Prospect 555

CSR MINERALS & CHEMICALS DIVISION

ANNUAL REPORT 1978/79
ON GEOLOGICAL EXPLORATION
OF EXPLORATION LICENCE 1864
YAMBARRAN RANGE, N.T.

SYDNEY
December 1979

M.J. VICARY

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8SD 52-15
1979
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GEOCHEMISTRY
ANNUAL
REVIEW
MINERALOGY
SOIL
SAMPLING
ROCK
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INTERPRETATION

1. INTRODUCTION

This annual report summarises work carried out on E.L. 1864.

Exploration Licence 1864 covers an area of about 980 km^2 and is located approximately 200 km south-west of Katherine, N.T. and about 35 km north of Timber Creek, N.T. The tenement covers parts of the north-east corner of the Auvergne 1:250,000 Sheet (SD /52-15).

Exploration Licence 1864 was granted to CSR Limited on 2nd October, 1978.

Areas of lateritised Cretaceous Mullaman Beds were known to occur on the dissected plateau of the Yambarran Range. A helicopter-borne survey using a Bell 47-G3B machine was carried out in June, 1979, to establish whether the lateritic profiles within the licence area were bauxitic.

A photogeological study of E.L. 1864 was undertaken on behalf of CSR Limited by Hunting Geology and Geophysics (Australia) Pty. Limited in Canberra, prior to the initiation of field activities.

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2. SUMMARY

A helicopter-borne survey on E.L. 1864 was carried out during June, 1979, and aggregated 25 flying hours.

The laterite profile was examined and sampled at thirty-seven localities within the licence area. A total of 65 rock chip samples were collected from breakaways and scarp margins and 5 auger soil samples were obtained on the top of the dissected plateau.

No significant development of bauxite has occurred in the laterite profile overlying the Mullaman Beds. Available alumina content is very low and ranges from 0.38-2.09% Al_2O_3.

Shallow auger soil/clay sampling was carried out on two large circular clay-filled areas. No Cu, Pb, Zn, Co, Ni, U, Th, Ta, Nb, Y, Mn, Ba or Sr geochemical values of significance were recorded. Zirconium (Zr) values are generally high. An anomalously high chromium value (294 ppm Cr) was recorded in the centre of the area CF/B.

No diagnostic kimberlite indicator minerals were detected in stream and soil/clay heavy mineral concentrates from E.L. 1864.

3. RECOMMENDATIONS

No further exploration for bauxite is warranted within the licence area.

Further testing, including drilling to bedrock, would be required to fully exhaust the possibility of the existence of kimberlitic rocks within E.L. 1864.

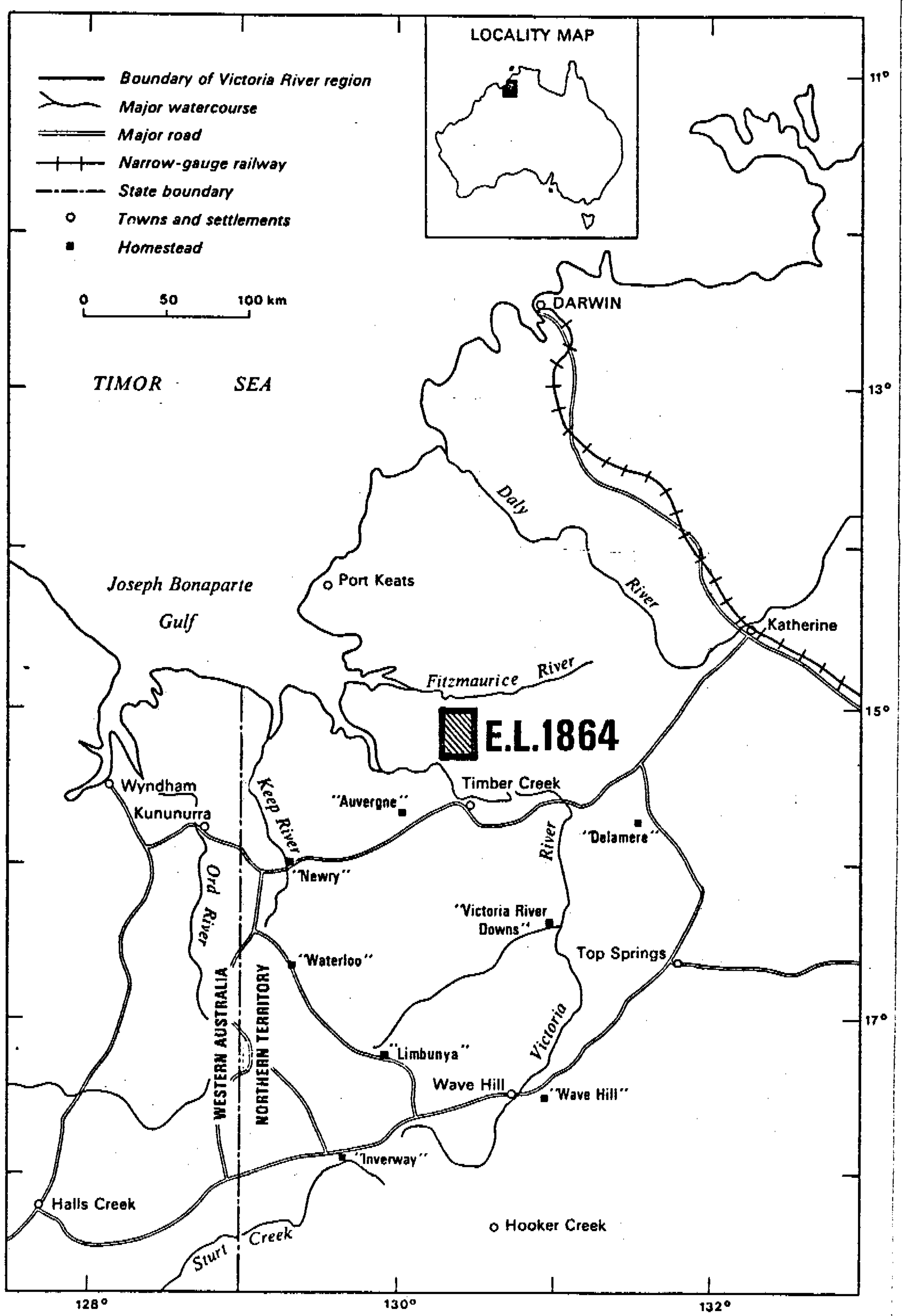

FIG. 1. LOCATION MAP E.L.1864, YAMBARRAN RANGE, N.T.

4. LOCATION AND ACCESS

Exploration Licence 1864 is located about 200 km south-west of Katherine, N.T. and 35 km north of Timber Creek, N.T. (Figure 1). Timber Creek lies on the Victoria Highway, which is sealed from Katherine to Kununurra, W.A. The tenement is located north to north-east of Bradshaw Station homestead (Figure 2).

Road access into Bradshaw Station is currently available via the road through Dorisvale and Wombungi homesteads. Vehicular access is also possible to the southern bank of the Victoria River at a point about 3 km south of Bradshaw homestead. A small punt is used for transferring persons and supplies across the river at this locality.

Vehicular entry into E.L. 1864 is possible to the base of the main scarp margin in the south-east corner of the licence area. The remaining portion of E.L. 1864 is inaccessible to vehicles and entry is only possible by helicopter and/or foot.

A small airstrip is located at Bradshaw Station homestead while the nearest licenced airport is maintained at Timber Creek.

A field camp was established near the banks of the Victoria River, about 12 km south-east of Bradshaw Station.

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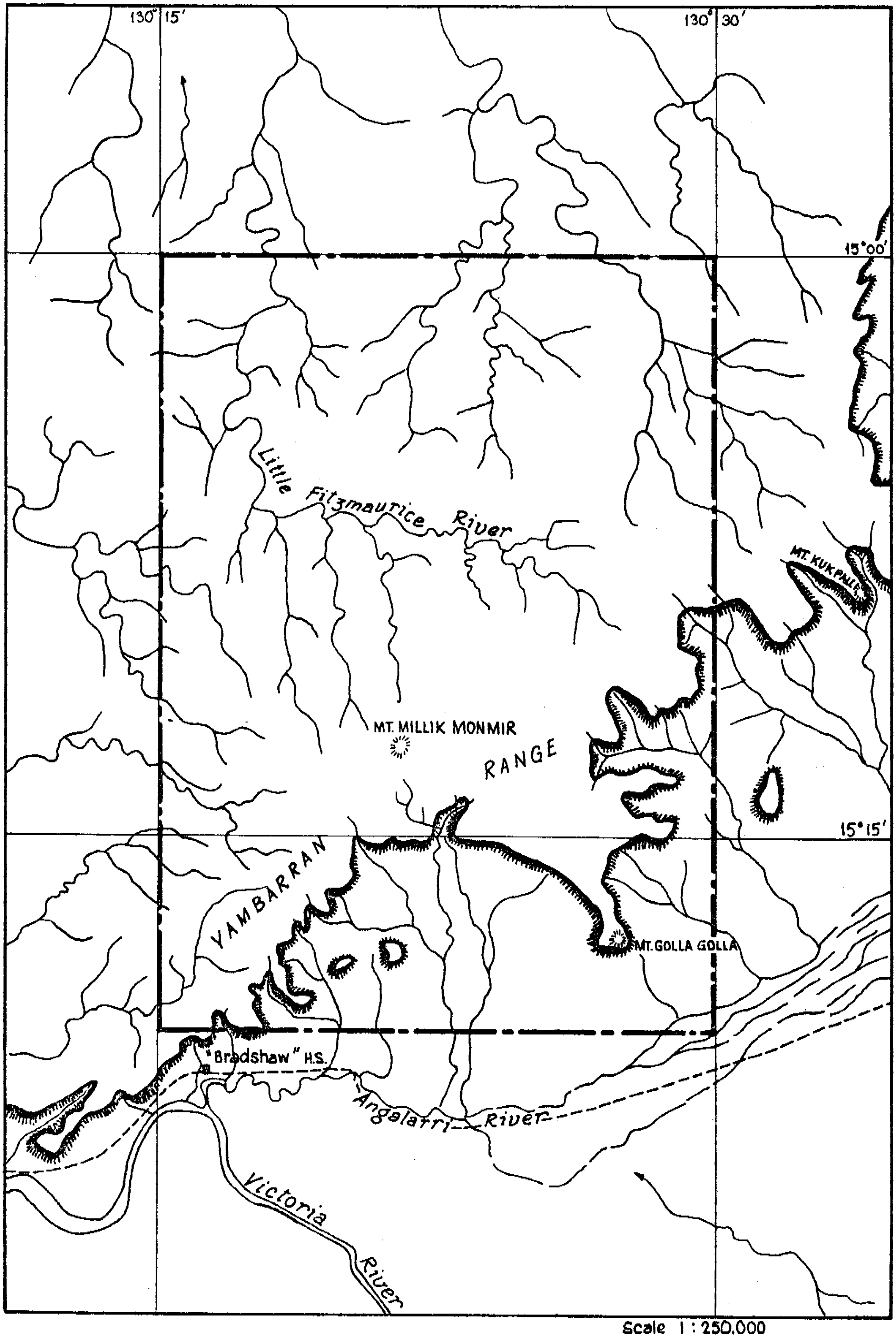

FIG. 2 LOCALITY MAP E.L. 1864 YAMBARRAN RANGE N.T.

5. TENEMENT

Exploration Licence 1864 covers an area of about 980 km^2 and is bounded by $15^{o}00'$S and $15^{o}20''$S latitude and $130^{o}15'$E and $130^{o}30'$E longitude (Figure 2).

The tenement was granted to CSR Limited for an initial term of twelve months from 2nd October, 1978.

6. PHYSIOGRAPHY

6.1 General

The major portion of E.L. 1864 is covered by tablelands, comprising a rugged dissected plateau, mesas, cuestas of the Yambarran Range. Scarp slopes are controlled by prominent benches of resistant sandstone beds. The plateau rises up to over 300 m above the surroundeding area with the highest point being 346 m above sea level approximately 5 km north of Mount Golla Golla.

Along the southern boundary of the tenement an island plain is formed within the valleys of the Victoria and Angalarri Rivers. The topography consists of wide alluvial flats of mainly clayey residual soils with local piedmont-type deposits of river gravels. The inland plain is separated from the tablelands by steep scarps.

The tablelands are deeply incised by major streams which appear to be largely controlled by faults and joints.

6.2 Correlation of Land Surfaces

Within the Auvergne 1:250,000 Sheet area three land surfaces are recognised (Sweet, et al, 1974a; Sweet, et al, 1946). These are equated with the mature weathering surfaces defined in the Northern Territory by Hayes (1967).

On E.L. 1864 residuals of lateritised Cretaceous Mullaman Beds form one of the main plateau surfaces of the Yambarran Range. These are remnants of the Tennant Creek. land surface of Hayes (1967) which is of late Cretaceous to mid Tertiary age.

Part of the planar surface of the tablelands consists of sandstone and siltstone of the Pinkerton Sandstone. This surface is at a lower level than the Tennant Creek Surface and is tentatively correlated with the Wave Hill Surface.

The inland plains of the Victoria Rivers represent part of the Koolpinyah Surface of Hayes (1967). This is the youngest surface known in the region and is part of the present erosion cycle which has been proceeding since probably late Tertiary.

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7. MAPPING METHODS

Black and white aerial photography at 1:75,750 scale was available for coverage of E.L. 1864.

A photogeological study of the licence area was carried out by Hunting Geology and Geophysics (Australia) Pty. Limited prior to the commencement of field work. This study more clearly defined the areas of Cretaceous Mullaman Beds and selected a number of sample sites within the tenement which were suitable for sampling using a helicopter.

A drainage base map of E.L. 1864 was prepared at 1:75,750 scale from the photographic enlargement of the corresponding portion of the Auvergne 1:250,000 (SD/52-15) topographic sheet.

All photogeological boundaries and major/minor scarp margins were plotted onto transparent overlays on aerial photographs and compiled onto the photo-base map.

Field data was recorded directly onto the appropriate aerial photograph and subsequently transferred to the base map.

8. GEOLOGY

8.1 Regional Stratigraphy

The Victoria River consists of basement metamorphics and intrusives of Archaean and Lower Proterozoic age, highly folded Lower Proterozoic geosynclinal rocks, and flat-lying and gently folded Upper Proterozoic platform sedimentary rocks (Sweet, 1977).

Basement rocks crop out in the Fitzmaurice Mobile Zone, a zone of deformed rocks in the north-west of the region, and in the Litchfield Block, west of the Pine Creek Geosyncline.

The Lower Proterozoic rocks of the Pine Creek Geosyncline crop out in the north and north-east of the region. Middle Proterozoic sediments were deposited in the Birrindudu Basin.

Upper Proterozoic sediments were deposited as extensive shallow-water, stable shelf or platform deposits in the Victoria River Basin and Daly River Basin. Sediments of a similar age were also deposited in the unstable Fitzmaurice Mobile Zone which is separated from the platform deposits of the adjacent Sturt Block by the north-east trending Victoria River Fault.

Phanerozoic rocks of the Ord, Bonaparte Gulf, Daly River and Wiso Basins occupy the south-western, north-western, north-eastern and eastern margins of the region.

The geology of the Auvergne 1:250,000 Sheet area is summarised in the published explanatory notes (Pontifex, et al 1972). The results of the 1:250,000 scale mapping of the geology of the sheet area are described by Sweet, et al (1974a). The geology of the Precambrian rocks and of the Antrim Plateau Volcanics in the Cape Scott, Port Keats, Fergusson River and Delamere 1:250,000 sheet areas is described by Sweet, et al (1974b). The Precambrian geology of the Victoria River Region is summarised by Sweet (1977).

8.2 Local Stratigraphy

Exploration Licence 1864 occupies part of the Sturt Block in the north-east corner of the Auvergne 1:250,000 Sheet area. The rocks form part of the Victoria River Basin and consist of an Upper Proterozoic sequence of shallow-water sediments (Auvergne Group) which are unconformably overlain in part by a thin capping of Cretaceous marine sediments.

8.2.1 Auvergne Group

The Auvergne Group unconformably overlies the Upper Proterozoic Bullita Group and is unconformably overlain in part by the Upper Proterozoic Bullo River Sandstone, and in some areas by the Duerdin Group (Pontifex, et al, 1972). All strata are essentially flat-lying.

The basal part of the Auvergne Group does not crop out on E.L. 1864.

(a) Angalarri Siltstone

This is a thick sequence of siltstone and shale which lies with apparent unconformity on the basal Jasper Gorge Sandstone and is conformably overlain by the Saddle Creek Formation. The upper contact is well-defined by the marked change in lithology and resistance to weathering from green fissile siltstone to flaggy sandstone at the base of the overlying Saddle Creek Formation (Sweet, et al, 1974).

The thickness of the Angalarri Siltstone is conservatively estimated at 300 m (Sweet, et al, 1974a) with the upper portion cropping out in the lower part of the scarp slopes of the Yambarran Range. The formation also directly underlies the extensive sand plains of the Angalarri River.

The Angalarri Siltstone is divided into a lower, flaggy coarse-grained siltstone and an upper fissile, finer grained siltstone or silty shale. Dolomitic

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siltstone and flaggy dolomite have been observed near Bradshaw homestead (Sweet, et al, 1974a).

The presence of thin laminae containing silt sized pellets of glauconite in the upper beds of the Angalarri Siltstone suggest deposition on a marine shelf with reducing bottom conditions.

(b) Saddle Creek Formation

This formation was described and defined by Sweet et al (1974a). It crops out along the dissected plateau of the Yambarran Range in scarp faces below the Pinkerton Sandstone.

The Saddle Creek Formation conformably overlies the Angalarri Siltstone and is conformably overlain by the Pinkerton Sandstone.

The Saddle Creek Formation along the Yambarran Range is characterised by a basal sandstone band about 7 m thick, which is overlain by up to 90 m of dolomitic siltstone, locally with glauconitic bands of massive fine-grained sandstone (Sweet, et al, 1974a). Deposition was probably in shallow water in a marine shelf environment.

(c) Pinkerton Sandstone

The Pinkerton Sandstone forms the main escarpment and dissected plateau of the Yambarran Range. The formation conformably overlies the Saddle Creek Formation and is overlain conformably by the Lloyd Creek Formation.

The base of the Pinkerton Sandstone is defined by a distinctive basal, massive to blocky quartz sandstone up to 30 m thick, north of Bradshaw homestead. This is overlain by a softer, poorly outcropping sequence of thinly bedded mudstone, quartz siltstone and fine sandstone (Sweet, et al, 1974a).

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The maximum thickness of the Pinkerton Sandstone is probably in excess of 100 m in the Auvergne Sheet area.

The Pinkerton Sandstone is a mature unit and indicates shallow-water deposition during a marine transgression with minor shore-line oscillations.

(d) Lloyd Creek Formation

This formation crops out in scarp slopes in the Yambarran Range. It overlies conformably the Pinkerton Sandstone and is overlain conformably by the Spencer Sandstone. Outcrop of the formation is poorly exposed on E.L. 1864.

The Lloyd Creek Formation consists of dolomitic siltstone in the lower portion, overlain by silty, thin-bedded stromatolitic dolomite and blocky dolomite (Sweet, et al, 1974b). Both oolitic and stromatolitic varieties of dolomite are present.

A maximum thickness of 75 m is quoted for the Lloyd Creek Formation on the Auvergne 1:250,000 Sheet area (Sweet, et al, 1974a). A shallow-water marine intertidal and lagoonal depositional environment is indicated.

(e) Spencer Sandstone

The Spencer Sandstone consists of a prominent basal flaggy to blocky, fine to medium grained sandstone up to 15 m thick. The upper part of the unit consists of flaggy, thinly bedded sandstone with interbedded fissile silty sandstone. It is locally dolomitic. The upper part of the unit is generally more poorly exposed than the lower part.

The Spencer Sandstone is conformably underlain by the Lloyd Creek Formation and conformably overlain by The Shoal Reach Formation.

On E.L. 1864, erosion has removed all but the lowermost part sandstone horizon of the Spencer Sandstone. A maximum thickness of about 10 m is inferred for the formation adjacent to the western boundary of the tenement.

8.2.2 Mullaman Beds

The Mullaman Beds unconformably overlie the Proterozoic rocks of the Auvergne Group in the north-east corner of the Auvergne 1:250,000 Sheet area. The Mullaman Beds are of Cretaceous age and also crop out in adjacent sheet areas to the north, north-east and east. They typically form a capping on mesas and dissected plateau and are characteristically deeply weathered and lateritised.

The Mullaman Beds comprise a sequence of marine sediments overlying freshwater sediments and consist of sandstone with interbedded siltstone and claystone (Sweet, et al, 1974a). On E.L. 1864 they are exposed in scarp margins of breakaways and dissected plateau and consist of flat-lying, fine to medium grained argillaceous sandstone and siltstone.

The total thickness of the Mullaman Beds in the licence area was not measured but they range from a thin veneer to probably less than 30 m.

8.2.3 Cainozoic Rocks

(a) Laterite and Lateritic Soils

Laterite is formed on mesa and plateaux remnants of Mullaman Beds within E.L. 1864 and adjacent areas. The laterite forms part of the Tennant Creek Surface of Hayes (1967). The complete laterite profile contains a ferruginous pisolitic zone overlying a nodular and then mottled and pallid zone.

Lateritic profiles examined during field work on E.L. 1864 are described and discussed in more detail elsewhere in this report.

Lateritic soil and scree forms thin but extensive deposits on some areas of flat-lying Pinkerton Sandstone and Mullaman Beds on the Yambarran plateau.

(b) Superficial Soils

Superficial soils and skeletal sandy or loamy soils occur as blanket-type deposits over Proterozoic sediments and laterites on the Yambarran plateau in the licence area.

Alluvial and colluvial sediments occur as scree-like deposits at the base of the scarp slopes and as valley-fill deposits.

(c) Recent Alluvium Deposits

These include mud, silt and fine-grained sand and minor gravels along the larger watercourses. Fine-grained sand deposits are characteristic of the smaller creeks.

9. STRUCTURE

Exploration Licence No. 1864 is located within the Sturt Block which forms part of the Precambrian Victoria River Basin (Pontifex, et al, 1968). The Sturt Block was a stable platform or epicontinental shelf.

Movement within the Sturt Block during deposition was essentially epeirogenic, although at least three periods of gentle folding and warping have occurred (Pontifex, et al, 1972). Folds are broad and open with limbs dipping mostly at less than 10 degrees (Sweet, et al, 1974a). In the Yambarran Range, the sediments of the Auvergne Croup are gently warped with a regional dip of 5 to 10 degrees.

Faulting is a prominent feature on the Sturt Block. Faults are generally of small magnitude with both a north-easterly strike direction, roughly parallel to the major Victoria River Fault, and a north-westerly direction.

The north-east trending faults are more prominent and displace rocks of the Auvergne group (Sweet, et al, 1974a); many are probably thrust faults. Most of the north-west trending faults are vertical or nearly so (Sweet, et al, 1974a).

There is no apparent overthrusting or overturning of the strata on E.L. 1864.

10. GEOCHEMICAL SAMPLE PREPARATION AND METHOD OF ANALYSIS

Geochemical exploration on E.L. 1864 consisted of soil, rock chip and heavy mineral concentrate sampling. All chemical analyses was carried out by Pilbara Laboratories in Perth, W.A.

Soil auger samples were first air-dried and then sieved to yield a -20 mesh and -120 mesh fraction for each sample. Both fractions were analysed for Cu, Pb, Zn, Co, Ni, Cr and Mn by A.A.S. method after an $HCl/HClO_4$ digestion at 180°C and the elements U, Th, Ba, Nb, Sr, Ta, T and Zr by a fusion/ICP technique.

Rock chip samples were crushed and pulverised in the laboratory before analysis. Bauxite analysis was carried out on each sample with determination of reactive SiO_2, total SiO_2, available Al_2O_3, total Al_2O_3, total TiO_2, total Fe and loss on ignition (L.O.I.).

Total SiO_2, Al_2O_3, TiO_2 and Fe were determined by A.A.S. after an NaO_2 fusion. Available Al_2O_3 was determined using a scanning technique, involving a caustic soda digestion of the pulverised sample at 100°C in an open beaker and determination of the soda soluble alumina content in the filtered liquor. Reactive SiO_2 was determined by A.A.S. after digestion of the filtrate mud with HCl. L.O.I. was carried out at 900°C for one hour on each air-dried sample.

The laboratory assay result sheets are included as Appendix I of this report.

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11. GEOLOGICAL MAPPING AND GEOCHEMICAL SAMPLING OF LATERITIC PROFILES ON E.L. 1864

11.1 Preliminary Photogeological Work

11.1.1 Geology

Areas of laterite development on Cretaceous Mullaman Beds were delineated during the photogeological study of E.L. 1864 undertaken by Hunting Geology and Geophysics (Aust.) Pty. Limited during March-April, 1979.

The Mullaman Beds are exposed as the capping of irregularly shaped mesas and buttes, being the remnants of a once extensive depositional plain which was exposed to lateritic weathering during the Tertiary. The planar surface has been extensively eroded by parallel slope retreat following stream rejuvenation to produce the present topography of steep scarps and V-shaped valleys.

The Mullaman Beds are characterised by their dark tone and even texture relative to the underlying Proterozoic rocks, by their general lack of structural complexity and by the presence of a characteristic vegetation pattern. The outcrop margins of this formation are often clearly marked by a major or minor scarp, although the boundary is less clear in other places, where it appears to thin out gradually, or has only a subtle break of slope at its margin.

The outcrop of Mullaman Beds as determined by the photogeological study was found to correspond fairly closely to that indicated in published geological maps.

11.1.2 Basis for Selection of Sample Localities

A total of 169 sample points within E.L. 1864 were selected by the contract consultants as suitable for reconnaissance sampling using a helicopter (CSR MCD DWG No. 05215-2). Forty-eight (48) of these sample locations were given a high priority, it being considered that these were relatively accessible sites at which the lateritic profile was best displayed in the "breakaway" or escarpment. These sites were selected to give, as far as possible, a low but even density of prime sampling locations.

Six auger-soil traverses were suggested within E.L. 1864, in suitably representative areas where the density of other sampling would be low.

It was envisaged that the high priority sample locations would be examined and sampled first, followed if necessary, by sampling of the lower priority sites.

11.2 Field Activities

11.2.1 Ground Inspection of Lateritic Profile

Ground inspection within E.L. 1864 quickly indicated no significant bauxitic development of the lateritic profile overlying the Mullaman Beds.

Areas previously mapped as laterite/lateritic soil overlying the Mullaman Beds along and adjacent to the scarp margin near Mount Golla Golla and Mount Kukpalli were found on examination to contain no significant mappable lateritic profile. Flat-lying quartz sandstone, locally iron stained, of the Pinkerton Sandstone crops out in this area.

The maximum measured thickness of the laterite on the Mullaman Beds in E.L. 1864 was 11.5 m at sample sites 2019 and 2028. The exposed lateritic profile at other sample localities rarely exceeded 5 m in thickness.

The complete lateritic profile where present in E.L. 1864 consists of three broad divisible horizons :-

- an uppermost hard ferruginous pisolitic cap rock. Max. 3 m thick.
- an intermediate nodular/tabular zone.
- a basal mottled zone. Cellular feature locally at top.

A thin (up to 0.5 m thick) massive haematitic ironstone horizon often occurs at the base of the nodular/tabular zone. The basal mottled zone is usually poorly defined and gradational into the underlying bedrock.

A description of the lateritic profile at each rock chip sample site is tabulated in Appendix V. A brief description of samples collected at each auger soil sample locality is contained in Appendix IV.

No significant lateritic profiles were observed on Precambrian quartzite/sandstone/siltstone in E.L. 1864.

11.2.2 Geochemical Sampling Carried Out

The lateritic profile was sampled at a total of thirty-seven localities within E.L. 1864 during the helicopter-borne programme. All sample sites are shown on CSR/MCD DWG No. D5215-1.

A total of sixty-five channel or composite "grab" rock chip samples were collected from the lateritic profile on breakaways and scarp margins at thirty-two sites on the Yambarran Plateau within the tenement. These sites included most of the recommended first priority areas and gave an even sample density over lateritised regions.

At sample sites where a reasonably thick lateritic profiles was exposed, any discrete horizons or zones comprising the profile were sampled individually. Sample numbers were denoted ....A, B, C and D, etc. from the top of the profile downwards.

A total of five auger soil samples were collected from widely spaced sample points away from scarp margins on the Yambarran Plateau surface. These samples were not submitted for chemical analysis.

11.2.3 Geochemical Results

A tabulation of rock chip geochemical results is contained in Appendix I.

(a) Total and Available Alumina

Total alumina content ranges from 1.51 to 17.0% Al_2O_3 with only a few samples from the upper part of the lateritic profile exceeding 10% total Al_2O_3. There is a significant decrease in total Al_2O_3 down the lateritic profile.

Available alumina content was uniformly very low in all sample localities. Values ranged from 0.38% available Al_2O_3 (sample 2029) to 2.09% available Al_2O_3 content with depth from the top of the lateritic profile.

(b) Reactive Silica

The reactive silica content was uniformly low at $<$0.1% SiO_2 at about half the sample sites. In other localities values ranged from 0.1 to 0.4% reactive SiO_2. There was no significant vertical variation in reactive silica content throughout the lateritic profile on E.L. 1864.

(c) Total Silica

Total silica content was high in all rock chip samples collected on E.L. 1864. Values ranged from 82.0% SiO_2 (sample Nos. 2024(B), 2027(c) and 2028(c) to 30.0% SiO_2 (sample No. 2027[A]). About one-third of samples analysed contained $>$60% total SiO_2,

As expected there was a consistent trend of increasing total SiO_2 with depth in the laterite profile.

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(d) Total Iron

Total Fe content of the samples analysed was quite variable. Values were generally $>$ 10% total Fe with a maximum of 45.9% total Fe (sample No. 2027[A]) and a minimum of 0.2% total Fe (sandstone bedrock - Sample No. 2030[c]).

In the lateritic profiles samples in E.L. 1864, iron enrichment occurred in the upper pisolitic zone and locally within a massive ironstone band at the base of the nodular/tabular zone.

(e) Titanium

The titania content of the samples collected ranged from 0.07% TiO_2 (sample No 2027[A]) to 0.92% TiO_2 (sample No's. 2011[A] and 2012[A]). The majority of values were below 0.5% TiO_2.

There is a recognisable trend for relative enrichment of titania in the upper part of the lateritic profile.

(f) Loss on Ignition (L.O.I.)

Values ranged from 2.65% L.O.I. (sample No. 2006[B]) to 16.06% L.O.I. (sample No. 2027[B]).

There is a general trend for decreasing L.O.I. content with increasing depth in the lateritic profile.

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AREA CF/A		SOIL GEOCHEMICAL VALUES P.P.M.																						
		Cu		Pb		Zn		Co		Ni		Cr		Mn		U	Th	Ba	Nb	Sr	Ta	Y	Zr
		−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #
INNER CLAY-FILLED DEPRESSION	RANGE	4 - 15	10 - 20	2 - 27	14 - 33	1 - 12	3 - 14	2 - 16	2 - 16	5 - 17	10 - 25	37 - 101	30 - 59	13 - 135	24 - 126	<1 - 1	30 - 78	76 - 367	<5 - 10	23 - 121	< 10	19 - 43	245 - 491
	MEAN	11	16	18	24	7	9	9	10	13	16	56	44	58	63	N.C.*	52	210	N.C.	52	<10	30	368
OUTER SANDY SOIL COVERED ZONE	RANGE	8 - 23	14 - 28	4 - 26	15 - 41	4 - 30	2 - 13	2 - 16	4 - 1	8 - 26	10 - 31	37 - 76	34 - 69	16 - 28	21 - 39	<1 - 1	23 - 93	75 - 238	<5 - 8	31 - 49	< 10	19 - 34	310 - 599
	MEAN	13	20	16	27	10	8	8	10	16	22	54	47	22	29	N.C	56	144	N.C.	38	<10	26	425

AREA CF/B		SOIL GEOCHEMICAL VALUES P.P.M.																						
		Cu		Pb		Zn		Co		Ni		Cr		Mn		U	Th	Ba	Nb	Sr	Ta	Y	Zr
		−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−120 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #	−20 #
INNER CLAY-FILLED DEPRESSION	RANGE	10 - 16	11 - 16	15 - 20	19 - 32	4 - 10	6 - 18	3 - 14	7 - 19	12 - 20	12 - 22	46 - 74	43 - 56	16 - 94	27 - 97	<1 - 1	8 - 26	196 - 320	<5 - 5	64 - 111	< 10	32 - 41	339 - 592
	MEAN	11	14	18	28	6	11	8	11	15	18	59	49	51	59	N.C.	21	260	N.C.	82	< 10	36	457
OUTER SANDY SOIL COVERED ZONE	RANGE	10 - 14	12 - 16	22 - 36	13 - 15	7 - 9	6 - 8	7 - 9	8 - 9	12 - 16	16 - 23	84 - 294	26 - 46	17 - 22	23 - 29	<1 - 1	20 - 46	90 - 223	<5 - 17	16 - 55	< 10	9 - 21	195 - 368
	MEAN	12	14	29	14	8	7	8	9	14	20	189	36	20	26	N.C.	31	145	N.C.	45	< 10	17	376

* N.C.= NOT CALCULATED

TABLE 1 SUMMARY OF AUGER SOIL GEOCHEMISTRY - AREAS CF/A AND CF/B E.L. 1864 YAMBARRAN N.T.

12. GROUND INSPECTION AND SAMPLING OR AIRPHOTO CIRCULAR FEATURES

12.1 Photo-interpretation

Four circular features were recognised and recorded by the consultants during their photogeological study of E.L. 1864. Three of these features occur within the licence area (CSR/MCD DWG No. D5215-2) and were believed to correspond with sediment-filled depressions on the dissected plateau surface. The other circular feature is a large, vague circular area of tonal contrast occurring to the east of, and outside E.L. 1864.

It was considered remotely possible by the consultants that these circular features were the surface expressions to kimberlite pipes.

12.2 Ground Inspection

The three circular features identified within E.L. 1864 were located on the ground and an inspection was carried out at each locality. The areas designated CF/A, CF/B and CF/C (CSR/MCD DWG No. D5215-1).

From ground inspection, the two largest circular areas (i.e. CF/A and CF/B) were found to correspond with shallow clay-filled depressions on the flat plateau surface. These "clear" areas stand out very prominently on the otherwise tree-lined plateau. There is no outcrop within the designated circular areas.

The peripheral regions of the depressions on areas CF/A and CF/B are covered with a sandy lateritic soil.

Ground traversing of area CF/C failed to delineate a clay-filled depression similar to those identified on features CF/A and CF/B. A roughly circular pattern of vegetation was identified from the air over circular feature CF/C.

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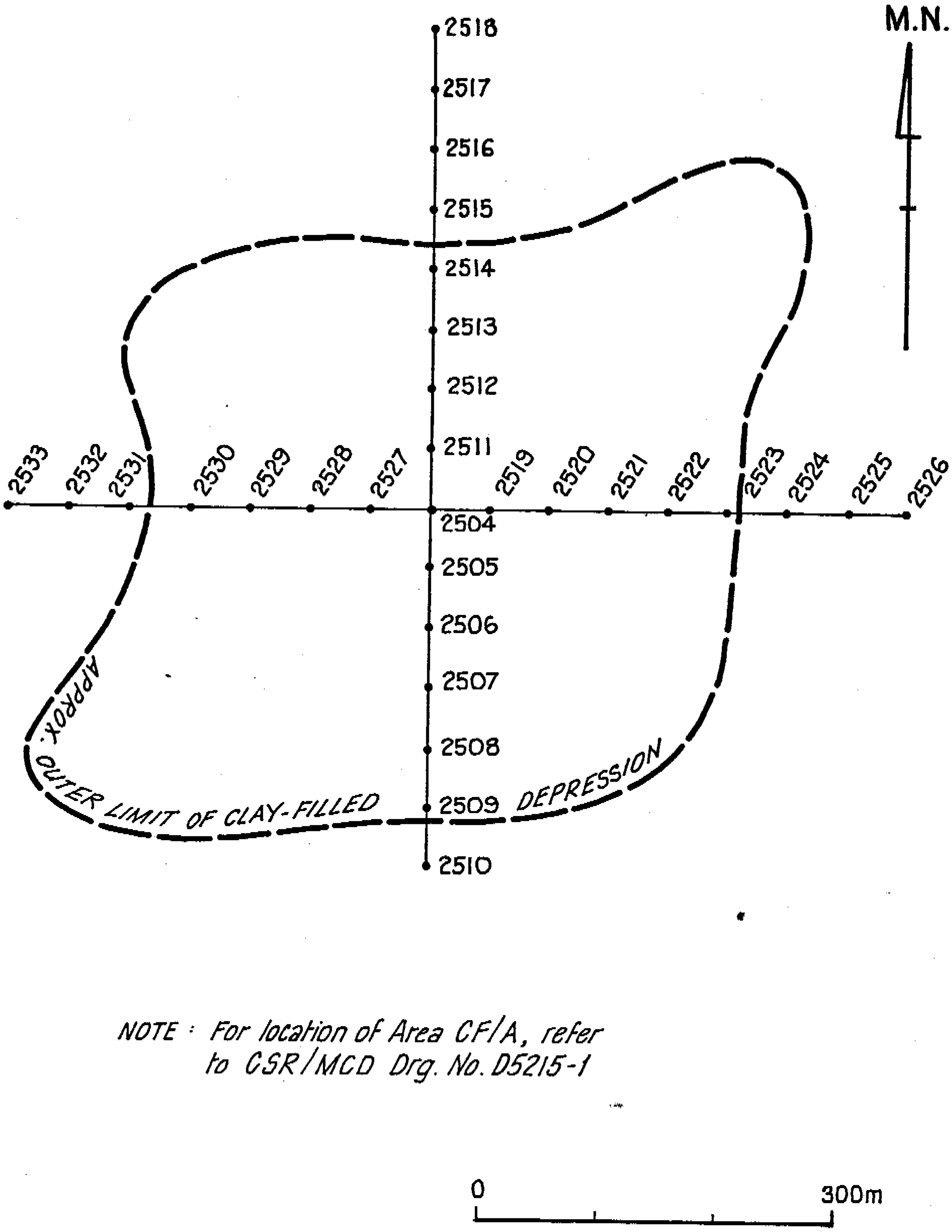

FIG. 3. LOCATION OF AUGER SOIL/CLAY GEOCHEMICAL SAMPLES CIRCULAR FEATURE CF/A E.L. 1864, N.T.

12.3 Geochemical Sampling Carried Out

12.3.1 Shallow soil-auger sampling was carried out on circular features CF/A and CF/B. No geochemical sampling was undertaken on area CF/C.

A 1.5 m long hand auger with a 7.7 cm diameter auger head was used for the collection of soil samples.

On area CF/A a total of 30 soil/clay samples were collected at 50 m intervals along a north trending and east trending traverse through the centre of the ciruclar area (Figure 3). Samples were collected from a minimum depth of 40 cm with hole 2504 augered to maximum depth.

On area CF/B, four holes were augered to maximum depth (i.e. 1.5 m) along an east trending traverse across the margin of the circular feature (Figure 4).

Two fractions (-20 mesh and -120 mesh) were obtained from each sample.

12.3.2 A sample comprising the insoluble residue of mineral and rock fragments from the sandy clay samples was obtained from both circular features CF/A and CF/B. The heavy mineral fraction was liberated by solution and removal of the clay-sized particles and the raw residue was then concentrated over tetrabromoethane.

A mineralogical examination of the final heavy mineral concentrate was carried out by Minpet Services in Sydney.

12.4 Geochemical Results

The results of soil/clay sampling on areas CF/A and CF/B are summarised in Table 1.

There is an overall enhancement, by a factor of up to two of Cu, Pb, Zn, Co and Ni values in the -120 mesh fraction

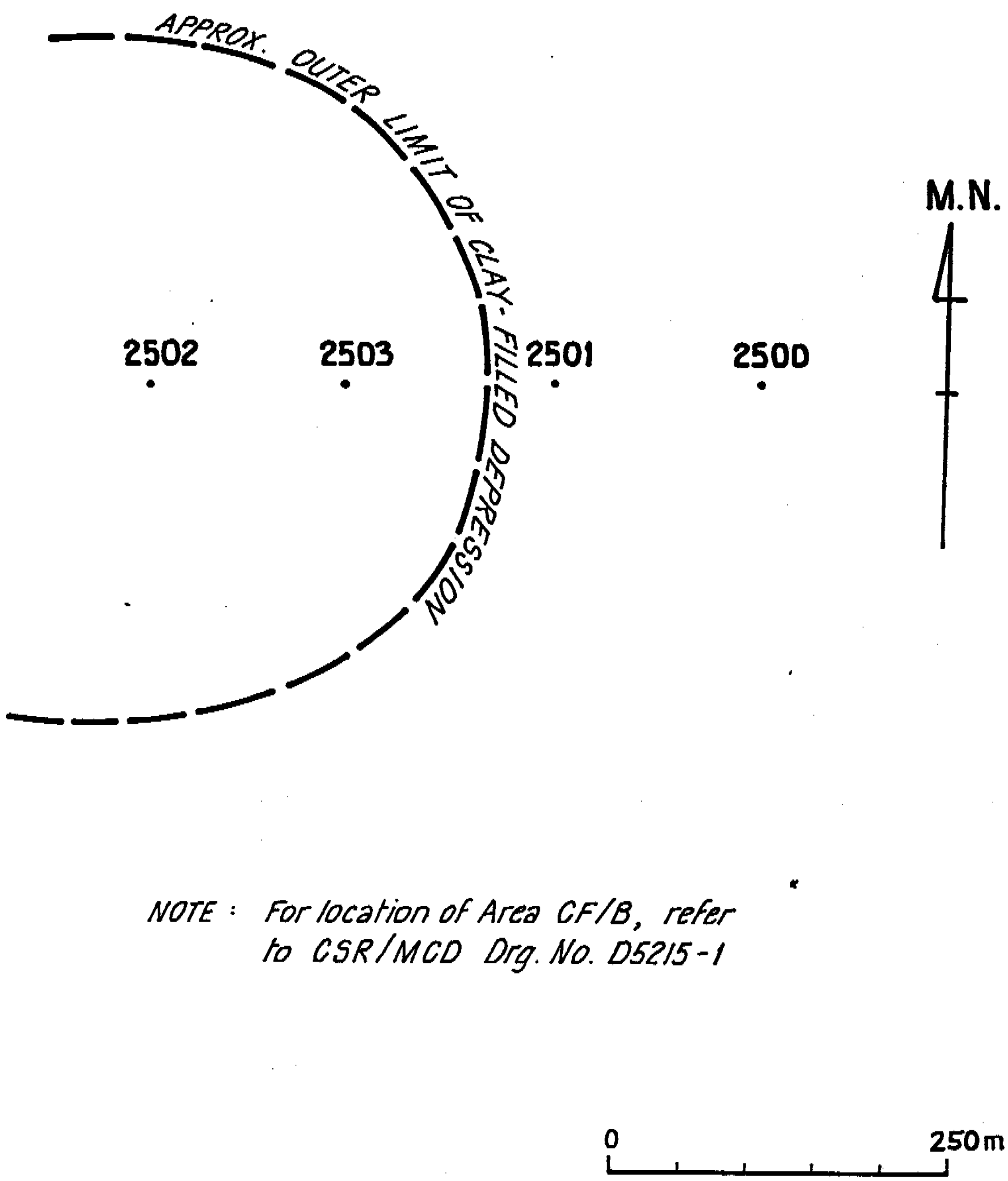

FIG. 4. LOCATION OF AUGER SOIL / CLAY GEOCHEMICAL SAMPLES CIRCULAR FEATURE - AREA CF/B E.L. 1864, N.T.

compared to the -20 mesh fraction. Chromium (Cr) values generally show a slight enhancement in the coarser -20 mesh fraction relative to the -120 mesh fraction.

(a) Area CF/A

There are no Cu, Pb, Zn, Co, Ni, U, Ta, Cr and Nb geochemical values of significance along the traverse lines in area CF/A. The mean value for each of these elements is less than 30 ppm. No significant Th, Mn, Ba, Sr and Y values were identified. Zirconium (Zr) content is uniformly high.

(b) Area CF/B

No significantly anomalous Cu, Pb, Zn, Co, Ni, Mn, U, Th, Ba, Nb, Sr, Ta and Y soil/clay geochemistry was identified on area CF/B. Again, Zr values are uniformly high.

The significance of a high chromium value (294 ppm Cr) at sample site 2500 in the centre of the circular depression is unknown. A value of 135 ppm Cr was recorded for a float? sample of fine to medium grained sandstone (weakly iron-stained) near the margin of area CF/B.

In summary, geochemical values obtained from surface sampling of the clay-rich central zone and outer lateritic soil covered region of both circular features are not indicative of an underlying kimberlitic host rock. The results of the shallow geochemical sampling carried out to date suggest a likely sandstone/shale bedrock.

However, deeper holes down to bedrock would be required to establish conclusively whether rocks of kimberlitic affinities are present.

12.5 Results of Mineralogical Examination of Soil/Clay Heavy Mineral Concentrates

The results of the mineralogical examination are summarised in Table 2.

TABLE 2: SUMMARY OF MINERALOGICAL EXAMINATION OF HEAVY MINERAL CONCENTRATES, E.L. 1864, YAMBARRAN RANGE, NORTHERN TERRITORY

MPS NO.	CSR NO.	MINERALS ABUNDANCE Major 5.0→100.0%	Minor 1-4.9 %	Trace <0.1-0.9 %	GRAIN SIZE LIMITS Min. (mm)	Max. (mm)	Med. (mm)	SPHERICITY	COMMENTS	SAMPLE WEIGHTS Hand (kg)	Conc. (g)	%
227	3500	Ferruginous siltstone	Magnetite/ maghemite	Rutile	<0.1	0.8 (0.5)	0.2 (0.17)	Rutile, zircon, tourmaline - high.	Ferruginous silt +90% conct.	8.5	2.33	0.027
			Zircon	Topaz				Topaz - moderate.				
			Tourmaline	Ilmenite				Magnetite, ilmenite, limonite siltstone - poor.				
228	3501	Ferruginous siltstone	Zircon	Magnetite/ limonite	<0.1	0.8 (0.5)	0.2 (0.17)	Rutile, tourmaline, zircon - high.	Ferruginous silt +90% conct.	11.25	9.81	0.087
			Rutile	Andalusite				Other minerals - poor.				
			Topaz	Tourmaline								
229	3502	Ferruginous siltstone	Ilmenite	Magnetite	<0.1	1	0.3	Rutile, tourmaline - high.	Ferruginous silt +90% conct.	9.5	7.87	0.083
		Talc	Rutile					Zircon, magnetite - high to moderate.				
		Zircon	Tourmaline					Other minerals - poor.				
			Topaz									
230	3503	Biotite	Magnetite	Actinolite	<0.1	0.6	0.3	Some magnetite, rutile - high		14.0	1.30	0.0093
		Ferruginous siltstone	Diopside	Topaz				Tourmaline - high.				
		Ferruginous chert	Sphene	Tourmaline				Zircon - moderate				
			Zircon					Topaz - moderate				
			Rutile					Remainder - poor.				
231	3504	Rutile	Ilmenite	Biotite	0.1	0.6	0.15	Magnetite, rutile, zircon - high.	Zircon +30% of concentrate.	11.65	0.57	0.0048
		Tourmaline	Magnetite	Corundum				Tourmaline - moderate to poor				
		Zircon		Actinolite								
232	CF(A)	Ferruginous siltstone and limonitised hematite.			<0.1	20	2 3		Ferruginous silt +90% conct.	0.462	19.92	4.3
		* -60# Ilmenite	Magnetite	Biotite	< 0.02	0.2	0.07	Magnetite - high to poor.	Magnetite present as perfect spheres			
		Rutile	Topaz	Actinolite				Rutile - high				
		Zircon	Tourmaline					Zircon - moderate to poor				
								Remainder - poor.				
233	CF(B)	Limonitised hematite and ferruginous silt.			< 0.1	1.2	2			0.506	4.91	0.97
		Rutile	Magnetite	Pyrite	0.03	0.14	0.07	Magnetite, fractured, platey - poor; where sperical - poor.				
		Biotite	Tourmaline					Rutile, tourmaline - high				
		Ilmenite	Zircon					Zircon - moderate. All other minerals - poor.				

No diagnostic kimberlite indicator minerals were detected in the heavy mineral concentrates from areas CF/A and CF/B.

The heavy mineral suite present consists of ferruginous siltstone and limonitised haematite with subordinate rutile, zircon and ilmenite and minor magnetite and tourmaline. Biotite is a major constituent of the heavy mineral concentrate from area CF/B, but is only a trace component in area CF/A.

XRD determination and/or microchemical tests would be required to establish conclusively if the ilmenite present is kimberlitic in character. Such determinations were considered unwarranted at this time, due to the absence of other classical kimberlite indicator minerals.

/....

13. STREAM HEAVY MINERAL CONCENTRATE SAMPLING

13.1 Sampling Techniques

Five (5) heavy mineral concentrate samples were collected from streams draining the area of the Yambarran Range, east of Mt. Millik Mannir (CSR/MCD DWG No. D5215-1). All samples were collected from within E.L. 1864.

Three of the samples were from tributaries of the Angalain River while the other two were collected from the Little Fitzmaurice River in the central region of the tenement.

Sampling was carried out to check for the presence of kimberlite indicator minerals in the heavy mineral suite of each drainage sample.

A crude panned concentrate was obtained initially in the field and then further concentrated over tetrabromoethane (S.G. 2.96) in the laboratory. The final concentrate was then examined optically under the binocular microscope.

The minerals comprising the heavy mineral suite were identified and a semi-quantative estimation of the major/minor/trace components was made for each sample.

The mineralogical work was carried out by Minpet Services in Sydney.

13.2 Results Obtained

The results of the mineralogical examination are summarised in Table 2.

No diagnostic kimberlite indicator minerals were identified in the heavy mineral concentrates. Much of the heavy mineral component was ferruginous siltstone with only minor to traces of heavy minerals present; these being mostly zircon, rutile, biotite, magnetite, ilmenite and tourmaline. Minor diopside was identified in Sample 3503.

/....

In the absence of more easily recognisable classical indicator minerals, no XRD or microchemical determinations were carried out.

14. CONCLUSIONS

Ground examination and sampling within E.L. 1864 has clearly demonstrated no significant bauxitisation of the lateritic profiles within the tenement.

Reconnaissance geochemical and heavy mineral concentrate sampling to date in E.L. 1864 downgraded the possibility of kimberlitic pipe-like bodies occurring at shallow depth within the defined circular features.

However, the possibility of deeper bodies remains untested.

15. REFERENCES

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MJV/SS
December 1979

APPENDIX I

ASSAY RESULT SHEETS

Pilbara Laboratories Pty. Ltd.

Analytical Report

4 MacAdam Place, Balcatta, Western Australia 6021
Telephone: (09) 344 2411
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CSR LIMITED MINERALS & CHEMICALS DIVISION

Report Code: B 969
Page: 1 of 3
Report Date: AUGUST 6, 1979
Project:
Locality:
Sample Type: Rock chips; soil
Sample Prefix:
Clients Order: 19317
Submission Date: JUNE 22, 1979
Method: HCl/HClO4/AA

RECEIVED 13 AUG 1979

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER: [signature]

SAMPLE	SiO2	Al2O3	Fe	TiO2	LOI	SiO2(*)	Al2O3(*)
2001	37.0	8.52	27.5	0.45	6.35	<0.1	1.33
2002	49.0	7.62	16.7	0.50	5.60	<0.1	1.46
2003/A	39.5	13.60	19.6	0.76	10.60	<0.1	2.09
2003/B	55.5	6.94	12.4	0.33	6.83	<0.1	1.38
2003/C	74.0	4.94	1.4	0.28	4.67	<0.1	1.05
2004	47.0	7.71	17.8	0.40	6.05	<0.1	1.06
2005	32.5	13.30	26.6	0.55	9.18	<0.1	1.67
2006/A	46.5	7.36	17.7	0.32	8.43	<0.1	1.27
2006/B	43.5	8.47	18.5	0.33	2.65	<0.1	0.50
2006/C	66.0	6.76	4.7	0.31	5.38	<0.1	2.03
2007/A	44.5	9.64	21.7	0.33	7.56	<0.1	1.10
2007/B	70.0	2.62	2.3	0.07	2.38	<0.1	1.16
2008/A	53.0	7.13	12.0	0.28	6.24	<0.1	1.36
2008/B	54.0	2.56	21.0	0.18	3.55	<0.1	0.54
2008/C	72.0	7.32	3.6	0.34	6.94	<0.1	0.88
2008/D	76.0	3.91	2.0	0.15	4.75	<0.1	1.04
2009	58.0	6.69	17.3	0.21	5.20	<0.1	1.21
2010/A	59.0	11.00	11.1	0.29	9.62	<0.1	1.16
2010/B	75.0	4.77	4.3	0.26	4.31	<0.1	1.30
2011/A	46.5	12.50	21.3	0.88	9.69	0.3	1.67
2011/B	61.0	7.75	13.8	0.49	7.39	0.3	0.80
2012/A	37.5	17.00	24.2	0.92	10.30	0.1	1.48
2012/B	44.0	12.40	24.9	0.56	8.71	0.1	0.39
2013/A	43.0	15.30	24.2	0.83	10.90	0.2	1.16
2013/B	49.5	9.73	23.6	0.49	7.41	0.1	0.92

Data in ppm unless otherwise stated ...

* SiO2 - reactive silica
* Al2O3 - available alumina

All relevant AAS data are background corrected

Pilbara Laboratories Pty. Ltd

Analytical Report

CSR LIMITED MINERALS & CHEMICALS DIVISION

4 MacAdam Place, Balcatta, Western Australia 6021
Telephone: (09) 344 2411
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Cables: Pilbaralab - Perth

Report Code: B 969
Page: 2 of 3
Report Date: AUGUST 6, 1979
Project:
Locality:
Sample Type: Rock chips; soil
Sample Prefix:

Copy 1: CSR LTD
2: CSR M. VICARY

Clients Order: 19317
Submission Date: JUNE 22, 1979
Method: HCl/HClO4/AA

LABORATORY OFFICER: [signature]

SAMPLE	SiO2	Al2O3	Fe	TiO2	LOI	SiO2(*)	Al2O3(*)
2014/A	41.0	11.10	28.8	0.53	8.73	0.1	1.04
2014/B	80.0	5.97	4.3	0.40	5.79	0.1	0.73
2015/A	53.5	8.38	14.7	0.55	7.34	<0.1	1.38
2015/B	61.0	3.41	0.3	0.24	3.69	<0.1	0.52
2016/A	44.5	8.78	22.2	0.45	8.26	<0.1	0.89
2016/B	52.0	6.62	14.7	0.34	5.48	<0.1	1.12
2017/A	37.5	7.95	25.5	0.34	9.18	<0.1	1.28
2017/B	50.0	9.55	14.0	0.57	8.44	<0.1	1.47
2018	56.5	7.42	10.0	0.63	7.32	<0.1	1.36
2019/A	43.5	6.46	19.4	0.47	8.02	<0.1	1.28
2019/B	48.0	3.91	20.7	0.30	5.44	<0.1	1.82
2019/C	68.0	3.48	2.9	0.29	6.64	0.4	0.44
2020	63.0	4.76	5.7	0.51	5.98	0.3	0.53
2021/A	43.5	6.91	22.9	0.39	8.46	0.2	0.71
2021/B	66.0	5.27	8.5	0.32	5.74	0.3	0.65
2022	41.0	7.93	29.1	0.40	6.23	0.2	0.96
2023/A	38.5	13.90	23.1	0.57	9.76	0.2	1.38
2023/B	43.0	6.11	18.5	0.41	6.47	0.1	0.84
2023/C	64.0	4.19	14.3	0.37	5.16	0.2	0.82
2024/A	38.0	10.30	20.8	0.49	8.97	0.2	1.41
2024/B	82.0	4.67	1.6	0.36	5.02	0.2	0.91
2025/A	39.5	3.20	27.5	0.59	9.22	0.2	1.01
2025/B	59.0	6.55	13.2	0.40	6.83	0.2	1.34
2026/A	54.0	8.73	19.1	0.48	8.10	0.2	1.81
2026/B	57.5	6.15	19.0	0.36	6.76	0.2	1.50

Data in ppm unless otherwise stated ...

* SiO2 - reactive silica
* Al2O3 - available alumina

All relevant AAS data are background corrected

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Telephone: (09) 344 2411
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Report Code: B 969

Report Date: AUGUST 6, 1979

Project: ....

Locality: ....

Sample Type: Rock chips; soil

Sample Prefix: ....

Clients Order: 19317

Submission Date: JUNE 22, 1979

Method: HCl/HClO4/AA

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER: [signature]

SAMPLE	SiO2	Al2O3	Fe	TiO2	LOI	SiO2(*)	Al2O3(*)
2027/A	30.0	1.14	45.9	0.07	8.87	0.3	1.51
2027/B	67.5	5.28	10.9	0.32	16.06	0.3	1.24
2027/C	82.0	3.09	0.7	0.24	4.20	0.3	1.07
2028/A	43.5	8.78	22.7	0.42	7.68	0.1	1.17
2028/B	73.0	3.53	6.2	0.22	4.81	0.2	0.53
2028/C	82.0	3.03	1.0	0.25	4.06	0.1	0.47
2028/D	59.0	3.97	15.7	0.30	5.55	0.1	1.32
2029	44.5	2.51	27.6	0.14	6.71	0.2	0.38
2030/A	38.0	8.40	28.1	0.43	7.53	0.2	0.93
2030/B	79.0	2.24	1.3	0.24	3.11	0.1	0.49
2030/C	76.0	2.16	0.2	0.20	2.81	0.1	0.56
2031/A	38.0	6.83	28.4	0.35	7.08	0.3	0.77
2031/B	48.5	4.91	19.8	0.32	5.63	0.1	0.88
2032/A	43.5	4.49	22.8	0.32	5.12	0.2	0.86
2032/B	56.0	4.82	14.1	0.37	5.29	0.3	1.44

Data in ppm unless otherwise stated ...

* SiO2 - reactive silica
* Al2O3 - available alumina

All relevant AAS data are background corrected

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Report Code: B 969
Page: 4 of 7
Report Date: JULY 20, 1979
Project:
Locality:
Sample Type: Rock Chips; Soil
Sample Prefix: -20 MESH
Clients Order: 19317
Submission Date: JUNE 22, 1979
Method: HCl/HClO4/AA

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER:

SAMPLE	Cu	Pb	Zn	Co	Ni	Cr	Mn
2500/Y	10	22	7	9	12	294	17
2500/Z	14	36	9	7	16	84	22
2501/Y	10	15	4	4	12	60	16
2501/Z	11	20	4	10	14	64	17
2502/Y	10	19	5	3	12	74	51
2502/Z	16	20	10	14	17	62	94
2503/Y	10	16	5	6	14	48	59
2503/Z	11	20	9	11	20	46	68
2504/Y	14	21	10	12	16	58	135
2504/Z	14	26	12	16	17	49	135
2505	15	26	7	11	14	49	102
2506	12	22	5	9	15	37	37
2507	13	19	6	11	16	43	33
2508	14	14	3	10	15	42	18
2509	9	12	5	8	14	47	13
2510	11	7	2	6	15	73	18
2511	12	9	8	9	14	101	34
2512	12	19	6	14	11	52	55
2513	13	18	8	10	13	51	32
2514	15	25	8	11	17	46	26
2515	23	26	11	13	26	43	22
2516	15	30	4	15	22	37	23
2517	15	21	5	9	18	41	24
2518	11	10	8	8	9	53	16
2519	12	14	8	6	14	43	61

Data in ppm unless otherwise stated ...

All relevent AAS data are background corrected.

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Cables: Pilbaralab - Perth

Report Code: B 969
Page: 5 of 7
Report Date: JULY 20, 1979
Project:
Locality:
Sample Type: Rock Chips; Soil
Sample Prefix: -20 mesh
Clients Order: 19317
Submission Date: JUNE 22, 1979
Method: HCl/HClO4/AA

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER:

SAMPLE	Cu	Pb	Zn	Co	Ni	Cr	Mn
2520	9	20	4	7	11	90	91
2521	10	13	5	10	12	64	31
2522	4	9	3	6	10	53	20
2523	6	2	1	2	5	49	15
2524	8	4	4	3	8	57	17
2525	12	14	30	2	10	37	25
2526	8	14	9	2	8	68	26
2527	11	20	7	4	11	53	78
2528	8	27	10	6	15	48	122
2529	9	20	8	9	14	69	84
2530	11	16	6	9	14	66	29
2531	14	17	10	12	19	76	23
2532	12	23	8	11	15	59	22
2533	12	15	15	16	22	47	28
3000	3	7	2	4	2	135	19

Data in ppm unless otherwise stated ...

All relevant AAS data are background corrected

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4 MacAdam Place, Balcatta, Western Australia 6021
Telephone: (09) 344 2411
Telex: AA 93837
Cables: Pilbaralab - Perth

Report Code: B 969
Page: 6 of 7
Report Date: JULY 20, 1979
Project:
Locality:
Sample Type: Rock Chips; Soil
Sample Prefix: -120 mesh
Clients Order: 19317
Submission Date: JUNE 22, 1979
Method: HCl/HClO4/AA

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER:

SAMPLE	Cu	Pb	Zn	Co	Ni	Cr	Mn
2500/Y	12	13	6	9	16	26	29
2500/Z	16	15	8	8	23	46	23
2501/Y	15	30	11	8	20	56	33
2501/Z	16	32	9	10	20	54	27
2502/Y	11	29	6	7	12	46	52
2502/Z	12	19	12	19	19	15	97
2503/Y	11	29	9	10	14	43	67
2503/Z	16	30	18	11	22	49	77
2504/Y	15	27	14	8	15	40	121
2504/Z	16	28	14	10	18	41	125
2505	15	29	9	9	15	43	91
2506	16	28	7	10	17	42	54
2507	14	24	7	6	13	49	42
2508	18	22	8	7	24	59	25
2509	14	15	6	6	13	43	24
2510	15	17	7	9	17	40	39
2511	14	18	9	10	16	43	41
2512	14	21	9	10	14	33	60
2513	17	23	8	12	18	32	39
2514	20	28	7	15	25	45	30
2515	28	38	13	17	31	46	26
2516	20	33	11	17	30	35	34
2517	22	25	9	14	26	40	38
2518	14	18	4	9	17	49	24
2519	15	24	12	11	16	45	46

Data in ppm unless otherwise stated ...

All relevant AAS data are background corrected

Pilbara Laboratories Pty. Ltd

Analytical Report

CSR LIMITED MINERALS & CHEMICALS DIVISION

4 MacAdam Place, Balcatta, Western Australia 6021
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Cables: Pilbaralab - Perth

Report Code: B 969
Page: 7 of
Report Date: JULY 20, 1979
Project:
Locality:
Sample Type: Rock Chips; Soil
Sample Prefix: -120 mesh
Clients Order: 19317
Submission Date: JUNE 21, 1979
Method: HCl/HClO4/AA

Copy 1: CSR LTD
2: CSR M. VICARY

LABORATORY OFFICER: ....

SAMPLE	Cu	Pb	Zn	Co	Ni	Cr	Mn
2520	16	22	10	8	14	44	115
2521	17	38	9	16	20	40	44
2522	13	15	11	6	14	30	29
2523	10	14	3	2	10	32	24
2524	18	18	3	4	12	34	23
2525	20	15	8	4	16	40	25
2526	17	30	5	7	16	42	32
2527	16	26	8	9	13	48	94
2528	16	22	10	12	18	53	126
2529	17	23	12	14	16	54	98
2530	19	31	10	12	19	57	29
2531	24	41	13	12	24	62	21
2532	25	34	13	14	26	58	27
2533	20	36	2	8	30	69	38

Data in ppm unless otherwise stated ...

All relevent AAS data are background corrected

31.10.78

ATTENTION: MAL VICERY

PLEASE FIND LISTED BELOW RESULTS FOR JOB NO. B 1171, YOUR ORDER NO. 19331.

SAMPLE	U	BA	NB	SR	TA	TH	Y	ZR
2500Y	1	90	17	16	-10	46	9	195
2500Z	1	108	11	55	-10	30	21	491
2501Y	-1	158	5	55	-10	26	19	448
2501Z	-1	223	-5	54	-10	20	19	368
2502Y	1	231	-5	69	-10	26	34	469
2502Z	-1	292	5	83	-10	24	41	426
2503Y	-1	196	-5	111	-10	8	32	592
2503Z	-1	320	-5	64	-10	26	35	339
2504Y	-1	283	5	57	-10	42	37	412
2504Z	-1	367	-5	74	-10	42	43	383
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~			
2505	1	282	-5	65	-10	39	35	383
2506	-1	192	5	58	-10	35	28	375
2507	1	204	8	76	-10	30	25	440
2508	1	208	7	45	-10	51	27	477
2509	-1	106	9	35	-10	30	20	491
2510	-1	116	8	35	-10	37	23	599
2511	-1	203	10	47	-10	48	33	404
2512	-1	208	-5	54	-10	53	37	455
2513	-1	183	-5	58	-10	51	34	448
2514	1	207	8	43	-10	54	24	303
2515	1	238	8	46	-10	63	25	310
2516	1	156	5	36	-10	58	27	404
2517	1	158	-5	34	-10	66	24	332
2518	-1	108	-5	31	-10	58	19	397
2519	1	248	5	40	-10	75	31	303
2520	-1	222	5	32	-10	78	26	245
2521	-1	183	6	121	-10	31	21	296
2522	-1	107	5	36	-10	70	19	260
2523	-1	76	5	23	-10	63	19	347
2524	1	89	6	35	-10	44	26	542
2525	1	101	-5	41	-10	74	28	412
2526	1	75	5	33	-10	93	26	404
2527	1	225	6	47	-10	56	33	375
2528	1	279	6	47	-10	61	31	325
2529	-1	218	5	46	-10	63	34	332
2530	1	191	-5	42	-10	74	34	296
2531	1	197	5	38	-10	80	30	310
2532	1	165	6	49	-10	27	25	505
2533	1	178	8	40	-10	23	34	455

DATA IN PPM UNLESS OTHERWISE STATED...
FUSION/ICP
ALL RELEVANT AAS DATA ARE BACKGROUND CORRECTED

LI TO FOLLOW.

SYMBOL (-) MEANS LESS THAN.

APPENDIX II

SUMMARY OF ASSAY RESULTS OF ROCK CHIP SAMPLING OF THE LATERITIC PROFILE ON E.L. 1864

APPENDIX II - SUMMARY OF ASSAY RESULTS OF ROCK CHIP SAMPLING OF THE LATERITIC PROFILE ON E.L. 1864

SAMPLE LOCATION NUMBER	ROCK CHIP SAMPLE NUMBER	SAMPLE INTERVAL From top of scarp edge (m)	THICKNESS OF SAMPLE INTERVAL (m)	ROCK TYPE/LATERITIC ZONE	ANALYTICAL RESULTS						
					REACTIVE SiO_2	AVAILABLE Al_2O_3	TOTAL Al_2O_3	TOTAL SiO_2	TOTAL Fe	TOTAL TiO_2	L.O.I.
2001	2001	0 - 5	5	Ferruginous pisolitic cap and nodular zone.	< 0.1	1.33	8.52	37.0	27.5	0.45	6.35
2002	2002	0 - 1	1	Scree of ferruginous pisolitic and conglomerate cap rock.	< 0.1	1.46	7.62	49.0	16.7	0.50	5.60
2003	2003A	0 - 5	5	Ferruginous pisolitic cap, nodular near base.	< 0.1	2.09	13.60	39.5	19.6	0.76	10.60
	2003B	5 - 7	2	Ferruginous nodular/tabular zone.	< 0.1	1.38	6.94	55.5	12.4	0.33	6.83
	2003C	7 - 11	4	Mottled sandstone/bedrock?	< 0.1	1.05	4.94	74.0	1.4	0.28	4.67
2004	2004	0 - 5	5	Ferruginous thin pisolitic cap/nodular zone. Mottled sandstone at base.	< 0.1	1.06	7.71	47.0	17.8	0.40	6.05
2005	2005	0 - 5	5	Ferruginous pisolitic cap and nodular zone.	< 0.1	1.67	13.30	32.5	26.6	0.55	9.18
2006	2006A	0 - 3	3	Ferruginous pisolitic cap. Nodular/ironstone at base.	< 0.1	1.27	7.86	46.5	17.7	0.32	8.43
	2006B	3 - 6	3	Nodular zone. Ferruginous.	< 0.1	0.50	8.47	43.5	18.5	0.33	2.65
	2006C	6 - 8.5	2.5	Mottled zone. Honeycombed at top.	< 0.1	2.03	6.76	66.0	4.7	0.31	5.38
2007	2007A	0 - 4	4	Ferruginous pisolitic cap and nodular zone.	< 0.1	1.10	9.64	44.5	21.7	0.33	7.56
	2007B	~8 - 10	2	Ferruginous sandstone (bedrock).	< 0.1	1.16	2.62	70.0	2.3	0.07	2.88
2008	2008A	0 - 2.5	2.5	Ferruginous pisolitic cap and nodular zone.	< 0.1	1.36	7.13	58.0	12.0	0.28	6.24
	2008B	2.5- 3	0.5	Ironstone zone.	< 0.1	0.54	2.56	54.0	21.0	0.18	3.56
	2008C	3 - 4	1	Mottled zone.	< 0.1	0.88	7.82	72.0	3.6	0.34	6.94
	2008D	~20 - 23	3	Quartz sandstone (weathered bedrock).	< 0.1	1.04	3.91	76.0	2.0	0.15	4.75
2009	2009	0 - 2	2	Ferruginous conglomerate cap - banded near base. Scree.	< 0.1	1.21	6.69	58.0	17.3	0.21	5.20
2010	2010A	0 - 2.5	2.5	Ferruginous pisolitic cap and nodular zone at base.	< 0.1	1.16	11.00	59.0	11.1	0.29	9.62
	2010B	2.5- 4	1.5	Mottled zone. Locally cellular at top.	< 0.1	1.30	4.77	75.0	4.3	0.26	4.31
2011	2011A	0 - 2	2	Ferruginous pisolitic cap.	0.3	1.67	12.50	46.5	21.3	0.88	9.69
	2011B	2 - 4	2	Mottled zone. Nodular at top.	0.3	0.80	7.75	61.0	13.8	0.49	7.39
2012	2012A	0 - 2	2	Ferruginous pisolitic zone.	0.1	1.48	17.00	37.5	24.2	0.92	10.80
	2012B	2 - 4	2	Nodular zone. Mottled near base.	0.1	0.89	12.40	44.0	24.9	0.56	8.71
2013	2013A	0 - 2.5	2.5	Ferruginous pisolitic cap and nodular zone at base.	0.2	1.16	15.30	43.0	24.2	0.83	10.90
	2013B	2.5- 5	2.5	Nodular zone. More cellular near base.	0.1	0.92	9.73	49.5	23.6	0.49	7.41

SAMPLE LOCATION NUMBER	ROCK CHIP SAMPLE NUMBER	SAMPLE INTERVAL From top of scarp edge (m)	THICKNESS OF SAMPLE INTERVAL (m)	ROCK TYPE/LATERITIC ZONE	ANALYTICAL RESULTS						
					REACTIVE SiO_2	AVAILABLE Al_2O_3	TOTAL Al_2O_3	TOTAL SiO_2	TOTAL Fe	TOTAL TiO_2	L.O.I.
2014	2014A	0 - 3	3	Ferruginous pisolitic cap and nodular zone.	0.1	1.04	11.10	41.0	28.8	0.53	8.73
	2014B	3 - 5	2	Mottled sandstone.	0.1	0.73	5.97	80.0	4.3	0.40	5.79
2015	2015A	0 - 3	3	Ferruginous pisolitic cap and nodular zone. Mottled at base.	<0.1	1.38	8.88	53.5	14.7	0.55	7.34
	2015B	3 - 9	6	Mottled zone. Sandstone.	<0.1	0.52	3.41	61.0	0.3	0.24	3.69
2016	2016A	0 - 2	2	Ferruginous pisolitic cap. Nodular at base.	<0.1	0.89	8.78	44.5	22.2	0.45	8.26
	2016B	2 - 5	3	Mottled zone. Nodular/cellular near top.	<0.1	1.12	6.62	52.0	14.7	0.34	5.48
2017	2017A	0 - 2	2	Ferruginous pisolitic cap.	<0.1	1.28	7.95	37.5	25.5	0.34	9.18
	2017B	2 - 3	1	Cellular/mottled zone.	<0.1	1.47	9.55	50.0	14.0	0.57	8.44
2018	2018	0 - 2	2	Banded/cellular/mottled sandstone.	<0.1	1.36	7.42	56.5	10.0	0.63	7.32
2019	2019A	0 - 4	4	Ferruginous nodular to banded zone.	<0.1	1.28	6.46	43.5	19.4	0.47	8.02
	2019B	4 - 8	4	Ferruginous nodular zone.	<0.1	1.82	3.91	48.0	20.7	0.30	5.44
	2019C	8 - 11.5	4	Mottled/banded sandstone.	0.4	0.44	3.48	68.0	2.9	0.29	6.64
2020	2020	0 - 2.5	2.5	Cellular to bedded sandstone.	0.3	0.53	4.76	63.0	5.7	0.51	5.98
2021	2021A	0 - 2	2	Ferruginous pisolitic cap. Nodular at base.	0.2	0.71	6.91	43.5	22.9	0.39	8.46
	2021B	2 - 4.5	2.5	Nodular zone.	0.3	0.65	5.27	66.0	8.6	0.32	5.74
2022	2022	0 - 2.5	2.5	Scree. Ferruginous pisolitic cap.	0.2	0.96	7.93	41.0	29.1	0.40	6.23
2023	2023A	0 - 1.5	1.5	Ferruginous pisolitic cap. Nodular at base.	0.2	1.38	13.90	38.5	23.1	0.57	9.76
	2023B	1.5- 3	1.5	Ferruginous nodular to bedded zone.	0.1	0.84	6.11	43.0	18.5	0.41	6.47
	2023C	3 - 5	2	Bedrock. Sandstone.	0.2	0.82	4.19	64.0	14.3	0.37	5.16
2024	2024A	0 - 3	3	Ferruginous pisolitic cap. Nodular at base.	0.2	1.41	10.80	38.0	20.8	0.49	8.97
	2024B	3 - 6	3	Mottled zone.	0.2	0.91	4.67	82.0	1.6	0.36	5.02
2025	2025A	0 - 2.5	2.5	Ferruginous pisolitic zone. Nodular/tabular at base.	0.2	1.01	3.20	39.5	27.5	0.59	9.22
	2025B	2.5- 5	2.5	Mottled zone.	0.2	1.34	6.55	59.0	13.2	0.40	6.83
2026	2026A	0 - 2	2	Ferruginous pisolitic cap. Nodular near base.	0.2	1.81	8.78	54.0	19.1	0.48	8.10
	2026B	2 - 4	2	Nodular/mottled zone.	0.2	1.50	6.15	57.5	19.0	0.36	6.76
2027	2027A	0 - 3	3	Ferruginous pisolitic cap.	0.3	1.51	7.14	30.0	45.9	0.07	8.87
	2027B	3 - 5	2	Nodular/cellular zone. Mottled near base.	0.3	1.24	5.28	67.5	10.9	0.32	16.06
	2027C	5 - 6	1	Weathered bedrock. Sandstone.	0.3	1.07	3.09	82.0	0.7	0.24	4.20

SAMPLE LOCATION NUMBER	ROCK CHIP SAMPLE NUMBER	SAMPLE INTERVAL From top of scarp edge (m)	THICKNESS OF SAMPLE INTERVAL (m)	ROCK TYPE/LATERITIC ZONE	ANALYTICAL RESULTS						
					REACTIVE SiO_2	AVAILABLE Al_2O_3	TOTAL Al_2O_3	TOTAL SiO_2	TOTAL Fe	TOTAL TiO_2	L.O.I.
2028	2028A	0 - 3	3	Ferruginous pisolitic cap.	0.1	1.17	8.78	48.5	22.7	0.42	7.68
	2028B	3 - 6	3	Nodular zone.	0.2	0.63	3.53	73.0	6.2	0.22	4.81
	2028C	6 - 10	4	Cellular/mottled zone.	0.1	0.47	3.03	82.0	1.0	0.25	4.06
	2028D	10 - 11.5	1.5	Mottled zone.	0.1	1.32	3.97	59.0	15.7	0.30	5.55
2029	2029	0 - 2.5	2.5	Scree. Ferruginous sandstone.	0.2	0.38	2.51	44.5	27.6	0.14	6.71
2030	2030A	0 - 3	3	Ferruginous pisolitic cap. Nodular at base.	0.2	0.93	8.40	38.0	28.1	0.43	7.53
	2030B	3 - 7	4	Mottled zone.	0.1	0.49	2.24	79.0	1.3	0.24	3.11
	2030C	7 - 10	3	Bedrock. Weathered sandstone.	0.1	0.56	2.16	76.0	0.2	0.20	2.81
2031	2031A	0 - 2	2	Ferruginous pisolitic cap. Nodular at base.	0.3	0.77	6.83	38.0	28.4	0.35	7.08
	2031B	2 - 4	2	Nodular/cellular zone.	0.1	0.88	4.91	48.5	19.8	0.32	5.63
2032	2032A	0 - 2	2	Ferruginous pisolitic cap. Nodular zone near base.	0.2	0.86	4.49	43.5	22.8	0.32	5.12
	2032B	2 - 4	2	Cellular/mottled zone.	0.3	1.44	4.82	56.0	14.1	0.37	5.29

APPENDIX III

DESCRIPTION OF AUGER SOIL AND CLAY SAMPLES COLLECTED FROM AREAS CF/A AND CF/B, E.L. 1864

SAMPLE NO.	LITHOLOGY
2500Y	0-50 cm. Greyish-white sandy soil grading into light reddish brown sandy soil with abundant small pisoliths and rounded fragments of iron and ferruginous sandstone.
2500Z	50-150 cm. Light reddish-brown sandy soil with small, rounded fragments of ferruginous sandstone - some mottled.
2501Y	0-70 cm. Light greyish sandy soil grading into a light yellowish-brown sandy soil. A few loose, small pisoliths and rounded fragments of iron and ferruginous sandstone. Some fragments mottled near base.
2501Z	70-150 cm. Greyish-brown sandy clay. Some minor iron mottling.
2502Y	0-70 cm. Dark-grey sandy clay. Weak iron mottling.
2502Z	70-150 cm. Light grey sandy clay.
2503Y	0-100 cm. Light grey clay. Minor ferruginous staining.
2503Z	100-150 cm. Light yellowish-grey sandy clay.
2504Y	0-55 cm. Light grey sandy clay. Minor iron staining.
2504Z	55-150 cm. Light grey sandy clay. A few small ferruginous sandstone fragments.
2505	Light creamy-brown sandy clay.
2506	Light yellow-brown sandy clay. Minor iron fragments.
2507	Light yellow-brown sandy clay. Minor iron fragments.
2508	Khaki-brown sandy clay. Trace limonite.
2509	Khaki-brown sandy clay. Trace limonite.

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APPENDIX IV

DESCRIPTION OF AUGER SAMPLES COLLECTED FROM LATERITE COVERED AREAS, E.L. 1864

SAMPLE NO.	LITHOLOGY
2534	0-15 cm. Light khaki-brown sandy soil with some small pisoliths and fragments of iron and ferruginous sandstone.
	15-30 cm. Brownish-red sandy soil with pisoliths and fragments of ferruginous sandstone and minor goethite.
	30-150 cm. Reddish-brown sandy soil with some pisoliths and rounded fragments of ferruginous sandstone. Sandstone locally mottled.
2535	0-90 cm. Light yellow-brown grading into deep orange-brown sandy soil with abundant small (<1 cm diam.) pisoliths and fragments of iron and ferruginous sandstone.
	90-150 cm. Deep reddish brown sandy soil containing rounded fragments of mottled ferruginous sandstone. Traces of white sandy clay.
2536	0-45 cm. Light khaki sandy soil with fragments of ferruginous sandstone. Minor pisoliths of haematite/goethite.
	45-90 cm. Deep orange brown sandy soil with rounded to sub-rounded fragments (up to 2 cm diam.) of ferruginous sandstone. Trace white clay.
2537	0-40 cm. Light fawn sandy soil with small (<1 cm diam.) pisoliths and fragments of goethite and ferruginous sandstone.
	40-80 cm. Yellow-brown sandy soil with rounded fragments (up to 1.5 cm diam.) of ferruginous sandstone.
2538	0-55 cm. Buff sandy soil with minor pisoliths and rounded fragments of goethite and ferruginous sandstone.
	55-90 cm. Orange-brown grading into reddish-brown sandy soil with rounded to sub-rounded fragments of ferruginous sandstone - some mottling. Minor limonite.

2510	Light creamy-brown sandy soil with abundant clay.
2511	Light grey sandy clay.
2512	Greyish-khaki sandy clay. Minor limonite staining.
2513	Greyish-khaki sandy clay. Minor limonite staining.
2514	Greyish-khaki Sandy clay. Minor limonite staining.
2515	Light yellowish-brown sandy soil. A few iron pisoliths.
2516	Light yellowish-brown sandy soil. A few iron pisoliths.
2517	Light khaki sandy soil. A few iron and ferruginous sandstone pisoliths and fragments.
2518	Light khaki sandy soil. A few iron and ferruginous sandstone pisoliths and fragments.
2519	Greyish-khaki sandy clay.
2520	Light khaki sandy clay.
2521	Light khaki sandy clay.
2522	Light khaki-fawn sandy clay.
2523	Light khaki-brown sandy clay. Minor iron staining.
2524	Khaki-brown sandy soil. Minor iron fragments.
2525	Khaki-brown sandy soil. Minor iron fragments.
2526	Khaki-brown sandy soil. More abundant ferruginous sandstone fragments.
2527	Light grey clay.

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2528	Light grey clay.
2529	Light greyish-khaki sandy clay.
2530	Light fawn sandy clay.
2531	Yellowish-brown sandy soil. Minor iron fragments.
2532	Yellowish-brown sandy soil. More abundant ferruginous sandstone fragments.
2523	Yellowish brown ferruginous sandy soil. Some iron pisoliths and fragments.

APPENDIX V

DESCRIPTION OF LATERITIC PROFILE AT ROCK CHIP SAMPLE LOCALITIES, E.L. 1864

SAMPLE LOCATION	LITHOLOGY
2001	0-2 m. Ferruginous pisolitic zone. Pisoliths of ferruginous sandstone (up to 2 cm diam.) in a hard, compact sandy, iron-rich matrix. 2.5 m. Gradational into nodular zone. Rounded fragments of ferruginous sandstone in a haematitic sandstone matrix.
2002	0-1 m. Scree slope. Strongly pisolitic and ferruginous laterite - locally conglomeratic. Detrital laterite overlying fine to medium grained sandstone bedrock.
2003	0-3 m. Ferruginous pisolitic laterite. Pisoliths generally $<$ 2 cm diam. and consist of ferruginous sandstone cores with goethitic rims. Minor ochrous limonite rims. Well cemented ferruginous sandy matrix. 3-7 m. Nodular/tabular zone. Increased limonite/ goethite content. Minor pods of massive ironstone. 7-11 m Mottled zone. Ferruginous medium grained sandstone. Mottled with minor patches of white clay. Bedded near base.
2004	0-1.5 m. Weakly ferruginous pisolitic zone. Occasional pisolith to 3 cm diam. in a well cemented compact fine grained ferruginous sandstone matrix. 1.5-4 m. Gradational into nodular zone. Ferruginous. Minor clay in matrix. 4-5 m Mottled zone. Increased limonite content. Fine to medium grained sandstone.
2005	0-2 m. Pisolitic zone. Ferruginous sandstone pisoliths (limonitic rims) in a hard cemented iron-rich sandy matrix. 2-5 m. Nodular zone. Limonite-rich matrix. Minor bands of ironstone.
2006	0-3 m. Ferruginous pisolitic zone. Minor ferruginous sandstone pisoliths (1-2 cm diam.). Iron-rich sandy matrix.

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2006 3-6 m. Well defined nodular zone. Ferruginous sandstone with prominent hard massive ironstone bands.

6-8.5 m. Mottled zone. Honey combed structure at top. Softer, more earthy ferruginous quartz sandstone. Increased clay content.

2007 0-2 m. Hard ferruginous pisolitic zone. Ferruginous sandstone pisoliths-limonitic rims. Iron-rich sandstone matrix - well cemented.

2-4 m. Gradational into nodular zone. Fine to medium grained sandstone. Minor limonite. Trace of clay.

2008 0-3 m. Weakly ferruginous pisolitic zone. Pisoliths of ferruginous sandstone matrix in an iron-rich sandy matrix. Thin massive haematite ironstone bands at base.

3-4 m. Mottled zone. Soft earthy mottled fine to medium grained sandstone.

20-23 m. Bedrock. Fine to medium grained quartz sandstone.

2009 0-2 m Detrital ferruginous pisolitic scree and ferruginous conglomerate. Trace clay material. Grading into weakly mottled fine grained sandstone bedrock.

2010 0-2.5 m. Ferruginous pisolitic zone. Pisoliths of ferruginous sandstone-limonitic rims up to 2 cm diam. - most < 1 cm diam.) in a sandy ferruginous matrix. Nodular zone at base.

2.5-4 m. Mottled zone. Weakly ferruginous, medium-grained sandstone. Minor clay. Cellular structure at top of zone.

2011 0-2 m. Ferruginous pisolitic zone. Ferruginous sandstone pisoliths - generally limonitic rims. Iron-rich medium grained sandstone matrix.

2-4 m. Nodular zone at top. Grading into a mottled zone - softer, more clay-rich ferruginous fine-grained to medium-grained sandstone.

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2012 0-2 m. Ferruginous pisolitic zone. Pisoliths of ferruginous medium grained sandstone, up to 1.5 m diam. Limonitic rims. Sandy iron-rich matrix.

2.4 m. Nodular zone. Ferruginous nodules up to 3 cm diam. in ochrous haematitic sandy matrix. Mottled zone with cellular structure near base.

2013 0-2 m. Ferruginous pisolitic zone. Generally small pisoliths and rounded fragments of ferruginous sandstone up to 1.5 cm diam. Hard ferruginous sandstone matrix.

2.5 m. Massive haematitic ironstone band at top. Gradational into nodular zone. Ferruginous sandstone matrix. Minor cellular structure. Mottled fine to medium grained sandstone at base.

2014 0-2.5 m. Ferruginous pisolitic zone. Generally small (< 1.5 cm diam.) pisoliths and rounded fragments of ferruginous sandstone in a hard iron-rich matrix.

2.5-3 m. Nodular zone. Limonitic rims on sandstone fragments. Ferruginous sandstone matrix. Minor ironstone (haematitic) bands.

3-5 m. Mottled fine to medium grained sandstone. Cellular structure. Weakly ferruginous.

2015 0-1 m. Ferruginous pisolitic zone. Pisoliths and rounded fragments to 1.5 cm diam. with limonitic rims and haematitic sandstone cores. Hard iron-rich sandy matrix.

1-3.5 m. Hard haematite band (0.5 m thick) at top. Grades into nodular zone containing rounded ferruginous sandstone fragments. Cellular structure near base.

3.5-9 m. Mottled fine to medium grained sandstone. Minor limonitic spots. Low clay content.

2016 0-1.5 m. Hard ferruginous pisolitic zone. Well cemented pisoliths of haematitic sandstone (limonitic rims). Fine

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to medium grained ferruginous sandstone matrix.

1.5-5 m. Nodular zone gradational into cellular zone at top. Fine to medium grained ferruginous sandstone fragments. Ochrous haematitic sandy matrix. Mottled zone near base.

2017 0-2 m. Ferruginous pisolitic cap. Ferruginous fine-grained sandstone pisoliths in a hard iron-rich matrix. Thin nodular zone at base.

2-3 m. Cellular zone at top, grading into a weakly ferruginous mottled zone. Fine to medium grained sandstone bedrock from 3 m depth.

2018 0-2 m. Lateritised medium grained sandstone. Cellular structure with weak banding at top of profile. Minor limonite. Grades into a weak and poorly defined mottled zone.

2019 0-4 m. Ferruginous nodular to banded zone. Haematitic fine to medium grained sandstone. Hard with iron-rich matrix.

4-8 m. Gradational into nodular zone. Ferruginous sandstone fragments and matrix.

8-11.5 m. Mottled zone at top. Increased clay content. Gradational into fine-grained sandstone bedrock.

2020 0-2.5 m. Weathered, weakly ferruginous fine to medium grained sandstone. Cellular at top and gradational into well bedded sandstone bedrock.

2021 0-2 m. Ferruginous pisolitic zone. Gradational into a nodular zone. Ferruginous fine to medium grained sandstone. Iron-rich sandy matrix.

2-4.5 m. Nodular zone. Fine to medium grained sandstone. Weakly ferruginous.

2022 0-2.5 m. Ferruginous pisolitic cap. Pisoliths and rounded fragments of fine grained sandstone. Haematitic matrix. Scree material.

2023 0-1.5 m. Ferruginous pisolitic zone. Pisoliths and rounded fragments of ferruginous (mainly limonitic) sandstone in an sandy iron-rich matrix. Nodular at base.

1.5-3 m. Nodular zone at top gradational into finely bedded ferruginous sandstone (limonite > haematite). Locally prominent cellular structure.

3-5 m. Bedrock. Weakly ferruginous fine to medium grained sandstone.

2024 0-2 m. Prominent ferruginous pisolitic zone. Hard. Fine-grained iron-rich (limonite > haematite) matrix.

2-3 m. Nodular zone. Massive haematitic ironstone band at base.

3-6 m. Soft, earthy mottled fine to medium grained sandstone. Bedrock near base(?).

2025 0-1.5 m. Ferruginous pisolitic zone. Haematite-rich pisoliths in an iron-rich fine to medium grained sandy matrix. Trace clay material.

1.5-2.5 m. Nodular/tabular zone. Trace clay material. Ferruginous medium grained sandstone.

2.5-5 m. Mottled zone. Locally limonitic. Fine to medium grained sandstone.

2026 0-1.5 m. Moderately pisolitic zone. Pisoliths and rounded fragments (up to 2 cm diam.) of ferruginous sandstone in an iron-rich sandy matrix.

1.5-3 m. Nodular zone (limonitic ferruginous sandstone. Grading into soft mottled zone. Medium grained ferruginous sandstone. Cellular at top. Local pads of haematised material.

2027 0-3 m. Ferruginous pisolitic zone. Hard. Ferruginous (limonitic) pisoliths and rounded fragments of ferruginous sandstone in a haematitic (somewhat ochrous) sandy matrix.

/....

3-5 m. Nodular zone. Grading into cellular zone. Mottled limonitic zone. Massive thin haematitic ironstone bands at base.

5-6 m. Bedrock. Weakly mottled. Trace limonite. Medium grained sandstone.

2028 0-2.5 m. Pisolitic ferruginous zone. Uniform pisolith up to 1.5 cm diam. with haematitic sandstone cores and limonitic rims in a haematitic sandstone matrix.

2.5-6 m. Nodular zone containing haematitic nodules up to 4 cm diam. Hard ferruginous sandstone fragments. Haematitic and limonitic matrix.

6-10 m. Cellular zone at top. Gradational into mottled whitish fine to medium grained sandstone. Trace clay.

10-11.5 m. Soft, cellular to bedded zone. Bedrock? Weakly mottled.

2029 0-2.5 m. Ferruginous pisolitic scree material. Haematitic sandstone cores with limonitic sandy matrix. Gradational in sandstone bedrock at base.

2030 0-1.5 m. Ferruginous pisolitic cap rock. Pisoliths of sandstone (haematitic cores and limonitic rims) in a hard well cemented haematitic sandy matrix.

1.5-3 m. Nodular zone. Ferruginous sandstone fragments and matrix.

3-7 m. Mottled zone with weak haematitic and limonitic ochrous patches.

7-10 m. Mottled zone gradational into bedrock. Ferruginous (haematitic) sandstone - fine to medium grained.

2031 0-1.5 m. Ferruginous pisolitic zone. Haematitic sandstone pisoliths (limonitic rims) in a hard iron-rich sandy matrix.

1.5-2.5 m. Nodular zone. Haematitic sandstone matrix. Cellular texture in part. Trace clay.

/....

2.5-4 m. Cellular zone gradational into a weakly mottled zone.

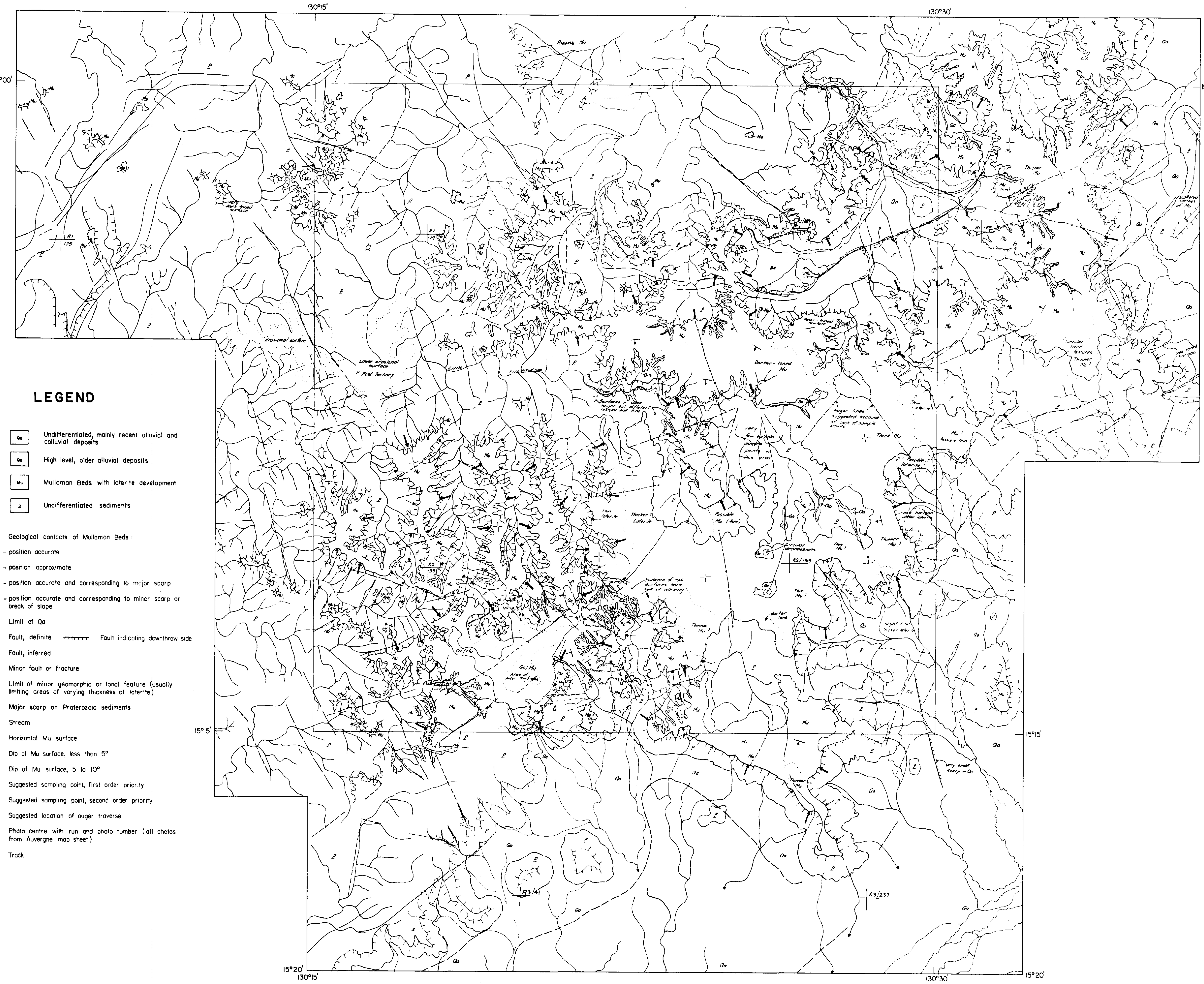
2032 0-2 m. Ferruginous pisolitic cap rock. Minor to trace clay material. Ferruginous fine to medium grained sandstone. Nodular zone at base.

2.4 m. Cellular zone. Medium grained ferruginous sandstone. Gradational into mottled sandstone. A few scattered haematitic patches.

CR80/8

Photogeological Worksheet
Exploration Licence 1864
YAMBARRAN RANGE, N.T.

Scale 1: 75 750 (photo scale)



LEGEND

QUATERNARY	Qa	Undifferentiated, mainly recent alluvial and colluvial deposits
	Qa	High level, older alluvial deposits
CRETACEOUS	Mu	Mullaman Beds with laterite development
PROTEROZOIC	P	Undifferentiated sediments

Geological contacts of Mullaman Beds :
- position accurate
- position approximate
- position accurate and corresponding to major scarp
- position accurate and corresponding to minor scarp or break of slope

Limit of Qa

Fault, definite — Fault indicating downthrow side

Fault, inferred

Minor fault or fracture

Limit of minor geomorphic or tonal feature (usually limiting areas of varying thickness of laterite)

Major scarp on Proterozoic sediments

Stream

Horizontal Mu surface

Dip of Mu surface, less than 5°

Dip of Mu surface, 5 to 10°

Suggested sampling point, first order priority

Suggested sampling point, second order priority

Suggested location of auger traverse

Photo centre with run and photo number (all photos from Auvergne map sheet)

Track

This photogeological worksheet was compiled from 34 panchromatic photographs, with 80% forward overlap. The drainage base was obtained from the photographic enlargement of the 1: 250 000 topographic map Auvergne (SD 52-15)

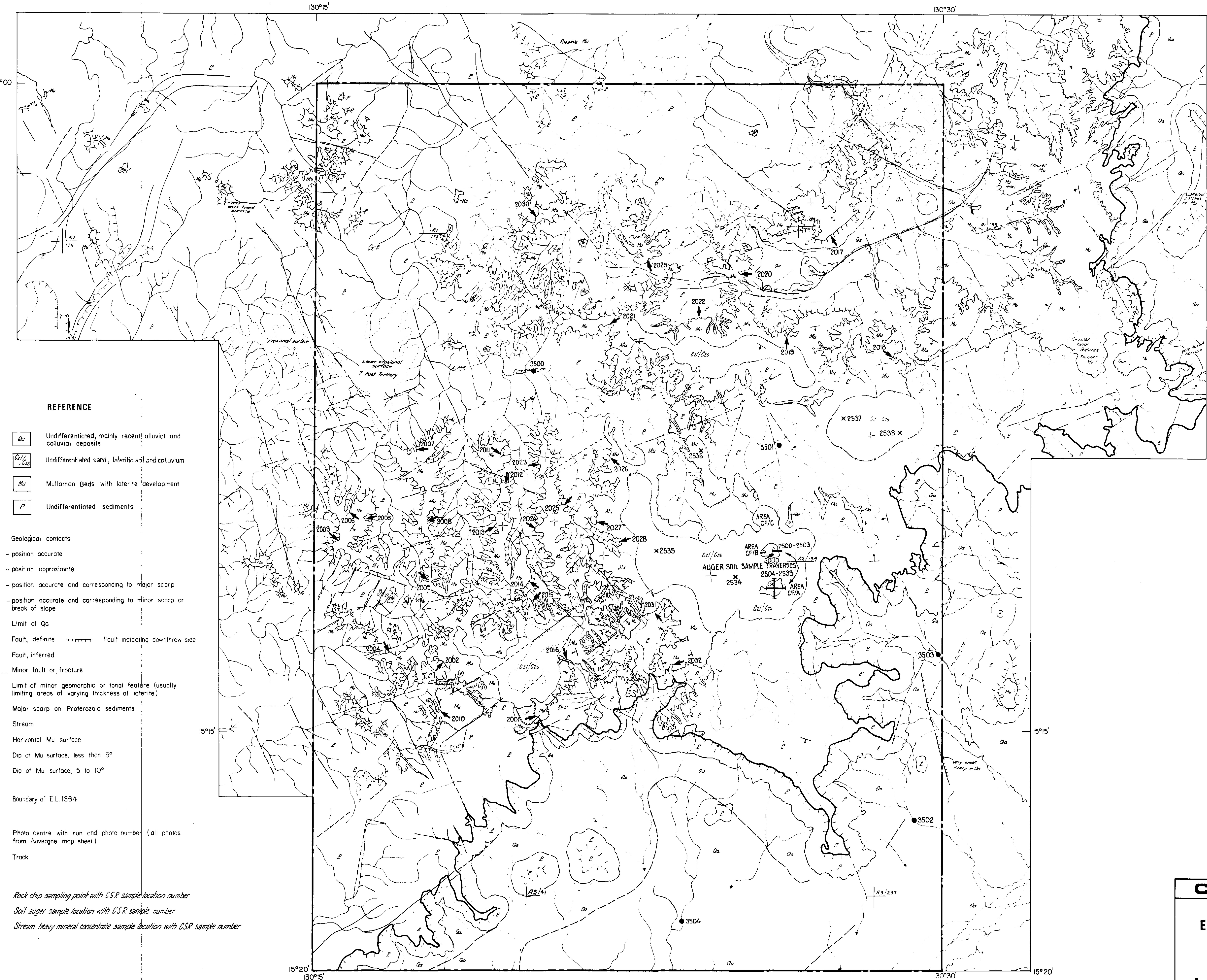
No field work was included in the project.

Approximate scale 1: 75 750

0 1 2 3 4 5 6 7 8 9 10 Km

Undertaken on behalf of Pacminex Pty. Ltd
by Hunting Geology and Geophysics (Australia) Pty. Limited
Canberra, March 1979
Job No. GA 4/79

D5215 - 2



REFERENCE

QUATERNARY	Qa	Undifferentiated, mainly recent alluvial and colluvial deposits
	Czl/Czs	Undifferentiated sand, lateritic soil and colluvium
CRETACEOUS	Mu	Mullaman Beds with laterite development
PROTEROZOIC	P	Undifferentiated sediments

Geological contacts
- position accurate
- position approximate
- position accurate and corresponding to major scarp
- position accurate and corresponding to minor scarp or break of slope

Limit of Qa

Fault, definite — Fault indicating downthrow side

Fault, inferred

Minor fault or fracture

Limit of minor geomorphic or tonal feature (usually limiting areas of varying thickness of laterite)

Major scarp on Proterozoic sediments

Stream

Horizontal Mu surface

Dip of Mu surface, less than 5°

Dip of Mu surface, 5 to 10°

Boundary of E.L. 1864

R1/179 Photo centre with run and photo number (all photos from Auvergne map sheet)

Track

2001 Rock chip sampling point with C.S.R. sample location number

× 2534 Soil auger sample location with C.S.R. sample number

● 3501 Stream heavy mineral concentrate sample location with CSR sample number

This photogeological worksheet was compiled from 34 panchromatic photographs, with 80% forward overlap. The drainage base was obtained from the photographic enlargement of the 1:250,000 topographic map Auvergne (SD 52-15)

Note - Geology modified by C.S.R. after field work in June, 1979

Approximate scale 1:75,750

0 1 2 3 4 5 6 7 8 9 10 Km

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Canberra, March 1979
Job No. GA 4/79

CR80/8

CSR LIMITED-MCD

E.L.1864 YAMBARRAN RANGE N.T.
GEOLOGY &
GEOCHEMISTRY (Rock Chip, Auger Soil and Stream H.M.C. Sampling)

SCALE: 1:75,750 APPROX		DRG. No.
GEOLOGY: M.J.V.		D5215-1
DATE: July '79		
REVISED		