

TM 356

Technical
Memorandum 356

Investigation of Uranium Mineralization
on the Liba No. 2 and Liba No. 17
Claims Near Cameron, Coconino County,

Arizona

by

I. B. Gray

1957

ARIZONA GEOLOGICAL SURVEY

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UNITED STATES ATOMIC ENERGY COMMISSION

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COUNTY, ARIZONA

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January 14, 1957

Flagstaff, Arizona

INVESTIGATION OF MINERALIZATION ON THE LIBA NO. 2
AND LIBA NO. 17 CLAIMS NEAR CAMERON, ARIZONA

By Irving B. Gray, Area Geologist, USAEC

- SUBJECT:** Investigation of a reportedly large low-grade ore body in the vicinity of Cameron, Arizona.
- CLAIMS:** Liba No. 2 and Liba No. 17.
- LOCATION:** Approximately ten miles SE of Cameron, in the NE $\frac{1}{4}$ Section 4, T 27 N, R 10E, Coconino County, Arizona.
- ACCESS:** About eight miles of good dirt road leading ESE from a point on U. S. Highway 89 approximately seven miles SSW of Cameron, Arizona.
- OWNERSHIP:** Messrs. Hollingsworth and Travis, Dallas, Texas.
- INTERESTS:** Mr. Stephen Black of the Blackwood Oil and Mining Corp., 523 Title and Trust Building, Phoenix, Arizona. Messrs. Hollingsworth and Travis are presumably affiliated with the Blackwood Oil and Mining Corp.
- INSTIGATION:** During September 1956, Mr. Stephen Black requested that the Exploration Division of the Grand Junction Operations Office of the USAEC make an examination of their property near Cameron, Arizona. Mr. Black stated that about 2,000 holes averaging 60 feet in depth had been drilled, and that 8 to 10 exploratory pits had been dug. He further stated that there was an estimated 3,000,000 tons of "ore" averaging 0.12% to 0.15% U₃O₈, but that the "ore" was out of equilibrium and that there was some doubt as to the estimates of tonnage and grade. His interests in an AEC examination were to compare AEC with private estimates of grade and tonnage for purposes of considerations pertinent to installation of an upgrading plant. A previous attempt at upgrading this "ore" by this corporation reportedly was discontinued when the concentrate failed to meet mill requirements (Tuba City Mill) on grade and amenability.
- PRELIMINARY RECONNAISSANCE:** Mr. Black and Mr. I. B. Gray, Area Geologist, USAEC, made a preliminary field reconnaissance of the area on 23 October 1956. Mr. Black indicated that he was primarily interested in grade and tonnage data on the Liba No. 2 and Liba No. 17 claims where a large mineralized "channel" existed, and where most of their

exploration had been done to date. Maps, reports and drill hole information for these claims were made available. A reconnaissance of several other claims owned by Mr. Black's company in that area was also made during the trip.

GEOLOGIC

INVESTIGATION: A reconnaissance in that area indicates that the mineralization of the Liba No. 2 and Liba No. 17 claims is localized near the top of the Shinarump member of the Triassic Chinle formation (see Section AA¹ on accompanying map). A favorable lithology appears to have been primarily responsible for the precipitation of uranium from solutions of an unknown source. An elongate north-south trending "channel type" scour into a subjacent massive sandstone stratum near the top of the Shinarump member, with subsequent (or concomitant) filling of this scour by a highly heterogeneous lithology consisting of conglomerate, sandstone, mudstone galls, bedded mudstone, and carbon trash appears to have prepared a chemical and physical environment favoring deposition and retention of the uranium minerals. Mineralization is not continuous throughout the favorable lithologic unit. Crossbedding indicates that transport direction within the "channel" was towards the north.

MINERALOGY: Uranium mineral identification was not attempted. Channel samples were taken from top to bottom of the strongest mineralized zones found on the walls of the pits. Varying depths of the mineralized intervals in adjacent pits would indicate that mineralized "lenses" may be more or less laterally discontinuous and vertically separated.

Fifteen samples were assayed for U₃O₈, chemically and radiometrically. Of these fifteen, four were also assayed for V₂O₅ and CaCO₃. The V₂O₅ averaged 0.02% and the CaCO₃ averaged 0.6%, coinciding closely in V₂O₅ and CaCO₃ content to ores in the overlying Petrified Forest member of the Chinle formation in the Cameron area. The accompanying table indicates that the uranium is not unduly out of equilibrium when considered as a whole, although individual samples are often out of equilibrium. The anomalous condition of adjacent samples being strongly, and oppositely, out of equilibrium was reported by a Rare Metals Corporation official for their Huskon No. 11 claim adjacent to, and forming the northern extension to, the Liba No. 2 mineralization. Pit No. 13 is not shown on the accompanying map. It is located approximately 300 feet south of the Liba No. 17 claim in a probable southward extension to the mineralized trend.

LUCIUS PITKIN, INC.

CERTIFICATE OF ASSAY

| <u>Pit No.</u> | <u>Thickness Represented in Feet</u> | <u>% c U₃O₈</u> | <u>% e U₃O₈</u> | <u>% V₂O₅</u> | <u>% CaCO₃</u> | <u>Remarks</u> |
|----------------|--------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 7.8 | 0.09 | 0.04 | 0.02 | 0.5 | |
| 2 | 9.7 | 0.32 | 0.20 | | |) Samples taken on opposite side of) same pit. Combined on accompanying) map to show 9.7 ft. of 0.22% U ₃ O ₈ . |
| 2 | 9.7 | 0.11 | 0.06 | | | |
| 3 | 8.3 | 0.12 | 0.06 | | | |
| 5 | 5.5 | 0.04 | 0.05 | | | |
| 8 | 2.0 | 0.10 | 0.14 | | | |
| 3 | 9 | 4.0 | 0.04 | 0.05 | | |
| 10 | 5.5 | 0.06 | 0.09 | | | |
| 11 | 10.2 | 0.10 | 0.07 | | | |
| 12 | 1.5 | 0.05 | 0.06 | | | |
| 13 | 5.6 | 0.04 | 0.07 | 0.02 | 0.9 | Not shown on accompanying map. Located approximately 300 feet south of Liba No. 17 claim. |
| 14 | 4.0 | 0.04 | 0.04 | 0.01 | 0.3 | |
| 15 | 20.0 | 0.05 | 0.11 | 0.03 | 0.7 | |
| 16 | 2.0 | 0.09 | 0.10 | | | |
| 17 | 3.3 | 0.09 | 0.15 | | | |

ORE RESERVES,
DESCRIPTIONS:

Reserves were computed according to definitions specified by the E. A. Youngberg memorandum dated October 11, 1956, subject: "Definitions of Classes of Ore Reserves".

Indicated. The bounding perimeter of indicated ore on the Liba No. 17 "ore body" extends only 25 feet beyond the last mineralized drill hole, inasmuch as drill holes in this area were spaced on 50 foot centers. Due to lack of drill hole information on Liba No. 2, indicated ore was limited to a 50 foot radius about sampled pits No. 14 and No. 17, and to a 100 foot radius about pit No. 15 where trenching near the pit gives evidence of "ore" extension to that extent. Thickness was computed as the average thickness of mineralization in drill holes and sampled pits on the Liba No. 17 claim, and as the thickness of mineralization in each sampled pit for the Liba No. 2 claim. Indicated "ore bodies", as shown on accompanying map, are the Liba 17A, Liba 17B, Liba 2A, Liba 2B, and Liba 2C plots.

Inferred. As "extensions of known or discovered ore bodies and clusters broadly inferred to assume limits", it is inferred that the "channel" or "mineralized belt" is continuous between the northern extension of the well drilled Liba 17B plot and the Huskon No. 11 claim where a mineralized zone continues northward from the north end of the Liba No. 2 claim (see accompanying map). Sampling of pits within this segment, and the probing of drill holes (for which we have no information other than the word of the owners that holes were mineralized within the "trend") attest to its continuity. The average width and thickness of the mineralized trend was taken as the average width and thickness of the known portion of this trend in the Liba No. 17 claim. The average grade for the inferred "ore" on the Liba No. 17 claim was taken as the average grade of the adjacent known segment in the Liba No. 17 claim. The average grade for the inferred "ore" on the Liba No. 2 claim was taken as the average grade of the assayed channel samples taken from mineralized pits on that claim. Inferred "ore bodies", as shown on accompanying map, are the Liba 17C and Liba 2D plots.

ORE RESERVES,
COMPUTATIONS:

Estimated at 14 cu. ft. of rock per ton.

Liba No. 17 Claim:

- (a) Liba 17A Plot. Average 9.0 ft. thick over 12,500 sq. ft., Average grade 0.18% U₃O₈

$$\frac{12,500 \times 9}{14} = 8,036 \text{ tons averaging } 0.18\% \text{ U}_3\text{O}_8 \text{ (indicated)}$$

- (b) Liba 17B Plot. (Northeast extension to Liba 17A plot included in Liba 17B plot due to proximity to pits No. 1 and No. 10, and apparent pinchout of "ore" 100 feet NE of pit No. 2). Average 7.3 feet thick over 203,600 sq. ft., Average grade 0.075% U₃O₈

$$\frac{203,600 \times 7.3}{14} = 106,163 \text{ tons averaging } 0.075\% \text{ U}_3\text{O}_8 \text{ (indicated)}$$

- (c) Liba 17C Plot. Average 7.3 ft. thick over 39,000 sq. ft., Average grade 0.075% U₃O₈

$$\frac{39,000 \times 7.3}{14} = 20,336 \text{ tons averaging } 0.075\% \text{ U}_3\text{O}_8 \text{ (inferred)}$$

Total estimated reserves for Liba No. 17 Claim:

| | | | |
|-----------------------|-----------|--------|------------------------------------------------------|
| 8,000 tons | of | 0.18% | U ₃ O ₈ indicated |
| 106,000 tons | of | 0.075% | U ₃ O ₈ indicated |
| 20,000 tons | of | 0.075% | U ₃ O ₈ inferred |
| <hr/> | | | |
| total of 134,000 tons | averaging | 0.081% | U ₃ O ₈ indicated and inferred |

Liba No. 2 Claim:

- (a) Liba 2A Plot. 3.3 ft. thick, 50 ft. radius, average grade 0.09% U₃O₈

$$\frac{3,1416 \times 50^2 \times 3.3}{14} = 1,851 \text{ tons averaging } 0.09\% \text{ U}_3\text{O}_8 \text{ (indicated)}$$

- (b) Liba 2B Plot. 20.0 ft. thick, 100 ft. radius, average grade 0.05% U₃O₈

$$\frac{3,1416 \times 100^2 \times 20}{14} = 44,880 \text{ tons averaging } 0.05\% \text{ U}_3\text{O}_8 \text{ (indicated)}$$

- (c) Liba 2C Plot. 4.0 ft. thick, 50 ft. radius, average grade 0.04% U₃O₈

$$\frac{3,1416 \times 50^2 \times 4}{14} = 2,244 \text{ tons averaging } 0.04\% \text{ U}_3\text{O}_8 \text{ (indicated)}$$

Average grade of 3 channel samples from Liba No. 2 was 0.054% U₃O₈.

Average of (a), (b), and (c) above is 48,975 tons averaging 0.051% U₃O₈.

- (d) Liba 2D Plot. Estimating that the mineralized belt in Liba No. 2 is 215 feet wide for the 1,500 ft. length of the claim, and taking an average of 7.3 ft. for thickness, then there would be 172,447 tons averaging 0.054% U₃O₈. Subtracting the 48,975 tons of indicated (above) would leave 123,472 tons of 0.055% U₃O₈ inferred for Liba 2D plot. (inferred)

Total estimated reserves for Liba No. 2 Claim:

| | | | |
|-----------------------|-----------|---------------|------------------------------------------------------|
| 1,800 tons | of | 0.09% | U ₃ O ₈ indicated |
| 45,000 tons | of | 0.05% | U ₃ O ₈ indicated |
| 2,200 tons | of | 0.04% | U ₃ O ₈ indicated |
| <u>123,000 tons</u> | <u>of</u> | <u>0.055%</u> | <u>U₃O₈ inferred</u> |
| total of 172,000 tons | averaging | 0.054% | U ₃ O ₈ indicated and inferred |

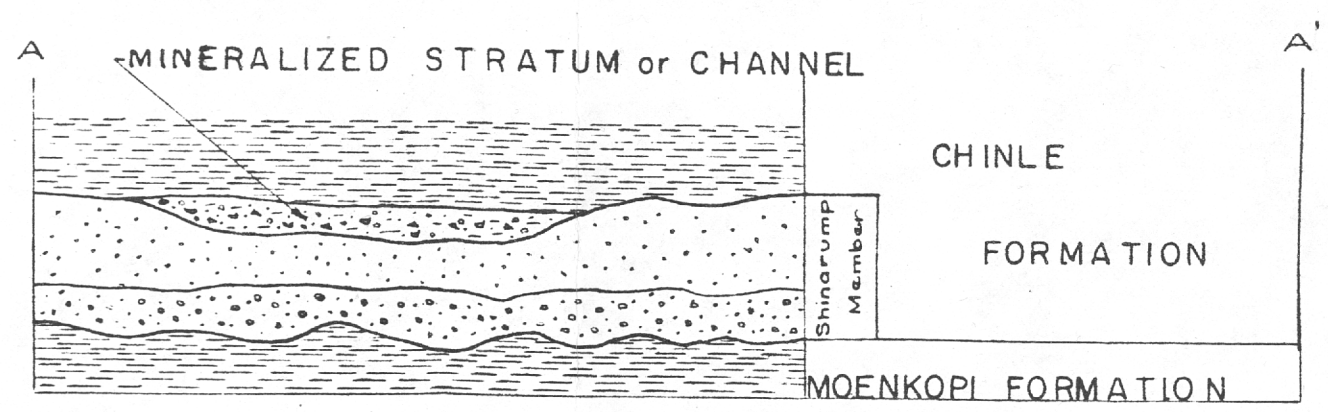
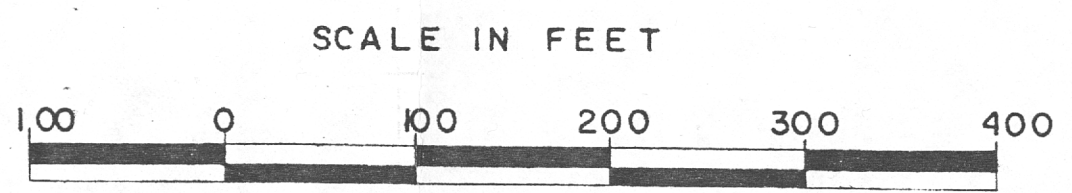
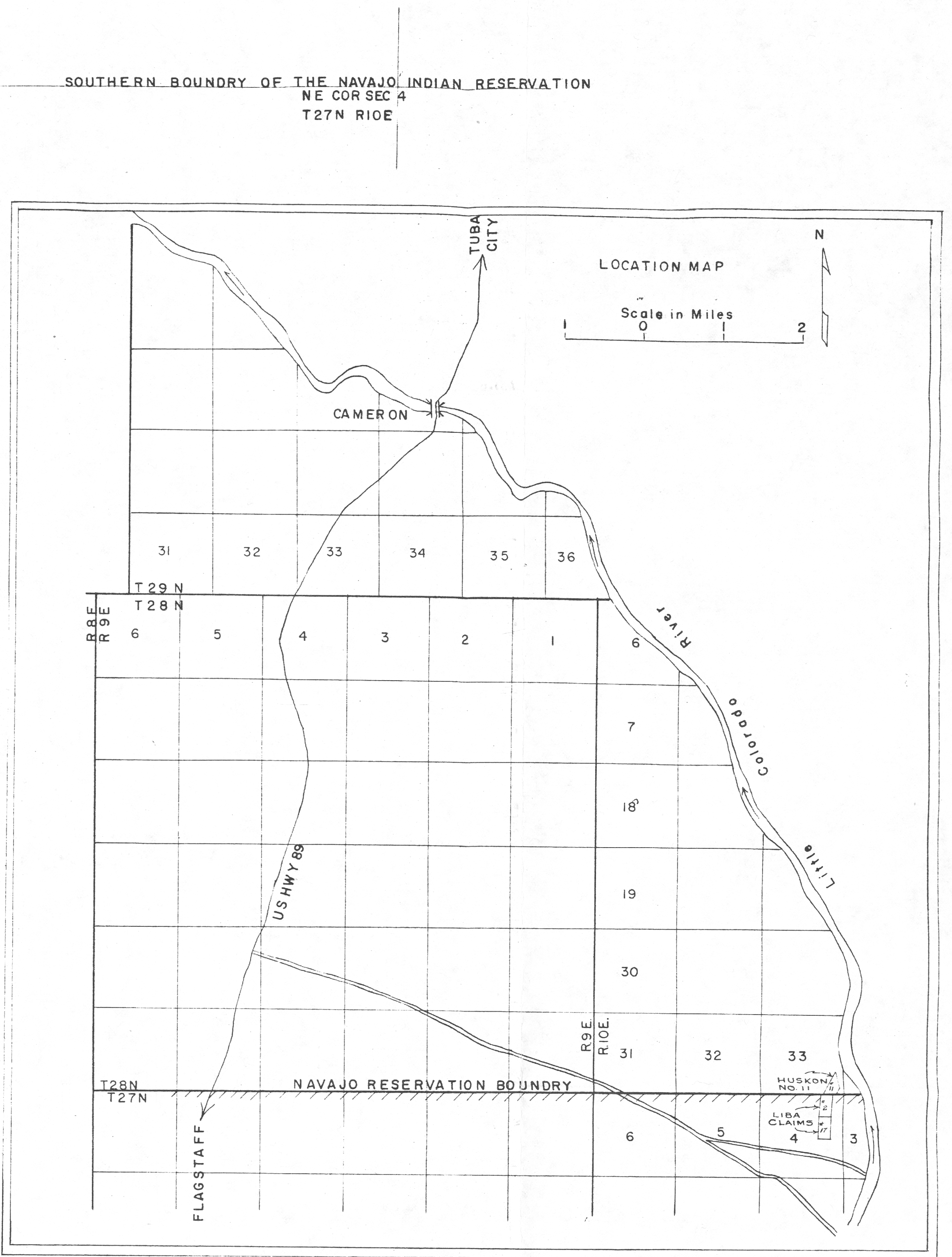
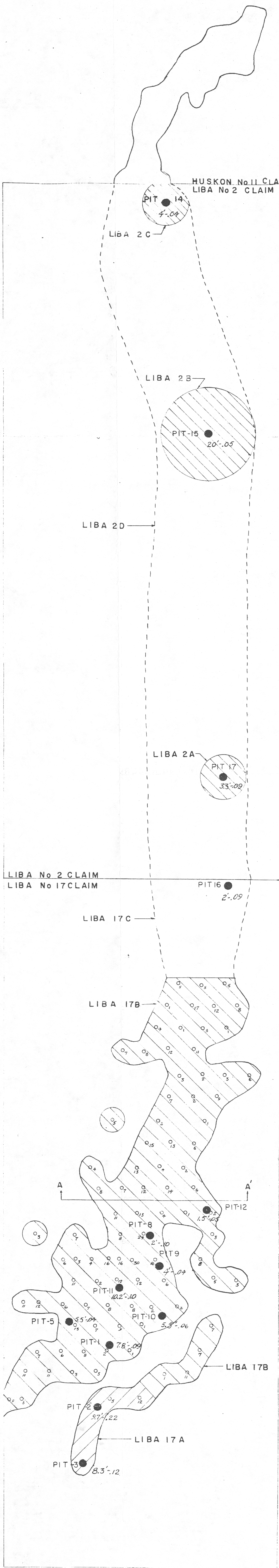
Total of indicated and inferred for Liba No. 17 and Liba No. 2 Claims combined:

| |
|------------------------------------------------------------------------------|
| 134,000 tons averaging 0.081% U ₃ O ₈ (Liba No. 17) |
| <u>172,000 tons averaging 0.054% U₃O₈ (Liba No. 2)</u> |
| total of 306,000 tons averaging 0.066% U ₃ O ₈ |

ORE RESERVES,
CONCLUSIONS:

Although this survey cannot claim to have the mass of detailed exploration and assay data available to, and digested by, the personnel associated with this development, the evidence as presented indicates that Mr. Black's estimate of 3,000,000 tons of ore averaging 0.12% to 0.15% appears unduly optimistic, both as to grade and to quantity.

It is understood that the above "optimistic" estimate included various other holdings in the general area which were not included in this report, but that the Liba No. 2 and Liba No. 17 constituted by far the greatest bulk of the "mineralized areas". It is further conceded that Mr. Black's estimate may have included an extension of the mineralized "trend" southward from the Liba No. 17 claim for any unspecified distance. It appears certain that this trend does extend southward from the Liba No. 17 claim, but information as to its continuity, dimensions, and degree of mineralization is almost entirely lacking. A limited amount of exploration to the south of the Liba No. 17 claim indicates that the trend does continue to the south, but any large extension of the trend must necessarily come within some sort of Geologic Potential classification due to the limited geologic information and its remoteness from the locality of detailed subsurface exploration.



- LEGEND
- AEC chemical assay indicating 24.0 foot composite sample averaging 0.05% U_3O_8 . Sample taken from wall of hand dug pit.
 - Drill-hole gamma-ray logging indicates 80 feet of mineralization.
 - ▨ Plot-Area for estimating tonnages.
 - Known limits of mineralization
 - - - Inferred limits of mineralization

CAMERON, ARIZONA
Shinarump Uranium Mineralization
on the
Liba No. 2 and No. 17 Claims, Sect. 4, T. 27 N., R. 10 E.
Operated by the
BLACKWOOD OIL & MINING CORPORATION
prepared
by
THE U.S. ATOMIC ENERGY COMMISSION
Irving B. Gray, USAEC Area Geologist, Traced by: fjt& e.m.b. 1/8/57

