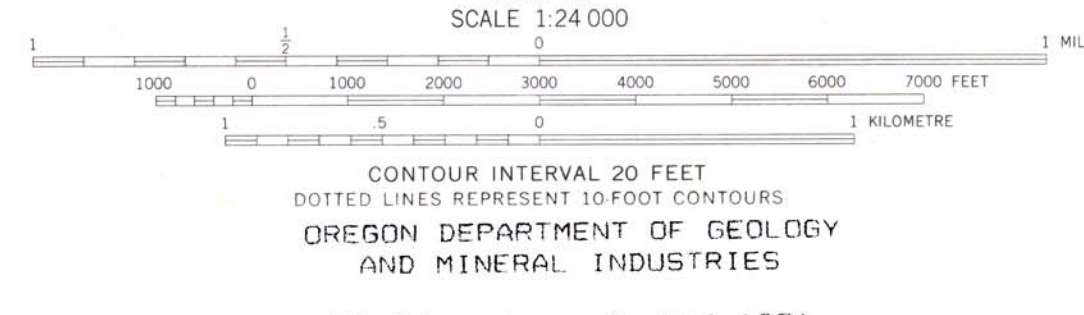
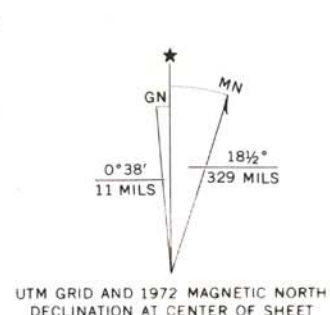




Mapped, edited, and published by the Geological Survey  
Control by USGS and NOS/NOAA  
Topography by photogrammetric methods from aerial  
photographs taken 1971. Field checked 1972  
Projection and 10,000-foot grid ticks: Oregon coordinate  
system, south zone (Lambert conformal conic)  
1000-metre Universal Transverse Mercator grid ticks,  
zone 11, shown in blue. 1927 North American datum  
Fine red dashed lines indicate selected fence lines  
Areas covered by dashed light-blue pattern are subject  
to controlled inundation



ROAD CLASSIFICATION  
Primary highway, hard surface  
Secondary highway, hard surface  
Unimproved road  
Interstate Route  
U. S. Route  
State Route

MUSTANG BUTTE, OREG.  
N4307.5—W11752.5/7.5  
1972

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



OPEN-FILE REPORT O-92-11  
PRELIMINARY GEOLOGIC MAP OF THE  
MUSTANG BUTTE QUADRANGLE  
MALHEUR COUNTY, OREGON

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

1992

This unpublished Open-File Report has not been reviewed and may not meet all Oregon Department of Geology and Mineral Industries' standards.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

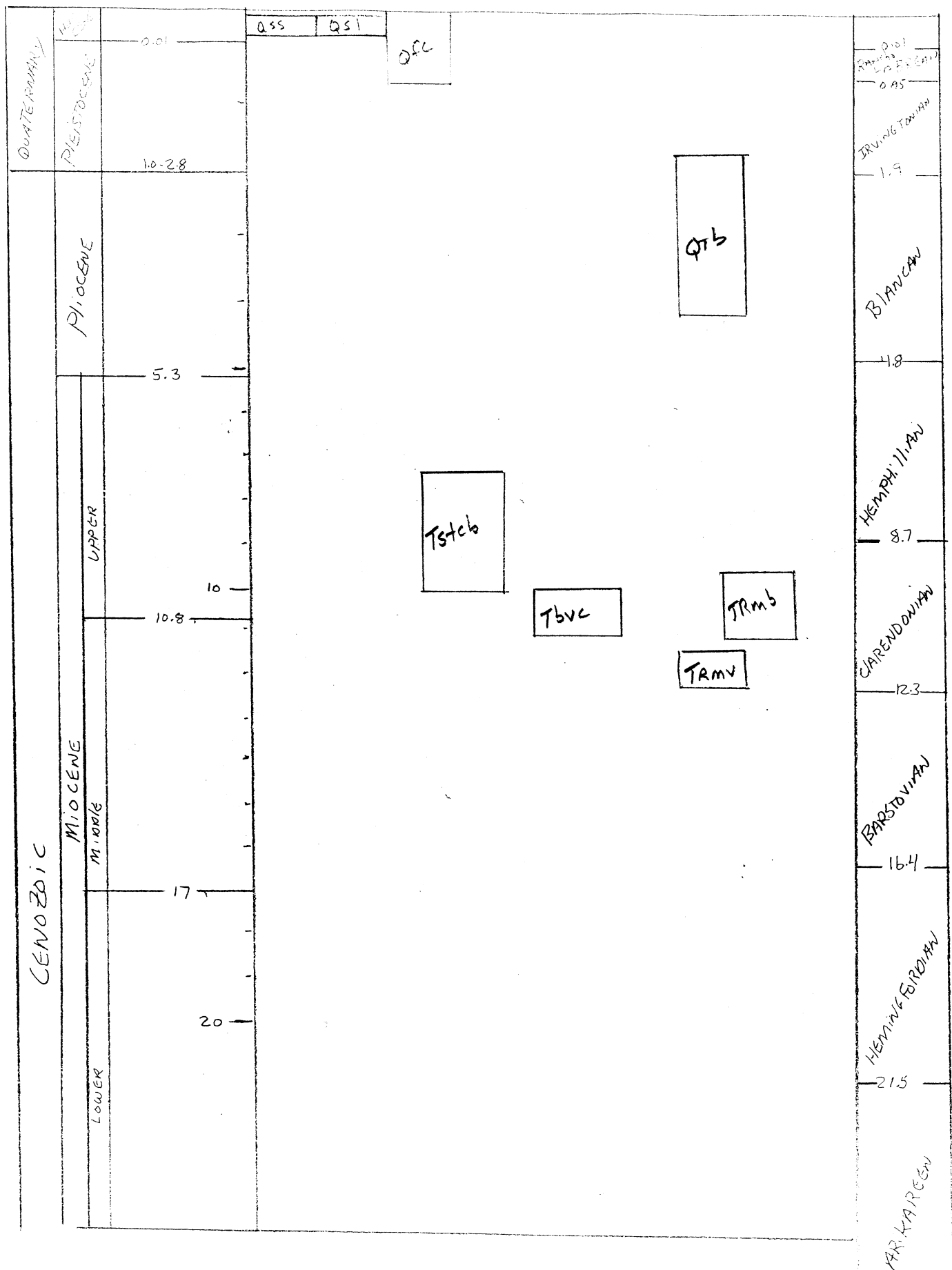
Funding Statement: Funded jointly by the Oregon Department of Geology and Mineral Industries, the Oregon State Lottery, and the U. S. Geological Survey COGEOGRAPHIC Program as part of a cooperative effort to map the west half of the 1<sup>0</sup> by 2<sup>0</sup> Boise sheet, eastern Oregon.

## Mustang Butte

A spherulitic, porphyritic rhyolite dome exposed north of the old town of Mooreville makes up the oldest rock unit (Trmv) exposed in the Mustang Butte quadrangle. The rhyolite is metaluminous in composition and contains sanidine, plagioclase, orthopyroxene, and altered olivine phenocrysts. Basalt and iron-rich andesite flows of unit TbvC overlie the rhyolite at Mooreville, where at least three flows with an aggregate thickness of 200 feet are exposed. Some of the TbvC flows are noteworthy in that they contain clear plagioclase xenocrysts as large as 2 cm in diameter. Hart and Mertzman (1982) report radiometric K/Ar dates of 11.7 and 11.2 Ma from flows in this unit.

Stratigraphic position of the aphyric rhyolite dome at Mustang Butte is not known at this time. The dome is a metaluminous, high silica rhyolite and is overlain by presumably Pliocene diktytaxitic olivine basalt flows of unit QTb. The flows are characterized by well-preserved flow tops heavily mantled by loess. Chemically they include high alumina basalt.

Lacustrine and eolian deposits marking a large Pleistocene playa lake cover Barren Valley. Prevailing winds here during the Pleistocene were evidently from northwest to southeast, as evidenced by the wave cut terrace on the flank of Mustang Butte and distribution of lacustrine and eolian sand deposits along the southeast shoreline. Lacustrine deposits in Barren Valley mark the extent of the pluvial Turbull Lake. This was one of a series of Pleistocene lakes which stretched southwestward along the east, fault-bounded flank of Steens Mountain. These young faults extend into the northeast quarter of the quadrangle.



## MUSTANG BUTTE QUADRANGLE

- Qfc** Alluvial fan deposits (Quaternary) Mainly unconsolidated and poorly sorted accumulations of coarse gravel deposited by ephemeral streams draining into Piute Lake. Includes deposits of colluvium and slope wash along the north flank of the lake bed.
- Qss** Lacustrine sediments (Quaternary) Mainly unconsolidated lacustrine deposits of light colored fine sand and silt, may include evaporite deposits.
- Qsl** Lacustrine and eolian deposits (Quaternary) Mainly unconsolidated lacustrine deposits of pale brown fine to medium grained sand deposited along the south margin of Piute Lake. Includes rounded gravels along ancient shorelines and wave cut terraces. Also includes higher elevation deposits of wind-blown sand marginal to the shoreline.
- Qfb** Olivine basalt (Pliocene?) Gray and grayish-black diktytaxitic olivine basalt flows with well preserved flow tops. Locally heavily mantled by windblown silt. Includes holocrystalline basalts with less than 2% olivine phenocrysts as large as 3mm in diameter in a groundmass of interlocking plagioclase lathes and subophitic clinopyroxene which are chemically high alumina basalts (Analyses 1, Table 1). Equivalent to unit Qb of Walker, (1977) and Walker and Repenning, (1966).
- Tstcb** Tuffaceous siltstones, and sandstones (Late Miocene) Mainly pale yellowish-white to white, tuffaceous siltstones.
- Tbvc** Basalt and ferroandesite. (Miocene) Bluish-black to bluish-gray, platy tholeiitic andesite, basaltic andesite, and basalt flows. Includes distinctive glomeroporphyritic flows with plagioclase phenocrysts as large as 2 cm in diameter, plagioclase and orthopyroxene glomerocrysts, and rare quartz xenocrysts. At least three flows with an aggregate thickness of 200 feet exposed north of Mooreville. Analyzed samples (Samples 4 and 5, table 1 contain high abundances of K<sub>2</sub>O and Fe<sub>2</sub>O<sub>3</sub>. Xenocryst-bearing flows are petrographically and chemically similar to the Square Mountain ferro-latite (Bonnichsen and others, 1988). Equivalent to unit Tba of Sherrod and others (1988). Age based on K/Ar dates of 11.7 and 11.2 Ma (Hart and Mertzman, 1982) from presumably correlative rocks in the Sheepshead Mountains to the south.

Trmb

Rhyolite at Mustang Butte (Miocene?) Light gray, spherulitic, aphyric rhyolite dome with marginal vitrophyre breccias. Contains about 2% plagioclase microphenocrysts < 1mm in diameter set in a microfelsitic groundmass of quartz and potassium feldspar. Chemically a metaluminous high-silica rhyolite (Analyses 2 & 3, Table 1). Part of unit Tvs of Walker (1977).

Trmv

Rhyolite at Mooreville (Miocene) Pinkish-gray to gray, spherulitic, porphyritic rhyolite dome. Vertical joints locally contain lythophysae cavities as large as 2" in diameter. Characteristically consists of 5% phenocrysts (sanidine and plagioclase) as much as 6 mm in diameter in cryptofelsitic groundmass containing radiating clots of chalcedony and opaques. Also contains sparse orthopyroxene and altered olivine phenocrysts. Chemically a metaluminous, high-silica rhyolite (Analyses, Table 1). Part of unit Tvs of Walker (1977). Unconformably overlain by flows of unit Tbvc.

## REFERENCES

DF-0-92-11

- Bonnichsen, Bill, Leeman, W.P., Jenks, M.D., and Honjo, N., 1988, Geologic field trip guide to the central and western Snake River Plain, Idaho, emphasizing the silicic volcanic rocks; in Link, P.K. and Hackett, W.R., editors, Guidebook to the geology of central and southern Idaho: Idaho Geological Survey Bulletin 27, p. 247-281.
- Hart, W.K. and Mertzman, S.A., 1982, K-Ar ages of basalts from southcentral and southeastern Oregon: Isochron West, vol. 33, p. 23-26.
- Sherrod, D.R., Minor, S.A., and Vercoutere, T.L., 1989; Geologic map of the Sheepshead Mountains, Harney and Malheur counties, Oregon: U.S. Geological Survey Miscellaneous Field Studies Map, MF-2079, scale 1:50,000.
- Walker, G.W., 1977, Geologic map of Oregon east of 121st meridian: U.S. Geological Survey Miscellaneous Investigations Map I-902, scale 1:500,000
- Walker, G.W. and Repenning, C.A., 1966, Reconnaissance geologic map of the west half of the Jordan Valley quadrangle, Malheur County, Oregon: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-457, scale 1:250,000.

LAB #	Quadrangle	1/4	1/4	Sec.	T.(S.)	R.(E.)	Lithology	Unit	SiO2	Al2O3	TiO2	FE2O3	MNO	CaO	MgO	K2O	Na2O	P2O5	LOI	Cr	Co	Ni	Cu	Zn	Rb	Sr	Y	Zr	Nb	BA	LI
									%	%	%	%	%	%	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
AZB-100	Mustang Butte	NW	SW	13	28	39	Olivine basalt	QTb	48.5	15.8	1.03	11.4	0.18	11.5	9.06	0.3	2.59	0.13	-0.38	314	40	146	40.5	75.	-10	190	22	83	13	135	5.6
AZB-102	Mustang Butte	SW	SE	9	27	39	Basalt	Tbvc	53.7	15.1	2.16	12.1	0.19	6.39	3.12	2.24	3.67	0.76	0.77	-10	27	11	27.6	120.	53	436	33	271	38	1250	9.3
AZB-103	Mustang Butte	NE	NE	17	27	39	Rhyolite	Trev	75.5	12.4	0.12	1.48	0.03	0.21	0.17	4.81	4.37	0.04	0.39	10	<5	<5	10.0	95.	190	-10	89	367	57	111	6.3
AZB-104	Mustang Butte	SW	SW	5	28	39	Aphyric rhyolite	Trab	74.4	12.7	0.06	0.99	0.05	0.53	0.16	4.5	4.5	0.05	2.23	10	<5	<5	8.9	69.	282	-10	108	123	69	128	33.9
AZB-105	Mustang Butte	SW	SE	7	28	39	Aphyric rhyolite	Trab	75.7	12.8	0.07	0.87	0.06	0.63	0.26	4.42	4.6	0.07	0.47	-10	<5	<5	9.1	66.	246	-10	120	116	62	146	23.6
AZB-106	Mustang Butte	SW	SW	12	27	39	Andesite	Tbvc	59.2	13.7	1.72	9.19	0.16	4.94	2.17	3.31	3.32	0.67	1.39	-10	18	15	20.8	117.	92	251	63	378	46	1320	8.4



Mustang Butte Quadrangle

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



Location of whole rock sample analyzed in Table 1