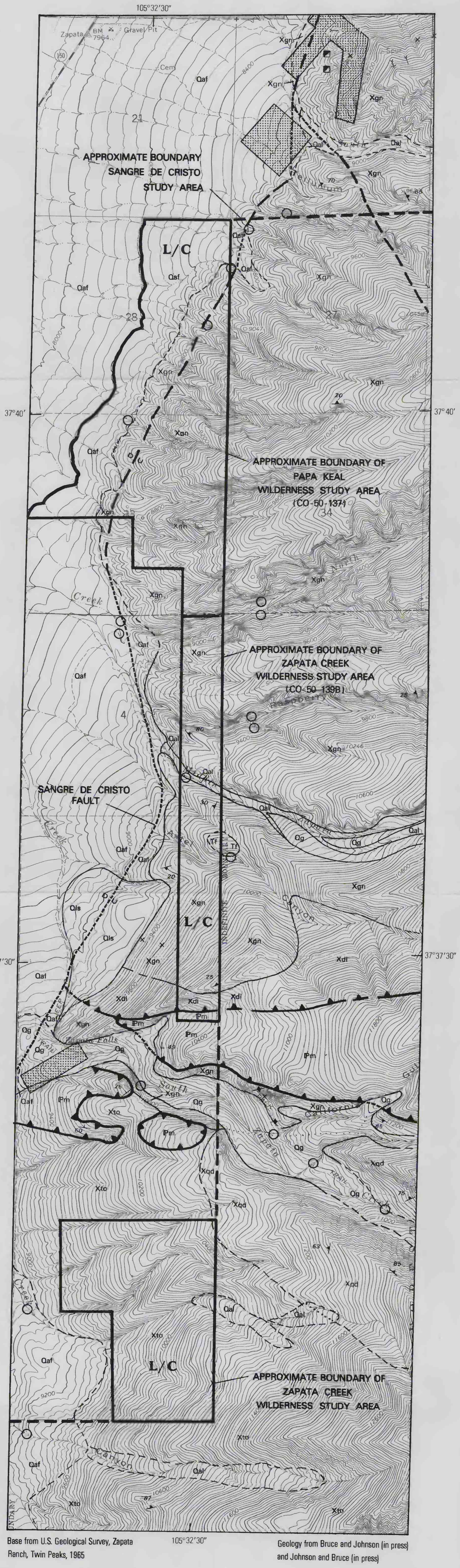
DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

BULLETIN 1716-D
PLATE 1



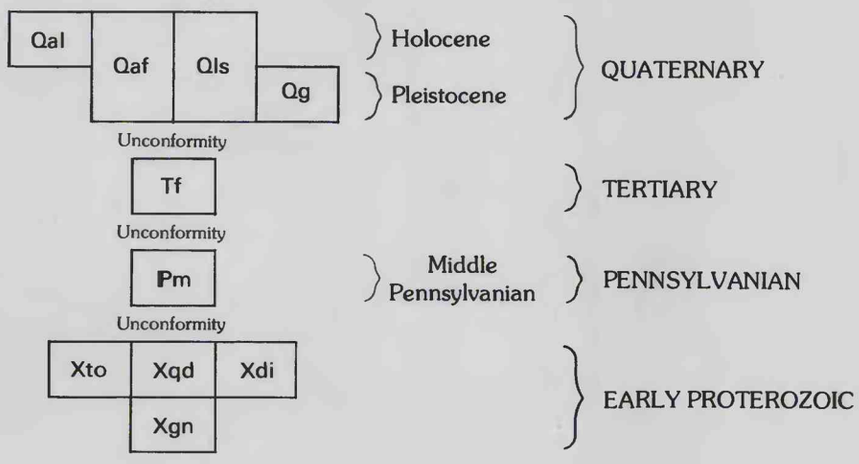
Base from U.S. Geological Survey, Zapata Ranch, Twin Peaks, 1965

Geology from Bruce and Johnson (in press) and Johnson and Bruce (in press)

EXPLANATION OF MINERAL RESOURCE POTENTIAL

L/C **Geologic terrane having low mineral resource potential for metallic minerals, oil, gas, and coal, and geothermal energy, with certainty level C**

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Qal **Alluvium (Quaternary)**—Sand, gravel, and clay deposited by streams; includes Holocene stream deposits, Pleistocene glacial outwash, and locally, colluvium

Qaf **Alluvial-fan deposits (Quaternary)**—Poorly sorted, coarse sand and gravel deposited by distributary stream systems

Qls **Landslide deposits (Quaternary)**—Angular rock debris at the base of steep slopes forming hummocky topography typical of landslide deposits

Qg **Glacial deposits (Pleistocene)**—Gray till of Pinedale and Bull Lake age containing boulders as much as 10 ft in diameter

Tf **Felsic pluton (Tertiary)**—Small, light-gray to white, medium- to coarse-grained granitic pluton; nonfoliated, sharp contacts with surrounding gneiss

Pm **Minturn Formation (Middle Pennsylvanian)**—Gray arkosic sandstone, conglomeratic sandstone, siltstone, shale, and minor limestone; contains fossils of marine invertebrates and terrestrial plants

Xto **Tonalite gneiss (Early Proterozoic)**—White to light-gray-green, buff-weathering, homogeneous gneiss of tonalite composition; contains porphyroblastic aggregates of mafic minerals as much as 15 mm across set in an equigranular groundmass of 3- to 4-mm plagioclase and quartz grains; weak foliation and weak to moderate cataclasis throughout unit, becoming more intense near faults and shear zones

Xqd **Quartz diorite (Early Proterozoic)**—Dark-gray to dark-green, predominantly medium-grained, locally compositionally banded, seriate to porphyritic hornblende quartz diorite; predominantly composed of hornblende and plagioclase with minor quartz and biotite; pluton is roughly concentrically zoned

Xdi **Diorite (Early Proterozoic)**—Dark-green to dark-gray, fine- to medium-grained, seriate to equigranular, locally foliated hornblende diorite; predominantly composed of hornblende and plagioclase with minor quartz as inclusions in plagioclase; extensively altered to sericite, chlorite, and epidote

Xgn **Mixed gneiss (Early Proterozoic)**—Mafic and felsic gneiss and micaceous schist, complexly interlayered in variable proportions and intruded by many bodies of nonfoliated igneous rock; layers discontinuous, rarely traceable for more than ¼ mi; predominantly composed of leucocratic, biotite-quartz-plagioclase-microcline gneiss and hornblende-bearing varieties of leucocratic gneiss that are interlayered with mafic quartz-plagioclase-hornblende gneiss; extensively altered to chlorite, epidote, and sericite with alteration intensity increasing near range-bounding faults; includes small, irregular masses of nonfoliated granite and foliated diorite; dikes and sills ranging from aplite and pegmatite to meta-basalt cut the unit

Contact—Dashed where approximately located or inferred, dotted where concealed

High-angle fault—Approximately located; dotted where concealed. U, upthrown side, D, downthrown side

Thrust fault—Sawteeth on upper plate; dashed where approximately located, dotted where concealed

Strike and dip of beds

Strike and dip of foliation

Inclined

Vertical

Area of patented claims

Surface openings

Adit

Caved adit

Shaft

Prospect pit

Geochemical sample locality

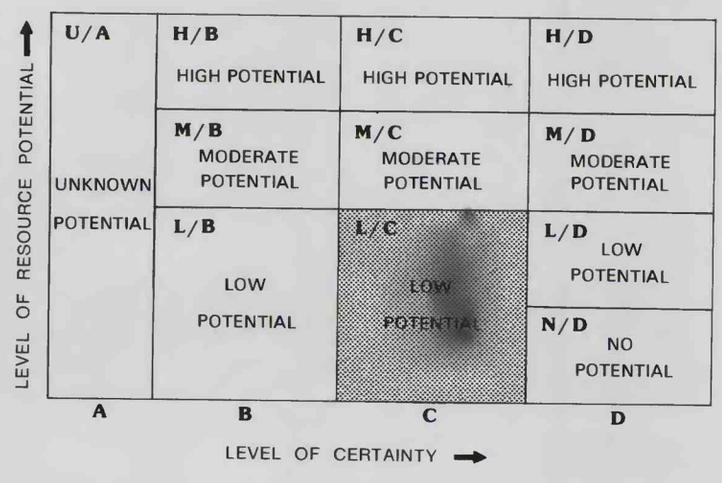


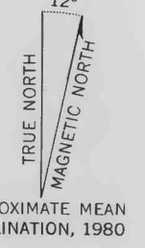
Diagram showing relationships between levels of mineral resource potential and levels of certainty. Shading shows levels that apply to this study area

LEVELS OF RESOURCE POTENTIAL

- **H** High mineral resource potential
- **M** Moderate mineral resource potential
- **L** Low mineral resource potential
- **U** Unknown mineral resource potential
- **N** No known mineral resource potential

LEVELS OF CERTAINTY

- **A** Available data not adequate
- **B** Data indicate geologic environment and suggest level of resource potential
- **C** Data indicate geologic environment, give good indication of level of resource potential, but do not establish activity of resource-forming processes
- **D** Data clearly define geologic environment and level of resource potential and indicate activity of resource-forming processes in all or part of the area



APPROXIMATE MEAN DECLINATION, 1980

SCALE 1:24 000

1 ½ 0 1 MILE

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MAP SHOWING MINERAL RESOURCE POTENTIAL, GEOLOGY, GEOCHEMICAL SAMPLE LOCALITIES, AND CLAIMS AND SURFACE WORKINGS, PAPA KEAL AND ZAPATA CREEK WILDERNESS STUDY AREAS, ALAMOSA COUNTY, COLORADO