U.S.GEOLOGICAL SURVEY
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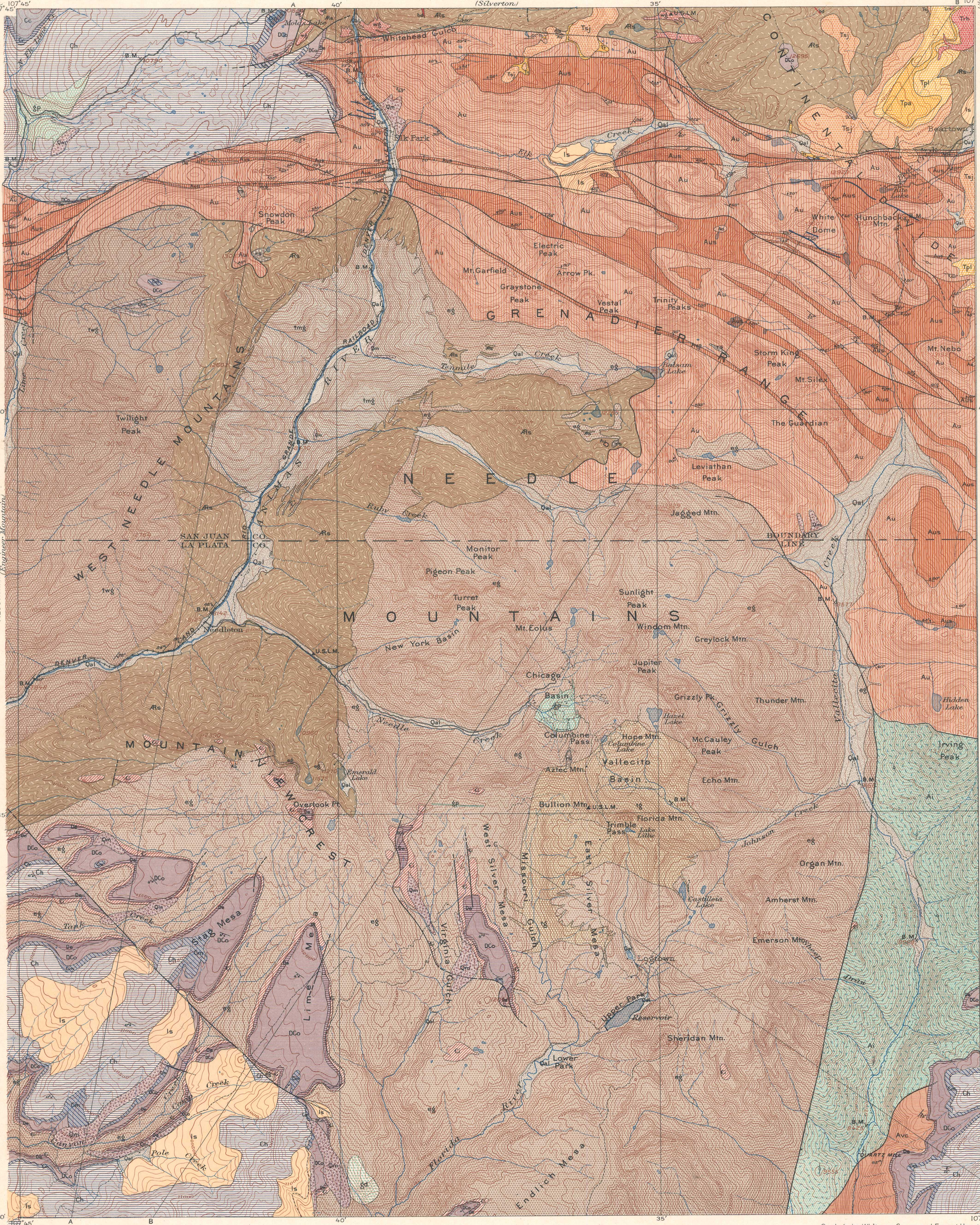
# AREAL GEOLOGY

COLORADO
NEEDLE MOUNTAINS
QUADRANGLE

(Telluride) (Silverton)

107°45' 37°45' — A — 40' — 35' — B 107°30' 37°45'




(Durango) 37°30' 107°45' — A — B — 40' — 35' — 107°30' 37°30'

## LEGEND

**IGNEOUS ROCKS**
*(continued)*

*Earlier than Ignacio quartzite*

- **Granite-porphyry** (gp) *(dikes, crosscutting bodies, and laccolithic forms)*
- **Lamprophyric dikes** (lp) *(minette and kersantite)*
- **Basic dikes** (bd) *(diabase and greenstone)*
- **Granodiorite** (gd)

ALGONKIAN OR CAMBRIAN

- **Trimble granite** (tg) *(fine-grained, gray biotite-granite)*
- **Eolus granite** (eg) *(coarse, pink hornblende-biotite-granite)*
- **Whitehead granite** (wg) *(reddish-pink biotite-granite)*
- **Tenmile granite** (tmg) *(pink and gray biotite-granite)*
- **Twilight granite** (twg) *(light-grayish-pink gneissoid granite, which predominates in the area indicated)*

ALGONKIAN (Engineer Mountain)

- **Irving greenstone** (Ai) *(largely greenstone, massive and schistose, with some granite-gneiss and quartzite)*

**Known faults** *(doubtful location indicated by dashes)*

**Concealed faults** *(covered by younger deposits)*

**Sections** A B C A B C

80° *Strike and dip of stratified rocks*
*Strike of vertical beds*

## LEGEND

- **Rock streams** (rs) *(loose rock and soil having the appearance of talus; occupies the floors of cirques)*
- **Landslides** (ls) *(a confused mixture of soil and large and small blocks of rock from cliffs and slopes above)*

**SEDIMENTARY ROCKS**
*(Areas of subaqueous deposits are shown by patterns of parallel lines, subaerial deposits by patterns of dots and circles)*

QUATERNARY

- *Recent* — **Alluvium** (Qal) *(torrential fans and stream gravels)*
- *Pleistocene* — **Moraines** (Qm) *(glacial gravels, unstratified, in mounds and ridges)*

TERTIARY

- *Eocene?* — **Telluride conglomerate** (Tt) *(pebbles and bowlders of schist, quartzite, and limestone)*

*UNCONFORMITY*

CARBONIFEROUS

- *Permian?* — **Cutler formation** (Cc) *(sandstone, grit, conglomerate, and some calcareous shale; prevailing color red)*
- *Pennsylvanian* — **Rico formation** (Cr) *(sandstone, limestone, and shale, of red or gray color; fossiliferous)*
- **Hermosa formation** (Ch) *(sandstone, shale, and limestone, of grayish color; fossiliferous)*
- **Molas formation** (Cm) *(red calcareous shale containing limestone and chert nodules; fossiliferous)*

*UNCONFORMITY*

DEVONIAN

- **Ouray limestone** (DCo) *(white or light pink, saccharoidal limestone, with a few quartzite layers; fossiliferous)*
- **Elbert formation** (De) *(thin-bedded, calcareous and sandy shale, buff and yellow, with pseudomorphs of salt crystals; fossiliferous)*

*UNCONFORMITY*

CAMBRIAN

- *Saratogan?* — **Ignacio quartzite** (Ci) *(thin-bedded, gray or pink, wavy quartzite, with trail markings on shaly partings)*

*UNCONFORMITY*

ALGONKIAN

*Needle Mountains group*

- **Uncompahgre formation** (Au, Aus) *(massive and thin-bedded, light to dark quartzite, locally conglomeratic, with dark shale, slate, and argillite, Aus)*
- **Vallecito conglomerate** (Avc) *(lower part consists largely of greenstone schist pebbles; upper part contains pebbles of quartzite, jasper, hematite, and magnetite)*

**METAMORPHIC ROCKS OF UNKNOWN ORIGIN**
*(Areas of metamorphic rocks of unknown origin are shown by hachures)*

ARCHEAN

- **Schist and gneiss** (Rs) *(quartz-mica-schist and amphibolite with some granite-gneiss)*

**IGNEOUS ROCKS**
*(Areas of igneous rocks are shown by patterns of triangles and rhombs; metamorphism is indicated by hachures)*

TERTIARY

- **Intrusive rhyolite** (Trh) *(an irregular, crosscutting body)*

*Potosi volcanic series*

- **Quartz-latite** (Tpl) *(flows and tuffs)*
- **Andesite** (Tpa) *(mainly in flows)*
- **San Juan tuff** (Tsj) *(blue to gray andesitic tuff and breccia)*

*Legend is continued on the left margin.*

E.M.Douglas, Geographer in charge.
Topography and Control by W.M.Beaman.
Surveyed in 1899 and 1900.

TRUE NORTH — MAGNETIC NORTH — $13\frac{1}{2}$°
APPROXIMATE MEAN DECLINATION 1900.

Scale $\frac{1}{62500}$

1 ½ 0 1 2 3 4 Miles
1 ½ 0 1 2 3 4 5 Kilometers

Contour interval 100 feet.
*Datum is mean sea level.*
*Projection based on U.S.C.and G.Survey data of 1900.*
*Projection of Engineer Mt. sheet based on earlier data.*

Edition of Sept. 1905

Geology by Whitman Cross and Ernest Howe,
assisted by J.Morgan Clements,
G.W.Stose, and Albert Johannsen.
Surveyed in 1900, 1901, and 1903.