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DENVER EXPLORATION BRANCH

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PRELIMINARY REPORT ON GEOLOGIC RECONNAISSANCE IN RALSTON CREEK-GOLDEN GATE CANYON AREAS, JEFFERSON COUNTY, COLORADO

By

Thomas H. Riley

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GEOLOGIC RECONNAISSANCE IN RALSTON CREEK-GOLDEN GATE CANYON AREAS, JEFFERSON COUNTY, COLORADO

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ABSTRACT

The Ralston Creek-Golden Gate Canyon area occupies approximately twenty square miles of Jefferson County, Colorado. The area is drained by Ralston Creek and Golden Gate Canyon. Uranium is now being produced from the Ralston Creek Mine and a few tons of copper ore have been shipped from the North Star Mine. Major structural features have been mapped by aerial photo interpretation and field examination.

Rocks in the area are composed of pre-Cambrian Idaho Springs formation, Pennsylvanian and younger sediments and a Tertiary basalt dike. In general, the metamorphic structure trends from east-west to N. 60° W.

Breccia reefs dominate the structural picture. The Hurricane Hill Breccia Reef and the Rogers Breccia Reef have been mapped for a distance of more than 15 miles to the northwest, trending S. 40° E. Four east-west cross faults and numerous north-south breccia zones have been mapped between the main breccias. (Plate I)

Mineralization is of at least two types. Pre-Cambrian veinlets of scheelite in high calcium rocks follow the intricate foliation of the schist. Copper-uranium mineralization is associated with Tertiary breccia zones. Primary minerals associated with the pitchblende are chalcopyrite, galena, sphalerite, bornite, covellite, molybdenite, quartz, and carbonates. Secondary minerals identified megascopically are: torbernite, autunite, malachite, azurite, chrysocolla, native copper, and limonite.

The Ralston Creek-Golden Gate Canyon areas are outside of any of the typical vein-type mining districts of the Front Range Mineral Belt. The frequent association of uranium with copper mineralization is a very useful guide in prospecting and exploring for uranium in this area.

INTRODUCTION

The Ralston Creek-Golden Gate Canyon area, as described in this report, occupies approximately twenty square miles of Jefferson County, Colorado. It is bounded by Golden Gate Canyon on the south, Ralston Creek on the north, the upturned sediments to the east and Crawford Gulch to the west (Fig. 1). Most of the area is accessible by all weather roads up Golden Gate Canyon and Crawford Gulch, and by jeep roads into the area.

Topography is rugged with trellis-like drainage dissecting the area. Elevations vary between 6,000 feet and 8,000 feet. The area is drained by Ralston Creek and Golden Gate Canyon as primary drainages, with several other large secondary drainage basins. The climate is semi-arid, with Ralston Creek as the only persistent drainage. Flash floods are not uncommon.

The main industry is cattle grazing. Uranium is now being produced from the Ralston Creek Mine, and a few tons of copper ore has been shipped from the North Star Mine.

The purpose of this preliminary geologic reconnaissance was to determine the major structural features of the area, and the relation between the uranium mineralization along Golden Gate Canyon and that of Ralston Creek. The work has been accomplished through aerial photo interpretation and field examination.

GEOLOGY

Lithology

Rocks in the area consist of the pre-Cambrian Idaho Springs formation which has been intruded by granite pegmatite dikes. The Idaho Springs formation in this area is composed of granite gneiss, hornblende gneiss, garnet schist, quartz-biotite-sillimonite schists, and quartzite.

Coarse grained granite gneiss, which grades locally into pegmatites, occurs extensively in the area. Granite gneiss appears on the northwest side of Ralston Creek as the upthrown side of the Rogers Breccia Reef. The gneiss grades from a granite gneiss to gneissic granite, and into pegmatite, with the pegmatite retaining some gneissic structure in places. A large mass of granite gneiss was observed to the west of Hurricane Hill Breccia Reef near Drew Hill.

Hornblende gneiss and biotite schist occur extensively in the area along with garnet schist, sillimanite schist and quartzite.

COLORADO
DISTRICT 4

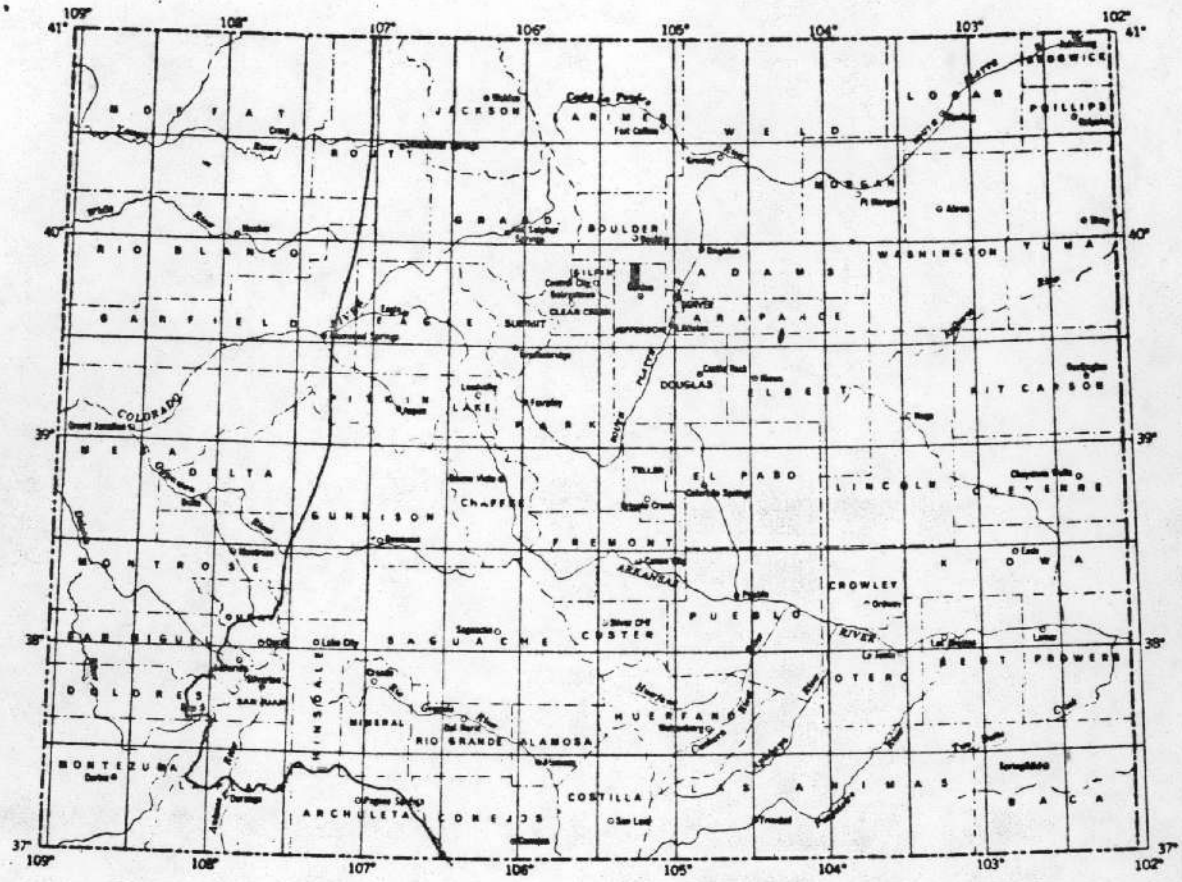

FIG. 1 INDEX MAP: RALSTON CREEK-GOLDEN GATE CANYON AREA
JEFFERSON CO., COLO.

Bands and seams of quartzite occur frequently throughout the area, however, the Coal Creek quartzite, which occurs extensively to the north, does not extend into the area mapped.

Tertiary igneous rocks are absent with the exception of a small basalt dike which occurs to the east of the area. No other Tertiary intrusive or extrusive rocks are known to occur in the area.

The oldest sedimentary rock in the area is the Pennsylvanian Fountain formation which lies unconformably on the pre-Cambrian metamorphics.

Structure

Lithologic units were not mapped as such in this investigation, except in the area near the Ralston Creek Mine. In general the pre-Cambrian metamorphic structure trends from east-west to N. 60° W., with local deviations from this attitude due to faulting and drag folding. Drag folding is especially prominent along the Rogers Reef (Plate II).

Two breccia reefs dominate the structural picture in this area (Plate I). Lovering[1/] has mapped the Hurricane Hill Breccia Reef and the Rogers Breccia Reef over distances of 15 miles, extending from beyond the Boulder tungsten belt to the northwest, down to the border of the Ralston Creek area. Both of these reefs have been projected through the Ralston Creek area.

The Rogers Breccia Reef, trending S. 40° E., passes between the North Star Mine and the Nigger Shaft, down the northwest side of Ralston Creek and on into the sediments to the east, where it apparently is absorbed in the Morrison shales. The breccia is composed of angular fragments of granite gneiss up to two inches in diameter, cemented by dark chocolate brown carbonate matrix. The fragments of granite gneiss show no hydrothermal alteration megascopically.

The Hurricane Hill Breccia Reef outcrops at the junction of Ralston Creek with Crawford gulch road at the bottom of Drew Hill. At this point, the breccia is highly silicified and stands out in bold relief as a large lens-shaped body of quartz containing angular fragments of silicified granite gneiss. The reef crops out again to the southeast on Drew Hill where it is weakly cemented with iron stained carbonaceous material. The Hurricane Hill structure had been traced on aerial photos from Ralston Creek to the junction of Golden Gate Canyon with Crawford Gulch. Just above this junction the breccia splits, with one

1/ P.P. 223 by Lovering and Goddard.

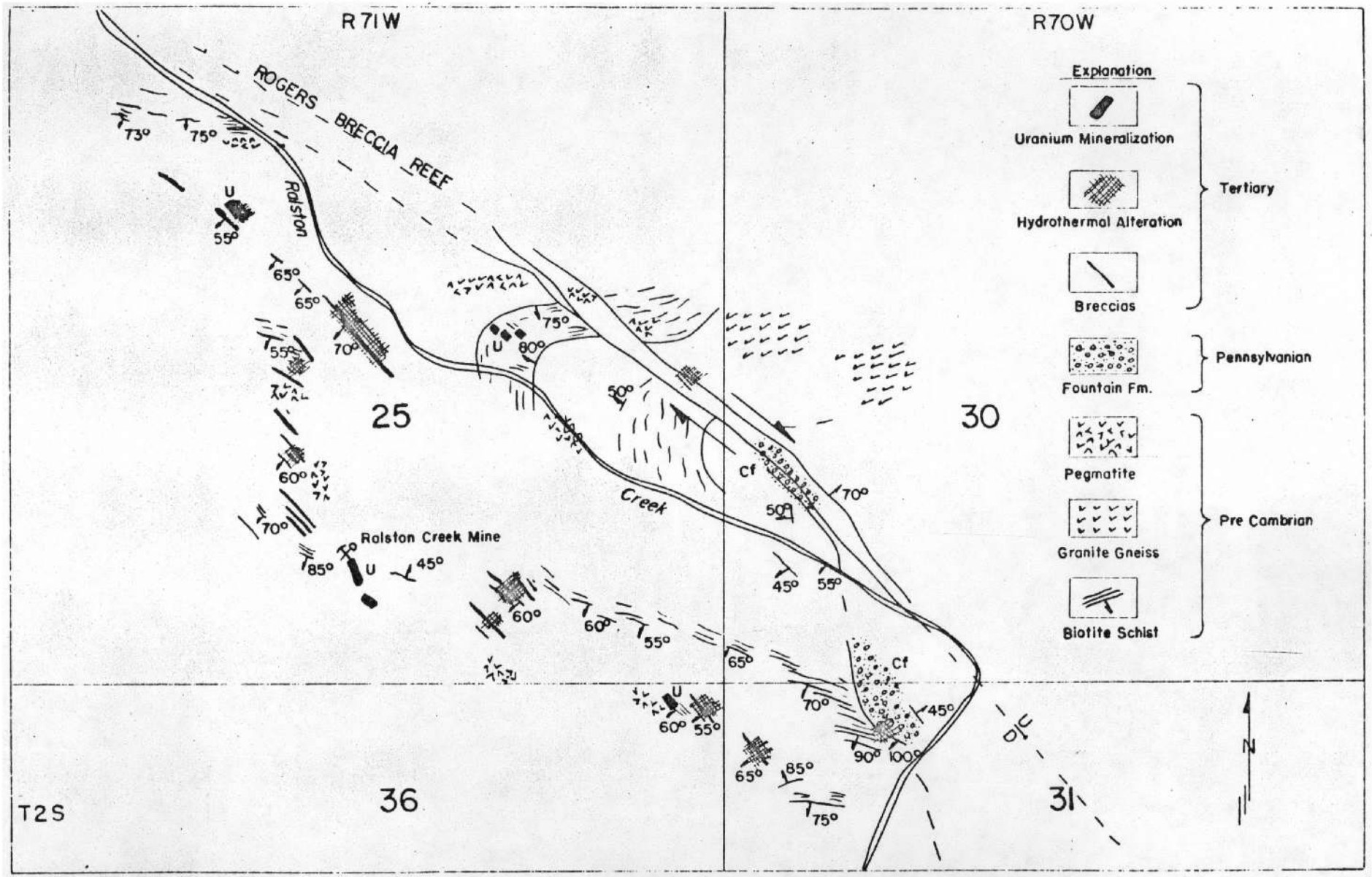

PLATE II - GEOLOGIC MAP: RALSTON CREEK MINE AREA

JEFFERSON CO., COLO.

SCALE - 1" = 800'

branch turning east and forming Half Mile Gulch, the west member continues to the south, and has been projected as far as Clear Creek, six miles south of Golden Gate Canyon. The carbonaceous matrix, is rich in iron and weathers readily to a limonitic gossan, which produces a reddish brown soil. The ease with which the matrix is weathered causes saddles to form where the breccia crosses ridges, and forms smoothly rounded slopes elsewhere. In general the breccias influence topography by forming depressions, saddles and gulches. Where there has been silicification, the breccia resists decomposition and stands as a dike or reef. There has been relatively slight silicification along breccia zones in the area mapped, except in the Hurricane Hill Breccia Reef north of Ralston Creek. The breccias vary from 3 feet to 40 feet in width, with very little change in strike.

Second in order of prominence to the main breccia reefs are cross-faults between them. At least four of these structures cross the area, nearly east-west (Plate I). The northernmost of these crossing structures splits away from the Hurricane Hill Breccia Reef north of Ralston Creek and transects the foliation of the Idaho Springs formation. This fault has weakened the resistance of the country rock to weathering, and in large part influenced the course of Ralston Creek. Three more cross-faults have been mapped to the south of Ralston Creek. One of them north of Belcher Hill, one south of Belcher Hill and the southernmost fault takes off just to the north of the junction of Golden Gate Canyon with Crawford Gulch.

Numerous smaller breccia zones trending north to northwest terminate at their intersection with the east-west faults. Some of these northerly trending breccia zones attain a width of 30 feet, as is the case north of the Ralston Creek Mine. Mineralization in the breccia zones accompanies narrow flat lying faults or shears which strike N. 20° W. and dip west. These occur as series of subparallel faults, with minor displacement. Hydrothermal activity has bleached and altered the country rock and silicification is evident at the Ralston Creek Mine.

Mineralization

At the North Star Mine there is a breccia in the granite gneiss containing carbonate cementing material and copper minerals, most of which have been converted to malachite. This structure is highly radioactive in places and contains visible pitchblende. Very little torbernite has been observed at this mine. Uranium mineralization at the North Star Mine occurs in a granite gneiss, whereas other occurrences have been in a country rock of bleached biotite schist as at the Ralston Creek Mine, or in hornblende gneiss as at the Union Pacific shaft.

Primary minerals observed in association with uranium are chalcopyrite, galena, sphalerite, calcite, quartz. Copper is always present in some form. Secondary minerals identified megascopically are: torbernite, autunite, malachite, azurite, chrysocolla, native copper, limonite. No secondary lead or zinc minerals were observed but assays prove their presence.

There are at least two types of mineralization in the area. Scheelite mineralization has been observed in narrow veinlets within the Idaho Springs formation. These veinlets follow the intricate foliation of the schist and are accompanied by no discernable hydrothermal alteration. The scheelite is associated with rocks high in calcium content such as grossularite garnet, epidote, calcite, powellite. This mineralization is pre-Cambrian in age.

Copper-uranium mineralization thus far observed is associated with breccia zones. Mineralization along Ralston Creek is in the vicinity of the Rogers Reef, whereas that of the Golden Gate Canyon area is found in association with the Hurricane Hill Breccia Reef. This mineralization is probably of Tertiary age.

CONCLUSIONS

The Ralston Creek-Golden Gate Canyon area is located outside of any typical vein type mining district in the Front Range Mineral Belt.

The Rogers Breccia Reef and Hurricane Hill Breccia Reef are Tertiary structures which have been traced over distances of at least 15 miles. These reefs are the dominant structural feature of the area, and have a strong influence upon topography and drainage.

Copper-uranium mineralization along Ralston Creek is associated with Rogers Breccia Reef, whereas that of Golden Gate Canyon is associated with the Hurricane Hill Breccia Reef.

Mineralization is characterized by quartz-carbonate, with copper and iron sulfides, and minor amounts of lead, zinc and pitchblende. The frequent association of uranium with copper mineralization in this area serves as a useful guide in prospecting and exploring for uranium. This copper-uranium mineralization has thus far been observed in breccia zones, and the mineralogy is similar in each deposit. The Golden Gate Canyon and Ralston Creek areas appear to be genetically the same.

The structure with which uranium has thus far been found extends over a great area to the north and south, and similar structure is apparent to the west of the area mapped.

The Ralston Creek Mine is now producing uranium ore, and the area may well be a source of substantial production and possibly a new uranium province.

RECOMMENDATIONS

Further work should be done to establish criteria for the localization of ore and the source of the mineralization. This could be accomplished by regional and detailed mapping and microscopic study of known occurrences. Methods of reconnaissance and exploration which are found to be successful should be extended into the adjoining areas to the north, south and west, where conditions are similar to those found in the Ralston Creek-Golden Gate Canyon areas. Geochemical methods of prospecting are recommended as one means of locating new deposits in this area.

Cool Creek

ROGER'S BRECCIA REEF

NORTH STAR MINE

HURRICANE HILL BRECCIA REEF

RALSTON CREEK

NIGGER SHAFT

DREW HILL

RALSTON CR. MINE

Cf

Clk

Jm

Kd

Cly

P€gn

P€m

BELCHER HILL

Ralston Reservoir

Van Bibber Creek

CRAWFORD GULCH

GOLDEN GATE CANYON

BUCKMAN TUNNEL

U.P. SHAFT

C. R. G. W.

Note: Interpretive map compiled on aerial photos

EXPLANATION

- Kd — Dakota Fm
- Jm — Morrison Fm
- Clk — Lykins Fm
- Cly — Lyons Fm
- Cf — Fountain Fm
- p€m — Pre-cambrian metamorphics with pegmatite inclusions
- Silicification
- Mineralization
- Schistosity
- Breccias

N

PLATE I

PRELIMINARY GEOLOGIC RECONNAISSANCE MAP OF THE RALSTON CREEK-GOLDEN GATE CANYON AREA, JEFFERSON COUNTY, COLORADO

Scale approx. 1=20,000

1/2 0 1/2 1 Mile

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