REPORT ON A.P. 2652, RINGWOOD AREA, N.T.

by J.R. Stewart
Kratos Uranium N.L.

August 1974
SUMMARY

Authority to Prospect No. 2652 held by Kratos Exploration Pty. Ltd. covers 110 square miles and is situated about 80 miles east-south-east of Alice Springs, N.T. on Ringwood Station.

Since the discovery of copper mineralisation in this area in 1954 by M. Collings, three programmes of exploration have been carried out.

Soon after the original discovery, the Resident Government Geologist, Alice Springs recommended a diamond drilling programme following an investigation of mineral prospects in the Alice Springs area. Two holes, approximately one mile apart along strike, were drilled in 1965-66. The best intersection was 10 feet assaying 0.25% copper but core recovery was poor.

Kenneth McMahon & Partners, acting for Australian Geophysical Pty. Ltd., carried out a limited stream sediment geochemical programme in 1966, followed by geological mapping, geochemical rock sampling and a number of IP traverses in 1967. Two rotary percussion drill holes were completed, the best intersection obtained being 35 feet assaying 0.39% lead.

Kratos Exploration Pty. Ltd. undertook a geochemical grid sampling programme followed by diamond drilling in 1970. Results from the geochemical sampling were encouraging and it is clear that the three diamond drill holes did not test the area of interest - due to a facies change along strike.

Further work is required to properly evaluate the zones of interest located to date. In addition, parts of the area remain untested.
INTRODUCTION

Authority to Prospect No. 2652, comprising approximately 110 square miles in the Alice Springs district, is reached by travelling 74 miles along the Ringwood Station road, thence to the south for a further 25 miles. It is situated on Ringwood Station, owned by Mr. M. Collings and it lies in the north-west corner of the Male River 1:250,000 Geological Series Sheet (see map).

The Authority to Prospect is currently held by Kratos Exploration Pty. Ltd. and is valid until 2nd June, 1972.

PHYSIOGRAPHY

Between strike ridges, the area is flat with sparse vegetation. Annual rainfall is low and the soil is of red desert type.

Several east-west trending ridges up to 300 ft high represent resistant beds of silicified sandstone and conglomerate.

REGIONAL GEOLOGY

In A.P. 2652 a sedimentary succession of Upper Proterozoic age unconformably overlies Archean Arunta Complex rocks. Outcrop is very limited due to a covering of soil, alluvium, Pleistocene to Recent gravels, and aeolian sands.

The basement Archean rocks consist of granite gneiss, micaceous and calc-schists, and quartzites penetrated by numerous basic intrusions.

Two formations of Proterozoic age occur; the Areyonga and Pertatataka Formations. The Areyonga Formation consists of boulder clays, pebble and cobble conglomerate, arkose, poorly sorted sandstone and siltstone. Wells et al (1965) noted that "the lithology of the formation varies rapidly along strike".

Overlying the Areyonga Formation is the Pertatataka Formation, consisting of siltstone, and shale with lenses of sandstone and dolomite. Siltstone and shale make up the bulk of the Formation.

Disseminated base metal sulphides occur in the lower members of the Formation, particularly the Ringwood Member.
PREVIOUS EXPLORATION

(a) Bureau of Mineral Resources

In 1965 Youles, a Resident Government Geologist at Alice Springs, recommended a drilling programme to test at depth the surface copper mineralisation reported by Mr. Collings, owner of Ringwood Station. Two diamond drill holes were subsequently put down in 1965-66 by the Mines Branch, Northern Territory Administration.

The first hole showed pyrite mineralisation in the main interval of grey-green dolomitic siltstone between 220 ft 6 in and 256 ft 4 in but core recovery was only 25%. Assay results gave 0.25% copper in the interval 250-260 ft.

The second hole was originally planned to test the eastern end of the strike ridge some 4 or 5 miles distant, but in view of the poor core recovery in the first hole, it was drilled one mile along strike to the north-east. Fine grained disseminated sulphides, mainly pyrite, occurred throughout the zone 329 ft – 382 ft 6 in. Chalcopyrite was identified sporadically, particularly in small cross-cutting veinlets and in clots along bedding planes. The host rocks were largely green and grey siltstones containing disseminated graphitic material. Highest assay was 0.12% copper over 2 ft.

Youles (1967) concluded that the Ringwood copper prospect was of stratiform type and suggested that further investigation of the sequence be carried out.

(b) Australian Geophysical Pty. Ltd.

During the period 1966-67, Kenneth McMahon & Partners Pty. Ltd. carried out a programme of exploration over 502 square miles, which included most of A.P. 2652, on behalf of Australian Geophysical Pty. Ltd.

A limited stream sediment geochemical sampling programme was followed by geological mapping, geochemical rock sampling and reconnaissance induced polarization traverses in selected areas. Finally, eleven vertical, rotary percussion holes were drilled, two of these being within A.P. 2652. Total footage drilled was 3,015 ft.
Samples were taken at 5 ft intervals and A.A.S. (atomic absorption spectrometry) analyses carried out for copper, nickel, cobalt, lead and zinc. The samples giving the highest results were then checked by chemical analyses, which included determination of silver. The chemical assay results are set out in the following table.

<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Sample Depth (5 ft interval)</th>
<th>Lead (%)</th>
<th>Zinc (%)</th>
<th>Silver (oz/ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R2</td>
<td>44</td>
<td>0.25</td>
<td>0.40</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>0.40</td>
<td>0.10</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>214</td>
<td>0.15</td>
<td>-</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>295</td>
<td>0.20</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>R3</td>
<td>95</td>
<td>0.55</td>
<td>-</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>0.20</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>(145)</td>
<td>0.20</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(150)</td>
<td>0.35</td>
<td>-</td>
<td>Tr</td>
</tr>
<tr>
<td></td>
<td>(155)</td>
<td>0.25</td>
<td>-</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(160)</td>
<td>0.65</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>(165)</td>
<td>0.35</td>
<td>-</td>
<td>Tr</td>
</tr>
<tr>
<td></td>
<td>(170)</td>
<td>0.55</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>205</td>
<td>0.20</td>
<td>-</td>
<td>Tr</td>
</tr>
</tbody>
</table>

* A chemical check assay of the interval 140-170 ft gave an average grade of 0.39% Pb over a true thickness of 25 ft.

The geological logs of the two holes contain the following notes:

R2: Disseminated pyrite throughout intervals 69-125 ft and 200-229 ft; weak chalcopryite 90-95 ft.

R3: Disseminated pyrite throughout interval 70-140 ft; disseminated galena 90-95 ft and 135-170 ft.

The A.A.S. results show that there were a number of other mineralised sections traversed in Holes R2 and R3 with values up to 0.1% Pb and 0.3% Zn in the 5 ft sample intervals concerned.

Kenneth McMahon & Partners recommended that further work be carried out to test the continuity and grade of the mineralisation encountered in Holes R2 and R3.
(c) Kratos Exploration Pty. Ltd.

The further work recommended by Kenneth McMahon & Partners was not carried out by Australian Geophysical Pty. Ltd., and title to the area was obtained by Kratos Exploration Pty. Ltd. (a wholly owned subsidiary of Kratos Uranium N.L.) in June, 1970.

During the period June - September, 1970, Kratos Exploration Pty. Ltd. carried out a systematic geochemical sampling programme over a strike length of about eight miles of the Pertatataka Formation. Grid lines were spaced 2,000 ft apart and surface and auger drill hole samples were collected at 400 ft intervals along each of these grid lines. In all, 394 auger holes were drilled for a total footage of 2,687 ft. 720 surface and bottom hole samples were analysed for copper, lead and zinc content.

Summary sketch plans are included with this report. Full data on the sampling programme is available at Kratos Uranium N.L.'s office.

Following the geochemical programme, three vertical diamond drill holes were put down to test in a preliminary manner the most obvious geochemical anomaly outlined in the area. Total footage drilled was 1,241 ft comprising holes 235½ ft, 580 ft and 425½ ft deep respectively.

DDH 1 and DDH 2 were drilled approximately 1,500 ft and 1,800 ft respectively along strike to the west from percussion holes R2 and R3. DDH 3 was drilled further to the south and tested a zone lower in the stratigraphic sequence.

No mineralisation of economic grade was intersected in any of the three diamond drill holes but numerous minor occurrences of copper, lead and zinc minerals were noted by McDonald Mining and Engineering Pty. Ltd., which carried out geological examination of the cores. However, examination of the geological logs shows that there is a marked facies change between the successions intersected in the percussion holes and that tested by DDH1 and 2. Holes R2 and R3 passed through a sequence of grey dolomitic siltstones and dolomite interbedded with maroon shales. In the case of the three diamond drill
holes, virtually the entire section in each case is composed of grey-green dolomite with varying percentages of very thin units of reddish purple mudstone less than 1 mm thick.

Furthermore, none of the work carried out by Kratos Exploration Pty. Ltd. tested the copper-bearing horizon intersected by the Bureau of Mineral Resources.

**DISCUSSION OF RESULTS AND FURTHER WORK**

Re-examination of the geochemical results obtained in 1970 show that there are three major anomalous areas within the main grid.

Testing of the area should be continued by examination of these three anomalous areas on a more closely spaced grid, say 400 ft x 400 ft. In addition, other anomalous areas, particularly the zone drilled by B.M.R., should be investigated by grid sampling.

Although there is some degree of correlation between surface samples and auger hole samples, it is clear that auger holes should be drilled to obtain the samples required. For example, there is a pronounced shift eastwards in the zinc anomaly in the area diamond drilled by Kratos when bottom hole results are compared with those from surface samples.

On the basis of the sub-surface zinc results, plotted on a residual anomaly basis, further test drilling should be carried out along strike to the east of R2 and R3. This should possibly be preceded by more closely spaced geochemical sampling.

**CONCLUSION**

The Areyonga and Pertatataka Formations in A.P. 2652 contain evidence of sedimentary-type copper and lead/zinc mineralisation over a strike length of some 8 miles. Mineralised beds occur at intervals throughout the stratigraphic section.

A widely spaced geochemical auger sample grid has outlined at least three zones showing anomalous lead/zinc values. In addition early diamond drilling by the Bureau of Mineral Resources intersected copper mineralisation lower in the section.

.../6
An attempt was made by Kratos Exploration Pty. Ltd. to test one of the lead/zinc anomalous zones by diamond drilling. This was unsuccessful due to facies change - the target is further east.

In view of the inconclusive results obtained to date, further work as outlined above should be carried out to assess the potential of the area.

BIBLIOGRAPHY


RINGWOOD DRILL HOLE DATA

DH1,2,3  Kratos Uranium N.L.  represented by  1,2,5

PDH 2,3  Australian Geophysical  represented by  3,4

DDH 1,2  B.M.R.  represented by  6,7

Scale  1 inch = 4000 feet
COPPER 3-6 FEET

REGIONAL
RESIDUAL

GEOCHEMICAL ANOMALIES
RINGWOOD AREA
LEAD 0-3 FEET

REGIONAL

RESIDUAL

GEOCHEMICAL ANOMALIES

RINGWOOD AREA
GEOCHEMICAL ANOMALIES
RINGWOOD AREA
Additional Data
Three diamond drill holes were put down in the area during October-November, 1970. The aim of this drilling was to test in a preliminary manner the most pronounced geochemical anomaly defined by the earlier geochemical survey.

Total footage drilled was 1,241 ft. Details are set out on the attached sheet. No significant mineralisation was intersected in any of the holes. There are grounds for believing that this may be due to a facies change. Further careful evaluation of all results obtained to date will be carried out before deciding on a forward programme.

One copy of a report on the diamond drilling results is enclosed. This work was carried out under contract by McDonald Mining and Engineering Pty. Ltd. Should a second copy of this report be required, we would be happy to supply it.

Total expenditure to date in this Authority to Prospect is approximately as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field expenditures - geochemical party</td>
<td>$24,500</td>
</tr>
<tr>
<td>McDonald contract</td>
<td>800</td>
</tr>
<tr>
<td>Technical supervision (Kratos)</td>
<td>5,000</td>
</tr>
<tr>
<td>Two field visits (Kratos)</td>
<td>900</td>
</tr>
<tr>
<td>Diamond drilling 1,240 ft @ notional $10 per ft</td>
<td>12,400</td>
</tr>
<tr>
<td></td>
<td>$43,600</td>
</tr>
</tbody>
</table>

J.R. Stewart
Director

Encl.
<table>
<thead>
<tr>
<th>Hole No.</th>
<th>Depth</th>
<th>Core Recovery Actual</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>235'5&quot;</td>
<td>214'1&quot;/229'5&quot;</td>
<td>93.3</td>
</tr>
<tr>
<td>1A</td>
<td>579'10&quot;</td>
<td>568'1&quot;/569'10&quot;</td>
<td>99.7</td>
</tr>
<tr>
<td>2</td>
<td>425'5&quot;</td>
<td>409'0&quot;/415'0&quot;</td>
<td>98.6</td>
</tr>
</tbody>
</table>
As stated in the last monthly report, a report covering geological investigations and drilling results in this Authority to Prospect has been received from McDonald Mining and Engineering Pty. Ltd.

Considerable delay was experienced in obtaining results of assays carried out by Geochemical and Mineralogical Laboratories Pty. Ltd. on the drill core samples from this area. These were only received immediately before Christmas and the staff has been on holidays during the Christmas–early January period. It is intended to submit a copy of McDonald's report, including assay data, with the next monthly report.

Total expenditure to date in this Authority to Prospect is approximately $34,000.

A. Bowers

for J.R. Stewart
Director
As reported previously, the auger drilling and geochemical sampling programme in this Authority to Prospect was completed on 11th September, 1970. In all, 394 auger holes were drilled for a total footage of 2,687 ft. 720 surface and bottom hole samples were sent for analysis for copper, lead and zinc content.

The preliminary programme of diamond drilling was commenced on 20th October, 1970. At 29th October, 1970, one hole had been drilled to 245'5" and a second hole was being drilled ahead at 300 ft. No information on the results of the drilling has yet been received from the field.

Drilling costs to date may be taken as about $5,450 using the national figure of $10 per ft. The drilling is being carried out by Kratos' own drill rig.

J.R. Stewart
Director
Kratos Exploration Pty. Ltd.
The auger drilling and geochemical sampling programme in this Authority to Prospect was completed on 11th September, 1970.

A preliminary examination of the data obtained from this programme has been made and three diamond drill holes totalling approximately 3,000 ft have been planned to test the sedimentary succession in the area showing the highest anomalous base metal values.

Briefly, a strike length of about eight miles of the Pertatataka Member and the Ringwood Member was tested on grid lines spaced 2,000 ft apart. In general, surface and auger drill hole samples were collected at 400 ft intervals along each of these grid lines. It was found that distinctly anomalous zones could be defined in several areas along the total strike length. The most significant of these will be tested by the diamond drilling programme. Two percussion holes drilled previously by Australian Geophysical Pty. Ltd. are in this area. One of these holes gave an intersection of 25 ft assaying 0.39% lead.

Total expenditure in the Ringwood area to 13th September, 1970 is $24,420. In addition, an amount of approximately $3,000 can be debited to this programme by way of technical supervision.

J.R. Stewart
Director
Kratos Exploration Pty. Ltd.
Auger drilling and geochemical sampling in this Authority to Prospect continued throughout the month. Attached is a copy of a sketch map showing the sampling grid to 30th July, 1970.

To 8th August, 1970, 258 auger holes totalling 1,689 ft had been drilled over a strike length exceeding two miles. 458 samples had been sent for analysis.

To date, assay results of 296 samples have been received and analysis of this data is proceeding.

Copper mineralisation (malachite) is visible at intervals in thin dolomite beds, but as most of the area is covered by red sand and soil, proper assessment is dependent on the geochemical results. Low grade bedded mineralisation is clearly widespread in the area and the exploration objective is to determine whether mineralisation with a sufficiently high grade to constitute an economic orebody is present in the area.

Expenditure figures for July are not yet available but will be provided in the next report.

J.R. Stewart
Director
Kratos Exploration Pty. Ltd.

Att.
Field operations commenced in this Authority to Prospect on 16th June, 1970.

A team of three persons headed by the Company’s Field Manager is carrying out auger drilling on a grid commencing several hundred yards to the north west of the Hi Jinks Bore.

In the initial work, auger drill holes will be spaced at 400 ft intervals on grid lines spaced 2,000 ft apart. The grid runs essentially east west and covers an area of little outcrop where malachite mineralisation is occasionally visible on isolated outcrops of dolomite protruding through the general cover of red soil. The aim of the auger drilling programme is to obtain geochemical samples in the weathered grey dolomitic siltstones below the red soil cover.

To 30th June, 71 holes had been drilled on six grid lines for a total footage of 322 ft 4 ins. Since the end of the period covered by this report, analyses for copper, lead and zinc have been received from Geochemical and Mineralogical Laboratories Pty. Ltd. for the first 96 samples submitted for assay. Examination of these results is continuing but, in summary, they are uniformly low.

The auger drilling and geochemical sampling programme will be continued until this, and at least one other zone considered favourable for base metal mineralisation are tested.

Expenditure to 30th June 1970, including capital expenditure on field equipment and vehicles, was $21,130. In addition, an amount of $4,600 can be attributed to general geological and technical supervision of the field operations.

J.R. Stewart
Director
Kratos Exploration Pty. Ltd.