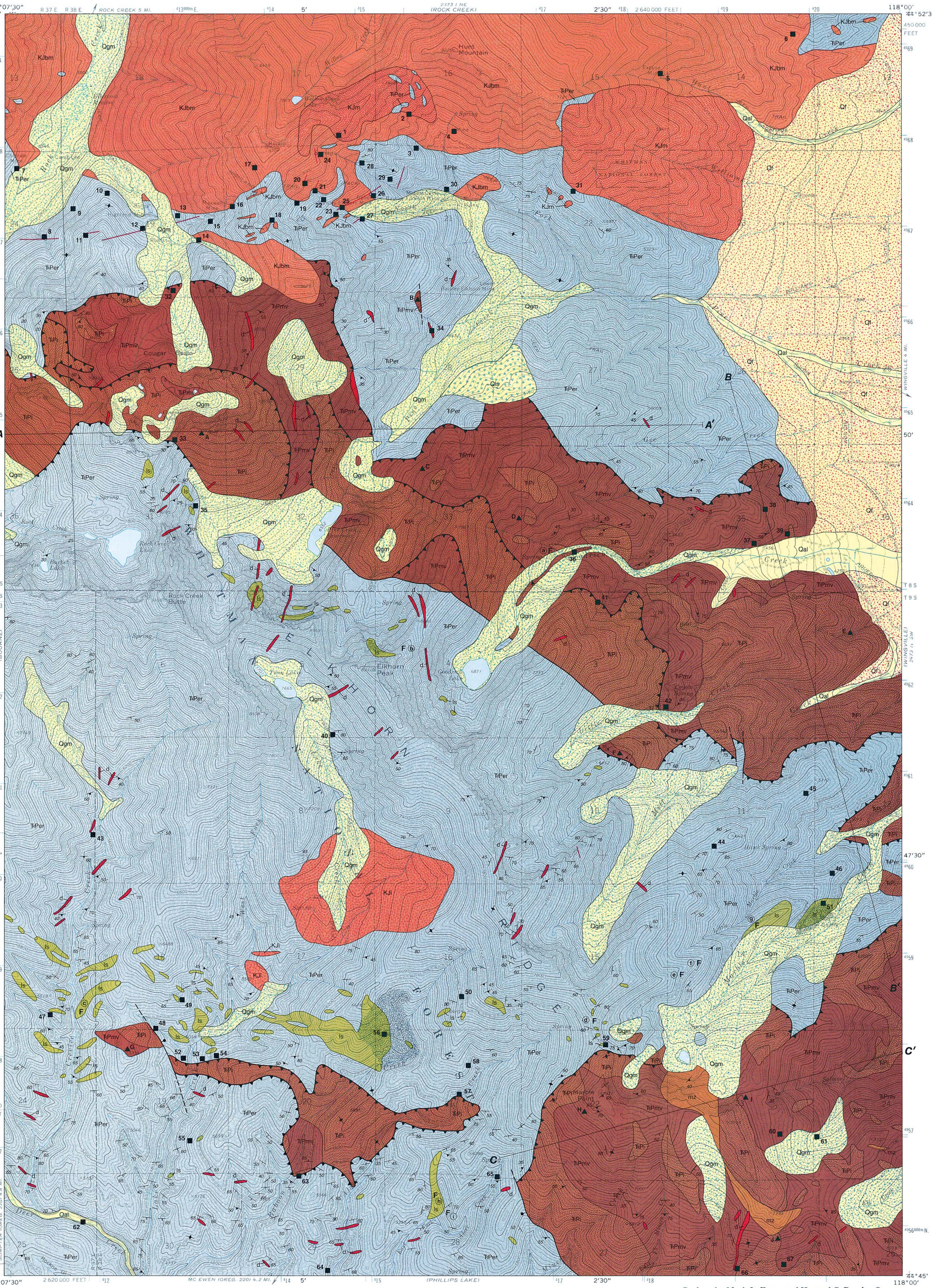
STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
DONALD A. HULL, STATE GEOLOGIST

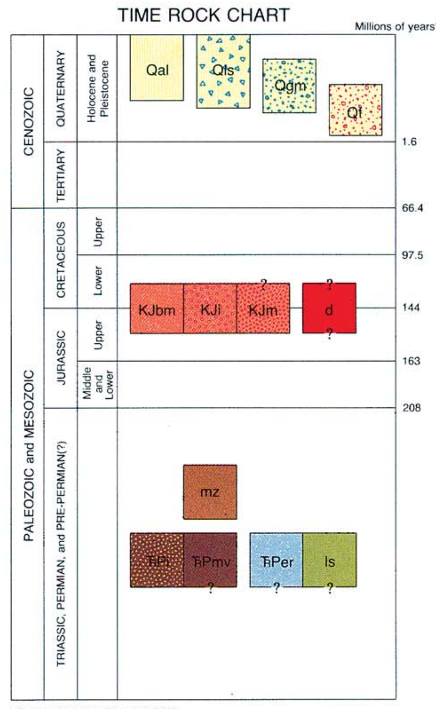
GEOLOGY AND MINERAL RESOURCES MAP OF THE ELKHORN PEAK QUADRANGLE, BAKER COUNTY, OREGON

1987

GMS-41
Geology and Mineral Resources Map of the Elkhorn Peak Quadrangle, Baker County, Oregon
By M.L. Ferns and others
Plate 1
Funded in part by the USDA Forest Service and the U.S. Geological Survey (COGEOMAP)



TIME ROCK CHART



MINERAL DEPOSITS

Bureau of Mines statistics, the past production from the quadrangle includes over 340,000 tons of lime valued at over $7.35 million at the time of production.

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Stimson, E.J., 1980, Geology and metamorphic petrology of the Elkhorn Ridge area, northeastern Oregon: Eugene, Oreg., University of Oregon master's thesis, 123 p.
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Switek, M.J., Jr., 1967, Stratigraphic section of the Elkhorn Ridge Argillite, Elkhorn Ridge area, Baker County, Oregon: Eugene, Oreg., University of Oregon master's thesis, 92 p.
Taubeneck, W.H., 1957, Geology of the Elkhorn Mountains, northeastern Oregon: Bald Mountain Batholith: Geological Society of America Bulletin, v. 68, no. 2, p. 181-238.
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EXPLANATION

cataclasized. The interpretation here is that units **ŦPi** and **ŦPmv** together appear to comprise a large-scale slab melange that contains little recognizable matrix. All contacts between rock units below unit **d** in the Time-Rock Chart are believed to be tectonic. The major boundary faults that separate the two assemblages vary along strike from low-angle, southward-dipping thrust faults to high-angle faults of uncertain nature.

mz — **Melange (pre-Upper Jurassic)** — Block melange comprised of irregularly distributed blocks of metagabbro, diorite, albite granite, keratophyre, massive chert, greenstone, limestone, calcareous argillite, foliated chlorite-mica schists, and serpentinite and serpentinized harzburgite. Individual blocks range up to 100 m in their longest dimension. Elongate zones of serpentinite up to 10 m across separate some of the blocks. Contact zones between blocks and serpentinites have locally been converted to zones of massive gray- to orange-colored talc schists up to 2 m in width. The areal distribution of the melange was mapped on the occurrence of talc schist float in poorly exposed areas

ŦPi — **Metamorphosed intrusive rocks (Triassic-Permian)** — Deformed and metamorphosed igneous complex composed mainly of equigranular epidiorite and subordinate quartz diorite, albite granite (sample J, Table 2), pyroxenite, foliated gabbro, and amphibolite. Diorites are composed of andesine feldspar and green ophitic hornblende, while albite granites are made up of oligoclase feldspar and quartz. Most rocks in the unit are cut by closely spaced, randomly oriented, anastomosing microbreccia zones up to 2 in. in thickness. These rocks include protocataclasites composed of granular, igneous-textured porphyroclasts that are randomly oriented in an isotropic matrix. Mylonite zones are less common than cataclasite zones. The porphyroclasts and occasionally the matrix are partially recrystallized to the greenschist-facies metamorphic mineral assemblages actinolite + epidote + chlorite + albite and epidote + chlorite + albite + quartz. Rare foliated metamorphic rocks within the complex include amphibole schists that are cut by a fracture cleavage. Local recrystallization of the cataclasite and mylonite matrixes to randomly oriented masses of actinolite suggests two periods of metamorphism: an early period associated with initial tectonic emplacement of the intrusives and a later phase related to recrystallization after the development of fracture cleavage and cataclasite textures. Age of the complex is presumed to be Permian and/or Triassic. A granodiorite in the Granite quadrangle has yielded a 243-m.y. lead-uranium age from zircons (Brooks and others, 1982). Unit is tectonically intercalated with sedimentary rocks (**ŦPmv**) as young as Late Triassic (Norian)

ŦPmv — **Metamorphosed volcanic and sedimentary rocks (Late Triassic-Permian?)** — A sequence of interbedded and intercalated volcanic and sedimentary rocks, including calcareous argillites, sandstones, tuff breccias, keratophyre tuffs, dark-colored limestones, andesite, and basalt. Interbedded flow rocks include both andesite and basalt (samples C, G, H, and I, Table 2). A limestone lens in upper part of sequence contains the Late Triassic (Norian) conodonts *Epigondolella abneptis* subsp. B of Orchard and *Xaniognathus* sp. (Wardlaw, written communication, 1985; sample a, Table 3). Unit as mapped consists of thrust slices imbricated with metaintrusive rocks of unit **ŦPi**. Contacts are generally marked by extensive cataclasite and mylonite zones that have nearly obliterated original igneous and sedimentary textures. Flame structures and rip-up clasts of sandstones in argillites indicate that the sediments had undergone soft-sediment deformation prior to development of cataclasites and mylonites. Cataclasite and mylonite zones occur throughout the unit, with nearly all of the unit being cut by narrow zones of microbreccias and subparallel sets of fracture cleavage. Local overturning of units is indicated by inverted relict graded beds. Imbricate thrusts are particularly well exposed on the north side of Pine Creek, where a 1,200-ft-thick section comprised mainly of interbedded tuff breccias, limestone, and calcareous argillite is in thrust contact with overlying and underlying slices of metadiorite (**ŦPi**)

ŦPer — **Elkhorn Ridge Argillite (Triassic, Permian, and pre-Permian?)** — Deformed sedimentary complex composed mainly of dark-colored siliceous argillite, argillite, and chert. Unit includes black carbonaceous argillite, tuffaceous argillite characterized by small euhedral plagioclase crystals, ribbon chert, and limestone (mapped separately as unit **ls**), sandstone, and rare limestone-clast and chert-pebble conglomerates. Ribbon cherts are abundant and are particularly well exposed on the lower parts of Alder, Baboon, and Lake Creeks. Massive purple-colored cherts are exposed at the head of Little Marble Creek. Ribbon cherts elsewhere in the Elkhorn Ridge Argillite have yielded Permian and Late Triassic microfossils (Dickinson and Thayer, 1978; Blome, verbal communication, 1985). Late Triassic (Karnian) radiolaria from chert float on the north slope of Elkhorn Peak include *?Corum* sp., *Pseudostylosphaera* sp., and *Triassocampe* sp. (Blome, written communication, 1986)

ls — **Limestone (Triassic, Permian, and pre-Permian?)** — Generally lensoid masses of light-gray to dark-blue high-calcium limestone, commonly converted to medium-grained crystalline marble that occurs as small detached blocks within enclosing black argillite. Presence of oolites and fusulinids is apparently indicative of shallow-water marine origin and suggests that the limestone masses may be olistoliths (slide blocks) incorporated into the presumably deeper water facies represented by the argillite and chert. Age is based on fusulinids of Tethyan affinities (sample g, Table 3) (Coward, 1983; Nestell, 1983)

MAP SYMBOLS

Contact — Approximately located

Fault — Bar and ball on downthrown side; dashed where approximate or inferred

Thrust fault — Teeth on upper plate

Quartz vein/mineralized fault zone

Strike and dip of bed or lava flow

Strike of vertical bed

Strike and dip of foliation

Strike of vertical foliation

Mine or prospect location — Number corresponds to map number in Table 1

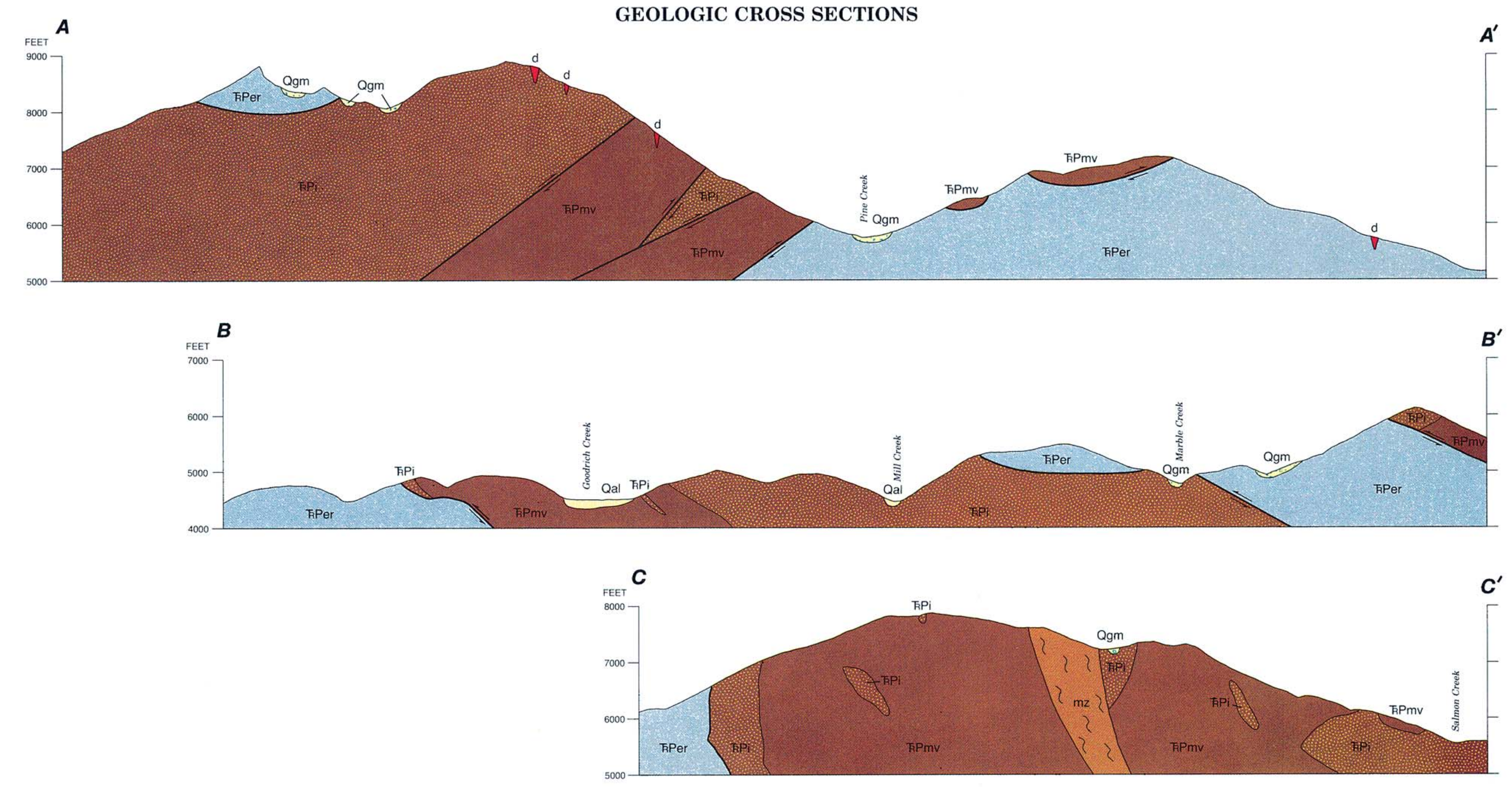
Location of rock sample for which chemical data are presented in Table 2, Plate 2

Fossil locality for which fossil data are presented in Table 3, Plate 2

Table 1. MINES AND PROSPECTS IN THE ELKHORN PEAK QUADRANGLE

Map no.	Name	Sec.	Locality T.(S.)	R.(E.)	Elevation (ft)	Geologic unit	Geologic description	Workings	Production	References
1.	Cumberland	17	8	38	8,000	KJbm, KJm	Altered zone in argillite screen between KJbm, KJm	300-ft caved adit	None	7
2.	General Sherman, Deming Group	16	8	38	7,040	KJbm, ŦPer, KJm	Quartz and epidote veinlets in argillite screen	400-ft crosscut with 100 ft of drift	None	7
3.	Pearl	16,27	8	38	6,600	ŦPer	Small shear zones in argillite hornfels	About 300 ft of tunnels	None	5,7
4.	Elkhorn Bonanza	16	8	38	6,560	KJbm	Narrow limonitic quartz vein strikes NE.	About 3,000 ft of workings	Unknown	1,7
5.	Excuse, Cub	15	8	38	5,680	KJbm	½- to 2½-ft thick shear zone with kidneys and streaks of quartz and sulfide strikes N. 22° E. and dips 55° W.	Several hundred feet of workings	Small	5,6,7
6.	Name unknown	14	8	38	4,300	KJbm	Quartz seams in quartz diorite	Shallow shafts and short adits	None	—
7.	Chloride	24	8	37	5,680	ŦPer, KJbm	Quartz vein with galena, sphalerite, arsenopyrite, pyrite, chalcopyrite, and argentite strikes N. 45° - 50° E. and dips 55° - 75° S.	Six tunnels with over 3,800 ft of workings	Small	1,5,6
8.	Midnight, Highland-Maxwell Group	24	8	37	6,120	ŦPer	2½-ft-wide zone of sheared graphitic argillite with small quartz streaks strikes N. 80° W. and dips 75° S.	250-ft-drift adit	Unknown	7
9.	Defender, Highland-Maxwell Group	19	8	38	6,000	ŦPer	Narrow east-west-trending shear in argillite hornfels	Short adits and discovery cuts	None	7
10.	Shamrock, Highland-Maxwell Group	19	8	38	6,500	ŦPer	10-in. quartz vein in argillite hornfels strikes due north	Short cuts	None	7
11.	Brooklyn	19	8	38	7,000	ŦPer	Narrow, east-west-striking quartz-cemented argillite breccia zones	About 250 ft in two adits; number of open cuts	None	7
12.	Highland Vein, Highland-Maxwell Group	19	8	38	6,400	ŦPer	Persistent, well-defined vein of crushed and generally silicified argillite strikes from N. 75° E. to N. 55° E. with nearly vertical dip. The vein reaches up to 28 ft in width and contains generally narrow ore shoots of pyrite, sphalerite, galena, arsenopyrite, chalcopyrite, and tetrahedrite	Over 10,000 ft of workings on three main levels	Est. $525,000	1,2,3,4,5,6
13.	Bottom, Bottom Dollar	19	8	38	6,640	ŦPer	Quartz vein with pyrite, galena, and sphalerite ranges from 8 in. to 5 ft in width, strikes N. 50° W. and dips 65° to 70° NE.	200-ft adit	None	7
14.	Name unknown	19	8	38	6,960	KJbm	2-ft-wide iron-stained fracture zone strikes N. 65° E. and dips 80° SE.	Short adit	None	—
15.	Maxwell, Highland Maxwell Group	19	8	38	7,100	ŦPer	Eastern extension of the Highland vein strikes N. 55° E.	Over 3,000 ft of workings	Est. $100,000	1,2,3,4,5,6
16.	Mountain Bell Vein, Highland-Maxwell Group	20	8	38	7,600	ŦPer, KJbm	3-ft-wide breccia zone in and along contact between quartz diorite and argillite strikes N. 30° E. and dips 80° SE. Vein contains sericitic gouge, quartz, pyrite, sericite, calcite, and fuchsite	About 1,000 ft of workings in adits and cuts	Small	4,7
17.	Name unknown	20	8	38	8,440	KJi	Narrow limonitic shear zone	Shallow cut	None	—
18.	Mountain View, Highland-Maxwell Group	20	8	38	7,200	ŦPer, KJi	1-ft zone of quartz stringers with nodular pyrite strikes N. 65° E. in chert hornfels	Shallow cuts	None	7
19.	Miners Hope, Denny Group	20	8	38	7,640	KJbm	Limonitic shear zone	Est. 600 ft workings in two caved adits	Unknown	7
20.	Missouri Girl, Denny Group	20	8	38	7,800	KJbm	Narrow (4- to 6-in.) limonitic quartz veins with manganese oxides strike N. 10° E. and dip 50° W.	Est. 200-ft caved adit	Unknown	7
21.	Captain Jack, Denny Group	20	8	38	7,600	ŦPer, KJi	2-ft-wide composite quartz vein strikes N. 35° E. and dips 90°	Est. 500-ft caved adit	Unknown	7
22.	Bonanza Queen, Denny Group	20	8	38	7,300	ŦPer	In argillite hornfels	Est. 300-ft caved adit	Unknown	7
23.	Blue Ledge, Baisley-Elkhorn Group	20	8	38	6,920	KJbm, ŦPer	Shear zone strikes N. 60° E.	Small prospect pits	None	7
24.	Hurdy Gurdy	20	8	38	8,000	KJbm	2-ft limonitic quartz vein strikes N. 10° W.	Over 500 ft of workings	Est. $80,000	1,7

GEOLOGIC CROSS SECTIONS



Geology by Mark L. Ferns and Howard C. Brooks, Oregon Department of Geology and Mineral Industries; Dan G. Avery, USDA Forest Service; and Charles D. Blome, U.S. Geological Survey.
Field work conducted 1985-1986
Map reviewed by J.G. Evans, U.S. Geological Survey, M.A. Kays, University of Oregon; G.R. Wheeler, University of California at Sacramento; and D.L. White
Cartography by Mark E. Neuhaus

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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Sample Location Map of the Elkhorn Peak Quadrangle, Baker County, Oregon

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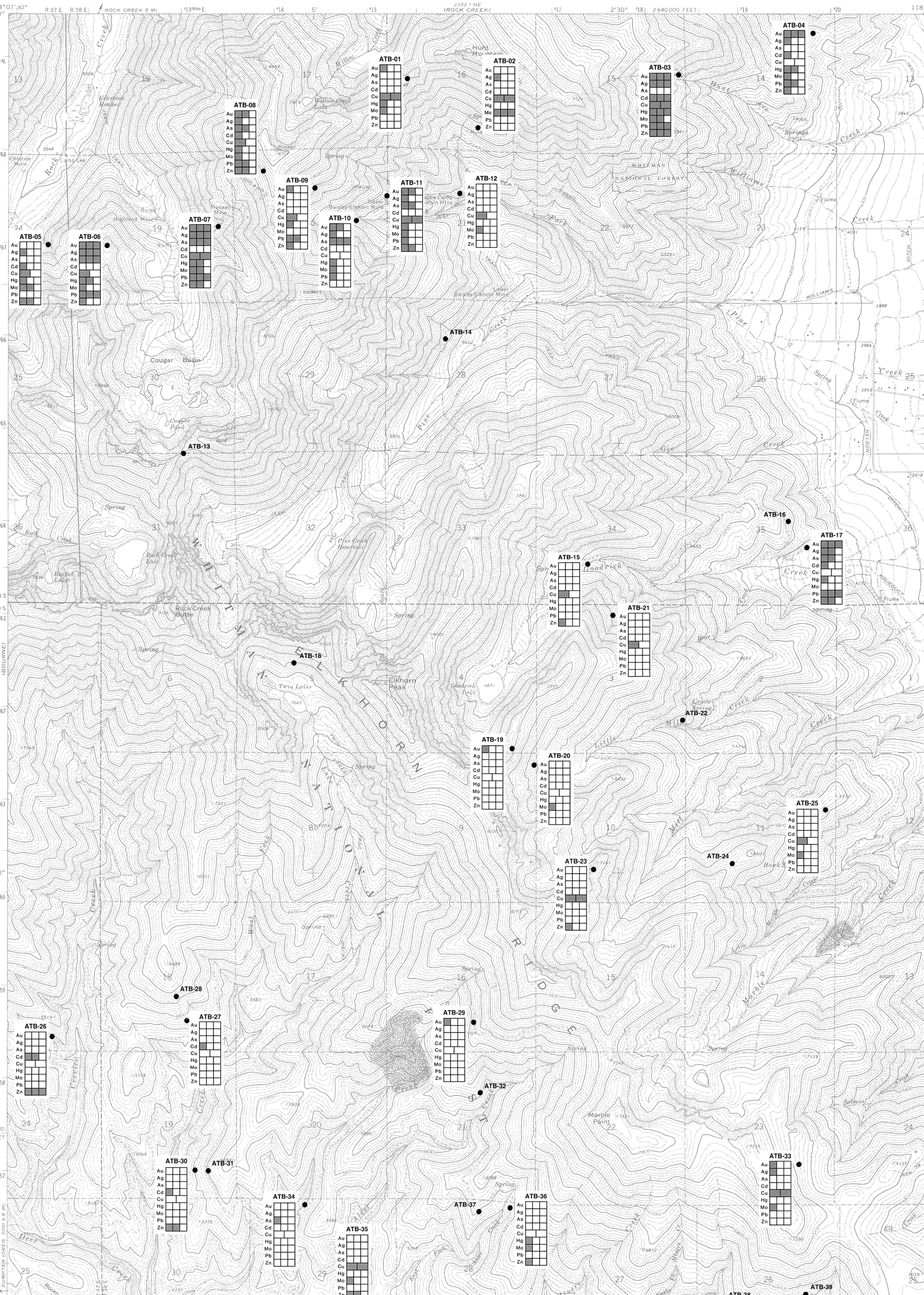
Plate 2

Funded in part by the USDA Forest Service and the U.S. Geological Survey (COGEOMAP)



Au: ≥1 ppm; ≥0.1 - <1 ppm; 0.01 - <0.1 ppm
Ag: ≥100 ppm; ≥10 - <100 ppm; 1 - <10 ppm
As: ≥1,000 ppm; ≥100 - <1,000 ppm; 50 - <100 ppm
Cd: ≥100 ppm; ≥10 - <100 ppm; 1 - <10 ppm
Cu: ≥100 ppm; 50 - <100 ppm
Hg: ≥10 ppm; ≥1 - <10 ppm; 0.1 - <1 ppm
Mo: ≥100 ppm; ≥10 - <100 ppm; 1 - <10 ppm
Pb: ≥1,000 ppm; ≥100 - <1,000 ppm; 50 - <100 ppm
Zn: ≥1,000 ppm; ≥100 - <1,000 ppm; 50 - <100 ppm

Base map by U.S. Geological Survey
Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1971. Field checked 1972

Projection and 10,000-foot grid ticks: Oregon coordinate system, north zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue. 1927 North American datum
To place on the predicted North American Datum 1983 move the projection lines 17 meters north and 81 meters east as shown by dashed corner ticks

UTM GRID AND 1984 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET (GN, MN, 0°45' 13 MILS, 18½° 329 MILS)

SCALE 1:24 000
1 MILE — 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION (OREGON)

SAMPLING AND ANALYTICAL PROCEDURES

Dumps, prospect pits, and mineralized outcrops were selectively sampled during geologic mapping. Samples marked by an asterisk are visually selected high-grade material taken from dumps on the premise that such material represents the targeted mineralization. The other samples were collected by random grab of material, including float. Time constraints did not permit the systematic collection of truly representative samples. Prospects about which there is little or no published information were sampled in preference to currently active mines and well-known formerly productive properties.

Chemex Labs Ltd. (North Vancouver, B.C., Canada) crushed and ground the samples and provided the data reported on Table 4. Gold was determined by fire assay/atomic absorption (AA) (10-g sample with final volume of 5 ml). Mercury was determined by cold vapor AA (1-g sample treated with HNO_3 and HCl and made to a final volume of 100 ml). The other elements were determined as follows: 0.5-g sample was digested with HNO_3 + HCl (3:1), made to final volume of 25 ml, and analyzed by inductively coupled plasma (ICP) emission spectrometry. The acids employed yielded partial rather than total metals concentrations because of incomplete digestion. In particular, the values reported for Al, Sb, Ba, Be, Ca, Cr, Ga, La, Mg, K, Na, Sr, Tl, Ti, W, and V are semiquantitative. The values for the remaining 14 elements — Ag, As, Bi, Cd, Co, Cu, Fe, Mn, Mo, Ni, P, Pb, U, and Zn — are essentially quantitative (per Chemex).

Quality-control check analyses were provided by Barringer Laboratories (Sparks, Nevada). Gold was determined by fire assay/AA (30-g sample in 5 ml). Mercury was determined by cold vapor AA (0.25-g sample, aqua regia digestion). The other elements were determined by AA after digestion of a 2-g sample in aqua regia (HNO_3 + HCl, 1:3); final volume was 20 ml.

Table 2. CHEMICAL ANALYSES OF ROCK SAMPLES*

Map letter, Plate 1	Geologic unit	Locality 1/4	Sec.	T.(S.)	R.(E.)	Rock type	SiO_2	Al_2O_3	TiO_2	FeO	Fe_2O_3	MnO	CaO	MgO	K_2O	Na_2O	P_2O_5
A.	TRPi	SW	30	8	38	Metadiorite	58.62	19.99	0.93	3.20	3.67	0.10	4.88	2.87	0.79	4.72	0.24
B.	TRPev	NW	28	8	38	Amphibolite	49.47	16.53	1.69	5.03	5.77	0.18	11.30	6.49	0.06	2.30	0.17
C.	TRPev	NW	33	8	38	Meta-andesite	57.09	18.57	1.01	3.67	4.21	0.13	6.25	3.96	1.74	3.22	0.16
D.	TRPev	NE	35	8	38	Greenstone (cataclasite)	49.41	18.15	1.18	4.98	5.70	0.17	11.31	6.48	0.14	2.29	0.19
E.	TRPi	SW	1	9	38	Metadiorite	55.62	15.09	0.70	4.41	5.06	0.18	7.93	7.29	0.49	3.16	0.07
F.	TRPev	NE	10	9	38	Greenstone (cataclasite)	51.64	14.10	1.66	5.45	6.24	0.18	10.43	7.42	0.02	2.68	0.18
G.	TRPev	NW	19	9	38	Metabasalt	54.93	14.13	0.96	4.62	5.29	0.17	10.59	6.56	0.04	2.60	0.10
H.	TRPev	SW	22	9	38	Metabasalt	53.16	17.46	1.15	4.55	5.21	0.19	9.33	4.43	0.00	4.31	0.21
I.	TRPev	C	23	9	38	Metabasalt	50.07	18.13	1.21	4.97	5.69	0.15	9.92	4.24	1.56	3.36	0.70
J.	TRPi	NE	26	9	38	Albite	73.95	13.79	0.61	1.72	1.97	0.07	2.56	0.65	0.10	4.48	0.11

*Analyses by X-ray fluorescence at Washington State University under the direction of Peter Hooper. Analyses are normalized on a volatile-free basis, and total Fe is expressed as Fe_2O_3/FeO at an arbitrarily fixed ratio. All numbers are in weight percent.

Table 3. FOSSIL LOCATIONS

Map letter, Plate 1	Geologic unit	Locality 1/4	Sec.	T.(S.)	R.(E.)	Host lithology	Fauna	Age	Identification	Source
a.	TRPev	SW	34	8	38	Bedded limestone	Conodonts	Late Triassic (early Norian)	Epigondolella abneptis subsp. B of Orchard; Xaniognathus sp.	Wardlaw, written communication, 1986
b.	TRPer	NW	4	9	38	Chert float	Radiolaria	Late Triassic (Karnian)	?Corum sp.; Pseudostylosphaera sp.; Triassocampe sp.	Blome, written communication, 1986
c.	ls	SE	13	9	37	Limestone block	Fusulinids	Permian	Schwagerina sp.	Nestell, personal communication, 1986
d.	TRPer	SE	15	9	38	Chert float	Radiolaria	Paleozoic (Pennsylvanian-Permian)	?Pseudoalbaillella sp.	Blome, written communication, 1986
e.	TRPer	SW	14	9	38	Bedded chert	Radiolaria	Late Triassic (late Karnian-middle Norian)	Capnodoce sp.; ?Corum sp.; Renzium sp. cf. R. weberorum Blome	Blome, written communication, 1986
f.	TRPer	SW	14	9	38	Bedded chert	Radiolaria	Late Triassic (late Karnian-middle Norian)	Betraccium(?) inornatum Blome; ?Canoptum sp.; Triassocampe sp.	Blome, written communication, 1986
	TRPer	SW	14	9	38	Bedded chert	Radiolaria	Late Triassic (Karnian or Norian)	Canoptum sp.; Sarla sp.	Blome, written communication, 1986
	TRPer	SW	14	9	38	Bedded chert	Radiolaria	Late Triassic?	?Xipha sp.	Blome, written communication, 1986
g.	ls	NE	14	9	38	Limestone pod	Fusulinids	Permian (Guadalupian)	Chusenella sp.; Neoschwagerina sp.; Pseudodoliolina sp.; Yabeina sp.	Nestell, 1983; Coward, 1983
h.	ls	NW	28	9	38	Limestone pod	Fusulinids	Permian	Schwagerina sp.	Nestell, verbal communication, 1986
i.	TRPer	NW	28	9	38	Chert slump block	Radiolaria	Mesozoic (Triassic?)	?Pseudostylosphaera sp.	Blome, written communication, 1986

Table 4. ANALYSES OF ROCK CHIP SAMPLES*

Sample number	Au (ppb)	Hg (ppb)	Al (%)	Ag (ppm)	As (ppm)	Ba (ppm)	Be (ppm)	Bi (ppm)	Ca (%)	Cd (ppm)	Co (ppm)	Cr (ppm)	Cu (ppm)
ATB-01	40	140	1.06	0.2	<10	50	<0.5	<2	0.23	<0.5	13	218	491
ATB-02**	<5	50	0.24	2.6	20	20	<0.5	32	0.04	0.5	24	68	118
ATB-03**	>10,000	63,000	0.07	>200.0	30	40	<0.5	28	6.24	>99.9	11	45	292
ATB-04**	1,050	1,400	0.03	4.4	10	<10	<0.5	2	9.00	7.0	1	159	16
ATB-05	<5	350	1.21	1.0	10	410	<0.5	<2	1.71	2.5	15	73	94
ATB-06	2,750	9,000	0.12	>200.0	1,300	140	<0.5	<2	0.05	<0.5	1	103	89
ATB-07**	3,600	4,400	0.20	130.0	9,120	40	<0.5	22	0.02	<0.5	3	45	901
ATB-08**	560	530	0.20	5.4	150	30	<0.5	<2	0.04	1.0	8	54	61
ATB-09**	20	100	1.98	0.8	40	50	<0.5	2	0.28	<0.5	15	160	74
ATB-10	320	130	0.60	1.6	1,250	20	<0.5	<2	0.17	<0.5	14	132	39
ATB-11**	165	290	0.34	7.8	370	10	<0.5	4	0.02	0.5	10	237	196
ATB-12**	<5	90	0.60	0.4	10	130	<0.5	2	0.24	<0.5	5	137	57
ATB-13**	<5	60	0.46	0.2	20	<10	<0.5	<2	4.50	<0.5	24	486	16
ATB-14**	<5	50	0.40	0.2	<10	<10	<0.5	2	0.08	<0.5	5	296	7
ATB-15	<5	50	2.06	0.4	10	90	<0.5	<2	0.60	<0.5	18	38	97
ATB-16**	<5	50	0.69	0.2	30	10	<0.5	<2	0.10	<0.5	6	108	6
ATB-17**	>10,000	340	0.96	96.0	110	<10	<0.5	10	4.00	1.5	16	403	15
ATB-18	<5	70	0.25	0.2	<10	20	<0.5	<2	0.01	<0.5	2	38	20
ATB-19	40	60	0.28	0.4	<10	20	<0.5	2	<0.01	<0.5	1	37	10
ATB-20	<5	60	0.28	0.2	<10	30	<0.5	<2	0.02	<0.5	2	43	18
ATB-21	<5	50	1.36	0.4	<10	110	<0.5	<2	0.26	<0.5	6	80	69
ATB-22	<5	50	0.96	0.4	10	40	<0.5	<2	0.14	<0.5	12	72	33
ATB-23	<5	80	1.45	0.4	<10	350	<0.5	<2	<0.01	0.5	4	43	332
ATB-24**	<5	60	0.38	0.2	10	100	<0.5	<2	0.01	<0.5	2	191	35
ATB-25	<5	50	1.09	0.4	10	60	<0.5	<2	0.01	<0.5	5	122	61
ATB-26	<5	60	0.54	0.6	<10	110	<0.5	<2	0.17	52.5	221	33	27
ATB-27	<5	40	0.29	0.4	20	100	<0.5	<2	22.30	1.5	8	3	7
ATB-28	<5	40	0.45	0.2	<10	50	<0.5	2	0.06	<0.5	7	28	24
ATB-29	10	50	0.84	0.6	10	50	<0.5	<2	0.12	<0.5	8	76	28
ATB-30	<5	60	0.22	0.2	<10	90	<0.5	<2	0.14	4.5	14	86	18
ATB-31	<5	30	0.01	0.6	20	100	<0.5	8	30.22	0.5	2	<1	9
ATB-32	<5	40	0.12	0.2	<10	20	<0.5	<2	0.18	<0.5	1	34	13
ATB-33	65	80	0.12	1.0	<10	10	<0.5	<2	0.10	<0.5	7	71	730
ATB-34**	<5	40	0.65	0.4	60	10	<0.5	2	0.03	<0.5	29	766	26
ATB-35**	<5	50	0.81	0.6	10	220	<0.5	<2	0.02	0.5	15	116	133
ATB-36	<5	210	0.29	0.4	<10	40	<0.5	<2	0.02	0.5	3	33	44
ATB-37**	<5	50	0.33	0.2	10	40	<0.5	2	2.77	<0.5	5	20	18
ATB-38**	<5	40	0.41	0.4	10	30	<0.5	4	23.35	0.5	4	17	41
ATB-39	<5	40	1.12	0.4	<10	30	<0.5	<2	0.24	<0.5	4	22	7

Sample number	Fe (%)	Ga (ppm)	K (%)	La (ppm)	Mg (%)	Mn (ppm)	Mo (ppm)	Na (%)	Ni (ppm)	P (ppm)	Pb (ppm)	Sb (ppm)	Sr (ppm)	Ti (%)	Tl (ppm)	U (ppm)	V (ppm)	W (ppm)	Zn (ppm)	Field number
ATB-01	4.20	<10	0.02	<10	0.39	174	4	0.04	25	690	2	<10	79	0.08	<10	<10	118	<10	20	EP-155
ATB-02**	7.72	<10	0.03	<10	0.06	40	796	<0.01	7	440	6	<10	9	<0.01	<10	<10	112	<10	20	EP-157
ATB-03**	3.53	10	0.02	<10	0.02	425	22	<0.01	6	230	>9,999	50	<1	<0.01	<10	<10	1	<10	>9,999	B-237
ATB-04**	0.47	20	<0.01	<10	0.01	729	4	<0.01	3	20	100	<10	<1	<0.01	<10	<10	2	<10	70	B-243
ATB-05	3.80	10	0.48	20	1.47	1,002	16	0.01	47	510	34	<10	88	0.02	<10	<10	86	<10	140	EP-177
ATB-06	2.90	<10	0.07	<10	0.01	32	7	<0.01	2	140	1,546	380	12	<0.01	<10	<10	68	<10	60	EP-151
ATB-07**	11.77	<10	0.19	<10	0.03	28	29	<0.01	1	410	>9,999	460	3	<0.01	<10	<10	15	<10	470	DA-11
ATB-08**	3.66	<10	0.18	<10	0.02	132	5	<0.01	10	460	178	<10	5	<0.01	<10	<10	35	<10	200	DA-02
ATB-09**	4.28	<10	0.06	<10	0.96	1,221	<1	0.03	43	520	110	<10	26	0.01	<10	<10	72	<10	70	EP-131
ATB-10	6.11	<10	0.34	<10	0.13	125	4	<0.01	27	810	62	<10	3	<0.01	<10	<10	30	<10	40	EP-110
ATB-11**	4.62	<10	0.08	<10	0.03	249	6	<0.01	13	390	60	10	2	<0.01	<10	<10	21	<10	250	EP-112
ATB-12**	1.40	<10	0.13	<10	0.22	184	3	0.05	20	280	10	<10	50	0.08	<10	<10	27	<10	10	EP-113
ATB-13**	1.55	10	<0.01	<10	2.72	496	<1	<0.01	413	100	16	<10	52	<0.01	<10	<10	17	<10	<10	EP-114
ATB-14**	0.79	<10	<0.01	<10	0.47	174	<1	0.01	22	140	8	<10	1	0.02	<10	<10	15	<10	<10	EP-108
ATB-15	5.46	<10	0.16	10	1.82	653	<1	0.02	13	930	12	<10	13	0.29	<10	<10	172	<10	80	B-53
ATB-16**	1.63	<10	0.01	<10	0.66	260	<1	<0.01	46	350	14	<10	6	<0.01	<10	<10	18	<10	10	EP-84
ATB-17**	2.13	10	<0.01	<10	1.52	558	<1	<0.01	196	220	3,716	<10	4	<0.01	<10	<10	38	<10	310	EP-80
ATB-18	0.76	<10	0.09	10	0.14	33	<1	<0.01	7	160	22	<10	4	<0.01	<10	<10	3	<10	10	B-75
ATB-19	0.67	<10	0.05	<10	0.11	36	<1	<0.01	4	120	14	<10	2	<0.01	<10	<10	2	<10	<10	B-59
ATB-20	1.71	<10	0.06	10	0.12	47	3	<0.01	8	440	12	<10	4	<0.01	<10	<10	3	<10	10	B-64
ATB-21	4.84	<10	0.27	<10	0.85	549	<1	0.05	10	720	8	<10	30	0.33	<10	<10	68	<10	30	EP-98
ATB-22	4.70	<10	0.26	<10	0.66	247	1	0.04	7	430	12	<10	9	0.26	<10	<10	61	<10	10	EP-92
ATB-23	11.49	<10	0.38	<10	0.19	53	<1	<0.01	11	540	12	<10	2	0.06	<10	<10	22	<10	70	EP-66
ATB-24**	1.28	<10	0.14	10	0.02	28	2	<0.01	13	320	8	<10	18	<0.01	<10	<10	9	<10	30	EP-70
ATB-25	1.74	<10	0.27	10	0.26	107	4	<0.01	12	320	10	<10	6	<0.01	<10	<10	19	<10	40	EP-124
ATB-26	34.67	<10	0.10	10	0.16	6,354	<1	<0.01	270	2,450	<2	<10	17	<0.01	<10	10	21	<10	3,670	EP-137
ATB-27	0.41	40	0.13	<10	7.39	147	<1	<0.01	8	4,470	6	10	141	<0.01	<10	<10	12	10	40	EP-172
ATB-28	1.46	<10	0.11	<10	0.19	220	1	<0.01	11	330	10	<10	1	0.01	<10	<10	9	<10	30	EP-133
ATB-29	2.03	<10	0.10	<10	0.66	739	<1	<0.01	23	320	8	<10	4	<0.01	<10	<10	22	<10	30	EP-165
ATB-30	38.33	<10	<0.01	<10	0.07	3,054	<1	<0.01	36	>9,999	<2	<10	29	<0.01	<10	<10	23	<10	860	EP-96
ATB-31	0.12	60	<0.01	<10	0.14	19	2	<0.01	3	190	24	10	880	<0.01	<10	<10	4	10	<10	EP-26
ATB-32	0.65	<10	0.01	<10	0.03	116	<1	<0.01	4	310	6	<10	12	<0.01	<10	<10	4	<10	10	B-235
ATB-33	2.63	<10	0.05	<10	0.01	32	2	<0.01	3	210	10	<10	2	<0.01	<10	<10	26	<10	10	EP-162
ATB-34**	1.66	<10	<0.01	<10	1.14	449	<1	<0.01	359	100	12	<10	2	<0.01	<10	<10	26	<10	10	EP-101
ATB-35**	6.71	<10	0.10	<10	0.19	515	4	<0.01	12	240	12	<10	4	<0.01	<10	<10	51	<10	110	EP-05
ATB-36	5.38	<10	0.13	10	0.04	126	6	<0.01	10	1,240	10	<10	16	<0.01	<10	<10	11	<10	70	EP-29
ATB-37**	0.95	10	0.07	<10	1.08	132	<1	<0.01	8	150	14	<10	8	<0.01	<10	<10	5	<10	10	EP-30
ATB-38**	0.81	40	<0.01	<10	0.04	207	1	<0.01	10	370	14	10	116	0.08	<10	<10	17	<10	20	EP-46
ATB-39	2.51	<10	0.07	<10	0.89	361	1	0.01	4	380	8	<10	4	0.12	<10	<10	9	<10	30	EP-48

*See discussion entitled "Sampling and Analytical Procedures" on this plate for explanation of sampling and analytical techniques and indication of which results are semiquantitative and which are quantitative.
**Samples from mines and prospects listed in Table 1, Plate 1.

Table 5. SAMPLE DESCRIPTIONS AND LOCATIONS

Sample no.	Locality 1/4	Sec.	T.(S.)	R.(E.)	Description	Geologic unit
ATB-01	SW	16	8	38	Rusty quartz	TRPer
ATB-02	SE	16	8	38	Rusty quartz	KJhm
ATB-03	NE	15	8	38	Quartz, gouge with pyrite, sphalerite	KJhm
ATB-04	NE	14	8	38	Rusty quartz	KJhm
ATB-05	NE	24	8	37	Carbonaceous gouge with quartz	TRPer
ATB-06	SW	19	8	38	Rusty quartz breccia	TRPer
ATB-07	NE	19	8	38	Rusty quartz	TRPer
ATB-08	SW	20	8	38	Rusty quartz	KJhm
ATB-09	NE	20	8	38	Vuggy quartz	KJhm
ATB-10	NE	20	8	38	Limonitic gouge with quartz, pyrite	TRPer
ATB-11	NE	20	8	38	Vuggy quartz with Mn, Fe oxides	TRPer
ATB-12	SW	21	8	38	Milky quartz	TRPer
ATB-13	SE	30	8	38	Talc, calcite, quartz	TRPi
ATB-14	NW	28	8	38	Milky quartz	TRPer
ATB-15	SW	34	8	38	Disseminated pyrite	TRPev
ATB-16	NE	35	8	38	Milky quartz	TRPer
ATB-17	SE	35	8	38	Vuggy quartz with pyrite, galena	TRPev, TRPi
ATB-18	NW	5	9	38	Limonitic silicified chert	TRPer
ATB-19	SE	4	9	38	Limonitic silicified chert	TRPer
ATB-20	NE	9	9	38	Limonitic silicified chert	TRPer
ATB-21	NE	3	9	38	Limonitic silicified metagabbro	TRPi
ATB-22	SW	2	9	38	Disseminated pyrite in silicified tuff	TRPev
ATB-23	SW	10	9	38	Limonitic chert breccia	TRPer
ATB-24	SW	11	9	38	Quartz-cemented chert breccia	TRPer
ATB-25	NE	11	9	38	Limonitic chert and argillite	TRPer
ATB-26	SE	13	9	37	Heavy iron oxides	TRPer
ATB-27	NE	18	9	38	Limestone	ls
ATB-28	SE	18	9	38	Limonitic silicified chert	TRPer
ATB-29	SE	15	9	38	Vuggy quartz with Fe, Mn oxides	TRPer
ATB-30	SE	19	9	38	Jasperoid with heavy Fe oxides, chalcedony stringers	TRPer
ATB-31	SE	19	9	38	Limestone	ls
ATB-32	NE	21	9	38	Silicified chert	TRPer
ATB-33	SE	23	9	38	Rusty silicified chloritic tuffs	TRPev
ATB-34	NW	19	9	38	Milky quartz, talc	TRPer, TRPi
ATB-35	SE	29	9	38	Rusty argillite and gouge	TRPer
ATB-36	SE	28	9	38	Limonitic gouge	TRPer
ATB-37	NE	28	9	38	Limonitic silicified chert	TRPer
ATB-38	SW	26	9	38	Limonitic gouge	d
ATB-39	SW	26	9	38	Limonitic silicified zone	TRPev

Table 6. QUALITY-CONTROL (QC) DATA

Sample no.	Source of data	Au (ppb)	Hg (ppb)	Ag (ppm)	As (ppm)	Bi (ppm)	Cd (ppm)	Cu (ppm)	Mo (ppm)	Pb (ppm)	Sb (ppm)	Zn (ppm)
ATB-02	Reported	<5	50	2.6	20	32	0.5	118	796	6	<10	20
	QC	11	79	3.0	15	34	<1.0	103	670	11	<1	17
ATB-07	Reported	3,600	4,400	130.0	9,120	22	<0.5	901	29	>9,999	460	470
	QC	3,219	2,214	304.8	12,800	26	4.0	840	36	27,200	390	450
ATB-10	Reported	320	130	1.6	1,250	<2	<0.5	39	4	62	<10	40
	QC	362	125	1.9	1,540	<1	<1.0	30	6	60	1	33
ATB-20	Reported	<5	60	0.2	<10	<2	<0.5	18	3	12	<10	10
	QC	2	21	<0.1	4	<1	<1.0	12	1	8	<1	10
ATB-30	Reported	<5	60	0.2	<10	<2	4.5	18	<1	<2	<10	860
	QC	2	125	<0.1	<2	<1	1.0	5	<1	3	<1	820
ATB-33	Reported	65	80	1.0	<10	<2	<0.5	730	2	10	<10	10
	QC	75	75	0.7	<2	1	<1.0	650	<1	6	<1	7