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UNITED STATES
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# THE EUREKA AND HAPPY LANDING (COOPER-SANDS) GROUPS OF CLAIMS, UINTAH COUNTY, UTAH

A PRELIMINARY REPORT

by
Harry C. Granger and Herman L. Bauer

May 1950
Special Report of Field Examination 32

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

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Dr. Phillip L. Merritt, Assistant Manager
Raw Materials Operations
U. S. Atomic Energy Commission
P. O. Box 30, Ansonia Station
New York 23, New York

Dear Phil:

Transmitted herewith for your information and distribution are copies 3 through 7 of Special Report of Field Examination 32, "The Eureka and Happy Landing (Cooper-Sands) groups of claims, Uintah County, Utah--a preliminary report," parts 1 and 2, by Harry C. Granger and Herman L. Bauer, May, 1950.

As you will note, the material in this report is entirely field data, and spaces have been left in the tables and on maps so that laboratory information may be added at a later date. It is anticipated that as soon as laboratory data are available, we will prepare a supplemental report in which the tables relative to sampling and reserve estimates will be completed, and a revised estimate of reserves will be made.

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Sincerely yours,

W. H. Bradley
Chief Geologist

U. S. DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

# THE EUREKA AND HAPPY LANDING (COOPER-SANDS) GROUPS OF CLAIMS, UINTAH COUNTY, UTAH

- A PRELIMINARY REPORT -

Part 1

by

Harry C. Granger

and

Herman L. Bauer



May 1950

Special Report of Field Examination 32

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# THE EUREKA AND HAPPY LANDING (COOPER-SANDS) GROUPS OF CLAIMS, UINTAH COUNTY, UTAH

- A Preliminary Report -

Part 1

by Harry C. Granger and Herman L. Bauer

## Abstract

The Eureka and Happy Landing groups of copper and uranium claims, Uintah County, owned by Mr. Lee Cooper and Mr. Charles Sands of Myton, Utah, are 12 miles southeast of Myton and 4 miles northeast of Ouray, Utah, respectively. The Eureka group consists of 16 claims and the Happy Landing group of 5 claims, all unpatented.

Thirty tons of uranium ore were produced on the Eureka claims in 1949 from deposits in flat-lying, interbedded, carbonaceous shale and sandstone of the Eocene Uinta (?) formation.

Uranium-bearing, carbon-rich material is associated with brochantite (?). Meta-torbernite (?), the only uranium mineral observed, occurs in fractures with brochantite (?) at the Eureka No. 7 claim in close association with carbonized plant remains. The deposits are as much as 90 feet long, 10 feet thick, and one of them on the Canary Bird claim has been mined along the bedding for 20 feet.

Prospecting of this formation by the mining industry, in other parts of the Uinta Basin, might result in finding additional deposits of uranium-bearing rock in areas where the presence of copper and concentrations of carbonized plant material occur within the Uinta (?) formation.

## Introduction

The Eureka and Happy Landing uranium deposits, Uintah County, Vernal quadrangle, Utah, were discovered in June 1949 by Mr. Lee Cooper and Mr. Charles Sands of Myton, Utah (fig. 1).

Figure 1.--Utah, showing the location of the Vernal quadrangle.

The Eureka group of 16 unpatented claims is along Castle Peak Draw (fig. 2) in secs. 4, 5, and 6, T. 9 S., R. 18 E. and sec.

Figure 2.--Vernal quadrangle, showing the location of the Eureka and Happy Landing groups of claims.

31, T. 8 S., R. 18 E., 12 miles southeast of Myton, Utah. The Happy Landing group of 5 unpatented claims is along the north flank of a ridge separating the White River and Wonsits Valley in secs. 19 and 30, T. 8 S., R. 21 E. and secs. 24 and 25, T. 8 S., R. 20 E., 4 miles northeast of Ouray.

The Eureka group is accessible from Myton by dirt road to within 2 miles southwest of the claims, thence along the sand bottom of a draw tributary to Castle Peak Draw. Loose sand makes travel difficult except for vehicles with four-wheel drive. The Happy Landing group is easily accessible by car and is half a mile from a dirt road.

The topography of the area is similar to that of large areas in the Colorado Plateau. Erosion of the essentially horizontal sedimentary strata formed broad benches on which

low erosion remnants are common, and in which flat-bottomed valleys, 50 to 200 feet deep, have been sharply incised. The Tertiary beds that contain the uranium deposits are exposed on the nearly vertical walls of these valleys.

The uranium ore produced in the fall of 1949 totaled about 30 tons. The first two shipments contained respectively 0.03 and 0.22 percent $U_3O_8$. Individual shipments and assays are given in table 1.

In October 1949 the owners requested the Atomic Energy Commission to examine their uranium deposits and at that time apparently submitted samples (table 2). The samples, analyzed in the U. S. Geological Survey laboratories, contained 0.073 and 0.11 percent eU ("Equivalent uranium" will be indicated by the letters "eU" throughout this report). These analyses, plus the favorable geologic environment of the deposits, suggested the desirability of a spot examination, and it was made by the writers on November 29 and 30, and December 1, 1949, while en route to Marysvale, Utah.

The writers examined 12 of the 16 claims in the Eureka group, namely the Eureka No. 1 to No. 9, inclusive, the Stain No. 1 and No. 2, and the Canary Bird. The 5 claims of the Happy Landing group, namely, the Hard-to-Get, Easy Money, Last Chance, Pay Day, and Happy Landing, were also studied. Maps of

Table 1.--Shipments of uranium ore, Eureka claims, 1949

| Claim | Pounds of ore | % $U_3O_8$ | % $V_2O_5$ | % Cu | % $CaCO_3$ | Receiving Station | Date of shipment |
|---|---|---|---|---|---|---|---|
| Stain No. 1 | 24,000 | 0.03 | 0.05 | - | 0.5 | Monticello, Utah | ? |
| Canary Bird | 14,530 | 0.22 1/ | 0.32 | 0.76 | 2.53 | United States Vanadium Corp., Rifle, Colo. | 9/27/49 |
| Eureka No. 6 | 6,650 | | | | | United States Vanadium Corp., Thompson's Springs, Utah | |
| Eureka No. 2 | 14,360 | | | | | Monticello, Utah | 11/23/49 |
| Total | 59,540 | | | | | | |

1/ Hand-sorted concentrate

Table 2.--Analyses of owner's samples, Eureka and Happy Landing groups of claims

| Claim | Assayer | Date | % $U_3O_8$ | % eU | % $V_2O_5$ | % Cu | % $CaCO_3$ |
|---|---|---|---|---|---|---|---|
| Happy Landing | The Brown Laboratory Grand Junction, Colo. | 7/18/49 | 0.15 | | 0.3 | | |
| - | Bureau of Mines, Salt Lake City | 8/--/49 | 0.18 | | | | |
| - | " " " | | 0.20 | | | | |
| - | " " " | | 0.60 | | | | |
| - | " " " | 8/23/49 | 5.00 | | | | |
| Eagle's Nest | Amer. Smelt. & Ref. Co. | 8/29/49 | 0.21 | | 0.02 | | |
| - | The Brown Laboratory Grand Junction, Colo. | 9/14/49 | 0.30 | | 0.15 | | |
| Canary Bird | U. S. Vanadium Corp. | 10/17/49 | 0.07 | | nil | | |
| " " | " " " " | | 0.27 | | nil | | |
| " " | " " " " | | 1.43 | | Trace | 3.21 | |
| Eagle's Nest | " " " " | | 0.16 | | nil | 0.39 | |
| Eureka No. 8 | " " " " | | 0.17 | | nil | 0.54 | |
| Canary Bird | " " " " | | 1.50 | | nil | 9.06 | |
| Pay Day | U. S. Geol. Survey, Washington, D. C. | - | | 0.073 | | | |
| Canary Bird | " " " " | | | 0.11 | | | |

the larger deposits were made by pace and compass on scales of 1/60 to 1/600.

## General Geology

The Uinta (?) formation, of Eocene age 1/ covers large

1/ Walton, Paul T., Geology of the Cretaceous of the Uintah Basin, Utah: Geol. Soc. Am. Bull., vol. 55, no. 1, pp. 91-129, 1944.

parts of the Uintah Basin in eastern Utah. It apparently accumulated with other Tertiary rocks in a basin formed by down-warping of the older formations in Laramide time. The lithology of the Uinta (?) formation suggests that it was formed by fluviatile and lacustrine deposition of sediments derived from the Uinta Mountains and other highlands. The thickness of this formation is given by Walton as 700 to 1,648 feet. The Uinta (?) formation is unconformable with the Duchesne River formation (Oligocene) and the underlying Green River formation (Eocene).

The Uinta (?) formation is exposed along both sides of the Duchesne River and is essentially horizontal in the areas studied. It is composed of interbedded, lenticular sandstones, shales, and conglomerate; the cross-bedded sandstones are buff and gray; the fissile shales are red, brown, gray, and buff; and the few lenses of conglomerate contain mudstone or small quartz pebbles (fig. 3). The lenses of fissile

Figure 3.--Columnar sections, Eureka No. 6, Eureka No. 7, and Eureka No. 2 claims, Uintah County, Utah.

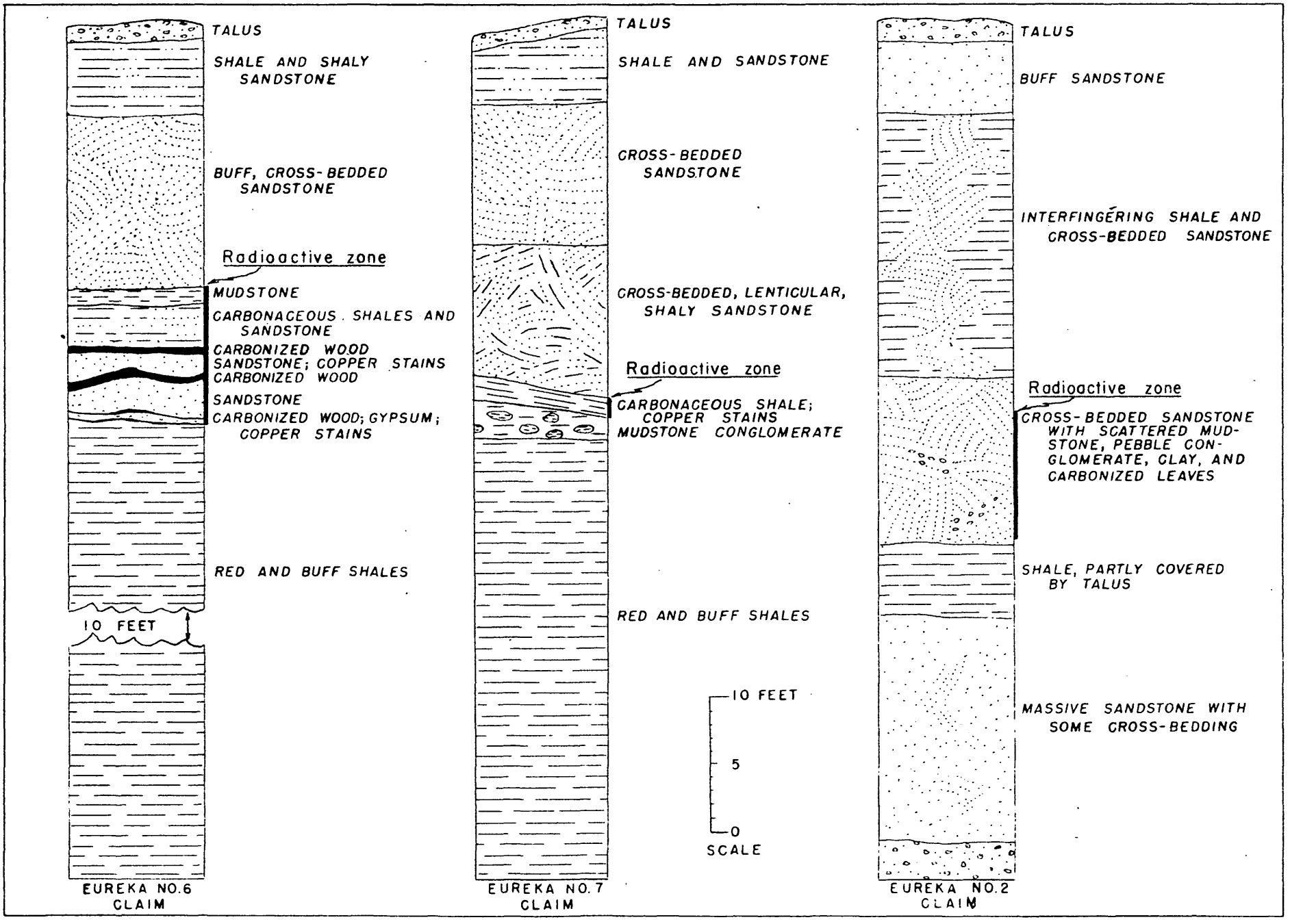


Figure 3.-- Columnar sections, Eureka No.6, Eureka No.7, Eureka No.2 claims, Uintah County, Utah

shale in the sandstone commonly contain fragments of carbonized wood and leaves, whereas the main beds of sandstone contain fossil logs and turtle shells. Many of the carbonized logs are surrounded by an aureole of a green copper mineral, brochantite (?), that impregnates the sandstone. Where carbon and brochantite (?) are together the carbon is radioactive. The shale lenses containing carbonized leaf and twig fragments are also radioactive. Meta-torbernite (?) was identified, associated with brochantite (?) in fractures on the Eureka No. 7 claim.

## Uranium Deposits

The uranium deposits of the Eureka and Happy Landing groups of claims are small green-stained lenses or zones rich in carbonized plant remains. The only uranium mineral identified was meta-torbernite (?) that occurs as scattered crystals on bedding planes and fractures in a sandy shale lens. On the Eureka No. 7 claim this lens is as much as 2 feet thick and 35 feet long. The lens was stained with brochantite (?), and carbonized leaf fragments were abundant along the bedding laminae. The uranium and vanadium content of samples (Table 2) from these deposits suggests that much of the radioactivity in the copper-bearing and carbon-rich material is caused by a mineral of the carnotite type.

The largest exposed uranium-bearing lens was on the Eureka No. 2 claim. It is 90 feet long and has a maximum thickness of 10 feet.

Eureka No. 2 claim.--The uranium-bearing deposit on the Eureka No. 2 claim is in a cross-bedded, buff sandstone lens (fig. 4) about 25 to 30 feet above the floor of Castle Peak Draw. The lenticular,

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Figure 4.--Sketch map, Eureka No. 2 claim.

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uranium-bearing deposit of this sandstone lens is 90 feet long and as much as 10 feet thick, tapering out to the northeast and terminating rather abruptly on the southwest. This sandstone lens contains intercalated quartz sands, mudstone-pebble

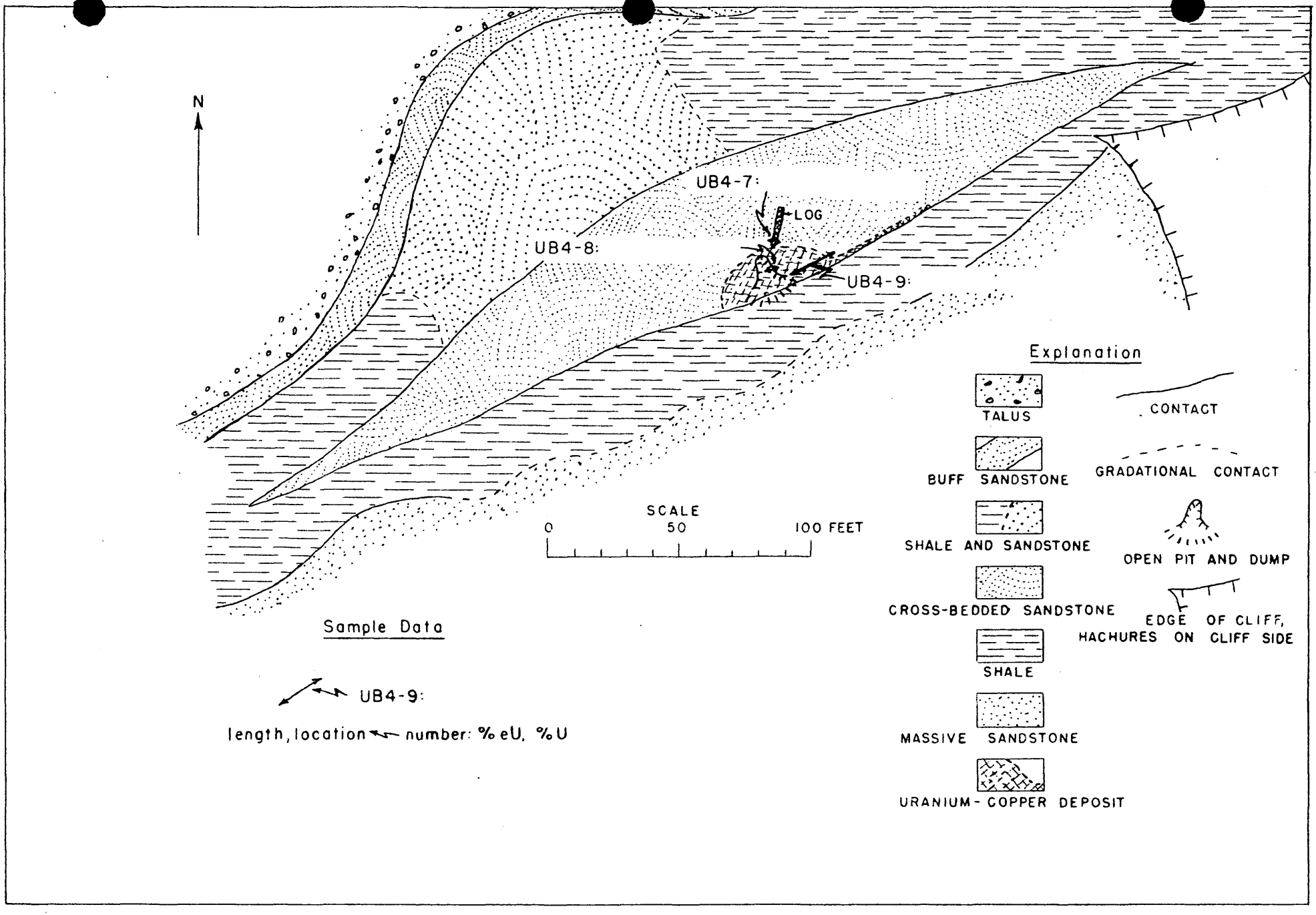


Figure 4.-- Sketch map, Eureka No. 2 claim

conglomerates, and clayey zones with carbonized leaves and twigs (fig. 3). It is stained by brochantite (?).

Ore has been mined from a small open cut in a zone of massive, poorly laminated clayey sandstone and carbonized plant remains. A carbonized log about 20 feet long and 10 inches in diameter is surrounded by an aureole impregnated with brochantite (?). This aureole suggests that the copper minerals were precipitated close to the woody material, but not in the carbonized log itself.

Two channel samples and one composite grab sample were taken at this deposit, (Table 3) to show the variations in grade. One channel sample, 26 inches long, was cut across a carbonized log and the adjacent copper-stained aureole; another represents 3 feet of carbonaceous sandstone. The composite grab sample was taken from 4 places in the radioactive sandstone area. The 3-foot channel sample, cut in carbonaceous sandstone, weighted against length, can be averaged with the grab sample to approximate the average grade of the bulk of the deposit. The 26-inch channel sample cut across the carbonized log is representative of the entire log and adjacent copper-stained aureole.

Eureka No. 6 claim.--At the Eureka No. 6 claim a lens of resistant, cross-bedded, buff sandstone (figs. 3 and 5) crops out at the

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Figure 5.--Sketch map, Eureka No. 6 claim.

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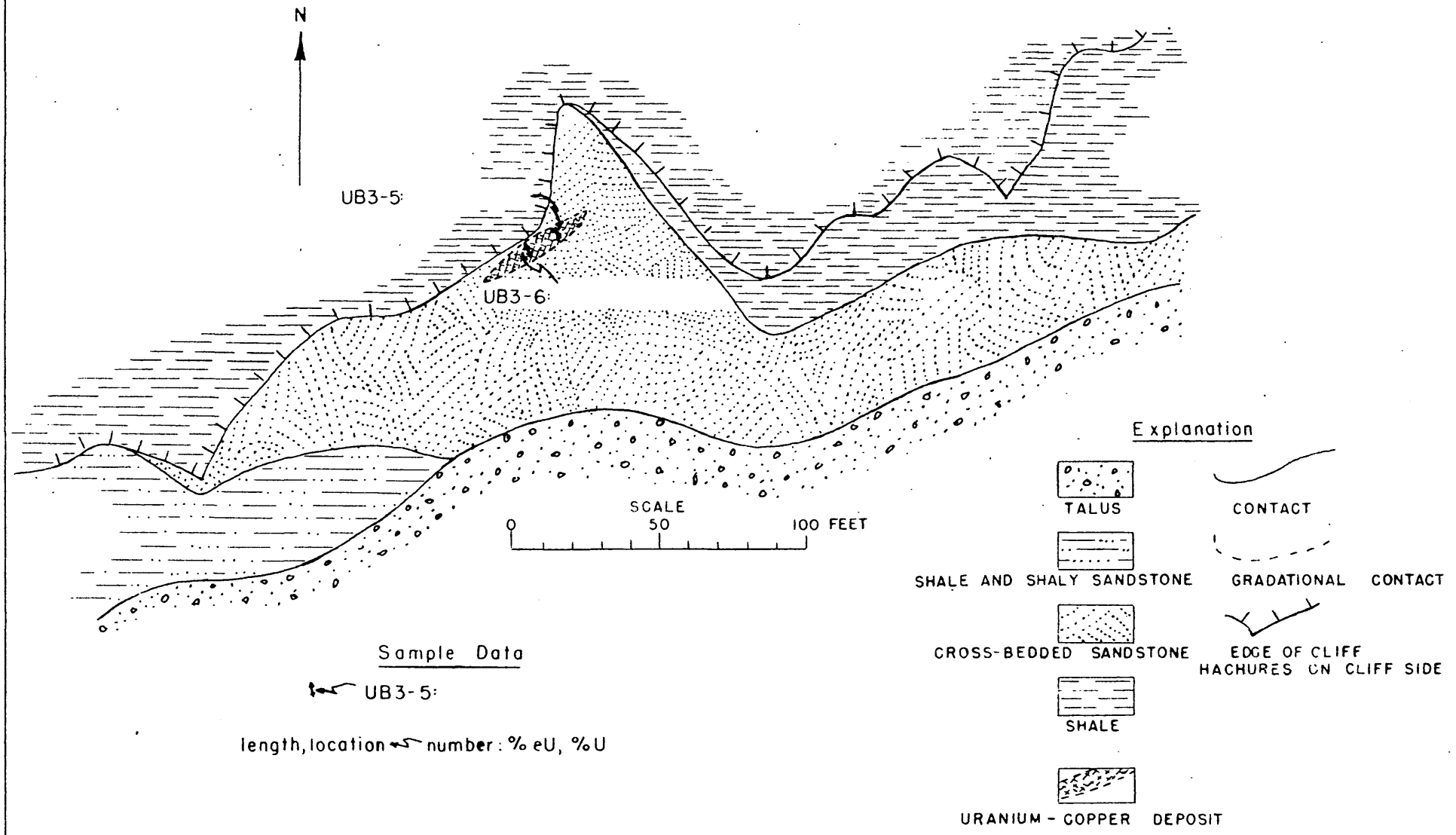


Figure 5.-- Sketch map, Eureka No. 6 claim

Table 3.--U. S. Geological Survey samples, Eureka and Happy Landing groups of claims

| Sample No. | Analyses 1/ eU % | U % | $V_2O_5$ % | $P_2O_5$ % | Cu % | Description |
|---|---|---|---|---|---|---|
| UB-1-1 | | | | | | Grab sample of carbonized turtle shell, Pay Day claim. |
| UB-1-2 | | | | | | Grab sample of carbonized fossil wood, Pay Day claim. |
| UB-2-3 | | | | | | 1.5 feet of carbonized sandstone and brochantite (?), Eureka No. 7 claim. |
| UB-2-4 | | | | | | 2.2 feet of carbonized sandstone and brochantite (?) with meta-torbernite (?), Eureka No. 7 claim. |
| UB-3-5 | | | | | | 3.6 feet of carbonized sandstone and shale, Eureka No. 6 claim. |
| UB-3-6 | | | | | | 3.7 feet of carbonized sandstone and shale, Eureka No. 6 claim. |
| UB-4-7 | | | | | | 26 inches of carbonized log and copper-stained aureole, Eureka No. 2 claim. |
| UB-4-8 | | | | | | 3.0 feet of carbonized sandstone, Eureka No. 2 claim. |
| UB-4-9 | | | | | | Composite of sandstone from 4 places in the radioactive area, Eureka No. 2 claim. |
| UB-5-10 | | | | | | 3.5 feet of sandstone and carbon lens, Canary Bird claim. |
| UB-5-11 | | | | | | 4.0 feet of sandstone and carbon lens, Canary Bird claim. |
| UB-5-12 | | | | | | Grab, carbonized wood lens, Canary Bird claim. |
| UB-6-13 | | | | | | 3.5 feet carbonized shale and sandstone, Stain No. 1 claim. |

1/ These data will be provided when available.

rim of the canyon wall. It overlies about 45 to 50 feet of a red and buff shale that is partly exposed in the draw. The sandstone has a maximum thickness of 25 feet and is about 400 feet long. Within the sandstone lens there are carbonaceous zones containing thin layers and lenses of sandy, carbonized leaves and fossil tree limbs that are associated with gypsum. These carbonaceous zones are radioactive. Brochantite (?) commonly coats fracture surfaces and impregnates the carbonaceous zones in the sandstone.

The ore deposit on the Eureka No. 6 claim (fig. 5) is exposed over an area 40 feet long and 10 feet thick, on the edge of a cliff. The main uranium-bearing ore body is 3.5 feet thick and ore has been produced over 25 feet of its length. It is composed of intercalated carbonaceous fissile shales and sandstones. Partly carbonized leaf fragments, limonite, and a yellow powdery mineral, probably jarosite, occur on the shale laminae. The entire radioactive zone on this property is about 10 feet thick (fig. 3), but only 3.5 feet of the exposed section contains appreciable quantities of uranium.

The two channel samples taken across this lens, if weighted against their length, should give the average grade of the 3.5-foot ore body that has been mined.

Eureka No. 7 claim.--Two exposures of radioactive material were observed on the Eureka No. 7 claim (fig. 6); one on either side

Figure 6.—Sketch map, Eureka No. 7 claim.

of a point that is capped by 10 to 12 feet of buff, cross-bedded sandstone. About 45 feet of red and buff shales are exposed at the base of the cliff.

The largest area of radioactive material is on the northeast side of the sandstone point; a smaller exposure is on the opposite side of the point, 50 feet to the southwest. This smaller exposure consists of a copper-stained area, about 2 feet thick and 8 feet in length, at the base of the sandstone.

The largest area of radioactive material is a sandy shale lens on the northeast cliff face, 10 to 15 feet below the base of the sandstone. This lens is 35 feet long and 2 feet thick. It strikes north and dips 10° W., although the beds above and below are nearly horizontal. Carbonized leaf fragments occur between the bedding laminae throughout this shale lens. Tabular, green crystals, identified as meta-torbernite (?) in the field, occur, associated with brochantite (?), on fractures and bedding surfaces. The two channel samples that were taken across this lens, if weighted against their length, should give the average grade of this ore body.

Eureka Nos. 1, 3, 4, 5, and 9 claims.—The Eureka No. 1, 3, 4, 5, and 9 claims were briefly examined. All of these claims contain uranium occurrences in the exposed ends of tree limbs or in sandstone lenses.

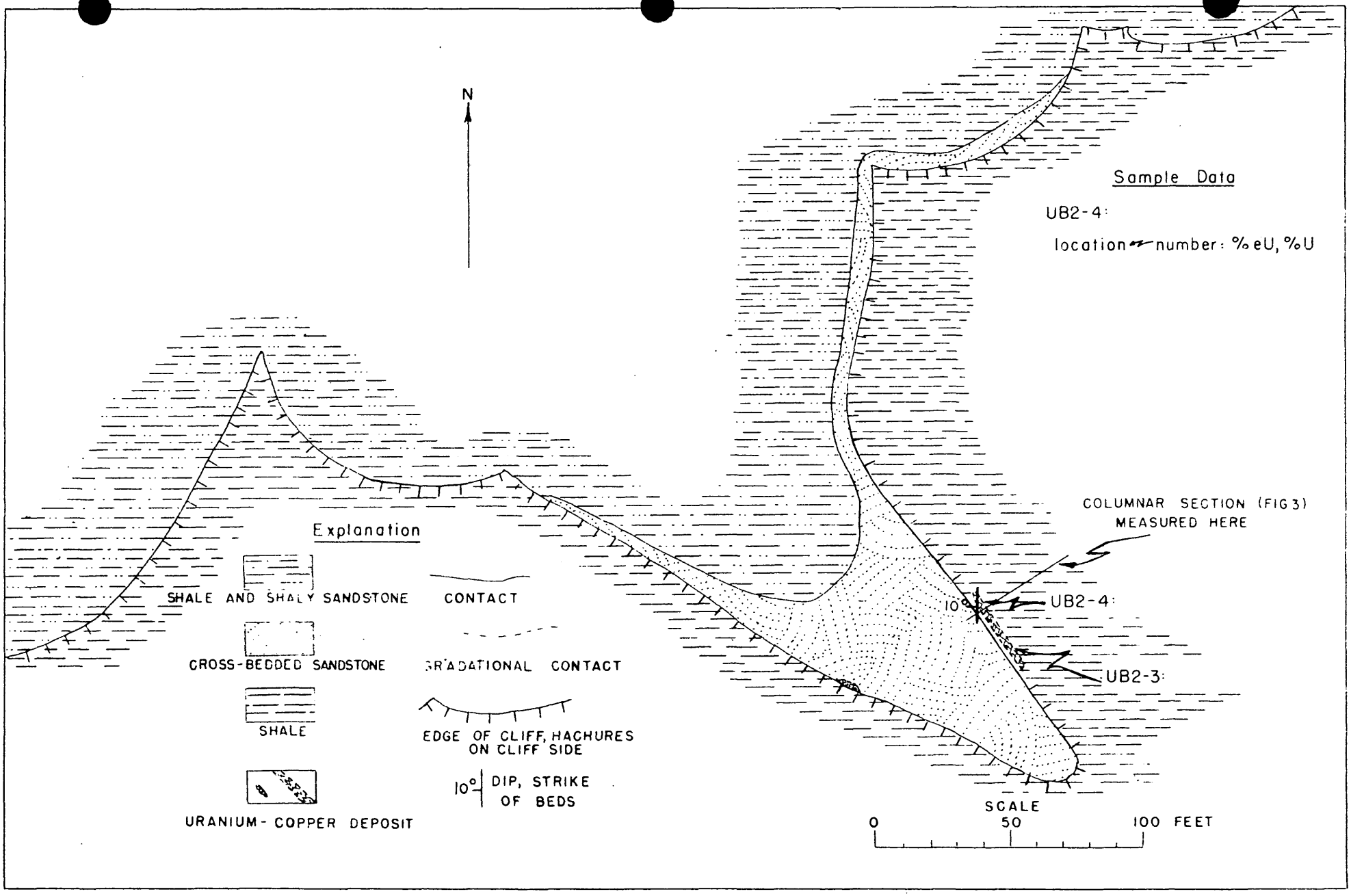


Figure 6.-- Sketch map, Eureka No. 7 claim

Canary Bird claim.--Uranium deposits on the Canary Bird claim are in a massive, cross-bedded, buff sandstone. The green-stained radioactive part of this bed cropped out in an area 10 feet long and 5 feet high before a 20-foot incline was driven by the owners (fig. 7). The incline follows two gently dipping layers of

Figure 7.--Sketch map and section, Canary Bird claim.

carbonaceous material that merge at a depth of 12 feet.

One truck load of ore was shipped from the incline and another, rich in copper, was discarded because the owners believed it was less radioactive than the carbonaceous material. The ore mined was hand sorted and 7-1/4 tons, containing 0.22 per cent $U_3O_8$, was sold. From field observation, it is evident that the radioactivity is confined to the copper-stained areas, and that carbonaceous zones within these areas are the most radioactive parts of the deposit.

The ore-bearing zone contains brochantite (?), gypsum, and a powdery yellow mineral that may be an iron sulfate. Carbonized turtle shells were found during mining. Numerous fractures are filled with gypsum and brochantite (?).

The ore zone is 10 feet wide on surface and is about 6 feet thick and over 20 feet long in the incline. Approximately half of the ore above the face of this incline has been mined. Beyond the face there may be a cone-shaped block of ore about 10 feet long.

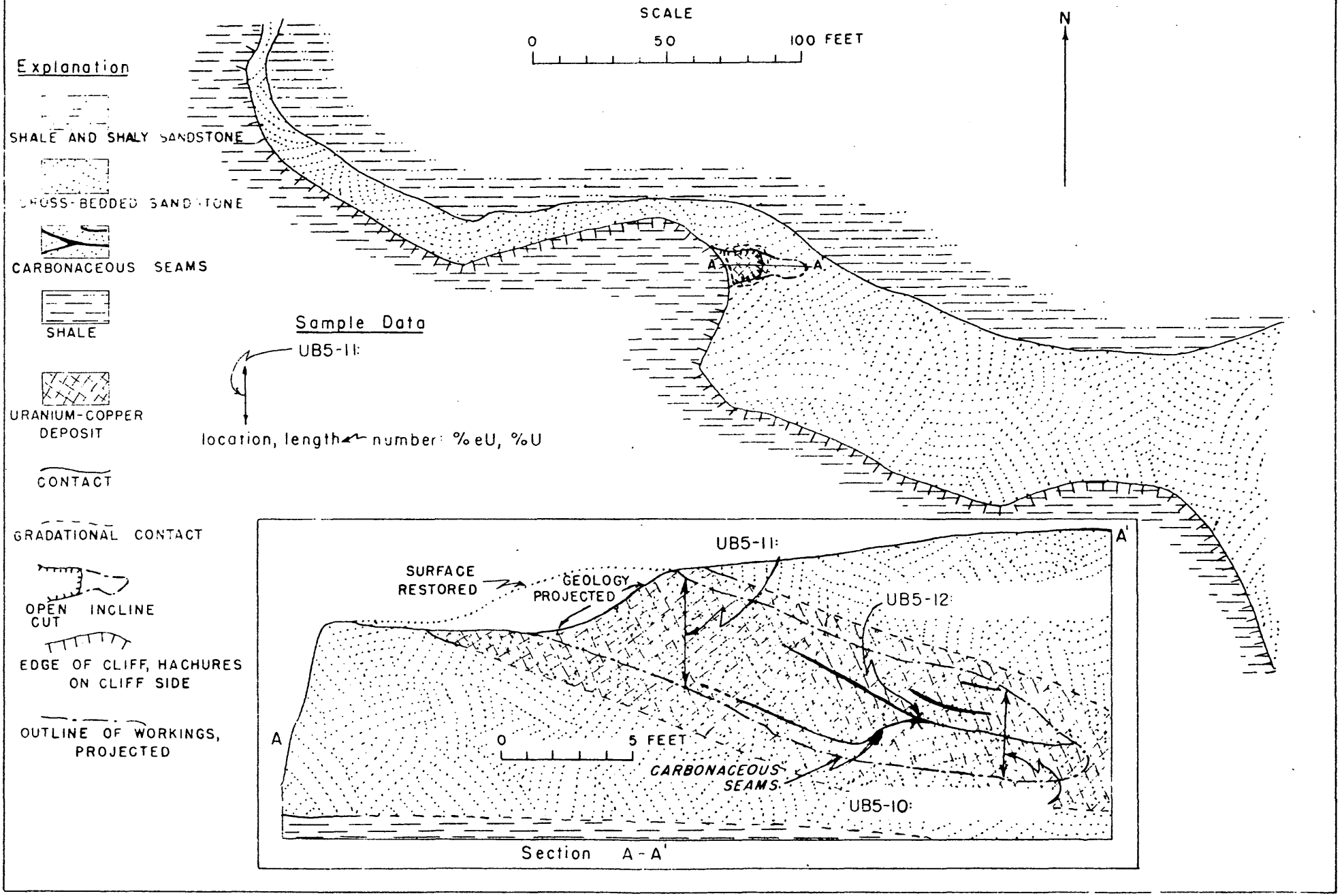


Figure 7.-- Sketch map and section, Canary Bird claim

Two channel samples (Table 3), taken on the walls of the incline, if weighted against length, will indicate the average grade of the deposit. One grab sample of carbonized wood was taken to determine the average uranium content of this material.

Stain No. 1 claim.---The east end of the Stain No. 1 claim has been prospected, and ore-mined, by bulldozing. The radioactive zone is in a large lens of cross-bedded sandstone. This zone is too low in grade to be mined profitably by bulldozing. The first shipment of ore (Table 3) from this claim contained 0.03 percent uranium oxide.

On the west end of the claim a narrow, radioactive carbonaceous shale lens (fig. 8) crops out on the cliff face overlooking

Figure 8.---Sketch section, cliff face at west end of Stain No. 1 claim.

Castle Peak Draw. This lens ranges in thickness from 2 to 14 feet; averages 3 feet. It is about 200 feet long. The shale is very fissile and contains discontinuous lenses of yellow clay and gypsum as much as a quarter of an inch thick. Groups of bedding laminae are stained heavily with iron oxide and have a varved appearance.

Massive, cross-bedded sandstone is both above and below the radioactive shale lens. Carbonized turtle shells were observed in the sandstone above the shale, and brochantite (?) impregnates and tints the sandstone just below the shale.

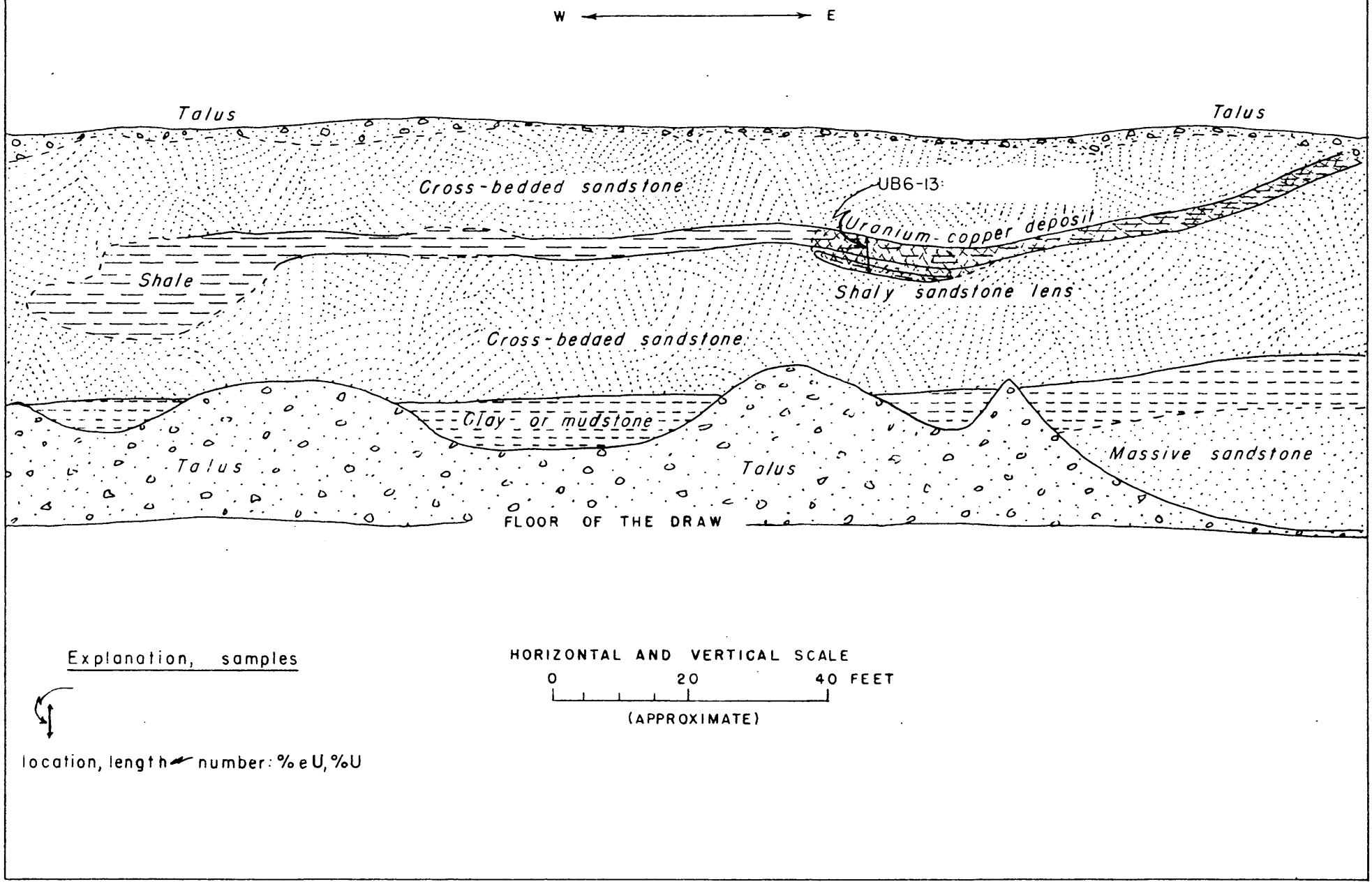


Figure 8.-- Sketch section, cliff face at west end of Stain No.1 claim

The most highly radioactive part of the deposit (fig. 8) is 80 feet long and from 2 to 4 feet thick; the average thickness is 2.5 feet. The thickest part of the ore body is on the west end where a small shaly sandstone lens, 20 feet long and one foot thick, lies one foot below the upper contact of the enclosing sandstone and the lower contact of the main ore-bearing shale bed. Copper staining and presumably the uranium minerals occur in sandstone between the two shaly beds.

One 3.5-foot sample was taken across the carbonaceous shales and sandstone. This is representative of the exposed ore.

Stain No. 2 claim.--On the Stain No. 2 claim, west of the Stain No. 1, several carbonized trees with abnormal radioactivity and brochantite (?) aureoles were observed. They lie near the base of the cliff along a shale-sandstone contact. The probable reserves are very small.

Happy Landing group of claims.--The radioactive, and copper-bearing areas on the Happy Landing group of claims are in discontinuous lenses of cross-bedded sandstone enclosed in red and buff shales. These lenses are several hundred feet long and 20 to 75 feet thick. Carbonized logs and their associated brochantite (?) aureoles are the main areas of radioactivity. The radioactive logs contain only a few hundred pounds of ore.

On the Pay Day claim a small flat area, 100 to 200 feet wide and several hundred feet long, contains several exposures, less than 4 feet long that include brochantite (?)-stained rock and small pieces of carbonized wood. A carbonized log about 15 feet

long and one highly radioactive carbonized turtle shell were found.

The uranium-bearing deposits on the Happy Landing group are small and widely scattered. Two grab samples, one of carbonized wood and the other of carbonized turtle shell were taken on the Pay Day claim (Table 3).

## Radioactivity

Each deposit was traversed with a Beckman Model MX5, Beta-Gamma, Survey meter. The radioactivity measured on the outcrop of most fissile, carbonaceous, shale lenses was 1 to 10 divisions on the 0.2 MR/hr (milliroentgen per hour) scale. A typical lens would measure 2 to 4 divisions. Some of the carbon from fossil branches or trees measured as high as 1.5 divisions on the 2.0 MR/hr scale in contrast with the surrounding aureole that was only a fifth as radioactive. A few carbonized turtle shells measured 20 divisions on the 0.2 MR/hr scale. The normal background measured between 0 and 6 divisions on the 0.02 MR/hr scale.

The average uranium content of the ore deposits was estimated by comparing field measurements of radioactivity in the parts of the deposits assayed for the owner with measurements in other parts of the deposits.

It is evident that the radioactivity is closely related to carbonized plant and animal remains and is indirectly associated with brochantite (?). Also, cross-bedded sandstone lenses, and the included fissile shales, have been more favorable hosts for uranium and copper minerals than have the clayey, non-fissile shales that are more common in the Uinta (?) formation.

## Conclusions and suggestions for prospecting

Because of the association of uranium with copper and carbonaceous material in the sandstones and shales of the Uinta (?) formation at the Eureka and Happy Landing claim groups, it is suggested that prospecting by the mining industry for other deposits of this type in the Uinta (?) formation be concentrated in areas that contain copper deposits and/or concentrations of carbonized organic materials. It seems possible that mining development also may be guided by these same criteria, where extensions of known deposits are sought.