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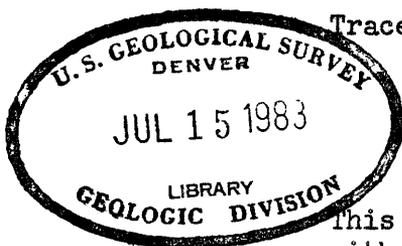
PHOTOGEOLOGIC MAPS OF THE IRIS SE AND DOYLEVILLE SW QUADRANGLES  
SAGUACHE COUNTY, COLORADO\*

By

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November 1957

Trace Elements Memorandum Report 984



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\*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

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## GEOLOGY AND MINERALOGY

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PHOTOGEOLOGIC MAPS OF THE IRIS SE AND DOYLEVILLE SW QUADRANGLES  
SAGUACHE COUNTY, COLORADO

By Kathleen McQueen

ABSTRACT

The Iris SE and Doyleville SW quadrangles, Saguache County, Colorado include part of the Cochetopa mining district. Photogeologic maps of these quadrangles show the distribution of sedimentary rocks of Jurassic and Cretaceous age; Precambrian granite, schist, and gneiss; and igneous rocks of Tertiary age. Sedimentary rocks lie on an essentially flat erosion surface on Precambrian rocks. Folds appear to be absent but faults present an extremely complex structural terrane. Uraniferous deposits occur at fault intersections in Precambrian and Mesozoic rocks.

INTRODUCTION

The Iris SE and Doyleville SW quadrangles, Saguache County, Colo., are in part of the Cochetopa mining district where uraniferous deposits occur at fault intersections in Precambrian and Mesozoic rocks. Aerial photographs taken in October 1939 show roads, buildings, a dump, and many prospect pits in the SE $\frac{1}{4}$  sec. 9, T. 47 N., R. 1 E. Little evidence of mining activity is seen on photographs taken in October 1955. Locations of quadrangles are shown in figure 1.

Photogeologic maps (plates 1 and 2) were compiled from 1:20,000-scale aerial photographs taken in October 1939, supplemented by 1:60,000-scale aerial photographs taken in October 1955. Photographic coverage at 1:20,000-scale was not available for a small area in south-central Doyleville SW

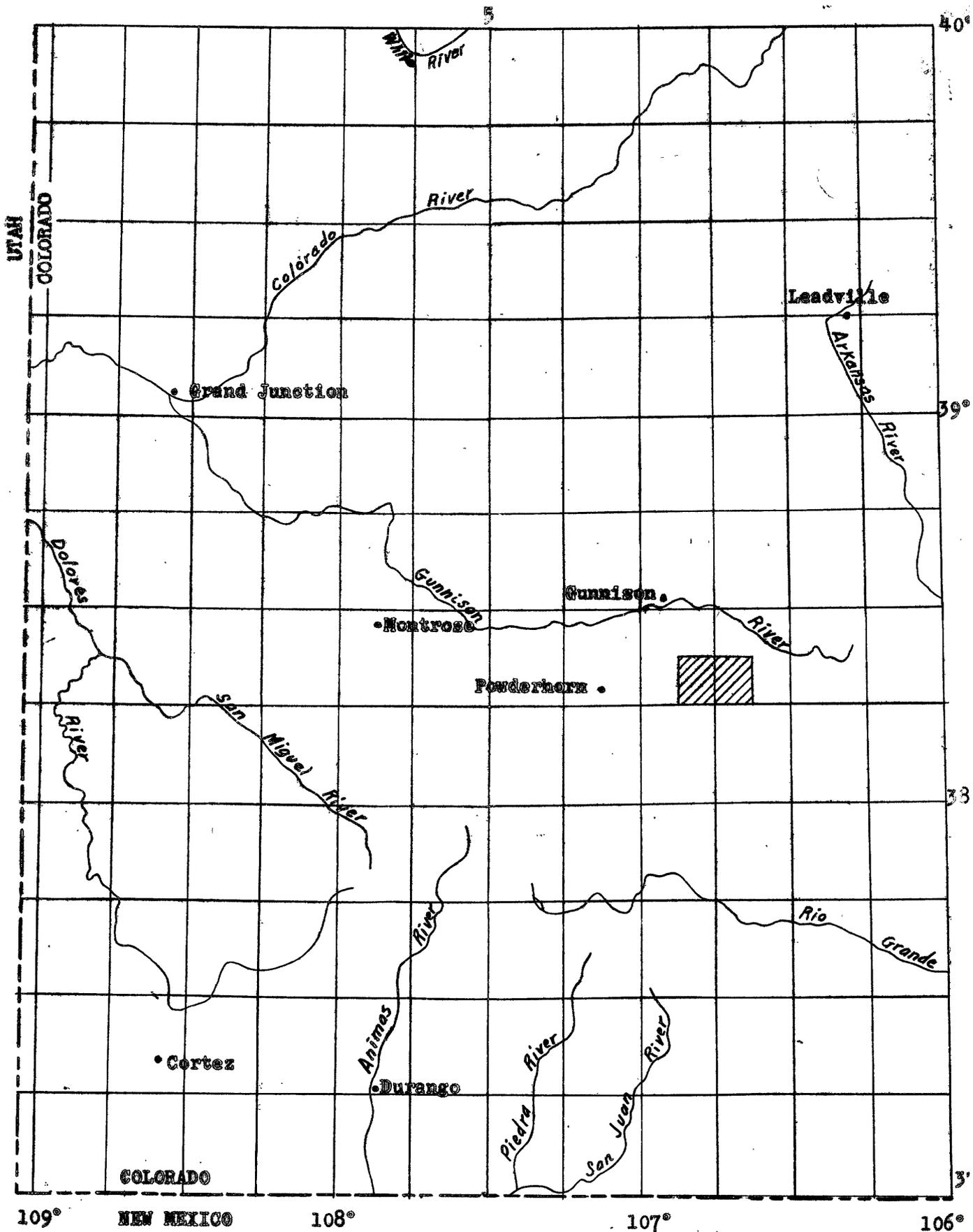


Figure 1. Index map showing locations of Iris SE and Doyleville SW quadrangles, Colorado.

quadrangle. The smaller-scale photography is available for the entire map area. A Kail radial planimetric plotter was used to transfer data from photographs to base maps. The maps have not been field checked.

This compilation is part of a program conducted by the U. S. Geological Survey on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

#### PREVIOUS WORK

Whitman Cross, Esper S. Larsen, Jr., and J. F. Hunter conducted reconnaissance geologic studies in the area between 1911 and 1917. The result of this work is included in U. S. Geological Survey Bulletin 843 (Cross and Larsen, 1935), and in U. S. Geological Survey Professional Paper 258 (Larsen and Cross, 1956).

Detailed information on the northern part of the map area is included in U. S. Geological Survey Professional Paper 300 (Derzay, 1956). Illustrations in Derzay's report include an annotated aerial photograph showing the location of the Los Ochos pitchblende deposit in the northeastern corner of Doyleville SW quadrangle and the distribution of Precambrian, Jurassic, and Cretaceous rocks in the vicinity of the mine. The paper also contains brief lithologic descriptions of the formations and gives measured thicknesses of Mesozoic formations.

#### GENERAL GEOLOGY

Iris SE and Doyleville SW quadrangles lie on the northeastern edge of the San Juan volcanic province (Derzay, 1956). The quadrangles constitute an area that has been covered for the most part by Tertiary lavas. According to Derzay (1956), sedimentary rocks of Jurassic and Cretaceous age and Precambrian granites, schists, and gneisses are exposed across the northern part of the area; they were faulted in Late Cretaceous or Tertiary time.

Intrusive rocks of Tertiary age are present in the western half of the area (Larsen and Cross, 1956).

## ROCK TYPES

Rock types have been differentiated on aerial photographs of this area on the basis of weathering and vegetation characteristics and photographic tone. The following descriptions pertain primarily to criteria used in compiling these maps from vertical aerial photographs.

### Igneous and metamorphic rocks

#### Precambrian rocks

Precambrian granites, schists and gneisses (Derzay, 1956) are present in northwestern Iris SE quadrangle and along Cochetopa Creek and its tributaries. On photographs, they are light in tone and jointing is well defined. Precambrian rocks visible on Razor Creek in Doyleville SW quadrangle may be intrusives (Larsen and Cross, 1956, pl. 1).

#### Tertiary rocks

Extrusive rocks.--Extrusive rocks of the Potosi volcanic series of Miocene age cover a major part of both quadrangles. On aerial photographs they are distinguished from other rocks in the area by their massive appearance. Cross and Larsen (1956, pl. 1) separate these rocks into three units: Piedra rhyolite, Alboroto rhyolite, and Conejos quartz latite. Although local areas of differing photographic tone and texture, possibly representing different rock types, can be distinguished, no correlation with the above three units could be established.

Two areas in Doyleville SW quadrangle show conspicuous features on photographs that may be of geologic significance. One area is in the N $\frac{1}{2}$  sec. 30, T. 47 N., R. 3 E., where low vegetation, probably brush, is concentrated in dense, subcircular clumps that are not seen elsewhere in the map area. The other conspicuous area is in the NW $\frac{1}{4}$  sec. 12, T. 46 N., R. 2 E., where rocks are very light in photographic tone and appear to be different from the surrounding terrane. These rocks appear to resemble light-toned exposures seen in Iris SE quadrangle in the NE $\frac{1}{4}$  sec. 32, T. 47 N., R. 3 E. In the absence of field checking it was not possible to determine which of the three extrusive rock units are represented by these distinctive areas.

Intrusive rocks.--Intrusive rocks are recognized on photographs because of their topographic expression and light photographic tone; they are seen as resistant pinnacles and ridges. Although dikes are easily recognized on the photographs, other types of intrusions, such as sills and laccoliths, cannot be distinguished. Larsen and Cross (1956, pl. 1) differentiate "rhyolite and granite porphyry" intrusive bodies and "intrusives of Conejos age" on the basis of field study, but these intrusive rocks cannot be differentiated by their appearance on aerial photographs.

#### Sedimentary rocks

##### Morrison formation

The Morrison formation of Late Jurassic age has been differentiated on photographs of this area as the interval between overlying resistant Dakota sandstone and underlying jointed Precambrian rocks. According to Derzay (1956, p. 138), the formation is about 200 feet thick; the upper 140 feet, the Brushy Basin member, consists of alternating mudstones and

sandstones, and the lower 60 feet, tentatively assigned to the Salt Wash member, consists of white fine-grained poorly cemented sandstone. On aerial photographs the basal beds of the formation appear as a resistant ledge on the Precambrian surface along Cochetopa Creek. In the upper part of the formation bedding is inferred by the banded appearance of vegetation. On these maps, the members of the formation have not been differentiated.

#### Dakota sandstone

The Dakota sandstone of Cretaceous age appears on photographs as a dark resistant layer capping low hills in northeastern Doyleville SW quadrangle and southward along Cochetopa Creek. Bedding is well defined on aerial photographs. According to Derzay (1956, p. 138) the formation is about 100 feet thick in the vicinity of the Los Ochos mine.

#### Mancos shale

The Mancos shale of Late Cretaceous age weathers to a surface of low relief and is generally barren of vegetation. Bedding is poorly defined on aerial photographs. The formation is differentiated as the interval between underlying distinctly bedded rocks (Dakota sandstone) and overlying massive volcanics.

### STRUCTURE

Sedimentary rocks lie on an essentially flat surface on Precambrian rocks and dip generally 2-3 degrees in an easterly direction. Folds appear to be absent, but faults present an extremely complex structural terrain. The Los Ochos fault, the most prominent fault in the map area, can be traced on the photographs for a distance equivalent to about 6 miles. The Los Ochos pitchblende deposit is located on the intersection of this fault and a

transecting shear zone. Similar fault intersections are favorable to mineral deposition in this area (Derzay, 1956). The Los Ochos fault is one of an east-west trending set which appears to extend westward as far as the northwestern corner of Iris SE quadrangle where numerous faults are visible on photographs.

Faults have been mapped where displacement of rocks is visible on photographs. Questioned faults shown on the map are inferred only by breaks in vegetation and topography. Unidentified linear features seen on the photographs also may represent small faults or fractures. Most of the faults are in pre-volcanic rocks, although a few faults appear to cut the volcanic rocks.

#### REFERENCES CITED

- Cross, Whitman, and Larsen, E. S., 1935, A brief review of the geology of the San Juan region of southwestern Colorado: U. S. Geological Survey Bull. 843, 138 p.
- Derzay, R. C., 1956, Geology of the Los Ochos uranium deposit, Saguache County, Colorado: U. S. Geol. Survey Prof. Paper 300, p. 137-141.
- Larsen, E. S., Jr., and Cross, Whitman, 1956, Geology and petrology of the San Juan region, southwestern Colorado: U. S. Geol. Survey Prof. Paper 258, 303 p.