	4.83	2350	110	1.74	221	0.04	0.08	36.6	1.2	74	1.59	64.2	6.7	17.05	0.14	1.1	0.15	1.45
10RN058A	0.226	2.3	5.72	1700	280	1.85	208	0.05	<0.02	56.4	1.1	85	3.09	77.2	4.33	21.5	0.17	1.8	0.108	1.59
10RN058B	0.035	3.76	1.62	1075	30	0.62	121.5	0.03	0.04	13.7	0.9	38	0.29	49.8	3.34	5.23	0.07	0.4	0.047	0.25
10RN058C	0.019	2.67	4.7	4910	130	1.37	100	0.06	0.08	57.2	0.9	63	1.31	34.7	3.94	14.4	0.14	1.1	0.105	1.16
10RN060A	0.181	4.15	4.5	5130	150	2.27	298	0.06	<0.02	61.8	1.4	71	0.61	46.7	3.33	15.45	0.19	1.9	0.127	0.5
10RN061B	0.003	0.09	6.28	23.2	370	0.8	6.02	0.03	<0.02	52.3	3.8	100	3.8	114	5.78	17.1	0.15	0.9	0.121	2.62
10RN068A	0.053	0.24	6.24	320	340	1.48	35.8	0.03	<0.02	56.5	25.9	114	5.51	368	11.65	21.5	0.28	0.9	0.128	1.88
10RN069A	0.009	1.52	7.22	58.5	650	2.29	6.26	0.03	<0.02	64	1.2	106	5.09	76.7	2.14	23.7	0.14	2.1	0.091	3.13
10RN077A	<0.001	0.02	0.14	6.6	20	0.13	0.43	0.02	<0.02	1.47	1	23	0.11	3.3	0.84	0.62	0.05	<0.1	<0.005	0.04
10RN083A	0.16	2.24	4.09	3470	180	1.69	292	0.04	<0.02	65.6	0.9	61	1.5	43.3	3.22	14.15	0.15	1.6	0.161	1.1
10RN083A1	0.002	0.39	5.18	249	50	1.7	6.87	0.04	<0.02	44.9	1.5	66	2.03	33.7	4.1	14.05	0.19	1.1	0.084	1.35
10RN083C	0.009	0.89	5.35	493	110	1.4	14.8	0.03	<0.02	38.6	3.1	72	4.89	165.5	13.15	14.45	0.21	0.9	0.131	2.05
10RN089C	0.003	0.07	6.73	36.8	400	0.77	2.26	0.97	0.27	26.4	16.7	86	1.96	46.4	4.89	14.55	0.1	1.5	0.06	0.82
10RN122A	<0.001	0.25	7.47	64.1	840	1.64	0.91	0.06	3.72	65	9.7	11	3.83	10.3	2.01	22	0.09	2.1	0.034	2.27
10RN126A	<0.001	0.46	7.32	98.9	770	1.91	0.43	0.03	1.06	63.1	4.8	11	4.26	17.8	2.01	20	0.1	2.1	0.063	2.96
10RN128A	<0.001	0.07	6.55	14.1	230	2.68	0.61	0.05	0.11	21.9	1.7	4	2.94	4.5	1	19.35	0.07	2.7	0.034	1.46
10RN130A	<0.001	0.05	0.2	9.5	20	0.06	0.91	0.01	0.03	1.74	2.2	22	0.25	60.2	0.91	0.72	0.17	0.1	0.019	0.04
10RN135A	0.277	3.14	6.35	2430	330	1.77	248	0.1	<0.02	65.1	2.5	92	4.31	82.6	4.3	24.5	0.14	1.9	0.205	2.27
10RN136A	0.007	0.88	7.65	360	730	2.8	41.4	0.01	<0.02	159.5	0.9	30	7.76	70.8	3.68	29.3	0.14	3.4	0.382	3.79
10RN137A	0.17	0.95	5.7	3130	370	1.09	118.5	0.08	<0.02	63.3	1.4	87	2.86	23.6	6.53	19.6	0.11	1.6	0.109	2.66

Sample Number	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th
	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10LF218B	25.1	4.7	0.69	68	1.37	0.23	1.9	2.2	320	20.1	84.2	0.003	0.23	11.8	10	7	47.6	15.8	0.09	0.75	4.3
10LF219A	17.5	4.9	0.8	48	1.3	0.27	5.5	1.9	260	5.6	54.5	0.002	0.05	12.65	13.2	11	33	14.3	0.32	8.26	4.7
10LF220A	38.4	8.3	0.99	65	1.34	0.3	2.6	2.2	170	9.7	122	<0.002	0.01	15.6	12.7	5	67.2	14.4	0.14	0.18	4.3
10LF221A	30.3	3.9	1.19	78	0.64	0.41	2.7	4.7	320	34.6	12.5	<0.002	0.06	9.26	12.1	2	21.1	29.3	0.17	0.54	5.2
10LF222A	31.5	4.1	1.19	64	0.86	0.41	3.5	3.4	240	23.3	27.1	<0.002	0.03	5.39	12.2	2	25.8	24.3	0.21	0.42	5.2
10LF233B	45.1	12.9	0.22	983	0.91	2.02	12.3	18.8	750	10.3	160.5	0.003	0.01	3.03	7.6	1	5.1	188	0.72	<0.05	14.8
10LF233D	2.3	46.1	0.04	971	1.32	0.02	0.5	13.5	250	11.3	14.4	<0.002	0.04	7.94	1.8	1	7.5	7.2	<0.05	0.06	0.4
10LF234B	47.4	18.6	0.39	2700	1.59	2.12	9.9	42.7	980	3.8	118.5	0.002	0.04	1.59	8.5	1	3.7	235	0.6	<0.05	13.7
10LF247C	15.2	38.5	0.58	347	1.85	0.33	5.7	40	1330	5.2	74.6	0.002	<0.01	13.1	12.4	3	3	47	0.35	0.14	4.3
10LF248A	17.5	26.2	1.31	263	1.12	1.44	6	10.5	460	4.1	104	0.002	0.05	0.99	17	2	1.2	75.6	0.38	1.53	3.6
10MBW002A	26	40.3	1.75	125	3.03	0.83	10.2	121.5	1110	1.7	259	0.006	0.2	0.46	22	2	1.5	68.8	0.6	0.21	7.1
10MBW003A	41.5	27.7	0.84	58	1.77	0.18	8.5	8.3	530	15.4	215	0.002	0.17	2.87	17.9	2	4.9	27.1	0.5	20.6	8.6
10MBW004A	9.9	27.4	0.35	77	1.46	0.09	3.2	2.3	240	6.7	146.5	<0.002	0.13	1.03	15.4	1	8.6	14.3	0.17	0.29	4.3
10MBW010	45.6	13.8	0.15	48	70.1	1.42	4.2	1.7	340	14.7	162	0.009	0.4	0.66	6.4	4	2.2	193	0.24	0.26	11.7
10MBW038A	<0.5	1.2	0.01	71	0.51	0.02	0.1	5.4	70	6.1	2	<0.002	0.01	0.84	0.2	1	0.2	2	<0.05	0.09	<0.2
10MBW044A	21.1	19.9	0.29	283	1	0.19	2.8	5.6	450	17.5	204	<0.002	<0.01	25.7	3.1	1	2.2	19.1	0.19	0.11	11.6
10MBW045A	33.1	20.7	0.32	259	0.94	2.43	5.4	27.5	530	7.8	125.5	0.003	0.05	2.34	4.2	1	0.8	389	0.4	0.05	15.2
10MBW047A	28.3	24	0.33	123	1.76	0.25	2.7	2.8	410	102	213	<0.002	0.01	15.55	3.1	1	4.3	37.4	0.19	0.37	12
10RN053C	8	24.9	0.52	974	0.58	0.7	2.2	47.5	350	8.8	13.6	<0.002	<0.01	0.83	4.1	1	0.6	49	0.11	<0.05	1.9
10RN057A	24	6.2	0.8	62	0.78	0.28	1.1	2.4	440	163.5	40.1	<0.002	0.18	21.7	9.6	3	45.4	17	0.06	0.51	2.9
10RN057B	20.8	8.5	0.72	63	0.98	0.22	1.2	2.3	570	78.9	147.5	<0.002	0.49	19.4	14.4	4	93.4	38	0.06	0.71	3.5
10RN058A	29	6.1	0.91	55	1.8	0.27	3.6	4	350	20.6	132	0.003	0.41	9.49	16.5	4	55.8	21	0.22	0.54	4.9
10RN058B	7.8	2.6	0.34	67	0.63	0.13	0.7	2.2	230	30.9	19.7	<0.002	0.2	8.83	4.5	2	14.9	9	<0.05	0.22	1
10RN058C	30.9	5.4	0.77	70	0.76	0.24	1.6	2	710	30.5	107	<0.002	0.24	10.15	11.4	4	34.6	16.5	0.09	0.48	3.3
10RN060A	34.7	4.1	0.99	65	1.85	0.34	3.7	3.2	360	42.8	36.8	0.002	0.22	13.2	13.4	8	40.6	20.3	0.22	1.84	5.8
10RN061B	24.1	25.9	1.54	289	1.19	0.05	2	14.3	320	4.4	240	0.002	0.02	0.85	17.8	1	32.4	18.8	0.13	0.05	2.1
10RN068A	26.5	28.8	0.3	428	1.24	0.04	2.5	61.9	1120	7.4	161.5	0.002	0.05	1.96	17.8	2	32	33.2	0.13	0.25	3.2
10RN069A	29.9	20.4	0.85	43	0.93	0.19	5.7	2.3	720	57.1	245	<0.002	0.33	2.15	19.1	3	16.6	20.2	0.33	0.35	7.3
10RN077A	0.7	1.6	0.01	214	0.36	0.04	0.6	2.3	80	2.7	1.8	<0.002	<0.01	0.25	0.4	<1	0.3	5.8	<0.05	<0.05	<0.2
10RN083A	37.1	4.4	0.65	58	2.16	0.22	2.4	4.2	470	44.6	104.5	<0.002	0.41	11.55	13.7	6	47.9	20.3	0.13	2.17	6.5
10RN083B1	22.9	7	0.87	33	0.43	0.24	0.9	2	310	13	154	<0.002	0.02	3.88	13.2	1	111.5	13	0.05	0.14	4.9
10RN083C	18.5	7.2	0.72	82	1.08	0.14	0.9	10.2	1290	41.5	211	<0.002	0.07	12.9	13.2	4	72.3	9.5	<0.05	0.22	3.2
10RN089C	12.4	45.6	1.72	1430	0.45	2.34	5.9	42	900	8.2	33.8	<0.002	0.01	0.47	20.8	1	1.5	122.5	0.33	0.06	2
10RN122A	34.5	9	0.18	1360	0.8	1.99	7.4	10.8	470	233	133	0.002	<0.01	3.82	3.9	1	2.2	108.5	0.55	<0.05	16
10RN126A	39.9	13.5	0.2	1230	0.32	0.73	6.1	2.6	460	538	188	<0.002	<0.01	6.98	3.8	1	7.7	25.3	0.46	<0.05	17.6
10RN128A	12.2	17.1	0.07	217	0.18	2.62	17.5	3.1	340	24.4	92.8	<0.002	<0.01	4.04	2.9	<1	2.1	142.5	1.31	<0.05	15.9
10RN130A	0.7	5.7	0.01	366	0.72	0.06	0.3	4.4	70	4.6	2.3	<0.002	<0.01	0.98	0.8	1	0.7	5.7	<0.05	<0.05	0.2
10RN135A	33.1	10.4	0.76	105	1.62	0.22	3.7	7	770	62.2	218	0.003	0.18	19.1	20.1	4	88.5	31.7	0.23	1.12	7.2
10RN136A	85	7.9	0.5	89	2.18	0.06	19.2	2	440	18.7	329	0.002	0.08	10	8.1	2	144	76.2	1.33	0.34	19.1
10RN137A	31.3	6.6	0.37	64	1.25	0.11	3	3.4	910	137.5	223	0.003	0.52	17	14.9	3	114	21.3	0.16	0.48	5.3

Sample Number	Ti	Tl	U	V	W	Y	Zn	Zr
	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10LF218B	0.103	0.51	1.3	101	174	5.4	5	46.8
10LF219A	0.222	0.48	1.6	126	60.8	5.5	4	67.5
10LF220A	0.166	0.53	1.7	81	26.4	7.7	4	88.1
10LF221A	0.142	0.2	1.6	122	24.7	6.4	8	55.2
10LF222A	0.162	0.18	1.8	120	20.1	6.5	6	63.3
10LF233B	0.294	1.3	4.2	89	1.8	7.9	42	106
10LF233D	0.013	0.16	0.5	18	0.8	2.1	23	4.4
10LF234B	0.252	0.97	3.7	92	1	12.5	41	103.5
10LF247C	0.23	0.6	1.4	132	1.3	7.1	210	50.5
10LF248A	0.303	0.85	1.4	158	1.6	9.7	39	52.8
10MBW002A	0.399	3.8	2.2	218	0.8	15.3	267	77.6
10MBW003A	0.265	1.78	3.2	176	23.1	9.5	15	74
10MBW004A	0.162	1.35	2.4	164	8.1	5.3	6	72.3
10MBW010	0.133	1.59	2.3	59	19.9	4.1	4	37.9
10MBW038A	0.005	0.02	0.1	5	0.4	0.4	8	0.6
10MBW044A	0.094	1.35	3.1	32	42.2	6.3	141	62.8
10MBW045A	0.151	1	2.1	35	49.5	6.6	99	42.9
10MBW047A	0.092	1.27	5.6	27	103	4	128	29.9
10RN053C	0.119	0.12	0.7	45	0.5	6.7	49	30
10RN057A	0.074	0.48	1.1	97	8.4	4.6	3	36
10RN057B	0.083	1.28	1.1	130	14.5	4.4	5	38.2
10RN058A	0.183	0.89	1.6	153	62.8	6.6	7	63
10RN058B	0.039	0.44	0.6	46	24.3	2.4	3	15.7
10RN058C	0.098	0.86	1.4	111	18.8	5.8	3	41
10RN060A	0.17	0.37	1.8	112	99.8	6.8	6	63.2
10RN061B	0.134	1.54	0.7	139	5.7	5.2	31	33.1
10RN068A	0.133	1.81	0.9	165	27.2	7.6	28	31.6
10RN069A	0.291	1.73	1.9	177	28.1	8	4	79
10RN077A	0.005	<0.02	<0.1	2	0.2	0.5	8	0.7
10RN083A	0.132	0.86	1.6	104	80.5	6.8	8	51.7
10RN083B1	0.081	0.68	1	126	9	5.4	5	37.6
10RN083C	0.079	1.03	0.8	136	16.1	5.8	17	32.8
10RN089C	0.432	0.2	0.8	170	1.1	17.3	96	44.8
10RN122A	0.182	1.13	3.7	37	1.1	5.1	533	71
10RN126A	0.165	1.46	4.7	33	1.6	4	698	61.6
10RN128A	0.07	0.78	3.6	15	1.7	5.8	47	54.3
10RN130A	0.008	0.02	0.1	4	0.2	0.9	12	1.9
10RN135A	0.197	1.38	1.7	177	56.8	8.1	73	72.8
10RN136A	0.2	2.63	3.4	65	19.2	8.1	8	127.5
10RN137A	0.137	1.19	1.3	156	24.7	6.5	29	63.8

Table 2. (continued)																				
Sample Number	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K
	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
10RN140A	0.308	2.71	5.43	2090	240	1.79	257	0.05	<0.02	58.2	1.3	89	2.22	66.8	3.35	20.2	0.14	1.8	0.147	1.15
10RN184A	0.004	0.28	2.83	47.3	180	0.88	1.06	0.02	0.06	26.5	1.6	47	1.98	82	1.54	8.4	0.16	1.3	0.038	0.98
10RN251A	0.103	1.68	5.18	1605	220	1.77	77.1	0.06	<0.02	55.7	1.4	88	2.38	55.5	3.02	18.25	0.11	1.6	0.073	1.05
10RN252A	0.149	0.34	7.26	877	580	1.43	87	0.16	<0.02	56.4	2.5	120	7.67	139.5	5.3	21.9	0.14	2.1	0.113	2.75
10RN253A	0.086	4.07	5	863	50	2.22	82.6	0.08	<0.02	53.9	1.4	77	0.6	20.9	1.86	16	0.08	1.5	0.052	0.26
10RN254A	0.109	1.35	5.09	2530	240	1.86	212	0.27	0.12	50.8	5.5	77	1.79	222	11.55	15.7	0.19	1.2	0.149	0.89
10RN255A	0.286	1.79	6.68	3980	490	1.65	157.5	0.14	<0.02	56.5	6.2	111	5.96	508	6.11	21.3	0.17	2	0.2	2.62
10RN255B	0.852	2.35	5.08	>10000	70	1.17	334	0.06	<0.02	34.1	80.1	96	3.63	1375	15.45	15.45	0.38	1.3	0.322	1.86
10RN256A	0.285	1.11	6.62	695	430	1.39	55.4	0.02	<0.02	54.6	4.5	114	5.72	103.5	4.7	24.1	0.13	2	0.15	2.87
10RN257A	0.344	2.64	6.17	2710	360	1.69	257	0.08	<0.02	54.9	2	102	4.28	89.4	4.77	22.9	0.17	2.1	0.138	1.89
10RN258A	0.281	2.48	5.15	3810	240	1.48	162	0.05	<0.02	49	1.3	90	1.79	120.5	7.43	22.6	0.18	1.6	0.167	1.41
10RN259A	0.245	2.16	5.6	3350	400	1.72	158	0.04	<0.02	60.1	1.8	95	4.14	248	7.44	26.3	0.16	1.8	0.283	2.02
10RN279A	0.001	0.86	0.11	34.7	20	<0.05	1.42	0.01	0.04	1.07	1.8	24	0.26	36.7	2.13	0.45	<0.05	<0.1	0.165	0.03
10RN288A	0.005	0.08	0.75	10	50	0.29	0.35	0.01	0.04	4.21	1.5	30	0.29	42.7	1.91	2.46	0.05	0.3	0.008	0.16
10RN310C	<0.001	0.04	0.91	9	110	0.23	0.31	3.53	0.13	4.91	6.8	25	0.57	10.4	1.62	1.98	<0.05	0.3	0.008	0.19
10RN315C	0.002	0.06	1.19	60.2	70	0.19	0.3	0.04	0.12	8.87	3.9	52	0.82	13.1	1.16	2.4	<0.05	0.3	0.008	0.14
10RN316C	<0.001	0.13	0.26	18	30	0.1	0.1	0.01	0.16	7.5	1.6	18	0.82	8.4	1.09	0.89	0.07	0.1	0.007	0.05
10RN319C	0.003	0.09	0.64	19.6	60	0.15	0.11	0.04	0.03	5.41	2.8	29	1.82	13.3	1.06	1.8	<0.05	0.2	0.007	0.12
10RN320A	<0.001	0.1	8.11	24	160	0.24	0.85	1.28	0.06	3.58	4.9	16	0.5	10.1	0.92	14.35	<0.05	0.1	<0.005	0.64
10Z021C	0.01	2.38	5.36	168.5	360	1.8	15.65	0.05	0.05	46.9	17	91	3.45	252	4.77	17.35	0.19	1.8	0.099	1.68
10Z028B	<0.001	0.1	7.05	8.2	710	0.73	0.06	1.41	0.28	27.7	20.4	87	5.29	64.8	4.96	16.45	0.17	1.3	0.056	0.76
10Z031A	0.009	2.26	2.07	11.2	270	0.6	58.4	0.01	0.04	14.15	2.7	35	2.59	99.6	2.45	6.86	0.1	0.7	0.128	1.45
10Z032A	0.005	1.96	7.16	3.6	1080	1.31	39.2	0.7	0.14	49.5	3.8	75	6.49	315	3.3	22.2	0.13	0.8	0.177	4.46
10Z036A	0.004	0.88	5.77	4.4	740	0.9	2.43	0.03	<0.02	49.2	1.6	136	4.6	223	1.68	18.9	0.15	2.6	0.049	3.06
10Z037A	<0.001	0.81	6.97	6.3	970	0.92	3.14	0.28	0.1	50.2	1	102	3.25	40.1	1.43	18.6	0.2	1.8	0.047	3.32
10Z053D	0.002	0.36	0.25	2.8	40	0.05	0.06	6.74	0.03	2.17	1.4	12	0.56	8.2	0.96	0.62	0.1	<0.1	<0.005	0.03
10Z057C	<0.001	0.11	0.17	1.6	20	0.12	0.08	0.05	<0.02	0.83	1.2	20	0.2	4.6	0.61	0.48	0.14	<0.1	<0.005	0.03
10Z073A	0.002	0.1	5.78	9	220	0.53	0.14	1.12	0.17	31.1	18.5	150	1.75	34.1	4.39	13.05	0.18	1.1	0.048	0.49
10Z079A	0.001	0.12	6.2	9.4	320	0.54	0.12	0.72	0.07	28.4	20.4	148	1.44	43.1	4.58	13.25	0.16	1.2	0.054	0.69
10Z101A	<0.001	0.02	0.5	1.1	10	<0.05	0.02	0.03	0.05	0.31	107.5	1750	<0.05	11.2	5.63	1.29	0.2	<0.1	<0.005	<0.01
10Z112B	<0.001	0.08	10.95	<5	10	<0.05	0.04	20.9	0.09	0.67	15.7	39	<0.05	10.6	1.09	2.38	0.11	<0.1	<0.005	<0.01
10Z122A	<0.001	0.01	0.41	0.5	10	<0.05	0.03	0.02	0.03	0.14	96.8	1620	0.05	5.8	5.45	1.16	0.2	<0.1	<0.005	0.01
10Z123B	<0.001	0.04	7.53	2.5	190	0.57	0.07	2.88	0.09	17.95	27.5	4	0.47	35.8	6.65	18.65	0.18	3.9	0.075	0.22
10Z124A	<0.001	0.02	0.41	28.9	10	0.09	0.02	1.33	0.03	0.13	78.5	1440	<0.05	10.3	4.3	1.31	0.14	<0.1	<0.005	0.01
10Z143A	0.006	0.23	2.17	8.3	290	0.75	0.15	0.06	1.05	12.85	20.3	142	0.52	81.8	3.15	5.49	0.08	0.8	0.026	0.49
10Z148A	<0.001	0.07	7.4	8	80	0.6	0.37	4.1	0.15	26.2	17.8	30	0.16	59	5.15	16.85	0.12	2.2	0.067	0.26
10Z148B	0.006	0.25	4.06	10.7	140	0.6	0.17	1.35	0.3	29.1	13.4	31	0.86	51.3	3.79	10.1	0.12	1.3	0.037	0.99
10Z151A	<0.001	0.03	0.34	4.9	60	0.1	0.18	0.01	<0.02	4	1.2	26	0.08	12.6	0.87	1.65	0.05	0.1	0.005	0.08
10Z178A	<0.001	0.02	0.47	4.5	240	0.18	0.21	0.01	<0.02	4.76	1.8	38	0.25	16.2	1.17	2.28	0.06	0.2	0.008	0.12
10Z182A	<0.001	0.03	0.28	5.6	120	0.1	0.18	0.02	<0.02	1.93	1.2	36	0.22	14	0.69	1.49	0.05	0.1	0.005	0.04

Sample Number	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th
	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10RN140A	29.5	4.5	0.97	77	1.89	0.31	5	4.9	410	27.4	95.2	0.004	0.35	14.05	16.4	4	57.7	21.7	0.3	0.91	5.3
10RN184A	12.2	4	0.36	37	4.01	0.01	3.7	23	720	9.4	41	<0.002	0.03	3.14	8.3	4	1	53.7	0.26	0.11	3.7
10RN251A	28.2	5.4	1.16	91	1.72	0.29	4	6.7	420	12.5	76.1	<0.002	0.27	4.69	15.1	5	39.7	19.9	0.22	0.41	5.1
10RN252A	27	17.1	1.43	125	1.49	0.08	4	16.8	1030	8.9	227	<0.002	0.77	2.95	19.8	3	39.1	23.8	0.21	0.67	5.8
10RN253A	28.6	3.4	1.23	54	1.87	0.42	4.2	5	220	44.8	23.7	<0.002	0.17	19.25	15.2	4	35.8	19.5	0.26	0.42	4.2
10RN254A	26	8	0.91	221	1.21	0.47	3.3	14.5	1100	52.8	70.1	<0.002	0.11	13.55	13.2	8	44	50.2	0.2	0.87	5.5
10RN255A	27.8	12.2	0.87	91	1.46	0.11	3.8	12.4	930	15.9	223	0.002	1.55	5.74	18.4	4	45.2	23.2	0.2	1.05	5.5
10RN255B	16.4	5.2	0.65	99	1.09	0.13	4	103.5	350	50.6	138.5	<0.002	>10.0	17.65	13	24	56.4	10.1	0.2	1.56	3.6
10RN256A	27.5	12.1	0.59	119	1.34	0.07	4.4	18.8	550	10	251	0.003	0.56	5.42	20.8	3	110	12.4	0.25	0.14	5.1
10RN257A	27.9	8.1	1.18	83	1.62	0.21	4.6	8.5	620	23.6	160.5	0.002	0.44	13.55	19.7	4	66.1	23.1	0.26	0.97	5.6
10RN258A	25	4.1	0.8	42	1.9	0.27	2.5	3.8	570	138.5	107.5	<0.002	0.45	31.5	16.9	6	84.9	49.2	0.13	1.03	5.8
10RN259A	31.3	6.3	0.62	59	2.57	0.18	3.6	7.4	670	36.9	163.5	0.002	0.46	17.5	21.3	4	79.3	33.1	0.19	0.71	9.6
10RN279A	0.5	1.7	0.02	190	0.3	0.01	0.5	3	40	43.6	2.3	<0.002	0.01	7.57	0.2	2	1.7	1.9	<0.05	<0.05	<0.2
10RN288A	2	6.6	0.07	74	2.08	0.01	0.8	6	330	2.2	8.7	<0.002	0.01	1.26	2	3	0.4	5.9	<0.05	0.05	0.8
10RN310C	2.3	5.2	0.88	1140	0.81	0.19	1.4	15.4	120	3.2	8.1	<0.002	0.01	1.09	3.8	1	0.4	124.5	0.05	<0.05	1
10RN315C	4.2	10.8	0.08	330	0.46	0.49	0.8	28.1	130	5.4	8.1	<0.002	<0.01	5.58	2.5	1	0.5	30.9	0.05	<0.05	0.8
10RN316C	3.8	5.2	0.03	289	0.4	0.02	0.8	9.8	60	12.2	2.8	<0.002	<0.01	2.39	1.5	1	0.2	9.5	<0.05	<0.05	0.3
10RN319C	2.4	4.9	0.05	294	0.36	0.12	0.8	14.9	70	6.5	6.7	<0.002	<0.01	2.35	1.8	1	0.2	16.2	<0.05	<0.05	0.6
10RN320A	1.5	2.6	0.51	153	0.13	5.84	0.6	24.5	180	2.5	10.1	<0.002	<0.01	0.09	1.6	1	0.4	769	<0.05	<0.05	<0.2
10Z021C	23	12.8	0.7	160	1.22	0.2	3.2	31.6	840	74	124	<0.002	0.16	4.23	15.5	6	11.6	26.5	0.21	8.65	5.2
10Z028B	12.9	41.3	1.72	1440	0.49	2.85	6.1	49.6	1190	5.9	31.2	<0.002	<0.01	19.8	21.8	1	1	122.5	0.37	<0.05	1.9
10Z031A	8	11.9	0.12	89	40.8	0.05	1.7	13	270	41.6	100.5	0.002	0.23	4.48	5.8	3	1.3	22.7	0.09	0.43	2.3
10Z032A	26.3	25.6	1.5	144	15.8	1.3	5.3	11.7	750	12.9	203	0.007	0.25	1.48	18.6	2	1.5	236	0.33	0.58	6.7
10Z036A	27.2	21.3	0.57	50	85.4	0.09	6.7	6.2	620	6.6	162	0.015	0.25	1.65	16.4	4	5.9	16.1	0.4	1.03	8
10Z037A	26.8	23.3	0.77	60	2.53	0.18	5.1	4.9	400	11	136.5	<0.002	0.12	1.49	15.3	1	4.1	19	0.32	0.44	5.8
10Z053D	1.1	31.9	0.04	485	0.41	0.06	0.2	2.6	30	14.9	1.4	<0.002	<0.01	2.46	0.9	1	0.2	403	<0.05	0.06	<0.2
10Z057C	<0.5	3.7	0.03	97	0.45	0.03	0.1	2.8	20	4.7	1.7	<0.002	<0.01	0.27	0.3	<1	0.2	2.6	<0.05	<0.05	<0.2
10Z073A	16	42.5	1.54	1080	0.5	2.27	6.2	51.9	820	6.3	23	<0.002	<0.01	1.22	22.9	2	0.8	121.5	0.36	0.06	1.8
10Z079A	13.5	37.6	1.64	921	0.93	2.49	6.7	53.1	710	8.6	27.5	<0.002	0.01	1.26	22.5	2	0.9	93.6	0.41	0.05	1.9
10Z101A	<0.5	0.6	21.2	790	0.17	0.01	0.1	2040	30	0.6	0.2	<0.002	<0.01	0.06	9.3	1	<0.2	2.7	<0.05	<0.05	<0.2
10Z112B	<0.5	5.8	2.3	585	0.14	<0.01	0.2	108	10	3.2	<0.1	<0.002	<0.01	0.15	1.3	1	0.2	6.6	<0.05	<0.05	<0.2
10Z122A	<0.5	1.4	21.9	649	0.19	<0.01	0.1	1930	10	<0.5	0.1	<0.002	<0.01	0.05	9.6	<1	<0.2	1.5	<0.05	<0.05	<0.2
10Z123B	5.6	2.9	2.01	1120	0.19	4.58	3.9	2.6	700	1.3	3.2	0.002	0.01	0.06	27.3	2	1.2	221	0.25	<0.05	0.7
10Z124A	<0.5	5.2	15.7	851	0.17	0.01	0.2	1055	20	<0.5	0.3	<0.002	0.06	1.18	8.2	1	<0.2	46.3	<0.05	<0.05	<0.2
10Z143A	6.3	10.9	0.13	1280	0.73	0.01	1.7	146	210	8.8	19.1	<0.002	<0.01	1.5	7.1	1	0.6	35.5	0.1	0.05	1.7
10Z148A	10.3	11.1	1.46	1310	0.93	3.36	3	12.6	660	5.6	3.9	0.002	0.12	0.2	22.5	1	0.9	91.1	0.18	0.1	2.4
10Z148B	12.3	9.9	1.07	850	2.52	1.07	2.8	20.1	1170	8.2	30.2	0.009	0.12	2.26	11.5	2	0.7	77.4	0.18	0.08	2.2
10Z151A	1	1.8	0.02	153	0.49	0.01	0.7	3.9	40	1.5	4	<0.002	<0.01	0.25	1.3	<1	0.2	4.8	<0.05	<0.05	0.3
10Z178A	1.6	2.4	0.05	127	0.52	0.02	1	6.4	90	1.4	7	<0.002	<0.01	0.36	1.4	<1	0.4	7.5	<0.05	<0.05	0.5
10Z182A	0.8	4.2	0.02	69	0.44	0.02	0.3	2.7	40	1.3	2.2	<0.002	<0.01	0.28	0.7	1	0.3	6	<0.05	<0.05	0.3

Sample Number	Ti	Tl	U	V	W	Y	Zn	Zr
	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10RN140A	0.219	0.72	1.6	145	189	6.4	8	67.3
10RN184A	0.166	0.35	5.2	71	1.2	13.5	21	45
10RN251A	0.176	0.55	1.5	138	37.7	6.5	5	60.2
10RN252A	0.171	1.84	1.6	183	18	9.2	10	76
10RN253A	0.205	0.18	1.6	128	68.9	6.3	6	53.6
10RN254A	0.162	0.52	1.4	128	77.3	8.2	32	46
10RN255A	0.168	1.51	1.8	169	53.7	9.4	10	79.4
10RN255B	0.144	1.09	1.4	125	63.3	9.4	13	50
10RN256A	0.207	1.42	1.6	192	22.4	7.3	15	76.2
10RN257A	0.205	1.04	1.7	165	110	8.5	7	81
10RN258A	0.141	0.7	1.3	150	35.9	6.6	4	60.7
10RN259A	0.141	1.79	1.8	154	106	6.7	5	70.4
10RN279A	0.005	0.03	<0.1	3	0.3	0.4	55	1.1
10RN288A	0.034	0.05	1.8	66	0.3	2.7	11	11
10RN310C	0.043	0.06	0.2	24	0.3	3.9	24	11.1
10RN315C	0.041	0.09	0.3	19	0.5	3.4	18	11.9
10RN316C	0.011	0.04	0.1	8	0.3	1.4	8	7.1
10RN319C	0.016	0.06	0.2	15	0.2	2	16	7.9
10RN320A	0.062	<0.02	<0.1	8	0.2	0.8	16	5.7
10Z021C	0.177	1.31	1.6	135	24.1	7.6	28	61.3
10Z028B	0.447	0.22	1.1	171	0.8	20.4	80	39.6
10Z031A	0.058	0.91	1.1	55	19.3	3.6	84	28.1
10Z032A	0.3	2.2	4.5	173	44.4	7.5	29	25.7
10Z036A	0.222	1.85	6.3	281	11.8	11.1	9	95.8
10Z037A	0.264	1.01	2.7	192	9.5	7.7	9	63.9
10Z053D	0.008	0.02	<0.1	5	0.1	4	3	1.2
10Z057C	0.007	0.02	<0.1	5	0.1	0.3	<2	1
10Z073A	0.447	0.11	0.7	155	0.9	17.9	75	34.3
10Z079A	0.449	0.14	0.7	154	1.4	14.5	78	38.2
10Z101A	<0.005	<0.02	0.1	35	0.1	0.2	47	<0.5
10Z112B	0.016	<0.02	<0.1	4	0.1	0.8	5	1.5
10Z122A	<0.005	<0.02	<0.1	36	0.2	0.5	36	<0.5
10Z123B	0.811	0.08	0.2	259	0.2	31.1	79	133
10Z124A	<0.005	<0.02	<0.1	30	<0.1	0.6	40	<0.5
10Z143A	0.108	0.11	1.5	105	0.4	8	120	33.2
10Z148A	0.388	0.04	0.6	147	0.4	20.6	77	70.7
10Z148B	0.271	0.23	3.6	173	0.6	19	67	45.7
10Z151A	0.015	0.03	0.2	8	0.1	0.8	2	4.7
10Z178A	0.021	0.03	0.3	10	0.2	1.3	7	8.4
10Z182A	0.011	0.03	0.1	6	0.1	0.8	2	4.5

Table 2. (continued)																				
Sample Number	Au	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf	In	K
	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%
10Z189A	<0.001	0.04	0.38	7.4	120	0.12	0.11	0.03	<0.02	2.16	1.5	34	0.21	17.1	1.04	1.61	<0.05	0.2	<0.005	0.06
10Z195D	<0.001	0.77	5.6	22.2	850	0.94	1.5	0.04	0.11	73.1	3.1	63	4.14	90.1	1.98	18.65	0.1	1.7	0.057	3.29
10Z198B	<0.001	1.19	4.97	486	490	0.96	7.11	0.02	0.64	29.9	11.3	60	7.57	968	22.6	21.3	0.39	0.5	0.171	2.09
10Z199A	<0.001	1.58	3.93	24.6	450	0.38	5.62	0.04	0.16	23.9	1.1	111	1.09	138.5	2.42	12.45	0.08	0.7	0.047	1.72
10Z202C	0.001	0.11	1.72	14.4	170	0.27	0.23	0.06	0.46	8.33	5.6	29	1.27	16	2.44	4.39	0.05	0.5	0.031	0.36
10Z207B	<0.001	0.09	7.24	9.2	340	1.2	0.44	1.73	0.05	49.4	22.6	83	3.21	30.5	5.13	18.2	0.13	2.2	0.052	1.54
10Z228B	0.05	3.42	4.68	2010	430	1.13	11.6	0.04	0.26	46.6	55.8	78	3.68	882	17.25	14.65	0.31	1	0.356	1.44
10Z239A	0.004	0.06	6.59	32.4	1090	0.88	0.19	0.78	0.07	33	18.4	81	2.23	37.2	4.25	13.95	0.11	1.8	0.053	1.07
10Z241A	0.001	0.61	2.56	20.3	180	0.35	0.56	3.24	0.15	11.55	7.3	38	0.72	76	3.3	5.56	0.06	0.7	0.033	0.33
10Z243A	<0.001	0.08	3.01	2.1	150	0.27	0.03	8	0.13	14.6	7.3	35	0.31	47	2.51	6.45	<0.05	1	0.02	0.24
10Z246C	0.272	1.48	6.44	7380	380	1.73	84.6	0.05	0.12	65.4	23.3	128	5.98	573	7.24	19.1	0.17	2.2	0.397	1.91

Sample Number	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb	Sc	Se	Sn	Sr	Ta	Te	Th
	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10Z189A	0.9	3.7	0.03	110	0.6	0.05	0.8	4.4	80	0.6	2.5	<0.002	<0.01	0.36	1.1	<1	0.2	15.5	<0.05	<0.05	0.3
10Z195D	38.8	18.9	0.41	84	4.72	0.15	6.2	6.9	340	24	173	<0.002	0.08	10.9	11.6	3	4.7	34.3	0.34	0.1	8.8
10Z198B	16.3	7.7	0.26	222	2.54	0.06	1.5	29.2	1680	116	95.8	0.002	0.2	72.7	14.6	4	3.6	10.8	0.06	0.95	1.3
10Z199A	11.2	9.9	0.21	81	41.4	0.07	1.9	3.8	290	48	62.3	<0.002	0.02	23.4	7.6	3	4.2	9.2	0.09	0.47	1.7
10Z202C	3.7	9.6	0.49	455	0.44	0.23	2.3	16.6	270	5.9	17.3	<0.002	<0.01	0.72	4.7	1	0.7	12.4	0.11	<0.05	1.1
10Z207B	22.1	37	2.16	1400	0.2	1.83	8.8	40.5	600	9	65	<0.002	<0.01	0.62	20	1	1.6	156	0.55	<0.05	7.6
10Z228B	24.5	8.8	0.49	654	1.92	0.17	1.6	86	2150	165	79.4	<0.002	0.1	47.4	13.9	8	39.2	20.8	0.07	1.34	6.9
10Z239A	14.1	20.8	0.7	967	1.52	2.19	5.5	29.9	760	7	28.7	<0.002	<0.01	13.3	18.4	1	0.9	140.5	0.32	0.05	2.5
10Z241A	5.4	14.1	0.66	928	1.22	0.95	2	14.7	390	9.4	12.7	<0.002	0.02	0.95	7.2	2	0.9	192.5	0.1	0.09	0.6
10Z243A	7.2	16.9	0.69	749	0.55	1.27	4.1	16.7	420	2.1	9.3	<0.002	0.02	0.15	8.6	2	0.6	1085	0.23	<0.05	1
10Z246C	32.7	22.5	0.46	265	1.28	0.12	5.4	51.9	1780	8.9	154	0.002	0.29	3.72	20.9	8	18.4	30.8	0.32	18.65	5.8

Sample Number	Ti	Tl	U	V	W	Y	Zn	Zr
	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm
10Z189A	0.017	0.04	0.2	10	0.2	1.4	6	6.8
10Z195D	0.172	1.37	2.2	137	7	7.9	73	65
10Z198B	0.126	0.8	1.5	130	14.6	6.8	1080	18.8
10Z199A	0.088	0.55	0.8	70	8.9	3.2	15	25.7
10Z202C	0.093	0.13	0.3	46	0.5	3.1	66	16.6
10Z207B	0.444	0.3	1.3	121	1	21.4	75	79.1
10Z228B	0.077	1.16	4	133	19.1	9.9	268	43.1
10Z239A	0.403	0.24	1.3	153	0.6	15.9	65	66.6
10Z241A	0.151	0.08	0.3	62	2.3	10.3	45	20.8
10Z243A	0.23	0.05	0.4	74	0.3	9.6	34	29.3
10Z246C	0.268	7.41	1.7	167	85.1	8.4	30	69.1

Table 3. Location and description of rocks collected for major- and minor-oxide and trace-element analyses in the Tolovana mining district, Livengood Quadrangle, Alaska

Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
2010GG089A	65.4640	-148.6718	422538	7261010	06N	<u>Anorthosite</u> : Medium-grained, white plutonic rock, equigranular, 2- to 3-mm-diameter crystals of subhedral plagioclase (greater than 95 percent) and localized scattered green minerals, possible secondary alteration by subhedral epidote (less than 5 percent). Cut by less than 1-mm-wide, deep-blue veinlets.
2010GG096A	65.4681	-148.6754	422382	7261465	06N	<u>Gabbro</u> : Coarse-grained plutonic texture, light gray to white weathered surfaces, grey and light green on fresh faces. 45 percent of the rock is composed of subhedral, 0.5- to 1.25-cm-long plagioclase crystals that are altered to a light-green color. The rest of the rock is a finer-grained, equigranular plutonic texture with 1-mm-diameter, subhedral plagioclase (20 percent) and subhedral mafic minerals (35 percent) mostly pyroxenes.
2010GG101A	65.4724	-148.6830	422045	7261959	06N	<u>Gabbro</u> : Weathered surfaces dark to light grey, fresh faces dark grey and white with localized zones of green. Medium-grained plutonic texture, with anhedral, 2- to 6-mm-long plagioclase (35 percent) and anhedral, finer-grained mafic minerals (65 percent). Cut by mm-scale veinlets in all directions.
2010GG106A	65.4770	-148.7057	421005	7262498	06N	<u>Gabbro</u> : Weathers light grey to white, fresh faces salt and peppered dark gray and white. Equigranular, grains 2- to 4-mm-diameter, plutonic texture, with 60 percent subhedral plagioclase and 40 percent anhedral mafic minerals. Some faces serpentized and/or chloritized.
2010LF040A	65.4593	-148.4735	431714	7260255	06N	<u>Gabbro</u> : Weathered and fresh surfaces are grey and white, with some orange iron oxide staining. Equigranular (2- to 3-mm-diameter crystals) plutonic texture, with 15 percent quartz, 40 percent feldspar, 15 percent biotite, and remaining 30 percent uncertain due to weathering.
2010LF097A	65.4389	-148.8935	412184	7258502	06N	<u>Gabbro</u> : Weathers dark grey, fresh color is medium greenish grey. Fine-grained plutonic texture with approximately 50 percent, dark-green, 0.5-mm-diameter, chloritized mafic minerals in a pale-green, 0.5-mm-diameter, feldspathic groundmass, with serpentized fractures.
2010LF114A	65.4228	-148.9585	409114	7256795	06N	<u>Monzonite</u> : Weathers tan and dark grey to black, fresh faces speckled with white, medium grey, and brown. Fine-grained plutonic texture of 40 percent, 2-mm- by 8-mm-diameter, subhedral feldspar, 20 percent, 1-mm-diameter, brown, subhedral pseudomorphs of mafic mineral(s), 5-10 percent, 0.5-mm-diameter, anhedral epidote, and 10 percent quartz.

Table 3. (continued)						
Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
2010LF121A	65.4186	-148.9874	407757	7256367	06N	<u>Porphyry</u> : Weathers grey, fresh faces grey with white phenocrysts, porphyritic texture, phenocrysts include 7 percent, 1.5-mm-diameter, euhedral quartz, 20 percent, 2-mm-diameter, euhedral feldspar, and 5 percent, 1.5-mm-diameter, black hornblende in a very fine-grained, grey groundmass.
2010LF123A	65.4187	-148.9925	407524	7256388	06N	<u>Rhyolite</u> : Weathers grey, fresh faces grey with white phenocrysts, porphyritic texture, phenocrysts include 10 percent, 1- to 3-mm-diameter K-feldspar and 10 percent, 1-mm-diameter, iron oxide-altered mafic mineral(s), in a very fine-grained, grey groundmass.
2010LF173A	65.4559	-148.9510	409574	7260479	06N	<u>Gabbro</u> : Weathers dark grey, fresh faces green and white. Fine-grained plutonic texture, with 45 percent, 0.5-mm-diameter, dark-green mafic mineral(s) and 55 percent plagioclase, cut by weak quartz-albite veinlets?
2010LF206A	65.4871	-148.9534	434418	7263950	06N	<u>Greenstone</u> : Weathers tan and dark to light grey, fresh faces dark green. Aphanitic texture, with about 1-2 percent, 0.5-mm-diameter plagioclase phenocrysts, chloritized.
2010MBW045A	65.3885	-148.4375	433199	7252318	06N	<u>Felsic Intrusive</u> : Weathers dark to light grey with a little orange, fresh faces white and pinkish. Porphyritic texture, phenocrysts include slightly altered, 1- to 2-mm-diameter, subhedral to euhedral biotite, 15 percent, clear, glassy quartz up to 3 mm in diameter, and K-feldspar. One fracture contains 1-cm-diameter patches of pyrite and likely chalcopyrite.
2010RN142A	65.4582	-148.7520	418803	7260464	06N	<u>Greenstone</u> : Weathers greenish-grey, fresh surfaces are light green. Aphanitic texture.
2010RN297A	65.4792	-148.6773	422326	7262709	06N	<u>Greenstone</u> : Weathers tan to rusty orange, fresh surfaces are dark greyish-green. Aphanitic texture.
2010RN322A	65.4989	-148.5376	428850	7264732	06N	<u>Gabbro</u> : Weathers grey, fresh surfaces are grey-green and white. Equigranular, 1- to 2-mm-diameter crystals, plutonic texture, with 30 percent plagioclase and 70 percent mafic minerals (pyroxenes).
2010Z022C	65.4320	-148.5524	427980	7257292	06N	<u>Porphyry</u> : Weathers yellowish to light brown, fresh faces light grey to greenish grey. Slightly porphyritic texture with light grey, glassy quartz phenocrysts averaging 1 mm in diameter.
2010Z215A	65.4889	-148.3699	436583	7263439	06N	<u>Gabbro</u> : Pale green color overall, non foliated, with 60 percent white feldspar and 40 percent dark mafic mineral(s).
2010Z225A	65.2876	-148.8770	412447	7241618	06N	<u>Quartz Monzonite</u> : Weathers light brown-tan, fresh faces white, black speckled. Feldspars up to 2.5 cm by 1 cm, quartz bearing, generally iron oxide stained.

Table 3. (continued)						
Sample Number	Latitude	Longitude	UTM E	UTM N	Zone	Description
2010Z226A	65.2874	-148.8738	412595	7241591	06N	<u>Quartz Monzonite:</u> Weathers light brown-tan, fresh faces white, black speckled. Feldspars up to 2.5 cm by 1 cm, quartz bearing, generally iron oxide stained.
2010Z227A	65.2630	-148.9261	410075	7238944	06N	<u>Quartz Monzonite:</u> Weathers light brown-tan, fresh faces white, black speckled. Feldspars up to 2.5 cm by 1 cm, quartz bearing, generally iron oxide stained.

Table 4: Whole-rock analyses including major-oxide, minor-oxide and trace-element for rocks collected in the Tolovana mining district, Livengood Quadrangle, Alaska.																				
Sample Number	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	Cr2O3	TiO2	MnO	P2O5	SrO	BaO	LOI	Total	Nb	Rb	Sr	Y	Zr
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm
2010GG089A	42.53	28.62	1.24	14.14	3.19	0.37	3.88	0.02	0.04	0.03	0.013	0.03	0.04	5.59	99.74	<2	2	97	8	<2
2010GG096A	47.57	18.24	8.43	10	5.44	3.19	1.35	0.02	1.23	0.15	0.099	0.05	0.01	3.15	98.92	51	146	33	82	619
2010GG101A	46.91	15.55	4.78	13.12	12.44	1.7	0.12	0.18	0.16	0.08	0.017	0.01	<0.01	4.6	99.67	92	253	12	104	1245
2010GG106A	54.94	17.94	3.66	8.76	5.07	5.54	0.29	0.04	0.25	0.07	0.012	0.02	<0.01	3.18	99.76	114	217	18	124	1780
2010LF040A	63.42	16.19	4.81	4.39	1.79	3.7	2.93	0.01	0.68	0.09	0.233	0.09	0.16	0.75	99.24	14	126	838	33	211
2010LF097A	53.16	15.13	8.96	8.61	5.66	4.93	0.21	0.02	0.67	0.15	0.097	0.08	0.11	2.07	99.86	8	115	440	28	156
2010LF114A	59.9	15.45	8.28	0.22	0.37	4.67	5.78	<0.01	0.7	0.19	0.084	0.01	0.03	2.48	98.17	37	234	970	64	274
2010LF121A	70.12	13.04	4.1	0.07	0.2	3.51	5.36	<0.01	0.27	0.09	0.026	0.01	0.08	1.82	98.7	44	243	961	67	252
2010LF123A	70.24	13.49	4.54	0.02	0.2	4.34	4.65	0.01	0.3	0.08	0.029	0.01	0.07	1.8	99.78	52	259	845	67	271
2010LF173A	51.19	14.83	11.75	9.2	4.42	4.29	0.48	0.01	0.85	0.2	0.109	0.06	0.02	1.61	99.01	12	95	303	29	150
2010LF206A	47	15.51	12.91	7.72	6.79	3.33	0.86	0.03	1.81	0.22	0.177	0.02	<0.01	3.55	99.92	<2	2	61	7	2
2010MBW045A	69.07	15.36	1.79	2.22	0.75	3.53	3.44	<0.01	0.35	0.04	0.113	0.05	0.13	2.52	99.37	<2	47	209	11	7
2010RN142A	39.79	14.77	12.58	18.12	7.2	0.13	0.04	0.01	0.85	0.22	0.082	0.01	0.01	4.8	98.61	2	19	428	27	96
2010RN297A	52.73	15.14	11.11	5.63	4.06	5.73	0.16	0.01	0.82	0.17	0.094	0.02	<0.01	2.82	98.49	<2	7	552	20	87
2010RN322A	51.12	16.12	9.79	7.97	4.83	5.06	0.12	0.01	0.81	0.16	0.108	0.04	<0.01	2.67	98.81	2	9	73	39	111
2010Z022C	58.63	14.92	3.68	4.73	2.02	2.96	2.64	<0.01	0.56	0.09	0.213	0.04	0.07	7.99	98.54	<2	3	662	16	90
2010Z215A	50.58	15.09	9.89	9.63	6.23	3.82	0.22	0.03	0.81	0.17	0.108	0.04	0.02	1.9	98.53	<2	<2	24	20	41
2010Z225A	55.99	16.54	7.35	4.8	2.83	3.24	4.6	0.01	1.09	0.15	0.691	0.11	0.24	1.07	98.7	<2	3	89	23	46
2010Z226A	57.19	16.75	6.85	4.69	2.59	3.33	4.93	<0.01	1.03	0.13	0.674	0.11	0.25	0.75	99.28	<2	3	318	21	76
2010Z227A	59.77	16.31	5.74	4.06	2.22	3.54	4.91	0.01	0.87	0.1	0.517	0.09	0.19	0.41	98.74	<2	3	354	18	71

Table 5: Detection limits for geochemical analyses. Analytical methods include: ICP-MS = Inductively Coupled Plasma-Mass Spectrometry, ICP-AES = Inductively Coupled Plasma Atomic Emission Spectroscopy Digestions include: 4 acid = HNO₃-HClO₄-HF + HCl; FA = Fire Assay for Au only

NOTE: * = possibly incomplete digestion dependent on mineralogy;

** = Volatilization during fuming may result in some loss of certain elements.

		ALS CHEMEX			
Element	Units	Lower Detection Limit	Upper Detection Limit	Analytical Method	Digestion
Au	ppm	0.001	10	FA-ICP-AES	Fire Assay
Ag	ppm	0.01	100	ICP-MS&AES	4 Acid
Al*	%	0.01	50	ICP-MS&AES	4 Acid
As**	ppm	0.2	10,000	ICP-MS&AES	4 Acid
Ba*	ppm	10	10,000	ICP-MS&AES	4 Acid
Be*	ppm	0.05	1,000	ICP-MS&AES	4 Acid
Bi	ppm	0.01	10,000	ICP-MS&AES	4 Acid
Ca	%	0.01	50	ICP-MS&AES	4 Acid
Cd	ppm	0.02	1,000	ICP-MS&AES	4 Acid
Ce	ppm	0.01	500	ICP-MS&AES	4 Acid
Co	ppm	0.1	10,000	ICP-MS&AES	4 Acid
Cr*	ppm	1	10,000	ICP-MS&AES	4 Acid
Cs	ppm	0.05	500	ICP-MS&AES	4 Acid
Cu	ppm	0.2	10,000	ICP-MS&AES	4 Acid
Fe*	%	0.01	50	ICP-MS&AES	4 Acid
Ga	ppm	0.05	500	ICP-MS&AES	4 Acid
Ge	ppm	0.05	500	ICP-MS&AES	4 Acid
Hf*	ppm	0.1	500	ICP-MS&AES	4 Acid
In	ppm	0.005	500	ICP-MS&AES	4 Acid
K	%	0.01	10	ICP-MS&AES	4 Acid
La	ppm	0.5	10,000	ICP-MS&AES	4 Acid
Li	ppm	0.2	10,000	ICP-MS&AES	4 Acid
Mg*	%	0.01	50	ICP-MS&AES	4 Acid
Mn*	ppm	5	100,000	ICP-MS&AES	4 Acid
Mo	ppm	0.05	10,000	ICP-MS&AES	4 Acid
Na	%	0.01	10	ICP-MS&AES	4 Acid
Nb	ppm	0.1	500	ICP-MS&AES	4 Acid
Ni	ppm	0.2	10,000	ICP-MS&AES	4 Acid
P	ppm	10	10,000	ICP-MS&AES	4 Acid
Pb	ppm	0.5	10,000	ICP-MS&AES	4 Acid
Rb	ppm	0.1	10,000	ICP-MS&AES	4 Acid
Re	ppm	0.002	50	ICP-MS&AES	4 Acid
S	%	0.01	10	ICP-MS&AES	4 Acid
Sb**	ppm	0.05	10,000	ICP-MS&AES	4 Acid
Sc	ppm	0.1	10,000	ICP-MS&AES	4 Acid
Se	ppm	1	1,000	ICP-MS&AES	4 Acid
Sn*	ppm	0.2	500	ICP-MS&AES	4 Acid

Table 5 (cont.)

Element	Units	Lower Detection Limit	Upper Detection Limit	Analytical Method	Digestion
Sr	ppm	0.2	10,000	ICP-MS&AES	4 Acid
Ta*	ppm	0.05	100	ICP-MS&AES	4 Acid
Te	ppm	0.05	500	ICP-MS&AES	4 Acid
Th	ppm	0.2	10,000	ICP-MS&AES	4 Acid
Ti	%	0.005	10	ICP-MS&AES	4 Acid
Tl	ppm	0.02	10,000	ICP-MS&AES	4 Acid
U	ppm	0.1	10,000	ICP-MS&AES	4 Acid
V	ppm	1	10,000	ICP-MS&AES	4 Acid
W*	ppm	0.1	10,000	ICP-MS&AES	4 Acid
Y	ppm	0.1	500	ICP-MS&AES	4 Acid
Zn	ppm	2	10,000	ICP-MS&AES	4 Acid
Zr*	ppm	0.5	500	ICP-MS&AES	4 Acid

Table 6: Detection limits for major-oxide and minor-oxide analyses. Analytical methods include: LBF-XRF = Lithium borate fusion and X-ray fluorescence spectroscopy. PP-XRF = Pressed-pellet X-ray fluorescence spectroscopy.

Note: Fe2O3 = total iron as Fe2O3; LOI* = loss on ignition; --- = not applicable.

		ALS CHEMEX		
Element	Units	Lower Detection Limit	Upper Detection Limit	Analytical Method
SiO2	%	0.01	100	LBF-XRF
Al2O3	%	0.01	100	LBF-XRF
Fe2O3	%	0.01	100	LBF-XRF
CaO	%	0.01	100	LBF-XRF
MgO	%	0.01	100	LBF-XRF
Na2O	%	0.01	100	LBF-XRF
K2O	%	0.01	100	LBF-XRF
Cr2O3	%	0.01	100	LBF-XRF
TiO2	%	0.01	100	LBF-XRF
MnO	%	0.01	100	LBF-XRF
P2O5	%	0.001	100	LBF-XRF
SrO	%	0.01	100	LBF-XRF
BaO	%	0.01	100	LBF-XRF
LOI*	%	0.01	100	Gravimetric
Total	%	---	---	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