Uranium Deposits on Mesas I 1/2 and II 1/2
Lubachubai Mountains, Northeast Arizona

by

J.A. Masters and R.D. Blum

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URANIUM DEPOSITS
ON
MESAS II₂ AND III₃
LUKACHUKAI MOUNTAINS, NORTHEAST ARIZONA

by
John A. Masters
and
Richard D. Blum

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October 24, 1951
(Grand Junction, Colorado)
URANIUM DEPOSITS

ON

MESAS I½ AND II½

LUKACHUKAI MOUNTAINS, NORTHEAST ARIZONA

Names and Addresses of Property Owners:

All land within the Navajo Indian Reservation is owned by the Navajo Indian Tribe and only Indians are permitted to file claim to mineral ground. The Reservation is under the jurisdiction of Allan G. Harper, Area Director, Office of Indian Affairs, U. S. Department of the Interior, Window Rock, Arizona.

The following Navajo Indians claim mineral rights on Mesas I½ and II½ of the Lukachukai Mountains, Northeast Arizona:

- Koley Black
  - Shiprock
  - New Mexico

- Dan Phillips
  - Shiprock
  - New Mexico

Mr. Black and Mr. Phillips are associated with the Navajo Uranium Mining Company, of Cortez, Colorado.
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ABSTRACT

Mesas I½ and II½ were investigated in October 1951, to determine the extent and degree of uranium mineralization in the Salt Wash sandstone. Carnotite-vanoxite-type minerals are sufficiently concentrated to recommend 14,600 feet of drilling.

INTRODUCTION

The Lukachukai Mountains are in Apache County, northeastern Arizona, about 35 miles southwest of Shiprock, New Mexico, in the Navajo Indian Reservation. The Atomic Energy Commission has a base camp at Cove, Arizona (Index Map, fig. 1). The camp is accessible from a point on U. S. Highway 666 five miles south of Shiprock by 35 miles of graded road. An airstrip suitable for light planes is located 2 miles east of Cove. Mesas I½ and II½ may be reached on foot from the roads to Mesa I and Mesa II.

The subject areas on the northeast rim of the Lukachukai Mountains were examined in October 1951, to determine the advisability of exploratory drilling. Attention has been focused on the small mesas as a result of the large ore reserves discovered by the Atomic Energy Commission drilling on Mesa IV½.

Mineralized outcrops were tested with a Detectron counter and chip samples were taken for chemical assaying.

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Mesa I\textsubscript{1/2} is claimed by Koley Black and Mesa I\textsubscript{11/2}, by Dan Phillips, both of Shiprock, New Mexico. They are associated with the Navajo Uranium Mining Company, of Cortez, Colorado.

Map coverage of the area includes:

1. Aerial photos (Scale: 1" = 500') by Jack Ammann, Photogrammetric Engineer, San Antonio, Texas.

2. Topographic maps (Scale: 1" = 500') constructed from aerial photos by the U. S. Geological Survey.

3. U. S. Geological Survey aerial photos (Scale: 1" = 3,333').

Previous geologic work in the area includes the early exploration of H. E. Gregory (1917) and recent reports by Ellsworth (1951), Ellsworth and Hatfield (1951), King (1951), King and Ellsworth (1951), Masters (October 1951), and Stafford (1951). Ray Starr, prospector for the Navajo Uranium Mining Company, investigated Mesas I\textsubscript{1/2} and I\textsubscript{11/2} in September 1951. Indian prospectors had previously investigated the area.

On the northeast mesas of the Lukachukai Mountains, in an area surrounding Mesas I\textsubscript{1/2} and I\textsubscript{11/2}, the Atomic Energy Commission drilled in 1950-51 a total of 140,000 feet and discovered about 170,000 tons of indicated and inferred ore. Navajo Uranium Mining Company ships a monthly average of 1,200 tons of 0.30% U\textsubscript{3}O\textsubscript{8} from mines on Mesa I. Climax Uranium Company ships a monthly average of 300 tons of 0.30% U\textsubscript{3}O\textsubscript{8} from mines on Mesa IV\textsubscript{1/2}.

GENERAL GEOLOGY

The stratigraphy of Mesas I\textsubscript{1/2} and I\textsubscript{11/2} is identical to that of the other Lukachukai mesas and has been adequately discussed in previous reports by Stafford (1951), King (1951), and Masters (October 1951).

It is sufficient to state that the carnotite-bearing Salt Wash sandstone member of the Morrison formation ranges in thickness from 100 to 150 feet and consists of pink to gray, fine-grained, limy, quartzose sandstone, interbedded with thin layers of red to gray mudstone. The Salt Wash is underlain by the Recapture shale member of the Morrison. Cross-bedded channel sandstones alternating laterally and vertically with horizontally bedded, shaly, flood-plain sandstones attest to deposition of the Salt Wash by braided, aggrading streams flowing across a gently undulating surface (Masters, 1951).
The strata have a rather uniform northwest strike and a gentle northeast dip of 120° toward the axis of the Lukachukai syncline. (pl. I).

GEOLOGY OF THE DEPOSITS

Ore-grade carnotite-vanoxite-type deposits occur 60 to 80 feet above the Bluff sandstone at several places along the Salt Wash rim. Plate I shows location of all mineralized outcrops and contains a table which lists the grade and thickness of chip samples taken from the middle of each outcrop. These samples are not necessarily repre- sentative of the entire mineralized outcrop. As on the other Lukachukai mesas, ore-grade carnotite deposits are restricted to light to dark gray, cross-bedded, channel sandstone.

Both mesas are located within the so-called "mineralized belt" of the northeast rim, which extends from Mesa I to Mesa V. On both mesas, the rim-mineralization ratio (Masters, 1951) (total footage of mineralized rim/total footage of rim) is 4 to 5%. Previous exploration of the Lukachukai mesas indicated that mesas with rim-mineralization ratios over 3% warrant drilling.

Carnotite and vanoxite type minerals predominate. Pintadoite (hydrous calcium vanadate) was seen at two localities.

RECOMMENDATIONS

Mesa I¼

A favorable drilling area on Mesa I¼ is shown on Plate I. Proposed holes are located 400 to 500 feet apart; 18 diamond drill holes about 150 feet in depth, and 14 holes about 300 feet in depth are recommended. The holes are located according to topography and mineralized outcrops. South of the dashed line shown on Plate I, the Salt Wash outcrop was not examined. From a viewpoint on Mesa II, the outcrop at the south end of the canyon appears to be very shaly as shown by the amount of tree and brush cover. Prospectors reported no mineralization. These two factors led the writers to believe that it was unnecessary to investigate the rim. However, from new roads south of the canyon, it can be seen that the Salt Wash contains favorable lenticular sandstones. At present, the ground is covered with snow, and the outcrop cannot be walked with safety until spring. However, the area is known to lie within a north to northeast trending "mineralized belt" (Masters, October 1951). The writers tentatively recommend five "wildcat" holes, about 300 feet in depth, to test favorability of the unexplored ground. Allowing for 12 offset holes about 200 feet in depth, total recommended drill footage is 11,000 feet.
Slightly more than 3 miles of road building is necessary (pl. I). No rock blasting is anticipated. Water for drilling is available at the bottom of the Mesa II road and on the south side of the mountains (Lukachukai Project No. 3).

Navajo Uranium Mining Company has completed a preliminary survey for a rim road from Mesa I around Mesa I½. Completion of the road will facilitate field investigation and permit more careful study of the drilling area. Presumably more mineralized outcrops will be exposed, which should influence the location of drill sites. It is suggested that exploration of Mesa I½ be postponed until the rim road is completed in the spring of 1952. Another road is planned from Mesa II to outcrop No. 6 on Mesa I-3/4. The Atomic Energy Commission can aid the development of that mesa by providing 3,000 to 4,000 feet of drilling and about 1-1/2 miles of drill road. It is suggested that plans for exploration of Mesa I-3/4 also be postponed until the spring of 1952.

Mesa I½

A favorable drilling area on Mesa I½ is shown on Plate I. A row of 12 holes about 200 feet in depth and spaced about 500 feet apart is recommended. The holes are located according to topography and mineralized outcrops. Allowing for six offset holes, total recommended diamond drill footage is 3,600 feet. The upper part of the proposed holes can be drilled by plug bit, but work in the Salt Wash section should be cored, if subsurface mapping is contemplated. Slightly more than one mile of road building is necessary (pl. I). No rock blasting is anticipated. Water for drilling is available at the bottom of the Mesa II road.
BIBLIOGRAPHY


Explanations:
- Salt Wash - Bluff Contact
- Roads
- Proposed Roads
- Ore-grade Outcrop, determined by chip samples assayed by G.J.E.B. and Navajo Uranium Mining Co.
- Mineralized Outcrop
- Structure Contour (Dashed where inferred)
- Ore Hole
- Mineralized Hole
- Proposed Drill Hole

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<th>OUTCROP LENGTH (FT.)</th>
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<th>% U3O8</th>
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Salt Wash has not been examined south of this line.

To join road from Mesa II to southside Mtns.