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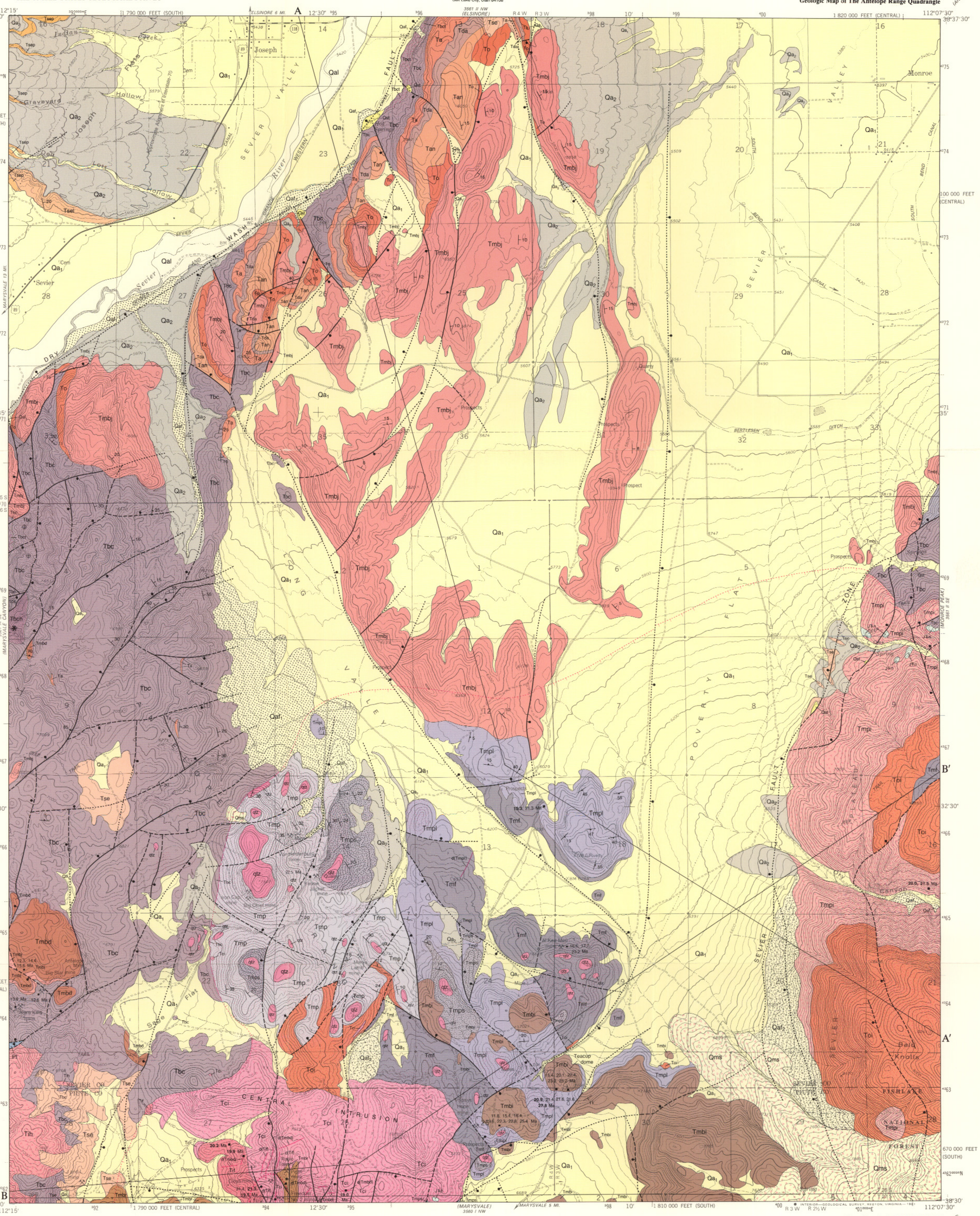


Base map from U.S. Geological Survey, Antelope Range Quadrangle, 1980

SCALE 1:24 000

1 ½ 0 1 MILE

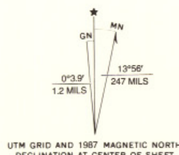
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Mapped by authors in 1977-79 and 1982-83
J.W. Parker, Cartographer

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1981



UTM GRID AND 1987 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

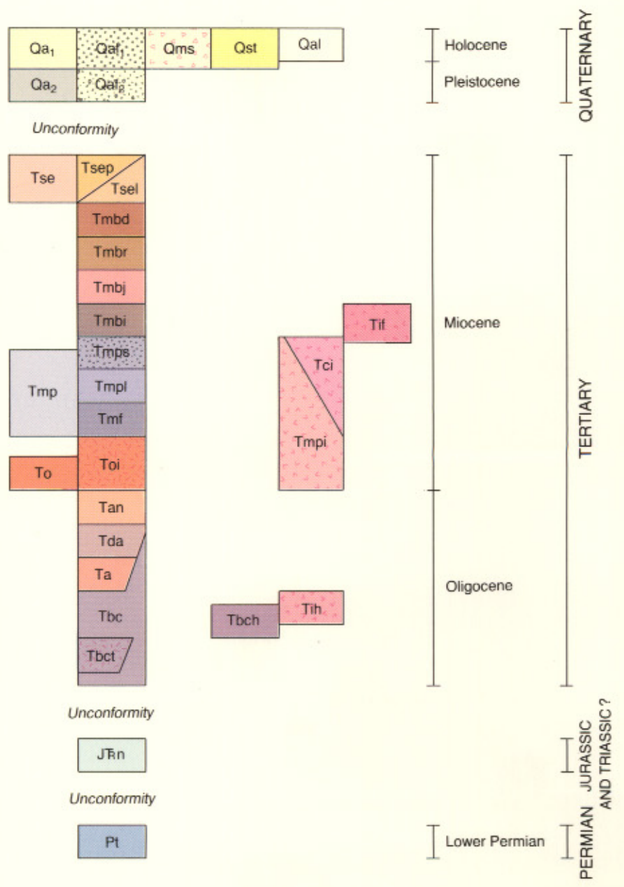
QUADRANGLE LOCATION

GEOLOGIC MAP OF THE ANTELOPE RANGE QUADRANGLE, SEVIER AND PIUTE COUNTIES, UTAH

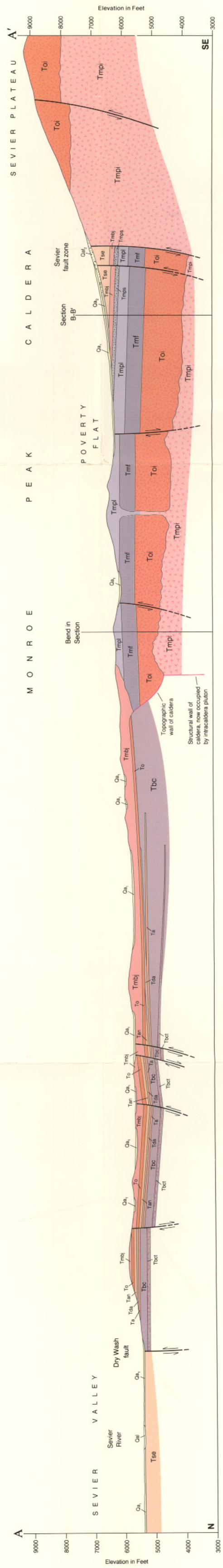
by
Peter D. Rowley, Charles G. Cunningham, Thomas A. Steven,
Harald H. Mehnert, and Charles W. Naeser

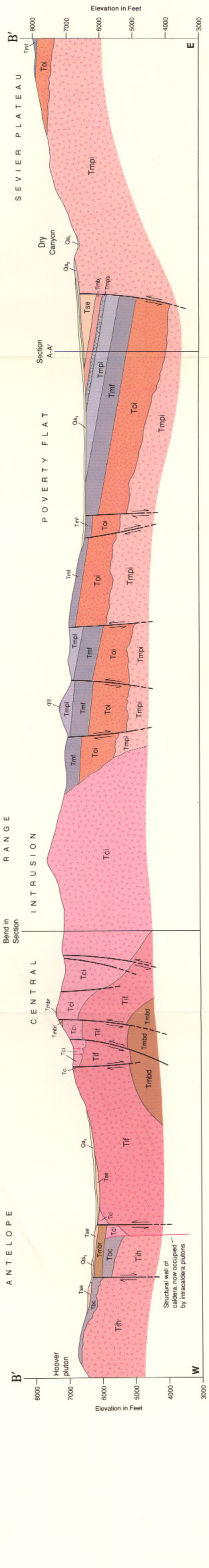
1988

CORRELATION OF MAP UNITS



MAP UNIT		SYMBOL	THICKNESS Feet(Meters)	LITHOLOGY
Surficial deposits		Qal, Qst, Qms, Qaf_1, Qa_1, Qaf_2, Qa_2	300 (90)	
Sevier River Formation		Tse	400 (120)	
Mount Belknap Volcanics	Dikes, lava flows, and plugs	Tmbd	300 (90)	
	Red Hills Tuff Member	Tmbr	200 (60)	
	Joe Lott Tuff Member	Tmbj	400 (120)	
	Crystal-rich volcanic domes and plugs	Tmbi	800 (240)	
Intracaldera rocks, Monroe Peak caldera	Sedimentary rocks	Tmp: Tmps	300 (90)	
	Lava flows of Monroe Peak	Tmp: Tmpl	500 (150)	
	Lava flows of Monkey Flat Ridge	Tmp: Tmf	500 (150)	
	Osiris Tuff	Toi	1200 (365)	
Basaltic andesite		Tan	55 (17)	
Antimony Tuff Mbr., Mt. Dutton Formation		Tda	60 (18)	
Tuff of Albinus Canyon		Ta	200 (60)	
Bullion Canyon Volcanics		Tbc	2500 (760)	
Three Creeks Tuff Member		Tbct	120 (36)	
Toroweap Formation		Pt	100 (30)	





DESCRIPTION OF MAP UNITS

Qa_1 — Piedmont-slope deposits—*Silt, sand, and gravel on piedmont slopes.*

Qaf_1 — Alluvial-fan deposits—*Silt, sand and gravel in alluvial fans and along streams that feed fans.*

Qms — Landslide debris—*Angular, unsorted material emplaced by mass movement.*

Qst — Hot spring deposits—*Tan and gray calcareous tufa and travertine.*

Qal — Flood-plain deposits—*Silt, sand, and gravel in the flood plain of the Sevier River.*

Qa_2 — Older piedmont-slope deposits—*Dissected remnants of older piedmont-slope deposits.*

Qaf_2 — Older alluvial-fan deposits—*Dissected remnants of older alluvial fans.*

Tse — Sevier River Formation, undivided—*Gray and tan, poorly to moderately consolidated sandstone, conglomerate, siltstone, and claystone, deposited chiefly in a fluvial environment.*

Tsep — Sevier River Formation, piedmont facies—*Tan sandstone, siltstone, conglomerate, and airfall tuff deposited along margins of basins.*

Tsel — Sevier River Formation, lacustrine facies—*Light-green claystone, marlstone, siltstone, and limestone deposited in the interior of a closed lake basin.*

Tmbd — Dikes, lava flows, and plugs of the Mount Belknap Volcanics—*Gray and pink, flow-foliated rhyolite dikes, lava flows, and plugs.*

Tmbr — Red Hills Tuff Member of the Mount Belknap Volcanics—*Red, densely welded, crystal-poor rhyolite ash-flow tuff.*

Tmbj — Joe Lott Tuff Member of the Mount Belknap Volcanics—*Tan and gray, poorly welded, crystal-poor rhyolite ash-flow tuff.*

Tmbi — Crystal-rich volcanic domes and plugs of Mount Belknap Volcanics—*Tan, pink, gray, and purple, crystal-rich rhyolite volcanic domes, lava flows, and intrusive feeders.*

Tif — Fine-grained silicic pluton—*Gray and greenish-gray, fine-grained granodioritic to granitic intracaldera pluton.*

Tmp — Monroe Peak intracaldera rocks, undivided—*Interbedded sequence of lava flows, airfall tuff, sandstone, siltstone, and conglomerate; undivided due to extensive hydrothermal alteration and silicification.*

Tmps — Monroe Peak intracaldera sedimentary rocks—*Tan, gray, and yellow, soft to moderately resistant sandstone, airfall tuff, and minor lava flows, siltstone, and conglomerate.*

Tmpl — Lava flows of Monroe Peak—*Gray, pink and khaki, intracaldera, crystal-rich, rhyodacitic lava flows.*

Tmf — Lava flows of Monkey Flat Ridge—*Gray, red, tan, and brown, intracaldera, crystal-poor rhyodacitic to dacitic lava flows.*

Tci — Central intrusion—*Gray and green, porphyritic or equigranular, intracaldera quartz monzonite or monzonite.*

Tmpi — Undivided intrusive rocks related to the Monroe Peak caldera—*Tan and gray, intracaldera monzonite porphyry and quartz monzonite porphyry.*

Toi — Osiris Tuff, intracaldera facies—*Orange and tan, densely welded rhyodacitic intracaldera ash-flow tuff.*

To — Osiris Tuff, outflow facies—*Brown and light-gray, densely welded rhyodacitic ash-flow tuff.*

Tan — Basaltic andesite—*Gray, black, and brown, crystal-poor lava flows.*

Tda — Antimony Tuff Member of the Mount Dutton Formation—*Purplish-gray and reddish brown, densely welded crystal-poor ash-flow tuff.*

Ta — Tuff of Albinus Canyon—*Gray, pink, tan, and reddish-brown, densely welded, crystal-poor ash-flow tuff.*

Tih — Hoover pluton—*Green and gray, holocrystalline, porphyritic quartz monzonite.*

Tbch — Hypabyssal plug of the Bullion Canyon Volcanics—*Green and pink, flow-foliated dacitic plug.*

Tbc — Bullion Canyon Volcanics—*Gray, green, and brown, heterogeneous, dacitic to rhyodacitic lava flows, and subordinate volcanic mudflow breccia and flow breccia.*

Tbct — Three Creeks Tuff Member of the Bullion Canyon Volcanics—*Pink, tan, and gray, moderately welded, crystal-rich, dacitic ash-flow tuff.*

JTRn — Navajo Sandstone—*Light-gray and buff, resistant, crossbedded sandstone.*

Pt — Toroweap Formation—*Light-gray marble and quartzite.*

Table 1. Data for K-Ar ages of rocks and alteration minerals in the Antelope Range quadrangle, Utah

Sample no.	[1]Rock unit; [2]mineral analyzed	[3]K_2O (%)	*Ar^{40} (10^{-10}moles/g)	*Ar^{40} (%)	[4]T	[5]Reference
1. KA12b	Tmbi; B	6.03	——	63	22.3	BA
do	do	7.07	——	56	19.6	do
do	do	——	——	52	22.8	do
do	do	——	——	45	25.4	do
KA12g	Tmbi; G	2.96	——	65	11.8	do
do	do	——	——	23	16.4	do
do	do	——	——	70	15.4	do
2. KA20b	Tmbi; B	6.10	——	63	16.4	do
do	do	——	——	46	23.9	do
KA20g	Tmbi; G	3.55	——	48	20.1	do
do	do	——	——	85	22.4	do
do	do	——	——	83	25.2	do
3. KA34	Tmbd; G	4.23	——	55	12.3	do
do	do	——	——	23	15.6	do
do	do	——	——	18	14.4	do
4. M28	Tif; B	5.81	1.806	77.0	21.4±0.9	ST
5. M47B	A; A	8.18, 7.99	2.639	63.0	22.5±1.0	ST
6. M48	N; N	4.79, 4.84	1.155	59.0	16.6±0.8	do
M48B	do	4.33, 4.36	1.116	27.6	17.7±1.0	CU
7. M49B	Tmbi; S	6.33, 6.35	1.967	83.2	21.4±1.0	ST
do	do	9.70, 9.55	3.053	89.9	21.6±0.9	do
do	Tmbi; B	8.94, 8.95	2.805	61.5	21.6±1.1	do
8. M682	N; N	0.86, 0.86	0.172	31.0	13.9±0.9	CU
9. M718	Tmpl; S	7.88, 8.17	2.480	87.4	21.3±0.7	TH
10. M778	N; N	2.95, 3.03	0.546	10.3	12.6±2.5	CU
11. M804	A; A	4.62, 4.70	1.582	67.9	23.2±1.2	do

Constants for samples 4-10: K^{40} $\lambda_\xi = 0.581 \times 10^{-10}$/yr; $\lambda_\beta = 4.962 \times 10^{-10}$/yr; $K^{40}/K = 1.167 \times 10^{-4}$; samples 1-3 recalculated by using new decay constants of Steiger and Jäger (1977)

*Radiogenic argon

—— Not determined or not published

[1]Rock unit symbols are those shown on the map; N, natroalunite veins; A, replacement alunite

[2]A, alunite; B, biotite; G, glass; N, natroalunite; S, sanidine

[3]Samples 4-10 determined by atomic absorption; samples 1-3, method of determination not known

[4]Age (Ma) $\pm 2\sigma$; error figures not given by Bassett and others (1963)

[5]BA, Bassett and others (1963); CU, Cunningham, Rye and others (1984); ST, Steven and others (1979); TH, this report

SAMPLE DESCRIPTIONS

1. Glassy margin of a probable intrusive feeder to a dome, located about 1000 feet east of Papsys Hope mine; lat 38°30′29″, long 112°10′30″. Glass is considerably altered and biotite is slightly altered.
2. Fresh glassy margin of Teacup dome; lat 38°30′41″, long 112°10′35″.
3. Basal glass in lava flows northwest of Big Star mine; lat 38°31′27″, long 112°14′52″.
4. Dike of fine-grained silicic pluton 200 feet west of Freedom No. 2 mine; lat 38°30′02″, long 112°12′53″.
5. Replacement alunite from Yellow Jacket mine; lat 38°32′04″, long 112°12′30″.
6. Vein natroalunite from Al Kee Mee mine; lat 38°31′39″, long 112°10′12″.
7. Glassy margin of Teacup dome; lat 38°30′41″, long 112°10′31″.
8. Vein natroalunite from Alum King mine; lat 38°31′15″, long 112°14′54″.
9. Dacitic lava flow in dome north of Long Valley; lat 38°32′30″, long 112°10′40″.
10. Vein natroalunite from Big Star mine; lat 38°31′20″, long 112°14′44″.
11. Replacement alunite from Al Kee Mee mine; lat 38°31′39″, long 112°10′12″.

Table 2. Data for fission-track ages of rocks in the Antelope Range quadrangle, Utah

Sample no.	[1]Rock unit; [2]mineral analyzed	[3]ps	[4]pi	[5]ϕ x10^{15}	[6]T	U (ppm)	[7]Reference
1. M28	Tif; Z	8.19(1137)	26.84(1864)	1.07	19.5±0.7	810	ST
do	do	8.22(1484)	9.65(871)	.418	21.3±0.9	740	do
2. M49B	Tmbi; Z	3.54(607)	11.05(946)	1.09	20.9±1.1	330	ST
do	Tmbi; A	.136(283)	.271(565)	.930	27.8±3.9	9.4	do
3. M50	Tif; Z	5.17(957)	13.00(1204)	.851	20.2±0.9	490	do
4. M569	Tmpi; Z	3.58(811)	9.47(1074)	.954	21.5±0.8	290	TH
do	Tmpi; A	.092(189)	.272(566)	l.00	20.0±3.4	7.8	do
5. M689	Tmbd; Z	5.66(419)	18.31(678)	1.03	19.0±1.0	510	CL
6. M693	Tmbd; Z	5.62(781)	17.21(1195)	1.02	19.9±1.1	490	TH
7. M718	Tmpl; Z	5.78(1017)	23.07(2029)	1.02	15.3±0.7	650	do

Constants: $\lambda_F = 7.03 \times 10^{-17}$/yr; K^{40} $\lambda_\xi = 0.581 \times 10^{10}$/yr; $\lambda_\beta = 4.962 \times 10^{10}$/yr; atomic abundance, $K^{40} = 1.167 \times 10^{-4}$

[1]Rock unit symbols are those shown on the map

[2]A, apatite; Z, zircon

[3]Tracks/cm^2, fossil, x 10^6; (number of tracks counted)

[4]Tracks/cm^2, induced, x 10^6; (number of tracks counted)

[5]Neutrons/cm^2

[6]age (Ma) $\pm 2\sigma$

[7]CL, Cunningham, Ludwig and others (1982); ST, Steven and others (1979); TH, this report.

SAMPLE DESCRIPTIONS

1. Dike of fine-grained silicic pluton 200 feet west of Freedom No. 2 mine; lat 38°30′02″, long 112°12′53″.
2. Glassy margin of Teacup dome; lat 38°30′41″, long 112°10′31″.
3. Fresh sample of fine-grained silicic pluton from portal of Blue Eagle mine north of Central Mining Area; lat 38°30′24″, long 112°13′10″.
4. Holocrystalline quartz monzonite porphyry, from Dry Canyon, Sevier Plateau; lat 38°31′58″, long 112°07′35″.
5. Glassy dike cutting Central intrusion, from 0.8 mi northeast of Freedom No. 2 mine; lat 38°30′05″, long 112°12′16″.
6. Whilte rhyolite dike cutting fine-grained silicic pluton, northwest of Central Mining Area; lat 38°30′15″, long 112°13′05″.
7. Dacitic lava flow in dome north of Long Valley; lat 38°32′30″, long 112°10′40″.

SYMBOLS

CONTACT

85 — **FAULT**—*Most are high-angle normal faults. Dashed where approximately located; queried where probable; dotted where concealed. Direction and angle of dip shown, where observed. Bar and ball on downthrown side, where known. Arrows indicate strike-slip displacement.*

CALDERA—*Topographic or structural wall of the Monroe Peak caldera. Dashed where approximately located; dotted where concealed.*

d(Tif) — **DIKE**—*Lithology indicated by symbol of equivalent rock unit, in parentheses.*

qtz — **QUARTZ MASS**—*White, fine- to coarse-grained, locally brecciated quartz. Formed as hot-spring sinter and as replacement masses during wallrock alteration by intrusions.*

ALTERED ROCK—*White, red, and yellow, hydrothermally altered, silicified, and locally mineralized rock. Chiefly argillic alteration to kaolinite and alunite. Propylitically altered rock not shown.*

* **VENT**—*Inferred central vent area of volcano.*

CENTRAL MINING AREA—*Approximate outline of principal uranium mines.*

STRIKE AND DIP OF BEDDING

15 — Inclined

⊕ — Horizontal

70 — **STRIKE AND DIP OF FLOW FOLIATION**

15.3, 21.3 Ma — **SAMPLE LOCALITY**—*Fission-track (bold) or K-Ar dated (see tables 1 and 2).*