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BUREAU OF MINERAL RESOURCES
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SURFACE GEOLOGY AT THE FLEUR DE LYS MINE NEAR BROCK'S CREEK, NORTHERN TERRITORY

by

J. B. Firman.

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C O N T E N T S

Illustrations

SUMMARY

The Fleur de Lys Mine is situated five miles south-west of Brock's Creek Siding on the North Australian Railway. A uranium-copper ore is mined at the Fleur de Lys. Gold, tin, copper and silver-lead have been worked in the surrounding district. The sediments near the mine are shales and siltstones of Lower Proterozoic Age (Noakes, 1949,) which strike north-west and dip steeply to the south-west. They have been injected by quartz veins and amphibolite. Uranium minerals have been found at two localities where the sediments have adjusted to stress by bedding-plane shearing, cross-shearing and jointing. In the oxidised zone the secondary uranium mineral torbernite is associated with the copper minerals malachite, azurite and cuprite. Below the oxidised zone uraninite is found associated with pyrite, chalcopyrite and chalcocite. A radiometric survey has disclosed three areas where radio-activity is relatively high.

INTRODUCTION

Situation and access

The Fleur de Lys Mine is situated in the Woggaman Goldfield five miles south-west of Brock's Creek, a siding on the North Australian Railway 117 miles from Darwin. A graded road joins the Stuart Highway 110 miles from Darwin and runs north-west for one and a half miles to the mine.

Mining History

Gold was discovered in the Brock's Creek District in 1872 by an Adelaide syndicate. Subsequently, deposits of gold, tin, copper and silver-lead were worked, but mining declined at the close of the 19th Century. After the discovery of uranium at Rum Jungle in 1949 it was suggested that the "graphite-slate" formations in the Brock's Creek District should be prospected for uranium. (Sullivan and Iten, 1952). E. Macdonald discovered promising radioactivity at the site of the mine in 1953. The mine is now managed by Macdonald for Brock's Creek Uranium Company, N.L..

Geologists of the Bureau of Mineral Resources investigated the area at the request of the Atomic Energy Commission. Surface mapping of the mine area began in March, 1954, and was continued, whenever time permitted, until January, 1955.

Acknowledgements.

J. H. Lord, F. J. Frankovich, D. E. Gardner, and J. Rade gave assistance at various times during the survey.

GENERAL GEOLOGY

Sedimentary rocks.

The rocks that crop out near the mine are thin-bedded argillaceous siltstone, quartzose siltstone and shale. They are sheared and have a slaty appearance in some places and a blocky appearance in others.

Igneous rocks

Quartz veins trend parallel to the strike of the sediments.

Silicified amphibolite is indicated north-east of the mine workings by a dark red stony soil containing many large amphibolite boulders.

Structure

The sediments strike north-west and dip steeply to the south-west. Bedding is well defined in some outcrops. Some of the micaceous siltstones have a lineation sub-parallel to the bedding which indicates shearing. Slaty cleavage is poorly developed.

Closely-spaced fractures, which are visible in the shafts, dip about 50 degrees south-west. The sediments dip about 70 degrees south-west. The fractures, together with bedding-plane slickensides, indicate that beds to the south-west have moved downward relative to beds to the north-east. The surface fracture pattern near the inclined shaft is irregular, but a general north-east trend is apparent.

ECONOMIC GEOLOGY

The mine is situated in a line of old goldmines which is 13 miles long. The Cosmopolitan Howley, at the south-east end of the line, is one mile south-east of the Fleur de Lys. Other goldmines, Chinese Howley, Big Howley, Bridge Creek and Mount Pacqualin, are situated north-west of the Fleur de Lys (Plate 1).

Mineralisation and structural control.

Secondary uranium minerals have been found in two horizons; one in and adjacent to a bed of quartzose siltstone near No. 1 Shaft, and the other in a shale bed near No. 4 Shaft (Plate 2). Slickensides and variable dip indicate adjustment to stress in these horizons, probably by bedding-plane shearing. Cross-joints and shears provide suitable openings for mineral deposition within the mineralised horizons.

Two zones of uranium mineralisation are seen in No. 1 Shaft. The upper zone, which extends from the surface to a depth of 40 feet, contains torbernite associated with malachite, azurite and cuprite. The uranium and copper minerals occur as coatings on bedding-plane surfaces and on shear and joint surfaces. The fracture pattern is irregular, but a general north-easterly trend is apparent. The lower zone

which extends from a depth of 40 feet to at least 100 feet, contains uraninite associated with pyrite, chalcopyrite and chalcocite. In this zone the uranium and copper minerals occur in bedding-plane shears and in thin shears with a general north-easterly trend. The shears probably served as chanelways along which the primary uranium mineral was introduced. The joints near the surface formed suitable structures for the later deposition of the secondary uranium mineral torbernite.

Radioactivity.

A radiometric survey of the mine area was made with a Harwell ratemeter (Type 1011C). Traverses were run at 25 feet intervals from the geological baseline, which runs through the mine area on a bearing of 330 degrees magnetic for 1600 feet. The traverses extend for approximately 300 feet on either side of the baseline.

The readings obtained were plotted on a scale of 20 feet to 1 inch. At this scale areas of radioactivity twice local background, or greater, were too small to contour. Average radioactivity was calculated for squares of side 100 feet and a generalised contour plan drawn using a contour interval of one quarter local background (Plate 3). Small areas of high radioactivity not situated on traverse lines were superimposed on the plan.

The areas of greatest radioactivity are situated as follows:

1. Near the No. 1 and No. 2 shafts.
2. Near No. 4 Shaft
3. At the north-west end of the baseline near Station 11.

RECOMMENDATIONS

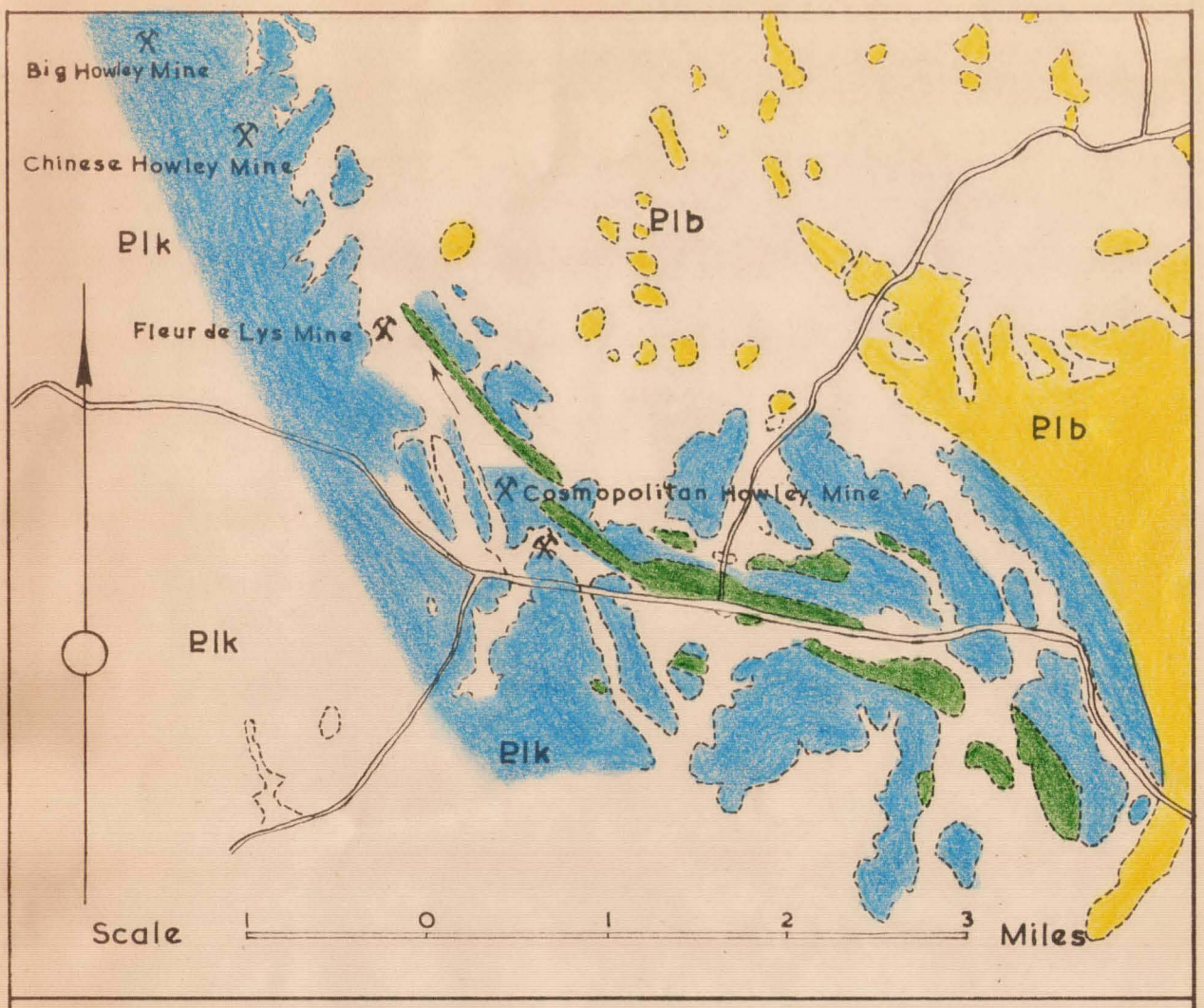
Costeaning should be extended to the north of No. 4 Shaft in the area covered by the radioactive "high" shown on the radiometric plan. Costeans should be put down in the area covered by the radioactive "high" at the north-west end of the baseline near Station 11 (Plate 3).

REFERENCES

Noakes, L.C., 1949 - A geological reconnaissance of the Katherine-Darwin Region, Northern Territory. Bur. Min. Resour. Aust. Bull. 16.

Sullivan, C.J. and Iten, K.W.B., 1952 - The geology and mineral resources of the Brock's Creek District, Northern Territory. Bur. Min. Resour. Aust. Bull.16

PLATE I.



REFERENCE

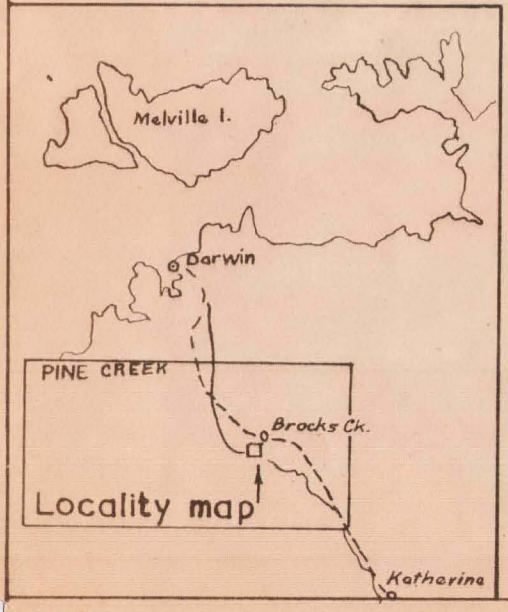
LOWER PROTEROZOIC

Plb — Burrell formation

Plk — Knight's formation

Amphibolite

LOCALITY MAP
SHOWING REFERENCE TO
4 MILE MAP SERIES.



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Darwin Uranium Group
Locality map showing

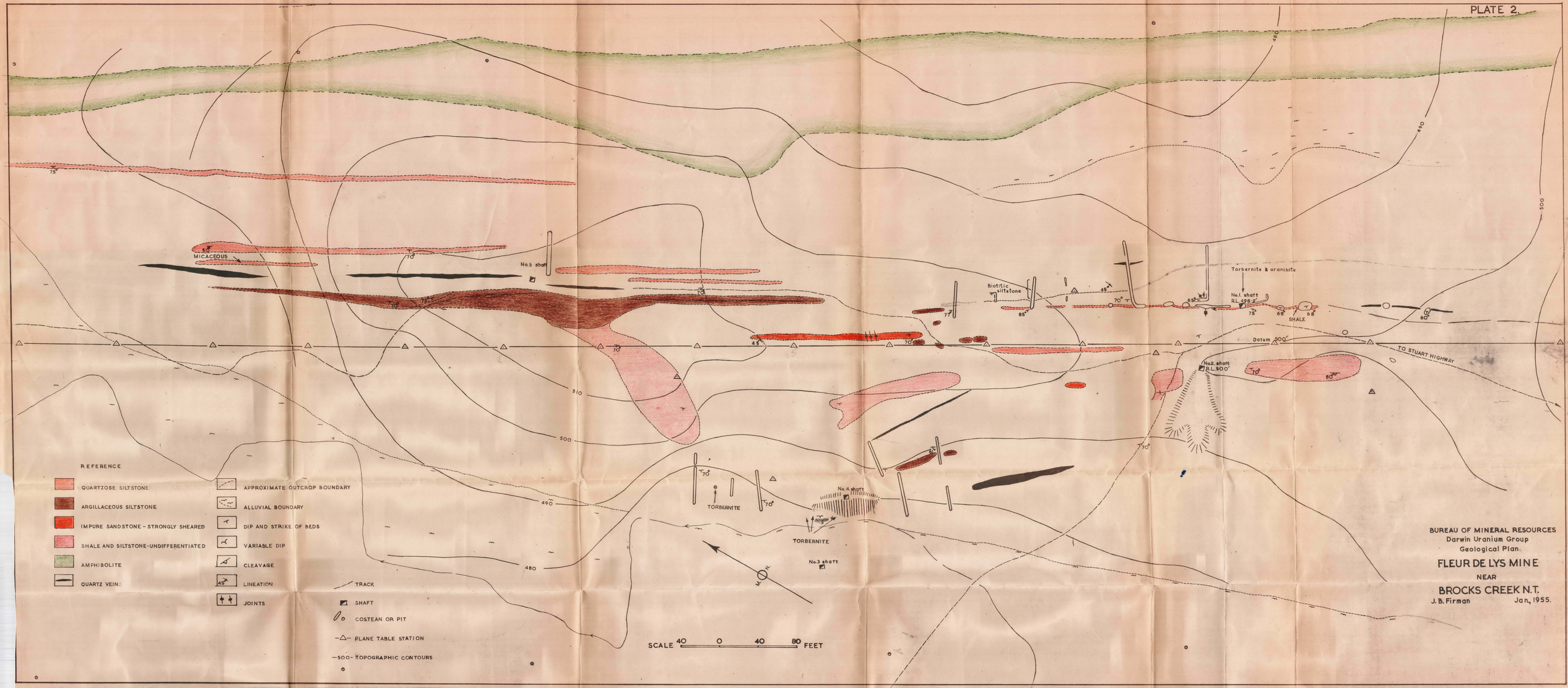
FLEUR DE LYS MINE

Near

BROCKS CREEK N. T.

Geology after B. P. Walpole and others.

PLATE 2.



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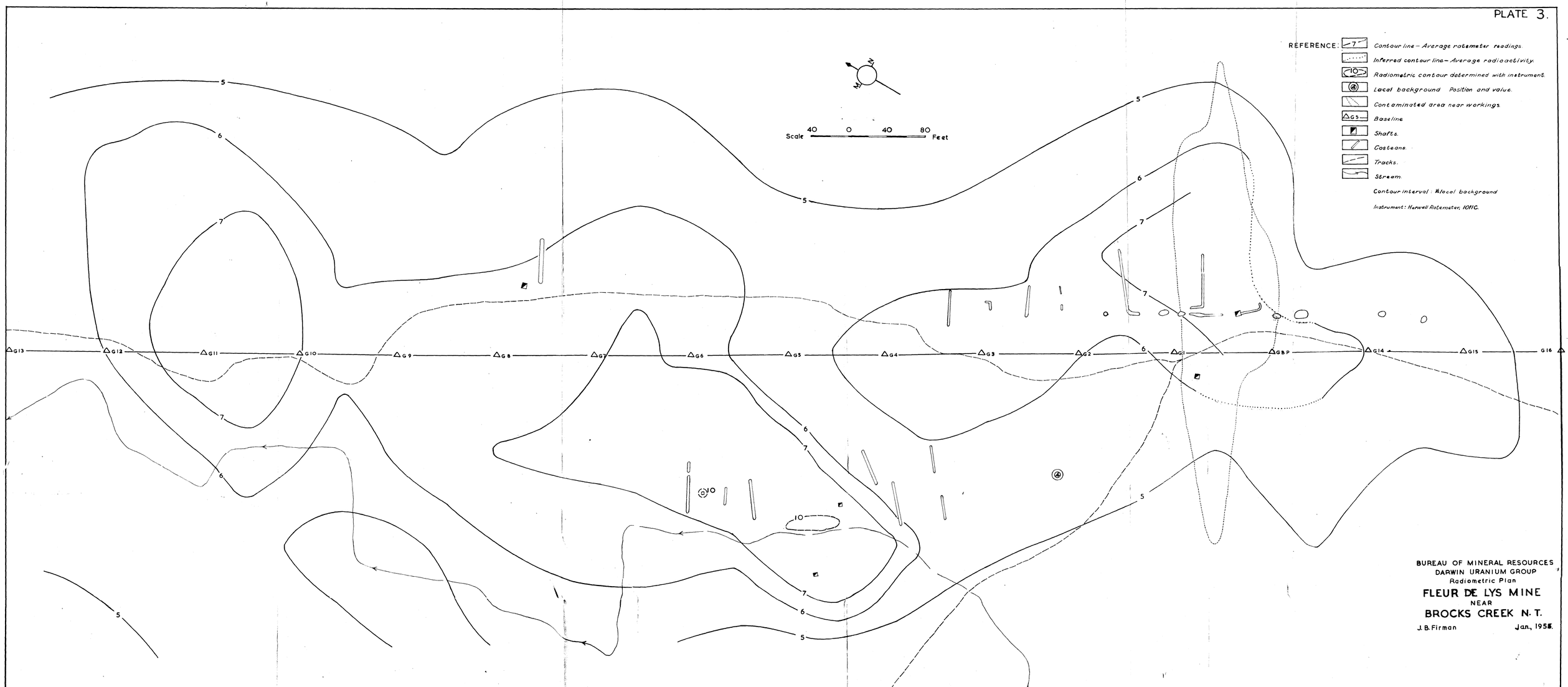
Darwin Uranium Group
Geological Plan.

FLEUR DE LYS MINE
NEAR
BROCKS CREEK N.T.

J. B. Firman Jan., 1955.

PLATE 3.



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DARWIN URANIUM GROUP
Radiometric Plan
FLEUR DE LYS MINE
NEAR
BROCKS CREEK N.T.
J.B. Firman Jan., 1958.