

# URANIUM DEPOSITS

Covered by the Radiant Claims,  
Kane County, Utah

by

ALFRED M. BURANEK



CIRCULAR NO. 17

of the

**UTAH GEOLOGICAL AND MINERALOGICAL SURVEY**

COLLEGE OF MINES AND MINERAL  
INDUSTRIES

University of Utah  
Salt Lake City, Utah



1942

Reprinted  
May, 1959

## UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

The Utah Geological and Mineralogical Survey was authorized by act of the Utah State Legislature in 1931; however, no funds were made available for its establishment until 1941 when the State Government was reorganized and the Utah Geological and Mineralogical Survey was placed within the new State Department of Publicity and Industrial Development where the Survey functioned until July 1, 1949. Effective as of that date, the Survey was transferred by law to the College of Mines and Mineral Industries, University of Utah.

The *Utah Code Annotated 1943, Vol. 2, Title 34*, as amended by *chapter 46 Laws of Utah 1949*, provides that the Utah Geological and Mineralogical Survey "shall have for its objects":

1. "The collection and distribution of reliable information regarding the mineral resources of the State.

2. "The survey of the geological formations of the State with special reference to their economic contents, values and uses, such as: the ores of the various metals, coal, oil-shale, hydro-carbons, oil, gas, industrial clays, cement materials, mineral waters and other surface and underground water supplies, mineral fertilizers, asphalt, bitumen, structural materials, road-making materials, their kind and availability; and the promotion of the marketing of the mineral products of the State.

3. "The investigation of the kind, amount, and availability of the various mineral substances contained in State lands, with a view of the most effective and profitable administration of such lands for the State.

4. "The consideration of such other scientific and economic problems as, in the judgment of the Board of Regents, should come within the field of the Survey.

5. "Cooperation with Utah state bureaus dealing with related subjects, with the United States Geological Survey and with the United States Bureau of Mines, in their respective functions including field investigations, and the preparation, publication, and distribution of reports and bulletins embodying the results of the work of the Survey.

6. "The preparation, publication, distribution and sale of maps, reports and bulletins embodying the results of the work of the Survey. The collection and establishment of exhibits of the mineral resources of Utah.

7. "Any income from the sale of maps and reports or from gifts or from other sources for the Survey shall be turned over to the State Treasurer and credited by him to a fund to be known as the Survey Fund to be used under the direction of the Director of the Survey for publication of maps, bulletins or other reports of investigation of the Geological and Mineralogical Survey."

The Utah Geological and Mineralogical Survey has published maps, circulars, and bulletins as well as articles in popular and scientific magazines. For a partial list of these, see the closing pages of this publication. For other information concerning the geological and mineralogical resources of Utah address:

ARTHUR L. CRAWFORD, *Director*

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

College of Mines and Mineral Industries

University of Utah

Salt Lake City, Utah

## F O R E W O R D

The following brief report was written long before atomic bombs had given uranium its modern significance.

The original circular was distributed during the infancy of the Utah State Department of Publicity and Industrial Development. No library copies were preserved for reference. A change in the state administration allowed the Department to become defunct. Most of its files were dissipated. Among those salvaged by the transfer of the Utah Geological and Mineralogical Survey to the University of Utah was but one copy of this Circular 17. Apparently no others had been preserved. From this lone copy the drawings had been severed and lost. A diligent search revealed no others. Hoped-for funds did not materialize to make a restudy possible. Reprinting was deferred to recover the original drawings.

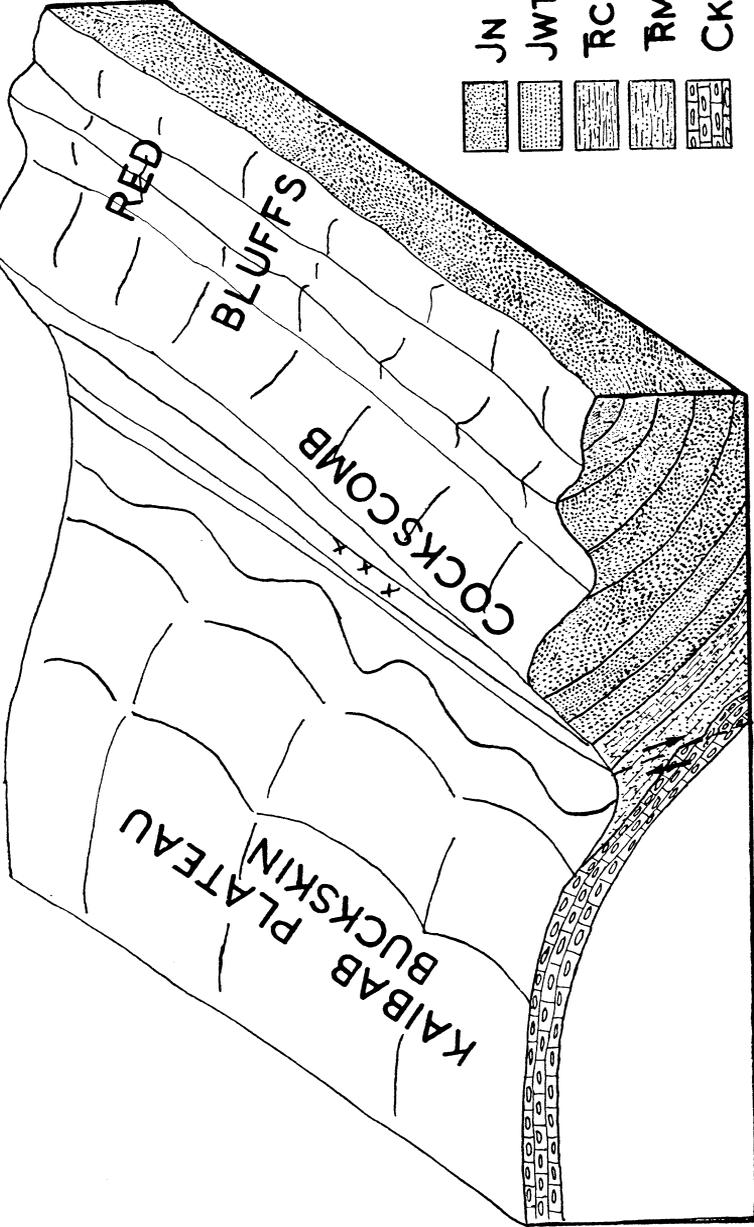
In the meantime, LeRoy Wilson, the owner mentioned in the report has been murdered--shot in the back as he prospected a lonely trail with geiger counter in hand, seeking other uranium deposits in the Kanab area.

A modern report will eventually be published by the Atomic Energy Commission by which these uranium deposits have now been investigated. The anticipation of this report has long delayed reprinting the older Buranek circular. However, the repeated request for something on this deposit now that the new paved highway from Kanab to Glen Canyon has been constructed so near it seems to justify reprinting the old circular without further delay--even though we cannot locate the missing illustrations.

ARTHUR L. CRAWFORD, DIRECTOR

UTAH GEOLOGICAL AND MINERALOGICAL SURVEY

HOUSE ROCK VALLEY



- JN NAVAJO
- JWT WINGATE
- RC CHINLE
- RM MOENKOPI
- CK KAIBAB

URANIUM DEPOSITS KANE COUNTY, UTAH

SEC. 24 T. 42 S. R. 2 W.

U R A N I U M   D E P O S I T S  
COVERED BY THE RADIANT CLAIMS

KANE COUNTY, UTAH

by

Alfred M. Buranek<sup>1/</sup>

Location:

The uranium deposits covered by the Radiant Claims are roughly 40 miles east and north by road from Kanab, Utah. A ranch owned by Mr. D. Robinson of Kanab is approximately 2 miles to the northwest. The holdings are in the Cockscomb escarpment of the Red Bluffs in Section 24, T. 42 S., R. 2 W., S.L.B.M. The Cockscomb is a local term applied to the west, ridge-like portion of the Red Bluffs.

To the west of the property is the Kaibab Plateau, sometimes called the Buckskin Plateau. Between the excarpment and the Kaibab Plateau is House Rock Valley, trending in a north-south direction. The uranium deposits examined are in the west face of the Cockscomb several hundred feet above the canyon floor. A number of small workings that prospect the deposits are plainly visible as one approaches the property from the north. From the Cockscomb escarpment the Paria River can be seen several miles to the east.

The property may be reached by taking the Paria road, a few miles out of Kanab, and following it for approximately 30 miles to a side road from the south. This is the Robinson Ranch road which intersects the Paria road about 6 miles west of Paria. From this intersection, follow the Robinson Ranch road to the ranch, and then continue on several miles farther over an old road that follows the stream bed in a southeast direction to the claims.

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<sup>1/</sup> Geologist (in 1942), Raw Materials Division, Utah  
Publicity & Industrial Development.

Owners:

The Radiant Claims are controlled by Mr. LeRoy A. Wilson of Bull Valley, Utah, post office address, Box 14, Veyo, Utah.

Transportation:

At the time of the writer's visit to the claims (October 25,26, 1941) the roads were in poor condition, due in part to a recent storm which left many muddy spots and washouts. In dry weather, the dirt road from Kanab toward Paria is fairly well kept by ranchers and cattlemen who have interests in this general vicinity.

The only grade of importance encountered from Kanab to the holdings is the last few miles where one leaves the plateau country to go down into House Rock Valley, but even here the grade is gentle, being lengthy rather than abrupt. The short distance from the Paria road to Robinson's Ranch and the uranium deposits is almost impassable with the average modern automobile. A few days work with a bulldozer might result in a passable road as long as the dry weather lasted, but it is the writer's opinion that a number of culverts would have to be laid to make a road of any permanence. The characteristic rainstorm of this area is a violent shower which, in a few minutes time, makes an ordinary dry wash a raging torrent. The usual storm is probably short-lived, but evidence of its violent nature is plainly seen in the many ravines of narrow width and great depth. If the property owners worked the mine only during the dry seasons of each year, a passable road might be maintained at comparatively small cost. On the other hand, a permanent road to the property would involve considerable work and outlay of capital for construction.

Geology:

A generalized section of the rock formations exposed in the uranium district about nine miles south of Paria, Utah, follows:

(Navajo sand-  
Lower Jurassic: Glen Canyon stone  
Group (Wingate sand-  
stone

Upper Triassic: Chinle  
Lower Triassic: Moenkopi  
Permian: Kaibab limestone

The Shinarump conglomerate of upper Triassic and the Kayenta formation of lower Jurassic were not observed near the claims, but fossil wood and abundant conglomeritic pebbles of the Shinarump outcrop at Robinson's Ranch.

Structurally these rocks here form the east limb of the Kaibab Monocline that defines the eastern border of the Kaibab Plateau and extends from the Colorado River northward to the Table Cliffs, a distance of 120 miles. The Monocline ranks as a major structure of the Kaiparowits region and the plateau country.<sup>2/</sup>

According to Gregory the maximum difference in elevation of similar beds on either side of this fold approaches 5,000 feet. The flexure itself accounts for most of this displacement, but locally at least (the length of House Rock Valley) the sandstones of the Chinle formation and the Glen Canyon group have been down-faulted against Moenkopi shales. (See diagram.)

The Kaibab limestone stripped of the overlying Mesozoic sediments forms the west wall of the valley and the east margin of the Kaibab Plateau. Triassic shales and sandstones (Moenkopi formation), being less resistant, form the valley floor. The east wall of the valley, locally termed the Cockscomb, is composed of the Glen Canyon group of sandstones, underlain by thin-bedded varicolored Triassic (Chinle) shales and fine-grained sandstones.

The Radient Claims are in sandstone beds that strike almost north-south and dip about 30° to the east. The beds become steeper in dip as one approaches the top of the Cockscomb ridge. At the summit they are almost vertical. Eastward from this point, the beds slowly level out until they are practically flat-lying with little or no dip.

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<sup>2/</sup> Gregory, H. E., and Moore, R. C., The Kaiparowits Region: U. S. Geological Survey Professional Paper No. 164, p. 122, 1931.

### Origin and Occurrence of the Uranium Minerals:

The sandstone carrying the values of uranium and copper is of even texture, rather coarse in grain and light gray in color. Usually it is compact but in places fairly porous. The uranium-copper minerals occur in either the Wingate member of the lower Jurassic, or the upper part of the Chinle member of upper Triassic. They have been deposited along small vertical fractures cutting across the sandstone beds. From this fracture zone uranium-copper solutions have migrated into a bed of porous sandstone and precipitated autunite, torbernite, and copper carbonates. The thickness of the mineralized sandstone is roughly 10 feet. Ore deposits of this type are characteristically lenticular in form and usually small, but in this case, the impregnation of the strata with the uranium-copper minerals may cover a large area. Several mineralized outcrops were observed in the sandstone bed over a distance of approximately 750 feet.

The mineralogy differs from other uranium-vanadium deposits of the state. The uranium-copper minerals were unquestionably later than the sandstone and were deposited by circulating solutions that precipitated their load in areas favorable for deposition. Evidence of mineralization is found in the bleached sandstone areas on either side of the mineralized fracture zones. The bleached sandstone is gray, although the general series of rocks is buff-red in color.

The lack of fossilized wood or other organic remains is noticeable in this deposit, because evidence of organic remains is common to practically all of the uranium-vanadium-copper deposits of the state.

From observation it is apparent that deposition was concentrated in porous sandstone where the bedding is intersected by the vertical fractures entirely free of any organic remains. The pattern of veinlets and the secondary nature of the minerals, containing as they do uranium and copper with only a trace of vanadium, indicate that carnotite or similar minerals were deposited elsewhere in this area and that subsequent circulating waters containing copper,

leached uranium from the uranium-vanadium deposits and redeposited the uranium and copper in the sandstone member of the "Cockscomb." Field evidence indicates that vanadium has a tendency to remain close to its source, while uranium migrates great distances. Usually, deposits of carnotite and other vanadium-uranium ores of San Juan and Grand Counties, Utah, are generally concentrated around fossilized organic remains. A fossilized tree may contain high values in uranium and vanadium. However, vanadium is usually present in the outer zones whereas uranium is absent.

Heikes<sup>3/</sup> observed "at the Blue Dike prospect in White Canyon, waters that are seeping out of certain strata carry uranium, copper, and other metals, mainly as sulphates, indicating the readiness with which the metals are taken into solution." Thus, the deposit near Paria might owe its origin to solutions that have traversed older bodies of carnotite (or some similar mineral), dissolving the uranium and redepositing it with copper. This hypothesis would explain the occurrence in quantity of the relatively rare minerals, autunite and torbernite, near Paria.

Most Utah districts in which important vanadium and uranium deposits have been discovered are associated with large structural features. The Paria deposit is associated with the sharp monoclinical fold that defines the eastern border of the Kaibab Plateau, and was formed apparently after the tilting, folding and faulting of the Kaibab Monocline. The structural features caused by this movement controlled to a certain extent the circulation of ground water in this region and eventually mineralized solutions bearing copper and uranium entered the sandstone by means of fracture zones such as that exposed in the workings of the Radiant Claims.

#### Development:

The property is developed by several small workings on the west face of the Cockscomb. They may be divided into two groups: (1) the

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<sup>3/</sup> Heikes, V. C., The Ore Deposits of Utah: U. S. Geol. Survey Prof. Paper 111, p.157, 1920.

lower workings consist of a small dump and a shallow inclined shaft, now caved, and a small prospect hole some 750 feet to the south on approximately the same bedding of sandstone; (2) the upper workings comprise several small prospect holes and one small dump. The upper workings are roughly 150 feet above the lower.

#### Mineralogy:

The uranium-copper minerals occur in the lower workings prospected by the shallow inclined shaft. The fluorescent minerals are exposed in an area roughly 10 feet by 15 feet. These minerals fluoresce a brilliant yellow-green under ultraviolet light. The fluorescing color is somewhat comparable to the fluorescence of some types of hyalite opal.

The dominant uranium minerals in the sandstone are autunite (a hydrous phosphate of uranium and calcium) and torbernite (a hydrous phosphate of uranium and copper). The autunite is yellow in color and is plainly visible to the unaided eye as small flakes disseminated throughout the sandstone. The green torbernite occurs as small sun-bursts or incrustations associated with the autunite.

The small fracture zone observed in the face of this working, cuts almost vertically through the sandstone beds. The broken material in the fracture zone contains the highest percentage of fluorescent minerals. Upon this fact plus the observation that mineral concentrations diminish laterally away from this zone is based the writer's opinion that solutions carrying the uranium and copper entered the sandstone bed by this avenue.

Approximately 750 feet to the south in the same sandstone member is another small prospect. None of the yellow or green minerals were observed in the hand specimen, but under the ultraviolet light this material glowed almost as brightly as the ore from the main pit. Whether this deposit is laterally connected with the other is not known. It is more probable that another similar fracture zone or feeder has been responsible for this deposit.

Along with the uranium minerals a brownish stain was noted in the weathered rocks. It does not fluoresce, but may be the end product of the breaking down of the uranium minerals. Rocks having this stain are strewn over the dump and outcrop on either side of the working. As yet this substance has not been identified.

Malachite and azurite were noted in a shallow prospect pit about 150 feet above the main uranium pit. The malachite and azurite also have been deposited in small fractures in the sandstone. One small rosette of crystallized azurite was found in a vuggy piece of sandstone. Although many samples were collected from this deposit, which is similar in every way to the uranium deposit above described, none of the yellow autunite or fluorescence was noted.

Only fluorescent specimens were taken for analysis because the deposit (if of economic significance) could be mined by using ultra-violet equipment and following the procedure used in scheelite mining. A generous sample of the fluorescent material was submitted to Crismon and Nichols, assayers in Salt Lake City, for analysis. They reported as follows:

Uranium oxide	- $U_3O_8$	0.25%
Vanadium oxide	- $V_2O_5$	Trace
Copper		0.05%

Markets:

The writer knows of no other buyer <sup>4/</sup> for this ore than the Vitro Corporation in Philadelphia. At present this company purchases all of the high grade carnotite ores of San Juan and Grand Counties. Whether they would be interested in a uranium ore with content as low as 0.25%  $U_3O_8$  is not known.

Mr. K. N. Garard of the Vanadium Corporation of America, now superintendent of the V.C.A.'s new plant at Monticello, Utah, stated

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<sup>4/</sup> Note that this is reprinted from a circular written in 1942, before the "atomic bomb" and the feverish demand for uranium resulting therefrom.

that the plant at Monticello will save only the vanadium content of the uranium-vanadium ores of the San Juan-Grand County areas. According to Mr. Garard, there is no market for quantity production of uranium, as it finds only a limited use in ceramic and paint industries.

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### Guidebooks to the Geology of Utah

No. 3 (1948) "Geology of the Utah-Colorado Salt Dome Region, with Emphasis on Gypsum Valley, Colo.," by Wm. Lee Stokes, University of Utah.....	\$2.50
No. 4 (1949) "The Transition Between the Colorado Plateaus and the Great Basin in Central Utah," by Edmund M. Spleker, Ohio State University.....	\$3.00
No. 6 (1951) "Geology of the Canyon, House, and Confusion Ranges, Millard County, Utah," a symposium by twelve authorities.....	\$4.00
No. 7 (1952) "Cedar City, Utah, to Las Vegas, Nevada." A symposium by 17 specialists .....	\$4.00
No. 8 (1952) "Geology of the Central Wasatch Mountains, Utah." A symposium volume by various authorities on this area, with roadlogs and definitive data so arranged as to be of maximum use to a visiting geologist.....	\$3.50
PLATE 1 Extra copies Geologic Map of Central Wasatch Mountains East of Salt Lake Valley, Utah, with roadlogs; from Guidebook No. 8.....(RS-38)	\$ .50
No. 9 (1954) "Uranium Deposits and General Geology of Southeastern Utah." The occurrence, mineralogy, chemistry, origin and technology of the Colorado Plateau-type uranium deposits — a symposium by AEC scientists and other authorities, edited by one of the authors, Dr. William Lee Stokes, who in 1941 wrote his Ph.D. thesis on the Morrison formation from which has come 60 per cent of the uranium production to date in this region.....	\$3.00
No. 10 (1955) "Tertiary and Quaternary Geology of the Eastern Bonneville Basin." A re-examination of the "Salt Lake formation," and of events portrayed by it and by younger valley fill. A symposium of Ph.D. theses and other special research on the volcanic, erosional, and sedimentary record of Bear River, Ogden, Weber, and Jordan Valleys. Edited by Dr. Armand J. Eardley.....	\$4.00
No. 11 (1956) "Geology of Parts of Northwestern Utah." Stresses the Raft River Mountains and the Promontory region.....	\$4.00
No. 12 (1957) "Geology of the East Tintic Mountains and Ore Deposits of the Tintic Mining Districts." Summarizes the published information on these famous mining districts and contributes new data and ideas by modern authorities. Emphasis has been placed on the regional environment of the districts, factors controlling localization of ore in the mines, and exploration for new ore deposits.....	\$4.00
No. 13. (1958) "Geology of the Stansbury Mountains, Tooele County, Utah. Chiefly by J. Keith Rigby. Supplemental section on the northern Stansbury Range and Stansbury formation by William L. Stokes and Dwight E. Arnold. Emphasis is given to the stratigraphy, structure, and geomorphic history of the Stansbury Range .....	\$4.00
RS-67b — Geology of the Desert Peak Quadrangle Southern Stansbury Mountains, Tooele County, Utah. 30 cents each or 75 cents per set. Limited supply.	
RS-67c — Geologic Cross Sections of the Stansbury Mountains. 30 cents each or 75 cents per set.	