Chronos – A timely near-mine discovery for Peak Gold Mines

D. I. Steven[1], A.G. Dimond[1], J. Egan[1], J.R. Peters[1], C. Powell[1] & M. Stander[1]

[1]Newgold Peak Gold Mines, PO Box 328, Cobar, NSW, 2835
daniel.steven@newgold.com

Summary

The Chronos lenses adjacent to the Perseverance deposit have been a recent discovery for Peak Gold Mines (PGM). Defining the lenses has been an ongoing focus, since mining induced seismic activity slowed production rates and delineation and exploration drilling in Perseverance Zone D (PZD) in 2015.

PZD is the largest of PGM's resources in terms of tonnage and contained metal and the discovery of the Chronos lenses has enabled PGM to sustain production targets. Initially discovered in 2014 from exploration drilling, above the current know reserves and resources of Perseverance and to the south of the Hercules lens, following up on high lead zinc values in a 1999 drill hole. Chronos, like Perseverance, has no known surface expression and drilling has been undertaken from underground as well as from surface.

Chronos is made up of three discrete lenses, a lead-zinc-silver lens with a smaller high grade gold centre between a pair of high grade lead-zinc lenses to the east and west. Like other deposits in the vicinity, has a short economical strike length, up to 150m, a planar upright attitude, with a thickness of 5-25m, and a vertical extension still to be constrained. It is geometrically well shaped for underground mining.

The lenses contain a 93 koz gold, 352 koz silver and 3 Mlb copper reserve (net of depletion) with significant lead (33 Mlb) and zinc (14 Mlb) mineralisation (Newgold, 2017a and 2017b). There is an additional 1,410 kt at 0.73 g/t gold, 0.34 % copper, 5.93 % lead and 6.23 % zinc in inferred mineral resources.

From the initial discovery of Chronos, PGM began an aggressive drilling program in 2015 and 2016 to give an outline and evolving ore model, also with the intention of increasing the mines polymetallic resources. Infrastructure was very close to these lenses so drill platforms could easily be placed to effectively explore the lower portions of the deposit.

The Chronos lenses are hosted in sheared silicified turbidite sediments with chlorite and sericite (muscovite) alteration and silicified rhyolite breccias, both of lower Devonian age. The lenses contain gold-bearing Pb-Zn-Cu sulphide mineralisation, that is trace to locally abundant pyrrhotite, sphalerite, galena, chalcopyrite and pyrite. There are trace amounts of bismuth, bismuthinite, stannite, tetrahedrite, stipnomelane, magnetite, titanate, rutile, arsenopyrite and boulangerite, with dyscrasite (Ag_3Sb) possibly observed.

The positively skewed gold data with an extreme CV of 32 presented its own modelling challenges. A trial sample of approximately 16,000 tonnes milled in December 2015 became the basis for reconciling the model.

Further work has been done to define the metallurgical properties of the ore lenses. This work has aided optimisation of the current mill to produce a high overall recovery with a large percentage of gold recovered from the gravity circuit.

Introduction

The Chronos lenses of the Perseverance deposit have been a recent (2014) addition to the mineral resources of PGM. PGM is located approximately 8 kilometres south southeast of Cobar, in central west New South Wales, at latitude 31° 34'S, longitude 145° 53'East (Figures 1 and 2). It is owned and operated by PGM, a wholly owned subsidiary of TSE and NYSE listed Newgold Inc.

Figure 1: Location of Cobar within NSW (2016, Google Earth).

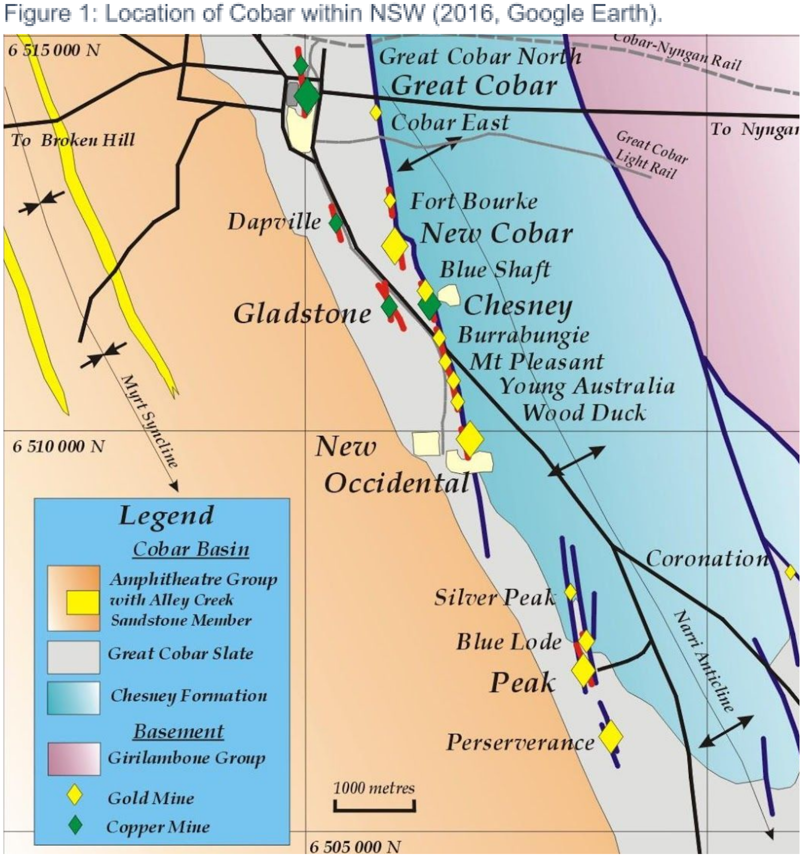


Figure 2 shows the deposits currently mined by PGM and near-mine prospects. The operation is located across two sites with the main offices, processing plant, laboratory, core yard and maintenance workshops close to the Peak headframe above the Peak deposit. The Peak and Perseverance deposits are accessed by shaft and decline from this location.

Above the Chesney deposit there are offices and ablutions with access to underground mining areas of the Chesney, New Cobar and Jubilee deposits via the New Cobar open pit.

The operation mines and processes approximately 800,000 t per annum to produce 90 – 100 koz gold and 13 – 15 Mlb copper.

Between the start of the operation in 1992 and the end of 2016 PGM has produced 2.8 Moz of gold and 98 kt of copper.

The ore reserve at the commencement of operation in 1992 was 3.9 Mt at 7.1 g/t gold and 0.8 % copper for total contained gold of 0.89 Moz and 31 kt of copper metal (Cook, 1996).

The current ore reserve (as at December 31, 2016) is 2.8 Mt at 2.8 g/t gold and 1.3 % copper (Newgold, 2017a).

Figure 2: Location of PGM's deposits and prospects, with Cobar located top left-centre and regional geology underlay (after Whitcher, 1986).

PGM therefore has a strong record of replacing mined out reserves with additional resources and reserves. Overall PGM has discovered 3 million oz gold at a cost of approximately $25 per oz. The Chronos lenses of the Perseverance deposit are the latest of the near-mine exploration successes to add to this.

Underground exploration drilling has identified a significant high-grade gold lens within an associated base metal lens and two (east and west) adjacent base metals lenses. From a small exploration program in 2014, through aggressive targeted drilling in 2015 and 2016, the Chronos ore model quickly evolved and production began in 2016, following a 16,000 tonne bulk sample mined in December 2015.

Like PGM's other deposits, the Chronos lenses have a narrow strike length and the vertical extension has still to be constrained.

Regional Geology

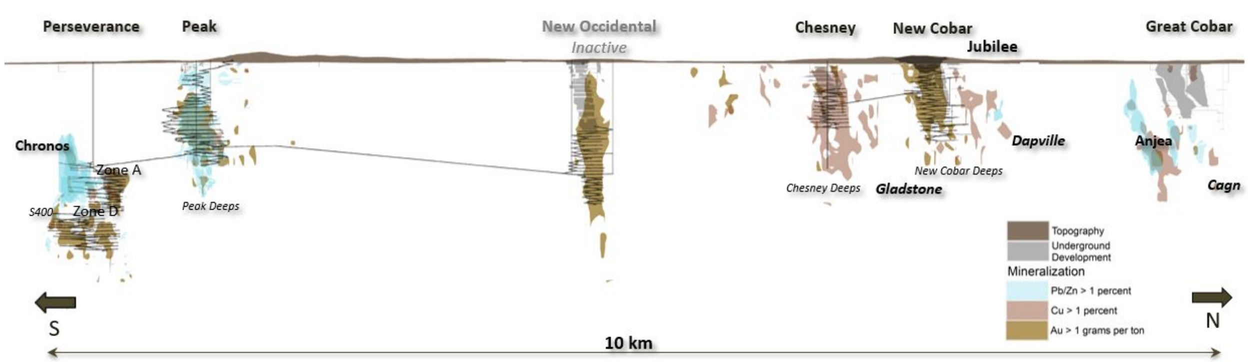
The Cobar Gold Field (CGF) is located on the eastern margin of the Devonian Cobar Basin. The basin lies in the north region of the Central Belt of the Lachlan Orogen. The Central Belt formed as a back-arc basin in the Cambrian between the Precambrian metamorphic rocks of the Broken Hill Block, to the west. To the east lies the Macquarie Arc subduction complex.

Throughout the region multiple deposits and mineral occurrences have been discovered, with a wide variety of styles of mineralisation (Fitzherbert *et al.*, 2016).

Southern Mine Corridor

Northern Mine Corridor

Figure 3: Longitudinal section of Cobar Gold Field showing PGM's mines and prospects (Newgold, 2015).



CGF is a 10 km long belt that trends south-southeast from the town of Cobar (Figures 2 and 3). The CBF sits within rocks of the Nurri Group. Basement Ordovician rocks of the Girilambone Group lie to east and younger Devonian Amphitheatre Group rocks to the west. (Glen, 1982; Stegman and Pocock, 1996)

Figure 4: Schematic cross-section through the Cobar Gold Field, eastern margin of the Cobar Basin (Modified from Glen *et al.*, 1994).

Much has been published on the basin synthesis and architecture (Drummond *et al.*, 1992; Fitzherbert *et al.*, 2016; Glen, 1987; Glen, 1991; Glen, 1995; Glen, 1996) and this is not the scope of this paper. Suffice to say that a complex architecture of faults has developed on the eastern margin of the basin, schematically shown in Figure 4.

The lower Devonian rocks form a series of south east plunging moderate amplitude folds, with the western limb of the Nurri anticline containing second order shears that host, or are spatially related to, the CGF deposits (Taylor, 2010; Taylor, 2011).

Named shear zones throughout the CGF, Lady Greaves, Great Chesney Fault, Blue Shear, Great Cobar Fault, Peak-Perseverance Shear, are very visible northwest trending structures clearly identified from magnetic and gravity data.

The dominant shear zones where gold mineralisation occurs are the Great Chesney Fault, the Great Cobar Fault and Peak-Perseverance Shear, all of which juxtapose the Chesney Formation with the Great Cobar Slate, with the Peak-Perseverance Shear, in the south, also faulting the Great Cobar Slate.

Unique to the Perseverance and Peak deposits in the CGF, rhyolitic rocks also host significant mineralisation (Stegman and Pocock, 1996; Taylor, 2011). The Perseverance rhyolite occurs on the eastern side of the Great Cobar Fault with a southerly plunging ‘anticlinal’ aspect. There is still much discussion surrounding this aspect with multiple forms of thought existing for the depositional nature and structure of the rhyolite and subsequent mineralisation emplacement.

To date, the western side of the ‘anticlinal limb’ has been the focus of PGM’s mine geologists since the discovery of Perseverance deposit in 1994. By contrast the eastern limb and the eastern contacts of the rhyolite with the sediment are poorly explored.

Deposit Geology, Structure and Alteration

A top of this ‘anticlinal’ feature, where the rhyolite upwells into the surrounding meta-sediments of the Chesney Formation, lie the three Chronos lenses, in both rhyolite and meta-sediments. These are the Chronos Western Lens (CRW), Chronos Main Lens (CRM) and Chronos Eastern Lens (CRE) (Figures 3 and 7a).

The Chronos lenses, with a high-grade gold shoot lying within the CRM, lie directly south and at a similar depth and easting as the Hercules lens of the Perseverance deposit, and above and further east of the southern end of the Perseverance Zone D lens (Figure 7b).

The lenses are hosted by meta-sediments of a turbidite sequence protolith, with little detrital material remaining and a contemporaneous volcanic intrusive (rhyolite), which is found along the western margin of the Chesney-Narri anticline and doesn't outcrop. (Glen *et al.,* 1992; Perkins *et al.*, 1994; Black, 2007; Bodorkos *et al.*, 2013). The mineral assemblages and textures observed in the meta-sediments infer a epizone grade of greenschist facies metamorphism.

Meta-Sediments

Located on the eastern side of the Chesney Fault, the meta-sediments are typically fine grained with minor thin sandy beds and they are poorly bedded with weak to moderate cleavage, with most detrital material and textures not remaining (Figures 5a and 5b).

Alteration during basin deformation and the injection of hydrothermal fluids has resulted in a quartz +chlorite +muscovite (sericite) ±sulphides mineral assemblage in the meta-sediments. The Devonian host rocks underwent syn-tectonic hydrothermal alteration and veining, evidence for which includes deformation and recrystallisation textures in quartz; foliation in chlorite and sericite and recrystallisation textures in sulphides (Ashley, 2015).

Alteration assemblages vary locally from chlorite-quartz rich with minor sericite, through quartz rich, with minor chlorite and sericite to sericite rich with minor quartz and chlorite (Figure 5).

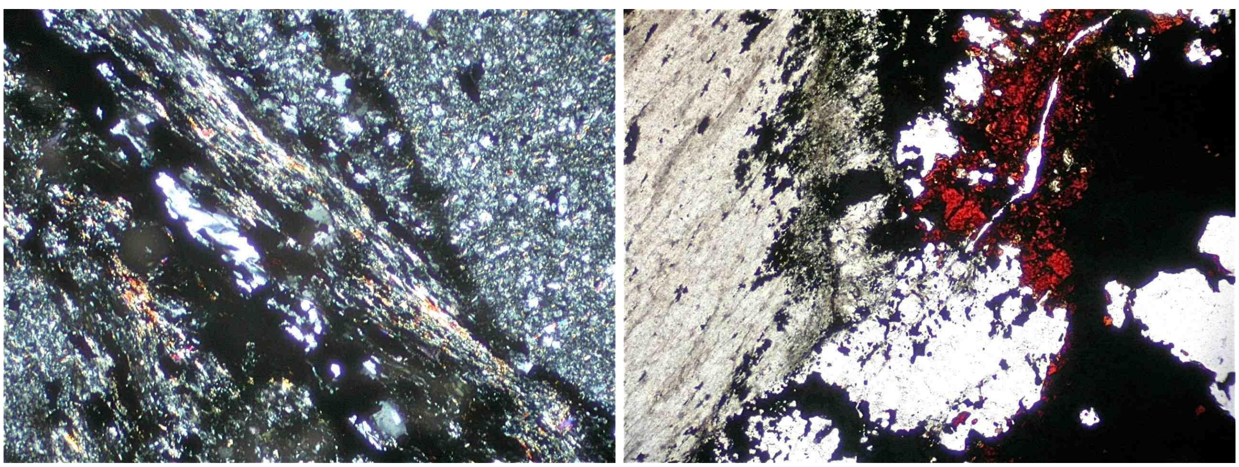


Figure 5: Meta-sediments within the Chronos Lenses: a) Left -Strongly altered siltstone (right) cut by a diffuse foliated vein assemblage that includes chlorite, sericite, quartz and sulphides (black). Host rock alteration is to fine grained chlorite and quartz. Transmitted light, crossed polarisers, field of view 2 mm across; b) Right -Altered foliated fine grained sedimentary fragment in the breccia (left) abutting a zone of hydrothermal infill (right) containing quartz, dark orange sphalerite and galena and pyrrhotite (black). The breccia fragment is mainly replaced by sericite, although minor chlorite and sulphides also occur. Plane polarised transmitted light, field of view 2 mm across (Ashley, 2015).

Rhyolite

There is still much to learn about the emplacement and structure of the rhyolite at Perseverance. Initial work, and delineation drilling of Perseverance Zones A and D, identified an antiformal aspect and a faulted eastern major that juxtaposed the rhyolite against the Chesney formation meta-sediments. Further drilling and exploration clouds this interpretation and ongoing further work will hopefully eventually resolve this geomorphology.

Like the meta-sediments, the rhyolite has been hydrothermally altered, veined and as such demonstrates low grade metamorphism. The mineral assemblage in the rhyolite is typically k-feldspar, quartz and chlorite. There are minor amounts of sericite, plagioclase (albite), carbonate and traces of zircon, apatite, leucoxene, epidote, titanite and bornite (Ashley, 2015). In some areas biotite has been observed in the rhyolite indicating slightly higher grade metamorphism than is found in the meta-sediments and the majority of the rhyolite.

Within the rhyolite mass a number of different lithofacies have been identified:

- Massive aphanitic – light to medium grey-brown in colour with a highly siliceous groundmass, perlitic crackling is observed.
- Aphanitic, flow banded rhyolite – light to medium grey-brown in colour with darker flow bands interpreted to be a weak alignment of crystals within the highly siliceous groundmass (Figure 6a).
- Amygdaloidal – defined by the abundance of quartz filled amygdales with a higher observation of perlitic crackling present than compared to the massive aphanitic. Darker in colour with amygdales filled by recrystallized quartz in a highly siliceous groundmass.
- Hyaloclastic – Described as a breccia where there is an alignment of angular rhyolite clasts re-healed by a silica flood. This lithofacies is restricted to the Peak-Perseverance Shear Zone.
- Brecciated rhyolite – angular clast with a fine silica ground mass
- Brecciated rhyolite-sediments – located along the rhyolite-meta-sediment contact zone with more rounded clasts of rhyolite and flow banded rhyolite and/or angular meta-sedimentary clasts.

Within and peripheral to the rhyolite, fractures give rise to vugs that can be lined with quartz crystals ±sulphides (Figure 6b) and also contain pockets of gas (hydrogen and methane).

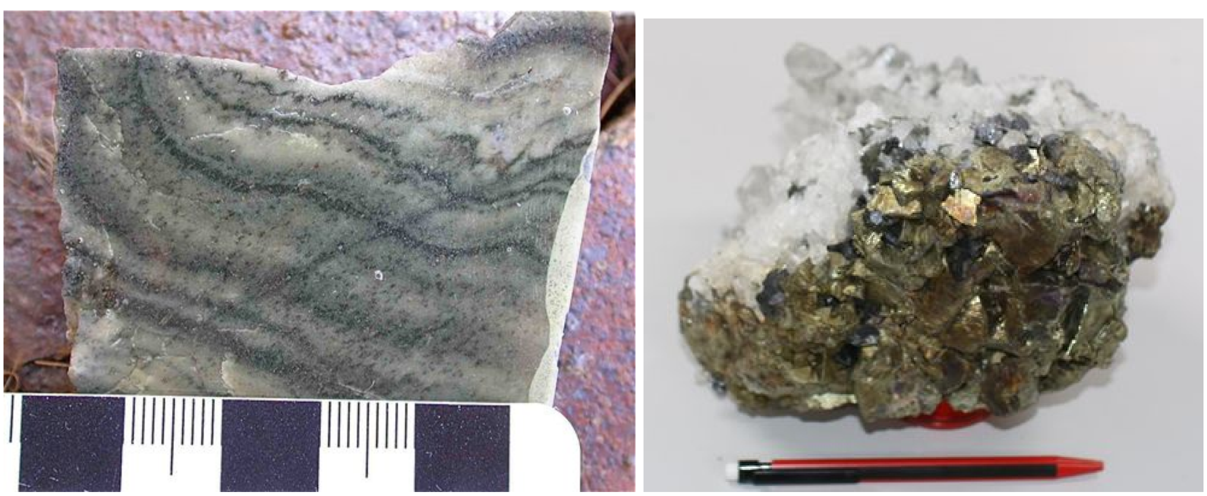


Figure 6: a) Left - aphanitic, flow banded rhyolite from Perseverance (Ashely, 2015); b) Right - quartz crystals from a vugs in the rhyolite with chalcopyrite and sphalerite lining the contact between quartz and rhyolite, from 9250 level in Chronos.

The location of the lenses is structurally controlled by the regional cleavage within the meta-sediments, the Peak-Perseverance Shear and splays off deep (basement tapping?) faults that formed during basin inversion and deformation, that are sub parallel to the cleavage.

The Perseverance Shear has relatively wide influence, tens of metres from the main trace of the shear (Figure 7a shows the shear trace). It affects the surrounding meta-sediments and rhyolites (Taylor, 2011). Underground development into the Chronos lenses has revealed numerous short lived shear zones and faults that are difficult to observe in drill core.

Some of these shears contain talc mineralisation that requires minor ground support and mine design alterations and may be problematic when talc containing ore is milled. To date the talc shears have most commonly been observed in the CRW and this lens isn't in development or production schedules currently.

Mineralisation

Like the other lenses of the Perseverance deposit and PGM other ore bodies, the Chronos lenses are typically 1-15m wide, and pinch and swell along strike and down dip (Figure 7a). They are defined by brecciating of the host rock and addition of hydrothermal infill with gold and base metal bearing high salinity fluids.

Economic mineralisation in the Chronos lenses consists of accessory gold, both within and associated with sulphides and in quartz; trace sliver, as lead replacement in galena, as electrum with gold mineralisation (and as dyscrasite? within galena) (Ashley, 2015; Huynh, 2017b); and locally abundant sphalerite and galena and moderate chalcopyrite. There is also locally abundant pyrrhotite and pyrite.

Sulphide mineralisation is mostly from hydrothermal infill, as veinlets and disseminated to locally massive; although a small portion is a replacement product in the host rock, which is mainly pyrite and pyrrhotite, but also includes chalcopyrite, galena and sphalerite.

Characteristically the sulphides are recrystallised and range in grain size up to 2 mm. The sulphides are intergrown with quartz and minor chlorite, sericite and k-feldspar, and can be

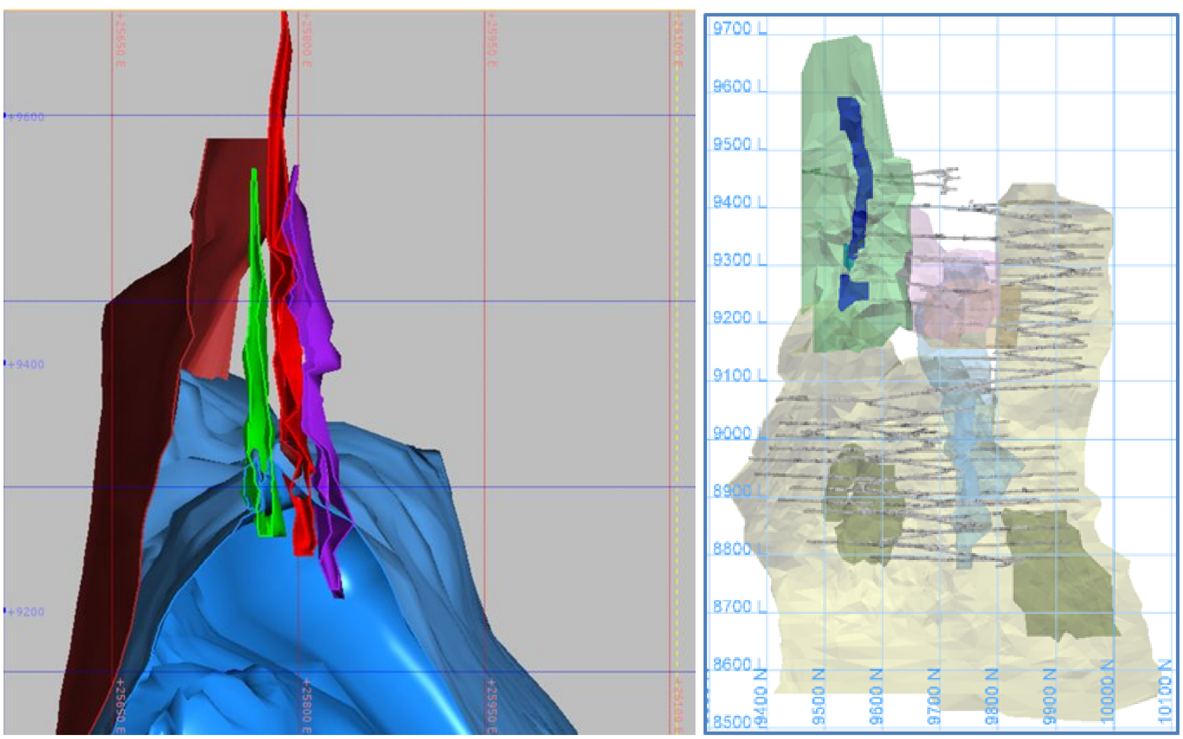
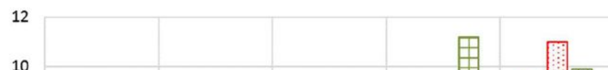


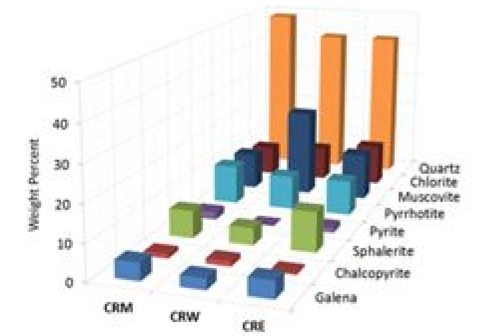
Figure 7: a) Left – cross section, looking north, of the three Chronos lenses, CRW (green). CRM (red) and CRE (purple), with modelled rhyolite (blue) and Peak-Perseverance Shear (maroon); b) Right – longitudinal section,

looking west, showing Perseverance domains, with Chronos in light green and the high grade gold shoot in CRM shown in dark blue. Development wireframes in Perseverance are also shown.

crudely banded. Textures of the quartz and sulphides suggest the mineralisation process was syn-tectonic. Textural relationships in the aggregates of sulphides indicate that pyrite (and arsenopyrite) are paragenetically early. This was followed by pyrrhotite, and subsequently sphalerite, then galena and chalcopyrite. With gold hosted within pyrrhotite grains (Figure 11b) along with in contact with all other sulphides, gold is likely early and remobilised. Sphalerite and galena are closely associated, and silver is strongly associated with lead, with metallurgical test work showing it exhibits an almost 1:1 recovery ratio with lead (Huynh; 2017b).

The colour of the gold in hand specimen and thin section suggests a high fineness. The sphalerite is estimated to have a low to moderate iron content (1-5 %) (Ashley, 2015). Most pyrrhotites in the lenses are of the non-magnetic hexagonal phase.





enses; b) Right - overall mineral distribution in the three

Mineralogically the three lenses are similar (Figure 8 and Table 1), with the main point of difference being the high grade gold core of the CRM lens (Figure 7b shows this core in blue, within the larger Chronos domain, with the other Perseverance domains also shown). Also carbonate minerals have been observed associated with sphalerite and galena veining in the CRW and CRE lenses, typically where sulphide mineralisation is not as abundant in these lenses.

The CRW strikes in a north north-westerly direction, dipping steeply to the east and is dominated by a singular massive sulphide body (vein). The lens consists of, in order of abundance, pyrrhotite, sphalerite, galena, chalcopyrite and trace pyrite, with minor accessory gold. Observations from drilling show that the CRW is relatively thicker in the lower portion of the lens, contained within the rhyolite and narrowing in the upper meta-sedimentary portion of the lens.

Figure 9: Crude Zonation of sulphides in the CRW lens on the left, with, relatively less pervasively, hydrothermally altered meta-sediment on the right (9460 South heading, looking south, 5.5m wide)

On a development face scale we observe the crude banding of sulphides across the lens (Figure 9) and in drill core this was observed on the millimetre band scale in both the CRW and CRE. Alteration is not as pervasive into the host meta-sediments as is seen in the other lenses. However, geotechnically and metallurgically important is the prescence of talc mineralisation within faults in and around the CRW lens.

Table 1: Summary of the minerals making up the three Chronos lenses (Huynh, 2017b).

MINERAL	FORMULA	Master Composite CRW (wt%)	Master Composite CRM (wt%)	Master Composite CRE (wt%)
Quartz	SiO_2	42.7	48.5	42.9
Pyrite	FeS_2	0.2	2.1	1.5
Muscovite	$KAl_2(Si_3Al)O_{10}(OH,F)_2$	**24.6**	**10.3**	**13.3**
Chlorite (ferroan)	$(Fe^{2+},Mg)_5Al(Si_3Al)O_{10}(OH)_8$	**9.5**	**8.3**	**11.6**
Galena	PbS	**3.1**	**4.9**	**4.8**
Chalcopyrite	$CuFeS_2$	**1.4**	**1.2**	**0.5**
Sphalerite	$(Zn,Fe)_S$	**4.8**	**7.7**	**11.2**
Orthoclase	$KAlSi_3O8$	0.6	4.2	2.4
Stilpnomelane	$K(Fe,Mg)_8(Si,Al)_{12}(O,OH)_{27}.nH2O$	0.1	0.1	0.1
Magnetite	Fe_3O_4	1.2	0.9	1.3
Pyrrhotite	$Fe_{1-x}S$	**9.6**	**11.0**	**9.9**
Talc	$Mg_3Si_4O_{10}(OH)_2$	2.2	0.7	0.4

With its high grade gold core, the CRM has been the main focus for PGM. The lens strikes in a north north-westerly direction, dipping steeply to the east, matching the regional cleavage orientation and is the middle of the three Chronos lenses. Strike length is 50-150 m with a width of 4-15 m, with the gold rich core (Figure 7b and Figure 14) being up to 50m in strike length and at the narrower side of the width range.

The Main lens of Chronos is largely brecciated with clasts of original meta-sediment and rhyolite host rocks, with few remnant features, in a matrix of fine grained quartz and sulphides. The sulphides in order of abundance are pyrrhotite, sphalerite, galena, and in a reversal of what is observed in the CRW lens, there is more pyrite than chalcopyrite (Figure 8 and Table 1).

Within the middle of the CRM lens there is a high grade gold shoot that has an orientation very similar to the global orientation of the lenses. The gold mineralisation is closely associated with short lived sphalerite and coarse grained galena veining, commonly found along boundaries between these veins and host rock clasts. However, gold is found accessory to galena, sphalerite, pyrrhotite and chalcopyrite and in the quartz gangue. Grain size is highly variable and in the highest grade areas is up to 15 mm (Figures 10 and 11).

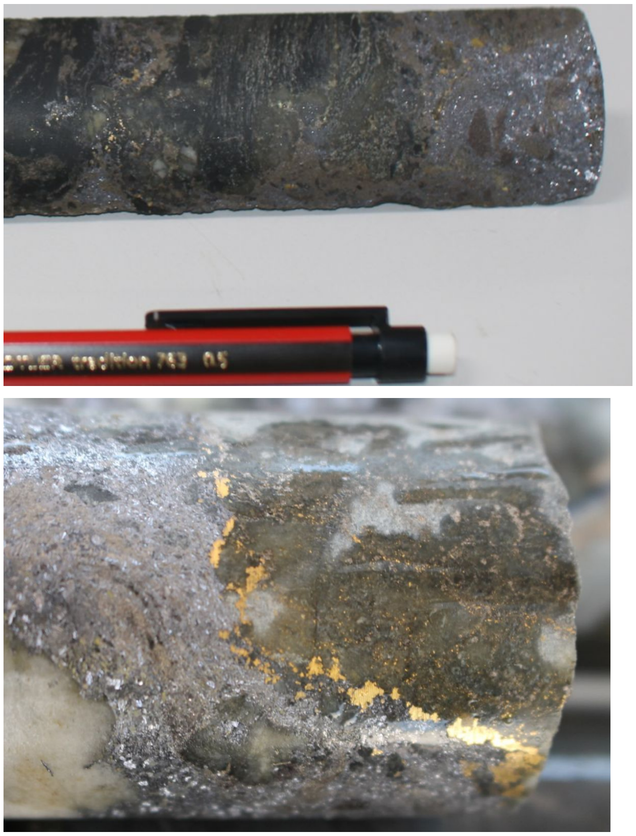


Figure 10: a) Left – Quarter NQ2 core from the CRM lens with gold mineralisation associated with coarse galena, sphalerite and pyrrhotite mineralisation matrix, with altered meta-sediment clasts; b) Right – BQ core from the CRM lens showing coarse gold on the contact between a galena dominant sulphide vein and altered host rock clast.

A one metre sample of core from the CRM lens returned an assay result of 6,920 g/t gold, with other highlights from 2015 exploration being 9m at 310 g/t gold and 8 m at 143 g/t gold (Newgold, 2015).

In hand specimens, abundant large grained gold along the margins of intensely altered clasts of sediments, in association with quartz veining, has been observed (Figure 11a). Also observed is the grain size of the galena, more than likely recrystallised, is an important feature as to the presence of gold. In the few levels of development completed the larger the grain size of galena, up to 2 mm, the higher probability that there will be high gold grade and abundant visible grains of gold.

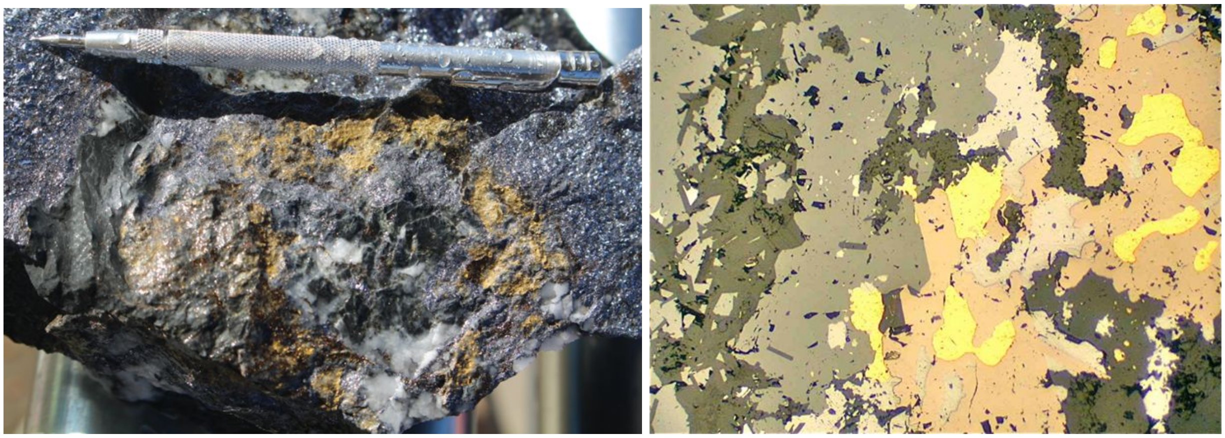


Figure 11: a) Left – Hand specimen from 9350 Level in CRM lens, with abundant visible gold and up to granule sized galena, with sphalerite and pyrrhotite mineralisation within quartz hydrothermal infill and meta-sediment clast breccia. b) Right – Thin section of core from the CRM lens showing a cluster of gold grains, mostly hosted in pyrrhotite, adjacent to the sphalerite-rich band (left) that also has minor galena. The major gangue phase is flaky chlorite (darker grey). Plane polarised reflected light, field of view 1 mm across (Ashley, 2015).

The CRE lens is the easternmost of the three Chronos lenses and like the other two strikes north north-westerly and dips steeply to the east, sub parallel with the regional cleavage orientation. It is the most extensive along strike, being up to 250m long, close to the meta-sediment-rhyolite contact level.

The lens consists of quartz-sulphide rocks that are a matrix support hydrothermal breccia of intensely altered protolith with hydrothermal infill. Differing from the CRW and CRM lenses, sphalerite is the most abundant sulphide in the CRE lens, followed by pyrrhotite, galena, pyrite and trace chalcopyrite. The CRE lens has the lowest gold grade of the Chronos lenses.

Like the CRW lens, the CRE lens shows crude banding of sulphides on both a mine and thin section scale (Figure 12a), with this banding also evident in sphalerite of differing iron content (Figure 12b). This exists in conjunction with areas where the major sulphides are variably intergrown with each other and quartz.

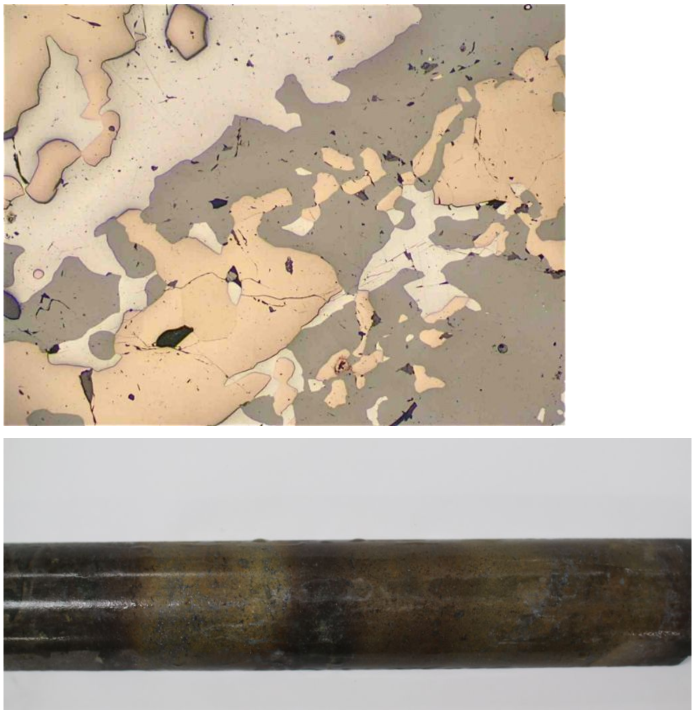


Figure 12: a) Left – Thin section of core from the CRE lens showing crudely banded aggregate of intergrown medium grained sphalerite (mid grey), pyrrhotite (pale brown) and galena (silvery grey). Plane polarised reflected light, field of view 2 mm across (Ashley, 2015); b) Right – NQ2 drill core from the CRE lens showing bands of sphalerite of different compositions (varying iron content).

Petrographic work on drill core from the Chronos lenses identified several trace minerals. Hosted in the hydrothermal infill there are trace amounts of sparse grains of apatite, titanate and rutile. Hosted within the dominant sulphides are trace amounts of small grains of arsenopyrite and boulangerite, with possibly dyscrasite (Ag_3Sb), observed hosted with galena (Ashley, 2015).

Metallurgical evaluation has also identified minor (c. 1 %) magnetite and trace amounts of stipnomelane, stannite, tetrahedrite, native bismuth and bismuthinite (Huynh, 2017b; McArthur, 2015a and 2015b).

Mineral Resources

With locations shown in Figure 13, PGM has a global reserve of 2.7 Mt at 2.83 g/t gold and 1.32 % copper, with a mineral resource (inclusive of reserves (and Great Cobar not on figure)) of 9.2 Mt at 1.88 g/t Au and 1.64 % Copper as at December 31, 2016 (Newgold, 2017b). These figures include the high grade gold shoot of the CRM lens but not the larger base metal envelope surrounding this in the CRM or the CRW and CRE lenses.

The inferred mineral resource, exclusive of the reserves in the Chronos lenses of the Southern Mine Corridor is 1.4 Mt at 0.73 g/t gold, 35.3 g/t silver, 0.34 % copper, 5.93 % lead and 6.23 % Zinc (Newgold, 2017b).

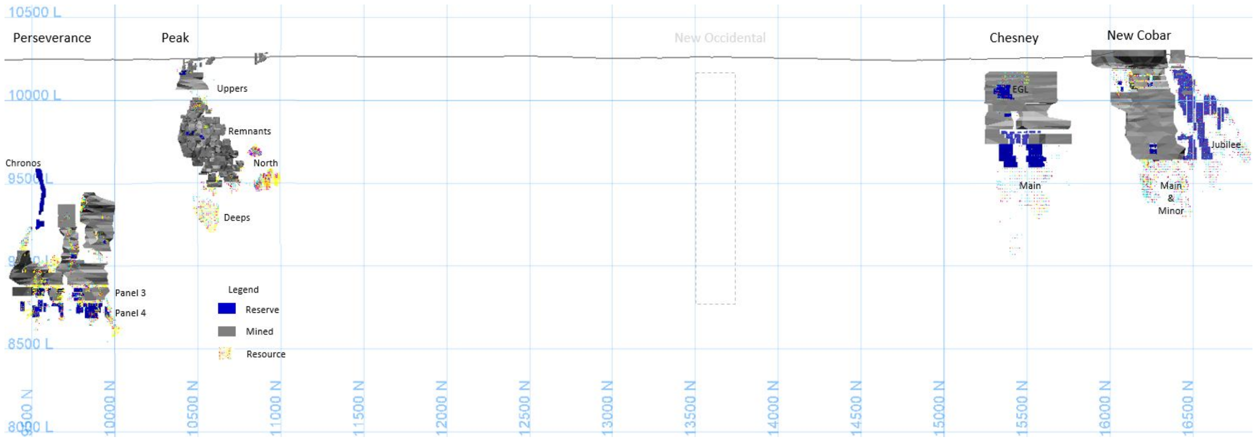


Figure 13: Longitudinal section looking west illustrating PGM's active mining areas and the current Reserves and Resources (as at December 31, 2016, excluding Resource at Great Cobar), Chronos Reserves can be seen on the far left.

Evaluation drilling is completed to a roughly 25 x 25 m spacing using NQ2 core, that is cut along the long axis prior to sampling and analysis. The delineation drill spacing is on a roughly 10 x 12.5 m pattern using BQ core and has focused on the high grade gold zone in the CRM lens. Gold grades in the CRM lens are extremely irregular ranging from uneconomic to over 1,000 g/t, with a maximum of 6,920 g/t, over short distances. This results in highly skewed gold data, with a CV of 32.

A 10 x 10 x 2m block model is constructed around the logged Chronos lens domains with anisotropic search ellipses with elongations determined from prior experience in the Perseverance deposit and observations from drill core logging and underground mapping.

The estimation methods used at Chronos were MIK for gold and OK for other elements and density. The threshold for gold was at the 99.5 percentile which was constrained by the median and the high grade estimate was constrained by the geology wireframe of the high grade gold shoot. These constraints are in line with reconciliation of the bulk sample mined and processed in late 2015.

Table 2: Summary of the metal contained in the reserve for the CRM lens

Chronos	Class	Kt	Au g/t	Ag g/t	Cu %	Pb %	Zn %	Bi ppm	NSRT value
	Measured	110	17.44	64.91	0.84	8.23	3.42	66	$ 866
	Indicated	78	12.83	50.65	0.49	7.69	3.45	50	$ 631
	Inferred	0.46	22.93	21.61	0.11	1.08	0.90	26	$ 1,065
Grand Total		190	15.52	58.82	0.69	7.99	3.43	59	$ 768

Table 2 illustrates the estimated resource for the gold core reserve of CRM lens and this reserve is illustrated in Figure 15. This reserve will be mined out over the next two years and complement production from PGM's other active mining areas.

Mining

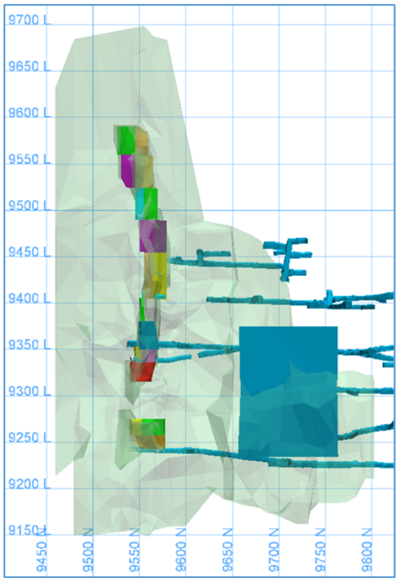


Figure 14: Reserves (multi-coloured wireframes) in the gold core of the CRM (Chronos domain – light green), with development wireframes and mined out Hercules lens area also shown (blue).

To date, mining has concentrated on extracting the high grade gold core (see Figure 7b and 14) of the CRM. Development design has taken in to account the presence of the CRE and CRW lenses, with considerations for future mining. However, design has been optimised for the short strike length of the gold core of the CRM. Extraction has taken the form of sublevel open stoping that is utilised across all of PGM's actively mined deposits and made use of existing equipment and where possible infrastructure.

Underground development is carried out using standard electric-hydraulic twin-boom jumbo drills with emulsion for blasting. Levels are driven along strike in the ore, a slot is developed and a stope is blasted into the void. Ore is extracted and waste rock is used to backfill the void. Waste rock is introduced to the mined out section for stability and to reduce the need for pillars and cemented rock fill is used to increase stope stability and maximize ore recovery (Newgold, 2017b).

Proximity to the Zone A and Hulk lenses enabled development to take-off from pre-existing sublevels on the lower levels of the Chronos lenses (mine levels 9225 -9405), with development on the 9460 level utilising the exploration drive and then an incline required to access the higher up levels from the 9460.

The CRM lens now provides a complement to the Zone D lens as an ore source from the Perseverance deposit. However, due it's metallurgical differences it is batched through the processing plant and not blended with the other deposits like Zone D ore.

In late 2015, an initial bulk sample of 16,000 t was mined from the 9350 Level and from up holes fired above it. This helped PGM overcome the challenges slowed production in Zone D had produced and meet production guidance for 2015 and provided the opportunity to batch the material through the mill, that could then be used to reconcile model, grade control and mill figures and assist the mill in finding the optimal setup to process Chronos lens ore.

Metallurgy

The processing plant at PGM has currently been configured to handle gold-copper ore, with a variable gold head grade and a copper head grade of approximately 1 %, to produce gold doré and a copper concentrate for sale. This is done through a three stage process after comminution. The SAG and Ball mill have a target output particle size of P_{80} of 75 µm.

Initially the stream enters the gravity circuit that consists of cyclones, Knelson concentrators and a Gekko inline leach reactor, to recover as much gold as possible, after which the tail from this stream then heads to the floatation circuit.

The floatation circuit is used to recover as much chalcopyrite as possible, with small quantities of gold also recovered here that goes to produce a copper concentrate. The tail from this goes on to the CIL circuit where remaining gold is recovered and combined, after electrowinning, with the gold recovered from the gravity circuit.

The relatively low copper grade, combined with the high lead and zinc grades of the Chronos lenses has meant that the plant needs to handle the Chronos ore separately in order to realise the contained value of the lead and zinc in the ore and prevent contaminating the copper concentrate with high lead and zinc concentrations.

Prior to a bulk sample being extracted from the CRM, core samples from throughout the Chronos lenses were sent for extensive metallurgical test work to work out the optimal plant setup and give a benchmark for mill operations going forward. A particular focus was to maximise the gravity recoveries of gold from the core gold shoot within the CRM lens and the performance of the floatation circuit with regard to lead and zinc recovery.

In late 2015, a 16,000 t bulk sample was processed through the mill in isolation. Development samples were sent to an independent metallurgist for testing. Results from this, along with results from core tests, were compared to the actuals when the bulk sample was processed. High variability of gold, lead and zinc content in the bulk sample ore compared to the more homogenised test work samples that were used, meant gravity and overall recoveries were highly variable and lower than expected.

Results from test work show that Chronos is highly amenable to gravity recovery and up to 70 % can be achieved through the gravity circuit. Although this was achieved on certain days during the bulk sample processing, it varied between 10 and 70 %, with higher gold head grade correlating with higher gravity recovery.

Flotation test work carried out discovered that saleable combined lead-zinc or individual lead and zinc concentrates can easily be produced from all three lenses. Additional work is required to depress zinc recovery into the lead concentrate if two separate concentrates are produced, as it has yet to be determined if liberation or flotation selectivity is the cause of this.

Quartz, muscovite and chlorite are the main hydrophilic gangue minerals present. Talc found close and associated with the CRW lens will cause some issues with the milling properties of the western lens, and at present we have yet to process any of this development.

Exploration History

Perseverance was discovered in 1994 and production commenced in 2003, with its exploration history well documented by Taylor (2010; 2011). In 1999, drill hole UD99PE0020 yielded a narrow intercept with relatively high lead and zinc values, that was located above and south of Perseverance Zone A (Figure 15). At the time, this was not followed up on, with gold and copper intercepts the priority.

In 2014, five exploration drill holes UD14PE0379-83 (Figure 15) followed up on this elevated lead and zinc with these holes intersecting three distinct massive sulphide mineralised zones, the CRE, CRM and CRW lenses. Assay results ranged from 0.5 g/t to over 600 g/t gold, 5 to 50 % lead and 2 to 30 % zinc.

Since these holes, PGM has drilled over 160 further holes to explore and delineate the Chronos lenses. This has totalled c. 50,000 m of diamond drill core (Figure 15). This very quickly brought Chronos from a prospect into production, with a significant portion of PGM's gold production coming from the gold core of the CRM lens in 2017 (Figures 7b and14). A key driver for this shift of focus from Zone D into Chronos was the mining induced seismic activity posing extraction difficulties in the lower southern portions of Zone D.

Later this year further drilling above and below the current resource and reserves will take place to add to the current inventory as the upper and lower limits of the lenses have yet to be defined. There has also been some follow up drilling from the surface, to explore and define the upper extents of the Chronos lenses.

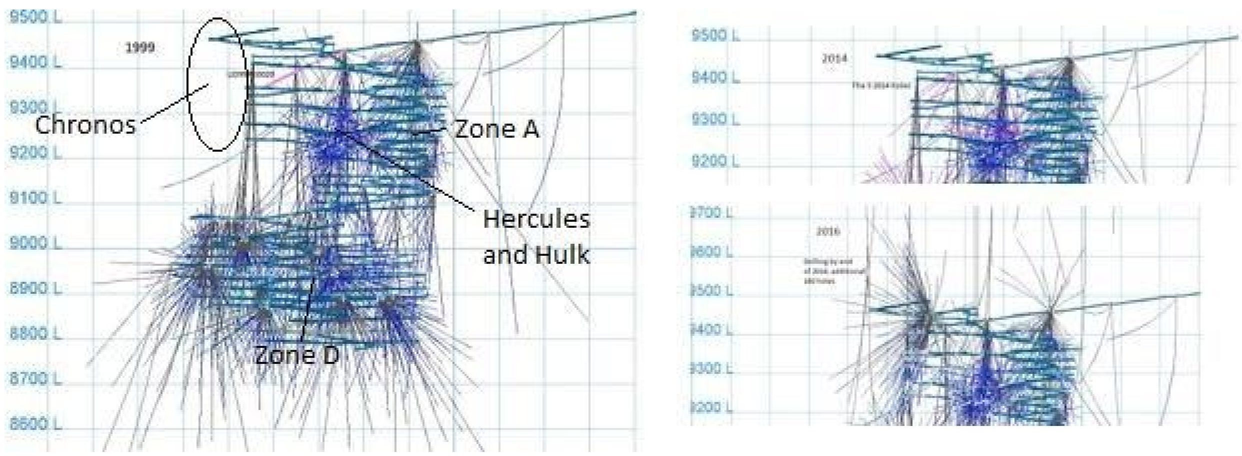


Figure 15: Longitudinal sections looking west of the development wireframes and drill holes in the Perseverance deposit. Clockwise from the left: Hole UD99PE0020 (pink trace) was the first hole to encounter significant mineralisation in the Chronos area, with drilling to 2013 also shown and location of Perseverance lenses; Drilling in 2014 added, showing holes UD14PE0379-83; Drilling from 2015 and 2016 added to illustrate the intense campaign of drilling completed by PGM into the Chronos lenses.

Conclusions

The Chronos lenses of the Perseverance deposit have proved to be a valuable addition to PGM's reserve inventory. With challenges being presented by currently mined ore bodies, following up on anomalous results needing further work to be explained, has proven to be a recipe for success in this instance.

Also, diligent work on the geology, when working in a production environment and company efforts are focused on matters with economic impact, has proven fruitful and maximises exploration dollars.

Working with management that understand one drill hole doesn't make or break a deposit, with the opportunity to drill and explore areas of interest is vital (i.e. not risk adverse management).

There is still a great deal to learn about the lenses, with significant development only occurring in the CRM lens and only one short drive in the CRW, and no development into the CRE to date.

Further Work

PGM continues to do delineation and exploration drilling within, and surrounding, the known Perseverance deposit. Discovery of extensions to the, and further, mineralisation is highly likely given the areas that remain under explored and the fact the deposit has not be closed off.

Above and below current Chronos reserves will be a prime focus once drilling platforms become available. This will test the Chronos lenses away from the rhyolite-meta-sediment contact, in meta-sediments above and rhyolite below. Proximal to the Perseverance deposit the eastern side of Nurri anticline is also an area worthy of attention.

Mapping and data collection will be ongoing as the gold core of the CRM is mined out and when development proceeds in the CRW and CRE lenses.

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