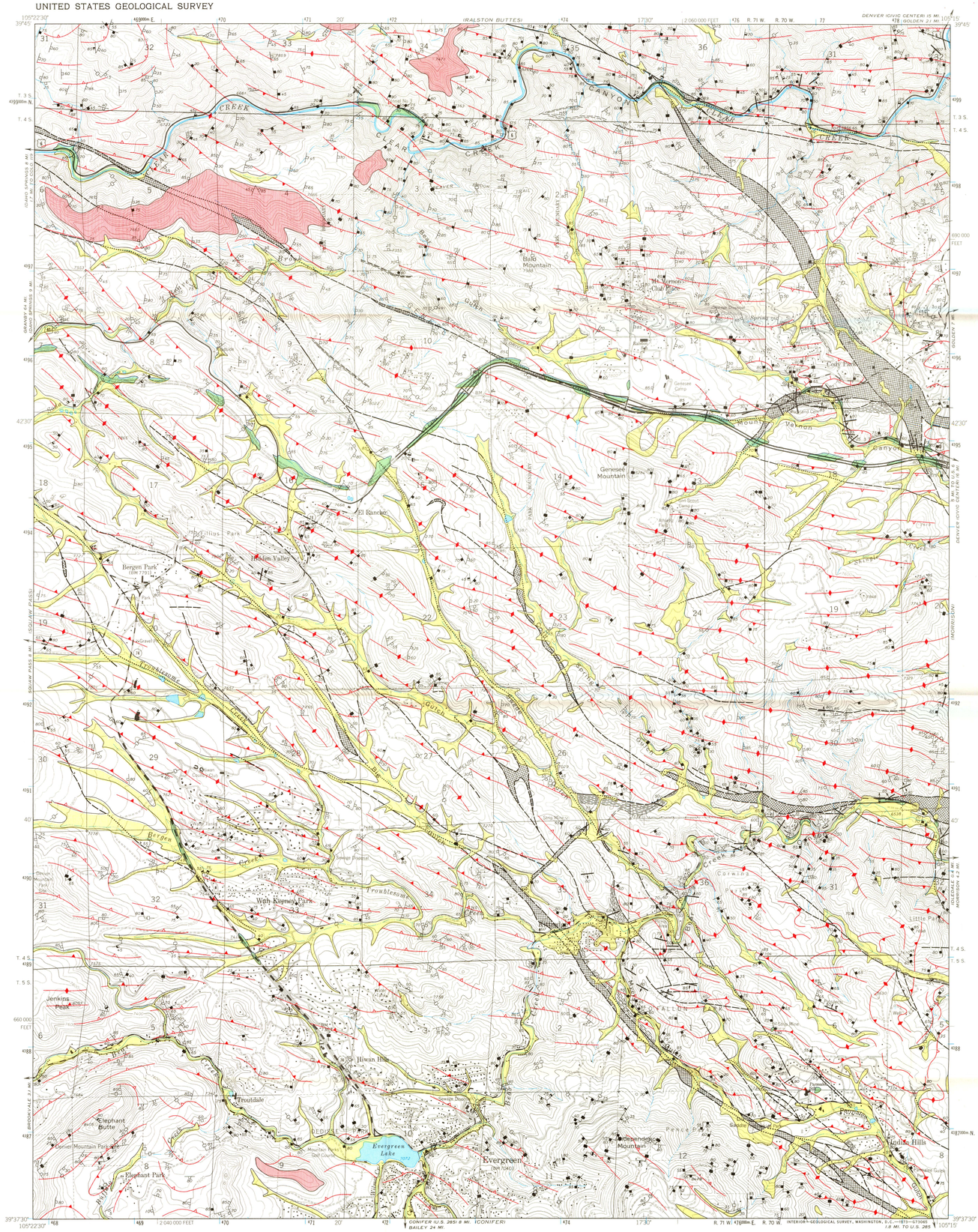
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



Base from U.S. Geological Survey, 1965
Photorevision as of 1971
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

APPROXIMATE MEAN DECLINATION, 1973

SCALE 1:24 000

1 0 1 MILE
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

COLORADO
QUADRANGLE LOCATION

Geology by J. C. Reed, Jr., 1971–72;
D. M. Sheridan, 1958–59, 1969–72;
Bruce Bryant, 1971–72;
P. W. Schmidt, 1972

MAP SHOWING FAULTS, JOINTS, FOLIATION, AND SURFICIAL DEPOSITS IN THE EVERGREEN QUADRANGLE, JEFFERSON COUNTY, COLORADO

By
John C. Reed, Jr., Douglas M. Sheridan, and Bruce Bryant

1973

FOLIO OF THE
EVERGREEN QUADRANGLE, COLORADO
MAP I-786-F

EXPLANATION

Artificial fill
Soil and rock debris used for fill. Mapped chiefly along major highways

Surficial deposits (Quaternary)
Clay, silt, sand, and gravel deposited by streams in the present valleys; soil and rock debris moved by frost and soil creep on hillsides; and angular rockfall debris accumulated beneath cliffs

Gravel (Tertiary)
Rounded to subangular pebbles, cobbles, and boulders as much as 15 feet in diameter in matrix of sand. Deposited by ancient streams in valleys that no longer exist

Bedrock (Precambrian)
Chiefly gneiss, schist, and various granitic rocks

Fault zone
Fracture zones along which movement has occurred between rock bodies on opposite sides. Rocks within the zones are crushed and broken and are commonly stained brown, yellow, or red by iron oxides. Symbol is dashed where zone is approximately located, queried where it is inferred, and dotted where it is concealed beneath surficial deposits. Crosshatched pattern indicates broad zone of crushed and stained rocks; lined pattern indicates presence of many small faults and fractures

Inclined Vertical
Strike and dip, in degrees, of small fault
Orientation and inclination of plane along which movement has occurred and along which rocks are crushed, broken, and discolored. Point of observation is at center of symbol

Inclined Vertical
Spacing of joints not specified

Inclined Vertical
Joints spaced less than 5 feet apart

Inclined Vertical
Joints spaced 5 to 50 feet apart
Strikes and dips, in degrees, of joints
Orientation and inclination of rock fractures along which little or no movement has occurred, generally nearly planar and commonly more or less regularly spaced. Estimated average spacing of joints shown by symbol as indicated. Where symbol occurs alone, point of observation is at center of symbol; where two or more symbols intersect, point of observation is at the intersection. Because joints were measured only at selected rock outcrops only a small percentage of joints actually present are shown

Vertical or near-vertical dip (85°-90°)

Steep dip (60°-85°)

Moderate dip (30°-60°)

Low dip (0°-30°)
Generalized strikes and dips of foliation
General direction and inclination of incipient planes of rock weakness caused by parallel orientation of platelike mineral grains and groups of grains. Commonly parallel to rock layers a few inches to several feet thick that display conspicuous differences in mineral content, color, or grain size

DIAGRAM ILLUSTRATING STRIKE AND DIP OF SMALL FAULT, JOINT, OR FOLIATION

USES OF THIS MAP

This map shows the orientation and inclination of faults, joints, and foliation planes in the Precambrian rocks that underlie the Evergreen quadrangle.

Because the joints and foliation planes control the directions of easiest splitting of the rocks, their orientation and inclination have an important influence on the ease and safety of excavation and should be considered in the location and design of highway cuts, building foundations, pipelines, sewer lines, and water lines. The orientation and inclination of foliation planes and joints also influence the stability of artificial cuts and of some of the steeper natural slopes (Schmidt, 1972). Where moderately or steeply dipping joints or foliation planes are undercut either artificially or naturally, individual blocks of rock or large rock masses may be dislodged. Examples can be seen in rockfalls in some of the roadcuts along U.S. Highways 6 and 40 and in natural rockfalls and landslips in several areas on the north side of Clear Creek Canyon.

Joints and foliation planes also provide channels for the circulation of ground water through the otherwise nearly impermeable Precambrian rocks and are therefore especially important in evaluating water resources and risks of ground-water contamination. Although fault zones are not important sources of ground water (Schmidt and Reed, 1972), many fault zones in this part of the Front Range are mineralized. Deposits of uranium, fluorite, and lead, copper, and zinc sulfides have been found along some of the zones in the Evergreen quadrangle and adjacent areas. There is, therefore, a danger that water produced from these zones may contain unusual concentrations of fluorine and metallic elements.

None of the faults or fault zones in the quadrangle have been active in the recent geologic past and, therefore, are not special earthquake hazards. They are shown on the map because of their possible effect on the quality of ground water and because the crushed and altered rocks along them are easily excavated and are commonly used as a source of road metal.

The data on this map may serve as a guide for planners and engineers making more detailed studies or for locating individual water wells. Further information on the geology of the quadrangle is provided by Sheridan, Reed, and Bryant (1972); distribution, depths, and yields of water wells are summarized by Schmidt and Reed (1972). Linear features identified on black and white aerial photographs and by experimental thermal infrared imagery are shown on a separate map (Schmidt and others, 1972). Many of these features seem to be related to faults and fractures and the map showing their distribution may be a useful adjunct to the present map.

REFERENCES

Schmidt, P. W., 1972, Slope map of the Evergreen quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-786-C.

Schmidt, P. W., Offield, T. W., and Pohn, H. A., 197 , Map showing photogeologic and thermal infrared linear features in the Evergreen quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-786-G.

Schmidt, P. W., and Reed, J. C., Jr., 1972, Map showing approximate locations, depths, and yields of water wells in the Evergreen quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-786-E.

Sheridan, D. M., Reed, J. C., Jr., and Bryant, Bruce, 1972, Geologic map of the Evergreen quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-784-A.