Ivanplats Limited

Platreef Project

Limpopo Province, Republic of South Africa

NI 43-101 Technical Report on Updated Mineral Resource Estimate

Submitted by:
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Mr. Timothy Kuhl, RMSME
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Prepared for: Ivanplats Limited
Effective Date: 13 March 2013
Project Number: 172476

CERTIFICATE OF QUALIFIED PERSON

I, Harry Parker, Ph.D., RM SME., am employed as a Technical Director with AMEC E&C Services, Inc. (AMEC).

This certificate applies to the technical report entitled "Ivanplats Limited, Platreef Project, Limpopo Province, Republic of South Africa, NI 43-101 Technical Report on Updated Mineral Resource Estimate", that has an effective date of 13 March 2013 (the "Technical Report").

I am a Fellow of the Australian Institute of Mining and Metallurgy (#113051), and a Registered Member of the Society for Mining, Metallurgy and Exploration (#2460450). I graduated from Stanford University with BSc and PhD degrees in Geology in 1967 and 1975 respectively. I graduated from Harvard University in 1969 with an AM degree in Geology. I graduated from Stanford University with an MSc degree in Statistics in 1974.

I have practiced my profession for 45 years during which time I have been involved in the estimation of mineral resources and mineral reserves for various mineral exploration projects and operating mines. I have either estimated or audited Ni, Cu and PGE resources for a number of mineral deposits, including the Spruce Road deposit (Minnesota), Area 5 deposit (Maine), Stillwater (Montana); McCreedy East (Ontario), and Voiseys Bay (Labrador).

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

I have visited the Platreef Project (the "Project") on many occasions from September 2001 to September 2003, in 2009, 2010, 2011, and most recently between 16 and 21 November 2012.

I am responsible for Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27 of the Technical Report.

I am independent of Ivanplats Ltd as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Platreef Project since 2001 during which time I have prepared or supervised mineral resource estimates on the Project. I have previously prepared a technical report on the Project entitled:

Parker, H., Kuhl, T., and David, D., 2012: Ivanplats Limited, Platreef Project, Limpopo Province, Republic Of South Africa, NI 43-101 Technical Report: unpublished report prepared by AMEC E&C Services Inc. for Ivanplats Limited, effective date 20 August 2012.

I have read NI 43–101 and those portions of the Technical Report for which I am responsible have been prepared in compliance with that Instrument.

As of the date of this certificate, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated: March 22, 2013

"Signed and sealed"

Dr Harry M. Parker, RM SME.

CERTIFICATE OF QUALIFIED PERSON

I, Timothy O. Kuhl., am employed as a Principal Geologist with AMEC E&C Services, Inc.

This certificate applies to the technical report entitled "Ivanplats Limited, Platreef Project, Limpopo Province, Republic of South Africa, NI 43-101 Technical Report on Updated Mineral Resource Estimate", that has an effective date of 13 March 2013 (the "Technical Report").

I am a Registered Member of the Society for Mining, Metallurgy and Exploration (#1802300). I graduated from the South Dakota School of Mines and Technology with a Bachelors of Science degree in Geological Engineering in 1975 and a Masters of Science degree in Geology in 1982.

I have practiced my profession continuously since 1982. I have been involved in estimation of mineral resources for various mining and exploration projects for commodities including gold, copper, platinum, palladium and nickel.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43–101 *Standards of Disclosure for Mineral Projects* (NI 43–101).

I visited the Platreef Project (the "Project") from 26 March to 9 April, 2010, and again from 19 July to 3 August 2011, from 25 January to 3 February 2012, and from 27 November 2012 to 12 December 2012.

I am responsible for Section 14 of the Technical Report.

I am independent of Ivanplats Ltd as independence is described by Section 1.5 of NI 43–101.

I have been involved with the Platreef Project since 2007 during which time I have prepared mineral resource estimates on the Project.

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I have read NI 43–101 and those portions of the Technical Report for which I am responsible have been prepared in compliance with that Instrument.

As of the date of this certificate, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated: March 22, 2013

"Signed and sealed"

Timothy O. Kuhl, RM SME.

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22 March 2013

CERTIFICATE OF QUALIFIED PERSON

Michael M. Valenta Pr.Eng (Int) FSAIMM
Managing Director
Metallicon Process Consulting (Pty) Ltd

I, Michael Matthew Valenta Pr.Eng (Int) FSAIMM, am the founder, managing director and chief consulting metallurgist with Metallicon Process Consulting (Pty) Ltd (**"Metallicon"**).

This certificate applies to the technical report entitled "Platreef Project, Limpopo Province, Republic of South Africa, NI 43-101 Technical Report On Updated Mineral Resource Estimate", that has an effective date of March 13, 2013 (the "**Technical Report**").

I am a registered professional engineer (no. 970402) on the register of the Engineering Council of South Africa as well as a registered professional engineer (no. 2003 60005) on the international register as defined by the Washington Accord. I am also a Fellow (no. 55644) of the Southern African Institute of Mining and Metallurgy. I am a member (no. 11354) of the Mine Metallurgical Managers' Association of South Africa and have served on the council and am a past president of the Mine Metallurgical Managers' Association of South Africa. I am a graduate of the University of the Witwatersrand, South Africa, with a BSc. in Extractive Metallurgy (1990).

I have been practicing as a metallurgical engineer continuously since 1991 and have 22 years' experience in metallurgy. I have been involved in research and development, plant operation, project management, plant design, plant optimization, due diligence studies and management in Africa, South America and Australia. My research and development experience has been in the formal research sector with Mintek in South Africa, and well as with my other employers throughout my experience. As a chief consulting metallurgist with Metallicon since 2005 I have managed and overseen a number of test work programmes for clients with institutions such as Mintek and SGS.

My formal design experience was gained as consulting metallurgist with Hatch Africa for three years prior to the establishment of Metallicon in 2005.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects ("**NI 43-101**").

I have not visited the site of the project as yet however I have been to Mintek to view the core samples, observe flotation tests and meet with the Mintek team in formal meetings (September 4, 2012).

I am responsible for Section 13 and those portions of the Summary, Conclusions and Recommendations that pertain to that section of the Technical Report.

I am independent of Ivanplats Limited as independence is described by Section 1.5 of NI 43-101.

I have been involved with the project since 2012 and have been reviewing the metallurgical test work and metallurgical design.

I have read NI 43-101 and those portions of the Technical Report for which I am responsible have been prepared in compliance with that Instrument.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make those sections of the technical report not misleading.

Michael M. Valenta   Pr. Eng (Int)   FSAIMM
Managing Director

Dated : 22 March 2013

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IMPORTANT NOTICE

This report was prepared as National Instrument 43-101 Technical Report for Ivanplats Limited (Ivanplats) by AMEC E&C Services Inc (AMEC). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in AMEC's services, based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Ivanplats subject to terms and conditions of its contract with AMEC. Except for the purposed legislated under Canadian provincial and territorial securities law, any other uses of this report by any third party is at that party's sole risk.

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1.0 SUMMARY

AMEC E&C Services Inc. (AMEC) was commissioned by Ivanplats Limited (Ivanplats) to prepare a NI 43-101 Technical Report (the Report) for the wholly-owned Platreef nickel–copper–gold–platinum group element (PGE) project (the Project) located near Mokopane, in the Limpopo Province of the Republic of South Africa (Figure 2-1).

The report is prepared in support of Ivanplat's press release dated 6 February 2013, entitled "Flatreef Discovery expands to 29.2 million ounces of platinum, palladium, rhodium and gold in Indicated Mineral Resources, plus an additional 44.0 million ounces in Inferred Mineral Resources, at a 2.0 g/t 4PE cutoff".

Ivanplats holds a 90% interest in Prospecting Right LP30/5/111/2/872PR and is operator. Ivanplats holds a 90% interest in Prospecting Right LP30/5/111/2/872PR and is operator. A consortium of Japanese entities including Itochu Corporation (Itochu), ITC Platinum (ITC- an affiliate of Itochu), Japan Oil, Gas and Metals National Corporation (JOGMEC), and Japan Gas Corporation (JGC) =holds the remaining 10% direct interest. A joint venture with Atlatsa Resources Corporation covers Prospecting Right No. LP30/5/111/2/740PR. Together, these prospecting rights form the Project.

1.1 Key Findings

The following are key outcomes of work to date:

- The 2011–2012 drilling program focused on a 2.9 km^2 area (Area 1), and reduced the drill spacing from 400 m to 100m. This enabled detailed logging and correlation of a cyclical sequence of norites, pyroxenites and harzburgites, analogous to the Merensky Reef
- The cyclic unit at Area 1, named by Ivanplats the Turfspruit Cyclic Unit (TCU) has average true thicknesses of 24 m at a 2 g/t 4PE (Pt+Pd+Au+Rh) cutoff grade. Average grades are 4.1 g/t 4PE. By comparison the Merensky Reef averages similar grades over 1 to 2 m
- The detailed drilling at Area 1 confirmed the previous (March 2011 Mineral Resources; because of the 100 m hole spacing, the TCU has been classified as Indicated Mineral Resource in Area 1. There are additional Inferred Mineral Resources in TCU and adjacent mineralization surrounding Area 1
- The TCU and immediately adjacent mineralization can be mined by mechanized selective underground mining methods at depths of 600 to 900 m. Mineral Resources are as follows:

- At a 2 g/t 4PE cutoff grade there are Indicated Mineral Resources of 210 Mt averaging 1.83 g/t Pt, 1.89 g/t Pd, 0.29 g/t Au, 0.12 g/t Rh (4.13 g/t 4PE), 0.34% Ni, and 0.17% Cu
- At a 2 g/t 4PE cutoff grade there are Inferred Mineral Resources of 415 Mt averaging 1.57 g/t Pt, 1.59 g/t Pd, 0.27 g/t Au, 0.11 g/t Rh (3.53 g/t 4PE), 0.33% Ni and 0.16 % Cu

- Metallurgical testwork on TCU composites has shown that a saleable metallurgical concentrate grading ~120 g/t PGEs is readily achievable at estimated recoveries of 85% for Pt, 87% for Pd, 65% for Au, 95% for Rh, 77% for Ni and 68% for Cu. Therefore at this level of study, it is expected that economic recoveries are possible using conventional flotation technology

1.2 Property Description and Location

The Project is located in the Limpopo Province of the Republic of South Africa, with its centroid at about 24º05'S and 28º59'E. The Project is located on three farms: Turfspruit (3,561 ha), Macalacaskop (4,281 ha) and Rietfontein (2,878 ha). The Project is situated on the Northern Limb of the Bushveld Igneous Complex (BIC).

The Project is accessible year-round by paved road, and a developed rail network goes through Mokopane, the closest railhead to the Project. Weather is not expected to affect the ability to conduct year-round mining operations.

A large, unskilled labour force lives in urban areas near and on the farms. These people can be trained, with some skilled trade and professional staff recruited from elsewhere in South Africa. Local town facilities and infrastructure exist to handle an influx of personnel.

An agreement was entered into with Eskom, the South African electricity supplier, to supply 70 MVA of power from an expansion of the national grid that would bring an additional high voltage line near the Project. A further agreement was entered into with Eskom to provide a temporary supply of 5 MVA in support of power requirements during any future construction activities.

The Limpopo province and the Mokopane area in particular, are considered to be particularly water-poor resource areas, and various studies were commissioned to determine the most likely water supply sources for the project. The Department of Water Affairs (DWA) has stated that all water for the Northern Limb (including any potential mining operation on the Platreef Project) would be supplied through the Olifants River Water Resource Development Project (ORWRDP). Under the ORWRDP, a pipeline is to be constructed between Flag Boshielo dam on the Olifants

River to Pruissen and from there to the North of Mokopane including the Platreef and other projects. Ivanplats' continued participation requires contributions to the costs of pipeline construction. In addition to the pipeline, a number of possible water sources to augment the supply system have been investigated by the DWA. A further potential short-term source of water is ground water in the Project area. Ground water sources have been identified, and Ivanplats has applied for water-use licenses from the DWA. AMEC is of the opinion that between these sources, there is a reasonable expectation that the water supply needs for any proposed Project development can be met.

1.3 Mineral Rights, Royalties and Agreements

Platreef Resources (Pty) Limited (Platreef Resources), a subsidiary of Ivanplats, legally holds exclusive prospecting rights for base and precious metals on the Turfspruit and Macalacaskop Farms. Ivanplats acquired a prospecting right for both Turfspruit and Macalacaskop farms in February 1998 and was granted a five-year New Order Prospecting Right (prospecting right) for Turfspruit and Macalacaskop in 2006 (Prospecting Right LP30/5/111/2/872PR). Ivanplats recently renewed the prospecting right, which now expires 31 May 2014.

Plateau Resources Limited (Plateau Resources), a subsidiary of Atlatsa Resources Corporation (Atlatsa, formerly Anooraq Resources Corporation), legally holds exclusive prospecting rights for base and precious metals on Rietfontein Farm (Prospecting Right No. LP30/5/111/2/740PR), which is subject to a Settlement and New Project Agreement (the 2009 Agreement) between Atlatsa and Ivanplats dated 11 December 2009. Under the 2009 Agreement, Ivanplats would hold an initial interest of 94% in the Property, and Anooraq a 6% interest in the Property, provided that the joint venture contemplates an open-pit mining operation that incorporates the Rietfontein mineral property. Anooraq would not hold an interest in an underground mine exploiting resources on Turfspruit and Macalacaskop.

The prospecting right was valid for a five-year period, expiring 27 November 2011. Prior to the expiry date, on 22 August 2011, Plateau Resources lodged an application to renew the prospecting right for a three-year extension of term. As at the effective date of the Report, the renewal was still pending.

Atlatsa is obligated to make payments necessary to keep the Rietfontein prospecting right and other filings in good standing subject to the terms of the 2009 Agreement with Ivanplats. Legal opinion indicates that a separate agreement between the South African-registered subsidiaries may be required to support the 2009 Agreement.

To support any future mining activities, prospecting rights are required to be converted to mining rights. Ivanplats has made an application to convert Prospecting Right LP30/5/111/2/872PR to a mining right.

A royalty payable to the South African government on production from any future mining operations depends on whether the mined product will be classified as either a refined material (capped at 5%), or unrefined material (capped at 7%).

In October 2010, Itochu acquired a 2% interest in Prospecting Right LP30/5/111/2/872PR from Ivanplats. On 26 May, 2011, Itochu through ITC, and in consortium with JOGMEC and JGC, announced the acquisition of an 8% direct interest in Prospecting Right LP30/5/111/2/872PR from Ivanplats at a cost of 22.4 B yen (approx US$280 M), and have concluded a Joint Operation and Investment Agreement with Ivanplats (JOIA). Consequently, the Itochu corsortium holds an aggregated interest of 10% in Prospecting Right LP30/5/111/2/872PR; Ivanplats owns the remaining 90%. The consortium's cash contribution under the JOIA continues to be applied to exploration and development of the Project

1.4 Environment and Socio-Economics

Baseline biophysical environmental studies were initially completed in 2003 and updated in 2007 as changes in the environmental regulatory framework took place. Under the terms of the Mineral and Petroleum Resources Development Act (2002), a Social and Labour Plan must be submitted as part of any mining rights application submission and should demonstrate how a project will contribute towards the socio-economic development of the area in which the mine will operate. An Environmental Impact Assessment (EIA) and Environmental Management Plan Report (EMPR) are required to be submitted 180 days after the submission of a mining rights application.

In 2011, Ivanplats commissioned Digby Wells Environmental to develop a detailed scope of work to provide Ivanplats with appropriate baseline data to be used to support an application for mining rights. These studies will include environmental, archaeological, cultural, heritage, community, and resettlement baseline data, and likely impacts of Project development.

1.5 History and Exploration

Exploration on the Platreef dates back to the 1960s, after which Rustenberg Platinum Holdings Limited, a wholly-owned subsidiary of Anglo American Platinum Corporation, began exploration over the Platreef in the 1970s. None of this historical information was available to AMEC.

Ivanplats acquired a prospecting licence for both Turfspruit and Macalacaskop farms in February 1998 and subsequently entered into a joint venture with Anooraq over the Rietfontein farm in 2001. The joint venture agreement was updated in 2009.

The initial exploration focus was on delineation of mineralization that could support open-pit mining. Ivanplats contracted a series of consultants to provide various studies involving concentrator/smelter options (Hatch in 2003), metallurgical testwork (Mineral Development Services Ltd. in 2003), and conceptual mining studies to assess reasonable prospects of developing an open-pit operation (African Minerals and AMEC in 2004). Mining cost assumptions were updated to the end of 2006, and capital and operating costs were updated in 2007 to support mineral resource assessments.

In 2007, Ivanplats commenced a deep drilling program to investigate the continuity and grade in an area targeted as having underground mining potential. This resulted in a series of unpublished Mineral Resource estimates assuming underground mining methods and updates being prepared at various times between September 2010 and January 2011. A March 2011 resource update was published in September 2012.

Work completed on the Project to date includes geological mapping, airborne and ground geophysical surveys, limited trenching, percussion drilling over the Platreef sub-crop, core drilling, petrography, density determinations, metallurgical testwork, preliminary mineralogical studies, and Mineral Resource estimation. Preliminary mining and supporting studies have commenced.

1.6 Geological Setting and Mineralization

The Platreef comprises a variably layered, composite norite–pyroxenite–harzburgite intrusion that lies at the base of the Northern Limb of the Bushveld Complex, in contact with metasedimentary and granitic floor rocks. The variability of lithology and thickness along strike is attributed to underlying structures and assimilation with local country rocks.

Within the Project area, four major cyclic units have been recognized which correlate well with the Upper Critical Zone (UCZ) rock sequence described for the main Bushveld Complex. The Turfspruit Cyclic Unit (TCU) is the main mineralized cyclic unit; this unit is analogous to the Merensky Cyclic Unit (MCU) that contains the Merensky anorthosite and pyroxenite and hosts the Bushveld's principal mineralized reefs. The TCU is laterally continuous across large parts of the Project area. Mineralization in the TCU shows generally good continuity and is mostly confined to pegmatoidal orthopyroxenite and harzburgite. Variations across the Project area in the stratigraphic footwall of the TCU, and in thickness and lithology (facies) within the TCU, are interpreted as related to potholes.

Other cyclic units that have been identified adjacent to the TCU are the Norite Cycles (NC1 and NC2), Pseudo Reef, and UG2. Contamination of the Platreef units by assimilation of Transvaal Supergroup metasedimentary rocks can occur within any of the stratigraphic horizons; however, it is predominantly confined to the units below the TCU. To date, no evidence of the existence of Lower Critical Zone lithologies have been found within the Turfspruit area, although Lower Zone mafic to ultramafic rocks have been intersected in many deep holes within the Project area.

Within the TCU, high-grade PGE–Ni–Cu mineralization is consistently hosted within an unconformable, non-cumulate, pegmatoidal, mafic to ultramafic sequence, commonly bound by chromitite stringers and containing coarse-grained to pegmatoidal sulphides; this is known as T2. The T2 pegmatoid is subdivided into an upper pyroxenitic unit (T2 Upper) and a lower olivine-bearing pyroxenitic or harzburgitic unit (T2 Lower). Overlying this pegmatoidal package is a barren non-pegmatoidal feldspathic pyroxenite unit of variable thickness, termed T1. A second mineralized zone, called T1m, of disseminated, medium- to coarse-grained sulphides, is perched near the top of the T1 feldspathic pyroxenite.

A geographical demarcation of the Project area into five zones (Zone 1 to Zone 5) has been developed based on exploration criteria. Three distinct geological features are recognized within these zones and include the following:

- A double reef package informally termed the Bikkuri Reef, wherein an upper pyroxenite-dominated and mineralized sequence (the Bikkuri Reef) is separated from a thicker, mixed-lithology sequence by Main Zone and metasedimentary lithologies
- Three different areas where TCU lithologies show significant thickening into what appear to be large depressions or “pothole” depressions controlled by existing pre-Bushveld fold structures
- Presence of a flat-lying portion of the TCU (“Flatreef”) that is related to structural controls.

A unique feature recognized within Zone 1 is the “Flatreef” portion of the Platreef, initially recognized as being approximately flat-lying compared to the steeper-dipping reefs within the Open Pit (Zone 4) area. The subhorizontal geometry of the TCU within the “Flatreef” appears to be broadly controlled by faults active after the deposition of the layered rocks of the UCZ and TCU, which may be reactivated older faults. The “Flatreef” in essence appears to contain better-mineralized T2 mafic to ultramafic units compared to the surrounding areas, where the T1 and T2 reefs occur in closer proximity to each other.

The most noticeable structural feature recognized within the TCU is a large depression that occurs within the eastern part of Zone 1, where significant thickening of the NC1 and the upper (T1) stratigraphic layer of the TCU occur. This depression contains a distinct thickening of the T1 feldspathic pyroxenite. A similar depression (only partly drilled) is present towards the northwestern edge of Zone 1. However, in this case, thickening of both the TCU as well as its footwall units appears to have occurred. A third depression occurs mainly in the Zone 2 area in the northern part of Macalacaskop farm. These depressions are interpreted to represent "potholes" analogous to those known in the Merensky Reef.

Detailed drilling in Zone 1 demonstrates that, at the current ±100m scale of drilling resolution, perturbations in TCU structure contours appear to have resulted more from potholes and faults, than from folding or basement topography.

Pyrrhotite, pentlandite and chalcopyrite occur as interstitial sulphides in the TCU lithologies. Platinum group minerals are mainly present as PGE–sulphides, PGE–BiTe and PGE–As alloys, that are fine-grained (< 10 µm) and may occur within base metal sulphides, on their rims, or encapsulated in silicates.

1.7 Drilling

Drilling on the Project has been undertaken in two major phases; the first from 2001 to 2003 termed the open-pit program. The second phase ran from 2007 to 2012 and is termed the underground program(s). From the 954 core drill holes (excluding re-drilled mother holes and all deflections) a total of 624,248 m were drilled and completed by 26 October 2012; this included 555 holes (194,591 m) from the open-pit program and 399 holes (429,657 m) from the underground program. Exploration drilling was halted on 26 October 2012 and has not yet recommenced.

Standardised geological core logging conventions were used to capture information from drill core. Geotechnical logging has been undertaken on selected drill cores. In the majority of instances, core recovery averaged 100%. The recoveries do indicate a substantial decrease within faulted/sheared zones. Collar surveys were conducted by a licenced land surveyor on all completed holes. The majority of drill holes are down-hole surveyed. All unsurveyed drill holes in the area that may potentially have Mineral Resources amenable to open-pit mining are vertical and range in depth from 7 to 583 m. All drill holes in the area that may potentially be amenable to underground mining have been down-hole surveyed by either gyroscopic (gyro) and/or electronic multi-shot (EMS) instruments.

1.8 Sample Preparation, Analyses and Security

Over the duration of Ivanplats' work programs, sample preparation and analyses were performed by accredited independent laboratories, including Set Point Laboratories (Set Point) in Johannesburg, Lakefield Laboratory (Lakefield; now part of the SGS Group) in Johannesburg, Ultra Trace (Ultra Trace) Laboratory in Perth, Genalysis Laboratories, Perth and Johannesburg (Genalysis), and SGS Metallurgical Services (SGS) in South Africa, Acme in Vancouver, and ALS Chemex in Vancouver.

Sample preparation and analytical procedures for samples that support Mineral Resource estimation have followed similar protocols since 2001. The preparation and analytical procedures are in line with industry-standard methods for PGE–Au–Ni–Cu deposits. Drill programs included insertion of blank, duplicate and standard reference material (SRM) samples. The quality assurance and quality control (QA/QC) program results do not indicate any problems with the analytical programs that would preclude use of the data.

Sample security has been demonstrated by the fact that the samples were always attended or locked in the on-site sample preparation facility.

1.9 Data Verification

AMEC reviewed the sample chain of custody, quality assurance and control procedures, and qualifications of analytical laboratories. AMEC is of the opinion that the procedures and QA/QC control are acceptable to support Mineral Resource estimation. AMEC also audited the assay database, core logging, and geological interpretations. These are acceptable to support Mineral Resource estimation.

1.10 Mineral Processing and Metallurgical Testing

There have been a number of metallurgical test work campaigns and conceptual flow sheet designs carried out for the treatment of Platreef mineralized material since 2001. Metallurgical test work has focused on maximising the recovery of platinum group elements (PGEs) and base metals, mainly nickel, whilst producing an acceptably high grade concentrate suitable for further processing and/or sale to a third party.

Until 2006, metallurgical test work was carried out mainly on lower-grade shallow material from the potentially large open-pit area, flotation recoveries and concentrate grades were generally low, resulting in the necessity for further processing on site via combinations of smelting, converting and magnetic separation; hydrometallurgical treatment was also considered.

Between 2008 and 2011, with the advent of the deep drilling exploratory program, test work was performed on high-grade composite samples (approximately 0.4% Ni, 0.2% Cu and 1.6 g/t 3PE (Pt+Pd+Au). The high-grade test work results were promising and indicated that there was a strong possibility of increasing concentrate grade and recovery.

During 2012–2013, work completed included mineralogical examination and flotation testwork.

The major PGM species present are PGE–bismuth tellurides, PGE–arsenides and PGE sulphides. PGM recovery by flotation at the grind size of the submitted sample (80% -75 µm) is estimated to be between 85% and 93%.

The metallurgical projection indicated a final concentrate grading 123 g/t 3PGE at 82.9% recovery.

Although this 2012–2013 test work is preliminary, it did indicate that an effective flow sheet will involve several stages of cleaner flotation with recycle of the re-cleaner and re-re-cleaner stage tailings. All of the geometallurgical units and the two blends produced acceptable smelter-grade final concentrates at acceptable recoveries. Calculations to simulate the effect of recycles from open circuit tests indicated a concentrate containing 120 g/t 4PE at a recovery of 85% on a composite sample, which was estimated to be comparable to the likely as-mined run of mine mineralized material.

Any future processing plant is likely to consist of a relatively standard flotation concentrator targeted at producing a saleable concentrate.

1.11 Mineral Resource Estimates

Three mutually exclusive Mineral Resource Models have been constructed:

- Mineral Resources amenable to open-pit mining methods occur to the 650 m elevation, which is approximately 500 m below the topographic surface. The Platreef has been modelled as a series of dipping layers of norites and pyroxenites, serpentinites (harzburgites), and xenoliths (rafts of hornfels). Nickel, copper, platinum, palladium, and gold were all estimated in each layer using inverse distance to a power interpolation. The Mineral Resource models were completed in 2003.
- Mineral Resources amenable to underground mass-mining methods occur below the 650 m elevation (-500m depth) and are located below the TCU and adjacent (75 m) material. Block-caving and sublevel caving are contemplated. Nickel,

copper, platinum, palladium gold and rhodium were estimated via inverse distance cubed (ID3) interpolation within lithological units such as norites, pyroxenites, harzburgites and mixtures of harzburgites and pyroxenites. These lithologies were interpreted to be stratiform. Stratabound occurrences of contaminated (with floor rocks) and disturbed zones were also modelled and estimated. The Mineral Resource Model was last updated in March 2011.

- Mineral Resources amenable to selective mining methods occur below the 650 m elevation (-500m depth) and near the top of the Platreef. Mechanized drift-and-fill, bench-and-fill and large scale sub level open stoping are being considered. Components of the TCU and adjacent material were modelled deterministically. Two main mineralized zones were modelled with three internal grade shells with nominal cutoff grades of 1, 2 and 3 g/t 3PE (Pt+Pd+Au). Rhodium was not used because assays were incomplete at the time of modelling. Three sets of faults were interpreted using regional structure as a guide to orientation and observed discontinuities in structure contour maps as to dip and dip direction. The lithological units and grade shells were hung on an artificial horizontal plane. Interpolation of nickel, copper, platinum, palladium, gold and rhodium was performed using ID3 interpolation, with validation in the 100 m drill-spaced areas by kriging. The Mineral Resource model was completed in March 2013.

1.12 Mineral Resource Statements

Mineral Resource statements for Mineral Resources amenable to underground mining methods (UMT) and Mineral Resources amenable to open pit mining methods (ATS and AMK) are tabulated in this section.

Mineral Resources are reported on a 100% basis. Attributable ownership is discussed in detail in Section 4.0.

There are two mining scenarios that could exploit mineralization at depth within the Platreef:

- Selective mining within and adjacent to TCU mineralized zones and adjacent to TCU mineralized zones. The selectively-mineable option is considered the Base Case for the purposes of this Report.
- AMEC reviewed the potential to mass-mine lower-grade material, and presents the results as an additional and mutually exclusive case.

AMEC notes that conceptual mining studies are underway, and the preferred option could change, or a mixture of the two options could emerge as the recommended route for Project development.

Other considerations are:

- Concentrator and site G+A costs must be covered for reporting Mineral Resources
- Mining costs have been considered in setting the cut-off ($38/t for the selective case), and for the bulk case (from $9/t to $35/t depending on whether block caving or some method of sub-level mining was used).

1.12.1 Base Case: Mineral Resource Statement (Estimate Assuming Selective Underground Mining Methods)

The TCU and adjacent blocks above T1, between T1 and T2 and below T2 contain higher-grade mineralization that could be mined using selective methods such as long-hole open stoping, drift-and-fill, bench-and-fill, or cut-and-fill.

Table 1-1 shows Mineral Resources lying within and adjacent to the TCU mineralized Zones.

AMEC compared these tonnages, and grades to the tonnages and grades stated in Ivanplats press release dated 6 February 2013. At the 2 g/t and 3 g/t 4PE cutoff grades being considered for scoping studies the AMEC tonnages and grades confirm those stated by Ivanplats. At the 1 g/t cutoff grade there has been some reclassification of Indicated to Inferred related to AMEC's classification of material in the footwall of the TCU that is sparsely sampled as Inferred Mineral Resources.

Table 1-1: Mineral Resource Statement for Mineral Resources Amenable to Selective Mining Methods; Effective Date 13 March 2013, Harry M. Parker RM.SME. and Timothy O. Kuhl, RM.SME.

Indicated Mineral Resources								
Tonnage and Grades								
Cutoff 4PE	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%**
3 g/t	137.0	2.273	2.314	0.347	0.153	5.086	0.375	0.185
2 g/t	214.4	1.830	1.886	0.290	0.124	4.129	0.341	0.168
1 g/t	387.0	1.275	1.339	0.214	0.087	2.916	0.282	0.139
Contained Metal								
Cutoff 4PE		**Pt (Moz)**	**Pd (Moz)**	**Au (Moz)**	**Rh (Moz)**	**4PE (Moz)**	**Ni (Mlbs)**	**Cu (M**
3 g/t		10.0	10.2	1.5	0.7	22.4	1,133.4	558.4
2 g/t		12.6	13.0	2.0	0.9	28.5	1,610.3	794.2
1 g/t		15.9	16.7	2.7	1.1	36.3	2,408.4	1,189
Inferred Mineral Resources								
Tonnage and Grades								
Cutoff 4PE	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%**
3 g/t	211.4	2.085	2.063	0.336	0.143	4.627	0.378	0.183
2 g/t	415.0	1.565	1.592	0.268	0.108	3.534	0.331	0.163
1 g/t	1054.8	0.960	1.018	0.175	0.068	2.221	0.254	0.130
Contained Metal								
Cutoff 4PE		**Pt (Moz)**	**Pd (Moz)**	**Au (Moz)**	**Rh (Moz)**	**4PE (Moz)**	**Ni (Mlbs)**	**Cu (M**
3 g/t		14.2	14.0	2.3	1.0	31.4	1,763.6	855.2
2 g/t		20.9	21.2	3.6	1.4	47.2	3,030.7	1,488
1 g/t		32.6	34.5	5.9	2.3	75.3	5,916.7	3,022

Notes:

(1) Mineral Resources estimated assuming underground selective mining methods are exclusive of the Mineral Resources estimated assuming selective mining methods. The 2 g/t 4PE cut-off is considered the base case for scoping studies in progress; the 3 g/t 4PE cut-off is also being considered.

(2) Mineral Resources are reported on a 100% basis.

(2) Mineral Resources are stated from approximately -200 m to 650 m elevation (from -500m to 1350m depth).

(3) Assumed commodity prices are Ni: $8.81/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz, and Rh: $2,065/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that mining costs (average $40/t) and process, G&A, and concentrate transport costs (average $12.5/t for a 3 Mt/a operation) would be covered. The process recoveries vary with block grade but typically would be 85-90% for Pt, Pd and Rh; 65% for Au and 60% for Ni and 80% for Cu.

(4) Indicated Mineral Resources are drilled on approximately 100 x 100m spacing; Inferred Mineral Resources are drilled on 400 m x 400 m (locally to 400 m x 200 m and 200 m x 200 m) spacing.

(5) Totals may not sum due to rounding

1.12.2 Mineral Resource Statement for Mineralization Amenable to Underground Mining Methods (Estimate Assuming Mass-Mining Methods)

The Mineral Resources amenable to mass underground mining methods have been revised for transfer of much of the previous (March 2011) Upper Unit Top Loaded Zone to the Mineral Resources amenable to selective underground mining methods.

Table 1-2 shows a tabulation of the Mineral Resources amenable to underground mining, and estimated assuming mass mining methods for the Platreef Project. Inferred Mineral Resources are reported at 0.15% Ni cut-off grade. This cut-off grade is justified using the commodity price and cost assumptions discussed in footnotes to Table 1-2.

The Mineral Resources amenable to mass mineable methods are all located in areas of wide spaced drilling (typically 400 x 400 m spacing). Only Inferred Mineral Resources are declared. Rhodium assays are generally not available, and hence Rh is not estimated for this case.

Table 1-2: Inferred Mineral Resources (at 0.15% Ni (total) Cut-Off) Assuming Underground Mass Mining Methods, Effective Date 13 March 2013, Harry M. Parker RM. SME. and Timothy O. Kuhl, RM. SME.

Tonnage and Grades							
Property	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**3PE (g/t)**	**% Ni**	**% Cu**
Turfspruit	1,870	0.40	0.49	0.09	0.98	0.21	0.13
Macalacaskop	40	0.28	0.39	0.09	0.76	0.21	0.14
Total	*1,910*	*0.40*	*0.49*	*0.09*	*0.98*	*0.21*	*0.13*
(3PE =Pt + Pd + Au)							

Contained Metal						
Property	**Pt (Moz)**	**Pd (Moz)**	**Au (Moz)**	**3PE (Moz)**	**Ni (Mlbs)**	**% (Mlbs)**
Turfspruit	24.0	24.0	24.0	24.0	8,740	5,520
Macalacaskop	0.4	0.4	0.4	0.4	190	120
Total	*24.4*	*24.4*	*24.4*	*24.4*	*8,930*	*5,650*

Notes:

(1) Mineral Resources are reported on a 100% basis

(2) Mineral Resources are stated from the 650 m elevation (-500m depth) downward to approximately -400 m elevation (-1550m depth). The 2011 block model has been trimmed to exclude the 2013 block model for selectively mineable Mineral Resources.

(3) The cut-off grade (0.15% Ni) assumes commodity prices of Ni: $8.810/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that a mix of block cave and sub-level mining costs (averaging $20/t, and ranging from $9/t to $35/t), and process, G&A, and concentrate transport costs (average of $12/t) would be covered for a conceptual 10 Mt/a operation. Process recoveries are taken from metal-specific equations for serpentinite. Nickel is presented as an example where nickel recovery = ((9.3 *Ln (Ni head grade) + 84.9).

(4) Mineral Resources at the 0.15% Ni cut-off grade occur in continuous zones; there are a relatively minor number of blocks inside these zones that are below cut-off and have been excluded.

(5) Inferred Mineral Resources are based on an area drilled on approximately 400 m x 400 m (locally 400 m x 200 m and 200 m x 200 m) spacing.

(6) Totals may not sum due to rounding

1.12.3 Mineral Resources Amenable to Open-pit Mining Methods

Mineral Resources amenable to open-pit mining methods have not been updated from the last Technical Report (September 2012).

Mineral Resources that could be exploited by open-pit mining methods include Platreef mineralization at Turspruit (ATS) and Macalacaskop (AMK).

Grade and lithological continuity at the infill drilling density (75 X 100 m) appear to be reasonably predictable. No Indicated Mineral Resources exist outside of the area of infill drilling because the drill hole spacing is often too wide to assume continuity of lithology (and thereby grade, which depends on lithology) between points of observation. Rhodium assays are generally not available, and hence Rh is not estimated for this case.

A 0.10% sulphide Ni cut-off was selected to declare Mineral Resources that are amenable to open-pit mining methods, as the total precious and base metals grade of the blocks above this cut-off grade are considered to cover projected conceptual operating costs.

Table 1-3 provides a tabulation of Mineral Resources for the Platreef Project that could be mined using open-pit methods.

Table 1-3: Indicated and Inferred Mineral Resources at 0.1 % Sulphide Nickel Cut-off that are Amenable to Open-Pit Mining Methods, Effective Date 31 March 2011, Harry M. Parker, RM.SME. and Timothy O. Kuhl, RM.SME.

Property/Deposit	Mt	% Ni Sulphide	% Cu Sulphide	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)
ATS – Indicated							
Turfspruit 241-KR	470	0.20	0.14	0.34	0.45	0.09	0.87
Rietfontein 2-KS	40	0.21	0.17	0.28	0.41	0.09	0.78
Total ATS Indicated	520	0.20	0.14	0.33	0.44	0.09	0.86
ATS – Inferred							
Turfspruit 241-KR	260	0.16	0.10	0.41	0.47	0.10	0.97
Rietfontein 2-KS	0	0.00	0.00	0.00	0.00	0.00	0.00
Total ATS Inferred	260	0.16	0.10	0.41	0.47	0.10	0.97
AMK – Inferred							
Macalacaskop	250	0.17	0.11	0.52	0.55	0.10	1.18
Total – Open Pit (AMK + ATS)							
Indicated	520	0.20	0.14	0.33	0.44	0.09	0.86
Inferred	510	0.16	0.10	0.46	0.51	0.10	1.07

3PE = Pt + Pd + Au

Notes:

(1) Mineral Resources are reported on a 100% basis.
(2) Mineral Resources are stated from 650 metre elevation to surface (approximately 500 metres depth extent). A selective mining unit (SMU) of 15 m x 15 m x 10 m has been assumed. External dilution has not been applied. At a 0.1% sulphide nickel cut-off grade, the mineralization is continuous.
(3) The 0.1% sulphide Ni cut-off grade is based on assumed costs and metal prices. Commodity prices were assumed to be Ni: $9.20/lb, Cu: $3.00/lb, Pt: $1785/oz, Pd: $650/oz, Au: $1,265/oz.
(4) Concentrator, G&A and concentrate transport costs are estimated to average $11/t for a conceptual 10 Mt/a operation. Mining costs are estimated at an average of $5/t.
(5) Indicated Mineral Resources are based on an area drilled on approximately 75 m x 100 m spacings.
(6) Inferred Mineral Resources are based on an area drilled on approximately 120 m x 140 m spacings.
(7) Totals may not sum due to rounding.

1.13 Exploration Targets

Beyond the current Mineral Resources, mineralization is open to expansion to the south and west. Two exploration targets have been identified.

Target 1 is located along the strike of the Flatreef to the south of the existing Mineral Resources. The target is based on results from three step-out holes and is estimated to contain up to an additional 30 to 60 Mt grading 3.4 to 5.0 g/t 4PE, 0.26% to 0.38% nickel and 0.13% to 0.19% copper over an area of 2.5 km^2.

Target 2 surrounds the declared Mineral Resources and contains an estimated additional 50 to 220 Mt grading 2.9 to 4.1 g/t 4PE, 0.24% to 0.32% nickel and 0.12% to 0.16% copper over an area of 7.6 km^2. The tonnage and grades are based on intersections of mineralization in adjacent drill holes within the Inferred Mineral Resources.

AMEC cautions that the potential quantity and grade of these exploration targets is conceptual in nature. There has been insufficient exploration and/or study to define these exploration targets as a Mineral Resource. It is uncertain if additional exploration will result in these exploration targets being delineated as a Mineral Resource.

Beyond these Exploration Target areas is approximately 37.5 km^2 of unexplored ground on the property under which the Platreef is projected to lie. It is not possible to estimate a range of tonnages and grades for this ground. There is excellent potential for mineralization to significantly increase with further step-out drilling to the southwest.

1.14 Conclusions

The QPs are of the opinion that the Mineral Resources for the Project, which have been estimated using core-drill data, have been performed to industry best practices (CIM, 2003), and conform to the requirements of CIM Definition Standards, 2010.

Since the commencement of exploration in the UMT area, iterative mineral resource estimates between 2010 and 2011 have led to a progressive increase in the tonnage of Inferred Mineral Resources. With the inclusion of results from the ongoing drill program in an update of the block model, higher confidence categories upgrades are supported, and should permit completion of more detailed mining studies.

Permitting, environmental, legal and socio-economic issues taxation and infrastructure considerations which may also impact the Mineral Resource estimates are typical of advanced-stage exploration and development projects in Southern Africa. It is the QPs' opinion that there is a reasonable expectation that Ivanplats and various stakeholders can reach agreement to develop the Project.

Other areas of uncertainty that may materially impact the Mineral Resource estimates include:

- Confirmation of the renewal of the Rietfontein prospecting licence has not been granted. The Mineral Resources amenable to open-pit methods on Macalacaskop are not expected to be affected; however, Mineral Resources amenable to open-pit methods as declared for Turfspruit and Rietfontein would have to be re-evaluated without a valid prospecting licence on Rietfontein.

- Monitoring of regulatory requirements needs to be improved. Continued instances of non-compliance could provide grounds for revocation of the Prospecting Licence held by Ivanplats or imposition of additional terms and conditions.
- Assumptions used to generate the conceptual data for consideration of reasonable prospects of economic extraction including:
  - Long-term commodity price assumptions
  - Long-term exchange rate assumptions
  - Assumed mining method
  - Operating and capital cost assumptions
  - Metal recovery assumptions
  - Concentrate grade and smelting/refining terms.
- For the TCU deposits metallurgical sampling has focused on higher grade composites approximating the average grade of the deposit – assuming the base case cut-off of 2 g/t 4PE is applied. The testing of lower grade material within and adjacent to the TCU, or very high grades within the TCU, has not currently been done
- Additional metallurgical sampling is planned once the updated geological interpretation has been validated; the ability to select samples from specific mineralization layers may result in changes to the metallurgical recovery sand smelter payables assumptions used to evaluate reasonable prospects of economic extraction

Mineral Resources have been estimated on an externally undiluted basis and without consideration for mining recovery. Dilution and recoveries will vary with the geometry (dip, thickness, faulting and or irregularities in contacts) of the mineralization and the eventual mining method used. These factors can only be estimated after life-of-mine plans are prepared. Typically dilution (low-grade or waste materials) ranges from 10% to 30%, and mining recoveries range from 70% to 100% using the mining methods considered for evaluation of reasonable prospects of economic extraction.

Ivanplats and its contractors (AMEC, Stantec and SRK) are performing conceptual studies to evaluate open-pit and underground options for project development. The planned exploration shaft will provide access to the TCU, will provide the means of taking a bulk sample, will enable trial mining, and will allow assessment of the short-scale variability of mineralization/waste contacts.

1.15 Recommendations

Ivanplats has provided AMEC with a two-phase work program; the first phase of which is focused on drilling. The second phase, which will be conducted concurrently with the first, is the sinking of an exploration shaft.

The two programs total as follows:

- Phase 1: 16 M
- Phase 2: 176 M
- Totals: $192 M

2.0 INTRODUCTION

2.1 Terms of Reference

AMEC E&C Services Inc. (AMEC) was commissioned by Ivanplats Limited (Ivanplats) to prepare a NI 43-101 Technical Report (the Report) for the wholly-owned Platreef nickel–copper–gold–platinum group element (PGE) project (the Project) located near Mokopane, in the Limpopo Province of the Republic of South Africa (Figure 2-1).

The report is prepared in support of Ivanplat's press release dated 6 February 2013, entitled "Flatreef Discovery expands to 29.2 million ounces of platinum, palladium, rhodium and gold in Indicated Mineral Resources, plus an additional 44.0 million ounces in Inferred Mineral Resources, at a 2.0 g/t 4PE cutoff".

Ivanplats holds a 90% interest in Prospecting Right LP30/5/111/2/872PR and is operator. Ivanplats holds a 90% interest in Prospecting Right LP30/5/111/2/872PR and is operator. A consortium of Japanese entities including Itochu Corporation (Itochu), ITC Platinum (ITC- an affiliate of Itochu), Japan Oil, Gas and Metals National Corporation (JOGMEC), and Japan Gas Corporation (JGC) =holds the remaining 10% direct interest. A joint venture with Atlatsa Resources Corporation covers Prospecting Right No. LP30/5/111/2/740PR. Together, these prospecting rights form the Project.

Holdings in the Platreef Project are through an indirectly wholly-owned Ivanplats South African subsidiary, Platreef Resources (Pty) Limited (Platreef Resources). For the purposes of this Report, the name "Ivanplats" refers interchangeably to, Ivanplats Limited, the predecessor company named Ivanhoe Nickel and Platinum Limited, and to the subsidiary company Platreef Resources and the parent company, Ivanplats. "Itochu" is used interchangeably to refer to the parent and subsidiary companies of Itochu Corporation.

2.2 Qualified Persons

The following people served as Qualified Persons (QPs) as defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects:

- Dr Harry Parker, R.M.SME., Technical Director, AMEC, Sparks, Nevada
- Mr Timothy Kuhl, R.M.SME., Principal Geologist, AMEC, Sparks, Nevada
- Mr Michael Valenta, Pr.Eng (Int) FSAIMM, Managing Director, Metallicon Process Consulting (Pty) Ltd

2.3 Site Visits and Scope of Personal Inspection

Dr Parker has made numerous visits to the Project site from September 2001 to September 2003, in 2009, 2010, 2011, and most recently from 16 to 21 November 2012. During the site visits, Dr Parker personally inspected core and surface outcrops, drill platforms, and sample cutting and logging areas; held discussions on geology and mineralization with Ivanplats' staff; and reviewed geological interpretations with staff.

Mr Kuhl visited the site from 26 March to 9 April 2010, 19 July to 3 August 2011, 25 January to 3 February 2012 and again 27 November 2012 to 12 December 2012. During these trips, he audited drill data obtained since AMEC's 2007 database audit (DaSilva, 2007), obtained QA/QC data, field checked drill collars, and collected witness samples for check assays. He also inspected core, surface outcrops, and sample cutting and logging areas. Discussions were held with Ivanplats' staff about project geology and mineralization; geological interpretations were reviewed, and potential locations of major infrastructure were viewed.

Mr Valenta has not visited the Project site, but did visit the Mintek laboratory where the current metallurgical testwork is underway.

2.4 Effective Dates

There are a number of effective dates, as follows:

- Date of the Mineral Resource estimate that is amenable to open-pit mining methods: 31 March 2011
- Date of the Mineral Resource estimate that is amenable to selective underground mining methods: 13 March 2013
- Date of the Mineral Resource estimate that is amenable to mass mining methods: 13 March 2013
- Date of the supply of the last information on the ongoing drill program on the Project in the form of a Project database extraction: 26 October 2012
- Date of the supply of the last information on permitting and tenure: 6 March 2013

The overall Report effective date is taken to be the date of the updated Mineral Resource estimate that is amenable to underground mining methods, and is 13 March 2013.

2.5 Information Sources and References

Reports and documents listed in the Reliance on Other Experts (Section 3.0) and References (Section 27.0) sections of this Report were used to support the preparation of the Report.

Other information was sourced from Ivanplats and AMEC staff in their areas of expertise as required, providing supporting information for the QPs.

All measurement units used in this Report are metric, and currency is expressed in US dollars unless stated otherwise. The Report uses Canadian English. Figures in the text were prepared by AMEC unless otherwise referenced.

The following abbreviations are commonly used in the metallurgical sections of this report: PGE = platinum group elements; PGM = platinum group metals; BMS = base metal sulphides. 3E or 3PE denotes Pt + Pd + Au; 4E or 4PE denotes Pt + Pd + Au + Rh.

2.6 Previous Technical Reports

Ivanplats has previously filed a technical report on the Project entitled:

Parker, H., Kuhl, T., and David, D., 2012: Ivanplats Limited, Platreef Project, Limpopo Province, Republic Of South Africa, NI 43-101 Technical Report: unpublished report prepared by AMEC E&C Services Inc. for Ivanplats Limited, effective date 20 August 2012.

3.0 RELIANCE ON OTHER EXPERTS

3.1 Mineral Tenure

The QPs have not reviewed the mineral tenure, nor independently verified the legal status, ownership of the Project area, underlying property agreements or permits. The QPs have fully relied upon, and disclaim responsibility for, information derived from legal experts for this information through the following documents:

- Webber Wentzel, 2012a: Legal Opinion: The South African Mineral Title held by Platreef Resources (Proprietary) Limited: letter opinion prepared by Webber Wenzel, Attorneys, on behalf of Ivanplats Ltd, BMO Nesbitt Burns Inc., Morgan Stanley Canada Limited, AMEC E&C Services Inc, 7 September 2012
- Webber Wentzel, 2012b: Plateau Resources (Proprietary) Limited: Prospecting Right 740PR in respect of the Farm Rietfontein 2 KS: letter opinion prepared by Webber Wenzel, Attorneys, on behalf of Ivanplats Ltd, BMO Nesbitt Burns Inc., Morgan Stanley Canada Limited, AMEC E&C Services Inc, 7 September 2012
- Leppan Beech Inc., Attorneys, 2009: Opinion Requested Regarding the Integrity of Prospecting Right Protocol O6/2006: letter opinion prepared by Leppan Beech Inc., Attorneys on behalf of Ivanhoe Nickel and Platinum Pty Ltd., 12 November, 2009, with two annexes
- Harrison, M., 2010: Opinion on Various Issues Pertaining to Platreef Resources (Pty) Limited's Prospecting Right; Renewal of the Right and Mining Right Application: letter opinion prepared by Harrison Attorneys on behalf of Ivanhoe Nickel and Platinum Limited, dated 12 September 2010
- Broughton, D., 2012: Platreef Project: letter prepared by David Broughton, Ivanplats Vice President Exploration for AMEC on the status of mineral tenure and surface rights for the Project, dated 14 June 2012.
- Geraghty, L., and Duhl, H., 2013: Application for Mining Right: email clarification from Harry Duhl, Legal Manager and Lex Geraghty, Senior Geologist, Ivanplats to AMEC, dated 6 March 2013

This information is used in Section **Error! Reference source not found.** of the Report.

- Ivanhoe Nickel and Platinum Limited and Anooraq Resources Corporation, 2009: Settlement and New Project Agreement: agreement signed between Ivanhoe Nickel and Platinum Limited and Anooraq Resources Corporation, effective date 11 December, 2009.

This information is used in Section 4.7 of the Report.

The QPs have viewed information from the South African Department of Minerals and Energy in relation to the renewal of the prospecting licence over Macalacaskop 243KR and Turfspruit 241KR Farms through the following document:

- Department of Mineral Resources: Renewal of a Prospecting Right in Terms of Section 18(3) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002): Platreef Resources (Pty) Ltd on the Farms Macalacaskop 243KR and Turfspruit 241KR, Situated in the Magisterial District of Mokerong: letter prepared by the Acting Deputy Director General Mineral Regulation, Department of Mineral Resources and addressed to Platreef Resources (Pty) Ltd, dated 4 May, 2011.

The QPs have viewed information from Plateau Resources in relation to the renewal of the prospecting licence over the Rietfontein Farm through the following document:

- Application In Terms Of Section 18 Of The MPRDA To Renew A Prospecting Right Over The Farm Rietfontein 2 KS-Plateau Resources (Pty) Ltd: letter from Plateau Resources to the Department of Mineral Resources advising of hard-copy renewal application, dated 22 August 2011

This information is consistent with the information provided by the legal experts on mineral title which is used in Section **Error! Reference source not found.** of the Report.

Will need to add final letter to cover period from 7 September 2012 to 8 March 2013 re Anooraq.

3.2 Surface Rights

The QPs have fully relied upon, and disclaim responsibility for, information supplied by Ivanplats' staff and experts retained by Ivanplats for information relating to the status of the current Surface Rights as follows:

- Ivanhoe Nickel and Platinum Limited and Anooraq Resources Corporation, 2009: Settlement and New Project Agreement: agreement signed between Ivanhoe Nickel and Platinum Limited and Anooraq Resources Corporation, effective date 11 December 2009

- Broughton, D., 2012: Platreef Project: letter prepared by David Broughton, Ivanplats Vice President Exploration for AMEC on the status of mineral tenure and surface rights for the Project, dated 14 June 2012.

This information is used in Section 4.5 of the Report.

The QPs have fully relied upon, and disclaim responsibility for, information supplied by Ivanplats' staff and experts retained by Ivanplats for information relating to agreements concluded with local communities through the following document:

- Broughton, D., 2012: Platreef Project: letter prepared by David Broughton, Ivanplats Vice President Exploration for AMEC on the status of mineral tenure and surface rights for the Project, dated 14 June, 2012

This information is used in Section 4.11.3 of the Report.

3.3 Royalties

The QPs have fully relied upon, and disclaim responsibility for, information supplied by Ivanplats' staff and experts retained by Ivanplats for information relating to the status of the current royalty provisions for the Project as follows:

- Harrison, M., 2010: Opinion on Various Issues Pertaining to Platreef Resources (Pty) Limited's Prospecting Right; Renewal of the Right and Mining Right Application: letter opinion prepared by Harrison Attorneys on behalf of Ivanhoe Nickel and Platinum Limited, 12 September 2010
- Broughton, D., 2012: Platreef Project: letter prepared by David Broughton, Ivanplats Vice President Exploration for AMEC on the status of mineral tenure and surface rights for the Project, dated 14 June, 2012.

This information is used in Section 4.6 of the Report.

3.4 Environmental

The QPs have obtained information regarding the environmental permitting status of the Project through opinions and data supplied by experts retained by Ivanplats, and from information supplied by Ivanplats' staff. AMEC has fully relied upon, and disclaims responsibility for, information derived from such experts through the following document:

- Els, M., 2003: Interim Environmental Baseline Report for the Platreef Project: WSP Walmsley Volume 1 Main Report W603/2, Sandton, Republic of South Africa and Update of the Executive Summary of the August 2003 Environmental Baseline Report for the Platreef Project S0242, September 2007: unpublished report prepared by WSP Walmsley, Sandton, Republic of South Africa for Ivanplats.

- Wessels, B., 2013: Platreef Updated Technical Report: email from Barbara Wessels, Digby Wells Consultant to AMEC providing updates on ongoing environmental studies.

This information is used in Section 4.8 of this Report.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Project centroid is located at about 24º05'S and 28º59'E. The Project is located in the Limpopo Province of the Republic of South Africa (Figure 4-1). The Project is located on three farms: Turfspruit (3,561 ha), Macalacaskop (4,281 ha) and Rietfontein (2,878 ha).

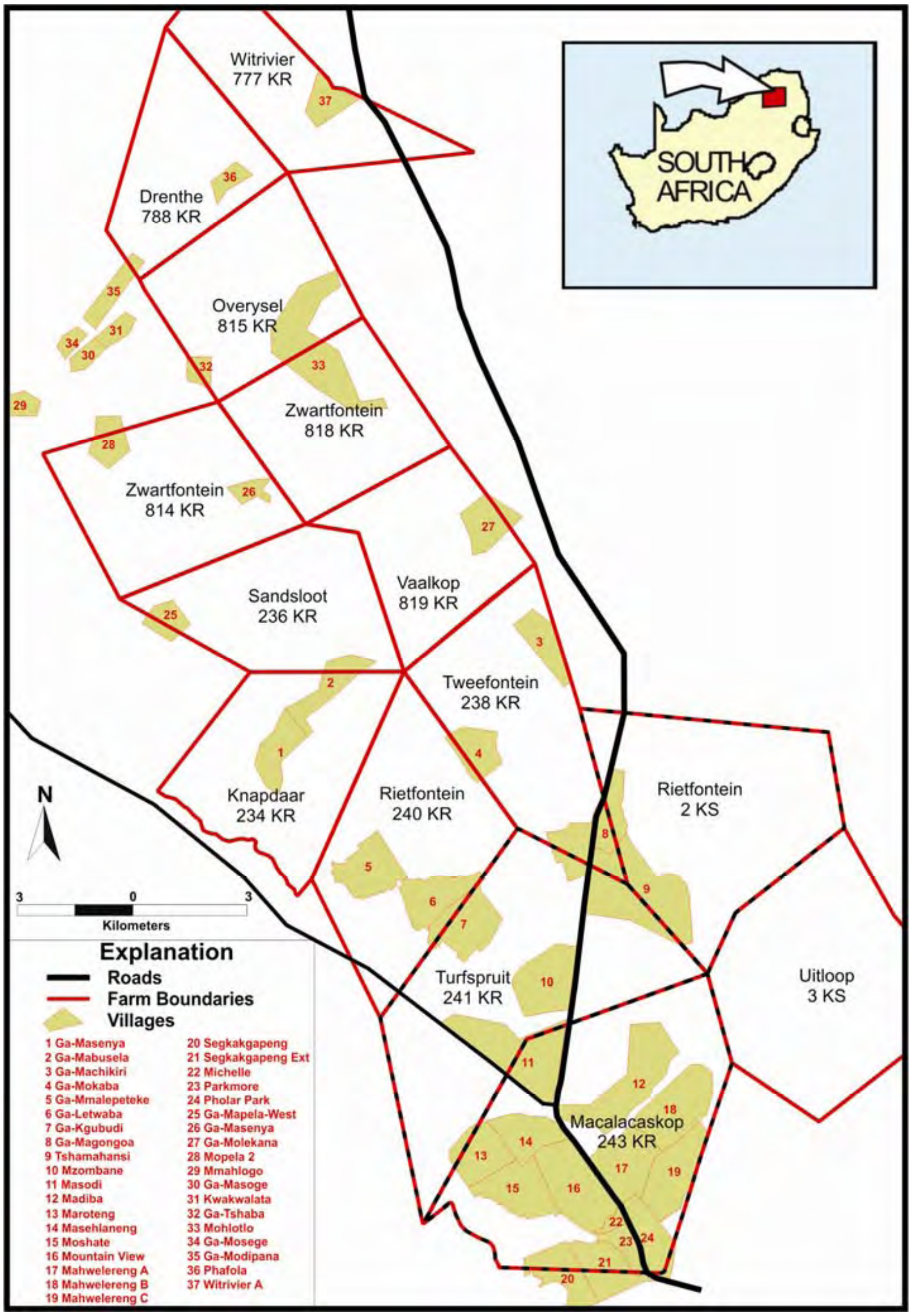
4.2 Property and Title in South Africa

The Minerals Act 50 of 1991 (the 1991 Act), effective 1992, was the previous legislation governing mining-related issues in South Africa; under this Act, mining rights were privately held.

The Mineral and Petroleum Resources Development Act No 28 of 2002 (MPRDA), which came into force in May 2004, and replaced the 1991 Act, provides the new regulatory framework for South Africa's mining and minerals industry. The MPRDA is centred upon mineral rights reverting to the State, and a "use-it-or-lose-it" principle ensuring that, if a legal entity, such as a mining company, fails to use its mineral rights, it will lose those rights after a certain period. The MPRDA also has provisions for the State to have the powers to force a mineral rights holder to abandon development projects if the State is of the opinion that the project is not producing at the most efficient levels or is a threat to environmental sustainability or community health. The Department of Minerals and Energy (DME) administers the MPRDA. The DME has discretionary powers for awarding conversions of mining rights from the 1991 Act to the MPRDA. These powers are primarily used in relation to Black Economic Empowerment (BEE) and social-upliftment objectives.

Under the South African Mining Charter of 2004 (Charter), companies are required to divest a portion of their investments to historically disadvantaged South Africans (HDSAs), as a condition of the conversion of old-order mining rights to new-order mining rights. In the Charter, mining company ownership targets for HDSAs are set at 15% during the first five years and 26% in 10 years. A special case was made for state-owned rights where no mining or prospecting operations had previously been conducted. In this instance, the HDSA target was 51% for a one-year period from 1 May 2004. After 1 May 2005, the Charter targets apply.

Figure 4-1: Project Location and Farm Boundaries



Note: Prospecting licence LP30/5/111/2/872PR boundaries correspond to the perimeter boundaries of the Macalacaskop (243 KR) and Turfspruit (241 KR) farms. The boundaries for prospecting licence LP30/5/111/2/740PR correspond to the perimeter of the Rietfontein (2 KS) farm. Collectively, the two prospecting licences form the Project area. Khaki areas on the plan are the main settlements and townships. Figure by AMEC, 2012; data courtesy Ivanplats.

Mining companies were given up to two years to apply for prospecting permit conversions and five years to apply for mining licence conversions for existing operations. In order to convert a 1991 exploration and mining right (the "old right") to a 2004 exploration and mining right (a "new right"), the holder was expected to lodge a social and labour plan, and to provide an undertaking that outlined how the holder intended to expand mining industry opportunities for HDSAs.

A holder of a mineral right is expected, under the terms of the MPRDA, to ensure that a mineral resource is optimally exploited. In addition, a rights holder is only entitled to a mining or prospecting right to the extent that the ground holding is actively worked. A planned exploration or mining work program is required, and must be followed, or corrective measures may be taken by the DME.

Trade in mining or prospecting rights, such as transfers between parties, or sales, can only be concluded with the approval of the DME.

4.2.1 Mineral Property Title

A prospecting right is a new-order right (i.e. granted under the MPRDA) issued in terms of the MPRDA that is valid for up to five years, with the possibility of a further extension of three years. The right can be obtained either by the conversion of existing old-order prospecting rights (i.e. granted under the 1991 Act or earlier acts) or through new applications.

A mining right is a new-order right issued in terms of the MPRDA that is valid for up to 30 years. A mining right can be obtained either by the conversion of an existing old-order mining right, or as a new-order right subject to the exercise of the exclusive right of the holder of a new-order prospecting right, or subject to an application for a new mining right.

4.2.2 Surface Rights Title

Under a common-law position previously in force in South Africa, which was supported by the 1991 Act, a land owner was the owner of the whole of the land, including the air space above the surface and everything below it. The MPRDA replaced this common-law position, and the 1991 Act was repealed by the MPRDA.

Although the MPRDA does not specifically indicate the Republic of South Africa as the owner of unmined minerals, the ability of a land owner to exercise absolute rights over minerals found on or under their land has been nullified. A landowner retains the ultimate surface rights ownership, but not the minerals ownership.

4.2.3 Environmental Regulations

On 2 August 2010, new environmental impact assessment (EIA) regulations came into effect in South Africa. The regulations were designed to align the 2006 environmental regulations with the National Environmental Management Act (NEMA), and to streamline the EIA process. Within the regulations, specified timeframes for receipt of Governmental assessment were stipulated, and some timeframes, such as the end of the calendar year, were excluded from public consultation processes and in the counting of days for both decisions and lodging of appeals.

Under the regulations, lists of activities requiring environmental authorization prior to commencement were revised to three notices:

- Listing notice 1: stipulates the activities requiring a basic assessment report (BAR). These are typically activities that have the potential to impact negatively on the environment. However, due to the nature and scale of such activities, such impacts are generally known
- Listing notice 2: identifies the activities requiring both a scoping exercise and an Environmental Impact Report (EIR). These are typically considered to be large-scale or highly-polluting activities, and the full range of potential impacts need to be established through a scoping exercise prior to the activity being assessed
- Listing notice 3: contains activities that will only require an environmental authorization through a basic assessment process if the activity is undertaken in one of the specified geographical areas indicated in that listing notice. Geographical areas differ from province to province. An example of such a listing would be erection of a cell phone mast.

4.2.4 Taxation

Mining companies in South Africa are typically taxed at the standard corporate tax rate of 28%. Corporate tax is paid on all income, plus 50% of capital gains, less deductible operating expenditure and a capital expenditure allowance.

4.2.5 Royalties

The South African Mineral and Petroleum Resources Royalty Act of 2008 came into effect on 1 March 2010. Under the Act, royalties are payable by operators using a prescribed formula by means of a ratio of earnings before interest and taxes (EBIT or profit) to gross sales of mineral resources; such royalties, are, however, capped within a range. The percentage is calculated in terms of different formulas depending on whether the mineral resources are classed as "unrefined" or "refined".

Platinum group elements (PGEs) comprising iridium, palladium, platinum, rhodium, ruthenium and osmium, if in the form of a concentrate grading at least 150 ppm PGE, would be classified as "unrefined". The definition of "unrefined" copper is "20% to 30% Cu". The "unrefined" nickel definition is "1.4% Ni content". There is no provision for gold as an "unrefined" element.

All unrefined metals are subject to the following specific royalty formula:

0.5 + [earnings before interest and taxes/(gross sales in respect of unrefined mineral resources x 9)] x 100

This royalty has a cap at 7%.

Platinum group elements comprising iridium, palladium, platinum, rhodium, ruthenium and osmium, if smelted and refined to 99% purity, would be classified as "refined". Copper, when processed into copper metal slabs, blister copper or cathode copper of at least 99.0% purity is considered "refined". Nickel is "refined" once processed into a metal or other form (e.g. ferro nickel, nickel metal or nickel sulphate) that has at least a 99.5% purity. To be classified as "refined", gold must be refined and smelted to at least a 99.5% purity.

All refined metals are subject to the following specific royalty formula:

0.5 + [earnings before interest and taxes/(gross sales in respect of refined mineral resources x 12.5)] x 100.

This royalty has a cap at 5%.

4.3 Project Ownership

In October 2010, Itochu acquired a 2% interest in Prospecting Right LP30/5/111/2/872PR from Ivanplats for US$10 million (840 M Japanese yen). On 26 May, 2011, Itochu announced the acquisition of an 8% direct interest in the prospecting right from Ivanplats through its affiliate ITC Platinum for an additional US$280 M (22.4 B yen), and has concluded a Joint Operation and Investment Agreement with Ivanplats (Itochu, 2011). Consequently, the Itochu Consortium holds an aggregated interest of 10% in Prospecting Right LP30/5/111/2/872PR; Ivanplats owns the remaining 90%. The Itochu Consortium's cash contribution will be applied to exploration and development activities on the prospecting right.

Itochu established a 100%-owned subsidiary, Itochu Mineral Resources Development Corporation, with intentions to undertake exploration and development projects in the mineral resources sector. Itochu's Platreef Project participation is one of the projects that will be promoted by and between Itochu and this newly-established company.

Ivanplats is the operator of the Platreef Project.

4.4 Mineral Tenure

Location plans of the farms and prospecting rights discussed in the next sub-sections are provided in Figure 4-1. The prospecting rights, and therefore the prospecting licence boundaries, are the same as the farm perimeter boundaries in the plan. Prospecting right LP30/5/111/2/872PR boundaries correspond to the perimeter boundaries of the Macalacaskop and Turfspruit farms. The boundaries for prospecting right LP30/5/111/2/740PR correspond to the perimeter of the Rietfontein farm. Figure 4-3 shows the locations of the townships that have developed within the farming areas, including on farms that are outside the Project area; these are discussed in more detail in Section 4.9.

4.4.1 Prospecting Right No. MPT No. 55/2006 (LP30/5/111/2/872PR)

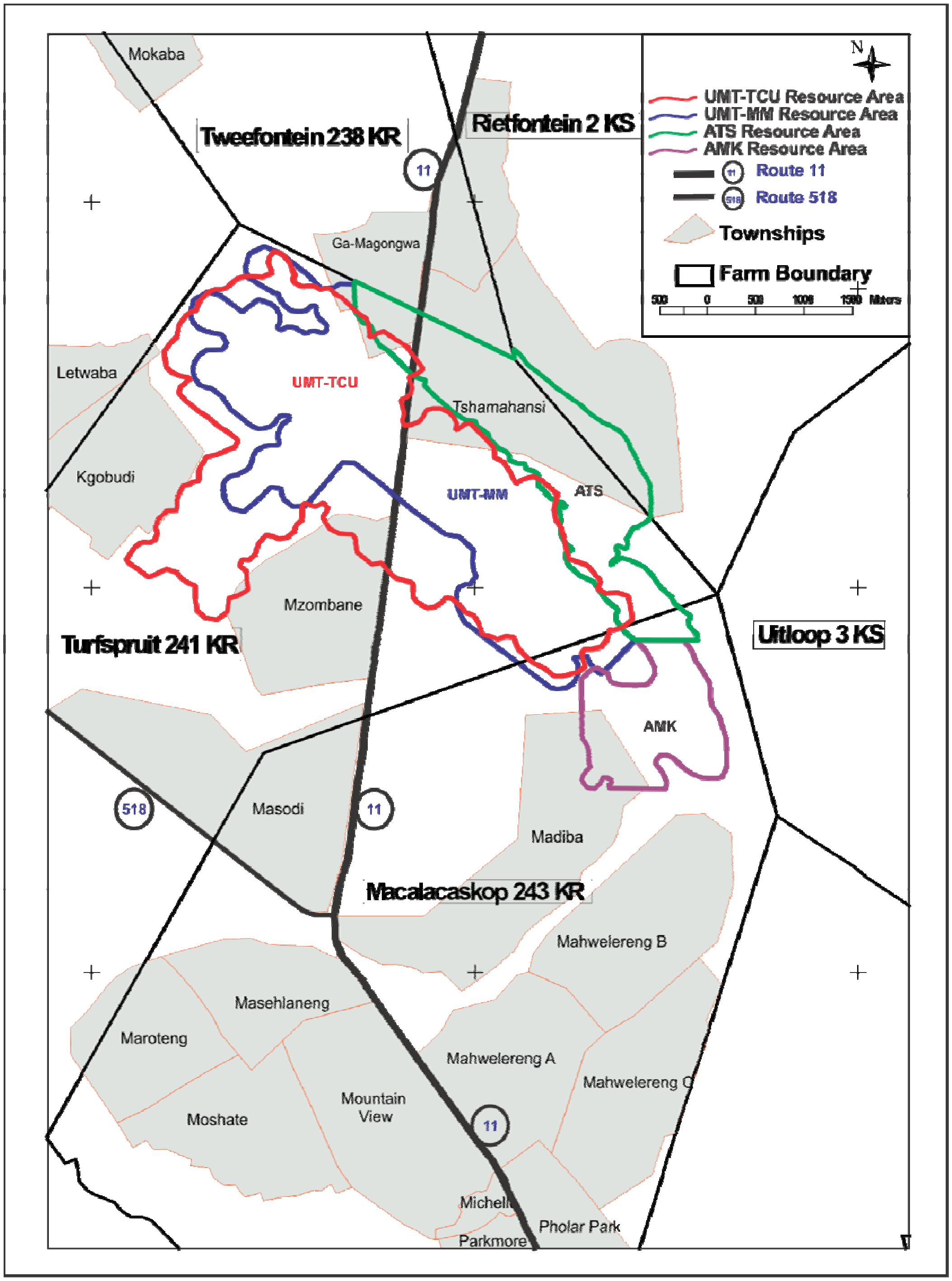
AMEC was supplied with legal opinions and annexes dated 20 November 2006, 21 November 2006, and 12 November 2009, which reviewed the legal status of the mineral lease K2921/2001 on the Turfspruit Number 241 KR and Macalacaskop Number 243 KR Farms.

These documents indicated that Platreef Resources (Pty) Limited, registration number 1988/000334/27, a subsidiary of Ivanhoe Nickel and Platinum Ltd in South Africa, legally holds exclusive prospecting rights to prospect for base and precious metals on farms Turfspruit 241 KR and Macalacaskop 243-KR.

At the outset, these rights were granted in accordance with the 1991 Act. The mineral right became legally effective in October 2002.

In January 2006 the mineral rights were converted to the new-order rights in terms of Item 6 of Schedule II of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), Republic of South Africa, under Mineral Prospecting Right MPT No. 55/2006, Prospecting Right No. LP30/5/111/2/872PR and was to expire on February 1, 2011.

Figure 4-2: Major Township and Farm Locations



Note: The main road indicated on this plan is Highway N11. The UMT area would be mined from underground; the AMK and ATS areas would be mined from open pits. The boundary of the ATS deposit is constrained by the Turfspruit farm (mineral tenure) boundary and the northeastern boundary of UMT. “Area1” was the focus of drilling activities in 2011–2012. Information on figure courtesy Ivanplats, generated by AMEC 2012.

Ivanplats made application to renew the prospecting right for a three-year extension of term prior to the expiry date. Ivanplats was notified by the Department of Mineral Resources on 4 May 2011 that the prospecting right had been renewed for a further three-year term, and the relevant deed of renewal was signed on 1 June 2011. The prospecting right is now valid until 31 May 2014.

For the title to continue to be maintained, Ivanplats must pay the required annual title fees and comply with the relevant obligations and work programs relating to its prospecting activities on the prospecting right. Ivanplats advised AMEC that the required payments have been made as at the Report effective date.

4.4.2 Prospecting Right No. MPT 76/2007PR (LP30/5/1/1/2/740PR)

Atlatsa Resources Corporation (Atlatsa; formerly Anooraq Resources Corporation) is a company incorporated in British Columbia, Canada. Its South African interests are held in the name of Plateau Resources Limited, a company incorporated under the laws of the Republic of South Africa.

Plateau Resources legally holds exclusive prospecting rights to prospect for base and precious metals on the farm Rietfontein 2 KS. The mineral lease is identified as Prospecting Right No. MPT 76/2007 PR, which has a DMR reference of LP30/5/1/1/2/740 PR. The prospecting right was valid for a five-year period, and was to expire on 27 November, 2011. Prior to the expiry date, on 22 August 2011, Plateau Resources lodged an application to renew the prospecting right for a three-year extension of term. At the effective date of the Report, the renewal was still pending. Legal opinion provided to AMEC notes that under the terms of section 18(3) of the MPRDA a prospecting right in respect of which an application for renewal has been lodged shall, despite its expiry date, remain in force until such time as the application has been granted or refused.

AMEC considers that, until there is legal opinion to the contrary or formal documentation of refusal of the renewal from the appropriate South African regulatory authorities, it is a reasonable expectation that the renewal will be forthcoming, and that therefore Mineral Resources can be declared on Prospecting Right No. MPT 76/2007 PR.

4.4.3 Application for Mining Right

A prospecting right can only be renewed for one three-year period under MPRDA. This renewal has occurred in respect of the Platreef prospecting right. The Atlatsa application for renewal of Prospecting Right No. MPT 76/2007 PR is still pending. To maintain tenure continuity over Mineral Prospecting Right MPT No. 55/2006, Ivanplats will need to apply for a mining right prior to expiry of the prospecting right. Ivanplats currently plans to lodge the application Ivanplats currently plans to lodge the application during Q2 2013.

The mining right application will require the following:

- Compliance with sections 22 and 23 of the MPRDA (regulating the application for and grant of a mining right) and the BEE and social development provisions applicable in the South African mining industry and incorporation of considerations from the MPRDA, the Amendment of the Broad-Based Socio-Economic Empowerment Charter for the South African Mining and Mineral Industry published on 20 September 2010 and the Scorecard that deals with the nine elements of BEE
- Compliance with section 39(1) of the MPRDA
- Compilation and lodgement of a scoping report in terms of regulation 49 of the MPRDA
- Completion of an environmental impact assessment (EIA) that will include public participation meetings) and production of an EIA report in terms of regulation 50 of the MPRDA
- Submission of an environmental management programme within 180 days of the date on which the Regional Manager provides a request for these data.

4.5 Surface Rights

The land over which the Mineral Prospecting Right MPT No. 55/2006 held, is owned by the State and held in trust for the respective communities. The Madiba community are the lawful occupiers of the Macalacaskop Farm and the Tshamahansi and Magongoa communities are the lawful occupiers of the Turfspruit Farm. Rights to prospect and mine the land are granted by the State. While holders of the prospecting and mining rights granted by the State have statutory rights to use the land for prospecting and mining purposes, the rights holder is expected to reach a consensus with the lawful occupiers of the land prior to commencing prospecting or mining operations. The lawful occupiers are entitled to compensation for losses and damages arising from prospecting or mining operations. The MPRDA sets out a procedure if agreement on compensation cannot be reached; this could include determination by arbitration or a competent court.

4.5.1 Macalacaskop and Turfspruit

The Ivanplats-controlled farms, Macalacaskop No 243 KR and Turfspruit No 241 KR, are contiguous, sharing a common boundary along the northwest border of Macalacaskop and the southeastern border of Turfspruit. Macalacaskop contains 4,281 ha of land. Turfspruit contains 3,561 ha of land. The combined total is 7,842 ha.

The farms have been legally surveyed in the past, and the original surveys are on file at the Office of the Surveyor-General of the Limpopo Province (formerly Northern Province) of South Africa. Macalacaskop is filed at that location under reference SG Number 1496/1894. Turfspruit is filed at the same location as reference SG Number A44/1963. Plot surveys and land area calculations were performed by the Surveyor General as indicated on the registered diagrams: SG Diagram No. A 44/63 (Turfspruit 241-KR) and No. A 45/63 (Macalacaskop 243-KR).

For the purposes of the Project, a local co-ordinate system is used, termed the Platreef co-ordinate system.

4.5.2 Rietfontein

Rietfontein Farm, No 2 KS, has a contiguous border with Turfspruit Number 241 KR, sharing a common boundary along the southwestern border of Rietfontein and the northeastern border of Turfspruit. Rietfontein Farm has an area of 2,878 ha.

Plot surveys and land area calculations were performed by a Professional Land Surveyor, of the RSA.

The farm was legally surveyed in the past, and the original surveys are on file at the Office of the Surveyor-General of the Limpopo Province (formerly Northern Province) of South Africa.

4.6 Royalties and Encumbrances

The Turfspruit prospecting licence was subject to an initial royalty agreement in 2001 with the Lebowa Minerals Trust (the Trust). A second agreement, which superseded the first, was later signed with the Trust. Upon conversion of the old-order lease to a new-order lease, under the Transitional Provisions of the MPRDA, old-order rights, which include such provisions as contained in the second Trust agreement, lapsed.

Although the Transitional Provisions do make an exception for the continuation of payment of royalties to communities, the Trust was dissolved by an Act of Parliament, with the rights of the Trust then vested in the South African government; the government is not a community. There are also tax-related provisions for continuation of payments required under old-order rights for removal and disposal of minerals; however, the agreement between the Trust and Ivanplats provided for prospecting payments, and not for removal of minerals, and also does not apply.

A royalty will be payable to the South African government when the prospecting licences have been converted to mining licences, and production has occurred. The royalty will be determined on whether the mined product will be classified as either a refined (capped at 5%), or unrefined (capped at 7%) material.

4.7 Property Agreements

4.7.1 Atlatsa (Anooraq) Agreement

A "Settlement and New Project Agreement" (the 2009 Agreement), dated 11 December 2009, was concluded between Ivanhoe Nickel and Platinum Ltd and Anooraq Resources Corporation. The 2009 Agreement superseded and replaced respective rights and obligations of Ivanplats and Anooraq under a 2001 Earn-in Agreement. Under the 2001 Earn-in Agreement, Anooraq had granted to Ivanplats the right to earn a 50% participating interest in the Rietfontein prospecting licence. The 2009 Agreement also terminated arbitration and other proceedings, and created a new legal and business relationship between the two parties.

The 2009 Agreement contained the following key elements:

- Anooraq contributed the Rietfontein prospecting right and the Rietfontein 2 KS farm. Ivanplats contributed a defined portion of the Turfspruit prospecting right and the Turfspruit 241 KR farm. This area became collectively the joint venture "Property". Under the agreement, both parties retain their existing prospecting rights in respect of mineral properties in their own names but make these rights and technical information on the properties available to the joint venture
- Both companies agreed to evaluate the possibility of development and open-pit mining activity on the Property, and if supported by a positive feasibility study, to commence mining

- The agreement envisaged that Ivanplats would hold an initial interest of 94% in the Property, and Anooraq a 6% interest in the Property, provided that the joint venture contemplates an open-pit mining operation that incorporates the Rietfontein mineral property
- Ivanplats is Operator of the joint venture
- For so long as Anooraq holds an interest in the joint venture, it is entitled to appoint a member to a technical committee, established to facilitate consultation and discussion with Ivanplats with respect to joint venture operations
- Expenditure during completion of a Feasibility Study will be borne by Ivanplats; Anooraq would have no obligation to make any financial contribution, i.e. would be free-carried. This time-frame is termed the "Carried Interest Period". During the Carried Interest Period, Anooraq must make payments to keep its Prospecting Permits in good standing and make other payments and filings as required to governmental authorities in the RSA to maintain its interest in Rietfontein 2 KS farm
- On completion of a Feasibility Study, Anooraq has two choices. The company can elect to contribute to expenditures in proportion to the initial interest held by Anooraq in the Property, in which case a new agreement, termed the "Definitive Participation Agreement" would come into effect. Where funding is less than the amount that would be expected in proportion to the initial interest, the company that is providing less funding would have its interest in the Property diluted, and the other party's interest in the Property would be increased by the same amount as the dilution. Alternatively, Anooraq can relinquish its interest in the Property for a 5% net smelter returns royalty payable on any mineral products extracted from the Rietfontein prospecting lease
- A BEE provision will be required to obtain a mining right. In this instance, the 2009 Agreement states that Anooraq will not be obliged to reduce its interest in the Property, but that the Ivanplats' interest will be reduced. BEE from an ownership perspective requires that at least 26% of the holder of the rights is owned and controlled by HDSAs. Anooraq may increase its Property interest as part of a BEE transaction if this is in accordance with appropriate South African laws, and Anooraq meets the local ownership requirements for a BEE transaction.

A provision was made within the 2009 Agreement for potential underground mining activities. In this instance, the agreement states:

if, and to the extent that, a feasibility study contemplates the extraction of mineral products from both the Turfspruit property and the Rietfontein property by way of sub-surface mining, and at the conclusion of the carried interest period, Anooraq elects to *maintain its interest in the project as a participating interest, the project property will be deemed to include those areas of the Turfspruit property and the Rietfontein property, respectively, from which the feasibility study contemplates that mineral products will be extracted by way of sub-surface mining and the respective interests of the parties will be adjusted:*

> *(a) in the case of the interest of the Anooraq Group, by dividing the total value of mineral products that the feasibility study contemplates will be extracted exclusively from the Rietfontein property by the total value of mineral products that the feasibility study contemplates will be extracted from the entire project property and multiplying the resulting quotient by 100; and*
>
> *(b) in the case of the interest of the Ivanplats Group, by dividing the total value of mineral products that the feasibility study contemplates will be extracted exclusively from the Turfspruit property by the total value of mineral products that the feasibility study contemplates will be extracted from the entire project property and multiplying the resulting quotient by 100.*

Under (b), any proposed underground mine that extracts 100% of its mineral products from Turfspruit would result in a 100% interest for Ivanplats.

Legal opinion provided to AMEC indicated that while the settlement agreement that was entered into between Ivanplats and Anooraq/Atlatsa (the holding companies of the South African subsidiaries that hold the prospecting rights through Platreef and Plateau) remains a valid and binding agreement, it is not legally competent for a holding company to create rights and obligations for a subsidiary under South African law. This opinion noted that in order to give effect to the provisions of the settlement agreement, the holders of the prospecting rights will be required enter into a separate agreement. Depending on the structure and provisions of that agreement, it will require various consents in terms of Section 11 and Section 102 of the MPRDA.

AMEC considers it a reasonable expectation that at the current stage of Project knowledge, such agreements could be enacted, and that therefore declaration of Mineral Resources on Prospecting Right No. LP30/5/111/2/872PR can be supported.

Ivanplats advised AMEC that an offer has been made to Anooraq/Atlatsa to outright purchase the Anooraq/Atlatsa rights to the Rietfontein farm; Anooraq/Atlatsa were considering the offer as of the Report effective date.

4.7.2 Itochu Agreement

In October, 2010 Ivanplats entered into an Earn-in Agreement (the Earn-in Agreement) with Itochu Corporation, a Japanese company. Under the Earn-in Agreement, Itochu purchased a 2% interest in Beales Limited (Beales), a currently 90% owned subsidiary of Ivanplats that owns the holding company, Platreef Resources, which holds the Platreef Project.

On 26 May 2011, Itochu acquired, through its affiliate ITC Platinum, an additional 8% interest in the Project, indirectly through Beales, through a Joint Operation and Investment Agreement (JOIA). The JOIA includes various adjustment and other clauses relating to the Beales shareholdings such that on enactment of the Joint Operation and Investment Agreement on 6 June 2011, the effective participating interests in the underlying Platreef Project became as follows: Ivanplats – 90%, Itochu – 2% and ITC Platinum Development Ltd. – 8%.

Under the JOIA, Ivanplats granted Itochu and ITC Platinum Development Ltd (collectively Itochu) a number of rights intended to preserve Itochu's minority interest in the Platreef Project. Such rights include:

- A covenant that prohibits dilution of Itochu's proportional ownership interest in the Platreef Project as a result of a BEE investment
- A pre-emptive right that permits Itochu to maintain its proportional interest in the Platreef Project as a result of any other issuance of securities at a price equal to the subscription price for those securities
- A right of first offer to purchase the equity stake held by Ivanplats in Beales or on a sale by Beales or Platreef Resources of an interest in the Platreef Project holdings
- A "tag-along" right of Itochu in which it will be entitled to put its interest along with a sale by Ivanplats of a significant equity stake in the Platreef Project holdings on the same terms and conditions as Ivanplats receives from such a sale

The parties have also agreed to establish a technical committee and a management committee in which Itochu will, in each case, be entitled to appoint two of six members so long as it holds no less than a 2% interest in the Platreef Project.

The JOIA provides for cash calls for development funding by the two parties, and dilution to the extent funding is covered by the other party. To the extent that Itochu's interest in the Platreef Project falls below 2%, its interest will be converted into a 1% net smelter returns royalty.

The JOIA provides for preferential third-party Japanese participation in the future operations of the Platreef Project. In particular, Itochu has covenanted to assist in securing Project financing for the development of the Platreef Project, while the parties have agreed to provide either Itochu or an Itochu-facilitated financial-assistance entity a right to off-take of production at commercial rates from the Platreef Project.

Finally, on a change of control, certain rights of the parties will be terminated and, to the extent that financial assistance has been provided, the JOIA acknowledges that such financial assistance will be reviewed, and repayment may be accelerated.

Finally, on a change of control, certain rights of the parties will be terminated and, to the extent that financial assistance has been provided, the Joint Operation and Investment Agreement acknowledges that such financial assistance will be reviewed, and repayment may be accelerated.

4.8 Environmental Studies

4.8.1 Previous Environmental Baseline Studies

WSP Walmsley was contracted by Ivanplats to conduct biophysical environmental baseline studies for the proposed mining area on the farms Macalacaskop, Turfspruit, and Rietfontein (Els, 2003). The socio-economic and public participation components were specifically excluded. The baseline studies were concentrated within the potential mining area. The study goals were to:

- Establish the pre-mining environmental baseline
- Provide the necessary information for completion of the Environmental Management Program Report (EMPR), in a form that is acceptable to the authorities
- Determine scientific grounds on which to base compensation claims
- Determine whether there are any environmental fatal flaws
- Provide input to the technical feasibility studies, such as ground water inflow predictions, soil handling requirements, positioning and pollution control around waste rock dumps, and water sources
- Identify major costs (order of magnitude) such as removal of graves, royalty claims
- Provide a sound scientific basis on which to determine the magnitude and significance of impacts in the Environmental Impact Assessment (EIA) and to make recommendations for the EMPR

- Work together with the project team from an early stage in the project life cycle to inform mine planning and to maximize the benefits of the project and to minimize the impacts and costs.

In 2003, WSP Walmsley identified no fatal flaws that would prevent successful completion of an EMPR, but cautioned that the baseline studies may have to be supplemented once the actual area of mining disturbance has been defined.

Subsequently, WSP Walmsley (2007) updated the executive summary of the 2003 study in order to:

- Identify potential material changes since 2003
- Highlight areas needing special attention for an EIA prior to the Project proceeding
- Highlight changes to the environmental framework and timetables affecting project implementation.

Between 2003 and 2007, changes in the environmental regulatory framework took place. Under the terms of the MPRDA, a social and labour plan must be submitted as part of the mining rights application submission. The social and labour plan should demonstrate how a project will contribute towards the socio-economic development of the area in which the mine is proposed to operate. Under the Act, within 14 days of a mining rights application, notice requiring submission of an EIA and EMPR within 180 days will be issued.

Updated EIA Regulations, Regulations 385, 386, and 387 in terms of Section 24 [Chapter 5] of National Environmental Management Act (NEMA) 107 of 1998 (NEMA), came into force on 3 July 2006. Mining is listed in these Regulations as an activity requiring an environmental authorization from the relevant provincial environmental authority. However, the sections on mining had not come into force as at the Report effective date, and will only do so after an official notification in the government gazette.

Various activities that would be expected to be associated with mining of the Platreef Project are also listed (i.e. roads, power lines, waste disposal, storage of hazardous substances, etc.) and will require an EIA to be submitted to the provincial environmental department for environmental authorization.

In 2007, WSP Walmsley noted that further work is required to identify the potential for acid rock drainage (ARD) and high sulphate contents if mined material such as waste rock is to be stored on surface. Ivanplats notes that ARD results obtained to date are not exceptional in a mining context, and should be controllable by a management plan forming part of an integrated environmental management plan.

In August 2010, new EIA regulations came into effect in South Africa. It is not currently known how the regulations will affect in detail any proposed EIA supporting any future development of the Platreef Project. The key change is that the Department of Environment will approve EIAs, and not the Department of Mineral Resources.

AMEC notes that although mining activities have been listed and certain powers given to the Minister of Mineral Resources, these provisions and listings have not been brought into effect, as they are not yet empowered by either the National Environmental Management Act or the Mineral Petroleum Resources Development Act; hence the uncertainty with respect to the Project.

4.8.2 Current Baseline Studies

In February 2011, Ivanplats commissioned Digby Wells Environmental (Digby Wells), an environmental consulting firm based in South Africa, to develop a detailed scope of work to provide Ivanplats with appropriate baseline data that could be used to support an application for a mining right. Included in the Digby Wells brief was a requirement to ensure the studies conformed to the framework provided in the World Bank Group (WBG) and International Finance Corporation (IFC) policies and guidelines for Environmental Assessment (EA). The scope of work also requested that Digby Wells identify the relevant local legislation for environmental assessment to which any Project development will be required to adhere.

Baseline studies will include:

- Topography and visual
- Heritage and archaeology
- Aquatic ecology
- Fauna and flora
- Noise
- Soils
- Resettlement action plan framework and social baseline
- GIS and mapping.

4.8.3 Air Quality

The study area is characterised by summer rainfalls and dry winters. The average rainfall is 472 mm of rain per year. The average mid-day temperatures range from 19.8°C in June to 27.8°C in January. The predominant wind direction is from the north–northeast, with the secondary component from the east and south east quadrant.

The available climatic data includes a five-year dataset from the South African Weather Service (SAWS) for the Mokopane Automatic Weather Station (2008–2012), and site-specific MM5 modelled meteorological data set for full three calendar years (2009–2011). This dataset consists of surface data, as well as upper air meteorological data that is required to run the dispersion model.

An ambient air quality dataset was obtained for the Mokopane Air Quality Monitoring Station, which is part of the air quality monitoring network that was commissioned for the Waterberg–Bojanala Priority Area during September 2012, and monitors all criteria pollutants (PM_{10}, $PM_{2.5}$, NO_x, SO_2, CO, O_3, BTEX, as well as basic meteorological parameters).

Future project activities such as on-site smelting or processing will most likely trigger listed activities identified in terms of Section 21 of the NEM:AQA. This will have to be confirmed with the designated Air Quality Officer once a mine plan is developed.

4.8.4 Compliance Audit

A performance assessment report in respect of the approved EM Plan was requested by the DMR in February 2012. Digby Wells was appointed by Platreef to conduct a compliance audit against the EM Plan as required by Regulation 55 of the MPRDA and to review and update the status of Ivanplats' financial provision for exploration activities as required in terms of Regulation 54 of the MPRDA. Platreef has submitted the Prospecting Environmental Management Plan Performance Assessment Report completed by Digby Wells. Results of the review indicated that an increase in financial provision for rehabilitation was warranted, and a letter of guarantee for the required environmental bonding was subsequently submitted to the DMR.

4.9 Permits

4.9.1 Current Permits

Ivanplats advised AMEC that exploration activities have typically been conducted in compliance with applicable laws in South Africa. The exception is that the existing

Prospecting Works Program and EMPR were contravened, when more drill holes were completed than the total number of drill holes granted to be drilled in the permits. Ivanplats has submitted a Section 102 application for approval of an amended Environmental Management Plan and Prospecting Works Program in order to accommodate future prospecting. The Section 102 application was submitted to the DMR on 16 May 2012 and subsequently replaced with a revised application to amend lodged together with the Bulk Sampling Application as lodged with the authorities on 21 September 2012. The application is still being processed.

On 26 October 2012, the DMR served Ivanplats with a directive in terms of Section 93 of the MPRDA. The directive ordered Ivanplats to cease all prospecting operations pending the conclusion of new surface use agreements with the occupants of the land (communities) in the presence of the Department of Rural Development and Land Reform.
Ivanplats has started the process to address the issue raised in the Section 93 directive and is meeting with the respective communities in the presence of the Department of Rural Development and Land Reform.

4.9.2 Bulk Sampling

On 21 September, 2012, Ivanplats applied for permission to conduct a bulk sampling program on the Project. The application envisaged an exploration shaft that would allow for collection of an approximate 1,500 t bulk sample from approximately 780 m depth below surface.

4.9.3 Additional Permits to Support Future Mine Development

Permits will be required to support any future underground access development such as shaft excavation (refer to Section 26.0). In addition, a number of permits will be required to support additional development of the Project and any subsequent mining operation. Permits are likely to cover aspects such as water usage, emissions, heritage, assessments of items/areas that may be of historical or cultural importance, use of explosives, and refining licences and/or export licences.

Key permits that will be required to support mine development include:

- Mining Right Application - MPRDA 28 of 2002, s 22 & GN R.527 Reg 10 & 11
- Approved EIA & EMP - Mineral and Petroleum Resources Development Act, Act 28 of 2002, s39(1) & GN R.527 Reg 48 -51

- Environmental Authorization and EIAR/EMP approval - National Environmental Management Act, Act 107 of 1998, s24(1), (2) & (5) & GN R543, GN R544, GN R545 and GN R546
- Waste License Application - National Environmental Management; Waste Act, Act 59 of 2008, s20 & GN R 718
- Rezoning Application Town - Planning and Townships Ordinance No.15 of 1986
- Integrated Water Use Licence Application - National Water Act, Act 36 of 1998, s21 & s40
- Industrial water supply agreement - Water Services Act, 108 of 1997, s 7
- Section 20 bulk sample application Mineral and Petroleum Resources Development Act, Act 28 of 2002, s39(1) & GN R.527 Reg 48 -51
- Section 102 amendment of the existing prospecting permit in accordance with the MPRDA.

AMEC notes that the actual number and type of permits required to support mine development would be identified during advanced studies on Project development.

4.10 Environmental Liabilities

Environmental liabilities are currently limited to field disturbances associated with drill sites; these have been and are remediated as each drill site is completed.

A preliminary ecological survey did not identify any flora or fauna that required specialist environmental management in the general area of the known mineralization.

4.11 Social License

4.11.1 Land Claims

Land claims by HDSAs have been lodged with a government commission over many regions of South Africa. All such South African land claims are to be reviewed by a governmental entity.

Ivanplats noted to AMEC that Ivanplats may have to pay some form of compensation to any claimants who are granted land as a consequence of such successful assertions. In the event of a claim succeeding, the claimant is entitled to restoration of the actual land claimed or to “equitable redress”.

The Rietfontein farm has been claimed by the Mamashela Community, and the claim has been gazetted.

Legal opinion provided to AMEC indicates that in a letter from the Department of Rural Development and Land Reform, dated 16 April 2012, the department confirmed that a claim for restitution has been lodged over the Turfspruit farm by the Mokopane Tribe. As of the Report effective date, the claim had not been gazetted.

Ivanplats has requested that Digby Wells, during the environmental studies that Ivanplats has commissioned, confirm the land status, and assist with resolving any potential claims in an equitable manner.

4.11.2 Social and Community Impact

Two large urban communities inhabit portions of the Platreef Project area (refer to Figure 4-2). The settlement of Madiba is located southwest of the known mineralization at Macalacaskop, and the settlement of Tshamahansi exists over significant parts of, and northeast of, Turfspruit, extending onto Rietfontein.

Some portion of the communities may be required to be relocated, with more relocation required to enable open-pit mining of the ATS deposit versus open-pit mining of the AMK deposit or underground mining of the UMT deposit. Such relocations have previously been performed in South Africa; however, any full relocation of Tshamahansi would be amongst the larger moves contemplated. Future detailed studies would be necessary should such relocation be required.

In 2007, a detailed study was performed of the requirements to support relocation of selected communities if an open-pit mine was developed (Synergy, 2007). The study identified three key areas requiring careful management and lead-in times, including:

- Timing: The time required for effective community relocation was considered to be dependent on successful community engagement, and the capability of municipal and provincial authorities to provide necessary infrastructure. Estimates of the time required for planning, construction and relocation varied between seven and nine years, based on the community sizes and areas in 2007
- Costs: The costs of relocation are likely to be higher than those estimated in 2007. In general terms, building costs in South Africa have been increasing at a rate in excess of official inflation largely as a result of substantial growth and demand in this sector
- Land: Identification of suitable land for relocations considering land availability and costs and project infrastructural requirement.

Synergy (2007) noted that, at a minimum, the following points are likely to require consideration in future evaluations:

- Identification of issues, liabilities and costs relating to any proposed resettlement. This should be supported by studies of “lessons-learned” outcomes from resettlements undertaken by other mining companies in South Africa, in particular that of Anglo Platinum at Ga Pila
- Assessment of alternatives, including assessment of different potential sites, land status evaluations, whether the resettlement should be completed as a single phase or multi-phase operation and over what timeframe
- Evaluation of government and community support for any proposed move
- Inclusion of appropriate organizations, whether governmental, civil, or traditional, in decision-making processes related to any proposed resettlement
- Ability of existing governmental, civil, and traditional authorities to manage any proposed resettlement, and to provide support for the communities post-relocation, ability of these various parties to manage any conflicts or disputes that may result
- Provision by Ivanplats for stakeholders to provide feedback on the process, and provision for establishment of accepted grievance mechanisms so that stakeholders’ dissatisfactions are addressed in a timely manner
- Flexibility of Ivanplats to react to changing perceptions in the community or to changes to the stakeholders involved both during the duration of any proposed move and the life of the Project
- Consideration of likely social (e.g. inheritance) or economic (e.g. awarding of construction contracts) impacts on the communities
- Consideration of Equator Principles and International Finance Corporation guidelines.

There is currently no overarching integrated legislation or policy that governs involuntary land settlement in South Africa, and consideration will have to be given to a number of different legislative instruments as well as the experience of similar settlement relocations undertaken by other companies. Additional legislation may be passed into law in the future, and there can be no guarantee that relocation of the settlements can be agreed between the parties involved, or that the timeframe, or the terms under which an agreement may be completed will remain in agreement.

Ivanplats considers that a full census to identify affected villages and communities, and identification of any affected infrastructure, such as schools, churches, and recreation facilities, will be required, but the census should be conducted when the most appropriate mining and development routes have been determined for the Project. Such a census will be conducted by Digby Wells once any mining right application has been submitted.

Ivanplats has already instituted policies and consultation procedures that will promote community relations. Regular meetings have been held with community representatives.

4.11.3 Surface Use and Co-operation Agreements

Ivanplats has concluded four surface use and co-operation agreements with the following local communities:

- Kgobudi community
- Magonoa community
- Tshamahansi community
- Madiba community

Legal opinion provided to AMEC indicates that a task team has been established by the Government of the Limpopo Province, the DMR, the Department of Rural Development and Land Reform and Ivanplats. This task team has initiated a process in terms of which the above communities will hold an election to determine who will be the members of the committees that will liaise with Ivanplats. The surface use and co-operation agreements will remain in place for the duration of the prospecting right until they are replaced by new agreements following negotiations with the newly-elected committees. This process has since been terminated by the parties.

As of February 2013, Ivanplats has created its own Stakeholder Engagement Forum, which purpose is to provide a platform for direct engagement with all stakeholders, including Government departments. The surface use and co-operation agreements will remain in place for the duration of the prospecting right until they are replaced by new agreements following negotiations with the affected local communities.

4.11.4 Platreef Skills and Business Survey

In March 2012, Digby Wells Environmental was appointed by Platreef to undertake a sample survey of skilled individuals and small business enterprises in the Mokopane area. The primary purpose of this survey was to establish an electronic database and knowledge repository of formal and informal businesses as well as skilled individuals within the proposed project's primary labour sending area.

During the survey, a total of 8,634 respondents registered their skills on the database. In general individuals who registered are relatively young, with 89% being younger than 40 years. With regards to gender females (52%) slightly outnumber males (48%). About 90% of respondents have at least some secondary education, while a quarter have attained some kind of tertiary education.

The majority (87%) of individuals who registered on the database are unemployed. However, most of them were previously employed and have some workplace experience. The majority of individuals were previously employed in the retail (12%), administration (10%) and service sectors (10%). Another 7% of individuals were previously employed in the mining sector.

A total of 537 respondents registered their businesses on the business database. Unlike the residency of respondents registered on the skills database, the results derived from the business survey, showed that a larger number of businesses are located near the immediate study area. Most businesses specialise in building and construction (20%), providing services (12%), and catering (10%). About 25% of these businesses are located in Mahwelereng Village, and have been trading for more than three years. Nearly 80% of businesses are registered as Close Corporations, while only 5% are informal or unregistered businesses.

With regards to the total workforce of registered businesses, most companies indicated that they employ less than five employees, while 35% indicated that they employ five to 19 employees. Only 12% of companies indicated that their total workforce ranges between 20 and 99.

Business owners were requested to indicate whether they are involved in contract work, and just less than one third indicated that they were. These businesses mostly specialise in the construction, service provision, and supply sectors. Of the businesses regularly involved in contract work, the experience with mining contracts includes catering, maintenance, construction, service provision, and supply.

It should be noted that the results of the survey only reflect the current trends in the skills and business domains and, as a result, the usefulness of the databases will be limited in future by the dated nature of the information they contain. To maintain and improve the utility of these databases, Digby Wells recommended that they should be updated on a regular basis, either by updating existing skills profiles or by allowing new registrations.

4.12 Significant Risk Factors

There are two significant permitting risks to Project development.

The first lies with any requirement for resettlement of occupants of townships on the three farms. This risk is much less if underground mining operations are conducted versus open-pit operations.

The second is the necessity for Ivanplats and Atlatsa to have lodged mining right applications prior to the expiry of the prospecting licences in 2014, with appropriate documentation such that legal grant of a mining lease can be obtained.

4.13 Comments on Section 4

In the opinion of the QPs, the information discussed in this section supports the declaration of Mineral Resources. The QPs note the following:

- Information provided by legal experts and Ivanplats support Ivanplats' ownership claims to Prospecting Right LP30/5/111/2/872PR. Ivanplats will need to apply for a mining right prior to expiry of Prospecting Right No. LP30/5/111/2/872PR in May 2014. The application is planned to be lodged during Q2 2013
- Ivanplats should seek legal opinion to confirm which elements are encompassed in the grant of Prospecting Right LP30/5/111/2/872PR for base and precious metals, to confirm if chrome is included in the list. AMEC notes that chromium is only present in the form of thin chromitite stringers in the Project area
- A joint venture with Atlatsa, over the Rietfontein farm, the circumstances of which were in dispute, has now been settled. An agreement, dated 11 December 2009 that covers the previously-disputed area is currently in force between Ivanplats and Atlatsa
- Ivanplats and Atlatsa may need to prepare additional legal agreements between the South African-registered subsidiary companies to meet South African law with respect to the 2009 agreement
- Ivanplats advised AMEC that Ivanplats has submitted an offer to outright purchase the rights to Rietfontein from Atlatsa. Atlatsa is considering the offer
- The Rietfontein licence renewal application was lodged on 22 August 2011; however, at the Report effective date, the renewal is still pending. AMEC considers that, until there is legal opinion to the contrary, it a reasonable expectation that the renewal will be forthcoming, and that therefore declaration of Mineral Resources on Prospecting Right No. LP30/5/111/2/872PR and

Prospecting Right No. LP30/5/111/2/740PR can be supported. Rietfontein is critical to open-pit mining on Turfspruit. If the Prospecting Right on Rietfontein is not renewed, Mineral Resources amenable to extraction by open-pit mining methods on both Rietfontein and Turfspruit would have to be re-evaluated

- Assuming the Rietfontein prospecting right is renewed, Atlatsa will need to apply for a mining lease prior to expiry of Prospecting Right No. LP30/5/111/2/740PR in August 2014
- Mining lease applications require appropriate supporting documentation, including completion of a scoping report, EIA, development of an environmental management program, and a requirement to meet BEE provisions
- Surface rights within the areas of the Rietfontein, Macalacaskop and Turfspruit Farm areas belong to the national government. AMEC considers that there is a reasonable expectation that land access and provision of land for infrastructure development for any proposed mining activity will be achievable following appropriate negotiation and compensation payments
- A royalty will be payable to the South African Government on production; this will be determined on whether the mined product will be classified as either a refined (capped at 5%), or unrefined (capped at 7%) material
- Exploration activities to date have been conducted within the regulatory framework required by the South African Government
- Collection of baseline environmental data has commenced. The current state of knowledge on environmental and permit status for the Project supports the declaration of Mineral Resources. Additional permits will be required for Project development
- A gazetted land claim has been lodged over the Rietfontein farm; information provided to Ivanplats by the Department of Rural Development and Land Reform indicates a non-gazetted claim by the Mokopane Tribe over the area covered by Prospecting Right LP30/5/111/2/872PR
- Should an open-pit mining scenario be considered, provision will need to be made for relocation of villages and infrastructure that exists in the likely footprint area of an open-pit mine. The impact of an underground operation will involve a smaller surface area, (which could be mitigated if fill were introduced after mining to mitigate subsidence), so that there are likely to be fewer relocation requirements
- AMEC notes that there have been instances where drill programs have been affected by short-term access issues, most recently in 2012. Over the 12+ years Ivanplats has been conducting exploration activities, the company has previously

managed to reach resolutions such that the planned work has been able to be completed

- Through their actions to date, Ivanplats has shown their understanding of, and accepts the importance of, proactive community relations, and is continuing to liaise with representatives of the local communities.
- To the extent known, there are no other significant factors and risks that may affect access, title, or the right or ability to perform work on the property.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility

The Project is located approximately 280 km northeast of Johannesburg. Year-round access is by four-lane, paved, all-weather road to Mokopane (formerly Potgietersrus). From Mokopane the access continues as a two-lane, paved, all-weather national highway. The highway passes through the Project. Access to drill sites and other areas within the Project is by gravel all-weather roads or by unpaved tracks.

The closest major international airport is Johannesburg, about a four-hour drive from Mokopane, and the regional hub is at Polokwane (formerly Pietersburg) 56 km to the north of Mokopane.

Limpopo Province has a developed rail network, connecting with lines that lead to Zimbabwe in the north, Maputo in Mozambique to the east and south to Gauteng Province. The closest railhead to the Project is in Mokopane.

5.2 Climate

The climate is semi-arid, with precipitation occurring as rain. Average annual rainfall is around 300 mm. Over 90% of the annual rainfall occurs between the months of October and March. The highest monthly averages typically occur in November and December; however, Golder Associates (2011) noted the highest monthly rainfall as 112 mm in January 1923.

High daily temperatures occur throughout the year; the mean maximum monthly temperatures range from 21°C to 33°C, with a maximum recorded temperature of 39°C. During the winter months the temperature may drop to around 0°C, although freezing is extremely rare. The mean minimum monthly temperature ranges from 6°C to 20°C.

Golder Associates (2011) noted that at Mokopane winds originate from the north (17.5% of the time) and from the north–northwest (14.5% of the time). Wind speeds are low to moderate, with a low percentage (19.46%) of calm conditions (<1 m/s).

It is expected that any future mining operations will be able to be conducted year-round.

Electrical energy, telephone service, and other infrastructure components are available in Mokopane. Mokopane's town centre is located approximately 11 km from the centre of the Project. Large-scale infrastructure, such as high-voltage electrical lines and large volumes of water, are situated within moderate distances from the Project. The main line of the national railroad system passes approximately 6 km east of the Project.

5.2.1 Local Labour Resources

There is a moderate level of mining activity within a 100 km radius around the farms. A large, unskilled labour force lives in urban areas near and on the farms. These people can be trained for many job assignments if a project is developed, as is demonstrated by Ivanplats' employment of approximately 80 staff from the Mokopane area. Some skilled trade positions and professional staff will have to be recruited from outside the area.

Adequate town-site facilities and infrastructure exist to support an influx of personnel. Housing may have to be constructed or subsidised for some positions.

5.2.2 Power Supply

The results of a 2007 study (Pienaar and Erwee) indicated that extension of the existing national power grid transmission and distribution systems from the Eskom substations to the project area was feasible and could be undertaken following completion of an agreement between Eskom and Ivanplats. An agreement was entered into with Eskom to supply a permanent 70MVA of power from an expansion of the national grid which will bring an additional high voltage line near the project.

As power is required for the initial mine development (shaft sinking), prior to the completion date of the permanent supply from 4,800 MW Medupi Power Station currently under construction, an agreement for 5MVA of temporary construction power was concluded with Eskom. This power will be supplied from a local sub-station close to Mokopane.

Any power requirements prior to the supply of temporary construction power will be supplied by diesel generated sets.

Based on these studies and discussions, Amec is of the opinion that there is a reasonable expectation that the electrical need for any proposed project development can be met.

Based on these studies and discussions, AMEC is of the opinion that there is a reasonable expectation that the electrical need for any proposed project development can be met.

5.2.3 Water Supply

The Limpopo province and the Mokopane area in particular, are considered to be particularly water-poor resource areas and various studies were commissioned to determine the most likely water supply sources for the project.

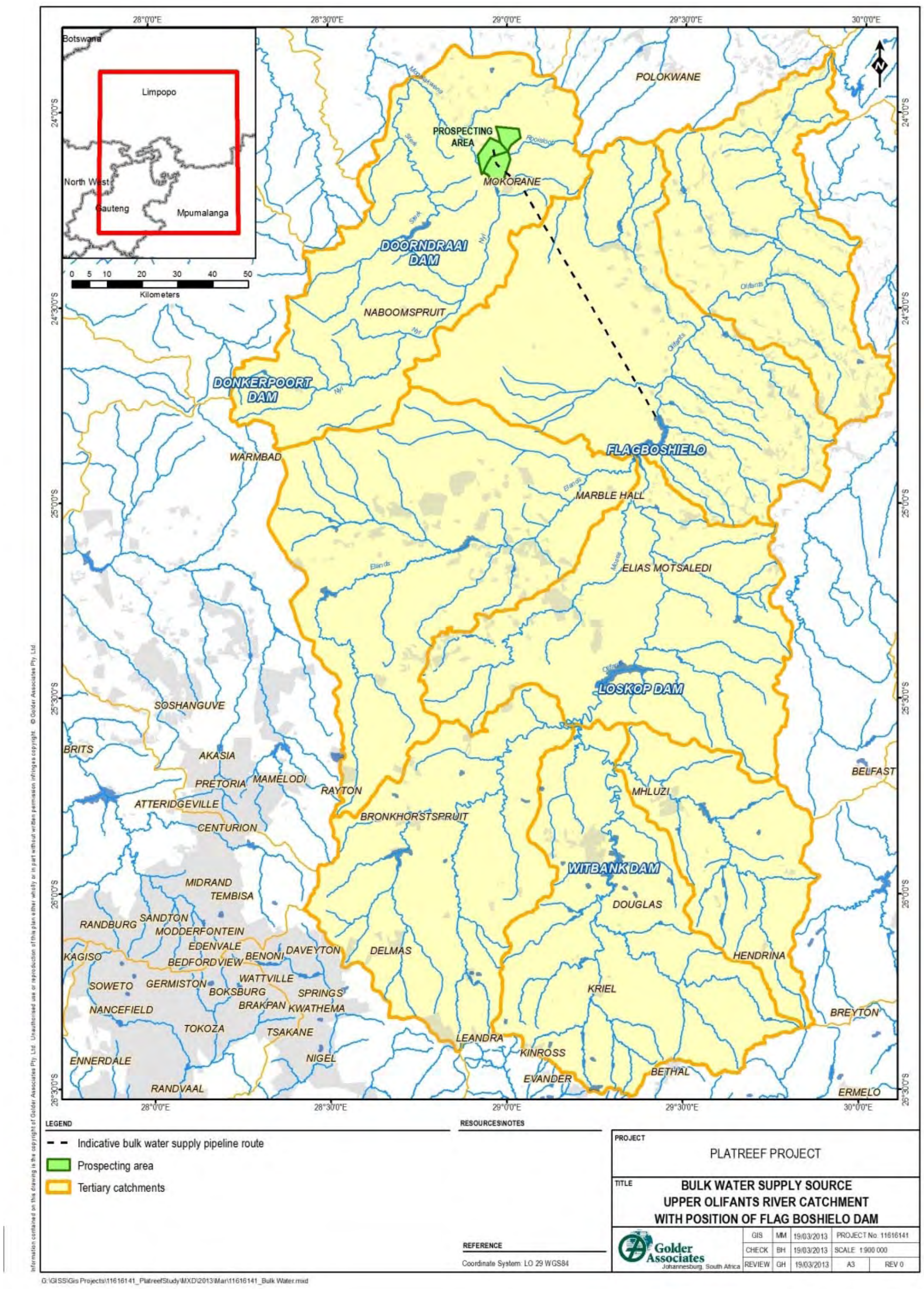
Ivanplats is a participant in the Olifants River Water Resource Development Project (ORWRDP) which is designed to deliver water for domestic and industrial (mining) purposes to the Eastern and Northern limbs of the bushveld complex. Ivanplats is also a member of the Joint Water Forum (JWF) which facilitates and co-ordinates discussions with the various participants in the water scheme. These participants were required to indicate their projected water requirements from the scheme in order for the total capacity to be determined. This was done, and the capacity required is made up of 62 ML/day for domestic use and 78 ML /day for industrial projects i.e. a total of 140 ML/day.

Under the ORWRDP, a pipeline is to be constructed between Flag Boshielo dam on the Olifants River to Pruissen and from there to the North of Mokopane including the Platreef and other projects (Figure 5-1). Ivanplats' continued participation will require contributions to the costs of pipeline construction. These costs will be in relation to the number of participants in the final agreement.

The Department of Water Affairs (DWA) has stated that all water for the Northern Limb (including any potential mining operation on the Platreef Project) would be supplied through the ORWRDP. A number of possible water sources to augment the supply system have been investigated, and most promising is acid mine drainage (AMD) from the Witbank coalfields. Another possible source is the transfer of water from The Vaal river system. Either of these sources will be treated and pumped into the Olifants River. Another potential short-term source of water is ground water in the Project area. Ground water sources have been identified and Ivanplats has applied for water-use licenses from the DWA (Figure 5-2).

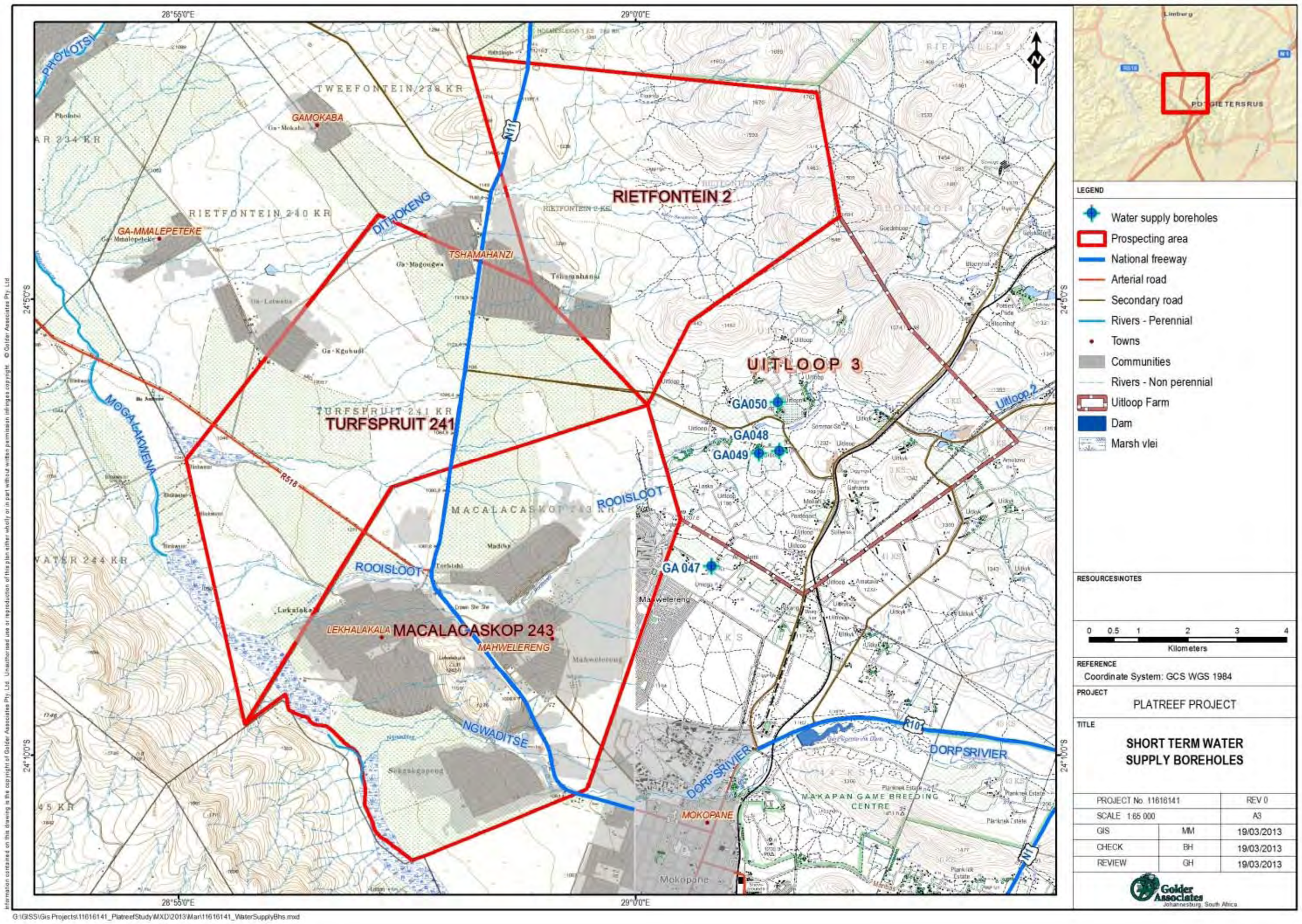
The QPs are of the opinion that between these sources, there is a reasonable expectation that the water supply needs for any proposed Project development can be met. The bulk of the long-term water supply is likely to be from the Flag Boshielo dam via the Pruissen pipeline, with additional support from borehole sources. This assumption will be reviewed during more detailed Project studies.

Figure 5-1: Location Plan Flag Boshielo Dam and Proposed Water Pipeline



Note: Figure courtesy Ivanplats, 2013

Figure 5-2: Water Bore Location Plan



Note: Figure courtesy Ivanplats, 2013

5.2.4 Highway Re-Alignment

The N11 national highway connects Mokopane with the South Africa/Botswana border. The current road runs directly through the Turfspruit and Macalacaskop farms, and serves the operating Mogalakawena (formerly Anglo Platinum PPL) mine and the Lonmin's Akanani Project. The road may need to be re-aligned away from the footprint of any future open pit. Re-alignment is not expected to be required for underground operations.

5.3 Physiography

The Rietfontein, Macalacaskop, and Turfspruit farms are located in a broad valley on flat terrain with a gradual westerly slope. There is very little topographic relief on the farms; however, to the east and west of the farms, semi-parallel, north–south-trending, high ridges flank the valley floor. A portion of the eastern ridge system trends onto the Rietfontein farm, adjacent to Turfspruit. Figure 5-3 is a photograh taken in the Project area illustrating the general topography.

The elevation on the farms ranges from a maximum of about 1,140 masl in northern Turfspruit to about 1,060 masl on Macalacaskop.

The land on the farms has been disturbed by settlements and farming. Subsistence farming and urban development covers the majority of all the farms. Some land has been allowed to lie fallow and is being reclaimed by bush, comprising shrubs and small trees. There are no remnant forests or other significant vegetation.

5.4 Sufficiency of Surface Rights

There is sufficient suitable land area available within the prospecting licences for any future tailings disposal, mine waste disposal, and installations such as a concentrator, smelter, and related mine infrastructure.

Should an open-pit operation be developed, AMEC notes that it is likely that a portion of the mine disturbances associated with the development and mining of the open-pit Mineral Resource would project beyond the current Ivanplats licence boundaries, onto the adjacent Tweefontein Farm.

Arrangements would have to be made with adjacent landowners and mineral rights holders in this instance. The QPs consider that there is a reasonable expectation that such agreements could be successfully negotiated.

Figure 5-3: Project Physiography

Note: Figure courtesy Ivanplats, 2012. Drill rigs show scale. Rigs are testing Zone 1.

5.5 Comments on Section 5

In the opinion of the QPs:

- Mining activities, whether open pit or underground, should be capable of being conducted year-round
- There is sufficient suitable land available for any future tailings disposal, mine waste disposal, and installations such as a concentrator, smelter, and related mine infrastructure within the prospecting licences
- A number of studies were completed by Ivanplats during the early 2000s on aspects of Project development, in particular on water and electricity availability. A review of these studies, and assessment of the current and likely power and water sources, manpower availability, and transport options indicates that there are reasonable expectations that sufficient labour and infrastructure is available or under construction to support declaration of Mineral Resources
- Should an open-pit operation be envisaged, then there will likely be mine disturbances associated with the development and mining of the open-pit Mineral Resource projecting beyond the current Project boundary, particularly onto Tweefontein Farm. Arrangements would have to be made with adjacent landowners in this instance. The QPs consider that there is a reasonable expectation that such agreements can be successfully negotiated
- The QPs have assumed that sufficient long-term water supply will be available to the Project from the Pruissen pipeline scheme, and such a supply can be supplemented from underground sources

6.0 HISTORY

During the 1970s, regional exploration was undertaken over the Platreef by Rustenberg Platinum Holdings Limited (Rusplats), a wholly-owned subsidiary of Anglo American Platinum Corporation (Amplats). Rusplats reportedly drilled several widely-spaced drill holes along the Platreef on Turfspruit and Macalacaskop farms. This drilling followed-up earlier work by the predecessor of Amplats during the 1960s. No data from either of these programs were available to AMEC for this Report.

Ivanplats acquired a prospecting permit for both Turfspruit and Macalacaskop farms in February 1998, and subsequently Ivanplats entered into a joint venture (JV) with Atlatsa over the Rietfontein farm in 2001.

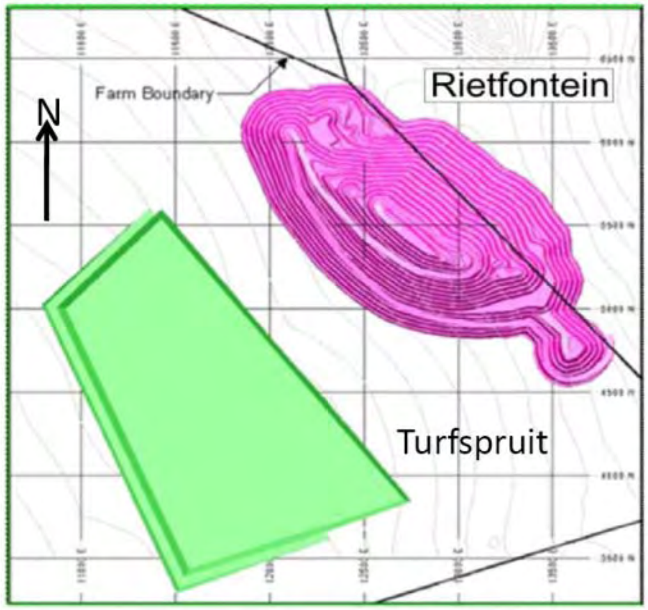
Work completed by Ivanplats consists of geological mapping, airborne and ground geophysical surveys, limited trenching, percussion drilling over the Platreef sub-crop, core drilling, petrography, density determinations, metallurgical testwork and preliminary engineering and design studies. These studies and Mineral Resource estimates were performed in 2002, 2003, 2004, 2005, 2007, 2009, 2010 and 2011.

Ivanplats contracted Hatch Engineering in 2003 (Hatch: 2003a, 2003b, 2003c, 2003d; Matyas, 2003) to provide a conceptual-level study for a ‘greenfield’ Ni–PGE concentrator/smelter. The study considered the smelter would treat an average of 1,200 t/d of concentrate. An update to the report assessed smelting of 1,850 t/d of concentrate.

Between June 2003 and December 2003, Mineral Development Services Ltd. (MDS) of South Africa (Lawrence, 2003) reviewed metallurgical testwork undertaken to June 2003, developed conceptual flow sheets, and prepared mechanical equipment lists for a concentrator. MDS (2003, 2004) also developed preliminary (±35%) capital and operating cost estimates.

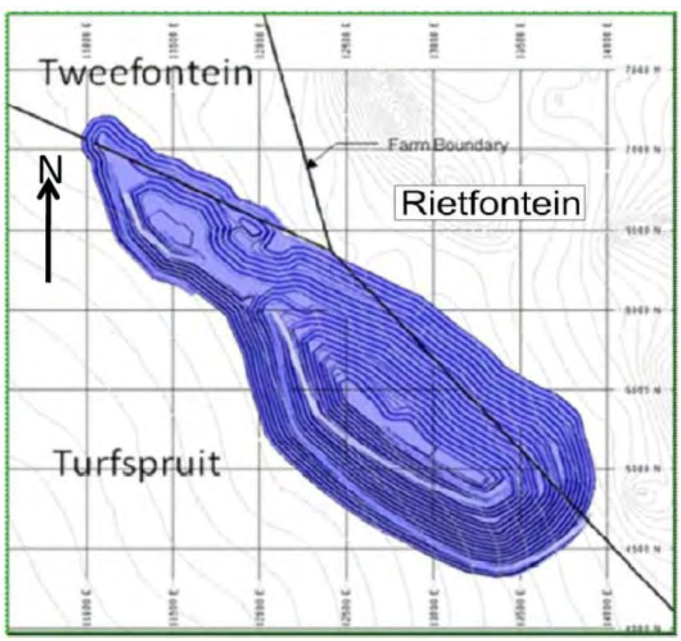
In 2003 to 2004, Ivanplats completed a second overall study on the Platreef Project. This internal study (African Minerals, 2004) was used to assess the amenability of the deposit to open-pit mining (AMEC, 2003a, 2004a, 2004b). Figures 6-1 and 6-2 show three-dimensional views of the conceptual ultimate pits. Results of the work indicated that the mineralization on the Turfspruit/Rietfontein farms was more likely to support a mining operation than the mineralization on the Macalacaskop farm.

Figure 6-1: Conceptual Pit Designed to Depth of Approximately 500 m



Note: Grid squares on plan are 500 m x 500 m; Figure prepared by AMEC, 2003

Figure 6-2: Conceptual Pit Designed to Depth of Approximately 560 m



Note: Grid squares on plan are 500 m x 500 m; Figure prepared by AMEC, 2003

AMEC considers the studies to be useful as background support when considering reasonable prospects for economic extraction for open-pit Mineral Resources in Section **Error! Reference source not found.** of this Report.

Following news of AfriOres' success in deep drilling to the north at Akanani (Witley, 2006), Ivanplats commenced a deep drilling program in 2007, to test for mineralization down-dip within the Turfspruit farm and to investigate the continuity and grade in an area targeted as having potential to be mined by underground methods. The drill program identified the area of mineralization currently known as the "Flatreef", and supported estimation of mineral resources amenable to underground mining methods. The initial estimates were updated multiple times in internal documentation between 2007 and 2011, and the 2011 update was publicly disclosed in Parker et al. (2012).

This Report presents a new Mineral Resource estimate update that supersedes the 2011 update and will be used as the basis for a Preliminary Economic Assessment that is currently underway.

7.0 GEOLOGICAL SETTING AND MINERALIZATION

Information on the Project regional setting and context is summarized from Parker et.al., (2012). The project-level geology section has largely been prepared by or draws on the work of Ivanplats personnel, specifically Dr. Danie Grobler and Shane Neilsen.

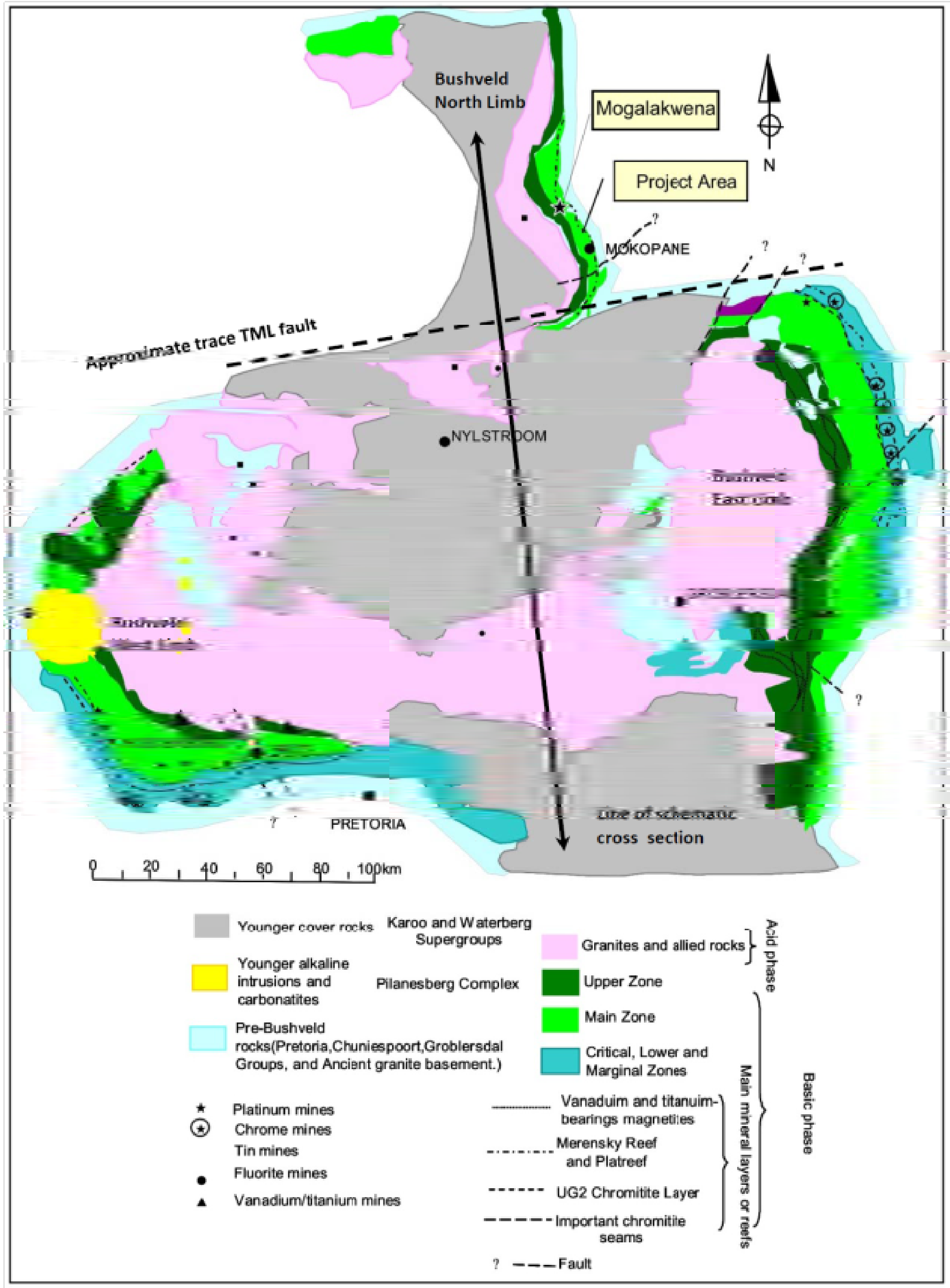
7.1 Regional Geology

Within the Kaapvaal Craton, the ~2.06 Ga Bushveld Igneous Complex (BIC) intrudes the Transvaal Supergroup, forming the world's largest layered intrusion and the world's largest source of platinum (Cawthorn, 1999). The Eastern and Western Limbs of the BIC are well exposed and researched, whereas understanding ot the Northern Limb, host to the Platreef Project, is still evolving.

Typically the BIC consists of a mafic–ultramafic layered suite, a granite suite, and a package of predominantly felsic volcanic rocks. The Rustenburg Layered Suite (RLS) hosts major deposits of platinum group elements (PGEs), chromite, vanadium and nickel (Figure 7-1). The suite has been subdivided into a number of zones described from the basal units to the top; descriptions are abstracted from Kinnaird et al., (2005), and Cawthorn (1999 and 2005):

- The Marginal Zone (MZN) — Norites with variable proportions of accessory clinopyroxene, quartz, biotite and hornblende, indicating magma contamination from the underlying sediments. This unit is not always present
- Lower Zone (LZ) — upper and lower peridotites separated by a central harzburgite
- Critical Zone (CZ) — Lower Critical Zone comprises orthopyroxenitic cumulates; Upper Critical Zone consists of packages of chromitite, harzburgite, pyroxenite, norite and anorthosite. The CZ hosts PGE–Au–Ni–Cu and chromite deposits in several different chromitite layers, known as "reefs", the most significant being the Merensky and the Upper Group 2 (UG2) reef of the Eastern and Western Limbs. These range on average from 0.4 to 1.5 m thickness, and PGEs typically range from 4 to 10 g/t (Cawthorn, 2005)
- Main Zone (MZ) — a succession of gabbronorites with occasional anorthosite and pyroxenite bands
- Upper Zone (UZ) — gabbroic succession.

Figure 7-1: Regional Geological Plan of the Bushveld Complex



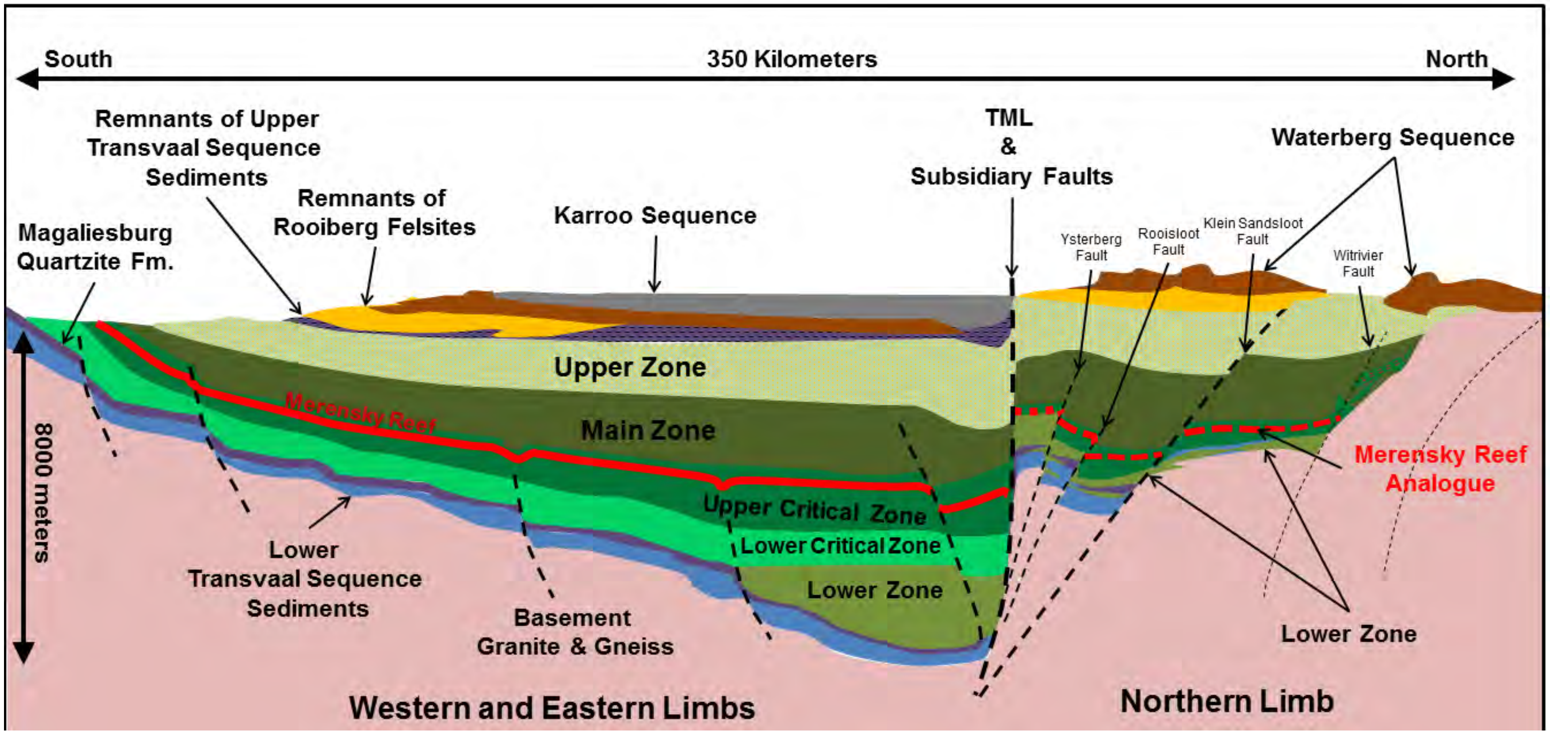
Note: Modified after Viljoen and Schürmann, 1998, section line represents location of section in Figure 7-2.

7.2 Northern Limb

The Northern Limb (formerly Potgietersrus Limb) of the BIC hosts the Platreef mineralization on the Project. Figure 7-2 shows a schematic section through the BIC that has been modified by Ivanplats to illustrate the interpreted Merensky Reef analogue within the Project area.

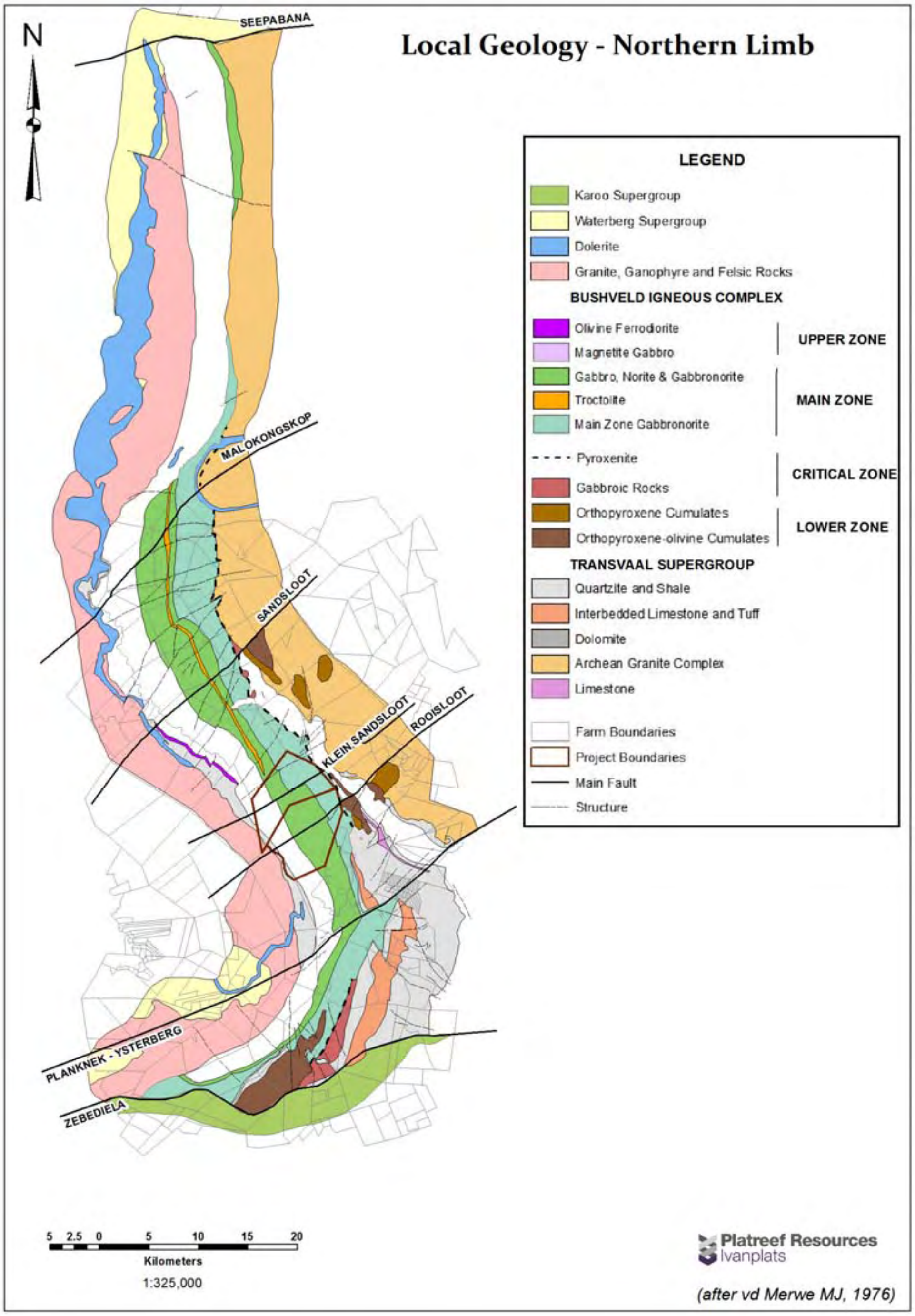
Structurally, the Northern Limb is separated from the rest of the BIC by a craton-wide linear structure called the Thabazimbi–Murchison Lineament (TML). In the area around Mokopane the near-surface expressions of the lineament are the Zebediela and Planknek–Ysterberg faults (Figure 7-3). In broad terms, Upper Zone and Main Zone rocks in the Northern Limb are similar to those in the Eastern and Western Limbs across the TML, but the underlying PGE-bearing mafic-ultramafic rocks of the RLS in the Northern Limb are much thinner, and form a poorly understood composite intrusion with "contact-style" mineralization adjacent the floor rocks, termed the Platreef. Recent work by Ivanplats' geologists provides evidence for a detailed stratigraphic correlation between the Platreef and its mineralized zones, and the well-known mineralized stratigraphy of the Upper Critical Zone and its Merensky and UG2 reefs, south of the TML.

Figure 7-2: Schematic Cross Section through Bushveld Igneous Complex



Note: Figure courtesy Ivanplats, 2012; modified after Kruger, 2005. Figure is schematic and not to scale. Section line illustrated is shown on Figure 7-1.

Figure 7-3: Geological Plan of the Northern Limb of the BIC



Note: Figure courtesy Ivanplats, 2013, modified after van der Merwe (1976).

7.2.1 Lithologies

South of the Planknek-Ysterberg fault, the lower part of the Northern Limb stratigraphy and its mineralized zones have been correlated with Upper Critical Zone (UCZ) rocks (Maier et al., 2008).

North of the Planknek-Ysterberg fault, PGE–Ni–Cu mineralization occurs within the Platreef, a moderately to steeply west-dipping, <100m to 200-400m thick, composite mafic–ultramafic intrusion emplaced into Transvaal Supergroup metasedimentary rocks and (to the north) into Archean granite–gneiss (Kinnaird, 2005)

Crude internal stratigraphy within the Platreef has been documented but has been difficult to correlate between properties. Where present it takes the form of a lower, usually heterogeneous and less well mineralized zone of variable lithologies including pyroxenite, harzburgite, norite, gabbronorite and xenoliths or rafts of variably digested and metamorphosed Transvaal Supergroup rocks; an overlying well-mineralized zone comprised mainly of pyroxenite and locally harzburgite; and an upper, generally poorly mineralized pyroxenite (Kinnaird, 2005 and references therein; Comline et al, 2007). Interpretation of Platreef lithologies, stratigraphy, and mineralization is hampered by widespread contamination of the mafic-ultramafic magmas through the digestion/assimilation process, particularly in the lower heterogeneous (contaminated) zone. Previous subdivision of the mineralized upper Platreef in the Project area (Parker et al., 2012) distinguished an Upper Top Loaded Zone (UTLZ) and a Lower Top Loaded Zone (LTLZ), mainly within the B-Pyroxenite (BP).

In 2012, Ivanplats staff demonstrated that high-grade PGE–Ni–Cu mineralization is consistently hosted within an unconformable, non-cumulate, pegmatoidal, mafic to ultramafic sequence, commonly bound by chromitite stringers and containing coarse-grained to pegmatoidal sulphides. Overlying this pegmatoidal package is a barren feldspathic pyroxenite unit of variable thickness. A separate mineralized zone, of disseminated, medium- to coarse-grained sulphides, is perched near the top of this non-pegmatoidal feldspathic pyroxenite. This mineralization was previously identified as the Upper and Lower Top-Loaded Zones.

Although generally thicker, these two zones share many similarities with the M1 and M2 mineralized zones of the Merensky Reef (Davey, 1992; Lea, 1996), and the host sequence of lithologies corresponds directly to the Merensky Cyclic Unit (MCU) (Grobler et al., 2012). Hanging wall and footwall lithologies correspond to those described for the Merensky Reef in the northern part of the Western Limb (Viljoen 1994 and 1999; Viljoen et al., 1986a; Viljoen et al, 1986b; Viring and Cowell 1999).

7.2.2 Structure

Emplacement of the BIC is generally considered to be associated with anorogenic magmatism caused by intracratonic rifting (Friese, 2012). The Eastern Limb is compartmentalized by several northeast-trending faults, whose map patterns indicate they influenced the development of the Marginal, Lower, and Critical Zones.

In the Northern Limb, similar compartmentalization is suggested by the presence of northeast to north-south faults that appear to separate "sub-basins" with different internal stratigraphy (Figures 7-2, 7-3). Details of this require a better understanding and correlation of stratigraphy within the Northern Limb. Pre-Bushveld fold structures may also have influenced the development of the Platreef and, in general, of the Northern Limb stratigraphy (Friese, 2003a; Friese and Chunnett, 2004; Nex, 2005).

7.2.3 Mineralization

The Platreef, which extends northward from Mokopane for at least 30 km, is defined as a Ni–PGE–Cu–Au-bearing mafic–ultramafic package with a hanging wall of MZ gabbronorite and a footwall of Transvaal Supergroup meta-sedimentary rocks in the south and Archaean granite gneiss in the north (Kinnaird, 2005). This definition includes the mineralization on the Project, but excludes mineralization in Main Zone gabbronorites north of the Drenthe farm, or south of Mokopane where mineralization occurs in recognizably layered rocks of the Critical Zone (Kinnaird, 2005, Maier et al., 2008).

Sulphide mineralization concentrated in the lower parts of the Platreef typically has Pt/Pd ratios of less than 1, whereas the upper portion of the Platreef may have ratios >1, and locally >2. PGE studies on the Platreef by Kinnaird et al, (2005) noted a poor correlation between PGE and sulfur. The study concluded that PGE mineralization was not simply controlled by segregating sulphide melt but rather the addition of semi-metals to the magma as a result of contamination. This produced a complex PGE assemblage including tellurides, bismuthides, and arsenides, in addition to PGE–sulphides.

Chromitite layers or stringers have been observed throughout the strike length of the Platreef, but tend to be discontinuous (White, 1994; Holwell and McDonald, 2006; Yudovskaya and Kinnaird, 2010). Platreef chromitites have been interpreted as 'chromite-rich zones' in pyroxenite, rather than continuous, persistent stratigraphic layers as in the Critical Zone south of the TML (McDonald and Holwell, 2011).

Correlation of the Platreef mineralized zones with the reefs of the Upper Critical Zone south of the TML has been suggested (Vermaak and van der Merwe, 2002; Maier et al., 2008) but remains contentious. Maier et al, (2008) argued that Platreef-type mineralization relates to a marginal setting whereby mineralization is focused along the margin of the Bushveld intrusion, at the base of the Rustenburg Layered Suite in a 'contact-style' manner.

7.3 Project Geology

7.3.1 Overview

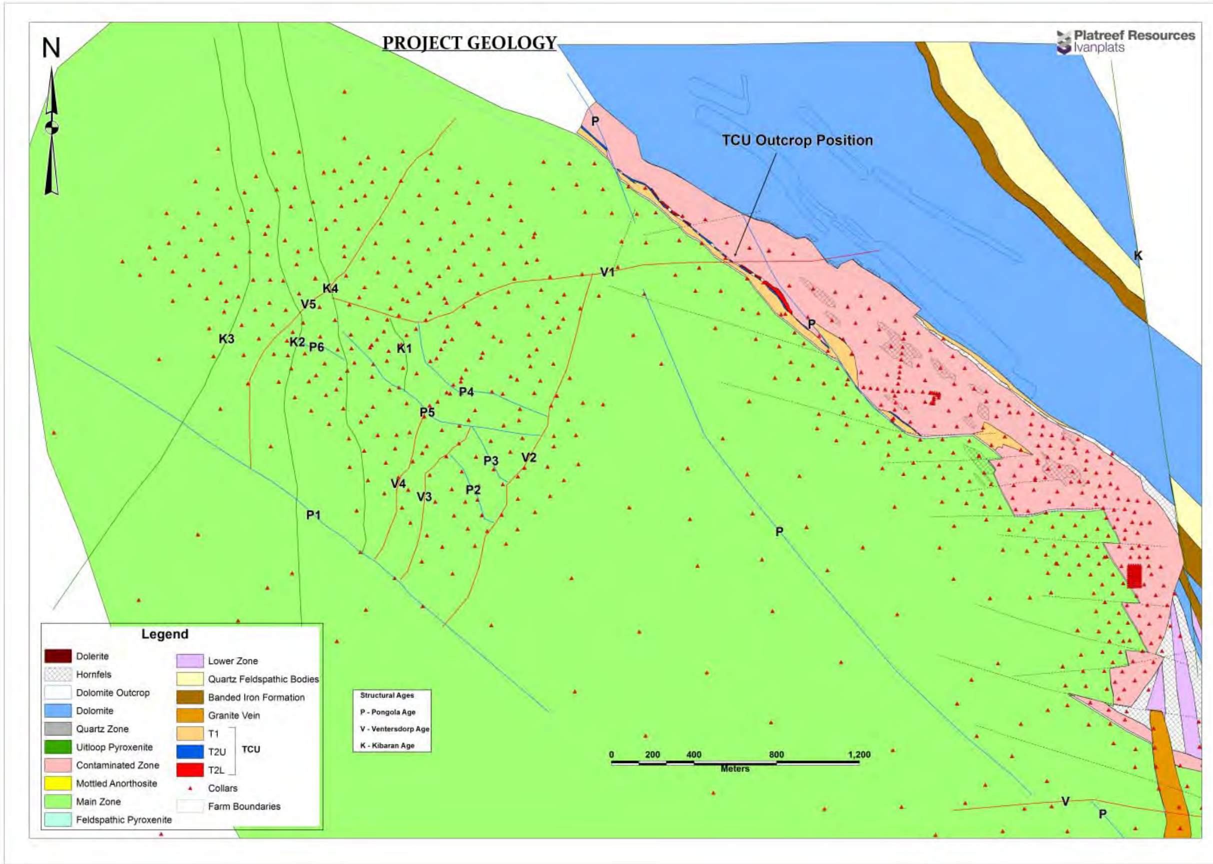
The generalized geology of the Project area is shown in Figure 7-4. Historically, the bulk of scientific and exploration work on the Bushveld's Northern Limb has been performed on the near-surface, generally steeply dipping, part of the Platreef that is amenable to open-pit mining methods.

The floor of the Platreef (contact with Lower Zone or Transvaal) shows steep dips to depths of 900 m (elevation 200 masl) . There is a strong right-angle bend at the south end of Figure 7-5, reflecting a possible fault offset between the Turfspruit and Macalacaskop basins of Kinnard (2005). Below the 200 m elevation is a zone of more gentle dips with local discontinuities that probably also reflect faulting. This area of near constant elevation has been called the Flatreef.

As shown in Figure 7-6, the top of the Platreef (contact with Main Zone) broadly reflects the topography of the floor contact, but is smoother, particularly the Flatreef (G1). There are two depressions that may have been influenced by the floor contact (G3, G4); these are the locus of potholes (see discussion in Section 7.3.4) with thickened TCU. The G2 area does not appear as a depression related to the floor contact, but there is a slight sag in the top contact (see Figure 7-6) and thickened TCU below (See Figures 7-15, 7-19, 7-20).

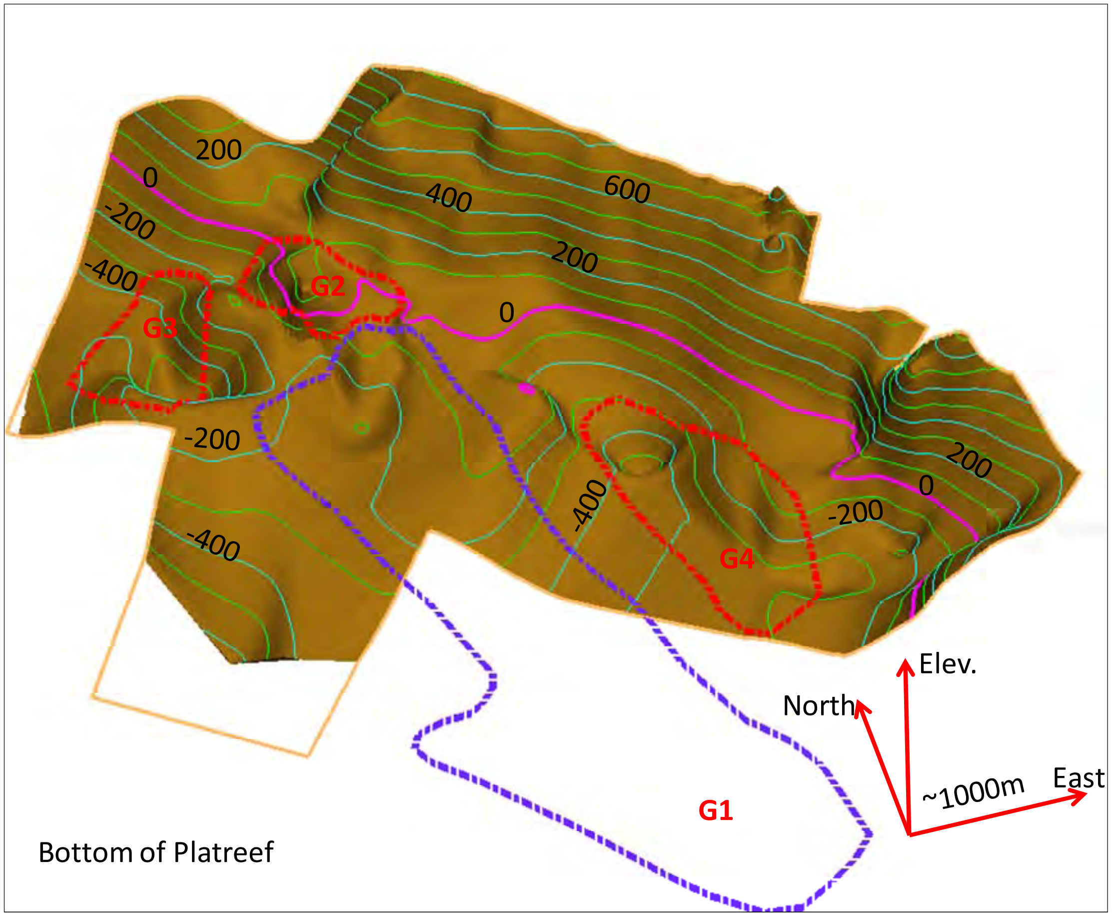
The change in dip of the Platreef at approximately 200 masl in the floor, 400 masl in the top, is accompanied by fundamental changes in geology. Unlike the steeply dipping up-dip area, the Platreef footwall here comprises apparently uncontaminated pyroxenite, harzburgite, and dunite of Lower Zone affinity. In this area it was first recognized that a cyclic magmatic stratigraphy exists and can be correlated from drill hole to drill hole within the upper portion of the Platreef. This upper portion contains well-developed, stratigraphically-constrained zones of chromitite and pegmatoid associated with elevated PGE grades (Grobler et al., 2012). Ivanplats geologists correlate these strata named by them the Turfspruit Cyclic Unit (TCU) with the Upper Critical Zone south of the TML.

Figure 7-4: Project Geology Plan



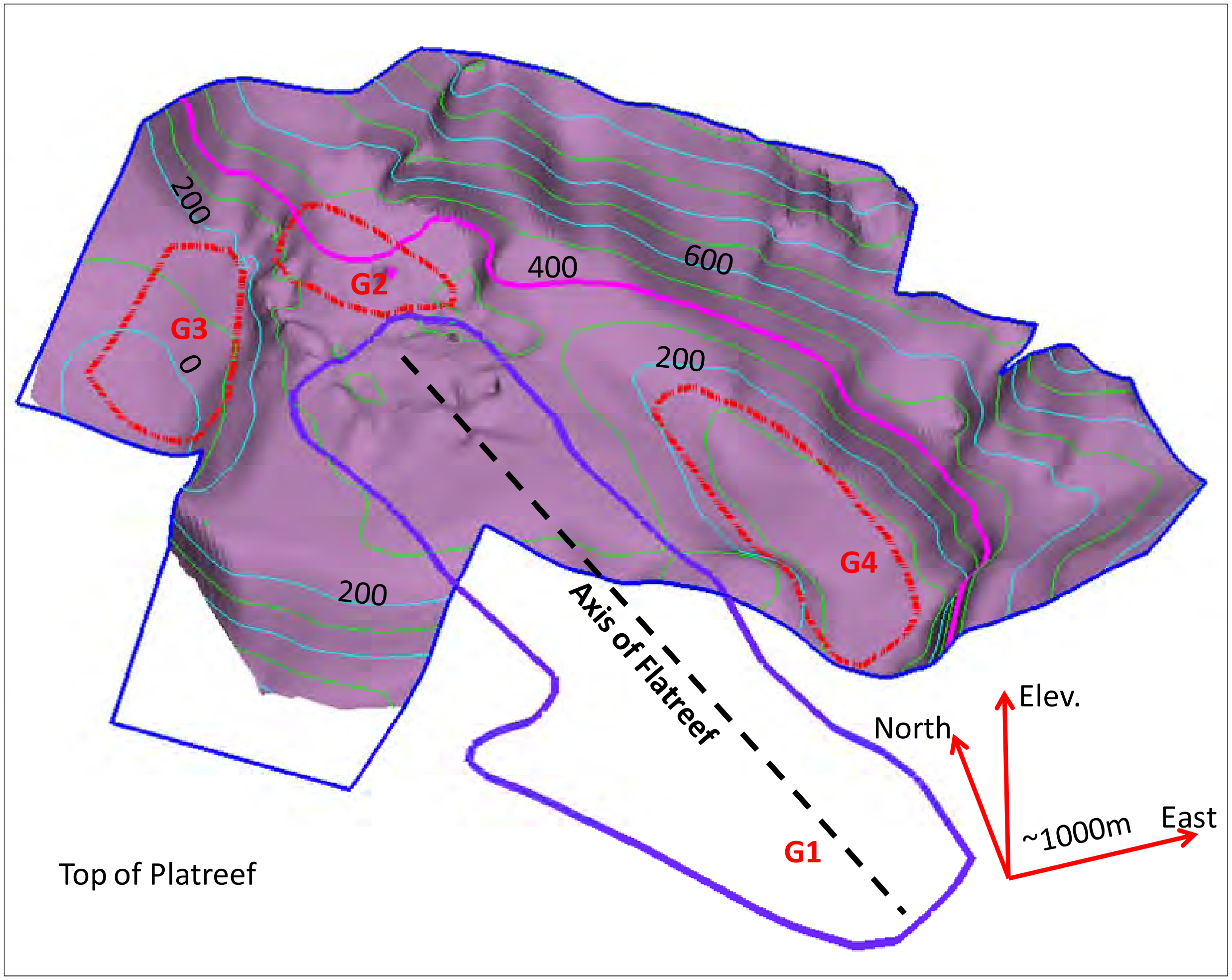
Note: Figure courtesy Ivanplats, 2013. Figure also shows the sub-outcrop position of the TCU units on the eastern side of the Turfspruit farm; P faults are Pongola normal dip slip, K faults are Kibaran normal dip slip, and V faults are Ventersdorp dextral strike slip

Figure 7-5: Perspective View, Platreef Floor Looking North–Northeast



Note: Figure prepared by AMEC and Ivanplats, 2013. Contours in masl. View is from data available to December 2011. G1 = Flatreef, with projection from gravity survey in 2012; G2, G3, G4 label areas where TCU is thickened.

Figure 7-6: Perspective View, Platreef Top, Looking North-Northeast



Note: Figure prepared by AMEC and Ivanplats, 2013. Contours in m. View is from data available to December 2011. G1 = Flatreef, with projection from gravity survey in 2012; G2, G3, G4 label areas where TCU is thickened.

A geographical demarcation of the Project area into five zones has been developed and is shown in Figure 7-7. The zones are based on different exploration target areas rather than on geological criteria.

Mineralized intercepts for the "Flatreef" are shown in Table 7-1 and are based on the drill holes shown in Figure 7-8. Grade shells were used to constrain grade estimation (see Section 14.2). They are also useful to demonstrate the distribution of mineralization. Table 7-2 shows the average true thicknesses of grade shells for the TCU.

7.3.2 2012–2013 Geological Re-interpretation and Correlation with Upper Critical Zone

A new subdivision and nomenclature termed the Turfspruit Cyclic Unit (TCU) was proposed for the upper Platreef on Turfspruit (Grobler and Nielsen, 2012; Grobler et al., 2012). Re-interpretation of historical drill holes has allowed the extension of this interpretation across the entire Project area, including the shallow mineralization considered potentially amenable to open-pit mining methods that is located towards the eastern boundary of Turfspruit. Although large areas show major contamination in this area, the cyclic stratigraphy remains recognizable, and the sub-outcrop position of the TCU has been established (refer to Figure 7-4). The general stratigraphic sequence, as recently developed in the Project area is depicted in Figure 7-9.

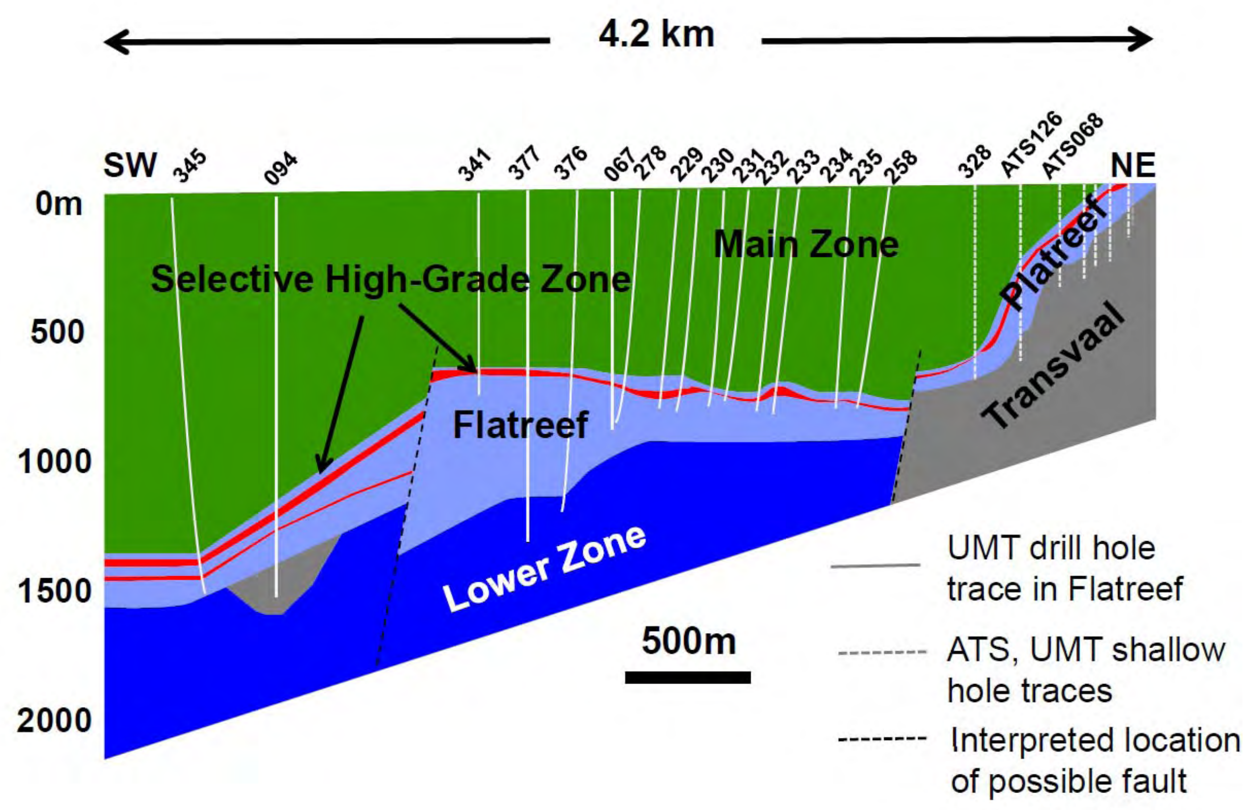
The cyclic magmatic sequence now recognized within the Project area has been subdivided into five major cyclic units, and correlated with Upper Critical Zone (UCZ) south of the TML (Grobler et al., 2012). The units include from top to bottom:

- Norite Cycles 1 (NC1) as hanging wall to the TCU; this unit is an analogue of the Bastard Cyclic Unit (BCU), containing the "Giant Mottled Anorthosite" (GMA) at its top
- Turfspruit Cyclic Unit (TCU), the main mineralized cyclic unit; this unit is analogous to the Merensky Cyclic Unit (MCU) that contains the Merensky anorthosite and pyroxenite
- Norite Cycles 2 (NC2) as footwall to the TCU; this unit is an analogue of the Merensky footwall in the Western and Eastern BIC
- Pseudo Reef Cyclic Units (PSR) that are restricted to large regional pothole depressions and are analogous to the Pseudo Reefs of the Swartklip Facies (Northwestern BIC) found in the interval between the Merensky Reef and UG2 reef
- UG2 Cyclic Unit (UG2CU) is an analogue to the UG2 Cyclic Unit of the Western and Eastern Limbs, exhibiting many similarities including "leader triplets" chromitite stringers.

Figure 7-7: Project Zones Plan

Note: Figure courtesy Ivanplats, 2013; position of cross sections shown in Figure 7-8 and 7-15 are shown.

Figure 7-8: Cross Section along Dip Section 11 Showing TCU (red)



Note: Figure courtesy Ivanplats 2012; drill intercepts calculated by AMEC are provided in Table 7-3. Location of section line is indicated in Figure 7-6. At the southwestern end of the section the TCU and UG2CU are both shown.

Table 7-1: Intercepts Grading > 2 g/t and > 3 g/t 3PE Located on Section Shown in Figure 7-8

2 g/t 3PE Composites									
DHID	From (m)	To (m)	Drilled Length (m)	% Ni	% Cu	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)
ATS068	199.30	206.36	7.06	0.36	0.21	2.32	2.26	0.33	4.90
ATS126	333.91	339.79	5.88	0.33	0.21	1.60	1.19	0.22	3.01
UMT328	687.59	703.00	15.41	0.29	0.17	1.14	1.26	0.27	2.66
UMT258	865.00	886.00	21.00	0.26	0.16	2.06	1.73	0.50	4.29
UMT256	836.93	841.00	4.07	0.42	0.26	2.91	2.55	0.78	6.24
UMT235	850.00	865.00	15.00	0.27	0.17	1.84	1.83	0.29	3.96
UMT234	810.00	836.06	26.06	0.38	0.20	2.12	2.32	0.32	4.75
UMT233	843.00	857.00	14.00	0.38	0.21	2.05	1.98	0.29	4.32
UMT232	835.00	853.00	18.00	0.38	0.20	2.06	1.66	0.26	3.98
UMT231	815.00	826.65	11.65	0.42	0.21	1.60	1.85	0.22	3.67
UMT230	803.00	813.00	10.00	0.38	0.17	1.67	2.10	0.22	4.00
UMT229	807.43	817.00	9.57	0.22	0.09	1.70	1.44	0.16	3.31
UMT278	780.00	795.00	15.00	0.39	0.19	2.07	2.35	0.27	4.69
UMT067	758.28	770.26	11.98	0.46	0.22	2.12	3.12	0.31	5.55
UMT376	703.18	718.00	14.82	0.32	0.16	2.06	2.24	0.34	4.65
UMT377	700.00	707.00	7.00	0.25	0.12	2.72	2.18	0.36	5.27
UMT341D1	694.00	711.00	17.00	0.32	0.16	1.61	1.49	0.35	3.44
UMT094	1256.99	1288.50	31.51	0.25	0.12	1.75	1.76	0.24	3.74
UMT345	1429.00	1440.00	11.00	0.30	0.14	1.91	1.33	0.50	3.74
3 g/t 3PE Composites									
DHID	From (m)	To (m)	Drilled Length (m)	% Ni	% Cu	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)
ATS068	199.30	202.34	3.04	0.53	0.30	3.95	3.36	0.51	7.82
ATS126	No 3g/t 3PE intercept								
UMT328	699.00	703.00	4.00	0.39	0.23	1.16	1.56	0.35	3.07
UMT258	865.00	882.00	17.00	0.16	0.29	2.32	1.95	0.58	4.85
UMT256	836.93	841.00	4.07	0.42	0.26	2.91	2.55	0.78	6.24
UMT235	850.00	861.09	11.09	0.33	0.21	2.39	2.22	0.34	7.95
UMT234	810.00	836.06	26.06	0.38	0.20	2.12	2.32	0.32	4.75
UMT233	843.00	856.00	13.00	0.38	0.21	2.05	1.98	0.29	4.32
UMT232	835.00	851.26	16.26	0.39	0.20	2.17	1.72	0.26	4.15
UMT231	815.00	821.44	6.44	0.47	0.23	2.19	2.42	0.28	4.89
UMT230	803.00	812.00	9.00	0.39	0.18	1.73	2.19	0.23	4.16
UMT229	807.43	812.18	4.75	0.17	0.08	2.44	1.51	0.22	4.17
UMT278	780.00	793.00	13.00	0.39	0.19	2.27	2.52	0.29	5.08
UMT067	758.28	770.26	11.98	0.46	0.21	2.12	3.12	0.31	5.54
UMT376	708.33	716.00	7.67	0.49	0.25	2.99	3.52	0.43	6.94
UMT377	700.00	706.00	6.00	0.25	0.12	2.92	2.33	0.39	5.65
UMT341D1	695.00	706.00	11.00	0.33	0.16	1.72	1.57	0.37	3.66
UMT094	1257.82	1275.79	17.97	0.26	0.13	2.44	2.45	0.30	5.20
UMT345	1430.00	1440.00	10.00	0.30	0.14	1.97	1.40	0.51	3.88

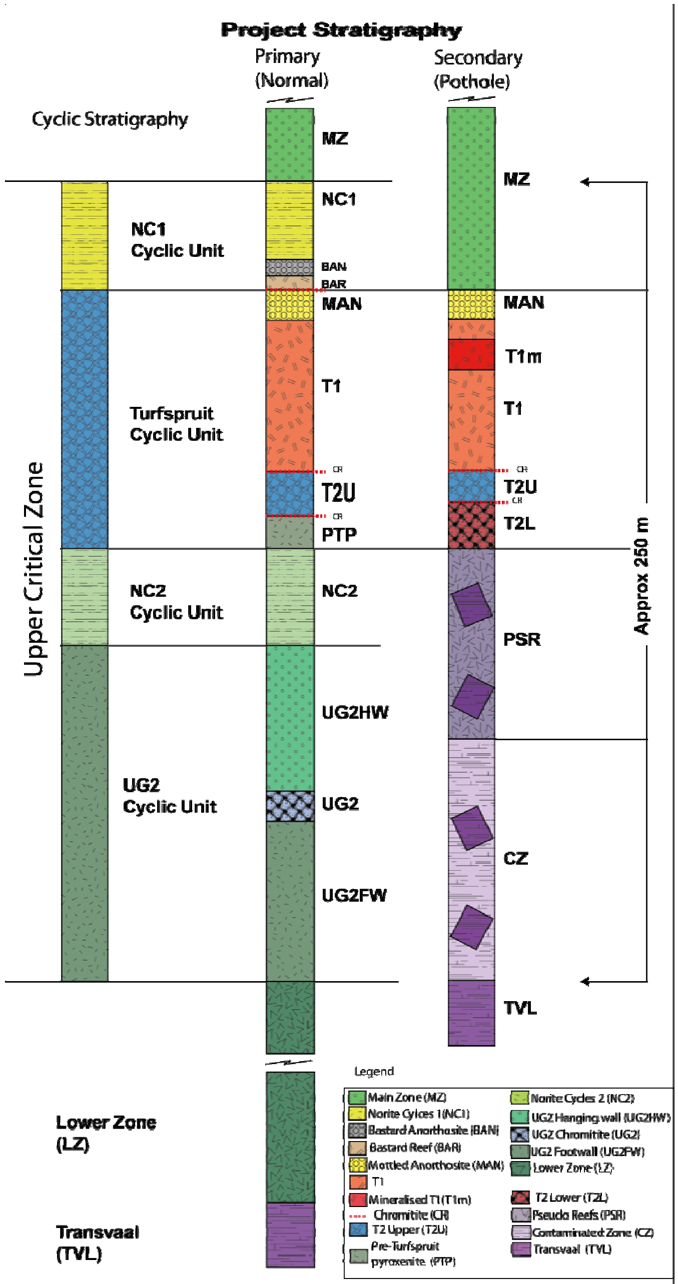
Notes: Lengths approximate true thicknesses as most holes are drilled subperpendicular to the Platreef.

Table 7-2: Average Grade Shell True Thicknesses

Nested Grade Shell	Indicated (Zone 1, 100 x 100 m spacing)	Inferred (Zones 2, 3)
3 g/t 3PE	17.1 m	12.9 m
2+3 g/t 3PE	24.3 m	18.0 m
1+2+3 g/t 3PE	29.1 m	23.6 m

Note: Computed where grade shell is present and at least 3 m thick

Figure 7-9: Proposed Cyclic Stratigraphic Framework



Note: Figure courtesy Ivanplats, 2012. PTP is an unmineralized ortho pyroxenite locally present at the base of the TCU.

The main difference between the UCZ cyclic units on Turfspruit and those in the Eastern and Western Limbs is their greater thickness, particularly with regards the TCU.

Figure 7-10 shows the correlation suggested by Ivanplats staff between the TCU and cyclic units located on the Eastern and Western Limbs of the BIC.

Contamination by Transvaal sediments can occur within any of the stratigraphic horizons; however, it is predominantly confined to the units below the TCU. Contamination hampers footwall stratigraphic identification and is grouped into “Contaminated Zone” (CZ) where dominant. To date, no evidence of the existence of Lower Critical Zone lithologies have been found within the Turfspruit area, although Lower Zone mafic to ultramafic rocks have been intersected in many deep holes within the Project area.

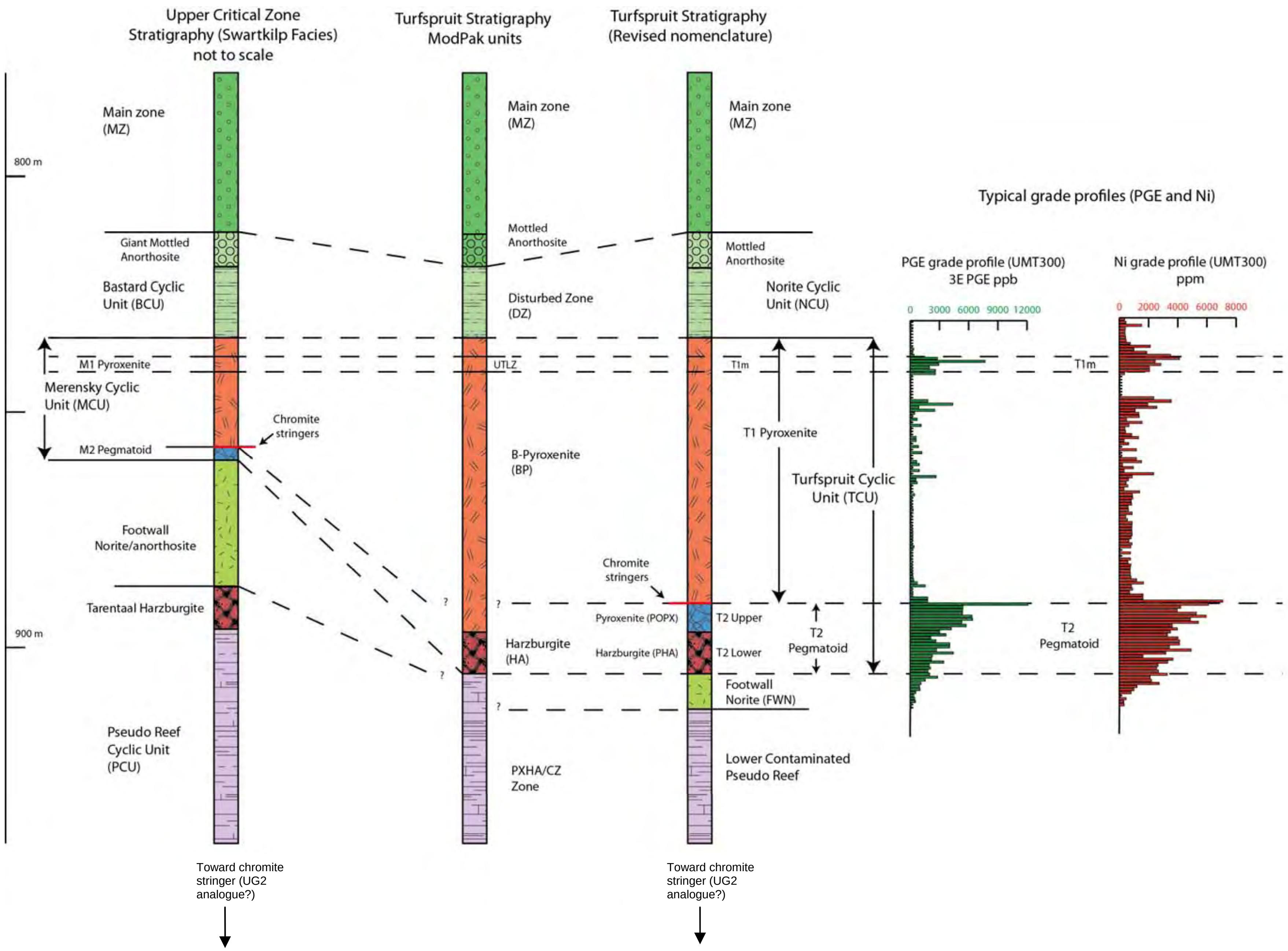
Turfspruit Cyclic Unit (TCU)

The TCU is the best-developed cyclical unit recognized in the Project area and hosts the principal mineralized reefs. The TCU is in general subdivided from the base upwards into the following zones:

1. Mineralized pegmatoidal harzburgite and/or pegmatoidal olivine-bearing pyroxenite (T2 Lower), locally with a chromitite stringer on its bottom contact
2. Mineralized pegmatoidal orthopyroxenite, commonly with a thin (~0.5 cm) chromitite stringer marking its upper contact (T2 Upper)
3. Non-mineralized non-pegmatoidal medium-grained feldspathic pyroxenite (T1), with a generally non-pegmatoidal mineralized zone near its top (T1m)
4. Mottled anorthosite--norite on the hanging wall contact (T1).

The pegmatoidal T2 Lower harzburgite exhibits a poikilitic texture whereby large orthopyroxene oikocrysts enclose smaller olivine ± chromite grains. Higher PGE and Ni-Cu grades (>4 g/t PGE, >0.4% Ni, >0.2% Cu) are commonly associated with the pegmatoid and chromitite, although mineralization also persists into both the over- and underlying rocks. Pt/Pd ratios also tend to be higher (>1.0) in association with chromitite and pegmatoid. The T2 Upper + Lower pegmatoidal zone averages ~4 to >20m in thickness.

Figure 7-10: Revised Stratigraphic Interpretation, Turfspruit Cyclic Unit



Note: Figure courtesy Ivanplats, modified by AMEC, 2012

The T1 pyroxenite is medium to coarse-grained, variably feldspathic, and usually comprises the thickest unit within the TCU, averaging ~15 m, but thickening to as much as 85 m in places (Nielsen and Grobler, 2012). The T1 pyroxenite contains the mineralized T1 (T1m) zone, which consists of disseminated, medium to coarse-grained sulphides hosted within the typically non-pegmatoidal feldspathic pyroxenite, locally containing chromitite stringers. The T1m contact is gradational with adjacent weakly to un-mineralized T1 pyroxenite. The basal 1–2 m of the T1 (directly above the T2 contact) is commonly weakly to moderately mineralized, and may contain millimetre-thick chromitite "leaders".

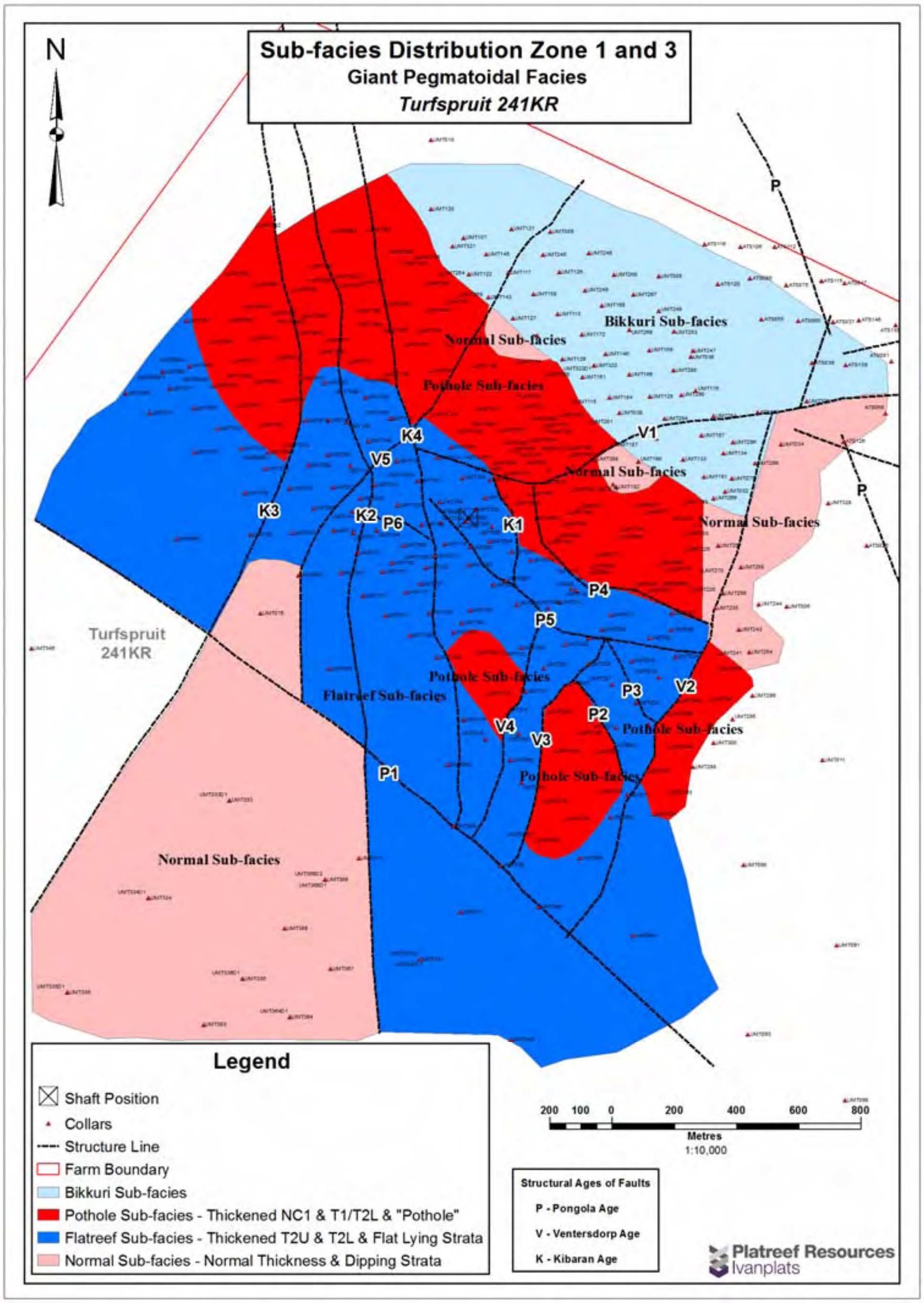
7.3.3 Delineation of New Platreef Regional Facies and Sub-Facies

Wagner (1929) divided the rocks of the Upper Critical Zone in the Western Limb of the BIC into two regional facies, the "Swartklip facies" to the north and the "Rustenburg facies" to the south of the Pilanesberg. The distinction was based on regional lithological and thickness variations and the presence of olivine-bearing layers in the Swartklip facies. Subsequently, based on the morphology of pothole structures and thickness variations of the Merensky Reef, four sub-facies have been recognised in the Rustenburg facies and two in the Swartklip facies (Viljoen et al., 1986a; Viljoen, 1999).

Consistent with the revised interpretation and correlation with the Upper Critical Zone (UCZ), the UCZ recognized in the Project area is proposed to represent a new regional facies, the "Giant Pegmatoidal facies" (Grobler et al., 2013). Establishment of the "Giant Pegmatoidal facies" is based on the significant thickness difference of the mineralized pegmatoidal T2 reef (~4 to >20 m), compared to the much thinner pegmatoidal Merensky Reef (~ 1 m) (Grobler et al., 2013).

Four magmatic sub-facies are currently recognized within the Giant Pegmatoidal facies, and were defined in an attempt to describe the T1m and T2 mineralized zones (Figure 7-11). These facies are based on the distribution and development of the different lithological units that represent the TCU and are expected to be applicable to the entire Project area. The distribution and morphology of these sub-facies are comparable to that of "potholes" described in the Merensky Reef south of the TML, and is described further in the next section.

Figure 7-11: Sub-facies Distribution of the Giant Pegmatoidal Facies across Zone 1 and Zone 3



Note: Figure courtesy Ivanplats, 2013, after Grobler et al., 2013. Shaft noted on figure is the planned location of a proposed exploration shaft. Refer to Section 7.3.5 for a discussion of the faulting indicated on the plan.

The stratigraphy of the UCZ as described above is depicted in Table 7-3 and Table 7-4. A comparison is made between the new UCZ stratigraphy, the previous ModPak distinctions used by Ivanplats from 2010 to 2012 (Parker et al., 2012), the historical Platreef interpretation and the recognised eastern and western Bushveld stratigraphy. Table 7-5 summarises the stratigraphic column and provides generalised rock compositions for each stratigraphic unit. Table 7-5 summarizes the regional and sub-facies descriptions.

7.3.4 Geological Features of the UCZ in Project Area

Three distinct geological features (Figure 7-12) are recognized within the Project area and include the following:

- A double reef package within the northeastern part of Zone 1 (informally termed the Bikkuri Reef)
- Three different areas (G2, G3, G4) where UCZ lithologies show significant thickening into what appear to be large depressions or “pothole” depressions, at least two of which (G3, G4) are possibly controlled by existing pre-Bushveld fold structures and/or faults. On the other hand in detail potholes can reflect magmatic (thermal) erosion on a local scale, as shown in Figure 7-13. Such erosion may have occurred at G2.
- Presence of a flat-lying portion of the TCU again related to structural control.

Figure 7-14 shows an isopach map of the thickness of the 2+3 g/t grade shell. The thickest zones correlate with the depressions described below. The axis of the Flatreef tends to have the thinnest zones. The contour patterns, particularly in the well drilled inset portion of Figure 7-14 are consistent with the pothole topography shown in Figure 7-13. In addition to and in advance of underground exploration, a detailed seismic survey will help to determine accurately the dimensions and amplitudes of potholes.

Table 7-3: Stratigraphic Correlations Summary

<table>
<tr><th>Platreef (White, 1994; Kinnaird et al., 2005)</th><th>Modpak (Parker et al., 2012)</th><th colspan="2">Turfspruit (Grobler and Nielsen, 2012)</th></tr>
<tr><td>Upper Zone</td><td>Upper Zone</td><td>Upper Zone</td><td>Upper Zone</td></tr>
<tr><td colspan="4">Unconformity</td></tr>
<tr><td>Main Zone</td><td>Main Zone (MZ)</td><td>Main Zone</td><td>Main Zone</td></tr>
<tr><td colspan="4">Unconformity</td></tr>
<tr><td rowspan="4">Disturbed Zone</td><td rowspan="4">Disturbed Zone (DZ)</td><td>Norite Cycle 1</td><td rowspan="3">NC1</td></tr>
<tr><td>Bastard Anorthosite (BAN)</td></tr>
<tr><td>Bastard Reef (BAR)</td></tr>
<tr><td>Mottled Anorthosite (MAN)</td><td rowspan="5">TCU</td></tr>
<tr><td>C Pyroxenite</td><td rowspan="2">B pyroxenite (BP)</td><td rowspan="2">T1</td></tr>
<tr><td rowspan="2">B Pyroxenite</td></tr>
<tr><td>Pegmatoidal B pyroxenite (PBP)</td><td>T2U</td></tr>
<tr><td></td><td>Harzburgite (HA)</td><td>T2L</td></tr>
<tr><td colspan="4">Unconformity</td></tr>
<tr><td rowspan="3">A Pyroxenite</td><td rowspan="3">Pyroxenites and harzburgites (PXHA)</td><td>Norite Cycle 2</td><td>NC2</td></tr>
<tr><td>Pseudo Reef</td><td>PSR</td></tr>
<tr><td>UG2 Hanging wall</td><td rowspan="3">UG2CU</td></tr>
<tr><td rowspan="2">Malmali subgroup</td><td rowspan="2">Contaminated Zone (CZ)</td><td>UG2 Chromitite</td></tr>
<tr><td>UG2 Footwall</td></tr>
<tr><td colspan="4">Unconformity</td></tr>
<tr><td>Lower Zone</td><td>Lower Zone (LZ)</td><td>Lower Zone</td><td>Lower Zone</td></tr>
<tr><td>Marginal Zone</td><td>Marginal Zone (MZN)</td><td>Marginal Zone</td><td>Marginal Zone</td></tr>
<tr><td>Transvaal</td><td>Transvaal (FL)</td><td>Transvaal</td><td>Transvaal</td></tr>
</table>

Note: Contaminated Zone can occur at any stratigraphic level below the TCU

Table 7-4: Upper Critical Zone (UCZ) on Turfspruit and Macalacaskop (Grobler et al., 2013)

Turfspruit UCZ		Lithology	Petrographic Description	Thickness (m)	BIC UCZ
NC1CU	NC1	Interlayered sequence of anorthosite, norite and feldspathic pyroxenite	Comprises cyclical units of GN, AN, N, FPX and locally chromite.	0–100	Bastard Cyclic Unit
	BAR	Feldspathic pyroxenite	Mineralised FPX located within the NC1, with a thin chrome stringer often developed on the basal contact.	0–5	
TCU	MAN	Mottled anorthosite	An anorthosite containing globules of pyroxene ranging in from mm sized spotted to cm sized mottled anorthosite.	0–20	Merensky Cyclic Unit
	T1	Feldspathic pyroxenite	Composed of ±20% plagioclase feldspar; ±80% orthopyroxene, with minor clinopyroxene. Medium to coarse grained, with pyroxene cumulates. Weak talc-tremolite-chlorite, as well as biotite alteration.	0–50	
	T1m	Mineralized feldspathic pyroxenite	Portion of the T1 feldspathic pyroxenite that contains fine- to medium-grained sulphides.	0–10	
	T2U	Orthopyroxenite	Poikilitic pegmatoidal orthopyroxenite, typically with a chrome stringer marking the top contact. Composed of >70% orthopyroxene, <10% clinopyroxene, <10% plagioclase and <10% olivine.	0–25	
	T2L	Harzburgite	Composed of >40% to <90% olivine; >10% to <40% orthopyroxene and <10% clinopyroxene and plagioclase <10%. Often has a characteristic poikilitic texture.	0–30	
				Unconformity	
NC2CU	NC2	Interlayered sequence of anorthosite, norite and feldspathic pyroxenite	Comprises cyclical units of AN, N, FPX and occasional Cr stringer in AN. Sporadically mineralised.	0–100	Footwall Norite 1-12
PSRCU	PSR	Harzburgite ("Tarentaal")	Composed of feldspathic harzburgite with subhedral plagioclase grains. Well mineralised with base metal sulphides (Ni and Cu) and less PGEs.	0–200	Pseudo Reef
UG2CU	UG2HW	Feldspathic pyroxenite	Composed of medium-grained cumulus orthopyroxene and intercumulus plagioclase with minor cumulus clinopyroxene, massive igneous texture.	0-150	UG2 Cyclic Unit
	UG2	Chromitite	Fine to medium-grained chromitite band. Subhedral to euhedral chromitite band consists of orthopyroxenes, clinopyroxene and plagioclase grains.	0–1.5	
	UG2FW	Olivine orthopyroxenite	Composed of medium-grained abundant intercumulus plagioclase and rounded cumulus olivine commonly enclosed by oikocrysts of clinopyroxene, crudely layered poikilitic igneous texture.	0–50	
				Unconformity	
LZ	LZ	Orthopyroxenite, harzburgite and dunite	Composed of orthopyroxenite, harzburgite and dunite. Fine to medium grained orthopyroxenite with interstitial plagioclase is characterized by very fine-grained disseminated sulphides.	0–200	Lower Zone

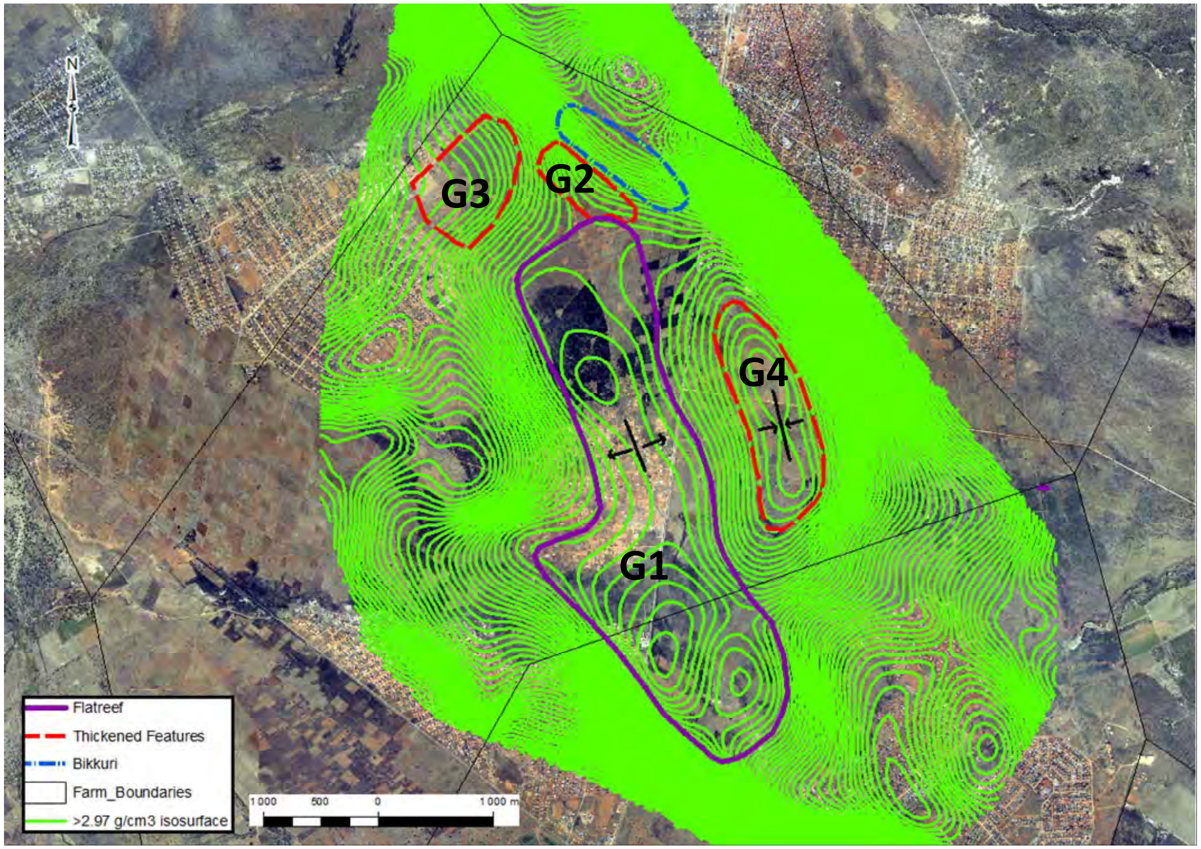
Turfspruit UCZ		Lithology	Petrographic Description	Thickness (m)	BIC UCZ
CZ	CZ	Parapyroxenite, calc-silicate, hornfels, quartzite xenoliths	A mixture of parapyroxenite (a mixture of metamorphosed metasediments, pyroxenite and serpentinite) and calc-silicate (a partially melted dolomite with inter-bedded chert). Associated with massive sulphide bodies.	0–350	
TVL	TVL	Quartzite, hornfels, dolomite	Very fine to fine-grained metasedimentary rocks.	0–250	Transvaal

Table 7-5: Facies and Sub-Facies Description

Facies	Sub-Facies	Abbreviation	Description
Giant Pegmatoidal Facies (GPF)	Bikkuri Reef	BRS	"Surprise reef" intersected at shallower than expected depths and forming a double reef package on the eastern side of Zone 1.
	Normal Reef	NRS	Reef exhibiting more normal thicknesses. Noritic footwall stratigraphy with a well-developed UG2 Cyclic Unit
	Flatreef	FRS	Flat-lying anomalously thick T2 reef.
	Pothole Reef	PRS	Thickening of lithologies into large depression structures. Development of olivine-bearing harzburgitic units at or near the base of the TCU. Footwall of thick Pseudo Reef pyroxenite and feldspathic harzburgite.

Note: Table after Grobler et al., 2013

Figure 7-12: Geophysical Plan, Falcon Gravity Data Showing Major Geological Fea

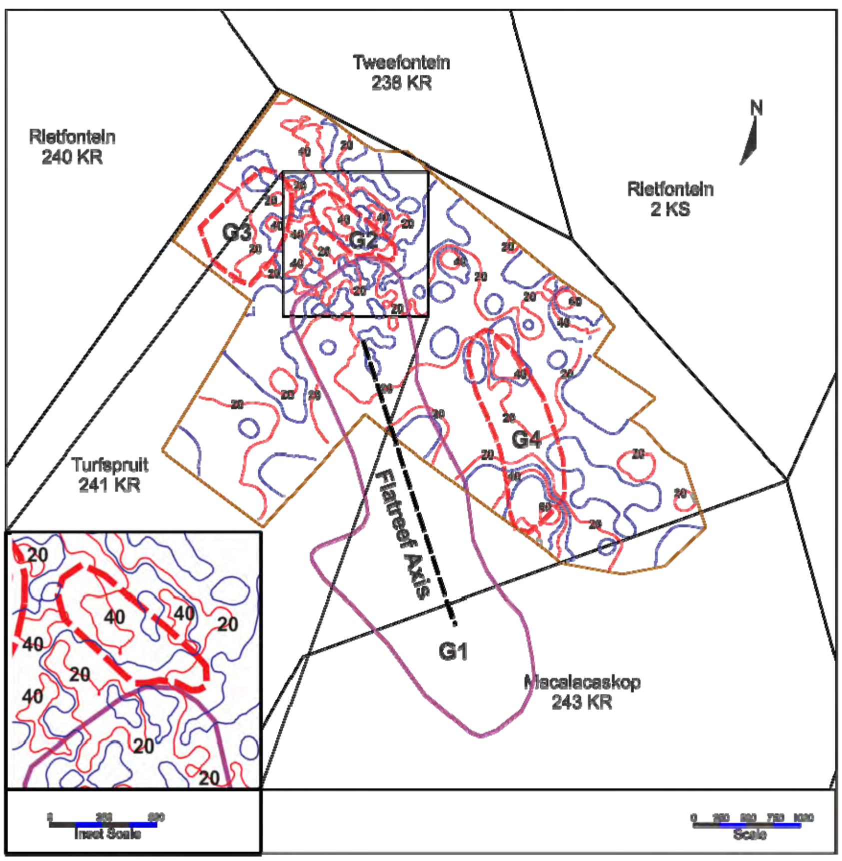


Note: Figure courtesy Ivanplats, 2013. G1 represents the Flatreef; G2, G3 and G4 represent areas with thickened TCU; blue dashed perimeter indicates location of Bikkuri Reef.

Figure 7-13: Pothole Structures, Karee Platinum Mine (Rustenburg Area)

Note: Photographs from van der Merwe and Cawthorn, 2005. Photographs show the occurrence of "pothole" structures at the base of the UG2 chromitite reef. Note human figures standing inside pothole structure in photograph on the right, which provide scale.

Figure 7-14: Isopach Map of the 2+3 g/t Grade Shell (units m)



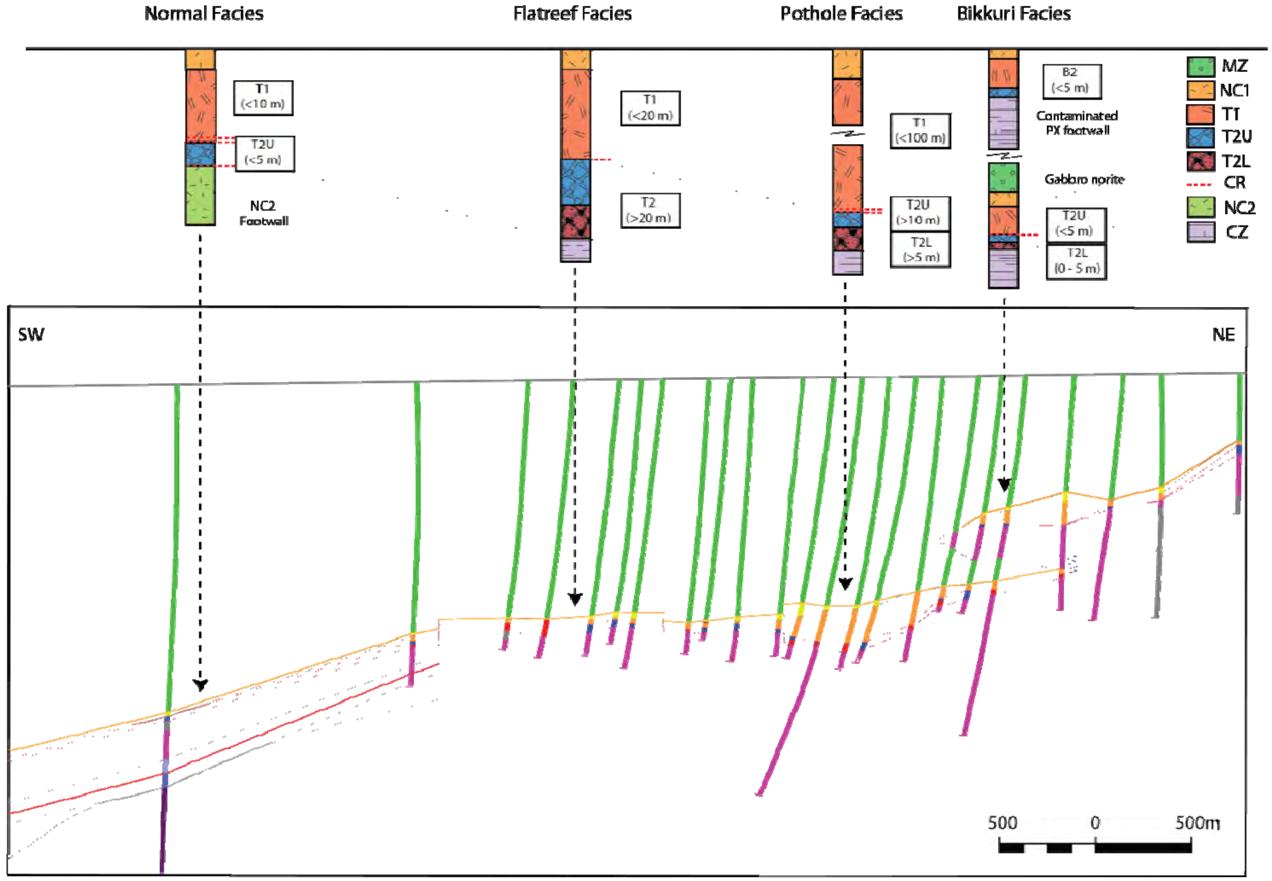
Note: Figure courtesy Ivanplats, 2013. Based on UMT-TCU model and gravity survey. G1 represents the Flatreef; G2, G3, G4 are areas with thickened TCU.

The largest feature recognized within the TCU is a depression (G2) that occurs within the eastern part of Zone 1, where significant thickening of the NC1 and the upper (T1) stratigraphic layer of the TCU occur. This depression contains a distinct thickening of the T1 feldspathic pyroxenite. A second similar depression (only partly drilled) is present towards the northwestern edge of Zone 1 (G3). However, in this case, thickening of the both the TCU as well as its footwall units (still in the Platreef) appear to have occurred. A third depression (G4) occurs mainly in the Zone 2 area in the southern part of the Turfspruit. Features related to these structures appear to be reminiscent of “regional pothole” structures as described from other parts of the BIC (Viljoen et al., 1986a; Viljoen et al., 1986b; Viring and Cowell, 1999). Smaller potholes appear to be present within the “Flatreef” based on the distribution of T2 Lower olivine-bearing lithologies. The regional pothole and normal sub-facies are very similar to those recognized and described from the Western and Eastern Limbs of the BIC.

A further, unique, feature recognized within Zone 1 is the “Flatreef” portion of the Platreef, initially recognized as being flat-lying compared to the steeper-dipping reefs within the Zone 4 area (the portion of the deposit where mineral resources amenable to open pit mining are located). Ongoing studies suggest that intrusion of the TCU appears to have been partially controlled by pre-Bushveld folds and faults evident in the Transvaal Supergroup sedimentary rocks. The presence of identical centimetre to metre scale primary cyclic magmatic layering in both steep and flat-dipping parts of the Project area suggests that post-Bushveld faulting tilted originally flatlying zones to current steep orientations in the up-dip area, while the Flatreef maintained more or less its original geometry. The “Flatreef” in essence appears to contain better-mineralized T2 mafic to ultramafic units compared to the surrounding areas, where the T1m and T2 reefs occur in closer proximity to each other. Juxtaposition of different T2 lithologies (possibly “normal” and “pothole” sub-facies) is difficult to model at the current drill spacing, but may be due to strike-slip displacement across fault structures.

Figure 7-15 is a cross-section through the mineralized zone and illustrates the different sub-facies recognized across the Turfspruit drilled extent. Structural displacement is evident on cross-sections and plan views on distribution plots of the different facies (refer to Section 7.3.4 for a discussion of Ivanplats’ structural interpretation of the Flatreef area.

Figure 7-15: Cross-section along Dip Section 7 through Zone 1 Turfspruit Cyclic Unit.



Note: Figure courtesy Ivanplats, 2013. Figure displays the occurrence of the different sub-facies within the interpreted Giant Pegmatoidal Facies. Each strip log at the tope of the figure corresponds with the geology observed in the drill section below. Cross section location shown in Figure 7-7.

7.3.5 Structure

Ivanplats has used the regional structural interpretations of Friese (2012) as a framework to guide structural interpretations in the Project area.

Five major groups of faults have been recognized regionally in the Bushveld according to their relative timing, orientation, and kinematics (Table 7-6, after Friese, 2012). On the Project, Ivanplats geologists have interpreted the Pongola (P), Kibaran (K) and Ventersdorp (V) fault sets mainly in Zone 1 where there is detailed drilling. Fault interpretations were generated by Ivanplats staff, using a combination of contour mapping and dip direction data (Figure 7-16, Figure 7-17) with Figure 7-18 providing a summary plan. This information provides the Project-wide framework for a conceptual model of the structural anomaly locally termed the “Flatreef” in Zone 1. Current interpretations show that the mineralization in the Flatreef area has been both upfaulted and downthrown. This is illustrated in the sections included as Figure 7-19 to Figure 7-21. Figure 7-18 shows the locations of the section lines.

7.3.6 Mineralogy of PGE-Base Metal Mineralization in the Project Area

There are six separate mineralized zones found throughout the Upper Critical Zone on the Project (refer to Table 7-5). The T1m and T2 are by far the best developed and shows good continuity across the property.

The other mineralized zones mostly contain erratic mineralization and disrupted continuity along strike and dip.

The primary magmatic mineralization on Turfspruit 241KR, in general, exhibits the same geological characteristics as described for the Merensky Reef within the Upper Critical Zone of the BIC.

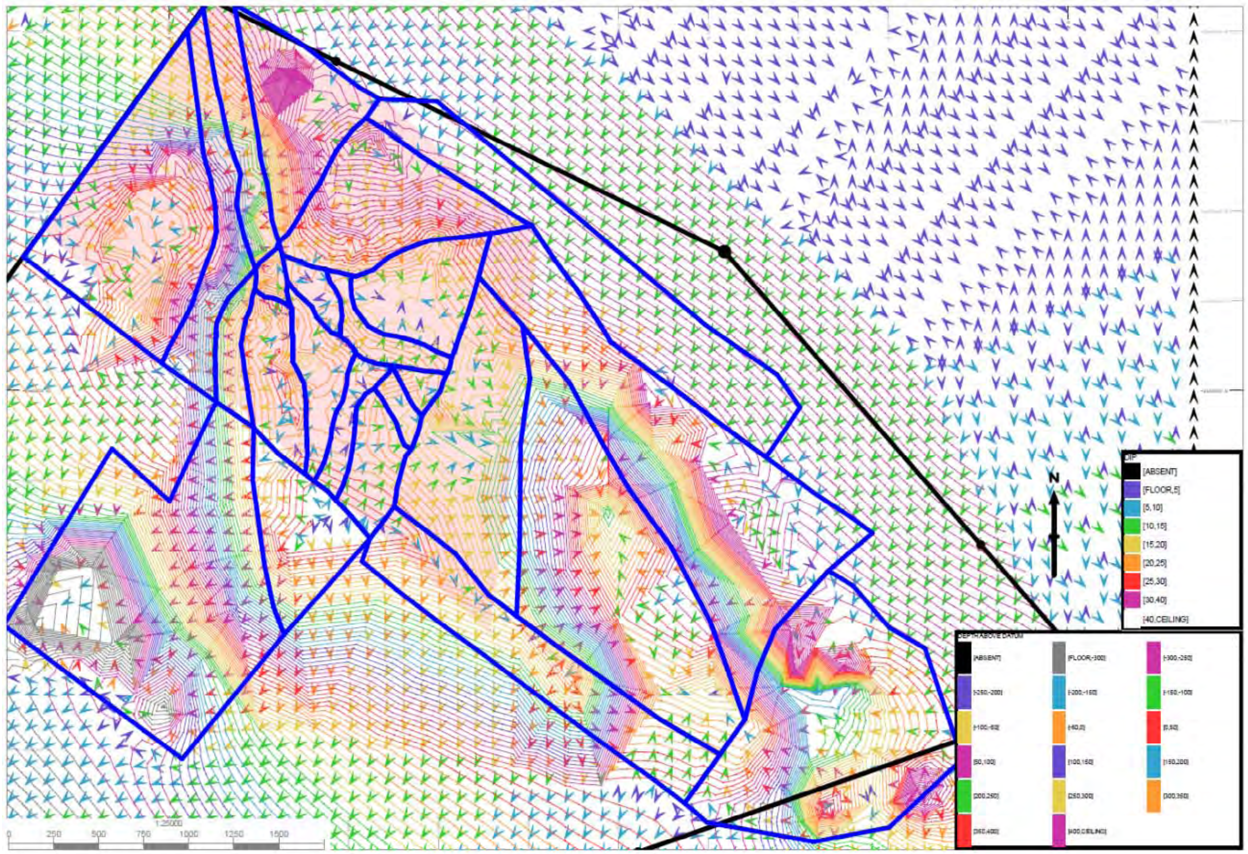
Although much thicker than the normal Merensky Reef, the Turfspruit T1 and T2 reefs are much less affected by contamination from sedimentary xenoliths than most of the other units below. The Pseudo- and UG2 Reefs found stratigraphically below the TCU usually are less continuous, being disrupted by sedimentary xenoliths and associated contamination/alteration.

Table 7-6: Summary of Structural Features in the Bushveld and Project Area

Name	Azimuth	Dip	Type	Sense	Age	Features	Comment	Association
Pongola Extensional Faults	NW	Steep	Normal	Extensional	Murchison Orogeny (2.98 – 2.96 Ga)	<40 cm brittle ductile tectonite with thin calcite veins, occasional granitic healing	Displaced by all three other fault groups, 10 - 35 m of net vertical displacement, dextral strike-slip reactivation	Granite dykes
Group 2 Thrusts	SE	Shallow	Thrust	Reverse	Ubendian Orogeny and syn-Bushveld Complex (2.1 – 1.86 Ga)	Semi-ductile, thin (3 - 60 cm), quartz veins and serpentinization on thrust planes	Subsidiary compressive structures	
Group 1 Thrusts	NW	Shallow	Layer-parallel	Reverse followed by normal reactivation	Ubendian Orogeny and syn-Bushveld Complex (2.1 – 1.73 Ga)	Semi-ductile, thin (3 - 60 cm), quartz veins and serpentinization on thrust planes	Flexural slip thrusts common on stratigraphic contacts	Granite sills
Kibaran Extensional faults	N	Steep	Normal	Extensional	Kibaran Orogeny (1.35 – 1.2 Ga)	Intensely sheared fracture surfaces with brittle-ductile tectonite infill and thin calcite veins	Major basement detachments with undulating dips Cross-cut by re-activated Pongola and Ventersdorp orientated faults.	
Ventersdorp Shear Zones	NE	Sub vertical	Strike-Slip	Dextral followed by sinistral reactivation	Reactivation syn-Bushveld Complex of Limpopo Orogeny rifts. (1.15 – 1.1 Ga)	Intensely deformed country rock now present as <50 cm thick ductile tectonite with slickenside features on fault surfaces, thin calcite veins and serpentinization	Prominent regional structures, 75 m of net vertical displacement. First and second order shears form large-scale dextral strike-slip duplexes	Granite and dolerite dykes

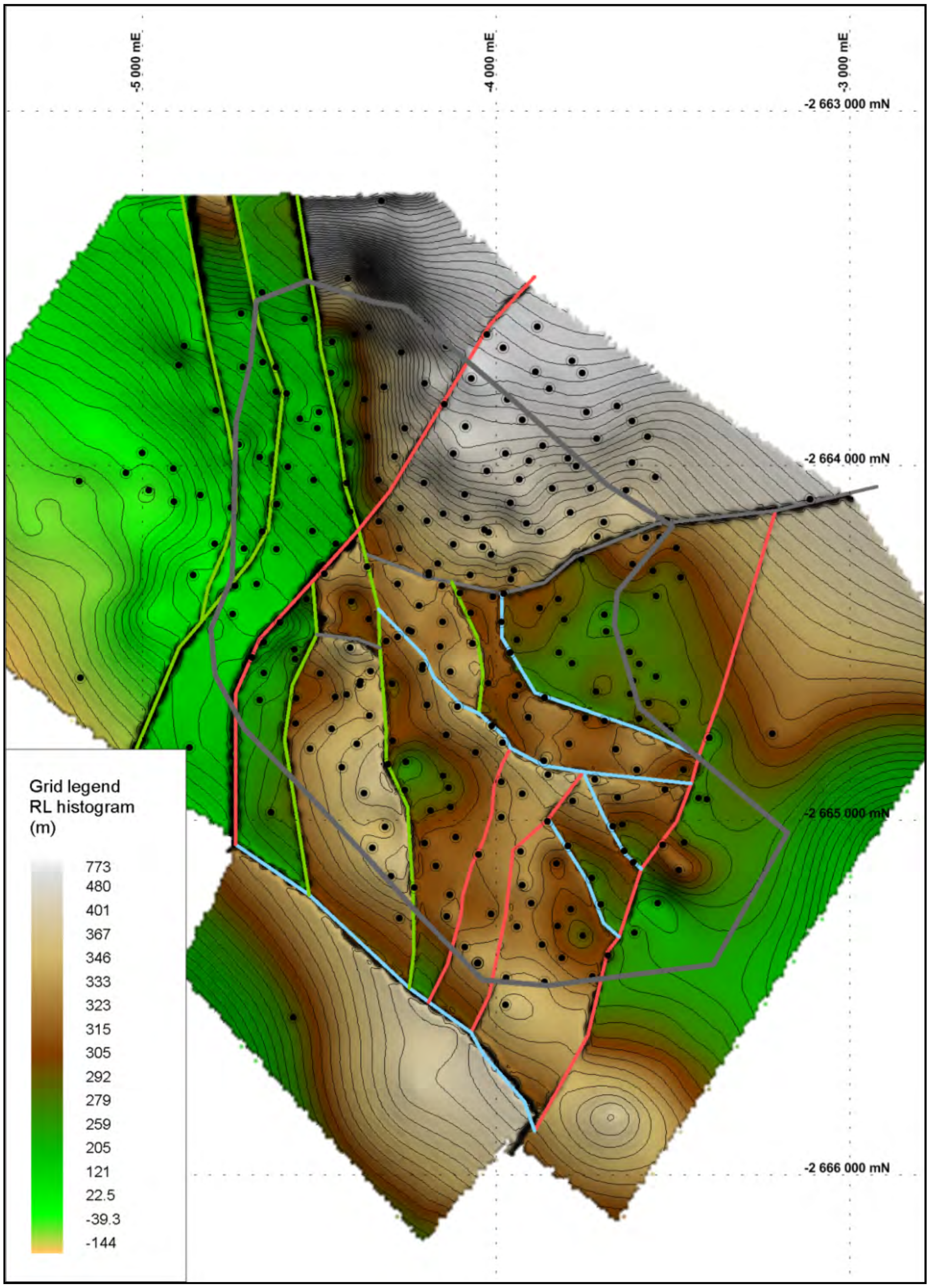
From Freise (2012).

Figure 7-16: Contour–Dip Direction Plan, Flatreef (Zone 1) Area



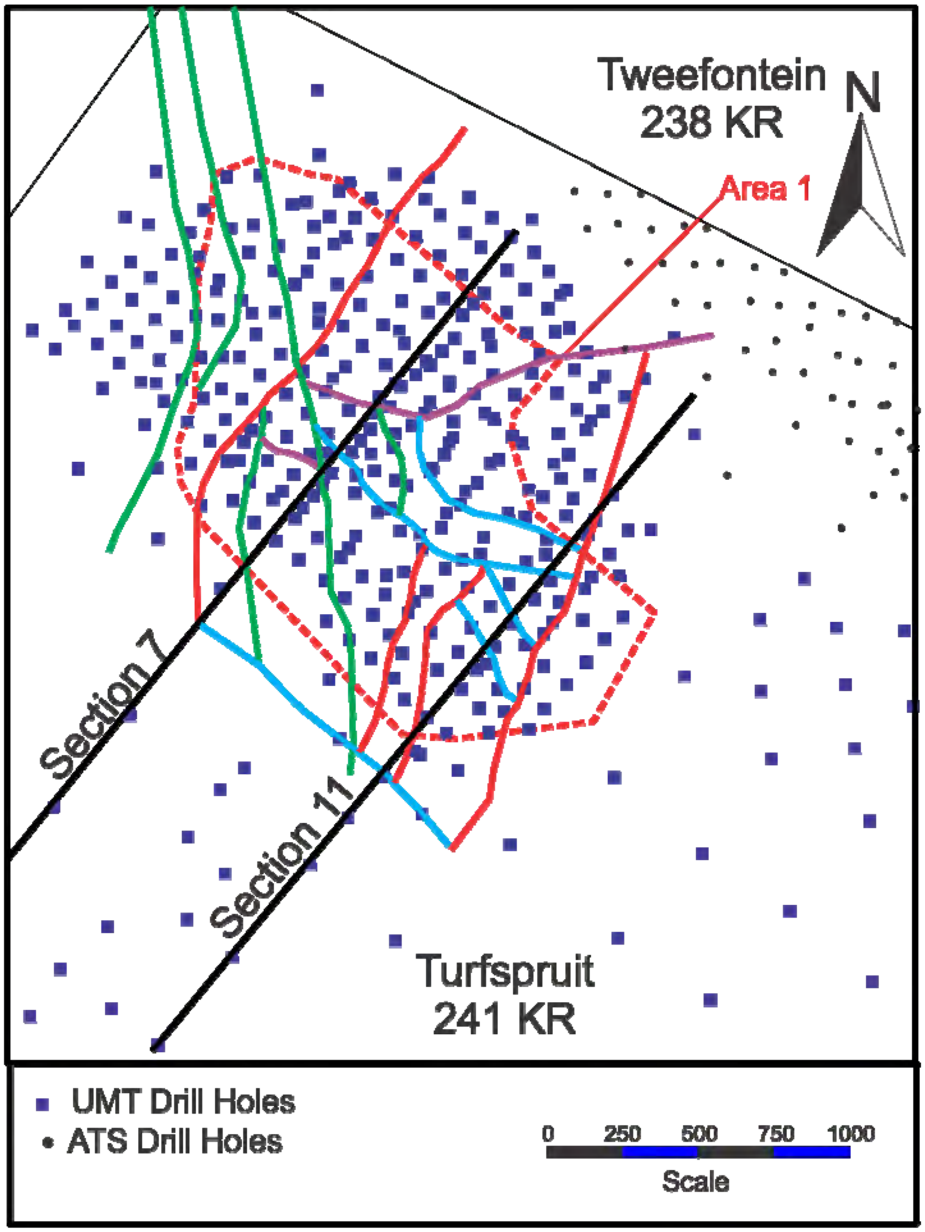
Note: Figure courtesy Ivanplats, 2013. Zone 1 boundaries are shown in black; contours and dips related to the T1 – Main Zone contact as per drilling data.

Figure 7-17: Inset Plan, Flatreef (Zone 1) Area



Note: Figure courtesy Ivanplats, 2013. Backdrop is the Falcon gravity survey – based elevation contour plan for the Main Zone-Platreef isosurfaceshown as RL in metres above sea level. Grey perimeter is Area1. Ventersdorp dextral strike-slip faults are indicated as red lines, Pongola normal dip-slip faults as pale blue or grey lines, and Kibaran normal dip-slip faults as green lines. Drill collars indicated as filled black circles.

Figure 7-18: Simplified Structural Plan Showing Locations of Wire-Frame Drill Sections



Note: Figure courtesy Ivanplats, 2013. . Ventersdorp dextral strike-slip faults are indicated as red lines, Pongola normal dip-slip faults as blue lines, and Kibaran normal dip-slip faults as green lines. Drill collars indicated as filled blue boxes.

Figure 7-19: TCU Dip Section 7, Looking Northwest

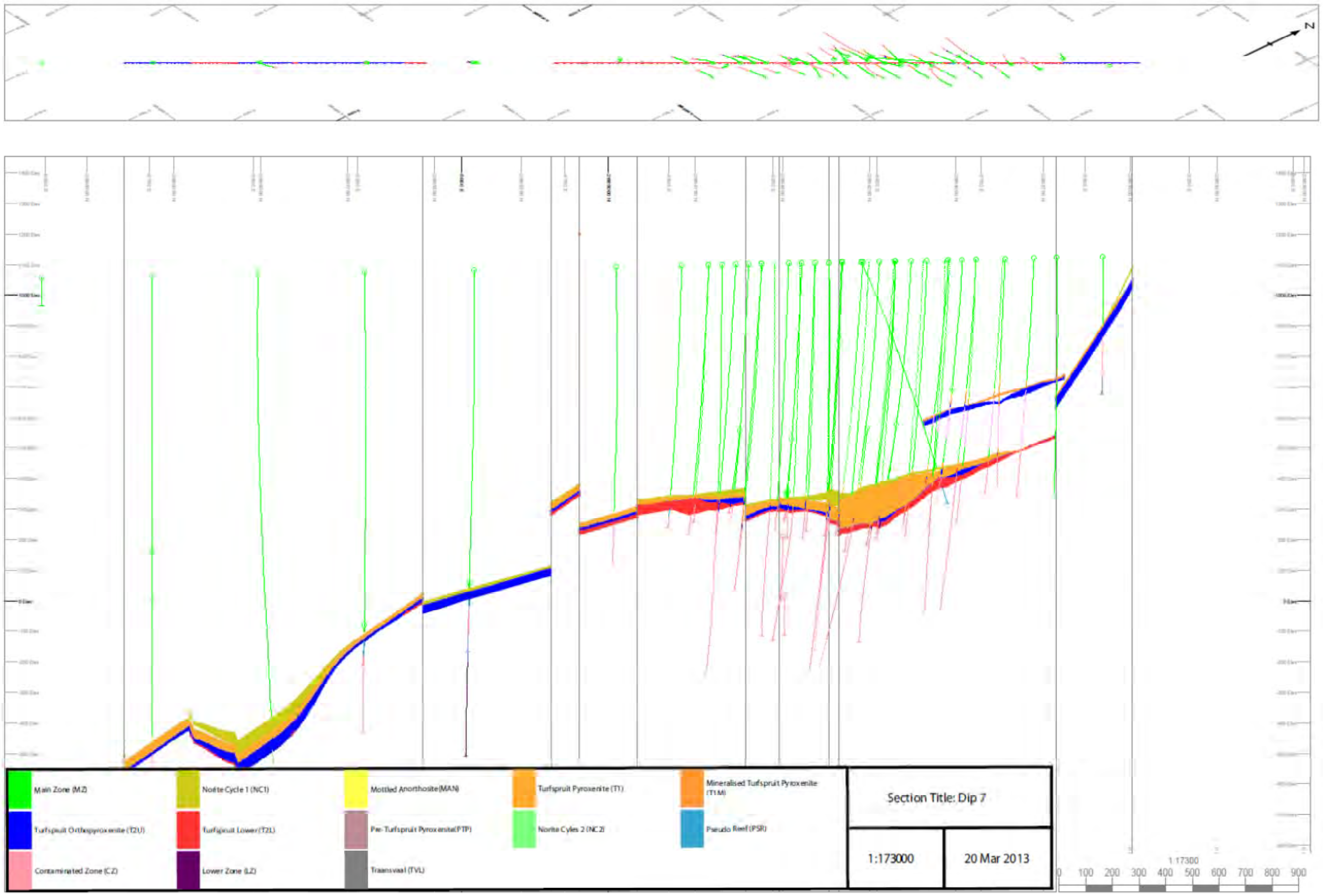
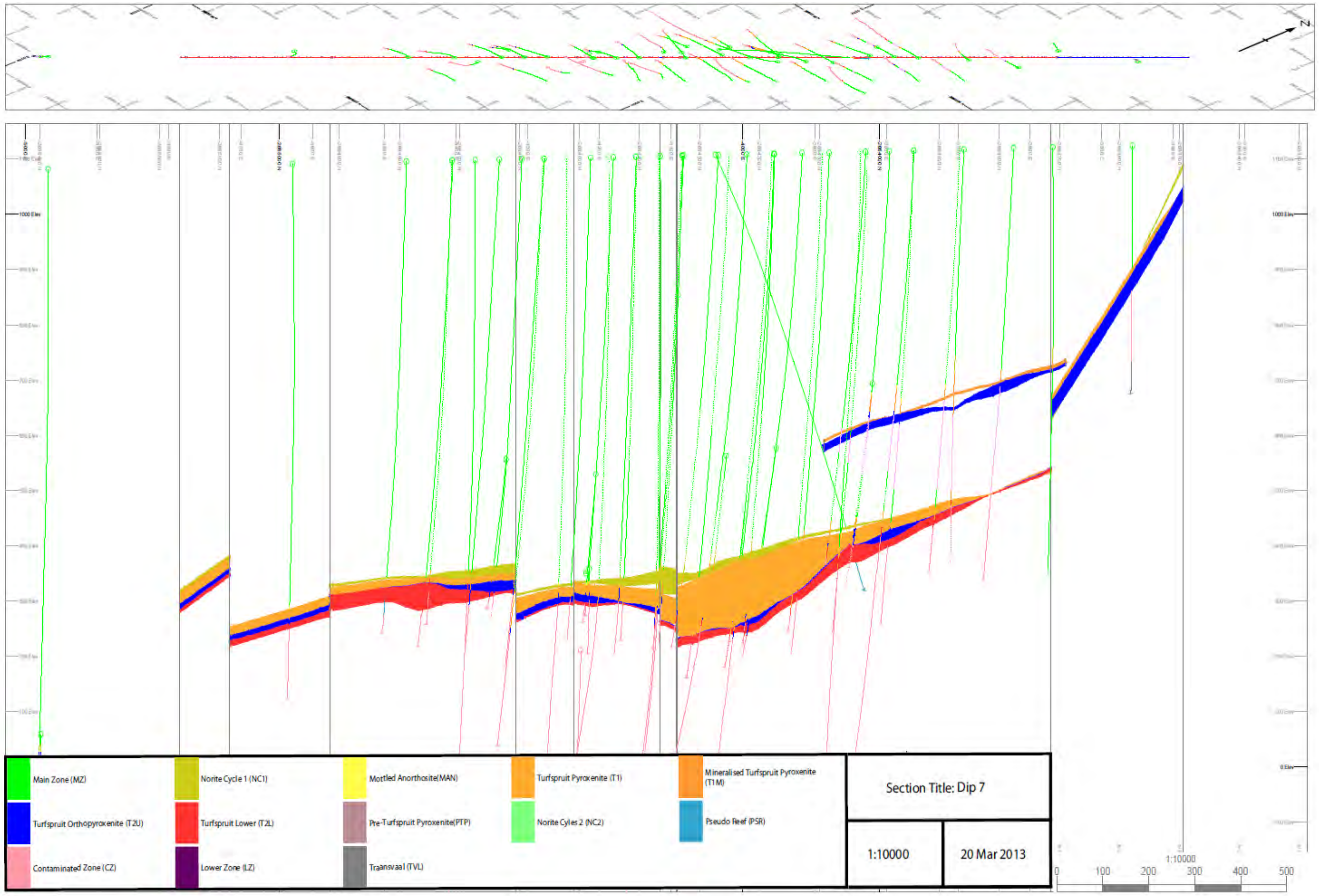
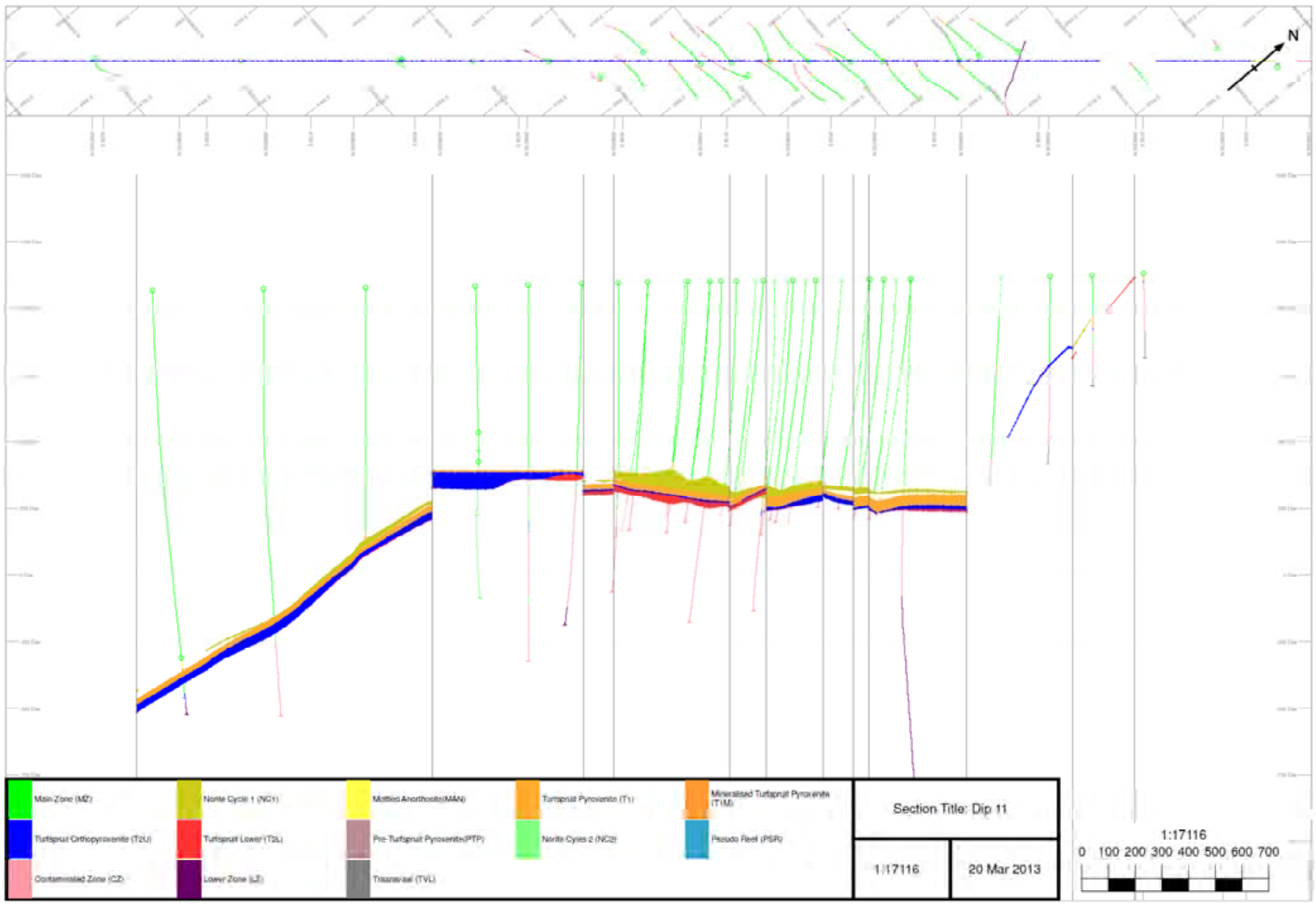


Figure 7-20: TCU Dip Section 7 (inset), Looking Northwest



Note: Figure courtesy Ivanplats, 2013.

Figure 7-21: T1 Wireframe, Dip Section 11, Looking Northwest



Note: Figure courtesy Ivanplats, 2013.

PGM and Base-metal Sulphide Occurrence

Unless otherwise referenced, the remainder of this section is based on work conducted on the ATS and AMK deposits by Hutchison (2003), and Hutchison and Kinnaird (2005); and is summarized from the UMT model report (AMEC, 2010). Much of the work described here was confirmed by mineralogy conducted in association with metallurgical testwork (see Section 13.3).

Within the Platreef, both base metal sulphides and PGMs occur as disseminations. The sulphides range from 5 µm to less than 2 cm in size and may form within primary silicates, often as oriented intergrowths, or interstitial to the primary silicates, or within the alteration assemblage of talc, tremolite and serpentine. Much of the sulphide component appears to be associated with intergranular quartzo–feldspathic veinlets, and chalcopyrite is also common in irregular veinlets and infilling small fractures.

There are a wide variety of PGE phases, mainly as tellurides, arsenides, and antimonides of Pd, Pt, Rh, Ag, and variable amounts of Bi occurring as bismutho-antimonides and complex bismuthotellurides. PGMs occur as small micrometre-sized (typically less than 5 µm) satellite grains around composite sulphide grains, or they are dispersed within the primary silicate phases unrelated to any sulphides. PGMs also occur in alteration assemblages dominated by talc, tremolite and serpentine. Less commonly, PGMs occur as inclusions within the disseminated and net-textured sulphides. There appear to be several phases of sulphide formation. An early phase is dominated by irregular blebs of disseminated pyrrhotite and pentlandite, and a later phase exists where chalcopyrite is more abundant, and the sulphides are associated with quartz–feldspathic material, both interstitial to primary silicates and thin veinlets. Figure 7-22 shows core with sulphides in drill hole UMT083 at approximately 1,323 m drill depth. Figure 7-23 shows photomicrographs of four Platreef samples.

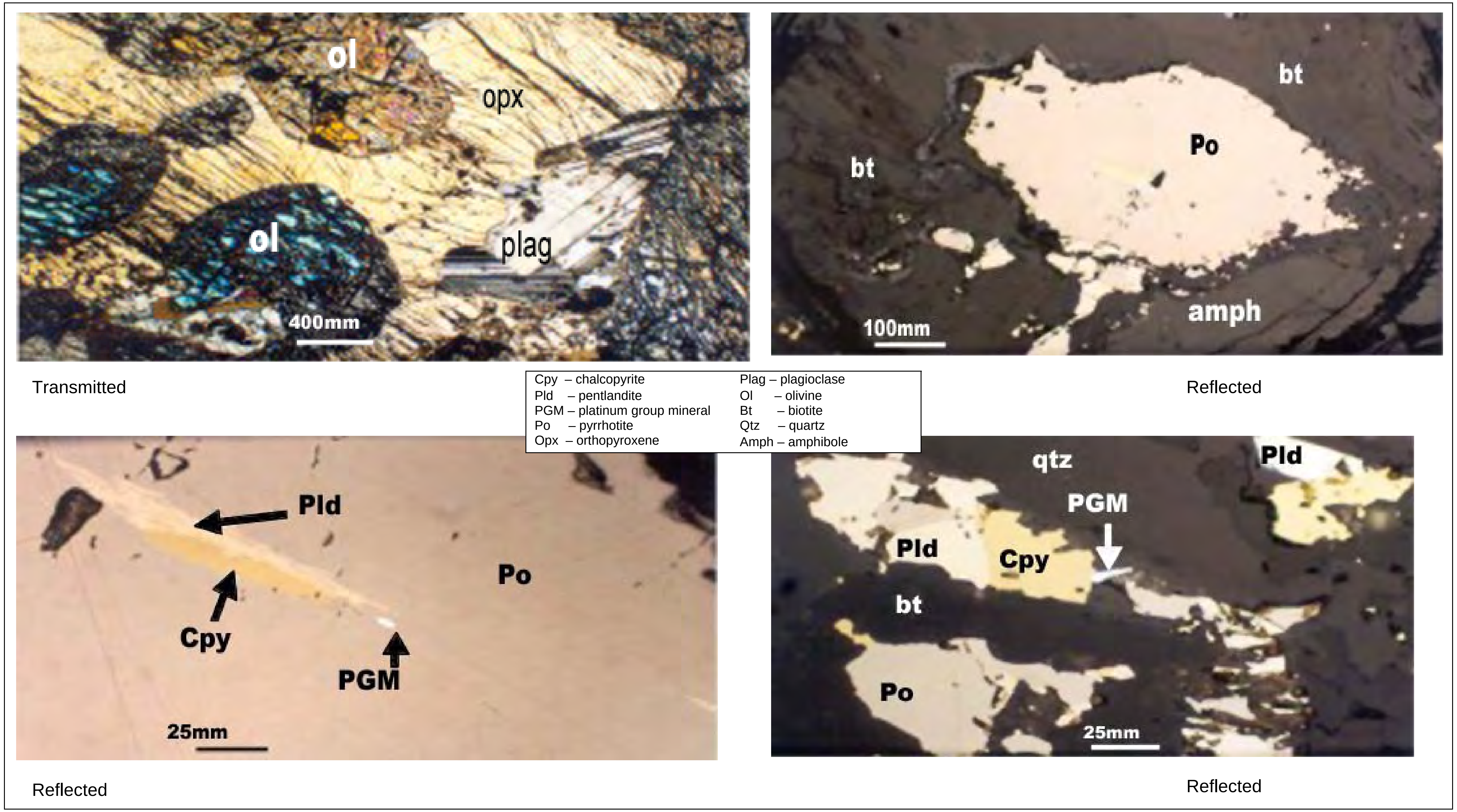
Base-Metal Sulphides

Within the Platreef at Macalacaskop and Turfspruit farms, sulphide contents range modally from less than 1% to more than 25%; rare sections of core may have massive sulphides over a scale of tens of centimetres. Textures vary from centimetre-sized blebs to sub-millimetre grains, composed of pyrrhotite, pentlandite and chalcopyrite, to irregular intergranular monomineralic grains composed of pyrrhotite or pentlandite. Veins and net-textured mineralization predominantly consisting of pyrrhotite are common in the peridotites (harzburgites), pyroxenites and hornfelses.

Figure 7-22: Core Photograph from UMT083 at 1,323 m Depth, Illustrating Sulphide Mineralization

Note: The yellowish mineral is chalcopyrite; the dull purplish mineral is pyrrhotite; the light cream mineral with higher reflectance and some cleavage is pentlandite. Core photographs courtesy Ivanplats, 2011

Figure 7-23: Transmitted and Reflected Light Photomicrographs of Four Platreef Samples



Note: Figure courtesy Ivanplats, 2003

Samples from drill holes show a number of textures, the most frequent being large fractionated blebs together with smaller disseminated monomineralic grains.

The sulphides occur typically as disseminated grains, varying in size from a few micrometres (mainly in serpentinized peridotite and calc-silicate rocks) to 2 cm blebs. The base metal sulphides are, in places, intergrown with secondary silicate replacing primary silicates, and in secondary hydrothermal veins traversing the primary or secondary silicates.

In 2010, a mineralogical study of three Platreef UMT metallurgical samples indicated most base-metal sulphides were liberated at a 75 µm grind (Duarte and Theron, 2010).

Platinum Group Minerals (PGMs)

The distribution of the discrete PGMs within the Platreef tends to be broadly controlled by stratigraphic position, with the uppermost part of the Platreef commonly carrying the highest PGE grades. On a hand-specimen scale the distribution can be erratic. Some samples are poorly mineralized, and others contain numerous grains, often with similar PGM minerals clustered together. The majority of the PGM grain sizes in the Platreef and footwall are very small (less than 10 µm to 5 µm), with few exceptions where grain sizes range between 20 µm and 60 µm.

Based on work done by Armitage et al. (2002) and internal research by Ivanplats, the PGMs identified can be classed as:

- High-temperature alloys; high-temperature semi-metalloids (arsenides and antimonoarsenides)
- lower-temperature semi-metalloids (antimonides, tellurides, bismuthotellurides)
- Lower-temperature semi-metalloids (antimonides, tellurides, bismuthotellurides)
- Lower-temperature alloys (Pt–Pd–Ge–Pb, Pd–Au, and Au–Ag alloys).

The recognized textural and mineralogical associations of PGM alloys are in base metal sulphides, on the rims of base metal sulphides, oxides, primary silicates, and alteration silicates.

7.3.7 Mineralized Units

The mineralized units in the Project area are summarized in Table 7-7.

Table 7-7: Mineralization of Different Cyclic Units on Turfspruit and Macalacaskop, Northern Limb

Cyclic unit	Mineralized Zone	Description
NC1CU	BAR	Fine to medium grained magmatic sulphides hosted in feldspathic pyroxenite. BMS are predominantly chalcopyrite, pentlandite and pyrrhotite.
TCU	T1	Medium to coarse grained magmatic sulphides grains hosted in feldspathic pyroxenite.
	T2	Very coarse grained magmatic sulphides hosted in pegmatoidal orthopyroxenite and pegmatoidal poikilitic harzburgite. The top of the mineralized zone is commonly marked by a chromite stringer.
PSRCU	PSR	Medium to coarse grained magmatic sulphide hosted in pyroxenite and feldspathic harzburgite. High percentage of base metal (Ni and Cu) is associated with this unit.
UG2CU	UG2	Fine grained sulphides hosted in chromitite. Associated with high grade PGEs
Other	Platreef contact style mineralization	Massive sulphide bodies hosted on the Bushveld - Transvaal contact. Predominantly Ni and Cu rich with minor PGEs

Mineralization within the TCU

The main mineralized zone of primary magmatic nature occurs within pegmatoidal T2 rocks at the base of the TCU (Figure 7-24). The vertical distribution of mineralization generally takes the following form:

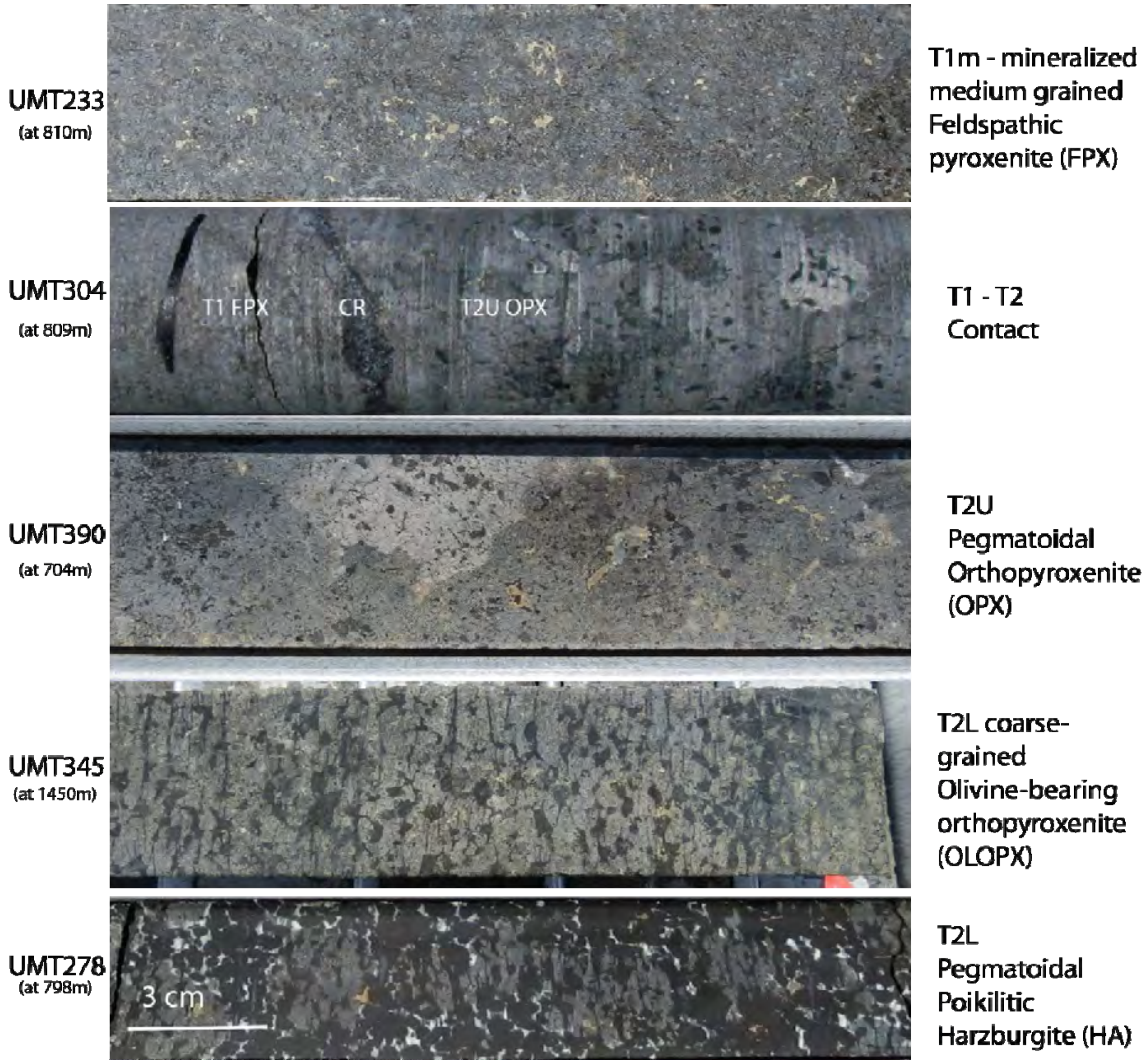
- In Normal Reef facies (refer to Table 7-6), the pegmatitic harzburgite (T2 Lower) is absent and mineralization is contained mainly within the pegmatitic pyroxenite (T2 Upper). However, mineralization typically persists a variable distance below the T2 Upper into the underlying pyroxenite-norite-anorthosite NC2 cyclic unit.
- In Pothole Reef facies, mineralization is continuous between T2 Upper pegmatitic pyroxenite and T2 Lower pegmatitic poikilitic feldspathic harzburgite and/or pegmatitic olivine-bearing pyroxenite (T2 Lower). The T2 Upper + T2 Lower mineralization generally shows good lateral continuity.
- A third scenario occurs when the T2 Upper is in contact with contaminated footwall lithologies (Contaminated Zone), however with careful observation these may be interpreted as either one of the T2 Lower or NC2 units.

The T2 reef is marked at its top contact by an abrupt change in grain size and texture, usually marked by a chromitite stringer of variable thickness. The sulphide grains also show an increase in grain size across the contact, becoming medium to coarse-grained, within both the T2 Upper and T2 Lower.

An interval of feldspathic pyroxenite (T1) barren of Ni–Cu–PGE mineralization is generally found above the T2 pegmatoid. The thickness of this interval can vary between 0 m and 85 m, depending on the structural setting (Nielsen and Grobler, 2012).

The T1m is a mineralized zone that is perched near the top of the T1 feldspathic pyroxenite. It is an approximately 4.5 m thick zone and contains between 1% and 5% sulphides. Chromitite stringers are only occasionally associated with the zone and tend to occur within the zone rather than marking the top and bottom as seen in the T2. Where present, the PGE mineralization is extremely elevated and shows high (> 1) Pt:Pd ratios.

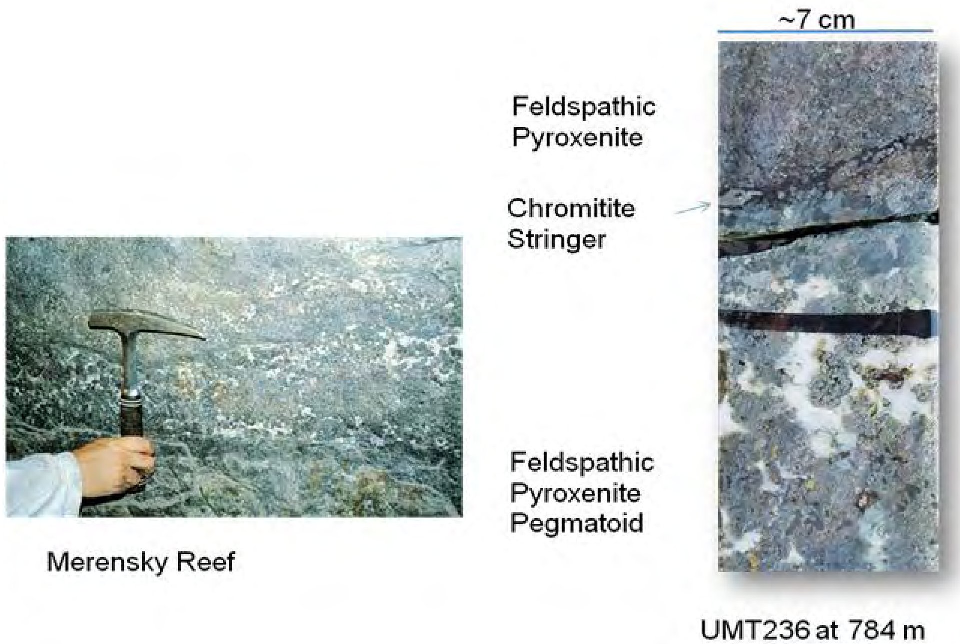
Figure 7-24: TCU Mineralization Shown in Typical TCU Lithologies



Note: figure courtesy Ivanplats, 2013. Black minerals are serpentinized olivine.

Davey (1992) and Lea (1996) also describe two zones of PGE enrichment associated with the Merensky Cyclic Unit in the eastern Bushveld, the M1 pyroxenite and M2 pegmatoid. Figure 7-25 shows a comparison of the Merensky Reef and the TCU.

Figure 7-25: Comparison of Merensky Reef and the TCU



Note: Left photograph by Anthony Naldrett of mine face from Rustenburg District, supplied by Ivanplats 2012; in this photograph, the pegmatoid is shown in white and black and the chromitite stringers are dark gray. Right photograph by Ivanplats, 2012 of the Platreef within the Project area. Two dark lines are visible in the Platreef core that are not the chromitite stringer as identified in the core labelling; the top line is a geotechnical break in the core, the basal, thicker line, is a pen line drawn on the core by the logging geologist.

7.4 Comments on Section 7

The Ivanplats geological team have used the detailed drilling (nominal 100 m spacing in Zone 1) to great advantage during the past year. Perhaps the greatest advance has been the detailed comparison between the TCU and the Merensky Cyclic Unit and establishment of correlative subunits in uncontaminated (with Floor units) located in the northwest portion of Zone 1.

An additional benefit of the detailed drilling has been the recognition of the structural regime and interpretation of faults that explain offsets in the subunits on cross-sections. These faults tie in with three sets that have been established in the region.

The enhanced geological interpretation will support both Mineral Resource estimation and conceptual mine planning using selective methods.

In the opinion of the QPs, knowledge of the deposit settings, lithologies, mineralization style and setting, and structural and alteration controls on mineralization within the AMK, ATS and UMT deposits are sufficient to support Mineral Resource estimation.

8.0 DEPOSIT TYPES

Two main PGE deposit types occur within the Bushveld Complex:

- Relatively narrow (maximum 1 m wide) stratiform layers (reefs) that occur towards the top of the Upper Critical Zone, typically some 2 km above the base of the intrusion (Merensky Reef-style), mainly found in the Western and Eastern Limbs. These narrow zones have been the principal targets for mining in the past; however, more recently wider zones with more irregular footwall contacts have been mined (termed "potholes"); and
- Contact-style mineralisation at the base of the intrusion (Platreef-type) occurs mainly in the North Limb.

In general within the Northern Limb, the Platreef comprises a variably layered, composite norite–pyroxenite–harzburgite intrusion that lies at the base of the Bushveld Complex, in contact with metasedimentary and granitic floor rocks. McDonald and Holwell (2011) reviewed the major literature on the Platreef and Northern Limb, and have concluded:

- The Platreef remains a complex and enigmatic deposit
- Stratigraphic relationships with other stratiform orebodies such as the Merensky and UG2 Reefs have been suggested but are not clear
- The extent to which the Northern Limb was connected to the rest of the complex across the Thabazimbi–Murchison Lineament (refer to Figure 7-1 where this is shown as the TML fault) remains to be established
- The Platreef represents a complex of sills intruded into basement granite-gneiss, Transvaal Supergroup sediments or pre-Platreef Lower Zone intrusions
- Intrusive relationships of the Main Zone gabbronorites, into solidified and deformed Platreef, removes the Main Zone as a source of metals for the Platreef
- Mineral chemistry, bulk geochemistry, and Sr, Nd, and Os isotope geochemistry of the Platreef are most consistent with an ultramafic (Critical or Lower zone) component
- Platreef Nd values and $^{187}Os/^{188}Os$ initial isotope ratios overlap clearly with the Merensky Reef but not the Upper Critical Zone
- Conventional and mass-independent S isotopes suggest a primary mantle source of S that was overprinted by the addition of local crustal S where Platreef intruded

pyrite-rich shales. Assimilation of S is viewed as an ore-modifying process, not as the primary trigger for mineralization.

Two emplacement models are considered to be the most likely to explain the mineralization (McDonald and Holwell, 2011):

- Platreef sulphides may have been derived from the same magma(s) that formed the Merensky Reef in the central part of each Bushveld limb and which were injected up and out along intrusion walls as the chamber expanded
- Alternatively, the sulphides may have formed in pre-Platreef staging chambers for Lower Zone intrusions where they were upgraded by repeated interactions with batches of Lower Zone magma. The sulphides were subsequently expelled as a crystal-sulphide mush by an early pulse of Main Zone magma that broke into and spread through the earlier Lower Zone magma chambers.

8.1 Comments on Section 8

The text in the previous section reflects study of norites, pyroxenites and harzburgites contaminated with floor rocks that occur on the steep (northeast) limb to depths of 700 m. In places (flatter embayments) thin massive sulphide zones occur at the contact between mafic and ultramafic intrusives and the metalsediments of the floor.

Drilling in 2010 on Ivanplats' Turfspruit 241 KR property north of Mokopane discovered an area where the Platreef changes from steeply west-dipping to gently-dipping or flat-lying. This "Flatreef" is under-lain by ultramafic rocks of Lower Zone affinity, where contamination from floor rocks is lessened, and stratigraphic correlation of lithologies in the uppermost Platreef is possible. Following a 2012 re-logging program completed by Ivanplats, the Flatreef can be considered as a Merensky-reef analogue. Current Ivanplats interpretations have the host sequence of lithologies corresponding directly to the Merensky Cyclic Unit (MCU). Hanging wall and footwall lithologies correspond to those described for the Merensky Reef in the northern part of the Western Limb.

The QPs consider that the mineralization delineated at the Turfspruit, Macalacaskop and Rietfontein farms is typical of Platreef-style mineralization within the Northern Limb of the Bushveld Complex. As a result of the Ivanplats interpretations, the QPs consider that exploration programs using the Merensky-reef analogue are appropriate to the deposit style.

9.0 EXPLORATION

9.1 Grids and Surveys

Drill-hole coordinates were given in the Hartebeesthoek 1994 LO29 national coordinate system.

- Origin: the co-ordinates of the origin are defined on the South African National Co-ordinate System at +4,324.66Y, +2,669,596.48X, LO 29ºE, WGS84 reference ellipsoid, Hartebeesthoek Datum. The origin is defined as x = +10 000.00 and y = +1000.0;
- Co-ordinate axis: The system is defined as a normal Cartesian co-ordinate system. The Y-axis is a line extending from the origin increasing to the north. The line is oriented north–south. The X-axis is a line extending from the origin increasing to the east. The line is oriented east–west. The Y-axis is perpendicular to the X-axis;
- Measurement of angles: Angles are measured in a counter-clockwise direction from the X-axis
  - 0º: East (+ X-axis)
  - 90º: North (+ Y-axis)
  - 180º: West (- X-axis)
  - 270º : South (- Y-axis); and
- Height datum: The height datum will be mean sea level as indicated by benchmark BMA2 at the intersection of the 00 and N7 geological gridlines. BMA2:= 1155.36 m

9.2 Geological Mapping

Original detailed geological outcrop mapping was completed by Ivanplats personnel in 2002 at 1:5,000 scale and was supported by trenching and percussion drilling in areas with no outcrop. A geological map combining the field mapping with drill-hole information was included as Figure 7-4.

9.3 Geochemical Sampling

Geochemical sampling of surface trenches proved to be ineffective in delineating stratigraphic control on mineralisation.

A detailed geochemical study based on the stratigraphic interpretation outlined in Section 7.2 and Section 7.3, and concentrating on selected borehole intersections is currently underway.

9.4 Geophysics

Since Project inception, geophysical survey methods have included aeromagnetics, gravity gradiometer and a number of downhole geophysical methods. The down-hole methods include: caliper; self-potential (SP)/point resistance (PR); electrode-array-focussed resistivity (EAL); magnetic susceptibility (Msus); temperature/conductivity; fall-waveform-sonic (FWFS); acoustic televiewer (ATV); optical televiewer (OTV); induced polarization (IP); density; neutron; induction and vertical seismic profile (VSP).

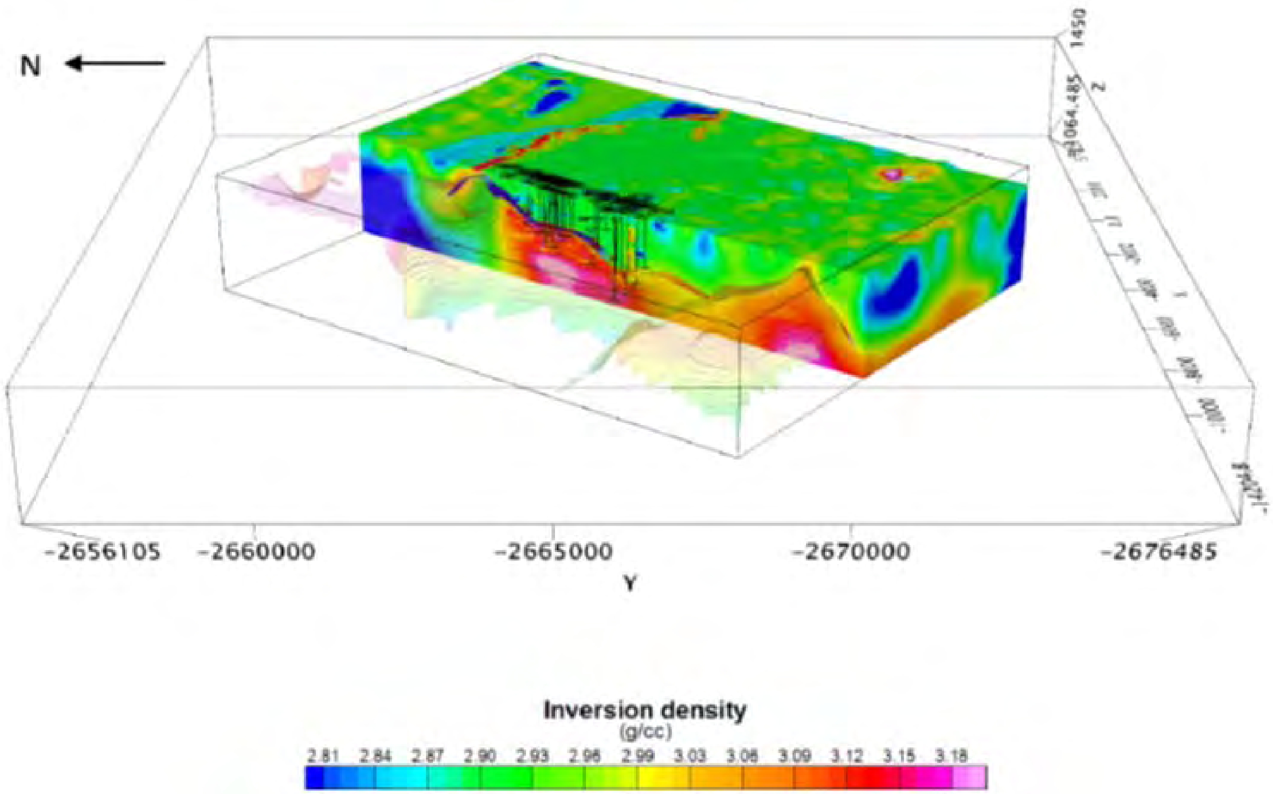
The various down-hole geophysical surveys were conducted from 2008 to 2012 within a total of 27 boreholes. The most recent down-hole geophysical survey work was conducted for GT008 that was drilled within the area selected as the site of the exploration bulk sample shaft.

In early 2012 Ivanplats acquired 130 km^2 of Falcon gravity data that were geologically-constrained and inverted by N. Williams of Ivanhoe Australia Ltd., through the use of proprietary algorithms. The Falcon airborne gravity gradiometer system was developed by BHP Minerals (now BHP Billiton) to aid in the discovery of mineral deposits. All rights were purchased by Fugro Airborne Surveys in 2009.

A >2.97 g/cm^3 three-dimensional (3D) isosurface was generated, representing the depth to density contrast of the geological contact between the gabbronorite of the Main Zone and the T1 pyroxenite of the Turfspruit Cyclic Unit (Figure 9-1).

The Falcon data supplements previous geophysical work conducted in the project area and indicates that the Flatreef could potentially extend to the south of Zone 1 for >3 km.

Figure 9-1: Geologically-constrained Falcon Gravity Inversion Interpretation



Note: Figure courtesy Ivanplats, and sourced from Williams (2012). Inversion sliced along NE oriented section. Image shows computed depth to >2.97 g/cm^3 isosurface which maps the gabbronorite/pyroxenite contact and thereby depicts the approximate structure of the mineralised reef horizon.

9.5 Petrology, Mineralogy, and Research Studies

Mineralogical studies based on samples from the TCU including the mineralised T1 and T2 reefs are currently being planned. In addition, researchers from the University of the Witwatersrand have taken selected samples of the various reefs and host lithologies of the entire UCZ stratigraphy including the Lower Zone intersected below the TCU. Detailed geochemical and mineralogical studies are currently being performed on those.

An MSc research student from Cardiff University is currently completing a mineralogical and geochemical study on samples selected across the TCU stratigraphy from uncontaminated rock in selected drill holes from Zone 3.

9.6 Geotechnical Studies

A number of geotechnical studies have been conducted in the Zone 1 area. These studies include:

- A scoping study by SRK Consulting Ltd (SRK) whereby a review of the geotechnical conditions likely to be encountered during underground mining operations was completed. The study comprised the geotechnical logging of 8 exploration boreholes, equating to some 1,515.10 m of core and the classification of the rock mass in terms of Laubscher's (1990) Mining Rock Mass Classification System and the Norwegian Geotechnical Institute's Q-System (Barton *et al*, 1974)
- A Platreef decline/boxcut study by SRK that provides an interpretation of four geotechnical holes and one UMT borehole
- A bulk sampling study by SRK (assisted by Ivanplats) that was conducted at the shaft location on borehole GT008. The study included geotechnical logging, rock mass classification, laboratory rock testing of GT008 and comparison to borehole UMT 258 located to the east of the shaft. Additional aspects of the report included a desk study of the potential stress regime and preliminary support recommendations for the shaft based on the Q-system rock mass rating and the Rock Wall Condition factor
- An ancillary geotechnical logging programme (including holes logged geotechnically as part of a prefeasibility study) whereby a total of 51 UMT boreholes located in Zone 1, equating to 11,994.41 m has been logged geotechnically with focus primarily on 50 m of hanging wall, the TCU mineralization and 50 m of footwall

- A point load testing programme was also conducted on the same particular zones mentioned above for 143 UMT boreholes and two geotechnical holes, equating to approximately 12,126 point load tests
- Soil horizon distribution analysis for Zone 1
- Structural logging of oriented core as well as analyses of the data and comparison with down-hole geophysical data using DIPS software
- A civil geotechnical study by SRK for the civil work pertaining to the shaft. A total of 3 geotechnical boreholes (GT009–GT011) extending to a depth of approximately 30m were drilled and logged as well as the excavation and logging of four test pits (PTP001–PTP004) directly around the shaft position
- A geotechnical investigation by Geoid Geotechnical Engineers to provide foundation design recommendations for the proposed shaft area boundary wall. The study included the excavation of four test pits (PTP005–PTP008) located on each corner of the proposed wall position, geotechnical logging, digital connectivity (DC) probing tests and soil laboratory testing.

Additional information on the geotechnical drill programs is included in Section 10.8.

Call and Nicholas completed geotechnical evaluations in 2003–2004 in the area where Mineral Resources amenable to open-pit mining methods have been estimated.

9.7 Hydrological Studies

9.7.1 Surface Water

The study area falls within the catchment area of the Mogalakwena River and consists of quaternary catchments A61F and A61G. The Mogalakwena River flows to the northwest and is characterised by the presence of wetlands along its drainage course on both Turfspruit and Macalacaskop farms. The Rooisloot stream, a significant tributary of Mogalakwena River crosses both farms flowing to the southwest and joining the Mogalakwena River in the southern part of Turfspruit. The farm Rietfontein 2KS is mountainous in the northeast with the surface drainage forming the headwaters of the westerly-flowing Klein-Sandsloot River which flows into the Dithokeng River and through a dam located to the north of Tshamahanzi village. The Ngwadise stream, also a tributary of the Mogalakwena River, flows across the southern part of Macalacaskop. The Dorps River drainage, in which the Gert Combrinck dam is located, is the headwaters of the Ngwaditse stream. For consistency this stream is called the Dorps River throughout the monitoring process.

The work undertaken by Golder Associates included:

- The 24 hour rainfall depths for different recurrence intervals were generated for use in infrastructure design
- Daily rainfall and average monthly evaporation records were produced using rainfall from the Potgietersrus (SKL) and Potgietersrus (POL) and Mokopane rainfall stations, and evaporation from the A6E002, A6E007 and A6E001 station maintained by the Department of Water Affairs (DWA)
- Hourly wind data measured at the Mokopane Weather Station were assessed and wind roses produced for the area. The data collected at this station were not considered to be fully representative of conditions on site, particularly on Rietfontein 2KS
- The water quality and flow data collected by the Department of Water Affairs (DWA) were sourced and assessed. According to the quality codes on the DWA website, the flow records for the flow station A6H033 on the Nyl River are only accurate from June 2005 to November. The available water-quality data were patchy, and limited water quality variables were measured
- The 50 year and 100 year flood peaks and flood lines were determined for the rivers crossing the Project area. These include the Rooislot, Dorps, Dithokeng, Tshama Rivers as well as the Mogalakwena River flowing to the west of the Project area.

A monitoring programme was set up to collect flow and water quality data on the Project area. A first round of water quality sampling and flow measurements was carried out in September 2011. The results show that the water has a high total dissolved solid (TDS) count, largely due to evaporation from maturation ponds treating sewage effluent on the Dorps River. The water quality results show high concentrations of dissolved manganese, aluminium and iron as well as fluoride. The monitoring programme was then continued monthly from December 2011 and is on-going. Currently the rivers are dry with only the Dorps Rivers flowing due to effluent from the industrial areas upstream of monitoring point.

9.7.2 Ground Water

In August 2012 Golder Associates completed an investigation of the groundwater hydrogeological baseline in the Platreef area which includes Turfspruit, Macalacaskop, and Rietfontein farms.

Work undertaken in the investigation included:

- A study of available hydrogeological reports and database information from the Department of Water Affairs (DWA) in Polokwane and Pretoria as well the drilling and testing that was conducted in early 2011 for the water resource assessment study
- A hydrocensus survey of municipal and selected private boreholes located within the three farms forming the baseline study area. Water levels were measured at unequipped or open boreholes, and groundwater samples were collected from 81 boreholes, which included 35 private boreholes
- Field data were compared with available data to validate such information as listed coordinates, equipment, and alternative numbers
- Geophysical surveying, drilling and pump testing of 22 monitoring boreholes
- A groundwater quality assessment
- Establishment of the initial groundwater monitoring network programme

The hydrogeological regime in the project area is made up of two main aquifer types, i.e. primary and secondary. The two farms Turfspruit and Macalacaskop are mainly underlain by intergranular and fractured aquifers, associated with the Rustenburg Layered Suite. Rietfontein to the north is underlain by sedimentary rocks of the Transvaal Sequence (sandstone, shale and dolomite) and basement granite which forms the hills of the northern boundary.

The primary aquifer is present within the alluvium in the Mogalakwena River where alluvial thicknesses of up to 20 m occur and borehole yields in excess of 10 L/s have been established. Minor alluvium occurrences are associated with Rooisloot River drainage. Boreholes in the Rooisloot Alluvial Aquifer are drilled to depths between 35 and 45 m. Water levels as shallow as 2 m are present. Calculated aquifer transmissivity values range between 315 and 404 m^2/day. The aquifer storage coefficient for both the alluvial and weathered bedrock aquifer is 2.7×10^{-3}.

The intergranular and fractured aquifers within the Platreef prospecting area are associated with the Rustenburg Layered Suite (RLS). The main secondary aquifer occurs at a shallow depth of less than 45 m. Water strike depths in the weathered bedrock range from 12 to 20 m, with strike yields between 0.1 to 1.0 L/s, and in the fractured bedrock water strikes range from 20 – 42 m with strike yields between 1 and 10 L/s. The average saturated thickness of the main aquifer zone is 17.6 m. Seasonal water level fluctuations due to direct rainfall recharge are expected. Intrusive dykes may act as boundaries to lateral groundwater flow.

A minor fractured aquifer is present at depth >45 m with strike depth varying from 45 to 156 m and yields between 0.1 and 0.2 L/s. Slug testing of six deep core holes indicate very low hydraulic conductivities, between 1 x 10^{-4} m/d and 1 x 10^{-5} m/d, considered representative of the igneous rock matrix. Inspection of core samples indicates insignificant fracturing at the mineralized contact zone at a depth of some 800 m.

The study has confirmed the presence of limited groundwater occurrence in Rietfontein underlain by dolomite and granite.

The general flow direction for groundwater is from northeast to southwest and eventually following the Mogalakwena River. Groundwater elevations (1220 mamsl) are highest on the farm Rietfontein underlain by granite and lowest (1030 mamsl) on the farm Turfspruit associated with the Rooisloot Alluvial Aquifer. This represents a hydraulic head of 190 m across the study area.

Groundwater serves as the main source of water supply for the various rural communities residing on three farms. Dispersed boreholes are in use throughout the area, with the highest volume abstracted for domestic water supply from the Rooisloot alluvial aquifer on the farm Turfspruit. The WARMS database indicates no registered water use for the three farms.

The total current abstraction from groundwater supplied from governmental boreholes located within these three farms is estimated to 5,270 m^3/day (76 boreholes). Abstraction from 43 private boreholes is estimated at 86 m^3/ day.

The borehole use/status and nitrate water quality distribution indicates that increased nitrate concentrations correlate with the locality of rural communities in the study area.

Long-term monitoring of groundwater levels and groundwater quality is essential to establish a history of the status of the natural groundwater regime. The monitoring network includes all the groundwater boreholes drilled during the investigation which will provide a comprehensive coverage of the groundwater conditions of the three farms forming the Project area. Routine manual monthly readings of the groundwater levels commenced in March 2012 in all 26 boreholes. To provide a continuous record of water level changes, electronic water level loggers were installed in December 2011 in 13 of the 26 monitoring boreholes. Quarterly groundwater water quality sampling commenced in March 2012 from 14 boreholes. The samples are submitted to UIS Laboratories in Pretoria for chemical analysis of physical parameters, macro determinants and trace elements.

9.8 Metallurgical Studies

A description of metallurgical studies is presented in Section 13.0.

9.9 Exploration Potential

The Platreef mineralization remains open along strike and down-dip. There is excellent opportunity to expand the extent of known mineralization with further drilling, based on the Falcon information in Figure 9-2. In particular Zone 5 has significant "Flatreef" exploration potential, as identified by the Falcon geophysical data, as current drilling is on a 400 x 800 m grid spacing.

9.10 Comments on Section 9

In the opinion of the QPs, the exploration programs completed to date are appropriate to the style of the mineralization within the Project area.

The exploration programs conducted by Ivanplats are appropriate to support Mineral Resource estimation and a Preliminary Economic Assessment (in progress).

Continued field work will be required to support any future pre-feasibilty study and exploration shaft design and sinking.

10.0 DRILLING

10.1 Drill Programs

Drilling on the Project has been undertaken in two major phases; the first from 2001 to 2003 is termed the open-pit program (designated AMK at Macalacaskop and ATS at Turfspruit/Reitfontein). The open-pit program drill holes are located in Zone 4 (see Figure 10-1). The second phase ran from 2007 to 2012 and is termed the underground program(s), designated UMT, and nearly all drilling is on Turfspruit. These drill holes are situated in Zones 1 to 3 and Zone 5.

From the 954 core drill holes (excluding re-drilled mother holes and all deflections) a total of 624,248 m were drilled and completed by 26 October 2012; this included 555 holes (194,591 m) from the open-pit program and 399 holes (429,657 m) from the underground program (refer to Figure 7-6 for a drill hole location plan).

Subsequently, following a notice from the Department of Mineral Resources (DMR) regarding community concerns over compensation issues, 29 holes and any further exploration drilling activities were put on hold in October 2012.

10.1.1 Zone 4

Drill-hole prefixes for the open-pit program are prefixed AMK; ARF; ATM; ATS; DTS; GT(001 to 003); ITS; PA; PUM; PUT; STM and STT. Most drill holes were collared as vertical drill holes with the exceptions of nine AMK drill holes which were completed at 45° to 60° inclinations and three ATS geotechnical holes completed at a 50° inclination. Drill holes were drilled nominally on a 100 m north–south-oriented local grid, whilst the ATS initial drill spacing is approximately 120 m to 140 m and generally follows an east–northeast-oriented drilling grid which conforms to the street plan in the Tshamahansi Township.

In addition to the exploration drilling, a cross-pattern of 21 vertical drill holes (30 m spacing) was completed for geostatistical purposes. A “mining simulation” drill grid was completed at a 10 m x 10 m drill spacing (DTS drill holes), and an infill program (ITS drill holes) was completed to increase the drill density to approximately 100 x 75 m or 75 x 75 m.

10.1.2 Zones 1 to 3

Several drilling campaigns have been completed since 2007 in these zones. Ivanplats’ initial underground drill campaign at Zone 2 in 2007 was to test for mineralisation down-dip of Zone 4 and was completed in 2009. In April 2011, Ivanplats initiated a program to expand the geological knowledge around the "Flatreef" and to perform infill drilling in Zone 1 to approximately 100 x 100 m spacing. The latest drill campaign was halted in October 2012.

From 2007 to 2012 a total of 425,918 m were drilled from 394 drill holes. Drill holes were collared as vertical until UMT105, after that, holes were dirlled at an 85° inclination with the exception of UMT330 which had a 60°inclination. Drill-hole spacing is nominally 400 x 400 m or 400 x 200 m with local 200 x 200 m coverage and 100 x 100 m coverage in much of Zone 1. There are a few areas where the spacing is somewhat wider and/or irregular (400 m to 500 m between holes).

10.1.3 Zone 5

In October 2012, further exploration drilling for the purpose of extending the geological knowledge of the "Flatreef" area to the south of Zone 3 ceased due to community concerns over compensation issues. Three drill holes were completed together with their respective three deflections, whilst two drill holes were suspended. A total of 3,739 m were drilled with all holes collared at 85° and completed on a nominal drill spacing of 400 x 800 m.

10.2 Drill Methods

All drilling has been completed by diamond drill coring methods. Drill programs have been completed primarily by contract drill crew, supervised by Ivanplats' geological staff.

10.2.1 Zone 4

Drilling was conducted between 2001 and 2003 by Rosond Drilling (an international contract drilling company). Drill rig types included Longyear-44, Longyear-38, Boyles-37, Tone-TEL and Rocor/Diamech-262. Wire-line equipment extracted NQ2 (50.5 mm diameter) and HQ (63.3 mm diameter) core, and a limited amount of geotechnical drilling was completed with oriented NQ3 (44.9 mm diameter) core from stabilized triple-tube core barrels. Metallurgical sample holes were completed with TNW-size (60.3 mm diameter) core. Completed holes were capped using a 1.5 m length of sealed steel pipe welded to the drill hole casing.

10.2.2 Zones 1 to 3 and Zone 5

Drilling of the underground deposit began in 2007 with Zone 2 ending in 2011, whilst drilling in Zone 1 and 3 is on-going, and Zone 5 is the latest explored area. All drilling extracts NQ (48 mm) or BQ (36 mm) sized diamond drill core. The holes were all near-vertical at their collars, but with depth the holes tend to incline less steeply. For the UMT holes the average hole length is 1,043 m; the minimum hole length is 212 m, and the maximum hole length is 1,973 m.

The underground drill program has shown the Platreef extending to at least a depth of 1,525 m and is 300 m to 600 m thick at Turfspruit. The average depth to the floor rocks (below the base of Platreef) is approximately 1,200 m, and the depth to the floor rocks ranges from 300 m to 1,500 m.

Completed holes were capped using a 1.5 m length of sealed steel pipe welded to the drill hole casing with drill hole labels inscribed on the drill caps.

10.3 Geological Logging

Standardised geological core logging conventions were used to capture information from the drill core. Detailed geological logging of drill core was completed daily by geologists onto log sheets. There has been an improvement in the style of logging from the historic work on the open-pit drilling program (Zone 4) to the current underground drilling program of Zone 5. The improvement in core logging provides a more accurate and detailed information of data.

Platreef staff performed core handling from drill site to storage. Each core box was photographed using a digital camera. The photographs are stored on a network server and duplicate CD-ROM media. After geological logging, sample intervals were marked on the core, and drill core was sawn longitudinally for sampling.

After sampling, the remaining half core is archived in one metre-length galvanized-plate core boxes. Storage facilities consist of lockable brick and corrugated steel sheds where the core boxes are placed on two metre-high pre-fabricated core racks for ease of access.

The QPs have reviewed the local geology, including core logging and interpretations and finds them to have been done in a professional manner that can support Mineral Resource estimation and project development.

10.3.1 Zone 4

Geological core logging involved the recording of lithology; grain size; type and degree of alteration (“low”, “medium” or “high”); type and visible percentage of sulphide (pentlandite, pyrrhotite, chalcopyrite, and pyrite); relative sulphide ratios and structural data. Data captured include lithology by standardised abbreviation; alteration by type and relative degree; biotite alteration as a modal percentage and visible sulphide types as a total modal percentage. Structural data were noted, core axis angles taken and RQD data captured at maximum 10 m intervals for each drill hole.

Logs were then independently double-entered into Excel® spreadsheets and upon validation stored in an Access® database.

10.3.2 Zone 1 to 3 and Zone 5

The detailed information recorded includes lithology; stratigraphic unit; texture; grain size; (bottom) contact type; angle to the core axis; alteration and structure which are all mandatory entries, whilst there is an option for geologist to record a comment(s).

Logs were then captured by a geologist into a Fusion database (a product of Datamine®) and independently checked by the onsite database manager.

10.4 Geotechnical Logging

Geotechnical logging has been undertaken on core drilled in Zone 1. The geotechnical logging is conducted as per the Ivanplats logging procedures for both orientated and non-orientated core. Geotechnical logging for both orientated and non-orientated core includes:

- Percentage recovery
- Percentage RQD
- Run fracture frequency/m per drilling interval
- Rock type description
- Determination of geotechnical zones
- Determination of discontinuity distributions, types, condition (micro and macro), weathering, alteration and infill
- Determination of rock competency between solid rock and matrix material
- Estimated rock strength
- Rock mass classification (namely Q-system and MRMR).

To determine the orientation of discontinuities from oriented core, the core is re-fitted and oriented (with reference to the downloaded orientation tool data). The alpha and beta angles of discontinuities are then determined using a goniometer, thus allowing for the dip and dip direction to be calculated. The orientations of the borehole from down-hole surveys are taken into consideration during the discontinuity orientation calculation. Results have been assessed using DIPS software to determine discontinuity sets.

10.5 Recovery

The core recovery within the first few metres of boreholes (approximately 5 m) is poor in most cases due to the associated soil horizon classified as overburden. Poor recovery occasionally extended to about 30 m depth due to the weathering of bedrock. However in the majority of instances, core recovery improved considerably once drilling reached the Main Zone hanging-wall, reef horizon (T1 and T2) and footwall rocks and was commonly 100%. The recoveries only show a substantial decrease within faulted/sheared zones.

10.6 Collar Surveys

A contracted certified land surveyor (Mr. Louis Nel) used a differential Trimble GPS system to conduct collar surveys on all completed holes. Stations were tied in with survey stations established by the National Survey General Directorate.

Drill-hole coordinates were given in the Hartebeesthoek 1994 LO29 national coordinate system.

10.7 Down-hole Surveys

There are 34 drill holes in Zone 4 without down-hole surveys. All unsurveyed drill holes are vertical and range in depth from 7 to 583 m. The ATS and AMK drill holes were down-hole surveyed using multi-shot Reflex and Maxibor instruments. Multiple survey shots were taken at 3 to 6 m intervals down hole.

Down-hole deviation surveys for the UMT drilling were completed by independent down-hole survey technicians using gyroscopic (gyro) and/or electronic multi-shot (EMS) instruments. Surveys are recorded down-hole at 3 to 5 m intervals. In Zones 1 to 3 and Zone 5, 30 drill holes are without surveys. UMT001 to UMT106 were drilled vertically, while UMT107 to UMT394 were drilled either at -85º or -90º. Where both an EMS and a gyro survey were completed, the gyro survey was assumed to be more accurate and therefore in most cases was used in the geological model. There are 76 instances where the EMS has been selected, due to erroneous or uncompleted gyro surveys.

10.8 Geotechnical Drilling

A total of 11 drill holes (GT001 to GT011) were drilled for geotechnical purposes. GT001 to GT003 were initially drilled as part of open pit geotechnical studies in the early 2000s, and subsequently GT004 to GT008 were drilled for the underground study within Zone 1. As part of the civil geotechnical study of the shaft, three drill holes (GT009 to GT011) were drilled in October 2012 to depths of approximately 30 m, and four test pits were excavated.

Additional geotechnical data is currently being obtained from 66 UMT exploration drill holes within Zone 1. These 66 drill holes were geotechnically logged from 50 m above to 50 m below the reef horizon.

10.9 Hydrogeological Drilling

The initial hydrogeological drilling program of 12 drill holes (GPR001 to GPR012) on the Turfspruit and Macalacaskop farms was completed in February 2011. Seven months later (October 2011) four closely-spaced drill holes were drilled on Turfspruit at the site of the proposed decline portal. These four drill holes were drilled to depths below the proposed decline depth of 30 m to investigate the near surface occurrence of groundwater, depth of weathering, and depth of fracturing that could affect the portal. In three of the four drill holes significant airlift yields (8-10 L/s) were encountered. Between November 2011 and February 2012 a further 14 drill holes (GPR013 to GPR026) were drilled with the aim to provide additional monitoring drill holes on the Turfspruit 241KR farm, and to expand drilling program on the Rietfontein 2KS farm.

During July and August 2012 four additional hydrological monitoring boreholes (BH005 to BH008) were drilled to 60–200 m depths at the proposed vertical exploration bulk sampling shaft, located 400 m northwest of the decline portal drill holes. Final air-lift-yields ranged from 0.9 to 4 L/s, and no water intercepts were encountered deeper than 40 m.

All hydrological GPR-numbered holes were drilled with a minimum diameter of 165 mm; cased and developed (except for GPR003 which was backfilled) as required for the assessment of aquifer characteristics and parameters. A cement grout sanitary seal of 5 m was inserted in the annulus of each borehole, and the boreholes were disinfected, capped, and locked.

10.10 Proposed Shaft Location Geotechnical Evaluation

SRK Consulting, as part of the ongoing PEA, evaluated the proposed site of the bulk-sample exploration shaft from a geotechnical perspective. On current plans, the bulk sample will be taken from approximately 780 m depth; SRK was requested to evaluate potential shaft conditions to this depth and to provide shaft support recommendations.

A single, triple tube, rotary-cored, vertical borehole (GT008) was drilled at the centre of the proposed production shaft position. The hole was geotechnically logged to a final depth of 1,225.97 m, which was 74.03 m short of the planned 1,300 m hole completion depth. This was due to extremely poor ground conditions being encountered at the end of hole.

The primary aim of the borehole logging was to:

- Classify the rock mass, over the full depth of the borehole, using Laubscher's (1990) Mining Rock Mass Rating Classification System and Barton *et al's* (1974) Norwegian Geotechnical Institutes Q-System
- Identify any potentially adverse ground conditions that may impact the stability of the production shaft
- Provide data with respect to the sub-surface geology, ground conditions and support recommendations.

Laboratory testing was carried out on selected, representative samples collected from borehole GT008; testing comprised:

- Uniaxial Compressive Tests
- Uniaxial Compressive Tests with Elastic Modulus and Poisson's Ratio
- Brazilian Tensile Strength Tests
- Base Friction tests based on direct shear tests on saw-cuts.

Analysis and interpretation consisted of:

- A qualitative description of the sub-surface geology, based on the geotechnical borehole log
- The interpretation of the weathering regime, based on the geotechnical borehole log
- The interpretation of the jointing with depth, including micro-condition, macro-condition, joint infill and joint alteration

- The quantification of the quality of the rock mass with depth
- The provision of support recommendations with depth.

Based on this work, SRK concluded that the rock mass in the area selected is both competent and of a suitable quality for the sinking of the vertical bulk-sample shaft to a depth of approximately 800 m. Rock bolts and grout were recommended for the two rock classes identified:

- Q-value between 4 and 10: bolts (untensioned and grouted) 1.0–1.5 m long and shotcrete 2–3 cm thick
- Q-value between 10 and 40: bolts (tensioned and grouted) 1.5–2.0 m long and chain link mesh.

SRK also noted that ground conditions in the resource area are variable and that, consequently, extrapolation of sub-surface ground conditions, even over relatively short horizontal distances, is not recommended – specifically with respect to major infrastructure.

10.11 Metallurgical Drilling

At ATS a number of core holes were drilled to obtain metallurgical samples; however, the actual number is not certain. Other metallurgical samples have been obtained from exploration drill holes.

10.12 Summary of Drill Intercepts

Example drill intercepts showing mineralization typical grades and thicknesses is included as Table 10-1.

10.13 Comments on Section 10

In the opinion of the QPs, the quantity and quality of the lithological, geotechnical, collar and down-hole survey data collected in the exploration and infill drill programs are sufficient to support Mineral Resource estimation as follows:

- Core logging meets industry standards for PGE–Au–Ni–Cu exploration
- Collar surveys and down-hole surveys have been performed using industry-standard instrumentation
- Recovery from core drill programs is acceptable to allow reliable sampling to support Mineral Resource estimation

Table 10-1: Drill Intercept Summary Table

Drill Hole	Length	Top of Interval			Ni (%)	Cu (%)	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)
		Elev.	Easting	Northing						
ATS – Area where Mineral Resources amenable to open pit mining methods are estimated										
ARF020	8.70	1131.0	13373.9	5293.5	0.44	0.15	1.60	1.52	0.51	3.63
Includes	2.77	1131.0	13373.9	5293.5	0.62	0.20	2.42	2.27	1.02	5.72
ARF020	5.92	1010.7	13373.9	5293.5	0.21	0.11	1.37	0.82	0.17	2.37
Includes	1.93	1010.7	13373.9	5293.5	0.15	0.09	2.64	1.28	0.23	4.15
ARF043	16.27	947.6	13253.4	5466.1	0.63	0.51	0.63	1.39	0.25	2.26
Includes	5.12	936.6	13253.2	5466.0	0.29	0.51	1.35	1.64	0.38	3.37
ATS046	42.26	717.5	12976.3	5336.4	0.42	0.49	0.99	1.49	0.28	2.75
Includes	12.61	688.4	12976.2	5336.5	0.57	0.69	1.87	2.79	0.48	5.14
AMK – Area where Mineral Resources amenable to open pit mining methods are estimated										
AMK030	39.80	990.5	13800.0	2500.0	0.34	0.17	0.94	1.23	0.22	2.39
Includes	4.03	957.6	13800.0	2500.1	0.32	0.14	1.15	1.68	0.28	3.11
AMK051	32.78	915.2	13583.7	2602.8	0.27	0.11	0.80	0.84	0.14	1.78
Includes	4.00	896.4	13583.7	2602.7	0.31	0.11	1.16	1.30	0.19	2.64
AMK081	33.34	794.1	13500.4	2794.5	0.26	0.16	1.11	1.38	0.19	2.69
Includes	13.73	794.1	13500.4	2794.5	0.35	0.20	1.47	1.77	0.25	3.49
UMT – Area where Mineral Resources amenable to underground mining methods are estimated										
UMT026	16.97	-113.8	11759.9	5063.9	0.18	0.08	2.13	1.31	0.27	3.71
Includes(1)	3.11	-113.8	11759.9	5063.9	0.27	0.15	6.38	3.45	0.66	10.48
Includes (2)	3.81	-118.4	11759.3	5063.7	0.36	0.13	3.55	2.62	0.46	6.63
UMT026	23.17	-155.2	11755.6	5062.2	0.36	0.15	1.12	1.76	0.22	3.10
Includes	9.15	-155.2	11755.6	5062.2	0.43	0.13	1.59	2.51	0.29	4.39
UMT039	46.39	246.7	9955.3	6780.7	0.31	0.13	2.39	2.96	0.28	5.63
Includes (1)	7.85	246.7	9955.3	6780.7	0.49	0.18	3.20	4.37	0.36	7.92
Includes (2)	9.39	249.5	9954.2	6780.3	0.43	0.19	3.48	4.38	0.44	8.29
UMT056	37.82	324.6	10341.0	5604.1	0.44	0.20	2.24	2.11	0.30	4.65
includes	11.69	322.6	10341.0	5604.0	0.50	0.20	5.05	4.15	0.54	9.74
UMT217	20.84	312.1	10214.5	5547.8	0.27	0.12	2.38	1.96	0.29	4.63
Includes	15.20	312.1	10214.5	5547.8	0..31	0.14	3.085	2.47	0.38	5.93
Includes	8.46	293.3	10211.8	5347.0	0.34	0.15	4.65	3.67	0.42	8.73
UMT281	12.22	277.8	10791.1	5525.1	0.25	0.15	1.14	1.079	0.18	2.39
Includes	7.11	272.2	10790.1	5525.0	0.30	0.19	1.63	1.44	0.23	3.30
UMT312	21.61	334.9	9944.7	5988.1	0.33	0.19	1.70	1.75	0.26	3.71
Includes	19.73	329.4	9944.0	5987.8	0.35	0.20	1.80	1.85	0.26	3.91
Includes	9.40	329.4	9944.0	5987.8	0.41	0.24	2.31	2.40	0.40	5.06

- Depending on the inclination of the drill hole, and the dip of the mineralization, drill intercept widths are approximately equivalent to true widths for most UMT drill holes. Drill orientations are generally appropriate for the mineralization style. In the open- pit areas, vertical holes have been spaced closely enough (ATS) so that the geological units and trends to grade can be defined. Elsewhere, the spacing of the holes is wider, and their angle with the Platreef approaches 45°. Ivanplats should consider drilling angle holes when infilling the more steeply-dipping sections of the Platreef
- Drill orientations are shown in the example cross-sections included in Sections **Error! Reference source not found.** and 14.0 and can be seen to appropriately test the mineralization. The sections display typical drill-hole orientations for the deposits
- Drill-hole intercepts as summarized in Table 10-1 appropriately reflect the nature of the PGE–Au–Ni–Cu mineralization.
- Sampling methodologies are discussed in Section 11.0, and comments on the sampling protocols are outlined in Section 11.9
- Metallurgical recoveries are discussed in Section 13.0, and comments on the recoveries are outlined in Section 13.5.

11.0 SAMPLE PREPARATION, ANALYSES, AND SECURITY

From the time of Ivanplats' initiation of the Project to date, Project staff members employed by Ivanplats were responsible for the following:

- Sample collection
- Core splitting
- Sample despatch to the analytical laboratory
- Sample storage
- Sample security.

11.1 Sampling Methods

The limited geochemical sampling of trenches, performed early in the exploration program, was superseded by core drill data; therefore geochemical sampling is not discussed further in this Report.

Drill core is sawn in half using a wet saw. A study completed during 2011 by AMEC (Long, 2011c), which reviewed the differences between recovered and assayed fines lost during sawing found no significant difference in the grades of the elements of interest in the fines compared to their associated core samples.

11.1.1 Assay Sampling

AMK and ATS Sampling

For the open-pit resource drilling between 2001 and 2003, assay sampling began where the geologist's observations indicated the top of bedrock. Before Q4 2001, some Platreef drill intervals lacking visual mineralization were not submitted for assay. This practice was reviewed in 2002, and additional core intervals were subsequently sampled.

Prior to May 2003, unsampled drilled intervals were limited primarily to soil, oxidized bedrock, and non-prospective hanging wall and footwall rocks. In addition, a small number of xenoliths within the Platreef Complex were deemed barren from geological observations and were assigned assay values of zero for resource estimation purposes. Beginning in May 2003, oxidized bedrock has been assay sampled, and a remedial assay sampling program including the oxidized portion of drill holes was completed by May 2003.

The sampling of drill core was completed by Ivanplats' employees at the Platreef project offices in Mokopane.

A sample length of one metre was initially selected for efficient sample handling and preparation. In May 2003, the nominal sample length was increased to 2.5 m, based on recommendations by Francois-Bongarcon (2002). Dr Francois-Bongarcon determined that a sample length of 2.5 m would not significantly degrade the assay quality, and Set Point Laboratories determined that the larger samples could be effectively prepared for assay.

The depth from the drill-hole collar for each sample was recorded in an electronic spreadsheet. Each sample was given a unique identification code. Sample boundaries were marked on the drill core, and the core was sawn longitudinally in half. Ivanplats' employees bagged the half-core intervals and assigned a drill-hole identifier and sample number to each sample.

UMT Sampling

For underground drilling of the UMT deposit, assay sampling was initiated 5 m above the Platreef (in the Main Zone) and extended 20 m into the Floor rocks. All drill core within the Platreef was sampled for assaying.

Sampling is completed by Ivanplats' employees at the Platreef project offices in Mokopane. Prior to sampling, core loss and core measurements are checked and confirmed by a geologist. The nominal sample length is 1 m, with a maximum of 1.25 m and a minimum of 0.3 m. Samples are broken at lithological contacts. The sample boundaries, lithological breaks and insertion points for blank samples are marked on the core by a geologist.

The sampling supervisor marks the 1 m sample boundaries (start and end) within lithological boundaries. After mark-up, a photograph of each core box is taken. The photograph includes notations for box number, start and end depths, and the photographer's name. After photography, the core is transferred to the core sawing area.

At the cutting area, a cut line is marked on the core. The drill core is cut bottom-up (downhole to uphole direction). The cut core is placed back in the core box, and the box is placed in the sun to dry. Once dry, the core is moved to a sampling bay.

Each sample is assigned a unique identification number, and each sample batch is assigned a unique number. Sample batches consist of 200 to 220 samples and include ±10 standard reference materials (SRMs) and ±10 blanks. Sample information is written into sample books, and sample bags are marked with sample numbers. Insertion points for standards and blanks are selected. A sample tag and two sample labels (with identical numbers) are placed in the bag of the corresponding sample number. Prior to sampling, the sample bags are inspected to ensure the sample bag, sample tag and sample labels are the same for each bag. An Excel spreadsheet is constructed that includes the drill hole ID, laboratory ID and sample number.

Sampling is completed by at least two people. Sample weights are captured in the Excel file for the sample batch. Photographs are taken of each sample displaying the bag sample number and the sample tags and labels inside the sample bag. Sampling is conducted in sets of 10 samples, and after every tenth sample, the samples are inspected to ensure sample numbers are correct, the Excel spreadsheet corresponds, and the sample bags are not damaged.

11.2 Metallurgical Sampling

SGS performed metallurgical test work in 2010. SGS used a conventional (lead collector) fire assay for PGE assays, and a peroxide fusion for its assay of base metals. Most Platreef samples do not have sulphur contents high enough to warrant a peroxide fusion rather than a lithium borate one, which is the more commonly-used fusion method on samples with less than 10% sulphur. Three sample pulps of head samples were obtained from SGS and submitted to Ultra Trace along with blind-inserted SRMs.

Ivanplats supplied samples of drill-core to Xstrata Process Support (XPS) in 2011 for use in two phases of scoped metallurgical and mineralogical testwork. The analytical work was performed by ALS Chemex at their Vancouver laboratory. Analysis of Pt, Pd, Au and Rh was performed using fire assay. The Pt, Pd and Au were determined by lead collection with cupellation to a low-temperature prill, followed by acid dissolution and ICP finish (ALS Chemex method PGM-ICP23). The Rh was separately assayed using a specialist gold collection fire assay method and ICP-MS finish (ALS Chemex method MS25). The base metals were determined by a sodium peroxide fusion followed by acid dissolution and ICP finish (ALS Chemex method ME–ICP81).

In August 2012, material for a ‘Phase 2’ sample was selected and sent to Mintek Laboratories. Samples were selected using the representative distribution method recommended by Jorge Oliviera of Xstrata Process support (XPS). Three separate zones were selected for sampling, under the guidance of Dr. Mike Bryson (Mintek), based on the following parameters;

- Proximity to proposed shaft

- Structurally favourable reef (flat-lying)
- Connectivity and quality of mineralization

Once the spatial zones were selected, all samples within 2g/t 3PGE composites within the zone were tabulated in Excel. Due to sample length variability, samples were normalized using the length weighted average function. The normalized 3PGE and Ni grades were rounded to 1,000 ppm and 0.1% respectively. These rounded values were then categorized into histogram bins.

Various sample distribution statistics were calculated to ensure that a representative sub-sample could be collected. The sample numbers were cross-checked with previous metallurgical sample work to check if ½ NQ core was still available. A new table was created and samples were added individually from all available drill holes until the appropriate distribution was achieved. Sample mass was estimated under the assumption that 1.0 metre of ¼ NQ core weighs 1.1 kg

The primary distribution parameters were 3PGE grade, Ni grade and rock type. Given the recent results of metallurgical work at XPS, it was decided to keep the grade distribution even, but favour samples with higher Pt/Pd ratios. A consequence of this is that the sample is slightly biased towards material from the top of the composite.

Two sources of error in the selection method are known. Firstly, the rounding and categorizing of data into sample bins and secondly, the assumption of uniform sample weight. These factors are not expected to have a significant influence on the overall result of this work

11.3 Density Determinations

11.3.1 AMK and ATS Bulk Density

At AMK bulk densities were determined for wet and dry rock fragments representing the major lithologies (Table 11-1). The wet determinations include moisture content within the rock. In order to quantify the moisture content, the samples were placed into a drying oven and then sealed in wax. The difference between the two determinations is negligible; this result is consistent with the observed lack of porosity. To be consistent with previously reported “wet” tonnages, the “wet” (i.e. unsealed) determinations have been used for tonnage calculations.

Table 11-1: Average Bulk Densities for AMK Area

Rock Group	Wet (Unsealed) Determinations			Dry (Wax Coat) Determinations		
	No.	Average of Wet Density g/cm³	Weighted Average g/cm³	No.	Average of Dry Density g/cm³	Weighted Average g/cm³
Main Zone	11	2.85		9	2.84	
Platreef	69	3.04	3.07	60	3.03	3.07
Xenolith	29	2.80	2.84	26	2.75	2.80
Serpentinized Peridotite	11	3.06	3.06	9	3.04	3.04
Footwall and Lower Zone	9	3.13		7	3.10	

At ATS, bulk density samples were selected to ensure high-quality coverage, both spatially and lithologically. Samples from various geographic areas and important lithological units were selected from the sawn half-core. Pieces selected were approximately 10 cm long. About 1,088 samples selected from 230 different drill holes were analyzed. Table 11-2 shows mean densities by rock type used for tonnage estimations in the ATS area.

11.3.2 UMT Bulk Density

Bulk density determinations from the underground drilling were completed by Ivanplats' geological staff. Sample lengths of 0.18 m were taken of sawn half-core at a nominal 5 m spacing from each drill hole. The density samples were determined by weight in air and weight in water using the formula:

Specific Gravity = Ma / (Ma-Mw)

where *Ma* = Mass in Air; and
Mw = Mass in Water

The database contains over 40,000 density determinations that were recorded from 2007 to 2012 from the underground UMT exploration drilling program. These particular densities are of the rock type's representative of the stratigraphic and lithological units used within the geological model.

The different stratigraphic units are shown in Table 11-3, where the proportions of the samples for each broad stratigraphic unit are displayed. More than half the samples taken across the lease area are from the Main Zone (MZ) gabbronorite (GN). A total of 3,005 samples have been taken within the Turfspruit Cyclic Unit (TCU) which is the main focus for Mineral Resource calculations, and over 12,500 density samples from the footwall of the TCU.

Table 11-2: Average Bulk Densities for ATS Area

Lithology	Average Density g/cm^3	Comments
Soil	1.76	From Glover, T.J., Pocket Ref, 2nd ed., Sequoia Publishing, Littleton, CO
Main Zone	2.89	Based on measurements
Serpentinite	3.01	Based on measurements
Hornfels	2.85	Based on measurements
Norite/pyroxenite	2.99	Based on measurements
Floor	2.85	Based on measurements

Table 11-3: Stratigraphic Unit Density

	Total	Hanging wall			Bikkuri			TCU			Footwall		
		MZ	NC1	MAN	Total	B1	B2	Total	T1	T2	NC2	CZ	LZ
Ave	2.99	2.90	2.98	2.84	3.12	3.12	3.13	3.15	3.18	3.11	3.06	3.1	3.17
Min	2.05	2.37	2.58	2.52	2.6	2.6	2.62	2.57	2.58	2.57	2.61	2.05	2.60
Max	4.45	3.5	3.49	3.02	3.37	3.37	3.37	3.60	3.60	3.42	3.46	4.45	3.42
Std dev	0.17	0.1	0.15	0.07	0.15	0.16	0.13	0.13	0.11	0.16	0.17	0.17	0.19
# of Samples	*40,168*	*22,756*	*918*	*176*	*263*	*189*	*74*	*3,005*	*1,878*	*1127*	*317*	*9,816*	*457*

Abbreviations used in this table are explained in Table 7-4.

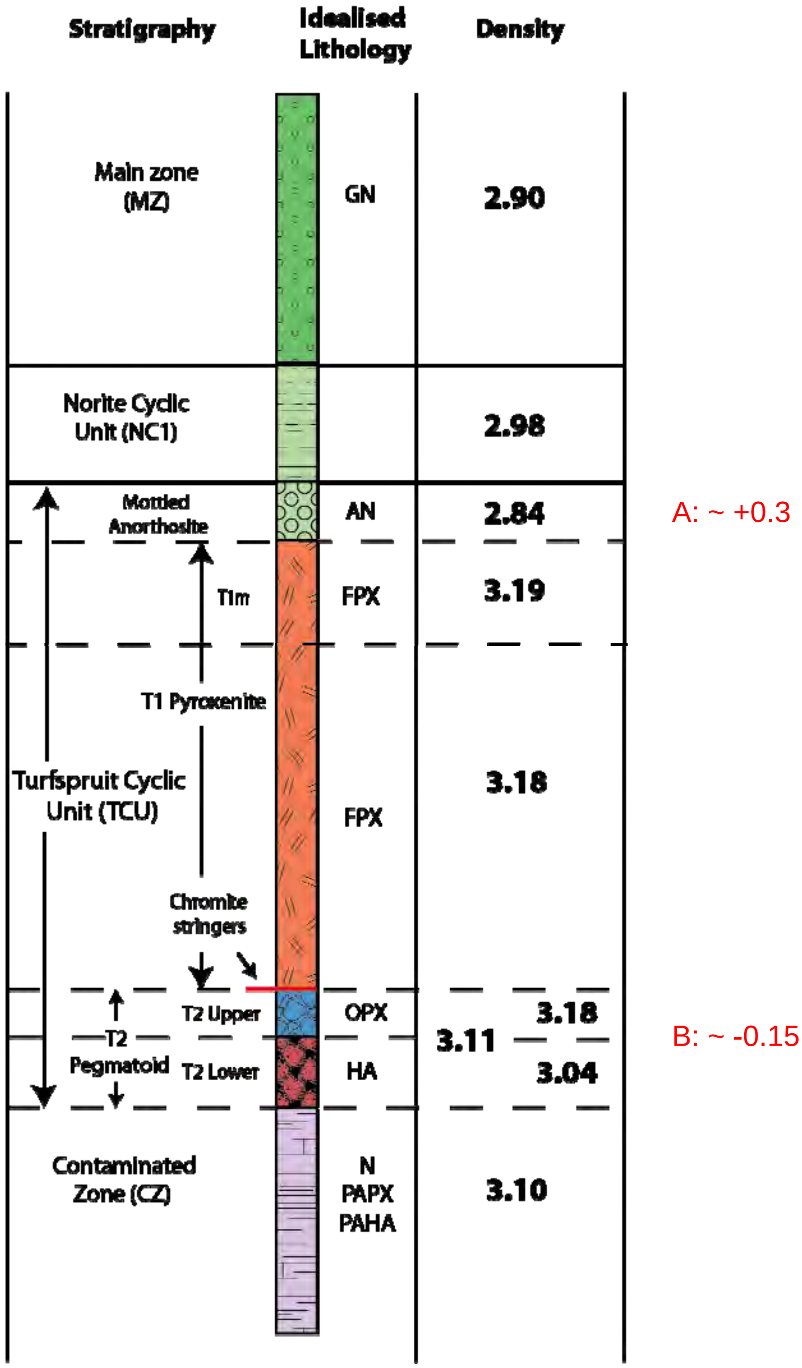
The separate lithologies from the entire stratigraphy are shown in Table 11-4. The more felsic rocks understandably have a lower SG with the GN averaging 2.91; the orthopyroxenite (OPX) and the feldspathic pyroxenite (FPX) average 3.19. The SG decreases as olivine is added to the system. This is counterintuitive, but is due to the serpentinization of the olivine. Within the TCU the SG decreases with the increase of the olivine content. The olivine bearing orthopyroxenite (OLOPX) averages 3.10 and the HA averages 2.99. The granite veins (GRV) have the lowest SG of any of the rock (2.66) and occur throughout the stratigraphy.

Table 11-4: Lithological Density

	Total	GN	GRV	AN	FPX	OPX	OLOPX	HA	PAPX	PAHA	CR	PX
Ave	2.99	2.91	2.66	2.84	3.19	3.19	3.10	2.99	.12	3.08	3.30	3.16
Min	2.05	2.37	2.44	2.43	2.68	2.78	2.60	2.52	2.05	2.27	3.09	2.13
Max	4.45	3.55	3.48	3.24	3.60	3.41	3.98	3.41	4.45	3.6	3.44	4.3
Std dev		0.07	0.11	0.07	0.08	0.10	0.19	0.14	0.17	0.16	0.14	0.16
# of Samples	*40,168*	*20,153*	*1,195*	*591*	*2,447*	*593*	*423*	*628*	*3,713*	*831*	*9*	*1,413*

Figure 11-1 shows a idealised strip log with the associated densities and two horizons of large density contrast are marked A and B.

Figure 11-1: Idealized Density Strip Log



Note: Figure courtesy Ivanplats, 2013

- There is a ~0.3 density contrast across the MZ/NC1/MAN and the T1 contact.

- Within the T2 the most significant difference is between the OPX or T2U (SG range of 3.19–3.18) and the HA or T2L (2.96–3.04). When the T2 is combined, the overall average SG is 3.11.

11.4 Analytical and Test Laboratories

To date, laboratories utilized for the Platreef Project include the primary laboratories Set Point Laboratories (Set Point; Johannesburg, RSA) and Ultra Trace Laboratory (Ultra Trace; Perth, Australia); the check laboratories Lakefield (Lakefield Johannesburg; Johannesburg, RSA) and Genalysis Laboratory Services (Genalysis; Perth, Australia and Johannesburg, RSA).

Metallurgical laboratories include G&T Metallurgical (G&T Metallurgical; Kamloops, BC, Canada), SGS Metallurgical Services (SGS; Johannesburg, RSA), Xstrata Process Support (XPS; Falconbridge, ON, Canada), and Mintek laboratories in Johannessburg, RSA.

All of these listed laboratories were, and are, independent of Ivanplats.

Set Point had no accreditations during the time period it performed assays of Platreef samples. Set Point was accredited to ISO17025 in 2003 and 2004. Set Point has participated in Geostats, Australia round-robin assessments since 2000.

Ultra Trace was registered with the Australian National Association of Testing Authorities (NATA number 14492) and was registered for the analysis of nickel ores by ICP methods and also by XRF. In 2007, Ultra Trace became a subsidiary of Amdel Limited (Amdel; head office: Port Melbourne, Australia). Amdel has adopted the ISO 9001 Quality Management Systems, and is a member of Bureau Veritas, an international group specialized in the inspection, analysis, audit, and certification, and management systems in relation to regulatory or voluntary standards.

Lakefield Johannesburg (now a subsidiary of SGS and renamed SGS Johannesburg) was not accredited before December 2002, but uses the same protocols and procedures as its sister laboratory, Lakefield Research, in Canada. Lakefield Johannesburg was actively working on obtaining ISO accreditation during the time period covered by its assaying of Platreef samples and became accredited to ISO 10725 in December 2002. Lakefield Johannesburg participated in proficiency testing during the time-frame covered by its check assay work on Platreef drilling samples, including the CANMET laboratory evaluation for PGEs and base metals.

Genalysis Perth is an accredited NATA laboratory (NATA number 3244). The terms of accreditation included most analyses performed for Platreef. The laboratory was accredited to AS ISO/IEC 17025–1999 and included the management requirements of

ISO 9002:1994. The Perth facility is accredited in the field of Chemical Testing for the tests shown in the Scope of Accreditation issued by NATA. The South African facility holds ISO/IEC 17025:2005 accreditation for specified analytical techniques.

Genalysis also participates in a number of regular international, national and internal proficiency round-robins and client specific proficiency programs.

G&T Metallurgical has ISO 9001:2000 registration (KPMG certificate number 1613). Their registration certifies provision of consultancy services to the mining industry including metallurgical, mineralogical, and assay testing procedures.

SGS in Johannesburg has ISO 9001 and 14001, OHASA 18001, and SA 8000 accreditation.

XPS is not accredited with ISO for metallurgical testing. They reportedly use a series of internal quality controls that assure 95 percent confidence in the results. This system was audited by Six Sigma and passed those criteria, although no official certificate was issued. Assaying reported by XPS is done by ALS Chemex which is registered to ISO 9001:2008. ALS Chemex also has accreditation from the Standards Council of Canada (CAN-P-4E, ISO/IEC 17025:2005), and General Requirements for Competence of Testing and Calibration Laboratories, and the Program for Accreditation of Laboratories in Canada (PALCAN) handbook (CAN-P-1570).

In late 2010, Acme Laboratories (Acme) of Vancouver, Canada, became the check laboratory. The laboratory holds ISO/IEC 17025:2005 accreditation for specified analytical techniques. In the third quarter of 2011, Ultra Trace could no longer accommodate all of the Project’s greatly increased sample production. Some samples were therefore submitted to Genalysis and Set Point Laboratories, both in Johannesburg, and ALS Chemex in Vancouver.

Mintek is a South African National Accreditation System accredited testing laboratory and holds ISO/IEC 17025:2005 accreditation for specified analytical techniques.

11.5 Sample Preparation and Analysis

Sample preparation for all samples was completed by Set Point. Set Point analyzed samples until capacity was reached in 2002. From November 2002 all prepared samples were analyzed by Ultra Trace.

11.5.1 AMK and ATS Sample Preparation

Prior to May 2003, sample bags were transported by a private freight contractor to Set Point in Johannesburg. After May 2003, sample preparation was completed at Set Point's new facility in Mokopane, and samples were delivered the same day they were loaded for transport.

Initial sample preparation by Set Point included crushing and pulverizing the entire sample to a nominal grind of 60% passing 200 mesh (75 µm) using a jaw crusher, a rolls crusher, and Labtechnics LM-2 pulverizers. In March 2002 a more stringent grind of 90% passing 150 mesh (106 µm) was established.

In August 2002, long grinding times began to outstrip the capacity of the Set Point preparation laboratory. Consequently, a splitting step was introduced between the sample crushing and the final pulverization. Francois-Bongarcon (2002) specified a criterion of 95% passing (p95) 10 mesh (1.7 mm). This was the desired average, and to implement it, a lower control limit of 90 percent passing 1.7 mm was specified. This has resulted in a test average, excluding failures that trigger re-grinding, of about 94 percent passing 1.7 mm.

The p95 -1.7 mm coarse reject was saved. For every 20^{th} sample, a split of the coarse reject was inserted into the sample stream and a "CRD" suffix (designating coarse-reject duplicate) was added to the sample name. These served as a quality check of the splitting protocol.

Set Point completed four screen tests of coarse reject samples each shift. The average of the four tests is recorded and was considered to constitute a failure (warranting corrective steps) if the mean fell below 90% passing 1.7 mm. In addition, approximately 2% of the coarse rejects were sent to Lakefield Johannesburg to check compliance of crush size specifications.

Upon receipt at Ultra Trace, approximately 2% of the sample pulps are tested by wet-screening a portion through a 106 µm screen. If more than one sample in the submission fails the test, the entire submission is repulverized, and the same samples are re-tested to confirm the grind criterion has been achieved.

All pulp rejects and coarse rejects are returned to the Platreef facilities in Mokopane.

11.5.2 UMT Sample Preparation

After sampling, the UMT samples are loaded on a truck and transported to the Set Point Laboratory in Mokopane for sample preparation. The samples are loaded in the presence of a supervisor and QA/QC coordinator. The transportation department records the number of samples, sample numbers and date of delivery in a chain of custody book. The receiving personnel at the laboratory sign the chain of custody.

The Set Point preparation laboratory checks the sample numbers against the sample submission form. Each sample is weighed, and the sample weight is reported to Platreef. Samples are crushed to 10 mm using a Keegor crusher and milled to 1.7 mm using a Labtechnics mill (LM2); the sample mass requires that the sample be divided into two or three portions for this brief milling (approximately 15 seconds). The portions are then blended back together by passing through a riffle splitter three times. A sample from every 20th sample is tested by screening through a 1.7 mm screen. If the specification is not met (90 percent passing 1.7 mm), the sample is re-crushed, and two nearby samples (between the failing sample and the preceding and following tested samples) are randomly selected and tested. If one of these fails, the entire corresponding group of samples is re-crushed, and the crush time of that crusher adjusted.

The samples are split in half using a riffle splitter. One split is packaged and returned to the Platreef office. The second split is milled to 90% passing 106 µm. A split of the pulp sample (±200 g) is repacked for shipment to assay laboratory. All materials are returned to Platreef.

After return to the Project, the pulps packed for submission are placed in numerical order, standard and certified reference material (SRM and CRM) samples are inserted into the sequence, and pulps are boxed for shipment to Ultra Trace. From the fourth quarter of 2011, samples have also been shipped to Genalysis (Johannesburg) and ALS Chemex (Vancouver) and Acme (Vancouver).

During 2012, Genalysis and Ultratrace were used as both primary and check laboratories on work performed, with Ultratrace re-assaying Genalysis samples and vice-versa.

11.5.3 AMK and ATS Sample Analysis

Samples were assayed by Set Point until 2002 when the capacity was exceeded. After November 2002, all samples were submitted to Ultra Trace for analysis after sample preparation was completed at Set Point.

Set Point analysis initially included Au, Pt, Pd, Rh, Cu, Ni, S, Cr, Co, V, Rb, Sr, and Sc. Au, Pt, and Pd were assayed by fire assay with a lead collector. The dissolved bead was analyzed by inductively-coupled plasma (ICP). Rhodium (Rh) was determined in a separate fire assay utilizing a gold inquart. The other elements were determined by

X-ray fluorescence (XRF) analysis of a pressed pellet of sample pulp mixed with a binding agent. The sulphur and Rh assays were discontinued in October 2002 due to their expense and believed limited usefulness at the time.

Ultra Trace performed a similar fire assay to determine Au, Pt and Pd by using an ICP mass spectrometer (MS) finish that provided a lower detection limit of 1 ppb. Ultra Trace did not assay for Rh. Ultra Trace determined Cu and Ni by multi-acid digestion sufficiently robust to provide dissolution of all minerals ("total" metal assay). For a short time, other metals were assayed by XRF using the same protocol as Set Point. In December 2002, the assay suite was reduced to Au, Pt, Pd, Cu, and Ni.

After May 2003, a separate protocol for oxidized samples was introduced. This involved relatively few samples showing signs of oxidation: Ni and Cu were analyzed via aqua regia (partial) digestion and standard "total" acid digestion. Fire assays were used to analyze Au, Pt, and Pd.

11.5.4 UMT Sample Analysis

Ultra Trace used a multi-acid digestion followed by ICP-OES reading to determine total Ni, Cu, Cr, and sulphur. Samples were also assayed for sulphur using a LECO furnace (controlled combustion of sample pulp with infrared reading of SO_2 gas); the LECO and ICP sulphur results show close agreement. Lead flux (collector) fire assays with an ICP-MS finish were used to determine Pt, Pd, and Au.

Set Point used the following assay methods (laboratory codes included in parentheses):

- Fire assay lead collection followed by ICP-MS for Au, Pt and Pd (Code 416)
- Total Acid Digestion followed by ICP-OES for Cu; Ni (Code 255)
- S by Leco (Code 255)
- Fire assay Pd collector followed by ICP-MS for Au, Pt, Rh (415)
- NiS Collection for Au, Pt, Pd, Rh, Ir, Ru, Os (419)

Ultra Trace used the following analytical methods

- Fire assay lead collection followed by ICP MS for Au, Pt and Pd (Doc 600)
- Total acid digestion followed by ICP OES for Cr; Cu; Ni and S (Doc 200)
- Small-scale aqua regia digestion followed by ICP OES for Cr, Cu, Ni, S (AR201)

Genalysis used the following analytical methods:

- Fire assay lead collection followed by ICP MS for Au, Pt and Pd (method code FA25/MS]
- Aqua regia digestion followed by ICP/OES for Cu, Cr, Ni, S (method code AR01/OM)
- Multi acid digestion followed by ICP OES for Cu, Cr, Ni, S (method code 4A/OM)

11.5.5 Check Sample Analysis

Check sampling at ALS Chemex used a fire assay technique followed by ICP MS for Au, Pt and Pd (ALS method PGM-MS24**)**. A four-acid-mixed acid digest followed by ICP-MS was completed to determine a 48-element suite (ME-MS61). Sulphur assays were performed using a LECO furnace (S-IR08).

Genalysis in Perth used the following analytical methods (laboratory codes included in parentheses):

- Fire assay lead collection followed by ICP-MS for Au, Pt and Pd (FA25/MS)
- Multi acid digestion followed by ICP-OES for Cu, Cr, Ni, S (4A/OM)
- Sieve test as indicated by individual sample breakdown (SV02).

In contrast, the Johannesburg branch of Genalysis used the following methods on selected samples:

- NiS fire assay for Au, Pt, Pd, Rh, Ru, Os, Ir (NS25/MS)
- Pd Collector fire assay for Rh (FA25P/OE)

ACME used the following protocols:

- 3B03 - Lead fire assay followed by ICP MS Au, Pt, Pd
- Group 1E – Four-acid digestion followed by ICP OES (Al, Ca, Cr, Cu, Fe, Mg, Ni, S)
- Group 1D01 - Aqua regia digestion followed by ICP OES (Al, Ca, Cr, Cu, Fe, Mg, Ni, S)

11.6 Quality Assurance and Quality Control

11.6.1 AMK and ATS QA/QC

Control Samples

All laboratories used in the Platreef Project exercise quality control in the form of duplicates, SRMs and blanks. These controls are included in each assay report.

After November 2001, Platreef inserted "blind" quality-control materials with each submission. The insertion frequency ranged from 3% to 6%. The controls included in-house prepared SRMs with "best values" determined by round-robin submission to five reputable independent commercial laboratories located on three continents: Lakefield and Set Point (RSA), Genalysis and Ultra Trace (Australia), and G&T (Canada).

All control results were analyzed for Au, Pt, Pd, Cu, and Ni. Failures were identified, and pulps from batches associated with failures were re-assayed. Platreef blind duplicate results (Set Point only) were analyzed to identify outliers and sample mis-orderings.

Blanks

Blank material used during drilling of AMK and ATS drill holes consisted of unsampled drill core of barren basement rock drilled at the end of each drill hole. Two to 10 m of basement rock was routinely drilled to obtain a reliable contact depth. The basement rock reliably returned Au, Pt and Pd results of less than 20 ppb, but had low concentrations of Cu and Ni (low hundreds of ppm).

One or two blanks were submitted per drill hole. These were placed between samples visually identified as mineralized, in order to detect contamination during preparation. Results of blanks were compared to the results of the preceding sample number, under the presumption that in most cases this sample would precede the blank through the same crusher and pulverizer. No trend of the blank grade compared to that of the preceding sample was seen, except for a brief period when the blank did show a slight upward trend in grade (low tens of ppb for PGMs) with respect to grade of the preceding sample. Although the effect was too small to impact Mineral Resource estimation, it was investigated. It was found that technicians had stopped cleaning the spoon used to transfer pulp when splitting the pulp samples for shipping. When cleaning recommenced, the correlation ceased.

After a new project geologist elected to increase sample interval lengths of some rock types up to 6 m, blanks started to show episodic high results. AMEC investigated and found that this was caused by the need to use two or more trays for drying the sample in the preparation laboratory when the sample interval exceeded about 1.5 m. There was only one sample tag, and trays were getting mixed up. In conjunction with the Set Point laboratory manager, AMEC introduced additional safeguards to prevent this, and blanks returned to normal performance.

Blank results indicate that contamination and sample mix-ups were sufficiently rare as to present no risk to Mineral Resource estimations.

Standard Reference Materials (SRMs)

Very few SRMs were commercially available for PGEs, and the decision was made to formulate in-house SRMs.

Initial Platreef SRMs were constructed from a selection of pulp rejects. After the change in preparation protocol in August 2002, coarse rejects were used to make 20–50 kg of SRM material. These SRMs from the coarse rejects were prepared and tested for homogeneity by SGS Lakefield Laboratories in Johannesburg. Materials showing inadequate homogeneity were re-milled or discarded. Each reference material was rotary split multiple times to produce single-use packets of approximately 80 g. The packets were thoroughly randomized to prevent any slight variations in grade (introduced during the splitting process) producing misleading shifts in the obtained average results over different time periods.

The round-robin consisted of submitting multiple packets of each reference material to a minimum of five independent commercial assay laboratories well-versed in assaying for the elements of interest. The best value is taken as the median of the population of each laboratory's mean. Using the median counters the effect of any extreme results produced by one laboratory, and eliminates the need to reject any laboratory's results.

Packets of SRMs were routinely inserted into every sample submission. Because the preparation and assay laboratory are run by separate companies, the insertions are blind to the assay laboratory. The SRMs provide a reliable check on laboratory performance.

Check Assays

Check assays were performed at Lakefield until June 2002. After June 2002, check assays were performed by Genalysis Laboratory (Genalysis) in Perth, Australia. The check assay program included the same assay suite as the original assays. In addition, the check assays used a less robust aqua regia digestion for Ni and Cu.

In addition to the blind controls, every 20th sample pulp was submitted to an independent laboratory for check assay. Blind reference materials were included in each of these submissions. These results were analysed and combined with the control analysis to identify samples for re-assay.

A separate program to validate the routine method of analysis for PGE (fire assay by lead collection) included assaying 2% of samples by nickel sulphide collector.

11.6.2 UMT QA/QC

Control Samples

As is prevalent throughout the industry, all laboratories employed by the Project use their own quality-control materials (blanks, pulp duplicates, standards) within each laboratory process batch. Laboratories routinely re-ran batches that failed their quality control requirements. Batches, which vary in size, typically include two duplicates, one or two blanks and a laboratory reference material. Results of laboratory quality controls are included in the laboratory reports. These results are informative because they show what the laboratory considers to be acceptable performance; batches showing inadequate performance are re-run, and the original assays are not part of laboratory final reports.

Blanks

Blanks utilized natural rock materials that have less than 5 ppb concentrations of Au, Pt, and Pd, but have copper concentrations of 10 to 20 ppm and Ni concentrations of 20 to 30 ppm. Blanks underwent preparation steps and therefore provide an upper limit on levels of contamination caused by preparation.

More than 1,700 blind blanks were included within the Ultra Trace submissions in 2010–2011. Very high levels in a blank for several elements would indicate sample mix-ups. None of the inserted blanks showed very high levels for multiple elements, although approximately 20 samples (<0.5%) showed moderately elevated levels for several elements, which might be ascribed to either a sample mix-up or to contamination during preparation. Excluding one anomalous Au result of 74 ppb, Au results for blanks did not exceed 15 ppb. No Pt or Pd results exceeded 70 ppb, and excluding two samples with anomalously high levels of Au and Pt and Pd, no blank result exceeded 40 ppb for Pt or Pd. Average blank results for Au, Pt, and Pd are all less than 3 ppb. The maximum Cu and Ni blank results are 122 and 548 ppm respectively. Excluding the highest blank Ni result, which had elevated results for Cu, Cr and S, the highest Ni result in a blank is 250 ppm. Performance on blanks is adequate for Mineral Resource estimation purposes.

Certified Reference Materials (CRMs)

The Project inserted coarse reject duplicates, field blanks, and packets of CRMs in order to independently monitor laboratory performance. Coarse reject samples were created by the preparation laboratory by routinely making a sample from the coarse reject of every 20^{th} sample, and assigning it the same sample number as its duplicate pair, with the addition of a suffix "CRD".

All sample submissions included packets of certified reference materials (CRMs) purchased from commercial African Mineral Standards (AMIS, Johannesburg), and/or in-house SRMs made from composites of drill sample coarse rejects that were prepared by SGS (Johannesburg), with best values assigned by AMEC based upon round-robin results. Details are provided in Reid (2011) and Long (2010). In-house SRMs were phased out as appropriate materials became available from AMIS.

Fifteen CRMs and SRMs were used extensively enough to compare Ultra Trace's mean results of each for comparison to best values. Excluding outliers that triggered follow-up investigation (for control insertion mix-ups) and in very rare cases remedial re-assaying of some laboratory batches, the average of the Ultra Trace results is within ten percent of the certified value for the major elements of interest (Ni, Pt, Pd, Au, Cu) and in most cases for the added element, sulphur. Ultra Trace results for Cr are much lower than the AMIS certified values (based upon fusion or XRF pellet analysis), indicating that the multi-acid digestion method is not adequate for this element. This is a known problem with acid digestion for Cr.

Check Assays

Approximately 5% of drill sample pulps previously assayed by Ultra Trace were forwarded, along with blind CRMs and blanks, to Genalysis. Genalysis performed the same assay suite, plus aqua regia digestions for Ni and Cu. Agreement was usually adequate and, in all cases where it was not, samples were re-assayed by both laboratories to resolve the problems. The assay database was routinely updated where remedial assaying was performed.

In 2010, Genalysis began to exhibit some systematic errors in its acid digestion assays, likely attributable to introduction of new heating blocks. The problem was eventually resolved, but the decision was taken to suspend sending check assays to Genalysis. Sample pulps were instead submitted to Acme Laboratories, Vancouver.

Prior to suspending submissions to Genalysis, the Project used Genalysis aqua regia results to estimate, for each rock type, the fraction of total Ni likely to be in sulphide minerals that could potentially be recovered by the flotation process. However, inserted controls showed increased batch-to-batch variations in aqua regia results, and Genalysis stated that their results should be considered semi-quantitative for this method.

The Project selected some mineralized samples to undergo an additional nickel sulphide collector fire assay to validate the conventional lead collector fire assay results for Pt and Pd, and to determine the grade of other PGMs, particularly Rh. NiS fire assays return lower Au results and are not regarded as reliable for Au. Pt and Pd results were on average slightly higher (about five percent) compared to the lead collector fire assays.

11.7 Databases

The drill-hole data are maintained in a Fusion database, created by Century Systems Technologies Inc. The Fusion database is maintained at the Platreef Project site. All available drill-hole data including data from the AMT and ATS drill campaigns have been captured in the database.

In March 2013, a project commenced to migrate the data in the Fusion database to an acQuire database.

11.7.1 AMT and ATS Data Entry

All geological information from drilling logs was double-entered into the computer by two different individuals. A relational database was used to compare the two files and to identify entry errors. Each non-matching dual entry was checked, and the correct entry identified for the final database.

All assay reports were transmitted from the laboratory to Platreef via email or electronic bulletin boards. The transmitted files are imported into an Excel template and checked for proper formatting, extraction of duplicate data and header information, and for reasonableness checks using various metal ratios. The checks identified records with missing or erroneous entries sourced at the laboratory.

Data were managed in Access and in SQL Server. Back-ups of data onto hard media (CD, DVD) were routinely performed. Some back-ups are stored in Ivanplats' offices in Johannesburg.

11.7.2 UMT Database

The data acquisition procedure includes filing of hard copies of drill-hole data after the data have been captured in the SQL Fusion database (co-ordinate surveys, total depth, downhole surveys, updated drill hole logs and assay certificates). An additional database administrator and additional database entry clerks were employed and trained to assist with the increased amount of data from current and planned drill programs. The Fusion 6.6 SQL logs authorized changes to data, thereby creating an audit trail. The changes are date- and time-stamped along with the name of the person who made the changes.

11.8 Sample Security

AMT and ATS pulp rejects and coarse rejects are returned to the Platreef offices in Mokopane, where they are stored in warehouses. Access to the warehouses is restricted to Ivanplats' employees with the appropriate security clearance. The compound containing the offices and warehouses is guarded on a 24-hour basis. Pulps sent to Ultra Trace are stored at Ultra Trace, with the exception of those pulps selected for check assays, which were in most cases exhausted after conducting checks.

11.9 Comments on Section 11

The sample preparation, sample analyses, data entry and security have been done to industry-standards for large exploration and development projects. Ivanplats personnel involved in these activities have been well-trained to maintain the integrity of samples and their analyses. The QPs are of the opinion that the quality of the PGE, Au, Ni, Rh and Cu analytical data are sufficiently reliable (also see discussion in Section 12.0) to support Mineral Resource estimation as follows:

- Data are collected following industry-standard sampling protocols
- Sample collection and handling of core were undertaken in accordance with industry-standard practices, with procedures to limit potential sample losses and sampling biases
- Sample intervals in core, vary from 1 m to 2.5 m intervals in the AMK and ATS areas, and are 1 m intervals in the UMT area; the sample intervals are considered to be adequately representative of the mineralization
- Bulk density determination procedures are consistent with industry-standard procedures, and there are sufficient bulk density determinations to support tonnage estimates

- Sample preparation for samples that support Mineral Resource estimation has followed similar procedures since 2001. The preparation procedure is in line with industry-standard methods for PGE–Au–Ni–Rh–Cu deposits
- Core drill programs were analyzed by independent laboratories using industry-standard methods
- Typically, Platreef drill programs included insertion of blank, duplicate and SRM samples
- Data that were collected were subject to validation, using in-built program triggers that automatically checked data on upload to the database
- Verification is performed on all digitally-collected data on upload to the main database, and includes checks on surveys, collar co-ordinates, lithology data, and assay data. The checks are appropriate, and consistent with industry standards
- Sample security has relied upon the fact that the samples were always attended or locked in the on-site sample preparation facility
- Chain-of-custody procedures consist of filling out sample submittal forms that are sent to the laboratory with sample shipments to make certain that all samples are received by the laboratory
- Current sample storage procedures and storage areas are consistent with industry standards.

12.0 DATA VERIFICATION

Several reviews of the database have been made since 2002. These include AMEC reviews and those performed by independent consultants. The most recent database audit was performed by AMEC during 2012 to ensure its suitability for resource estimation.

12.1 McDonald Speijers Audit (2002, 2004)

Ivanplats contracted McDonald Speijers (MS), an Australian mining consultancy, to review the technical aspects of the Platreef project in 2002 and 2004 (McDonald and Speijers, 2003 and 2004). After the first review, MS stated that the sampling and assay programs were in general appropriate to the type of mineralization, the QA/QC program was consistent with good industry standards, and mineral resource modelling construction was very thorough and competent. MS also recommended incorporation of the geological interpretation into the resource models, as the data became available. This was done in the next model update (model Q). They also recommended further improvements in modeling via mineralized zone interpretations. These modeling recommendations have been implemented where data are available to support them.

12.2 External Review of ATS Model (2003)

Dr J.M. Rendu (2003) completed a peer review of the inverse-distance weighted grade model for ATS that was available in March 2003. He found the model formed a reasonable basis for the evaluation and reporting of mineral resources and concluded that the model could be used as a basis for preliminary studies.

12.3 AMEC AMK and ATS Database Reviews (2007, 2010)

In addition to automated data verification procedures, spot inspections of the drill logs were completed. There was a period of time where barren gaps in the drill core were unsampled and unlogged. These gaps were re-examined, and the uncut core portions were identified and logged. Unsampled intervals were either sampled or assigned grades equal to zero.

AMEC completed a database audit in June 2007 for all available drilling at that time (DaSilva, 2007). Under the supervision of AMEC, Ivanplats' personnel completed a 5% random check of the ATS and AMK exploration database and a 100% check of collar coordinate surveys of holes used in resource estimation. The records selected for inspection were checked against primary sources of information (assay certificates, drill logs, survey certificates). No issues that could affect Mineral Resource estimation were noted.

12.4 AMEC Site Visits

During the April 2010 site visit (Kuhl, 2010), AMEC undertook the following:

- Compared database entries against supporting documents for collar, survey, density and geology coding for five UMT drill holes.
- Provided suggestions for improvement of database procedures
- Performed field checks for nine drill-hole collars using a Garmin GPS unit.

No significant errors were noted that could affect Mineral Resource estimation.

Dr Harry Parker visited the project site in March 2011 and reviewed logging of Modpak in 12 drill holes (Parker, 2011). The Modpak interpretations have since been superceded by the geological interpretations discussed in Section 7.3. Mr Kuhl also visited site in July–August 2011, and observed drilling operations and reviewed Modpak logging.

Mr. Kuhl later visited the project between 25 January and 2 February 2012. During this site visit, the new geological interpretation for the TCU and was reviewed in both cross-section and drill core. Mr. Kuhl also visited drilling locations.

Dr. Harry Parker visited the site from 16 to 22 November 2012. He inspected core and checked new logging units in nine holes; he verified collar coordinates for 10 holes using a hand-held GPS unit; he also collected 20 witness samples from holes drilled since March 2011 and personally supervised their splitting and bagging for submission to sample preparation at Set Point (Mokopane). Dr. Parker also reviewed the structural interpretation.

Mr. Kuhl visited the Project between 25 November and 12 December 2012. During this site visit, the geological interpretation for the TCU and was reviewed in both cross-section and drill core, preliminary exploration data analysis was completed, and work began on constructing the geological model. Mr. Kuhl retrieved 20 witness samples from Set Point (Mokopane) and supervised the packageing and shipment to Ultra Trace Laboratory

12.5 AMEC 2012 Database Reviews

12.5.1 August 2012 Review

In August 2012, AMEC compared the collar, down-hole, geology logs and assay data (Au, Pt, Pd, Ni and Cu) from the previously-audited database (August 2010) to the August 2012 database as a check on data integrity (Yennamani, 2012). The additional drill holes reviewed were completed after the database close-out date for the Mineral Resource estimate. The review noted:

- Some discrepancies between the original collar survey documents and the database; further investigation was recommended to resolve the differences
- Minor errors with downhole survey and lithology data; these were corrected in the database by Ivanplats staff.
- Minor issues related to the import of sample results from samples submitted for re-assays were found during database audit check; these were corrected in the database by Ivanplats staff.

AMEC considered that at the close of the review, that 99% of the Ivanplats assay database conformed to assay certificates from the laboratories and found that the assay database is acceptable to support future Mineral Resource estimation.

12.5.2 December 2012 Review

In December 2012, AMEC compared the down-hole, geology logs and assay data (Au, Pt, Pd, Ni and Cu) from the previously-audited database (August 2012) to as a check on data integrity (Yennamani, 2013). Eight new drill hole collars were added to the December 2012 database; information was checked on five of these holes. Collar data were unavailable for review. No issues were noted with the down-hole surveys or assay certificates. Minor discrepancies were noted with lithology coding in the database when compared to the logs; these were sent to Ivanplats staff for correction. The assay database was considered acceptable to support future Mineral Resource estimation.

12.6 Quality Assurance and Quality Control Results

12.6.1 AMK and ATS QA/QC

The open-pit resource drilling program was one of the largest sampling and assaying programs executed in South Africa at the time.

The original sample preparation protocol greatly exceeded usual industry practice; the entire sample of half core was pulverized. A change of protocol to produce a 10 mesh product and then pulverise a split of that product was considered. This is the most typical protocol used for sample preparation. A sampling expert evaluated the protocol, which is a 'best practice'. The controls on that protocol (coarse reject duplicates, daily screen tests and second-party screen tests) exceed industry standards.

Initial assaying was typical of that obtained in South Africa. Improvements were made, commencing in 2001, with the introduction of blind standards, blanks, extensive check assays and remedial assays. Check assays on samples assayed prior to 2001 have not identified any problems prior to these improvements. Samples identified as having inaccurate results were re-assayed. The re-assays are subjected to the same quality control. This approach exceeds industry standards.

Ivanplats' rigorous data entry and validation programs were above industry-standard.

In 2010, AMEC attempted to again review QA/QC data for the open-pit resource drilling, but was unable to do so because the data were being migrated from an old server to a new database. However, as the original QA/QC program was set up by AMEC, and AMEC personnel made periodic visits to check on implementation during 2001 to 2003, AMEC is of the opinion that the resource drilling results for the area amenable to be mined using open-pit methods are valid to support Mineral Resource estimation.

All final assay results are suitable for use in Mineral Resource estimation.

12.6.2 UMT QA/QC

AMEC obtained and reviewed the available QA/QC data for the UMT drilling. Blanks, duplicates, and CRMs are checked when results return and if results are not within established limits, re-analysis of samples in the vicinity of the failing controls are requested. The data are not accepted unless re-assays produce acceptable results. Overall, a small number of reports have been rejected, including reports by ALS Chemex, and results from some of these jobs are pending. A few failed batches by Ultra Trace have been remediated.

AMEC noted:

- All Ultra Trace means on SRMs are within 5% of recommended values for the five elements of economic interest (Ni, Cu, Pt, Pd, Au). Results are sufficiently accurate for Mineral Resource estimation for all five elements of economic interest

- Generally the results for Au, Pt and Pd blanks were satisfactory. Significantly poorer performance was noted for Cu and even more so for Ni results. The apparent poor performance for Cu may be a consequence of a low bias in Set Point Cu assays (used to certify the blank material). Nickel values were of concern because approximately 80% of samples exceeded the 8 ppm value stated by Set Point. AMEC is unsure of the cause for this issue, but suggests additional samples of the blank material be submitted for assay in order to better determine the Cu and Ni content of the blank. SRMs with low Cu and Ni content should accompany these samples
- Genalysis results for Cu, Pt, Pd and Au were in line with the SRMs, but Genalysis showed a low bias for Ni. The bias varies from batch to batch but is about 8% to 12% low overall. Results in the >6,000 ppm Ni grade range show good agreement. There are 13 pairs of results where Ni is greater than 6,000 ppm Ni, and these do not agree well between laboratories. There are not enough data in this range to be conclusive. AMEC recommended that all samples with Ni results greater than 10,000 ppm undergo an additional check assay by XRF fusion, which is likely to be more reliable in this grade range.

In mid-2010, approximately 5% of pulps were selected from pulps stored at Ultra Trace. The submission included certified reference materials. Data review indicated that:

- Acme results are approximately 10% higher for PGM fire assays compared to Ultra Trace results. Inserted CRMs in both Ultra Trace and Acme submissions indicate this can be accounted for by a slight low bias in the Ultra Trace results and a slight high bias in the Acme PGM results. The Ultra Trace results likely slightly underestimate PGMs by approximately 5% and therefore have very low risk of being biased high.
- Acme produced mean sulphur grades that are 20% higher than Ivanplats' average by one method it used, and 20% lower than Ivanplats' average by the other. Taken together, these two methods average to agree with Ivanplats' average result.

Ivanplats supplied results from coarse reject duplicate samples for Au, Pt, Pd, Ni, and Cu assays. Successful or 'passing' duplicates were identified by calculating the Absolute Value of the Relative Difference (AVRD).

AMEC evaluates the duplicate samples by calculating the AVRD, equal to the absolute value of the pair difference divided by the pair mean. Evaluating the AVRD of the coarse reject duplicates indicated that AVRD for Au, Pd, Cu and Ni met the 90th percentile goal of 20%: AVRD values are 20%, 11%, 7% and 5%, respectively. Pt exceeded the threshold, with AVRD values of 28% at the 90th percentile. AMEC noted that Ivanplats were not submitting pulp duplicates as part of their QA/QC program, and recommended that Ivanplats use Ultra Trace's reported pulp-duplicate results to assess the precision of pulp duplicates.

12.6.3 QA/QC Drilling Completed Between March 2011 and June 2012

AMEC performed a review on the QA/QC data available for drilling completed between March 2011 and June 2012. Results were:

Approximately 3,100 blanks were passed through preparation and assay during the period. Three clusters of low-grade contamination were found in three different drill holes (UMT 146, 155, and 181) all assayed by Genalysis. Indications were that the contamination likely occurred during sample preparation. The level of contamination is too low to have any impact on the future use of the samples in Mineral Resource estimation.

The Project's increased drilling rate necessitated using Genalysis and Set Point laboratories, in addition to UltraTrace. AMEC separated the results by laboratory and calculated each laboratory's median result for each element of interest for each AMIS Certified Reference Material. Results showed acceptable agreement between the laboratories.

Multi-acid digestion results show good accuracy by all laboratories for copper and nickel but pronounced low biases by Genalysis and UltraTrace for Cr. Set Point does not report Cr results. The Cr assays are not accurate by multi-acid digestion. Reliable Cr results most likely would require a fusion followed by reading by XRF. The low bias seen here is consistent with that seen previously in UltraTrace results.

Except for Cr, which is not used in the resource estimations, accuracy of these elements is sufficient by all laboratories for use in estimation of Mineral Resources.

12.7 AMEC Witness Samples

Three groups of witness samples have been collected at Platreef by AMEC, in April 2010, February 2011 and November 2012. The purpose of collecting these samples is to confirm the presence of mineralization.

12.7.1 April 2010

AMEC collected 20 witness samples in 2010 by selecting individual sample intervals of varying Ni grade. The selected sample intervals were re-sawn, and quarter core samples were prepared and submitted to SGS Lakefield. There were some large differences, particularly for Pt, but differences in mean grade were not statistically significant. Follow-up evaluation involving re-assaying of original and new quarter core coarse rejects and pulps by both SGS and Ultra Trace laboratories revealed that the differences stemmed from differences in the grades of the original (half core) and witness (quarter core) samples. AMEC (Long and Parker, 2011) concluded a larger number of samples were required in order to achieve a reliable verification of the original assays or if large differences were found, showing them to be statistically significant.

12.7.2 February 2011

AMEC (Long, 2011a) first identified diamond drill holes (UMT prefix) having mineralized intercepts of PGEs (Au, Pt and Pd). These were divided into ten groups based upon their drill-hole number, to provide grouping by similar time periods. There were approximately seven drill holes in each group. A drill hole was randomly selected from each group. The best mineralized intercepts were identified in each drill hole. The intercepts were compared to available information on sample intervals that had been re-sampled, including AMEC's previous witness samples, material taken for metallurgical study, and material collected for mineralogical studies. In cases where a mineralized interval had already been sampled, a different drill hole was selected. The follow up selection was made so that the selected drill holes had collar locations spread across the entire mineralized extent of the project drilling.

In order to reduce the impact of core shifting within a core box, mineralized intervals were assayed in their entirety. A minimum of two core boxes of samples was maintained, with as many as five core boxes used in some cases. Enough core boxes were selected so that lower-grade intervals (near background) would be included. Once a core box was selected, all of the core in the box was quartered, and all the quartered core sampled, except for the partial samples in the first and last core box selected for each drill hole.

Quarter core samples were prepared in the same way as routine samples: dried, weighed, crushed to greater than a control limit of 90% passing 10 mesh (using a jaw crusher for primary crushing and about 10 seconds in an LM2 as secondary crushing, and a criterion that an average sample achieves 95% passing 10 mesh), then split in a riffle splitter once or twice to obtain a sample pulp with a nominal weight of 500 g. The pulp split was then pulverized in an LM2 to a criterion of >90% passing 106 µm. Pulverization was checked by screen tests.

All samples were submitted to Ultra Trace for the current standard suite of analysis: Au, Pt, and Pd by Pb fire assay (sample weights approximately 40 g) with ICP/MS finish (2 ppb detection limit); Cu, Ni, and Cr by multi-acid digestion followed by ICP/OES (1 ppm detection limit); and S by Leco furnace (50 ppm detection limit).

For the 260 samples collected, very close agreement was obtained between original and quarter core samples for Cu, Ni, and S, and adequate agreement was obtained for Au. There was no preferential sampling of sulphides in the original (half core) samples.

Pt and Pd returned lower average results in the quarter core sampling compared to the original sampling, and these differences are statistically significant by a two-tailed student's t-test at the 5% level. This means there is less than a 5% chance that a re-sampling of the half core population would result in the mean observed in the quarter core witness samples. However, the results of the inserted CRMs indicated that the Pt and Pd results had a low (but within the acceptable range) bias for Pt and Pd, or around 5%, and the CRMs associated with the original results for these samples did not.

After applying a correction to the Pt results for the low bias shown by CRM results, the difference between the original and new results was no longer statistically significant. However, the correction applied for a low bias shown by CRMs for Pd is smaller, and the data have less variance; consequently the difference between the original and re-assay results remains statistically significant after applying a correction.

The second witness sampling program conducted in February 2011 showed that the original sampling was appropriately done for Ni, Cu, S and Au. Statistically significant low biases were found for Pt and Pd. Approximately half of these biases could be explained by low but acceptable bias in the CRMs returned for the batch of witness samples. Adjusting the witness data for these biases, the adjusted values are in reasonable agreement with the original samples.

12.7.3 2013

A third set of witness samples were taken in November 2012, and assay results received in January 2013.

Original and witness assay values were compared for Pt, Pd, Au, Ni, Cu, Cr and S and graphed. The resulting charts do not suggest any obvious sample mix-ups or outliers that are not a consequence of variation in grade.

Comparison of means of witness samples to means of original results show agreement within 5% for base metals, sulphur, and Pd, but not for Au and Pt. The original Au mean is 19% lower than the witness sample mean and the original Pt mean is 14% higher than the witness sample mean.

Paired student's t-tests on each element found no significant differences between means at the $p<.05$ level. A non-parametric statistical test, the Sign Test, was performed on the Au and Pt results; this showed the percentage of occurrences where the original result of a pair was less than the witness sample result was not statistically significantly different from the expected 50–50 distribution expected by chance (at the $p < .05$ level). In the case of Pt, nine out of 20 pairs had a lower Pt result for the original assay.

A separate evaluation of the Pd-spike method for Rh analysis was performed on a subset of 22 samples (plus three duplicate samples). This is comparison showed that the addition of the Pd to the conventional fire assay did not affect the Au and Pt results, with means agreeing within 3%. A comparison of a much smaller subset where there were original fire assays by NiS fusion covered five samples plus two duplicate samples. The mean of the Pd spike method was about 4% lower than the NiS fusion result. The number of pairs is too few for a meaningful statistical test, but the agreement in means suggests this method is likely working sufficiently well for estimating Rh content in Platreef samples. Additional data from sample pulps assayed by both methods are needed to further substantiate this interpretation.

12.8 Verification of Grind-Assay Function

AMEC selected 92 pulp samples of pyroxenite and harzburgite for screening at 75 µm, because metallurgical test data available in 2011 indicated that there may be enhanced 3PE grades related to the grinding of pulps, particularly for harzburgite. XPS recommended a grind of 80% passing -75 µm. Long (2011b) concluded that over 90% of harzburgite sample pulps are likely to achieve the recommended grind quality. Hence no modification of the grind protocol was recommended, nor was remedial work or further investigation considered warranted.

12.9 Comparison of UltraTrace and MINTEK assays

AMEC is currently conducting a comparison of UltraTrace assays on exploration samples to Mintek assays on pulp duplicates of the same samples. This is designed to produce assurance that the Mintek head assays, on which metallurgical recovery equations depend, conform to the UltraTrace assays which are the basis for the Mineral Resource estimates.

12.10 Comments on Section 12

AMEC has been involved in the Platreef Project since 2001 and has conducted continuous monitoring of data collection and data entry. Minor problems have been identified and resolved by improving procedures at the site. In the QPs' opinion sufficient verification has been conducted to provide assurance that the data collected are suitable for use as a basis for Mineral Resource estimation.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Previous Metallurgical Testwork

This section summarizes metallurgical work performed on the Platreef resource from October 2001 to February 2012.

Since 2001, there have been a number of metallurgical test work campaigns and conceptual flow sheet designs carried out for the treatment of Platreef mineralized material. Metallurgical test work has focused on maximising the recovery of platinum group elements (PGEs) and base metals, mainly nickel, whilst producing an acceptably high grade concentrate suitable for further processing and/or sale to a third party.

Up until 2006 metallurgical test work was carried out mainly on lower grade shallow material from the potentially large open-pit area. Flotation recoveries and concentrate grades were generally low, resulting in the necessity for further processing on site via combinations of smelting, converting and magnetic separation, hydrometallurgical treatment was also considered.

In 2008, with the advent of the deep drilling exploratory program, test work was performed on high-grade composite samples. The high-grade test work results were promising and indicated that there was a strong possibility of increasing concentrate grade and recovery.

13.1.1 AMK and ATS Drill Samples

Mineralized samples from the open-pit portion of the Platreef project were collected for metallurgical testwork between October 2001 and June 2003. The testwork was performed by G&T Metallurgical Services Ltd. in Kamloops, Canada (G&T Metallurgical) and was supervised by Mr Christopher Kaye of AMEC. The metallurgical flotation testwork program results were presented in a series of internal memoranda and are summarized below.

Based on the testwork, concentrator recovery formulae were developed for serpentinized and non-serpentinized mineralization, respectively:

*Nickel recovery = ((9.3*Ln(Ni head grade)+99.1) * % non-serpentine mineralization) + ((9.3 *Ln(Ni head grade)+84.9) * % serpentine mineralization)*

*Copper recovery= ((10.3*Ln(Ni head grade)+93.3)* % non-serpentine mineralization) + ((10.3*Ln(Ni head grade)+92.6)* % serpentine mineralization)*

*Platinum recovery= ((4.8*Ln(Ni head grade)+80.9)* % non-serpentine mineralization) + ((4.8*Ln(Ni head grade)+80.1)* % serpentine mineralization)*

*Palladium recovery= ((8.9*Ln(Ni head grade)+83.5)* % non-serpentine mineralization) + ((8.9*Ln(Ni head grade)+84.2)* % serpentine mineralization)*

*Gold recovery= ((11.9*Ln(Ni head grade)+78.5)* % non-serpentine mineralization) + ((11.9*Ln(Ni head grade)+79.4)* % serpentine mineralization).*

A mill–concentrate–smelter process was advanced. A design commensurate with the detail required for a pre-feasibility study and costing for a mill–concentrate–smelt process was performed by Mr Kaye in 2003.

13.1.2 MDS/Mintek ATS Sample Testwork

In 2004, Ivanplats contracted MDS/Mintek to complete a new series of metallurgical tests for optical characterization (Mintek, 2003c) and to support engineering studies (Mintek, 2003a; Mintek, 2003b; Mintek, 2003d; and MDS, 2004). The overall performances predicted by AMEC and those achieved by MDS/Mintek were found to be comparable for both recovery and concentrate grade.

13.1.3 UMT Testwork

SGS Lakefield Testwork

Exploratory flotation tests were performed at SGS Lakefield on low-grade and high-grade composite samples during 2007 and 2008. The high-grade sample (approximately 0.4% Ni, 0.2% Cu and 1.6 g/t 3PE (Pt + Pd + Au) test results indicated that, with optimization, there was a strong probability of significantly improving the testwork results compared to the testwork results that were returned based on samples from the conceptual open-pit portion of the Project.

A metallurgical test program was undertaken at SGS Laboratories in Johannesburg during the second half of 2010 with the objective of establishing the metallurgical response during froth flotation and to postulate a preliminary process design. Tests included a grind optimisation exercise program, reagent scouting tests and locked cycle tests, and results indicated that a saleable concentrate could be generated.

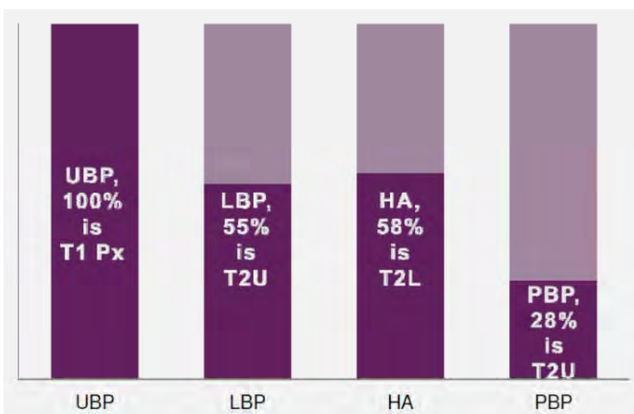
Subsequent to the flotation testwork, a mineralogical analysis was performed on the locked cycle cleaner tailings to determine the form of the unrecovered PGEs and to postulate methods for recovery improvement. The optimum grind size was indicated to be not more than 70% passing 75 µm. PGE recoveries were expected to improve if the rougher flotation tails were reground after the initial base-metal sulphide recovery at a coarser grind. Due to the disassociation of PGEs with sulphides and virtually no PGE sulphides present, the reagent suite used after the regrind was expected to be able to be customized to specifically target the PGE–Bi, BiTe, As and Sb metalloids. The circuit envisaged was one common in the South African PGE industry, and is known as an MF2 circuit (mill then float and second stage mill and float again).

Xstrata Process Support Testwork

A metallurgical testwork campaign was commenced in 2011 by Xstrata Process Support (XPS) in Ontario, Canada.

Five geometallurgical units from the TCU, then called the Upper Unit TLZ, were subject to preliminary grind assay evaluation with material ground to 50, 60, 80 and 90% mass passing 75 µm in the first phase of testing. The relationship of these five units to the current stratigraphic interpretation is included as Figure 13-1.

Figure 13-1: Mapping Old to New Geometallurgical Units



Note: Figure courtesy Ivanplats, 2013. UBP = Upper B Pyroxenite; LBP = Lower B Pyroxenite; HA = Harzburgite; PBP = Pegmatoidal B Pyroxenite

Two of these units (T2U and T2L, then known as Lower B Pyroxenite and Harzburgite) demonstrated significant responses in fire-assay PGE grade to the degree of pulverization, in that the 80% and 90% passing 75 µm treatment groups reported significantly higher Pt, Pd and Au (3PE) grades than their coarser treatment counterparts. The Lower B Pyroxenite (T2U) data show that, for palladium, a grade peak occurs at a pulverization state of 60% mass passing 75 µm. The Harzburgite (T2L) data show that, for both Pt and Pd, a grade peak occurs at a pulverization state of 80% mass passing 75 µm, consistent with the overall 3PE data.

Baseline flotation tests were undertaken. Rougher recoveries were obtained from elevated mass pulls ranging from 13.9% to 28.8%. Given the low levels of sulphides in the samples, these mass pulls indicated positive gangue flotation was occurring, a phenomenon that would present challenges in cleaning. The low rougher concentrate grades obtained from the baseline tests were considered to be due to the gangue flotation problem.

The second XPS testwork phase was based on a master composite prepared from core from the Flatreef area. A series of depressant optimization tests were performed. Depramin 267, a carboxymethyl cellulose (CMC) was selected as the main test depressant, at a dosage rate of 250 g/t. Comparative testing was done with Depramin C and SenDep 369 at this same addition rate. The platinum response to these tests showed a relative improvement in Pt rougher recovery of approximately 3.72% by increasing the dosage of Depramin 267 from 100 to 250 g/t milled. This response was accompanied by a reduction in overall mass pull from 17.7% to 15.4%. When a 300 g/t dose was applied, the overall platinum recovery declined from the maximum achieved with a 250 g/t dose. However, there was an associated drop in mass recovery, and the recovered concentrate grades increased, which showed that gangue was being depressed. It is likely that the depressed gangue carried locked PGM to tails.

Grind optimisation and reagent dosing testwork using an MF2 platform was completed on the rougher and scavenger circuit. Three sets of grinding parameters were used, and tests included modifications to flotation times and reagent type and dosage. The 70/90 (a primary grind of 70% passing 75 µm followed by a secondary grind of 90% passing 75 µm) circuit recovery was improved further by collector changes and increasing the scavenger flotation time. The rougher and scavenger concentrates from this work were studied by QEMSCAN to determine the processing characteristics.

At least one of the three strategies employed, the addition of copper sulphate to the second grind, the deepening of the second grind to 90% passing 75 µm, or the extension of scavenger flotation time from 10 to 15 minutes, was responsible for improved performance in reducing 4PE grades in the scavenger tail. Consequently, the MF2 70/90 float test was configured on the grounds that equivalent additions/changes to the rougher circuit would further improve the recovery performance. The reconfiguration resulted in 4PE grade and recovery gains in both the rougher and the scavenger floats. There was a noticeable improvement in the 4PE grades arising from the scavenger float, but there was a small decrease in nickel recovery performance.

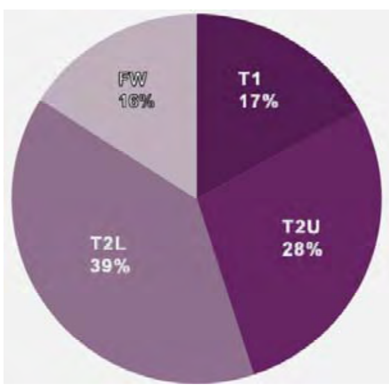
A modified flotation reagent strategy was applied while retaining the 70/90 grinding strategy. The main improvement compared to the previous test was in regard to 4PE recovery in the rougher float which improved from 63% to 75%. The scavenger stage 4PE recovery reduced from 20% to 12%. This suggests the addition of Senkol 9 Collector to the rougher stage has had a beneficial impact. However, the recovery improvement was accompanied by an increase in mass pull of 11% (greater than a 50% relative increase) due to increased flotation of siliceous gangue. Only one test has been carried out under these conditions, and no rationalization of reagents or optimization of reagent addition rates was attempted. The large number of reagents in use suggests that further optimization is required in a future test program.

13.2 Current Metallurgical Testwork

This section summarizes testwork available from March 2012 to February 2013.

As mentioned above, in 2010 a flotation test work program on high-grade samples was completed at the SGS laboratories in Johannesburg. The results have indicated that a potentially saleable concentrate can be produced and forms the basis for the process plant design for the scoping study. Further work was undertaken at the SGS Lakefield laboratories in Canada on the Master II Composite (MC II) sample in late 2012. The MC II sample makeup by lithology is as indicated in Figure 13-2.

Figure 13-2: Master Composite Rock type Percentages (New Geometallurgical Units)



In 2012 the resource was geologically re-assessed, and samples of three new geometallurgical units were supplied to Mintek. These units were designated T1, T2 Upper (T2U) and T2 Lower (T2L). Figure 13-1 summarizes the relationships between the new and old metallurgical units. These lithologies are currently subject to flotation test work, which is in progress. Comminution work has been delayed because the test facility is awaiting receipt of comminution samples. The notes on comminution included in this section are based on test work completed at Mintek in the third quarter of 2012. Preliminary and interim flotation results have been received from Mintek.

Comminution tests indicated that the mineralized material is competent with respect to SAG milling and that a crusher and ball mill circuit will be the preferred option. The ball mill work index results are in the range 18 to 21 kWh/t. This indicates that the Platreef material is hard to very hard.

The latest Mintek flotation test work has shown that the plant feed is amenable to treatment by conventional flotation without the need for re-grinding. Flotation recoveries are lower than expected. This is due to a non-floating PGM population locked in gangue at sizes of 10 µm or finer and amounting to approximately 10–15% of the contained PGMs, as determined by mineralogical analysis.

Although this phase of the test work is preliminary it did indicate that an effective flow sheet will involve several stages of cleaner flotation with recycle of the re-cleaner and re-re-cleaner stage tailings. All of the geometallurgical units and the two blends produced acceptable smelter-grade final concentrates at acceptable recoveries. Calculation to simulate the effect of recycles from open circuit tests indicated a concentrate containing 123 g/t PGE at a recovery of 85% on a composite sample, which was estimated to be comparable to the as-mined run-of-mine mineralized material (selective base case using Mineral Resources estimated at UMT-TCU; see Table 14-15).

Any future processing plant is likely to consist of a relatively standard flotation concentrator targeted at producing a saleable concentrate.

13.3 Mineralogy

In this section the following abbreviations are used: PGE = platinum group elements; PGM = platinum group minerals; BMS = base metal sulphides. The grind size of the samples submitted for mineralogical work was 80% -75 µm.

13.3.1 Introduction

Representative samples of the MC II composite and the new geometallurgical units (T1, T2U, T2L) were submitted for mineralogical examination. The investigations were aimed at PGM species identification and did not undertake a study of the overall lithology of the sample.

13.3.2 PGM Search

PGM search analyses were carried out to provide PGM species identification, grain size distribution, liberation characteristics and gangue associations of PGM-bearing particles detected in the sample.

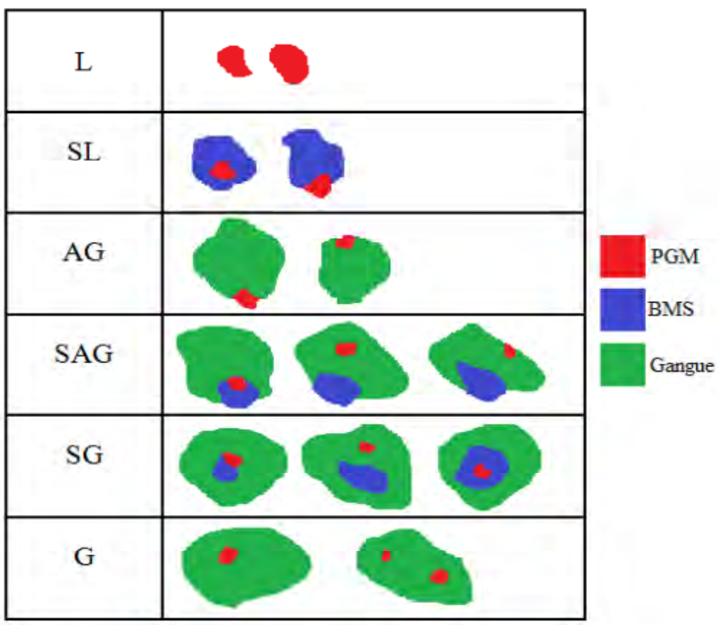
The PGM mode of occurrence was classified into one of six pre-defined mode of occurrence classes, as described in Table 13-1 and illustrated in Figure 13-3.

Table 13-1: PGM-Bearing Particle Mode of Occurrence Classes

PGM Mode of Occurrence Class	Description
L	Liberated PGM
SL	PGM associated with BMS only (i.e. a binary PGM-BMS particle)
AG	PGM attached to silicate or oxide gangue (i.e. PGM exposed at particle perimeter)
SAG	PGM associated with BMS attached to silicate or oxide gangue (i.e. BMS exposed at particle perimeter)
SG	PGM associated with BMS locked within silicate or oxide gangue (i.e. no exposure of PGM or BMS at particle perimeter)
G	PGM locked within silicate or oxide gangue (i.e. no exposure of PGM at particle perimeter)

Note: PGM = platinum group metals; BMS = base metal sulphides

Figure 13-3: PGM-Bearing Particle Mode of Occurrence Classes



Note: Figure from Mintek (2013).

PGM grain areas were used to calculate a liberation index for each PGM-bearing particle. This measure of PGM grain liberation is calculated by dividing the area of potentially floatable component (PGM + BMS) by the total area of the particle (PGM + BMS + gangue). The resultant figure will range between 0 and 1, the latter indicating either a liberated PGM grain, or a binary particle containing PGM and BMS only. In contrast, the liberation index of a PGM grain totally enclosed within a BMS-barren silicate particle (low probability of flotation) will approach zero.

The PGM mode of occurrence and liberation index data can be used in conjunction to determine the probability of recovery of each PGM-bearing particle.

Several PGM-bearing particles were detected in the sample. Mineral identification, grain size, liberation, and mode of occurrence data were gathered from each PGM-bearing particle detected.

PGM Types

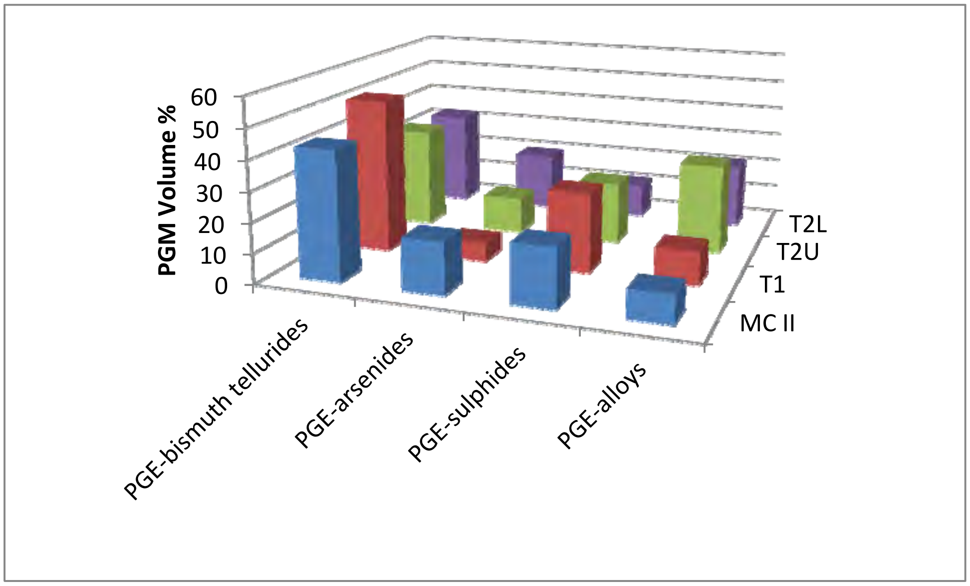
The PGM species detected are presented in Table 13-2 and Figure 13-4. PGE-bismuth tellurides are the dominant PGM species present (~32 to 51 volume percent). Lesser amounts of PGE–arsenides, PGE–sulphides and PGE–alloys were also detected.

Table 13-2: PGM Types Detected in the Sample (Summary of volume %)

Summary of Volume %	MC II	T1	T2U	T2L
PGE-bismuth tellurides	42.8	51.3	33.6	32.4
PGE-arsenides	17.2	6.1	12.2	19.6
PGE-sulphides	19.5	26.4	20.6	11.3
PGE-alloys*	9.4	11.2	29.8	21.5

Note: * this also includes Sb alloys.

Figure 13-4: PGM Types Detected in the Samples



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

PGM Grain-Size Distribution

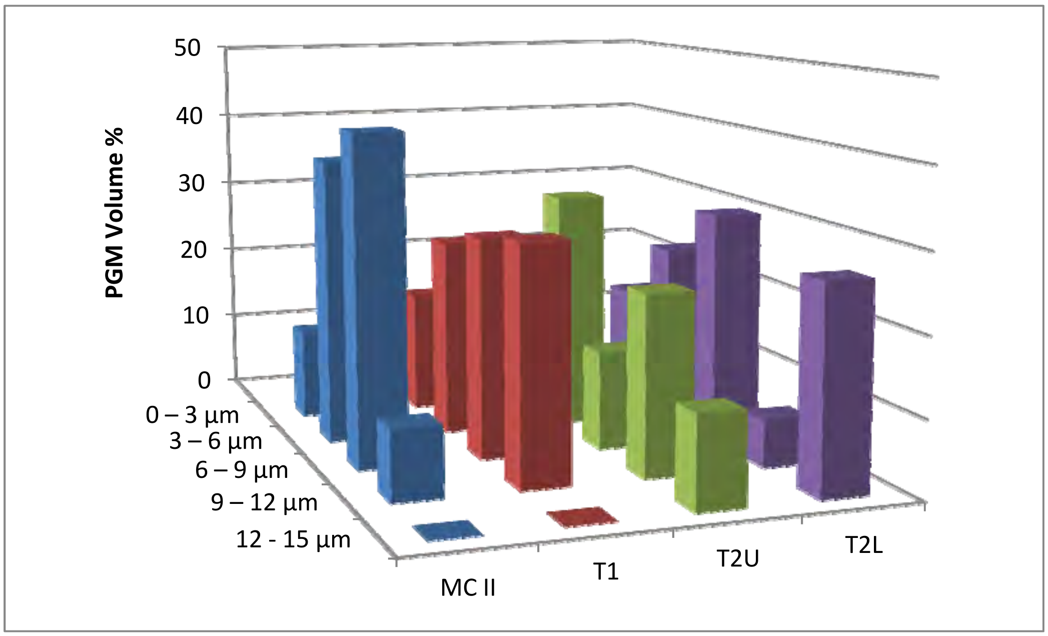
The grain-size distribution of PGM grains detected is presented in Table 13-3 and Figure 13-5. Grain sizes are expressed in equivalent circle diameter (ECD), which is defined as the diameter of a circle with the same area as the measured PGM grain. Note that the grain-size data presented have been obtained from measurements on sectioned grains (i.e. in two dimensions only), and although stereological corrections have been applied to the data, grain sizes reported are not comparable to true 3D grain sizes.

Table 13-3: PGM Grain-Size Distribution

Size Class (µm ECD)	MC II	T1	T2U	T2L
0 – 3	11.6	15.8	21.3	14.7
3 – 6	37.1	25.5	31	23
6 – 9	42.3	28.4	12.7	29.9
9 – 12	9	30.2	23.1	6.1
12 - 15	0	0	11.8	26.3
Totals	**100**	**100**	**100**	**100**

Note: Figures in the table for MCII, T1, T2U and T2L are presented as a volume percent distribution.

Figure 13-5: PGM Grain-Size Distribution



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

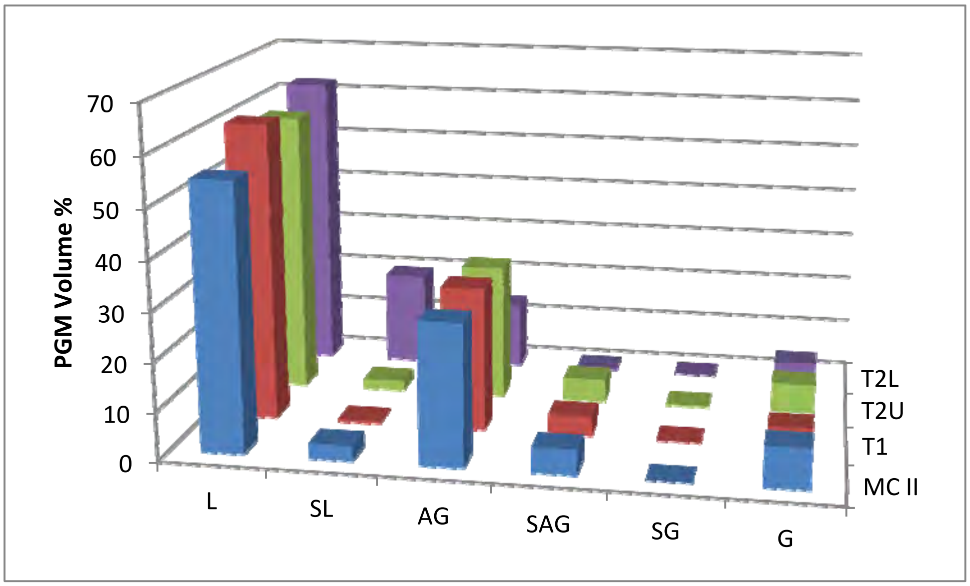
PGM Mode of Occurrence

The PGM mode of occurrence data is presented in Table 13-4 and Figure 13-6. Table 13-4 also shows the number of PGM grains in each mode of occurrence class that are smaller than 3 µm ECD, as these PGMs are likely to be slower-floating than those larger than 3 µm.

Table 13-4: PGM Mode of Occurrence – PGM % by Volume

Mode of Occurrence Class	MC II	T1	T2U	T2L
L	54.6	61.3	58.6	62.3
SL	3.1	0.5	2.1	19.5
AG	28.9	29.6	28.1	13.8
SAG	5.1	4.2	4.8	0.5
SG	0	0.1	0.3	0
G	8.3	4.3	6.1	3.9
Totals	**100**	**100**	**100**	**100**

Figure 13-6: PGM Mode of Occurrence



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

All of the samples have a similar amount of fully liberated PGM material. On average this is 60% within the limits of 55% to 63% by volume.

The T2L material has a lower attachment to gangue, at 14%, compared to the other samples, where the attachment was between 28% to 30%.

The T2L sample has a greater content of binary PGM–BMS particles at 20%, compared to the other samples at between 0.5% and 3%.

PGM Liberation Index

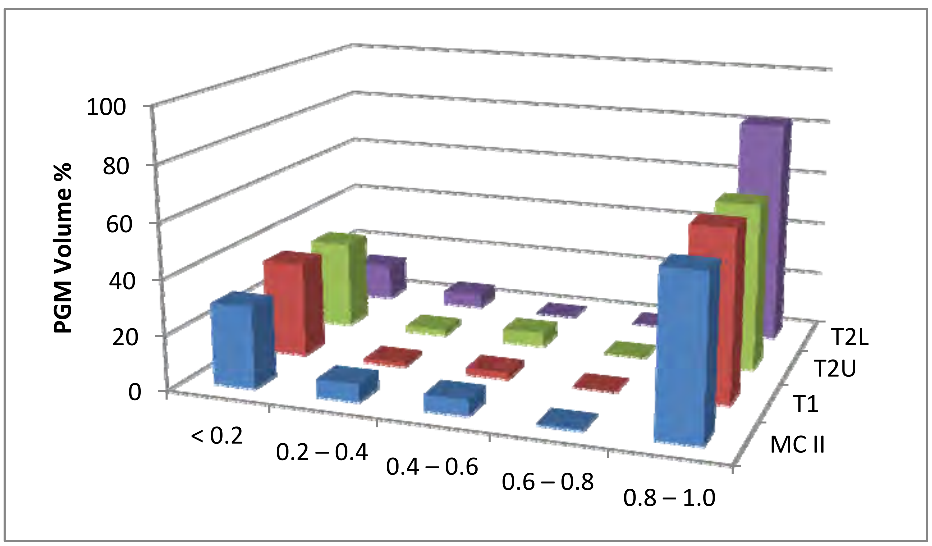
PGM liberation index data, is presented in Table 13-5. PGM-bearing particles with liberation indices of >0.4 are likely to comprise the fast-floating fraction of the sample. A proportion of the particles with liberation indices of <0.2 will be lost to the tailings, as their probability of flotation is low.

Table 13-5: PGM Liberation Index Data – PGM by Volume %

Index	MC II	T1	T2U	T2L
< 0.2	29.5	34.5	32.3	13.1
0.2–0.4	6.4	1.3	2.1	5.1
0.4–0.6	5.8	2.3	5	0
0.6–0.8	0.6	0	0	0
0.8–1.0	57.7	61.9	60.7	81.8
Totals	*100*	*100*	*100*	*100*

The liberation index data indicate that the PGM minerals are more liberated in the T2L sample, at 82%, than the others at 58% to 62% (Figure 13-5).

Figure 13-7: PGM Liberation Index Data



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

Potential PGM Recovery Prediction

Mintek's mineralogy division PGM flotation predictor software, known by the acronym MNL, which predicts potential PGM recovery from mineralogical information determined by the automated scanning electron microscope (SEM) system, was used to evaluate the PGM data obtained.

A prediction of the potential PGM recovery of the composite sample, based on the physical properties of the PGM-bearing particles detected during the autoSEM analysis is presented in the full reports. In summary, the MC II sample indicated a maximum expected recovery in the rougher stage of approximately 87%, whilst the T1, T2U and T2L samples showed expected rougher recoveries of 90%, 90% and 93% respectively.

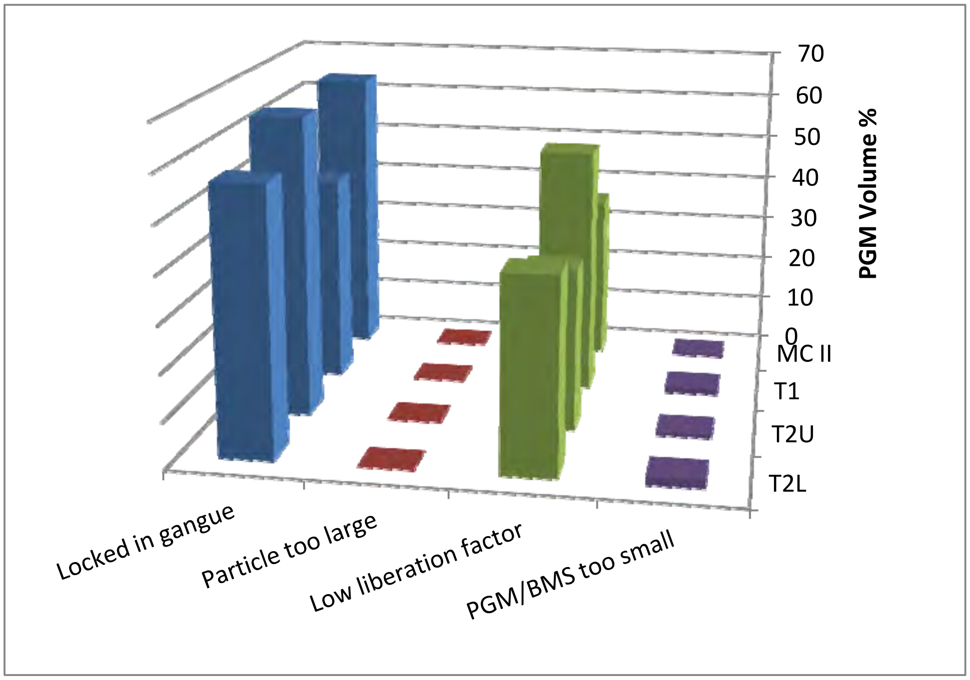
The reasons for the PGM losses, as determined by the flotation predictor software, are presented in Table 13-6 and Figure 13-6. These results have been normalised to 100%.

Table 13-6: Predicted Reasons for PGM Losses to Tailings

Reason for Loss	MC II	T1	T2U	T2L
Locked in gangue	63.5	45.2	64.8	56.9
Particle too large	0	0	0	0
Low liberation factor	36.1	53.6	34.6	41.3
PGM/BMS particles too small	0.4	1.2	0.7	1.7
Totals	*100*	*100*	*100*	*100*

Note: Figures for MC II, T1, T2U and T2L are in volume percent.

Figure 13-8: Predicted Reasons for PGM Losses to Tailings



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

The major reason for the PGMs being lost to tailings is poor liberation with the majority of the PGM locked in gangue or attached to large gangue particles; the latter leads to a low particle liberation index. Subjecting the rougher tails to a re-grind and secondary flotation (scavenger) stage may lead to improved PGM recovery, although this may be of questionable benefit for the new geometallurgical units, since their recoveries are already at or above 90%.

13.3.3 Base Metal Sulphide Analysis

A representative portion of the sample was screened into four size fractions:

- +75 µm
- -75 µm + 38 µm
- -38 µm + 5 µm
- -5 µm

Note: the -5 µm size fraction sieving was made possible by the use of specialist screens manufactured using electroforming technology.

The specific mineral search (SMS) mode on a QEMSCAN instrument was used to detect BMS minerals for characterisation. In a SEM backscattered electron (BSE) image, the higher the average atomic number of a mineral, the brighter the backscatter electron intensity will be. As a result of this phenomenon, BMS minerals will appear brighter than non-sulphide gangue in the backscattered electron image, and can thus be targeted for analysis by setting an appropriate BSE intensity threshold on the automated SEM. The SMS analysis thus ignores gangue particles that are not associated with BMS minerals, allowing more particles of interest (i.e. BMS-bearing) to be analysed in a particular time frame, and consequently improving the statistical validity of the results obtained. Gangue that was associated with BMS minerals was mapped and measured to provide mineral association and liberation characteristics of the BMS minerals. Automated energy dispersive spectrometry (EDS) was used to identify the minerals, by comparing the EDS analyses gathered from the sample to a set of standard mineral EDS spectra.

Base Metal Sulphide Modal Analysis

A QEMSCAN SMS analysis was performed on the sample. Relative proportions of BMS minerals present, as well as their liberation, grain size, and mineral association characteristics were determined by the analysis.

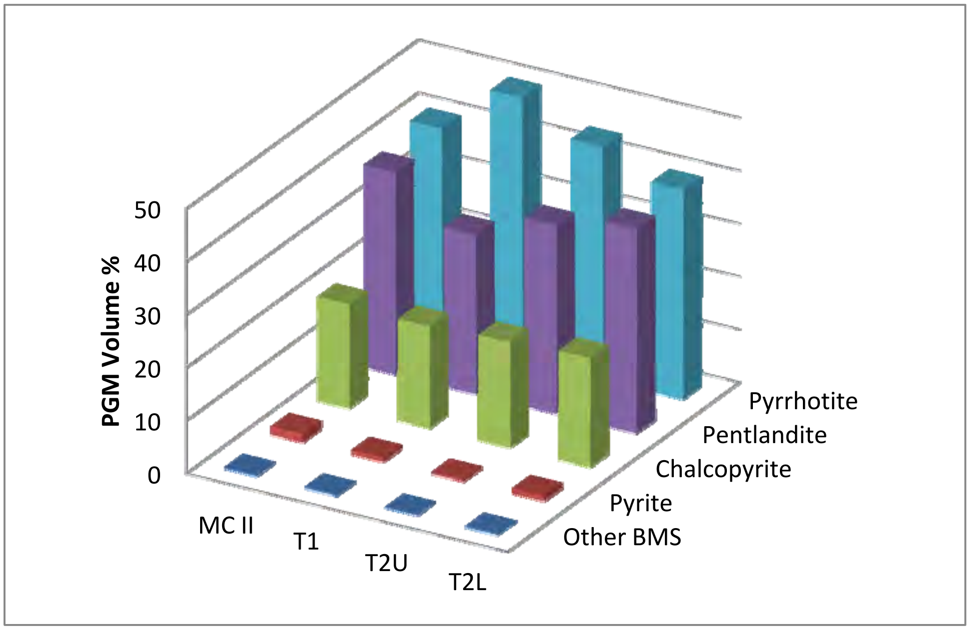
The relative proportions of the BMS minerals present, normalised to 100%, are presented in Table 13-7 and Figure 13-9. Oxide nickel was found to be entrained in silica. It will not be practicable to recover silica-hosted nickel in a flotation circuit.

Table 13-7: BMS Modal Proportions

Mineral	MC II	T1	T2U	T2L
Other BMS	0.3	0.3	0.2	0.3
Pyrite	1.6	0.8	0.4	1
Chalcopyrite	19.7	19.2	19.9	20.6
Pentlandite	38.2	30.1	35.5	38.6
Pyrrhotite	40.1	49.6	44	39.6
Total	*100*	*100*	*100*	*100*

Note: Figures for MC II, T1, T2U, and T2L are in percent.

Figure 13-9: BMS Modal Proportions



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

Pyrrhotite and pentlandite are the major BMS minerals in the sample; pyrrhotite comprises approximately 40 to 50 mass % of the total BMS content, and pentlandite comprises approximately 30 to 39 mass % of the total BMS content. Chalcopyrite comprises ~20 mass % of the BMS present. Minor amounts of pyrite were also detected. The trace amounts of sphalerite and galena detected were grouped together into an "other sulphides" class.

Base Metal Sulphide Liberation

Based on the liberation results for the PGMs and the BMS grain size distributions, it must be assumed that the trends of mineral particle size and liberation degree for the T1, T2U and T2L samples are comparable to those reported for the MC II sample.

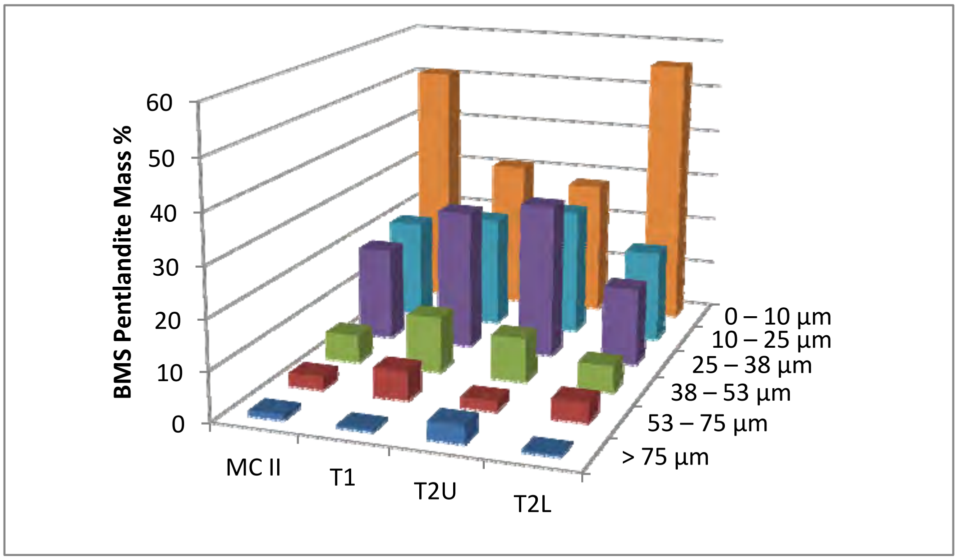
A large proportion of all major BMS minerals present are better than 80% liberated (i.e. at least 80% of the particle is comprised of BMS). In terms of flotation response, this is advantageous where PGM particles are associated with BMS grains.

Base Metal Sulphide Grain Size Distribution

Grain size distribution data for each of the major BMS minerals are presented in Figure 13-10, Figure 13-11 and Figure 13-12Note: Figure prepared by AMEC and based on 2013 data from Mintek.

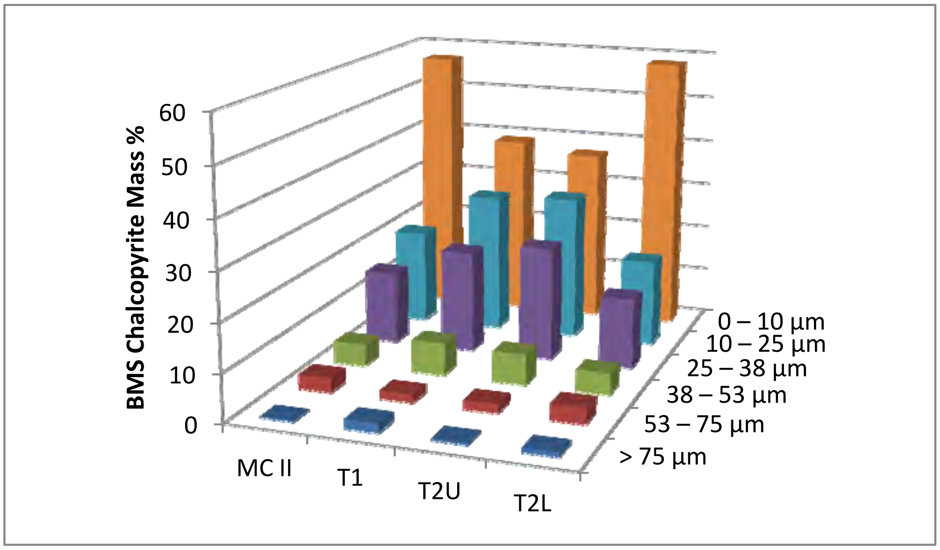
Figure 13-12. Note that the grain size data presented have been obtained from measurements on sectioned grains (i.e. in two dimensions only), and although stereological corrections have been applied to the data, grain sizes reported are not comparable to true 3D grain sizes.

Figure 13-10: Pentlandite Grain Size Distribution



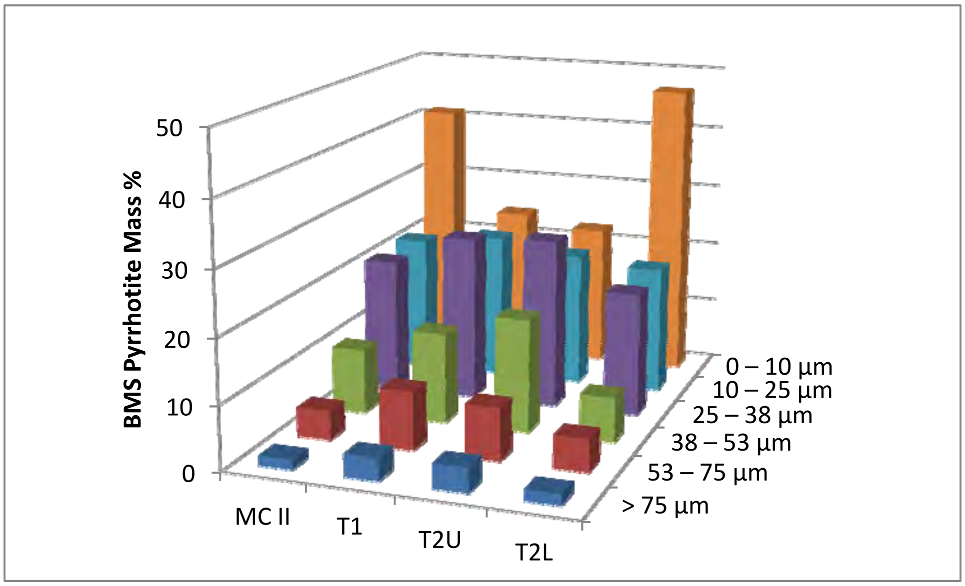
Note: Figure prepared by AMEC and based on 2013 data from Mintek.

Figure 13-11: Chalcopyrite Grain Size Distribution



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

Figure 13-12: Pyrrhotite Grain Size Distribution



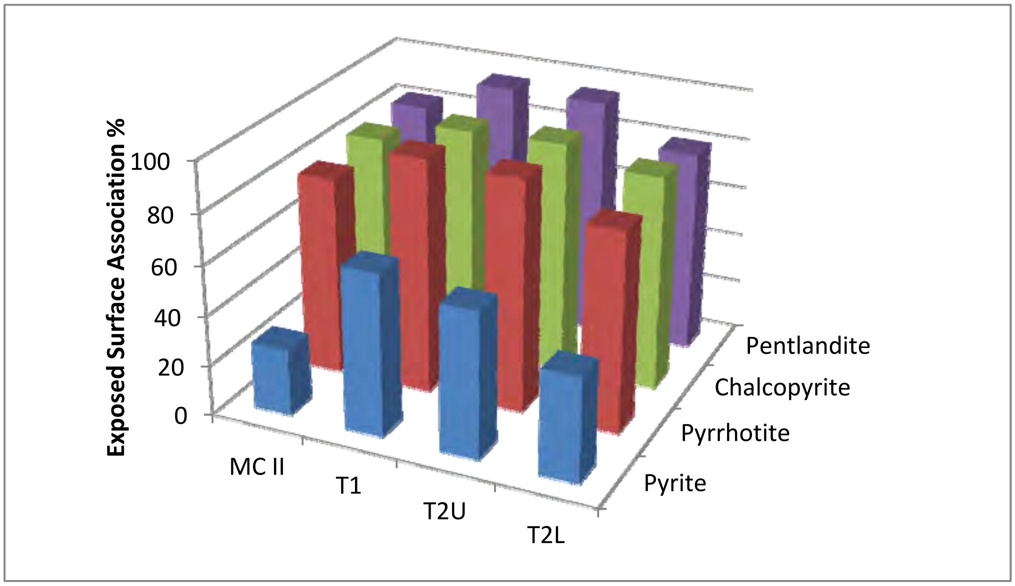
Note: Figure prepared by AMEC and based on 2013 data from Mintek.

It is noticeable that the MC II sample and the T2L sample have consistently greater proportion of -10 µm material and a lesser proportion of +38 µm material than either the T1 or T2U samples. Particles that are <10 µm are problematic to float making the recovery of these micro-fine particles difficult.

BMS Mineral Association

Mineral association is calculated by the QEMSCAN data processing software. "Exposed surface" refers to the number of pixels (normalised to percentage) between a particular mineral and the epoxy mounting medium. The data show that the major BMS minerals (pentlandite, chalcopyrite and pyrrhotite) have a high degree of exposed surface.

Figure 13-13: BMS Mineral Associations – Exposed Surfaces



Note: Figure prepared by AMEC and based on 2013 data from Mintek.

13.3.4 Conclusions

The major PGM species present are PGE-bismuth tellurides, PGE-arsenides and PGE sulphides. PGM recovery by flotation at the grind size of the submitted sample (80% -75 µm) is estimated to be between 85% and 93%. Most of the predicted PGM losses are due to PGM grains still locked in gangue, or attached to relatively large gangue grains. Secondary grind and flotation stages would possibly liberate these PGMs and consequently improve recoveries, but whether this can be done economically would need to be taken into account.

- Major BMS minerals present are pentlandite, chalcopyrite and pyrrhotite. All of these BMS species are well liberated at the grind size of the submitted sample.
- The findings here are in general agreement with earlier mineralogical evaluations (reported previously) in that:
  - The majority of PGMs are formed with bismuth and other amphoteric elements.
  - The particle sizes of the PGMs are generally (70–90%) less than 10 µm.
  - There is generally a high degree of liberation of both the PGM and BMS particles, in excess of 90%.

13.4 Flotation Test Work Summary

Two metallurgical test programmes were undertaken: one by SGS Lakefield in Canada and one by Mintek in Johannesburg. SGS worked on the Master Composite II (MC II). Mintek did some check comparison tests on the MC II sample and then concentrated on the three new geo-met unit samples; T1, T2U and T2L.

The head assays for the MC II sample are presented in Table 13-8 and the assays for the T1, T2U and T2L samples are summarised in Table 13-9.

Table 13-8: Master Composite II Head Assays

Sample	Master Composite II Sample: Head Assays							
	Pt (g/t)	Pd (g/t)	Rh (g/t)	Au (g/t)	3PGE+Au (g/t)	Cu (%)	Ni (%)	S (%)
SGS *	1.958	1.965	NA	0.294	4.217 as 2PGE+Au	0.181	0.366	0.856
Mintek	1.73	1.99	0.104	0.247	4.071	0.23	0.39	0.96

Note *: calculated head from tests, assay head not done; NA: not available

Table 13-9: Head Assays of Phase II Geometallurgical Units

	T1 Head Assays							
	Pt (g/t)	Pd (g/t)	Rh (g/t)	Au (g/t)	3PGE+Au (g/t)	Cu (%)	Ni (%)	S (%)
Average	2.52	2.26	0.12	0.35	5.25	0.20	0.40	0.98
	T2U Head Assays							
	Pt (g/t)	**Pd (g/t)**	**Rh (g/t)**	**Au (g/t)**	**3PGE+Au (g/t)**	**Cu (%)**	**Ni (%)**	**S (%)**
Average	2.02	2.03	0.13	0.32	4.50	0.25	0.46	1.02
	T2L Head Assays							
	Pt (g/t)	**Pd (g/t)**	**Rh (g/t)**	**Au (g/t)**	**3PGE+Au (g/t)**	**Cu (%)**	**Ni (%)**	**S (%)**
Average	2.08	2.47	0.16	0.29	5.00	0.25	0.51	1.05

Note: Due to the ongoing nature of the testwork, the Mintek Phase I work was based on MC II, whereas the Phase II work was based on the new geometallurgical units. Refer to Figure 13-2 for the makeup of the Phase II sample.

13.4.1 SGS Lakefield Test Work – Master Composite II

The work was initiated to check the effect of effect of a specific reagent suite. Accordingly, no exploratory work was done to determine optimum grind nor optimum reagent suite and conditions. The work concentrated on the production of a final cleaner concentrate at a saleable grade and an economic recovery.

Calibration Grind

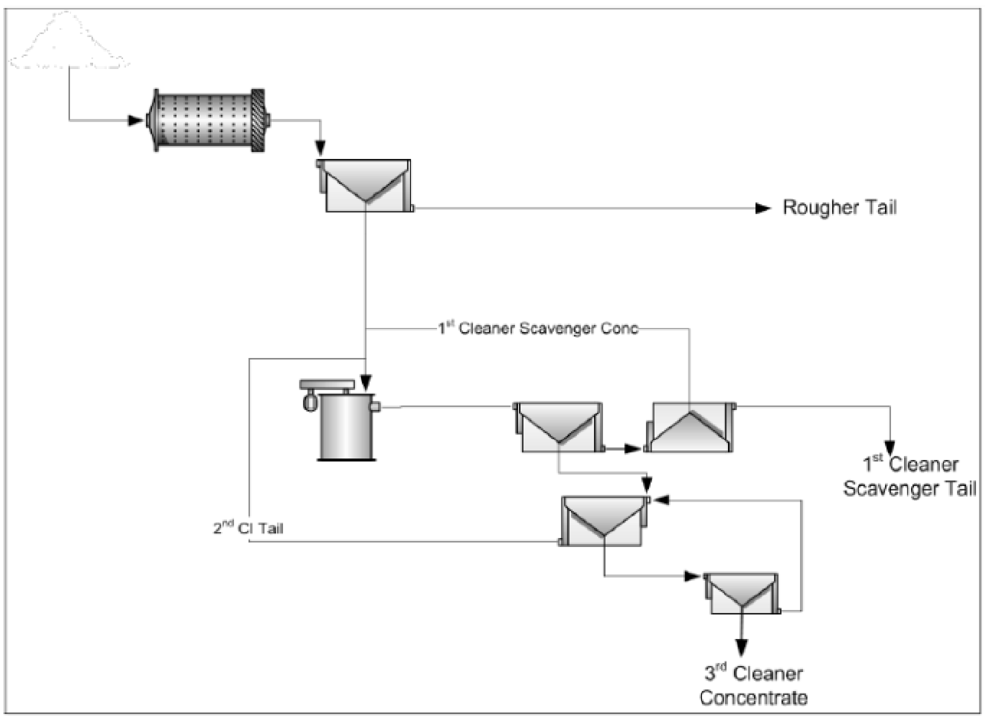
A standard grind was undertaken on the sample, which gave a P_{80} of 166 µm after 45 minutes grinding. A grind time of 90 minutes was selected for the remainder of the test work. Each test was checked for size analysis: this was done on the rougher tailings and not the as-ground head.

The grinds were conducted on 2 kg charges at 65% solids in a laboratory rod mill, using a high chromium steel charge and a mild steel shell.

Batch Cleaner Tests

A series of six batch rougher/cleaner tests were undertaken to investigate the reagents. The flow sheet used was as depicted in Figure 13-14 for the locked cycle test.

Figure 13-14: Locked Cycle Test Flow Sheet



Note: Figure from SGS, 2012

The conditions are summarised in Table 13-10. The results summary is given in Table 13-11.

Table 13-10: Summary of Batch Cleaner Tests Conditions

Test	Purpose	Reagents – addition rate g/t							
		SiPX	3477	HP 700	$CuSO_4$	Oxalic Acid	DETA	Thiourea	CMC
F1	Baseline	92.5	92.5	75.0	250	-	-	-	15.0
F2	As F1, Reagent 1 acid and DETA to replace $CuSO_4$	92.5	92.5	77.5	-	280	70	-	15.0
F3	As F1, Reagent 1 and Reagent2 to replace $CuSO_4$	92.5	92.5	77.5	-	280	-	70	85.0
F4	As F1, CMC in first cleaner	92.5	92.5	75.0	250	-	-	-	102.5
F5	As F4, magnetic separation before flotation	92.5	92.5	75.0	250	-	-	-	45.0
F6	As F3, oxalic only	92.5	92.5	77.5	-	330	-	-	175.0

Table 13-11: Summary of Batch Cleaner Tests Results

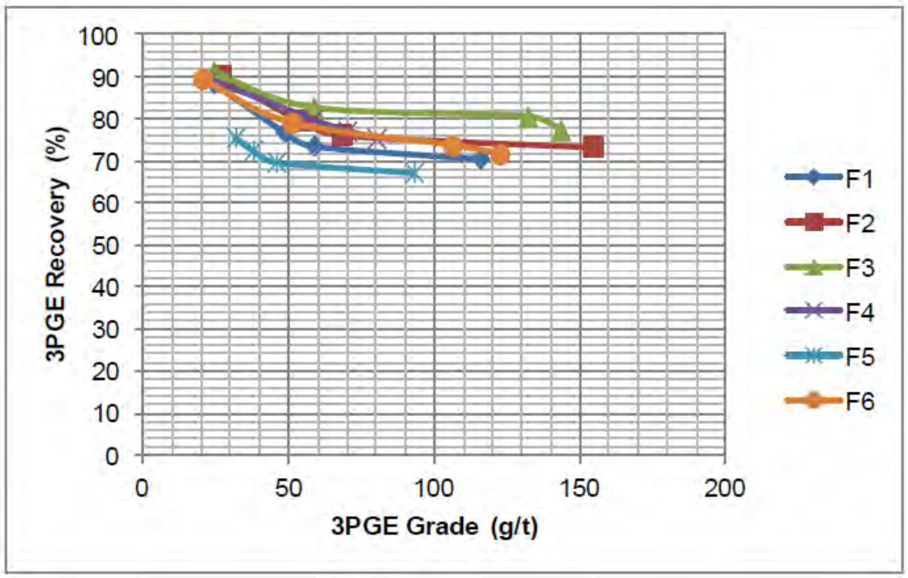
Test	Mass %	Final Concentrate Assay				Final Concentrate Recovery %			
		2PGE+ Au g/t	Ni %	Cu %	S %	2PGE+ Au	NI	Cu	S
F1	2.8	103	7.99	4.88	22.4	70.6	61.3	73.3	67.7
F2	2.2	154	10.0	6.62	20.4	73.4	59.0	79.6	49.2
F3	2.3	143	9.92	5.86	16.9	77.3	62.1	77.8	61.6
F4	4.0	80	5.83	3.52	16.8	75.3	62.3	73.6	72.9
F5	3.0	92.9	6.73	4.18	18.8	67.2	56.3	68.0	65.0
F6	2.7	107	7.98	5.16	20.6	71.5	58.9	77.5	64.4

The grinding conditions were: time at 90 minutes, P_{80} average was 79.5 µm, in the range of 73 µm (test F5) to 83 µm (tests F2, F4, F6) with F1 at 76 µm and F3 at 79 µm, the pH averaged 8.7 (natural pH) and the Ep was generally above +120 mV (test F1 was +80 mV).

Best results, in terms of rougher concentrate recovery and final concentrate grade and recovery, were obtained in tests F2 and F3 respectively. A 3PGE (Pt+Pd+Au) grade of 154 g/t 3PGE at 73.4% recovery was obtained in F2 while F3 achieved 143 g/t 3PGE at 77.3% recovery. The use of a magnetic fraction in test F5 skewed the results: if the magnetic fraction is added to the cleaner concentrate, the overall recovery is 76.4% 3PGE at a grade of 26.0 g/t 3PGE.

Figure 13-15 presents the resulting grade–recovery curves.

Figure 13-15: Grade–Recovery Curves



Note: Figure from SGS, 2012

Locked Cycle Test

A single 6-cycle locked cycle test was conducted using the conditions from test as shown in the flow sheet presented earlier in Figure 13-14. Except for Au and Pt, stability was reached after cycle C, and the projected metallurgical balance was calculated using cycles C through F. The metallurgical projection, summarised in Table 13-12, indicated a final concentrate grading 123 g/t 3PGE at 82.9% recovery.

Table 13-12: Locked Cycle Test Metallurgical Projection

	Mass	Product Assay				Distribution			
	%	3PGE g/t	Ni %	Cu %	S %	3PGE %	Ni %	Cu %	S %
3rd Cleaner Concentrate	2.8	122.9	8.69	5.11	22.4	82.9	69.8	83.2	73.4
Rougher Concentrate	15.6	24.2	1.81	1.03	4.75	90.6	80.4	92.6	86.2
1st Cleaner Scavenger Tail	12.8	2.50	0.29	0.13	0.86	7.7	10.6	9.3	12.8
Rougher Tail	84.4	0.47	0.08	0.015	0.14	9.4	19.6	7.4	13.8
Head (calculated)	100.0	4.19	0.35	0.17	0.86	100.0	100.0	100.0	100.0

The optimum conditions identified in test F3 and used in the locked cycle test are outlined below:

- SIPX (92.5 g/t) and AERO 3477 (92.5 g/t) as collectors (SIBX is typically used in the industry)
- Senfroth HP700 (75 g/t) as frother (this is believed to be a mixture of pine oil and TEB)
- Additinoal promoters (see Table 13-10) were added to the primary grind (200 g/t and 50 g/t, respectively) and to a conditioning stage prior to the 1st cleaning stage (80 g/t and 20 g/t, respectively)
- CMC (7LT used in this case) added in the cleaning stages only (105 g/t total), with the majority added to the 1st cleaning stage (70 g/t)
- A rougher retention time of 30 minutes
- A 1st cleaner retention time of 5 minutes with a 3 minute scavenger
- Second and 3rd cleaner retention times of 4 minutes each
- Flotation was conducted at a natural pH of 8.8.

13.4.2 Mintek Test Work – Geometallurgical Units T1, T2U, T2L

In order to determine the milling time required to achieve a specific grind, three point rod-milling curves were constructed for the three geo-metallurgical unit samples.

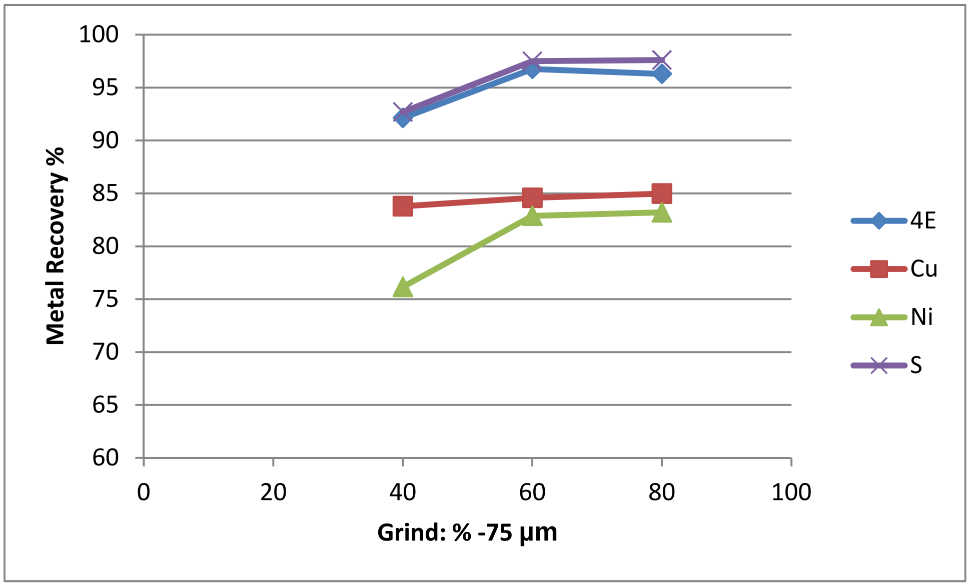
Grind optimisation test work was carried out in order to determine the optimum grind for the subsequent tests. In total three rougher flotation tests were carried out at 40%, 60% and 80% passing 75 µm using a reagent suite from the prior SGS Lakefield test work, summarised in Table 13-13.

Table 13-13: Flotation Conditions Used for Grind Optimisation Tests

Stage	Reagent Addition Rates (g/t)						
	SiPX	3477	Senfroth	Thiourea	Oxalic Acid	Condition (minutes)	Flotation (minutes)
Mill	-	-	-	200	50	Milling time	-
Rougher Circuit							
Rougher RC1	25	25	35			1	3
Rougher RC2						1	2
Rougher RC3	25	25	10			1	5
Rougher RC4						1	5
Rougher RC5	25	25	10			1	15
Total	75	75	55	200	50		30

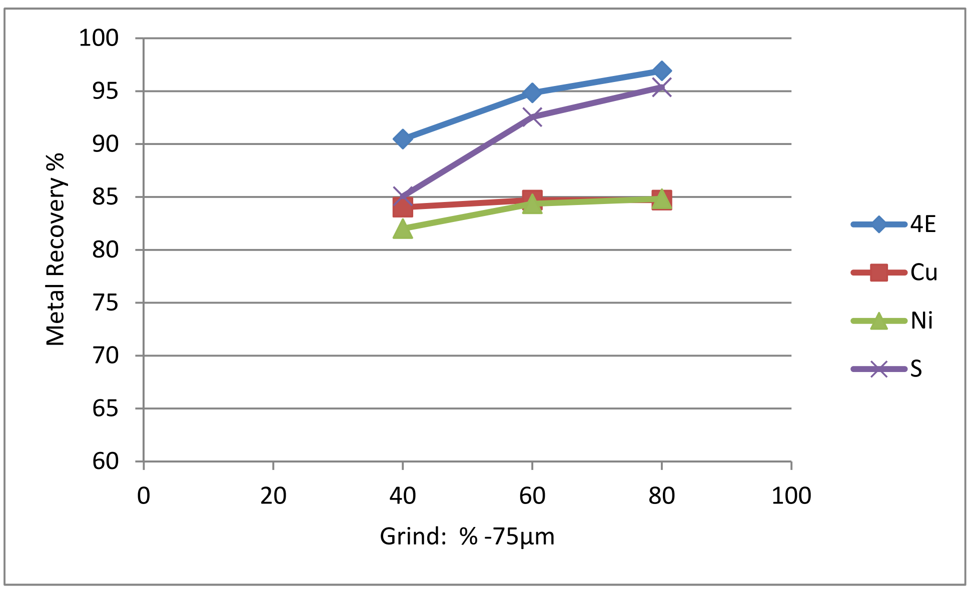
The grind optimisation test results are shown in Figure 13-16, Figure 13-17 and Figure 13-18.

Figure 13-16: T1 Grind versus Recovery



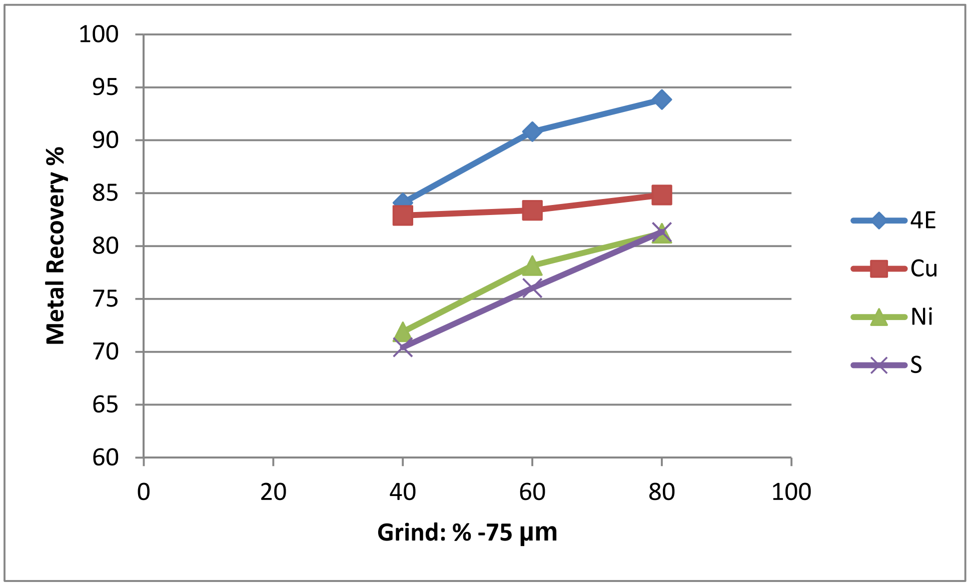
Note: Figure from SGS (2012)

Figure 13-17 T2U Grind versus Recovery



Note: Figure from SGS (2012)

Figure 13-18: T2L Grind versus Recovery



Note: Figure from SGS (2012)

For the T1 sample depicted in Figure 13-16, the highest recovery of 96.8% 3 PGE + Au was achieved at a grind size of 60% passing 75 µm. The 3E+Au recovery was slightly lower (not significant) with finer grinding. Base metals and S showed insignificant changes to recovery between 60% and 80% passing 75 µm.

For the T2U sample illustrated in Figure 13-17, the highest recoveries for 3 PGE + Au and S were at the finest grind: these were 96.9% and 95.4% respectively. The base metal recoveries showed very little difference between the 60% and 80% grinds.

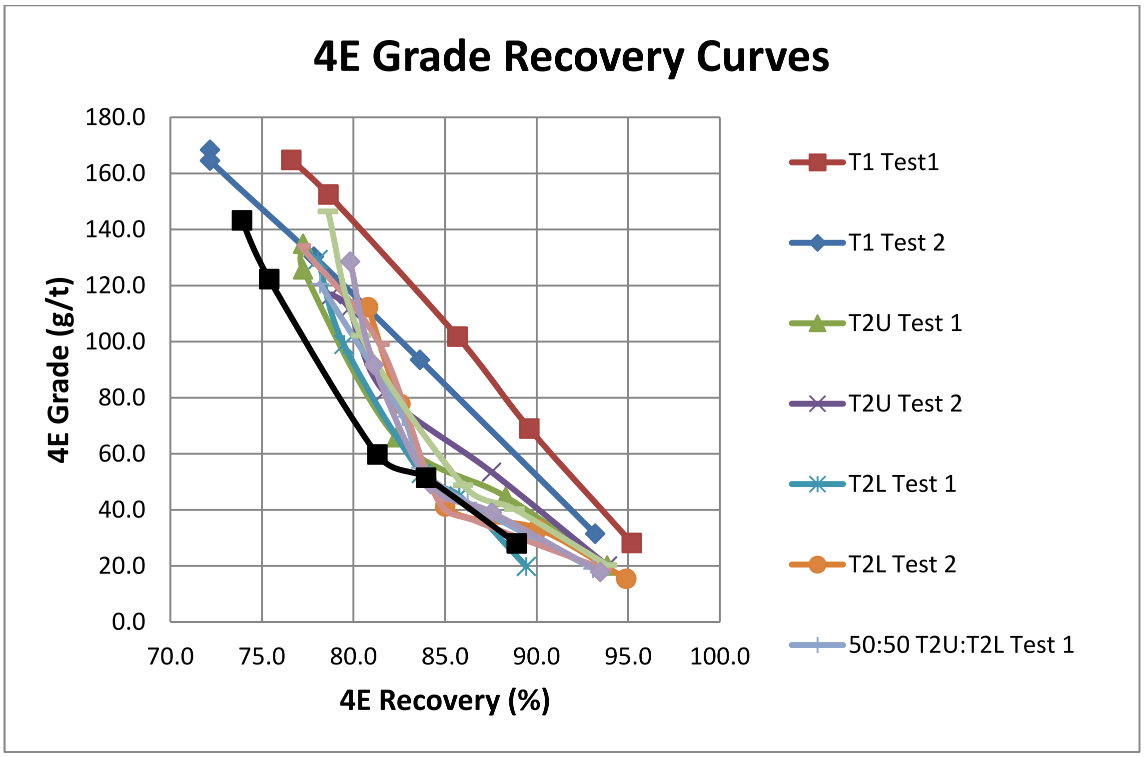
The T2L sample in Figure 13-18 showed similar 3 PGE + Au results to the T2U sample, with small differences in the absolute recovery values. The S recoveries were markedly less than the T2U material, perhaps indicating a significantly lower pyrrhotite/pyrite content.

Based on the foregoing, a standard base grind of 80% -75 µm was selected for the flotation test work. This was expected to give the maximum 3 PGE + Au recoveries without significant recovery losses of the base metals and S.

The rougher test work was extended to the testing of the three geometallurgical units into cleaner tests in open circuit configuration. Variations in conditions were also applied, using different grinding media, changes to the flotation reagent suite and reagent conditioning times. The results of the various different conditions were inconclusive in that insufficient tests at each variable were done to give a statistically significant result.

A grade recovery curve plotted from the individual test stages was produced and is presented below as Figure 13-19. It indicates that the results from the T2U and T2L are comparable and that the T1 material appears to have an advantage at lower concentrate grades.

Figure 13-19: 4PE Grade Recovery Curves



The individual test results are summarised in Table 13-14.

Table 13-14: Individual Test Results

Geomet Unit	Element	Assay Head Grade (g/t - %)	Actual Recovery %
T1	Pt	2.52	76.01
	Pd	2.26	75.57
Open circuit, batch	Rh	0.12	80.08
	Au	0.35	54.58
	4E	**5.25**	**74.38**
	Cu	0.20	0.00
	Ni	0.40	0.00
T2U	Pt	2.02	78.11
	Pd	2.03	79.61
Open circuit, batch	Rh	0.13	84.33
	Au	0.32	63.50
	4E	**4.50**	**78.03**
	Cu	0.25	65.36
	Ni	0.46	70.22
T2L	Pt	2.08	79.70
	Pd	2.47	79.88
Open circuit, batch	Rh	0.16	81.44
	Au	0.29	71.72
	4E	**5.00**	**79.43**
	Cu	0.25	74.64
	Ni	0.51	63.22
50:50 T2U, T2L	Pt	2.05	77.17
	Pd	2.13	78.84
Open circuit, batch	Rh	0.13	88.21
	Au	0.28	67.69
	4E	**4.59**	**77.64**
	Cu	0.24	63.30
	Ni	0.48	74.38
15% T1, 42.5% T2U, 42.5% T2L	Pt	2.15	80.81
	Pd	2.10	79.77
Open circuit, batch	Rh	0.12	85.66
	Au	0.29	65.78
	4E	**4.66**	**79.21**
	Cu	0.23	64.55
	Ni	0.46	75.25

13.4.3 Locked Cycle Test Work on two blends of T1 & T2 Geometallurgical Units

Two 6-cycle locked cycle tests were conducted on two blends consisting of 50% T2U and 50% T2L, 12%T1 and 42.5%T2U & 42.5%T2L. The reagent additions and conditions are given in Table 13-15.

Table 13-15: Locked Cycle Conditions – Blend

Feed:	Ivanplats: 50% T2U & 50% T2L & 42.5%T2U , 42,5%T2L.								
Mill:	Milled 2 kg charge for 109 minutes using Stainless steel rods								
Grind:	P_{80} ~ 75 µm								
Float Conditions									
Stage	**Reagents [g/t] (1% solution)**						**Time [min]**		
	SIPX	**3477**	**Senfroth**	**Oxalic**	**Thiourea**	**Sendep**	**Mill**	**Condition**	**Float**
Mill	-	-	-	200	50	-	109	-	-
Rougher Circuit									
Rougher 1	25	25	35					1	5
Rougher 2	25	25	10					1	10
Rougher 3	25	25	10					1	15
Cleaner Circuit				80	20			2	
Cleaner 1	10	10	5			50		1	5
Cleaner Scav.	2.5	2.5	5					1	3
ReCleaner Stage	2.5	2.5	5			25		1	4
ReReCleaner Stage	2.5	2.5	7.5			10		1	4
Total	93	93	78	280	70	85			

The results in terms of grades and recoveries are given in Table 13-16 and Table 13-17. In both cases the blends performed well, and a good saleable product was produced. The blend of 42.5%T2U and 42.5%T2L is presented as an early-stage approximation of what a future plant may be able to produce.

Table 13-16: Locked Cycle Blends by Major Element

		Grade			Recovery		
	Mass (%)	4E (g/t)	Cu (g/t)	Ni (g/t)	4E (%)	Cu (%)	Ni (%)
12%T1, 42,5%T2U and 42,5%T2L	3.23	119.19	5.92	10.75	85.21	86.76	73.62

Table 13-17: Locked Cycle Blends by Element

		Grade								Recovery							
	Mass (%)	Pt (g/t)	Pd (g/t)	Rh (g/t)	Au (g/t)	4E (g/t)	Cu (%)	Ni (%)	Total S (%)	Pt (%)	Pd (%)	Rh (%)	Au (%)	4E (%)	Cu (%)	Ni (%)	Total S (%)
12%T1, 42,5%T2U and 42,5%T2L	3.23	52.26	57.96	3.70	5.26	119.19	5.92	10.75	23.34	85.41	86.99	94.57	64.63	85.21	86.76	73.62	75.03
50% T2U and 50% T2L	3.07	56.56	60.96	3.98	5.08	126.57	6.71	11.35	19.73	84.24	85.41	89.22	62.75	83.79	86.88	69.40	55.99

13.4.4 Mintek Test Work –Analysis of the Concentrate by ICP-MS

The final concentrate from the locked cycle blend that comprised a mix of 42.5%T2U and 42.5%T2L, was analysed by ICP-MS, and the results are reported in Table 13-18. The trace elements are reported as relatively low.

Table 13-18: ICP-MS on Final Concentrate

Sample Name	Ti ppm	V ppm	As ppm	Se ppm	Sr ppm	Y Ppm	Li ppm	Cd ppm	Sn ppm	Sb ppm	Te ppm	Ba ppm	Hg ppm	Pb ppm	Bi ppm	Th ppm	U ppm	Ag ppm	Re ppm	Cl ppm	Fluoride ppm
Lock cycle (15%:42.5% and 42.5%)	60.3	7.1	13.5	60.7	2.6	0.77	0.24	3.2	2.1	1.9	48.1	2.4	0.55	35.4	18.3	0.58	0.34	11.4	0.21	79.1	<100
Lock cycle (15%:42.5% and 42.5%)	60.3	6.9	16	60.5	2.7	0.74	0.22	3.2	2.2	1.8	47.5	2.3	0.52	35.4	17.9	0.58	0.36	11.9	0.21	84.7	<100

13.4.5 Mintek Test Work –Analysis of the Concentrate by XRD

Table 13-19 provides a summary of the X-ray diffraction (XRD) analysis of the concentrate by chemical formula.

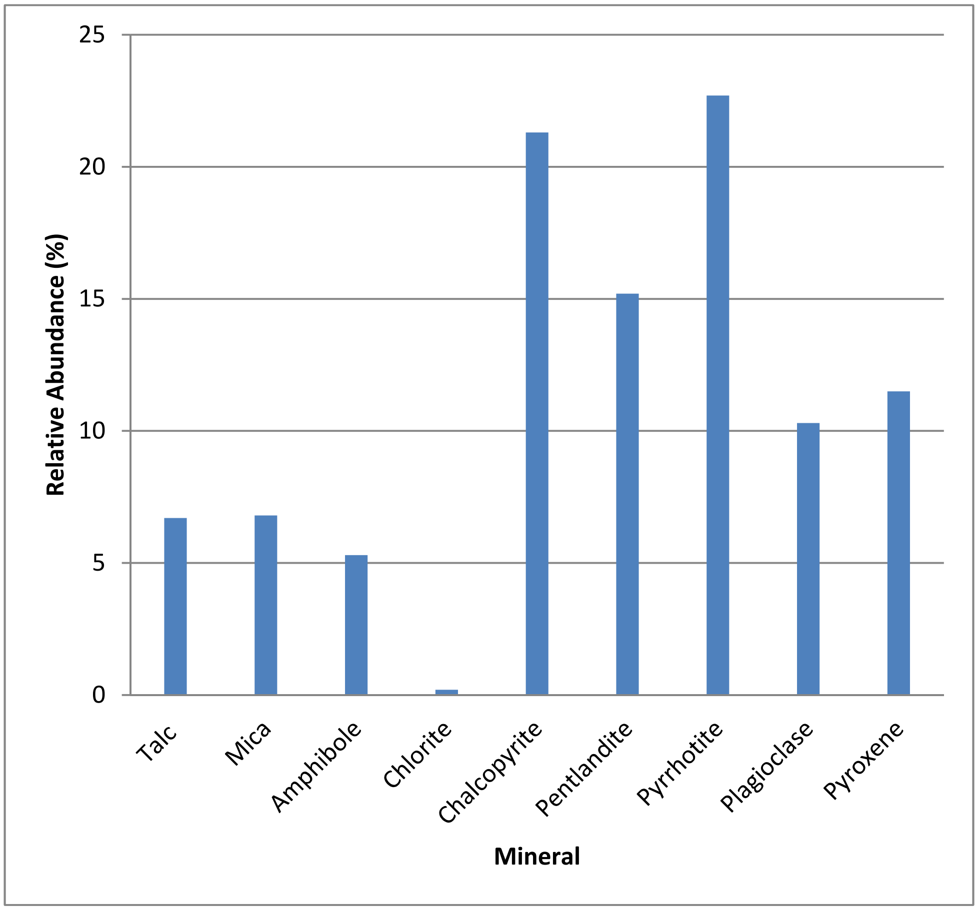
Table 13-19: XRD on Concentrate

Mineral	Ideal Mineral Formula	Locked cycle conc.
Talc	$Mg_3Si_4O_{10}(OH)_2$	6.7
Mica	$KMg_3Si_3AlO_{10}(F,OH)_2$	6.8
Amphibole	(Ca,Na) 2(Mg,Fe,Al) 5(Al,Si) 8O 22 (OH) 2	5.3
Chlorite	$(Mg_5Al)(AlSi_3)O_{10}(OH)_8$	0.2
Chalcopyrite	$CuFeS_2$	21.3
Pentlandite	$(Fe,Ni)_9S_8$	15.2
Pyrrhotite	Fe1-xS	22.7
Plagioclase	$NaAlSi_3O_8$	10.3
Pyroxene	$MgSiO_3$	11.5

Mineral	Ideal Mineral Formula	Locked cycle conc.
Talc	$Mg_3Si_4O_{10}(OH)_2$	minor
Mica	$KMg_3Si_3AlO_{10}(F,OH)_2$	minor
Amphibole	(Ca,Na) 2(Mg,Fe,Al) 5(Al,Si) 8O 22 (OH) 2	minor
Chlorite	$(Mg_5Al)(AlSi_3)O_{10}(OH)_8$	trace
Chalcopyrite	$CuFeS_2$	intermediate
Pentlandite	$(Fe,Ni)_9S_8$	intermediate
Pyrrhotite	Fe1-xS	intermediate
Plagioclase	$NaAlSi_3O_8$	minor
Pyroxene	$MgSiO_3$	minor

dominant = > 50 mass%, major = 25 – 50 mass%, intermediate = 15 – 25 mass%, minor = 5 – 15 mass%, trace = < 5 mass%, - = not detected

Figure 13-20: Mineral Relative Abundance



Note: Figure from Mintek, 2012.

13.5 Recovery Estimates

Table 13-20 summarises the actual and predicted recoveries on the individual geometallurgical units and blends. The individual units were open cycle tests and the blends were closed cycle. The open cycle recoveries are predictions based on the recoveries encountered in the closed locked cycle tests and a ratio applied accordingly.

Concentrate grades of over 100 g/t PGEs are easily achievable at these recoveries. Therefore at this level of study, it is expected that economic recoveries are possible using conventional flotation technology.

Table 13-20: Preliminary Recovery Predictions for Individual Geometallurgical Units and Blends

Geometallurgical Unit	Element	Assay Head Grade (g/t or %)	Actual Recovery (%)	Predicted Recovery (%)
T1	Pt	2.52	-	80.34
	Pd	2.26	-	82.40
Closed circuit, calxculated	Rh	0.12	-	88.41
	Au	0.35	-	53.63
	4E	**5.25**	**-**	**80.01**
	Cu	0.20	-	79.04
	Ni	0.40	-	63.90
T2U	Pt	2.02	-	82.55
	Pd	2.03	-	86.81
Closed circuit, calxculated	Rh	0.13	-	93.10
	Au	0.32	-	62.39
	4E	**4.50**	**-**	**83.94**
	Cu	0.25	-	73.41
	Ni	0.46	-	71.19
T2L	Pt	2.08	-	84.24
	Pd	2.47	-	87.11
Closed circuit, calxculated	Rh	0.16	-	89.91
	Au	0.29	-	70.47
	4E	**5.00**	**-**	**85.44**
	Cu	0.25	-	83.84
	Ni	0.51	-	64.09
50:50 T2U, T2L	Pt	2.05	84	84.24
	Pd	2.13	85	85.41
Locked cycle test	Rh	0.13	89	89.22
	Au	0.28	63	62.75
	4E	**4.59**	**84**	**83.79**
	Cu	0.24	68	67.95
	Ni	0.48	77	76.82
15% T1, 42.5% T2U, 42.5% T2L	Pt	2.15	85	85.41
	Pd	2.10	87	86.99
Locked cycle test results	Rh	0.12	95	94.57
	Au	0.29	65	64.63
These figures are used for supporting reasonable prospects of economic extraction in Section 14	**4E**	**4.66**	**85**	**85.21**
	Cu	0.23	73	72.51
	Ni	0.46	76	76.28

The following parameters (Table 13-21) have been used to develop recovery equations for use in establishing reasonable prospects for economic extraction for the TCU (see Section 14.6). These were effective 1 March 2013. AMEC and Ivanplats are continuing to analyse test work, and the equations may change in the course of the preparation of the PEA that is underway.

Table 13-21: Recovery Equation Parameters

Geomet Type/Element	tnf	tref	fref	c	Mass Pull
T1 Nickel	0.073279	0.116918	0.40	6.43571	4.685
T1 Copper	0.031727	0.047062	0.20	3.46085	4.685
T1 Platinum	0.135729	0.368503	2.52	48.39300	4.685
T1 Palladium	0.100332	0.332375	2.26	43.35971	4.685
T1 Gold	0.054304	0.126175	0.35	5.12227	4.685
T1 Rhodium	0.000012	0.011705	0.12	2.42901	4.685
T2U Nickel	0.079183	0.158592	0.46	10.41055	4.399
T2U Copper	0.040378	0.073807	0.25	6.06675	4.399
T2U Platinum	0.131450	0.446363	2.02	53.97145	4.399
T2U Palladium	0.093328	0.415265	2.03	55.33821	4.399
T2U Gold	0.053148	0.118887	0.32	6.95946	4.399
T2U Rhodium	0.000013	0.020963	0.13	3.72972	4.399
T2L Nickel					
T2L Copper	0.100295	0.180211	0.51	9.47005	4.423
T2L Copper	0.038440	0.069479	0.25	5.15458	4.423
T2L Platinum	0.161180	0.457729	2.08	46.15549	4.423
T2L Palladium	0.148556	0.465267	2.47	56.93663	4.423
T2L Gold	0.039136	0.100455	0.29	5.43975	4.423
T2L Rhodium	0.000115	0.030570	0.16	3.67649	4.423

Notes:
tnf = tailings grade non floatable;
tref = reference tailings grade;
fref = reference feed grade;
c = reference concentrate grade;
Mass Pull = Weight % recovered to concentrates

To determine recovery, it is first necessary to calculate the tailings grade:

Tail Grade = tnf + [(tref-tnf)/fref][Head Grade]

Then:

Recovery = [(c)(Head Grade-Tail Grade)]/[(Head Grade)(c-Tail Grade)]

13.6 Metallurgical Variability

A full suite of variability test work has not yet been conducted; however, the geometallurgical units chosen and the recommended blends are expected to be representative of the deposit as a whole for the purposes of the planned PEA.

Confirmatory work and further drilling would be required to fully quantify the variability across the deposit area.

13.7 Deleterious Elements

The ICP-MS and semi-quantitative XRD data clearly indicate a clean concentrate with low trace metal values and low chrome values. It is therefore not expected that penalties of any significance would apply to any saleable concentrate that may be produced from the Project area.

13.8 Comments on Section 13

Further test work will be required to obtain design parameters for the design of the process plant. These would include:

- Further test work on grind–recovery relationships
- Flotation kinetics and the identification of fast and slow floating minerals
- Opportunities to optimise any future flotation circuit configuration
- Opportunities to optimise an appropriate reagent suite
- Identifying the mode of occurrence of the recovery losses with the objective of identifying alternate process routes: e.g. separation on size and targeting areas of recovery loss
- Variability test work.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Introduction

There are three types of Mineral Resources for the Platreef Project:

- Mineral Resource that is amenable to underground selective mining methods. This consists of material within and adjacent to grade shells in the TCU, and is all below the 650 m elevation. This Mineral Resource has been updated using revised geological interpretation and incorporation of extensive additional drilling in Zone 1 and some new drilling in Zone 2 and Zone 3. The Mineral Resource amenable to selective underground mining methods is supported by the UMT-TCU model.
- Mineral Resource that is amenable to underground mass mining methods. In the 31 March 2011 Mineral Resource estimate, this included the mineral resource amenable to underground selective mining. The resource model has not been updated, but has been trimmed so as to now be mutually exclusive from the Mineral resource that is amenable to underground selective mining. The Mineral Resources amenable to underground mass mining are below the 650 m elevation. Within the "trimmed" Mineral Resources there has been limited additional drilling. The Mineral Resources amenable to mass underground mining is supported by the UMT-MM model, formerly referred to as the UMT bulk model.
- Mineral Resource that is amenable to open-pit mining. The model has not been updated, as there has been no new drilling. The stated Mineral Resources are unchanged and have an effective date of 31 March 2011. Mineral Resources amenable to open-pit mining are situated above the 650 m elevation

Indicated and Inferred Mineral Resources were estimated for the UMT-TCU area. Recognition of lithological controls (TCU stratigraphy) on grade has enabled declaration of Inferred Mineral Resources at wider drill spacings than would normally be possible. Additional infill drilling in Zone 1 permitted the declaration of Indicated Mineral Resources in that portion of the Project area.

Additional drilling down-dip permitted the expansion of the Inferred Mineral Resource in the UMT-TCU portion of the deposit. Additional down-dip/lateral potential could support estimation of additional Mineral Resources with additional drilling.

The UMT-TCU deposit is the main focus of the Project moving forward. The UMT-TCU Mineral Resource estimate and is now considered the base case. The UMT-MM underground deposit is an additional case.

The computer resource models for the Mineral Resource amenable to open pit mining methods (AMK and ATS models) were built by AMEC in 2002 and 2003. The Mineral Resource estimate for the UMT-MM model was completed in March 2011. This update for the UMT-TCU represents what was previously considered the Mineral Resource amenable to selective mining methods, and was completed in March 2013.

The limits of Platreef Indicated and Inferred Mineral Resource for the UMT-MM area and the Mineral Resources amenable to open pit mining are shown on Figure 14-1. The Mineral Resource areas that are amenable to open-pit mining are shown in red (ATS) and green (AMK). The limits of the Inferred Mineral Resources for the UMT-MM model are shown in blue. The limits of the UMT-TCU area Mineral Resource estimate are shown in Figure 14-2. The UMT-TCU resource area is formed of the densely-drilled Area 1 (predominantly Zone 1), and the less densely drilled Area 2 (predominantly Zones 2 and 3).

14.2 UMT-TCU Resource Model

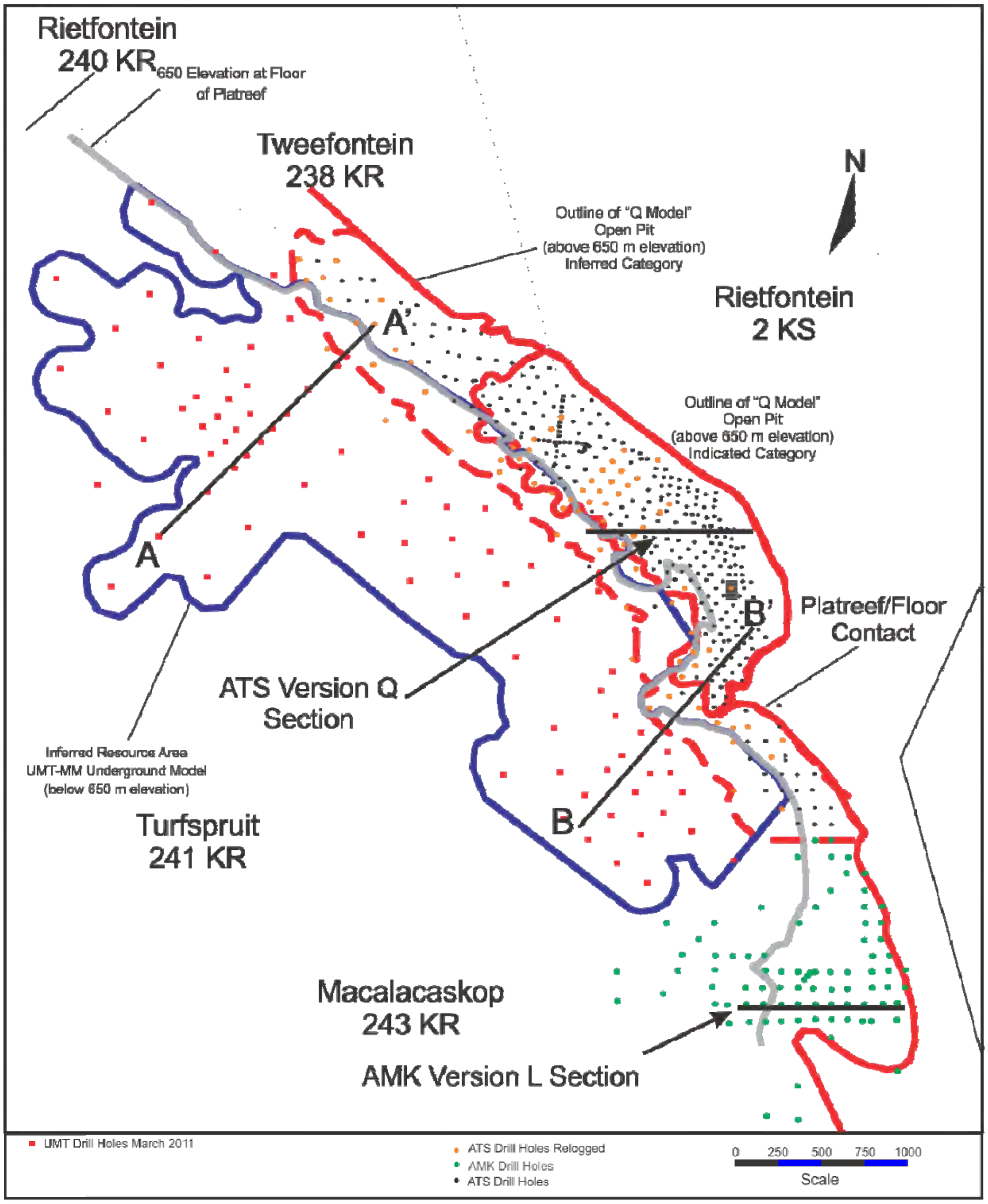
The UMT-TCU model is located on Turfspruit farm. Mineralization is considered amenable to selective underground mining methods. The UMT-TCU resource model update was limited to that portion of the UMT area defined by the stratigraphic sequence referred to as the TCU. The UMT-TCU model in analogous to what was previously (Parker et al., 2012) referred to as the higher-grade selectively-minable model and is now considered to be the Base Case moving forward.

The UMT-TCU model is contained within an envelope defined to include the TCU stratigraphic sequences. The upper surface of the envelope was set at 25 m above the top of the NC1. The lower surface of the envelope was set at 75 m below the bottom of the T2L stratigraphic horizon.

14.2.1 Drill Hole Data

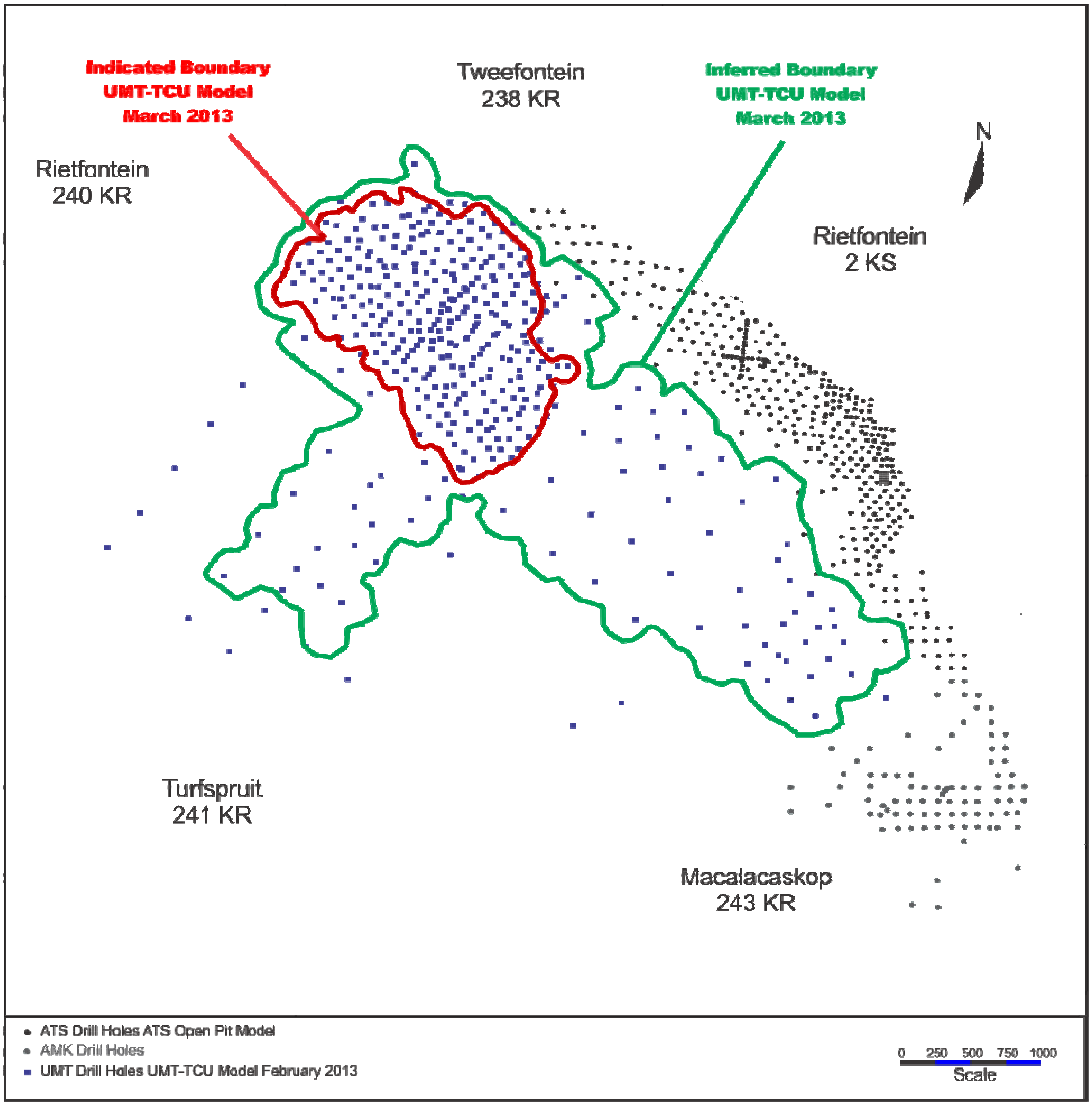
The drilling cut-off date for the UMT model was 26 October 2012. The Platreef database contains 954 core drill holes (excluding re-drilled pilot holes and all deflections). A total of 624,248 m were drilled and completed by 26 October 2012 and this includes 555 holes (194,591 m) from the open-pit program and 399 holes (429,657 m) from the underground program (refer to Figure 10-1).

Figure 14-1: Mineral Resource Areas for the UMT-MM and Open Pit



Note: Figure prepared by AMEC, 2013.

Figure 14-2: UMT-TCU Mineral Resource Indicated and Inferred Mineral Resource Areas



Note: Figure prepared by AMEC, 2013.

A total of 399 UMT drill holes (429,657 m) were used in the Mineral Resource model update. All UMT drill holes have been re-logged for consideration of the TCU. The UMT-TCU model includes 34 drill holes (38,537 m) from the open-pit area that have been re-logged for the TCU geology.

14.2.2 Geological Model (UMT-TCU)

Geological interpretations for the UMT-TCU area were developed by Ivanplats personnel. The re-logging work summarized in the lithological variable *STRAT* (Table 14-1) is the basis for the geological model. A numeric model code (MCODE) was assigned to each lithology.

Two-dimensional gridded-seam models were completed for five stratigraphic horizons used in the construction of the geological model (NC1, MAN, T1, T2U and T2L). Wireframe surfaces were constructed from the gridded seam models of the NC1, MAN, T1, T2U and T2L.

14.2.3 High-Grade Shells – UMT-TCU

Ivanplats personnel identified nested 3PE (Pt + Pd + Au) grade shells using a minimum of of 3 m of 1 g/t 3PE, 2 g/t 3PE and 3 g/t 3PE. Three PE grade shells were used rather than 4PE because rhodium assaying was incomplete at the time the shells were constructed. The grade shells were constructed as a tool for constraining grade estimates.

The nested grade shells were identified in two mineralized zones (T1MZ and T2MZ). The T1MZ grade shells are associated with the T1 stratigraphic unit. The T2MZ grade shells are associated with the T2 stratigraphic units (T2U and T2L). Two-dimensional gridded-seam models were completed for the T1MZ and T2MZ grade shells. Wireframe surfaces were constructed from the gridded seam models of the T1MZ and T2MZ seam models.

Grade shell codes (GCODES) were used to identify blocks within and outside the grade shells. The GCODES are summarized in Table 14-2.

14.3 Mineralization Adjacent to the TCU Mineralized Zones

There is scattered mineralization adjacent to the TCU mineralized zones that is locally continuous. Ivanplats plans to use floating stope software in scoping studies. Mineralization adjacent to the TCU mineralized zones may be included in the resultant stopes; hence there is a need to estimate grades in blocks in an envelope around the TCU mineralized zones.

Table 14-1: Model Package Description

	Modpak (UMT-MM)	UNIT (UMT-MM)	ZCODE (UMT-MM)	STRAT (UMT-TCU)	MCODE (UMT-TCU)
TCU (Top Loaded Zone)	DZ	UDZ	22	NC1	20
				MAN	21
	BP	UBP	23	T1	22
				T2U	25
	HA	UHABP	26	T2L	26
	PXHA	UPXHA	24	FW	27
	CZ	UCZ	27	FW	27
	HF	HF	28	FW	27
	HA	UHA	29	FW	27
Platreef: Lower Unit (Bottom Loaded Zone)	DZ	LDZ	32		
	BP	LBP	33		
	PXHA	LPXHA	34		
	LPX	LLPX	35		
	HABP	LHABP	36		
	CZ	LCZ	37		
	HA	LHA	39		
Floor (not estimated)	FL	FL	40		

Table 14-2: Summary of GCODE for TCU and Bikurri (All Elements)

Grade Shell	Grade Shell	GCODE
UMT-TCU	T1MZ 1g 3PE	101
	T1MZ 2g 3PE	102
	T1MZ 3g 3PE	103
	NC1	0
	MAN	0
	T1	1
	T2MZ 1g 3PE	201
	T2MZ 2g 3PE	202
	T2MZ 3g 3PE	203
	T2	2
	FW	0

14.3.1 Compositing and Exploratory Data Analysis (EDA) for UMT-TCU Model

The resource model update occurs within the stratigraphic sequence referred to as the Turfspruit Cyclic Unit discussed in Section 7. The drill hole database was composited to 1 m length composites within the UMT-TCU model envelope. The compositing was controlled by the nested grade shells and the TCU stratigraphic units.

EDA was completed using box plots, histograms, probability plots and contact profiles. EDA (discontinuities in grade profiles near contacts) suggested the grade shells and stratigraphic boundaries should be considered hard boundaries. Figure 14-3 displays the contact profile between the T2MZ 1 g/t 3PE and T2MZ 2 g/t 3PE shells.

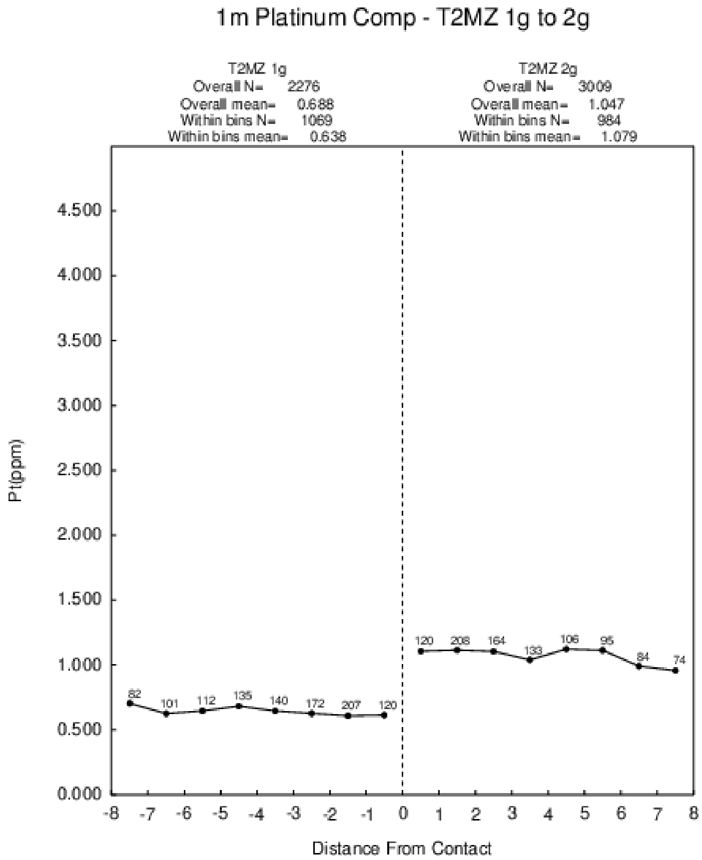
Rhodium anslyses are only partially complete on the assay database and rhodium to platinum regressions were constructed to estimate the rhodium content for samples missing rhodium analysis. Rhodium to platium ratios were calculated for each assay interval with rhodium assays. The Rh/Pt rations were binned by platinum cutoff and the regression equation was calculated.

Figures 14-4 and 14-5 show rhodium as a function of platinum regression for the T2U and T2L respectively. Table 14-3 summarizes the proportions of assays with rhodium analysis within the grade shells and by stratigraphic unit. The proportion of rhodium assays exceeds 50% within the 2 g/t 3PE shell and exceeds 60% in the in T2U and T2L.

14.3.2 Block Model and Grade Estimation

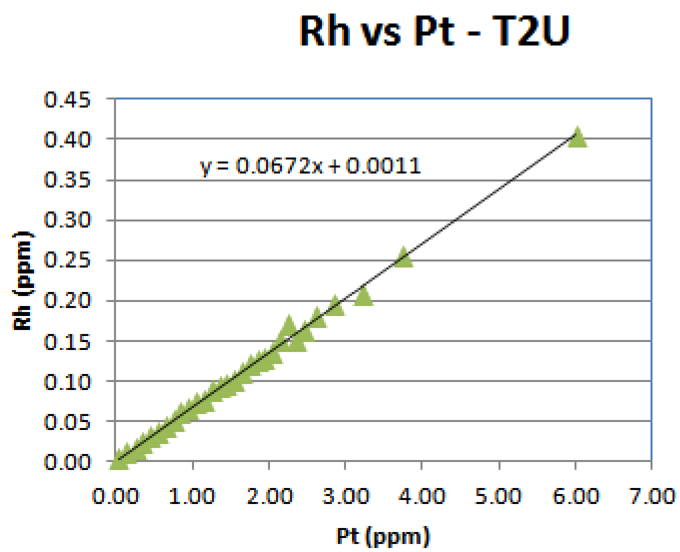
The UMT-TCU block model was constructed over the area of UMT drilling (Figure 14-6). Blocks were oriented parallel to the national coordinate system. The block model used a parent block size of 20 m x 20 m x 1 m. Sub-celling was 10 m x 10 m x 0.5 m. The geological stratigraphic units and grade shells were coded to the blocks. After estimation, the final resource model blocks were regularized to 10 m x 10 m x 2 m.

Figure 14-3: Contact Profile for Platinum between 1g and 2g 3PE Shells



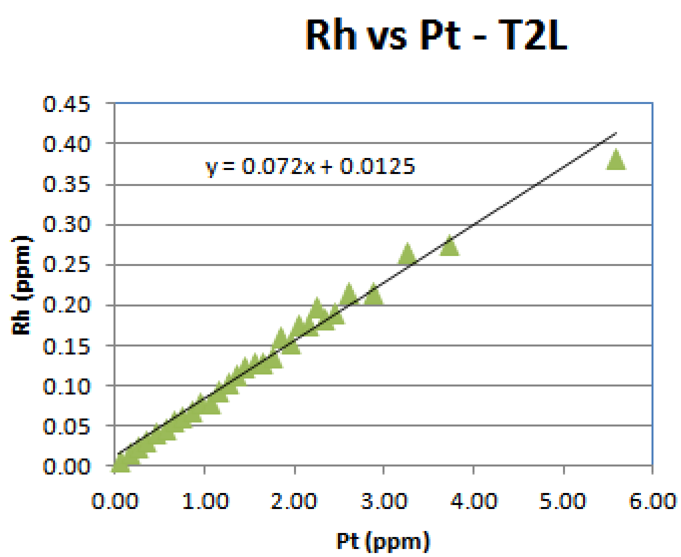
Note: Figure prepared by AMEC, 2013.

Figure 14-4: Rhodium Regression for the T2U



Note: Figure prepared by AMEC, 2013.

Figure 14-5: Rhodum Regression for the T2L

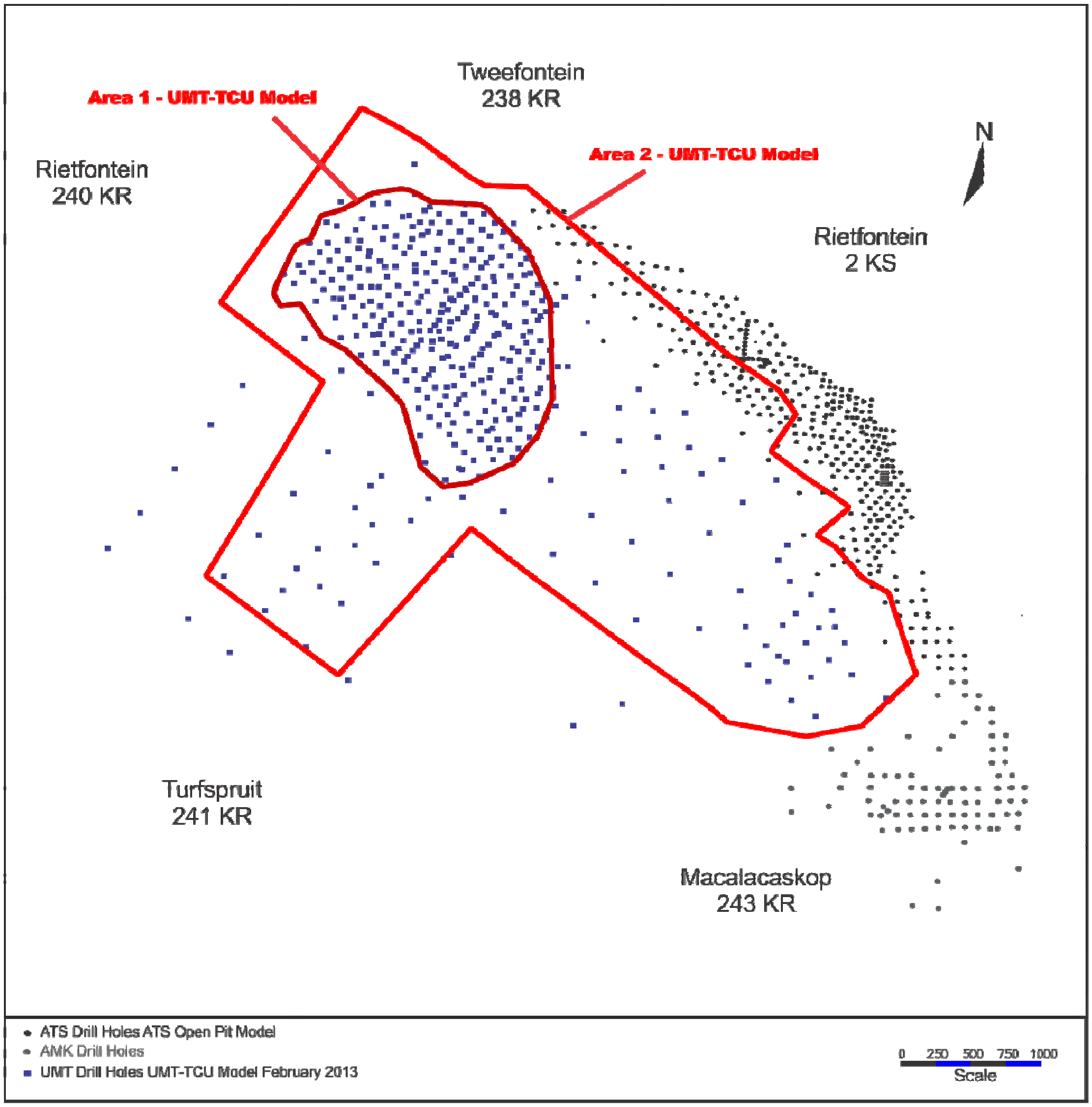


Note: Figure prepared by AMEC, 2013.

Table 14-3: Proportions of Rhodium Assays by Strat Code and Grade Shell

STRAT	Assays	Rh Analysis	%
HW	9052	1091	12.1
NC1	6470	236	3.6
MAN	825	108	13.1
T1	13526	5124	37.9
T2U	4098	2473	60.3
T2L	4167	2506	60.1
FW	72080	4871	6.8
FW	110218	16409	14.9
Grade Shell	**Assays**	**Rh Analysis**	**%**
T1MZ 1 g/t	1024	401	39.2
T1MZ 2 g/t	613	351	57.3
T1MZ 3 g/t	923	564	61.1
T2MZ 1 g/t	2577	967	37.5
T2MZ 2 g/t	3349	1791	53.5
T2MZ 3g/t	5088	3348	65.8

Figure 14-6: Extents of the UMT-TCU Resource Model, Showing Estimation Areas



Note: Figure prepared by AMEC, 2013.

Block Grade Estimation

Inverse distance to the third power (ID3) interpolation was used to estimate Platreef grades into blocks in the UMT-TCU model. Kriging was used in Estimation Area 1 within the T1MZ and T2MZ. Variograms (using the correlogram method) were completed by grade shell and combined shells. Figures 14-7 and 14-8 are examples of platinum down-hole and directional variograms.

To eliminate the effects of the 24 structural domains discussed in Section 7, the estimation was completed by hanging the T1MZ and T2MZ at the 1000 m elevation. Nearest-neighbour (NN) models representing declustered composite distributions were generated for validation checks. This allows the effect of discontinuities at fault boundaries to be removed.

Grade Estimation – UMT-TCU

T1MZ

Grade estimation in the T1MZ included block and composite matching by GCODE. To eliminate the effects of the structural domains discussed in Section 7, the elevation of the center of the 1 g/t 3PE grade shell was transformed to the 1000 m elevation. Model blocks and composites were transformed accordingly. Estimation was completed by kriging and inverse distance to the third power (ID3) in Estimation Area 1 and by ID3 in Estimation Area 2 (Zones 2 and 3). A nearest-neighbor estimate was completed for model validation. After grade estimation, all blocks and composites were back-transformed back to the original elevation.

T2MZ

Grade estimation in the T2MZ included block and composite matching by GCODE and MCODE Matching in Pass1. In Pass2, matching was only by GCODE. To eliminate the affects of the structural domains discussed in Section 7, the elevation of the center of the 1 g/t 3PE T2MZ grade shell was transformed to the 1,000 m elevation. Model Blocks and Composites were transformed accordingly. Estimation was completed by kriging and ID3 in Estimation Area 1 and by ID3 in Estimation Area 2. A nearest-neighbor estimate was completed for model validation. After grade estimation, all blocks and compostes to transformed back to the original elevation.

Figure 14-7: Down Hole Correlogram Model for Platinium Showing Nugget.

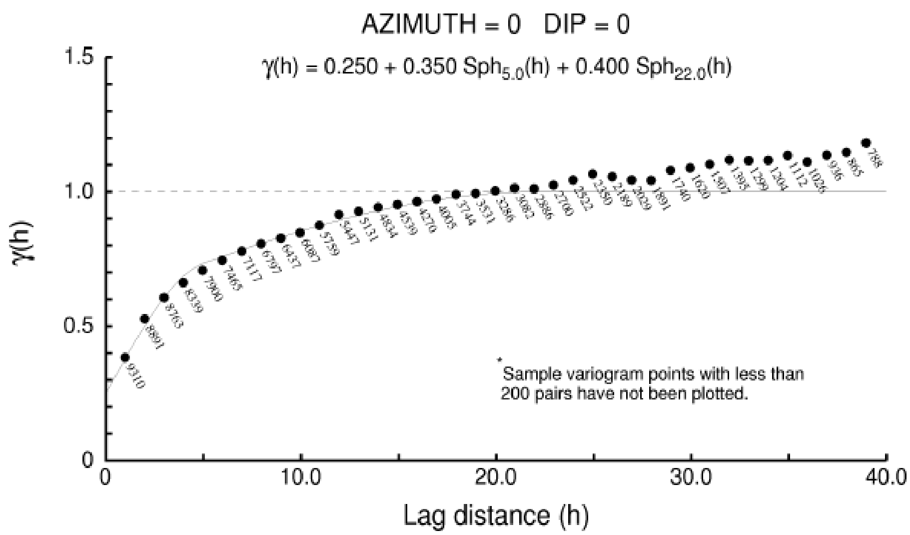
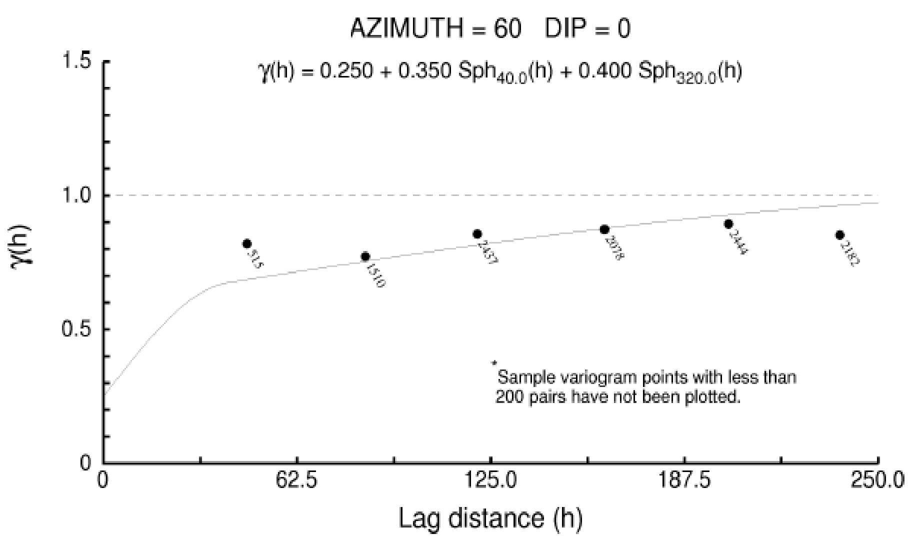


Figure 14-8: Directional Correlogram Model for Ptatinium at Azimuth 60



T1 and NC1

Grade estimation in the T1, NC1, and MAN stratigraphic units not within the nested grade shells were estimated by matching blocks and composites by MCODE. These blocks were estimated after transformation with respect to the the T1MZ virtual elevation of 1,000 m. Estimation was completed by ID3. A NN estimate was completed for model validation.

T2 and FW

Grade estimation in the T2 and FW stratigraphic units and not within the nested grade shells were estimated by matching blocks and composites by MCODE. These blocks were estimated after transformation with respect to the T2MZ virtual elevation of 1000 m. Estimation was completed by ID3. A NN estimate was completed for model validation.

Estimations were completed in Datamine using expanding search volumes. Search volumes are summarized in Table 14-4.

Outlier Restriction

No grade capping was implemented within the nested grade shells. An outlier restriction was applied in the host rocks outside the grade shells. The outlier thresholds were selected from probability plots of 1 m composites and are summarized in Table 14-5. All boundaries were considered hard.

Blocks not estimated were given the mean grade of the Stratigraphic unit. The mean grades used are summarized in Table 14-6. Unestimated blocks were generally located along fault block boundaries. Unestimated blocks within the FW stratigraphy were in areas of wide spaced drilling.

Regularization

Upon completion of the estimation, the UMT-TCU block model was regularized from the 20 m x 20 m x 1 m (sub-celled to 10 m x 10 m x 0.5 m) to a 10 m x 10 m x 2 m (no sub-cells) model. The 10 m x 10 m x 2 m regularized model permitted better resolution along the faulted boundaries and softened the hard boundaries used in the grade estimation.

14.3.3 Bulk Density

Densities were also coded to the blocks by stratigraphic unit using the mean density values for each stratigraphic unit (Table 14-7).

Table 14-4: Search Strategy for Grade Estimation (All Elements)

Search Volume	Search Distances X	Search Distances Y	Search Distances Z	Min Samples	Max Samples	Max/ DH
1	250	250	50	4	15	3
2	500	500	100	4	15	3
3	1500	1500	300	1	15	3

Table 14-5: Outlier Restriction Thresholds

Zone	Ni(%)	Cu (%)	Pt (%)	Pd (g/t)	Au (g/t)	Rh (g/t)
Grade	0.25	0.25	1.00	1.50	0.25	0.10
Distance	150 m	150 m	150 m	150 m	150 m	150 m

Table 14-6: Mean Grades to Fill Blocks Not Estimated

Zone	GCODE	Cu(%)	Ni(%)	Pt(ppm)	Pd(ppm)	Au(ppm)	Rh(ppm)
	T1MZ 1g	0.121	0.224	0.616	0.511	0.211	0.029
Area 1	T1MZ 2g	0.135	0.255	1.413	0.949	0.284	0.560
	T1MZ 3g	0.186	0.358	2.432	2.026	0.523	0.119
	T1MZ 1g	0.124	0.228	0.609	0.561	0.177	0.032
Area 2	T1MZ 2g	0.133	0.264	1.193	0.988	0.279	0.063
	T1MZ 3g	0.183	0.358	2.284	1.909	0.454	0.108
Area 1	T1	0.040	0.103	0.199	0.159	0.073	0.011
Area2	T1	0.037	0.095	0.163	0.120	0.061	0.009
	T2MZ 1g	0.113	0.238	0.650	0.750	0.119	0.047
Area 1	T2MZ 2g	0.137	0.283	1.046	1.184	0.187	0.074
	T2MZ 3g	0.188	0.386	2.460	2.532	0.333	0.172
	T2MZ 1g	0.114	0.232	0.741	0.759	0.125	0.053
Area 2	T2MZ 2g	0.142	0.288	1.022	1.133	0.185	0.073
	T2MZ 3g	0.191	0.396	2.203	2.210	0.338	0.156
Area 1	T2	0.079	0.175	0.393	0.456	0.076	0.033
Area 2	T2	0.074	0.149	0.291	0.338	0.064	0.027
All	NC1	0.025	0.055	0.065	0.069	0.023	0.008
All	MAN	0.007	0.016	0.032	0.026	0.007	0.002
All	FW	0.076	0.132	0.291	0.364	0.059	0.024

Table 14-7: Bulk Density Values

Zone	Mean Density	CV	Maximum SG	Minimum SG
HW	2.91	0.04	4.47	2.04
NC1	2.98	0.05	4.28	2.09
MAN	2.84	0.03	3.18	2.42
T1	3.19	0.04	4.33	2.58
T2U	3.19	0.04	3.80	2.30
T2L	3.04	0.05	4.34	2.33
FW	3.10	0.06	4.45	2.05

14.3.4 Mineral Resource Classification

Mineral Resources have been classified using the CIM Definition Standards for Mineral Resources and Mineral Reserves (CIM, 2010):

A Mineral Resource is a concentration or occurrence of diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction. The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.

An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings, and drill holes.

An 'Indicated Mineral Resource' is that part of the Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics, can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

UMT-TCU Model

Inferred mineral resources are declared where the drill hole spacing is 400 m to 800 m (predominately Area 2). The Inferred Mineral Resources are permitted at a wider drill hole spacing because of the well defined geology of the TCU. In Area 1, much of the FW stratigraphic unit is classified Inferred Mineral Resources because many of the tails of the drill holes were not sampled due to the focus on the TCU. It is expected that once these drill holes are sampled, a higher conficence category may be able to be assigned to the estimated Mineral Resources. Figure 14-9 displays the regions of Indicated and Inferred Mineral Resources on a typical cross section.

14.3.5 UMT-TCU Model Validation

Model validation included visual inspection of block grades relative to composite grades on cross-sections and level plans. Statistical comparisons consisting of box plots and grade profiles tabulated in different directions (swaths) for each metal by stratigraphic unit and grade shell were constructed to compare the Kriged (where present), ID3 grade estimates, NN estimates and 1 m composites.

Visual Validation and Box Plots

Block grades (ID3) were compared to composite grades (for each metal) by visual inspection on cross-sections, long sections and level plans. In general, the composite grades were honoured in the block distributions. Representative cross sections for 3PE and Ni are presented in Figure 14-10 and Figure 14-11 respectively (section lines A-A’).

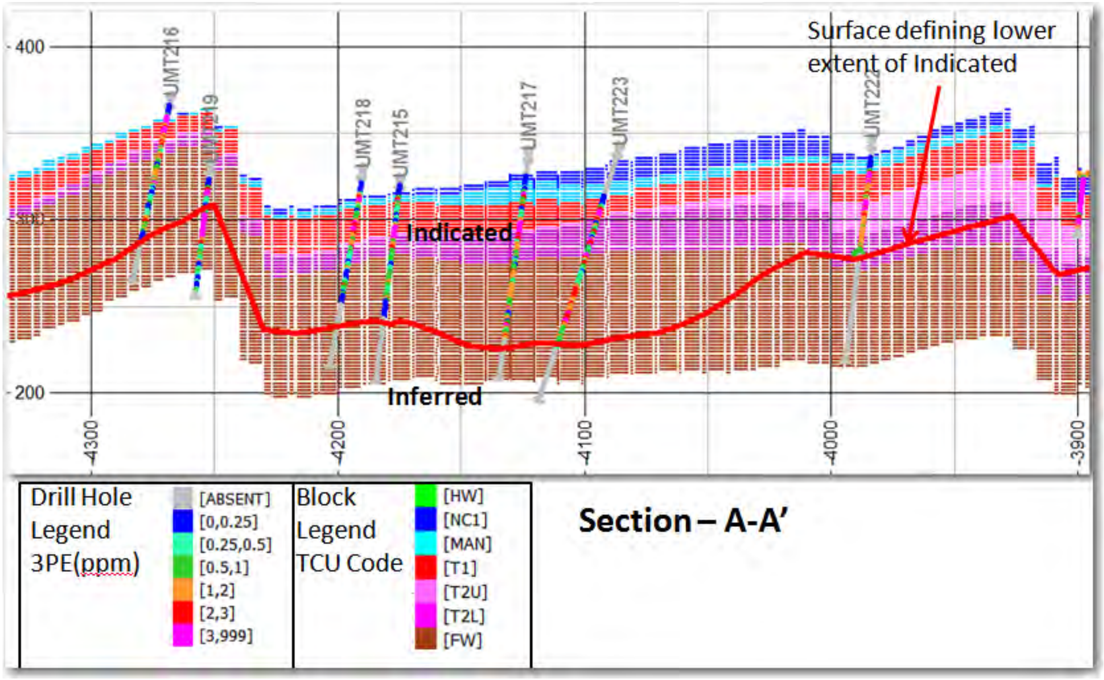
The global means and grade distributions for each metal from the ID3 model, NN model and 5 m composites checked within reasonable levels, suggesting the ID2 model is globally un-biased.

Swath Plots

Swath plots (width of 200 m) of the ID3 model, NN model and 1 m composites were completed for Cu, Ni, Pt, Pd, Au and Rh.

Overall, swath plots display reasonable comparisons between the ID3 estimates to their respective NN estimates; however, locally there are some differences, particularly in areas with limited drilling.

Figure 14-9: Surface Defining Lower Extent of Indicated Mineral Resources



Note: Figure prepared by AMEC, 2013

Figure 14-10: Section AA' Displaying 3PE Block and Composite Grades

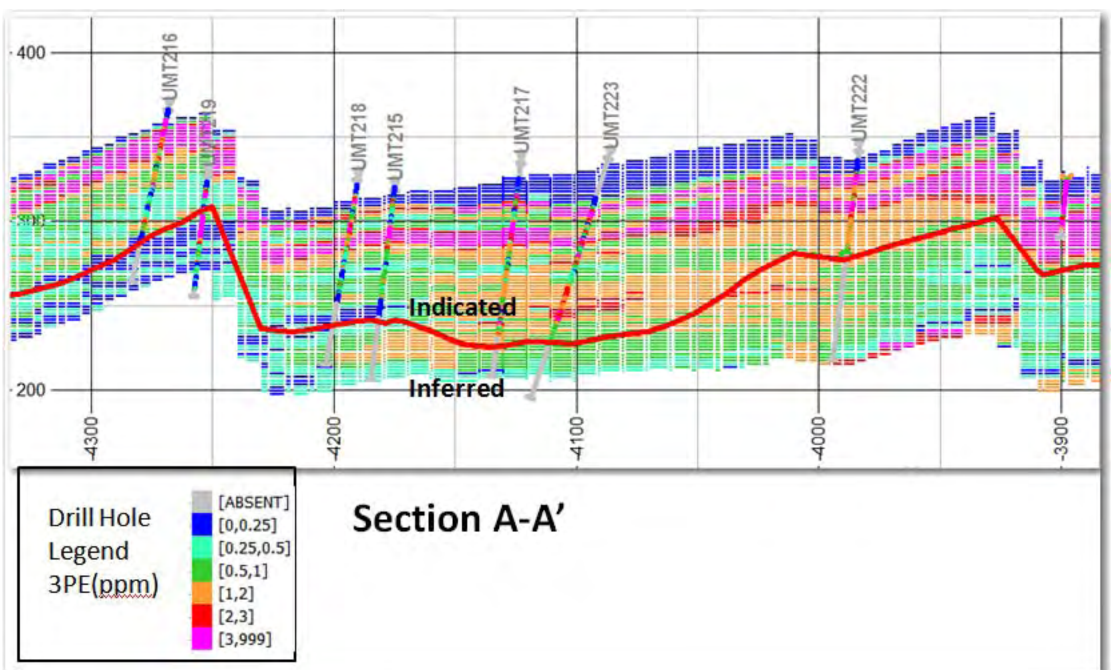
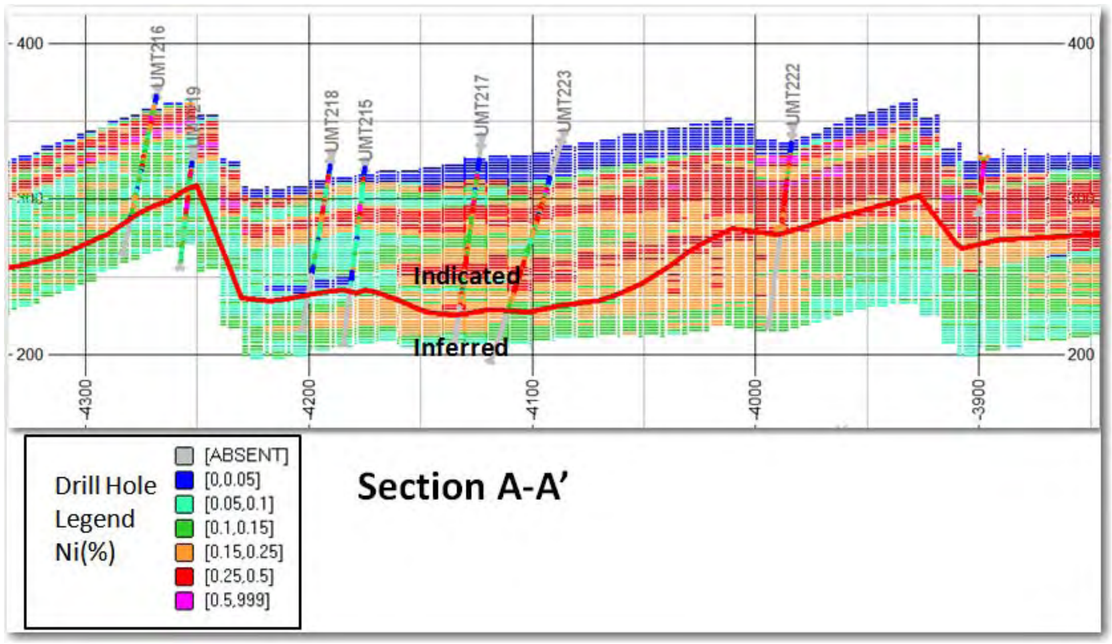


Figure 14-11: Section AA' Displaying Ni Block and Composite Grades



Note: Figures prepared by AMEC, 2013

AMEC commonly focuses swath plot analysis on blocks classified as Measured and Indicated. Model validation was completed for Estimation Areas 1 (Indicated) and 2 (Inferred) and no local bias were observed.

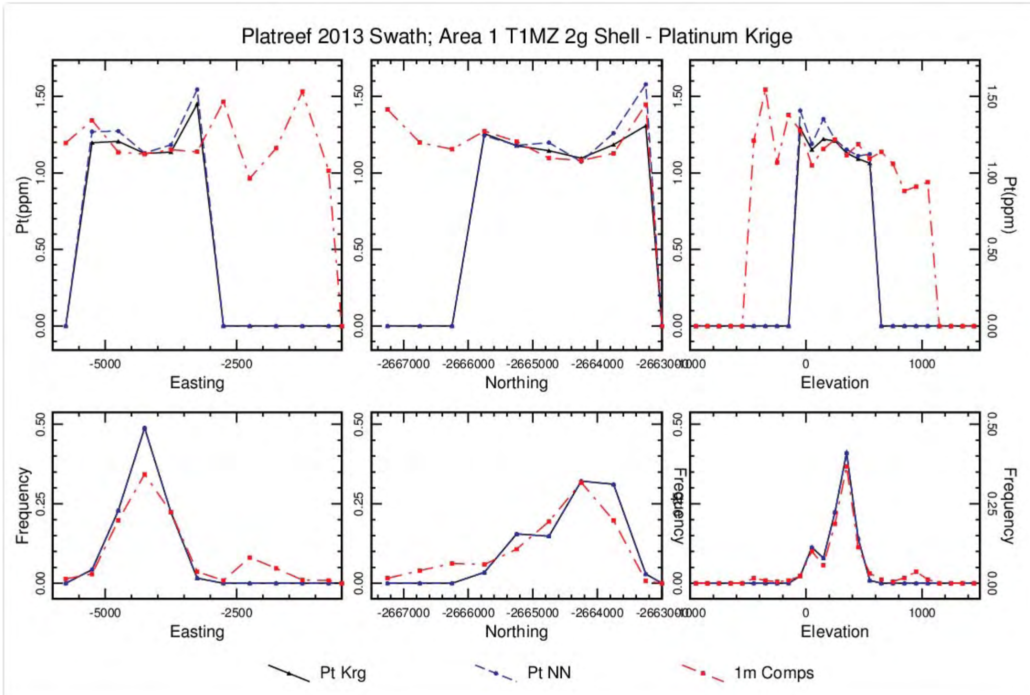
The platinum swath plot for the T2MZ 2 g/t shell is presented in Figure 14-12.

Comments on the UMT-TCU Model

As currently configured the UMT-TCU model covers the TCU Stratigraphic units and includes what was formerly referred to as the selectively-mineable model. The UMT-TCU model also includes estimation of grades in blocks adjacent to the TCU, up to 25 m on the hangingwall – effectively to the barren Main Zone gabbro norite, and up to 75 m into the FW – usually stops short of the Floor of the Platreef.

Additional drilling is required in the Inferred area (Area 2) to better define the stratigraphic units and the fault domains. Additional geological work is required to decipher the stratigraphy in the FW unit in both Areas 1 and 2. Upon the completion of the geological interpretation in the FW of the UMT-TCU model, an update of the UMT-Mass Model can be completed. There will then be one model for the UMT area.

Figure 14-12: Platinum Swath Plot for T1MZ – 2 g/t Shell



Note: Figure prepared by AMEC, 2013

Local bias is expected in Area 2 because of the wide-spaced drilling and large search distances required for grade estimation. Additional drilling should permit better grade estimations in Area 2.

Future models should consider a 10 m x 10 m block size.

14.4 UMT-MM Model

Inferred Mineral Resources were estimated for UMT-MM Model in March 2011 (Parker et al., 2012). Recognition of lithological controls (referred to as the ModPak) on grade has enabled declaration of Inferred Mineral Resources at wider drill spacings than would normally be possible. The UMT-MM Model is partially included in the update of the UMT-TCU model. That portion of the UMT-Bulk Model included in UMT-TCU Model has been identified, and this portion of the UMT-Bulk resources has been removed from the resource tabulation. The limits of the UMT-Bulk Inferred Mineral Resource are shown on Figure 14-1 and generally are beneath the UMT-TCU mineral resource (see Figure 14-17).

14.4.1 Geological Model

Geological interpretations for the UMT area were developed by Ivanplats and AMEC personnel. The re-logging work summarized in the lithological variable *Modpak* (refer to Table 14-1) is the basis for the UMT-MM geological model. A zone code (*Zcode*) was assigned to each lithology. Table 7-4 summarizes the correlation between the stratigraphic designations between the UMT-MM and UMT-TCU models.

Wireframe surfaces were constructed for the bottom of MZ (Main Zone-undisturbed), UDZ (Upper Disturbed Zone), UBP (Upper B-Pyroxenite), UPXHA (Upper Pyroxenite-Harzburgite)/Top of Lower Unit, LDZ (Lower Disturbed Zone), LBP (Lower B-Pyroxenite), and LPXHA (Lower Pyroxenite-Harzburgite). A wireframe model of the top of Floor was also built.

Wireframe solids were constructed for discontinuous and/or discordant Modpak units including BPHA (Harzburgite associated with bottom of B Pyroxenite), HA (Harzburgite not associated with B-Pyroxenite), CZ (Contaminated Zone, calc-silicates) and HF (Hornfels).

14.4.2 High-Grade Shells

A review of the drill hole assays relative to the geological interpretation and preliminary statistics indicated the need to use additional controls besides lithology for block-grade estimation. For this stage of the Project, and because drilling is widely spaced, grade shells were chosen as the appropriate tool for constraining grade estimates.

High-Grade Shell – UMT-MM Model

A grade shell (built as a wireframe model) based on a 1 g/t 3PE cut-off (3PE = Pt + Pd + Au) applied to 5 m composites (termed 5m1g shell) was built. This grade shell was used to tag blocks falling within the shell relative to the block centroid. Blocks within the 5m1g shell were coded as high-grade (HG), and blocks outside the shell were coded as low-grade (LG). The grade shell is typically in close association with the B Pyroxenite and Harzburgite contact as defined by the ModPak geological interpretation.

14.4.3 Exploratory Data Analysis and Grade Estimation Domains

Compositing and EDA for UMT-MM Model

Five-metre length composites, controlled by the geological surfaces and wireframes were constructed. Composites that were less than 2.5 m in length were stitched onto the previous up-hole composite. Composites were tagged as either "HG" for inside the 5m1g shell or "LG" for outside of the shell.

Exploratory data analysis (EDA) was completed on 5 m composites. Histograms and probability plots for each metal were used to determine capping level thresholds (Table 14-8).

Outlier restriction grade thresholds and distances (Table 14-9) were determined from a review of cross-sections (after a preliminary grade estimation run). The capping levels and outlier restrictions shown apply to both the LG and HG composites.

The capping and outlier restriction resulted in reduction in the estimated metal in its capped/outlier-restricted model of 2% of the Ni and Cu, 12% of the Pt and Pd and 3% of the Au compared to an uncapped inverse distance model. Inspection of preliminary sections and plans showed a propensity for unreasonable overextension of high PGE grades in the uncapped model. This is typical for models supported by wide-spaced data, and AMEC views its capping and outlier restriction as appropriate.

Box plots for each metal were used to assess mineralization ranges and domain associations. These plots show higher mean grades for Harzburgite than for any other lithology. Contact profiles were used to determine soft/hard contacts and composite sharing between the Zcode domains for grade estimation. Statistics were reviewed to determine sample sharing for Pt, Pd and Au in the LG zone (Table 14-10) and HG zone (Table 14-11).

14.4.4 UMT-MM Block Model and Grade Estimation

The UMT-MM block model was constructed over the area of UMT drilling (refer to Figure 14-1). The blocks were oriented parallel to the mine grid coordinates. The overall model parent block size was 50 m x 50 m x 50 m, with the parent block size within the Platreef for grade estimation being 25 m x 25 m x 5 m. The geological surfaces and wireframes, and grade zones (HG for bulk model and nested shells for selective model) were coded to the blocks, allowing sub-celling along the contacts to a minimum size of 5 m x 5 m x 1 m. Densities were also coded to the blocks using the average values by zone code (refer to Table 11-3).

Table 14-8: Composite Capping Levels for UMT-MM Model

Zone	Zone Code	Ni (%)	Cu (%)	Pt (g/t)	Pd (g/t)	Au (g/t)
MZ	10	NE	NE	NE	NE	NE
UDZ	22	0.35	0.22	No Cap	1.20	0.35
UBP	23	0.70	0.32	4.00	3.00	0.65
UPXHA	24	1.00	0.60	2.50	2.50	0.50
UHABP	26	No Cap	0.35	2.50	3.00	0.50
UCZ	27	0.40	0.25	1.50	1.80	0.40
HF	28	0.28	0.40	0.90	1.10	No Cap
LDZ	32	0.40	0.30	0.60	No Cap	No Cap
LBP	33	0.45	0.30	No Cap	1.50	No Cap
LPXHA	34	0.90	0.70	3.50	2.00	0.50
LLPX	35	0.70	0.40	No Cap	1.50	0.40
LHABP	36	No Cap	0.35	No Cap	2.20	0.40
LCZ	37	0.38	0.28	No Cap	No Cap	0.28
LHA	39	No Cap	No Cap	No Cap	No Cap	No Cap
FL	40	NE	NE	NE	NE	NE

Note: NE = Not Estimated

Table 14-9: Outlier Restriction Thresholds for UMT MM-Mineable Model

Metal	Distance Threshold	Grade Threshold
Ni	150 m	0.40 %
Cu	150 m	0.30 %
Pt	100 m	1.0 g/t
Pd	100 m	1.0 g/t
Au	100 m	0.30 g/t

Note: Composite grade is capped beyond distance threshold.

Table 14-10: Grade Estimation Composite Sharing for LG Zone – UMT- MM Model

Zone (Block)	Zcode (Block)	Ni Sharing	Cu Sharing	Pt (LG) Sharing	Pd (LG) Sharing	Au (LG) Sharing
UDZ	22		23	—	—	—
UBP	23	24	22, 24	22, 24, 26	24	26
UPXHA	24	23	23, 32	23, 32	23, 32	32
UHABP	26	—	—	23	—	23
UCZ	27	28	23, 24			28
HF	28	27				27
LDZ	32		24, 33		24, 33	24
LBP	33		32	32	32	
LPXHA	34	35, 37	35	24, 35, 37	35, 37	36, 37
LLPX	35	34	34	34	34	34
LHABP	36					
LCZ	37	34		34	34	34

(1) Zcode = Zone Code. See Table 14-1.

Table 14-11: Grade Estimation Composite Sharing for HG Zone – UMT-MM Model

Zone (Block)	Zcode (Block)	Ni Sharing	Cu Sharing	Pt (HG) Sharing	Pd (HG) Sharing	Au (HG) Sharing
UDZ	22			23, 26	23, 26	—
UBP	23			22, 26	22, 26	26
UPXHA	24			27	27	32
UHABP	26			22, 23	22, 23	23
UCZ	27			24	24	28
HF	28					
LDZ	32			33, 34, 35, 36, 37	33, 34, 35	33
LBP	33			33, 34, 35, 36, 37	32, 34, 35	32
LPXHA	34			33, 34, 35, 36, 37	33, 35, 37	36, 37
LLPX	35			33, 34, 35, 36, 37	32, 33, 34	34
LHABP	36			33, 34, 35, 36, 37	37	34, 37
LCZ	37			33, 34, 35, 36, 37	36	34, 36

(1) Zcode = Zone Code. See Table 14-1.

Figure 14-13 to 14-16 show representative sections through the UMT mass mining model. The sections show nickel and 3PE grades in drill holes and blocks. The dashed line shows the lower boundary of the UMT-TCU resource model discuss above.

Figure 14-17 shows the blocks remaining for Mineral Resource reported in in the UMT mass mining model after clipping out blocks (gray) that are covered by the UMT-TCU model.

14.5 Open-Pit Resource Models

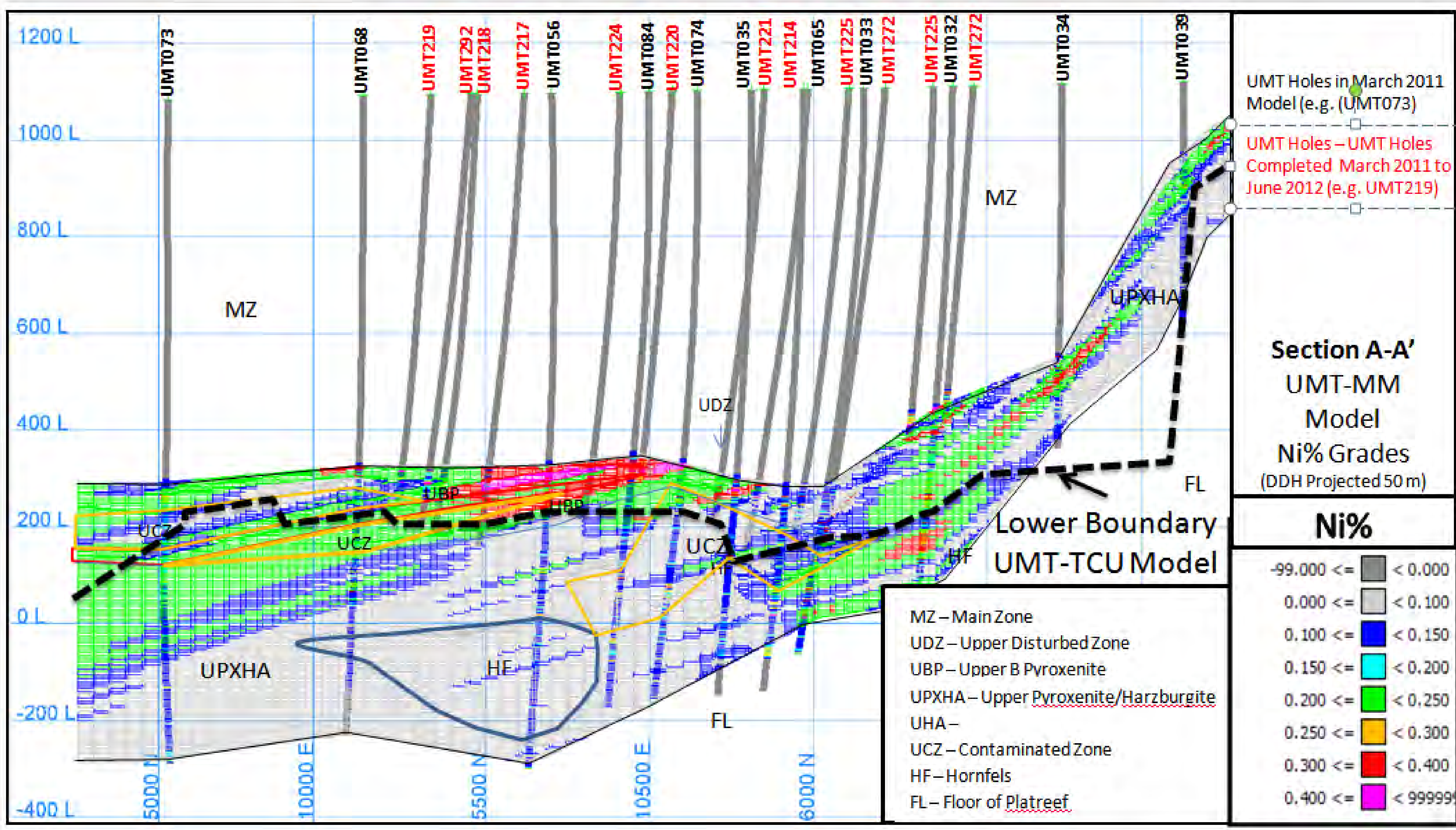
A summary is provided below; a more detailed description is provided in the September 2012 Technical Report.

The methodologies used for creating the block models and estimating Mineral Resources amenable to open-pit methods at AMK and ATS are similar.

Mineralization within the AMK deposit was modelled in 2003 and is referenced as the 'Version L' model (methodology used is described in Parker and Francis, 2002). The ATS resource model ('Version Q' model) was developed during 2002 and 2003 (AMEC 2003b). This model was used in conceptual studies (AMEC 2004c), which were used to support ATS open-pit Mineral Resources.

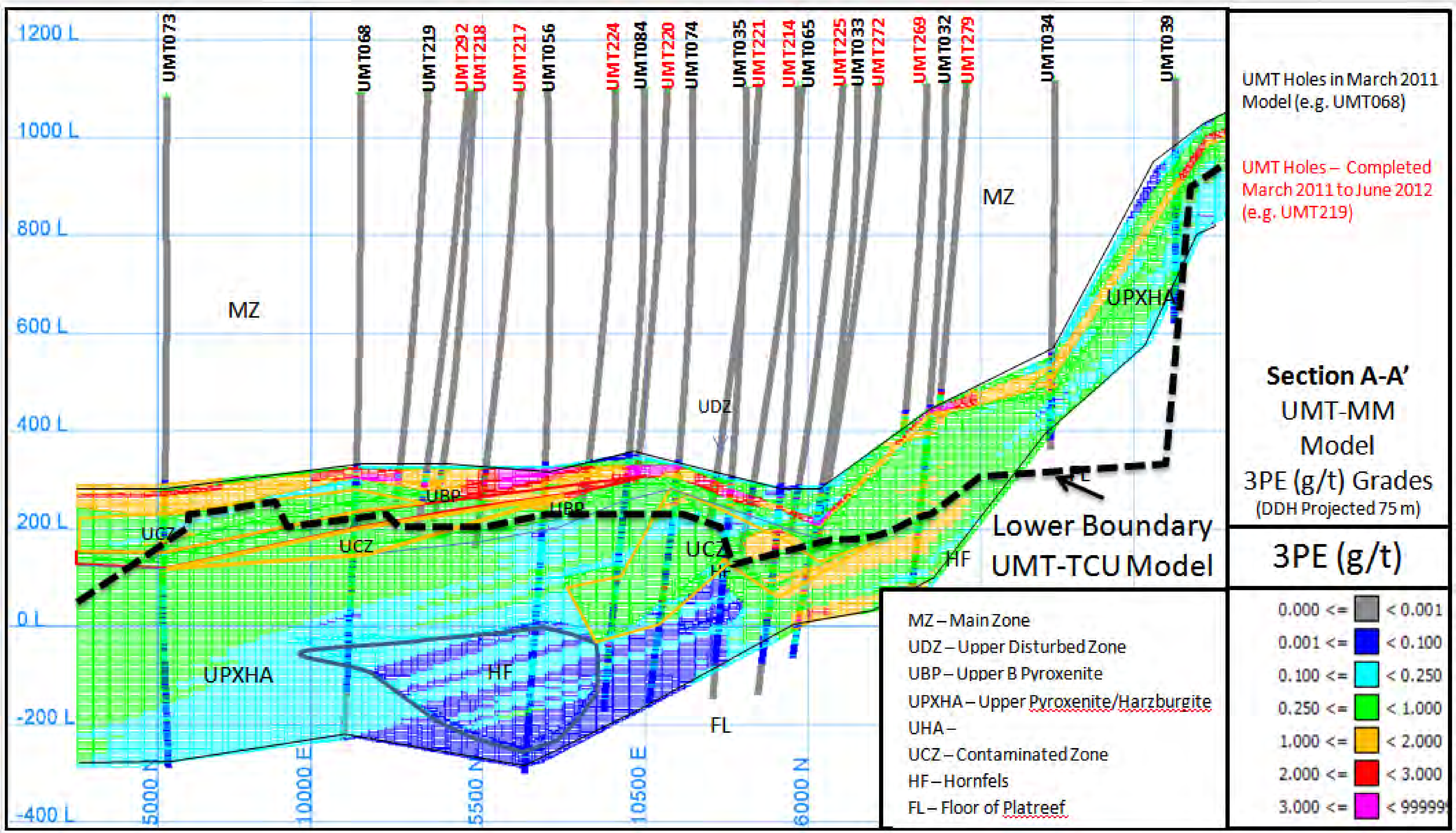
The drill-hole locations and open-pit resource model limits are also shown on Figure 14-1.

Figure 14-13:UMT Mass Mining Model – Cross-Section A-A' (Looking Northwest) Showing Ni%



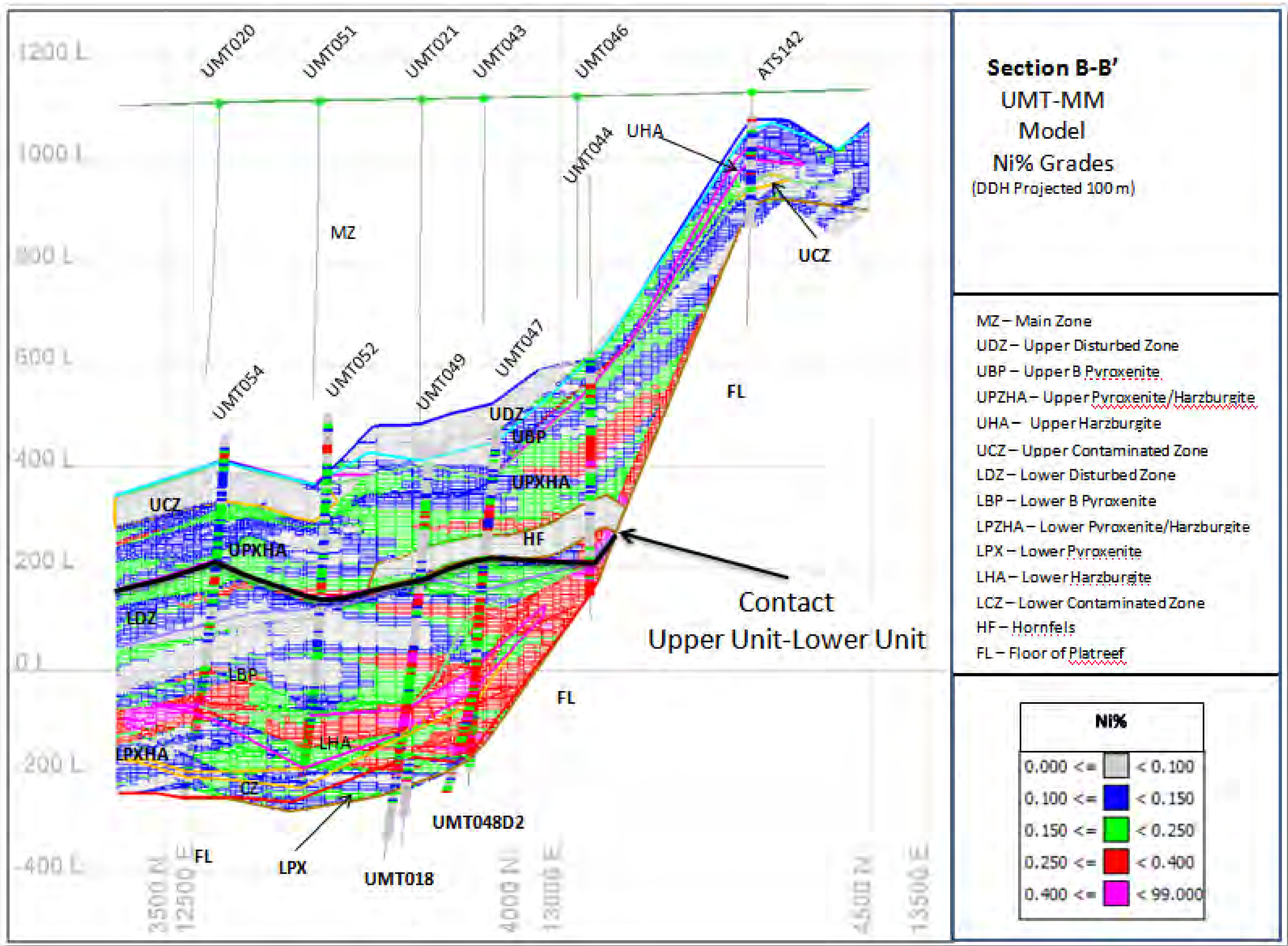
Note: Figure generated by AMEC, 2012

Figure 14-14: UMT Mass Mining Model – Cross-Section A-A' (Looking Northwest) showing 3PE (g/t)



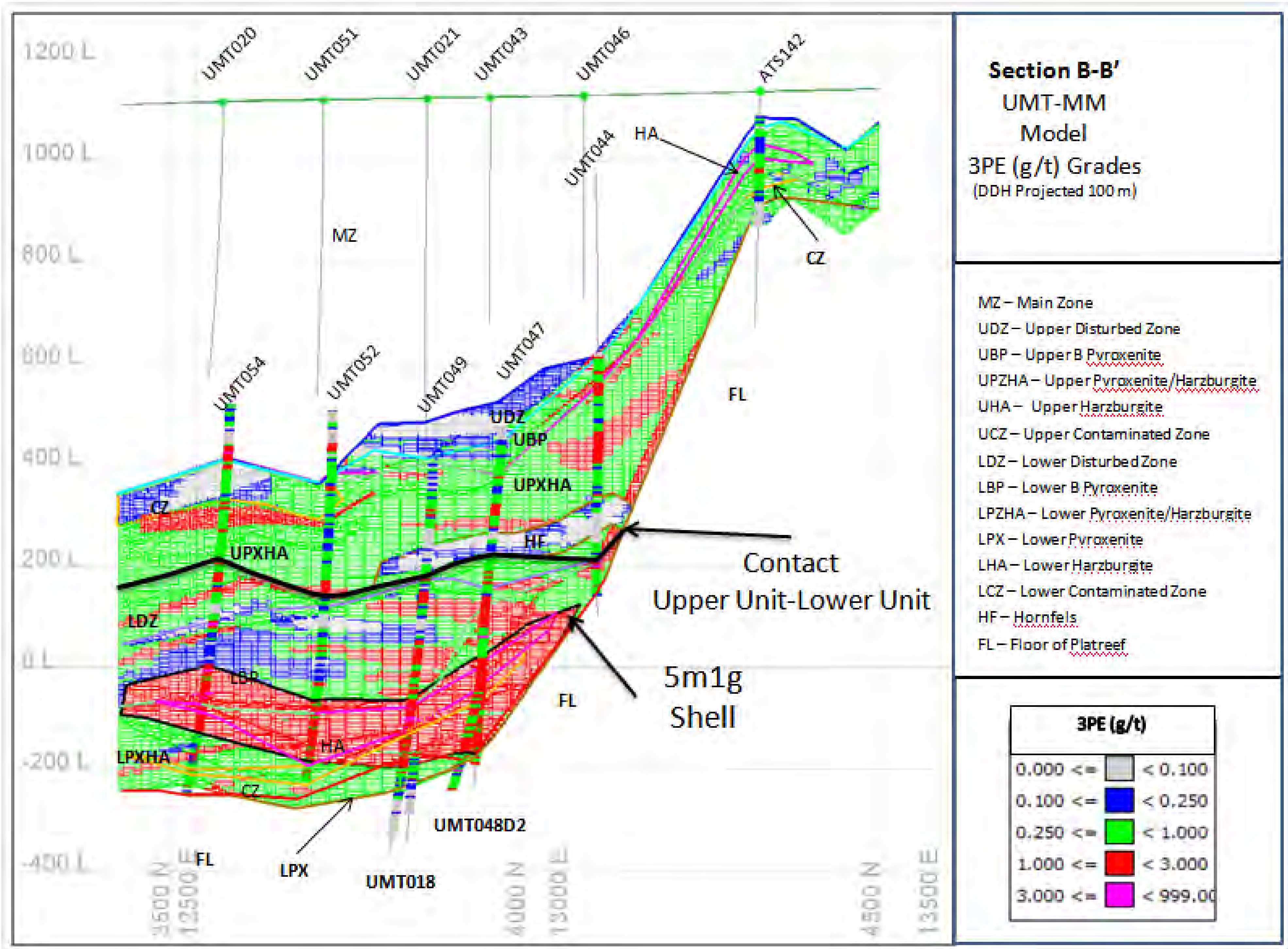
Note: Figure generated by AMEC, 2012

Figure 14-15:UMT Mass Mining Model – Cross-Section B-B' (Looking Northwest) Showing Ni%



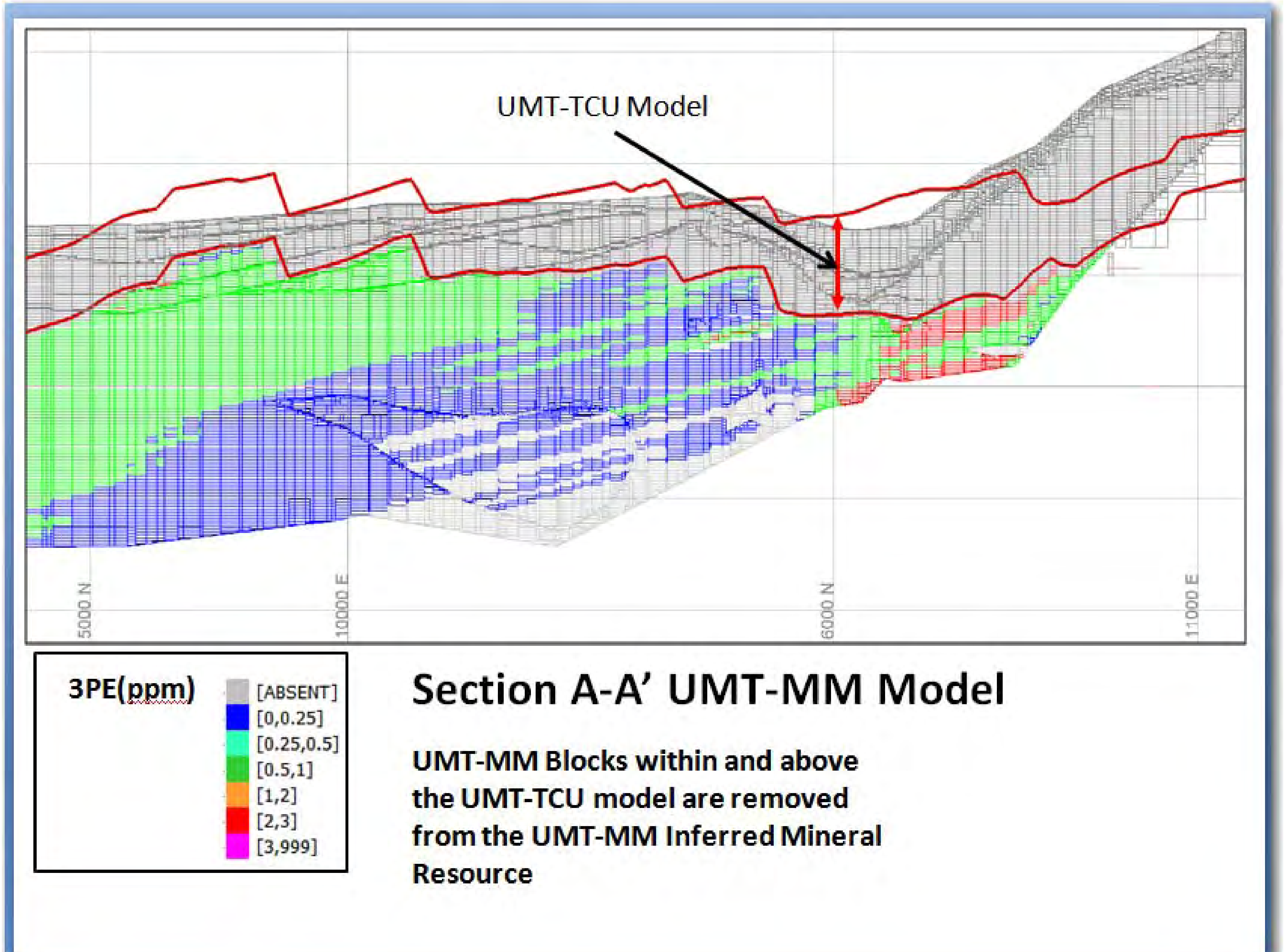
Note: Figure generated by AMEC, 2012

Figure 14-16:UMT Mass Mining Model- Cross-Section B-B' (Looking Northwest) Showing 3PE (g/t)



Note: Figure generated by AMEC, 2012

Figure 14-17: UMT-MM Inferred Mineral Resources Below UMT-TCU Model



14.5.1 Geological Models (Open Pit)

At both AMK and ATS, the hanging wall of the Platreef intrusive sequence is the Main Zone gabbronorite, and the footwall is the Transvaal Formation. Within the Platreef norites and pyroxenites (NPX), hornfels xenoliths (XE) of the Transvaal Formation and higher grade serpentinized peridotite–pyroxenite (SP) layers have been identified.

Hanging wall and footwall contacts were modelled as wireframe surfaces at ATS and AMK. The XE and SP units were modeled as wireframes for ATS. For AMK, these units were modelled probabilistically using indicator variables.

14.5.2 EDA and Grade Estimation Domains (Open Pit)

Grade estimation plans were developed by reviewing drill hole data on cross-sections and level plans, and a series of statistical plots (on 5 m composites and NN estimates) including box plots, histograms, probability plots, contact plots and variograms. Summaries of the observations made from this work are included in this section.

AMK Resource Area

The Platreef in the AMK model area is divided into two subzones. The main mineralized zone is Subzone 1 that occurs at the base of the Platreef and is predominantly ultramafic rocks (pyroxenites and serpentinized peridotites). Subzone 2 is spatially limited and occurs above Subzone 1; it is dominated by norites and gabbros and is not part of the Mineral Resource estimate.

Within Subzone 1, SP is the highest-grade lithology with the lowest-grade variability of the Platreef lithologies. NPX lithologies are lower-grade with similar variability to SP, particularly for platinum. XE is the lowest-grade unit with generally high grade variability. There is local mineralization within XE, particularly in dolomite. The low variability and levelling out at the top end of the grade distributions indicates an upper limit on grade, making it unnecessary to cap (or top-cut) the distributions before grade estimation. Such limits are commonly found where the geochemical environment constrains enrichment; i.e., there is equilibrium and no remobilization/concentration by secondary processes.

Contact grade profiles between the three groups in Subzone 1 indicated use of hard contacts for grade estimation was appropriate.

In general, correlations between the metals are very strong and linear, indicating origination from a high-temperature mono-sulphide solid-solution that exsolved pyrrhotite, chalcopyrite, pentlandite, and PGMs as it cooled with little evidence of significant metal zoning.

ATS Resource Area

ATS was divided into four spatial domains (from southeast to northwest: South, Middle, Embayment, and North) based on metal ratios and mineralization widths. Each domain was partitioned by a continuous to locally disrupted hornfels and/or marginal zone norite (MZN). The hornfels may have partitioned the magmas and/or prevented mixing or interaction of the magma with the floor. Each domain was subdivided into serpentinized peridotite (SP) and norites and pyroxenites (NPX).

Grade capping for the five metals was considered unnecessary because of the low-grade variability suggested by the CVs.

Minor grade discontinuities were identified at geological zone contacts. Geological zones with similar average grades were grouped for grade estimation. Hard boundaries were used for each of the regions and domains, except for XE.

Variograms (using the correlogram method) were estimated using Sage2001™ software for Cu, Ni, Au, Pt, Pd and dollar values inside each zone and hornfels unit using 5 m composites. Most variograms proved noisy and difficult to model; this was particularly true for zones with few composites.

14.5.3 Block Model and Grade Estimation (Open-Pit)

The estimation methodology for the AMK and ATS models was developed to improve local grade estimates without compromising global grade distributions. Grade estimates within the Platreef were completed for Cu, Ni, Au, Pt, and Pd using inverse distance to an appropriate power (IDP). The power value was adjusted such that the CVs of block grade distributions reasonably matched selective mining unit (SMU) targets. The variance of the block distribution is inversely proportion to the power used in inverse distance interpolation. The CVs of the SMU distributions were estimated using the volume–variance relationship which states that the variance is inversely proportional to the volume of support. Conceptual mining engineering studies completed on the ATS deposit determined a 15 m x 15 m x 10 m selective mining unit (SMU) was likely to be appropriate for the deposit.

For both models, the blocks were oriented parallel to the local mine grid, with domain coding and grade estimates completed on a whole block basis (i.e., no sub-celling). The proportion of each block below the topographic surface was stored.

No allowances were made in the open-pit models for external dilution; or contact boundary loss/waste dilution. Outside the Platreef, the lack of sulphides and generally low-grade assays permit a reasonable assumption that these blocks can be assigned as waste.

Data available at the time ATS and AMK were studied indicated that only sulphide copper and nickel were recoverable by metallurgical treatment processes; therefore, nickel and copper values are reported on a 'sulphide head grade' basis with no allowance made for metallurgical recovery.

AMK Resource Model

A block size of is 25 m x 25 m x 5 m was used for the AMK model. A single pass estimation run was made for each grade (Table 14-13). Block model Ni and Cu grades were adjusted by sulphide regressions before final reporting. Preliminary estimations were completed using ordinary kriging (OK), but the estimates were considered to be too smoothed for reporting global Mineral Resources.

A block size of is 25 m x 25 m x 5 m was used for the AMK model. A single-pass estimation run was made for each metal. Search ellipsoids and inverse distance power varied with domain (refer to Table 14-12). An octant search requiring a minimum of three octants with a maximum of two composites per octant was imposed for data selection. A block grade must be estimated with a minimum of six and a maximum of 24 composites.

Figures 14-18 and 14-19 show nickel and platinum grades for a section through the AMK deposit.

ATS Resource Model

A block size of 15 m x 15 m x 10 m was selected. Grades were estimated within the four regions, and three lithological domains (SP, XE, and NPX) of the Platreef. The same estimation plan was used for each element (Table 14-13). A three-pass setup was used for the estimation of grades with each pass having a progressively larger search ellipsoid; most blocks were estimated in Pass 1.

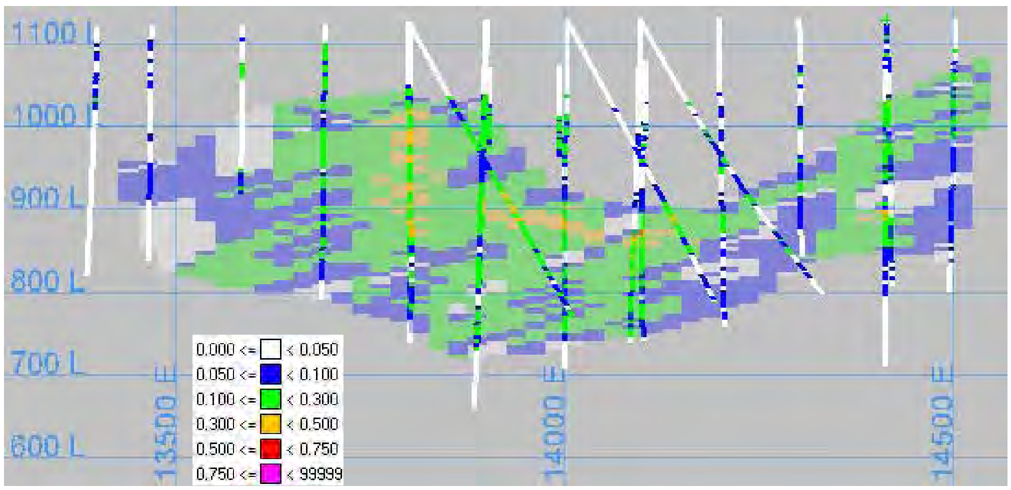
A sampling and assay program of the drill core from oxidized Platreef rocks was completed in late 2003, and a wireframe model of the oxidized and soil horizon was constructed. The average depth of oxidation is 30 m. Preliminary metallurgical results of oxidized material are not encouraging, and oxidized material is treated as waste.

Table 14-12: AMK Inverse Distance Estimation Parameters

Domain	ID Power	Ellipsoid Orientation(deg)		Search Distances (m)		
		Strike	Dip	X	Y	Z
SP	2.5	37	36 NW	200	200	30
XE	1.4	311	21 SW	200	200	30
NPX	6.0	311	21 SW	200	200	30

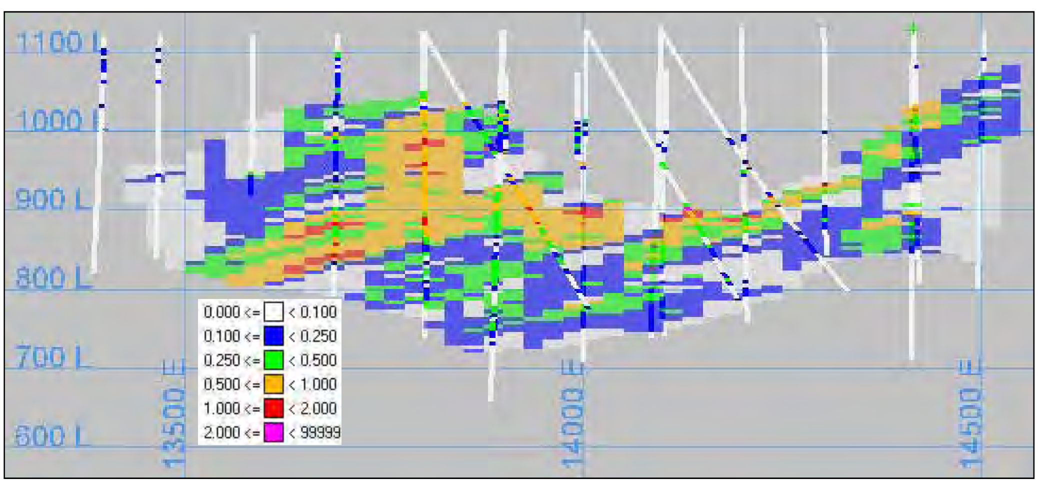
Note: The lengths of the search ellipsoid axes are shown in terms of rotated X, Y, Z, with Z being the pole to the "equatorial" plane of the ellipsoid

Figure 14-18: AMK Sulphide Ni (%) Block Estimates and Composites – Section 2500N (Version L Model, 2003)



Note: Section Looking North. Figure generated by AMEC, 2003

Figure 14-19: AMK Pt (g/t) Block Estimates and Composites – Section 2500N (Version L Model, 2003)



Note: Section Looking North. Figure generated by AMEC, 2003

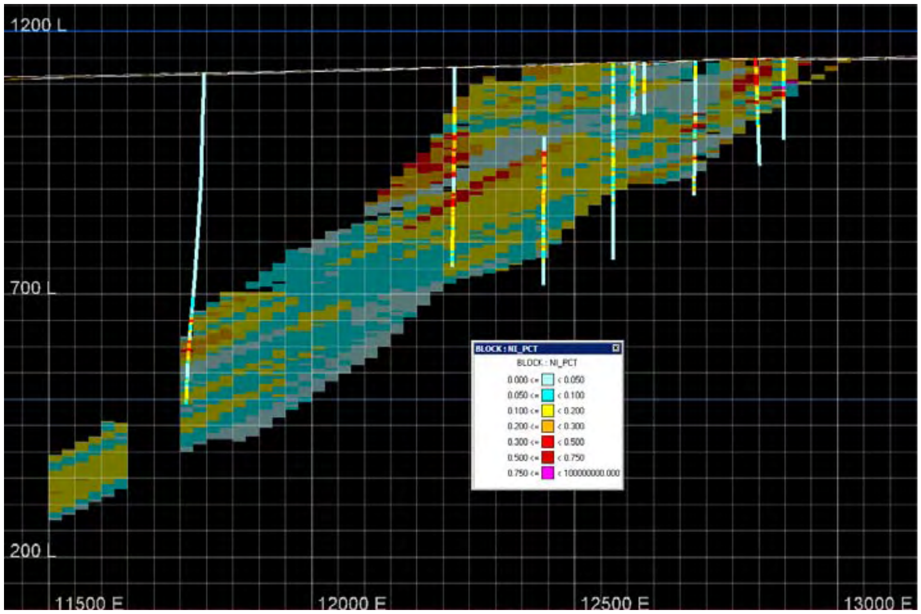
Table 14-13: ATS Inverse Distance Parameters

Domain	ID Power	Orientation(deg)		Pass 1 (m)			Pass 2 (m)			Pass 3 (m)		
		Strike	Dip	X	Y	Z	X	Y	Z	X	Y	Z
North												
SP	0.9	308	35 SW	150	150	25	250	250	25	300	300	50
XE	1.4	320	26 SW	150	150	25	250	250	25	300	300	50
NPX	5.0	308	35 SW	150	150	25	250	250	25	300	300	50
Middle												
SP	2.0	311	41 SW	150	150	25	250	250	25	300	300	50
XE	1.4	320	26 SW	150	150	25	250	250	25	300	300	50
NPX	4.4	311	41 SW	150	150	25	250	250	25	300	300	50
Embayment												
SP	3.5	308	38 SW	150	150	25	250	250	25	300	300	50
XE	1.4	320	26 SW	150	150	25	250	250	25	300	300	50
NPX	4.4	308	38 SW	150	150	25	250	250	25	300	300	50
South												
SP	2.5	48	25 SW	150	150	25	250	250	25	300	300	50
XE	1.4	320	26 SW	150	150	25	250	250	25	300	300	50
NPX	2.5	48	25 SW	150	150	25	250	250	25	300	300	50

Note: The lengths of the search ellipsoid axes are shown in terms of rotated X, Y, Z with Z being the pole to the "equatorial" plane of the ellipsoid

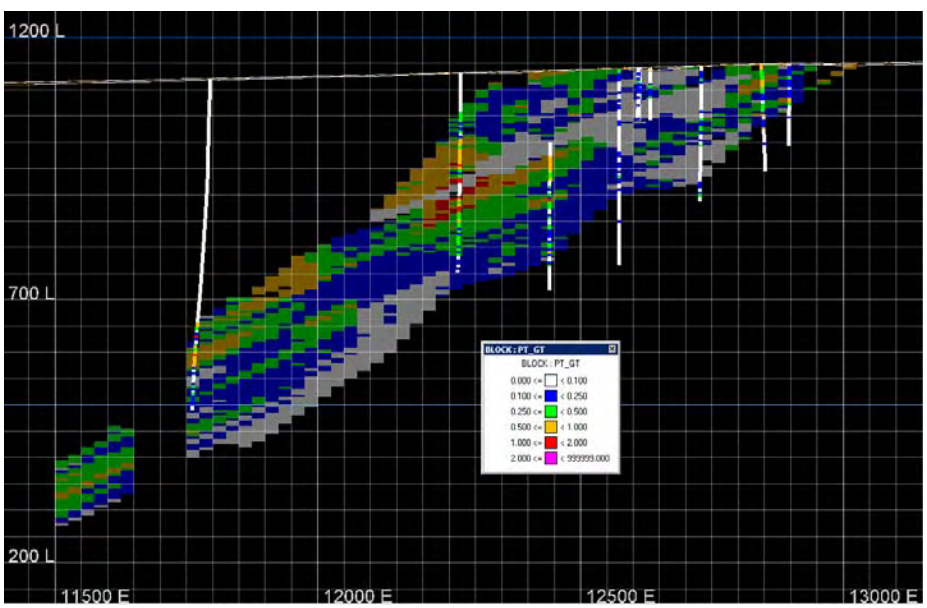
Figures 14-20 and 14-21 show nickel and platinum grades for a section through the ATS deposit

Figure 14-20: ATS Sulphide Ni (%) Block Estimates and Composites – Cross-Section 5850N (Version Q Model, 2003)



Looking North

Figure 14-21: ATS Pt (g/t) Block Estimates and Composites – Cross Section 5850N (Version Q Model, 2003)



Looking North

Note: Figures generated by AMEC, 2003

14.5.4 Density (Open Pit Models)

Bulk densities measured on drill core at site were used in tonnage estimates (Table 14-14). Section **Error! Reference source not found.** contains the description of the density sampling and measurement methodology.

14.5.5 Comments on Open-Pit-Models

Although the AMK model dates from 2003, it is suitable for conceptual studies. It does not contain allowances for block boundary loss or waste dilution at contacts. Eventually the AMK model should be connected with the UMT model to the north.

The ATS model is acceptable for preliminary mine planning, but will be locally inaccurate. The model will be high-biased in areas estimated to be high-grade and low-biased in areas estimated to be low-grade. The bias has been mitigated to some extent by infill drilling in the area where the drill spacing was reduced to 75 m x 75 m or 75 m x 100 m spacing. Additional infill drilling will be required to improve accuracy of grade estimation. The ATS model does not contain allowance for block boundary dilution or waste dilution at contacts, including the hanging wall and footwall of the Platreef and the contacts between XE (hornfels) and NPX or XE and SP.

Currently the TCU stratigraphic units are being correlated up-dip from the UMT-TCU model into the open pit area (ATS Model) and along strike southwesterly into the AMK area. Re-logging of ATS drill holes have identified the TCU sequence, though highly contaminated, in the open pit area. Though the Mineral Resource amenable to open pit mining is not presently the focus of the Platreef project, the reinterpretation of the geology in the open pit area will provide better information may increase the UMT-TCU resource above the current 650 elevation.

Table 14-14: Density Values for Tonnage Estimations

Rock	Density (g/cm^3)
AMK	
Platreef	3.07
Xenolith	2.80
Serpentinized Peridotite	3.04
ATS	
Main Zone	2.89
Serpentinite	3.01
Hornfels	2.85
Norite/Pyroxenite	2.99
Floor	2.85

14.5.6 Mineral Resource Classification (Open-Pit Models)

All Mineral Resources declared for AMK are in the Inferred category. Drill spacing is nominally on a 100 m grid, with Mineral Resources projected up to 200 m beyond drilling. At this spacing there is broad-scale continuity in grade and lithological domains, but on a local basis there is sufficient uncertainty as to domain position and grade to prevent classification of the Mineral Resources as Indicated.

Indicated and Inferred Mineral Resources reported for ATS are located above the 650 m elevation. Indicated Mineral Resources are drilled at 100 m x 75 m (locally 75 m x 75 m) spacings; at both of these spacings continuity of lithological domains and grade can be assumed. Inferred Mineral Resources are drilled at 100 to 200 m spacings.

14.6 Reasonable Prospects of Economic Extraction

14.6.1 Assumptions Made to Assess Reasonable Prospects for Economic Extraction

AMEC undertook a conceptual analysis to assess reasonable prospects for economic extraction for declaration of Mineral Resources. Underground mining methods considered are conventional, mechanized mining methods that have a reasonable safety factor.

Commodity Prices

AMEC considers that consensus long-term commodity prices should be used in declaration of Mineral Reserves and for purposes of financial analyses. Prices being used in conceptual studies that are in progress are $8.81/lb for Ni, $2.73/lb for Cu, $1,699/troy ounce for Pt, $667/troy ounce for Pd, and $1,315/troy ounce for Au. For rhodium, AMEC has used $2,065/troy ounce, which is based on the average of two values obtained from technical reports filed on Sedar ($1,875, $2,255).

On Site Operating Costs

For the selectively-mineable higher-grade scenario, a production rate of 3 Mt/a was assumed. Mining costs for some form of selective mining were estimated at approximately $40/t. Process and G+A costs for this case were estimated at an average of $12.50/t.

For the MM underground scenario, mining costs could vary from $9 to $35/t depending on whether block caving or some form of sub-level mining is used. For the MM underground case and open-pit case, a production rate of 10 Mt/a was assumed. Process and general and administrative (G+A) costs were estimated at an average of $12/t.

Process Recoveries

For the selective high-grade option, process recoveries are based on equations shown in Table 13-21. Typical recoveries for a T2U block are shown in Table 14-15.

For the open-pit cases, the process recoveries are taken from Section 13.1.1. These equations are based on Ni(s) and Cu(s) for nickel and copper.

For the MM underground case, the process recoveries are taken from Section 13.1.1 (serpentinite) regardless of the block lithology. This is a conservative assumption, given limited testwork. The equations are applied to total nickel (Ni).

Smelter Payables

AMEC assumed that a smelter would pay for 82% of the metals contained in the concentrates. This assumption is based on a survey made by Kramer (2012). It is likely to cost an average of $22t of concentrates (approximately $1/t of mineralized material) for road-freight to transport concentrates to a smelter, which for the purposes of assessing reasonable prospects, was assumed to be Rustenburg, in RSA.

There is some risk that if PGE concentrate grades are low, smelters would also levy treatment charges; on the other hand, it is envisioned that Platreef concentrates would be low in chromium, which might make them attractive to smelters whose feedstock primarily comes from Merensky and UG2 reef concentrates. AMEC's conceptual analysis does not include treatment charges.

Table 14-15: Typical Metallurgical Recoveries for a T2U Block

	Ni	Cu	Pt	Pd	Au	Rh
Block Grade	0.297 %	0.108 %	2.998 g/t	2.931 g/t	0.244 g/t	0.152 g/t
Recovery	56.8 %	49.8 %	80.9 %	81.7 %	58.6 %	84.4 %

Platreef concentrates could also be marketed to smelters outside RSA.

Royalty

The royalty has been assumed as 5% of smelter payables.

NSR (Net Smelter Return)

The NSR calculation assumes the smelter payables.

14.7 Mineral Resource Statement

Mineral Resource statements for Mineral Resources amenable to underground mining methods (UMT) and Mineral Resources amenable to open pit mining methods (ATS and AMK) are tabulated in this section.

Mineral Resources are reported on a 100% basis. Attributable ownership is discussed in detail in Section 4.0.

The following considerations were taken into account when making the decision to use a 650 m elevation to demarcate the base-case limit between Mineral Resources amenable to open pit mining methods and Mineral Resources amenable to underground mining methods:

- The ATS and UMT models overlap; therefore, a method for differentiating Mineral Resources amenable to open-pit or underground mining methods was required. Selecting the elevation is difficult at the current state of project knowledge. Various open-pit cases have been evaluated over the years resulting in pits bottoming at between the 660 m and 450 m elevation (540 m to 700 m vertical depths). The two cases run (and detailed) in 2003 (AMEC, 2003) bottomed at about the 660 m and 590 m elevations. The Indicated and some Inferred Mineral Resources lie within these pits
- In the ATS and AMK deposits, metallurgical recoveries were stated on a sulphide nickel basis, and the open-pit Mineral Resource models have sulphide nickel and copper. For the UMT deposit, metallurgical recoveries were stated on a total nickel

basis, and the underground Mineral Resource models use total nickel and copper. The distinction between sulphide and total nickel is necessary to perform the assessments of reasonable prospects of economic extraction for mineralization within the AMK, ATS and UMT deposits

- At elevations lower than 650 m, the open-pit models do not extend the entire way across the Platreef, and at elevations higher than 650 m, the underground models do not extend the entire way across the Platreef.

Future mining studies are likely to provide a reassessment of reasonable prospects of economic extraction for open-pit and underground scenarios. This may involve redefinition of the demarcation between Mineral Resources amenable to open pit or underground mining methods.

14.7.1 Mineral Resources Amenable to Underground Mining Methods

There are two mining scenarios that could exploit mineralization at depth within the Platreef:

- Selective mining within and adjacent to TCU mineralized zones.
- Mass mining

The selectively-mineable option is considered the Base Case for the purposes of this Report.

AMEC reviewed the potential to mass-mine lower-grade material, and presents the results as an additional and mutually exclusive case.

AMEC notes that conceptual mining studies are underway, and the preferred option could change, or a mixture of the two options could emerge as the recommended route for Project development.

Other considerations are:

- Concentrator and site G+A costs must be covered for reporting Mineral Resources
- Mining costs have been considered in setting the cut-off ($38/t for the selective case, and for the bulk case from $9/t to $35/t depending on whether block caving or some method of sub-level mining were used.

14.7.2 Base Case: Mineral Resource Statement (Estimate Assuming Selective Underground Mining Methods)

The TCU and adjacent blocks above T1, between T1 and T2 and below T2 contain higher-grade mineralization that could be mined using selective methods such as long-hole open-stoping, drift/cut and bench, drift-and-fill, bench-and-fill or cut-and-fill.

Table 14-16 shows Mineral Resources lying within and adjacent to the TCU mineralized zones.

Table 14-16: Mineral Resource Statement for Mineral Resources amenable to Selective Mining Methods; Effective Date 13 March 2013, Harry M. Parker RM.SME. and Timothy O. Kuhl, RM.SME.

Indicated Mineral Resources								
Tonnage and Grades								
Cutoff 4PE	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%)**
3 g/t	137.0	2.273	2.314	0.347	0.153	5.086	0.375	0.185
2 g/t	214.4	1.830	1.886	0.290	0.124	4.129	0.341	0.168
1 g/t	387.0	1.275	1.339	0.214	0.087	2.916	0.282	0.139
Contained Metal								
Cutoff 4PE		**Pt (Moz)**	**Pd (Moz)**	**Au (Moz)**	**Rh (Moz)**	**4PE (g/t)**	**Ni (Mlbs)**	**Cu (Mlbs)**
3 g/t		10.0	10.2	1.5	0.7	22.4	1,133.4	558.4
2 g/t		12.6	13.0	2.0	0.9	28.5	1,610.3	794.2
1 g/t		15.9	16.7	2.7	1.1	36.3	2,408.4	1,189.3
Inferred Mineral Resources								
Tonnage and Grades								
Cutoff 4PE	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%)**
3 g/t	211.4	2.085	2.063	0.336	0.143	4.627	0.378	0.183
2 g/t	415.0	1.565	1.592	0.268	0.108	3.534	0.331	0.163
1 g/t	1054.8	0.960	1.018	0.175	0.068	2.221	0.254	0.130
Contained Metal								
Cutoff 4PE		**Pt (Moz)**	**Pd (Moz)**	**Au (Moz)**	**Rh (Moz)**	**4PE (Moz)**	**Ni (Mlbs)**	**Cu (Mlbs)**
3 g/t		14.2	14.0	2.3	1.0	31.4	1,763.6	855.2
2 g/t		20.9	21.2	3.6	1.4	47.2	3,030.7	1,488.6
1 g/t		32.6	34.5	5.9	2.3	75.3	5,916.7	3,022.2

Notes:

(1) Mineral Resources estimated assuming underground selective mining methods are exclusive of the Mineral Resources estimated assuming mass-mining methods. The 2 g/t 4 PE cutoff is considered the Base Case for scoping studies in progress; the 3 g/t cutoff is also being considered.

(2) Mineral Resources are reported on a 100% basis.

(2) Mineral Resources are stated from approximately -200 m to 650 m elevation.

(3) The grade shells were determined using assumed commodity prices of Ni: $8.81/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz, Rh: $2.065/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that mining costs (average $40/t) and process, G&A, and concentrate transport costs (average $12.5/t for a 3 Mt/a operation) would be covered. The process recoveries vary with block grade but typically would be 85-90% for Pt, Pd and Rh; 65% for Au and 60% for Ni and 80% for Cu.

(4) Indicated Mineral Resources are drilled on approximately 100 X 100m spacing; Inferred Mineral Resources are drilled on 400 m x 400 m (locally to 400 m x 200 m and 200 m x 200 m) spacing.

(5) Totals may not sum due to rounding

AMEC tested the Mineral Resources for reasonable prospects for extraction. At a 2 g/t 4PE cutoff grade 80 to 85% of the blocks will generate an NSR/t of $50 or higher, meaning they will pay mining, process and G+A costs. An NSR/t of $50 is being considered by Ivanplats in scoping studies (in progress), with long-hole open stoping being the primary mining method. All of the blocks above a 1 g/t 4PE cut-off generate an NSR of $10/t, meaning they will cover nearly all process and G+A costs.

AMEC compared the tonnages, grades and contained metal in Table 14-16 to the tonnages, grades and contained metal stated in Ivanplats press release dated 5 February 2013. At the 2 g/t and 3 g/t 4PE cutoff grades being considered for scoping studies the AMEC tonnages and grades confirm those stated by Ivanplats. At the 1 g/t cutoff grade there has been some reclassification of Indicated to Inferred related to AMEC's classification of material in the footwall of the TCU that is sparsely sampled as Inferred Mineral Resources.

Table 14-17 shows the Inferred Mineral Resources lying within the Nested 1 g/t, 2 g/t and 3 g/t 3PE grade shells. This case illustrates what high-grade mineralization is present within the 1 g/t, 2 g/t and 3 g/t 3PE grade shells.

For the selectively-mineable underground base case, cut-offs for constraining grade shells have been presented in terms of 3PE, because the majority of the value is attributable to PGEs and gold. The Mineral Resources within the 1+2+3 g/t 3PE (nominal cut-off grade of 1 g/t 3PE), 2+3 g/t 3PE (nominal cut-off grade of 2 g/t 3PE) or 3 g/t 3PE (nominal cut-off grade of 3 g/t 3PE) grade shells have been estimated so that scoping mining studies could be performed using multiple options. The grade shells were constructed using 3PE = Pt+Pd+Au because rhodium assaying was incomplete at the time. Rhodium was subsequently assayed or estimated using regression, and its estimates are presented in tables below, along with a 4PE estimate (Pt+Pd+Au+Rh).

Table 14-18 tabulates the Mineral Resources that are adjacent to the grade shells.

Table 14-17: Mineral Resources Within Grade Shells Assuming Selective Underground Mining Methods, Effective Date 13 March 2013, Harry M. Parker RM.SME. and Timothy O. Kuhl, RM.SME.

Tonnage and Grades, Indicated Mineral Resources

Grade Shells	Mt	Pt (g/t)	Pd (g/t)	Au (g/t)	Rh (g/t)	4PE (g/t)	Ni (%)	Cu (%)	Cutoff	Mt	% of G.S.
3 g/t	121.1	2.335	2.376	0.353	0.157	5.221	0.379	0.187	3 g/t	115.9	96%
2 + 3 g/t	203.9	1.828	1.899	0.291	0.123	4.141	0.342	0.169	2 g/t	190.6	93%
1 + 2 + 3 g/t	264.6	1.568	1.637	0.257	0.107	3.568	0.320	0.157	1 g/t	262.0	99%

Contained Metal, Indicated Mineral Resources

Grade Shells	Pt (Moz)	Pd (Moz)	Au (Moz)	Rh (Moz)	4PE (g/t)	Cu (Mlbs)	Cu (Mlbs)
3 g/t	9.1	9.2	1.4	0.6	20.3	1011.4	498.4
2 + 3 g/t	12.0	12.4	1.9	0.8	27.1	1539.4	758.2
1 + 2 + 3 g/t	13.3	13.9	2.2	0.9	30.4	1866.2	914.0

Tonnage and Grades, Inferred Mineral Resources

Grade Shells	Mt	Pt (g/t)	Pd (g/t)	Au (g/t)	Rh (g/t)	4PE (g/t)	Ni (%)	Cu (%)	Cutoff	Mt	% of G.S.
3 g/t	184.7	2.130	2.116	0.348	0.146	4.741	0.388	0.187	3 g/t	177.5	96%
2 + 3 g/t	355.2	1.625	1.639	0.279	0.111	3.655	0.339	0.165	2 g/t	328.9	93%
1 + 2 + 3 g/t	548.4	1.306	1.323	0.230	0.090	2.950	0.301	0.147	1 g/t	540.0	98%

Contained Metal, Inferred Mineral Resources

Grade Shells	Pt (Moz)	Pd (Moz)	Au (Moz)	Rh (Moz)	4PE (g/t)	Ni (Mlbs)	Cu (Mlbs)
3 g/t	12.6	12.6	2.1	0.9	28.2	1580.2	762.7
2 + 3 g/t	18.6	18.7	3.2	1.3	41.7	2653.6	1288.9
1 + 2 + 3 g/t	23.0	23.3	4.1	1.6	52.0	3639.8	1776.5

Notes:

(1) Mineral Resources estimated assuming underground selective mining methods are exclusive of the Mineral Resources estimated assuming mass-mining methods. The grade shell rows are also not additive. The 3 g/t 3PE shell is included in the 2 + 3 g/t 3 PE shell, which is in turn included in the 1 + 2 + 3 g/t 3PE shell.

(2) Mineral Resources are reported on a 100% basis.

(2) Mineral Resources are stated from approximately -200 m to 650 m elevation.

(3) The grade shells were determined using assumed commodity prices of Ni: $8.81/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz, Rh: $2.065/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that mining costs (average $40/t) and process, G&A, and concentrate transport costs (average $12.5/t for a 3 Mt/a operation) would be covered. The process recoveries vary with block grade but typically would be 85-90% for Pt, Pd and Rh; 65% for Au and 60% for Ni and 80% for Cu. The Mineral Resources within the 1+2+3, 2+3 or 3 g/t 3PE grade shells have been estimated (at nominal cut-off grades of 1, 2 and 3 g/t 3PE respectively) to show sensitivity to cut-off grade and to provide multiple options for consideration in future mining studies. No allowances for mining recovery and external dilution have been applied.

(4) Indicated Mineral Resources are drilled on approximately 100 X 100m spacing; Inferred Mineral Resources are drilled on 400 m x 400 m (locally to 400 m x 200 m and 200 m x 200 m) spacing.

(5) Totals may not sum due to rounding

Table 14-18: Mineral Resources Adjacent to Grade Shells Assuming Selective Underground Mining Methods, Effective Date 13 March 2013, Harry M. Parker RM.SME. and Timothy O. Kuhl, RM.SME.

2 g/t 4PE Cutoff Grade, Indicated Mineral Resource								
Mineralized Zone	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%)**
HW	1.70	1.37	1.12	0.34	0.07	2.90	0.25	0.12
Middle	6.91	1.30	1.13	0.22	0.09	2.74	0.22	0.10
FW	6.09	1.18	1.15	0.16	0.08	2.57	0.25	0.14
Total	*14.70*	*1.26*	*1.14*	*0.21*	*0.08*	*2.69*	*0.23*	*0.12*

2 g/t 4PE Cutoff Grade Inferred Mineral Resource								
Mineralized Zone	**Mt**	**Pt (g/t)**	**Pd (g/t)**	**Au (g/t)**	**Rh (g/t)**	**4PE (g/t)**	**Ni (%)**	**Cu (%)**
HW	2.2	0.77	0.88	0.20	0.04	1.89	0.24	0.15
Middle	8.7	1.32	1.12	0.24	0.08	2.76	0.23	0.11
FW	44.0	1.03	1.21	0.17	0.08	2.49	0.27	0.15
Total	*54.9*	*1.06*	*1.18*	*0.18*	*0.08*	*2.51*	*0.26*	*0.14*

Notes:

(1) HW = above T1MZ, Middle = between T1MZ and T2MZ, FW = below T1MZ
(2) Mineral Resources estimated assuming underground selective mining methods are exclusive of the Mineral Resources estimated assuming selective mining within grade shells and mass-mining methods.
(2) Mineral Resources are reported on a 100% basis.
(3) Mineral Resources are stated from approximately -200 m to 650 m elevation.
(4) The Mineral Resources were determined using assumed commodity prices of Ni: $8.81/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz, Rh: $2.065/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that mining costs (average $40/t) and process, G&A, and concentrate transport costs (average $12.5/t for a 3 Mt/a operation) would be covered. The process recoveries vary with block grade but typically would be 85-90% for Pt, Pd and Rh; 65% for Au and 60% for Ni and 80% for Cu. No allowances for mining recovery and external dilution have been applied.
(5) Indicated Mineral Resources are drilled on approximately 100 X 100m spacing; Inferred Mineral Resources are drilled on 400 m x 400 m (locally to 400 m x 200 m and 200 m x 200 m) spacing.
(6) Totals may not sum due to rounding

14.7.3 Mineral Resource Statement for Mineralization Amenable to Underground Mining Methods (Estimate Assuming Mass-Mining Methods)

The Mineral Resources amenable to mass underground mining methods have been revised for transfer of much of the previous Upper Unit Top Loaded Zone to the Mineral Resources amenable to selective underground mining methods.

Table 14-19 shows a tabulation of the Mineral Resources amenable to underground mining, and estimated assuming mass-mining methods for the Platreef Project. The metallurgical laboratories (SGS Johannesburg, XPS Falconbridge Ontario and Mintek Johannesburg) report on a total nickel basis; therefore, this Mineral Resource is reported on a total nickel basis. Inferred Mineral Resources are reported at 0.15% Ni cut-off grade. This cut-off grade is justified using the commodity price assumptions discussed in Section **Error! Reference source not found.**. The Mineral Resources menable to mass mineable methods are all located in areas of wide spaced drilling (typically 400 x 400 m spacing). Only Inferred Mineral Resources are declared.

Comments on Mineral Resources Estimated Assuming Underground Mass Mining Methods

The geological logging and interpretation is the foundation for the underground resource model. Recognition of lithological controls on grade has enabled declaration of Inferred Mineral Resources at a wider spacing than would otherwise be possible. The Inferred Mineral Resource boundary is shown on Figure 14-2. The drill hole spacing is 400 m x 400 m or 400 m x 200 m, with local 200 m x 200 m coverage. Around the margins, the boundary is nominally 200 m from the closest drill hole. The bulk-mineable resource also includes material in Zone 1, where not all holes reached the footwall and the spacing was effectively 400 X 400 m.

The geometry of the Platreef in the Mineral Resource area that is amenable to underground mining methods is relatively complex, both in terms of thickness (150 m to 650 m) and dip (0° to 75°). Selection of mining methods and preparation of stope layouts is likely to require trade-off studies.

The declared Mineral Resources at the 0.15% Ni cut-off will provide an NSR/t of approximately $30. This should cover average mining, processing and G+A costs.

The resource model has been constructed using relatively wide-spaced data, and is therefore suitable for planning using bulk underground methods such as block caving, sub-level caving or sub-level open stoping. The degree of smoothing in the block model results from block size and estimation plans used, which reflects the currently-available data. The model is not suitable for planning a high-grade option using more selective mining methods typical of vein mining such as narrow open stoping or cut-and-fill mining.

Table 14-19: Inferred Mineral Resources (at 0.15% Ni (total) Cut-Off) Assuming Underground Mass Mining Methods, Effective Date 13 March 2013, Harry M. Parker RM. SME. and Timothy O. Kuhl, RM. SME.

Tonnage and Grades

Property	Mt	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)	% Ni	% Cu
Turfspruit	1,870	0.40	0.49	0.09	0.98	0.21	0.13
Macalacaskop	40	0.28	0.39	0.09	0.76	0.21	0.14
Total	*1,910*	*0.40*	*0.49*	*0.09*	*0.98*	*0.21*	*0.13*

(3PE =Pt + Pd + Au)

Contained Metal

Property	Pt (Moz)	Pd (Moz)	Au (Moz)	3PE (Moz)	Ni (Mlbs)	% (Mlbs)
Turfspruit	24.0	24.0	24.0	24.0	8,740	5,520
Macalacaskop	0.4	0.4	0.4	0.4	190	120
Total	*24.4*	*24.4*	*24.4*	*24.4*	*8,930*	*5,650*

Notes:

(1) Mineral Resources are reported on a 100% basis

(2) Mineral Resources are stated from the 650 m elevation downward to approximately -400 m elevation. The 2011 block model has been trimmed to exclude the 2013 block model for selectively mineable Mineral Resources.

(3) The cut-off grade (0.15% Ni) assumes commodity prices of Ni: $8.810/lb, Cu: $2.73/lb, Pt: $1,699/oz, Pd: $667/oz, Au: $1,315/oz. It has been assumed that payable metals would be 82% from smelter/refinery and that a mix of block cave and sub-level mining costs (averaging $20/t, and ranging from $9/t to $35/t), and process, G&A, and concentrate transport costs (average of $12/t) would be covered for a conceptual 10 Mt/a operation. Process recoveries are taken from metal-specific equations for serpentinite. Nickel is presented as an example where nickel recovery = ((9.3 *Ln (Ni head grade) + 84.9).

(4) Mineral Resources at the 0.15% Ni cut-off grade occur in continuous zones; there are a relatively minor number of blocks inside these zones that are below cut-off and have been excluded.

(5) Inferred Mineral Resources are based on an area drilled on approximately 400 m x 400 m (locally 400 m x 200 m and 200 m x 200 m) spacing.

(6) Totals may not sum due to rounding

14.7.4 Mineral Resources Amenable to Open-Pit Mining Methods

The Mineral Resources amenable to open-pit mining methods have not been updated from the last Technical Report (September 2012).

Mineral Resources that could be exploited by open-pit mining methods include Platreef mineralization at ATS and AMK.

About half of the Mineral Resources that could be extracted using open-pit mining methods are classified as Inferred Mineral Resources. Infill drilling has been completed for a portion of ATS at a nominal drill hole spacing of 75 m x 100 m (refer to Figure 14-2), and this area has been classified as Indicated Mineral Resources. Inferred Mineral Resources are estimated outside the area of the infill drilling and above the 650 m elevation (or to an approximate depth below topography of 500 m).

Grade and lithological continuity at the infill drilling density appear to be reasonably predictable. No Indicated Mineral Resources exist outside of the area of infill drilling because the drill hole spacing is often too wide to assume continuity of lithology (and thereby grade, which depends on lithology) between points of observation.

A 0.10% sulphide Ni cut-off was selected to declare Mineral Resources that are amenable to open pit mining methods, as the total precious and base metals grade of the blocks above this cut-off grade are considered to cover projected conceptual operating costs.

Table 14-20 provides a tabulation of Mineral Resources for the Platreef Project that could be mined using open pit methods.

Table 14-20: Indicated and Inferred Mineral Resources at 0.1 % Sulphide Nickel Cut-off that are Amenable to Open-Pit Mining Methods, Effective Date 31 March 2011, Harry M. Parker, RM.SME. and Timothy O. Kuhl, RM.SME.

Property/Deposit	Mt	% Ni Sulphide	% Cu Sulphide	Pt (g/t)	Pd (g/t)	Au (g/t)	3PE (g/t)
ATS – Indicated							
Turfspruit 241-KR	470	0.20	0.14	0.34	0.45	0.09	0.87
Rietfontein 2-KS	40	0.21	0.17	0.28	0.41	0.09	0.78
Total ATS Indicated	520	0.20	0.14	0.33	0.44	0.09	0.86
ATS – Inferred							
Turfspruit 241-KR	260	0.16	0.10	0.41	0.47	0.10	0.97
Rietfontein 2-KS	0	0.00	0.00	0.00	0.00	0.00	0.00
Total ATS Inferred	260	0.16	0.10	0.41	0.47	0.10	0.97
AMK – Inferred							
Macalacaskop	250	0.17	0.11	0.52	0.55	0.10	1.18
Total – Open Pit (AMK + ATS)							
Indicated	520	0.20	0.14	0.33	0.44	0.09	0.86
Inferred	510	0.16	0.10	0.46	0.51	0.10	1.07

3PE = Pt + Pd + Au

Notes:

(1) Mineral Resources are reported on a 100% basis.
(2) Mineral Resources are stated from 650 metre elevation to surface (approximately 500 metres depth extent). A selective mining unit (SMU) of 15 m x 15 m x 10 m has been assumed. External dilution has not been applied. At a 0.1% sulphide nickel cut-off grade, the mineralization is continuous.
(3) The 0.1% sulphide Ni cut-off grade is based on assumed costs and metal prices. Commodity prices were assumed to be Ni: $9.20/lb, Cu: $3.00/lb, Pt: $1785/oz, Pd: $650/oz, Au: $1,265/oz.
(4) Concentrator, G&A and concentrate transport costs are estimated to average $11/t for a conceptual 10 Mt/a operation. Mining costs are estimated at an average of $5/t.
(5) Indicated Mineral Resources are based on an area drilled on approximately 75 m x 100 m spacings.
(6) Inferred Mineral Resources are based on an area drilled on approximately 120 m x 140 m spacings.
(7) Totals may not sum due to rounding.

Comments: Mineral Resources Amenable to Open-Pit Mining Methods

Mineral Resources should at least pay for concentrator, site G+A and concentrator transport costs, which are assumed to be approximately $11/t. An $11/t NSR cut-off is approximately equivalent to a 0.05% sulphide nickel cut-off.

There has been little metallurgical testwork on samples below 0.15% sulphide nickel (AMEC, 2003); hence base-case Mineral Resources for the mineralization that may be amenable to open-pit extraction methods are declared at a 0.10% sulphide nickel cut-off grade. This cut-off grade is approximately equivalent to an NSR cut-off grade of $25/t (ATS) to $30/t (AMK).

The current drill hole spacing for Indicated Mineral Resources (75 m x 100 m) is sufficient to assume continuity of geology and mineralization between points of observation. The drill hole spacing will need to be reduced in order to support a feasibility study. The aim would be to increase the overall resource estimation confidence for the deposit, with the intention of improving the classification of some or all of the Mineral Resources from Indicated to Measured, and potentially from Inferred to Indicated.

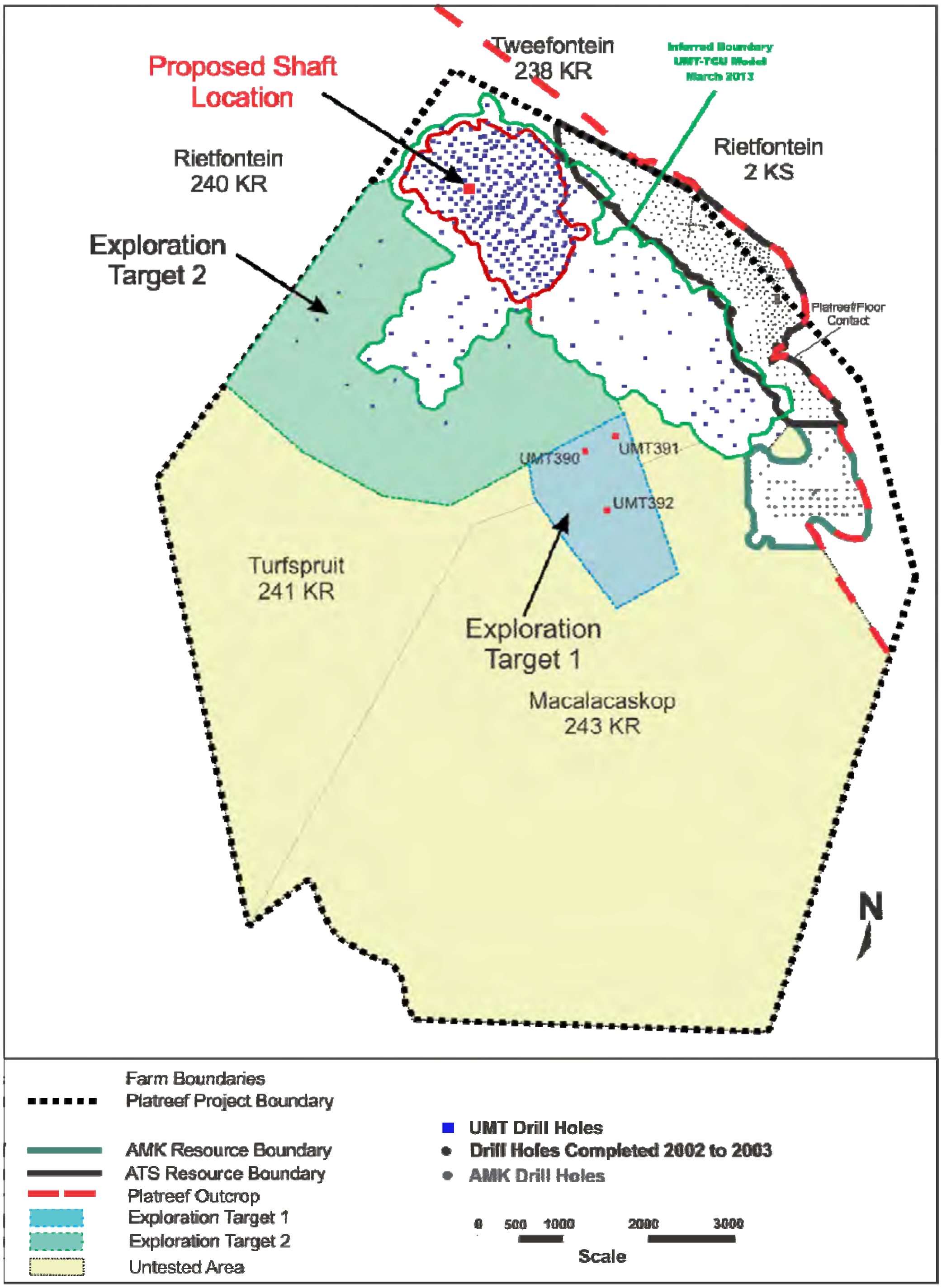
Additional detailed drilling is required to evaluate the effect of block boundary loss and external dilution at contacts between the Platreef and floor rocks, norite/pyroxenite and xenoliths, and serpentinized pyroxenite and xenoliths. This could result in a downside impact on grade and/or tonnage of Mineral Resources, which is not able to be predicted with the current data. Alternatively the ability to mine more selectively on a local basis should be studied, and this could have a positive impact on future Project economics.

Under the CIM Definition Standards (CIM, 2010), a Mineral Resource must have reasonable prospects for economic extraction. The Inferred Mineral Resources at both Turfspruit and Macalacaskop lie within 500 m of the surface and are potentially accessible by open-pit mining methods. The Indicated Mineral Resources have been shown to fall within a conceptual pit shell. Part of the Inferred Mineral Resources lies below the conceptual pit shell. Scoping studies are required to define the interface between the open-pit and underground methods, and there is a risk that a portion of the Inferred Mineral Resources may be shown to be sub-economic.

14.8 Exploration Targets

Beyond the current Mineral Resources, mineralization is open to expansion to the south and west. Two exploration targets have been identified (Figure 14-22).

Figure 14-19:Exploration Targets



Target 1 is based on results from three step-out holes released 12 November 2012 and is estimated to contain up to an additional 31 to 62 million tonnes grading 3.36 to 5.03 g/t 4PE, 0.26% to 0.38% nickel and 0.13% to 0.19% copper over an area of 2.5 square kilometres.

Target 2 surrounds the declared Mineral Resources and contains an estimated additional 50 to 220 million tonnes grading 2.9 to 4.1 g/t 4PE, 0.24% to 0.32% nickel and 0.12% to 0.16% copper over an area of 7.6 square kilometres. The tonnage and grades are based on intersections of mineralization in adjacent drill holes within the Inferred Mineral Resources.

AMEC cautions that the potential quantity and grade of these exploration targets is conceptual in nature. There has been insufficient exploration and/or study to define these exploration targets as a Mineral Resource. It is uncertain if additional exploration will result in these exploration targets being delineated as a Mineral Resource.

Technical operations on site are focused on re-logging of shallow drillholes to extend the new geological model of mineralization over the entire Platreef property. Drilling operations were curtailed in November 2012 following notice from the Department of mineral Resources (DMR) due to community concerns over compensation issues. Discussions are ongoing with the DMR and all key stakeholders.

Beyond these Exploration Target areas is approximately 37.5 km^2 of unexplored ground on the property under which the Platreef is projected to lie. It is not possible to estimate a range of tonnages and grades for this ground. There is excellent potential for mineralization to significantly increase with further step-out drilling to the southwest

14.9 Comments on Section 14.0

The QPs are of the opinion that the Mineral Resources for the Project, which have been estimated using core-drill data, have been performed to industry best practices (CIM, 2003), and conform to the requirements of CIM Definition Standards, 2010.

Since the commencement of exploration in the UMT area, iterative mineral resource estimates between 2010 and 2011 have led to a progressive increase in the tonnage of Inferred Mineral Resources. With the inclusion of results from the ongoing drill program in an update of the block model, higher confidence categories upgrades are supported, and should permit completion of more detailed mining studies.

Permitting, environmental, legal and socio-economic issues which may impact the Mineral Resource estimates are discussed in Section 4.13. Infrastructure considerations which may also impact the Mineral Resource estimates are discussed in Section 5.6.

Taxation considerations that are broadly applicable to the project are outlined in Section 4.2.4; taxation specific to the Project would be determined during more detailed studies. A general discussion of risk factors, appropriate to a Project that has a Mineral Resource estimate, is included in Section 25.

Other areas of uncertainty that may materially impact the Mineral Resource estimates include:

- Confirmation of the renewal of the Rietfontein prospecting licence has not been granted. The Mineral Resources amenable to open-pit methods on Macalacaskop are not expected to be affected; however, Mineral Resources amenable to open-pit methods as declared for Turfspruit and Rietfontein would have to be re-evaluated without a valid prospecting licence on Rietfontein.
- Monitoring of regulatory requirements needs to be improved. Continued instances of non-compliance could provide grounds for revocation of the Prospecting Licence held by Ivanplats or imposition of additional terms and conditions.
- Assumptions used to generate the conceptual data for consideration of reasonable prospects of economic extraction including:
  - Long-term commodity price assumptions
  - Long-term exchange rate assumptions
  - Assumed mining method
  - Operating and capital cost assumptions
  - Metal recovery assumptions
  - Concentrate grade and smelting/refining terms.
- For the UMT deposits metallurgical sampling has focussed on higher grade TCU composites. The testing of lower grade material within and adjacent to the TCU has not been done
- Additional metallurgical sampling is planned once the updated geological interpretation has been validated; the ability to select samples from specific mineralization layers may result in changes to the metallurgical recovery and smelter payables assumptions used to evaluate reasonable prospects of economic extraction

Mineral Resources have been estimated on an externally undiluted basis and without consideration for mining recovery. Dilution and recoveries will vary with the geometry (dip, thickness, faulting and or irregularities in contacts) of the mineralization and the eventual mining method used. These factors can only be estimated after life-of-mine plans are prepared. Typically dilution (low-grade or waste materials) ranges from 10% to 30%, and mining recoveries range from 70% to 100% using the mining methods considered for evaluation of reasonable prospects of economic extraction.

Ivanplats and its contractors (AMEC, Stantec and SRK) are performing conceptual studies to evaluate underground options for project development.

To support these studies AMEC recommends the following:

- Relogging ATS and AMK holes consistent with the new geological interpretation
- Re-modelling ATS and AMK using the UMT litho-stratigraphic units and interpolation using total nickel and copper
- Combining the ATS, AMK and UMT (bulk mineable) resource models into a single model or if not feasible, separate models defined on a common basis
- Revising metallurgical recovery equations for ATS and AMK so they are on a total nickel basis.

This will put all models on the same litho-stratigraphic and assay (total) basis.

15.0 MINERAL RESERVE ESTIMATES

This Section is not relevant to this Report.

16.0 MINING METHODS

This Section is not relevant to this Report.

17.0 RECOVERY METHODS

This Section is not relevant to this Report.

18.0 PROJECT INFRASTRUCTURE

This Section is not relevant to this Report.

19.0 MARKET STUDIES AND CONTRACTS

This Section is not relevant to this Report.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

This Section is not relevant to this Report.

21.0 CAPITAL AND OPERATING COSTS

This Section is not relevant to this Report.

22.0 ECONOMIC ANALYSIS

This Section is not relevant to this Report.

23.0 ADJACENT PROPERTIES

This Section is not relevant to this Report.

24.0 OTHER RELEVANT DATA AND INFORMATION

Ivanplats has commissioned a number of firms to complete initial studies in support of a planned Preliminary Economic Assessment (PEA) on the Project. The current status of these supporting documents is summarized below.

Mining studies are focusing on resource blocks with NSRs above $50/t. Long-hole stoping and benching and drifting with fill methods were selected. These studies are being undertaken by AMEC with support from Stantec and SRK. No interim results are available, with the exception of the initial geotechnical assessment, which is included in Section 9.6.

The studies will:

- Review throughput tonnage rate assumptions used to evaluate reasonable prospects for extraction (4, 8 and 12 Mt/a) and assess other throughput levels
- Evaluate and design appropriate mining methods, applicability, productive capacity, and associated resources of the deposit
- Consider the most appropriate mining methods
- Assess the underground haulage (conveyor or truck) and infrastructure access (shaft) that would best suit the selected mining methods

From these initial assessments, the selected throughput rate, mining method, and access and haulage criteria will be used to develop the PEA.

Given the thickness of mineralization and the potential for base metal credits, Ivanplats is currently considering a mine plan that will incorporate cost-efficient, conventional mechanized mining which will in turn support high safety standards.

Metallurgical testwork has been performed at SGS Johannesburg, XPS, and Mintek during 2010–2012 and is ongoing in 2013 at Mintek and SGS Johannesburg. A conceptual flowsheet was developed consisting of three stages of crushing, ball milling and classification, rougher, scavenger flotation and two stages of cleaner flotation, tailings handling, and concentrate thickening, filtration and storage. Preliminary results from this testwork have been used to prepare the Mineral Resource estimate in Section 14.0.

In February 2011, Ivanplats commissioned Digby Wells, an environmental consulting firm based in South Africa, to develop a detailed scope of work to provide Ivanplats with appropriate baseline data that could be used to support an application for a mining licence. The Mining licence application will be submitted to the Department of Mineral Resources in Q2 2013. The studies are on-going.

Golder Associates have been evaluating the hydrological and hydrogeological baseline information available for surface water and groundwater. Golder Associates has completed preliminary (and interim) reports; information available from the preliminary work completed is discussed in Section 9.7.

Several potential sites for tailings disposal were identified. Sites reviewed are located in unpopulated areas. Geotails Pty Ltd has completed the following in support of tailings dam design:

- Fatal-flaw analysis of three potential sites, and completion of a ranking matrix for each site from an engineering perspective
- General tailings facility layout plan and preliminary construction design
- Preliminary water balance assessment
- Consideration of storm waters and likely required diversion structures
- Preliminary closure considerations

Additional work was recommended, and includes geotechnical assessments of the site selected for the purposes of the planned PEA, condemnation drilling, determination of potential borrow sources, development of seepage and groundwater models in the preferred site area, and assessments of the geological and geochemical characteristics of the tailings material.

An exploration shaft is currently proposed that would be used to obtain sufficient material from each of the two main geometallurgical mineralization types known to run pilot-plant flotation tests on each, and on a blend of the two materials. A Bulk Sample Application was lodged with the Department of Mineral Resources in September 2012. Additional information would be obtained from the shaft, including:

- Obtain a bulk sample to determine the differences between the actual mined grades, and the predicted grades
- Conduct pilot plant testwork and facilitate process flowsheet development
- Confirm geological continuity
- Detailed structural / joint set mapping
- In-situ stress measurement.

In early 2012, Ivanplats commissioned a set of studies that will evaluate, from both technical and economic perspectives, the following smelter or hydrometallurgical technology options:

- Pyrometallurgical plant
  - Flash smelting furnace to produce a Cu/Ni/PGM mixed matte
  - Submerged arc AC furnace to produce a Cu/Ni/PGM mixed matte
  - ConRoast process to produce a Cu/Ni/PGM mixed alloy
- Hydrometallurgical plant
  - PlatSol process to produce nickel oxide and copper sulphide with PGM
  - Kell process to produce $PtCl_4$
  - Ni electrowon (EW) and Cu cementation (BCL option) to produce nickel cathode and copper sulphide with PGM

A number of production scenarios are to be included in the evaluations, including selling of the basic concentrate from concentrate from an on-site concentrator plant, construction of a hydrometallurgical plant on site, toll smelting, or potential creation of a joint venture vehicle to undertake custom smelting.

25.0 INTERPRETATION AND CONCLUSIONS

The QPs are of the opinion that the Mineral Resources for the Project, which have been estimated using core-drill data, have been performed to industry best practices (CIM, 2003), and conform to the requirements of CIM Definition Standards, 2010.

Since the commencement of exploration in the UMT area, iterative mineral resource estimates between 2010 and 2011 have led to a progressive increase in the tonnage of Inferred Mineral Resources. With the inclusion of results from the ongoing drill program in an update of the block model, higher confidence categories upgrades are supported, and should permit completion of more detailed mining studies.

Permitting, environmental, legal and socio-economic issues taxation and infrastructure considerations which may also impact the Mineral Resource estimates are typical of advanced-stage exploration and development projects in Southern Africa. It is the QPs' opinion that there is a reasonable expectation that Ivanplats and various stakeholders can reach agreement to develop the Project.

Other areas of uncertainty that may materially impact the Mineral Resource estimates include:

- Confirmation of the renewal of the Rietfontein prospecting licence has not been granted. The Mineral Resources amenable to open-pit methods on Macalacaskop are not expected to be affected; however, Mineral Resources amenable to open-pit methods as declared for Turfspruit and Rietfontein would have to be re-evaluated without a valid prospecting licence on Rietfontein.
- Monitoring of regulatory requirements needs to be improved. Continued instances of non-compliance could provide grounds for revocation of the Prospecting Licence held by Ivanplats or imposition of additional terms and conditions.
- Assumptions used to generate the conceptual data for consideration of reasonable prospects of economic extraction including:
  - Long-term commodity price assumptions
  - Long-term exchange rate assumptions
  - Assumed mining method
  - Operating and capital cost assumptions
  - Metal recovery assumptions
  - Concentrate grade and smelting/refining terms.

- For the TCU deposits metallurgical sampling has focused on higher grade composites approximating the average grade of the deposit – assuming the base case cut-off of 2 g/t 4PE is applied. The testing of lower grade material within and adjacent to the TCU, or very high grades within the TCU, has not currently been done
- Additional metallurgical sampling is planned once the updated geological interpretation has been validated; the ability to select samples from specific mineralization layers may result in changes to the metallurgical recovery sand smelter payables assumptions used to evaluate reasonable prospects of economic extraction

Mineral Resources have been estimated on an externally undiluted basis and without consideration for mining recovery. Dilution and recoveries will vary with the geometry (dip, thickness, faulting and or irregularities in contacts) of the mineralization and the eventual mining method used. These factors can only be estimated after life-of-mine plans are prepared. Typically dilution (low-grade or waste materials) ranges from 10% to 30%, and mining recoveries range from 70% to 100% using the mining methods considered for evaluation of reasonable prospects of economic extraction.

Ivanplats and its contractors (AMEC, Stantec and SRK) are performing conceptual studies to evaluate open-pit and underground options for project development. The planned exploration shaft will provide access to the TCU, will provide the means of taking a bulk sample, will enable trial mining, and will allow assessment of the short-scale variability of mineralization/waste contacts.

26.0 RECOMMENDATIONS

Ivanplats has provided AMEC with a two-phase work program; the first phase of which is focused on drilling. The second phase, which will be conducted concurrently with the first, is the sinking of an exploration shaft.

26.1.1 Phase 1

Ivanplats has identified an area shown on Figure 26-1 that it refers to as Zone 1. Due to the relatively higher vertical thickness (nominally 20 m to 30 m) of the combined 2 g/t and 3 g/t 3PE grade shells in this area, it represents a potentially attractive locale to base initial mining studies. Ivanplats is also investigating Zone 5, which is located to the southwest of Zone 1.

- Zone 1: Drilling proposed will continue to test the down-dip extensions to the "Area1" mineralization as far as the interpreted Kgobudi Fault. Drilling will also be undertaken to provide geotechnical, metallurgical and infill data in the area of the proposed exploration shaft.
- Zone 5 contains the Southwest Extension exploration target. The proposed drilling target is a potential structurally-controlled continuation of the "Flatreef". Infill drilling will also be undertaken in Zone 3, downdip of Zone 1.
- Additional targets are likely to be generated from relogging of drill core in Zone 2. The relogging of the 2008 and 2009 UMT drilling in this area have been completed.

A summary of the proposed drilling is included as Table 26-1.

Drill programs assume the following all-inclusive drill costs:

- 2013: $204/m
- 2014: $235/m

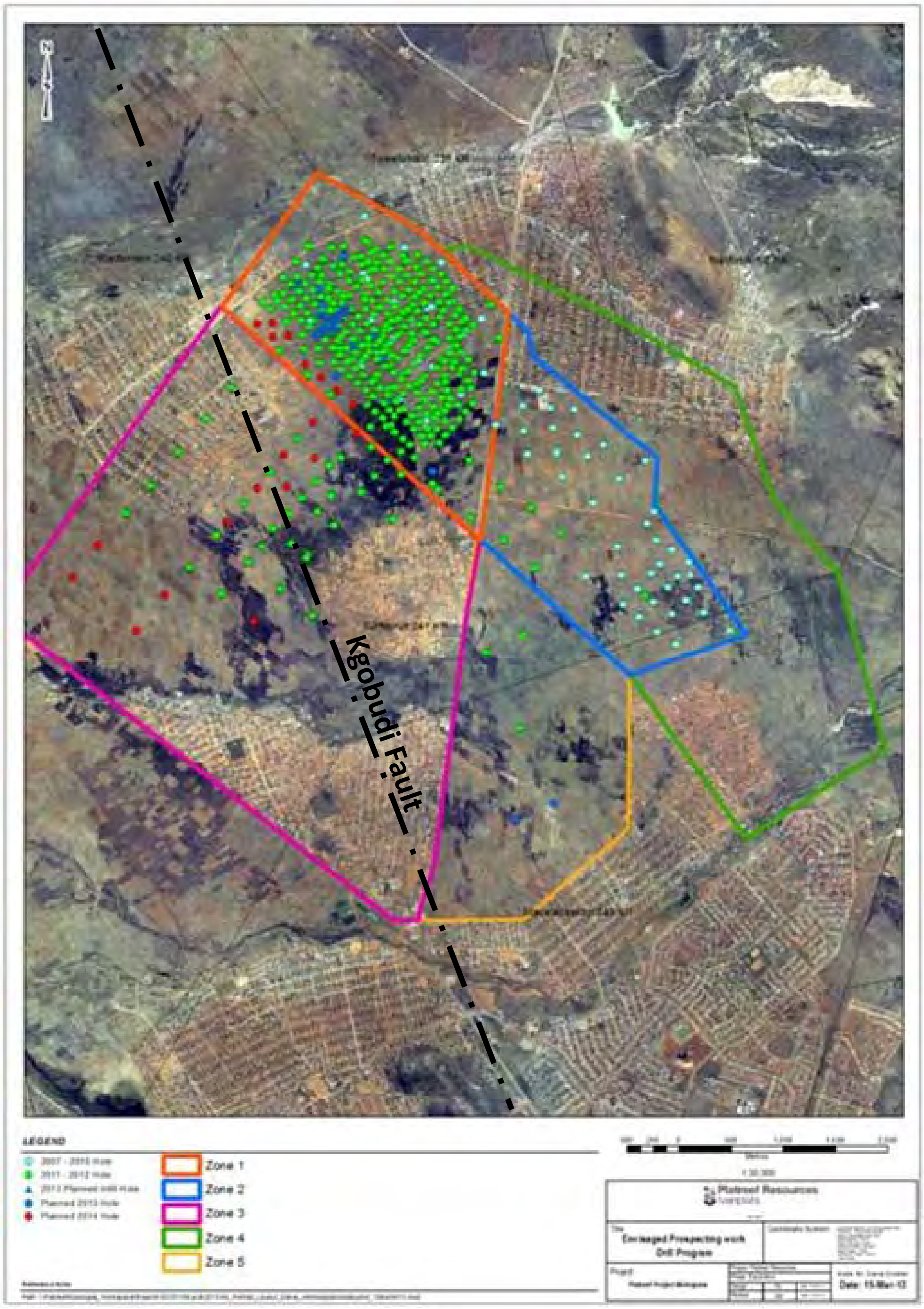
Variations in the metreage costs between years includes factoring for costs increases allocated at 10%, and additional costs in 2013 to cover the proposed geotechnical and metallurgical drilling requirements.

The Phase 1 program has an overall estimated total budget of $16 M.

26.1.2 Phase 2

The planned exploration shaft has an approximate budget estimate of $176 M.

Figure 26-1: Proposed Drill Plan for 2013–2014



Note: Figure courtesy Ivanplats, 2012.

Table 26-1: Proposed Drill Program

Year	Description	Number of holes	Total Metres
2013 (full year)	Exploration/Geology drilling (Zone 1 and 3)	10 (incl deflections)	12,000
	Geotechnical drilling	10	10,000
	Metallurgy drilling (HQ)	10 (incl deflections)	12,000
	50 m Infill Zone 1	20 (incl deflections)	30,000
	Exploration drilling (Zone 5)	4 (incl deflections)	6011
	Total	**54**	**70,011**
2014 (6 months)	Exploration drilling (Zone 1 and 3)	20	18,000
	Total	**20**	**18,000**
	Grand Total	**77**	**92,011**

The two programs total as follows

- Phase 1: 16 M
- Phase 2: 176 M
- Totals: $192 M

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