



## **PAULSENS PROJECT**

**Combined Reporting Group 211/1997**

**E08/1649, E08/1744, E08/1745, E08/1845, E08/2251, E08/2252, E47/1134, E47/1553  
M08/99, M08/196 and M08/222  
P08/516, P08/543, P08/544, P08/565, P47/1313**

**Ashburton Basin, Pilbara - Western Australia**

## **ANNUAL REPORT**

**For the reporting period 14<sup>th</sup> November, 2011–13<sup>th</sup> November, 2012**

**L. Fielding, December, 2012**

<b>1:250 000 map sheet:</b>	Wyloo SF 50-10
<b>1:100 000 map sheet:</b>	n/a
<b>Target Commodity:</b>	Au and base metals
<b>Keywords:</b>	Rock chip samples, soil sampling, geochemistry, RC drilling, diamond drilling, navigational drilling, structural review, underground mining.
<b>Tenement Holder:</b>	Northern Star Resources Ltd.
<b>List of Assays:</b>	Au, Ag, Al, As, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cu, Fe, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, U, V, W, Y, Zn, and Zr.
<b>ABSTRACT:</b>	
<b>Location:</b>	The Paulsens Project area is located approximately 185km WNW of the town of Paraburdoo and 10km north of Wyloo Station Homestead.
<b>Geology:</b>	The project covers part of the Archean-Proterozoic Wyloo Dome. The main rock types are granite, basalt, gabbro, tuff, dolerite, sandstone, siltstone, chert, and dolomite.
<b>Work done:</b>	Work carried out in the reporting period includes: geological review, 362 rock chip samples, 3127 soil samples, 82 surface drill holes totalling 22491.87m and 111 underground holes for a total of 31685.2m.
<b>Results:</b>	Significant results from drilling include 8m @ 14.73 g/t from 68m (PBERC0015) and 9m @ 12.7 g/t from 73m (PBERC0021). Rock chip results include 4.31 ppm Au (NPGER00366) and 25% Cu (NPGER000821).
<b>Conclusions:</b>	Mineralisation encounter at Paulsens Deeps and Belvedere remains open down plunge and requires further investigation. Successful results from the Gabbro Offset drilling have led to identification of mineralisation outside the mine corridor which required further test work. Geochemical review of soil sampling data is currently underway.

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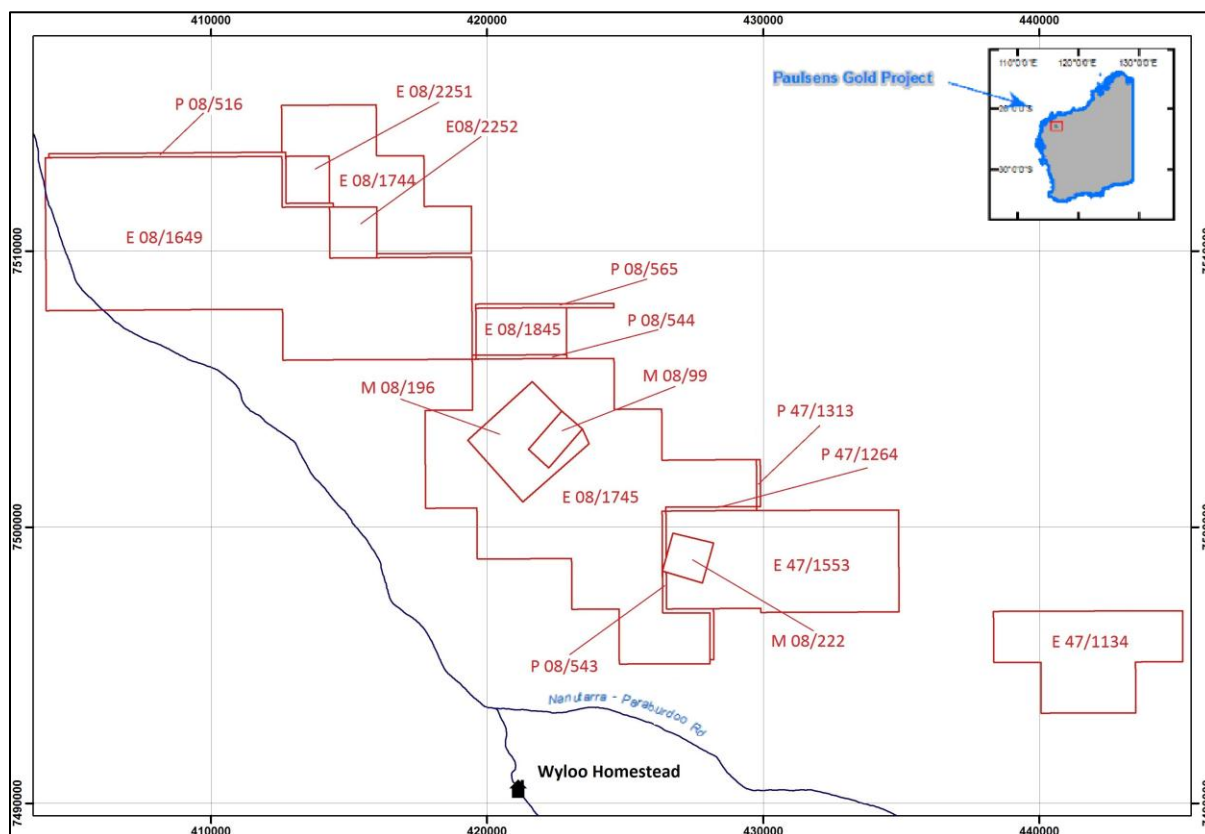
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## 1. INTRODUCTION

The following report summarises exploration and mining work undertaken on the Paulsens Project Combined Reporting Group (C211/1997) tenements during the reporting period 14<sup>th</sup> November, 2011 to 13<sup>th</sup> November, 2012. The Paulsens Reporting Group consists of eight exploration licences E08/1649, E08/1744, E08/1745, E08/1845, E08/2251, E08/2252, E47/1134 and E47/1553, three mining licences M08/99, M08/196 and M08/222 and five prospecting licences P08/516, P08/543, P08/544, P08/565 and P08/1313 (**Figure 1**).



**Figure 1: Location of the Paulsens Project tenements (Combined reporting group C211/1997).**

## 2. LOCATION AND ACCESS

The Paulsens Project tenements are located in the Ashburton Region of Western Australia, approximately 180km west of Paraburdoo and 10km north of the Wyloo Station Homestead (**Figure 1**). Access to the project area is gained via the sealed Nanutarra-Paraburdoo Road. The tenements are accessible via mining, station and exploration tracks. Large drainage channels, steep topography and heritage sites can make access challenging and in some cases inaccessible.

## 3. TENEMENT SCHEDULE

The Paulsens Combined reporting group consists of eight exploration licences E08/1649, E08/1744, E08/1745, E08/1845, E08/2251, E08/2252, E47/1134 and E47/1553, three mining licences M08/99, M08/196 and M08/222 and five prospecting licences P08/516, P08/543, P08/544, P08/565 and P08/1313. All tenements are 100% owned and managed by Northern Star Resources Ltd.

E08/2251 and E08/2252 were granted on the 11<sup>th</sup> June, 2012 and added to the Paulsens Reporting Group on the 27<sup>th</sup> July, 2012.

**Table 1** is a schedule of tenements that comprise the Paulsens reporting group C211/1997.

Tenement	Project	Area (sq Kms or Blocks )	Grant Date	Expiry Date	Managing Company / comments
E08/1649	Paulsens	24 Blocks	30/03/2007	29/03/2013	Northern Star Resources Ltd
E08/1744	Paulsens	18.5 km2	5/09/2007	4/09/2013	Northern Star Resources Ltd
E08/1745	Paulsens	60.82 km2	8/08/2007	7/08/2013	Northern Star Resources Ltd
E08/1845	Paulsens	2 Blocks	9/12/2008	8/12/2013	Northern Star Resources Ltd
E08/2251	Paulsens	1 Block	11/06/2012	10/06/2017	Northern Star Resources Ltd
E08/2252	Paulsens	1 Block	11/06/2012	10/06/2017	Northern Star Resources Ltd
E47/1134	Paulsens	19.02 km2	6/01/2003	5/01/2013	Northern Star Resources Ltd
E47/1553	Paulsens	56.55 km2	6/10/2006	5/10/2013	Northern Star Resources Ltd
M08/99	Paulsens	1.845 km2	14/02/1990	13/02/2032	Northern Star Resources Ltd
M08/196	Paulsens	8.011 km2	3/03/1999	2/03/2020	Northern Star Resources Ltd
M08/222	Paulsens	2.213 km2	24/08/2000	23/08/2021	Northern Star Resources Ltd
P08/516	Paulsens	1.7400 km2	30/03/2007	29/03/2015	Northern Star Resources Ltd
P08/543	Paulsens	0.989 km2	2/08/2007	1/08/2015	Northern Star Resources Ltd
P08/544	Paulsens	0.475 km2	2/08/2007	1/08/2015	Northern Star Resources Ltd
P08/565	Paulsens	0.72km2	18/11/2009	17/11/2013	Northern Star Resources Ltd
P47/1264	Paulsens	0.4748 km2	23/08/2007	14/08/2012	Northern Star Resources Ltd
P47/1313	Paulsens	0.2341 km2	30/01/2008	29/01/2016	Northern Star Resources Ltd

**Table 1: Paulsens Combined Group Reporting Tenement Schedule.**

#### 4. SUMMARY OF EXPLORATION ACTIVITIES

This report summarises exploration activities completed from the 14<sup>th</sup> November, 2011 to 13<sup>th</sup> November, 2012 (the reporting period). **Table 2** lists exploration completed during this time.

Tenement ID	No of rock chips	No of soil samples	Drilling (no. holes)	Drill prospects	Mining	Literature Review
E08/1649	147	834	—	—	—	Y
E08/1744	—	—	—	—	—	Y
E08/1745	148	2160	—	—	—	Y
E08/1845	—	32	7	Gossan Hills	—	Y
E08/2251	4	—	—	—	—	Y
E08/2252	4	—	—	—	—	Y
E47/1134	14	—	—	—	—	Y
E47/1553	24	38	8	Blacks Vein	—	Y
M08/99	—	—	10	Gabbro Offset, Apollo-Voyager	Y	Y
M08/196	17	2	22	Paulsens Deeps, Gabbro Offset	Y	Y
M08/222	—	33	35	Belvedere	—	Y
P08/516	—	—	—	—	—	Y
P08/543	—	21	—	—	—	Y
P08/544	—	7	—	—	—	Y
P08/565	4	—	—	—	—	Y
P47/1264	—	—	—	—	—	Y
P47/1313	—	—	—	—	—	Y
<b>Total</b>	<b>362</b>	<b>3127</b>	<b>82</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

**Table 2: Summary of exploration completed between 14<sup>th</sup> November, 2011 to 13<sup>th</sup> November, 2012.**

## 5. REGIONAL GEOLOGY

The Paulsens Project is located within the Wyloo Dome (**Figure 2**). Detailed geological descriptions of the area can be sourced from the Wyloo 1:250,000 geological sheets completed by the Geological Survey of Western Australia. The geomorphology of the Wyloo area is dominated by the Wyloo Dome which has formed flanking ridges and a central core of low rolling hills.

The regional basement rocks are Achaean age (2.7Ga) basaltic greenstones with intercalated sandstones and argillites of the Fortescue Group at the base of the Hamersley Basin sedimentary and volcanic sequence. The Hamersley Basin rocks are overlain, above an angular unconformity, by the Lower Proterozoic age (1.8Ga). Wyloo Group cover rocks with shallow water conglomerate, sandstone and dolomite sequences at the base, below thick, flysch-type sandstones and siltstones. The sequence indicates prolonged subsidence and sediment accumulation in the Ashburton Trough.

The Paulsens project area is located in the north-western part of the Wyloo Dome, a northwest trending, regional doubly-plunging anticlinorium fold (Tyler & Thorne 1990). The Wyloo Dome covers an area of 60 by 25 kilometres.

In the centre of the dome, twelve kilometres east of Paulsens, a large granite body of uncertain age (the Metawandy Granite) intrudes the mafic lavas and tuffs of the Fortescue Group. Minor amounts of interbedded sediments can be identified within this older sequence, occurring around the Tombstone Prospect. The sediments grade upwards and along strike into tuffs. The Melrose Argillite within the Fortescue Group is the immediate host of the Paulsens gold mineralisation localised in an anticlinal axial zone. The dome was formed during the Early Proterozoic (1.6Ga to 2.4Ga) Capricorn Orogen, which produced the Ophthalmia and Ashburton Fold Belts. Post-depositional folding and uplift deformed the dome.

Marking the edge of this older core sequence in the north-western portion of the dome and to the southeast and is an upward fining sedimentary sequence with a basal sandstone unit that also hosts the Paulsens gold deposit. This unit is overlain by massive basalt flows which contain intercalated sandstones and siltstones. This volcanic sequence is capped by the Mt McGrath sediments consisting of interbedded grits, sandstones and siltstones deposited on a basin margin.

The Mt McGrath sediments are overlain by the Duck Creek Dolomites which originated as fringing reefs around the emerging dome. The grits, sandstones and siltstones of the Ashburton Formation were deposited in deeper water beyond the fringing reefs.

At least two suites of early Proterozoic 1.6Ga to 2.6Ga dolerite dykes cut basement rocks of the Wyloo Dome. The Billeroo dykes are the oldest and most numerous and are up to 50 meters thick with irregular trends, generally sub-parallel to and affected by the axial plane cleavage of the second deformation. These dykes post-date the Melrose Fault and the mineralisation. The Black Hill dolerite dykes are unweathered and strongly magnetic with steep dips and a northeast trend.

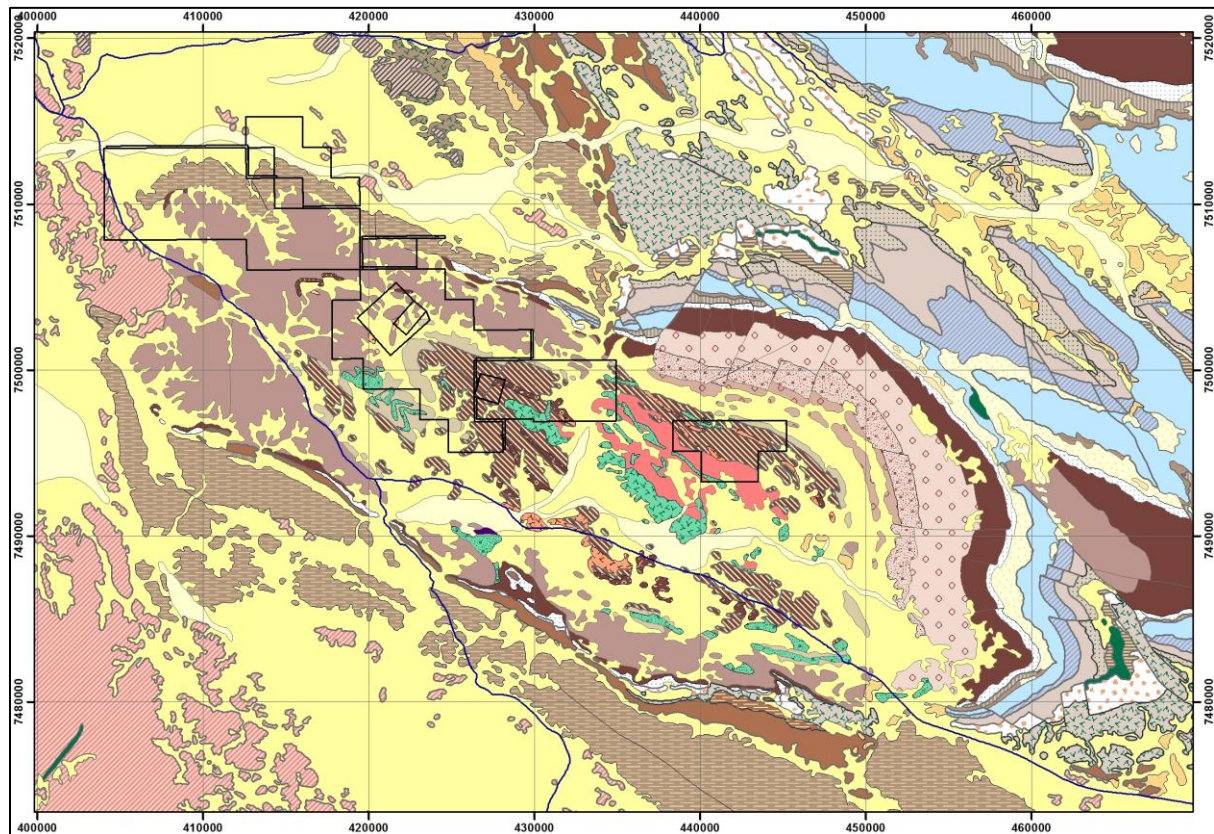
Two phases of deformation are recognised, the second of which was the most intensive. Regional metamorphism to greenschist facies was coincident with regional folding and has caused propylitic alteration of mafic rocks to chlorite-epidote-carbonate assemblages with andalusite porphyroblasts in pelitic rocks.

## 6. LOCAL GEOLOGY

Geology of the Paulsens Project area is made up of Fortescue Group rocks and minor Wyloo Group rocks that occur in the northern tenements (**Figure 2**). The Wyloo Group unconformably overlies the Fortescue Group. The contact between the two Groups is believed to be tectonic or partially tectonic. Most of the area is dominated by a sequence of metasediments. These are conformably overlain by a sequence of mafic volcanics.

From southwest to northeast (older to younger) the basement lithostratigraphy at Paulsens comprises laminated to thick bedded graphitic argillites and quartz arenites assigned to the Hardy Sandstone, gradationally overlain by volcanogenic sandstones and granule conglomerates of the Mt Jope Volcanics, and finally pillow basalts of the Mt Jope Volcanics. The Hardy and Mt Jope formations are assigned to the

Fortescue Group. A north-northwest striking gabbro dyke, termed the Paulsens gabbro, intrudes the Hardy Sandstone and Mt Joze Volcanics.



**Figure 2: Regional geology of the Wyloo Dome including the Paulsens Project (GSWA 1:250,000 Wyloo sheet).**

A shallow east-northeast dipping north-northwest plunging kink up to approximately 350 metres across in the Pulsens gabbro separates it into two west-southwest dipping limbs exposed along the west-south-western and east-north-eastern sides of Pulsens. The kink is occupied by a massive quartz-carbonate sulphide vein array and the kink is at least to some degree the result of faulting. Several west-south-west to southwest dipping dolerite dykes intrude both the Fortescue rocks and the Pulsens gabbro. Multiple chill margins within some of the dolerites indicate up to four intrusive pulses. The dolerite dykes appear to broaden and sill along the contact between the Mt Joze sediments and overlying pillow basalts.

The Wyloo Group is subdivided by the Geological Survey (Bulletin 139, "Geology of the Ashburton Basin, Western Australia") into the basal Beasley River Quartzite, the Cheela Springs Basalt, the Mount McGrath Formation, the Duck Creek Dolomite, the June Hill Volcanics and, stratigraphically highest, the Ashburton Formation. All of these units are represented in the Northwestern part of the tenement group.

## 7. EXPLORATION MODELS & MINERALISATION

### 7.1 *Pulsens Mineralisation*

The Pulsens Prospect is named after the historic Pulsen Mine (also known as Melrose Mine; Finucane 1939), located at the foot of a prominent quartz hill in the centre of M08/99, which was active during the period 1935 to 1940. According to Seymour, Thorne, and Blight (1988) reported mine production was 2955t for 28.549kg gold (average recovered grade 9.55g/t). The ore body at the old workings comprised a partially oxidised quartz-carbonate-sulphide vein generally less than 2m thick and dipping roughly 30° to the northeast. The quartz-carbonate-sulphide vein was worked over a strike length of roughly 50m (140 feet), stoping extended to approx. 17m (57 feet) below surface, and the deepest shaft to 32m (106 feet). It is now recognised that the reef at the old mine represents a small splay at the western edge of a much larger mineralised vein system.

The Pulsens resource is a structurally controlled vein-hosted Au-sulphide deposit. Quartz-carbonate veins are the main host to Au-sulphide mineralisation and thickest where the Melrose Fault Zone intersects the steeply



west-southwest dipping gabbroic Paulsens Dyke. The intersection of these two features defines the orientation of the mineralised vein array (approx. 35/340°). The upper and middle part of the vein array is broadly open folded about an axis 25/310° (F2) and appears thickest in the hinges suggesting thickening of veins during folding.

Pyrite is the principal sulphide phase, occurring mainly as irregular coarse-grained veins and pyrite-cemented quartz-wallrock breccias at the margins of the quartz-carbonate veins. Incipient brecciation and cementation of the Au-pyrite veins with quartz-carbonate-pyrrhotite (latter locally forming massive veins) indicates a second phase of mineralisation.

Following a decision to exploit the Paulsens mineralisation as an underground deposit, initial resource work was undertaken in March 2004. Development of the decline commenced in July 2004 and ore was first intersected in January 2005. First gold was poured in June 2005.

## **7.2 Belvedere Mineralisation**

The Belvedere resource is located 6.5 kilometres from the Paulsens Mine. Previous exploration has defined a non-JORC resource of 31,000 tonnes @ 4.29 g/t Au (4334oz). NST recently upgraded this to a JORC compliant resource of 168,000 tonnes @ 3.3g/t of Au (18,000 oz).

Belvedere prospect is located immediately west of a north-northeast-trending fault with apparent sinistral strike slip displacement of about one kilometre. The Belvedere quartz veins and stopes are in splays off this crosscutting fault. The main historical workings at Belvedere occur where this fault passes along the eastern margin of a north-south trending dolerite dyke where the latter bends onto a northeast trend. This bend in the dyke may be a result of the dyke intruding along a portion of the fault early in its development. Subsequent sinistral shear moment generated across the dolerite has produced two north trending Riedel shears which are pervasively carbonate altered and contain a network of quartz veins. These veins appear to be barren.

Maximum quartz vein development occurs where these shears bend or split, producing dilatational zones plunging west at around 60°. The quartz-sulphide veins (pyrite, arsenopyrite, galena) are up to six metres wide and extend along strike for 60 metres. The veins appear to pinch out to the north against a NW-trending conglomerate unit. The two veins are 30 metres apart and are gently folded and dip moderately to the west. Extensive areas of dolerite occur immediately adjacent to these quartz veins and may stope out parts of the mineralised vein system.

## **7.3 Mineralisation in the Wyloo Group**

Wyloo Group rocks are considered prospective for gold (and base metals) and have been explored in the past by various companies including BP Minerals, MIM, Pasminco and Poseidon Exploration. Reactive carbonate and carbonate rich sediments and brittle rocks such as quartzites in the Wyloo Group provides suitable sites for Au mineralisation in the area.

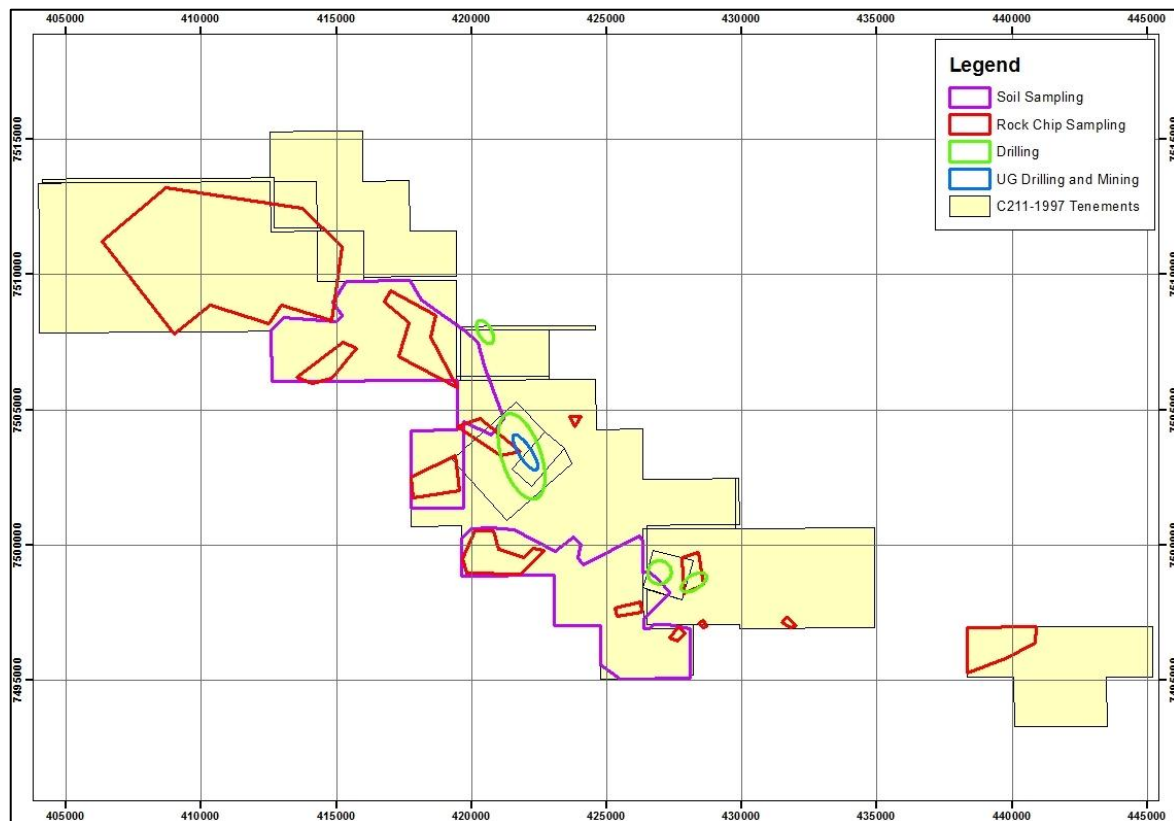
# **8. EXPLORATION ACTIVITIES COMPLETED: 14<sup>TH</sup> NOVEMBER 2011 – 13<sup>TH</sup> NOVEMBER, 2012 (2012 REPORTING PERIOD)**

Work completed during the 2012 reporting period is summarised below and in **Figure 3**.

- Target generation: data, literature and geological review and field reconnaissance.
- Geochemistry: soil sampling and rock chip sampling.
- Surface drilling: RC and diamond drilling.
- Water exploration.
- Underground work: mining and drilling.

## **8.1 Target Generation**

A review of literature and historic data was completed for all tenements. This included interpretation of recently acquired geophysics data and field reconnaissance trips. The review was carried out to determine prospective areas and generate new targets to be tested throughout the reporting period.



**Figure 3: Exploration Index Map for the period between 14th November, 2011 to 13th November, 2012. N.B data review was completed the entire tenement package.**

## 8.2 Geochemistry

Rock chip and soil sampling was undertaken over large areas of the Paulsen Project. A total of 362 rock chip and 3127 soil samples were collected during the year.

### 8.2.1 Rock chip sampling

Rock chip samples that were collected are displayed in **Figure 4**. Quartz veins, geophysical anomalies and structurally complex areas were the main focus of sampling. Samples were also collected in areas which were previously tested to gain an understanding of the appearance of mineralisation in different geological settings.

362 samples were analysed for Au, Ag, As, Al, Ba, Be, Cu, Fe, Mn, Mo, Ni, P, Pb, Sb, Sn, W and Zn. Samples were submitted to SGS Laboratory Services in Perth. They were crushed and pulverized to 75µm (PRP88) and analysed by Fire assay 50g charge (FAA505) for Au and a four acid digest with an ICP-OES finish (DIG40Q/ICP40Q) for multi-elements. Significant results include 4.31ppm Au (NPGER000633) from Amazon North and 1.74ppm Au (NPGER000889) from south west of the Belvedere Prospect. Elevated copper, up to 25% (NPGER000821), is located through the areas and is often associated with the gold mineralisation in quartz veins. **Figure 4** shows the sample locations and associated gold grades. Rock chip samples were followed up with soil sampling as discussed below in section 8.2.2.

### 8.2.2 Soil sampling

Soil sampling spaced on 400m by 50m and 200m by 50m grids were collected for a large portion of the tenement area immediately along strike of the Paulsens Gold mine. The focus of the sampling was the hinge zone of the Wyloo Dome, major structures identified from aeromagnetic and radiometric imagery and regional targets identified by John Hronsky in 2011. **Figure 5** displays the sample location and associated gold values.

Sample locations were recorded using a hand held Garmin GPS. They were collected from below the recently transported material by digging a pit to a depth of approximately 20-30cm. The pit was then cleaned out with a shovel and a sample was taken from the base. It was then sieved using a -2mm mesh with the fine fraction retained. A 500g sample was sent to SGS for multi element analysis using a 25g Aqua Regia digest and ICP-MS (ARM133/ICP-MS) finish.



Several areas have highlighted anomalous gold values and require follow up work. A consultant geochemist has been employed to help interpret the results of the survey. This work is ongoing as results are returned.

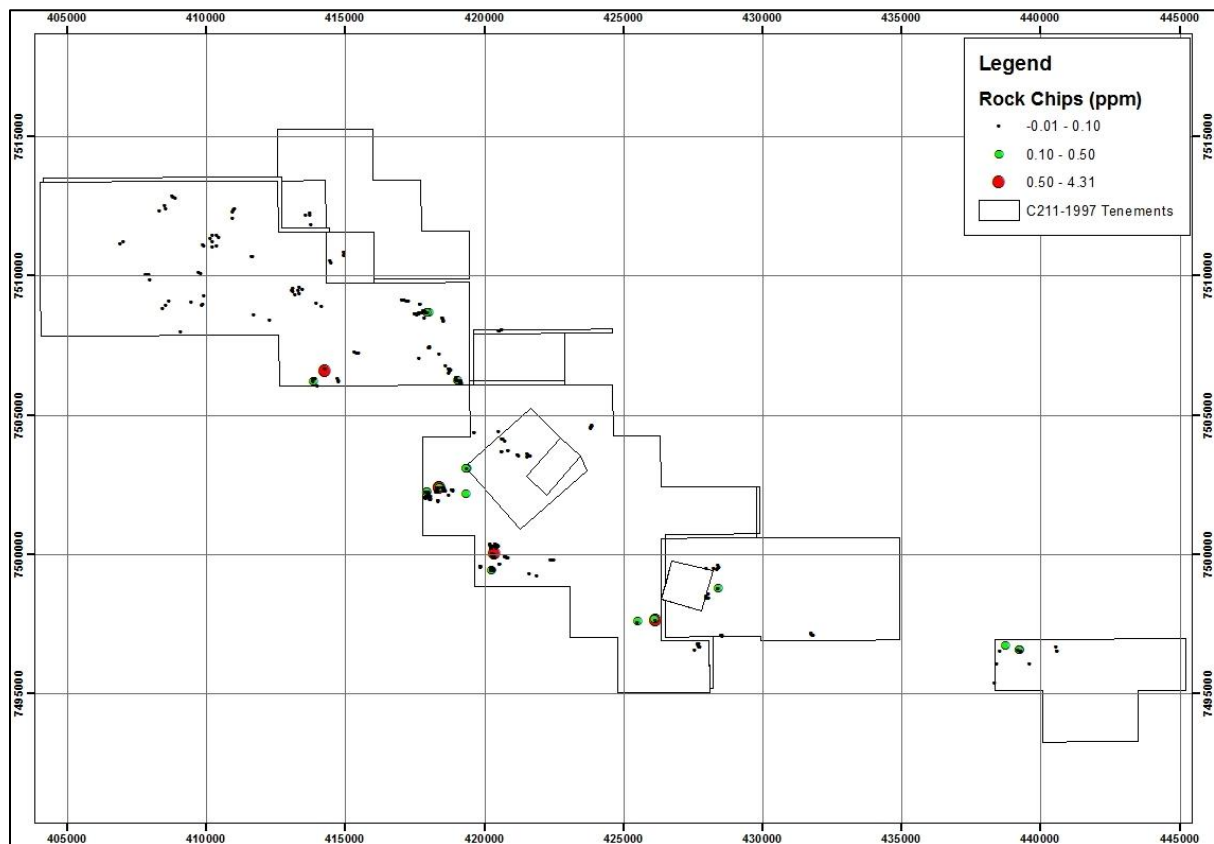


Figure 4: Rock chip sample locations.

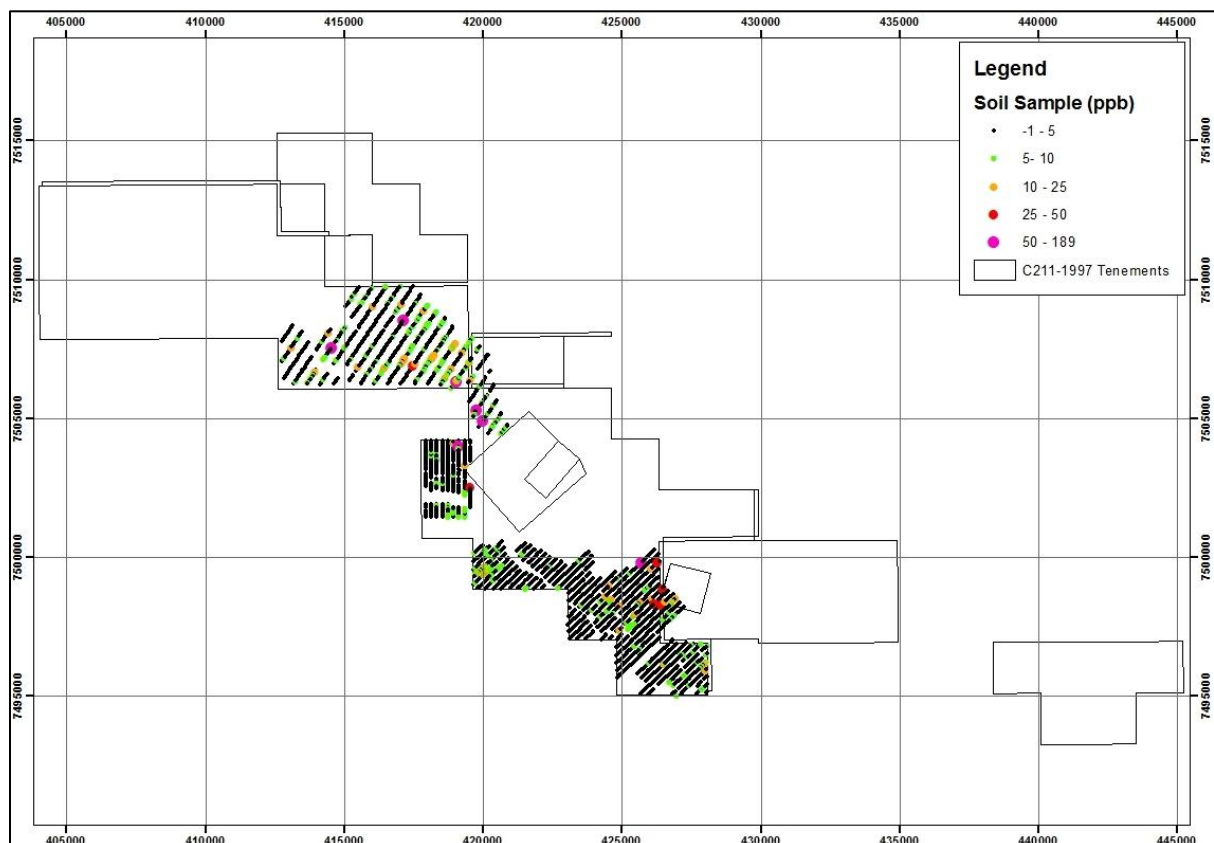


Figure 5: Soil Sample locations.

### 8.3 Surface Drilling

RC and diamond drill was carried out at six prospects in the Paulsens Project area. The drill prospects are summarised in **Table 3** below.

Prospect	Tenement	Number of holes	Type of drilling	Number of metres	Number of samples
Apollo-Voyager	M08/99	2	DD	851.7	209
Belvedere	M08/222	35	RC, RCD, DD	5172.74	2828
Blacks Vein	E47/1553	8	RC	877	604
Gabbro Offset	M08/99, M08/196	23	RC, RCD, DD	8839.13	2242
Gossan Hills	E08/1845	7	RC	1077	777
Paulsens Deeps	M08/196	7	Navi DD	5674.3	1752
Total		82		22491.87	8412

**Table 3: Summary of drilling completed during the 2012 reporting period.**

Diamond drilling was completed by DDH1 an RC by McKay Drilling and DDH1.

McKay utilised a Schramm T685W downhole hammer reverse circulation drill rig. A 143mm drill bit was used. The rig was accompanied by an on-board 1,350cfm/500psi compressor, an auxiliary compressor and a 2,000cfm/900psi booster.

Four metre composite samples and one metre samples were collected using a static cone splitter. The holes were collared to 6m depth with PVC pipe, and surveyed at 30m intervals with a Reflex EZ-Shot downhole instrument.

DDH1 carried out diamond drilling with an 8WD truck mounted Sandvik 1200HC drill rig. HQ or PQ casing was used until competent rock was reached. Thereafter, NQ casing was used.

For RC drilling an 8WD truck mounted Sandvik 1200HC multi purpose drill rig was used and supplied by a totally external air supply (sullair compressor). A 5.25 inch diameter face sampling hammer was used. Samples were individually split through a 12.5/87.5 3-tier standalone riffle splitter and stored in mining bags with individual meter split samples in calicos. Speared four metre composite samples were taken in areas of no geological significance. The holes were collared to 6m depth with PVC pipe, and surveyed at 30m intervals with a Reflex EZ-Shot downhole instrument.

Ethnographic and archaeological heritage surveys were completed for the Paulsens Deeps Prospect prior to drilling. Several sites were identified and the drill holes were altered to avoid any disturbance. In addition to this, a survey was conducted at the Merlin Prospect located on E08/1649. The proposed drilling at Merlin was put on hold and did not occur in the 2012 reporting period.

On completion of the drilling programme the holes were picked up with a differential GPS and surveyed by Down Hole Surveyors. EMS was utilised for the open drill holes which were not magnetically affected. A north seeking GYRO was used for the navigational drill holes and in rod surveys were completed.

All drill holes were capped with concrete hole pugs immediately. Rehabilitation of the drill pads at Black Vein is underway with sample bags removed for the drill sites and back filling of the sumps. Further rehab has occurred outside the 2012 reporting period and will be detailed in the 2013 annual report.

#### 8.3.1 Apollo-Voyager

Two (2) diamond drill holes for a total of 851.7 metres were completed to test the along strike extent of the Apollo mineralisation on the north side of the northern mine gabbro. The Apollo ore body has historically been mined out from underground. From previous drilling it appeared that the Apollo mineralisation was terminated to the north by the Apollo and Hardy Faults. Drilling aimed to test for Apollo style mineralisation which may have been displaced by the Hardy Fault.

A thin (0.3m) mineralised quartz reefs was intersected in the drilling and is likely to represent the adjacent ore body. Drilling was hampered by extremely broken ground (likely associated with faulting) and as such, water loss and core orientation were on-going problems. Some data was gathered from the intersected fault and will assist in future targeting.

### **8.3.2 Belvedere**

The Belvedere prospect is located 8 Km SE of Paulsens mine. Outcrop is dominated by Fortescue mafic volcanics and intercalated sediments correlated to the Mt Roe formation. Additionally, numerous generations of dolerite dyke are recognised.

Thirty five (35) drill holes were completed during the reporting period totalling 5172.74m. This included two phases of exploration (RC and DD) and one phase of resource drilling (RC) to aid in developing an updated model of mineralisation. Mineralisation at Belvedere is considered a function of mesothermal quartz reef development and occurs where the NE trending Belvedere Fault passes along the eastern margin of a north south trending dolerite dyke. Sinistral shear movement generated across the dolerite has produced two north trending Riedel shears that are pervasively carbonate altered and contain a network of quartz veins exploiting plunging dilation zones.

**Exploration Phase 1** – Fifteen (15) RC drill holes were completed for 2380m to gather data relating to the local geology and mineralising controls as well as to increase resource estimates previously completed by Taipan Resources. Holes were positioned to test the along strike and down plunge extensions of historic drilling. Particularly good results returned from PBERC0008 and PBERC0021 cohere with a quartz-carbonate vein +/- sulphide (Pyrite, Arsenopyrite, Chalcopyrite, Galena). Drilling gave a better constraint on the WSW orientation of mineralisation. Additionally, the dolerite dyke and associated Belvedere fault were able to be modelled.

**Exploration Phase 2** – Twelve (12) holes were drilled comprising 1909m RC and 244m DD. Drill holes were designed to test the down plunge extensions of the phase 1 drilling, extend the known mineralisation to the west and gather down hole structural data. Particularly good results returned from PBERC0015, PBERC0020, PBERC0025 and PBEDD0001 extended known mineralisation and offered information pertaining to the host lithologies and the down plunge habit of the target vein. Moreover, better resolution was gained on the dolerite dykes and their relationship to mineralisation. Additionally, diamond drilling helped better constrain the carbonate-sericite +/- fuchsite alteration halo associated with mineralisation. Mineralisation remains open down plunge and further drilling is recommended to test the prospect's full potential.

**Resource drilling** – Eight (8) RC holes were drilled totalling 640m. Drilling has tightened spacing to 25x25m. Significant intersects provide a better resolution on the geometry and understanding of the gold mineralisation. These holes in addition to the exploration drill holes will provide a robust model for mineralisation and will be used in planning future exploration and an updated resource calculation.

### **8.3.3 Blacks Vein**

The Blacks Vein prospect is located 10 Km SE of Paulsens mine. Outcrop is dominated by Fortescue mafic volcanics and intercalated sediments correlated to the Mt Roe formation. Eight (8) RC holes were drilled during the reporting period totalling 877m. Drilling targeted a mineralised quartz reef which exploits a pronounced fault zone recognised as gouge material and pervasive carbonate-sericite alteration. The fault zone can be traced for 0.5 Km and strikes at 060°, dips approximately 85° SE. It is likely related to the "linkage shear" connecting the nearby prospects of Tombstone and Belvedere. Assays from rock chip samples yielded results as high as 2.44ppm Au and 4.5% Cu. Drilling was designed to test the mineralisation along strike and at depth.

Drill holes intersected vein quartz at the projected depth and offer information pertaining to the habit of the target fault and vein. Thin lenses of quartz with moderate sulphide occur amongst intensely foliated dolerite and basalt. These suggest a slightly more oblique habit to the fault zone than first interpreted. Large hole deviations occurred and in some cases the drill holes may have missed their intended targets. No significant results were returned and at this stage no further drilling is recommended.

### **8.3.4 Gabbro Offset**

The Gabbro Offset prospect is located on mining tenements M08/099 and M08/196 adjacent to the Paulsens mine. Twenty three (23) holes totalling 8839.13m consisted of 2848 RC and 5990.13m diamond drilling.

Local geology comprises sandstone and shale correlated to the Hardey Formation and readily comparable to Paulsens mine. Numerous generation of dolerite cut cross cut stratigraphy. The Gabbro offset theory speculates that if one offset of the Gabbro exists in which the Paulsens Gold Mine ore body occurs, there is sound geological reason that another/multiple mineralised Gabbro offsets could occur. From late 2011, the gabbro offset geological model was tested from underground and surface using diamond and RC drilling. Large volumes of quartz with minor sulphide between gabbro supplemented the theory and encouraged further drilling.

Structural data gathered from diamond holes have been viewed in conjunction with underground data and helped better define the southern mine gabbro which was previously poorly constrained. Additionally, numerous mineralised quartz wedges have been intersected within the gabbro and have returned promising grade (some with visible gold). Structural and alteration data have also offered information concerning different suites of dolerite dyke and their association to mineralisation.

Exploration and underground geology departments are working closely to best approach continued exploration. Impressively high grades returned from underground drilling are immediately along strike from surface drill holes and require further test work to assess the full potential of the gold mineralisation. The prospect remains high priority given results to date and its close proximity to the mine.

#### **8.3.5 Gossan Hills**

Gossan hills is located 5.5 Km NNW of Paulsens mine. Seven (7) RC drill holes were completed totalling 1077m.

Local geology consists of mafic tuff (Mt Jope volcanics) and overlying Duck Creek Dolomite. The contact is considered prospective as faults are seen to penetrate the dolomite which may serve as a permeable lithology sandwiched between two relatively impermeable lithologies. Numerous moderate sized outcrops of silicified gossan, quartz veining and silicification (or Fe-overprint of dolomite dragged down the fault zone) are aligned sub-parallel to two N-S trending bounding faults, which traverse the lower contact of the Duck Creek Dolomite. A historic soil grid returned a significant gold anomaly associated with the gossan between bounding faults.

Drill holes were designed to target the outcropping gossan and bounding faults, as well as supplement historic drilling which had returned low grade Au. Drilling failed to intercept significant mineralisation. However, PGHRC004 and PGHRC0022 encountered anomalous gold associated with ferruginous ironstone units and quartz veins. Current interpretations attribute these anomalous patches to supergene enrichment possibly from a local feeder zone yet to be defined and numerous interpretations exists including epithermal mineralisation along undulating faults whose inclination has great influence on mineralisation.

At this stage no further exploration is planned.

#### **8.3.6 Paulsens Deeps**

Paulsens deeps prospect is located on tenement M08/196 immediately down plunge of the Paulsens Gold Mine. A navigational drilling programme totalling 5674.3m of diamond drilling consisted of 2 parent, 3 daughter and 2 granddaughter holes. The Paulsens deposit is a massive auriferous sulphide body hosted on the tectonised margins of a pre-existing massive quartz vein in Fortescue Group sediments and mafic volcanics. The vein occurs between separated gabbro bodies. Navigational drilling was designed to test the down dip extension of the Paulsens quartz from surface as the 30° plunge of the ore body makes exploration from underground technically difficult.

Mineralised quartz-ankerite reefs confirm that mineralisation continues down plunge. Furthermore, discrepancies in bedding, mineralised quartz-ankerite reefs, mineralised quartz wedges amongst gabbro and extensive intersects of fault gouge have encouraged detailed interpretations of the geology beyond the known Paulsens quartz. One of the most prominent interpretations is the existence and habit of the "Jupiter fault", defined by strong gouge material and quartz-ankerite breccias hosted by carbonaceous/graphitic sediment. The fault has close affinities to offsetting structures up plunge and offers crucial details for the structural scenarios down plunge.

Drill data interpretation and liaison with a structural consultants is ongoing with a view to continue navigational drilling and better define the down plunge extensions. Further drilling from the surface is recommended for the upcoming reporting period.

### **8.4 Water exploration**

In attempts to meet an increasing demand for water, 6 exploratory water bore-sites were selected within a 5 km radius of the Paulsens Mine. The sites were selected on the basis of geology, topography and the results of previous groundwater investigations. Conventional-hammer, hydro-stratigraphic holes were drilled by Harrington Drilling during February, 2012 using a Versadrill V-2095EXP rig. The holes were drilled to test targets at Gossan Hills Prospect where the two major faults cross cut the Duck Creek Dolomite. Two of the holes were completed as production bores (PB44 and PB45), two as monitoring bores (PB40 and PB43) and the remaining two holes were abandoned (PB41 and PB42).

## 8.5 Work completed underground at the Paulsens Gold Mine

### 8.5.1 Underground drilling

Underground exploration drilling consisted of a total of 111 diamond drill holes totalling 31685.2 metres. Out of these holes 102 (3367.92m) were completed on M08/99 and the remaining 102 holes (28317.28m) were drilled on M08/196.

All core is logged and sampled on site. LTK60 core is sampled as whole core and NQ2 core as half core. Once sampled, the core is packaged up and sent to ALS Chemex – Australian Laboratory Services Pty (ALS) Limited in Perth for analysis. Samples are weighed and crushed to 70% passing -6mm mesh. The crushed material is split and a portion is pulverised. A 100 gram pulp is sent for gold assay. A 30g portion of the pulp is treated by fire assay method with atomic absorption finish (Au-AA25). Samples in excess of 100g/t of Au are re-analysed using ALS' dilution method (Au-DIL). Northern star resources insert one standard in each hole and one blank into each ore zone. Laboratory standards and blanks are inserted by ALS and several pulp duplicated are also assayed as a determinant of mineralisation variability.

Grades returned from the underground drilling include exceptional grades such as 32.95m @ 19.55 g/t (3.5m true thickness) from PDU2077, 15.53m @ 34.66 g/t (7.5m true thickness) from PDU2122, 8.11m @ 41.47 g/t (5.33m true thickness) from PDU2107 and 13.70m @ 17.15 g/t (7m true thickness) from PDU2109 to name a few.

### 8.5.2 Paulsens mine working for the 2012 reporting period

As at the 10th November 2012 the mine workings were at the 505 level (mine grid or -495mRL). **Table 4** summarises the mine development from 1st December, 2011 to 30th November, 2012.

Development	Metres Advance
Capital - Decline	906
Capital - Level	963
Operating	3,618
Total	5,487

**Table 4** Mine development (1st December, 2011 to 30th November, 2012).

### 8.5.3 Latest published resource figures

The most recently published JORC compliant resource was calculated in June, 2012 and is summarised in **Table 5** below. Calculations used a 2.5g/t Au cut-off grade for underground and 1.0g/t Au for open pit (Lawson, S, 2102).

	Measured		Indicated		Inferred		Total		
	Tonnes (,000)	Grade (g/t)	Tonnes (,000)	Grade (g/t)	Tonnes (,000)	Grade (g/t)	Tonnes (,000)	Grade (g/t)	Oz Au (,000)
<b>30 June 2012</b>									
Open Pit			573	2.5	169	2.5	742	2.5	61
Paulsens Upper Levels			136	7.1	32	5	168	6.7	36
Voyager 1	277	8.8	75	12.4	44	10.7	395	9.7	123
Voyager 1 Extension			64	20.0	39	33	103	25.0	83
Voyager 2			22	14.3	71	10.5	93	11.4	34
Paulsens Stockpiles									11
Belvedere			45	2.8	123	3.5	168	3.3	18
Merlin					523	1.4	523	1.4	24
Mt Clement JV					226	1.8	226	1.8	13
<b>Total</b>	<b>277</b>	<b>8.8</b>	<b>915</b>	<b>5.5</b>	<b>1227</b>	<b>3.8</b>	<b>2418</b>	<b>5</b>	<b>403</b>

**Table 5:** Most recently published JORC compliant resource released to the ASX on the 2nd August, 2012.

### 8.5.4 Mine production figures

From the 14<sup>th</sup> November, 2011 to 13<sup>th</sup> November, 2012 a total of 68,533.86 oz of gold was recovered from 348,719 tonnes of ore at a grade of 6.68g/t.

## **9. CONCLUSIONS AND RECOMMENDATIONS**

Work completed during the 2012 reporting period has defined several high priority targets which require further exploration work. Encouraging results from recent drilling at Belvedere, Gabbro Offset and Paulsens Deeps required additional drilling to test the economic potential of these Prospects.

Soil sampling which has occurred over large areas of E08/1649 and E08/1745 requires further data analysis to identify anomalies. A geochemical consultant has been contracted to aid in this interpretation. Any anomalies identified will be followed up with site visits to help explain possible causes of the anomaly and further sampling to reduce the grid spacing to a 100m by 50m grid. Pending results these targets may be drill tested with either RAB or RC drilling depending on the terrain.



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