GEOLOGIC MAP AND PROTEROZOIC STRUCTURE OF THE CLEATOR SHEAR ZONE, YAVAPAI COUNTY, ARIZONA

EXPLANATION

SCALE 1:3000

0 250 500 750 1000 1250 FEET

0 100 200 300 METERS

CONTOUR INTERVAL 40 FEET

INDEX MAP OF ARIZONA

MAGNETIC NORTH DECLINATION 1972

Geology by Mark Darrach
1985 - 1987

PROTEROZOIC (1700 - 1750 Ma)

METASEDIMENTARY UNITS

Metagraywacke-1

gw1

Restricted to the west side of the Cleator shear zone. A gray to greenish-tan metasandstone and metasiltstone unit metamorphosed under lower to mid-amphibolite facies conditions. Compositional layering 1mm-15cm thick-local subunits are massive metasandstone without layering. Muscovite, biotite, chlorite, garnet, quartz, plagioclase and Fe-Ti oxides are major phases. Epidote-hornblende-garnet-quartz-rock is rare. Rock is well sorted, medium grained, subangular to subrounded. Graded bedding, load structures, scour surfaces, and rough cross-bedding are locally preserved. This unit represents turbidite sequences and is often gradational with underlying mafic tuffaceous metasediments.

Metagraywacke-2

gw2

Restricted to the east side of the main Cleator shear zone and distinguished from metagraywacke-1 by the presence of coarse proximal siliciclastic metasedimentary breccia and rounded quartz augen clasts 1mm to 6cm in diameter. A gray to light-tan typically massive metasandstone metamorphosed under lower to mid-amphibolite facies conditions. Compositional layering is locally preserved. Subunits of coarse, subangular, monolithologic, matrix-supported metasedimentary breccia occur in units up to 10m in thickness. Graded bedding and load structures are common. Locally this unit contains a boulder metasedimentary breccia unconformably overlying silicic volcanics.

Mafic Tuffaceous Metasedimentary Rocks

mts

A grayish-black to green Mafic Tuffaceous Metasandstone underlying the metagraywacke-1 and metagraywacke-2 units. Matrix-supported metasedimentary breccia containing clasts of subrounded to subangular metachert, mafic metavolcanics, carbonate and silicic metavolcanics comprise up to 50% of the unit. Graded bedding, scour surfaces and rough crossbedding are rare. This unit unconformably overlies metavolcanic rocks.

UNCONFORMITY

EXHALATIVE UNITS

Metachert

[redacted]

A distinctive stratigraphic horizon of massive gray or white recrystallized quartz. This unit is locally manganese-rich and gradational with banded iron formation and may occur as tourmalinite. The unit's geometry is that of discontinuous pods likely representing a combination of initial horizontal deposition of exhalites and modification of layers by folding and boudinage. The unit often marks the contact between the underlying volcanic to sedimentary rocks. Locally metachert also marks the transition from the mafic tuffaceous metasedimentary rocks to metagraywacke-1 units.

Banded Iron Formation

bif

This unit outcrops just west of the main Cleator shear zone. Black to reddish-black metachert with layers of hematite, jasper, and quartz. Rare layers of white chert and red-rich layers are present locally. Manganese oxides stain the unit black. The unit occurs as semi-continuous bands and occasional pods. Locally gradational with chert, this unit is representative of exhalative deposition following volcanic rock deposition and preceding influx of turbidites.

Metachert-cemented Exhalative Breccia

exf

Angular silicic metavolcanic clasts to 1m in long dimension in a matrix of white to gray metachert including pyrite cubes to 1cm. This unit is found as a thin discontinuous cap overlying massive silicic and mafic metavolcanic rocks and marks the unconformable stratigraphic transition to metagraywacke-2 turbidite sequences east of the Cleator shear zone.

METAVOLCANIC UNITS

Silicic Metatuffs

st

Tan/pink-white to tan fine-grained silicic metatuffs composed almost entirely of quartz grains (up to 1mm in diameter) and sericite. Angular chert fragments up to 3cm in long dimension are rare. This unit may be correlative with nonfoliated silicic metavolcanic rocks.

Silicic Metavolcanic Flows

sf

White to tan/pink-white silicic metavolcanic rocks probably representing lava flows and/or ash flows. The unit varies from aphanitic to porphyritic with volcanic quartz phenocrysts up to 6mm in diameter and plagioclase phenocrysts to 4mm in maximum dimension in an aphanitic quartz-muscovite groundmass. Primary structures such as columnar joints, vesicles and segregations of flow-banding are infrequent (or locally) preserved.

Mafic Metavolcanic Flows

mf

Dark green to grayish-black massive lava flow unit with irregular carbonate lenses up to 20cm in long dimension. Thin chlorite, plagioclase, quartz and epidote are major phases. "Chert" inclusions and rinds suggest use of pillows are common.

STRUCTURAL SYMBOLS

contact

contact (approximately located (95-20m))

gradational contact

an anastomosing, series of north-south trending discrete left-lateral shear zones displaying well developed mylonitic and phyllonitic fabrics. Subvertical foliation is locally folded into right to sinistral chiaromonte mesoscopic folds from a few mm to 5m in amplitude. Plunges vary from vertical to subhorizontal. Many sinistral shear indicators consistent with sinistral displacement are present. The eastern shear zone is characterized by a pronounced lineation. Rocks on the footwall have undergone identifiable lithologies mimicing the majority of the shear zone thus have been delineated. Dashed symbols indicate inferred position of a shear zone.

fault, showing dip of the fault (plane and sense of displacement. Dashed lines indicate location (position) of the fault trace.

strike and dip of bedding where youngingdirection

compositional layering representing bedding and transposed bedding, where youngingdirection is not known; star represents S1 and S2 in units where compositional layering is bedding.

strike and dip of S2 foliation; defined by aligned phyllosilicates

strike and dip of mylonitic/phyllonitic foliation in the Cleator shear zone

strike and dip of shear bands in the Cleator shear zone

strike and dip of granulated/cataclastic fault veins in the Cleator shear zone; "U" is on dip side

trend and plunge of stretching lineation; defined by striations, elongate mineral aggregates, stretched pebbles, and pulled apart mineral grains

trend and plunge of mineral lineation

trend and plunge of pressure shadow lineation

trend and plunge of boudin longaxis

trend and plunge of intersection lineation

trend and plunge of slickenslide

tension gash arrayed and inferred represent native shear sample

direction of youngingdirection from sedimentary structures

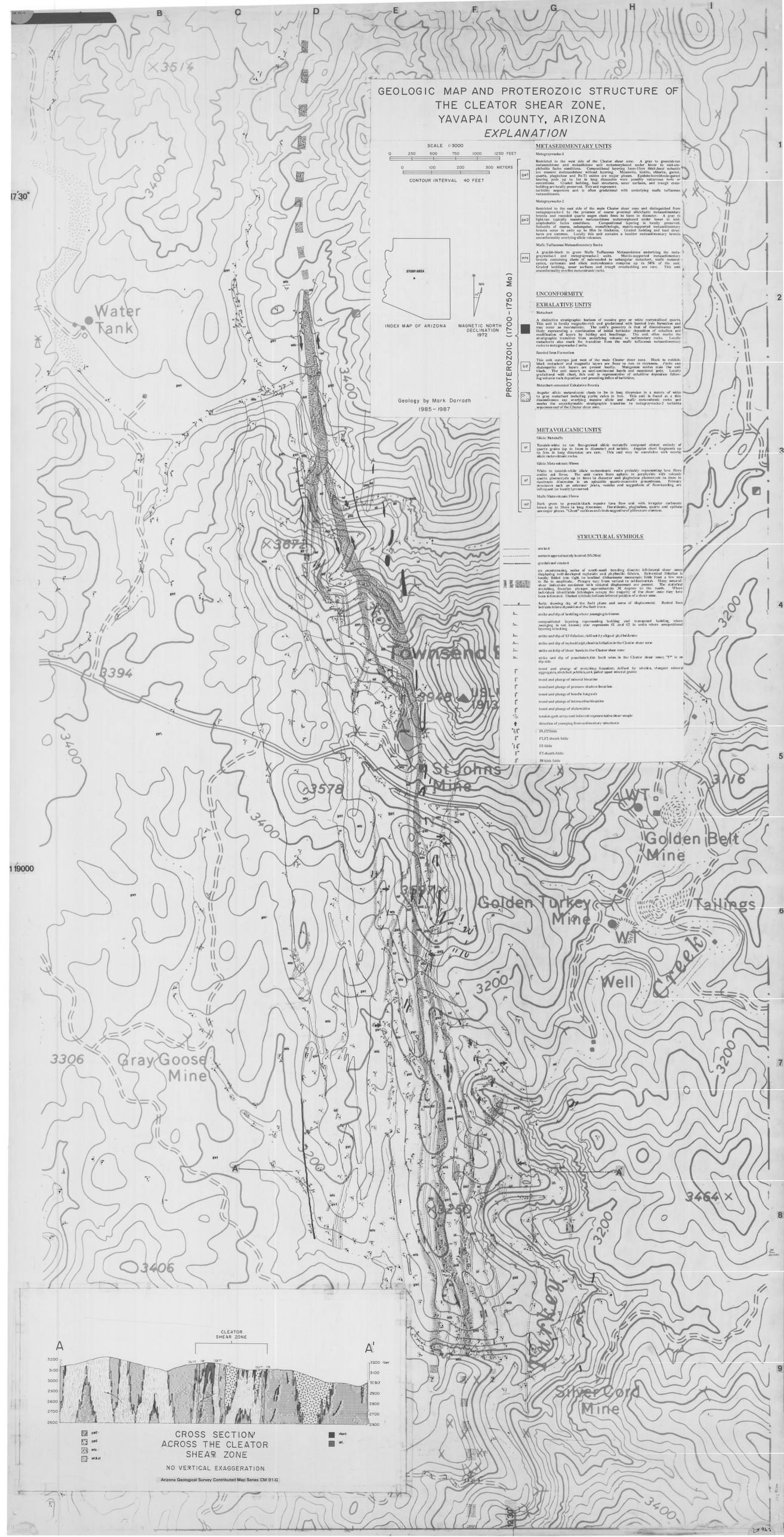
F1,F2 folds

F1,F2 sheath folds

F3 folds

F3 sheath folds

F4 kink folds



Arizona Geological Survey Contributed Map Series CM 91-G