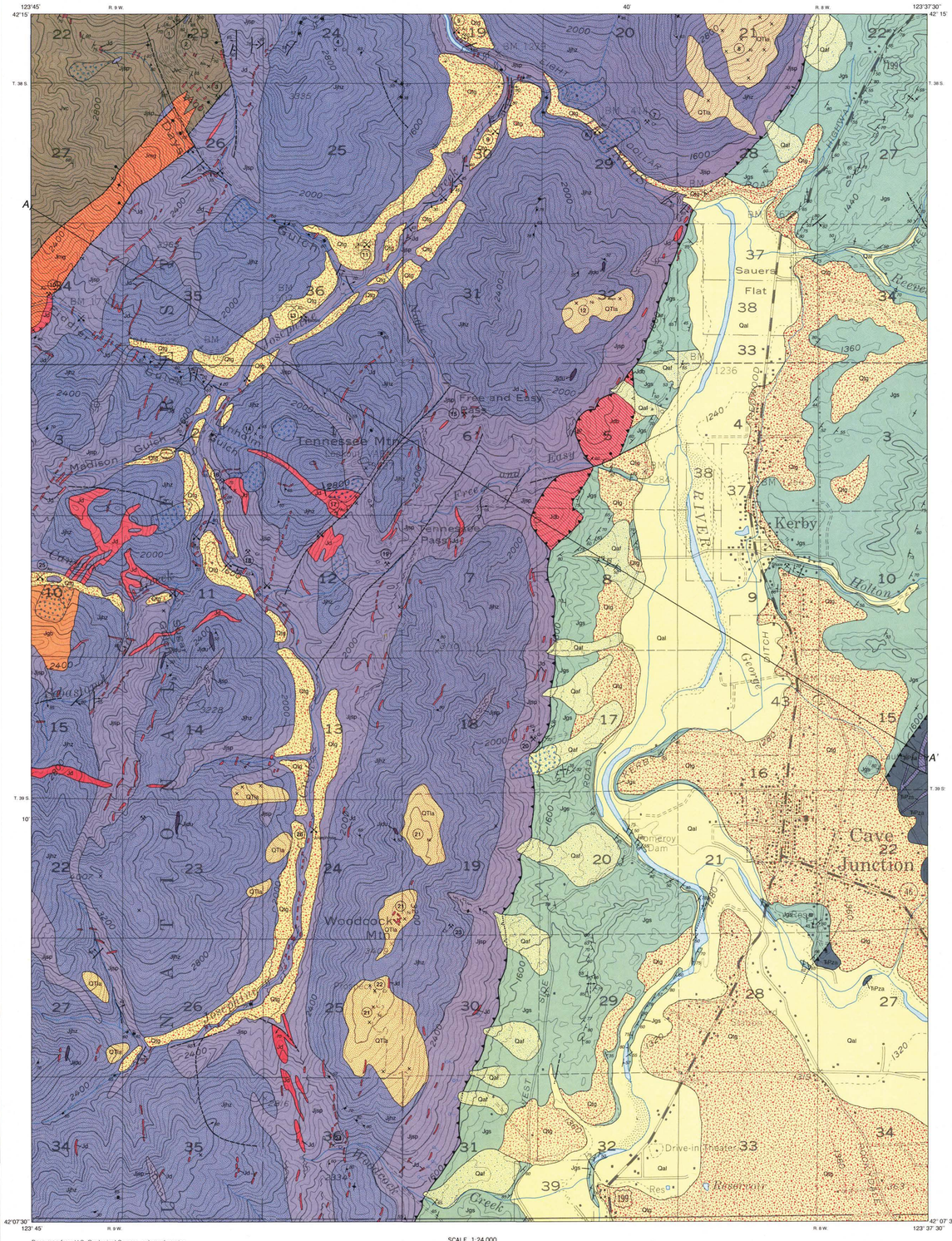
STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

GEOLOGIC MAP OF THE NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON

1986



Base map from U.S. Geological Survey - enlarged version of Cave Junction 15' quadrangle (original scale 1:62,500)

Topography from aerial photographs by multiplex methods and from planetable surveys by USBR and by USGS 1954
Aerial photographs taken 1952

Polyconic projection. 1927 North American datum
10,000-foot grid based on Oregon coordinate system, south zone

Dashed land lines indicate approximate locations

TRUE NORTH
MAGNETIC NORTH
20°
APPROXIMATE MEAN DECLINATION, 1954

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

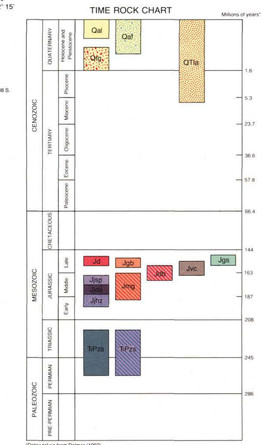
CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

OREGON
QUADRANGLE LOCATION

Geology by Len Ramp

Field work completed in 1985
Map reviewed by Barry Moring, U.S. Geological Survey, Robert G. Coleman, Menlo Park, and Gregory D. Harper, State University of New York
Chemical analysis supervised by Gary L. Baxter
Cartography by Mark E. Neuhaus

TIME ROCK CHART



*Dates taken from Palmer (1983)

EXPLANATION

Qal — **Alluvium (Holocene)** — Sand, gravel, and silt in stream channels on flood plains and terraces forming a cover over bed rock varying in thickness from a few inches to more than 150 ft in the Sauers Flat area near Kerby, judging from logged depth to bed rock in nearby water wells

Qaf — **Alluvial fan deposits (Holocene-Pleistocene?)** — Soil and rock debris from adjacent steep slopes; derived from gulches with intermittent stream flow and/or landslide debris (**Qls**); composed predominantly of ultramafic material

Qtg — **Terrace gravel (Pleistocene)** — Older, partially cemented alluvium; consists of sand, gravel, silt, and clay deposits on benches and gentle slopes from about 30 ft to 300 ft above present stream channels. Some deposits have been worked extensively for gold, particularly along lower Josephine Creek and its tributaries. Deposits derived from Galice sedimentary rocks have been weathered in part to clay

QTla — **Lateritic soil (Holocene-Miocene?)** — Iron-rich soil developed on peridotite surfaces; predominantly the result of chemical weathering. The unit is usually found on flat ridge tops and old landslide areas and has residual enrichment of nickel, cobalt, and chromite (Ramp, 1978)

Jd — **Dikes (Upper Jurassic)** — Numerous small- to medium-sized dikes dated at 150 million years before the present (m.y. B.P.) (Harper and others, 1986) intruding ultramafic and volcaniclastic rocks. Composition of dikes includes andesite, quartz diorite, dacite, hornblende diorite, hornblende gabbro, diabase, porphyritic andesite, and rodingite (see rock descriptions in Table 2, Plate 2). The dikes are generally tabular in peridotite and lenticular in serpentinite. Some larger dikes are composite or multiple with varying textures and compositions. Gold is associated with a few of the dikes. Thickness of some dikes has been exaggerated on the map to permit graphic representation

Jgs — **Metasedimentary rocks (Upper Jurassic)** — Metamorphosed thin-bedded siltstone and graywacke sandstone with graded bedding, black shale, minor layers of pebble conglomerate, and chert. The unit is tightly folded and steeply dipping and displays some slaty cleavage. These same pelagic sediments overlie the Josephine ophiolite in Del Norte County, California, and contain *Buchia concentrica* (Sowerby) of late Oxfordian to early Kimmeridgian age (Harper, 1980). This unit was correlated with the Galice Formation of Diller (1907) by Wells and others (1949), Wells and Walker (1953), and Cater and Wells (1953)

Jgb — **Gabbro (Upper Jurassic)** — Medium- to coarse-grained hornblende gabbro with poikilitic texture; contains green hornblende, calcic plagioclase, accessory magnetite, epidote, and minor quartz. The body mapped on Canyon Creek contains some diorite and appears to be related to the other dikes (**Jd**)

Jvc — **Volcaniclastic rocks (Upper-Middle? Jurassic)** — Andesitic water-laid tuffs and agglomerate, volcanic wacke with graded bedding, dark siltstone, chert, and altered lavas (greenstone). About 2 mi to the northwest, this unit contains very coarse water-worked volcanic conglomerate and pillow lavas that are overlying and derived from diabasic dikes (Ramp, 1984). These rocks are mapped as volcanic member of Galice Formation by Wells and others (1949) and may be equivalent to the Rogue Formation of Wells and Walker (1953), which has been dated at 157 ± 2 m.y. B.P. (Saleeby, 1984). This formation encloses a stratabound massive sulfide deposit (mine 1, Table 1)

Jdu — **Diabasic dikes and pillow basalt (Upper-Middle? Jurassic)** — Dark-green augite basalt with abundant secondary chlorite; overlies and occurs as screens between medium-coarse to fine-grained diabasic dike rocks that have abundant secondary epidote. These rocks appear to be overthrust on serpentinized Josephine peridotite as has occurred with similar rocks at the Turner-Albright Mine about 14 mi to the south. A few miles farther south in Del Norte County, California, similar rocks are dated at 157 m.y. B.P. and mapped as the upper portion of the Josephine ophiolite (Harper, 1980)

Jmg — **Metagabbro (Middle-Lower? Jurassic)** — Rocks mapped in this unit have considerable variation and include amphibolite, clinopyroxenite with diorite "veins," hornblende diorite, dark-green clinopyroxene-rich gabbro, and hornblende gabbro with secondary quartz, epidote, and minor pyrite. The amphibolite shows well-developed foliation and has abundant epidote on the fractures. The unit appears to be in fault contact with both the serpentinite and volcaniclastic rocks. Its relationship to the other units is unclear, but the unit probably should be considered as part of the mafic-ultramafic Josephine ophiolite sequence

Jjsp, Jdu, Jjhz — **Josephine peridotite (Middle-Lower? Jurassic)** — This unit is largely harzburgite tectonite (**Jjhz**) with minor dunite (**Jjdu**). Most of the peridotite has been serpentinized to some degree. Areas of greater than 50 percent serpentinization are mapped separately (**Jjsp**). A few small areas such as on Eight Dollar Mountain and on some of the higher terrain are fresh, unserpentinized harzburgite (olivine and enstatite with accessory magnetite and chromite). Areas of more complete serpentinization are generally situated near fault contacts, along shear zones, and in areas of lower terrain. (Areas of predominant serpentinization were outlined, in part, by photogeologic methods and should be considered approximate.) A few small segregations of chromite have been prospected and mined in this unit. It is also the source of the native nickel iron mineral josephinite, which has been recovered from placer operations on upper Josephine Creek

TRPza — **Applegate Group (Triassic-Paleozoic)** — Metasedimentary and metavolcanic rocks of probable marine depositional environment including "greenstone," argillite, chert, quartzite, marble, and minor intrusives. Metamorphic grade varies from greenschist facies up to amphibolite facies and even higher near plutons. Cherts are recrystallized to quartzites. Epidote-clinozoisite alteration is pervasive, and much of the plagioclase is altered to albite. Smith and others (1982) suggest Triassic- to Paleozoic-age range

TRPz — **Serpentinite (Triassic-Paleozoic)** — Serpentinized peridotite and dunite occurring with the Applegate Group

GEOLOGY AND MINERAL DEPOSITS

Geologic setting

The map area includes a portion of the Western Jurassic Belt and a small area of the Western Paleozoic and Triassic Belt of the complex Klamath Mountains geomorphic province. These belts, which were named by Irwin (1960), are separated by an east-dipping thrust that is exposed in the vicinity of Cave Junction. Many of the rocks of both belts belong to ancient oceanic crusts. The suite of rocks making up such a crust is referred to as an ophiolite. A normal, complete ophiolite suite includes a base of peridotite from the upper mantle, overlain in sequence by gabbro and sheeted diabasic dikes, ocean-floor basaltic lavas, and pelagic sediments. Harper (1980) describes a complete ophiolite, the Josephine ophiolite, a few miles to the south where it is well exposed along the Smith River in Del Norte County, California.

About 60 percent of the map area is underlain by ultramafic rocks, primarily peridotite and serpentinite, which are part of a northeast-extending arm of the large Josephine ultramafic sheet. The ultramafic rocks are highly deformed, intruded by numerous dikes, and in large part serpentinized.

The relationship of the layered volcaniclastic rocks (**Jvc**) in the northwest corner of the map to the marine metasedimentary rocks (**Jgs**) lying east of the ultramafic rocks is not shown in this area; a few miles to the north, however, these units appear to be in conformable contact, with unit **Jgs** overlying unit **Jvc**.

Structure

The major structural features are the faulted boundaries of principal geologic units in the area. The west-dipping thrust fault bounding the eastern edge of the ultramafic rocks is not well exposed but appears as highly sheared serpentinite gouge overriding the metasedimentary rocks. This fault appears to dip from about 20° to about 60° west. The deeply alluviated Illinois Valley is evidence of possible recent movement along this fault, which may have formed a temporary dam to the Illinois River on possibly more than one occasion. The west edge of the ultramafic arm is marked by a northeast-trending, nearly vertical fault that has been offset by later northwest-trending high-angle faults.

Sedimentary units **Jvc** and **Jgs** appear to be isoclinally folded and steeply dipping. The predominant direction of dip is to the east.

Mineral deposits (see Table 1)

The area has had significant placer gold production since 1850, when gold was discovered in the Illinois River near the mouth of Josephine Creek. Several small seasonal placer operations are still active in the area.

A few lode gold deposits were prospected and mined in a small way, primarily in the early days, and records of production and geologic details are sparse. Much of the placer gold appears to have come from mineralization in the volcaniclastic terrain and is also associated with dikes intruding the ultramafic rocks.

Platinum group metals are found in most of the gold placer concentrates from the area, but chemical analyses of panned concentrates from essentially all the stream sediments failed to show significant concentrations of these metals.

Wells and others (1949, p. 21) report from approximate analyses of platinum group metals in the area that they contain about 30 percent platinum, 32 percent iridium, 25 percent osmium, 13 percent ruthenium, and little or no rhodium or palladium. Since the present analyses are for platinum and palladium only, it is conceivable that interesting amounts of the other platinum group metals may be present (Table 3, Plate 2). The ratio of platinum metals to gold in placer concentrates in Josephine Creek is unreported. Wells and others (1949) reported a ratio of platinum group metals to gold in the Waldo area south of Cave Junction of 1:75, and Shenon (1933) reported a ratio of about 1:50 in the Takilma area.

A few small chromite deposits occur in the Josephine ultramafic rocks. None in this area have had significant production. They are described in a Department publication, Bulletin 52 (Ramp, 1961).

Nickel-bearing lateritic soils developed on the Josephine peridotite, in particular on Eight Dollar Mountain and Woodcock Mountain, are described in an earlier Department publication (Ramp, 1978).

The mineral josephinite has been the subject of considerable geologic interest for a number of years. This native metal alloy of nickel and iron occurs as nuggets in stream gravels along a 5-mi-long north-flowing stretch of upper Josephine Creek and to a lesser extent in Woodcock Creek and Mendenhall Creek. One of the more complete studies of josephinite has been that of Botto and Morrison (1976). Dick (1974) reported the occurrence of grains of josephinite up to 4 mm long in outcrops of sheared serpentinite near the saddle between Woodcock Creek and Mendenhall Creek. An attempt was made during the present study to duplicate that find, and bulk samples of sheared serpentinite were taken in the above described saddle and in the saddle between Woodcock Creek and Josephine Creek (see Table 2, Plate 2, samples 95 and 96). Microscopic examination of a multitude of slabs and crushing, grinding, and subsequent gravity separation of bulk samples of the rock failed to reveal the presence of josephinite. In addition, no platinum group minerals were detected in **the rocks or concentrates**.

Terrace gravel deposits (**Qtg**) derived from Galice Formation metasedimentary rocks (**Jgs**) in the area northeast of Kerby may contain clay that can be used in the manufacture of brick and tile. Future testing is being planned to evaluate this potential.

Previous geologic mapping

The area has been mapped by Wells and others (1949), Ramer (1967), Dick (1976), Ramp and Peterson (1979), and Smith and others (1982).

Acknowledgments

Some field assistance was provided by Mark Ferns, Paul Staub, and Klaus Neuendorf, Oregon Department of Geology and Mineral Industries. The completed map was reviewed by Barry Moring, U.S. Geological Survey, Menlo Park, California; Robert G. Coleman, Menlo Park; and Gregory D. Harper, State University of New York, Albany, New York. The Bureau of Mines in Reno, Nevada, provided the gold, palladium, and platinum analyses.

REFERENCES

Botto, R.I., and Morrison, G.H., 1976, Josephinite: A unique nickel-iron: American Journal of Science, v. 276, no. 3, p. 241-274.

Cater, F.W., Jr., and Wells, F.G., 1953, Geology of the Gasquet quadrangle, California-Oregon: U.S. Geological Survey Bulletin 995-C, p. 79-133.

Dick, H.J.B., 1974, Terrestrial nickel iron from the Josephine peridotite, its geologic occurrence, associations, and origin: Earth and Planetary Science Letters, v. 24, p. 291-298.

——, ——1976, The origin and emplacement of the Josephine peridotite of southwestern Oregon: New Haven, Conn., Yale University doctoral dissertation, 409 p.

Diller, J.S., 1907, Mesozoic sediments of southwestern Oregon: American Journal of Science, 4th ser., v. 23, p. 401-421.

Harper, G.D., 1980, Structure and petrology of the Josephine ophiolite and overlying metasedimentary rocks, northern California: Berkeley, Calif., University of California doctoral dissertation, 259 p.

Harper, G.D., Saleeby, J.B., Cashman, S., and Norman, E., 1986, Isotopic age of the Nevadan orogeny in the western Klamath Mountains, California-Oregon [abs.]: Geological Society of America Abstracts with Programs, v. 18, no. 2, p. 114.

Irwin, W.P., 1960, Geologic reconnaissance of the northern Coast Range and Klamath Mountains, California, with a summary of mineral resources: California Division of Mines and Geology Bulletin 179, 80 p.

Palmer, A.R., 1983, The Decade of North American Geology 1983 geologic time scale: Geology, v. 11, no. 9, p. 503-504.

Ramer, A.R., 1967, Petrology of a portion of the Josephine peridotite sheet, Josephine County, Oregon: Eugene, Oreg., University of Oregon master's thesis, 121 p.

Ramp, L., 1961, Chromite in southwestern Oregon: Oregon Department of Geology and Mineral Industries Bulletin 52, 169 p.

——, ——1978, Investigations of nickel in Oregon: Oregon Department of Geology and Mineral Industries Miscellaneous Paper 20, 68 p.

——, ——1984, Geologic map of the southeast quarter of the Pearsoll Peak quadrangle, Curry and Josephine Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-30.

Ramp, L., and Peterson, N.V., 1979, Geology and mineral resources of Josephine County, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 100, 45 p.

Saleeby, J.B., 1984, Pb-U zircon ages from the Rogue River area, western Jurassic belt, Klamath Mountains, Oregon [abs.]: Geological Society of America Abstracts with Programs, v. 16, no. 5, p. 331.

Shenon, P.J., 1933, Geology and ore deposits of the Takilma-Waldo district, Oregon: U.S. Geological Survey Bulletin 846-B, p. 141-194.

Smith, J.G., Page, N.J., Johnson, M.G., Moring, B.C., and Gray, F., 1982, Preliminary geologic map of the Medford 1° by 2° quadrangle, Oregon: U.S. Geological Survey Open-File Report 82-955.

Wells, F.G., Hotz, P.E., and Cater, F.W., Jr., 1949, Preliminary description of the Kerby quadrangle: Oregon Department of Geology and Mineral Industries Bulletin 40, 23 p.

Wells, F.G., and Walker, G.W., 1953, Geologic map of the Galice quadrangle, Oregon: U.S. Geological Survey Geologic Quadrangle Map GQ-25.

GMS-38

Geologic Map of the Northwest Quarter of the Cave Junction Quadrangle, Josephine County, Oregon
By Len Ramp

Plate 1

Funded in part by the USDA Forest Service

Table 1. MINES AND PROSPECTS IN THE NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, OREGON*

LOCATIONS ARE SHOWN ON MAP ON PLATE 1.

Map no.	Mine or prospect	Commodity	¼/¼/¼	Sec.	Location T.(S.)	R.(W.)	Elevation (ft)	Geologic formation	Description	Workings	Production	References
1.	Suttle No. 1 (Twin Tunnel)	Au	NE SW	23	38	9	2,550	Jvc	Massive granular pyrite layer in volcanic sediments	Two short adits	Nil	7
2.	Gold Ridge (?)	Au	NE SW	23	38	9	2,970	Jvc	Pyrite in fractured cherty tuffaceous sediments	Shaft and decline on ridge 15 ft deep	Nil	4
3.	Chatty claim	Au	NW NE	26	38	9	2,730	Jvc, Jgs	Pocket mineralization on vertical fault contact of serpentinite and metasediments	Shallow open cut and short adit	$8,000 pocket	1,2,4
4.	Black King	Cr	SW SE	24	38	9	2,650	Jjhz	Small lenticular pods of massive chromite in serpentinized harzburgite	Shallow pit	Small	5
5.	Unnamed placer	Au	NE SW	19	38	8	1,250	Qtg, Jjsp	Poorly sorted, partially cemented gravel on serpentinite bed rock	Shallow pits	Unknown	3
6.	Consolidated placer	Au	SE NW	29	38	8	1,300	Qtg, Jjsp	Medium to fine gravel and sand on serpentinite bed rock	Small pit	Unknown	—
7.	Eight Dollar No. 1	Cr	SE NE	29	38	8	1,830	Jjhz	Disseminated to banded chromite in 0-ft-thick lens of dunite in harzburgite	Shallow cut	1½ tons	5
8.	Eight Dollar Laterite	Ni	—	21	38	8	2,000 to 3,250	QTla, Jjhz	Red lateritic soil and saprolite developed on peridotite	Several pits	Large samples	6
9.	Golden Princess placer	Au	SW NE	30	38	8	1,270	Qtg, Jjsp	Poorly sorted, partially cemented gravel on serpentinite bed rock	Shallow hydraulic pits (nearly worked out)	Unknown	4
10.	Mood	Au	Center	34	38	9	1,780	Jjsp, Jmg, Jd	Serpentinite metagabbro contact zone with diorite dike, pyrite, quartz	Open cut and over 2,000 ft of caved tunnels	A few hundred ounces	1,2,4
11.	Gold King (Smith)	Au	NW NE	36	38	9	1,500	Qtg, Jjsp	Semicemented gravels on serpentinite bed rock	Shallow pits, ponds, and trenches	Unreported	7
12.	Free and Easy Laterite	Ni	S½	32	38	8	2,000 to 2,400	QTla, Jjhz	Red lateritic soil and yellow saprolite developed on peridotite	Shallow pits	None	6
13.	Bear placer and Foster asbestos	Au, chrysotile	SW¼	36	38	9	1,400 ±	Qtg, Jjsp	Cemented gravels on serpentinite bed rock with chrysotile veinlets	1,100 ft of drifts on bed rock and several diamond drill holes	Unreported	4,3,7
14.	Low Boy	Cr	SE NE	2	39	9	2,200	Jjhz	Thin chromite schlieren in harzburgite and disseminated in altered dunite	Two small cuts	None	5
15.	Free and Easy	Au	SE NW SW NE	6	39	8	2,080	Jjsp, Jd	Gold occurs in sheared altered dikes in sheared serpentinite; values are spotty	Caved adits and small cuts	Unreported	1,2,4
16.	Alta (Oro Fino)	Au	SW SE SE SE	2	39	9	1,680 to 1,960	Jd, Jjsp	Sulfides and gold in diorite dike intruding serpentinite	Caved adits and cuts	Some early-day production; totals not recorded	1,2,4
17.	Roseburg and Fidelity	Au	SW SE	1	39	9	2,400 to 2,500	Jd	Pyrite and gold in quartz veins in diorite surrounded by serpentinite	Two adits and small cuts	Unrecorded	1,2,4
18.	Tennessee	Cr	SE NE NE NE	11	39	9	1,760	Jjsp	Small coarse-grained, high-grade chromite layer in partly serpentinized harzburgite and dunite	Small cuts	21 long tons	5
19.	Tennessee Pass	Cr	SE NE	12	39	9	2,165	Jjsp	Small lens-shaped bodies of massive chromite in sheared serpentinite	Shallow cuts, short adit, and glory hole	300 tons high-grade	5
20.	Lucky Strike	Cr	NE SE	18	39	8	1,730	Jjsp	Thin chromite zone in sheared serpentinite strikes N. 15 E. and dips 45° W.	Short drifts, shallow shaft, and bulldozer trench	20 long tons	5
21.	Woodcock Mtn. Laterite	Ni	—	19,24, 25,30, 31	39	8-9	2,400 to 3,400	QTla, Jjhz	Shallow rocky lateritic soil and saprolite developed on harzburgite and dunite	Shallow cuts and trenches	None	6
22.	Nettie (Woodcock)	Cr	SE NE	25	39	9	3,280	QTla	Small boulders of refractory-grade chromite in lateritic soil	Shallow pit beside dozer trench	None	5
23.	Dottie May	Cr	SE SW	19	39	8	2,700	Jjhz	Narrow north-trending streaks of massive and disseminated refractory-grade chromite in serpentinized dunite	Short adit and shallow cut	None	5
24.	Woodcock Creek	Cr	Center	36	39	9	2,000	Jjsp	Narrow lenses and streaks of chromite in serpentinized harzburgite and dunite	Small cuts	None	—
25.	Canyon Creek placers	Au	SE NW	10	39	9	1,600 to 1,800	Qtg, Jjsp	Partially cemented gravels and sand on serpentinite bed rock have been extensively worked	Numerous pits and ground-sluiced areas and drifts	Large but no records	1
26.	Josephinite placers	Josephinite	NE NW	24	39	9	1,760	Qtg, Jjsp	Native nickel iron nuggets derived from serpentinite occur in partly cemented terrace and stream gravels	Small hydraulic pits	Small production for specimen market and as by product of gold placers	8

* Several other small prospects for both gold and chromite are present in the map area but are not listed here due to lack of pertinent data. Extensive placer mining, mainly hydraulic, has been done along Josephine Creek and most of its tributaries, especially Canyon Creek, Tennessee Gulch below the Roseburg and Fidelity, and Fiddler Gulch below the Mood and Days Gulch. Present-day mining activity is mainly small Venturi-type dredgers operating within the stream channels.

REFERENCES

1. Diller, J.S., 1914, Mineral resources of southwestern Oregon: U.S. Geological Survey Bulletin 546, 147 p.
2. Parks, H.M., and Swartley, A.M., 1916, Handbook of the mining industry of Oregon: Oregon Bureau of Mines and Geology, Mineral Resources of Oregon, v. 2, no. 4, 306 p.
3. Wells, F.G., Hotz, P.E., and Cater, F.W., Jr., 1949, Preliminary description of the geology of the Kerby quadrangle, Oregon: Oregon Department of Geology and Mineral Industries Bulletin 40, 23 p.
4. Oregon Department of Geology and Mineral Industries, 1952, Oregon metal mines handbook–Josephine County: Oregon Department of Geology and Mineral Industries Bulletin 14-C, v. 2, sec. I, 209 p.
5. Ramp, L., 1961, Chromite in southwestern Oregon: Oregon Department of Geology and Mineral Industries Bulletin 52, 169 p.
6. Ramp, L., 1978, Investigations of nickel in Oregon: Oregon Department of Geology and Mineral Industries Miscellaneous Paper 20, 68 p.
7. Oregon Department of Geology and Mineral Industries, Mine file reports (unpublished): Grants Pass, Oreg., Grants Pass Field Office.
8. Botto, R.I., and Morrison, G.H., 1976, Josephinite: A unique nickel-iron: American Journal of Science, v. 276, no. 3, p. 241-274.

MAP SYMBOLS

Landslide debris — Deposits of mixed soil and rock fragments; depicted by pattern printed over color representing predominant underlying rock unit

Contact — Approximately located; queried where uncertain

Fault — Arrow showing dip; bar and ball on downthrown side; dashed where approximate or inferred; dotted where concealed; queried where uncertain

Thrust fault — Teeth on upper plate; dashed where approximate; dotted where concealed

Zone of intense shearing

Strike and dip of bedding

Strike and dip of overturned bedding

Strike of vertical beds

Strike and dip of foliation in metamorphic rocks or banding in igneous rocks

Vertical foliation

Strike and dip of joint

Vertical joint

Strike and dip of parallel jointing

Anticline axis

Spring

Shaft — **Mine adit**

Gold placer — **Mine or quarry**

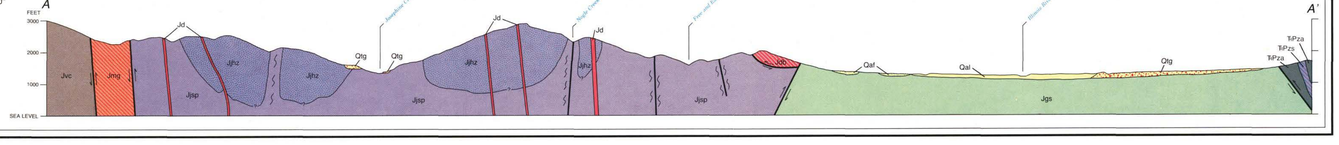
Prospect

(Numbers correspond to numbers in Table 1)

Au Cr Ni **Principal metal at mine or prospect**

Josephinite Chrysotile Shale **Mineral occurrence or rock product**

GEOLOGIC CROSS SECTION



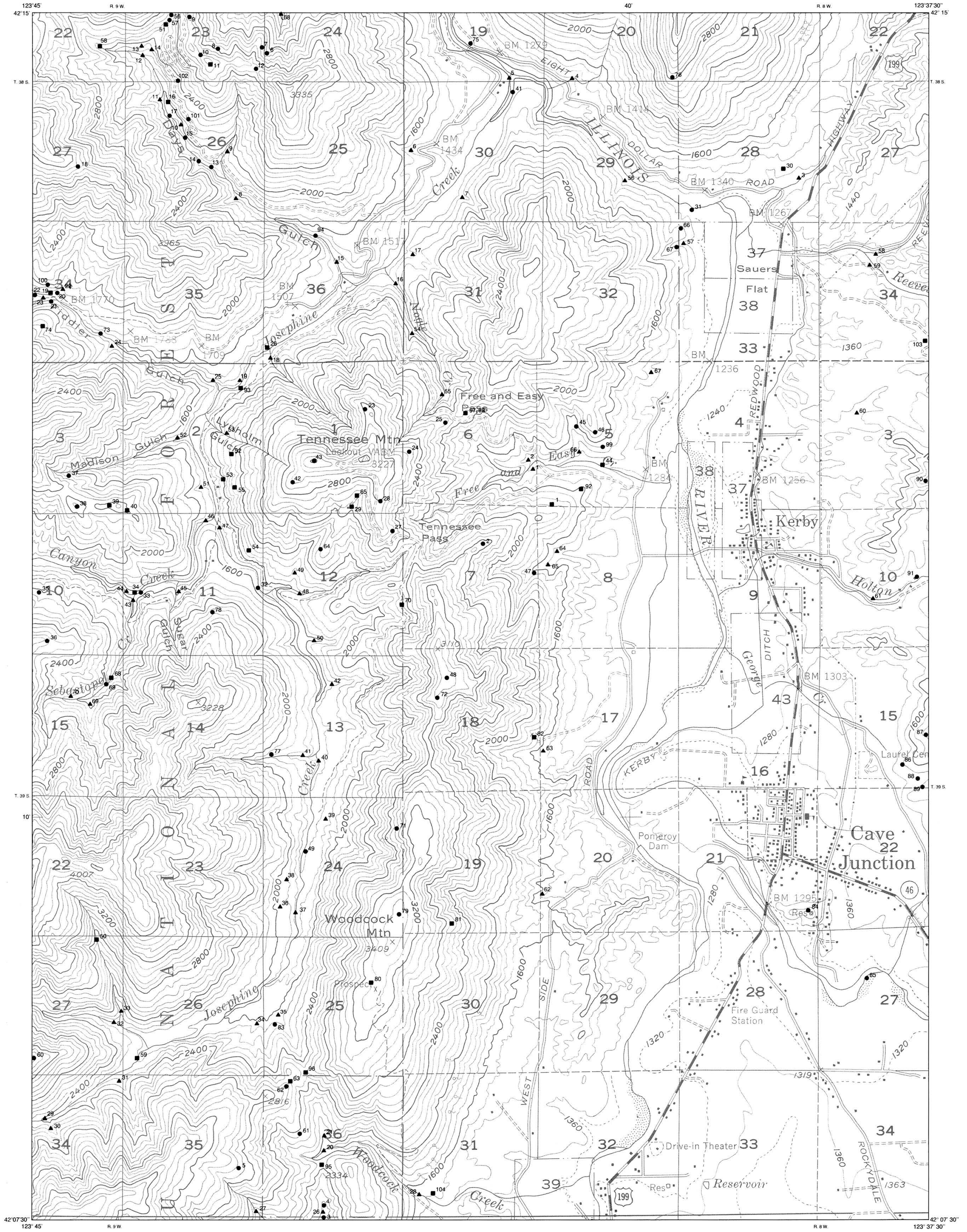
STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

SAMPLE LOCATION MAP OF THE NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON

1986

GMS-38
Geologic Map of the Northwest Quarter of the Cave Junction Quadrangle, Josephine County, Oregon
By Len Ramp
Plate 2

Funded in part by the USDA Forest Service



Base map from U.S. Geological Survey - enlarged version of Cave Junction 15' quadrangle (original scale 1:62,500)
Topography from aerial photographs by multiplex methods and from planetable surveys by USBR and by USGS 1954
Aerial photographs taken 1952
Polyconic projection. 1927 North American datum
10,000-foot grid based on Oregon coordinate system, south zone
Dashed land lines indicate approximate locations

APPROXIMATE MEAN DECLINATION, 1984

SCALE 1:24 000

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

OREGON
QUADRANGLE LOCATION

Samples collected by Len Ramp, 1984-85.

LABORATORY PROCEDURES

By Gary L. Baxter

SAMPLE PREPARATION NOTES

1. Rock samples were crushed and then ground to minus 80-mesh.
2. Field notes indicated the presence of visible free gold in some of the panned concentrates and a potential for platinum group alloy particles. In an attempt to obtain homogeneous analytical samples, particularly with respect to the precious metals that were likely to be in a malleable form, the procedure below was used. Extensive testing by the U.S. Bureau of Mines indicated that the analytical samples were not generally homogeneous (Au-Pd-Pt). Extensive grinding to enable homogenizing of the samples was considered to be counterproductive because of the presence of malleable particles and the potential for cross contamination.
3. Panned concentrates were ground and then sieved to obtain plus-80-mesh and minus-80-mesh fractions. The minus-80-fraction weights were, in general, greater than 95 percent of the total sample weight. These fractions were used as the analytical samples. The plus-80-mesh fractions were analyzed for Au-Pd-Pt.

ANALYTICAL METHODS

Au-Pd-Pt: The total Au content, plus Pd and Pt where determined, was obtained by fire assay preconcentration into added Ag, dissolution with HNO_3 and then HCl, and analysis of the metal(s) by induction coupled plasma emission spectrometry (ICP), direct current plasma emission spectrometry (DCP), and atomic absorption spectrometry (AA).

1. The U.S. Bureau of Mines (Reno) provided Au + Pd + Pt analyses for mafic rock samples and for the minus-80-mesh panned concentrates. The sample weight was a ¼ assay ton. The metals were determined by ICP.
2. Chemex Laboratories, North Vancouver, British Columbia, Canada, provided Au analyses for the other rock samples. The sample weight was 10 g, and the final volume was 5 ml. The metal was determined by AA.
3. Bondar-Clegg Laboratories, North Vancouver, British Columbia, Canada, provided quality-control check analyses for Au in minus-80-mesh panned concentrates and rocks. The sample weight was 20 g, and the final volume was 2 ml. The metals were determined by DCP.
4. The Oregon Department of Geology and Mineral Industries (DOGAMI) laboratory provided Au + Pd + Pt analyses for the plus-80-mesh panned concentrate fractions. All of each fraction was fire assayed, and the final volume was 3 ml. The metals were determined by AA.

Other Metals—Rock Samples: Total metal contents were obtained by dissolution with HF and other acids; analysis of the metals was by ICP, DCP, or AA.

1. Chemex Laboratories provided the analyses. Each 0.5-g sample was treated with HF + HNO_3 + $HClO_4$, taken to dryness overnight, redissolved in HCl, and made to final volume of 25 ml with deionized water. The metals were determined by ICP.
2. Bondar-Clegg Laboratories provided the quality-control check analyses. A 0.5-g sample was treated as above, but the final volume was 20 ml. The metals were determined by DCP.
3. The DOGAMI laboratory provided additional quality-control check analyses for certain elements. Each 5-g sample was treated with HF + HNO_3, taken to dryness, redissolved in HCl and HNO_3, and made to a final volume of 250 ml. Dilutions were made as required for high metal concentrations. The metals were determined by AA.

Other Metals—Panned Concentrate Samples: Partial metals contents (i.e., those extractable by "mild" reagents) were obtained by treatment with mixed acids. One laboratory provided total metals contents of these samples.

1. Chemex Laboratories provided the analyses. Each 0.5-g sample was treated with HNO_3 + HCl (3:1), heated on a water bath, and made to a final volume of 25 ml with deionized water. The metals were determined by ICP.
2. Bondar-Clegg Laboratories provided the total metals contents using the method described for rock samples.
3. The DOGAMI laboratory provided quality-control check analyses for certain elements. Each 5-g sample was treated with HNO_3, taken to dryness, and further treated and analyzed using the method described for the rock samples.

● ■ Table 2. ROCK SAMPLE DESCRIPTIONS AND CHEMICAL ANALYSES, NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON. SAMPLE LOCATIONS ARE MARKED ON MAP ON THIS PLATE WITH CIRCLES FOR ROCK SAMPLES AND BOXES FOR ORE SAMPLES.

Map no.	Field no.	Lab no.	Geologic formation	1/4	1/4	Sec.	T.(S.)	R.(W.)	Elevation (ft)	Rock description	Type sample	Au (ppm)	Ag (ppm)	Ba (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Mo (ppm)	Ni (ppm)	Pd (ppb)	Pt (ppb)	V (ppm)	Zn (ppm)
1	84CR001	ASG-1	Jdb	SW	SW	5	39	8	1,840	Diabase dike rock with minor pyrite	Multiple grab	<0.005	0.4	70	22	135	60	--	48	--	--	187	39
2	84CR002	--	Jjhz	SW	NE	7	39	8	2,430	Partly serpentinized harzburgite	--	--	--	--	--	--	--	--	--	--	--	--	--
3	84CR003	ATG-28	Jjsp	NE	NW	1	40	9	1,710	Panned concentrate of black sands	Panned concentrate	--	0.2	10	48	1,663	65	--	374	--	--	136	60
4	84CR004	--	Jd	SE	SW	36	39	9	1,740	Fine-grained dark-gray andesite dike rock	--	--	--	--	--	--	--	--	--	--	--	--	--
5	84CR005	--	Jd	NE	SE	35	39	9	2,940	Medium-grained hornblende andesite	--	--	--	--	--	--	--	--	--	--	--	--	--
6	84CR006	--	Jd	SW	SW	24	38	9	2,620	Medium-grained hornblende andesite and fine-grained dacite (composite dike)	--	--	--	--	--	--	--	--	--	--	--	--	--
7	84CR007	--	Jd	SE	SE	23	38	9	2,630	Fine-grained dacite and andesite altered in part to rodingite	--	--	--	--	--	--	--	--	--	--	--	--	--
8	84CR008	--	Jvc,Jd	SW	SE	23	38	9	2,840	Hornblende diorite dike rock	--	--	--	--	--	--	--	--	--	--	--	--	--
9	84CR009	--	Jjsp	NE	SW	23	38	9	3,040	Massive compact serpentinite	--	--	--	--	--	--	--	--	--	--	--	--	--
10	84CR010	--	Jvc	SW	SE	23	38	9	3,100	Pale-gray to pinkish-white iron-stained chert	--	--	--	--	--	--	--	--	--	--	--	--	--
11	84CR011	ASG-2	Jvc	SW	SE	23	38	9	3,130	Quartz-veined cherty sediments with disseminated pyrite	Grab	0.020	0.4	25	4	23	90	--	20	--	--	59	28
12	84CR012	--	Jd	SE	SE	23	38	9	2,920	Dark-gray fine- to medium-grained porphyritic andesite with zoned plagioclase phenocrysts and altered augite	--	--	--	--	--	--	--	--	--	--	--	--	--
13	84CR013	--	Jd	NW	SE	26	38	9	1,740	Gray porphyritic andesite with plagioclase and uralite phenocrysts and light-grayish-tan porphyritic dacite (composite dike)	--	--	--	--	--	--	--	--	--	--	--	--	--
14	84CR014	--	Jjsp	NW	SE	26	38	9	1,775	Dark-green fine-grained compact serpentinite with calcite veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
15	84CR015	--	Jmg	SE	NW	26	38	9	1,910	Clinopryoxenite with small quartz diorite intrusives	--	--	--	--	--	--	--	--	--	--	--	--	--
16	84CR016	ASG-3	Jvc	NE	NW	26	38	9	2,015	Siliceous dike with disseminated pyrite and minor chalcopyrite	Grab	<0.005	<0.2	235	15	40	196	--	24	--	--	132	53
17	84CR017	--	Jmg	NE	NW	26	38	9	1,945	Hornblende diorite, dacite, and pyroxenite	--	--	--	--	--	--	--	--	--	--	--	--	--
18	84CR018	--	Jvc	NW	SE	27	38	9	3,430	Red and tan chert	--	--	--	--	--	--	--	--	--	--	--	--	--
19	84CR019	ASG-4	Jmg,Jjsp	NE	SW	34	38	9	1,850	Sheared iron-stained talcose serpentinite, Mood Mine	2-ft chip	0.09	<0.2	<10	96	1,410	62	--	2,360	30	50	27	41
20	84CR020	--	Jjsp	NW	SE	34	38	9	1,860	Serpentinized clinopyroxenite	--	--	--	--	--	--	--	--	--	--	--	--	--
21	84CR021	--	Jd	NE	SW	34	38	9	1,800	Light-colored medium-grained quartz diorite	--	--	--	--	--	--	--	--	--	--	--	--	--
22	84CR022	--	Jmg	NE	SW	34	38	9	1,845	Hornblende diorite or gabbro (?) with secondary quartz and minor pyrite	--	--	--	--	--	--	--	--	--	--	--	--	--
23	84CR023	--	Jd	SW	NE	1	39	9	2,820	Porphyritic hornblende dacite	--	--	--	--	--	--	--	--	--	--	--	--	--
24	84CR024	--	Jd	NW	SW	6	39	8	2,620	Gray fine-grained andesite and pale-tan rodingite dike rock in serpentinite	--	--	--	--	--	--	--	--	--	--	--	--	--
25	84CR025	--	Jd	SE	NW	6	39	8	2,170	Porphyritic hornblende diorite with hornblende phenocrysts	--	--	--	--	--	--	--	--	--	--	--	--	--
26	84CR026	ASG-5	Jd	SW	SW	36	38	9	1,320	Porphyritic dacite with minor pyrite	Grab	0.005	<0.2	710	8	34	38	--	36	--	--	52	48
27	84CR027	--	Jd	NE	NE	12	39	9	2,570	Fine-grained hornblende andesite with minor pyrite	--	--	--	--	--	--	--	--	--	--	--	--	--
28	84CR028	--	Jjhz	SE	SE	1	39	9	2,800	Partly serpentinized harzburgite	--	--	--	--	--	--	--	--	--	--	--	--	--
29	84CR029	ASG-6	Jd	SW	SE	1	39	9	2,460	Iron-stained vein quartz near portal of 35-ft adit in quartz diorite with disseminated pyrite	Grab	0.620	0.4	10	6	40	17	--	34	--	--	21	4
30	84CR030	--	Qtg	NW	SE	28	38	8	1,370	Green plastic clay test fired at Klamath Brick and Tile Co. formed hard red brick of good quality	--	--	--	--	--	--	--	--	--	--	--	--	--
31	84CR031	--	Jjsp	SW	SW	28	38	8	1,220	Olive-green nonmagnetic serpentinite	--	--	--	--	--	--	--	--	--	--	--	--	--
32	84CR032	--	Jd	NE	SE	11	39	9	1,500	Hornblende-quartz andesite porphyry dike with zoned plagioclase phenocrysts and chlorite after hornblende	--	--	--	--	--	--	--	--	--	--	--	--	--
33	84CR033	--	Jd	NW	SW	11	39	9	1,550	Fine-grained gray hornblende quartz andesite dike	--	--	--	--	--	--	--	--	--	--	--	--	--
34	84CR034	ASG-7	Jd	NW	SW	11	39	9	1,560	Dacite porphyry or quartz diorite with disseminated pyrite	Random chip	<0.005	<0.2	275	5	20	102	--	6	--	--	35	28
35	84CR035	--	Jgb	NE	SW	10	39	9	2,020	Coarse-grained hornblende gabbro with poikilitic green hornblende after augite, minor quartz, and epidote	--	--	--	--	--	--	--	--	--	--	--	--	--
36	84CR036	--	Jgb	SE	SW	10	39	9	2,700	Medium- to coarse-grained hornblende quartz diorite in gabbro	--	--	--	--	--	--	--	--	--	--	--	--	--
37	84CR037	--	Jd	SW	SE	3	39	9	2,220	Medium-grained, dark-colored diabase dike with minor secondary quartz and epidote	--	--	--	--	--	--	--	--	--	--	--	--	--
38	84CR038	--	Jd	SW	SE	3	39	9	2,480	Composite dike of fine-grained andesite, porphyritic andesite, and hornblende diorite	--	--	--	--	--	--	--	--	--	--	--	--	--
39	84CR039	ASG-8	Jd	SE	SE	3	39	9	2,435	Vein quartz from dump of old prospect cut in small dike	Multiple grab	0.005	0.4	10	6	52	85	--	65	--	--	11	1
40	84CR040	ASG-9	Jd,Jjhz	SW	SW	2	39	9	2,420	Fractured crystalline vein quartz from old prospect cut on contact	Multiple grab	0.005	<0.2	10	4	47	9	--	30	--	--	7	1
41	84CR041	--	Jd	NE	NE	30	38	8	1,195	Gray fine-grained andesite with few small quartz veins	--	--	--	--	--	--	--	--	--	--	--	--	--
42	84CR042	--	Jd	SW	SW	1	39	9	2,970	Light-colored porphyritic hornblende andesite or dacite (?)	--	--	--	--	--	--	--	--	--	--	--	--	--
43	84CR043	--	Jd	NE	SW	1	39	9	3,200	Medium-grained hornblende diorite	--	--	--	--	--	--	--	--	--	--	--	--	--
44	84CR044	ASG-10	Jdb	NE	SW	5	39	8	1,285	Sheared pyrite impregnated greenstone from creek bed	Random chip	<0.005	0.6	120	20	43	89	--	56	30	50	210	99
45	84CR045	--	Jdb	SE	NW	5	39	8	1,570	Fine-grained basaltic greenstone and medium-grained diabase with secondary quartz and epidote	--	--	--	--	--	--	--	--	--	--	--	--	--
46	84CR046	--	Jdb	SE	NW	5	39	8	1,780	Dark-green augite basalt (pillow lava?)	--	--	--	--	--	--	--	--	--	--	--	--	--
47	84CR047	--	Jd	SE	NE	7	39	8	1,630	Gray andesite or diabase with small quartz veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
48	84CR048	--	Jjhz	NE	NW	18	39	8	3,050	Serpentinized harzburgite with accessory magnetite and chromite	--	--	--	--	--	--	--	--	--	--	--	--	--
49	84CR049	--	Jd	SE	NW	24	39	9	1,740	Fine-grained light-gray andesite dike with calcite veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
50	84CR050	ASG-11	Jd	NE	NE	27	39	9	2,760	Very fine-grained siliceous (rhyolite?) dike	Grab	<0.005	<0.2	175	1	17	14	--	86	--	--	1	53
51	84CR051	ASG-12	Jvc	NE	SW	23	38	9	2,500	Massive sulfides, mostly pyrite from dump Sulfide No. 1 (Twin Tunnel claim)	Grab	2.70	4.2	4,520	39	96	1,330	42	26	--	--	86	2,170
52	84CR052	ASG-13	Jd	NE	SE	2	39	9	1,860	Hornblende andesite porphyry with minor disseminated pyrite	Grab	<0.005	0.4	195	14	68	52	--	78	--	--	154	58
53	84CR053	ASG-14	Jd	SW	SE	2	39	9	1,680	Chunks of vein quartz in breccia zone in hornblende diorite porphyry	Multiple grab	0.67	0.4	35	10	85	36	--	83	--	--	42	15
54	84CR054	ASG-15	sp	NE	NE	11	39	9	1,760	Coarse-grained massive chromite	Multiple grab	<0.003	--	--	--	--	--	--	--	<30	<30	--	--
55	84CR055	ASG-16	Jd	SE	SE	2	39	9	1,900	Quartz breccia vein in composite dike	Multiple grab	0.40	0.2	20	12	230	12	--	64	--	--	43	7
56	84CR056	--	Jvc	NE	SW	23	38	9	2,600	Dark-reddish-brown banded chert with minor calcite veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
57	84CR057	--	Jvc	NE	SW	23	38	9	2,550	Light-gray andesite or diabase dike	--	--	--	--	--	--	--	--	--	--	--	--	--
58	84CR058	ASG-17	Jvc	SE	SE	22	38	9	2,460	Dark iron-stained fractured chert	Random chip	0.10	<0.2	20	8	51	16	--	31	--	--	89	35
59	84CR059	ASG-18	Jd	SW	SW	26	39	9	2,160	Fine-grained light-tan siliceous rhyolite or aplite dike	Grab	<0.005	<0.2	215	2	35	16	--	48	--	--	1	58
60	84CR060	--	Jjhz	SE	SW	27	39	9	3,450	Unserpentinized harzburgite with typical granular fractured olivine	--	--	--	--	--	--	--	--	--	--	--	--	--
61	84CR061	--	Jd	SE	NW	36	39	9	2,320	Dark-gray medium-fine-grained andesite or diabase (?)	--	--	--	--	--	--	--	--	--	--	--	--	--
62	84CR062	--	Jd	NW	NW	36	39	9	2,630	Hornblende diorite	--	--	--	--	--	--	--	--	--	--	--	--	--
63	84CR063	ASG-19	Jd	NW	NW	36	39	9	2,640	Fine-grained pyroxene andesite with disseminated pyrite and minor chalcopyrite	Grab	<0.005	1.0	85	19	145	111	--	40	--	--	235	75
64	84CR064	--	Jd	NE	NW	12	39	9	2,250	Light-colored, medium-grained hornblende diorite, in part porphyritic, in part containing disseminated pyrite	--	--	--	--	--	--	--	--	--	--	--	--	--
65	84CR065	ASG-20	Jd	SW	SE	1	39	9	2,520	Fractured iron-stained medium-grained quartz diorite with disseminated pyrite	Multiple grab from dump	<0.005	1.0	150	16	20	167	--	8	--	--	67	1
66	84CR066	--	Jd	NW	NW	33	38	8	1,360	Medium-fine-grained gray diabase or andesite (?)	--	--	--	--	--	--	--	--	--	--	--	--	--
67	84CR067	--	Jd	NW	NW	33	38	8	1,275	Medium-grained gray diabase dike on serpentinite-shale contact	--	--	--	--	--	--	--	--	--	--	--	--	--
68	84CR068	ASG-21	Jjsp	NE	NE	15	39	9	1,840	Iron-stained talcose serpentinite	2-ft chip	<0.005	<0.2	10	80	2,080	20	--	1,810	--	--	41	32
69	84CR069	--	Jd	NE	NE	15	39	9	1,840	Medium-coarse-grained quartz diorite porphyry with sparse disseminated pyrite	--	--	--	--	--	--	--	--	--	--	--	--	--
70	84CR070	ASG-22	Jd	NW	SW	7	39	9	2,320	Pale-greenish-gray medium-fine-grained dacite porphyry dike exposed in old prospect cut above road	Grab	<0.005	0.4	230	2	33	15	--	24	--	--	7	49
71	84CR071	--	Jjdu	NE	NE	24	39	9	3,060	Typical tan-weathering dunite with minor serpentine, enstatite, and accessory magnetite and chromite	--	--	--	--	--	--	--	--	--	--	--	--	--
72	84CR072	--	Jd	SE	NW	18	39	8	3,030	Dark-gray fine-grained andesite dike with few small quartz veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
73	84CR073	--	Jd	SE	SE	34	38	9	1,650	Dark-gray fine-grained diabase or andesite dike with some secondary quartz	--	--	--	--	--	--	--	--	--	--	--	--	--
74	84CR074	ASG-23	Jjsp,Jd	SE	SW	34	38	9	2,235	Sheared talcose serpentine-diorite contact rock	Multiple grab	<0.005	0.8	125	35	765	50	--	335	--	--	160	66
75	84CR075	--	Jd	NE	SW	19	38	8	1,200	Hornblende diorite porphyry and fine-grained hornblende andesite	--	--	--	--	--	--	--	--	--	--	--	--	--
76	84CR076	--	Jjhz	SE	SE	20	38	8	2,850	Harzburgite (unserpentinized)	--	--	--	--	--	--	--	--	--	--	--	--	--
77	84CR077	--	Jd	NW	SW	13	39	9	1,840	Fine-grained cream to white aplite (quartz plagioclase)dike	--	--	--	--	--	--	--	--	--	--	--	--	--
78	84CR078	--	Jd	NW	SE	11	39	9	2,260	Coarse- to fine-grained hornblende diorite porphyry	--	--	--	--	--	--	--	--	--	--	--	--	--
79	84CR079	--	Jd	SE	SE	24	39	9	3,380	Medium- to fine-grained dark-gray andesite	--	--	--	--	--	--	--	--	--	--	--	--	--
80	84CR080	ASG-24	Jjhz	SE	NE	25	39	9	3,285	Massive coarse-grained chromite displaying stress cleavage from beside prospect cut	Multiple grab	<0.003	--	--	--	--	--	--	--	<30	<30	--	--
81	84CR081	ASG-25	Jjsp	SE	SW	19	39	8	2,700	Chromite with some mixed serpentine	Multiple grab	<0.003	--	--	--	--	--	--	--	<30	<30	--	--
82	85CR001	ATG-1	Jjsp	NE	SE	18	39	8	1,690	Fine-grained chromite in sheared serpentinite	Grab	<0.003	--	--	--	--	--	--	--	<30	<30	--	--
83	85CR002	--	Jd	NW	SW	25	39	9	2,100	Medium-grained quartz diorite with chlorite after hornblende	--	--	--	--	--	--	--	--	--	--	--	--	--
84	85CR003	--	Jgs	SE	SE	21	39	8	1,460	Indurated micaceous siltstone	--	--	--	--	--	--	--	--	--	--	--	--	--
85	85CR004	--	TRPza	SE	NW	27	39	8	1,300	Saussuritized porphyritic basalt with minor pyrite mineralization	--	--	--	--	--	--	--	--	--	--	--	--	--
86	85CR005	--	TRPza	SW	SE	15	39	8	1,520	Iron-stained pale-green quartz-epidote rock with minor pyrite mineralization	--	--	--	--	--	--	--	--	--	--	--	--	--
87	85CR006	--	TRPzs,TRPza	NE	SE	15	39	8	1,765	Medium- to fine-grained diabase cut by quartz veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
88	85CR007	--	TRPza	SW	SE	15	39	8	1,500	Fine- to coarse-grained altered diabase; may be from sheeted-dike sequence (?)		--	--	--	--	--	--	--	--	--	--	--	--
89	85CR008	--	TRPza	SW	SE	15	39	8	1,530	Pale-gray to dark-greenish-gray chert and impure cherty siltstone	--	--	--	--	--	--	--	--	--	--	--	--	--
90	85CR009	--	Jgs	SE	SE	3	39	8	1,850	Iron-stained weathered graywacke and siltstone with numerous small quartz veins	--	--	--	--	--	--	--	--	--	--	--	--	--
91	85CR010	--	Jgs	SW	NE	10	39	8	1,380	Gray, white, pinkish-gray, and iron-stained gray chert with minor pyrite	--	--	--	--	--	--	--	--	--	--	--	--	--
92	85CR011	ATG-76	Jgs	SE	SW	5	39	8	1,630	Weathered quartz-veined siltstone with iron and manganese-oxide staining	Grab	0.015	0.2	190	30	32	219	--	71	--	--	106	110
93	85CR012	ATG-77	Jd	NE	NE	2	39	9	1,380	Fractured iron-stained quartz diorite with quartz veinlets and limonite after pyrite	Random chip	0.260	0.2	30	30	102	1	--	256	--	--	92	60
94	85CR013	--	Jd	NE	NW	36	38	9	1,430	Light-gray, fine-grained dacite dike with quartz and calcite veinlets	--	--	--	--	--	--	--	--	--	--	--	--	--
95	85CR014	ATG-4	Jjsp	NE	SW	36	39	9	2,050	Sheared serpentinized harzburgite	30-ft channel	--	--	--	200	--	--	--	2,600	--	--	--	--
96	85CR015	ATG-5	Jjsp	SE	SW	25	39	9	2,530	Sheared serpentinized harzburgite	30-ft channel	--	--	--	200	--	--	--	3,000	--	--	--	--
97	85CR016	ATG-78	Jd,Jjsp	SE	NW	6	39	8	2,075	Fractured fine-grained iron-stained siliceous dike, largely weathered to quartz, clay, and limonite	Grab	2.05	1.2	10	2	18	1	47	17	--	--	7	10
98	85CR017	ATG-79	Jd,Jjsp	SE	NW	6	39	8	2,070	Same as No. 98 but with a few black manganese-oxide specks and minor residual pyrite	Grab	1.65	0.4	10	2	34	3	--	29	--	--	19	10
99	85CR018	--	Jdb	NE	SW	5	39	8	1,520	Basalt and diabase (several chunks)	--	--	--	--	--	--	--	--	--	--	--	--	--
100	85CR019	--	Jmg	SE	NW	34	38	9	2,000	Dark-green clinopyroxene-rich gabbro	--	--	--	--	--	--	--	--	--	--	--	--	--
101	85CR020	--	Jmg,Jvc	SE	NW	26	38	9	2,160	Amphibolite after gabbro and fine-grained quartzite after chert	--	--	--	--	--	--	--	--	--	--	--	--	--
102	85CR021	--	Jvc	SE	SW	23	38	9	2,310	Fine-grained green metatuff, chert, and gray-green "andesite" dikes (several chunks)	--	--	--	--	--	--	--	--	--	--	--	--	--
103	85CR022	--	Qtg	SW	SE	34	38	8	1,470	Crudely stratified silt, sand, and gravel derived in large part from Galice sedimentary rocks with abundant clay alteration	--	--	--	--	--	--	--	--	--	--	--	--	--
104	85CR023	ATG-2	Qaf	SW	SW	31	39	8	1,540	Fine-grained dark-green claylike mass of serpentine and sepiolite in spring-fed Darlingtonia bog	Auger sample	<0.005	0.2	10	228	3,611	10	--	3,892	--	--	81	60

▲ Table 3. ANALYSIS OF HAND-PANNED CONCENTRATES OF STREAM-SEDIMENT SAMPLES, NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON. CONCENTRATION RATIO IS APPROXIMATELY 1,500:1, GROUND MINUS-80-MESH SAMPLE FRACTION[1]. SAMPLE LOCATIONS ARE MARKED WITH TRIANGLES ON MAP ON THIS PLATE.

Map no.	Lab no.	Ag (ppm)	As (ppm)	Au[3] (ppm)	Ba[2] (ppm)	Bi (ppm)	Cd (ppm)	Co (ppm)	Cr[2] (ppm)	Cu (ppm)	Fe %	Mn (ppm)	Mo (ppm)	Ni (ppm)	P (ppm)	Pb (ppm)	Pt[3] (ppm)	Sb[2] (ppm)	V[2] (ppm)	Zn (ppm)
1	ATG-06	0.2	30	<0.007	10	2	<0.5	93	9,186	64	13.05	1,855	<1	1,472	80	6	<0.010	10	105	170
2	ATG-07	0.2	30	<0.007	10	4	<0.5	95	5,808	60	14.25	1,904	<1	1,285	100	<2	<0.010	10	80	120
3	ATG-08	0.2	10	14.5	<10	4	<0.5	27	1,190	8	2.26	630	3	475	20	146	0.015	<10	19	30
4	ATG-09	0.2	20	<0.007	110	2	<0.5	66	2,118	27	8.43	1,038	2	1,075	350	6	<0.010	<10	65	70
5	ATG-10	2.6	30	<0.007	<10	<2	<0.5	102	4,760	69	22.87	1,469	<1	1,153	110	<2	<0.010	<10	206	90
6	ATG-11	0.2	30	<0.007	30	2	<0.5	166	5,538	44	9.54	2,120	<1	1,512	100	6	<0.010	10	79	130
7	ATG-12	0.2	10	<0.007	10	2	<0.5	116	5,671	53	13.32	1,668	<1	1,681	100	<2	<0.010	10	76	110
8	ATG-13	0.2	20	<0.007	10	2	<0.5	133	>9,999	86	18.94	2,454	<1	1,611	140	<2	<0.010	<10	148	210
9	ATG-14	0.2	20	0.45	10	4	<0.5	116	9,548	71	15.58	1,783	<1	1,442	120	<2	<0.010	10	128	150
10	ATG-15	0.2	10	1.40	20	2	<0.5	38	454	66	5.22	918	<1	314	280	20	<0.010	<10	126	60
11	ATG-16	0.2	<10	<0.007	20	<2	<0.5	24	308	42	4.28	729	<1	106	350	4	<0.010	<10	136	40
12	ATG-17	0.2	10	0.007	<10	4	<0.5	35	483	55	4.60	777	<1	457	160	8	<0.010	<10	99	40
13	ATG-18	0.2	<10	<0.007	10	<2	<0.5	43	199	82	6.12	1,086	<1	135	340	6	<0.010	<10	140	70
14	ATG-19	0.2	20	1.30	50	4	<0.5	50	671	132	5.82	738	<1	469	190	44	<0.010	<10	104	90
15	ATG-20	0.2	10	<0.007	10	2	<0.5	52	2,146	58	7.96	1,032	<1	458	160	168	<0.010	<10	154	60
16	ATG-21	0.2	30	0.030	10	<2	<0.5	104	6,295	62	18.72	1,699	<1	1,363	100	<2	<0.010	10	85	120
17	ATG-22	0.2	20	1.31	10	<2	<0.5	107	3,235	45	16.01	1,426	<1	1,289	70	<2	0.005	<10	63	60
18	ATG-23	0.2	<10	0.80	10	<2	<0.5	68	3,211	35	10.58	1,072	<1	811	110	4	<0.010	<10	82	70
19	ATG-24	0.2	10	<0.007	<10	<2	<0.5	91	3,582	57	17.12	1,223	<1	1,140	150	<2	<0.010	<10	175	80
20	ATG-25	0.2	10	<0.007	10	<2	<0.5	136	3,435	45	20.26	1,556	<1	1,986	120	<2	<0.010	<10	80	60
21	ATG-26	0.2	10	<0.007	<10	<2	<0.5	69	3,499	46	17.66	1,555	<1	895	80	<2	<0.010	<10	77	70
22	ATG-27	0.2	10	<0.007	10	2	<0.5	34	1,550	44	5.69	950	1	260	240	6	<0.010	<10	115	60
23	ATG-28	0.2	10	<0.007	10	4	<0.5	48	1,663	65	6.92	966	<1	374	230	58	<0.010	<10	136	60
24	ATG-29	0.2	20	<0.010	<10	6	<0.5	105	9,630	63	12.23	1,615	<1	1,236	150	<2	0.015	10	142	180
25	ATG-30	5.4	10	5.17	10	4	<0.5	66	3,784	66	9.89	1,217	<1	569	210	20	0.015	<10	151	100
26	ATG-31	0.2	20	<0.007	10	<2	<0.5	160	5,202	56	22.70	1,941	<1	2,458	130	<2	0.030	10	85	90
27	ATG-32	0.2	10	<0.007	10	<2	<0.5	142	2,441	33	26.27	1,524	<1	2,359	100	<2	<0.010	10	45	40
28	ATG-33	0.2	20	<0.007	10	<2	<0.5	91	2,949	36	13.20	1,516	3	1,237	90	<2	<0.010	<10	76	60
29	ATG-34	0.2	20	<0.007	<10	4	<0.5	105	1,159	26	11.52	1,305	2	1,467	60	<2	<0.010	10	23	30
30	ATG-35	0.2	<10	<0.007	<10	<2	0.5	104	668	35	14.91	1,265	<1	1,663	50	<2	<0.010	10	15	30
31	ATG-36	0.2	10	<0.007	<10	<2	0.5	96	990	29	13.91	1,036	<1	1,690	60	<2	<0.010	10	23	30
32	ATG-37	0.2	<10	<0.007	<10	<2	0.5	91	804	35	15.27	1,162	1	1,474	60	<2	<0.010	10	17	30
33	ATG-38	0.2	20	<0.007	<10	<2	<0.5	90	941	28	12.24	1,202	1	1,428	50	<2	<0.010	10	24	30
34	ATG-39	0.2	10	<0.007	20	<2	<0.5	166	2,503	42	15.43	1,981	<1	3,448	220	<2	<0.010	10	61	70
35	ATG-40	0.2	10	<0.007	20	2	<0.5	95	1,667	28	7.79	1,326	1	1,406	220	2	<0.010	<10	59	60
36	ATG-41	0.2	20	0.85	<10	2	<0.5	71	1,476	26	8.12	1,055	1	1,309	50	<2	<0.010	10	24	40
37	ATG-42	0.2	10	<0.007	<10	<2	<0.5	90	1,895	38	15.08	1,235	<1	1,470	70	<2	<0.010	10	30	40
38	ATG-43	0.2	10	<0.007	<10	<2	0.5	96	766	32	9.81	1,271	<1	1,741	60	<2	<0.010	10	20	30
39	ATG-44	0.2	20	<0.007	20	<2	<0.5	124	2,518	32	9.09	1,171	<1	2,537	200	4	<0.010	10	49	70
40	ATG-45	0.2	10	1.25	<10	<2	<0.5	123	1,368	51	18.66	1,220	<1	3,064	50	<2	0.005	10	26	40
41	ATG-46	0.2	30	0.30	<10	2	<0.5	116	>9,999	78	18.99	2,459	1	1,293	110	<2	<0.010	<10	110	220
42	ATG-47	0.2	30	<0.007	<10	<2	<0.5	92	>9,999	122	25.11	2,897	<1	1,141	80	<2	<0.010	<10	133	260
43	ATG-48	0.2	10	0.30	<10	<2	<0.5	143	1,910	31	24.70	1,406	<1	1,490	60	<2	<0.010	10	45	40
44	ATG-49	1.6	10	23.8	10	<2	<0.5	99	4,936	93	26.15	1,656	<1	1,143	230	<2	<0.010	<10	327	100
45	ATG-50	0.4	10	17.8	10	<2	<0.5	144	5,477	66	21.05	1,844	<1	1,647	230	<2	0.005	<10	116	110
46	ATG-51	0.2	20	7.03	10	<2	<0.5	105	4,293	70	22.55	1,343	<1	1,122	210	<2	<0.010	10	214	90
47	ATG-52	0.2	20	4.71	<10	<2	<0.5	136	3,788	78	22.51	1,491	<1	3,102	70	<2	0.015	10	50	80
48	ATG-53	0.2	30	<0.007	<10	<2	<0.5	159	>9,999	172	27.92	3,054	<1	1,405	80	<2	0.005	<10	134	280
49	ATG-54	0.2	10	1.47	10	<2	<0.5	121	8,159	26	19.70	1,908	<1	1,199	170	14	<0.010	<10	143	140
50	ATG-55	0.2	10	<0.007	<10	<2	0.5	134	>9,999	73	24.60	2,987	<1	1,233	100	10	<0.010	<10	127	230
51	ATG-56	0.2	10	1.00	20	<2	<0.5	140	4,308	2	13.25	1,918	<1	1,522	170	16	<0.010	<10	114	70
52	ATG-57	0.2	10	0.20	10	<2	0.5	155	>9,999	22	25.80	2,348	<1	1,458	120	8	<0.010	<10	131	200
53	ATG-58	0.2	10	<0.007	20	<2	<0.5	141	3,293	14	11.18	1,608	<1	1,977	190	16	<0.010	<10	100	60
54	ATG-59	0.2	10	0.010	30	<2	<0.5	244	>9,999	<1	27.00	3,592	<1	2,205	150	12	0.030	<10	154	220
55	ATG-60	0.2	20	0.34	10	<2	<0.5	120	>9,999	22	22.57	2,916	<1	1,135	130	12	<0.010	<10	120	240
56	ATG-61	0.2	10	<0.007	10	<2	<0.5	110	3,150	<1	12.33	1,496	<1	1,298	80	18	<0.010	<10	53	60
57	ATG-62	0.2	10	0.39	40	<2	<0.5	160	6,018	<1	19.88	2,085	<1	2,133	170	20	<0.010	<10	119	100
58	ATG-63	0.2	10	<0.007	240	<2	<0.5	14	78	31	4.46	920	2	71	610	14	<0.010	<10	48	120
59	ATG-64	0.2	10	<0.007	220	<2	<0.5	12	56	25	3.53	943	3	47	420	10	<0.010	<10	40	70
60	ATG-65	0.2	<10	<0.007	200	<2	<0.5	9	57	25	3.32	839	3	39	380	10	<0.010	<10	44	60
61	ATG-66	0.2	10	<0.007	190	<2	<0.5	21	137	32	4.19	975	1	125	420	12	<0.010	<10	78	70
62	ATG-67	0.2	10	<0.007	230	2	<0.5	61	820	16	5.50	1,627	2	802	340	14	<0.010	<10	59	70
63	ATG-68	0.2	20	<0.007	10	<2	<0.5	87	>9,999	9	16.34	2,060	<1	1,177	110	16	<0.010	<10	110	180
64	ATG-69	0.2	<10	1.98	100	<2	<0.5	37	195	50	5.52	1,324	<1	106	290	6	<0.010	10	186	50
65	ATG-70	0.2	30	<0.007	10	2	<0.5	73	>9,999	19	12.74	2,241	<1	807	100	10	<0.010	<10	131	220
66	ATG-71	0.2	20	1.31	<10	<2	<0.5	74	4,951	<1	16.51	1,365	<1	934	100	12	<0.010	<10	72	90
67	ATG-72	0.2	10	1.40	10	<2	<0.5	71	4,021	<1	11.89	1,100	<1	917	100	14	<0.010	<10	68	70
68	ATG-73	0.2	10	<0.007	20	<2	<0.5	43	1,793	24	9.99	1,079	<1	408	320	8	<0.010	<10	124	70
69	ATG-74	0.2	<10	<0.007	<10	<2	0.5	111	1,606	<1	18.04	1,056	<1	1,375	100	6	<0.010	<10	50	30
70	ATG-75	0.8	<10	0.2	<10	<2	1.0	126	1,269	<1	21.21	1,063	<1	1,421	70	2	<0.010	<10	39	30

[1]Other elements determined but not listed in table: Be[2]--all samples <0.5 ppm; Pd[3]--all samples <0.010 ppm; Tl[2]--all samples <10 ppm except ATG-09=10 ppm; U --all samples <10 ppm; W[2]-- all samples <10 ppm. In addition, the following elements were analyzed and the semiquantitative results are available from the analytical laboratory in the Portland office of the Oregon Department of Geology and Mineral Industries: Al[2], Ca[2], Ga[2], K[2], La[2], Mg[2], Na[2], Sr[2] and Ti[2].

[2]Semiquantitative results. Digestion is a "partial" type, but lab providing analyses considers data for 14 elements to be quantitative ("total" concentration) and data for the remaining 16 elements to be semiquantitative.

[3]Samples were not homogeneous with respect to native metals, and many had visible gold. Averages are reported for Au and Pt where replicate analyses were made. Caution is recommended in interpretation of Pt values because of proximity to detection limit. All samples contained <0.010 ppm Pd. Analyses by U.S. Bureau of Mines, Reno, Nevada.

▲ Table 4. PRECIOUS METAL CONCENTRATIONS: WEIGHTED AVERAGES FOR THE COMBINED MINUS-80-MESH AND PLUS-80-MESH FRACTIONS OF THE PANNED CONCENTRATES, NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON*. SAMPLE LOCATIONS ARE MARKED WITH TRIANGLES ON MAP ON THIS PLATE.

Map no.	Au (ppm)	Pd (ppm)	Pt (ppm)
1	0.02	--	--
2	0.45	0.046	--
4	0.002	--	--
5	0.37	--	0.03
11	--	--	0.04
12	--	--	0.02
14	1.14	0.067	0.05
16	--	0.007	--
17	1.46	--	0.07
19	--	--	0.02
22	0.006	--	--
23	0.17	--	--
24	0.009	--	--
25	6.19	--	--
26	--	--	0.08
27	--	--	0.03
34	0.013	--	--
35	0.014	--	--
36	0.94	--	--
37	--	--	0.03
39	--	--	0.08
40	1.95	--	--
44	29.6	--	--
45	18.7	--	--
46	9.49	--	0.07
47	7.61	--	0.07
48	--	--	0.03
51	1.52	--	--
55	1.43	--	--
56	0.13	--	--
57	0.83	--	--
58	0.027	--	--
67	0.95	--	--
68	0.15	--	--
69	0.12	--	--
70	0.50	--	--

*The 70 plus-80-mesh fractions were analyzed by the Oregon Department of Geology and Mineral Industries laboratory. The concentrations given in this table were calculated as follows: (concentration of minus-80-mesh x weight of minus-80-mesh + concentration of plus-80-mesh x weight of plus-80-mesh) / total weight.

This table lists only the changes in concentrations from those given in Table 3. The data herein reflect the generally higher metal(s) content of the plus-80-mesh fractions of those samples listed. For all other samples, the plus-80-mesh metal(s) concentrations and/or weights did not change the data for the minus-80-mesh fractions when the above calculation was employed.

Interpretation of the Pt values in this table are subject to the same qualifications as noted in Table 3.

Table 5. QUALITY-CONTROL DATA,NORTHWEST QUARTER OF THE CAVE JUNCTION QUADRANGLE, JOSEPHINE COUNTY, OREGON

Lab no. Sample type	Source of data	Ag (ppm)	As (ppm)	Au (ppm)	Bi (ppm)	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)	Fe (%)	Mn (ppm)	Mo (ppm)	Ni (ppm)	Pb (ppm)	Sb (ppm)	U (ppm)	V (ppm)	W (ppm)	Zn (ppm)
PANNED CONCENTRATE SAMPLES																			
ATG-15	Reported	0.2	10	1.40	2	<0.5	38	454	66	5.22	918	<1	318	20	<10	<10	126	<10	60
Concentrate	Bondar-Clegg	<0.5	8	0.003	<2	2.0	46	1,388	83	7.19	1,529	<1	417	16	<5	<10	261	27	93
	DOGAMI	--	--	--	--	--	55	460	75	4.8	840	--	340	--	--	--	--	--	70
ATG-25	Reported	0.2	10	<0.007	<2	<0.5	136	3,435	45	20.26	1,556	<1	1,986	<2	<10	<10	80	<10	60
Concentrate	Bondar-Clegg	<0.5	10	<0.001	4	9.0	93	>20,000	75	>10.00	2,424	<1	2,451	<5	70	<10	487	14	516
	DOGAMI	—	—	—	—	—	172	4,400	31	19.8	1,410	--	2,290	--	--	--	--	--	66
ATG-35	Reported	0.2	<10	<0.007	<2	<0.5	104	668	35	14.91	1,265	<1	1,663	<2	10	<10	15	<10	30
Concentrate	Bondar-Clegg	<0.5	<5	0.001	4	3.0	93	>20,000	52	>10.00	1,679	<1	2,002	<5	29	<10	255	<10	240
	DOGAMI	—	—	—	—	—	126	470	25	14.1	1,170	--	1,810	--	--	--	--	--	34
ATG-45	Reported	0.2	10	1.25	<2	<0.5	123	1,368	51	18.66	1,220	<1	3,064	<2	10	<10	26	<10	40
Concentrate	Bondar-Clegg	<0.5	9	1.40	4	6.0	97	>20,000	70	>10.00	2,023	2	3,552	6	59	<10	314	<10	323
	DOGAMI	—	—	—	—	—	152	790	37	17.7	1,100	--	3,520	--	--	--	--	--	39
ATG-55	Reported	0.2	10	<0.007	<2	<0.5	134	>9,999	73	24.60	2,987	<1	1,233	10	<10	<10	127	<10	230
Concentrate	Bondar-Clegg	<0.5	<5	0.001	4	9.0	116	>20,000	208	>10.00	5,293	<1	1,630	<5	50	<10	345	15	933
	DOGAMI	—	—	—	—	—	161	12,400	151	>10.0	>2,000	--	1,450	--	--	--	--	--	164
ATG-65	Reported	0.2	<10	<0.007	<2	<0.5	9	57	25	3.32	839	3	39	10	<10	<10	44	<10	60
Concentrate	Bondar-Clegg	<0.7	<5	0.003	<2	4.0	11	924	37	2.91	660	<1	40	7	< 5	<10	103	<10	72
	DOGAMI	—	—	—	—	—	18	90	38	3.4	860	--	53	--	--	--	--	--	70
ATG-75	Reported	0.8	<10	0.2	<2	1.0	126	1,269	<1	21.21	1,063	<1	1,421	2	<10	<10	39	<10	30
Concentrate	Bondar-Clegg	0.7	<5	5.60	4	8.0	116	>20,000	63	>10.00	1,593	<1	1,909	<5	43	<10	293	<10	279
	DOGAMI	—	—	—	—	—	165	1,100	21	>10.0	1,000	--	1,830	--	--	--	--	--	41
ROCK SAMPLES																			
ATG-78	Reported	1.2	<10	2.05	<2	<0.5	2	18	<1	2.38	397	47	17	6	<10	<10	7	<10	<10
Rock	Bondar-Clegg	<0.5	<5	3.90	<2	<1.0	3	45	14	2.45	465	49	14	<5	< 5	10	9	<10	12
	DOGAMI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ASG-10	Reported	—	—	<0.005	—	—	20	43	89	5.86	1,520	—	56	—	—	—	—	—	99
Rock	DOGAMI	—	—	<0.030	—	—	82	49	83	7.0	1,590	—	91	—	—	—	—	—	130
ASG-12	Reported	—	—	—	—	—	39	96	1,330	18.80	108	—	26	—	—	—	—	—	2,170
Rock	DOGAMI	—	—	—	—	—	76	130	1,320	18.3	101	—	43	—	—	—	—	—	2,300
ASG-20	Reported	—	—	—	—	—	16	20	167	6.09	430	—	8	—	—	—	—	—	<1
Rock	DOGAMI	—	—	—	—	—	98	28	153	7.6	424	—	40	—	—	—	—	—	30
ASG-4	Reported	—	—	0.150	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rock	BuMines	—	—	0.090	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—