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Rept.Bk.No. 64/117
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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
MINERAL RESOURCES DIVISION

REPORT ON VANADIUM OCCURRENCES, JAMESON RANGE, WESTERN AUSTRALIA

by

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MINERAL RESOURCES SECTION

and

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METALLICS SECTION

D.M. 132/67

22nd June, 1967.

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R/B 64/117

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PLANS

NO.	Title	Scale
S.5914	Locality plan	-
67-422	Vanadium occurrences, Jameson Range, Western Australia	1inch = 2 miles

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REPORT ON VANADIUM OCCURRENCES, JAMESON RANGE, WESTERN AUSTRALIA

INTRODUCTION

On February 2nd, 1967 it was reported in the press that vanadium deposits "tentatively estimated at 100 million tons, have been found near the remote Jameson Range, 520 miles northeast of Kalgoorlie". The deposits were located by geologists of the Geological Survey of Western Australia. Random samples indicated a grade from 0.57% to 1.40% V_2O_5 (with average contents as follow: V_2O_5, 1%; Fe_2O_3, 45%; TiO_2, 18%).

The area was inspected by the authors in company with K.R. Warne on 15th, 16th April 1967. The prospect area is currently covered by a Ministerial Reserve.

LOCATION AND ACCESS

The Jameson Range (Plate 1) comprises a low range of hills (elevations up to 400ft. above the general level) situated 84 miles west northwest of Wingellina and 68 miles southwest of Giles (see locality plan No. S.5914). The range was approached from the track which extends from Wingellina through the Blackstone and Cavenagh Ranges to Warburton Mission and Kalgoorlie. This track passes some 12 to 15 miles south of the Jameson Range; northerly from Lightning Rocks the route traversed longitudinal land ridges having a northeasterly trend. Scrub-cover is variable in the dune corridors and dense mulga thickets were encountered. Near the range the topography is undulating with open, grassed, crab-hole flats interspersed with dense mulga scrub. Movement would be difficult after rain.

GEOLOGICAL SETTING

Gabbroic rocks underlie the Jameson and other ranges in this locality. Daniels (1967) has described a layered sequence of basic and ultrabasic rocks which are part of the Giles Complex and are intrusive into granulites, granites and mixed volcanic rocks. The following account is based on that report.

In Western Australia the complex has been subdivided into four major, separate sheets including the Jameson Range Gabbro approximately 18,000 ft. in thickness. Each sheet shows its own differentiation, but it is the uppermost sheet, the Jameson Range Gabbro, which is the richest in late differentiates. In the Jameson Range these differentiates consist of stratiform sheets of titaniferous magnetite associated with anorthosite, gabbro and troctolite.

The Jameson Range Gabbro is a well-banded basic sheet that has been subdivided into four major zones (see plan 67-442):

Zone	Rock Type	Approx. Thickness
4 (top)	Mixed zone of anorthosite, troctolite, gabbro and titaniferous magnetite	? 12,500 ft.
3	Hypersthene Troctolite	? 2,500 ft.
2	Mafic zone	up to 1,000 ft.
1 (bottom)	Glomeroporphyritic Gabbro	1,500 ft.

The layering of these rocks is regular and dips to the southwest and west at low to moderate angles (10° to 50°).

Titaniferous magnetite bands, with which vanadium is associated, are apparently confined to zones 2 and 4. These more mafic zones are prone to chemical weathering; they are largely obscured by laterite cover marginal to the main axis of the range which is comprised of troctolite.

VANADIUM OCCURRENCE

Vanadium is associated with titaniferous magnetite layers generally within ultrabasic varieties of the Giles Complex

(1) Zone 2

An unknown thickness of laterite almost completely masks the ultramafic rocks which are medium-grained, granular and contain between 20 and 50% opaque minerals with brown hornblende, olivine, clinopyroxene and traces of plagioclase and orthopyroxene. Samples 1 to 3 contained 0.70, 0.57 and 0.76% V_2O_5.

A sample (E) taken of the laterite contained ~~0.14~~ 0.07% V_2O_5.

(2) Zone 4

The rocks in this zone are better exposed than those in zone 2, but outcrop is subdued and discontinuous, and patchy lateritic cover is locally developed.

Several magnetite bands were located in this layered sequence; one band up to 15 feet in thickness near the base of the zone was traceable intermittently for several miles (Plates 2,3). The bands comprise massive segregations within an olivine-felspar rock containing a high proportion of opaque minerals. Contacts between magnetite and the enclosing rocks are relatively sharp - the gradational margin rarely exceeding 1 foot in thickness (Plate 4).

Samples (4 and 5) taken by Daniels contained 1.10 and 1.33% V_2O_5 while samples (D and G) taken by us some 4 miles to the northwest apparently from the same band, contained ~~1.07~~ 0.53 and ~~2.21~~ 1.11% V_2O_5. The host rocks immediately underlying and overlying the deposit showed ~~0.53~~ 0.26% and ~~0.35~~ 0.18% V_2O_5 respectively on analysis (samples E and F).

A magnetite band higher in the sequence (sample H) contained ~~2.21~~ 1.11% V_2O_5.

CONCLUSIONS

The discovery of vanadium in the Jameson Range area is potentially significant in delineating a metallogenic province. The dimensions of the Giles Complex intrusives and evidence of magmatic segregation suggest a parallel with the South African Bushveld Igneous Complex where titaniferous iron-ores containing 1.5 to 1.9% V_2O_5 are scheduled for development.

The deposits remain to be tested. More detailed mapping, drilling, sampling and possibly airborne magnetometer surveys will be required to define reserves and grade.

Remote location and lack of water may handicap exploitation of the deposits and this might ultimately depend on development of the Wingellina nickel deposit where South Western Mining Co. have reported 60 million tons of ore averaging 1.32% nickel.

In South Australia the Giles Complex intrusives bear some similarity to those of the Jameson Range and magnetite differentiates are known, although these are local and of limited extent. A sample of lateritic magnetite taken from Caroline contained ~~0.71~~ 0.36% V_2O_5 while lodestone taken from near Mount Davies showed ~~1.28~~ 0.64% V_2O_5; the latter is a small body within a shear zone. Mapping of the Caroline area is being undertaken this year. Further investigation of the magnetite differentiates appears to be warranted.

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RKJ:PGM:CC
22.6.1967

REFERENCE

DANIELS, J.L., 1967. "Interim report on a vanadium prospect, Jameson Range, Western Australia". G.S.W.A. Record 1967/2 (unpublished).

ANALYSES OF MAGNETITE FROM JAMESON RANGE (Daniels 1967) for location see plan 67-422

Sample No.	1	2	3	4	5	6	7	8	9	10
Fe_2O_3	15.6	12.5	16.0	50.8	58.3	56.9	54.7	67.0	63.0	62.5
FeO	24.4	25.7	28.4	11.3	12.3	10.8	12.6	6.7	8.1	11.0
TiO_2	13.0	17.3	15.1	26.0	18.1	19.6	16.2	16.0	20.9	18.9
MnO	0.30	0.34	0.29	0.24	0.28	0.31	0.28	0.21	0.07	0.08
SiO_2	24.1	23.1	19.9	1.82	1.04	1.33	3.62	1.70	1.36	1.63
Al_2O_3	6.39	5.26	7.46	5.11	5.32	4.21	4.71	4.57	2.39	2.35
P_2O_5	0.03	0.08	0.06	0.04	0.04	0.03	0.04	0.08	0.11	0.24
S	0.04	0.08	0.01	0.05	0.03	0.02	0.03	0.03	0.02	0.06
V_2O_5	0.70	0.57	0.76	1.18	1.33	1.40	1.11	0.75	0.71	0.77
Cr_2O_3	0.01	0.01	0.01	0.03	0.18	0.38	0.63	0.14	0.29	0.25
NiO	0.06	0.04	0.05	0.04	0.08	0.15	0.10	0.02	0.05	0.05
MgO	6.19	8.05	6.65	1.78	1.81	2.28	3.49	0.78	1.43	1.09
CaO	6.47	5.80	3.80	0.07	0.04	0.04	0.04	0.22	0.04	0.09

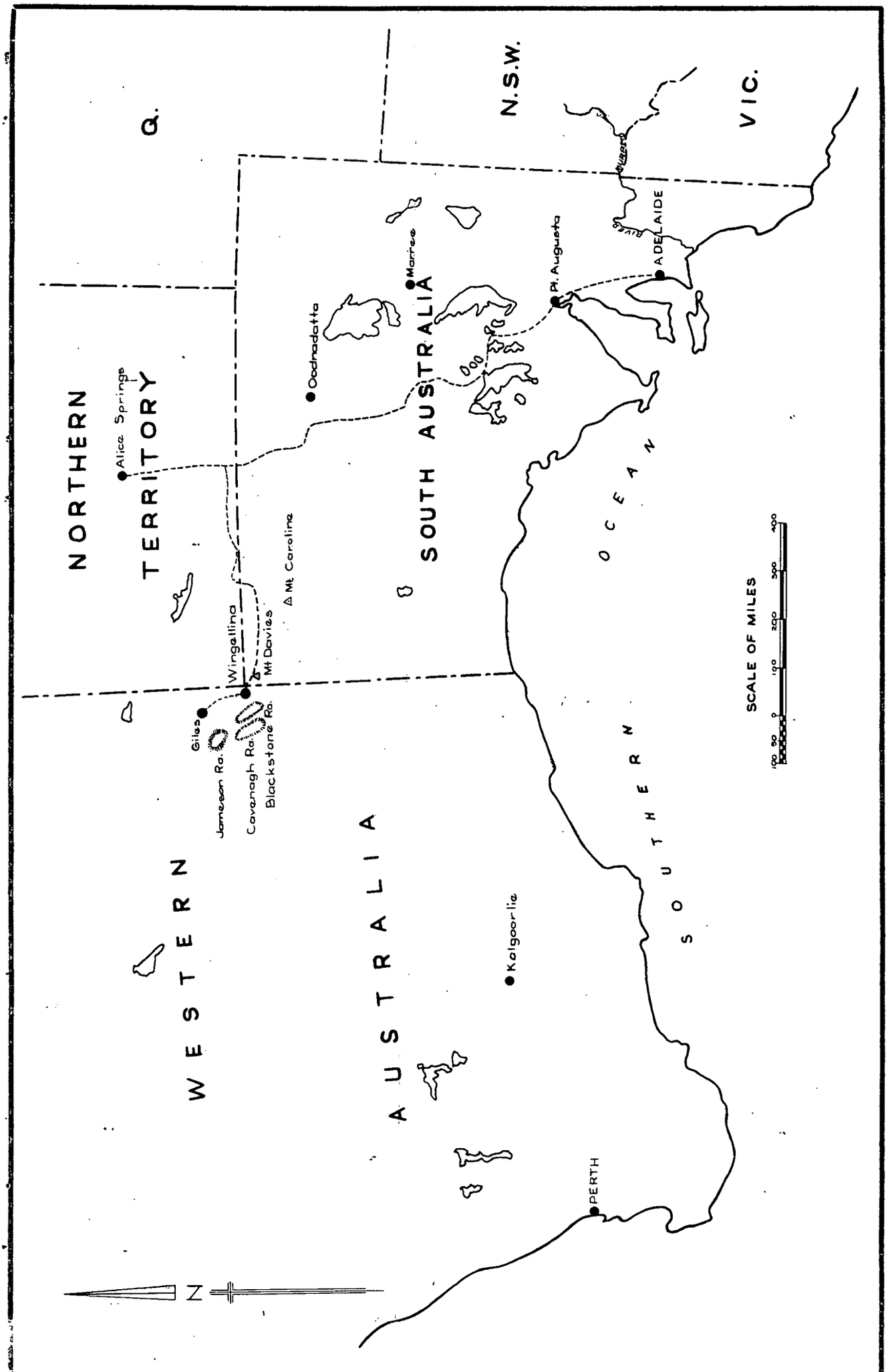
V_2O_5 Analyses of magnetite from Jameson Range area (W.A.) A to H								Caroline lateritic magnetite	Davies lodestone
V_2O_5	A	B	C	D	E	F	G	H		
	1.19 ~~2.39~~	0.07 ~~0.14~~	0.18 ~~0.35~~	0.53 ~~1.07~~	0.26 ~~0.53~~	0.18 ~~0.35~~	1.11 ~~2.21~~	1.11 ~~2.21~~	0.36 ~~0.71~~	0.64 ~~1.28~~

Plate 1 Jameson Range looking to northwest. Igneous foliation, dipping southwesterly at about 30° is apparent in troctolites of zone 3 which comprise the main range

Plate 2 Vanadium-bearing magnetite 15ft. in thickness, Jameson Range.

Plate 3 Vanadium-bearing magnetite, Jameson Range

Plate 4 Contact zone between magnetite band and enclosing olivine rich ultrabasics



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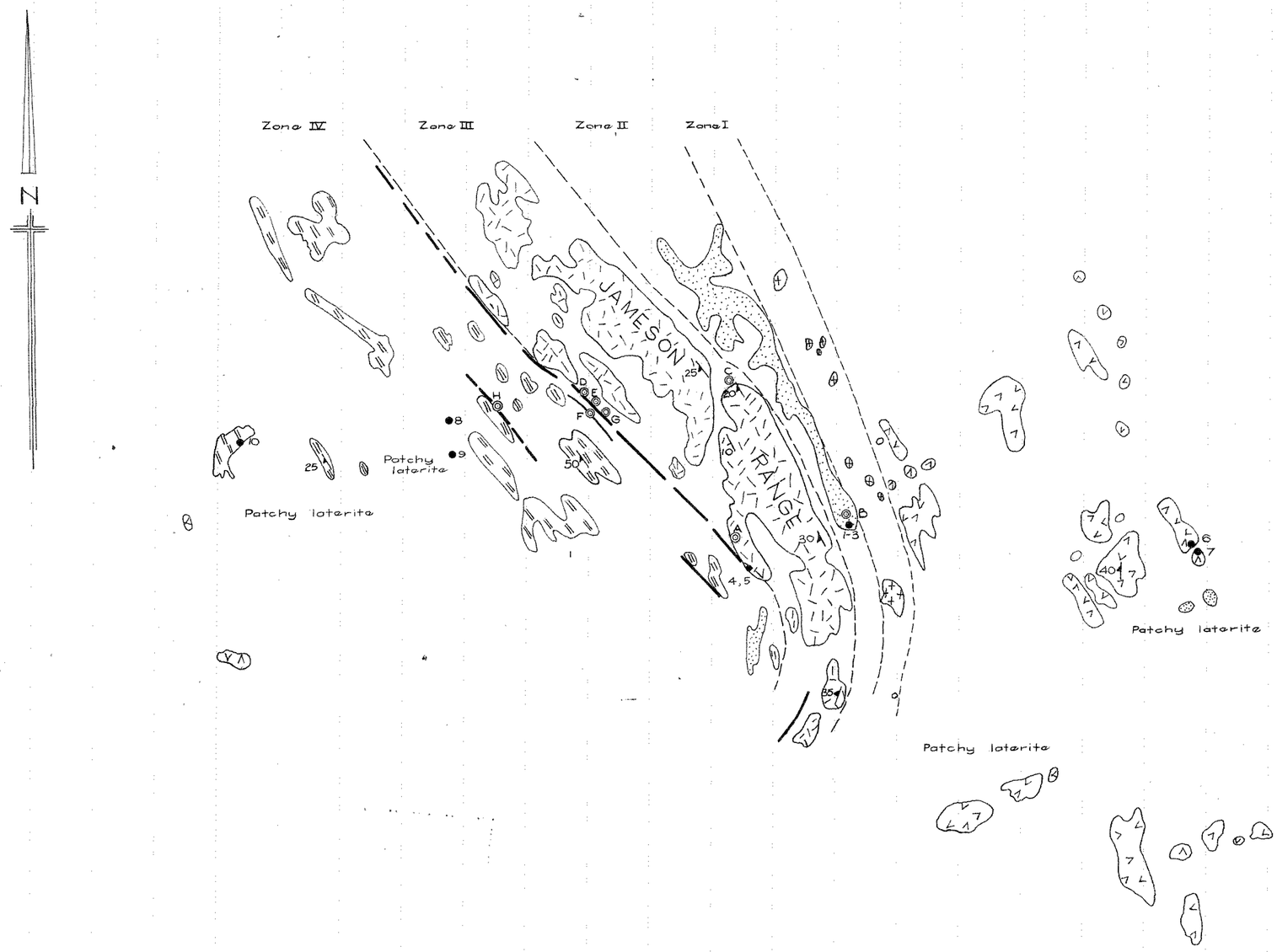
	Drn. R.K.J.	JAMESON RANGE–W.A.	SCALE: As shown.
	Tcd. N.E.	LOCALITY PLAN	S 5914
	Ckd. L.V.W.		994·1
	Exd.		DATE: 4 July 1967



LEGEND

Quaternary — Sand plain, sand dunes, alluvium.

Tertiary — Laterite.

Giles complex

- Zone I — Glomeroporphyritic gabbro (1500 ft)
- Zone II — Mafic zone (under laterite) (<1000 ft)
- Zone III — Hypersthene troctolite (? 2.500 ft)
- Zone IV — Anorthosite, troctolite, gabbro & magnetite Gabbroic & related rocks (? 12500 ft)

Vanadium bearing magnetite

Igneous foliation strike & dip 25

Sample location 10 ● W.A.G.S. H ◎ S.A.G.S.

Modified after J.L. Daniels, 1967.

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VANADIUM OCCURRENCES JAMESON RANGE (W.A.)

		Drn. R.K.J.	SCALE: As shown
		Tcd. N.E.	67-422 994.1
		Ckd. L.V.W.	
Director of Mines		Exd.	DATE: 4 July 1967.