UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

OPEN-FILE REPORT O-93-3
PRELIMINARY GEOLOGIC MAP OF THE COPELAND RESERVOIR QUADRANGLE
MALHEUR COUNTY, OREGON
1993
BY HOWARD C. BROOKS

COPELAND RESERVOIRS QUADRANGLE
OREGON—MALHEUR CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

Mapped, edited, and published by the Geological Survey

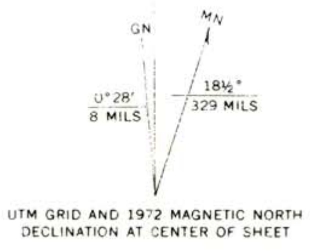
Control by USGS and NOS/NOAA

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

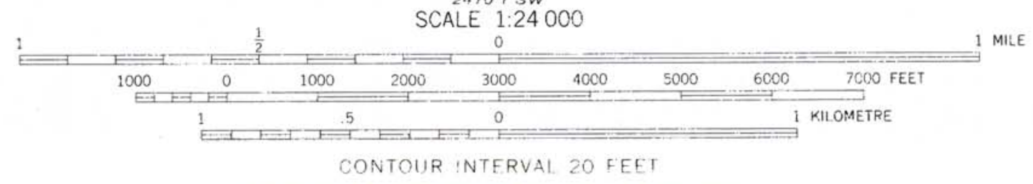
Fine red dashed lines indicate selected fence lines

Areas covered by dashed light blue pattern are subject to controlled inundation



UTM GRID AND 1972 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000



CONTOUR INTERVAL 20 FEET

OREGON DEPARTMENT OF GEOLOGY
AND MINERAL INDUSTRIES

Field work conducted 1992

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

QUADRANGLE LOCATION

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

COPELAND RESERVOIRS, OREG.
N4322.5—W11737.5/7.5

1972

AMS 2470 I NW—SERIES V892

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PRELIMINARY GEOLOGIC MAP OF THE COPELAND RESERVOIR QUADRANGLE MALHEUR COUNTY, OREGON

By Howard C. Brooks

1993

This unpublished Open-File Report has not been reviewed and may not meet all Oregon Department of Geology and Mineral Industries' standards.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 1992
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 COGEOMAP Program as part of a cooperative effort to map the west half of the 1^{O} by 2^{O} Boise sheet, eastern, Oregon.

GEOLOGY AND MINERAL RESOURCES MAP OF THE COPELAND RESERVOIRS QUADRANGLE, MALHEUR COUNTY, OREGON

By Howard C. Brooks, Oregon Department of Geology and Mineral Industries. Field work conducted in 1992. Funded jointly by the Oregon Department of Geology and Mineral Industries, the Oregon State Lottery, and the U. S. Geological Survey COGEOMAP program as part of a cooperative effort to map the west half of the Boise 1 by 2 degree quadrangle.

EXPLANATION*

Qal — **Alluvium (Holocene and Pleistocene)** -- Unconsolidated and unsorted to well-sorted deposits of gravel, sand, and silt in the flood plains of modern streams.

Qp — Playa deposits (Holocene and Pleistocene) -- Chiefly unconsolidated deposits of sand, silt, and clay underlying poorly drained lowlands. Surficial deposits include extensive areas of silt loam.

QTfc — Colluvial and alluvial fan deposits (Holocene, Pleistocene, and Pliocene?)-- Mainly alluvial fan and slope deposits consisting of an unconsolidated mix of rock fragments (mostly rhyolite and basalt), gravel, sand, and silt. Includes extensive wind-blown silt and sand deposits, scree, talus, and small slump deposits. The Qtfc deposits along the margins of lower Butte Creek are the remnants of a floodplain that is somewhat older than Qal.

Qtg — **Terrace gravels (Pleistocene and Pliocene ?)** -- Unconsolidated, poorly sorted deposits of gravel sand and silt exposed on benches and ridge tops above the level of modern floodplains. Qtg deposits have a more tabular exposure pattern than Qtfc deposits and are an important source of detritus in Qtfc.

Tbcm — **Basalt of Cedar Mountain (upper Miocene)** -- Mostly dark gray to black, commonly glomeroporhyritic, locally diktytaxitic, olivine basalt and basaltic andesite flows which are continuous with flows underlying Cedar Mountain to the south and probably were extruded from vents in that area (Ferns, unpublised mapping). Thin tuffaceous sedimentary deposits separate flows locally. Varies from 1 to 8 or more flows 10 to 40 ft thick. Tbcm flows overlying Tdss in the northeast corner of the map area are relatively glass-rich and exposure surfaces are disintegrated suggesting the flows were deposited in water.

Tdss Tuffaceous sedimentary and pyroclastic deposits (upper Miocene) -- Chiefly light gray to white, pale brown or pink silicic tuffaceous sedimentary deposits, water-laid tuff, pumice lapilli breccias, and tuffaceous conglomerate. Conglomerate in the upper part of the unit characteristically contains subrounded to well rounded rhyolite (90 percent) and basalt (10 percent) pebbles and cobbles in a poorly to moderately consolidated tuffaceous sand and silt matrix; obsidian clasts less than 2 in across are a minor constituent. Continuous with unit Tdss in the Rufino Butte and Avery Creek quadrangles (Brooks, unpublished mapping, 1991) units Ts1, Ts2, and Ts3 of Evans (unpublished mapping, 1991) and the Butte Creek Volcanic Sandstone of Kittleman and Others (1967)

Tbbc Basalt of Butte Creek (Miocene) -- Gray, aphyric basalt. Single exposure crosses Butte Creek in west central part of map. Varies from 10 to 25 feet thick. Overlies Tdr and underlies conglomeratic upper part of Tdss. (See table 1 for analysis of one sample).

Dry Creek igneous complex (Middle Miocene). Here divided into one basaltic andesite unit (Tdb) and one felsic unit (Tdr). The south extension of the felsic units of the complex mapped by Brooks in the adjoining Rufino Butte quadrangle to the north (unpublished mapping, 1991) are here combined in Tdr due mainly to the limited exposure of unit Tdb which extensively separates stratigraphically some of the felsic units in the Rufino Butte quadrangle.

Tdb Mostly gray, aphyric, locally vesiculated, generally fine grained basalt and basaltic andesite. Includes small patches of red cinders and tuff. Hand specimens of flow rocks commonly exhibit disseminated dark red iron oxide. Mapped by Kittleman and others (1967) as "unnamed igneous complex". Continuous with rocks mapped by Evans (Alder Creek sheet) as Malheur Basalt.

Tdr

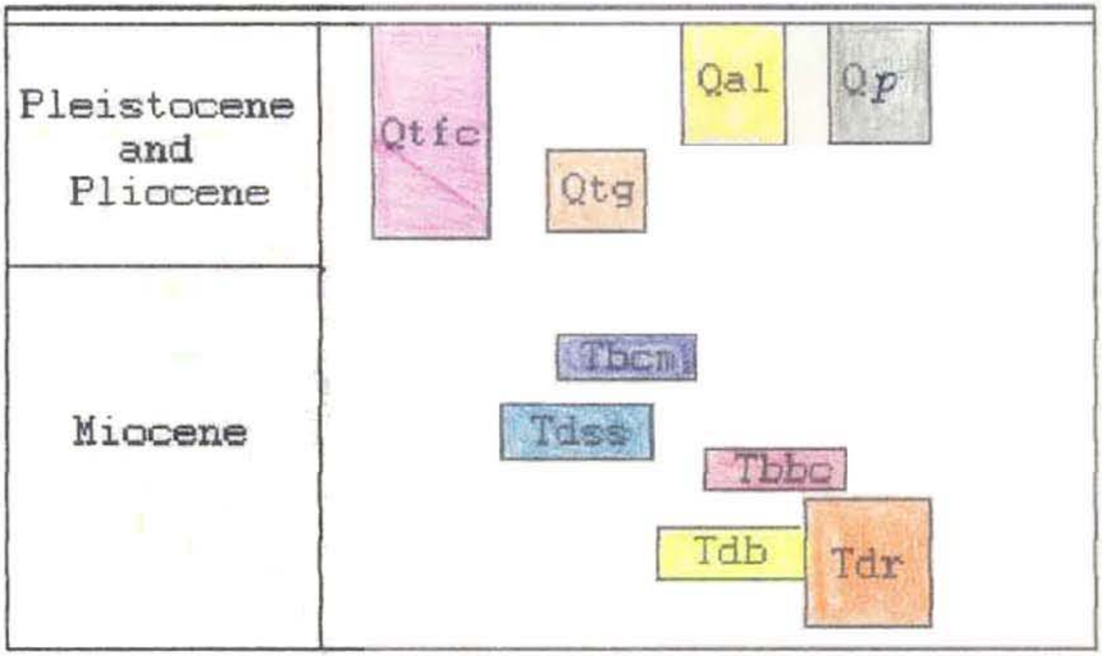
Rhyolite (Miocene)--Chiefly rhyolite flows and flow breccias. Colors range from gray to red. Two major lithologies are recognized and probably could be divided stratigraphically with additional mapping. Where the two units are superimposed in outcrop the upper is mostly reddish brown, plagioclase phyric breccia. The lower flows commonly are aphyric, laminated, and tend to fracture parallel to laminae. Laminae alternate from gray to light gray, to red and brownish red and commonly are contorted; obsidian chips commonly make up 1 to 5 percent of the float but its sources are rarely exposed. All analysed samples of the red breccia (C, E, and H, Table 1) have appreciably lower silica and higher TiO2 and Fe2O3 contents than samples of the laminated rocks (F and I) and they are chemically like samples from dacitic unit Tdrd which underlies unit Tdb in the Rufino Butte quadrangle. Tdr unit includes small patches of vitrophyre and perlite. Gray granular perlite underlies several acres along the west side of Wildcat Creek in SW1\4 Sec. 19, T. 24 S., R. 41 E. Red perlite occurs in Sec. 7, T. 24 S., R. 42 E.

*Chemical analyses of samples from several units are shown in the accomanying tables.

TABLE 1. WHOLE ROCK ANALYSES, COPELAND RESERVOIRS QUADRANGLE, MALHEUR COUNTY, OREGON

Map no.	Laboratory no.	Field no.	1\4	1\4	Sec.	T.(S.)	R.(E.)	UTM Coordinates	Elev. ft.	Lithology	Map unit	SiO2	Al2O3	TiO2
A	BAB-11	B-92-81	SE	NW	8	24	41	4816090N 439545E	4,060	Basaltic andesite	Tdb	54.7	15.5	1.58
B	BAB-9	B-92-78	NW	SW	7	24	41	4815835N 441515E	4,400	Basaltic andesite	Tdb	56.9	15.1	1.20
C	BAB-8	B-92-75	NW	NE	17	24	41	4814770N 441955E	4,450	Rhyolite	Tdr	66.4	14.3	0.609
D	BAB-10	B-92-74	NW	NE	7	24	41	4814770N 441880E	4,400	Basaltic andesite	Tdb	54.5	16.1	1.30
E	AZB-332	B-91-281	SE	NE	14	24	41	4814515N 447030E	4,240	Rhyolite	Tdr	66.9	14.8	0.786
F	BAB-6	B-92-15	SW	NW	19	24	41	4813075N 439364E	4,220	Rhyolite	Tdr	74.2	13.2	0.267
G	BAB-14	B-92-25	NW	NW	28	24	41	4811835N 442485E	4,470	Basaltic andesite	Tdb?	54.4	16.3	1.15
H	BAB-13	B-92-125	NE	NE	30	24	41	4811605N 440635E	4,200	Rhyolite	Tdr	67.1	14.1	0.770
I	BAB-12	B-92-41	SE	NW	28	24	41	4811165N 443195E	4,560	Rhyolite	Tdr	71.7	13.8	0.435
J	BAB-15	B-92-127	SE	SE	30	24	41	4810335N 440695E	4,240	Basalt	Tbbc	47.3	15.7	2.15
K	BAB-16	B-92-130	SW	NW	31	24	41	4809805N 439455E	4,440	Basaltic andesite	Tbcm	56.3	16.6	1.16
L	BAB-3	B-92-42	SW	NE	33	25	41	4809677N 443651E	4,660	Basalt	Tbcm	52.1	16.1	1.66
M	BAB-2	B-92-45	NW	SE	9	25	41	4805980N 443060E	4,610	Basaltic andesite	Tbcm	54.5	16.4	1.15
N	BAB-1	B-92-54	NE	NW	24	25	41	4803480N 447360E	4,610	Basaltic andesite	Tbcm	55.1	16.6	1.14

	Map unit	SiO2	Al2O3	TiO2	Fe2O3	MnO	CaO	MgO	K2O	Na2O	P2O5	LOI	TOTAL	Cr	Rb	Sr	Y	Zr	Nb	Ba	Co	Cu	Li	Mn	Ni	Zn
ite	Tdb	54.7	15.5	1.58	9.44	0.16	6.44	3.16	1.98	3.77	0.66	1.45	99.1	59	48	468	28	220	42	989						
ite	Tdb	56.9	15.1	1.20	7.86	0.14	7.10	3.92	2.32	3.17	0.36	1.65	99.9	80	62	356	18	192	36	949						
	Tdr	66.4	14.3	0.609	3.84	0.06	2.03	0.69	4.10	4.15	0.14	1.75	98.3	<10	94	176	11	307	41	1060						
ite	Tdb	54.5	16.1	1.30	8.47	0.17	7.29	3.42	1.78	3.27	0.46	2.80	99.8	93	50	511	23	209	25	1300						
	Tdr	66.9	14.8	0.786	3.70	0.11	2.17	0.65	3.89	4.58	0.20	0.70	98.8	370	91	283	29	320	44	1310	5	7.6	16.2	710	10	674
	Tdr	74.2	13.2	0.267	1.59	0.04	0.54	0.14	4.55	4.18	0.05	0.6	100.2	<10	121	28	55	379	58	950						
ite	Tdb?	54.4	16.3	1.15	8.19	0.14	7.73	4.03	1.82	3.08	0.34	1.45	98.8	69	43	492	18	168	31	789						
	Tdr	67.1	14.1	0.770	4.12	0.06	2.43	0.83	3.97	4.29	0.14	1.5	99.5	30	98	176	36	311	30	988						
	Tdr	71.7	13.8	0.435	2.39	0.06	1.39	0.42	4.68	4.32	0.07	0.55	100.0	37	118	89	35	300	42	1040						
	Tbbc	47.3	15.7	2.15	13.40	0.20	9.62?	6.36	0.87	2.78	0.73	0.05	99.3	102	21	384	14	147	30	491						
ite	Tbcm	56.3	16.6	1.16	8.35	0.15	7.92	4.12	1.73	3.17	0.37	1.15	100.1	74	30	504	16	168	36	971						
	Tbcm	52.1	16.1	1.66	10.70	0.17	8.70	5.18	1.22	2.97	0.53	0.65	100.2	99	41	510	29	170	34	734						
ite	Tbcm	54.5	16.4	1.15	8.30	0.15	7.74	4.23	1.58	3.12	0.34	0.65	98.4	47	31	510	32	145	22	910						
ite	Tbcm	55.1	16.6	1.14	8.17	0.14	7.74	4.29	1.16	3.19	0.34	0.80	99.3	81	34	521	<10	174	44	801						



Correlation Chart, Copeland Reservoirs 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