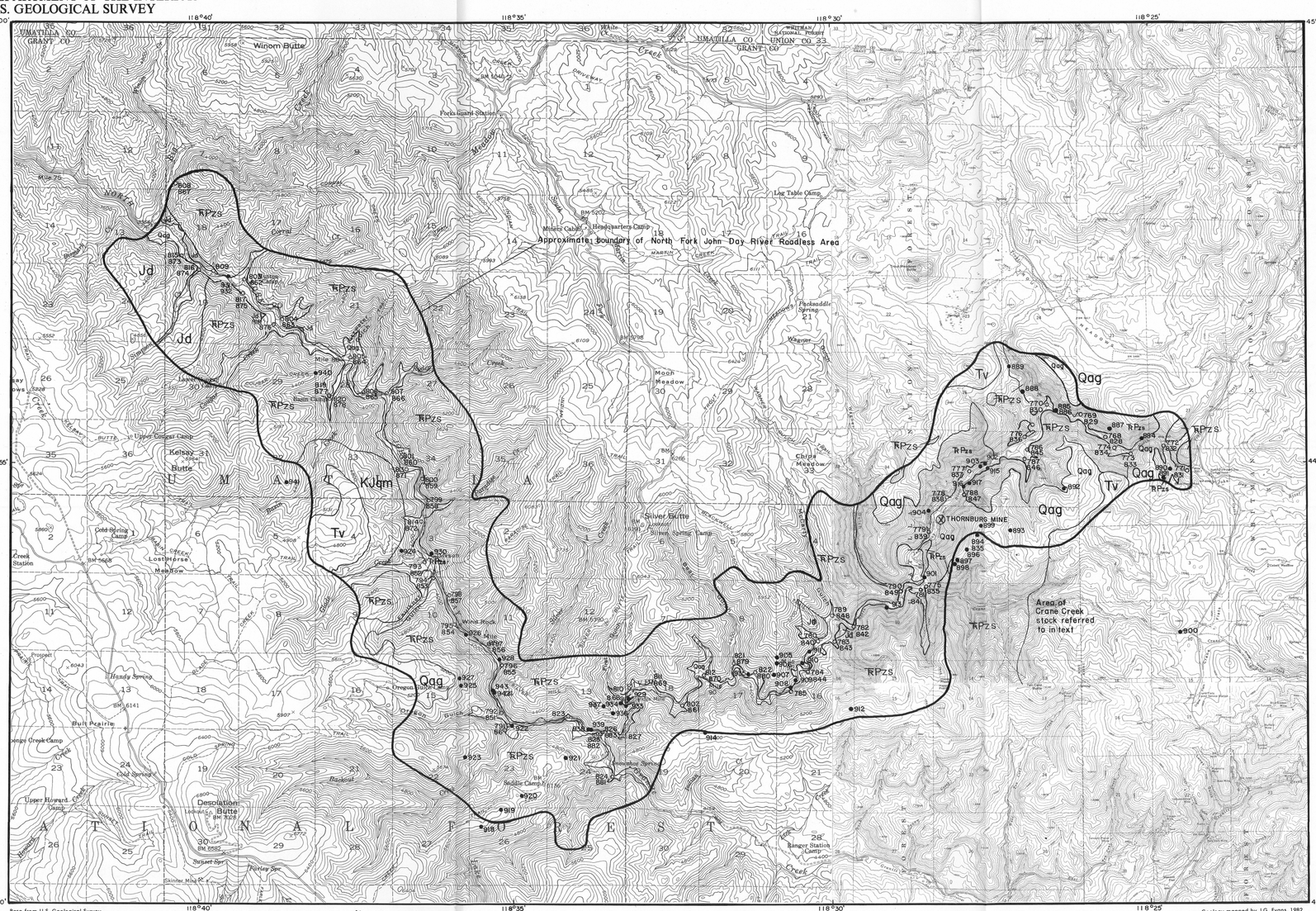
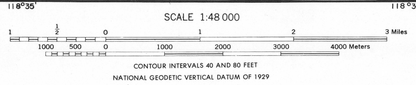


Base from U.S. Geological Survey
1:24,000 Granite, Trout Meadows, 1972;
1:62,500 Desolation Butte, 1951

Geology mapped by J.G. Evans, 1982



EXPLANATION

GEOCHEMICAL SAMPLE LOCALITY

● ROCK SAMPLE

○ STREAM-SEDIMENT SAMPLES.--Upper number silt sample; lower number, pan-concentrate sample

CORRELATION OF MAP UNITS

Qag	QUATERNARY
Tv	TERTIARY
KJqm	CRETACEOUS OR JURASSIC
Jd	JURASSIC
℞Pzs	TRIASSIC AND PALEOZOIC

DESCRIPTION OF MAP UNITS

Qag	ALLUVIUM, GLACIAL DEPOSITS, AND TEPHRA (QUATERNARY)
Tv	VOLCANIC DEPOSITS (TERTIARY)
KJqm	QUARTZ MONZONITE (CRETACEOUS OR JURASSIC)
Jd	DIORITE (JURASSIC)
℞Pzs	SEDIMENTARY AND IGNEOUS ROCKS (TRIASSIC AND PALEOZOIC)
———	CONTACT
▬▬▬	APPROXIMATE BOUNDARY OF NORTH FORK JOHN DAY RIVER ROADLESS AREA

STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and submitted to the President and the Congress. This report represents the analytical results of a geochemical survey of the North Fork John Day River Roadless Area (B6253) in the Umatilla and Wallowa-Whitman National Forests, Grant County, Oregon. The North Fork John Day River Roadless Area was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

INTRODUCTION

The North Fork John Day River Roadless Area comprises 21,210 acres in the Umatilla and Wallowa-Whitman National Forests, Grant County, Oregon, about 30 mi northwest of Baker, Oregon (index map). The irregularly shaped area extends for about 1 mi on both sides of a 25-mi segment of the North Fork John Day River from Big Creek on the west to North Fork John Day Campground on the east. Most of the roadless area is in the northern half of the Desolation Butte 15-minute quadrangle. The eastern end of the area is in parts of the Granite and Trout Meadows 7 1/2-minute quadrangles.

GEOLOGY

The rock units shown here on the large map have been simplified from the geologic map by Evans (1986a). Most of the North Fork John Day River Roadless Area is underlain by rocks of Paleozoic to Jurassic age. These include hornblende diorite (Triassic or Paleozoic), the Elkhorn Ridge Argillite (Triassic and Paleozoic), diorite (Early Triassic), a pyroclastic and volcanic rock assemblage (Early Triassic), and a breccia (Jurassic) of argillite and chert, containing serpentinite. The Elkhorn Ridge Argillite and the pyroclastic and volcanic assemblage record sedimentation and subduction-related deformation not far from a volcanic arc. The Triassic and Paleozoic sedimentary, volcanic, and pyroclastic rocks were intruded by Early Triassic diorite. These rocks underwent regional metamorphism to greenschist facies about late Triassic time. All these rocks were later metamorphosed, by stocks of Jurassic age (diorite), and by dikes and a stock of Jurassic or Cretaceous age (quartz monzonite). Only the stocks are shown here on the large map. Contact metamorphic aureoles, up to 1 mi wide in rocks surrounding three of the Jurassic diorite stocks, contain mineral assemblages characteristic of the hornblende hornfels facies. The Paleozoic and Mesozoic rocks are unconformably overlain by a Tertiary (Eocene and Oligocene) assemblage of basalt, andesite, volcaniclastic rocks, sandstone, and lake bed deposits. Quaternary alluvium, glacial till, and thick regolith that contains reworked tephra cover a large part of the eastern half of the study area.

MINING ACTIVITY

The North Fork John Day River Roadless Area is in the eastern part of the North Fork mining district and the western part of the Granite mining district (Cognar, 1985). Mining in the region dates from the discovery of gold in Granite Creek, a tributary of the North Fork, in 1861 near the present town of Granite (Farden and Hewett, 1914), and from initial mining of placer deposits near McCarty Gulch in 1845 in the North Fork district (Oregon Metal Mines Handbook, 1941). Production of placer gold from the Granite district and North Fork district was estimated to be more than $5,000,000 by 1968 (Brooks and Ramp, 1968). Approximately 1 million cubic yards of placer gravel has been mined from four or five principal deposits in the roadless area. Total production from these gravels is unknown and an estimate of production is not possible due to lack of records. Most output, however, was probably from the Thornburg placer mine. Only a few of the hundreds of claims located over the years in the study area have been lode claims; no lode mining is known there at present. Lode mining in surrounding areas began in the 1870's and has continued to the present. Production from lode mines in the Granite district exceeds $2,200,000 (Brooks and Ramp, 1968).

GEOCHEMISTRY

Placer deposits of gold along the North Fork John Day River were studied by Cognar (1985) who took 444 alluvial samples at 289 sites. From analyses of these samples he delineated indicated and inferred marginal reserves and resources (Cognar, 1985; Evans and Cognar, 1985).

Additional samples were collected by the writer in 1982 from streams tributary to the North Fork John Day River and from the river itself (60 silt and 57 pan-concentrate samples from 60 sites), and from outcrops (60) that contain hematite and quartz veins, or showed indications of alteration such as black, red, brown, or yellow staining, or bleaching and recrystallization. The sample sites are shown on the accompanying map.

The samples were analyzed for 30 elements (Fe, Mg, Ca, Ti, Mn, Ag, As, B, Ba, Be, Bi, Cd, Co, Cr, Cu, La, Mo, Nb, Ni, Pb, Sb, Sc, Sn, Sr, V, W, Y, Zn, Zr and Th) by spectrographic methods (Grimes and Marranzino, 1968). Gold was analyzed by atomic absorption methods (Ward and others, 1969). Results of the analyses are reported by Evans (1985b).

Concentrations of gold (Au), silver (Ag), barium (Ba), tin (Sn), tungsten (W) and zinc (Zn) were found in samples from the North Fork John Day River Roadless Area. The principal geochemical data bearing on these elements are summarized in table 1, the last column of which explains the methods used for determining anomalous amounts for each metal. Geographical distribution and analytical values of anomalous samples are shown in figures 1 through 4.

Gold occurs in alluvium of the North Fork John Day River and in 21 tributaries of the river in the study area. Sources of the gold are glacial till, older placer deposits (Tertiary and Quaternary) and mineralized Paleozoic and Mesozoic rocks. Silver, barium, tin, tungsten, and zinc may be present in the same kinds of geological materials. Barium, tin and tungsten seem to be spatially associated with the intrusions of Jurassic or Cretaceous quartz monzonite and possibly the Jurassic diorite in the southwestern and western parts of the area, respectively. Gold, silver, tin, and zinc in Crane Creek sediments may be related to mineralization near the southeast margin of the North Fork John Day River Roadless Area, near the Crane Creek stock. Other than mentioned above, no clear relations were found between the six metals (Au, Ag, Ba, Sn, W, Zn) and their geologic environments.

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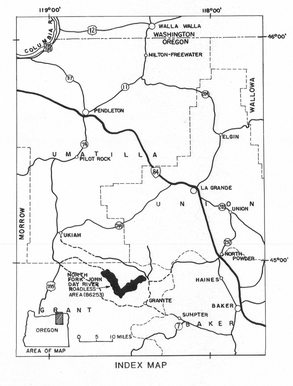

INDEX MAP

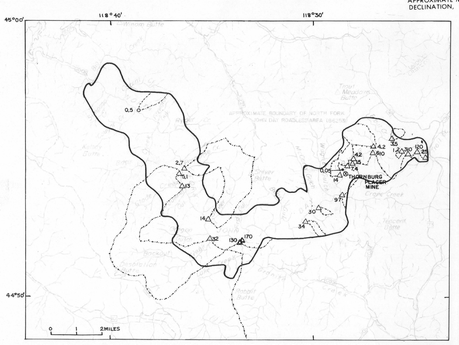

Figure 1. Distribution of gold in the North Fork John Day River Roadless Area. Drainages containing anomalous concentrations are outlined by dotted lines. Dots indicate rock sample sites; circles, silt samples; triangles, pan concentrate samples. Concentrations are in parts per million.

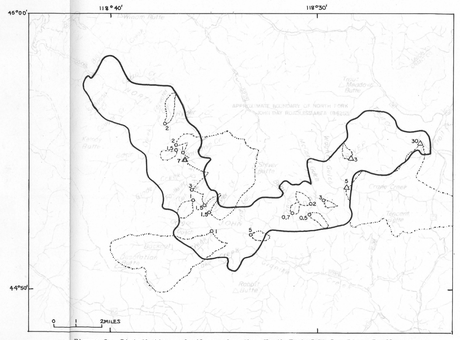

Figure 2. Distribution of silver in the North Fork John Day River Roadless Area. See Figure 1 caption for explanation of symbols.

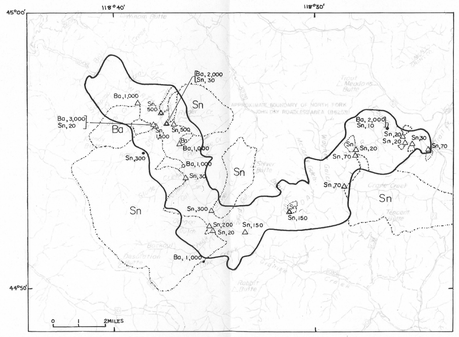

Figure 3. Distribution of barium (Ba) and tin (Sn) in the North Fork John Day River Roadless Area. See Figure 1 caption for explanation of symbols.

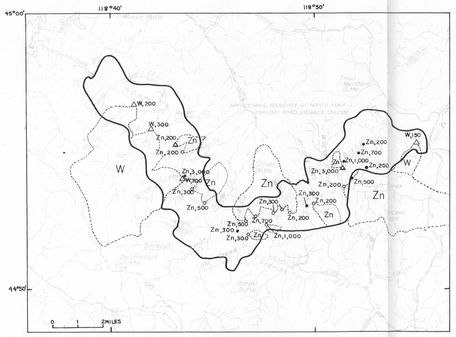

Figure 4. Distribution of tungsten (W) and zinc (Zn) in the North Fork John Day River Roadless Area. See Figure 1 caption for explanation of symbols.

Table 1

Geochemical data for gold (Au), silver (Ag), barium (Ba), tin (Sn), tungsten (W), and zinc (Zn)

Element	Lower limit of determination parts per million (ppm)	Types of samples and range of values (ppm)	Number of drainages tributary to North Fork John Day River containing anomalous concentrations	Detected in North Fork John Day River	Number of drainages in which element is associated with gold	Method used for determining anomalous concentrations
Au	silt and rock, 0.05 pan conc. 0.05 – 17.0	1 rock (0.05) 3 silt (0.3–0.5) 21 pan conc. (1.2 – 610)	21	yes	----	Crustal abundance 0.003 – 0.005 (Isum, 1968 p. 3; Lee and Yao, 1970, p. 782). Therefore, 0.05 ppm considered anomalous here
Ag	silt and rock, 0.5 pan. conc., 1.0	18 silt (.5–5) 4 pan conc. (3 – 30)	18	no	8	Crustal abundance 0.07 ppm (Vinogradow, 1962). Therefore, 0.5 ppm considered anomalous here.
Ba	silt and rock, 20 pan conc., 50[1]	2 rock (1,000; 2,000) 2 silt (1,000; 2,000) 4 pan conc. (1,000 – 3,000)	5	no	1	3.4 percent of samples have 1,000 ppm or more. This concentration is close to 2 standard deviations from mean and is considered anomalous here.
Sn	silt and rock, 10 pan conc., 20[2]	2 rock (10,300) 2 silt (10, 30) 17 pan conc. (20 – 1,500)	17	yes	8	Crustal abundance 2–3 ppm (Sainsbury and Reed, 1973, p. 641). Therefore, 10 ppm considered anomalous here.
W	silt and rock, 50 pan conc., 100[2]	4 pan conc. (150 – 700)	4	no	2	Crustal abundance 1–1.3 ppm (Hobbs and Elliott, 1973, p. 669). Therefore, 50 ppm considered anomalous here.
Zn	silt and rock, 200 pan conc., 500[2]	8 rock (200–3,000) 14 silt (200–3,000) 2 pan conc. (500, 700)	15	no	3	Crustal abundance 65–94 ppm (Wedow and others, 1973, p. 700). Therefore, 200 ppm considered anomalous here.

[1]Pan concentrate samples have higher limits of determination than do rock and silt samples because of smaller than standard mass of sample analyzed by atomic absorption.

[2]Pan concentrate samples have higher limits of determination than do rock and silt samples because of complex spectra obtained in spectrographic analysis.

GEOCHEMICAL MAP OF THE NORTH FORK JOHN DAY RIVER ROADLESS AREA, GRANT COUNTY, OREGON

By
James G. Evans

1986

Interior—Geological Survey, Reston, Va.—1986

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225