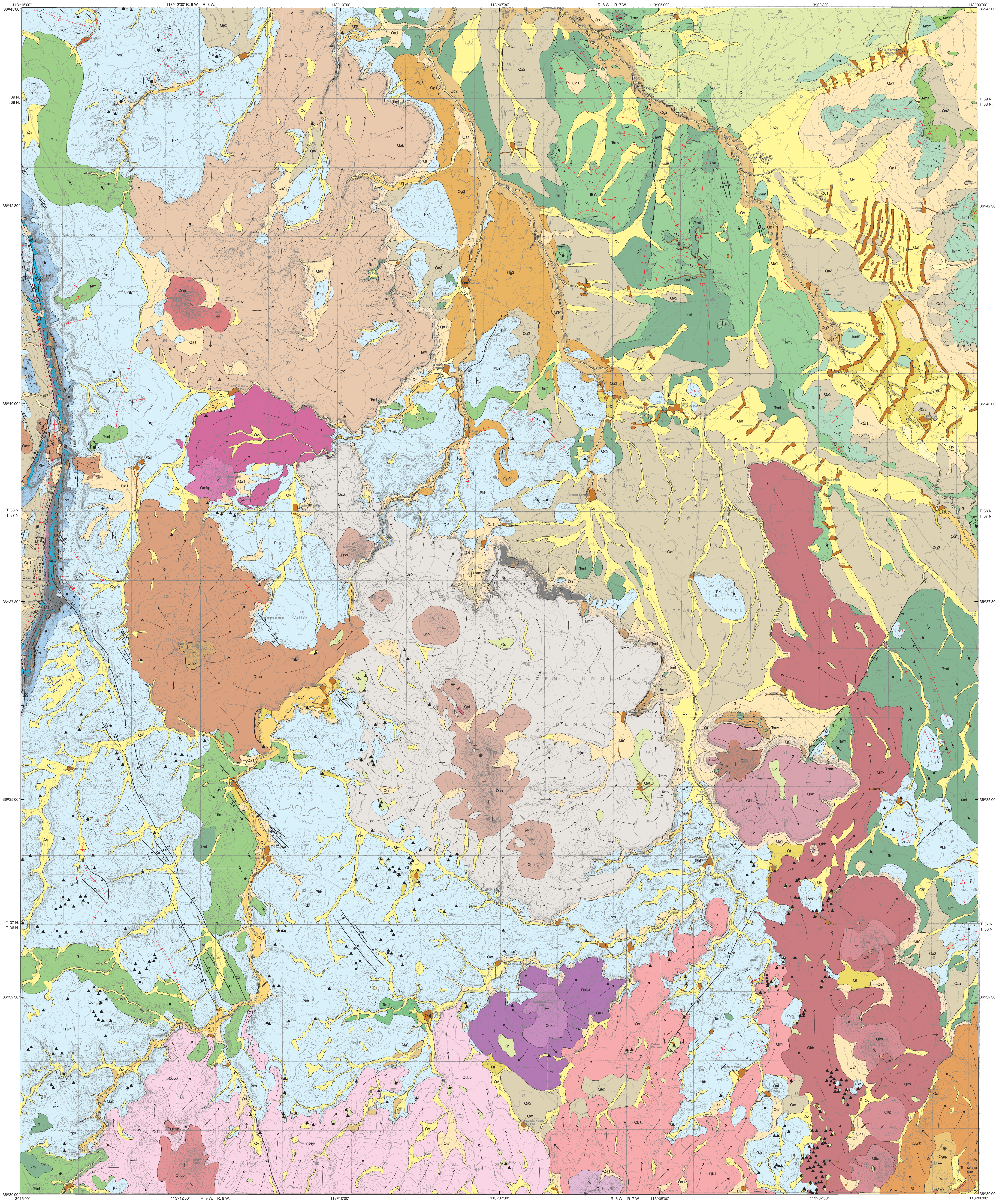
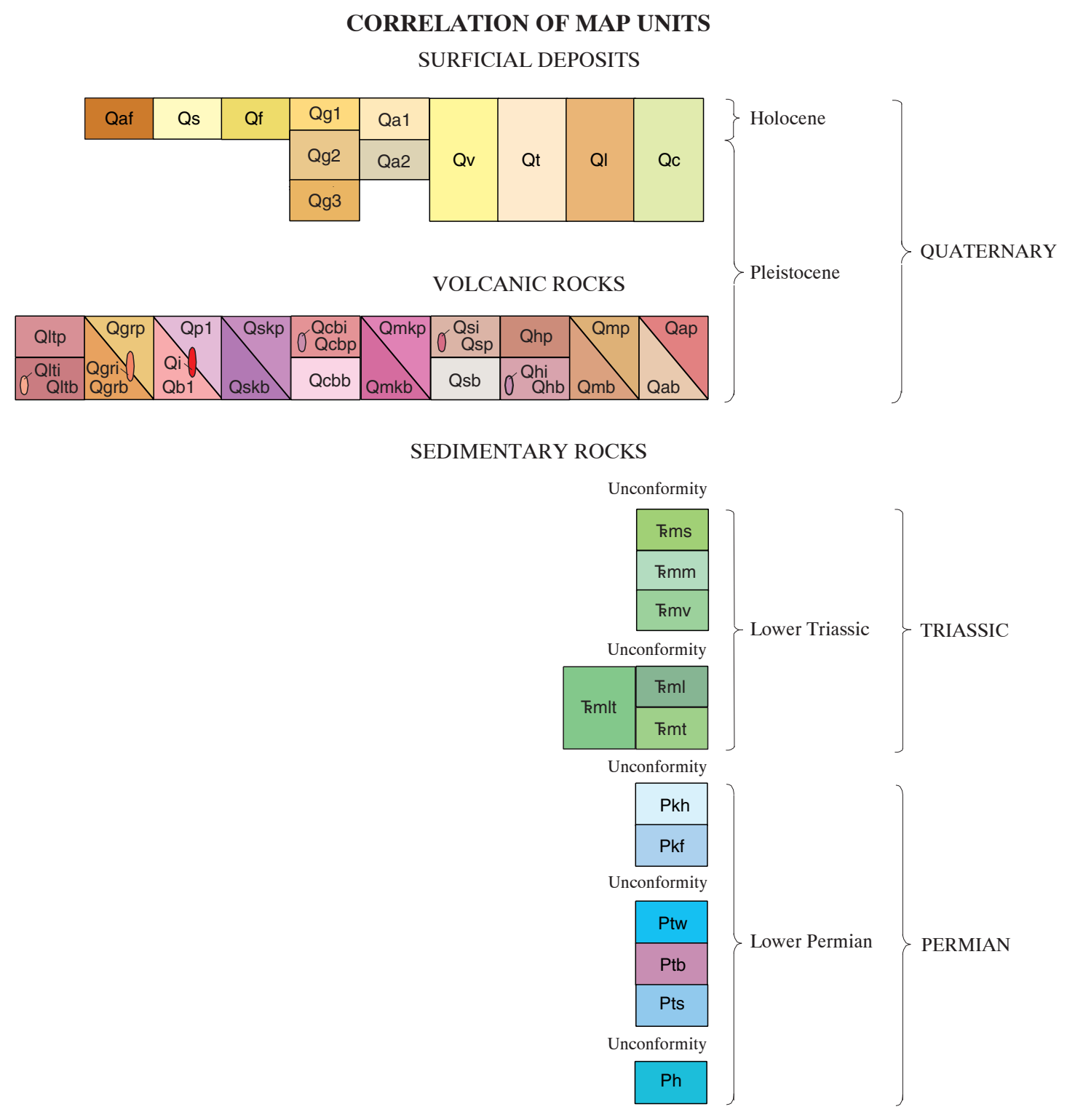
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
U.S. NATIONAL PARK SERVICE
and the
BUREAU OF LAND MANAGEMENT

MISCELLANEOUS FIELD STUDIES MAP MF-2418
Pamphlet accompanies map
Version 1.0


113°15'00"
113°12'30"
R. 9 W.
R. 8 W.
113°10'00"
113°07'30"
R. 7 W.
113°05'00"
113°02'30"
113°00'00"
36°45'00"
T. 39 N.
T. 38 N.
36°42'30"
36°40'00"
T. 37 N.
36°37'30"
36°35'00"
T. 36 N.
36°32'30"
36°30'00"
UPPER CLAYHOLE VALLEY
LITTLE CLAYHOLE VALLEY
ANTELOPE VALLEY
SEVEN KNOLLS
BLACK ROCKS BENCH
Lonesome Valley
HURRICANE CLIFFS
HURRICANE MONOCLINE
HURRICANE FAULT
Toroweap Fault

CORRELATION OF MAP UNITS


SURFICIAL DEPOSITS
Qaf
Qs
Qf
Qg1
Qg2
Qg3
Qa1
Qa2
Qv
Qt
Ql
Qc
Holocene
Pleistocene
QUATERNARY
VOLCANIC ROCKS
Qltp
Qlti
Qltb
Qgrp
Qgri
Qgrb
Qp1
Qi
Qb1
Qskp
Qskb
Qcbi
Qcbp
Qcbb
Qmkp
Qmkb
Qsi
Qsp
Qsb
Qhp
Qhi
Qhb
Qmp
Qmb
Qap
Qab
SEDIMENTARY ROCKS
Unconformity
Ꞁems
Ꞁemm
Ꞁemv
Ꞁeml
Ꞁemt
Ꞁemlt
Lower Triassic
TRIASSIC
Pkh
Pkf
Ptw
Ptb
Pts
Ph
Lower Permian
PERMIAN

LIST OF MAP UNITS

SURFICIAL DEPOSITS

Qaf	Artificial fill and quarries (Holocene)
Qs	Stream-channel alluvium (Holocene)
Qf	Floodplain deposits (Holocene)
Qg1	Young terrace-gravel deposits (Holocene)
Qa1	Young alluvial fan deposits (Holocene)
Qv	Valley-fill deposits (Holocene and Pleistocene)
Qt	Talus deposits (Holocene and Pleistocene)
Ql	Landslide deposits (Holocene and Pleistocene)
Qc	Colluvial deposits (Holocene and Pleistocene)
Qg2	Intermediate terrace-gravel deposits (Holocene and Pleistocene)
Qa2	Older alluvial fan deposits (Pleistocene)
Qg3	Older terrace-gravel deposits (Pleistocene)

VOLCANIC ROCKS

	Basalt of Larimore Tank (Pleistocene)
Qlti	Intrusive dike or neck
Qltp	Pyroclastic deposits
Qltb	Basalt flows
	Basalt of Graham Ranch (Pleistocene)
Qgri	Intrusive plug or dike
Qgrp	Pyroclastic deposits
Qgrb	Basalt flows
	Undivided basalts (Pleistocene)
Qi	Basalt dike
Qp1	Pyroclastic deposits
Qb1	Basalt flows
	Basalt of Spencer Knoll (Pleistocene)
Qskp	Pyroclastic deposits
Qskb	Basalt flows
	Basalt of Craigs Knoll and Berry Knoll (Pleistocene)
Qcbi	Intrusive dike or neck
Qcbp	Pyroclastic deposits
Qcbb	Basalt flows
	Basalt of Maryland Knoll (Pleistocene)
Qmkp	Pyroclastic deposits
Qmkb	Basalt flows
	Basalt of Seven Knolls (Pleistocene)
Qsi	Intrusive dike or neck
Qsp	Pyroclastic deposits
Qsb	Basalt flows
	Basalt of Hat Knoll (Pleistocene)
Qhi	Intrusive dike
Qhp	Pyroclastic deposits
Qhb	Basalt flows
	Basalt of Moriah Knoll (Pleistocene)
Qmp	Pyroclastic deposits
Qmb	Basalt flows
	Antelope Knoll Basalt (Pleistocene)
Qap	Pyroclastic deposits
Qab	Basalt flows

SEDIMENTARY ROCKS

	Moenkopi Formation (Lower Triassic)
Ꞁems	Shnabkaib Member
Ꞁemm	Middle red member
Ꞁemv	Virgin Limestone Member
Ꞁeml	Lower red member
Ꞁemt	Timpoweap Member
Ꞁemlt	Lower red member and Timpoweap Member, undivided
	Kaibab Formation (Lower Permian)
Pkh	Harrisburg Member
Pkf	Fossil Mountain Member
	Toroweap Formation (Lower Permian)
Ptw	Woods Ranch Member
Ptb	Brady Canyon Member
Pts	Seligman Member
Ph	Hermit Formation (Lower Permian)

EXPLANATION

Contact—Approximate contact for alluvial units only

Fault—Dashed where inferred or approximately located; dotted where concealed; bar and ball on downthrown side. Faults shown as bounding alluvium do not offset alluvium. Number is estimated separation displacement in meters; number in parenthesis is estimated displacement on indicated unit along fault

76 (40)

Landslide scarp—Headwall scarp of landslide; hachures point in direction of slide

Folds—Showing trace of axial surface and direction of plunge; dotted where concealed

Anticline

Plunging anticline

Doubly plunging anticline

Syncline

Plunging syncline

Doubly plunging syncline

Monocline

Dome

Strike and dip of beds

14 **Inclined**—Measured in the field

4 **Approximate**—Estimated from aerial photographs

Implied—Interpreted from aerial photographs; dip amount not determined

Strike of vertical and subvertical joints

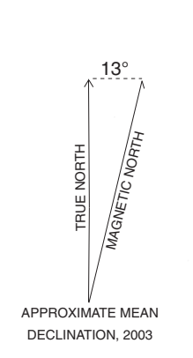
C **Collapse structure**—Circular collapse structures characterized by strata dipping inward toward central point. On Kaibab Formation surface (Pkh), may reflect collapse of deep-seated breccia pipe that originated in Redwall Limestone

▲ **Sinkhole**—Enclosed depression or cave

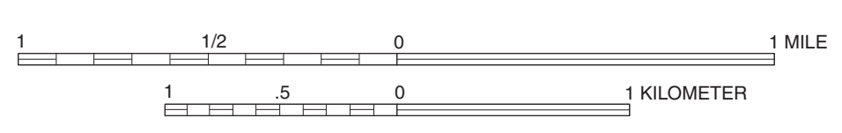
Flow direction of basalt

✳ **Pyroclastic cone**

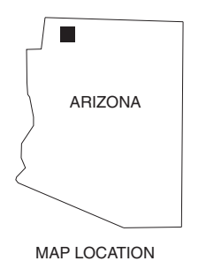
Base from U.S. Geological Survey, 1:24,000, Antelope Knoll, Little Clayhole Valley, Moriah Knoll, and Hat Knoll, 1971
Universal Transverse Mercator Projection
1927 North American Datum
Clark 1866 Ellipsoid, Zone 12


13°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 2003

SCALE 1:31,680


1
1/2
0
1 MILE
1
.5
0
1 KILOMETER

CONTOUR INTERVAL 10 AND 20 FEET


ARIZONA
MAP LOCATION

Geology mapped in 1994 by G.H. Billingsley
Digital database by S.S. Priest
Edited by Theresa Iki
Manuscript approved for publication April 30, 2003

Geologic Map of Upper Clayhole Valley and Vicinity, Mohave County, Northwestern Arizona

By

George H. Billingsley and Susan S. Priest

2003

This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and proportions may not be true on plots of this map.

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