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COMMONWEALTH OF AUSTRALIA.



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BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

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PRELIMINARY REPORT ON THE YENBERRIE URANIUM PROSPECT, N.T.

by

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DARWIN, N.T.

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PLANS.

<u>Plate No.</u>		<u>Scale.</u>
1	Preliminary Geological Map of Yenberrie Uranium Prospect, including locality maps.	1 inch - 100 feet.
2	Localities A,B and C. Sketch plans showing sampling data, Geiger counts, and assay results where available.	1 inch - 2 feet

SUMMARY.

Specimens of torbernite have been found in discontinuous portions of a strongly sheared band, up to 17 inches wide, within a greisenous and silicified shear zone, in coarse grained granite. The shear zone trends approximately north-northeast, is 500 feet long, and torbernite has been found within it over a length of 250 feet. Two shafts sunk on the prospect showed that the uranium mineral occurs in appreciable amounts down to a depth of about 8 ft. Below this, the highly sheared band contains little torbernite, and it does not appear to be a likely source of any primary uranium minerals. In one of the shafts, and in a costean across the shear zone, a band of gossanous material 8 to 10 inches wide is exposed, 8 inches to a foot east of the highly sheared band. It consists, in part, of friable, limonitic material, and, in part, of vuggy quartz containing limonitic box work. It is thought that this gossanous band was the source of the secondary uranium mineral found in the strongly sheared band, and at greater depths it will contain primary uranium minerals, and sulphides.

Additional costeans should be dug and a self-potential survey made on the prospect to find out whether the gossanous band is continuous along the shear zone between the known occurrences of uranium minerals. If it is proved to be continuous, the prospect would warrant a shallow drill hole to intersect the gossanous band at a depth of 100 feet, which should be well below the zone of oxidation.

INTRODUCTION.

A little torbernite, reported to be associated with cassiterite, was discovered at the Yenberrie prospect, late in 1952, by Messrs. R. Young and S. Mazlin, members of a syndicate operating a battery to treat tin ore, near Mt. Todd. The area was mapped during May 1953, on a scale of 100 feet to an inch, by D.E. Gardner and N.O. Jones.

The prospect was tested for radioactivity with an Austronic ratemeter, and count rates exceeding three times the local background were obtained at four localities along the main shear zone over a length of 250 feet. Samples were obtained from shallow pits and shafts sunk at three of the four localities. A plan of the area and locality maps accompany this report.

SITUATION AND ACCESS.

The Yenberrie uranium prospect is $3\frac{1}{2}$ miles east of the Stuart Highway, and $4\frac{1}{2}$ miles in a direction 15 degrees east of north from the bridge across the Edith River, which is 33 miles by road northward from Katherine, and 187 miles southward from Darwin. The Edith Siding on the Darwin-Birdum railway is 0.9 miles south-east of the highway bridge. The prospect is $1\frac{1}{2}$ miles slightly north of west from the old Yenberrie wolfram and molybdenite mines, and 5 miles in a direction 10 degrees west of north from the "Edith River Uranium-bearing Area" (Fisher 1952).

The prospect is reached by leaving the Highway at a point $2\frac{1}{2}$ miles northward from the Edith River bridge, travelling eastward along the newly formed Wolfram Hill Road for $3\frac{1}{4}$ miles, and then following a bulldozed track, that branches off sharply to the west and continues for about 1 mile.

GENERAL GEOLOGY.

The uranium prospect is situated within the Cullen Granite (Noakes, 1949), near its southern extremity. Hornfelses derived from the Brocks Creek Group, of Lower Proterozoic age, into which the granite is intrusive, crop out approximately $\frac{1}{2}$ mile to the east. In the area mapped, the granite is generally coarse grained, although it includes small masses, apparently with irregular and indefinite boundaries, in which abundant phenocrysts

of quartz and felspar are enclosed in a medium grained ground mass. In the latter granites, the phenocrysts commonly appear to make up the greater proportion of the volume of the rock : the ground mass forms small interstitial areas. This distribution of phenocrysts and ground mass is not invariable. One portion of a single specimen may be almost entirely coarse grained, and another portion of it may be porphyritic, the ground mass being more abundant than the phenocrysts. Two specimens of granite, A5918 and A5919 have been obtained for the Bureau of Mineral Resources collection.

FRACTURING AND SHEARING.

The northern and the southern portions of the area mapped in the plane table survey can be distinguished by slight differences in the trends of their shears or fractures, and they will be described separately.

The northern portion is intersected by narrow fracture zones trending 322 to 328 degrees and 336 to 342 degrees. Some of them have resulted in close, platy jointing of the granite, with minor silicification and possibly slight greisenization adjacent to the joint planes; others are more strongly sheared and silicified over widths up to 5 feet. Red staining along fracture or cleavage planes may indicate a very slight introduction of hematite, common in shear zones or faults in the Edith River area, but in general, the silicified zones in the northern part of the area are devoid of vugs, limonitic boxwork and of gossanous outcrops. This fracture pattern terminates in a southward direction at a line which trends 80 degrees and passes through a point approximately 350 feet north on the base line shown in the plan. The line is not, as far as is known, marked by any fracturing.

The southern part of the area is intersected by a strong shear zone trending 330 degrees and dipping 84 degrees east. Subsidiary fractures trend 346 to 348 degrees and 354 to 356 degrees. The main shear zone has been traced over a length of 500 feet and has an exposed width of 10 to 20 feet. Massive granite crops out, in places, within 15 feet of it both to the east and the west. The central portion of the shear zone has been exposed in shallow shafts or pits put down at localities A, C, and B. It is marked by a strongly sheared band, which ranges in width, where observed, from 7 to 17 inches, and appears to dip to the east at a very high angle. Its walls are silicified bands of less strongly sheared granite^{and} vein-quartz, and they pass laterally into weathered massive granite. The strongly sheared band consists, near the surface, of reddish and greyish-white earthy material, in part friable. At greater depths, say 10 feet below the surface, it is seen to consist of strongly sheared granite containing numerous streaks and bands of gouge. The weathered portion within 8 feet of the surface contains small scattered colloform and tabular masses of torbernite, but apart from this, the strongly sheared band does not appear, in hand-specimen, to be mineralized. The silicified bands on either side of it are characterized by platy jointing along the strike of the shear zone. The quartz grains of the original granite have been crushed and broken, and the felspar destroyed, and apparently, in part chloritized. East of the strongly sheared band at localities C and B, the silicified bands contain vuggy quartz veins. In places, the cavities give the veins a spongy appearance, and they contain a limonitic boxwork, apparently representing sulphide minerals. West of the strongly sheared band, the quartz veins are narrow, and they have much weaker indications of mineralization.

The subsidiary fractures in the southern part of the area resemble the fractures in the northern part, already described. Some trending 347 degrees appear to branch out from the main shear zone on its eastern side, but, with the exception of a silicified shear zone at locality C, the supposed junction is covered with detritus. At locality C, the subsidiary fracture or shear has a ferruginous and possibly gossanous band about 9 inches wide adjacent to its western wall. It is possible that the vuggy quartz on the eastern side of the main shear zone occurs only at the junctions with those subsidiary fractures.

OCCURRENCE OF URANIUM.

Geiger counts exceeding 3 times the background count of the area were obtained at the surface, along the main shear zone, at localities A, B, C, and D. The northernmost and southernmost of these radiometric anomalies, 250 feet apart, were discovered in October 1952 by Messrs. Young and Mazlin, who obtained high Geiger counts at the surface. No uranium bearing mineral was found at the surface, but at a depth of about 2 feet small irregular "pockets" in the strongly sheared band contained an appreciable amount of torbernite. It occurred in an earthy reddish and yellowish matrix, generally in association with limonite, and thin films of it could be detected on fracture surfaces. A sample at a depth of 2 feet at locality A contained a "vein" of torbernite about 0.3 inch thick. Geiger counts more than 20 times the local background count have been reported by Mr. S. Mazlin and a count of 30 times background was recorded by R.S. Matheson from a pit about 2 feet deep at locality B. The discoverers of the prospect bulldozed a thickness of about 3 feet of weathered surface material from locality A, and deepened the pit there to 2 feet below the bulldozed surface, viz. about 5 feet below the original surface. The pit at locality B was deepened to 2 feet 6 inches. At both localities the Geiger counts at the bottom of the deepened pits were small and it appeared that the relatively high grade uranium-bearing material found at shallower depths had been entirely removed in the process of sinking the pits. This was confirmed by sampling done by Gardner and Jones. Hence it was decided to test the shear zone further by putting down shallow shafts at localities A and C and by deepening the pit at B and extending it eastwards as a costean. At locality C, the strongly sheared band was found to contain torbernite-rich "pockets" at depths from 5 to 8 feet. At the bottoms of the shafts (approximately 13 feet deep), the Geiger counts on the strongly sheared band had declined considerably, to a little above background at A, and to 700 per minute at C (in comparison with counts up to 10,000 per minute at depths of 5 feet to 8 feet). At both localities, the strongly sheared band at the bottoms showed no signs of mineralization in the hand-specimen. The eastern, or hanging wall at A consists of fractured coarse granite, slightly silicified and (?) Chloritized. At C, it also consists of fractured coarse granite which forms a band 9 inches wide, and contains cavities that may represent either leached sulphides or weathered and leached feldspars. Fracture planes in it are coated, in places, with filmy micaceous torbernite. This granitic band is succeeded on the east, at C, by an 8 inch band which appears to be made up in part of semi-friable limonitic material, and in part of very vuggy quartz. Both show abundant limonitic box-work. At locality B, where good torbernite specimens had been found at a depth of 2 feet, the uranium content had diminished to a negligible proportion at 2 feet 6 inches, and increased to nearly .9 percent at 3 feet, the maximum depth. The eastern part of the shear zone resembles strongly that at locality C. The strongly sheared zone here is 7 inches wide, is succeeded on the east by 12 inches of sheared granite containing vuggy quartz veins; and this by red friable earth with fragments of quartz veins showing limonitic box-work. The depth of the costean across the eastern part of the shear zone was only 2 feet, and probably at

greater depth, the red friable earth in it would become more limonitic, and like that at C, suggestive of weathered and leached sulphides.

It appears likely that the primary uranium minerals occurred, together with sulphide minerals, in the vuggy quartz and the "semi-friable" limonitic material adjacent to it. From the surface down to an undetermined depth they have been completely removed by weathering and leaching. Some of the uranium was precipitated as torbernite in the highly sheared band. Possibly that which remains in it received a coating of impervious clayey material from the gouge, and was protected from subsequent solution and removal.

Details of exposures in shafts or pits, and of samples taken are tabulated below, and are illustrated in plate 2.

LOCALITY A (SHALLOW PIT, LATER DEEPENED TO 15 FT. BELOW ORIGINAL GROUND SURFACE.)

Description.	Depth from surface (feet)	Regist- ered No. of sample.	width (ins)	Counts per min along sample channel	U ₃ O ₈ percent (if assayed.)
Reddish and yellowish, weathered, earthy material, in part friable. Contains specimens of torbernite. (This is weathered upper part of strongly sheared band)	2	-	14	20 times back-ground. Probably at least 2800	Reported by Young & Mazlin that picked samples assayed 6% U ₃ O ₈ .
Channel sample cut eastward across bottom of pit, at depth of 2'4" below bulldozed surface, viz., approximately 5' below original surface.					
Fractured, coarse grained granite; silicified (Western or foot wall of strongly sheared band).	5	A5921	6	400	.01
Red and greyish-white, earthy; in part semi-friable. (This is weathered part of strongly sheared band).	5	A5922	17	700	.03
Fractured, coarse grained granite. (Eastern or hanging wall of strongly sheared band).	5	A5923	5	400	.01
North wall of shaft, just below timbering, 7' below bulldozed surface viz., approx. 10' below original surface.					
Strongly sheared granite; weathered	10	-	12	300 to 400	Not assayed

North wall of shaft 15' below original surface, from west wall to east wall.

Description.	Depth from surface (feet)	Registered No. of sample.	Width inches.	Counts per min along sample channel.	U ₃ O ₈ percent (if assayed).
Coarse grained granite not markedly sheared.	15	-	24	Less than 200	Not assayed.
Strongly sheared granite, containing grey earthy bands of gouge.	15	-	12	200 to 240	Not assayed.

LOCALITY B (SHALLOW PIT, CONTINUED EASTWARD AS A COSTEAN).

Channel sample cut eastward across bottom of pit 24" wide, near north end, at depth of 2'3", and continued as costean from 24" to 58"

0-4". Fractured coarse granite, in part silicified and chloritized; contains small cubic cavities.	2'3"	A5924	4"	400	.01
4"-17". Brecciated quartz vein strongly sheared in central portion over width of 1". Contains a few small cavities, in part limonitic, and dark-coloured grains which may be cassiterite and tourmaline.	2'3"	A5925	13"	400	.01
17"-24". Vein quartz slightly vuggy and limonitic; also red, earthy material, friable and porous, containing small masses of pale-red amorphous (colloform ?) earth.	2'3"	A5926	7"	440	.05
24"-36". Sheared granite with quartz veins; vuggy and shows limonitic boxwork.	2'3"	A5969	12"	Not determined.	Less than <.01
36"-45". Red friable earth. Fragments of quartz veins show limonitic boxwork.	2'3"	A5970	9"	Not determined	.02
45"-58". Sheared or crushed granite.	2'3"	A5971	13"	Not determined	Less than <.01

Description.	depth from surface (feet).	Regist- ered No. of sample.	Width (ins.)	Counts per min along sample channel.	U ₃₀ percentag (if assayed).
Channel sample cut westward across bottom of pit, depth 3 feet, at 1 foot south of sample channel described above.					
0-6". Highly shear- ed granite, with vein quartz and limonitic cavities. Contains flaky torb- ernite in fracture planes.	3'	A5972	6"	(Count on bag was 1500) 2250	.86
6"-17". Sheared or crushed granite. A quartz vein from 6"-8" showed one small flake of torbernite.	3'	A5973	11"	1000	.02
<u>LOCALITY C.</u>					
A costean dug eastward across the shear zone ranged in depth from 3'6" at its western end to 5' at the eastern end. It was later deepened, as a shaft to 15'					
At surface: Weath- ered outcrop of highly sheared band covered by a few inches of detri- tal material.				Count of 400 obtain- ed over an area of 1 sq.ft.	
Channel sample cut eastward along bottom of costean.					
0-1'. Weathered granite, friable.	3'6	A5976	12"	(Count on sample 120) 750	.02
1'-1'6". Sheared granite and quartz stringers, showing limonitic cavities; friable.	3'10	A5977	6"	(count on sample 120) 1000	.04
1'6"-1'10". Harder band of sheared granite, probably a little silicified, containing limonitic streaks.	4'	A5978	4"	(Count of 200 on sample) 1400.	.04
1'10"-2'9". Sheared granite; grey-green and brownish friable earth, with soft lim- onitic streaks and some torbernite (This is the strongly shear- ed band)	4'3"	A5979	10"	(Count of 600 on sample) 3000	.23
2'9"-3'6". Hard band of sheared granite, not greatly altered. Cavities probably of weathered felspar. Torbernite in joint planes.	4'6"	A5980	9"	(Count of 320 on sample) 3200	.15

Description.	Depth from surface (feet).	Regist- ered No. of sample.	Width (ins).	Counts per min along sample channel.	U ₃ O ₈ Percent (if assayed)
3'6"-4'2". Reddish & dark brown; semi- friable and in part gougy; some limon- itic streaks. From 4' 2" to 4'6" vein quartz with abundant limon- itic boxwork, contains a little gold.	4'6"	A5981	8"	(Count on sample 200 1600	.06
4'2"-4'6". Silicified sheared granite. This is probably at least 2' thick.	5'	A5982	4"	(Count on sample 120) 600	< .01
Grab sample from shaft.					
Grey-white, friable strongly sheared granite in north wall of shaft.	6'6"	A5988	6"	5000	
Sample channel cut westward across bottom of shaft, 12' deep. Description shows distance of sample from east wall of shaft.					
0-0'9". Semi-friable ferruginous earth with limonite (box- work ?) and frag- ments of vein quartz.	12'	A5983	9"	700-800	
0'9"-1'4". Siliceous brecciated band with much colouring of lim- onite, & probably a little gossanous.	12'	A5984	7"	800	
1'4"-1'10. Brecciated, friable, gougy band; greyish white (Strong- ly sheared granite.	12'	A5985	6"	700	
1'10"-2'6. Sheared and brecciated granite. Less strongly sheared and brecciated than preceeding sample.	12'	A5986	8"	600	
2'6"-3'6. Weathered granite (sheared).	12'	A5987	12"	400-500	

CONCLUSIONS AND RECOMMENDATIONS.

The torbernite found in the upper, weathered part of the strongly sheared band was derived from primary uranium minerals that occurred in the gossanous band, adjacent to the hanging wall. Associated sulphides provided a strongly acidic environment when weathering, and this resulted in complete leaching of the primary uranium minerals. The uranium was precipitated, as torbernite, in fracture and joint planes, and some of it may have been protected from subsequent leaching by receiving a coating of gouge-clay in

the strongly sheared band. The gossanous material has been observed only at localities B and C. Its extension between these points, and northwards to locality A, should be tested by additional costeans and, assuming the gossan to represent sulphide minerals, by a self-potential survey of the prospects. If the sulphide body appeared to be continuous, the prospect would warrant diamond drilling, to intersect the sulphides below the zone of oxidation, say, at a depth of 100 feet.

REFERENCES.

- | | | |
|-------------|-------|---|
| Fisher N.H. | 1952: | The Edith River Uranium-bearing area.
Com. Min. Res. Records 1952/69. |
| Noakes L.C. | 1949: | A geological Reconnaissance of the
Katherine-Darwin Region, Northern
Territory. Com Min. Res. Bull. 16. |
-

PRELIMINARY GEOLOGICAL MAP

PLATE 1.

YENBERRIE URANIUM PROSPECT NORTHERN TERRITORY

Reference

Lower
Proterozoic? X X

Coarse-grained granite

Dolerite

Shear zone, with silicification

Gossanous outcrop (Scale exaggerated)

• A5921
6", .01

Sample 1105; width sampled if assay sample
2nd 430g, per cent

2N

Baseline and pegs for radiometric survey

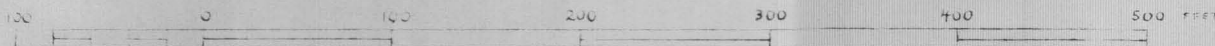
90°

Contours (assumed datum 100 ft. at peg 00)

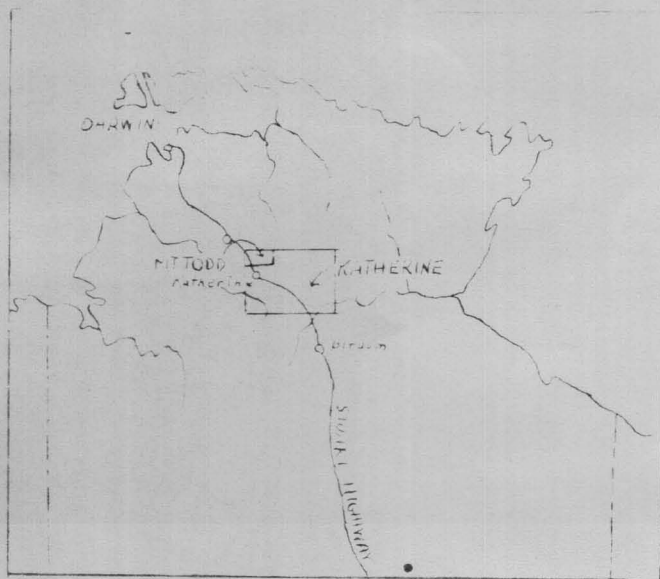
14

Geiger-count 4 times background count.

SCALE



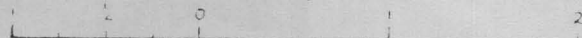
POSITION OF AREA DEALT WITH
IN RELATION TO AUSTRALIAN
GEOLOGICAL SURVEY MAP SERIES



LOCALITY MAP

(Traced from photo mosaic)

Scale



Reference

+

Granite

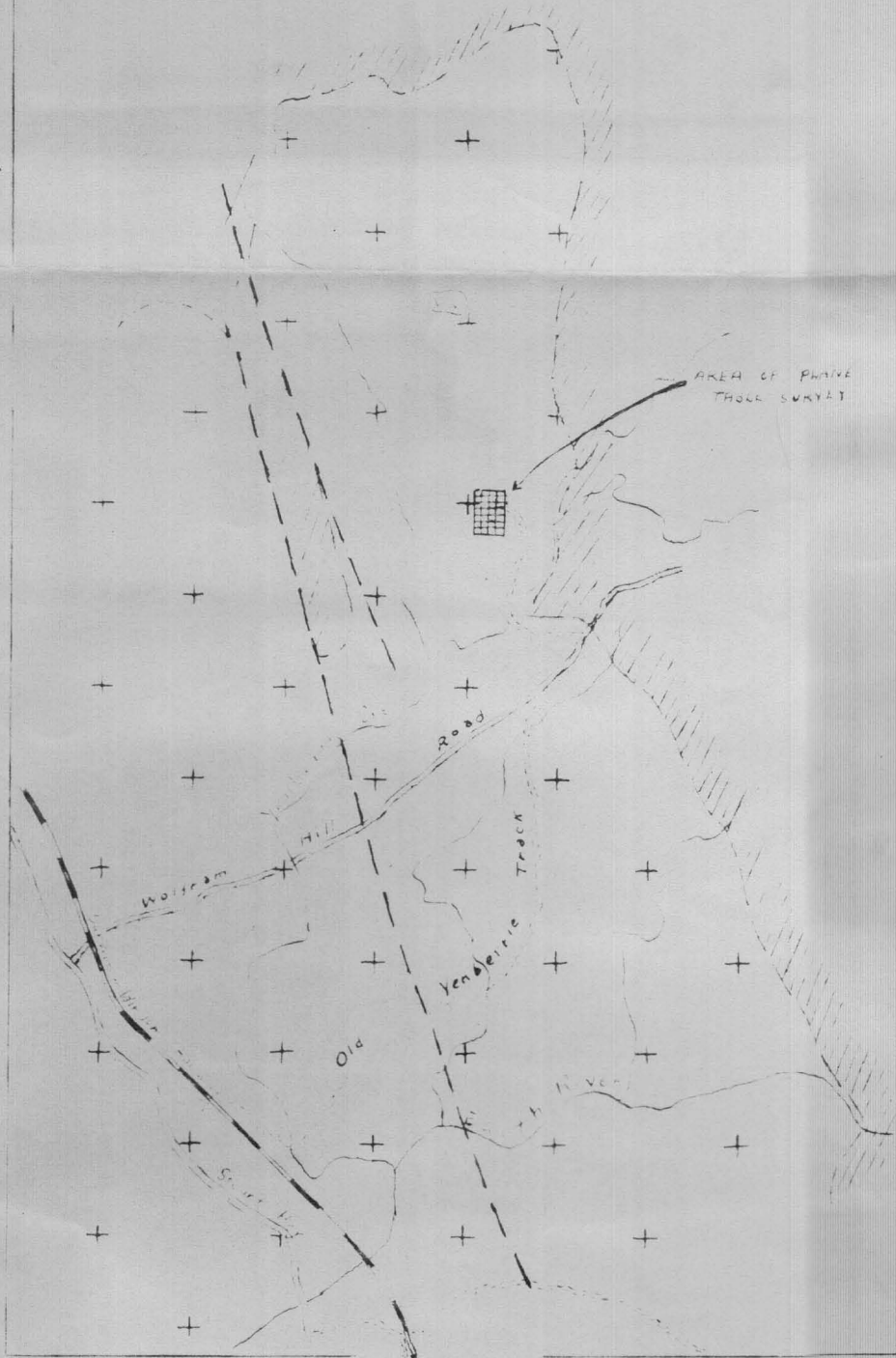
▨

Brock's Creek Group

▨

Tascanite

Faults



Plane table and telescopic alidade survey
and geology by R.E. Gardner and N.D. Jones, May 1953

Sketch plans showing sampling data, geiger counts, and assay results, where available.

Scale.
0 1 2 3 4 5 Feet.

Reference.



Limonitic, gossanous, in part, friable.



Brecciated quartz vein.



Quartz vein.



Granite, sheared or finely jointed and, in part, brecciated.



Strongly-sheared granite.

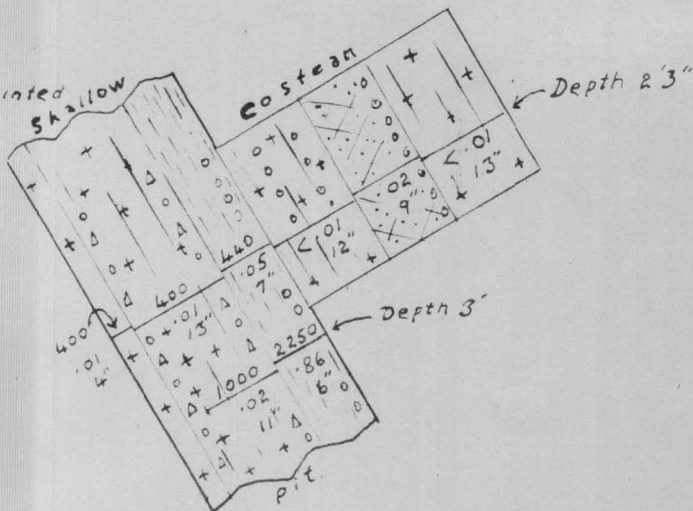
700 geiger-count per minute.

.03 U_3O_8 , per cent.

17" Width, in inches.

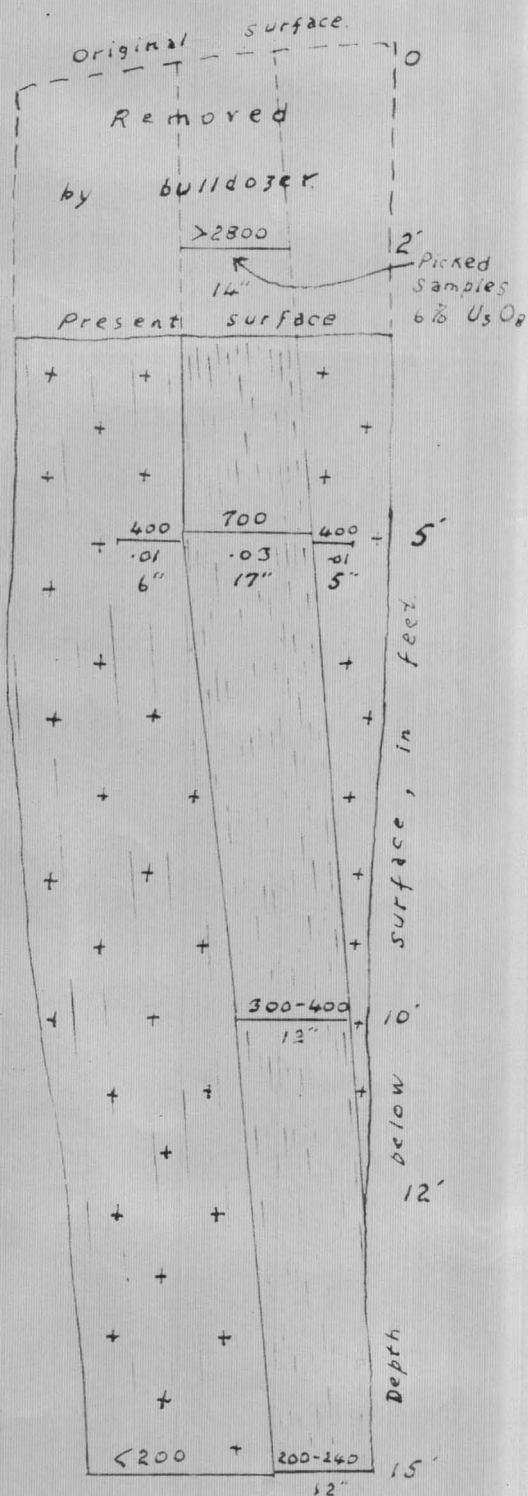
LOCALITY B

Plan of shallow pit and costean.



LOCALITY A.

North wall of shaft.



LOCALITY C.

North wall of shaft.

