USGS
science for a changing world

Aqueous Geochemical Data from the Analysis of Stream-Water Samples Collected in June and August 2008—Taylor Mountains 1:250,000- and Dillingham D4 1:63,360-Scale Quadrangles, Alaska

Open-File Report 2011–1100

U.S. Department of the Interior
U.S. Geological Survey

Aqueous Geochemical Data from the Analysis of Stream-Water Samples Collected in June and August 2008—Taylor Mountains 1:250,000- and Dillingham D-4 1:63,360-Scale Quadrangles, Alaska

By Bronwen Wang, Victoria Owens, Elizabeth Bailey, and Greg Lee

Open-File Report 2011–1100

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2011

Suggested citation:
Wang, Bronwen, Owens, Victoria, Bailey, Elizabeth, and Lee, Greg, 2011, Aqueous geochemical data from the analysis of stream-water samples collected in June and August 2008—Taylor Mountains 1:250,000- and Dillingham D-4 1:63,360-scale quadrangles, Alaska: U.S. Geological Survey Open-File Report 2011–1100, 20 p.

Contents

Figures

Tables

Conversion Factors and Datums

Conversion Factors

Multiply	By	To obtain
kilometer (km)	0.6214	mile (mi)
liter (L)	33.82	ounce, fluid (fl. oz)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8×°C)+32.$$

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

Datums

Vertical coordinate information is referenced to the North American Vertical Datum of 1927 (NAVD 27).

Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Aqueous Geochemical Data from the Analysis of Stream-Water Samples Collected in June and August 2008—Taylor Mountains 1:250,000- and Dillingham D-4 1:63,360-Scale Quadrangles, Alaska

By Bronwen Wang, Victoria Owens, Elizabeth Bailey, and Greg Lee

Abstract

We report on the chemical analysis of water samples collected from the Taylor Mountains 1:250,000- and Dillingham D-4 1:63,360-scale quadrangles, Alaska. Reported parameters include pH, conductivity, water temperature, major cation and anion concentrations, and trace-element concentrations. We collected the samples as part of a multiyear U.S. Geological Survey project entitled "Geologic and Mineral Deposit Data for Alaskan Economic Development." Data presented here are from samples collected in June and August 2008. Minimal interpretation accompanies this data release. This is the fourth release of aqueous geochemical data from this project; data from samples collected in 2004, 2005, and 2006 were published previously. The data in this report augment but do not duplicate or supersede the previous data releases. Site selection was based on a regional sampling strategy that focused on first- and second-order drainages. Water sample sites were selected on the basis of landscape parameters that included physiography, wetland extent, lithological changes, and a cursory field review of mineralogy from pan concentrates. Stream water in the study area is dominated by bicarbonate (HCO_3^-), although in a few samples more than 50 percent of the anionic charge can be attributed to sulfate (SO_4^{2-}). The major-cation chemistry of these samples ranges from Ca^{2+}-Mg^{2+} dominated to a mix of Ca^{2+}-Mg^{2+}-Na^++K^+. In most cases, analysis of duplicate samples showed good agreement for the major cation and major anions with the exception of the duplicate samples at site 08TA565. At site 08TA565, Ca, Mg, Cl, and $CaCO_3$ exceeded 25 percent and the concentrations of trace elements As, Fe and Mn also exceeded 25 percent in this duplicate pair. Chloride concentration varied by more than 25 percent in 5 of the 11 duplicated samples. Trace-element concentrations in these samples generally were at or near the detection limit for the method used and, except for Co at site 08TA565, generally good agreement was determined between duplicate samples for elements with detectable concentrations. Major-ion concentrations were below detection limits in all field blanks, and the trace-element concentrations also were generally below detection limits; however, Co, Mn, Na, Zn, Cl, and Hg were detected in one or more field blank samples.

Introduction

Geological, geochemical, and geophysical data are important for the evaluation of mineral resources. In Alaska, even at a reconnaissance scale of 1:250,000, adequate data are available for less than one-half of the state to assess the undiscovered mineral resource potential. Government agencies and private industry have requested the collection of new geological data and in response the U.S. Geological Survey (USGS) initiated the "Geologic and Mineral Deposit Data for Alaskan Economic Development" project with the goal of obtaining geological and geoenvironmental data for a poorly know region of the state.

Southwestern Alaska, which includes the Taylor Mountains quadrangle (fig. 1), is a region where minimal geologic data are available; however, based on the limited data and known mineral prospects, the region is thought to have a high potential for undiscovered mineral resources (Miller and others, 2006). Water data are especially helpful for geoenvironmental assessment and hence were collected during the course of the project. This is the fourth release of aqueous geochemical data from this project; the 2004, 2005, and 2006 aqueous geochemical data were released previously (Wang and others, 2006a; Wang and others, 2006b; Wang and others, 2011). Data in this report augment, but do not duplicate or supersede, the previous data releases and only minimal interpretation is provided herein.

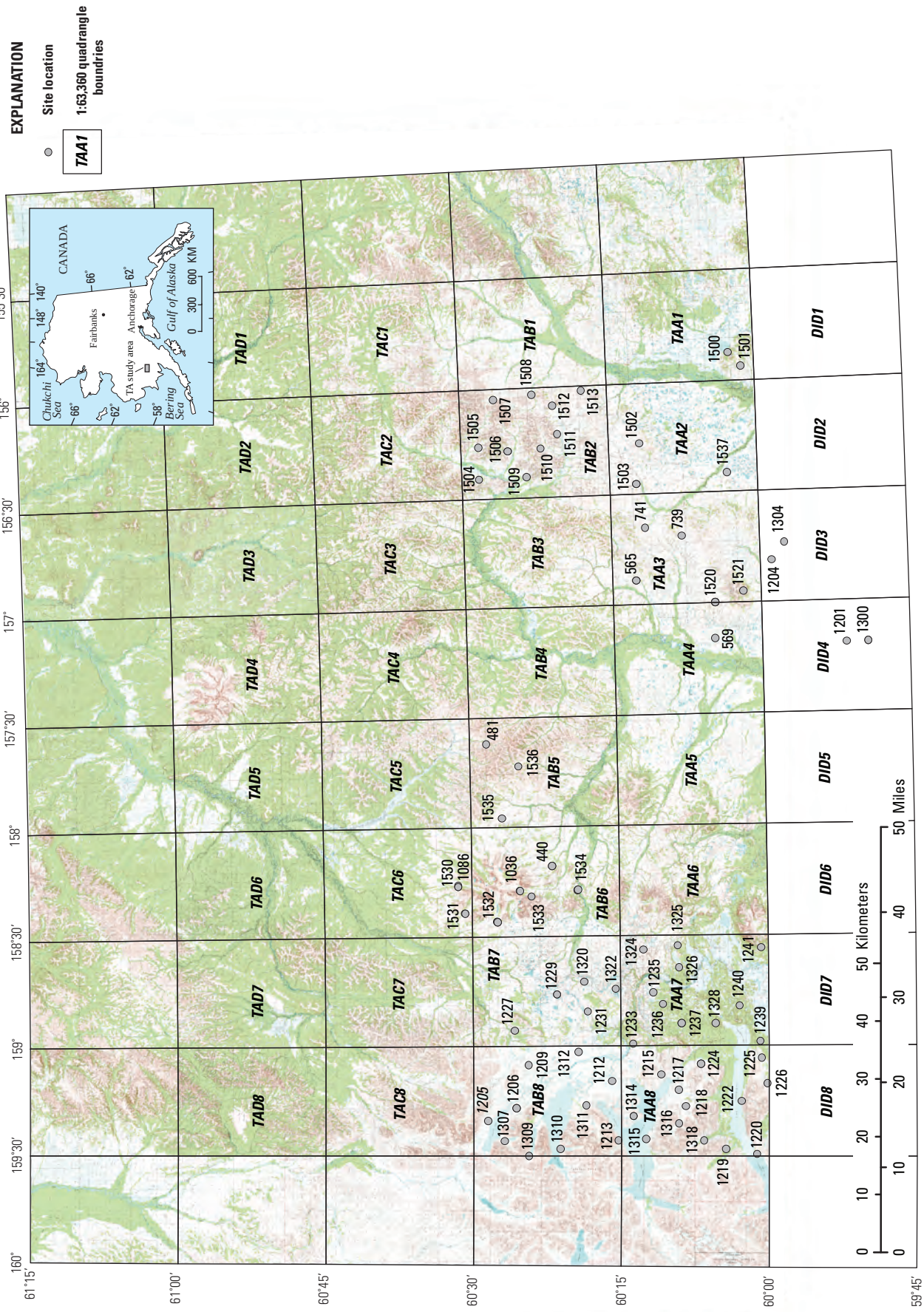

Figure 1. Location of stream-water sites in the Taylor Mountains (TA) and Dillingham D-4 quadrangles, Alaska, 2008.

Methods

The stream-water sampling sites (fig. 1) are a subset of sites used for sediment sampling for the overall project. Site selection was based on a regional sampling strategy that focused on first- and second-order streams. Water sampling site selection also was based on landscape parameters that included physiography, wetland extent, lithological changes, and a cursory field review of the mineralogy in the pan-concentrate samples. Stream pH, conductivity, and temperature were measured on site. All three of these values were measured directly in the stream using standard pH meters, conductivity meters, and submersible thermometers, respectively. The pH meters were calibrated daily using a three-point calibration (pH 4, 7, 10), and pH standards were used in the field to monitor the performance of the pH probe. The conductivity meters were checked and calibrated daily using a 1,430 µS/cm standard. Sites 1086, 1530, 1531, 1532, 1533, and 1534 (fig. 1) were sampled in June and August 2008.

Dip-composite water samples were collected using telfon collection bottles. The collection bottles were cleaned in a boiling nitric-acid bath prior to field deployment (Olson and DeWild, 1999). In the field, the sample bottles were carried in the samplers' backpacks and capped in a clean plastic-resealable bag. The sample collection bottle was rinsed with copious amounts of native water prior to sample collection. Sampling consisted of dipping the collection bottle at several locations across the stream, upstream of all other sampling activities. Samplers wore disposable gloves during the sample collection and processing. Water samples for major- and trace-element analysis were filtered immediately after collection through a 0.45 µm capsule filter, using a peristaltic pump, into high density polyethylene bottles. Samples for major cation (Ca^{2+}, Mg^{2+}, K^{+}, Na^{+}) and trace-element analysis were preserved with 0.5 mL of ultra-high-purity concentrated nitric acid (HNO_3). Samples analysed for alkalinity and major anions (SO_4^{2-}, Cl^{-}, F^{-}, NO_3^{-}) analysis were filtered, but not acidified. A single sample was collected for low-level total- and methyl-mercury analysis. The mercury samples were collected as described previously; however, the total- and methyl-mercury samples were not filtered and were simply transferred from the collection bottle to a sterile polyethylene terephthalate copolyester (PETG) bottle. PETG bottles are appropriate for low-level mercury analysis (David Kabbenhoft, U.S. Geological Survey, oral commun. 2005). The mercury samples are preserved using 5 mL of 5 percent mercury-free HCl. The mercury samples were refrigerated and then shipped on ice to the USGS Wisconsin Science Center Mercury Research Laboratory in Middleton, Wis., for analysis.

Samples submitted for major- and trace-element analysis were shipped to the USGS Minerals Program Denver laboratories. Major cations (Ca^{2+}, Mg^{2+}, K^{+}, Na^{+}) and trace element concentrations were determined by inductively coupled plasma mass spectrometry (ICP-MS) (Lamothe and others, 2002), and major anions (SO_4^{2-}, Cl^{-}, F^{-}, NO_3^{-}) were determined by ion chromatography (IC) (Theodorakos and others, 2002). Alkalinity was determined using a preset endpoint (pH 4.5) autotitration system (Theodorakos, 2002). Laboratory procedures require instrument calibration using an appropriate standard and analysis of standard reference materials where appropriate. Laboratory instrument calibration and quality control procedures are: (1) hardware and software are checked daily to insure proper functioning of the instrument and its components; (2) instruments are calibrated using standards that contain all reported elements; (3) analysis of standard reference materials (SRM); (4) samples are analyzed with every 10th sample in a calibration check solution (that is, a calibration standard run as a sample); (5) after every 20 samples, the instrument is recalibrated and SRMs are analyzed; and (6) each group of samples concludes with a SRM analysis (P.J. Lamothe, U.S. Geological Survey, oral commun., 2005). SRMs were obtained from the USGS Water Resource Discipline and information regarding these reference materials is available at http://bqs.usgs.gov/SRS/.

Elements determined by ICP-MS and IC are censored to the lower limit of determination (LLD) for the method as determined in Lamothe and others (2002) and Theodorakos and others (2002). The LLD of the method is defined as 5-times the standard deviation of the instrument response on a blank solution. Values below the LLD are reported as less than the LLD. In some instances, the LLD has changed since the methods were published. LLD values used in this data release are given in table 1. Because instrument and matrix interferences vary, the data may have been censored by the analyst to a higher limit than the method LLD.

Mercury concentrations were determined using cold-vapor atomic-fluorescence spectrometry (Olson and DeWild, 1999; DeWild and others, 2002). Laboratory procedures for ensuring quality of total and methyl-mercury data are given in Olson and DeWild (1999). Method performance and method detection limits for total and methyl-mercury are given in Olson and DeWild (1999) and DeWild and others (2002). The uncertainty assignment information for the alkalinity determination method is given in Theodorakas (2002).

The analytical data are stored in the USGS National Geochemical Database maintained by the Minerals Program in Denver, Colo. (contact Dave Smith), and the USGS Wisconsin Science Center Mercury Research Laboratory database (contact John DeWild). Data in appendixes A and B of this report are the complete analytical data available for these samples.

Data Summary

Major- and trace-element data are summarized in tables 1 and 2 (at back of report), and the complete analytical data are presented in the appendixes. Of the trace elements analyzed, Ag, Be, Bi, Ga, Ge, Lu, Mo, Th, and Tl were not detected in the water samples. Minimum and maximum concentrations,

mean, and median values of the elements in water are given in table 1; however, summary statistics were not calculated if the number of qualified values exceeded 25 percent of the samples. For elements that have qualified values, summary statistics were calculated using the Kaplan-Meier method for censored data as detailed in Helsel (2005).

The major anion chemistry of the samples collected in 2008 from the Taylor Mountains quadrangle and Dillingham D-4 is dominated by bicarbonate (HCO_3^-), calculated from the alkalinity measurements, although in a few samples more than 50 percent of the anionic charge can be attributed to sulfate (SO_4^{2-}). The major-cation chemistry ranges from Ca^{2+}-Mg^{2+}-dominated water to a mix of Ca^{2+}-Mg^{2+}-Na^++K^+ water (fig. 2).

Duplicate samples were collected for trace-element and major-ion analysis at sites 08TA1300, 08TA565, 08TA1206, 08TA1314, 08TA1224, 08TA1237, 08TA1503, 08TA1506, 08TA1522, 08TA1532, 08TA440 (table 2). Duplicate samples were collected for total mercury at sites 08TA1300 and 08TA1503 . Most duplicates showed good agreement for the major cation and major anions; however, varitions in Ca, Mg, $CaCO_3$, and Cl were greater than 25 percent in the duplicate samples collected at site 08TA565. Concentrations of trace elements As, Fe, and Mn also varied by more than 25 percent in this duplicate pair. Chloride concentration varied by more than 25 percent in 5 of the 11 duplicated sites (table 2). Many trace elements were at or near the detection limit of the method used in these samples and with the exception of Co at site 08TA565, good agreement was found between duplicate samples for elements with detectable concentrations. Duplication of Co concentrations was systematically poor (greater than or equal to 25 percent in 10 of 11 duplicate pairs, table 2). Major-ion concentrations were less than detection in all field blanks, and the trace-element concentrations also were generally below detection limits; however, Na, Cl, Co, Mn, Zn, and Hg were detected in one or more field blank samples (table 2).

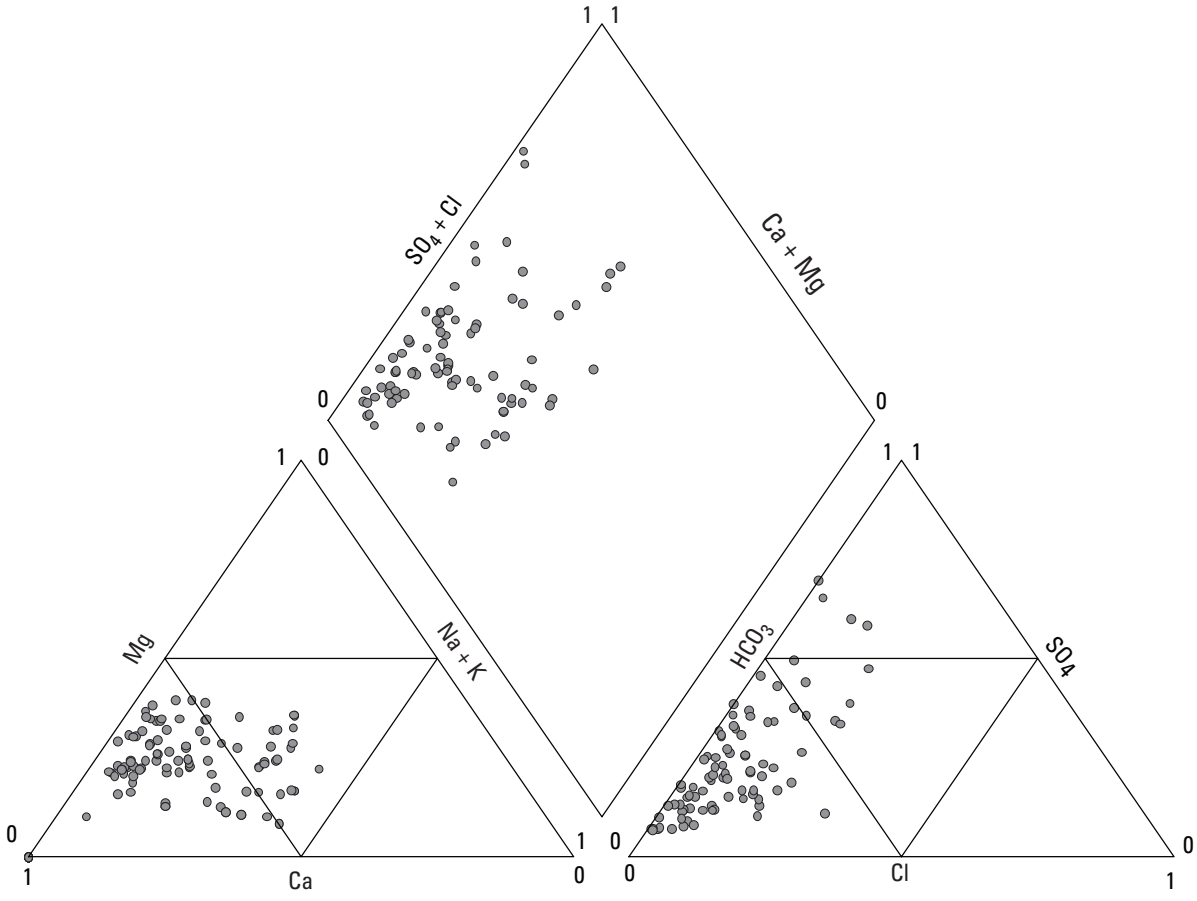

Figure 2. The range of major-ion ratios in stream-water samples collected from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.

References Cited

DeWild, J.F., Olson, M.L., and Olund, S.D., 2002, Determination of methyl mercury by aqueous phase ethylation, followed by gas chromatographic separation with cold vapor atomic fluorescence detection: U.S. Geological Survey Open-File Report 01-445, 14 p., accessed July 1, 2010, at http://pubs.usgs.gov/of/2001/ofr-01-445/.

Helsel, D.R., 2005, Nondetects and data analysis: Wiley-Interscience, Hoboken, New Jersey, 250 p.

Lamothe, P.J., Meier, A.L., and Wilson, S.A., 2002, The determination of forty four elements in aqueous samples by inductively coupled plasma-mass specrtometry, *in* Taggart, J.E. ed., Analytical methods for chemical analysis of geologic and other materials, U.S. Geological Survey: U.S. Geological Survey Open-File Report 02-223, p. H-1–H-11, accessed July 1, 2010, at http://pubs.usgs.gov/of/2002/ofr-02-0223/H21&23OFR99-151_M.pdf.

Miller, M.L., Bailey, E.A., Beischer, G.A., Bradley, D.C., Bundtzen, T.K., Goldfarb, R.J., Karl, S.M., Saltus, R.W., and Wang, Bronwen, 2006, USGS mineral resource studies in the Taylor Mountains quadrangle, southwestern Alaska—New "AMRAP": Journal of the Alaska Miners Association, v. 34, no. 2, p. 1-15.

Olson, M.L., and DeWild, J.F., 1999, Low-level collection techniques and species-specific analytical methods for mercury in water, sediment, and biota: U.S. Geological Survey Water Resources Investigations 99-4018-B, 11 p.

Theodorakos, P.M., 2002, Determination of total alkalinity using a preset endpoint (pH 4.5) autotitration system, *in* Taggart, J.E. ed., Analytical methods for chemical analysis of geologic and other materials, U.S. Geological Survey: U.S. Geological Survey Open-File Report 02-223, p. E-1–E-3, accessed July 1, 2010, at http://pubs.usgs.gov/of/2002/ofr-02-0223/E04PresetEndpoint_M.pdf.

Theodorakos, P.M., d'Angelo, W.M., Ficklin, W.H., 2002, Floride, chloride, nitrate, and sulfate in aqueous solutions utilizing AutoSuppression chemically suppressed ion chromatography, *in* Taggart, J.E., ed., Analytical methods for chemical analysis of geologic and other material, U.S. Geological Survey: U.S. Geological Survey Open-File Report 02-223, p. V-1–V-7, accessed July 1, 2010, at http://pubs.usgs.gov/of/2002/ofr-02-0223/OFR-02-0223.pdf.

Wang, Bronwen, Mueller, Seth, Bailey, Elizabeth, Lee, Greg, 2006a, Aqueous geochemical data from the analysis of stream water samples collected in August 2004—Taylor Mountains 1:250,000-scale quadrangle, Alaska: U.S. Geological Survey Open-File Report 2006-1175, 7 p., accessed July 1, 2010, at http://pubs.usgs.gov/of/2006/1175/.

Wang, Bronwen, Mueller, Seth, Stetson, Sarah, Bailey, Elizabeth, Lee, Greg, 2006b, Aqueous geochemical data from the analysis of stream-water samples collected in June and July 2005—Taylor Mountains 1:250,00 scale quadrangle, Alaska: U.S. Geological Survey Open-File Report 2006-1361, 5 p., accessed July 1, 2010, at http://pubs.usgs.gov/of/2006/1361/.

Wang, Bronwen, Mueller, Seth, Stetson, Sarah, Bailey, Elizabeth, Lee, Greg, 2011, Aqueous geochemical data from the analysis of stream water samples collected in June and July 2006—Taylor Mountains 1:250,00-scale quadrangle, Alaska: U.S. Geological Survey Open-File Report 2011-1011, 10 p., accessed February 10, 2011, at http://pubs.usgs.gov/of/2011/1011/.

This page intentionally left blank

Tables

Table 1. Summary statistics for parameters measured in water samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.

[**Abbreviations:** µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; NA, not applicable; Hg, mercury; –, not calculated (censored value exceeded 25 percent, total and methyl mercury were measured only on a subset of site and summary statistics were not calculated); <, less than]

Parameter	Lower limit of determination	Minimum	Maximum	Mean	Standard deviation	Median	Interquartile range
Conductivity, µS/cm	NA	1.6	2,770	87.3	290.1	50.6	60
pH	NA	2.3	9.6	7.059	0.9145	7.01	0.79
Water Temperature, °C	NA	0.9	101.2	7.7	10.6	6.8	4.3
Concentrations are in mg/L							
Calcium, Ca	0.2	0.72	29.5	6.4	5.0	5.04	7.3
Potassium, K	0.03	0.09	0.52	0.17	0.08	0.20	0.10
Magnesium, Mg	0.01	0.09	7.56	1.72	1.42	1.37	1.87
Sodium, Na	0.5	0.5	3.2	1.3	0.7	1.1	1.1
Alkalinity, $CaCO_3$[1]		4	53	20	12	18	18
Chlorine, Cl	0.05	<0.08	5.30	1.13	0.74	1.40	1.10
Fluorine, F	0.01	<0.08	0.30	0.09	0.03	0.08	0.01
Nitrate, NO_3	0.08	<0.08	3.5	–	–	–	–
Sulfate, SO_4	0.05	<2	49	8.55	8.3	6.0	7.5
Phosphorous, P	0.01	<0.01	0.04	0.02	0.01	0.01	0.01
Silicon dioxide, SiO_2	0.2	2.8	14.1	6.3	2.9	5.8	4.1
Concentrations are in µg/L							
Silver, Ag	3	<1	<1	–	–	–	–
Aluminum, Al	2	<2	168	23.53	26	15	21
Arsenic, As	1	<1	86	–	–	–	–
Barium, Ba	0.2	1.2	28.6	5.7	4.9	3.9	4.1
Beryllium, Be	0.05	<0.05	<0.05	–	–	–	–
Bismuth, Bi	0.2	<0.2	<0.2	–	–	–	–
Cadmium, Cd	0.02	<0.02	<0.02	–	–	–	–
Cerium, Ce	0.01	<0.01	0.39	–	–	–	–
Cobalt, Co	0.02	0.03	5.02	0.83	0.83	0.56	1.04
Chromium, Cr	1	<1	<1	–	–	–	–
Cesium, Cs	0.02	<0.02	0.14	–	–	–	–
Copper, Cu	0.5	<0.5	1.4	–	–	–	–
Dysprosium, Dy	0.005	<0.005	0.070	–	–	–	–
Erbium, Er	0.005	<0.005	0.040	–	–	–	–
Europium, Eu	0.005	<0.005	0.020	–	–	–	–
Iron, Fe	50	<50	2,600	–	–	–	–
Gallium, Ga	0.05	<0.05	<0.05	–	–	–	–
Gadolinium, Gd	0.005	<0.005	0.074	–	–	–	–
Germanium, Ge	0.05	<0.05	<0.05	–	–	–	–
Holmium, Ho	0.005	<0.005	0.010	–	–	–	–
Lanthanum, La	0.01	<0.01	0.16	–	–	–	–
Lithium, Li	0.100	<0.100	2.700	0.953	0.560	0.800	0.850
Lutetium, Lu	<0.1	<0.1	<0.1	–	–	–	–
Manganese, Mn	0.20	<0.20	56.40	8.66	12.14	3.90	6.88
Molybdenum, Mo	2	<2	<2	–	–	–	–
Niobium, Nb	0.2	<0.2	<0.2	–	–	–	–
Neodymium, Nd	0.01	<0.01	0.27	–	–	–	–
Nickel, Ni	0.4	<0.4	1.4	–	–	–	–
Lead, Pb	0.05	<0.05	0.10	–	–	–	–
Praesodynium, Pr	0.01	<0.01	0.06	–	–	–	–
Rubidium, Rb	0.01	0.04	0.69	0.20	0.12	0.15	0.14

Table 1. Summary statistics for parameters measured in water samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[**Abbreviations:** µS/cm, microsiemens per centimeter; °C, degrees Celsius; mg/L, milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; NA, not applicable; Hg, mercury; –, not calculated (censored value exceeded 25 percent, total and methyl mercury were measured only on a subset of site and summary statistics were not calculated); <, less than]

Parameter	Lower limit of determination	Minimum	Maximum	Mean	Standard deviation	Median	Interquartile range
Concentrations are in µg/L—Continued							
Antimony, Sb	0.3	<0.3	<0.3	–	–	–	–
Scandium, Sc	0.6	<0.6	1	–	–	–	–
Selenium, Se	1	<1	<1	–	–	–	–
Samarium, Sm	0.01	<0.01	0.06	–	–	–	–
Strontium, Sr	0.50	3.64	139.00	30.46	23.38	24.90	31.75
Tantalum, Ta	0.02	<0.02	<0.02	–	–	–	–
Terbium, Tb	0.005	<0.005	0.010	–	–	–	–
Thorium, Th	0.2	<0.2	<0.2	–	–	–	–
Titanium, Ti	0.5	0.6	5.4	–	–	–	–
Thallium, Tl	0.1	<0.1	<0.1	–	–	–	–
Thulium, Tm	0.005	<0.005	0.005	–	–	–	–
Uranium, U	0.1	<0.1	<0.1	–	–	–	–
Vanadium, V	0.5	0.6	1.5	–	–	–	–
Tungsten, W	0.5	<0.5	<0.5	–	–	–	–
Yttrium, Y	0.01	<0.01	0.35	0.05	0.06	0.030	0.040
Ytterbium, Yb	0.005	<0.005	0.040	–	–	–	–
Zinc, Zn	0.5	<0.5	32.2	2.1	4.9	0.9	1.1
Zirconium, Zr	0.2	<0.2	0.5	–	–	–	–
Concentrations are in ng/L							
Unfiltered total-Hg[2]	0.01	0.37	2.42	–	–	–	–
Unfiltered methyl-Hg[3]	0.04	< 0.04	0.24	–	–	–	–
Filtered total-Hg[2]	0.01	0.11	2.31	–	–	–	–
Filtered methyl-Hg[3]	0.04	< 0.04	0.18	–	–	–	–

[1]See Theodorakos (2002) for uncertainty assignment information.

[2]See Olson and DeWild (1999) for method detection limit detemination information.

[3]See DeWild and others (2002) for method detection limit detemination information.

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample. **Abbreviations:** FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.							
	June 16, 2008				June 17, 2008		June 18, 2008	
	08TA1300	08TA1300D	08TA565	08TA565D	08TA1206	08TA1206D	08TA1314	08TA1314D
Concentrations are in mg/L								
Calcium, Ca	3.45	3.52	5.68	2.54	1.42	1.41	2.58	2.73
Magnesium, Mg	1.03	1.03	1.91	0.8	0.33	0.33	0.59	0.72
Potassium, K	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1
Sodium, Na	2.47	2.5	2.07	1.92	0.44	0.44	0.46	0.58
Alkalinity, $CaCO_3$	13.01	13.12	22.52	9.25	5.94	5.99	8.62	9.61
Chlorine, Cl	1.6	1.6	1.6	0.4	0.2	0.1	1.3	1.3
Fluorine, F	0.1	0.1	0.09	0.13	<.08	<.08	0.08	0.08
Nitrate, NO_3	0.7	0.9	<.08	<.08	<.08	<.08	2.7	2.7
Sulfate, SO_4	4	4.1	6	5.5	2	2	1.9	1.9
Phosphorous, P	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Silicon dioxide, SiO_2	12.8	13.4	9.4	9.2	3.8	3.8	3.3	3.7
Concentrations are in µg/L								
Silver, Ag	<1	<1	<1	<1	<1	<1	<1	<1
Aluminum, Al	108	105	38.6	35.9	19.7	19.6	19.3	24.2
Arsenic, As	2	2	<1	3.3	<1	<1	<1	<1
Barium, Ba	4.69	4.95	6.64	4.27	2.18	2.17	6.84	7.48
Beryllium, Be	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth, Bi	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium, Cd	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02
Cerium, Ce	0.28	0.29	0.09	0.07	< 0.01	< 0.01	0.01	0.02
Cobalt, Co	1.73	0.66	1.52	1.26	0.34	0.51	0.78	0.18
Chromium, Cr	<1	<1	<1	<1	<1	<1	<1	3
Cesium, Cs	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Copper, Cu	1.4	0.96	0.52	<0.5	<0.5	<0.5	<0.5	<0.5
Dysprosium, Dy	0.05	0.05	0.02	0.01	< 0.005	< 0.005	0.007	0.008
Erbium, Er	0.03	0.03	0.01	0.006	< 0.005	< 0.005	< 0.005	0.005
Europium, Eu	0.01	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron, Fe	1,090	1,080	386	171	<50	<50	<50	<50
Gallium, Ga	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Gallium, Gd	0.054	0.058	0.02	0.01	< 0.005	< 0.005	0.008	0.009
Germanium, Ge	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Holmium, Ho	0.01	0.01	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lanthanum, La	0.12	0.12	0.04	0.03	< 0.01	< 0.01	0.01	0.02
Lanthanum, Li	1.5	1.3	1.9	2.3	0.7	0.8	0.3	< 0.1
Lanthanum, Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Manganese, Mn	44.5	44	34.4	11	1	1.2	11.6	11
Molybdenum, Mo	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Niobium, Nb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.28
Neodymium, Nd	0.18	0.2	0.07	0.05	< 0.01	< 0.01	0.02	0.03
Nickel, Ni	0.6	0.5	0.5	0.6	<0.4	<0.4	<0.4	<0.4
Lead, Pb	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Praesodynium, Pr	0.04	0.04	0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium, Rb	0.31	0.32	0.18	0.36	0.19	0.19	0.2	0.22
Antimony, Sb	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.98
Scandium, Sc	1	1	0.7	0.7	< 0.6	< 0.6	< 0.6	< 0.6
Selenium, Se	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Samarium, Sm	0.05	0.05	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample.
Abbreviations: FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.							
	June 16, 2008				June 17, 2008		June 18, 2008	
	08TA1300	08TA1300D	08TA565	08TA565D	08TA1206	08TA1206D	08TA1314	08TA1314D
Sulfate, SO_4	< 2	< 2	3	3	< 2	< 2	< 2	< 2
Strontium, Sr	20.5	21.3	30.2	25.1	6.48	6.51	13.8	14.9
Tantalum, Ta	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.1
Terbium, Tb	0.008	0.008	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Thorium, Th	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Titanium, Ti	3.2	3.2	1.1	0.9	< 0.5	< 0.5	< 0.5	< 0.5
Thallium, Tl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thulium, Tm	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium, U	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Vanadium, V	1	1	<0.5	<0.5	<0.5	<0.5	<0.5	0.9
Tungsten, W	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.74
Yttrium, Y	0.27	0.27	0.1	0.07	0.02	0.02	0.04	0.04
Ytterbium, Yb	0.03	0.02	0.01	0.008	< 0.005	< 0.005	< 0.005	< 0.005
Zinc, Zn	25.5	2.3	2.8	5.2	1.6	2.3	2.6	0.7
Zirconium, Zr	0.3	0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Concentrations are in ng/L								
Unfiltered total-Hg	2.56	2.52	–	–	–	–	–	–
Unfiltered methyl-Hg	0.24	–	–	–	–	–	–	–
Filtered total-Hg	–	–	–	–	–	–	–	–
Filtered methyl-Hg	–	–	–	–	–	–	–	–

Parameter	Sample date and field No.							
	June 19, 2008		June 20, 2008		June 21, 2008		June 22, 2008	
	08TA1224	08TA1224D	08TA1237	08TA1237D	08TA1503	08TA1503D	08TA1506	08TA1506D
Concentrations are in mg/L								
Calcium, Ca	4.9	4.91	9.82	9.97	9.77	9.79	17.6	17.2
Magnesium, Mg	1.74	1.78	1.84	1.86	4.05	4.12	4.78	4.62
Potassium, K	0.1	0.1	0.1	0.1	0.34	0.35	0.2	0.2
Sodium, Na	0.61	0.61	0.89	0.91	3.14	3.24	2.44	2.37
Alkalinity, $CaCO_3$	15.27	15.18	27.37	26.41	29.49	29.93	42.96	40.26
Chlorine, Cl	1.4	1.4	0.2	0.1	0.4	<0.08	0.3	1.5
Fluorine, F	0.08	0.08	<0.08	<0.08	0.08	<0.08	0.08	0.09
Nitrate, NO_3	0.4	0.4	1.8	1.8	<0.08	<0.08	0.8	0.9
Sulfate, SO_4	5.7	5.7	5.6	5.7	16.1	18	19.4	19.5
Phosphorous, P	< 0.01	< 0.01	< 0.01	< 0.01	0.01	0.02	< 0.01	< 0.01
Silicon dioxide, SiO_2	3.6	3.6	5.7	5.8	13.2	13.2	6.9	6.7
Concentrations are in µg/L								
Silver, Ag	<1	<1	<1	<1	<1	<1	<1	<1
Aluminum, Al	9.4	9.1	10.7	11.1	25.5	28.4	8.7	8.6
Arsenic, As	<1	<1	<1	<1	<1	1	<1	<1
Barium, Ba	2.82	2.89	6	6.06	7.22	7.27	12.3	11.8
Beryllium, Be	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth, Bi	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium, Cd	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cerium, Ce	< 0.01	< 0.01	< 0.01	< 0.01	0.06	0.07	0.02	0.02
Cobalt, Co	0.56	0.03	0.1	1.9	0.18	0.97	1.78	0.14
Chromium, Cr	<1	<1	<1	<1	<1	<1	<1	<1

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample.
Abbreviations: FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.							
	June 19, 2008		June 20, 2008		June 21, 2008		June 22, 2008	
	08TA1224	08TA1224D	08TA1237	08TA1237D	08TA1503	08TA1503D	08TA1506	08TA1506D
Concentrations are in µg/L—Continued								
Cesium, Cs	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Copper, Cu	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dysprosium, Dy	< 0.005	< 0.005	< 0.005	< 0.005	0.01	0.02	0.008	0.005
Erbium, Er	< 0.005	< 0.005	< 0.005	< 0.005	0.008	0.009	0.005	0.005
Europium, Eu	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron, Fe	<50	<50	<50	<50	397	483	58	53
Gallium, Ga	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Gallium, Gd	< 0.005	< 0.005	< 0.005	< 0.005	0.02	0.01	0.01	0.006
Germanium, Ge	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Holmium, Ho	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lanthanum, La	< 0.01	< 0.01	< 0.01	< 0.01	0.03	0.03	0.01	0.01
Lanthanum, Li	< 0.1	0.1	0.3	0.3	1.8	1.7	1.5	1.4
Lanthanum, Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Manganese, Mn	1.5	0.7	4.2	7.3	41.3	42.7	24.7	21.5
Molybdenum, Mo	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Niobium, Nb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Neodymium, Nd	< 0.01	< 0.01	< 0.01	< 0.01	0.04	0.05	0.02	0.02
Nickel, Ni	<0.4	<0.4	<0.4	<0.4	0.5	0.6	0.4	<0.4
Lead, Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Praesodynium, Pr	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01
Rubidium, Rb	0.16	0.15	0.18	0.18	0.26	0.26	0.14	0.14
Antimony, Sb	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Scandium, Sc	< 0.6	< 0.6	< 0.6	< 0.6	0.9	0.9	< 0.6	< 0.6
Selenium, Se	< 1	< 1	< 1	< 1	< 1	< 1	1.2	1.2
Samarium, Sm	< 0.01	< 0.01	< 0.01	< 0.01	0.02	0.01	< 0.01	< 0.01
Sulfate, SO_4	4	4	4	4	14	14	20	19
Strontium, Sr	14.8	15.3	29.6	30	60.4	60.5	85.2	83.0
Tantalum, Ta	0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Terbium, Tb	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Thorium, Th	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Titanium, Ti	< 0.5	< 0.5	< 0.5	< 0.5	0.9	1.1	< 0.5	< 0.5
Thallium, Tl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thulium, Tm	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium, U	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.19	0.19
Vanadium, V	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tungsten, W	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Yttrium, Y	0.02	0.02	0.02	0.02	0.07	0.08	0.04	0.04
Ytterbium, Yb	< 0.005	< 0.005	< 0.005	< 0.005	0.009	0.008	< 0.005	0.006
Zinc, Zn	0.8	<0.5	<0.5	0.7	<0.5	1.1	0.7	<0.5
Zirconium, Zr	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Concentrations are in ng/L								
Unfiltered total-Hg	0.71	–	–	–	1.47	1.50	–	–
Unfiltered methyl-Hg	–	–	–	–	–	–	–	–
Filtered total-Hg	–	–	–	–	–	–	–	–
Filtered methyl-Hg	–	–	–	–	–	–	–	–

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample.
Abbreviations: FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.					
	June 23, 2008		August 18, 2008		June 24, 2004	
	08TA1522	08TA1522D	08TA1532	08TA1532D	08TA440	08TA440D
Concentrations are in mg/L						
Calcium, Ca	2.05	2.11	1.32	1.36	1.2	1.14
Magnesium, Mg	1.33	1.37	0.31	0.32	0.59	0.58
Potassium, K	0.2	0.2	0.2	0.2	0.1	0.1
Sodium, Na	2.06	2.11	1.31	1.31	0.95	0.95
Alkalinity, $CaCO_3$	4.53	11.85	7.26	7.46	9.06	5.87
Chlorine, Cl	1.7	1.7	1.0	1.1	1.4	1.4
Fluorine, F	0.1	0.1	<0.04	<0.04	0.08	0.08
Nitrate, NO_3	<.08	<.08	<.08	<.08	<.08	<.08
Sulfate, SO_4	4.2	4.2	1.7	1.8	2.7	2.7
Phosphorous, P	0.02	0.02	< 0.01	< 0.01	< 0.01	< 0.01
Silicon dioxide, SiO_2	9.8	10.2	6.6	6.6	4.6	4.4
Concentrations are in µg/L						
Silver, Ag	<1	<1	<1	<1	<1	<1
Aluminum, Al	14.5	15.8	27.7	27.1	27.7	27.1
Arsenic, As	<1	<1	8.4	8.4	8.4	8.4
Barium, Ba	2	2.04	3.14	3.25	3.14	3.25
Beryllium, Be	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth, Bi	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium, Cd	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cerium, Ce	0.02	0.02	0.04	0.04	0.04	0.04
Cobalt, Co	1.98	0.67	3.37	1.53	3.37	1.53
Chromium, Cr	<1	<1	<1	<1	<1	<1
Cesium, Cs	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Copper, Cu	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dysprosium, Dy	0.005	0.005	0.008	0.006	0.008	0.006
Erbium, Er	< 0.005	< 0.005	0.008	0.007	0.008	0.007
Europium, Eu	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron, Fe	<50	<50	113	98	113	98
Gallium, Ga	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Gallium, Gd	< 0.005	< 0.005	0.01	0.01	0.01	0.01
Germanium, Ge	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Holmium, Ho	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lanthanum, La	< 0.01	< 0.01	0.02	0.02	0.02	0.02
Lanthanum, Li	1.9	1.8	< 0.1	< 0.1	< 0.1	< 0.1
Lanthanum, Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Manganese, Mn	6	3.9	7.8	5.1	7.8	5.1
Molybdenum, Mo	< 2	< 2	< 2	< 2	< 2	< 2
Niobium, Nb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Neodymium, Nd	0.01	0.01	0.03	0.03	0.03	0.03
Nickel, Ni	0.4	<0.4	0.4	<0.4	0.4	<0.4
Lead, Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Praesodynium, Pr	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium, Rb	0.17	0.18	0.42	0.42	0.42	0.42
Antimony, Sb	0.42	<0.3	0.33	<0.3	0.33	<0.3
Scandium, Sc	0.7	0.8	0.8	0.8	0.8	0.8

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample. **Abbreviations:** FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.					
	June 23, 2008		August 18, 2008		June 24, 2004	
	08TA1522	08TA1522D	08TA1532	08TA1532D	08TA440	08TA440D
	Concentrations are in µg/L—Continued					
Selenium, Se	< 1	< 1	< 1	< 1	< 1	< 1
Samarium, Sm	< 0.01	< 0.01	< 0.01	0.01	< 0.01	0.01
Sulfate, SO_4	2	2	< 2	< 2	< 2	< 2
Strontium, Sr	19.2	20.2	6.5	6.67	6.5	6.67
Tantalum, Ta	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Terbium, Tb	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Thorium, Th	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Titanium, Ti	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Thallium, Tl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thulium, Tm	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Uranium, U	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Vanadium, V	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tungsten, W	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Yttrium, Y	0.02	0.02	0.06	0.06	0.06	0.06
Ytterbium, Yb	< 0.005	< 0.005	0.01	0.01	0.01	0.01
Zinc, Zn	1	0.6	<0.5	<0.5	<0.5	<0.5
Zirconium, Zr	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	Concentrations are in ng/L					
Unfiltered total-Hg	–	–	–	–	–	–
Unfiltered methyl-Hg	–	–	–	–	–	–
Filtered total-Hg	–	–	–	–	–	–
Filtered methyl-Hg	–	–	–	–	–	–

Parameter	Sample date and field No.					
	June 15, 2008			June 24, 2008		
	08TABlank1-R	08TABlank1-F	08TABlank2-F	08TABlank5-R	08TABlank3-F	08TABlank4-F
	Concentrations are in mg/L					
Calcium, Ca	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Magnesium, Mg	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Potassium, K	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium, Na	<0.01	<0.01	0.01	<0.01	0.01	0.01
Alkalinity, $CaCO_3$	–	–	–	–	–	–
Chlorine, Cl	1.3	<0.08	<0.08	1.3	<0.08	<0.08
Fluorine, F	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Nitrate, NO_3	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Sulfate, SO_4	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Phosphorous, P	<0.01	< 0.01	<0.01	<0.01	<0.01	< 0.01
Silicon dioxide, SiO_2	<0.2	< 0.2	<0.2	<0.2	<0.2	<0.2

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample.
Abbreviations: FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.					
	June 15, 2008			June 24, 2008		
	08TABlank1-R	08TABlank1-F	08TABlank2-F	08TABlank5-R	08TABlank3-F	08TABlank4-F
	Concentrations are in µg/L					
Silver, Ag	<1	<1	<1	<1	<1	<1
Aluminum, Al	<2	<2	<2	<2	<2	<2
Arsenic, As	<1	<1	<1	<1	<1	<1
Barium, Ba	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Beryllium, Be	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Bismuth, Bi	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Cadmium, Cd	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Cerium, Ce	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cobalt, Co	<0.02	0.11	<0.02	<0.02	0.05	0.11
Chromium, Cr	<1	<1	<1	<1	<1	<1
Cesium, Cs	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Copper, Cu	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dysprosium, Dy	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Erbium, Er	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Europium, Eu	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Iron, Fe	<50	<50	<50	<50	<50	<50
Gallium, Ga	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Gallium, Gd	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Germanium, Ge	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Holmium, Ho	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lanthanum, La	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Lanthanum, Li	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Lanthanum, Lu	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Manganese, Mn	<0.2	0.2	<0.2	<0.2	<0.2	0.2
Molybdenum, Mo	< 2	< 2	< 2	< 2	< 2	< 2
Niobium, Nb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Neodymium, Nd	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Ni	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Lead, Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Praesodynium, Pr	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Rubidium, Rb	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Antimony, Sb	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Scandium, Sc	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Selenium, Se	< 1	< 1	< 1	< 1	< 1	< 1
Samarium, Sm	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sulfate, SO_4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Strontium, Sr	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Tantalum, Ta	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Terbium, Tb	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Thorium, Th	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Titanium, Ti	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Thallium, Tl	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Thulium, Tm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Uranium, U	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vanadium, V	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Tungsten, W	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Yttrium, Y	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample. **Abbreviations:** FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.					
	June 15, 2008			June 24, 2008		
	08TABlank1-R	08TABlank1-F	08TABlank2-F	08TABlank5-R	08TABlank3-F	08TABlank4-F
	Concentrations are in µg/L—Continued					
Ytterbium, Yb	<0.5	1.1	<0.5	<0.5	<0.5	1.1
Zinc, Zn	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Zirconium, Zr	–	–	–	–	–	–
	Concentrations are in ng/L					
Unfiltered total-Hg	–	–	–	–	–	–
Unfiltered methyl-Hg	–	–	–	–	–	–
Filtered total-Hg	–	–	–	–	–	–
Filtered methyl-Hg	–	–	–	–	–	–

Parameter	Sample date and field No.			
	June 15, 2008		June 24, 2008	
	08TABlankR	08TABlankF	08TABlankR2	08TABLANKF2
	Concentrations are in mg/L			
Calcium, Ca	–	–	–	–
Magnesium, Mg	–	–	–	–
Potassium, K	–	–	–	–
Sodium, Na	–	–	–	–
Alkalinity, $CaCO_3$	–	–	–	–
Chlorine, Cl	–	–	–	–
Fluorine, F	–	–	–	–
Nitrate, NO_3	–	–	–	–
Sulfate, SO_4	–	–	–	–
Phosphorous, P	–	–	–	–
Silicon dioxide, SiO_2	-	-	–	–
	Concentrations are in µg/L			
Silver, Ag	–	–	–	–
Aluminum, Al	–	–	–	–
Arsenic, As	–	–	–	–
Barium, Ba	–	–	–	–
Beryllium, Be	–	–	–	–
Bismuth, Bi	–	–	–	–
Cadmium, Cd	–	–	–	–
Cerium, Ce	–	–	–	–
Cobalt, Co	–	–	–	–
Chromium, Cr	–	–	–	–
Cesium, Cs	–	–	–	–
Copper, Cu	–	–	–	–
Dysprosium, Dy	–	–	–	–
Erbium, Er	–	–	–	–
Europium, Eu	–	–	–	–
Iron, Fe	–	–	–	–
Gallium, Ga	–	–	–	–
Gallium, Gd	–	–	–	–
Germanium, Ge	–	–	–	–
Holmium, Ho	–	–	–	–
Lanthanum, La	–	–	–	–

Table 2. Concentrations of major and trace elements in duplicate and blank samples from the Taylor Mountains and Dillingham D-4 quadrangles, Alaska, 2008.—Continued

[D following field number indicates duplicate sample. R in blank name refers to an unfiltered sample. F in blank name refers to a filtered sample. **Abbreviations:** FA, filtered acidified; °C, degrees Celsius; µS/cm, microsiemens per centimeter; mg/L milligram per liter; µg/L, microgram per liter; ng/L, nanogram per liter; Hg, mercury; <, less than; –, not determined]

Parameter	Sample date and field No.			
	June 15, 2008		June 24, 2008	
	08TABlankR	08TABlankF	08TABlankR2	08TABLANKF2
Concentrations are in µg/L—Continued				
Lanthanum, Li	–	–	–	–
Lanthanum, Lu	–	–	–	–
Manganese, Mn	–	–	–	–
Molybdenum, Mo	–	–	–	–
Niobium, Nb	–	–	–	–
Neodymium, Nd	–	–	–	–
Nickel, Ni	–	–	–	–
Lead, Pb	–	–	–	–
Praesodynium, Pr	–	–	–	–
Rubidium, Rb	–	–	–	–
Antimony, Sb	–	–	–	–
Scandium, Sc	–	–	–	–
Selenium, Se	–	–	–	–
Samarium, Sm	–	–	–	–
Sulfate, SO_4	–	–	–	–
Strontium, Sr	–	–	–	–
Tantalum, Ta	–	–	–	–
Terbium, Tb	–	–	–	–
Thorium, Th	–	–	–	–
Titanium, Ti	–	–	–	–
Thallium, Tl	–	–	–	–
Thulium, Tm	–	–	–	–
Uranium, U	–	–	–	–
Vanadium, V	–	–	–	–
Tungsten, W	–	–	–	–
Yttrium, Y	–	–	–	–
Ytterbium, Yb	–	–	–	–
Zinc, Zn	–	–	–	–
Zirconium, Zr	–	–	–	–
Concentrations are in ng/L				
Unfiltered total-Hg	0.08	–	0.06	0.05
Unfiltered methyl-Hg	<0.04	–	<0.04	<0.04
Filtered total-Hg	–	0.11	–	–
Filtered methyl-Hg	–	<0.04	–	–

This page intentionally left blank

Appendix A. Analytical Data For Stream-Water Samples Collected in 2008 from the Taylor Mountains and Dillingham D-4 Quadrangles, Alaska

Microsoft Excel spreadsheet is available for download at http://pubs.usgs/gov/of/2011/1100.

Appendix B. Standard Reference Material and Field Blank Data Accompanying Water Samples Collected in 2008 from the Taylor Mountains and Dillingham D-4 Quadrangles, Alaska

Microsoft Excel spreadsheet is available for download at http://pubs.usgs/gov/of/2011/1100.

This page intentionally left blank

Publishing support provided by the U.S. Geological Survey
Publishing Network, Tacoma and Rolla Publishing Service Centers

For more information concerning the research in this report, contact the
Director, Alaska Science Center
U.S. Geological Survey
4210 University Dr.
Anchorage, Alaska 99508-4560
http://alaska.usgs.gov