DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

Analytical results and sample locality maps of rock samples from the eastern Goodnews Bay quadrangle, southwest Alaska

By

J.E. Gray, B.M. Adrian, P.L. Hageman, and J.E. Kilburn

Open-File Report 92-8-A Paper version
92-8-B Diskette version

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

U.S. Geological Survey, DFC, Box 25046, MS 973, Denver, CO, 80225

1992

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STUDIES RELATED TO AMRAP

The U.S. Geological Survey is required by the Alaska National Interests Lands Conservation Act (Public Law 96-487, 1980) to survey certain Federal lands to determine their mineral potential. Results from the Alaska Mineral Resource Assessment Program (AMRAP) must be made available to the public and submitted to the President and Congress. This report is one of a series of publications that presents geochemical results collected during the mineral assessment study of the Goodnews Bay quadrangle, Alaska (fig. 1). Geochemical data for rock samples collected from selected areas within the eastern portion of the Goodnews Bay quadrangle are presented here. The data in this report are also available on computer diskette in Gray and others (1992).

INTRODUCTION

Between 1975 and 1977, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Goodnews Bay, Hagemeister Island, and Nushagak Bay quadrangles as part of the mineral resource assessment of the region. Sample media collected included stream sediments, nonmagnetic heavy-mineral concentrates derived from stream sediments, and organic materials. A description of the sampling methods and analytical procedures used during the reconnaissance survey, along with a tabulation of the geochemical data and a site locality map for the samples are given in Cieutat and others (1988).

Using the geochemical data of Cieutat and others (1988), Kilburn and Jones (1992) and Jones and Kilburn (1992) delineated a number of geochemically anomalous areas considered favorable for the presence of metallic mineral resources. Geochemical anomalies identified in the eastern part of the Goodnews Bay quadrangle were the subject of a follow-up field investigation in the summer of 1990. During this follow-up study, altered and mineralized rocks were collected in most areas identified by the geochemical reconnaissance study as anomalous. In addition, rock samples were collected from two poorly studied mineral occurrences, a sphalerite-rich vein along the Togiak River (Hoare and Cobb, 1977), and a Hg-rich occurrence near the Ongivinuck River (Coonrad and others, 1978). This report presents only the locations, brief descriptions, and the analytical data for rock samples collected during the 1990 follow-up study. The data listed in this report were interpreted by Kilburn and others (1992). The mineral assessment report for the Goodnews Bay study appears in Kilburn and others (in press).

GENERAL GEOLOGY AND MINERAL OCCURRENCES

The eastern Goodnews Bay quadrangle is underlain primarily by northeast-striking rocks of the Togiak tectonostratigraphic terrane (Jones and others, 1987; Box, 1985). This structurally complex terrane is characterized by a thick sequence of Jurassic graywacke and Jurassic and Early Cretaceous interbedded breccia, tuff, basalt, tuffaceous siltstone, and chert. The volcanic, volcaniclastic, and sedimentary rocks of the Togiak terrane are intruded locally by felsic

Figure 1. Location of the Goodnews Bay quadrangle, Alaska.

stocks of Late Cretaceous to early Tertiary age. Major structural features, some of which appear to delineate terrane boundaries, trend northeast to north-northeast (Hoare and Coonrad, 1978). The most detailed account of the geology and a correlation of rock units is given in Hoare and Coonrad (1978).

The Bristol Bay mining region, which is regarded as one mining district, encompasses the eastern part of the Goodnews Bay quadrangle (Cobb, 1973). Only a few small Hg-, Cu-, and Zn-bearing quartz veins and reports of scattered Au placers were documented in the eastern Goodnews Bay region (Eberlein and others, 1977) prior to the 1990 follow-up study. Quartz veins include a sphalerite-bearing occurrence with minor amounts of chalcopyrite in altered pillow lava just south of the Kashaiak Mountains along the Togiak River (Berg and Cobb, 1967), the cinnabar-stibnite-realgar-orpiment-bearing Kagati Lake prospect hosted in a Late Cretaceous granitic stock located several km east of Kagati Lake near Mount Oratia (Sainsbury and MacKevett, 1965), and small copper-rich veins hosted in a Late Cretaceous to Tertiary granitic stock in the Pistuk Peak-Togiak Lake region (Eakins, 1968; Hoare and Cobb, 1977). Gold-bearing placers were reported at several sites along Trail and Rainy Creeks, and minor placer gold was reported in creeks that drain the ridge southwest of Sunshine Valley and streams entering Elva Lake (Hoare and Cobb, 1977). Newly discovered base- and precious-metal-bearing veins in the eastern Goodnews Bay quadrangle are described in Kilburn and others (1992).

METHODS OF STUDY

Sample Collection

Geochemical sampling for this follow-up study consisted of rock samples collected from outcrop, ridge float, or talus slopes. Outcrop rock samples were collected as composite chip samples that were as representative as possible of the exposed rocks. Most samples were collected from altered or mineralized rocks. This report contains analytical data for approximately 100 rock samples that were collected from areas in the eastern portion of the Goodnews Bay quadrangle (figs. 2a and 2b).

Sample Analysis

Rock samples were crushed and pulverized to minus-100 mesh (150 μm) using a disk mill with ceramic plates. The pulverized samples were analyzed for a variety of elements by different chemical methods. Samples were analyzed for 35 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). Spectrographic results were determined by visually comparing spectra derived from the sample against spectra obtained from laboratory reference standards. Standard concentrations are geometrically spaced over any given order of magnitude of concentration such that values reported for each sample are reported in a geometric sequence 10, 15, 20, 30, 50, 70, 100, etc. The elements determined by the spectrographic method and their limits of determination are listed in table 1.

The samples were also analyzed for 10 elements by inductively coupled plasma-atomic emission spectrometry after a partial digestion of a 1-gram aliquot and organic solvent extraction (Motooka, 1988).

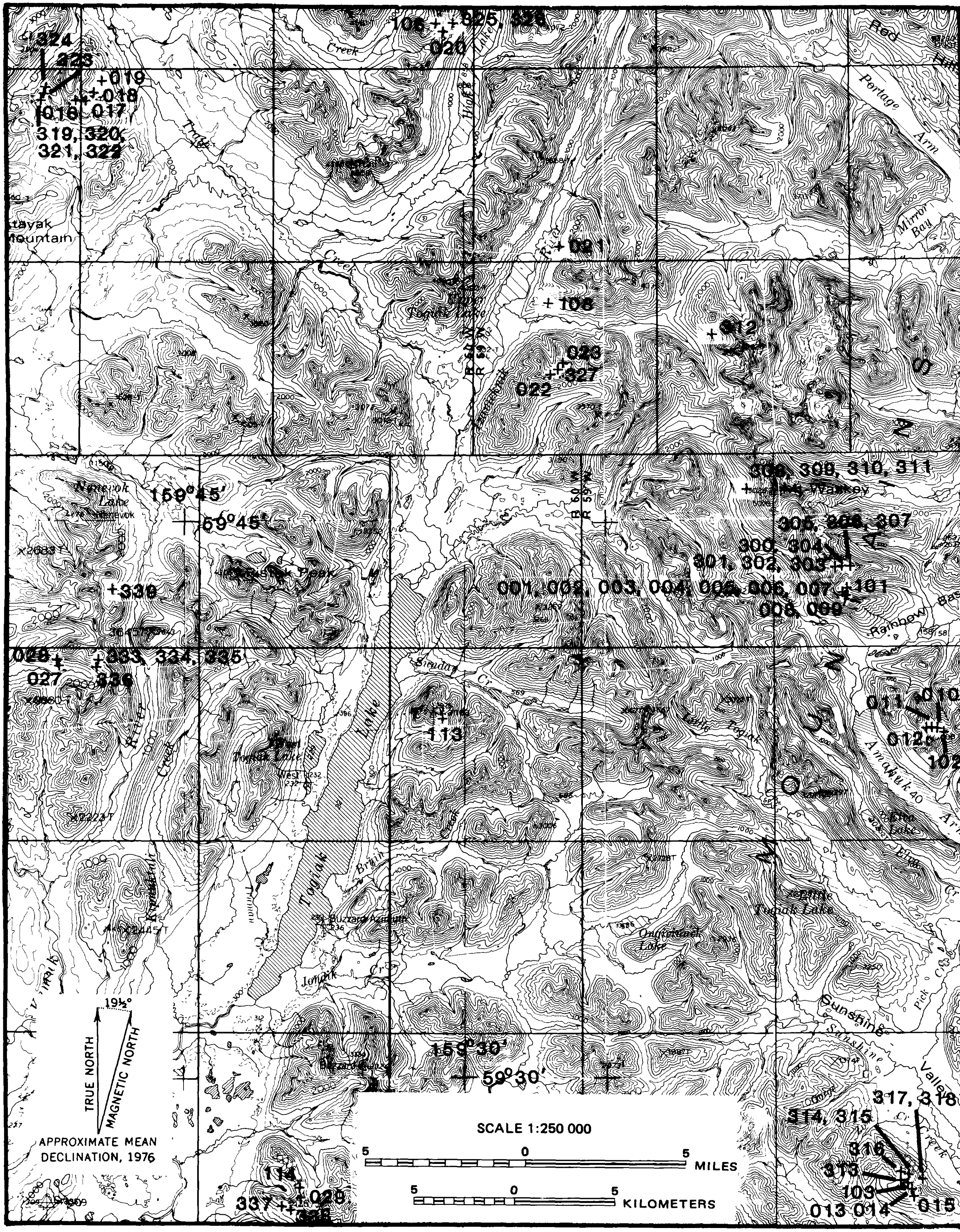

Figure 2a. Localities of rock samples from the Goodnews Bay quadrangle.

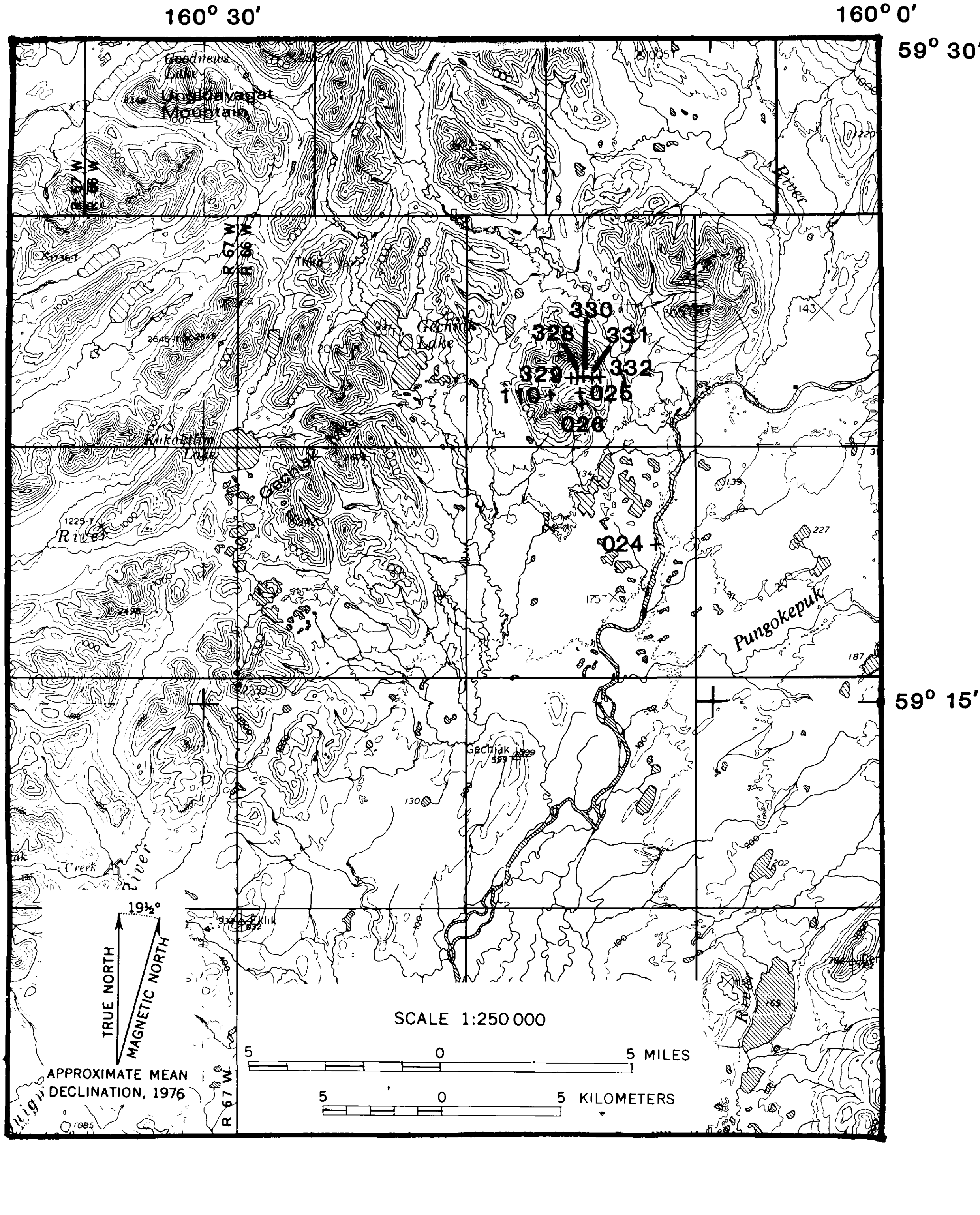

Figure 2b. Localities of rock samples from the Goodnews Bay quadrangle.

Table 2 lists the elements analyzed by inductively coupled plasma-atomic emission spectrometry and limits of determination. In addition, gold was determined by graphite furnace atomic absorption spectrophotometry following a hydrobromic acid-bromine digestion of a 10-gram aliquot and an organic solvent extraction (O'Leary and Meier, 1986). Tungsten was determined by a visible spectrophotometric method by decomposing the sample with nitric, hydrofluoric, and hydrochloric acids (Welsch, 1983). Mercury was determined using a modified version of the cold-vapor atomic absorption spectrophotometry method of Kennedy and Crock (1987). Lower limits of determination for Au, W, and Hg by these methods are also listed in table 2.

Discrepancies in analyses for certain elements duplicated by different analytical methods, such as values determined for Au, may be attributable to the particulate nature of minerals that contain Au, different sample aliquots used, and different extraction procedures. The atomic absorption spectrophotometry analysis of Au provides the most statistically representative results due to the larger sample aliquot analyzed. For example, a 10-gram sample aliquot is used for the atomic absorption analysis, whereas a 10-milligram sample aliquot is used in the spectrographic technique.

DATA STORAGE SYSTEM

Upon completion of the analytical work, the results were entered into a computer-based file as part of the USGS Rock Analysis Storage System (RASS) database. This database contains both descriptive geological information and analytical data. Any of this information may be retrieved and converted to a binary form (STATPAC) for computerized analysis or publication (VanTrump and Miesch, 1976).

The data in this report are also available on a 5.25 inch, 360-Kb magnetic diskette in Gray and others (1992). Access to this information requires an IBM compatible computer using MS DOS and a 5.25 inch drive capable of handling 360-Kb diskettes. The diskette report contains the analytical results for the rock samples in STATPAC file (.STP) format. An executable data conversion program STP2DAT.EXE (Grundy and Miesch, 1987) is also contained on the diskette that provides various format options into which the .STP file may be changed.

DESCRIPTION OF DATA TABLE

Table 3 contains summary geologic information and analytical results for the rock samples collected during this study. Locations are given in latitude and longitude in table 3 and these locations are plotted on figures 2a and 2b. Abbreviations in table 3 in the columns labeled "notes" and "ore and alteration minerals" are: ALT. = alteration; ARSENO = arsenopyrite; BLCHED = bleached; CHALCO = chalcopyrite; DISS = disseminated; HLY = highly; PLAG. = plagioclase; PORPH. = porphyry; QTZ = quartz; and SILCFD = silicified.

The analytical method for each element shown in table 3 is abbreviated as a suffix in the column headings with the designations "S", "P", "AA", and "VS" indicating semiquantitative optical emission spectrography, inductively coupled plasma-atomic emission spectrometry, atomic absorption spectrophotometry, and visible spectrophotometry analyses, respectively. The letter "N" in the data table indicates that an element was looked for but not observed at the concentration shown, while an "L" indicates that an element was observed but present in concentrations below the lower limit of determination shown. A "G" was entered in the table after the upper limit of determination if an element was observed but was present in concentrations above this value. Lower and upper limits of determination for the inductively coupled plasma-atomic emission spectrometry method listed in this table may be variable due to variable sample aliquot weight, dilution of an analytical aliquot, or instrumental interference correction. Values determined for the major elements, Fe, Mg, Ca, Na, Ti, and P are given in weight percent; all other values are in parts per million (micrograms/gram).

ACKNOWLEDGMENTS

We would like to acknowledge R. Goldfarb and S. Box for their assistance with sample collection in the field. In addition, we thank D. Abrams, J. Kelley, and C. Motooka for sample preparation; J. Motooka and B. Roushey for chemical analyses; and K. Slaughter for assistance with report preparation and data reduction.

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Table 1. Limits of determination for the spectrographic analysis of rock samples, based on a 10-mg sample.

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	0.02	10
Calcium (Ca)	0.05	20
Sodium (Na)	0.2	5
Titanium (Ti)	0.002	1
Phosphorous (P)	0.2	10
	Parts per million	
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	10	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Gallium (Ga)	5	100
Germanium (Ge)	10	100
Lanthanum (La)	50	1,000
Manganese (Mn)	10	5,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Thorium (Th)	100	2,000
Vanadium (V)	10	10,000
Tungsten (W)	20	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000

Table 2. Other analytical methods used and limits of determination*. [ICP-AES, Inductively Coupled Plasma-Atomic Emission Spectrometry; CVAAS, Cold-Vapor Atomic Absorption Spectrophotometry; GFAAS, Graphite Furnace Atomic Absorption Spectrophotometry; VS, Visible Spectrophotometry].

Element	Analytical Method	Lower limit (ppm)	Upper limit (ppm)
Silver (Ag)	ICP-AES	0.045	1,500
Arsenic (As)	ICP-AES	0.6	3,000
Gold (Au)	ICP-AES	0.15	2,400
Bismuth (Bi)	ICP-AES	0.6	1,500
Cadmium (Cd)	ICP-AES	0.03	500
Copper (Cu)	ICP-AES	0.03	1,200
Molybdenum (Mo)	ICP-AES	0.09	1,500
Lead (Pb)	ICP-AES	0.6	12,000
Antimony (Sb)	ICP-AES	0.6	800
Zinc (Zn)	ICP-AES	0.03	500
Gold (Au)	GFAAS	0.002	
Mercury (Hg)	CVAAS	0.02	
Tungsten (W)	VS	1	

* NOTE: Lower and upper limits of determination for the ICP-AES method listed in this table are nominal, and in table 3 may be variable. The variability in limits of determination for an element is due to variable sample aliquot weight, dilution of an analytical aliquot, or instrumental interference correction.

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska.
[N, not detected at the concentration shown; L, detected but below the concentration shown; G, determined to be greater than the concentration shown]

SAMPLE	LATITUDE	LONGITUDE	SAMPLE TYPE	AREA	ROCK TYPE	NOTES	ORE AND ALTERATION MINERALS
001	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	HORNFELS	QTZ STOCKWORK, OXIDIZED	CHALCOPYRITE, PYRITE
002	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	QTZ VEIN	3/4" WIDE	LIMONITE AFTER PYRITE
003	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	ARGILLITE	1/2" WIDE QTZ VEIN, OXIDIZED	EUHEDRAL QTZ CRYSTALS
004	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	QTZ VEIN	1" WIDE, OXIDIZED	
005	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	GRANITE	OXIDIZED	BIOTITE, PLAGIOCLASE
006	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	ARGILLITE	OXIDIZED, QTZ VEIN	DISSEMINATED PYRITE
007	59 43 05	159 09 39	OUTCROP	RAINBOW BASIN	HORNFELS	HIGHLY OXIDIZED	
008	59 43 02	159 09 38	OUTCROP	RAINBOW BASIN	QTZ VEIN	6-12" WIDE IN DIKE	ARSENOPYRITE
009	59 43 02	159 09 38	OUTCROP	RAINBOW BASIN	GRANITIC DIKE	QTZ VEIN	ARSENOPYRITE
010	59 39 22	159 04 51	RUBBLE	AMAKUK ARM	ARGILLITE	OXIDIZED	
011	59 39 21	159 05 02	RUBBLE	AMAKUK ARM	ARGILLITE	OXIDIZED	
012	59 39 21	159 05 11	RUBBLE	AMAKUK ARM	ARGILLITE	SHEAR ZONE, OXIDIZED	
013	59 27 02	159 06 23	OUTCROP	SUNSHINE VALLEY	HORNFELS	OXIDIZED	
014	59 26 59	159 06 17	OUTCROP	SUNSHINE VALLEY	HORNFELS	OXIDIZED	
015	59 26 54	159 06 13	OUTCROP	SUNSHINE VALLEY	ARGILLITE	OXIDIZED, TALUS FORMING	DISSEMINATED PYRITE, CHALCOPYRITE?
016	59 56 35	159 50 43	OUTCROP	TRAIL CREEK	GRANITE	OXIDIZED	
017	59 56 33	159 50 30	OUTCROP	TRAIL CREEK	HORNFELS	CONTACT ZONE	
018	59 56 38	159 49 50	OUTCROP	TRAIL CREEK	ARGILLITE	MINOR OXIDATION	
019	59 56 57	159 49 30	RUBBLE	TRAIL CREEK	VOLCANIC CONGLOMERATE	HIGHLY OXIDIZED	
020	59 58 18	159 31 13	OUTCROP	HIGH LAKE	GRAYWACKE	OXIDIZED, QTZ STRINGERS	
021A	59 52 29	159 25 09	FLOAT	UPPER TOGIAK LAKE	EQUIGRANULAR IGNEOUS	OXIDIZED, QTZ VEINLETS	CINNABAR
021B	59 52 29	159 25 09	FLOAT	UPPER TOGIAK LAKE	ARGILLITE	HIGHLY OXIDIZED	
022	59 49 02	159 25 15	RUBBLE	UPPER TOGIAK LAKE	QTZ VEIN	IN ARGILLITE	
023	59 49 18	159 24 41	OUTCROP	UPPER TOGIAK LAKE	ARGILLITE	GREEN STAINING	
024	59 18 37	160 09 56	OUTCROP	TOGIAK RIVER	VEIN	IN OXIDIZED PODS	SPHALERITE?
024A	59 18 37	160 09 56	OUTCROP	TOGIAK RIVER	BASALT	OXIDIZED, COLLECTED WITH #024	
024B	59 18 37	160 09 56	OUTCROP	TOGIAK RIVER	VEIN	PROSPECT SITE	
024C	59 18 37	160 09 56	OUTCROP	TOGIAK RIVER	BASALT	ALTERED, BLEACHED	
024D	59 18 37	160 09 56	OUTCROP	TOGIAK RIVER	BASALT	1m FROM VEIN	
025	59 21 59	160 13 19	OUTCROP	LONE MOUNTAIN	HORNFELS	INTRUSIVE CONTACT	
026	59 21 49	160 13 16	OUTCROP	LONE MOUNTAIN	HORNFELS	GOSSAN	PYRITE, CHALCO, ARSENO, DISS PYRITE
026A	59 21 49	160 13 16	OUTCROP	LONE MOUNTAIN	HORNFELS	OXIDIZED, NEAR GOSSAN	QTZ/PYRITE STRINGERS
026B	59 21 49	160 13 16	OUTCROP	LONE MOUNTAIN	GOSSAN		
026C	59 21 49	160 13 16	OUTCROP	LONE MOUNTAIN	QTZ/PYRITE VEINLETS	ALONG BEDDING	
026D	59 21 49	160 13 16	OUTCROP	LONE MOUNTAIN	BEDROCK	NEAR GOSSAN	
027	59 41 11	159 51 41	OUTCROP	KEMUK RIVER	ARGILLITE	OXIDIZED	
028	59 41 15	159 51 42	FLOAT	KEMUK RIVER	BRECCIA	OXIDIZED	
029	59 26 53	159 38 52	OUTCROP	ONGIVINUCK RIVER	MAFIC DIKE	Hg STAINS, Fe STAINS	
029A	59 26 53	159 38 52	OUTCROP	ONGIVINUCK RIVER	QTZ VEINLET	OXIDIZED, IN DIKE	
101A	59 43 08	159 09 29	TALUS	RAINBOW BASIN		PUNKY, BLEACHED	QTZ CRYSTALS, ARSENOPYRITE
101B	59 43 08	159 09 29	TALUS	RAINBOW BASIN	PORPHYRY		
101C	59 43 08	159 09 29	OUTCROP	RAINBOW BASIN	ARGILLITE	2-4mm ARSENOPYRITE VEINLETS	
101D	59 43 08	159 09 29	TALUS	RAINBOW BASIN		Fe CEMENTED	
101E	59 43 08	159 09 29	OUTCROP	RAINBOW BASIN	GRANITE PORPH.		
101F	59 43 08	159 09 29	TALUS	RAINBOW BASIN	GRANITE	ARSENOPYRITE VEINS	
102A	59 39 19	159 04 25	OUTCROP	AMAKUK ARM	ARGILLITE	Fe STAINED	
102B	59 39 19	159 04 25	OUTCROP	AMAKUK ARM	PLAG.PORPH.DIKE	CHLORITE ALTERED	
103A	59 27 14	159 06 36	OUTCROP	SUNSHINE VALLEY	RHYOLITE DIKE	ALTERED	
103B	59 27 14	159 06 36	OUTCROP	SUNSHINE VALLEY	ARGILLITE		DISS PYRITE

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Ca %-S	Fe %-S	Mg %-S	Na %-S	P %-S	Ti %-S	Ag ppm-S	As ppm-S	Au ppm-S	B ppm-S	Ba ppm-S	Be ppm-S	Bi ppm-S	Cd ppm-S
001	1.5	5	2	2	0.2L	0.5	0.5	1000	10N	10L	700	1.5	50	20N
002	0.2	2	0.5	1	0.2N	0.3	0.5	700	10N	20	300	1L	1000	20N
003	0.5	5	0.7	2	0.2L	0.5	0.5	200	10N	10	500	1	15	20N
004	0.05L	0.07	0.02L	0.2L	0.2N	0.015	0.5N	200N	10N	10L	50	1L	10N	20N
005	0.7	5	0.5	3	0.2N	0.5	0.5L	200N	10N	20	300	2	10N	20N
006	2	7	1.5	2	0.2	0.5	0.5N	200N	10N	10	1000	1L	10N	20N
007	3	7	2	2	0.2	0.7	0.5N	200N	10N	10	1000	1L	10N	20N
008	0.05L	0.05	0.02L	0.2N	0.2N	0.007	0.5N	200N	10N	10L	20	1N	10N	20N
009	0.05L	0.05	0.02L	0.2N	0.2N	0.01	0.5N	200N	10N	10L	30	1N	10N	20N
010	1.5	7	3	3	0.2L	0.7	0.5N	200N	10N	30	700	1L	10N	20N
011	2	7	3	3	0.2L	0.7	0.5N	200N	10N	50	700	1L	10N	20N
012	0.1	5	1	3	0.2L	0.7	0.5	200N	10N	100	300	1	10N	20N
013	1	7	2	5	0.2L	0.5	0.5N	200N	10N	50	700	1N	10N	20N
014	1	5	3	1.5	0.2L	0.7	0.5L	200N	10N	50	1000	1L	10N	20N
015	1	7	3	2	0.2L	0.7	0.5N	200N	10N	30	500	1N	10N	20N
016	0.5	5	0.7	3	0.2L	0.3	0.5N	200N	10N	20	1000	1L	10N	20N
017	0.7	7	2	2	0.2L	0.3	0.5N	200N	10N	20	1000	1L	10N	20N
018	1	7	2	5	0.2L	0.5	0.5N	200N	10N	20	300	1	10N	20N
019	1	7	2	1.5	0.2N	0.5	0.5N	200N	10N	20	700	1	10N	20N
020	1.5	7	3	3	0.2L	0.7	0.5N	200N	10N	30	150	1N	10N	20N
021A	2	7	3	3	0.2L	0.7	0.5N	200N	10N	30	300	1L	10N	20N
021B	0.05L	5	0.3	5	0.2L	0.3	0.5	200N	10N	20	500	1N	10N	20N
022	5	1	0.02	0.2N	0.2N	0.002	0.5N	200N	10N	30	30	1N	10N	20N
023	0.05	2	1	1	0.2N	0.1	0.5N	200N	10N	30	3000	1L	10N	20N
024	5	5	0.7	2	0.2N	0.2	5	200N	10N	20	300	1N	10N	500
024A	0.2	5	0.5	0.2L	0.2N	0.5	1	200N	10N	50	200	1N	10N	20N
024B	5	5	2	1	0.2N	0.2	1	200N	10N	20	500	1N	10N	20N
024C	5	7	5	1.5	0.2N	0.7	0.5N	200N	10N	30	500	1N	10N	20N
024D	5	7	5	1	0.2N	0.5	0.5N	200N	10N	10	300	1N	10N	20N
025	1	3	1.5	5	0.2N	0.5	0.5N	200N	10N	10	1000	1L	10N	20N
026	3	7	2	1.5	0.2	0.3	1	200N	10N	10L	70	1.5	20	20N
026A	2	5	2	2	0.2N	0.7	0.5N	200N	10N	10N	2000	1	10N	20N
026B	1.5	10	1	0.7	0.2	0.2	0.5	200N	10N	20	100	1	10L	20N
026C	5	7	1	1	1.5	0.2	0.5L	200N	10N	15	200	1	10N	20N
026D	2	5	2	1.5	0.2N	0.5	0.5N	200N	10N	10L	1500	1.5	10N	20N
027	0.1	5	2	2	0.2N	0.3	0.5N	200N	10N	20	700	1	10N	20N
028	0.15	5	1	3	0.2L	0.3	0.5L	200N	10N	20	700	1	10N	20N
029	2	5	5	2	0.2N	0.3	0.5N	200N	10N	20	1000	1L	10N	20N
029A	5	3	3	0.2L	0.2N	0.2	0.5L	700	10N	300	200	2	10N	20N
101A	0.05L	10	0.02	0.2N	0.2N	0.05	1.5	10000G	10N	20	70	1N	100	20N
101B	2	5	2	2	0.2N	0.5	0.5N	500	10N	50	500	1.5	10N	20N
101C	2	10	0.5	0.2	0.7	0.2	1.5	10000	10N	20	100	1L	150	20N
101D	1	7	1	2	0.3	0.3	0.5N	200L	10N	100	500	1L	10N	20N
101E	1.5	3	0.7	3	0.2L	0.5	0.5L	200	10N	10	500	2	10N	20N
101F	0.1	5	0.1	1.5	0.2N	0.2	0.5	10000	10N	50	300	1.5	150	20N
102A	0.05	5	0.5	3	0.2L	0.7	0.5	200N	10N	50	300	1L	10N	20N
102B	2	3	2	3	0.2N	0.3	0.5L	200N	10N	50	500	1	10N	20N
103A	1	1.5	0.3	3	0.2N	0.2	0.5N	200N	10N	50	500	1.5	10N	20N
103B	2	7	1.5	2	0.2L	0.5	0.5L	200N	10N	10	500	1N	10N	20N

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Co ppm-S	Cr ppm-S	Cu ppm-S	Ga ppm-S	Ge ppm-S	La ppm-S	Mo ppm-S	Mn ppm-S	Nb ppm-S	Ni ppm-S	Pb ppm-S	Sb ppm-S	Sc ppm-S	Sn ppm-S
001	20	30	200	20	10N	50N	10	1500	20N	70	10N	100N	20	10L
002	15	10L	50	5	10N	50N	5L	500	20N	30	10N	100N	7	10N
003	20	15	200	15	10N	50N	20	700	20N	70	10N	100N	10	10N
004	10N	10N	20	5N	10N	50N	150	50	20N	5N	10N	100N	5N	10N
005	10L	10N	100	50	10N	50L	70	500	20	5N	15	100N	5	10N
006	150	50	200	30	10N	50N	5L	5000G	20N	300	10N	100N	20	15
007	150	50	300	30	10N	50L	5L	5000G	20N	200	10N	100N	30	20
008	10N	10N	5	5N	10N	50N	5N	150	20N	5N	10N	100N	5N	10N
009	10N	10N	5	5N	10N	50N	5N	150	20N	5N	10N	100N	5N	10N
010	15	30	70	50	10N	50N	5N	1000	20N	20	15	100N	30	10N
011	15	50	70	50	10N	50N	5N	1000	20N	15	15	100N	30	10N
012	10	30	70	50	10N	50N	10	500	20N	10	15	100N	30	10N
013	10L	20	20	50	10N	50N	5N	1500	20N	5L	15	100N	20	10N
014	15	20	50	50	10N	50N	5N	700	20N	15	15	100N	20	10N
015	30	50	70	50	10N	50N	5N	3000	20N	70	15	100N	20	10N
016	10L	10L	15	30	10N	50L	5N	1000	20N	5	15	100N	10	10N
017	10	15	70	30	10N	50N	5N	3000	20N	10	15	100N	20	10N
018	50	10	70	30	10N	50N	5N	5000	20N	50	15	100N	20	10N
019	15	20	70	30	10N	50N	7	1500	20N	20	15	100N	15	10N
020	20	70	50	50	10N	50N	5N	1000	20N	50	10	100N	20	10N
021A	30	70	50	50	10N	50N	5N	1000	20N	50	15	100N	20	10N
021B	10N	50	20	20	10N	50N	5N	500	20N	15	15	100N	10	10N
022	10N	10N	5N	30	10N	50N	5N	100	20N	5L	10N	100N	5N	10N
023	10L	10N	20	10	10N	50N	5N	1500	20N	30	10N	100N	7	10N
024	10	70	700	10	10N	50N	5N	5000G	20N	15	20	100N	15	10N
024A	10L	100	50	20	10N	50N	5N	1000	20N	5	30	100N	20	10N
024B	50	15	100	30	10N	50N	5	5000G	20N	20	30	100N	15	10N
024C	50	70	100	30	10N	50N	5N	5000	20N	50	10N	100N	50	10N
024D	70	200	50	30	10N	50N	5N	5000G	20N	100	10L	100N	70	10N
025	20	20	70	50	10N	50N	5N	700	20N	15	10	100N	20	10N
026	30	10N	1000	70	10L	50	50	700	20N	10	10L	100N	15	30
026A	20	50	200	30	10N	50N	5N	1000	20N	50	10L	100N	20	10N
026B	30	10N	300	50	10L	50	10	1000	20N	10	10L	100N	10	20
026C	15	50	200	30	10N	50	5	1000	20N	30	10L	100N	10	10N
026D	10	70	100	50	10N	50N	5N	1500	20N	20	10N	100N	20	10N
027	50	30	70	50	10N	50N	5N	5000G	20N	30	15	100N	20	10N
028	10	50	70	50	10N	50N	10	1000	20N	15	15	100N	15	10N
029	30	500	50	50	10N	50N	5N	1000	20N	200	15	100N	20	10N
029A	15	500	30	30	10N	50N	5N	1000	20N	150	10	100N	10	10N
101A	10N	10N	2000	5N	10N	50N	5N	100	20N	5L	10	100	5L	10N
101B	10	50	70	50	10N	50L	5N	1500	20L	15	10L	100N	10	10
101C	200	10L	2000	5N	10N	50L	5N	1000	20N	100	10L	100N	7	15
101D	15	30	70	50	10N	50N	5N	5000G	20N	20	10L	100N	15	10N
101E	10	10N	50	70	10N	50	5N	700	20	5L	20	100N	5	10N
101F	20	10N	50	20	10N	50N	50	200	20L	5L	10L	100N	5L	10N
102A	10N	100	50	50	10N	50N	5	300	20N	5L	30	100N	30	10N
102B	10L	30	15	50	10N	50N	5N	700	20N	10	20	100N	7	10N
103A	10L	20	5	50	10N	50N	5N	500	20L	5	10	100N	5	10N
103B	15	30	70	50	10N	50N	5N	1500	20N	15	10	100N	30	10N

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Sr ppm-S	Th ppm-S	V ppm-S	W ppm-S	Y ppm-S	Zn ppm-S	Zr ppm-S	Au ppm-AA	Hg ppm-AA	W ppm-VS	Ag ppm-P	As ppm-P	Au ppm-P	Bi ppm-P
001	200	100N	300	20N	30	200N	200	0.75	0.02N	1	0.74	1000	0.4	41
002	100L	100N	70	20N	10	200N	50	1.35	0.02N	2	1.1	980	1.2	400
003	100	100N	150	20N	30	200N	200	0.15	0.02	1	0.54	300	0.15N	12
004	100N	100N	10L	100	10N	200N	10L	0.010	0.02N	22	0.6	130	0.15N	5
005	150	100N	50	20N	15	200N	300	0.006	0.02N	8	0.25	31	0.15N	2.2
006	200	100N	500	20N	50	200N	200	0.008	0.02N	1N	0.3	46	0.15N	2.3
007	300	100N	500	20N	70	200N	200	0.020	0.02N	1N	0.34	100	0.15N	3
008	100N	100N	10L	20N	10N	200N	10N	0.002	0.02N	1N	0.045N	150	0.15N	1.1
009	100N	100N	10L	20N	10N	200N	10N	0.006	0.02N	1	0.045N	94	0.15N	0.6N
010	300	100N	500	20N	30	200L	100	0.002N	0.02N	1N	0.12	4.6	0.15N	0.6N
011	500	100N	300	20N	30	200N	150	0.002N	0.02N	1N	0.045N	2.8	0.15N	0.6N
012	100	100N	500	20N	50	200N	200	0.002N	0.02N	1N	0.33	11	0.15N	0.6N
013	200	100N	200	20N	20	200N	100	0.002N	0.06	1N	0.045N	7.2	0.15N	0.6N
014	200	100N	300	20N	30	200N	150	0.002L	0.02	1N	0.11	100	0.15N	0.6N
015	200	100N	300	20N	30	200N	100	0.002N	0.04	1N	0.094	4.1	0.15N	0.6N
016	100	100N	70	20N	20	200N	100	0.002N	0.02	1N	0.045N	3.7	0.15N	0.6N
017	300	100N	200	20N	20	200N	150	0.002L	0.04	1N	0.073	1.7	0.15N	0.6N
018	150	100N	300	20N	20	200N	150	0.002L	0.02N	1N	0.045N	0.6N	0.15N	0.6N
019	500	100N	200	20N	30	200N	100	0.002N	0.04	1N	0.12	13	0.15N	0.6N
020	150	100N	300	20N	15	200N	100	0.002L	0.04	1N	0.045N	0.6N	0.15N	0.6N
021A	500	100N	300	20N	15	200N	100	0.002L	0.02	1N	0.045N	0.6N	0.15N	0.6N
021B	100	100N	500	20N	20	200N	70	0.002N	0.58	1N	0.31	28	0.15N	0.6N
022	100N	100N	100	20N	10N	200N	10N	0.010	0.02N	2	0.045N	0.6N	0.15N	0.6N
023	150	100N	30	20N	10L	200N	30	0.002L	0.06	1N	0.045N	0.6N	0.15N	0.6N
024	100L	100N	100	20N	10L	10000G	15	0.35	10.4	1N	3	13	0.15N	0.6N
024A	100N	100N	200	20N	10L	700	50	0.20	1.1	1N	1.3	110	0.28	0.6N
024B	150	100N	200	20N	10	200N	50	0.002L	0.06	1N	0.95	10	0.15N	0.6N
024C	700	100N	500	20N	20	200N	50	0.002N	0.02	1N	0.045N	0.6N	0.15N	0.6N
024D	500	100N	500	20N	15	200N	30	0.002N	0.02N	1N	0.045N	0.6N	0.15N	0.6N
025	200	100N	500	20N	20	200N	150	0.002N	0.02N	1	0.078	38	0.15N	0.6N
026	100	100N	200	20L	30	200N	100	0.008	0.02	45	1	8.8	0.15N	26
026A	200	100N	500	20N	20	200N	200	0.004	0.02N	3.3	0.14	0.6N	0.15N	1.5
026B	100	100N	100	30	15	200N	70	0.010	0.02	72	0.55	7.9	0.15N	12
026C	150	100N	150	20N	50	200L	100	0.008	0.02	7	0.19	11	0.15N	1.4
026D	200	100N	300	20N	20	200N	100	0.004	0.02N	2.7	0.092	1.2	0.15N	0.9
027	100	100N	300	20N	30	200N	150	0.002	0.04	1N	0.12	16	0.15N	0.6N
028	150	100N	300	20N	30	200L	150	0.004	0.04	1N	0.37	75	0.15N	0.6N
029	300	100N	150	20N	20	200N	100	0.002N	13.4	1N	0.045N	4.9	0.15N	0.6N
029A	300	100N	100	20N	10	200N	30	0.25	1.4	16.2	0.23	1100	0.22	0.6N
101A	100N	100N	20	20N	10N	200N	15	0.052	0.02N	72	0.045N	3800G	0.15N	57
101B	500	100N	100	20N	15	200N	200	0.002	0.02N	4.4	0.045N	830	0.15N	1.5
101C	100	100N	50	20N	50	200N	30	0.05	0.02N	64	0.045N	3800G	0.15N	75
101D	100	100L	200	20N	20	200N	100	0.004	0.02N	1N	0.21	340	0.15N	4.3
101E	200	100N	50	20N	20	200N	500	0.004	0.02N	3.3	0.09	470	0.15N	1.8
101F	100L	100N	20	20N	10	200N	200	0.3	0.02N	6.3	0.045N	3800G	0.15N	77
102A	150	100N	1000	20N	20	200N	200	0.002N	0.06	1N	0.65	63	0.15N	0.6N
102B	1000	100N	100	20N	10	200N	100	0.002N	0.02N	1N	0.045N	54	0.15N	0.6N
103A	200	100N	30	20N	10L	200N	100	0.002N	0.02	1N	0.045N	39	0.15N	0.6N
103B	200	100N	700	20N	20	200N	100	0.002N	0.04	1N	0.11	13	0.15N	0.78

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Cd ppm-P	Cu ppm-P	Mo ppm-P	Pb ppm-P	Sb ppm-P	Zn ppm-P
001	0.067	180	2.4	2.9	1.2	33
002	0.063	56	4.3	6	10	18
003	0.084	160	21	1.3	1.9	25
004	0.064	32	35	2.4	0.79	3
005	0.10	87	35	4.7	1.3	25
006	0.14	97	0.8	3.2	0.6N	23
007	0.095	140	0.82	2.5	0.72	17
008	0.03N	13	0.41	0.69	0.6N	1.1
009	0.03N	13	0.22	0.65	0.6N	0.85
010	1.3	57	0.44	9.8	0.6N	150
011	0.063	51	0.44	11	0.6N	88
012	0.65	42	7.5	16	1.3	77
013	0.03N	19	0.22	3.2	0.6N	42
014	0.16	41	1.3	7.9	1.2	60
015	0.20	53	0.2	6.3	0.81	90
016	0.059	15	0.2	14	0.6N	43
017	0.038	50	0.1	9	0.6N	65
018	0.03N	58	0.14	12	0.6N	66
019	0.20	52	5.7	24	1.3	69
020	0.076	41	0.35	6.5	0.6N	71
021A	0.078	39	0.39	4.5	0.6N	68
021B	0.031	16	3	18	4.6	49
022	0.03N	0.99	0.09N	0.6N	0.6N	1.1
023	0.03N	29	0.12	5.3	2.3	49
024	390	510	3.5	28	1.2	1400G
024A	4.7	31	1.9	50	1.4	700
024B	0.33	120	6.8	37	1.1	97
024C	0.097	95	0.12	2.1	0.6N	39
024D	0.07	50	0.09N	1.8	0.6N	36
025	0.19	72	0.3	4.1	1.2	81
026	0.13	900	7.2	5.4	1.8	16
026A	0.07	130	0.41	2.4	0.78	48
026B	0.22	200	5.5	4.7	1	41
026C	1.2	160	0.44	3.1	0.6N	91
026D	0.15	120	0.32	2	0.6N	44
027	0.5	68	0.61	18	1.2	110
028	0.97	73	13	14	1.8	140
029	0.13	38	0.61	7.9	9.1	52
029A	0.054	36	2.5	10	60	48
101A	0.03N	780	0.5	5.7	64	0.03N
101B	0.11	46	0.27	3.1	0.73	45
101C	0.03N	630	0.09N	2.1	3	4.9
101D	0.67	64	1.4	3.6	1.7	87
101E	0.093	43	1.1	4.4	0.6N	37
101F	0.03N	11	2.3	2.4	0.6N	4
102A	0.57	48	6.2	36	3.8	77
102B	0.042	14	0.16	18	0.6N	39
103A	0.03N	7.3	0.13	9.3	2.1	14
103B	0.13	56	0.41	4.6	0.76	54

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	LATITUDE	LONGITUDE	SAMPLE TYPE	AREA	ROCK TYPE	NOTES	ORE AND ALTERATION MINERALS
106A	59 58 22	159 31 23	OUTCROP	HIGH LAKE	QTZ.VEIN/SILTSTONE	ALTERED, FELSIC DIKE MARGIN	
106B	59 58 22	159 31 23	OUTCROP	HIGH LAKE	FELSIC DIKE	ALTERED	
106C	59 58 22	159 31 23	OUTCROP	HIGH LAKE	DIORITE DIKE		
108	59 50 59	159 25 30	OUTCROP	UPPER TOGIAK LAKE	GRAYWACKE	Fe STAINED	QTZ STRINGERS
110A	59 21 56	160 14 36	FLOAT	LONE MOUNTAIN	BRECCIA	Fe CARBONATE CEMENTED	
110B	59 21 56	160 14 36	OUTCROP	LONE MOUNTAIN	QTZ VEIN	IN GRANODIORITE	MAFIC IGNEOUS INCLUSIONS
113	59 39 43	159 31 16	OUTCROP	TOGIAK LAKE	PYRITE BAND	10' WIDE, TUFFACEOUS CHERT	MINERALIZATION ADJACENT TO FAULT
114	59 27 04	159 38 50	OUTCROP	ONGIVINUCK RIVER	MAFIC DIKE	1m WIDE, CUTS QTZ DIORITE	
300	59 43 46	159 09 48	RUBBLE	RAINBOW BASIN	HORNFELS	HIGHLY OXIDIZED	ABUNDANT SULFIDES
301	59 43 42	159 09 59	OUTCROP	RAINBOW BASIN	ARGILLITE	OXIDIZED	PYRITE, ARSENOPYRITE
302	59 43 42	159 09 59	OUTCROP	RAINBOW BASIN	ARGILLITE	HIGHLY OXIDIZED, SILICIFIED	SULFIDE VEINS & DISS SULFIDE
303	59 43 42	159 09 59	OUTCROP	RAINBOW BASIN	GRAYWACKE	SILICIFIED	SULFIDE VEINS
304	59 43 43	159 09 44	OUTCROP	RAINBOW BASIN	SULFIDE VEIN	1-2" WIDE,IN SILCFD ARGILLITE	ARSENOPYRITE, PYRITE, QTZ
305	59 43 45	159 09 25	RUBBLE	RAINBOW BASIN	ARGILLITE	SULFIDE VEINLET	PYRITE, SPHALERITE
306	59 43 45	159 09 25	RUBBLE	RAINBOW BASIN	HORNFELS	HIGHLY OXIDIZED,NEAR INTRUSIVE	DISS PYRITE
307	59 43 45	159 09 25	RUBBLE	RAINBOW BASIN	IGNEOUS	HYPABYSSAL?	PYROXENE, HORNBLENDE?, K-FELDSPAR
308	59 45 55	159 14 55	OUTCROP	MT.WASKEY	INTRUSIVE	HIGHLY OXIDIZED, SILICIFIED	
309	59 45 55	159 14 55	TALUS	MT.WASKEY	ARGILLITE	HIGHLY OXIDIZED, SILICIFIED	PYRITE & SPHALERITE STOCKWORKS
310	59 45 55	159 14 55	FLOAT	MT.WASKEY	ARGILLITE	HIGHLY OXIDIZED	DISS PYRITE
311	59 45 55	159 14 55	RUBBLE	MT.WASKEY	GRAYWACKE	1-2" WIDE QTZ VEIN	PYRITE
312	59 50 02	159 16 42	OUTCROP	MT.WASKEY	ARGILLITE	OXIDIZED	
313	59 27 23	159 06 34	OUTCROP	SUNSHINE VALLEY	ARGILLITE	HIGHLY OXIDIZED	QTZ & PYRITE VEINS
314	59 27 26	159 06 33	OUTCROP	SUNSHINE VALLEY	ARGILLITE	HIGHLY OXIDIZED, SILICIFIED	DISS PYRITE
315	59 27 26	159 06 33	OUTCROP	SUNSHINE VALLEY	ARGILLITE	HIGHLY SILICIFIED, OXIDIZED	SMALL QTZ CRYSTALS, PYRITE
316	59 27 30	159 06 51	RUBBLE	SUNSHINE VALLEY	ARGILLITE	SILICIFIED, OXIDIZED	QTZ VEINLET, OXIDIZED SULFIDES
317	59 27 21	159 05 47	FLOAT	SUNSHINE VALLEY	ARGILLITE	OXIDIZED, SILICIFIED	QTZ/PYRITE/ARSENOPYRITE? VEINLET
318	59 27 21	159 05 47	FLOAT	SUNSHINE VALLEY	ARGILLITE	OXIDIZED, SILICIFIED	ARSENOPYRITE? VEIN
319	59 56 26	159 52 38	RUBBLE	TRAIL CREEK	QTZ.VEIN BRECCIA	HIGHLY SILICIFIED	IRREGULAR FINELY CRYSTALLINE QTZ
320	59 56 26	159 52 38	RUBBLE	TRAIL CREEK	GRAYWACKE	BLEACHED, SILICIFIED, CLAY ALT.	
321	59 56 26	159 52 38	RUBBLE	TRAIL CREEK	GRAYWACKE	HIGHLY OXIDIZED & SILICIFIED	VERY SMALL QTZ VEINLETS
322	59 56 26	159 52 38	RUBBLE	TRAIL CREEK	GRAYWACKE	HIGHLY SILICIFIED	STOCKWORKS, TOURMALINE?/HORNBLENDE?
323	59 56 35	159 52 20	TALUS	TRAIL CREEK	GRAYWACKE	SILICIFIED	MINOR DISS PYRITE
324	59 56 43	159 52 26	TALUS	TRAIL CREEK	ARGILLITE	OXIDIZED	PYRITE & ARSENOPYRITE? VEINS, QTZ
325	59 58 30	159 30 38	FLOAT	HIGH LAKE	ARGILLITE	MODERATELY OXIDIZED,SILICIFIED	VEIN & DISS PYRITE
326	59 58 30	159 30 38	FLOAT	HIGH LAKE	GRAYWACKE		QTZ VEINS
327	59 49 10	159 24 57	OUTCROP	UPPER TOGIAK LAKE	ARGILLITE	VERY HIGHLY OXIDIZED	DISS PYRITE, CHALCOPYRITE
328	59 22 21	160 13 23	OUTCROP	LONE MOUNTAIN	GRAYWACKE	HIGHLY OXIDIZED	PYRITE VEINS, CHALCOPYRITE?
329	59 22 20	160 13 38	RUBBLE	LONE MOUNTAIN	GRANITE	BLEACHED, OXIDIZED, CONTACT	DISS PYRITE
330	59 22 23	160 13 14	OUTCROP	LONE MOUNTAIN	HORNFELS	HIGHLY OXIDIZED	PYRITE, SULFIDE VEINS
331	59 22 22	160 13 05	OUTCROP	LONE MOUNTAIN	ARGILLITE	VERY HIGHLY OXIDIZED, GOSSAN	PYRITE, CHALCOPYRITE REPLACEMENT
332	59 22 20	160 13 00	OUTCROP	LONE MOUNTAIN	ARGILLITE	VERY HIGHLY OXIDIZED, GOSSAN	PYRITE, CHALCOPYRITE REPLACEMENT
333	59 41 22	159 49 33	RUBBLE	ATSHICHLUT MT.	ARGILLITE	HIGHLY SILICIFIED, OXIDIZED	DISS PYRITE, PYRITE VEIN
334	59 41 22	159 49 33	RUBBLE	ATSHICHLUT MT.	ARGILLITE	BLCHED,HLY SILICIFIED,OXIDIZED	DISS & VEIN PYRITE
335	59 41 22	159 49 33	RUBBLE	ATSHICHLUT MT.	ARGILLITE	BLEACHED, SILICIFIED, OXIDIZED	DISS & VEIN PYRITE
336	59 41 15	159 49 37	OUTCROP	ATSHICHLUT MT.	ARGILLITE	HLY OXIDIZED,BLEACHED,CLAY ALT.	
337	59 26 37	159 39 41	OUTCROP	ONGIVINUCK RIVER	ARGILLITE	OXIDIZED, BLEACHED	QTZ, CARBONATE VEINS
338	59 26 34	159 39 28	OUTCROP	ONGIVINUCK RIVER	DIORITE	SLIGHTLY OXIDIZED	QTZ, CARBONATE VEINS
339	59 43 11	159 48 43	OUTCROP	KEMUK RIVER	ARGILLITE	HIGHLY OXIDIZED, SILICIFIED	DISS PYRITE, PYRITE & QTZ VEINS

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued

SAMPLE	Ca %-S	Fe %-S	Mg %-S	Na %-S	P %-S	Ti %-S	Ag ppm-S	As ppm-S	Au ppm-S	B ppm-S	Ba ppm-S	Be PP M-S	Bi ppm-S	Cd ppm-S
106A	15	5	3	0.2L	0.2N	0.1	0.5N	200N	10N	20	150	1N	10N	20N
106B	1	1	0.2	3	0.2N	0.2	0.5N	200N	10N	200	300	1L	10N	20N
106C	5	7	7	2	0.2L	0.5	0.5N	200N	10N	10N	300	1N	10N	20N
108	0.05L	7	0.1	0.2L	0.2N	0.15	0.5N	200N	10N	10	150	1N	10N	20N
110A	15	10	5	0.2N	0.2N	0.15	0.5N	300	10N	10L	50	1N	10N	20N
110B	2	5	1.5	3	0.2L	0.5	0.5N	200N	10N	10N	1000	1	10N	20N
113	0.07	7	0.7	3	0.2N	0.5	0.5L	200N	10N	20	150	1N	10N	20N
114	3	5	7	2	0.2N	0.5	0.5N	200N	10N	10	300	1L	10N	20N
300	0.05L	10	0.2	0.2	0.2N	0.2	0.5	5000	10N	70	200	1N	10N	20N
301	2	7	1	3	0.2L	0.7	0.5N	200N	10N	50	300	1	10N	20N
302	0.5	7	1.5	3	0.2N	0.7	0.5N	200N	10N	200	1000	1	10N	20N
303	20	2	0.3	0.7	0.2N	0.2	0.5N	200N	10N	20	20	1N	10N	20N
304	0.05	15	0.5	0.2L	0.2N	0.15	5	10000G	10N	1500	50	1N	150	20N
305	1.5	3	0.7	2	0.2L	0.3	0.5L	200N	10N	10	70	1L	10N	20N
306	0.5	5	1	2	0.2N	0.3	0.5N	200N	10N	1500	300	1L	10N	20N
307	2	5	3	2	0.2L	0.5	0.5N	200N	10N	50	500	1	10N	20N
308	0.7	3	2	3	0.2N	0.5	0.5N	200N	10N	20	300	1L	10N	20N
309	2	5	3	2	0.2N	0.5	0.5	200N	10N	30	500	1L	10N	20N
310	0.5	5	1	1.5	0.2N	0.5	0.5N	200N	10N	200	300	1L	10N	20N
311	2	5	3	2	0.2N	0.5	0.5N	200N	10N	100	500	1N	10N	20N
312	0.7	3	0.2	5	0.2N	0.3	0.5N	200N	10N	150	700	1	10N	20N
313	1	5	2	1.5	0.2N	0.5	0.5N	200N	10N	15	1000	1L	10N	20N
314	1	5	1.5	2	0.2N	0.5	0.5N	200N	10N	10L	700	1N	10N	20N
315	0.3	1	0.3	2	0.2N	0.15	0.5N	200N	10N	70	200	1.5	10N	20N
316	1	3	1	2	0.2N	0.5	0.5N	200N	10N	10L	700	1L	10N	20N
317	1.5	5	3	2	0.2	0.5	0.5N	200N	10N	50	1000	1L	10N	20N
318	1.5	5	2	2	0.2L	1	0.5N	200N	10N	15	1000	2	10N	20N
319	0.05L	0.5	0.1	0.2N	0.2N	0.2	0.7	2000	10N	100	200	1L	10N	20N
320	0.1	1	0.2	1	0.2N	0.3	0.5N	200N	10N	150	500	1L	10N	20N
321	2	7	2	1	0.2L	0.5	0.5N	200N	10N	50	300	1L	10N	20N
322	0.2	3	0.7	0.5	0.2N	0.2	0.5N	700	10N	2000G	20	1N	10N	20N
323	0.7	5	2	2	0.2L	0.7	0.5L	200N	10N	150	1500	1	10N	20N
324	1.5	3	0.7	1.5	0.2N	0.2	0.5N	200N	10N	20	1500	1	10N	20N
325	1	5	2	2	0.2N	0.7	0.5L	200N	10N	30	300	1	10N	20N
326	3	3	3	2	0.2N	0.5	0.5N	200N	10N	10L	200	1L	10N	20N
327	2	7	5	3	0.2N	0.7	0.5N	200N	10N	10L	200	1N	10N	20N
328	2	7	2	2	0.5	0.5	0.5N	200N	10N	10N	300	1L	10N	20N
329	1	2	1	3	0.2N	0.3	0.5N	200N	10N	10N	1000	1L	10N	20N
330	1.5	7	1.5	3	0.3	0.5	0.5N	200N	10N	10L	300	1	10N	20N
331	2	10	1	0.3	0.5	0.3	1.5	200N	10N	10L	70	1L	10N	20N
332	1.5	15	0.7	0.2L	0.5	0.15	1.5	200N	10N	10L	20	1N	10N	20N
333	0.05L	3	0.3	0.2	0.2N	0.3	100	200L	10N	10N	5000G	1N	10N	20N
334	0.05L	7	0.2	0.7	0.2N	0.5	7	200N	10N	10L	5000G	1N	10N	20N
335	0.05L	10	0.7	1	0.2N	0.2	0.5	200N	10N	20	1000	1L	10N	20N
336	0.15	5	0.1	0.2N	0.2N	0.3	50	200N	10N	10N	5000G	1N	10N	20N
337	5	3	2	0.2L	0.2N	0.1	0.5N	200N	10N	70	500	1N	10N	20N
338	7	5	2	2	0.2N	0.3	0.5N	200N	10N	50	500	1N	10N	20N
339	2	5	3	3	0.2N	0.5	0.5N	200N	10N	50	500	1L	10N	20N

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Co ppm-S	Cr ppm-S	Cu ppm-S	Ga ppm-S	Ge ppm-S	La ppm-S	Mo ppm-S	Mn ppm-S	Nb ppm-S	Ni ppm-S	Pb ppm-S	Sb ppm-S	Sc ppm-S	Sn ppm-S
106A	10L	50	20	5N	10N	50N	5N	1000	20N	15	10	100N	5L	10N
106B	10N	10N	5L	50	10N	50L	5N	150	20N	5N	10	100N	5L	10N
106C	50	300	70	50	10N	50N	5N	1000	20N	200	10	100N	30	10N
108	10L	15	10	5N	10N	50N	5N	1500	20N	10	10L	100N	5L	10N
110A	10N	10N	20	10	10N	50N	5N	1500	20N	5L	10L	100N	5L	10N
110B	10	10	7	30	10N	50L	5N	1000	20N	5L	10L	100N	7	10N
113	15	10	70	20	10N	50N	5	700	20N	7	10L	100N	20	10N
114	70	500	30	30	10N	50N	5N	700	20N	500	10L	100N	30	10N
300	20	10N	200	15	10N	50N	5N	500	20N	5N	20	100N	5L	20
301	10	20	70	30	10N	50N	5L	2000	20N	15	10	100N	15	10N
302	30	20	500	30	10N	50N	5N	3000	20N	100	10	100N	20	10N
303	10N	10L	30	10	10N	50L	5N	5000G	20N	7	10N	100N	5	10N
304	200	10N	50	5N	10N	50N	5N	1000	20N	50	30	200	5L	10N
305	10L	10L	100	20	10N	50N	5N	1500	20N	5L	10N	100N	10	10N
306	50	30	50	30	10N	50N	5N	5000	20N	70	10L	100N	20	10N
307	20	100	15	50	10N	50L	5N	1000	20N	30	15	100N	15	10N
308	10	10L	30	50	10N	50N	5N	1500	20N	5L	10L	100N	20	10N
309	30	20	100	50	10N	50N	5N	1000	20N	10	10	100N	20	30
310	20	70	70	30	10N	50N	7	5000	20N	50	10	100N	20	10N
311	15	70	100	30	10N	50N	5N	1500	20N	30	10	100N	30	50
312	10L	10L	7	30	10N	50L	5N	1500	20N	5L	15	100N	7	10N
313	30	15	70	50	10N	50N	5N	1000	20N	50	10N	100N	30	10N
314	20	20	70	50	10N	50N	7	700	20N	20	10L	100N	30	10N
315	10L	15	15	50	10N	50N	5L	700	20N	7	10L	100N	5L	10N
316	50	10	50	30	10N	50N	5N	1500	20N	100	10N	100N	20	10N
317	15	15	70	50	10N	50L	5N	700	20N	15	10L	100N	30	10N
318	15	15	200	70	10N	50N	10	1500	20N	10	20	100N	30	10N
319	10N	10N	5	5L	10N	50N	5N	150	20N	5L	20	150	5L	10N
320	10N	20	10	15	10N	50N	5L	100	20N	5L	10L	100N	10	10N
321	100	20	100	30	10N	50N	10	5000G	20N	150	10	100N	20	10N
322	10L	30	5	15	10N	50N	5N	200	20N	50	10N	100N	15	10N
323	30	30	100	50	10N	50L	5L	1000	20N	100	10	100N	20	10N
324	10L	10L	50	30	10N	50L	5N	1500	20N	5	10L	100N	15	10N
325	15	50	70	50	10N	50N	5N	700	20N	50	15	100N	30	10N
326	15	50	30	30	10N	50N	5N	1000	20N	20	10N	100N	15	10N
327	50	20	300	50	10N	50N	5N	1500	20N	70	10N	100N	50	10N
328	20	70	500	30	10N	50L	5N	5000G	20N	30	10L	100N	20	10N
329	10L	15	200	50	10N	50N	5N	150	20N	5	10L	100N	5	10N
330	20	70	300	50	10N	50N	5	5000G	20N	20	10N	100N	20	10N
331	70	20	700	15	10N	50N	5	1000	20N	50	10L	100N	15	10N
332	50	10L	1000	10	10N	50N	5N	500	20N	70	10L	100N	5	10N
333	10L	10	200	15	10N	50N	5N	150	20N	7	300	100N	7	10N
334	10N	50	50	20	10N	50N	30	150	20N	5N	100	100N	20	10N
335	10L	30	200	30	10N	50N	50	300	20N	15	50	100N	20	10N
336	15	50	70	15	10N	50N	50	150	20N	20	200	100N	10	10N
337	10N	10L	5	5L	10N	50N	5N	1500	20N	5N	10N	100N	5	10N
338	20	150	20	50	10N	50N	5N	1000	20N	70	20	100N	15	10N
339	15	50	70	70	10N	50N	5N	1000	20N	30	15	100N	30	10N

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Sr ppm-S	Th ppm-S	V ppm-S	W ppm-S	Y ppm-S	Zn ppm-S	Zr ppm-S	Au ppm-AA	Hg ppm-AA	W ppm-VS	Ag ppm-P	As ppm-P	Au ppm-P	Bi ppm-P
106A	1000	100N	20	20N	10L	200N	10	0.002N	0.02	1N	0.045N	9.7	0.15N	0.6N
106B	100L	100N	20	20N	10L	200N	100	0.002N	0.02	1N	0.045N	6.5	0.15N	0.6N
106C	150	100N	500	20N	15	200N	100	0.002N	0.02N	1N	0.052	8	0.15N	0.6N
108	100N	100N	50	20N	10	200N	20	0.002N	0.08	1N	0.045N	26	0.15N	0.6N
110A	200	100N	50	20N	10L	200N	20	0.15	1.9	1N	0.045N	460	0.15N	0.6N
110B	300	100N	100	20N	10	200N	100	0.002N	0.02N	1N	0.045N	83	0.15N	0.6N
113	100L	100N	200	20N	15	200N	100	0.002N	0.64	1N	0.27	14	0.15N	0.6N
114	200	100N	200	20N	15	200N	100	0.002L	0.02N	2.5	0.045N	86	0.15N	0.6N
300	100N	100N	20	20N	10	200N	50	0.002L	0.02N	1N	0.39	2000	0.15N	1.7
301	500	100N	200	20N	30	200N	500	0.002N	0.02N	1N	0.24	91	0.15N	3
302	150	100N	700	20N	30	200N	300	0.002N	0.02	1N	0.29	59	0.15N	0.72
303	150	100N	50	20N	30	500	30	0.002N	0.02N	1N	0.16	38	0.15N	1.1
304	100N	100N	50	20N	10	500	30	1.4	0.02N	3	1.8	3800G	0.15N	81
305	100L	100N	100	20N	30	200N	200	0.002N	0.02N	1	0.25	150	0.15N	0.93
306	200	100N	300	20N	30	200N	200	0.002N	0.02N	1N	0.21	130	0.15N	1.2
307	500	100N	150	20N	15	200N	150	0.002N	0.02N	1N	0.059	43	0.15N	0.6N
308	200	100N	100	20N	20	200N	150	0.002N	0.02N	1N	0.085	26	0.15N	0.6N
309	300	100N	200	20N	30	200N	200	0.002N	0.02N	1N	0.47	19	0.15N	1.6
310	150	100N	500	20N	30	200N	150	0.002L	0.02N	1N	0.36	43	0.15N	0.76
311	500	100N	300	20N	15	200N	100	0.002N	0.02N	1N	0.18	38	0.15N	1.3
312	100	100N	50	20N	20	200N	200	0.002N	0.02	1N	0.06	20	0.15N	0.6N
313	150	100N	200	20N	30	200N	200	0.002L	0.02N	1N	0.054	18	0.15N	0.67
314	150	100N	300	20N	20	200N	100	0.002L	0.02N	1N	0.078	1.7	0.15N	0.6N
315	100L	100N	20	20N	10L	200N	50	0.002N	0.02	1	0.045N	2.8	0.15N	0.6N
316	200	100N	200	20N	20	200N	100	0.008	0.04	2.1	0.045N	14	0.15N	0.98
317	200	100N	200	20N	50	200N	200	0.002L	0.02N	1N	0.07	0.6N	0.15N	0.78
318	500	100N	300	20N	50	200N	200	0.006	0.1	2	0.13	0.8	0.15N	1
319	100N	100N	50	20N	10L	200N	30	0.15	0.02	1	0.22	3800G	0.15N	0.6N
320	100	100N	500	20N	20	200N	150	0.002N	0.02N	1N	0.045N	81	0.15N	0.88
321	150	100N	300	20N	20	200N	100	0.002	0.02N	1N	0.13	56	0.15N	0.6N
322	100	100N	300	20N	20	200N	100	0.008	0.02	1N	0.045N	870	0.15N	11
323	200	100N	700	20N	70	200	300	0.002	0.02	1N	0.28	48	0.15N	0.6N
324	300	100N	50	20N	30	200N	200	0.002N	0.02N	1N	0.049	6.9	0.15N	0.6N
325	200	100N	1000	20N	50	200N	200	0.002N	0.06	1N	0.19	0.66	0.15N	0.6N
326	200	100N	200	20N	10	200N	100	0.002N	0.02N	1N	0.045N	0.6N	0.15N	0.6N
327	100	100N	1000	20N	30	200N	50	0.002	0.02N	1N	0.045N	2	0.15N	0.6N
328	150	100N	300	20N	50	200N	150	0.002	0.02N	4	0.27	0.6N	0.15N	1.8
329	300	100N	70	20N	10	200N	50	0.002N	0.02N	10	0.13	0.6N	0.15N	0.62
330	150	100N	300	20N	50	200N	150	0.002	0.02N	14	0.25	0.6N	0.15N	2.9
331	100	100N	150	20N	20	200N	50	0.004	0.02N	12	1.2	0.6N	0.15N	8.2
332	100L	100N	100	50	10	200N	30	0.008	0.02N	37	0.83	0.6N	0.15N	9.6
333	300	100N	150	20N	10N	200N	50	0.15	0.84	1N	27	150	0.15N	0.6N
334	700	100N	200	20N	10N	200N	30	0.002L	0.60	1N	5.3	28	0.15N	0.6N
335	100N	100N	200	20N	10L	200L	50	0.002	0.04	1	0.39	1.8	0.15N	0.63
336	200	100N	200	20N	10L	1000	30	0.40	1.8	1N	17	37	0.15N	0.6N
337	500	100N	50	20N	10	200N	15	0.002N	0.02	1N	0.045N	0.6N	0.15N	0.6N
338	300	100N	150	20N	10	200N	30	0.002L	0.82	1	0.093	8.3	0.15N	0.6N
339	500	100N	200	20N	30	200N	100	0.002L	0.02	1N	0.13	0.6N	0.15N	0.6N

Table 3. Geologic and geochemical data for rock samples from the eastern portion of the Goodnews Bay quadrangle, Alaska -- Continued.

SAMPLE	Cd ppm-P	Cu ppm-P	Mo ppm-P	Pb ppm-P	Sb ppm-P	Zn ppm-P
106A	0.06	11	0.3	9.1	2	14
106B	0.056	4	0.09N	16	0.6N	22
106C	0.058	54	0.26	8.6	0.78	55
108	0.18	9.6	0.28	8.7	4.9	46
110A	0.03N	16	0.17	3.8	11	25
110B	0.057	7.7	0.21	2.9	0.6N	38
113	0.28	45	5	6.4	1.4	59
114	0.03N	22	0.25	1.4	2.6	31
300	0.03N	150	0.65	14	10	7.4
301	0.07	41	0.33	7.8	1.9	32
302	0.53	61	0.37	4.5	6.3	91
303	12	24	3.1	2.4	0.76	710
304	3.2	2	0.09N	25	58	0.03N
305	0.18	95	0.83	3.3	1.9	32
306	2.6	52	0.82	4.6	4	140
307	0.072	16	0.17	10	1.5	61
308	0.26	24	0.44	7.7	3.7	55
309	0.12	130	0.28	8.1	2.3	34
310	0.33	62	2	13	4.5	80
311	0.14	97	0.11	5	3	27
312	0.1	7.3	0.27	18	0.83	45
313	0.035	50	0.16	2.6	0.67	71
314	0.03N	64	3.7	1.9	0.77	28
315	0.03N	20	3.9	9.6	0.6N	9.5
316	0.03N	41	1.5	1.8	0.78	20
317	0.03N	49	0.29	2	0.6N	57
318	0.067	240	2.5	3.9	1.1	58
319	0.03N	6.2	0.4	59	5.4	1.1
320	0.03N	13	4.3	7.8	3.9	1.8
321	0.13	130	0.78	5.2	5.4	75
322	0.12	7.6	1	4.6	2.4	6.2
323	2	65	0.88	9.7	4.6	230
324	0.13	37	0.16	7.8	0.73	53
325	0.18	44	0.58	20	1.4	58
326	0.069	28	0.26	6.1	0.6N	45
327	0.059	250	0.21	1.5	0.6N	72
328	0.043	340	0.16	2.2	0.77	44
329	0.11	170	0.48	9	0.6N	11
330	0.041	330	0.29	1.8	0.86	31
331	0.2	670	0.13	7.3	2.3	17
332	0.19	520	0.16	3	1.4	12
333	0.71	150	2.4	310	3.5	69
334	0.03N	31	27	77	1.6	66
335	0.13	170	52	65	2.2	95
336	2.2	37	18	240	5	570
337	0.032	3.6	0.27	4.3	0.6N	22
338	0.17	29	0.24	17	0.6N	61
339	0.15	50	0.43	17	0.6N	89