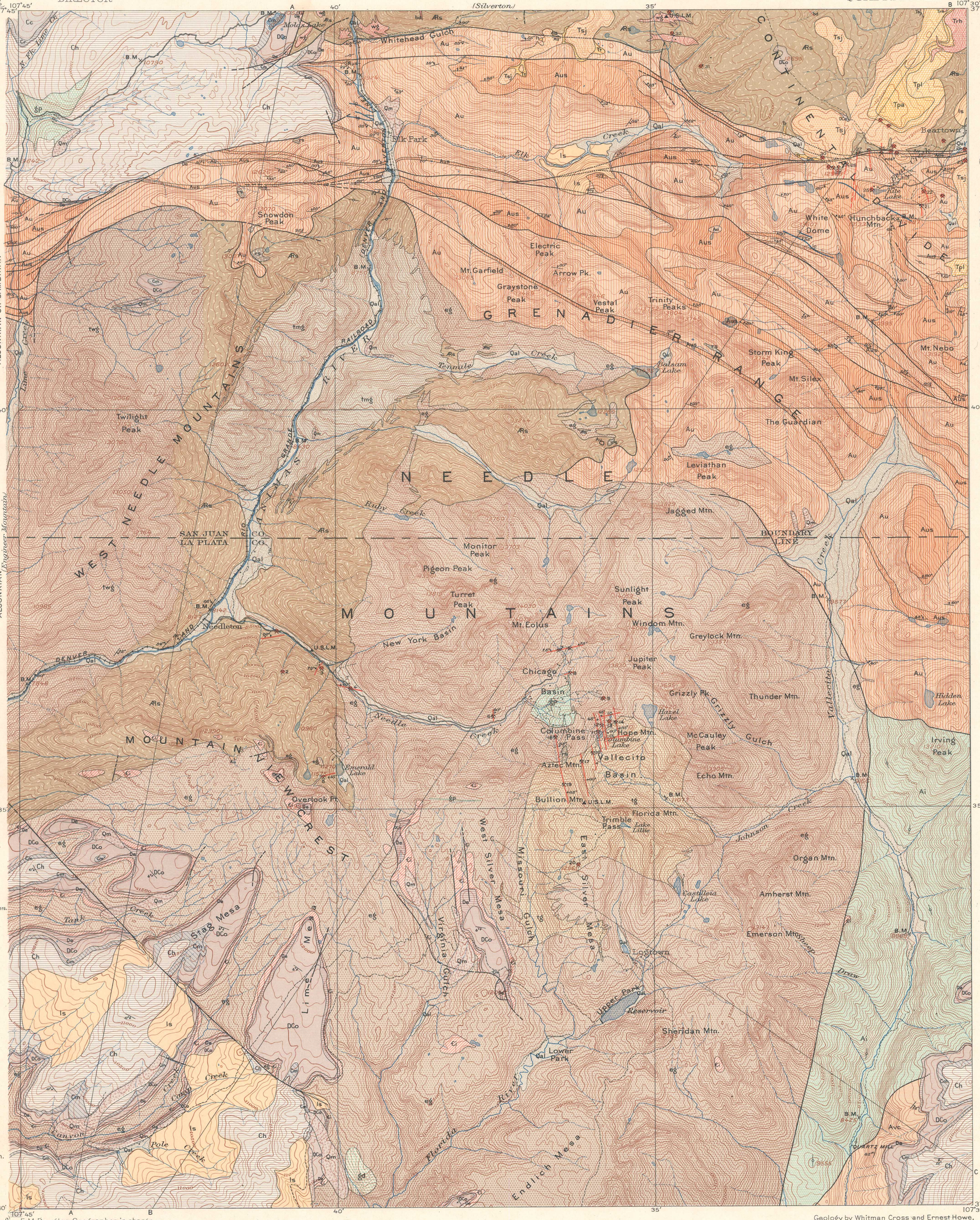
U.S. GEOLOGICAL SURVEY
CHARLES D. WALCOTT
DIRECTOR

ECONOMIC GEOLOGY

COLORADO
NEEDLE MOUNTAINS
QUADRANGLE



LEGEND

IGNEOUS ROCKS
(continued)

- gp — Granite-porphyry *(dikes, crosscutting bodies, and laccolithic forms)*
- lp — Lamprophyric dikes *(minette and kersantite)*
- bd — Basic dikes *(diabase and greenstone)*
- gd — Granodiorite
- tg — Trimble granite *(fine grained, gray biotite-granite)*
- eg — Eolus granite *(coarse, pink hornblende-biotite-granite)*
- wg — Whitehead granite *(reddish-pink biotite-granite)*
- tmg — Tenmile granite *(pink and gray biotite-granite)*
- twg — Twilight granite *(light-grayish-pink gneissoid granite, which predominates in the area indicated)*

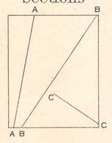
Earlier than Ignacio quartzite — ALGONKIAN OR CAMBRIAN — ALGONKIAN

- Ai — Irving greenstone *(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



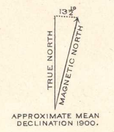
- 60° Strike and dip of stratified rocks
- Strike of vertical beds
- 60° Fluoritic gold-bearing quartz veins, showing strike and dip
- *Gold mines and prospects*

NAMES OF MINES.

Location indicated on map by numbers.

1. Mastodon.
2. Waterfall.
3. List.
4. Name unknown.
5. Emerald Lake.
6. Sheridan.
7. Mt. Eolus.
8. Little Jim.
9. Black Giant.
10. Name unknown.
11. Eureka.
12. Eureka.
13. Jennie Hayes.
14. Apache.
15. Name unknown.
16. St. Paul.
17. Republic.
18. Aztec.
19. Pittsburg.
20. Name unknown.
21. Kankakee.
22. Sylvanite.
23. Robinson.
24. Camp Bird.
25. Gold Bug.
26. New York and Brooklyn.
27. Good Hope.
28. Golden Shear.
29. Summit.
30. Little May.
31. Eldorado.
32. Elkora.

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



Scale 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.
Economic Geology by J. D. Irving and W. H. Emmons.
Surveyed in 1904 and 1905.

LEGEND

- rs — Rock streams *(loose rock and soil having the appearance of talus; occupies the floors of cirques)*
- ls — Landslides *(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 / Pleistocene — Qal — Alluvium *(torrential fans and stream gravels)*
- Pleistocene — Qm — Moraines *(glacial gravels, unstratified, in mounds and ridges)*

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

UNCONFORMITY

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

UNCONFORMITY

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

UNCONFORMITY

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

UNCONFORMITY

ALGONKIAN
- Needle Mountains group — Aus / Au / Aus — Uncompahgre formation *(massive and thin-bedded, light to dark quartzite, locally conglomeratic, with dark shale, slate, and argillite, Aus)*
- Avc — Vallecito conglomerate *(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
- Ars — Schist and gneiss *(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
- Trh — Intrusive rhyolite *(an irregular, cross-cutting body)*
- Potosi volcanic series — Tpl — Quartz-latite *(flows and tuffs)*
- Tpa — Andesite *(mainly in flows)*
- Tsj — San Juan tuff *(blue to gray andesitic tuff and breccia)*

Legend is continued on the left margin.