Tracker Geoservices Pty Ltd

Annual and Surrender Report E30339
Darwin Glauconite Project

For the Period 15 Oct 2015 to 18 Nov 2016

RD Gee

17 Jul 2019

Target Commodity - Potash

Darwin 1:250 000 Sheet
Fogg Bay 1:250 000 Sheet SD5203
Fogg Bay 1:100 000 Sheet 4972

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Abstract

E30339 was granted on 15 October 2015 and relinquished on 18 November 2016. It was one of two other applications (ungranted) made in the Darwin region in the search for the mineral glauconite as a source of the fertiliser commodity potash.. Considerable preliminary regional exploration was undertaken before focusing on Dundee. A thin glauconite layer is known to occur at the base of the Cretaceous sequence in the greater Darwin region. This unconformity was regionally mapped in the Dundee area on E30339 and elsewhere in the Darwin region, where traces of the glauconite unit were identified. No sampling was undertaken on E30339. Field observations indicate this glauconite unit is strongly lateritized and grab samples from the Darwin region indicate it is heavily leached of potassium. It was concluded this unit has no value as a source for potash, and consequently E30339 was surrendered.

Introduction

Glauconite commonly occurs in shallow marine sandstones and when it reaches 30% modal content it is called greensand. It has long been considered a potential source of potash because it can be easily beneficiated by magnetic methods to produce a quality concentrate that may be up to 10% K_2O, which is a potential source of potash. The challenge is to release the potash in an effective and economic manner.

Previous attempts to extract potash from glauconite have employed complex pyrometallurgy and hydrometallurgy processes requiring repeated stages of high-temperature calcining and leaching with hot concentrated mineral acids, and sequential crystallisations. These attempts have been commercially unsuccessful, mainly because of high energy requirements, and high capital costs.

Potash West (ASX:PWN) listed in May 2011 with the intention of extracting potash from glauconite sands at Gin Gin WA. Potash West developed a process based on roasting and hot acid leach of glauconite concentrate, called the K-Max process.

The First Scoping Study of Potash West in Jan 2013 invoked processing 2.4Mt/y of greensand, producing 200kt of potassium sulphate (SOP) through a complex process involving three hot acid-leach circuits and a fluid-bed roaster. The major operating costs were production of sulphuric acid from imported sulphur, and energy costs for the heating and calcining – neither of which were detailed. The process had small operating margins, and high CAPEX of $650M. Potash West was able to enhance the economics of their project by the production of superphosphate, but the high capital affectively killed the concept.

Tracker has pursued a revolutionary process for the extraction of potash from activated glauconite using cold dilute acids, which enables glauconite to be viewed more favourably as a viable source of potash. On this basis Tracker examined the glauconite occurrences in the Darwin region.

Project Location and Access

The Dundee tenement E30339 is located near Dundee Beach estate 65km southwest of Darwin (**Figure 1**). Access is via the Cox Peninsular Road which takes off from the Stuart Highway 5km south of Noonamah. After 35 km along the Cox Peninsular Rd, the road forks left to Dundee Beach, which is some 50km further on.

Tenure

E30339 was granted to Tracker Geoservices Pty Ltd on 15 Oct 2015 and surrendered 14 Oct 2016. It was made up of 91 block-equivalents, bounded mostly by the irregular coastline, amounting to 148.35Km^2.

Preliminary Exploration

A considerable amount of preliminary exploration has been done on glauconite occurrences in the greater Darwin area in the search for glauconite occurrences.

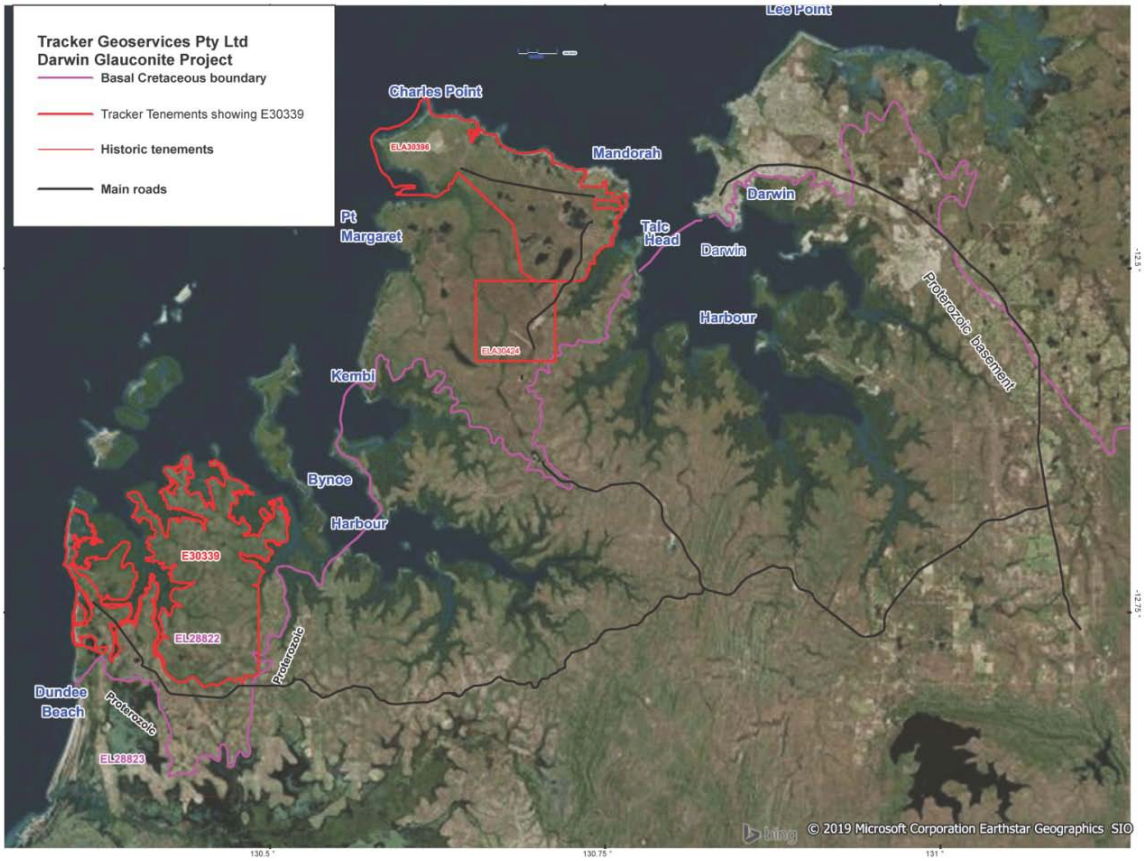

Figure 1: Location of Darwin Glauconite Project

Glauconite has been known to occur in the Cretaceous sequence around Darwin for many years, (Peitsch 1983, 1986, Doyle 2001, Nott 2003). However it has never been assessed as a source of potash. Moreover, phosphorite occurs in the same geological environment as glauconite and is also known from the immediate Darwin area (Kemezys 1968). Phosphorite is the raw material for superphosphate manufacture, and thus offers synergy with glauconite exploration.

The basal near-coastal prograding facies of the Cretaceous occurs in three major palaeo-embayments (**Figure 1**), called from west to east Dundee, Cox Peninsular and Koolpinyah Embayments. These are the shallow marine shore facies of the off-shore Money Shoal Basin. This basal facies is mostly represented by the stratigraphic unit called the Darwin Member, of the Bathurst Island Formation. The landward apexes of these embayments contain significant fluvial sands that represent palaeo-rivers that bebouched into the shallow Cretaceous seas.

Darwin Member

Darwin Member is best exposed in the sea cliffs around the Darwin peninsula, where Skwarko (1966) set up the type section. A good section is exposed at Talc Head which can be directly correlated with that in the sea cliffs around the Darwin peninsula, so that a composite reference section can be erected as shown below.

Unit	Thickness	Description
Mudstone	20 – 60m	Calcareous organic shale poorly expose on gunn Point and recorded in drill holes
Gritty sandstone	?5m	Ferruginous gritty quartz sandstone exposed west of Mandorah, probably representing Marligur Sandstone
Phosphorite Layer	2.2m	Tube beds and phosphorite nodule beds, within grey calcareous phosphatic mudstone.
Claystone (Porcelainite)	18m	Silica cemented claystone, after Radiolaria mudstone
Triplet sandstone	1.5m	Three sandstone beds with claystone interbeds
Claystone	0.8 – 1.2m	Pale yellow claystone bed
Basal Glauconite layer	0.5 – 3.5m	Dark chocolate-coloured ferruginous sandstone passing up into kahki-coloured sandstone with minor quartz grains
Basal lag conglomerate	0-0.6m	Rounded granules and pebbles to 5cm resting unconformably on Precambrian basement

Composite stratigraphic section of the Cretaceous sequence around Darwin

The basal Glauconite Layer is seen in coastal cliff sections around Darwin peninsula where it is ferruginous sandstone (Peitsch 1983, 1986) generally about one meter thick. It is thicker on the Cox Peninsula, where it is 2.0 – 3.5m thick.

On the southern side of Darwin Harbour, the sequence from Swires Bluff, through Talc Head to Mandorah and further west toward Charles Point is dipping very gently (0.03 degrees) to the northwest. Consequently the lower units are increasingly submerged, and the higher units are progressively exposed.

At Margaret Point on the western side of Cox Peninsular, the basal unit is thicker, consisting of 1.2m of conglomerate on the basement overlain by 7m of iron-cemented gritty argillaceous sandstone, followed by a 1m bed of silica cemented sandstone, then overlain by the glauconite unit. This thickened basal sequence is consistent with the basin deepening to the northwest.

Weathering of Darwin Member

A period of deep weathering which probably peaked about 25 million years ago (Ollier and Pain, 1996) produced a deep weathering profile in the Cretaceous, and the underlying basement rocks. This has potential to destroy much of the glauconite.

A capping of lateritic duricrust is developed on the top of the weathering profile. The duricrust is predominantly goethitic, with vermiform, platy and pisolitic textures. Continued maturation after the peak of lateritisation has culminated in dehydration of goethite turning it into hematite, and in places maghemite. It is best interepreted as an *insitu* development with some surficial redistribution and cementation by goethite.

Much of the 18-Meter Claystone unit is converted to hard porcelainite during the lateritisation process. The deep weathering of the radiolarian-bearing claystones mobilized silica which re-deposited as microcrystalline quartz called porcelainite. In some areas, lateritic duricrust on Cretaceous sediments has subsequently been etched and eroded by Quaternary processes to form sea-cliffs, drainages, swamps and clay pans.

Cox Peninsula

Altogether there are 99 water bores on the Cox Peninsular, drilled in several campaigns over the last five decades. Records are managed by Water Resources Division of Department of Land Resource Mangement. About 70% of these have drill logs that enable the principal stratigraphic units of the Darwin Member to be identified. Cuttings from these water bores were examined at the NTGS drill store.

These cuttings record the 18-meter claystone (porcelainite) unit shelving gently to the northwest. The phosphorite unit has not been noted in any of the logs, however procelainite with scattered rounded nodules observed in a gravel pit 3km south of Belyuen may be this unit.

The basement contact is well documented and is generally planar and also gently shelves northwest where it is about 35-45m below sea level in the vicinity of Charles Point. However there is an “island” palaeohigh where basement is encountered at shallow depths of 5 – 12m below ground level. The basal pebbly sandstone thickens from thin lag gravel in the southeast to a three-meter bedded gritty sandstone unit in the northwest.

Some 16 bores specifically note the presence of green glauconite in the sandstone above this basal unit, and several other logs record the presence of ferruginous sandstone with honeycomb or spongy texture which is interpreted to be the weathered glauconite layer. With the aid of these drill logs and coastal exposures, the distribution of the glauconite facies is mapped.

The non-glauconite areas are recorded in the logs as medium to coarse pale-coloured clayey sandstone, generally without a hint of the ferruginous layer at the base. It is presumed that the glauconite layer is geologically absent, rather than being missed by poor logging. Based on

currently available logs, the central axis of Cox Peninsula running in an arc from Belyuen to Charles Point may be devoid of the glauconite layer. However this is subject to re-logging of drill cuttings which are held in the NTGS Core Store.

No samples from Dundee were collected, but to complete the record of work done on the greater project, results of petrological and geochemical work on samples around Darwin are given here. Three samples of totally lateritised rock from Cox Peninsular were submitted to Pontifex Petrographics (Appendix 1) for petrographic examination.

Sample No	Location
GNT011	South side Tapa Bay, edge of laterite plateau
GNT012	South side of Tapa Bay, high-water edge
GNT013	Army drum site, Belyuen, edge of laterite plateau

These are described as loosely packed aggregates of rounded poly-lobate and peletal grains generally 0.25mm diameter, interspersed with 7-10% larger (1.2mm) detrital quartz grains, with clay filled interstices. The peletal grains are now expressed as hollow voids with goethitic shells, and represent heavily leached glauconite. Sample GNT013 had small patches of bright green mica that is probably remnant glauconite mineral.

It is evident from the three petrographic samples, together with hand-lens field examination, that much of the glauconite layer is, or has been, very rich in glauconite, and values around 80% can be expected.

Fresh green glauconite is recorded in the logs of several water bores in the Cox Peninsula Embayment at depths from 12m to 21m below surface level. Above this the glauconite layer is recognised in logs as “brown honey-comb textured ferruginous sandstone”.

No geochemical work was done on Dundee, but 10 samples of outcropping glauconite sandstone in the Darwin – Cox Peninsular region were analysed with results as follows.

Sample	Location	East	North	Description	K2O	P2O5	Fe2O3	SiO2
GNT001	Talc Head	693285	8620068	Top 1m of glau layer. Choc ssn with honeycomb texture	0.23	0.449	26.67	55.35
GNT002	Talc Head	693285	8620068	1m below GNT001. Khaki mottled ssn with nodules	1.82	0.262	28.02	47.85
GNT003	Talc Head	693285	8620068	1m sample below GNT002. Khaki sandstone	2.5	0.251	30.27	54
GNT004	Talc Head	693285	8620068	0.6m soft basal khaki quartz sandstone	1.84	0.238	28.56	53.37
GNT005	Woods Inlet,	691111	8620665	top 1m glau layer, choc ssn with worm tubes	0.31	0.301	36.35	41.89
GNT006	Woods Inlet	691111	8620665	1m below GNT005, deep weathered choc ssn	0.43	0.237	25.83	46.5
GNT007	Woods Inlet	691111	8620665	basal 0.5m mottled deep weathered glauc ssn	0.41	0.281	25.37	51.21
GNT008	Woods Inlet,	691111	8620665	white kaolin overprint on lower 1m of choc ssn	0.28	0.173	7.06	72.46
GNT009	Woods Inlet,	691111	8620665	choc coloured sandstone adjacent to GNT009	0.25	0.491	34.57	46.81
GNT010	Kembi track	675641	8610623	Gritty sandstone 50% decayed glauconite	0.03	0.13	45.33	38.96

It is clear the deep weathering has had a detrimental effect on the quality of the glauconite, with most of the potassium leached out.

Koolpinyah Embayment

This is the large embayment that occurs between the Lee Point basement high, and basement high that forms Cape Hotham. Both these basement highs are subdued. The embayment hosts the present day Howard and Adelaide Rivers.

Altogether there are 33 drill holes into the Koolpinyah Cretaceous embayment, of which 16 have recorded glauconite in the drill logs. These drill holes include water resource drilling by (Jolly 1986), extractive minerals drilling (Doyle 2001), and AEM mapping of salt-water ingress (Tan and others 2011). Mineral Exploration drilling by Unangesellschaft and BHP exploration provide no useful data for the Cretaceous.

The report by Jolly (1985) showed the base of the Cretaceous sequence overlies the dolomite basement, and dips shallowly north at 0.16^0 as it thickens northward into the Money Shoal Basin in the Arafura Sea. The Darwin Member maintains a constant thickness of 38meters, and the northward thickening is achieved by thickening of the overlying Marligu Formation.

These early water bores demonstrated a glauconitic sandstone unit at the base of the Darwin Member. They also demonstrate a marker bed 1metre in thickness right in the middle of the Darwin Member. It is described by Kemezys (1968) in the core log of DDHI as "black clay which contains a maze of tubes infilled with light grey-green glauconitic material".

The southern part of this Cretaceous embayment contains a basal facies of clean sand which is the focus of extractive sand and gravel industry of Darwin, investigated by the extractives mineral drilling program of Doyle 2001.

HoleID	Source	East	North	Thickness	Depth	Comment
8329	WRD NT Gov	721872	8644168	16	48.0	glauc claystone, glauc basal sand gravel at 78m
22291	WRD NT Gov	730370	8646236	4	80.0	grey-green claystone, glauconitic sand
22292	WRD NT Gov	731956	8643155	3	75.0	glauconitic sand
22295	WRD NT Gov	738845	8643453	6	80.0	green quartz gravel
22298	WRD NT Gov	731843	8639538	2	68.0	organic pyritic glauconit ooze
22812	WRD NT Gov	732514	8641841	2	81.0	coarse glauconite sand with pyrite
EM23	NTGS	731764	8633176	3	40.0	3 m of glauconite
EM81	NTGS	735150	8631549	4	48.0	4 m of glauconite
EM82	NTGS	728946	8634039	3	35.0	3 m of glauconite
EM83	NTGS	732839	8634808	4	51.0	4 m of glauconite
EM84	NTGS	728810	8640613	5	64.0	5 m of glauconite
EM69	NTGS	732373	8631284	34	36.0	2 m of glauconite
RN037150	Tan 2011	735987	8635546	?	53.0	glauconite
RN037151	Tan 2011	742280	8629311	6	42.0	42-48m glauconite sand
RN036536	Tickell DIPE	741940	8637196	?	56.0	trace glauconite
RN036537	Tickell DIPE	736493	8634174	?	45.0	glauconite sand

Drill holes with glauconite define a coherent belt between the shallow-water sand facies to the south, and the deeper-water facies to the north. Although this is a significantly larger area of glauconite, the depths of 35 – 64m would be prohibitive for glauconite mining.

A series of cored sonic drill holes were drilled into the Darwin Member in the Koolpinya area as part of an electro-magnetic program by Geoscience Australia to map the salt water ingress

into the groundwater aquifers (Tan and others 2101). Drillhole RN31750 recorded glauconite. Detailed logs are not available, but a chemical analysis of the sample gave 3.2% K2O. This suggests the glauconitic sandstone contains about 50% glauconite. These holes show the zone of complete oxidation was 21m deep, and the base of the transition zone was 33m deep. Below that the rocks are totally unoxidised, and quite carbonaceous and pyritic. It is interesting to note that RN37151 recorded 11meters averaging 6.2% K2O, and hole 37154 recorded a 42m interval averaging 5.7% K2O. Curiously these intervals were logged as basement Koolpinyah Dolomite. KP Tan (pers comm.) has confirmed this is micaceous phyllite in the Koolpinyah dolomite.

The distribution of glauconite in terms of the Cretaceous sedimentary facies, demonstrates that the glauconite unit is widespread, and to some extent predicable. It is possible that more shallow glauconite may be present toward the landward edge of the Cretaceous shoreline in the Koolpinya Station area, east of Howard Springs, but this would lie in the drainage plains of the Adelaide River.

Dundee Embayment

The Dundee Embayment contains Cretaceous sequence on the peninsula between Bynoe Harbor and Dundee Beach. It is poorly exposed and not well investigated. The embayment outline comes from the 1:100k Fog Bay Geological Map (Hickey 1985). The Darwin Member was recognized on Turtle and Indian Island, but exposures being limited to “4 meter sea cliffs” were insufficient to clearly identify it on the mainland. Nevertheless its presence can be inferred.

The coastal strip at Dundee Beach, and fingers of land going north to Bynoe Harbour (Bynoe Haven and Dundee Downs) are subject to “five-acre” rural development, which constrain exploration. But the large area of Dundee Forest, between Dundee Beach and Bynoe Downs developments, and extending north to Turtle Island remains available to exploration. ELA 30339 covers this area, and provided access can be gained, the ELA is prospective for glauconite.

Altogether there are 54 drill holes, including 41 mineral exploration holes and 11 groundwater appraisal bores in the general Dundee - Bynoe Downs area, including 41 mineral exploration holes, 10 groundwater appraisal bores. These provide little information on the nature of the basal Cretaceous, as the great majority are outside the prospective Cretaceous area. Water bore logs indicate the presence of a fluvial palaeo-river entering the southern part of the embayment.

Logs of the early uranium exploration holes do not record lithologies in the Cretaceous, but two exploration holes shown on **Figure 2** (POP11 and DDH3FRPP) recorded green clay at the Cretaceous base that is possibly glauconite.

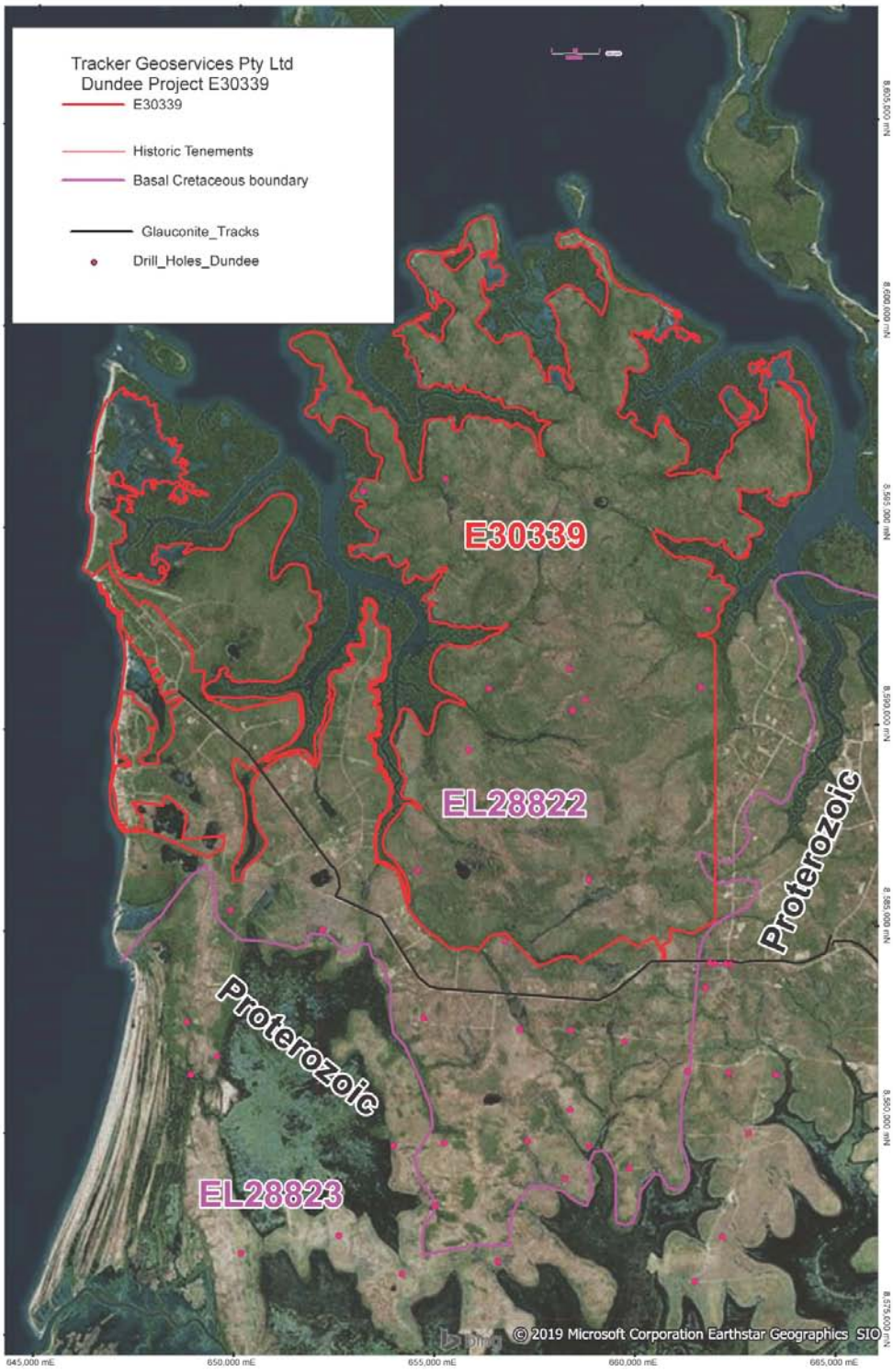

Figure 2 Dundee E30339

Previous Exploration

Dundee is the only area of Cretaceous around Darwin that has been subject to specific glauconite exploration. In 2012, a partnership of Argold Holdings (Herb Girschik, geologist) and Austasia Resources (Hong Kong investment group) took out two ELs (2822 in the north, and 2823 to the south) for glauconite exploration. The application was apparently based on the observation in drill logs of widespread green clay at the base of the Cretaceous. This was reported in statutory mineral exploration reports by Uranex Ltd who were searching for uranium at the basement unconformity.

Summary abstracts have been downloaded from the NTDME CR on-line system for the northern Argold EL 2822 (CR2013-0019), and the southern Argold EL 2823 (CR2012–1122, and CR 2013–0528).

On EL 28823 Argold drilled 19 widely-spaced RC holes for 575m (average depth 30m) and failed to intersect any significant green clay. Considering the position of EL28823, which lies outside the Cretaceous envelope, this is not surprising.

EL 28822 covered much of the expected area of the glauconite layer, but no drilling or any other geological work was done, other than reconnaissance drives on tracks. RC drilling was proposed, but the shareholders in the project considered it was “not a good investment”, and so the project was abandoned, without testing the concept.

Conclusions

Although there are regional indications that the glauconite layer will occurred at or near the base of the Cretaceous sequence at Dundee, it has not been verified. Based on preliminary work done on Cox Peninsular Koolpinya, it is likely to be heavily lateritised and depleted of its potassium content. The area does not warrant further work.
E30339 should be surrendered.

References

Argold Holdings Pty Ltd 2012. Final Relinquishment Report on exploration on EL 28823, For the period 10 Dec 2011 to 10 Dec 2012, Part of Dundee Glauconite Project, *Bynoe* and *Fog Bay* 1:100,000 sheets

Argold Holdings Pty Ltd 2013. Final Relinquishment Report on exploration on EL 28822, For the period 21 Feb 2012 to 19 Jun 2013, Part of Dundee Glauconite Project, *Bynoe* and *Fog Bay* 1:100,000 sheets

Doyle N, 2001. Extractive minerals within the outer Darwin area.. Northern Territory Geological Survey, Report 14.

Hickey S 1986. Explanatory Notes for Fog Bay 1:100 000 Geological series Sheet 4972, Northern Territory Geological Survey.

Jolly, P., 1985, Gunn Point Peninsula: Investigation of Groundwater Resources - 1984. *Northern Territory Water Resources Division, Department of Mines and Energy*, Report 2/1985

Jolly P, 1983. McMinns-Benhams Lagoon borefield investigation, 1981-1982. *Northern Territory Water Resources Division, Department of Mines and Energy*, Report 17/1983.

Kemezys KJ, 1968. Cretaceous phosphorites of the Darwin region. Bureau of Mineral Resources Australia, Record 1968-52.

Nott, J.F., 2003. The urban geology of Darwin, Australia. Quaternary International, 103, 83-90.

Ollier C and Pain C, 1996. *Regolith, soils and landforms*. Wiley and Sons, Chichester, New York.

Peitsch BA, 1983. Explanatory Notes for Darwin 1:100 000 Geological series Sheet 5073, Northern Territory Geological Survey.

Peitsch BA, 1986. Explanatory notes for the Bynoe 1:100 000 Geological series, Sheet 5072. Northern Territory Geological Survey.

Skwarko SK, 1966. Cretaceous stratigraphy and palaeontology of the Northern Territory. BMR Bulletin 73.

Tan KP, Halas L, Lawrie K, Clarke JDA, Apps HE, Costelloe M, Sumner J, Fell-Smith SA, Brodie RC, Ley Y, Schoning GL, Halas V, 2011. Northern Territory Coastal Plain: Mapping seawater intrusion in coastal plain aquifers using airborne electromagnetic data. *Geoscience Australia Professional Opinion 2011/05*

Appedix1: Tabulation drillholes on Dundee E30339

Hole	Company	Location	Easting	Northing	Tot Depth	Cret depth	Lithology
DGRC1	Argold	Dundee	663372	8581339	14	12	alluvium over granite
DGRC2	Argold	Dundee	662683	8579890	17	15	alluvium over granite
DGRC3	Argold	Dundee	662003	8577335	17	14	alluvium over granite
DGRC4	Argold	Dundee	661309	8576235	18	16	alluvium over granite
DGRC5	Argold	Dundee	658699	8579609	31	28	pallid claystone K sedimentary rock
DGRC6	Argold	Dundee	659694	8579047	37	35	sandstone over gneiss
DGRC7	Argold	Dundee	659454	8582328	43	41	claystone, glauc 26-30m over granite
DGRC8	Argold	Dundee	655088	8579697	42	40	K claystone over granite
DGRC9	Argold	Dundee	658097	8578792	37	30	K claystone, basal ssn, over gneiss
DGRC10	Argold	Dundee	656407	8576751	25	20	K claystone , granite
DGRC11	Argold	Dundee	654017	8576461	23	20	K claystone, no basal ssn, over granite
DGRC12	Argold	Dundee	654861	8578157	38	38	sandy claystone , no basement
DGRC13	Argold	Dundee	658236	8580507	37	35	claystone, over gneiss
DGRC14	Argold	Dundee	653833	8579647	16	14	claystone over granite
DGRC16	Argold	Dundee	652455	8577420	31	25	claystone over granite
DGRC17	Argold	Dundee	650024	8576997	55	7	claystone over basement
DGRC18	Argold	Dundee	661148	8581780	18	15	Clay ssn, glauc 13-15m, over gneiss
DGRC19	Argold	Dundee	658266	8582469	50	42	claystone over granite
DGRC20	Argold	Dundee	666798	8579628	26	24	palaeochannel sand over gneiss
POP 1	Idemitsu	Dundee	657172	8579748			no Cretaceous
POP 2	Idemitsu	Dundee	656272	8590948			no Cretaceous
POP 3	Idemitsu	Dundee	661622	8583508			no Cretaceous
POP 4	Idemitsu	Dundee	656632	8584688			no Cretaceous
POP 5	Idemitsu	Dundee	654472	8586448			no Cretaceous
POP 6	Idemitsu	Dundee	658722	8586198		6	basement below 8m
POP 7	Idemitsu	Dundee	655752	8589428		0	no recovery
POP 8	Idemitsu	Dundee	658272	8591423		6	Basement below 6m
POP 9	Idemitsu	Dundee	661547	8590948		9	Basement below 9 m
POP 10	Idemitsu	Dundee	658672	8590648			
POP 11	Idemitsu	Dundee	661157	8581448			
POP 14	Idemitsu	Dundee	655222	8596148			28 - 34 green clay over brown clay
POP 13	Idemitsu	Dundee	658352	8590398			54.5 - 59 green clay over pegmatite
POP 15	Idemitsu	Dundee	661737	8592873			laterite and clay to 42 m over gneiss
POP 16	Idemitsu	Dundee	653172	8595848			laterite and clay to 9 m over gneiss
DD2 FRRP	company	Fog Bay	649800	8585500			
DD3 FRRP	company	Fog Bay	659600	8582200			
DD4 FRRP	company	Fog Bay	662200	8581400			
DD5 FRRP	company	Fog Bay					
DD6 FRRP	company	Fog Bay	657000	8582500			
DD7 FRRP	company	Fog Bay	654600	8582800			
DD8 FRRP	company	Fog Bay	652100	8585000			
FIN 8	AOG						
FIN 9	AOG						
FIN 10	AOG						
33332	DIPE Water	DD	662249	8584083			sand gravel clay over basement
33333	DIPE_Water	DD	662128	8584091	79.9	15	gravel over felsic bedrock
33334	DIPE_Water	DD	662128	8584091	79.5	18	gravel above weathered felsic bedrock
33335	DIPE_Water	BH - DD	668298	8583549	79.5	3	gravel over felsic gneiss
33336	DIPE_Water	BH-DD	667916	8583425	102.9	6	gravel over felsic basement
33345		SDB	648697	8582728	108	0	quartzite subcrop
33346		SDB	649443	8581873	109	0	quartzite subcrop
33347		SDB	648797	8581424	73	0	quartzite subcrop
33348		DD	661860	8584093	51	0	basement subcrop
33349		DD	661733	8584113	55	0	weathered biotite gneiss

DD = Dundee Downs, BH-DD = Bynoe Haven – Dundee Downs, SBD = South Dundee Beach