OPEN-FILE REPORT O-92-10
PRELIMINARY GEOLOGIC MAP OF THE MCCAIN CREEK QUADRANGLE
MALHEUR COUNTY, OREGON
1992
BY MARK L. FERNS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MC CAIN CREEK QUADRANGLE
OREGON—MALHEUR CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1968. Field checked 1969

Polyconic projection. 1927 North American datum

10,000-foot grid based on Oregon coordinate system, south zone

1000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1969 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

OREGON DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES

Field work conducted 1991

Funded jointly by the Oregon Department of Geology and Mineral Industries, the Oregon State Lottery, and the U. S. Geological Survey COGEOMAP Program.

ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

QUADRANGLE LOCATION

MC CAIN CREEK, OREG.
N4307.5—W11715/7.5
1969
AMS 2570 III NE—SERIES V892

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By M. L. Ferns
Oregon Department of Geology and Mineral Industries

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This unpublished Open-File Report has not been reviewed and may not meet all Oregon Department of Geology and Mineral Industries' standards.

Field work conducted in 1991
Map Scale: 1:24,000

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McCain Creek

Low-silica rhyolite flows that comprise the summit of Mahogany Mountain are the oldest rocks exposed in the McCain Creek quadrangle. The sparsely phyric, flow-foliated flows make-up a flow-dome complex, which, according to Rytuba and others, erupted prior to the collapse of the Mahogany Mountain caldera. The high-standing escarpment on the north side of Mahogany Mountain is believed to mark the south wall of the caldera. The caldera is filled with a thick accumulation of tuffaceous surge deposits, non-welded ashflow tuff, and airfall tuff of units Ttlg and Ttsc. The tuff of Leslie Gulch (Ttlg) is the stratigraphically lowest unit exposed within the caldera. According to Vander Meulen and others (1987), the tuff of Leslie Gulch is made up mainly of orange and pale-yellow, crystal-poor, lithic ashflow and airfall tuffs that are generally non- to poorly-welded. Age is reportedly middle Miocene (@ 15.5 Ma).

The irregular surface of the tuff of Leslie Gulch is overlain by a second, somewhat younger sequence of ashflow and airfall tuffs that makes up the tuff of Spring Creek (unit Ttsc). The tuffs are generally shades of yellow-green and green in color and, according to Vander Meulen and others (1987) are generally crystal rich with as much as 20 to 25% sanidine, plagioclase, and quartz phenocrysts. According to Vander Meulen and others (1987), the tuff of Leslie Gulch is peralkaline (comendite) in composition while the tuff of Spring Creek is meta-aluminous. The tuff of Spring Creek presumably erupted during formation of the Three Fingers Caldera to the north; shortly after collapse of the Mahogany Mountain Caldera. The tuff of Spring Creek is not exposed south of the Mahogany Mountain escarpment.

The low-silica, meta-aluminous rhyolitic tuff of Swisher Mountain (Ttsm) crops out south and west of Mahogany Mountain. Contact between the tuff of Swisher Mountain and the rhyolites on Mahogany Mountain is covered by a alluvial fan and gravel sheet (QTs) that formed prior to incising of the Owyhee River Canyon.

McCAIN CREEK QUADRANGLE

Qal Fluviatile and lacustrine deposits (Holocene and Pleistocene). Mainly unconsolidated deposits of stream gravels and silts deposited along the modern stream channels.

Qls Landslides (Holocene and Pleistocene?) Unstratified accumulations of basalt and rhyolite blocks along the north edge of the quadrangle. Characterized by hummocky topography with small springs.

QbJc Basalt of Jordan Craters (Holocene) Black iridescent vesicular olivine basalt flow with exceptionally well preserved tumuli, pahoehoe surfaces, and collapse structures. Fresh flow surfaces are exposed with no soil cover. In thin section, consists of 2-3mm olivine phenocrysts in a subophitic groundmass of plagioclase, clinopyroxene, and opaques. Chemically an alkali olivine basalt with a maximum age of 0.15 Ma, according to Hart (1982) Minimum age of 2800 years indicated by radiocarbon date from organic debris in upper Cow Lake (Mehringer, 1987).

Qfg Alluvial fan and gravel deposits (Holocene and Pleistocene) Unconsolidated accumulations of partially- to well-rounded boulders and cobbles of rhyolite. Size of blocks and boulders decreases and degree of rounding increases southeastward off of the flank of Mahogany Mountain.

QTb Olivine basalt (Pleistocene? and Pliocene) Bluish-gray to black, diktytaxitic olivine basalt flows exposed adjacent to Upper Cow Lake. Locally heavily mantled by gravels of Qfg. Finely vesicular, holocrystalline flows with subophitic to ophitic clinopyroxene, plagioclase, and intergranular olivine. Includes transitional and high alumina olivine basalts. Includes flows dated at 3.84, 4.1 and 4.5 Ma (Hart, 1982). Equivalent to part of unit QTb of Walker (1977).

Tstu Tuffaceous siltstones (Miocene) White and pale brown tuffs and tuffaceous siltstones. Poorly exposed. Conformably overlies unit Ttsm.

Ttsm Tuff of Swisher Mountain (Middle Miocene) Densely welded, dark purple to reddish-purple, crystal-lithic ashflow tuff. Interior of ashflow is devitrified. Flow top is locally marked by pumiceous carapace breccias containing blocks of black and banded red and black vitrophyre and reddish, vesicular, devitrified tuff. Contains about 15 - 20% broken plagioclase crystals as much as 1 cm in length, light green pigeonite crystals, and as much as 5 % lithic fragments. Sanidine and orthopyroxene occur as accessory minerals in some thin sections. Chemically, a low-silica meta-aluminous rhyolite (Analyses , Table 1). Ashflow is over 200 feet thick south of The Tongue and thickens southeastward into the Downey Canyon quadrangle. Petrographically and chemically similar to the tuff of Swisher Mountain as described by Ekren and others (1982) and herein considered to be a northern extension of the Swisher Mountain from the upper Owyhee Canyon where mapped and described by Evans (1990). The tuff of Swisher Mountain is considered to be about 13.9 Ma in age (Ekren, 1982).

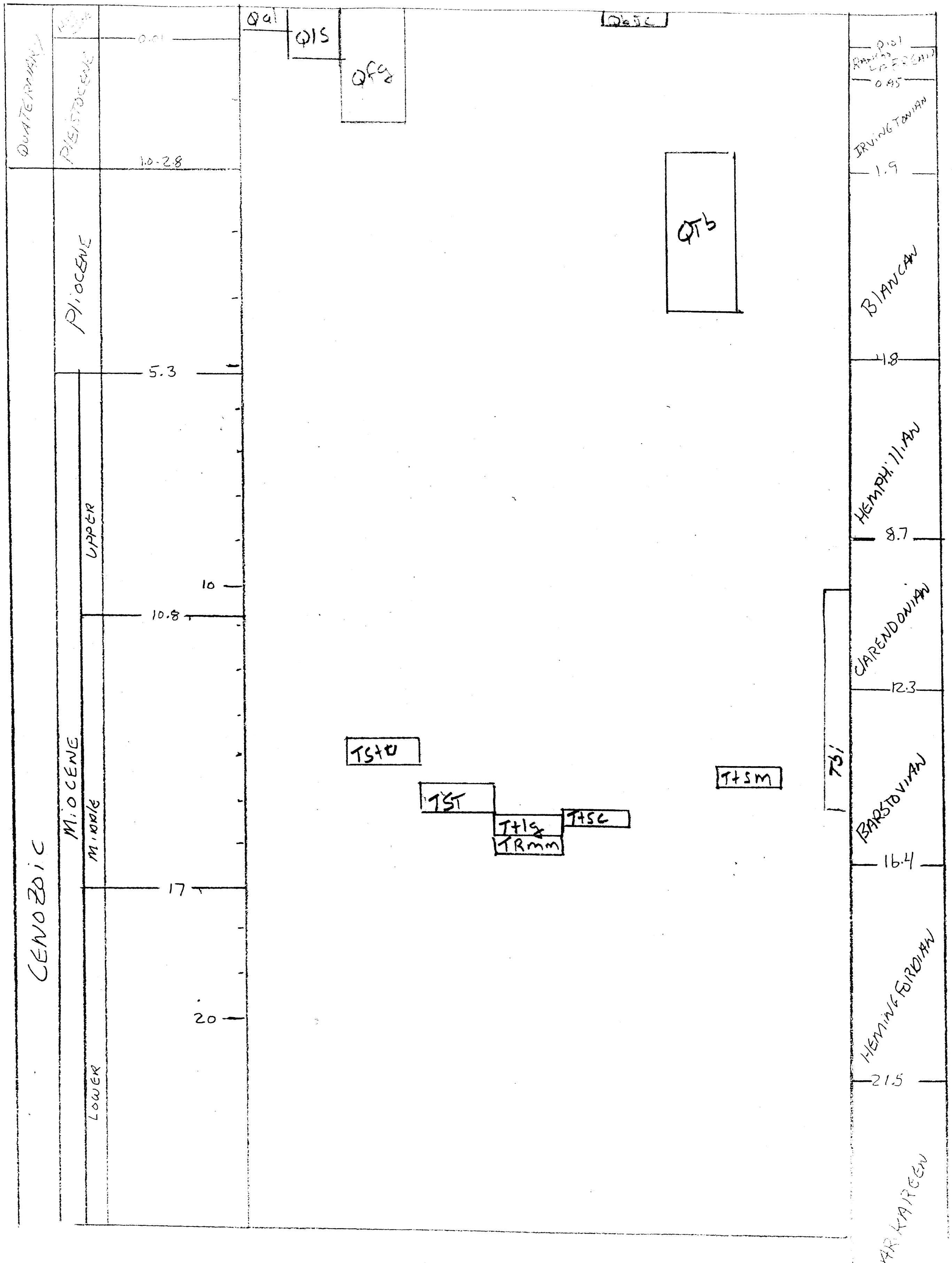
Tst Tuffaceous sedimentary rocks (Miocene) Mainly white to light green tuffaceous epiclastic silt- and fine-grained sandstones. Locally includes interbedded orange palagonitic tuffs and white airfall tuffs. Unconformably overlies units Ttsc and Ttlg.

Ttsc Tuff of Spring Creek (Miocene) Mainly pale yellowish-green and green, non-welded and partially welded crystal-lithic ashflow and airfall tuffs. Locally includes an interbedded light-grayish-purple, densely welded crystal-lithic ashflow tuff which contains flattened pumice clasts. Partially welded tuffs characteristically contain irregularly shaped masses of porphyritic vitrophyre. According to Vander Meulen and others (1987), the tuff of Spring Creek is a metaluminous rhyolite which is crystal-rich at the base, with 20 to 25% sanidine, plagioclase, and quartz phenocrysts. The tuff of Spring Creek also contains hornblende and biotite phenocrysts (Plumley, 1986).

Ttlg Leslie Gulch Tuff (Miocene) Mainly pale-yellow and orange to reddish-orange weathering, generally crystal-poor, non-welded to welded, lithic-rich ashflow and airfall tuffs. Includes lapilli tuffs with angular, unflattened pumice and light-green rhyolite lithic fragments up to 1.5 inches in diameter. According to Vander Meulen (1989) and Vander Meulen and others (1987) the Tuff of Leslie Gulch in the McCain Creek quadrangle is intracaldera facies and consists of ashflow, airfall, and surge deposits. Typically, individual ashflows are sparsely phyric, with 4 to 8% potassium feldspar and 1 to 4% quartz phenocrysts less than 3 mm in diameter. Chemically peralkaline with a commendite composition (Vander Meulen, 1989). Age is middle Miocene, based on K/Ar age of 15.5 + 0.5 Ma (Vander Meulen and others, 1987).

Trmm Rhyolite of Mahogany Mountain (Miocene) Light purple-gray to purple, flow-foliated, rhyolite flows. Sparsely phyric with about 2% plagioclase and quartz phenocrysts. Commonly vertically banded with spherulitic cavities as large as 4" in diameter. Chemically a low silica, peraluminous rhyolite. Unit probably includes at least two separate flows. Basal flow mapped by MacLeod (1990) is an unevolved, low silica rhyolite that contains sparse sanidine and plagioclase phenocrysts. Unit is considered by Vander Meulen (1989) and Rytuba and others (1985) to be part of a rhyolite flow-dome complex which vented prior to eruption of the Leslie Gulch Tuff. Contact between Trmm and Ttlg interpreted as a caldera margin (Rytuba and others, 1985; Vander Meulen, 1989).

Tmi Mafic intrusions (Miocene) Mainly greenish- and reddish-black weathering grayish-black to black basalt sills and dikes. Textures range from aphyric along margins to diabasic in central cores. Typically altered, with palagonitized glass and zeolitized plagioclase lathes between large anhedral clinopyroxene crystals.



McCAIN CREEK

LAB #	1/4	1/4	Sec.	T.(S.)	R.(E.)	Lithology	Unit	SiO2	Al2O3 %	TiO2 %	Fe2O3 %	MnO %	CaO %	MgO %	K2O %	NA2O %	P2O5	Cr ppm	Co ppm	Ni ppm	Cu ppm	Zn ppm	Rb ppm	Sr ppm	Y ppm	Zr ppm	Nb ppm	Ba ppm	Li pp
AZB-136	SW	SW	5	27	44	Rhyholite tuff	Ttsm	71.1	13.4	0.47	3.08	0.0	1.1	0.25	5.15	3.70	0.11	28	<5	8	8.2	62.	170	104	51	543	40	1830	20.9
AZB-137	SE	SW	11	27	44	Rhyolite	Trmm	73.9	12.5	0.18	1.45	0.0	0.2	0.05	4.49	4.38	0.04	<10	<5	<5	5.7	90.	133	18	70	421	48	1490	7.6
AZB-138	NE	SE	13	27	44	Rhyolite	Trmm	73.3	12.7	0.19	1.63	0.0	0.1	0.07	4.59	4.37	0.06	19	<5	<5	5.2	41.	141	23	83	386	22	1440	8.4
AZB-139	NE	NW	35	27	44	Rhyolite tuff	Ttsm	69.4	13.1	0.50	3.20	0.0	1.3	0.35	5.07	3.27	0.09	<10	<5	6	7.6	63.	175	119	53	537	41	1820	9.7

Laboratoy Number	1/4	1/4	Sec.	T.	R.	Map Unit	Ag ppm	As ppm	Au ppb	Cu ppm	Hg ppm	Mo ppm	Pb ppm	Sb ppm	Tl ppm	Zn ppm	Bi ppm	Cd ppm	Ga ppm	Se ppm	Te ppm	Ba ppm	Co ppm	Cr ppm	Fe %	Li ppm	Mn ppm	Ni ppm
AZB-001	NE	SE	16	27S	44E	Ttsc	.130	35.3	<1	6.63	.202	7.92	12.2	1.85	<.5	55.8	<.25	.414	2.28	<1.0	<.5	211	2	164	1.15	49	97	2
AZB-002	SE	SE	16	27S	44E	Ttsc	.162	7.16	<1	4.59	<.1	3.81	2.75	1.06	<.5	10.9	<.25	<.1	<.5	<1.0	<.5	376	1	113	0.47	61	95	<1
AZB-003	NW	NW	22	27S	44E	Ttsc	.164	28.9	<1	5.28	<.1	76.9	11.0	4.52	.561	37.1	<.25	.122	1.31	<1.0	<.5	528	2	181	1.01	57	153	2
AZB-004	SE	NW	19	27S	45E	Trmm	.167	38.9	4	3.12	.233	4.15	2.93	4.71	<.5	21.6	<.25	<.1	<.5	<1.0	<.5	719	1	52	0.75	6	57	3
AZB-005	NW	NE	30	27S	45E	Trmm	.155	12.9	2	2.72	<.1	2.85	3.12	.281	<.5	60.5	<.25	<.1	<.5	<1.0	<.5	769	1	40	1.29	9	93	13

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MAP SYMBOLS

———	**Contact** -- approximately located
—•— — - - - - -	**Fault contact** -- dashed where approximately located, dotted where concealed. Ball and bar on down throw side
⅄	**Strike and dip of beds**
x	Location of whole rock sample analyzed in Table 1
•	Location of mineralized sample analyzed in Table 2