GEOLOGICAL REVIEW

EL 4225

HODGSON DOWNS N.T.

for

WANSFORD INVESTMENTS LTD

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1.0 SUMMARY :

Review of the geology of E.L. 4225 has established the presence of a circular "cryptoexplosive" structure within the licence boundaries. This structure is consistent with meteor impact centres but may also have resulted from a violently explosive volcanic event. A regional aeromagnetic and geological survey with particular emphasis on this circular structure is recommended.

2.0 INTRODUCTION :

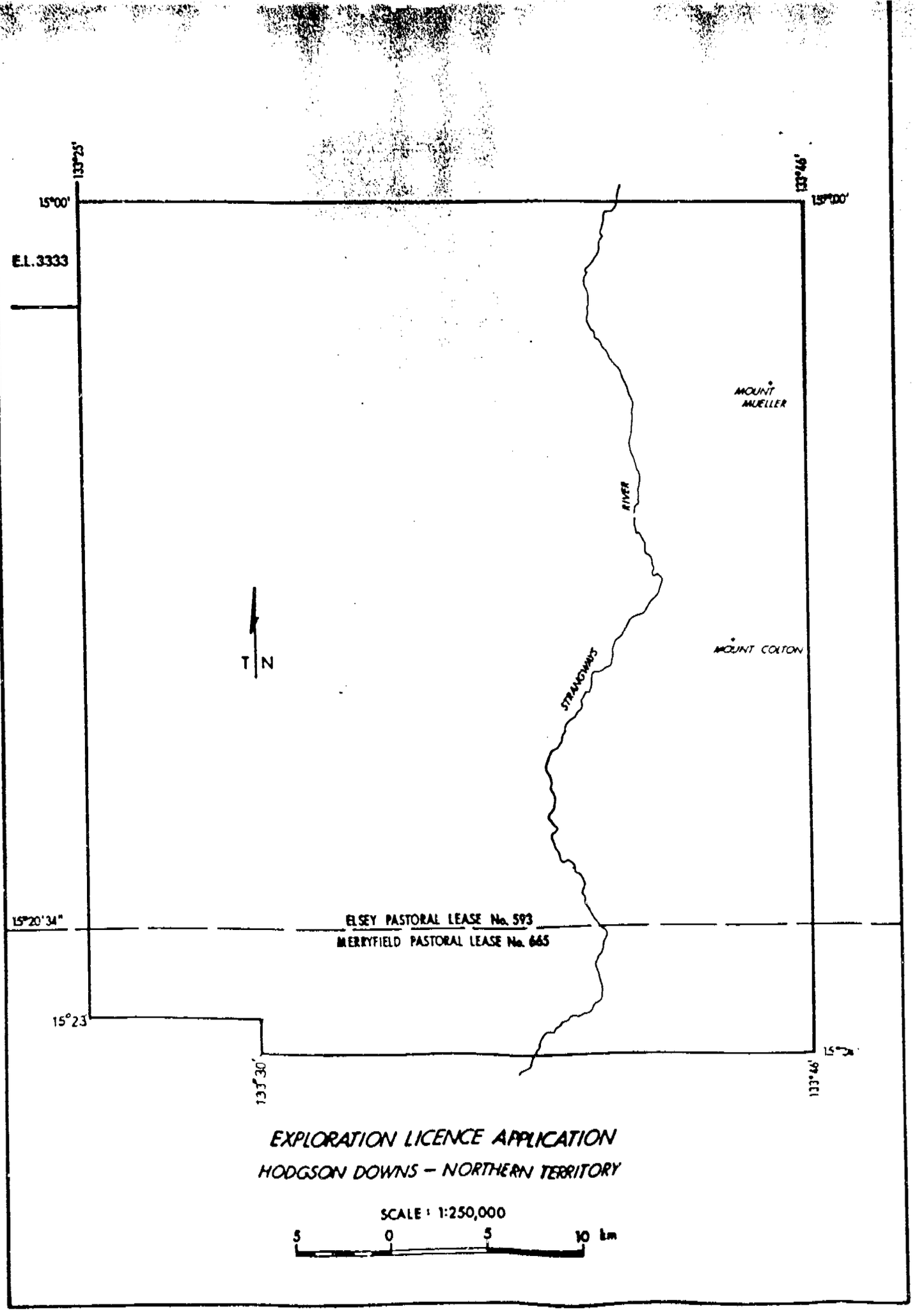
A short geological review was carried out on E.L. 4225 for Wansford Investments Limited, holder of the tenement.

3.0 LOCATION AND ACCESS (figure 1)

E.L. 4225 is situated in the extreme northwest corner of the Hodgson Downs (SD53-14) 1:250,000 Map Sheet, overlapping partially into the north-east corner of the adjoining Larrimah Sheet.

It lies approximately 150 km SSE of Katherine and is accessible in dry weather from the Stuart Highway via Mataranka, 100 km from Katherine, and a further 50 km east along the Roper Valley road to the E.L. Boundary.

The climate is monsoonal and wet from December to April, with an average rainfall of 660 mm.



EXPLORATION LICENCE APPLICATION

HODGSON DOWNS – NORTHERN TERRITORY

SCALE : 1:250,000

5 0 5 10 km

4.0 PHYSIOGRAPHY :

E.L. 4225 is divided into two physiographical units: the Barkly-Birdum Tableland and the Mature Gulf Fall. The Barkly-Birdum Tableland comprises the southern 1/3 of the licence and is formed of Cretaceous sediments which are capped by duricrust and Tertiary sediments overlying Cambrian limestone. The edge of the Tableland is marked in places by a 30 metre scarp of laterized Cretaceous sediments.

The majority of the E.L. is formed by the Mature Gulf Fall which is characterized by broad flat valleys between strike ridges of sandstone up to 70 m. elevation. The topography is mainly controlled by Proterozoic structure with most of the prominent hills formed along strike ridges or adjacent to faults.

5.0 GENERAL GEOLOGY :

The licence area is underlain by Roper Group sediments, an Upper Proterozoic sandstone-siltstone sequence with interbedded shales and minor carbonate rocks of up to 3500 metres total thickness. The Proterozoic rocks were deposited in the McArthur Basin, which extends from Arnhem Land in the north, to beyond the Queensland border in the south.

Overlying the Proterozoic sediments with strong unconformity are Lower Cambrian sandstones, siltstones and basic volcanics. These are in turn conformably overlain by massive limestone. In the northwest corner of the E.L., a tholeiitic basalt sequence of Lower Cambrian age outcrops which forms the southern limit of the Antrim Plateau Volcanics exposed in the Katherine Sheet.

Cretaceous quartz sandstone, ferrigenous sandstone and calcareous sandstone overlie a major central portion of the area including a large section of a circular igneous collapse structure. This structure lies near Cattle Creek in the central west-northwest section of the E.L. The core is occupied mainly by highly weathered acid to intermediate shattered material containing breccia(?) fragments of sediments and volcanics and large rounded boulders of granite. The Roper sediments around the structure are severely fractured and dip steeply towards the centre.

Other igneous structures include dolerite sills which intrude the upper part of the Roper Group sediments. The uppermost sill intrudes the Bukalorkmi Sandstone Member in the vicinity of the eastern E.L. boundary. The second sill intrudes the Bessie Creek Sandstone unit just east of Strangways River.

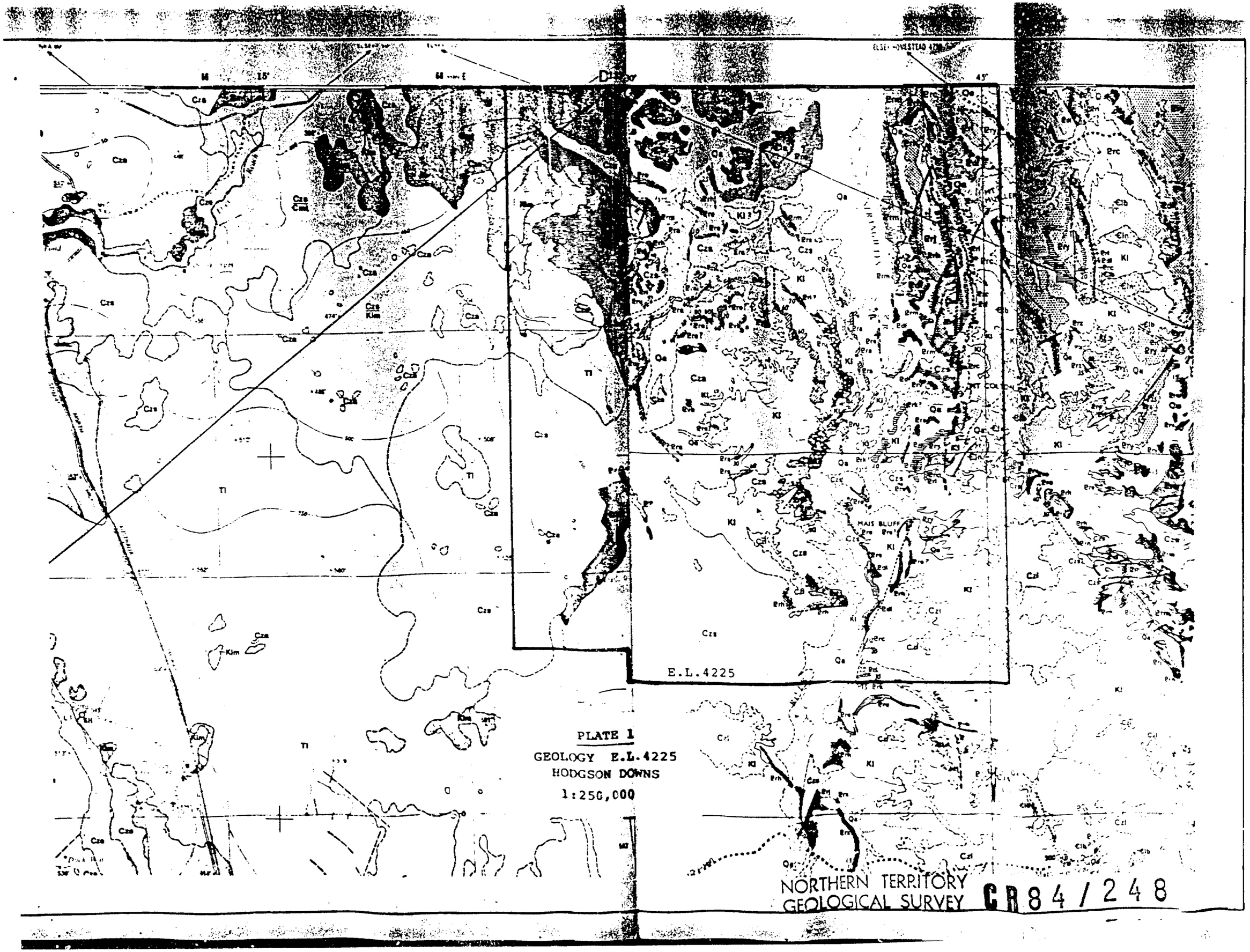


PLATE 1

GEOLOGY E.L.4225

HODGSON DOWNS

1:250,000

Age	Rock Unit and Symbol		Approx. Thickness (feet)	Lithology	Stratigraphic Relationship	Topography	Remarks
Quaternary ..	.. ..		to 50	Sandy alluvium, transported black soil		Flood plains and swamps.	
Cainozoic ..	.. ..		to 50	Superficial cover—mostly sand, some laterite, soil, rubble and travertine.		On surface of plateaux and flat mature land surfaces.	Sand mainly derived from older friable sandstone.
Lower Cretaceous	Mullaman Beds		to 200	Porcellanite and claystone. Calcareous and ferruginous sandstone, massive, white, friable sandstone. Local calcarenite lens.	Unconformable on older rocks.	Tablelands and mesas. Undulating hills below tablelands.	Plant and marine fossils.
Middle Cambrian	Tindall Limestone (Cmt) ..		?	Massive crystalline limestone with chert nodules.	Overlying Lower Cambrian Volcanics	Small outcrop in creek bank.	No fossils found.
	Antrim Plateau (Cla) Volcanics ..		200	Massive and amygdaloidal basic lavas. Red feldspathic sandstone.	Unconformable on Upper Proterozoic sediments.	Rounded low hills.	
	Nutwood Downs Volcanics (Cln)		400	Massive and amygdaloidal basalt, some agglomerate. Flaggy red feldspathic sandstone.	Conformable on Bukalara Sandstone.	Low rounded hills and flat-topped hills.	Jointed.
	Cox Formation (Clc) ..		150	Purple micaceous siltstone, fine-grained sandstone, green shale. Blocky white quartz sandstone. Local calcareous sandstone.	Conformable on Bukalara Sandstone in Cox River area.	Mesas and broad gently undulating plains.	
Lower Cambrian	Bukalara Sandstone (Clb) ..		200	Blocky buff, white and red quartz sandstone; minor shale bands.	Unconformable on Proterozoic	Jointed tablelands	Prominently cross-bedded sometimes slumped.
	(Pvb)		?	Acid to intermediate (?) volcanic-breccia	Not known	Low hills	Exposed in circular area. May be collapse structure.
	(Pdl)		200	Massive dolerite	Intrudes Proterozoic rocks as sills	Plains	Intruded at several stratigraphic levels.
Upper (?) Proterozoic	Roper Group / Maiwok Sub-Group	Chambers River Formation (Prc)	Up to 1000	Flaggy fine sandstone and siltstone; some blocky medium sandstone horizons.	Top of Maiwok Sub-Group. Conformable on McMinn Formation	Rounded hills	
		McMinn Formation (Prm) ..	1200	Flaggy fine sandstone and greywacke, blocky friable sandstone horizons, ironstone and calcareous sediments, all interbedded with siltstone and shale.	Conformable on Velkerri Formation.	Blocky sandstone forms cuestas. Rounded hills.	Divided into four members.
		Bukalorkmi Sandstone Member (Prl)	40	Medium to coarse-grained friable quartz sandstone, ferruginous sandstone.	Topmost member of McMinn Formation. Conformable on Kyalla Member.	Cuestas	Extensively ripple-marked.
		Kyalla Member (Pry) ..	500+	Flaggy fine sandstone, siltstone and greywacke interbedded with shale. Greywacke slumped in places; blocky quartz sandstone. Cone-in-cone calcareous rock.	Interbedded with and generally over Moroak Sandstone and Sherwin Ironstone Members.	Rubble-covered rounded hills and broad flat valleys.	
		Sherwin Ironstone Member (Prz)	Up to 20	Oolitic and pisolitic hematite, sideritic when fresh; ferruginous sandstone.	Lenses within Moroak Sandstone and Kyalla Members	In scarps and on dip slopes	Medium grade iron ore in places
		Moroak Sandstone Member (Prk)	40 to 150	Blocky medium sandstone interbedded with shale and siltstone.	Generally at base of McMinn Formation where it conformably overlies Velkerri Formation	Scarps and cuestas	
		Velkerri Formation (Prv) ..	1000	Laminated shale, siltstone and fine greywacke, calcareous in places.	Base of Maiwok Sub-Group. Conformable on Bessie Creek Sandstone	A few low rounded bare hills. Broad valleys	
		Bessie Creek Sandstone (Pre) ..	100 to 200	Friable, massive fine to coarse quartz sandstone.	Conformable on Corcoran Formation	Prominent ridges reduced to sandy rises in places	Is characteristically jointed.
		Corcoran Formation (Pro) ..	400 to 600	Shale, siltstone, fine micaceous sandstone; blocky sandstone.	Conformable on Abner Sandstone	Broad valleys with low ridges	
		Abner Sandstone (Pra) ..	600 to 1500	Quartz sandstone, ferruginous flaggy sandstone, siltstone, and shale; greywacke slumped in places.	Conformable on Crawford Formation	Prominent ridges	
		Munyi Member (Prm) ..	Up to 200	Ferruginous sandstone and flaggy siltstone; shale.	Top of Abner Sandstone, conformable on Hodgson Sandstone Member	Capping on plateaux and top slopes of sandstone	
		Hodgson Sandstone Member (Prh)	100 to 300	Friable, massive medium to coarse sandstone; siltstone.	Conformable on Jalboi Member	Prominent ridges and hills	Characteristically jointed
		Jalboi Member (Prj) ..	400 to 600	Blocky and flaggy quartz sandstone, slumped greywacke, siltstone and shale.	Conformable between Hodgson and Arnold Sandstone Members	Rounded hills and banded ridges	
		Arnold Sandstone Member (Prx)	Up to 200	Blocky and massive friable quartz sandstone	Base of Abner Sandstone, conformable on Crawford Sandstone	Sandstone ridges and hills	Lenses of [illegible] Jointing similar to Hodgson Sandstone Member
		Crawford Formation (Prr)	400	Blocky and flaggy quartz sandstone, greywacke, slumped in places, siltstone and shale. Buff and pink massive micaceous quartz greywacke possibly calcareous. Flaggy fine calcareous siltstone.	Conformable on Mainoru Formation	Backslope to Abner Sandstone ridges	Characteristically contains glauconite (quartz) greywacke weathers with distinctive rounded and pitted appearance
		Mainoru Formation (Pru) ..	Up to 1500	Flaggy siliceous and micaceous siltstone and shale. Purple and red flaggy dolomite.	Conformable on Limmen Sandstone	Outcrop poor, low rubble-covered rises	
		Limmen Sandstone (Pri) ..	300 to 2000	Silicified purple and white clean quartz sandstone with grit bands; poorly sorted feldspathic sandstone, fine micaceous siltstone, red and green shale.	Base of Roper Group. Unconformable over McArthur Group	Prominent ridges	
Lower (?) Proterozoic ..	McArthur Group	Kookaburra Creek Formation (Pmu)	?	Chert breccia, chert and feldspathic sandstone.	Conformable on Mt. Birch Sandstone	Low weathered outcrops	
		Mount Birch Sandstone (Pmh)	?	Feldspathic sandstone	Conformable on Lower Vizard Formation elsewhere	Low ridges	
Lower Proterozoic	Tawallah Gr. ?	(Pt) ..	?	Polymictic conglomerate, medium to coarse sandstone, underlain by acid to inte[illegible] lavas.	Not obvious in this area	Large hills and low ridges	Stratigraphic position

5.0 GENERAL GEOLOGY (Cont'd)

Recent Cainozoic sediments, laterite, travertine, freshwater limestone and alluvium cover the majority of the licence area. Sand covers the greatest proportion. Laterite which commonly underlies the sand is a remnant of an earlier Tertiary land surface.

6.0 STRUCTURE

Broad regional folding affects the Proterozoic and Cambrian sediments. None of the folding is strong and most external stress has been taken up in faulting. A regional syncline in upper Roper Group units is steepened against the Strangways Fault in the eastern section of the licence area.

The dominant structural features consist of N-S faults including the major Strangways Fault which was probably active during sedimentation and influenced the distribution of sediments. Most of the faulting occurred in PreCambrian time, but movement continued into the Proterozoic.

The other major structural feature is the circular igneous centre near Cattle Creek described above.

7.0 DISCUSSION : Strangways Cryptoexplosive Structure 1

The Strangways structure occupies a circular area 20-25 km. in diameter. It consists of a core of granite gneiss about 5 km. in radius, a collar generally 5 km. wide of upturned and overturned quartzite and siltstone of the Proterozoic Roper Group, and an outer zone less disturbed but distinguishable from the effects of regional deformation.

No definite coherent rock oucrops in the core; exposures present are of breccia or meltrock. The meltrock is aphanitic and contains 25% gneiss fragments.

Flat-lying Cretaceous sandstone conceals about a quarter of the structure. Middle Cambrian limestone is probably also unconformable on the disturbed strata.

A review of regional aeromagnetic data shows that the total magnetic intensity reveals its circular structure with magnetic highs skewed to the south-west.

The origin of cryptoexplosive structures is highly controversial. The presence of shatter cones, diaplectic glass and shock melts clearly indicate a high degree of shock metamorphism, suggesting a meteorite impact genesis. Another possible cause is a violently explosive volcanic event.

Should a volcanic model apply it would be recommended to look for alkalic and alkaline ultramafic intrusives. This could be an important economic target for elements associated with ultramafic rocks such as Ni, Co, Cr and V.

1 J.Ferguson 1981

8.0 RECOMMENDATIONS :

A preliminary field programme is recommended consisting of a regional aeromagnetic survey in conjunction with reconnaissance mapping and rock chip sampling of geophysically anomalous target areas with particular emphasis on the circular "cryptoexplosive" centre. This would be followed by detailed geological, geochemical and geophysical surveys in selected areas.

9.0 REFERENCES :

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