EL 27915 St Vidgeon North
Annual Technical Report

URAPUNGA 53-10 Mapsheet

A.W.Mackie
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SUMMARY

EL27915 St Vidgeon North comprising 325 square km located 250km east of Mataranka was pegged over a thrust fault-bound, uplifted block of 1640Ma Vizard to Nathan Group mainly sandstone, siltstone, mudstone lesser carbonate and extrusive volcanic succession assigned to the Palaeo-Mesoproterozoic McArthur Basin, a regional platform cover sequence of the North Australian Craton.

The Vizard Group is deemed a correlative of the Barney Creek Formation of the McArthur Group hosting the giant HYC Clastic Dominated Pb-Zn deposit, 160km south south east of the licence area at McArthur River. The licence area is bisected by the northwest-southeast trending Urapunga Fault Zone a component of the east south east trending regional structure, the Urapunga Tectonic Ridge which separates Arnhem Shelf to the north from Bauhinia Shelf to the south. Disseminated spotty, sporadic, Walmudga Formation dolomite-hosted basemetal mineralisation occurs within the Vizard Thrust between Mt Vizard and Mt Birch 5km west of the licence area, lead isotope-dated around 1300Ma. An analogous situation exists within the St Georges Thrust on the eastern side of the licence area requiring follow up rock chip/soil sampling and if anomalous for base metals RAB drill testing. At Mountain Creek Pb-Zn prospect located 2km south of the licence area within Nagi Thrust, a southeasterly extension of Vizard Thrust, patchy, disseminated basemetal mineralisation hosted by dololulite of Knuckey Formation occurs for over 3 km. A parallel thrust a few kilometres north, within the licence area also hosted by Knuckey Formation carbonate is possibly analogous to Mountain Creek requiring follow up rock chip/soil sampling.

A first year program of historical data compilation, reconnaissance field evaluation, image processing and computer modelling of 1994 Urapunga, 500m line space, Geophysical survey digital data was undertaken revealing several discrete, spot magnetic ‘highs’ within regional shear zones requiring follow up during the forthcoming licence year.
1. Introduction

The Roper Project area comprising EL27918, EL 27915 and ELA 27916 by in large straddles the easterly flowing Roper River from near its source in the Elsie uplands, downstream for about 100km where it meanders across low-lying areas of mangrove swamp into the Gulf of Carpentaria, some 475km southeast of Darwin. Murphy's iron occurrence near Roper Bar is the first documented iron discovery in the NT (1911) however interest in the prospect was short-lived. Only now is the areas iron ore potential being assessed through exploratory drill testing, prerequisite to resource delineation and subsequent mining.

2. Location and Access (Figure 1)

Access is south via the Stuart Highway from Darwin for 424km until the turnoff to Roper Bar is reached 5km south of Mataranka. The single strip, sealed Roper Highway goes to Roper Bar a distance of 210km, however Mt McMinn located in the north-east corner of EL 27918 is only 165km from the Stuart Highway. The Roper Highway traverses across the southern half of EL 27918 providing access. The northern areas is accessed by reasonably well maintained station tracks. EL 27915 is bounded by the Roper River to the northwest immediately south of Ngukurr, which is accessed via the Roper Highway for 40km, east of Mt McMinn. The western half of the licence area is accessed by Mountain Creek Track which turns south of the Roper Highway 6km east at Ngukurr. The eastern area is served by a number of station tracks travelling to the southwest of St. Vidgeon Homestead.

3. Tenure

EL 27918 Sherwin Creek comprising 101 graticular blocks (310km2) and EL 27015 St. Vidgeon North comprising 106 graticular blocks (325km2) were granted to A. W. Mackie on 26th October 2010 for 6 years.

4. Previous Exploration (Figures 2,3,4)

The Roper Region is centred on the middle and lower reaches of Roper River comprising URAPUNGA and ROPER RIVER. The first significant NT-iron discovery was Murphy's prospect near Roper Bar in 1911. Murphy's iron ore occurrence, the catalyst for the arrival of a BHP prospecting party in 1955 who planned to carry out geological mapping and channel sampling of ferruginous sandstones tentatively identified on aerial photographs during the previous off-season? Purportedly there were 200 million tonnes of ironstone averaging 40% Fe cropping out south of the Roper River within the McMinn sedimentary group? Five, 50kg iron samples were taken from 5 locations, for ore dressing and concentration tests. Unfortunately even after grinding to minus 14 mesh a large amount of silica remained locked in the concentrate. Microscopic investigation showed the ore comprised varying amounts crystalline hematite and microcrystalline quartz suggesting the rock was an oolitic ironstone.

The available iron ore in Gum Creek area, comprising deposits A, B, C were nearly half the 1955 reserve within 40km of Roper Bar wharf. BHP bulk sampled the area on a nominal spacing of 300m along the outside escarpments of the range and edges of steep ravines. Faces were cleaned down by blasting. BHP concluded the only ironstones in the Roper River region of potential economic interest occur within the McMinn Group (read Sherwin Formation Pzr, 2001) occurring near the top of a sedimentary succession where no fossils were found. Two basins of McMinn Group rocks were mapped. One, the largest, covers 307000 square km, rectangular shaped with a long axis trending northeast-southwest. Mt McMinn (located in northeast corner of EL 27918) is the furthest known exposure of “McMinn Group rocks” to the northeast while in the southwest, the northwest side of the rectangle bulges somewhat up the valley of the Roper River.
The other smaller basin resembles a square covering 77000 square Kilometres southeast of old St. Vidgeon Homestead between Mountain Creek and Cox River where beds are predominantly arenaceous interbedded with siliceous shale, flow basalts and dolerite sills. Ironstone occurs as oolitic ferruginous sandstone with minor limonitic ferruginous shale. The shale overlying a sandstone succession is deemed an eroded basin with gently dipping sides modified by faulting on the northern margin and north-south folding on the eastern side. The larger basin is also affected by north-south faulting and gentle folding towards the western margin. The north-east area of the larger basin is typically basinal with gently inward dipping sides. Here the main ironstone deposits are found. To the west another basin-shaped area centered on Roper Valley Station occurs where the main ironstones crop out towards the bottom of the sedimentary succession west of Hodgson Downs Homestead.

There are two main types of ironstone: namely a soft red pisolitic ore and a finer grain oolitic ferruginous grey sandstone generally occurring higher in the sequence. The pisolitic beds of the Roper Valley – Hodgson Downs area are associated with sandstones occurring above siliceous shales at the base of the formation. The ironstones are all oolitic comprising ochreous hematitic oolites and rounded quartz grains with varying amounts of interstitial crystalline hematite and microcrystalline quartz.

The Gum Creek, (now called Sherwin Creek) or north-eastern deposits namely A, B, C, D, E ironstone beds occur within two limbs of a range formed by synclinal folding of “McMinn Beds” (which plunge to the north-west) called the northern and eastern escarpments (12km and 8km long, respectively). Gum Creek, a tributary of the Roper, flows through the northern range halfway along providing main road access from Mataranka to Roper Bar through the gorge. All drainage off the gorges is down the dip slopes into Gum Creek forming up to 30m deep ravines. The ravines on the dip slopes in conjunction with frontal escarpments provide ideal, regular sampling sites. The main ironstones were initially mapped on an enlarged aerial photo (1:58,000scale) followed up by detailed mapping (1:3100) for ore reserve calculations.

Deposit A on the west side of the main road is small as the ferruginous sediments soon become too low grade (2 bulk samples).

Deposits B and C are separated by the synclinal axis about which “McMinn” sediments are folded to form two ranges. For practical purposes ironstones are assigned to one of three members. However over much of the area the middle bed comprises three ferruginous shale units which are sometimes included in sampling of middle bed. Deposit C of the eastern range is exposed along the eastern escarpment for a strike length of 5.2km covering an area of about 800ha. A generalised section is:

| Shale/sandstone overburden | 12.2 m |
| Upper ironstone | 1 - 3.65 m |
| Shale/sandstone | 4.6 m |
| Middle ironstone | 3.65 - 12.2 m |
| Shales/thin sandstone | 12 - 21 m |
| Bottom ironstone | 1 - 9.75 m |
| Shale |

Neither grade nor thickness of individual beds are uniform for any distance along strike or down dip. Generally grade improves from top to bottom. The bottom bed is redder, softer, weathering more easily accentuating cross-beds, more uniform in grade and occasionally limonitic. It has a characteristic “holey” appearance with the odd flattened hematitic pellet and very little microcrystalline quartz. Its least exposed along the front of the escarpment.

The middle bed is the thickest of the three ironstone members, purplish-red to purplish-grey where it grades 40-50% Fe. As grade deteriorates it becomes much greyer as silica content increases. Its generally harder than the lower beds, eventually grading into poorly ferruginous sandstone down dip and along strike. The middle bed crops out over a much larger area than the bottom bed. The higher grade middle bed is generally thin (4.5m)
with one or more interbedded shale horizons. An inverse relationship exists between grade and thickness i.e. higher the grade, the thinner the middle bed. The thickest sections occur in the middle of the range where good quality ironstone interbeds with ferruginous shales and siliceous ironstones. At both north and south ends ironstone grades into sandstone and quartzite. Solid ironstone ensures a steep cliff face whereas shale weathers back more readily to a sloping hillside. The upper bed may be up to 6m thick however it is generally between 1.2-2.4m cropping out near the top of ravines.

Deposit B – Northern Range
The same beds of the eastern range continue along the northern range however overburden is thicker and more extensive with few ravines incising dip slopes. The bottom bed is exposed along the top of the escarpment for 1609m. Although in some areas it is soft, strongly cross-beded and grading over 40% Fe, it lacks consistency along strike. The middle bed is split by shale interbeds into 3 ferruginous layers. Apart from shale dilution (0.5-1.2m thick) grade is consistently good on most faces. Thickness ranges between 4.6 and 10.7m. A reliable ore reserve estimate of the range is difficult because of the uncertainty of how far ore extends down dip.

In 1955 eleven sample sites were selected at 1600m intervals, samples were taken every 60cm down the cliff faces after being cleaned down by blasting. Five shafts were also sunk. Microscopic examination revealed several types of transitional ore where no one type occurs exclusively in one ironstone bed or area. In 1956, 72 bulk samples were collected at 400m intervals over deposits A, B, and C. An ore reserve of 100 million tonnes was estimated. Disregarding overburden which for the most part is less than 3 parts overburden to one part iron; reserves are nearly 200 million tons, the greater proposition of which occur in the middle and bottom beds i.e. 180 million tons of ironstone averaging 40.8% Fe in beds averaging 6.4m thickness. To summarise, from 1955 – 1961. BHP assessed 27 iron ore prospects (seven on HODGSON DOWNS) west and southwest of Murphy's prospect. An extensive exploration program of mapping, drilling (31 dth’s, 1793m) shaft sinking, sampling, and metallurgical testing was undertaken delineating several hundred million tonnes of iron ore from deposits near Hodgson Downs, Mt Scott, Mt Fisher and Sherwin Creek (formerly Gum Creek). In 1961 Mt Isa Mines (CEC P/L) prospected north of Roper River from Roper Bar to Roper River Mission, on the Gulf of Carpentaria searching for northerly continuations of the Barney Creek Member which hosts the giant Clastic Dominated Pb-Zn HYC deposit (227 Mt@13% Pb+Zn, 40 ppm Ag) located on BAUHINIA DOWNS. CEC also investigated Kipper Creek oolitic ironstone deposit, discovered 6km north of Urapunga Homestead, eastward, along strike for 56km and likewise westward for 16km, A thin oolitic basal ironstone occurs in the Wadjeli Sandstone Member of Mainoru Formation (1493 Ma). A costean 1609m east of Kipper Creek revealed a true thickness of 2.6m comprising an upper ironstone (0.91m) overlying a green shale with minor fine grain hematite beds, also 0.91m thick and a basal oolitic hematite horizon (0.76m). Four shallow and eight stepped-out diamond drill holes tested the subsurface ironstone horizon. The upper pisolitic layer assayed 31% Fe, the middle shale-hematite unit 16.1% Fe and the lower oolitic bed 40.4.5 Fe for an average iron content of 29.2%.

The lower bed is red-brown both on surface and in drill core comprising fine grain, limonitised hematite. Angular detrital quartz grains are enclosed by hematite. In core, abundant iron carbonate intergrows with hematite forming irregular layers and late stage discordant veins. Carbonate is clouded with limonitic inclusions. Pebbles up to 100mm wide comprised of oolitic hematite occur in the oolitic matrix. The thin iron-rich layer occurring within the overlying green shale horizon comprise angular detrital quartz grains within a fine grain hematitic matrix comprising 60% of the rock with accessory mica flakes and tourmaline grains. The upper ironstone horizon crops out as weathered earthy fragments of crystalline hematite and limonite. In drill core pisolites comprise fine grain quartz concentrically layered with elongated aggregates of iron carbonate within a matrix of recrystallised siderite enclosing angular detrital quartz grains. The Kipper Creek ironstones are oolitic implying shallow aerated waters under turbulent conditions. The lower ironstone comprising primary hematite oolites are formed by direct precipitation of hematite concentrically around a “free rolling” nucleus in sea water supersaturated in iron. Interstitial siderite cement between oolites suggests transportation from a formational shallow water environment to deeper water where Eh conditions are compatible for the precipitation of siderite?
The shale horizon indicates detrital material entering the basin while the thin bands of detrital quartz within a hematitic matrix indicates precipitation of iron was also occurring during shale deposition. The pisoliths of the upper ironstone, initially calcium carbonate in composition were transported and deposited in deeper water to be replaced by silica and/or siderite? Iron saturation of oceanic waters, prerequisite for the precipitation of siderite and hematite will only occur if restrictive conditions exist and persist in the basin. CEC inspected Murphy's low grade iron deposit comprising a series of quartz lenses 100m long by 7m wide comprising massive to disseminated hematite over 1000m of strike hosted by arkosic arenite of Mt Birch Sandstone, Pnb of Nathan Group (1614 Ma). Bulk sampling by BHP (1987) assayed 54% Fe over 5m and 51% Fe over 11m. CEC also investigated Mt Vizard. Pb, Zn, Cu prospect discovered by BHP in 1958 located 6km southeast of Ngukurr where traces of lead, zinc and copper mineralisation occur within silicified brecciated dolomite of the Walmudga Formation (1589 Ma).

The mineralisation extends for 4.8km along the north-north-west trending Vizard thrust comprising brecciated grey/black silicified rock fragments within a matrix of white quartz. Galena, sphalerite, chalcopyrite and malachite are widely disseminated occurring in both fragments and matrix. A sample thin sectioned from a BHP costean showed the matrix comprising very fine grain crystalline quartz overprinted by small veins of chaledony, abundant carbonate and radiating spheroids of chalcedony indicating an epithermal origin? BHP intersected sulfide veinlets at 72.5m showing galena, sphalerite and pyrite in a cored drill hole. CEC returned to the area in 1994 conducting rock chip and soil sampling over the weakly mineralised fault zone for a best result of 1.8% Pb and 0.8% Cu. Lead isotope analysis of galena from Mt Vizard and Mt Birch prospects showed lead is more radiogenic than HYC with inhomogenous isotopic compositions indicative of epigenetic origin? In 1997 a Rio Tinto Exploration grab sample of malachite-stained dolomitic siltstone assayed 39% Cu. CEC investigated Walmudga Pb, Cu, Zn prospect in 1962 located 7.5km northeast of Ngukurr noting similarities to Mt Vizard where traces of lead, zinc, copper mineralisation occur within two parallel silicified fault breccias 200 metres apart trending due north for 300 metres. Silicified oolite crops out west of the two parallel faults while sandstone and silicified dolomite crop out between and east of the two north-trending fault zones tentatively assigned to the Walmudga Formation (1589 Ma). The fault breccia comprises brown/grey silicified rock fragments within a matrix of white quartz.

Galena, chalcopyrite, malachite and sphalerite minutae are present in the matrix only comprising two generations of quartz, one relatively fine grain surrounded by a coarsely crystalline overgrowth phase. In thin section rock fragments are orthoquartzite with minor silicified oolite. Mt Birch Pb, Cu prospect located 6.5km south-southwest of Ngukurr was also discovered by BHP in 1958, the mooted southern extension of Mt Vizard Pb-Cu show. Rock chips by Rio Tinto Exploration in 1997 assayed 5.2% Pb and 7 grams/tonne silver comprising minor galena and chalcopyrite within sheared, brecciated, silicified dolomite of the Walmudga Formation. Core drill hole DD97WG002 intersected 15 metres averaging 0.18% Cu from 15m, while DD97WG001 intersected 0.15% Cu, 580 ppm Pb, 668 ppm Zn from 47.6m. Mountain Creek Pb-Zn prospect located 26km south southeast of Ngukurr was discovered by Rio Tinto in 1997. Soil and rock geochemistry delineated a strata bound Pb-Zn anomaly over 3km, drill tested by 143 RAB and 35 RC drillholes. Better results include 9m averaging 0.21% Zn, 15m averaging 0.4% Zn and one metre averaging 1.2% Zn from 31m in RAB drill hole WG217.

Mineralisation comprises disseminated sphalerite, pyrite, minor galena within cherty dololutites of the Knuckey Formation (1614 Ma).

A follow up diamond drill program of 5 holes intersected one metre averaging 1.5% Zn from 65m. Pb-Zn mineralisation is patchy at best, associated with chert veining and recrystallised carbonate, produced by a mooted low temperature hydrothermal carbonate replacement event?

Low temperature carbonate-hosted lead, zinc, copper mineralisation is therefore confined to silicified, brecciated dololutite of the Nathan Group i.e. Knuckey and Walmudga Formation within fault zones comprising patchy veinlets and disseminations of lead, zinc, copper and iron sulfides in recrystallised carbonate and siliceous vein controlled replacement zones. Lead isotope dating of galena gives a mineralisation age of 1200-1300 Ma, coincidental with the intrusion of Derim Derim dolerite dykes and sills.
In 1984 Stockdale Prospecting Ltd (SPL) commenced regional drainage sampling of the eastern half of URAPUNGA recovering anomalous pyrope garnet counts from two restricted areas. Subsequent drill testing intersected microdiamondiferous kimberlite at Packsaddle 1.

Anomalous value chromites were recovered from a small creek 9km south east of Packsaddle 1 leading to the discovery of a decomposed ferruginised ultramafic dyke of probable kimberlitic origin called Black Jack 1. Forty six RAB / RC drill holes tested Packsaddle 1 intersecting phlogopite-bearing, tan olivine clay over a strike length of 700m, up to 3m in thickness from which 46 microdiamonds were recovered. Both Packsaddle and Blackjack kimberlitic dykes are hosted by Roper Group Velkerri Formation sandstone within north trending regional faults. SPL enjoyed no further success relinquishing the area by 1992.

In 1990, after a hiatus of 30 years the Sherwin Creek iron ore deposits namely A, B, C, D and E were pegged by G. Fanning who believed new regional infrastructure development, updated iron and steel technology and anticipated emerging markets for value-added iron and steel products in southeast Asia heralded the beginning of a new era of rapidly escalating steel production, eventually requiring new/alternate sources of iron ore? Fanning concluded the two upper ironstones of deposits B and C are ferruginous oolitic sandstones, low in grade, rich in silica with an estimated resource of 200 million tonnes averaging 27-33% Fe, and 40-45% silica (BHP). However the softer, rarely exposed lower ironstone is similar to those found at Hodgson Downs and Mt. Fisher ie a massive uniformly hematitic pisolite. According to Orridge/Fanning BHP collected ten lower bed bulk samples from deposits B and C averaging 45.8% Fe and 28.5% silica with an average thickness of 7.3m. If low grade is excluded by applying a 45% Fe cut-off, average grade is elevated to 52.3% Fe while average thickness is reduced to 5.1m.

The BHP estimated resource for the lower bed is 56.2 million tonnes, with a stripping ratio of 2.3 to 1 however applying a 45% Fe cut-off reduces estimated resource to 30 million tonnes.

Metallurgical test work by BHP on a composite sample averaging 45.8% Fe and 28.5% silica produced a concentrate averaging 64.9% Fe and 7.35% silica after roasting, wet magnetic separation, demagnetisation and classification. Orridge/Fanning concluded the best potential for commercial iron ore is the oxidised zone commencing from the surface to depths of 6m to 15m where primary siderite and chamosite is oxidised to hematite and ochreous limonite. Unoxidised ironstone comprises oolithic to pisolithic siderite and hematite with minor oolitic chamosite (hydrous aluminium iron silicate) cemented by siderite and specular hematite. Silica occurs as clastic quartz grain cores to oolites and as crypto-crystalline minutae in the matrix. Magnetite is sometimes present, however pyrite is rare.

Oxidised ironstone occurs at Hodgson Downs, Mt Fisher and Sherwin Creek. In 1992 the total inferred resource was 94 million tonnes averaging 46-55% Fe, 15-29% silica with low sulphur and phosphorus.

At the behest of G. Fanning the NTGS conducted an investigation of Hodgson Downs, Mt Fisher, Sherwin Creek and Mt Scott deposits from 1995 to 1997 by Metalliferous geologist P. Ferenzi, who believed although iron ore occurrences are present at several stratigraphic levels within Roper Group sediments, the majority are hosted by ironstone members of the Sherwin Formation comprising interbedded oolitic sandy ironstone (chamositic and sideritic below the depth of oxidation), ripple marked, quartz sandstone, sandy mudstone, thinly interbedded shale, sandstone and oolitic/pisolitic hematite ironstone. At Sherwin Creek four ironstone units are present within an 88m thick sequence intruded by a dolerite sill. Massive ironstone beds are typically 1-4m thick often found near the tops of cliff faces of the northern and eastern escarpment. The bottom ironstone is of superior grade and quality i.e. ochreous red hematitic oolite and pisolite ore comprising closely packed oolites of ochreous red hematite and well rounded quartz grains. Below 30m ore comprises concentrically zoned hematitic oolites with dispersed quartz grains within a hematitic and/or sideritic cement. Quartz grains form the nuclei of hematitic oolites. The three upper, sandy ironstone beds contain less iron than soft oolitic bottom bed due to the presence of more siderite, greenalite and quartz in primary ore. Chalcedonic quartz replaces sideritic cement during diagenesis forming a siliceous, cellular textured rock after oolites have been weathered out. Upper ironstones are interbedded with coarse grain siderite and chamosite-bearing quartz sandstone, sandy shale/mudstone.

Ferenzi summarised Sherwin Creek A, B, C, D and E deposits as follows:
- Upper and middle ironstones are low grade (~38% Fe) with high silica (42%)
Lower ironstone exposed along eastern side of deposit C averages 45.5% Fe over 7.3m, but only 33.6% Fe over 5m in drill intersections.

High overburden to ore ratios (5:1) plus lower grade of lower ironstone make mining uneconomic.

Soft oolitic ironstone exposed at deposit E and further south is higher in grade (48% Fe) but higher in silica (~23%) and phosphorous (~0.2%) relatively thin (1.7m) to mine.

Canavan (1965) estimated a potential ore resource of 200 million tonnes averaging 27-33% Fe, 40% silica.

Ferenczi concluded: There were several million tonnes of ironstone in the Roper area hosted by Mesoproterozoic Sherwin Formation ironstone members of which the soft hematitic oolite beds exposed at Hodgson Downs and Mt Fisher show the best economic potential where surface enrichment of iron is 20% higher than subsurface drill intersections.

Hodgson Down Deposit W is the most promising prospect with an inferred resource of 60 million tonnes averaging 40-50% Fe. More drilling is recommended to substantiate above resource and verify ore continuity, grade and thickness, as well as determining metallurgical viability of processing low grade iron ore.

After 1997 there was little oolitic iron ore exploration in the Roper Valley until 2009 when the Fanning Tenements were taken up by Batavia Mining. Western Desert Resources moved into the area of cropping out Sherwin Formation south of the old St Vidgeon Homestead in 2008, known as the smaller eastern basin, within Limmen National Park, where a global resource of 1292 million tonnes averaging 45% Fe was estimated from Google Earth satellite imagery.

Batavia became Sherwin Iron Ltd (SHD) commencing drilling at Hodgson Down Deposit W in mid June 2010 through to the end of October, completing 467 RC drill holes for 13682m (average 26m) and 74 diamond drill holes for 979m (average 13m). Drilling resumed mid April 2011 at Sherwin Creek completing 381 RC drill holes for 13706m (average 35.9m) and 31 diamond drill holes for 897m (average 29m).

As of November 10, 2011 the following resources are delineated:

1. Sherwin Creek  320Mt a) 40.1% Fe, 34% Si, 0.04% P deposits A,B,C
2. Mt Fisher  15Mt a) 44% Fe 34% Si
3. Hodgson Downs  153Mt a) 45% Fe 20.5%Si deposits W,X

Total 488 MT a) 41.7% Fe, 30% Si, 0.03% P
(at a cut-off grade 35% Fe)

Sherwin Creek resource extends along a large open folded mesa some 8km long by 2.5-3km wide coincident with BHP deposits A, B, C. Deposit E which butts up to the southern boundary of EL 27918 has also been drill tested on a 200m by 200m spacing however a resource is yet to be announced.

The Sherwin Creek resource is confined within two sandy oolitic ironstones dipping gently away from the mesa crest namely middle bed averaging 38.2% Fe and 5m thickness and lower bed which averages 41.3% Fe and 6m thickness. Both the geology and metallurgy of Sherwin Creek iron formations are different from Hodgson Down deposit W and X.

The lower bed is thickest and highest in grade in the central part of the mesa and remains open down dip (within 40m of surface). The middle bed is the thickest in deposit B and highest grade at the southern end of deposit C.

Density separation without grinding of 45% Fe, 27% silica ore resulted in upgrading to 53% Fe and 16% silica. Further test work involving a single pass magnetic separation delivered a product averaging 61% Fe, 6% silica and 2% alumina increasing concentrate yield from 56% to 65%.

A notice of intent is lodged with the NT government advising the construction of a 160km slurry pipeline to a dewatering plant on the Alice Springs to Darwin railway for downloading of ten million tonnes per annum of iron ore concentrate into special containers bound for Port Darwin and beyond however as of last week a haul road (160km) to Xsrata’s loading facility at Bing Bong on the Gulf of Carpentaria is proposed, costing $70 million.
5. GEOLOGY  Regional Setting (Figures 5,6,7)

The Roper project area is dominated by the Palaeo to Mesoproterozoic McArthur Basin now regarded as an erosional and structural remnant of several stacked overlapping sedimentary basins. The Pine Creek Orogen cropping out to the west is part of North Australian Craton (NAC) basement likewise the onlapping McArthur Basin succession is part of the NAC platform cover sequence. The stratigraphy of the McArthur Basin is dominated by siliciclastic and carbonate sediments deposited in shallow marine, marginal marine, fluvial, aeolian and lacustrine environments ranging from 4 to 12km thickness. Depositional geometries and deformational history were influenced by pre-existing northerly structural trends of underlying ‘basement’ subdividing the basin into ‘shelf’ areas and ‘fault zones’ which are relatively thin (4km) or conversely relatively thick (12km) successions respectively. The Roper Region is bisected by the east west-trending Urapunga Tectonic Ridge (UTR), a basement high separating Bauhinia Shelf to the south from Arnhem Shelf to the north. The intersection of the northerly-trending Walker and Batten Troughs with the UTR occupies most of ROPER RIVER. The Vizard Group (1640Ma, Isa Superbasin correlative and McArthur Group equivalent) is a mix of carbonate and siliclastics present only in southeast URAPUNGA occupying an embayment within the UTR. The Nathan Group, also an Isa Superbasin correlative crops out to the east also containing carbonate and a basaltic volcanic unit, Yalwarra Volcanics (1614-1589Ma) restricted to only one part of the basin. The Roper Group (1500-1400Ma) assigned to the Roper Superbasin the youngest element of the McArthur Basin comprises 1800m of mudstone, sandstone, minor calcareous siltstone, limestone, pedogenic breccia, conglomerate and ironstone. However, it is dominated by shallow marine quartz sandstone plus a spectrum of associated deeper shelf facies such as a mixture of sandstone and mudstone indicative of storm dominated shelfs and basinal mudstone often rich in organic matter. The Derim Derim Dolerite intrudes the Roper Group (1324Ma).

The McArthur Basin succession has undergone two compressional events, the earlier ‘Post-Nathan shortening’ marks the hiatus between the deposition of Isa and Roper Superbasins coincidental with the Isan Orogeny. The later ‘Post Roper Group inversion’ imparted a structural grain to the region although a number of earlier events are recognisable namely two major fault zones Urapunga and Walker, trending east south east and north south respectively. Thrust faults within the southeastern Urapunga Fault Zone have placed Vizard Group (1640Ma) rocks over Roper Group (1500-1400Ma), as occurs along the arcuate Vizard-Nagi Thrust parallel to the western boundary of EL27915 where Vizard Group Nagi Formation is thrust over Roper Group Phelp Sandstone.

A brief geological history of the region is as follows;

1. 1850-1820Ma; peneplanation of Pine Creek Orogen rocks.
2. 1820-1710Ma deposition of earliest McArthur succession rocks. Urapunga Tectonic Ridge (UTR) a basement high precluding deposition of Katherine River Group sediments on URAPUNGA?
3. 1690-1620Ma; initial rifting followed by deposition of carbonate and siliclastics of Isa Superbasin equivalent the Vizard Group (1640Ma) within a localised rift, evolving along the southern flank of the UTR? The 1660-1630Ma period has two similar mineralising events, occurring in discrete areas of the NAC, where major Mt Isa-type deposits (MITs) and smaller unconformity uranium deposits occur. The older 1655-1650Ma event affected the eastern NAC, including the giant Mt Isa (150Mt@13%Pb+Zn,150ppm,Ag) and Hilton-George Fisher(228Mt@16%Pb+Zn,99ppmAg) MIT deposits. The younger event which affected the northern NAC between 1640-1630Ma includes the equally large HYC CD Pb-Zn deposit located about 170km southeast of EL27915 at McArthur River on BAUHINIA DOWNS.
4. 1620-1590Ma; localised uplift and prolonged erosion of Vizard Group sediments on UTR near Roper Bar before renewed subsidence and deposition of the Nathan Group another carbonate-siliciclastic succession.

5. 1590-1500Ma; the compressional ‘post Nathan shortening’ event terminated sedimentation causing tilting, uplift and erosion of the Nathan Group continuing for several tens of millions of years. Meanwhile in northeastern NAC, Century MIT deposit (105Mt @ 12.1% Zn, 1.8% Pb, 46 ppm Ag) was deposited at 1575Ma, coincident with the minimum age of Isa Superbasin deposition (which lasted 95m.y. commencing from 1670Ma). Pb/Pb model ages for the world-class, North Australian zinc and uranium deposits identify four principal phases of fluid migration and ore formation

1. 1670-1680Ma (Cannington, Pegmont, Broken Hill, Jabiluka)
2. 1650Ma (Mt Isa, Hilton-George Fisher and Westmoreland)
3. 1640Ma (HYC, Nabarlek, Browns, Killi Killi Hills)
4. 1575Ma (Century).

Iron oxide-copper-gold mineralisation in the Eastern Succession of Mt Isa Inlier namely Ernest Henry, Selwyn and Mt Isa 1100 copper orebody are coeval with a mooted east-west, D3 compressional, 1530 Ma event?

However, of particular relevance is the event chart for the Western Succession which identifies times of fluid migration and metal precipitation coinciding with intervals of missing rock record. Such intervals also coincide with bends on the Apparent Polar Wander Path for Northern Australia i.e. 1640Ma U-turn is coeval with the deposition of HYC, Browns and Nabarlek? Suggesting the tectonic drivers of basin subsidence and uplift also drove fluid migration. Interestingly, numerous U/Pb ages from northern Australia uraninite and brannerite cluster within 50m.y. around 1350Ma, 1100Ma, 850Ma and 550Ma respectively coinciding with, (1) the intrusion of phonolitic dykes in the McArthur Basin, (2) the amalgamation of Australia and Laurentia during Grenville Orogeny, (3) breakup of Rodinia and initiation of the Georgina Basin (4) extrusion of Antrim Plateau Volcanics. The young ages show fluid flow in sedimentary basins is controlled by far-field tectonic events?

New-age Zircon dating of magmatic and metamorphic rocks from The Granites-Tanami, Arunta, Tennant Creek and Hatches Creek regions of Central Australia identify a series of tectonothermal events which may have acted as far-field drivers of event chronology recognised in the Mt Isa – McArthur region.

6. 1500 – 1400Ma; Initiation of Roper Superbasin sedimentation and deposition of Roper Group commenced brought on by crustal downwarping over a large area resulting in broad subsidence followed by a marine incursion across the region. Sea level changes brought on by episodic subsidence are reflected by a distinct alternation of sometimes organic-rich mudstone and shallow marine quartz-rich sandstones. The occurrence of three pisolithic ‘red-bed’ units over a 65Ma stratigraphic interval (commencing from lower-most Wadjeli Sandstone Member-1495Ma followed by’ middle’ Munyi Member-1450Ma? and lastly, 1429Ma Sherwin Formation) make the Roper Group highly prospective for oolitic iron deposits of which there are currently, published, inferred resources of about one billion tonnes averaging 40%Fe and 10-35% silica. However there is a dearth of any other types of mineralisation such as clastic dominated Pb-Zn-Ag ores characteristic of the giant HYC deposit on BAUHINIA DOWNS. The Roper Group succession is not a happy hunting ground for Mesoproterozoic, CD Pb-Zn deposits such as Sullivan the most economically significant continental rift-hosted CD deposit in the world (after Australian deposits). The world-class deposit (16Mt Pb+Zn,9Mt Ag) is hosted by Mesoproterozoic Aldridge Formation of the Belt-Purcell basin located in northwestern USA and adjacent Canada described as a continental rift-sag basin comprising 12km of reduced marine sediments, turbidites and interlayered mafic sills overlain by 4km of sag facie fine clastics and carbonates showing abundant evidence of evaporative conditions. Importantly, around the deposit mafic sills constitute 40% of Aldridge Formation with an isotopic age range of 1470Ma to 1440Ma placing the deposit squarely within Roper Group timelines of 1500Ma to 1400Ma.

The deposit formed as a well developed lower vent complex driven by the intrusion of gabbroic sills into wet unconsolidated seafloor sediments forming a collapsed ‘mud volcano’ with pyrrhotite, galena and sphalerite gradually transitioning upwards to an upper bedded ore zone followed by thinly banded distal sulphides. The main period of Earth’s history Proterozoic, CD Pb-Zn mineralisation occurred from 1850Ma to 1590Ma. However within NAC the main CD deposit episode occurred from 1690Ma to 1575Ma resulting in the North
Australian zinc belt comprising both sag and continental rift-hosted deposits with global resources of 120Mt Zn+Pb. An intriguing distribution aspect of CD deposits is the skewed abundance of giant CD Pb-Zn deposits in continental rift and sag basins between 1690Ma and 1300Ma. Interestingly most of the continental rift and sag basin ores are located within the Australian Proterozoic craton indicating perhaps it was the right place and time in Earth history to form giant CD deposits? They appear after the Great Oxygenation Event when oxygenated shallow ocean water coexisted with deeper reduced seawater to create a contrasting redox character hydrosphere where extremely efficient redox-controlled precipitation of CD ores occurred either in the water column or deep basin sediments. Furthermore, the Australian craton was favourably located latitude-wise facilitating formation of oxidised brines able to efficiently transport lead and zinc. There is abundant evidence of evaporative environments ie. potential brine factories in Australian basins hosting giant CD deposits. However, critical parts of the ore-forming puzzle are firstly the infiltration of sedimentary brines into reduced marine sequences sourced from underlying continental sedimentary successions and secondly, a large scale tectonic trigger to kickstart ascent of brines. Idnurm demonstrated the ages of continental sag-hosted North Australian superbasin CD deposits are coeval with major bends in the Palaeoproterozoic to Mesoproterozoic apparent polar wander path ie. fluid flow and subsequent CD mineralisation were triggered by far-field tectonic events such as collisions and rifting changing the relative motion of NAC. Likewise 1470Ma Sullivan deposit is within error of a major bend on the Mesoproterozoic Laurentian APWP.In NAC, mineralisation at HYC and Century cannot be correlated with local deformational events. However the age of HYC mineralisation corresponds to 1640Ma to 1635Ma Leibig Event when Warumpi province accreted onto the NAC in central Australia. Similarly Century deposit mineralisation is coeval with the 1575Ma Chewings Event which also affected the southern margin of NAC.

The world class Sullivan CD Pb-Zn deposit appears to be the only ore-forming event in the Global rock record coincident with the deposition of middle Roper Group ie. 1470Ma to 1440Ma hence a Sullivan lookalike may be a possibility? The Roper is a cyclical mud, silt and sandstone package with very little carbonate intruded by the younger Derim Derim Dolerite-1324Ma meaning it came in towards the end of Roper sedimentation not as the basin was evolving as occurs at Sullivan thus providing a heat source to drive ascending mineralising fluids? Also there is a lack of sedimentary pile thickness about the area indicating a shallow water environment precluding Pb-Zn precipitation on the sea floor facilitated by deep reduced seawaters?

6. 1324Ma: ‘Post-Roper east-west extension and dykes’ led to the rise of mafic magma to middle and upper Roper Group spreading out as a series of mafic sills of Derim Derim Dolerite-1324Ma meaning it came in towards the end of Roper sedimentation not as the basin was evolving as occurs at Sullivan thus providing a heat source to drive ascending mineralising fluids? Also there is a lack of sedimentary pile thickness about the area indicating a shallow water environment precluding Pb-Zn precipitation on the sea floor facilitated by deep reduced seawaters?

7. 1320Ma: ‘Post-Roper shortening’a compressional east-northeast-west-southwest to northeast-southwest event developing major folds and faults in Roper Group sediments shortly after the intrusion of Derim Derim Dolerite. The last major cratonisation event in the region.

8. Neoproterozoic – 513Ma: Erosion continued for the entire Neoproterozoic reaching a level not far off what it is today. An early Cambrian extension resulted in widespread extrusion of Antrim Plateau mafic lavas throughout northern Australia.

Local Geology ( Figures 5, 8, 9, 10 ).

The area under licence trends north west paralleling two opposing thrust faults namely St George and Vizard Thrusts 10 -15km apart forming a fault-bounded block of Vizard and Nathan Group rocks placed over younger Roper Group within the Urapunga Tectonic Ridge.

The Vizard Group represents the oldest Isa Superbasin unit exposed in the Roper Region comprising 1640Ma, basal St Vidgeon Formation dolostone, tuffaceous/dolomitic siltstone, potassic tuff and chert indistinguishable age-wise at least, from Barney Creek Formation of the McArthur Group which hosts the giant CD Pb-Zn HYC deposit further south at McArthur River. The more anoxic upper facies preserved east of Mountain Creek is comparable with HYC Pyritic Shale member of the Barney Creek Formation perhaps indicating a locally
developed sub-basin? Fine arkose, shale, dolomitic sand/siltstone, potassic tuff and chert of the 1634Ma,Nagi Formation unconformably overlay St Vidgeon Formation cropping out from northwest corner, trending south south east, juxtaposing the Vizard Thrust for 30km, along the western boundary of the licence area. Stratigraphically placed between St Vidgeon Formation and Nathan Group, the Nagi Formation correlates with Batten Subgroup of the McArthur Group. Mt Birch Sandstone is a prominent dolomitic/quartz ridge-forming sandstone unconformably overlying Nagi Formation, the top of which is a basin-wide palaeoregolith surface occurring beneath Mt Birch basal conglomerate. 5km northwest of Roper Bar some 20km west of the licence area Mt Birch Sandstone directly overlays Mt Reid Rhyolite/Urapunga Granite (1858Ma) ‘basement’ indicating a rapid northwestward thinning of Nathan Group sedimentation. The upper contact of Mt Birch Sandstone is gradational into overlying Knuckey Formation where the boundary is placed at the top of a prominent dip-slope capping, white/pink feldspathic sandstone. Knuckey Formation is a recessive, sparsely cropping out dololutite, dolomitic silt/sandstone, stromatolitic dolostone, shale, mudstone and chert sequence conformably overlain by Yalwarra Volcanics ie. the top of Knuckey Formation is placed below the lowermost basalt. Age-wise Knuckey Formation is latest Palaeoproterozoic. It is correlated and compared with lower Balbirini Dolomite (1613Ma) of the McArthur River Group ie. recessive, red-bed dominated ‘evaporite unit’. The Yalwarra Volcanics comprising recessive basalt/peperite alternating with prominent ridges of volcanogenic sandstone intermittently crop out commencing 8km northwest of Roper Bar, on a south to southeastly continuous trend for 40km, passing through the licence area into HODGSON DOWNS. Peperite forms at the base of basaltic flows extruded onto and/or into wet sediment by subaerial to shallow subaqueous lavas. The conformable basal contact favours a marginal marine setting for onset of a volcanic event at the Knuckey Formation – Yalwarra Volcanics interface. Locally intercalated oolites at the top of the Yalwarra Volcanics are regarded as a transitional, marginal marine environment where oolitic chert interbedded with uppermost sandstone forms a gradational conformable contact with the overlying Walmudga Formation. Yalwarra Volcanics are younger than 1613Ma to 1609Ma lower Balbirini Dolomite but older than the 1589Ma upper Balbirini Dolomite hence an approximate age of 1600Ma is postulated for a basaltic event known only on URAPUNGA reflecting a local extension associated with tectonic uplift over the crest of Urapunga Tectonic Ridge. Walmudga Formation silicified carbonate (chert) quartz sandstone,siltstone and shale conformably overly Yalwarra Volcanics cropping out extensively over the eastern half of the licence area unconformably overlain by thrust faulted footwall, Phelp Sandstone of the Roper Group. The top of the Walmudga is often capped by a 2m thick ferruginous/manganiferous chert breccia palaeoregolith below the Roper Group Unconformity. The Walmudga Formation is correlated with the middle to upper Balbirini Dolomite of the McArthur Group ie. 1589Ma.
6. **EXPLORATION PROGRAM** (Figures 11,12,13,14,15,16,17)

1. Literature search and historical data acquisition/compilation
2. Image processing and computer modelling of 1994 Urapunga NTGS Geophysical survey AMAG and Radiometric data.
3. Regional reconnaissance of licence area

7. **EXPENDITURE**

- Literature search $ 2,500.00
- Database compilation $ 3,000.00
- Reprocessing geophysical data $ 7,000.00
- Computer modelling $ 5,000.00
- GeologyTime 12@$1000/day $ 12,000.00
- Administration $ 3,000.00

**TOTAL $ 32,500.00**

8. **CONCLUSIONS and RECOMMENDATIONS**

EL27915 was pegged over an uplifted fault-bounded block of McArthur Group, Barney Creek Formation equivalent, sedimentary/volcanic rocks deemed prospective for HYC lookalike Pb-Zn deposits within the Urapunga Fault Zone and possible iron deposits within Mt Birch Sandstone similar to Murphy’s ie lenses of massive hematite within arkosic arenite above the basement unconformity with Urapunga Granite. Epigenetic breccia-hosted, disseminated base metal-Pb, Zn, Cu mineralisation occurs within the Vizard Thrust at Mt Vizard and Mt Birch prospects respectively hosted by brecciated, silicified Walmudga Formation dolomite. An analogous situation exists within the St George Thrust on the northeastern boundary of the licence area requiring follow up mapping, rock chip and soil sampling. Coincidently there are 5 interesting, discrete AMAG features over 10km of arcuate strike within the same St George Thrust (Urapunga Fault Zone) requiring follow up GMAG and RAB drill testing. Likewise the southwest corner, where a discrete dipolar magnetic high positioned over east southeast-trending Vizard/Nathan Group thrust faulted contact occurs. The inferred Urapunga Fault Zone more or less bisects the licence area from north-west to south-east, including St Georges Thrust. In the northwest licence area there are two additional spot AMAG ‘highs’ about 1km apart positioned over the UFZ also requiring GMAG ground-truthing and possible RAB drill testing? Thinning of Barney Creek Formation – HYC equivalent, the 1640Ma Vizard Group to the northwest(over Urapunga Tectonic Ridge) precludes the deposition of HYC lookalikes requiring prerequisite deep seawater sulphate reducing redox potential to precipitate ore forming sulphides on the sea floor? ie local basin too shallow.
9. References


28. Western Desert resources ASX Announcements 2010-11.
**EL27915**

**Structural Sketch**

Showing Vizard Grp seds placed over Roper Grp. Py, oldest unit of exposed ISA Superbasin. Pw: St Vigdis Fm, lowest. of Vizard Grp correlates HVC pyritic shale Mem. of Barneyck Fm. Fg 9.

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**Key Features:**
- **Roper Grp:** 1500-1400 Ma
- **Nathan Grp:** Upper - Yalwarra Volcanics 1614-1589 Ma
- **Vizard Grp + Lwr Nathan Grp:** 1640 Ma
- **Urapunga granite:** 1858 Ma
- **Thrust Fault**
- **Azimuths:**
  - 134° 30’
  - 135°

**Grids:**
- 15°
- 50°
- 0 5 10 15 20 25 30 Km
Two opposing N to NW trending thrust faults (placing Vizard/St George Groups over Roper)

Yrapunga Fault

El 27915 St Vidgeon N 1500 Ma

Structural Setting showing Major Geological Units

PnK Knuckey Fm 50

PnW Walmudga Fm 1589

PnY Yalwarra Volcanics

PnW Vizard Fm 1640 Ma

PnV Vizard Grp 1640 Ma

Mnt Birch 1614 Ma

Figure 10 15°
EL 27915
RADIOMETRICS
POTASSIUM
FIGURE 17