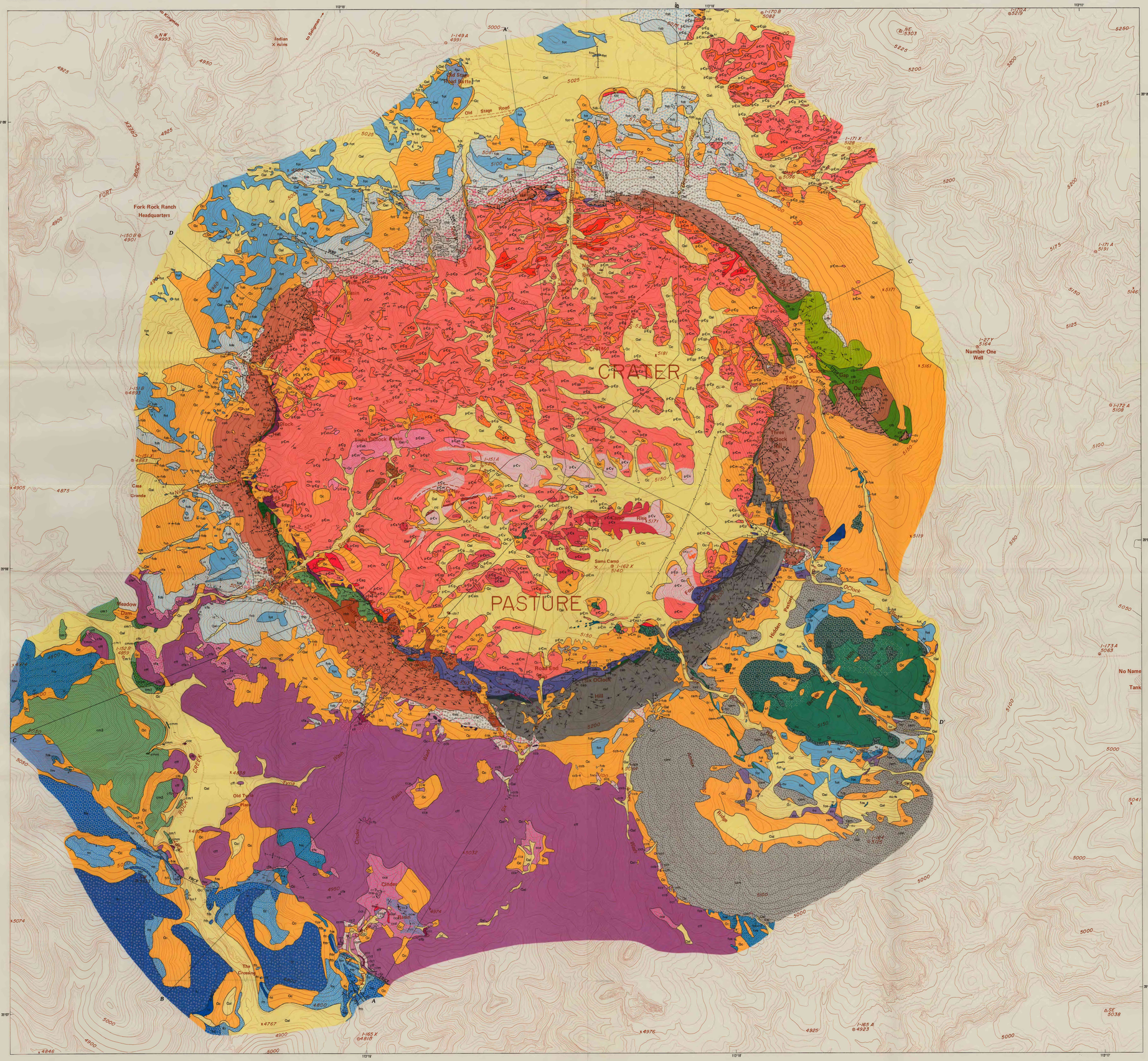
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
MANNED SPACECRAFT CENTER
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



Fuis, G.S., 1995, The geology and mechanics of formation of the Fort Rock Dome, Yavapai County, Arizona: U.S. Geological Survey Professional Paper 1266

APPROXIMATE MEAN DECLINATION, 1995

SCALE 1:5 000

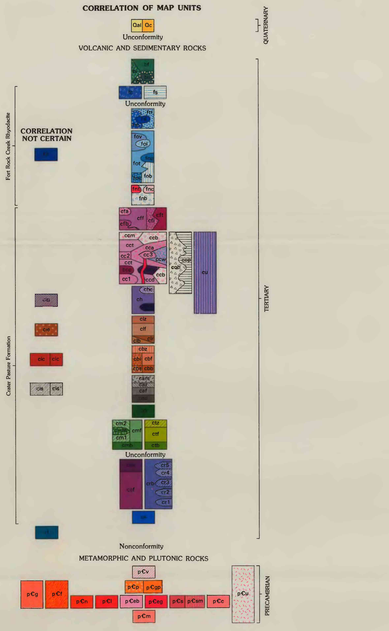
CONTOUR INTERVAL 25 FEET
1 FOOT INTERMEDIATE CONTOUR

AREA OF MAP
ARIZONA

Geology by G.S. Fuis, 1969–1971
Prepared on behalf of the Manned Spacecraft Center, National Aeronautics and Space Administration under contract W-13130
Note: see plate 2 for cross sections

Topographic base compiled from aerial photographs by the U.S. Geological Survey, 1972

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal **Alluvium**

Qc **Colluvium and high terrace deposits**

VOLCANIC AND SEDIMENTARY ROCKS

Basalt of Buttox Hills
- **Flow**
- **Intrusion**
- **Tuff and tuff-breccia**—Partly intrusive
- **Undivided basalt**—Probably spatter or intrusions

Fort Rock Creek Rhyodacite

fs **Rhyodacite-bearing sedimentary breccia and rhyodacite sandstone and conglomerate**

Breccia and conglomerate of the Crossing

Three Sisters Butte Member
- **ftp** **Massive tuff**
- **Volcanic breccia**
- **Ash-fall lapilli tuff**

Old Stage Road Member
- **fot** **Ash-flow tuff**
- **fov** **Vapor-phase crystallized ash-flow tuff**
- **fol** **Lapilli breccia**
- **Boulder patch**
- **fob** **Sedimentary breccia**—Contains clasts eroded from the dome; locally includes sandstone or tuff equivalent to unit fos
- **Basal pumiceous sandstone or tuff**

Rhyodacite intrusion on Three OClock Hill

Sedimentary breccia of Noon Gorge
- **Tuffaceous sandstone and conglomerate**—Contains dark-colored bombs and ash of olivine trachyandesite (or olivine trachybasalt)
- **fsb** **Sedimentary breccia**—Contains clasts eroded from the dome
- **fnc** **Granule and fine-pebble conglomerate**—Consists of light-colored trachyandesite ash

Crater Pasture Formation

Flow of Fault Canyon—Olivine-sanidine trachybasalt
- **cfe** **Agglomerate**
- **cff** **Flow**
- **cfi** **Intrusion**
- **cfr** **Intrusive tuff-breccia and breccia**
- **cfb** **Flow-base zone**—Characterized by vugs and (or) flow breccia

Tuff and agglomerate of Cinder Basin—Olivine trachybasalt
- **cbm** **"Mixed" sedimentary breccia**—Contains clasts of olivine trachybasalt, rhyodacite, and dacite
- **cob** **Sedimentary breccia**—Contains clasts eroded from the dome
- **cbt** **Tuff**—Includes agglomeratic tuff, sandstone, and conglomerate
- **cca** **Agglomerate**
- **ccw** **Welded agglomerate**
- **cc3** **Flow 3**
- **cc2** **Flow 2**
- **cc0** **Dike**
- **ccc** **Granule and fine-pebble conglomerate**
- **Undivided olivine trachybasalt**—Probably spatter or intrusions
- **cc1** **Flow 1**

Sedimentary breccia of One OClock Wash
- **cdb** **Sedimentary breccia**—Contains clasts eroded from the dome
- **cbd** **Block patch**

Tuff and conglomerate of Hidden Pasture—Olivine trachyandesite and hornblende trachyandesite
- **cth** **Undivided tuff, conglomerate, and sandstone**
- **cho** **Fine-pebble conglomerate**
- **Hornblende-trachyandesite tuff**

cbu **Undivided olivine trachyandesite, hornblende trachyandesite, and olivine trachybasalt tuff and conglomerate**—Ash is related to Hidden Pasture and (or) Cinder Basin units

cvp **Shonkinite intrusion under the powerlines**

Flow of Lion Ridge—Hornblende trachyandesite
- **clr** **Flow-top zone**—Characterized by microvugs and microbreccia; dark gray
- **clf** **Flow**
- **clb** **Reddened flow base**
- **clb** **Basal unit**—Tuff, tuff-breccia, and minor flow-base breccia

Hornblende trachyandesite intrusion in Eight OClock Basin

Flow of Buffalo Ridge—Hornblende trachyandesite
- **cbz** **Flow-top zone**—Characterized by microvugs and microbreccia; dark gray to dark brown
- **cbi** **Intrusion**
- **cbf** **Flow**
- **cbr** **Intrusive breccia and tuff-breccia**
- **cbb** **Basal unit**—Tuff, local sandstone, and minor flow-base breccia

Hornblende trachyandesite intrusion near Crater Divide—Prime indicates alteration to clay minerals

Flow of Annex Ridge—Hornblende trachyandesite
- **Upper massive flow**
- **cax** **Flow-top zone**—Characterized by microvugs, microbreccia; rough, "warty" surface, and vertical partings
- **Lower flow**
- **Basal unit**—Tuff, local sandstone and conglomerate, and minor flow-base breccia

cbs cbs' **Hornblende trachyandesite intrusion on Six OClock Hill**—Prime indicates alteration to clay minerals

Pyroxene-trachyandesite sandstone and conglomerate—Locally includes breccia containing clasts from an underlying unit

Flow of Meadow Dam—Hornblende trachybasalt
- **cm2** **Flow 2**
- **cmf** **Undivided flow**
- **cmb** **Middle unit**—Agglomeratic volcanic breccia
- **cm1** **Flow 1**
- **Basal unit**—Volcanic breccia, flow-base breccia, and local sandstone

Tuff and flow of Two OClock Gap—Pyroxene trachyandesite
- **ctg** **Flow-top zone**—Characterized by vugs, dark gray
- **ctf** **Flow**
- **ctb** **Basal unit**—Tuff and tuff-breccia

Flow of Eight OClock Gorge—Limburgite
- **Sandstone and granule conglomerate**
- **Flow**—Locally includes inkided agglomerate

Volcanic breccia and flow of Road End Gap—Olivine trachyandesite
- **cob** **Volcanic breccia**
- **co5** **Flow 5**
- **co4** **Flow 4**
- **co3** **Flow 3**
- **co2** **Flow 2**
- **co1** **Flow 1**
- **Basal tuffaceous breccia and sandstone**

Rhyodacite intrusion in Five OClock Wash

METAMORPHIC AND PLUTONIC ROCKS

- **pCv** **Veined rocks**—Mapped only where density of veins is "very high" (see text)
- **pCg** **Granite pegmatite**
- **pCgp** **Mixed granite and granite pegmatite**
- **pCg** **Granite**—Includes some leucocratic quartz monzonite and leucocratic granodiorite
- **pCf1** **Flaser granite**
- **pCn** **Cataclasite of Noon Basin**—Granite
- **pCl** **Cataclasite of Lion Ridge**—Quartz-monzonite
- **pCeb** **Cataclasite of Eight OClock Basin**—Leucocratic-quartz-monzonite
- **pCeg** **Cataclasite of Eight OClock Gorge**—Quartz-monzonite and granodiorite
- **pCs pCsf** **Cataclasite of Sams Camp Rise**—Granite; unit pCsm is mylonite
- **pCc** **Undivided cataclasite**
- **pCm** **Layered metamorphic rocks**—Includes amphibolite, schist, phyllonite, and gneiss
- **pCu** **Undivided metamorphic and plutonic rocks (on cross sections only)**

Authigenic breccia—Occurs at base of sedimentary breccia of One OClock Wash

Flow breccia

Contact—Showing dip. Queried where uncertain. On cross sections: short dashes indicate inferred projection above surface

Unconformity within unit—Hachures on upper bed

Fault—Showing dip. Ball and bar on downthrown side. Dashed where approximately located or inferred; dotted where concealed; queried where uncertain. Double line and hachures indicate fault zone bounded by faults

Thrust fault—Sawteeth on upper plate. Dashed where inferred or approximately located or inferred; queried where uncertain

Fold—Dashed where approximately located
- **Anticline**
- **Monocline**

Strike and dip of flow cleavage in volcanic rocks—Queried where uncertain
- **Inclined**
- **Vertical**
- **Horizontal**
- **Overturned**

Note: Symbols may be combined

Strike and dip of foliation in metamorphic rocks—Queried where uncertain
- **Inclined**
- **Vertical**
- **Horizontal**

Inclined axial planes of small folds

Inclined axial planes of small folds coincident with foliation

Strike and dip of beds in sedimentary rocks
- **Inclined**
- **Vertical**
- **Horizontal**

Averaged altitudes of lenticular clasts

Isopleth—Showing volume percentage of clasts of Precambrian rocks in sedimentary breccia of One OClock Wash and in sedimentary breccia of Noon Gorge
- **99** **More than 99 percent**
- **50** **Less than 99 but more than 50 percent**
- **10** **Less than 50 but more than 10 percent**
- **1** **Less than 10 but more than 1 percent**
- **Trace**—Letter symbol also used in map units where no contours appear
- **0** **No detectable clasts**—Letter symbol also used in map units where no contours appear

Fault names are abbreviated:

EHF	Eight OClock Hill fault
EGF	Eight OClock Gorge fault
FHF	Four OClock Hill fault
LTGF	Lower Two OClock Gap fault
NGF	Noon Gorge fault
OHF	One OClock Hill fault
SHF	Short Hill fault
THF	Three OClock Hill fault
UTGF	Upper Two OClock Gap fault
WBF	Wedge Basin fault
FRCF	Fort Rock Creek fault

Note: Accurate geodetic control became available in 1980. Lines of latitude and longitude were copied from the preliminary version of the Fort Rock NE quadrangle (scale 1:24,000) onto this base map. At that time, the north-south reference on this map was found to be in error by about 1¼" to 1½" in a clockwise direction. As altitudes shown on this map were plotted using this reference, they are in error by the same amount.

GEOLOGIC MAP OF THE FORT ROCK DOME, YAVAPAI COUNTY, ARIZONA

By
Gary S. Fuis

U.S. Government Printing Office: 1996—774-067

Fuis, G.S., 1996, The geology and mechanics of formation of the Fort Rock Dome, Yavapai County, Arizona: U.S. Geological Survey Professional Paper 1266