

EXPLANATION

— THERMAL LINEAMENT ALONG TOPOGRAPHIC FEATURE

— Parallel to foliation

— Parallel to joint set or fault within 1,000 feet (305 m) as mapped by Reed, Sheridan, and Bryant (1973)

— NON-TOPOGRAPHIC THERMAL LINEAMENT

— Parallel to foliation

— Parallel to joint set or fault within 1,000 feet (305 m) as mapped by Reed, Sheridan, and Bryant (1973)

NOTE - Some lineaments are parallel to both foliation and joint sets or faults

DISCUSSION

Linear features expressed by ground-surface temperature contrasts were mapped from thermal-infrared (8-14 micrometres) images covering about two-thirds of the Evergreen quadrangle. The images were obtained predawn and midday in July 1971 on flights about 3,000 feet (914 m) above mean terrain.

The thermal lineaments may represent contacts between different geologic materials, structural zones where near-surface moisture is somewhat concentrated, or simply thermal contrast between slopes of different orientation that have been differentially heated. About one-third of the mapped lineaments are in this last category, occurring in valleys and along ridge crests; therefore, these lineaments are more directly related to topography than to differences in surface materials. A map of geologic structures in the quadrangle (Reed and others, 1973), however, shows much of the topography to be structurally controlled, and an indirect relationship exists between structure and the thermal lineaments along topographic features. No lineaments appear to relate directly to contacts between different geologic units (Sheridan and others, 1973). Of the lineaments that are not on topographic features, about two-thirds are roughly parallel to joint sets, foliation, or faults and fractures measured nearby (within 1,000 ft or 305 m) and shown on the map by Reed, Sheridan, and Bryant (1973). Of the nontopographic lineaments, a majority is associated with closely spaced joints; many of these joint-related lineaments are nearly perpendicular to nearby faults, which strongly suggests structural control of many of the nontopographic thermal lineaments.

Most of the nontopographic thermal lineaments are cooler than adjacent ground, especially in the daytime images. It is likely that such lineaments represent zones of evaporational cooling; thus, it is inferred that many of the thermal lineaments reveal relative concentrations of near-surface moisture. This relationship has been found in other areas of thermal surveys (Rowan and others, 1970; Offield and others, 1970), but it has not been verified in the Evergreen quadrangle. The inference here is supported, however, by the correspondence of the thermal lineaments and structures that could well serve as channels for ground-water movement. This map indicates which type of structure is associated with each thermal lineament.

In rocks of the Evergreen quadrangle the principal reservoirs and avenues of movement of ground water are fractures, joints, and faults. In addition to being sources of water supply, these features may be avenues of contamination of water supply by local waste disposal through leaching fields. As many of the thermal lineaments may mark these water-bearing structures, they should be considered, in addition to available information on geologic structures (Reed and others, 1973), for sites proposed for development.

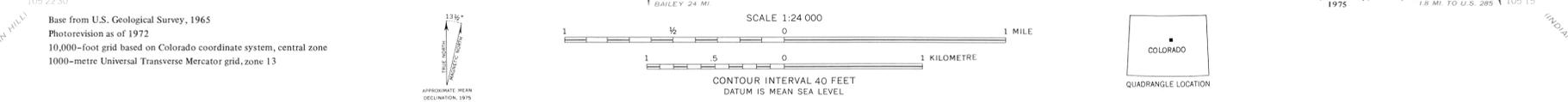
REFERENCES

Offield, T. W., Rowan, L. C., and Watson, R. D., 1970, Linear geologic structure and mafic rock discrimination as determined from infrared data, sec. 11 of Earth Resources Program, 3d ann., review - v. 1, Geology and geography: Houston, Tex., NASA Manned Spacecraft Center, MSC-03742, 12 p.

Reed, J. C., Jr., Sheridan, D. M., and Bryant, Bruce, 1973, Map showing faults, joints, foliation, and surficial deposits in the Evergreen quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Geol. Inv. Map I-786-F.

Rowan, L. C., Offield, T. W., Watson, Kenneth, Cannon, P. J., and Watson, R. D., 1970, Thermal infrared investigations, Arbuckle Mountains, Oklahoma: Geol. Soc. America Bull., v. 81, no. 12, p. 3549-3561.

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-786-A [1973].



MAP SHOWING THERMAL LINEAMENTS IN THE EVERGREEN QUADRANGLE, JEFFERSON COUNTY, COLORADO

By
T. W. Offield, and H. A. Pohn
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