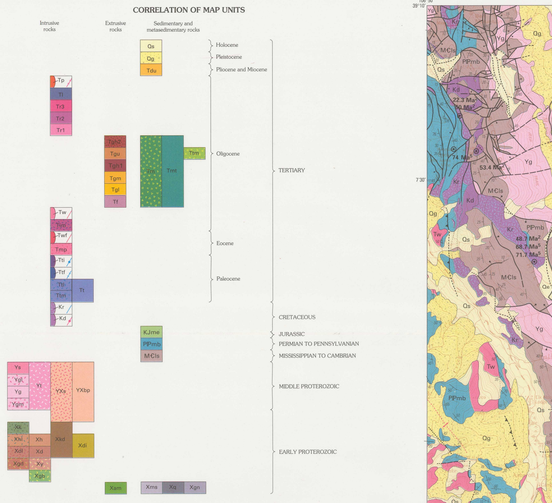
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I-2565
Pamphlet accompanies map

CORRELATION OF MAP UNITS



LIST OF MAP UNITS

[See accompanying text pamphlet for detailed descriptions of map units]

- Qs — Surficial deposits (Holocene)
- Qg — Glacial deposits (Pleistocene)
- Tdu — Dry Union Formation (Pliocene and Miocene)
- Rock units of the Grizzly Peak caldera
  - Tp — Post-resurgent plutons (Oligocene)
  - Resurgent plutons
    - Late-resurgent plutons (Oligocene)
    - Oldest resurgent plutons
      - Tr3 — Youngest pluton (Oligocene)
      - Tr2 — Intermediate-age pluton (Oligocene)
      - Tr1 — Oldest pluton (Oligocene)
  - Grizzly Peak Tuff
    - Upper heterogeneous subunit (Oligocene)
    - Tgu — Upper rhyolite subunit (Oligocene)
    - Tgm — Lower heterogeneous subunit (Oligocene)
    - Tgm — Middle rhyolite subunit (Oligocene)
    - Tgl — Lower rhyolite subunit (Oligocene)
  - Caldera-Collapse Breccia
    - Tmb — Megabreccia (Oligocene)
    - Tmt — Clast-supported tuff megabreccia (Oligocene)
    - Tmm — Matrix-supported tuff megabreccia (Oligocene)
  - Tri — Precaldera rhyolite lava (Oligocene)
- Tw — Intrusive rocks of the White Rock pluton (Oligocene)
- Twf — Intrusive rocks of the Italian Mountain intrusive complex (Oligocene)
- Twf — Felsic plutons and dikes of Winfield Peak and Middle Mountain (Eocene)
- Tmp — Intrusive rocks of the Mount Princeton pluton (Eocene)
- Intrusive rocks of the Twin Lakes pluton
  - Tti — Intermediate-composition porphyry dikes (Paleocene)
  - Ttf — Felsic porphyry dikes (Paleocene)
  - Tt — Main body (Paleocene)
  - Ttp — Leucocratic core (Paleocene)
  - Ttm — Mafic border (Paleocene)
- Kr — Quartz porphyry, granite, and aplite (Cretaceous)
- Kd — Dioritic intrusive rocks (Cretaceous)
- KJme — Mancos Shale through Entrada Sandstone, undivided (Upper Cretaceous through Middle Jurassic)
  - Mancos Shale (Upper Cretaceous)
  - Dakota Sandstone (Lower Cretaceous)
  - Morrison Formation (Upper Jurassic)
  - Entrada Sandstone (Middle Jurassic)
- PPmb — Maroon Formation through Belden Formation, undivided (Lower Permian through Pennsylvanian)
  - Maroon Formation (Lower Permian to Middle Pennsylvanian)
  - Gothic Formation (Middle Pennsylvanian)
  - Belden Formation (Middle and Lower Pennsylvanian)
- MCls — Leadville Limestone through Sawatch Quartzite (Lower Mississippian through Upper Cambrian)
  - Leadville Limestone (Lower Mississippian)
    - Castle Butte Cliff Member
    - Red Cliff Member
  - Chaffee Group (Lower Mississippian? and Upper Devonian)
    - Gilman Sandstone (Lower Mississippian to Upper Devonian)
    - Dyer Dolomite (Upper Devonian)
    - Parting Formation (Upper Devonian)
  - Fremont Limestone (Upper Ordovician)
  - Harding Sandstone (Middle Ordovician)
  - Manitou Dolomite (Lower Ordovician)
  - Peerless Formation (Upper Cambrian)
  - Sawatch Quartzite (Upper Cambrian)
- Ys — St. Kevin Granite (Middle Proterozoic)
- Intrusive rocks of the Grottos pluton
  - Yqf — Leucocratic bodies (Middle Proterozoic)
  - Yg — Main body (Middle Proterozoic)
  - Ygm — Mafic border (Middle Proterozoic)
- Yt — Granite of Taylor River (Middle Proterozoic)
- YXks — Granodiorite of Sayers (Middle or Early Proterozoic)
- YXbp — Browns Pass Granite (Middle or Early Proterozoic)
- Yk — Kroenke Granodiorite (Early Proterozoic)
- Intrusive rocks of the Henry Mountain pluton
  - Xhl — Leucocratic granite bodies (Early Proterozoic)
  - Xh — Granite of Henry Mountain (Early Proterozoic)
- Intrusive rocks of the Denny Creek pluton
  - Xdl — Leucocratic bodies (Early Proterozoic)
  - Xd — Main body of Denny Creek Granodiorite (Early Proterozoic)
  - Xgd — Kroenke Granodiorite and Denny Creek Granodiorite, undivided (Early Proterozoic)
- Xdi — Diorite (Early Proterozoic)
- Xgb — Gneissic granodiorite (Early Proterozoic)
- Xy — Granite of Mount Yale (Early Proterozoic)
- Ygb — Gabbro and Metagabbro (Early Proterozoic)
- Xam — Amphibolite (Early Proterozoic)
- Xms — Metasedimentary gneiss (Early Proterozoic)
- Xq — Metasedimentary gneiss and quartzite (Early Proterozoic)
- Xgn — Mixed gneiss, mica schist, and gneissic granite (Early Proterozoic)

Contact—Dashed where approximately located. In the Grizzly Peak Caldera, the lack of a contact indicates a gradation between the two map units

Fault—Dashed where approximately located; dotted where concealed. Arrow and number indicate dip of fault plane; tick and number 90 indicate vertical fault

Normal—Bar and ball on downthrown side

Thrust—Teeth on upper plate

Shear zone

Strike and dip of bedding
- Inclined
- Vertical
- Overturned

Strike and dip of joints
- Inclined
- Vertical

Strike and dip of tectonic foliation
- Inclined
- Vertical

Lineation—Showing bearing and plunge. May be combined with tectonic foliation symbols

Approximate trend of variable attitudes

Minor folds, showing plunge

Strike and dip of igneous flow foliation
- Inclined
- Vertical

Strike and dip of compaction foliation in welded tuff
- Horizontal
- Inclined

Anticline, showing plunge

Syncline, showing plunge

Overturned syncline

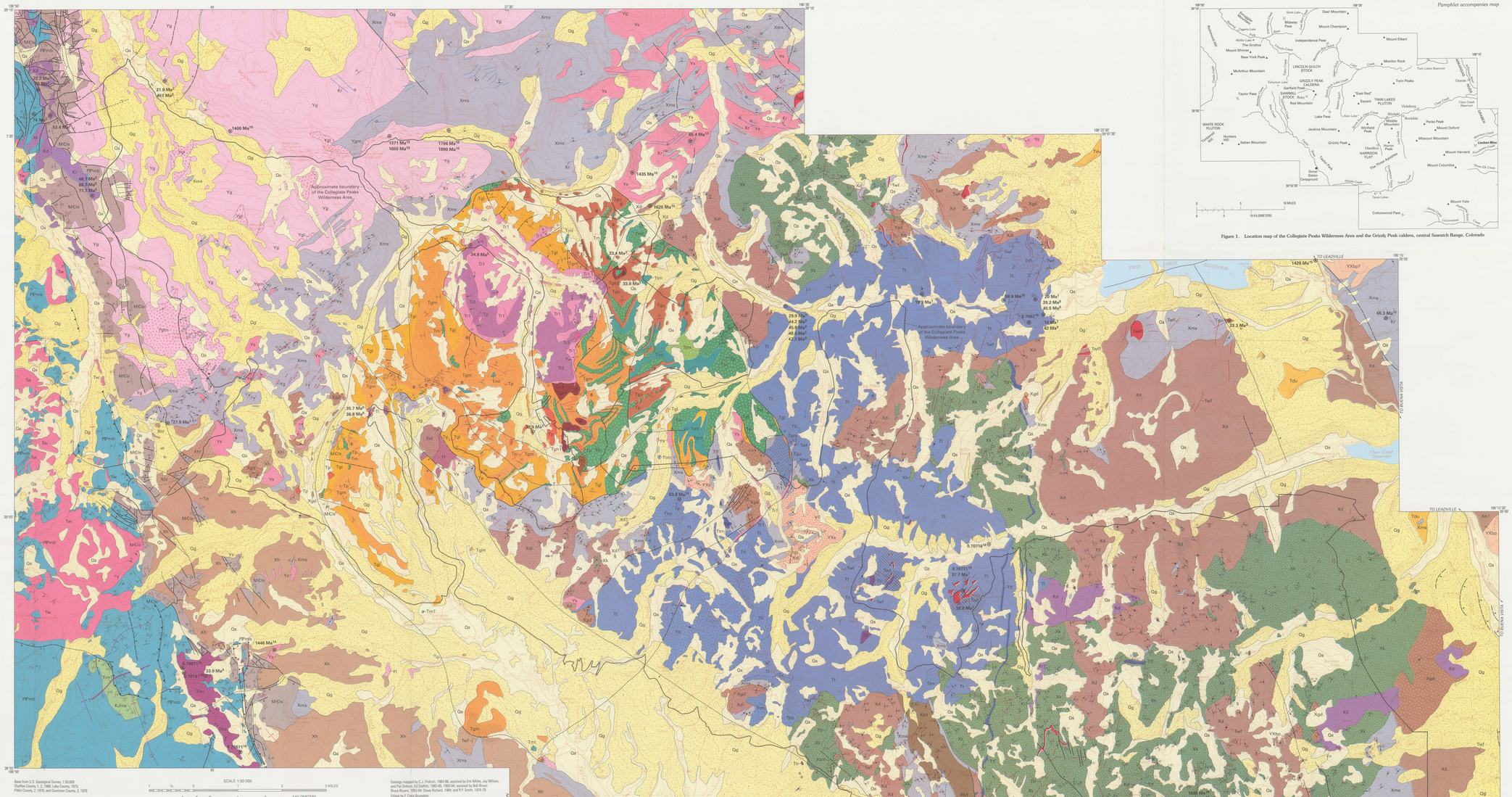
Brecciated zones adjacent to Twin Lakes pluton

Altered zones
- Iron-stained, quartz-pyrite veinlets; propylitic assemblage at Winfield
- Quartz-sericite-pyrite
- Quartz-sericite; phyllic assemblage at Winfield
- Potassium feldspar-quartz assemblage at Winfield

33.3 Ma[3] — Geochronologic sample locality—Superscript number keyed to source of data in Table 1

Sample locality for chemical analysis of dike—Chemical analyses permit certainty of assignment to map unit. Dikes without this symbol are inferred to belong to map unit on the basis of petrography

Approximate boundary of Collegiate Peaks Wilderness Area



Base from U.S. Geological Survey, 1:50,000
Chaffee County, 1:12, 1980; Lake County, 1970;
Pitkin County, 2, 1978; and Gunnison County, 3, 1976

Geology mapped by C.J. Fridrich, 1983-88, assisted by Eric Miller, Jay Wilson, and Pat Dobson; Ed DeWitt, 1983-85, 1993-94, assisted by Bob Bruce; Bruce Bryant, 1993-94; Dave Richard, 1984, and R.P. Smith, 1974-79
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CONVERSIONS FACTORS

Multiply	By	To obtain
inches (in.)	2.54	centimeters (cm)
feet (ft)	0.3048	meters (m)
miles (mi)	1.609	kilometers (km)

Deer Mountain
Mount Champion
Independence Pass
Mount Ebert
Monitor Rock
Twin Peaks
Twin Lakes Reservoir
Granite
Clear Creek Reservoir
Leadville
Mount Yale
Mount Harvard
Mount Columbia
Mount Oxford
Missouri Mountain
Packs Peak
Rockdale
Buena Vista
Cottonwood Pass
Tennessee Pass
Tennessee Creek
Homestake Creek
Fryer Creek
Lake Creek
Texas Creek
Cottonwood Creek
Chalk Creek
Chaffee County
Lake County
Gunnison County
Pitkin County
Lincoln Mine
Twin Lakes
Winfield
Hancock
Nathrop
Princeton
Mount Princeton
Chalk Mountain
Tomichi Creek
Quartz Creek
Taylor River
Taylor Park Reservoir
Taylor Park
Cement Creek
Crested Butte
Gunnison River
Ohio Creek
Slate River
Coal Creek
Brush Creek
Italian Mountain
Hunters Lake
Tincup
Cottonwood Lake
Hancock
Maxwell Creek
Chalk Creek
Nathrop
Buena Vista
Poncha Springs
Salida
Monarch Pass
Garfield
Maxwell Creek
Marshall Pass
Sargents
Parlin
Gunnison
Doyleville
Sargents
Parlin
Pitkin