UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Analytical results and sample locality map of stream-sediment, heavy-mineral-concentrate, rock, and water samples from the North Pole Ridge (OR-005-008), Thirtymile (OR-005-001), and Lower John Day (OR-005-006) Wilderness Study Areas, Sherman and Gilliam Counties, Oregon

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the North Pole Ridge, Thirtymile, and Lower John Day Wilderness Study Areas, Sherman and Gilliam Counties, Oregon.

INTRODUCTION

In June 1986, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the North Pole Ridge (OR-005-008), Thirtymile (OR-005-001), and Lower John Day (OR-005-006) Wilderness Study Areas (WSA) located from south to north along the John Day River between Clarno and Cottonwood Canyon, Sherman and Gilliam Counties, Oregon (fig. 1). Additional outcrop samples were collected during geologic mapping studies in 1985 and 1987. The North Pole Ridge WSA covers 5,830 acres (9 mi^2) (24 km^2), Thirtymile WSA covers 7,332 acres (11 mi^2) (30 km^2), and Lower John Day WSA covers 15,470 acres (24 mi^2) (62 km^2) in north-central Oregon within the Columbia River Plateau physiograhic province. Elevations within the three WSAs range from 640 feet at the north end of the Lower John Day WSA to 2,947 feet on Horse Mountain at the south end of the North Pole Ridge WSA. Dirt roads provide access to much of the upland area on the plateau surface but roads descend to river level at only four places in or near the WSAs. The canyon country along the John Day River is best accessed by river raft, floating the river between Clarno and Cottonwood Bridges at times of adequate water flow.

The John Day River follows a meandering coarse between the two bridges. The river and the major tributaries have cut deep canyons into the gently rolling upland surface of the Columbia River Plateau. Vegetation consists primarily of grasses and shrubs common to the semiarid region; pine trees are common near the river and luxuriant growth occurs around perennial springs.

The John Day River and its tributaries within the three WSAs have cut into the Grande Ronde Basalt which comprises the thickest and most voluminous flow in the Columbia River Basalt Group of Miocene age (Bela, 1982). Numerous individual flows occur, some forming cliffs, some showing columnar jointing. Ash and pyroclastic material are interbedded with the basalt flows. The underlying Oligocene John Day Formation is exposed at Butte Creek, immediately upstream from the south end of the North Pole Ridge WSA. The Middle Miocene Picture Gorge Basalt lies between the John Day and Grande Ronde Formations and is exposed in places along the John Day River in the southwest portion of the North Pole Ridge WSA. Landslide deposits are common along the river in the North Pole Ridge WSA.

METHODS OF STUDY

Sample Media

Analyses of the stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Heavy-mineral-concentrate samples provide information about the chemistry of

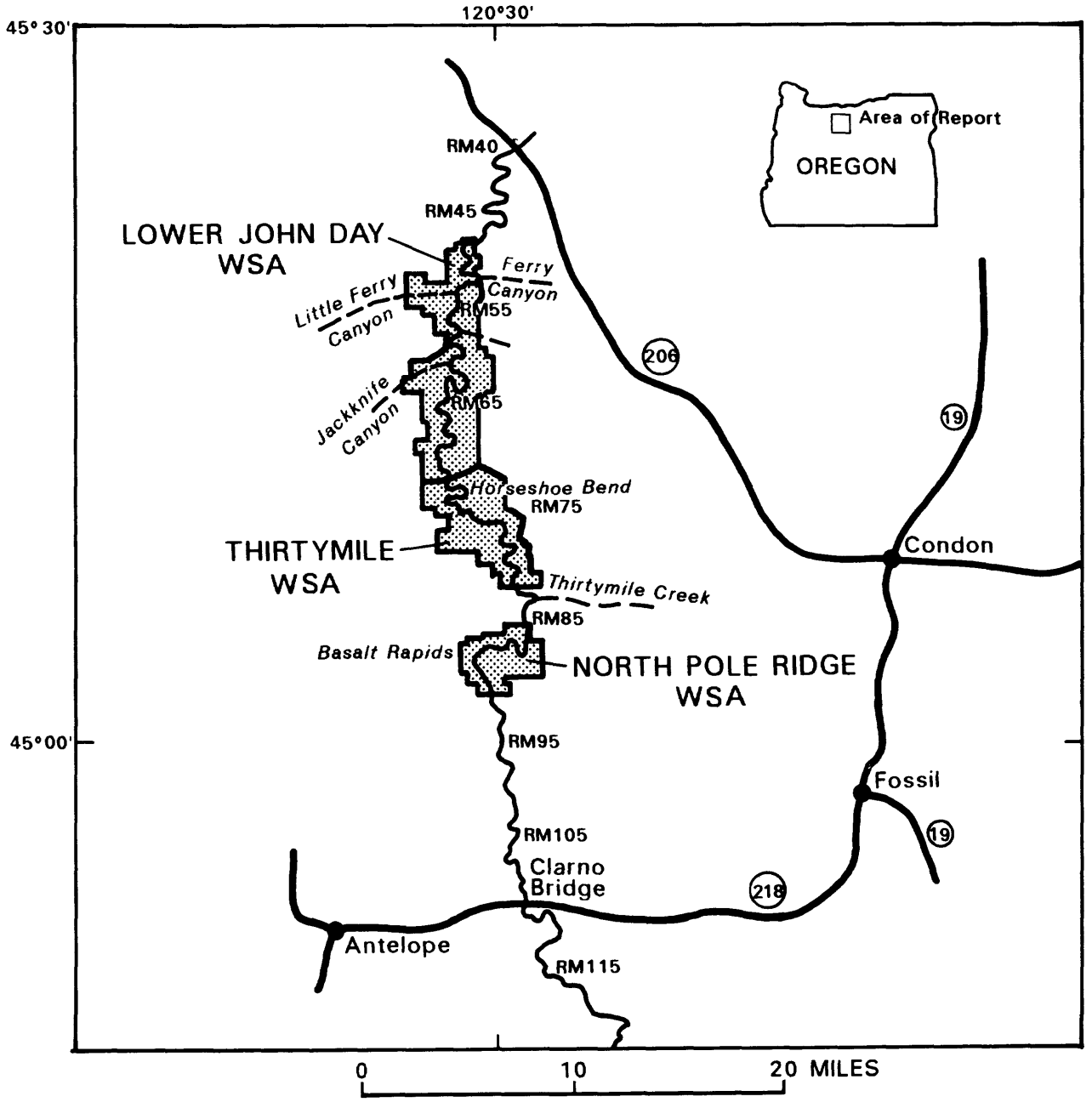

Figure 1. Location map of the North Pole Ridge (OR-5-8), Thirtymile (OR-5-1), and Lower John Day (OR-5-6) Wilderness Study Areas, Sherman and Gilliam Counties, Oregon.

certain minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals, many of which may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples.

Analyses of unaltered or unmineralized rock samples provide background geochemical data for individual rock units. On the other hand, analyses of altered or mineralized rocks, where present, may provide useful geochemical information about the major- and trace-element assemblages associated with a mineralizing system.

Sample Collection

Heavy-mineral-concentrate samples were collected at 57 sites; stream-sediment samples were collected at 56 sites; and rocks were collected at 76 sites (plate 1). Four springs were also sampled. Sampling density was one sample site per 1.3 mi^2 for the stream sediments, 1.4 mi^2 for the heavy-mineral concentrates and 2 mi^2 for the rocks. Typical drainage basins samples ranged from 0.5 to 1 mi^2 in surface area but major tributaries draining several mi^2 were also sampled.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on USGS topographic map. Each sample was composited from several localities within an area that may extend as much as 20 ft from the site plotted on the map.

Heavy-mineral-concentrate samples

Heavy-mineral-concentrate samples were collected from the same active alluvium as the stream-sediment samples. Each bulk sample was screened with a 2.0-mm (10-mesh) screen to remove the coarse material. The less than 2.0-mm fraction was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Bulk panned-concentrate samples

A heaping 16-inch pan (approximately 20 lb or 9 kg) of active alluvium was panned until most of the quartz, feldspar, organic material, and clay-sized material were removed.

Rock samples

Rock samples with NPR, TM, or LJD prefixes were primarily stream cobbles and may in some cases have come from areas outside the WSA boundaries. The other rock samples are outcrop samples collected during geologic mapping studies. Descriptions of rock samples are in table 6.

Water samples

Unfiltered, unacidified water samples were collected at four springs. The four water samples were analyzed only for uranium and had the following values: NPR004W, 0.14 ppb; TM 015W, <0.10 ppb; TM107W, 0.12 ppb; and <JD 020W, <0.10 ppb.

Sample Preparation

The stream-sediment samples were air dried, then sieved using 80-mesh (0.17-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was saved for analysis.

After air drying, bromoform (specific gravity 2.8) was used to remove the remaining quartz and feldspar from 57 heavy-mineral-concentrate samples that had been panned in the field. The resultant heavy-mineral sample was separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material, primarily magnetite, was not analyzed. The second fraction, largely ferromagnesian silicates and iron oxides, was saved for archival storage. The third fraction (the least magnetic material which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis. These magnetic separates are the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope of 15° and a tilt of 10° with a current of 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

The remaining 11 bulk panned concentrates were collected specifically for gold analysis. After drying, magnetite was removed by passing the sample several times through a vertical chute attached to an electromagnet.

Rock samples were crushed and then pulverized to minus 0.15 mm with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment, heavy-mineral-concentrate, and rock samples were analyzed for 31 or 35 elements using semiquantitative, direct-current arc emission spectrographic methods. The analyses for heavy-mineral-concentrate and stream-sediment samples were performed by analysts in the Branch of Exploration Geochemistry using the method of Grimes and Marranzino (1968); analyses for rock samples were performed by analysts in the Branch of Analytical Chemistry using the method of Myers and others (1961). The elements analyzed for and their lower limits of determination are listed in table 1. For arsenic (As), gold (Au), cadmium (Cd), lanthanum (La), and thorium (Th), the lower limits of determination for the two analytical methods varies. The values in the parentheses are the limits of determination for Myers and others (1961). Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements, iron, magnesium, calcium, and titanium, are given in weight percent; all others are given in parts per million (micrograms/gram). Analytical data for samples from the North Pole Ridge, Thirtymile and Lower John Day WSAs are listed in tables 3, 4, and 5.

Chemical methods

Samples from these study areas were also analyzed by other chemical methods. Rocks and stream sediments were analyzed for gold and mercury using atomic absorption spectroscopy (AA) and for arsenic, antimony, zinc, bismuth, and cadmium using inductively coupled plasma-atomic emission spectroscopy (ICP). Stream sediments were analyzed for uranium and thorium using delayed neutron activation (DN); rocks were analyzed for uranium using fluorometry (F); and water samples were analyzed for uranium using Scintrex Corporation UA-3 analyzer. Heavy-mineral concentrates were analyzed for gold using atomic absorption spectroscopy. Bulk panned-concentrates, stream-sediments, and rocks were analyzed for gold using flameless atomic absorption spectroscopy (FAA). See table 2 for references to these methods.

Analytical results for stream-sediment, heavy-mineral-concentrate, and rock samples are listed in tables 3, 4, and 5, respectively.

DATA STORAGE SYSTEM

Upon completion of all analytical work, the analytical results were entered into either a computer-based file called Rock Analysis Storage System (RASS) or a computer data base called PLUTO. These data bases contain both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

Tables 3-6 list the results of analyses for the samples of stream sediment, heavy-mineral concentrate, rock, and bulk panned concentrate respectively. For the three tables, the data are arranged so that column 1 contains the USGS-assigned sample numbers. The NPR, TM, and LJD prefixes have been dropped from the sample numbers for stream-sediment, panned-concentrate, stream-cobble, and float samples on the sample location map (plate 1). Columns in which the element headings show the letter "s" below the element symbol are emission spectrographic analyses; "aa" indicates atomic absorption analyses; "icp" indicates inductively coupled plasma-atomic emission spectroscopy; "faa" indicates flameless atomic absorption analyses; and "dn" indicates delayed neutron activation analyses. A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination shown for that element in tables 1 or 2. For emission spectrographic analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was observed but was below the lowest reporting value. For AA and ICP analyses, a "less than" symbol (<) entered in the tables in front of the lower limit of determination indicates that an element was below the lowest reporting value. If an element was observed but was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. If an element was not looked for in a sample, two dashes (--) are entered in tables 3-6 in place of an analytical value. Because of the formatting used in the computer program that produced tables 3-6, some of the elements listed in these tables (Fe, Mg, Ca, Ti, and Be) carry one or more nonsignificant digits to the right of the significant digits. The analysts did not determine these elements to the accuracy suggested by the extra zeros.

Gold was detected but not quantifiable in five of the 40 heavy-mineral-concentrate samples analyzed. These samples are starred (**) in tables 4A-4C. Due to the very small sample size used, the results are qualitative rather than a quantitative and, therefore, we will only report whether or not gold was detected.

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TABLE 1.--Limits of determination for the spectrographic analysis of rocks and stream sediments, based on a 10-mg sample

[The values shown are the lower limits of determination assigned by the Grimes and Marranzino method, except for those values in parentheses, which are the lower values assigned by the Myers and others method. The spectrographic limits of determination for heavy-mineral-concentrate samples are based on a 5-mg sample, and are therefore two reporting intervals higher than the limits given for rocks.]

Elements	Lower determination limit		Upper determination limit
	Percent		
Iron (Fe)	0.05		20
Magnesium (Mg)	.02		10
Calcium (Ca)	.05		20
Titanium (Ti)	.002		1
Sodium (Na)	0.2		5
Phosphorus (P)	0.2		10
	Parts per million		
Manganese (Mn)	10		5,000
Silver (Ag)	0.5		5,000
Arsenic (As)	200	(700)	10,000
Gold (Au)	10	(15)	500
Boron (B)	10		2,000
Barium (Ba)	20		5,000
Beryllium (Be)	1		1,000
Bismuth (Bi)	10		1,000
Cadmium (Cd)	20	(30)	500
Cobalt (Co)	5		2,000
Chromium (Cr)	10		5,000
Copper (Cu)	5		20,000
Gallium (Ga)	5		500
Germanium (Ge)	10		100
Lanthanum (La)	20	(30)	1,000
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
Vanadium (V)	10		10,000
Tungsten (W)	50		10,000
Yttrium (Y)	10		2,000
Zinc (Zn)	200		10,000
Zirconium (Zr)	10		1,000
Thorium (Th)	100	(200)	2,000

TABLE 2.--Chemical methods used

[AA = atomic absorption; FAA = flameless atomic absorption; ICP = inductively coupled plasma spectroscopy; DN = delayed neutron; and F = fluorometry]

Element or constituent determined	Sample type	Method	Determination limit (micrograms/ gram or ppm)	Reference
Gold (Au)	rocks and sediments	AA	.1	Modification of Thompson and others, 1968.
Gold (Au)	bulk panned-, concentrates, rocks, and sediments	FAA	0.002	Meier, A. L., 1980.
Gold (Au)	concentrates	AA	0.05	Thompson and others, 1968.
Mercury (Hg)	rocks and sediments	AA	0.02	Koirtyohann and Khalil, 1976.
Arsenic (As)	rocks and sediments	ICP	5	Crock and others, 1987
Antimony (Sb)	rocks and sediments	ICP	2	
Cadmium (Cd)	rocks and sediments	ICP	2	
Bismuth (Bi)	rocks and sediments	ICP	2	
Zinc (Zn)	rocks and sediments	ICP	0.1	
Thorium (Th)	sediments	DN		Millard, 1976.
Uranium (U)	sediments	DN		Millard, 1976.
Uranium (U)	rocks	F	0.05	Modification of Centanni and others, 1956.
Uranium (U)	water	F		Scintrex Corporation, 1978.

Table 3A. Results of analyses of stream-sediment samples from the North Pole Ridge Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
NPR001	45 6 15	120 30 18	7.0	2.0	2.0	1.00	1,000	N	N	N	20	300	1.0
NPR003	45 6 7	120 29 40	5.0	1.5	2.0	.70	1,000	N	N	N	20	300	1.0
NPR004	45 6 14	120 29 5	15.0	3.0	3.0	>1.00	2,000	N	N	N	10	200	N
NPR005	45 6 31	120 28 17	3.0	1.5	1.5	.50	700	N	N	N	50	300	1.5
NPR006	45 6 35	120 27 32	5.0	1.5	1.5	.70	1,000	N	N	N	30	500	1.0
NPR007	45 6 47	120 27 42	5.0	1.5	2.0	.70	1,000	N	N	N	20	200	<1.0
NPR008	45 7 25	120 27 58	10.0	2.0	2.0	.70	1,500	N	N	N	30	300	1.0
NPR009	45 7 24	120 27 52	5.0	1.5	1.5	.70	1,000	N	N	N	50	300	1.0
NPR010	45 8 54	120 28 42	1.5	.7	.7	.15	500	N	N	N	50	200	2.0
NPR100	45 6 22	120 29 46	5.0	1.5	1.5	.50	1,000	N	N	N	20	300	1.5
NPR101	45 5 59	120 27 40	5.0	1.5	1.5	.70	700	N	N	N	50	300	1.5
NPR102	45 5 58	120 27 44	5.0	1.5	2.0	.70	1,000	N	N	N	30	300	1.0
NPR103	45 7 29	120 27 20	3.0	1.5	1.5	.30	700	N	N	N	100	500	1.0
NPR104	45 8 8	120 27 50	7.0	2.0	2.0	>1.00	1,500	N	N	N	15	300	1.0

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
NPR001	N	N	20	30	20	N	N	N	20	10	N	20	N	300	200
NPR003	N	N	20	50	15	N	N	N	20	10	N	15	N	300	150
NPR004	N	N	50	200	70	N	N	N	50	N	N	50	N	200	700
NPR005	N	N	15	50	15	<50	N	N	15	10	N	15	N	200	100
NPR006	N	N	20	50	15	<50	N	N	20	10	N	15	N	200	200
NPR007	N	N	20	100	30	N	N	N	20	10	N	20	N	200	200
NPR008	N	N	30	50	30	N	N	N	30	15	N	15	N	300	200
NPR009	N	N	20	50	15	N	N	N	20	N	N	15	N	300	150
NPR010	N	N	7	<10	10	N	N	N	7	<10	N	10	N	150	100
NPR100	N	N	15	50	15	N	N	N	10	<10	N	15	N	300	150
NPR101	N	N	15	30	15	N	N	N	10	10	N	15	N	200	200
NPR102	N	N	15	30	15	N	N	N	15	20	N	15	N	300	200
NPR103	N	N	15	50	10	<50	N	N	15	15	N	10	N	300	100
NPR104	N	N	30	70	15	<50	N	N	30	15	N	20	N	300	200

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Au-ppm faa	Th-ppm dn	U-ppm dn	Au-ppm aa
NPR001	N	20	N	100	N	.03	<5	<2	<.1	<2	58	N	4.48	1.470	<.1
NPR003	N	15	N	100	N	.02	<5	<2	<.1	<2	60	N	4.29	1.350	<.1
NPR004	N	20	N	50	N	.04	<5	<2	.2	<2	91	N	2.00	.759	<.1
NPR005	N	20	N	150	N	.03	<5	<2	.2	<2	56	N	4.66	1.690	<.1
NPR006	N	20	N	100	N	.03	6	<2	.3	<2	60	N	6.52	1.620	<.1
NPR007	N	15	N	70	N	.04	<5	<2	.1	<2	61	N	5.51	1.110	<.1
NPR008	N	30	N	100	N	.02	<5	<2	.3	<2	68	N	6.48	1.380	<.1
NPR009	N	20	N	100	N	.03	<5	<2	.2	<2	54	N	6.58	1.590	<.1
NPR010	N	15	N	70	N	.06	<5	<2	.2	2	50	N	7.20	1.680	<.1
NPR100	N	20	N	100	N	.03	<5	<2	.2	<2	58	--	5.00	1.840	<.1
NPR101	N	20	N	100	N	.03	<5	<2	<.1	<2	49	.002	5.17	1.840	<.1
NPR102	N	20	N	100	N	.02	<5	<2	.1	<2	58	.006	3.30	2.050	<.1
NPR103	N	20	N	150	N	<.02	<5	<2	.2	<2	38	.002	5.10	2.270	<.1
NPR104	N	20	N	150	N	.02	<5	<2	.2	<2	62	N	4.19	1.650	--

Table 3B. Results of analyses of stream-sediment samples from the Thirtymile Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
TM011	45 10 35	120 28 18	7	2.0	2.0	1.0	1,000	N	N	N	10	300	1.5
TM012	45 11 15	120 28 49	5	1.5	2.0	1.0	1,000	N	N	N	30	300	1.0
TM013	45 11 15	120 28 47	7	2.0	2.0	1.0	1,500	N	N	N	20	300	1.0
TM014	45 12 15	120 31 4	7	2.0	2.0	1.0	1,500	N	N	N	30	500	1.0
TM015	45 12 40	120 32 31	5	2.0	2.0	1.0	1,000	N	N	N	15	200	1.0
TM105	45 10 49	120 29 16	5	1.0	1.5	.5	1,000	N	N	N	30	300	1.0
TM106	45 11 19	120 29 2	15	1.5	2.0	1.0	1,000	N	N	N	20	500	1.0
TM108	45 11 54	120 29 45	5	1.5	1.5	.3	700	N	N	N	30	500	1.0
TM109	45 12 32	120 32 8	5	1.0	1.0	.5	700	N	N	N	20	200	1.0
TM110	45 12 43	120 32 34	5	1.5	1.5	1.0	1,000	N	N	N	10	300	1.0
TM111	45 12 50	120 32 35	5	2.0	2.0	.7	1,000	N	N	N	30	500	1.0

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
TM011	N	N	30	20	20	<50	N	N	10	<10	N	20	N	200	200
TM012	N	N	20	50	20	<50	N	N	15	10	N	15	N	300	150
TM013	N	N	30	100	10	<50	N	N	20	10	N	20	N	200	200
TM014	N	N	30	50	15	<50	N	N	20	10	N	20	N	300	200
TM015	N	N	20	100	20	N	N	N	20	<10	N	20	N	300	200
TM105	N	N	15	30	10	N	N	N	15	10	N	15	N	200	150
TM106	N	N	30	50	15	N	N	N	15	10	N	15	N	300	200
TM108	N	N	15	50	15	N	N	N	10	15	N	15	N	200	100
TM109	N	N	20	30	10	N	N	N	15	<10	N	15	N	200	200
TM110	N	N	20	30	10	N	N	N	10	10	N	15	N	300	200
TM111	N	N	20	30	10	N	N	N	10	10	N	15	N	300	200

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Au-ppm faa	Th-ppm dn	U-ppm dn	Au-ppm aa
TM011	N	30	N	100	N	.03	<5	<2	.2	<2	69	N	5.09	1.66	<.1
TM012	N	30	N	100	N	.03	<5	<2	.2	<2	58	N	3.90	2.05	<.1
TM013	N	50	N	200	N	<.02	<5	<2	<.1	<2	60	N	4.50	1.92	<.1
TM014	N	30	N	150	N	<.02	<5	<2	.1	<2	51	N	4.90	1.96	<.1
TM015	N	20	N	100	N	.02	<5	<2	.3	<2	64	.150	2.50	1.42	<.1
TM105	N	15	N	100	N	.02	<5	<2	.2	<2	58	N	3.60	1.93	<.1
TM106	N	20	N	150	N	.02	<5	<2	.2	<2	64	.002	5.22	1.77	<.1
TM108	N	20	N	150	N	.02	<5	<2	.1	<2	54	N	<2.40	2.23	<.1
TM109	N	20	N	150	N	<.02	<5	<2	.2	<2	61	.002	4.70	1.80	<.1
TM110	N	20	N	150	N	.03	<5	<2	.3	<2	57	N	3.30	1.84	<.1
TM111	N	20	N	150	N	<.02	<5	<2	.2	<2	55	N	4.20	2.00	<.1

Table 3C. Results of analyses of stream-sediment samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
LJD016	45 14 2	120 32 23	5	2.0	1.5	1.0	1,000	N	N	N	20	300	<1.0
LJD017	45 14 48	120 32 35	5	1.5	1.5	.7	700	N	N	N	50	300	1.5
LJD018	45 14 38	120 33 5	2	1.5	1.0	.3	700	N	N	N	30	200	1.0
LJD019	45 16 2	120 32 40	7	2.0	2.0	1.0	1,000	N	N	N	15	300	<1.0
LJD020	45 16 40	120 32 15	15	3.0	3.0	>1.0	1,000	N	N	N	10	200	<1.0
LJD021	45 17 50	120 32 42	7	2.0	2.0	1.0	1,500	N	N	N	15	300	<1.0
LJD022	45 18 4	120 31 17	5	2.0	2.0	1.0	1,000	N	N	N	20	300	1.0
LJD024	45 19 2	120 32 35	15	3.0	3.0	>1.0	2,000	N	N	N	10	300	1.0
LJD025	45 18 41	120 33 55	5	1.5	2.0	.7	1,000	N	N	N	20	300	1.0
LJD026	45 19 8	120 33 22	7	1.5	2.0	>1.0	1,000	N	N	N	30	500	1.0
LJD028	45 20 23	120 31 49	5	1.5	1.5	1.0	700	N	N	N	50	300	1.0
LJD029	45 21 5	120 31 59	5	1.5	2.0	.7	700	N	N	N	20	300	1.0
LJD030	45 21 55	120 32 5	5	1.5	2.0	1.0	700	N	N	N	50	500	1.0
LJD032	45 23 0	120 30 58	5	2.0	2.0	1.0	700	N	N	N	30	300	1.0
LJD033	45 24 5	120 31 46	7	2.0	2.0	1.0	1,000	N	N	N	20	300	1.0
LJD112	45 14 3	120 32 33	10	2.0	2.0	>1.0	1,500	N	N	N	20	700	1.0
LJD113	45 15 15	120 33 10	7	2.0	2.0	1.0	1,000	N	N	N	30	500	1.0
LJD114	45 16 25	120 32 39	7	1.5	2.0	1.0	1,000	N	N	N	20	500	1.0
LJD115	45 17 58	120 32 55	7	2.0	3.0	1.0	1,500	N	N	N	30	500	1.0
LJD116	45 18 26	120 31 24	7	1.5	1.5	>1.0	1,000	N	N	N	20	300	1.0
LJD117	45 18 29	120 34 31	7	2.0	2.0	1.0	1,500	N	N	N	20	300	1.0
LJD118	45 19 35	120 31 30	7	2.0	1.5	1.0	1,000	N	N	N	20	300	1.5
LJD119	45 21 14	120 32 7	7	2.0	2.0	>1.0	1,500	N	N	N	20	300	1.0
LJD120	45 22 28	120 34 4	5	1.0	1.0	.5	700	N	N	N	50	300	1.0
LJD121	45 22 38	120 34 43	5	1.5	1.5	.7	1,000	N	N	N	30	300	1.0
LJD122	45 22 44	120 34 43	7	2.0	2.0	>1.0	1,000	N	N	N	20	300	1.0
LJD123	45 23 31	120 33 34	5	1.5	2.0	1.0	1,000	N	N	N	20	300	1.0
LJD124	45 22 22	120 32 32	5	1.5	1.5	1.0	1,000	N	N	N	20	300	1.0
LJD125	45 22 17	120 31 25	7	2.0	2.0	1.0	1,000	N	N	N	10	300	1.0
LJD126	45 23 17	120 31 35	15	3.0	2.0	>1.0	2,000	N	N	N	10	300	1.0
LJD127	45 24 23	120 31 24	7	2.0	2.0	1.0	1,000	N	N	N	30	300	1.0

Table 3C. Results of analyses of stream-sediment samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s
LJD016	N	N	20	20	10	N	N	N	10	<10	N	20	N	300	200
LJD017	N	N	10	30	15	<50	N	N	10	10	N	15	N	200	150
LJD018	N	N	7	20	15	N	N	N	10	<10	N	10	N	200	150
LJD019	N	N	20	50	10	N	N	N	15	10	N	20	N	300	200
LJD020	N	N	30	100	15	N	N	N	30	<10	N	30	N	300	500
LJD021	N	N	20	100	15	<50	N	N	20	<10	N	20	N	200	300
LJD022	N	N	20	30	10	<50	N	N	10	<10	N	20	N	200	200
LJD024	N	N	30	50	10	N	N	N	20	10	N	30	N	300	500
LJD025	N	N	20	20	10	N	N	N	10	15	N	15	N	300	150
LJD026	N	N	30	30	15	N	N	N	10	15	N	20	N	300	300
LJD028	N	N	20	50	15	N	N	N	15	15	N	15	N	300	200
LJD029	N	N	20	50	15	N	N	N	15	15	N	20	N	200	200
LJD030	N	N	20	50	15	<50	N	N	15	15	N	15	N	300	200
LJD032	N	N	20	70	20	<50	N	N	20	15	N	15	N	200	200
LJD033	N	N	30	50	20	N	N	N	20	20	N	30	N	200	200
LJD112	N	N	30	50	15	<50	N	N	30	15	N	20	N	300	200
LJD113	N	N	20	50	10	<50	N	N	15	15	N	15	N	200	200
LJD114	N	N	20	30	10	N	N	N	15	10	N	15	N	300	150
LJD115	N	N	20	50	15	<50	N	N	20	15	N	20	N	300	200
LJD116	N	N	30	30	15	N	N	N	15	<10	N	20	N	300	200
LJD117	N	N	30	30	7	<50	N	N	10	10	N	20	N	200	200
LJD118	N	N	20	50	15	N	N	N	10	10	N	20	N	200	200
LJD119	N	N	30	50	15	<50	N	N	20	15	N	20	N	300	200
LJD120	N	N	10	50	10	N	N	N	15	10	N	15	N	300	150
LJD121	N	N	15	70	10	<50	N	N	15	15	N	15	N	300	150
LJD122	N	N	20	50	7	N	N	N	20	10	N	20	N	300	200
LJD123	N	N	20	50	10	<50	N	N	10	10	N	20	N	200	200
LJD124	N	N	20	50	10	N	N	N	10	15	N	20	N	200	200
LJD125	N	N	20	150	20	N	N	N	30	<10	N	20	N	200	200
LJD126	N	N	30	50	7	N	N	N	20	10	N	30	N	300	300
LJD127	N	N	20	50	15	N	N	N	15	10	N	20	N	200	150

Table 3C. Results of analyses of stream-sediment samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	Au-ppm faa	Th-ppm dn	U-ppm dn	Au-ppm aa
LJD016	N	20	N	150	N	<.02	<5	<2	.2	<2	60	--	4.20	1.83	<.1
LJD017	N	20	N	150	N	.03	<5	<2	.1	<2	61	--	4.50	1.95	<.1
LJD018	N	20	N	100	N	.03	<5	<2	.2	<2	49	--	<2.60	1.92	<.1
LJD019	N	20	N	100	N	<.02	<5	<2	.1	<2	59	--	2.70	1.76	<.1
LJD020	N	20	N	150	N	.02	<5	<2	<.1	<2	80	--	2.30	1.30	<.1
LJD021	N	30	N	150	N	<.02	<5	3	<.1	<2	71	--	2.90	1.65	<.1
LJD022	N	30	N	150	N	<.02	<5	<2	.1	<2	61	--	5.17	1.95	<.1
LJD024	N	30	N	150	N	<.02	<5	2	<.1	<2	81	--	3.85	1.36	--
LJD025	N	20	N	150	N	<.02	<5	<2	.1	<2	58	--	5.52	2.11	<.1
LJD026	N	30	N	150	N	<.02	<5	<2	<.1	<2	66	--	4.40	1.88	<.1
LJD028	N	15	N	150	N	<.02	<5	<2	.2	<2	58	--	6.26	2.15	<.1
LJD029	N	20	N	150	N	.03	<5	<2	.2	<2	67	--	5.83	1.81	<.1
LJD030	N	20	N	200	N	<.02	<5	<2	.2	<2	59	--	7.33	1.94	<.1
LJD032	N	20	N	150	N	.02	<5	<2	.2	<2	58	--	7.50	1.54	<.1
LJD033	N	30	N	150	N	.03	<5	<2	.1	<2	69	--	5.73	1.62	<.1
LJD112	N	30	N	150	N	<.02	<5	<2	<.1	<2	54	--	4.00	1.82	<.1
LJD113	N	20	N	100	N	<.02	<5	<2	.1	<2	47	--	4.40	2.19	<.1
LJD114	N	20	N	150	N	<.02	<5	<2	.3	<2	56	--	5.65	1.97	<.1
LJD115	N	20	N	150	N	<.02	<5	<2	<.1	<2	55	--	5.89	1.90	<.1
LJD116	N	20	N	150	N	<.02	<5	2	.2	<2	68	--	4.86	1.79	<.1
LJD117	N	20	N	150	N	<.02	<5	<2	.3	<2	59	--	5.18	1.89	<.1
LJD118	N	20	N	150	N	<.02	<5	<2	.3	<2	60	--	4.00	2.18	<.1
LJD119	N	20	N	150	N	<.02	<5	<2	.2	<2	56	--	5.10	1.96	<.1
LJD120	N	20	N	100	N	<.02	<5	<2	<.1	<2	50	--	5.89	2.01	<.1
LJD121	N	20	N	200	N	<.02	<5	<2	.1	<2	45	--	6.90	2.07	<.1
LJD122	N	30	N	150	N	<.02	<5	<2	<.1	<2	54	--	5.41	1.62	<.1
LJD123	N	20	N	100	N	<.02	<5	<2	<.1	<2	54	--	6.39	1.66	<.1
LJD124	N	20	N	100	N	<.02	<5	<2	<.1	<2	57	--	6.43	1.95	<.1
LJD125	N	30	N	100	N	<.02	<5	<2	.3	<2	56	--	3.48	1.36	<.1
LJD126	N	30	N	100	N	<.02	<5	<2	.2	<2	78	--	5.25	1.44	<.1
LJD127	N	20	N	100	N	<.02	<5	<2	.3	<2	60	--	5.61	1.55	--

TABLE 4A. RESULTS OF ANALYSES OF HEAVY-MINERAL-CONCENTRATE SAMPLES FROM THE NORTH POLE RIDGE WILDERNESS STUDY AREA, SHERMAN AND GILLIAM COUNTIES, OREGON.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s
NPR001	45 6 15	120 30 18	1.0	.7	15	.3	700	N	N	N	30
NPR003	45 6 7	120 29 40	1.5	.7	10	.3	1,000	N	N	N	30
NPR004	45 6 14	120 29 5	.7	.7	7	2.0	500	300	N	700	50
NPR005	45 6 31	120 28 17	.7	.7	7	.5	500	N	N	N	30
NPR008	45 7 25	120 27 58	.7	.5	7	.5	700	N	N	N	30
NPR010	45 8 54	120 28 42	.7	.5	10	1.5	700	N	N	N	50
NPR101	45 5 59	120 27 40	3.0	2.0	7	.2	700	N	N	N	50
NPR102	45 5 58	120 27 44	2.0	1.0	7	.7	1,000	700	N	1,500	50
NPR103	45 7 29	120 27 20	1.5	.1	10	.3	700	N	N	N	50
NPR104	45 8 8	120 27 50	1.0	1.0	10	.2	700	N	N	N	50

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
NPR001	200	N	N	N	<10	50	10	300	N	N	10	50
NPR003	150	N	N	N	<10	70	<10	300	N	<50	10	N
NPR004	700	N	N	N	N	150	<10	150	N	N	50	200
NPR005	200	N	N	N	<10	50	<10	150	N	N	15	N
NPR008	N	N	N	N	N	50	<10	200	N	N	15	N
NPR010	<50	N	N	N	N	70	<10	500	N	<50	15	N
NPR101	100	N	N	N	15	300	10	70	N	N	50	N
NPR102	2,000	N	N	N	N	200	N	200	N	N	20	2,000
NPR103	200	N	N	N	<10	50	10	150	N	N	20	<20
NPR104	N	N	N	N	<10	150	10	150	N	N	30	N

Sample	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Au-ppm faa
NPR001	N	<10	<20	1,000	70	N	300	N	>2,000	N	--	--
NPR003	N	<10	N	1,000	70	N	500	N	>2,000	N	N	--
NPR004	N	50	70	300	100	N	700	N	>2,000	N	**	--
NPR005	N	N	N	500	50	N	200	N	>2,000	N	N	--
NPR008	N	N	N	500	50	N	200	N	>2,000	N	N	--
NPR010	N	20	N	300	70	N	500	N	>2,000	N	N	--
NPR101	N	50	N	300	150	100	200	N	>2,000	N	--	--
NPR102	N	<20	2,000	700	100	N	500	N	>5,000	N	--	--
NPR103	N	<10	N	700	70	N	150	N	>2,000	N	N	--
NPR104	N	N	N	300	50	N	150	N	>2,000	N	N	--

**detectable gold

Table 4B. Results of analyses of heavy-mineral-concentrate samples from the Thirtymile Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s
TM011	45 10 35	120 28 18	1.0	.3	7	.3	500	N	N	N	20
TM013	45 11 15	120 28 47	1.0	.5	10	1.0	500	N	N	N	70
TM014	45 12 15	120 31 4	1.5	1.0	7	.5	1,000	N	N	N	50
TM015	45 12 40	120 32 31	1.0	1.0	10	1.0	500	N	N	N	30
TM105	45 10 49	120 29 16	1.5	.5	15	.5	1,000	N	N	N	50
TM106	45 11 19	120 29 2	2.0	1.0	7	.5	700	N	N	N	50
TM108	45 11 54	120 29 45	1.5	1.0	7	.5	700	N	N	N	30
TM109	45 12 32	120 32 8	1.0	.7	10	.5	700	N	N	N	30
TM110	45 12 43	120 32 34	1.5	.7	7	.5	700	N	N	N	20
TM111	45 12 50	120 32 35	1.5	.7	10	.7	1,000	N	N	N	30

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
TM011	300	N	N	N	<10	20	<10	200	N	N	<10	N
TM013	50	N	N	N	<10	70	<10	300	N	50	15	N
TM014	300	N	N	N	<10	70	<10	200	N	<50	15	200
TM015	200	N	N	N	N	100	<10	150	N	<50	15	N
TM105	200	N	N	N	<10	100	10	500	N	N	15	<20
TM106	500	N	N	N	15	150	10	200	N	N	20	20
TM108	200	N	N	N	<10	200	10	200	N	<50	20	20
TM109	300	N	N	N	<10	50	<10	300	N	N	15	70
TM110	1,000	N	N	N	<10	100	10	200	N	N	20	300
TM111	100	N	N	N	N	50	<10	300	N	N	15	300

Sample	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Au-ppm faa
TM011	N	10	N	500	50	N	200	N	>2,000	N	--	--
TM013	N	15	N	300	70	N	500	N	>2,000	N	N	--
TM014	N	<10	N	500	100	N	200	N	>2,000	N	--	--
TM015	N	<10	N	300	100	N	300	N	>2,000	N	N	--
TM105	N	30	30	700	70	N	500	N	>2,000	N	N	--
TM106	N	30	<20	300	100	N	300	N	>2,000	N	N	--
TM108	N	15	<20	300	70	100	300	N	>2,000	N	N	--
TM109	N	15	100	700	70	N	300	N	>2,000	N	N	--
TM110	N	20	200	500	70	N	500	N	>2,000	N	N	--
TM111	N	20	20	500	100	N	300	N	>2,000	N	N	--

Table 4C. Results of analyses of heavy-mineral-concentrate samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

[N, not detected; <, detected but below the limit of determination shown; >, determined to be greater than the value shown.]

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s
LJD016	45 14 2	120 32 23	.7	.5	10	.15	700	N	N	N	30
LJD017	45 14 18	120 32 35	1.0	.2	15	.50	700	N	N	N	20
LJD018	45 14 38	120 33 5	1.5	1.5	7	.50	300	N	N	N	70
LJD019	45 16 2	120 32 40	.7	.7	10	.70	500	N	N	N	50
LJD020	45 16 40	120 32 15	.5	.3	7	1.50	500	N	N	N	50
LJD021	45 17 50	120 32 42	.7	.7	7	1.00	500	N	N	N	30
LJD022	45 18 4	120 31 17	1.0	.5	7	.70	700	N	N	N	50
LJD024	45 19 2	120 32 35	.7	.5	10	.30	1,000	N	N	N	30
LJD025	45 18 41	120 33 55	1.0	.5	10	.70	1,000	N	N	N	20
LJD026	45 19 8	120 33 22	1.0	.2	10	1.00	700	N	N	N	20
LJD028	45 20 23	120 31 49	1.0	.5	7	.50	500	N	N	N	50
LJD029	45 21 5	120 31 59	1.5	1.0	10	1.00	700	N	N	N	30
LJD030	45 21 55	120 32 5	1.0	.3	7	.50	500	N	N	N	30
LJD032	45 23 0	120 30 58	1.5	.7	10	1.50	700	N	N	N	50
LJD033	45 24 5	120 31 46	1.0	.3	5	.50	500	N	N	N	50
LJD112	45 14 3	120 32 33	1.0	.7	10	.70	700	N	N	N	30
LJD113	45 15 15	120 33 10	1.0	1.0	15	.50	500	N	N	N	50
LJD114	45 16 25	120 32 39	1.0	1.0	10	.70	1,000	N	N	N	30
LJD115	45 17 58	120 32 55	1.5	1.0	10	.50	1,000	N	N	N	30
LJD116	45 18 26	120 31 24	1.5	.7	7	.70	700	N	N	N	50
LJD117	45 18 29	120 34 31	1.5	.5	10	1.00	700	N	N	N	50
LJD118	45 19 35	120 31 30	2.0	1.5	10	1.00	700	N	N	N	30
LJD119	45 21 14	120 32 7	1.0	.5	10	1.00	700	N	N	N	30
LJD120	45 22 28	120 34 4	1.5	.5	7	.70	700	N	N	N	50
LJD121	45 22 38	120 34 43	1.0	.3	10	.70	500	N	N	N	70
LJD122	45 22 44	120 34 43	.7	.3	15	.70	700	N	N	N	20
LJD123	45 22 31	120 33 34	1.0	.5	10	.50	700	N	N	N	20
LJD124	45 22 22	120 32 32	.7	.2	10	.50	700	N	N	N	30
LJD125	45 22 17	120 31 25	1.0	1.0	7	2.00	500	N	N	N	50
LJD126	45 23 17	120 31 35	1.0	.5	15	.50	700	N	N	N	30
LJD127	45 24 23	120 31 24	2.0	2.0	10	2.00	700	N	N	N	50

Table 4C. Results of analyses of heavy-mineral-concentrate samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s
LJD016	200	N	N	N	<10	20	10	150	N	N	15	N
LJD017	100	N	N	N	N	20	<10	300	N	<50	10	1,000
LJD018	300	N	N	N	<10	200	<10	70	N	<50	20	N
LJD019	200	N	N	N	N	100	<10	300	N	50	20	N
LJD020	100	N	N	N	N	70	15	200	N	<50	15	150
LJD021	70	N	N	N	N	100	<10	200	N	50	20	N
LJD022	500	N	N	N	<10	30	<10	200	N	<50	10	30
LJD024	1,000	N	N	N	N	<20	<10	300	N	<50	15	N
LJD025	500	N	N	N	<10	20	10	200	N	N	10	N
LJD026	N	N	N	N	<10	30	N	300	N	50	10	N
LJD028	200	N	N	N	<10	50	<10	200	N	<50	10	N
LJD029	150	N	N	N	N	200	<10	300	N	<50	20	<20
LJD030	150	N	N	N	N	50	<10	500	N	<50	10	N
LJD032	150	N	N	N	<10	100	<10	200	N	<50	20	N
LJD033	300	N	N	N	N	<20	N	150	N	N	<10	N
LJD112	700	N	N	N	<10	70	<10	300	N	N	10	500
LJD113	N	N	N	N	N	100	<20	150	N	N	<20	150
LJD114	1,500	N	N	N	N	150	10	300	N	N	15	50
LJD115	200	N	N	N	<10	150	<10	200	N	N	15	30
LJD116	500	N	N	N	<10	50	<10	200	N	<50	10	N
LJD117	200	N	N	N	<10	50	N	500	N	50	10	<20
LJD118	200	N	N	N	<10	200	<10	300	N	50	20	N
LJD119	100	N	N	N	<10	100	N	500	N	<50	10	N
LJD120	300	N	N	N	<10	20	<10	200	N	<50	15	N
LJD121	300	N	N	N	<10	20	<10	200	N	<50	10	N
LJD122	100	N	N	N	<10	<20	<10	200	N	<50	<10	N
LJD123	1,500	N	N	N	<10	<20	N	300	N	N	10	N
LJD124	200	N	N	N	<10	<20	<10	300	N	N	10	N
LJD125	200	N	N	N	N	150	10	100	N	<50	20	N
LJD126	500	N	N	N	<10	30	<10	200	N	N	10	N
LJD127	200	N	N	N	10	200	15	150	N	50	30	N

Table 4C. Results of analyses of heavy-mineral-concentrate samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Au-ppm faa
LJD016	N	<10	50	300	30	N	300	N	>2,000	N	--	--
LJD017	N	<10	N	300	50	N	500	N	>2,000	N	N	--
LJD018	N	<10	N	500	70	N	100	N	>2,000	N	--	--
LJD019	N	20	N	500	50	N	500	N	>2,000	N	N	--
LJD020	N	30	500	300	70	N	500	N	>2,000	N	**	--
LJD021	N	50	N	300	70	N	500	N	>2,000	N	**	--
LJD022	N	<10	N	500	70	N	300	N	>2,000	N	**	--
LJD024	N	<10	N	500	50	N	500	N	>2,000	N	N	--
LJD025	N	<10	N	500	70	N	300	N	>2,000	N	N	--
LJD026	N	15	N	300	70	N	500	N	>2,000	N	N	--
LJD028	N	10	N	300	50	<100	200	N	>2,000	N	N	--
LJD029	N	50	N	500	100	N	500	N	>2,000	N	N	--
LJD030	N	15	30	300	50	N	300	N	>2,000	N	N	--
LJD032	N	15	N	500	100	N	300	N	>2,000	N	N	--
LJD033	N	N	N	500	50	<100	150	N	>2,000	N	N	--
LJD112	N	50	50	500	70	N	300	N	>2,000	N	**	--
LJD113	N	N	50	500	50	N	150	N	>5,000	N	--	--
LJD114	N	50	N	300	70	N	500	N	>2,000	N	N	--
LJD115	N	30	<20	500	70	<100	200	N	>2,000	N	--	--
LJD116	N	20	N	300	100	<100	300	N	>2,000	N	N	--
LJD117	N	50	N	300	100	<100	500	N	>2,000	N	N	--
LJD118	N	30	N	200	100	100	300	N	>2,000	N	N	--
LJD119	N	30	20	300	100	100	500	N	>2,000	N	N	--
LJD120	N	<10	N	500	100	N	200	N	>2,000	N	N	--
LJD121	N	<10	N	500	70	N	200	N	>2,000	N	N	--
LJD122	N	N	70	500	50	N	200	N	>2,000	N	N	--
LJD123	N	20	N	500	70	<100	300	N	>2,000	N	--	--
LJD124	N	15	N	500	50	N	300	N	>2,000	N	N	--
LJD125	N	15	<20	200	100	N	200	N	>2,000	N	N	--
LJD126	N	<10	N	500	70	N	300	N	>2,000	N	N	--
LJD127	N	15	N	500	200	N	200	N	>2,000	N	--	--

**detectable gold

Table 5A. Results of analyses of rock samples from the North Pole Ridge Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s
85JA201	45 5 23	120 30 3	7	2.0	7.0	>1.0	1,000	N	N	N
85JA202	45 7 19	120 28 11	7	2.0	7.0	>1.0	1,000	N	N	N
85JA206	45 7 25	120 28 26	7	1.5	7.0	1.0	700	N	N	N
85JA209	45 7 27	120 28 55	7	3.0	7.0	1.0	1,000	N	N	N
NPR006	45 6 35	120 27 32	10	2.0	3.0	>1.0	1,500	N	N	N
NPR007	45 6 47	120 27 42	10	2.0	3.0	>1.0	1,000	N	N	N
NPR103	45 7 29	120 27 20	10	2.0	3.0	>1.0	1,000	N	N	N
SJD3	45 5 22	120 30 18	7	3.0	7.0	1.0	1,000	N	N	N
SJD4	45 6 57	120 28 36	7	1.5	5.0	1.0	1,000	N	N	N
SJD5	45 7 2	120 28 37	7	1.5	7.0	1.0	700	N	N	N
SJD6	45 7 4	120 28 35	7	2.0	7.0	.7	1,000	N	N	N
SJD7	45 7 28	120 27 52	7	1.5	5.0	1.0	700	N	N	N
SJD871	45 6 50	120 29 29	7	1.0	2.0	.5	1,000	N	N	N
SJD872	45 6 45	120 28 14	7	1.0	2.0	.5	1,000	N	N	N
SJD873	45 6 41	120 28 8	7	.7	1.5	.5	700	N	N	N
SJD874	45 6 28	120 27 56	7	1.0	2.0	.5	1,000	N	N	N
SJD875	45 6 40	120 27 52	7	1.0	2.0	.5	700	N	N	N
SJD876A	45 6 47	120 27 46	7	1.0	2.0	.5	1,000	N	N	N
SJD877	45 7 13	120 27 28	7	.7	2.0	.5	1,000	N	N	N
SJD878	45 7 9	120 27 25	5	.7	1.5	.5	1,000	N	N	N
SJD879	45 6 27	120 27 24	7	.7	2.0	.5	1,000	N	N	N
SJD8710	45 6 28	120 27 33	5	1.0	2.0	.5	1,000	N	N	N
SJD8711	45 7 40	120 27 42	7	1.0	1.5	.7	1,500	N	N	N
SJD876B	45 6 47	120 27 46	5	1.5	2.0	.5	700	N	N	N
87JA101	45 7 46	120 28 30	7	1.0	1.5	.5	1,000	N	N	N
87JA102	45 7 57	120 28 17	7	1.0	2.0	.5	1,000	N	N	N
87JA103	45 8 3	120 28 10	7	.7	2.0	.5	1,000	N	N	N
87JA104	45 8 7	120 28 7	5	1.5	2.0	.5	1,500	N	N	N
87JA105	45 7 16	120 27 58	3	.5	1.5	.3	700	N	N	N
87JA107A	45 7 21	120 28 25	7	.7	2.0	.5	1,000	N	N	N
87JA107B	45 7 21	120 28 25	7	.7	2.0	.5	1,000	N	N	N
87JA107C	45 7 21	120 28 25	7	.7	2.0	.5	1,000	N	N	N
87JA108A	45 7 19	120 28 26	7	1.0	2.0	.7	1,000	N	N	N
87JA108B	45 7 19	120 28 26	7	1.0	2.0	.5	1,000	N	N	N
87JA109A	45 7 24	120 28 56	7	1.5	3.0	.5	1,500	N	N	N
87JA110	45 7 19	120 28 58	7	1.5	3.0	.5	1,500	N	N	N
87JA111	45 5 48	120 27 29	3	.7	1.5	.3	700	N	N	N
87JA112	45 5 48	120 27 29	7	1.0	2.0	.7	1,000	N	N	N
87JA113A	45 5 44	120 27 31	7	1.0	3.0	.5	1,000	N	N	N
87JA113B	45 5 44	120 27 31	7	1.0	2.0	.5	1,000	N	N	N
87JA114A	45 5 46	120 27 33	7	.7	2.0	.5	700	N	N	N
87JA114B	45 5 46	120 27 33	7	1.0	2.0	.5	1,000	N	N	N
87JA115A	45 5 50	120 27 33	7	.7	2.0	.5	1,000	N	N	N
87JA115B	45 5 50	120 27 33	7	1.0	2.0	.5	1,000	N	N	N
87JA116	45 5 53	120 27 42	7	1.0	2.0	.5	1,000	N	N	N

Table 5A. Results of analyses of rock samples from the North Pole Ridge Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	B-ppm s	Ba-ppm s	Be-ppm s	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s
85JA201	N	3,000	<1.0	N	N	20	15	20	<50	N	<20	15
85JA202	N	3,000	<1.0	N	N	20	10	20	<50	N	<20	15
85JA206	N	700	1.0	N	N	30	<10	7	<50	N	<20	<5
85JA209	N	300	<1.0	N	N	30	30	20	<50	N	<20	10
NPR006	10	1,000	1.0	N	N	50	20	30	50	N	N	10
NPR007	<10	700	1.0	N	N	50	20	10	<50	N	N	10
NPR103	<10	700	1.0	N	N	50	15	15	<50	N	<20	10
SJD3	N	300	<1.0	N	N	30	30	150	N	N	<20	20
SJD4	N	700	<1.0	N	N	20	<10	7	50	N	<20	<5
SJD5	N	700	<1.0	N	N	20	<10	15	<50	N	<20	7
SJD6	N	700	<1.0	N	N	20	15	15	<50	N	<20	7
SJD7	N	700	1.0	N	N	20	<10	15	<50	N	<20	7
SJD871	10	700	1.5	N	N	50	<10	10	N	N	<20	<5
SJD872	<10	700	1.5	N	N	50	<10	10	N	N	<20	<5
SJD873	<10	700	1.5	N	N	50	<10	10	N	N	<20	<5
SJD874	<10	700	1.5	N	N	50	10	10	N	N	<20	5
SJD875	<10	500	1.5	N	N	50	<10	15	N	N	<20	5
SJD876A	<10	300	1.5	N	N	50	10	15	N	N	<20	7
SJD877	<10	700	1.5	N	N	50	<10	15	<50	N	<20	7
SJD878	<10	700	1.5	N	N	50	<10	15	N	N	<20	7
SJD879	<10	700	1.5	N	N	50	<10	15	N	N	<20	7
SJD8710	<10	2,000	1.5	N	N	30	<10	20	N	N	<20	15
SJD8711	10	2,000	1.5	N	N	50	10	20	N	N	<20	20
SJD876B	<10	700	1.5	N	N	70	15	15	N	N	<20	10
87JA101	<10	700	2.0	N	N	50	<10	10	N	N	<20	<5
87JA102	<10	700	1.5	N	N	50	<10	5	N	N	<20	<5
87JA103	<10	700	1.5	N	N	50	10	20	N	N	<20	5
87JA104	10	2,000	1.5	N	N	30	<10	20	N	N	<20	10
87JA105	10	300	1.5	N	N	30	50	15	N	N	<20	20
87JA107A	<10	700	1.5	N	N	50	<10	10	N	N	<20	<5
87JA107B	<10	700	1.5	N	N	50	<10	5	N	N	<20	<5
87JA107C	<10	500	1.5	N	N	50	<10	5	N	N	<20	<5
87JA108A	<10	700	1.5	N	N	50	<10	10	N	N	<20	<5
87JA108B	<10	700	1.5	N	N	50	<10	7	N	N	<20	<5
87JA109A	<10	500	1.0	N	N	50	30	15	N	N	<20	15
87JA110	N	500	1.5	N	N	50	30	15	N	N	<20	20
87JA111	10	300	1.5	N	N	20	30	15	N	N	<20	20
87JA112	<10	700	1.5	N	N	50	<10	15	50	N	<20	7
87JA113A	<10	700	1.5	N	N	50	<10	15	50	N	<20	15
87JA113B	<10	700	1.5	N	N	50	<10	15	50	N	<20	10
87JA114A	<10	700	1.5	N	N	50	<10	50	50	N	<20	10
87JA114B	<10	700	1.5	N	N	50	<10	15	<50	N	<20	10
87JA115A	<10	700	1.5	N	N	50	<10	15	<50	N	<20	7
87JA115B	N	700	1.5	N	N	50	<10	15	N	N	<20	7
87JA116	N	700	1.5	N	N	70	<10	15	N	N	<20	7

Table 5A. Results of analyses of rock samples from the North Pole Ridge Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Ga-ppm s	Ge-ppm s
85JA201	<10	N	70	N	300	300	N	50	N	100	--	--
85JA202	15	N	70	N	300	300	N	50	N	100	--	--
85JA206	70	N	30	N	300	300	N	30	N	150	--	--
85JA209	<10	N	50	N	300	300	N	20	N	100	--	--
NPR006	15	N	30	N	500	300	N	50	N	100	--	--
NPR007	15	N	30	N	300	300	N	50	N	150	--	--
NPR103	15	N	30	N	300	300	N	50	<200	100	--	--
SJD3	<10	N	70	N	150	700	N	30	N	70	--	--
SJD4	10	N	50	N	500	300	N	30	N	150	--	--
SJD5	10	N	50	N	300	300	N	30	N	150	--	--
SJD6	10	N	30	N	300	300	N	20	N	150	--	--
SJD7	10	N	30	N	500	300	N	30	N	150	--	--
SJD871	10	N	30	N	500	300	N	20	N	100	15	N
SJD872	10	N	30	N	500	500	N	20	N	100	20	N
SJD873	10	N	20	N	500	300	N	20	N	100	15	N
SJD874	10	N	20	N	500	300	N	20	N	100	15	N
SJD875	10	N	20	N	300	300	N	20	N	100	15	N
SJD876A	10	N	20	N	500	300	N	20	N	100	15	N
SJD877	10	N	30	N	500	500	N	20	N	100	20	N
SJD878	10	N	20	N	500	300	N	20	N	100	20	N
SJD879	10	N	20	N	500	500	N	20	N	100	20	N
SJD8710	<10	N	20	N	500	500	N	30	N	70	20	N
SJD8711	<10	N	30	N	700	500	N	30	N	100	20	N
SJD876B	10	N	30	N	500	300	N	20	N	100	15	N
87JA101	10	N	30	N	500	500	N	30	N	150	20	N
87JA102	10	N	30	N	500	500	N	30	N	100	20	N
87JA103	10	N	30	N	500	500	N	30	N	150	20	N
87JA104	<10	N	20	N	700	300	N	20	N	100	15	N
87JA105	10	N	15	N	300	200	N	10	N	100	15	N
87JA107A	10	N	30	N	500	500	N	20	N	100	20	N
87JA107B	10	N	20	N	500	500	N	20	N	150	20	N
87JA107C	10	N	30	N	500	500	N	20	N	150	20	N
87JA108A	10	N	30	N	500	300	N	20	N	150	20	N
87JA108B	10	N	30	N	500	500	N	30	N	150	20	N
87JA109A	<10	N	30	N	500	300	N	15	N	100	20	N
87JA110	<10	N	30	N	500	500	N	20	N	100	15	N
87JA111	15	N	15	N	200	150	N	15	N	150	15	N
87JA112	10	N	30	N	300	700	N	20	N	150	20	N
87JA113A	10	N	30	N	300	500	N	20	N	150	20	N
87JA113B	10	N	30	N	300	500	N	20	N	150	20	N
87JA114A	10	N	20	N	300	500	N	20	N	150	20	N
87JA114B	<10	N	30	N	300	500	N	20	N	150	15	N
87JA115A	<10	N	30	N	300	500	N	20	N	150	20	N
87JA115B	10	N	30	N	300	500	N	20	N	150	20	N
87JA116	10	N	30	N	500	500	N	20	N	150	20	N

Table 5A. Results of analyses of rock samples from the North Pole Ridge Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Na-pct s	P-pct s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	U-ppm f	Au-ppm faa
85JA201	--	--	N	<.10	.03	<5	<2	1.3	<2	83	--	<.002
85JA202	--	--	N	<.10	.04	<5	<2	1.5	<2	97	--	<.002
85JA206	--	--	N	3.80	1.80	170	<2	.4	9	55	--	1.400
85JA209	--	--	N	<.10	.04	9	<2	.4	<2	49	--	<.002
NPR006	--	--	N	<.10	.02	<5	5	1.0	<2	70	1.10	<.002
NPR007	--	--	N	<.10	<.02	<5	<2	.5	<2	45	.45	<.002
NPR103	--	--	N	<.10	<.02	<5	<2	.9	<2	73	1.10	<.002
SJD3	--	--	N	<.10	.03	<5	<2	.3	<2	71	--	<.002
SJD4	--	--	N	<.10	<.02	<5	<2	.2	<2	42	--	<.002
SJD5	--	--	N	<.10	<.02	<5	<2	.2	<2	36	--	<.002
SJD6	--	--	N	<.10	<.02	<5	<2	.2	<2	35	--	<.002
SJD7	--	--	N	<.10	.04	<5	<2	.6	<2	75	--	<.002
SJD871	2.0	N	N	<.05	<.02	<5	<2	<.1	<2	39	--	<.002
SJD872	2.0	N	N	<.05	.02	<5	<2	<.1	<2	43	--	<.002
SJD873	2.0	N	N	<.05	.02	<5	<2	<.1	<2	44	--	<.002
SJD874	3.0	N	N	<.05	.03	<5	<2	.1	<2	40	--	<.002
SJD875	1.5	N	N	<.05	.05	<5	<2	.4	<2	54	--	<.002
SJD876A	2.0	N	N	<.05	.03	<5	<2	.2	<2	41	--	<.002
SJD877	3.0	N	N	<.05	<.02	<5	<2	.2	<2	52	--	<.002
SJD878	3.0	N	N	<.05	<.02	<5	<2	.3	<2	58	--	<.002
SJD879	2.0	N	N	<.05	<.02	<5	<2	.3	<2	61	--	<.002
SJD8710	2.0	.5	N	<.05	<.02	<5	<2	1.0	<2	78	--	<.002
SJD8711	2.0	.5	N	<.05	.02	<5	<2	.8	<2	72	--	<.002
SJD876B	2.0	.5	N	<.05	<.02	<5	<2	.1	<2	39	--	<.002
87JA101	2.0	.5	N	<.05	<.02	<5	<2	.2	<2	40	--	<.002
87JA102	2.0	.5	N	<.05	<.02	<5	<2	.3	<2	54	--	<.002
87JA103	3.0	.5	N	<.05	<.02	<5	<2	<.1	<2	31	--	<.002
87JA104	3.0	.5	N	<.05	.02	<5	<2	.9	<2	79	--	<.002
87JA105	2.0	.5	N	<.05	.03	5	<2	.3	<2	55	--	<.002
87JA107A	2.0	.5	N	<.05	<.02	<5	<2	.1	<2	41	--	<.002
87JA107B	2.0	.5	N	<.05	<.02	<5	<2	.1	<2	43	--	<.002
87JA107C	2.0	.5	N	<.05	<.02	<5	<2	.1	<2	42	--	<.002
87JA108A	2.0	.5	N	<.05	<.02	<5	<2	.2	<2	50	--	<.002
87JA108B	2.0	.5	N	<.05	<.02	<5	<2	.3	<2	42	--	<.002
87JA109A	2.0	.5	N	<.05	<.02	<5	<2	.4	<2	47	--	<.002
87JA110	1.5	N	N	<.05	<.02	<5	<2	.2	<2	47	--	<.002
87JA111	1.5	N	N	<.05	.03	6	<2	.4	<2	57	--	<.002
87JA112	1.5	N	N	<.05	<.02	<5	<2	.4	<2	67	--	<.002
87JA113A	2.0	N	N	<.05	<.02	<5	2	.2	<2	57	--	<.002
87JA113B	2.0	N	N	<.05	<.02	<5	<2	.2	<2	56	--	<.002
87JA114A	2.0	N	N	<.05	<.02	<5	<2	.2	<2	20	--	<.002
87JA114B	1.5	N	N	<.05	<.02	<5	<2	.4	<2	52	--	<.002
87JA115A	1.5	N	N	<.05	<.02	<5	<2	.4	<2	52	--	<.002
87JA115B	2.0	N	N	<.05	<.02	<5	<2	.4	<2	56	--	<.002
87JA116	2.0	N	N	<.05	<.02	<5	<2	.5	<2	63	--	<.002

Table 5B. Results of analyses of rock samples from the Thirtymile Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
85JA210	45 11 12	120 29 0	7	1.5	7.00	>1.000	700	N	N	N	N	700	1.0
85JA211	45 11 7	120 29 10	3	.7	1.50	.150	150	N	N	N	10	100	1.0
85JA212	45 11 10	120 29 15	7	1.5	7.00	1.000	1,000	N	N	N	N	700	1.0
85JA213	45 10 58	120 29 52	10	1.5	7.00	1.000	700	N	N	N	N	700	<1.0
85JA214	45 10 58	120 30 17	7	3.0	7.00	.700	700	N	N	N	N	300	N
85JA215	45 11 18	120 29 53	7	1.5	7.00	.700	700	N	N	N	N	500	<1.0
SJD10	45 11 2	120 28 11	7	1.5	5.00	1.000	1,000	N	N	N	N	700	1.0
SJD11	45 11 3	120 28 26	7	2.0	7.00	1.000	700	N	N	N	N	700	1.0
SJD12	45 11 0	120 28 33	7	1.5	7.00	1.000	1,000	N	N	N	N	700	1.0
SJD13	45 12 18	120 31 6	7	2.0	5.00	1.000	1,000	N	N	N	N	700	1.0
SJD8	45 11 14	120 27 54	7	3.0	7.00	.700	700	N	N	N	N	300	<1.0
SJD9	45 11 2	120 28 8	7	1.5	7.00	1.000	700	N	N	N	N	700	1.0
TM015	45 12 40	120 32 31	10	3.0	5.00	>1.000	2,000	N	N	N	15	2,000	1.0
TM109	45 12 32	120 32 8	10	.1	.05	.015	700	N	N	N	<10	<20	1.5

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s
85JA210	N	N	30	10	10	<50	N	<20	5	10	N	50	N	300
85JA211	N	N	N	15	20	N	N	<20	<5	N	N	10	N	<100
85JA212	N	N	20	<10	7	<50	N	<20	<5	10	N	30	N	200
85JA213	N	N	30	15	7	<50	N	<20	5	10	N	50	N	300
85JA214	N	N	30	30	15	N	N	<20	10	N	N	50	N	150
85JA215	N	N	20	<10	5	N	N	<20	<5	10	N	30	N	200
SJD10	N	N	50	<10	7	<50	N	<20	<5	N	N	50	N	500
SJD11	N	N	30	15	30	N	N	<20	10	10	N	50	N	300
SJD12	N	N	30	<10	15	<50	N	<20	10	10	N	50	N	200
SJD13	N	N	30	<10	15	<50	N	<20	7	10	N	50	N	500
SJD8	N	N	20	30	20	N	N	<20	7	N	N	50	N	200
SJD9	N	N	20	<10	7	<50	N	<20	<5	10	N	50	N	200
TM015	N	N	30	10	20	50	N	N	10	10	N	50	N	500
TM109	N	N	5	15	<5	N	N	N	<5	N	N	<5	N	N

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	U-ppm f	Au-ppm faa
85JA210	500	N	30	N	150	N	<.1	.04	<5	<2	.6	<2	64	--	<.002
85JA211	100	N	10	N	70	N	<.1	.04	<5	<2	.5	<2	59	--	<.002
85JA212	300	N	30	N	150	N	<.1	.02	<5	3	.4	<2	61	--	<.002
85JA213	300	N	30	N	150	N	<.1	.03	<5	<2	.3	<2	39	--	<.002
85JA214	300	N	30	N	100	N	<.1	<.02	<5	<2	.6	<2	52	--	<.002
85JA215	300	N	30	N	150	N	<.1	<.02	<5	3	.3	<2	51	--	<.002
SJD10	300	N	30	N	150	N	<.1	<.02	<5	<2	.5	<2	60	--	<.002
SJD11	500	N	30	N	150	N	<.1	.09	<5	<2	.6	<2	70	--	<.002
SJD12	300	N	30	N	150	N	<.1	<.02	<5	<2	.4	<2	58	--	<.002
SJD13	300	N	30	N	150	N	<.1	.04	<5	<2	.6	<2	66	--	<.002
SJD8	300	N	20	N	100	N	<.1	<.02	<5	<2	.4	<2	53	--	<.002
SJD9	300	N	30	N	150	N	<.1	<.02	<5	<2	.3	<2	61	--	<.002
TM015	300	N	70	N	100	N	<.1	<.02	<5	<2	1.1	<2	36	.6	<.002
TM109	200	N	N	N	N	N	<.1	<.02	25	<2	.8	<2	9	.4	<.002

Table 5C. Results of analyses of rock samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.

Sample	Latitude	Longitude	Fe-pct. s	Mg-pct. s	Ca-pct. s	Ti-pct. s	Mn-ppm s	Ag-ppm s	As-ppm s	Au-ppm s	B-ppm s	Ba-ppm s	Be-ppm s
85JA221	45 17 23	120 31 47	7.0	2.00	5.00	.700	700	N	N	N	<10	700	1.0
85JA222	45 17 25	120 31 53	7.0	1.50	3.00	.700	700	N	N	N	<10	700	1.0
85JA223	45 17 31	120 32 5	7.0	1.50	3.00	.700	700	N	N	N	<10	700	1.0
85JA224	45 17 41	120 32 17	7.0	1.50	3.00	.500	700	N	N	N	<10	700	1.0
85JA225	45 17 57	120 32 23	7.0	1.50	5.00	.700	700	N	N	N	<10	500	<1.0
85JA226	45 17 58	120 32 18	7.0	1.50	3.00	.700	700	N	N	N	<10	700	1.0
85JA227	45 22 38	120 31 46	7.0	1.50	3.00	.700	700	N	N	N	<10	700	1.0
85JA228	45 22 37	120 31 39	7.0	1.50	3.00	.500	700	N	N	N	<10	700	<1.0
85JA229	45 22 34	120 31 28	7.0	2.00	5.00	.300	700	N	N	N	<10	300	<1.0
85JA230	45 23 57	120 30 52	7.0	2.00	3.00	.300	700	N	N	N	<10	300	<1.0
85JA231	45 23 55	120 31 9	7.0	1.50	3.00	.500	700	N	N	N	<10	500	1.0
LJD021	45 17 50	120 32 42	2.0	.07	<.05	.002	700	N	N	N	<10	200	<1.0
LJD023A	45 18 42	120 33 45	1.0	.05	<.05	.007	20	N	N	N	<10	N	N
LJD023B	45 18 42	120 33 46	1.0	.05	.07	.020	500	N	N	N	<10	150	N
LJD023C	45 18 42	120 33 44	1.0	.20	.10	.005	10	N	N	N	<10	N	5.0
LJD024A	45 19 2	120 32 37	1.0	.05	.05	.007	200	N	N	N	<10	70	2.0
LJD024B	45 19 2	120 32 38	1.0	.07	.05	.050	20	N	N	N	10	N	N
LJD027A	45 19 2	120 32 35	.5	.02	<.05	<.002	10	N	N	N	10	N	N
LJD027B	45 19 2	120 32 36	5.0	1.50	2.00	1.000	1,000	N	N	N	N	700	1.5
LJD031A	45 22 17	120 32 5	.2	.03	<.05	.010	150	N	N	N	<10	50	N
LJD031B	45 22 17	120 32 6	.3	.05	.05	.005	20	N	N	N	10	N	1.5
LJD127	45 24 23	120 31 24	7.0	2.00	2.00	1.000	1,000	N	N	N	<10	500	1.5
SJD14	45 17 54	120 32 3	7.0	1.50	3.00	1.000	700	N	N	N	<10	700	1.0
SJD15	45 18 36	120 32 53	7.0	3.00	7.00	.700	1,500	N	N	N	<10	500	<1.0
SJD16	45 18 33	120 32 48	7.0	2.00	7.00	1.000	1,500	N	N	N	<10	700	1.0
SJD17	45 18 30	120 32 38	7.0	2.00	7.00	1.000	1,500	N	N	N	<10	700	1.0
SJD18	45 18 18	120 32 6	7.0	2.00	7.00	1.000	1,000	N	N	N	<10	700	1.0
SJD19	45 18 2	120 32 1	7.0	3.00	7.00	.700	1,000	N	N	N	<10	500	<1.0
SJD20	45 23 56	120 30 48	7.0	3.00	7.00	.700	1,000	N	N	N	<10	300	<1.0
SJD21	45 23 56	120 31 2	7.0	1.50	7.00	1.000	1,000	N	N	N	<10	700	<1.0
SJD22	45 23 54	120 31 17	7.0	2.00	7.00	1.000	700	N	N	N	<10	700	1.0

Table 5C. Results of analyses of rock samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	Bi-ppm s	Cd-ppm s	Co-ppm s	Cr-ppm s	Cu-ppm s	La-ppm s	Mo-ppm s	Nb-ppm s	Ni-ppm s	Pb-ppm s	Sb-ppm s	Sc-ppm s	Sn-ppm s	Sr-ppm s
85JA221	N	N	30	10	7	<50	N	<20	<5	15	N	30	N	500
85JA222	N	N	15	<10	7	<50	N	<20	<5	200	N	30	N	500
85JA223	N	N	15	<10	7	<50	N	<20	<5	15	N	30	N	500
85JA224	N	N	20	30	7	<50	N	<20	5	15	N	30	N	500
85JA225	N	N	20	<10	30	N	N	<20	10	N	N	30	N	300
85JA226	N	N	15	<10	10	<50	N	<20	5	15	N	30	N	300
85JA227	N	N	20	<10	7	<50	N	<20	<5	15	N	30	N	300
85JA228	N	N	20	30	7	<50	N	<20	5	15	N	30	N	300
85JA229	N	N	15	30	30	<50	N	<20	10	<10	N	30	N	300
85JA230	N	N	15	<10	15	<50	N	<20	7	<10	N	30	N	300
85JA231	N	N	15	<10	7	<50	N	<20	<5	10	N	30	N	300
LJD021	N	N	N	N	<5	N	N	N	<5	N	N	N	N	N
LJD023A	N	N	N	N	<5	N	N	N	<5	N	N	<5	N	N
LJD023B	N	N	N	N	<5	N	N	N	<5	N	N	5	N	N
LJD023C	N	N	N	N	<5	N	N	N	<5	N	N	<5	N	N
LJD024A	N	N	N	<10	<5	N	N	N	<5	N	N	<5	N	N
LJD024B	N	N	N	N	<5	N	N	N	<5	N	N	N	N	N
LJD027A	N	N	N	N	<5	N	N	N	N	N	N	N	N	N
LJD027B	N	N	20	10	10	<50	N	N	5	15	N	20	N	200
LJD031A	N	N	N	<10	N	N	N	N	<5	N	N	<5	N	N
LJD031B	N	N	N	N	N	N	N	N	<5	N	N	<5	N	N
LJD127	N	N	20	10	7	<50	N	N	5	10	N	20	N	200
SJD14	N	N	20	<10	7	<50	N	<20	<5	10	N	30	N	500
SJD15	N	N	30	30	20	N	N	<20	10	N	N	50	N	200
SJD16	N	N	30	<10	7	<50	N	<20	10	10	N	50	N	300
SJD17	N	N	30	10	7	<50	N	<20	7	10	N	50	N	300
SJD18	N	N	30	15	15	N	N	<20	7	10	N	50	N	300
SJD19	N	N	30	30	50	N	N	<20	15	<10	N	70	N	300
SJD20	N	N	30	30	20	N	N	<20	10	<10	N	50	N	300
SJD21	N	N	30	<10	7	<50	N	<20	<5	<10	N	30	N	300
SJD22	N	N	30	<10	15	<50	N	<20	7	10	N	30	N	300

Table 5C. Results of analyses of rock samples from the Lower John Day Wilderness Study Area, Sherman and Gilliam Counties, Oregon.--Continued

Sample	V-ppm s	W-ppm s	Y-ppm s	Zn-ppm s	Zr-ppm s	Th-ppm s	Au-ppm aa	Hg-ppm aa	As-ppm icp	Bi-ppm icp	Cd-ppm icp	Sb-ppm icp	Zn-ppm icp	U-ppm f	Au-ppm faa
85JA221	300	N	30	N	100	N	<.1	.03	<5	<2	.5	<2	65	--	<.002
85JA222	300	N	30	N	100	N	<.1	.03	<5	<2	.3	<2	60	--	<.002
85JA223	300	N	30	N	100	N	<.1	.02	<5	<2	.3	<2	54	--	<.002
85JA224	300	N	30	N	100	N	<.1	<.02	<5	3	.3	<2	52	--	<.002
85JA225	300	N	30	N	70	N	<.1	.07	<5	<2	.5	<2	48	--	<.002
85JA226	300	N	30	N	100	N	<.1	.04	<5	<2	.3	<2	41	--	<.002
85JA227	300	N	30	N	100	N	<.1	.04	<5	<2	.2	<2	52	--	<.002
85JA228	300	N	30	N	70	N	<.1	.19	<5	<2	.2	<2	52	--	<.002
85JA229	200	N	30	N	70	N	<.1	.06	<5	<2	.4	<2	48	--	<.002
85JA230	200	N	30	N	70	N	<.1	.04	<5	<2	.4	<2	50	--	<.002
85JA231	200	N	30	N	70	N	<.1	.03	<5	<2	.3	<2	50	--	<.002
LJD021	300	N	N	N	N	N	<.1	<.02	<5	<2	.3	<2	2	.35	<.002
LJD023A	70	N	N	N	<10	N	<.1	<.02	<5	<2	.2	<2	10	.10	<.002
LJD023B	100	N	N	N	<10	N	<.1	<.02	<5	<2	.2	<2	8	.20	<.002
LJD023C	20	N	N	N	N	N	<.1	<.02	<5	<2	.2	<2	<2	1.90	<.002
LJD024A	50	N	N	N	N	N	<.1	<.02	<5	<2	<.1	<2	<2	.20	<.002
LJD024B	100	N	N	N	<10	N	<.1	<.02	<5	<2	<.1	<2	5	.20	<.002
LJD027A	30	N	N	N	N	N	<.1	<.02	<5	<2	<.1	<2	5	.20	<.002
LJD027B	200	N	30	N	100	N	<.1	<.02	<5	<2	.5	<2	20	.60	<.002
LJD031A	50	N	N	N	N	N	<.1	<.02	<5	<2	<.1	<2	3	.20	<.002
LJD031B	20	N	N	N	N	N	<.1	<.02	<5	<2	<.1	<2	2	.10	<.002
LJD127	300	N	30	N	100	N	<.1	<.02	<5	<2	.5	<2	16	.70	<.002
SJD14	300	N	20	N	150	N	<.1	<.02	<5	2	.7	<2	73	--	<.002
SJD15	300	N	20	N	100	N	<.1	<.02	<5	<2	.4	<2	48	--	<.002
SJD16	300	N	30	N	150	N	<.1	<.02	<5	<2	.4	<2	61	--	<.002
SJD17	300	N	30	N	150	N	<.1	<.02	<5	<2	.5	<2	350	--	<.002
SJD18	300	N	30	N	150	N	<.1	<.02	<5	<2	.5	<2	58	--	<.002
SJD19	300	N	20	N	100	N	<.1	<.02	<5	<2	.5	<2	52	--	<.002
SJD20	300	N	20	N	100	N	<.1	<.02	<5	<2	.4	<2	46	--	<.002
SJD21	300	N	30	N	150	N	<.1	<.02	<5	2	.4	<2	70	--	<.002
SJD22	300	N	30	N	150	N	<.1	<.02	<5	<2	.2	<2	37	--	<.002

TABLE 6.--Results of analyses of bulk panned-concentrate samples

North Pole Ridge Wilderness Study Area

Sample	Latitude	Longitude	Au-ppm faa
NPR002	45 6 15	120 29 54	.320
NPR003	45 6 7	120 29 40	N
NPR006	45 6 31	120 28 17	N
NPR007	45 6 47	120 27 42	N
NPR009	45 7 24	120 27 52	N
NPR100	45 6 22	120 29 46	N
NPR101	45 5 58	120 27 44	N
NPR102	45 5 58	120 27 44	N
NPR103	45 7 29	120 27 20	N
NPR104	45 8 8	120 27 50	N
Thirtymile Wilderness Study Area			
TM012	45 11 15	120 28 49	N

Table 7A. Description of rock samples from the North Pole Ridge WSA

NPR 006	Basalt - aphanitic to very fine grained
NPR 007	Basalt - a very fine grained; few vesicles
NPR 103	Hematitic, vesicular basalt
SJD 871	Basalt - porphyritic, aphanitic
SJD 872	Basalt - porphyritic, aphanitic
SJD 873	Basalt - porphyritic, aphanitic
SJD 874	Basalt - massive, aphanitic
SJD 875	Basalt flow breccia - massive, aphanitic
SJD 876A	Basalt; fault zone - massive, aphanitic
SJD 876B	Basalt; fault zone - massive, aphanitic
SJD-3	Basalt- nonvesicular, relatively coarse grained
SJD-4	Dark-grey, vesicular, aphyric basalt
SJD-5	Dark-grey, vesicular, aphyric basalt
SJD-6	Dark-grey, vesicular, aphyric basalt
SJD-7	Light-grey, mottled basalt
85JA201	Aphanitic, vesicular basalt
85JA202	Aphanitic, vesicular basalt
85JA206	Weakly porphyritic, vesicular basalt
85JA209	Finely vesicular basalt
SJD877	Basalt - massive, aphanitic
SJD878	Basalt - massive, aphanitic
SJD879	Basalt - porphyritic, aphanitic
SJD8710	Basalt - massive, aphanitic
SJD8711	Basalt; fault zone - massive, aphanitic
87JA101	Basalt - massive, aphanitic
87JA102	Basalt - massive, aphanitic
87JA103	Basalt - massive, aphanitic
87JA104	Basalt - massive, aphanitic
87JA107A	Basalt - massive, aphanitic
87JA107B	Basalt - massive, aphanitic
87JA107C	Basalt - massive, aphanitic
87JA108A	Basalt - massive, aphanitic
87JA108B	Basalt - massive, aphanitic
87JA109A	Basalt - massive, aphanitic
87JA110	Basalt - massive, aphanitic
87JA112	Basalt - massive, aphanitic
87JA113A	Basalt - massive, aphanitic
87JA113B	Basalt - massive, aphanitic
87JA114A	Basalt - massive, aphanitic
87JA114B	Basalt - massive, aphanitic
87JA115A	Basalt - massive, aphanitic
87JA115B	Basalt - massive, aphanitic
87JA116	Basalt - massive, aphanitic

Table 7B. Description of rock samples from the Thirtymile WSA

TM 015	Red basalt
TM 109	Jasper; yellow-brown
SJD 8	Vesicular basalt
SJD 9	Aphanitic, vesicular basalt
SJD 10	Aphanitic, vesicular basalt
SJD 11	Basalt
SJD 12	Vesicular basalt
SJD 13	Nonvesicular basalt
85JA210	Nonvesicular basalt
85JA211	Clay-rich interflow sediment
85JA212	Vesicular basalt
85JA213	Vesicular basalt
85JA214	Vesicular basalt
85JA215	Vesicular basalt

Table 7C. Description of rock samples from the Lower John Day WSA

LJD 021	Jasper and opal; yellow-green to brown
LJD 023A	Brecciated, silicified rock with quartz veins
LJD 023B	Yellow-brown silicified rock with hyalite opal veins
LJD 023C	Jasper and opal; yellow-brown
LJD 024A	Jasper, opal, and chalcedony
LJD 024B	Yellow-brown silicified rock with hyalite opal veins
LJD 027A	Red to tan silicified rock
LJD 027B	Red-brown vesicular basalt
LJD 031A	Limonitic quartz vein
LJD 031B	Opal, jasper, chalcedony; yellow, brown
LJD 127	Brecciated basalt; outcrop sample
SJD 14	Extremely jointed and platy basalt.
SJD 15	Aphyric basalt
SJD 16	Vesicular and columnarly jointed basalt
SJD 17	Nonvesicular basalt
SJD 18	Nonvesicular basalt
SJD 19	Vesicular , aphyric basalt
SJD 20	Vesicular basalt
SJD 21	Basalt flow
SJD 22	Aphanitic, vesicular basalt
85JA221	Nonvesicular basalt flow
85JA222	Nonvesicular basalt flow
85JA223	Vesicular basalt
85JA224	Vesicular, porphyric basalt
85JA225	Vesicular basalt
85JA226	Nonvesicular basalt
85JA227	Vesicular basalt
85JA228	Vesicular basalt
85JA229	Nonvesicular basalt
85JA230	Vesicular basalt
85JA231	Vesicular basalt