COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

**BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS**

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RECORD No. 1963/87



# EXAMINATION OF SAMPLES FROM RUM JUNGLE CREEK SOUTH OREBODY, NT

by

J. Daly

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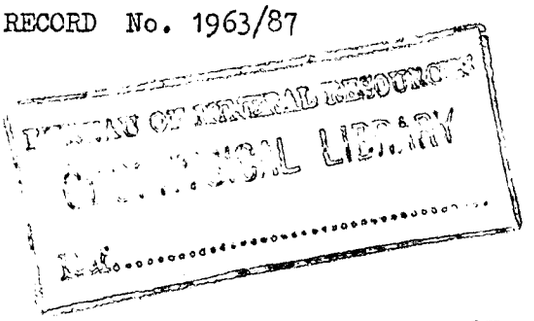

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## ILLUSTRATIONS



## SUMMARY


Forty-nine samples from the Rum Jungle Creek South uranium orebody were assayed by Australian Mineral Development Laboratories, in order to obtain information on factors likely to influence the electrical conductivity of the orebody. Assays were made for uranium, graphite, total sulphur, and sulphate sulphur.

The results have been examined by elementary statistical methods. It is shown that the mean graphite content is not likely to be representative of the orebody, and that sulphate sulphur content and total sulphur content are correlated. The data are insufficient to warrant any other conclusions.

## 1. INTRODUCTION

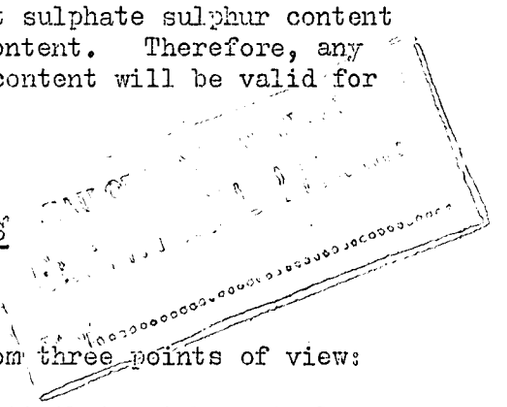
In connexion with geophysical surveys in the Rum Jungle district, a suite of samples from the Rum Jungle Creek South uranium orebody was assayed for various constituents considered likely to affect the electrical conductivity of the orebody. The purpose of the investigation was to check the possibility of correlation between minerals of high conductivity and uranium orebodies.

The assays were made by Australian Mineral Development Laboratories (AMDL). The samples were selected from a large number which had been submitted to AMDL for assay in other connexions. The selection was designed to be representative of the orebody at various positions, and of as wide a range of uranium content as possible. A total of 49 samples was assayed. The results were examined by the geophysical staff of the Darwin office of the Bureau of Mineral Resources, Geology and Geophysics, and it was concluded that no correlation with the topographic or stratigraphic position of the samples in the orebody could be established with any high degree of probability. In this Record, the results are submitted to elementary statistical tests, to see if any correlations can be established on this basis alone.

## 2. RESULTS

The samples were assayed for uranium content, total sulphur content, sulphate sulphur content, and graphite content. The results are presented in Table 1. The first three columns of this table are descriptive of the samples. The next four columns give the results of determinations by AMDL. The last three columns are obtained by calculation. The eighth column shows sulphide sulphur content, obtained by subtracting the sulphate sulphur content from the total sulphur content. The ninth column shows the pyrite content, calculated from the sulphide sulphur content on the assumption that pyrite is the only sulphide present. It is understood that this assumption is justified by present knowledge of the orebody. The tenth column shows the ratio of calculated pyrite content to measured graphite content.

It is apparent from the table that sulphate sulphur content is only a small fraction of total sulphur content. Therefore, any correlation established with total sulphur content will be valid for pyrite content, to a close approximation.



## 3. DISCUSSION OF RESULTS

The results will be considered from three points of view:

(a) the distribution of the various attributes taken singly,

(b) testing for correlations between the various attributes, and

(c) testing for correlations between the various attributes and the depth, on the groups of samples for which this is possible.

Graphical methods only have been used. The use of graphical methods is an obvious first step in such enquiries. In the present case, the consistency of the data is so poor that the use of more refined methods is not warranted.

Distribution of various attributes

Plate 1 shows histograms of percent $U_3O_8$, percent graphite, percent total sulphur, and ratio of pyrite to graphite. The results have been grouped in ranges of 0.25 percent in the first three histograms, and in ranges chosen arbitrarily in the fourth histogram.

The histograms of percent $U_3O_8$, percent total sulphur, and ratio pyrite to graphite have no unusual features, and could be approximated by distributions of standard types. The ratio pyrite to graphite is greater than unity for all except five samples, and has a well-defined maximum between two and five. The most probable value of the ratio of pyrite to graphite for a sample chosen at random from the orebody would lie within this range. The most unusual distribution is that of percent graphite, which is very strongly peaked. This could not be approximated by a distribution of the standard types. The mean of all measurements is 0.81 percent. Calculating a standard deviation about this mean would give a distribution quite unlike the histogram. It would be possible to fit a distribution to the values not greater than 1.5 percent, but this would have a small standard deviation, and the probability of the individual high values shown would be extremely small. The conclusion is that the most probable value of graphite content is between 0.25 percent and 0.5 percent, and that the samples showing high values have been influenced by extra causes.

Correlations between attributes

Plates 2 and 3 show scatter diagrams for $U_3O_8$ *v.* graphite, $U_3O_8$ *v.* total sulphur, $U_3O_8$ *v.* sulphate sulphur, graphite *v.* total sulphur, graphite *v.* sulphate sulphur, and total sulphur *v.* sulphate sulphur.

The diagram of $U_3O_8$ *v.* graphite does not exclude the possibility of some degree of negative correlation, with high values of $U_3O_8$ associated with low values of graphite, and vice versa. However, the amount of the data is too small to allow of any definite conclusion. None of the other diagrams show any evidence of correlation at all, except for the diagram of total sulphur *v.* sulphate sulphur, which clearly indicates positive correlation.

Correlations with depth

Plates 4 and 5 show the values of the various attributes plotted against footage, for those holes which were represented by more than two samples. The results are only included for completeness, as this aspect was not envisaged when the samples were selected, and the data are very incomplete. The results for Hole 411 appear to show very definite trends, $U_3O_8$ and sulphur decreasing steadily with depth, and graphite increasing. However, this correlation is not apparent in any of the other holes and may be due to coincidence.

## 4. CONCLUSIONS

It appears that the mean value of graphite content of 0.81 percent is not likely to be representative of the orebody. A more probable value lies in the range between 0.25 percent and 0.5 percent. The pyrite content is higher than the graphite content, and a value for the ratio pyrite to graphite between two and five is likely to be representative. There is no evidence that the various attributes are correlated, except for clear correlation between total sulphur and sulphate sulphur (perhaps not an unexpected result), and for slight evidence of negative correlation between uranium and graphite.

The main conclusion to be drawn, however, is that the data are insufficient to allow of well-based inferences. It appears that, if investigations of this nature are to be undertaken, the examination of large numbers of samples must be allowed for. It is probable that the Rum Jungle Creek South orebody is comparable in uniformity with many other orebodies so that correlations with regard to the types of mineralization in orebodies should be regarded with suspicion, unless based on adequate sampling. If the number of samples examined is relatively small, the probability of such correlations may be extremely low.

# TABLE I
## ASSAY RESULTS

| HOLE | FOOTAGE | MARK | $U_3O_8$ % | GRAPHITE % | S (TOTAL) % | S (SULPHATE) % | S (SULPHIDE) % | PYRITE % | RATIO PYRITE/GRAPHITE |
|---|---|---|---|---|---|---|---|---|---|
| 400 | 112–115 | 41515 | 4.15 | 0.38 | 1.96 | 0.18 | 1.78 | 3.34 | 9.1 |
| 374 | 150–186 | 52005 | 0.67 | 1.22 | 1.03 | 0.04 | 0.99 | 1.80 | 1.5 |
| 365 | 145–200 | 52402 | 1.33 | 1.38 | 2.21 | 0.14 | 2.07 | 3.88 | 2.8 |
| 365 | 225–268 | 52403 | 0.26 | 0.32 | 1.17 | 0.06 | 1.11 | 2.08 | 6.5 |
| 461 | 122–125 | 52535 | 0.11 | 0.29 | 0.17 | 0.01 | 0.16 | 0.30 | 1.0 |
| 461 | 125–143 | 52536 | 0.24 | 0.33 | 0.64 | 0.03 | 0.61 | 1.14 | 3.5 |
| 461 | 145–149 | 52537 | 0.135 | 0.26 | 0.48 | 0.03 | 0.45 | 0.84 | 3.2 |
| 461 | 149–161 | 52538 | 0.415 | 0.31 | 0.70 | 0.04 | 0.66 | 1.24 | 4.0 |
| 461 | 161–167 | 52539 | 0.11 | 0.19 | 2.01 | 0.05 | 1.96 | 3.67 | 19.4 |
| 462 | 106–112 | 52540 | 0.405 | 0.26 | 0.29 | 0.04 | 0.25 | 0.47 | 1.8 |
| 462 | 112–118 | 52541 | 0.155 | 0.19 | 0.18 | 0.04 | 0.14 | 0.26 | 1.4 |
| 462 | 118–138 | 52542 | 0.60 | 0.38 | 0.72 | 0.05 | 0.67 | 1.26 | 3.3 |
| 462 | 141–148 | 52543 | 0.10 | 0.86 | 1.34 | 0.07 | 1.24 | 2.32 | 2.7 |
| 463 | 122–125 | 52544 | 0.495 | 2.69 | 2.44 | 0.15 | 2.29 | 4.30 | 1.6 |
| 463 | 140–146 | 52545 | 0.12 | 5.90 | 2.78 | 0.24 | 2.54 | 4.75 | 0.8 |
| 464 | 174–196 | 52546 | 0.245 | 0.28 | 0.82 | 0.02 | 0.80 | 1.50 | 3.5 |
| 467 | 123–129 | 52551 | 0.315 | 0.19 | 2.56 | 0.18 | 2.38 | 4.46 | 23.5 |
| 467 | 161–169½ | 52552 | 0.375 | 0.32 | 1.32 | 0.07 | 1.25 | 2.35 | 7.3 |
| 453 | 123–129 | 52604 | 0.68 | 0.39 | 1.01 | 0.23 | 0.88 | 1.65 | 4.2 |
| 446 | 158–164 | 52608 | 0.64 | 1.16 | 2.79 | 0.14 | 2.65 | 4.95 | 4.3 |
| 446 | 167–179 | 52609 | 1.05 | 0.33 | 1.33 | 0.13 | 1.20 | 2.25 | 6.8 |
| 446 | 224–230 | 52610 | 0.35 | 0.50 | 0.43 | – | 0.43 | 0.81 | 1.6 |
| 443 | 154–163 | 52612 | 0.57 | 0.37 | 0.43 | 0.02 | 0.41 | 0.76 | 2.1 |
| 443 | 163–172 | 52613 | 0.20 | 0.32 | 0.23 | 0.01 | 0.22 | 0.41 | 1.3 |
| 443 | 202–208 | 52614 | 0.29 | 0.35 | 0.45 | – | 0.45 | 0.84 | 2.4 |
| 443 | 214–220 | 52615 | 0.47 | 0.41 | 0.93 | 0.02 | 0.91 | 1.70 | 4.2 |
| 442 | 139–145 | 52616 | 0.40 | 0.29 | 0.15 | 0.07 | 0.08 | 0.15 | 0.5 |
| 442 | 196–214 | 52617 | 0.21 | 0.47 | 0.46 | 0.03 | 0.43 | 0.81 | 1.7 |
| 440 | 146–155 | 52619 | 0.80 | 1.37 | 1.67 | 0.04 | 1.63 | 3.10 | 2.3 |
| 440 | 215–224 | 52620 | 0.52 | 0.90 | 0.89 | 0.06 | 0.83 | 1.56 | 1.7 |
| 437 | 128–144 | 52626 | 0.19 | 0.64 | 0.47 | 0.01 | 0.46 | 0.86 | 1.3 |
| 437 | 147–153 | 52627 | 0.19 | 0.37 | 0.43 | 0.01 | 0.42 | 0.79 | 2.1 |
| 437 | 162–171 | 52628 | 0.43 | 0.47 | 0.66 | 0.01 | 0.65 | 1.22 | 2.6 |
| 436 | 123–147 | 52629 | 3.50 | 0.44 | 2.34 | 0.14 | 2.20 | 4.12 | 9.4 |
| 436 | 162–168 | 52630 | 0.37 | 0.30 | 1.47 | 0.14 | 1.33 | 2.50 | 8.3 |
| 434 | 129–135 | 52633 | 1.92 | 0.98 | 0.84 | 0.02 | 0.82 | 1.54 | 1.6 |
| 433 | 130–151 | 52636 | 2.65 | 1.38 | 3.97 | 0.21 | 3.76 | 7.07 | 5.1 |
| 422 | 196–202 | 52648 | 1.60 | 3.44 | 1.04 | 0.03 | 1.01 | 1.90 | 0.6 |
| 417 | 84–99 | 52653 | 0.53 | 0.62 | 1.21 | 0.04 | 1.17 | 2.19 | 3.5 |
| 417 | 105–111 | 52654 | 0.27 | 0.43 | 2.20 | 0.07 | 1.13 | 2.12 | 4.9 |
| 417 | 138–147 | 52656 | 1.34 | 0.38 | 2.68 | 0.24 | 2.44 | 4.56 | 12.6 |
| 417 | 150–156 | 52657 | 0.11 | 0.36 | 1.00 | 0.05 | 0.95 | 1.78 | 5.0 |
| 417 | 174–204 | 52658 | 0.27 | 0.61 | 0.34 | 0.01 | 0.33 | 0.62 | 1.0 |
| 411 | 115–127 | 52663 | 1.31 | 1.09 | 3.05 | 0.09 | 2.96 | 5.55 | 5.1 |
| 411 | 130–142 | 52664 | 0.70 | 1.19 | 3.02 | 0.14 | 2.88 | 5.40 | 4.5 |
| 411 | 160–172 | 52665 | 0.37 | 2.61 | 0.71 | 0.04 | 0.67 | 1.26 | 0.5 |
| 411 | 175–181 | 52666 | 0.24 | 2.96 | 0.35 | 0.03 | 0.32 | 0.60 | 0.6 |
| 400 | 133–145 | 52680 | 0.19 | 0.59 | 0.53 | 0.02 | 0.51 | 0.96 | 1.6 |
| 387 | 183–186 | 52691 | 2.40 | 1.98 | 1.16 | 0.05 | 1.11 | 2.08 | 1.1 |
| | | | Mean | Mean | Mean | Mean | Mean | Mean | |
| | | | 0.71% | 0.81% | 1.25% | 0.07% | 1.2% Pyrite (calc.) 2.25% | 2.2% | |

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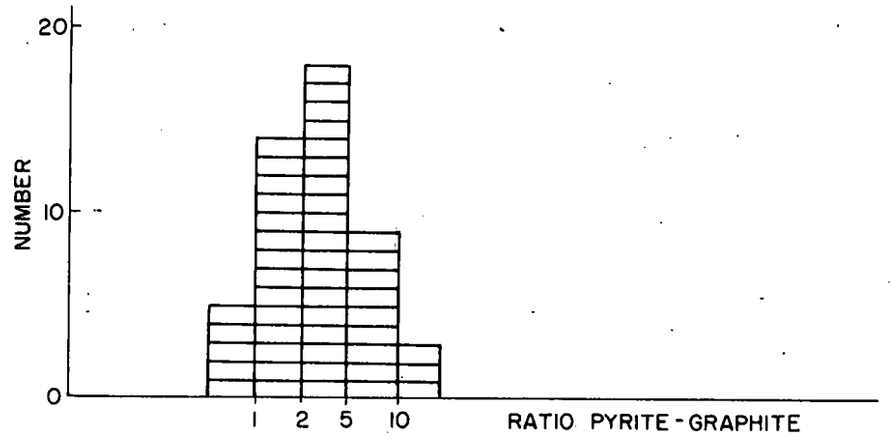
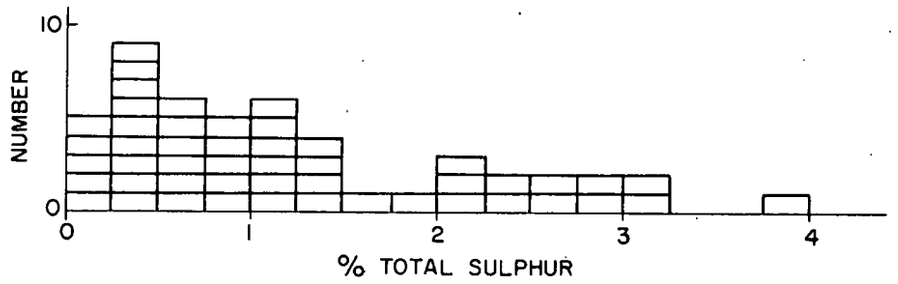
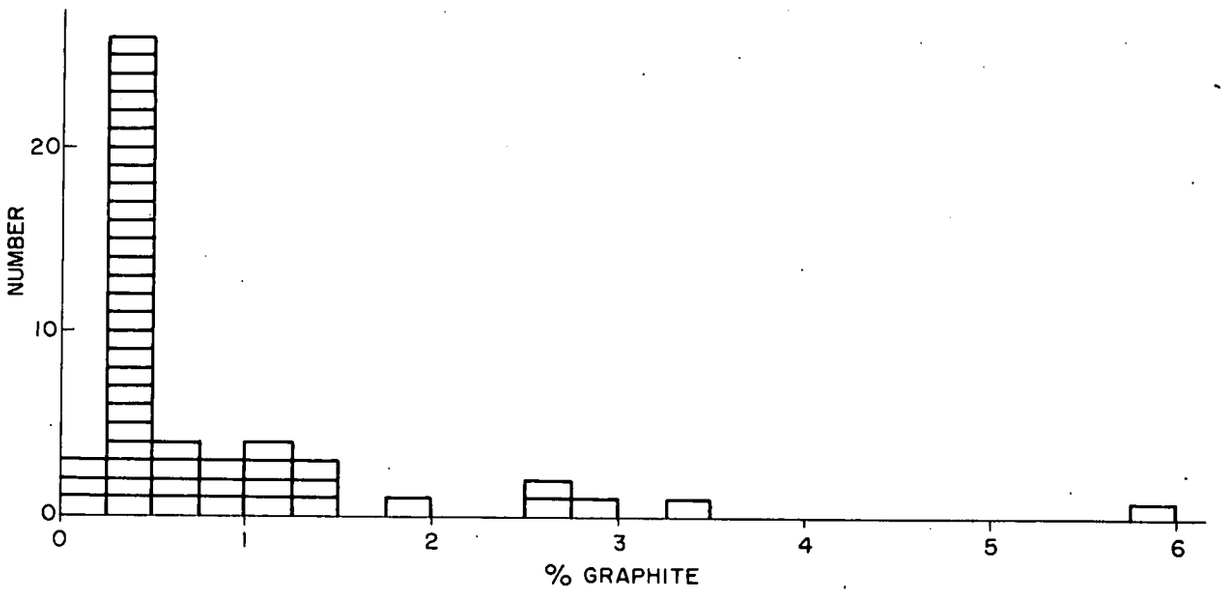
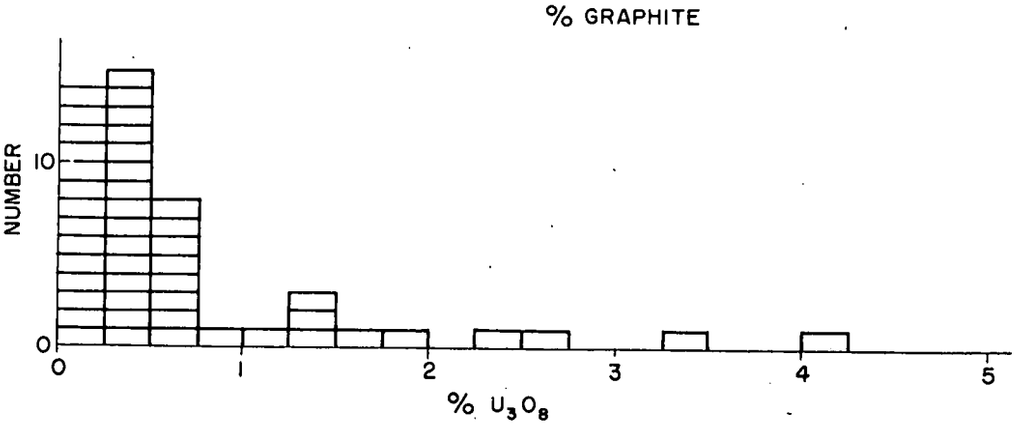
PLATE I




RUM JUNGLE CREEK SOUTH OREBODY SPECIMENS, NT

# HISTOGRAMS OF: RATIO PYRITE TO GRAPHITE; PERCENTAGES OF TOTAL SULPHUR, GRAPHITE, $U_3O_8$

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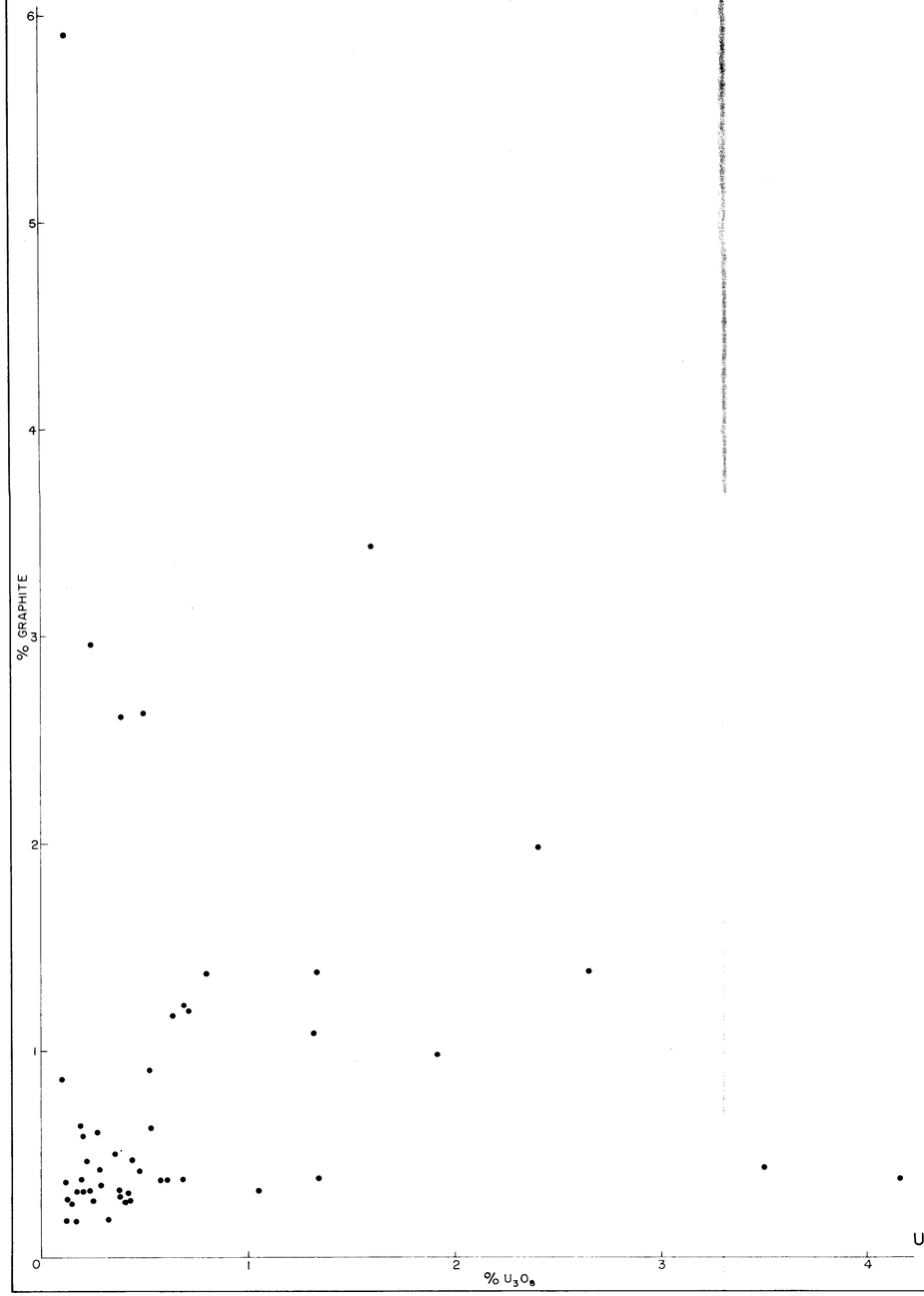
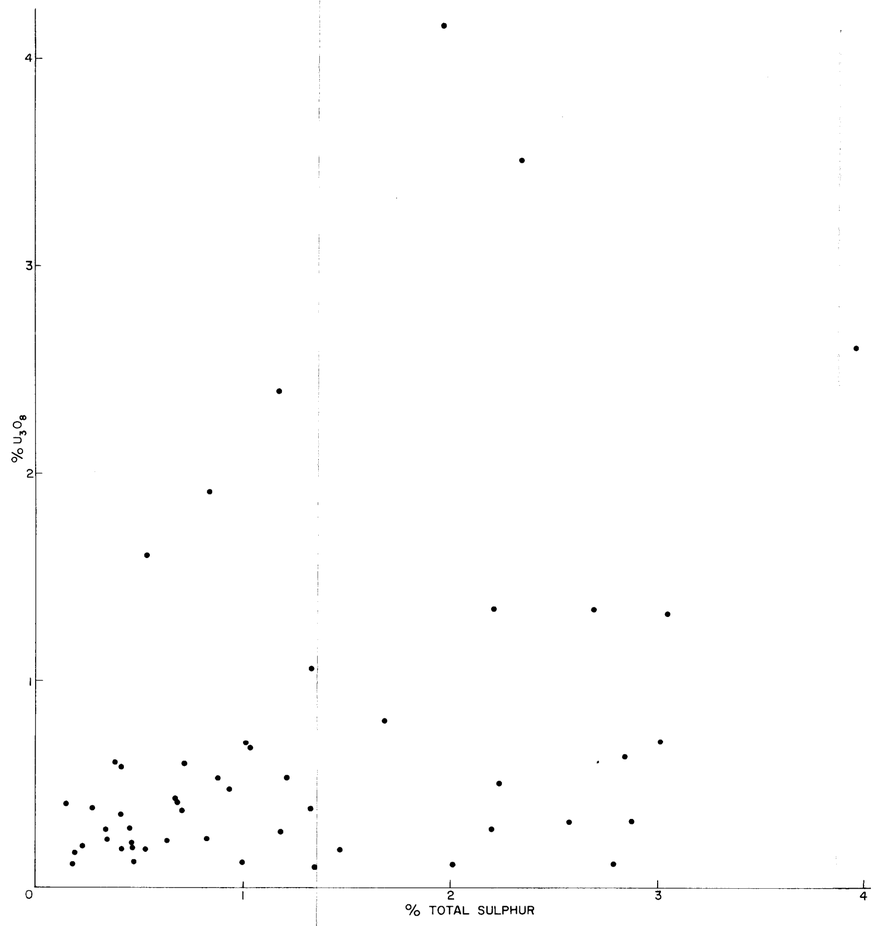
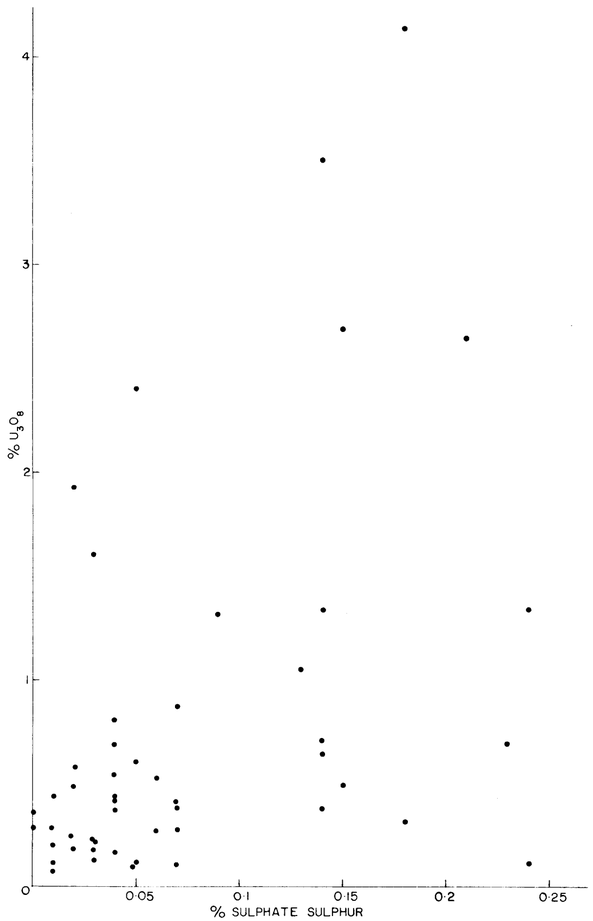
PLATE 2




$U_3O_8$ V. GRAPHITE




$U_3O_8$ V. TOTAL SULPHUR




$U_3O_8$ V. SULPHATE SULPHUR

# SCATTER DIAGRAMS
## $U_3O_8$ V. GRAPHITE, TOTAL SULPHUR, AND SULPHATE SULPHUR

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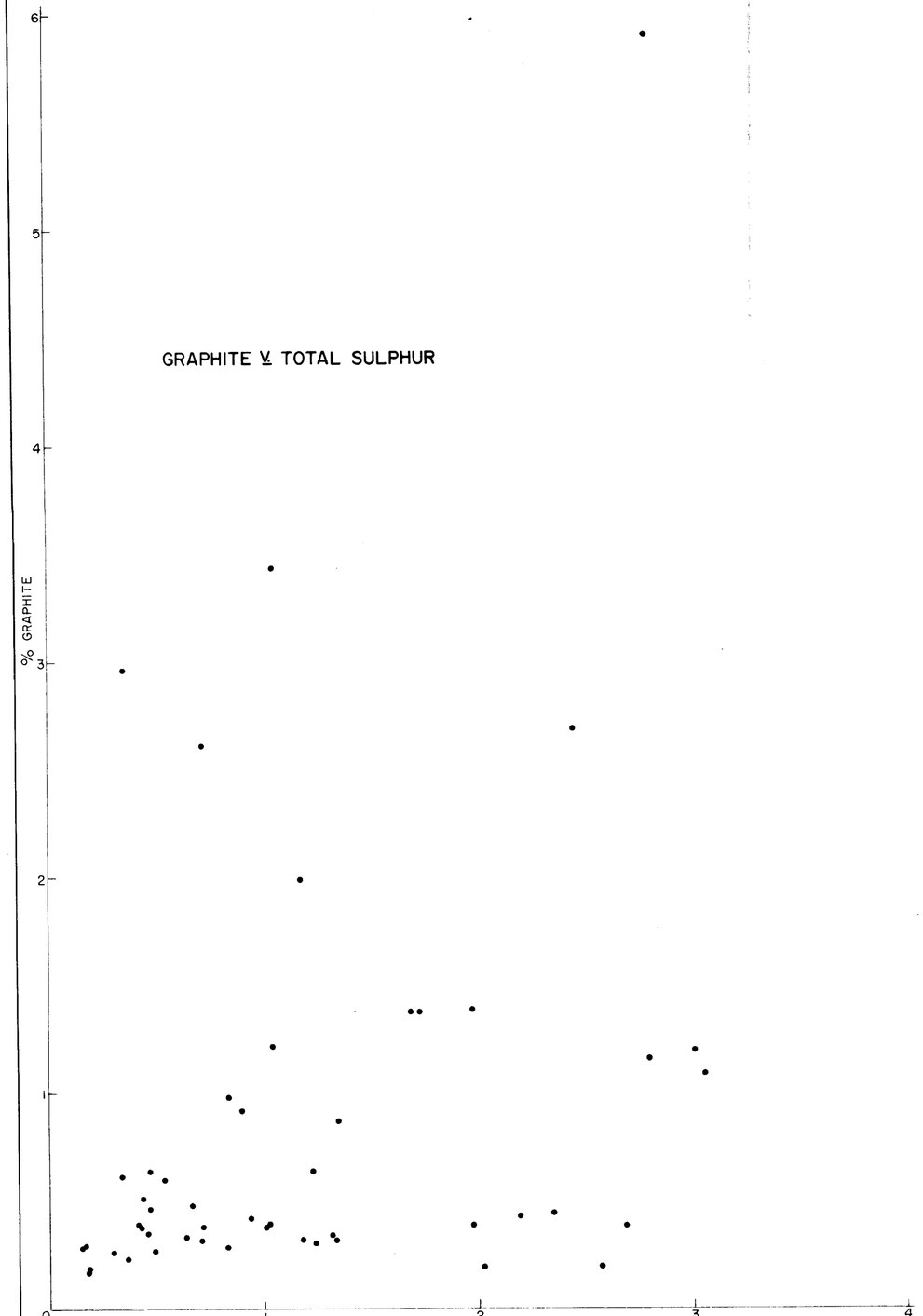
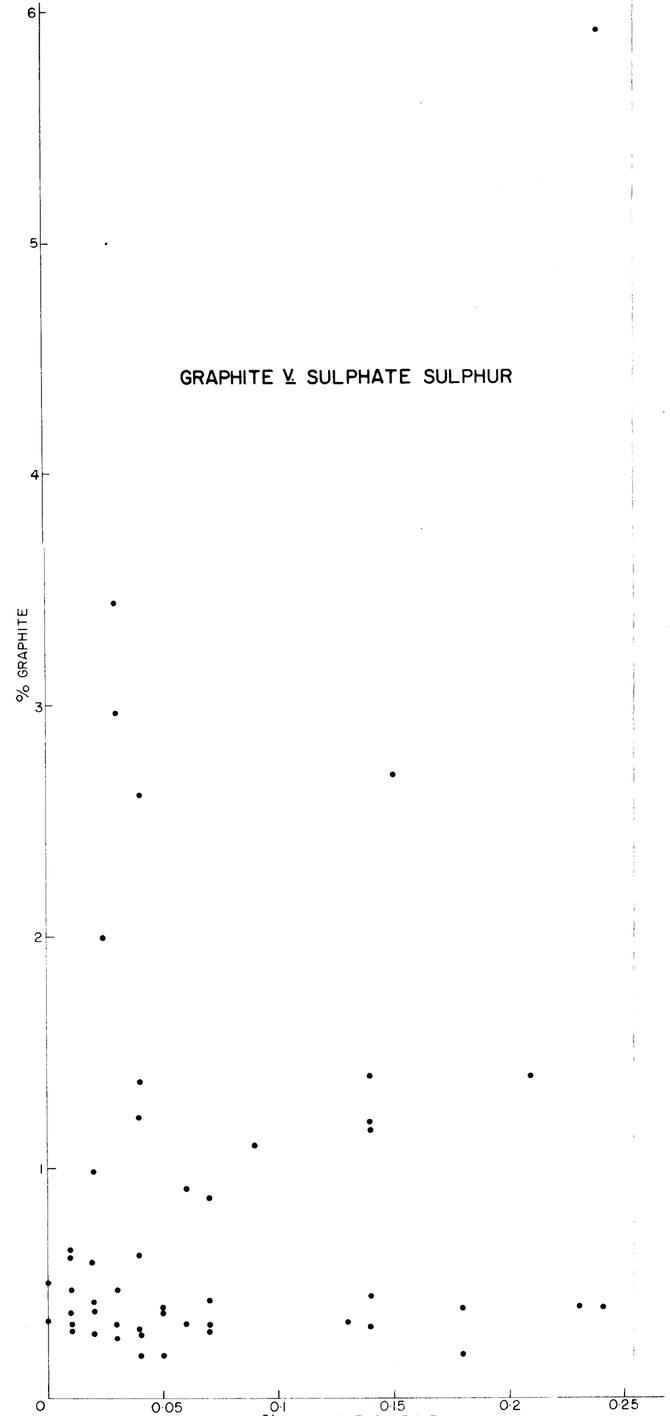
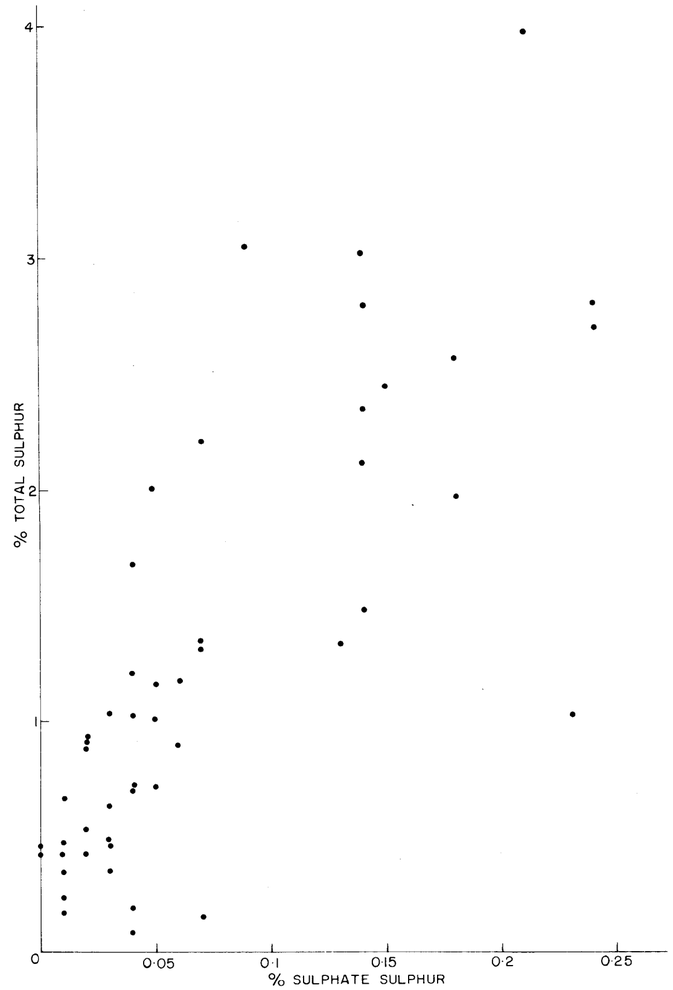
PLATE 3




TOTAL SULPHUR V. SULPHATE SULPHUR

## SCATTER DIAGRAMS

GRAPHITE V. TOTAL SULPHUR
GRAPHITE V. SULPHATE SULPHUR
TOTAL SULPHUR V. SULPHATE SULPHUR

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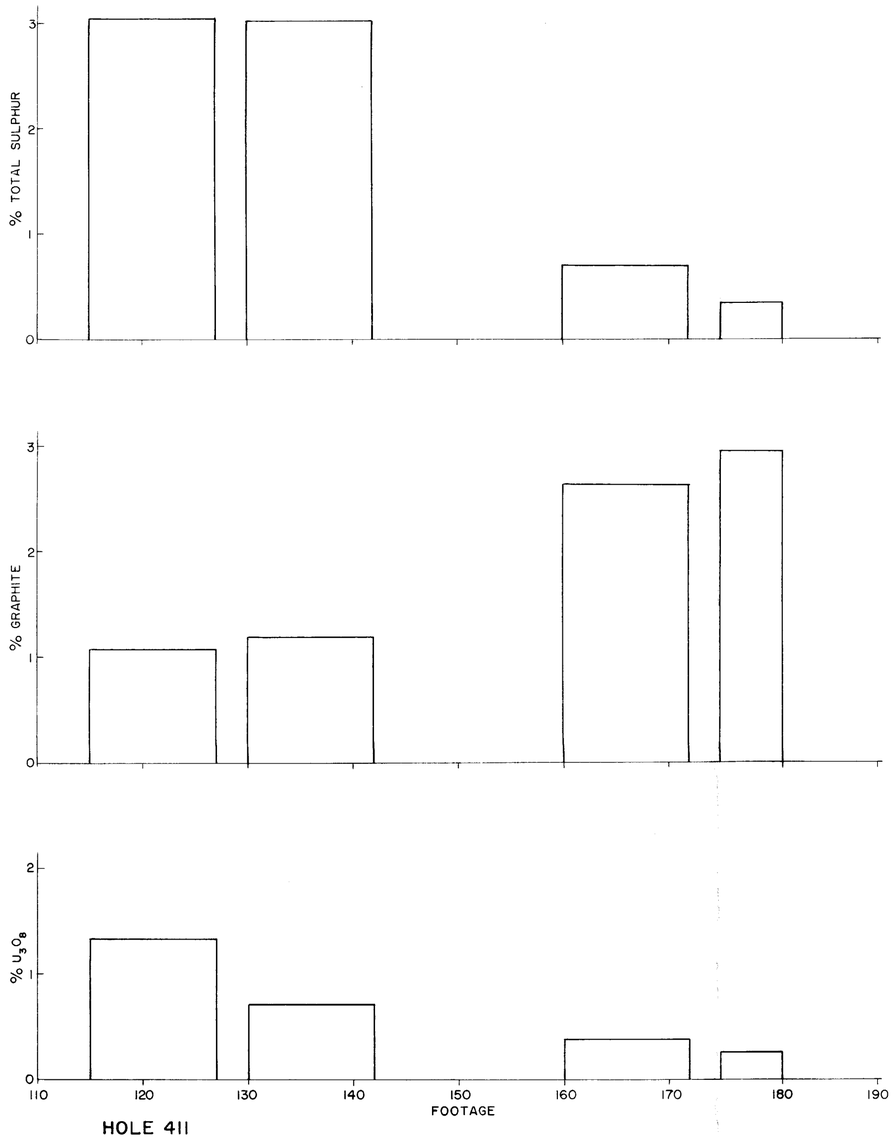
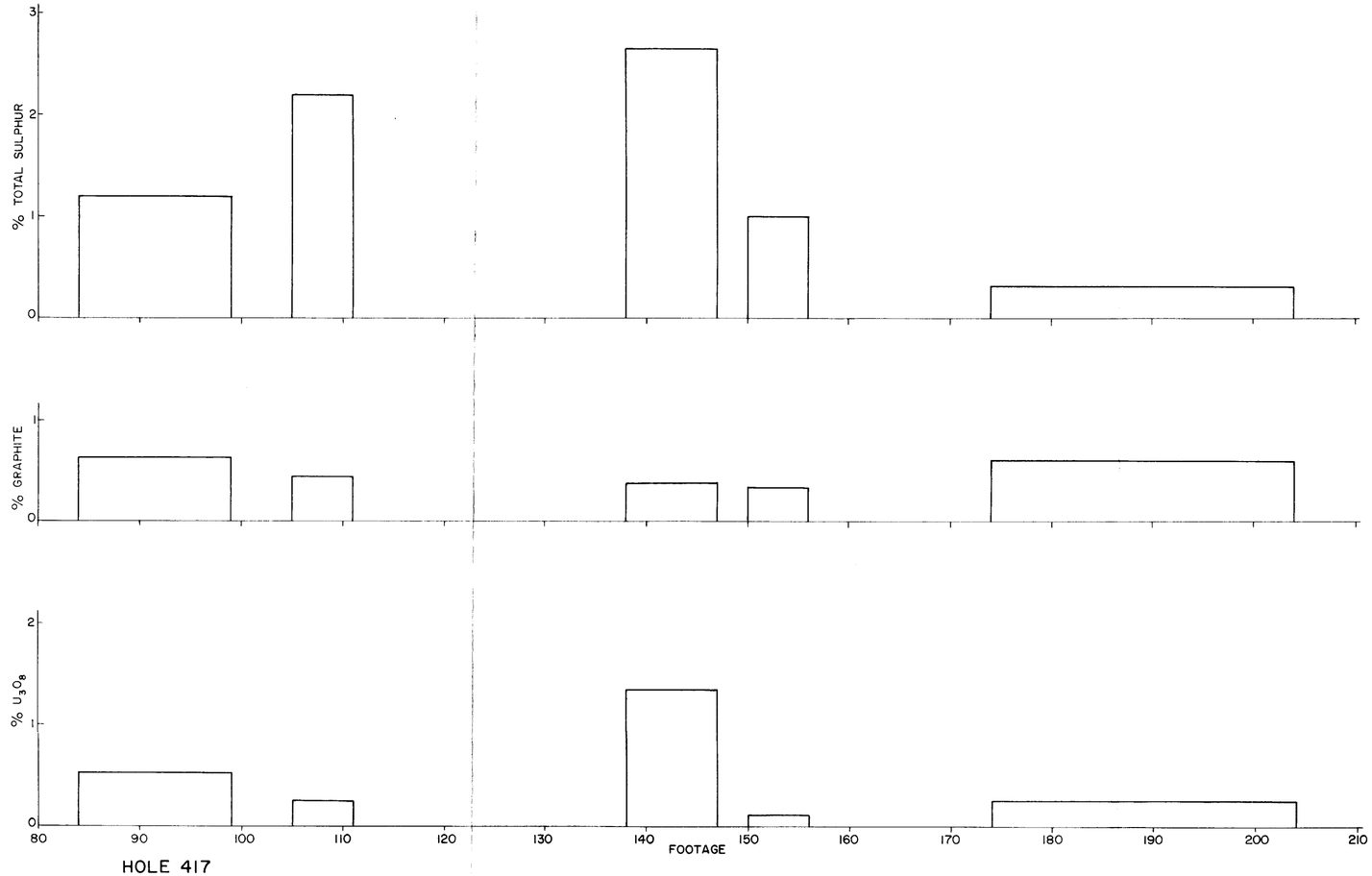
RUM JUNGLE CRK STH OREBODY SPECIMENS, NT




HOLE 411




HOLE 417

# VARIATION OF CONSTITUENTS WITH FOOTAGE

## HOLES 411 AND 417

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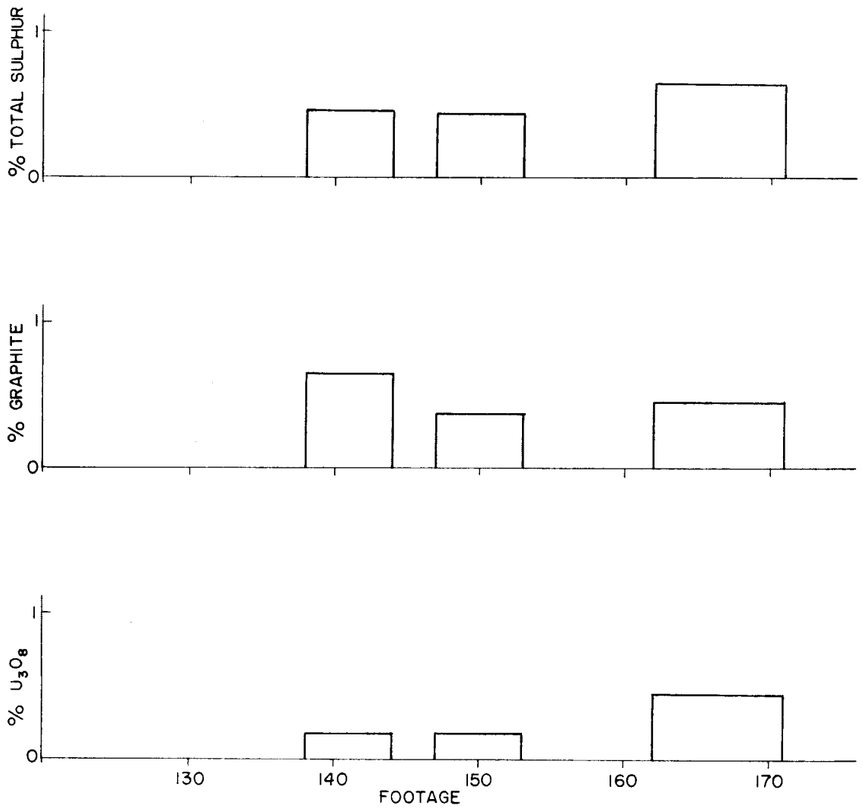
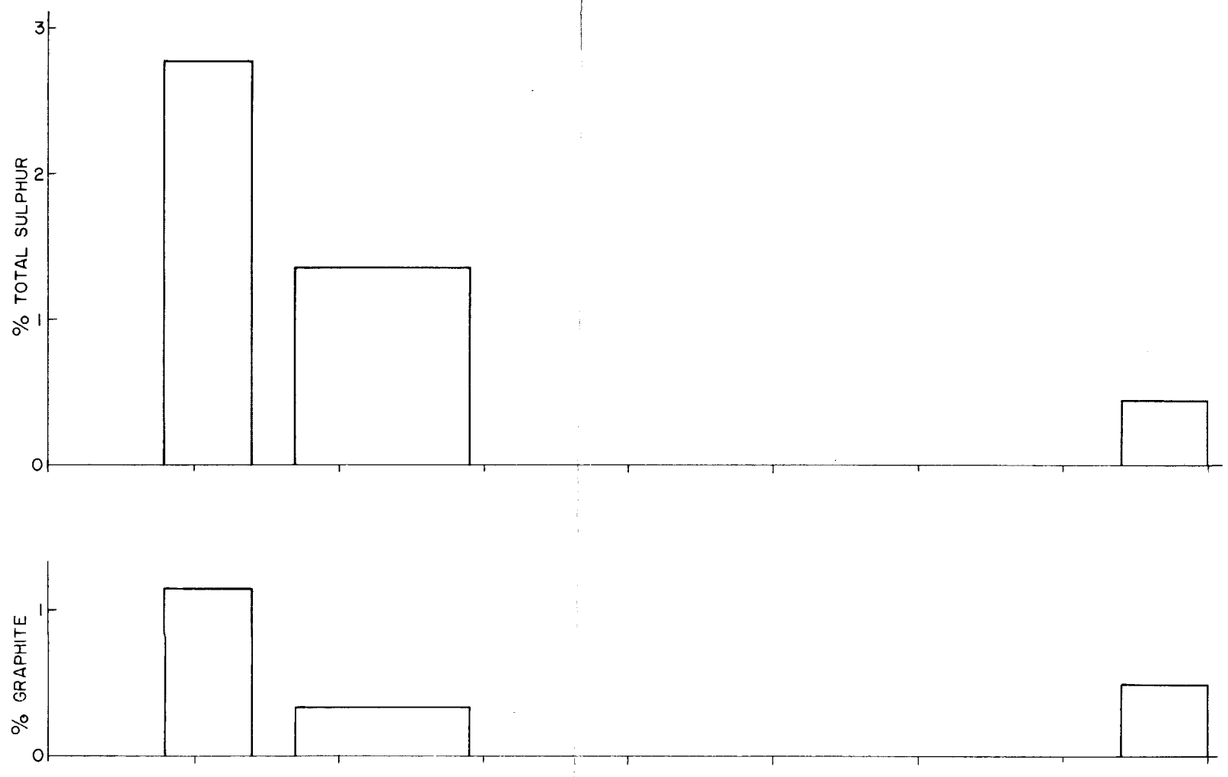
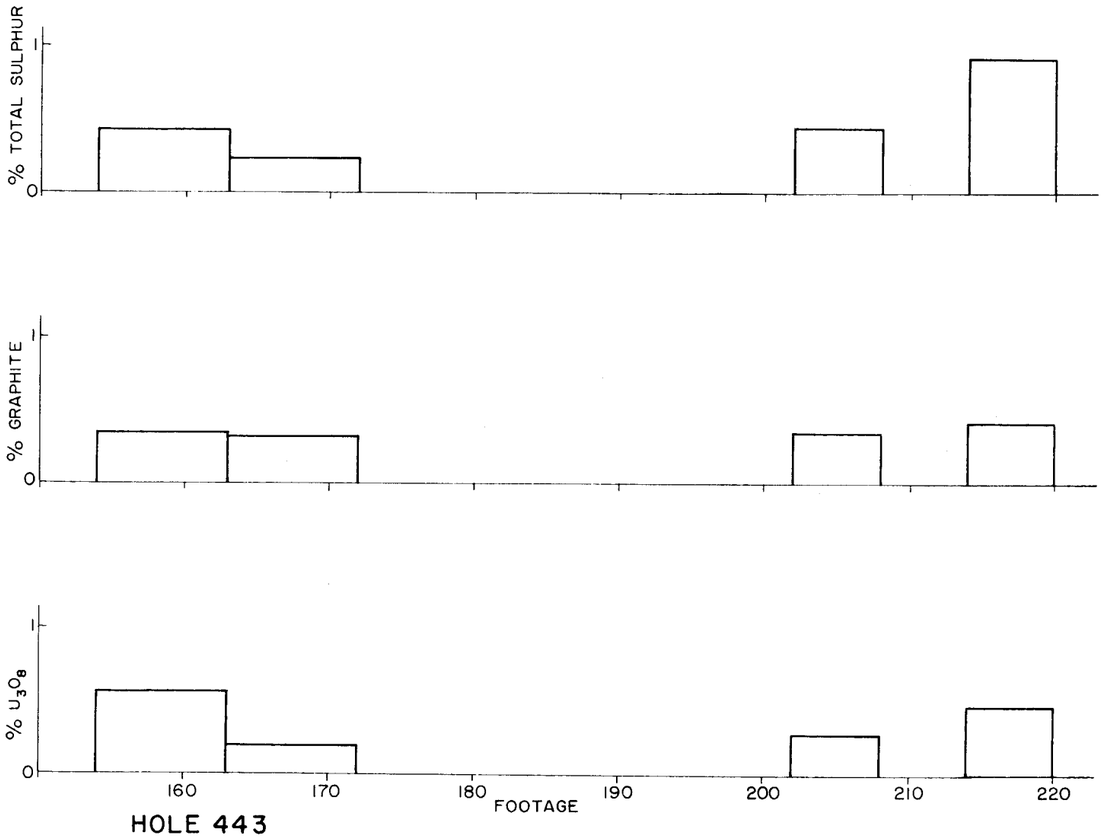
PLATE 5




HOLE 437




HOLE 446



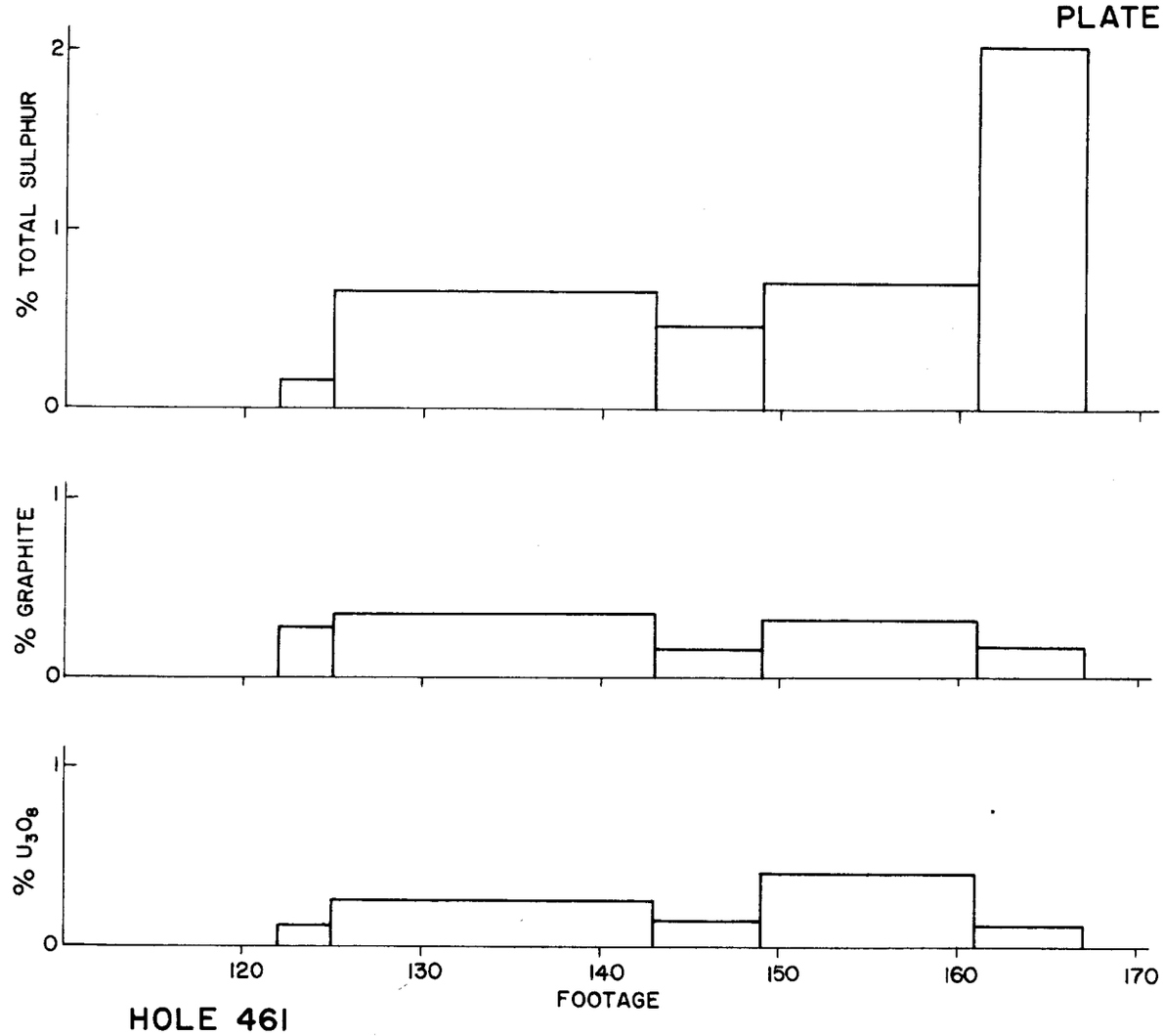

HOLE 443

# VARIATION OF CONSTITUENTS WITH FOOTAGE

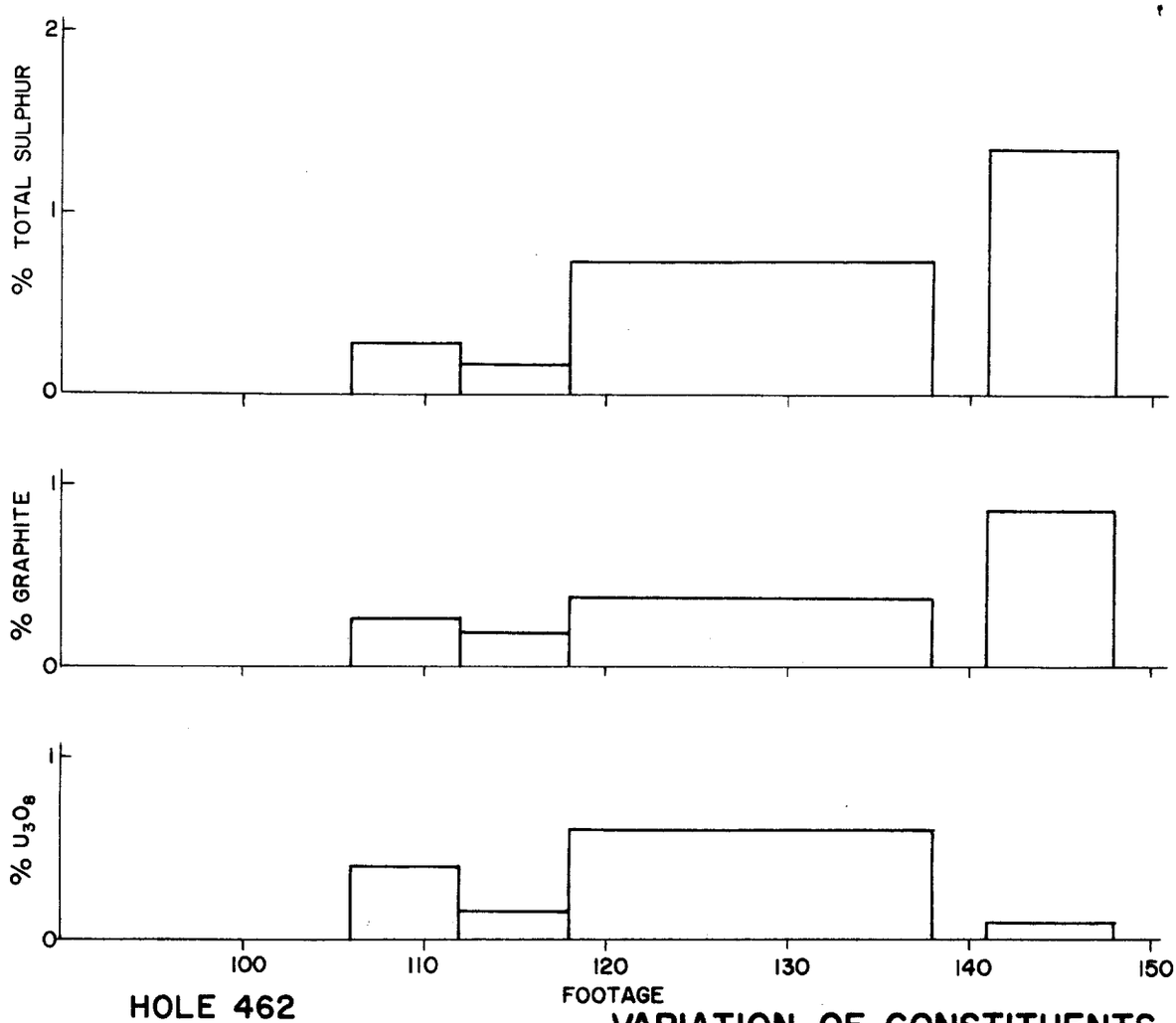
HOLES 437,443 AND 446

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS D52/B7-60
TO ACCOMPANY RECORD No.1963/87

PLATE 6




HOLE 461




HOLE 462

# VARIATION OF CONSTITUENTS WITH FOOTAGE HOLES 461 AND 462

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS D52/B7-61

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RUM JUNGLE CRK. STH. OREBODY SPECIMES, NT