

1972/52

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF  
NATIONAL DEVELOPMENT  
BUREAU OF MINERAL  
RESOURCES, GEOLOGY  
AND GEOPHYSICS



Record 1972/52

MARY RIVER AREA SELF-POTENTIAL SURVEY,  
NORTHERN TERRITORY,  
1971

by

P.W.B. Bullock

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

BMR  
Record  
1972/52  
c.3

Record No. 1972/52

MARY RIVER AREA SELF-POTENTIAL SURVEY,  
NORTHERN TERRITORY, 1971

by

P.W.B. Bullock

The information contained in this report has been obtained by the Department of National Development as part of the policy of the Commonwealth Government to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus or statement without the permission in writing of the Director, Bureau of Mineral Resources, Geology & Geophysics.

## CONTENTS

### SUMMARY

1. INTRODUCTION
2. GEOLOGY
3. RESULTS
4. CONCLUSIONS
5. REFERENCES

## ILLUSTRATIONS

Plate 1. Locality map, grid plan and geology.

Plate 2. Self-potential contours.

### SUMMARY

In 1971 the Darwin Uranium Group of the Bureau of Mineral Resources made a self-potential survey in an area of the Mary River Government Mining Reserve No. 275 to assist in the selection of drilling targets over geochemical anomalies being investigated by the Mines Branch, Northern Territory Administration. The self-potential results show no anomalies that might indicate mineralization, though the results suggest that self-potential relates closely to the lithology in the area surveyed.

## 1. INTRODUCTION

In 1970 the Darwin Uranium Group of the Bureau of Mineral Resources (BMR) made a geophysical survey in the Mary River area, Northern Territory, in Government Mining Reserve No. 275, using electromagnetic and magnetic methods (Williams, 1971). The survey was made at the request of the Mines Branch, Northern Territory Administration, to help locate drilling targets in an area of lead, zinc, and copper geochemical anomalies found by the Mines Branch (Daly, 1971). Geophysical anomalies were discovered but they could not be correlated with the known mineralization. However, an earlier geophysical survey, made in 1967, had indicated a negative self-potential anomaly just north of the area of the 1970 survey (Duckworth, 1969) so it was decided to make a self-potential survey over the area.

The field work was done during a week in July and a few days in October, 1971, by P. Bullock (geophysicist) and N. Ashmore (technical assistant); assistance was given by D. Hammond (field assistant, Mines Branch).

Self-potential was read with a Sharpe VP-6 instrument at 50-ft (15.2 metres) spacing, relative to a fixed base on each traverse. The bases were tied together during the course of the survey.

## 2. GEOLOGY

The area surveyed consists of rocks of the Lower Proterozoic Masson Formation. Surface geology and diamond drilling results are described by Daly (1971). The geophysical grid used is shown in Plate 1, and covers two low ridges of gossanous quartz hematite and sandstone rubble surrounded by black-soil plain which is underlain by shale and sandstone to the east and alluvium and shale to the west. Faulting and shearing occur along two main directions trending approximately northwest and northeast. DDH No. 1 (Pl. 1) intersected quartz sandstone, pyritic carbonaceous shale, and carbonate rock with minor sulphides.

## 3. RESULTS

Self-potential results are shown as contours in Plate 2; there is an undisturbed area over the black-soil plain west of the ridges, but the remainder of the surveyed area is disturbed. This difference in self-potential character between the black-soil plain west of the ridges and the remainder of the area probably relates to lithology; the presence of carbonaceous material within the shales probably causes anomalies in the eastern part of the area surveyed.

Duckworth's (1969) self-potential traverses are shown in Plate 2 as dotted lines where they overlap the grid covered in the 1971 survey. Duckworth's results indicate that the disturbed area extends north of the 1971 area for at least 600 metres and that the undisturbed area also extends north of the 1971 area, but the boundary between the disturbed and undisturbed areas swings north beyond Traverse 12 and passes through 20S/5W on the geochemical grid (Pl. 1).

Faulting may exist between the two ridges within the 1971 area because the correlation of self-potential features from one line to another is lost on Traverse 6.

No correlation of the self-potential results with the previous geochemical and geophysical work is apparent. Electromagnetic and magnetic anomalies occur in both the disturbed and undisturbed self-potential areas. The peaks of the geochemical anomalies occur only in the disturbed self-potential area, but there is no correlation with individual self-potential anomalies. These results suggest that the self-potential method is not suitable for indicating mineralization within the area.

#### 4. CONCLUSIONS

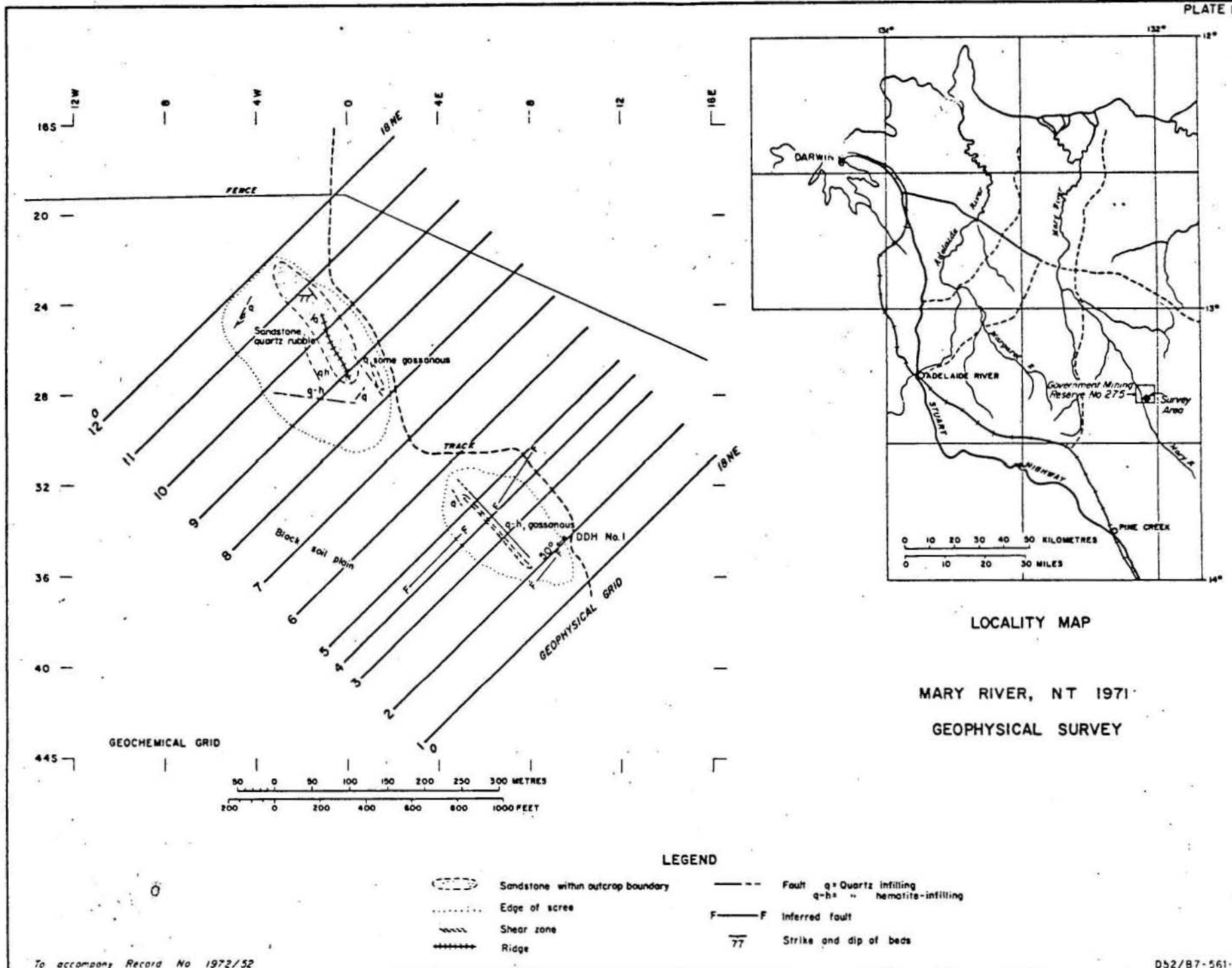
The self-potential method located many anomalies but none that could be interpreted as being due to sulphide mineralization; it is therefore not suitable for locating drill targets in the area covered in this report. The self-potential results appear to correlate with lithology and geological trends and could possibly be used as an aid to geological mapping.

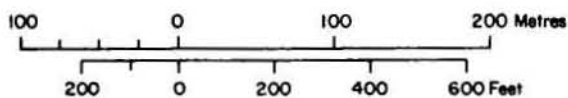
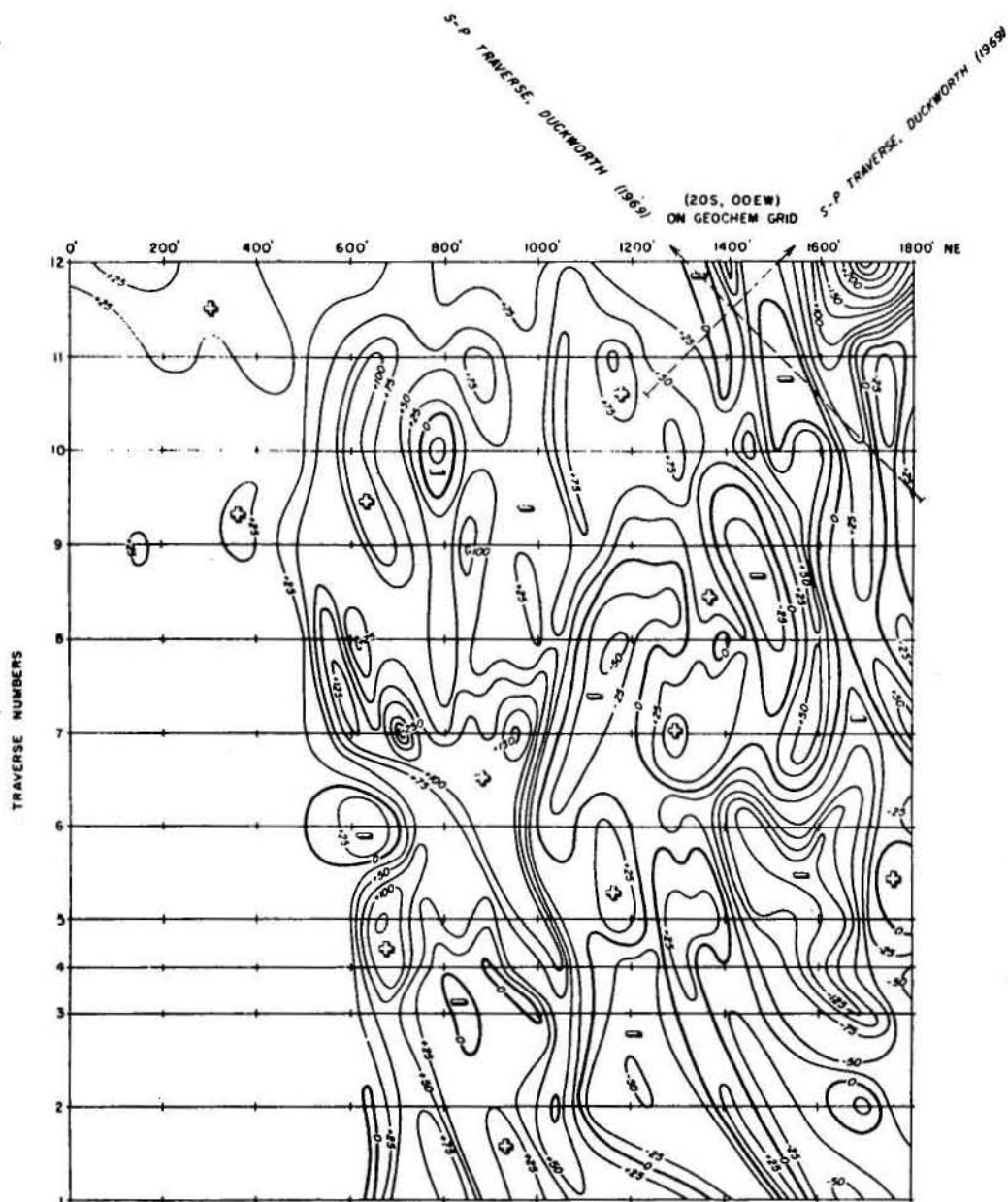
#### 5. REFERENCES

DALY, M.R., 1971 - Mary River survey, 1970. N.T. Geol. Survey report.

DUCKWORTH, K., 1969 - Mary River area geophysical survey, 1967. In Minor metalliferous investigations, Northern Territory Resident Geological Section. Bur. Miner. Resour. Aust. Rec. 1969/90, p. 9-12 (unpubl.).

WILLIAMS, J.P., 1971 - Mary River area geophysical survey, Northern Territory, 1970. Ibid. 1971/134 (unpubl.).





Contour Interval 25mV

## SELF-POTENTIAL CONTOURS