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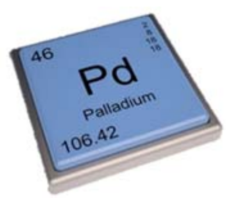
(AMENDED) TECHNICAL REPORT, UPDATED MINERAL RESOURCE ESTIMATE AND PRELIMINARY ECONOMIC ASSESSMENT OF THE MARATHON DEPOSIT, THUNDER BAY MINING DISTRICT NORTHWESTERN ONTARIO, CANADA

48° 45’ N Latitude, 86° 19’ W Longitude

FOR
GENERATION MINING LIMITED

NI 43-101 & 43-101F1
TECHNICAL REPORT

GENERATION MINING



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P&E Mining Consultants Inc.
Report 367

Effective Date: January 6, 2020
Signing Date: July 6, 2020

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IMPORTANT NOTICE

This (Amended) Technical Report was prepared as a National Instrument 43-101 Technical Report, in accordance with Form 43-101F1, for Generation Mining Limited ("Gen Mining") by P&E Mining Consultants Inc. ("P&E"). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in P&E's services and 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 to be used by Gen Mining, subject to the terms and conditions of its contract with P&E. This contract permits Gen Mining to file this report as a Technical Report with Canadian Securities Regulatory Authorities pursuant to National Instrument 43-101, Standards of Disclosure for Mineral Projects. Except for the purposes legislated under provincial securities laws, any other use of this Technical Report by any third party is at that party's sole risk.

FORWARD-LOOKING INFORMATION

This report includes certain information that may be deemed "forward-looking information" under applicable securities laws. All statements in this release, other than statements of historical facts, that address acquisition of the Property and future work thereon, Mineral Resource and Reserve potential, exploration activities and events or developments that the Company expects is forward-looking information. Although the Company believes the expectations expressed in such statements are based on reasonable assumptions, such statements are not guarantees of future performance and actual results or developments may differ materially from those in the statements. There are certain factors that could cause actual results to differ materially from those in the forward-looking information. These include the results of the Company's due diligence investigations, market prices, exploration successes, continued availability of capital and financing, and general economic, market or business conditions.

Investors are cautioned that any such statements are not guarantees of future performance and actual results or developments may differ materially from those projected in the forward-looking information. For more information on the Company, investors are encouraged to review the Company's public filings at www.sedar.com. The Company disclaims any intention or obligation to update or revise any forward- looking information, whether as a result of new information, future events or otherwise, other than as required by law.

INFORMATION CONCERNING ESTIMATES OF MINERAL RESERVES AND RESOURCES

These estimates have been prepared in accordance with the requirements of Canadian securities laws, which differ from the requirements of United States' securities laws. The terms "Mineral Reserve", "Proven Mineral Reserve and "Probable Mineral Reserve" are Canadian mining terms as defined in accordance with NI 43-101 and the CIM Definition Standards. The CIM Definition Standards differ from the definitions in the United States Securities and Exchange Commission ("SEC") Guide 7 ("SEC Guide 7") under the United States Securities Act of 1933, as amended. Under SEC Guide 7, a "final" or "bankable" Feasibility Study is required to report Mineral Reserves, the three-year historical average price is used in any Mineral Reserve or cash flow analysis to designate Mineral Reserves and the primary environmental analysis or report must be filed with the appropriate governmental authority. In addition, the terms "Mineral Resource", "Measured Mineral Resource", "Indicated Mineral Resource" and "Inferred Mineral Resource" are defined in NI 43-101 and recognized by Canadian securities laws but are not defined terms under SEC Guide 7 or recognized under U.S. securities laws. U.S. investors are cautioned not to assume that any part or all of mineral deposits in these categories will ever be upgraded to Mineral Reserves. "Inferred Mineral Resources" have a great amount of uncertainty as to their existence, and great uncertainty as to their economic and legal feasibility. It cannot be assumed that all or any part of an "Inferred Mineral Resource" will ever by upgraded to a higher category. Under Canadian securities laws, estimates of "Inferred Mineral Resources" may not form the basis of Feasibility or Pre-Feasibility studies, except in rare cases. U.S. investors are cautioned not to assume that all or any part of an Inferred Mineral Resource exists or is economically or legally mineable. Accordingly, these Mineral Reserve and Mineral Resource estimates and related information may not be comparable to similar information made public by U.S. companies subject to the reporting and disclosure requirements under the United States federal laws and the rules and regulations thereunder, including SEC Guide 7.

1.0 SUMMARY

The following (Amended) Technical Report presents an Updated Mineral Resource Estimate and Preliminary Economic Assessment prepared by P&E Mining Consultants Inc. ("P&E") regarding the Marathon Deposit (the "Project") on the Marathon Platinum Group Metals-Copper ("PGM-Cu") Property, Marathon, Ontario, Canada (the "Property"). Generation Mining Limited owns a 51% interest in the Property (with an option to earn up to an 80% interest). Also presented are an Updated Mineral Resource Estimate on the Geordie Deposit, and an initial Mineral Resource Estimate on the Sally Deposit, both within the Marathon Property limit.

The purpose for this (Amended) Technical Report is to provide data on the 2019,39-hole exploration drilling program that was concurrent with the Technical Report compilation and were not included with the January 6, 2020 Updated Mineral Resource Estimate and Preliminary Economic Assessment Technical Report. The Mineral Resource Estimates, Economic Analysis, Interpretations and Conclusions and Recommendations provided in the originally issued Technical Report remain unchanged.

This Technical Report was prepared pursuant to the requirements of Canadian National Instrument ("NI") 43-101. The Mineral Resource Estimates by P&E contained in this Technical Report were prepared in accordance with the guidelines of the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM") Standards on Mineral Resources and Reserves, Definitions and Guidelines.

1.1 INTRODUCTION

Generation Mining Limited ("Gen Mining" or "the Company") retained P&E Mining Consultants Inc. to prepare this independent NI 43-101 Technical Report, updated Mineral Resource Estimate, and Preliminary Economic Assessment ("PEA") on Gen Mining's Marathon PGM-Cu Property located near Marathon, Ontario, Canada. P&E understands this Technical Report may be used in support of Gen Mining's possible financing purposes. In preparing this Technical Report, P&E utilized a key public document titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District, Northwestern Ontario, Canada" prepared by P&E with an effective date of September 9, 2019.

1.2 PROPERTY DESCRIPTION LOCATION

The Marathon PGM-Cu Property is located approximately 10 kilometres ("km") north of the Town of Marathon, Ontario which is situated adjacent to the Trans-Canada Highway No. 17 on the northeast shore of Lake Superior. Thunder Bay, a major industrial city with a population of 100,000 people is located approximately 300 km westward along Highway 17 while Sault Ste-Marie is approximately 400 km to the southeast along the same Highway 17. Marathon has a population of approximately 3,100 (2016 Census, Statistics Canada). Property access is by a gravel road from highway 17 (Figure 1.1), which lies just north of Marathon and immediately south of the Property. The centre of the proposed Project footprint sits at approximately 48° 45' N Latitude, 86° 19' W Longitude.

Gen Mining owns a 51% interest (with an option to earn up to an 80% interest) through a Joint Venture arrangement) in the Marathon Deposit and the Property from Stillwater Canada Inc. (a wholly owned subsidiary of Sibanye Gold Ltd., trading as Sibanye-Stillwater Limited). This increase in ownership would be through spending of $10 million and preparing a Preliminary Economic Assessment within 4 years of the Property acquisition date marked as July 11, 2019. Gen Mining acts as the operator of the joint venture and has spent approximately $4 million on the Project as of the effective date of this Technical Report.

FIGURE 1.1 REGIONAL LOCATION MAP

Source: *Marathon PGM Corp. (2006)*

Upon Gen Mining completing a Definitive Feasibility Study and making a positive commercial production decision, and so long as Sibanye-Stillwater has a minimum 20% interest in the Property, then Sibanye-Stillwater will have 90 days to increase its ownership from 20% to a total of 51% interest. Within 90 days of the Commercial Decision Date and agreeing to fund 31% of the total capital costs as estimated in the Definitive Feasibility Study, Sibanye-Stillwater and Gen Mining will contribute the remaining funds on a 51%:49% basis.

On July 11, 2019 Gen Mining had (through a wholly-owned subsidiary) completed the acquisition of a 51% initial interest in the Marathon PGM-Cu Property, from Stillwater Canada Inc. (“Stillwater”), a wholly owned subsidiary of Sibanye Gold Limited, and entered into a joint venture agreement with respect to the Property. Gen Mining can increase its interest in the Property and joint venture to 80% (the “Second Interest”) by spending $10 million and preparing a Preliminary Economic Assessment within four years (the “Second Earn-In Period”).

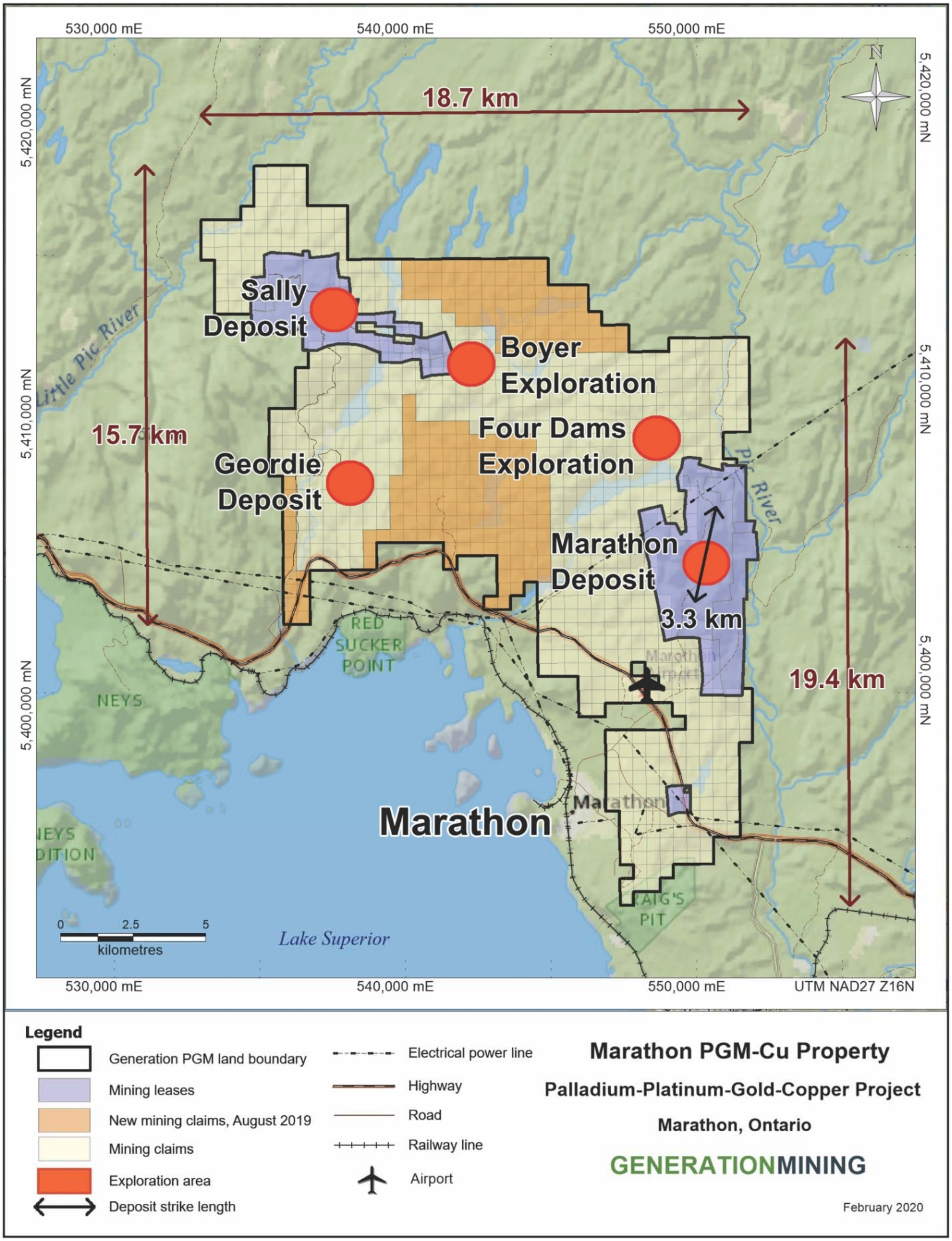
On Closing, Gen Mining paid to Stillwater $2.9 million in cash (in addition to the $100,000 previously paid upon signing the letter of intent) and issued 11,053,795 common shares of Gen Mining at a deemed price per common share of $0.2714 (totalling $2,999,999.96), for a total consideration payment to Stillwater of $5,999,999.96 for the initial 51% interest.

Gen Mining is now the operator of the Property (unless its interest in the joint venture reduces to a minority interest) and will assume all liabilities of the Property in such operatorship capacity. During the Second Earn-In Period, Gen Mining must sole-fund all expenditures in respect of the Property and related activities. Once Gen Mining has earned the Second Interest, the parties will fund expenditures on a pro rata basis (80% funded by Gen Mining and 20% funded by Stillwater) in order to maintain their respective interests in the joint venture, subject to normal dilution provisions.

Upon a Feasibility Study being prepared and the management committee of the joint venture making a positive commercial production decision, (as long as Stillwater has a minimum 20% interest in the Property), then Stillwater will have 90 days to exercise an option to increase its participating interest in the joint venture from its current percentage up to 51% .

The original Marathon Property held by Stillwater Canada Inc. from 2010 to 2019 has since been enlarged by Gen Mining through the periodic staking of unpatented mining claims. As illustrated in Figure 1.2, during the summer of 2019 Gen Mining staked an additional 215 claim blocks totalling 4,558 hectares (“ha”). This increases Gen Mining’s land position to include 45 leases and 1,071 claims, or 21,965 ha (219.65 square kilometres) at the effective date of this Technical Report. Gen Mining is a publicly traded company with a listing on the CSE (Canadian Securities Exchange) under the symbol GENM. There are no outstanding royalties on the main Marathon Deposit, however, royalties do apply to other parts of the Property.

FIGURE 1.2 MARATHON PGM-CU PROPERTY CLAIM MAP



Source: *Generation Mining Limited (2019)*

1.3 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The Marathon PGM-Cu Property is located at latitude 48°45’ N and longitude 86°19' W. Local access to the Property is primarily by a gravel road off of Trans-Canada Highway No. 17. The Property is characterized by moderate to steep hilly terrain with a series of interconnected creeks and lakes surrounded by dense vegetation. Occasional outcrops of gabbro are present on the Property and overburden which consists of boulder till with gabbro and mafic volcanic boulders, ranges from 3 m to 10 m in thickness. The general elevation around the mine site is slightly higher than the overall regional topography. Ground surface elevations in the area of the proposed mine range from approximately 260 m to over 400 m asl with a gradual decrease in elevation from north to south.

The vegetation consists of northern hardwood and conifer trees as well as muskeg areas, which are bogs or wetlands common to boreal forest regions. The Project area is bounded to the east by the Pic River and Lake Superior to the south and west.

The climate is typical of northern areas within the Canadian Shield with long winters and short, warm summers. Average annual precipitation in the area of Marathon was 826 mm for the period 1952-1983, of which 240 mm fell as snow. Average annual surface runoff is approximately 390 mm. The annual average temperature is 1°C with the highest average monthly temperature of 15°C in August and lowest in January of -15°C (Environment Canada).

Exploration and drilling may be carried out throughout the year except during the few weeks of spring break up when most gravel roads are not suitable for vehicles and transport truck weight restrictions are placed on Highways.

Logistical support, including power and telephone lines, is available at the Property and at Marathon, which is linked to the Ontario power grid. Additionally, on March 21, 2019, the Minister of the Environment, Conservation and Parks approved the environmental assessment for the East-West Tie transmission project which is a proposed 450 km double-circuit 230 kV transmission line connecting the Lakehead Transfer Station in the Municipality of Shuniah near the city of Thunder Bay to the Wawa Transfer Station located east of the Municipality of Wawa. It will also connect to the Marathon Transformer Station.

The Marathon airport is located immediately north of the Town of Marathon, and runs adjacent to Highway 17 near the southwest corner of the Marathon PGM-Cu Property.

Water is available from the Pic River as well as from many lakes and creeks which drain the area. A high voltage power line transects the northern edge of the Property. The CP Rail trans Canada rail line as well as numerous rail load-out locations are within close proximity and deep-water dock facilities are available at Marathon and Heron Bay. Mining equipment and personnel are available in Marathon, Manitouwadge, White River and Thunder Bay.

Land-use activities in the area include hunting, fishing, trapping and snowmobiling. Sport fishing activity is focused on the Pic River which contains a variety of warm water fish species and in Hare and Bamoos Lakes located northwest of the Project. Pukaskwa National Park is located near the mouth of the Pic River approximately 20 km downstream of the Property.

1.4 HISTORY

The Marathon PGM-Cu Property was explored by various companies over the past 60+ years, and during this time, a total of 883 drill holes and 1,008 trenches totalling 199,343 m were completed. The majority of drilling was completed to delineate the Marathon Deposit.

Exploration for copper and nickel deposits in the Marathon area commenced in the 1920s and has continued until the present. In the 1940s, the discovery of titaniferous magnetite and disseminated chalcopyrite occurrences was made. During the past five decades, the Property has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drilling programs, geological studies, Mineral Resource Estimates, metallurgical studies, mining studies, and economic analyses. The Property was explored and studied from 1985 to 2014 by various companies. These studies have successively enhanced the knowledge base on the Marathon Deposit.

In 1963, Anaconda Copper acquired the Property and carried out systematic exploration work including diamond drilling of 32,741 m in 151 drill holes from 1964-1966. This culminated in the discovery of a large copper-PGM deposit. Anaconda conducted a number of metallurgical tests intermittently from 1965 to 1982, however, they discontinued further work on the Project in the early 1980s due to low metal prices at the time.

In 1985, Fleck purchased a 100% interest in the Property with the objective of improving the Project economics by focusing on the platinum group metals ("PGM") values of the Deposit. Fleck carried out an extensive program, which included re-assaying of the Anaconda drill core, further diamond drilling, surface trenching of the mineralized zones, bulk sampling and a pilot plant testing. On June 10, 1998, Fleck changed its name to Polymet Mining Corp.

In 1986, H.A. Symons carried out a Feasibility Study for Fleck which indicated a low internal rate of return. In 1987, Kilborn Limited carried out a Pre-Feasibility Study review for Fleck that included preliminary results from the Lakefield Research Limited pilot plant tests that indicated a low internal rate of return.

In late 1987, Teck Corporation ("Teck") prepared a Preliminary Economic Feasibility Report on the Fleck's Marathon Project based on a conventional open pit operation and concluded that the Project was uneconomic due to low metal prices at that time.

In 1987, Euralba Mining Ltd. ("Euralba"); an Australian Junior mining company entered into a joint venture agreement with Fleck which is 1998 changed its name to PolyMet Mining Corp.

In 1989, BHP Engineering Pty Ltd. ("BHP") carried out a Pre-Feasibility Study for Euralba, compiled 2,500 samples of drill core which were assayed at Lakefield Research Limited. Euralia developed a Mineral Resource block model of the Marathon Deposit that was used to design an optimized open pit. BHP considered several metallurgical processes, including an on-site smelter process.

In 2000, Geomaque Exploration Ltd. acquired certain rights to the Marathon Project through an option agreement with Polymet. Geomaque and its consultants carried out a study of the economic potential of the Marathon Project. The study included a review of the geology and drill hole database, interpretation of the mineralized zones, statistics and geostatistics, computerized block model, Mineral Resource estimation, open pit design and optimization, metallurgy, process design, environmental aspects, capital and operating cost estimates and cash flow modeling for an internal study.

In 2003, Marathon PGM Corp. acquired the Marathon Deposit, at the time known as the Marathon PGM Project from PolyMet and carried out exploration and various studies from 2004 through 2010. A Mineral Resource Estimate of the Marathon Deposit was prepared using the same drill hole database that Geomaque used for its 2001 Mineral Resource Estimate and the assay database from trenches excavated by Anaconda and Fleck.

From 2004 to 2009 Marathon PGM Corp. funded programs of advanced exploration and diamond drilling. Approximately 617 holes and 113,030 m were drilled to expand the Mineral Resource. In 2006, a technical report titled "Technical Report and Resource Estimate on the Marathon PGM-Cu Property, Marathon" was prepared by P&E Mining Consultants Inc. In 2007, P&E authored a second Technical Report titled "Updated Technical Report and Preliminary Economic Assessment on the Marathon PGM-Cu Property, Marathon Area". An internal study on the Mineral Resource update of the Geordie Palladium-Copper Property was produced on June 4, 2008. A Feasibility Study was published in 2008 and updated in January 2010 by Micon/Metchem titled "Technical Report on the Updated Mineral Resource Estimate and Updated Feasibility Study for the Marathon PGM-Cu Project" (Marathon Deposit/Marathon Project).

In 2010, Stillwater Mining Company and Marathon PGM Corp. entered into an agreement whereby Stillwater would acquire all of the outstanding shares of Marathon PGM. Stillwater formed a Canadian corporation, Stillwater Canada Inc. In March 2014, Nordmin Engineering Ltd. provided Stillwater Canada Inc. with an internal Feasibility Report. From 2011 to 2017 Stillwater developed trail access; and conducted a systematic approach to prospecting, geological mapping, trenching, geophysics and some diamond drilling and continued their environmental monitoring programs to ensure that environmental programs remained in good standing. Stillwater Canada Inc. also re-logged over 150 drill holes. A total of 45 holes were drilled and 9,767 m of core was recovered from the holes.

In 2017, Stillwater Mining Company was acquired for $2.2 billion by Sibanye Gold Limited (NYSE: SBGL) and renamed Sibanye-Stillwater (NYSE: SBGL).

During the summer of 2017, Sibanye-Stillwater completed 5,925 m of exploration drilling in the Sally (16 holes), Four Dams (2 holes) and Marathon Deposit (4 holes) areas. Holes ranged from 102 m to 537 m in length. All of the 2017 exploration drilling in the Marathon Deposit area was external to the current Mineral Resource Estimate. As of the effective date of this Technical Report the 2017 drilling by Sibanye-Stillwater had not been filed for an assessment credit.

On July 11, 2019 Generation Mining Limited had (through a wholly-owned subsidiary, Generation PGM Inc.), completed the acquisition of a 51% initial interest in the Marathon PGM-Cu Property from Stillwater Canada Inc., a wholly owned subsidiary of Sibanye Gold Limited, and entered into a joint venture agreement with respect to the Property. Gen Mining can increase its interest in the Property and joint venture to 80% by making certain exploration commitments.

Gen Mining carried out an exploration drilling program in 2019. Drilling started on August 15th and ended November 3rd, drill holes ranged from 135 m to 1,050 m in length, and total metres drilled was 12,434 m.

There have been numerous Mineral Resource Estimates and economic studies carried out by the various owners of the Property, not all of which have been NI 43-101 compliant or publicly disclosed. The most recent NI 43-101 compliant and publicly disclosed Mineral Resource Estimate was completed in September 2019 by P&E.

1.5 GEOLOGICAL SETTING AND MINERALIZATION

The Marathon PGM-Cu Property is situated along the eastern margin of the Coldwell Complex, which is part of the Keweenawan Supergroup of igneous, volcanic and sedimentary rocks that were emplaced around, and in the vicinity of the Mid-continent Rift System ("MRS").

The Marathon Deposit is hosted by the Two Duck Lake Gabbro ("TDL Gabbro"), a late intrusive phase of the Eastern Gabbro. The Eastern Gabbro is a composite intrusion and occurs along the northern and eastern margin of the Proterozoic Coldwell Alkaline Complex ("CAC") which intrudes the much older Archean Schreiber-Hemlo greenstone belt. The entire CAC is believed to have intruded over a relatively short period of time near the beginning of the main stage of the MRS magmatism that occurred between 1108 and 1094 Ma.

The geology of the Marathon Deposit is dominated by the intrusive cross-cutting relationships between complicated assemblages of gabbroic to ultramafic rocks as well as the complicated nature of the basal contact between the Eastern Gabbro and partially melted Archean rocks. A new classification scheme subdivides these predominantly gabbroic rocks into the Fine Grained, Layered, and Marathon Series. The Two Duck Lake Gabbro is the youngest gabbroic member of the Marathon Series. The order of emplacement and respective grouping of the intrusive units from oldest to youngest are summarized as follows:

- Archean country rock;
- Fine grained gabbro (Fine Grained Series);
- Layered olivine gabbro (Layered Series);
- Wehrlite-Troctolite Sill (Marathon Series);
- Two Duck Lake Gabbro (Marathon Series);
- Oxide Ultramafic Intrusions that consist of cumulate clinopyroxene +/- olivine +/- magnetite +/- apatite (Marathon Series);
- Rheomorphic Intrusive Breccia (partial melt of Archean footwall rocks);
- Quartz syenite and augite syenite.

A newly recognized 30 m to 50 m thick sill composed of an upper wehrlite and lower troctolite unit is located immediately above the main mineralized bearing Two Duck Lake Gabbro. The unit is significant for two reasons: first, it forms an important marker horizon; and second, the excellent continuity negates the possibility of post mineralization faulting as proposed by a previous study.

Each of the three magmatic series (Fine Grained, Layered and Marathon) has been characterized using geochemical criteria in Pearce Element diagrams. These diagrams clearly separate individual rock series with significant lateral continuity into distinctive fields and are therefore a useful tool to confirm geological mapping. More importantly, as the Marathon Series are the dominant host rocks for sulphide mineralization, the diagrams are a powerful exploration tool that can potentially discriminate mineralized from barren rock units. In general, the Pearce Element diagrams demonstrate that the Marathon Series rocks plot in a field that lies between those for Fine Grained and Layered Series. The Fine Grained Series has the lowest Ce/Yb, Sm/Yb, Th/Zr and Nb/Zr and conversely, the Layered Series has the highest Ce/Yb, Sm/Yb, Th/Zr and Nb/Zr ("Ce" = cerium, "Yb" = ytterbium, "Sm" = Samarium, "Th" = thorium, "Zr" = zirconium, "Nb" = niobium).

The Marathon Deposit consists of several large, thick and continuous zones of disseminated sulphide mineralization hosted within the Two Duck Lake Gabbro. The mineralized zones occur as shallow dipping sub parallel lenses that follow the basal gabbro contact and are labeled as footwall, main, hanging wall zones and the W Horizon. The Main Zone is the thickest and most continuous zone. For 516 drill hole intersections with mineralized intervals greater than 4 m thick, the average thickness is 35 m and the maximum is 183 m.

Sulphides in the Two Duck Lake Gabbro consist predominantly of chalcopyrite, pyrrhotite and minor amounts of bornite, pentlandite, cobaltite, and pyrite. The proportions of sulphide minerals as determined in a QEMSCAN survey of a bulk sample are 2.75% pyrrhotite, 0.79% copper-iron ("Cu-Fe") sulphides (chalcopyrite and bornite), 0.09% pentlandite and trace amounts of pyrite, galena and sphalerite.

The relative proportions of pyrrhotite and chalcopyrite vary significantly across the Deposit, however, in general, the sulphide assemblage changes gradually up section from the base to the top of mineralized zones. Sulphides at the base of the TDL Gabbro consist predominantly of pyrrhotite and minor chalcopyrite but the relative proportion of chalcopyrite increases up section to nearly 100% chalcopyrite near the top. In the W Horizon, sulphides consist mainly of chalcopyrite and bornite and minor to trace amounts of pentlandite, cobaltite, pyrite and pyrrhotite. In general, the variations in chalcopyrite to pyrrhotite ratio across the deposit, and from bottom to top of the deposit, correlates with variations in the copper/palladium ("Cu/Pd") ratio, with the highest concentrations of palladium ("Pd") occurring in samples with Cu-rich sulphide assemblages.

A prominent feature of the Marathon Deposit is the local and extreme enrichment of PGM with respect to Cu. For example, high grade samples from the W Horizon that contain between 25 and 50 grams per tonne ("g/t") Pd might also contain very low concentrations of Cu (<0.02% Cu). The separation of PGM from Cu is observed throughout the Deposit but is most common near the top of the mineralized zone. In the southern half of the Deposit, PGM enrichment is most prominent in the W Horizon.

There is a relationship between mineralization and the paleo topography of the footwall contact. For example, mineralization is best developed within basins or troughs of the footwall and thins or pinches out above prominent footwall ridges. It is important to note that although the mineralized zones are almost continuous from the north to south extents of the Deposit, assays with the best grades fall along trends that mimic the alignment of troughs or ridges.

The Marathon Deposit formed by sulphide accumulation in basins and troughs of the magma conduit and underwent significant upgrading of Cu and Platinum Group Elements ("PGE") contents by the process of multistage dissolution upgrading that was described for similar disseminated mineralization in the Noril'sk region, Russia by Kerr and Leitch (2005). This model best explains three dominant characteristics of the Marathon Deposit, as follows: 1) the intrusion of multiple parallel thin and continuous sill-like bodies; 2) the relationship between troughs and ridges in the footwall contact with thicker accumulations of higher grade (Cu and Pd) material; and 3) the extreme but systematic variations in base metal to PGE ratios. An alternative hydrothermal origin for PGE enrichment is rejected on the basis that primary minerals are well preserved and there is a strong positive correlation between Pd, platinum ("Pt"), rhodium ("Rh"), and iridium ("Ir").

In the magma conduit deposit model, the present exposure of Two Duck Lake Gabbro represents only a fraction of the magma that made its way up through the crust. On the basis of mass balance calculations, and considering the TDL Gabbro is less than about 250 m thick, only a very large magmatic system can explain the excessive enrichments of platinum metals with up 45 g/t of combined platinum, palladium and gold over 10 m or the accumulations of disseminated sulphide layers that are up to 160 m thick. Consequently, it is envisaged that a very large volume of magma, perhaps greater than 10,000 times the volume of gabbro present in-situ, passed through the conduit and formed the Two Duck Lake Gabbro.

Fluid dynamic factors that affected magma flow are relevant to exploration. Features such as pooling of TDL magma in basins within the footwall or brecciation of Eastern Gabbro by TDL magma as it stopes its way upward are important examples of how the magma flow was slowed resulting in the precipitation of the more dense sulphide liquid from the magma. Conversely, above ridges or crests in the footwall, where TDL Gabbro thins and the magma velocity increased, sulphides were unable to settle out of the magma and mineralized horizons thin or pinch out.

In addition to the Marathon Deposit, the Property hosts other PGM deposits/mineralization in four additional areas – Geordie, Sally, Boyer and Four Dams.

1.6 DEPOSIT TYPES

The Marathon Deposit is one of several mafic to ultramafic intrusive bodies in the MRS System that host significant copper, nickel or PGE sulphide mineralization. These intrusions include the Yellow Dog peridotite (Eagle Deposit), the Tamarack Deposit, the Current Lake Intrusive Complex (Thunder Bay North Deposit), and the numerous intrusions located along the base of the Duluth Complex.

Intrusion and deposition of sulphides within magma conduits has recently become the dominant mineralization forming process chosen to explain the rift related deposits. For example, a magma conduit deposit model has been proposed for the Marathon Deposit), Thunder Bay North and the Eagle Deposit. The magma conduit model has grown in favour since it was proposed to explain deposits in the Noril'sk region and the deposits at Voisey's Bay, Newfoundland and Labrador, Canada. Further, an important contribution to the understanding of magma conduits and the formation of very high tenor PGM deposits was derived from a sophisticated geochemical model for an open system multiple stage process expected in a magma conduit which was applied to explain the extreme PGM concentrations found in the W Horizon at the Marathon Deposit.

In the magma conduit deposit model, the present exposure of the Two Duck Lake and Eastern Gabbro series represents only a fraction of the magma that was generated in the mantle and made its way up through the crust. Most of the magma actually passed through the magma conduits and erupted on the surface as basaltic volcanic flows. The gabbroic units and associated Cu-PGM mineralization represent material that crystallized or settled out of the magma as it moved through the conduit.

There are many striking petrologic and geochemical similarities between the Two Duck Lake Gabbro and the Partridge River Intrusion, located at the base of the Duluth Complex, Minnesota. The Partridge River intrusion is the best described gabbroic intrusion in the Duluth Complex and is host to the Minnamax (Babbit) and Dunka Road Cu-Ni-PGM Deposits. The relevant features described from the Partridge River Intrusion are also observed in the Two Duck Lake Gabbro

Comparisons between the MRS and the Voisey Bay and Noril'sk settings point to several similarities that suggest that the MRS is a likely setting for Ni-Cu mineralization. The continental rifting and associated voluminous igneous activity in all three regions formed in response to the rise of a hot plume of mantle material from deep in the Earth, fracturing the overlying continental crust. In the MRS, melting of the plume produced more than 2 million cubic kilometres of mostly basalt lava flows and related intrusions.

1.7 EXPLORATION

Prior to August 2019, the only recent diamond drilling exploration work carried out on the Property was during the summer of 2017 when Sibanye-Stillwater completed 5,925 m of exploration drilling in the Sally (16 holes), Four Dams (2 holes) and Marathon Deposit (4 holes) areas. Holes ranged from 102 m to 537 m in length. All of the 2017 exploration drilling in the Marathon Deposit area was external to the current Mineral Resource Estimate.

A passive seismic survey was conducted on the Sally Zone where an initial Mineral Resource Estimate was completed by P&E in 2019. The survey was designed to pinpoint the potential source of massive sulphides found in the area as well as a grab sample taken in 2017 which assayed 183 g/t total PGEs + Au and 9.1% Cu.

Exploration by Gen Mining during 2019 mainly consisted of diamond drilling.

1.8 DRILLING

On August 19, 2019 Gen Mining announced that it had begun 12,000 m exploration drilling program on the Marathon PGM-Cu Property. Two drills and crews were mobilized and drilling commenced August 15th. The program is designed to test several high-priority sites along a strike length of more than 40 km.

The following areas were the targets for the 2019 drilling program:

- 3,000 m testing the West Feeder Zone near the Main Zone;
- 1,000 m of confirmation/infill drilling on the Marathon Deposit;
- 2,700 m exploration drilling on two Geordie Deposit offsets;
- 2,600 m of greenfield exploration drilling on the Boyer Area; and
- 2,700 m of drilling for the source of the extremely high-grade samples and massive sulphides at the Sally Deposit.

Drilling in 2019 totalled 39 holes over 12,434 m. No data from the 2019 drill program was included in the 2019 Mineral Resource Estimates on the Marathon, Geordie and Sally Deposits, since the assay information was not available before the September 9, 2019 cut-off date for the Mineral Resource Estimates.

Drilling activities in 2019 were concurrent with the Technical Report compilation which occurred after the September 9, 2019 effective date of the Updated Mineral Resource Estimate which was used as the basis of this Technical Report. The majority of the 2019 drill holes tested greenfield targets external to pit constrained Mineral Resources at either Marathon, Sally and Geordie with the exception of 5 holes (M-19-530 to M-19-534, inclusive) drilled at Marathon for validation and metallurgical purposes and one hole (M-18-78) at Sally designed to test the down dip potential of the Keel Zone of the Sally Deposit.

Drill holes M-19-530 – M-19-534, inclusive, comprised three holes which tested the W Horizon and two which tested the Marathon Main Zone. With allowance for anticipated inhomogeneities within the mineralized zones drill results are consistent with historical results. Similarly, drill holes which tested extensions to the Sally Deposit both along strike and down dip encountered mineralization which is also consistent with historical results.

1.9 SAMPLE PREPARATION, ANALYSIS AND SECURITY

The core and trench cut sampling protocol (preparation, analysis and security procedures) instituted and used by past Project operator Marathon PGM Inc. in each of their drilling and other rock sampling programs were identical to those reported in earlier NI 43-101 Technical Reports.

Upon sampling, tagging and bagging, samples are then grouped into batches, placed into rice bags and sent by courier to Accurassay's facilities (acquired by AGAT Laboratories in 2017) in Thunder Bay, Ontario. Upon receipt of the samples, Accurassay provided analytical services to the mining and mineral exploration industry and is registered under ISO 9001:2000 quality standard.

In 2011, Stillwater Canada Inc. changed assay laboratories and initiated analyses at ALS Chemex Labs, Ltd. in Thunder Bay. ALS Chemex uses a similar laboratory protocol but with the exception that PGM analyses are conducted by ICP-MS instead of Atomic Absorption utilized at Accurassay. All samples were analyzed for copper ("Cu"), nickel ("Ni"), silver ("Ag"), gold ("Au"), platinum ("Pt") and palladium ("Pd"). Rhodium ("Rh") analysis was requested on certain higher-grade samples.

The samples provided to Accurassay by Marathon PGM Corp. were core samples, rock (from trenches) samples and pulp samples. The samples were dried, if necessary, crushed to approximately minus 10 mesh and split into 250 g to 450 g sub-samples using a Jones Riffle. The sub-samples were then pulverized to 90% passing 150 mesh.

Flame atomic absorption spectroscopy ("AAS") determinations for preliminary concentrations of Au, Pt and Pd by fire assay (lead collection) was the preferred method.

A 30.2 g sample mass was routinely used for precious metal analyses. A furnace load consists of 23 or 24 samples with a check done every 10th sample (by client ID), along with a laboratory blank and a Quality Control Standard.

Samples provided to Accurassay by Marathon PGM Corp. did not require preliminary treatment and were mixed directly with the assay flux and for 1¼ hours at 1,800 to 2,000 degrees Fahrenheit. Samples are typically cupelled for 50 minutes at 1,900 degrees Fahrenheit.

Precious metal beads were digested using a nitric/hydrochloric acid digestion and bulked up with a 1% lanthanum oxide ("La_2O_3") solution and distilled water.

For flame AAS determinations of Cu, cobalt ("Co"), Ni, Pb, and Ag, an acid digestion consisting of aqua regia (1 part nitric to 3 parts hydrochloric acid) was the preferred method. A sample mass of 0.25 g and a final volume of 10 mL is used for the analysis.

Accurassay used a Varian AA240FS with manual sample introduction for the determination of Au, Pt and Pd. A Varian 220FS or 240FS with SIPS and auto-diluter is used for the determination of base metals.

Calibration standards are made up from 1,000 ppm certified stock solutions. Quality assurance ("QA") solutions are made up from separately purchased 1,000 ppm certified stock solutions. All stock solutions are prepared commercially by ISO certified suppliers.

All data generated for quality control standards, blanks and duplicates are retained with the client's file and are used in the validation of results. For each quality control standard, control charts are produced to monitor the performance of the laboratory. Warning limits are set at ±2 standard deviations, and control limits are set at ±3 standard deviations. Any data points for the quality control standards that fall outside the warning limits, but within the control limits require 10% of the samples in that batch to be re-assayed.

The in-house standard used for Au, Pt, Pd and Rh was made up from a rock source provided to Accurassay by a third party. All standards used to certify base metal values were provided by CANMET. The QA sample was made in the laboratory from certified stock solutions purchased from an ISO 9000 certified supplier. The quality assurance samples were used to verify the initial calibration of the instruments and monitor the calibration throughout the analysis.
Values of materials were obtained from their respective certificates of analysis.

Stillwater continued with a robust quality assurance/quality control ("QA/QC" or "QC") program that had been implemented in the mid-2000s by the predecessor company, Marathon PGM Corp.

For the 2009 data, there were 31 data points for MPG1 and 18 data points for MPG2. All data points fell between +/- two standard deviations from the mean for Au, Cu, Pd and Pt. For the 2011 data there were 35 data points for MPG1 and 32 data points for MPG2. All data points fell between +/- two standard deviations from the mean. The blank material used for the 2009 and 2011 programs was a commercially prepared nepheline syenite sand. There were 49 data points in 2009 and 68 in 2011. All blank results were below five times detection limit for the commodity in question. There were 81 pulp duplicate pairs analyzed at ALS Minerals for Au, Pt and Pd for the 2011 drill program. Both platinum and palladium demonstrated excellent precision at the pulp level. There were no duplicates available for copper.

P&E considers the sampling methods from the current and past drilling programs to be satisfactory. P&E considers the data to be of good quality and acceptable for use in the current Mineral Resource Estimates for the Marathon, Geordie and Sally Deposits.

1.10 DATA VERIFICATION

The Project was visited by Mr. David Burga, P.Geo., of P&E, an independent Qualified Person as defined by NI 43-101 on April 4, 2012 and he collected 10 verification samples from nine holes. The samples were taken by Mr. Burga to AGAT Laboratories in Mississauga, ON for analysis. Copper, silver and nickel were analyzed using 4-acid digest with AAS finish. Gold, platinum and palladium were analyzed using lead collection fire assay with ICP-OES finish.

A site visit to the Project was undertaken by Mr. Bruce Mackie of Bruce Mackie Geological Consulting Services ("Mackie") on May 4, 2019. As part of the site visit, 12 verification samples from nine diamond drill holes intervals were taken by Mr. Mackie, P.Geo. and submitted to Activation Laboratories Ltd. in Thunder Bay and analyzed for Au, Ag, Pt, Pd and Cu.

For both site visits (Burga and Mackie), drill logs for the sections reviewed were found to be appropriately detailed and present a reasonable representation of geology, alteration mineralization and structure. No discrepancies in the sample tag numbers within the core trays and the intervals quoted in the aforementioned Excel spreadsheets were noted.

Based on the results of the Investigation, Messrs. Burga and Mackie are of the professional opinion that the mineralized drill hole assay results and corresponding drill hole logs reported by Stillwater and Marathon PGM Corp. that were the subject of their investigations are verifiable and accurate and portray a reasonable representation of the types of mineralization encountered on the Marathon and Geordie Deposits.

P&E considers there to be good correlation between the independent verification samples and the original analyses in the Company database.

Based upon the evaluation of the QA/QC program undertaken by the Company, as well as database verification carried out by P&E, it is P&E's opinion that the data are robust and suitable for use in the current Mineral Resource Estimates for the Marathon, Geordie and Sally Deposits.

1.11 MINERAL PROCESSING AND METALLURGICAL TESTING

Metallurgical testwork results and flowsheet design for the Project originate from a series of bench-scale metallurgical studies at several testing laboratories over several years. Metallurgical tests included crushing, grinding, batch, locked cycle and mini pilot scale froth flotation testing.

Early mineralogical examination revealed that the copper mineralization was bi-modal – most of the chalcopyrite was coarse grained (>100 µM), with the balance being fine grained. Essentially all of the PGM mineralization was very fine grained (80% <10 µm).

The production of a mineral concentrate for sale to a smelter is the most reasonable strategy for the Project. Early testwork results indicated that a rougher flotation of copper (chalcopyrite) at a coarse grain size followed by re-grinding of the flotation tails and production of a rougher PGM-rich concentrate. Later testwork revealed that re-grinding of both of the rougher concentrates combined with repeated cleaner flotation tailings would successfully produce smelter-acceptable grades of concentrate and at high recoveries of copper and PGM's. The copper and PGM concentrates would be combined, dried and shipped to a smelter and subsequent refinery.

Due to the low concentration of each valuable mineral in the mineralized material, the "mass pull", i.e. the amount of final concentrate produced, is small, approximately 1.5% of process feed. This small amount presents some challenge for laboratory scale testing when re-grinding and multiple flotation steps are needed. Despite this, recoveries of 90% for copper, > 80% for palladium and >70% for gold, platinum and silver were confirmed by multiple laboratory batch and small-scale pilot tests.

1.12 MINERAL RESOURCE ESTIMATE

All Mineral Resource estimation work reported herein was carried out or reviewed by Fred Brown, P.Geo., and Eugene Puritch, P.Eng., FEC, CET both of P&E and independent Qualified Persons as defined by National Instrument 43-101. Portions of the background information and technical data for this study were obtained from previously filed National Instrument 43-101 Technical Reports. Mineral Resource modeling and grade estimation were carried out using GEOVIA GEMS™ software. Variography was carried out using Snowden Supervisor. Open-pit optimization was carried out using NPV Scheduler software.

Sample data for the Mineral Resource Estimate of the Marathon Deposit in this Technical Report were provided in the form of ASCII text files and Excel format files. The supplied databases contain 1,359 unique drill hole collar and trench records. Of these, 177 records fall outside the block model limits or had no reported assay data. Drill hole and surface channel sample records consist of collar, survey, lithology, bulk density and assay data. Assay data fields consist of the drill hole ID, downhole interval distances, sample number, and Ag, Au, Cu, Pd, Pt assay grades. All data are in metric units. Collar coordinates were provided in the NAD 27 UTM Zone 16N coordinate system.

A calculated net smelter return ("NSR") field for domain modeling was added to the database as follows:

$$NSR\ CDN\$/t = Ag * 0.45 + Au * 39.03 + Cu * 76.27 + Pd * 35.00 + Pt * 26.47$$

The client supplied database contains a total of 43,057 non-zero Ag assays, 34,044 non-zero Au assays, 34,296 non-zero Cu assays, 34,040 non-zero Pd assays, and 34,034 non-zero Pt assays. Industry standard validation checks were carried out on the client supplied databases, and minor corrections made where necessary. No significant errors were noted with the client supplied databases. P&E considers that the client supplied database is suitable for Mineral Resource estimation.

The Mineral Resource Estimate is based on 17 mineralization domains, with a total volume on the order of 74 million cubic metres. Mineralization domains have been based on zones developed by Dr. David Good, former Vice President Exploration for Stillwater Canada Inc. and Marathon PGM Corp. Mineralization domains are further broadly grouped into two areas, the northern domains where mineralization is dominated by paleo-topographic controls, and the remaining southern domains. Of the 17 domains modeled, the North Main (rock code 90), Walford Zone (rock code 80) and North Footwall (rock code 20) make up 80% of the total Mineral Resource by volume.

Domain models were generated from successive polylines as defined by a nominal NSR value of CDN$13/t, oriented perpendicular to the overall trend of the mineralization. All polyline vertices were snapped directly to drill hole assay intervals, and include low grade material where necessary to maintain continuity between cross-sections. An overburden surface was constructed from the supplied lithological logging, and all mineralization domains were clipped to topographic and overburden surfaces where appropriate.

The average Nearest Neighbour drill hole collar distance is 45.9 m, and the average drill hole length is 187.7 m. P&E noted a strong overall correlation between Pd and Pt as well as Au with Pd and Pt. A strong correlation between Cu with Pd and Pt was noted in the northern area.

The client supplied database contains 1,136 bulk density measurements, with values ranging from 2.53 to 4.31 tonnes per cubic metre ("t/m^3"). P&E noted a slight decrease in bulk density with depth, primarily associated with the denser Magnetite Hanging Wall units occurring higher in the stratigraphic column.

Constrained assay sample lengths range from 0.10 m to 29.8 m, with an average sample length of 2.04 m. A total of 80% of the samples have a length of 2.00 m. All constrained assay samples were therefore composited to the dominant sample length of 2.00 m. Length-weighted composites were calculated for all metals within the defined mineralization domains. Missing sample intervals in the data were assigned a nominal background grade of 0.001 g/t or 0.001%. Residual composites that were less than 1.00 m in length were discarded so as not to introduce a short sample bias into the estimation process.

A substantial number of surface channel samples have been collected across the Marathon Deposit from excavated trenches below the overburden. As a check on any potential bias from the channel samples, lognormal QQ plots were generated comparing composited channel samples to composited drill hole samples for the North Footwall, Walford and North Main domains. The results do not indicate a substantial bias between the channel samples and the drill hole samples, with the possible exception of a slight bias for Pd in the North Main domain. P&E considers the channel samples to be acceptable for Mineral Resource estimation.

Grade capping analysis was conducted on the domain-coded and composited grade sample data in order to evaluate the potential influence of extreme values during grade estimation. Capping thresholds were determined by the decomposition of the domain composite log-probability distributions. Composites are capped to the defined threshold prior to estimation.

Three-dimensional continuity analyses (variography) were conducted on the domain-coded uncapped composite data. The downhole variogram was viewed at a 2.0 m lag spacing (equivalent to the composite length) to assess the nugget variance contribution. Standardized omni-directional spherical models were used to model the experimental semi-variograms. The experimental semi-variograms were used to define appropriate search ranges for Mineral Resource classification.

The modeled Marathon Deposit mineralization domains extend along a corridor 2,000 m wide and 3,500 m in length. An orthogonal block model was established with the block model limits selected so as to cover the extent of the mineralized structures, the proposed open pit design, and to reflect the general nature of the mineralized domains. The block model consists of separate variables for estimated grades, rock codes, volume percent, bulk density and classification attributes.

The Mineral Resource Estimate was constrained by mineralization wireframes that form hard boundaries between the respective composite samples. Block grades were estimated in a single pass with Inverse Distance Cubed ("ID^3") interpolation using a minimum of three and a maximum of 12 composites within a 200 m diameter search envelope, with a maximum of three samples per octant. For each grade element an uncapped Nearest Neighbour model ("NN") was also generated using the same search parameters. An NSR block model was subsequently calculated from the estimated block grades. Bulk density was modeled using Inverse Distance Squared ("ID^2") linear weighting of between three and nine bulk density samples, with a maximum of one sample per drill hole.

Subsequent to the initial classification, blocks were re-classified using a maximum a-posteriori selection pass which corrected isolated classification artefacts and consolidated areas of similar classification into continuous areas. The Mineral Resources for the Marathon Deposit are reported against an NSR cut-off value of CDN$13/t and constrained within an optimized pit shell (Table 1.1). The Mineral Resource model was subjected to two other sensitivity analyses. (Tables 1.2 and 1.3).

The block model was validated visually by the inspection of successive section lines in order to confirm that the block models correctly reflect the distribution of high-grade and low-grade values. An additional validation check was completed by comparing the average grade of the constrained capped composites to the model block grade estimates at zero cut-off grade. Capped composite grades and block grades were also compared to the average NN block estimate. No significant issues were identified. A check for local estimation bias was completed by plotting vertical swath plots of the estimated ID^3 block grade and the NN grade. No significant discrepancies were identified.

As a further check of the Mineral Resource model, the total volume reported at zero cut-off was compared by domain with the calculated volume of the defining mineralization wireframe. All reported volumes fall within acceptable tolerances.

P&E considers that the information available for the Marathon Deposit is reliable, demonstrates consistent geological and grade continuity, and satisfies the requirements for a Mineral Resource Estimate.

TABLE 1.1
MARATHON DEPOSIT PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Measured	103,337	0.64	0.21	0.20	0.07	1.5	1.34	2,123	688	463	239	4,964	4,445
Indicated	75,911	0.46	0.15	0.20	0.06	1.8	1.10	1,115	376	333	151	4,371	2,685
Meas + Ind	**179,248**	**0.56**	**0.18**	**0.20**	**0.07**	**1.6**	**1.24**	**3,238**	**1,064**	**796**	**390**	**9,335**	**7,130**
Inferred	668	0.37	0.12	0.19	0.05	1.4	0.95	8	3	3	1	31	21

Note: *Meas = Measured, Ind = Indicated, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1) *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, marketing, or other relevant issues.*
2) *Mineral Resources were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by CIM Council.*
3) *The Inferred Mineral Resource in this estimate has a lower level of confidence that that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4) *Contained metal totals may differ due to rounding.*
5) *Mineral Resources are reported within an optimized pit shell at an NSR cut-off value of CDN$13/t.*

TABLE 1.2 MARATHON DEPOSIT PIT CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITIES AT VARIOUS NSR CUT-OFFS*													
NSR Cut-off CDN$/Tonne	**Tonnes (k)**	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**	**PdEq (g/t)**	**Pd (koz)**	**Pt (koz)**	**Cu (Mlb)**	**Au (koz)**	**Ag (koz)**	**PdEq (koz)**
100	8,025	2.29	0.72	0.41	0.19	2.0	3.95	591	185	72	49	529	1,020
90	11,656	2.01	0.62	0.40	0.17	2.0	3.57	754	231	103	64	742	1,336
80	17,036	1.76	0.53	0.39	0.15	1.9	3.20	963	290	146	84	1,033	1,754
75	20,780	1.64	0.49	0.38	0.14	1.9	3.02	1,092	327	175	96	1,243	2,021
70	25,003	1.53	0.45	0.38	0.14	1.8	2.86	1,227	365	207	109	1,478	2,302
65	29,977	1.42	0.42	0.37	0.13	1.8	2.71	1,372	408	242	124	1,768	2,610
60	35,845	1.33	0.39	0.36	0.12	1.8	2.56	1,529	454	281	141	2,108	2,946
55	42,741	1.23	0.37	0.34	0.12	1.8	2.41	1,696	503	322	159	2,508	3,310
50	51,328	1.14	0.34	0.33	0.11	1.8	2.26	1,881	561	371	180	2,995	3,724
45	61,639	1.05	0.31	0.31	0.10	1.8	2.11	2,075	620	427	204	3,579	4,173
40	74,246	0.96	0.29	0.30	0.10	1.8	1.95	2,280	687	488	232	4,278	4,664
35	88,778	0.87	0.27	0.28	0.09	1.8	1.81	2,483	759	552	260	5,066	5,164
30	106,507	0.79	0.24	0.26	0.09	1.7	1.66	2,695	836	618	291	5,975	5,691
25	127,485	0.71	0.22	0.24	0.08	1.7	1.52	2,902	914	683	324	7,005	6,221
20	151,144	0.64	0.20	0.22	0.07	1.7	1.38	3,086	991	746	360	8,110	6,710
15	172,876	0.58	0.19	0.21	0.07	1.6	1.27	3,213	1,050	789	384	9,076	7,060
13	**179,916**	**0.56**	**0.18**	**0.20**	**0.07**	**1.6**	**1.24**	**3,238**	**1,064**	**796**	**390**	**9,335**	**7,130**
10	187,289	0.54	0.18	0.20	0.07	1.6	1.20	3,270	1,078	809	397	9,640	7,231
5	193,180	0.53	0.18	0.19	0.07	1.6	1.17	3,286	1,087	813	404	9,813	7,274
0.01	196,061	0.52	0.17	0.19	0.06	1.6	1.15	3,290	1,091	817	403	9,840	7,280

Note: *NSR = net smelter return, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

***** *Within same pit shell as in Table 1.1.*

TABLE 1.3
MARATHON DEPOSIT PIT RE-CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITY AT CDN$25/TONNE NSR CUT-OFF

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Measured	70,792	0.82	0.25	0.25	0.09	1.5	1.67	1,864	578	387	194	3,510	3,794
Indicated	45,279	0.60	0.19	0.25	0.07	1.9	1.40	871	272	252	106	2,817	2,032
Meas & Ind	**116,071**	**0.73**	**0.23**	**0.25**	**0.08**	**1.7**	**1.56**	**2,735**	**850**	**639**	**300**	**6,326**	**5,826**
Inferred	144	0.62	0.16	0.28	0.05	0.9	1.41	3	1	1	0	4	7

Note: *Meas = Measured, Ind = Indicated, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

Mineral Resource Estimates were also generated by P&E for the Geordie and Sally Deposits. The methodologies to create the block models were similar to those used for the Marathon Deposit. All drilling and assay data were provided in the form of Excel data files by Gen Mining. The GEOVIA GEMS™ V6.8.2 database for the Geordie Deposit Mineral Resource Estimate, compiled by P&E, consisted of 61 drill holes totalling 9,647 m, of which a total of 57 drill holes intersected the mineralization wireframes used for the Mineral Resource Estimate. For the Sally Deposit, the database consisted of 82 drill holes totalling 16,975 m and 371 surface channels totalling 1,871 m, of which a total of 47 drill holes and 162 channels intersected the mineralization wireframes used for the Mineral Resource Estimate.

The resulting pit constrained Mineral Resource Estimates for the Geordie and Sally Deposits, at an NSR CDN$15/t cut-off, as of the effective date of this Technical Report, are tabulated in Table 1.4 and 1.5, respectively. P&E considers the mineralization of Geordie and Sally to be potentially amenable to open pit economic extraction.

TABLE 1.4
GEORDIE PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Indicated	17,268	0.56	0.04	0.35	0.05	2.4	1.44	312	20	133	25	1,351	801
Inferred	12,899	0.51	0.03	0.28	0.03	2.4	1.22	212	12	80	14	982	505

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1. *Mineral Resources, which are not Mineral Reserves. do not have demonstrated economic viability.*
2. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources in this report were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*
5. *The Mineral Resource Estimate was based on metal prices of US$3.00/lb copper, US$1,300/oz gold, US$16/oz silver, US$1,100 /oz palladium, and US$900/oz platinum, and an NSR cut-off value of CDN$15/t.*

TABLE 1.5
SALLY PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Indicated	24,801	0.35	0.20	0.17	0.07	0.7	0.96	278	160	93	56	567	767
Inferred	14,019	0.28	0.15	0.19	0.05	0.6	0.86	124	70	57	24	280	389

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1. *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
2. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources in this report were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*
5. *The Mineral Resource Estimate was based on metal prices of US$3.00/lb copper, US$1,300/oz gold, US$16/oz silver, US$1,100 /oz palladium, and US$900/oz platinum, and an NSR cut-off value of CDN$15/t.*

1.13 MINING METHODS

The Marathon Deposit is well defined and characterized by near-surface, wide, and moderately dipping mineralized zones, and lends itself to conventional open pit mining methods. Accordingly, the PEA mine plan entails developing three open pits aligned from north to south over a strike length of approximately 3 km. An open pit mining and processing schedule has been developed for the Project. The mine production plan utilizes mainly Measured and Indicated Mineral Resources. Inferred Mineral Resources make up less than 1% of the total mine plan. Inferred Mineral Resource have a lower level of confidence that that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.

Open pit optimizations were run based on an NSR cut-off value of $9.50/t and pit slope angles of 50-55°, with mining costs of $2.70/t mineralization and $2.50/t waste rock. Pit slope angles by design sector were recommended by Knight Piesold in a 2013 geotechnical study, and were subsequently flattened by 5° on the west side of the pit to allow for hanging wall haulage ramps in the optimizations. Benches and haul roads were incorporated during the creation of each pit design.

Mining dilution of 10% and 3% mining losses at diluting grades that averaged an NSR value of $6.80/t were incorporated to estimate the diluted potentially mineable portion of the Updated Mineral Resource Estimate (process plant feed). Total process plant feed was estimated at 89.4 Mt at a life-of-mine ("LOM") average NSR value of $48.39/t and average grades of 0.69 g/t Pd, 0.21 g/t Pt, 0.22% Cu, 0.07 g/t Au and 1.52 g/t Ag. Total waste material within the open pits was estimated at 270 Mt, giving a LOM strip ratio of 3.0:1. A production schedule was generated at 5.0 Mtpa process plant feed for the first five years of production, then increased to 8 Mtpa thereafter. The open pit production schedule consists of one year of pre-production for pre-stripping followed by 13 years of mining and a partial final year of stockpile reclaim. The target total peak annual mining rate is 36 Mt tonnes of material per year, or 100,000 tpd.

The open pit mining will be owner-operated using conventional open pit mining diesel equipment consisting of 254 mm diameter rotary drills on 10 m high benches, 29 m^3 bucket hydraulic excavators, 221 t off-highway haul trucks and auxiliary equipment. The major mining equipment (trucks, shovels, drills, wheel loaders, dozers, graders) will be leased in order to reduce initial capital costs. An explosives contractor will be hired for delivering and loading explosives into the blast holes and setting off the blasts.

The open pit operation will require the development of two mine rock storage facilities located primarily to the east of the mining areas, with a smaller storage facility at the east side of the process solids management facility ("PSMF"). Mine waste rock will also be used to raise the embankments at the PSMF over the LOM.

Three process plant feed grade stockpiles will be used. The stockpile inventory will fluctuate from year to year, depending on whether excess feed is being mined and placed into stockpile or sent directly to the process plant.

The Marathon Project will require mine offices, change house/dry-facilities, maintenance facilities and truck work shop, diesel fuel tank farm, warehousing and cold storage areas. The mine office will provide office space for mine management, engineering, geology, environmental, personnel, administration and mine maintenance services. The Marathon Project mining operation will require a peak open pit workforce of 213 personnel.

1.14 RECOVERY METHODS

Metallurgical testwork results and flowsheet design for the Marathon Project originate from a series of bench scale metallurgical tests at multiple laboratories over several years. The extensive metallurgical testing has indicated recoveries of PGM's and Cu to be reasonably high and relatively consistent. Tests included crushing, grinding, as well as batch, cycle and mini pilot scale froth flotation testing. The most recent tests focused on confirming circuit stability, maximizing concentrate grade and representing a split Cu-PGM flowsheet with fine grinding and multiple cleaning stages in each flotation circuit.

Process plant recoveries for this PEA were determined by P&E to be: Copper – 92% in production years 1 to 5 when copper grades are highest, and 90% for production years 6 onwards to the end of LOM; Palladium – 82.9%; Platinum – 74.5%; Gold – 73.2%; and Silver – 71.5%.

For the first five production years, the Marathon process plant will treat 5 Mtpa of mineralized material by using the following major components and processes:

- crushing and grinding to a moderate grain size;
- froth flotation of a copper rougher concentrate which is re-ground and re-floated several times for copper grade improvement;
- re-grinding of the copper flotation tails and a PGM rougher flotation concentrate is recovered;
- the PGM concentrate is re-ground and re-floated to improve PGM grade; and
- the Cu and PGM concentrates are combined, thickened, filtered and prepared for shipment to a smelter.

From production year six onwards to the end of LOM, the process plant will treat 8 Mtpa after incorporating the following components:

- increased crushing capacity - initial crushing achieved by operating additional hours, second stage crushing added;
- increased grinding capacity – addition of a ball mill; and
- increased flotation capacity – addition of float cells.

1.15 PROJECT INFRASTRUCTURE

A new 7 km access road from the Property will be constructed to the existing Peninsula Road that accesses the Trans-Canada Highway. Site roads will be constructed on an as-needed basis.

The mine plan initially targets near-surface high-grade mineralization in the south of the Marathon Deposit, then advances to the northern area. Over the LOM, open pits are expanded in both the north and south areas, and a small open pit is developed in the centre area. The main mine rock storage facility has been designed to the east of the open pits, with a smaller storage facility on the east side of the PSMF area. The majority of the mine rock will be non-acid generating. Waste rock will also be placed to construct and raise the PSMF embankments.

Property electrical energy requirements will be supplied by a short connection to the nearby Hydro One 115 kV electrical power grid.

Site buildings have been located near the southeast end of the Deposit, and will consist of the primary crusher, process plant, office complex, warehouse, diesel tank farm and workshop. To accommodate the large construction workforce, a construction camp will be built at site and will remain operational for the first five years of mine life. Once the operational phase of the mine commences, the operations workforce working on rotation, will be responsible for its own housing and travel from local communities.

An explosives contractor bulk explosives plant and magazine will be established at required safe distances from the process plant/office/maintenance facility area.

The process plant facilities will consist of the following:

- Primary crusher building;
- Enclosed crushed material stockpile facility;
- Grinding, flotation, thickening and filtration building that will also house areas for:
  - Offices,
  - Lunchroom,
  - Control room;
- Laboratory building, separate from the process plant;
- Reagents storage and mixing building;
- Spare parts warehouse building;
- Main electrical substation; and
- 2 MW emergency generator.

The PSMF embankments will be constructed in downstream mode with mine waste rock with a geomembrane layer underlain by two transition zones on the upstream face. The upstream embankment slopes will be 2H:1V. An HDPE geomembrane will be anchored into low permeability bedrock to minimize seepage from the facility. Construction steps include the removal of overburden and high permeability near-surface bedrock, placement of slush grout on the prepared bedrock surface and/or the injection grouting into deeper, more permeable bedrock zones as required.

PSMF embankments will be constructed using Type 1 mine waste rock that is NAG (non-acid generating). A total of 39.5 Mt of mine rock will be used to construct the PSMF embankments over the LOM. Ongoing monitoring, sampling and testing of the mine rock will be completed during the initial construction and during subsequent PSMF embankment lifts to confirm that the mine rock used in the embankment constructions is NAG.

The PSMF will be constructed in two cells. Process solids will be separated into NAG and PAG in the process plant and separately discharged into the PSMF. The PAG will be permanently submerged under water in the PSMF pond and maintained in a complete water saturated condition for the long term. PSMF pond water will be reconditioned and recycled to the process plant. Once operations have commenced, process water to support the process plant will generally be provided by recycling water from the PSMF.

Three separate water supply systems will be provided to support the operations for the process plant; a clean process water supply system, a thickener overflow and PSMF reclaim water supply system, and a potable water supply.

Three water treatment facilities will be operated during the Project operations:

- Reclaim water treatment facility. PSMF reclaimed water, surface run-off, and open pit water will be combined for use in the process plant and for fire suppression water.
- A conventional septic-type system will be associated with the site camp. Process plant and administration facilities will be equipped with sewage storage facilities that are pumped on a regular basis by a commercial operator.
- Effluent treatment facility, drawing excess water from the PSMF ponds. The Marathon Project facility will be a net-discharge facility. Treated discharge to the environment will meet all provincial and federal discharge limits for total suspended solids ("TSS"), metals, pH, biological toxicity etc.

1.16 MARKET STUDIES AND CONTRACTS

Metal prices and the CDN:US dollar exchange rate are based on December 31, 2019 approximate two-year trailing average metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag, and $CDN:US$ = 0.76. Both the metal prices and exchange rate are potentially subject to spot market conditions. There are no metals streaming or hedging agreements in place.

The Marathon PGM-Cu Project is located approximately 750 km west by road from Glencore's copper smelter located in Rouyn-Noranda, QC where concentrate deliveries can be made by either truck or rail. There will be opportunity to send concentrate off-shore to potential smelters in Europe and Asia.

Marathon PGM concentrate production will average approximately 72,000 dry metric tonnes ("dmt") per year over the projected mine-life, or approximately 78,000 wet metric tonnes ("wmt") per year. The concentrates to be produced from the Project will be very low in deleterious elements commonly seen in copper concentrates (e.g. lead, zinc, arsenic, antimony, bismuth) and are not expected to draw any penalties.

Treatment charges are estimated at US$85/dmt, and copper refining charges are estimated at US$0.085/lb payable copper. No price participation charges are anticipated.

For the balance of the contract terms, the following are expected to apply:

- Payable/accountable metals:
  - Copper 96.5%, subject to a minimum deduction of 1.2 units (1.2%)
  - Gold 97%, subject to a minimum deduction of 1 g/dmt
  - Silver 97%, subject to a minimum deduction of 30 g/dmt
  - Platinum 95%, subject to a minimum deduction of 3 g/dmt
  - Palladium 95%, subject to a minimum deduction of 3 g/dmt.

- Refining charges:
  - Gold US$5.00/oz
  - Silver US$0.40/oz
  - Platinum US$20.00/oz
  - Palladium US$20.00/oz.

- Transportation/logistics costs, delivered receiving smelter: US$148.00/dmt.

1.17 ENVIRONMENTAL STUDIES, PERMITS, AND SOCIAL OR COMMUNITY IMPACTS

Detailed and comprehensive environmental baseline studies had been undertaken and essentially completed between 2005 to 2014, until the Marathon Project was put on hold in 2014. Since 2014, ongoing baseline monitoring and sampling has continued, and therefore no sampling opportunity has been lost during the suspension period.

In 2008 Marathon PGM Corp. had retained True Grit Consulting Ltd., and later in 2009 had engaged EcoMetrix, to assist in the development of a comprehensive environmental research program to support the acquisition of all the needed federal and provincial approvals and permits. Comprehensive data collection had been initiated in 2008 and much of this information was compiled with other Project information into a 2010 detailed Project Description to commence the Federal Environmental Assessment process. Subsequently, in June 2012 an Environmental Impact Statement ("EIS") Report was submitted to a federal and provincial Joint Review Panel ("JRP") which had been formed for the Project. The JRP found EIS and supporting information to be sufficient in 2013 and ready to proceed to the Panel Hearings. Prior to the hearings, the Environmental Assessment ("EA") was put on-hold and remains in that status as of the effective date of this Technical Report.

The environmental approval process can be expected to be revived. This will potentially save considerable time to obtain environmental approval compared with starting fresh and seeking individual federal and provincial government decisions. The complex permitting for construction and operation will commence following approval of the EA by the provincial and federal Environment Ministries.

The existing studies provide a basis for assessment of the nature, extent and duration of potential environmental and socioeconomic effects resulting from mine development, operation and closure. A Closure Plan that will minimize long term care and maintenance requirements had been prepared, and submitted with the EIS and is anticipated to remain valid and acceptable. Regular engagement and consultation with communities has been maintained by all operators since 2007, and continues with Gen Mining. EA level engagement and consultations should resume as soon as possible.

Up to Project suspension in 2014, a series of consultations and negotiations and/or agreements, had been engaged with local indigenous communities and the Town of Marathon. In the last five years, while limited in scope, social and community engagement and consultation activity has continued. To date there are no community benefit agreements ("CBA's") with any community.

1.18 CAPITAL AND OPERATING COSTS

1.18.1 Capital Costs

The capital cost estimate is developed to a level commensurate with that of a Preliminary Economic Assessment in order to evaluate the Project viability. After inclusion of a contingency, the capital cost estimate is considered to have an accuracy of ±25%, Q4 of 2019.

The total estimated cost to design, procure, construct and commence production at the facilities described in this Technical Report is \$431 million ("\$M"). Table 1.6 summarizes the initial capital cost estimate. An exchange rate of CDN\$1 = US\$0.76 has been used for the initial capital cost estimate. All costs are in Canadian dollars unless otherwise noted.

TABLE 1.6
INITIAL CAPITAL COST SUMMARY

Item	Cost (\$M)
Mine Pre-Stripping	15.3
Mining Capital Cost	40.6
Process Plant including EPCM	272.8
PSMF	14.3
Mine Site Infrastructure	54.0
Contingency	34.1
Total	**431.1**

Mine pre-stripping will be done by an owner mining fleet during Year-1. Operating costs during Year-1 will be capitalized.

The major pieces of mining equipment (trucks, shovels, drills, wheel loader, dozers, graders) will be leased over five-year periods. Capitalized down-payments for the pre-production mining fleet and equipment leases will be incurred in Year-2 and Year-1. Mining capital costs also include site development that consists of clearing and grubbing the initial mining areas, haul road construction, pit dewatering pumps and pipelines, radio and survey equipment, a computerized dispatch system, and an explosives plant including storage and magazines.

Process plant initial capital costs consist of $221M in direct costs and $52M for indirect costs. The initial capital cost estimate has been built up by cost account areas. Indirect costs have been calculated using factoring percentages based on historical data of similar projects.

The starter dam for the PSMF will be constructed to hold the first production year's process solids of approximately 4 Mt plus an embankment height for 1 m of water cover and 1 m of freeboard. A contractor will carry out much of the work, and will be supplemented by owner mining equipment once pit pre-stripping commences. The PSMF embankments will be raised in subsequent years using suitable mine waste rock generated from the open pits.

Mine site infrastructure capital costs include items such as water treatment plants, mining equipment workshop, connection to the Ontario Hydro electrical power line grid, a construction camp, an administration building, a dry/change facility, a warehouse and storage facilities.

Contingency has been included in the initial capital cost in recognition of the degree of detail on which the estimate is based. A contingency percentage of 10% has been included to most cost areas except for mine pre-production unit mining costs and down-payments for equipment leases. A contingency of 10% is acceptable considering that three Feasibility Studies have been completed on the Project, all employing similar plant configurations, since the metallurgical flowsheet is well understood, and utilizes similar mining configurations.

1.18.2 Sustaining Capital Costs

Sustaining capital costs are estimated at $277M as presented in Table 1.7.

TABLE 1.7
SUSTAINING CAPITAL COST SUMMARY

Item	Initial Total ($M)
Mining, mainly equipment lease payments	128.1
Process Plant expansion to 8 Mtpa	38.3
PSMF expansion over LOM	67.0
Contingency	13.6
Total	**277.0**

1.18.3 Operating Costs

The operating cost estimate includes the cost of open pit mining, mineral processing, and General and Administration ("G&A"). The life-of-mine Project average operating cost is estimated at $19.12/t processed, as presented in Table 1.8.

TABLE 1.8 OPERATING COST SUMMARY	
Item	**LOM Average Operating Cost ($/t processed)**
Mining	9.23
Processing	8.92
G&A	0.97
Total	**19.12**

Mine operating costs are derived from in-house equipment databases and recent vendor budgetary quotes for all major and supporting equipment operating parameters, and include fuel, consumables, labour ratios, and general parts and maintenance costs. The estimated mine unit operating cost averages $2.34/t mined over the life of the Project.

Process plant operating costs are estimated at $9.54/t for a throughput rate of 5 Mtpa, and at $8.70/t for processing at 8 Mtpa. Over the LOM the average processing cost is estimated at $8.92/t.

G&A costs include a labour staff establishment of 29 people at 5 Mtpa and 32 people at 8 Mtpa. A housing subsidy for the first five years of operation is included to transition the approximately 300 site employees from the Project camp on the site to housing in the Town of Marathon and surrounding communities. The camp will be closed after five years of operation since it is assumed that apartments, single and multiple housing will be constructed or become available for employees during the five-year housing transition period. The G&A operating costs are estimated at $1.51/t processed when at 5 Mtpa, and $0.76/t processed for 8 Mtpa. Over the LOM the average G&A cost is estimated at $0.97/t.

1.18.4 Manpower

Project labour establishment is estimated to reach a peak of 320 persons in production years six and seven. At 5 Mtpa, manpower is estimated to average 198 mining, 76 process plant, and 29 G&A, for a total of 303. At 8 Mtpa, manpower is estimated to average 204 mining, 76 process plant, and 32 G&A, for a total of 312.

1.19 ECONOMIC ANALYSIS

A Project financial model was developed to estimate the viability of the Marathon Project LOM plan. The LOM plan covers a two-year pre-production period and a 14-year production schedule for mining approximately 90 Mt of mineralized material. Table 1.9 presents a summary of the LOM financial parameters and valuation. All costs are in Q4 2019 Canadian dollar nominal terms and inflation has not been considered in the cash flow analysis.

Table 1.9 LOM Financial Valuation and Parameters		
Item	**Unit**	**Value**
Commodity Prices and FX		
Palladium Price	US$/oz	1,275
Copper Price	US$/lb	3
Platinum Price	US$/oz	900
Gold Price	US$/oz	1,300
Silver Price	US$/oz	16
CDN:US	CDN$:US$	0.76
Mine Plan Summary		
Mine Life	years	14
Mineralized Material	Mt	89.4
Diluted Palladium Grade	g/t	0.69
Diluted Copper Grade	%	0.22
Diluted Platinum Grade	g/t	0.21
Diluted Gold Grade	g/t	0.07
Diluted Silver Grade	g/t	1.52
Processing Rate Years 1-5	tpd	14,000
Processing Rate Years 6-14	tpd	22,000
Processing Recovery		
Concentrate Produced LOM	Mt	0.95
NSR/t Feed LOM	CDN$/t	48.39
Payable PdEq LOM	Moz	2.6
Average PdEq Per Year	oz	194,000
LOM Operating Cost		
Mining	$/t mined	2.34
Processing	$/t processed	8.92
G&A	$/t processed	0.97
Cash Operating Cost PdEq	US$/oz	504
AISC Cost PdEq	US$/oz	586
Capital Costs		
Initial	$M	431
Sustaining	$M	277
Financial Results		
Pre-Tax $NPV_{5\%}$	$M	1,184
After-Tax $NPV_{5\%}$	$M	871
Pre-Tax IRR	%	35
After-Tax IRR	%	30
After-Tax Payback[1]	years	2.5

***Note [1]**: After Project production commences.*

At metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and a CDN$ to US$ exchange rate of 0.76, the Project is estimated to generate approximately $145M free undiscounted cash flow annually, for a total of $1,427M over the LOM.

The PEA demonstrates favourable economic returns with an estimated after-tax NPV5% of $871M and after-tax IRR of 30%. Pre-tax figures are NPV5% of $1,184M and IRR of 35%. Revenue contributions are estimated at 54.4% from Pd, 31.1% from Cu, 8.9% from Pt, 4.6% from Au, and 1.0% from Ag.

Sensitivity results on the value drivers are presented in Table 1.10 to 1.12.

TABLE 1.10
PALLADIUM PRICE SENSITIVITY

% of Base Case	55	71	86	**Base Case**	118	133	149
US$/oz Pd	700	900	1,100	**1,275**	1,500	1,700	1,900
NPV (5% discount after-tax CDN$M)	255	469	684	**871**	1,112	1,326	1,540
IRR %	13.4	19.6	25.3	**30.0**	35.8	40.8	45.7
Payback (years)	6.4	4.0	2.9	**2.5**	2.1	1.8	1.6

TABLE 1.11
AFTER-TAX NPV AT 5% DISCOUNT RATE SENSITIVITY (CDN$M)

Sensitivity % of Base Case	**-20**	**-10**	**0**	**+10**	**+20**
OPEX	973	922	**871**	820	769
CAPEX	1,048	960	**871**	782	694

TABLE 1.12
AFTER-TAX IRR SENSITIVITY (%)

Sensitivity % of Base Case	**-20**	**-10**	**0**	**+10**	**+20**
OPEX	38.1	33.7	**30.0**	26.9	24.3
CAPEX	33.9	32.0	**30.0**	27.9	25.8

Project economics are more leveraged to metal prices and exchange rate, with lesser leverage to capital and operating costs.

1.20 RISKS AND OPPORTUNITIES

1.20.1 Risks

A summary of several Project risks identified during the PEA is as follows:

- In a PEA the level of cost accuracy is such that capital and operating cost escalations can occur with more detailed study. This could be due to price escalations or changes in design scope. The contingency applied in the PEA cost estimate may not accurately reflect these cost increases.
- Pit slope designs are based on geotechnical and hydrogeological studies completed from surface. Once pit operations commence and pit wall mapping is undertaken, structural changes could impact on design wall angles or the water inflows.
- Supplementary metallurgical testwork is recommended on fresh drill core to reach a Feasibility Study confidence level of metal recoveries and grades. Testwork should be performed on a representative Deposit sample of approximately 1 tonne to confirm optimum Pd metallurgical performance.
- Additional optimization of fine grinding size for both Cu and PGM rougher concentrates could reduce possible uncertainty in grind size targets and grinding method.
- Specific process testwork is needed on the concentration of sulphides from fresh as-produced PGM rougher tails.
- Tests should be performed on bulk process solids (no sulphide separation) to simulate particle behaviour on disposal and investigate the possible natural segregation of fine sulphides to wet zones in the PSMF.
- An optimization study should be conducted on primary and secondary grinding: SAG-ball mill, secondary ball mill for 5 Mtpa, and include the consideration of proficient expansion to 8 Mtpa.
- Process plant and infrastructure construction is estimated to be completed within 18 months. Any delay will incur additional capital costs.

1.20.2 Opportunities

A summary of Project opportunities identified during the PEA is as follows:

- It may be possible to access deeper process plant feed material and increase the mine life with additional pit wall pushbacks. This will depend on future metal prices and economics.

- The location of the primary crusher can be optimized with the goal of reducing haul distances by using a conveyor. A trade-off study is warranted to review locating the primary crusher and low-grade stockpile close to the North Pit entrance.

- Currently the mine plan cannot make use of pit backfilling. Detailed mine planning and pit sequencing may enable waste rock backfilling or tailings deposition to occur into portions of the mined-out pits. This would reduce the Project footprint and possibly reduce haulage or sustaining capital costs.

- Mining equipment procurement could be done through a vendor firm such as DBS SME Banking to reduce EPCM costs.

- The Geordie and Sally Deposits were not studied to determine if the Mineral Resources could be incorporated into the PEA mine plan. There is potential to extend the LOM since the Deposits are located within 16 km of the Marathon Deposit.

- Improved process recoveries and lower costs could be achieved by using recently-developed replacements or supplements of the PAX flotation agent. Batch tests should readily confirm potential.

- Simpler, lower cost process solids management is very likely if sulphide isolation is confirmed to be unnecessary to prevent ARD during operations and on closure.

- The logistics planning of all Project construction shipments could be optimized to reduce freight costs.

1.21 INTERPRETATIONS AND CONCLUSIONS

1.21.1 Introduction

P&E concludes that the Marathon Project has favourable economic potential as an open pit mining operation, utilizing an on-site processing plant to produce a copper concentrate that contains PGM's.

The PEA results outline 89.4 Mt of process plant feed (inclusive of mining dilution and loss factors) with payable metals averaging 0.69 g/t Pd, 0.22% Cu, 0.21 g/t Pt, 0.07 g/t Au, and 1.52 g/t Ag for a PdEq grade of 1.26 g/t within three production open pits. The Project has an estimated initial capital cost of $431M, at a strip ratio of 3.0:1, and estimated economics of an after-tax NPV of $871M at a 5% discount rate, an after-tax IRR of 30%, and a 2.5-year payback period using metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and an exchange rate of CDN$1.00 = US$0.76.

P&E recommends that Gen Mining advance the Marathon Project with further drill exploration, metallurgical testwork, and a Feasibility Study with the intention of moving the Project towards a production decision.

The following itemizes the conclusions that can be drawn from the information provided in this PEA.

1.21.2 Mineral Resource Estimates

The Marathon Property is located approximately 10 km north of the Town of Marathon, Ontario which is situated adjacent to the Trans-Canada Highway No. 17 on the northeast shore of Lake Superior. Gen Mining owns a 51% interest (with an option to earn up to an 80% interest through a Joint Venture arrangement) in the Marathon Deposit and the Property from Stillwater Canada Inc. (a wholly owned subsidiary of Sibanye Gold Limited). This increase in ownership would be obtained through spending of $10 million and preparing a Preliminary Economic Assessment within four years of the Property acquisition date marked as July 11, 2019. Gen Mining acts as the operator of the joint venture and once Gen Mining reaches an 80% interest, a Joint Venture between Gen Mining and Stillwater Canada Inc. will be formed.

The Property is characterized by moderate to steep hilly terrain with a series of interconnected creeks and lakes surrounded by dense vegetation. During the past five decades, the Marathon Property has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drilling programs, geological studies, resource estimates, metallurgical studies, mining studies, and economic analyses.

The Marathon Property is situated along the eastern margin of the Coldwell Complex, which is part of the Keweenawan Supergroup of igneous, volcanic and sedimentary rocks that were emplaced around, and in the vicinity of the Mid-continent Rift System ("MRS"). The Marathon Deposit is hosted by the Two Duck Lake Gabbro ("TDL Gabbro"), a late intrusive phase of the Eastern Gabbro. The Eastern Gabbro is a composite intrusion and occurs along the northern and eastern margin of the Proterozoic Coldwell Alkaline Complex ("CAC") which intrudes the much older Archean Schreiber-Hemlo greenstone belt. The entire CAC is believed to have intruded over a relatively short period of time near the beginning of the main stage of the Mid-continent Rift magmatism that occurred between 1108 and 1094 Ma.

Drilling and sampling procedures, sample preparation, and assay protocols are generally conducted in agreement with best practices. Verification of the drill hole collars, surveys, assays, core, and drill hole logs indicates that the Marathon PGM-Cu Project data is reliable. Based on the QA/QC program, the data is sufficiently reliable to support the Mineral Resource Estimates generated for three Deposits on the Property (Marathon, Geordie and Sally).

The Mineral Resource block models have been constructed in conformance to industry standard practices. The geological understanding is sufficient to support the Mineral Resource Estimates. P&E considers that the information available for the Marathon, Geordie and Sally Deposits is reliable, demonstrates consistent geological and grade continuity, and in each case satisfies the requirements for a Mineral Resource Estimate.

The Mineral Resource for the Marathon Deposit is reported against an NSR cut-off value of $13/t and constrained within an optimized pit shell. The Updated Mineral Resource Estimate is based on a total of 883 drill holes and 1,008 trenches totalling 199,343 m. The Measured plus Indicated Mineral Resource totals 179.2 Mt at an average grade of 0.56 g/t, Pd, 0.18 g/t Pt.

0.20% Cu, 0.07 g/t Au and 1.6 g/t Ag. The Inferred Mineral Resource totals 0.7 Mt with an average grade of 0.37 g/t Pd, 0.12 g/t Pt, 0.19% Cu, 0.05 g/t Au and 1.4 g/t Ag.

At an NSR cut-off value of $25/t, the pit-constrained combined Measured and Indicated Mineral Resource is 116 Mt with an average grade of 0.73 g/t Pd, 0.23 g/t Pt, 0.25% Cu, 0.08 g/t Au and 1.7 g/t Ag. The Inferred Mineral Resource at this cut-off grade is estimated at 0.14 Mt with an average grade of 0.62 g/t Pd, 0.16 g/t Pt, 0.28% Cu, 0.05 g/t Au and 0.9 g/t Ag.

The Geordie and Sally Deposits are within 16 km of the Marathon Deposit. At an NSR cut-off value of $15/t and constrained within an optimized pit shell, the Geordie Indicated Mineral Resource totals 17.3 Mt at an average grade of 0.56 g/t Pd, 0.04 g/t Pt, 0.35% Cu, 0.05 g/t Au and 2.4 g/t Ag, and the Inferred Mineral Resource totals 12.9 Mt at an average grade of 0.51 g/t Pd, 0.03 g/t Pt, 0.28% Cu, 0.03 g/t Au and 2.4 g/t Ag.

At an NSR cut-off value of $15/t and constrained within an optimized pit shell, the Sally Indicated Mineral Resource totals 24.8 Mt at an average grade of 0.35 g/t Pd, 0.20 g/t Pt, 0.17% Cu, 0.07 g/t Au and 0.7 g/t Ag, and the Inferred Mineral Resource totals 14.0 Mt at an average grade of 0.28 g/t Pd, 0.15 g/t Pt, 0.19% Cu, 0.05 g/t Au and 0.6 g/t Ag.

Neither the Geordie nor Sally Mineral Resource Estimates were incorporated into the mine plan reported in this Technical Report.

1.21.3 Mining Methods and Infrastructure

P&E completed this PEA based on an Updated Mineral Resource Estimate for the Marathon Deposit. The reporting of the Updated Mineral Resource Estimate complies with all disclosure requirements for Mineral Resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the Updated Mineral Resource is consistent with CIM Definition Standards - For Mineral Resources and Mineral Reserves.

The potentially mineable portion of the Updated Mineral Resource Estimate was determined to be 89.4 Mt with an average grade of 0.69 g/t Pd, 0.21 g/t Pt, 0.22% Cu, 0.07 g/t Au and 1.52 g/t Ag from three open pits. Waste rock and overburden material was estimated at 270 Mt for a LOM strip ratio of 3.0:1.

Conventional open pit mining equipment and methodologies will be utilized. The major mining equipment (trucks, shovels, drills, wheel loaders, dozers, graders) will be leased in order to reduce initial capital costs. An explosives contractor will be hired for delivering and loading explosives into the blast holes. Other than explosives delivery, mining will be owner-operated.

The mine plan initially targets near-surface high-grade mineralization in the south of the Marathon Deposit, then advances to the northern area. Over the LOM, open pits are expanded in both the north and south areas, and a small open pit is developed in the centre area. The main waste rock storage facility has been designed to the east of the open pits, with a smaller storage facility on the east side of the PSMF area.

Property electrical energy requirements will be supplied by a short connection to the nearby Hydro One 115 kV electrical power grid.

Site buildings have been located near the southeast end of the Deposit, and will consist of the primary crusher, process plant, office complex, warehouse and workshop. To accommodate the large construction workforce, a construction camp will be built at site and will remain operational for the first five years of mine life. Once the operational phase of the mine commences, the operations workforce working on rotation, will be responsible for its own housing and travel from local communities.

The PSMF embankments will be constructed in downstream mode with mine waste rock with a geomembrane layer underlain by two transition zones on the upstream face. The upstream embankment slopes will be 2H:1V. An HDPE geomembrane will be anchored into low permeability bedrock to minimize seepage from the facility. Construction steps include the removal of overburden and high permeability near-surface bedrock, placement of slush grout on the prepared bedrock surface and/or the injection grouting into deeper, more permeable bedrock zones as required.

The PSMF will ultimately be built in two cells, with the ability of one cell to contain a cap of 1 m of water to submerge PAG process solids. PSMF pond water will be reconditioned and recycled to the process plant.

Three water treatment facilities will be operated during the Project operations: 1) reclaim water treatment from the PSMF, open pits and surface run-off, 2) conventional septic-type systems for the camp and offices, and 3) effluent treatment of excess water from the PSMF ponds.

1.21.4 Recovery Methods

Metallurgical testwork results and flowsheet design for the Marathon Project originate from a series of bench scale metallurgical tests at multiple laboratories over several years. The extensive metallurgical testing has indicated recoveries of PGM's and Cu to be reasonably high and relatively consistent. Tests included crushing, grinding, as well as batch, cycle and mini pilot scale froth flotation testing. The most recent tests focused on confirming circuit stability, maximizing concentrate grade and representing a split Cu-PGM flowsheet with fine grinding and multiple cleaning stages in each flotation circuit.

Process plant recoveries for this PEA were determined by P&E to be: Copper – 92% in production years 1 to 5 when copper grades are highest, and 90% for production years 6 onwards to the end of LOM; Palladium – 82.9%; Platinum – 74.5%; Gold – 73.2%; and Silver – 71.5%.

For the first five production years, the Marathon process plant will treat 5 Mtpa of mineralized material by using the following major components and processes:

- crushing and grinding to a moderate grain size;
- froth flotation of a copper rougher concentrate which is re-ground and re-floated several times for copper grade improvement;

- re-grinding of the copper flotation tails and a PGM rougher flotation concentrate is recovered;

- the PGM concentrate is re-ground and re-floated to improve PGM grade; and

- the Cu and PGM concentrates are combined, thickened, filtered and prepared for shipment to a smelter.

From production year six onwards to the end of LOM, the process plant will treat 8 Mtpa after incorporating the following components:

- increased crushing capacity - initial crushing achieved by operating additional hours, second stage crushing added;

- increased grinding capacity – addition of a ball mill;

- increased flotation capacity – addition of float cells.

1.21.5 Environmental and Social Considerations

Detailed and comprehensive environmental baseline studies had been undertaken and essentially completed between 2005 to 2014, until the Project was put on hold in 2014. Since 2014, ongoing baseline monitoring and sampling has continued, and therefore no sampling opportunity has been lost during the suspension period.

In 2008 Marathon PGM Corp. had retained True Grit Consulting Ltd., and later in 2009 had engaged EcoMetrix, to assist in the development of a comprehensive environmental research program to support the acquisition of all the needed federal and provincial approvals and permits. Comprehensive data collection had been initiated in 2008 and much of this information was compiled with other Project information into a 2010 detailed Project Description to commence the Federal Environmental Assessment process. Subsequently, in June 2012 an Environmental Impact Statement ("EIS") Report was submitted to a federal and provincial Joint Review Panel ("JRP") which had been formed for the Project.

The environmental approval process can be expected to be revived. This will potentially save considerable time to obtain environmental approval compared with starting fresh and seeking individual federal and provincial government decisions. The complex permitting for construction and operation will commence following approval of the Environmental Assessment ("EA") by the provincial and federal Environment Ministries.

Up to the time of Project suspension in 2014, a series of consultations and negotiations and/or agreements, had been engaged with local indigenous communities and the Town of Marathon. In the last five years, while limited in scope, social and community engagement and consultation activity has continued. To date there are no community benefit agreements ("CBA's") with any community.

1.21.6 Economic Analysis

Open pit mining costs have been estimated to average $2.34/t material over the LOM. At a strip ratio of 3.0:1 mining costs equate to $9.23/t of process plant feed. Processing costs ($8.92/t) and site G&A ($0.97/t) contribute to a total LOM average cost estimated at $19.12/t processed.

Initial capital costs are estimated at $431M and include a 10% contingency. Sustaining capital costs are estimated at $277M for mining equipment capital leases, PSMF and process plant expansion and mine closure.

Using the PEA metal pricing of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and an exchange rate of CDN$1.00 = US$0.76, the Project has an estimated pre-tax NPV at a 5% discount of $1,184M and an IRR of 35%. After-tax NPV and IRR are estimated at $871M and 30%, respectively.

Project economics are more leveraged to metal prices and exchange rate, with lesser leverage to capital and operating costs.

The PEA has highlighted several opportunities to increase Project economics and reduce identified risks. These include opportunities to optimize the mining and processing plans, along with the opportunity to expand the Geordie and Sally Mineral Resource Estimates through further exploration, with the intent of establishing Mineral Reserves at the two Deposits.

1.22 RECOMMENDATIONS

P&E considers the Marathon Project as a significant PGM and copper Mineral Resource with a well-defined mineralized trend and model. It is P&E's opinion that the Project has demonstrated favourable economics at current metal prices, and should be advanced to a Feasibility Study for production consideration. The PEA has shown that the Marathon Deposit can be mined by open pit methods at an initial production rate of 5 Mtpa for a period of five years, then increasing production to 8 Mtpa until the end of mine life.

The process plant is designed to produce a Cu-PGM concentrate through two flotation circuits to optimize Cu and PGM metal recoveries. The PEA estimates that over the 14-year LOM a total of 2.6 Moz of PdEq will be recovered at an average diluted grade of 1.26 g/t PdEq. This also equates to a total of 1.1 billion pounds of CuEq recovered over the LOM.

At metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and a CDN$ to US$ exchange rate of 0.76, the PEA demonstrates favourable economic returns with an estimated after-tax NPV5% of $871M and after-tax IRR of 30%. Pre-tax figures are NPV5% of $1,184M and IRR of 35%. Revenue contributions are 54.4% from Pd, 31.1% from Cu, 8.9% from Pt, 4.6% from Au, and 1.0% from Ag.

It is P&E's opinion that the Marathon Property has significant potential to increase Mineral Resources. The Geordie Deposit has a recent updated Mineral Resource Estimate, and the Sally Deposit has a recent initial Mineral Resource Estimate, and further exploration on both Deposits is warranted.

The following recommendations are related to production mining aspects of the Project:

- Currently the mine plan does not consider pit backfilling of waste rock or tailings. Detailed mine planning and pit sequencing may enable waste rock backfilling or tailings deposition to occur into portions of the mined-out pits depending upon production sequencing. This would reduce the Project disturbance footprint and possibly reduce haulage and/or sustaining capital costs; and

- Mining equipment procurement could be done through a vendor firm such as DBS SME Banking to reduce EPCM costs.

P&E has reviewed the tailings management strategy in past engineering studies and offers the following recommendations for improvement:

- Increasing the Cu and PGM process streams thickening underflow to at least 50% solids is recommended. This reduces pumping costs for tailings and pond water recycle, and the warm water from thickener overflows may be beneficial to the flotation processes, and requires further analysis;

- A higher thickened tailings slurry discharge will result in higher final in-facility density, potentially assisting in defining the closure strategy;

- To manage PAG and NAG process solids, two process solids streams were suggested in previous environmental studies during the EA. One alternative is the use of injection discharge for one stream from a floating barge by a lance into a zone below the settled solids-pond water interface; and

- The storage of Type 2 process solids underwater in mined-out satellite open pits, in later years of Project operation, is a reasonable possibility. This should be preceded by the confirmation that no potential Mineral Resources are sterilized by backfilling the specific pits.

The following actions related to the process plant and environmental aspects are recommended:

- Supplementary metallurgical testwork is recommended on fresh drill core to reach a Feasibility Study confidence level of metal recoveries and grades. Testwork should be performed on a representative Deposit sample of approximately 1 tonne to confirm optimum Pd metallurgical performance and to generate representative bulk process solids (PGM rougher and cleaner-scavenger tails);

- Additional optimization of fine grinding size for both Cu and PGM rougher concentrates would confirm metallurgical process grind size targets and grinding methodology;

- Determine the amount of alkalinity (lime or limestone) that could be added to bulk process solids to ensure NAG;

- An optimization study should be conducted on primary and secondary grinding: SAG-ball mill, secondary ball mill for 5 Mtpa, and include the consideration of proficient expansion to 8 Mtpa; and

- Improved process recoveries and lower costs could be achieved by using recently developed replacements or supplements of the PAX flotation agent. Batch tests should readily confirm potential.

Specific opportunities for advancing the Property include:

- Project Administration (ongoing environmental baseline studies, work permits, community relations, supervision and office expenses, and government financial assistance opportunities for accommodation construction);

- Further exploration drilling in areas external to the Marathon Deposit, to include surface mapping and prospecting, surface and downhole geophysics, and diamond drilling;

- Further work is recommended on the Geordie and Sally Deposits to determine their potential; and

- Marathon Deposit – Feasibility Study, including metallurgical drilling and related studies.

The proposed work program is estimated at $5.5M as summarized in Table 1.13.

TABLE 1.13
RECOMMENDED WORK PROGRAM AND BUDGET

Program	Budget ($ M)
Project administration	1.0
Exploration external to Marathon Deposit	1.0
Feasibility Study	3.5
Total	**5.5**

2.0 INTRODUCTION AND TERMS OF REFERENCE

2.1 TERMS OF REFERENCE

The following report was prepared to provide a National Instrument ("NI") 43-101 Technical Report, updated Mineral Resource Estimate and Preliminary Economic Assessment ("PEA") for the mineralization contained in the Marathon Platinum Group Metals-Copper Property ("Marathon PGM-Cu Property" or the "Property") located in northwestern Ontario near Marathon, Canada. Generation Mining Limited ("Gen Mining") owns a 51% interest in the Property (with an option to earn up to an 80% interest).

This Technical Report was prepared by P&E Mining Consultants Inc., ("P&E") at the request of Mr. Jamie Levy, President and CEO of Gen Mining, an Ontario registered company trading under the symbol of "CSE: GENM" on the Toronto Canadian Securities Exchange ("TSX") with its corporate office at:

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This Technical Report has an effective date of January 6, 2020.

The present Technical Report is prepared in accordance with the requirements of National Instrument 43-101 ("NI 43-101") and in compliance with Form NI 43-101F1 of the Ontario Securities Commission ("OSC") and the Canadian Securities Administrators ("CSA"). The Mineral Resources in the estimate are considered compliant with the Canadian Institute of Mining, Metallurgy and Petroleum ("CIM"), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions.

The purpose of the current Technical Report is to provide an independent, NI 43-101 Technical Report, updated Mineral Resource Estimate and Preliminary Economic Assessment on the Marathon PGM-Cu Property. P&E understands that this Technical Report will be used for internal decision-making purposes and will be filed on SEDAR as required under TSX regulations. The Technical Report may also be used to support public equity financings.

2.2 SITE VISIT

Mr. Bruce Mackie, P. Geo., an independent Qualified Person under the terms of NI 43-101, conducted a site visit of the Property on May 04, 2019. As part of the site visit, confirmation samples from selected drill core intervals were taken by Mr. Mackie and were submitted to Activation Laboratories Ltd. in Thunder Bay. This work was aided by John McBride, P.Geo. a Senior Project Geologist employed at the time by Stillwater Canada Inc. and previously employed with Marathon PGM Corp.

The Property was visited on April 4, 2012 by Mr. David Burga, P.Geo., of P&E, an independent Qualified Person as defined by NI 43-101. Mr. Burga collected 10 samples from nine holes as part of P&E's independent sampling for Quality Assurance/Quality Control ("QA/QC") purposes.

Mr. Eugene Puritch, P.Eng., FEC, CET, of P&E, an independent Qualified Person as defined by NI 43-101, visited the Property numerous times between 2005 and 2010 to review geological and mining aspects related to Mineral Resource and engineering studies.

2.3 SOURCES OF INFORMATION

P&E carried out a study of all relevant parts of the available literature and documented results concerning the Project and held discussions with technical personnel from the Company regarding all pertinent aspects of the Project. This Technical Report is also based, in part, on internal Company technical reports, press releases and maps, published government reports, Company letters and memoranda, and public information as listed in the "Sources of Information" section at the conclusion of this Technical Report. Additional details of the topic can be found in the public filings of Gen Mining as available on SEDAR at www.sedar.com.

Table 2.1 presents the authors and co-authors of each section of the Technical Report, who acting as a Qualified Person as defined by NI 43-101, take responsibility for those sections of the Technical Report as outlined in Section 28 "Certificate of Author" attached to this Technical Report.

TABLE 2.1
REPORT AUTHORS AND CO-AUTHORS

Qualified Person	Employer	Sections of Technical Report
Mr. Andrew Bradfield, P.Eng.	P&E Mining Consultants Inc.	2, 3, 19, 22, 24 and Co-author 1, 18, 21, 25, 26
Ms. Jarita Barry, P.Geo.	P&E Mining Consultants Inc.	11 and Co-author 1, 12, 25, 26
Mr. Fred Brown, P.Geo.	P&E Mining Consultants Inc.	Co-author 1, 14, 25, 26
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Mr. Eugene Puritch, P.Eng.	P&E Mining Consultants Inc.	Co-author 1, 14, 25, 26

2.4 UNITS AND CURRENCY

In this Technical Report, all currency amounts are stated in Canadian dollars ("$") unless otherwise stated. At the time of this Technical Report the 24-month trailing average exchange rate between the US dollar and the Canadian dollar is 1 US$ = 1.32 CDN$ or 1 CDN$ = 0.76 US$.

Commodity prices are typically expressed in US dollars ("US$") and will be so noted where appropriate. Quantities are generally stated in Système International d'Unités ("SI") metric units including metric tons ("tonnes", "t") and kilograms ("kg") for weight, kilometres ("km") or metres ("m") for distance, hectares ("ha") for area, grams ("g") and grams per tonne ("g/t") for metal grades. Platinum group metal ("PGM"), gold and silver grades may also be reported in parts per million ("ppm") or parts per billion ("ppb"). Copper metal values are reported in percentage ("%") and parts per billion ("ppb"). Quantities of PGM, gold and silver may also be reported in troy ounces ("oz"), and quantities of copper in avoirdupois pounds ("lb"). Abbreviations and terminology are summarized in Table 2.2.

Grid coordinates for maps are given in the UTM NAD 27 Zone 16N or as latitude/longitude.

TABLE 2.2
TERMINOLOGY AND ABBREVIATIONS

Abbreviation	Meaning
"$"	dollar(s)
"°"	degree(s)
"°C"	degrees Celsius
<	less than
>	greater than
"%"	percent
"3-D"	three-dimensional
"AAS"	atomic absorption spectrometry
"Accurassay"	Accurassay Laboratories
"Ag"	silver
"ALS"	ALS Metallurgical Laboratories
"ALS Chemex"	ALS Chemex Labs, Ltd.
"asl"	above sea level
"AMEC"	AMEC Earth and Environmental (now Wood)
"Anaconda"	Anaconda Canada Exploration Ltd.
"Au"	gold
"BHP"	BHP Engineering Pty Ltd.
"CAC"	Proterozoic Coldwell Alkaline Complex
"CAPEX"	capital expense/expenditure
"CDN$"	Canadian dollar
"Ce"	cerium
"CEAA"	Canadian Environmental Assessment Act (now Impact Assessment Agency 2019)

TABLE 2.2
TERMINOLOGY AND ABBREVIATIONS

Abbreviation	Meaning
"CIM"	Canadian Institute of Mining, Metallurgy, and Petroleum
"cm"	centimetre(s)
"CN"	cyanide
"Co"	cobalt
"conc"	concentrate
"Cu"	copper
"DDH"	diamond drill hole
"Deposit"	Marathon Deposit
"DFO"	Fisheries and Oceans Canada
"$M"	dollars, millions
"EA"	Environmental Assessment
"EcoMetrix"	EcoMetrix Incorporated
"EIS"	Environmental Impact Statement
"EMRD"	Extraction Metallurgy Research Division
"Euralba"	Euralba Mining Ltd
"Exen"	Exen Consulting Services
"Fleck"	Fleck Resources Ltd.
"Fe"	iron
"ft"	foot
"FS"	Feasibility Study
"FW"	Freewest Resources Inc.
"g"	gram
"GDS"	Geo Data Solutions GDS Inc.
"Geomaque"	Geomaque Explorations Ltd.
"Gen Mining"	Generation Mining Limited, including wholly owned subsidiary Generation PGM Inc.
"Geostat"	Geostat Systems International
"g/t"	grams per tonne
"ha"	hectare(s)
"HADD"	Harmful Alteration, Disruption or Destruction of Fish Habitat
"HGPR"	high pressure grinding rolls
"HLEM"	horizontal loop electromagnetic survey
"ID"	identification
"ID^3"	inverse distance cubed
"ID^2"	inverse distance squared
"IP"	induced polarization
"Ir"	iridium
"IRR"	internal rate of return
"ISO"	International Organization for Standardization
"JRP"	Joint Review Panel
"JV"	joint venture

Table 2.2 Terminology and Abbreviations	
Abbreviation	**Meaning**
“k”	thousand(s)
“kg”	Kilograms(s)
“KHD”	KHD Humboldt Wedag GmbH
“km”	kilometre(s)
“L”	litre(s)
“LCT”	locked cycle tests
“LG”	Lerchs-Grossmann algorithm
“LIMS”	local information management system
“LMOC”	Layered Magnetite Olivine Cumulate
“LOM”	life of mine
“L/s”	litres per second
“LUMINX”	Lakehead University’s Mineralogy and Experimental Laboratory
“lb”	avoirdupois pound (weight)
“m”	metre(s)
“m^3”	cubic metre(s)
“Ma”	millions of years
“Mackie”	Mr. Bruce Mackie Geological Consulting Services
“Mag”	magnetic
“Marathon”	Marathon PGM Corp.
“Marathon Deposit”	Marathon Deposit that is part of the Marathon PGM-Cu Property
“max.”	maximum
“mbs”	metres below surface
“MECP”	Ministry of Environment, Conservation and Parks
“Mg”	magnesium
“Micon”	Micon International Limited
“min.”	minimum
“mm”	millimetre
“MENDM”	Ontario Ministry of Energy, Northern Development and Mines
“MOEPC”	Ontario Ministry of Environment Conservation and Parks
“Moz”	million ounces
“m RL”	metres relative level
“MRS”	Mid-continent Rift System
“Mt”	mega tonne or million tonnes
“NAD”	North American Datum
“Nb”	niobium
“NE”	northeast
“Ni”	nickel
“NI”	National Instrument
“NN”	nearest neighbour
“Nordmin”	Nordmin Engineering Ltd.
“NovaWest”	NovaWest Resources Inc.

TABLE 2.2 TERMINOLOGY AND ABBREVIATIONS	
Abbreviation	**Meaning**
"NRCan"	Natural Resources Canada
"NSR"	net smelter return
"NPV"	net present value
"NW"	northwest
"OEA Act"	Ontario Environmental Assessment Act
"OPEX"	operating expense/expenditure
"OUI"	oxide ultramafic intrusions
"oz"	Troy ounce
"P_{80}"	80% percent passing
"P&E"	P&E Mining Consultants Inc.
"Pb"	lead
"Pd"	palladium
"PdEq"	palladium equivalent
"PEA"	Preliminary Economic Assessment
"P.Eng."	Professional Engineer
"PGE"	platinum group element
"P.Geo."	Professional Geoscientist
"PGM"	Platinum Group Metal
"Polymet"	Polymet Mining Corp.
"ppb"	parts per billion
"ppm"	parts per million
"PRFN"	Pic River First Nation
"Property"	the Marathon PGM-Cu Property that is the subject of this Technical Report
"PSMA"	process solids management areas
"PSMF"	processed solids management facility
"Pt"	platinum
"PWQO"	Provincial Water Quality Objectives
"QA/QC"	quality assurance/quality control
"QMS"	quality management system
"RDi"	Resource Development Inc.
"Rh"	rhodium
"RIB"	Rheomorphic Intrusive Breccia
"S"	sulphur
"SE"	southeast
"SEDAR"	System for Electronic Document Analysis and Retrieval
"SGS-Lakefield"	SGS Lakefield Research
"Sm"	samarium
"Stillwater"	Stillwater Canada Inc.
"SW"	southwest
"t"	metric tonne(s)

TABLE 2.2
TERMINOLOGY AND ABBREVIATIONS

Abbreviation	Meaning
"TBN"	Thunder Bay North Deposit
"TC"	Transport Canada
"TDL Gabbro"	Two Duck Lake Gabbro
"Technical Report"	this NI 43-101 Technical Report
"Teck"	Teck Corporation
"Th"	thorium
"the Company"	Generation Mining Limited
"t/m^3"	tonnes per cubic metre
"tpd"	tonnes per day
"TPGM"	total PGM
"True Grit"	True Grit Consulting Ltd.
"US$"	United States dollar(s)
"UTM"	Universal Transverse Mercator grid system
"VA"	voluntary agreement
"VECs"	valued ecosystem components
"WT"	Wehrlite-Troctolite
"WRSF"	waste rock storage facility
"XPS"	Xtrata Process Research
"Yb"	ytterbium
"Zn"	zinc
"Zr"	zirconium

3.0 RELIANCE ON OTHER EXPERTS

P&E has assumed that all the information and technical documents listed in the Sources of Information section of this Technical Report are accurate and complete in all material aspects. While P&E carefully reviewed all the available information presented, P&E cannot guarantee its accuracy and completeness. P&E reserves the right, but will not be obligated to revise our report and conclusions if additional information becomes known to P&E subsequent to the effective date of this Technical Report.

The authors have relied largely on the documents listed in the Sources of Information and the site visit for the information in this Technical Report, however, the conclusions and recommendations are exclusively the authors. The results and opinions outlined in this Technical Report are dependent on the aforementioned information being current, accurate and complete as of the effective date of this Technical Report and it has been assumed that no information has been withheld which would impact the conclusions or recommendations made herein. P&E does not assume any responsibility or liabilities that may arise as a result of this Technical Report being used contrary to its intended purpose.

Copies of the tenure documents, operating licenses, permits, and work contracts were not reviewed. Information relating to tenure was reviewed by means of the public information available through the Ontario Ministry of Energy, Northern Development and Mines ("MENDM") website. P&E has relied upon this public information and has not undertaken an independent detailed legal verification of title and ownership of the Marathon PGM-Cu Property. P&E has not verified the legality of any underlying agreement(s) that may exist concerning the licenses or other agreement(s) between third parties but has relied on, and believes it has a reasonable basis to rely upon Gen Mining to have conducted the proper legal due diligence.

P&E has also relied upon Andrew Falls of Exen Consulting Services for opinions on PGM-Cu concentrate marketing and logistics.

A draft copy of this Technical Report has been reviewed for factual errors by Gen Mining. Any changes made as a result of these reviews did not involve any alteration to the conclusions made. Hence, the statement and opinions expressed in this document are given in good faith and in the belief that such statements and opinions are not false and misleading at the effective date of this Technical Report.

The authors wish to emphasize that they are Qualified Persons only in respect of the areas in this Technical Report identified in their "Certificates of Qualified Persons" submitted with this Technical Report to the Canadian Securities Administrators.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 LOCATION

The Marathon PGM-Cu Property is located approximately 10 kilometres ("km") north of the Town of Marathon, Ontario which is situated adjacent to the Trans-Canada Highway No. 17 on the northeast shore of Lake Superior. Thunder Bay is approximately 300 km westward along Highway 17 while Sault Ste. Marie is approximately 400 km to the southeast along the same Highway 17. Marathon has a population of approximately 3,200 (2016 census).

Local access to the Property is by a gravel road from highway 17 (Figures 4.1 and 4.2), which lies just north of Marathon and immediately south of the Property. The centre of the proposed Project footprint sits at approximately 48° 45' N Latitude, 86° 19' W Longitude.

The primary industry supporting the Town of Marathon is mining (Figures 4.1 and 4.2).

FIGURE 4.1 REGIONAL LOCATION MAP

Source: Marathon PGM Corp. (2006)

FIGURE 4.2 REGIONAL MINING ACTIVITY MAP

Source: *Generation Mining Limited (2019)*

4.2 PROPERTY DESCRIPTION AND TENURE

The original Marathon Property held by Stillwater Canada Inc. from 2010 to 2019 has since been enlarged by Gen Mining through the periodic staking of unpatented mining claims. As summarized in Appendix CC, and illustrated in Figure 4.3 below, Gen Mining during the summer of 2019 staked an additional 215 claim blocks totalling 4,558 hectares (“ha”). This increases Gen Mining’s land position to include 45 leases and 1,071 claims, or 21,965 ha (219.65 square kilometres) at the effective date of this Technical Report.

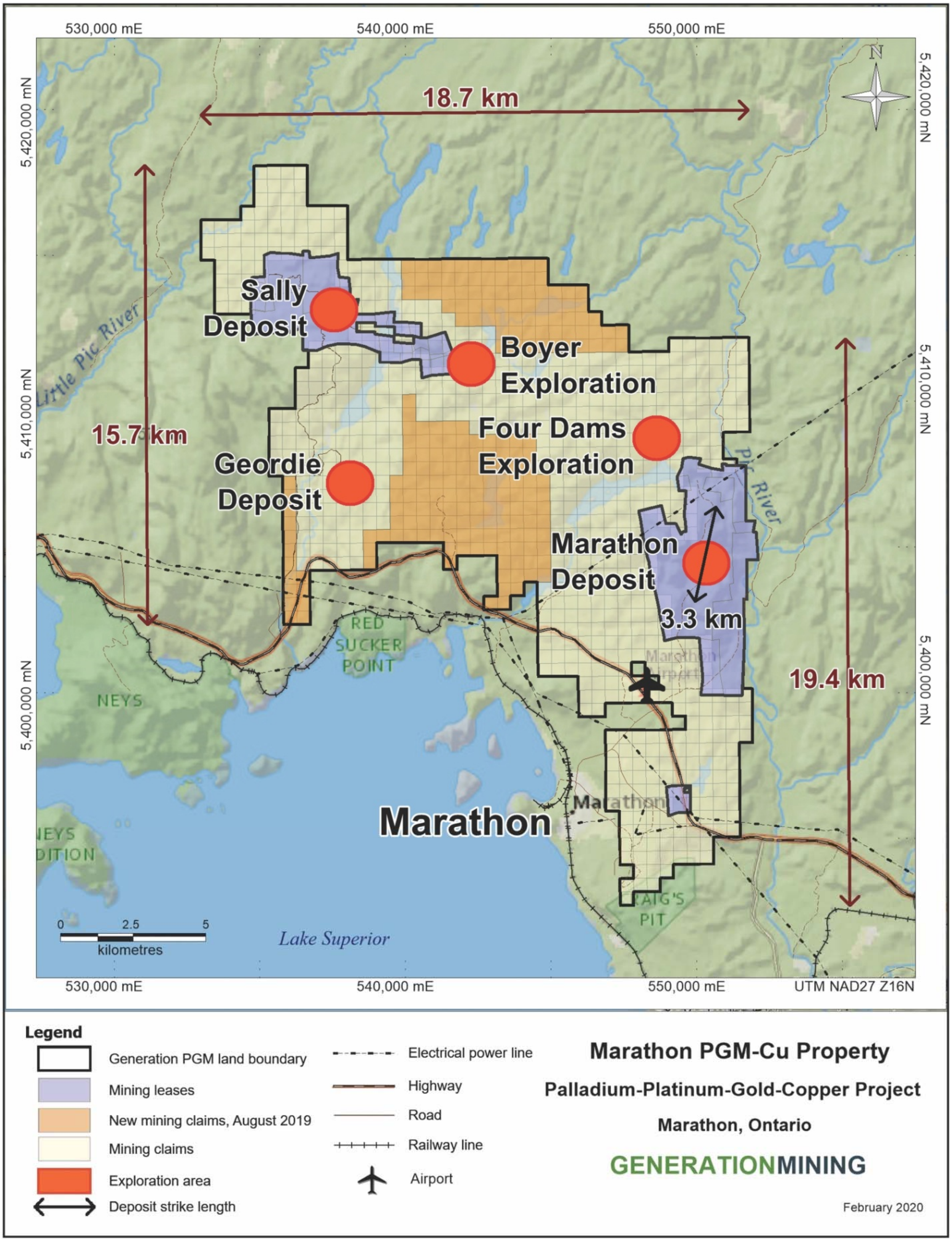
The 45 leases are located in Seeley Lake Township and total 4,810.19 ha. The recorded dates and expiry dates are listed in Appendix CC.

Claim information (Figure 4.3) an also be found in Appendix CC All claims have been renewed to their respective anniversary dates from 2020 to 2022. To retain the claims in good standing assessment work by Gen Mining will have to be applied by these dates. The claims are registered in the name of Generation PGM Inc., a subsidiary of Generation Mining Limited. There are no outstanding royalties on the Marathon Deposit, however, varying royalties exist on remaining land package (refer to Figure 4.4). A complete summary of the encumbrances can be found in Appendix CC.

In 2010, the Property was acquired by Stillwater Mining Company (NYSE: SWC) from Marathon PGM Corporation (TSX: MAR) for US$118 million. At that time, Stillwater was a palladium and platinum mining company with headquarters located at Littleton, Colorado, USA. Stillwater mined PGMs from the Stillwater igneous complex in south central Montana known as the J-M Reef and recovered metals from spent catalytic converters. Stillwater later (in 2017) was acquired for US$2.2 billion by Sibanye Gold Limited (NYSE: SBGL) and renamed Sibanye-Stillwater (NYSE: SBGL). On July 11, 2019 Generation Mining Limited had (through a wholly-owned subsidiary), completed the acquisition of a 51% initial interest in the Property, from Stillwater Canada Inc. (“Stillwater”), a wholly owned subsidiary of Sibanye Gold Limited, and entered into a joint venture agreement with respect to the Property. Gen Mining can increase its interest in the Property and joint venture to 80% (the “Second Interest”) by spending $10 million and preparing a Preliminary Economic Assessment within four years (the “Second Earn-In Period”).

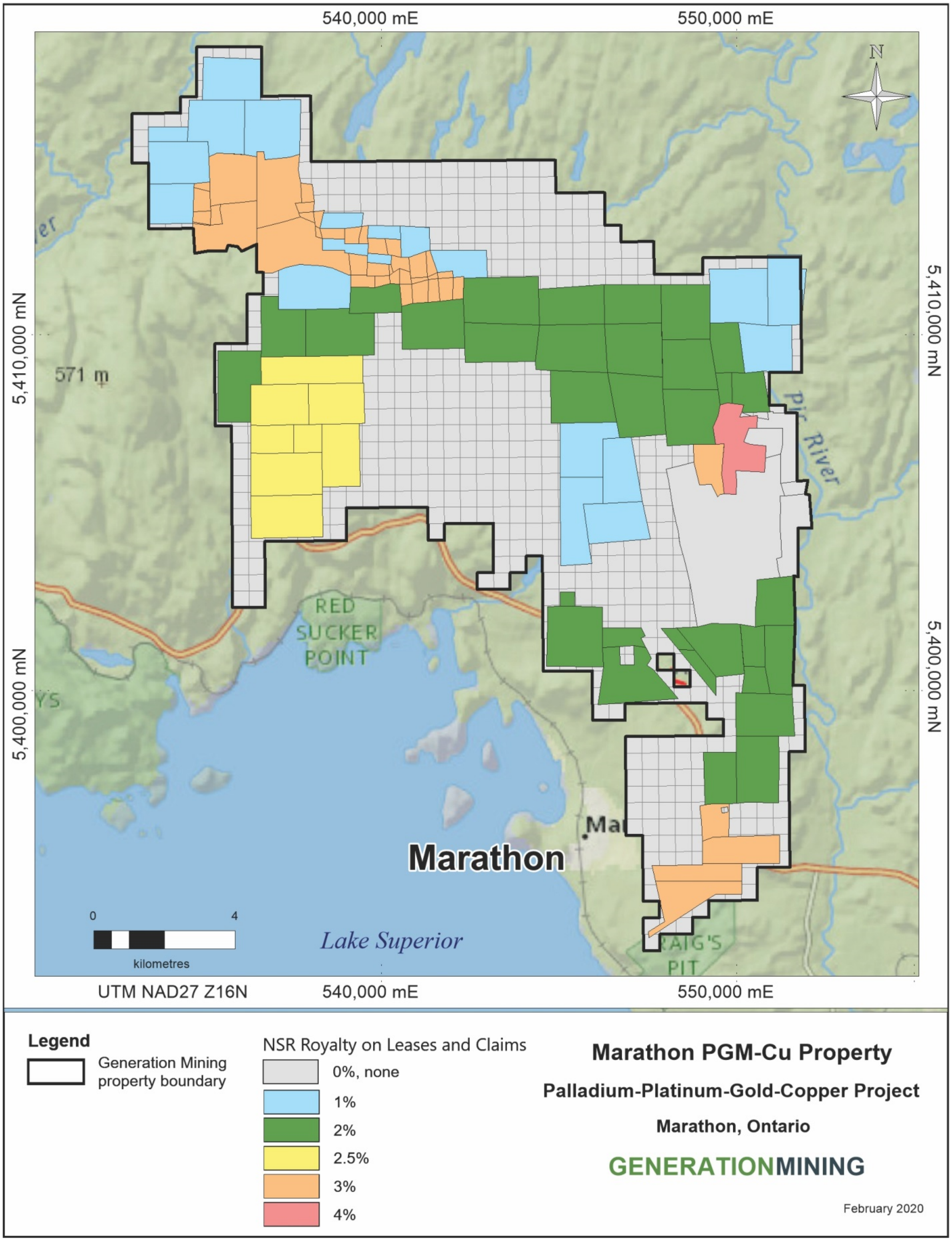
On July 9, 2019, the proceeds of the previously completed $8 million bought deal private placement financing led by Haywood Securities Inc. were released from escrow, and the 28,572,000 outstanding subscription receipts were converted into an aggregate of 28,572,000 common shares and 14,286,000 common share purchase warrants. On Closing, Gen Mining paid to Stillwater $2.9 million in cash (in addition to the $100,000 previously paid upon signing the letter of intent) and issued 11,053,795 common shares of Gen Mining at a deemed price per common share of $0.2714 (totalling $2,999,999.96), for a total consideration payment to Stillwater of $5,999,999.96 for the initial 51% interest.

FIGURE 4.3 MARATHON DEPOSIT CLAIM LOCATION MAP



Source: *Generation Mining Limited (2019)*

FIGURE 4.4 SUMMARY ROYALTY ("NSR") MAP



Source: *Generation Mining Limited (2019)*

Gen Mining is now the operator of the Project (unless its interest in the joint venture reduces to a minority interest) and will assume all liabilities of the Property in such operatorship capacity, including funding all activities. During the Second Earn-In Period, Gen Mining must sole-fund all expenditures in respect of the Property and related activities. Gen Mining has spent approximately $4 million on the Project as of the effective date of this Technical Report. Once Gen Mining has earned the Second Interest, the parties will fund expenditures on a pro rata basis (80% funded by Gen Mining and 20% funded by Stillwater) in order to maintain their respective interests in the joint venture, subject to normal dilution provisions. If Gen Mining does not earn into the Second Interest, then for a period of 90 days after the termination of the Second Earn-In Period, Stillwater shall have a one-time option to re-acquire from Gen Mining a 31% participating interest in the joint venture (for a total 80% participating interest) for CDN$1.00 and become operator under the joint venture at such time.

Upon a Feasibility Study being prepared and the management committee of the joint venture making a positive commercial production decision, (as long as Stillwater has a minimum 20% interest in the Property), then Stillwater will have 90 days to exercise an option to increase its participating interest in the joint venture from its current percentage up to 51% (the "Percentage Differential") by agreeing to fund an amount of the total capital costs as estimated in the feasibility study, multiplied by the Percentage Differential, in addition to its pro rata proportion of costs that it would fund at its current participating interest level. Should this option be exercised, Stillwater would also take over operatorship of the Project at such time.

As a result of the Closing, Stillwater now owns 12.96% percent of Gen Mining's issued and outstanding common shares on an undiluted basis. The common shares issued to Stillwater on Closing are subject to a statutory hold period in Canada of four months and one day expiring November 11, 2019. Prior to the Closing, Stillwater did not own any common shares of Gen Mining. Following the Closing, Stillwater owns 11,053,795 common shares of Gen Mining. Stillwater stated that *"the acquisition of the common shares is for investment purposes only and Stillwater has no present intention to acquire further securities of Gen Mining although Stillwater may in the future and in accordance with applicable securities laws, increase or decrease its investment in the Company.* (Extracted from a Gen Mining press release dated July 11, 2019)

4.3 ONTARIO MINERAL TENURE

The claims information presented in this section is valid as of the effective date of this Technical Report. Currently, the Ministry of Energy, Northern Development and Mines ("MENDM") is in the process of converting from a system of ground staking to a system of online registration of mining claims. The MENDM implemented the new system on April 10, 2018.

Ontario Crown lands are available to licensed prospectors for the purposes of mineral exploration. A licensed prospector must first stake a mining claim to gain the exclusive right to explore on Crown land. Claim staking is governed by the Ontario Mining Act and is administered through the Provincial Mining Recorder and Mining Lands offices of the MENDM.

Mining claims can be staked either in a single unit or in a block consisting of several single units. In un-surveyed territory, a single unit claim is laid out to form a 16-hectare (40-acre) square with boundary lines running 400 m (1,320 ft) astronomic north, south, east and west. Multiples of single units, up to a maximum of 16 units (256 ha), may be staked with only a perimeter boundary as one block claim.

Upon completion of staking, a recording application form is filed with payment to the Provincial Recording Office. All claims are liable for inspection at any time by the MENDM. A claim remains valid as long as the claim holder properly completes and files the assessment work as required by the Mining Act and the Minister approves the assessment work. A claim holder is not required to complete any assessment work within the first year of recording a mining claim. In order to keep an unpatented mining claim current, the mining claim holder must perform $400 worth of approved assessment work per mining claim unit, per year; immediately following the initial staking date, the claim holder has two years to file one year's worth of assessment work. Claims are forfeited if the assessment work is not done.

A claimholder may prospect or carry out mineral exploration on the land under the claim. However, the land covered by these claims must be converted to leases before any development work or mining can be performed. Mining leases are issued for 21-year terms and may be renewed for further 21-year periods. Leases can be issued for surface and mining rights, mining rights only or surface rights only. Once issued, the lessee pays an annual rent to the province. Furthermore, prior to bringing a mine into production, the lessee must comply with all applicable federal and provincial legislation.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESS

The Property is located at latitude 48°45’ N and longitude 86°19' W. Local access to the Property is by paved and gravel roads, Figure 5.1, from the Town of Marathon. The Property is located approximately 10 km to the north of the town. Stillwater Canada Inc carried out engineering studies and an impact assessment on upgrading the current road and proposed that a new access road is required with the preferred route following a similar corridor as the existing access route.

FIGURE 5.1 ACCESS ROAD PHOTOGRAPH

Source: *Generation Mining Limited (2019)*

5.2 CLIMATE

The Property climate is typical of northern areas within the Canadian Shield with long winters and short but warm to hot summers. The climate does not create any problem for exploration with diamond drilling and other non-geological/geochemical work is able to be carried out at any time without difficulty, except for limited access issues during the four week period of “spring break up”, when most gravel roads are not suitable for driving and transport truck load weight restrictions are in place on the Highways.

Average annual precipitation in the area of Marathon was 826 mm for the period 1952-1983, of which 240 mm fell as snow. Average annual surface runoff is approximately 390 mm. The annual average temperature is 1°C with the highest average monthly temperature of 15°C in August and lowest in January of -15°C (Environment Canada).

5.3 LOCAL RESOURCES

Logistical support, in terms of power and telephone lines, is available at the Property as well as at the Town of Marathon, which is linked to the Ontario Power grid. Water is available from the Pic River as well as many lakes and creeks which drain the general area.

Infrastructure for mining equipment and personnel are available at Thunder Bay, approximately 300 km west of the Property. There are several active mines in the general area and therefore some local mining services are available in the Town of Marathon.

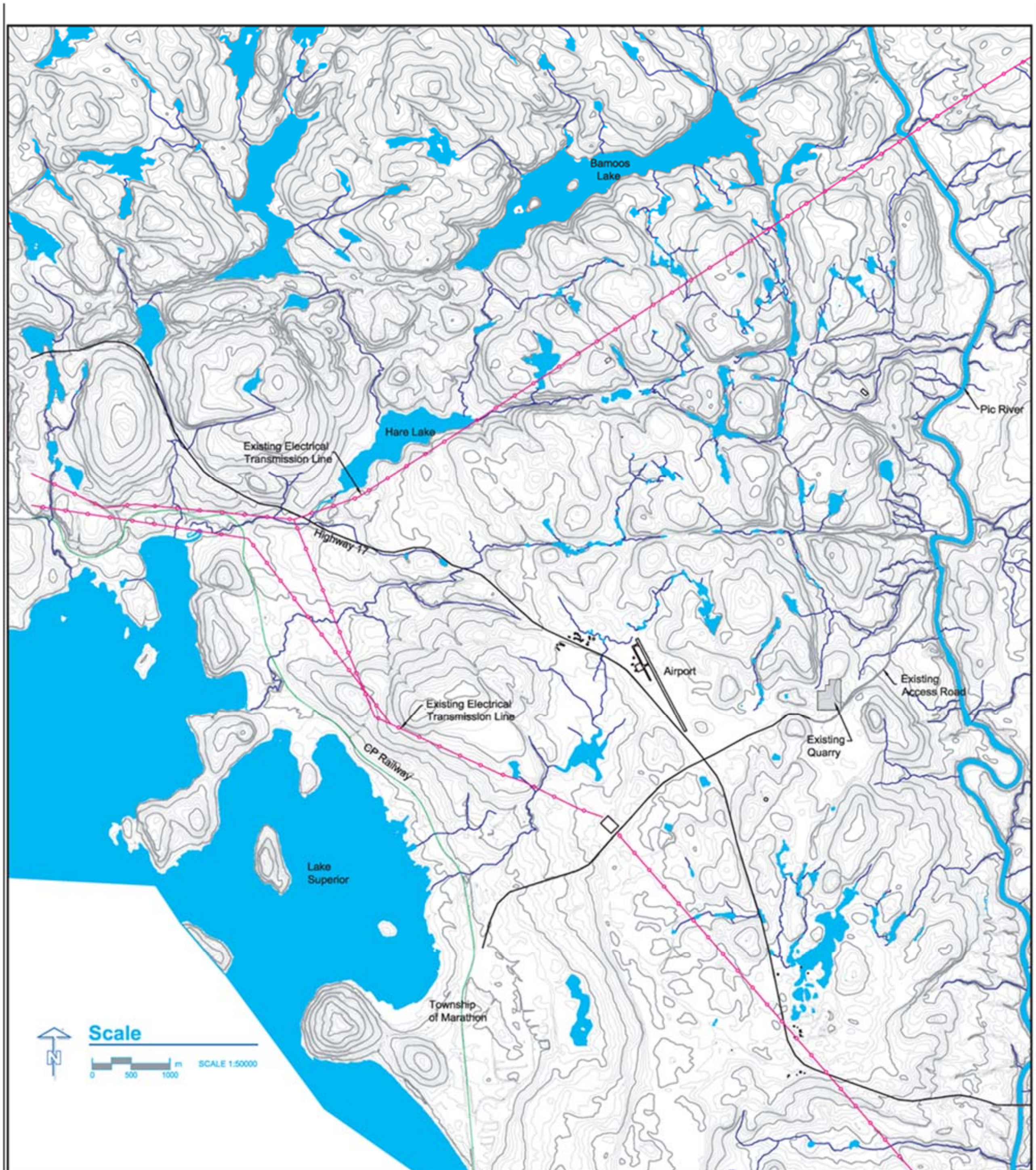
A high voltage power line transects the Property. A rail line runs close to the Property and shallow water dock facilities are available at Marathon and Heron Bay (Figure 5.2).

March 21, 2019, the Minister of the Environment, Conservation and Parks approved the environmental assessment for the East-West Tie transmission project which is a proposed 450 km double-circuit 230 kV transmission line connecting the Lakehead Transfer Station in the Municipality of Shuniah near the city of Thunder Bay to the Wawa Transfer Station located east of the Municipality of Wawa. It will also connect to the Marathon Transformer Station.

The Marathon airport is located immediately north of the Town of Marathon, runs adjacent to Highway 17, and is near the southwest corner of the Property. Marathon Municipal Airport (CYSP) operates as a Registered Airport (Aerodrome class) under the Canadian Aviation Regulations (CARs; Subsection 302). The airport is used by private aircraft owners and a few small commercial helicopter companies. As of the effective date of this Technical Report, no commercial flight service is available.

Land-use activities in the area include hunting, fishing, trapping and snowmobiling. The existing access road is used by anglers to access the Pic River, and by snowmobile users in the winter. Sport fishing activity is focused on the Pic River which contains a variety of warm water fish species and in Hare and Bamoos Lakes located northwest of the Property. Pukaskwa National Park is located near the mouth of the Pic River approximately 20 km downstream of the Property.

FIGURE 5.2 ACCESS, TOPOGRAPHY, PHYSIOGRAPHY MARATHON PGM-CU PROJECT MAP



Source: *Marathon PGM Corp. (2010)*

5.4 PHYSIOGRAPHY

The Property is located in an area of moderate to steep, hilly terrain typical of glaciated areas of the Canadian Shield, Figure 5.3. The surrounding terrain is typical boreal forest cover, with significant topographic relief characterized by relatively flat plateaus, truncated at steep cliffs adjacent to a series of creeks and ponds. The vegetation consists of northern hardwood and conifer trees as well as muskeg areas, which are bogs or wetlands common to all boreal forest regions. The land is not used for agriculture. Wildlife includes black bear, wolves, moose, rabbits and various migratory birds.

The site is bounded to the east by the Pic River (Figures 5.2 and 5.4) and Lake Superior to the south and west. The Project site is drained by a total of six primary sub-watersheds, four of which drain to the Pic River whereas the remaining two drain directly to Lake Superior. All other small creeks in the area drain into the Pic River. The interior of the Project site is isolated from both the Pic River and Lake Superior by steep relief (i.e., topography) and therefore much of this area is fishless. In the instances where fish do occur the community is limited to small-bodied (forage) fish (EcoMetrix, 2012).

The general elevation around the Project site is slightly higher than the overall regional topography. Ground surface elevations in the area of the Property range from approximately 260 m to over 400 m above sea level with a gradual decrease in elevation from north to south.

Occasional outcrops of gabbro are present on the Property and overburden which consists of boulder till with gabbro and mafic volcanic boulders, ranges from 3 m to 10 m in thickness.

FIGURE 5.3 TOPOGRAPHY PHOTOGRAPH

Source: *Sibanye-Stillwater Website*

FIGURE 5.4 PIC RIVER PHOTOGRAPH

Source: *Stillwater Canada Inc. (2012)*

6.0 HISTORY

6.1 EXPLORATION HISTORY

Marathon area exploration for copper and nickel deposits started in the 1920s and continued until the 1940s with the discovery of titaniferous magnetite and disseminated chalcopyrite occurrences.

6.1.1 Summary 1964 – 2019

During the past four decades, the Project underwent several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drilling programs, geological studies, Mineral Resource Estimates, metallurgical studies, mining studies, and economic analyses. These studies have successively enhanced the knowledge base on the Deposit. The following historical summary of work is taken, in part, from an internal Nordmin Marathon PGM-Cu Feasibility Study dated March 14, 2014.

In 1963, Anaconda Copper acquired the Property and carried out systematic exploration work including diamond drilling of 32,741 m in 151 drill holes from 1964-1966. This culminated in the discovery of a large copper-PGM deposit. Many of the holes were drilled in areas off the present Property. Anaconda carried out a test pitting program that recovered 23 t of mineralized material and sent it for testing to its Extraction Metallurgy Research Division ("EMRD") facilities. Anaconda conducted a number of metallurgical tests intermittently from 1965 to 1982, as described under the section on Mineral Processing and Metallurgical Testing. Anaconda's primary objective was to improve metallurgical recoveries of copper and increase the copper concentrate grade. Anaconda discontinued further work on the Project in the early 1980s due to low metal prices at the time.

In 1985, Fleck Resources Ltd. ("Fleck") purchased a 100% interest in the Property with the objective of improving the Project economics by focusing on the platinum group element ("PGM") values of the Marathon Deposit. Fleck carried out an extensive program, which included re-assaying of the Anaconda drill core, further diamond drilling, surface trenching of the mineralized zones, bulk sampling and a pilot plant testing, at Lakefield Research Limited ("Lakefield"). Fleck drilling totalled 3,627 m in 37 diamond drill holes.

In 1986, H.A. Symons carried out a Feasibility Study for Fleck based on a 9,000 tonnes per day ("tpd") conventional flotation plant with marketing of copper concentrate. The study indicated a low internal rate of return. In 1987, Kilborn Limited carried out a Pre-Feasibility Study for Fleck that included preliminary results from the Lakefield pilot plant tests (Kilborn Limited, 1987). The study envisaged a 13,400 tpd conventional flotation plant with marketing of copper concentrate but the study indicated a low internal rate of return, later confirmed by Teck Corporation ("Teck").

In late 1987, Teck prepared a Preliminary Economic Feasibility Report on Fleck's Marathon Project based on a conventional open pit operation and concluded that the Project was uneconomic due to low metal prices at that time.

In 1987, Euralba Mining Ltd. ("Euralba"), an Australian junior mining company, entered into a joint venture agreement with Fleck.

In 1989, BHP Engineering Pty Ltd. ("BHP") carried out a Pre-Feasibility Study for Euralba, compiled some 2,500 samples of drill core and had them assayed at Lakefield. Euralia retained Geostat Systems International ("Geostat") to develop a Mineral Resource block model of the Marathon Deposit that was used by BHP to design an optimized open pit. BHP considered several metallurgical processes, including an on-site smelter process.

In 1998, Fleck changed its name to PolyMet Mining Corp.

In 2000, Geomaque Exploration Ltd. ("Geomaque") acquired certain rights to the Project through an option agreement with PolyMet. Under the terms of the November 7, 2000 option agreement, Geomaque could earn a 50% interest in the Property by spending $2,750,000 on exploration or completing a Feasibility Study by October 31, 2004. The terms of the option agreement also allowed Geomaque to earn an additional 10% interest in the Project by making a payment of $1,000,000 within three months of the fourth anniversary of the option agreement.

Geomaque and its consultants carried out a study of the economic potential of the Project. The study included a review of the geology and drill hole database, interpretation of the mineralized zones, statistics and geostatistics, computerized block model, Mineral Resource estimation, open pit design and optimization, metallurgy, process design, environmental aspects, capital and operating cost estimates and financial modeling. Geomaque also completed 15 diamond drill holes totalling 3,158 m, however, results were not available for incorporation in the study. The internal Geomaque study was presented as a NI 43-101 compliant Technical Report titled "Marathon Palladium Project Preliminary Assessment and Technical Report" dated April 9, 2001.

Marathon PGM Corp. acquired the Project from PolyMet in December 2003, and carried out exploration and various studies from 2004 through 2010. On December 23, 2003, Roscoe Postle Associates Inc. ("RPA") was retained by Marathon PGM Corp. to prepare an independent Technical Report on the Project including an independent Updated Mineral Resource Estimate. The purpose of the Technical Report was to provide an independent assessment of the Project in relation to an initial public offering by Marathon PGM Corp. As part of their assignment RPA prepared a Mineral Resource Estimate of the Deposit using the same drill hole database that Geomaque used for its 2001 Mineral Resource Estimate. In addition to the drill hole database, RPA used the assay database from trenches on the Deposit that were excavated by Anaconda and Fleck.

Marathon PGM Corp. funded programs of advanced exploration and diamond drilling on a continuous basis between June 2004 and 2009. Approximately 617 holes and 113,030 m were drilled from 2004 to 2009 to expand the Mineral Resource and for condemnation holes outside of the proposed open pit area. In 2006, a Technical Report titled "Technical Report and Resource Estimate on the Marathon PGM-Cu Property, Marathon" was prepared by P&E Mining Consultants Inc. and dated March 24, 2006. In 2007, P&E authored a second Technical Report titled "Updated Technical Report and Preliminary Economic Assessment on the Marathon PGM-Cu Property, Marathon Area" for Marathon PGM Corp. dated February 19, 2007. An internal study on the Mineral Resource update of the Geordie Palladium-Copper Property was produced on June 4, 2008 and filed on SEDAR. A Feasibility Study was published in 2008 and updated in January 2010 by Micon/Metchem titled "Technical Report on the Updated Mineral Resource Estimate and Updated Feasibility Study for the Marathon PGM-Cu Project" dated January 8, 2010. P&E was one of the authors of the 2008 Technical Report.

Stillwater Mining Company ("Stillwater") and Marathon PGM Corp. entered into an agreement on September 7, 2010 pursuant to which Stillwater would acquire all of the outstanding shares of Marathon PGM Corp. The agreement closed on November 30, 2010. Stillwater subsequently formed a Canadian corporation, Stillwater Canada Inc. ("Stillwater Canada"). In March 2012, MC Mining Ltd. of South Africa (formerly called Coal of Africa Limited) purchased a 25% interest in Stillwater Canada. In March 2014, Nordmin Engineering Ltd. provided Stillwater Canada with an internal Feasibility Study on the Project. Stillwater Canada drilled a total of 45 holes totalling 10,285 m.

From 2011 to 2017 Stillwater Canada developed trail access and conducted a systematic approach to prospecting, geological mapping, trenching, geophysics and diamond drilling. Stillwater Canada also re-logged over 150 drill holes. A total of 45 holes were drilled and 9,767 m of core was recovered from the holes.

In 2017, Stillwater was acquired for US$2.2 billion by Sibanye Gold Limited (NYSE: SBGL) and renamed Sibanye-Stillwater (NYSE: SBGL).

On July 11, 2019 Generation Mining Limited had (through a wholly-owned subsidiary), completed the acquisition of a 51% initial interest in the Property from Stillwater Canada, a wholly owned subsidiary of Sibanye Gold Limited (which trades as Sibanye-Stillwater), and entered into a joint venture agreement with respect to the Property. Gen Mining can increase its interest in the Property and joint venture to 80% by spending $10 million and preparing a Preliminary Economic Assessment within four years.

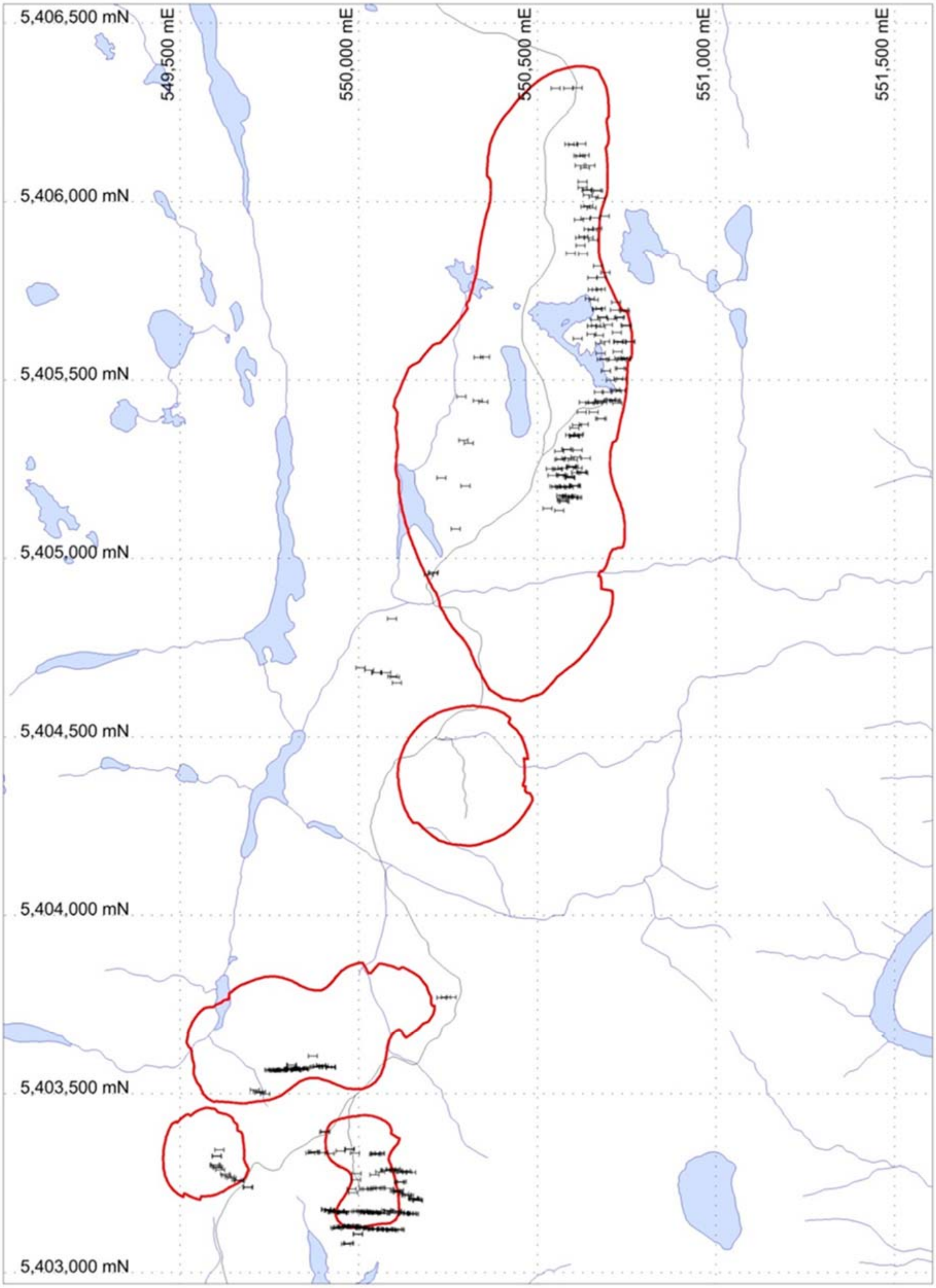
6.2 HISTORICAL TRENCHING

Trenching and the respective channel sampling at the Deposit were integral to developing an understanding of the mineralization. The location of trenches with respect to the 2009 planned pit outline is presented in Figure 6.1. Special care was taken during preparation of the channel cuts to ensure representative and continuous sampling. The entire trench-related channels were used in the preparation of the historical 2012 Mineral Resource Estimate prepared by P&E.

Fleck conducted a significant trenching program at approximately 50 m intervals along the length of the Main Zone. Marathon PGM Corp. applied trenching in the southern area of the Deposit between 2004 and 2006 to help define and delineate the Main Zone and W Horizon at the surface. Marathon PGM Corp. continued trenching in 2008 just west of the Main Zone to delineate continuity of mineralization located higher up in the stratigraphic section.

A summary of trenching details can be found in Table 6.2 under historical drilling, which contains the drill hole summary.

FIGURE 6.1 **LOCATION MAP OF TRENCH SAMPLES USED IN PREPARATION OF THE 2012 MINERAL RESOURCE ESTIMATE**



Source: *Stillwater Canada Inc. (2012)*

6.2.1 Validation of Trench Assay Data in the Main Zone

The Deposit database contains 1,736 surface sample assays collected from channels that were saw cut along lines spaced 30 to 50 m apart along approximately 2 km of strike length. The channels were cut in approximately straight lines located close to and perpendicular to the base of the Deposit during the years 1985 to 1986 and 2005 to 2009.

It is assumed that the operator did not add bias to the sampling. This seems reasonable given the disseminated nature of the Deposit and that the Footwall and Main Zones of the Deposit are tens of metres thick.

To validate channel samples cut by Fleck, a total of 17 duplicate channel samples were cut beside the historic channels. A comparison of the 1986 and 2012 field duplicate sample data is presented in Table 6.1 for gold ("Au"), platinum ("Pt"), palladium ("Pd") and copper ("Cu"), and Figure 6.2.

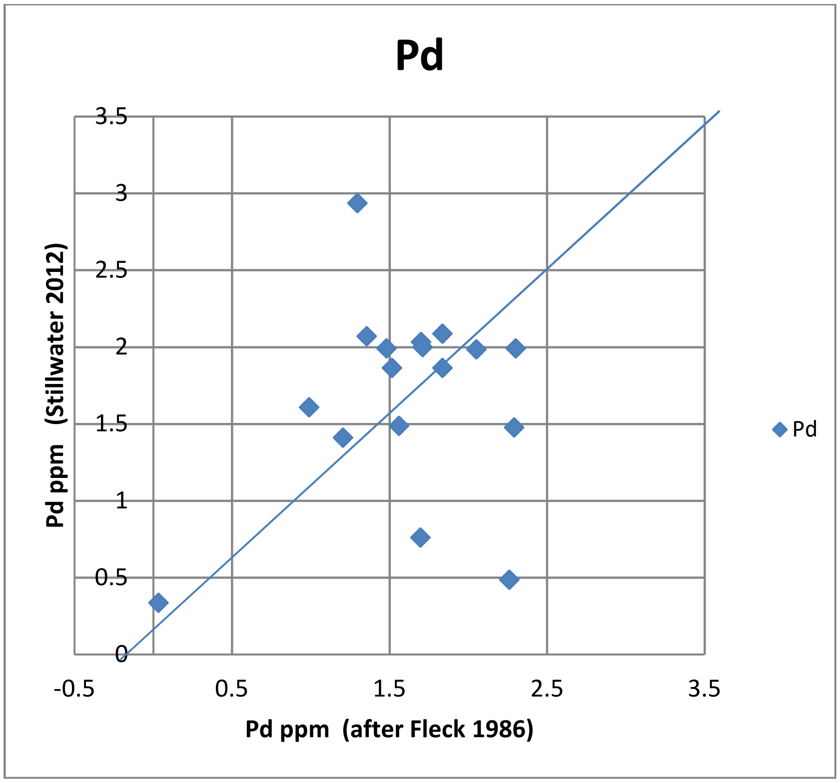
Although the Cu-Cu and Pd-Pd plots (Figure 6.2) exhibit scatter that is typical of field duplicates, the points are distributed in a cluster close to a curve for 1:1 on each plot and the averages for the two sample groups are very close (Table 6.1) and thus confirms the reliability of using the trench channel cuts in the 2012 Mineral Resource Estimate.

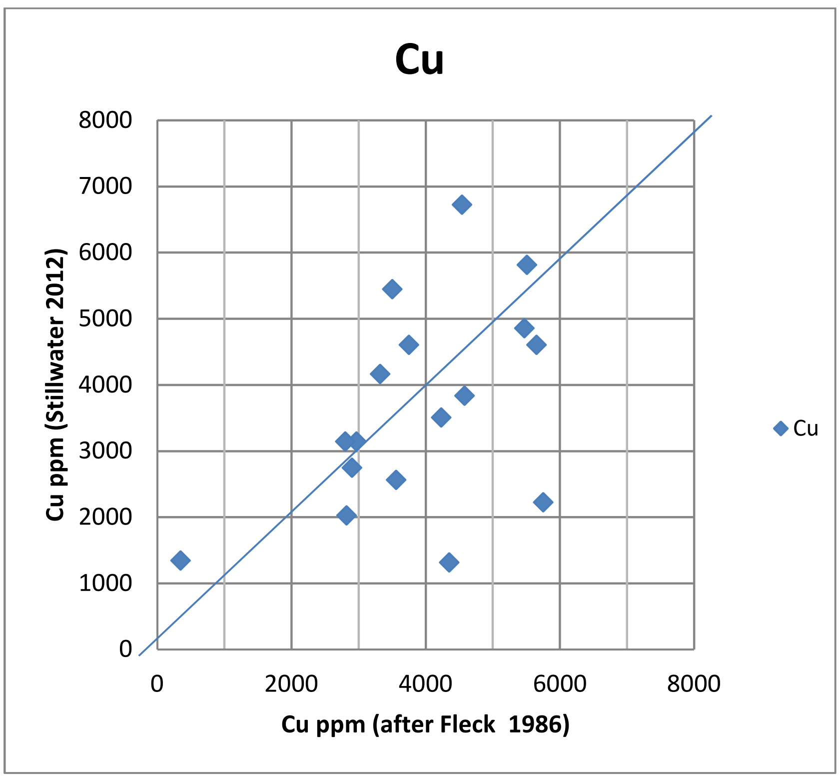
TABLE 6.1
COMPARISON OF FIELD DUPLICATE CHANNEL SAMPLES FROM 1986 WITH SAMPLES FROM 2012

Fleck Trench	From (m)	To (m)	1986 Sample No.	2012 Sample No.	1986 Au (g/t)	2012 Au (g/t)	1986 Pt (g/t)	2012 Pt (g/t)	1986 Pd (g/t)	2012 Pd (g/t)	1986 Cu (ppm)	2012 Cu (ppm)
272-1	0.0	1.3	F-3965	K004973	0.090	0.082	0.349	0.334	1.478	2.290	2,030	2,820
272-1	1.3	5.2	F-3966	K004974	0.130	0.116	0.640	0.310	2.938	1.295	6,730	4,540
270-0	0.0	4.1	F-3996	K004975	0.130	0.208	0.383	0.611	2.035	1.700	2,570	3,560
270-0	4.1	9.5	F-3997	K004976	0.085	0.127	0.256	0.224	1.609	0.989	2,750	2,900
270-0	9.5	11.4	F-3998	K004977	0.139	0.199	0.272	0.546	1.992	2.300	4,610	5,650
270-9	0.0	3.2	F-3998	K004978	0.139	0.159	0.272	0.368	1.992	1.480	4,610	3,750
270-9	3.2	5.7	F-3999	K004979	0.119	0.093	0.252	0.343	2.072	1.355	5,450	3,500
270-9	5.7	7.6	F-4000	K004980	0.140	0.181	0.340	0.462	2.001	1.710	5,820	5,510
270-25	0.0	1.9	F-9801	K004981	0.103	0.226	0.302	0.552	1.986	2.050	4,860	5,470
270-25	1.9	6.0	F-9802	K004982	0.310	0.095	0.310	0.464	2.089	1.835	4,170	3,320
270-25	6.0	10.5	F-9803	K004983	0.280	0.141	0.640	0.431	1.865	1.835	3,150	2,970
270-25	10.5	15.4	F-9803	K004984	0.280	0.135	0.640	0.573	1.865	1.515	3,150	2,800
270-25	15.4	20.3	F-9804	K004985	0.048	0.144	0.550	0.611	1.489	1.560	3,510	4,230
270-25	20.3	25.1	F-9805	K004986	0.068	0.092	0.216	0.230	1.413	1.205	3,840	4,580
270-9	7.6	12.1	F-9806	K004987	0.073	0.134	0.234	0.563	0.762	1.695	2,230	5,750
270-9	12.1	17.0	F-9807	K004988	0.073	0.299	0.150	0.345	0.487	2.260	1,320	4,350
270-9	17.0	19.4	F-9808	K004989	0.034	0.015	0.116	0.038	0.339	0.034	1,350	345
Average					**0.132**	**0.144**	**0.348**	**0.412**	**1.671**	**1.595**	**3,656**	**3,885**

Note: *1 g/t = 1 ppm, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

FIGURE 6.2 **COMPARISON OF DUPLICATE FIELD CHANNEL SAMPLES FROM 1986 AND 2012**





Source: *Stillwater Canada Inc. (2012)*

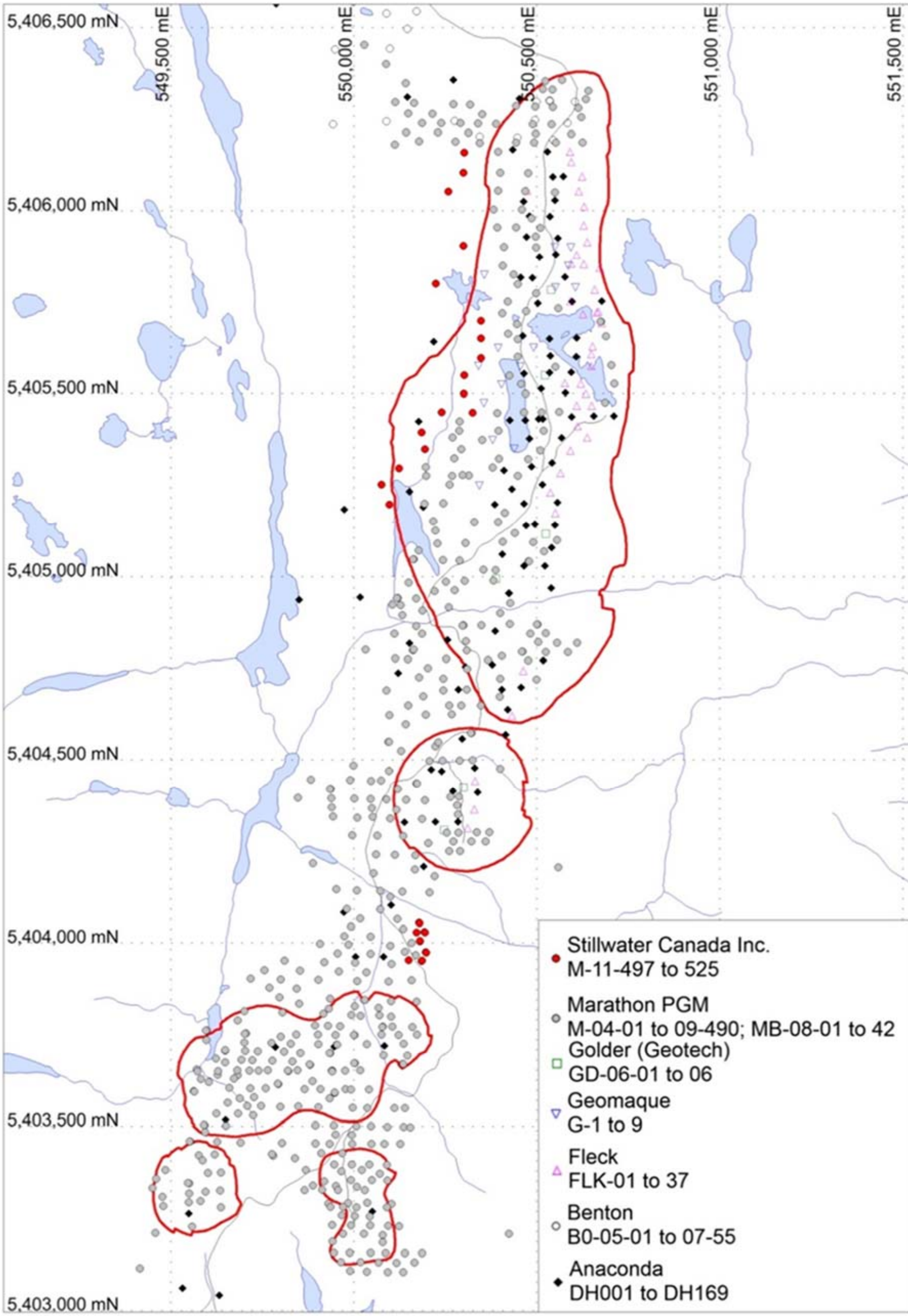
6.3 HISTORICAL DRILLING

A summary of previous diamond drilling on the Project is listed in Table 6.2. A 39-hole, aggregate 12,434 m, diamond drill program was completed by Gen Mining in 2019. However, no results from the 2019 program have been used in the Marathon/Geordie/Sally Deposit Mineral Resource Estimates in this Technical Report. All historical drill holes are plotted in UTM NAD 27 Zone 16N. Table 6.2 drill holes are shown in Figure 6.3.

TABLE 6.2
SUMMARY OF HISTORICAL DRILLING AND TRENCHING ON THE MARATHON PGM-CU PROPERTY, 1964-2017

Item	Year	No. of Holes / Trenches	Total Length (m)
Drilling by Company			
Anaconda	1964-1966	151	32,741.3
Fleck	1980s	37	3,627.2
Geomaque	2000	15	3,158.0
Marathon	2004	32	4,080.0
Marathon	2005	102	14,601.9
Marathon	2006	108	21,799.0
Marathon	2007	205	39,781.1
Benton	2005-2007	50	9,198.0
Marathon	2008	99	21,238.8
Marathon	2009	21	2,333.3
Stillwater Canada	2011	35	6,552.5
Stillwater Canada	2013	6	1,399.5
Stillwater Canada	2017	22	5925.0
Generation Mining	2019	39	12,434
Total Drilling		**922**	**178,857.5**
Trenching by Location			
Marathon Trenches	2004-2009	494	4,436.3
Sally	1991-2017	82	16,953.6
Sally Trenches	1991-2017	371	1,870.7
Geordie	1987-2010	61	9,647.2
Total Drilling and Trenching		**1,930**	**211,765.4**

FIGURE 6.3 DIAMOND DRILL HOLE LOCATIONS, MARATHON DEPOSIT, ORGANIZED BY EXPLORATION COMPANIES



Source: *Stillwater Canada Inc. (2012)*

RPA (2004) stated that it was its understanding that all drill hole collars in the area of the Deposit have been surveyed, however, exploration holes outside of that area have not been surveyed. All drill hole collar co-ordinates use the Universal Transverse Mercator ("UTM") NAD 27 Zone 16N grid system in the Geomaque database. The Anaconda holes appear to have been surveyed for downhole dip only. The Fleck holes also appear to have been surveyed downhole, however, for dip only. The Geomaque holes were surveyed down-hole using a gyroscopic instrument and little hole-deviation was noted.

6.4 HISTORICAL GEOPHYSICAL SURVEYING

Several geophysical surveys have been conducted over the Property. These are summarized in Table 6.3.

TABLE 6.3
SUMMARY OF GEOPHYSICAL SURVEYS

Year	Survey Type
2005	IP/Resistivity & Magnetics by JVX
2007	Geophysical Survey Report: Insight Section Array Induced Polarization and Resistivity Surveys. February 2007 Insight Geophysics Inc.
2007	Geophysical Survey Report: Insight Section Array Induced Polarization and Resistivity Surveys May 2007 Insight Geophysics Inc.
2008	Heliborne AeroTEM System EM and Magnetic Survey Superior Block March 2008 by Aeroquest International
2011	Heliborne High Resolution Aeromagnetic and Spectrometric Survey June 2011 Geo Data Solutions GDS Inc.
2012	Gravity Survey of the Marathon PGM-Cu Deposit August 2012
2018	Seismic Survey

In 2005, induced polarization ("IP")/resistivity and magnetometer surveys were carried out over portions of the Property by JVX Limited ("JVX"). The survey results are presented in a report by JVX titled "IP/Resistivity and Magnetic Surveys Marathon PGM-Cu Project Marathon Area, Ontario". The work involved approximately 14.7 km of IP/resistivity survey on a grid of east/west lines spaced on either 50 or 100 m centers. In addition, three more widely spaced lines were surveyed. The purpose of the survey was to delineate disseminated sulphide zones believed to contain copper and platinum group mineralization. A magnetometer survey was also carried out on the same lines that were surveyed by IP/Resistivity.

Observations concluded:

1. The Property, from an IP perspective, is divided along a north-south axis near the grid centre. East of this line the resistivity is generally higher than to the west probably reflecting a more felsic lithology. The resistivity on the west side of the Property is

quite variable with north-south trending zones of low resistivity especially apparent in the southern part of the survey where these zones can be traced across adjacent lines.

2. The total magnetic intensity map is similar to the resistivity map with generally higher magnetic intensities recorded to the east and variable results with north-south trending magnetic lineations to the west. Magnetic dipole pairs are oriented east-west, consistent with near surface, linear north-south trending sources. The margins of the magnetic highs tend to be spatially associated with the resistivity lows.

3. The chargeability map reveals a clear zoning similar to that shown in the magnetic and resistivity maps. Chargeability is localized into a broad north-south band. Based on the survey results exploration targets were selected and recommendations made for drill testing.

Three-dimensional ("3-D") magnetic inversion modeling was performed on the Property by JVX during the early part of 2005. The modeling was performed on merged aeromagnetic data covering the Project area. The underlying aeromagnetic data was derived from the data produced during "Operation Treasure Hunt" (Ontario Geological Survey, 2002) and from the Master Aeromagnetic Dataset for Ontario (Ontario Geological Survey, 1999). Small cell sizes (25 m cells) were used in an effort to provide better resolution of target geometry.

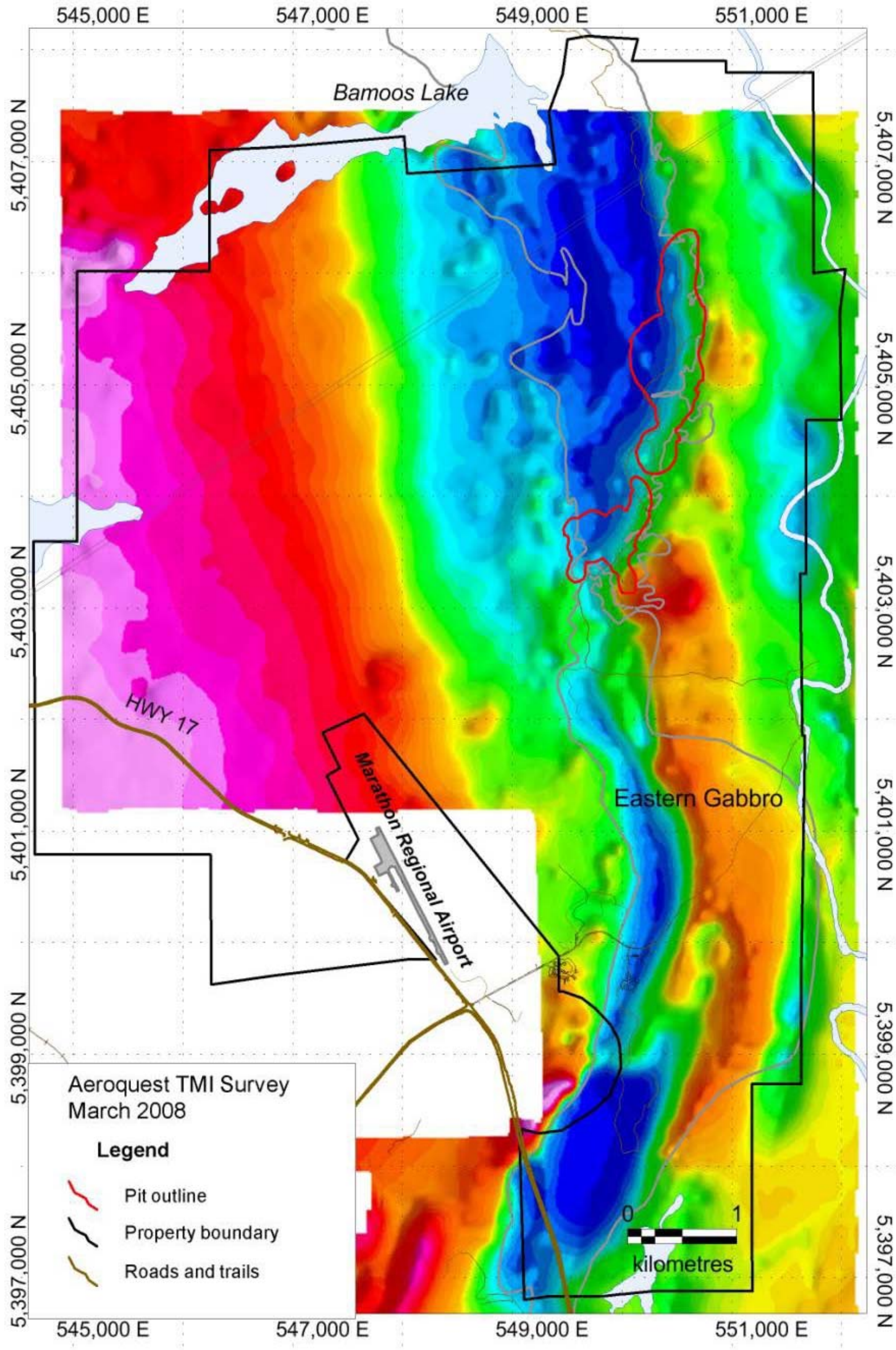
The PGM mineralization appears to be associated with a strong north - south positive magnetic high trend. This is in contrast to the majority of the Coldwell Complex units that produce a prominent magnetic low (as this intrusion occurs at a time of pole reversal). The main objective of the modeling was to determine the geometry of the source producing the magnetic high trend with the possibility of outlining any embayment that could be favourable to hosting wider zones of the targeted mineralization.

A time domain IP/resistivity survey was conducted by Insight Geophysics Inc. ("Insight") on the Property (Figure 6.4). The purpose of the survey was to acquire high density apparent resistivity and chargeability measurements from near surface to depths up to 500 m. The survey was conducted from January 21, 2007 through to February 21, 2007 and consisted of seven lines orientated east-west and covered a total of 6,725 m.

A second survey was conducted by Insight between May 4th and May 20th, 2007 to extend the previous survey to the north with an additional east-west line (5,405,450 N) and to join all the surveys with a north-south line. Two lines totalling 4,000 m were surveyed.

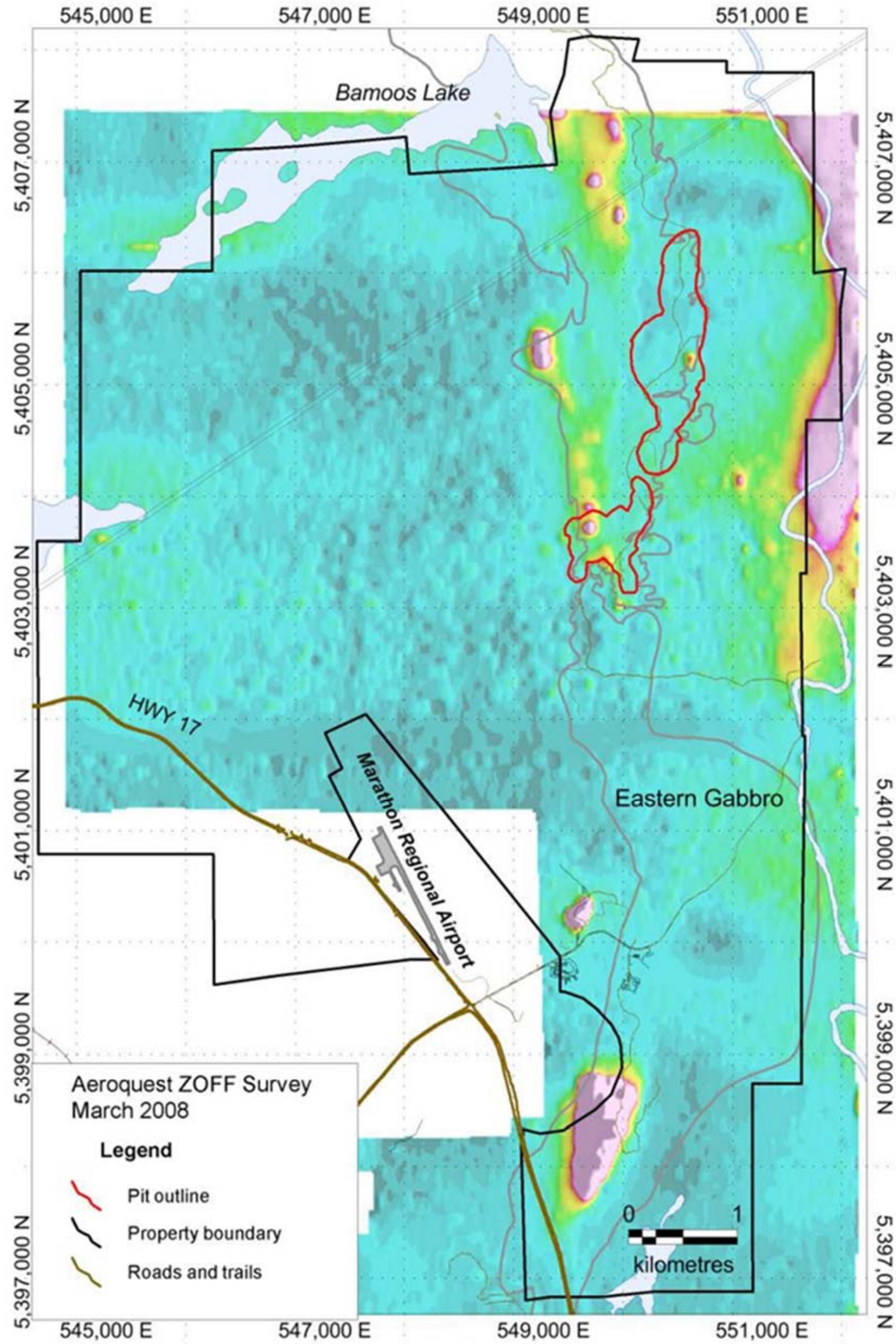
A high resolution, helicopter-borne aeromagnetic (total magnetic field) and AeroTEM electromagnetic survey was conducted by Aeroquest International Inc. between December 20, 2007 and January 12, 2008 (Figure 6.5). Traverses were spaced 100 m with an orientation of 090° and control lines were flown perpendicular to the survey lines with a spacing of 850 m. A total of 844 line-km was flown for the survey.

FIGURE 6.4 MAGNETOMETER SURVEY RESULTS OVER THE MARATHON PGM-CU PROPERTY



Source: *Stillwater Canada Inc. (2014)*

FIGURE 6.5 AEROTEM SURVEY RESULTS OVER THE MARATHON PGM-CU PROPERTY



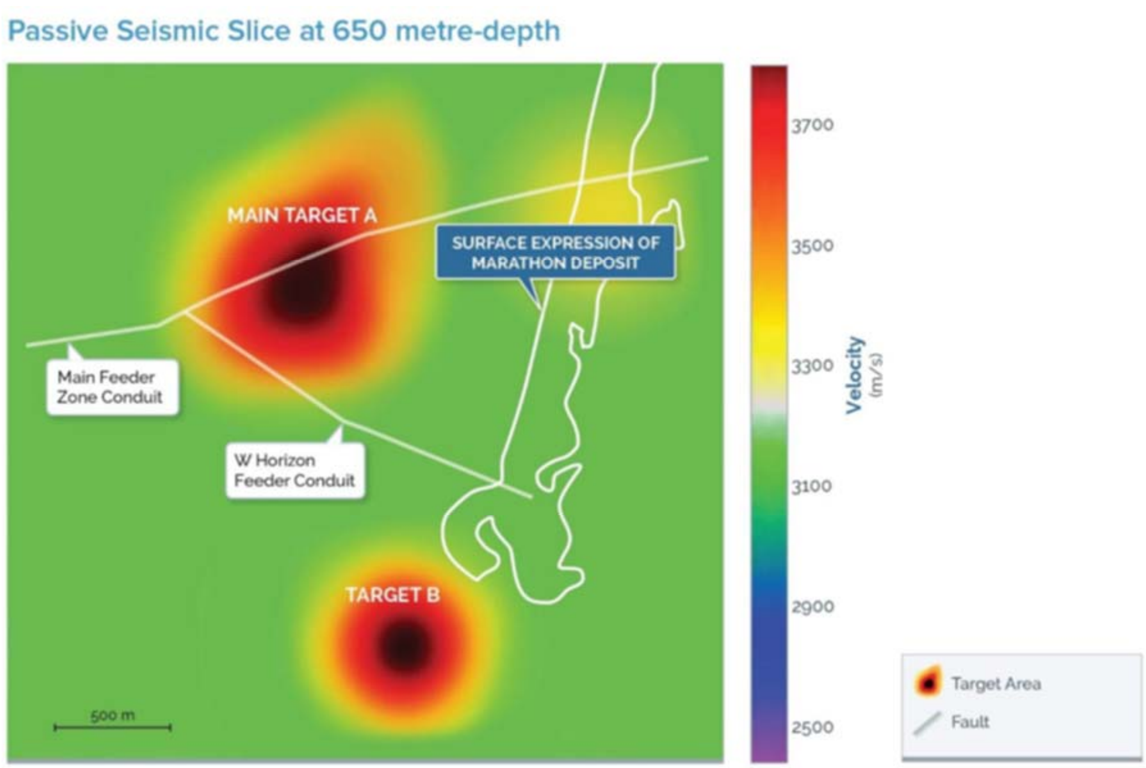
Source: *Stillwater Canada Inc. (2017)*

A high resolution, helicopter-borne aeromagnetic (total magnetic field) and spectrometric (gamma-ray spectrometric) survey was conducted by Geo Data Solutions GDS Inc. ("GDS"). The survey was conducted between June 3rd and June 9th, 2011. Traverses were spaced 100 m with an orientation of N0°E and control-lines were spaced 1,000 m with an orientation of N90°E. In total 2,505 km were flown for the survey. The survey was conducted in collaboration with Rare Earth Metals Inc. and covers the Coldwell Alkaline Complex. Data is useful in exploration over the Bermuda Property, however, over the Property the total magnetic data duplicated data collected previously by Aeroquest.

In 2018, a seismic survey was conducted over a portion of the Property covering known feeder zones. Past drilling had identified two of the likely conduits for the magma that originally formed the Main Zone and W Horizon Deposits which contain the majority of the historic Mineral Resources on the Property.

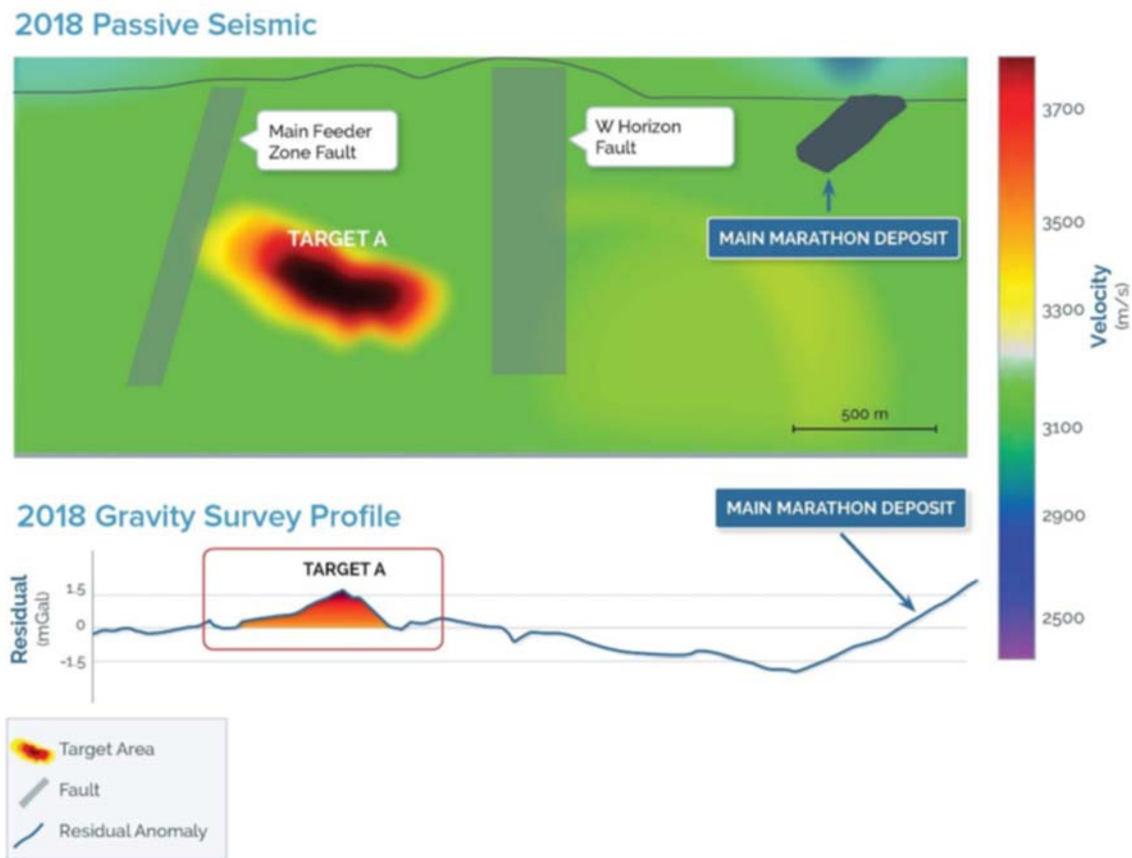
The survey outlined two potential targets at depth along the feeder zones. The largest of these is located about one km west of the Main Zone proximal to the Main Feeder Zone Fault, and measures approximately 800 m by 400 m horizontally, and is shown at about 650 m in depth with the top of the target at approximately 500 m below surface The accompanying idealized section view is presented in Figures 6.6 and 6.7. Of particular interest was the positive residual gravity feature coincident with this target which was drill tested as part of the 2019 drill program. Drill results suggest the high velocity seismic anomaly and coincident gravity anomaly are due to accumulations of olivine and magnetite.

FIGURE 6.6 SEISMIC DATA REVEALING POTENTIAL FEEDER ZONES



Source: *Generation Mining Limited (2019)*

FIGURE 6.7 SEISMIC DATA PROFILE ON POTENTIAL FEEDER ZONES



Source: *Generation Mining Limited (2019)*

6.5 GEOLOGICAL MAPPING

As part of the 2005 summer exploration program, a detailed geological survey was carried out over the same grid that was established for the geophysical surveying. Approximately 15.0 line-km of mapping and prospecting was conducted. The results of the geological mapping program were incorporated into the existing geological database.

6.6 HISTORICAL MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES

Historical Mineral Resource Estimates on the Marathon Deposit are summarized in Table 6.4. The estimates are difficult to compare because some are with cut-off grades, and some are without, and they are at different metal price and recovery assumptions. They are not necessarily NI 43-101 compliant.

TABLE 6.4 **HISTORICAL MINERAL RESOURCE ESTIMATES - MARATHON DEPOSIT**					
Estimator / Date	**Tonnes (M)**	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Cut-off Value**
Anaconda, 1984	31.3	1.34 combined		0.47	N/A
Kilborn, 1986	42.6	1.51	0.41	0.46	N/A
Kilborn, 1987	36.9	1.10	0.27	0.38	$12/t NSR
Geostat, 1988	29.4	1.02	0.26	0.36	$16/t NSR
RPA, 2004	62.5**	0.79	0.20	0.30	0.15% Cu
Micon 2009	114.8**	0.78	0.23	0.24	$10.50/t NSR

Note: *Cu = copper, Pd = palladium, Pt = platinum.*
***** *Measured + Indicated.*

6.6.1 Geomaque 2001 Mineral Resource Estimate

Walford and Hendry (2001) estimated Mineral Resources for the Marathon Deposit at a series of Cu cut-off grades, most of which are listed in Table 6.5.

Subsequent to the April 2001 Mineral Resource Estimate, Geomaque added its drill holes to the database and modified the geological interpretation by defining a high-grade zone (>0.7 Pd+Pt+Au) within the previously defined broader mineralized zone. Instead of kriging, Geomaque used inverse distance cubed to interpolate block grades within each zone using only drill hole composites within the respective zones. Geomaque used the same search strategy and Mineral Resource classification parameters as for the April 2001 estimate. The September 2001 Mineral Resource Estimate, as shown in Table 6.6 was reported in a Geomaque press release dated October 16, 2001 at a cut-off grade of 0.8 g/t Pd.

TABLE 6.5 MARATHON DEPOSIT, GEOMAQUE APRIL 2001 MINERAL RESOURCE ESTIMATE BY CU CUT-OFF												
Cut-off Cu (%)	**Mineral Resource Classification**											
	Measured				**Indicated**				**Inferred**			
	Tonnes (M)	**Cu (%)**	**Pt (g/t)**	**Pd (g/t)**	**Tonnes (M)**	**Cu (%)**	**Pt (g/t)**	**Pd (g/t)**	**Tonnes (M)**	**Cu (%)**	**Pt (g/t)**	**Pd (g/t)**
0.10%	22.2	0.29	0.20	0.76	40.3	0.27	0.19	0.697	43.8	0.25	0.15	0.52
0.20%	17.1	0.33	0.22	0.88	9.1	0.32	0.21	0.831	25.6	0.32	0.17	0.68
0.30%	9.5	0.38	0.25	1.03	15.2	0.38	0.239	0.97	12.7	0.38	0.21	0.85

Note: *Cu = copper, Pd = palladium, Pt = platinum.*
Source: *Geomaque 2001*

TABLE 6.6 MARATHON DEPOSIT MINERAL RESOURCE ESTIMATE, GEOMAQUE SEPTEMBER 2001					
Classification	**Tonnes (M)**	**Pd (g/t)**	**Pt (g/t)**	**Au (g/t)**	**Cu (%)**
Measured	8.1	1.40	0.37	0.12	0.41%
Indicated	13.1	1.28	0.33	0.11	0.39%
Measured + Indicated	**21.3**	**1.32**	**0.34**	**0.12**	**0.40%**
Inferred	8.2	1.24	0.32	0.12	0.39%
Mineral Resource Estimate reported at 0.8 g/t Pd Cut-off grade					

Note: *Au = gold, Cu = copper, Pd = palladium, Pt = platinum, M = millions.*
Source: *Geomaque (2001)*

6.6.2 RPA 2004 Mineral Resource Estimate

RPA prepared a Mineral Resource Estimate on the Marathon Deposit using the same drill hole database that Geomaque used for its 2001 Mineral Resource Estimates.

RPA's Mineral Resource Estimate used a geostatistical approach, whereby grades were interpolated into a block model by ordinary kriging. Variography was used to develop the kriging parameters.

The RPA Mineral Resource Estimate was classified as Measured, Indicated and Inferred based on drill hole spacing relative to the variogram ranges, and apparent continuity of the mineralized lenses. In general, Measured Mineral Resources were near surface where drill hole and trench spacing is in the order of 25 m. The RPA Mineral Resource Estimate is presented in Table 6.7.

TABLE 6.7
MARATHON DEPOSIT, RPA 2004 MINERAL RESOURCE ESTIMATE

Classification	Tonnes (M)	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)
Measured	11.1	0.91	0.22	0.08	0.29%
Indicated	51.4	0.76	0.20	0.07	0.31%
Measured + Indicated	**62.5**	**0.79**	**0.20**	**0.07**	**0.30%**
Inferred	10.3	0.53	0.19	0.06	0.22%
Mineral Resource Estimate reported at 0.15% Cu cut-off grade					

Note: *Au = gold, Cu = copper, Pd = palladium, Pt = platinum, M = millions.*

6.6.3 Micon 2010 Updated Mineral Resource Estimate

The revised Micon 2009 Mineral Resource Estimate for the Marathon Deposit was undertaken by Sam Shoemaker, MAusIMM, and Charley Murahwi, P.Geo., of Micon with the assistance of David Good, Ph.D., P.Geo., V.P. Exploration of Marathon PGM Corp.

A review of the basis for the previous Mineral Resource Estimate (geologic cross-sections) was completed by Micon with an additional 21 new drill holes (effective date December 16, 2009). The new in-fill drilling required that an updated cross-sectional interpretation be completed before an updated Mineral Resource Estimate could be established. In order to better represent the geology of the Deposit, a new block model was constructed which used an unfolding technique on the sample search ellipsoid. This approach allowed a search ellipsoid to better reflect the actual trend of the mineralization. In addition, smaller block sizes were used in the mineralized zones to further help delineate the Mineral Resource.

The diluted block model was exported to Whittle where the model was prepared for optimization. A number of pit optimization runs were completed along with extensive sensitivity analysis. Table 6.8 shows the Mineral Resource contained within the selected optimized pit shell.

TABLE 6.8
MICON 2009 PIT SHELL MINERAL RESOURCE ESTIMATE (DILUTED BLOCK MODEL)

Total Resource (Lower and Higher Grade) above $10.50/t NSR Cut-off

Category	Pit Shell 46 Mineral Resource						Contained Metal				
	Tonnes millions	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Ag (g/t)	Pd (oz 000)	Pt (oz 000)	Au (oz 000)	Cu (lb million)	Ag (oz 000)
Measured	94.3	0.846	0.243	0.088	0.262	1.599	2,564	736	266	545	4,847
Indicated	20.5	0.451	0.160	0.062	0.140	1.421	386	133	50	73	976
Measured + Indicated	**114.8**	**0.775**	**0.228**	**0.083**	**0.241**	**1.567**	**2,950**	**869**	**316**	**618**	**5,823**
Inferred	6.2	0.306	0.104	0.047	0.151	1.459	61	21	9	21	290

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

The Mineral Resource Estimate presented above is the subject of the Micon Feasibility Study discussed in Section 24 of this Technical Report.

6.6.4 Micon 2010 Mineral Reserve Estimate

The Mineral Resource model used for the pit optimization, pit design, and production scheduling was the diluted block model developed and updated by Micon in 2009 and used to estimate the Mineral Resource. Only material in the block model with the Mineral Resource classification of 'Measured' or 'Indicated' were considered as potential process plant feed. In addition to the estimated grade values for Cu, Pd, Pt, Au, Ag, and Rh contained within the diluted block model, other variables were calculated or input into the diluted block model. These included the Net Smelter (NSR), geotechnical parameters, block economic net value, haulage simulation results, block material type, and Whittle rock types.

Pit optimization was completed using a Lerchs-Grossmann algorithm ("LG") on the block model. Once a pit optimization was completed, the selected pit shell was used as a design basis for the open pit. Three major mining pit areas were designed; the North pit, South pit, and Malachite pit. For each pit a production schedule was prepared, followed by equipment selection and estimation of operating costs, capital costs and personnel requirements.

Mineral Reserves were estimated for the North, South and Malachite pits and are summarized in Table 6.9.

6.6.5 Micon 2010 Feasibility Study

A Feasibility Study ("FS") on the Marathon PGM-Cu Property was completed in 2010 by Micon International Limited and is available on SEDAR. Subsequent engineering studies on the Property were retained in draft and were not filed on SEDAR. Since this PEA supersedes all previous engineering studies, a summary of the Micon 2010 FS has been included below for reference.

The design of a 22,000 tpd process plant comprised primary crushing, secondary crushing, high pressure grinding rolls ("HGPR"), ball milling, flotation, concentrate dewatering and process solids (tailings) disposal. The concentrator was designed to produce a copper sulphide flotation concentrate containing PGMs and gold. The life-of-mine capital cost estimate was $495M comprising $351M of pre-production capital and $144M of sustaining and closure capital. The estimated total average life-of-mine unit operating cost was $16.64/t.

The FS completed on the Project demonstrated the potential to generate strong cash flow under appropriate metal price assumptions of US$2.91/lb Cu, US$1,346.65/oz Pd, US$321.44/oz Pt, US$819.22/oz Au, US$14.10/oz Ag, and an exchange rate of CDN/US=1.099. The base case results showed that the Project generated an IRR of 21.2% before tax and 17.4% after tax. The undiscounted payback period was 4.4 years, and the discounted cash flow was positive after 6 years. The NPV at a 6% discount rate was $250.7M after tax. The sensitivity studies demonstrate that the Project was quite sensitive to adverse changes in price assumptions and moderately sensitive to changes in operating cost or capital expenditure.

As a result of its FS on the Project, Micon recommended that Marathon PGM Corp. proceed with the development of the Project.

TABLE 6.9
MARATHON DEPOSIT, MICON 2010 MINERAL RESERVE ESTIMATE

Classification	Tonnes	Pd (g/t)	Pt (g/t)	Au (g/t)	Cu (%)	Ag (g/t)	Cu (Mlb)	Pd (oz 000)	Pt (oz 000)	Au (oz 000)	Ag (oz 000)
Proven	76,461,000	0.910	0.254	0.090	0.268	1.464	452	2,237	625	222	3,600
Probable	14,986,000	0.435	0.147	0.060	0.138	1.318	46	209	71	29	635
Total	91,447,000	0.832	0.237	0.085	0.247	1.440	497	2,447	696	251	4,235

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

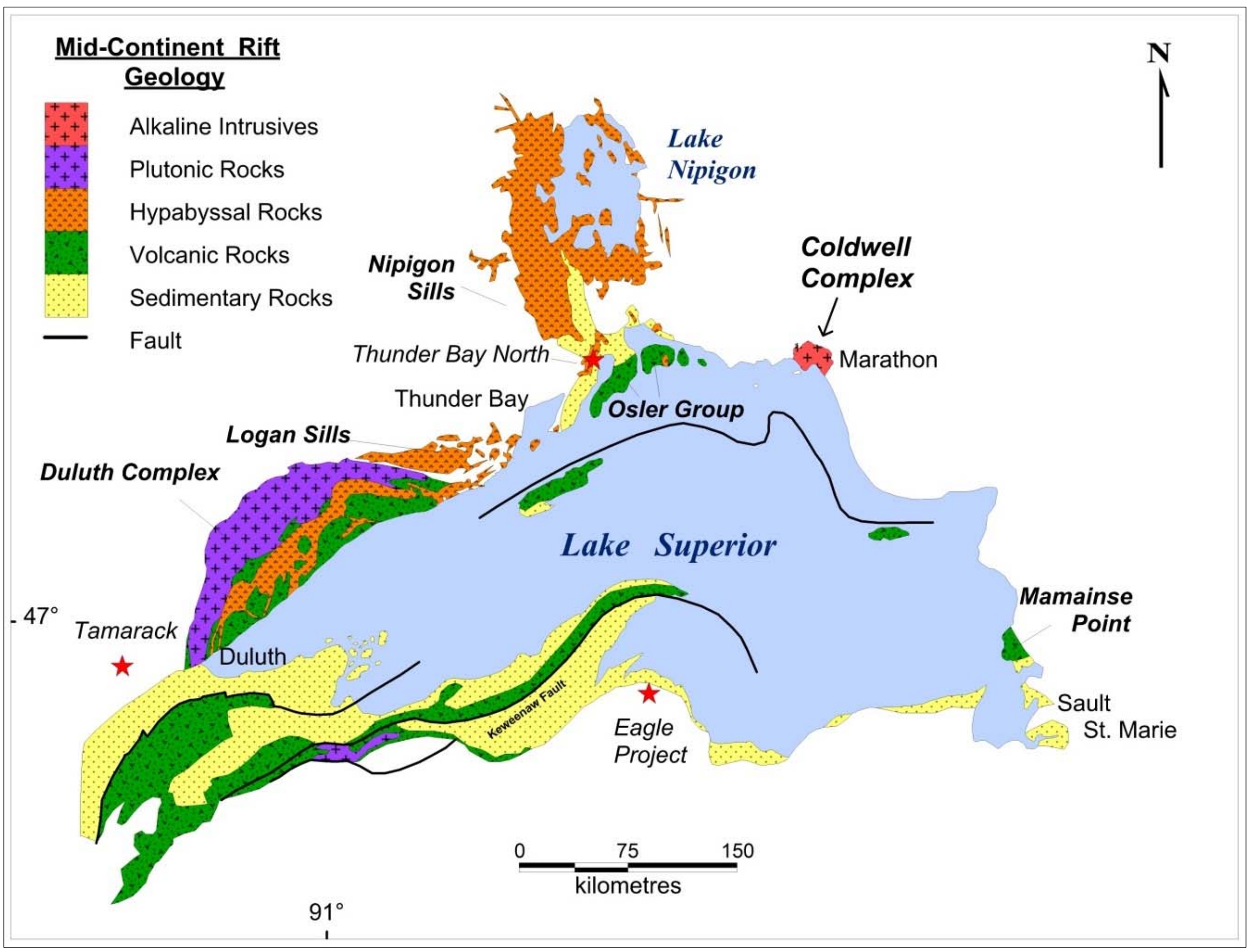
7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGY

The Marathon Deposit is hosted by the Two Duck Lake Gabbro, a late intrusive phase of the Eastern Gabbro. The Eastern Gabbro has recently been described as a composite intrusion by Good et al. (2012) and occurs along the northern and eastern margin of the Proterozoic Coldwell Alkaline Complex ("CAC") which intrudes the much older Archean Schreiber-Hemlo greenstone belt (Figure 7.1). The sub-circular CAC has a diameter of 25 km and a surface area of 580 km^2 and is the largest alkaline intrusive complex in North America (Walker et al. 1993).

The Coldwell Alkaline Complex is believed to have intruded over a relatively short period of time near the beginning of the main stage of the Mid-Continent Rift magmatism that occurred between 1108 and 1094 Ma (Heaman and Machado, 1992 and Heaman et al., 2007).

FIGURE 7.1 REGIONAL GEOLOGY OF THE MID-CONTINENT RIFT IN THE LAKE SUPERIOR AREA



Source: *Marathon PGM Corp. (2010)*

7.1.1 Geology of the Coldwell Alkaline Complex

The CAC was first described as a lopolith by Puskas (1967) and as three intrusive centers by Mitchell and Platt (1977). The intrusive centers were later described as three superimposed rings by Currie (1980). Detailed mapping across the CAC by Walker et al. (1993) supported the multiple intrusive centre model of previous interpretations. Walker et al. also proposed that the CAC has a sub-horizontal structure or stratigraphy.

The major rock units of each magmatic centre of the CAC, as summarized by Shaw (1994) after Walker (1993), and as shown in Figure 7.2, include the following:

- Centre I: Eastern and Western Gabbros, Amphibole Quartz Syenite, Iron-rich Augite Syenite, Monzodiorite and mafic volcanic and subvolcanic rocks.

- Centre II: Amphibole Nepheline Syenite and Alkaline Gabbro.

- Centre III: Quartz Syenite and Amphibole Quartz Syenite.

Recent work by Kern et al. (2012) and Kulakov et al. (2012) suggests Centres I and III were intruded prior to Centre II. These two studies presented comprehensive paleomagnetic data from the CAC and included measurements from intrusive syenitic to gabbroic rocks of Centres I, II and III. The results of Kern et al. indicate that paleomagnetic signatures for Centres I and III are statistically indistinguishable, and that rocks of Centre II were emplaced after the magnetic reversal that occurred about 1103-1104 Ma. The study by Kulakov et al. examined the package of volcanic rocks located in the centre of the CAC, and determined that the paleomagnetic signature for the basalts is very similar to that for intrusive rocks of Centres I and III as determined by Kern et al. and is consistent with a deposition age of 1107 Ma.

FIGURE 7.2 GEOLOGY OF THE COLDWELL COMPLEX

Note: *Shows the locations of the Marathon Deposit and the Geordie Deposit.*
Geology after Walker et al. (1993)
Source: *Marathon PGM Corp. (2010)*

7.1.2 Geology of the Eastern Gabbro

The Eastern Gabbro forms part of a very large magmatic system and contains numerous Cu-PGM occurrences along its entire length. It is up to 1,500 m thick and strikes for 33 km around the eastern margin of the Coldwell Complex (Figure 7.3). It is considered the oldest intrusive phase of the Complex and was interpreted to have formed by multiple intrusions of magma into restricted dilatant zones within a ring dyke possibly associated with ongoing caldera collapse (Walker et al, 1993; and Shaw, 1997 after work by Puskas (1967 and 1970) and Currie (1980)). Shaw (1997) concluded the Eastern gabbro consists of evolved basaltic magma with a sub-alkaline parentage.

The magnetic signature of the Eastern Gabbro in the area of the Marathon Deposit is shown in Figure 7.3, which highlights the segmented or discontinuous character of various phases of the Eastern Gabbro.

The Eastern Gabbro is overlain by massive to layered augite syenite (Puskas, 1970; and Walker et al., 1993). Layering in the gabbro and augite syenite dips moderately towards the centre of the complex.

7.1.2.1 Historic Classification of the Eastern Gabbro

Puskas (1970) subdivided the Eastern Gabbro into three groups: the Outer Border Zone of chilled gabbro; the Inner Border Zone A of massive gabbro; and the Inner Border Zone B of layered gabbro. Based on detailed regional mapping, Walker et al. (1993) subdivided the Eastern Gabbro into three dominant intrusive bodies: the Eastern Layered Gabbro Series; the Two Duck Lake Gabbro; and the Malpa Lake Gabbro. Further detailed study of two stratigraphic sections through the Layered Gabbro Series by Shaw (1997) resulted in the definition of at least three intrusive phases separated by thick zones of xenolith-laden massive gabbroic bodies. The lower zone consists of a fine-grained chill (Sequence I) that grades upward into modally layered gabbro at the metre scale (Sequence II) to the centimetre scale (Sequence III).

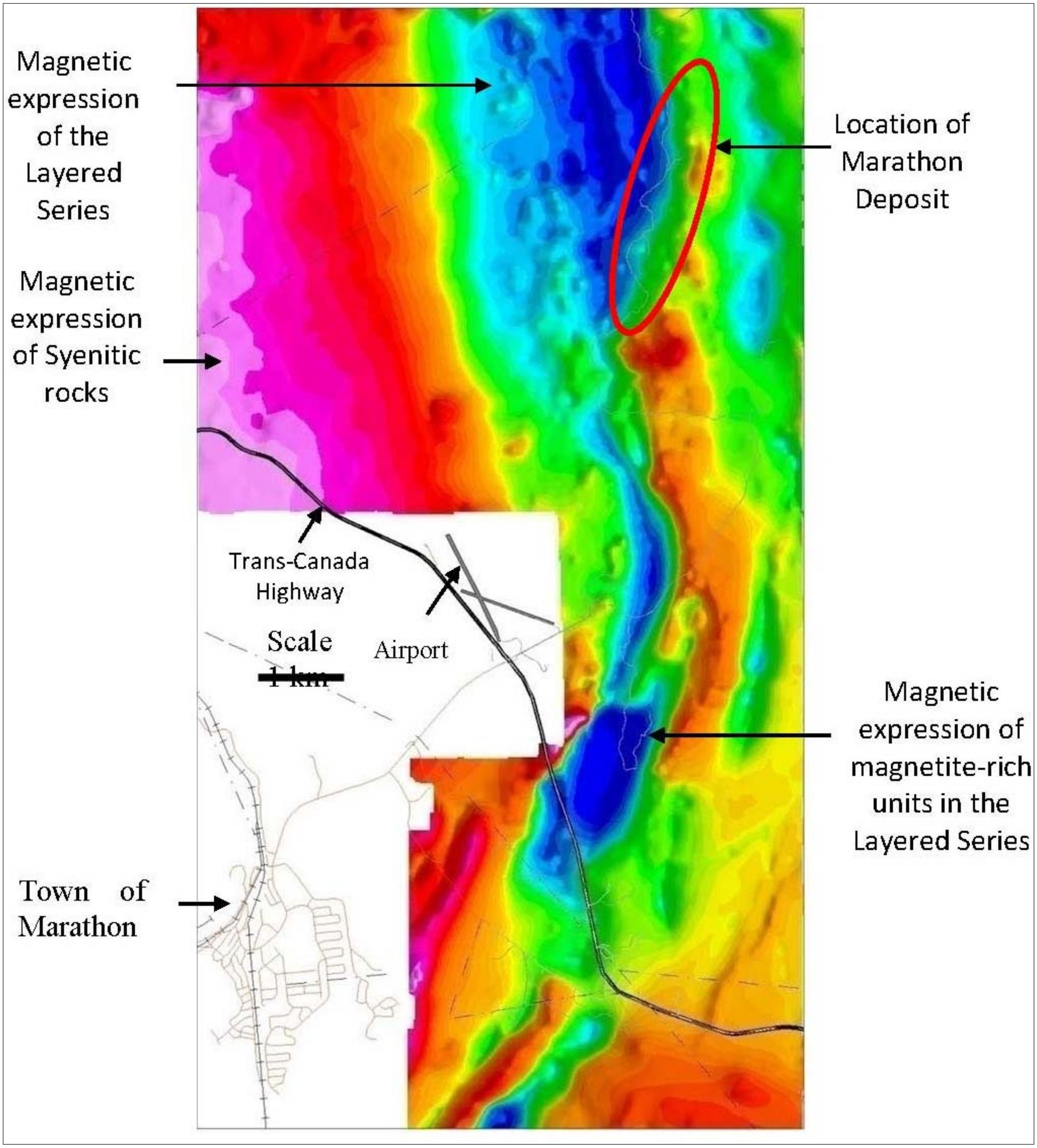
7.1.2.2 New Classification of the Eastern Gabbro

A new classification of the Eastern Gabbro as proposed by Good et al. (Economic Geology 2012) includes the Fine Grained Series, Layered Series and Marathon Series. The new classification is based on distinctive petrographic features, geochemical characteristics and cross-cutting relationships. The three series largely maintain the subunits of the Eastern Gabbro as presented by Puskas (1970) and Shaw (1997) but with the main differences that the units are not necessarily co-genetic. The Marathon Series is the youngest intrusive phase and is defined here to include all mafic and ultramafic intrusive rocks that host copper and platinum group element ("PGE") mineralization in the vicinity of the Marathon Deposit. The Fine Grained Series is the oldest intrusive phase and is equivalent to the outer boundary chill gabbro of Puskas or Sequence I rocks of Shaw. The Layered Gabbro Series matches the Inner Zones A and B of Puskas or Sequences II and III of Shaw (Table 7.1).

TABLE 7.1
NEW CLASSIFICATION SCHEME FOR THE EASTERN GABBRO

Stillwater Canada Classification for Eastern Gabbro				Previous Classification Strategies		
Series	**Unit**	**No. of Sub-units**	**Relative Age**	**Puskas, 1970**	**Wilkinson, 1983**	**Shaw, 1997**
Fine Grained Series	Gabbro	4	oldest	Outer border zone of chilled gabbros	Fine Grained Gabbro	Layered Gabbro Series I
Layered Series	Gabbroic anorthosite	1		Inner Border Zone B of Layered gabbro	Banded Gabbro	Layered Gabbro Series II and III
	Olivine gabbro	2				
	Oxide augite melatroctolite	1				
Marathon Series	Wehrlite	4		Inner Border Zone A of massive gabbro	Mottled Gabbro	
	Augite troctolite	7				
	Oxide melatroctolite	1			Magnetite olivinite	
	Two Duck Lake Gabbro	5			Heterogen-eous gabbro	Two Duck Lake Gabbro
	Apatitic clinopyroxenite	2	youngest			

FIGURE 7.3 TOTAL MAGNETIC IMAGE OVER EASTERN BOUNDARY OF THE COLDWELL COMPLEX



Source: *Marathon PGM Corp. (2010)*

7.1.3 Detailed Geology of the Marathon PGM-Cu Property

The Property geology is defined to a large extent by the intrusive cross-cutting relationships between the Marathon Series and the earlier Fine Grained Series, and by the complicated nature of the basal contact with the partially melted Archean rocks. The geology of the Property is shown on a plan map (Figure 7.4) and a north-south longitudinal section (Figure 7.4) that is located along the western edge of the Deposit.

The Two Duck Lake Gabbro ("TDL Gabbro") is the dominant host rock for Cu-PGM mineralization and is the focus of exploration. Additional accumulations of Cu-PGM mineralization are associated with oxide ultramafic intrusions of the Marathon Series that consist of clinopyroxene +/- olivine +/- magnetite +/- apatite cumulate rocks. These ultramafic bodies occur predominantly in the hanging wall of the Deposit and were formerly referred to as Layered Magnetite Olivine Cumulates.

7.1.4 Archean Country Rock and Rheomorphic Intrusive Breccia

The footwall of the Deposit is comprised of Archean intermediate pyroclastic rocks that have undergone partial melting as a result of the heat of intrusion of the Eastern Gabbro. At the contact with the Eastern Gabbro, the footwall is referred to as Rheomorphic Intrusive Breccia ("RIB"). The RIB/gabbro contact is not a simple contact as blocks of RIB material occur within the gabbroic series and intrusions of gabbro extend deep below the footwall contact. Also, a few thin near vertical promontories of RIB extend into the gabbroic series (Figure 7.4).

In a detailed study of the RIB, Uldis Abolins (1967) described the breccia as a matrix supported heterogeneous mixture of angular and sub-rounded fragments composed of fine to coarse grained gabbroic material, quartzite, pyroxenite and layered quartz pyroxenite. A distinguishing feature of the RIB is the common occurrence of elongate curved pyroxenite fragments. Abolins estimated the composition of the breccia matrix to be close to that of a quartz norite.

Locally, the footwall forms basins and ridges under the TDL Gabbro. This paleo surface played an important role in the formation of the Deposit by encouraging accumulation of sulphides through physical processes such as settling out of sulphide droplets in the magma conduit (see Section 8.0 for a detailed discussion).

7.1.5 Fine Grained Gabbro (Fine Grained Series)

The most abundant rock type in the hanging wall overlying the Deposit is fine grained gabbro. Layering can be detected at the metre scale by gradational change in grain size. Contacts with other gabbro units are sharp.

The fine grained gabbro consists of equigranular clinopyroxene, olivine, plagioclase and minor magnetite. Intergranular angles are near 120° (Figure 7.4) indicating the fine grained gabbro is re-crystallized. Re-crystallization would require very high temperature metamorphism perhaps of pyroxene hornfels grade. Metamorphism occurred during intrusion of Layered Series and TDL Gabbro.

An important and remarkable feature of fine grained gabbro is the extremely low level of secondary alteration (Figure 7.4). In a survey of 50 thin sections only a few sections contained serpentine alteration of olivine and one section contained amphibole alteration of olivine. Tremolite was not observed. Trace to less than trace amounts of secondary minerals such as chlorite and muscovite occur in the vicinity of olivine or cross-cutting fractures.

Locally, the occurrences of flattened pipe shaped features that resemble amygdules imply that some of the fine grained gabbro may have originated as basaltic flows that were recrystallized during pyroxene hornfels grade metamorphism.

A common feature within fine grained gabbro particularly close to intrusions of TDL Gabbro is the formation of 1-2 cm sized zoned amoeboid shaped blebs with either a clinopyroxene or olivine core or a thin plagioclase rich rim. This texture is interpreted to have formed either by migration of material from the TDL magma along a very fine 3-D network or by pyroxene hornfels metamorphism related to intrusion of the TDL magma.

7.1.6 Layered Olivine Gabbro and Oxide Augite Melatroctolite (Layered Series)

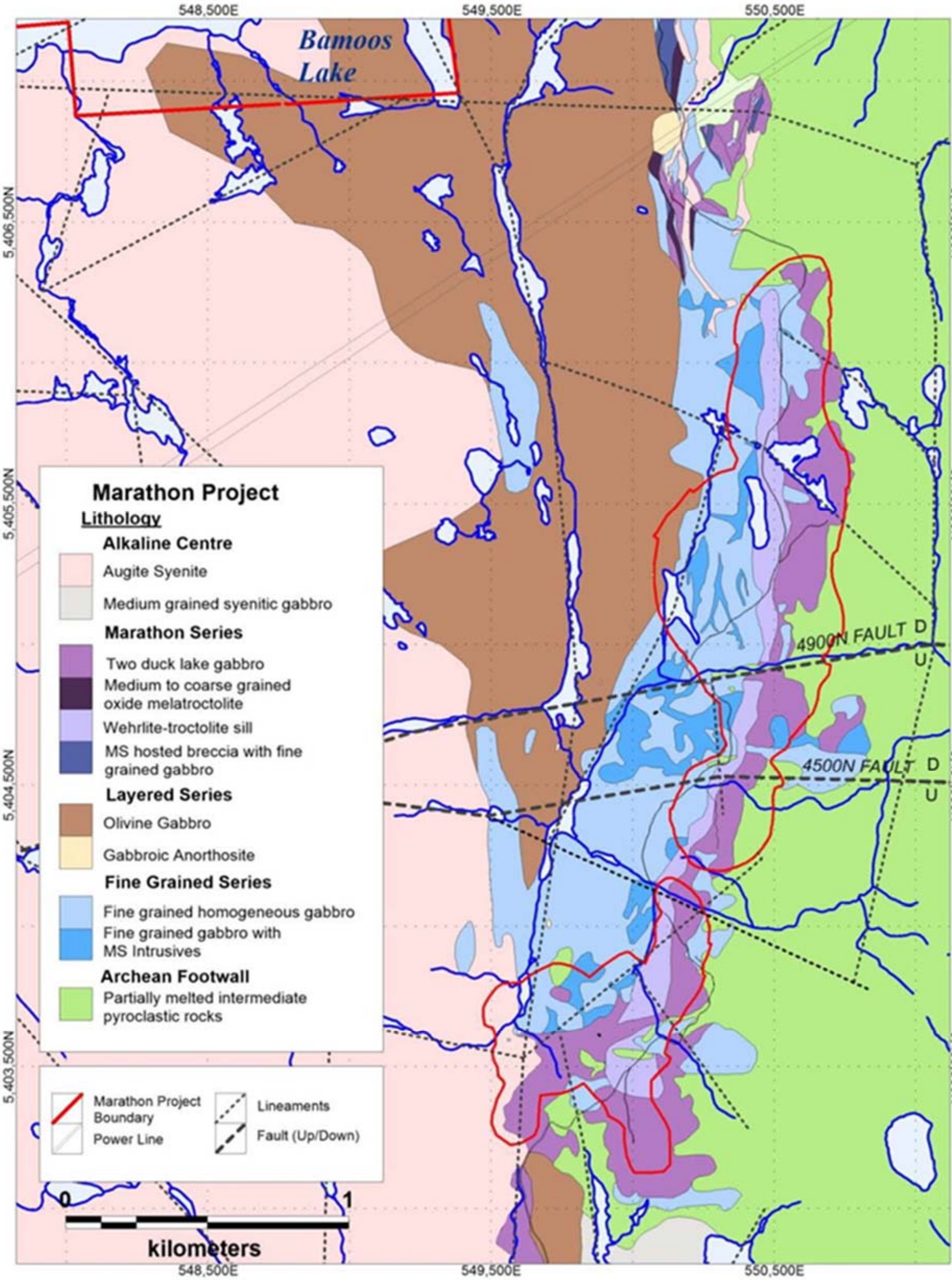
The Layered Series makes up the majority of the Eastern Gabbro but only occurs along the western edge of the Property. It is compositionally, geochemically and texturally similar along the entire strike length of the complex. The Layered Series is dominated by massive to modally layered olivine gabbro with lesser amounts of inter-layered thick units of oxide augite melatroctolite. Contacts between these units are typically gradational.

The olivine gabbro is medium to coarse grained and is characterized by intergranular texture, plagioclase alignment, and modal layering. The modal layering is defined by a gradational increase in the abundance of plagioclase, and ranges in composition from olivine melagabbro to olivine gabbroic anorthosite. The lower contact of modal layers is not sharp but shows strong contrast. The modal layers are variable on a decimetre to metre scale and may show continuous to lenticular rhythmic layering. Cross-bedded, wavy or convoluted layering may also be present.

The olivine gabbro has an intergranular texture and is composed of, in decreasing order of abundance, plagioclase, clinopyroxene, olivine, magnetite and apatite. Medium-to-coarse grained plagioclase is euhedral to subhedral, whereas olivine and clinopyroxene crystals are medium grained and subhedral. The gabbro includes up to 10%, fine grained, euhedral and interstitial apatite and up to 10% interstitial magnetite. Alteration of plagioclase and mafic minerals to sericite and chlorite or actinolite, respectively, is weak to moderate.

The oxide augite melatroctolite is texturally similar and gradational to the layered olivine gabbro and is distinguished by abundant magnetite (15 to 25 modal %). The oxide augite melatroctolite occurs as discontinuous and irregular pods and lenses within the layered olivine gabbro. The unit is typically medium-to-coarse grained and may exhibit plagioclase alignment.

FIGURE 7.4 GEOLOGICAL MAP OF THE MARATHON DEPOSIT



Note: *Mapping by geologists of Marathon PGM Corp and Stillwater Canada Inc, 2012*
Source: *Stillwater Canada Inc. (2012)*

7.1.7 Wehrlite-Troctolite Sill (Marathon Series)

A newly recognized Wehrlite-Troctolite ("WT") sill located immediately above the main mineralization-bearing TDL Gabbro (Figure 7.5 and Figure 7.6) is an important marker horizon and is thought to have important implications with regard to the origin of the Deposit mineralization. Further, of equal or greater significance, the excellent continuity of the unit across a total of 128 carefully logged drill holes negates the possibility of numerous post mineralization faults as proposed by Dahl et al. (2001). The sill is 30 to 50 m thick, is composed of an upper wehrlite and lower augite troctolite unit, and does not contain any significant sulphides.

The WT sill is an excellent marker horizon and provides the only evidence for normal faulting along the surface lineaments located near 5,404,900 N and 5,404,500 N as illustrated in Figure 7.5.

The WT sill occurs along the entire strike length of the Deposit and forms an important marker horizon above the Main Zone of mineralization. This relationship changes at the south end of the Deposit (near 5,403,800 N), where the dip of the sill is sub-horizontal, and the TDL Gabbro cuts through the sill to form the southwest limb of the Deposit.

The wehrlite typically occurs immediately above the augite troctolite unit. The wehrlite consists of, in decreasing order of abundance, olivine, clinopyroxene, plagioclase, and magnetite. Olivine and clinopyroxene are medium to very coarse grained but olivine is generally subhedral and clinopyroxene is anhedral. Plagioclase is interstitial and medium-to-coarse grained, and magnetite is anhedral to subhedral. Plagioclase comprises 5–25% of the rock. Thin layers of coarse-grained oxide wehrlite commonly occur within the wehrlite.

The augite troctolite is distinguished by the presence of coarse-grained olivine, clinopyroxene and magnetite oikocrysts. The nature of plagioclase varies from euhedral laths to anhedral, interstitial networks; the latter feature giving the augite troctolite a mottled appearance.

7.1.8 Two Duck Lake Gabbro (Marathon Series)

The TDL Gabbro is the host rock for the Marathon Deposit. It occurs as a massive and poorly layered unit approximately 50 to 250 m thick that strikes near north for greater than 6 km (Figure 7.5, Figure 7.6 and Figure 7.7) and in general dips west at angles from 5 to 45°. The TDL Gabbro intruded the Fine Grained Series beneath the Wehrlite-Troctolite sill and near the basal contact with Archean Footwall. The TDL Gabbro is intruded by very thin dykelets of RIB that are partial melt derivatives of the Archean basement and also by late north-northwest trending quartz syenite dykes.

The modal mineralogy of a composite sample that is representative of the Deposit mineralization (and TDL Gabbro) was determined in a QEMSCAN survey by XPS (Kormos, 2008). A total of nine aliquots of material were analyzed. In decreasing order of abundance, the composite sample was comprised of 42.0% plagioclase, 25.7% clinopyroxene, 7.8% amphibole, 5.5% iron oxides, 4.6% olivine, 2.6% other silicates (quartz, epidote, talc, and serpentine), 2.2% orthoclase, 0.7%

biotite, and the remainder of various sulphides (pyrrhotite, chalcopyrite and pentlandite). Orthopyroxene is rare and where present occurs as late reaction rims on olivine (Good, 1993).

The TDL Gabbro is distinguished from other gabbro types by cross-cutting relationships and mineral textures resulting from the respective crystallization histories. In TDL Gabbro, plagioclase crystallized first and forms elongate laths that are surrounded by ophitic textured clinopyroxene or olivine. Pegmatitic textured TDL Gabbro occurs locally as pods within coarse grained gabbro or as rims on Fine Grained Gabbro xenoliths. Mineralized pegmatite makes up less than about 5% of all mineralized zones. The composition of pegmatitic TDL Gabbro was compared to that of coarse grained, TDL Gabbro by Good (1992), and found to be similar.

An important aspect of TDL Gabbro relative to other Cu-PGM deposits such as at the Lac des Iles Mine is the fresh unaltered nature of primary minerals and textures. There is some local development of secondary minerals such as chlorite, amphibole, serpentine and calcite but the abundance of these minerals is not greater than about 10% for the Deposit (Kormos, 2008).

There is only a minor fluctuation in mineral compositions across the TDL Gabbro (Good and Crocket, 1994a; Ruthart, 2013). Plagioclase crystals are normally zoned with compositions between 65% and 52% anorthite but in the Main mineralized zone typically exhibit replacement at grain margins by a more calcic plagioclase (69-79% anorthite). The average olivine composition is 56.9% forsterite and 540 ppm Ni. Clinopyroxene and orthopyroxene lie respectively within the fields of augite and hypersthene with Mg numbers between 0.6 and 0.7.

7.1.9 Oxide Ultramafic and Apatitic Clinopyroxenite Intrusions (Marathon Series)

The thickest accumulations of magnetite rich oxide melatroctolite are located between approximately 5,404,900N and 5,405,200N.

Oxide ultramafic intrusions frequently contain disseminated chalcopyrite and pyrrhotite and make up an important but very irregular component of the Marathon Series. The intrusions typically occur as discontinuous sills and irregular pods that crosscut Fine Grained Series, the Wehrlite-troctolite sill, and the TDL Gabbro. The intrusions are less than 200 m in strike length and up to 100 m thick, but are commonly a few to tens of metres thick and less than about 50 m along strike. The size, irregular shape and mineralogy of these intrusions resemble the oxide ultramafic intrusions ("OUI") that occur in the Duluth Complex (Ripley et al., 1998) and Sept Isles Intrusive Suite (Tollari et al., 2008).

The numerous cumulate phases and combinations thereof in oxide ultramafic intrusions are best described using the cumulate terminology of Miller et al. (2002). For example, the intrusive units vary in composition from oxide melatroctolite (FOCpA to FCOpA) to apatitic clinopyroxenite (CCoFAp to CCFoAp) to apatitic olivine clinopyroxenite (COFAp to OCFAp). Magnetite content varies from 5% in the clinopyroxenite to 25% in the oxide melatroctolite. Semi-massive or massive bands of magnetite are common and vary from 2 to 50 cm in thickness. Apatite is ubiquitous and varies in abundance from 5% to 30%. Massive apatite cumulate bands up to 30 cm thick are rare but found in apatitic clinopyroxenite.

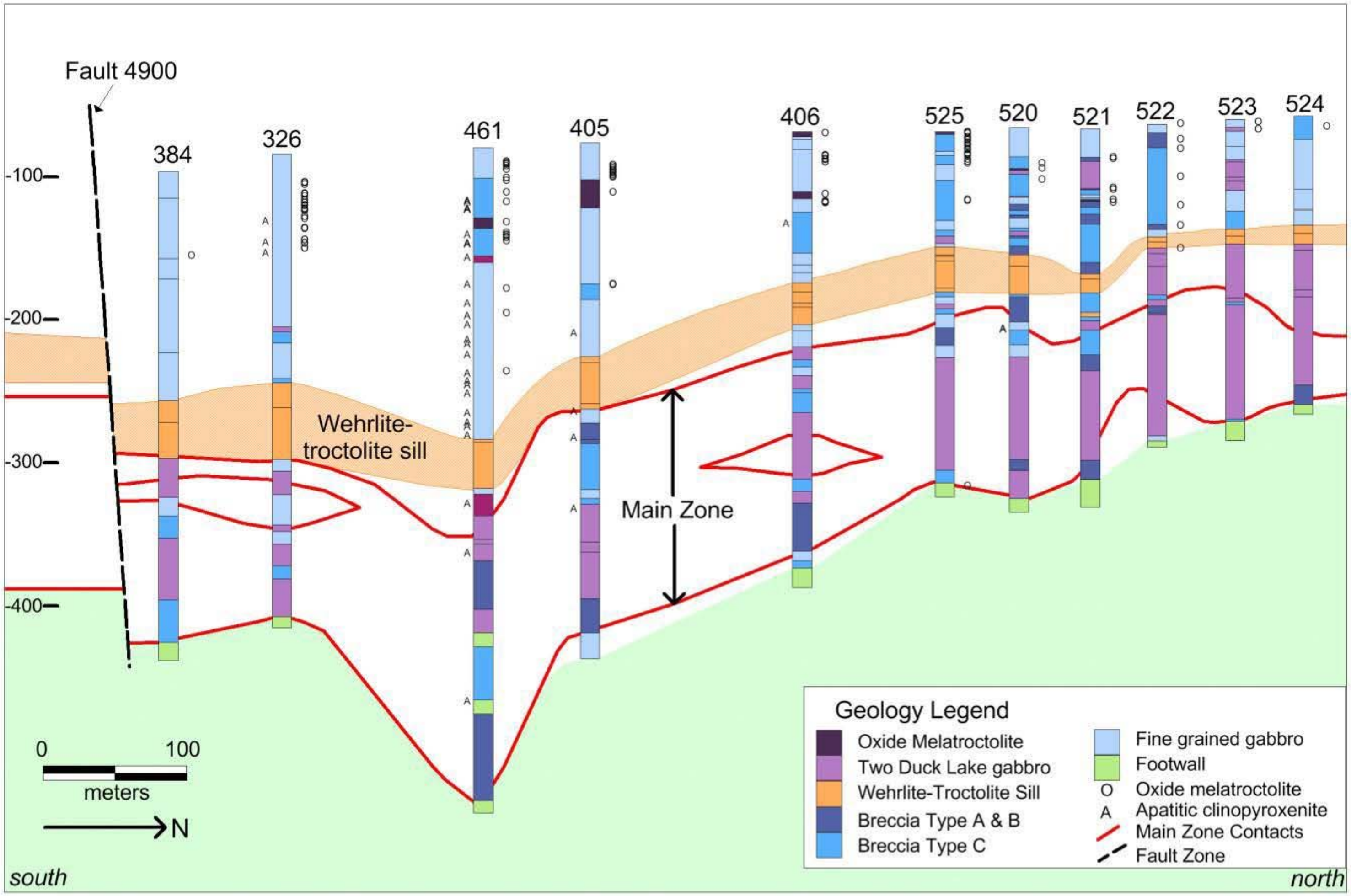
In general, these intrusions occur throughout the stratigraphy at the Deposit, however, units located high up in the stratigraphy are predominantly oxide melatroctolite and have higher overall magnetite content. These oxide melatroctolite intrusions are typically intermixed with plagioclase-rich gabbro bands (PcOf to PFoc) which display ophitic and/or flow aligned textures. Units lower down in the stratigraphy are composed primarily of apatitic clinopyroxenite and apatitic olivine clinopyroxenite. Compositional zonation is not evident within the lower intrusions.

7.1.10 Breccia Units (Marathon Series)

The TDL Gabbro intruded along planes of weakness in earlier Fine Grained Gabbro and the Archean pyroclastic or rheomorphic footwall breccia to form numerous sills and intrusive breccias. Three types of intrusive breccias are recognized at the Marathon Deposit: type A consists of TDL Gabbro matrix and angular xenoliths of fine grained gabbro; type B is similar to type A but also includes xenoliths of footwall material; and type C consists of Fine Grained Gabbro that is cut by multiple thin dykelets of TDL Gabbro, or higher up in the stratigraphic section, typically oxide melatroctolite. In general, the main body of TDL Gabbro progresses outward from a central uniform gabbro without xenoliths to breccia type A and lastly to breccia type C near the upper contact with fine grained gabbro. Breccia type B typically occurs along the basal contact, but is not always present. However, it should be noted that the distribution of breccia units is not regular and reversals are common, as illustrated for example, by the distribution of breccia units down holes 461 and 514 in Figure 7.5.

Breccia types A, B and C typically contain sulphide-bearing TDL Gabbro, or higher up in the stratigraphy, sulphide-bearing oxide melatroctolite. Hence breccia units are an important host rock for Cu- PGM mineralization.

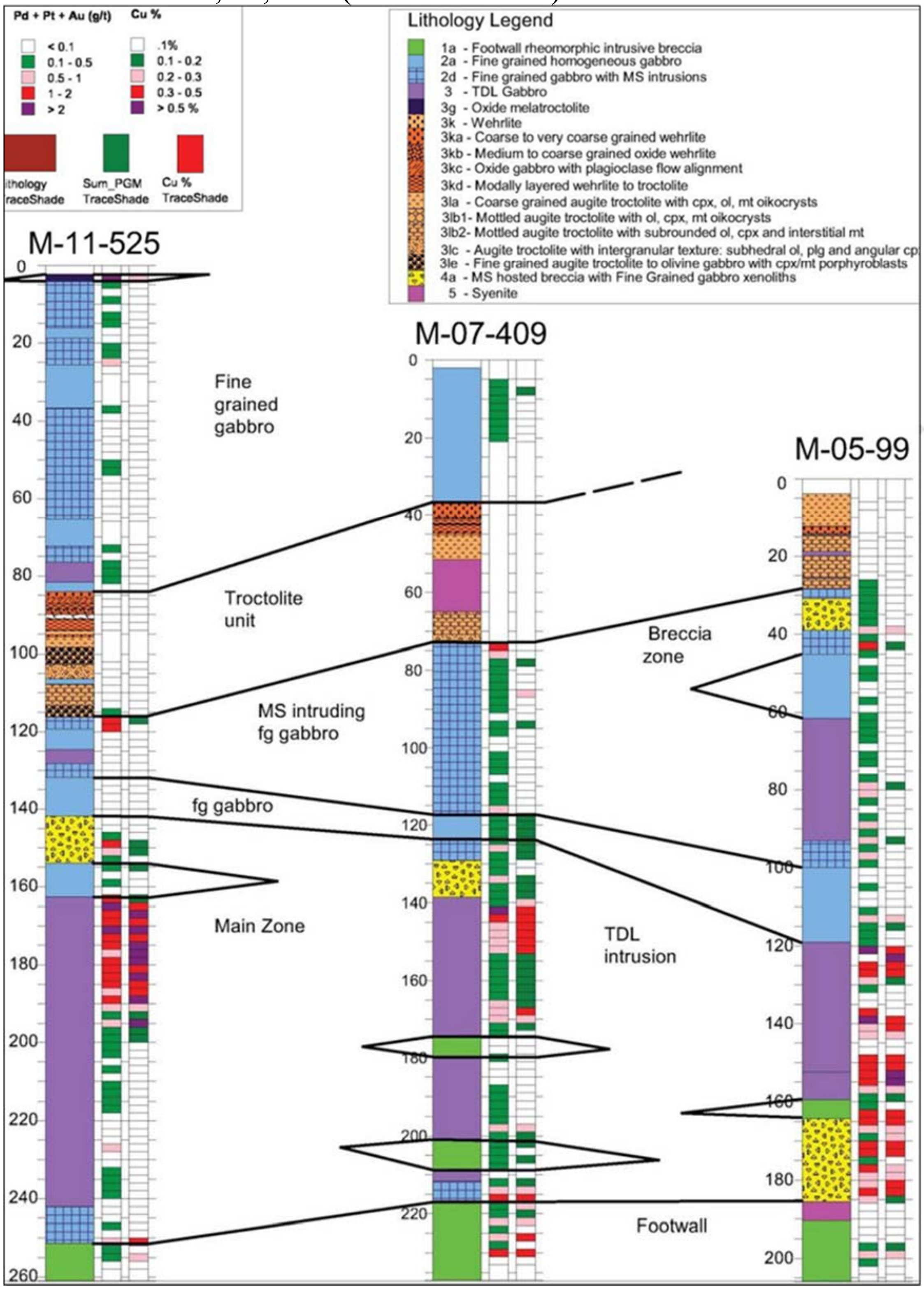
FIGURE 7.5 LONGITUDINAL PROJECTION THROUGH THE CENTRAL PORTION OF THE MARATHON DEPOSIT (LOOKING WEST)



Note: *Figure highlights the complicated sequence of rock units within the Marathon Series and the relative location of the Wehrlite-Troctolite sill above the Main Zone of Two Duck Lake Gabbro. Note the offset along the normal fault close to 5,404,900N. Note the distribution of apatitic clinopyroxenite immediately above the central portion of the Main Magma conduit as indicated by the position of hole M08-461. Hole numbers indicated without prefix example 525 is M-11-525. Note that for Figure 7.5, breccia types A and B are described as Breccia with Marathon Series matrix, and breccia type C is described as Fine grained gabbro with Marathon Series intrusions.*

Source: *Stillwater Canada Inc. (2014)*

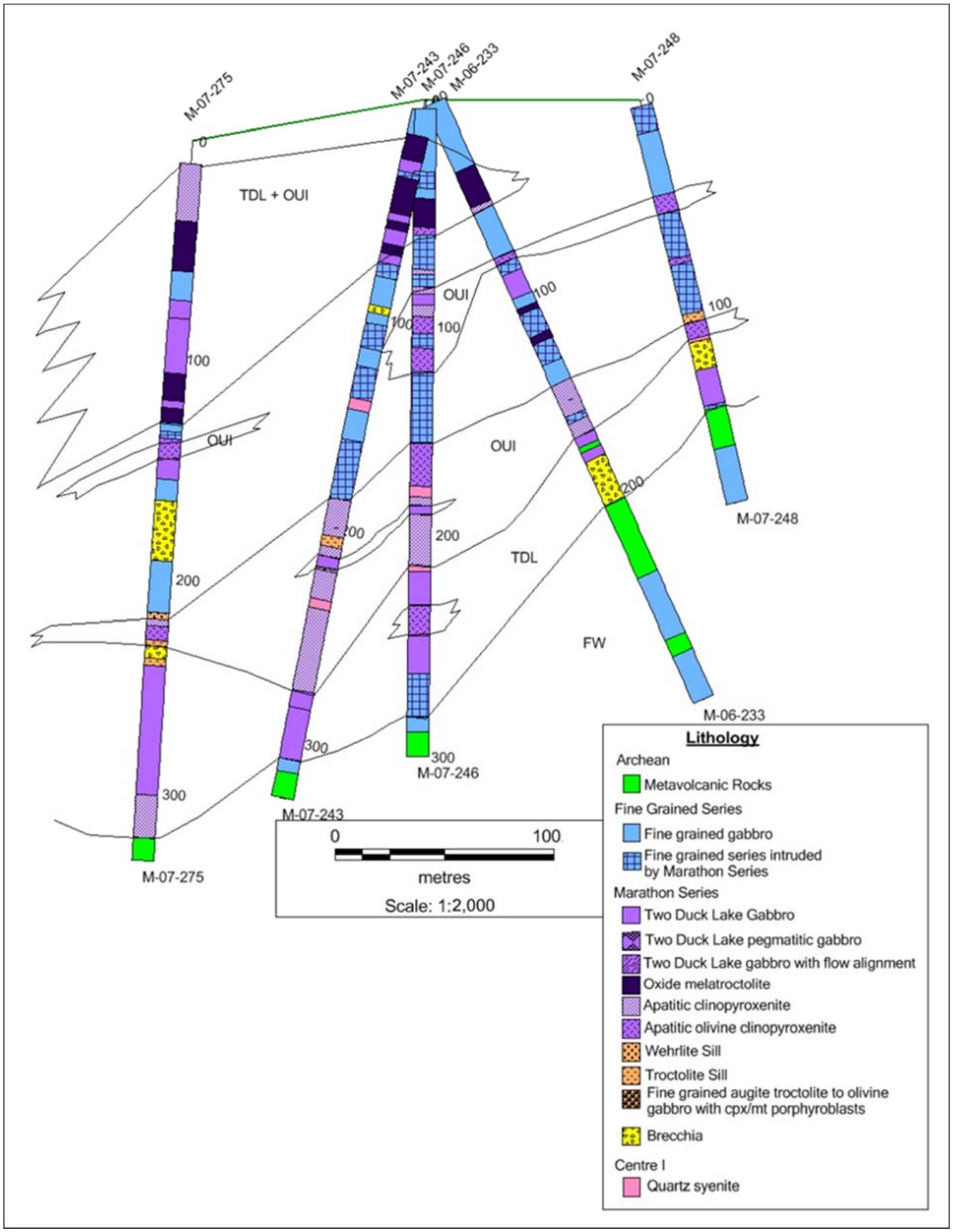
FIGURE 7.6 VERTICAL CROSS SECTION THROUGH THE MAIN ZONE AT SECTION 5,405,450 N (LOOKING NORTH)



Note: Figure highlights the complicated sequence of rock units within the Marathon Series and the relative location of the Wehrlite-Troctolite sill above the Main Zone mineralization. Note that hole M-11-525 is also located in the longitudinal projection in Figure 7.5.

***Source:** Stillwater Canada Inc. (2012)*

FIGURE 7.7 VERTICAL CROSS SECTION AT 5,403,750 N (LOOKING NORTH)



Note: *Figure shows the irregular but complicated nature of the oxide +/- apatite bearing ultramafic intrusions (OUI) of the Marathon Series.*
Source: *Stillwater Canada Inc. (2012)*

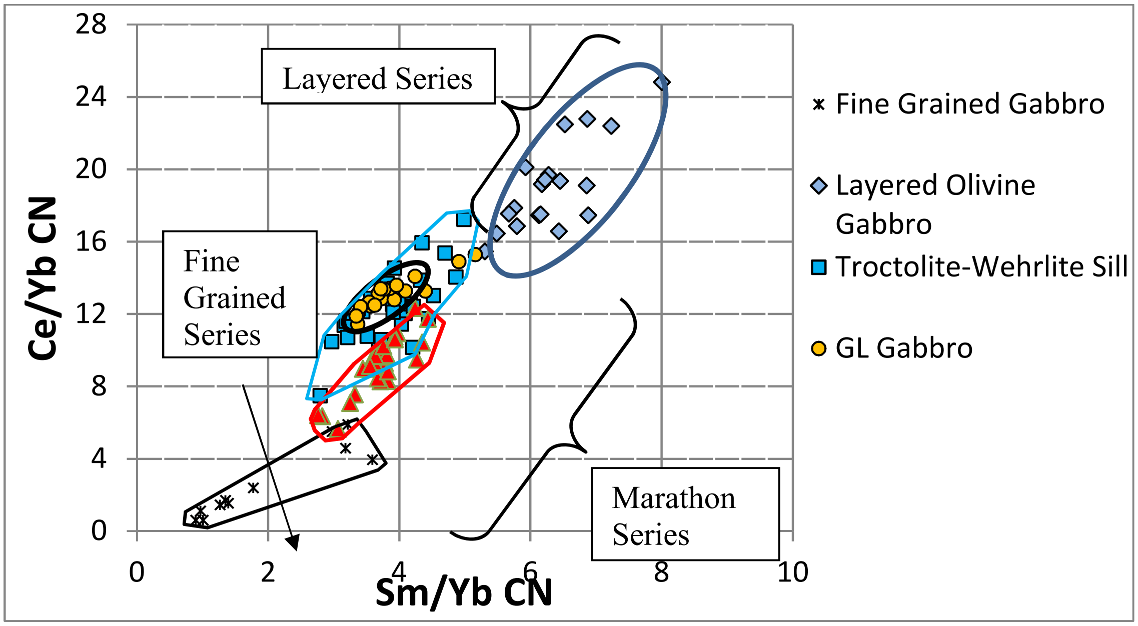
7.2 GEOCHEMICAL DISCRIMINATION DIAGRAMS FOR THE EASTERN GABBRO

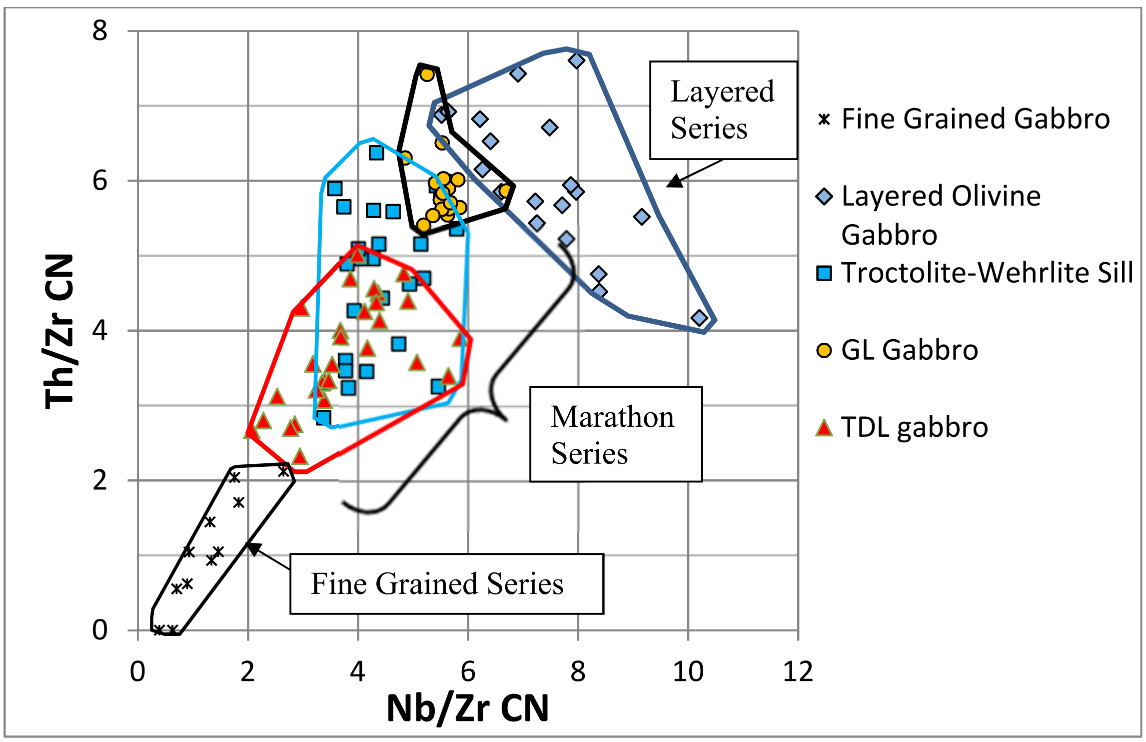
Trace element data together with cross-cutting relationships provides clear evidence that the Eastern Gabbro is a composite intrusion. Each of the three magmatic series (Fine Grained, Layered and Marathon Series) previously characterized by textural, petrographic and cross-cutting relationships have recently been shown to have distinctive trace element signatures that can only be explained by intrusion of distinct magma types.

Pearce element diagrams (Figure 7.8) are very useful as discrimination diagrams because they neatly characterize the three intrusive series of the Eastern Gabbro into separate fields. In each figure, rock units of the Marathon Series plot in a field that lies between those for Fine Grained and Layered Series with the Fine Grained Series having lower Ce/Yb, Sm/Yb, Th/Zr and Nb/Zr and conversely, the Layered Series having higher Ce/Yb, Sm/Yb, Th/Zr and Nb/Zr ("Ce" = cerium, "Yb" = ytterbium, "Sm" = Samarium, "Th" = thorium, "Zr" = zirconium, "Nb" = niobium).

In Figure 7.9 three prominent units from the Coldwell are compared to other MRS related intrusive and extrusive rock units located along the north shore of Lake Superior (Figure 7.1 and 7.2). In Figure 7.9 the representative samples of TDL Gabbro are compared to Fine Grained Series, Coubran basalt and MRS related intrusive sills and dykes of the Logan and Nipigon Sills located near Thunder Bay, Ontario (after Hollings et al. 2011). It is interesting that the data for the Fine Grained Series overlie the fields for the Nipigon and Logan sills, whereas the rocks of the Marathon Series have somewhat higher Ce/Yb, Sm/Yb, Th/Zr and Nb/Zr. Since the Fine Grained series is the earliest intrusive phase in the Coldwell, then the similarity of the Fine Grained Series to the Logan and Nipigon sills suggests that timing of the two events were simultaneous.

FIGURE 7.8 PEARCE ELEMENT RATIO DIAGRAMS FOR THE THREE MAJOR INTRUSIVE SUITES IN THE EASTERN GABBRO SUITE

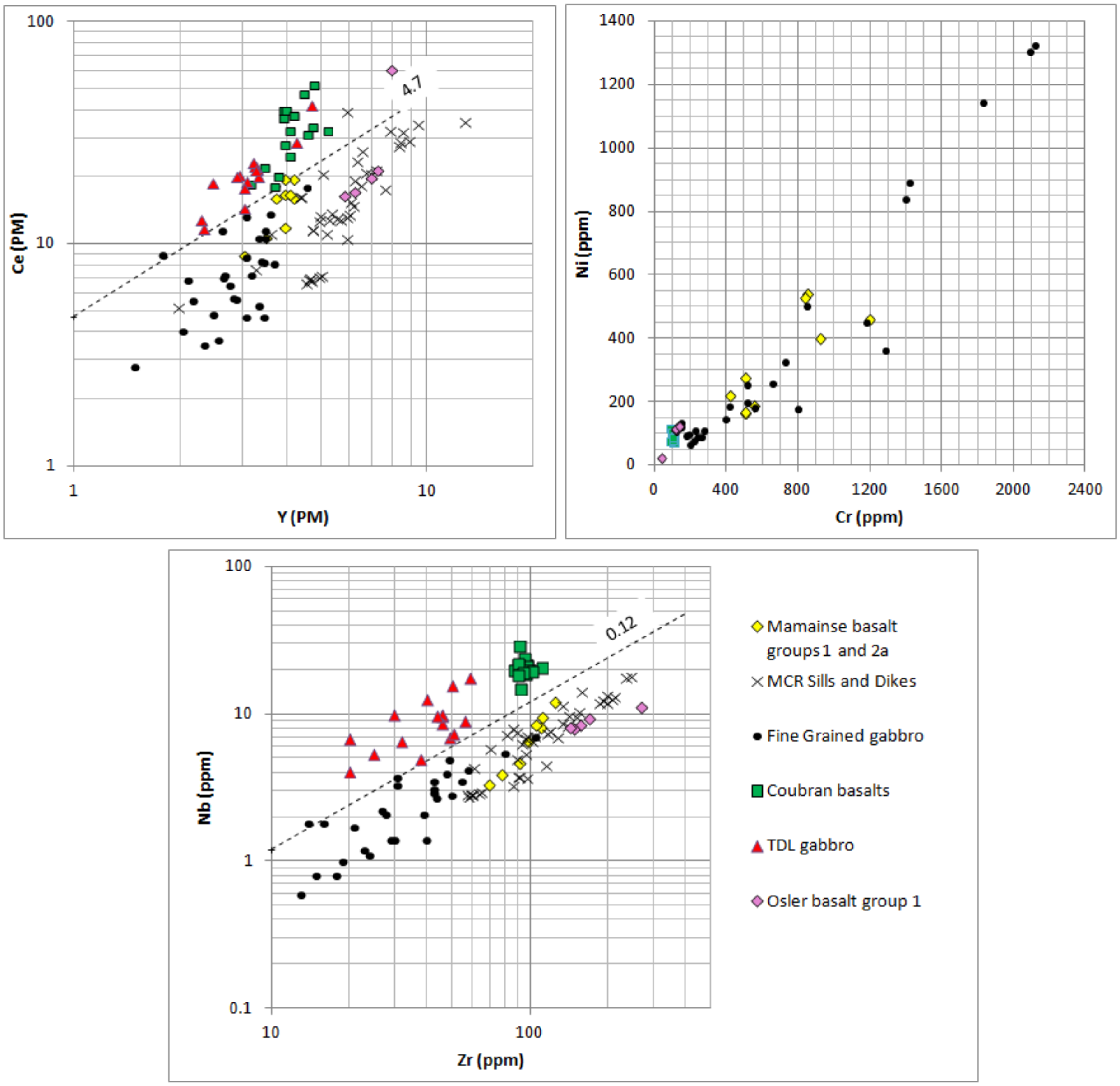




Note: *These diagrams very nicely characterize the units into three groups that could be considered as least evolved (Fine Grained Series) to most evolved (Layered Series). Note the element in the denominator for axes on both figures is considered to be the least incompatible, respectively. Some data for TDL Gabbro after Ruthart (2013). Ratios are chondrite normalized after Sun and McDonough (1989).*

Source: *Stillwater Canada Inc. (2012)*

FIGURE 7.9 COMPARISON OF TDL GABBRO AND COURBRAN BASALT TO INTRUSIVE AND EXTRUSIVE ROCKS OF MID-CONTINENT RIFT



Note: *Comparison of Coldwell Units (Two Duck Lake Gabbro and basaltic flows north of Coubran Lake) to Mid-continent Rift related intrusive Sills (Nipigon sills) in the vicinity of Thunder Bay and basalt flows from Mamainse Point located along the eastern shoreline of Lake Superior and Osler basalt. Data for Nipigon Sills after Hollings et al. (2011), and Mamainse Point after Lightfoot et al. (1999). Some data for TDL Gabbro after Ruthart (2013). Ratios are chondrite normalized after Sun and McDonough (1989).*

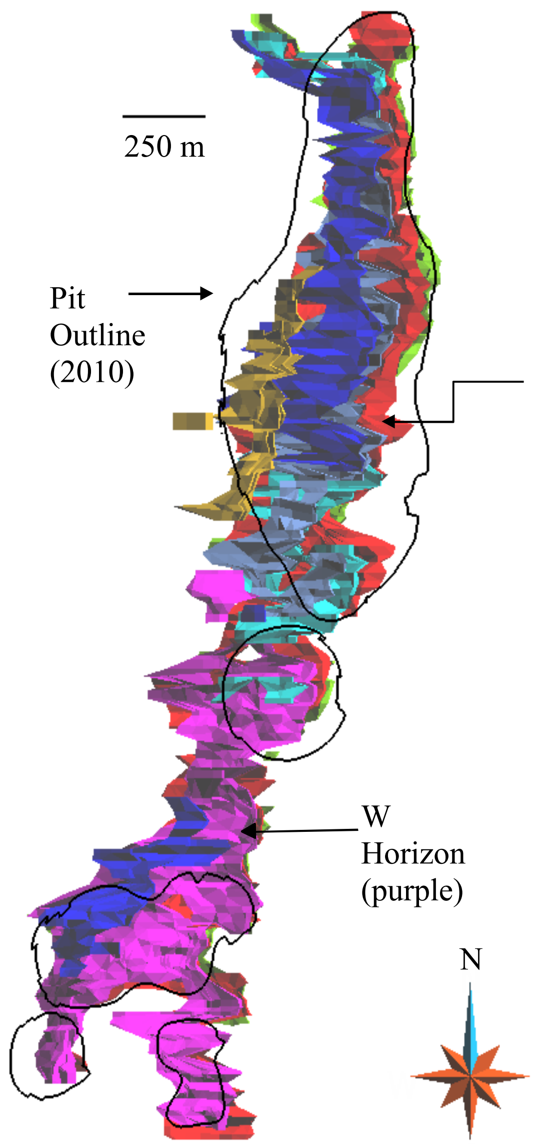
Source: *Stillwater Canada Inc. (2014)*

7.3 MINERALIZED SHOWINGS AND OCCURRENCES

7.3.1 Mineralized Zones

The Deposit consists of several large, thick and continuous zones of disseminated sulphide mineralization hosted within the TDL Gabbro (Figure 7.10). The mineralized zones occur as shallow dipping sub-parallel lenses that follow the basal gabbro contact and are labeled as footwall, main, hanging wall zones and the W Horizon. The Main Zone is the thickest and most continuous zone. For 516 drill hole intersections with mineralized intervals greater than 4 m thick the average thickness is 35 m +/- 28 m and the maximum thickness is 183 m.

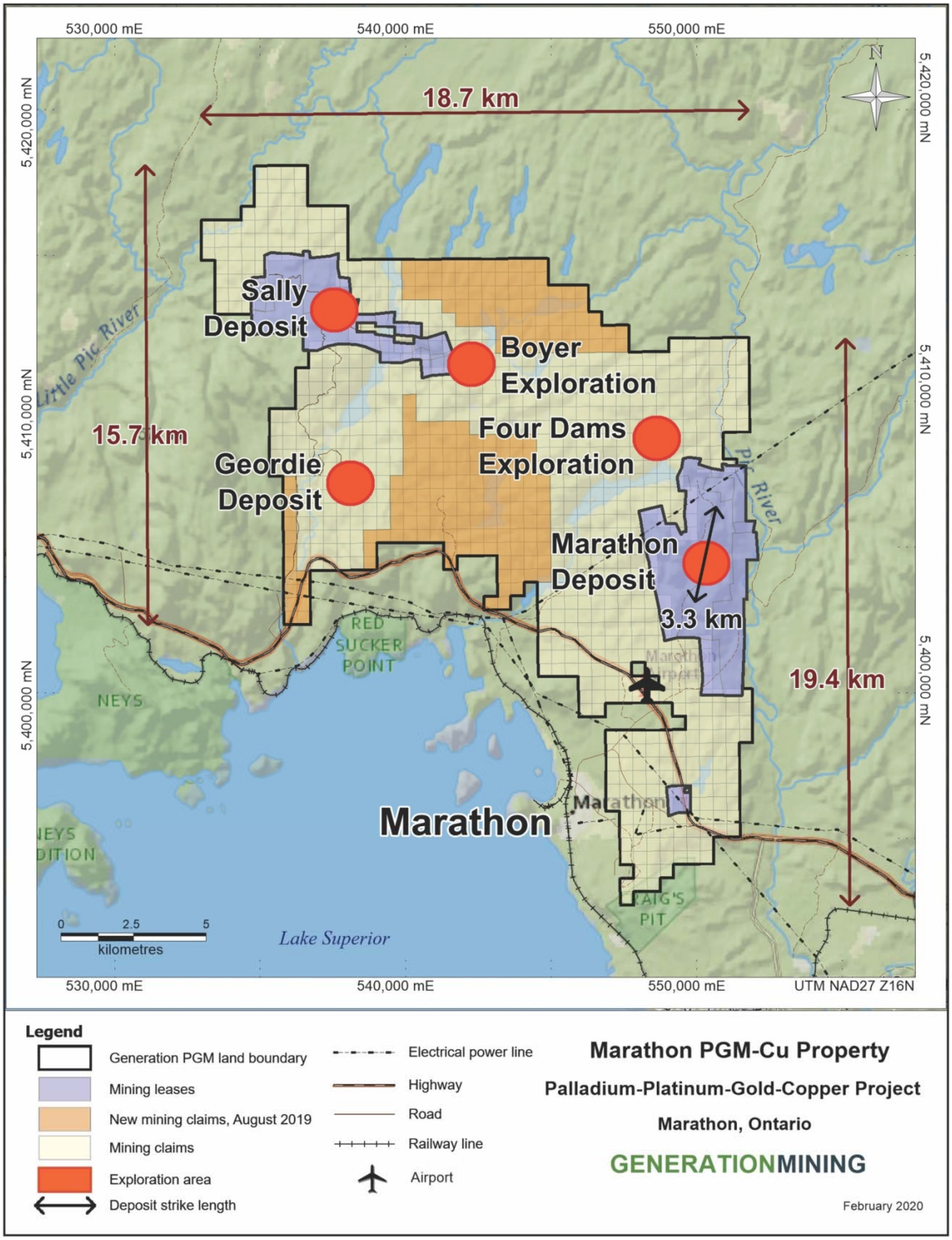
FIGURE 7.10 PLAN VIEW OF THE MARATHON DEPOSIT MINERALIZED ZONES



Source: *Stillwater Canada Inc. (2012)*

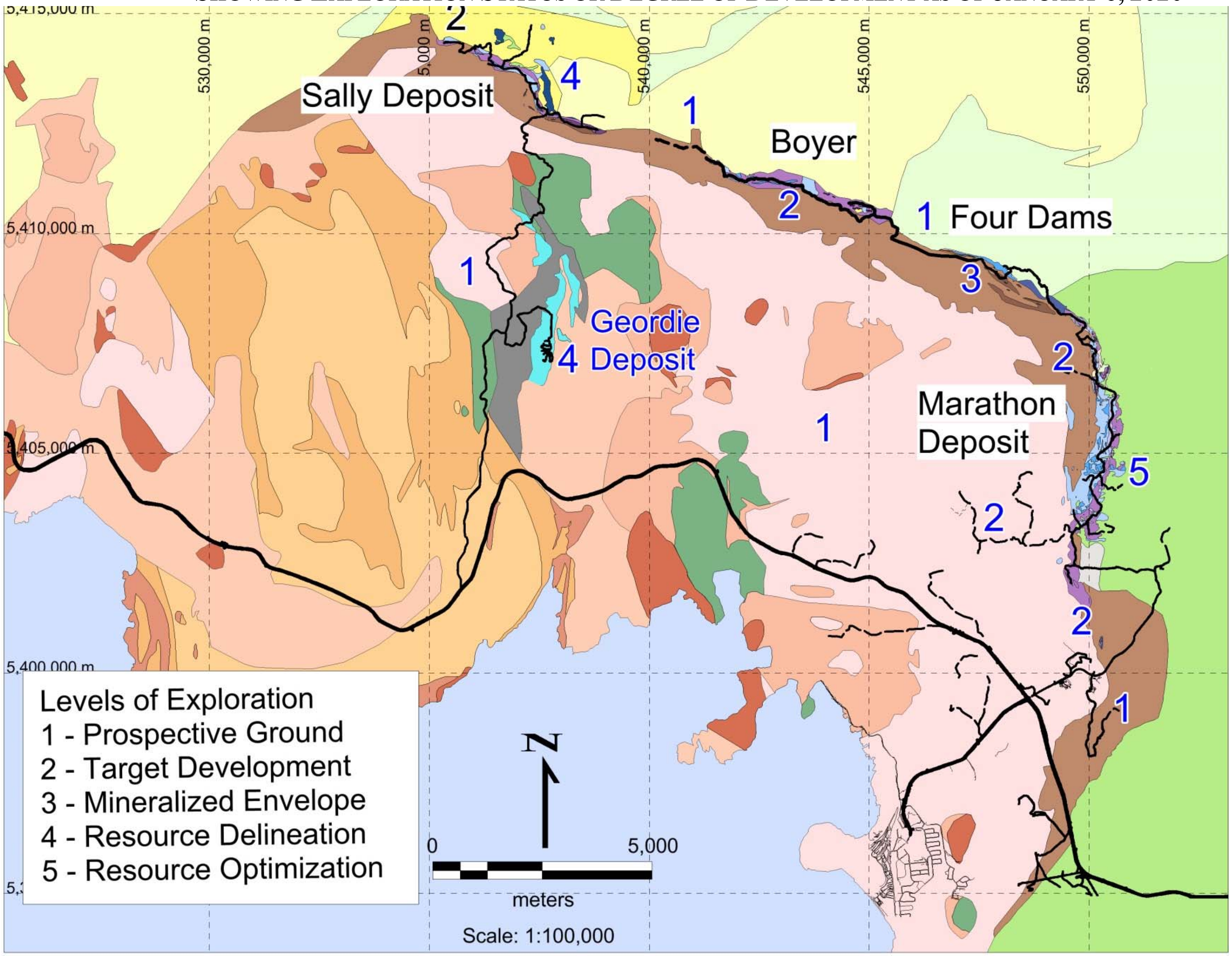
Figures 7.11 and 7.12 illustrate the location of the main mineralized areas located on the Property.

FIGURE 7.11 LOCATIONS OF MINERALIZED DEPOSITS AND THOSE AREAS IDENTIFIED FOR EXPLORATION



Source: *Generation Mining Limited (2019)*

FIGURE 7.12 GEOLOGY MAP OF THE COLDWELL COMPLEX AND LOCATION OF ALL KNOWN CU-PGM OCCURRENCES SHOWING EXPLORATION STATUS OR DEGREE OF DEVELOPMENT AS OF JANUARY 6, 2020



Source: *Generation Mining Limited (2019)*

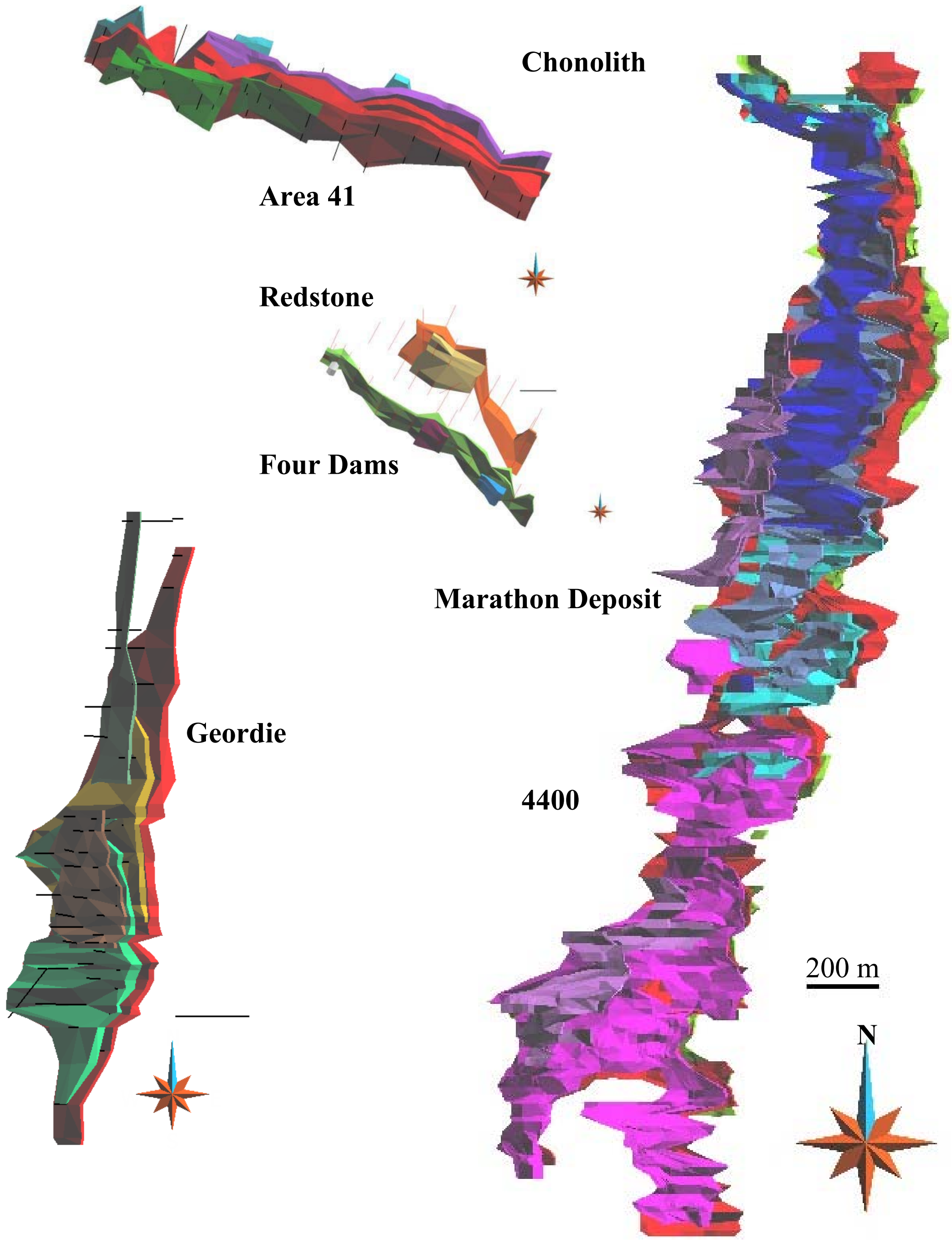
This section will describe Cu and PGM occurrences located in the vicinity of the Marathon Deposit; for instance, the Geordie and Sally Deposits, and other occurrences located along the outer margin of the Coldwell Complex.

Each of these occurrences displays at least some of the many characteristics described at the Marathon Deposit. Given that these prospects share a common origin, then similarities between them are expected. However, in detail, there is much dissimilarity in the respective petrography or metal compositions that imply, for instance, that a dominant intrusive or mineralization forming process at one location might have played a minimal role at another. These factors are assessed at every locale and used to determine deposit significance and relevant exploration criteria.

Mineralized domains have been defined by drilling and 3-D modeling at several, but not all, locations. These mineralized domains are displayed with the Marathon Deposit in Figure 7.13. The figures are reproduced to the same scale in order to illustrate their relative size, and each body is oriented in their true position with north pointing toward the top of the page.

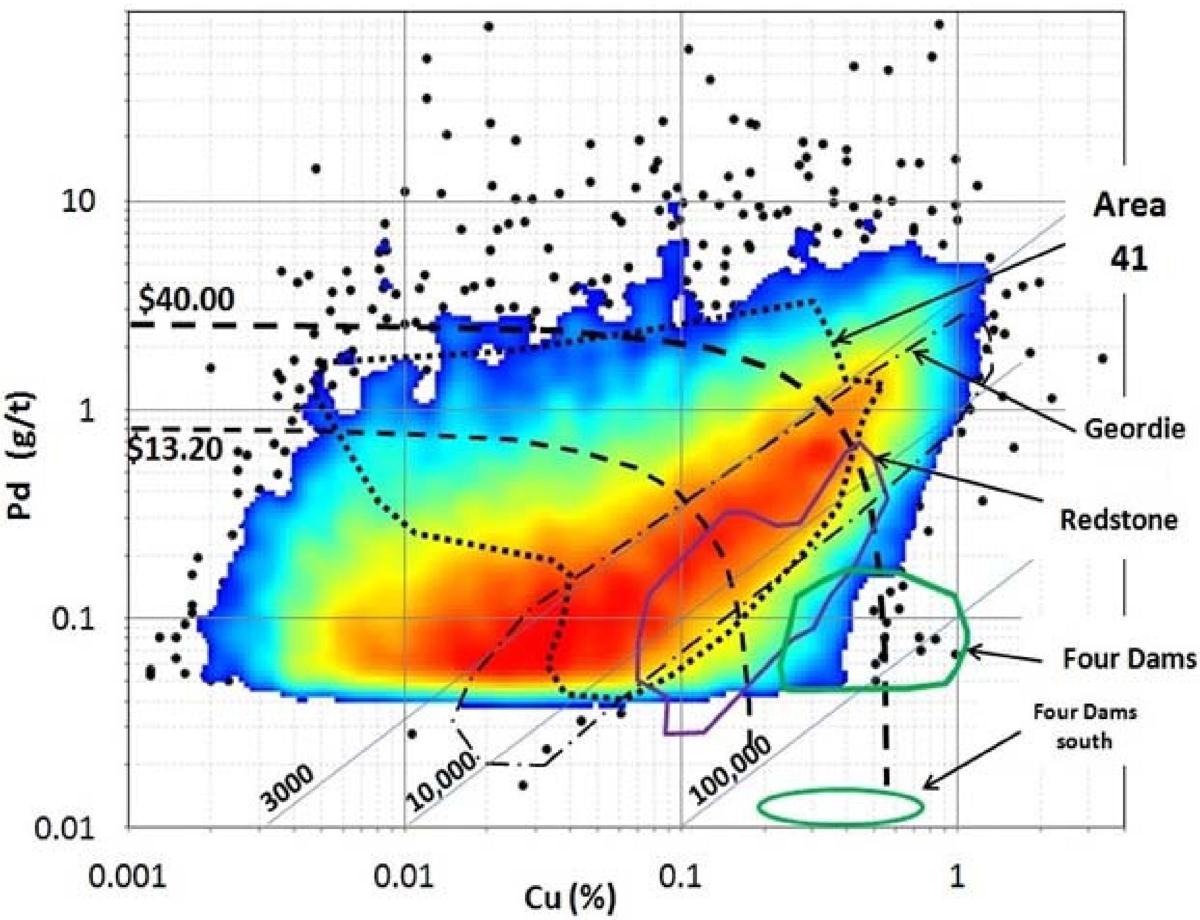
There are significant differences in the Cu and PGM abundances between the various Coldwell Deposits. These differences are best illustrated in the plot of Cu vs. Pd (Figure 7.14). For instance, the distribution of Cu and Pd at Area 41 closely matches the distribution observed at the Marathon Deposit. The abundance of Cu relative to Pd is much higher at Four Dams compared to other deposits. Samples such as those at Four Dams (north) have Cu/Pd of 20,000 to 200,000, but Cu/Pd at Four Dams South is greater than 200,000. The distribution of Cu and Pd at Geordie shows a strong positive correlation and the average Cu/Pd is slightly higher than the average Cu/Pd at the Marathon Deposit. Similarly, at Redstone, there is a strong positive correlation, but the average Cu/Pd is greater than at either Geordie or Marathon.

FIGURE 7.13 SCALED 3-D MODELS OF THE COLDWELL MINERALIZED DOMAINS COMPARED TO THE MARATHON DEPOSIT



Note: *The scaled 3-D models are oriented correctly with north pointing up as shown by individual north arrows. Trace of drill holes at each location except for the Marathon Deposit are indicated by faint grey lines.*
Source: *Micon (2010)*

FIGURE 7.14 COMPARISON OF CU VS. PD FOR COLDWELL COMPLEX DEPOSITS



Notes: *The coloured contours represent the point density map for Marathon Deposit assays (black dots). Fields for assays from other occurrences are represented by individual curves. Dashed curves labelled as $13.20 and $40.00 represent calculated NSR $/t values using the 2010 Mineral Resource Estimate metal prices and process recoveries. Diagonal blue lines represent constant Cu/Pd values, for example 3,000.*

Source: *Micon (2010)*

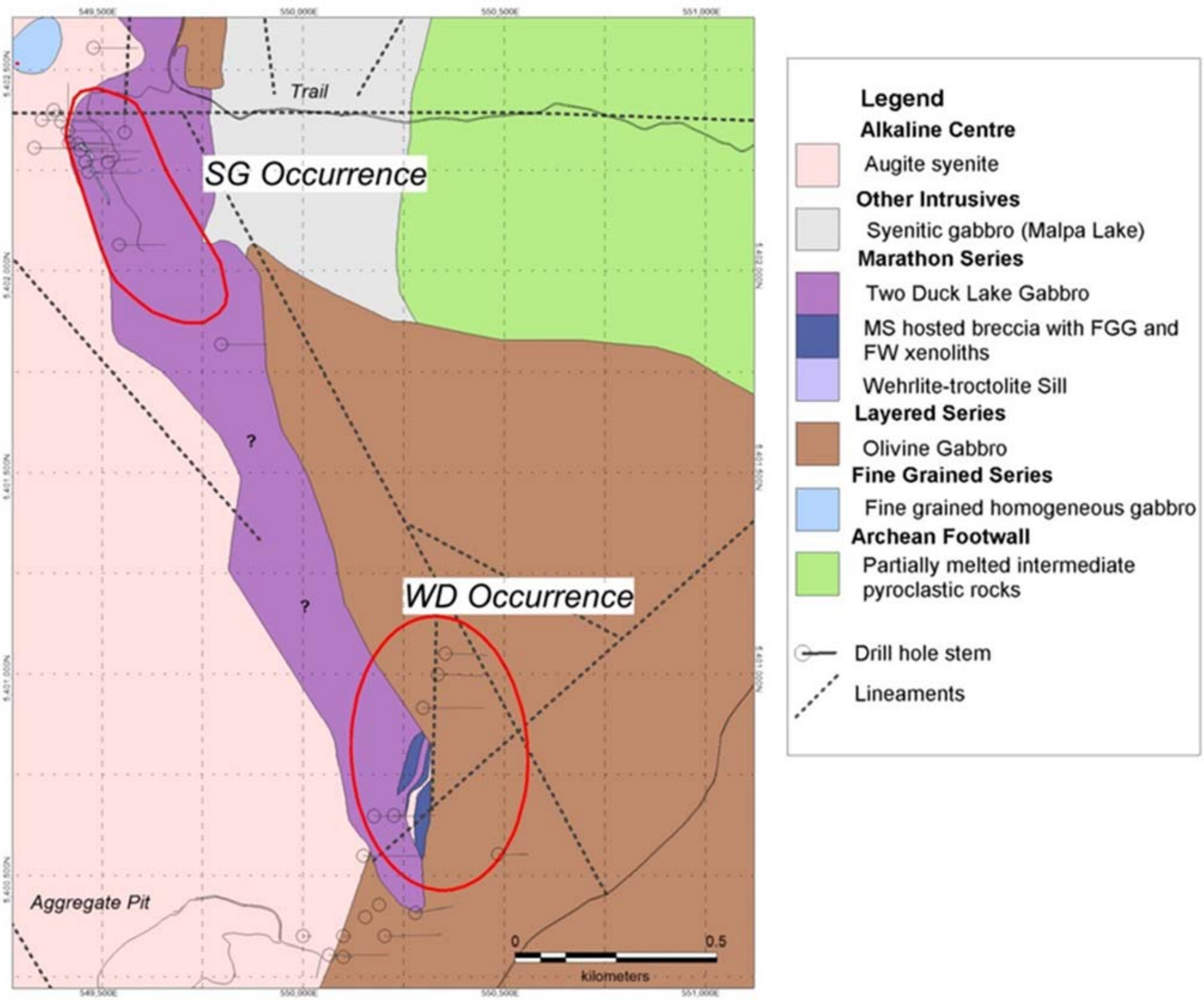
7.3.2 SG and WD Occurrences

The SG and WD occurrences are located south of the Marathon Deposit as shown in Figures 7.12 and 7.15. These zones are hosted by TDL Gabbro, but unlike at the Marathon Deposit where mineralization occurs directly above the footwall, mineralized TDL Gabbro at the SG and WD zones occur along the west margin of the Eastern Gabbro close to the contact with the overlying Augite Syenite. The depth to footwall and nature of the contact in this area are unknown.

The change in stratigraphy south of the Deposit is interpreted to be related to faulting at 5,402,350 N resulting in the footwall offset to the east by 2 km. A southeast trending fault connects the SG and WD zones; both zones also encompass additional converging faults (Figure

7.15). The area between these two zones lacks exploration due to thick overburden which makes prospecting, trenching and drilling difficult.

FIGURE 7.15 LITHOLOGY MAP SHOWING THE SG AND WD OCCURRENCES



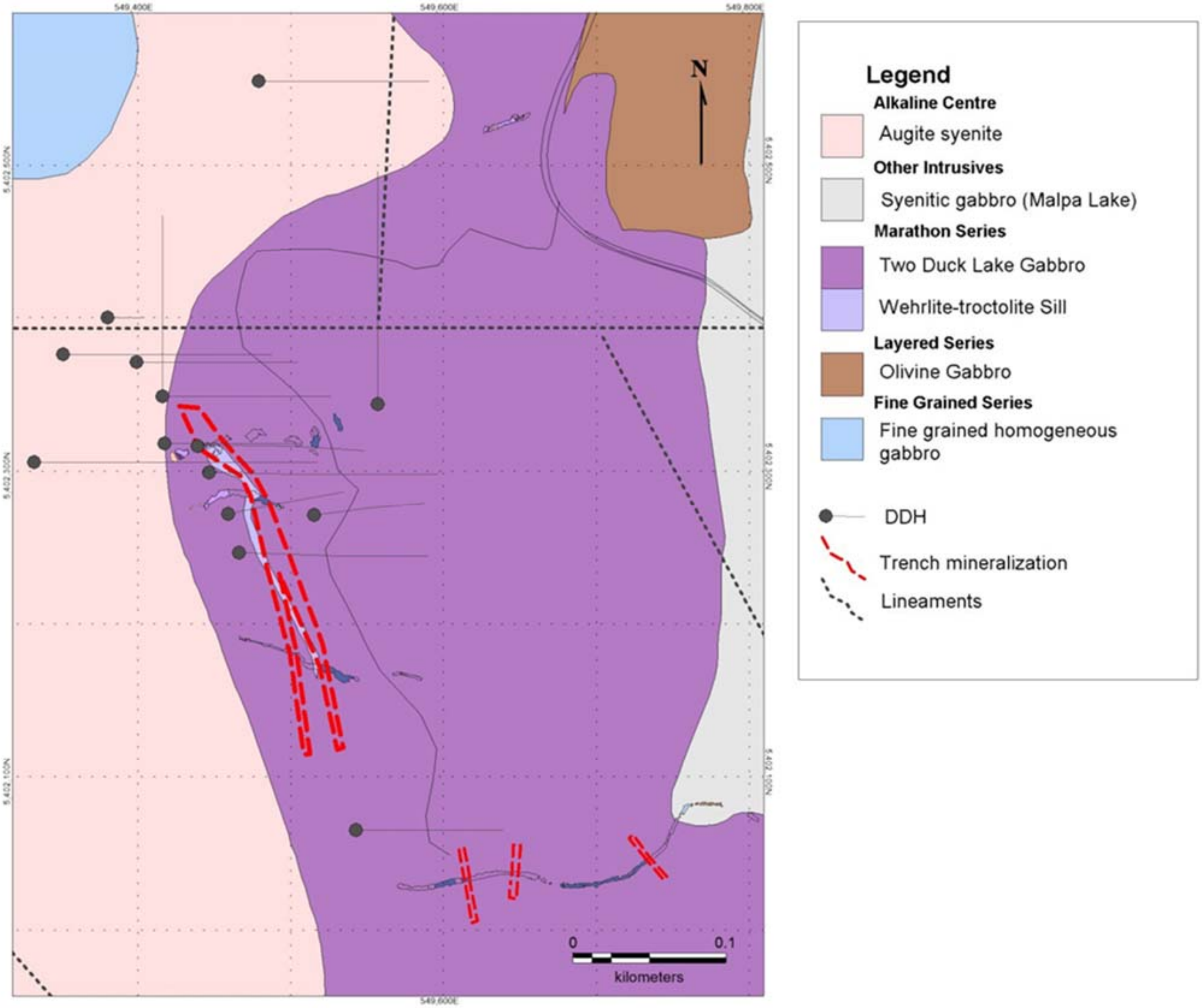
Source: *Stillwater Canada Inc. (2014)*

7.3.2.1 SG Zone

The SG Zone is characterized by near surface mineralization in TDL Gabbro (Figure 7.16), similar to that at the Deposit. Previous work includes 16 drill holes, 56 grab samples and 600 m of outcrop stripping. The mineralized zone has a strike of 160 to 170°, dips at 30-45° west and extends for 120 m along strike.

The SG Zone includes a thick sequence of TDL Gabbro. Mineralization typically occurs in zones where TDL Gabbro is intermixed with lenses of oxide ultramafic rocks. The best drill hole intersection to date is shallow with an average grade of 1.33 g/t PGM and 0.27% Cu over 18 m.

FIGURE 7.16 SG OCCURRENCE SHOWING LINEAMENTS, TRENCHES, DRILL HOLES AND SURFACE MINERALIZATION

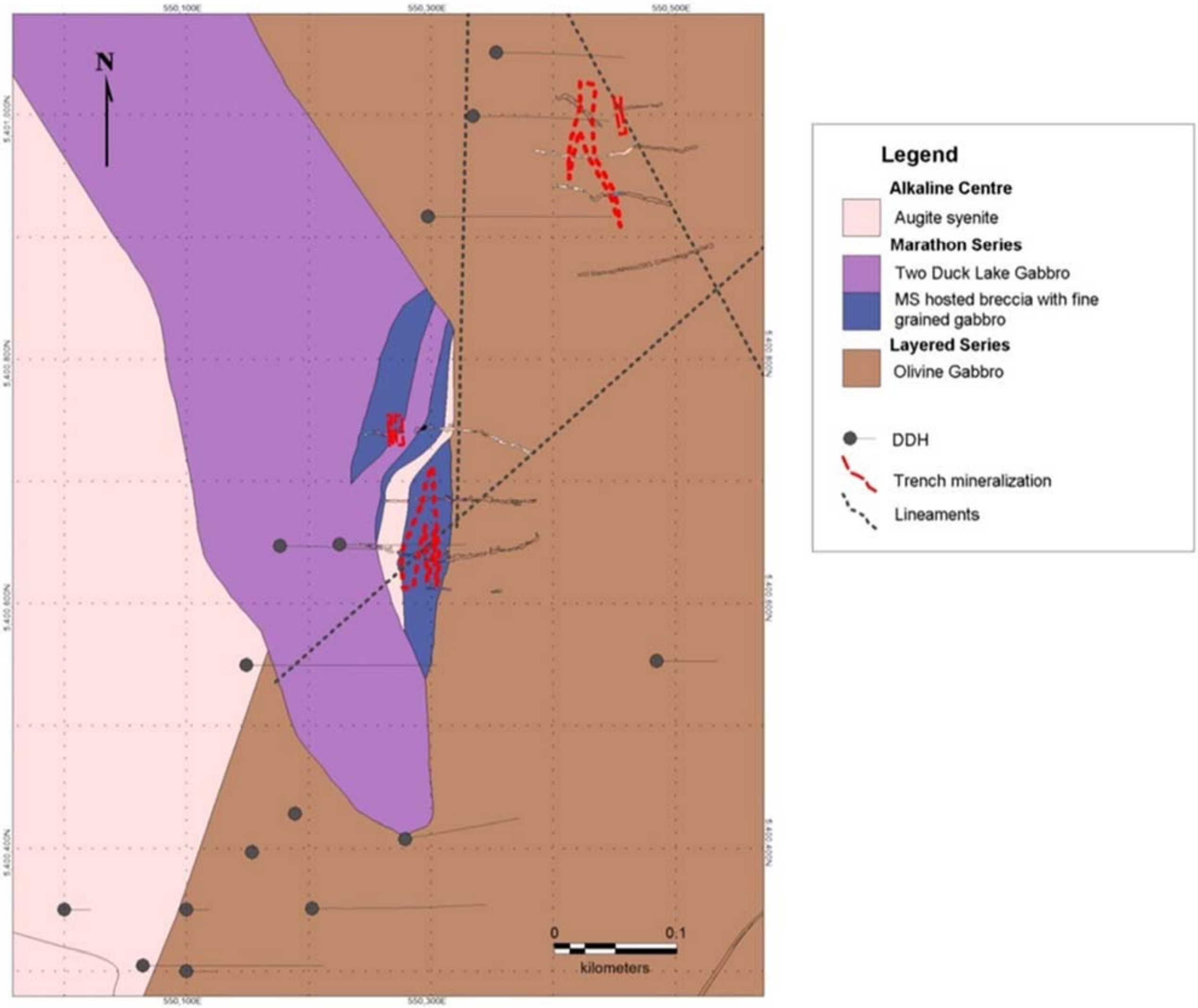


Source: *Stillwater Canada Inc. (2014)*

7.3.2.2 WD Zone

The WD Zone is located southeast of the SG Zone (Figure 7.17). Previous work includes 15 drill holes; 1,000 m of outcrop stripping and channel sampling; and 48 grab samples. Mineralization in this area occurs at two stratigraphic positions: TDL Gabbro and Layered Series Gabbro. These two mineralized zones are easily classified using Cu/Pd ratios. The Cu/Pd for mineralization in the Layered Series is much higher than for mineralization in the TDL Gabbro owing to the negligible Pd values and higher average copper content in the Layered Series rocks. Strike length for the mineralized zones is 100 m in the Layered series and 150 m in the TDL Gabbro. Both zones are open to the north. All mineralization strikes north-south. Marathon Series mineralization dips steeply west at 70°. Dip for Layered Series mineralization is shallow, at 45° west.

FIGURE 7.17 WD OCCURRENCE SHOWING LINEAMENTS, TRENCHES, DRILL HOLES AND SURFACE MINERALIZATION

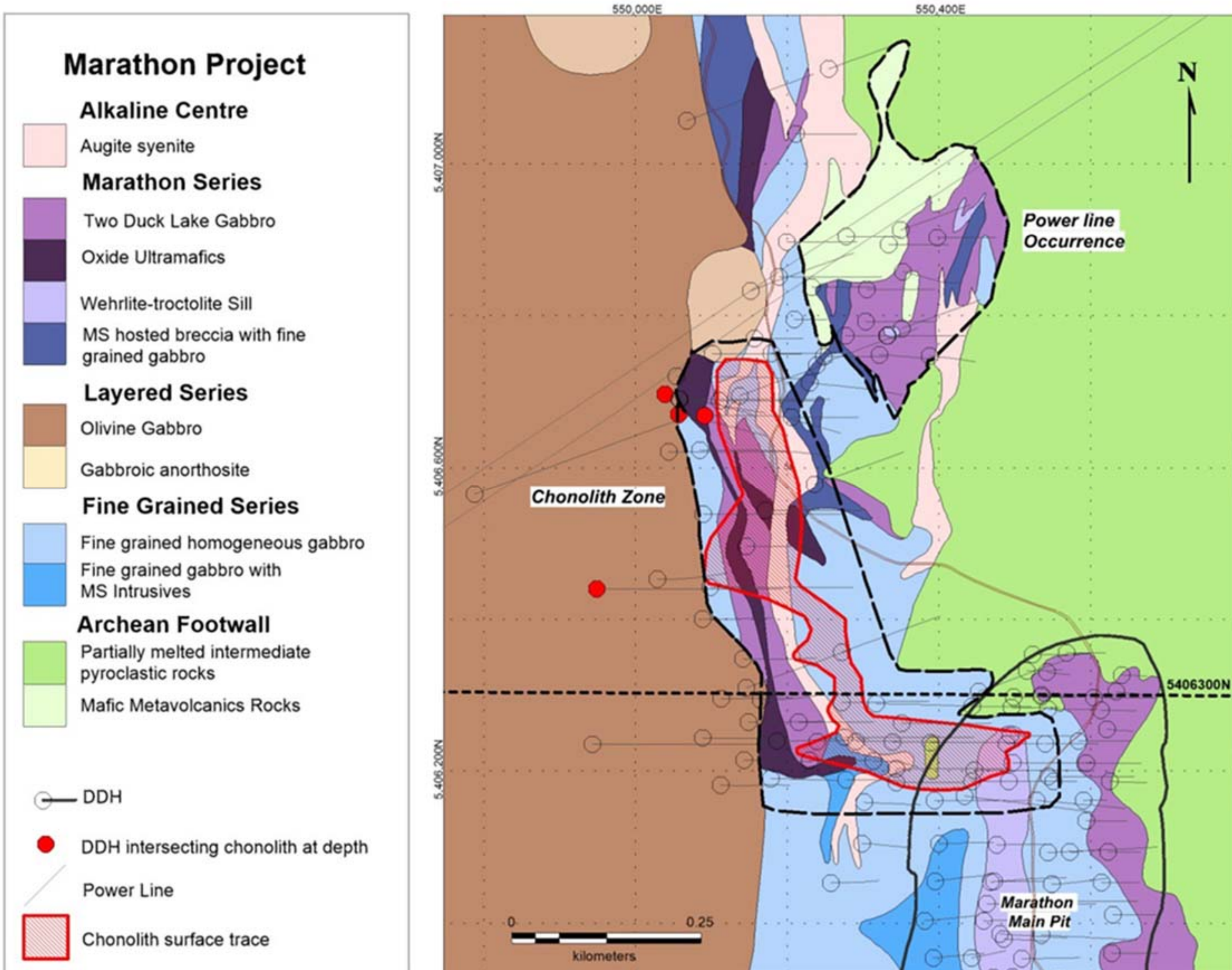


Source: *Stillwater Canada Inc. (2014)*

7.3.3 The Chonolith Zone

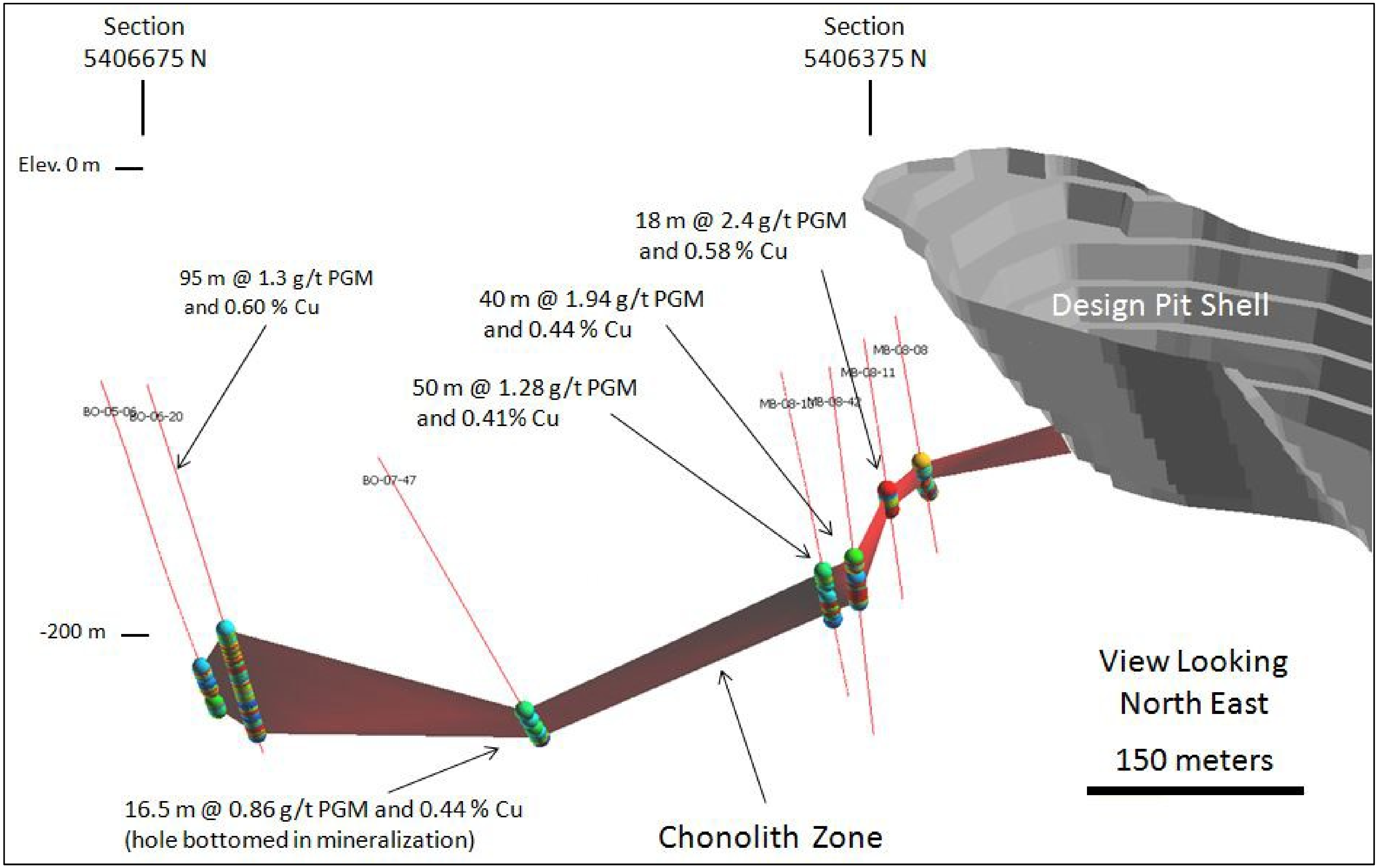
The Chonolith Zone is presumed to be continuous with the north end of the Main Zone, but this relationship will need to be confirmed by drilling. In general, the Main Zone follows the footwall contact north along the edge of the Main pit, but at 5,406,300 N changes direction and continues down dip to the west. The mineralization continues for 350 m west before turning north where it is interpreted to connect to a 200 m deep channel of mineralization referred to as the Chonolith (Figure 7.18). The Chonolith Zone is up to 120 m thick and begins in the north at a depth of 200 m. The north-south trending section of the Chonolith is 500 m long and cut by only four drill holes. The best intersection in the north south section is 1.3 g/t PGM and 0.6% Cu over 95 m (Figure 7.19). The section of the Chonolith that strikes west and connects with the Main Zone inside the open pit is intersected by a total of 10 drill holes. The best intersection in this area is 1.28 g/t PGM and 0.41% Cu over 50 m.

FIGURE 7.18 NORTH END OF THE MARATHON DEPOSIT SHOWING THE CHONOLITH AND POWER LINE ZONES



Source: *Stillwater Canada Inc. (2014)*

FIGURE 7.19 3-D VIEW OF DRILL HOLE INTERSECTS FOR THE CHONOLITH AND THE MARATHON PIT SHELL (LOOKING EAST)

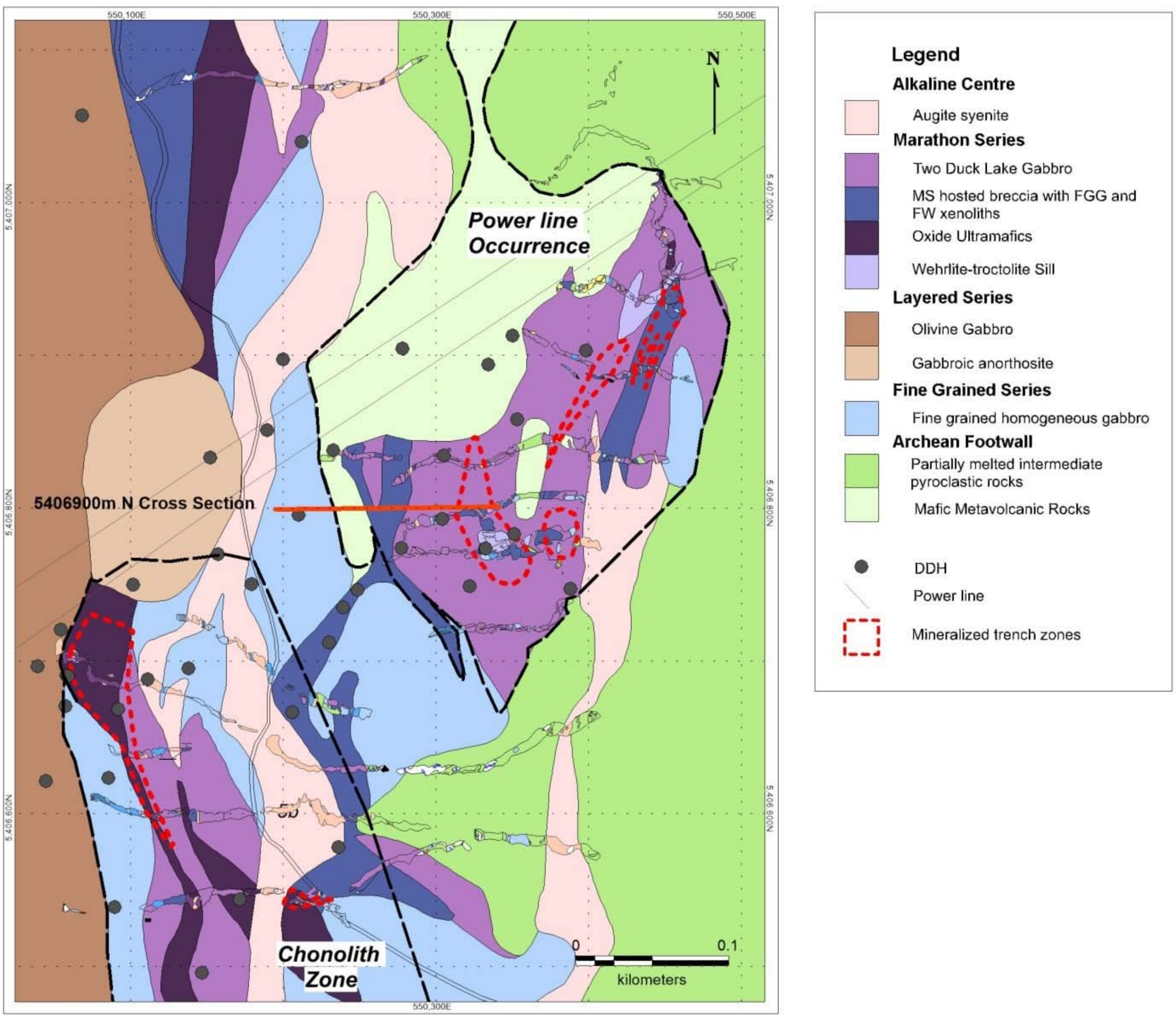


Source: *Stillwater Canada Inc. (2014)*

7.3.4 The Power Line Occurrence

The Power Line Occurrence, located northeast of the Chonolith Zone, consists of a flat lying bowl shaped body of TDL Gabbro that sits in a trough in the footwall (Figure 7.20). The Chonolith Zone and Power Line Occurrence are separated by a shift in the footwall to the east, and a syenite dyke. The Power Line Zone consists of multiple lenses including intervals such as 0.44 g/t PGM and 0.2% Cu over 18 m.

FIGURE 7.20 POWER LINE OCCURRENCE SHOWING TRENCHES AND MINERALIZED SURFACE ZONES



Note: *Mineralized zones defined on the trenches with a cut-off of $12 NSR/t value.*
Source: *Stillwater Canada Inc. (2014)*

7.3.5 Geordie Deposit

The Marathon Deposit is one of two contact-type Cu-PGM deposits in the Coldwell Complex that have been described in the literature (Good and Crocket, 1994). The second is the Geordie Deposit which Marathon acquired in 2008. P&E completed an updated Mineral Resource Estimate for the Geordie Deposit in 2019, which is described in Section 14 of this Technical Report.

The Geordie Deposit is located near the centre of the Coldwell Complex (Figure 7.12). Mineralization occurs along the base of the Geordie Intrusion, a large layered gabbro with a basal zone of heterogeneous augite troctolite and gabbro. A simplified geology map of the Geordie Deposit is shown in Figure 7.21 and a cross-section through the middle of the deposit is shown in Figure 7.22.

Exploration on the Geordie Deposit includes 61 diamond drill holes totalling 9,645 m, trenching, mapping, magnetic and radiometric airborne survey and soil sampling.

A NI 43-101 Mineral Resource Estimate on the Geordie Deposit was published by Marathon in June 2010. The 2010 Mineral Resource Estimate contained 32.4 million tonnes ("Mt") of Measured and Indicated Mineral Resource at average grades of 0.37% Cu, 0.61 g/t Pd, 0.04 g/t Pt, 0.05 g/t Au, and 2.93 g/t Ag. The Mineral Resource also contained 8.0 Mt of Inferred Mineral Resource at average grades of 0.36% Cu, 0.59 g/t Pd, 0.03 g/t Pt, 0.04 g/t Au, and 2.87 g/t Ag.

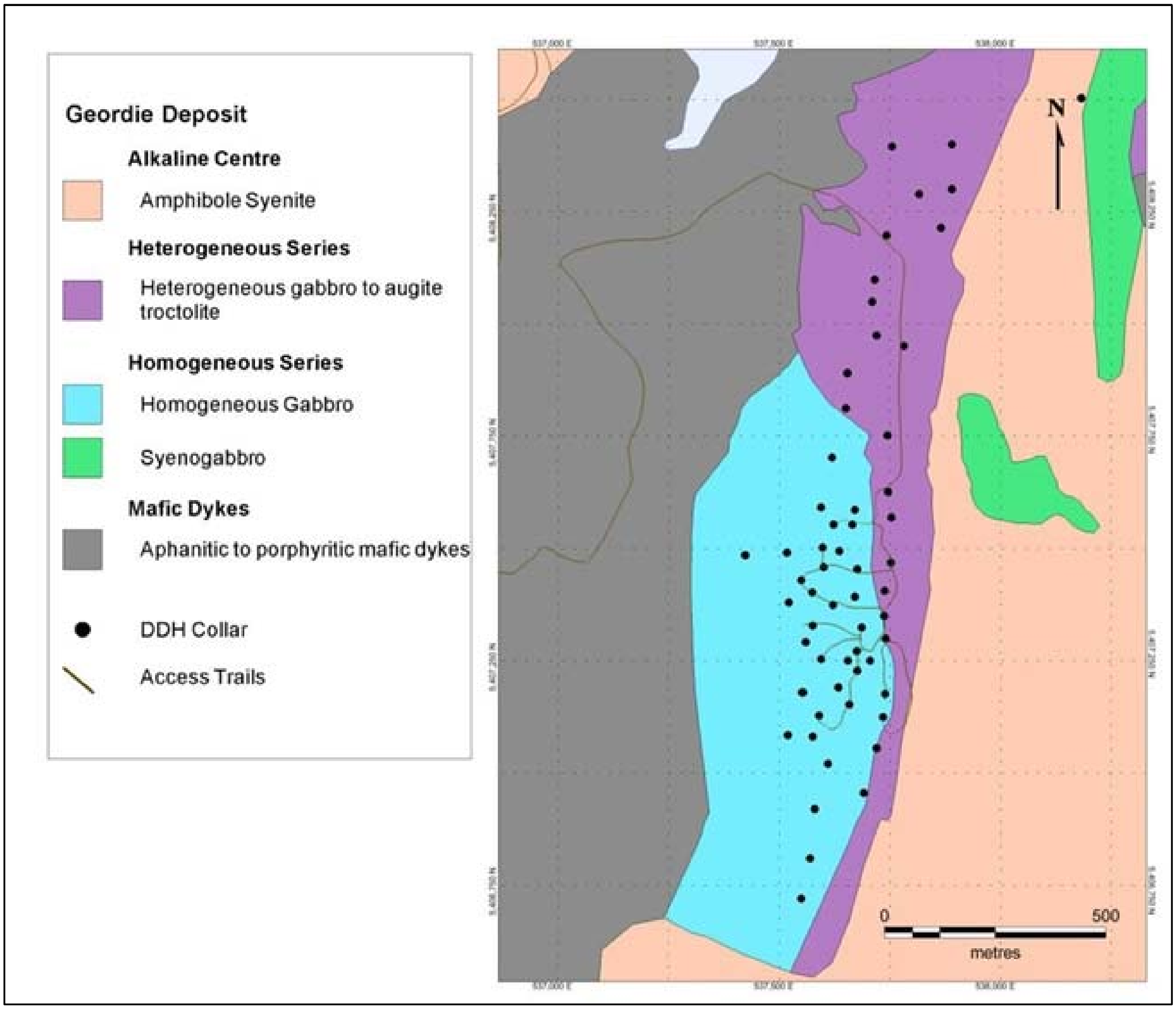
The sulphides consist predominantly of chalcopyrite and bornite, and minor pyrite, millerite, cobaltite, siegenite, sphalerite and galena. Sulphides are disseminated with angular to blebby grain shapes. Thin veins of chalcopyrite occur near the base of the intrusion and also in the underlying syenite.

The mineralization occurs within a thick continuous basal zone that dips 45 to 60° and traced over a strike length of 1.7 km. Minor thin discontinuous zones occur higher up in the stratigraphy.

Drilling has outlined a series of sub-parallel mineralized zones within the gabbroic/troctolite body. Mineralization is mainly chalcopyrite with lesser amounts of bornite, pyrite, magnetite, and supergene chalcocite. Associated with concentrations and disseminated grains of chalcopyrite are a wide variety of platinum-group minerals and precious-metal tellurides, bismuthinites and alloys. In 2001, a series of metallurgical tests indicated average concentrate recoveries of 87% for Cu and 76% for Pd in mineralized zones.

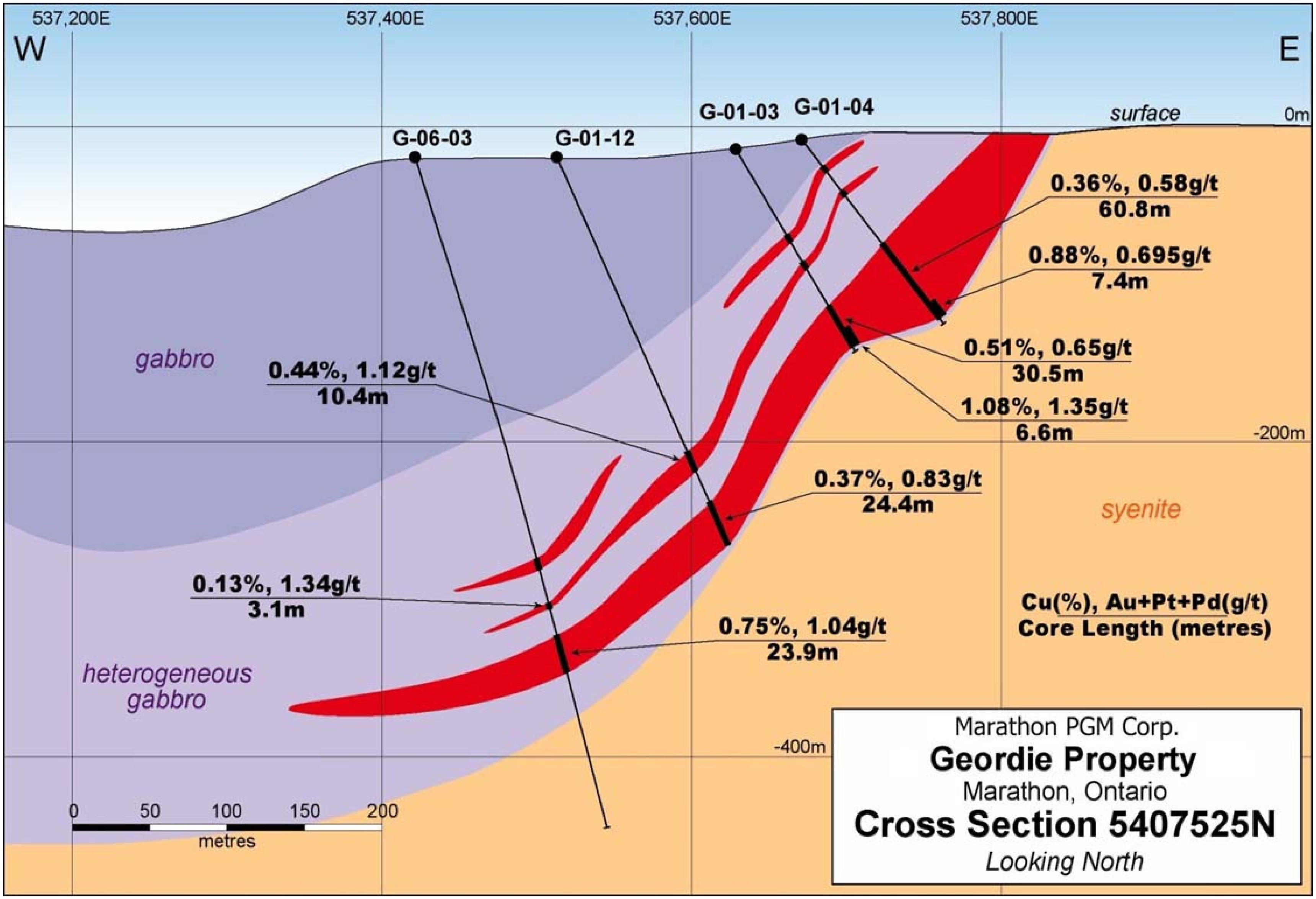
The abundance of Pt is very low, but for samples with greater than 45 ppb Pt or Pd (three times the detection limit of Pd) the average Pd/Pt is 11. There is a strong positive correlation between Cu and Pd and the average Cu/Pd is 6,500.

FIGURE 7.21 GEOLOGIC MAP OF THE GEORDIE DEPOSIT



Source: *Stillwater Canada Inc. (2014)*

FIGURE 7.22 VERTICAL CROSS SECTION AT THE GEORDIE DEPOSIT (LOOKING NORTH)



Source: *Stillwater Canada Inc. (2014)*

7.3.6 Four Dams Prospect

The Four Dams Prospect is located 4 km northwest of the Marathon Deposit on the northern rim of the Coldwell Complex (Figure 7.12). Four Dams is subdivided into three mineralized zones, as follows: Four Dams North, Four Dams South and Lacobeer Lake (Figure 7.23).

The Four Dams North mineralization occurs in a 100 m thick lens of Marathon Series ultramafic rocks that strikes northwesterly for 350 m and dips 60° to the southwest. The intrusion has a thin marginal zone of melagabbro and a core of apatitic clinopyroxenite to apatitic wehrlite.

Sulphides in the Four Dams North Zone include disseminated to blebby chalcopyrite with lesser pyrrhotite and trace bornite. The mineralization includes intervals such as 0.16 g/t PGM and 0.39% Cu over 74 m, and 0.23 g/t PGM and 0.40% Cu over 85 m. Higher PGM grades occur in the central apatitic wehrlite zone.

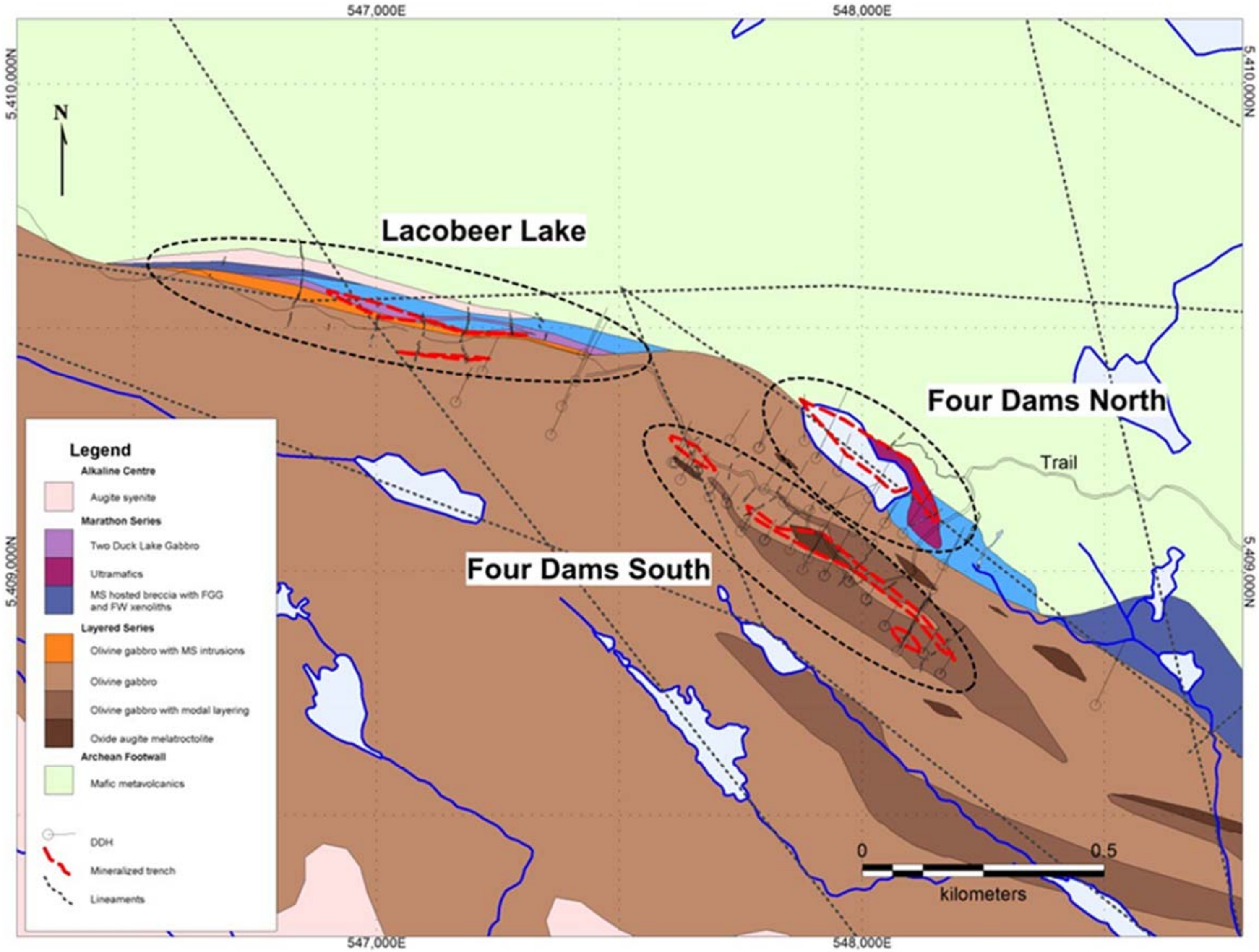
The Four Dams South mineralization is hosted by the Layered Series rocks, located approximately 150 m south of the Four Dams North mineralization. The mineralization occurs in homogeneous or modally layered olivine gabbro inter layered with magnetite rich lenses.

The Four Dams South Zone is continuous for 700 m along strike, dips 40° to the southwest and pinches and swells from thicknesses of up to 50 m and down to 4 m. The zone was defined by 32 short diamond drill holes in 2013. Best intersections include 0.33% Cu over 48 m, but the zone contains only trace Pd.

The sulphide minerals consist of fine-to-medium grained disseminated pyrrhotite and chalcopyrite and are associated with actinolite and albite alteration. The Four Dams South mineralization is believed to be a result of hydrothermal remobilization.

The Lacobeer Zone is poorly defined owing to thick overburden. Work to date includes five trenches but only one of them intersected mineralization. The zone is inferred to be a maximum of 25 m thick on surface with complicated textural relationships within Marathon Series gabbros. Best grab samples from prospecting include 2.6 g/t PGM and 0.53% Cu.

FIGURE 7.23 THREE MINERALIZATION ZONES AT FOUR DAMS



Note: *Mineralized surface zones were determined using projected drill hole data (Four Dams North) and surface sampling.*
Source: *Micon (2010)*

7.3.7 Sally Area 41 Occurrence

The Sally area includes the Area 41 Occurrence and is located at the northern margin of the Eastern Gabbro (Figure 7.12). The Sally Deposit strikes east-southeast, dips at 45-50° south and extends for over 1.2 km along strike. The Sally Deposit is open to the east and west. P&E completed an initial Mineral Resource Estimate of the Sally Deposit in 2019, which is presented in Section 14 of this Technical Report.

A total of 56 holes have been drilled in the Sally Deposit area, of which 45 are drilled into Area 41 (Figure 7.24). The drilling at Area 41 is considered to be sufficient to define the thickness and continuity of the mineralized envelope, but closer spaced drilling is required to define and characterize zones of higher-grade material.

Drilling has thus far intersected four main mineralized horizons at Area 41, referred to in descending order from top to bottom, as Zones 1 to 4 (Figure 7.25).

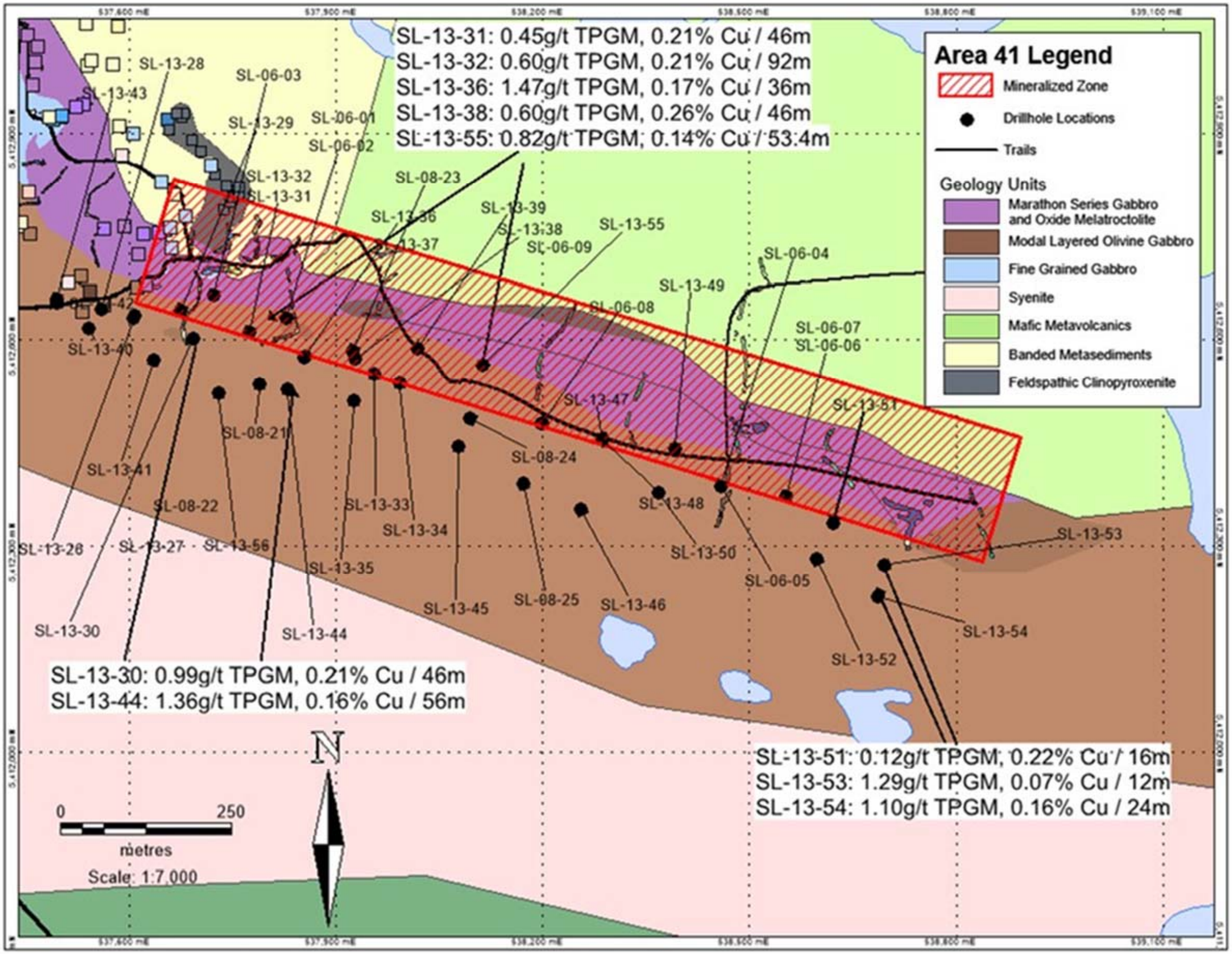
Zone 1: The uppermost mineralized zone in Figure 7.25, contains Cu and trace amounts of Pd, and is commonly less than 10 m thick. Zone 1 is hosted by TDL Gabbro that is intermixed with Marathon Series oxide melatroctolite.

Zone 2: The second mineralized zone is hosted by TDL Gabbro that generally includes xenoliths of the Fine Grained Gabbro Series. This second mineralized zone is typically 40 to 50 m thick and contains some of the highest Pd grades in the deposit, particularly at the contact between the Marathon Series (Breccia unit A) and the feldspathic clinopyroxenite unit of the Fine Grained Series (Figure 7.25).

Zone 3: Zone 3 occurs below the feldspathic clinopyroxenite unit and is referred to as the Main Zone because it is normally over 40 m thick and is the most continuous over the strike length of the deposit, except at the far west end where mineralization is cut by multiple faults. The mineralization is hosted by TDL Gabbro.

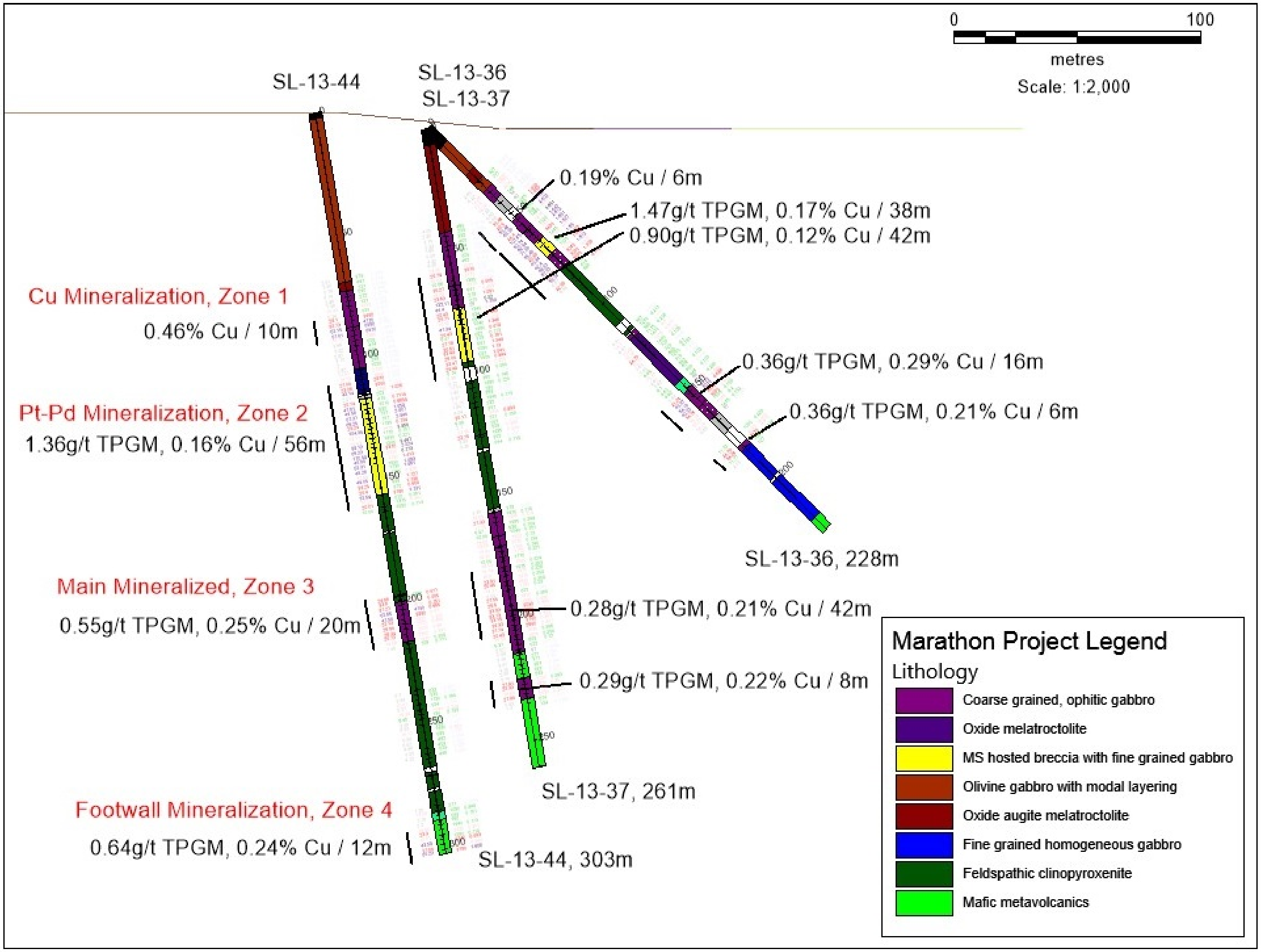
Zone 4: Zone 4 occurs below the main mineralized zone, where Fine Grained Series and/or Archean footwall are crosscut by Marathon Series intrusions. Mineralization contains Cu and Pd values that are similar to the Main Zone, but has increased pyrrhotite content, and thus is considered to be lower tenor.

FIGURE 7.24 GEOLOGY MAP OF SALLY AREA 41 OCCURRENCE WITH DRILL HOLE COLLARS AND BEST INTERSECTIONS



Source: *Stillwater Canada Inc. (2014)*

FIGURE 7.25 VERTICAL CROSS SECTION OF SALLY AREA 41 OCCURRENCE SHOWING STRATIGRAPHY OF GEOLOGICAL UNITS AND MINERALIZATION



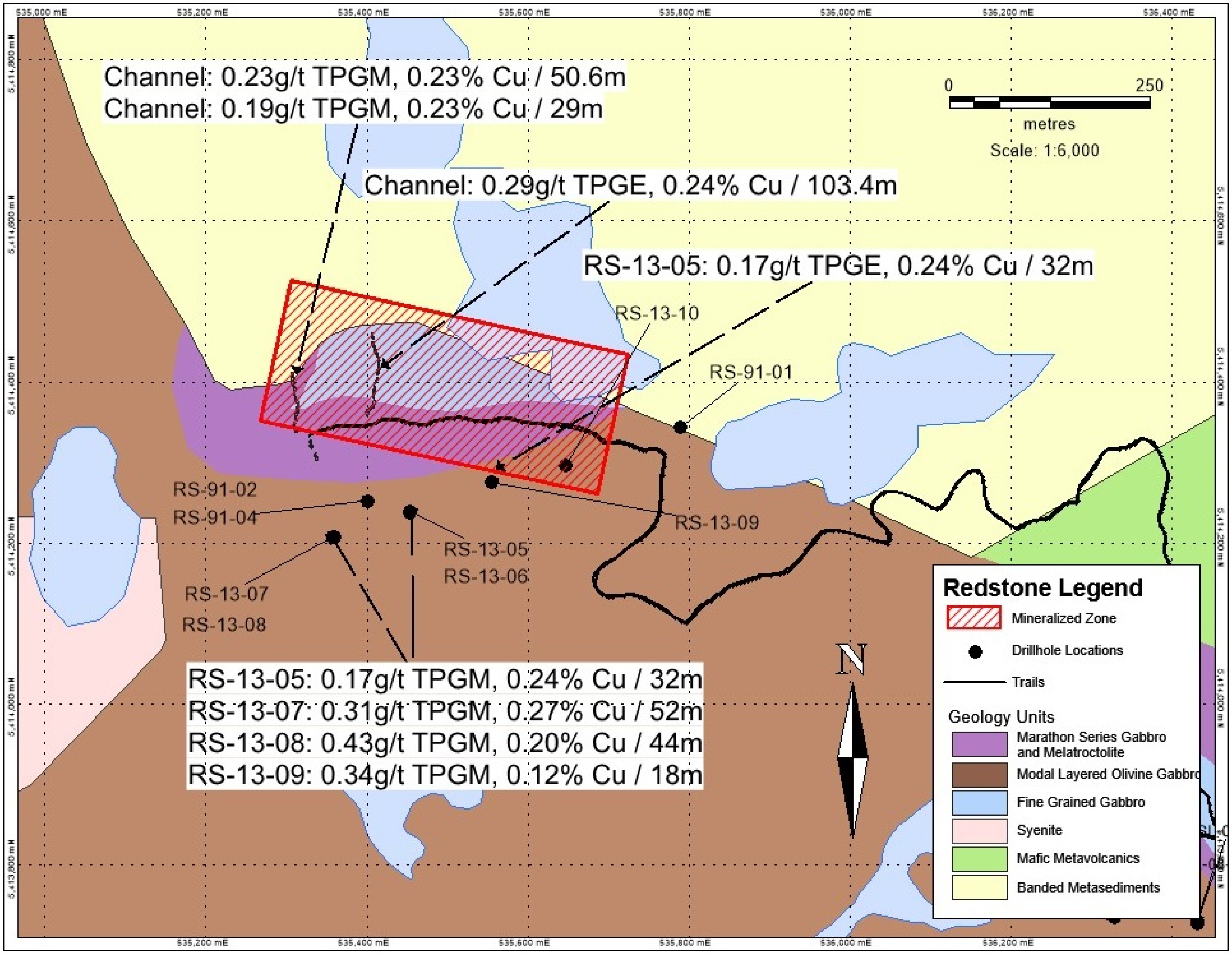
Source: *Stillwater Canada Inc. (2014)*

7.3.8 Redstone Prospect

The Redstone Prospect is situated along the outer margin of the Eastern Gabbro in the northwest corner of the Coldwell Complex (Figure 7.12). The mineralized zone strikes near east-west, dips between 30 and 45° south and is continuous along strike for 450 m (Figure 7.26). The zone extends down dip for at least 200 m and is open to the west.

The mineralization consists of disseminated chalcopyrite, pyrrhotite and trace bornite and is hosted in a complicated assemblage of Marathon Series rocks. The upper portion of the sequence is dominated by oxide melatroctolite with minor TDL Gabbro, and the lower zone is composed predominantly of Marathon Series breccia units. The lower breccia units are composed of TDL Gabbro intermixed with oxide melatroctolite and numerous xenoliths of the Fine Grained Series and/or metavolcanic footwall.

FIGURE 7.26 GEOLOGY OF THE REDSTONE OCCURRENCE WITH 2013 DRILL HOLE AND SURFACE CHANNEL ASSAYS



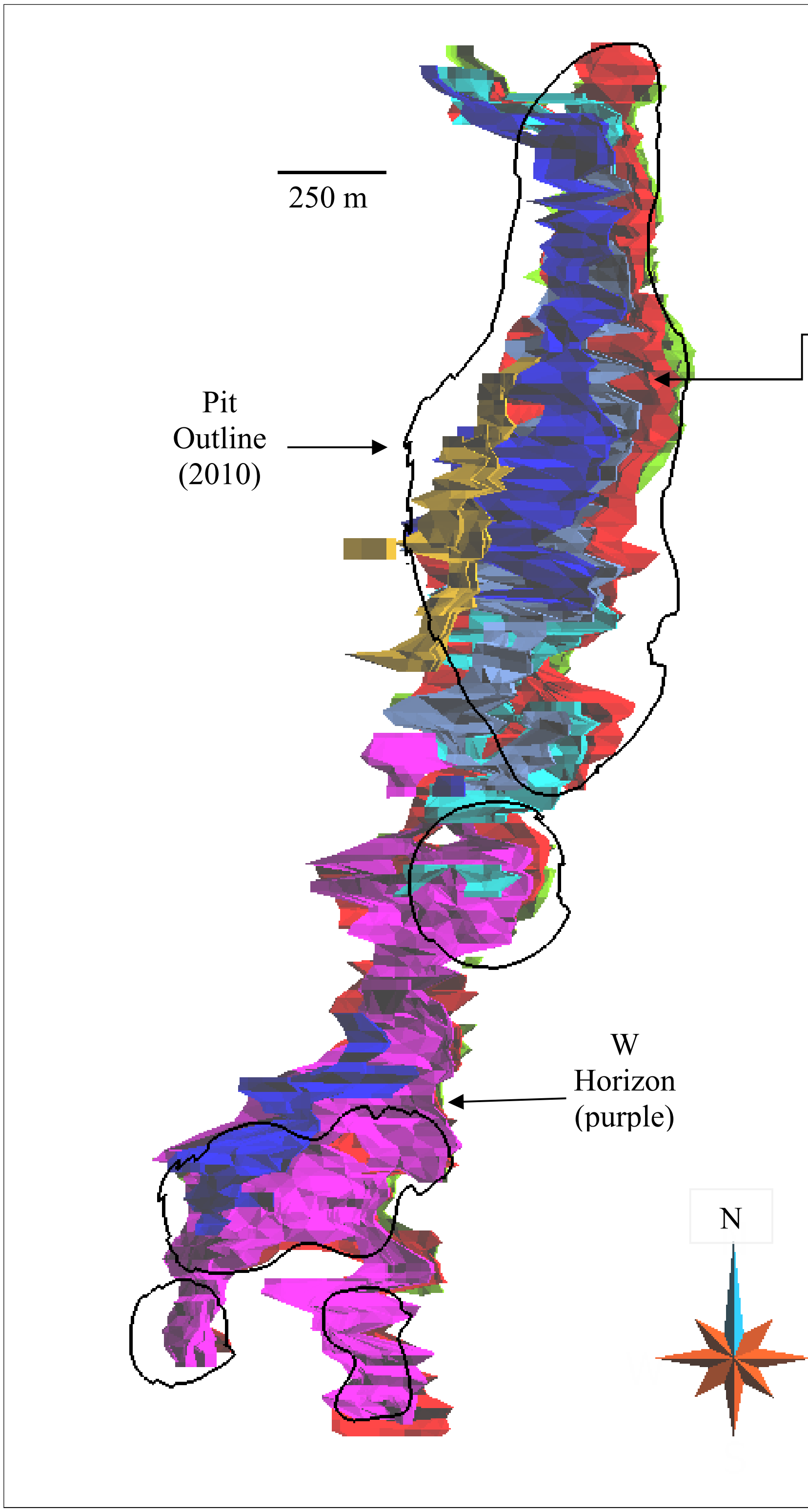
Source: *Stillwater Canada Inc. (2014)*

7.3.9 The W Horizon

The W Horizon forms a nearly continuous sheet of mineralization that strikes north-south for 1.4 km from section 5,403,125 N to section 5,404,525 N and continues down dip for over 650 m. The zone is open at depth. It ranges in thickness from 2 m (minimum sample width) to 30 m and occurs near the top of the mineralized zones (Figure 7.27). The zone is difficult to identify in drill core because it commonly contains only trace sulphides, but if sulphides are present, they consist of chalcopyrite and bornite. Continuity of the W Horizon between drill holes is shown by minimum PGM abundances of 1 g/t and by Cu/(Pt+Pd) ratios less than approximately 3,500.

Several very high-grade lenses ranging from 30 to 200 m in length occur within the W Horizon. The highest intersection to date contains 107 g/t PGM+Au, 1.04 g/t Rh and 0.02% Cu over 2 m (hole M07-239), but the best intersection contains 45.2 g/t PGM+Au and 0.49% Cu over 10 m (hole M07-306).

FIGURE 7.27 PLAN VIEW OF THE SURFACE MODELS (2012) OUTLINING THE MINERAL RESOURCE FOR THE MARATHON DEPOSIT AND LOCATION OF THE W HORIZON



Note: *The W Horizon is shown in purple.*
Source: *Marathon PGM Corp. (2010)*

7.4 SULPHIDE MINERALIZATION

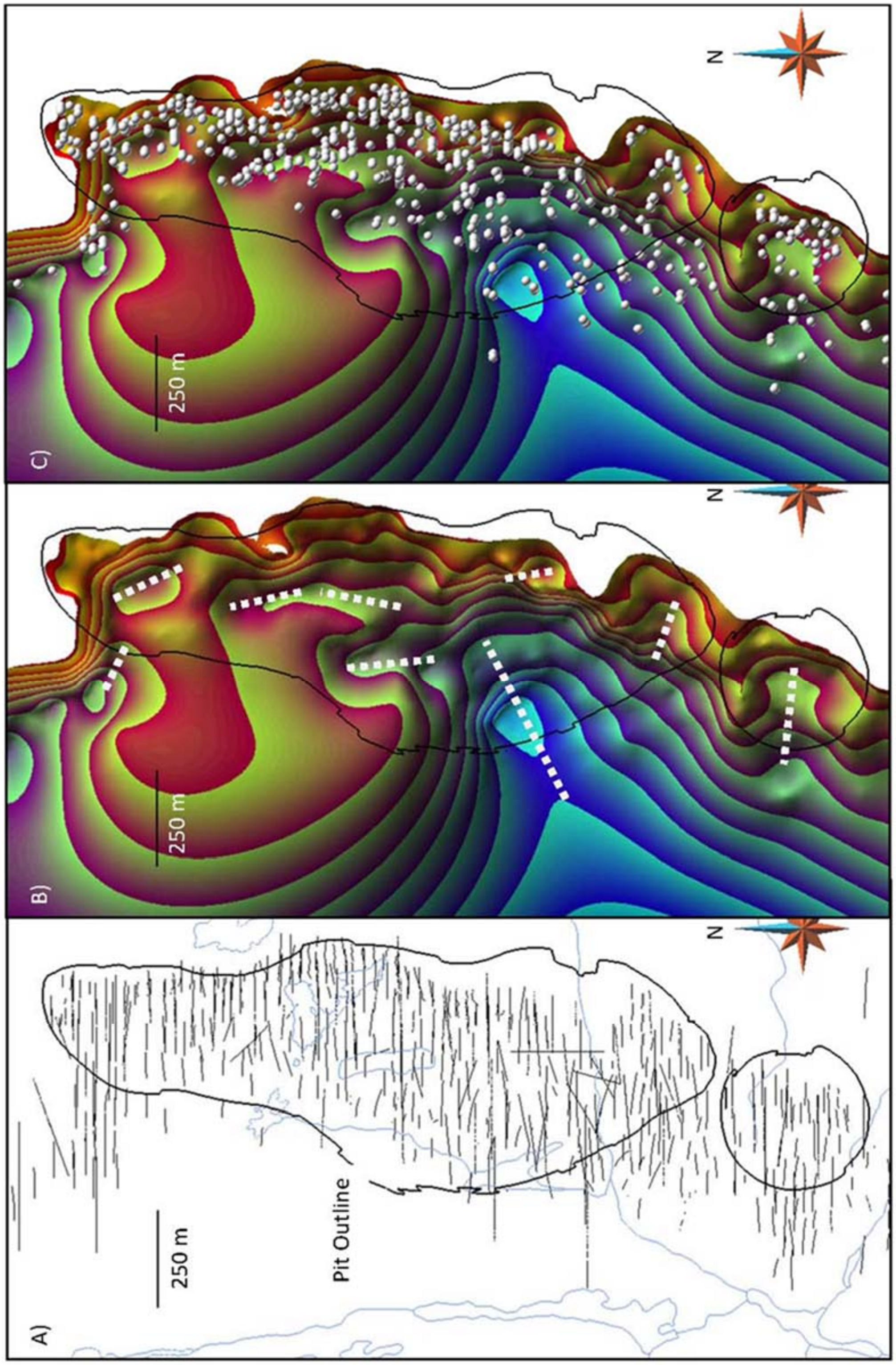
Sulphides in the TDL Gabbro consist predominantly of chalcopyrite, pyrrhotite and minor amounts of bornite, pentlandite, cobaltite, and pyrite. They occur in between primary silicates and to a lesser extent in association with secondary calcite and hydrous silicates such as chlorite and serpentine (Watkinson and Ohnenstetter, 1992). Chalcopyrite occurs as separate grains or as replacement rims on pyrrhotite grains. Some chalcopyrite is intergrown with highly calcic plagioclase (An70 to An80) in replacement zones at the margins of plagioclase crystals (Good and Crocket, 1994).

The modal mineralogy of a composite sample that is representative of the Deposit mineralization (and TDL Gabbro) was determined in a QEMSCAN survey by XPS (Kormos, 2008). A total of nine aliquots of material were analyzed. In decreasing order of abundance, the sulphide component of the composite sample consists of 2.75% pyrrhotite, 0.79% Cu-Fe sulphides (chalcopyrite and bornite), 0.09% pentlandite and trace amounts of pyrite, galena and sphalerite.

The relative proportions of pyrrhotite and chalcopyrite vary significantly across the Deposit, but in general, the sulphide assemblage changes gradually up section from the base to the top of mineralized zones. Sulphides at the base of the TDL Gabbro consist predominantly of pyrrhotite and minor chalcopyrite but the relative proportion of chalcopyrite increases up section to nearly 100% chalcopyrite near the top. In the W Horizon, sulphides consist mainly of chalcopyrite and bornite and minor to trace amounts of pentlandite, cobaltite, pyrite and pyrrhotite.

There is a relationship between mineralization and the paleo topography of the footwall contact as demonstrated in Figure 7.28. For example, mineralization is best developed within basins or troughs (Figure 7.28 b and c) of the footwall and thins or pinches out above prominent footwall ridges. It is important to note that although the mineralized zones are almost continuous from the north to south extents of the Deposit, assays with the best grades (combined Pd+Cu recalculated and presented as net smelter return) in Figure 7.29, fall along trends that mimic the alignment of troughs or ridges.

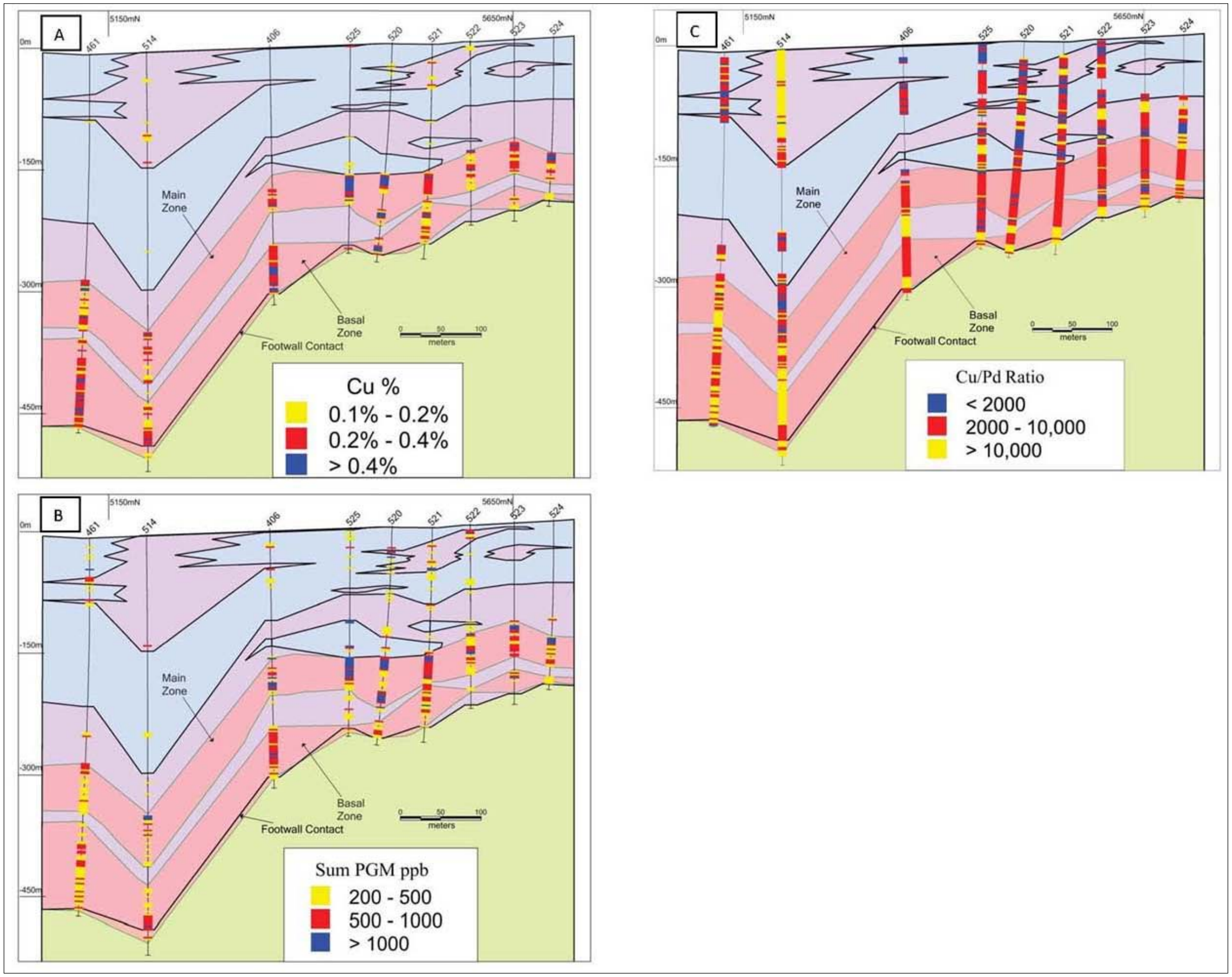
FIGURE 7.28 PLAN VIEWS OF THE PROPOSED PIT OUTLINE (2010) BENEATH THE MARATHON MAIN ZONE



Note: *Figure A) includes all diamond drill holes and outlines for small lakes and streams. Figure B) includes the contoured 3-D surface model for the footwall contact. The white dashed lines highlight the trough axes in the footwall. Figure C) includes white spheres that represent drill hole assays that are filtered to show only those with NSR values greater than $75/t.*

Source: *Marathon PGM Corp. (2010)*

FIGURE 7.29 MARATHON DEPOSIT NORTH-SOUTH VERTICAL CROSS SECTION ALONG THE WESTERN EDGE OF THE MAIN OPEN PIT (LOOKING WEST)



Note: *Figures show the Main and Footwall zones hosted within TDL Gabbro. Detailed geology along the drill stems for this section is located in Figure 7.5. Numbers along the top of drill stems are drill hole numbers (example, M11-514). Numbers at top of figure are deposit section indicator (example 5150 m N corresponds to 5405150 m N, NAD 27 Zone 16N). Figures A, B and C contain assay values along the drill stem for Cu, Pd and Cu/Pd, respectively.*

Source: *Marathon PGM Corp. (2010)*

7.4.1 Platinum Group Minerals

The following summary was prepared from the detailed petrographic and SEM studies conducted at Lakehead University by Liferovich (2006, 2007). Two sample groups from the Main Zone and W Horizon are described and compared. A total of 2,304 grains from 55 thin sections were analysed and 39 different platinum group minerals and gold, silver alloys were identified.

The grain size distribution for platinum group minerals in the Main Zone is similar to that in the W Horizon (Table 7.2). In general, approximately 60% of PGM grains are less than 5 micrometres (microns) in size. 40% of the PGM are greater than 5 microns.

The type and proportion of host minerals for the platinum group minerals are presented in Table 7.3. The dominant host minerals for the PGM in both areas are sulphides and other platinum group minerals. Similar proportions occur within the boundaries of plagioclase crystals, but note that the 25% proportion is by count and not by volume (mass) and it is expected that the volume percent of grains in plagioclase margins is less than 25% because included grains are smaller. The relatively high proportion (38%) of PGM in hydrous silicates (chlorite and serpentine) in the Main Zone contrasts with the much lower proportion in the W Horizon (4.3%).

The suite of platinum group minerals in the Main Zone is very different from that of the W Horizon (Table 7.4). Indeed, of the 12 dominant platinum group minerals that comprise 85% of the PGM reported in the W Horizon, none were found in the Main Zone. Conversely, of the 10 dominant minerals found in the Main Zone (91% of all PGM found), only 2.6% occurred in the W Horizon. This remarkable difference in the ranges of PGM for the two zones implies different conditions of PGM mineral crystallization.

TABLE 7.2
SIZE DISTRIBUTION FOR PGM MINERALS IN THE MAIN ZONE COMPARED WITH THE W HORIZON

Zone	No. of Grains	< 5 Microns (%)	5-10 Microns (%)	10-20 Microns (%)	>20 Microns (%)
Main	573	64.9	16.9	12.5	5.7
W Horizon	1731	58.3	27.1	9.6	5.0

Source: *Ruthart (2013)*

TABLE 7.3 PROPORTION OF PGM MINERALS SPATIALLY ASSOCIATED WITH SILICATES, SULPHIDES OR OTHER PGMS					
Zone	**No. of Grains**	**Plagioclase Boundaries (%)**	**Sulphides (%)**	**Other PGMs (%)**	**Hydrous Silicates (%)**
Main	573	22.4	34.9	4.36	38
W Horizon	1731	25	53.7	16.5	4.3

Note: *This does not represent volume percent as grains included in plagioclase boundaries are smaller than those located elsewhere.*
Source: *Ruthart (2013)*

TABLE 7.4 DOMINANT PGM MINERAL PHASES IN THE MAIN ZONE COMPARED TO THE W HORIZON			
Mineral	**Formula**	**W Horizon**	**Main Zone**
Zvyagintsevite	$(Pd,Pt,Au)_3Pb$	41.8%	-
Palladinite	(Pd,Cu,Au)O	15.5%	-
Telargpalite	$(Pd,Ag)_3Te$	5.5%	-
Skaergaardite	PdCu	3.9%	-
Kotulskite, Pb-rich	Pd(Te,Bi,Pb)	3.8%	-
Isoferroplatinum	$(Pt,Pd)_3(Fe,Cu)$	3.7%	-
Keithconnite, Pb-rich	$Pd_{3-x}(Te,Pb,Sb)$	3.5%	-
Tetraferroplatinum	PtFe	3.4%	-
Plumbopalladinite	Pd_3Pb_2	1.2%	-
Vysotskite	PdS	1.2%	-
Laflammeite	$Pd_3Pb_2S_2$	1.1%	-
Atokite, Pb-rich	$(Pd,Pt)_3(Sn,Pb)$	0.9%	-
Au, Ag and alloys		7.0%	3.3%
Stilwaterite	Pd_8As_3	0.4%	0.9%
Arsenopalladinite	$Pd_8(As,Sb,Pb)_3$	0.3%	1.7%
Cotunnite, Ru-rich	$(Pb,Ru)Cl_2$	-	2.1%
Hessite	Ag_2Te	-	3.7%
Hollingworthite	(Rh,Pt,Pd)AsS	0.2%	5.6%
Sperrylite	$PtAs_2$	1.1%	6.3%
Kotulskite	Pd(Te,Bi)	-	9.9%
Sobolevskite	PdBi	0.1%	10.1%
Mertierite-II	$Pd_8(Sb,As,Pb)_3$	0.3%	16.1%
Kotulskite-Sobolevskitess	$Pd_2Te(Bi,Pb)$	0.2%	34.9%

Note: *A total of 2,304 grains from 55 thin sections were analysed from the two zones. Other minerals with less than 1% distribution in both zones were excluded from this list.*
Source: *Ruthart (2013)*

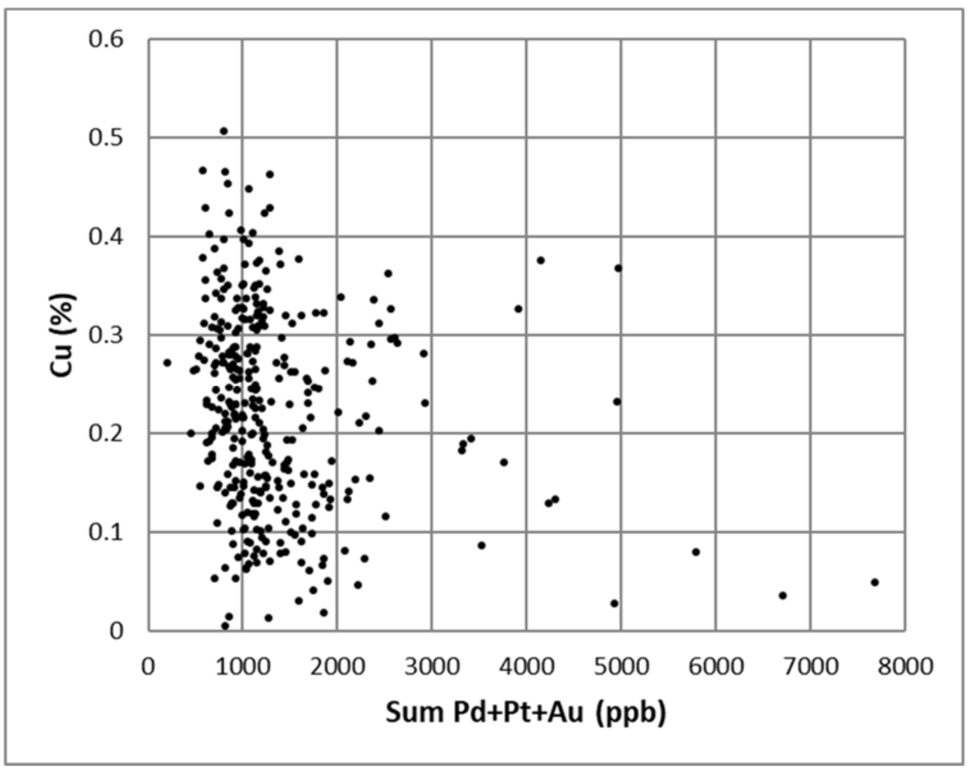
7.4.2 Distribution of Cu, Ni and PGM Within the Marathon Deposit

A very prominent feature of the Marathon Deposit is the local and extreme enrichment of PGM with respect to Cu and Ni. For example, high grade samples from the W Horizon that contain between 25 and 50 g/t Pd (1 gram per tonne = 1 part per million) might also contain very low concentrations of Cu and Ni (<0.02%). The separation of PGM from Cu is observed throughout the Deposit but is most common near the top of the mineralized zone. In the southern half of the Deposit, PGM enrichment is most prominent in the W Horizon.

The separation of PGM from Cu is shown by the very poor correlation between Cu and the sum of PGM for the average of 356 intersections in the Deposit (Figure 7.30). The disparity in the relative behavior of PGM and Cu and Ni is unusual for contact type magmatic sulphide deposits. Barrie et al. (2002) attributed the PGM enrichment to high temperature zone refining process, but this process is inconsistent with mass balance calculations and the close correlation between Pd and the other PGM metals.

An understanding of the separation of PGM from Cu is important to define the model for deposition of the Deposit. In this section, the trends for S, Cu, Ni and PGM concentrations in these zones are described and three mechanisms for metal concentration during magmatic processes are proposed.

FIGURE 7.30 PLOT OF CU VS. THE SUM OF PD+PT+AU FOR AVERAGE VALUES OF 356 DIAMOND DRILL HOLE INTERSECTIONS (NSR CUT-OFF OF $15/T)



Note: *Each point represents an intersection of between 4 and 160 m thickness. All of the points represent 14,485 m of drill core or approximately 8,000 samples.*
Source: *Marathon PGM Corp. (2010)*

7.4.3 Metal Ratios for the Marathon Deposit

Inter element ratios for metals that show positive and significant correlation are calculated for a subset of samples representative of the Deposit (Table 7.5).

TABLE 7.5
CALCULATED RATIOS FOR CU, NI AND THE PGM METALS

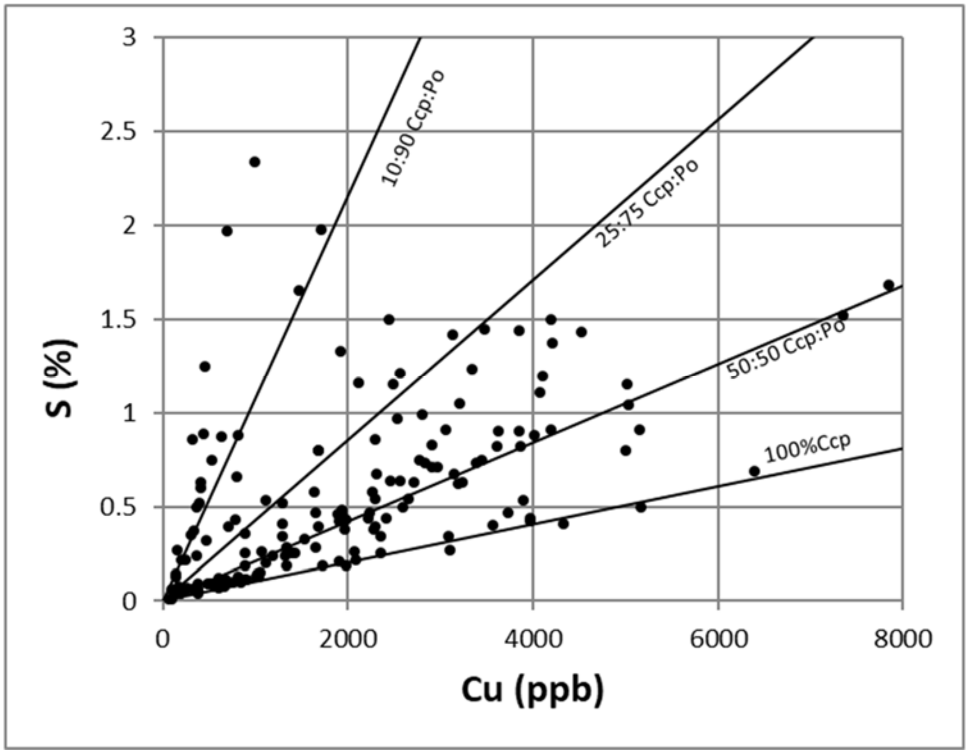
Ratio	Average	Standard Deviation	Minimum	Maximum	No. of Samples
Cu/Ni	14.5	2.8	8.2	21	40
Pd/Pt	2.99	1.02	0.83	9.2	8,663
Pd/Rh	40	19	10	84	32
Pd/Ir	910	636	147	2,573	28
Pd/Au	9.6	6.6	0.3	80	8,663

Note: *Cu/Ni ratio calculated for samples with >3,000 ppm Cu. Pd/Pt ratio calculated for intersection data. Pd/Rh and Pd/Ir calculated using high precision and high accuracy data by Good (1993) and 10 high grade samples analyzed by Activation Laboratories Ltd.*
Au = gold, Cu = copper, Ir = iridium, Ni = nickel, Pd = palladium, Pt = platinum, Rh = rhodium.
Source: *Generation Mining (2019)*

7.4.4 Distribution of Cu in TDL Gabbro

The sulphide assemblage in the Marathon Deposit is comprised predominantly of chalcopyrite and pyrrhotite with minor pentlandite and bornite. Chalcopyrite is the dominant copper mineral and bornite occurs locally, particularly in the W Horizon. In general, sulphides at the base of the Main Zone are comprised of pyrrhotite and the proportion of chalcopyrite increases up section. On average, the majority of mineralized samples contain greater than 25% chalcopyrite and less than 75% pyrrhotite as shown in Figure 7.31. Samples with the highest concentrations of PGM fall along or close to the curve representing 100% chalcopyrite.

FIGURE 7.31 SULPHUR VS. COPPER FOR SAMPLES REPRESENTATIVE OF MARATHON DEPOSIT MINERALIZATION



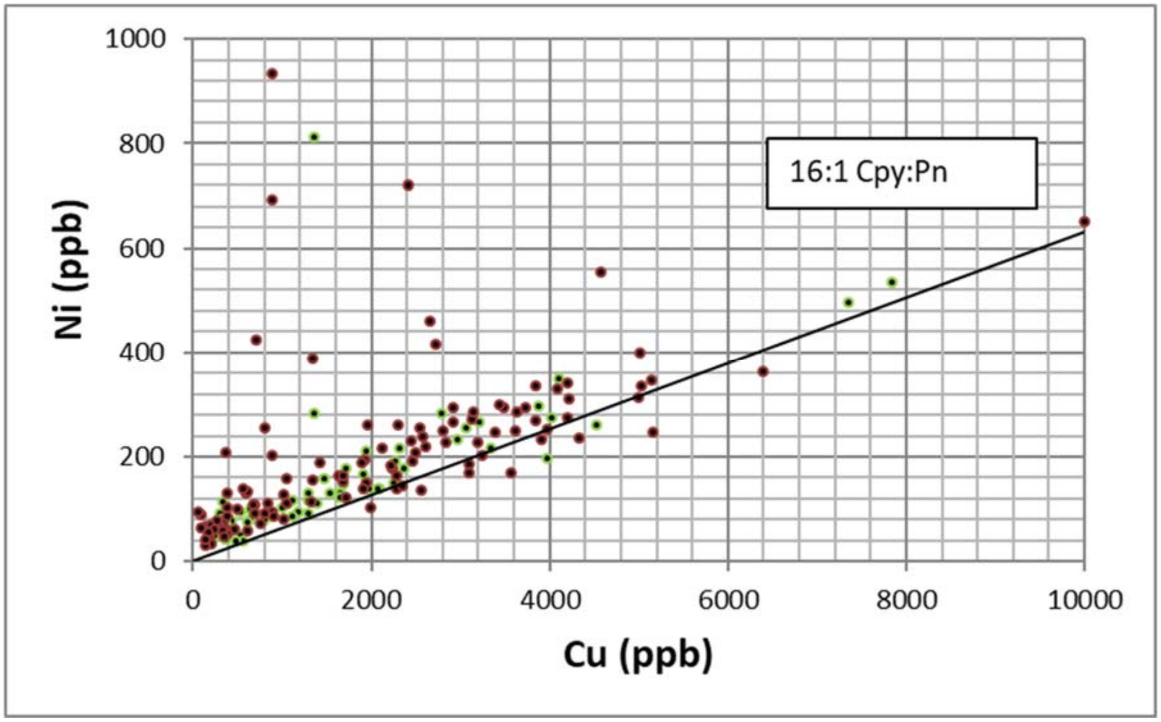
Note: *The lines represent the location where samples with the specified chalcopyrite: pyrrhotite ratios would plot.*
Source: *Marathon PGM Corp. (2010)*

7.4.5 Distribution of Ni Relative to Cu

Pentlandite is the dominant nickel-bearing mineral but is present as a minor component of the sulphide assemblage. Based on whole rock data for Ni vs. Cu, as shown in Figure 7.32, the chalcopyrite to pentlandite ratio for mineralized samples is relatively constant and is approximately 16:1. For whole rock data where Cu is >3,000 ppm, the Cu/Ni ratio is relatively constant at 14.5 (Table 7.5). A small proportion of samples in Figure 7.32 contains higher nickel and would therefore have a higher proportion of pentlandite than a 16:1 ratio, but this is unusual. Inspection of the data set for the entire Deposit reveals that the abundance of nickel is normally less than approximately 1,200 ppm and rarely greater than 1,500 ppm.

In Figure 7.32 the abundance of nickel where the abundance of copper is 0% corresponds to the amount of nickel (60-100 ppm) held by olivine and clinopyroxene. The nickel content of olivine, as measured by Good (1993) for samples in the Main Zone and Ruthart (2013) for samples in the W Horizon, is between 400 and 600 ppm.

FIGURE 7.32 PLOT OF NI AGAINST CU FOR A SUBSET OF MAIN ZONE SAMPLES FOR WHICH S (WT %) WAS DETERMINED

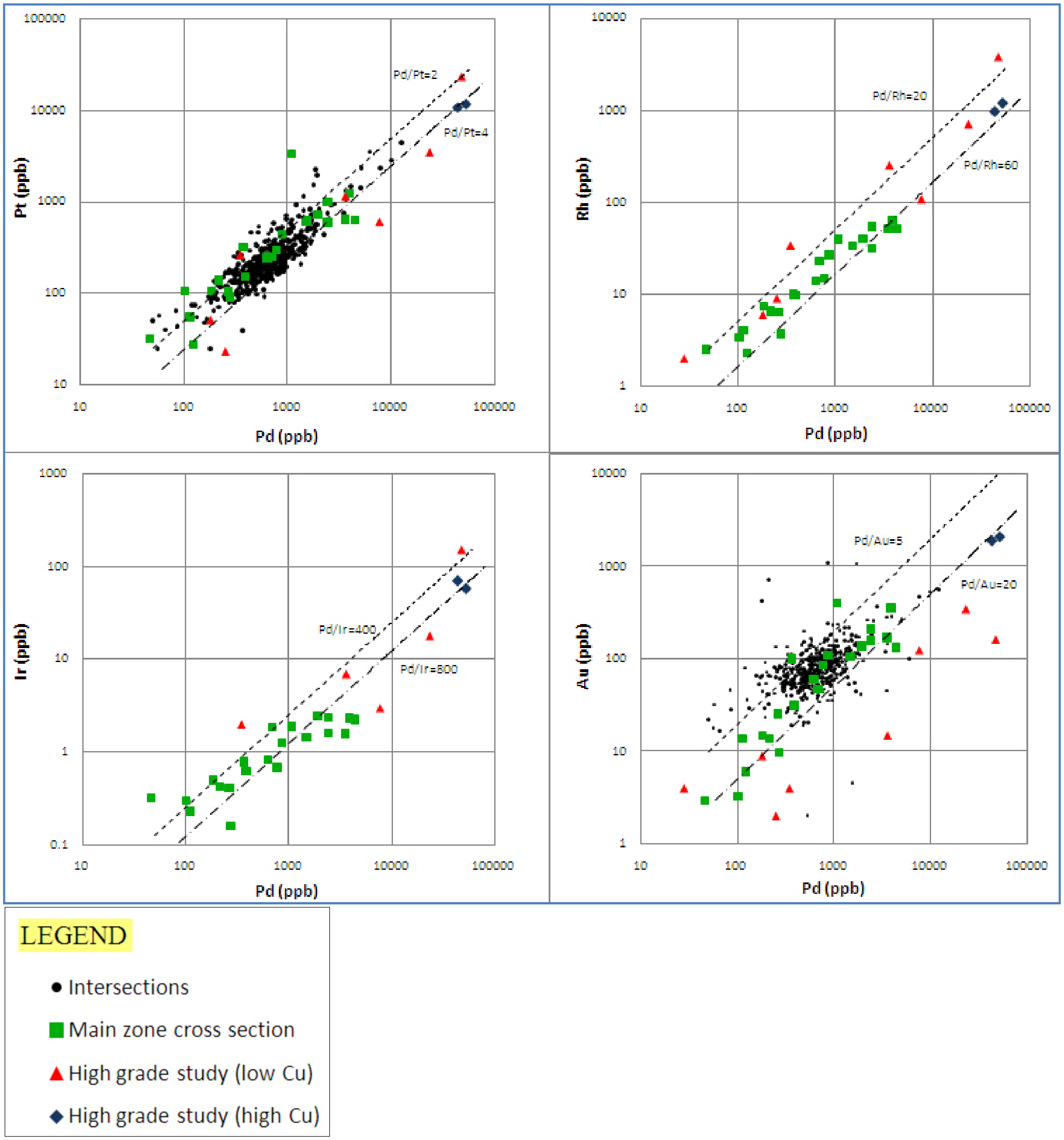


Note: *In general, the nickel content increases with increasing Cu. The majority of samples lie along a trend parallel to a calculated line representing samples with 94% chalcopyrite and 6% pentlandite or an approximate ratio of 16:1.*
wt % = weight percent.
Source: *Marathon PGM Corp. (2010)*

7.4.6 Distribution of PGMs

There is a strong and positive correlation between Pd and the other PGM metals (Pt, Rh and Ir) and Au for all types of mineralization in the Deposit. In Figure 7.33 the majority of data fall between the curves for various metal ratios. The calculated average values for PGM metal ratios are presented in Table 7.5.

FIGURE 7.33 PLOT OF PD VS. RH, IR AND AU FOR REPRESENTATIVE SAMPLE GROUPS OF THE MARATHON DEPOSIT



Note: *Intersections are averages of drill core intervals of between 4 and 160 m of mineralization. Main Zone cross-section samples were analyzed by Good (1993). 10 high-grade study samples are subsamples of 2 m thick, high grade intersections (analyzed by Activation Laboratories Ltd.). Low Cu samples represent 50 cm splits from interval at 184-186 m in hole M-07-237 which contained 121 ppm Cu. High Cu samples are 10 cm of quartered core that were selected from the interval between 152-156 m in hole M-07-306 which contained 0.8% (8,000 ppm) Cu. The Main Zone cross section samples and high-grade study samples are considered to be high precision and high accuracy analyses.*

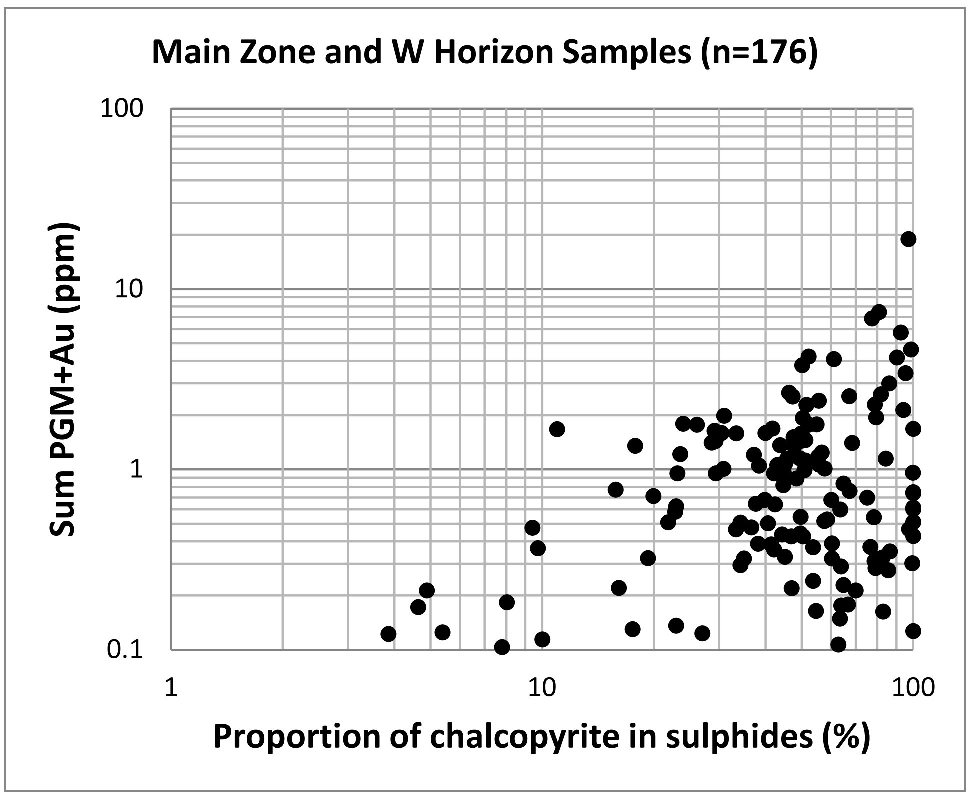
Source: *Marathon PGM Corp. (2010)*

7.4.7 Relationship Between Sulphide Assemblage and PGM

The composition of the sulphide assemblage is in general indicative of PGM enrichment. For example, a pyrrhotite rich sulphide assemblage is typically poor in PGM whereas chalcopyrite rich (up to 100%) or bornite-bearing sulphide assemblages are typically high in PGM. This general field relationship is verified in Figure 7.34 where the values for the sum of PGM + Au are highest in samples with high calculated proportions of chalcopyrite in total sulphides. Note this relationship is different than that shown in Figure 7.37 where it shown that there is no correlation between Cu and Pd. Also note that the increasing proportion of chalcopyrite is not always a sign of increasing PGM+Au.

That there is a relationship between chalcopyrite and total PGM+Au, but no correlation between copper and Pd, implies multiple concentrating mechanisms acted to concentrate Cu and PGM+Au.

FIGURE 7.34 SUM OF PT+PD+AU VS. CALCULATED PROPORTION OF CHALCOPYRITE IN SULPHIDE ASSEMBLAGE



Note: *Data set is representative of Main Zone and W Horizon.*
Source: *Marathon PGM Corp. (2010)*

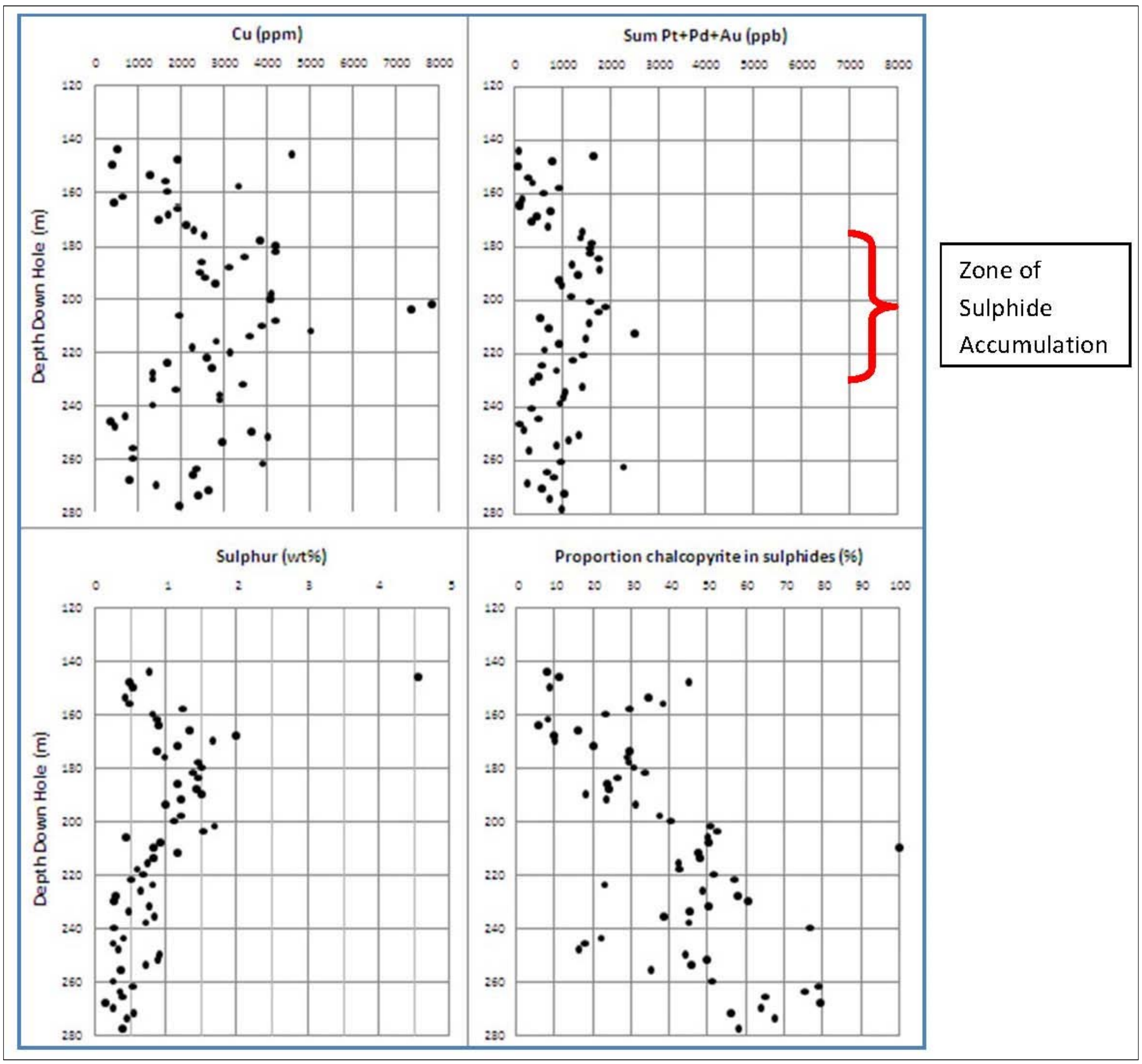
7.4.8 Variations of Cu, PGM, Sulphur and Chalcopyrite Across Mineralized Zones

Two different trends are shown by metal variation plots across mineralized zones in Figures 7.35 and 7.36.

In Figure 7.35 the abundances of S and PGM increase systematically up section and can be attributed to the simple accumulation of sulphides. The change in the abundance of Cu is less obvious, but there is a systematic decrease in the proportion of chalcopyrite in the sulphide assemblage. In summary, the abundance of sulphides and PGM are increasing, but sulphides are becoming more pyrrhotite rich.

In Figure 7.36 the abundance of Cu and the proportion of chalcopyrite increase up section, the abundance of S stays flat or decreases and the Pd stays low but increases dramatically in the uppermost 12 m where the samples contain the highest proportion of chalcopyrite.

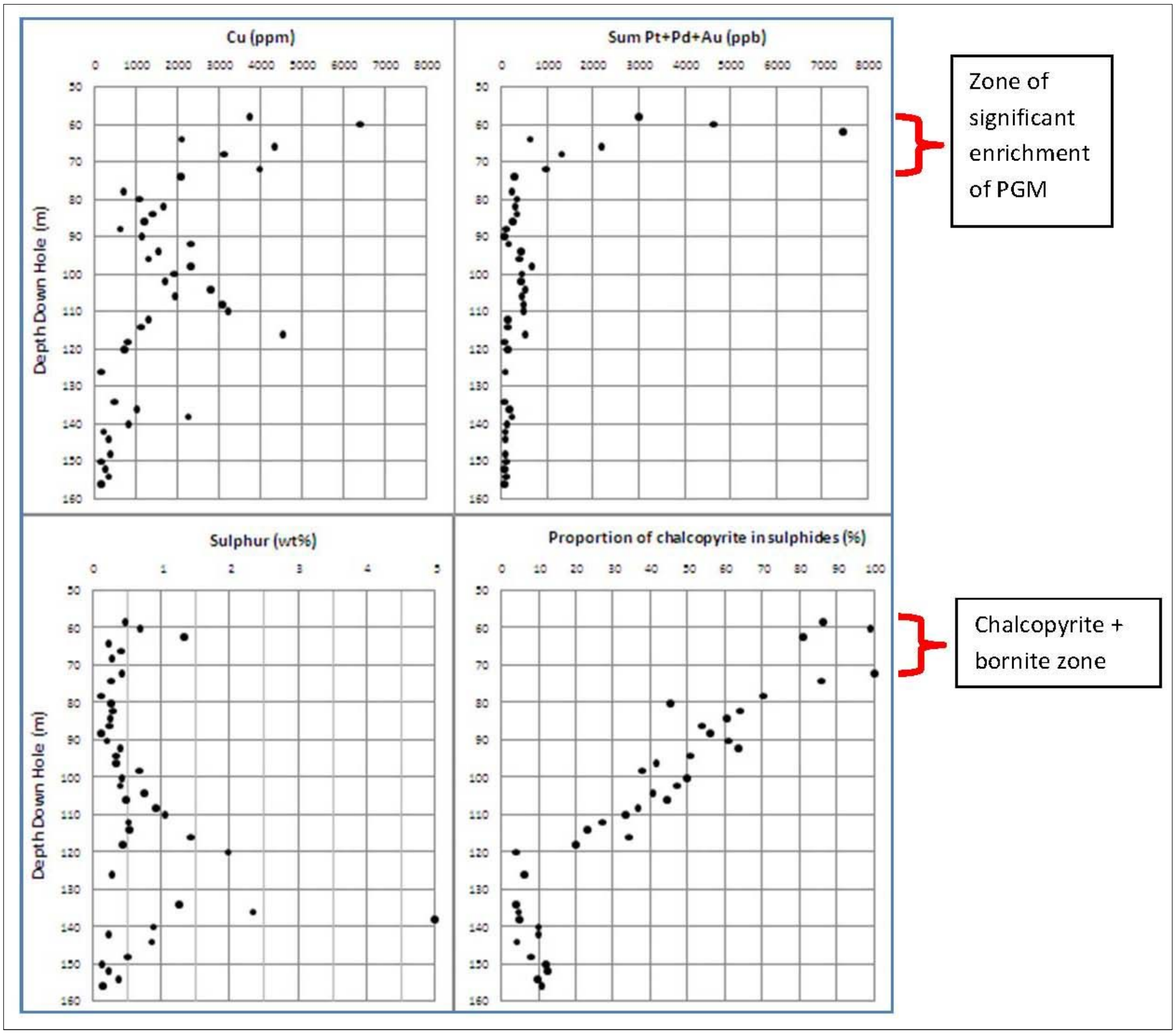
FIGURE 7.35 METAL VARIATION DOWN DIAMOND DRILL HOLE MB-08-10



Note: *Each sample represents 2 m of split drill core. Shows elevated PGM and Cu with increasing sulphur (sulphides) regardless of proportion of chalcopyrite.*

Source: *Marathon PGM Corp. (2010)*

FIGURE 7.36 METAL VARIATION DOWN DIAMOND DRILL HOLE G9



Note: *Each sample is 2 m of split drill core. Shows significant PGM enrichment in zones with highest proportion of chalcopyrite.*
Source: *Marathon PGM Corp. (2010)*

7.4.9 Mechanisms for Cu-PGM Concentration in the Marathon Deposit

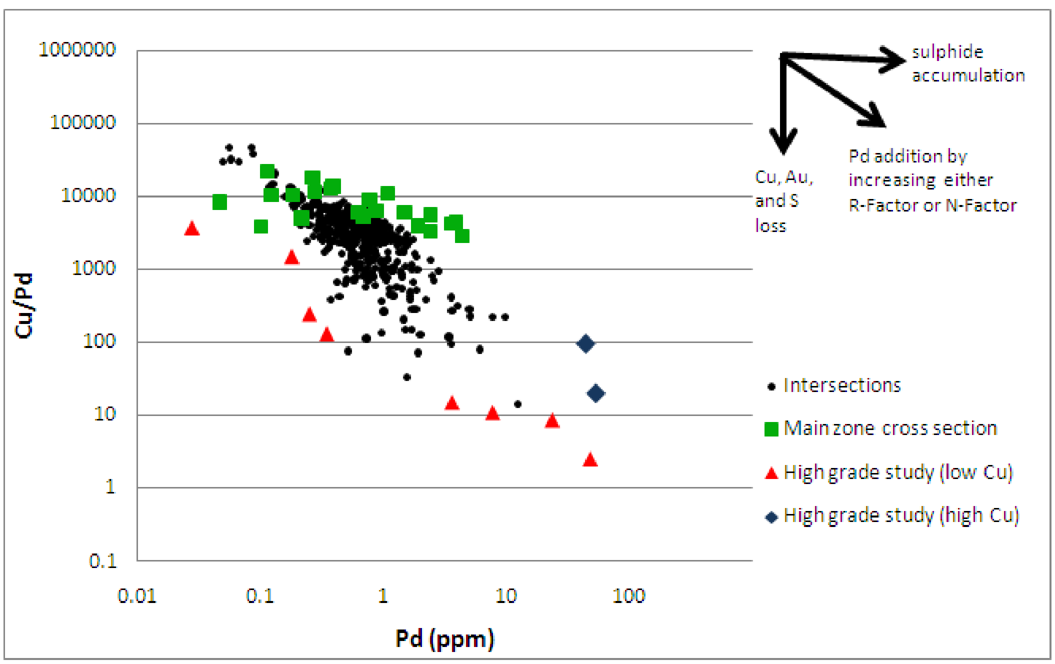
At least three mechanisms for sulphide and PGM precipitation have been proposed for the Deposit including hydrothermal (Watkinson and Ohnenstetter 1992), magmatic (Good and Crocket (1994a) and zone refining (Barrie 2002). A hydrothermal mechanism at low or intermediate temperatures (<600ºC) is not possible owing to the near total absence of hydrous minerals in the W Horizon and the significant correlations between Pd-Pt, Pd-Rh and Pd-Ir. The high temperature, zone refining mechanism suggested by Barrie (2002) is compelling but there is insufficient experimental evidence to use PGM correlation as support for or against the model, and the implied redistribution and concentration of PGM by zone refining doesn't fit with a mass balance calculation. There is just too much PGM and too little gabbro for a zone refining mechanism to have played a significant role.

Based on petrographic and geochemical evidence, it seems most likely that more than one process operated at high temperatures (>700ºC) to concentrate metals in the Deposit. Three possible mechanisms include:

- Accumulation of sulphide liquid in fluid dynamic traps in the magma conduit;
- Ongoing interaction of sulphides with magma that is flowing through the conduit (N-factor); and
- Removal of S, Cu, and Au from the sulphide assemblage.

The effects of the three mechanisms on the abundance of Cu and Pd are shown in Figure 7.37. The effect of accumulating sulphides is shown by the trend for the Main Zone samples (green squares). The effect of the N-factor is the rapid increase in Pd relative to Cu, and pulls samples toward the lower right corner of the figure. The intersection data (dots) represent the average affects due to sulphide accumulation and N-factor enrichment. Finally, the removal of Cu in PGM enriched zones (W Horizon) is shown by the downward displacement of the samples from the low Cu, high grade zone (red triangles). The removal of Au is inferred from the Pd-Au variation diagram in Figure 7.33.

FIGURE 7.37 DOMINANT MECHANISM DIAGRAM FOR CU AND PGM CONCENTRATION

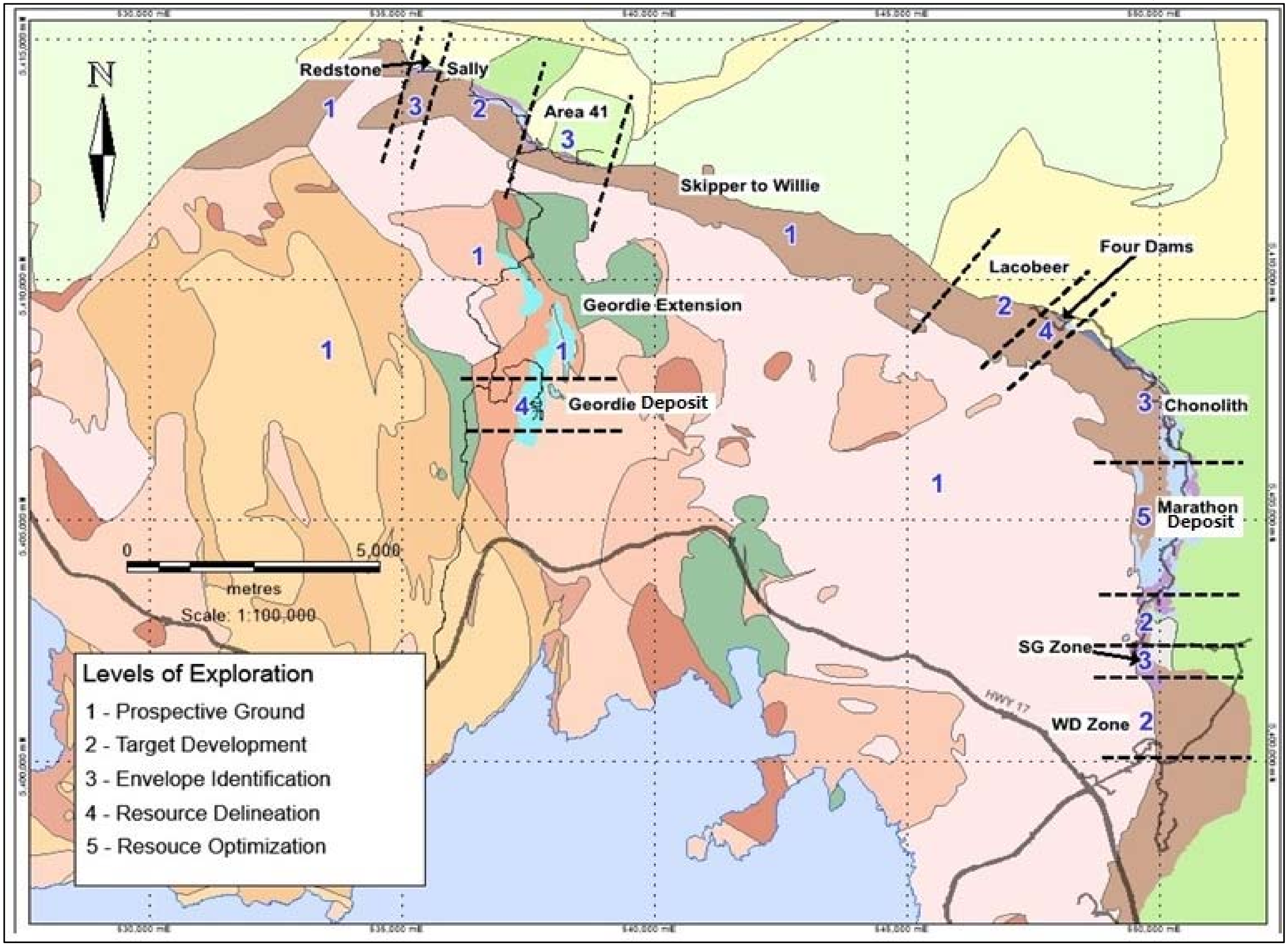


Note: *Figure highlights the effects on metal values of the three dominant mechanisms proposed to explain the concentration of Cu and PGM in the Marathon Deposit*
Source: *Marathon PGM Corp. (2010)*

7.4.10 Other Mineralized Cu and PGM Prospects in the Coldwell Complex

Figure 7.38 illustrates the locations of all other occurrences found on the Property.

FIGURE 7.38 GEOLOGY MAP OF THE COLDWELL COMPLEX AND LOCATION OF ALL KNOWN CU-PGM OCCURRENCES SHOWING EXPLORATION STATUS OR DEGREE OF DEVELOPMENT AS OF SEPTEMBER 9, 2019



Source: *Generation Mining Limited (2019)*

8.0 DEPOSIT TYPES

8.1 DEPOSIT TYPE MAGMA CONDUIT MODEL

The Marathon Deposit is one of several mafic to ultramafic intrusive bodies in the MRS System that host significant copper, nickel or PGM sulphide mineralization. These intrusions include the Yellow Dog peridotite (Eagle Deposit), the Tamarack Deposit, the Current Lake Intrusive Complex (Thunder Bay North Deposit), and the numerous intrusions located along the base of the Duluth Complex.

Intrusion and deposition of sulphides within magma conduits has recently become the dominant mineralization forming process chosen to explain the rift related deposits. For example, a magma conduit deposit model has been proposed for the Marathon Deposit by Good (2010), Thunder Bay North by Goodgame et al. (2010) and the Eagle Deposit (Ding et al., 2012). The magma conduit model has grown in favour since it was proposed to explain deposits in the Noril'sk region, Siberia by Naldrett et al. (1995) and Naldrett and Lightfoot (1999) and the deposits at Voisey's Bay by Li and Naldrett (1999). Further, an important contribution to the understanding of magma conduits and the formation of very high tenor PGM deposits was presented by Kerr and Leitch (2005). They derived a sophisticated geochemical model for an open system multiple stage process expected in a magma conduit. This model was applied to explain the extreme PGM concentrations found in the W Horizon at the Marathon Deposit by Good (2010).

8.1.1 Magma Conduit Model for Marathon Mineralization

In the magma conduit deposit model, the present exposure of the Two Duck Lake and Eastern Gabbro series represents only a fraction of the magma that was generated in the mantle and made its way up through the crust. Most of the magma actually passed through the magma conduits and erupted on the surface as basaltic volcanic flows. The gabbroic units and associated Cu-PGM mineralization represent material that crystallized or settled out of the magma as it moved through the conduit.

It is envisaged that a very large volume of magma, perhaps greater than 10,000 times the volume of gabbro present in-situ, passed through the conduit and formed the TDL Gabbro. On the basis of mass balance calculations, and considering the TDL Gabbro is less than 250 m thick, only a very large magmatic system such as this can explain the excessive enrichments of platinum metals with up 45 g/t of combined platinum, palladium and gold over 10 m or the accumulations of disseminated sulphide layers that are up to 160 m thick. Similarly, in the case of the oxide ultramafic intrusions, very large volumes of magma are required to deposit the very thick layers (tens of metres) of massive magnetite (>75% magnetite).

In the magma conduit model, fluid dynamic factors that affected magma flow are relevant to exploration. Features such as pooling of TDL magma in basins within the footwall or brecciation of Eastern Gabbro by TDL magma as it stopes its way upward during ascent are important examples of how the magma flow was slowed resulting in the precipitation of the more dense sulphide liquid from the magma. Conversely above ridges or crests in the footwall, where TDL Gabbro thins and the magma velocity increased, sulphides were unable to settle out of the magma and mineralized horizons thin or pinch out. Accumulation of sulphide by fluid dynamic processes can explain the bulk of the mineralization in the Marathon Deposit and metal trends such as that shown in diamond drill hole MB-08-10. Metal trends show increasing Cu and PGM+Au with increasing total sulphides regardless of the proportion of chalcopyrite in the sulphide assemblage.

After sulphides settled out of the magma, a second process acted to upgrade the sulphides with PGM+Au, particularly in the upper portions of the mineralized zone as describe in drill hole G9. The upgrading occurred as magma passed through the conduit and interacted with sulphides in the crystal pile possibly by stirring up early formed sulphides. This process of sulphide upgrading was used to describe the extreme enrichments of PGM relative to copper in disseminated sulphides at the Noril'sk deposits by Naldrett et al (1995). Naldrett et al described the mathematical model whereby the ratio of magma in the conduit that interacted with sulphides to the amount of sulphides is referred to as the N factor. Under conditions where the N Factor is very high, continued interaction of fresh magma with sulphides will continue to increase the grade of PGM while the Cu concentration remains constant. Very high PGM concentrations in the W Horizon such as 45 g/t over 10 m (hole M07-306) and metal trends such as the gradual increase in the proportion of chalcopyrite and the matching rapid increase in PGM+Au are interpreted to be a result of continuous upgrading.

A third process of PGM upgrading by sulphide dissolution (after Kerr and Leitch, 2005) is envisaged to have occurred in the W Horizon in order to account for samples with extreme PGM content and only trace copper. For example, in many instances the PGM enrichment of up to 75 ppm Pd occurs in samples with only 0.01 to 0.02% Cu. These levels of Pd when re-calculated to abundances in 100% sulphides correspond to untenable concentrations of between 2 and 4% Pd in 100% sulphide. The sulphide dissolution process involves the progressive removal of Cu and S from the pre-existing sulphides when they interact with magma that is sulphur under saturated. The Pd and Pt remain behind with the remnant sulphides. Evidence of Au loss in samples of the W Horizon imply that Au was also removed along with Cu and S by this same process.

8.2 DEPOSIT COMPARISONS

8.2.1 Comparison of Marathon Deposit with Mid-Continent Rift-Related Deposits (after Good and Crockett, 1994)

There are many striking petrologic and geochemical similarities between the TDL Gabbro and the Partridge River Intrusion, located at the base of the Duluth Complex, Minnesota. The Partridge River intrusion is the best described gabbroic intrusion in the Duluth Complex and is host to the Minnamax (Babbit) and Dunka Road Cu-Ni-PGM Deposits. The relevant features described from the Partridge River Intrusion that are also observed in the TDL Gabbro, include the following:

- The textures and abundance of minerals in the Partridge River Intrusion and the inferred crystallization path are remarkably similar to those of the TDL Gabbro.

- The compositions of plagioclase, pyroxene, and olivine are restricted relative to other mafic intrusions and overlie values for the TDL Gabbro.

- The coherent behavior of Zr, Rb, and Y, indicative of control by variable proportions of intercumulus liquid, is consistent with observations in the TDL Gabbro.

- Chalcopyrite and PGM are inter-grown with calcic plagioclase that replaces less calcic plagioclase.

- Pyrrhotite, but not pentlandite, is replaced by chalcopyrite.

- Sulphides are predominantly interstitial to unaltered plagioclase, olivine, and pyroxenes and chalcopyrite and PGM are associated with Cl-enriched biotite and apatite, and altered minerals, such as chlorite, epidote, and calcite.

- Variable Cu/Ni ratios within deposits and between deposits and a trend of increasing ratios with increasing Cu are indicative of chalcophile element fractionation as shown for the TDL Gabbro.

- The occurrence of more than one type of disseminated sulphide zone, one being relatively sulphur rich is analogous to the main and basal sulphide zones in the TDL Gabbro.

The many similarities between the Partridge River Intrusion and the TDL Gabbro imply that they formed by analogous processes. Four mechanisms have previously been proposed to account for features observed in the Partridge River Intrusion.

1. Chalockwu and Grant (1990) proposed that the magma of the Partridge River Intrusion was emplaced as a plagioclase plus olivine crystal mush that crystallized in situ.

2. Grant and Chalockwu (1992) provide geochemical and isotopic evidence implying that the Partridge River Intrusion consists of a mechanical mixture of cumulus plagioclase, olivine, and intercumulus liquid which were not in equilibrium with each other.

3. Foose and Weiblen (1986), and Ripley (1986) proposed various mechanisms for the mixing of magmas of similar compositions, but at different stages of crystal fractionation, to account for compositional irregularities.

4. Finally, an external source for sulphur is well documented in the available literature and Andrews and Ripley (1989) argue that sulphur assimilation occurred prior to intrusion of the host gabbro. These mechanisms are, to some extent, analogous to those proposed in the model for the formation of the Marathon Deposit.

8.2.2 Comparisons of Mid-Continent Rift Deposits and Voisey Bay and Noril'sk Deposits

Comparisons between the Mid-Continent Rift System and the Voisey Bay and Noril'sk settings point to several similarities that suggest that the Mid-Continent Rift is a likely setting for Ni-Cu mineralization. The continental rifting and associated voluminous igneous activity in all three regions formed in response to the rise of a hot plume of mantle material from deep in the earth, fracturing the overlying continental crust. In the Mid-Continent Rift, melting of the plume produced more than 2 million cubic kilometres of mostly basalt lava flows and related intrusions.

In all three regions, basalts derived from the mantle plume are enriched in trace elements, particularly in comparison to the most common basalts erupted on earth, those formed at rifts in the oceans. Like basalts in the Noril'sk region, early basalts of the Mid-Continent Rift have compositions characterized by relatively high abundances of magnesium, chromium, nickel, and platinum, and relatively low abundances of sulphur. Such metal-rich but sulphur-poor basalt magmas can carry metals (such as Ni, Cu, and PGM's) to high levels in the crust because sulphur is not available to form a separate sulphide liquid that would scavenge metals from the magma while it is still deep below the surface. If these metal-rich basalts encounter a source of sulphur near the surface, and sulphur is incorporated into the basalt magma, they would be ripe for sulphide mineral formation.

8.3 DEPOSIT MODEL CONCLUSIONS

A possible model for the emplacement and crystallization history of the Two Duck Lake magma and genesis of sulphides is proposed as outlined below.

Step one: Crystallization of plagioclase and olivine occurred in a deep magma chamber prior to emplacement into its present site. Due to density differences, plagioclase did not settle out of the magma column but much of the olivine did. During crystallization and sporadic replenishment with unfractionated magma, the magma chamber becomes compositionally stratified.

Step two: Sulphur migrated out of the country rock into the magma chamber resulting in the formation of sulphide droplets. The Ni/S ratio of the sulphide droplets will be high in the lower layers of the chamber, and low in the upper layers of residual magma.

Step three: The Two Duck Lake intrusion and sulphide deposit is formed when magma is forced out of the deep chamber upward into its present site. The more fractionated, plagioclase-rich upper layers become mixed with the less fractionated lower layers by the turbulent movement out of the deep chamber. The sulphide droplets grow as they come into contact with other droplets during transport. At the time of intrusion, the crystal mush consists of plagioclase crystals of nearly uniform composition, interstitial silicate magma, and droplets of sulphide liquid; there was little, if any, crystal-free magma in the chamber.

Step four: After intrusion, some minor settling of plagioclase crystals occurred, and plagioclase formed a framework for crystallization of the interstitial melt. The crystal mush cooled rapidly thereby inhibiting post-cumulus processes, such as complete internal equilibration of the system. A very small amount of volatile-rich interstitial melt migrated toward the center of the intrusion, crystallized granophyre, and released water into the surrounding gabbro, resulting in the formation of pegmatite.

Step five: Subsolidus reactions occurred involving local migration of components in deuteric fluid. This process results in features such as the replacement of pyrrhotite by chalcopyrite and the deposition of PGM in association with hydrous silicates; the last to form are microscopic chalcopyrite, calcite, and chlorite veinlets. The numerous documented features presumably reflect reactions that occur as the temperature decreases and the fluid evolves.

9.0 EXPLORATION

A passive seismic survey was conducted on the Sally Zone where an initial Mineral Resource Estimate was completed by P&E in 2019. The survey was designed to pinpoint the potential source of massive sulphides found in the area as well as a grab sample taken in 2017 which assayed 188.28 g/t total PGEs + Au and 9.1% Cu.

Exploration during 2019 mainly consisted of diamond drilling, and details are noted in Section 10 Drilling of this Technical Report.

Refer to Section 6 History in this Technical Report for information on pre-2019 exploration.

10.0 DRILLING

On August 19, 2019 Gen Mining announced that the Company has begun exploration by way of a 12,000 m drilling program on its Marathon PGM-Cu Property. Two drills and crews were mobilized and drilling commenced August 15th. The program was designed to test several high-priority sites along a strike length of more than 40 km.

Previous drilling on the Property is discussed in Section 6 History of this Technical Report.

10.1 TARGETS FOR THE 2019 EXPLORATION DRILLING PROGRAM

Gen Mining believes that the Property has been under-explored for the past several years during a time of unprecedented low palladium prices. The Company's goal in 2019 was to expand the current Mineral Resource while examining the economics of a potential mine. The following areas were the targets for the 2019 exploration program:

- 3,000 m testing the West Feeder Zone near the Main Zone;
- 1,000 m of confirmation/infill drilling on the Marathon Deposit;
- 2,700 m exploration drilling on two Geordie Deposit offsets;
- 2,600 m of greenfield exploration drilling on Boyer Area; and
- 2,700 m of drilling for the source of the extremely high-grade samples and massive sulphides at the Sally Deposit.

Drilling in 2019 totalled 39 holes, in aggregate 12,434 m of drilling. A drill hole summary is included in Table 10.1 which includes hole IDs, zone reference and total depth drilled.

10.2 2019 EXPLORATION DRILLING PROGRAM RESULTS TO DATE

Drilling activities in 2019 were concurrent with the Technical Report compilation which occurred after the September 9th, 2019 effective date of the Updated Mineral Resource Estimate which was used as the basis of this Technical Report. The majority of the 2019 drill holes tested greenfield targets external to pit constrained Mineral Resources at either Marathon, Sally and Geordie with the exception of 5 holes (M-19-530 to M-19-534, inclusive) drilled at Marathon for validation and metallurgical purposes and one hole (SL-18-78) at Sally designed to test the down dip potential of the Keel Zone of the Sally Deposit.

Drill holes M-19-530 – M-19-534, inclusive, comprised three holes which tested the W Horizon and two which tested the Marathon Main Zone. With allowance for anticipated inhomogeneities within the mineralized zones drill results are consistent with historical results. Similarly, drill holes which tested extensions to the Sally Deposit both along strike and down dip encountered mineralization which is also consistent with historical results.

Drill holes M-19-535/W/WE and M-19-536 which tested the Feeder Zone, approximately 1,400 m west of the Marathon Deposit, as discussed in Section 6.0 of this Technical Report and illustrated in Figures 6.6 and 6.7, intersected magnetite rich Layered Series Gabbro rocks which are believed to be responsible for the passive seismic target. However, drill holes M-19-537 and

M-19-538 drilled further to the east along the Feeder Zone and approximately 350 m west of the Marathon Deposit intersected significant widths of Marathon Series rocks down dip from the Main Marathon Deposit confirming the continuation of the Deposit on the south side of the 4900 fault which is believed to have provided a locus for the Feeder Zone.

With reference to Table 10.1 other holes at Sally confirmed the potential for mineralization external to the Sally Deposit. Most holes returned subeconomic assays with the exception of SL-19-75 which returned 1.18 g/t PdEq over a 4 m core length. Drill holes at Boyer which drill tested a mineralized trend at surface and drill holes at Geordie which tested a number of greenfield geophysical targets external to the Geordie Deposit Mineral Resource intersected sub economic mineralization.

TABLE 10.1
2019 DIAMOND DRILL HOLE PROGRAM

Drill Hole ID	Zone	Actual Length (m)	Drilling Date	
			Start	Finish
M-19-531	W-Horizon	156.00	2019-08-16	2019-08-17
M-19-535	Feeder	519.00	2019-08-24	2019-09-01
M-19-535W	Wedge	160.00	2019-09-02	2019-09-07
M-19-535WE	Wedge	453.00	2019-09-07	2019-09-14
M-19-536	Feeder	1,050.00	2019-09-15	2019-09-25
M-19-538	Feeder	630.00	2019-10-05	2016-10-11
M-19-537	Feeder	672.00	2019-09-28	2019-10-05
M-19-533	Marathon	222.00	2019-08-20	2019-08-22
M-19-534	Marathon	255.00	2019-08-22	2019-08-24
M-19-530	W-Horizon	135.00	2019-08-15	2019-08-16
M-19-532	W-Horizon	255.00	2019-08-17	2019-08-20
BY-19-07	Boyer	243.00	2109-10-04	2019-10-06
BY-19-06	Boyer	222.00	2019-10-01	2019-10-03
BY-19-03	Boyer	231.00	2019-09-24	2019-09-26
BY-19-04	Boyer	198.30	2019-09-26	2019-09-27
BY-19-01	Boyer	276.00	2019-09-19	2019-09-21
BY-19-08	Boyer	204.00	2019-10-07	2019-10-09
BY-19-09	Boyer	246.00	2019-10-09	2019-10-11
BY-19-10	Boyer	213.00	2019-10-11	2019-10-13
BY-19-11	Boyer	222.00	2019-10-14	2019-10-16
BY-19-13	Boyer	150.00	2019-10-18	2019-10-20
BY-19-14	Boyer	135.00	2019-10-22	2019-10-23
BY-19-02	Boyer	255.00	2019-09-21	2019-09-24
BY-19-12	Boyer	219.00	2019-10-16	2019-10-18
BY-19-05	Boyer	249.00	2019-09-28	2019-09-30
G-19-28	Geordie	288.00	2019-09-13	2019-09-15
G-19-29	Geordie	219.00	2019-09-15	2019-09-17
G-19-23	Geordie	312.00	2019-08-29	2019-08-31

Table 10.1 2019 Diamond Drill Hole Program				
Drill Hole ID	**Zone**	**Actual Length (m)**	**Drilling Date**	
			Start	**Finish**
G-19-24	Geordie	315.00	2019-08-31	2019-09-04
G-19-25	Geordie	366.00	2019-09-04	2019-09-07
G-19-26	Geordie	210.00	2019-09-07	2019-09-09
G-19-27	Geordie	237.54	2019-09-09	2019-09-12
G-19-22	Geordie	639.00	2019-08-19	2019-08-28
SL-19-74	Sally	276.00	2019-10-15	2019-10-18
SL-19-73	Sally	327.00	2019-10-12	2019-10-15
SL-19-76	Sally	282.00	2019-10-21	2019-10-23
SL-19-75	Sally	255.00	2019-10-18	2019-10-20
SL-19-78	Sally	852.70	2019-10-27	2019-11-04
SL-19-77	Sally	285.00	2019-10-24	2019-10-26
Total		**12,434.54**	**No. Holes**	**39**

11.0 SAMPLE PREPARATION, ANALYSIS AND SECURITY

11.1 MARATHON DEPOSIT SAMPLE PREPARATION, ANALYSIS AND SECURITY

The following section of this Technical Report is largely taken from the 2014 internal Feasibility Study draft report completed by Nordmin Engineering Ltd. ("Nordmin"), and outlines sampling protocol (preparation, analysis and security procedures) instituted and used by Marathon PGM Corp. in each of their drilling and other rock sampling programs since at least 2007. These protocols are identical to those reported in earlier NI 43-101 compliant Technical Reports issued by Marathon PGM Corp. on the Property.

11.1.1 Protocols Before Dispatch of Samples

Each sample bag has a numbered identification ("ID") tag placed inside, along with the sample; before being sealed. The sample ID number is also written on the outside of the sample bag. The position of the samples on the remaining half cores is marked with a corresponding ID tag. Samples are then grouped into batches before being placed into rice bags. Each rice bag is also sealed before being dispatched. Other than the insertion of control samples there are no other action taken at site.

During the 2007 and 2008 drilling campaigns, samples were delivered either by Marathon PGM Corp. personnel or shipped via Courtesy Courier. On rare occasions when samples were deemed to be high priority, they were shipped via Greyhound Bus Lines out of the Town of Marathon, to Accurassay's facilities (acquired by AGAT Laboratories in 2017) in Thunder Bay, Ontario. Upon receipt of the samples, Accurassay personnel would ensure that the seals on rice bags and individual samples had not been tampered with.

Accurassay provides analytical services to the mining and mineral exploration industry and is registered under ISO 9001:2000 quality standard.

In 2011, Stillwater Canada Inc. changed assay laboratories and initiated analyses at ALS Chemex Labs, Ltd. in Thunder Bay ("ALS Chemex"). ALS Chemex uses a similar laboratory protocol but with the exception that PGM analyses are conducted by ICP-MS instead of Atomic Absorption utilized at Accurassay.

11.1.2 Laboratory Protocols

At the time of delivery, the laboratory acknowledges receipt of the sample shipment in good order and logs all samples into their Laboratory Information Management System ("LIMS"). Samples were both prepared and analyzed at the Accurassay or the ALS Chemex Labs in Thunder Bay, Ontario.

All samples were analyzed for Cu, Ni, Ag, Au, Pt and Pd. Rhodium was requested on samples within an intersection of two or more consecutive samples with an NSR value greater than $8/t, as well as the two samples on either side of the intersection, even though the values were likely to be below detection limit. The two samples outside of the mineralized intersection were requested for dilution information purposes.

The following details have been extracted from the Accurassay's established procedures on the Marathon PGM Corp. samples.

11.1.3 Sample Preparation

The samples provided to Accurassay by Marathon PGM Corp. were core samples, rock samples and pulp samples. The samples were dried, if necessary, crushed to approximately minus 10 mesh and split into 250 g to 450 g sub-samples using a Jones Riffler. The sub-samples were then pulverized to 90% passing 150 mesh using a ring and puck pulverizer and homogenized prior to analysis. Silica sand cleaning between each sample was performed to prevent cross-contamination between samples.

11.1.3.1 Fire Assay Precious Metals

For flame atomic absorption spectroscopy ("AAS") determinations, preliminary concentration for Au, Pt and Pd by fire assay (lead collection) is the preferred method. The standard operating procedure for fire assaying at Accurassay involves weighing, fluxing, fusion and cupellation of each sample.

Weighing

A 30.2 g sample mass was routinely used for analysis of the samples, although select sample masses may have been altered to accommodate sample chemistry, if required.

A furnace load consists of 23 or 24 samples with a check done every 10th sample (by client ID), along with a laboratory blank and a Quality Control Standard. Duplicate checks were performed on pulverized samples.

Fluxing

Samples provided to Accurassay by Marathon did not require preliminary treatment and were mixed directly with the assay flux and fused. Currently, Accurassay uses a premixed basic flux purchased from Reliable Industrial Supply. The composition of the flux is as follows: Litharge (PbO), 50.4%, soda ash (dense), 35.9%, borax, 10%, and silica flour, 3.6%. It is standard practice for laboratories to use a premixed flux and adjust the ingredients when necessary.

Fusion

Samples are typically fused for 1¼ h at 1,800 to 2,000°F. The fusion time may be increased if needed.

Cupellation

Samples are typically cupelled for 50 minutes at 1,900°F. The cupellation time may be increased if needed.

11.1.3.2 Digestion – Precious Metals

Precious metal beads were digested using a nitric/hydrochloric acid digestion and bulked up with a 1% lanthanum oxide (“La_2O_3”) solution and distilled water. The use of lanthanum in the concentration of 0.2-1.0% is an acceptable practice and complies with accepted published methods. A final volume of 3 mL was used for the analysis.

11.1.3.3 Digestion – Base Metals

For flame AAS determinations of Cu, Co, Ni, Pb, and Ag, an acid digestion consisting of aqua regia (1 part nitric to 3 parts hydrochloric acid) was the preferred method. A sample mass of 0.25 g and a final volume of 10 mL is used for the analysis. For samples requiring a full assay digestion (high grade); a sample mass of 2.5 g and a final volume of 250 mL is used. A full assay is required whenever the concentration of any given element is greater than 1% for any of the above noted elements.

11.1.3.4 Flame Atomic Absorption Spectrometric Measurement

Accurassay uses a Varian AA240FS with manual sample introduction for the determination of Au, Pt and Pd. A Varian 220FS or 240FS with SIPS and auto-diluter is used for the determination of base metals.

Calibration standards are made up from 1,000 ppm certified stock solutions. Quality assurance (“QA”) solutions are made up from separately purchased 1,000 ppm certified stock solutions. All stock solutions are prepared commercially by ISO certified suppliers.

11.1.3.5 Reporting

Laboratory reports are produced using Accurassay’s LIMS program. All duplicate assays are reported on the certificate of analysis. Quality control (“QC”) standards and blanks are not reported unless requested by the client.

11.1.3.6 Control Charts for Quality Control Standards

All data generated for quality control standards, blanks and duplicates are retained with the client’s file and are used in the validation of results. For each quality control standard, control charts are produced to monitor the performance of the laboratory. Warning limits are set at +/-2 standard deviations, and control limits are set at +/-3 standard deviations. Any data points for the quality control standards that fall outside the warning limits, but within the control limits, require 10% of the samples in that batch to be re-assayed. If the results from the re-assays match the original assays the data are validated, if the re-assay results do not match the original data, the entire batch is rejected, and new re-assays are performed. Any quality control standard that falls outside the control limits is automatically re-assayed and all of the initial test results are rejected.

11.1.3.7 Standards

The in-house standard used for Au, Pt, Pd and Rh was made up from a rock source provided to Accurassay by a third party. The standard names were APG1 and APP7. The CANMET standards used for the analysis of Au, Pt, Pd and Rh were WMS-1 and WMG-1. All standards used to certify base metal values were provided by CANMET. The following standards were used: CZN3, RTS-2, and RTS-3.

The QA sample was made in the laboratory from certified stock solutions purchased from an ISO 9000 certified supplier. The solution was made from a completely different lot number than the solutions used to calibrate standards. The quality control standards were used to monitor the processes involved in analyzing the samples. The quality assurance samples were used to verify the initial calibration of the instruments and monitor the calibration throughout the analysis.

It should be noted that although a standard or quality assurance standard may not be listed by job number on the control charts, a standard and quality assurance sample was run with each job.

The values for APG1 and APP7 were developed by Accurassay and verified through round-robin analysis with other laboratories in Canada. The values for CANMET certified reference materials were obtained from their respective certificates of analysis.

11.1.4 Quality Assurance/Quality Control Program

Stillwater continued with a robust quality assurance/quality control ("QA/QC" or "QC") program that had been implemented in the mid-2000s by the predecessor company, Marathon PGM Corp. The QC program consisted of the insertion of reference materials, field blanks and duplicate pair monitoring.

Two standards, named MPG1 and MPG2, were prepared by Accurassay in Thunder Bay. Material was sourced from the Marathon Project. 375 samples were analyzed for the characterization of MPG1, and 325 samples were analyzed for the characterization of MPG2. A mean and standard deviation were calculated for each reference material.

All data from the 2009 and 2011 drill programs were examined by P&E. Drill data prior to 2009 had been examined by P&E, (and passed), for use in previous Mineral Resource Estimates.

11.1.4.1 Performance of Reference Materials 2009 and 2012

For the 2009 data, there were 31 data points for MPG1 and 18 data points for MPG2. All data points fell between +/- two standard deviations from the mean for Au, Cu, Pd and Pt.

For the 2011 data there were 35 data points for MPG1 and 32 data points for MPG2. All data points fell between +/- two standard deviations from the mean.

11.1.4.2 Performance of Blank Material

The blank material used for the 2009 and 2011 programs was a commercially prepared nepheline syenite sand. There were 49 data points in 2009 and 68 in 2011. All blank results were below five times detection limit for the commodity in question.

11.1.4.3 Performance of Duplicate Data

There were 81 pulp duplicate pairs analyzed at ALS Chemex for Au, Pt and Pd for the 2011 drill program. All pairs were graphed on a simple scatter graph. The precision on the gold pulp pairs was acceptable, with less precision (as is to be expected) on the very low grades. Both platinum and palladium demonstrated excellent precision at the pulp level. There were no duplicates available for copper.

11.1.5 Surface Trench Samples

The Deposit database contains 1,736 surface sample assays collected from channels that were saw cut along lines spaced 30 to 50 m apart along approximately 2 km strike length. The channels were cut in approximately straight lines located close to and perpendicular to the base of the Deposit during the years 1985 to 1986 and 2005 to 2009.

After a comparison of the trench samples with the diamond drill holes in the same vicinity, the channel samples were included in the Mineral Resource Estimate. In a report titled, "Trench vs. Core Assay Data in the Marathon Deposit Main Zone," authored by D. Good, Ph.D., P. Geo., and dated March 18, 2012, it was clearly shown that channel samples should not be excluded from the database because a sampling bias could not be proven. The test sample set included channel samples cut from a relatively Pd-rich zone of the Main Zone, and when compared to the core samples drilled in the immediate vicinity, there was no sampling bias demonstrated. P&E has reviewed the report by D. Good and accept the methodology and conclusions.

P&E considers the data to be of good quality and acceptable for use in the current Mineral Resource Estimate.

11.2 GEORDIE DEPOSIT SAMPLE PREPARATION, ANALYSES AND SECURITY

The following section of this report is largely taken from the 2010 technical report completed by Python Mining Consultants Inc., ("Python"), and outlines sampling protocol (preparation, analysis and security procedures) instituted and used by Marathon PGM Corp. in its 2010 drilling program.

11.2.1 Sampling Method and Approach

In the 2010 drill program, mineralized drill core was sampled in 2 m intervals with very few exceptions. All sections of core containing heterogeneous or plagioclase-rich gabbro intrusions were sampled continuously. Samples were also taken for several metres into the surrounding, non-mineralized syenite. Core recovery was considered to be very good. 946 samples were sent for analysis from this program in addition to quality control samples.

In previous year's drilling programs, the sampling method varied slightly. From 2000 to 2002, all core was sampled and sent for assay. A sample length of 3 m was used for non-mineralized core. The sample length was shortened to 1 or 1.5 m in mineralized rock. In 2006, selective samples of 1 to 3 m were taken at regular intervals in the non-mineralized, upper portions of drill holes. The mineralized core was sampled continuously with 1 m samples. Some samples were shortened to less than 1 m at the logging geologist's discretion. In 2008, the drill holes were sampled continuously with 1.5 m samples. 3,261 samples were taken and analyzed over the course of previous years drill programs.

P&E considers the sampling methods from the current and past drilling programs to be satisfactory.

11.2.2 Sample Preparation, Analyses and Security

Shipments of drill core were transported from the Property to a core logging facility in the Town of Marathon. A geologist was responsible for logging the core and marking sample intervals. The core was then split using a diamond core saw. A tag with a sample identification ("ID") number was placed in each sample bag before being sealed. The sample ID number was also written on the outside of the sample bag. The position of the samples on the remaining half cores was marked with a corresponding ID tag. Samples were then grouped into batches before being placed into rice bags. Each rice bag was also sealed and labelled before being dispatched. Samples were shipped by Gardenwine North transport trucks to Accurassay Laboratories in Thunder Bay, Ontario. Upon receipt of the samples, Accurassay personnel would ensure that the seals on rice bags and individual samples had not been tampered with.

Duplicate pulp samples were sent to ALS Chemex Analytical Laboratories in Thunder Bay Ontario for verification of Cu analyses done at Accurassay. The remaining half-core is now stored in sheds at the Marathon core storage facility.

During previous years, drill core was logged and sampled on the Property. Samples were sealed in plastic bags and placed into cardboard boxes that were securely taped. The boxes were transported from the Property by helicopter to the Greyhound Bus Lines station in the Town of Marathon. The samples were then shipped by bus to Accurassay Laboratories in Thunder Bay.

Accurassay Laboratories (acquired by AGAT Laboratories in 2017) has been accredited for analysis of gold, platinum, palladium, copper, nickel, and cobalt under ISO/IEC Guideline 17025 by the Standards Council of Canada and is registered under the ISO 9001:2000 quality standard.

Acme Analytical Laboratories has implemented a quality system compliant with the International Standards Organization ("ISO") 9001 Model for Quality Assurance and ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories.

It is P&E's opinion that the sample preparation, analysis, and security measures taken on this Project are adequate. The following sample preparation and analysis protocol used at Geordie was devised by Marathon PGM Corp. staff in 2006 for exploration at the Marathon Deposit and used subsequently over the following four years.

11.2.3 Laboratory Protocols

At the time of delivery, the laboratory acknowledges receipt of the sample shipment in good order. Samples were both prepared and analyzed at the Accurassay laboratory.

All samples were analyzed for Cu, Ni, Ag, Au, Pt and Pd. The following details have been extracted from Accurassay's established procedures on the Marathon PGM Corp. samples.

11.2.3.1 Sample Preparation

The samples provided to Accurassay by Marathon PGM Corp. were ½-split core samples. The samples were dried, if necessary, crushed to approximately minus 10 mesh and split into 250 g to 450 g sub-samples using a Jones Riffler. The sub-samples were then pulverized to 90% passing 150 mesh using a ring and puck pulverizer and homogenized prior to analysis. Silica sand cleaning between each sample was performed to prevent cross-contamination between samples.

11.2.3.2 Fire Assay

For flame atomic absorption spectroscopy ("AAS") determinations, preliminary concentrations for Au, Pt and Pd by fire assay (lead collection) is the preferred method. The standard operating procedure for fire assaying at Accurassay involves weighing, fluxing, fusion and cupellation of each sample.

Weighing

A 30.2 g sample mass was used for the Marathon PGM Corp. samples. Note: sample masses may have been altered to accommodate sample chemistry, if required.

A furnace load consists of 23 or 24 samples with a check done every 10th sample (by client ID), along with a blank and a Quality Control Standard. Note: duplicate checks are done on pulverized samples.

Fluxing

Samples provided to Accurassay by Marathon PGM Corp., did not require preliminary treatment and were mixed directly with the assay flux and fused. Accurassay uses a pre-mixed basic flux purchased from Reliable Industrial Supply. The composition of the flux is as follows: Litharge (PbO) 50.4%, soda ash (dense) 35.9%, borax 10%, and silica flour 3.6%. It is standard practice for laboratories to use a pre-mixed flux and adjust the ingredients when necessary.

Fusion

Samples are typically fused for 75 minutes at 1,800 to 2,000 degrees Fahrenheit. The fusion time may be increased if needed.

Cupellation

Samples are typically cupelled for 50 minutes at 1,900 degrees Fahrenheit. The cupellation time may be increased if needed.

11.2.3.3 Base Metals

For flame AAS determinations of Cu, Co, Ni, and Ag, an acid digestion, consisting of aqua regia (1 part nitric to 3 parts hydrochloric acid), is the preferred method. A sample mass of 0.25 g and a final volume of 10 mL is used for the analysis. For samples requiring a full assay digestion (mineralized zone grade); a sample mass of 2.5 g and a final volume of 250 mL is used. A full assay is required whenever the concentration of any given element is greater than 1% for any of the above noted elements.

11.2.3.4 Digestion – Precious Metals

Precious metal beads were digested using a nitric/hydrochloric acid digestion and bulked up with a 1% La2O3 solution and distilled water. The use of lanthanum in the concentration of 0.2-1.0% is an acceptable practice and complies with accepted published methods. A final volume of 3 mL was used for the analysis.

11.2.3.5 Flame Atomic Absorption Spectrometric Measurement

Accurassay uses a Varian AA240FS with manual sample introduction for the determination of Au, Pt and Pd. A Varian 220FS or 240FS with SIPS and auto-diluter is used for the determination of base metals.

Calibration standards are made up from 1,000 ppm certified stock solutions. Quality assurance ("QA") solutions are made up from separately purchased 1,000 ppm certified stock solutions. All stock solutions are prepared commercially by ISO certified suppliers.

11.2.3.6 Reporting

Laboratory reports are produced using Accurassay's local information management system ("LIMS") program. All duplicate assays are reported on the certificate of analysis. Quality control ("QC") standards and blanks are not reported unless requested by the client.

11.2.3.7 Standards

Two in-house standards (MPG1 and MPG2) were used for control of Au, Pt, Pd and Cu determinations. The standards were made up from a composite of core sample reject material provided to Accurassay by Marathon PGM Corp. from the Marathon Deposit and are representative of the metal abundances in the Coldwell Complex deposits. The values for MPG1 and MPG2 were developed by Accurassay and verified through round-robin analysis with other laboratories in Canada.

The QA sample was made in the laboratory from certified stock solutions purchased from an ISO 9000 certified supplier. The solution was made from a completely different lot number than the solutions used to calibrate standards. The quality control standards were used to monitor the processes involved in analyzing the samples. The quality assurance samples were used to verify the initial calibration of the instruments and monitor the calibration throughout the analysis.

It should be noted that although a standard or quality assurance standard may not be listed by job number on the control charts, a standard and quality assurance sample was run with each job.

11.2.4 Quality Assurance/Quality Control Program

11.2.4.1 Performance of Standards

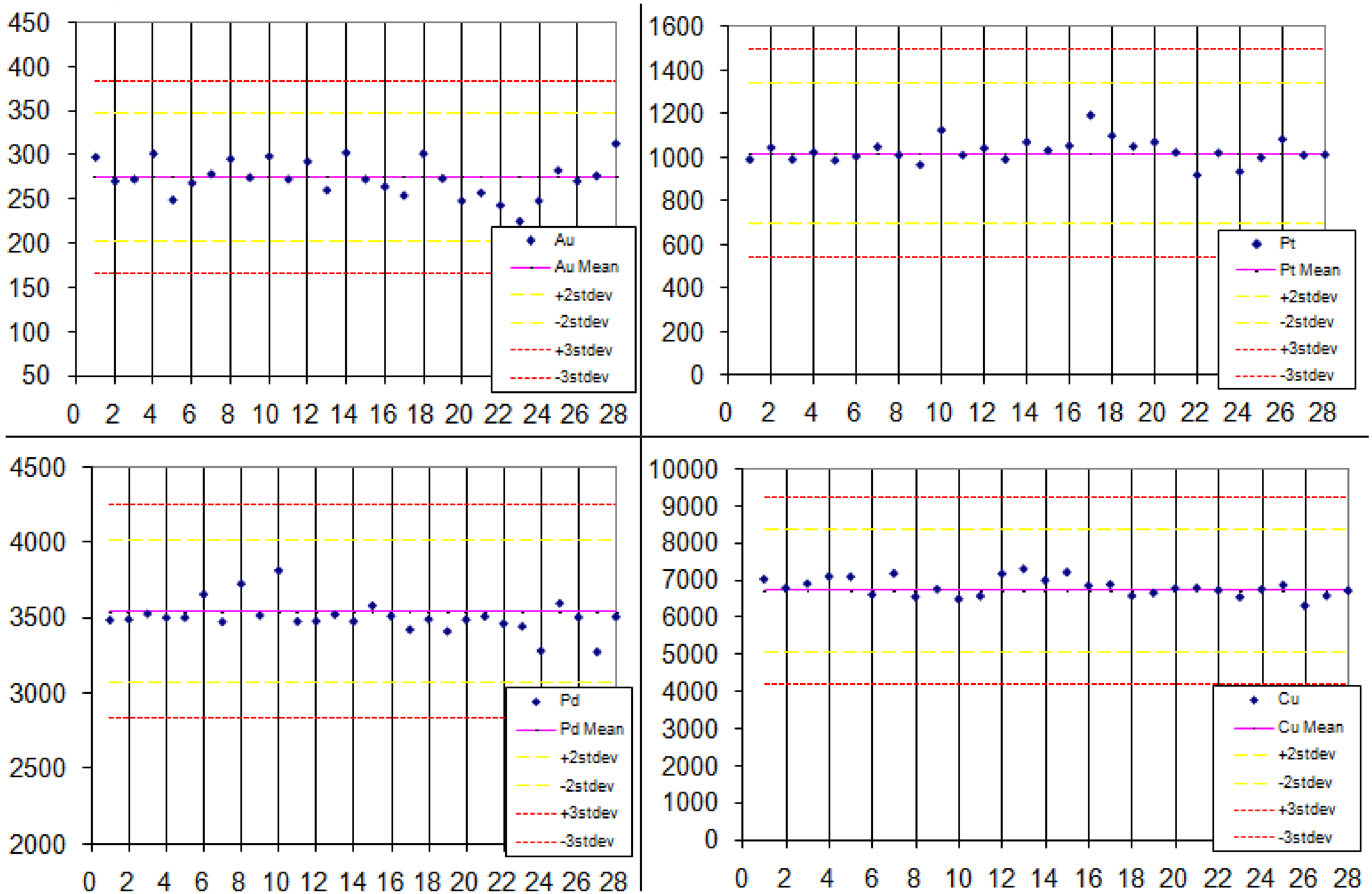
All data generated for quality control standards, blanks and duplicates are used in the validation of results. For each quality control standard, control charts are produced to monitor the performance of the laboratory. Warning limits are set at +/-2 standard deviations, and control limits are set at +/-3 standard deviations. If two consecutive data points for the quality control standards fall outside the warning limits, but within the control limits, 10% of the samples in that batch are to be re-assayed. If the results from the re-assays match the original assays the data are validated, if the re-assay results do not match the original data the entire batch is rejected, and new re-assays are performed. Any quality control standard that falls outside the control limits is automatically re-assayed and all of the initial test results are rejected.

As can be noted in the control charts (Figures 11.1 and 11.2), none of the Cu, Au or Pd results fall outside of the warning limit and only one of the Pt results falls between the warning limit and the control limit. Consequently, no action was considered necessary.

The results of the MPG1 standard tests are shown in Figure 11.1. All values are in ppb except Cu in ppm. As shown in the figure, no determination falls outside of the 2x detection limit (warning) boundary and there was no sample drift during the period.

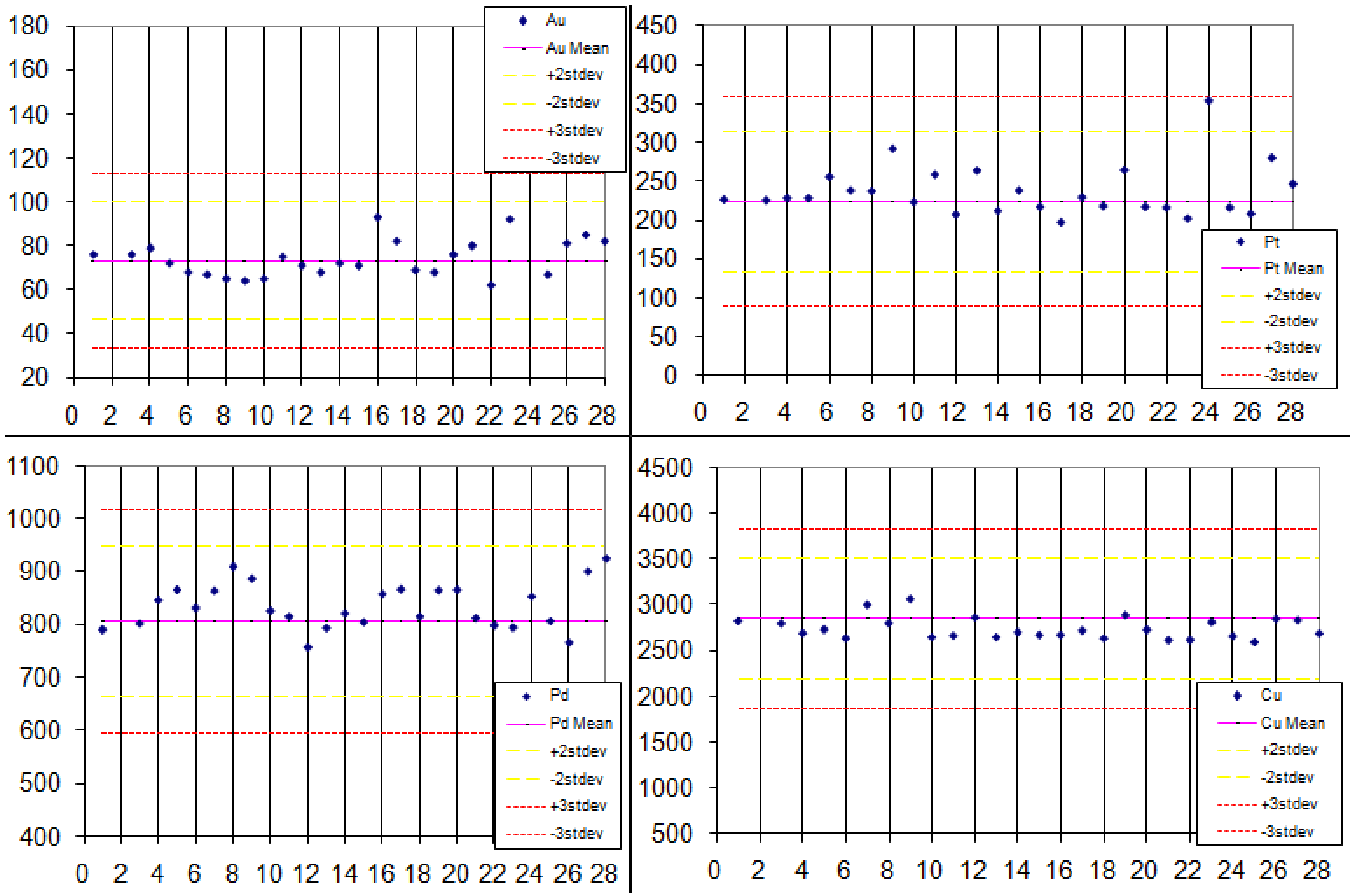
The results of the MPG2 standard tests are shown in Figure 11.2. All values are in ppb except Cu in ppm. As shown in the figure, only one determination falls outside of the 2x detection (warning) limit boundary and there was no sample drift evident during the period observed. No action was taken for the batch where Pt falls outside of the warning limit.

FIGURE 11.1 DETERMINATIONS FOR IN HOUSE STANDARD MPG1



Source: *Python (2010)*

FIGURE 11.2 DETERMINATIONS FOR IN HOUSE STANDARD MPG2



Source: *Python (2010)*

11.2.4.2 Performance of Blanks

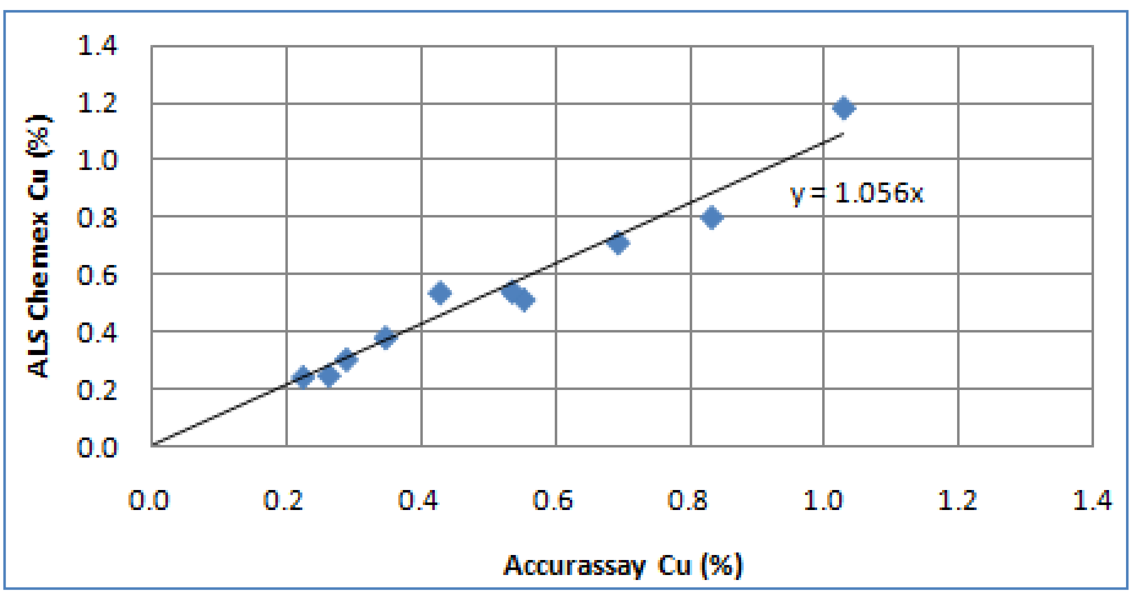
Every sample batch (consisting of 22 or 23 samples) shipped to Accurassay, contained a single blank sample. The blank material comprised 40 g of pulverized nepheline syenite, obtained from "B and L" in Thunder Bay. To verify the quality of the blank material, 10 samples were tested at ALS Chemex to ensure the viability of this material.

The results of the 56 blank sample analyses were considered excellent, with all of the Au, Pt and Pd determinations at or below the detection limits of 5, 15 and 10 parts per billion, respectively. Three blank Cu determinations returned results of 6, 7 and 46 ppm (greater than 3x the detection limit of 1 ppm), however, these elevated results are still considered acceptable levels of contamination and of no material impact. Therefore, no action was necessary for these three batches.

11.2.4.3 Performance of Pulp Duplicates

To further verify the accuracy of Cu determinations carried out by Accurassay, a total of ten pulp samples selected from the two main host rocks (units 3a and 3b), with a varying range of Cu grades, were submitted to ALS Chemex in Thunder Bay for comparison analysis. Results of the duplicate analyses are shown in Figure 11.3 and Table 11.1. Two samples returned 15% to 25% higher values from the ALS Chemex Labs, however, the results are considered acceptable.

FIGURE 11.3 COMPARISON CHART OF ALS AND ACCURASSAY CU RESULTS



Source: *Python (2010)*

TABLE 11.1
DUPLICATE PULP ANALYSES FROM ACCURASSAY AND ALS CHEMEX, THUNDER BAY, ONTARIO

Hole_ID	Sample No.	From (m)	To (m)	zone	Cu % (AA)	Cu % (ALS)	% Difference ALS-AA (%)
heterogeneous gabbro (unit 3a)							
G10-01	870004	10.00	12.00	MZ	0.55	0.51	-7.4%
G10-02	870059	66.0	68.0	MZ	0.35	0.38	9.2%
G10-03	870090	42.0	44.0	HW	0.29	0.30	4.5%
G10-04	870149	142.0	144.0	MZ	0.43	0.54	25.1%
G10-13	870620	184.00	186.00	MZ	0.69	0.71	2.8%
heterogeneous gabbro (unit 3b)							
G10-03	870084	32.0	34.0	MZ	0.54	0.54	1.1%
G10-07	870258	60.00	62.00	HW	0.26	0.25	-6.4%
G10-10	870433	180.00	182.00	MZ	1.03	1.19	15.2%
G10-11	870504	186.00	188.00	MZ	0.22	0.24	7.0%
G10-13	870618	180.00	182.00	MZ	0.83	0.80	-3.8%

Note: *ALS-AA (%) = % difference in values of ALS compared with AA.*
Source: *Python (2010)*

P&E considers the data to be of good quality and acceptable for use in the Mineral Resource Estimate.

11.3 SALLY DEPOSIT SAMPLE PREPARATION, ANALYSES AND SECURITY

11.3.1 Sampling Method and Approach

Samples are collected at 2 m intervals from all significant mineralized zones and from known mineralized rock units. Sampling is continuous wherever possible to minimize potential problems during Mineral Resource modelling. Two samples are collected before and after each mineralized domain in order to estimate dilution. The known mineralized rock units include Two Duck Lake Gabbro, breccias with TDL gabbro matrix and sulphide-bearing apatite clinopyroxenite or oxide ultramafic intrusions.

The beginning and end of each sample is marked with a wax crayon, and then a sample tag is placed at the beginning of each sample. The core is also marked with a line along the length of the core to indicate where the core is to be halved. The core is then cut in half using a wet saw with a diamond blade. One half is sent for assay and the other half remains in the box as a permanent record. The duplicate samples are prepared by splitting the remaining halved core leaving only quartered core in the box.

P&E considers the sampling methods from the current and past drilling programs to be satisfactory.

11.3.2 Sample Preparation, Analyses and Security

The samples are sent to ALS Minerals sample preparation facility in Thunder Bay. Pulp sample material is then sent to the Vancouver ALS facility for analysis. ALS operates with a quality management system and complies with the requirements of ISO 9001:2008. The quality management system of ALS is audited both internally and by external parties.

The samples are prepared and sent for multi-element analyses (Table 11.2).

TABLE 11.2
SAMPLE ANALYSIS METHODS

Procedure	Description	Element Analyzed and Range (ppm)		
Prep 31	Crush to 70% less than 2 mm, riffle split off 250 g, pulverize split to better than 85% passing 75 microns.			
PGM-ICP23	Pt, Pd and Au by fire assay and ICP-AES finish. 30 g nominal sample weight	Pt 0.005-10 Pd 0.001-10 Au 0.001-10		
ME-ICP41	Aqua Regia Digestion – first pass exploration tool, dissolution of base metals	Ag 0.2-100 W 10-10,000 Ca 0.01%-25% La 10-10,000 Sb 2-10,000 Zn 2-10,000 Cd 0.5-1,000 Mg 0.01%-25% Sc 1-10,000 Co 1-10,000 Mn 5-50,000 Sr 1-10,000	Al 0.01%-25% Cr 1-10,000 Mo 1-10,000 Th 20-10,000 As 2-10,000 Cu 1-10,000 Na 0.01%-10% Ti 0.01%-10% B 10-10,000 Fe 0.01%-50% Ni 1-10,000 Tl 10-10,000	Ba 10-10,000 Ga 10-10,000 P 10-10,000 U 10-10,000 Be 0.5-1,000 Hg 1-10,000 Pb 2-10,000 V 1-10,000 Bi 2-10,000 K 0.01%-10% S 0.01%-10%
OG46-OL	Aqua regia is a powerful solvent for sulphides, which dissolves Ag and base metals but may not completely dissolve more resistive elements. Minimum sample weight 0.5 g	Ag 1-1,500 ppm Co 0.001-20 Mn 0.01-50 Pb 0.001-20 As 0.01-60 Cu 0.001-40 Mo 0.001-10	S 0.01-10 Cd 0.001-10 Fe 0.01-100 Ni 0.001-10 Zn 0.001-30 Ag 1-1,500 ppm Bi 0.001-30	Fe 0.01-100 Pb 0.001-30 As 0.01-30 Cu 0.001-50 Mo 0.001-10 Zn 0.001-60
S-IR08 OL for S > 10%	Total sulphur by combustion furnace.	Total S 0.01% - 50%		

Source: *Geochemistry Service Schedule (2013)*

It is P&E's opinion that the sample preparation, analysis, and security measures taken on this Project are adequate and the data is of good quality and acceptable for use in the Mineral Resource Estimate.

11.3.3 2013-2017 Quality Assurance/Quality Control Program

Quality Control/Quality Assurance ("QA/QC" or "QC") from the 2013 drill program through 2017 is established by means of an internal quality management system with a rotating sequence of duplicates, blanks and standards that are inserted for every 15th sample.

The blanks are created in-house using granular nepheline syenite sand purchased from Bell and Mackenzie Ltd (Thunder Bay). Baggies of 'blank' material are prepared in a clean environment.

11.3.3.1 Performance of Standards

Two standards (MPG1 and MPG2) were prepared and certified by Accurassay Laboratories in 2008 and used during the 2013 through 2017 programs. The certified results for standards MPG1 and MPG2 are shown in Tables 11.3 and 11.4.

The standards were prepared from sample rejects collected from drilling the Marathon Property in 2007 and 2008. The preparation and certification procedures used for MPG1 and MPG2 are described in an article by Wesley M. Johnson, in the Geostandards Newsletter, Vol. 15, No. 1, April 1991, p. 23 to 31, entitled "Use of Geochemical Reference Materials In A Quality Control/Quality Assurance Program".

TABLE 11.3
STANDARD MPG1

Element	Average (ppb)	Standard Deviation (ppb)
Pd	3,538	236
Pt	1,019	160
Au	275	36
Cu	6,715	835
Ni	444	33
Co	70	5

Note: *Au = gold, Cu = copper, Co = cobalt, Ni = nickel, Pd = palladium, Pt = platinum.*

TABLE 11.4 STANDARD MPG2		
Element	**Average (ppb)**	**Standard Deviation (ppb)**
Au	70	13
Pt	223	45
Pd	805	71
Cu	2,853	329
Ni	318	28
Co	85	8

Note: *Au = gold, Cu = copper, Co = cobalt, Ni = nickel, Pd = palladium, Pt = platinum.*

The analyses for elements Au, Pt, Pd, Ag and Cu for standards MPG1 and MPG2 are plotted in Figures 11.4 to 11.13.

The mean value, standard deviation and lower and upper working limits (2 standard deviations from the average) of both the MPG1 and MPG2 standards are presented in Tables 11.5 and 11.6.

TABLE 11.5
MPG1 CONTROL LIMITS

	Au (ppm)	**Pt (ppm)**	**Pd (ppm)**	**Ag (ppm)**	**Cu (ppm)**	**Ni (ppm)**	**S (%)**
Average	0.261	0.914	3.334	3.320	6982.89	375.495	1.115
Standard Deviation	0.056	0.101	0.203	0.268	339.049	19.2712	0.0593
Lower Working Limit	0.149	0.712	2.928	2.784	6304.792	336.9526	0.9964
Upper Working Limit	0.372	1.116	3.740	3.856	7660.98	414.037	1.233

Note: *Ag = silver, Au = gold, Cu = copper, Ni = nickel, Pd = palladium, Pt = platinum, S = sulphur.*

TABLE 11.6
MPG2 CONTROL LIMITS

	Au (ppm)	Pt (ppm)	Pd (ppm)	Ag (ppm)	Cu (ppm)	Ni (ppm)	S (%)
Average	0.0835	0.2503	0.8337	1.2396	2860.879	277.6593	1.1777
Standard Deviation	0.0409	0.0883	0.0992	0.2043	130.0568	13.0896	0.0612
Lower Working Limit	0.0017	0.0737	0.6353	0.831	2600.7653	251.4801	1.0553
Upper Working Limit	0.1653	0.4270	1.0322	1.6482	3120.993	303.8386	1.3002

Note: *Ag = silver, Au = gold, Cu = copper, Ni = nickel, Pd = palladium, Pt = platinum, S = sulphur.*

As can be noted in Figure 11.4, there are some outliers beyond the upper control limit (example point 5229); however, individual outliers are isolated to a specific element and did not fail for all tested elements in the same sample. In addition, inspection of the internal standard data determined by routine ALS procedure verified the analyses are sound and no further action was taken. There is a strong confidence for the analysis as data falls within the 95% confidence interval as seen in Figures 11.4 to 11.13, and there is no systematic bias either above or below the recommended values, nor is there temporal variation in the data.

FIGURE 11.4 PERFORMANCE OF MPG1 FOR AU

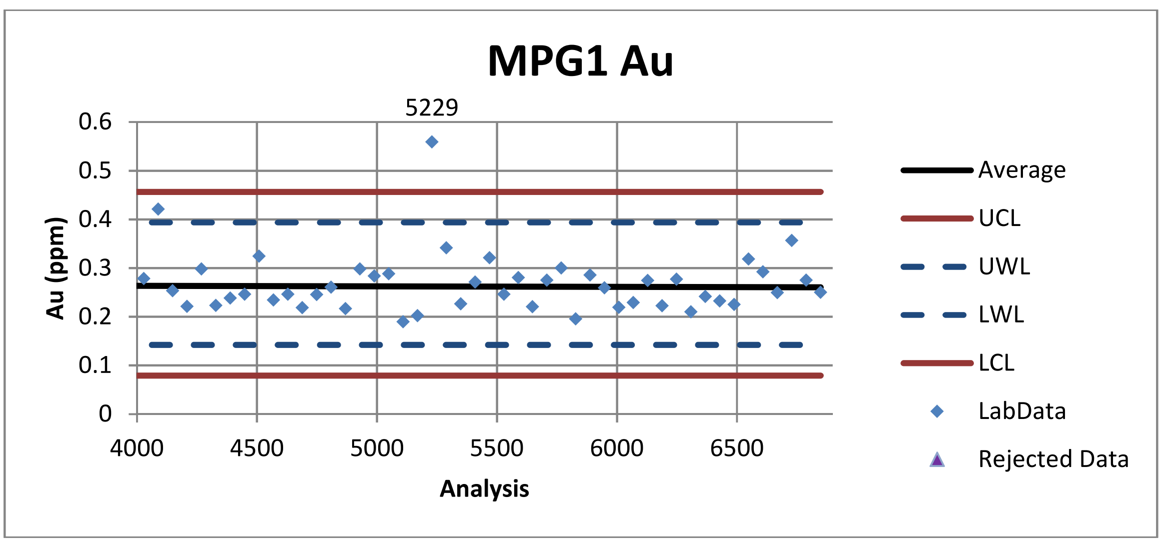


FIGURE 11.5 PERFORMANCE OF MPG1 FOR PT

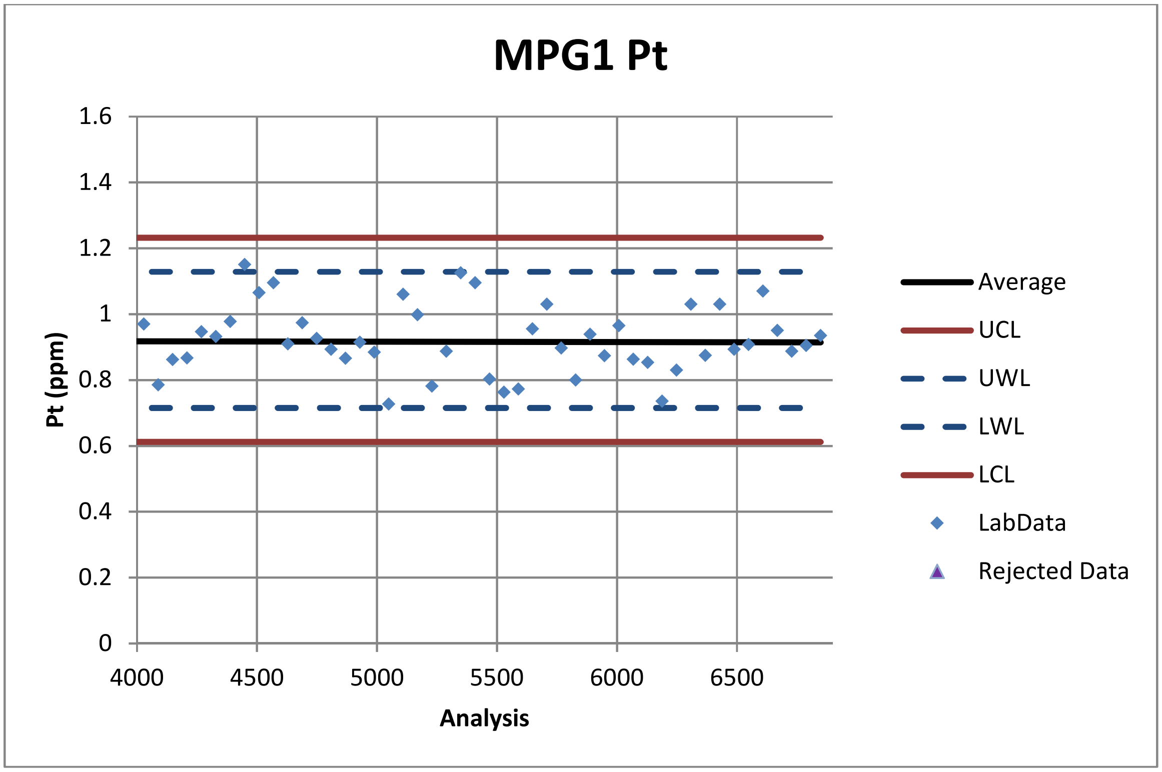


FIGURE 11.6 PERFORMANCE OF MPG1 FOR PD

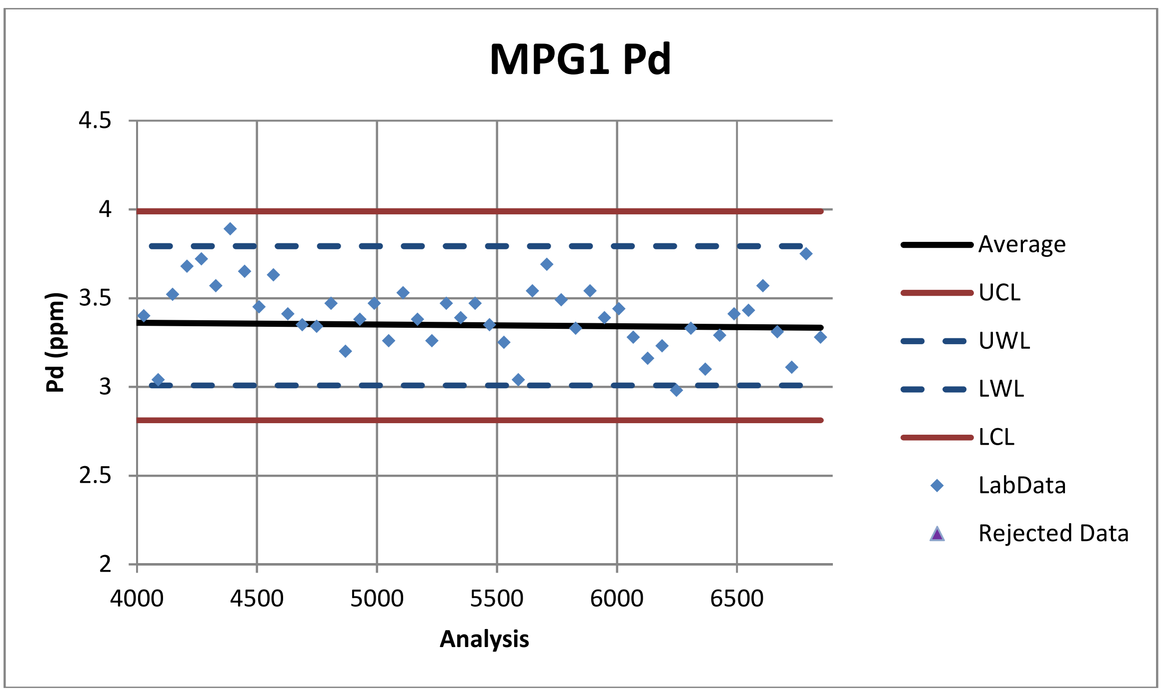


FIGURE 11.7 PERFORMANCE OF MPG1 FOR AG

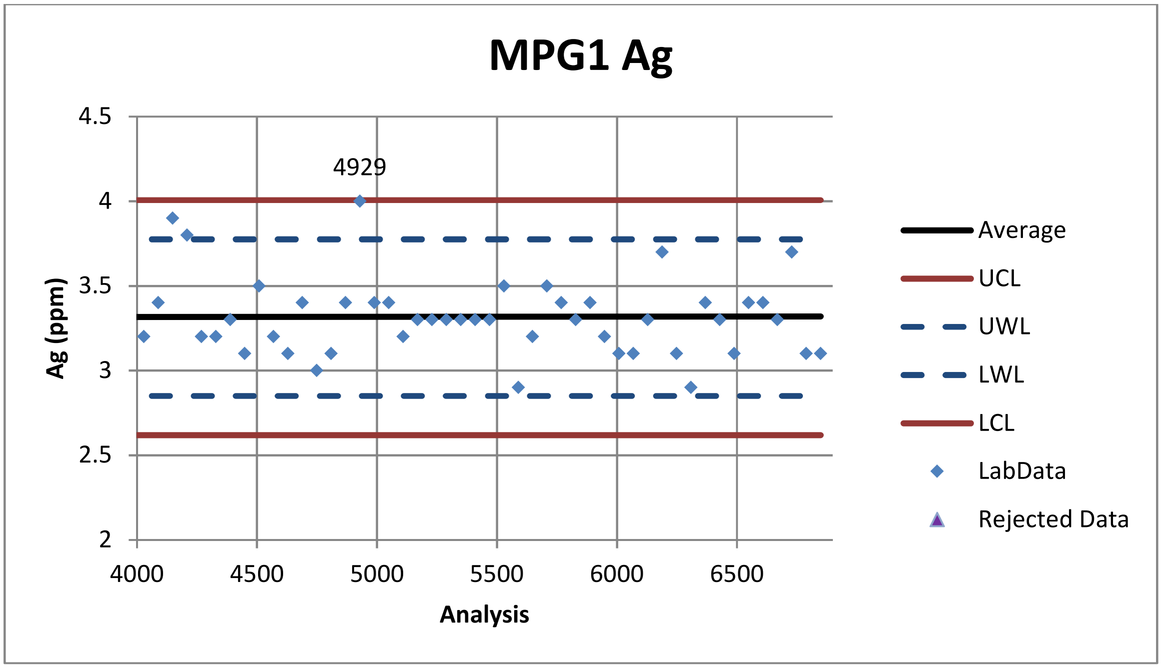


FIGURE 11.8 PERFORMANCE OF MPG1 FOR CU

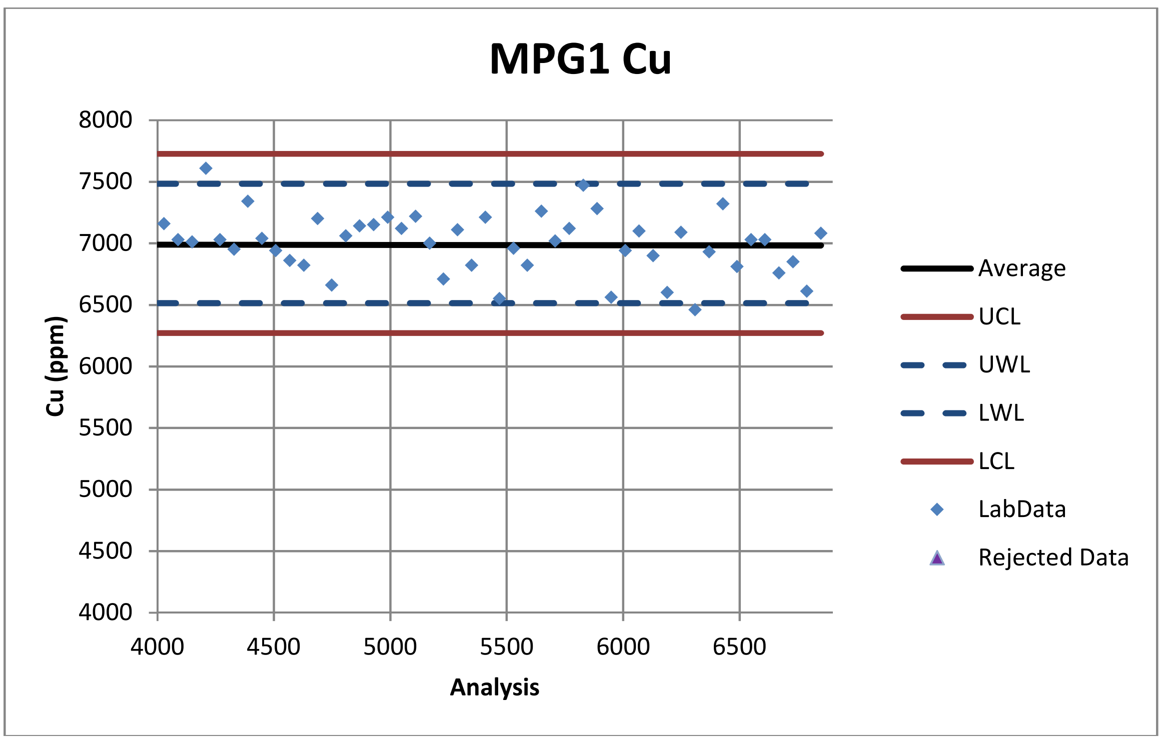


FIGURE 11.9 PERFORMANCE OF MPG2 FOR AU

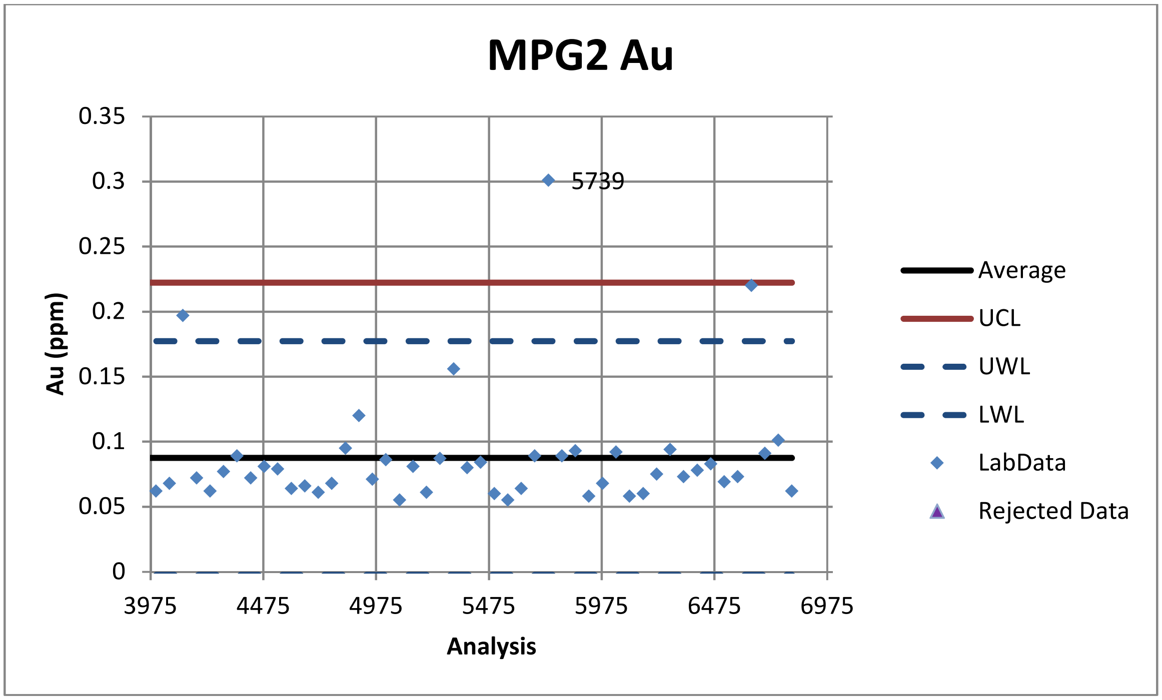


FIGURE 11.10 PERFORMANCE OF MPG2 FOR PT

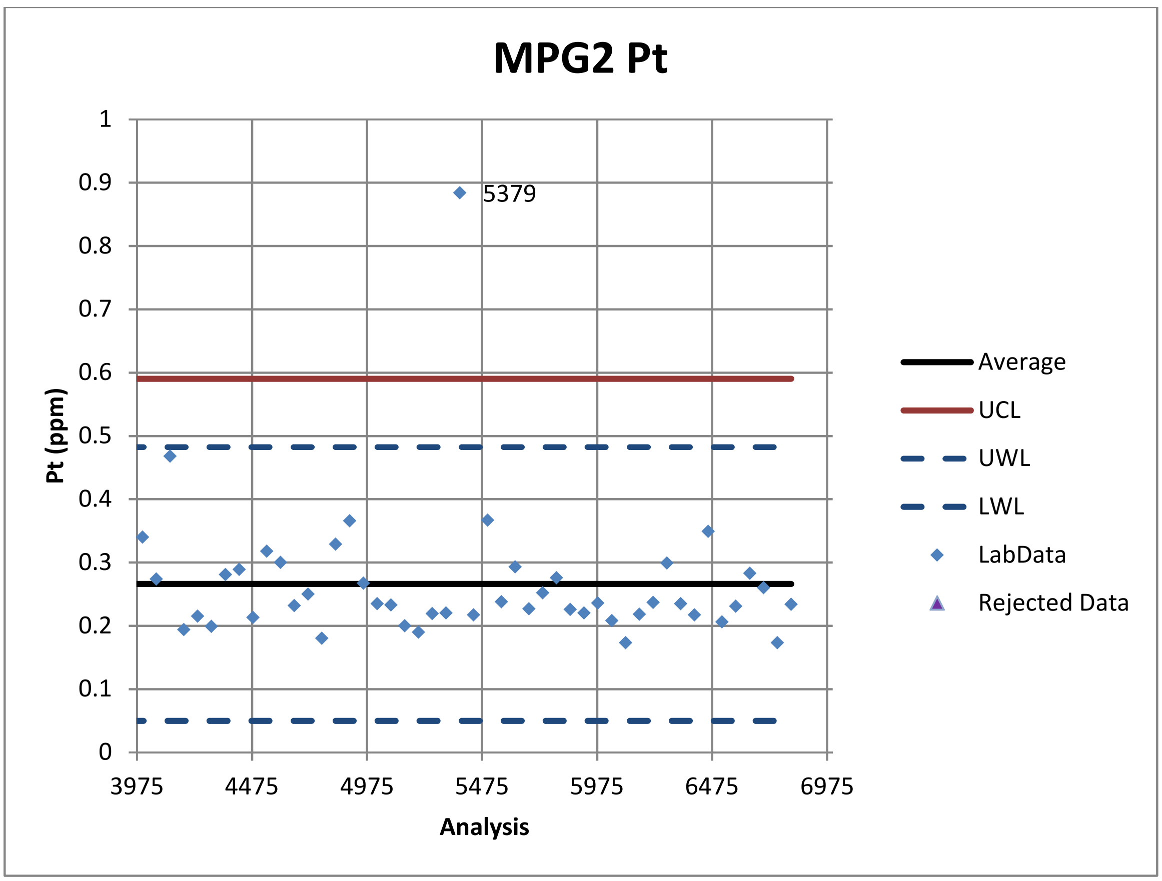


FIGURE 11.11 PERFORMANCE OF MPG2 FOR PD

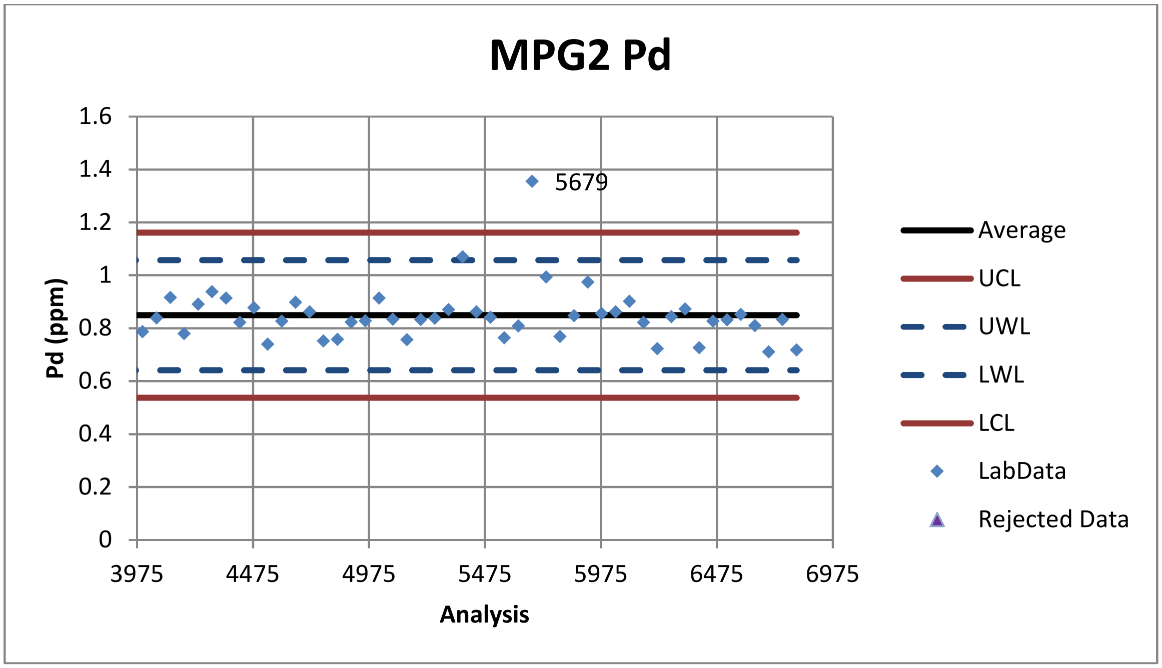


FIGURE 11.12 PERFORMANCE OF MPG2 FOR AG

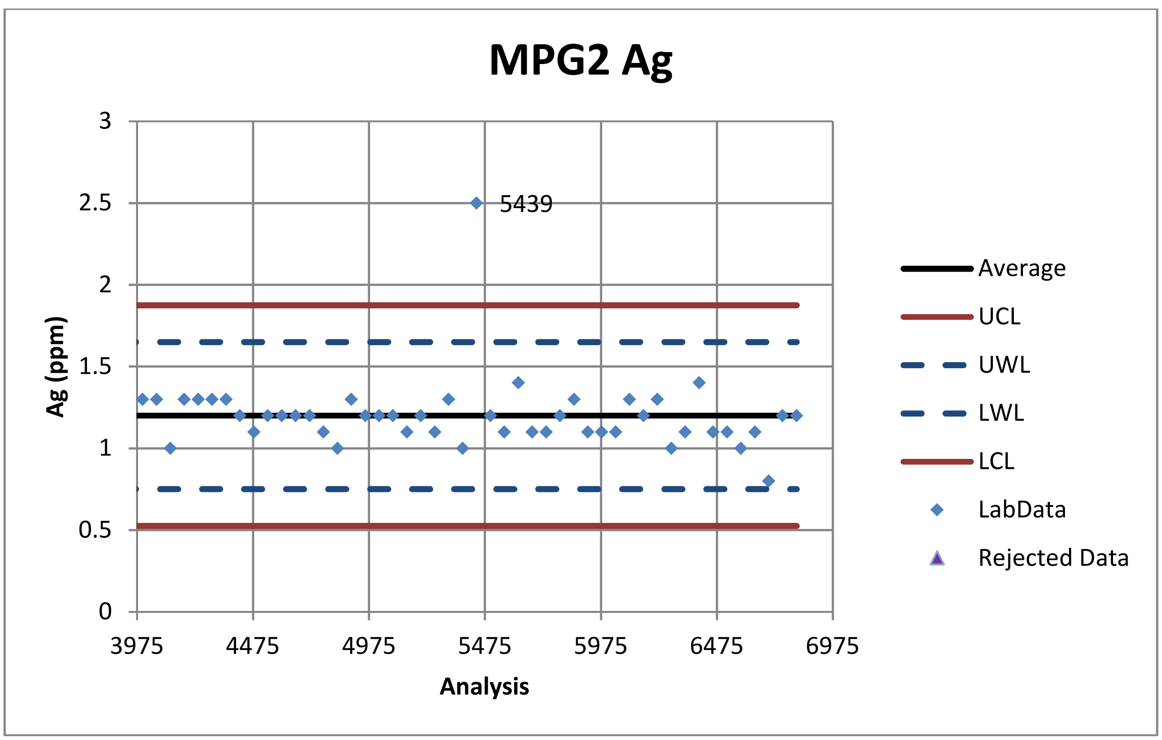
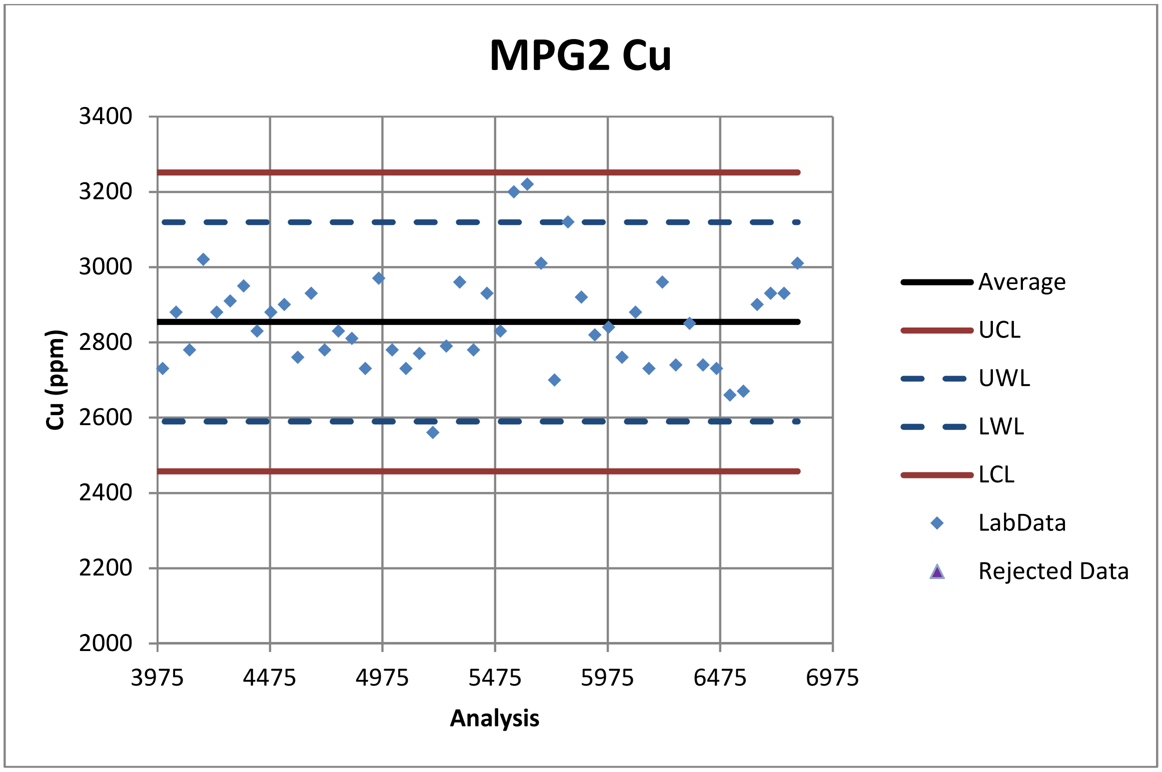


FIGURE 11.13 PERFORMANCE OF MPG2 FOR CU



11.3.3.2 Performance of Blanks

The blanks are created in-house using granular nepheline syenite sand purchased from Bell and Mackenzie Ltd (Thunder Bay). Baggies of 'blank' material are prepared in a clean environment.

The mean value, standard deviation and upper working limits (2 standard deviations from the average) of the blank material are presented in Table 11.7.

The results of the blank sample analyses (Figures 11.14 to 11.18) are considered excellent, with the vast majority of the Au, Pt, Pd, Ag and Cu determinations falling below the respective upper working limit of two times the standard deviation of the mean of each element. The occasional result falling above the upper working limit (as with sample 8621 in Figure 11.15) is not considered to be of material impact to the Mineral Resource Estimate and contamination is not considered to be an issue in the 2013 data.

TABLE 11.7
BLANK CONTROL LIMITS

	Au (ppm)	Pt (ppm)	Pd (ppm)	Ag (ppm)	Cu (ppm)	Ni (ppm)	S (%)
Average	0.0013	0.0028	0.0011	0.1096	8.0593	2.9765	0.0176
Standard Deviation	0.0019	0.0009	0.0012	0.0327	8.7975	10.5980	0.0414
Upper Working Limit	0.0051	0.0046	0.0034	0.1751	25.6543	24.1726	0.1004

Note: *Ag = silver, Au = gold, Cu = copper, Ni = nickel, Pd = palladium, Pt = platinum, S = sulphur.*

FIGURE 11.14 PERFORMANCE OF BLANK FOR AU

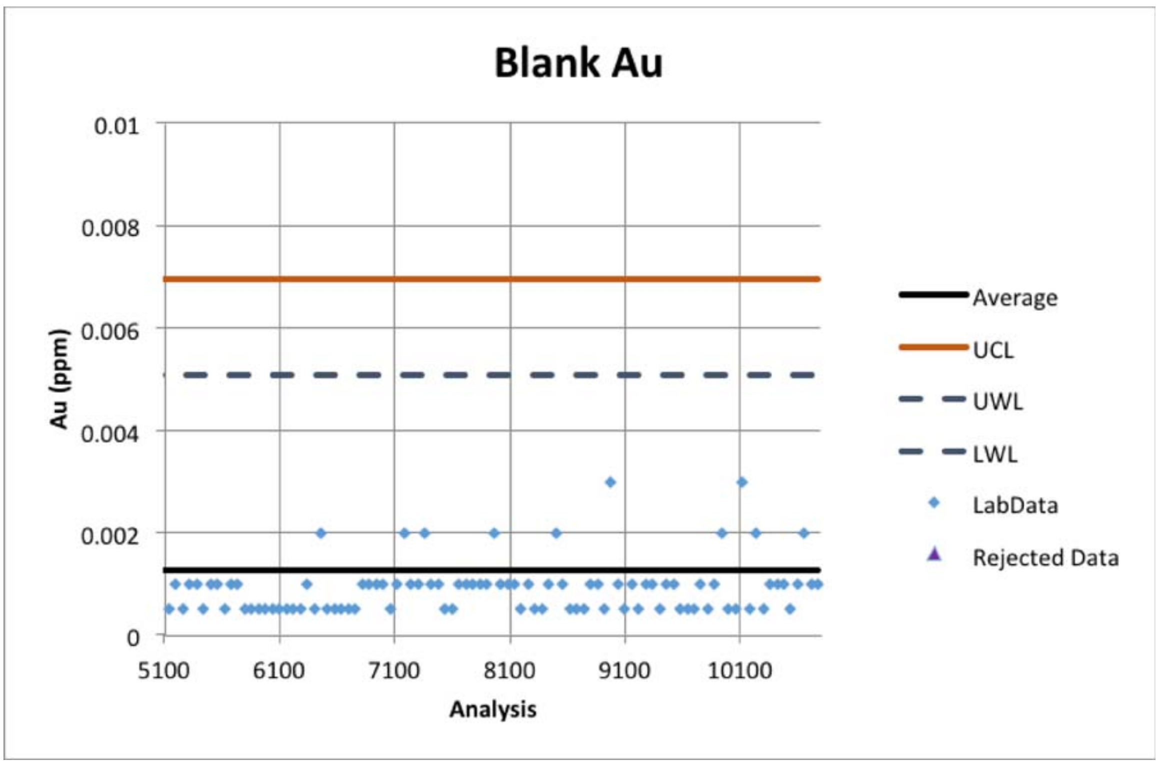


FIGURE 11.15 PERFORMANCE OF BLANK FOR PT

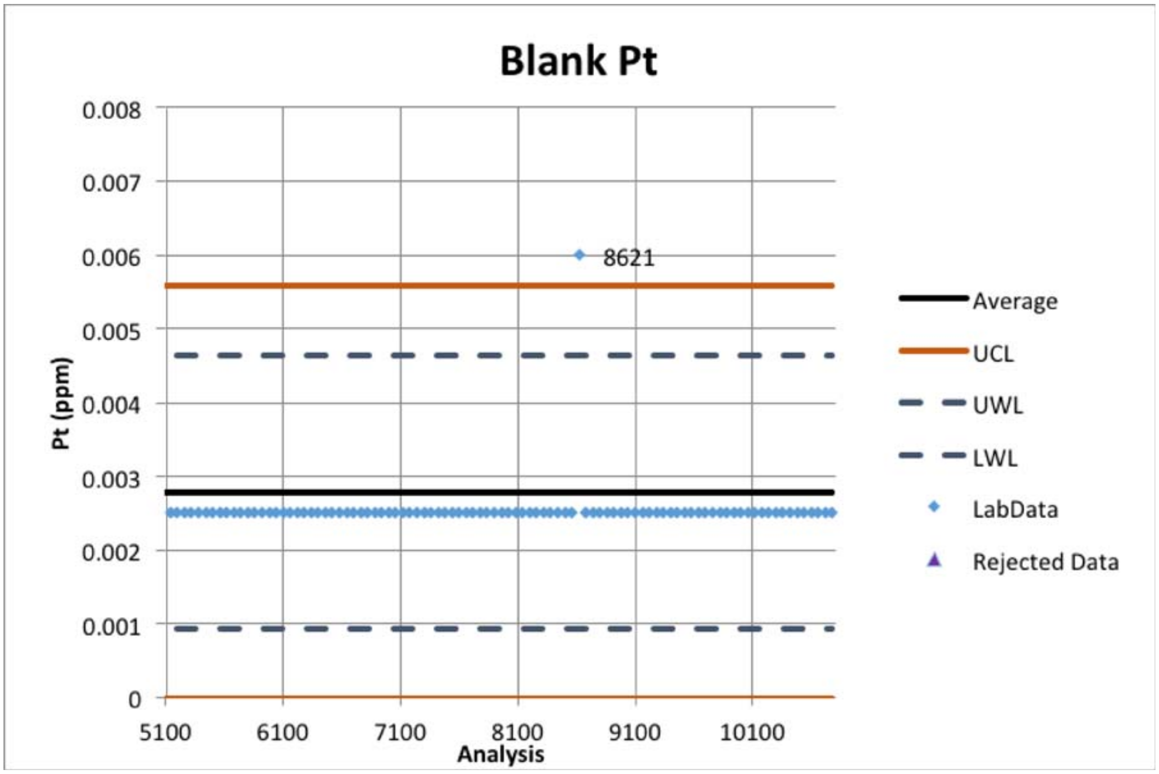


FIGURE 11.16 PERFORMANCE OF BLANK FOR PD

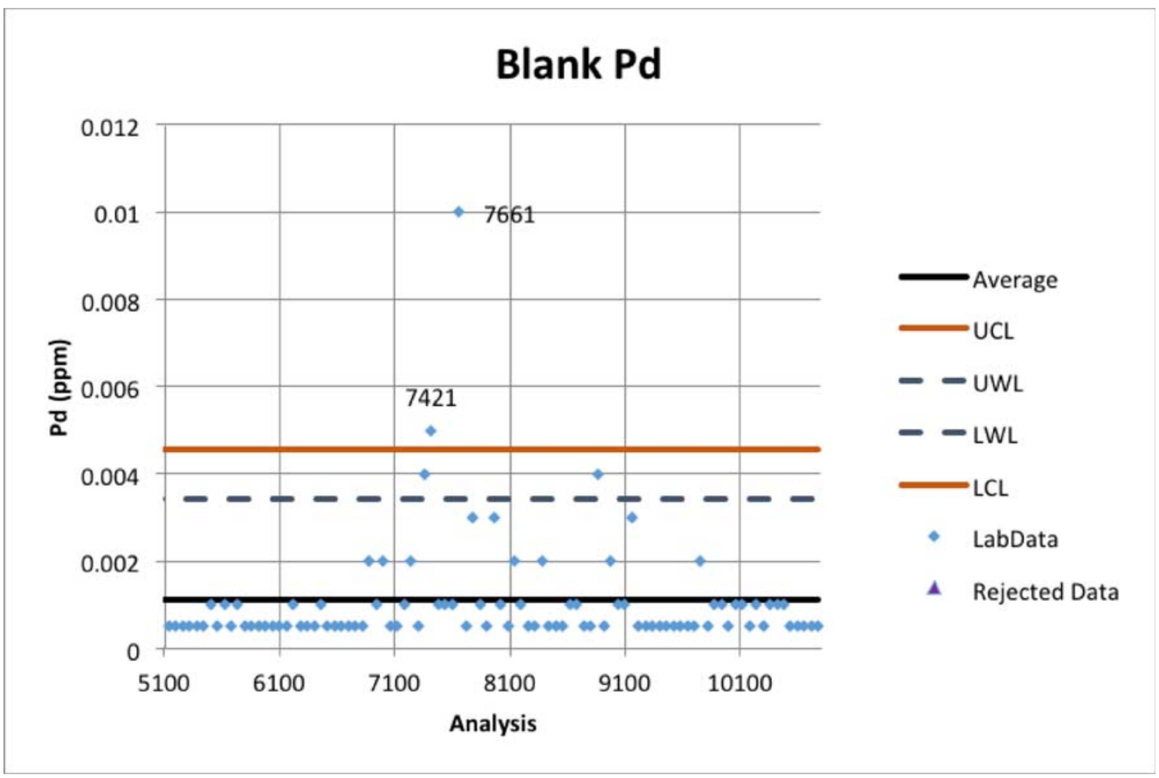


FIGURE 11.17 PERFORMANCE OF BLANK FOR AG

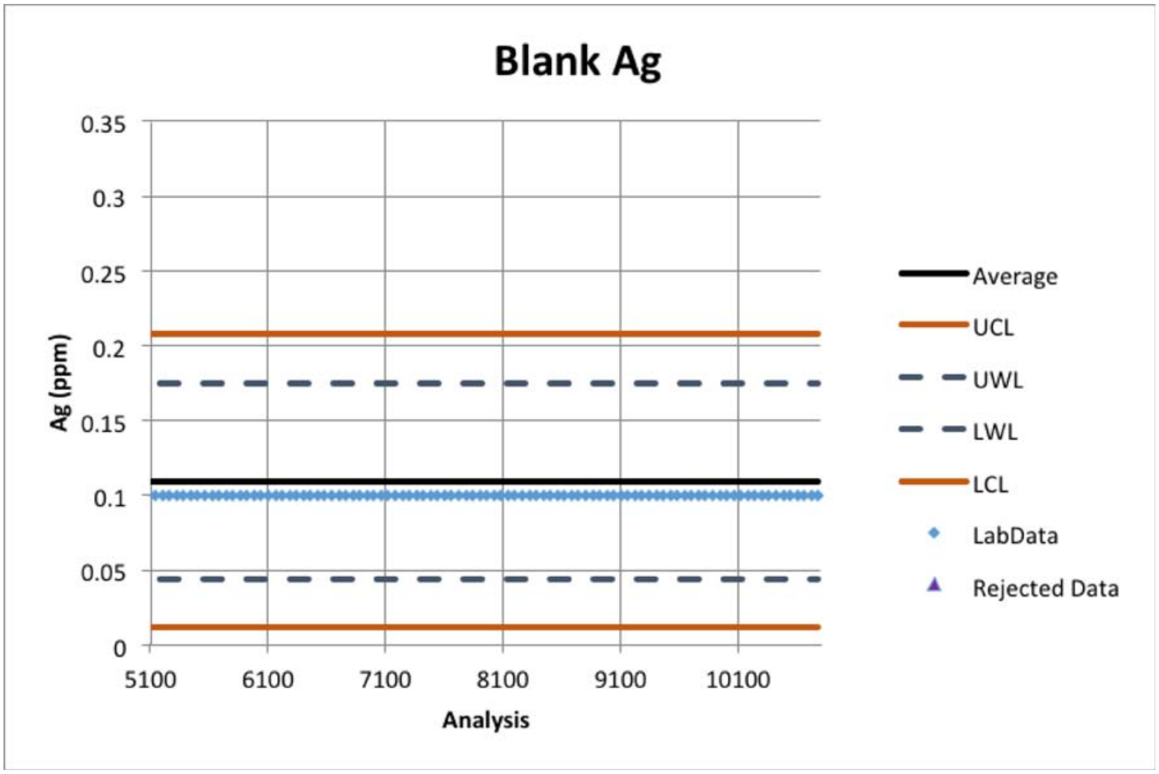
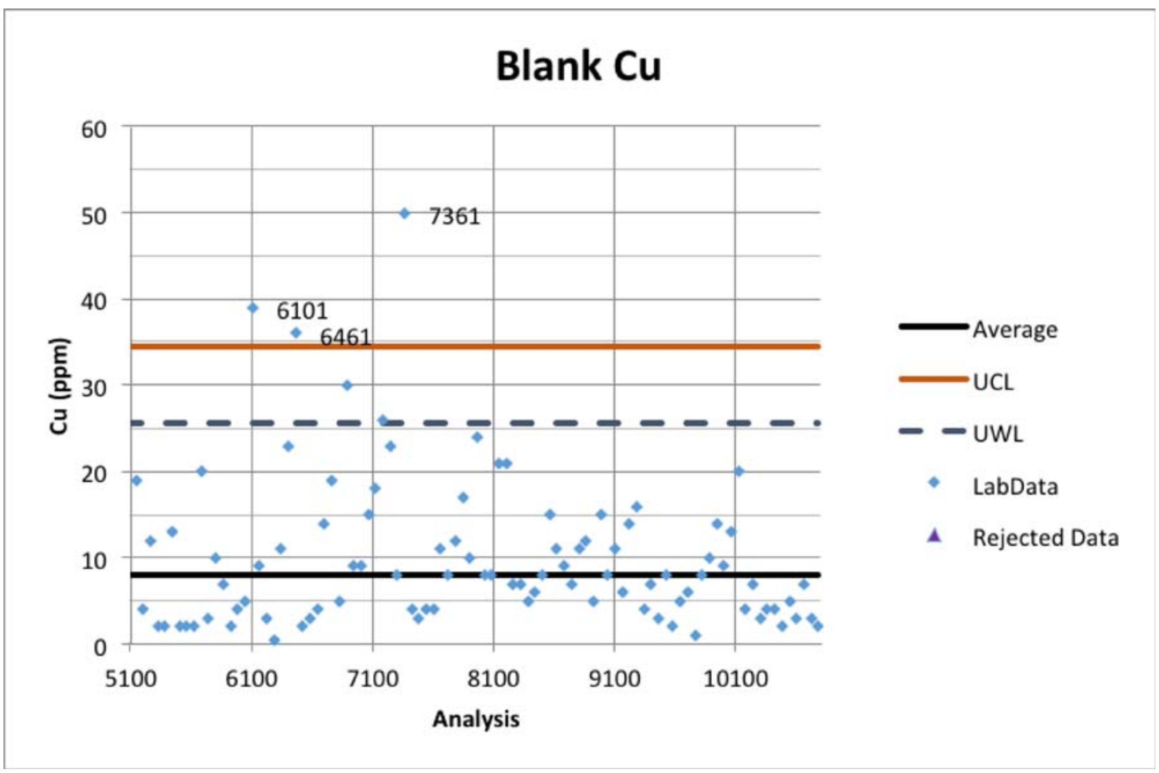


FIGURE 11.18 PERFORMANCE OF BLANK FOR CU



11.3.3.3 Performance of Field Duplicates

The field duplicate data is represented in Table 11.8 and the duplicate sample results are plotted in Figures 11.19 through 11.23 for each element including: Au, Pt, Pd, Ag, Cu, Ni and S. A best-fit line is calculated for each element, as well as the R-squared value. There is a strong confidence in the data, with all R-squared values greater than 89%.

TABLE 11.8
FIELD DUPLICATE CONTROL LIMITS

	Au (ppm)	Pt (ppm)	Pd (ppm)	Ag (ppm)	Cu (ppm)	Ni (ppm)	S (%)
Average	0.0195	0.0489	0.0854	0.3417	825	124.1472	0.3048
Standard Deviation	0.0391	0.1054	0.1771	0.3329	909.051	164.5228	0.3599
R Squared	0.899	0.8933	0.9508	0.911	0.9551	0.9874	0.944

Note: *Ag = silver, Au = gold, Cu = copper, Ni = nickel, Pd = palladium, Pt = platinum, S = sulphur.*

FIGURE 11.19 PERFORMANCE OF FIELD DUPLICATES FOR AU

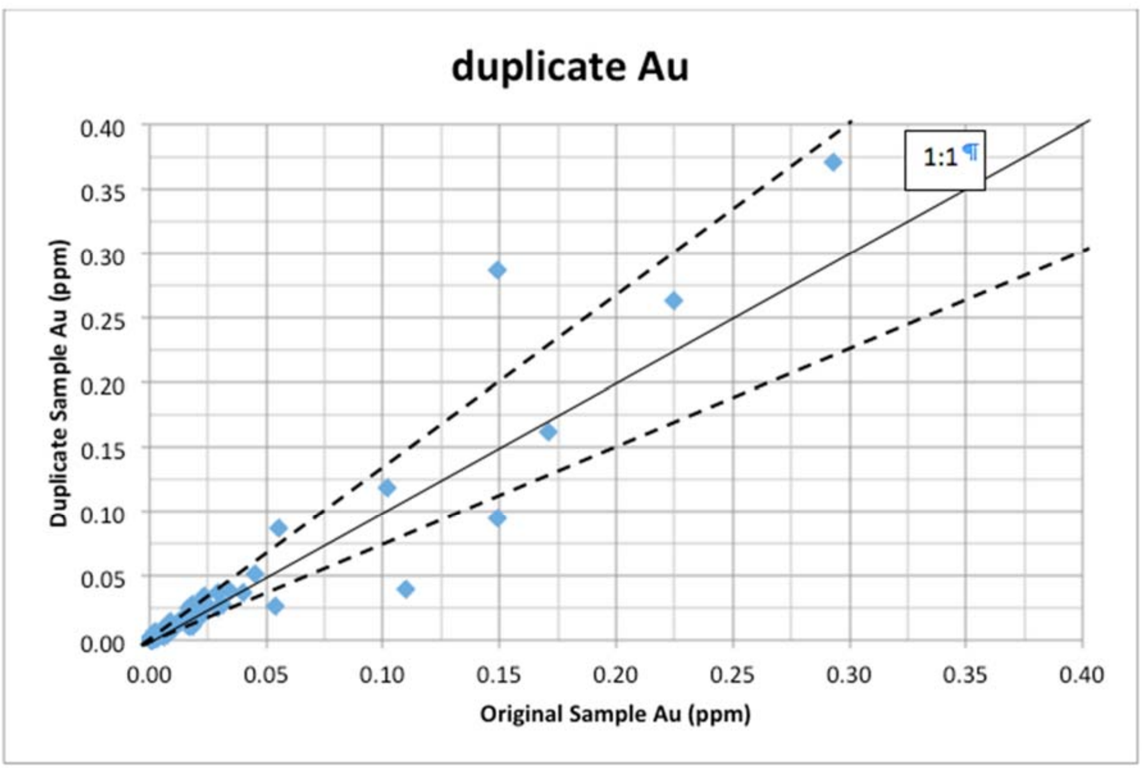


FIGURE 11.20 PERFORMANCE OF FIELD DUPLICATES FOR PT

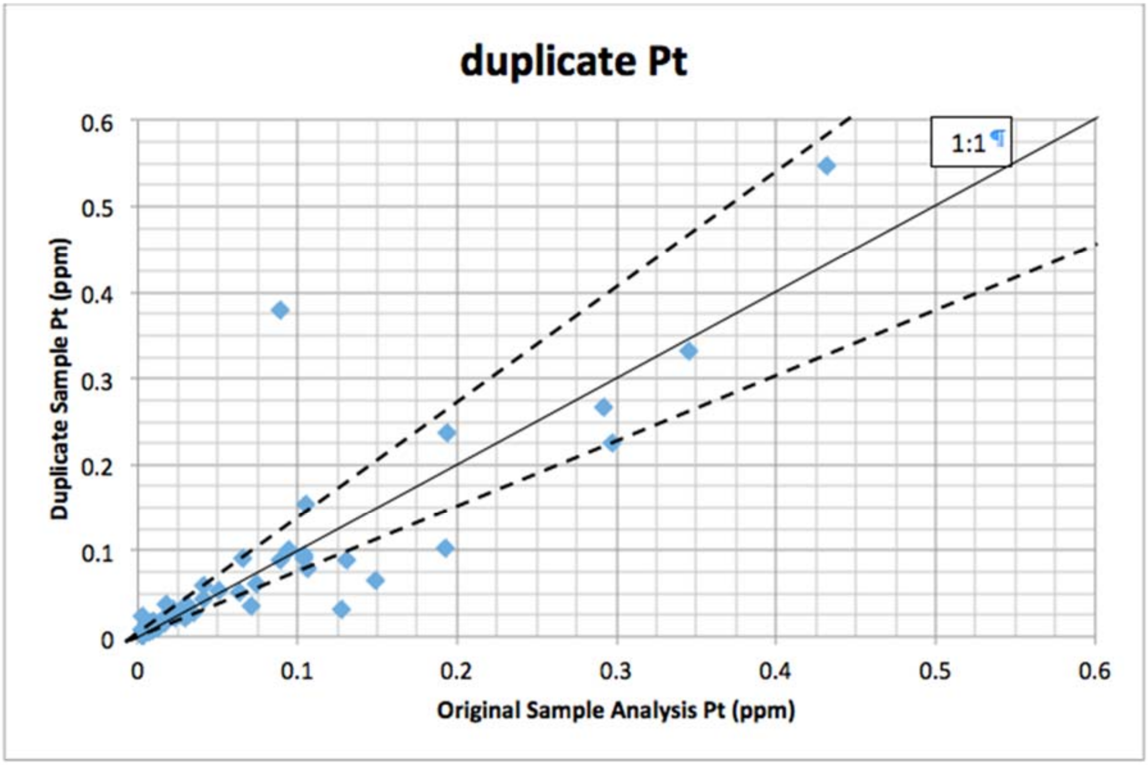


FIGURE 11.21 PERFORMANCE OF FIELD DUPLICATES FOR PD

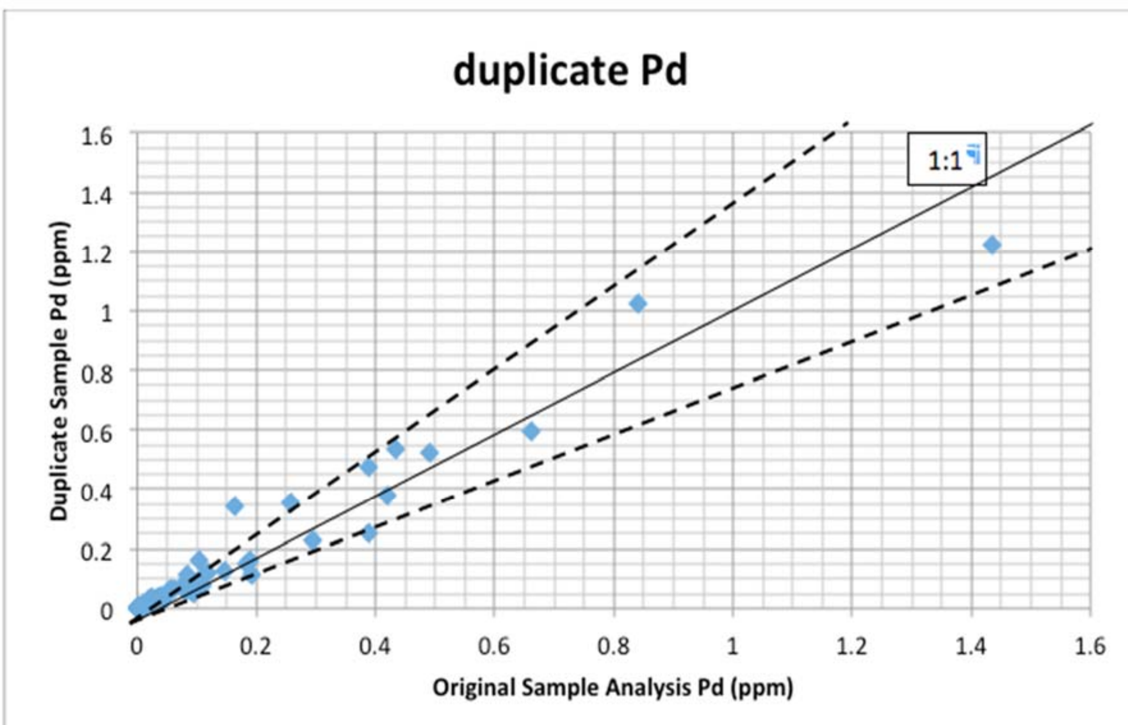


FIGURE 11.22 PERFORMANCE OF FIELD DUPLICATES FOR AG

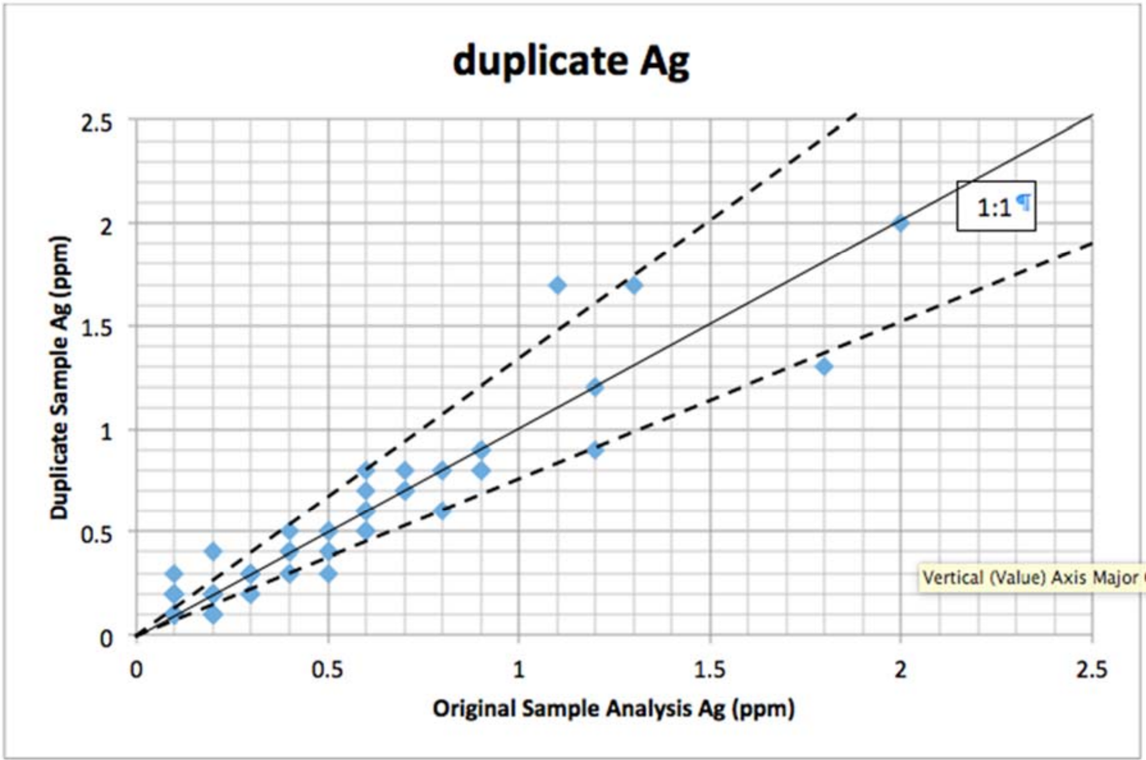
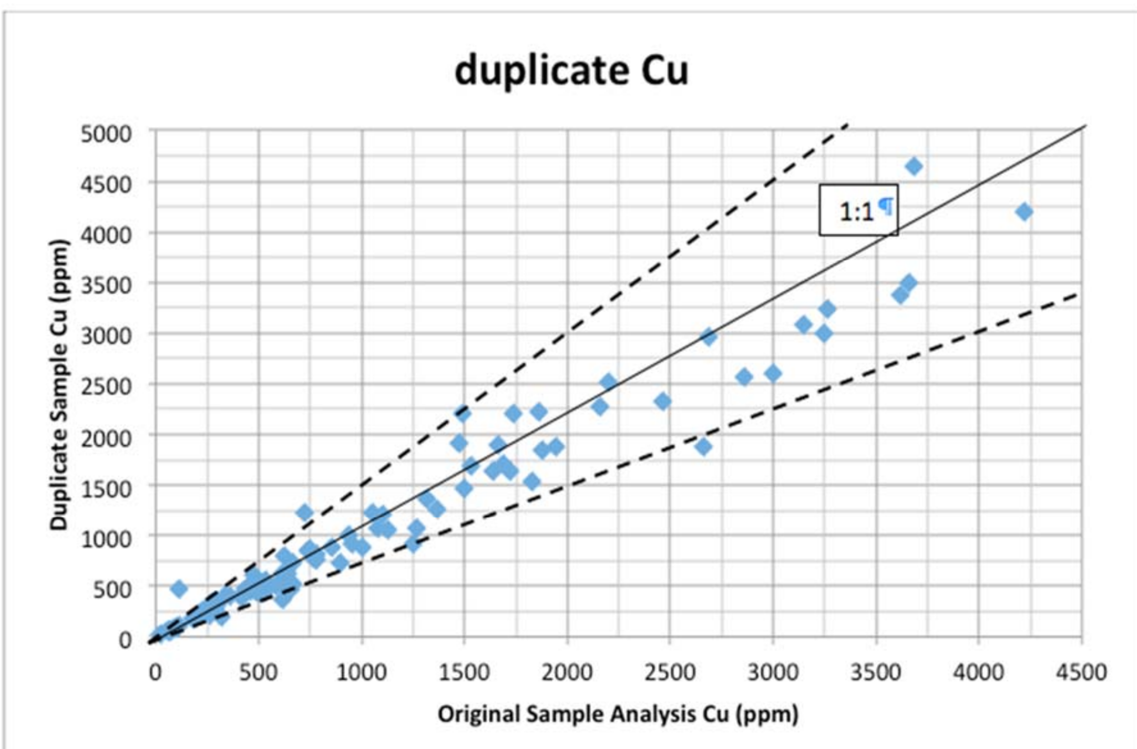


FIGURE 11.23 PERFORMANCE OF FIELD DUPLICATES FOR CU



P&E considers the data to be of good quality and acceptable for use in the Mineral Resource Estimate.

11.3.4 2017 Quality Assurance/Quality Control Program

11.3.4.1 Performance of Standards

The analyses for elements Au, Pt, Pd, Ag and Cu for standards MPG1 and MPG2 are plotted in Figures 11.24 to 11.33.

Some outliers beyond the set control limits can be noted; however, the overall performance of both standards, for all elements, is excellent and no bias or temporal variation in the 2017 data is noted.

FIGURE 11.24 PERFORMANCE OF MPG1 AU

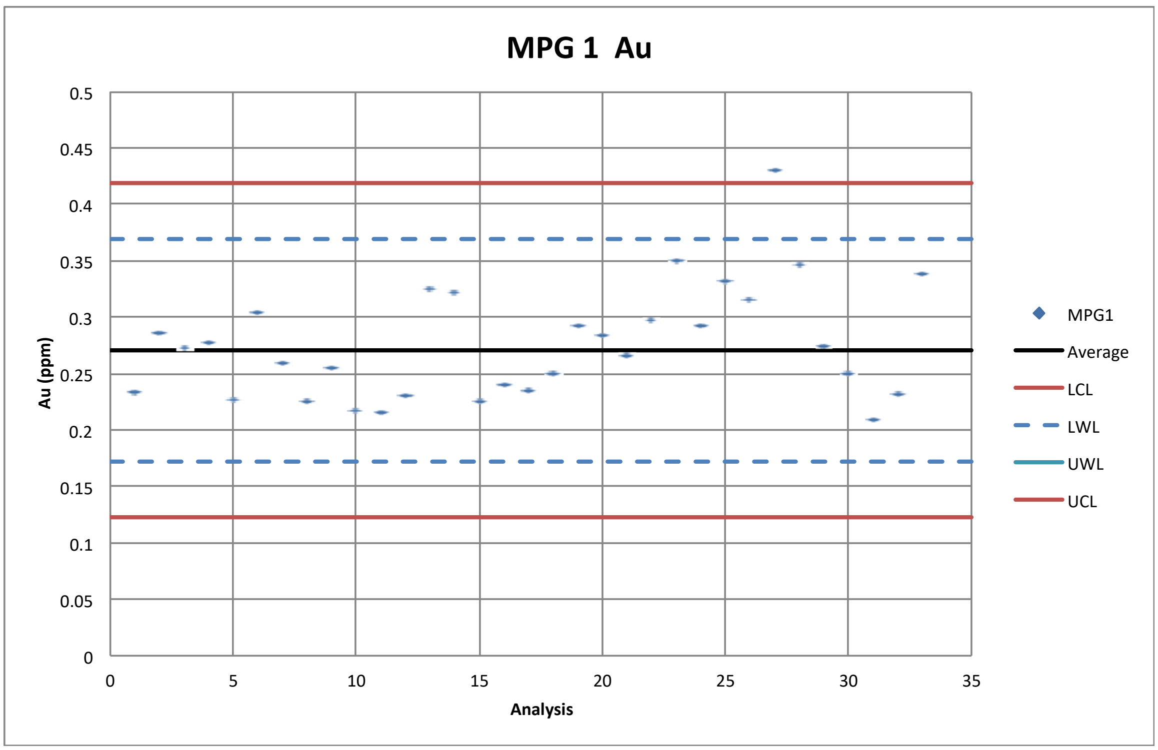


FIGURE 11.25 PERFORMANCE OF MPG1 FOR PT

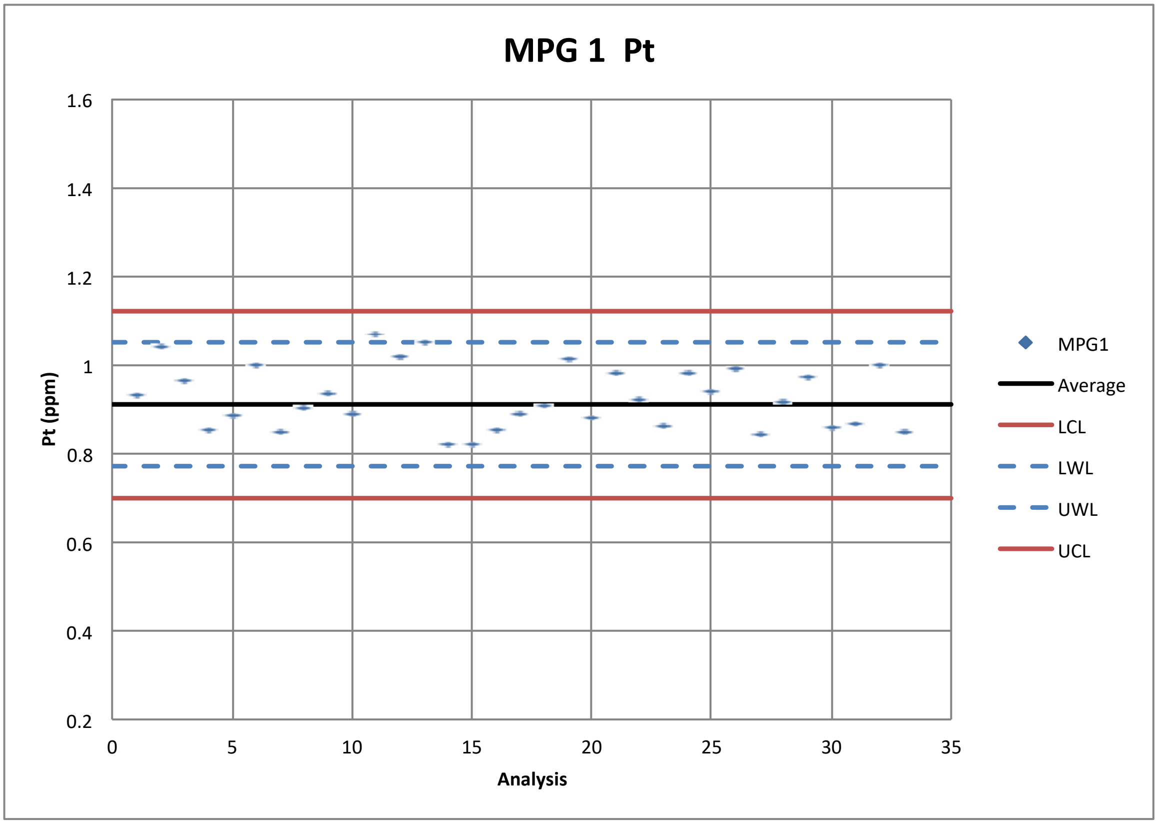


FIGURE 11.26 PERFORMANCE OF MPG1 FOR PD

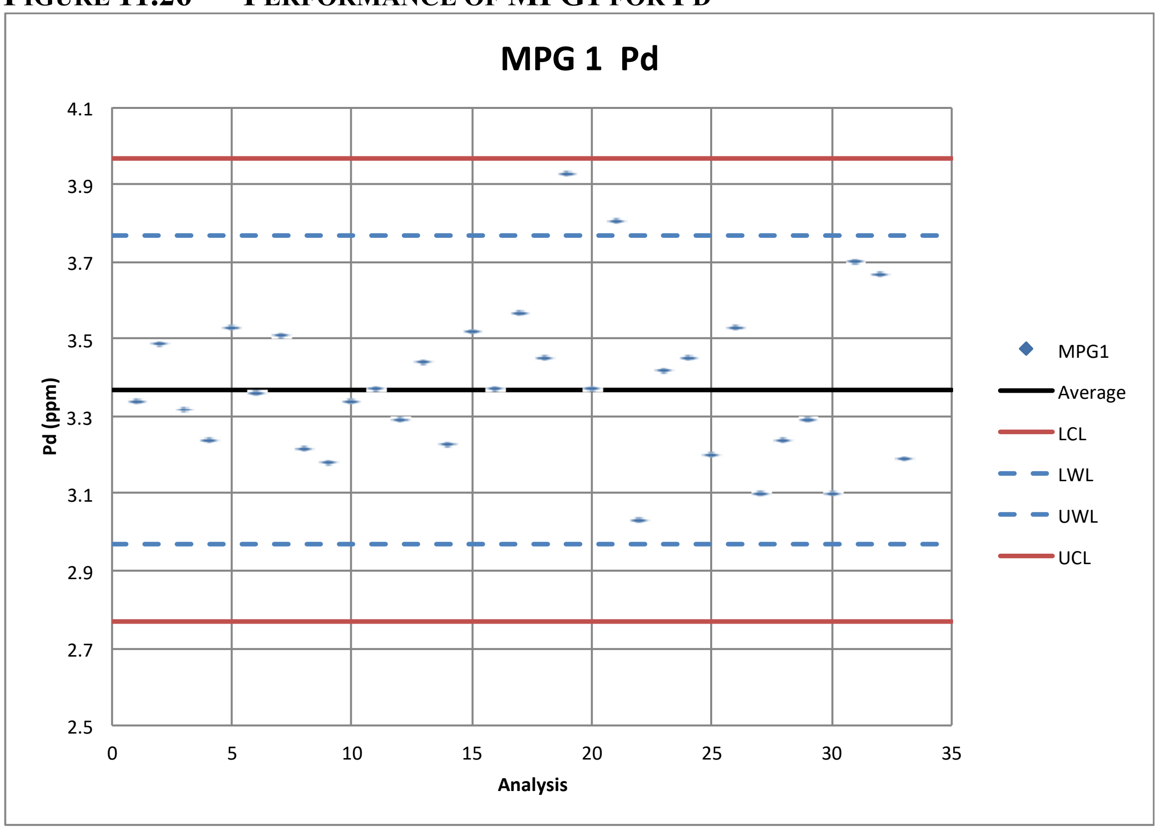


FIGURE 11.27 PERFORMANCE OF MPG1 FOR AG

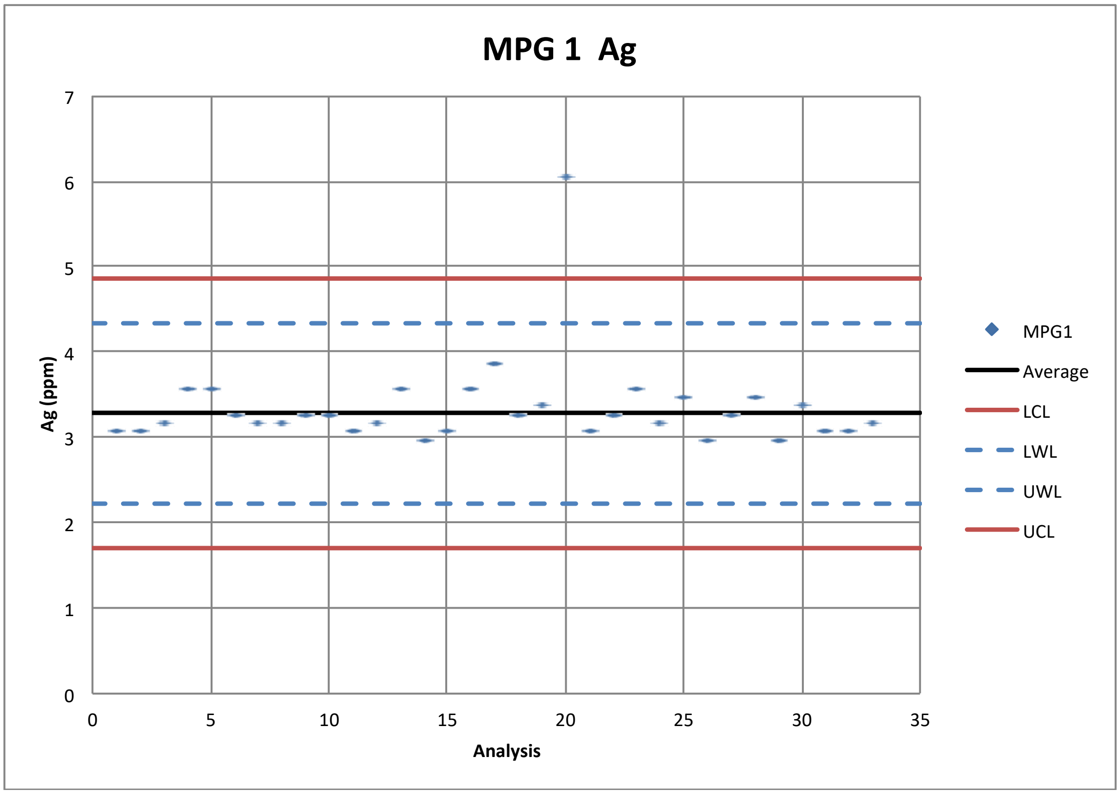


FIGURE 11.28 PERFORMANCE OF MPG1 FOR CU

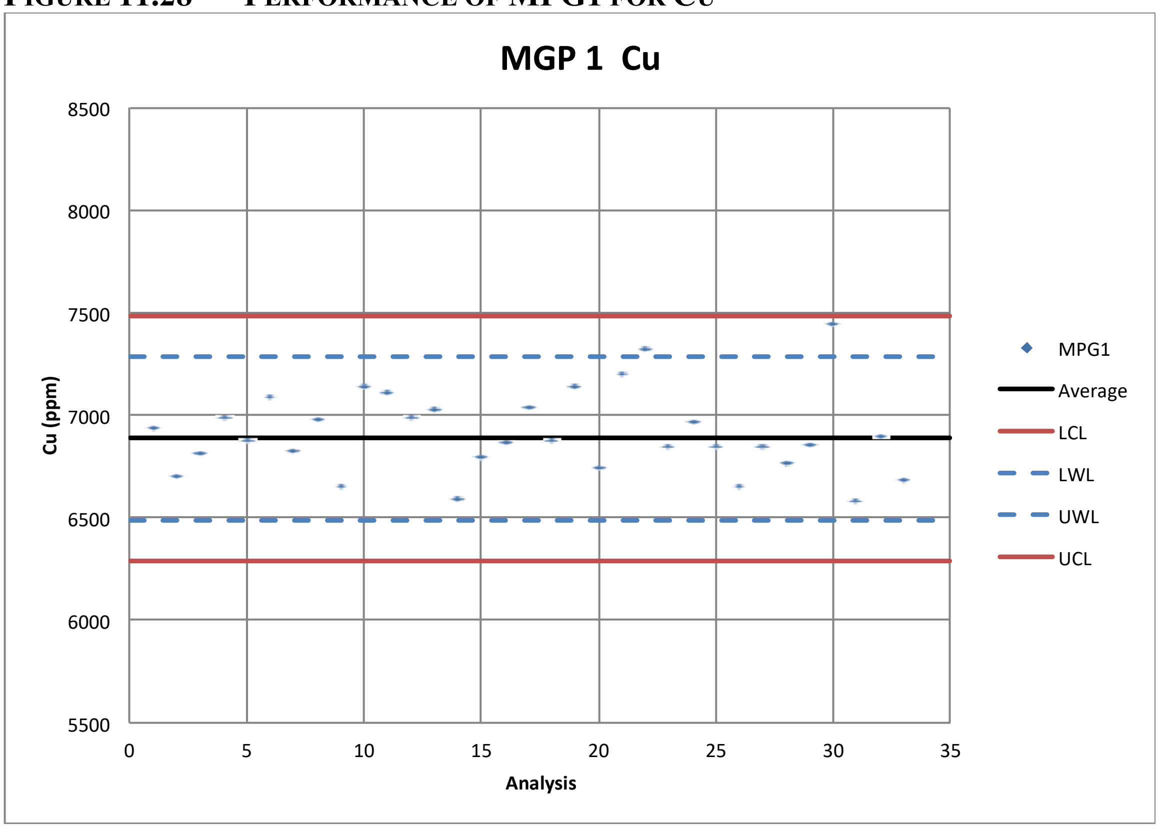


Figure 11.29 Performance of MPG2 for Au

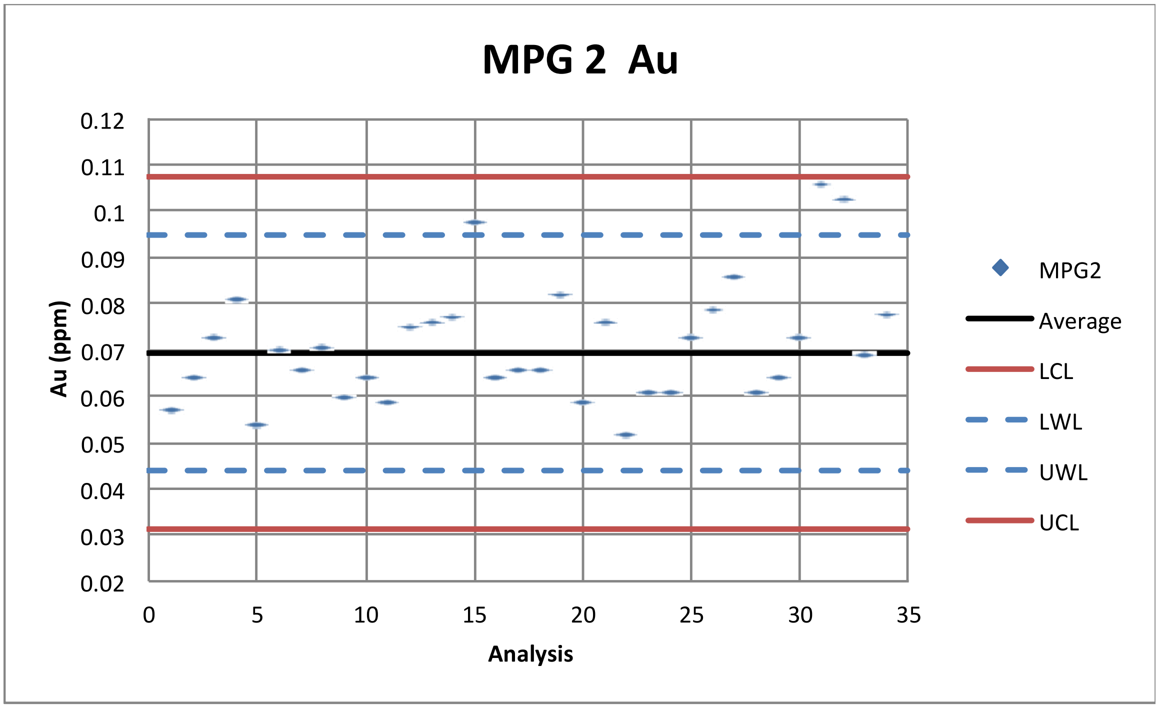


Figure 11.30 Performance of MPG2 for Pt

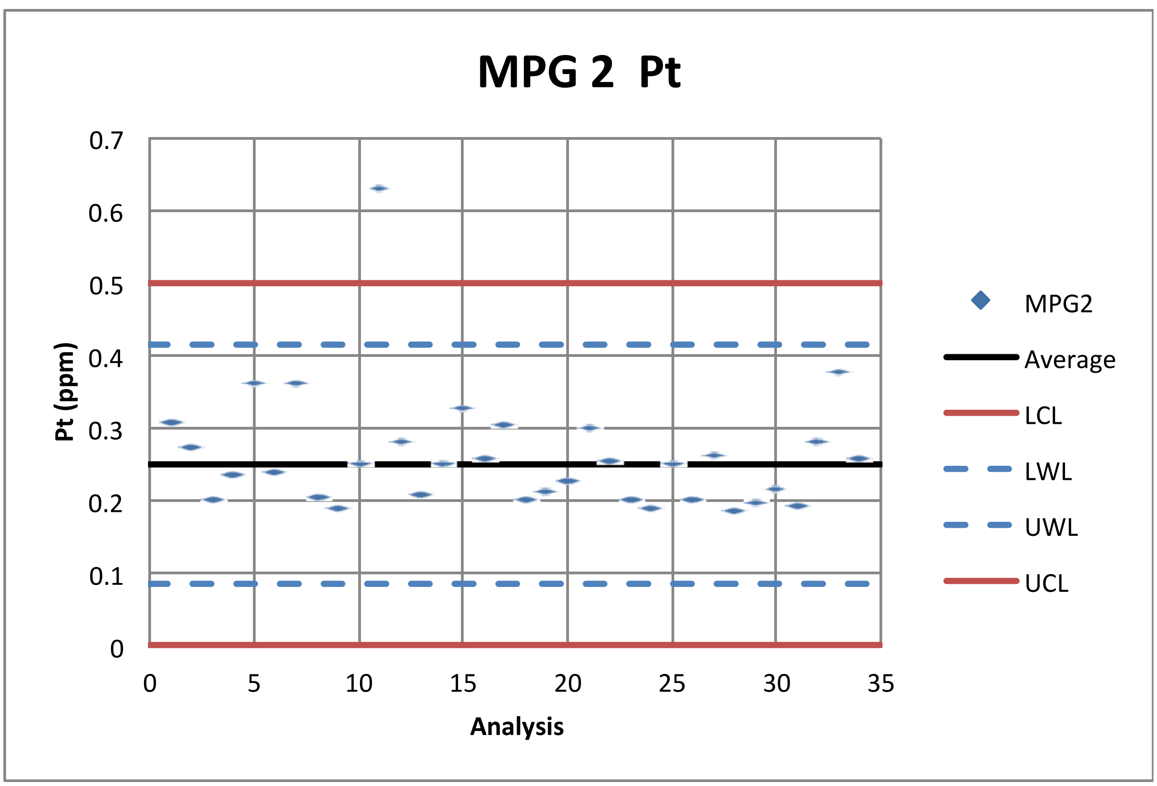


FIGURE 11.31 PERFORMANCE OF MPG2 FOR PD

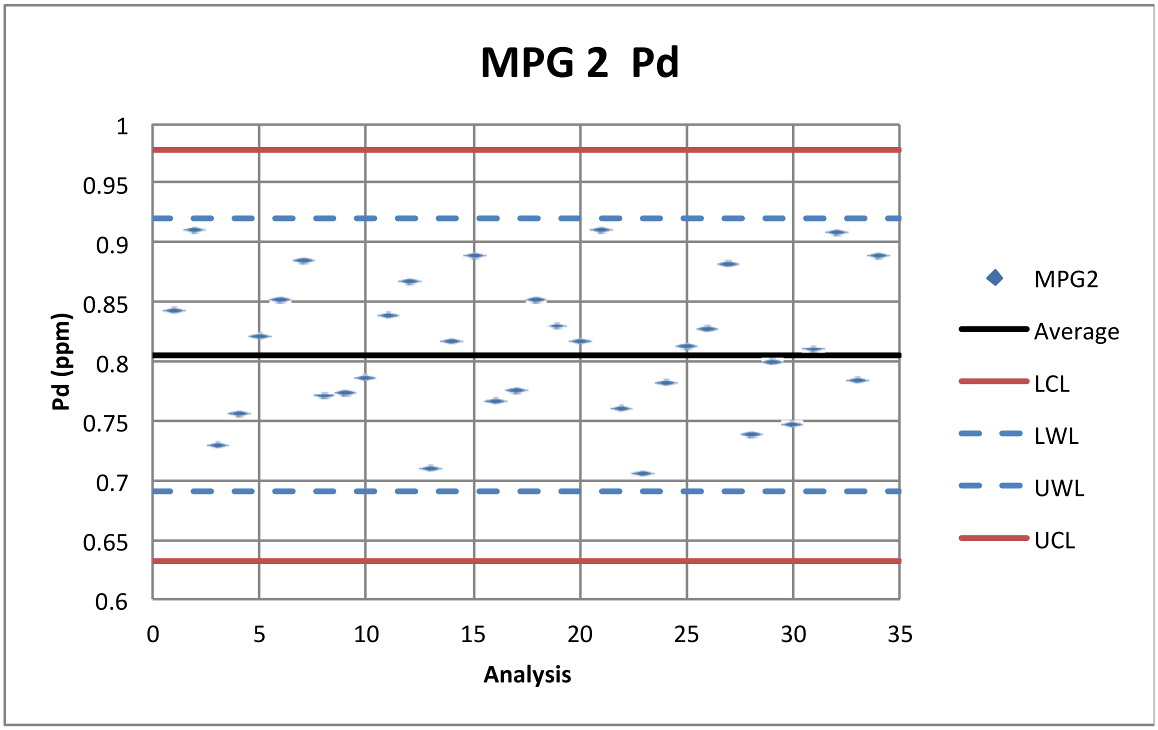


FIGURE 11.32 PERFORMANCE OF MPG2 FOR AG

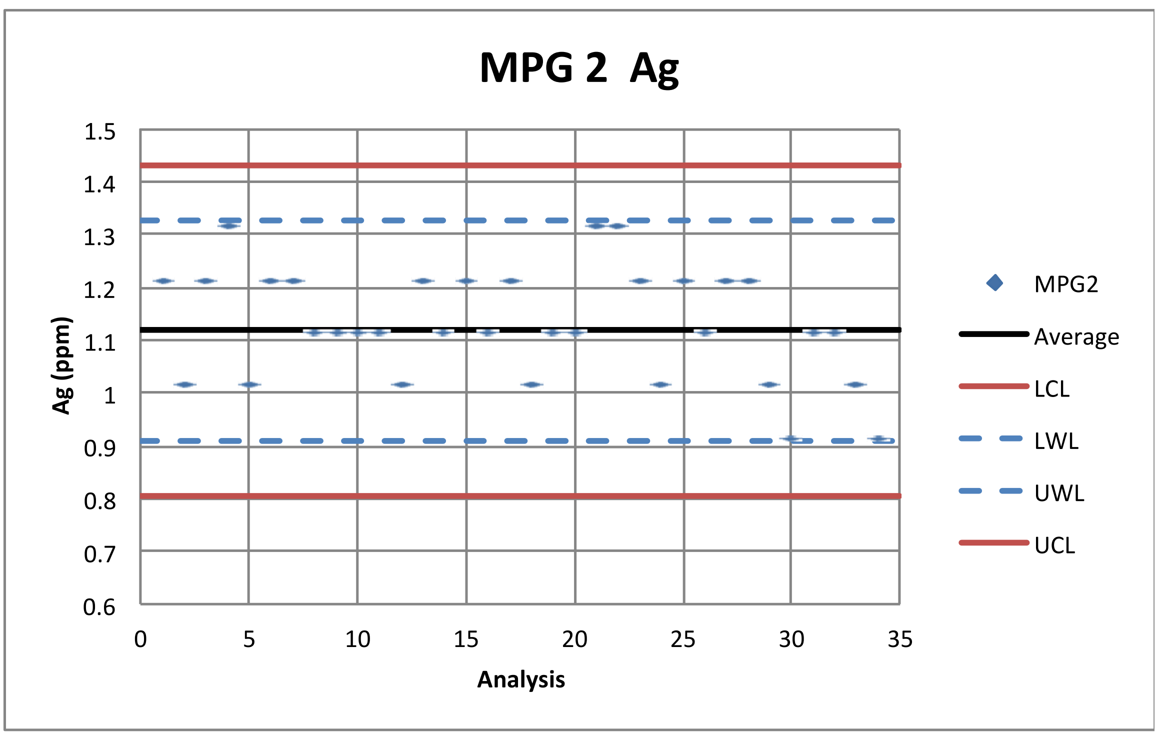
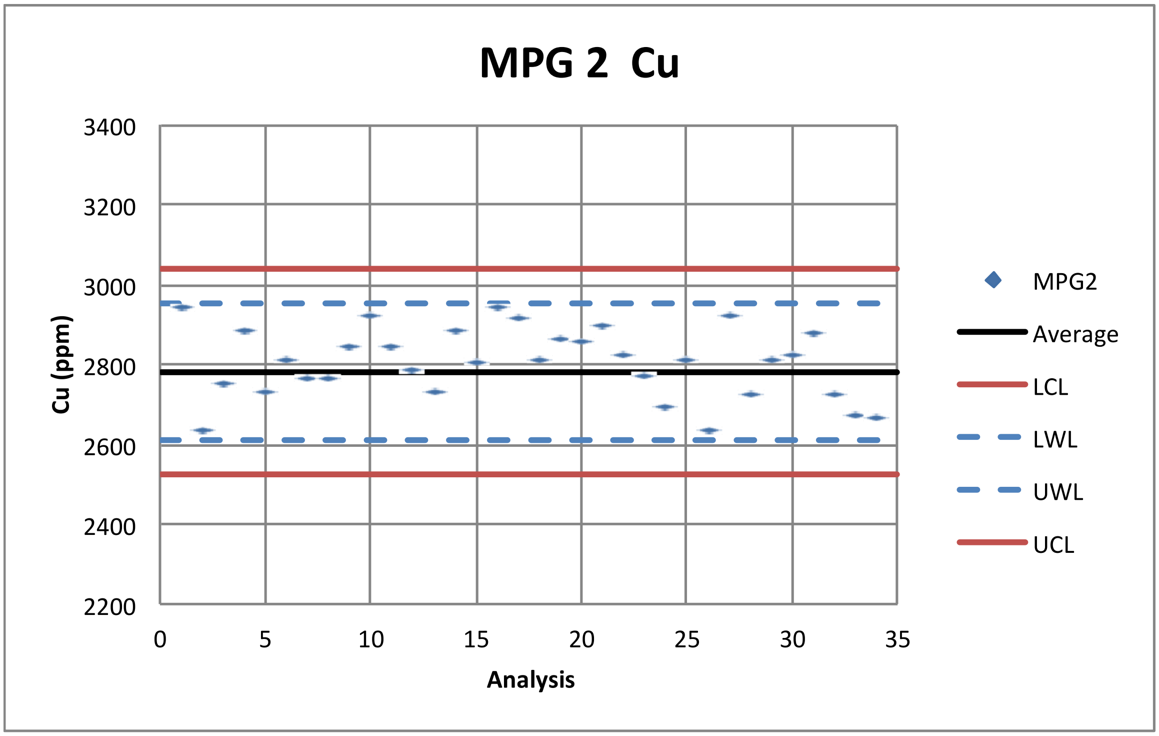


FIGURE 11.33 PERFORMANCE OF MPG2 FOR CU



11.3.4.2 Performance of Blanks

The results of the blank sample analyses (Figures 11.34 to 11.38) are considered excellent, with the vast majority of the Au, Pt, Pd, Ag and Cu determinations falling below the respective upper working limit of two times the standard deviation of the mean of each element. The occasional result falling above the upper working limit is not considered to be of material impact to the Mineral Resource Estimate and contamination is not considered to be an issue with the 2017 data.

FIGURE 11.34 PERFORMANCE OF BLANK FOR AU

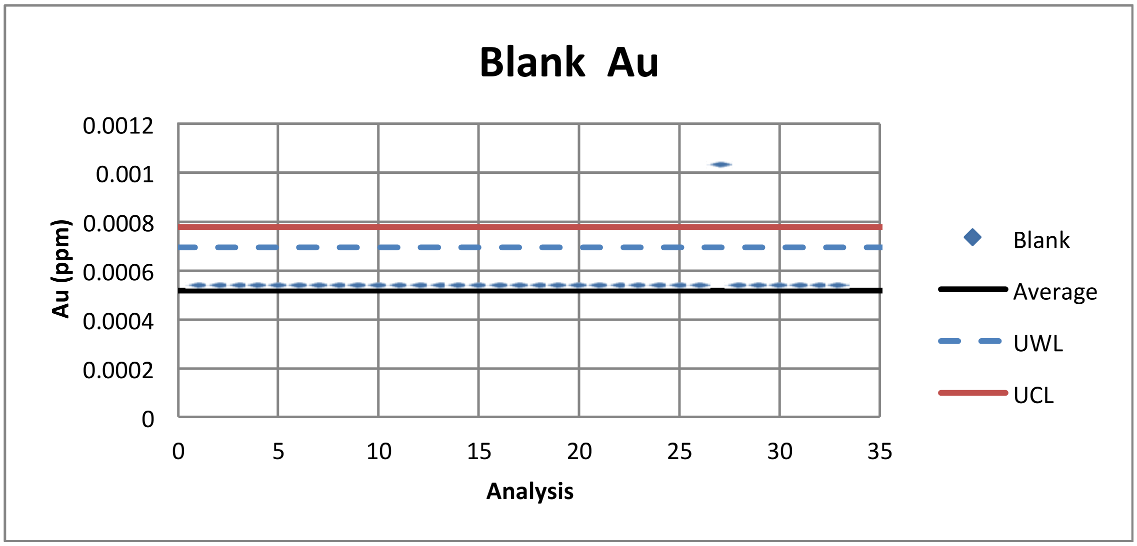


FIGURE 11.35 PERFORMANCE OF BLANK FOR PT

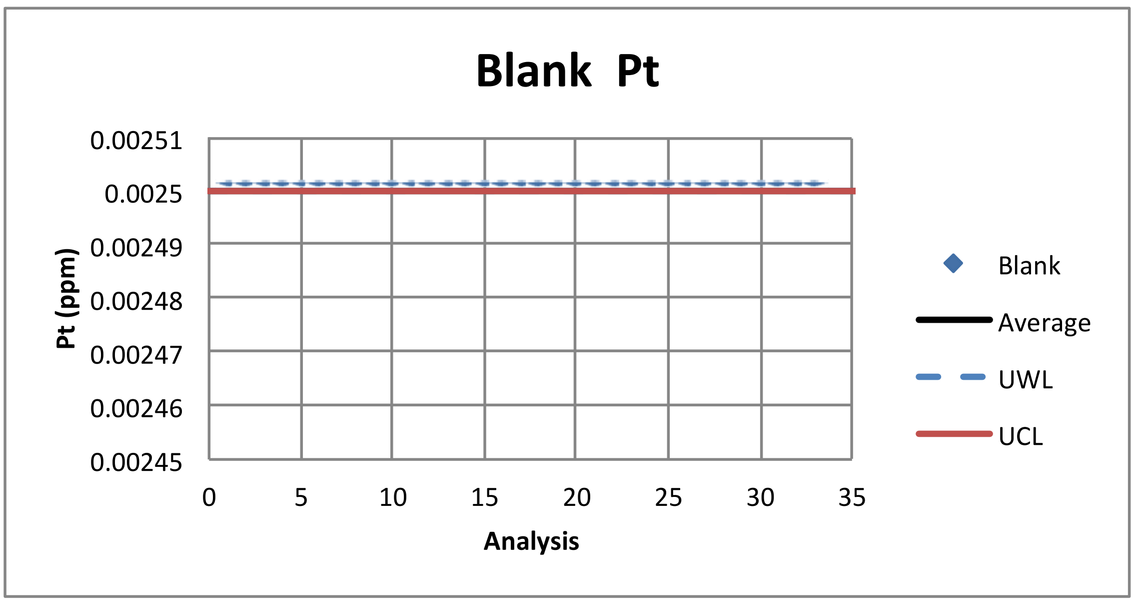


FIGURE 11.36 PERFORMANCE OF BLANK FOR PD

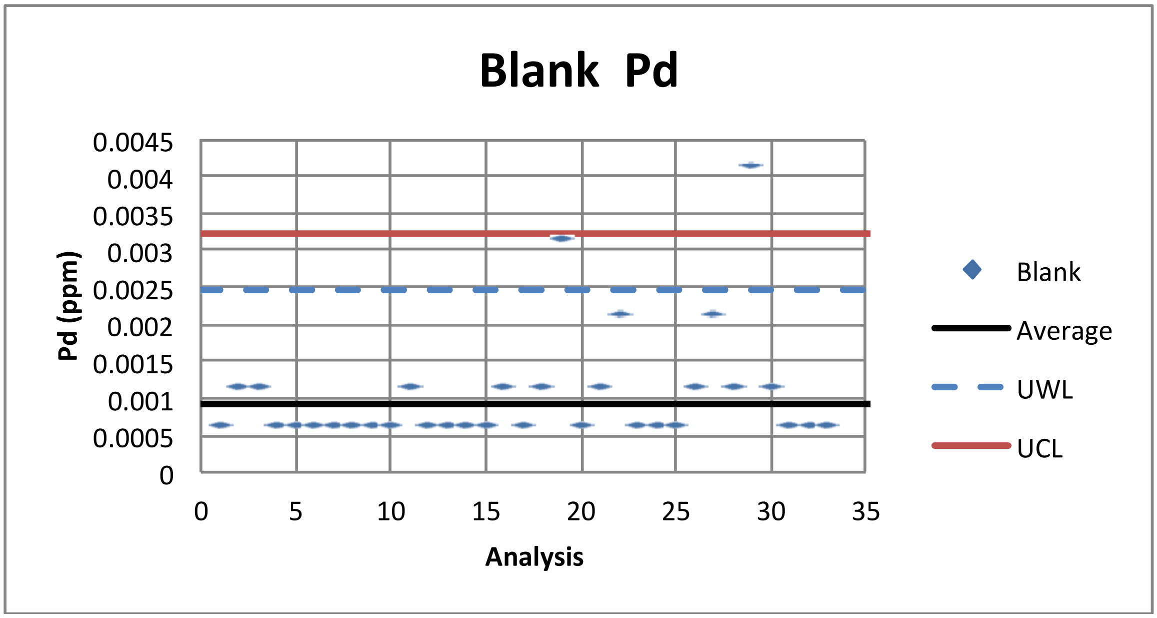


FIGURE 11.37 PERFORMANCE OF BLANK FOR AG

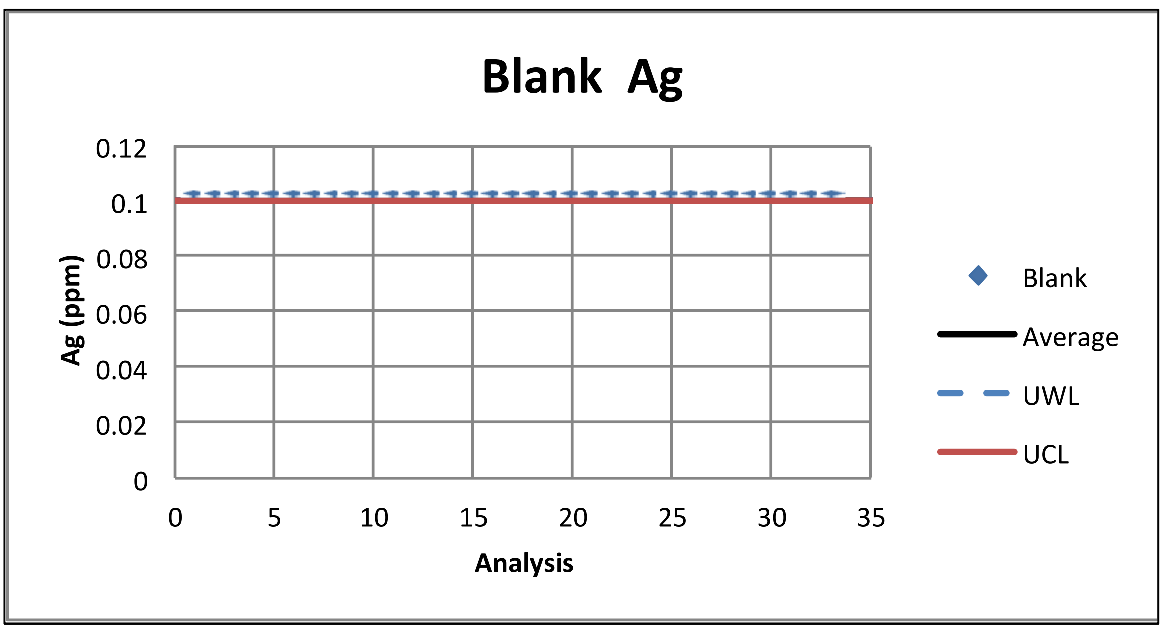
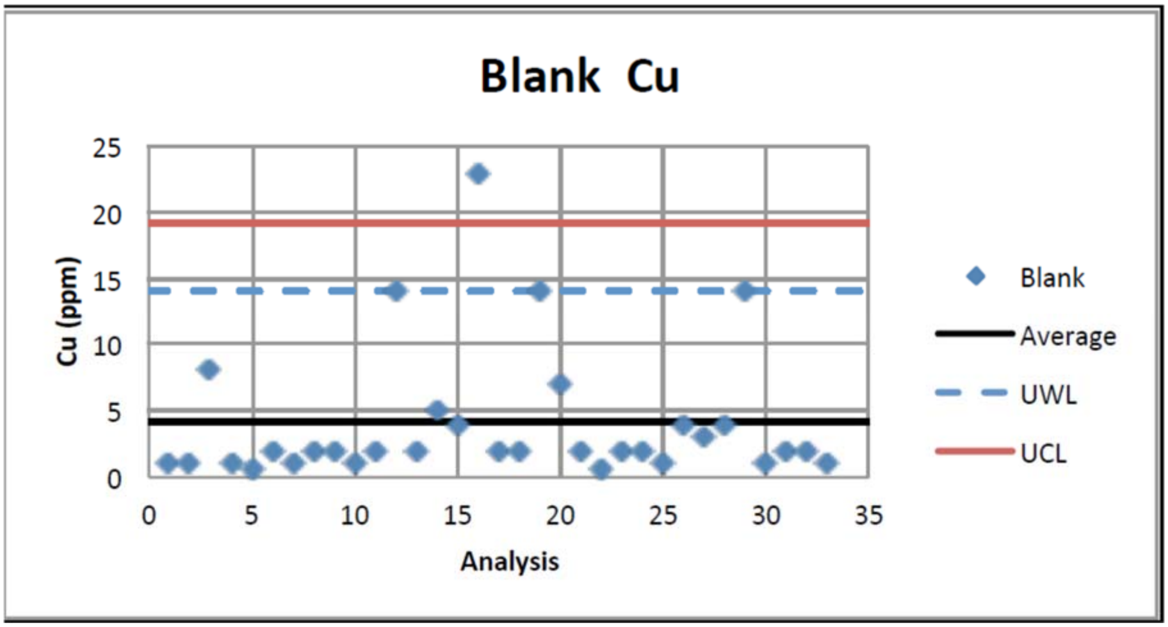


FIGURE 11.38 PERFORMANCE OF BLANK FOR CU



11.3.4.3 Performance of Field Duplicates

The field duplicate data for Au, Pt, Pd, Ag and Cu were plotted on scatter plots and precision for all elements was considered acceptable by P&E.

P&E considers the 2017 data to be of good quality and acceptable for use in the Mineral Resource Estimate.

11.3.5 2017 Quality Assurance/Quality Control Program

11.3.5.1 Performance of Standards

The analyses for elements Au, Pt, Pd, Ag and Cu for standards MPG1 and MPG2 are plotted in Figures 11.39 to 11.48.

Some outliers beyond the set control limits can be noted; however, the overall performance of both standards for all elements is excellent and no bias or temporal variation in the 2017 data is noted.

FIGURE 11.39 PERFORMANCE OF MPG1 AU

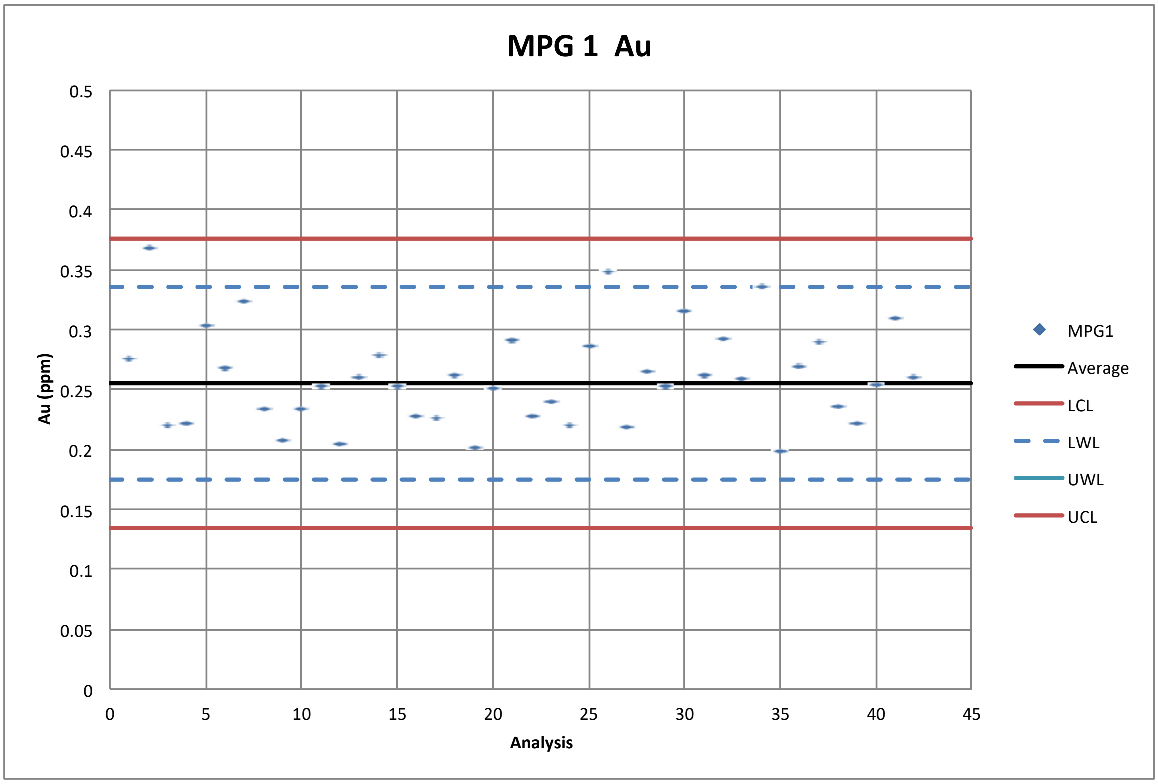


FIGURE 11.40 PERFORMANCE OF MPG1 FOR PT

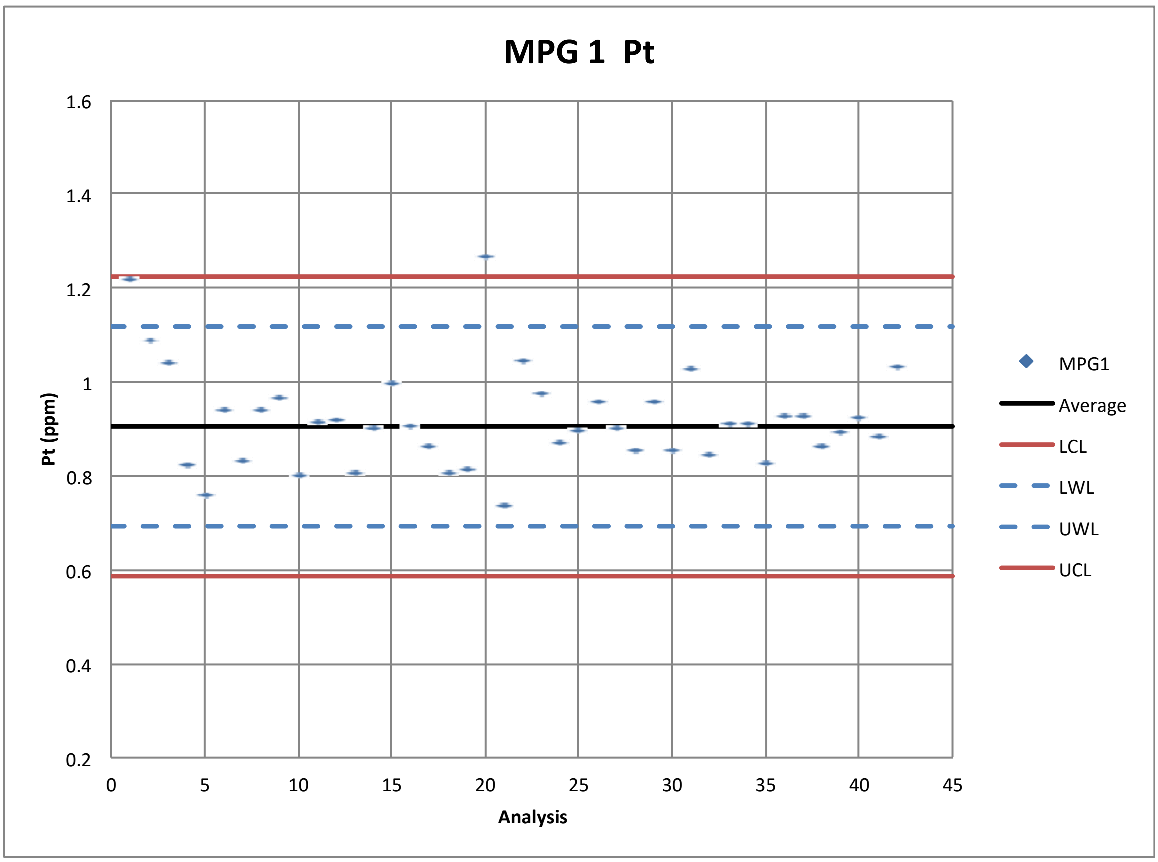


FIGURE 11.41 PERFORMANCE OF MPG1 FOR PD

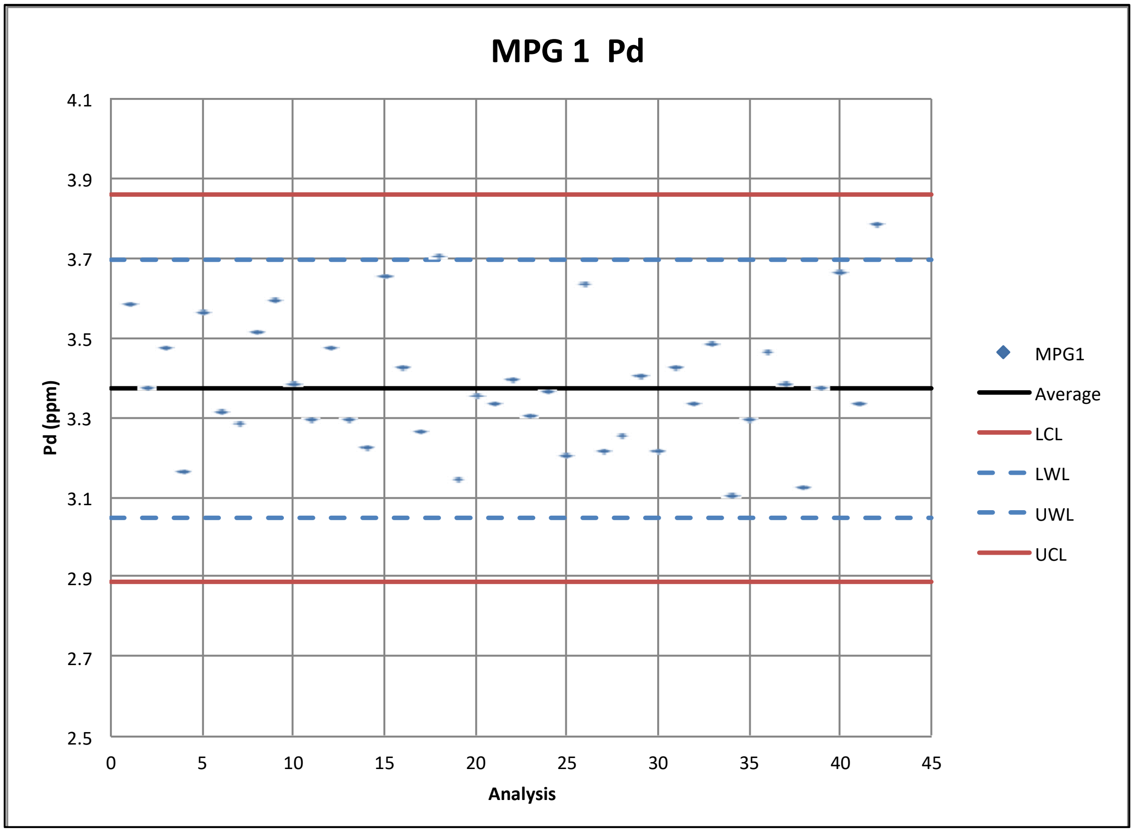


FIGURE 11.42 PERFORMANCE OF MPG1 FOR AG

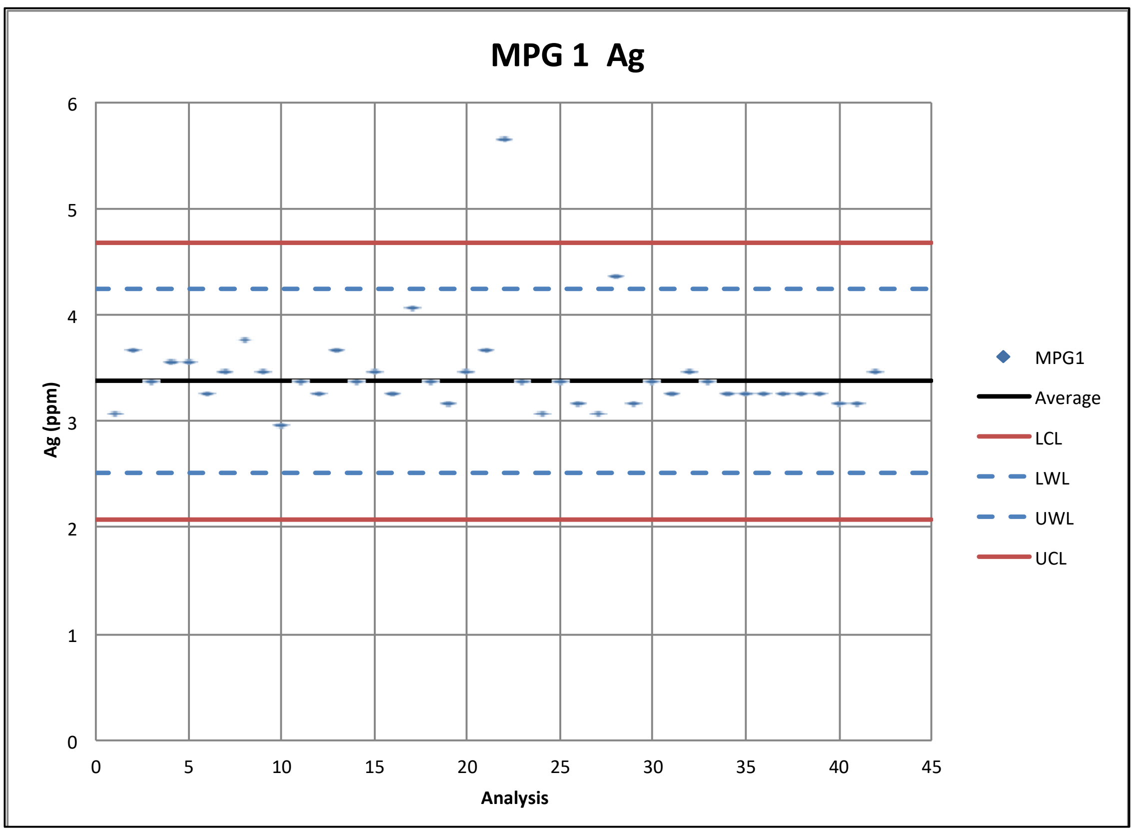


FIGURE 11.43 PERFORMANCE OF MPG1 FOR CU

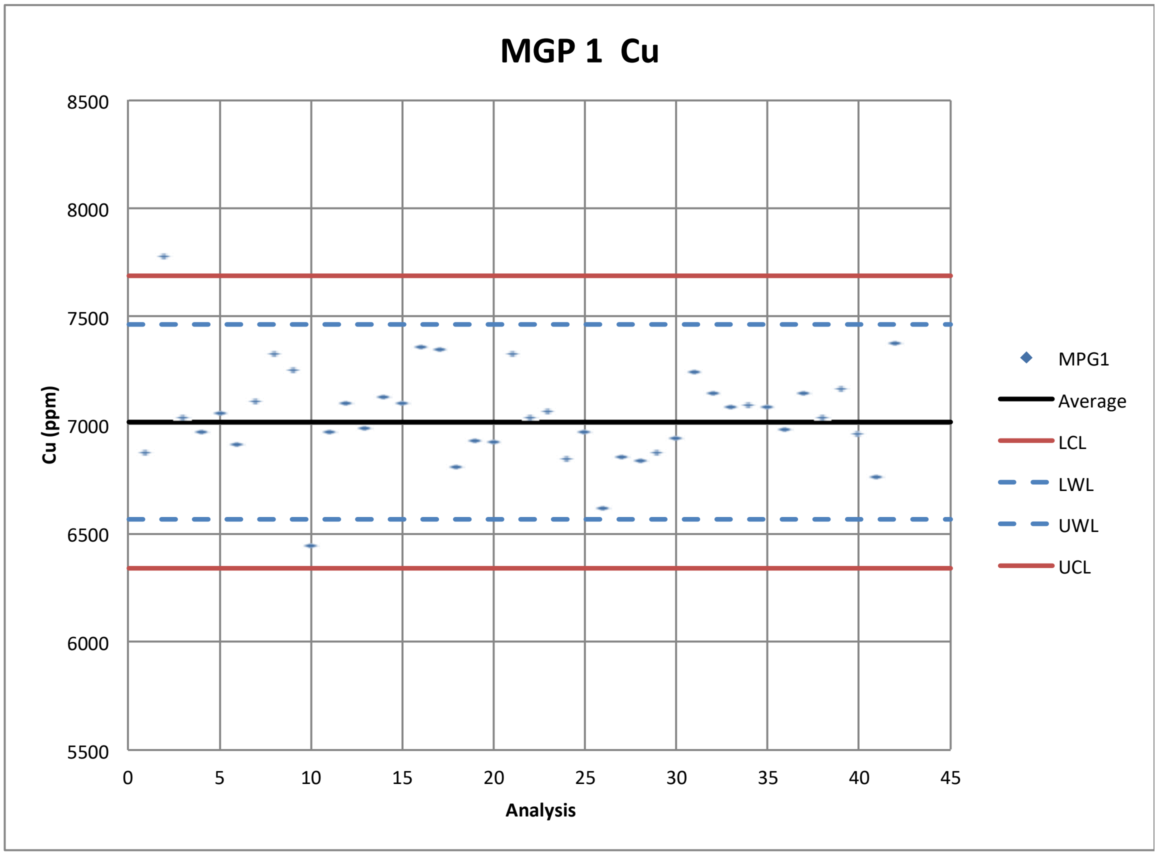


FIGURE 11.44 PERFORMANCE OF MPG2 FOR AU

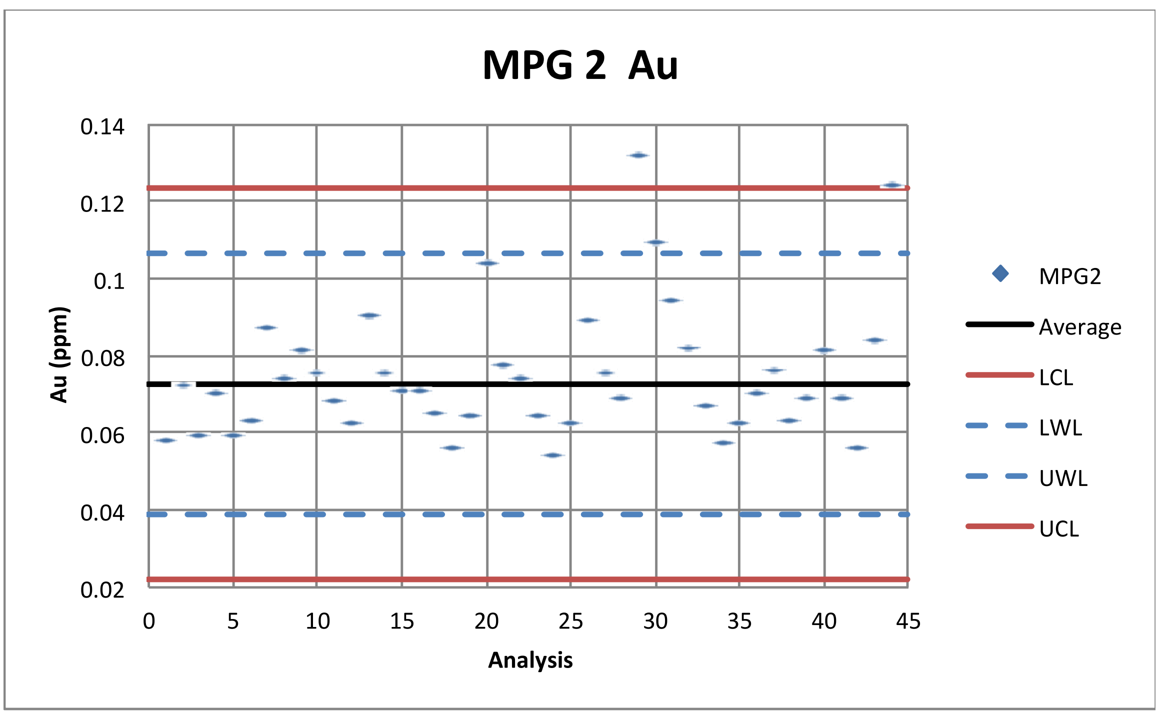


FIGURE 11.45 PERFORMANCE OF MPG2 FOR PT

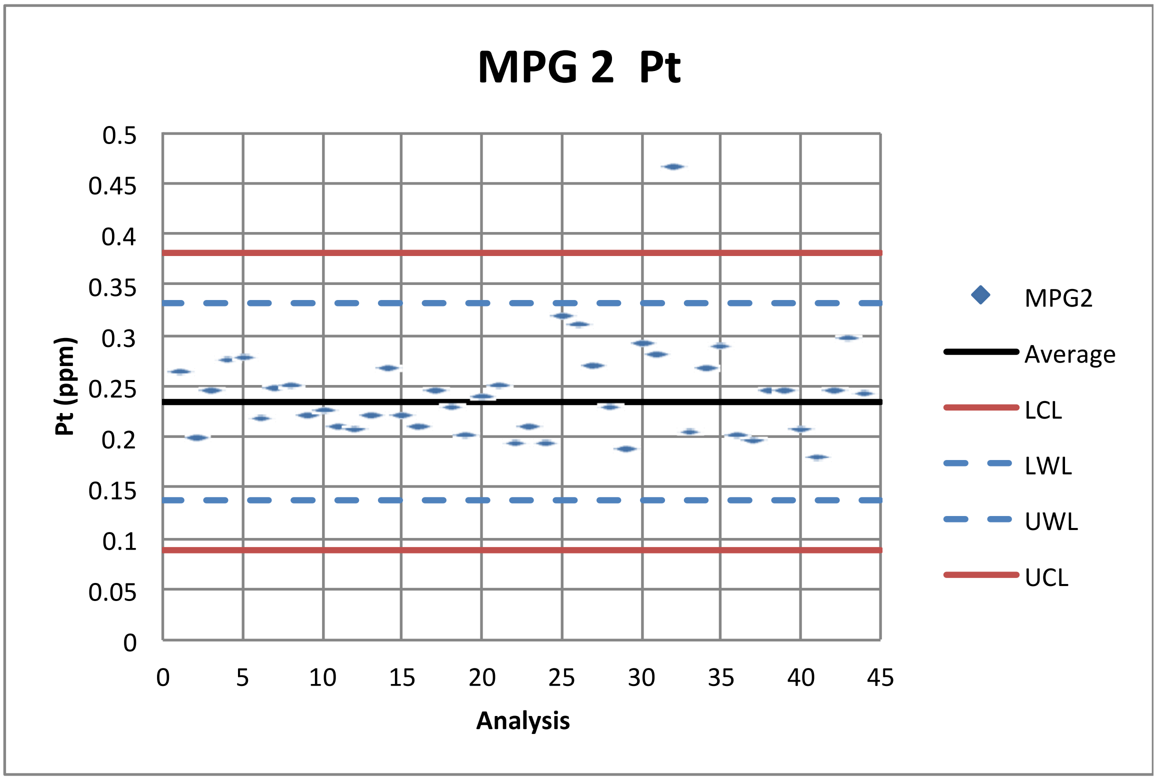


FIGURE 11.46 PERFORMANCE OF MPG2 FOR PD

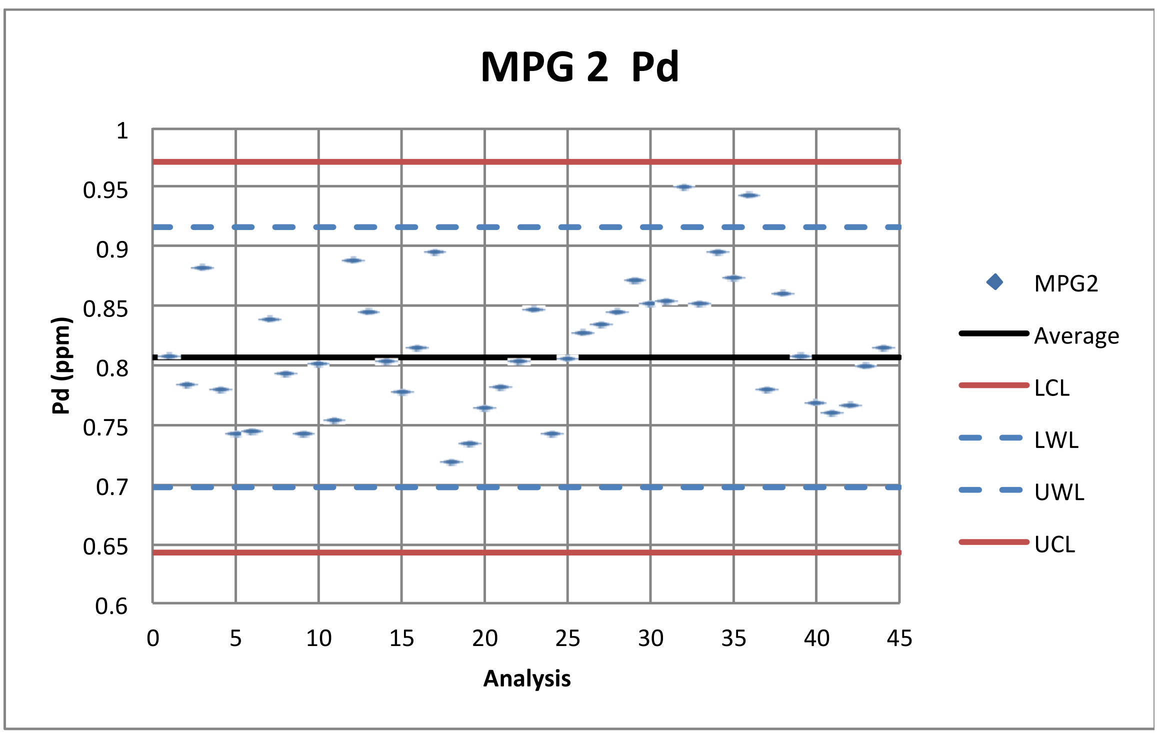


FIGURE 11.47 PERFORMANCE OF MPG2 FOR AG

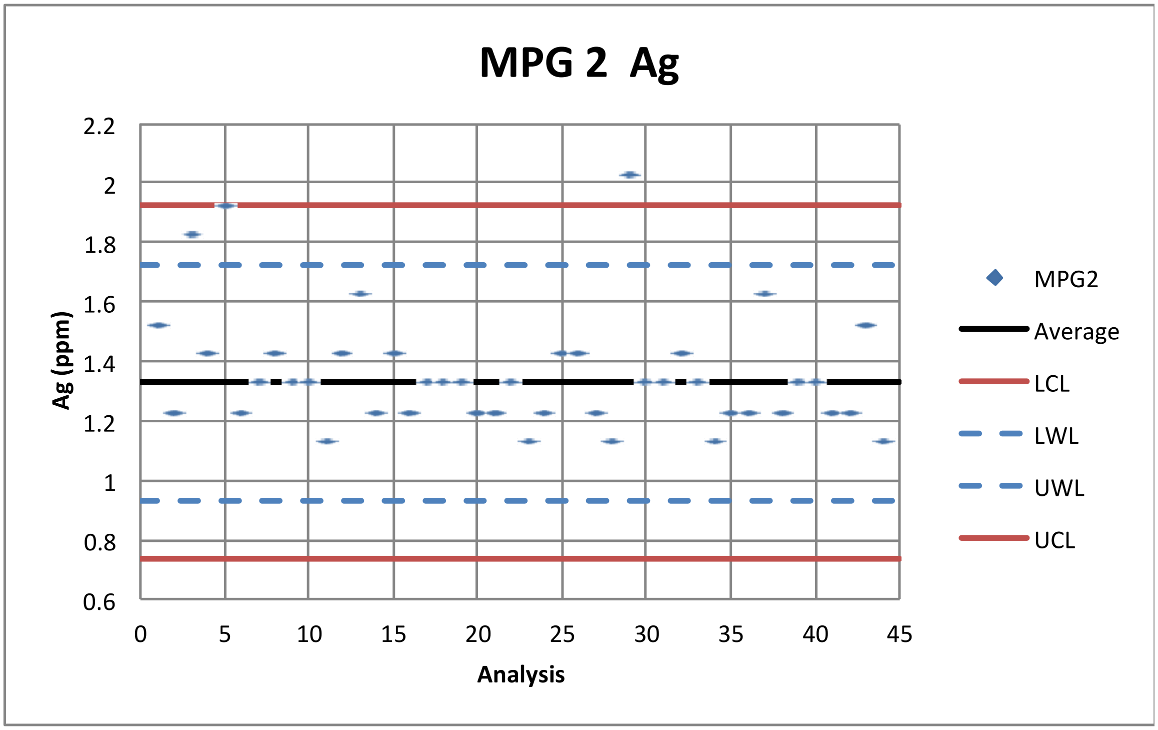
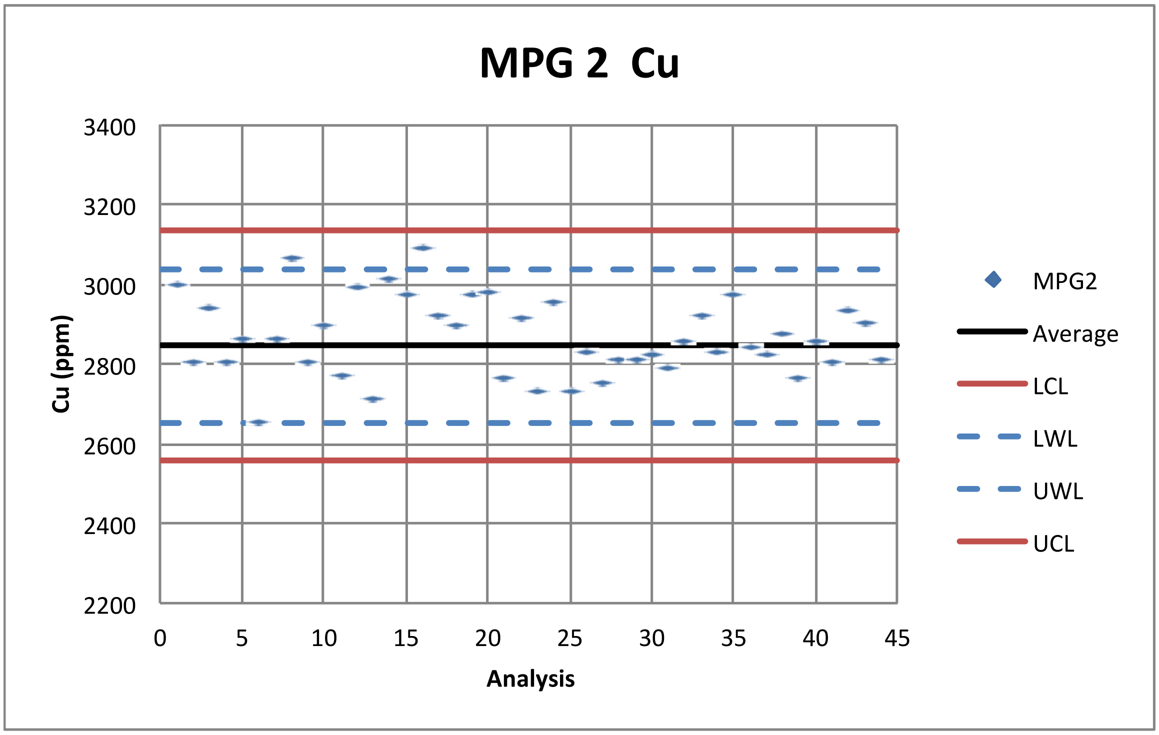


FIGURE 11.48 PERFORMANCE OF MPG2 FOR CU



11.3.5.2 Performance of Blanks

The results of the blank sample analyses (Figures 11.49 to 11.53) are considered excellent, with the vast majority of the Au, Pt, Pd, Ag and Cu determinations falling below the respective upper working limit of two times the standard deviation of the mean of each element. The occasional result falling above the upper working limit is not considered to be of material impact to the Mineral Resource Estimate and contamination is not considered to be an issue with the 2017 data.

FIGURE 11.49 PERFORMANCE OF BLANK FOR AU

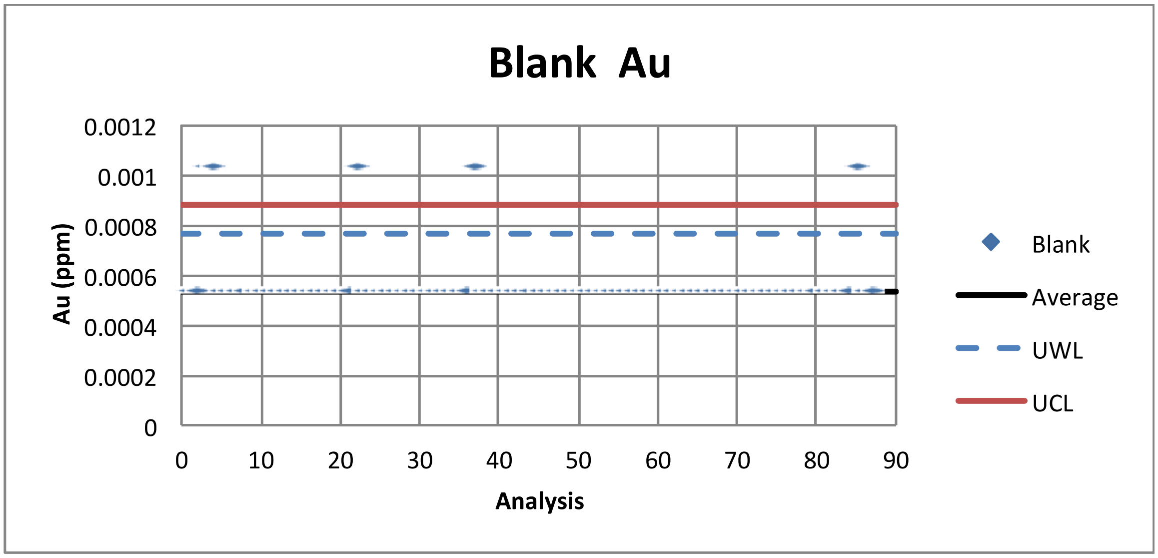


FIGURE 11.50 PERFORMANCE OF BLANK FOR PT

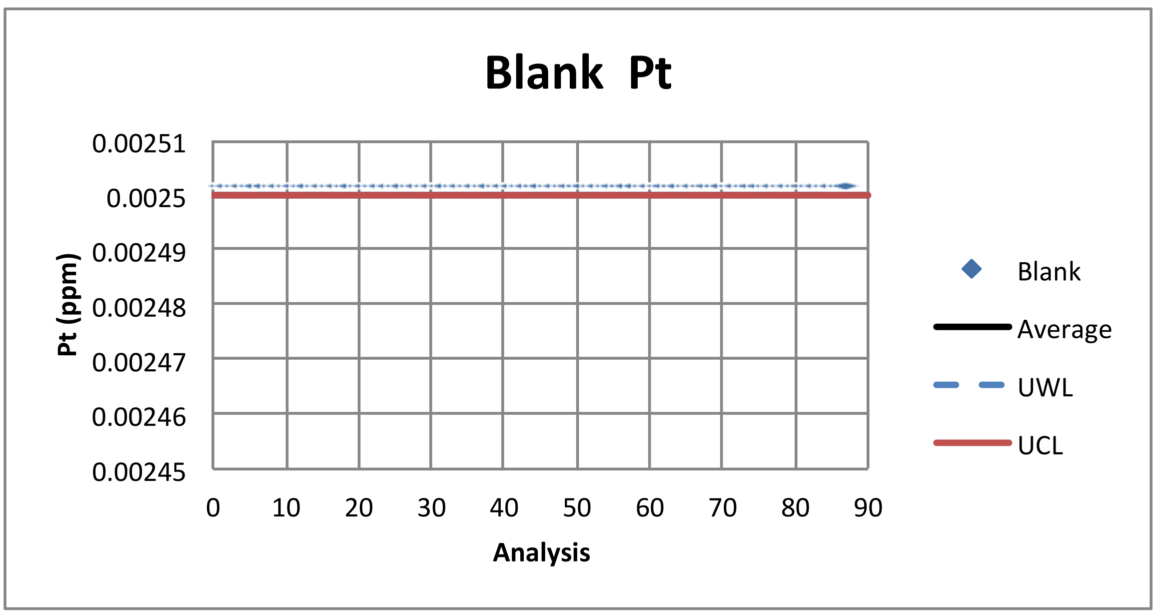


FIGURE 11.51 PERFORMANCE OF BLANK FOR PD

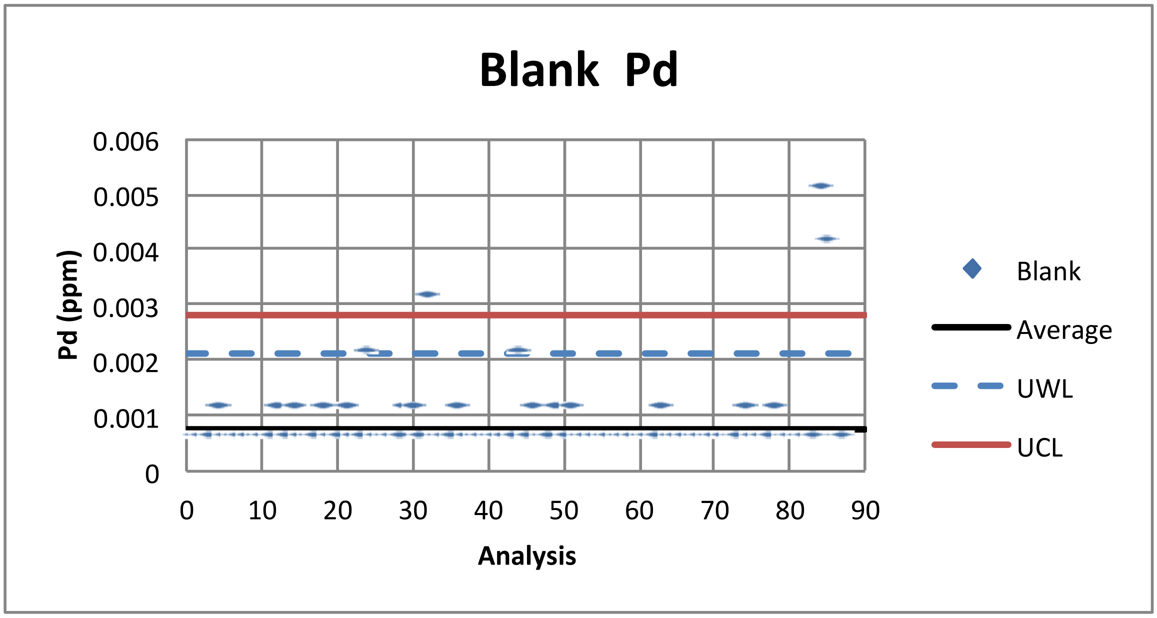


FIGURE 11.52 PERFORMANCE OF BLANK FOR AG

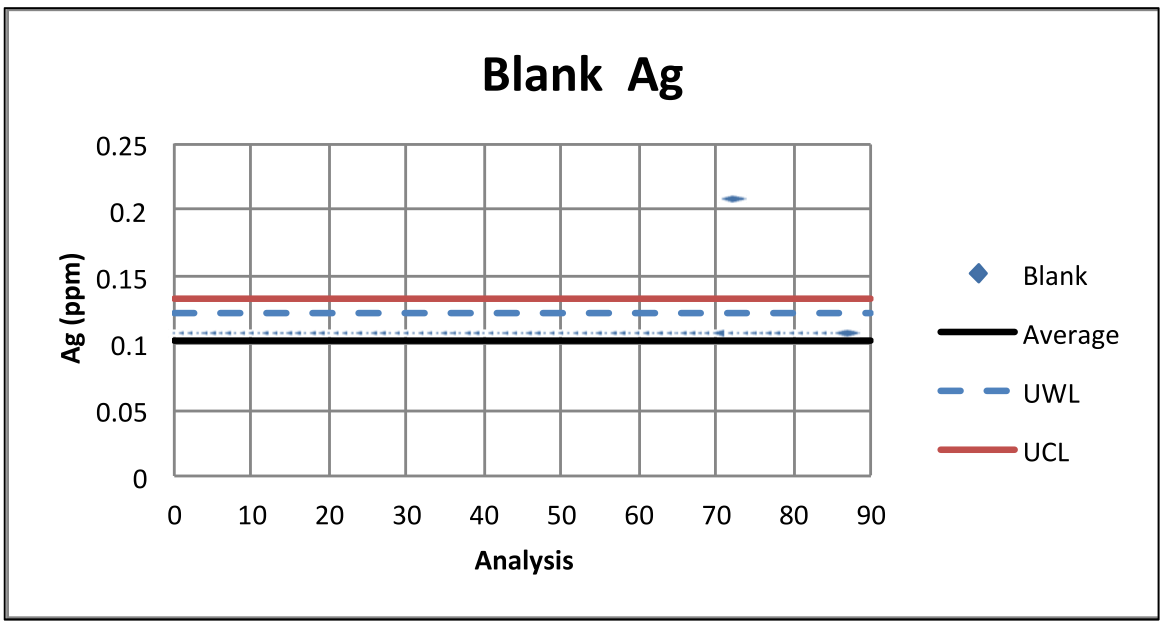
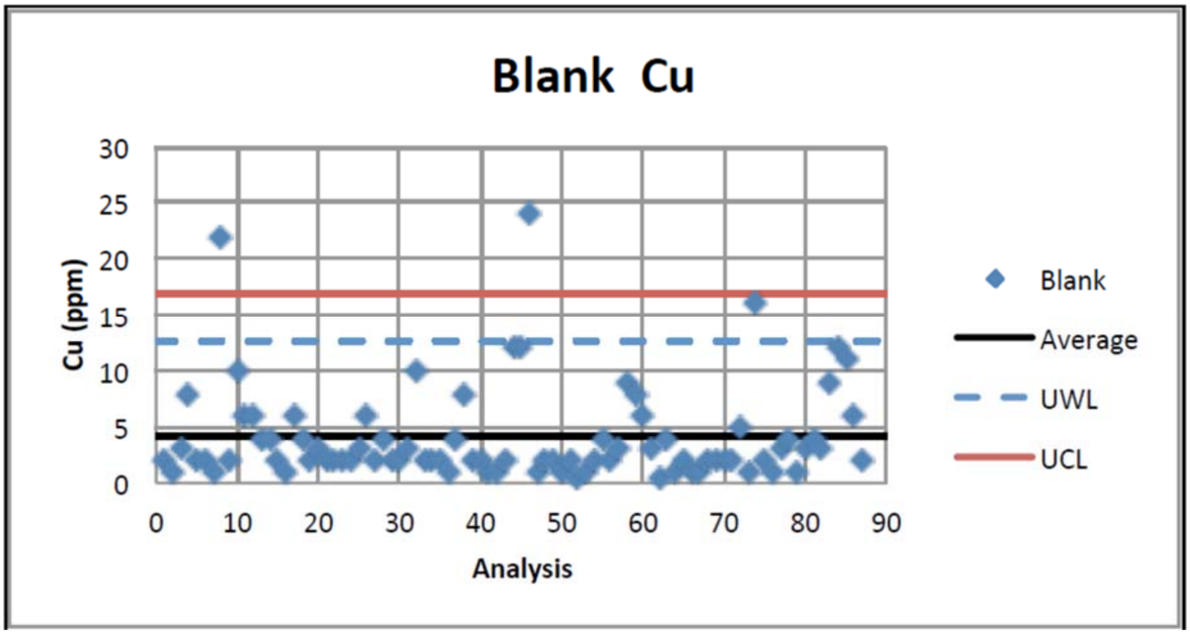


FIGURE 11.53 PERFORMANCE OF BLANK FOR CU



11.3.5.3 Performance of Field Duplicates

The field duplicate data for Au, Pt, Pd, Ag and Cu were plotted on scatter plots and precision for all elements was considered acceptable by P&E.

P&E considers the 2017 data to be of good quality and acceptable for use in the Mineral Resource Estimate.

11.4 2019 QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

Drilling in 2019 employed the same sampling methodologies and QA/QC protocols and procedures as those used during the 2017 drill program. As of the January 6th, 2020 effective date of this Technical Report a QA/QC analysis of all 2019 results was pending.

12.0 DATA VERIFICATION

12.1 MARATHON DEPOSIT DATA VERIFICATION

12.1.1 April 2012 Site Visit and Independent Sampling

The Property was visited on April 4, 2012 by Mr. David Burga, P.Geo., of P&E, an independent Qualified Person as defined by NI 43-101. Mr. Burga collected 10 samples from nine holes. Samples were collected by ¼ sawing the half core remaining in the core box.

The samples were placed in plastic bags, given a unique sample ID and taken by Mr. Burga to AGAT Laboratories in Mississauga, ON for analysis.

Copper, silver and nickel were analyzed using 4-acid digest with AAS finish. Gold, platinum and palladium were analyzed using lead collection fire assay with ICP-OES finish.

AGAT has developed and implemented at each of its locations a Quality Management System ("QMS") designed to ensure the production of consistently reliable data. The system covers all laboratory activities and takes into consideration the requirements of ISO standards.

AGAT maintains ISO registrations and accreditations. ISO registration and accreditation provide independent verification that a QMS is in operation at the location in question. Most AGAT laboratories are registered or are pending registration to ISO 9001:2000.

Results of the independent site visit samples are presented in Figure 12.1 through Figure 12.4.

FIGURE 12.1 P&E SITE VISIT RESULTS FOR PALLADIUM

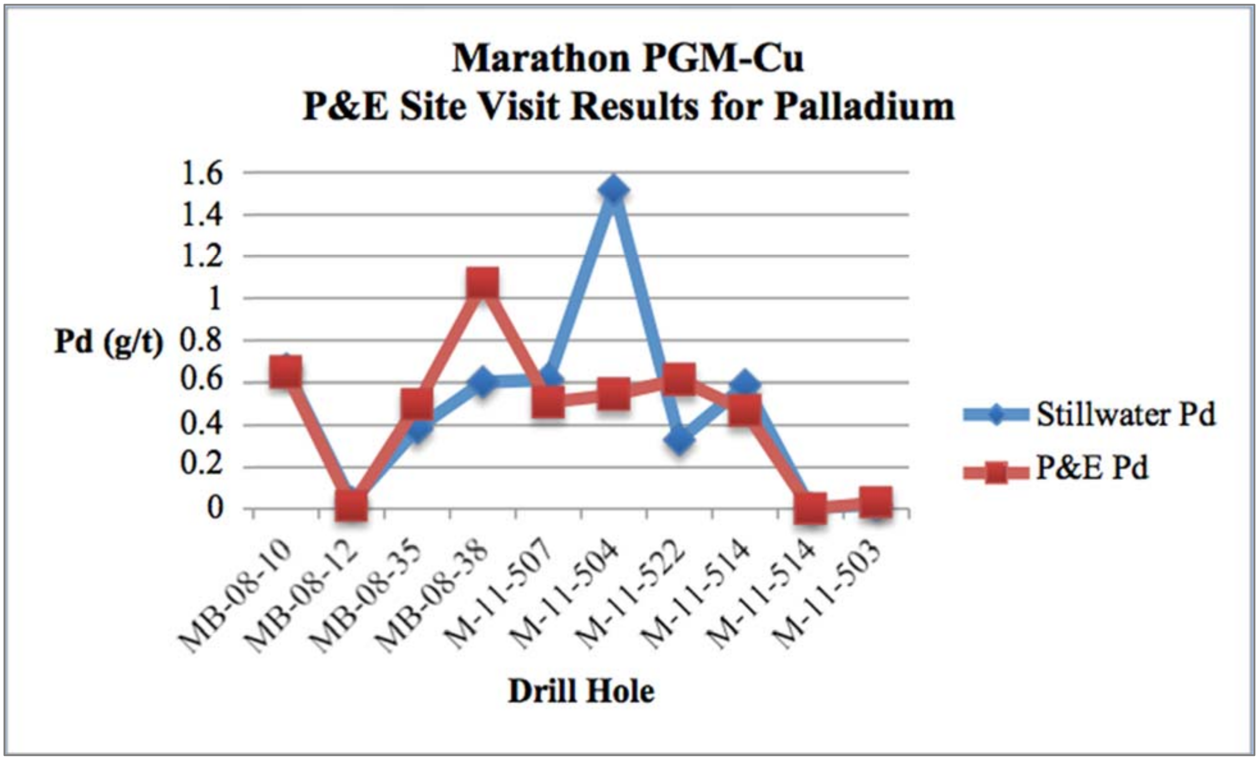


FIGURE 12.2 P&E SITE VISIT RESULTS FOR PLATINUM

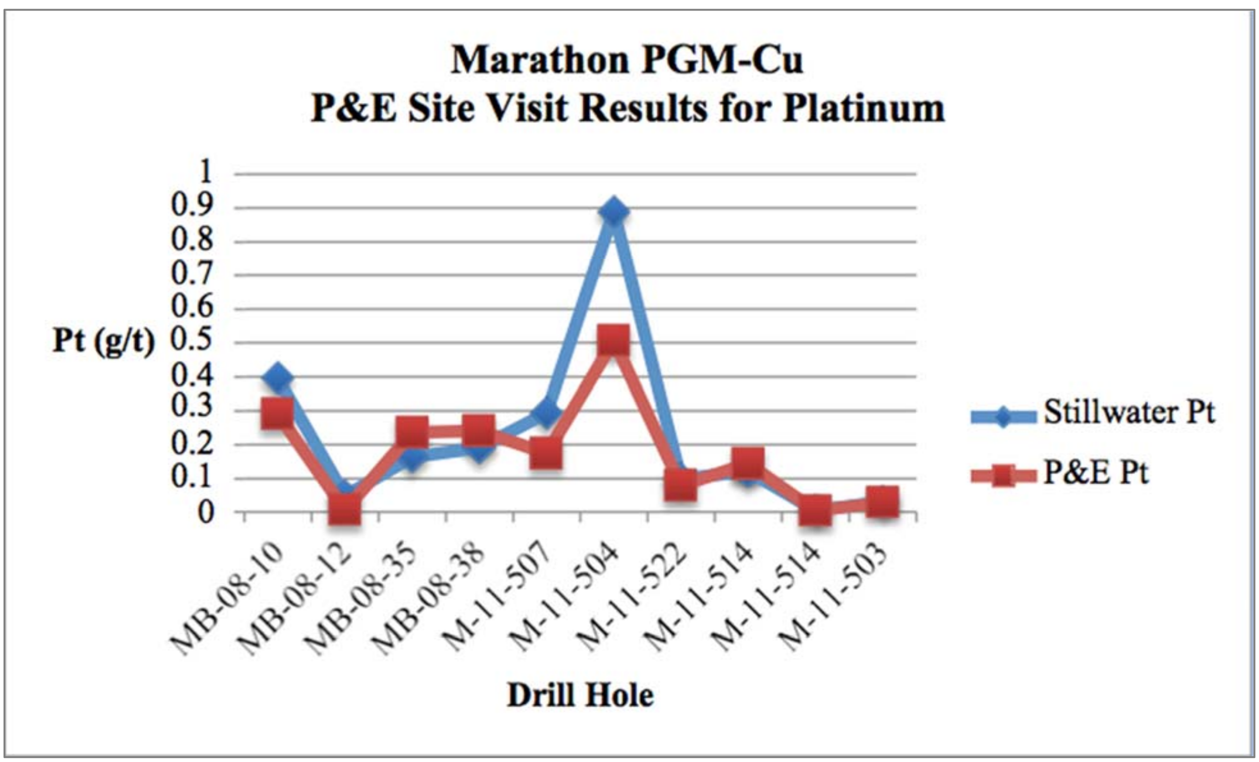


FIGURE 12.3 P&E SITE VISIT RESULTS FOR COPPER

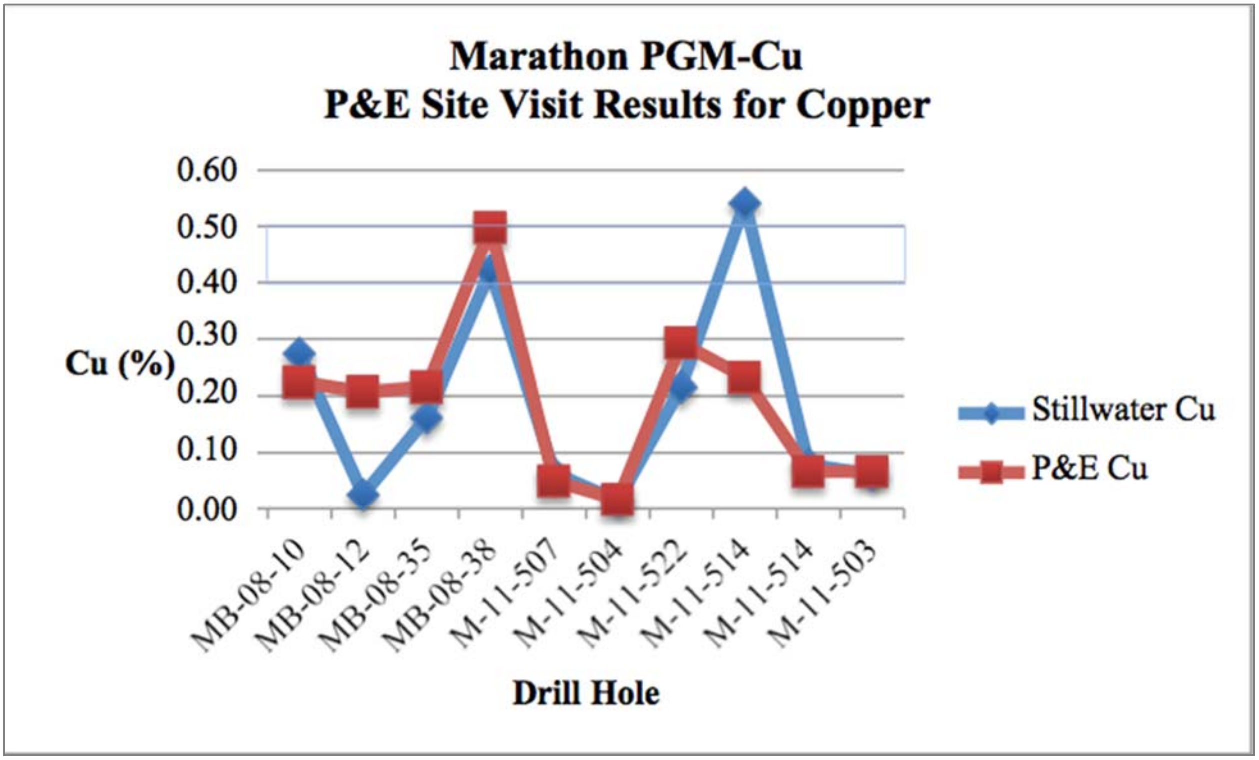
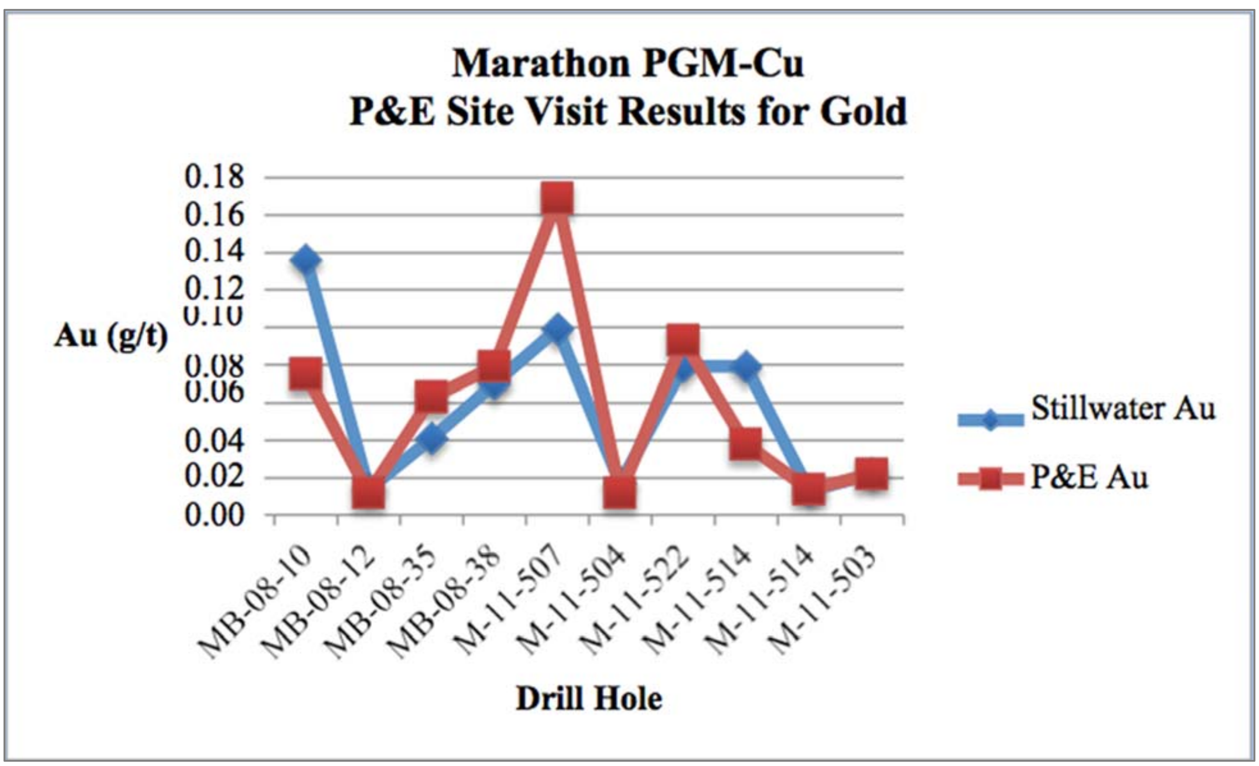


FIGURE 12.4 P&E SITE VISIT RESULTS FOR GOLD



12.1.2 May 2019 Site Visit and Independent Sampling

A site visit to the Property was undertaken by Mr. Bruce Mackie, P.Geo., of Bruce Mackie Geological Consulting Services ("Mackie"), an independent Qualified Person as defined by NI 43-101, on May 04, 2019. As part of the site visit, confirmation samples from selected drill core intervals were taken by Mr. Mackie and submitted to Activation Laboratories Ltd. in Thunder Bay. This work was aided by Mr. John McBride, P.Geo., a Senior Project Geologist employed at that time by Stillwater Canada Inc.

12.1.2.1 Data Verification and Drill Core Examination

The Property was accessed by road via Highway 17, which runs through portions of the Project and 12 mineralized drill hole intercepts were inspected by Mr. Mackie (listed in Table 12.1).

Prior to the inspection, the core was located and laid out at the main core storage facility in the Town of Marathon. This work was performed Mr. John McBride of Stillwater. It should be noted that while the mineralized drill hole intercepts were provided in advance to save time during the site visit, the specific intervals that were to be resampled by Mr. Mackie were not provided in advance.

TABLE 12.1
DRILL HOLE INTERCEPTS INSPECTED

Zone	Hole No.	From (m)	To (m)	Interval (m)
Main Zone	M-05-49	20.0	34.0	14.0
Main Zone	M-05-49	80.0	90.0	10.0
Main Zone	M-11-520	176.0	189.0	13.0
Main Zone	M-11-520	211.0	227.0	16.0
BR Zone	M-06-178	3.0	17.0	14.0
Southern Resource Zone	M-17-528	43.0	55.0	12.0
Southern Resource Zone	M-17-529	70.0	80.0	10.0
Sally Zone	SL-17-71	31.0	49.0	18.0
Sally Zone	SL-17-72	264.0	284.0	20.0
Sally Zone	SL-17-72	310.0	320.0	10.0
Geordie	G-00-08	158.01	168.50	10.5
Geordie	G-10-17	216.00	234.00	18.0
Total				**165.5**

Source: *Mackie (2019)*

The 12 intercepts were selected from nine diamond drill holes based largely on the following criteria: availability of core (much of the mineralized core from historic drilling from the Core Area of the Deposit was taken for metallurgical testwork), intercepts ranging from low grade (<0.5 g/t Pd), medium grade (0.5 to 1.0 g/t Pd) and high grade (>1.0 g/t Pd). In addition, intercepts were selected were from five different zones. The Core Area is defined as the area of the Property from which the historic Mineral Resource Estimates were calculated (the Main

Zone, BR Zone, and Southern Resource Zone), the Sally Zone, as well as from the Geordie Area. Finally, the selection captured drill core from several different drill campaigns carried out between 2005 and 2017 by both Marathon PGM Corp. and Stillwater.

Mr. Mackie's inspection of the mineralized drill hole intercepts comprised the following tasks:

- Drill hole numbers were verified, and initial and final depths of the mineralized intercepts were reviewed.
- Measurement of core sample lengths and verification of sample numbers and tags.
- Validation of the descriptive geology with emphasis on the reported visual estimates of pyrite, chalcopyrite, pyrrhotite, chalcocite and magnetite content reported by Marathon and Stillwater.
- Validation, using original Accurassay and ALS Chemex assay certificates, of Pd, Pt, Au, and Cu assays reported for the mineralized intercepts in MS ExcelTM files: Marathon Assays and Core.xlsx and Geordie Assay Range for Due Diligence.xlsx provided by Stillwater.

Mr. Mackie's visual estimates of pyrite, chalcopyrite, pyrrhotite, chalcocite and magnetite content generally agree with those reported by Marathon PGM Corp. and Stillwater for the 12 mineralized drill hole intercepts reviewed.

Drill logs for the sections reviewed were found to be appropriately detailed and presented a reasonable representation of geology, alteration mineralization and structure.

No discrepancies in the sample tag numbers within the core trays and the intervals quoted in the above-mentioned Excel spreadsheets were noted. Nor were any discrepancies observed in the Pd, Pt, Au, and Cu values quoted from those in the original assay certificates.

Based on the results of the investigation, Mr. Mackie is of the opinion that the mineralized drill hole assay results and corresponding drill hole logs reported by Stillwater and Marathon (for drill holes M-05-49, M-11-520, M-06-178, M-17-528, M-17-529, SL-17-71, SL-17-72, G-00-08, and G-10-17 that were the subject of the investigation) are verifiable and accurate and portray a reasonable representation of the types of mineralization encountered on the Marathon and Geordie Deposits.

12.1.2.2 Confirmation of Sampling

12 samples were taken for due diligence to verify the presence of palladium, platinum, gold, and copper in the drill core. In addition, a sample of both the high- and low-grade standards used by Stillwater in its 2017 drill program were also taken for analyses. The sample intervals were selected by Mr. Mackie without prior knowledge given to Stillwater or Gen Mining. The samples collected consisted of sawn quarter core. All verification samples duplicated the original sample intervals. In all instances the original sample interval was visible in the core box. Each verification sample was indicated with a Bruce Mackie sample identification tag that was placed

in the core box. Mr. Mackie collected each sample and placed them in clear identified plastic bags with a unique sample number tag.

The verification samples remained in the custody of Mr. Mackie until he delivered them in person in a sealed container to Activation Laboratories Ltd., an accredited assay laboratory, in Thunder Bay.

The samples were prepared and analyzed using similar methodologies employed by Stillwater during its 2017 diamond drill campaign: sample preparation Code RX1, gold, platinum and palladium analyses by fire assay followed by ICP-MS (Code 1C-EXP2) and trace element analyses by partial "aqua regia" digestion with an ICP-MS finish (Code UT-1M). A more detailed description of the analytical procedures used can be found on the Activation Laboratories Ltd. website (www.actlabs.com).

In addition, the Specific Gravity of each of the core samples was determined by Pycnometer (Nitrogen).

Table 12.2 gives the intervals sampled and Table 12.3 summarizes the results of the confirmation sampling.

P&E considers there to be good correlation between the independent verification samples and the original analyses in the Company database.

12.1.2.3 Assay Verification

Verification of assay data entry was performed on 7,022 assay intervals for Cu, Au, Ag, Pt and Pd. A few data entry errors were observed and corrected. The 7,022 verified intervals were checked against assay laboratory certificates from Accurassay Laboratories of Thunder Bay, Ontario, ALS Chemex of Vancouver, B.C., ACME Analytical Laboratories Ltd. of Vancouver, B.C., Bell White Analytical Laboratories of Haileybury, Ontario, and XRAL Laboratories of Don Mills, Ontario. The checked assays represented 51% of the data to be used for the Mineral Resource Estimate and approximately 13% of the entire database.

12.1.2.4 Drill Hole Twinning

During the 2019 drill program and concurrent with the PEA studies, four historical holes within the Marathon Deposit Mineral Resource were twinned to partially validate historical drilling as well obtain samples for further metallurgical studies. With allowance for anticipated inhomogeneities within the mineralized zones drill results are consistent with historical results.

TABLE 12.2 CONFIRMATION OF SAMPLE INTERVALS						
Zone	**Hole Number**	**From (m)**	**To (m)**	**Interval (m)**	**Laboratory / Year**	**Lab Certificate Number**
Sally	SL-17-71	41.0	43.0	2.0	ALS/2017	TB17177687
Sally	SL-17-72	276.0	278.0	2.0	ALS/2017	TB17210631
Sally	SL-17-72	314.0	316.0	2.0	ALS/2017	TB17210631
Southern Resource	M-17-529	72.0	74.0	2.0	ALS/2017	TB17233256
Southern Resource	M-17-528	45.0	47.0	2.0	ALS/2017	TB17220588
BZ Zone	M-06-178	7.0	9.0	2.0	Accurassay/2006	200641225
Main Zone	M-11-520	183.0	185.0	2.0	ALS/2011	TB11168362
Main Zone	M-11-520	217.0	219.0	2.0	ALS/2011	TB11168362
Main Zone	M-05-49	22.0	24.0	2.0	Accurassay/2005	200541214
Main Zone	M-05-49	84.0	86.0	2.0	Accurassay/2005	200541214
Geordie	G-00-08	160.1	161.1	1.0	Accurassay/2000	200041175
Geordie	G-10-17	222.00	224.00	2.0	Accurassay/2010	201040690

Source: *Mackie (2019)*

TABLE 12.3 CONFIRMATION OF ASSAY RESULTS							
Survey By	**From (m)**	**To (m)**	**Length (m)**	**Au (g/t)**	**Pd (g/t)**	**Pt (g/t)**	**Cu (ppm)**
DDH SL-17-71 Mineralized Intercept Sally Zone							
Stillwater	41.0	43.0	2.0	0.200	0.633	0.245	3,330
Mackie	41.0	43.0	2.0	0.195	0.591	0.246	3,510
DDH SL-17-72 Mineralized Intercept Sally Zone							
Stillwater	276.0	278.0	2.0	0.124	1.310	0.850	529
Mackie	276.0	278.0	2.0	0.065	1.190	0.587	225
Stillwater	314.0	316.0	2.0	0.252	1.085	0.658	1,920

TABLE 12.3 CONFIRMATION OF ASSAY RESULTS							
Survey By	**From (m)**	**To (m)**	**Length (m)**	**Au (g/t)**	**Pd (g/t)**	**Pt (g/t)**	**Cu (ppm)**
Mackie	314.0	316.0	2.0	0.263	1.790	0.924	2,840
DDH M-17-529 Mineralized Intercept Southern Resource							
Stillwater	72.0	74.0	2.0	0.136	0.815	0.239	3,510
Mackie	72.0	74.0	2.0	0.101	0.750	0.235	3,530
DDH M-17-528 Mineralized Intercept Southern Resource							
Stillwater	45.0	47.0	2.0	0.190	0.274	0.129	2,770
Mackie	45.0	47.0	2.0	0.103	0.113	0.101	2,530
DDH M-06-178 Mineralized Intercept BZ Zone							
Marathon	7.0	9.0	2.0	0.963	2.230	0.727	2,352
Mackie	7.0	9.0	2.0	0.152	1.750	0.583	852
DDH M-11-520 Mineralized Intercept Main Zone Resource							
Stillwater	183.0	185.0	2.0	0.055	0.616	0.139	3,480
Mackie	183.0	185.0	2.0	0.053	0.599	0.120	2,940
DDH M-11-520 Mineralized Intercept Main Zone Resource							
Stillwater	217.0	219.0	2.0	0.160	1.160	0.244	4,680
Mackie	217.0	219.0	2.0	0.092	0.935	0.275	3,860
DDH M-05-49 Mineralized Intercept Main Zone Resource							
Marathon	22.0	24.0	2.0	0.005	0.755	0.530	190
Mackie	22.0	24.0	2.0	0.013	0.461	0.430	190
DDH M-05-049 Mineralized Intercept Main Zone Resource							
Marathon	84.0	86.0	2.0	0.039	0.321	0.106	1,410
Mackie	84.0	86.0	2.0	0.043	0.327	0.071	2,340
DDH G-00-08 Mineralized Intercept Geordie							
Marathon	160.1	161.1	1.0	0.141	2.125	0.107	9,980
Mackie	160.1	161.1	1.0	0.092	1.700	0.092	8,670
DDH G-10-17 Mineralized Intercept Geordie							
Marathon	222.0	224.0	2.0	0.065	0.981	0.065	5,163
Mackie	222.0	224.0	2.0	0.052	0.824	0.051	5,860

TABLE 12.3
CONFIRMATION OF ASSAY RESULTS

Survey By	From (m)	To (m)	Length (m)	Au (g/t)	Pd (g/t)	Pt (g/t)	Cu (ppm)
MPG-1 High Grade Standard 2017 Drill Program							
Stillwater				0.275	3.538	1.109	6,715
Mackie				0.240	3.550	0.868	7,070
MPG-2 Low Grade Standard 2017 Drill Program							
Stillwater				0.073	0.805	0.223	2,853
Mackie				0.119	1.110	0.245	2,800

Note: *DDH = diamond drill hole, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*
Source: *Mackie (2019)*

12.2 GEORDIE DEPOSIT DATA VERIFICATION

12.2.1 Database Verification

P&E conducted verification of the Geordie Project drill hole assay database for gold, platinum, palladium, silver and copper, by comparison of the database entries with assay certificates, supplied to P&E by Gen Mining, in Portable Document Format.

Assay data ranging from 1987 through 2010 were verified for the Geordie Project. 69% (3,163 out of 4,558 samples) of the database was checked for gold, platinum, palladium, silver and copper, which included 82% (1,047 out of 1,277 samples) of the constrained drilling assay data.

Only two minor errors for gold and one minor error for palladium were encountered during verification of the Geordie database, which are of no material impact to the Mineral Resource Estimate.

12.2.2 Site Visit and Due Diligence Sampling

Due diligence sampling was not considered necessary for verification purposes, due to the extensive verification sampling already undertaken at the Marathon PGM-Cu Property over a number of drilling programs.

Based upon the evaluation of the QA/QC program undertaken by the Company, as well as database verification carried out by P&E, it is P&E's opinion that the data are robust and suitable for use in the current Mineral Resource Estimate.

12.3 SALLY DEPOSIT DATA VERIFICATION

12.3.1 Database Verification

P&E conducted verification of the Sally Project drill hole assay database for gold, platinum, palladium, silver and copper, by comparison of the database entries with assay certificates, supplied to P&E by Gen Mining, in Portable Document Format.

Assay data ranging from 2007 through 2017 were verified for the Sally Project. 57% (5,182 out of 9,119 samples) of the database was checked for gold, platinum and palladium, which included 50% (1,275 out of 2,529 samples) of the constrained drilling assay data.

53% (4,874 out of 9,119 samples) of the database was checked for copper, which included 50% (1,275 out of 2,529 samples) of the constrained drilling assay data.

37% (3,325 out of 9,119 samples) of the database was checked for silver, which included 41% (1,029 out of 2,529 samples) of the constrained drilling assay data.

No errors were encountered during verification of the Sally database.

12.3.2 Site Visit and Due Diligence Sampling

Due diligence sampling was not considered necessary for verification purposes, due to the extensive verification sampling already undertaken at the Marathon PGM-Cu Property over a number of drilling programs.

Based upon the evaluation of the QA/QC program undertaken by the Company, as well as database verification carried out by P&E, it is P&E's opinion that the data are robust and suitable for use in the current Mineral Resource Estimate.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

Metallurgical testwork results and flowsheet design for the Marathon PGM-Cu Project originate from a series of bench scale metallurgical at multiple testing laboratories over several years. Tests included crushing, grinding, as well as batch, cycle and mini pilot scale froth flotation testing.

There has been no recent mineral process and metallurgical testing. Previous work is discussed below.

13.1 MINERALOGICAL TESTWORK

A limited number of general and PGM-specific mineralogical investigations were performed on representative samples of the Marathon PGM-Cu mineralization.

In 2004, SGS-Lakefield conducted petrographic and image analyses that targeted the PGM-Cu mineralization. Xstrata Process Research ("XPS") conducted QEMSCAN modal analyses of a composite sample in 2008. Lakehead University's Mineralogy and Experimental Laboratory ("LUMINX") studied the distribution of the PGM's in 2006 and 2007.

13.1.1 SGS-Lakefield Mineralogical Studies 2004

SGS-Lakefield identified that the copper mineralization was bi-modal with most of the copper as coarse chalcopyrite and the balance as fine chalcopyrite locked with other sulphides and some silicates. Since chalcopyrite is a relatively soft mineral, early recovery of coarse, liberated copper in the flotation circuit was suggested.

13.1.2 Xstrata Process Development 2008

The 2008 XPS mineralogical study realized the following:

- The chalcopyrite is 77% fully liberated at a P_{80} size of 110 µm;
- The balance of the chalcopyrite is locked within particles of size range of 11–47 µm;
- The principal sulphide, pyrrhotite is about 90% liberated at 110 µm;
- Several fine-grained PGM minerals were identified, including froodite ($PdBi_2$) and sperrylite ($PtAs_2$); and
- The magnesium oxide ("MgO")-containing minerals are principally clinopyroxene and actinolite.

The XPS study suggested that flotation of copper (chalcopyrite) occurs at a coarse size followed by re-grinding of copper flotation tails for the flotation recovery of the balance of the copper and the PGM's. The MgO minerals should be susceptible to chemical depression in the flotation stages.

13.1.3 LUMINX PGM Study 2006-2007

The LUMINX mineralogical study results indicated that the PGM minerals are <30 µm in size, with 80% < 10 µm. Up to half of these minerals occur at the sulphide-silicate mineral boundary. Between 12 to 20% of the PGM's were found to be locked in sulphides or hematite. Less than 10% occur as liberated PGM particles or PGM aggregates. Up to half of the PGMs were found to be associated with silicates, mainly chlorite and serpentine.

These general findings support an early flotation separation of most of the copper at a relatively coarse particle size followed by precise fine grinding and a select flotation regime for PGM's. The association of up to half of the PGM's with MgO-rich silicates could represent a concentrate grade challenge.

13.1.4 Resource Development Inc. (RDi)

Bulk mineralogical studies were performed by Resource Development Inc. ("RDi") in Colorado on a composite representing the majority of the Deposit. It was determined that:

- The major host rock minerals are plagioclase (60%), olivine (24%), clinopyroxene (8%) and magnetite/ilmenite (4%);
- The dominant sulphide minerals in the sample were identified as pyrrhotite and chalcopyrite;
- Pentlandite and mackinawite are present in trace amounts; and
- Platinum group minerals are too rare and small to be identified by light microscopy techniques.

These simple observations suggest that magnetic separation and select separation of pyrrhotite could improve the Cu-PGM concentrate grade.

13.2 METALLURGICAL TESTWORK

Metallurgical testwork results and flowsheet design for the Project originate from a series of bench scale metallurgical tests at several laboratories from the early 1960s up to 2013. Tests included crushing, grinding, batch, cycle and mini pilot scale froth flotation testing. The focus of the testwork has consistently been the development of a robust process to economically produce Cu and Cu-PGM concentrates. A principal result of the various bench and pilot scale testwork campaigns was the selection of a "split flowsheet" for the development of the Cu/PGM mineralized material.

13.2.1 Early Metallurgical Test Results

Between 1965 and 1967, Anaconda Copper conducted several pilot scale beneficiation tests on high-grade Cu (0.6 to 0.8%) composites. The reported Cu recoveries were high at 91 to 94% at a concentrate grade ranging from 10% (low) to 27% (normal); Pd recoveries ranged from 72% to 86%.

In 1985, Fleck commissioned Lakefield Research to conduct bench and pilot scale tests. The key findings of these tests on high-grade Cu composites indicated that:

- Re-grinding the rougher concentrates increases concentrate grade;
- High copper recovery can be realized - 89%, 80%, and 71% respectively for Cu, Pd and Pt at a smelter acceptable Cu grade; and
- Addition of cellulose improves the concentrate grades.

13.2.2 2004-2008 Metallurgical Tests

13.2.2.1 SGS-Lakefield 2004 -2005

Locked cycle tests ("LCT") were performed, and the concept of a split flowsheet was introduced. The rationale for the split was the observation that a bi-modal distribution of at least one valuable mineral existed. Most of the chalcopyrite (the main copper mineral) was found to be relatively coarse which, being softer than the silicates, tends to grind finer than the average size distribution. The secondary occurrence of chalcopyrite is as very fine "blebs", locked with other sulphides and silicates. Liberation of this fine mineralization would require fine re-grinding. SGS-Lakefield also observed that the coarse chalcopyrite responds rapidly to flotation, while fine minerals are slow in responding to flotation.

13.2.2.2 SGS-Lakefield 2007-2008

An extensive series of batch and locked cycle flotation tests were performed at SGS-Lakefield on six composite samples. The main focus of the test program was the optimization of the flotation process using batch rougher and cleaner flotation tests and to simulate this process, followed by a series of "locked cycle" flotation tests. Batch variability flotation tests related to mineralization type and grade were included to examine the sensitivity of the flowsheet to these particular variabilities. Other variabilities that were investigated involved:

- The effects of the primary grind size;

- Collector selection, dosage and addition points. Earlier tests had shown the presence of unstable and collapsing froth, unsuitable conditions for an operating plant. Reagent additions need to be sparingly added at critical locations; and

- Re-grinding of 1st rougher tails and both Cu and Cu-PGM rougher concentrates.

Based on the LCT results, SGS-Lakefield estimated the metal recoveries for Cu-PGM mineralization, assuming metal grades approximating the Mineral Resource Estimate at that time of testing, and these are listed in Table 13.1.

TABLE 13.1 ESTIMATED RECOVERIES BASED ON SGS-LAKEFIELD 2008 LCT				
Metal	**Unit**	**Feed Grade**	**Concentrate Grade**	**Recovery (%)**
Copper	%	0.28	22.0	91.0
Gold	g/t	0.11	6.53	73.0
Platinum	g/t	0.23	13.0	63.0
Palladium	g/t	0.87	57.0	77.0
Rhodium*	g/t	0.02		46.0
Silver*	g/t	1.60		77.0
* *estimated from main composite sample grade*				

Note: *all recovery values are in %, LCT = locked cycle tests.*

13.2.3 Follow-up Metallurgical Testing

The follow-up metallurgical testwork targeted refinements to a split circuit flowsheet, i.e., the production of Cu and Cu-PGM concentrates in the same facility. The importance and scale of re-grinding of concentrates in advance of repeated cleaner flotation stages as well as the effects reagent recirculation in closed circuit cleaner flotation were important emphases.

13.2.3.1 XPS 2008- 2009 Bench LCT and Mini Pilot Plant Tests

A three-tonne (3 t) sample assaying averaging 0.031% Ni, 0.322% Cu, 1.07% S, 1.149 g/t PGM (total Pt, Pd, Au, Rh), 1 g/t Ag, and 6.73% MgO was subject to a series of bench scale LCT and a 100 hour mini pilot plant test. The LCT results are summarized in Table 13.2 and the pilot plant results are shown in Table 13.3. The results are similar and represent good recoveries of Cu and PGM's. XPS reported froth and circuit instability that could be reduced by operating cleaners in open circuit. However, this circuit configuration could be expected to result in lower recoveries.

TABLE 13.2 XPS 2009 LCT TEST RESULTS				
Metal	**Unit**	**Feed Grade**	**Concentrate Grade**	**Recovery (%)**
Copper	%	0.322	21.65	90.49
Gold	g/t	1.149 PGM	6.00	83.07
Platinum	g/t		15.46	77.33
Palladium	g/t		56.76	80.99
Rhodium	g/t			
Silver	g/t	1.0		

Note: *all recovery values are in %, LCT = locked cycle tests, XPS = Xstrata Process Research.*

TABLE 13.3 XPS 2009 MINI PILOT PLANT TEST RESULTS						
Metal	**Unit**	**Feed Grade**	**Cu Conc Grade**	**PGM Concentrate Grade**	**Combined Grade**	**Total Recovery (%)**
Copper	%	0.32	22.94	15.57	18.75	92.5
Gold	g/t	0.07	3.51	3.43	3.47	77.3
Platinum	g/t	0.19	8.3	9.0	8.7	71.0
Palladium	g/t	0.84	42.6	41.9	42.2	80.4
Rhodium	g/t	0.02	0.5	0.69	0.61	50.3
Silver	g/t	1.33	65.9	64.6	65.1	77.9
MgO	%	6.4	3.2	4.8	4.1	1.0
Mass Pull	**%**	**100**	**0.69**	**0.91**	**1.59**	

Note: *all recovery values are in %, XPS = Xstrata Process Research.*

XPS conducted supplementary tests confirming the marginally beneficial effects of cleaner concentrate re-grinding to 30 µm. Additional grinding to 15 µm was not shown to be beneficial.

13.2.3.2 XPS 2010 Bench LCT

Another set of LCT was performed at XPS in 2010, using the same split flotation flowsheet previously used by XPS. An increase in the number of cycles from six to eight appeared to result in better froth stability.

As shown in Table 13.4 the concentrate grades ranged from 14.5% Cu to 21.9% Cu at 84.5% to 92.9% Cu recovery (**average 89.71%**). Pd recoveries ranged from 79.9% to 84.0% (**average 82.93%). Average Pt and Au recoveries were 74.53% and 73.16%, respectively**. Silver ranged from 60.8% to 73% recovery with an average of 71.5%.

TABLE 13.4 LCT COPPER AND PGM RECOVERIES VS. FEED GRADE						
Composite No.	**Cu (%)**	**Au (g/t) (%)***	**Pt (g/t) (%)***	**Pd (g/t) (%)***	**Ag (g/t) (%)***	**Rh (g/t) (%)***
Composite 1						
Feed Grade (% or g/t)	0.11	0.04	0.13	0.41	0.54	0.008
Concentrate Grade (% or g/t)	15.24	5.19	13.22	44.01	58.18	0.74
Recovery Mean* (%)	84.51	59.30	68.18	83.52	65.21	70.59
Composite 2						
Feed Grade (% or g/t)	0.17	0.05	0.11	0.46	0.87	0.010
Concentrate Grade (% or g/t)	14.51	4.09	9.28	32.70	48.25	0.48

TABLE 13.4 LCT COPPER AND PGM RECOVERIES VS. FEED GRADE						
Composite No.	**Cu (%)**	**Au (g/t) (%)***	**Pt (g/t) (%)***	**Pd (g/t) (%)***	**Ag (g/t) (%)***	**Rh (g/t) (%)***
Recovery Mean* (%)	91.15	73.15	78.81	84.00	60.77	70.04
Composite 3						
Feed Grade (% or g/t)	0.25	0.08	0.29	0.86	1.20	0.020
Concentrate Grade (% or g/t)	18.62	5.46	12.12	49.80	57.83	0.60
Recovery Mean* (%)	90.69	81.54	75.29	79.95	77.47	62.40
Composite 4						
Feed Grade (% or g/t)	0.30	0.10	0.23	0.84	1.47	0.027
Concentrate Grade (% or g/t)	19.10	5.38	12.30	50.59	63.46	0.88
Recovery Mean* (%)	89.29	78.33	75.09	82.71	71.04	69.83
Composite 5						
Feed Grade (% or g/t)	0.39	0.11	0.25	0.95	1.80	0.024
Concentrate Grade (% or g/t)	21.94	5.80	13.04	55.16	68.94	0.66
Recovery Mean* (%)	92.91	73.46	75.28	84.47	83.37	61.60

** all recovery mean values are in %, LCT = locked cycle tests.*
***Note**: all Cu values are in %, Ag = silver, Au = gold, Pd = palladium, Pt = platinum, Rh = rhodium.*
***Source:** NORDMIN Marathon PGM-Cu internal Feasibility Study (2014)*

The two LCT on composite blends are shown in Table 13.5.

TABLE 13.5 XPS 2010 LCT ON BLENDS							
Composite Blend	**Item**	**Cu (%)**	**Au (g/t) (%)***	**Pt (g/t) (%)***	**Pd (g/t) (%)***	**Ag (g/t) (%)***	**Rh (g/t) (%)***
1/5	Feed (% or g/t)	0.25	0.08	0.19	0.68	1.17	0.016
	Conc (% or g/t)	17.9	4.98	11.8	46.4	60.4	0.64
	Recovery (%)	91.2	71.3	74.7	81.6	72.6	56.2
2/4	Feed (% or g/t)	0.24	0.08	0.17	0.65	1.17	0.019
	Conc (% or g/t)	18.4	5.52	11.6	45.1	62.4	0.66
	Recovery (%)	88.6	83.6	78.6	82.0	69.1	72.1
Average	**Recovery** (%)	**89.9**	**77.5**	**76.7**	**81.8**	**70.9**	**64.1**

** all recovery mean values are in %, XPS = Xstrata Process Research, LCT = locked cycle tests.*
***Note**: all Cu values are in %, Ag = silver, Au = gold, Pd = palladium, Pt = platinum, Rh = rhodium.*

13.2.4 Recent Metallurgical Testwork Results

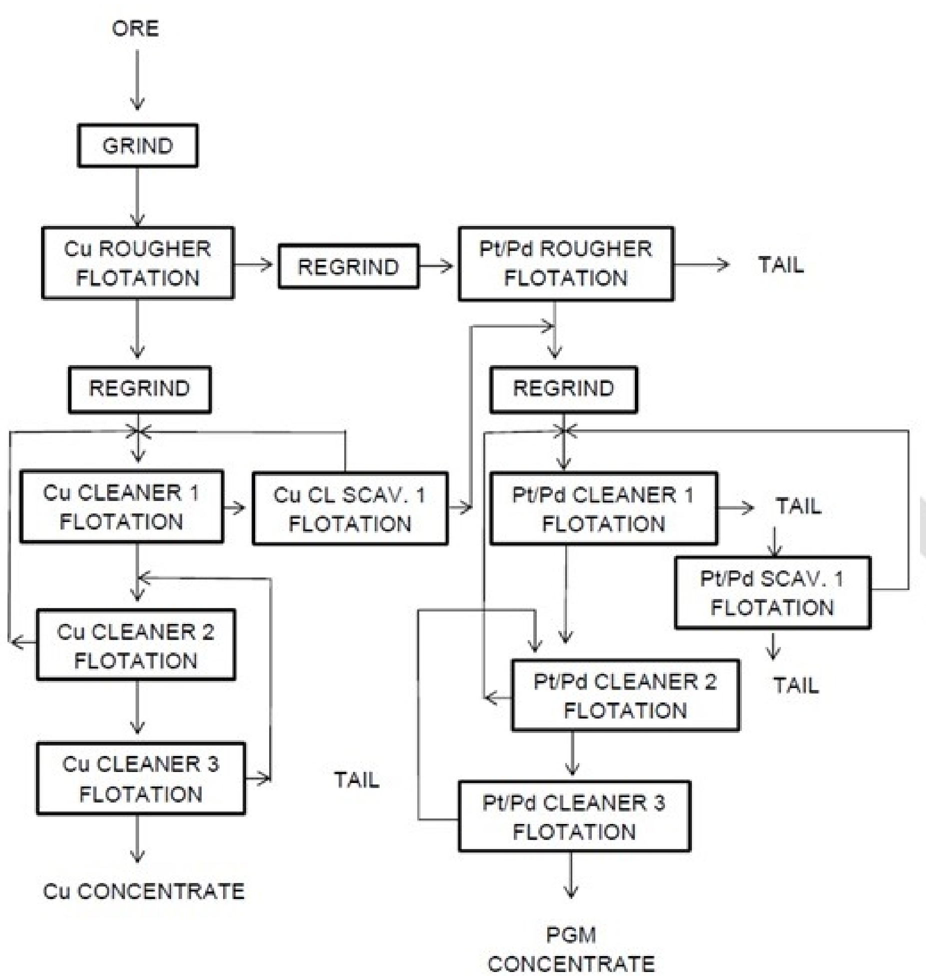
13.2.4.1 RDi Testwork – 2012

Five composite mineralized samples were provided to RDi by Stillwater Canada in 2012 for a variety of metallurgical studies to refine the split flowsheet design, including: sample characterization; Bond ball mill and abrasion indices; grinding studies; and open-circuit and locked-cycle flotation tests to set target retention times, reagent types and reagent dosage rates.

RDI concluded a range of LCT testwork on the one composite representing 80% of the Mineral Resource. The LCT were patterned after the modified split flowsheet shown in Figure 13.1.

The results of RDi's LCT are summarized in Table 13.6. A higher proportion of metals reported to the copper concentrate and grade was lower than previously reported by XPS in LCT and mini pilot scale tests. The combined concentrate was relatively low in copper content.

FIGURE 13.1 RDI MODIFIED SPLIT FLOWSHEET



Source: *NORDMIN Marathon PGM-Cu Internal Feasibility Study (2014)*
Note: *RDi = Resource Development Inc.*

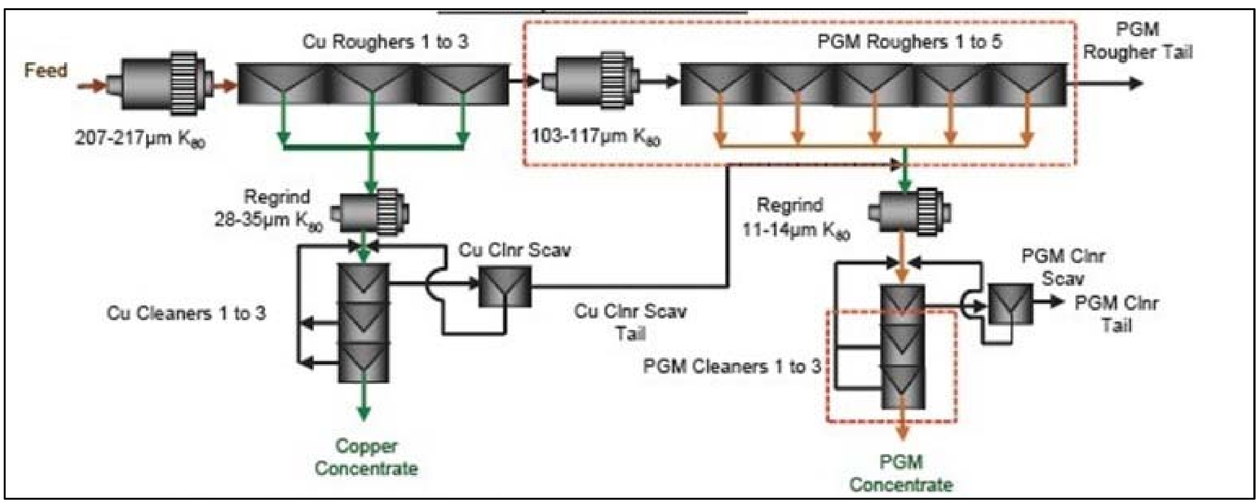
TABLE 13.6 RDi LCT ON MAIN COMPOSITE						
Metal	**Unit**	**Feed Grade**	**Cu Conc Grade**	**PGM Concentrate Grade**	**Combined Grade**	**Total Recovery (%)**
Copper	%	0.31	19.1	4.93	15.8	88.1
Gold	g/t	0.16	4.67	2.87	4.25	45.3
Platinum	g/t	0.25	12.1	6.28	10.7	73.3
Palladium	g/t	0.81	42.6	22.2	36.5	89.1
Mass Pull	**%**	**100**	**1.3**	**0.4**	**1.7**	

Note: *all recovery values are in %, RDi = Resource Development Inc., LCT = locked cycle tests.*

13.2.4.2 ALS LCT and Mini Pilot Scale Tests 2013-2014

Testwork was continued at ALS Metallurgical Laboratories ("ALS") in Kamloops, BC on the same composite samples that were tested at RDi. The flowsheet simulated in LCT and pilot scale tests is similar to that used at RDi and is illustrated in Figure 13.2.

FIGURE 13.2 ALS KAMLOOPS TEST CIRCUIT



Source: *NORDMIN Marathon PGM-Cu Internal Feasibility Study (2014)*

In addition to confirming the flowsheet, a sufficient quality of concentrate was needed for smelter feed evaluation. A summary of the ALS tests is shown in Table 13.7. The four-day pilot test produced significantly poor quality concentrate and generally lower recovery than the bench scale LCT. However, pilot test results on the Main Zone Mineral Resource produced good results.

TABLE 13.7 ALS LOCKED CYCLE AND PILOT PLANT TEST RESULTS									
Metal	Unit	Feed Grade	LCT		Pilot Test Average Results		Main Zone		
			Combined Conc Grade	Recovery (%)	Conc Grade	Recovery (%)	Feed Grade	Conc. Grade	Recovery (%)
Copper	%	0.195	19.6	93.5	12.41	91.3	0.307	18.8	95.5
Gold	g/t	0.076	4.67	79.7	3.1	78.2	0.109	5.59	84.7
Platinum	g/t	0.171	12.1	51.4	6.4	67.9	0.218	9.46	70.1
Palladium	g/t	0.555	42.6	80.7	26.1	75.2	0.864	45.1	83.9
Mass Pull	**%**	**100**	**0.9**		**1.51**			**1.6**	

Note: *ALS = ALS Metallurgical Labs, LCT = locked cycle tests.*

13.2.5 Additional Metallurgical Tests

13.2.5.1 Grinding Testwork

In 2007/2008, SGS-Lakefield conducted extensive grindability testwork Bond work index, drop weight and abrasion tests. The selected rock core represented seven Cu-PGM lithologies. The rock was assessed as slightly tougher and more abrasive than average rock found elsewhere. From the test data and using relevant Comminution Economic Evaluation Tool CEET2, SAG mill Power Index ("SPI") and JKSimMet software, semi-autogenous mill/ball mill/crusher ("SABC") equipment size and power requirements were determined for a 22,000 tpd process plant. Re-grind mill sizing (3 units, Figure 13.2) was apparently not addressed.

The SABC sizing for grinding to P_{80} of 120 and 85 μm are shown in Table 13.8. All scenarios included a pebble crusher on SAG mill discharge oversize.

TABLE 13.8 MARATHON GRINDING MILL SIZES FOR 22,000 TPD				
P_{80} = 125 μm	**JK SimMet (SABC)**		**CEET2 (SABC)**	
Nominal size (ft)	34 x 15	21 x 36	34 x 15	22 x 36
Design ball charge (%)	10	33	10	33
Design power (kW)	8,435	7,933	8,653	9,040
Installed power (kW)	10,220	8,877	10,444	10,444
P_{80} = 85 μm	**JK SimMet (SABC)**		**CEET2 (SABC)**	
Nominal size (ft)	34 x 15	23 x 39	34 x 15	24 x 38
Design ball charge (%)	10	33	10	33
Design power (kW)	8,435	10,636	8,653	11,738
Installed power (kW)	10,220	12,085	10,444	12,682

Source: *Marathon Technical Report, Micon (2010)*

13.2.5.2 High Pressure Grinding Roll

High pressure grinding roll ("HPGR") pilot scale programs were completed by KHD Humboldt Wedag GmbH at its testing facilities located near Cologne, Germany. This work was undertaken to test the suitability for this technology to replace a conventional SABC grinding circuit. Tests were completed in 2007 and 2008 on 3.5 and 1.3 t samples.

The installation of a HPGR requires a second crushing stage after a primary stage to size HPGR feed to approximately 40 mm. The HPGR discharge may or may not be screened for recycling coarse material. The next processing unit in the circuit would be a ball mill to prepare flotation feed. Essentially, an HPGR installation removes a SAG mill and replaces it with a second stage crusher, a fine mineralized material storage system with bottom material recovery capability and a HPGR crushed product handling arrangement. Dust collection would be needed for all of the "dry" process equipment.

In 2008, Met-Chem completed a comparison between the use of a SABC circuit and an HPGR installation for the Project. The HPGR option included a primary crusher, secondary crusher, HPGR and a ball mill. Met-Chem suggested that the HPGR capital and operating costs were lower than the SABC option – $128/143 M capital and $4.10/6.22/t, respectively. Both estimates can be assumed to be approximate, given that the total metallurgical facility capital cost estimate present by Micon 2010[1] was $158 M and the total operating cost was $6.79/t.

P&E suggests that the concept of an HPGR crushing installation for the development of the Project warrants further investigation in future engineering studies. Aspects that could be considered are the potential interruptions of plant operation by frozen mineralization in the secondary crusher stockpile and packing on rollers, cost and delays caused by roller surface rebuilding and the need for standby HPGR units. HPGR installations are limited in wet, cold mining locations. As such, an HPGR was not considered in this Technical Report.

13.2.5.3 Miscellaneous Metallurgical Investigations

PGM rougher flotation tailings were subjected to a simple magnetic separation test. The target was the production of a by-product magnetite concentrate. The test produced a low purity product. Magnetite typically partially reports to sulphide flotation concentrates. An opportunity may exist to upgrade rougher concentrates by removing coarse magnetite before re-grinding.

A "PLATSOL" test was conducted at SGS-Lakefield on a flotation concentrate. The PLASTOL process is a high-pressure leach process developed to recover the platinum group metals ("PGMs") from mineralized materials and concentrates. In the test, Cu and Pt were fully dissolved. Approximately 80% of the Pd and 50% of the Au and Ag were leached. These low extractions eliminate further consideration of the PLATSOL process for the Project.

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[1] Micon, 2010, Technical Report on the Updated Feasibility Study for the Marathon PGM-Cu Project.

Samples of flotation concentrate were shipped from the ALS pilot plant results to Outotec for the determination of thickening and filtration characteristics. The thickening rate was reasonable with 56-60% solids (low) achievable in thickener underflow. The filtration rate ranged from 200 to 390 kg/m^2h (reasonable) with a residual moisture content ranging from 11.4 to 14.6%. The slightly higher than desirable moisture content is related to the fineness of the concentrate mineralization.

13.3 METALLURGICAL RECOVERIES

The extensive metallurgical testwork appears to have overcome several challenges presented in concentrating the valuable minerals present in the Deposit, including the following:

- The copper and PGM mineralization are present in small proportions;
- A small amount of concentrate would be produced from each tonne of mineralized material fed to a process plant – the concentration ratio exceeds 65:1. This is a particular problem for both bench and small-scale pilot testing – a final concentrate from a 1 kg test would be only 15 grams;
- The soft copper mineral needs to be removed at a relatively coarse grind. The rougher concentrate containing copper and PGM mineralization both need to be reground, and in the laboratory, the quantities are less than suitable for laboratory-scale equipment; and
- The kinetics of copper flotation are fast and that of the PGM flotation are slow. Long flotation times can lead to froth collapse.

The XPS LCT test results of 2010 (Figure 13.1 and Table 13.5) appear to represent stable test conditions for a split flowsheet as well as representing a range of mineralization grades expected in process plant feed.

Five tests representing mineralized material composites assaying between 0.11% and 0.39% Cu (Figure 13.1) produced the following average recoveries:

Copper – 89.7%	Palladium – 82.9%
Silver – 71.5%	Platinum – 74.5%.
Gold – 73.2%	

Two blends assaying 0.24% Cu (Table 13.5) produced the following recoveries:

Copper – 89.9%	Palladium – 81.8%
Silver – 70.9%	Platinum – 76.7%.
Gold – 77.5%	

The recoveries determined in these XPS tests are marginally lower, particularly for copper and gold, than used by Micon (2010) and Nordmin (2014) in their Technical Reports, e.g. Cu 90.8

and 92.96% respectively; gold 79.9 and 82.4%. Palladium recoveries reported in XPS tests are slightly higher than assigned by Micon and Nordmin.

A summary of Project estimated recoveries for the first 5 years of 5 Mtpa production followed by years 6 to 14 at an 8 Mtpa processing rate is shown in Table 13.9. The ALS results can be considered important guides to what may be expected in a process plant operation. The locked cycle and continuous pilot plant operation were conducted using the optimized circuit shown in Figure 13.2.

Additionally, in 2019, five holes were drilled in the Marathon Deposit to partially validate historical drill intercepts within the Main Zone and W-Horizon as well as to collect drill core for further metallurgical study.

TABLE 13.9
SUMMARY OF RECOVERIES, MARATHON PGM PROJECT

Commodity		SGS-Lakefield	XPS			ALS			Estimated Recoveries		
Type	**Units**	**Pilot 1986**	**Pilot 2009**	**Locked Cycle 2010**	**Locked Cycle 2010**	**Locked Cycle 2013**	**Pilot 2013**	**Main Zone**	**Dec 2019 Resource Grade**	**First 5 Years**	**Years 6 to 14**
Cu	% Recovery	89	92.50	89.70	89.90	93.5	91.30	95.5		**92.00**	90.00
Ag	% Recovery		77.90	71.50	70.90					**71.50**	71.50
Au	% Recovery	80 (est)	77.30	73.20	77.50	79/7	78.20	84.7		**73.20**	73.20
Pd	% Recovery	80	80.40	82.90	81.80	80.7	75.20	83.9		**82.90**	82.90
Pt	% Recovery	21	71.00	74.50	76.60	51.4	67.90	70.1		**74.50**	74.50
Cu in feed	%	0.47	0.32	0.24	0.25	0.20	0.20	0.307	0.22	**0.27**	0.20
Ag in feed	g/t		1.33	1.18	1.17				1.52	**1.086**	1.65
Au in feed	g/t		0.07	0.08	0.08	0.076	0.076	0.109	0.07	**0.092**	0.067
Pd in Feed	g/t	1.85	0.84	0.70	0.67	0.555	0.555	0.864	0.69	**1.008**	0.553
Pt in Feed	g/t		0.19	0.21	0.18	0.171	0.171	0.218	0.21	**0.282**	0.179
Cu Conc Grade % Cu		21	18.8	Average of first 5 tests 17.9	Average of last 2 of 7 tests 18.1	19.6	Average 12.41	18.8		**Est 19% Cu**	

Note: *XPS = Xstrata Process Research, ALS = ALS Metallurgical Lab, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.0 MINERAL RESOURCE ESTIMATES

There are three Mineral Resource Estimates discussed within this section: Marathon, Geordie and Sally.

14.1 MARATHON DEPOSIT MINERAL RESOURCE ESTIMATE

14.1.1 Introduction

The purpose of this Technical Report section is to summarize the Mineral Resource Estimate for the Marathon Deposit, Marathon, Ontario, for Gen Mining. The Mineral Resource Estimate presented herein has been prepared following the guidelines of the Canadian Securities Administrators' National Instrument 43-101 and Form 43-101F1 and in conformity with generally accepted "CIM Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. Mineral Resources have been classified in accordance with the "CIM Standards on Mineral Resources and Reserves: Definition and Guidelines" as adopted by CIM Council.

Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. Confidence in the estimate of Inferred Mineral Resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure.

All Mineral Resource estimation work reported herein was carried out or reviewed by Fred Brown, P.Geo., and Eugene Puritch, P.Eng., FEC, CET, both of P&E, both independent Qualified Persons as defined by National Instrument 43-101 by reason of education, affiliation with a professional association and past relevant work experience. The effective date of this Mineral Resource Estimate is September 9th, 2019.

Portions of the background information and technical data for this study were obtained from previously filed National Instrument 43-101 Technical Reports. The authors have assumed that previous companies' reports, maps and other data are complete and accurate.

Mineral Resource modeling and estimation were carried out using GEOVIA GEMS™ software. Variography was carried out using Snowden Supervisor. Open-pit optimization was carried out using NPV Scheduler software.

14.1.2 Previous Mineral Resource Estimates

A public Mineral Resource Estimate for the Marathon Deposit dated January 8, 2010 was prepared by Micon International Ltd. The Mineral Resource Estimate reported a total Measured and Indicated Mineral Resource Estimate of 114.8 Mt and an Inferred Mineral Resource Estimate of 6.2 Mt (Table 14.1). The Mineral Resource Estimate was reported relative to an NSR cut-off grade of CDN$10.50/t. The Mineral Resource Estimate was calculated based on the results of 818 drill holes and 456 surface channel samples.

TABLE 14.1 MARATHON DEPOSIT PREVIOUS MINERAL RESOURCE ESTIMATE DATED JANUARY 8, 2010										
Classification	**Tonnes (Mt)**	**Ag (g/t)**	**Au (g/t)**	**Cu (%)**	**Pd (g/t)**	**Pt (g/t)**	**Ag (koz)**	**Au (koz)**	**Pd (koz)**	**Pt (koz)**
Measured	94.3	1.60	0.09	0.26	0.85	0.24	4,847	266	2,564	736
Indicated	20.5	1.42	0.06	0.14	0.45	0.16	976	50	386	133
Mea + Ind	**114.8**	**1.57**	**0.08**	**0.24**	**0.78**	**0.23**	**5,823**	**316**	**2,950**	**869**
Inferred	6.2	1.46	0.05	0.15	0.31	0.10	290	21	61	21

Note: *Mea = Measured, Ind = Indicated, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

This Technical Report and updated Mineral Resource Estimate replaces all previous Technical Reports and Mineral Resource Estimates for the Marathon Deposit.

14.1.3 Data Supplied

Sample data were provided in the form of ASCII text files and Excel format files. The supplied databases contain 1,359 unique collar records (Table 14.2). Of these, 177 records fall outside the block model limits or had no reported assay data (see Appendix A). Drill hole and surface channel sample records consist of collar, survey, lithology, bulk density and assay data. Assay data fields consist of the drill hole ID, downhole interval distances, sample number, and Ag, Au, Cu, Pd, Pt assay grades. All data are in metric units. Collar coordinates were provided in the NAD 27 UTM Zone 16N coordinate system.

A calculated NSR field was added for domain modeling to the database as follows:

NSR CDN$/t = Ag * 0.45 + Au * 39.03 + Cu * 76.27 + Pd * 35.00 + Pt * 26.47

TABLE 14.2 MARATHON DEPOSIT DRILL HOLE DATABASE SUMMARY			
Item	**Drill Holes**	**Channel Samples**	**Total**
Count	883	494	1,377
Total metres	166,435.6	4,436.3	170,871.9
Minimum Length (m)	4.9	0.8	0.8
Maximum Length (m)	655.9	52.8	655.9
Average Length (m)	187.7	9.0	122.7

The client supplied database contains a total of 43,057 non-zero Ag assays, 34,044 non-zero Au assays, 34,296 non-zero Cu assays, 34,040 non-zero Pd assays, and 34,034 non-zero Pt assays. Industry standard validation checks were carried out on the supplied databases, and minor corrections made where necessary. P&E typically validates a Mineral Resource database by checking for inconsistencies in naming conventions or analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, and missing interval and coordinate fields.

No significant errors were noted with the client supplied database. P&E considers that the database supplied is suitable for the Mineral Resource Estimate.

14.1.4 Domain Modeling

The updated P&E Mineral Resource Estimate is based on 17 mineralization domains, with a total volume on the order of 74 million cubic metres (see Appendix B). Mineralization domains have been based on zones developed by Dr. David Good, former Vice President Exploration for Stillwater Canada Inc. Mineralization domains are further broadly grouped into two areas, the northern domains where mineralization is dominated by paleo-topographic controls, and the remaining southern domains. Of the 17 domains modeled, the North Main (rock code 90), Walford Zone (rock code 80) and North Footwall (rock code 20) make up 80% of the total Mineral Resource Estimate by volume.

Domain models were generated from successive polylines as defined by a nominal C$13/t NSR cut-off value, oriented perpendicular to the overall trend of the mineralization. All polyline vertices were snapped directly to drill hole assay intervals, and include low grade material where necessary to maintain continuity between cross-sections. Where required, the polylines were extended over partially sampled drill holes, which were assigned low nominal background grades for compositing. Drill holes that reported no assay results were not included in the modeling process. An overburden surface was constructed from the supplied lithological logging, and all mineralization domains were clipped to topographic and overburden surfaces where appropriate. Each resulting mineralization domain was assigned a unique rock code, and the resulting domains were used for domain coding, statistical analysis and compositing limits (Table 14.3).

TABLE 14.3
MARATHON DEPOSIT MINERALIZATION DOMAINS

Description	Domain	Rock Code	Percent by Volume
Magnetite 1	MAG	101	1
Magnetite 2	MAG	102	1
Magnetite 3	MAG	103	0
Magnetite Hanging wall	MHW	52	0
Magnetite Hanging wall 1	MHW	51	1
Magnetite Hanging wall 3	MHW	53	0
Malachite Main	MBR	30	4
Malachite Footwall	MBRFW	40	2
North Footwall	NFW	20	9
North Hanging wall 1	NHW	10	0
North Hanging wall 2	NHW2	60	5
North Hanging wall 3	NHW3	70	3

TABLE 14.3 MARATHON DEPOSIT MINERALIZATION DOMAINS			
Description	**Domain**	**Rock Code**	**Percent by Volume**
North Hanging wall 4	NHW4	65	1
North Hanging wall 5	NHW5	15	0
North Hanging wall 6	NHW6	75	1
North Main	NMAIN	90	57
Walford Zone	WZONE	80	14

14.1.5 Exploratory Data Analysis

The average Nearest Neighbour drill hole collar distance is 45.9 m, and the average drill hole length is 187.7 m (Figure 14.1 and Appendix A for a plan view with drill hole traces and trenches). Summary assay data for the supplied database and for domain-coded assay samples are tabulated in Table 14.4.

FIGURE 14.1 MARATHON DEPOSIT DIAMOND DRILL HOLE LOCATIONS IN PLAN VIEW

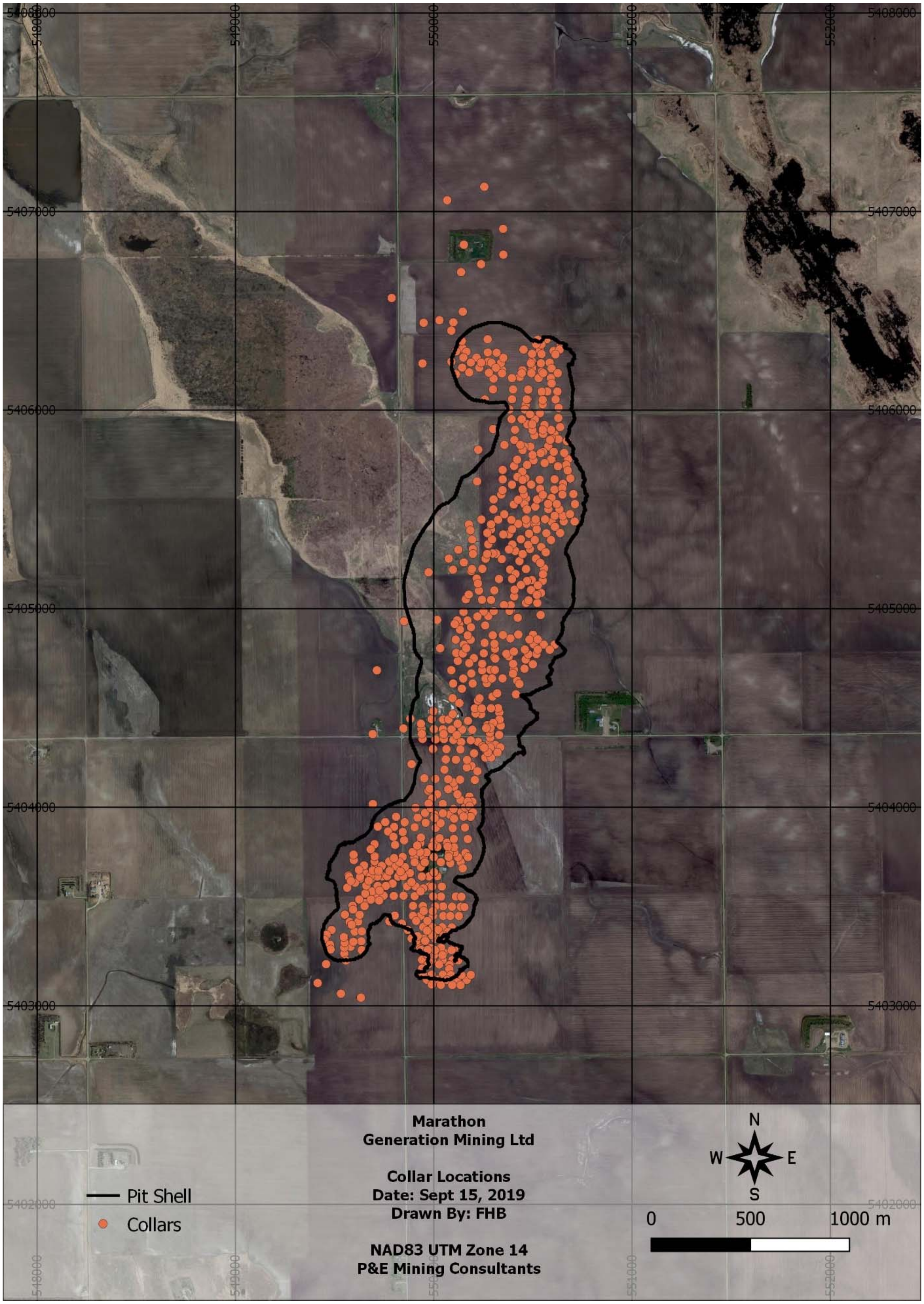


TABLE 14.4
MARATHON DEPOSIT SUMMARY ASSAY STATISTICS
ROCK CODES 0 TO 53

Rock Code	0*	10	15	20	30	40	51	52	53
Ag Mean g/t	1.22	1.37	1.36	1.31	1.73	1.64	2.62	2.56	2.25
Au Mean g/t	0.02	0.04	0.04	0.05	0.07	0.05	0.05	0.04	0.06
Cu Mean %	0.04	0.09	0.02	0.23	0.10	0.10	0.07	0.09	0.10
Pd Mean g/t	0.08	0.27	0.39	0.44	0.47	0.22	0.28	0.17	0.24
Pt Mean g/t	0.04	0.11	0.23	0.13	0.20	0.10	0.13	0.08	0.11
Ag St Dev	1.23	0.98	0.82	1.76	1.51	1.78	2.09	2.45	1.18
Au St Dev	0.04	0.08	0.07	0.08	0.12	0.05	0.08	0.03	0.06
Cu St Dev	0.07	0.09	0.03	0.26	0.12	0.10	0.07	0.05	0.09
Pd St Dev	0.23	0.35	0.56	0.67	1.16	0.33	0.96	0.24	0.37
Pt St Dev	0.07	0.10	0.25	0.16	0.43	0.11	0.34	0.09	0.10
Ag CoV %	101.13	71.30	60.16	133.61	87.13	108.08	79.88	95.67	52.58
Au CoV %	234.68	182.50	180.80	144.87	171.49	108.91	159.98	80.78	104.04
Cu CoV %	193.17	97.53	148.59	113.04	117.46	94.80	93.76	63.52	85.13
Pd CoV %	291.37	128.71	144.08	152.13	244.69	151.41	340.47	144.36	151.21
Pt CoV %	172.41	87.98	108.04	130.41	212.60	113.11	266.82	118.47	91.43
Ag Min g/t	0.01	0.45	0.45	0.10	0.10	0.10	0.45	0.45	0.50
Au Min g/t	0.0005	0.001	0.002	0.001	0.001	0.001	0.002	0.002	0.002
Cu Min %	0.0001	0.003	0.005	0.002	0.0001	0.001	0.003	0.003	0.005
Pd Min g/t	0	0.005	0.005	0.001	0.001	0.001	0.005	0.005	0.005
Pt Min g/t	0	0.007	0.007	0.001	0.001	0.001	0.005	0.006	0.007
Ag Max g/t	68.00	6.00	3.02	44.00	19.00	33.00	24.00	25.00	6.30
Au Max g/t	2.14	0.70	0.37	1.17	1.59	0.36	0.84	0.14	0.28
Cu Max %	2.22	0.52	0.13	4.91	0.97	0.90	0.37	0.29	0.32
Pd Max g/t	14.56	2.10	2.68	14.91	18.60	3.37	10.50	1.59	2.06
Pt Max g/t	3.48	0.43	1.14	2.21	8.72	1.03	4.21	0.79	0.47
Ag Count	25,179	84	31	1643	1120	635	240	112	55
Au Count	34,044	84	35	1876	1149	642	245	115	55
Cu Count	34,133	84	35	1872	1148	642	245	115	55
Pd Count	34,040	84	35	1876	1149	642	245	115	55
Pt Count	34,034	84	35	1866	1149	642	245	115	55

***** *Unconstrained assays*
Note: *St Dev = standard deviation, CoV = covariance, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

TABLE 14.4 **MARATHON DEPOSIT SUMMARY ASSAY STATISTICS** **ROCK CODES 60 TO 103**									
Rock Code	**60**	**65**	**70**	**75**	**80**	**90**	**101**	**102**	**103**
Ag Mean g/t	1.55	1.74	1.53	2.19	1.98	1.64	1.68	1.48	1.77
Au Mean g/t	0.04	0.06	0.03	0.06	0.07	0.07	0.06	0.05	0.03
Cu Mean %	0.11	0.09	0.08	0.19	0.11	0.24	0.07	0.09	0.12
Pd Mean g/t	0.30	0.22	0.21	0.57	0.67	0.63	0.39	0.28	0.07
Pt Mean g/t	0.11	0.13	0.10	0.19	0.27	0.19	0.11	0.09	0.05
Ag St Dev	2.41	1.22	3.43	2.52	11.00	1.47	1.42	1.18	1.42
Au St Dev	0.05	0.09	0.05	0.07	0.18	0.10	0.12	0.09	0.04
Cu St Dev	0.13	0.10	0.07	0.19	0.13	0.21	0.07	0.08	0.13
Pd St Dev	0.43	0.31	0.24	0.74	2.48	0.80	0.44	0.37	0.15
Pt St Dev	0.13	0.17	0.10	0.24	1.05	0.26	0.10	0.09	0.06
Ag CoV %	155.45	70.02	224.01	115.09	556.41	89.86	84.40	79.63	80.45
Au CoV %	122.26	154.89	133.97	111.89	248.76	138.95	181.48	159.38	109.62
Cu CoV %	126.13	107.72	98.33	102.48	122.87	86.69	94.45	96.06	109.23
Pd CoV %	143.27	143.69	115.31	129.17	368.68	127.12	112.25	135.16	214.05
Pt CoV %	115.80	130.87	102.61	129.81	395.79	141.75	89.27	92.56	113.51
Ag Min g/t	0.02	0.45	0.09	0.45	0.10	0.02	0.10	0.10	0.45
Au Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cu Min %	0.001	0.002	0.001	0.005	0.0001	0.0001	0.001	0.001	0.001
Pd Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.001	0.001
Pt Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.006	0.002	0.001
Ag Max g/t	38.04	9.12	73.00	29.30	591.00	27.00	9.00	5.22	8.00
Au Max g/t	0.59	0.69	0.50	0.43	7.23	2.61	1.10	0.93	0.15
Cu Max %	1.43	0.66	0.51	1.47	1.22	3.55	0.31	0.53	0.73
Pd Max g/t	5.70	2.35	1.89	4.87	69.98	15.72	2.77	1.91	0.98
Pt Max g/t	1.50	1.42	0.70	2.34	39.10	8.20	0.54	0.37	0.23
Ag Count	923	234	548	172	3931	7703	232	151	64
Au Count	993	238	599	211	4067	8311	232	151	64
Cu Count	999	238	597	211	4062	8307	232	151	64
Pd Count	993	238	599	211	4067	8311	232	151	64
Pt Count	989	238	596	209	4065	8297	232	151	64

Note: *St Dev = standard deviation, CoV = covariance, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

P&E noted a strong overall correlation between Pd and Pt as well as Au with Pd and Pt. A strong correlation between Cu with Pd and Pt was noted in the northern area (Table 14.5).

TABLE 14.5 MARATHON ASSAY CORRELATION TABLE (PEARSON CORRELATION COEFFICIENT)					
Total	**Ag**	**Au**	**Cu**	**Pd**	**Pt**
Ag	1				
Au	0.09	1			
Cu	0.08	0.41	1		
Pd	0.05	0.57	0.41	1	
Pt	0.04	0.43	0.26	0.84	1
NFW 20	**Ag**	**Au**	**Cu**	**Pd**	**Pt**
Ag	1				
Au	0.29	1			
Cu	0.17	0.33	1		
Pd	0.25	0.52	0.60	1	
Pt	0.29	0.50	0.51	0.69	1
WZone 80	**Ag**	**Au**	**Cu**	**Pd**	**Pt**
Ag	1				
Au	0.06	1			
Cu	0.04	0.29	1		
Pd	0.01	0.56	0.22	1	
Pt	0.01	0.42	0.13	0.87	1
NMain 90	**Ag**	**Au**	**Cu**	**Pd**	**Pt**
Ag	1				
Au	0.19	1			
Cu	0.30	0.45	1		
Pd	0.19	0.56	0.65	1	
Pt	0.18	0.44	0.47	0.66	1

Note: *NFW = North Footwall, WZone = Walford Zone, NMain = North Main (see Table 14.3), Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.1.6 Bulk Density

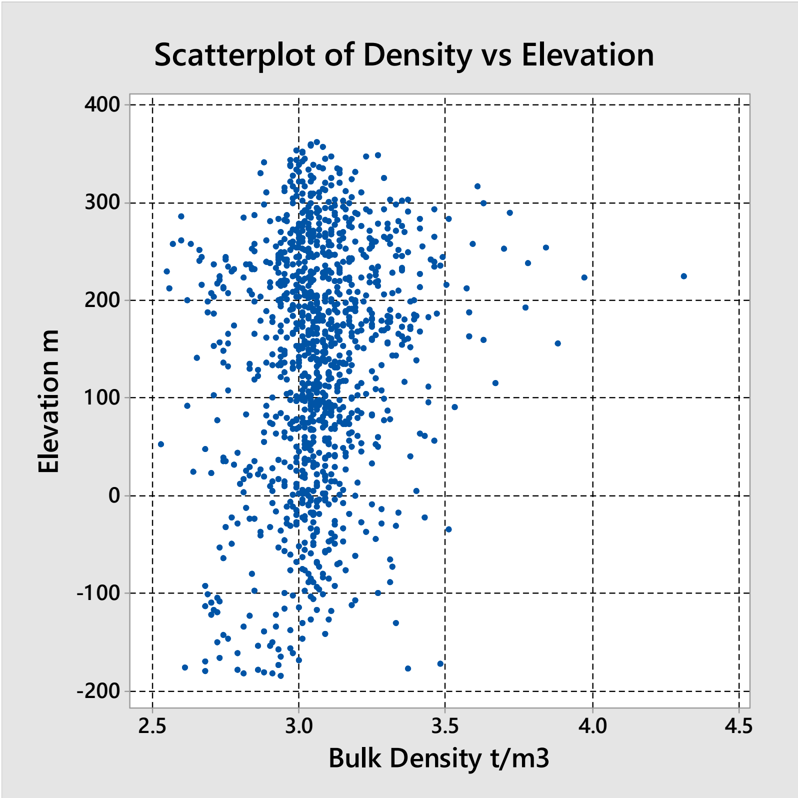
The client supplied database contains 1,136 bulk density measurements, with values ranging from 2.53 to 4.31 tonnes per cubic metre (“t/m^3”) (Table 14.6). P&E noted a slight decrease in bulk density with depth, primarily associated with the denser Magnetite Hanging Wall units occurring higher in the stratigraphic column (Figure 14.2).

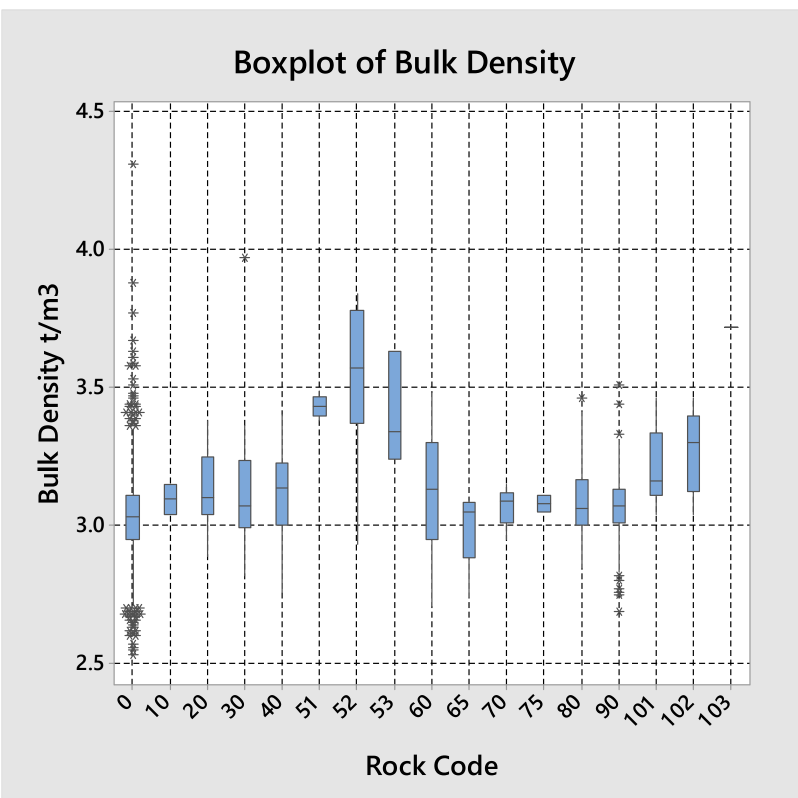
TABLE 14.6
MARATHON BULK DENSITY SAMPLE STATISTICS

Rock Code	Mean	Standard Deviation	CoV	Minimum	Maximum	Count
0	3.04	0.19	6.22	2.53	4.31	621
10	3.10	0.08	2.51	3.04	3.15	2
20	3.13	0.13	4.13	2.89	3.38	63
30	3.11	0.20	6.49	2.82	3.97	40
40	3.11	0.17	5.45	2.76	3.40	18
51	3.43	0.04	1.21	3.38	3.49	6
52	3.53	0.31	8.78	2.93	3.84	7
53	3.40	0.20	5.95	3.24	3.63	3
60	3.11	0.19	6.03	2.71	3.48	23
65	2.99	0.14	4.53	2.74	3.09	6
70	3.07	0.06	2.06	2.95	3.15	16
75	3.08	0.04	1.38	3.05	3.11	2
80	3.09	0.12	4.02	2.85	3.46	113
90	3.07	0.12	3.78	2.69	3.51	197
101	3.22	0.14	4.34	3.04	3.46	13
102	3.27	0.16	4.77	3.04	3.46	5
103	3.72	na	na	3.72	3.72	1
Total	**3.07**	**0.18**	**5.82**	**2.53**	**4.31**	**1,136**

Note: *CoV = covariance.*

FIGURE 14.2 MARATHON BULK DENSITY PLOTS





14.1.7 Compositing

Constrained assay sample lengths range from 0.10 m to 29.8 m, with an average sample length of 2.04 m (Figure 14.3). A total of 80% of the samples have a length of 2.00 m.

All constrained assay samples were therefore composited to the dominant sample length of 2.0 m. Length-weighted composites were calculated for all metals within the defined mineralization domains. Missing sample intervals in the data were assigned a nominal background grade of 0.001 g/t or 0.001%. The compositing process started at the first point of intersection between the drill hole and the domain intersected, and halted upon exit from the domain wireframe. Residual composites that were less than 1.0 m in length were discarded so as not to introduce a short sample bias into the estimation process. The wireframes that represent the interpreted mineralization domains were also used to back-tag a rock code identifier into the drill hole workspace. The composite data were visually validated against the domain wireframes and subsequently exported for analysis and estimation. Summary uncapped composite statistics are tabulated in Table 14.7.

FIGURE 14.3 MARATHON HISTOGRAM OF CONSTRAINED ASSAY SAMPLE LENGTHS

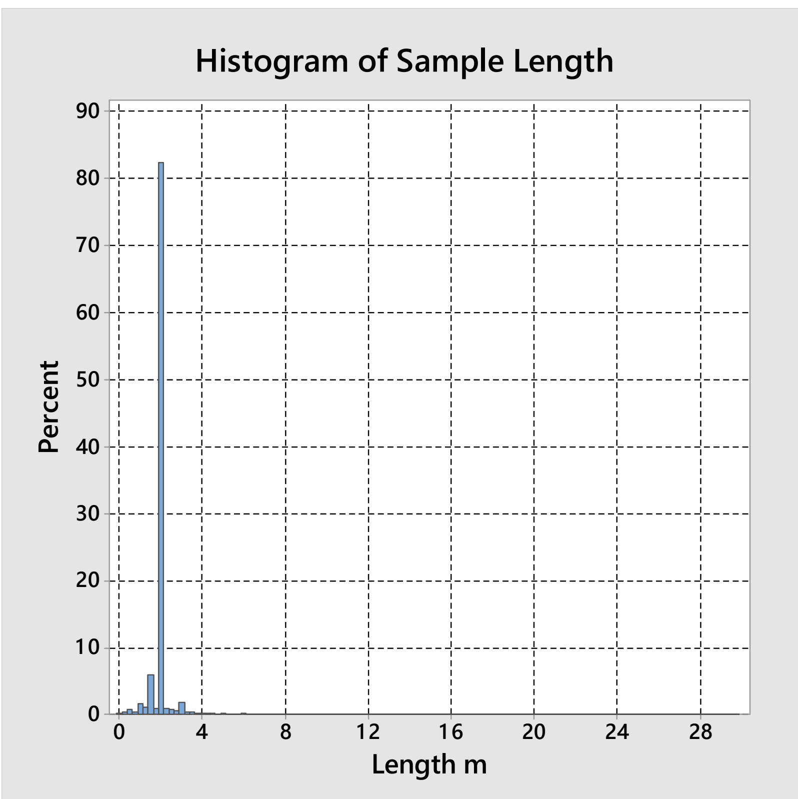


TABLE 14.7
MARATHON SUMMARY COMPOSITE STATISTICS
ROCK CODES 10 TO 60

Rock Code	10	15	20	30	40	51	52	53	60
Ag Mean g/t	1.36	0.94	1.12	1.71	1.71	2.56	2.33	2.21	1.36
Au Mean g/t	0.05	0.04	0.05	0.07	0.05	0.06	0.04	0.06	0.04
Cu Mean %	0.11	0.02	0.23	0.11	0.11	0.07	0.08	0.11	0.11
Pd Mean g/t	0.29	0.38	0.44	0.53	0.25	0.31	0.16	0.26	0.31
Pt Mean g/t	0.11	0.23	0.13	0.22	0.11	0.14	0.08	0.11	0.11
Ag St Dev	1.01	0.90	1.70	1.56	1.88	2.21	2.57	1.27	2.42
Au St Dev	0.09	0.07	0.07	0.12	0.05	0.09	0.03	0.07	0.05
Cu St Dev	0.08	0.03	0.20	0.13	0.10	0.07	0.06	0.09	0.11
Pd St Dev	0.31	0.57	0.58	1.23	0.35	1.02	0.24	0.38	0.39
Pt St Dev	0.10	0.25	0.14	0.45	0.12	0.36	0.10	0.10	0.12
Ag CoV %	74.00	95.39	150.96	91.29	110.04	86.04	110.35	57.67	178.39
Au CoV %	188.13	184.62	134.73	164.62	102.04	158.35	84.60	105.05	118.62
Cu CoV %	72.62	173.68	85.44	111.90	87.60	94.34	69.88	85.07	105.47
Pd CoV %	105.24	148.54	130.59	231.86	140.42	329.88	149.17	147.98	125.79
Pt CoV %	83.99	111.10	113.21	204.00	106.98	264.34	125.53	89.37	108.50
Ag Min g/t	0.450	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Au Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cu Min %	0.003	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001
Pd Min g/t	0.005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Pt Min g/t	0.007	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Ag Max g/t	5.87	2.76	44.00	18.92	33.00	24.00	25.00	6.30	38.04
Au Max g/t	0.70	0.37	1.16	1.59	0.36	0.84	0.14	0.28	0.59
Cu Max g/t	0.31	0.13	3.34	0.97	0.90	0.37	0.29	0.32	0.89
Pd Max g/t	1.58	2.68	14.91	18.59	3.37	10.49	1.59	2.06	5.70
Pt Max g/t	0.39	1.14	1.75	8.72	1.03	4.21	0.79	0.47	1.18
Ag Count	75	32	1885	1007	538	214	111	51	927
Au Count	75	32	1885	1007	538	214	111	51	927
Cu Count	75	32	1885	1007	538	214	111	51	927
Pd Count	75	32	1885	1007	538	214	111	51	927
Pt Count	75	32	1885	1007	538	214	111	51	927

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

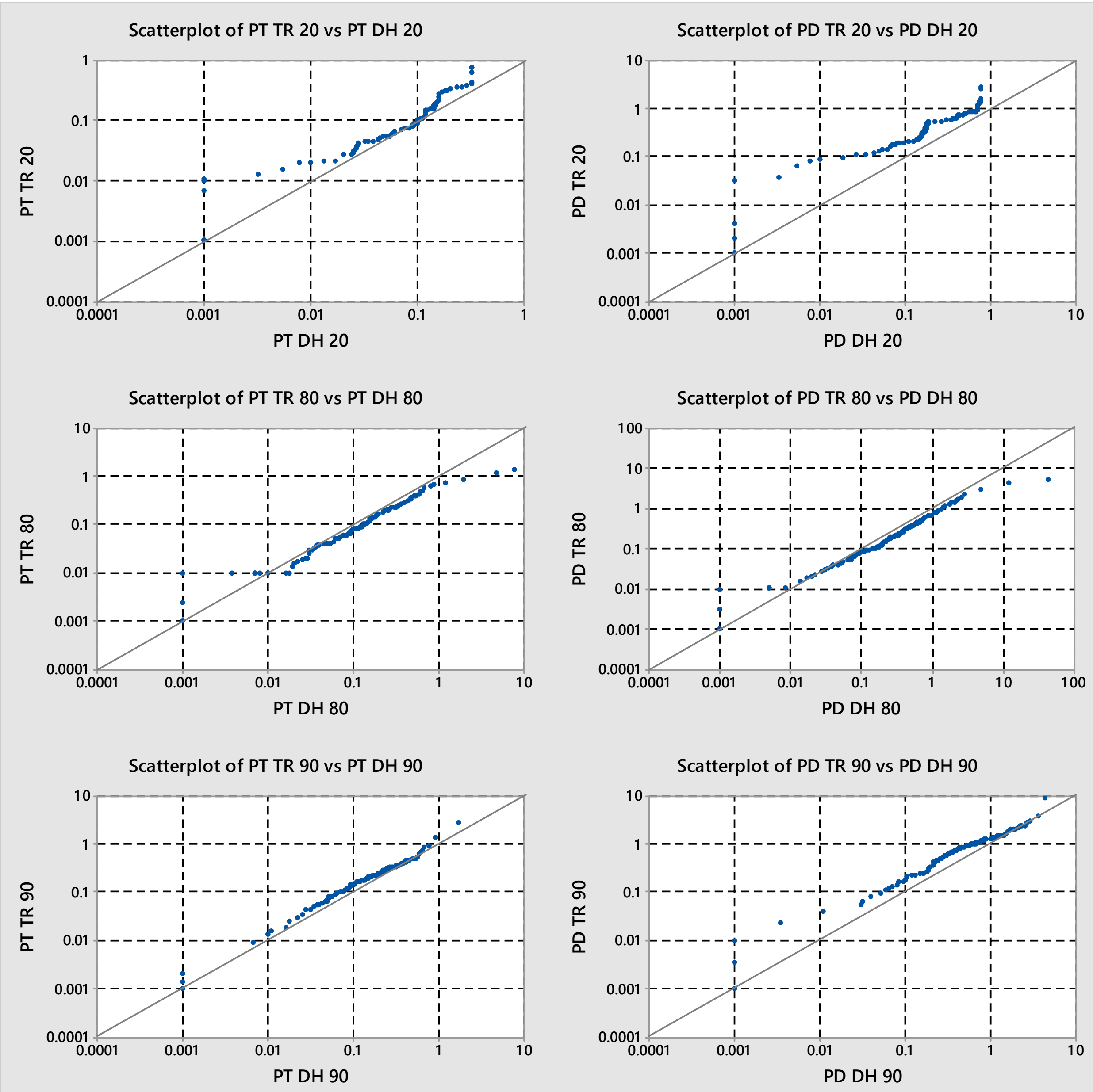
TABLE 14.7
MARATHON SUMMARY COMPOSITE STATISTICS
ROCK CODES 65 TO 103

Rock Code	65	70	75	80	90	101	102	103
Ag Mean g/t	1.63	1.36	2.01	1.95	1.46	1.63	1.64	1.79
Au Mean g/t	0.06	0.04	0.07	0.08	0.07	0.06	0.06	0.04
Cu Mean %	0.10	0.08	0.20	0.11	0.24	0.08	0.10	0.13
Pd Mean g/t	0.22	0.24	0.62	0.70	0.65	0.42	0.30	0.08
Pt Mean g/t	0.13	0.11	0.20	0.28	0.19	0.11	0.10	0.05
Ag St Dev	1.23	3.42	2.56	11.26	1.47	1.46	1.20	1.52
Au St Dev	0.09	0.05	0.07	0.18	0.09	0.10	0.09	0.04
Cu St Dev	0.10	0.07	0.17	0.13	0.19	0.07	0.07	0.11
Pd St Dev	0.30	0.24	0.71	2.54	0.78	0.42	0.34	0.17
Pt St Dev	0.17	0.11	0.23	1.09	0.25	0.09	0.08	0.06
Ag CoV %	75.15	250.73	127.61	578.06	100.42	89.44	73.24	85.11
Au CoV %	148.15	123.55	103.15	243.42	129.25	152.71	150.35	99.52
Cu CoV %	104.39	85.29	86.66	116.70	80.24	86.90	77.46	88.58
Pd CoV %	136.46	99.91	112.89	364.17	120.38	99.97	115.68	197.13
Pt CoV %	131.10	101.70	114.91	394.17	134.33	80.27	79.67	114.10
Ag Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.100	0.001
Au Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cu Min %	0.001	0.001	0.001	0.000	0.000	0.001	0.003	0.001
Pd Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Pt Min g/t	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001
Ag Max g/t	7.38	72.53	29.22	590.96	27.00	9.00	5.22	8.00
Au Max g/t	0.69	0.50	0.43	7.22	2.61	1.05	0.93	0.15
Cu Max %	0.66	0.51	0.81	1.18	2.18	0.31	0.53	0.73
Pd Max g/t	2.00	1.89	4.86	69.98	15.71	2.52	1.63	0.98
Pt Max g/t	1.42	0.70	2.33	39.10	8.20	0.48	0.37	0.23
Ag Count	228	551	177	3746	8515	206	114	51
Au Count	228	551	177	3746	8515	206	114	51
Cu Count	228	551	177	3746	8515	206	114	51
Pd Count	228	551	177	3746	8515	206	114	51
Pt Count	228	551	177	3746	8515	206	114	51

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

A substantial number of surface channel samples have been collected across the Deposit from excavated trenches below the overburden. As a check on any potential bias from the channel samples, lognormal QQ plots were generated comparing composited channel samples to composited drill hole samples for the North Footwall (rock code 20), Walford (rock code 80) and North Main (rock code 90) domains. For the drill hole data, the composite samples were restricted to the top 20 m of the drill hole. The results do not indicate a substantial bias between the channel samples and the drill hole samples, with the possible exception of a slight bias for Pd in the North Main domain (Figure 14.4). P&E considers the channel samples to be acceptable for the Mineral Resource Estimate.

FIGURE 14.4 MARATHON LOGNORMAL PLOTS COMPARING COMPOSITED CHANNEL SAMPLES AND DRILL HOLE SAMPLES



14.1.8 Treatment of Extreme Values

Grade capping analysis was conducted on the domain-coded and composited grade sample data in order to evaluate the potential influence of extreme values during grade estimation. Capping thresholds were determined by the decomposition of the domain composite log-probability distributions (see Appendix H). Where possible, the observed correlations between elements were also maintained when determining appropriate capping levels. Potential outliers are not markedly clustered in localized high-grade areas and sub-domaining is therefore not warranted. Composites are capped to the defined threshold prior to estimation (Table 14.8).

TABLE 14.8
MARATHON CAPPING THRESHOLDS AND CONTRIBUTION TABLES

Rock Code	Element	Cap*	Sample Count	Mean*	Number Capped	Capped Mean*	Capped Percentile
10	Ag	4	75	1.36	1	1.34	2
10	Au	0.1	75	0.05	4	0.03	24
10	Cu	0.2	75	0.11	9	0.10	8
10	Pd	0.8	75	0.29	4	0.26	10
10	Pt	0.26	75	0.11	5	0.11	5
15	Ag	No Cap	32	0.94	0	0.94	0
15	Au	0.3	32	0.04	1	0.04	6
15	Cu	0.04	32	0.02	3	0.01	36
15	Pd	1	32	0.38	3	0.30	22
15	Pt	1	32	0.23	1	0.22	2
20	Ag	14	1,885	1.12	2	1.10	2
20	Au	0.6	1,885	0.05	5	0.05	2
20	Cu	1.3	1,885	0.23	3	0.23	1
20	Pd	2	1,885	0.44	23	0.42	5
20	Pt	1.1	1,885	0.13	7	0.12	1
30	Ag	10	1,007	1.71	3	1.70	1
30	Au	0.5	1,007	0.07	11	0.07	7
30	Cu	0.8	1,007	0.11	3	0.11	0
30	Pd	4	1,007	0.53	13	0.47	12
30	Pt	2	1,007	0.22	9	0.20	8
40	Ag	10	538	1.71	1	1.67	3
40	Au	No Cap	538	0.05	0	0.05	0
40	Cu	0.5	538	0.11	5	0.11	1
40	Pd	2	538	0.25	4	0.24	2
40	Pt	1	538	0.11	1	0.11	0
51	Ag	10	214	2.56	1	2.50	3
51	Au	0.3	214	0.06	5	0.05	9
51	Cu	0.25	214	0.07	8	0.07	4
51	Pd	0.8	214	0.31	4	0.20	36
51	Pt	0.4	214	0.14	8	0.09	30

TABLE 14.8 MARATHON CAPPING THRESHOLDS AND CONTRIBUTION TABLES							
Rock Code	**Element**	**Cap***	**Sample Count**	**Mean***	**Number Capped**	**Capped Mean***	**Capped Percentile**
52	Ag	7	111	2.33	1	2.16	7
52	Au	0.1	111	0.04	5	0.04	2
52	Cu	0.2	111	0.08	3	0.08	2
52	Pd	0.6	111	0.16	4	0.14	13
52	Pt	0.3	111	0.08	2	0.07	7
53	Ag	4.5	51	2.21	2	2.16	2
53	Au	0.16	51	0.06	5	0.06	9
53	Cu	0.25	51	0.11	5	0.10	5
53	Pd	0.7	51	0.26	3	0.21	19
53	Pt	0.3	51	0.11	3	0.11	5
60	Ag	7	927	1.36	7	1.23	10
60	Au	0.4	927	0.04	2	0.04	1
60	Cu	0.7	927	0.11	6	0.11	1
60	Pd	2	927	0.31	5	0.30	2
60	Pt	0.6	927	0.11	9	0.11	2
65	Ag	No Cap	228	1.63	0	1.63	0
65	Au	0.4	228	0.06	3	0.06	4
65	Cu	0.4	228	0.10	4	0.10	2
65	Pd	0.7	228	0.22	12	0.19	14
65	Pt	0.4	228	0.13	9	0.11	12
70	Ag	6	551	1.36	5	1.20	12
70	Au	0.2	551	0.04	6	0.04	4
70	Cu	0.4	551	0.08	2	0.08	0
70	Pd	No Cap	551	0.24	0	0.24	0
70	Pt	0.4	551	0.11	17	0.11	5
75	Ag	7	177	2.01	2	1.88	7
75	Au	0.3	177	0.07	4	0.07	3
75	Cu	0.7	177	0.20	2	0.20	1
75	Pd	2.6	177	0.62	3	0.61	3
75	Pt	0.6	177	0.20	6	0.19	7
80	Ag	10	3746	1.95	25	1.50	23
80	Au	2	3746	0.08	4	0.07	3

TABLE 14.8 MARATHON CAPPING THRESHOLDS AND CONTRIBUTION TABLES							
Rock Code	**Element**	**Cap***	**Sample Count**	**Mean***	**Number Capped**	**Capped Mean***	**Capped Percentile**
80	Cu	1.0	3746	0.11	3	0.11	0
80	Pd	16	3746	0.70	14	0.64	9
80	Pt	10	3746	0.28	5	0.26	7
90	Ag	10	8515	1.46	5	1.46	0
90	Au	1	8515	0.07	7	0.07	1
90	Cu	1.5	8515	0.24	2	0.24	0
90	Pd	5	8515	0.65	24	0.64	1
90	Pt	1.8	8515	0.19	18	0.19	2
101	Ag	6	206	1.63	1	1.61	1
101	Au	0.2	206	0.06	7	0.05	13
101	Cu	0.23	206	0.08	6	0.08	2
101	Pd	1.7	206	0.42	2	0.42	1
101	Pt	0.33	206	0.11	4	0.11	1
102	Ag	4	114	1.64	4	1.61	2
102	AuU	0.14	114	0.06	4	0.05	15
102	Cu	0.3	114	0.10	1	0.09	2
102	Pd	No Cap	114	0.30	0	0.30	0
102	Pt	No Cap	114	0.10	0	0.10	0
103	Ag	5	51	1.79	1	1.73	3
103	Au	0.09	51	0.04	5	0.03	8
103	Cu	0.3	51	0.13	1	0.12	7
103	Pd	0.3	51	0.08	3	0.06	25
103	Pt	0.14	51	0.05	5	0.05	11

Note: *Ag, Au, Pd and Pt values are g/t, Cu values are %.*
Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.

14.1.9 Continuity Analysis

Three-dimensional continuity analyses (variography) were conducted on the domain-coded uncapped composite data. The downhole variogram was viewed at a 2.0 m lag spacing (equivalent to the composite length) to assess the nugget variance contribution. Standardized omni-directional spherical models were used to model the experimental semi-variograms (see Appendix I).

The experimental semi-variograms were used to define appropriate ranges for Mineral Resource classification. Based on the results of the variography as well as the observed geological continuity and the existing drill hole pattern, a Measured range was defined as 70 m (equivalent to the shortest Pd range), an Indicated range was defined as 120 m (equivalent to the second shortest Pd range and the shortest Pt ranges), and an Inferred range that was extended to 200 m in order to fully populate the modeled mineralization domains (Table 14.9).

TABLE 14.9
MARATHON ISOTROPIC EXPERIMENTAL SEMI-VARIOGRAMS

Commodity	Values
NFW 20	
Ag	0.25 + 0.29 SPH(70) + 0.46 SPH(130)
Au	0.45 + 0.38 SPH(9) + 0.17 SPH(120)
Cu	0.31 + 0.31 SPH(8) + SPH(120)
Pd	0.35 + 0.19 SPH(20) + 0.46 SPH(70)
Pt	0.32 + 0.40 SPH(60) + 0.28 SPH(120)
WZone 80	
Ag	0.26 + 0.24 SPH(90) + 0.50 SPH(130)
Au	0.40 + 0.19 SPH(56) + 0.41 SPH(90)
Cu	0.13 + 0.47 SPH(12) + 0.40 SPH(40)
Pd	0.45 + 0.07 SPH(90) + 0.48 SPH(220)
Pt	0.35 + 0.24 SPH(130) + 0.41 SPH(160)
NMain 90	
Ag	0.17 + 0.27 SPH(46) + SPH(120)
Au	0.37 + 0.46 SPH(9) + 0.17 SPH(60)
Cu	0.15 + 0.62 SPH(15) + 0.23 SPH(150)
Pd	0.14 + 0.42 SPH(100) + 0.44 SPH(120)
Pt	0.15 + 0.67 SPH(10) + 0.18 SPH(120)

Note: *SPH = Spherical, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum. NFW = North Footwall, WZone = Walford Zone, NMain = North Main (see Table 14.3).*

14.1.10 Block Model

The modeled mineralization domains extend along a corridor 2,000 m wide and 3,500 m in length. An orthogonal block model was established with the block model limits selected so as to cover the extent of the mineralized structures, the proposed open pit design, and to reflect the general nature of the mineralized domains (Table 14.10). The block model consists of separate variables for estimated grades, rock codes, percent, bulk density and classification attributes. A volume percent block model was used to accurately represent the volume and tonnage contained within the constraining mineralized domains.

TABLE 14.10 MARATHON BLOCK MODEL SETUP			
Coordinates*	**Origin**	**Block Size (m)**	**Number of Blocks**
Easting (X)	549,000	5.0	400
Northing (Y)	5,403,00	5.0	700
Elevation (max Z) (m)	500	6.0	140

** Coordinates are in UTM NAD 27 Zone 16N.*

14.1.11 Grade Estimation and Classification

The Mineral Resource Estimate was constrained by mineralization wireframes that form hard boundaries between the respective composite samples. Block grades were estimated in a single pass with Inverse Distance Cubed ("ID^3") interpolation using a minimum of three and a maximum of 12 composites within a 200 m diameter search envelope, with a maximum of three samples per octant. For each grade element an uncapped Nearest Neighbour model ("NN") was also generated using the same search parameters. An NSR block model was subsequently calculated from the estimated block grades.

Bulk density was modeled using Inverse Distance Squared ("ID^2") linear weighting of between three and nine bulk density samples, with a maximum of one sample per drill hole.

Blocks were classified algorithmically based on the local drill hole spacing within each domain. All blocks within 70 m of five or more drill holes were classified as Measured, and blocks within 120 m of four or more drill holes were classified as Indicated. All additional estimated blocks were classified as Inferred.

The average number of samples used for grade estimation per block was as follows:

- Measured: 7.7 drill holes within 70 m.
- Indicated: 10.4 drill holes within 120 m.
- Inferred: 11.4 drill holes within 200 m.

Subsequent to the initial classification, blocks were re-classified using a maximum a-posteriori selection pass which corrected isolated classification artifacts and consolidated areas of similar classification into continuous areas (Appendix F).

14.1.12 Marathon Mineral Resource Estimate

Mineral Resources reported herein have been constrained within a constraining optimized pit shell. The results from the optimized pit shell are used solely for the purpose of reporting Mineral Resources and include Measured, Indicated and Inferred Mineral Resources. The optimized pit shell was constructed based on the economic parameters listed in Table 14.11. The optimized pit shell is presented in Appendix G.

TABLE 14.11 MARATHON PIT OPTIMIZATION ECONOMIC PARAMETERS	
Parameter	**Value**
Exchange Rate CDN$/US$	0.77
Cu US$/lb	3.00
Au US$/oz	1,300
Pt Price US$/oz	900
Pd Price US$/oz	1,100
Ag Price US$/oz	16
Cu float recovery %	93
Au float recovery %	80
Pt float recovery %	80
Pd float recovery %	82
Ag float recovery %	75
Cu smelter payable %	96
Au smelter payable %	90
Pt smelter payable %	88
Pd smelter payable %	93
Ag smelter payable %	90
Smelting, Refining and Shipping $/t processed	4.00
G&A $/t processed	1.50
Rock mining Cost $/t mined	2.00
Process Plant Feed Mining Cost $/t mined	2.00
Process Plant Cost $/t processed	7.50
Pit Slope	50°
NSR Contribution per tonne (CDN$)	
Cu $/%	76.27
Au $/g	39.03
Pt $/g	26.47
Pd $/g	35.00
Ag $/g	0.45
Marginal Cut-Off $/t	13.00

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

All Mineral Resources are reported against an NSR cut-off of CDN$13/t and constrained within an optimized pit shell (Table 14.12).

Highlights of the updated Mineral Resource Estimate are as follows:

- Measured and Indicated Mineral Resources of 7.1 Moz PdEq with an average grade of 1.24 g/t PdEq;

- Inferred Mineral Resource of 20 koz PdEq with an average grade of 0.94 g/t PdEq;
- Measured and Indicated Mineral Resources of 796 Mlb Cu with an average grade of 0.56%; and
- Inferred Mineral Resource of 3.0 Mlb Cu at an average grade of 0.19%.

For further details on Cu, Pd, NSR block models cross sections and plans (see Appendix C, D and E).

Mineral Resource Estimate sensitivities for differing NSR cut-off values within the Mineral Resource reporting pit shell are summarized in Table 14.13, and for a CDN$25/t NSR cut-off re-constrained pit shell in Table 14.14.

TABLE 14.12
MARATHON DEPOSIT PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Measured	103,337	0.64	0.21	0.20	0.07	1.5	1.34	2,123	688	463	239	4,964	4,445
Indicated	75,911	0.46	0.15	0.20	0.06	1.8	1.10	1,115	376	333	151	4,371	2,685
Meas + Ind	**179,248**	**0.56**	**0.18**	**0.20**	**0.07**	**1.6**	**1.24**	**3,238**	**1,064**	**796**	**390**	**9,335**	**7,130**
Inferred	668	0.37	0.12	0.19	0.05	1.4	0.95	8	3	3	1	31	21

Note: *Meas = Measured, Ind = Indicated, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1) *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability. The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, marketing, or other relevant issues.*
2) *Mineral Resources were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by CIM Council.*
3) *The Inferred Mineral Resource in this estimate has a lower level of confidence that that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4) *Contained metal totals may differ due to rounding.*
5) *Mineral Resources are reported within an optimized pit shell at an NSR cut-off value of CDN$13/t.*

TABLE 14.13 MARATHON DEPOSIT PIT CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITIES AT VARIOUS NSR CUT-OFFS*													
NSR Cut-off CDN$/Tonne	**Tonnes (k)**	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**	**PdEq (g/t)**	**Pd (koz)**	**Pt (koz)**	**Cu (Mlb)**	**Au (koz)**	**Ag (koz)**	**PdEq (koz)**
100	8,025	2.29	0.72	0.41	0.19	2.0	3.95	591	185	72	49	529	1,020
90	11,656	2.01	0.62	0.40	0.17	2.0	3.57	754	231	103	64	742	1,336
80	17,036	1.76	0.53	0.39	0.15	1.9	3.20	963	290	146	84	1,033	1,754
75	20,780	1.64	0.49	0.38	0.14	1.9	3.02	1,092	327	175	96	1,243	2,021
70	25,003	1.53	0.45	0.38	0.14	1.8	2.86	1,227	365	207	109	1,478	2,302
65	29,977	1.42	0.42	0.37	0.13	1.8	2.71	1,372	408	242	124	1,768	2,610
60	35,845	1.33	0.39	0.36	0.12	1.8	2.56	1,529	454	281	141	2,108	2,946
55	42,741	1.23	0.37	0.34	0.12	1.8	2.41	1,696	503	322	159	2,508	3,310
50	51,328	1.14	0.34	0.33	0.11	1.8	2.26	1,881	561	371	180	2,995	3,724
45	61,639	1.05	0.31	0.31	0.10	1.8	2.11	2,075	620	427	204	3,579	4,173
40	74,246	0.96	0.29	0.30	0.10	1.8	1.95	2,280	687	488	232	4,278	4,664
35	88,778	0.87	0.27	0.28	0.09	1.8	1.81	2,483	759	552	260	5,066	5,164
30	106,507	0.79	0.24	0.26	0.09	1.7	1.66	2,695	836	618	291	5,975	5,691
25	127,485	0.71	0.22	0.24	0.08	1.7	1.52	2,902	914	683	324	7,005	6,221
20	151,144	0.64	0.20	0.22	0.07	1.7	1.38	3,086	991	746	360	8,110	6,710
15	172,876	0.58	0.19	0.21	0.07	1.6	1.27	3,213	1,050	789	384	9,076	7,060
13	**179,916**	**0.56**	**0.18**	**0.20**	**0.07**	**1.6**	**1.24**	**3,238**	**1,064**	**796**	**390**	**9,335**	**7,130**
10	187,289	0.54	0.18	0.20	0.07	1.6	1.20	3,270	1,078	809	397	9,640	7,231
5	193,180	0.53	0.18	0.19	0.07	1.6	1.17	3,286	1,087	813	404	9,813	7,274
0.01	196,061	0.52	0.17	0.19	0.06	1.6	1.15	3,290	1,091	817	403	9,840	7,280

***** *Within same pit shell as in Table 14.12.*

Note: *NSR = net smelter return, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

TABLE 14.14
MARATHON DEPOSIT PIT RE-CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITY AT CDN$25/TONNE NSR CUT-OFF

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Measured	70,792	0.82	0.25	0.25	0.09	1.5	1.67	1,864	578	387	194	3,510	3,794
Indicated	45,279	0.60	0.19	0.25	0.07	1.9	1.40	871	272	252	106	2,817	2,032
Meas & Ind	**116,071**	**0.73**	**0.23**	**0.25**	**0.08**	**1.7**	**1.56**	**2,735**	**850**	**639**	**300**	**6,326**	**5,826**
Inferred	144	0.62	0.16	0.28	0.05	0.9	1.41	3	1	1	0	4	7

Note: *NSR = net smelter return, Meas = Measured, Ind = Indicated, Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

14.1.13 Validation

The block model was validated visually by the inspection of successive section lines in order to confirm that the block models correctly reflect the distribution of high-grade and low-grade values. An additional validation check was completed by comparing the average grade of the constrained capped composites to the model block grade estimates at zero cut-off. Capped composite grades and block grades were also compared to the average Nearest Neighbour block estimate (Table 14.15). No significant issues were noted.

TABLE 14.15
MARATHON VALIDATION STATISTICS FOR GRADE BLOCK ESTIMATES

Rock Code	Element	Mean*	Capped Mean*	NN*	Estimate*
10	Ag	1.36	1.34	1.59	1.59
10	Au	0.05	0.03	0.04	0.04
10	Cu	0.11	0.10	0.10	0.09
10	Pd	0.29	0.26	0.26	0.24
10	Pt	0.11	0.11	0.12	0.11
15	Ag	0.94	0.94	1.02	1.04
15	Au	0.04	0.04	0.03	0.04
15	Cu	0.02	0.01	0.02	0.01
15	Pd	0.38	0.30	0.36	0.26
15	Pt	0.23	0.22	0.20	0.20
20	Ag	1.12	1.10	1.10	1.18
20	Au	0.05	0.05	0.05	0.05
20	Cu	0.23	0.23	0.20	0.21
20	Pd	0.44	0.42	0.36	0.37
20	Pt	0.13	0.12	0.11	0.11
30	Ag	1.71	1.70	1.60	1.60
30	Au	0.07	0.07	0.06	0.07
30	Cu	0.11	0.11	0.10	0.10
30	Pd	0.53	0.47	0.46	0.44
30	Pt	0.22	0.20	0.21	0.20
40	Ag	1.71	1.67	1.58	1.58
40	Au	0.05	0.05	0.05	0.05
40	Cu	0.11	0.11	0.11	0.11
40	Pd	0.25	0.24	0.24	0.23
40	Pt	0.11	0.11	0.11	0.11
51	Ag	2.56	2.50	2.32	2.38

TABLE 14.15 **MARATHON VALIDATION STATISTICS FOR GRADE BLOCK ESTIMATES**					
Rock Code	**Element**	**Mean***	**Capped Mean***	**NN***	**Estimate***
51	Au	0.06	0.05	0.04	0.04
51	Cu	0.07	0.07	0.07	0.06
51	Pd	0.31	0.20	0.27	0.19
51	Pt	0.14	0.09	0.13	0.09
52	Ag	2.33	2.16	1.90	1.93
52	Au	0.04	0.04	0.03	0.03
52	Cu	0.08	0.08	0.08	0.07
52	Pd	0.16	0.14	0.13	0.12
52	Pt	0.08	0.07	0.07	0.06
53	Ag	2.21	2.16	2.16	2.16
53	Au	0.06	0.06	0.06	0.05
53	Cu	0.11	0.10	0.09	0.10
53	Pd	0.26	0.21	0.18	0.18
53	Pt	0.11	0.11	0.08	0.09
60	Ag	1.36	1.23	1.27	1.26
60	Au	0.04	0.04	0.04	0.04
60	Cu	0.11	0.11	0.10	0.10
60	Pd	0.31	0.30	0.30	0.29
60	Pt	0.11	0.11	0.12	0.11
65	Ag	1.63	1.63	1.50	1.48
65	Au	0.06	0.06	0.05	0.05
65	Cu	0.10	0.10	0.08	0.08
65	Pd	0.22	0.19	0.22	0.19
65	Pt	0.13	0.11	0.12	0.11
70	Ag	1.36	1.20	1.28	1.21
70	Au	0.04	0.04	0.04	0.03
70	Cu	0.08	0.08	0.08	0.08
70	Pd	0.24	0.24	0.24	0.23
70	Pt	0.11	0.11	0.11	0.11
75	Ag	2.01	1.88	1.73	1.67
75	Au	0.07	0.07	0.06	0.06
75	Cu	0.20	0.20	0.15	0.17
75	Pd	0.62	0.61	0.52	0.53
75	Pt	0.20	0.19	0.18	0.17

Table 14.15 **Marathon Validation Statistics for Grade Block Estimates**					
Rock Code	**Element**	**Mean***	**Capped Mean***	**NN***	**Estimate***
80	Ag	1.95	1.50	1.52	1.55
80	Au	0.08	0.07	0.07	0.07
80	Cu	0.11	0.11	0.09	0.09
80	Pd	0.70	0.64	0.65	0.64
80	Pt	0.28	0.26	0.26	0.27
90	Ag	1.46	1.46	1.55	1.57
90	Au	0.07	0.07	0.06	0.07
90	Cu	0.24	0.24	0.22	0.22
90	Pd	0.65	0.64	0.52	0.53
90	Pt	0.19	0.19	0.16	0.16
101	Ag	1.63	1.61	1.58	1.50
101	Au	0.06	0.05	0.06	0.05
101	Cu	0.08	0.08	0.09	0.08
101	Pd	0.42	0.42	0.46	0.39
101	Pt	0.11	0.11	0.12	0.11
102	Ag	1.64	1.61	1.80	1.68
102	Au	0.06	0.05	0.07	0.05
102	Cu	0.10	0.09	0.11	0.09
102	Pd	0.30	0.30	0.30	0.27
102	Pt	0.10	0.10	0.11	0.09
103	Ag	1.79	1.73	1.81	1.84
103	Au	0.04	0.03	0.03	0.03
103	Cu	0.13	0.12	0.15	0.13
103	Pd	0.08	0.06	0.05	0.05
103	Pt	0.05	0.05	0.04	0.04

Note: *Ag, Au, Pd and Pt values are g/t: Cu values are %, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

A check for local estimation bias was completed by plotting vertical swath plots of the estimated ID^3 block grade and the Nearest Neighbour grade (see Appendix J). No significant discrepancies between the ID^3 and NN model grades were noted.

As a further check of the Mineral Resource model the total volume reported at zero NSR $/t cut-off was compared by domain with the calculated volume of the defining mineralization wireframe (Table 14.16). All reported volumes fall within acceptable tolerances.

Table 14.16 Marathon Comparison Between Wireframe Volume and Estimated Volume			
Domain	**Wireframe (000 m^3)**	**Estimate (000 m^3)**	**Ratio (%)**
MAG_101	711	711	100
MAG_102	405	404	100
MAG_103	145	143	102
MBR_30	3062	3062	100
MBRFW_40	1,763	1,762	100
MHW_51	655	656	100
MHW_52	333	335	100
MHW_53	158	159	99
NFW_20	6,462	6,462	100
NHW_10	324	326	99
NHW2_60	3,827	3,822	100
NHW3_70	2,175	2,175	100
NHW4_65	840	841	100
NHW5_15	90	91	99
NHW6_75	437	438	100
NMAIN_90	42,284	42,259	100
WZONE_80	10,294	10,294	100
Total	**73,964**	**73,939**	**100**

Note: *Domains are listed in Table 14.3.*

P&E considers that the information available for the Marathon Deposit is reliable, demonstrates consistent geological and grade continuity, and satisfies the requirements for a Mineral Resource Estimate.

14.2 GEORDIE DEPOSIT MINERAL RESOURCE ESTIMATE

14.2.1 Introduction

The purpose of this Technical Report section is to summarize the Mineral Resource Estimate for the Geordie Deposit, Marathon, Ontario, for Gen Mining. The Mineral Resource Estimate presented herein is reported in accordance with the Canadian Securities Administrators' National Instrument 43-101 and has been estimated in conformity with the generally accepted CIM "Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. Confidence in the estimate of Inferred Mineral Resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Mineral Resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent Mineral Resource Estimates.

This Mineral Resource Estimate was based on information and data supplied by Gen Mining, and was undertaken by Yungang Wu, P.Geo. and Eugene Puritch, P.Eng., FEC, CET of P&E, both independent Qualified Persons in terms of NI 43-101. The effective date of this Mineral Resource Estimate is January 6, 2020.

14.2.2 Database

All drilling and assay data were provided in the form of Excel data files by Gen Mining. The GEOVIA GEMS™ V6.8.2 database for this Mineral Resource Estimate, compiled by P&E, consisted of 61 drill holes totalling 9,647 m, of which a total of 57 drill holes intersected the mineralization wireframes used for the Mineral Resource Estimate. A drill hole surface plan is shown in Appendix K.

The database contained assays for Cu, Pd, Pt, Au and Ag as well as other lesser elements of non-economic importance. The basic statistics of all raw assays for the elements of economic interest are presented in Table 14.17.

TABLE 14.17
GEORDIE DEPOSIT ASSAY DATABASE SUMMARY

Variable	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)
Number of Samples	4,558	4,558	4,558	4,558	4,556
Minimum Value	0.000	0.000	0.000	0.000	0.500
Maximum Value	2.594	0.205	1.828	1.270	416.250
Mean	0.189	0.018	0.117	0.020	1.791
Median	0.054	0.007	0.035	0.011	1.810
Variance	0.102	0.001	0.037	0.001	39.466
Standard Deviation	0.320	0.024	0.192	0.037	6.282
Coefficient of Variation	1.693	1.281	1.632	1.901	3.508
Skewness	2.961	2.286	3.123	14.209	63.049
Kurtosis	13.107	9.788	14.922	367.516	4,158.174

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

All drill hole survey and assay values are expressed in metric units, with grid coordinates in the NAD 27, Zone 16N UTM system.

14.2.3 Data Verification

Verification of Pd, Pt, Cu, Au and Ag assay database was performed on 3,163 assays by P&E against laboratory certificates that were obtained directly from ACME Analytical of Vancouver, BC and Accurassay of Thunder Bay, ON. Two minor errors were found.

P&E also validated the Mineral Resource database by checking for inconsistencies in analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, survey and missing interval and coordinate fields. P&E believes that the database is suitable for Mineral Resource estimation.

14.2.4 Mineralized Domain Interpretation

One main mineralization domain wireframe and five hanging wall domain wireframe domains were constructed for the Mineral Resource Estimate. The wireframes were created from successive cross-sectional polylines on north-facing vertical sections with 25 m spacing. An NSR CDN$15/t cut-off value was applied to the mineralization wireframes for Mineral Resource Reporting. The NSR was calculated with the formula:

NSR (CDN$/tonne) = (Pd g/t * $35) + (Pt g/t * $26.47) + (Cu% * $76.27) + (Au g/t * $39.03) + (Ag g/t * $0.45).

The minimum constrained sample length for the wireframes was 2.0 m. In some cases, mineralization below the C$15/t NSR cut-off value was included for the purpose of maintaining zonal continuity and the minimum width. On each section, mineralized polyline interpretations were digitized from drill hole to drill hole, but not typically extended more than 25 m into untested territory.

The main mineralization zone (GL_Main) is modeled approximately 1,650 m along strike, 320 m deep vertically from surface, with an average true width of 23 m, with a general strike azimuth of 5°, dipping 45° to the west.

The resulting Mineral Resource domains were utilized as constraining boundaries during Mineral Resource estimation for rock coding, statistical analysis and compositing limits. The 3-D domains are presented in Appendix L.

Topography and bedrock surfaces and were created using drill hole collars and overburden logs from the drill holes.

14.2.5 Rock Code Determination

A unique rock code was assigned for each mineralized domain in the Mineral Resource model as presented in Table 14.18.

Table 14.18 **Geordie Model Rock Codes Used for the Mineral Resource Estimate**		
Domains	**Rock Type**	**Volume (m^3)**
GL_Main	100	7,529,110
GL_HW1	200	2,590,882
GL_HW2	300	779,926
GL_HW3	400	286,894
GL_HW4	500	190,256
GL_HW5	600	82,937
Air	0	
OVB	10	
Waste	99	

Note: *Domains are listed in Table 14.3.*

14.2.6 Compositing

The basic statistics of all wireframe domain constrained assays and sample lengths are presented in Table 14.19.

Table 14.19 **Geordie Basic Statistics of All Domain Constrained Assays and Sample Lengths**						
Variable	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**	**Length (m)**
Number of Samples	1,277	1,277	1,277	1,277	1,277	1,277
Minimum Value	0.00	0.00	0.01	0.00	0.50	0.31
Maximum Value	2.59	0.21	1.83	1.27	416.25	5.05
Mean	0.54	0.03	0.33	0.04	2.91	1.64
Median	0.41	0.03	0.24	0.03	2.00	1.53
Variance	0.19	0.00	0.07	0.00	137.18	0.31
Standard Deviation	0.43	0.03	0.26	0.06	11.71	0.56
Coefficient of Variation	0.80	0.92	0.80	1.28	4.02	0.34
Skewness	1.43	1.43	1.57	11.36	34.42	1.05
Kurtosis	5.03	5.48	6.06	219.07	1,214.58	6.44

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

Approximately 36% of the constrained sample lengths were 2 m in length, with an overall average length of 1.64 m. In order to regularize the assay sampling intervals for grade interpolation, a 2.0 m compositing length was selected for the drill hole intervals that fell within the constraints of the above-mentioned Mineral Resource domains. Composites were calculated for Pd, Pt, Cu, Au and Ag over 2.0 m lengths starting at the first point of intersection between assay data hole and hanging wall of the 3-D zonal constraint. The compositing process was halted upon exit from the footwall of the aforementioned constraint. Un-assayed intervals and below detection limit assays were set to 0.001 g/t for Pd, Pt, Au and Ag, and 0.001% for Cu. If the last interval was less than 0.5 m, the composite length was adjusted to make all intervals of the hole equal in length so as not to introduce any short sample bias in the grade interpolation process. The constrained composite data were extracted to point files for a capping study. The composite statistics are summarized in Table 14.20.

TABLE 14.20
GEORDIE COMPOSITE SUMMARY STATISTICS

Variable	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Length (m)
Number of Samples	1,063	1,063	1,063	1,063	1,063	1,063
Minimum Value	0.001	0.001	0.001	0.001	0.001	1.36
Maximum Value	2.364	0.181	1.670	0.789	416.224	2.34
Mean	0.525	0.033	0.318	0.041	2.806	1.98
Median	0.408	0.028	0.240	0.031	2.130	2.00
Geometric Mean	0.382	0.020	0.238	0.026	1.826	1.98
Variance	0.163	0.001	0.058	0.002	163.975	0.018
Standard Deviation	0.404	0.029	0.241	0.047	12.805	0.11
Coefficient of Variation	0.769	0.866	0.758	1.125	4.564	0.06
Skewness	1.335	1.378	1.468	7.188	31.660	-2.50
Kurtosis	4.689	5.252	5.637	94.380	1,022.053	13.47

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.2.7 Grade Capping

Grade capping was investigated on the 2.0 m composite values in the database within the constraining domains to ensure that the possible influence of erratic high values did not bias the database. Log-normal histograms for Pd, Pt, Cu, Au and Ag composites were generated for each mineralized zone and the selected resulting graphs are exhibited in Appendix M. Only one Ag value in the Main zone was capped at 15 g/t. The statistics of capped composites are summarized in Table 14.21. The capped composites were utilized to develop variograms and for block model grade interpolation.

TABLE 14.21 GEORDIE CAPPED COMPOSITE SUMMARY STATISTICS					
Variable	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**
Number of Samples	1,063	1,063	1,063	1,063	1,063
Minimum Value	0.001	0.001	0.001	0.001	0.001
Maximum Value	2.364	0.181	1.670	0.789	15.000
Mean	0.525	0.033	0.318	0.041	2.428
Median	0.408	0.028	0.240	0.031	2.130
Geometric Mean	0.382	0.020	0.238	0.026	1.820
Variance	0.163	0.001	0.058	0.002	3.187
Standard Deviation	0.404	0.029	0.241	0.047	1.785
Coefficient of Variation	0.769	0.866	0.758	1.125	0.735
Skewness	1.335	1.378	1.468	7.188	1.994
Kurtosis	4.689	5.252	5.637	94.380	10.981

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.2.8 Semi-Variography

A semi-variography study was performed as a guide to determining a grade interpolation search strategy. Omni, along strike, down dip and across dip semi-variograms were developed for the Main Zone on Cu and Pd using the composites. Selected variograms are attached in Appendix N.

Continuity ellipses based on the observed ranges were subsequently generated and used as the basis for estimation search ranges, distance weighting calculations and Mineral Resource classification criteria.

14.2.9 Bulk Density

A total of 186 bulk density measurements were provided by Stillwater, of which 53 measurements were located inside of the Mineral Resource wireframes. The average bulk density of the Main Zone was 3.15 t/m^3 from 35 samples, while the average bulk density of hanging wall zones was 3.11 t/m^3.

14.2.10 Block Modeling

The Geordie block model was constructed using GEOVIA GEMS™ V6.8.2 modelling software, and the block model origin and block size are tabulated in Table 14.22. The block model consists of separate model attributes for estimated grades of Pd, Pt, Cu, Au, Ag and rock type (mineralization domains), volume percent, bulk density, NSR $/t value and classification.

TABLE 14.22 GEORDIE BLOCK MODEL DEFINITION			
Direction	**Origin**	**No. of Blocks**	**Block Size (m)**
X	537,140	178	5
Y	5,406,620	358	5
Z	374	64	6
Rotation	No		

All blocks in the rock type block model were initially assigned a waste rock code of 99, corresponding to the surrounding country rocks. All mineralized domains were used to code all blocks within the rock type block model that contained 1% or greater volume within the domains. These blocks were assigned their appropriate individual rock codes as indicated in Table 14.18. The overburden and topographic surfaces were subsequently utilized to assign rock code 10 and 0, corresponding to overburden and air, respectively, to all blocks 50% or greater above the respective surfaces.

A volume percent block model was set up to accurately represent the volume and subsequent tonnage that was occupied by each block inside the constraining domains. As a result, the domain boundary was properly represented by the percent model ability to measure individual infinitely variable block inclusion percentages within that domain. The minimum percentage of the mineralized block inclusion was set to 1%.

The Pd, Pt, Cu, Au and Ag grade blocks were interpolated with Inverse Distance Squared ("ID^2"). Multiple passes were executed for the grade interpolation to progressively capture the sample points in order to avoid over-smoothing and preserve local grade variability. Search ranges were based on the variograms and search directions which were aligned with the strike and dip directions of each domain accordingly. Grade blocks were interpolated using the parameters in Table 14.23.

TABLE 14.23 GEORDIE BLOCK MODEL INTERPOLATION PARAMETERS						
Pass	**Dip Range (m)**	**Strike Range (m)**	**Across Dip Range (m)**	**Max No. of Samples per Hole**	**Min No. Samples**	**Max No. Samples**
I	65	60	15	2	3	12
II	130	120	30	2	1	12
III	195	180	45	2	1	12

Selected cross-sections and plans of the Cu, Pd and NSR grade blocks are presented in Appendix O to R.

The NSR values of blocks were derived with the formula:

NSR (CDN$/tonne) = (Pd g/t * $35) + (Pt g/t * $26.47) + (Cu% * $76.27) + (Au g/t * $39.03) + (Ag g/t * $0.45).

The bulk density model was populated with a uniform bulk density of 3.15 t/m^3 for the Main Zone and 3.11 t/m^3 for all hanging wall zones.

14.2.11 Mineral Resource Classification

In P&E's opinion, the drilling, assaying and exploration work on the Geordie Project supports this Mineral Resource Estimate and are sufficient to indicate a reasonable potential for economic extraction and thus qualify it as a Mineral Resource under the CIM definition standards. The Mineral Resource was classified as Indicated and Inferred based on the geological interpretation, semi-variogram performance and drill hole spacing. The Indicated Mineral Resource was classified for the blocks interpolated with the Pass I in Table 14.23, which used at least three composites from a minimum of two holes; and Inferred Mineral Resources were classified for all remaining grade populated blocks within all mineralized domains. The classifications have been adjusted to reasonably reflect the distribution of each classification. Selected classification block cross-sections and plans are attached in Appendix R.

14.2.12 NSR Calculation

The Mineral Resource Estimate was derived from applying NSR $/t cut-off values to the block models and reporting the resulting tonnes and grades for potentially mineable areas. The parameters in Table 14.24 were used to calculate the NSR values that determine the open pit mining potentially economic portions of the constrained mineralization. Selected NSR block cross-sections and plans are attached in Appendix Q.

Pit Optimization Parameters

TABLE 14.24
GEORDIE PIT OPTIMIZATION ECONOMIC PARAMETERS

Parameter	Value
Exchange Rate CDN$/US$	0.77
Cu US$/lb	3.00
Au US$/oz	1,300
Pt Price US$/oz	900
Pd Price US$/oz	1,100
Ag Price US$/oz	16
Cu float recovery %	93
Au float recovery %	80
Pt float recovery %	80
Pd float recovery %	82
Ag float recovery %	75

TABLE 14.24 GEORDIE PIT OPTIMIZATION ECONOMIC PARAMETERS	
Parameter	**Value**
Cu smelter payable %	96
Au smelter payable %	90
Pt smelter payable %	88
Pd smelter payable %	93
Ag smelter payable %	90
Smelting, Refining and Shipping $/t processed	4.00
G&A $/t processed	1.50
Rock Mining Cost $/t mined	2.00
Process Plant Feed Mining Cost $/t mined	2.00
Process Plant Feed Transport Cost $/t processed	2.00
Process Plant Cost $/t processed	7.50
Pit Slope	50°
NSR Contribution per tonne (CDN$)	
Cu $/%	76.27
Au $/g	39.03
Pt $/g	26.47
Pd $/g	35.00
Ag $/g	0.45
Marginal Cut-off $/t	15.00

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.2.13 Mineral Resource Estimate

The resulting pit constrained Mineral Resource Estimate at an NSR CDN$15/t cut-off as of the effective date of this Technical Report, is tabulated in Table 14.25. The optimized pit shell is presented in Appendix S. P&E considers the mineralization of Geordie to be potentially amenable to open pit economic extraction.

TABLE 14.25
GEORDIE PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Indicated	17,268	0.56	0.04	0.35	0.05	2.4	1.44	312	20	133	25	1,351	801
Inferred	12,899	0.51	0.03	0.28	0.03	2.4	1.22	212	12	80	14	982	505

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1. *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
2. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources in this report were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*
5. *The Mineral Resource Estimate was based on metal prices of US$3.00/lb copper, US$1,300/oz gold, US$16/oz silver, US$1,100 /oz palladium, and US$900/oz platinum, and an NSR cut-off value of CDN$15/t.*

Mineral Resource Estimates are sensitive to the selection of a reporting NSR cut-off value and are demonstrated in Table 14.26.

TABLE 14.26
GEORDIE PIT CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITY

Classification	NSR Cut-off (CDN$/t)	Tonnes (kt)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)
Indicated	100	1,030	1.32	0.09	0.81	0.10	5.25
	80	2,430	1.14	0.07	0.70	0.09	4.39
	60	5,423	0.94	0.06	0.58	0.07	3.52
	45	8,793	0.80	0.05	0.50	0.06	3.03
	35	10,993	0.73	0.04	0.46	0.06	2.81
	25	13,852	0.64	0.04	0.40	0.05	2.62
	15	**17,124**	**0.56**	**0.04**	**0.35**	**0.05**	**2.44**
	0.1	17,609	0.55	0.04	0.35	0.04	2.40
Inferred	100	193	1.18	0.06	0.80	0.08	4.33
	80	614	1.06	0.06	0.68	0.07	4.04
	60	1,613	0.90	0.05	0.56	0.06	3.40
	45	3,369	0.77	0.04	0.44	0.05	2.77
	35	5,384	0.67	0.04	0.37	0.04	2.47
	25	6,593	0.61	0.03	0.34	0.04	2.40
	15	**7,978**	**0.55**	**0.03**	**0.30**	**0.04**	**2.31**
	0.1	8,136	0.54	0.03	0.30	0.03	2.30

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum, k = thousands, M = millions.*

14.2.14 Confirmation of Estimate

The block model was validated using a number of industry standard methods including visual and statistical methods.

- Visual examination of composites and block grades on successive plans and sections were performed on-screen in order to confirm that the block models correctly reflect the distribution of composite grades. The review of estimation parameters included:
  - Number of composites used for estimation;
  - Number of drill holes used for estimation;
  - Mean distance to sample used;
  - Number of passes used to estimate grade; and
  - Mean value of the composites used.

- Comparisons of mean grades of composites with the block models of the Main Zone at zero grade are presented in Table 14.27.

TABLE 14.27 GEORDIE MAIN ZONE AVERAGE GRADE COMPARISON OF COMPOSITES WITH BLOCK MODELS					
Data Type	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**
Composites	0.65	0.04	0.40	0.05	2.74
Block Model ID^2*	0.60	0.04	0.37	0.04	2.63
Block Model NN**	0.60	-	0.37	-	-

Notes: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*
***** *block model grades were interpolated using Inverse Distance Squared.*
****** *block model grades were interpolated using Nearest Neighbour.*

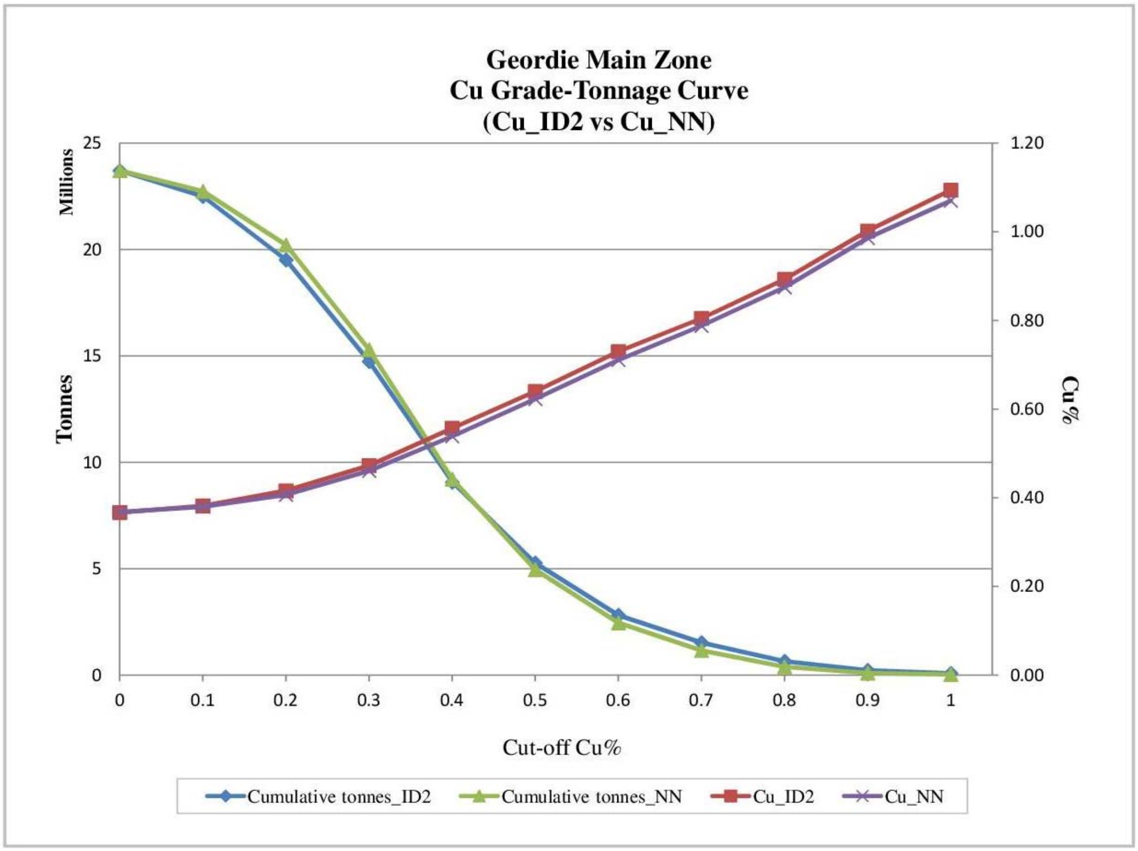
The comparisons above show the average grades of the block models to be somewhat lower than that of composites used for the grade estimations. These are most likely due to the smoothing by the grade interpolation process. The block model values will be more representative than the composites due to 3-D spatial distribution characteristics of the block models.

A volumetric comparison was performed with the block model volume versus the geometric calculated volume of the domain solids and the differences are shown in Table 14.28.

TABLE 14.28 GEORDIE VOLUME COMPARISON OF BLOCK MODEL WITH GEOMETRIC SOLIDS	
Geometric volume of wireframes	11, 460,005 m^3
Block model volume	11,380,114 m^3
Difference	0.7%

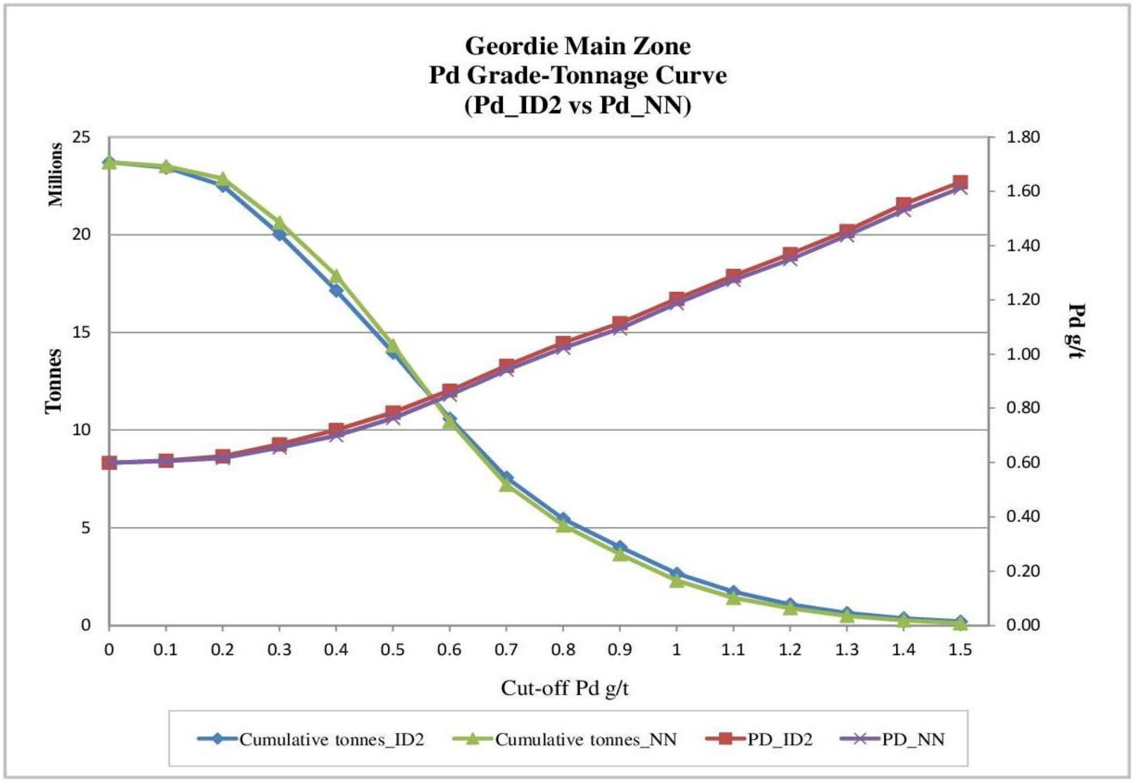
Comparisons of the grade-tonnage curve of the Cu grade model interpolated with Inverse Distance Squared (“ID^2”) and Nearest Neighbour (“NN”) on a global Mineral Resource basis for the Main Zone are presented in Figure 14.5.

FIGURE 14.5 GEORDIE MAIN ZONE CU GRADE-TONNAGE CURVE FOR ID² AND NN INTERPOLATION



Comparisons of the grade-tonnage curve of the Pd grade model interpolated with ID^2 and NN on a global resource basis for the Main Zone are presented in Figure 14.6.

FIGURE 14.6 GEORDIE MAIN ZONE PD GRADE-TONNAGE CURVE FOR ID^2 AND NN INTERPOLATION



Cu and Pd local trends of the Main Zone were evaluated by comparing the ID^2 and NN estimate against the composites. As shown in Figures 14.7 to 14.9, both Cu and Pd grade interpolations with ID^2 and NN agreed well.

FIGURE 14.7 GEORDIE MAIN ZONE CU AND PD GRADE SWATH EASTING PLOT

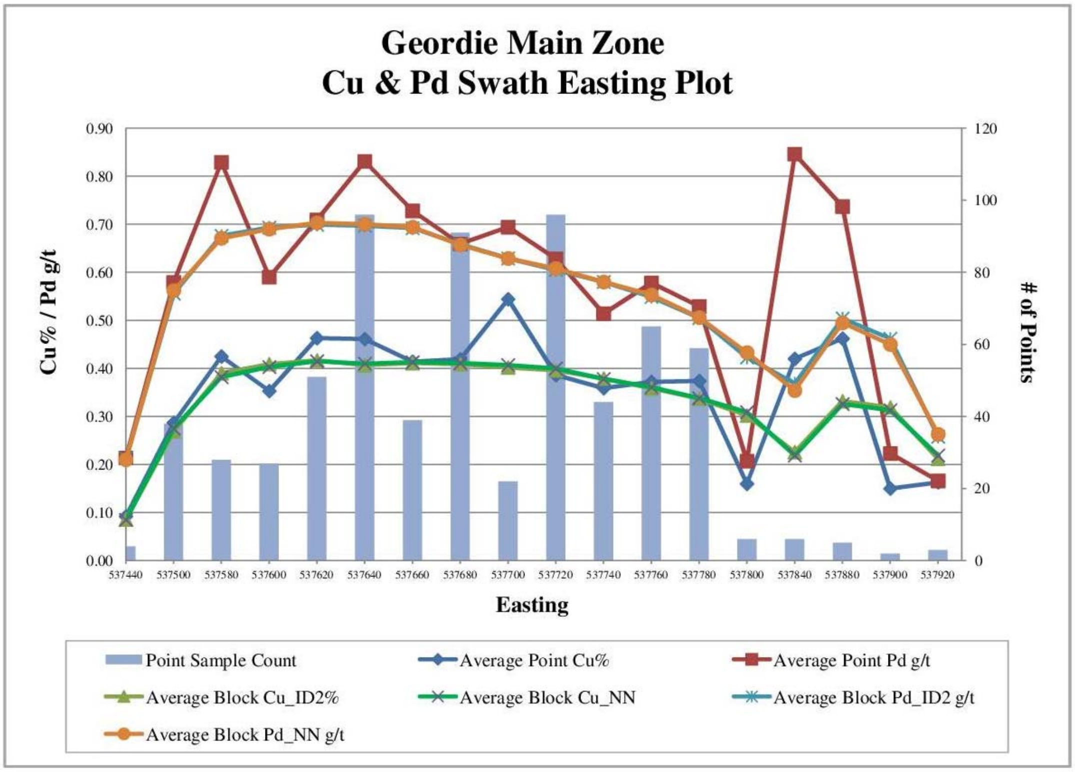


FIGURE 14.8 GEORDIE MAIN ZONE CU AND PD GRADE SWATH NORTHING PLOT

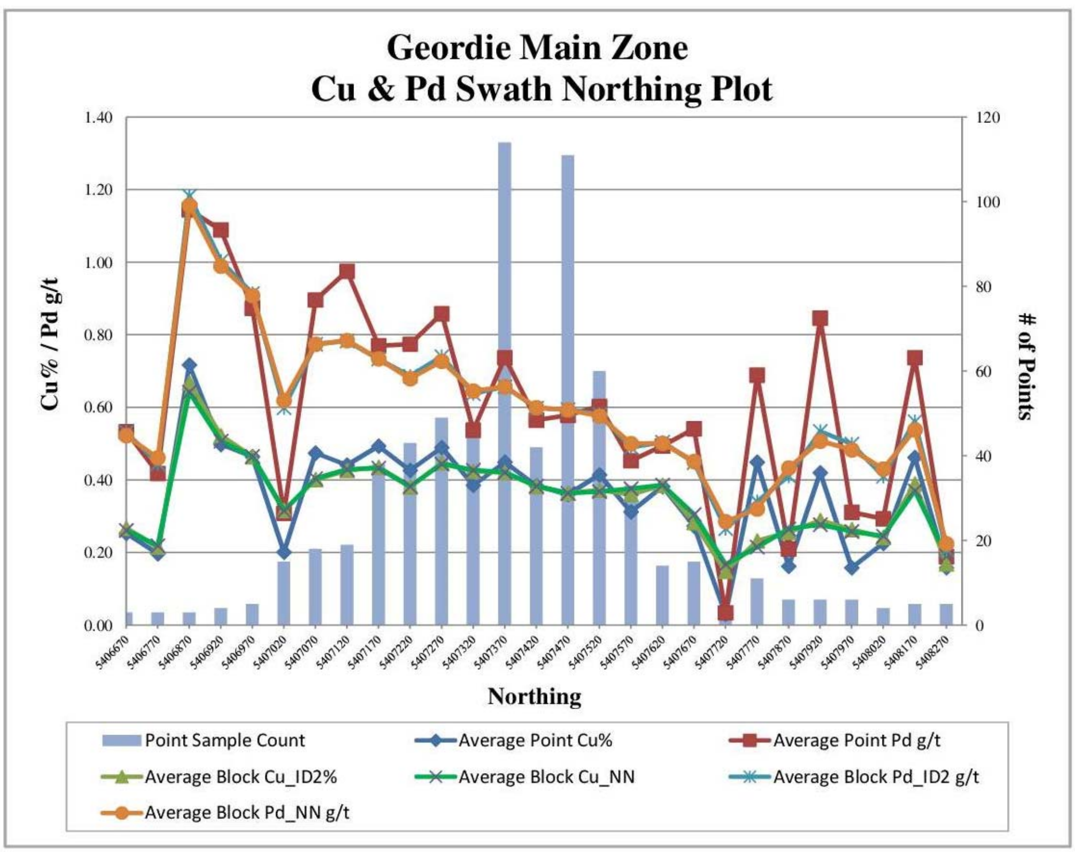
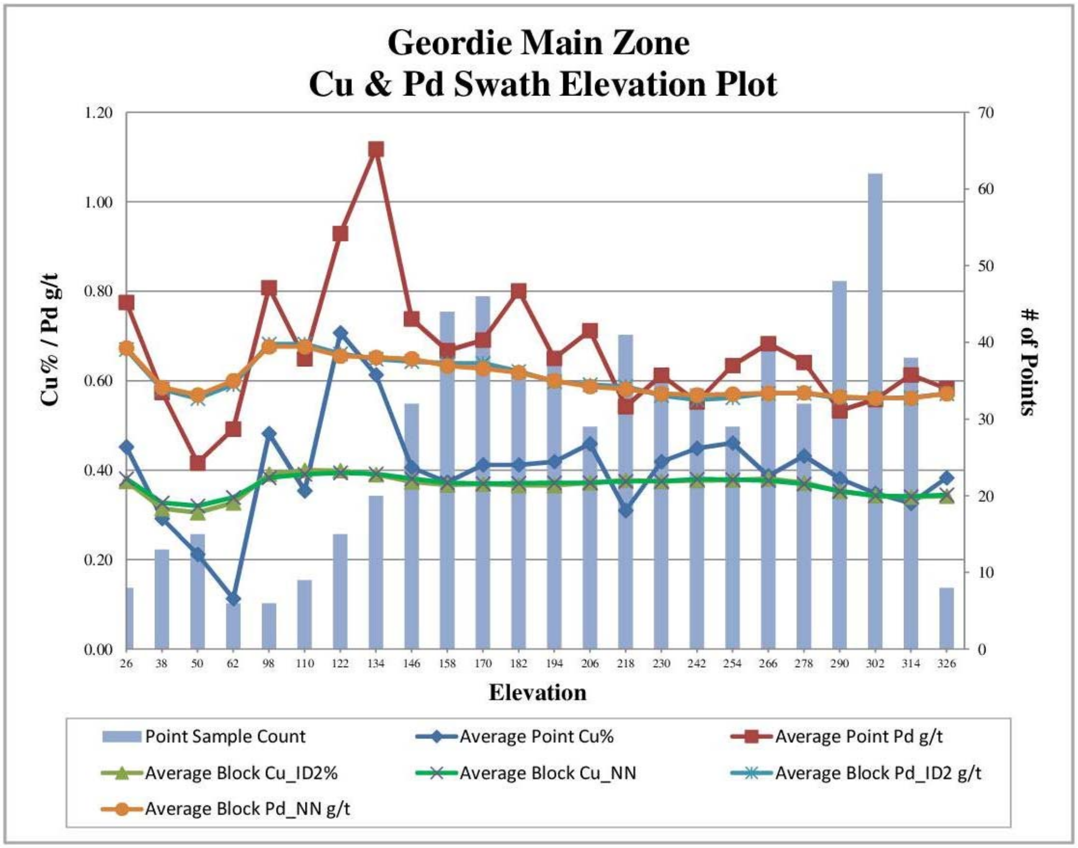


FIGURE 14.9 GEORDIE MAIN ZONE CU AND PD GRADE SWATH ELEVATION PLOT



14.3 SALLY DEPOSIT MINERAL RESOURCE ESTIMATE

14.3.1 Introduction

The purpose of this Technical Report section is to summarize Mineral Resource Estimate on the Sally Deposit, Marathon, Ontario, for Gen Mining. The Mineral Resource Estimate presented herein is reported in accordance with the Canadian Securities Administrators' National Instrument 43-101 and has been estimated in conformity with the generally accepted CIM "Estimation of Mineral Resource and Mineral Reserves Best Practices" guidelines. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability. There is no guarantee that all or any part of the Mineral Resource will be converted into a Mineral Reserve. Confidence in the estimate of Inferred Mineral Resources is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Mineral Resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent Mineral Resource Estimates.

This Mineral Resource Estimate was based on information and data supplied by Gen Mining, and was undertaken by Yungang Wu, P.Geo. and Eugene Puritch, P.Eng., FEC, CET of P&E,

both independent Qualified Persons in terms of NI 43-101. The effective date of this Mineral Resource Estimate is January 6, 2020.

14.3.2 Database

All drilling and channel assay data were provided in the form of Excel data files by Gen Mining. The GEOVIA GEMS™ V6.8.2 database for this Mineral Resource Estimate, compiled by P&E, consisted of 82 drill holes totalling 16,975 m and 371 surface channels totalling 1,871 m, of which a total of 47 drill holes and 162 channels intersected the mineralization wireframes used for the Mineral Resource Estimate. A drill hole and surface channel plan is shown in Appendix T.

The database contained assays for Cu, Pd, Pt, Au and Ag as well as other lesser elements of non-economic importance. The basic statistics of all raw assays for the elements of economic interest are presented in Table 14.29.

TABLE 14.29
SALLY ASSAY DATABASE SUMMARY

Variable	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)
Number of Samples	8,733	8,784	9,118	8,857	5,958
Minimum Value	0.001	0.001	0.000	0.001	0.100
Maximum Value	5.270	3.665	3.276	1.704	37.310
Mean	0.131	0.073	0.091	0.030	0.782
Median	0.024	0.025	0.059	0.011	0.400
Variance	0.088	0.026	0.012	0.004	1.254
Standard Deviation	0.296	0.161	0.109	0.065	1.120
Coefficient of Variation	2.255	2.197	1.193	2.119	1.433
Skewness	5.841	7.041	4.738	7.606	7.888
Kurtosis	57.364	89.121	90.263	109.782	200.037

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

All drill hole survey and assay values are expressed in metric units, with grid coordinates in the NAD 27, Zone 16N UTM system.

14.3.3 Data Verification

Verification of Cu, Pd, Pt, Au and Ag assay database was performed by P&E against laboratory certificates that were obtained directly from Accurassay and ALS Global as shown in Table 14.30, >50% of constrained assay data have been verified by P&E with electronically issued original certificates from laboratories. The verification of the older portion of the historical database was not performed during the course of this study, as no laboratory certificates were available to P&E. No errors were discovered in the checked data.

TABLE 14.30
SALLY ASSAY DATABASE VERIFICATION

Element	No. of Assays	No. of Checked Assays	% Checked	No. of Constrained Assays	No. of Checked Constrained Assays	% Checked Constrained Assays
Pd	8,733	5,182	59	2,529	1,275	50
Pt	8,784	5,182	59	2,529	1,275	50
Cu	9,118	4,874	53	2,529	1,275	50
Au	8,857	5,182	59	2,529	1,275	50
Ag	5,958	3,325	56	2,529	1,029	41

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

P&E also validated the Mineral Resource database by checking for inconsistencies in analytical units, duplicate entries, interval, length or distance values less than or equal to zero, blank or zero-value assay results, out-of-sequence intervals, intervals or distances greater than the reported drill hole length, inappropriate collar locations, survey and missing interval and coordinate fields. P&E believes that the database is suitable for Mineral Resource estimation.

14.3.4 Mineralized Domain Interpretation

Five (5) mineralized domain wireframes were constructed for the Mineral Resource Estimate. The wireframes were created from successive polylines on cross-sections facing an azimuth of 290^0 with 50 m spacing. A CDN$15/t NSR cut-off value was applied to the mineralization wireframes for Mineral Resource reporting. The CDN$/t NSR value was calculated with the formula:

NSR (CDN$/tonne) = (Cu% * $76.27) + (Pd g/t * $35) + (Pt g/t * $26.47) +
(Au g/t * $39.03) + (Ag g/t * $0.45).

The minimum constrained sample length for the wireframes was 2.0 m. In some cases, mineralization below the CDN$15/t NSR cut-off value was included for the purpose of maintaining zonal continuity and the minimum width. On each section, mineralized polyline interpretations were digitized from drill hole to drill hole, but not typically extended more than 25 m into untested territory.

The mineralization zones are modeled approximately 1,330 m along strike, 400 m deep vertically from surface with an average true width of 4.5 to 12 m, with a general strike azimuth of 110°, dipping 45° to SSW.

The resulting Mineral Resource domains were utilized as constraining boundaries during Mineral Resource estimation, for rock coding, statistical analysis and compositing limits. The 3-D domains are presented in Appendix U.

Topography and bedrock surfaces were created using drill hole collars and overburden logs from the drill holes.

14.3.5 Model Rock Code Determination

A unique model rock code was assigned for each mineralized domain in the Mineral Resource model as presented in Table 14.31.

TABLE 14.31
SALLY MODEL ROCK CODES USED FOR THE MINERAL RESOURCE ESTIMATE

Domains	Rock Type	Volume (m^3)	True Width (m)
Sally1	1100	5,262,975	12.1
Sally2	1200	6,921,904	8.1
Sally3	1300	4,936,367	10.0
Sally4	1400	3,296,756	9.7
Sally5	1500	1,206,857	4.5
Air	0		
OVB	10		
Waste	99		

14.3.6 Compositing

The basic statistics of all wireframe domain constrained assays and sample lengths are presented in Table 14.32.

TABLE 14.32
SALLY BASIC STATISTICS OF ALL DOMAIN CONSTRAINED ASSAYS AND SAMPLE LENGTHS

Variable	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	Length (m)
Number of Samples	2,490	2,484	2,529	2,509	1,866	2,529
Minimum Value	0.001	0.001	0.000	0.001	0.100	0.30
Maximum Value	5.270	3.665	3.276	1.704	11.850	3.25
Mean	0.312	0.179	0.168	0.066	1.231	1.58
Median	0.169	0.093	0.150	0.034	0.800	1.50
Variance	0.199	0.069	0.018	0.010	1.361	0.23
Standard Deviation	0.446	0.263	0.135	0.102	1.167	0.48
Coefficient of Variation	1.427	1.470	0.802	1.553	0.948	0.31
Skewness	4.076	4.410	6.148	5.372	2.396	-0.22
Kurtosis	28.890	36.185	119.126	53.067	12.912	2.24

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

Approximately 46% of the constrained sample intervals were 2 m in length, with an overall average length of 1.58 m. In order to regularize the assay sampling intervals for grade interpolation, a 2.0 m compositing length was selected for the drill hole intervals that fell within the constraints of the above-mentioned Mineral Resource domains. Composites were calculated for Cu, Pd, Pt, Au and Ag over 2.0 m lengths starting at the first point of intersection between assay data hole and hanging wall of the 3-D zonal constraint. The compositing process was halted upon exit from the footwall of the aforementioned constraint. Un-assayed intervals and below detection limit assays were set to 0.001% for Cu and 0.001 g/t for Pd, Pt, Au and Ag. The composite with length less than 0.5 m was discarded so as not to introduce any short sample bias in the grade interpolation process. The constrained composite data were extracted to point files for a capping study. The composite statistics are summarized in Table 14.33.

TABLE 14.33 SALLY COMPOSITE SUMMARY STATISTICS					
Variable	**Pt (g/t)**	**Pd (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**
Number of Samples	2,066	2,066	2,066	2,066	2,066
Minimum Value	0.001	0.001	0.001	0.001	0.001
Maximum Value	5.270	2.775	2.161	1.115	7.290
Mean	0.304	0.172	0.169	0.062	0.783
Median	0.171	0.090	0.156	0.033	0.500
Geometric Mean	0.121	0.075	0.123	0.031	0.132
Variance	0.173	0.057	0.014	0.007	0.944
Standard Deviation	0.416	0.238	0.119	0.086	0.972
Coefficient of Variation	1.368	1.383	0.706	1.400	1.241
Skewness	3.922	3.476	3.195	4.091	2.263
Kurtosis	28.663	21.713	41.816	30.107	10.276

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.3.7 Grade Capping

Grade capping was investigated on the 2.0 m composite values in the database within the constraining domains to ensure that the possible influence of erratic high values did not bias the database. Log-normal histograms for Cu, Pd, Pt, Au and Ag composites were generated for each mineralized zone and the selected resulting graphs are exhibited in Appendix V. No capping was required on Au and Ag for all domains. The capped composite values for Cu, Pd and Pt are presented in Table 14.34. The statistics of capped composites are summarized in Table 14.35. The capped composites were utilized to develop variograms and for block model grade interpolation.

Table 14.34 **Sally Capped Composite Values**									
Variables	**Domain**	**Total No. of Composites**	**Capping Value**	**No. of Capped Composites**	**Mean of Composites**	**Mean of Capped Composites**	**CoV of Composites**	**CoV of Capped Composites**	**Capping Percentile**
Pd	Sally1	365	No Capping	0	0.17	0.17	0.96	0.96	100.0
	Sally2	663	No Capping	0	0.27	0.27	1.29	1.29	100.0
	Sally3	589	3	4	0.43	0.42	1.30	1.20	99.3
	Sally4	391	3	2	0.31	0.31	1.26	1.24	99.5
	Sally5	58	No Capping	0	0.17	0.17	1.27	1.27	100.0
Pt	Sally1	365	No Capping	0	0.09	0.09	0.98	0.98	100.0
	Sally2	663	No Capping	0	0.14	0.14	1.38	1.38	100.0
	Sally3	589	No Capping	0	0.25	0.25	1.21	1.21	100.0
	Sally4	391	2	1	0.21	0.21	1.29	1.22	99.7
	Sally5	58	No Capping	0	0.06	0.06	0.94	0.94	100.0
Cu	Sally1	365	No Capping	0	0.19	0.19	0.53	0.53	100.0
	Sally2	663	1	1	0.17	0.17	0.78	0.66	99.8
	Sally3	589	No Capping	0	0.16	0.16	0.70	0.70	100.0
	Sally4	391	No Capping	0	0.16	0.16	0.77	0.77	100.0
	Sally5	58	No Capping	0	0.19	0.19	0.57	0.57	100.0

Note: *CoV = Coefficient of Variation,*

Table 14.35 Sally Capped Composite Summary Statistics					
Variable	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**
Number of Samples	2,066	2,066	2,066	2,066	2,066
Minimum Value	0.001	0.001	0.001	0.001	0.001
Maximum Value	3.000	2.180	1.000	1.115	7.290
Mean	0.301	0.172	0.169	0.062	0.783
Median	0.171	0.090	0.156	0.033	0.500
Geometric Mean	0.121	0.075	0.123	0.031	0.132
Variance	0.154	0.055	0.013	0.007	0.944
Standard Deviation	0.393	0.235	0.113	0.086	0.972
Coefficient of Variation	1.304	1.366	0.668	1.400	1.241
Skewness	3.041	3.209	1.345	4.091	2.263
Kurtosis	15.847	17.534	7.054	30.107	10.276

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.3.8 Semi-Variography

A semi-variography study was performed as a guide to determining a grade interpolation search strategy. Omni, along strike, down dip and across dip semi-variograms were developed for combined all domains on Cu and Pd using the capped composites. Selected variograms are attached in Appendix W.

Continuity ellipses based on the observed ranges were subsequently generated and used as the basis for estimation search ranges, distance weighting calculations and Mineral Resource classification criteria.

14.3.9 Bulk Density

A total of 2,616 bulk density measurements were provided by Stillwater, of which 528 measurements were located inside of the Mineral Resource wireframes. The average of wireframe constrained bulk densities was 3.06 t/m^3.

14.3.10 Block Modeling

The Sally block model was constructed using GEOVIA GEMS™ V6.8.2 modelling software, and the block model origin and block size are tabulated in Table 14.36. The block model consists of separate model attributes for estimated grades of Pd, Pt, Cu, Au, Ag and rock type (mineralization domains), volume percent, bulk density, NSR value and classification.

TABLE 14.36 SALLY BLOCK MODEL DEFINITION			
Direction	**Origin**	**No. of Blocks**	**Block Size (m)**
X	537,155	348	5
Y	5,412,280	188	5
Z	430	98	6
Rotation	Clockwise 20°		

All blocks in the rock type block model were initially assigned a waste rock code of 99, corresponding to the surrounding country rocks. All mineralized domains were used to code all blocks within the rock type block model that contained 1% or greater volume within the domains. These blocks were assigned their appropriate individual rock codes as indicated in Table 14.31. The overburden and topographic surfaces were subsequently utilized to assign rock type 10 and 0, corresponding to overburden and air, respectively, to all blocks 50% or greater above the respective surfaces.

A volume percent block model was set up to accurately represent the volume and subsequent tonnage that was occupied by each block inside the constraining domains. As a result, the domain boundary was properly represented by the percent model ability to measure individual infinitely variable block inclusion percentages within that domain. The minimum percentage of the mineralized inclusion within a block was set to 1%.

The Cu, Pd, Pt, Au and Ag grade blocks were interpolated with Inverse Distance Squared (“ID^2”). Multiple passes were executed for the grade interpolation to progressively capture the sample points in order to avoid over-smoothing and preserve local grade variability. Search ranges were based on the variograms and search directions which were aligned with the strike and dip directions of each domain accordingly. Grade blocks were interpolated using the parameters in Table 14.37.

TABLE 14.37 SALLY BLOCK MODEL INTERPOLATION PARAMETERS						
Pass	**Dip Range (m)**	**Strike Range (m)**	**Across Dip Range (m)**	**Max No. of Samples per Hole**	**Min No. Samples**	**Max No. Samples**
I	50	65	20	2	3	12
II	100	130	40	2	1	12
III	200	260	80	2	1	12

Selected cross-sections and plans of the Cu, Pd and NSR grade blocks are presented in Appendix X to AA.

The NSR values of blocks were derived with the formula below:

NSR (CDN$/tonne) = (Cu% * $76.27) + (Pd g/t * $35) + (Pt g/t * $26.47) + (Au g/t * $39.03) + (Ag g/t * $0.45).

The bulk density model was interpolated with Inverse Distance Squared ("ID^2") using wireframe constrained bulk densities.

14.3.11 Mineral Resource Classification

In P&E's opinion, the drilling, assaying and exploration work on the Sally Deposit supports this Mineral Resource Estimate and are sufficient to indicate a reasonable potential for economic extraction and thus qualify it as a Mineral Resource under the CIM definition standards. The Mineral Resource was classified as Indicated and Inferred based on the geological interpretation, semi-variogram performance and drill hole spacing. The Indicated Mineral Resource was classified for the blocks interpolated with the Pass I in Table 14.37, which used at least three composites from a minimum of two holes; and Inferred Mineral Resources were categorized for all remaining grade populated blocks within all mineralized domains. The classifications have been adjusted to reasonably reflect the distribution of each classification. Selected classification block cross-sections and plans are attached in Appendix AA.

14.3.12 NSR Calculation

The Mineral Resource Estimate was derived from applying NSR $/t cut-off values to the block models and reporting the resulting tonnes and grades for potentially mineable areas. The parameters in Table 14.38 were used to calculate the NSR values that determine the open pit mining potentially economic portions of the constrained mineralization.

Pit Optimization Parameters

TABLE 14.38
SALLY PIT OPTIMIZATION ECONOMIC PARAMETERS

Parameter	Value
Exchange Rate CDN$/US$	0.77
Cu US$/lb	3.00
Au US$/oz	1,300
Pt Price US$/oz	900
Pd Price US$/oz	1,100
Ag Price US$/oz	16
Cu float recovery %	93
Au float recovery %	80
Pt float recovery %	80
Pd float recovery %	82
Ag float recovery %	75
Cu smelter payable %	96

TABLE 14.38 **SALLY PIT OPTIMIZATION ECONOMIC PARAMETERS**	
Parameter	**Value**
Au smelter payable %	90
Pt smelter payable %	88
Pd smelter payable %	93
Ag smelter payable %	90
Smelting, Refining and Shipping $/t processed	4.00
G&A $/t processed	1.50
Rock Mining Cost $/t mined	2.00
Process Plant Feed Mining Cost $/t mined	2.00
Process Plant Feed Transport Cost $/t processed	2.00
Process Plant Cost $/t processed	7.50
Pit Slope	50°
NSR Contribution per tonne (CDN$)	
Cu $/%	76.27
Au $/g	39.03
Pt $/g	26.47
Pd $/g	35.00
Ag $/g	0.45
Marginal Cut-Off $/t	15.00

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

14.3.13 Mineral Resource Estimate

P&E considers the mineralization of the Sally Deposit to be potentially amenable to open pit economic extraction. The optimized pit shell is presented in Appendix BB. The resulting pit constrained Mineral Resource Estimate at an NSR CDN$15/t cut-off as of the effective date of this Technical Report, is tabulated in Table 14.39.

TABLE 14.39
SALLY PIT CONSTRAINED MINERAL RESOURCE ESTIMATE (1-5)

Classification	Tonnes (k)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)	PdEq (g/t)	Pd (koz)	Pt (koz)	Cu (Mlb)	Au (koz)	Ag (koz)	PdEq (koz)
Indicated	24,801	0.35	0.20	0.17	0.07	0.7	0.96	278	160	93	56	567	767
Inferred	14,019	0.28	0.15	0.19	0.05	0.6	0.86	124	70	57	24	280	389

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

1. *Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability.*
2. *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
3. *The Inferred Mineral Resource in this estimate has a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
4. *The Mineral Resources in this report were estimated using the Canadian Institute of Mining, Metallurgy and Petroleum (CIM), CIM Standards on Mineral Resources and Reserves, Definitions and Guidelines prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council.*
5. *The Mineral Resource Estimate was based on metal prices of US$3.00/lb copper, US$1,300/oz gold, US$16/oz silver, US$1,100 /oz palladium, and US$900/oz platinum, and an NSR cut-off value of CDN$15/t.*

Mineral Resource Estimates are sensitive to the selection of a reporting NSR cut-off value and are demonstrated in Table 14.40.

TABLE 14.40
SALLY PIT CONSTRAINED MINERAL RESOURCE ESTIMATE SENSITIVITY

Classification	NSR Cut-off (CDN$/t)	Tonnes (kt)	Pd (g/t)	Pt (g/t)	Cu (%)	Au (g/t)	Ag (g/t)
Indicated	100	84	1.67	1.05	0.21	0.24	0.65
	80	350	1.41	0.84	0.19	0.20	0.62
	60	1,422	1.04	0.60	0.19	0.17	0.81
	45	3,427	0.81	0.47	0.19	0.15	0.82
	35	6,173	0.65	0.38	0.18	0.12	0.77
	25	9,875	0.51	0.30	0.18	0.10	0.76
	15	**12,596**	**0.43**	**0.25**	**0.18**	**0.08**	**0.74**
	0.1	13,213	0.41	0.24	0.17	0.08	0.73
Inferred	100	0	1.48	0.73	0.25	0.32	1.51
	80	34	1.13	0.67	0.23	0.23	1.24
	60	249	0.95	0.52	0.21	0.18	0.97
	45	547	0.80	0.43	0.20	0.14	0.78
	35	937	0.65	0.35	0.19	0.12	0.71
	25	1,295	0.55	0.30	0.19	0.10	0.66
	15	**1,520**	**0.48**	**0.26**	**0.19**	**0.09**	**0.64**
	0.1	1,520	0.48	0.26	0.19	0.09	0.64

Note: *NSR = net smelter return, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum, k = thousands.*

14.3.14 Confirmation of Estimate

The block model was validated using a number of industry standard methods including visual and statistical methods.

- Visual examination of composites and block grades on successive plans and sections were performed on-screen in order to confirm that the block models correctly reflect the distribution of composite grades. The review of estimation parameters included:
  - Number of composites used for estimation;
  - Number of drill holes used for estimation;
  - Mean distance to sample used;
  - Number of passes used to estimate grade; and
  - Mean value of the composites used.

- Comparisons of mean grades of composites with the block models at global basis are presented in Table 14.41.

TABLE 14.41 SALLY AVERAGE GRADE COMPARISON OF COMPOSITES WITH BLOCK MODELS					
Data Type	**Pd (g/t)**	**Pt (g/t)**	**Cu (%)**	**Au (g/t)**	**Ag (g/t)**
Composites	0.30	0.17	0.17	0.06	0.78
Capped Composites	0.30	0.17	0.17	0.06	0.78
Block Model ID^2*	0.25	0.15	0.17	0.05	0.62
Block Model NN**	0.25	-	0.17	-	-

Notes: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*
***** *block model grades were interpolated using Inverse Distance Squared.*
****** *block model grades were interpolated using Nearest Neighbour.*

The comparisons above show that the Cu average grade of the block model was the same as the composites, while the Pd, Pt, Au and Ag average grades of the block models were somewhat lower than that of composites used for the grade estimations. This is most likely due to the smoothing by the grade interpolation process. The block model values will be more representative than the composites due to 3-D spatial distribution characteristics of the block models.

A volumetric comparison was performed with the block model volume versus the geometric calculated volume of the domain wireframes and the differences are shown in Table 14.42.

TABLE 14.42 SALLY VOLUME COMPARISON OF BLOCK MODEL WITH GEOMETRIC SOLIDS	
Geometric volume of wireframes	21, 624,859 m^3
Block model volume	21,590,327 m^3
Difference	0.16%

Comparisons of the grade-tonnage curve of the Cu and Pd grade model interpolated with Inverse Distance Squared (“ID^2”) and Nearest Neighbour (“NN”) on a global basis for all domains are presented in Figure 14.10 and 14.11.

FIGURE 14.10 SALLY CU GRADE-TONNAGE CURVE FOR ID^2 AND NN INTERPOLATION

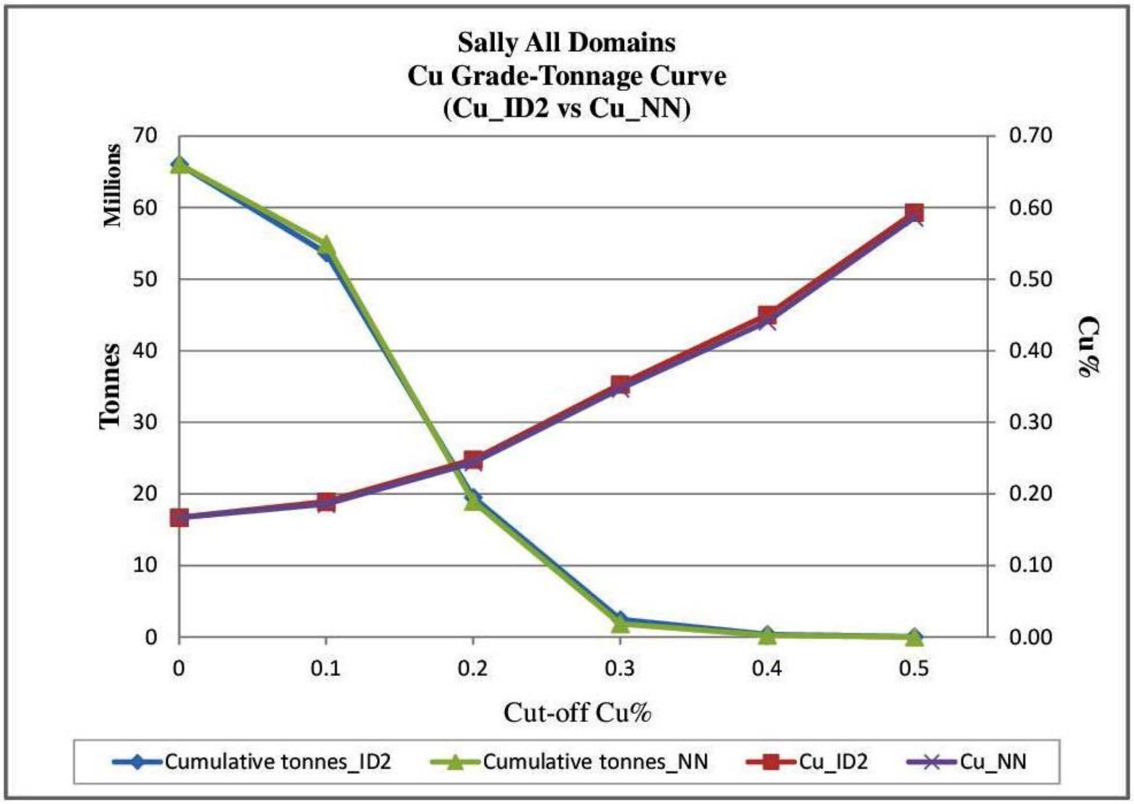
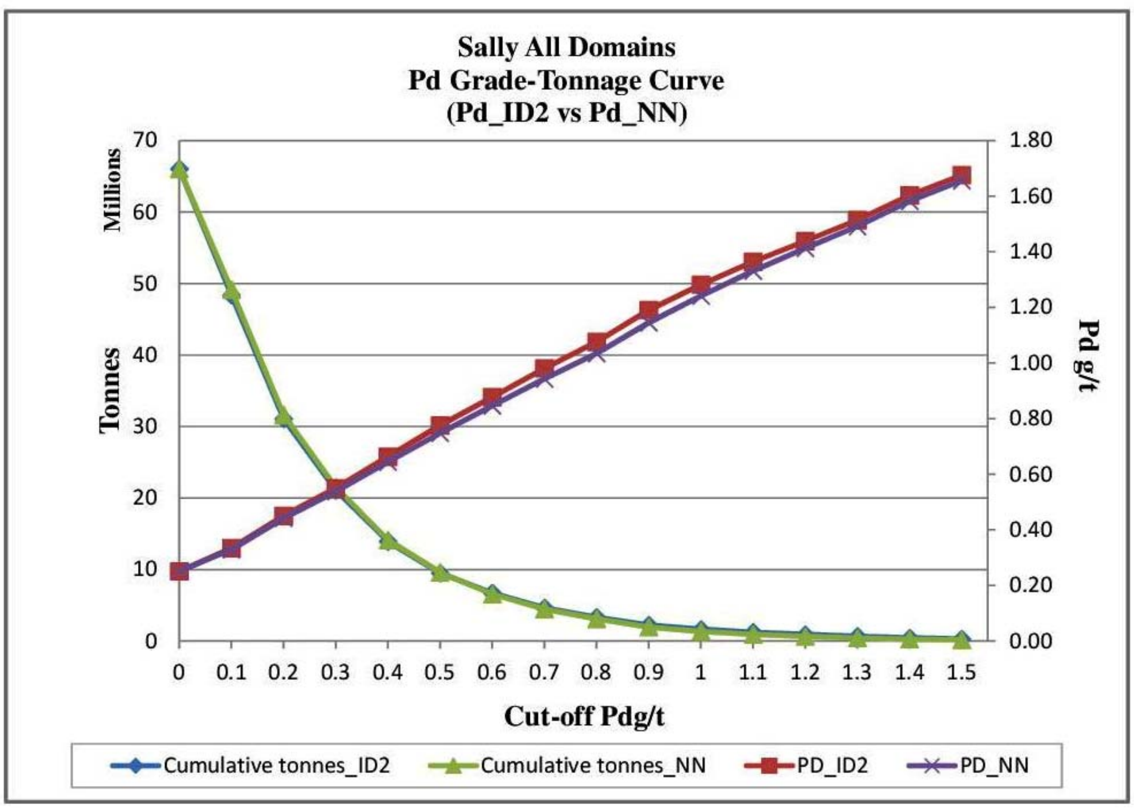


FIGURE 14.11 SALLY PD GRADE-TONNAGE CURVE FOR ID^2 AND NN INTERPOLATION



Cu and Pd local trends of all domains were evaluated by comparing the ID^2 and NN estimate against the Composites. As shown in Figures 14.12 to 14.14, both Cu and Pd grade interpolations with ID^2 and NN agreed well.

FIGURE 14.12 SALLY CU AND PD GRADE SWATH EASTING PLOT

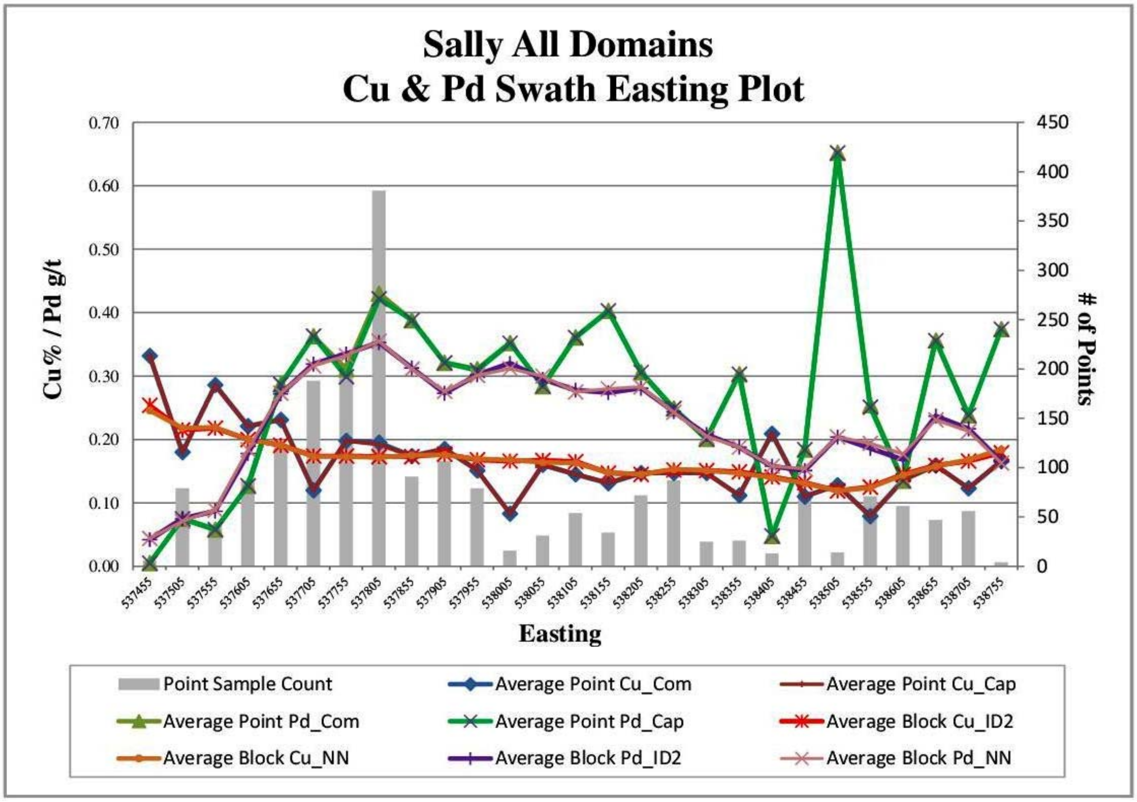


FIGURE 14.13 SALLY CU AND PD GRADE SWATH NORTHING PLOT

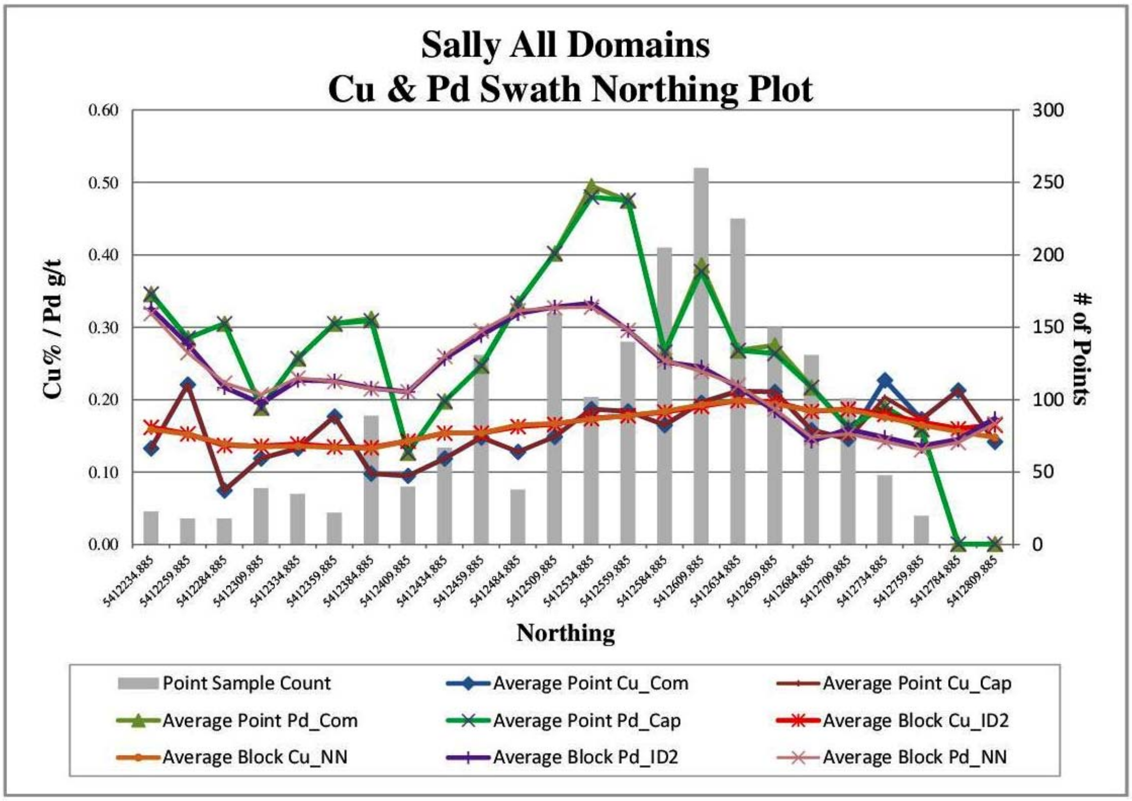
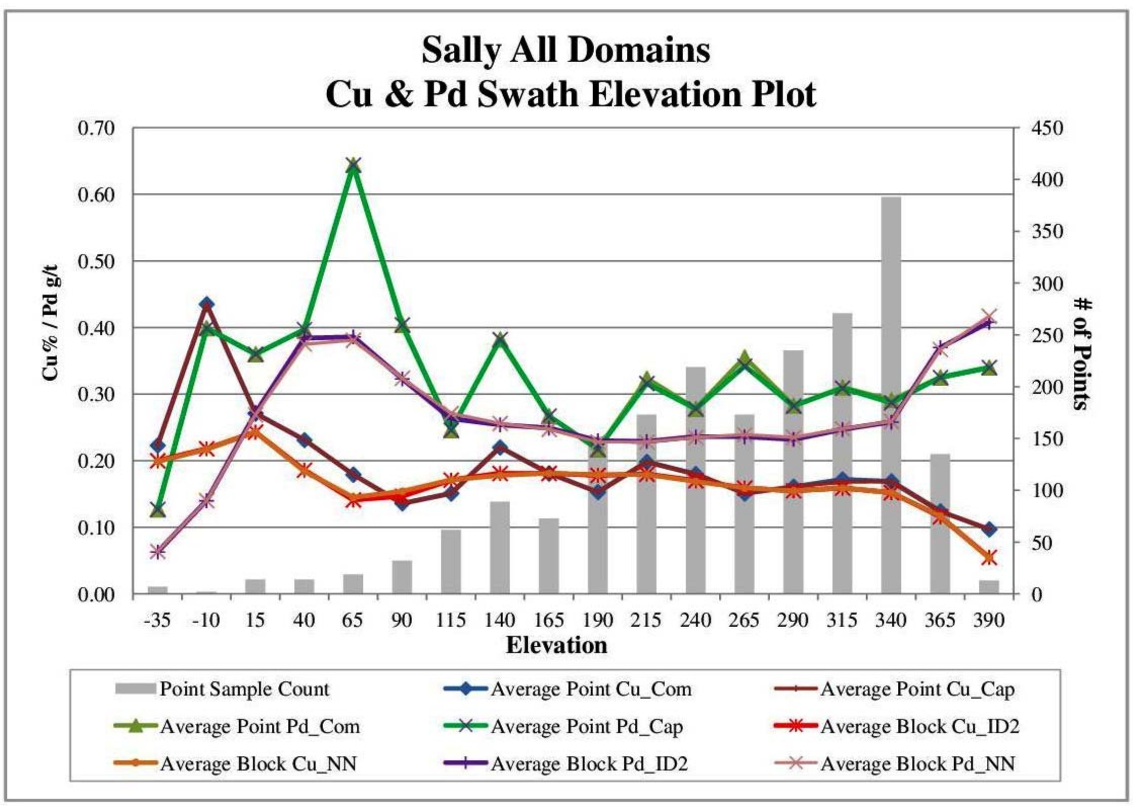


FIGURE 14.14 SALLY CU AND PD GRADE SWATH ELEVATION PLOT



15.0 MINERAL RESERVE ESTIMATE

There are no stated Mineral Reserves for the Marathon PGM-Cu Project.

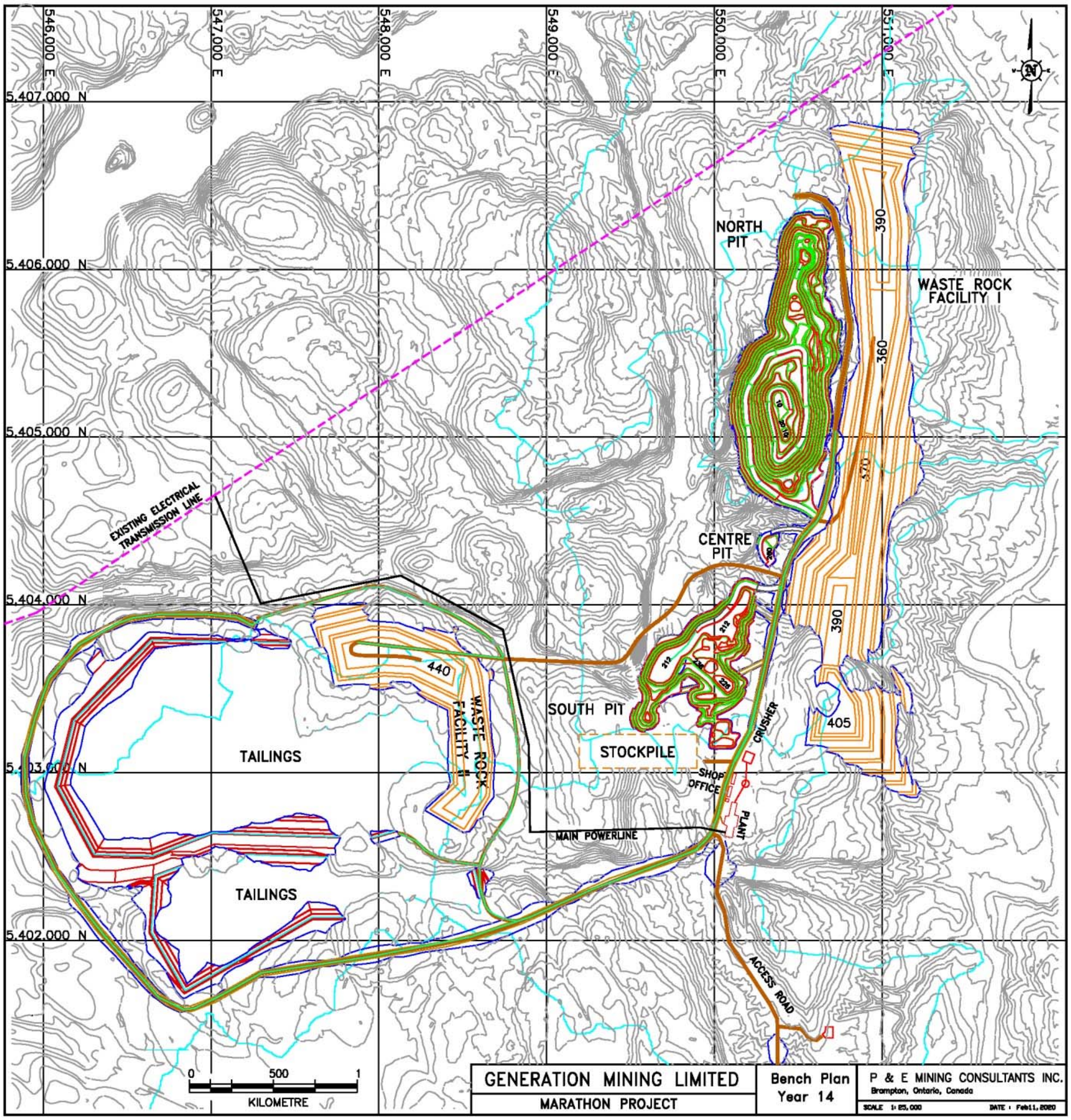
According to NI 43-101 guidelines, a Preliminary Economic Assessment is considered preliminary in nature and can include the use of Inferred Mineral Resources which are considered too speculative geologically to apply economic considerations that would enable them to be categorized as Mineral Reserves.

16.0 MINING METHODS

The Marathon Deposit is characterized by near-surface, wide, and moderately dipping mineralized zones. Hence, the Deposit lends itself to conventional open pit mining methods. Accordingly, the mine plan entails developing three adjacent open pits; the North, Centre, and South Pits. Figure 16.1 provides a Project site general arrangement showing the location of the various mine facilities.

The PEA production plan includes Inferred Mineral Resources that have a lower level of confidence that that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration. However, it should be noted that Inferred Mineral Resources in the PEA process plant feed tonnage are less than 1,000 tonnes, which is less than 1% of the total feed. 99% of the planned production is Measured and Indicated Mineral Resources.

FIGURE 16.1 MARATHON PROJECT SITE PLAN



16.1 OPEN PIT MINING

Three adjacent open pits will be developed along the known and well defined mineralized structure. The mining operation will use a conventional drill and blast approach, typically used in hard rock open pit mines. The mining operation will excavate two different materials:

- Waste Rock, that is to be placed onto waste rock storage facilities.

- Process Plant Feed, that is either processed or placed in a stockpile for future processing.

The design of the open pit mine plan and production schedule entailed several sequential steps:

1. Pit optimizations to select the optimal pit shells.
2. Design operational pits (with ramps and benches) based on the optimal shells.
3. Develop internal pit phases (push-backs) to moderate the annual mined tonnages.
4. Develop a life-of-mine pit production schedule, including stockpiling operations.
5. Develop a life-of mine processing plant schedule.

16.1.1 Pit Optimization

A series of pit optimizations were completed using the NPV Scheduler software package. The optimization process produces a series of nested pit shells containing mineralized material that is economically mineable according to geometry and a set of physical and economic design parameters. The generated pit shell that meets the Project's economic and operational targets is selected as the optimum pit shell and is used for mine design.

A series of pit optimizations were undertaken using the parameters shown in Table 16.1 and with a range of metal price revenue factors (from 30% to 120%). Two production scenarios were considered. The first was a plant throughput rate of 5 Mtpa and the second considered a throughput rate of 8 Mtpa. Parameters for both scenarios are shown in Table 16.1. The internal NSR cut-off value for the 5 Mtpa case is $11.45/t and the NSR cut-off value for the 8 Mtpa case is $9.50/t.

TABLE 16.1
PIT OPTIMIZATION PARAMETERS

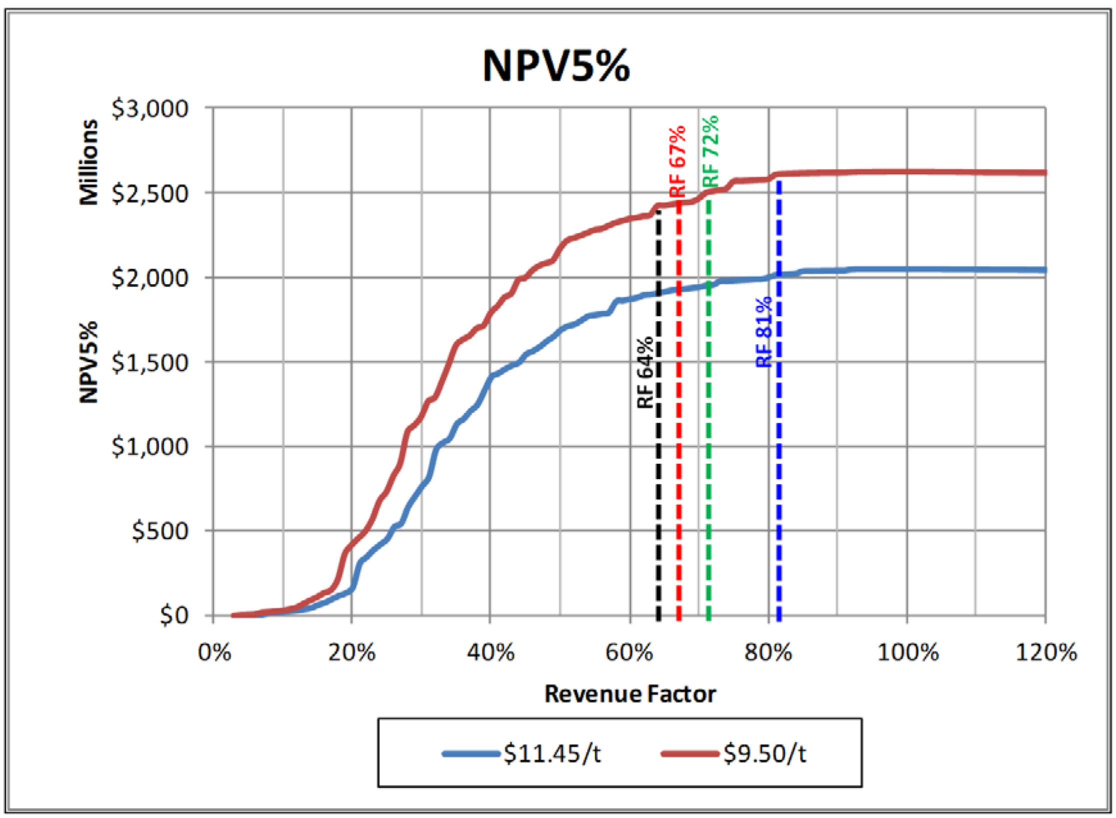
Parameter	Units	5 Mtpy	8 Mtpy
Production Case	tpd	13,700	21,900
Exchange Rate	$US:CDN	0.77 US : 1 CDN	0.77 US : 1 CDN
Metal Prices			
Cu	US$/lb	2.90	2.90
Au	US$/oz	1,300	1,300
Pt	US$/oz	900	900
Pd	US$/oz	1,200	1,200
Ag	US$/oz	16	16
Operating Costs			
Overburden Mining Cost	$CDN/t	n/a	n/a
Waste Mining Cost	$CDN/t	2.75	2.50
Mineralization Mining Cost	$CDN/t	2.97	2.70
Processing Cost	$CDN/t	10.00	8.33
G&A Cost	$CDN/t	1.28	1.00
Royalty & Community Benefits	$CDN/t	0.17	0.17
Operating Costs for COV*	$CDN/t	**11.45**	**9.50**

TABLE 16.1 PIT OPTIMIZATION PARAMETERS			
Parameter	**Units**	**5 Mtpy**	**8 Mtpy**
Dilution (optimization only)	%	5	5
Mining Recovery (optim only)	%	97	97
Metallurgical Recovery			
Cu	%	89.7	89.7
Ag	%	71.5	71.5
Au	%	73.2	73.2
Pd	%	82.9	82.9
Pt	%	74.5	74.5
Pit Slopes for Optimization (Not for Pit Design)			
Entire pit	no deduct	Az = 0° to 180°	55°
Entire pit	deduct -5°	Az =180 to 360°	50°

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*
** COV = cut-off value*

The optimization results are shown in Figure 16.2 (net present value ("NPV")) and Figure 16.3 (tonnages). Figure 16.2 shows that the NPV curve for both cases begin to flatten beyond a revenue factor of 60%. Several shell sizes were considered near the peak of the NPV5% curve. These shells are shown in plan view in Figure 16.4.

FIGURE 16.2 PIT OPTIMIZATION NPV



Different pit shell sizes and process plant throughput scenarios were examined and determined that the optimal case pit tonnage is approximately 90 Mt. While larger pits may be potentially economic, larger quantities of waste will need to be stored on surface. Since the Project area is limited in size, and the Project environmental assessment was well advanced based on previous engineering studies, the 64% revenue factor pit shell was selected for the pit design. This pit shell would theoretically yield approximately 90 Mt of process plant feed. The selection of this pit shell, however, does not preclude additional pit wall pushbacks to access future deeper mineralized feed (see Figure 16.5).

The process plant feed quantities reported from optimization analysis represent the potentially mineable tonnage contained in the optimized pit shell. However, the material quantities used in the mine production schedule will be derived from a detailed operational pit design.

FIGURE 16.3 PIT OPTIMIZATION TONNAGES

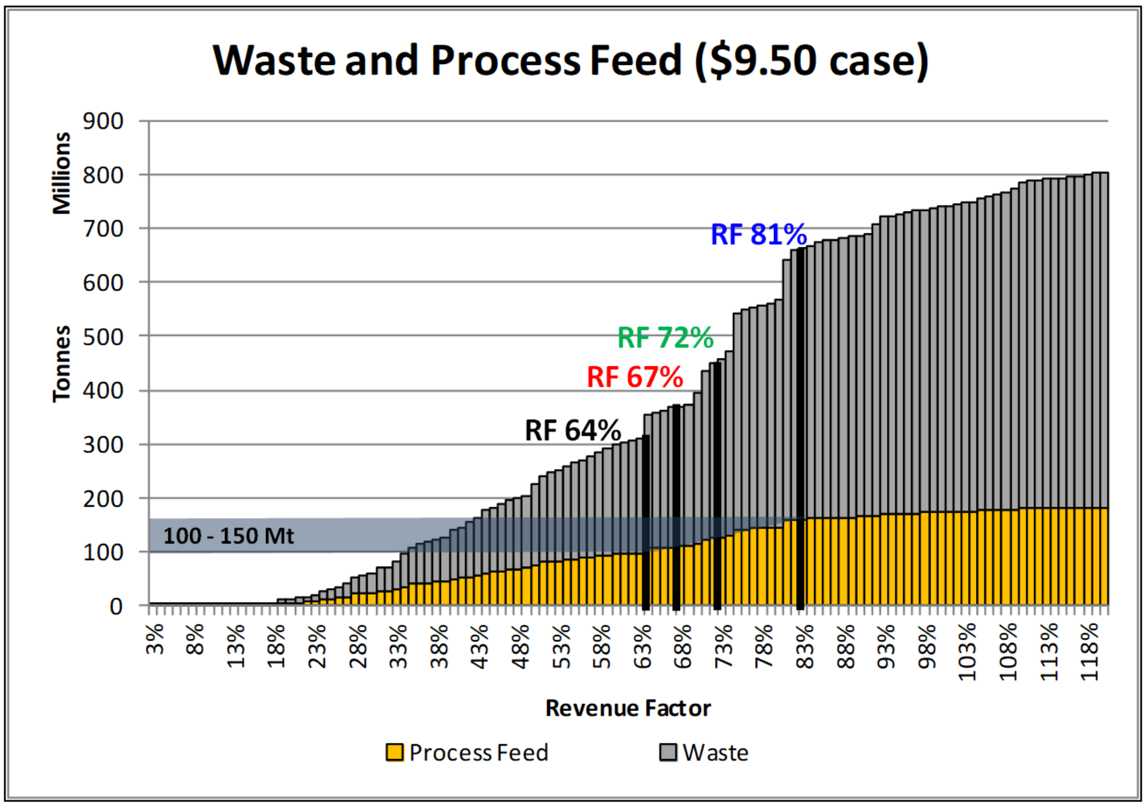


FIGURE 16.4 PLAN VIEW OF NESTED PIT SHELLS

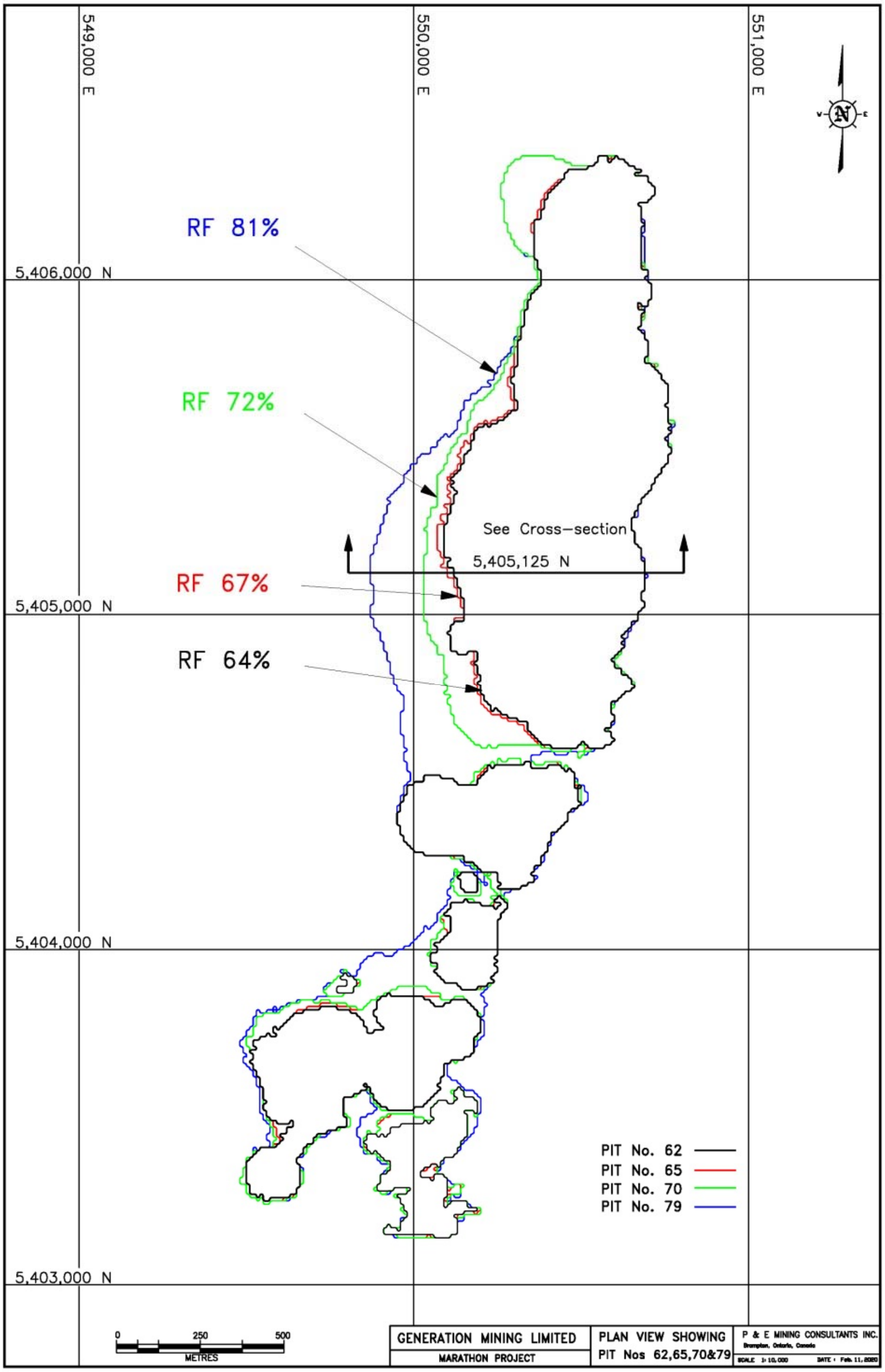
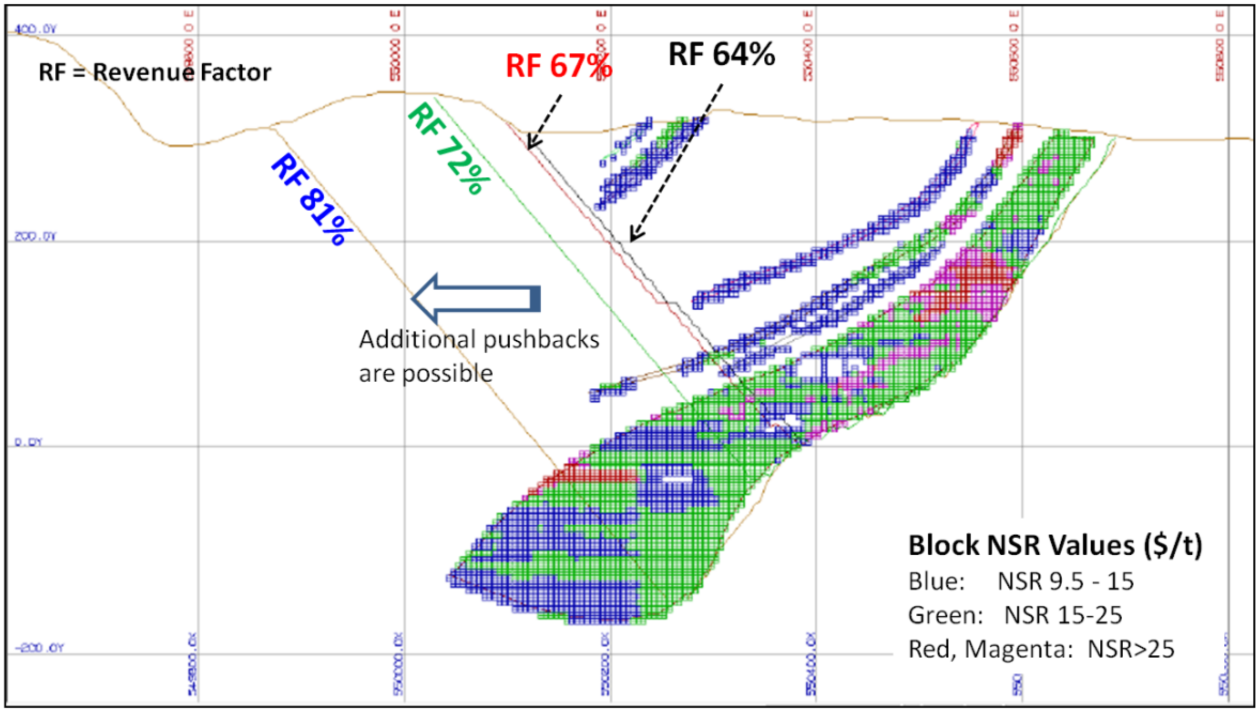


FIGURE 16.5 EXAMPLE CROSS-SECTION OF NESTED PIT SHELLS



16.1.2 Pit Designs

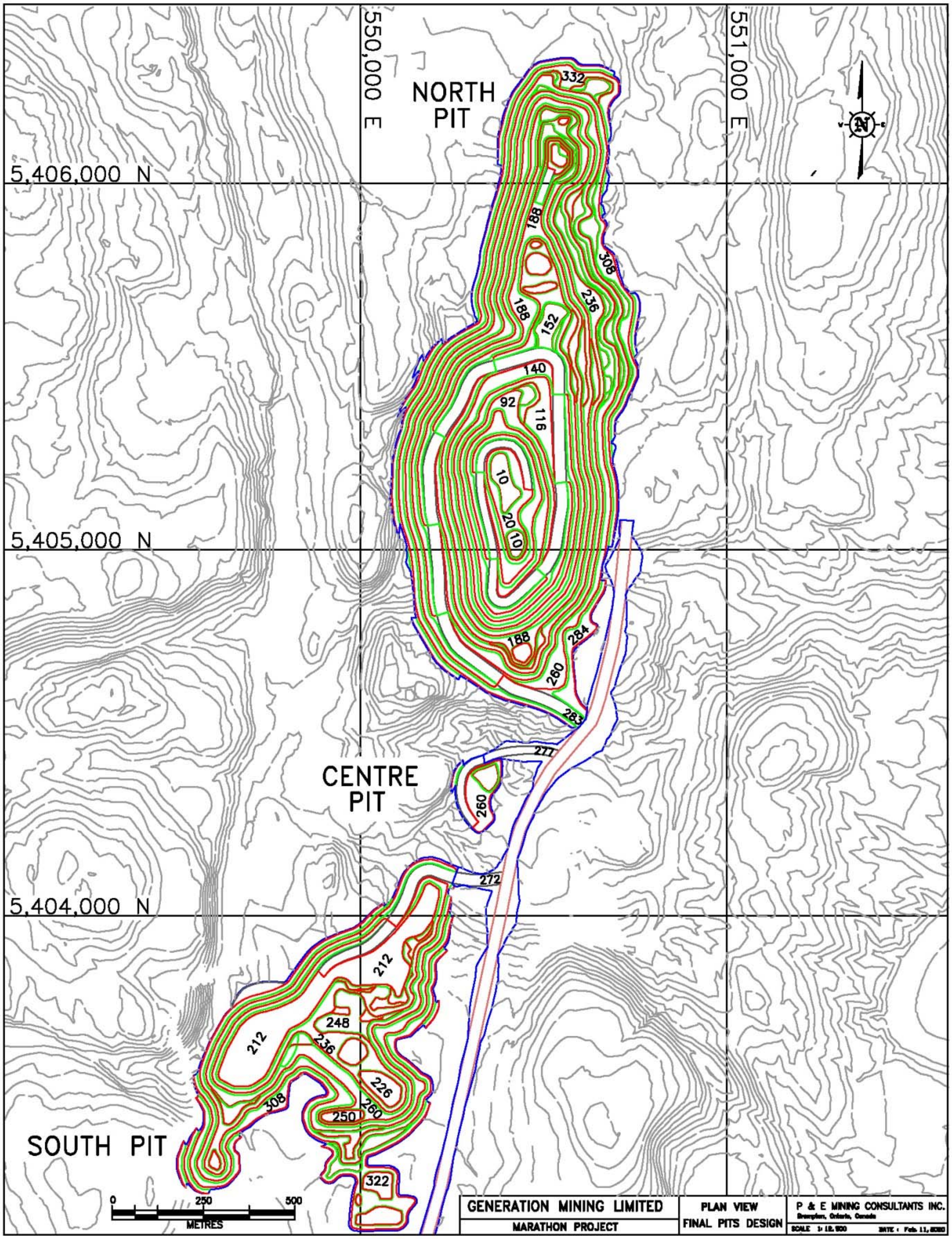
Three pit designs were created using the selected optimized pit shells as the basis.

Haul roads were added, according to the guidelines shown in Table 16.2. Figure 16.6 presents a plan view of the three final pit designs. Pit phases were developed within these pit designs.

TABLE 16.2
PIT DESIGN PARAMETERS

Parameter	Size
Truck capacity, truck width	213 t, 7.3 m
Haul Ramp Width (double lane)	32 m
Haul Ramp Width (single lane)	22 m
Ramp Grade (maximum)	10%

FIGURE 16.6 FINAL PIT DESIGN

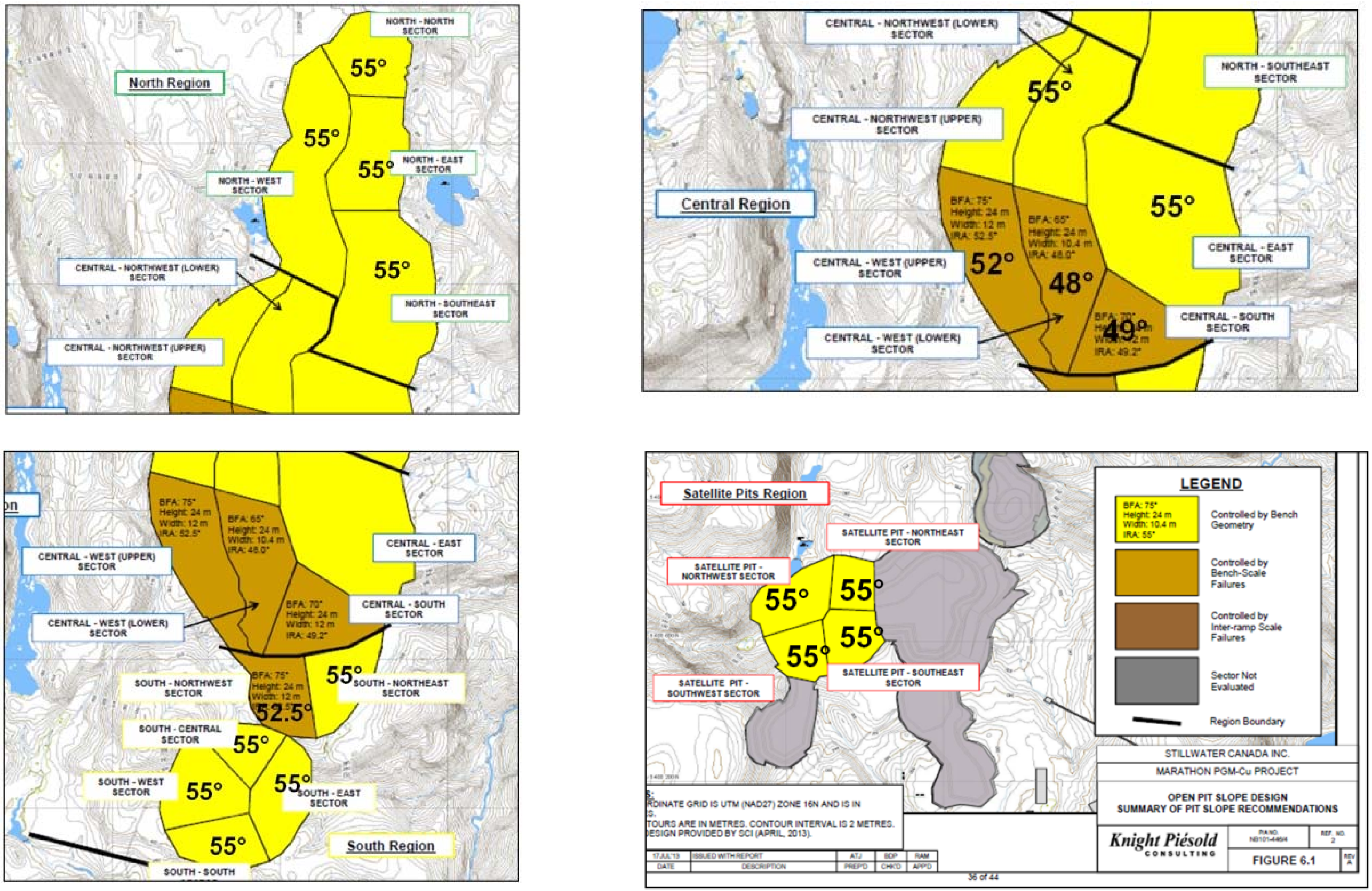


16.1.2.1 Geotechnical Studies

Open pit slope geotechnical studies were completed in March 2007 by Golder Associates for Marathon PGM Corp., and in July 2013 by Knight Piesold for Stillwater Canada Inc. The Knight Piesold 2013 geotechnical study forms the basis for this PEA mine design.

The geotechnical consultants sub-divided the pit into numerous design sectors, as shown in Figure 16.7. Each sector was assessed and assigned specific pit slope criteria. The individual sectors and inter-ramp slope angles are presented in Figure 16.7. Inter-ramp design angles vary from 52-55° depending upon open pit sectional geotechnical parameters.

FIGURE 16.7 DESIGN PIT SLOPE SECTORS



16.1.2.2 Hydrogeological Studies

Extensive hydrogeological investigations, monitoring and sampling have been undertaken at the Project site between 2007 and 2011 to characterize baseline conditions. The hydrostratigraphy of the site has been investigated through borehole drilling, drill core observation, grain size analysis and in-situ hydraulic conductivity testing.

A total of 36 monitoring wells have been installed at the Project site. Groundwater quality is similar to that encountered at sites across northern Ontario with consistent exceedances of the Ontario Drinking Water Standards for parameters such as hardness, iron and manganese.

In 2011, a 3D numerical groundwater model was developed for the site to better understand hydrogeological conditions at the Project. This hydrogeological modelling was done on a previous iteration of a similar mine plan.

The results of the modelling indicated that during operations, groundwater elevations around the open pits will decrease as groundwater discharges to the pits. A zone of depression is formed centred on the pits. During operations, the yearly groundwater inflows to the pits were estimated to average approximately 1,300 m^3/day.

Subsequently during closure, water will accumulate within the North Pit once dewatering operations cease and groundwater levels in the surrounding rock will increase as the surface of the water in the pit rises. The elevation of the water in the pit is expected to stabilize at an elevation that will result in it receiving groundwater. As a result, the water table in the vicinity of the North Pit is expected to stabilize at an elevation lower than its pre-development elevation.

16.1.2.3 Mining Dilution and Losses

In order to estimate the tonnage of process plant feed, mining dilution and loss factors were applied to the in-situ tonnage.

The amount of mining dilution that occurs will be dependent on the width of the mineralized zones and the blast hole spacing that is used to define the mining dig limits. During mining operations, dilution is expected to occur due to rock mass movement from blasting.

In order to estimate dilution, several different representative bench plans were selected for analysis. For selected benches a 3.0 m wide envelope of diluting material was assumed to surround the mineralized domains (see Figure 16.8 for the concept), which averaged 10.0% within the open pit design. The 3.0 m width is approximately half the anticipated drill burden distance between blast holes. The diluting grades were estimated within this dilution envelope and applied to the mineable undiluted insitu grades.

The dilution parameters and grades are summarized in Table 16.3. Mining losses were assumed at 3% based on P&E's operating experience.

FIGURE 16.8 DILUTION ENVELOPE CONCEPT

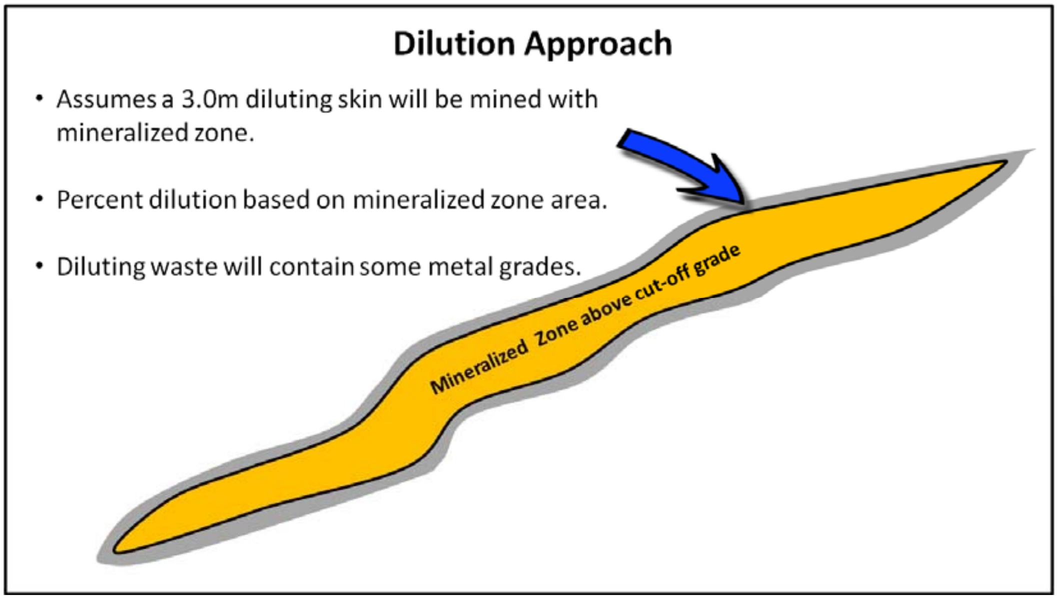


TABLE 16.3
DILUTION AND LOSS CRITERIA

Dilution Skin (m)	% Dilution	% Feed Loss	Au Grade (g/t)	Ag Grade (g/t)	Cu Grade (%)	Pt Grade (g/t)	Pd Grade (g/t)	NSR ($/t)
3.0	10.0	3.0	0.02	1.24	0.04	0.06	0.10	6.80

***Note:** Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

16.1.3 Potentially Mineable Portion of the Mineral Resource

After the pit designs were finalized, the potential process plant feed (i.e. "potentially mineable portion of the Mineral Resource") and waste rock tonnages were reported within the pit design. The process plant feed portion of the Mineral Resource is summarized in Table 16.4 for both undiluted and diluted production scenarios. The PEA process plant production schedule utilized diluted tonnages.

TABLE 16.4 OPEN PIT TONNAGES (UNDILUTED AND DILUTED)			
Item	**Units**	**Undiluted Pit Tonnage**	**Diluted Pit Tonnage**
Total Material (t)	Mt	359.6	359.6
Total Waste (t)	Mt	275.8	270.2
Strip Ratio	w:o	3.29	3.02
Process Feed (t)	M	83.8	89.4
NSR Value	$/t	51.67	48.39
Au grade	g/t	0.08	0.07
Ag grade	g/t	1.55	1.52
Cu grade	%	0.25	0.22
Pt grade	g/t	0.22	0.21
Pd grade	g/t	0.74	0.69

Note: *Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

16.1.3.1 Pit Design Phases

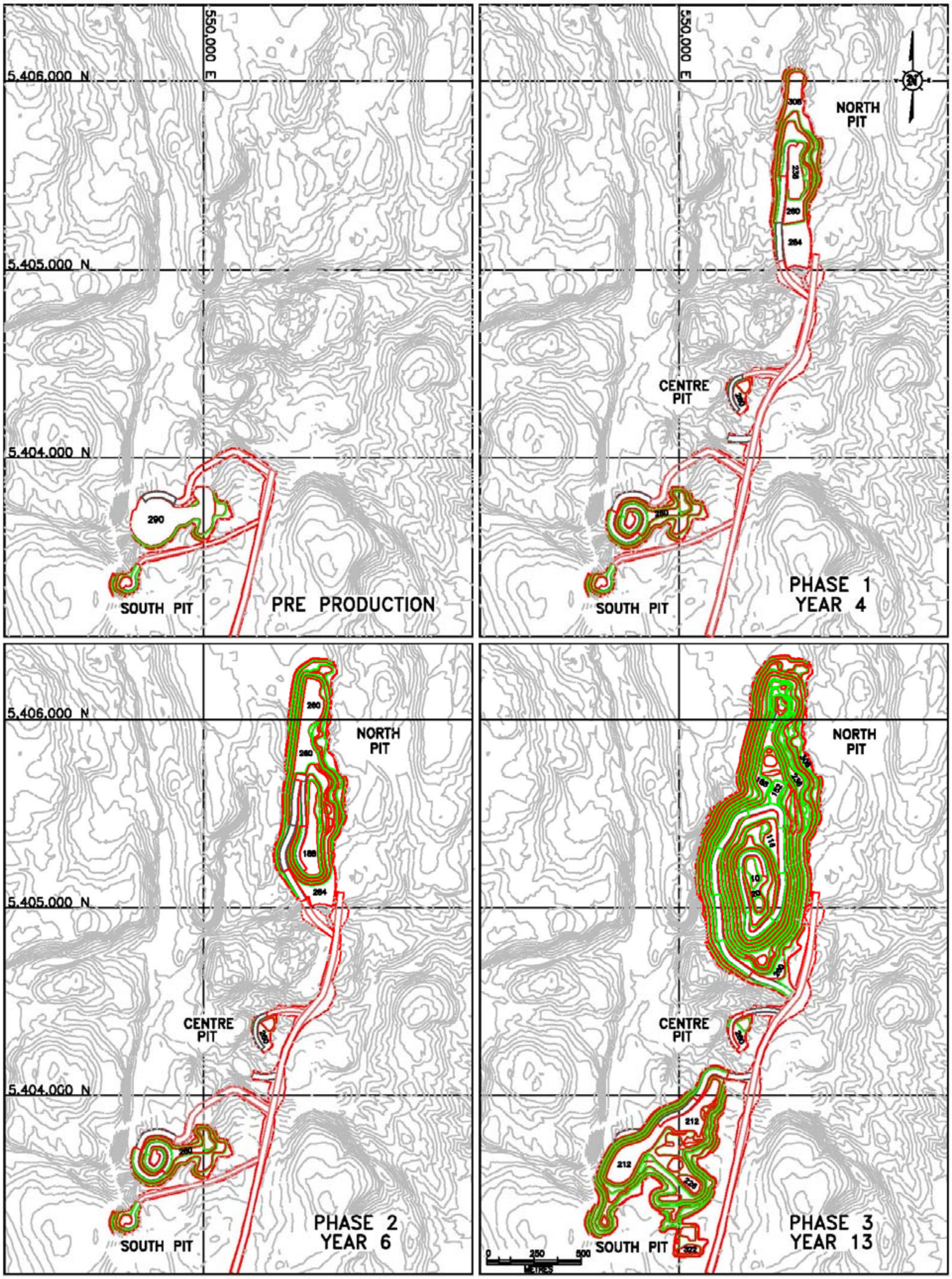
In order to distribute the annual mined waste rock tonnages and to accelerate the access to higher grade feed, the larger North Pit ("NP") design was sub-divided into three phases. The South Pit ("SP") was sub-divided into two phases and the Centre Pit ("CP") was mined as a single phase.

The total tonnages contained within each production phase are summarized in Table 16.5 and the phases are presented in Figure 16.9.

TABLE 16.5 PIT PRODUCTION PHASE TONNAGES								
Phase	**Units**	**Total**	**NP1**	**NP2**	**NP3**	**SP1**	**SP2**	**CP1**
Total Material (t)	Mt	359.6	28.3	45.4	221.2	14.3	49.3	1.0
Total Waste Rock (t)	Mt	270.2	16.2	30.8	171.9	11.8	38.9	0.7
Process Plant Feed (t)	Mt	89.4	12.2	14.6	49.4	2.5	10.4	0.3
Strip Ratio	W:O	3.02	1.33	2.11	3.48	4.82	3.72	1.98

Note: *The process plant feed utilized in the PEA contains a minor amount (~1%) of Inferred Mineral Resources. The reader is cautioned that Inferred Mineral Resources have a lower level of confidence than that applied to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of the Inferred Mineral Resource could be upgraded to an Indicated Mineral Resource with continued exploration.*
NP = North Pit, SP = South Pit, CP = Centre Pit.

FIGURE 16.9 OPEN PIT DESIGN PHASES



16.1.4 Mine Production Schedule

The production schedule consists of one year of pre-production stripping followed by 13 years of open pit production and a partial year of processing stockpiled mineralization in Year 14. Table 16.6 summarizes the annual open pit mining schedule. The NSR cut-off value used to define feed and waste rock is $9.50/t.

Table 16.7 summarizes how the individual pit phase sequence will be mined. Mining commences in Phase SP1 and ultimately finishes in SP2 in Year 13. Annual mine advance drawings are shown for Years -1, 4, 8, 14 in Figures 16.12 to 16.15 at the end of this report section.

Stripped waste rock will be placed into two different locations depending on when and where mining is occurring. Table 16.8 presents the waste rock placement schedule. The waste rock storage facilities are discussed further in Section 18.8.

The processing plant production schedule is shown in Table 16.9. In the initial years the processed head grade will be higher than the average grade (see Figure 16.10). In the later years the processed grade will be lower than mine average. This trend is generated by the use of grade stockpiling, which extends the Project life into Year 14. Process feed material is reclaimed from low grade stockpiles after the open pit mines are depleted in Year 13. Stockpiling methodology is discussed further in Section 16.1.5.6.

FIGURE 16.10 PROCESSED GRADE PROFILE (NSR/T)

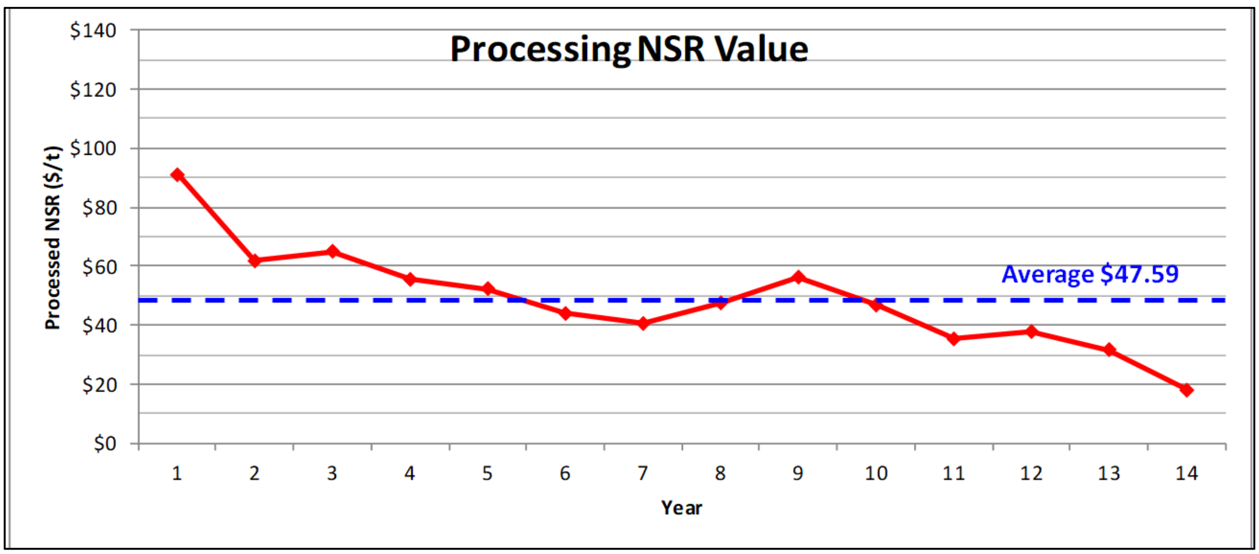


TABLE 16.6
MINE PRODUCTION SCHEDULE

Mining	Units	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13
Total Material	Mt	359.6	7.2	24.0	24.0	24.0	30.0	36.0	36.0	34.0	32.0	32.0	26.0	20.0	20.0	14.4
Total Waste Rock	Mt	270.2	6.1	17.6	17.7	18.3	24.2	30.7	29.6	27.8	23.4	21.5	14.4	14.2	14.0	10.5
Strip Ratio	W:O	3.02	5.79	2.78	2.84	3.24	4.21	5.80	4.59	4.51	2.71	2.05	1.25	2.42	2.31	2.72
Process Plant Feed	Mt	89.4	1.1	6.4	6.3	5.7	5.8	5.3	6.4	6.2	8.6	10.5	11.6	5.8	6.0	3.9
NSR ($/t)	$/t	48.39	70.92	62.46	51.86	57.77	47.88	48.72	47.79	45.34	45.53	49.10	39.49	37.81	42.35	43.87
Au	g/t	0.07	0.13	0.09	0.07	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08
Ag	g/t	1.52	1.61	1.05	0.76	1.02	1.20	1.29	1.45	1.61	1.63	1.77	1.81	1.90	2.02	1.83
Cu	%	0.22	0.17	0.20	0.24	0.27	0.23	0.26	0.24	0.22	0.24	0.27	0.21	0.16	0.20	0.13
Pt	g/t	0.21	0.42	0.33	0.20	0.23	0.19	0.19	0.20	0.20	0.18	0.18	0.17	0.21	0.22	0.27
Pd	g/t	0.69	1.21	1.04	0.78	0.86	0.70	0.67	0.67	0.64	0.62	0.66	0.53	0.55	0.59	0.71

Note: *Feed grades are diluted, Y = year, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

TABLE 16.7
MINING BY PHASE (TOTAL MATERIAL)

Total Material	Units	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13
NP1	Mt	28.3	-	10.9	10.3	6.1	1.1	-	-	-	-	-	-	-	-	-
NP2	Mt	45.4	-	6.0	9.9	8.1	10.9	5.6	4.9	-	-	-	-	-	-	-
NP3	Mt	221.2	-	-	2.9	9.8	18.0	30.4	31.1	34.0	32.0	32.0	21.4	4.1	4.8	0.8
SP1	Mt	14.3	7.2	7.1	-	-	-	-	-	-	-	-	-	-	-	-
SP2	Mt	49.3	-	-	-	-	-	-	-	-	-	-	4.6	15.9	15.2	13.6
CP1	Mt	1.0	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-
Total	**Mt**	**359.6**	**7.2**	**24.0**	**24.0**	**24.0**	**30.0**	**36.0**	**36.0**	**34.0**	**32.0**	**32.0**	**26.0**	**20.0**	**20.0**	**14.4**

Note: *Y = year.*

TABLE 16.8
WASTE ROCK PLACEMENT SCHEDULE

Destination	Units	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13
Tailings Dam	Mt	39.5	1.4	4.7	4.7	3.1	3.1	3.1	2.4	2.4	2.4	3.1	3.1	3.1	3.1	-
East Facility	Mt	188.5	-	11.9	9.6	15.3	21.2	27.6	27.1	25.4	21.0	18.4	8.2	1.6	1.0	0.2
South Facility	Mt	42.1	4.8	1.0	3.5	-	-	-	-	-	-	-	3.1	9.5	9.9	10.3
Total Waste Rock	Mt	270.2	6.1	17.6	17.7	18.3	24.2	30.7	29.6	27.8	23.4	21.5	14.4	14.2	14.0	10.5

Note: *Y = year*

TABLE 16.9
PROCESS PLANT SCHEDULE

Processing	Units	Total	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Process Feed	Mt	89.4	-	3.7	4.9	5.0	5.0	5.0	7.7	8.0	8.0	8.0	8.0	8.0	8.0	8.0	2.1
NSR (block model)	$/t	48.39	-	91.03	61.84	65.10	55.57	52.46	44.02	40.62	47.62	56.34	46.86	35.40	37.89	31.78	18.02
Au	g/t	0.07	-	0.13	0.08	0.09	0.08	0.08	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.06	0.04
Ag	g/t	1.52	-	1.14	0.80	1.08	1.14	1.27	1.35	1.45	1.62	1.86	1.94	1.78	1.85	1.61	1.39
Cu	%	0.22	-	0.24	0.28	0.29	0.26	0.28	0.22	0.20	0.25	0.31	0.25	0.16	0.18	0.12	0.10
Pt	g/t	0.21	-	0.49	0.24	0.26	0.22	0.20	0.18	0.18	0.19	0.20	0.19	0.19	0.19	0.19	0.10
Pd	g/t	0.69	-	1.57	0.95	0.98	0.82	0.72	0.62	0.57	0.66	0.76	0.63	0.50	0.52	0.48	0.24

Note: *Y = year, Ag = silver, Au = gold, Cu = copper, Pd = palladium, Pt = platinum.*

16.1.5 Mining Practices

It is assumed for the PEA that the open pits will be operated as an owner-operated conventional open pit mine. It is assumed that major mining equipment will be purchased by the owner on a five-year lease basis.

16.1.5.1 Drilling and Blasting

All of the mined waste rock and process plant feed will require blasting.

Blasthole drilling will be carried out using rotary drills, with hole diameters of 254 mm with an operating bench height of 10 m.

The blasthole burden and spacing will be approximately 7 m and will be carried out using both emulsion and an ammonium nitrate fuel oil mixture ("ANFO"). A contracted bulk explosives truck will load explosives directly into the production drill holes. Blast initiation will be carried out using conventional non-electric detonators and booster charges.

The assumed industry standard powder factor in both waste rock and process plant feed is 0.30 kg/t.

16.1.5.2 Loading and Hauling

Diesel powered hydraulic front shovel excavators with a 29 m^3 heavy rock bucket will be used to excavate the blasted rock. The excavators will load the 221 t off-highway haul trucks with a 3-4 bucket pass loading match.

Excavator-truck loading operations will also be supported by a wheel loader with a 29 m^3 rock bucket although only about 10-15% of the truck loading will be done by the wheel loader.

16.1.5.3 Pit Dewatering

The open pits are expected to see groundwater seepage in addition to regular precipitation events and snowmelt. Operating and capital costs have included a pit dewatering system to pump water from pit sumps at an average rate of 1,300 m^3/day.

Staged skid or trailer mounted centrifugal and submersible pumps will be employed for pit dewatering.

16.1.5.4 Auxiliary Pit Services Equipment

The primary mining operations will be supported by a fleet of support equipment consisting of bulldozers, graders as well as water truck, maintenance vehicles, and service vehicles. A list of major and support equipment is provided in Table 16.10.

16.1.5.5 Waste Rock Storage Facilities

The open pit will require the development of two waste rock storage locations, shown in Figure 16.1. Mine waste rock will also be used in the construction of the tailings dam and for other mine site infrastructure requirements. Table 16.8 summarizes the waste rock storage location by year. The intent is to minimize waste rock haul distances whenever possible.

P&E generated a Mineral Resource sulphur block model that indicates potentially acid-generating ("PAG") waste rock (i.e. > 0.3% S) totals approximately 2.5 Mt, or 1% of the total waste rock tonnage. PAG material will be placed inside the tailings pond in one location, and will eventually be submerged sub-aqueously within the tailings.

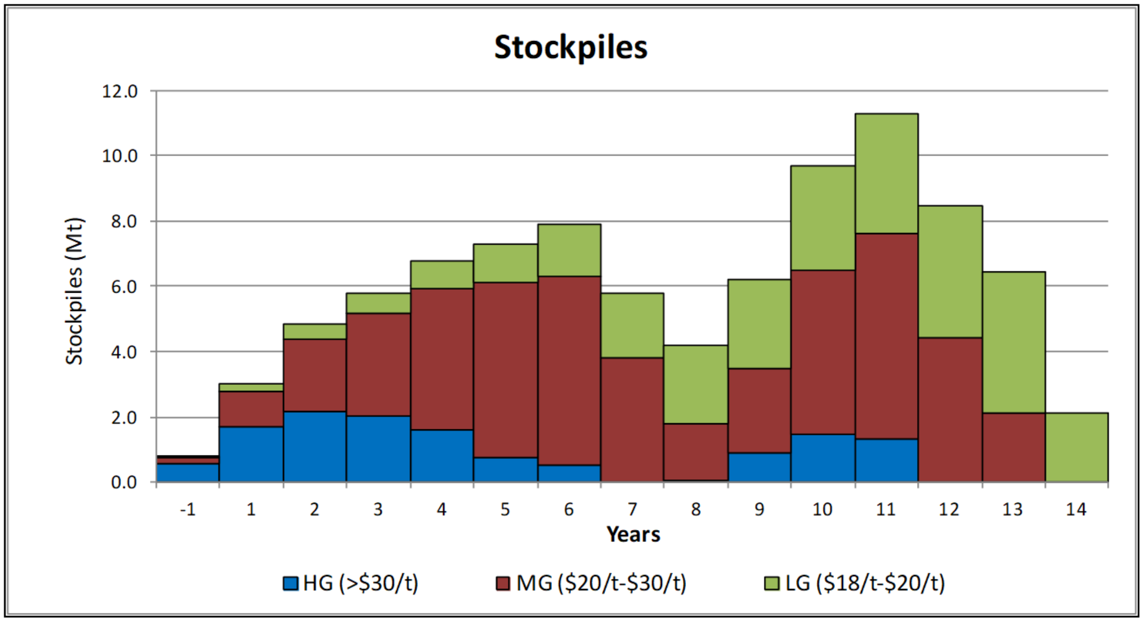
16.1.5.6 Process Plant Feed Stockpiling

The mining operation will use process plant feed stockpiling for three reasons. Firstly, stockpiles are used to moderate fluctuations in mined tonnages to ensure steady supply to the process plant. Secondly, different cut-off grade stockpiles will help defer low grade processing and advance high grades. This grade impact is shown previously in Figure 16.9. Thirdly, stockpiles are utilized to ensure maximum process plant productivity and maximum metal recovery and operational efficiency.

Three process plant feed grade stockpiles were used. The stockpile inventory will fluctuate from year to year, depending on whether excess feed is being mined and placed into stockpile or sent directly to the process plant. The approximate annual stockpile inventory is shown in Figure 16.11. The peak tonnage will occur around Year 11 with 11 Mt stockpiled, most of it consisting of low to medium grade material.

- High Grade: NSR > $30/t.
- Medium Grade: NSR $20 - $30/t.
- Low Grade: NSR $18 - $20/t.

FIGURE 16.11 STOCKPILE INVENTORIES



16.1.6 Mining Equipment

The mine operations at the Marathon Project will utilize conventional open pit mining methods and technologies used at other locations around Canada where similar rock and climatic conditions are found. Table 16.10 lists the peak mine equipment fleet requirements generated from industry standard production equipment productivities.

TABLE 16.10
MINING EQUIPMENT FLEET

Equipment Fleet	Year														
	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
P&H 77XR Drill	1	3	3	3	3	4	4	3	3	3	3	2	2	2	
Hydraulic Shovel, 29 cu.m	1	1	1	1	1	2	2	2	2	2	1	1	1	1	
Wheel Loader 29 cu.m	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Haul Truck 221 t	3	7	6	6	7	9	9	9	9	9	8	6	6	5	1
Stemming Truck, 15 t	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Personnel Van		3	3	3	3	3	3	3	3	3	3	3	3	3	3
Crane, Grove 40 t	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rubber Tire Dozer 844B-class		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dozer (D375A)		4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mechanic and Welding Truck		2	2	2	2	2	2	2	2	2	2	2	2	2	2
Excavator, 4 cu.m		2	2	2	2	2	2	2	2	2	2	2	2	2	2

TABLE 16.10
MINING EQUIPMENT FLEET

Equipment Fleet	Year														
	-1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
(PC390)															
Fuel and Lube Truck		2	2	2	2	2	2	2	2	2	2	2	2	2	2
Grader 16H-class 16' blade		3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flat Deck with Hiab		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Light Plant		5	5	5	5	5	5	5	5	5	5	5	5	5	5
Tire Manipulator		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Truck and Trailer, 200 t		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pickup Truck	6	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Pit Water Pumps	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Forklift	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Wheel Loader 4 cu.m		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tractor Massey Ferguson 375/4WD		2	2	2	2	2	2	2	2	2	2	2	2	2	2
Water Truck (HM400)		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Drill, 100 mm, Crawler, DTH		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Drill, 50 mm, Crawler		1	1	1	1	1	1	1	1	1	1	1	1	1	1

16.1.7 Mine Support Facilities

The Marathon Project will require mine offices, change house/dry-facilities, maintenance facilities, warehousing and cold storage areas. The mine office will provide office space for mine management, engineering, geology, environmental, personnel, administration and mine maintenance services. These structures are part of the Project infrastructure described in Section 18 of this Technical Report.

A maintenance shop which will provide pit support services will be located near the process plant site. The mine maintenance facility will consist of a truck shop which will include a wash facility, welding equipment and maintenance bays. The facility will have adjoining indoor parts storage and tool crib.

A fuel and lube station will be conveniently located near the maintenance facility and main haul road for equipment access. A mobile truck-mounted fuel and lube system will be available to service less mobile equipment in the field.

16.1.8 Mining Manpower

The Marathon Project mining operation will require a peak open pit workforce of 213 personnel, as summarized in Table 16.11. Manpower numbers will fluctuate as mining volumes and operating equipment needs change.

The mining operations manning list includes all aspects involved with the open pit operations, including:

- Senior mine and maintenance supervision.
- Office technical staff, engineering, geology, surveying, etc.
- Clerical, maintenance planning, training.
- Mine operations crews.
- Mine support crews.
- Mine maintenance crews.

TABLE 16.11
MINING OPERATIONS MANPOWER

Manpower	Year														
	-1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Driller	3	8	8	8	10	11	11	11	10	10	8	7	7	5	
Stemming Operator	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Blaster	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Blasting Helper	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Truck Drivers	11	25	23	22	26	32	34	34	34	34	28	22	22	17	3
Shovel Operators	2	3	3	3	4	5	5	4	4	4	4	3	3	2	
Loader Operators	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
HD Mechanic	5	23	23	23	25	29	29	29	28	28	25	22	22	19	1
Pit Services (dewatering)		4	4	4	4	4	4	4	4	4	4	4	4	4	1
Grader Operator		8	8	8	8	8	8	8	8	8	8	8	8	8	1
Dozer Operator		16	16	16	16	16	16	16	16	16	16	16	16	16	1
Water/Sand Truck Operator		4	4	4	4	4	4	4	4	4	4	4	4	4	
Utility Operators		8	8	8	8	8	8	8	8	8	8	8	8	8	
Mine Superintendent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mine General Foremen	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Mine Foremen		8	8	8	8	8	8	8	8	8	8	8	8	8	
Drill and Blast Foremen		2	2	2	2	2	2	2	2	2	2	2	2	2	
Shovel Foremen		4	4	4	4	4	4	4	4	4	4	4	4	4	
Mine Clerk	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Dispatch Engineer		1	1	1	1	1	1	1	1	1	1	1	1	1	
Dispatchers		4	4	4	4	4	4	4	4	4	4	4	4	4	
Equipment Trainer	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Maintenance General Foreman		1	1	1	1	1	1	1	1	1	1	1	1	1	
Maintenance Foreman		8	8	8	8	8	8	8	8	8	8	8	8	8	
Shop Foreman		4	4	4	4	4	4	4	4	4	4	4	4	4	

Manpower	Year														
	-1	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Maintenance Clerk	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Planner		1	1	1	1	1	1	1	1	1	1	1	1	1	
Scheduler		1	1	1	1	1	1	1	1	1	1	1	1	1	
Welder	2	4	4	4	4	4	4	4	4	4	4	4	4	4	
Gas Mechanic	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
Fuel and Lube Person	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Tireman		4	4	4	4	4	4	4	4	4	4	4	4	4	1
Partsman		1	1	1	1	1	1	1	1	1	1	1	1	1	
Laborer	2	4	4	4	4	4	4	4	4	4	4	4	4	4	1
General maintenance	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Chief Mine Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Senior Pit Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Drill and Blast Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Project Engineer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Reliability Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Geologist	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Surveyor	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Survey Technician	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
Mine Technician	1	2	2	2	2	2	2	2	2	2	2	2	2	2	
Ore Control Technician	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Geotechnical Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Tailings Engineer		1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	**67**	**193**	**191**	**190**	**199**	**211**	**213**	**212**	**210**	**210**	**199**	**188**	**188**	**177**	**11**

FIGURE 16.12 MINE PLAN – YEAR -1 (PRE-PRODUCTION)

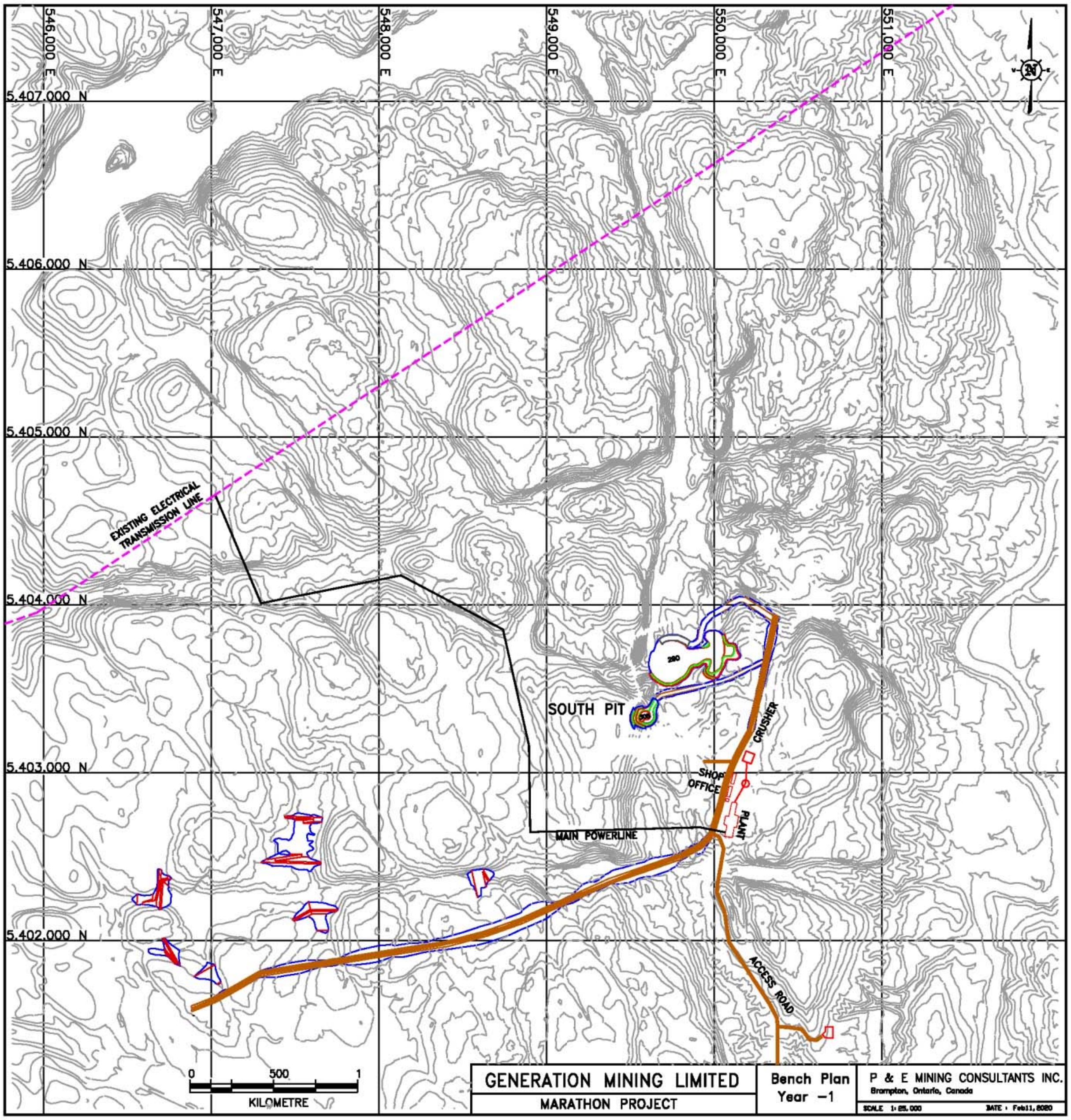


FIGURE 16.13 MINE PLAN – YEAR 4

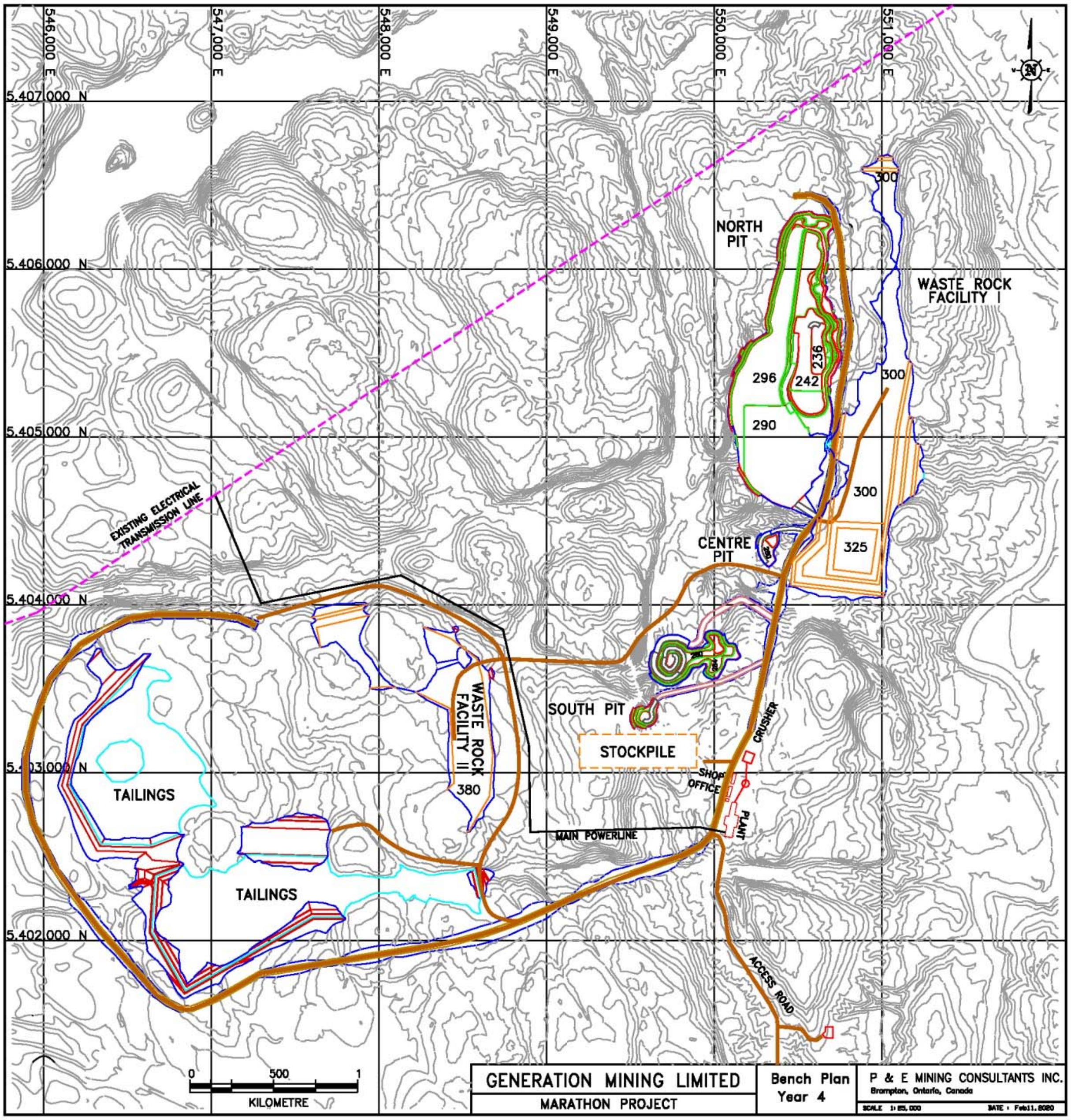


FIGURE 16.14 MINE PLAN – YEAR 8

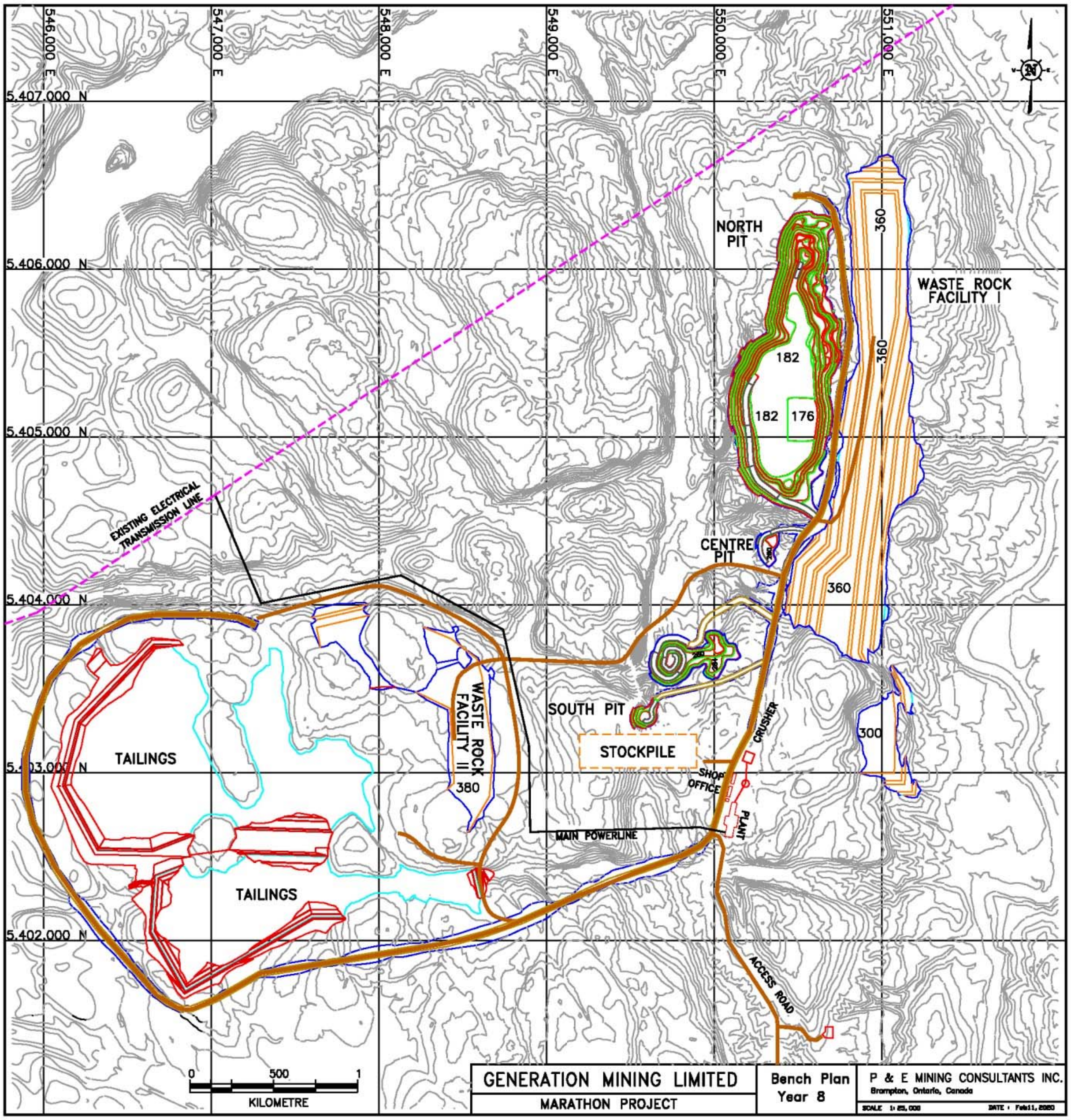
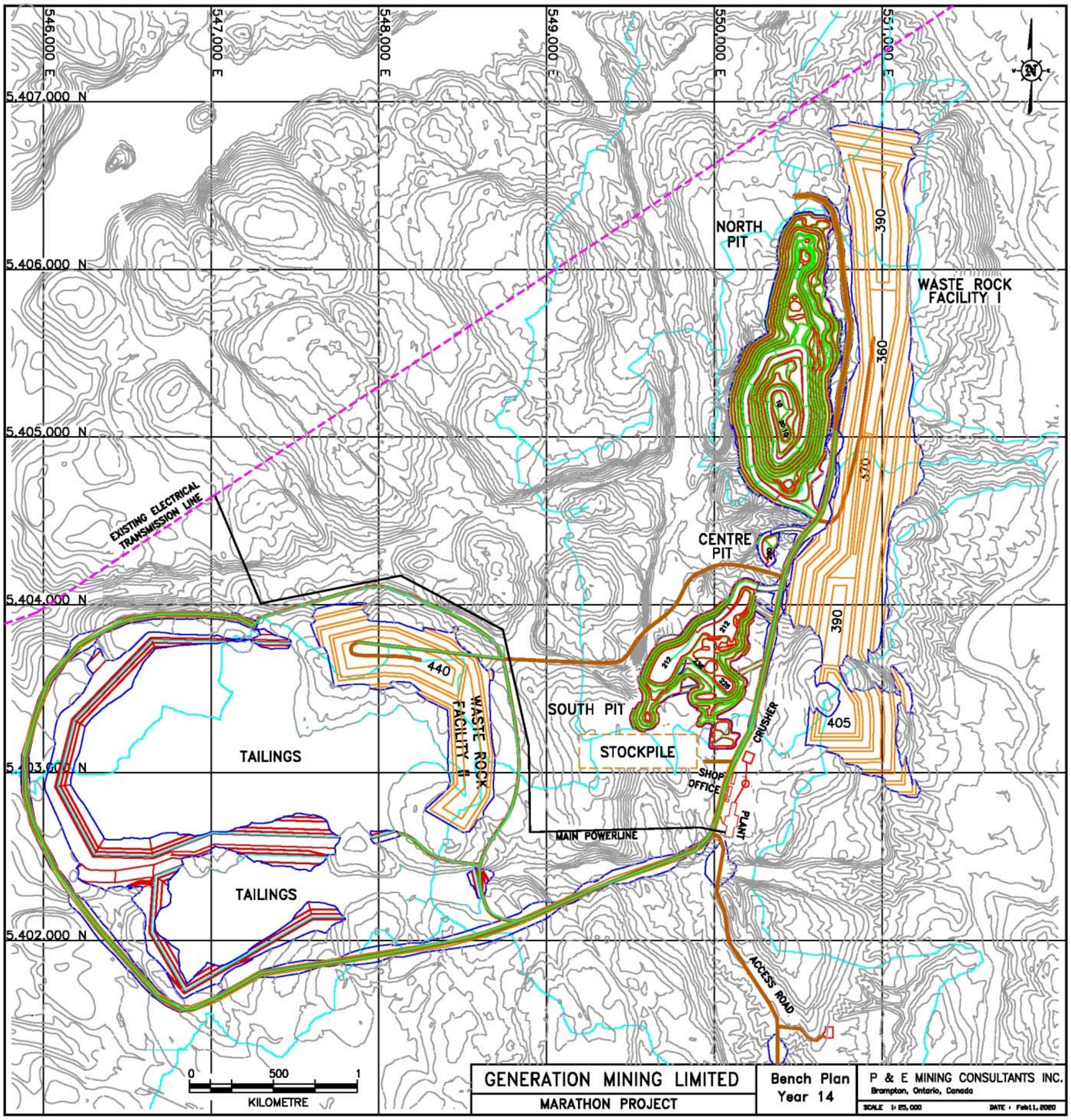


FIGURE 16.15 MINE PLAN – YEAR 14 (END OF PRODUCTION)



17.0 RECOVERY METHODS

17.1 PROCESS PLANT FLOWSHEET DEVELOPMENT

Extensive metallurgical testing over many years at several laboratories on the Marathon Mineral Resource material has indicated process recoveries of PGM's and Cu to be reasonably high and relatively consistent. The most recent tests focused on confirming circuit stability, maximizing concentrate grade and representing a split Cu-PGM flowsheet with fine grinding and multiple cleaning stages in each flotation circuit.

The PEA production plan has been developed where for the first five years the Marathon process plant will treat 5 Mtpa of mineralized material by using the following major components and processes:

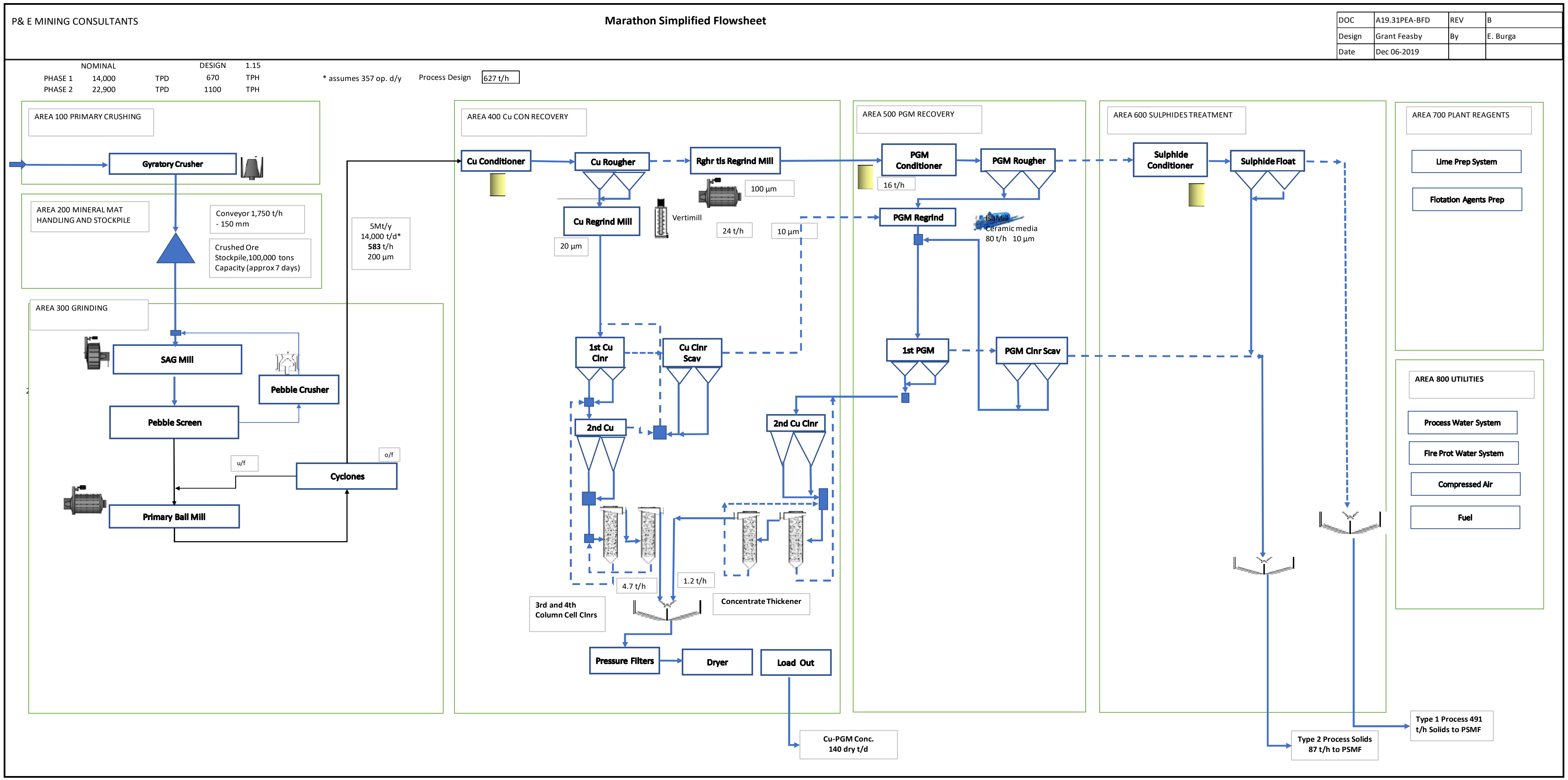
- Gyratory crusher reduces ROM material from <1,000 mm to P_{80} 150 mm.
- Crushed material is transported by a 100 m long conveyor to the plant feed stockpile.
- Stockpiled material is drawn and conveyed to feed a SAG mill.
- The SAG (semi-autogeneous grinding) mill partially grinds the 150 mm feed and discharges a coarse-grained slurry over a vibrating screen with 90 mm openings. Oversize is fed to a pebble cone crusher discharging to SAG feed and the undersize is fed into one large ball mill.
- The ball mill operates in closed circuit with cyclones. The cyclone underflow is returned to ball mill feed, and overflow (P_{80} 200 µm) to the copper rougher flotation circuit.
- The resultant copper rougher concentrate is re-ground (to P_{80} 20-30 µm) and subject to 4 stages of cleaning.
- The copper rougher tails are re-ground (to P_{80} 100 µm) and subject to a PGM rougher flotation.
- The PGM rougher concentrate is re-ground to a very fine size (to P_{80} 10 µm) and also subject to multiple stages of cleaning.
- The final cleaning stages are performed using flotation columns which are less sensitive to froth mobility and preferred for fine particle recovery.
- The PGM rougher tails are conditioned to activate Cu and PGM-barren sulphides and subject to an aggressive sulphide flotation in order to separately dispose potentially acid generating ("PAG") tailings from NAG tailings. Tailings are termed "process solids".

- There are 3 thickeners in the Marathon process plant, one for the combined copper and PGM tailings, and one for each of the process solids streams.

- The combined Cu-PGM concentrate is thickened and filtered in preparation for shipment to a national or international customer.

The Marathon process plant flowsheet, prepared by P&E, is summarized in Figure 17.1.

FIGURE 17.1 MARATHON PROCESS PLANT FLOWSHEET



Several Marathon-specific aspects were identified in the extensive metallurgical testwork and these are incorporated in the design of the process flowsheet. These include:

- Chalcopyrite is a relatively coarse mineral and floats quickly;
- The PGM-containing minerals are very fine and respond slowly to flotation;
- Parallel copper and PGM flotation circuits are needed;
- Careful design is needed to maintain recirculating loads at a low level in the flotation circuits; and
- Both rougher copper and PGM concentrates require fine grinding and multiple stages of cleaner flotation stages.

Fine grinding was investigated in the testwork with respect to optimization of flotation response to grind size. Additional testwork may be justified to assist in the selection of optimum fine grinding methodology and type of grinding media.

Additional equipment will be installed in the process plant during production Year 5 in order that in production Year 6 the capacity of the process plant will be at 8 Mtpa. The primary crusher operating at 8.5 hours per day for 5 Mtpa will expand operation to 13.5 hours per day to achieve the 8 Mtpa throughput. A secondary cone crusher will be installed before the SAG mill, and a second ball mill will be installed after the SAG mill. Additional flotation cells will be installed, and the electrical distribution system will be modified to handle a higher capacity. It is anticipated that efficiencies in equipment utilization will realized during the initial, lower tonnage years, and less than proportional expansion of equipment capacities will be necessary.

A concise description of each process unit is outlined below as well as a preliminary identification of major equipment type and size.

17.2 PRIMARY CRUSHING

17.2.1 Crushing Strategy

Primary crushing is located at the southern end of the mine open pits and will reduce the size of mineralized material to a size permitting conveyor transport. The crushed material will be stockpiled under a weatherproof enclosure and conveyed to the SAG milling section in the process plant.

17.2.2 Description

ROM mineralized material is hauled by 221 t haul trucks from the open pit and dumped directly into a primary crusher, where it is reduced to less than 150 mm. The primary crusher is a gyratory with an operating capacity of 1,750 tph and is capable of handling mine rocks up to 600 mm. Oversized rocks are broken with an operator-controlled, crusher site-dedicated rock breaker before being fed to the primary crusher. This crusher is scheduled to operate 8.5 hours per operating day to process 5 Mtpa of crushed material to the SAG mill operations.

After the gyratory crusher, the crushed mineralized material drops into a surge bin and onto an apron feeder, which feeds that discharges onto the covered stockpile.

A baghouse collects dust generated from crushing operations within the gyratory crusher building. A sump will be included to collect wash-down water during the mild weather season. Conveyor-spilled rock will be collected and placed by a suitable skid-steer machine either onto the conveyor or returned to the primary crusher.

17.3 STOCKPILE RECLAIM

17.3.1 Function of Reclaim System

The stockpile reclaim system is designed to feed mineralized material to the SAG-ball mill grinding circuit at a rate of at least 600 tph. The stockpile is contained under a permanent unheated conical dome to prevent snow and rain intrusion. The reclaim system is able to tolerate potentially frozen material and provision is included to minimize segregation by size which naturally occurs in a stacking process (large fragments report to the bottom edge of the pile).

17.3.2 Description

The stockpile reclaim system is designed to operate 24 hours per day at a minimum capacity of 600 tph. The equipment is sized for 8 Mtpa and the reclaim system will operate at 63% of design capacity for the initial five years.

Material from the stockpile is reclaimed by four apron feeders, set up in two pairs. The feeders are located in a tunnel beneath the stockpile pad. Each pair of reclaim apron feeders is large enough to handle the full process plant capacity on its own.

Each apron feeder normally reclaims crushed rock directly from the stockpile via gravity flow, however, it can also receive material directly from a front-end loader. The stockpile will normally be activated and blended by a large stockpile-dedicated loader – e.g. CAT 988.

A multi-idler belt weigh scale on the SAG feed conveyor measures the mass flow rate of mineralized material fed into the process plant. A lower end-of-belt location is selected for the scale to optimize accuracy and also provide a location for sampling material to determine moisture content. The stockpile reclaim tonnage rate is remotely controlled by varying the operating speed of the reclaim apron feeders.

A small baghouse in the stockpile reclaim tunnel collects dust at the transfer points. Collected dust is discharged through a rotary valve onto the SAG conveyor feed belt.

During the mild weather, two sumps with sump pumps collect and transfer wash-up residue slurry from the stockpile area to the SAG feed box.

17.4 SECONDARY CRUSHING

A secondary crusher unit, placed in the crushing circuit between the coarse material stockpile and the SAG mill, will be considered at the time of an expansion of the annual tonnage of plant feed from 5 Mtpa to 8 Mtpa, currently planned in year 6. A screen deck, to separate out 75 mm material, will be installed in advance of a cone crusher which could be a Metso HP800 or equivalent.

17.5 GRINDING

17.5.1 Grinding Options

The previous owner, Stillwater, and engineering consultants (Micon, 2008 and Nordmin, 2014) had selected a combination of secondary crushing, high pressure grinding rolls ("HPGR's") and a ball mill to prepare the process feed for primary copper flotation. A relatively coarse grind size was selected, P_{80} of 212 µm (65 Mesh), which is consistent with targeted metallurgical test conditions. P&E suggests that a conventional SAG-ball mill combination be selected for primary grinding instead of crushing-HPGR, for the following reasons:

- HPGR's have had limited use in Canada and other northern countries. Stockpiling and handling of intermediate crushed frozen material is believed to be problematic;
- The introduction of innovative mineral processing (HPGR) technology could add risk to successful start-up. The fine-tuning of ROM and crushed rock handling in winter conditions could compromise the anticipated need to focus on the complex flotation processes;
- Metallurgical testwork did not appear to have included HPGR-prepared mineralized material. HPGR-prepared material could be expected to respond differently to flotation;
- Initial SAG-ball mill sizing and scale up (5 to 8 Mtpa) is much better understood than HPGR installations;
- The economic benefits of HPGR vs. SAG-ball mill may not be assured; and
- HPGR capex and opex have been indicated to be higher than SAG-ball mill installations.

17.6 SAG-BALL MILL GRINDING CIRCUIT

17.6.1 Objective

The grinding circuit is designed to produce a 35% to 40% w/w solids slurry with a P_{80} of about 212 µm (65 Mesh) from feed brought into the plant from the crushed material stockpile. The resultant slurry feeds the copper rougher flotation circuit.

17.6.2 Description

Crushed mineralized material is fed directly from the process plant stockpile to the SAG mill and combined with water, which is reclaimed from plant thickeners and from the process solids management facility ("PSMF"). The SAG mill is nominally sized to be 9.7 m diameter by 4.3 m long. The SAG is oversized for production at 5 Mtpa, and is suitable for 8 Mtpa. The SAG discharges to a 76 mm slotted rubber-surfaced screen and the oversize "pebbles" are returned to the SAG feed following crushing in a short head crusher to 15 mm. The feed to the crusher travels by conveyor past two high intensity magnetic separators to protect the crusher from tramp metal. The undersize of the SAG discharge screen is directed to either the ball mill feed or to the ball mill cyclone feed.

A nominally sized 6.7 m diameter by 9.1 m long ball mill completes the primary grinding in closed circuit with a cyclone bank. Cyclone overflow slurry (target P_{80} = 212 µm) flows forward to the copper rougher flotation circuit. Oversize material in the cyclone underflow slurry flows by gravity back to the ball mill feed. A circulating load of up to 250% is anticipated. Grinding media is 17 and 50 mm steel balls.

The cyclone overflow (also referred to as copper rougher feed) is sampled with a secure two-stage Vezin sampler for screen analyses in the metallurgical laboratory and for multi-element analyses by ICP and fire assay in the chemical laboratory. Previous Marathon internal documents (Nordmin 2014) suggest that online x-ray fluorescence and an online particle size analyzer could be used for the measurement of flotation feed characteristics. P&E suggests that the metal content of the flotation feed is too low for precise on-line XRF analyses, and a representative composite sample is more reliable than on-stream particle size analyses. A laboratory bench-compatible XRF analyzer may provide quick and reliable analyses on low copper laboratory-dried samples. Such a unit could be considered after start up.

The sampled cyclone overflow (flotation feed) flows to a conditioning tank where milk-of-lime slurry is added for pH control along with potassium amyl xanthate ("PAX") and frother for copper flotation.

A second ball mill, sized to meet needs, will be installed into the grinding circuit when 8 Mtpa capacity is required.

17.7 COPPER ROUGHER FLOTATION

17.7.1 Strategy

The copper rougher circuit produces a copper-rich concentrate which is fed to a copper re-grind circuit. The copper rougher tailings are transferred to a second ball mill to liberate PGM minerals.

17.7.2 Description

The copper rougher circuit is composed of two rows of four (4) flotation cells nominally sized at 50 m^3. Additional amounts of flotation reagents (PAX and MIBC) are added to cells 1 and 2. Concentrate slurry is pumped to the copper re-grind classifier feed. Copper rougher tailings slurry is pumped to the second ball mill cyclone feed.

The slurry level in all flotation cells in the process plant is controlled using valves that are specifically selected for use in the conventional cells as well as the column cleaner cells in the copper cleaner circuit.

Flotation air flow to each cell is also controlled, primarily by manual adjustments based on operator observations. Reagent addition flow rates are monitored and controlled from the central control room.

The copper rougher tailings are automatically sampled and assayed in the laboratory for copper and PGM's. This measurement is used in conjunction with the Copper Rougher Flotation Feed sample to adjust flotation process parameters (reagent and flotation air flow rate setpoints) to optimize concentrate grade and recovery.

17.8 COPPER ROUGHER CONCENTRATE RE-GRIND

17.8.1 Purpose

Copper rougher concentrate is re-ground to a particle size of P_{80} = 20 µm to allow improvements in copper grade and liberate fine PGM minerals.

17.8.2 Copper Re-grind Description

Copper rougher concentrate is re-ground using a VertiMill to a target particle size of P_{80} = 20 µm. The VertiMill operates in closed cycle with a cyclone cluster. An example grinding unit for this task is a Metso VTM 800-EB.

The classifier overflow flows to the first cleaner flotation cells. This stream is sampled and assayed for metal content and particle size analyses. A laser diffraction particle size analyzer is ideal for the fine particle size analyses.

17.9 COPPER CLEANER FLOTATION

17.9.1 Objective

The copper cleaner flotation circuit is designed to produce the final copper concentrate product, which is sent to the concentrate thickener. The Cleaner Scavenger tailings are sent to the PGM Re-grind Ball Mill circuit, to prepare for recovery of residual PGM's.

17.9.2 Description

Ground copper rougher concentrate is treated in a 4-stage cleaner circuit combined with a single cleaner scavenger circuit consisting of equipment of the following example sizes:

- 3 x 10 m^3 Outotec e10 first cleaner cells;
- 2 x 10 m^3 e10 copper cleaner scavenger cells;
- 4 x 4 m^3 Metso DR24 second cleaner cells; and
- 2 x 10 m^3 column cells in series to perform as 3rd and 4th cleaners.

Tailings from the first cleaner are fed to the copper cleaner-scavenger circuit. The cleaner-scavenger concentrate is returned to the first cleaner feed, while the tailings are sent to the PGM re-grind circuit.

Potassium Amyl Xanthate ("PAX") (or an up-to-date substitute) is used to float sulphides, a starch to depress talc and associated silicates and a frother ("MIBC") are applied at strategic locations in the copper cleaner circuit.

17.10 PGM CIRCUIT

17.10.1 Strategy

The PGM circuit is designed to recover residual copper from copper rougher tails as well as the bulk of the fine PGM mineralization. This is achieved by one stage of medium grinding PGM rougher flotation followed by fine concentrate grinding and four stages of cleaning.

17.10.2 Description

Copper rougher tailings are re-ground in a ball mill of similar dimensions of the first ball mill. This mill is in closed circuit with cyclones that produce a PGM rougher feed of P_{80} = 100 µm or slightly finer. This cyclone overflow is regularly sampled and fed to two banks of four 50 m^3 flotation cells where a PGM rougher concentrate is produced.

The rougher concentrate is re-ground to a very fine size to P_{80} of 10 µm. Two VertiMills (one operating, one standby) could be used to achieve this grind. A horizontal stirred mill such as an ISAMill using ceramic grinding media may be alternatively selected to achieve this grind.

The ground rougher concentrate is subjected to four stages of cleaning using two stages of conventional cells and two stages of column cells (a circuit alignment similar to the copper circuit). Milk of lime, PAX (or equivalent) and frothers are applied in the PGM circuit.

The final PGM cleaner concentrate is combined with the copper cleaner concentrate in the concentrate thickener.

The detailed design of the 5 Mtpa PGM circuit (e.g. for a Feasibility Study) will include consideration of and identification of opportunities for economically expanding the circuit to accommodate the 8 Mtpa process plant feed. The scheduled changes in PGM process plant feed grade, the potential to scale up flotation, grinding, pumping and thickening capacities, supplemented by the metallurgical performance experience during the first years, will be important factors.

17.11 RESIDUAL SULPHIDE FLOTATION

17.11.1 Rationale and Strategy

Residual sulphides, mainly pyrrhotite, represent a potential acid rock drainage ("ARD") generation issue in the process solids management facility ("PSMF"). To ensure that ARD does not occur during operations and on closure, residual sulphides would be isolated in a separate concentrate which would be disposed in zones of the PSMF that would be perpetually water-saturated. These would be termed Type 2 process solids. Tailings free of residual sulphides would be termed Type 1 process solids.

17.11.2 Process Description

PGM rougher tailings feed a conditioner tank with a retention time of over 10 minutes where the depressed sulphides are reactivated by pH adjustment and/or the addition of carbon dioxide. The flotation bank is composed of up to five 50 m^3 flotation cells and a moderately enriched sulphide concentrate is removed. This concentrate is combined with the PGM scavenger tails and becomes Type 2 process solids. The sulphide flotation tailings are designated as Type 1 process solids.

Both type 1 and type 2 process solids are thickened, from 35% solids and 15% solids, respectively, to approximately 50% solids, or higher, before separately pumping to the PSMF. While previous Marathon process plant designs did not include in-plant thickening of process solids, the following are reasons for considering such action:

- Dilute tailings disposal results in enhanced particle size separation in the PSMF;
- Dilute tailings disposal results in poor settling of fines, lowering of final PS densities, and an unconsolidated mass which restricts closure activities;
- Suspended solids restrict pond water recycling to the process plant;

- Reduction in pumping costs and pipeline size; and
- Loss of heat content in discharged water. A warmer slurry usually enhances flotation response.

17.12 CONCENTRATE THICKENING, FILTRATION AND HANDLING

17.12.1 Purpose

The thickening and filtration circuit is designed to dewater and filter a combined copper/PGM concentrate feed, in preparation for shipping to smelters.

17.12.2 Description

Copper and PGM concentrates from both the copper and PGM cleaner circuits are fed to the concentrate thickener, where the feed slurry is mixed with flocculant and thickened to a target concentration of 60% solids.

Thickened concentrate is pumped to the concentrate pressure filters, where the moisture content is reduced to 10% or less (with a target of 8%). In the event that moisture content is higher than 10%, measures can be considered to partially dry the concentrates using a Holoflite type dryer which produces little fugitive dust. The dryer selection will be subject to engineering and economic assessments.

Rigorous sampling and weighing of the concentrate are required to be able to accurately record production and metallurgical performance.

Concentrate can be shipped in bulk lots during mild weather conditions. Assuming that the receiving smelter rejects frozen shipment of concentrates, heated transport containers could be considered for winter shipment by road or rail, or the concentrate could be bagged in 1 tonne lots. The bags can be stored in a heated warehouse and transported in insulated/heated trucks or rail cars. Bagged concentrate offers an advantage for accurate sampling (pipe method) and inventory control.

17.13 MAJOR EQUIPMENT REQUIREMENTS FOR THE MARATHON PROCESS PLANT

A summary of major equipment needs for the Marathon process plant is shown in Table 17.1. All items are subject to detailed review and adjustment following advanced engineering studies. The reference code follows Table 17.1.

Table 17.1 Process Design Criteria				
Description	**Unit**	**Design**		**Reference / Info.**
		Years 1-5	**Years 6+**	
Operating days per year		350	350	
Nominal Daily Input	dry tpd	14,300	22,900	
Nominal Annual Input, Years 1 - 5	dry tpa	5,000,000		
Nominal Annual Input, Years 6 - 14.5	dry tpa		8,000,000	
Average Feed to Plant				
- Fe	%	TBD	TBD	
- Mg	%	TBD	TBD	
- S	%	TBD	TBD	
- Ag	g/t	1.08	1.67	
- Au	g/t	0.09	0.07	
- Pt	g/t	0.27	0.19	
- Pd	g/t	0.98	0.58	
- Rh	g/t	TBD	TBD	
- Co	%	TBD	TBD	
- Cu	%	0.27	0.21	
- Ni	%	TBD	TBD	
Mineralized material grinding				
- Abrasion Index (“AI”)	kWh/t	0.396	0.4	Micon
- Bond Ball Mill Work Index	kWh/t	16	16	Micon
Utilization (of operating days)				
- Crushing circuit	%	35	56	
- Concentrator	%	95	95	
- Process Solids & Filtration	%	95	95	
Primary Crushing				
- Type	-	Metso 54/75” gyratory	Metso 54/75” gyratory	NAP
- Installed Power	kW	450	450	
- Feed Size F_{80}	mm	500	500	
- Closed Size Setting	mm	150	150	
Secondary Crusher, plus Crusher Screen			Metso HP800	NAP
SAG Mill				
- Dimensions (Dia. x EGL)	m	9.7 x 4.3	9.7 x 4.3	NAM
- Installed Power	kW	7,460	7,460	
- Feed Size F_{80}	mm	150	150	
- Product Size P_{80}	mm	2.5	2.5	
Pebble Crushing				

TABLE 17.1 **PROCESS DESIGN CRITERIA**				
Description	**Unit**	**Design**		**Reference / Info.**
		Years 1-5	**Years 6+**	
- Dimensions	m	2.3x2.5x2.6	2.3x2.5x2.6	NAP
- Installed Power	kW	315	315	
- Feed Size F_{80}	mm	76	76	
- Crusher Product P_{80}	mm	15	15	
Ball Mills				
- Dimensions (Dia. X EGL)	m	6.7 x 9.1		NAM
- Number of Mills	No.	1	2	(Adjusted)
- Installed Power	kW	7,460		Second ball
- Circulating Load	%	250		mill in yr 6
- Primary Grinding P_{80}	µm	200		is optional
Copper Flotation Circuit				
Rougher				
- Rougher Residence Time	min	20	20	Nordmin,
- Rougher Cell Volume	m^3/cell	50	50	P&E
- No. of Rougher Cells, 2 lines of 4	No.	8 Outotec e50's	10 Outotec e50's	Calc's
	tph	30	50	
Cu Rougher Conc Re-grind				
Feed size F_{80}	µm	200	200	P&E
Ground Product P_{80}	µm	20	20	Calc's
Suggested mill (1 only)		Metso VTM-800-EB	Metso VTM-800-EB	
1st Cleaner, Residence Time	min	20	20	
- 1st Cleaner Cell Volume	m^3	30	50	P&E Est.
- 1st Cleaner Cells	No.	3 Outotec e10's	5 Outotec e10's	
1st Cleaner Scavenger				
- Residence Time	min	10	10	
- 1st Cleaner Scavenger vol	m^3	18	18	
- No. Cleaner-Scav Cells	No.	2 e10's	2 e10's	
Second Cleaner				
- Residence Time	min	20	20	
- 2nd Cleaner Cell Volume	m^3	4	4-6	
- Second Cleaner Cells	No.	4 Metso DR24	4-6 DR24	
Third/Fourth Cleaners – Column Cells				
Residence Time	min	10	7-8	
- Each 3rd/4th Cleaner Cell	m^3	10	10	
- Cell Dimensions	m	1.2 Φ, 10	1.2 Φ, 10	

TABLE 17.1 **PROCESS DESIGN CRITERIA**				
Description	**Unit**	**Design**		**Reference / Info.**
		Years 1-5	**Years 6+**	
- No. of cells	No.	high 2	high 2	
PGM Feed Re-grind Ball Mill - Dimensions (Dia. X EGL) - Number of mills - Installed Power - Circulating Load - Feed F_{80} - Product P_{80}	 m No. KW % µm µm	 6.7 x 9.1 1 7,460 250 200 100	 6.7 x 9.1 1 TBD	Needs review
PGM Flotation Circuit Rougher - Rougher Residence Time - Rougher Cell Volume - No. Rougher Cells 2 @ 4 PGM Rougher Conc Re-grind Mill Feed size F_{80} Ground Product P_{80} Suggested mills 1st Cleaner - Residence Time - 1st Cleaner Cell Volume - No. 1st Cleaner Cells 1st Cleaner Scavenger - Residence Time - 1st Cleaner Scavenger vol - No. Cleaner-Scav Cells Second Cleaner - Residence Time - Vol. Second Cleaner Cell - Second Cleaner Cells Third/Fourth Cleaners – Column Cells Residence Time	 min m^3/cell No. tph µm µm 1 or 2 mills min m^3 No. min m^3/cell No. min m^3 No.	 20 50 8 Outotec e50's 40 100 10 Metso VTM-800-EB 20 30 3 Outotec e10's 20 30 3 e10's 20 4 4 Metso DR24	 20 50 10 Outotec e50's 60- 100 10 20 50 5 e10's 4 e10's 4-6 4-6 DR24	 Needs detailed review, ISAMill is an option

Table 17.1 **Process Design Criteria**				
Description	**Unit**	**Design**		**Reference / Info.**
		Years 1-5	**Years 6+**	
- Each 3rd/4th Cleaner Cell - Cell Dimensions No. of cells	min m^3	30 10 0.45 Φ by 10 high 2	30 10 0.45 Φ by 10 high 2	
Concentrate Thickening and Filtration - Solids to Thickener - Thickening rate (measured) - Thickener diameter - Solids in Underflow - Filtration rate - Area @ 50% utilization - Cake moisture - Filter type Filter units	 tph tph/m^2 m % tpm^2h m^2 % No.	 8.9 0.25 14 60 0.200 88 10 Plate and Frame 2	 14 0.25 14 60 110 10 Plate and Frame 3	 Nordmin Outotec Test
Sulphide Flotation from Process Solids (Tailings)	No. e50 cells	5	5	Estimate
PS Thickener (Type 1 PS) Feed rate – solids Solids in feed - Solids in Underflow - Thickening rate - Thickener diameter	 tph % % tph/m^2 m	 500 35 50 5 10	 600 35 50 5 10	 Estimates
PS Thickener (Type 2 PS) Feed rate -solids Solids in feed - Solids in Underflow - Est. Thickening rate - Thickener diameter	 tph % % tph/m^2 m	 100 15 50 2.0 10	 160 15 50 2.0 10	 Estimates

Source: *Micon (2008), NAP = North American Palladium (2008), NAM = New Age Metals (2019), Nordmin (2014).*

Supplementary, important and significantly costly equipment as well as key installations essential for process plant operations are listed in Table 17.2.

TABLE 17.2
SUPPLEMENTARY MAJOR PROCESS PLANT EQUIPMENT LIST

Section	Description	Example Type/Size	Description
Primary Crushing	Dust collector	Baghouse	
	Pan Feeder	Vibrating metal	Metso 661 Pan Feeder
	Rock Breaker		Mounted over crusher
	Conveyors – conveyor cover, support structures	High capacity - >1,500 tph, 100 m length from crusher to stockpile	Delivers crushed material to plant stockpile
	Multi draw-points and feeders	At least 4	Beneath concrete pad
	Stack shed	Conical or dome	Single, central drop point, side opening for loader access
	Stack activator, blender	Large loader, e.g. CAT 988	Long reach hoe optional
Plant Feed	Conveyors and Weightometer	Converging pan feeders	Belt weightometer at low end of belt
Dedicated Internal Plant Support Infrastructure	Plant Overhead Crane	50+ t capacity	On track – remote control
	Slurry Pumps	Large SRL type pumps in grinding and process solids handling	All pumps duplicated
	Froth and Sump Pumps	Small, vertical shaft	All in duplicate
	Low pressure flotation blower(s)	Medium pressure 4-5 psig	2 @ 500 m^3/min for roughers 2 @ 50 m^3/min for cleaners
	Conditioners (5)	3 large – 2 for roughers and 1 for sulphide flotation, 2 small – for cleaners	5 m Φ by 5 m high 1.5 m Φ by 3 m high
	Electrical	MCC centres	At least 2
	Grinding media	Steel and ceramic	Storage and handling
	Reagents	Storage, preparation and distribution	Lime, PAX, frothers, starch, CO2 (sulphide float)
	Concentrate dryer	Holoflite type	Optional, only if filter cake exceeds 10% moisture limit
	Control Room, software,	System monitors and controls for remote start-	At least 5 sets of 2-stage Vezin slurry samplers

TABLE 17.2 SUPPLEMENTARY MAJOR PROCESS PLANT EQUIPMENT LIST			
Section	**Description**	**Example Type/Size**	**Description**
	automatic sampling and plant instrumentation	stop, alteration of feed rates	
	Offices, Lunch Room, Change Room	Offices for Manager, Metallurgist, Foreman and Maintenance	
	Shops	Maintenance Electrical Instrumentation	
Attached Infrastructure	Fresh Water	Process and Firewater Tankage	
	Concentrate Management	Storage, bagging and sampling in heated warehouse	Bagging only for winter operations
	Laboratories (2)	Metallurgical and analytical (see below)	Separate building with enclosed walkway to plant
	Process Solids (tailings) Handling	Pumping and Pipelines	2 – 3 km lines – one 500 mm, one 150 mm Φ, HDPE trench contained
	Standby Power for thickeners, pumps, lights	Diesel genset	2.0 MW

17.14 ASSAY AND METALLURGICAL LABORATORIES

The assay laboratory facilities will include all necessary equipment to:

- filter, dry and pulverize mine and concentrate samples to prepare them for assay;
- perform all digestions and analytical procedures required for tracking concentrator feed head grades; and
- perform all digestions and analytical procedures required for tracking the day-to-day metallurgical performance of the concentrator facility (using grinding and flotation composite samples collected within the process plant).

The assay laboratory, located in a separate building away from process plant influences, will also prepare and assay geology and mine samples. Sample preparation will include crushers, splitters and pulverizers as well as drying ovens, dust extractors and collectors.

Analytical instruments required to provide all routine assays for the mine, concentrator, and environmental department will include:

- fire assay equipment, for determination of gold, silver and PGM values;
- one atomic absorption spectrophotometer ("AAS");
- two ICP's, including one ICP-mass spectrometer ("MS") for environmental samples;
- bench scale XRF for copper analyses in solids;
- Leco furnace for sulphur analyses; and
- wet chemistry fume hoods and hot plates.

Laboratory assay information will be reported in digital format and a Laboratory Information Management System ("LIMS") will be put in place.

The metallurgical laboratory will include process-stream dedicated pressure filters, a drying oven, regular and fine grinding equipment, bench scale flotation machines of 1 kg and 0.1 kg sample rating. Wet and dry Ro-tap equipment and screens, ultrafine screens and a laser particle size analyzer will also be required.

17.15 WATER SUPPLY

Three separate water supply systems will be provided to support the operations for the process plant; a clean process water supply system, a thickener overflow and PSMF reclaim water supply system, and a potable water supply.

17.15.1 Process Water Supply System

Process water will be supplied to a process/fire suppression water storage tank from the water treatment plant located adjacent to the process plant building. The water treatment plant will be fed with a combination of surface run-off and groundwater inflows pumped from one of the mine open pit main sumps, using barge-mounted pumps.

Clean process water will be used for:

- emergency fire suppression;
- gland water for the slurry pumps;
- concentrate filter wash water;
- reagent make-up; and
- process water make-up.

The process/fire water tank will be equipped with a standpipe, which will ensure that the tank is always holding at least a multi-hour supply of fire suppression water.

Potable water will be supplied to the mine site by a treated groundwater supply (a purpose drilled well), and/or by an off-site source such as the Town of Marathon.

17.15.2 PSMF Reclaim Water Supply System

PSMF reclaim water will be supplied to the Reclaim Water Storage Tank adjacent to the process plant. Barge-mounted pumps at the PSMF will pump the reclaimed water directly to the storage tank. The overflow solution from the concentrate and PS thickeners will also be reused by pumping it to the reclaim storage tank.

Reclaim water will be used for:

- Primary ball mill circuit dilution;
- Secondary grinding mill circuit dilution;
- Cu re-grind mill circuit dilution and froth launders; and
- PGM re-grind mill circuit froth launders and dilution.

It is assumed that the use of reclaim water will not adversely affect the performance of the copper and PGM flotation circuits. If it is determined that there is a negative effect, minor treatment of the reclaim water (pH adjustment) could be implemented. If this is unsuccessful, the use of a small amount of fresh water at critical locations (e.g. fine grinding) would be implemented.

It is anticipated that essentially all of the water requirements for the operation can be supplied by a combination of surface run-off to the pits and sumps, groundwater inflows to the pits and sumps, and reclaim water from the PSMF. Limited provision will be made to withdraw and treat water from wells or the nearby Pic River.

17.16 PRODUCTION RAMP-UP

Once the process plant has been commissioned it is estimated that it will take five quarters to reach full production of 5 Mtpa. Initial process plant production ramp-up in Year 1 is estimated to average 74% of full production. In Year 2 production is estimated at 95% in Q1, then at 100% thereafter until the beginning of Year 6.

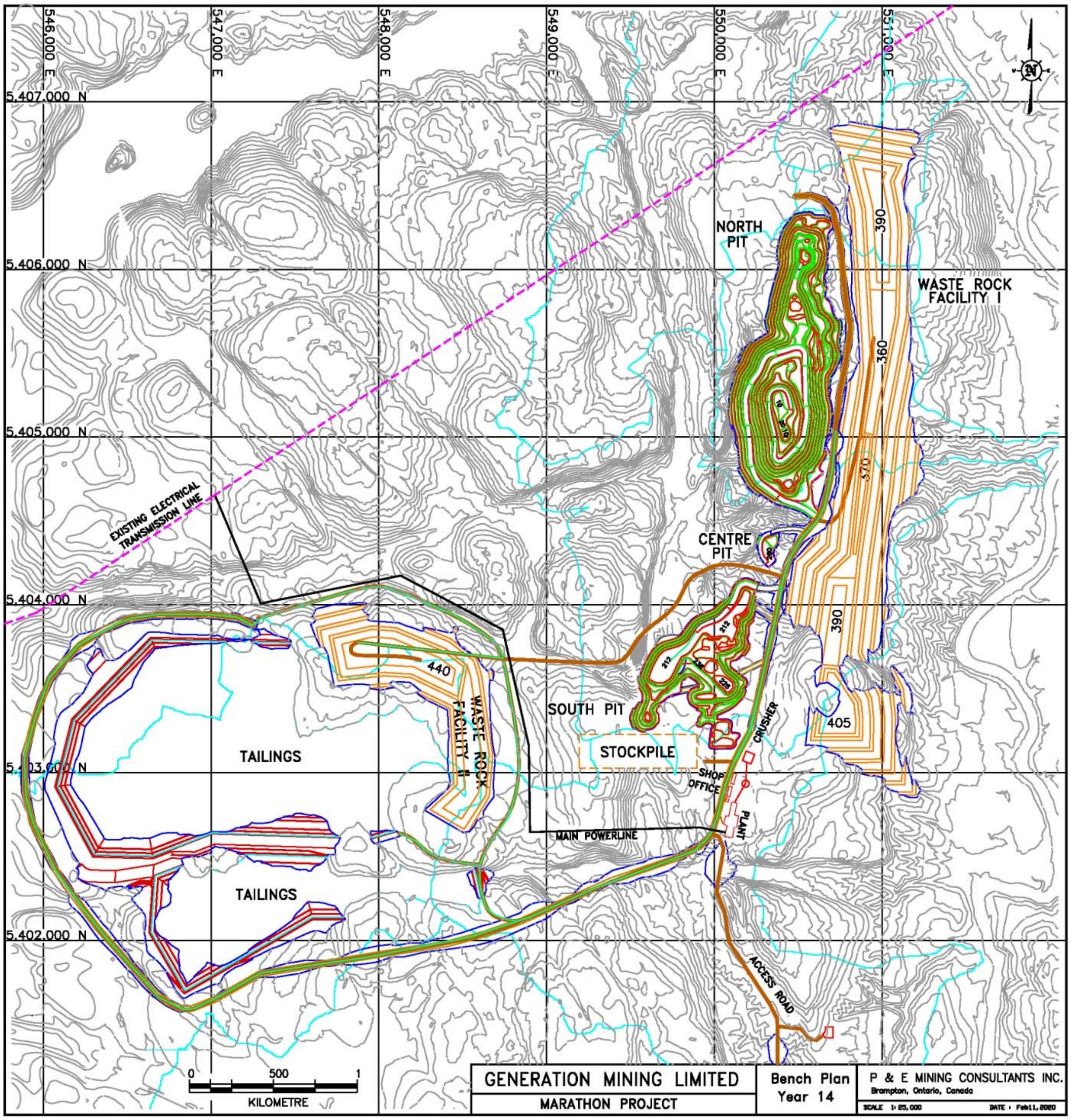
Ramp-up to 8 Mtpa is estimated at 85% in Q1 of Year 6, then 100% thereafter.

18.0 PROJECT INFRASTRUCTURE

18.1 OVERVIEW

A site general arrangement plan of the Project area at the end of mine life is presented in Figure 18.1.

FIGURE 18.1 PROJECT SITE PLAN



Project infrastructure facilities include:

- Three open pits, two waste rock storage facilities, process solids storage facility, low grade mineralization stockpile. Haul roads will be 32 m wide.

- A new 7 km access road from the Property to the existing Peninsula Road that accesses the Trans-Canada Highway.

- Site roads, light vehicle and pit haul roads, gate house, and parking area at the mine office (administration building). The office complex will contain a dry capable of handling all mine site shift personnel, staff and visitors. It will comprise of both a wet and dry side, with baskets and lockers. The office will be of modular construction that will sit on a concrete pad.

- A construction camp for 300 people, comprised of modular trailer units, with a shower block, kitchen, mess hall, and recreational area. After construction, the camp will be phased out, with employees encouraged to find their own housing within the Town of Marathon and surrounding communities. A housing allowance will be offered to employees for up to the first five years of mine operations.

- A 115 kV power line connection to the main grid, extending 4.6 km southeast from a tap point on the M2W powerline to a substation at the process plant. Electrical power supply and site distribution, comprising power lines, electrical substations, transformers, and 2 MW emergency diesel generator.

- Process plant buildings and facilities, including a laboratory and concentrate truck load-out.

- Diesel fuel and propane tank farm storage facility with delivery systems.

- An explosives contractor bulk explosives plant and magazine will be established at required safe distances from the process plant/office/maintenance facility area.

- Mine equipment and maintenance building sized for 221 t haul trucks, including wash bay, six major equipment maintenance bays, a service area, and tire-changing facilities. It will be equipped with a 50 t overhead crane required for large equipment maintenance.

- A heated warehouse and cold storage building will adjoin the workshop/maintenance building.

- Site water systems, comprising the fresh water supply system, the process plant site surface water run-off collection systems and the process water collection and pumping system. All water generated on site, whether process or run-off sourced, will be directed to the PSMF, where it will be treated prior to discharge to the environment.

- Diversion ditches will be installed to mitigate run-off water (freshet) from entering active mining areas.

- Fire protection equipment, including hydrants and fire water lines feeding the buildings.

- Sanitary waste disposal systems.

- Communications, including intercom, telephones, fibre optics for personnel computers, CCTV, and alarms.

18.2 MINERAL PROCESSING PLANT BUILDINGS

The mineral processing facilities will be located on the eastern side of the Property, at the southern end of the main waste rock storage facility. The process plant facilities will consist of the following:

- Primary crusher building;
- Enclosed crushed material stockpile facility;
- Grinding, flotation, thickening and filtration building that will also house areas for:
  - Offices,
  - Lunchroom,
  - Control room;
- Laboratory building, separate from the process plant;
- Reagents storage and mixing building;
- Spare parts warehouse building;
- Main electrical substation; and
- 2 MW emergency generator.

18.3 ROADS

Prior to the main Project construction period, a new dual lane all-weather access road to the Property will be constructed from Peninsula Road, at a point just north of the Trans-Canada Highway. Security will be located on this access to prevent unauthorized Property entry. The access road construction will be followed by 32 m wide haul roads for the mining equipment to the first mining area at the South Pit, and to the main waste rock storage facility located east of the open pit mining area, along with roads to the PSMF, the low grade stockpile and the primary crusher. An arrangement of gravel roads will be built using non-acid generating waste rock from the pre-stripping of the South Pit. As mining progresses, haul roads to the other open pits and waste rock facilities will be constructed on an as-required basis.

18.4 POWER SUPPLY

Project infrastructure will be powered with electricity provided by Hydro One Networks Inc. via a tap point on the existing M2W 115 kV powerline that runs southwest/north east along the northern boundary of the Property.

The total required electrical power estimate for the process plant during the first five years of operation is estimated at 33 MW, and increases to 45 MW once the process plant throughput is at 8 Mtpa. An emergency power 2 MW diesel generator will be located at the process plant.

18.5 FUEL SUPPLY

A diesel fuel storage tank farm will be installed at site for the mobile mining equipment. Diesel and gasoline will be trucked to the onsite diesel and gasoline fuel tank farm. The diesel fuel farm will include a permitted containment facility, and will be resupplied and topped-up several times weekly.

Propane will be trucked to site. Two 30,000 L pressurized tanks will be located on site.

18.6 WATER SUPPLY

Three separate water supply systems will be provided to support the operations for the process plant; a clean process water supply system, a thickener overflow and PSMF reclaim water supply system, and a potable water supply. Details on these are noted at the end of Section 17 of this Technical Report.

18.7 WATER MANAGEMENT

Potable water will be supplied to the mine site by a treated groundwater supply (a purpose drilled well), and/or by an off-site source such as the Town of Marathon.

Over 15,000 m^3 of water will be required to charge the process plant on start-up. It is estimated that a total of approximately 1 Mm^3 of water will be necessary to sustain processing over the initial six months of operations. It is expected that water will be collected from a local water source to fully charge the process plant. A temporary pumping system would be installed in Hare Lake, or alternatively if the Hare Lake system is subject to the effects of drought conditions, the Pic River would be an alternate source.

Once operations have commenced, process water to support the process plant will generally be provided by recycling water from the PSMF. The water needs of the process plant are estimated to be approximately 15,000 m^3/day, based on an average throughput of 14,700 tpd.

Three (3) water treatment facilities will be operated during the Project operations. These are:

- Reclaim water treatment facility. PSMF reclaimed water, surface run-off, and open pit water will be combined for use in the process plant and for fire suppression water.

The treatment process will be simple, focusing on suspended solids removal and potentially pH adjustment to suit the process plant operation.

- Domestic sewage and grey water treatment. A conventional septic-type system will be associated with the site camp. Process plant and administration facilities will be equipped with storage facilities that are pumped on a regular basis by a commercial operator.

- Effluent treatment facility. The Marathon Project facility will be a net-discharge facility. Previous studies (Nordmin, 2014) estimated that the average discharge would be approximately 90 m^3/h. The effluent treatment plant, drawing excess water from the PSMF ponds, will be designed to treat several times that flow, e.g. 225 to 300 m^3/h. Treated discharge to the environment will meet all provincial and federal discharge limits for TSS, metals, pH, biological toxicity, etc.

18.8 MINE ROCK STORAGE FACILITIES

The excavation of the open pit mines will require the stripping of 270.2 Mt of waste rock over the mine life. This will consist of barren material and mineralized material below the NSR $/t cut-off value.

The majority of the waste rock will be non-acid generating. It will be placed in three storage areas; (i) the tailings dam, (ii) the East Waste Rock Storage Facility, and (iii) the South Waste Rock Storage Facility. The locations of these facilities are shown in Figure 18.1.

The largest waste rock storage facility will be located east of the North Pit to minimize truck haul distances. The South facility will be located within the tailings footprint to avoid disturbing additional terrain and to allow sub-aqueous storage of potentially acid generating material (“PAG”). PAG waste rock (i.e. > 0.3%S) will consist of about 2.5 Mt or about 1% of the total waste rock tonnage. The PAG waste rock will be stored in the South Facility in order that it can be submerged in water.

The allocation of waste to the different storage facilities is summarized in Table 18.1.

TABLE 18.1
WASTE ROCK STORAGE LOCATIONS

Facility	Tonnage (Mt)	Area	Max Height
Tailings Dam (PSMF)	39.5	-	-
East Facility	188.5	160 ha	120 m
South Facility	42.1	60 ha	90 m
Total Waste Rock	**270.1**		

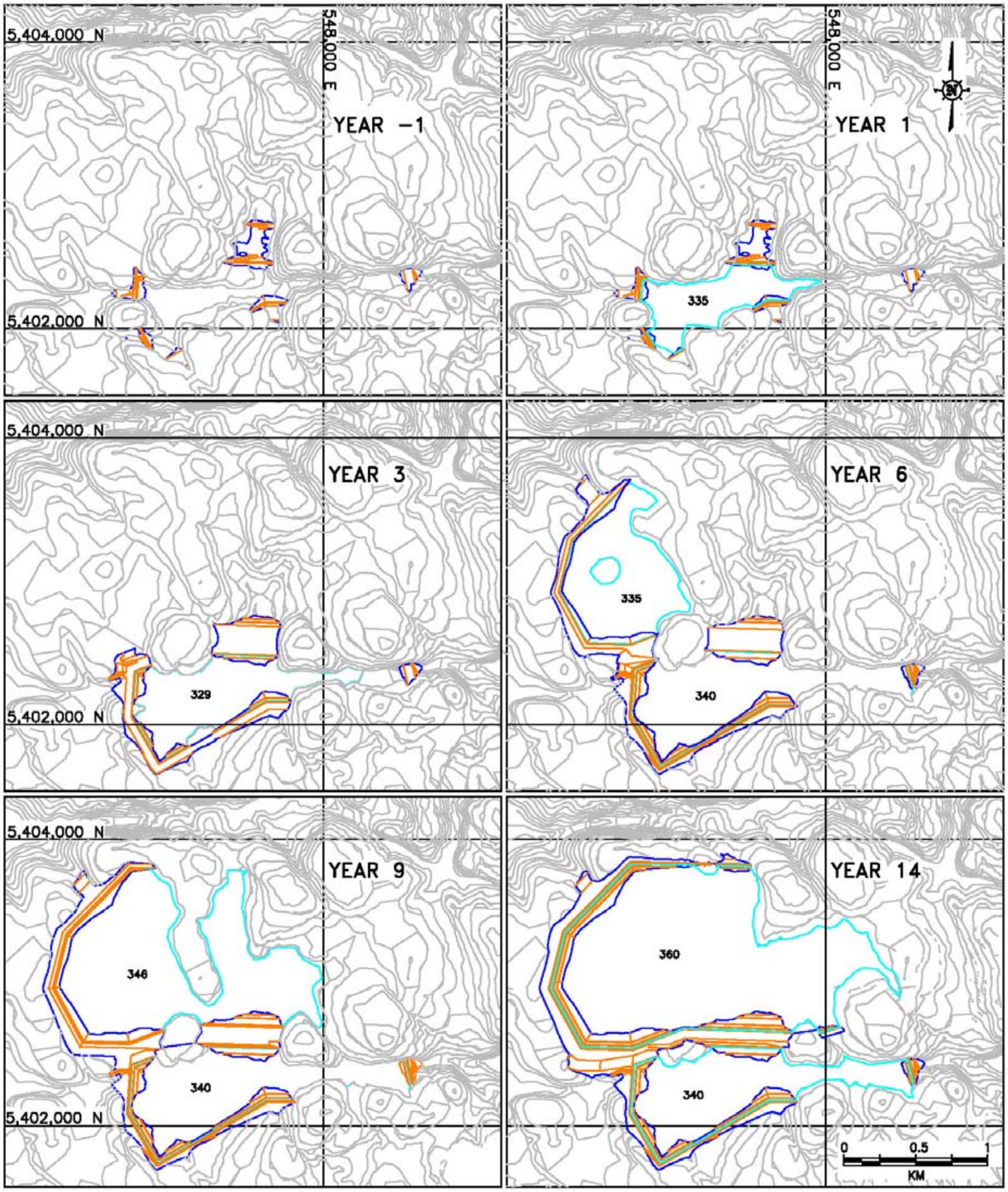
The design of the external waste rock storage facilities consists of 1.5:1 bench faces with 20 m wide berms every 30 m vertically, resulting in overall side slopes of approximately 2:1. The average placed waste rock compacted bulk density is estimated at 2.35 t/m^3.

18.9 PROCESS SOLIDS MANAGEMENT FACILITY

Eight alternatives and sites on the Property for a process solids management facility ("PSMF") were identified by Golder Associates and AMEC (now Wood) for the previous owner, Stillwater Inc. Four of the eight potential were subject to a detailed Multiple Accounts Analysis which was conducted as part of the Project EIS. Environmental, socio-economic, technical and economic factors were considered in the Analysis.

The results of the assessment indicated that the preferred PSMF option for the Project was a multi-cell PSMF, largely limited to the stream 6 watershed identified as Stream 6, PSMF Combined Storage Area and influence is limited to the Stream 6 sub-watershed. Relating to environmental impact, this option ranked highest because of a smaller catchment area, less impact on water bodies and on fish communities. P&E has reviewed the extensive EIS documentation related to Process Solids Management and agrees with the site selection and containment strategy. The progression of embankment construction, from pre-production to the end of LOM is shown in Figure 18.2. Process solids will be stored first in Cell 1, the southern cell, and later in Cell 2.

FIGURE 18.2 PSMF EMBANKMENT PROGRESSION OVER LOM



A total of 90 Mt of Process Solids will be produced over the life of mine ("LOM"). The PSMF's can contain all of the process solids at a design density of 1.5 m^3/t. The capacity can be expanded on the PSMF footprint should the mine plan be extended in the future.

18.9.1 Embankment Construction and Seepage Control

The PSMF embankments will be constructed in downstream mode with mine waste rock with a geomembrane layer underlain by two transition zones on the upstream face. The upstream embankment slopes will be 2H:1V. An HDPE geomembrane will be anchored to low permeability bedrock to minimize seepage from the facility. Construction steps include the removal of overburden and high permeability near-surface bedrock, placement of slush grout on the prepared bedrock surface and/or the injection grouting into deeper, more permeable bedrock zones.

PSMF embankments will be constructed using 39.5 Mt of Type 1 mine waste rock that is NAG (Non-Acid Generating). Ongoing monitoring, sampling and testing of the mine rock will be completed during the initial construction and during subsequent embankment lifts to confirm that the mine rock used in the embankment constructions is NAG.

18.9.2 Process Solids Deposition, Acid Rock Drainage and Metal Leaching

The 2014 Stillwater process solids deposition plan includes the strategy of separating the solids discharged from the process plant into two streams – PAG (potentially acid generating) and NAG. This is a unique strategy for the Canadian mining industry. PAG solids would be approximately 15% of total process solids. The NAG would be designated as Type 1 Process Solids, and the PAG as Type 2. Type 1 would be discharged from the upstream face of embankments at the slurry density produced by the final flotation step in the plant of approximately 35%. Type 2 tailings, containing a higher percentage of sulphides would be discharged into each PSMF pond cell at 15% solids.

P&E has reviewed this tailings management strategy and offers the following recommendations for improvement:

- Discharging of process solids as a dilute slurry results in significant particle separation by size, generating sandy beaches and slime ponds. Both sand and slimes are well known to characteristically consolidate poorly;

- Thickening of both slurry streams in dedicated thickeners in the process plant is recommended, with thickening to at least 50% solids. This reduces pumping costs for tailings and pond water recycle, and the warm water from thickener overflows is likely to be beneficial to the flotation processes;

- Thickened tailings underflow will result in higher final in-facility density and assist in implementation of a closure strategy;

- To manage PAG and NAG process solids, two process solids streams were suggested in previous environmental studies during the EA. One alternative is the use of injection discharge for one stream from a floating barge by a lance into a zone below the settled solids-pond water interface; and

- The storage of Type 2 process solids underwater in mined out satellite open pits, in later years of Project operation, is a reasonable possibility. This should be preceded by the confirmation that no potential Mineral Resources are sterilized by backfilling the specific pits.

The Type 2 process solids would be stored below the water table in the PSMF or below water in the flooded pits to prevent acid generation. The submerged Type 2 solids will also be covered with Type 1 materials on closure. Analyses by specialists engaged by Stillwater have shown that run-off from the Type 1 process solids can be expected to have a pH close to neutral and that the potential for metal leaching from the PSMF is low.

The Project should proceed with the strategy of separating process solids into two types at the beginning of operations This includes the installation of two separate thickeners in the process plant, two separate discharge lines and the construction of the means to inject Type 2 process solids into the zone of submerged solids.

Nevertheless, there is an opportunity that segregation of process solids into two separate streams may not be required. The Marathon Project concentration process is principally the concentration of metal sulphides including chalcopyrite. The major sulphide in the Marathon Mineral Resource is pyrrhotite which would be largely relegated to waste, as process solids.

Information provided in the Marathon main EA document indicates that the bulk, unseparated process solids contains, on average, 0.5% sulphide sulphur, slightly higher than the normal 0.3% sulphur limit that would trigger ARD investigations. In addition, the same document indicated that the NP/AP (neutralizing potential/acid generating potential) ratio of bulk process solids was 2.3, which is higher than the usually accepted limit of 2.0 for PAG.

It can be assumed that the sulphide sulphur content of the bulk process solids will be variable based on the content of mineralized process plant feed and influenced to a great deal by the performance of the PGM cleaner-scavenger circuit (which is designed to reject non-valuable sulphides). Nevertheless, the potential for ARD in the bulk process solids may be considered marginal. In addition, the natural segregation of very fine, soft sulphide particles to the wet zones during normal deposition in the PSMF may positively influence (reduce) the potential for acid generation in unsaturated zones of the PSMF.

The following actions are recommended:

- Tests (grinding, flotation) should be conducted on a large bulk mineralized sample that would generate representative bulk process solids (PGM rougher and cleaner-scavenger tails);

- Investigate the segregation of sulphides in simulated PSMF deposition; and

- Determine the amount of alkalinity (lime or limestone) that could be added to bulk process solids to ensure NAG.

Should the tests confirm minimal potential for the generation of ARD, the installation of sulphide flotation and dual process solids handling (Types 1 and 2) could be reconsidered. If PAG is uncertain, the dual system could be installed. Should field results confirm NAG, the equipment can be economically salvaged for use in process plant expansion in production Year 6.

18.9.3 PSMF Water Management

PSMF pond water will be recycled to the process plant. The amount of water available will depend on weather conditions, the clarity of the pond water, and confirmation that pond water chemistry does not negatively influence flotation performance. This latter condition also applies to water reclaimed from both process solids thickeners.

The PSMF design includes measures to manage storm water and run-off within the affected sub-watershed areas. Provisions are included for controlled and treated (if required) release of excess surface run-off from the mine site. An Environmental Design Storm ("EDS"), Inflow Design Flood ("IDF") and freeboard requirements were established to define the necessary storm water management provisions. The EDS is the storm event that would be contained within the facility prior to reclaim for the process plant or discharge to the environment. The "Timmins Storm" – 193 mm in 24 hours was selected as the EDS for the PSMF. The large EDS event ensures that there will be sufficient capacity within the facility to contain virtually all anticipated storm events during the operating period.

The PSMF will include an associated water management facility to treat water, if required, prior to discharge to the environment. Water quality will be monitored upstream, downstream and within the PSMF during initial construction, throughout operations and after closure. The excess water removal system will be regularly sampled and analyzed to ensure that water quality objectives are met for the receiving water bodies. Tests have indicated that run-off from the Type 1 process solids will be pH neutral. Discharged water will meet discharge quality limits of MMER and those established by the anticipated Environmental Compliance Approval ("ECA") requirements.

18.9.4 Pipeline Routes

In general, the pipelines for process solids delivery, reclaim water and access water removal will be located along the road alignments behind the protection of a safety berm to and along the crest of the PSMF. The road alignments will be graded such that if a leak in one of the pipelines were to occur, the process solids or reclaim water will drain back into the PSMF for spill containment. Where the location and topography of the routing prevents drainage back to the PSMF, catch basins, culverts or other measures will be incorporated for spill containment.

19.0 MARKET STUDIES AND CONTRACTS

19.1 METAL PRICES

Metal prices and the CDN:US dollar exchange rate are based on December 31, 2019 approximate two-year trailing average metal prices that are presented in Table 19.1. Both the metal prices and exchange rate are potentially subject to spot market conditions. There are no metals streaming or hedging agreements in place.

TABLE 19.1
METAL PRICES AND EXCHANGE RATE

Item	Price
Palladium (US$/oz)	1,275
Copper (US$/lb)	3.0
Platinum (US$/oz)	900
Gold (US$/oz)	1,300
Silver (US$/oz)	16.0
Exchange Rate ($CDN:US$)	0.76

19.2 CONCENTRATE MARKET OUTLOOK AND CONCENTRATE SALES TERMS

An independent marketing and logistics study was commissioned for the concentrates to be produced from the Marathon PGM project. The conclusions are summarized below.

Marathon PGM concentrate production will average approximately 72,000 dry metric tonnes ("dmt") per year over the projected mine-life, or approximately 78,000 wet metric tonnes ("wmt") per year. The concentrates to be produced from the Project will be very low in deleterious elements commonly seen in copper concentrates (e.g. lead, zinc, arsenic, antimony, bismuth) and are not expected to draw any penalties. In fact, the concentrates are exceptionally 'clean' and would offer a good blend quality to most smelters. The expected analysis of the concentrate is set out in Table 19.2.

TABLE 19.2
MARATHON PGM CONCENTRATE EXPECTED ANALYSIS

Element	Unit	Grade	Element	Unit	Grade
Cu	%	17 - 19	Cl	ppm	84
Au	g/t	4 - 8	Co	%	0.06
Ag	g/t	40 - 200	Cr	ppm	44
Pt	g/t	10 - 17	F	%	0.025
Pd	g/t	40 - 60	K	ppm	650
Rh	g/t	0.9 - 1.0	Li	ppm	< 5
Ru	ppm	0.1	MgO	%	3.6
Ir	ppm	0.06	Mn	ppm	350

TABLE 19.2 **MARATHON PGM CONCENTRATE EXPECTED ANALYSIS**					
Element	**Unit**	**Grade**	**Element**	**Unit**	**Grade**
Fe	%	29	Mo	ppm	33
S	%	24	Na	%	0.29
Zn	%	0.12	Ni	%	0.52
Pb	%	0.06	P	ppm	< 200
As	%	0.004	Se	%	0.008
Sb	%	< 0.001	SiO_2	%	6
Bi	%	< 0.002	Sn	ppm	< 20
Hg	ppm	< 0.3	Sr	ppm	110
Al_2O_3	%	1.7	Ti	ppm	650
Ba	ppm	60	Tl	ppm	< 30
Be	ppm	< 0.2	V	ppm	40
CaO	%	1.1	Y	ppm	1.9
Cd	ppm	10	H_2O	%	7 - 10

The projected levels of PGMs in the Marathon concentrates are considerably higher than those found in most copper concentrates, and particularly those traded in the global custom concentrate market. While more common in nickel concentrates, PGMs in most copper concentrates are typically at trace levels. Most copper smelters/refineries recover PGMs which report to refinery anode slimes along with gold, silver and other byproduct metals such as selenium and tellurium. However, PGM production at most of these refineries will typically be very low due to the contained metal characteristics of the inputs.

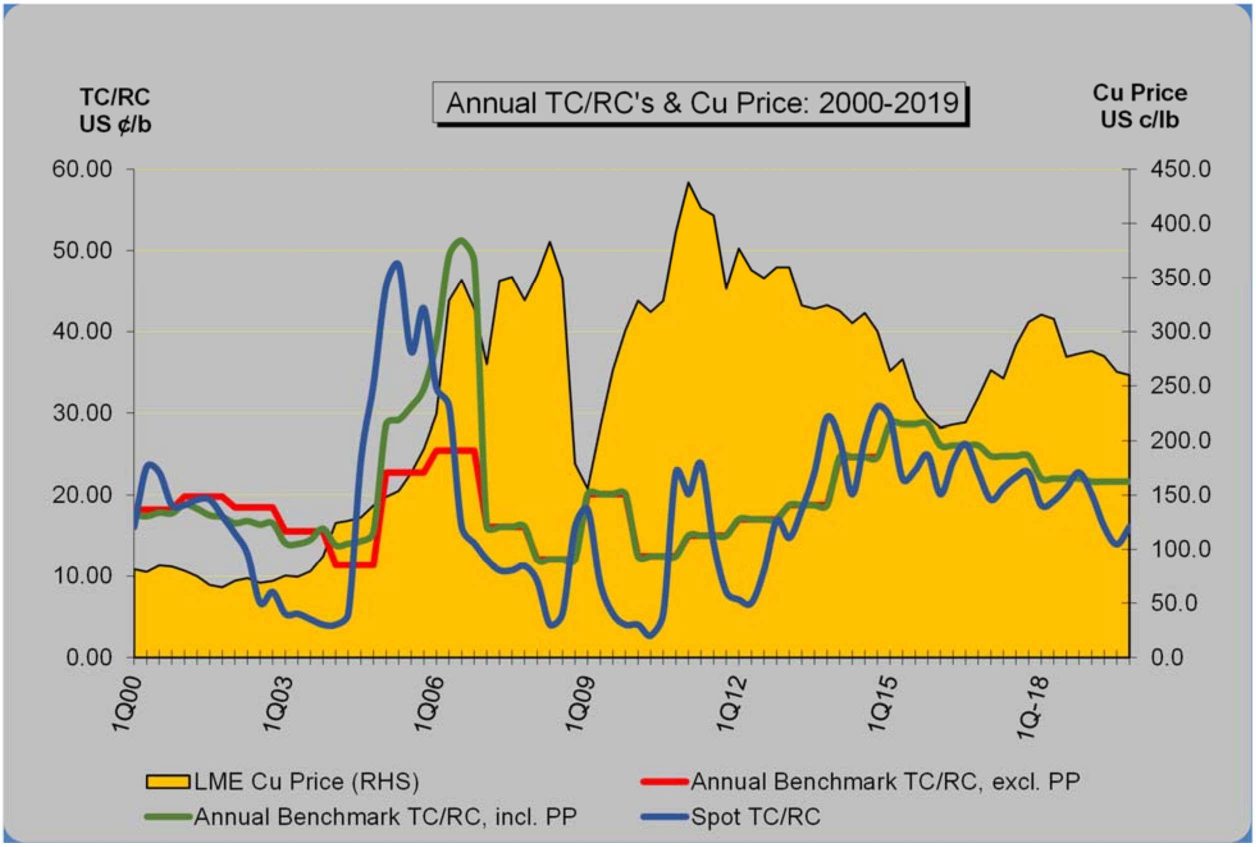
Although not all copper smelters will pay for PGMs in copper concentrates, smelters geographically well-located to the Project are known to recover and pay for PGMs and have indicated interest in the concentrates.

19.2.1 Treatment/Refining Charge Outlook

Treatment and refining charges (“TC/RC”) are typically responsive to basic supply-demand fundamentals with floors and ceilings to these charges being primarily governed by mine and smelter economics based on copper metal and byproduct prices for the former, and operating costs for the latter.

Over the past 20 years, “benchmark” treatment and refining charges have averaged (in dollars of the day) the equivalent of US$73/dmt smelting and US7.3¢/lb Cu refining, with a peak in 2015 of US$107 and US10.7¢ and a low in 2004 of US$44 and US4.0¢ (see Figure 19.1 - combined TC/RC shown in equivalent US¢/lb Cu, basis 28% Cu grade in concentrates). Price participation, representing the amount that smelters share in copper price changes above and/or below specified thresholds, a feature of the concentrates market for many years, was eliminated in annual contracts in 2007.

FIGURE 19.1 TREATMENT AND COPPER REFINING CHARGES, 2000 TO PRESENT



Source: *Exen Consulting Services (2019)*

Spot treatment and refining charges have ranged to even greater extremes, with nominal highs seen in 2006 above US$160/16¢, to headline figure lows witnessed in early 2004 and again in 2007-08 on mine to merchant business actually below US$0/0¢.

With agreements reached between Freeport-McMoRan Inc. and Chinese smelters Jiangxi Copper and Tongling in late November 2020 benchmark treatment and refining charges have been set at a multi-year low of US$62/dmt smelting and US6.2¢/lb copper refining. Although perhaps reflective of a projected tight concentrate market nearby, such terms are generally viewed as being at or very close to the bottom-end of cyclical ranges as few smelters can operate profitably at such levels.

Although the early 2020s are forecast to see below average TC/RCs due to projected tight concentrate market conditions, such cyclical supply-demand imbalances should not be expected to persist. Markets will reverse course, be it due to supply or demand factors, and it can be expected that annual treatment terms will move back up towards and occasionally through the US$100/dmt smelting and US10.0¢/lb copper refining level for periods of time.

In the long-term, average charges are projected to be in the range of US$80-90/dmt smelting and US8.0-9.0¢/lb refining. Accordingly, forecast treatment and refining charges and price participation used for the purposes of the study, were as follows:

- Treatment Charge: US $85.00/dmt
- Copper Refining Charge: US $0.085/lb payable copper
- Price Participation: Nil.

For the balance of the contract terms, the following are expected to apply:

- Payable/accountable metals:
  - Copper 96.5%, subject to a minimum deduction of 1.2 units (1.2%)[2]
  - Gold 97%, subject to a minimum deduction of 1 g/dmt[3]
  - Silver 97%, subject to a minimum deduction of 30 g/dmt
  - Platinum 95%, subject to a minimum deduction of 3 g/dmt
  - Palladium 95%, subject to a minimum deduction of 3 g/dmt.

It is to be noted that while copper, gold and silver payables are relatively consistent with industry typicals in North America and Europe (the most likely destinations for the concentrates for logistical reasons)[4], the platinum and palladium payables as shown are representative of indications received from different parties. Copper smelter recoveries of PGMs are comparable to gold recoveries so there should be considerable opportunity to improve the Pt/Pd payable structure. It is also to be noted that historical minimum deductions associated with palladium accountabilities have typically been higher than the platinum minimum deductions, which is largely a function of the historical Pt/Pd price relationship. With palladium prices now considerably higher than platinum, it is expected that the two sets of minimum deductions will, at a minimum, converge (as shown above).

- Refining charges:
  - Gold US$5.00/oz
  - Silver US$0.40/oz
  - Platinum US$20.00/oz
  - Palladium US$20.00/oz.

- Penalties: None based on the indicated analysis.

19.2.2 Concentrate Transportation and Logistics

19.2.2.1 Transportation

The Marathon PGM-Cu Project is located approximately 750 km west by road from Glencore's copper smelter in Rouyn-Noranda, QC where concentrate deliveries can be made by either truck

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[2] The net payable copper is calculated as the lesser of (a) 96.5% of the contained copper content, and (b) the contained copper content less 1.2%.

[3] The net payable gold is calculated as the lesser of (a) 97% of the contained gold content, and (b) the contained gold content less 1 gm/dmt. Silver, platinum and palladium payables are calculated similarly.

[4] Asian smelter gold payables are anywhere from 90-94% flat i.e. with no minimum deductions, at the indicated grades for these concentrates, whereas Asian silver payables are 90% flat if silver is in excess of 30 g/dmt (no payment if less than 30 g/dmt)

or rail. For offshore sales, the Project is approximately 1,550 km by rail from Quebec City, one of two identified east coast loadports offering year-round ocean service to destinations around the globe. As a potential seasonal loadport alternative, the port at Thunder Bay is located 300 km by road west of Marathon. There is also a deep-water port in Marathon which was formerly used by Marathon Pulp Inc. Title to this facility is being transitioned to the Town of Marathon. Since there is currently limited infrastructure at this location, it is not being considered as a viable concentrate loadout port at the present time.

Concentrate from the Marathon Project will be transported by truck either direct to a domestic smelter or to Thunder Bay for trans-loading to an oceangoing vessel, or to a storage load-out facility near the Town of Marathon where it can be trans-loaded into covered gondola railcars for shipment by CP Rail to a domestic smelter or to the Port of Quebec City for offshore deliveries. Other loadports include Trois Rivieres, Quebec on the east coast, while on the west coast, Pembina Canada Terminals' (formerly Kinder-Morgan's) Vancouver Wharves facility in North Vancouver, BC, may offer an alternative for any deliveries to Asian destinations.

The aforementioned ports on the St. Lawrence and in Vancouver offer year-round service to the various offshore smelter destinations. As an alternative to these loadports however, Thunder Bay, and potentially the port at Marathon, could be used during non-winter months when the St. Lawrence Seaway is open. Vessel freight indications suggest that significant cost savings may be realized if either of these Great Lakes ports can be utilized.

19.2.2.2 Logistics Cost Summary

For the purposes of this Technical Report, transportation and other costs (insurance, representation, losses, freight credits where applicable), are projected as follows:

- Transportation/logistics costs, delivered receiving smelter: US$148.00/dmt.

20.0 ENVIRONMENTAL STUDIES, PERMITS, AND SOCIAL OR COMMUNITY IMPACTS

20.1 ENVIRONMENTAL STUDIES

Detailed and comprehensive environmental baseline studies had been undertaken and essentially completed between 2005 to 2014, until the Marathon Project was put on hold in 2014.

In 2008 Marathon PGM Corp. had retained True Grit Consulting Ltd., and later in 2009 had engaged EcoMetrix, to assist in the development of a comprehensive environmental research program to support the acquisition of all the required federal and provincial approvals and permits. Comprehensive data collection had been initiated in 2008 and much of this information was compiled with other Project information into a 2010 detailed Project Description to commence the Federal Environmental Assessment process. Subsequently, in June 2012 an Environmental Impact Statement ("EIS") Report was submitted to a federal and provincial Joint Review Panel ("JRP") which had been formed for the Project.

The environmental approval process can be expected to be revived, should the Project be assessed to be economically and technically feasible. The complex permitting process for construction and operation will commence following approval of the EA by the provincial and federal Environment Ministries.

20.1.1 Environmental Baseline Studies

A complete set of environmental studies have been completed for the Project site and potential operations; these provide an assessment of the nature, extent and duration of potential environmental effects resulting from mine development, operation and closure. Environmental data has been collected at the site since as early as 2005 and consistently (i.e. seasonally and/or annually) since 2007. The following aspects of the environment have been studied in detail:

- **Air quality and climate** – The nearby Marathon airport station provided detailed baseline meteorology. Average annual precipitation is 826 mm, with 238 mm as snow, and 588 mm as rain. Site air quality was determined to be very good regarding air-borne particulates and contaminants of potential concern. When the Project is in full operation, air quality is expected to meet all provincial and federal criteria at the nearest sensitive receptor location, except possibly for NOx which could exceed provincial levels along the access road depending on which concentration transport option is selected. The potential effect of climate change on the Project was evaluated and found to be limited during years of operation and was factored into the decision-making and conceptual design processes for site closure and reclamation.

- **Noise** – Background measurements were obtained. Assessments of noise impacts were made using noise sensitive receptors at regional cottages, establishments on Hwy 17 and at facilities that could be constructed in Marathon. All noise levels were predicted to be below provincial criteria.

- **Geochemical assessment of mined material**. – Following recovery of copper and PGM's in the plant, residual sulphides, mainly pyrrhotite, will be removed in a dedicated circuit to produce Type 2 process solids that will be separately thickened and pumped to the PSMF for secure storage under pond water, and on closure will be permanently water saturated.

- **Terrain and soils** – Soil characteristics and amounts of soil that will be affected or relocated by the Project have been identified. Soil stockpiling and use in reclamation are to be key aspects for site closure. No significant adverse effects on terrain and soils are predicted in relation to the Project.

- **Ecosystem mapping and vegetation** – Approximately 900 ha of vegetation is to be cleared by the Project. An overview of the potential effects on the vegetation community during each phase of the Project was completed in 2012. The Valued Ecosystem Components ("VEC's") that were assessed included forest cover, non-forest cover (including rocky barrens and wetlands), regionally and provincially rare species and protected species.

- **Aquatic resources** – Aquatic baseline studies assessed species composition abundance, spatial distribution, biological and habitat characteristics of the fish and benthic invertebrate communities of the local aquatic ecosystem. A Fish Habitat and Compensation Strategy was developed and submitted to the Federal-Provincial Joint (Environmental Assessment) Review Panel in January 2014. Approximately 1.8 ha affords direct habitat (fish bearing) that will require compensation. Of this area approximately 0.35 ha affords direct habitat that will need to be compensated under section 35(2) of the Fisheries Act and 1.45 ha is required under Section 27.1 of the Metal Mining Effluent Regulations, due to loss of fish frequented habitat associated with the footprint of stockpiles and tailings impoundment structures.

- **Wildlife** – Extensive baseline assessments of terrestrial habitat and species were completed, and a rich diversity was recorded. Eight species of amphibians, 18 mammals, several bats, 88 bird species including nine species of waterfowl and four raptors were observed. Of the 900 ha of forested habitat, as well as a small amount of aquatic influence habitat associated with the aquatic features, that would be removed for the Project development, some will be re-established by mine closure actions, and others will re-develop naturally.

- **Species at risk** – Potential risks included transit and winter habitat for woodland caribou, and loss or change of habitat for four species of birds. In consultation with the Provincial government, a Proposed Caribou Habitat Offsite Mitigation report was submitted to the JRP to provide 115 ha of restoration of natural forest ecosystems to benefit woodland caribou (Northern BioScience, 2014).

- **Hydrology** – A detailed baseline hydrological assessment was completed in 2012. As anticipated, the hydrology of the region is characterized by large snowmelt run-off during the freshet in the spring which tapers off to low summer base flow, from July to September. The lowest stream flow typically occurs in the winter months. Surface water analyses indicated that Project area waters are generally of high quality, with most parameters meeting Provincial Water Quality Objectives ("PWQO") for the protection of aquatic life.

- **Hydrogeology** – Hydrogeological investigations consisting of borehole drilling, drill core observation, monitoring and sampling at the Project site were completed. The information was used to build site models to describe current hydrogeological conditions and to assess impacts of the Project development and on closure.

- **Archeological** – No archeological heritage sites were located in extensive surveys.

While the Marathon Project was suspended in early 2014, it is anticipated no significant extra baseline studies will be required. The only exceptions may be those required by government agencies, or those that may emerge concerning the impact of minor alterations in the Project Description.

20.2 ENVIRONMENTAL REGULATIONS AND PERMITTING

The federal and provincial Environmental Assessment ("EA") processes and permitting framework for metal mining in Canada are well established. Following the EA approval, the Marathon Project will enter a permitting phase which will regulate the Project through all phases – construction, operation, closure, and even post-closure. Prior to and throughout all of these processes, consultation with, and advice from, local First Nations and Métis and local communities are considered essential.

20.2.1 Project Environmental Assessment

An Environmental Assessment is required for the Marathon Project under the federal *Canadian Environmental Assessment Act* ("CEA Act"). It is understood that the agreement by the former owner, Stillwater Canada Inc., to coordinate environmental assessment with Ontario under the Ontario *Environmental Assessment Act* ("OEA Act") remains in effect.

20.2.2 Federal Environmental Assessment Process

In 2012, the 1992 Canadian Environmental Assessment Act was updated to CEAA 2012. CEAA 2012 has been recently updated under Federal Legislation C-69. However, Generation PGM Inc. submitted a response to the CEA Agency on September 27, 2019 confirming that the Project will continue the assessment under the process established by CEAA 2012. Under CEAA 2012, an EA focuses on issues within federal jurisdiction including:

- Fish, fish habitat and other aquatic species
- Migratory birds;
- Federal lands and effects of crossing interprovincial boundaries;
- Effects on Aboriginal peoples such as their use of traditional lands and resources; and
- A physical activity that is designated by the Federal Minister of Environment that can cause adverse environmental effects or result in public concerns.

It had been determined that the Project is subject to review under the 2012 CEA Act. This determination arose from the requirement for Fisheries and Oceans Canada ("DFO"), Transport Canada ("TC") and Natural Resources Canada ("NRCan") to issue permits, approvals, authorizations and/or licenses pursuant to the *Fisheries Act*, the *Navigable Waters Protection Act* and the *Explosives Act*, respectively.

The development of Marathon mine open pits and to a lesser extent PSMF (processed solids management facility, aka tailings management) can be considered to adversely impact fish habitat (a federal EA could have been triggered by that aspect alone). With careful design, the anticipated impact of the Project on fisheries could be considered limited. The "HADD" (Harmful Alteration, Disruption or Destruction of Fish Habitat) is anticipated to be small.

The CEA Agency recommended that the federal Minister of the Environment refer the Project to a Review Panel and in October 2010, the federal Minister of the Environment announced that the Project would undergo an independent review panel-advised federal EA. A panel-driven EA process is usually considered to be thorough, time-consuming and somewhat costly.

20.2.3 Provincial Environmental Assessment Process

The Ontario EA process is administered by the recently renamed Ministry of Environment, Conservation and Parks ("MECP"). In addition to promoting responsible environmental management, interested third parties, e.g. members of the public, can comment on a mining project and request the MECP minister call for an EA.

Ontario mining projects are not often subject to the provincial EA Act (OEA) because many mine development activities are not specified in the relevant Act. However, specifications do include:

- Transfer of Crown resources including land,
- Building electric power generation facilities or transmission lines,
- Constructing new roads and transport facilities, and
- Establishing a PSMF (tailings management facility).

Other than standing timber, no Crown resources are affected by the Marathon Project.

In 2011, following consultation with federal and provincial governments, aboriginal groups and stakeholders, the then Project owner (Stillwater) took the progressive approach of bringing the Project under the OEA Act. This resulted in a Voluntary Agreement ("VA") with the Province of Ontario to have the Project subject to the OEA Act. The agreement provided for an assessment of the entire Project under the OEA Act in order to permit the federal and provincial environmental assessment process to be implemented in a way to coordinate scope, timing and procedures.

A Joint (federal-provincial) Review Panel ("JRP") was established which would manage a process to complete a single, comprehensive assessment of both the possible impacts and benefits of the Project in advance of any federal or provincial government decisions. After the conclusion of the review process, the JRP would prepare a report setting out its conclusions and recommendations relating to the EA of the Project.

While the JRP process was suspended in 2014, it could be expected to restart as the Marathon Project moves ahead after confirmation of economic viability.

20.2.4 Environmental Approval Requirements

A significant number of approvals, permits, and authorizations will be required following the EA process, and in advance of construction and operations. Federal items are:

- Authorization for alteration to fish habitat, including a HADD analyses under the Fisheries Act;

- Approval to amend Schedule 2 of the Metal Mining Effluent Regulations with respect to watercourses frequented by fish; and

- Acquiring an Explosives Handling License.

Provincial approvals, permits and authorizations are numerous and include:

- Approvals for emissions, discharges and waste management,
- Permit to take water;
- Work permit for construction of mine facilities on Crown Land;
- Building and land use permits;
- Endangered species permit – woodland caribou may be a focus;
- Bulk fuel, domestic waste water treatment permits;
- Forest license – allowance for clearances;
- Approval of health and safety procedures and management, as well as emergency provisions; and
- Approval of a financed Closure Plan.

In addition, several municipal permits are anticipated to be required – e.g. accommodation and catering as well as modifications to rail loading and port facilities.

20.3 ENVIRONMENTAL MANAGEMENT STRATEGIES

The Marathon Project is designed and will be operated in strategies that will minimize impact on the local environment. Important aspects include:

- Minimization of Project footprint – consolidation of waste management facilities, roads and infrastructure, and where possible confining the infrastructure to specific watersheds;

- Curtailing the need to draw fresh water – process water sourced from open pits, PSMF's and site surface run-off;

- Design for closure – stockpile soils and progressively close out during operations; and

- Engineer and implement measures to prevent ARD from mine waste rock and process solids.

The Project measures to prevent ARD from process solids are extensive and unique in the Canadian mining industry. A dedicated circuit in the process plant (ref: Section 17 of this Technical Report) will separate a sulphide-rich concentrate from process solids. This concentrate will be deposited under a water cover during operations and will remain water-saturated on closure (ref: Section 18 of this Technical Report). This condition prevents ARD formation. The sulphide-free process solids will not be ARD-producing nor metal leaching.

20.4 SOCIAL AND COMMUNITY REQUIREMENTS

Up to the time of Project suspension in 2014, a series of consultations and negotiations and/or agreements, had been engaged with local aboriginal communities and the Town of Marathon. In the last five years, while limited in scope, social and community engagement and consultation activity has continued. To date there are no community benefit agreements ("CBA's") with any community.

20.4.1 Aboriginal Communities

The Project site is within the boundaries of lands claimed as exclusive and shared territories by indigenous communities. Aboriginal Title and a comprehensive land claim had been filed, while other community groups have been identified as having interest in the Project based on Treaty rights within the Robinson Superior Treaty, asserted traditional territory and proximity to the Project. MOU's and "Capacity funding" agreements had been signed between the previous Project owner and several communities.

20.4.2 Other Communities

Extensive consultation activities were made with the public, various stakeholder organizations and with government agencies. These groups had the opportunity to review plans, expert reports and provide comments through the public and private meetings.

Although large scale "Townhall" style engagements haven't occurred since the Project was put on hold, private meetings, engagement and consultations still occur with the Town of Marathon and all the six aboriginal groups who expressed an interest in the Project. Maintaining these relationships will enable a smooth re-establishment and refreshment of comprehensive consultations if the Project is determined to be economically and technically feasible.

20.5 MINE CLOSURE

A draft Conceptual Closure Plan was prepared in 2012 to meet the objective that the Project site would be closed in a manner that minimizes residual social and natural environment impacts.

An updated Closure Plan can be expected that will also satisfy all regulatory requirements and be consistent with best Canadian industrial practice. The Plan will be submitted to the Ontario Ministry of Northern Development, Mines and Energy and is expected to include:

- Results of consultations with indigenous groups, local communities and provincial agencies;
- Provision for progressive closure of PSMF (tailings), MRSF (waste rock storage) and mined-out pits;
- Restoration of creek diversions, ponds and any dyked-off lake sections; and
- Restoration of plant and infrastructure sites.

Some key aspects of the 2012 Closure Plan can be expected to be included in a new Plan, including:

- Allowing mined-out pits to naturally flood;
- Consideration that mine rock and/or process solids would be disposed in the earliest mined-out pits in later years of operations;
- Boulder fencing and or access barriers around the edge of open pits;
- Mine workings expert-examined for long term stability;
- All buildings, infrastructure and equipment removed from the Project site;
- Re-establishment of natural water courses and drainage routes; and
- All disturbed surfaces including the PSMF prepared for assisted and natural revegetation.

For closure planning and financial assurance considerations, closure can be addressed in four phases:

- Construction and pre-production;
- Production and modification of production;
- End of operations; and
- Post-closure.

The closed-out Marathon Project site can essentially be a “walk-away” situation, that is, no significant post operation active treatment would be required. Surface water quality should return to pre-mining conditions and the flooded pits will be allowed to self-establish aquatic biology.

21.0 CAPITAL AND OPERATING COSTS

21.1 CAPITAL COSTS

The Project capital cost estimate addresses the engineering, procurement, construction and commissioning of the Marathon Palladium Project, which consists of an open pit mine, a processing plant, process solids management facility ("PSMF"), and associated ancillary facilities. The capital costs exclude all operational costs once commercial production has been established.

The capital cost estimate is developed to a level commensurate with that of a Preliminary Economic Assessment in order to evaluate the Project viability. After inclusion of a contingency, the capital cost estimate is considered to have an accuracy of ±25%, Q4 of 2019. The capital costs have been generated from securing equipment quotations on key crusher, process plant, infrastructure items and employing factors used to estimate civil, electrical and mechanical contract labour, material and ancillary costs. Mining equipment costs were generated from securing equipment quotations and using database costs for assembly and commissioning. Ancillary equipment costs were generated from P&E's extensive equipment database.

The total estimated cost to design, procure, construct and start-up the facilities described in this Technical Report is $431 million ("$M"). Table 21.1 summarizes the initial capital cost estimate. An exchange rate of CDN$1 = US$0.76 has been used for the initial capital cost estimate. All costs are in Canadian dollars unless otherwise noted.

The estimate includes a contingency allowance of approximately $34M. No contingency was applied to mine pre-production unit mining costs or to down-payments for equipment leases since these costs were generated from quotations and fall within a PEA level of estimation accuracy.

Sustaining capital represents capital expenses after commercial production has been established. It is comprised of additional costs and equipment purchases, including a process plant expansion to 8 Mtpa, which will be incurred during the operating life of the Project, and are not included in operating costs. Life of mine sustaining capital is estimated to be $277M.

No provision has been included in the capital cost to offset future cost escalation.

Table 21.1 Initial Capital Cost Summary	
Item	**Cost ($M)**
Mine Pre-Stripping	15.3
Mining Capital Cost	40.6
Process Plant including EPCM	272.8
PSMF	14.3
Mine Site Infrastructure	54.0
Contingency	34.1
Total	**431.1**

Items not included in the initial capital estimate are:

- Sunk costs and costs prior to the start of basic engineering phase;
- Escalation beyond the beginning of the pre-production period;
- Working capital;
- Interest and financing costs; and
- Reclamation bonding or closure cost allowance.

A contingency has been included in the initial capital cost in recognition of the degree of detail on which the estimate is based. A contingency percentage of 10% has been included to most cost areas except for mine pre-production unit mining costs and down-payments for equipment leases. A contingency of 10% is acceptable considering that three Feasibility Studies have been completed on the Project, all employing similar plant configurations, since the metallurgical flowsheet is well understood, and similar mining configurations are utilized.

21.1.1 Initial Mining Capital Cost

The initial mine capital cost has been subdivided into five areas; (i) pre-stripping, (ii) mine equipment, (iii) mine development, (iv) equipment capital leases, and (v) freight and spares. Major pieces of mining equipment will be acquired through a lease/purchase agreement. All major pieces of mining equipment will be purchased outright at the end of the five-year equipment lease. Support and ancillary equipment will be purchased outright. Table 21.2 summarizes the initial mine capital cost estimated at $56M, before contingency.

TABLE 21.2 INITIAL MINE CAPITAL COST SUMMARY					
Capital Item	**Year -2 ($M)**	**Year -1 ($M)**	**Initial Total ($M)**	**Years 1 to 16 ($M)**	**LOM Total ($M)**
Pre-Stripping		15.3	15.3		15.3
Mine Equipment	5.8	11.6	17.4	6.0	23.4
Mine Development		10.8	10.8	15.2	26.0
Capital Leases		11.6	11.6	106.5	118.1
Freight and Spares	0.3	0.6	0.9	0.3	1.2
Total Mine Capital	**6.1**	**49.8**	**55.9**	**128.0**	**183.9**

The pre-stripping will be done by an owner mining fleet during Year-1. Capitalized down-payments for the pre-production mining fleet and equipment leases will be incurred in Year-2 and Year-1. While pre-stripping will be done by the owner's fleet, the Year-1 mining operating costs will be capitalized. Mine development consists of clearing and grubbing the initial mining sites, haul road construction, pit dewatering pumps and pipelines, radio and survey equipment, a computerized dispatch system, and an explosives plant including storage and magazines.

On-going open pit sustaining and equipment leasing costs will add another $128M over the 14-year life of the mine. The majority of the sustaining capital is for equipment lease payments. Equipment rebuild costs, new haul roads, and clearing/grubbing are also included in the sustaining capital cost estimate.

21.1.2 Process Plant Initial Capital Cost

The initial process plant is estimated to cost $273M, and is summarized by direct and indirect costs in Table 21.3. The initial process plant throughput is 5 Mtpa.

TABLE 21.3 INITIAL PROCESS PLANT CAPITAL COST SUMMARY	
Capital Item	**Initial Total ($M)**
Direct Costs	
Crushing, conveying	18.1
ROM handling, crushed storage	17.9
Grinding	43.0
Copper concentrate recovery	2.3
PGM recovery	14.5
Sulphides treatment	10.0
Reagent handling	2.2
Plant building, laboratory, security	36.9
Services	14.3
Concentrate handling	6.8

TABLE 21.3 INITIAL PROCESS PLANT CAPITAL COST SUMMARY	
Capital Item	**Initial Total ($M)**
Emergency power, diesel storage	5.1
Electrical substation	9.9
Mobile equipment	3.9
Site roads	6.0
Sub-Total Direct Costs	**220.9**
Indirect Costs	
EPCM	22.1
Owner's costs	6.6
Spares, initial load	5.5
Freight, transportation	17.7
Sub-Total Indirect Costs	**51.9**
Total	**272.8**

Direct Cost

The initial capital cost estimate has been built up by cost account areas. Costs are based on the assumption that equipment and materials will be purchased on a competitive basis and installation contracts will be awarded in defined packages for lump sum or unit rate contracts.

Indirect Costs

The indirect costs have been calculated using factoring percentages based on historical data of similar type projects. Indirect costs generally include overhead staff and support facilities; bonding; insurance; construction permits; contract administration; schedule management; management of subcontractors; onsite busing; surveying; mobilization and demobilization; construction equipment and small tools; supervision; safety; temporary power, toilets and communication; warehousing; cleanup and waste removal; construction vehicles, fuel and maintenance.

Process plant indirect costs are included at an overall rate of 24% of the direct cost.

Spare Parts and Initial Fills

An allowance has been made for spare parts required for start-up and commissioning of the Project. 3% of the equipment value has been assigned.

EPCM Services

EPCM services for basic and detailed engineering design, procurement, and construction management of the processing plant and ancillary facilities have been included at 10% of the direct cost. This percentage is based on industry experience on similar projects.

Owner's Costs

Owner's costs have been developed based on 3% of direct costs.

Freight

Transportation costs have been included for delivery of equipment and materials to the Project site. In general, it has been assumed that most equipment and bulk materials will be purchased in North America and can be trucked to site. Delivery by naval vessel to the Town of Marathon wharf is possible for approximately eight months per year. Crane rental from Thunder Bay would be required to off-load the equipment at the wharf, and to load it onto trucks for transport to the Project site. It has been envisaged to ship much of the process plant equipment in modules to the Marathon wharf. The freight cost is based on 8% of process plant equipment costs and on 5% of mining equipment costs.

21.1.3 PSMF Initial Capital Cost

The starter dam for the PSMF will be constructed to hold the first production year's process solids of approximately 4 Mt plus an embankment height for 1 m of water cover and 1 m of freeboard. A contractor will carry out much of the work, and will be supplemented by owner mining equipment once pit pre-stripping starts. The initial capital cost of the PSMF is estimated at $14.3M as presented in Table 21.4. The PSMF embankments will be raised in subsequent years using suitable mine waste rock generated from the open pits.

TABLE 21.4
PSMF INITIAL CAPITAL COST SUMMARY

Item	Initial Total ($M)
Cell 1 site clearance	1.0
Cell 1 foundation prep	1.9
Cell 1 embankment	5.0
Roads to cells	1.0
Pipework and pumps	2.5
Type 2 barge and distribution system and water reclaim	1.5
Embankment and pipeline instrumentation	0.1
Engineering 10%	1.3
Total	**14.3**

21.1.4 Infrastructure Capital Cost

Initial mine infrastructure capital costs are estimated at $54M in Table 21.5.

TABLE 21.5 MINE INFRASTRUCTURE CAPITAL COST SUMMARY	
Item	**Initial Total ($M)**
Water treatment plant	16.4
Mine workshop with overhead crane	5.0
Access and powerline to main grid	16.0
Construction camp	7.0
Administration building	2.8
Warehouse and storage facilities	6.8
Total	**54.0**

21.1.5 Sustaining Capital Costs

Sustaining capital costs are estimated at $277M in Table 21.6.

TABLE 21.6 SUSTAINING CAPITAL COST SUMMARY	
Item	**Initial Total ($M)**
Mining, mainly equipment lease payments	128.1
Process plant expansion to 8 Mtpa	38.3
PSMF expansion over LOM	67.0
Contingency	13.6
Total	**277.0**

21.2 OPERATING COSTS

The operating cost estimate includes the cost of open pit mining, mineral processing, and General and Administration ("G&A"). The life-of-mine Project average operating cost is summarized in Table 21.7.

TABLE 21.7 OPERATING COST SUMMARY	
Item	**LOM Average Operating Cost ($/t processed)**
Mining	9.23
Processing	8.92
G&A	0.97
Total	**19.12**

21.2.1 Open Pit Mining

Mine operating costs are derived from in-house equipment databases and recent vendor budgetary quotes for all major and supporting equipment operating parameters, and include fuel, consumables, labour ratios, and general parts and maintenance costs. The estimated mine operating cost is summarized in Table 21.8 on an annual basis, and in Table 21.9 on a unit cost basis, and averages at $2.34/t mined over the life of the Project.

Annual production tonnes, waste tonnes, and loading and hauling hours are calculated based on the capacities of the loading and hauling fleet. These tonnes and hours provide the basis for drilling, blasting, and support fleet inputs. Based on the mining tonnes scheduled, a requirement for production drilling hours is calculated based on hole size and pattern, bench height, material density and penetration rate of the drill.

The quantity of explosives is calculated and priced, and contractor labour and fees added for down-the-hole delivery of explosives. An estimate for blasting initiation systems and accessories is provided on a per hole basis. Drilling and blasting inputs (drill pattern, powder factor, etc.) have been included.

Fleet requirements for loading, hauling and support are derived from the loading and hauling operating hours. The support fleet of dozers, front-end loaders, graders, service and welding trucks, etc., is added in. The diesel fuel cost assumed is $0.90/litre delivered to the site.

Equipment costs are based on estimated fuel consumption rate, consumables cost, ground engaging tools ("GET") estimate, and general parts and preventative maintenance costs on a per-hour or per-metre interval basis.

Operating labour man-hours are categorized for the different labour categories such as operators, mechanics, electricians, welders, etc. The mining cost also includes costs for all mine salaried staff, consumables, and software and fleet management systems' licensing and maintenance. It is essentially a fixed cost component.

TABLE 21.8 ANNUAL ESTIMATED MINE OPERATING COSTS																	
Annual Costs	**Units**	**Production Year Total LOM**	**Year**														
			-1 Capitalized	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Direct Mining Costs (by Activity)																	
Drilling	$(000)	71,208	1,518	4,896	4,905	4,913	6,092	7,162	7,140	6,830	6,390	6,390	5,213	4,139	4,142	2,997	0
Blasting	$(000)	142,768	4,075	10,004	10,004	10,004	11,895	13,785	13,784	13,155	12,524	12,524	10,634	8,743	8,743	6,969	0
Loading	$(000)	74,462	1,720	4,990	4,992	5,016	6,258	7,352	7,480	7,034	6,550	6,503	5,557	4,540	4,457	3,519	214
Hauling	$(000)	228,125	3,564	14,764	14,199	13,727	16,244	20,175	21,770	21,943	22,006	22,354	18,630	15,186	15,071	11,640	415
Services/Roads/Dumps	$(000)	185,373	1,475	15,466	15,496	14,407	14,272	14,205	13,695	13,729	13,739	14,217	14,329	14,448	14,461	12,430	481
General, Supervision and Tech	$(000)	84,199	2,225	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	6,475	21
Allowance	$(000)	39,307	729	2,830	2,804	2,727	3,062	3,458	3,517	3,458	3,384	3,423	3,042	2,677	2,667	2,202	57
Total Operating Cost	**$(000)**	**825,443**	**15,305**	**59,424**	**58,875**	**57,270**	**64,297**	**72,613**	**73,862**	**72,623**	**71,069**	**71,886**	**63,880**	**56,208**	**56,017**	**46,232**	**1,187**
Direct Mining Costs (by Cost Element)																	
Operating Labour	$(000)	120,450	1,945	8,871	8,679	8,582	9,337	10,167	10,360	10,227	10,109	10,109	9,294	8,464	8,464	7,613	176
Maintenance Labour	$(000)	63,848	1,246	4,691	4,691	4,691	4,906	5,336	5,336	5,336	5,229	5,229	4,906	4,584	4,584	4,261	69
Supervision and Technical	$(000)	74,686	2,033	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	5,743	21
Non-Energy Consumables and Parts	$(000)	307,541	5,606	21,368	21,066	20,782	24,707	29,107	29,773	28,772	27,649	27,664	23,234	19,028	18,927	14,985	479
Fuel	$(000)	162,584	1,035	10,323	10,295	10,263	12,061	14,322	15,111	15,066	14,934	15,219	13,161	11,213	11,132	9,097	386
Electric Power	$(000)	4,623	264	356	356	356	356	356	356	356	356	356	356	356	356	356	0
Leases and Outside Services	$(000)	52,405	2,447	5,242	5,242	4,124	4,124	4,124	3,666	3,666	3,666	4,144	4,144	4,144	4,144	1,976	0
Allowance	$(000)	39,307	729	2,830	2,804	2,727	3,062	3,458	3,517	3,458	3,384	3,423	3,042	2,677	2,667	2,202	57
Total Operating Cost	**$(000)**	**825,443**	**15,305**	**59,424**	**58,875**	**57,270**	**64,297**	**72,613**	**73,862**	**72,623**	**71,069**	**71,886**	**63,880**	**56,208**	**56,017**	**46,232**	**1,187**

Note: *Year -1 costs have been capitalized as pre-production and are not included in the totals.*
Year 14 includes no open pit mining activity, and is comprised of operations costs for reclaiming process plant feed from stockpiles only.

TABLE 21.9
ESTIMATED MINE UNIT OPERATING COSTS

Mining Unit Costs	Units	Production Years Total LOM	-1 Capitalized	1	2	3	4	5	6	7	8	9	10	11	12	13
Direct Mining Costs (by Activity)																
Drilling	$/t mined	0.20	0.21	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.21	0.21	0.21
Blasting	$/t mined	0.41	0.57	0.42	0.42	0.42	0.40	0.38	0.38	0.39	0.39	0.39	0.41	0.44	0.44	0.48
Loading	$/t mined	0.21	0.24	0.21	0.21	0.21	0.21	0.20	0.21	0.21	0.20	0.20	0.21	0.23	0.22	0.24
Hauling	$/t mined	0.65	0.49	0.62	0.59	0.57	0.54	0.56	0.60	0.65	0.69	0.70	0.72	0.76	0.75	0.81
Services/Roads/Dumps	$/t mined	0.53	0.20	0.64	0.65	0.60	0.48	0.39	0.38	0.40	0.43	0.44	0.55	0.72	0.72	0.86
General, Supervision and Tech	$/t mined	0.24	0.31	0.27	0.27	0.27	0.22	0.18	0.18	0.19	0.20	0.20	0.25	0.32	0.32	0.45
Allowance	$/t mined	0.11	0.10	0.12	0.12	0.11	0.10	0.10	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.15
Total Operating Cost (mined material)	**$/t mined**	**2.34**	**2.13**	**2.48**	**2.45**	**2.39**	**2.14**	**2.02**	**2.05**	**2.14**	**2.22**	**2.25**	**2.46**	**2.81**	**2.80**	**3.22**
Total Operating Cost	$/t feed	9.23		9.35	9.42	10.11	11.17	13.72	11.46	11.78	8.25	6.84	5.52	9.63	9.27	11.96
Direct Mining Costs (by Cost Element)																
Operating Labour	$/t mined	0.34	0.27	0.37	0.36	0.36	0.31	0.28	0.29	0.30	0.32	0.32	0.36	0.42	0.42	0.53
Maintenance Labour	$/t mined	0.18	0.17	0.20	0.20	0.20	0.16	0.15	0.15	0.16	0.16	0.16	0.19	0.23	0.23	0.30
Supervision and Technical	$/t mined	0.21	0.28	0.24	0.24	0.24	0.19	0.16	0.16	0.17	0.18	0.18	0.22	0.29	0.29	0.40
Non-Energy Consumables and Parts	$/t mined	0.87	0.78	0.89	0.88	0.87	0.82	0.81	0.83	0.85	0.86	0.86	0.89	0.95	0.95	1.04
Fuel	$/t mined	0.46	0.14	0.43	0.43	0.43	0.40	0.40	0.42	0.44	0.47	0.48	0.51	0.56	0.56	0.63
Electric Power	$/t mined	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
Leases and Outside Services	$/t mined	0.15	0.34	0.22	0.22	0.17	0.14	0.11	0.10	0.11	0.11	0.13	0.16	0.21	0.21	0.14
Allowance	$/t mined	0.11	0.10	0.12	0.12	0.11	0.10	0.10	0.10	0.10	0.11	0.11	0.12	0.13	0.13	0.15
Total Operating Cost	**$/t mined**	**2.34**	**2.13**	**2.48**	**2.45**	**2.39**	**2.14**	**2.02**	**2.05**	**2.14**	**2.22**	**2.25**	**2.46**	**2.81**	**2.80**	**3.22**
Total Operating Cost	$/t feed	9.23		9.35	9.42	10.11	11.17	13.72	11.46	11.78	8.25	6.84	5.52	9.63	9.27	11.96

21.2.2 Processing

Process plant operating cost estimates are presented in Table 21.10 for throughput rates of 5 Mtpa and 8 Mtpa.

TABLE 21.10
PROCESS PLANT OPERATING COSTS

Item	Opex at 5 Mtpa ($/t processed)	Opex at 8 Mtpa ($/t processed)
Personnel	1.54	0.96
Crushing	0.10	0.10
Grinding steel	2.67	2.67
Grinding ceramic	0.05	0.05
Reagents	0.72	0.65
Maintenance	0.75	0.75
Electricity	3.36	3.22
Tailings management	0.10	0.05
Water management	0.05	0.05
Concentrate handling	0.10	0.10
Other	0.10	0.10
Total	**9.54**	**8.70**

21.2.3 General and Administrative (G&A)

G&A costs include a labour staff establishment of 29 people at 5 Mtpa and 32 people at 8 Mtpa. A housing subsidy for the first five years of operation is included to transition the approximately 300 site employees from the Project camp on the site to housing in the Town of Marathon and surrounding communities. The camp will be closed after five years of operation as it is assumed that apartments, single and multiple housing will be constructed or become available for employees during the five year housing transition period. The estimated G&A operating costs are presented in Table 21.11 at $1.51/t processed for 5 Mtpa and $0.76/t processed for 8 Mtpa.

TABLE 21.11 G&A OPERATING COSTS		
Item	**Opex at 5 Mtpa ($M)**	**Opex at 8 Mtpa ($M)**
Staff salaries	3.04	3.33
Housing subsidy / Camp costs	2.19	0.00
General office expenses	0.20	0.40
Environmental and permits	0.30	0.30
IT, safety	0.10	0.20
Insurance	0.80	1.00
Community service programs	0.25	0.30
Contingency @ 10%	0.69	0.55
Total	**7.57**	**6.08**
Unit cost ($/t processed)	**1.51**	**0.76**

21.3 MANPOWER

Project labour establishment is estimated to reach a peak of 320 persons in years six and seven of production.

At 5 Mtpa, manpower is estimated to average 198 mining, 76 process plant, and 29 G&A, for a total of 303.

At 8 Mtpa, manpower is estimated to average 204 mining, 76 process plant, and 32 G&A, for a total of 312.

22.0 ECONOMIC ANALYSIS

A Project financial model was developed to estimate the viability of the Marathon Project LOM plan. The LOM plan covers a two-year pre-production period and a 14-year production schedule for mining approximately 90 Mt of mineralized material. Table 22.1 presents a summary of the LOM financial parameters and valuation. All costs are in Q4 2019 Canadian dollar nominal terms and inflation has not been considered in the cash flow analysis.

TABLE 22.1
LOM FINANCIAL VALUATION AND PARAMETERS

Item	Unit	Value
Commodity Prices and FX		
Palladium Price	US$/oz	1,275
Copper Price	US$/lb	3
Platinum Price	US$/oz	900
Gold Price	US$/oz	1,300
Silver Price	US$/oz	16
CDN:US	CDN$:US$	0.76
Mine Plan Summary		
Mine Life	years	14
Mineralized Material	Mt	89.4
Diluted Palladium Grade	g/t	0.69
Diluted Copper Grade	%	0.22
Diluted Platinum Grade	g/t	0.21
Diluted Gold Grade	g/t	0.07
Diluted Silver Grade	g/t	1.52
Processing Rate Years 1-5	tpd	14,000
Processing Rate Years 6-14	tpd	22,000
Processing Recovery		
Concentrate Produced LOM	Mt	0.95
NSR/t Feed LOM	CDN$/t	48.39
Payable PdEq LOM	Moz	2.6
Average PdEq Per Year	oz	194,000
LOM Operating Cost		
Mining	$/t mined	2.34
Processing	$/t processed	8.92
G&A	$/t processed	0.97
Cash Operating Cost PdEq	US$/oz	504
AISC Cost PdEq	US$/oz	586
Capital Costs		
Initial	$M	431
Sustaining	$M	277
Financial Results		
Pre-Tax $NPV_{5\%}$	$M	1,184
After-Tax $NPV_{5\%}$	$M	871

TABLE 22.1 LOM FINANCIAL VALUATION AND PARAMETERS		
Item	**Unit**	**Value**
Pre-Tax IRR	%	35
After-Tax IRR	%	30
After-Tax Payback[1]	years	2.5

Note* [1]*: After Project production commences.

Other economic factors include the following:

- Discount rate of 5%.
- Figures in nominal 2019 dollars.
- All cash flows are calculated for the period in which they are incurred and are not adjusted for incoming and outgoing payments, and are for a full 12-month period.

Net revenue is calculated on the following:

- Revenues are calculated on the sale of a 19% copper concentrate that contains PGMs, and its value from LOM production of 0.95 Mdmt concentrate, that averages CDN$4,549/dmt over the LOM.
- Concentrate refining and treatment charges are based on anticipated ("indicative") terms with Glencore's Horne smelter.
- Concentrate transport charges are anticipated to be for truck haulage, with a factor for Freight Allowance.
- No net smelter return ("NSR") is payable.
- No community benefit agreement ("CBA") has been signed with any community, and therefore none is currently applicable.

Tax estimates reflect an Ontario mining tax, and Federal and Provincial income taxes.

The process plant is designed to produce a Cu-PGM concentrate through two flotation circuits to optimize Cu and PGM metal recoveries. The PEA estimates that over the 14-year LOM a total of 2.6 Moz of PdEq will be recovered at an average diluted grade of 1.26 g/t PdEq. This also equates to a total of 1.1 billion pounds of CuEq recovered over the LOM. The annual amounts of payable metal are presented in Table 22.2.

At metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and a CDN$ to US$ exchange rate of 0.76, the Project is estimated to generate approximately $145M undiscounted free cash flow annually, for a total of $1,427M over the LOM.

The PEA demonstrates favourable economic returns with an estimated after-tax NPV5% of $871M and after-tax IRR of 30%. Pre-tax figures are NPV5% of $1,184M and IRR of 35%. Revenue contributions are estimated at 54.4% from Pd, 31.1% from Cu, 8.9% from Pt, 4.6% from Au, and 1.0% from Ag.

A summary of the Project financial model is presented in Table 22.3.

TABLE 22.2
PAYABLE METAL PER YEAR

Payable Metal	Units	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Au	koz	115.5	9.4	6.6	7.7	6.8	6.6	9.2	9.8	9.2	10.2	9.2	10.3	10.0	9.1	1.5
Ag	koz	2,011.2	53.0	25.3	53.1	65.5	74.2	146.9	176.3	187.0	206.0	239.8	246.8	250.7	234.2	52.3
Pt	koz	324.5	37.0	20.2	22.5	18.7	15.9	23.1	24.8	24.7	24.3	24.6	28.1	27.3	29.7	3.7
Pd	koz	1,406.4	138.3	108.8	113.7	94.5	81.0	108.7	104.1	119.1	135.7	113.1	92.5	95.3	90.3	11.3
Cu	Mlb	340.3	15.5	23.6	24.7	22.1	23.5	28.6	27.1	33.7	41.5	33.6	21.8	24.5	16.6	3.5
PdEq net of credits	koz	2,579.2	211.1	185.6	196.3	167.4	155.2	203.6	197.5	227.5	263.5	221.9	177.3	185.4	162.5	24.5
CuEq net of credits	Mlb	1,096.2	89.7	78.9	83.4	71.1	66.0	86.5	83.9	96.7	112.0	94.3	75.4	78.8	69.1	10.4

Note: *Ag = silver, Au = gold, Cu = copper, CuEq = copper equivalent, Pd = palladium, PdEq = palladium equivalent, Pt = platinum, k = thousands, M = millions.*

Table 22.3
Financial Model Summary

Generation Mining   Marathon Project, Ontario

FINANCIAL MODEL

Canadian dollars unless otherwise stated

Au US$/oz	Ag US$/oz	Pt US$/oz	Pd US$/oz	Cu US$/lb	Fx Rate US$:CDN$
$1,300	$16.00	$900	$1,275	$3.00	$1.32

	Units	Inputs	Totals	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
MINE PRODUCTION																			
Waste Mined	t		270,150,998		6,139,199	17,647,160	17,748,579	18,337,377	24,242,891	30,708,985	29,556,771	27,834,635	23,381,377	21,497,005	14,433,776	14,160,310	13,956,121	10,506,812	
Process Feed Mined	t		89,422,421		1,061,046	6,352,629	6,251,825	5,662,409	5,756,925	5,291,099	6,443,162	6,165,617	8,618,649	10,502,912	11,566,411	5,839,503	6,043,914	3,866,320	
Total Material Mined	t		359,573,419		7,200,245	23,999,789	24,000,404	23,999,786	29,999,816	36,000,084	35,999,933	34,000,252	32,000,026	31,999,917	26,000,187	19,999,813	20,000,035	14,373,132	
Strip Ratio	w:o		3.0		5.8	2.8	2.8	3.2	4.2	5.8	4.6	4.5	2.7	2.0	1.2	2.4	2.3	2.7	
Stockpile Reclaim	t		25,177,724			737,097	677,928	889,922	1,628,000	968,024	2,488,006	2,812,503	953,174	290,020	1,142,231	3,392,504	2,474,659	4,618,907	2,104,749
PROCESSING				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Process Feed	tpy		89,422,397			3,687,326	4,939,142	5,002,094	5,002,095	5,001,695	7,698,080	7,998,229	7,997,972	7,998,095	7,998,232	7,998,228	7,998,231	7,998,230	2,104,749
NSR	$CAD/t feed		$48.39			$96.05	$63.03	$65.83	$56.14	$52.05	$44.36	$41.42	$47.71	$55.28	$46.55	$37.19	$38.90	$34.09	$19.52
Au	g/t		0.07			0.13	0.08	0.09	0.08	0.08	0.07	0.07	0.07	0.08	0.07	0.07	0.07	0.06	0.04
Ag	g/t		1.52			1.1	0.8	1.1	1.1	1.3	1.4	1.5	1.6	1.9	1.9	1.8	1.9	1.6	1.4
Pt	g/t		0.21			0.49	0.24	0.26	0.22	0.20	0.18	0.18	0.19	0.20	0.19	0.19	0.19	0.19	0.10
Pd	g/t		0.69			1.57	0.95	0.98	0.82	0.72	0.62	0.57	0.66	0.76	0.63	0.50	0.52	0.48	0.24
Cu	%		0.22			0.24	0.28	0.29	0.26	0.28	0.22	0.20	0.25	0.31	0.25	0.16	0.18	0.12	0.10
Mass Pull for Copper Concentrate @ 19% Cu	%		1.06%			1.14%	1.33%	1.37%	1.23%	1.33%	1.04%	0.95%	1.18%	1.47%	1.18%	0.76%	0.85%	0.57%	0.47%
Concentrate Tonnes (dry)	dmt		951,200			41,919	65,509	68,713	61,605	66,338	80,222	75,773	94,713	117,446	94,716	60,618	68,195	45,464	9,970
Concentrate tonnes (wet)	wmt	8.0%	1,027,296			45,273	70,749	74,210	66,533	71,645	86,640	81,835	102,290	126,841	102,293	65,468	73,651	49,101	10,767
REVENUE				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Copper Concentrate @ 19% Cu	$US / dmt					$ 6,421	$ 3,612	$ 3,642	$ 3,464	$ 2,983	$ 3,235	$ 3,323	$ 3,062	$ 2,861	$ 2,987	$ 3,729	$ 3,467	$ 4,558	$ 3,133
Total NSR Revenue	USD(000)		$ 3,288,528			$ 269,160	$ 236,592	$ 250,246	$ 213,405	$ 197,862	$ 259,546	$ 251,781	$ 290,029	$ 336,004	$ 282,952	$ 226,067	$ 236,435	$ 207,218	$ 31,232
Total NSR Revenue	CAD(000)		$ 4,327,011			$ 354,158	$ 311,305	$ 329,271	$ 280,796	$ 260,345	$ 341,507	$ 331,291	$ 381,617	$ 442,111	$ 372,305	$ 297,456	$ 311,099	$ 272,655	$ 41,095
NSR per tonne feed	$CAD/t feed		$48.39			$96.05	$63.03	$65.83	$56.14	$52.05	$44.36	$41.42	$47.71	$55.28	$46.55	$37.19	$38.90	$34.09	$19.52
OPERATING COST				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Mining Cost	CAD/t matl	$2.34	$ 825,443			$ 59,424	$ 58,875	$ 57,270	$ 64,297	$ 72,613	$ 73,862	$ 72,623	$ 71,069	$ 71,886	$ 63,880	$ 56,208	$ 56,017	$ 46,232	$ 1,187
Processing Cost 5Mtpa	CAD/t feed	$9.54	$ 225,453			$ 35,177	$ 47,119	$ 47,720	$ 47,720	$ 47,716									
Processing Cost 8Mtpa	CAD/t feed	$8.70	$ 572,373								$ 66,973	$ 69,585	$ 69,582	$ 69,583	$ 69,585	$ 69,585	$ 69,585	$ 69,585	$ 18,311
Processing Cost	CAD/t feed	$8.92	$ 797,826			$ 35,177	$ 47,119	$ 47,720	$ 47,720	$ 47,716	$ 66,973	$ 69,585	$ 69,582	$ 69,583	$ 69,585	$ 69,585	$ 69,585	$ 69,585	$ 18,311
G&A (reduces after yr 5)	CAD/t feed	$1.51	$ 86,855			$ 5,568	$ 7,458	$ 7,553	$ 7,553	$ 7,553	$ 7,021	$ 6,079	$ 6,078	$ 6,079	$ 6,079	$ 6,079	$ 6,079	$ 6,079	$ 1,600
Total operating Cost	CAD(000)		$ 1,710,125			$ 100,169	$ 113,453	$ 112,543	$ 119,570	$ 127,882	$ 147,856	$ 148,287	$ 146,729	$ 147,548	$ 139,543	$ 131,872	$ 131,680	$ 121,895	$ 21,098
Unit Operating	$/t feed		$19.12			$27.17	$22.97	$22.50	$23.90	$25.57	$19.21	$18.54	$18.35	$18.45	$17.45	$16.49	$16.46	$15.24	$10.02
Unit Mining Cost	$/t feed		$9.23			$16.12	$11.92	$11.45	$12.85	$14.52	$9.59	$9.08	$8.89	$8.99	$7.99	$7.03	$7.00	$5.78	$0.56
Unit Mining Cost	$/t material		$2.34			$2.48	$2.45	$2.39	$2.14	$2.02	$2.05	$2.14	$2.22	$2.25	$2.46	$2.81	$2.80	$3.22	$0.56
G&A Cost	$/t feed		$0.97			$1.51	$1.51	$1.51	$1.51	$1.51	$0.91	$0.76	$0.76	$0.76	$0.76	$0.76	$0.76	$0.76	$0.76
CAPITAL COSTS				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Initial Project Capital	CAD('000)		$ 431,057	$ 202,691	$ 228,366														
Total Sustaining Capital	CAD('000)		$ 276,958			$ 20,836	$ 26,503	$ 27,403	$ 26,145	$ 40,851	$ 29,756	$ 15,905	$ 13,688	$ 12,637	$ 8,175	$ 8,310	$ 6,975	$ 6,775	$ 33,000
Total Capital	CAD('000)		$ 708,015	$ 202,691	$ 228,366	$ 20,836	$ 26,503	$ 27,403	$ 26,145	$ 40,851	$ 29,756	$ 15,905	$ 13,688	$ 12,637	$ 8,175	$ 8,310	$ 6,975	$ 6,775	$ 33,000
CASH FLOW				Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14
Revenue from Concentrate	CAD('000)		$ 4,327,011			$ 354,158	$ 311,305	$ 329,271	$ 280,796	$ 260,345	$ 341,507	$ 331,291	$ 381,617	$ 442,111	$ 372,305	$ 297,456	$ 311,099	$ 272,655	$ 41,095
(-) Operating Cost	CAD('000)		-$ 1,710,125			-$ 100,169	-$ 113,453	-$ 112,543	-$ 119,570	-$ 127,882	-$ 147,856	-$ 148,287	-$ 146,729	-$ 147,548	-$ 139,543	-$ 131,872	-$ 131,680	-$ 121,895	-$ 21,098
(-) Working Capital	CAD('000)	$ 16,695				-$ 16,695													$ 16,695
(-) Capital Spending	CAD('000)		-$ 708,015	-$ 202,691	-$ 228,366	-$ 20,836	-$ 26,503	-$ 27,403	-$ 26,145	-$ 40,851	-$ 29,756	-$ 15,905	-$ 13,688	-$ 12,637	-$ 8,175	-$ 8,310	-$ 6,975	-$ 6,775	-$ 33,000
Pre-Tax Cashflow	CAD('000)		$ 1,908,872	-$ 202,691	-$ 228,366	$ 216,458	$ 171,349	$ 189,325	$ 135,081	$ 91,613	$ 163,895	$ 167,099	$ 221,199	$ 281,926	$ 224,586	$ 157,275	$ 172,445	$ 143,985	$ 3,692
(-) Taxes	CAD('000)		-$ 481,658			-$ 17,931	-$ 16,678	-$ 23,271	-$ 26,456	-$ 21,621	-$ 38,618	-$ 37,225	-$ 53,076	-$ 70,538	-$ 55,397	-$ 38,816	-$ 43,326	-$ 36,427	-$ 2,279
After-Tax Cashflow	CAD('000)		$ 1,427,214	-$ 202,691	-$ 228,366	$ 198,527	$ 154,671	$ 166,054	$ 108,625	$ 69,992	$ 125,278	$ 129,874	$ 168,123	$ 211,389	$ 169,189	$ 118,459	$ 129,119	$ 107,558	$ 1,413
Discounted AT Annual Cash Flow	CAD('000)	5.0%	$ 870,898	-$ 202,691	-$ 217,491	$ 180,070	$ 133,611	$ 136,613	$ 85,111	$ 52,229	$ 89,033	$ 87,904	$ 108,373	$ 129,774	$ 98,921	$ 65,962	$ 68,475	$ 54,324	$ 680
Cumulative Discounted AT Cash Flow	CAD('000)			-$ 202,691	-$ 420,182	-$ 240,112	-$ 106,502	$ 30,112	$ 115,223	$ 167,452	$ 256,484	$ 344,388	$ 452,762	$ 582,536	$ 681,457	$ 747,420	$ 815,894	$ 870,218	$ 870,898

Net Present Value			Pre-Tax	After-Tax
	NPV (0%)	$M	$ 1,909	$ 1,427
	NPV (5%)	$M	$ 1,184	$ 871
	IRR	%	35.1%	30.0%
	Payback period	yrs		2.5

Note: *Ag = silver, Au = gold, Cu = copper, CuEq = copper equivalent, Pd = palladium, PdEq = palladium equivalent, Pt = platinum.*

22.1 SENSITIVITY ANALYSIS

Key economic assumptions were examined by running sensitivity analysis on the following to determine their relative importance as value drivers:

- Palladium price.
- Operating costs.
- Capital costs.
- Discount rate.

Sensitivity results on the value drivers are presented in Table 22.4 to 22.7.

TABLE 22.4
PALLADIUM PRICE SENSITIVITY

% of Base Case	55	71	86	Base Case	118	133	149
US$/oz Pd	700	900	1,100	**1,275**	1,500	1,700	1,900
NPV (5% discount after-tax CDN$M)	255	469	684	**871**	1,112	1,326	1,540
IRR %	13.4	19.6	25.3	**30.0**	35.8	40.8	45.7
Payback (years)	6.4	4.0	2.9	**2.5**	2.1	1.8	1.6

TABLE 22.5
AFTER-TAX NPV AT 5% DISCOUNT RATE SENSITIVITY (CDN$M)

Sensitivity % of Base Case	-20	-10	0	+10	+20
OPEX	973	922	**871**	820	769
CAPEX	1,048	960	**871**	782	694

TABLE 22.6
AFTER-TAX IRR SENSITIVITY (%)

Sensitivity % of Base Case	-20	-10	0	+10	+20
OPEX	38.1	33.7	**30.0**	26.9	24.3
CAPEX	33.9	32.0	**30.0**	27.9	25.8

TABLE 22.7 AFTER-TAX DISCOUNT RATE NPV SENSITIVITY	
Discount Rate (%)	**NPV (CDN$M)**
0	1,427
5	871
6	790
8	648
10	531

Figure 22.1 presents a sensitivity analysis on after-tax NPV at a 5% discount rate to palladium price, operating costs and capital costs. Figure 22.2 presents sensitivity analyses on after-tax IRR to palladium price, operating costs and capital costs.

FIGURE 22.1 NPV SENSITIVITY ANALYSES

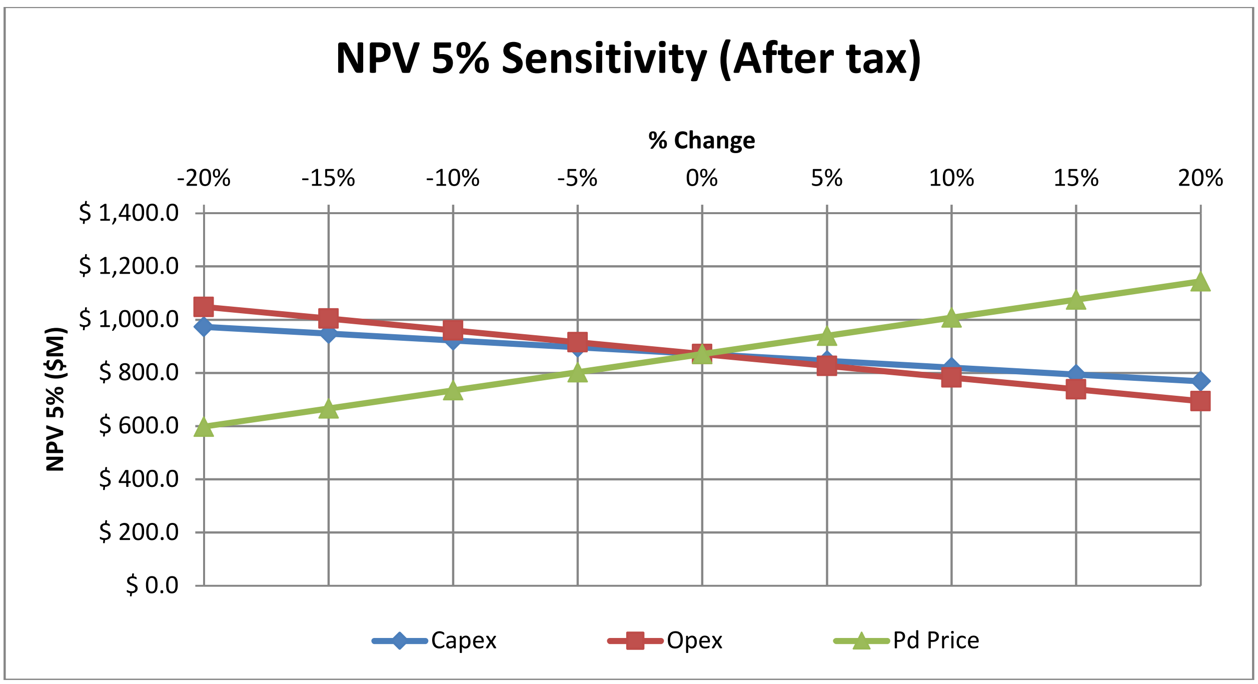
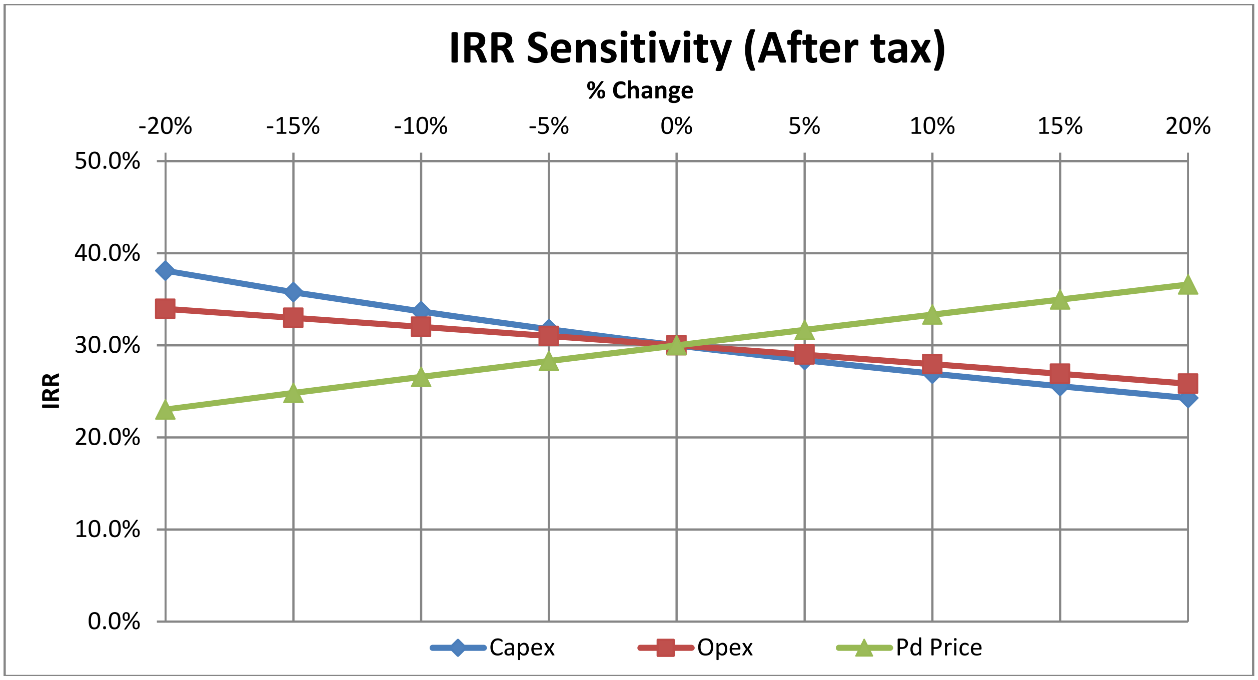


FIGURE 22.2 IRR SENSITIVITY ANALYSES



23.0 ADJACENT PROPERTIES

23.1 INTRODUCTION

Since its acquisition of the Marathon Property in January 2004, Marathon PGM Corp. systematically added to its land position through the periodic optioning, purchasing and staking of adjacent lands, as has Gen Mining in 2019. The PGM-Cu mineralization appears to extend onto some of these lands that had been the subject of drilling by Anaconda in the 1960s. A 12 km strike length of the mineralized trend that runs along the contact between the intrusive gabbro of the Coldwell Complex and the older volcanic and sedimentary rock is now covered by the land package controlled by Gen Mining.

23.2 REGIONAL PROPERTIES

The Marathon Deposit is one of two contact-type PGM deposits in the Coldwell Complex that have been described in the literature (Good and Crocket, 1994). The second is the Geordie Deposit which Marathon PGM Corp. acquired in 2008 and is located within the current Gen Mining Property boundaries.

Cu-Ni-PGM exploration in northern Ontario has been focused in five regions as follows: Marathon to Manitouwadge area; Nipigon region; Shebandowan district; Norton-McFaulds Lake Group or Ring of Fire region; and, the East Bull Lake District or River Valley area (Figure 23.1). These five regions have drawn interest from multiple exploration and mining companies because of the high potential for further Cu- Ni-PGM discovery and development.

FIGURE 23.1 LOCATION MAP OF OTHER PGM (CU, NI) EXPLORATION PROJECTS IN NORTHERN ONTARIO

Source: *Stillwater Canada Inc. (2014)*

23.2.1 Lac Des Iles Deposit

One similar deposit to Marathon is the Lac des Iles Mine. Although the Lac des Iles Deposit, owned and operated currently by North American Palladium Ltd. (“NAP”), is geographically related to and has some similarities with the Marathon Deposit, there are many dissimilarities, including age of formation (2.69 Ga for Lac des Isles compared with 1.1 Ga for the Marathon Deposit), dominant mineralization textures, and overall style of mineralization and metal ratios.

The Marathon Deposit contains mineralization textures that are considered fairly typical of contact style mineralization, while textures of the Lac des Iles Deposit display some fundamental differences to that type of deposit. The Marathon Deposit is very fresh and coarse grained when compared with Lac des Iles. The Lac des Iles Deposit is metamorphosed and hydrothermally altered, which translates to a significant difference in metallurgy. Despite the lower palladium grade in the Marathon Deposit, recoveries are similar to Lac des Iles due to the differences in alteration and texture.

The Lac des Iles Deposit is not localized near the contact between the host intrusion and the country rocks and evidence of the assimilation of the host rocks is entirely lacking. Instead, the mineralization at Lac des Iles has many features in common with layered intrusion-hosted deposits, in which pulses of primitive magma introduced the PGM. However, unlike the quiescent magma chambers of most layered deposits, the magmas at Lac des Iles were intruded energetically, forming breccias and magma mingling textures.

The mineralization at Lac des Iles has less Pt with respect to Pd, compared to the Marathon Deposit and most other PGM deposits. With Pd:Pt ratios of 10:1, Lac des Iles stands in marked contrast to other deposits in the general vicinity (e.g. Marathon) where Pd:Pt ratios average approximately 4:1.

23.2.2 Thunder Bay North Property

The Thunder Bay North property, formerly held by Australia's Magma Metals Pty Ltd. Is located approximately 50 km north-northeast of Thunder Bay and covers an area of approximately 700 km^2. Magma Metals was incorporated in 2005 and listed on the TSX in November 2009. The Thunder Bay North Property was its principal project. Panoramic Resources Ltd purchased the property from Magma in 2012.

Diamond drilling on the northwestern part of the Current Lake Intrusive Complex formed the basis for an initial Mineral Resource Estimate. Currently 145,000 m of diamond drilling has been carried out. Magma Metals has initiated a preliminary assessment of the project and released a PEA in 2011 of its Thunder Bay North PGM-Cu-Ni Project. In 2012 Magma Metals was acquired by Panoramic Resources Ltd. Currently Rio Tinto Exploration Canada Inc. ("RTEC") holds an option to earn a 70% interest in the property by spending up to $20M over five years. In January 2017, RTEC confirmed that it had achieved the minimum expenditures on the project. In 2017 the reported Mineral Resources were: Indicated: 9.83 Mt at 2.34/t PtEq for 741,000 PtEq oz and Inferred Mineral Resources of 0.53 Mt at 2.87 PtEq for 49,000 PtEq oz (http://panoramicresources.com/thunder-bay-north-pgm-project).

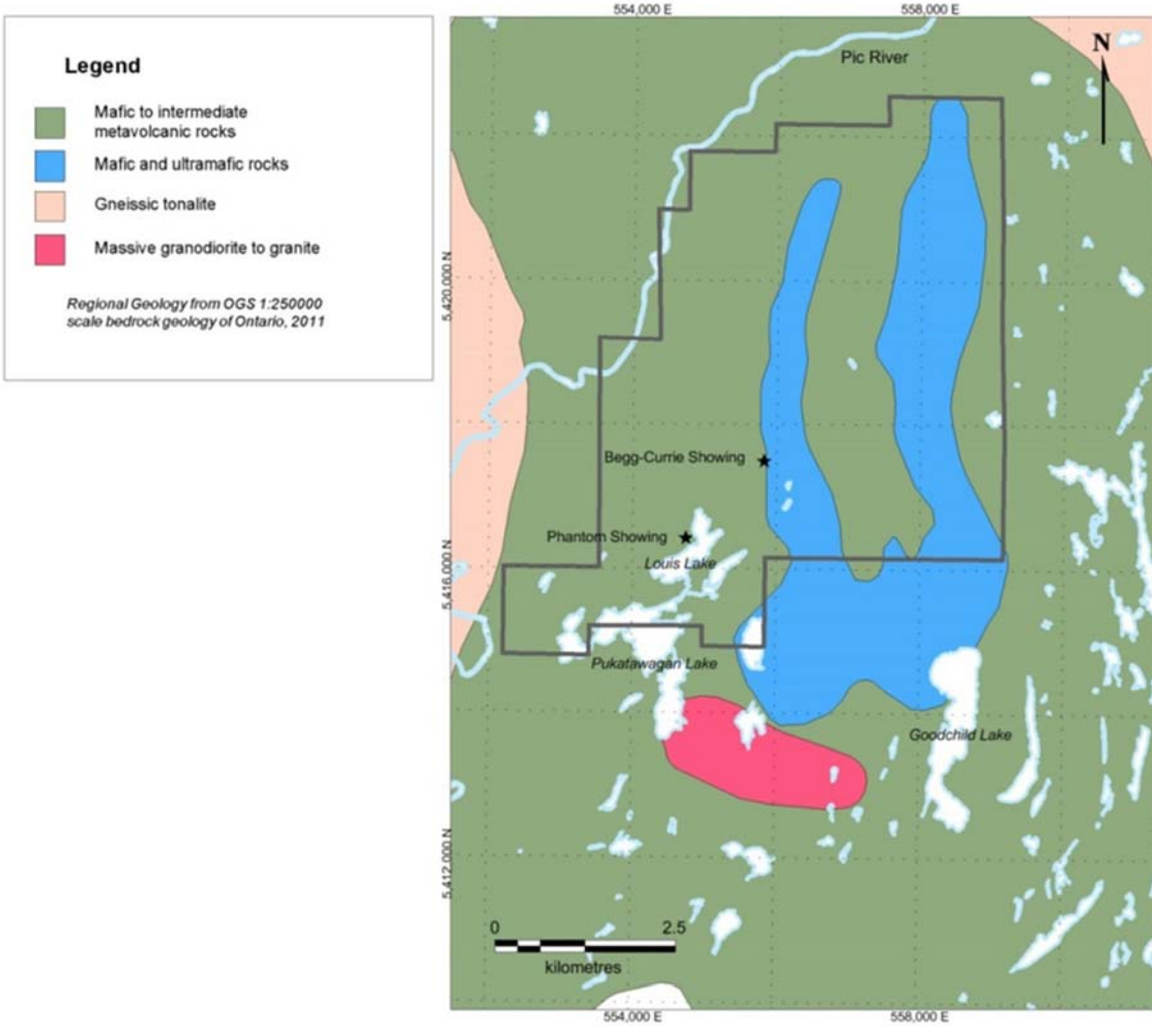
23.2.3 Goodchild Property

The Goodchild property is located 20 km northeast of the Town of Marathon and is accessible by helicopter from the Marathon airport. The property consists of approximately 19 contiguous mining claims held by Benton Resources Inc.

The Goodchild property is located within the Heron Bay Archean Greenstone Belt. It is underlain by an assemblage of supracrustal rocks, predominantly mafic 370etavolcanics rocks (basalts) with minor interflow sedimentary rocks including graphitic slate, argillites and iron formation. The supracrustal rocks have been metamorphosed to lower amphibolite facies and trend northeast. The sequence has been intruded by the Goodchild Ultramafic complex which is centered north of Goodchild Lake (Figure 23.2).

The Goodchild Ultramafic complex has a general north-south trend and is comprised of two limbs. The complex is identified as a magnetic high on airborne surveys and measures 8 km long by 4 km wide. The major rock units are serpentinized peridotite, dunite and minor spinifex textured komatiite. Minor units of pyroxenite and gabbro have also been observed.

FIGURE 23.2 MAP OF THE GOODCHILD ULTRAMAFIC COMPLEX



Note: Claim boundary for Benton Capital property. Regional geology from the Ontario Geological Survey.
Source: *Stillwater Canada Inc. (2014)*

23.2.3.1 Beggs-Currie and Phantom Occurrences

Two main showings referred to as Beggs-Currie and Phantom occur within the boundary of the Benton Resources Inc. claims (Figure 23.2). These occurrences have a long history of exploration.

The Beggs-Currie Showing consists of a sulphide breccia zone along the contact between the mafic volcanic rocks and ultramafic intrusive rocks. It has been described as “composed of 50% ultramafic rock and 50% massive pyrrhotite + chalcopyrite”. Grab samples from this zone have returned values up to 12.6% Ni and 0.295% Co.

The Phantom showing is a quartz vein hosted pyrrhotite + chalcopyrite zone associated with shear zones. This style of mineralization has been observed in the footwall mafic volcanics at the

Beggs-Currie Showing. Grab samples at the Phantom Showing have returned values of up to 1.27% Ni and 0.2% Cu. The Beggs-Currie showing has a higher Ni tenor relative to the Phantom Showing.

23.2.4 Other Occurrences in the Nipigon Region

Other known early stage exploration Cu-Ni-PGM properties within the Nipigon Region are listed in Table 23.1.

TABLE 23.1
EARLY STAGE CU-NI-PGM PROSPECTS IN THE NIPIGON REGION

Property	Location	Company	Rock Type	Mineralization	Sample Grades
Eva Kitto	153 km NE of Thunder Bay	Bethlehem Mining Corp, Minfocus Exploration, Rainy Mountain	Ultramafic intrusion		
Seagull	60 km NE of Thunder Bay	Trillium North Minerals, Black Panther Mining Corp. & Rainy Mountain Corp.	Gabbro-Pyroxenite	Disseminated Chalcopyrite	0.44 m @7.9 g/t TPGM 1.72 m @ 3.25 g/t TPGM, 4.28 m @ 1.77 g/t TPGM
Nipigon Reef Seagull North	North of Seagull	Minfocus Exploration Ltd.	Gabbro-Pyroxenite Intrusion		
Weese- Luella	25 km north of Armstrong	Minfocus Exploration Ltd.	Anorthosite, Gabbro-peridotite		3.2% Cu, 1.3% Ni over 10 m
Awkward Lake	50 km south of Armstrong	Cascadia International Resources Inc.	Gabbro	Disseminated to massive chalcopyrite, pentlandite and pyrrhotite	Drilling – 0.21% Cu, 0.33% Ni over 4.5 m grab sample in massive sulphide, 4.53% Ni
Sunday Lake	25 km NE of Thunder Bay	Transition Metals Corp., Implats	Mafic to ultramafic intrusion	Semi-massive vein; disseminated to blebby Cu and Po	3.22 g/t TPGM over 20.2 m
Hele	75 km NE of Thunder Bay	Transition Metals Corp., HTX Minerals Corp.	Mafic-ultramafic intrusion		No significant mineralization

Note: *TPGM = total PGM (platinum group metals).*

24.0 OTHER RELEVANT DATA AND INFORMATION

24.1 RISKS AND OPPORTUNITIES

Several Project risks and opportunities were identified during the PEA, as follows:

24.1.1 Risks

24.1.1.1 Mining

- In a PEA the level of cost accuracy is such that capital and operating cost escalations can occur with more detailed study. This could be due to price escalations or changes in design scope. The contingency applied in the PEA cost estimate may not accurately reflect these cost increases.

- Pit slope designs are based on geotechnical and hydrogeological studies completed from surface. Once pit operations commence and pit wall mapping is undertaken, structural changes could impact on design wall angles or the water inflows.

24.1.1.2 Processing

- Supplementary metallurgical testwork is recommended on fresh drill core to reach a Feasibility Study confidence level of metal recoveries and grades. Testwork should be performed on a representative Deposit sample of approximately 1 tonne to confirm optimum Pd metallurgical performance.

- Additional optimization of fine grinding size for both Cu and PGM rougher concentrates could reduce possible uncertainty in grind size targets and grinding method.

- Specific process testwork is needed on the concentration of sulphides from fresh as-produced PGM rougher tails.

- Tests should be performed on bulk process solids (no sulphide separation) to simulate particle behaviour on disposal and investigate the possible natural segregation of fine sulphides to wet zones in the PSMF.

- An optimization study should be conducted on primary and secondary grinding: SAG-ball mill, secondary ball mill for 5 Mtpa, and include the consideration of proficient expansion to 8 Mtpa.

- Process plant and infrastructure construction is estimated to be completed within 18 months. Any delay will incur additional capital costs.

24.1.2 Opportunities

24.1.2.1 Mining

- It may be possible to access deeper process plant feed material and increase the mine life with additional pit wall pushbacks which will depend on future metal prices and economics.

- The location of the primary crusher can be optimized with the goal of reducing haul distances by using a conveyor. A trade-off study is warranted to review locating the primary crusher and low grade stockpile close to the North Pit entrance.

- Currently the mine plan cannot make use of pit backfilling. Detailed mine planning and pit sequencing may enable waste rock backfilling or tailings deposition to occur into portions of the mined-out pits. This would reduce the Project footprint and possibly reduce haulage operating and/or sustaining capital costs.

- Mining equipment procurement could be done through a vendor firm such as DBS SME Banking to reduce EPCM costs.

- The Geordie and Sally Deposits were not studied to determine if the Mineral Resources could be incorporated into the PEA mine plan. There is potential to extend the LOM since the Deposits are located within 16 km of the Marathon Deposit.

24.1.2.2 Processing

- Improved process recoveries and lower costs could be achieved by using recently-developed replacements or supplements of the PAX flotation agent. Batch tests should readily confirm potential.

- Simpler, lower cost process solids management is very likely if sulphide isolation is confirmed to be unnecessary to prevent ARD during operations and on closure.

- The logistics planning of all Project construction shipments could be optimized to reduce freight costs.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 INTRODUCTION

P&E concludes that the Marathon Project has favourable economic potential as an open pit mining operation, utilizing an on-site processing plant to produce a copper concentrate that contains PGM's.

The PEA results outline 89.4 Mt of process plant feed (inclusive of mining dilution and mining loss factors) with payable metals averaging 0.69 g/t Pd, 0.22% Cu, 0.21 g/t Pt, 0.07 g/t Au, and 1.52 g/t Ag for a PdEq grade of 1.26 g/t within three production open pits. The Project has an estimated initial capital cost of $431M, at a strip ratio of 3.0:1, and estimated economics of an after-tax NPV of $871M at a 5% discount rate, an after-tax IRR of 30%, and a 2.5-year payback period using metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and an exchange rate of CDN$1.00 = US$0.76.

P&E recommends that Gen Mining advance the Marathon Project with further drill exploration, metallurgical testwork, and a Feasibility Study with the intention of moving the Project towards a production decision.

The following itemizes the conclusions that can be drawn from the information provided in this PEA.

25.2 MINERAL RESOURCE ESTIMATES

The Marathon Property is located approximately 10 km north of the Town of Marathon, Ontario which is situated adjacent to the Trans-Canada Highway No. 17 on the northeast shore of Lake Superior. Gen Mining owns a 51% interest (with an option to earn up to an 80% interest through a Joint Venture arrangement) in the Marathon Deposit and the Property from Stillwater Canada Inc. (a wholly owned subsidiary of Sibanye Gold Limited). This increase in ownership would be obtained through spending of $10 million and preparing a Preliminary Economic Assessment within four years of the Property acquisition date marked as July 11, 2019. Gen Mining acts as the operator of the joint venture and once Gen Mining reaches an 80% interest, a Joint Venture between Gen Mining and Stillwater Canada Inc. will be formed.

The original Marathon Property held by Stillwater Canada Inc. from 2010 to 2019 has since been enlarged by Gen Mining through the periodic staking of unpatented mining claims. During the summer of 2019 Gen Mining staked an additional 215 claim blocks totalling 4,558 ha. This increases Gen Mining's land position to include 45 leases and 1,071 claims, or 21,965 ha (219.65 km^2) at the effective date of this Technical Report.

The Property is characterized by moderate to steep hilly terrain with a series of interconnected creeks and lakes surrounded by dense vegetation. During the past five decades, the Marathon Property has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drilling programs, geological studies, resource estimates, metallurgical studies, mining studies, and economic analyses.

The Marathon Property is situated along the eastern margin of the Coldwell Complex, which is part of the Keweenawan Supergroup of igneous, volcanic and sedimentary rocks that were emplaced around, and in the vicinity of the Mid-Continent Rift System. The Marathon Deposit is hosted by the Two Duck Lake Gabbro ("TDL Gabbro"), a late intrusive phase of the Eastern Gabbro. The Eastern Gabbro is a composite intrusion and occurs along the northern and eastern margin of the Proterozoic Coldwell Alkaline Complex ("CAC") which intrudes the much older Archean Schreiber-Hemlo greenstone belt. The entire CAC is believed to have intruded over a relatively short period of time near the beginning of the main stage of the Mid-Continent Rift magmatism that occurred between 1,108 and 1,094 Ma.

Drilling activities in 2019 were concurrent with the Technical Report compilation which occurred after the September 9, 2019 effective date of the Updated Mineral Resource Estimate which was used as the basis of this Technical Report. The majority of the 2019 drill holes tested greenfield targets external to pit constrained Mineral Resources at either Marathon, Sally and Geordie with the exception of 5 holes (M-19-530 to M-19-534, inclusive) drilled at Marathon for validation and metallurgical purposes and one hole (M-18-78) at Sally designed to test the down dip potential of the Keel Zone of the Sally Deposit.

Drill holes M-19-530 – M-19-534, inclusive, comprised three holes which tested the W Horizon and two which tested the Marathon Main Zone. With allowance for anticipated inhomogeneities within the mineralized zones drill results are consistent with historical results. Similarly, drill holes which tested extensions to the Sally Deposit both along strike and down dip encountered mineralization which is also consistent with historical results.

Drilling and sampling procedures, sample preparation, and assay protocols are generally conducted in agreement with best practices. Verification of the drill hole collars, surveys, assays, core, and drill hole logs indicates that the Marathon PGM-Cu Project data is reliable. Based on the QA/QC program, the data is sufficiently reliable to support the Mineral Resource Estimates generated for three Deposits on the Property (Marathon, Geordie and Sally).

The Mineral Resource block models have been constructed in conformance to industry standard practices. The geological understanding is sufficient to support the Mineral Resource Estimates. P&E considers that the information available for the Marathon, Geordie and Sally Deposits is reliable, demonstrates consistent geological and grade continuity, and in each case satisfies the requirements for a Mineral Resource Estimate.

The Mineral Resource for the Marathon Deposit is reported against an NSR cut-off value of \$13/t and constrained within an optimized pit shell. The Updated Mineral Resource Estimate is based on a total of 883 drill holes and 1,008 trenches totalling 199,343 m. The Measured plus Indicated Mineral Resource totals 179.2 Mt at an average grade of 0.56 g/t, Pd, 0.18 g/t Pt. 0.20% Cu, 0.07 g/t Au and 1.6 g/t Ag. The Inferred Mineral Resource totals 0.7 Mt with an average grade of 0.37 g/t Pd, 0.12 g/t Pt, 0.19% Cu, 0.05 g/t Au and 1.4 g/t Ag.

At an NSR cut-off value of \$25/t, the pit-constrained combined Measured and Indicated Mineral Resource is 116 Mt with an average grade of 0.73 g/t Pd, 0.23 g/t Pt, 0.25% Cu, 0.08 g/t Au and 1.7 g/t Ag. The Inferred Mineral Resource at this cut-off grade is estimated at 0.14 Mt with an average grade of 0.62 g/t Pd, 0.16 g/t Pt, 0.28% Cu, 0.05 g/t Au and 0.9 g/t Ag.

The Geordie and Sally Deposits are located within 16 km of the Marathon Deposit.

At an NSR cut-off value of $15/t and constrained within an optimized pit shell, the Geordie Indicated Mineral Resource totals 17.3 Mt at an average grade of 0.56 g/t Pd, 0.04 g/t Pt, 0.35% Cu, 0.05 g/t Au and 2.4 g/t Ag, and the Inferred Mineral Resource totals 12.9 Mt at an average grade of 0.51 g/t Pd, 0.03 g/t Pt, 0.28% Cu, 0.03 g/t Au and 2.4 g/t Ag.

At an NSR cut-off value of $15/t and constrained within an optimized pit shell, the Sally Indicated Mineral Resource totals 24.8 Mt at an average grade of 0.35 g/t Pd, 0.20 g/t Pt, 0.17% Cu, 0.07 g/t Au and 0.7 g/t Ag, and the Inferred Mineral Resource totals 14.0 Mt at an average grade of 0.28 g/t Pd, 0.15 g/t Pt, 0.19% Cu, 0.05 g/t Au and 0.6 g/t Ag.

Neither the Geordie nor Sally Mineral Resource Estimates were incorporated into the mine plan reported in this Technical Report.

25.3 MINING METHODS AND INFRASTRUCTURE

P&E completed this PEA based on an Updated Mineral Resource Estimate for the Marathon Deposit. The reporting of the Updated Mineral Resource Estimate complies with all disclosure requirements for Mineral Resources set out in the NI 43-101 Standards of Disclosure for Mineral Projects. The classification of the Updated Mineral Resource is consistent with CIM Definition Standards - For Mineral Resources and Mineral Reserves.

The potentially mineable portion of the Updated Mineral Resource Estimate was determined to be 89.4 Mt with an average grade of 0.69 g/t Pd, 0.21 g/t Pt, 0.22% Cu, 0.07 g/t Au and 1.52 g/t Ag from three open pits. Waste rock and overburden material was estimated at 270 Mt for a LOM strip ratio of 3.0:1.

Conventional open pit mining equipment and methodologies will be utilized. The major mining equipment (trucks, shovels, drills, wheel loaders, dozers, graders) will be leased in order to reduce initial capital costs. An explosives contractor will be hired for delivering and loading explosives into the blast holes. Other than explosives delivery, mining will be owner-operated.

The mine plan initially targets near-surface high-grade mineralization in the south of the Marathon Deposit, then advances to the northern area. Over the LOM, open pits are expanded in both the north and south areas, and a small open pit is developed in the centre area. The main waste rock storage facility has been designed to the east of the open pits, with a smaller storage facility on the east side of the PSMF area.

Property electrical energy requirements will be supplied by a short connection to the nearby Hydro One 115 kV electrical power grid.

Site buildings have been located near the southeast end of the Deposit, and will consist of the primary crusher, process plant, office complex, warehouse and workshop. A construction camp will be built at site and will remain operational for the first five years of mine life. When the camp closes, personnel will be responsible for their own housing and travel from local communities.

The process plant facilities will consist of the following:

- Primary crusher building;
- Enclosed crushed material stockpile facility;
- Grinding, flotation, thickening and filtration building that will also house areas for:
  - Offices,
  - Lunchroom,
  - Control room;
- Laboratory building, separate from the process plant;
- Reagents storage and mixing building;
- Spare parts warehouse building;
- Main electrical substation; and
- 2 MW emergency generator.

The PSMF embankments will be constructed in downstream mode with mine waste rock with a geomembrane layer underlain by two transition zones on the upstream face. The upstream embankment slopes will be 2H:1V. An HDPE geomembrane will be anchored into low permeability bedrock to minimize seepage from the facility. Construction steps include the removal of overburden and high permeability near-surface bedrock, placement of slush grout on the prepared bedrock surface and/or the injection grouting into deeper, more permeable bedrock zones as required.

PSMF embankments will be constructed using Type 1 mine rock that is NAG (Non-Acid Generating). A total of 39.5 Mt of mine rock will be used to construct the PSMF embankments over the LOM. Ongoing monitoring, sampling and testing of the mine rock will be completed during the initial construction and during subsequent embankment lifts to confirm that the mine rock used in the embankment constructions is NAG.

The PSMF will ultimately be built in two cells, with the ability of one cell to contain a cover of 1 m of water to submerge PAG process solids. PSMF pond water will be reconditioned and recycled to the process plant.

Three water treatment facilities will be operated during the Project operations:

- Reclaim water treatment facility. PSMF reclaimed water, surface run-off, and open pit water will be combined for use in the process plant and for fire suppression water.

- A conventional septic-type system will be associated with the site camp. Process plant and administration facilities will be equipped with sewage storage facilities that are pumped on a regular basis by a commercial operator.

- Effluent treatment facility, drawing excess water from the PSMF ponds. The Marathon Project facility will be a net-discharge facility. Treated discharge to the environment will meet all provincial and federal discharge limits for total suspended solids, metals, pH, biological toxicity etc.

25.4 RECOVERY METHODS

Metallurgical testwork results and flowsheet design for the Marathon Project originate from a series of bench scale metallurgical tests at multiple laboratories over several years. The extensive metallurgical testing has indicated recoveries of PGM's and Cu to be reasonably high and relatively consistent. Tests included crushing, grinding, as well as batch, cycle and mini pilot scale froth flotation testing. The most recent tests focused on confirming circuit stability, maximizing concentrate grade and representing a split Cu-PGM flowsheet with fine grinding and multiple cleaning stages in each flotation circuit.

Process plant recoveries for this PEA were determined by P&E to be: Copper – 92% in production years 1 to 5 when copper grades are highest, and 90% for production years 6 onwards to the end of LOM; Palladium – 82.9%; Platinum – 74.5%; Gold – 73.2%; and Silver – 71.5%.

For the first five production years, the Marathon process plant will treat 5 Mtpa of mineralized material by using the following major components and processes:

- crushing and grinding to a moderate grain size;
- froth flotation of a copper rougher concentrate which is re-ground and re-floated several times for copper grade improvement;
- re-grinding of the copper flotation tails and a PGM rougher flotation concentrate is recovered;
- the PGM concentrate is re-ground and re-floated to improve PGM grade; and
- the Cu and PGM concentrates are combined, thickened, filtered and prepared for shipment to a smelter.

From production year six onwards to the end of LOM, the process plant will treat 8 Mtpa after incorporating the following components:

- increased crushing capacity - initial crushing achieved by operating additional hours, second stage crushing added;
- increased grinding capacity – addition of a ball mill;
- increased flotation capacity – addition of float cells.

25.5 ENVIRONMENTAL AND SOCIAL CONSIDERATIONS

Detailed and comprehensive environmental baseline studies had been undertaken and essentially completed between 2005 to 2014, until the Project was put on hold in 2014. Since 2014, ongoing baseline monitoring and sampling has continued, and therefore no sampling opportunity has been lost during the suspension period.

In 2008 Marathon PGM Corp. had retained True Grit Consulting Ltd., and later in 2009 had engaged EcoMetrix, to assist in the development of a comprehensive environmental research program to support the acquisition of all the needed federal and provincial approvals and permits. Comprehensive data collection had been initiated in 2008 and much of this information was compiled with other Project information into a 2010 detailed Project Description to commence the Federal Environmental Assessment process. Subsequently, in June 2012 an Environmental Impact Statement ("EIS") Report was submitted to a federal and provincial Joint Review Panel ("JRP") which had been formed for the Project.

The environmental approval process can be expected to be revived. This will potentially save considerable time to obtain environmental approval compared with starting fresh and seeking individual federal and provincial government decisions. The complex permitting for construction and operation process will commence following approval of the Environmental Assessment ("EA") by the provincial and federal Environment Ministries.

Up to when the Project was suspended in 2014, a series of consultations and negotiations and/or agreements, had been engaged with local indigenous communities and the Town of Marathon. In the last five years, while limited in scope, social and community engagement and consultation activity has continued. To date there are no community benefit agreements ("CBA's") with any community.

25.6 ECONOMIC ANALYSIS

Open pit mining costs have been estimated to average $2.34/t material over the LOM. At a strip ratio of 3.0:1, mining costs equate to $9.23/t of process plant feed. Processing costs ($8.92/t) and site G&A ($0.97/t) contribute to a total LOM average cost estimated at $19.12/t processed.

Initial capital costs are estimated at $431M and include a 10% contingency. Sustaining capital costs are estimated at $277M for mining equipment capital leases, PSMF and process plant expansion and mine closure.

Using the PEA metal pricing of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and an exchange rate of CDN$1.00 = US$0.76, the Project has an estimated pre-tax NPV at a 5% discount of $1,184M and an IRR of 35%. After-tax NPV and IRR are estimated at $871M and 30%, respectively.

Project economics are more leveraged to metal prices and exchange rate, with lesser leverage to capital and operating costs.

The PEA has highlighted several opportunities to increase Project economics and reduce identified risks. These include opportunities to optimize the mining and processing plans, along with the opportunity to expand the Geordie and Sally Mineral Resource Estimates through further exploration, with the intent of establishing Mineral Reserves at the two Deposits.

26.0 RECOMMENDATIONS

P&E considers the Marathon Project as a significant PGM and copper Mineral Resource with a well-defined mineralized trend and model. It is P&E's opinion that the Project has demonstrated favourable economics at current metal prices, and should be advanced to a Feasibility Study for production consideration. The PEA has shown that the Marathon Deposit can be mined by open pit methods at an initial production rate of 5 Mtpa for a period of five years, subsequently increasing production to 8 Mtpa until the end of mine life.

The process plant is designed to produce a Cu-PGM concentrate through two flotation circuits to optimize Cu and PGM metal recoveries. The PEA estimates that over the 14-year LOM a total of 2.6 Moz of PdEq will be recovered at an average diluted grade of 1.26 g/t PdEq. This also equates to a total of 1.1 billion pounds of CuEq recovered over the LOM.

At metal prices of US$1,275/oz Pd, US$3/lb Cu, US$900/oz Pt, US$1,300/oz Au, US$16/oz Ag and a CDN$ to US$ exchange rate of 0.76, the PEA demonstrates favourable economic returns with an estimated after-tax NPV5% of $871M and after-tax IRR of 30%. Pre-tax figures are NPV5% of $1,184M and IRR of 35%. Revenue contributions are 54.4% from Pd, 31.1% from Cu, 8.9% from Pt, 4.6% from Au, and 1.0% from Ag.

It is P&E's opinion that the Marathon Property has significant potential to increase Mineral Resources. The Geordie Deposit has a recent updated Mineral Resource Estimate, and the Sally Deposit has a recent initial Mineral Resource Estimate, and further exploration on both Deposits is warranted.

The following recommendations are related to production mining aspects of the Project:

- Currently the mine plan does not consider pit backfilling of waste rock or tailings. Detailed mine planning and pit sequencing may enable waste rock backfilling or tailings deposition to occur into portions of the mined-out pits depending upon production sequencing. This would reduce the Project disturbance footprint and possibly reduce haulage and/or sustaining capital costs; and

- Mining equipment procurement could be done through a vendor firm such as DBS SME Banking to reduce EPCM costs.

P&E has reviewed the tailings management strategy in past engineering studies and offers the following recommendations for improvement:

- Increasing the Cu and PGM process streams thickening underflow to at least 50% solids is recommended. This reduces pumping costs for tailings and pond water recycle, and the warm water from thickener overflows may be beneficial to the flotation processes, and requires further analysis;

- A higher thickened tailings slurry discharge will result in higher final in-facility density, potentially assisting in defining the closure strategy;

- To manage PAG and NAG process solids, two process solids streams were suggested in previous environmental studies during the EA. One alternative is the use of injection discharge for one stream from a floating barge by a lance into a zone below the settled solids-pond water interface; and

- The storage of Type 2 process solids underwater in mined-out satellite open pits, in later years of Project operation, is a reasonable possibility. This should be preceded by the confirmation that no potential Mineral Resources are sterilized by backfilling the specific pits.

The following actions related to the process plant and environmental aspects are recommended:

- Supplementary metallurgical testwork is recommended on fresh drill core to reach a Feasibility Study confidence level of metal recoveries and grades. Testwork should be performed on a representative Deposit sample of approximately 1 tonne to confirm optimum Pd metallurgical performance and to generate representative bulk process solids (PGM rougher and cleaner-scavenger tails);

- Additional optimization of fine grinding size for both Cu and PGM rougher concentrates would confirm metallurgical process grind size targets and grinding methodology;

- Determine the amount of alkalinity (lime or limestone) that could be added to bulk process solids to ensure NAG;

- An optimization study should be conducted on primary and secondary grinding: SAG-ball mill, secondary ball mill for 5 Mtpa, and include the consideration of proficient expansion to 8 Mtpa; and

- Improved process recoveries and lower costs could be achieved by using recently developed replacements or supplements of the PAX flotation agent. Batch tests should readily confirm potential.

Specific opportunities for advancing the Property include:

- Project Administration (ongoing environmental baseline studies, work permits, community relations, supervision and office expenses, and government financial assistance opportunities for accommodation construction);

- Further exploration drilling in areas external to the Marathon Deposit, to include surface mapping and prospecting, surface and downhole geophysics, and diamond drilling;

- Further work is recommended on the Geordie and Sally Deposits to determine their potential; and

- Marathon Deposit – Feasibility Study, including metallurgical drilling and related studies.

The proposed work program is estimated at $5.5M as summarized in Table 26.1.

Table 26.1 Recommended Work Program and Budget	
Program	**Budget ($ M)**
Project administration	1.0
Exploration external to Marathon Deposit	1.0
Feasibility Study	3.5
Total	**5.5**

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28.0 CERTIFICATES

CERTIFICATE OF QUALIFIED PERSON

EUGENE PURITCH, P. ENG., FEC, CET

I, Eugene J. Puritch, P. Eng., FEC, CET, residing at 44 Turtlecreek Blvd., Brampton, Ontario, L6W 3X7, do hereby certify that:

1. I am an independent mining consultant and President of P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I am a graduate of The Haileybury School of Mines, with a Technologist Diploma in Mining, as well as obtaining an additional year of undergraduate education in Mine Engineering at Queen's University. In addition, I have also met the Professional Engineers of Ontario Academic Requirement Committee's Examination requirement for Bachelor's Degree in Engineering Equivalency. I am a mining consultant currently licensed by the: Professional Engineers and Geoscientists New Brunswick (License No. 4778); Professional Engineers, Geoscientists Newfoundland and Labrador (License No. 5998); Association of Professional Engineers and Geoscientists Saskatchewan (License No. 16216); Ontario Association of Certified Engineering Technicians and Technologists (License No. 45252); Professional Engineers of Ontario (License No. 100014010); Association of Professional Engineers and Geoscientists of British Columbia (License No. 42912); and Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (No. L3877). I am also a member of the National Canadian Institute of Mining and Metallurgy.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   I have practiced my profession continuously since 1978. My summarized career experience is as follows:
   - Mining Technologist - H.B.M.& S. and Inco Ltd., 1978-1980
   - Open Pit Mine Engineer – Cassiar Asbestos/Brinco Ltd., 1981-1983
   - Pit Engineer/Drill & Blast Supervisor – Detour Lake Mine, 1984-1986
   - Self-Employed Mining Consultant – Timmins Area, 1987-1988
   - Mine Designer/Resource Estimator – Dynatec/CMD/Bharti, 1989-1995
   - Self-Employed Mining Consultant/Resource-Reserve Estimator, 1995-2004
   - President – P&E Mining Consultants Inc, 2004-Present
4. I have visited the Property that is the subject of this Technical Report numerous times between 2005 and 2010.
5. I am responsible for co-authoring Sections 1, 14, 25, 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Reports titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019 and "Updated Technical Report and Preliminary Economic Assessment on the Marathon PGM-Cu Property Marathon Area, Thunder Bay Mining District, Northwestern Ontario, Canada", with an effective date of April 5, 2007.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020

Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Eugene Puritch]

Eugene Puritch, P.Eng., FEC, CET

CERTIFICATE OF QUALIFIED PERSON

ANDREW BRADFIELD, P. ENG.

I, Andrew Bradfield, P. Eng., residing at 5 Patrick Drive, Erin, Ontario, N0B 1T0, do hereby certify that:

1. I am an independent mining engineer contracted by P&E Mining Consultants.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I am a graduate of Queen's University, with an honours B.Sc. degree in Mining Engineering in 1982. I have practiced my profession continuously since 1982. I am a Professional Engineer of Ontario (License No.4894507). I am also a member of the National CIM.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   I have practiced my profession continuously since 1982. My summarized career experience is as follows:

   - Various Engineering Positions – Palabora Mining Company, 1982-1986
   - Mines Project Engineer – Falconbridge Limited, 1986-1987
   - Senior Mining Engineer – William Hill Mining Consultants Limited, 1987-1990
   - Independent Mining Engineer, 1990-1991
   - GM Toronto – Bharti Engineering Associates Inc, 1991-1996
   - VP Technical Services, GM of Australian Operations – William Resources Inc, 1996-1999
   - Independent Mining Engineer, 1999-2001
   - Principal Mining Engineer – SRK Consulting, 2001-2003
   - COO – China Diamond Corp, 2003-2006
   - VP Operations – TVI Pacific Inc, 2006-2008
   - COO – Avion Gold Corporation, 2008-2012
   - Independent Mining Engineer, 2012-Present
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 2, 3, 19, 22, 24 and co-authoring Sections 1, 18, 21, 25, 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had no prior involvement with the Project that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1. This Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signing Date: July 6, 2020

{SIGNED AND SEALED}
[Andrew Bradfield]

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Andrew Bradfield, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

JARITA BARRY, P.GEO.

I, Jarita Barry, P.Geo., residing at 4 Creek View Close, Mount Clear, Victoria, Australia, 3350, do hereby certify that:

1. I am an independent geological consultant contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I am a graduate of RMIT University of Melbourne, Victoria, Australia, with a B.Sc. in Applied Geology. I have worked as a geologist for a total of 14 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by Engineers and Geoscientists British Columbia (License No. 40875), Professional Engineers and Geoscientists Newfoundland & Labrador (License No. 08399) and Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (License No. L3874). I am also a member of the Australasian Institute of Mining and Metallurgy of Australia (Member No. 305397);

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:
   - Geologist, Foran Mining Corp. 2004
   - Geologist, Aurelian Resources Inc. 2004
   - Geologist, Linear Gold Corp. 2005-2006
   - Geologist, Búscore Consulting 2006-2007
   - Consulting Geologist (AusIMM) 2008-2014
   - Consulting Geologist, P.Geo. (APEGBC/AusIMM) 2014-Present
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Section 11, and co-authoring Sections 1, 12, 25, and 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101. I am independent of the Vendor and the Property.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Jarita Barry]

____
Jarita Barry, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

FRED H. BROWN, P.GEO.

I, Fred H. Brown, of PO Box 332, Lynden, WA, USA, do hereby certify that:

1. I am an independent geological consultant and have worked as a geologist continuously since my graduation from university in 1987.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I graduated with a Bachelor of Science degree in Geology from New Mexico State University in 1987. I obtained a Graduate Diploma in Engineering (Mining) in 1997 from the University of the Witwatersrand and a Master of Science in Engineering (Civil) from the University of the Witwatersrand in 2005. I am registered with the South African Council for Natural Scientific Professions as a Professional Geological Scientist (registration number 400008/04), the Association of Professional Engineers and Geoscientists of British Columbia as a Professional Geoscientist (171602) and the Society for Mining, Metallurgy and Exploration as a Registered Member (#4152172).

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:
   - Underground Mine Geologist, Freegold Mine, AAC 1987-1995
   - Mineral Resource Manager, Vaal Reefs Mine, Anglogold 1995-1997
   - Resident Geologist, Venetia Mine, De Beers 1997-2000
   - Chief Geologist, De Beers Consolidated Mines 2000-2004
   - Consulting Geologist 2004-2008
   - P&E Mining Consultants Inc. – Sr. Associate Geologist 2008-Present
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for co-authoring Sections 1, 14, 25, and 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Fred H. Brown]

Fred H. Brown, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

DAVID BURGA, P.GEO.

I, David Burga, P. Geo., residing at 3884 Freeman Terrace, Mississauga, Ontario, do hereby certify that:

1. I am an independent geological consultant contracted by P & E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I am a graduate of the University of Toronto with a Bachelor of Science degree in Geological Sciences (1997). I have worked as a geologist for over 20 years since obtaining my B.Sc. degree. I am a geological consultant currently licensed by the Association of Professional Geoscientists of Ontario (License No 1836).

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:
   - Exploration Geologist, Cameco Gold 1997-1998
   - Field Geophysicist, Quantec Geoscience 1998-1999
   - Geological Consultant, Andeburg Consulting Ltd. 1999-2003
   - Geologist, Aeon Egmond Ltd. 2003-2005
   - Project Manager, Jacques Whitford 2005-2008
   - Exploration Manager – Chile, Red Metal Resources 2008-2009
   - Consulting Geologist 2009-Present
4. I have visited the Property that is the subject of this Technical Report on April 4, 2012.
5. I am responsible for co-authoring Sections 1, 12, 25, and 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[David Burga]

____

David Burga, P.Geo.

CERTIFICATE OF QUALIFIED PERSON

D. GRANT FEASBY, P. ENG.

I, D. Grant Feasby, P. Eng., residing at 12,209 Hwy 38, Tichborne, Ontario, K0H 2V0, do hereby certify that:

1. I am currently the Owner and President of:
   FEAS - Feasby Environmental Advantage Services
   38 Gwynne Ave, Ottawa, K1Y1W9
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I graduated from Queens University in Kingston Ontario, in 1964 with a Bachelor of Applied Science in Metallurgical Engineering, and a Master of Applied Science in Metallurgical Engineering in 1966. I am a Professional Engineer registered with Professional Engineers Ontario. I have worked as a metallurgical engineer for over 50 years since my graduation from university.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report has been acquired by the following activities:
   - Metallurgist, Base Metal Processing Plant.
   - Research Engineer and Laboratory Manager, Industrial Minerals Laboratories in USA and Canada.
   - Research Engineer, Metallurgist and Plant Manager in the Canadian Uranium Industry.
   - Manager of Canadian National Programs on Uranium and Acid Generating Mine Tailings.
   - Director, Environment, Canadian Mineral Research Laboratory.
   - Senior Technical Manager, for large gold and bauxite mining operations in South America.
   - Expert Independent Consultant associated with several companies, including P&E Mining Consultants, on mineral processing, environmental management, and mineral-based radiation assessment.
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 13, 17, 20 and co-authoring Sections 1, 18, 21, 25, and 26 of this Technical Report.
6. I am independent of the issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[D. Grant Feasby]

D. Grant Feasby, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

KEN KUCHLING, P.ENG.

I, Ken Kuchling, P. Eng., residing at 33 University Ave., Toronto, Ontario, M5J 2S7, do hereby certify that:

1. I am a senior mining consultant with KJ Kuchling Consulting Ltd. located at #1903-33 University Ave, Toronto, Ontario Canada contracted by P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I graduated with a Bachelor's degree in Mining Engineering in 1980 from McGill University and a M. Eng degree in Mining Engineering from UBC in 1984. I have worked as a mining engineer for a total of 38 years since my graduation from university. My relevant work experience for the purpose of the Technical Report is 12 years as an independent mining consultant in commodities such as gold, copper, potash, diamonds, molybdenum, tungsten, and bauxite. I have practiced my profession continuously since 1980. I am a member of the Professional Engineers of Ontario.

   I have read the definition of "Qualified Person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.

   My relevant experience for the purpose of the Technical Report is:
   - Associate Mining Engineer, P&E Mining Consultants Inc. — 2011 – Present
   - Mining Consultant, KJ Kuchling Consulting Ltd. — 2000 – Present
   - Senior Mining Engineer, Diavik Diamond Mines Inc., — 1997 – 2000
   - Senior Mining Consultant, KJ Kuchling Consulting Ltd., — 1995 – 1997
   - Senior Geotechnical Engineer, Terracon Geotechnique Ltd., — 1989 - 1995
   - Chief Mine Engineer, Mosaic, Esterhazy K1 Operation. — 1985 – 1989
   - Mining Engineering, Syncrude Canada Ltd. — 1980 – 1983
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 15, 16 and co-authoring Sections 1, 18, 21, 25 and 26 of this Technical Report.
6. I am independent of the issuer applying the test in Section 1.5 of NI 43-101.
7. I have had no prior involvement with the Project that is the subject of this Technical Report.
8. I have read NI 43-101 and Form 43-101F1 and the Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Ken Kuchling]

____
Ken Kuchling, P.Eng.

CERTIFICATE OF QUALIFIED PERSON

BRUCE W. MACKIE, M.SC., P. GEO.

I, Bruce W. Mackie, P. Geo., residing at 339 Parkridge Crescent, Oakville, Ontario, L6M 1A8 do hereby certify that:

1. I am an independent geological consultant contracted by Generation Mining Limited.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I graduated with an Honours Bachelor of Science degree in Geology and Chemistry from the Carleton University in 1975 and with a Master of Science degree in Geology from University of Manitoba in 1978. I have worked as a geologist for a total of 40 years since obtaining my M.Sc. degree. I am a member of the Canadian Institute of Mining and Metallurgy and a P. Geo., Registered in the Province of Ontario (APGO No. 0585).

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
4. I have visited Marathon Deposit on behalf of Generation Mining Limited on May 4, 2019.
5. I am responsible for co-authoring Sections 1, 12, 25, and 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Bruce W. Mackie]

____
Bruce W. Mackie M.Sc., P. Geo.

CERTIFICATE OF QUALIFIED PERSON

PAUL PITMAN, P.GEO.

I, Paul W. Pitman, B.Sc., P.Geo., residing in Brampton, Ontario, do hereby certify that:

1. I am an independent consulting geologist since 1983, President of PWP Consulting and an independent consultant to P&E Mining Consultants Inc.
2. This certificate applies to the Technical Report titled "(Amended) Technical Report, Updated Mineral Resource Estimate and Preliminary Economic Assessment of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", (The "Technical Report") with an effective date of January 6, 2020.
3. I am an honours graduate of Carleton University, 1969 in geology and have been practicing continuously as a professional since graduation. I have been the principal of a geological consulting practice for a period of 35 years. I am a P.Geo., registered in the Province of Ontario (APGO # 0575). I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of education, affiliation with a profession association and past geological experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

   I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that, by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
4. I have not visited the Property that is the subject of this Technical Report.
5. I am responsible for authoring Sections 4 to 10, 23, and co-authoring Sections 1, 25, and 26 of this Technical Report.
6. I am independent of the Issuer applying the test in Section 1.5 of NI 43-101.
7. I have had prior involvement with the Project that is the subject of this Technical Report. I was a "Qualified Person" for a Technical Report titled "Technical Report, Updated Mineral Resource Estimate of the Marathon Deposit, Thunder Bay Mining District Northwestern Ontario, Canada", with an effective date of September 9, 2019.
8. I have read NI 43-101 and Form 43-101F1 and this Technical Report has been prepared in compliance therewith.
9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

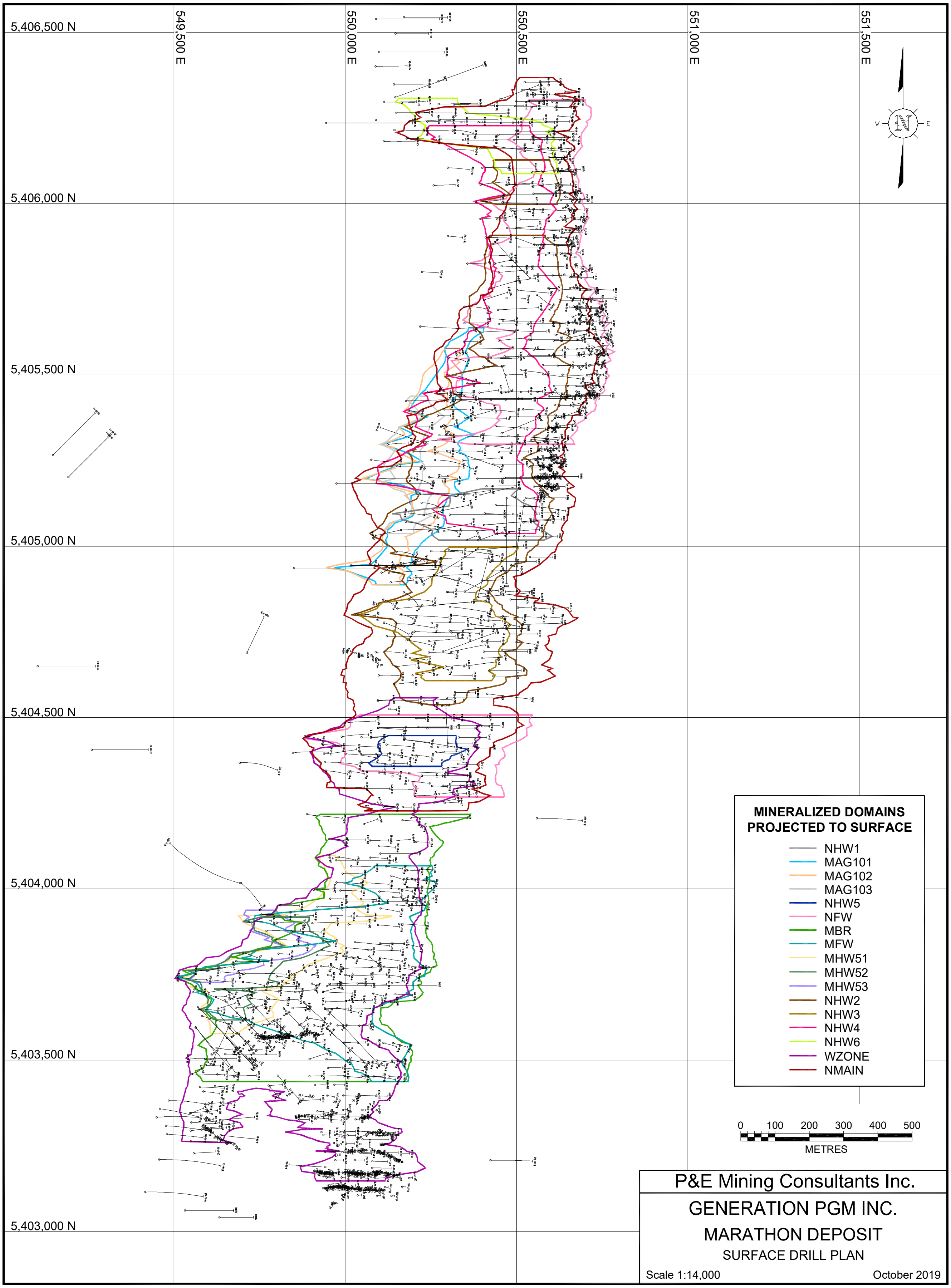
Effective Date: January 6, 2020
Signed Date: July 6, 2020

{SIGNED AND SEALED}
[Paul Pitman]

____

Paul W. Pitman, B.Sc. (P.Geo.)

APPENDIX A MARATHON SURFACE DRILL HOLE PLAN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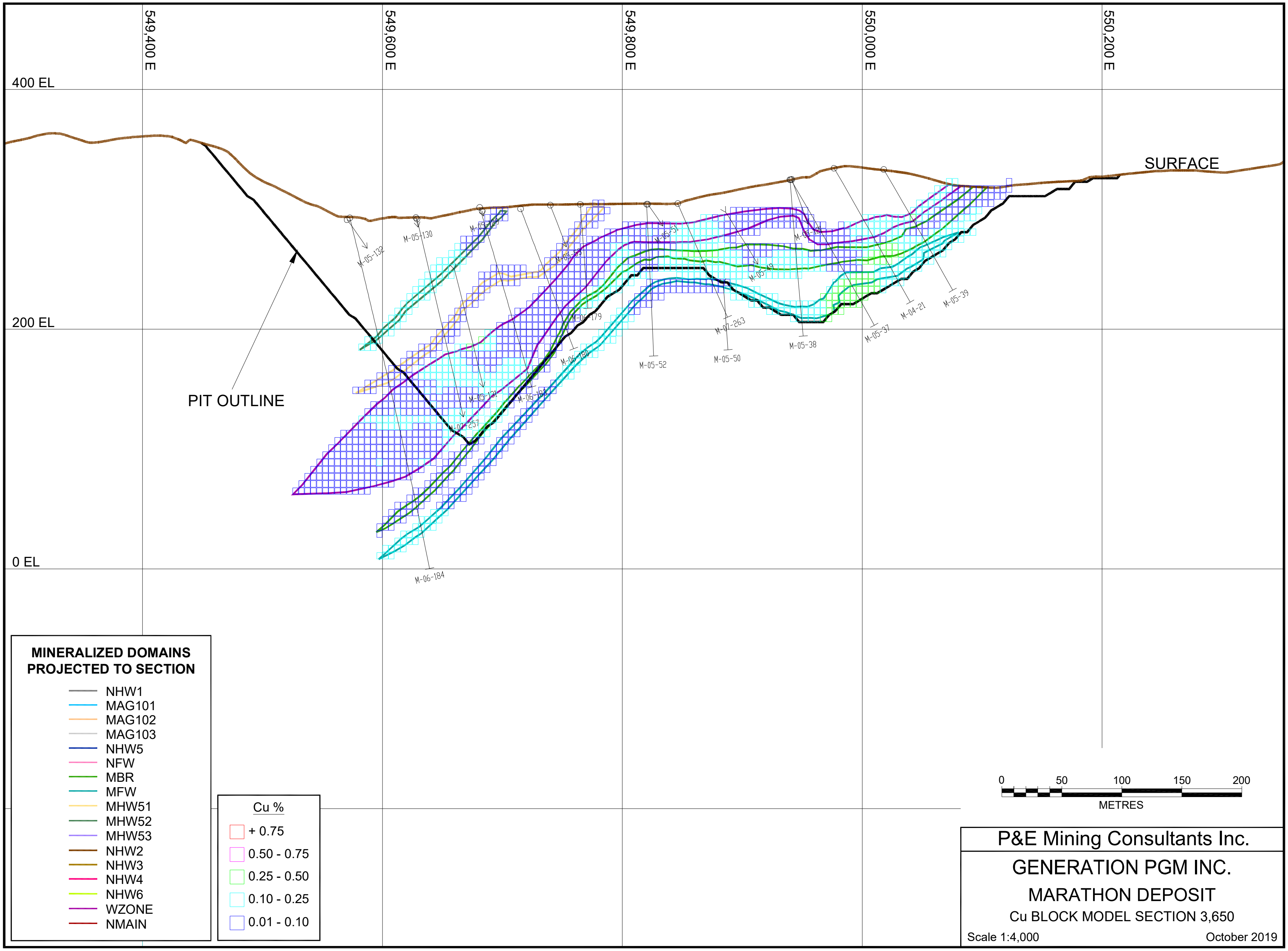
550,000 E
550,500 E
551,000 E
551,500 E
MINERALIZED DOMAINS PROJECTED TO SURFACE
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
SURFACE DRILL PLAN
Scale 1:14,000
October 2019

APPENDIX B MARATHON 3-D DOMAINS

MARATHON DEPOSIT - 3D DOMAINS

APPENDIX C MARATHON CU BLOCK MODEL CROSS SECTIONS AND PLANS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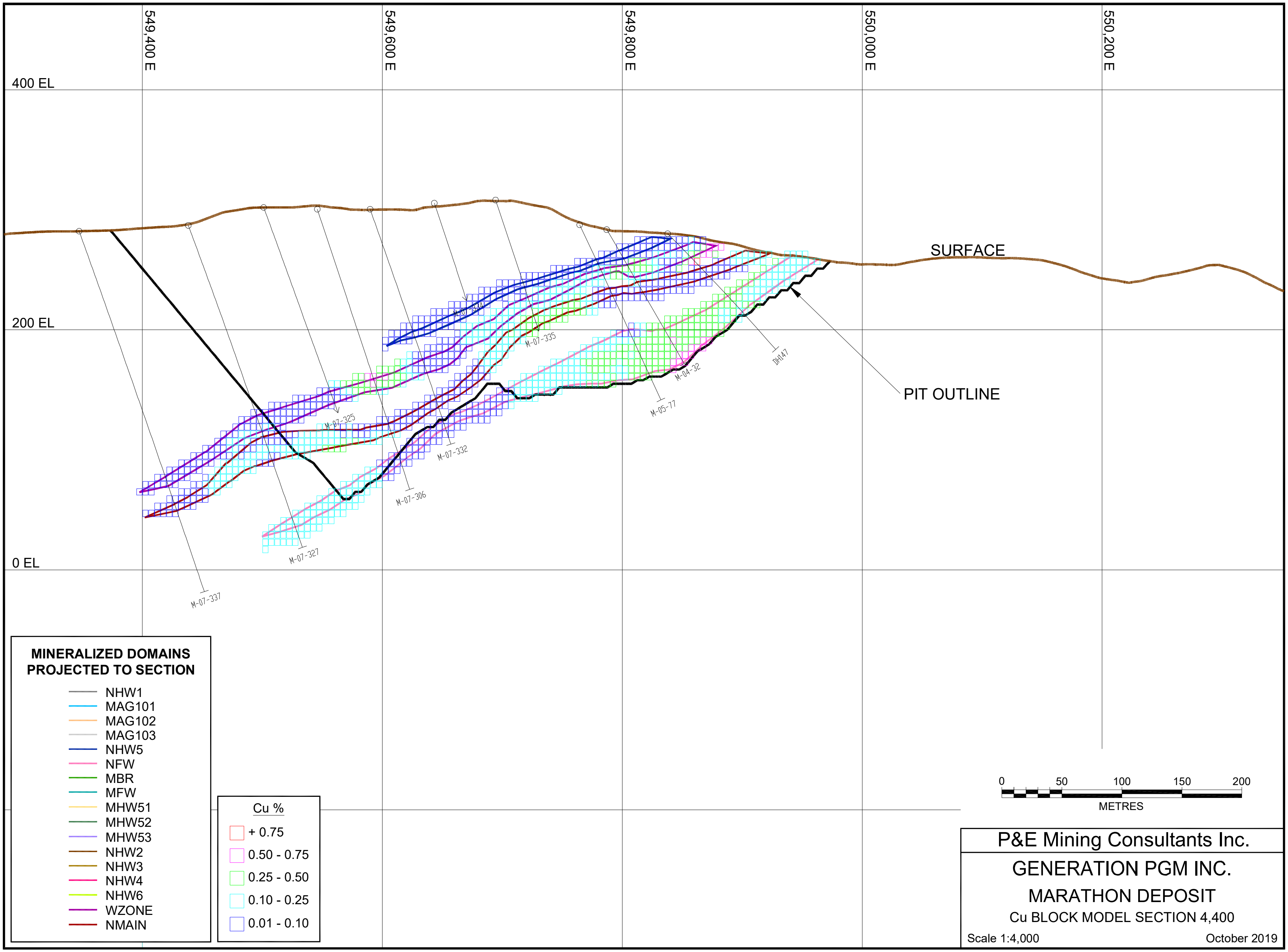
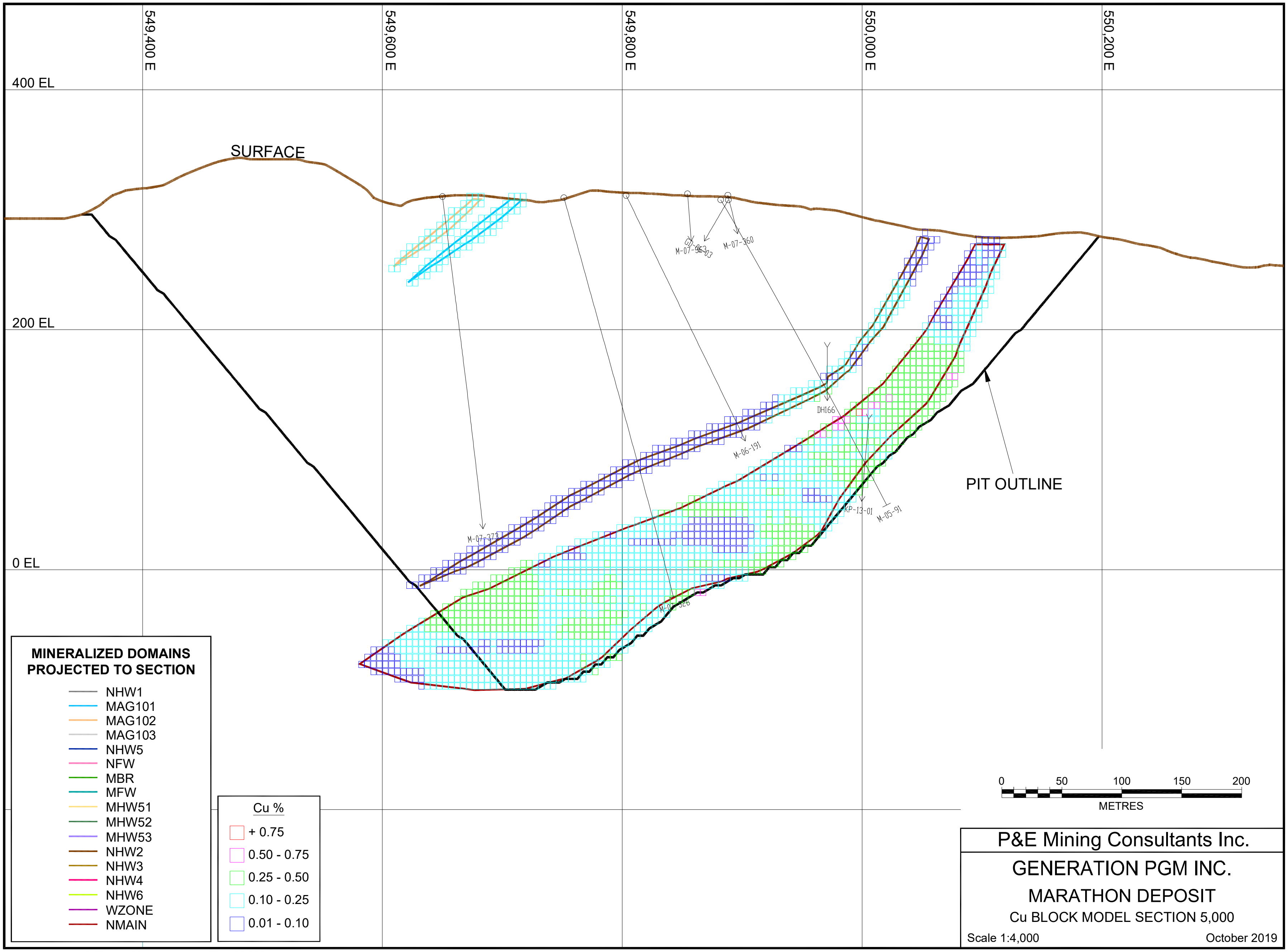
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 3,650
Scale 1:4,000
October 2019


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 4,400
Scale 1:4,000
October 2019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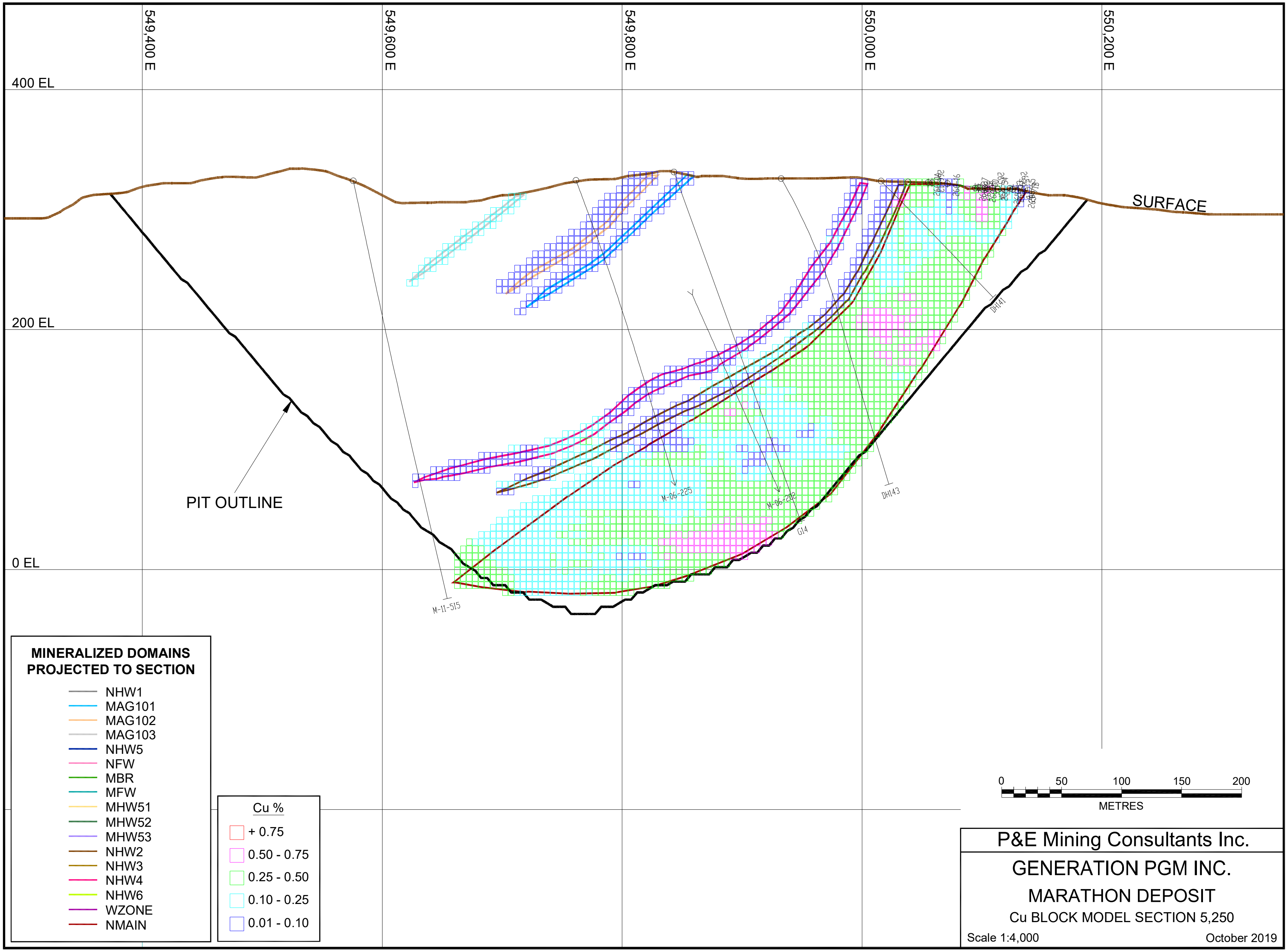
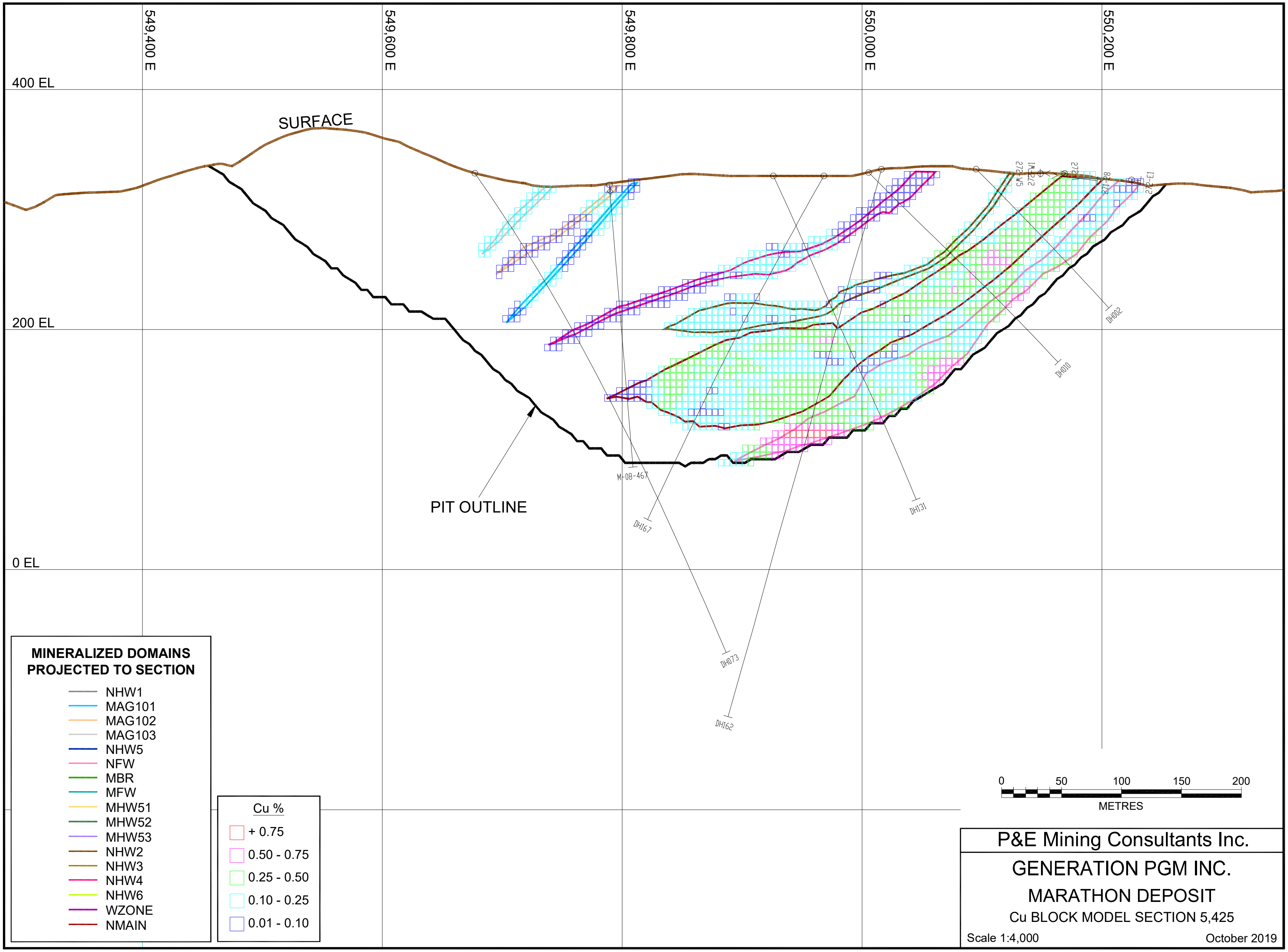
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 5,000
Scale 1:4,000
October 2019



549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 5,250
Scale 1:4,000
October 2019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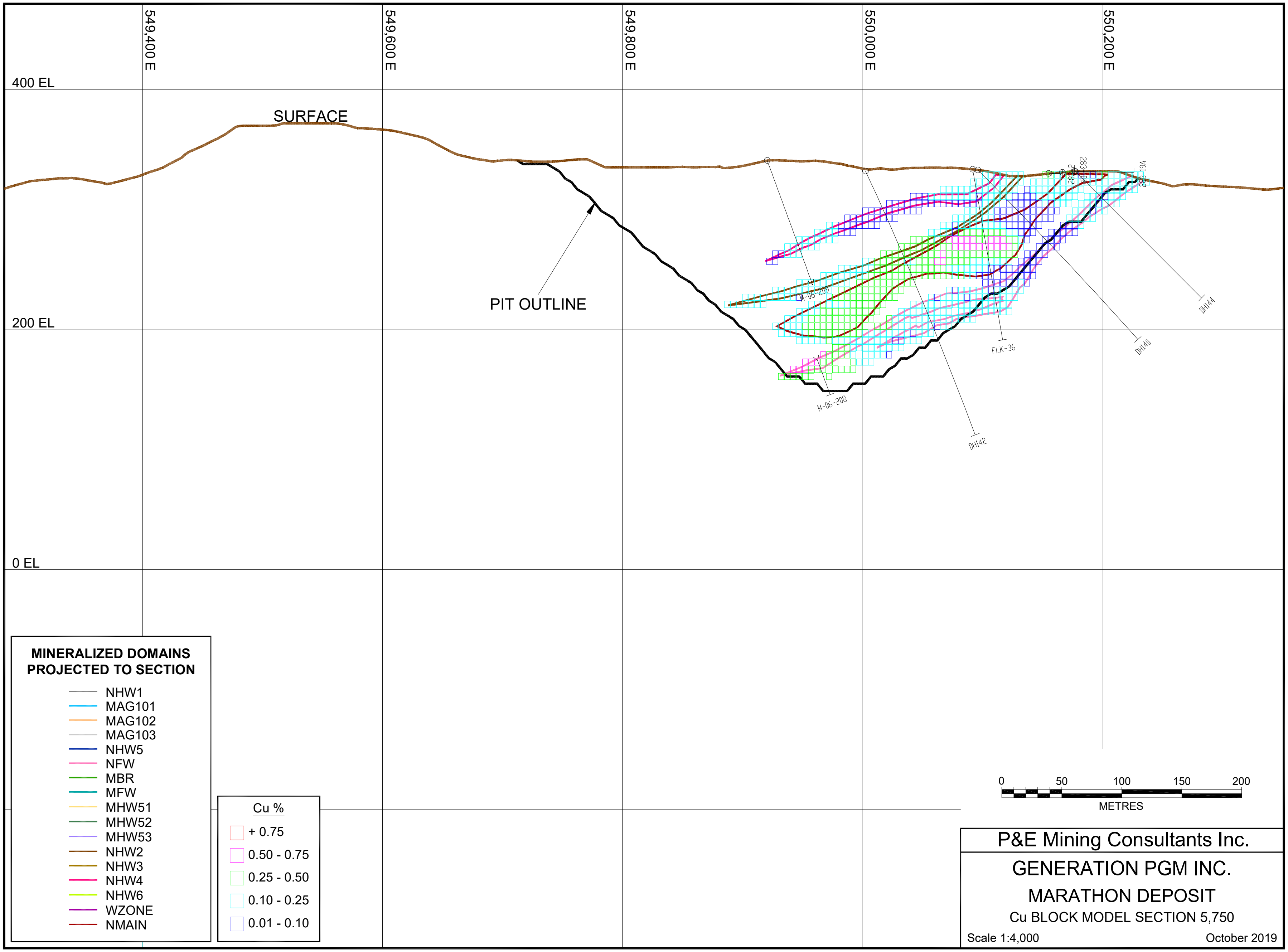
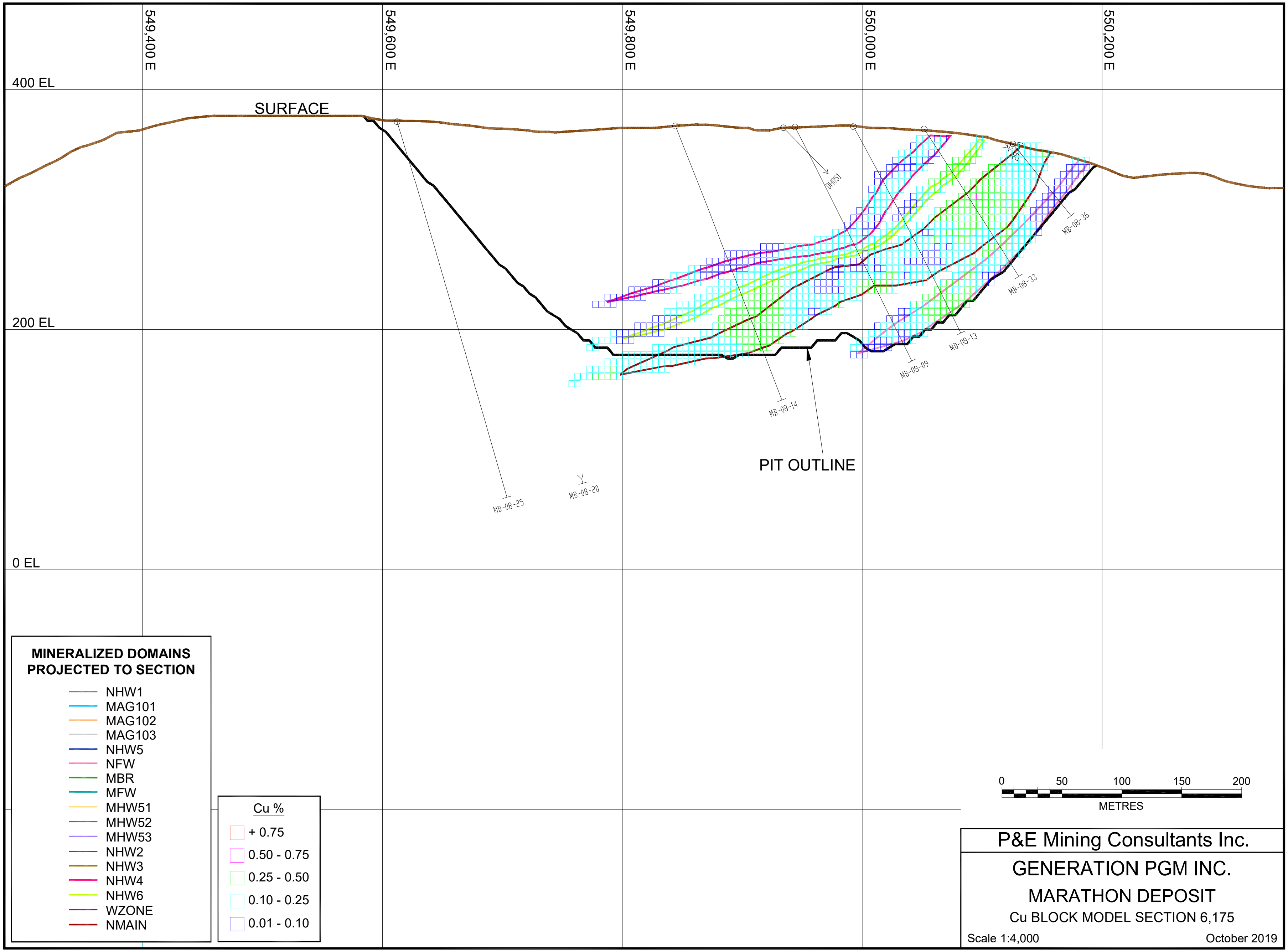
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 5,425
Scale 1:4,000
October 2019



549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 5,750
Scale 1:4,000
October 2019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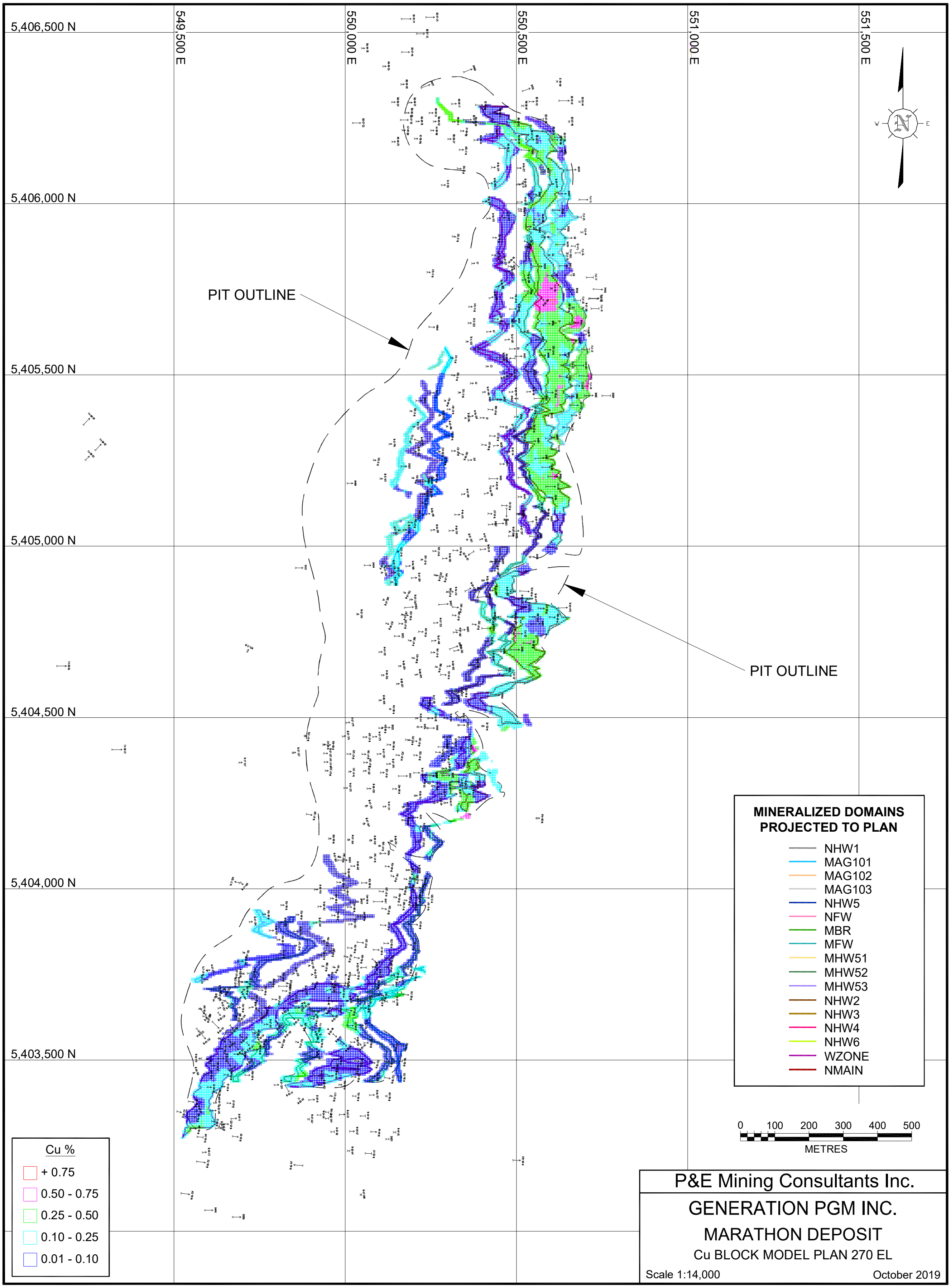
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MB-08-25
MB-08-20
MB-08-14
MB-08-09
MB-08-13
MB-08-33
MB-08-36
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL SECTION 6,175
Scale 1:4,000
October 2019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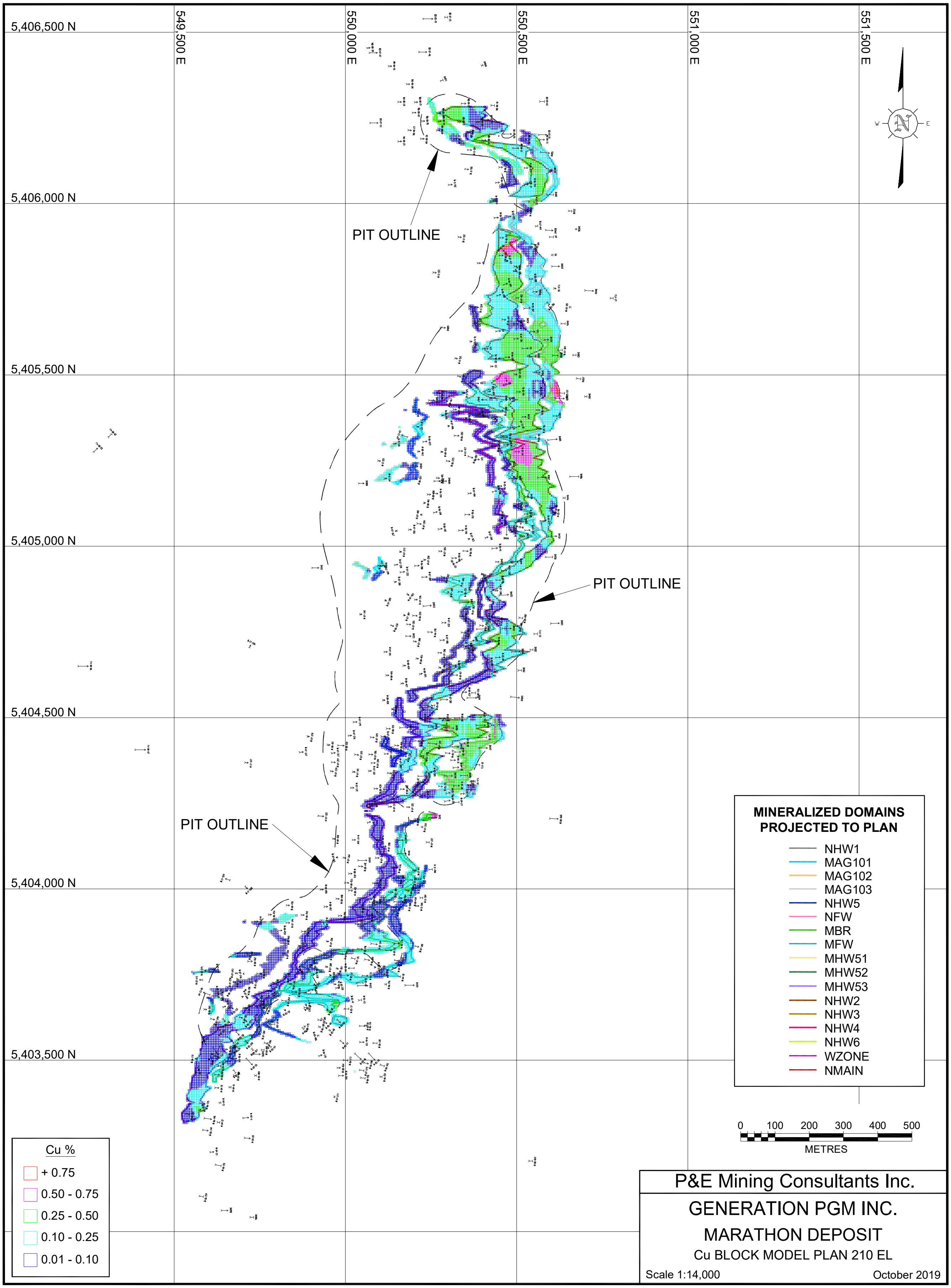
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0
100
200
300
400
500
METRES
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL PLAN 270 EL
Scale 1:14,000
October 2019



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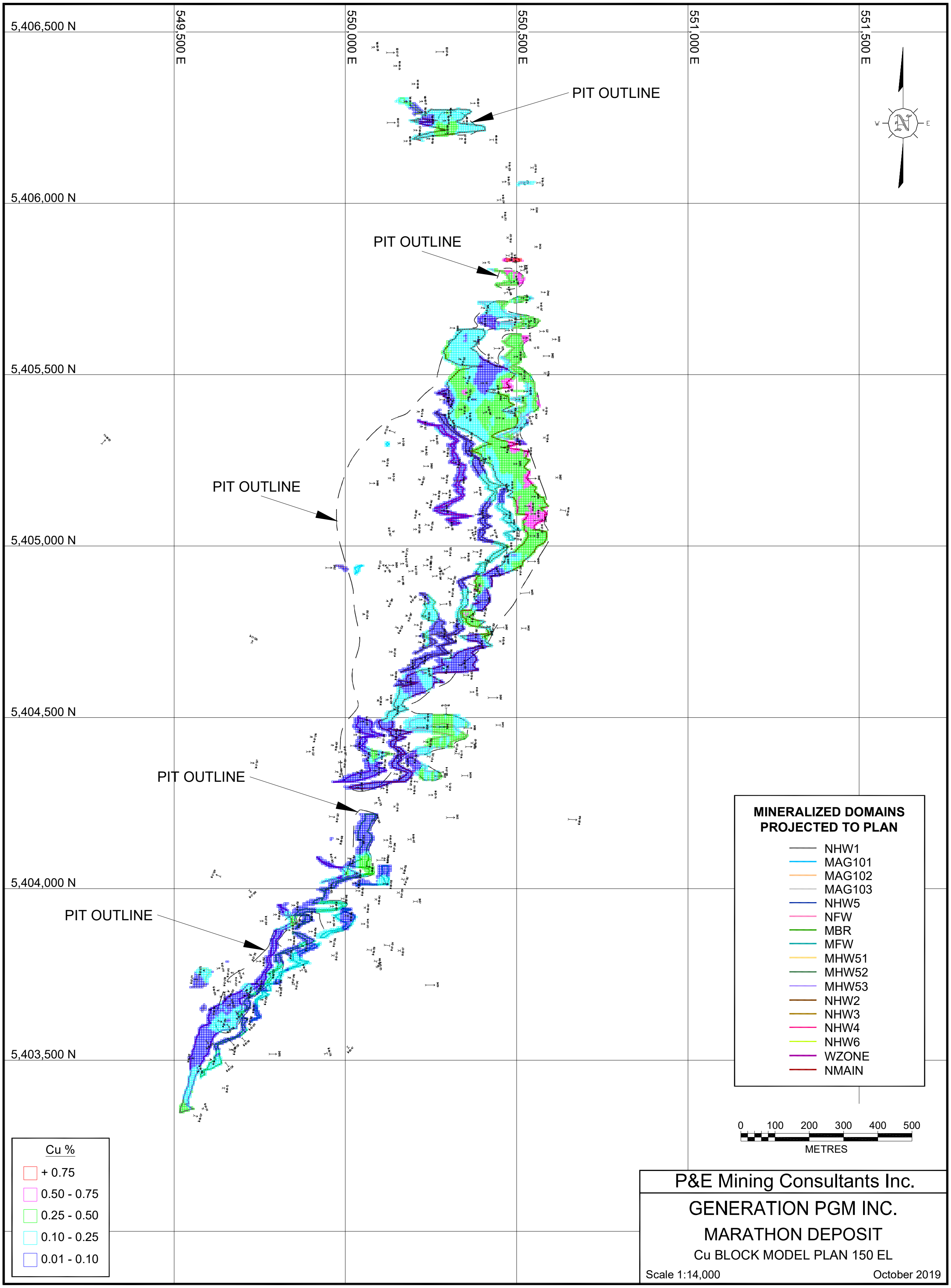
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL PLAN 210 EL
Scale 1:14,000
October 2019



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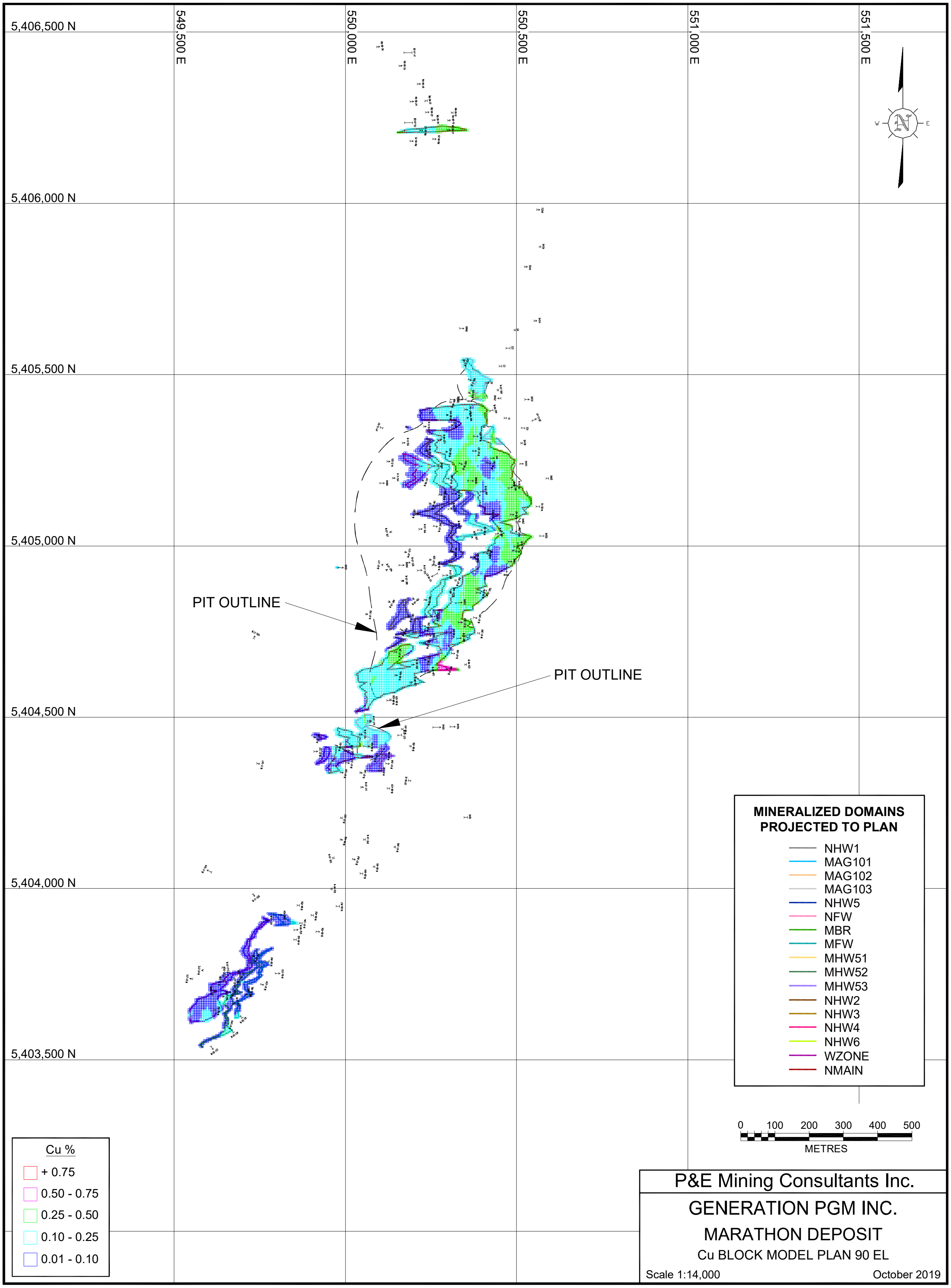
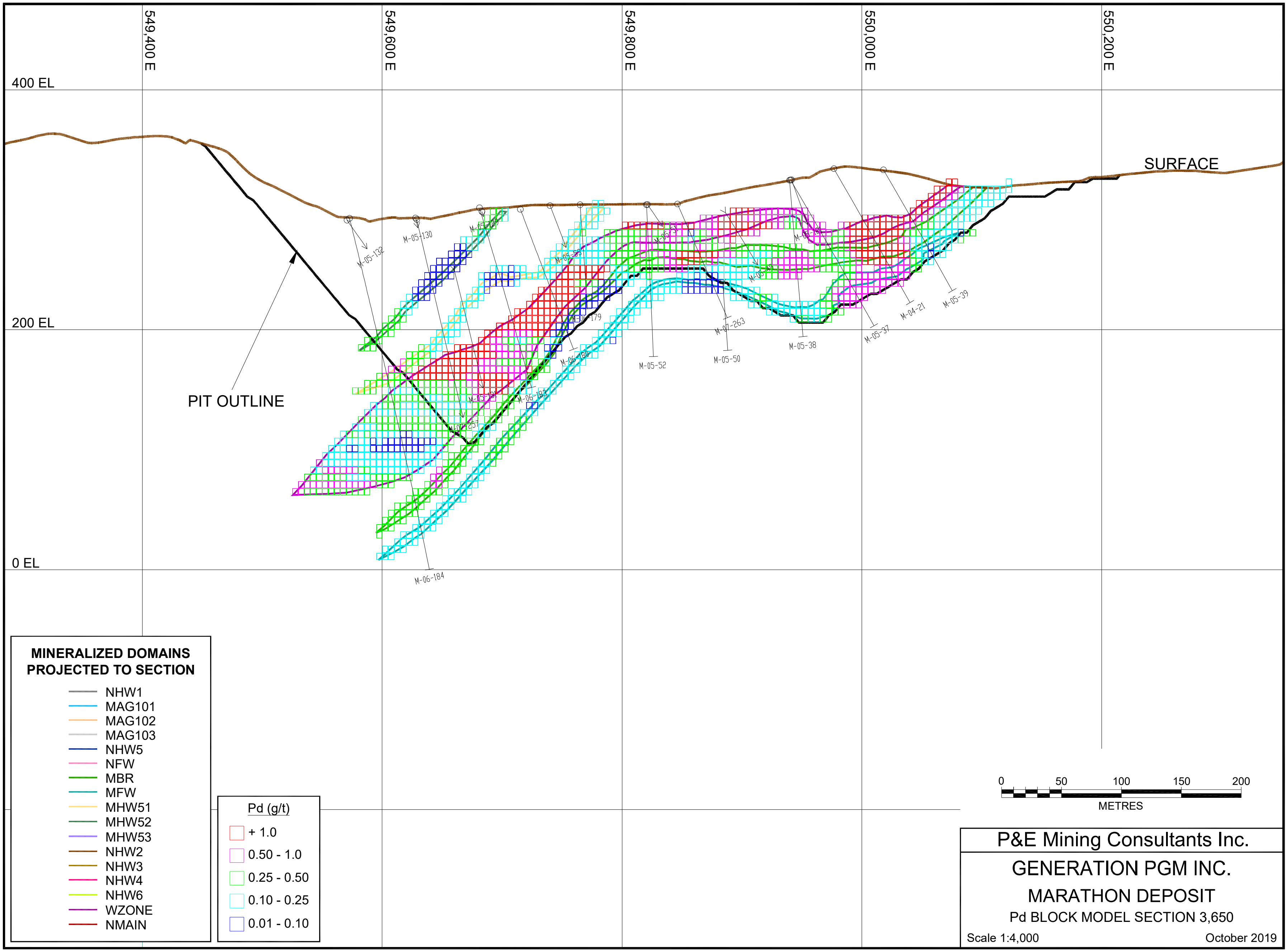
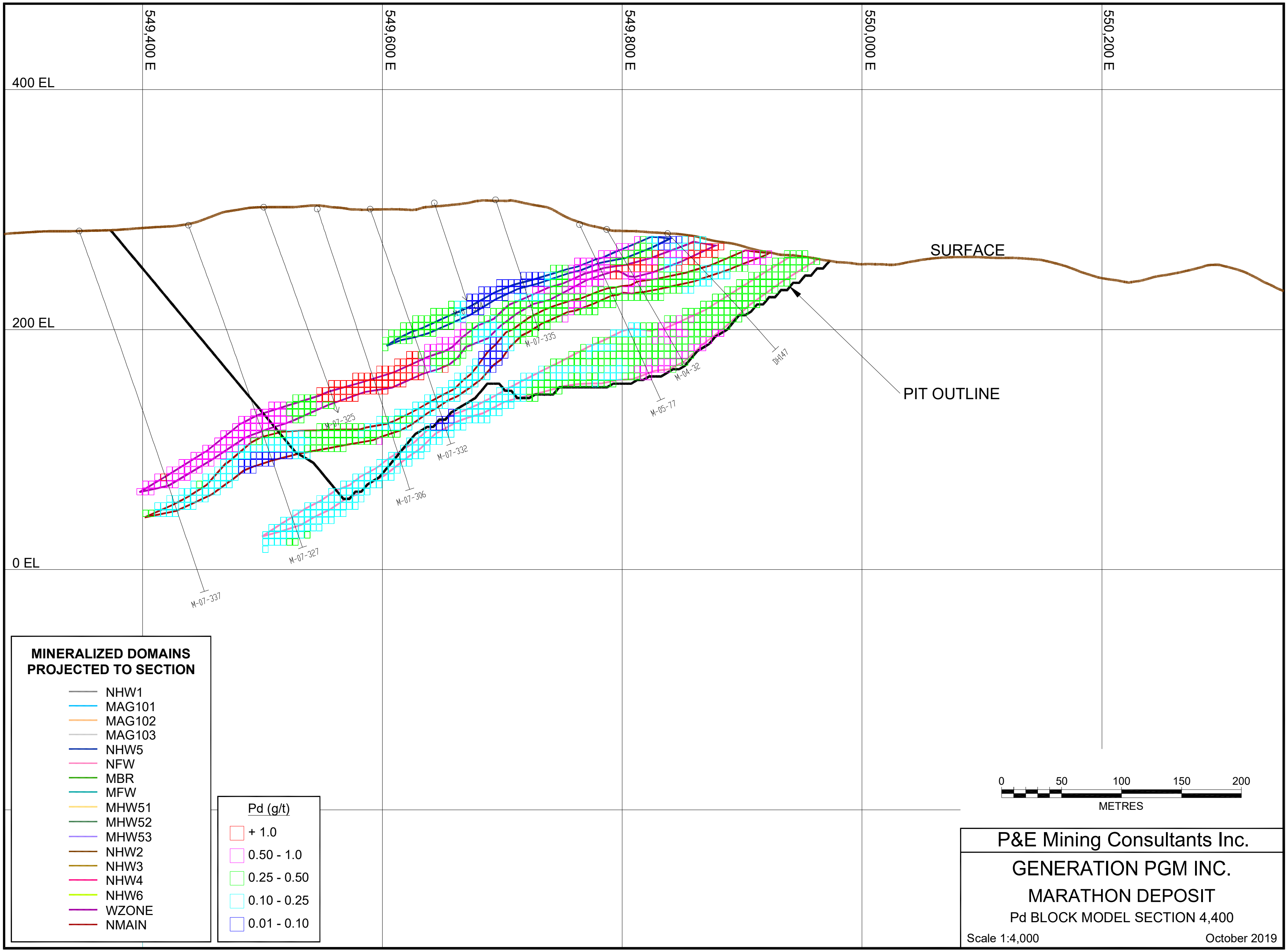
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL PLAN 150 EL
Scale 1:14,000
October 2019

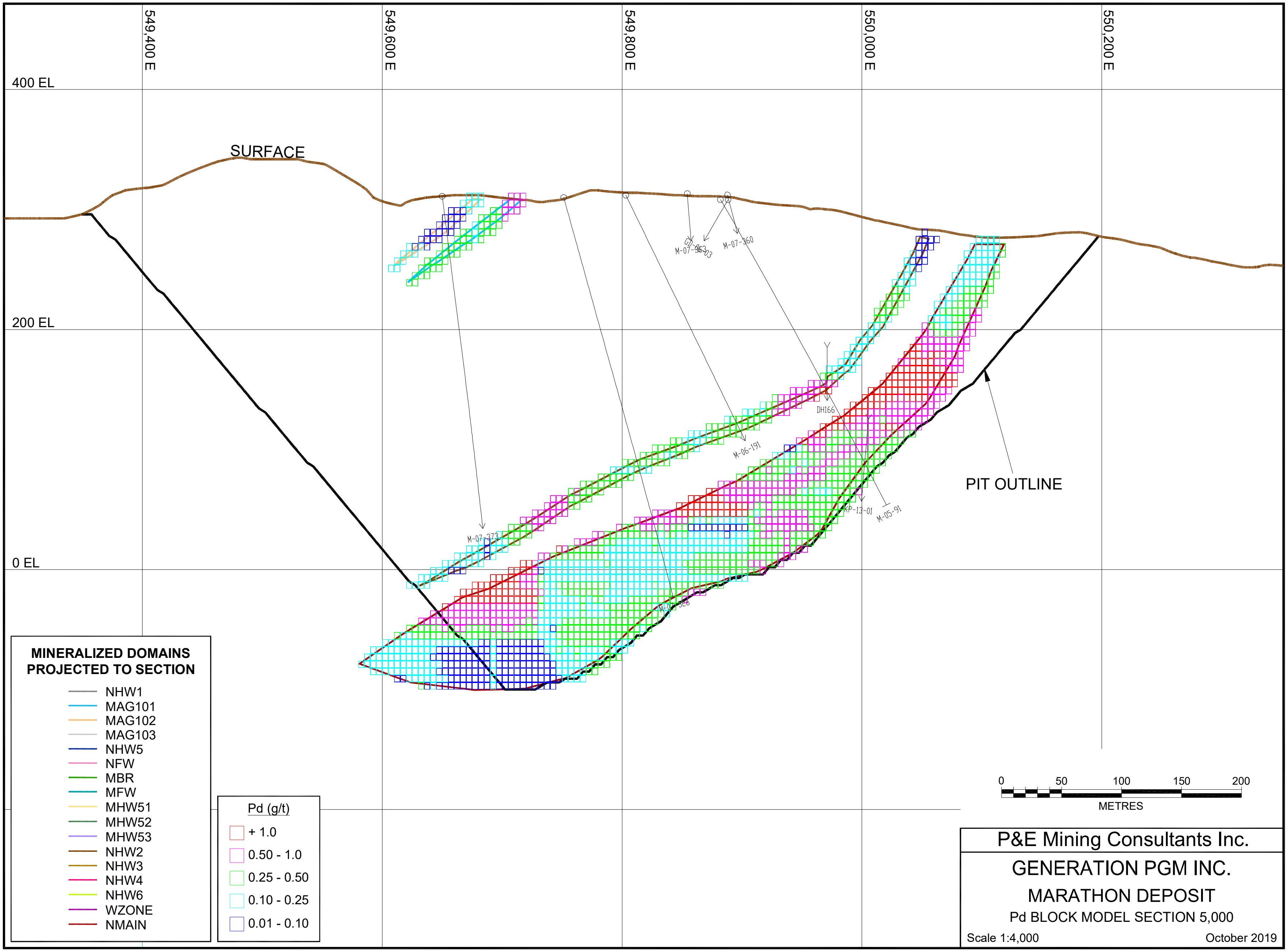

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Cu %
+ 0.75
0.50 - 0.75
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Cu BLOCK MODEL PLAN 90 EL
Scale 1:14,000
October 2019

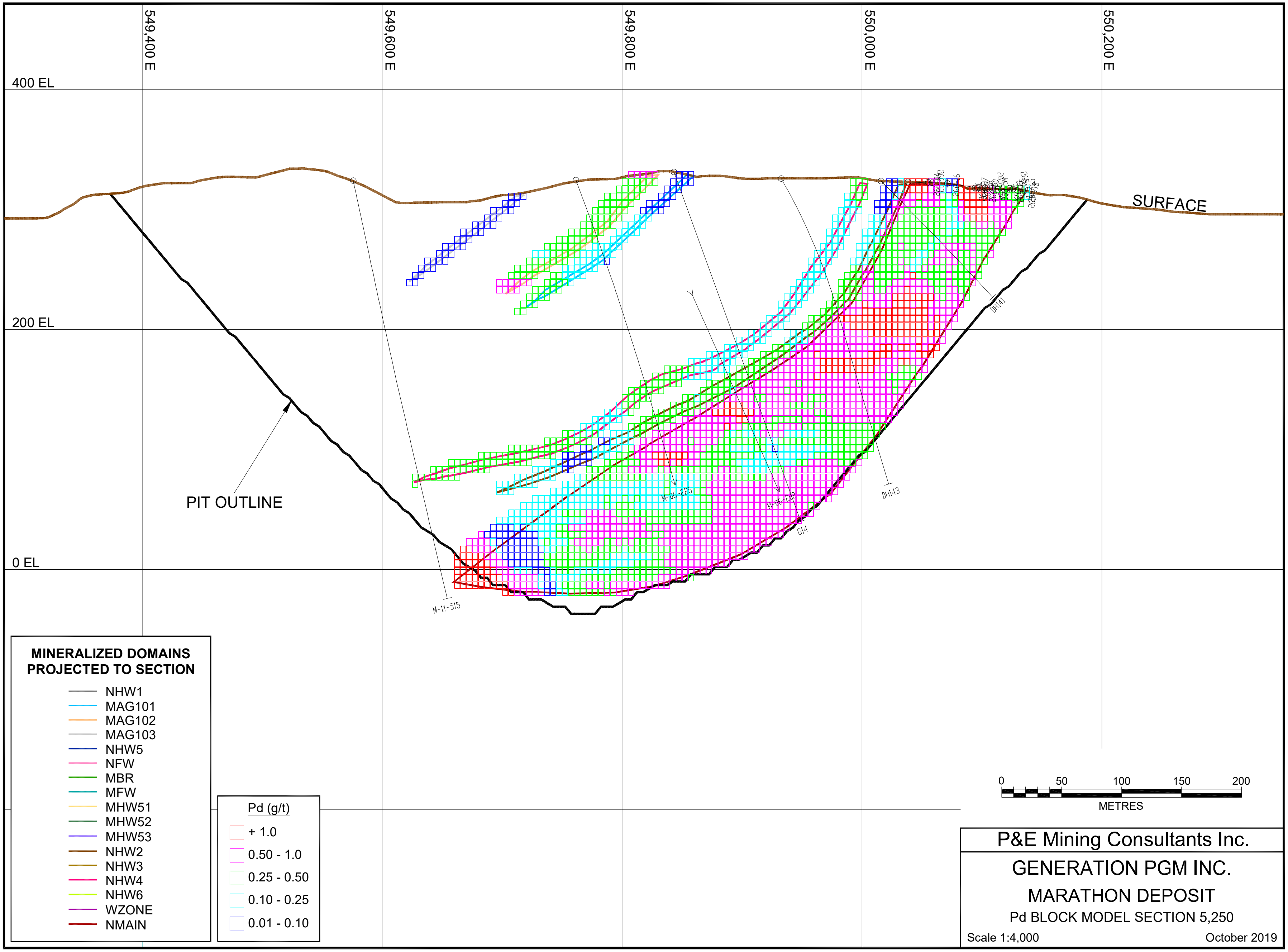
APPENDIX D MARATHON PD BLOCK MODEL CROSS SECTIONS AND PLANS

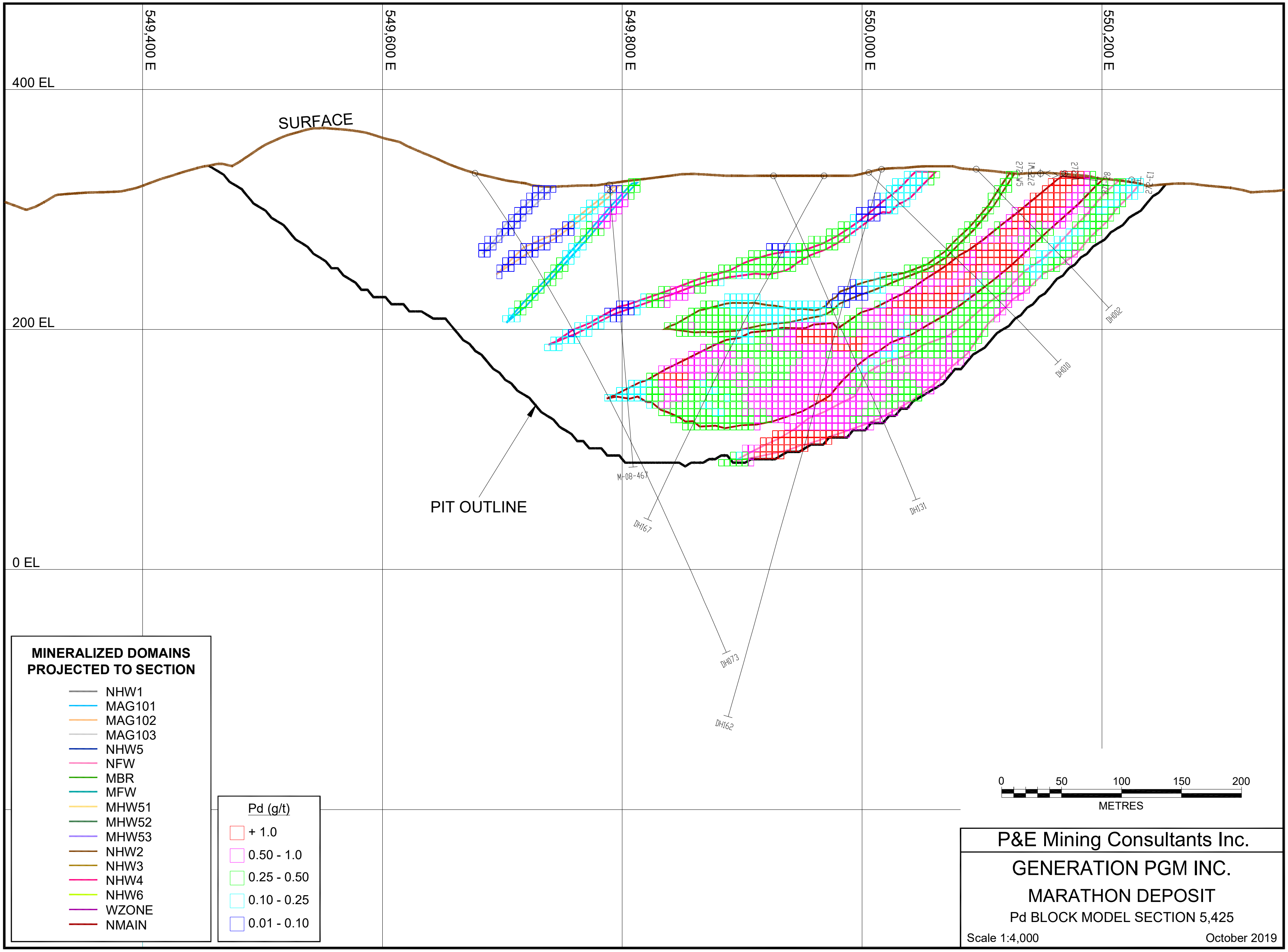


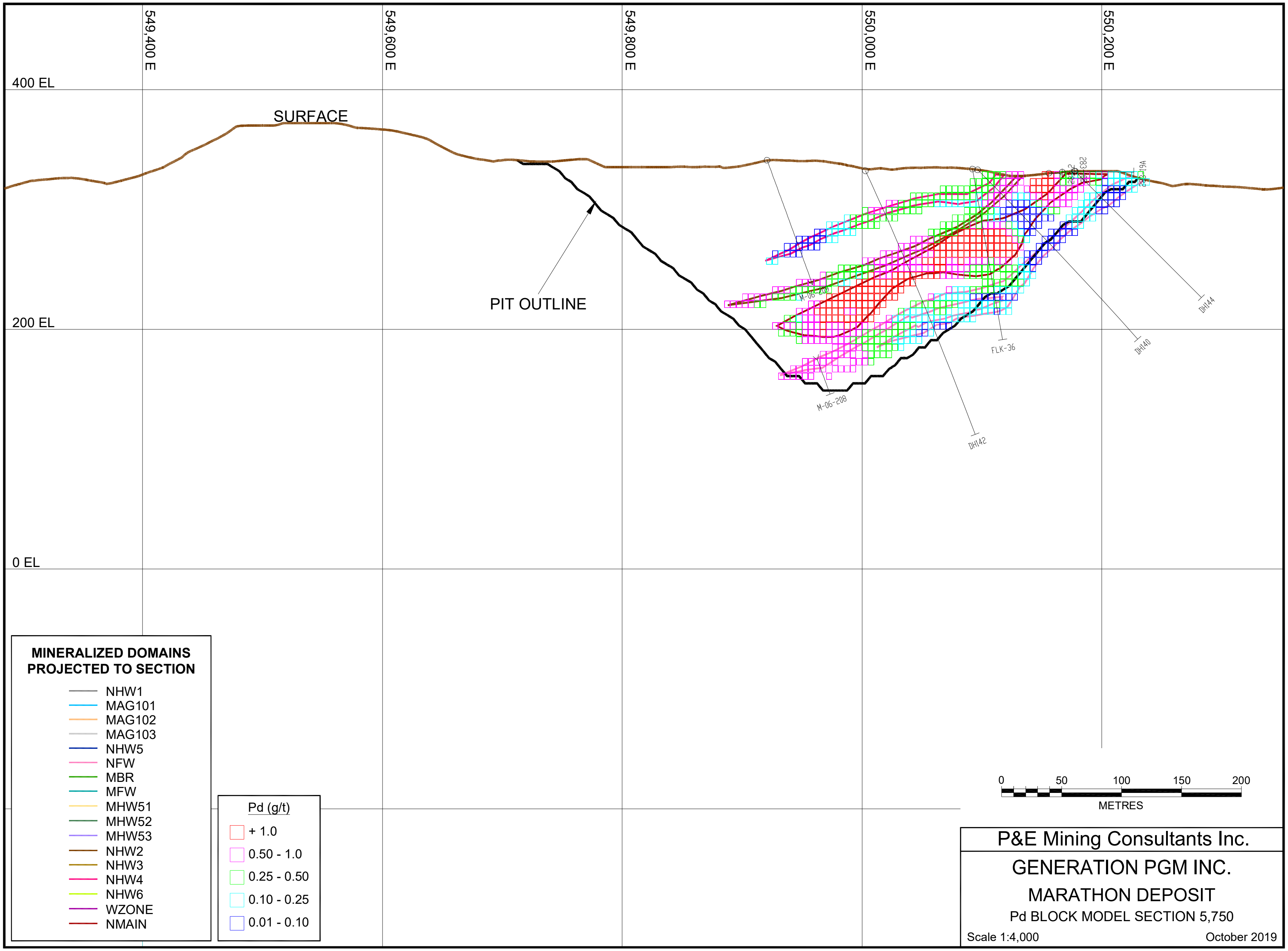
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 3,650
Scale 1:4,000
October 2019

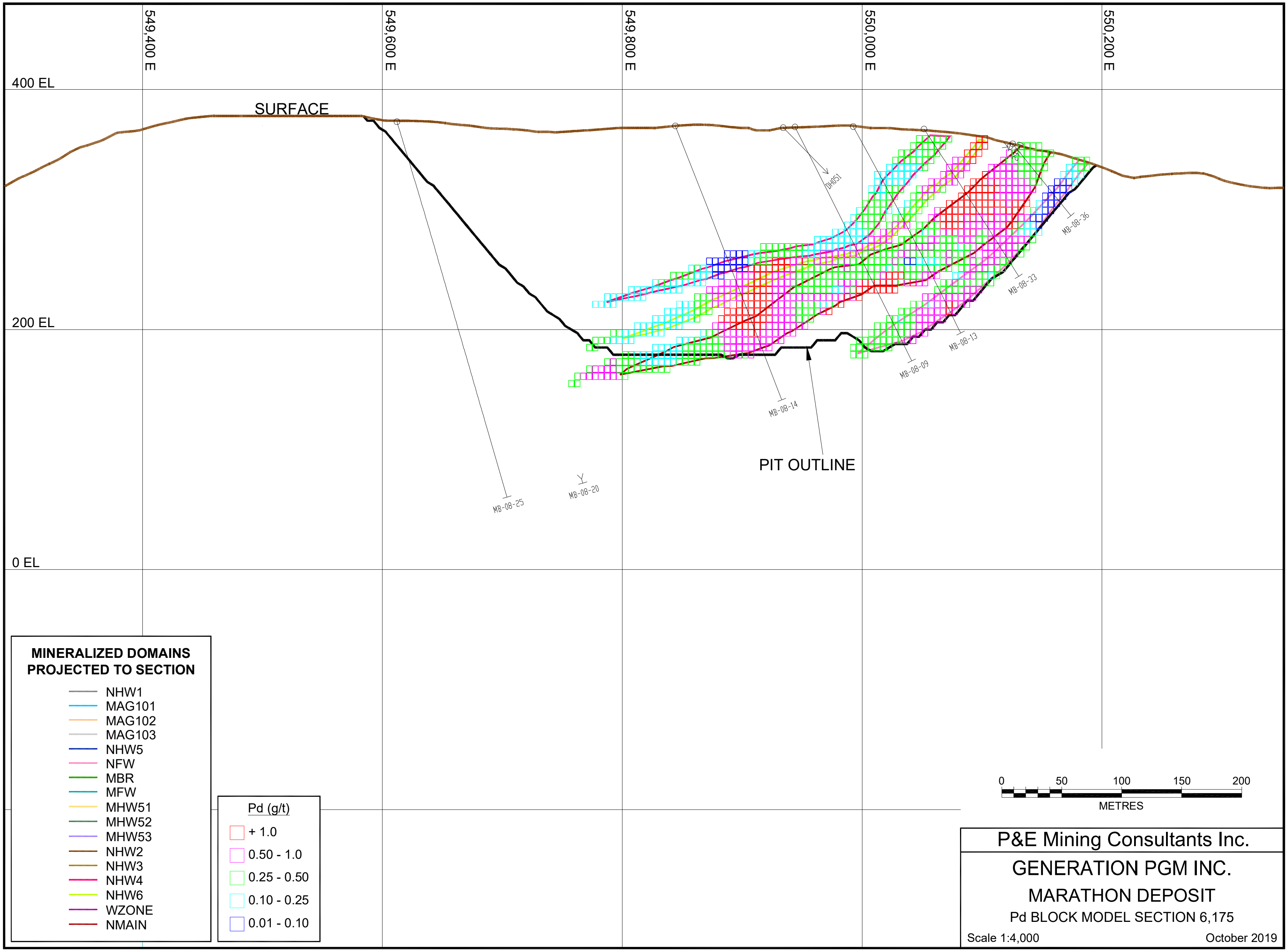

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-07-337
M-07-327
M-07-325
M-07-306
M-07-332
M-07-335
M-05-77
M-04-32
DH147
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 4,400
Scale 1:4,000
October 2019

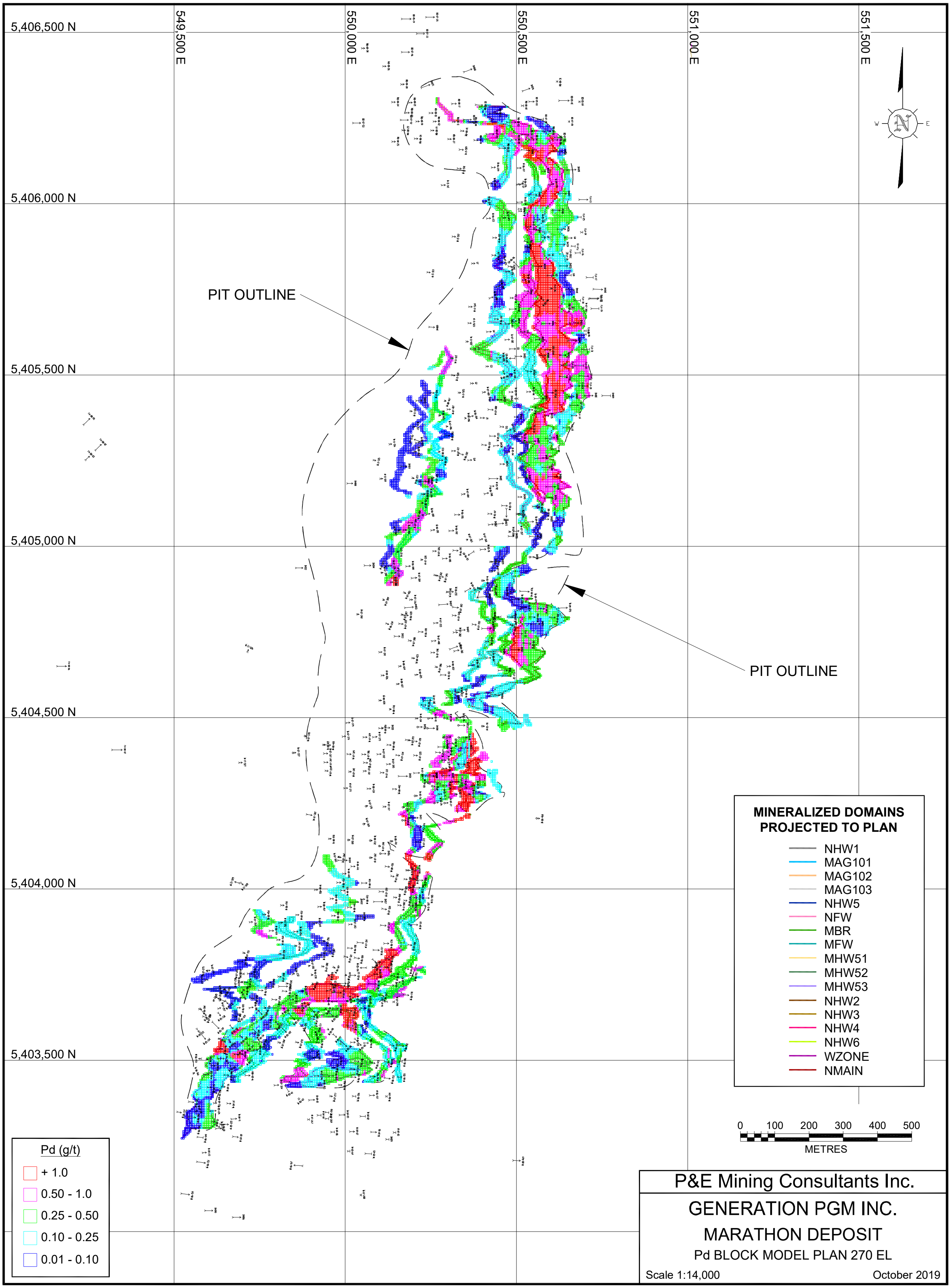

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 5,000
Scale 1:4,000
October 2019

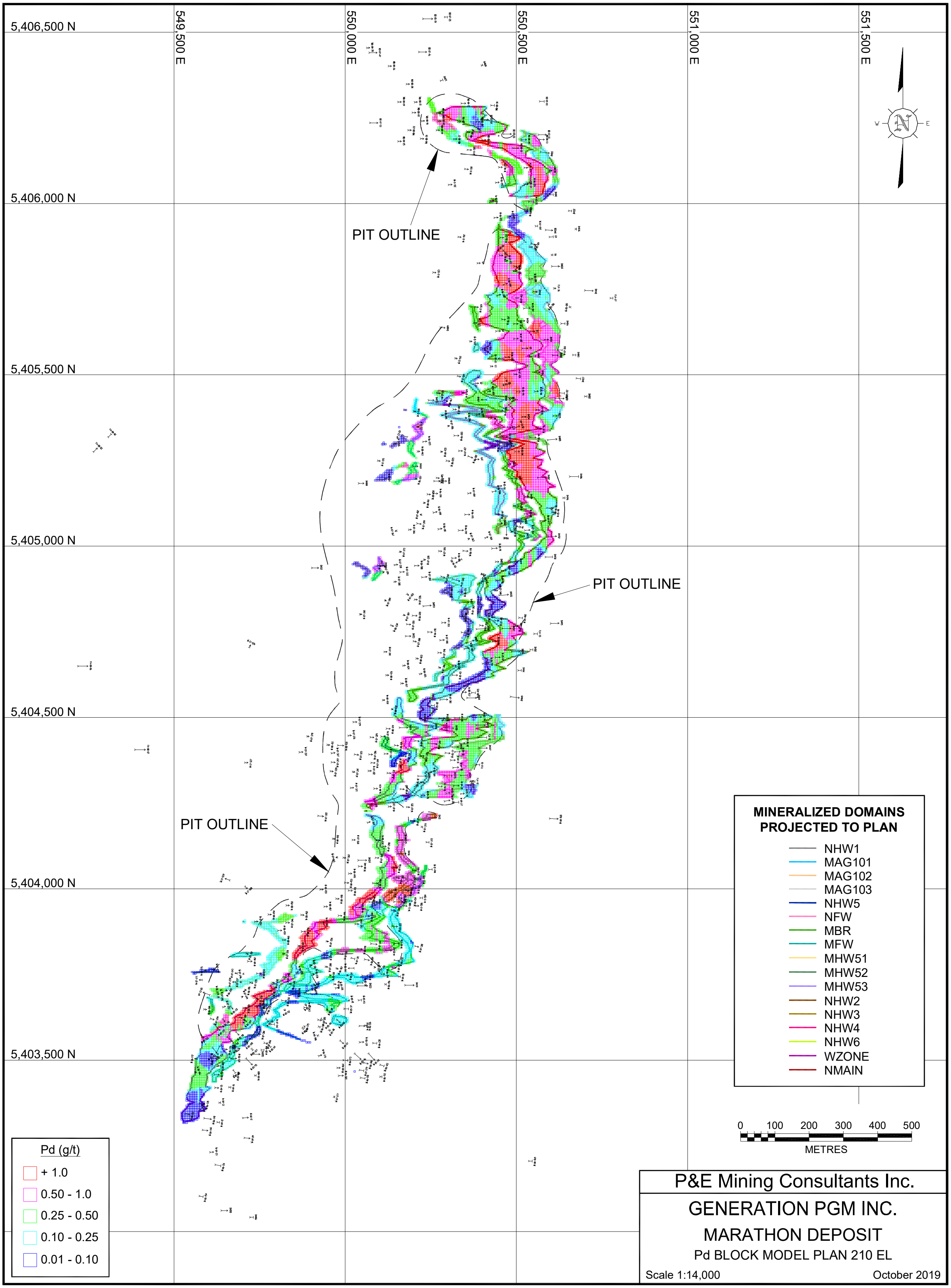

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 5,250
Scale 1:4,000
October 2019

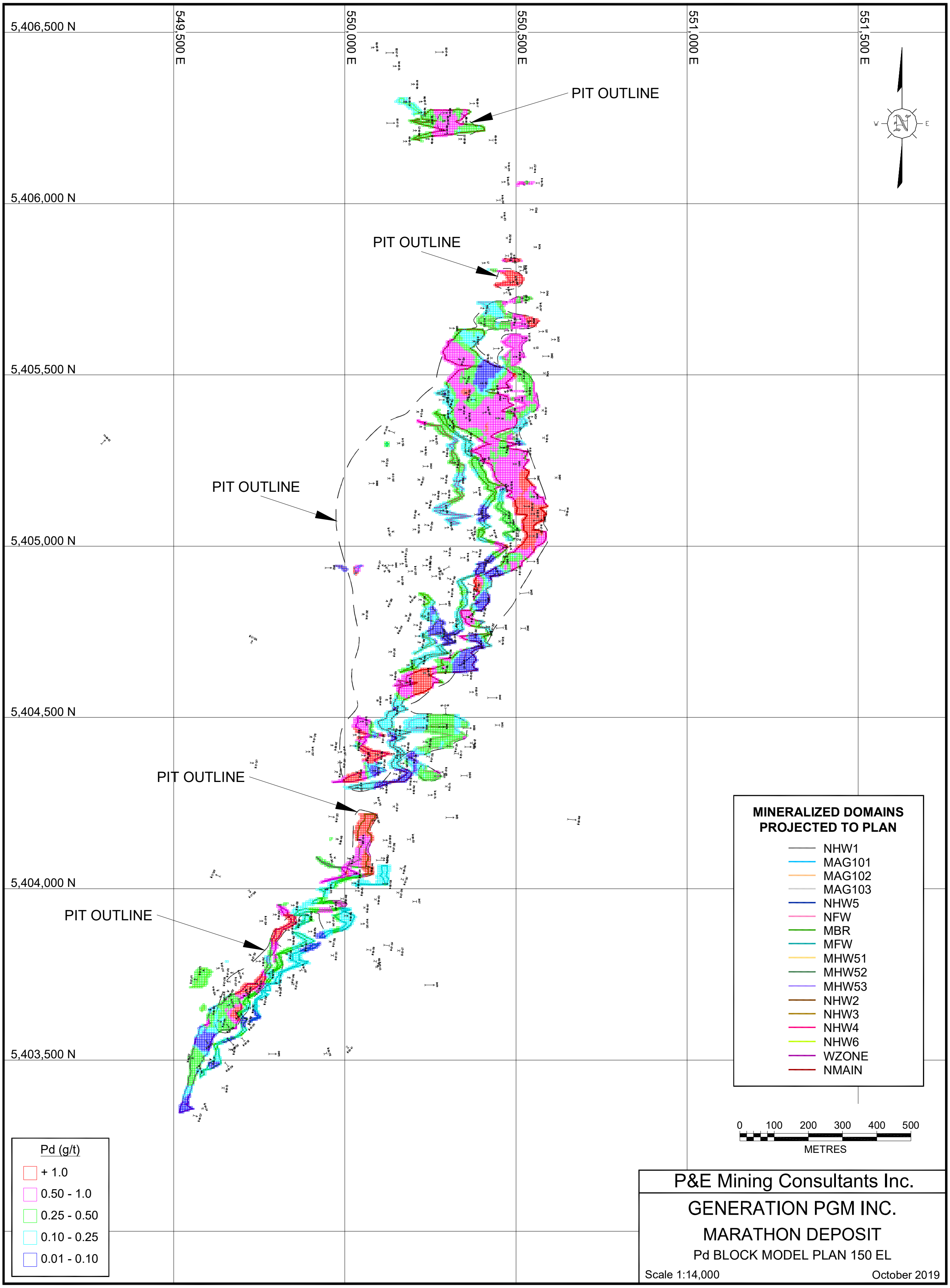

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
DH002
DH010
DH131
DH167
DH073
DH162
M-08-467
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 5,425
Scale 1:4,000
October 2019

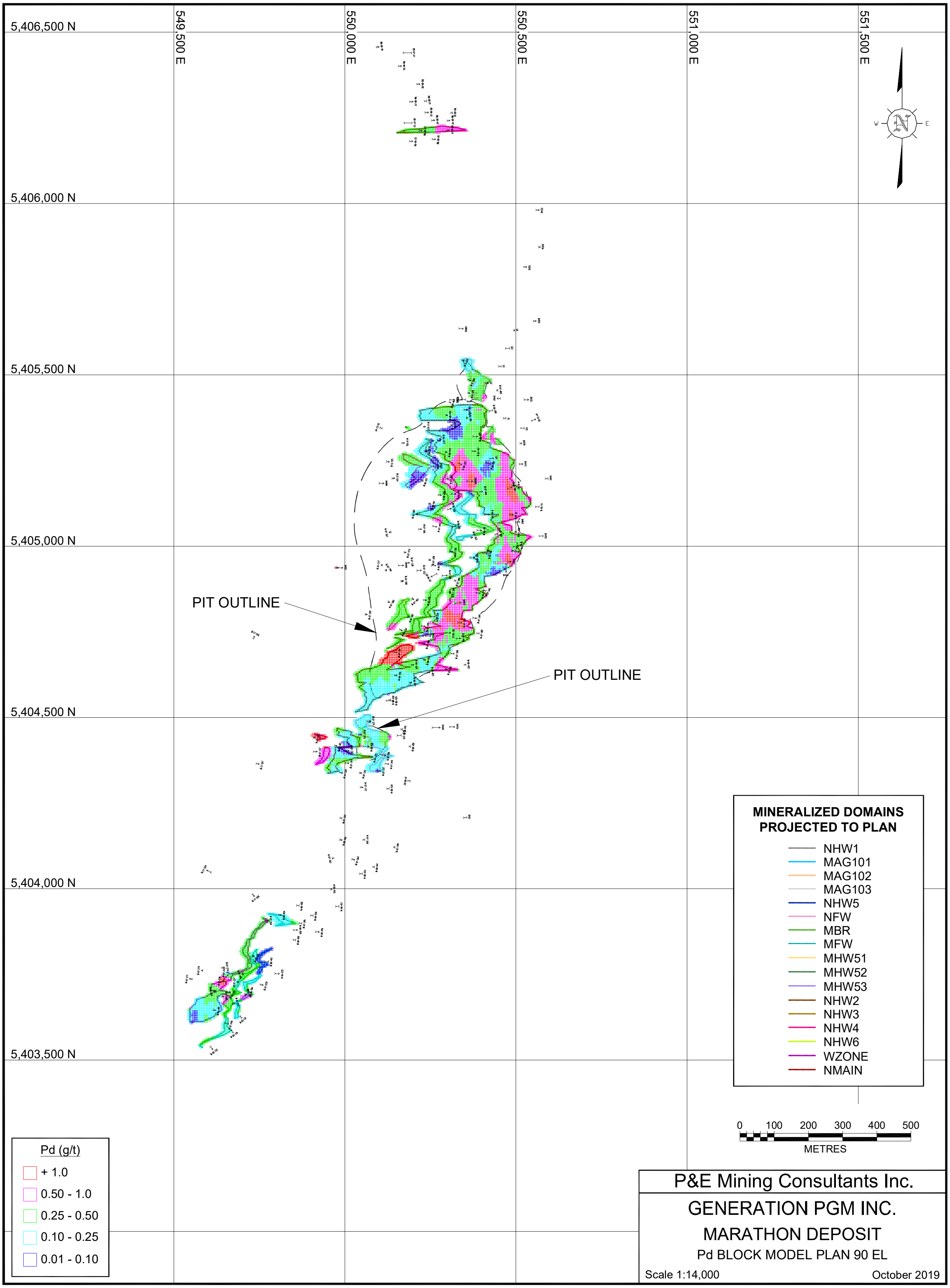

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-06-209
M-06-208
FLK-36
DH142
DH140
DH144
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 5,750
Scale 1:4,000
October 2019


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MB-08-25
MB-08-20
MB-08-14
MB-08-09
MB-08-13
MB-08-33
MB-08-36
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL SECTION 6,175
Scale 1:4,000
October 2019

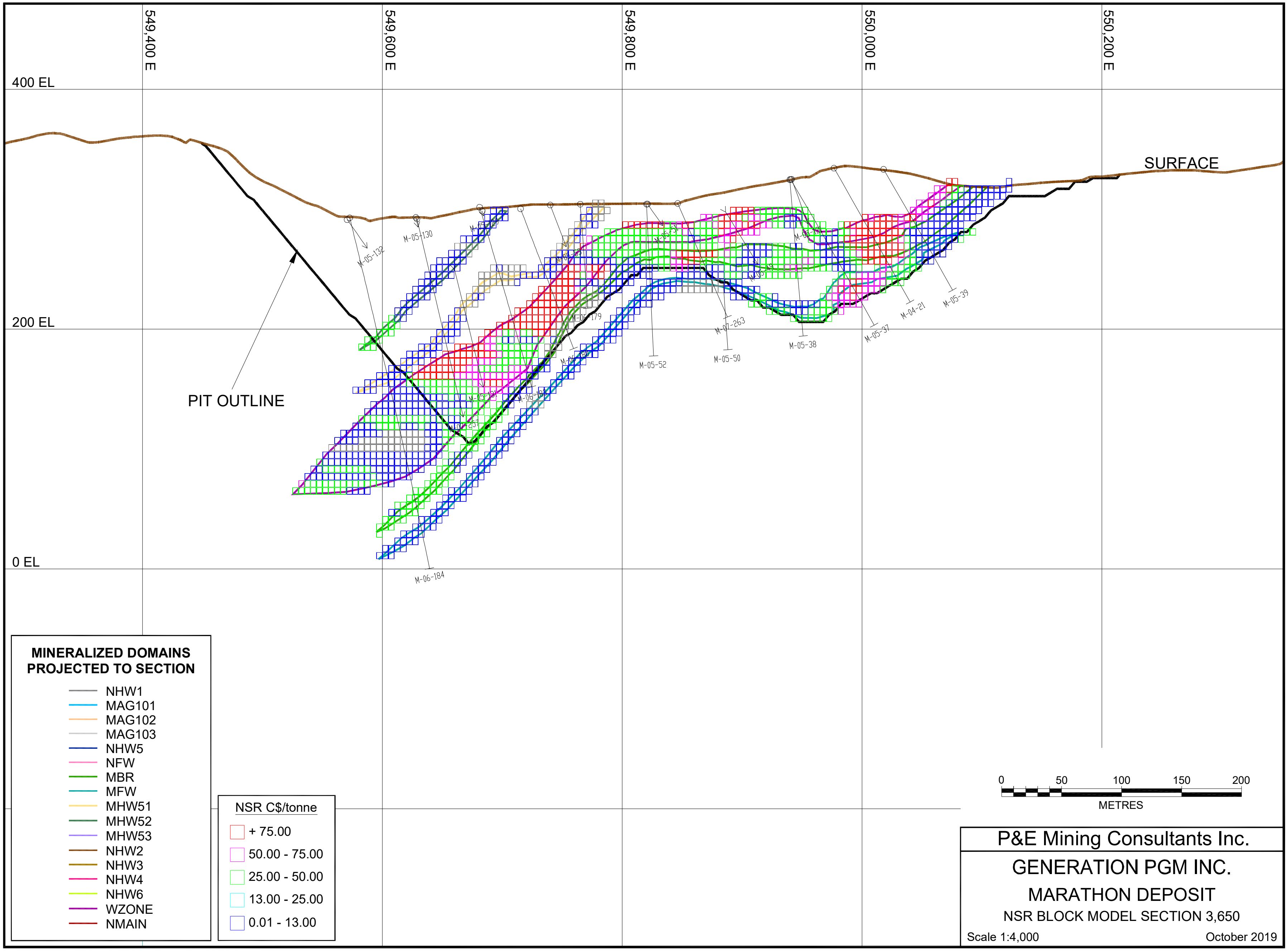

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL PLAN 270 EL
Scale 1:14,000
October 2019

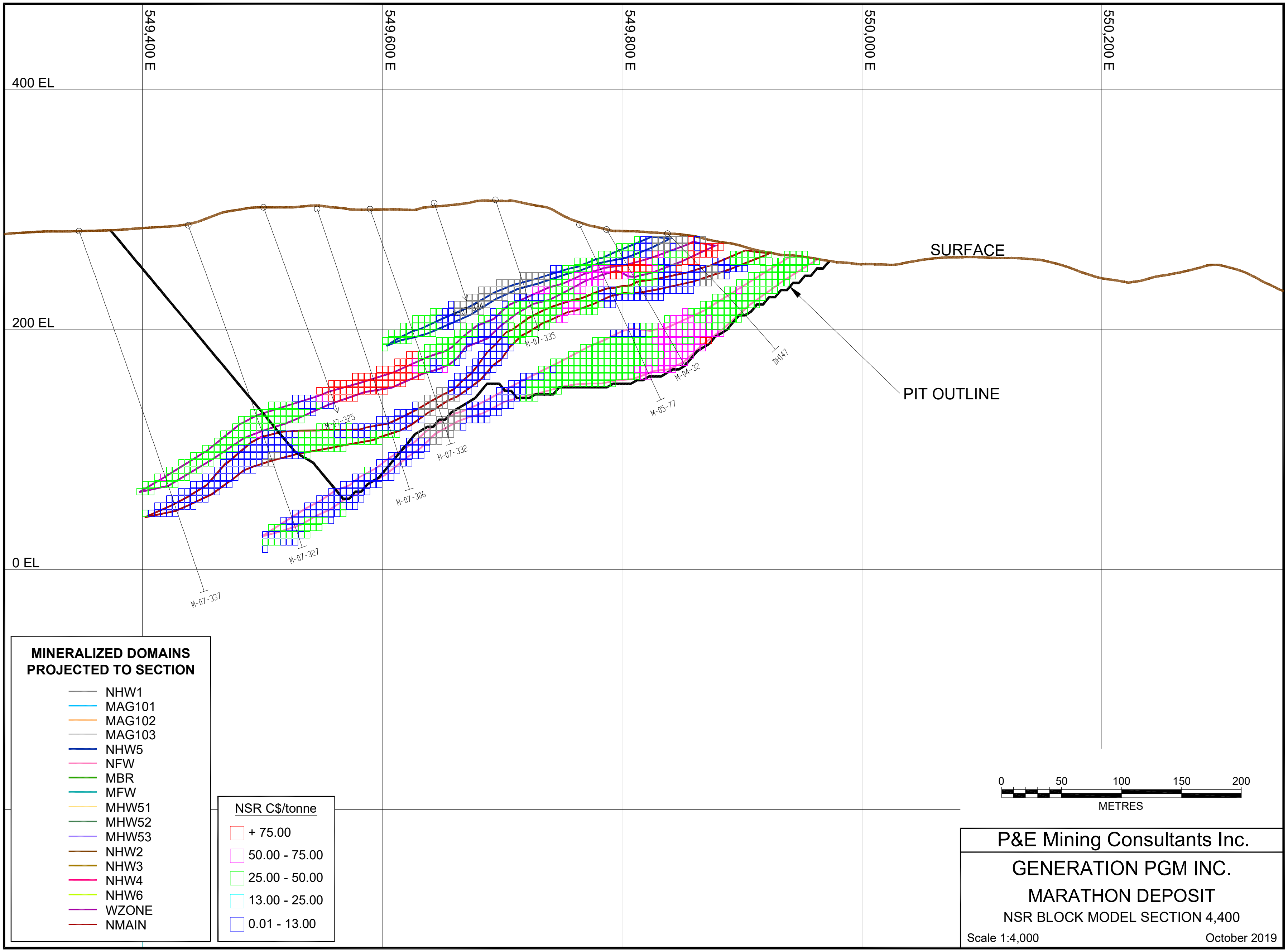

5,406,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
W
E
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0
100
200
300
400
500
METRES
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL PLAN 210 EL
Scale 1:14,000
October 2019

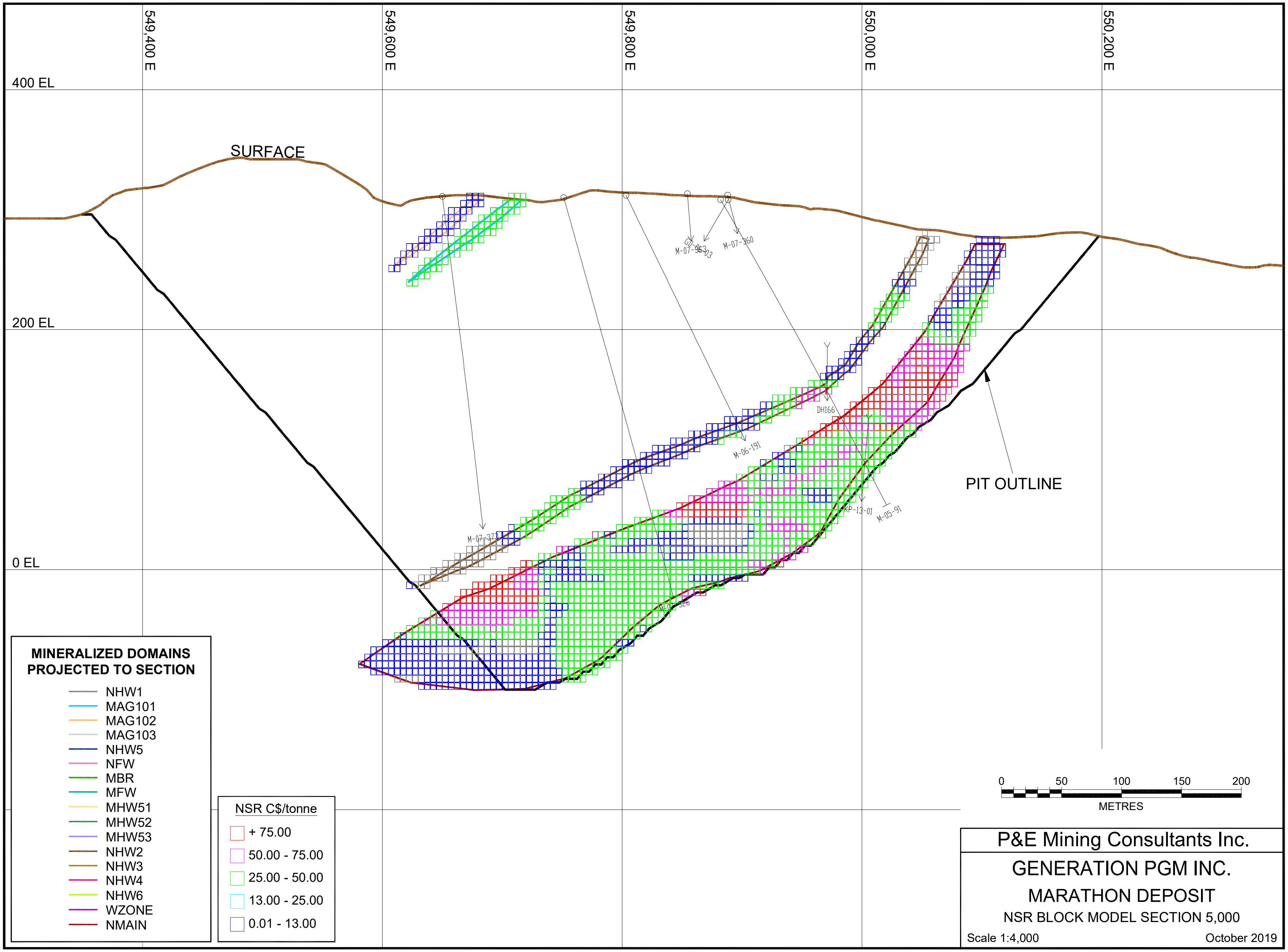

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL PLAN 150 EL
Scale 1:14,000
October 2019


5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
W
E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
Pd (g/t)
+ 1.0
0.50 - 1.0
0.25 - 0.50
0.10 - 0.25
0.01 - 0.10
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
Pd BLOCK MODEL PLAN 90 EL
Scale 1:14,000
October 2019

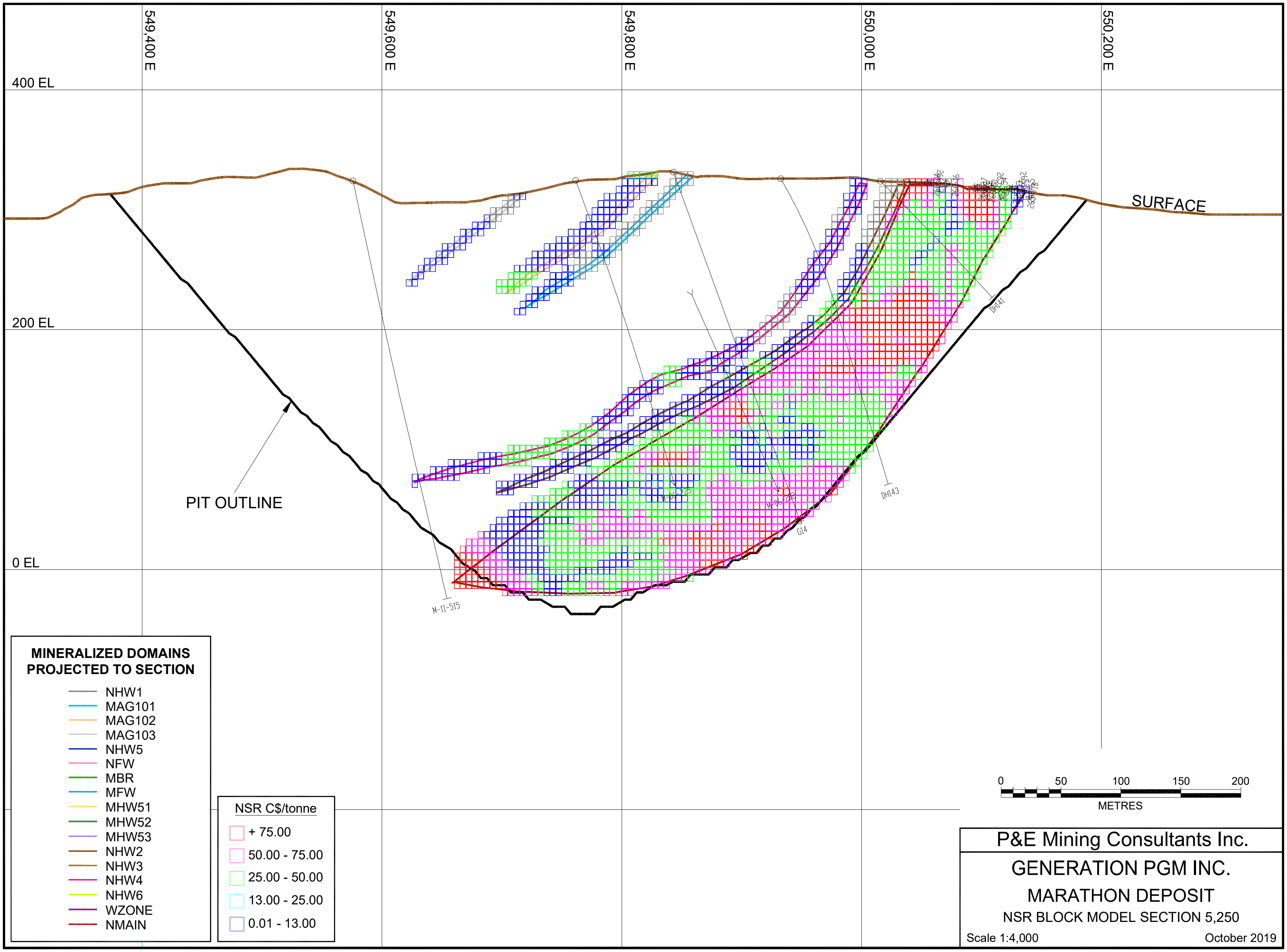
APPENDIX E MARATHON NSR BLOCK MODEL CROSS SECTIONS AND PLANS


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 3,650
Scale 1:4,000
October 2019

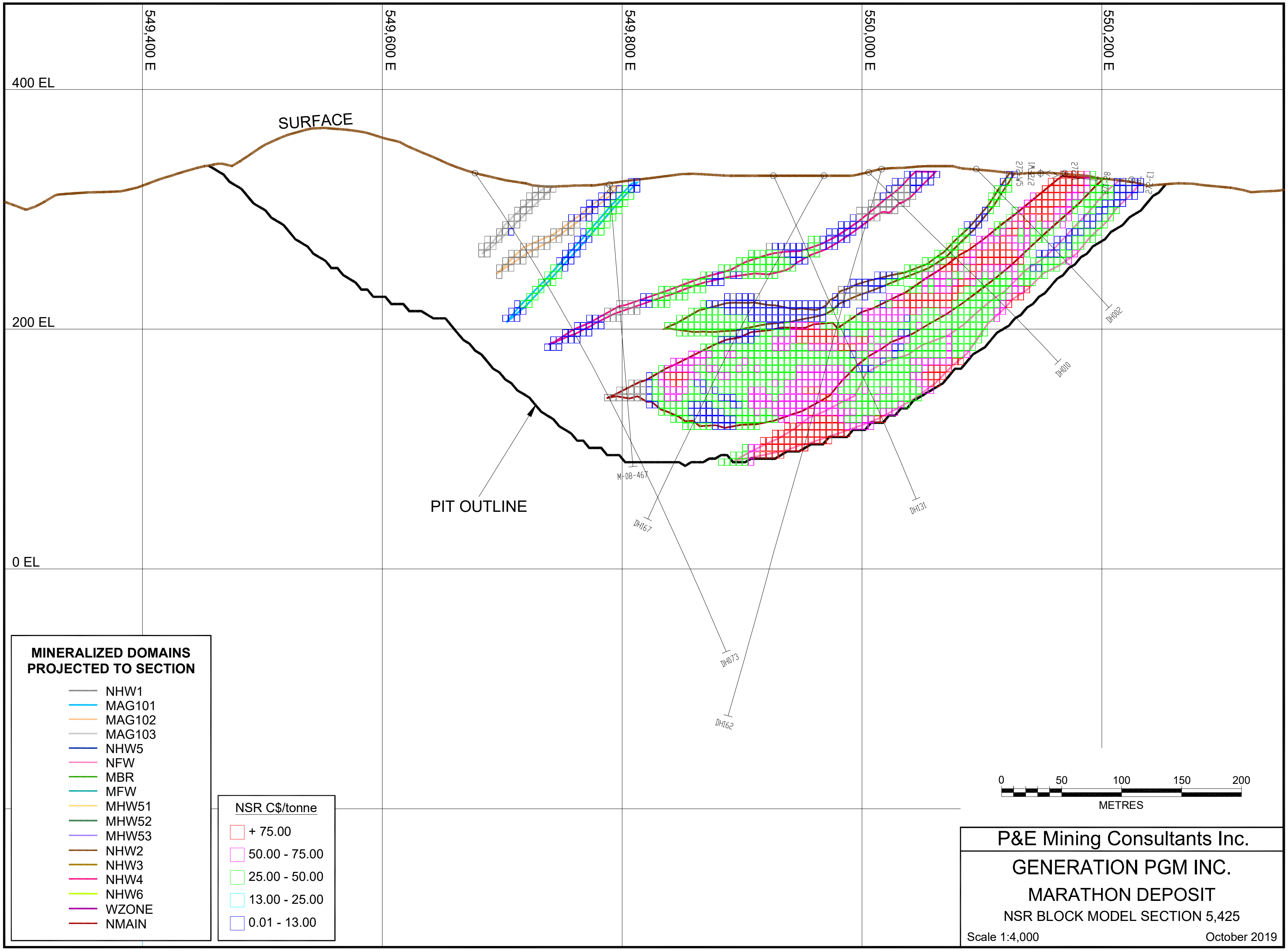

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-07-337
M-07-327
M-07-325
M-07-306
M-07-332
M-07-335
M-05-77
M-04-32
DH147
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 4,400
Scale 1:4,000
October 2019



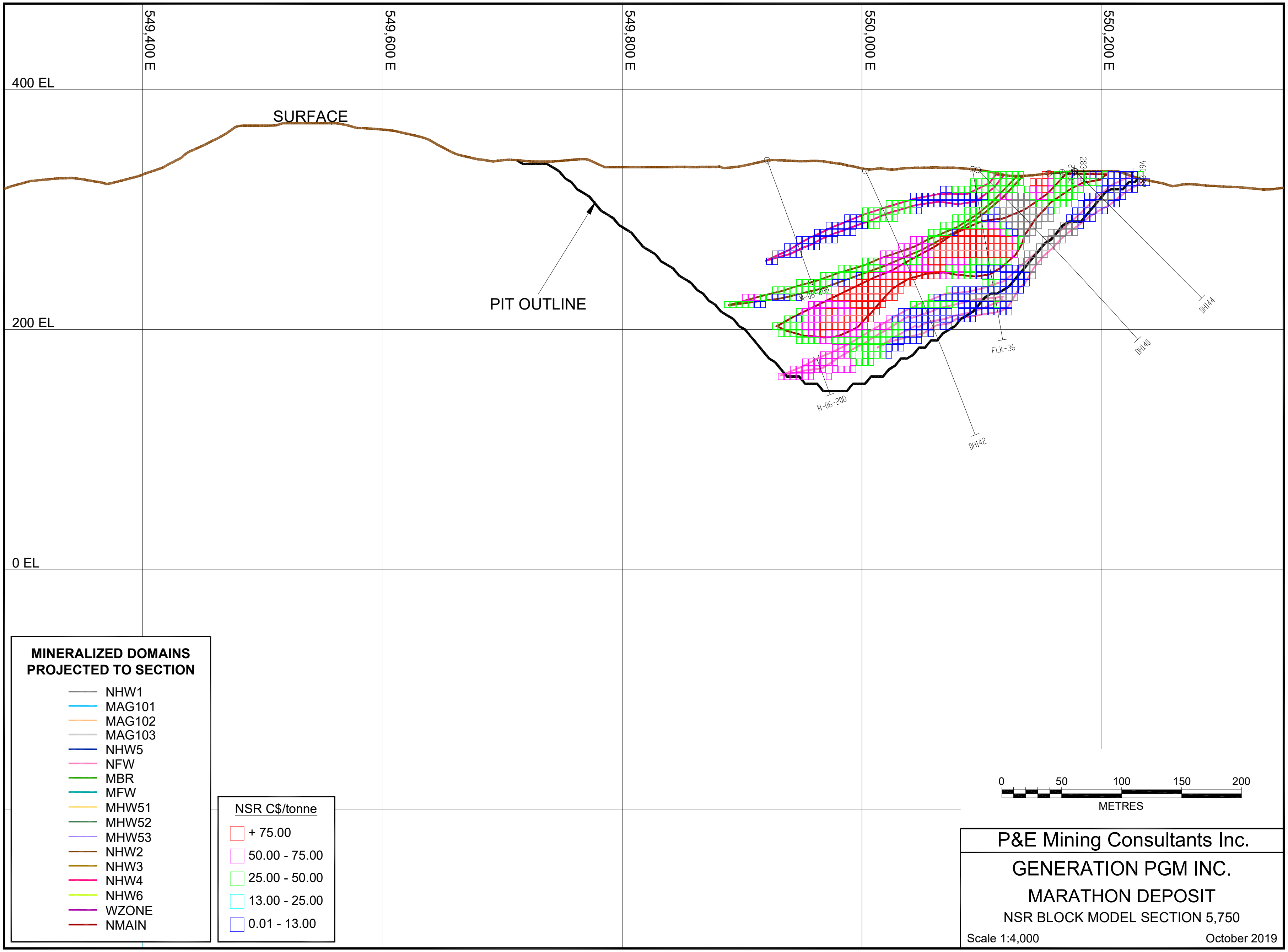
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 5,000
Scale 1:4,000
October 2019



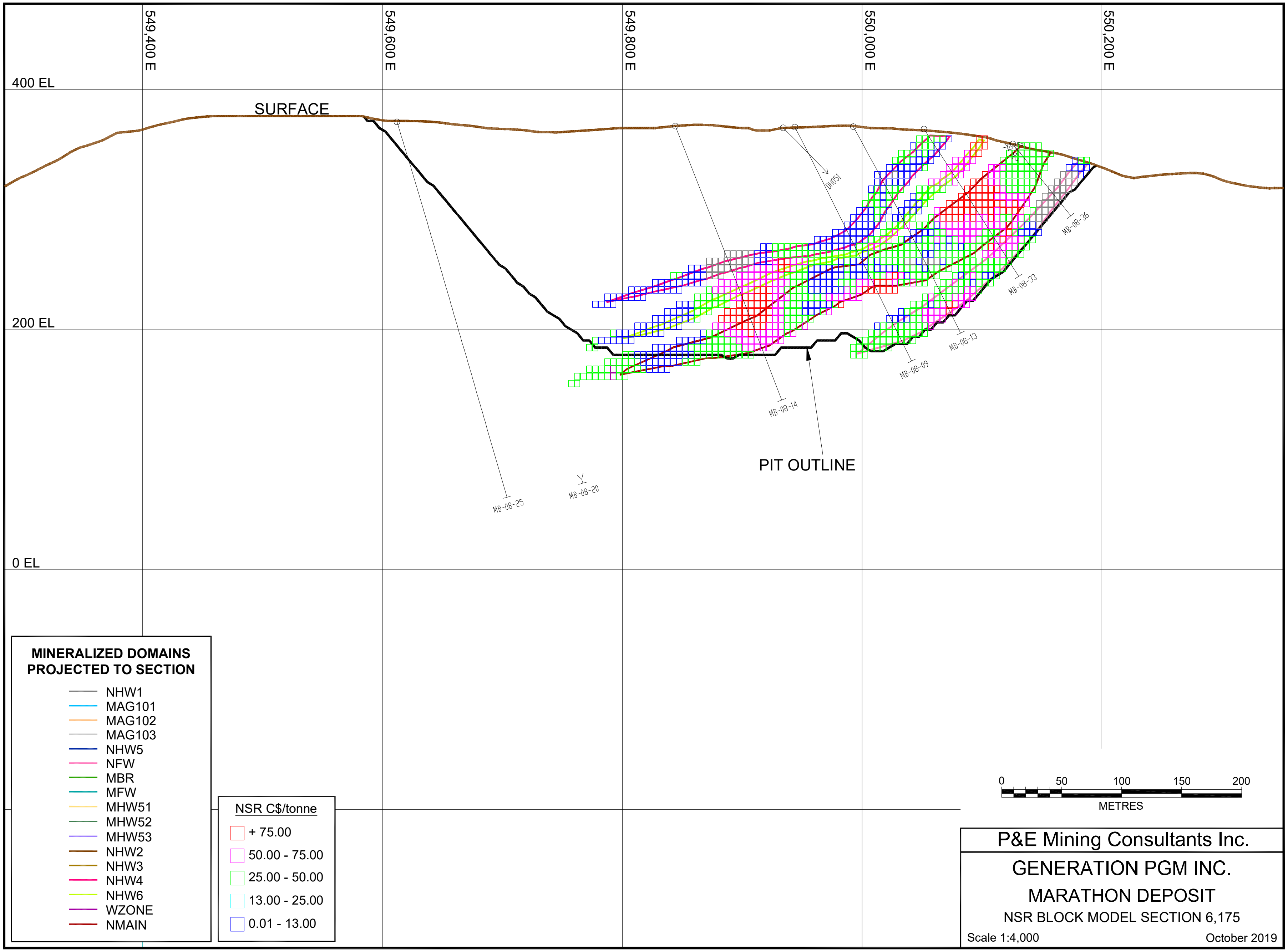
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-11-515
DH141
DH143
G14
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 5,250
Scale 1:4,000
October 2019

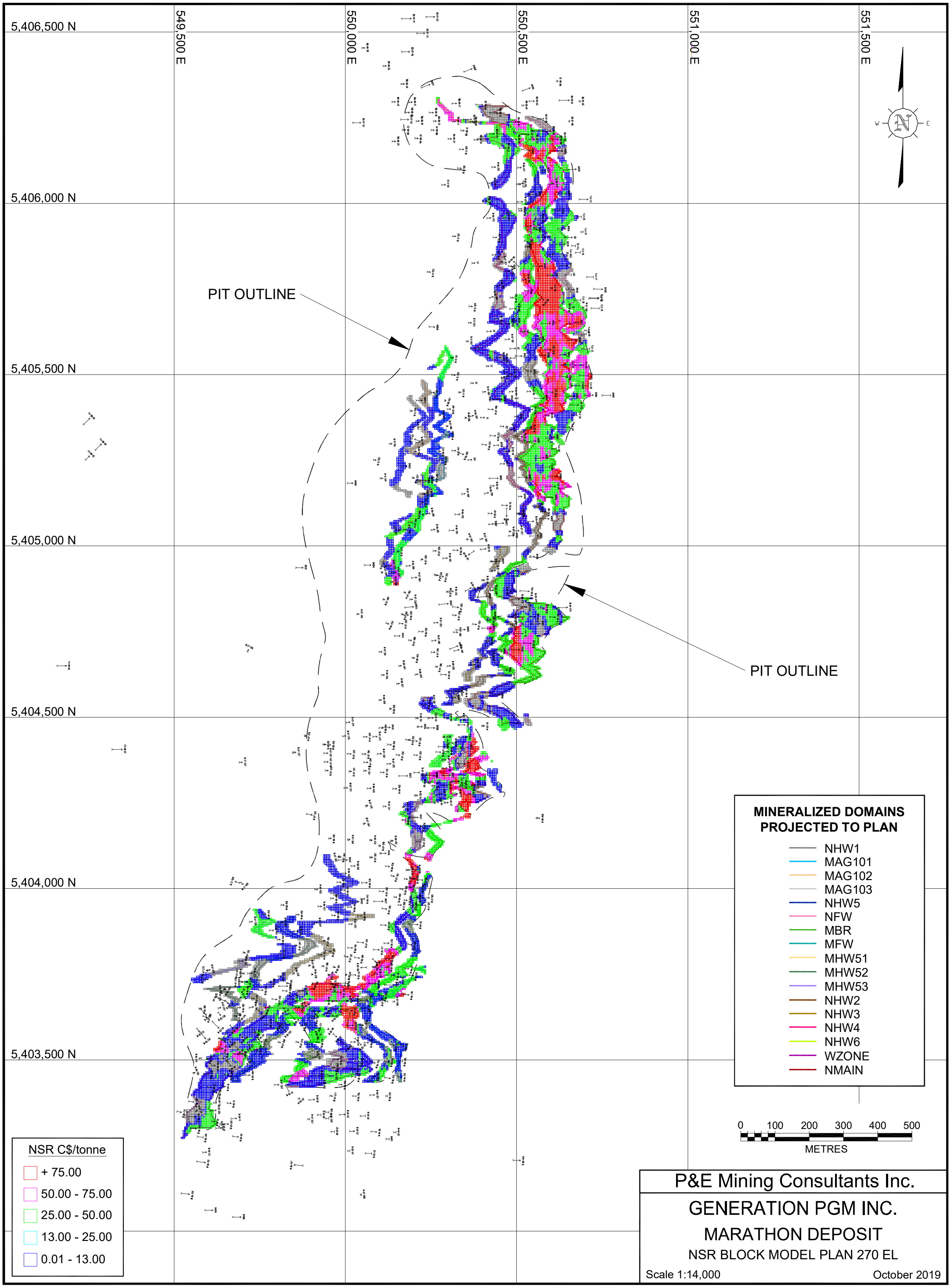


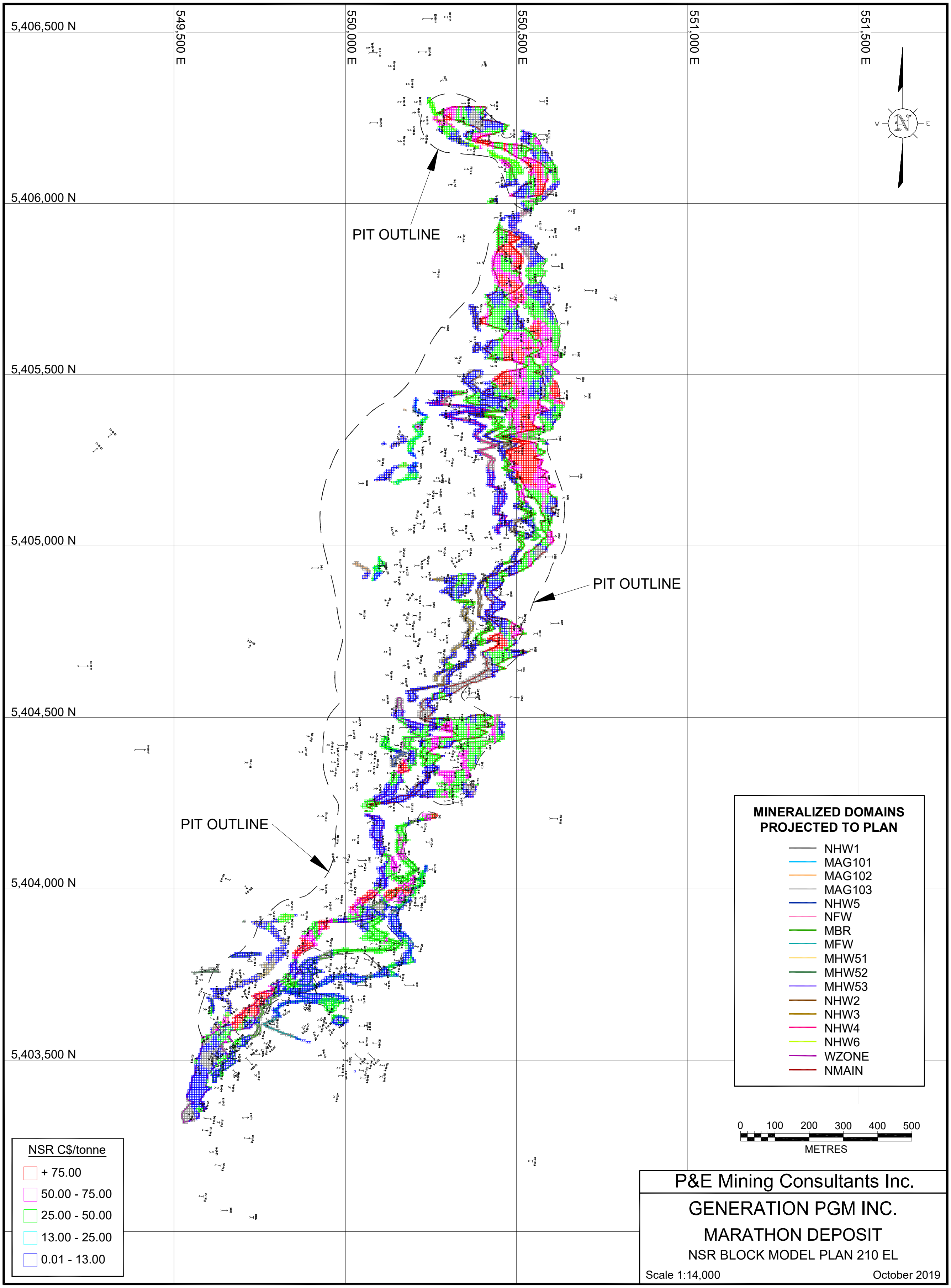
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-08-467
DH167
DH073
DH162
DH131
DH010
DH002
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 5,425
Scale 1:4,000
October 2019

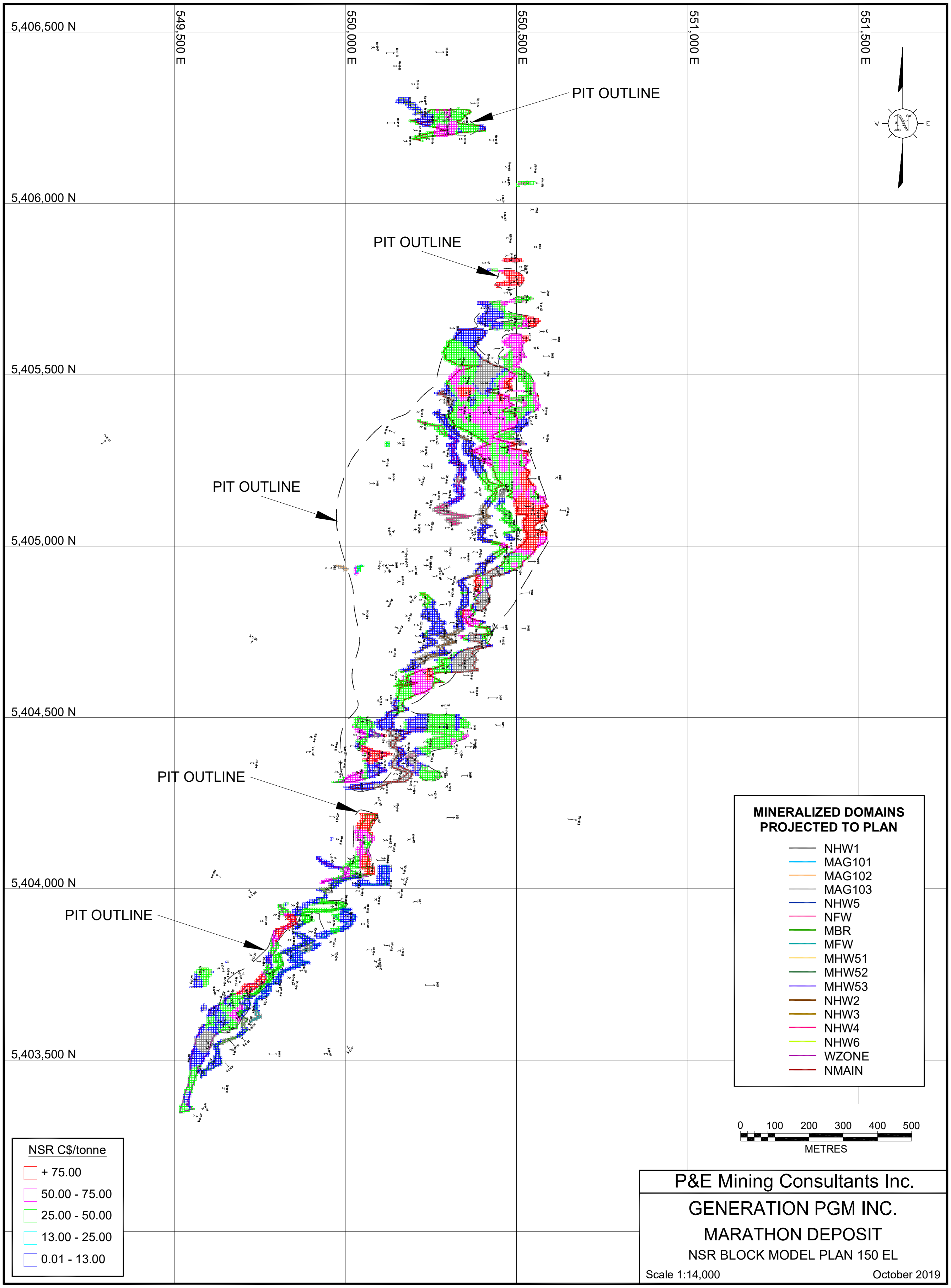


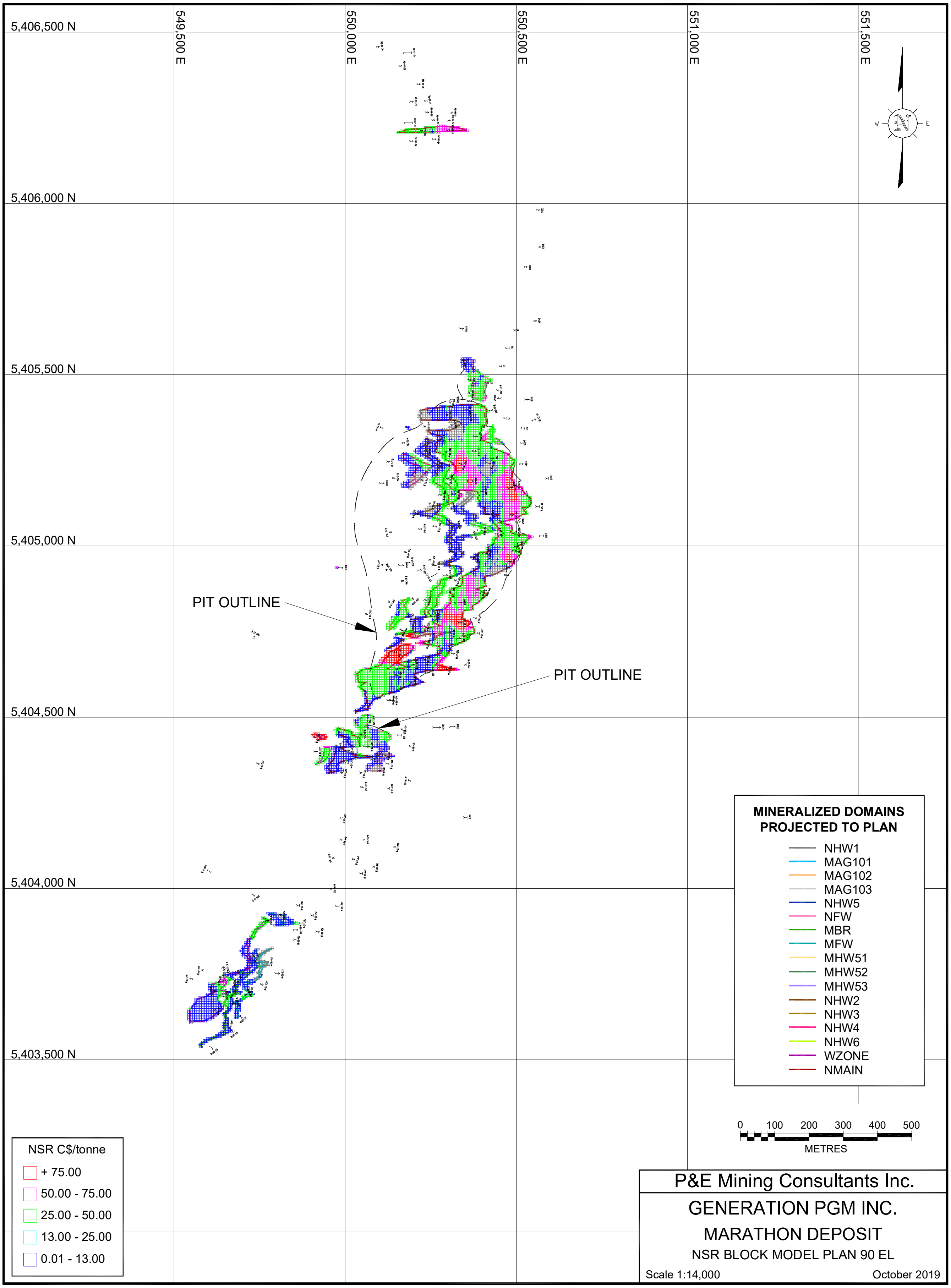
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-06-208
FLK-36
DH140
DH142
DH144
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 5,750
Scale 1:4,000
October 2019


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MB-08-25
MB-08-20
MB-08-14
MB-08-09
MB-08-13
MB-08-33
MB-08-36
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL SECTION 6,175
Scale 1:4,000
October 2019

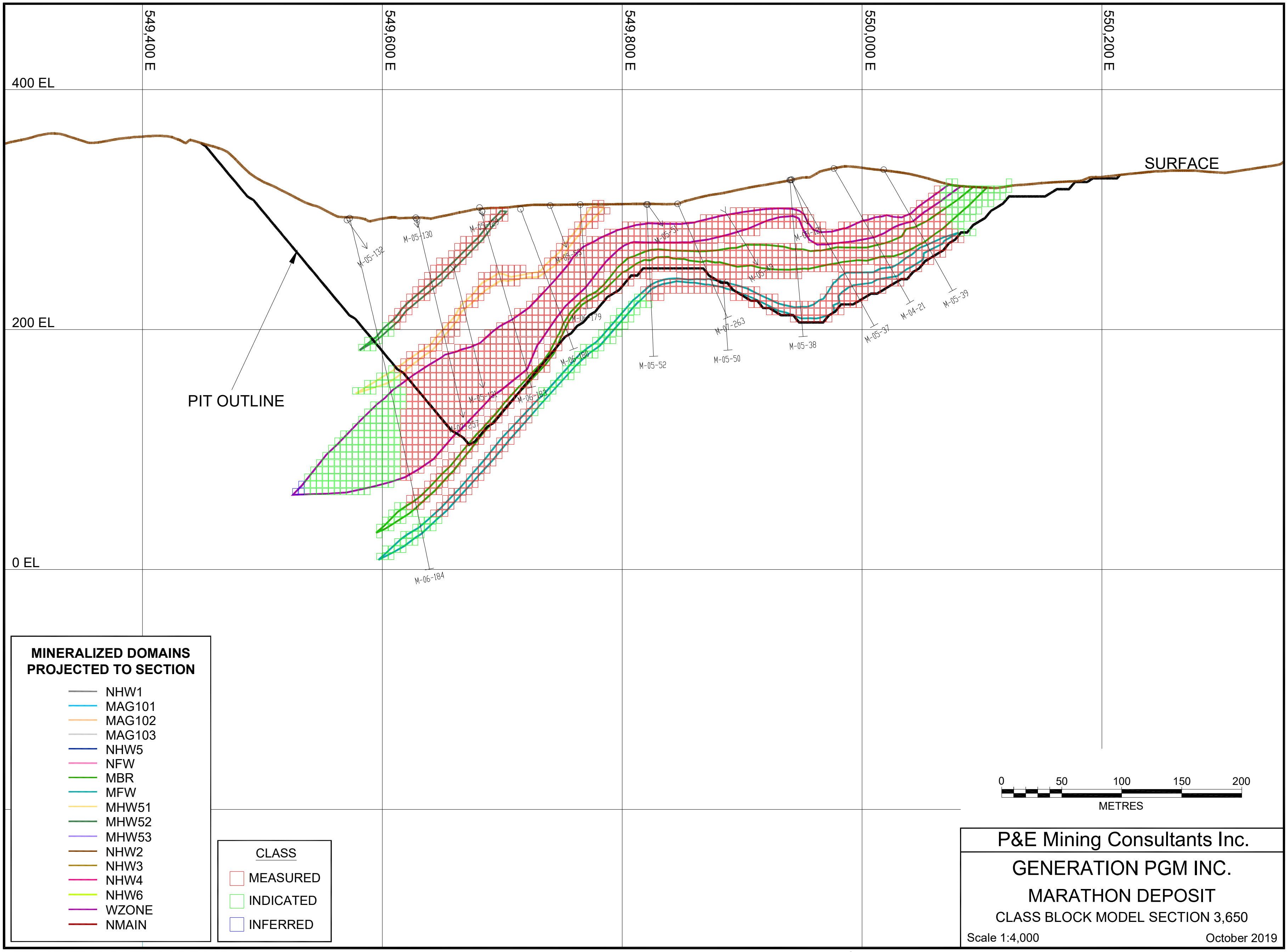

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL PLAN 270 EL
Scale 1:14,000
October 2019

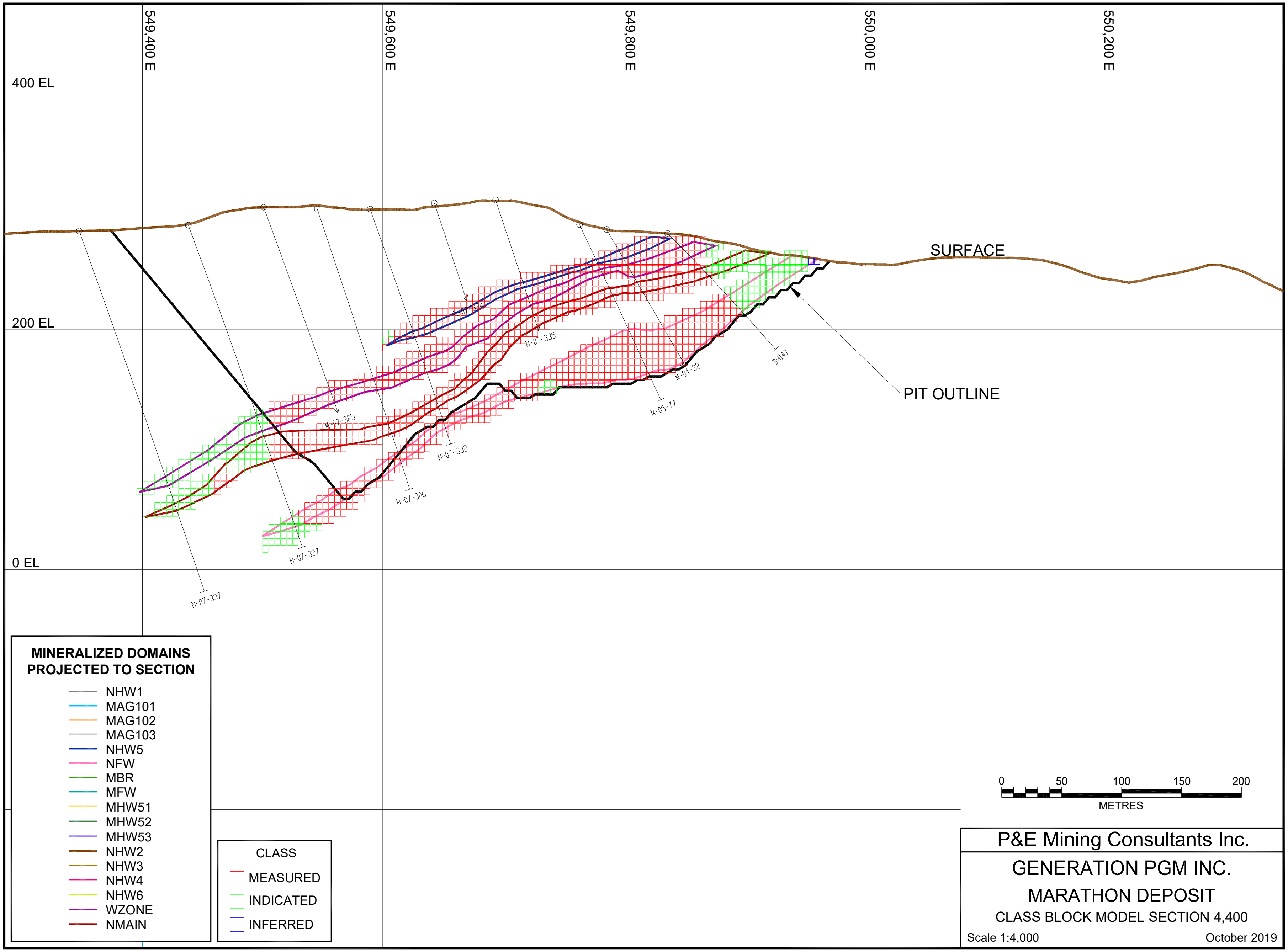

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL PLAN 210 EL
Scale 1:14,000
October 2019

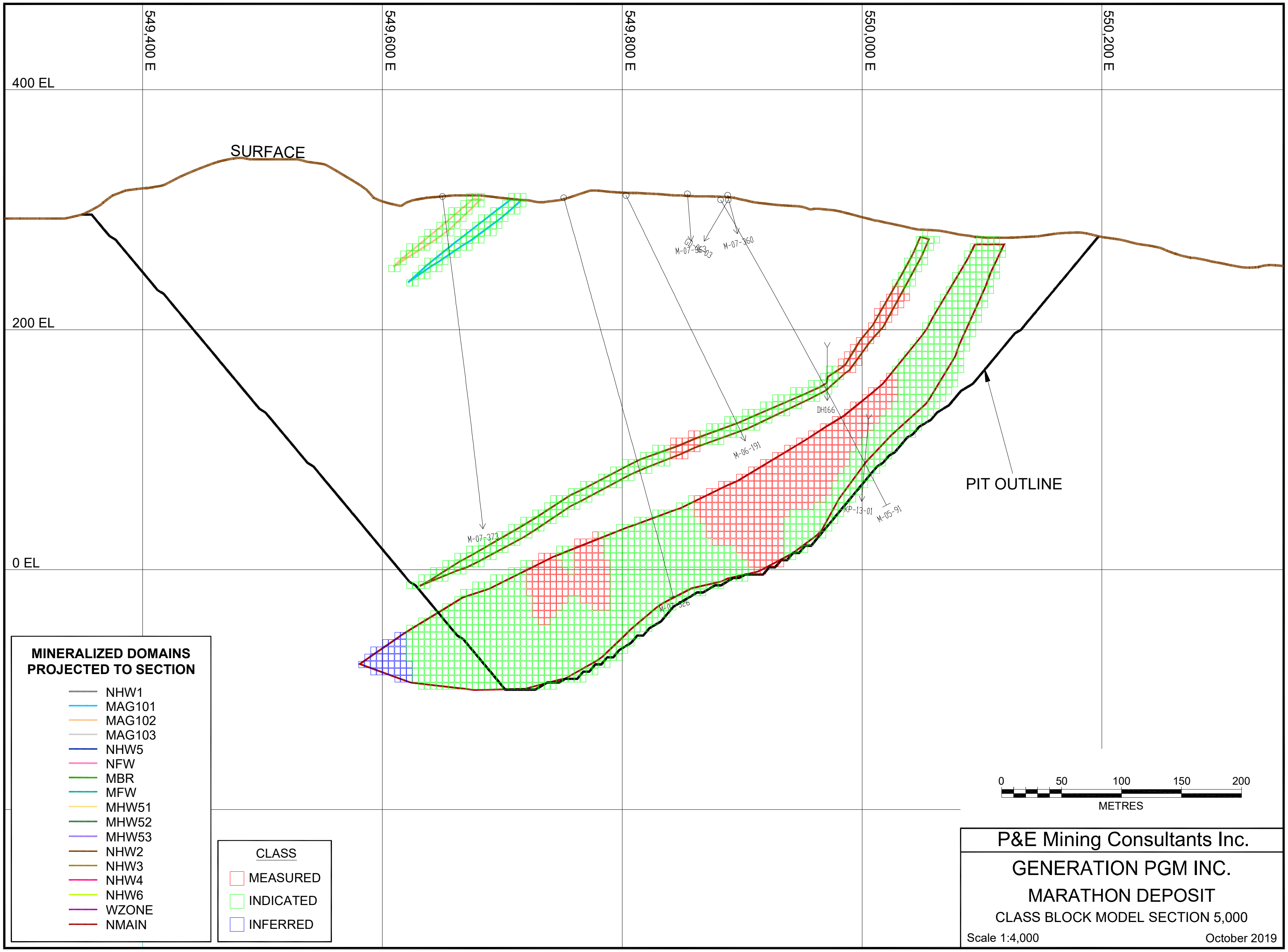

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL PLAN 150 EL
Scale 1:14,000
October 2019


5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
W
E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
NSR C$/tonne
+ 75.00
50.00 - 75.00
25.00 - 50.00
13.00 - 25.00
0.01 - 13.00
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
NSR BLOCK MODEL PLAN 90 EL
Scale 1:14,000
October 2019

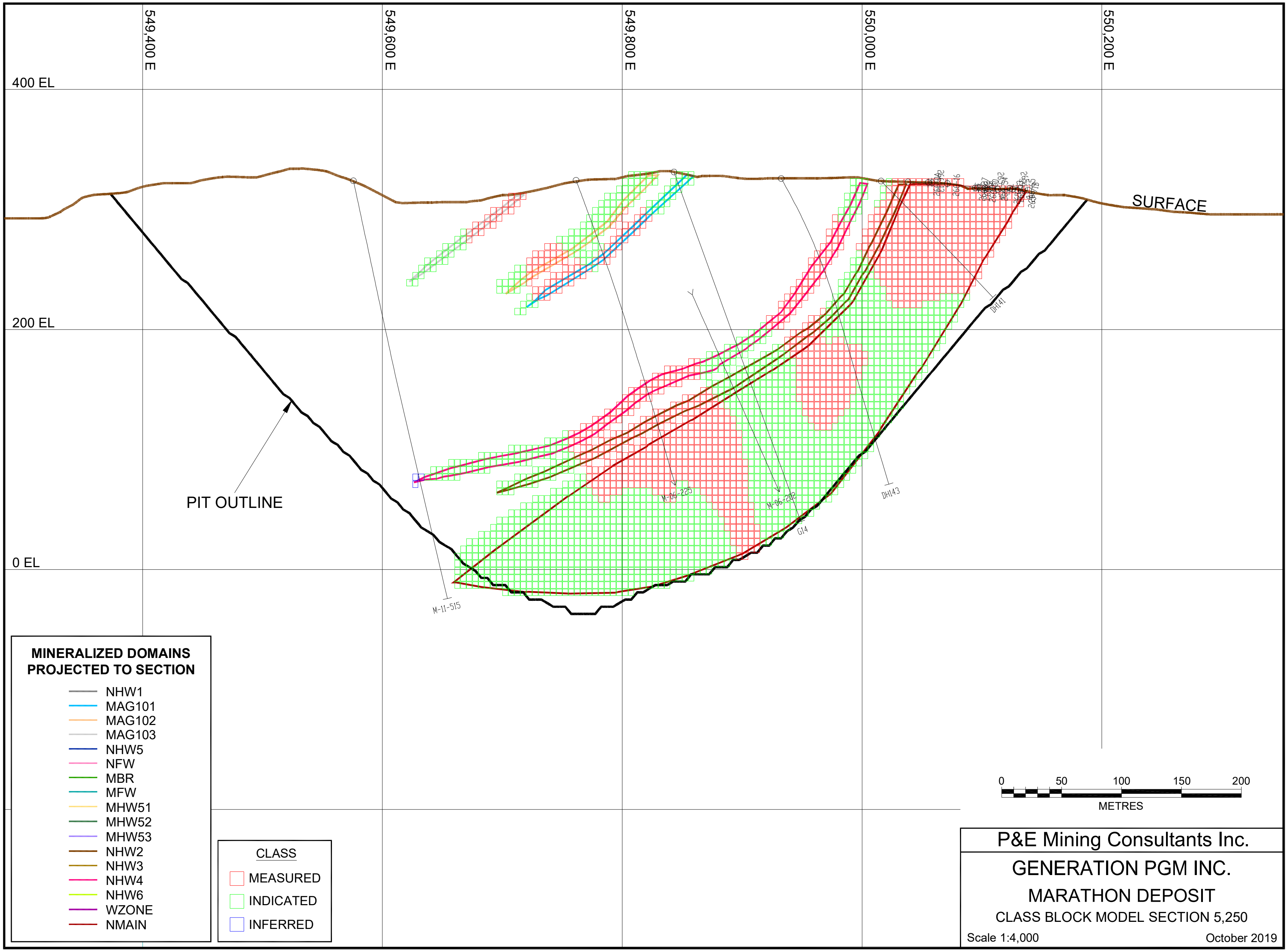
APPENDIX F MARATHON CLASSIFICATION BLOCK MODEL CROSS SECTIONS AND PLANS


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 3,650
Scale 1:4,000
October 2019

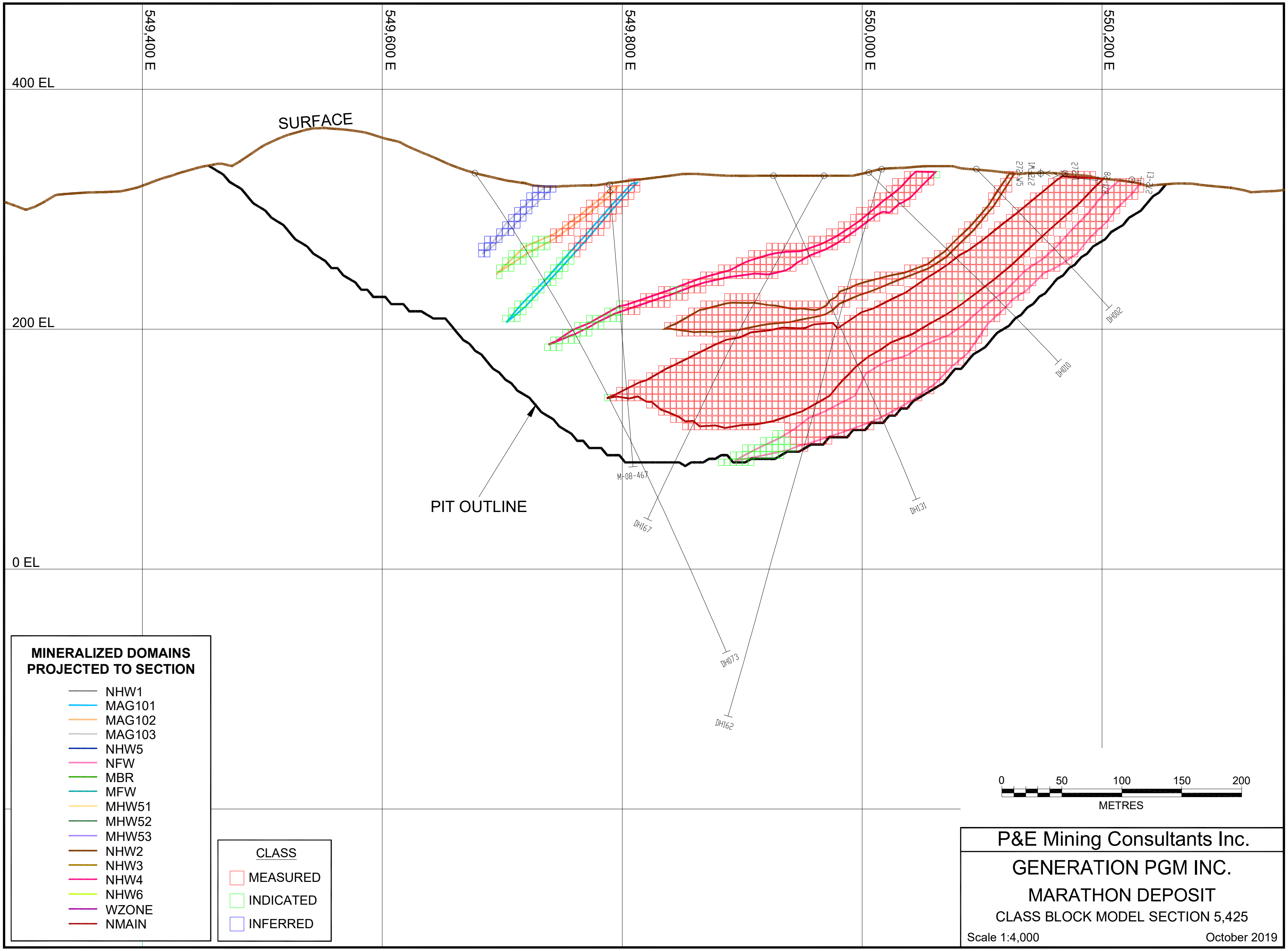

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-07-337
M-07-327
M-07-325
M-07-306
M-07-332
M-07-335
M-05-77
M-04-32
DH147
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 4,400
Scale 1:4,000
October 2019

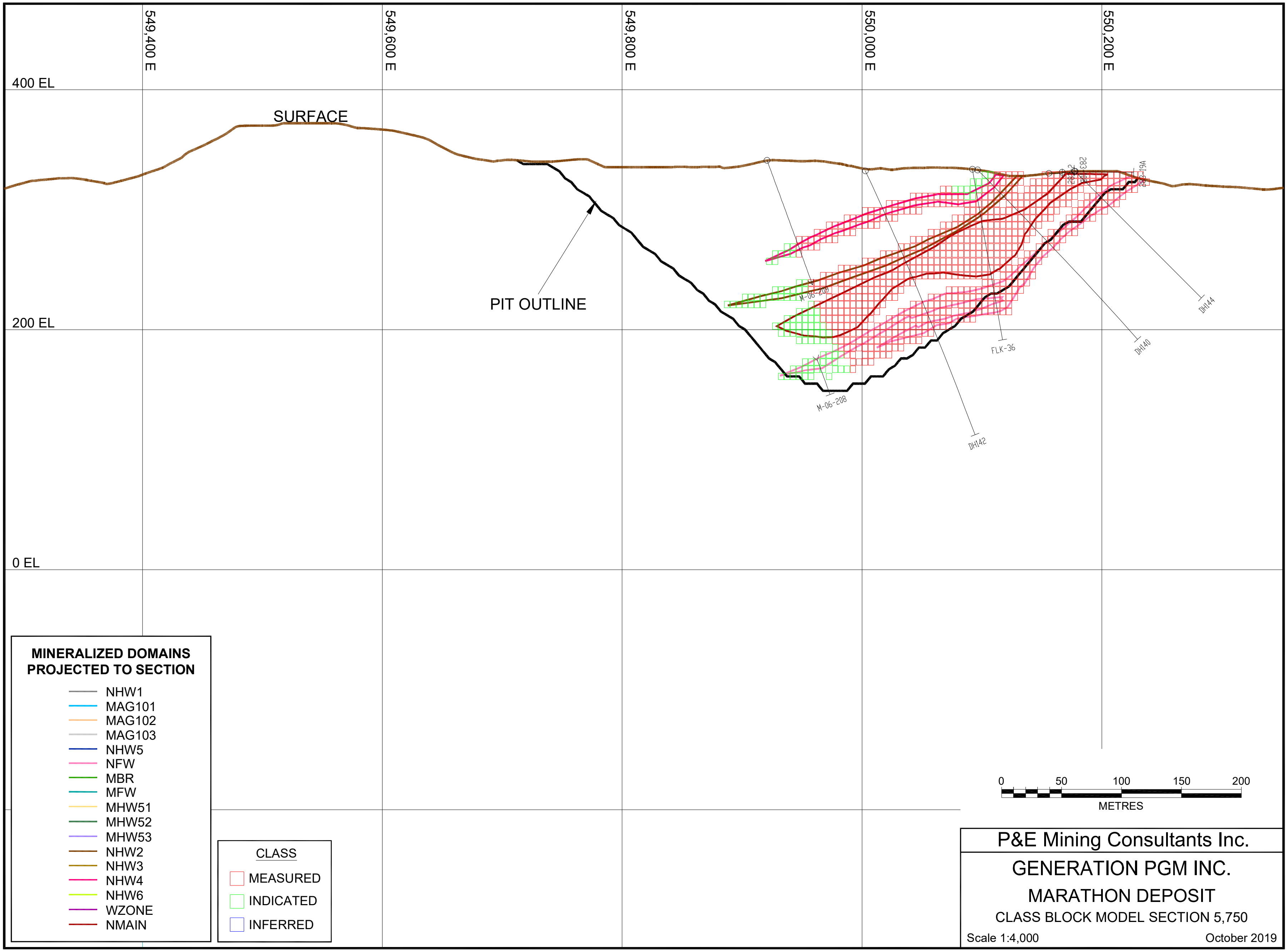


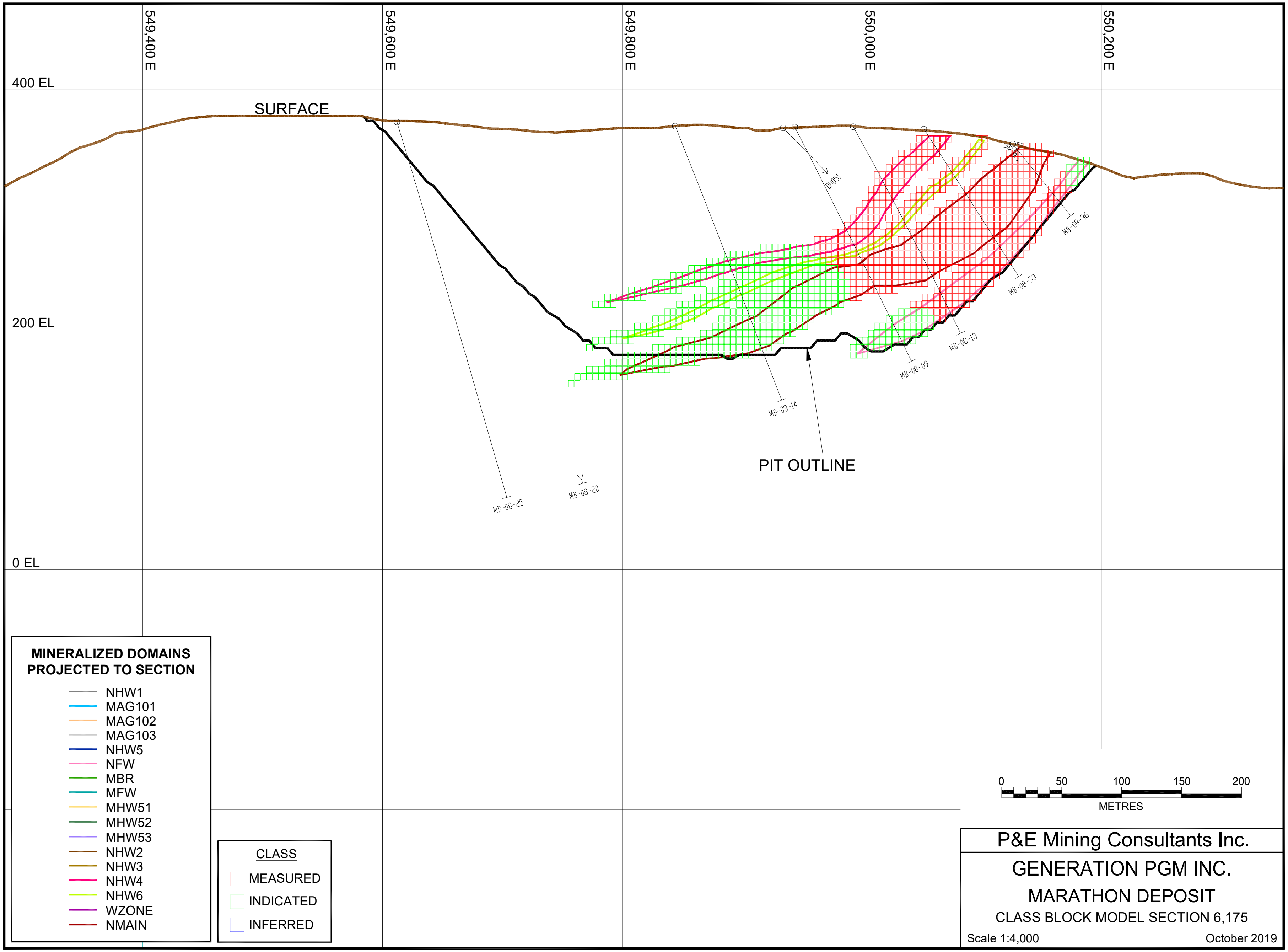
549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-07-373
M-06-191
M-07-360
DH166
KP-13-01
M-05-91
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 5,000
Scale 1:4,000
October 2019

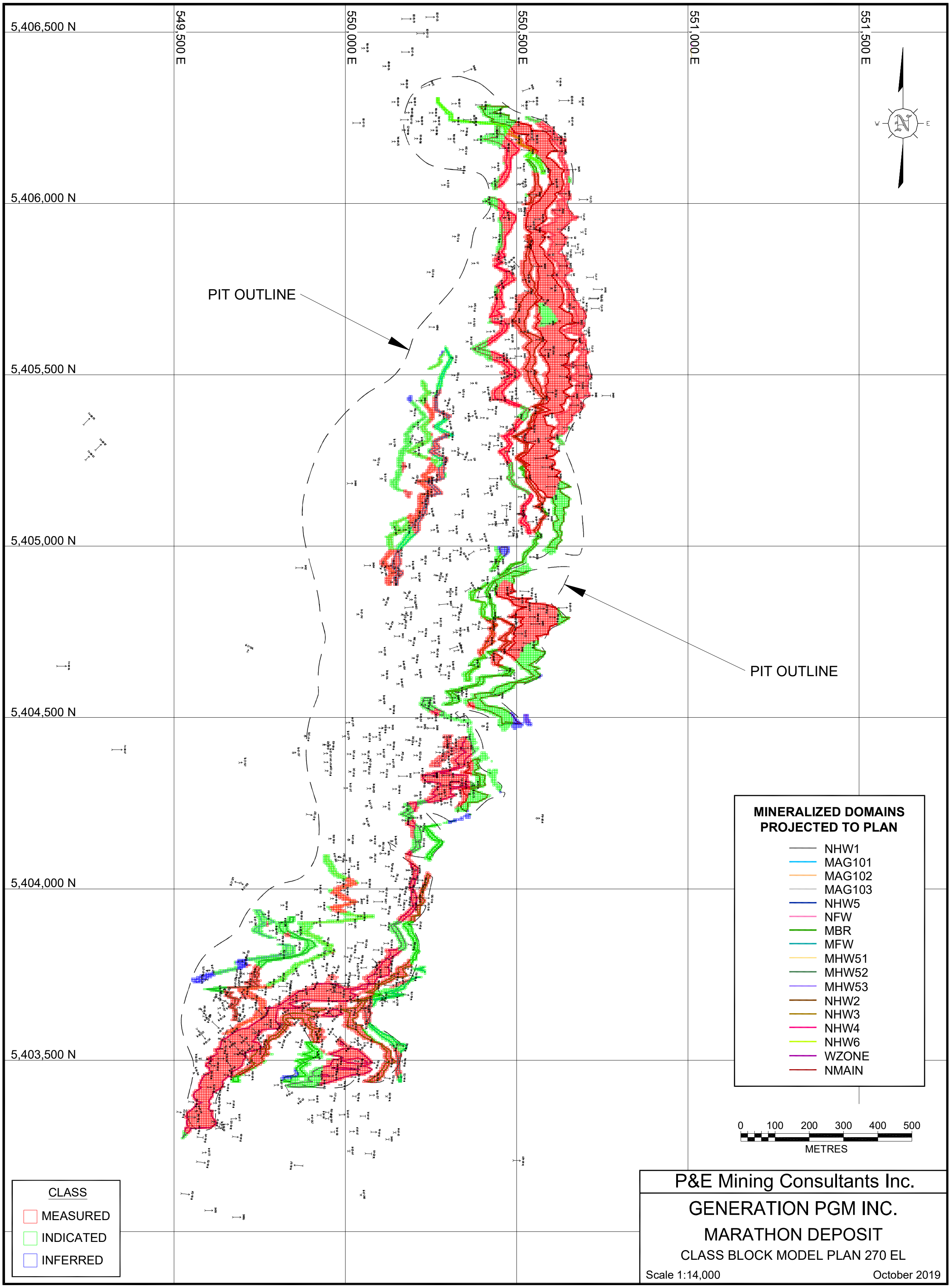


549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-11-515
M-06-225
M-06-202
G14
DH143
DH141
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 5,250
Scale 1:4,000
October 2019

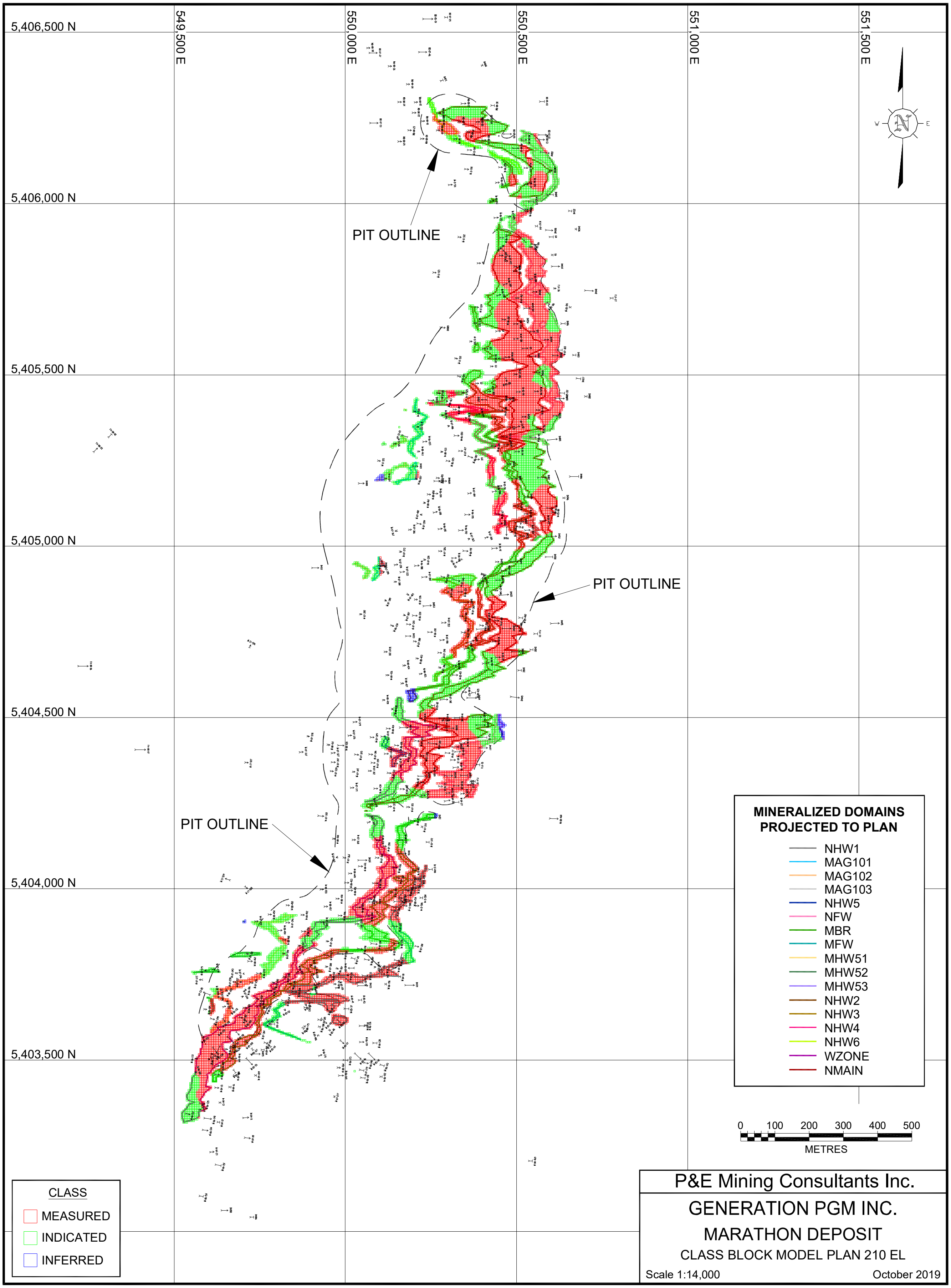

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
DH002
DH010
DH131
DH167
DH073
DH162
M-08-467
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 5,425
Scale 1:4,000
October 2019

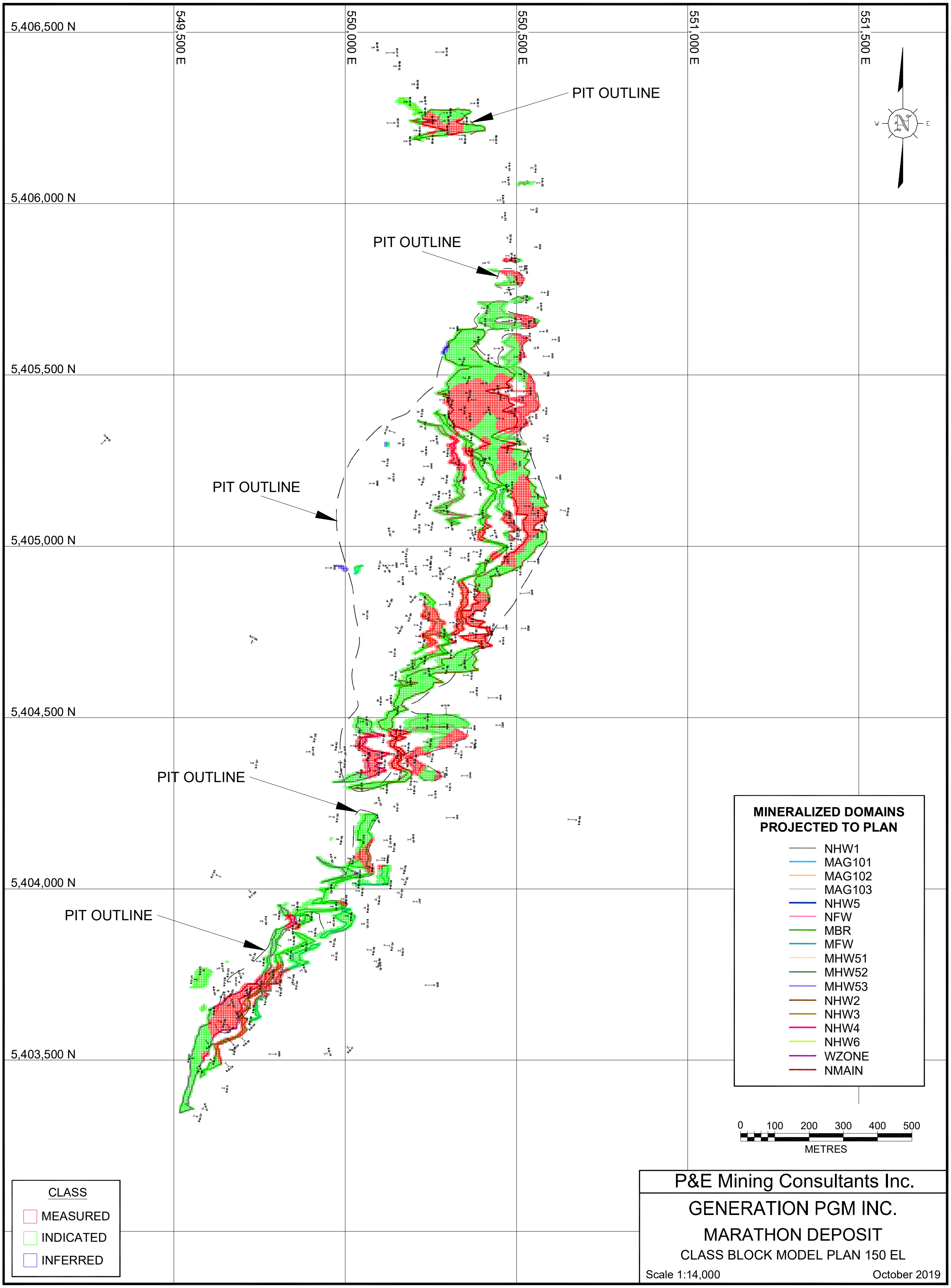

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
M-06-208
FLK-36
DH140
DH144
DH142
MINERALIZED DOMAINS PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 5,750
Scale 1:4,000
October 2019

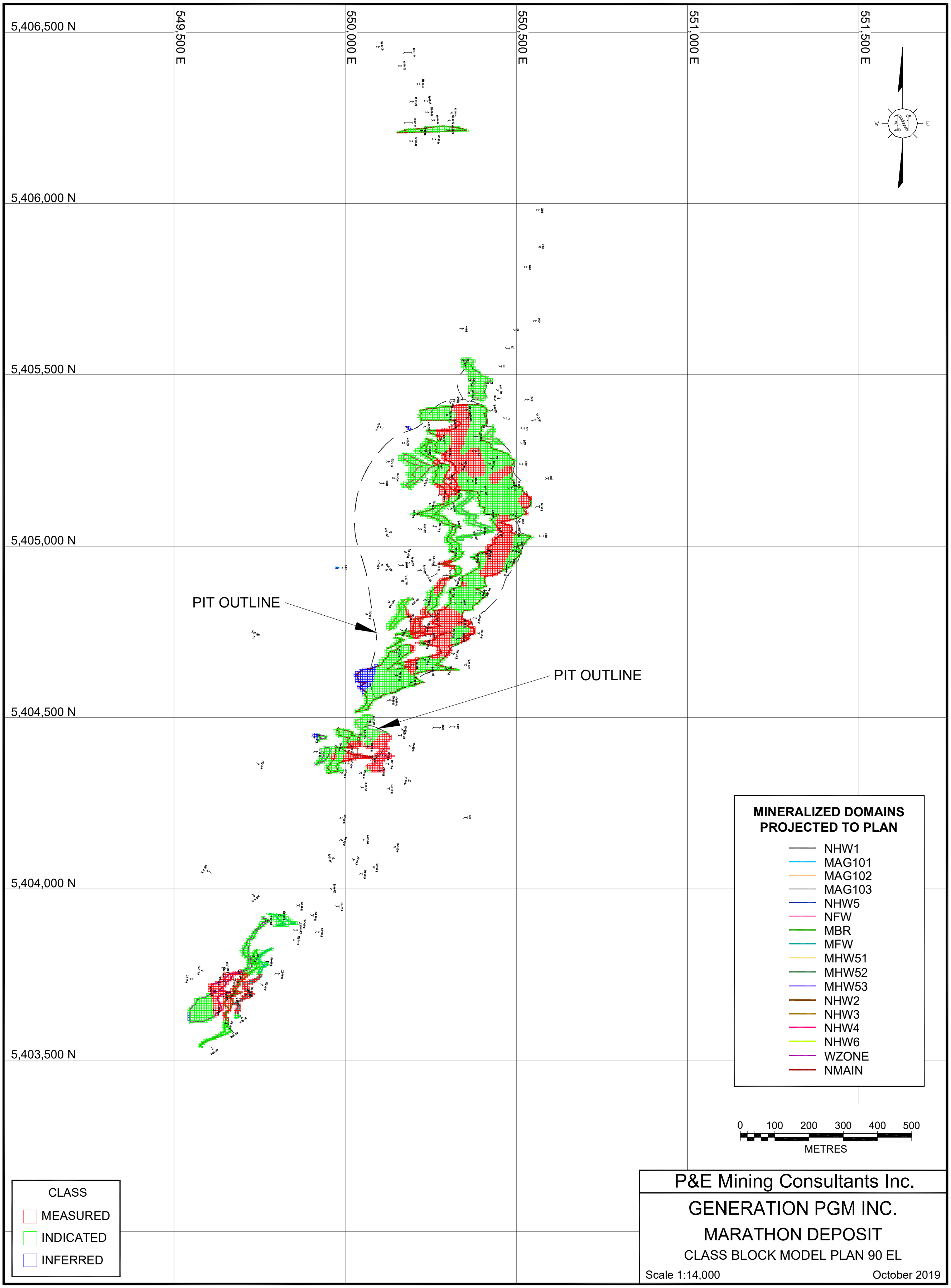

549,400 E
549,600 E
549,800 E
550,000 E
550,200 E
400 EL
200 EL
0 EL
SURFACE
PIT OUTLINE
MB-08-25
MB-08-20
MB-08-14
MB-08-09
MB-08-13
MB-08-33
MB-08-36
DH051
MINERALIZED DOMAINS
PROJECTED TO SECTION
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
CLASS
MEASURED
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL SECTION 6,175
Scale 1:4,000
October 2019



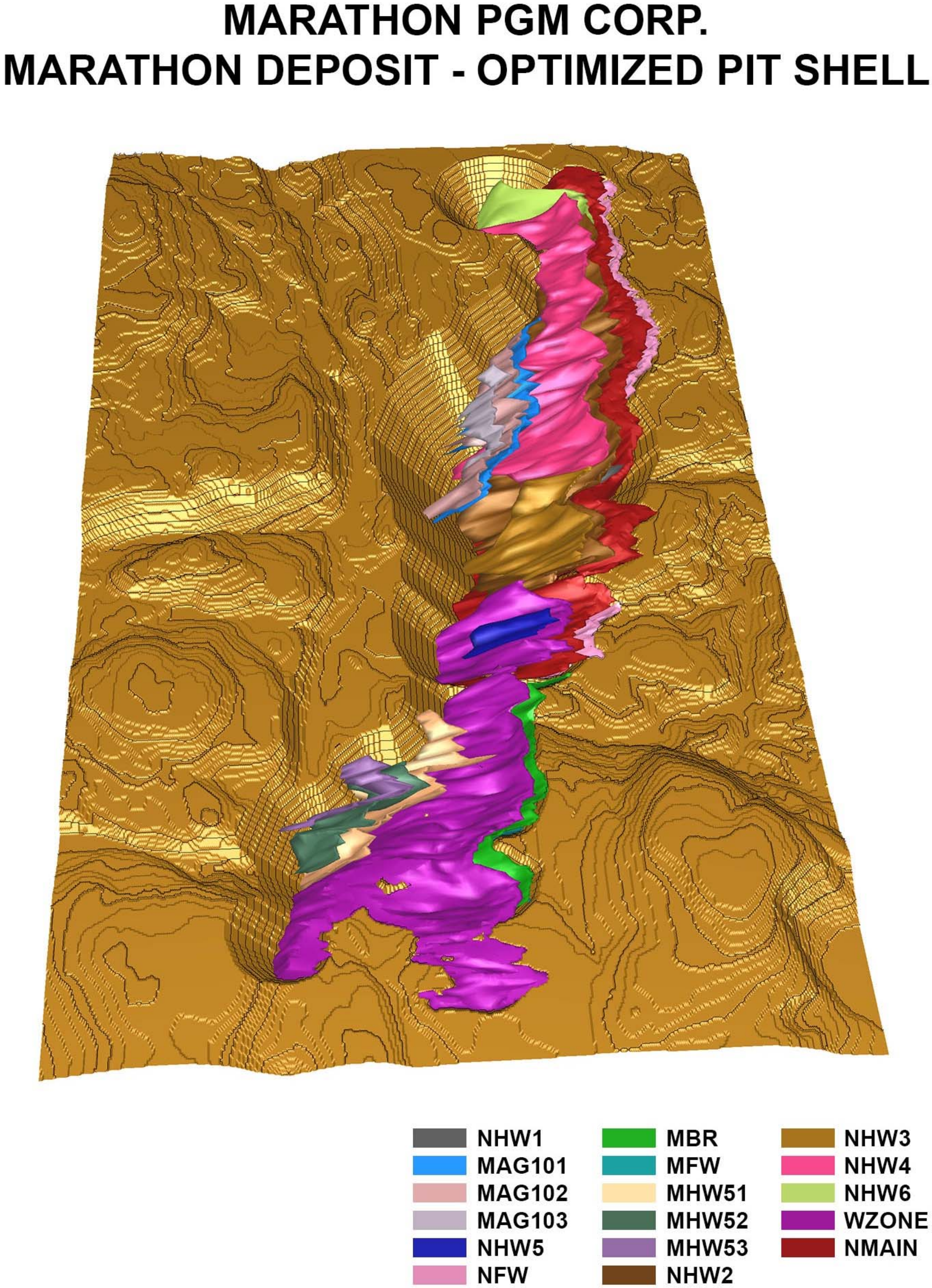
5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL PLAN 270 EL
Scale 1:14,000
October 2019


5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
W
E
N
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0
100
200
300
400
500
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL PLAN 210 EL
Scale 1:14,000
October 2019

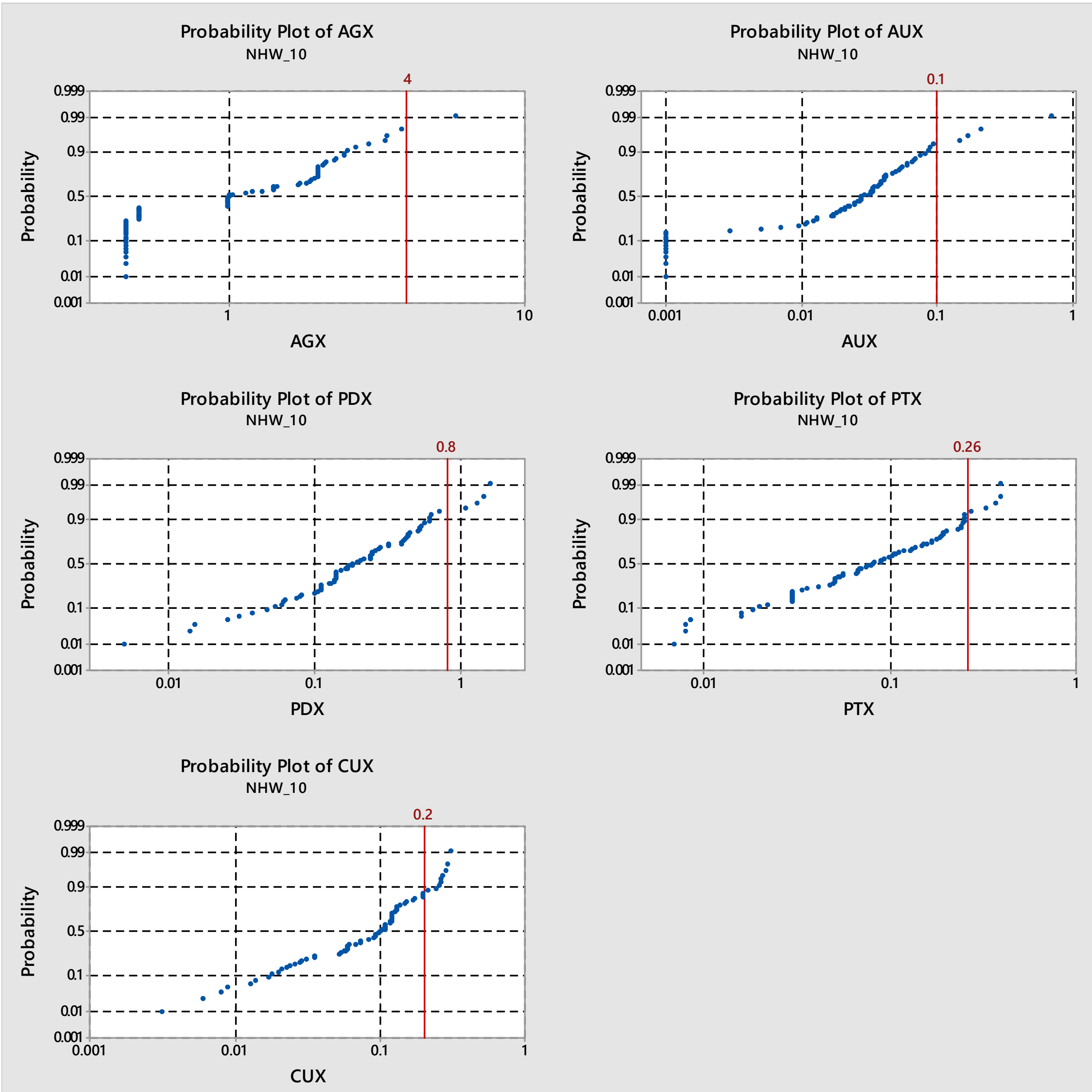

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL PLAN 150 EL
Scale 1:14,000
October 2019

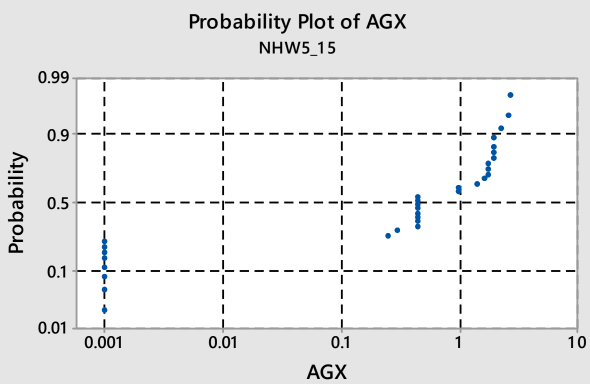

5,406,500 N
5,406,000 N
5,405,500 N
5,405,000 N
5,404,500 N
5,404,000 N
5,403,500 N
549,500 E
550,000 E
550,500 E
551,000 E
551,500 E
W
E
PIT OUTLINE
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
NHW1
MAG101
MAG102
MAG103
NHW5
NFW
MBR
MFW
MHW51
MHW52
MHW53
NHW2
NHW3
NHW4
NHW6
WZONE
NMAIN
0 100 200 300 400 500
METRES
CLASS
MEASURED
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
MARATHON DEPOSIT
CLASS BLOCK MODEL PLAN 90 EL
Scale 1:14,000
October 2019

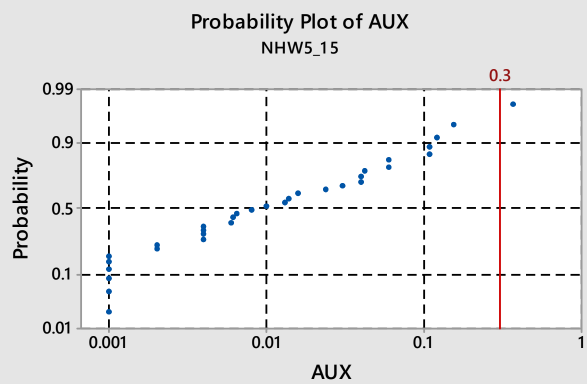
APPENDIX G MARATHON OPTIMIZED PIT SHELL

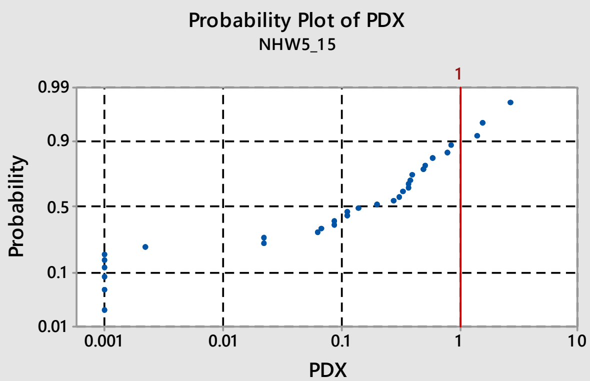


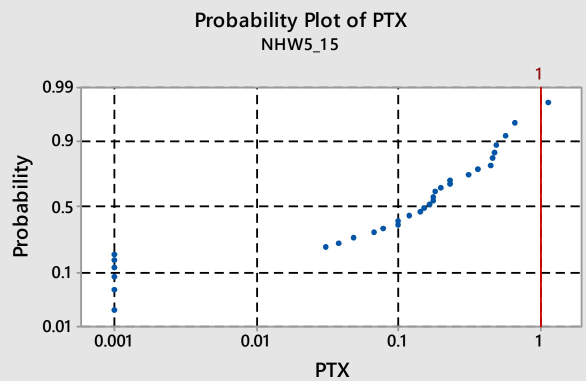
APPENDIX H MARATHON LOG-NORMAL PROBABILITY PLOTS

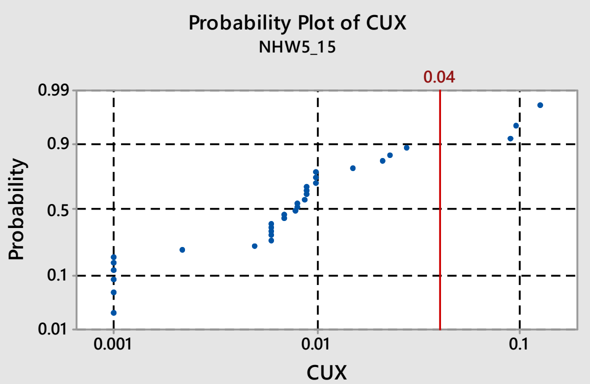


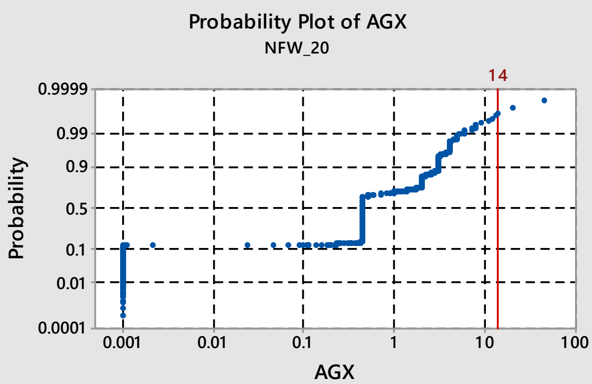

Probability Plot of AGX
NHW5_15
Probability
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
1
10
AGX

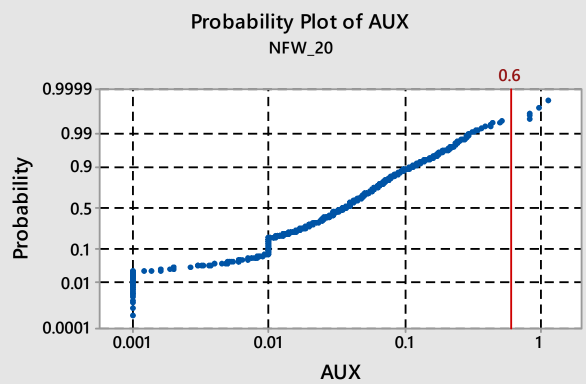

Probability Plot of AUX
NHW5_15
0.3
Probability
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
1
AUX

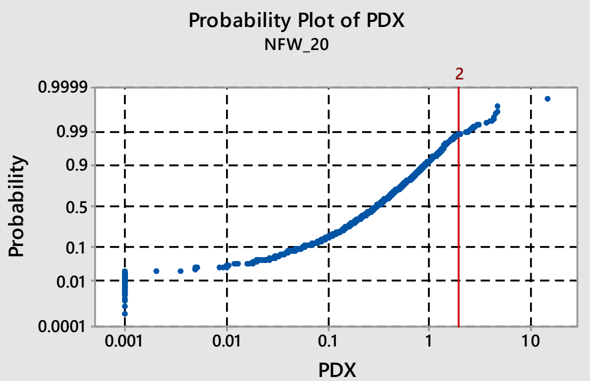

Probability Plot of PDX
NHW5_15
1
Probability
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
1
10
PDX

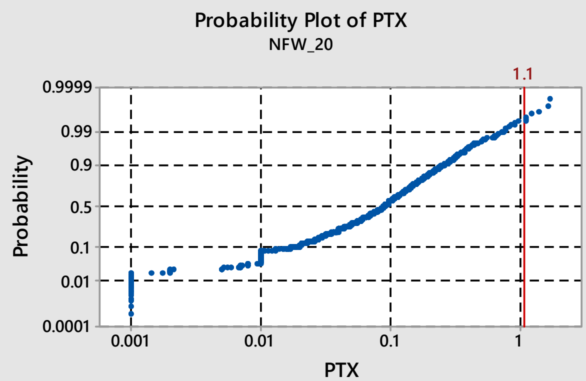

Probability Plot of PTX
NHW5_15
1
Probability
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
1
PTX

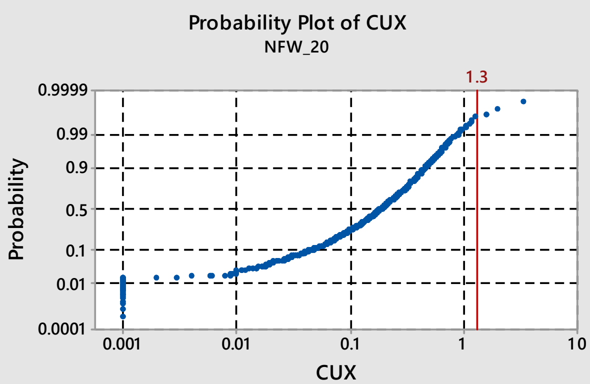

Probability Plot of CUX
NHW5_15
0.04
Probability
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
CUX

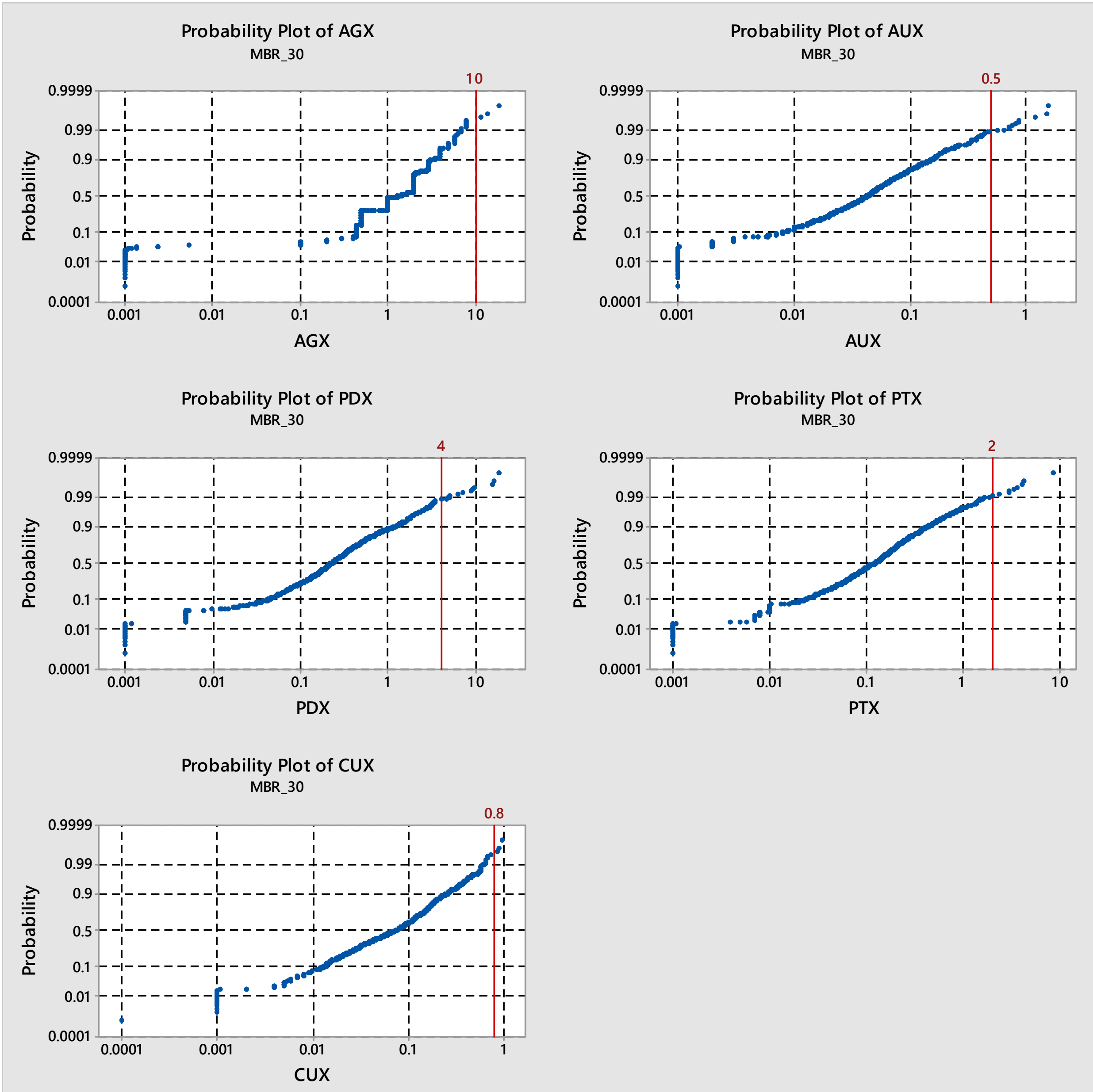

Probability Plot of AGX
NFW_20
14
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
10
100
AGX

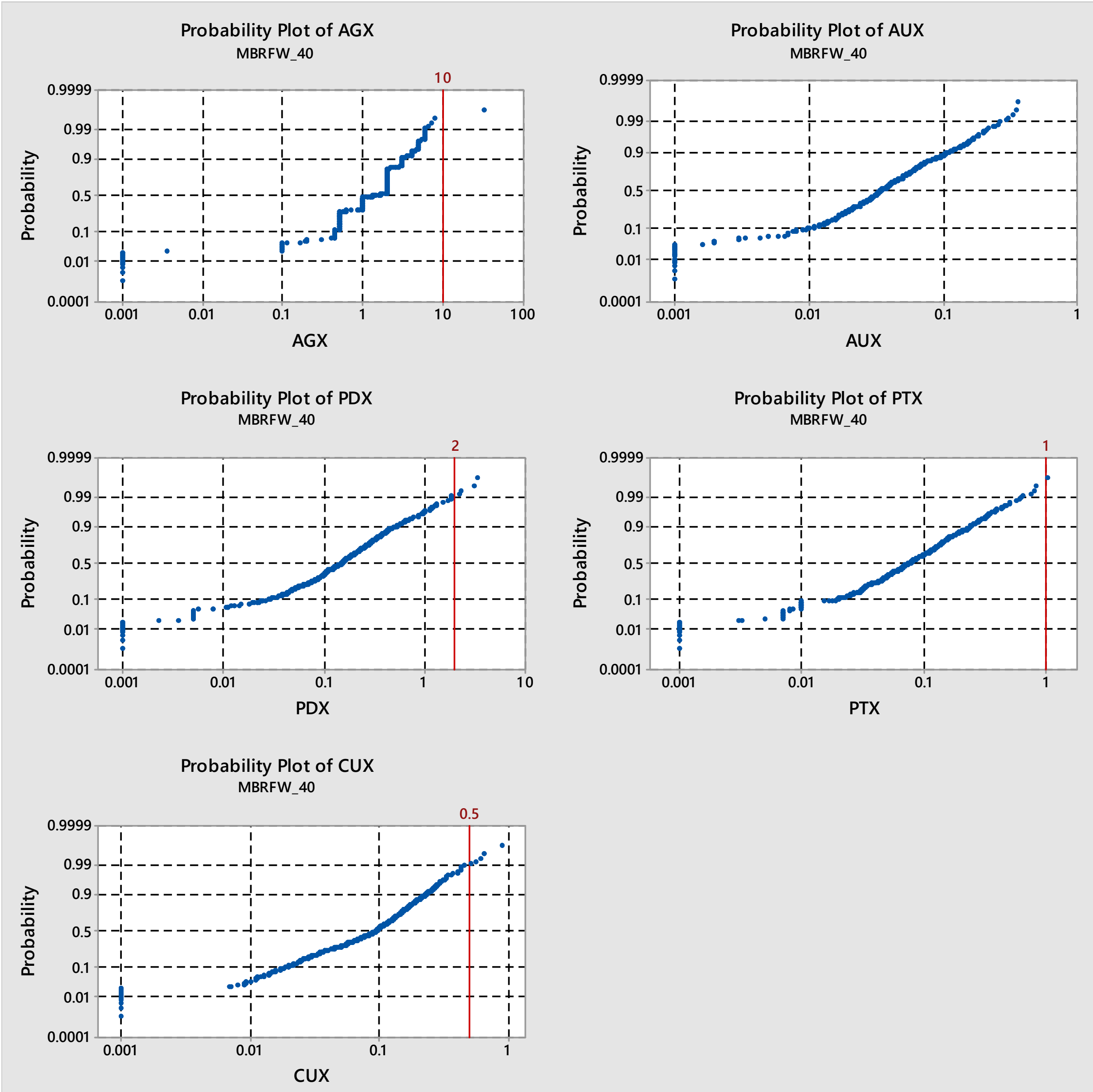

Probability Plot of AUX
NFW_20
0.6
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
AUX

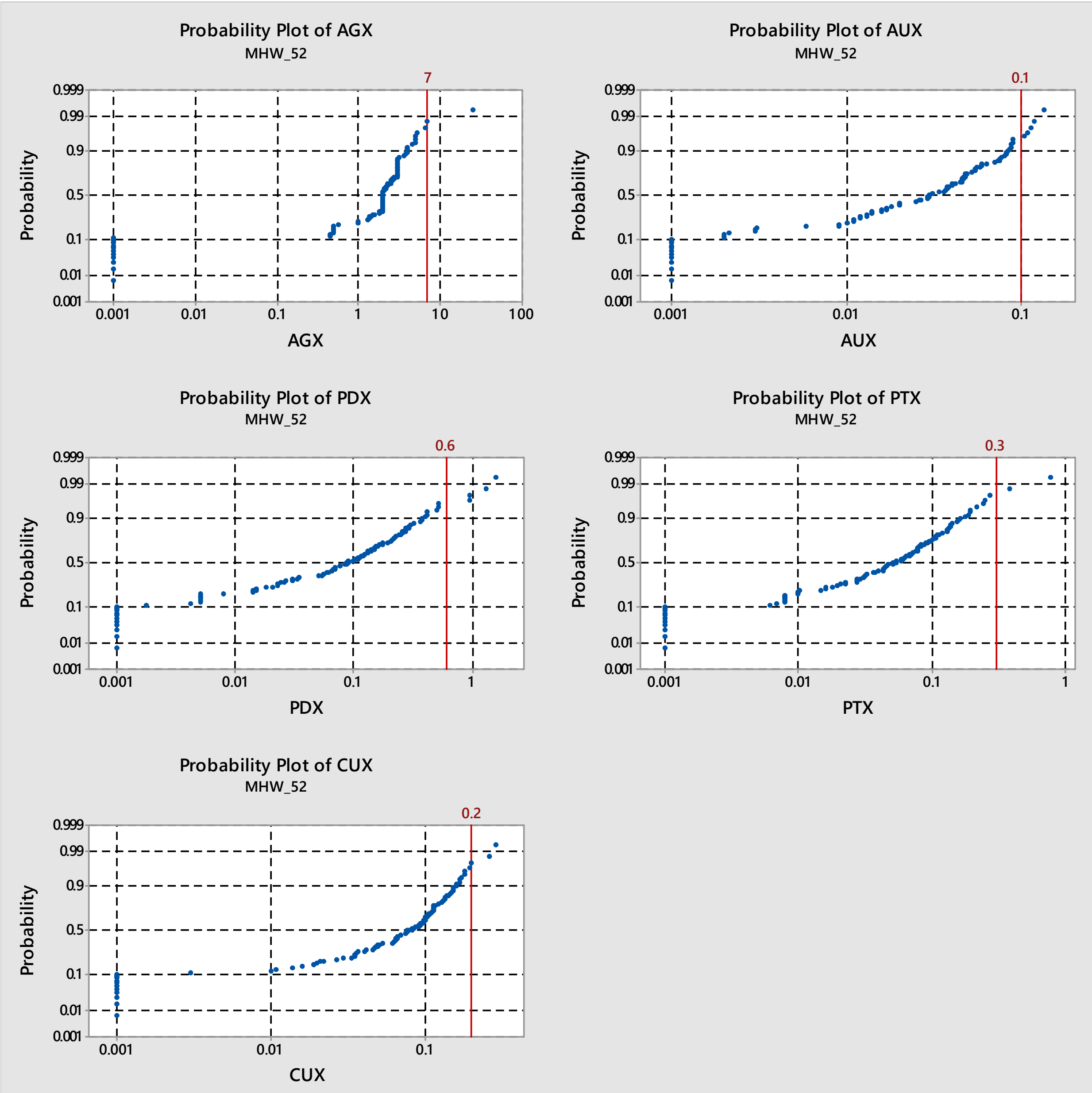

Probability Plot of PDX
NFW_20
2
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
10
PDX

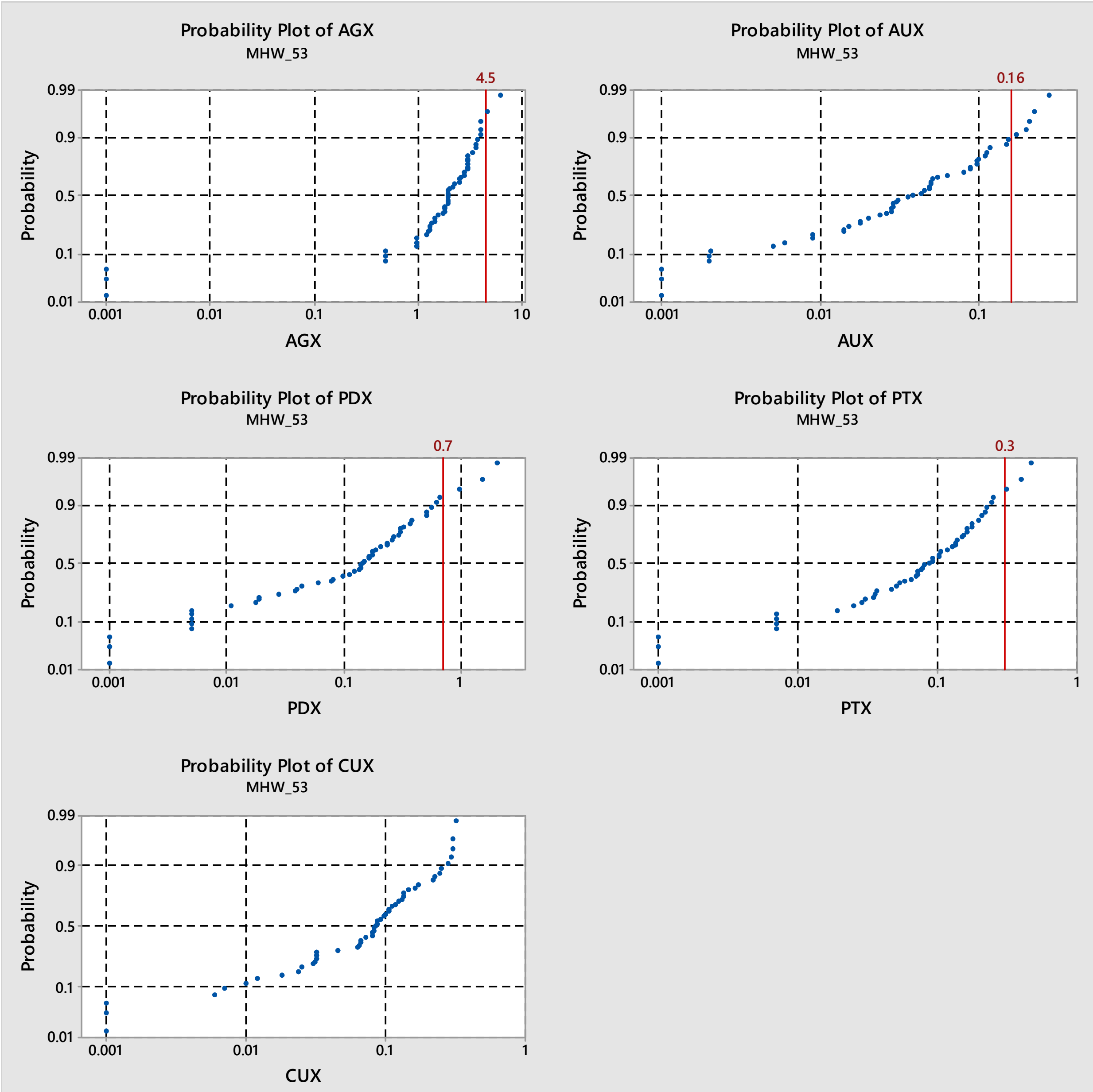

Probability Plot of PTX
NFW_20
1.1
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
PTX


Probability Plot of CUX
NFW_20
1.3
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
10
CUX

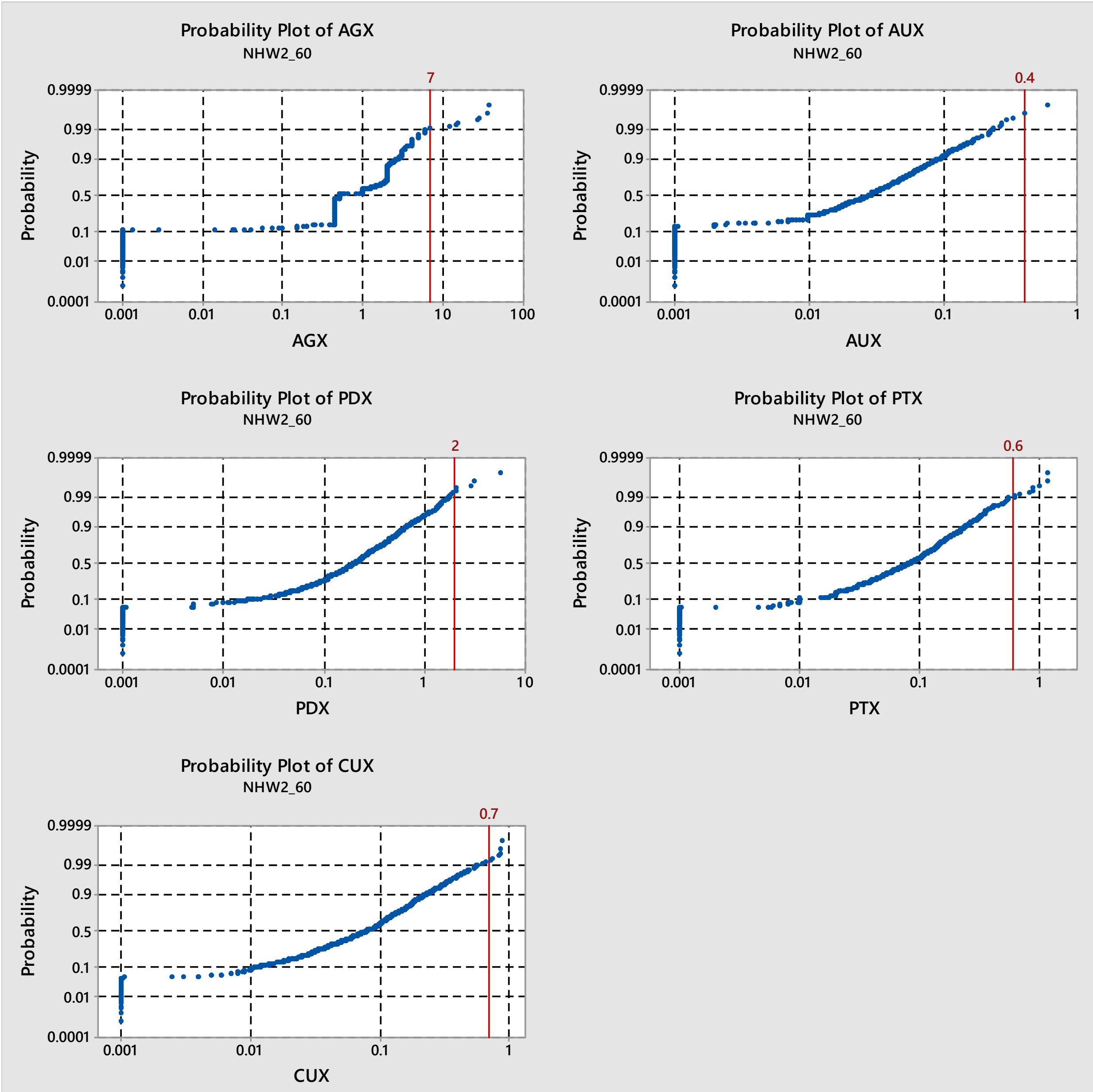

Probability Plot of AGX
MBR_30
10
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
AGX
Probability Plot of AUX
MBR_30
0.5
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
AUX
Probability Plot of PDX
MBR_30
4
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
PDX
Probability Plot of PTX
MBR_30
2
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
PTX
Probability Plot of CUX
MBR_30
0.8
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.0001
0.001
0.01
0.1
1
CUX


Probability Plot of AGX
MBRFW_40
10
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
10
100
AGX
Probability Plot of AUX
MBRFW_40
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
AUX
Probability Plot of PDX
MBRFW_40
2
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
10
PDX
Probability Plot of PTX
MBRFW_40
1
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
PTX
Probability Plot of CUX
MBRFW_40
0.5
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
Probability
0.001
0.01
0.1
1
CUX

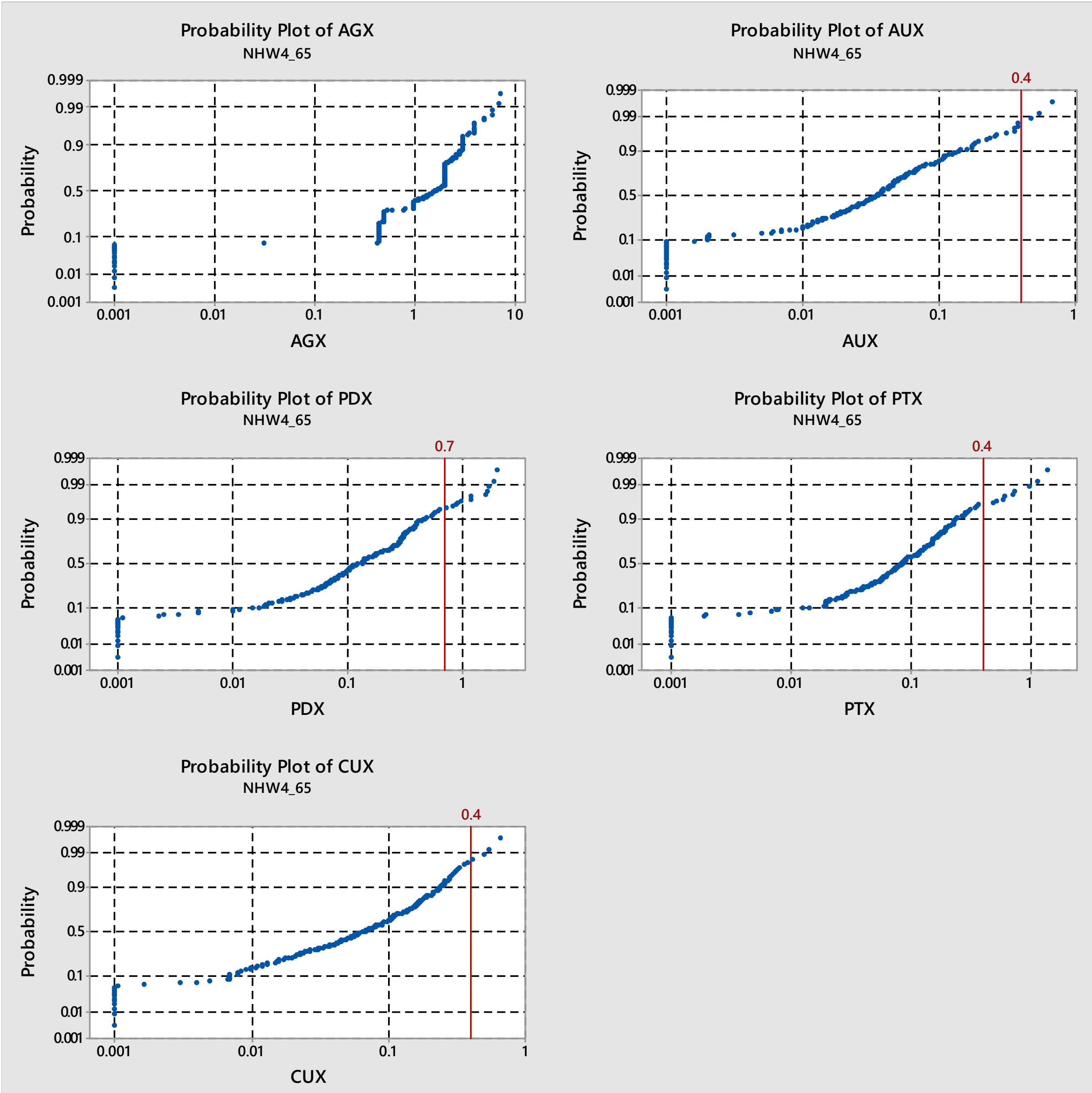

Probability Plot of AGX
MHW_52
7
Probability
AGX
Probability Plot of AUX
MHW_52
0.1
Probability
AUX
Probability Plot of PDX
MHW_52
0.6
Probability
PDX
Probability Plot of PTX
MHW_52
0.3
Probability
PTX
Probability Plot of CUX
MHW_52
0.2
Probability
CUX

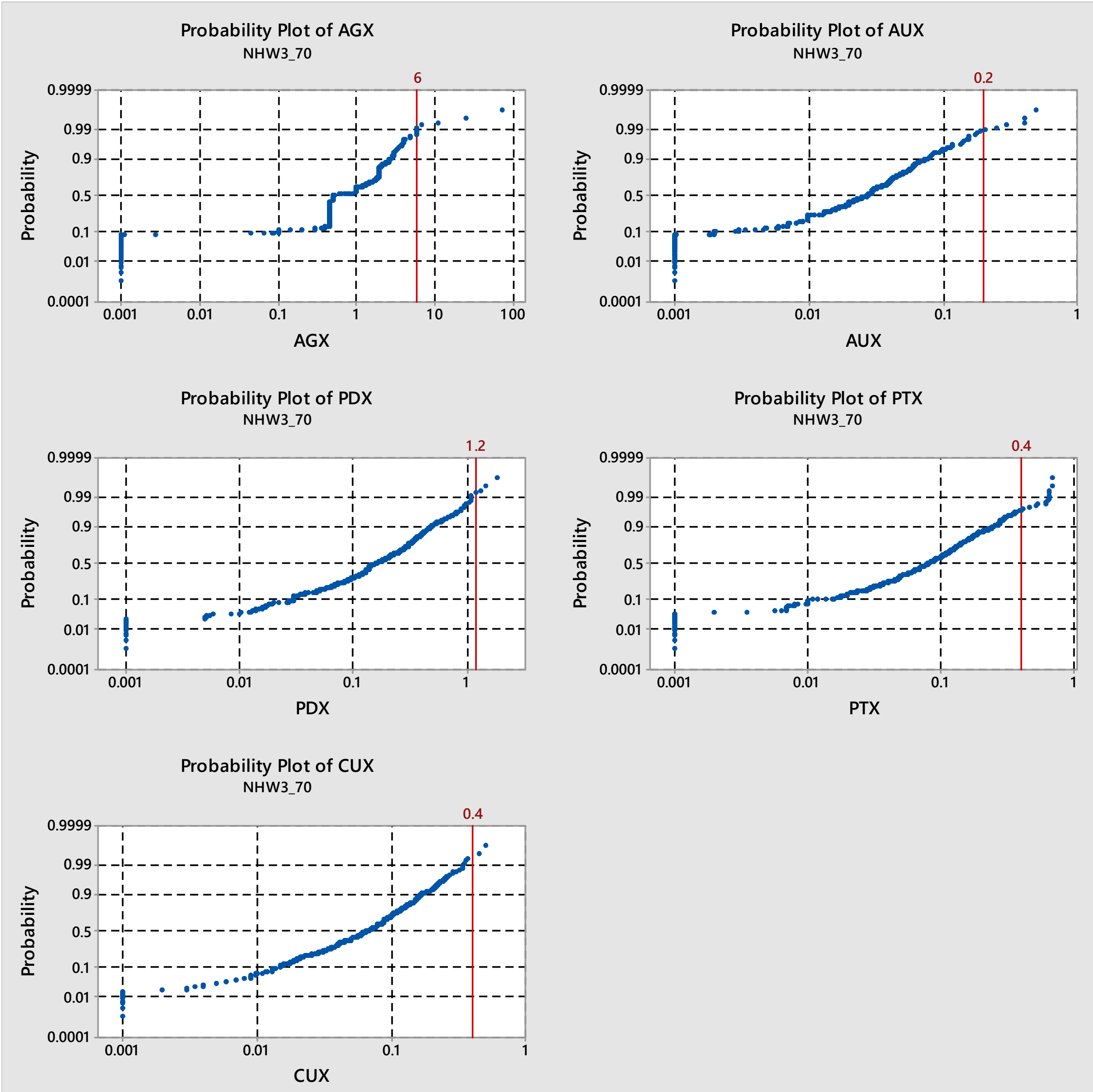


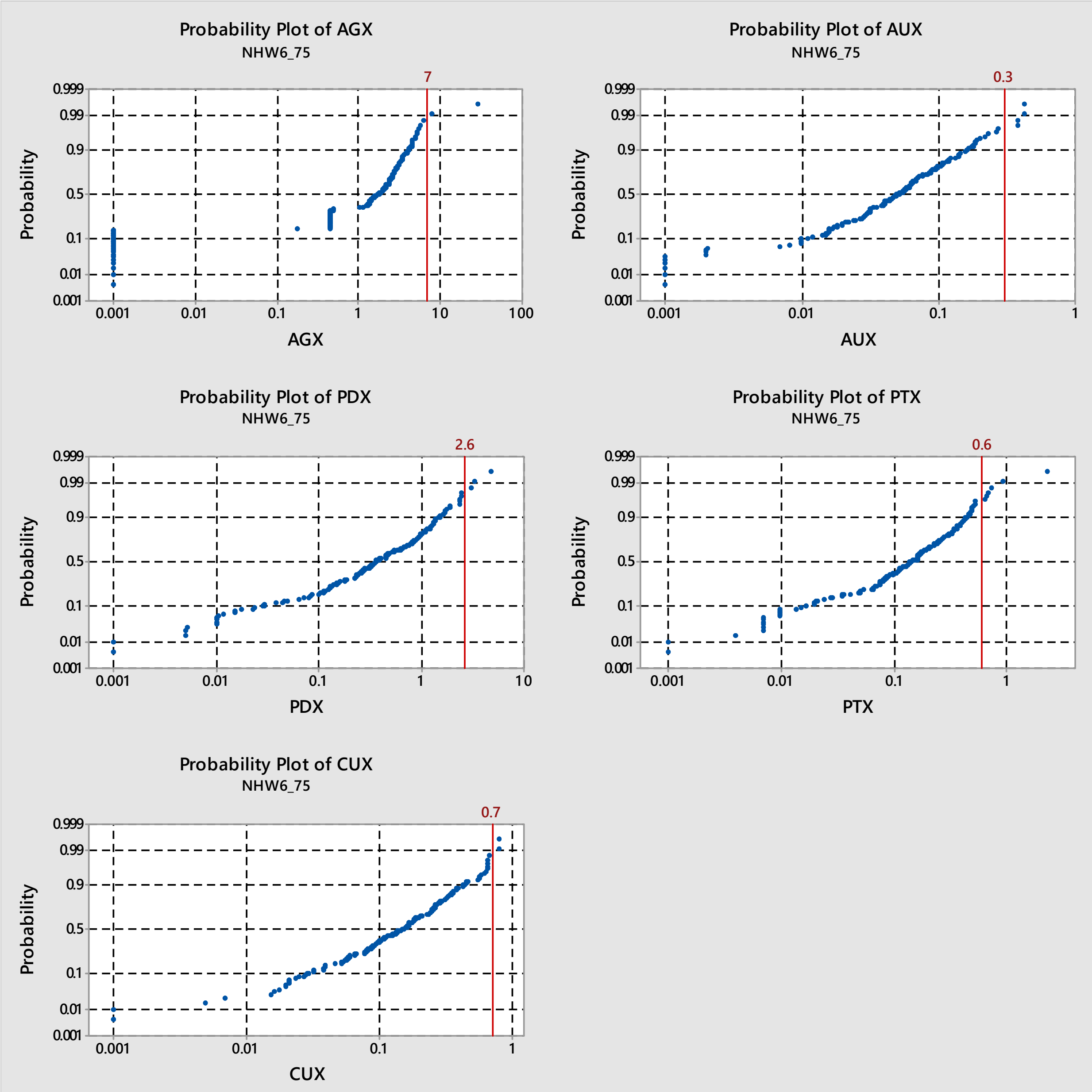
Probability Plot of AGX
MHW_53
4.5
Probability
AGX
0.99
0.9
0.5
0.1
0.01
0.001
0.01
0.1
1
10
Probability Plot of AUX
MHW_53
0.16
Probability
AUX
0.001
0.01
0.1
Probability Plot of PDX
MHW_53
0.7
Probability
PDX
0.001
0.01
0.1
1
Probability Plot of PTX
MHW_53
0.3
Probability
PTX
0.001
0.01
0.1
1
Probability Plot of CUX
MHW_53
Probability
CUX
0.001
0.01
0.1
1

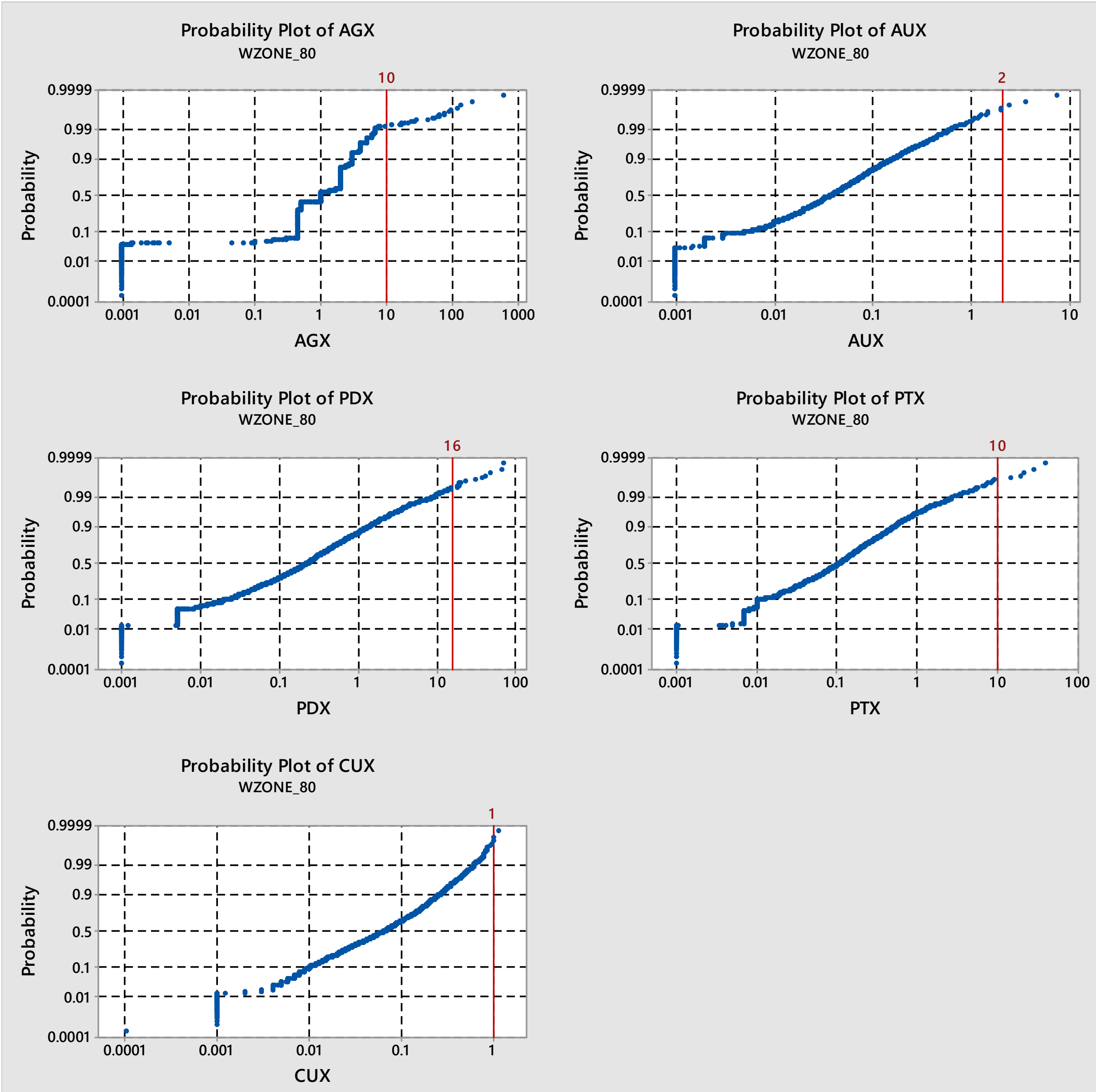


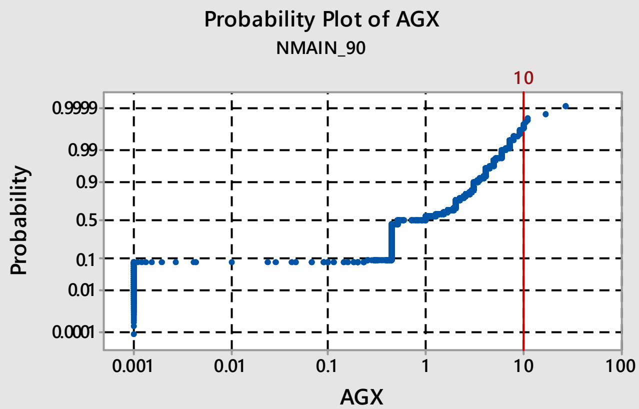
Probability Plot of AGX
NHW2_60
7
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
AGX
Probability Plot of AUX
NHW2_60
0.4
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
AUX
Probability Plot of PDX
NHW2_60
2
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
PDX
Probability Plot of PTX
NHW2_60
0.6
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
PTX
Probability Plot of CUX
NHW2_60
0.7
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
CUX

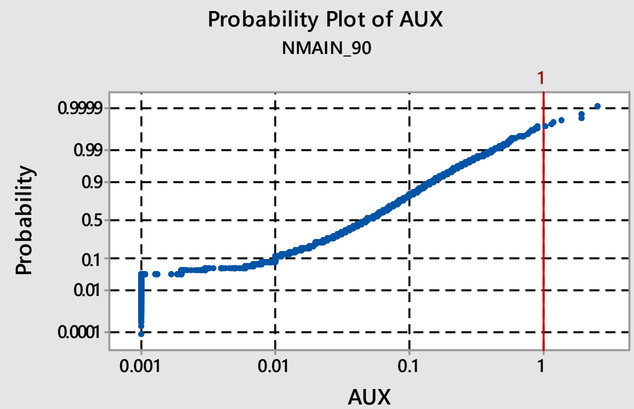

Probability Plot of AGX
NHW4_65
Probability
AGX
Probability Plot of AUX
NHW4_65
0.4
Probability
AUX
Probability Plot of PDX
NHW4_65
0.7
Probability
PDX
Probability Plot of PTX
NHW4_65
0.4
Probability
PTX
Probability Plot of CUX
NHW4_65
0.4
Probability
CUX

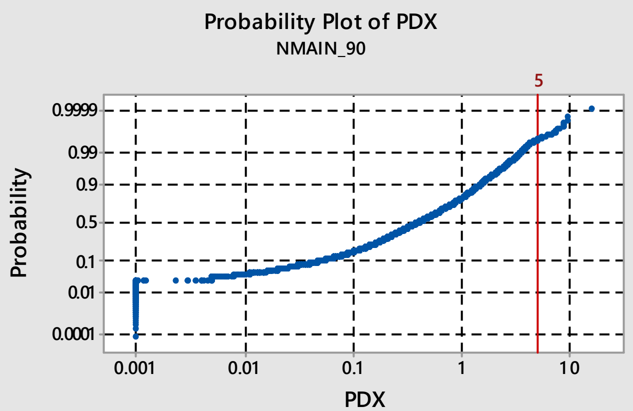

Probability Plot of AGX
NHW3_70
6
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
AGX
Probability Plot of AUX
NHW3_70
0.2
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
AUX
Probability Plot of PDX
NHW3_70
1.2
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
PDX
Probability Plot of PTX
NHW3_70
0.4
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
PTX
Probability Plot of CUX
NHW3_70
0.4
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
CUX

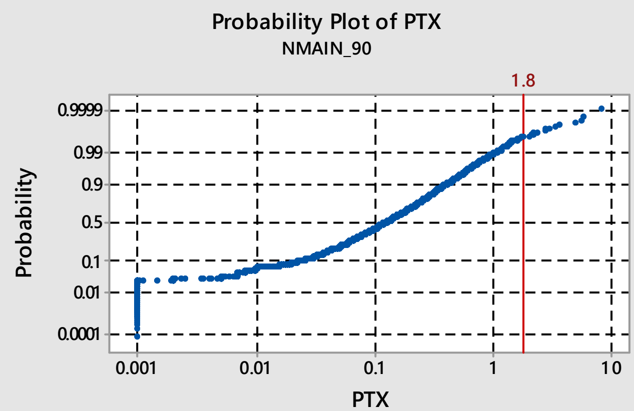

Probability Plot of AGX
NHW6_75
7
Probability
AGX
Probability Plot of AUX
NHW6_75
0.3
Probability
AUX
Probability Plot of PDX
NHW6_75
2.6
Probability
PDX
Probability Plot of PTX
NHW6_75
0.6
Probability
PTX
Probability Plot of CUX
NHW6_75
0.7
Probability
CUX

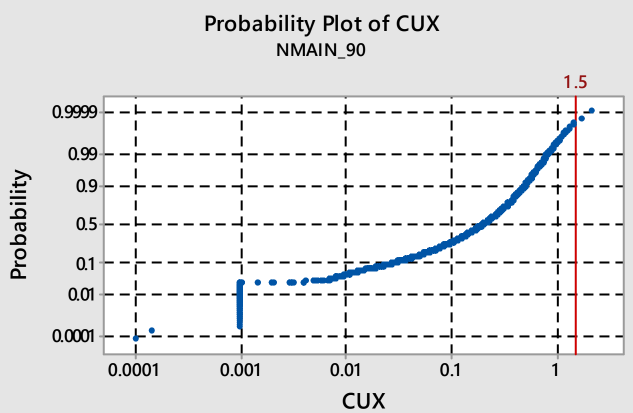

Probability Plot of AGX
WZONE_80
10
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
1000
AGX
Probability Plot of AUX
WZONE_80
2
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
AUX
Probability Plot of PDX
WZONE_80
16
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
PDX
Probability Plot of PTX
WZONE_80
10
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
PTX
Probability Plot of CUX
WZONE_80
1
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.0001
0.001
0.01
0.1
1
CUX

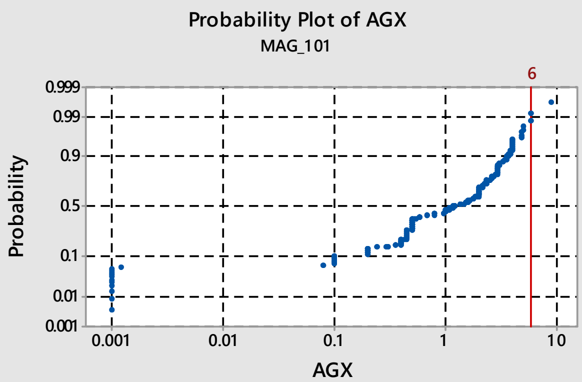

Probability Plot of AGX
NMAIN_90
10
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
100
AGX

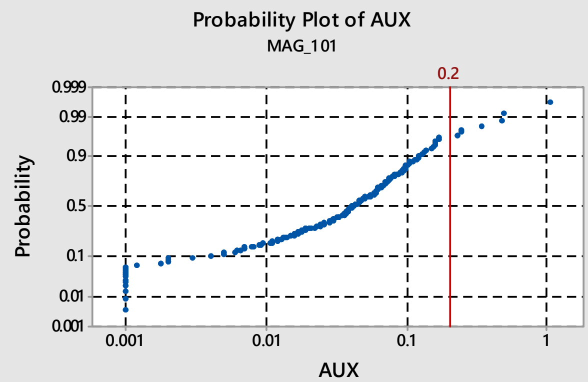

Probability Plot of AUX
NMAIN_90
1
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
AUX

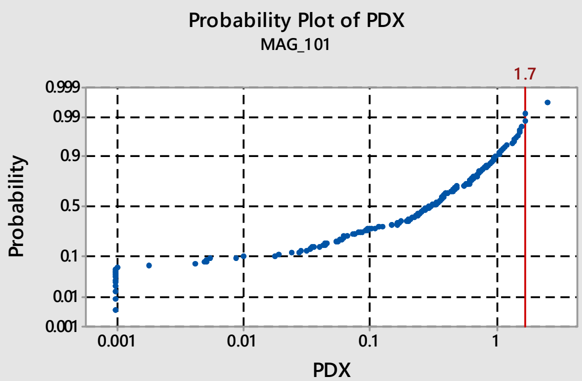

Probability Plot of PDX
NMAIN_90
5
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
PDX

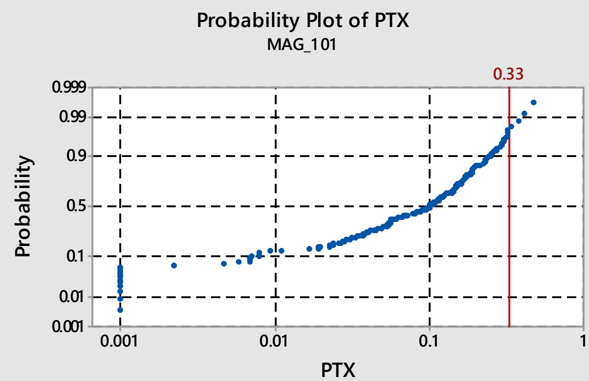

Probability Plot of PTX
NMAIN_90
1.8
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.001
0.01
0.1
1
10
PTX

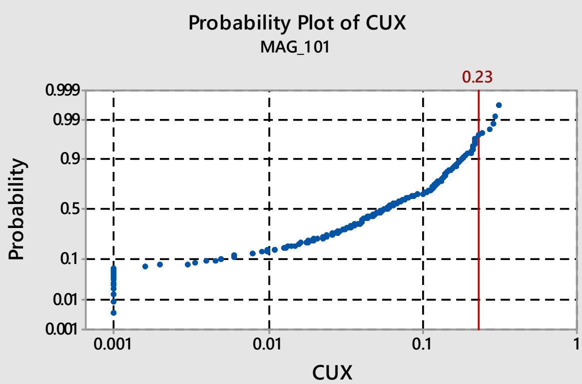

Probability Plot of CUX
NMAIN_90
1.5
Probability
0.9999
0.99
0.9
0.5
0.1
0.01
0.0001
0.0001
0.001
0.01
0.1
1
CUX

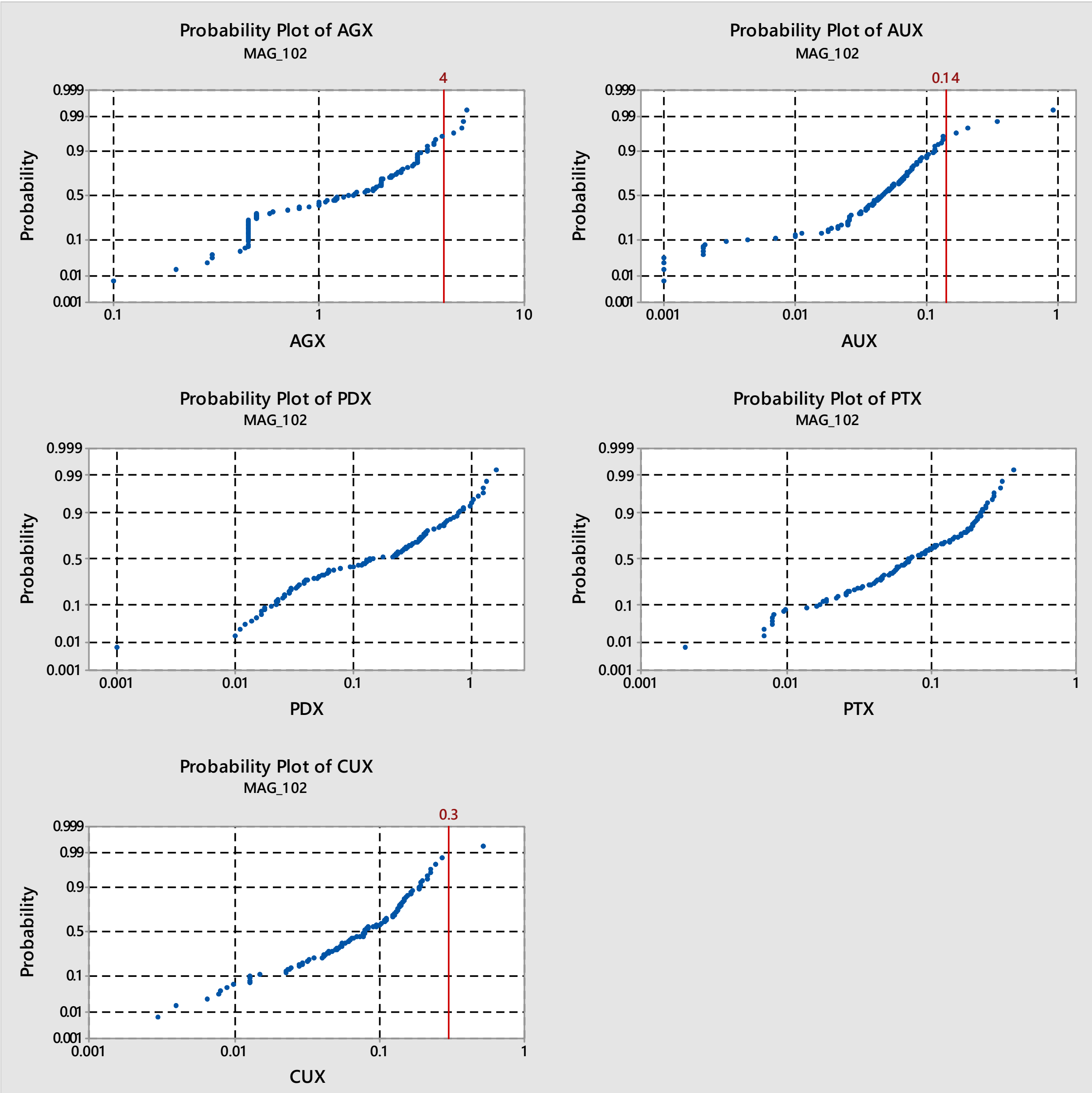

Probability Plot of AGX
MAG_101
6
Probability
0.999
0.99
0.9
0.5
0.1
0.01
0.001
0.001
0.01
0.1
1
10
AGX


Probability Plot of AUX
MAG_101
0.2
Probability
0.999
0.99
0.9
0.5
0.1
0.01
0.001
0.001
0.01
0.1
1
AUX

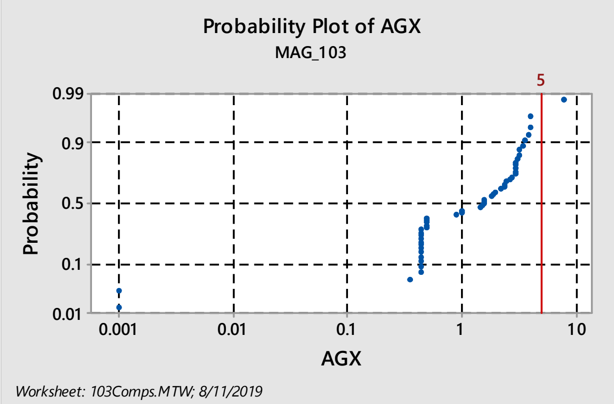

Probability Plot of PDX
MAG_101
1.7
Probability
0.999
0.99
0.9
0.5
0.1
0.01
0.001
0.001
0.01
0.1
1
PDX

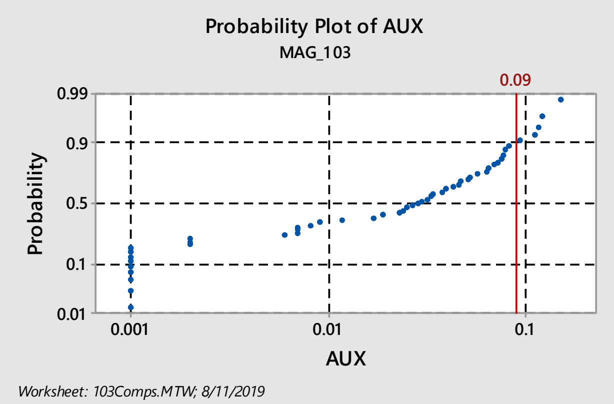

Probability Plot of PTX
MAG_101
0.33
Probability
0.999
0.99
0.9
0.5
0.1
0.01
0.001
0.001
0.01
0.1
1
PTX

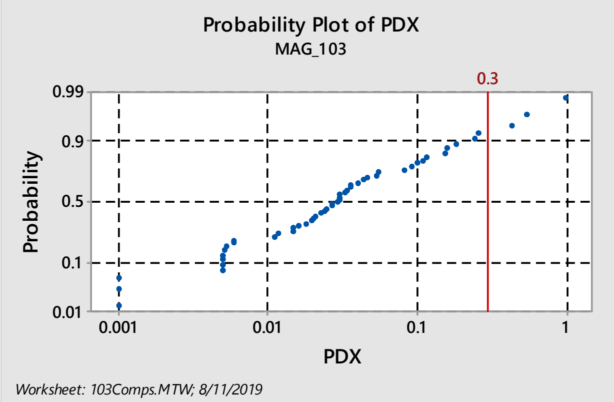

Probability Plot of CUX
MAG_101
0.23
Probability
0.999
0.99
0.9
0.5
0.1
0.01
0.001
0.001
0.01
0.1
1
CUX

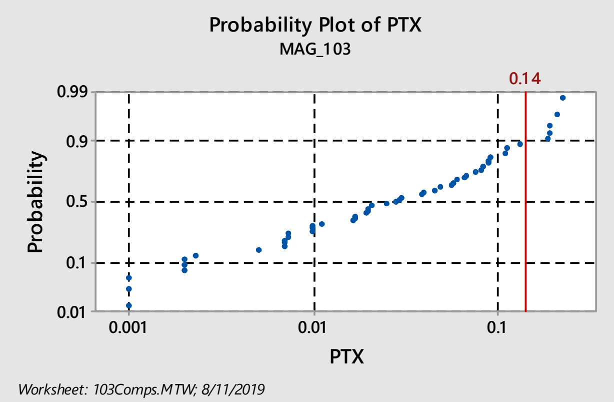


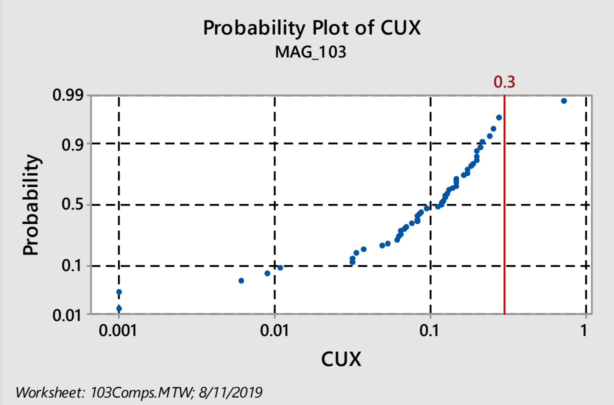
Probability Plot of AGX
MAG_102
4
0.999
0.99
0.9
0.5
0.1
0.01
0.001
Probability
0.1
1
10
AGX
Probability Plot of AUX
MAG_102
0.14
0.999
0.99
0.9
0.5
0.1
0.01
0.001
Probability
0.001
0.01
0.1
1
AUX
Probability Plot of PDX
MAG_102
0.999
0.99
0.9
0.5
0.1
0.01
0.001
Probability
0.001
0.01
0.1
1
PDX
Probability Plot of PTX
MAG_102
0.999
0.99
0.9
0.5
0.1
0.01
0.001
Probability
0.001
0.01
0.1
1
PTX
Probability Plot of CUX
MAG_102
0.3
0.999
0.99
0.9
0.5
0.1
0.01
0.001
Probability
0.001
0.01
0.1
1
CUX


Probability Plot of AGX
MAG_103
5
0.99
0.9
0.5
0.1
0.01
Probability
0.001
0.01
0.1
1
10
AGX
Worksheet: 103Comps.MTW; 8/11/2019

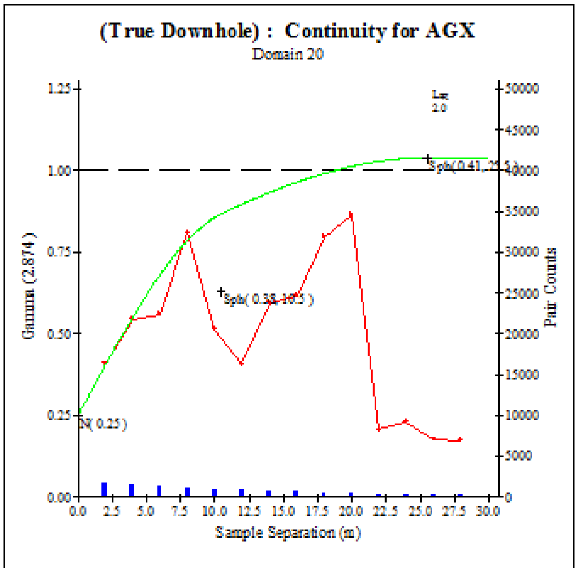

Probability Plot of AUX
MAG_103
0.09
0.99
0.9
0.5
0.1
0.01
Probability
0.001
0.01
0.1
AUX
Worksheet: 103Comps.MTW; 8/11/2019

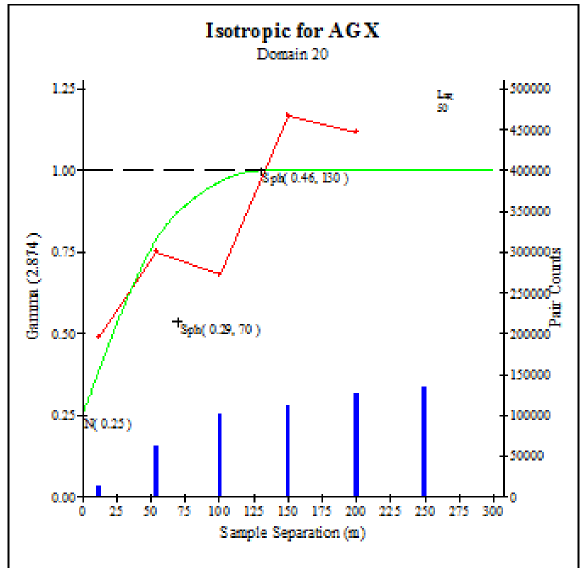

Probability Plot of PDX
MAG_103
0.3
0.99
0.9
0.5
0.1
0.01
Probability
0.001
0.01
0.1
1
PDX
Worksheet: 103Comps.MTW; 8/11/2019

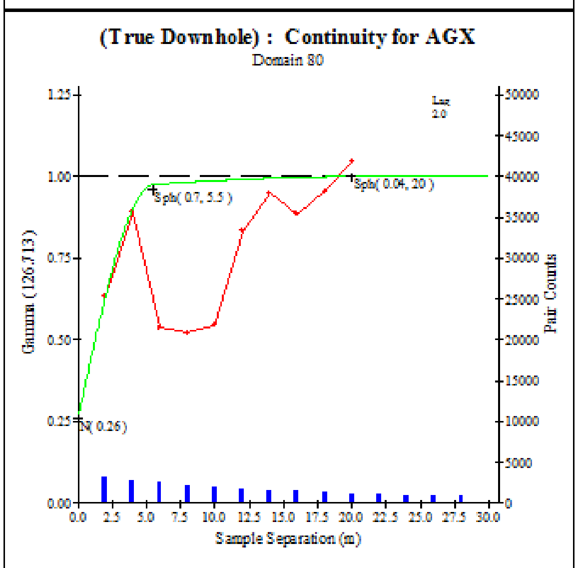

Probability Plot of PTX
MAG_103
0.14
0.99
0.9
0.5
0.1
0.01
Probability
0.001
0.01
0.1
PTX
Worksheet: 103Comps.MTW; 8/11/2019

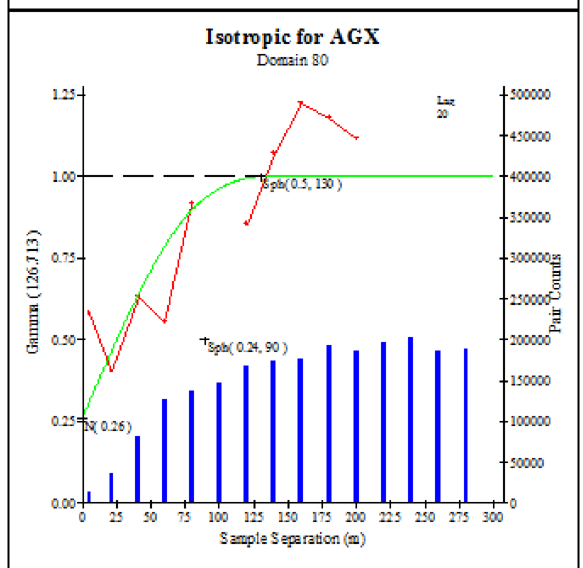

Probability Plot of CUX
MAG_103
0.3
0.99
0.9
0.5
0.1
0.01
Probability
0.001
0.01
0.1
1
CUX
Worksheet: 103Comps.MTW; 8/11/2019

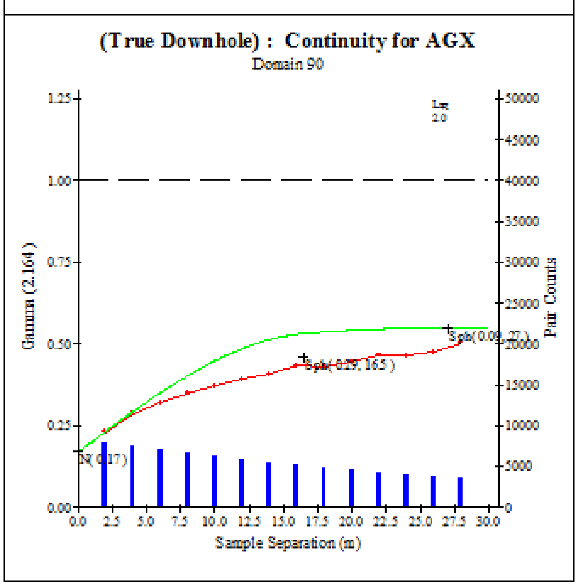
APPENDIX I MARATHON VARIOGRAMS

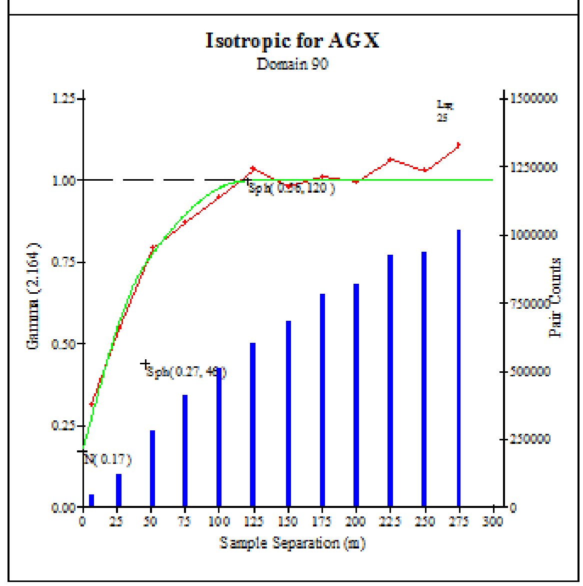


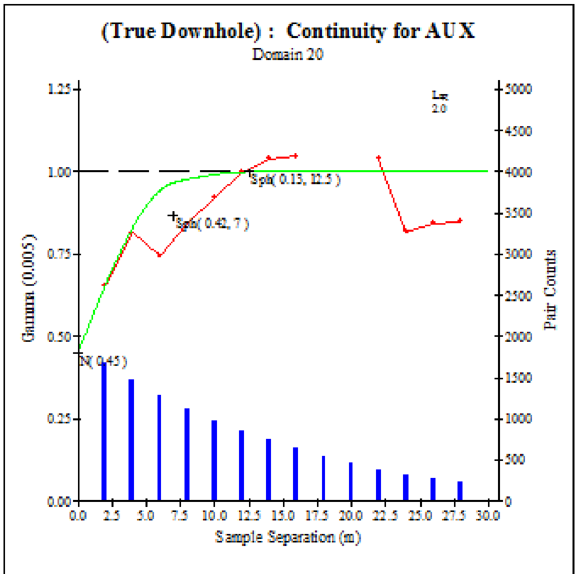


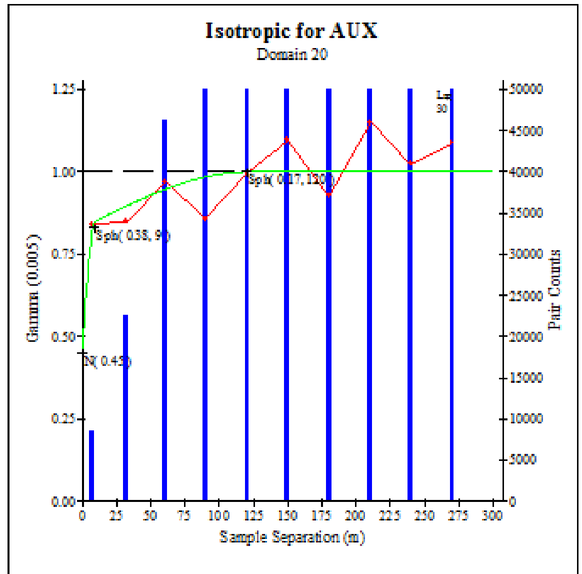


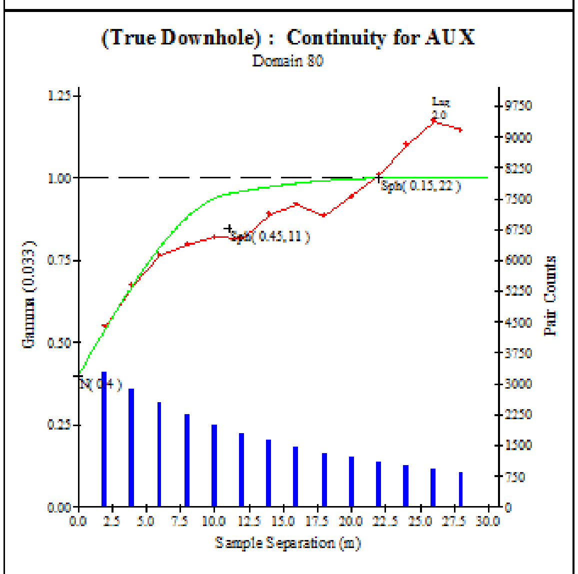


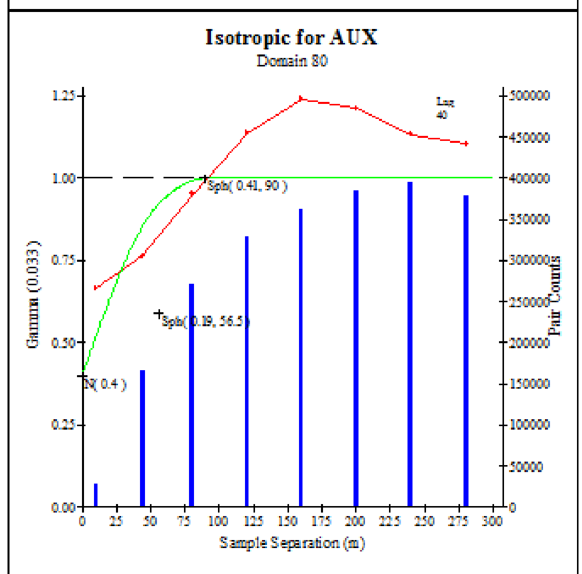


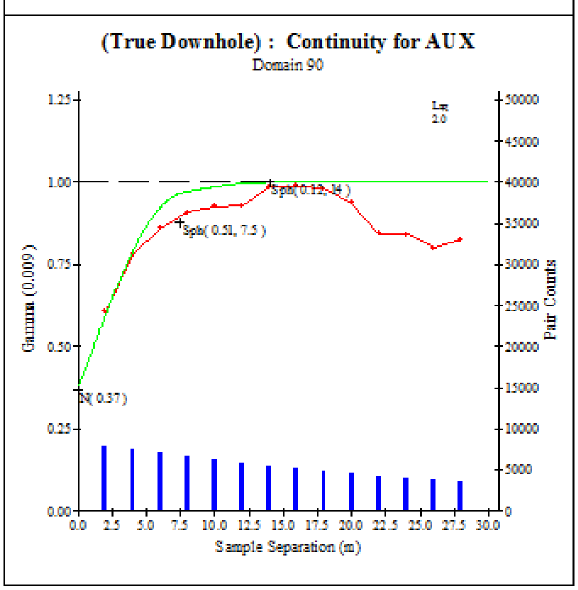


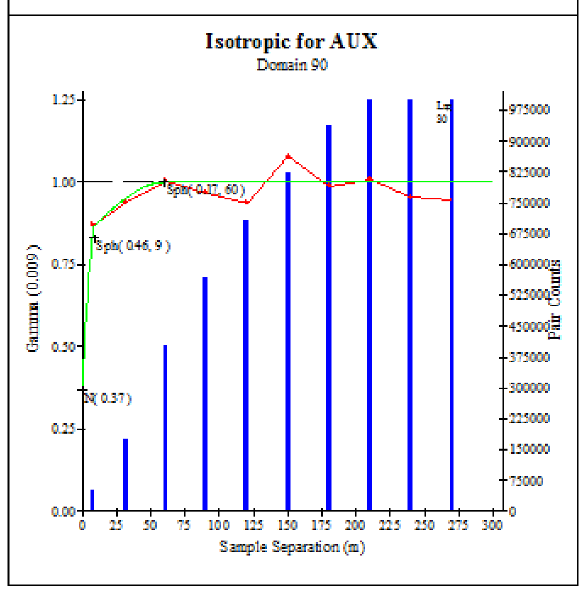

(True Downhole) : Continuity for AUX
Domain 20
Lag 2.0
Sph(0.13, 12.5)
Sph(0.42, 7)
N(0.45)
Gamma (0.005)
Pair Counts
Sample Separation (m)

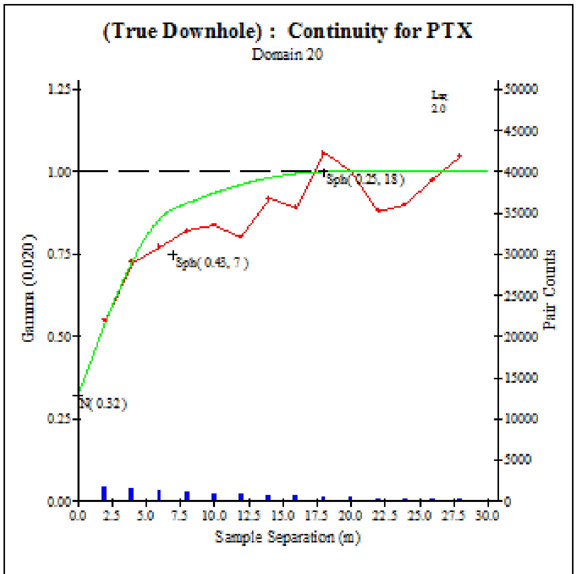

Isotropic for AUX
Domain 20
Lag 30
Sph(0.17, 120)
Sph(0.38, 9)
N(0.45)
Gamma (0.005)
Pair Counts
Sample Separation (m)

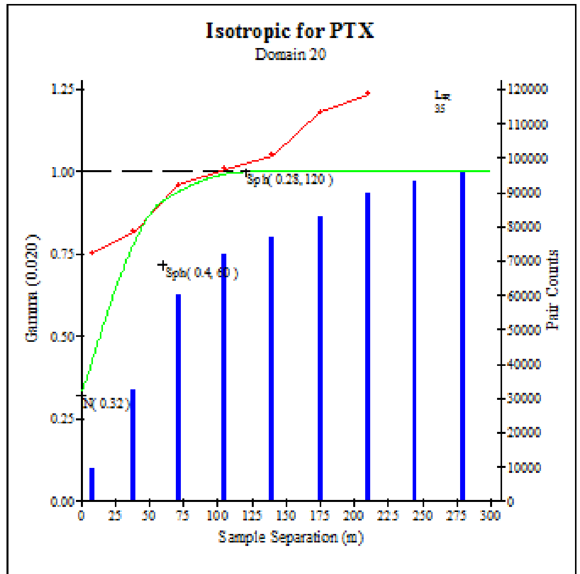

(True Downhole) : Continuity for AUX
Domain 80
Lag 2.0
Sph(0.15, 22)
Sph(0.45, 11)
N(0.4)
Gamma (0.033)
Pair Counts
Sample Separation (m)

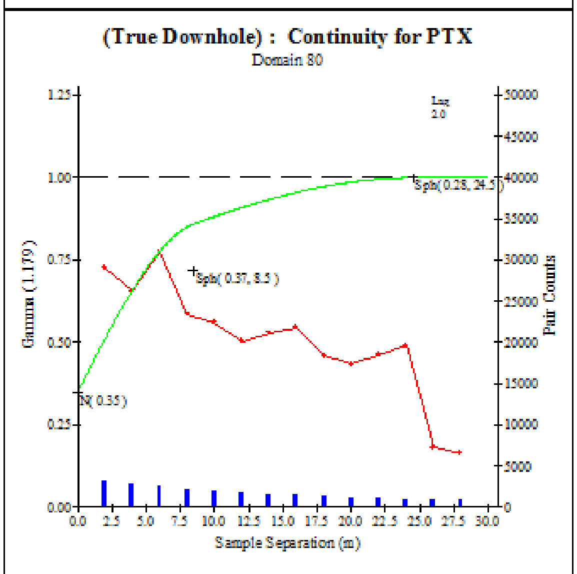

Isotropic for AUX
Domain 80
Lag 40
Sph(0.41, 90)
Sph(0.19, 56.5)
N(0.4)
Gamma (0.033)
Pair Counts
Sample Separation (m)

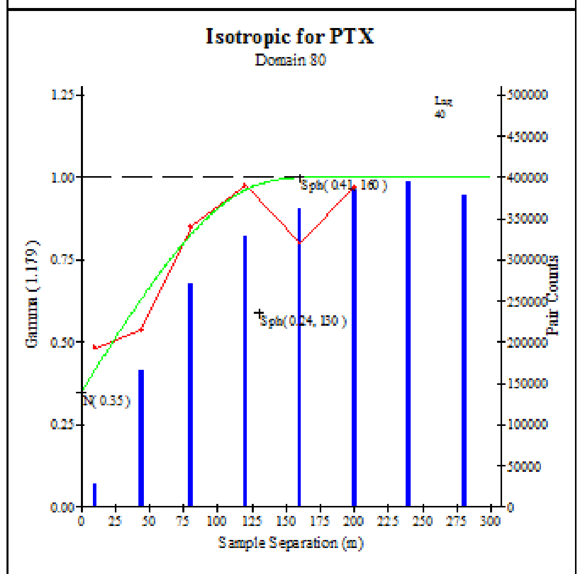

(True Downhole) : Continuity for AUX
Domain 90
Lag 2.0
Sph(0.12, 14)
Sph(0.51, 7.5)
N(0.37)
Gamma (0.009)
Pair Counts
Sample Separation (m)

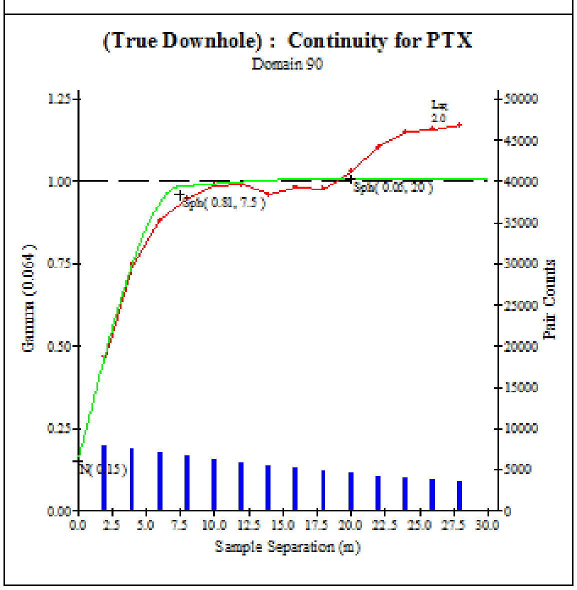

Isotropic for AUX
Domain 90
Lag 30
Sph(0.17, 60)
Sph(0.46, 9)
N(0.37)
Gamma (0.009)
Pair Counts
Sample Separation (m)

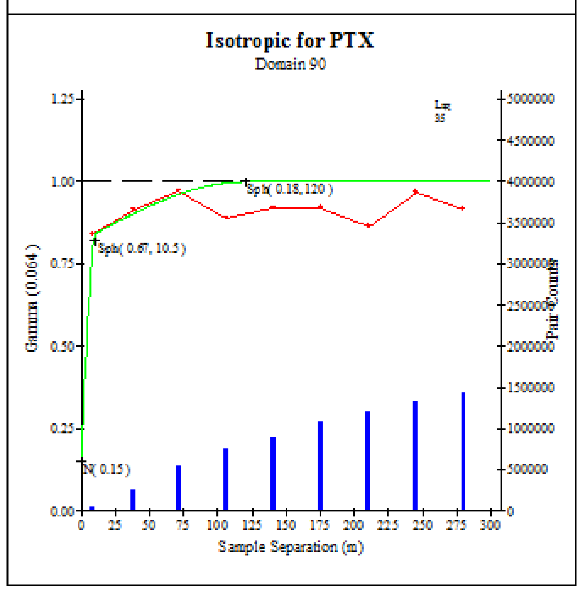

(True Downhole) : Continuity for PTX
Domain 20
Lag 2.0
Sph(0.25, 18)
Sph(0.45, 7)
N(0.32)
Gamma (0.020)
Pair Counts
Sample Separation (m)


Isotropic for PTX
Domain 20
Lag 35
Sph(0.28, 120)
Sph(0.4, 60)
N(0.32)
Gamma (0.020)
Pair Counts
Sample Separation (m)

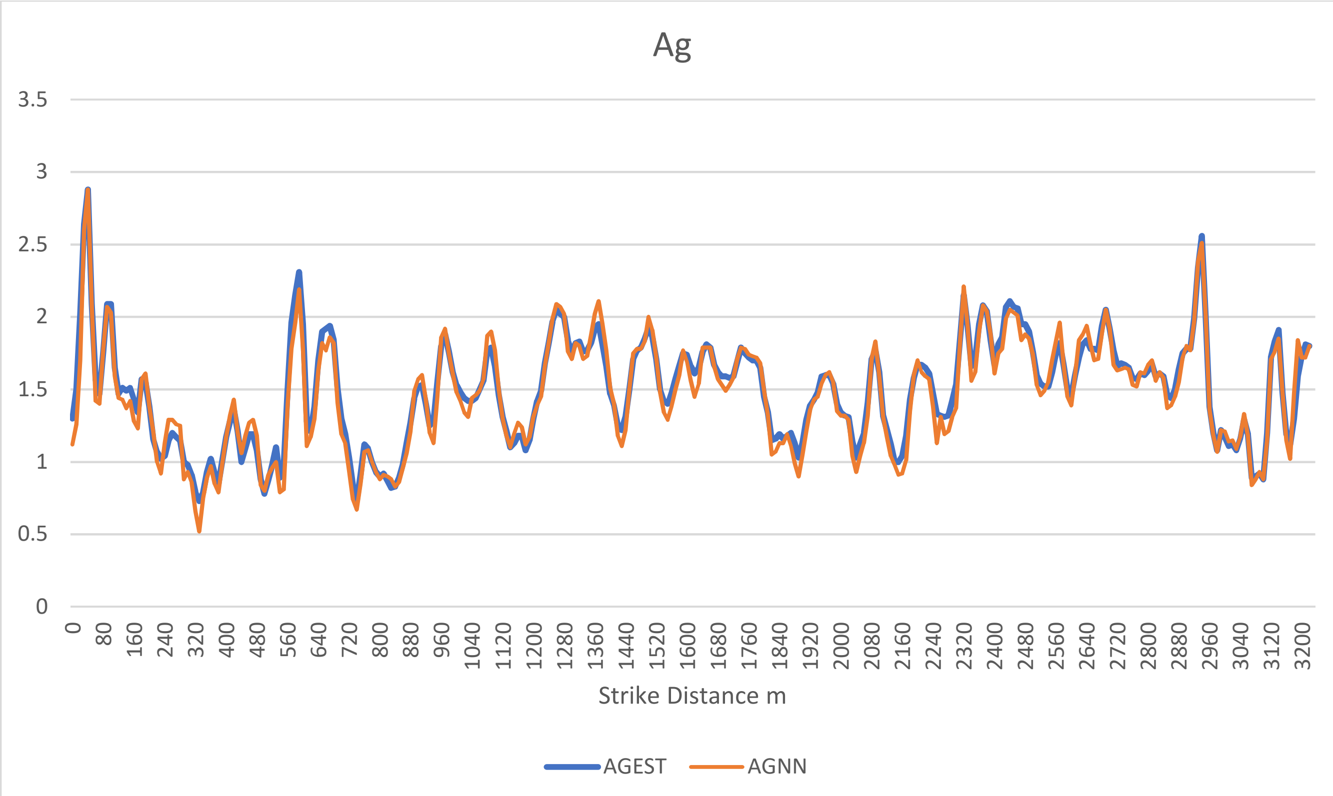

(True Downhole) : Continuity for PTX
Domain 80
Lag 2.0
Sph(0.28, 24.5)
Sph(0.37, 8.5)
N(0.35)
Gamma (1.179)
Pair Counts
Sample Separation (m)

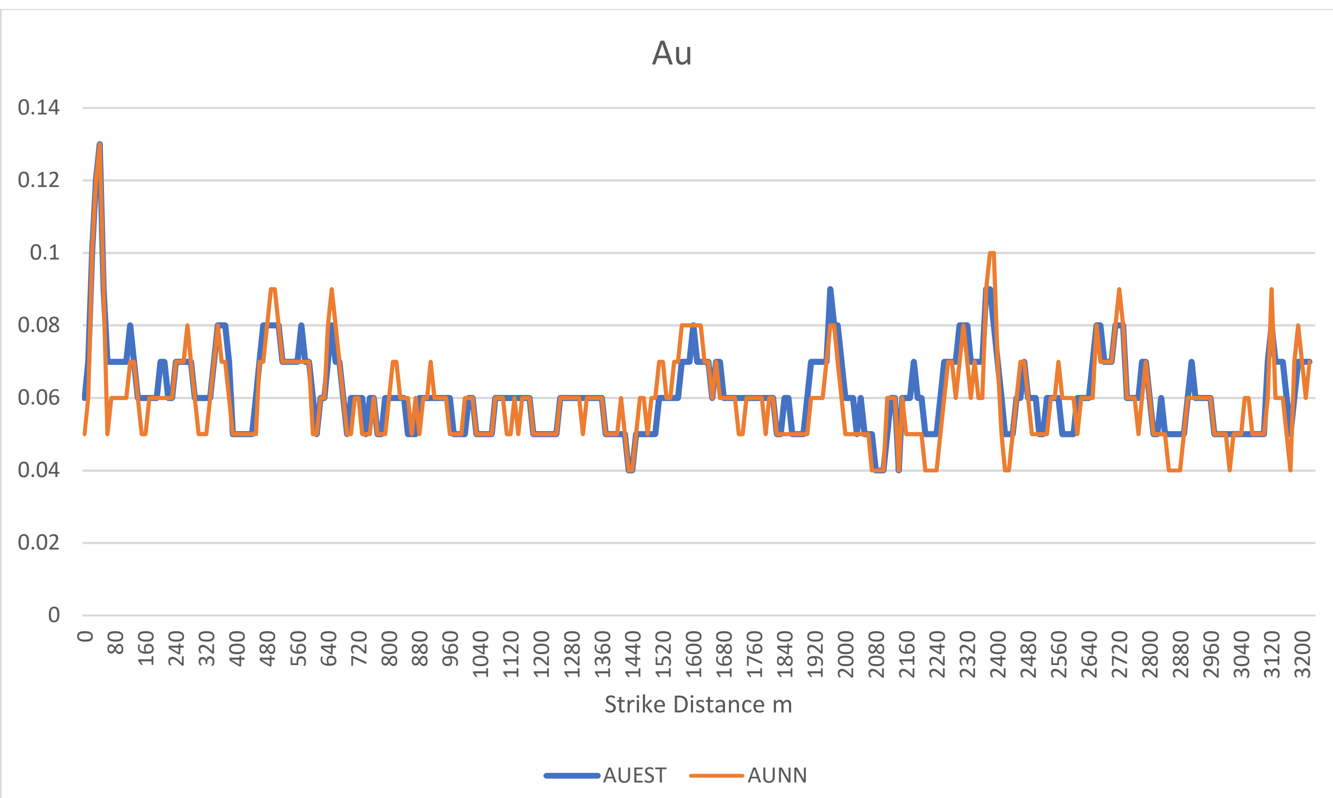

Isotropic for PTX
Domain 80
Lag 40
Sph(0.41, 160)
Sph(0.24, 130)
N(0.35)
Gamma (1.179)
Pair Counts
Sample Separation (m)

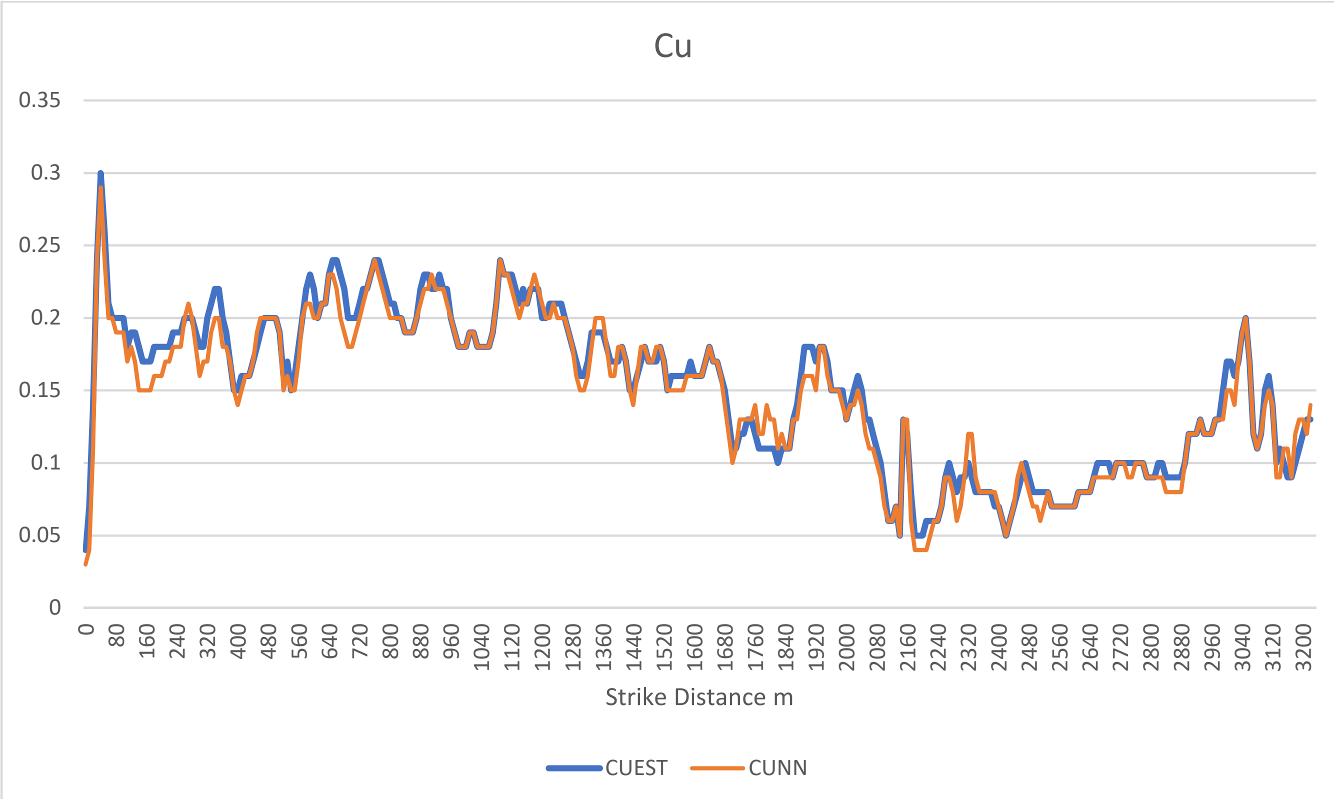

(True Downhole) : Continuity for PTX
Domain 90
Lag 2.0
Sph(0.81, 7.5)
Sph(0.05, 20)
N(0.15)
Gamma (0.064)
Pair Counts
Sample Separation (m)


Isotropic for PTX
Domain 90
Lag 35
Sph(0.18, 120)
Sph(0.67, 10.5)
N(0.15)
Gamma (0.064)
Pair Counts
Sample Separation (m)

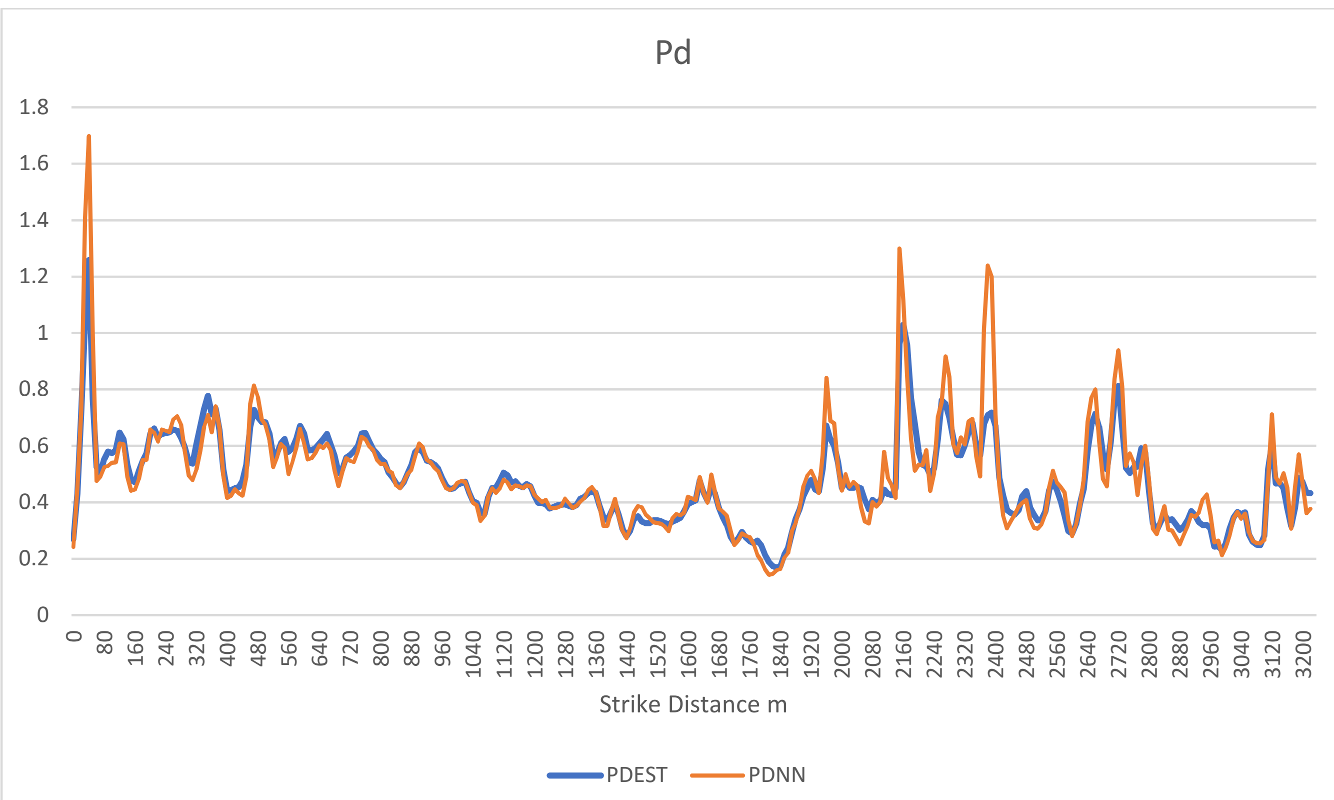
APPENDIX J MARATHON SWATH PLOTS



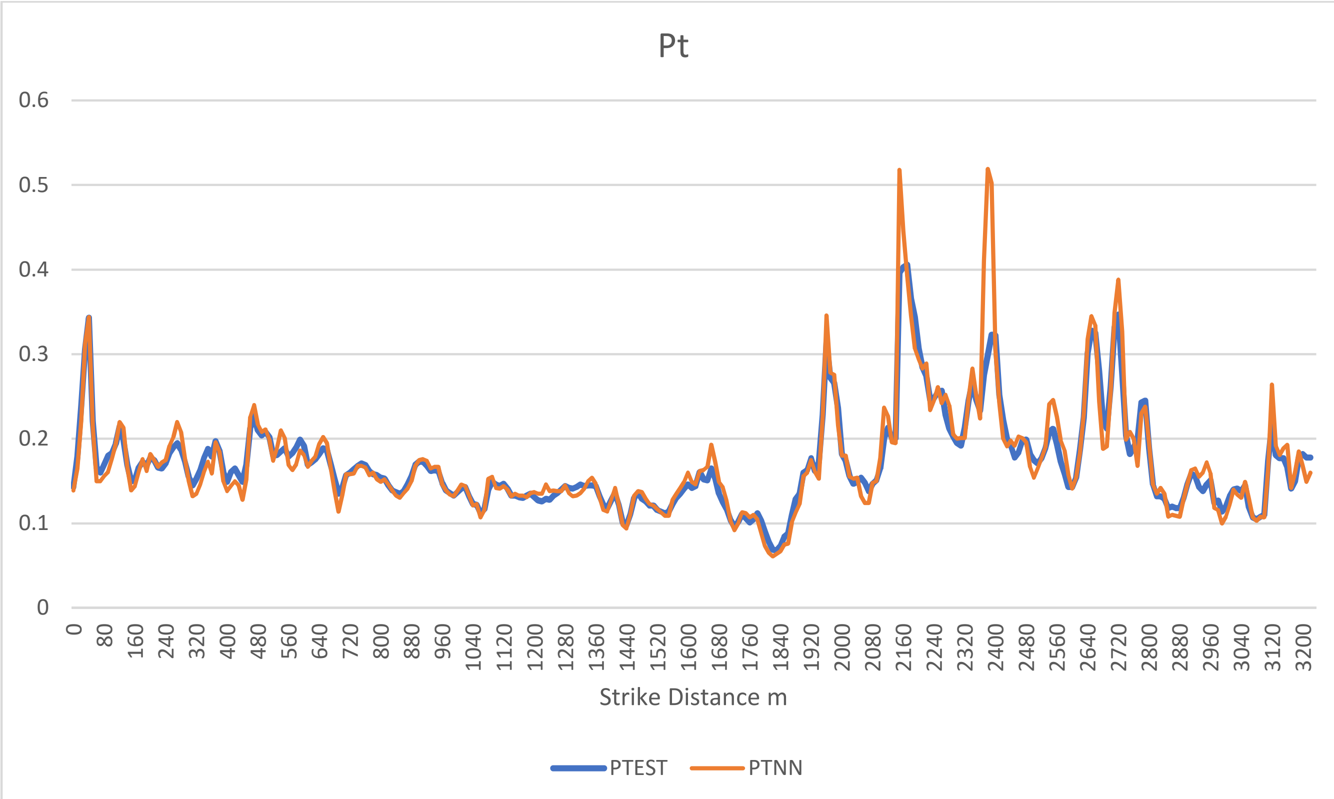




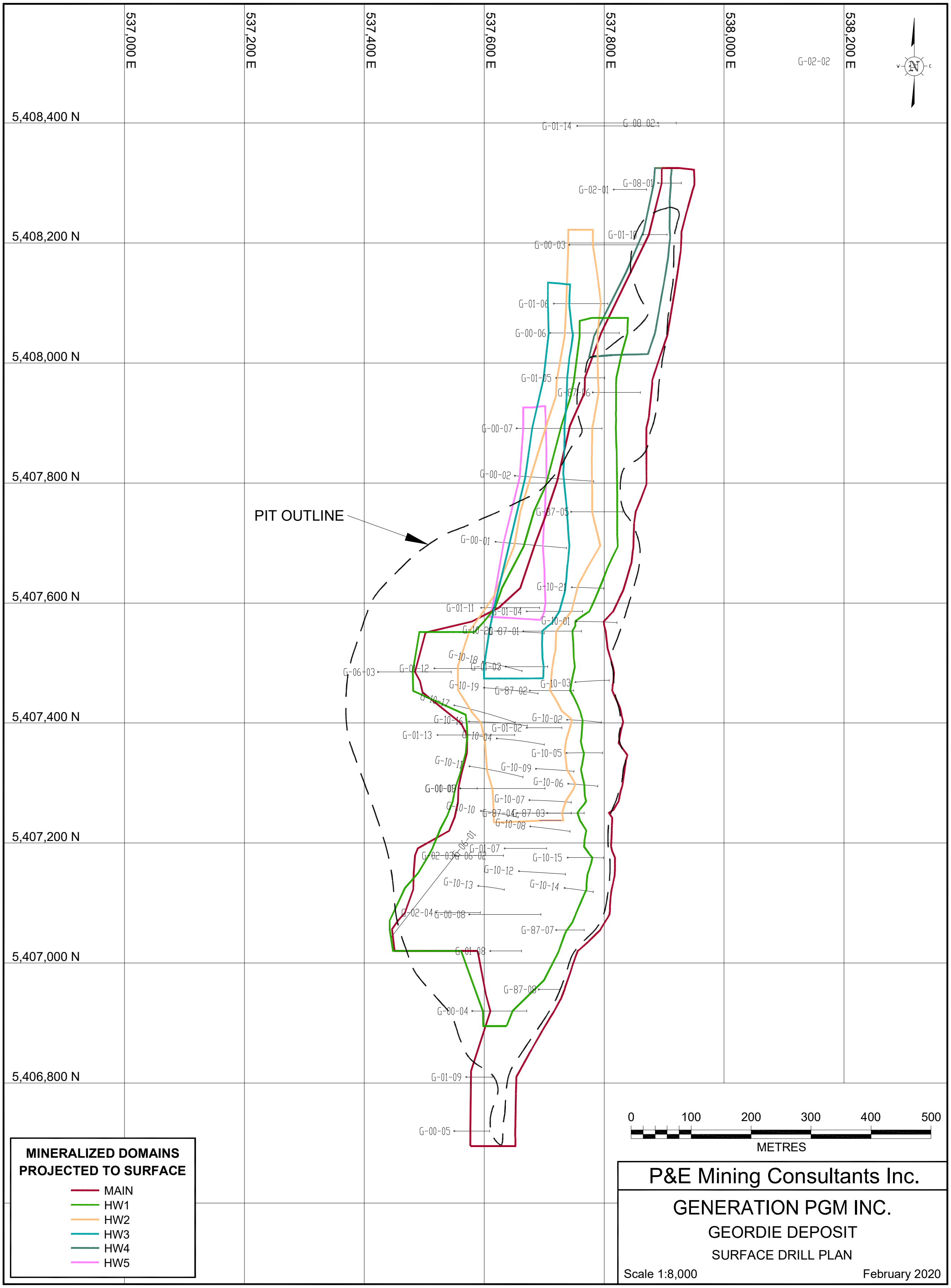
Cu
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0 80 160 240 320 400 480 560 640 720 800 880 960 1040 1120 1200 1280 1360 1440 1520 1600 1680 1760 1840 1920 2000 2080 2160 2240 2320 2400 2480 2560 2640 2720 2800 2880 2960 3040 3120 3200
Strike Distance m
CUEST
CUNN



Pd
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0 80 160 240 320 400 480 560 640 720 800 880 960 1040 1120 1200 1280 1360 1440 1520 1600 1680 1760 1840 1920 2000 2080 2160 2240 2320 2400 2480 2560 2640 2720 2800 2880 2960 3040 3120 3200
Strike Distance m
PDEST
PDNN

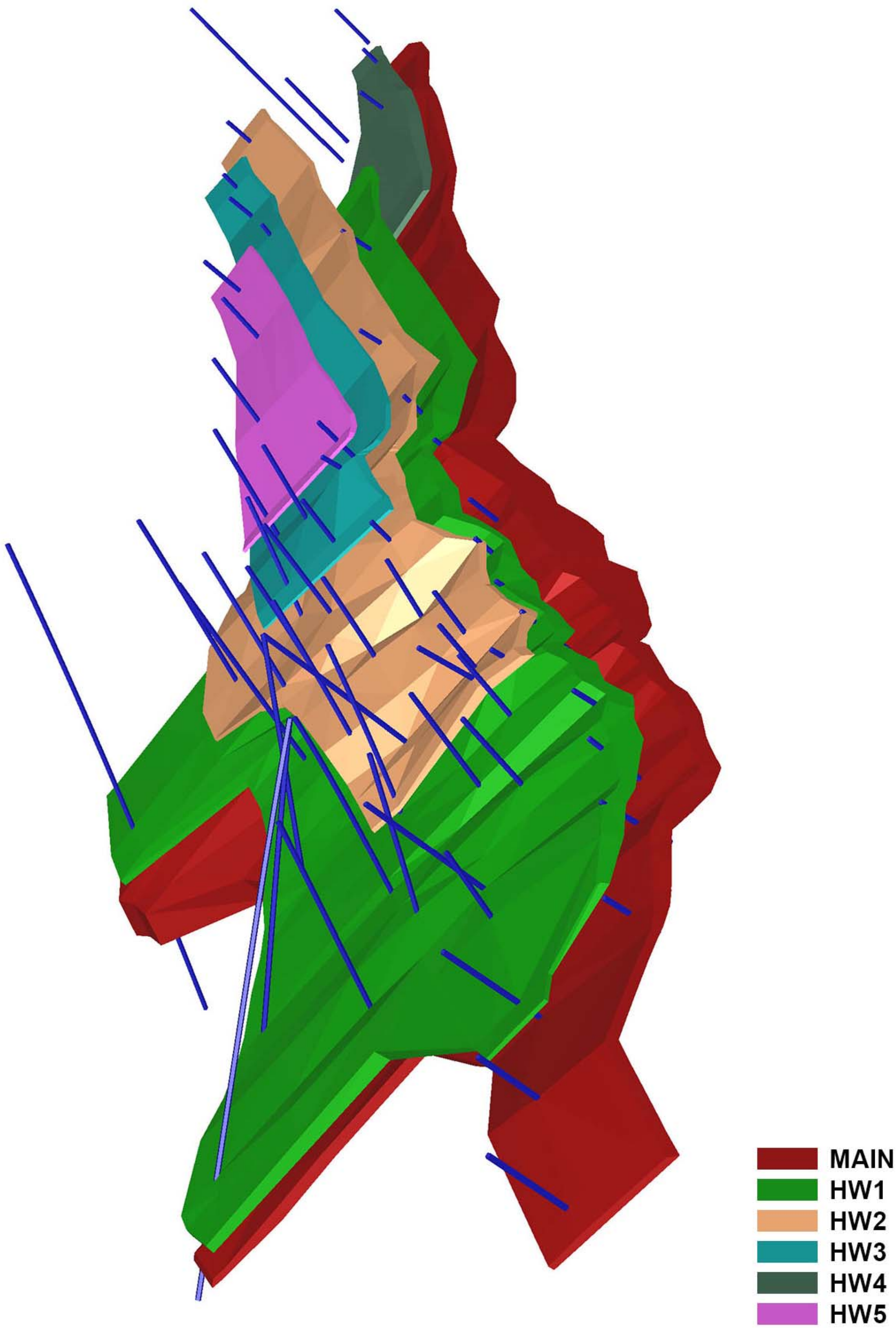

Pt
0.6
0.5
0.4
0.3
0.2
0.1
0
0
80
160
240
320
400
480
560
640
720
800
880
960
1040
1120
1200
1280
1360
1440
1520
1600
1680
1760
1840
1920
2000
2080
2160
2240
2320
2400
2480
2560
2640
2720
2800
2880
2960
3040
3120
3200
Strike Distance m
PTEST
PTNN

APPENDIX K GEORDIE SURFACE DRILL PLAN

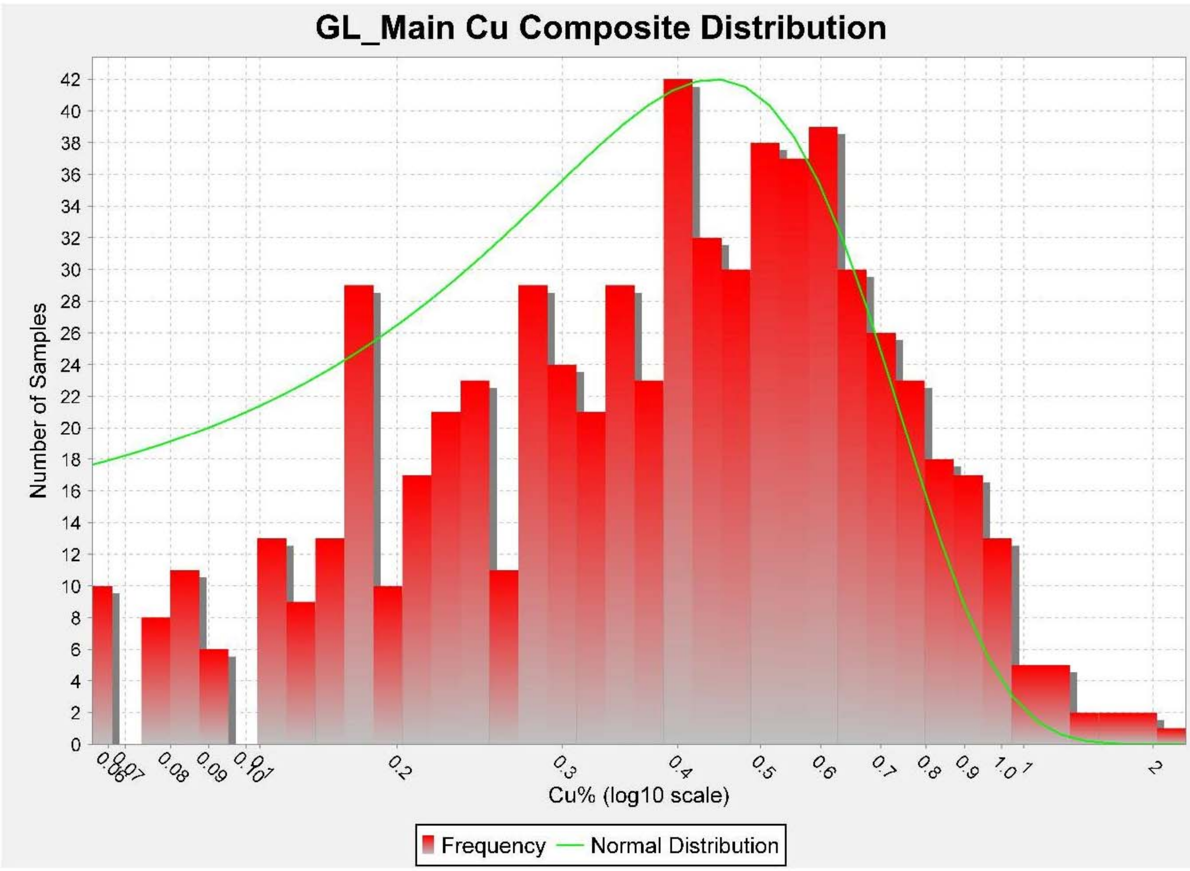

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO SURFACE
MAIN
HW1
HW2
HW3
HW4
HW5
0 100 200 300 400 500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
SURFACE DRILL PLAN
Scale 1:8,000
February 2020

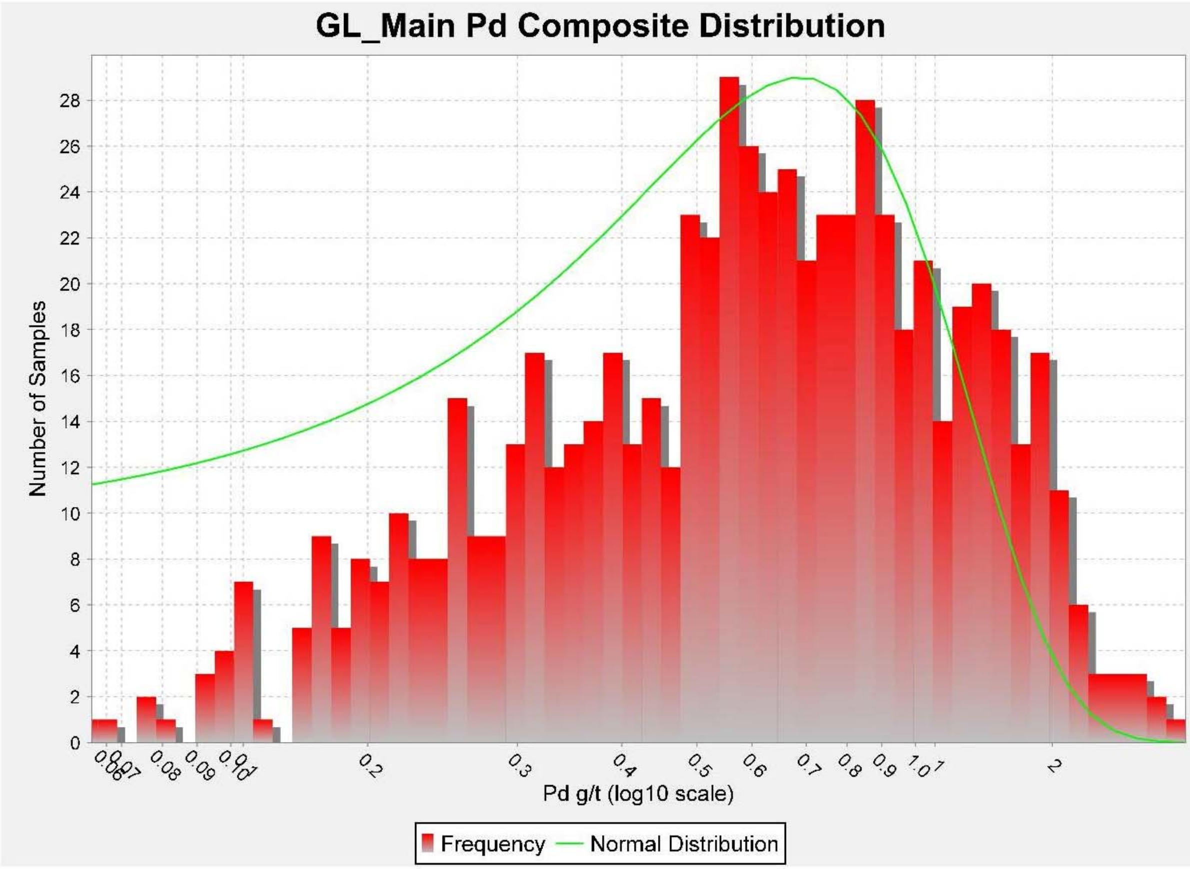
APPENDIX L GEORDIE 3-D DOMAINS

GEORDIE DEPOSIT - 3D DOMAINS

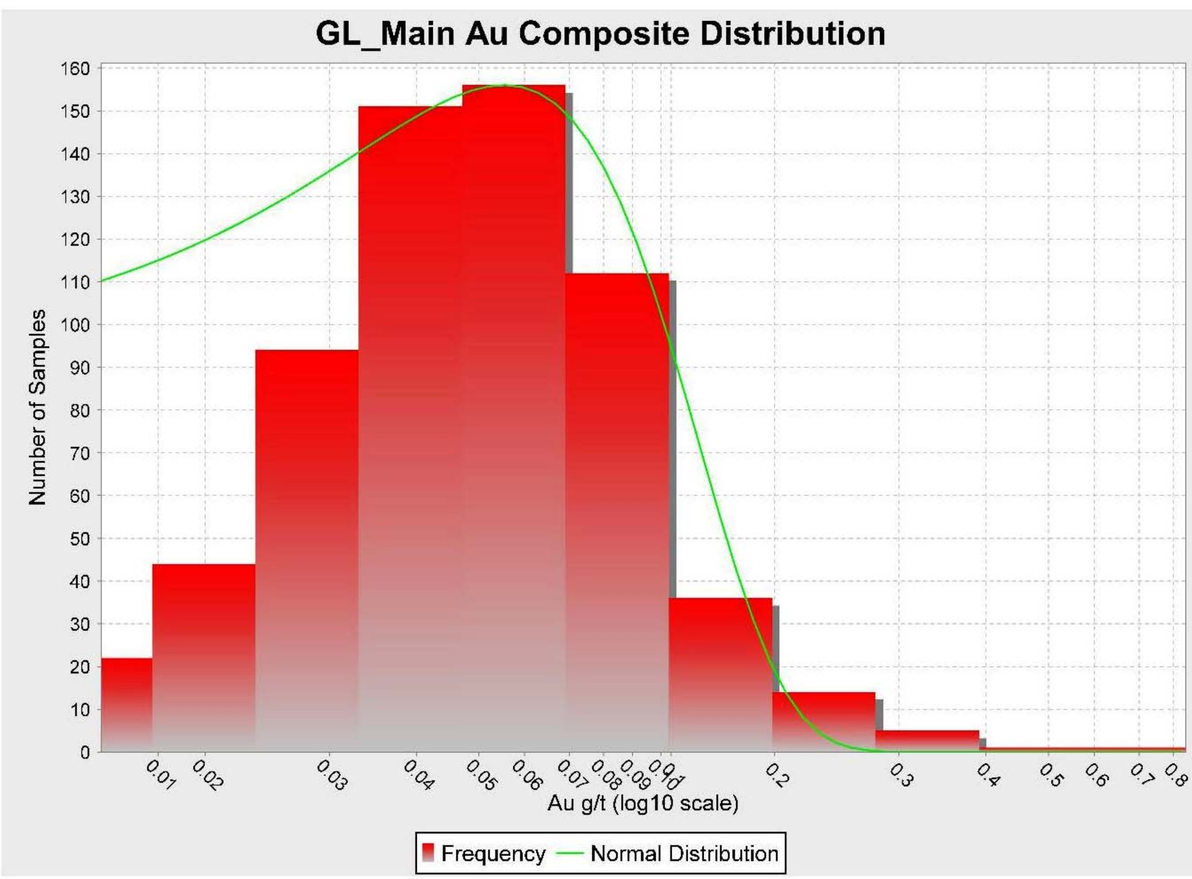


APPENDIX M GEORDIE LOG NORMAL HISTOGRAMS

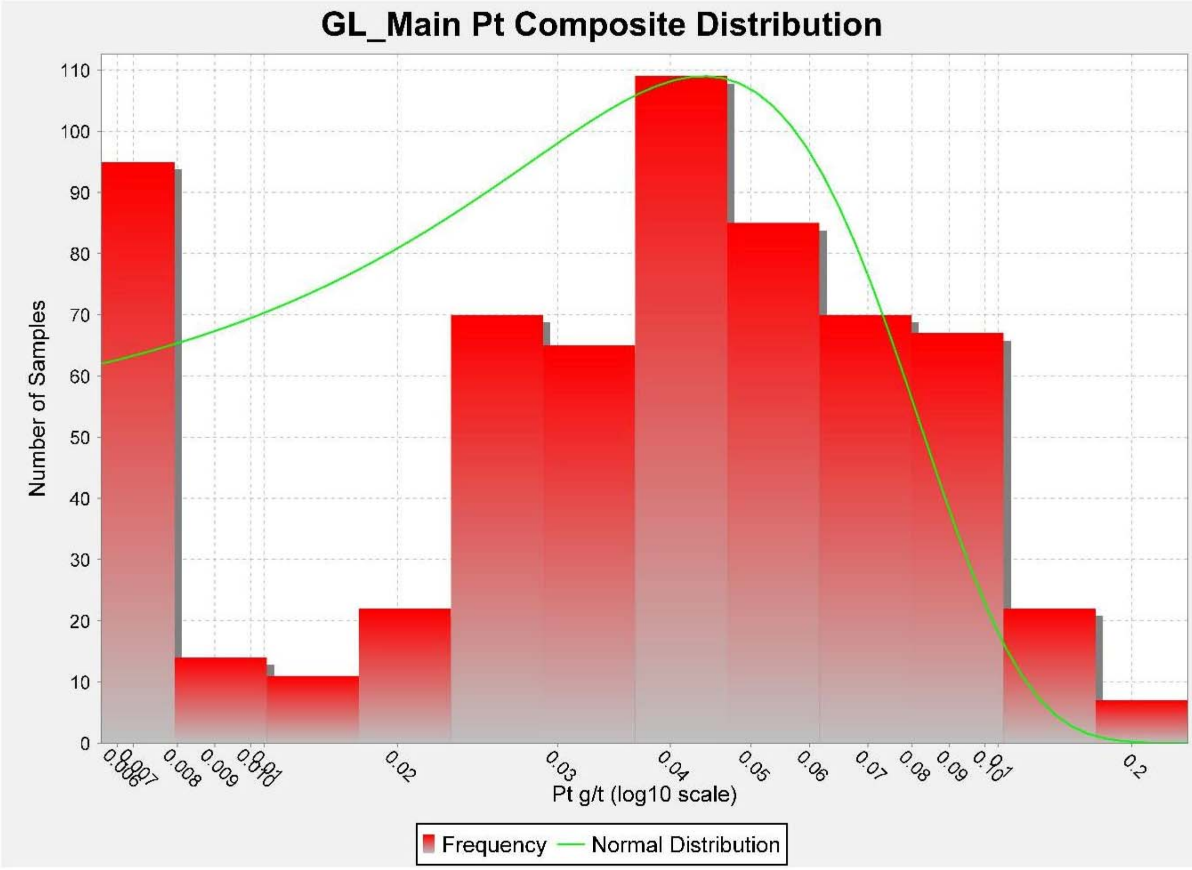


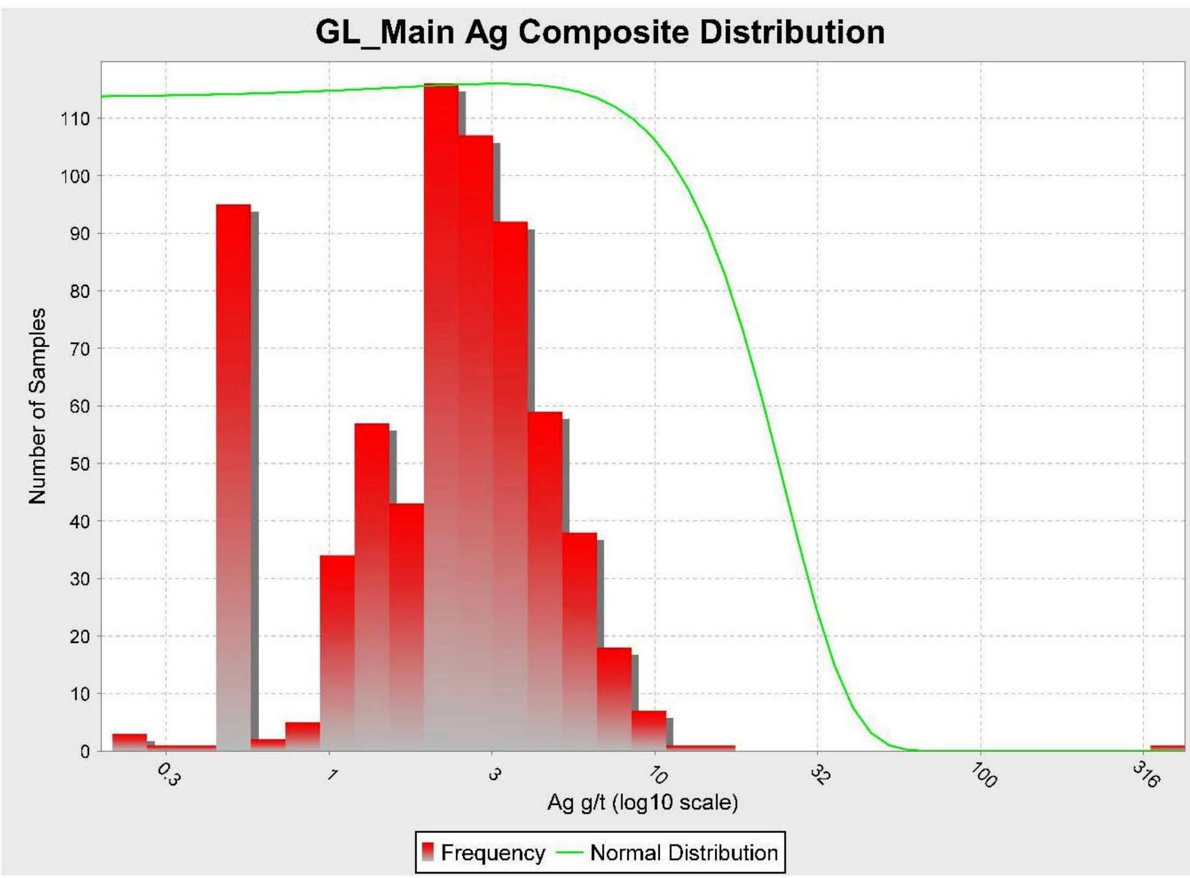


GL_Main Pd Composite Distribution
Number of Samples
Pd g/t (log10 scale)
Frequency
Normal Distribution

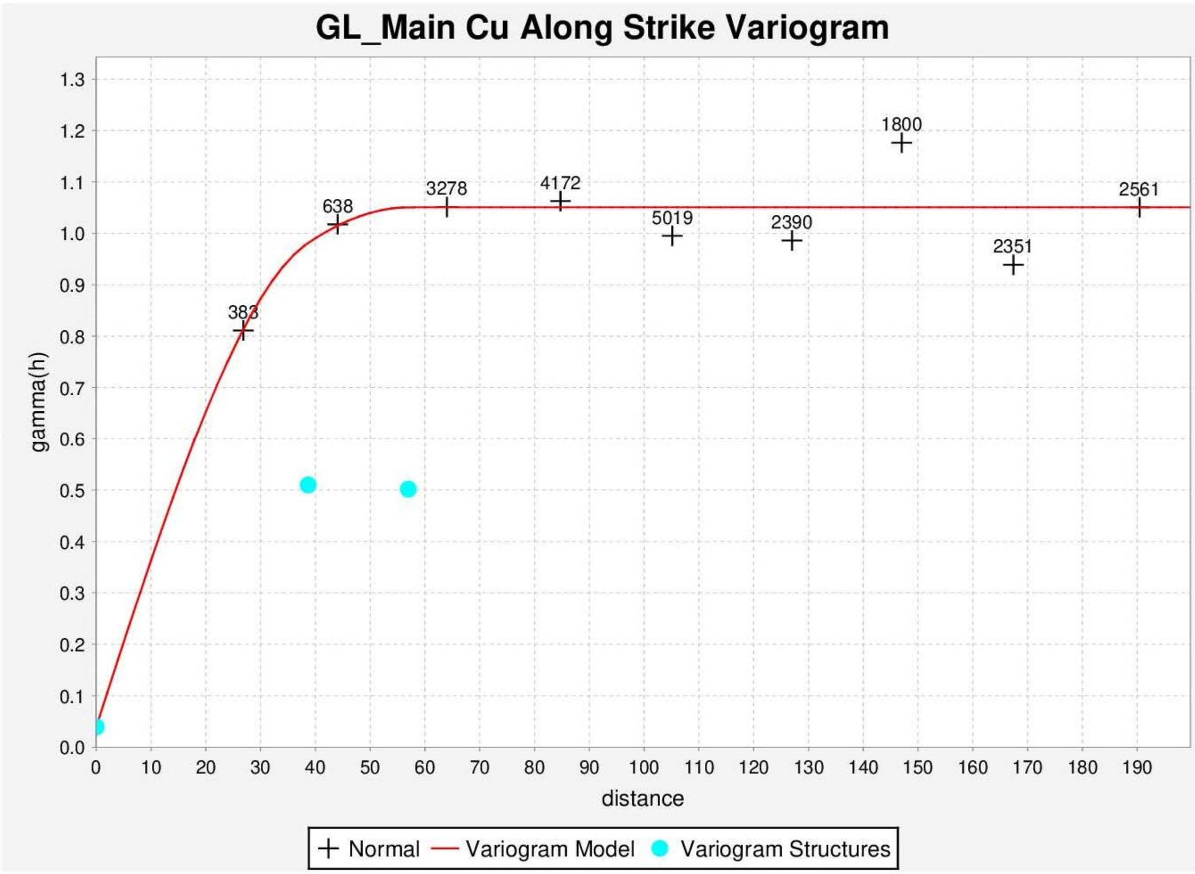


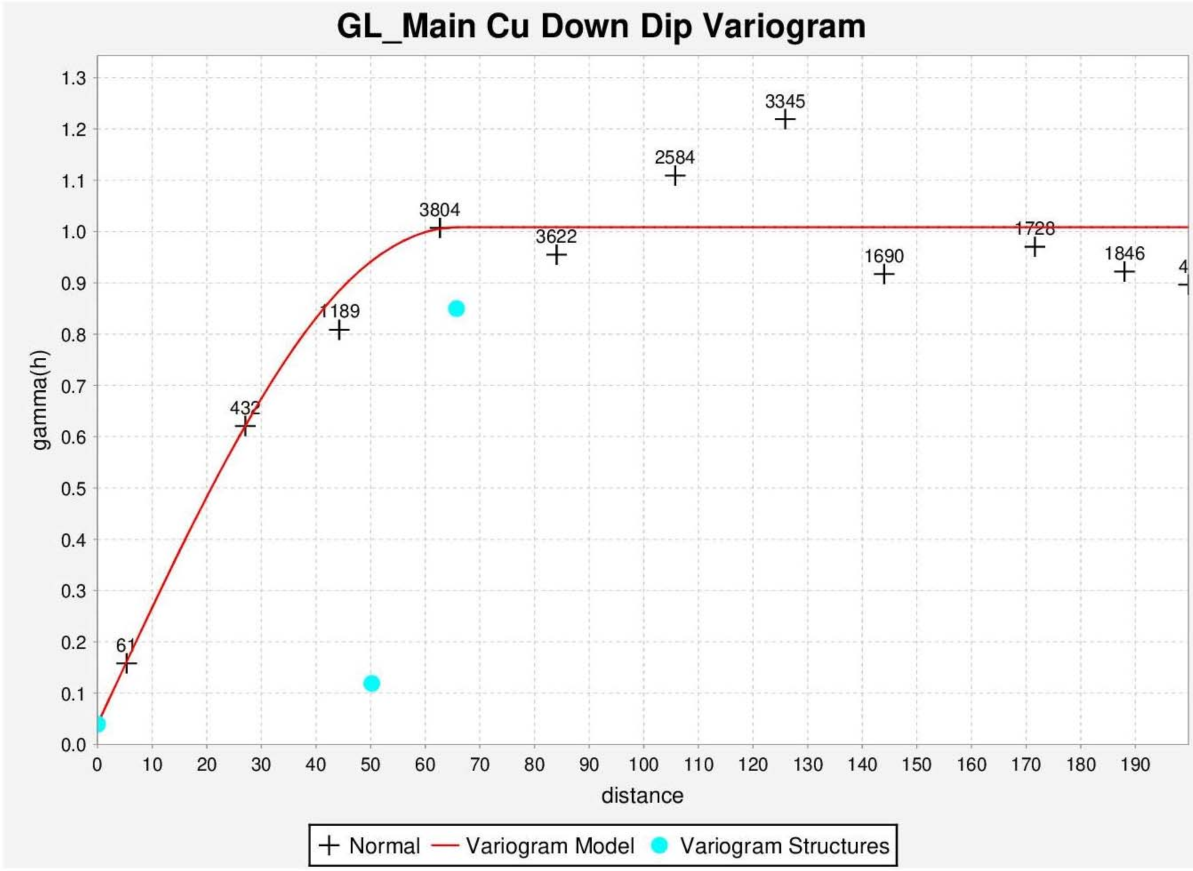
GL_Main Au Composite Distribution
Number of Samples
Au g/t (log10 scale)
Frequency
Normal Distribution

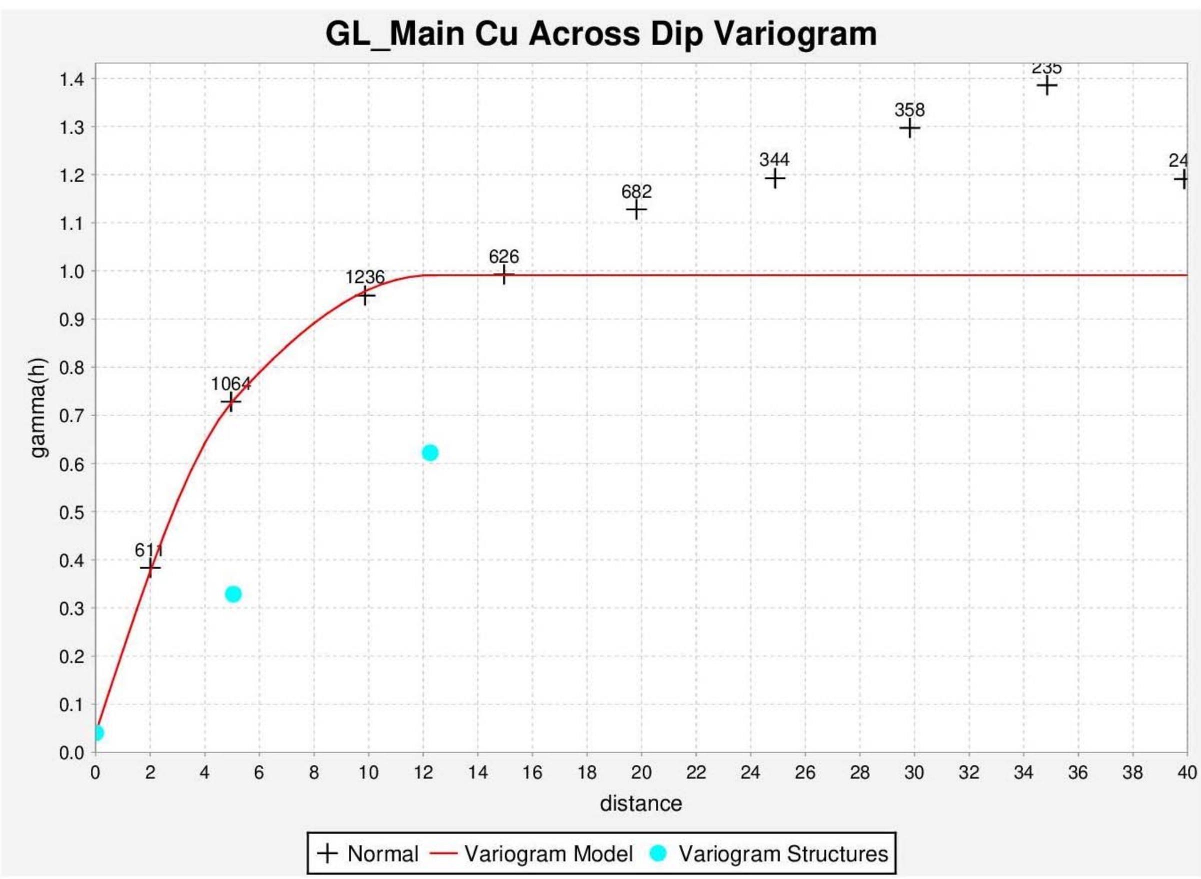

GL_Main Pt Composite Distribution
Number of Samples
110
100
90
80
70
60
50
40
30
20
10
0
0.006
0.007
0.008
0.009
0.010
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.1
0.2
Pt g/t (log10 scale)
Frequency
Normal Distribution

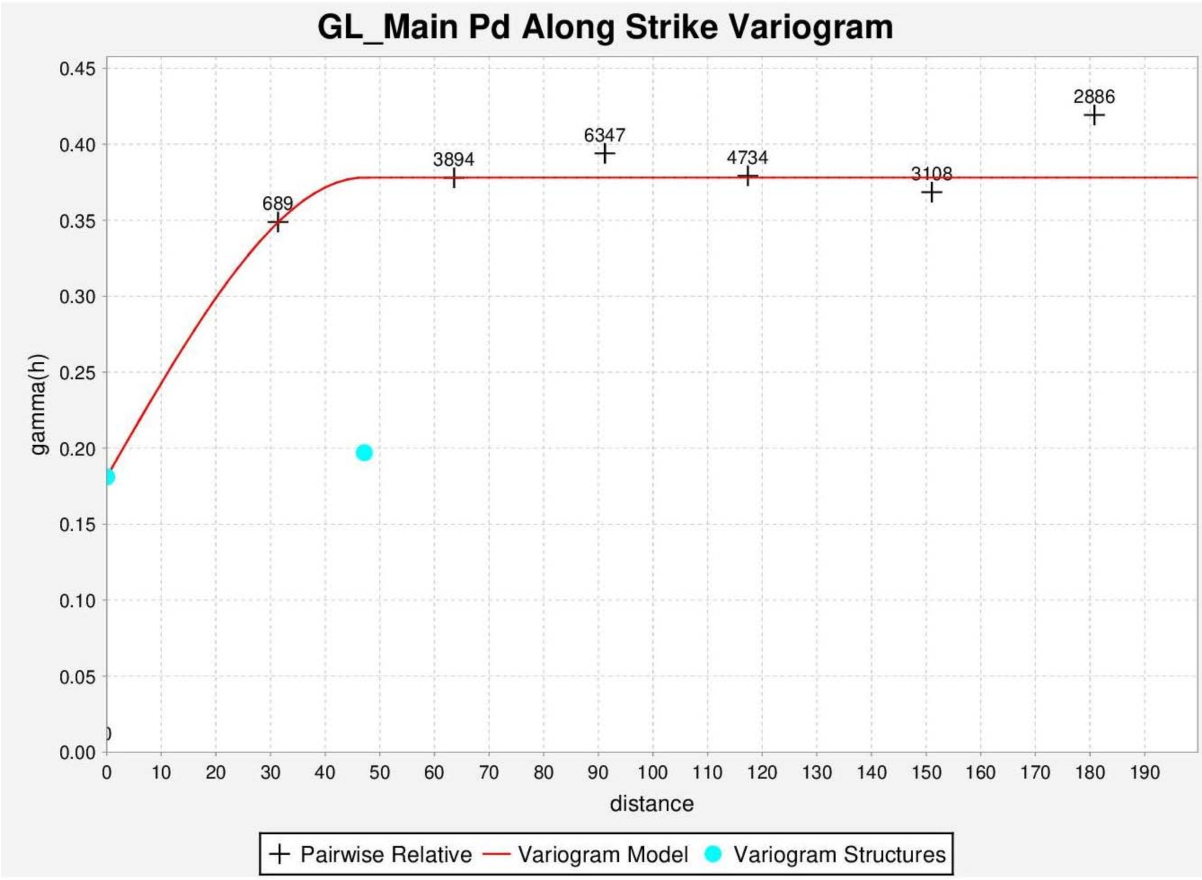

GL_Main Ag Composite Distribution
Number of Samples
110
100
90
80
70
60
50
40
30
20
10
0
0.3
1
3
10
32
100
316
Ag g/t (log10 scale)
Frequency
Normal Distribution

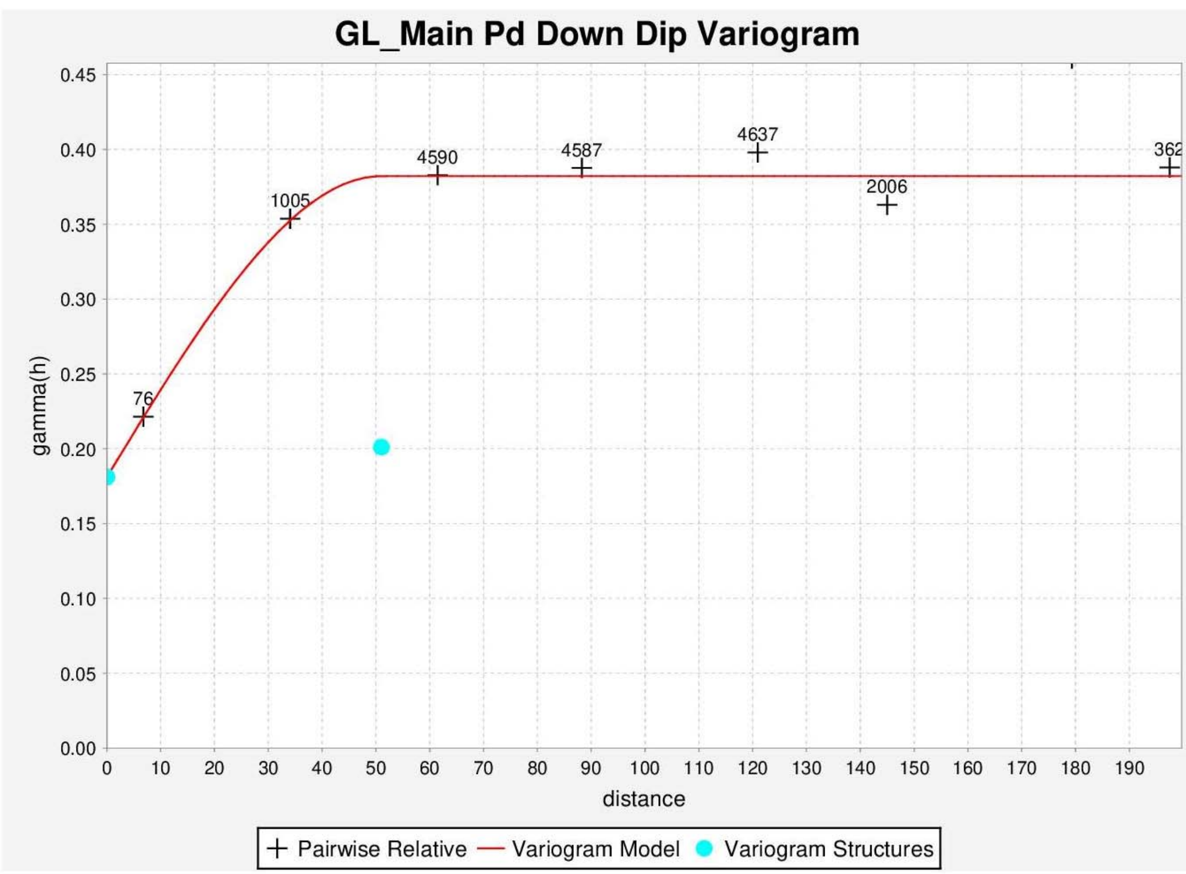
APPENDIX N GEORDIE VARIOGRAMS

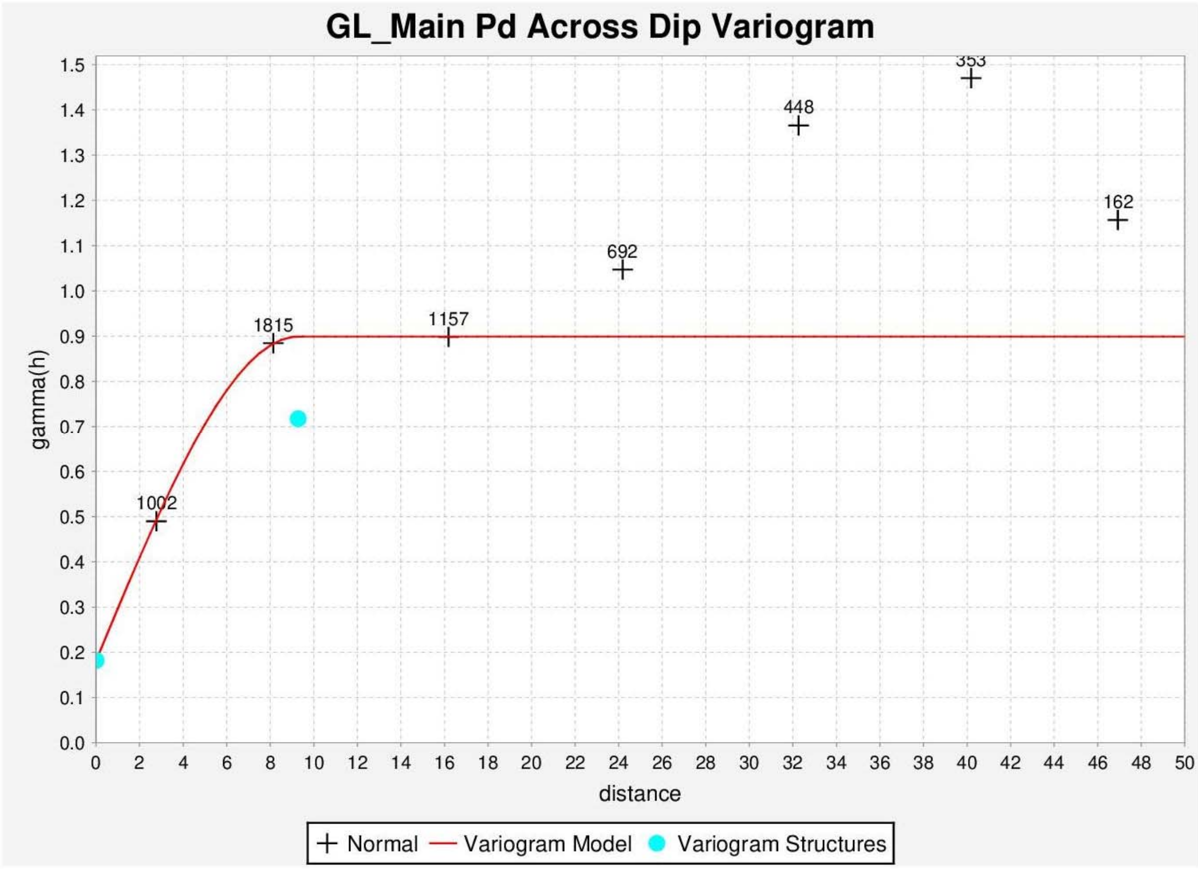



GL_Main Cu Down Dip Variogram
gamma(h)
distance
61
432
1189
3804
3622
2584
3345
1690
1728
1846
Normal
Variogram Model
Variogram Structures

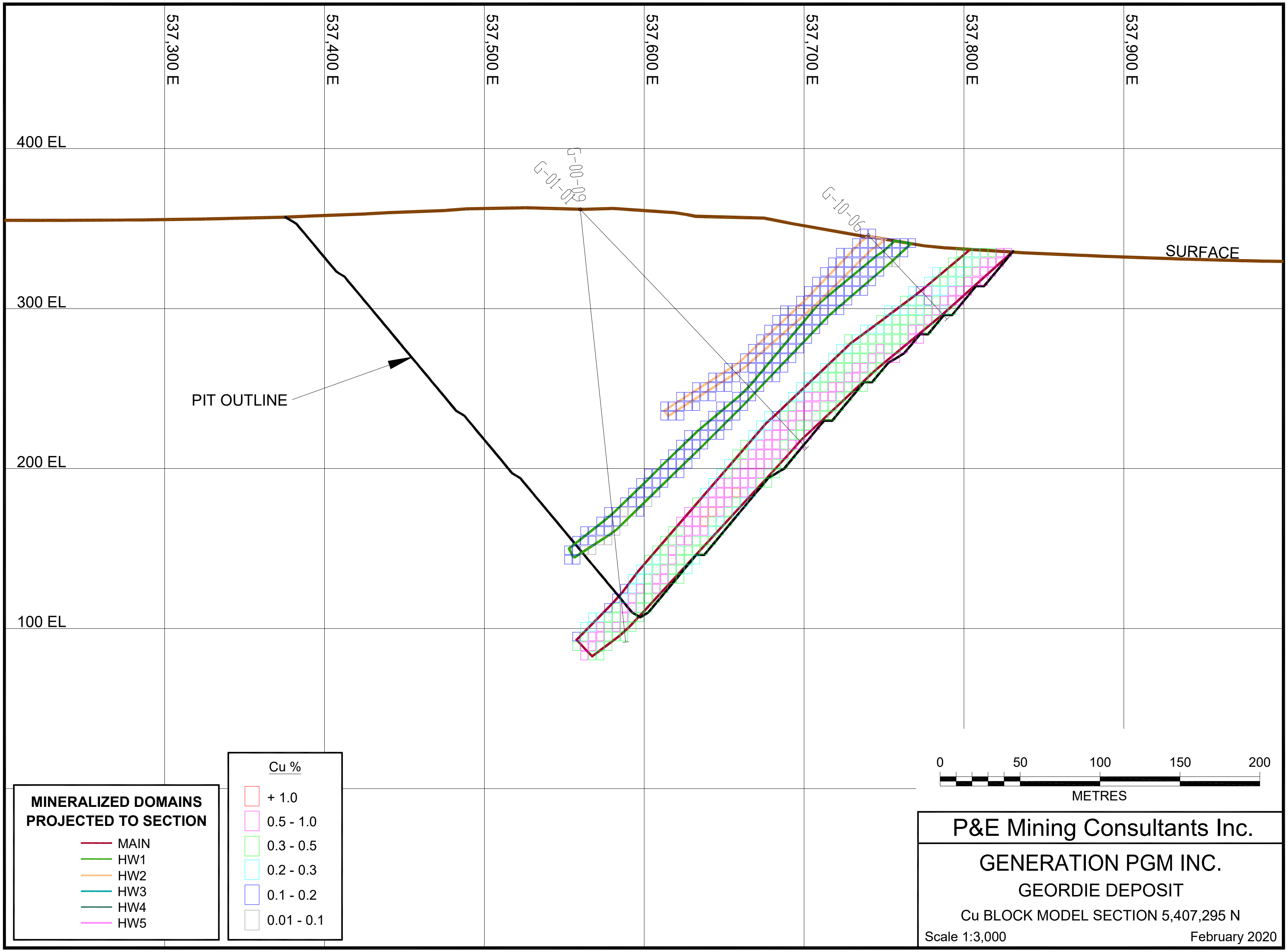

GL_Main Cu Across Dip Variogram
gamma(h)
distance
611
1064
1236
626
682
344
358
235
Normal
Variogram Model
Variogram Structures


GL_Main Pd Along Strike Variogram
gamma(h)
distance
2886
6347
3894
4734
3108
689
Pairwise Relative
Variogram Model
Variogram Structures

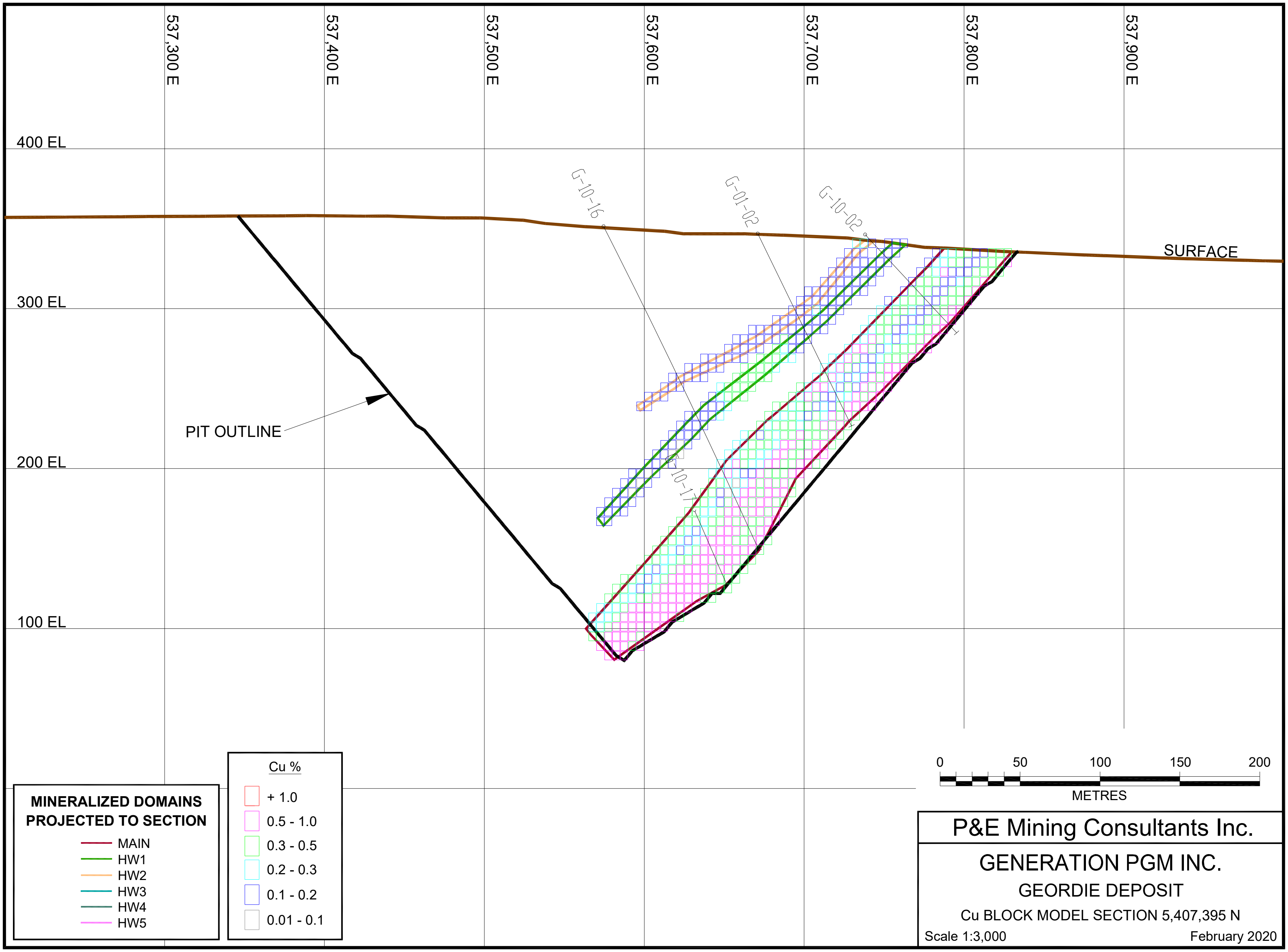

GL_Main Pd Down Dip Variogram
gamma(h)
distance
4637
4590
4587
2006
1005
76
Pairwise Relative
Variogram Model
Variogram Structures


GL_Main Pd Across Dip Variogram
gamma(h)
distance
1002
1815
1157
692
448
353
162
Normal
Variogram Model
Variogram Structures

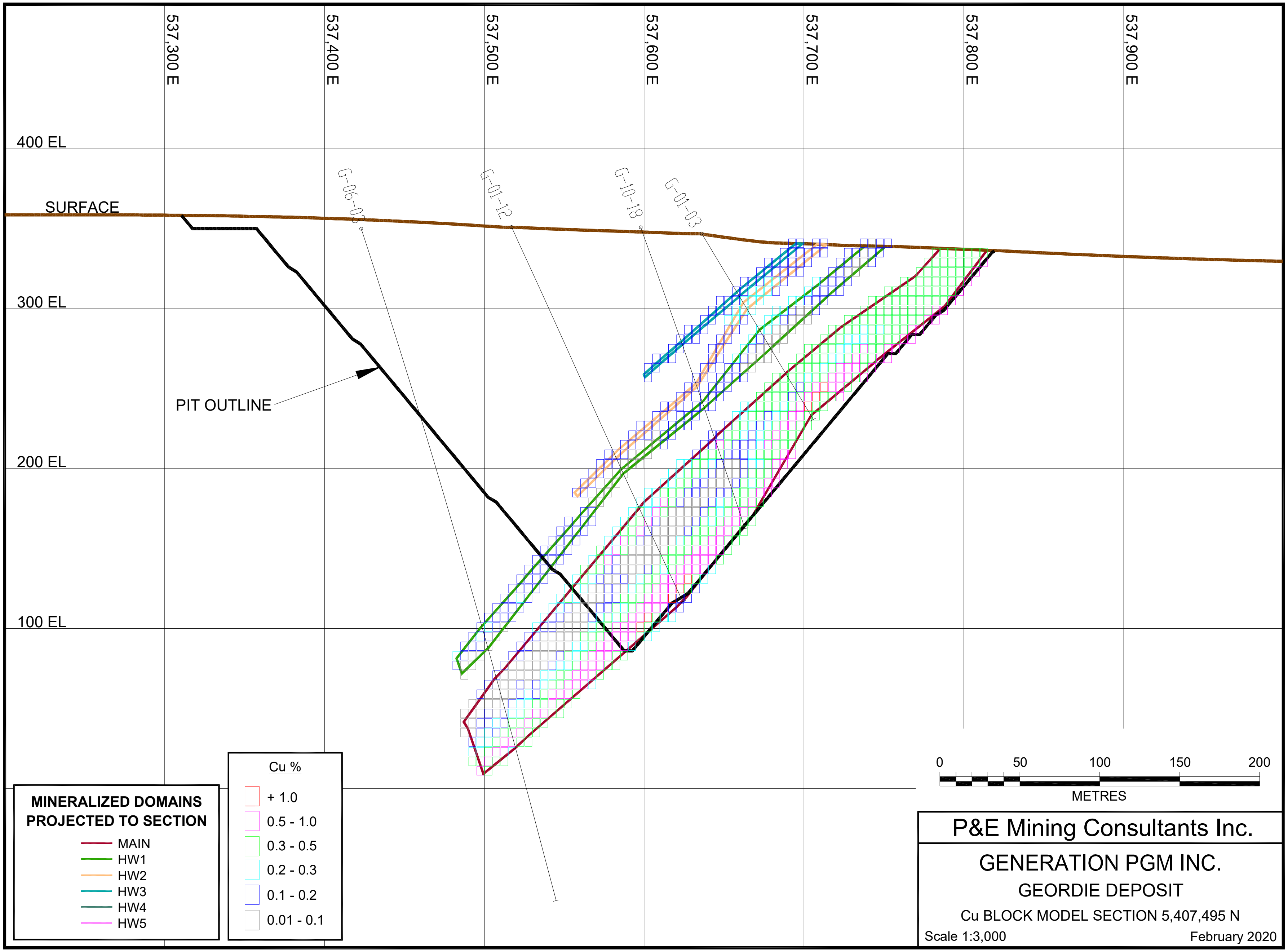
APPENDIX O GEORDIE CU BLOCK MODEL CROSS SECTIONS AND PLANS



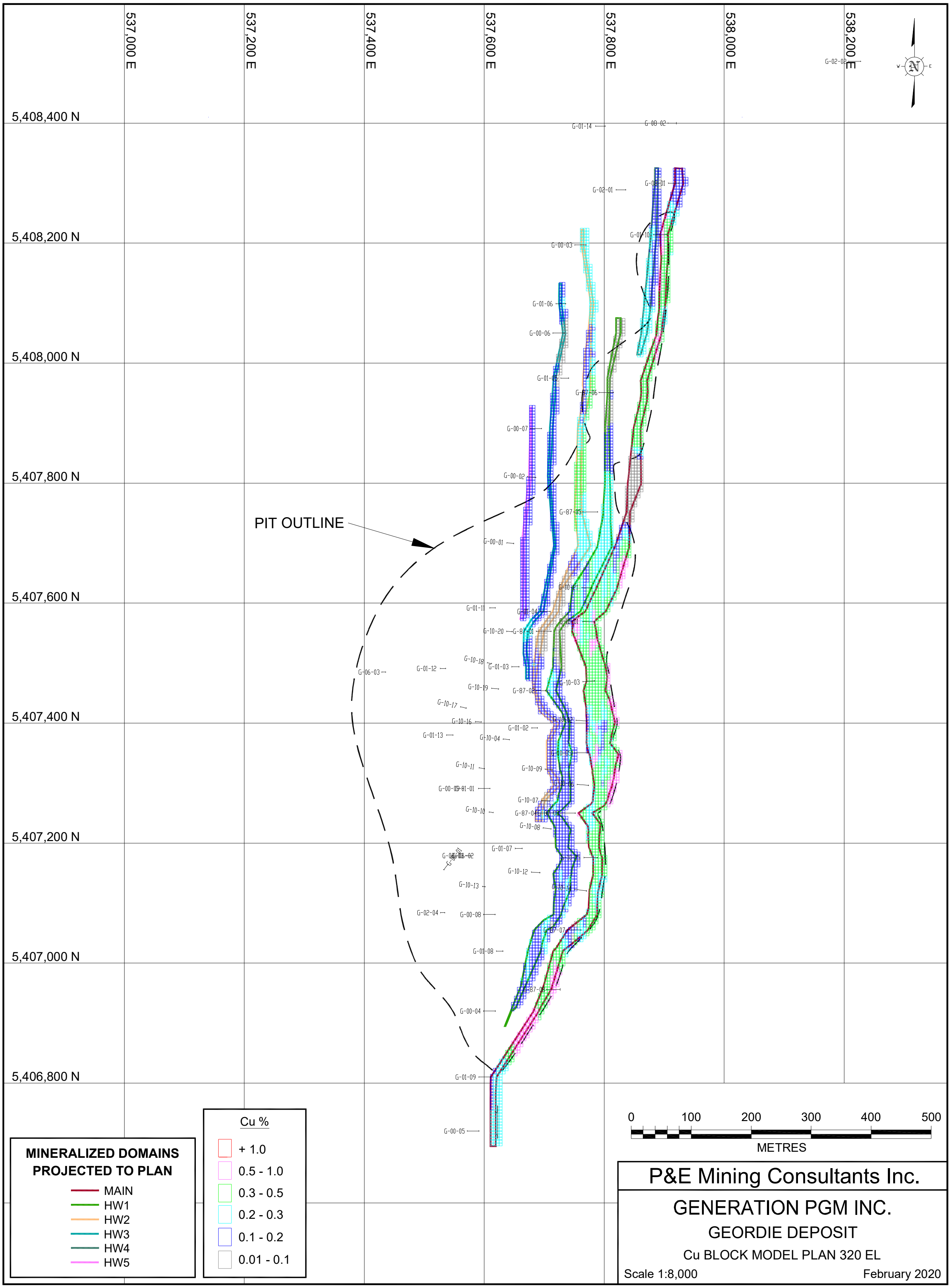
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-00-09
G-01-07
G-10-06
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL SECTION 5,407,295 N
Scale 1:3,000
February 2020



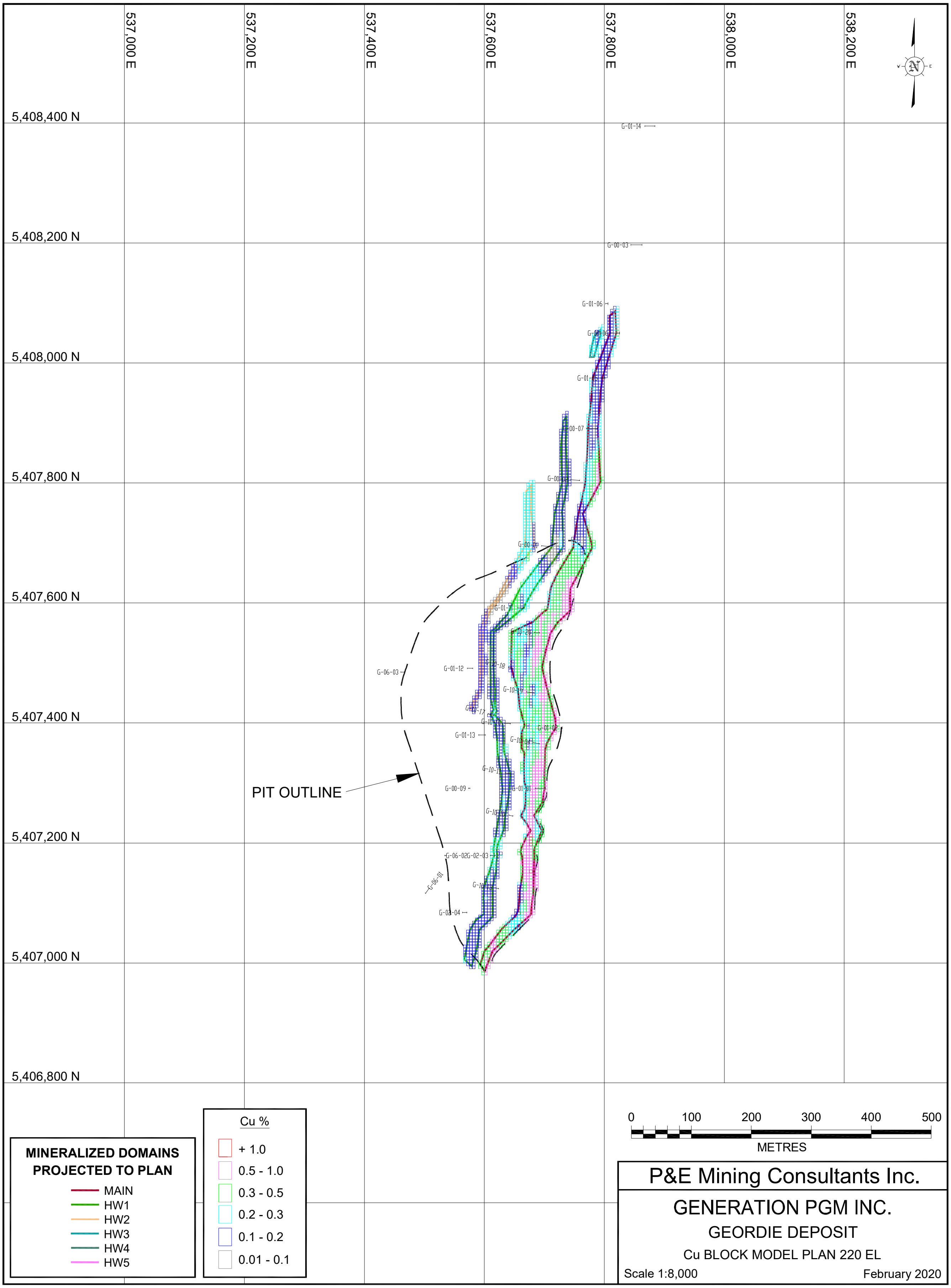
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-10-16
G-01-02
G-10-02
G-10-17
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL SECTION 5,407,395 N
Scale 1:3,000
February 2020



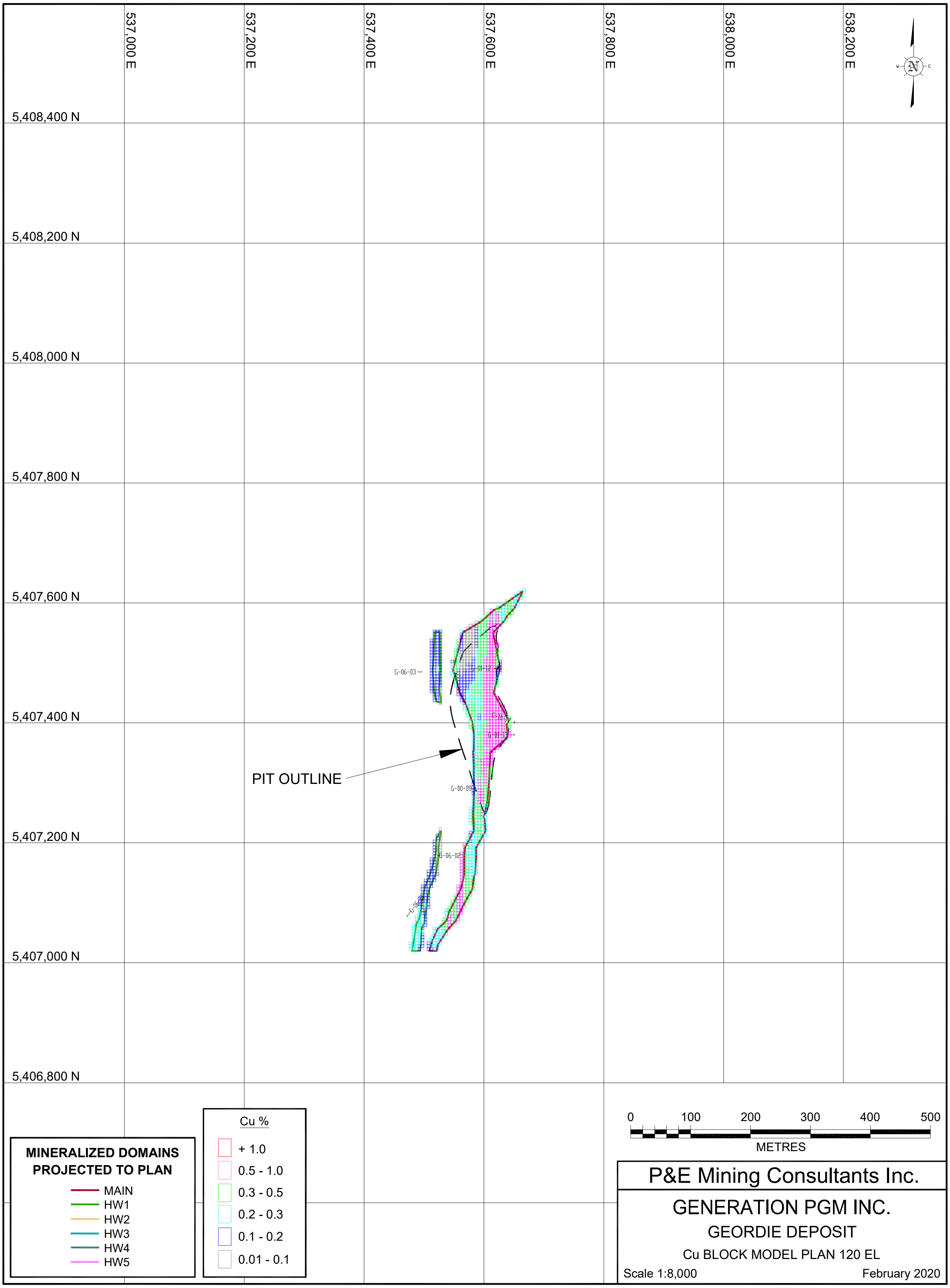
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
SURFACE
PIT OUTLINE
G-06-03
G-01-12
G-10-18
G-01-03
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL SECTION 5,407,495 N
Scale 1:3,000
February 2020



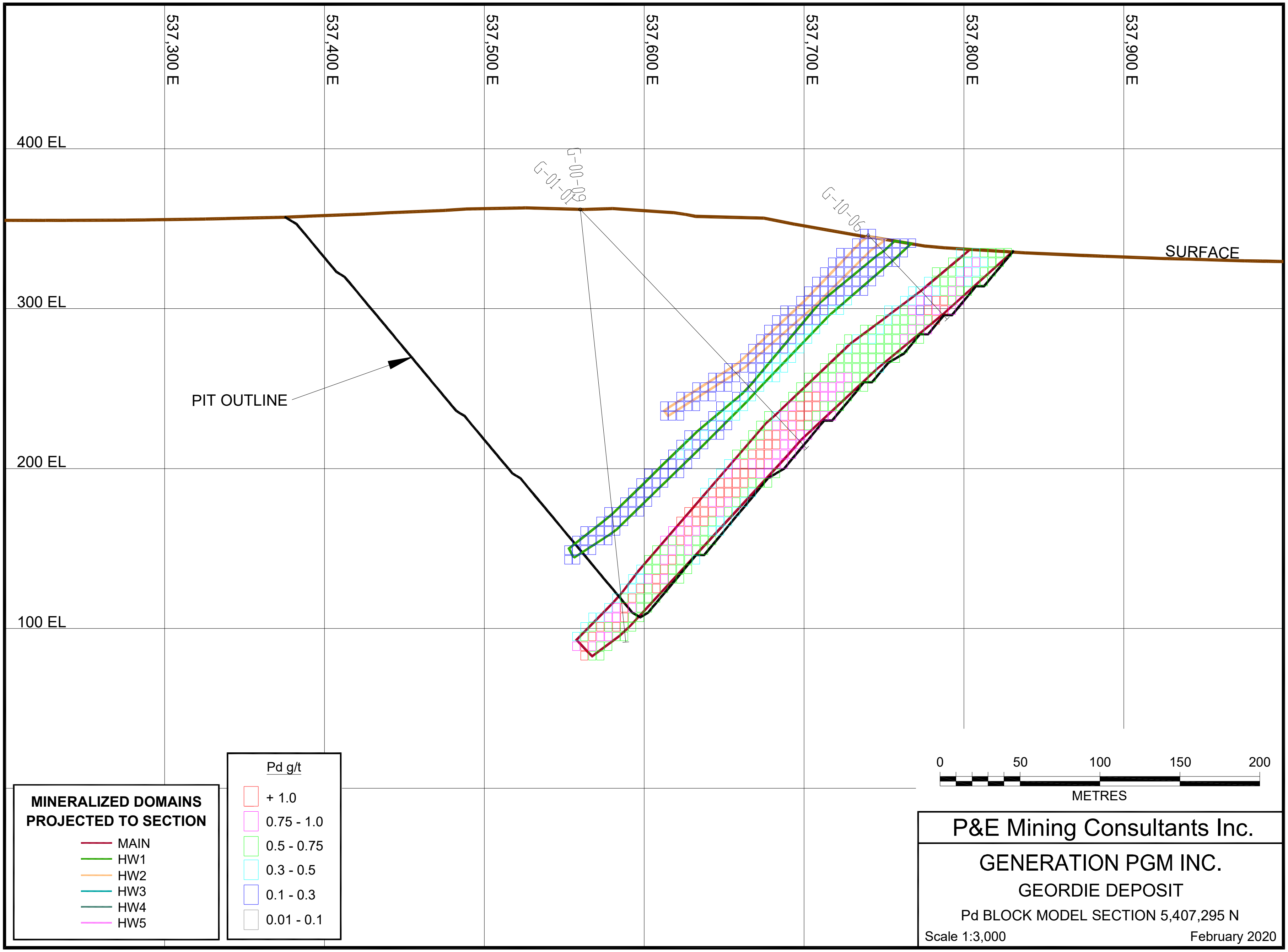
537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL PLAN 320 EL
Scale 1:8,000
February 2020

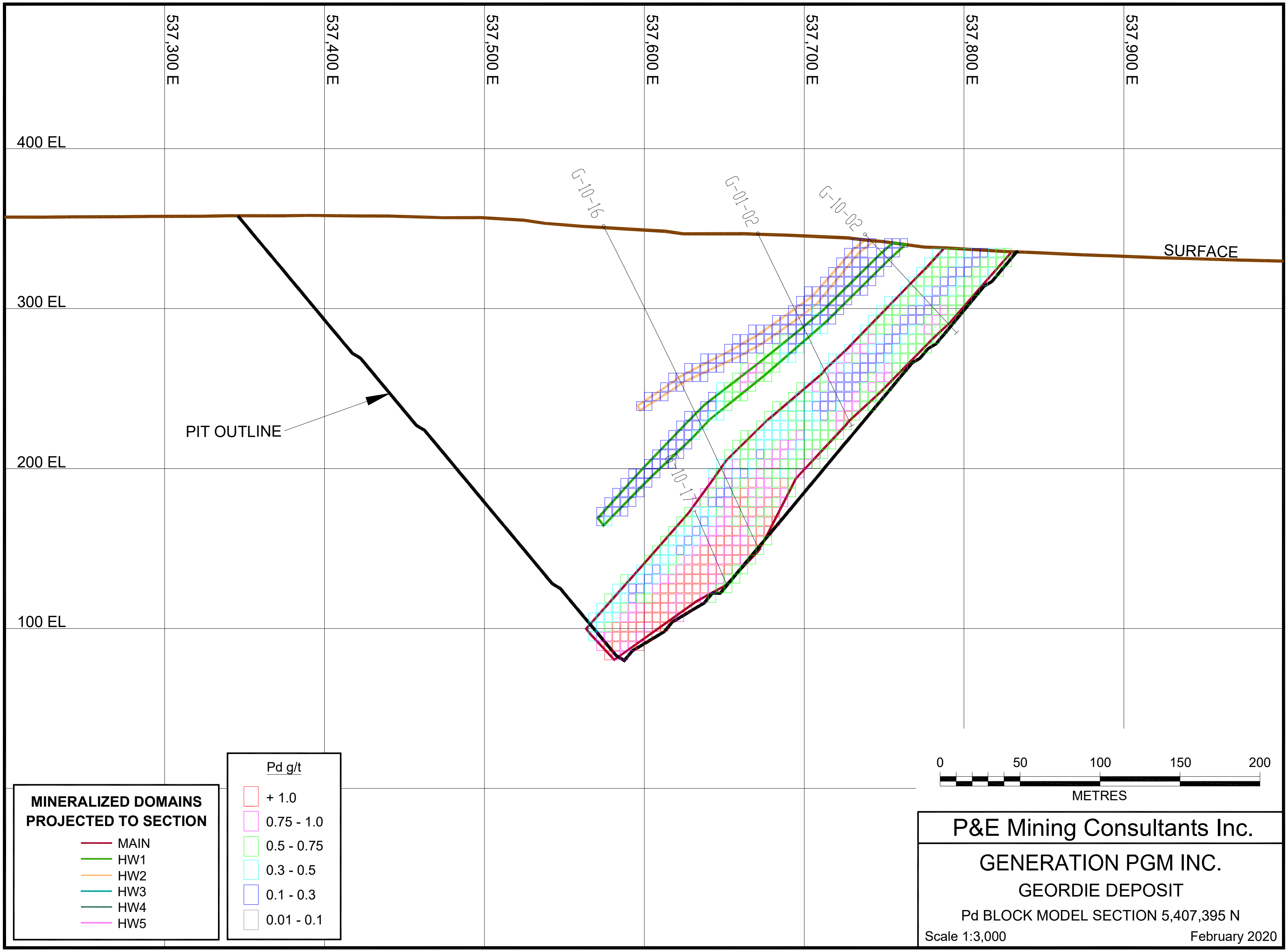


537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL PLAN 220 EL
Scale 1:8,000
February 2020

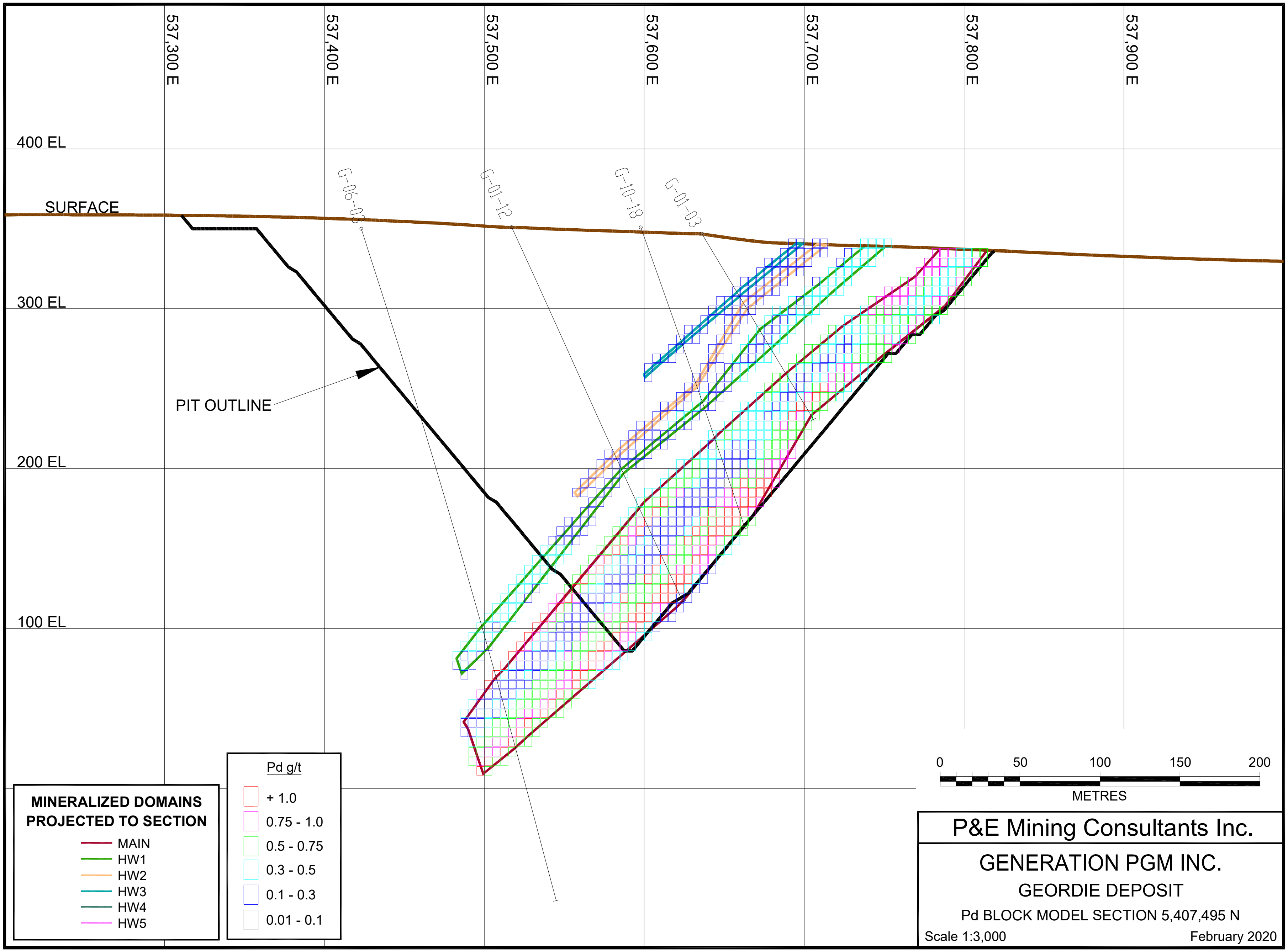

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
N
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Cu BLOCK MODEL PLAN 120 EL
Scale 1:8,000
February 2020

APPENDIX P GEORDIE PD BLOCK MODEL CROSS SECTIONS AND PLANS

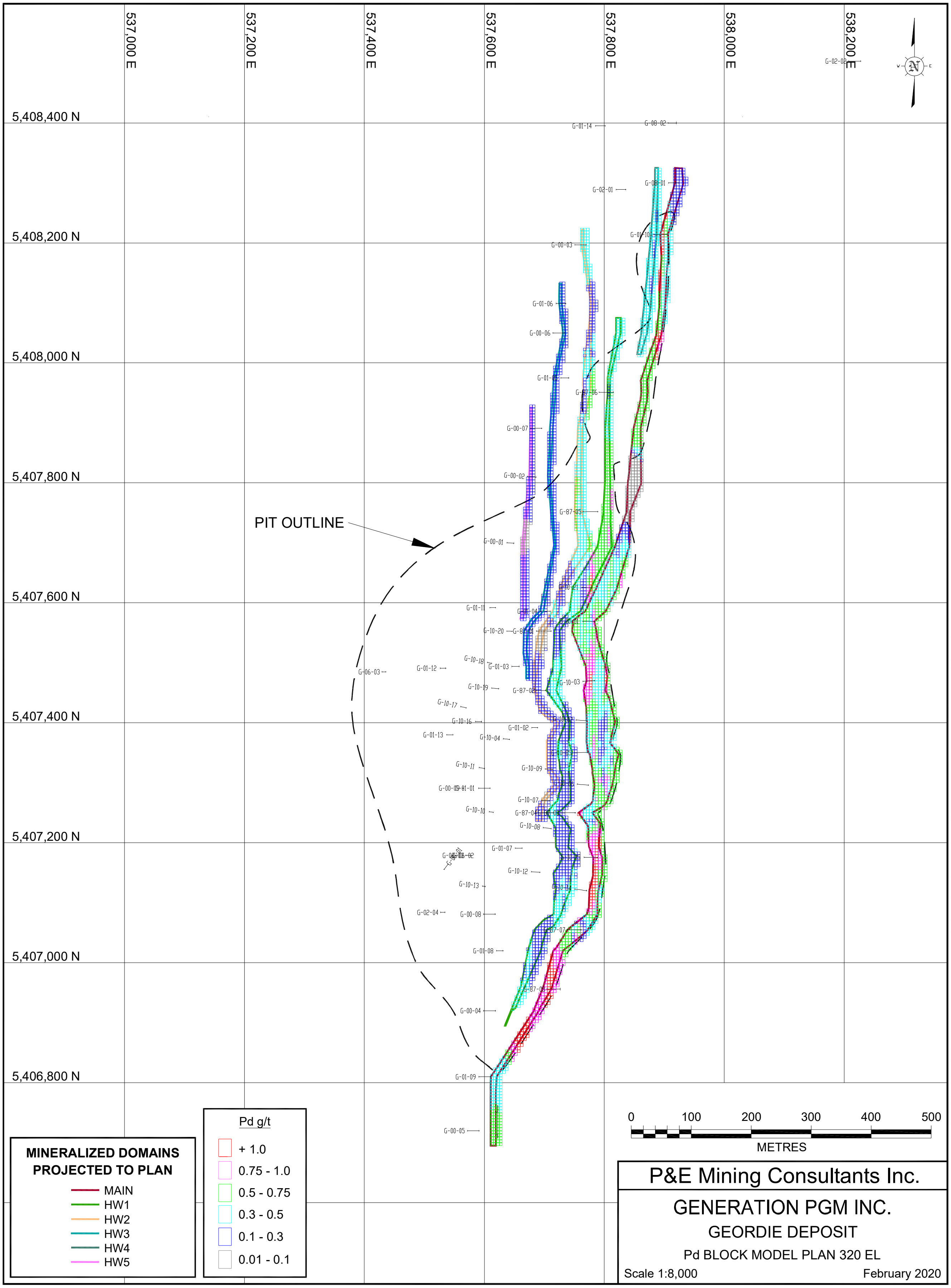

537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-01-07
G-00-09
G-10-06
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL SECTION 5,407,295 N
Scale 1:3,000
February 2020

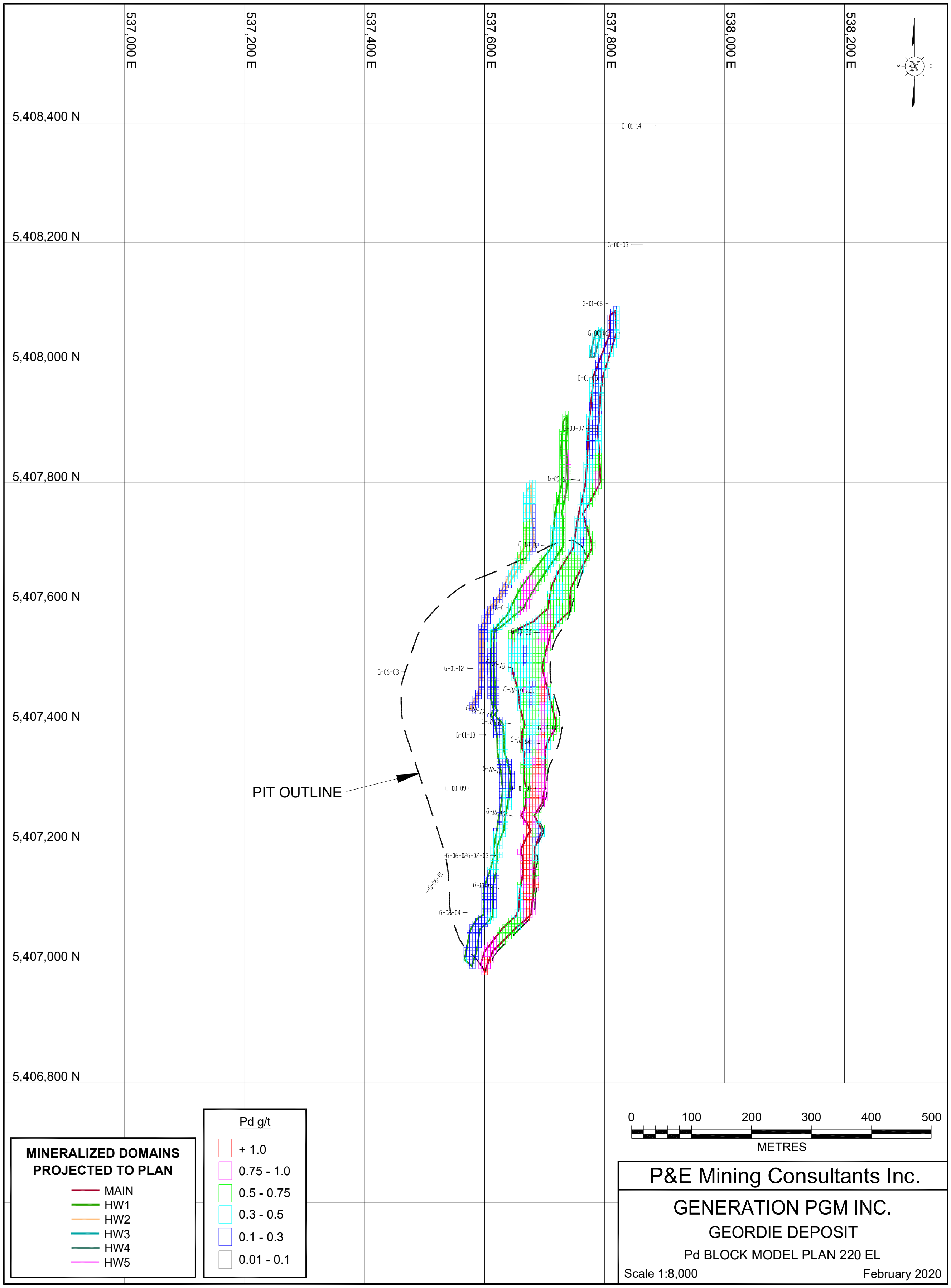


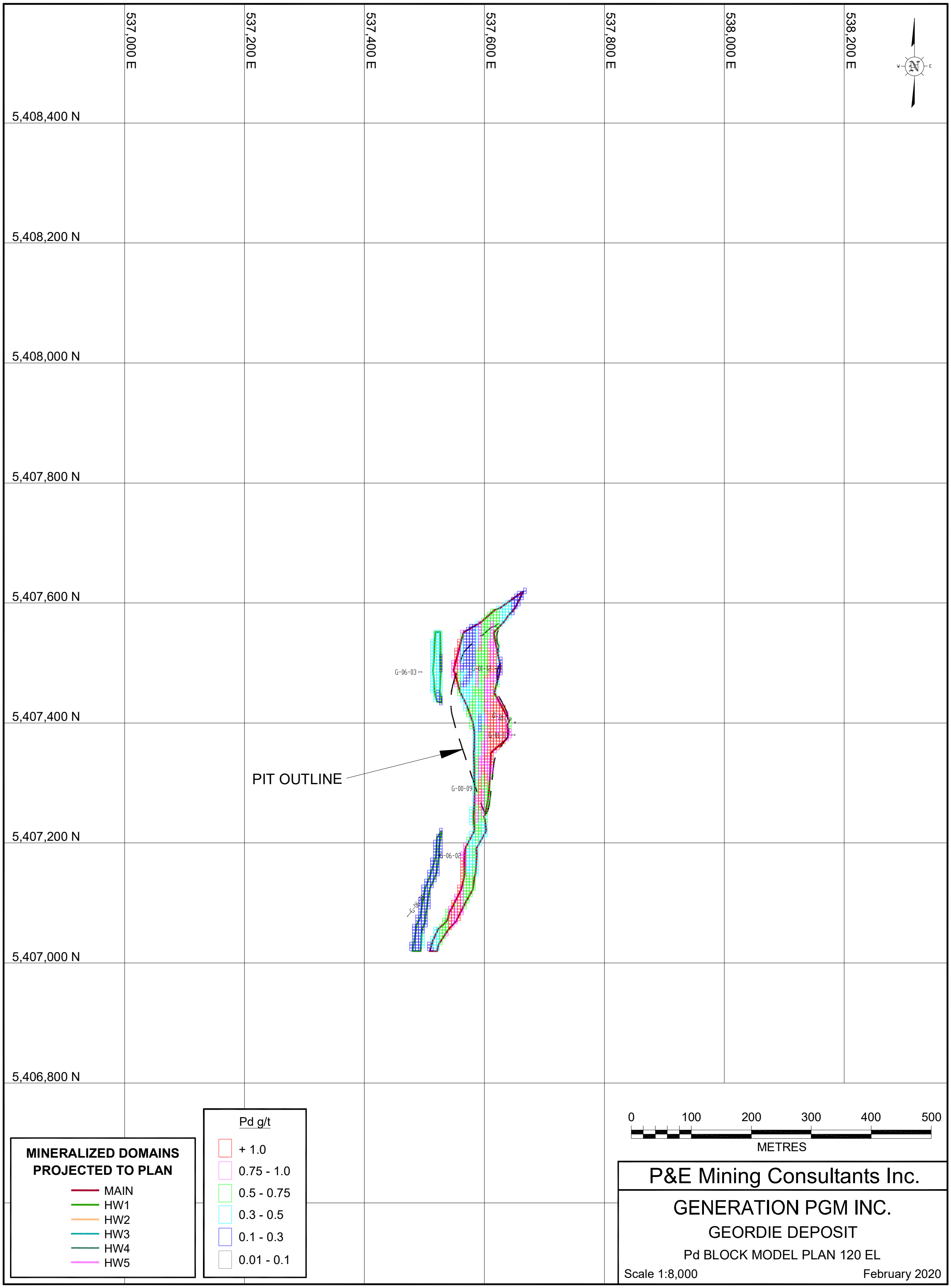
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-10-16
G-01-02
G-10-02
G-10-17
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL SECTION 5,407,395 N
Scale 1:3,000
February 2020



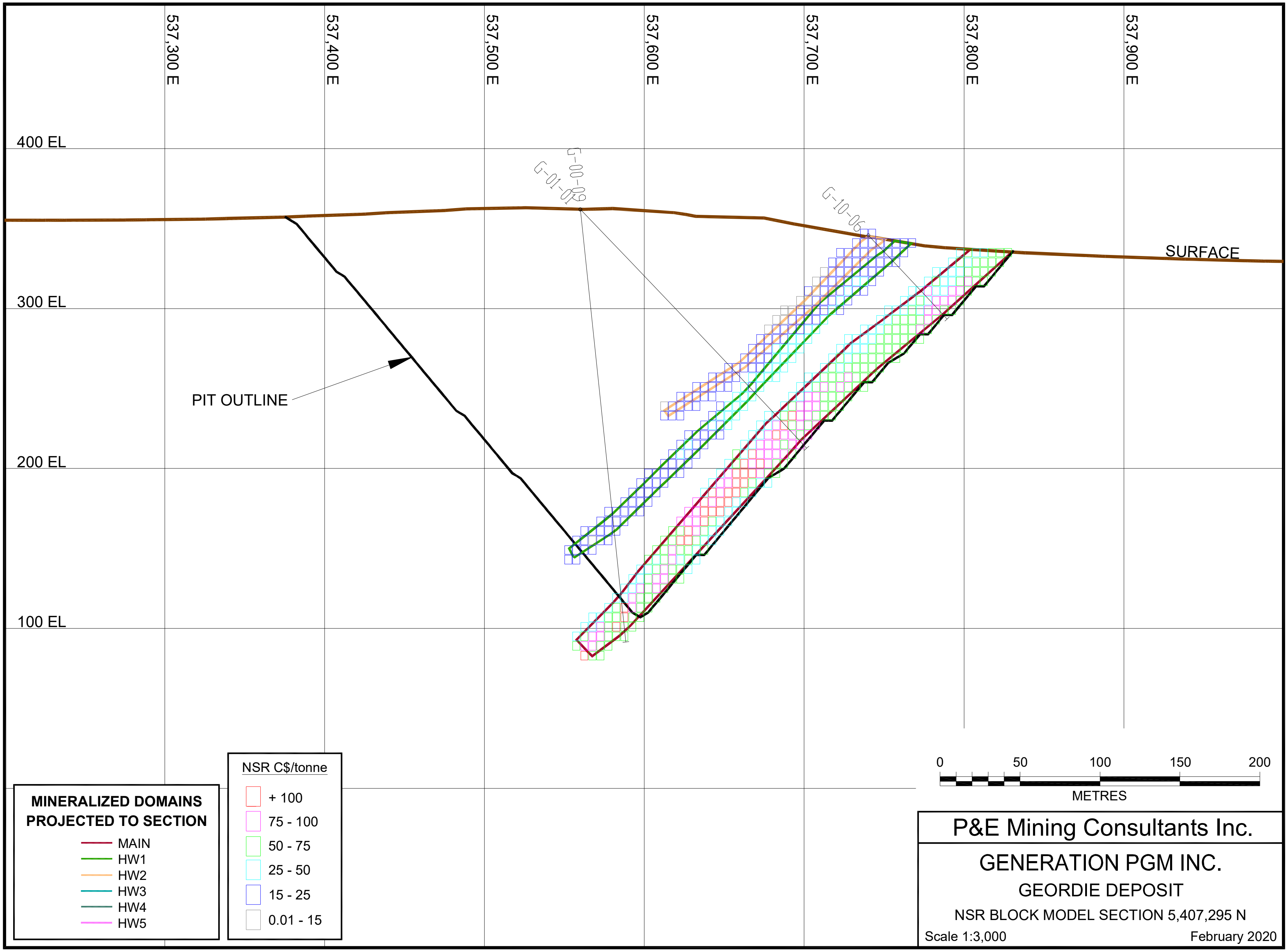
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
SURFACE
PIT OUTLINE
G-06-03
G-01-12
G-10-18
G-01-03
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL SECTION 5,407,495 N
Scale 1:3,000
February 2020


537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL PLAN 320 EL
Scale 1:8,000
February 2020

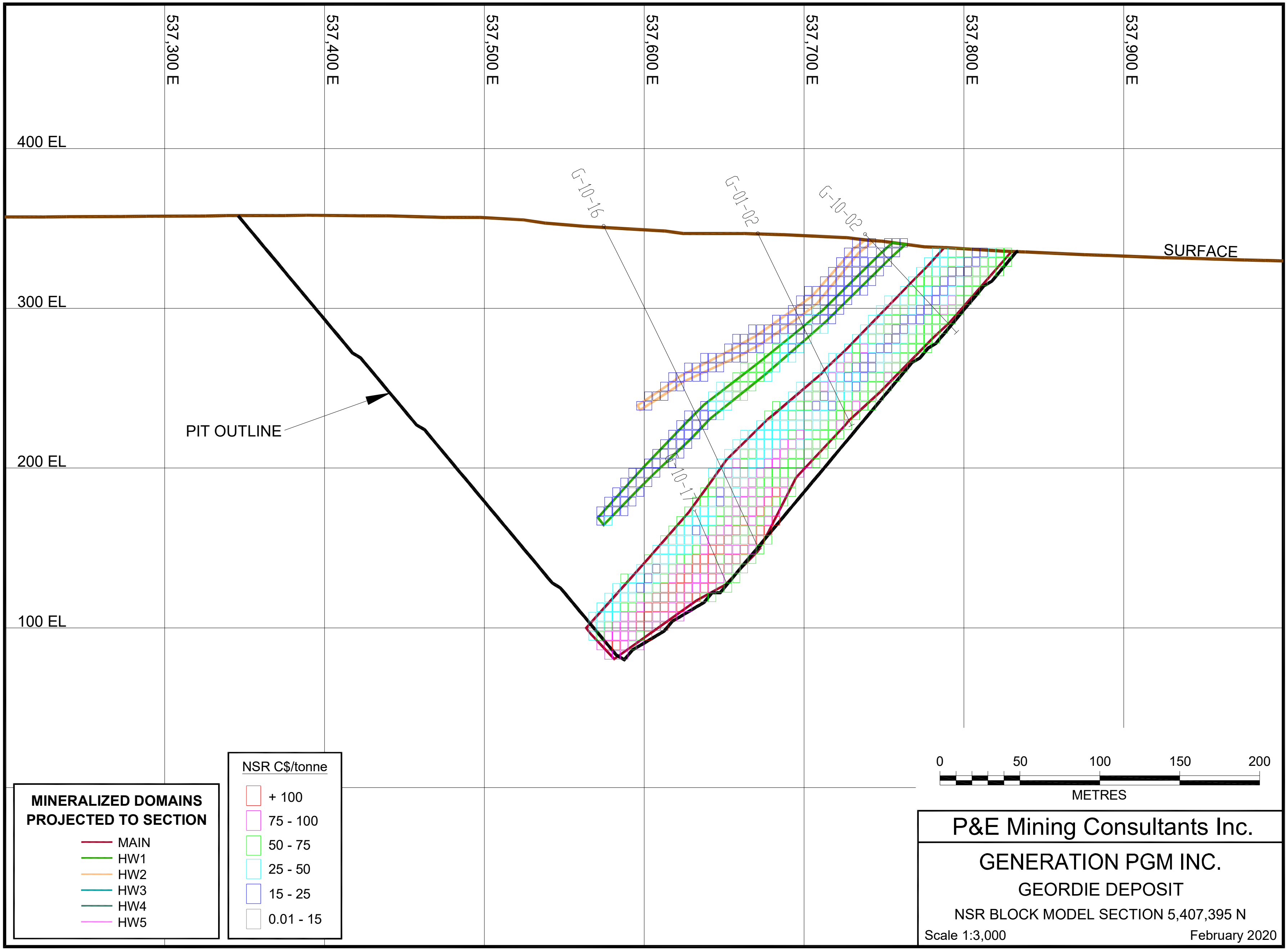

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL PLAN 220 EL
Scale 1:8,000
February 2020


537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
Pd BLOCK MODEL PLAN 120 EL
Scale 1:8,000
February 2020

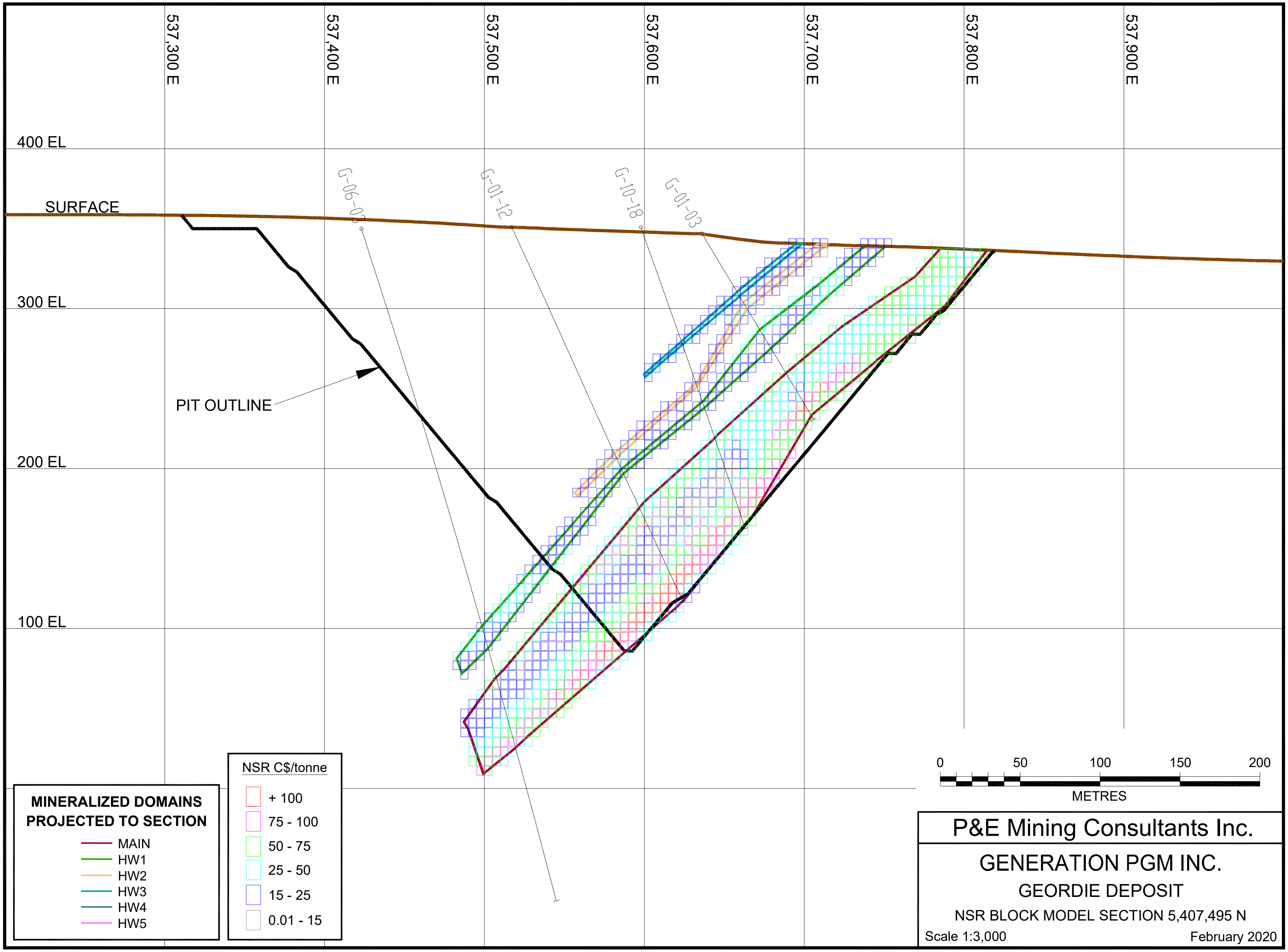
APPENDIX Q GEORDIE NSR BLOCK MODEL CROSS SECTIONS AND PLANS

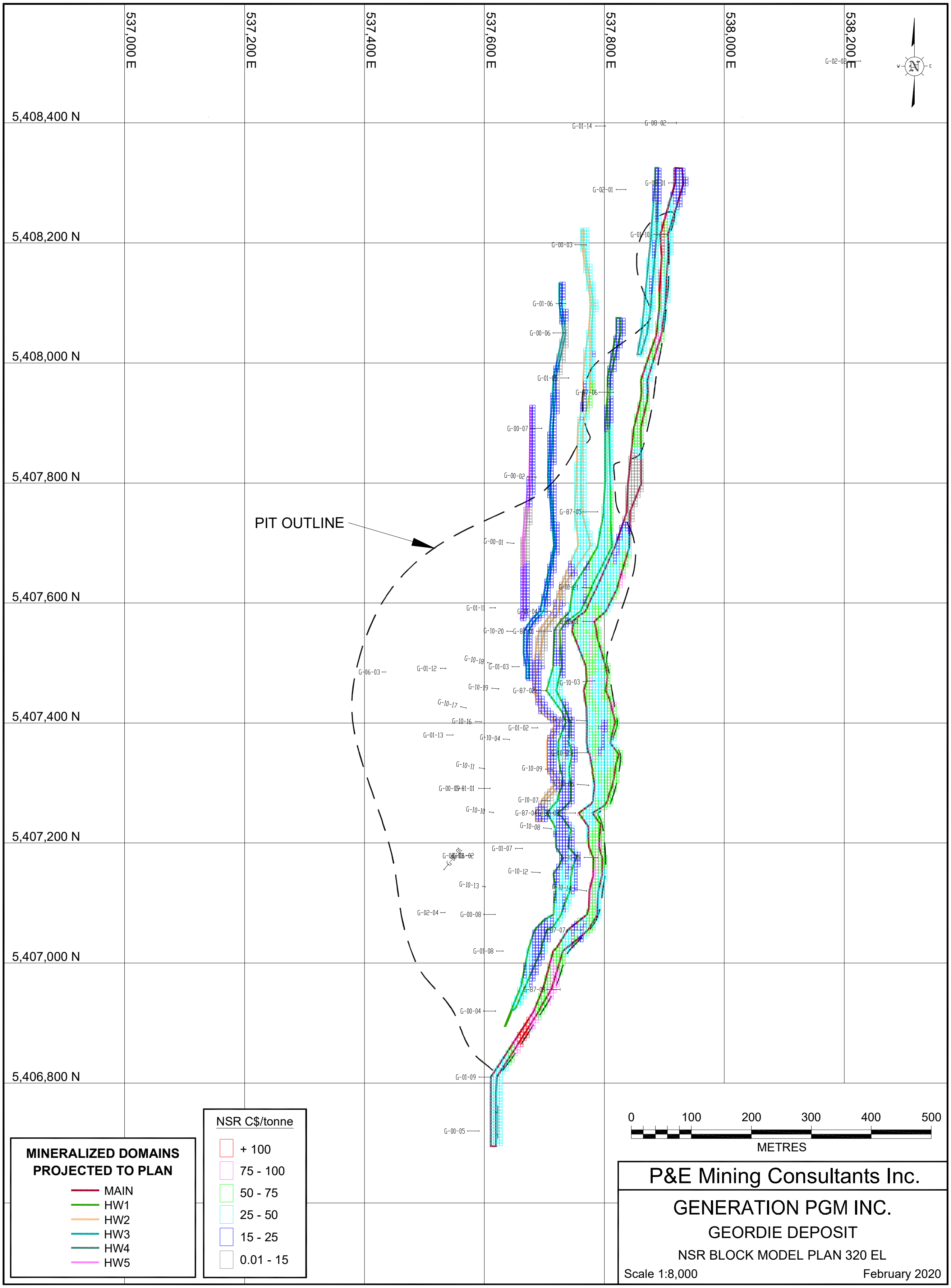


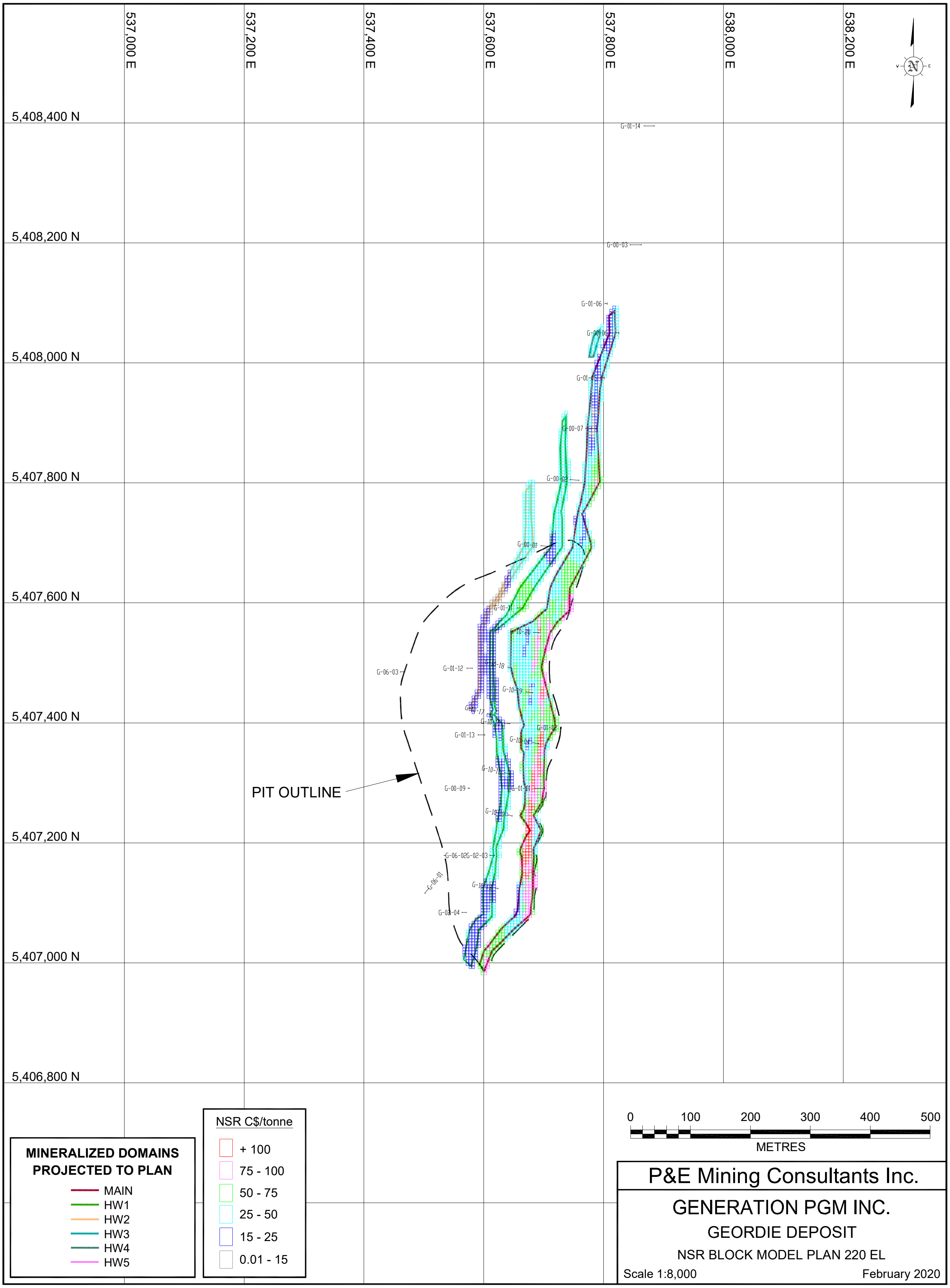
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-00-09
G-01-07
G-10-06
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL SECTION 5,407,295 N
Scale 1:3,000
February 2020



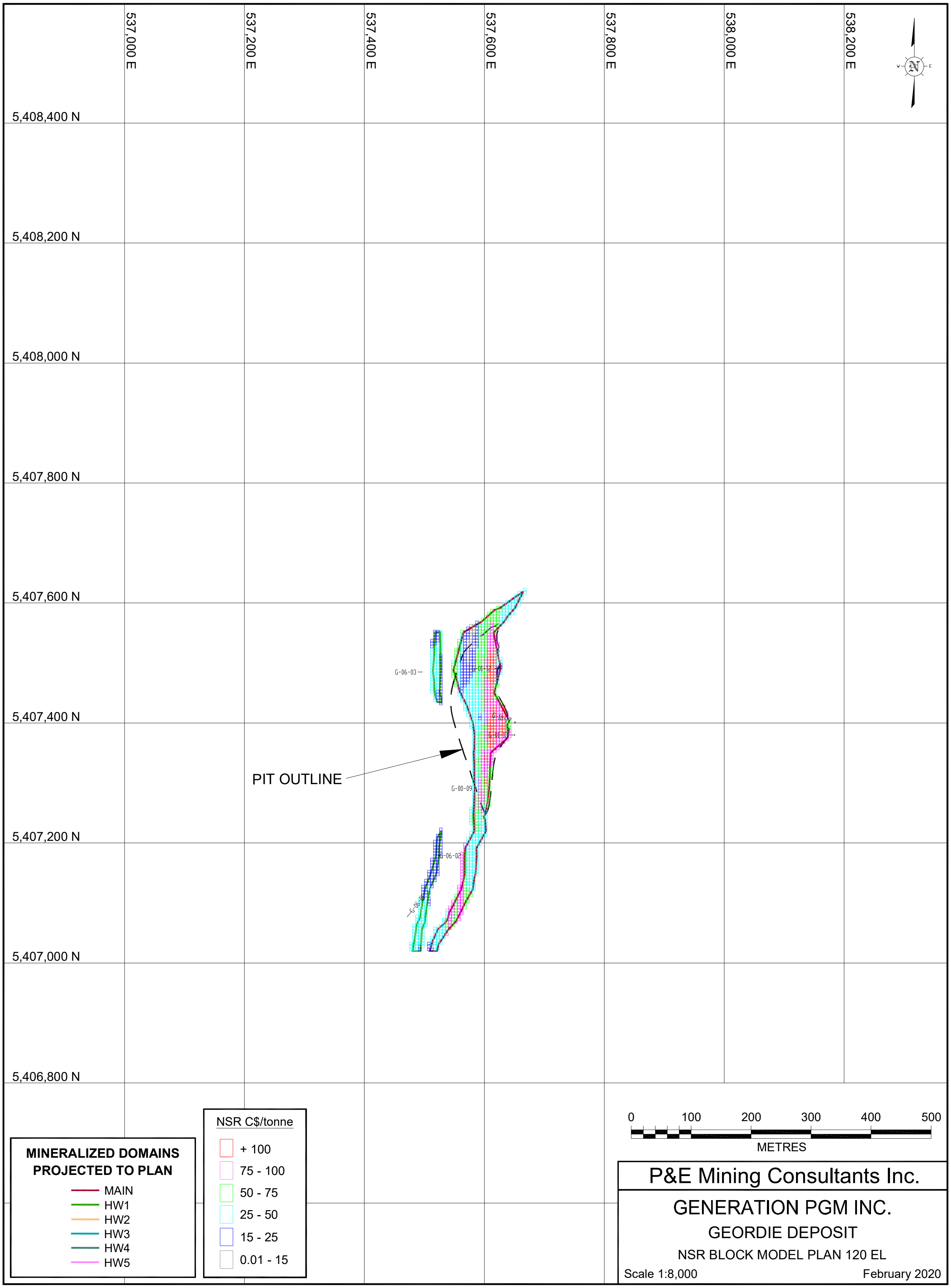
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-10-16
G-01-02
G-10-02
G-10-17
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL SECTION 5,407,395 N
Scale 1:3,000
February 2020


537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
SURFACE
PIT OUTLINE
G-06-02
G-01-12
G-10-18
G-01-03
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL SECTION 5,407,495 N
Scale 1:3,000
February 2020

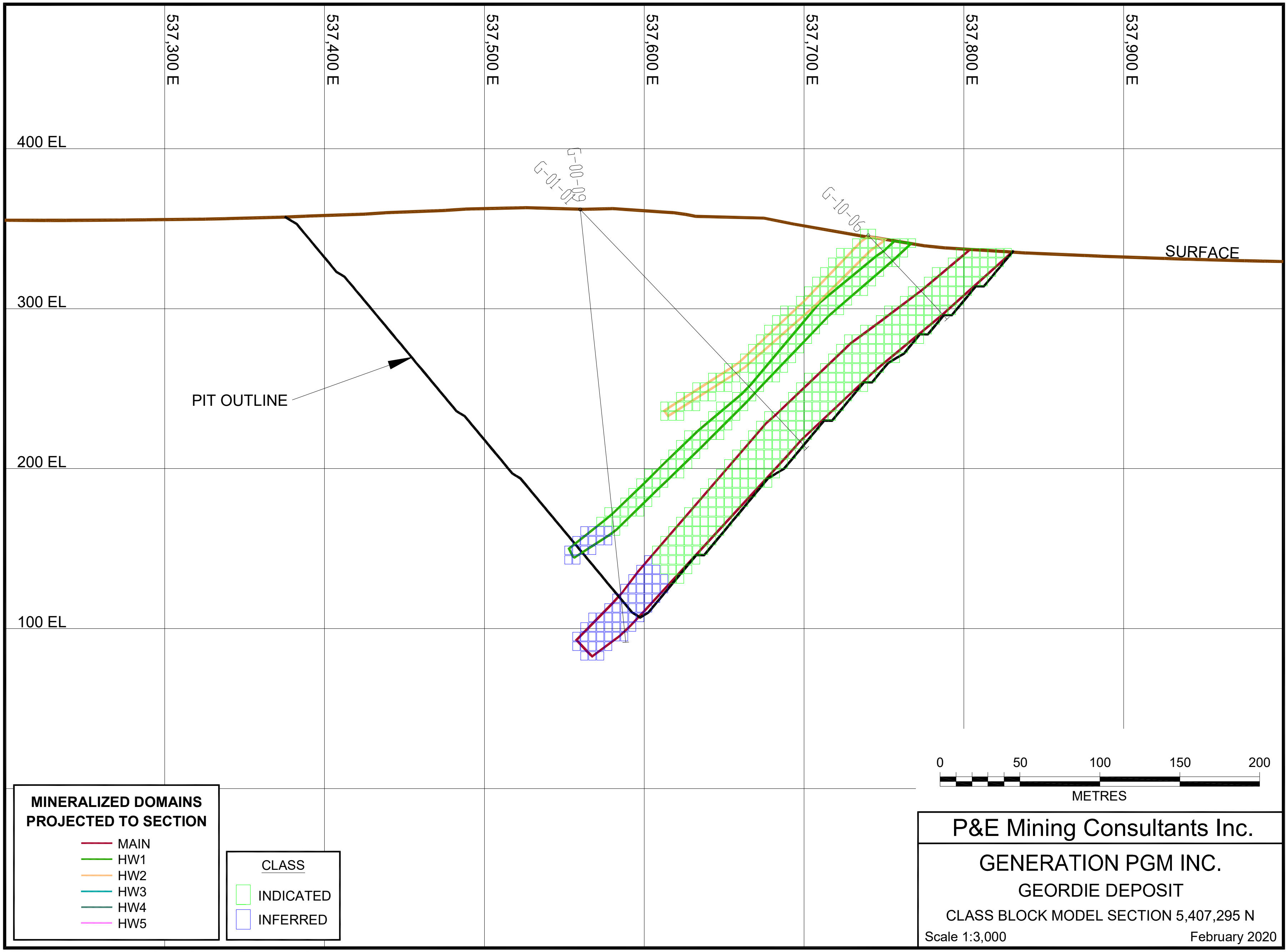

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL PLAN 320 EL
Scale 1:8,000
February 2020



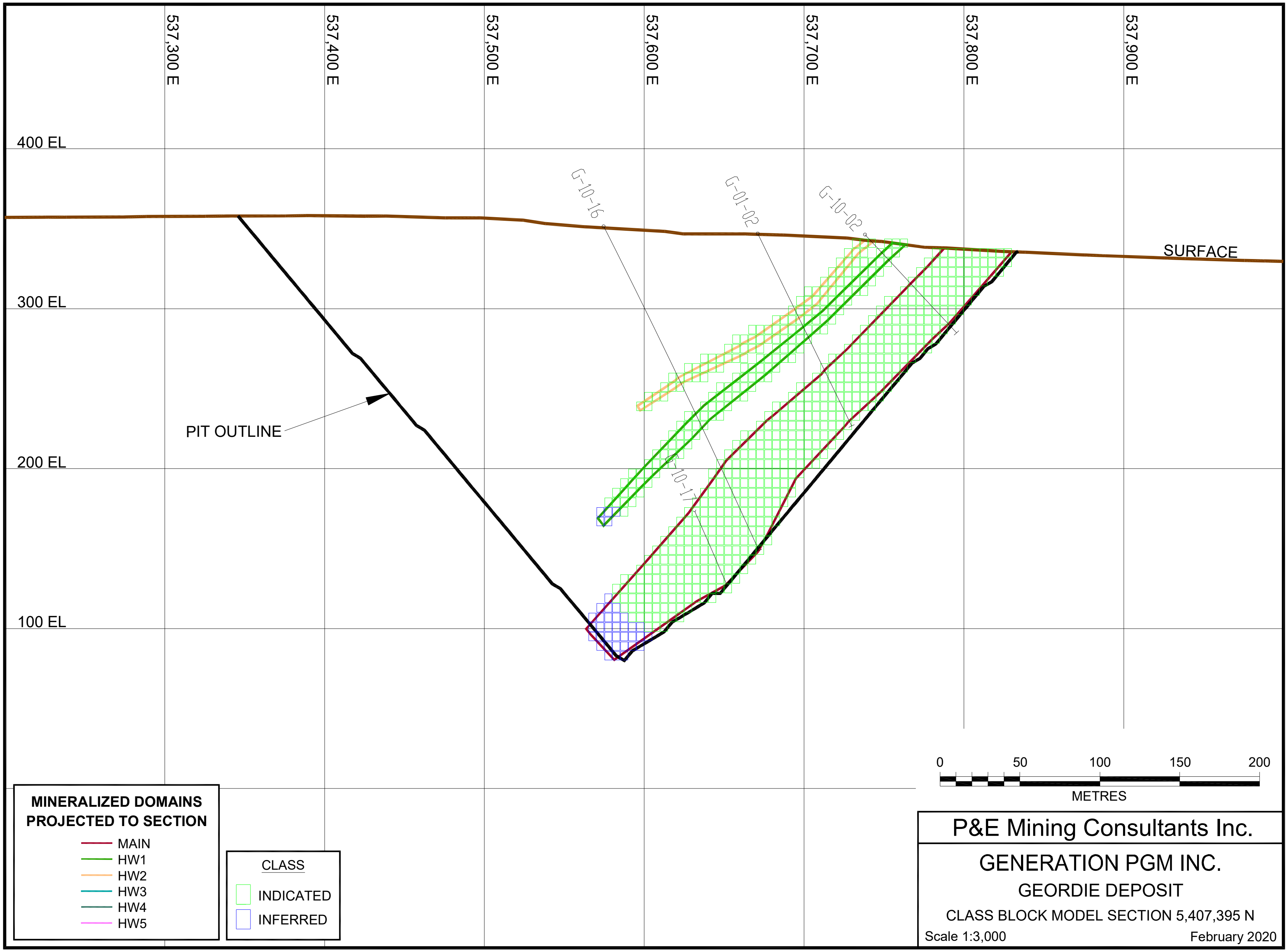
537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL PLAN 220 EL
Scale 1:8,000
February 2020

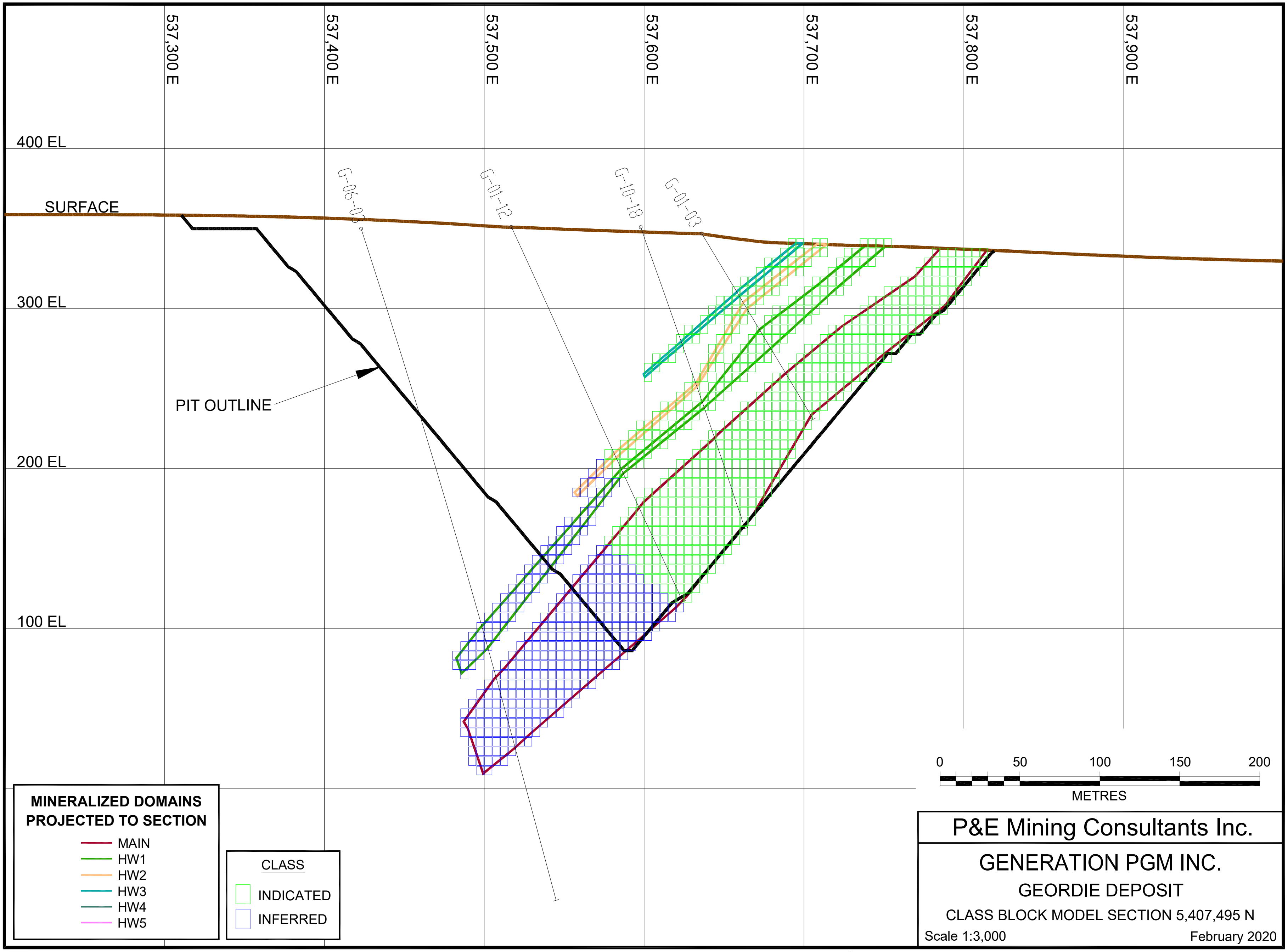

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
N
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
G-06-03
G-00-09
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
NSR BLOCK MODEL PLAN 120 EL
Scale 1:8,000
February 2020

APPENDIX R GEORDIE CLASSIFICATION BLOCK MODEL CROSS SECTIONS AND PLANS

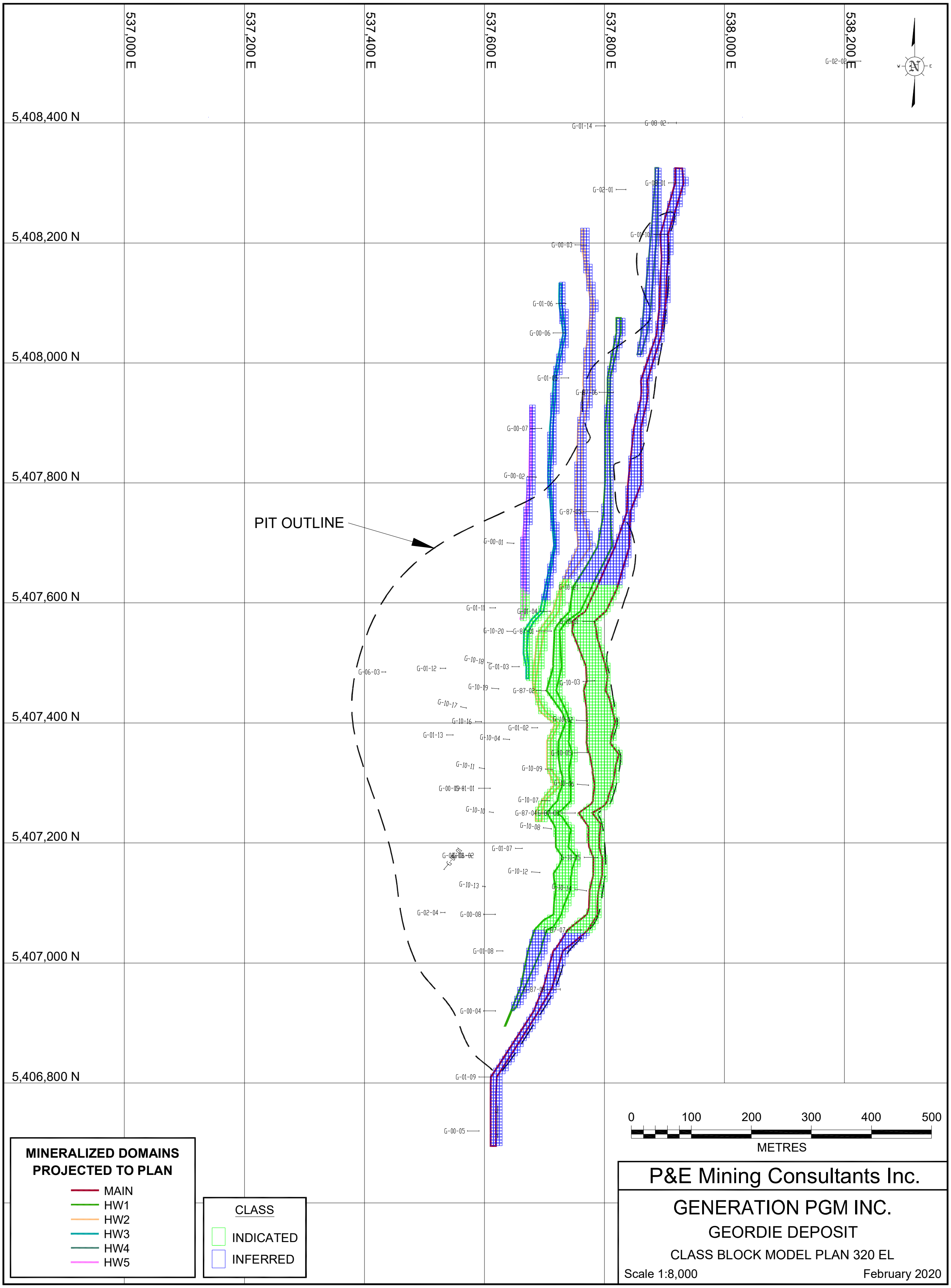


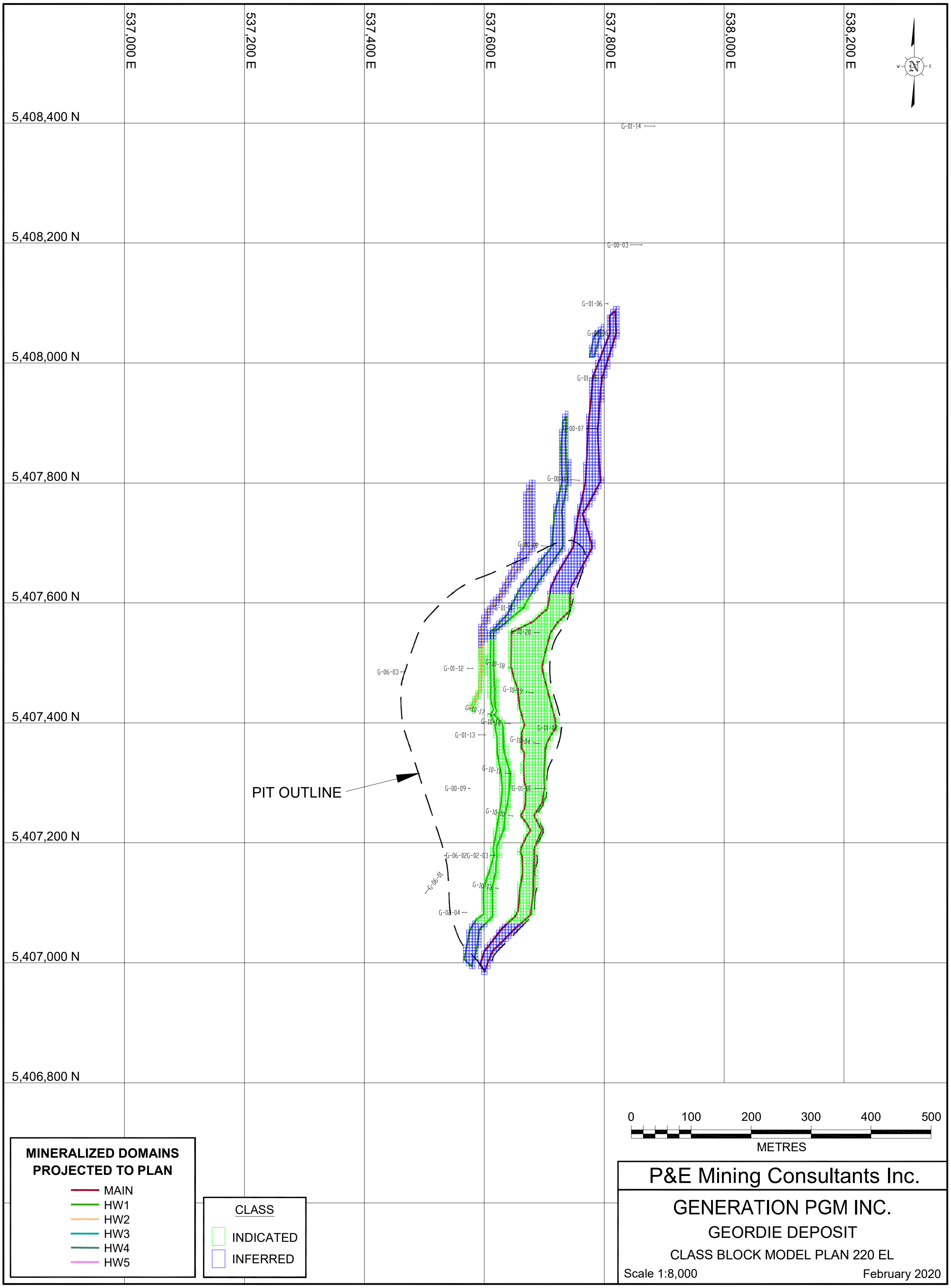
537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-00-09
G-01-07
G-10-06
SURFACE
PIT OUTLINE
0
50
100
150
200
METRES
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL SECTION 5,407,295 N
Scale 1:3,000
February 2020


537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
G-10-16
G-01-02
G-10-02
G-10-17
SURFACE
PIT OUTLINE
0
50
100
150
200
METRES
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL SECTION 5,407,395 N
Scale 1:3,000
February 2020

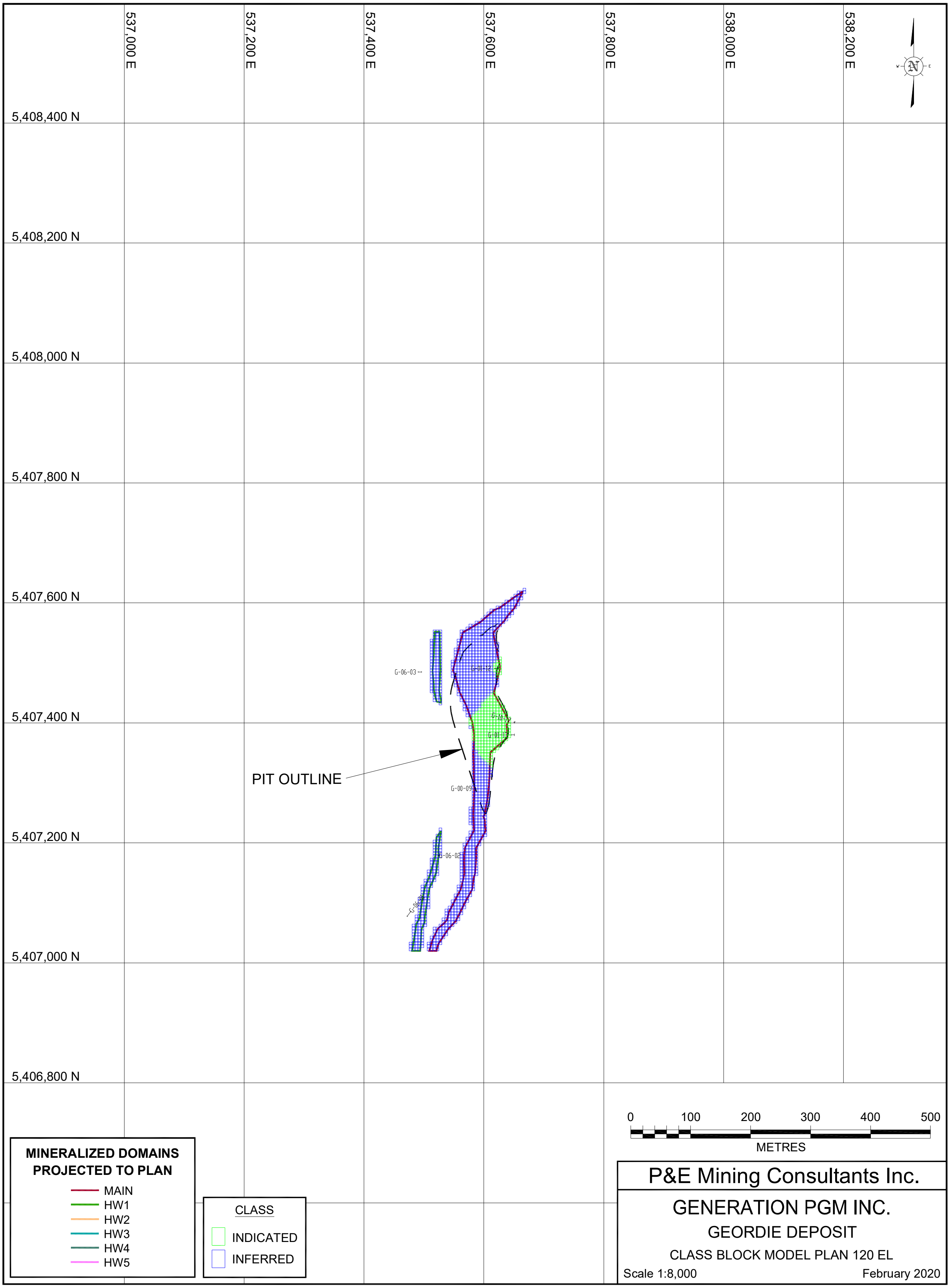


537,300 E
537,400 E
537,500 E
537,600 E
537,700 E
537,800 E
537,900 E
400 EL
300 EL
200 EL
100 EL
SURFACE
PIT OUTLINE
G-06-03
G-01-12
G-10-18
G-01-03
MINERALIZED DOMAINS PROJECTED TO SECTION
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL SECTION 5,407,495 N
Scale 1:3,000
February 2020


537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL PLAN 320 EL
Scale 1:8,000
February 2020

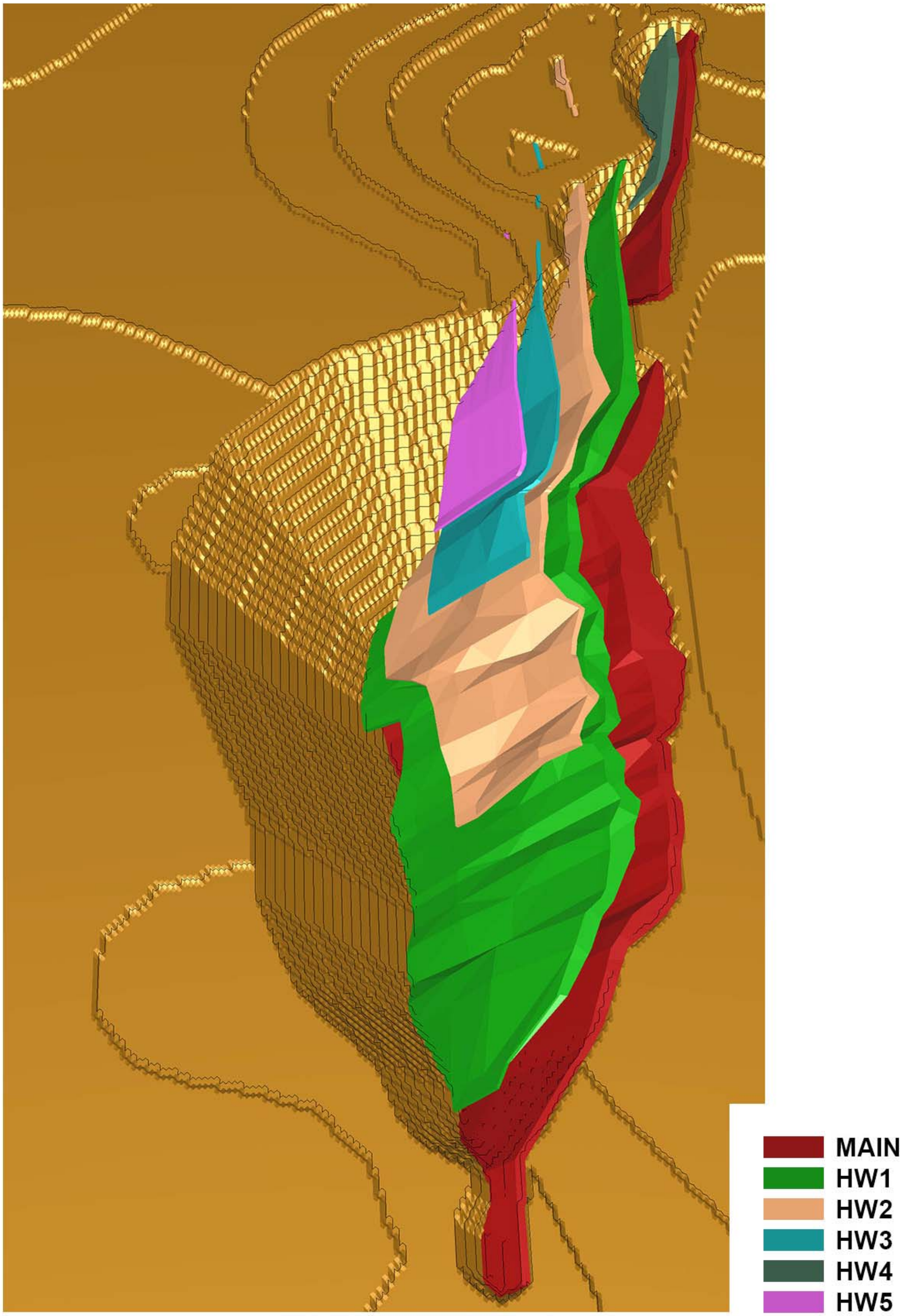


537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
N
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL PLAN 220 EL
Scale 1:8,000
February 2020

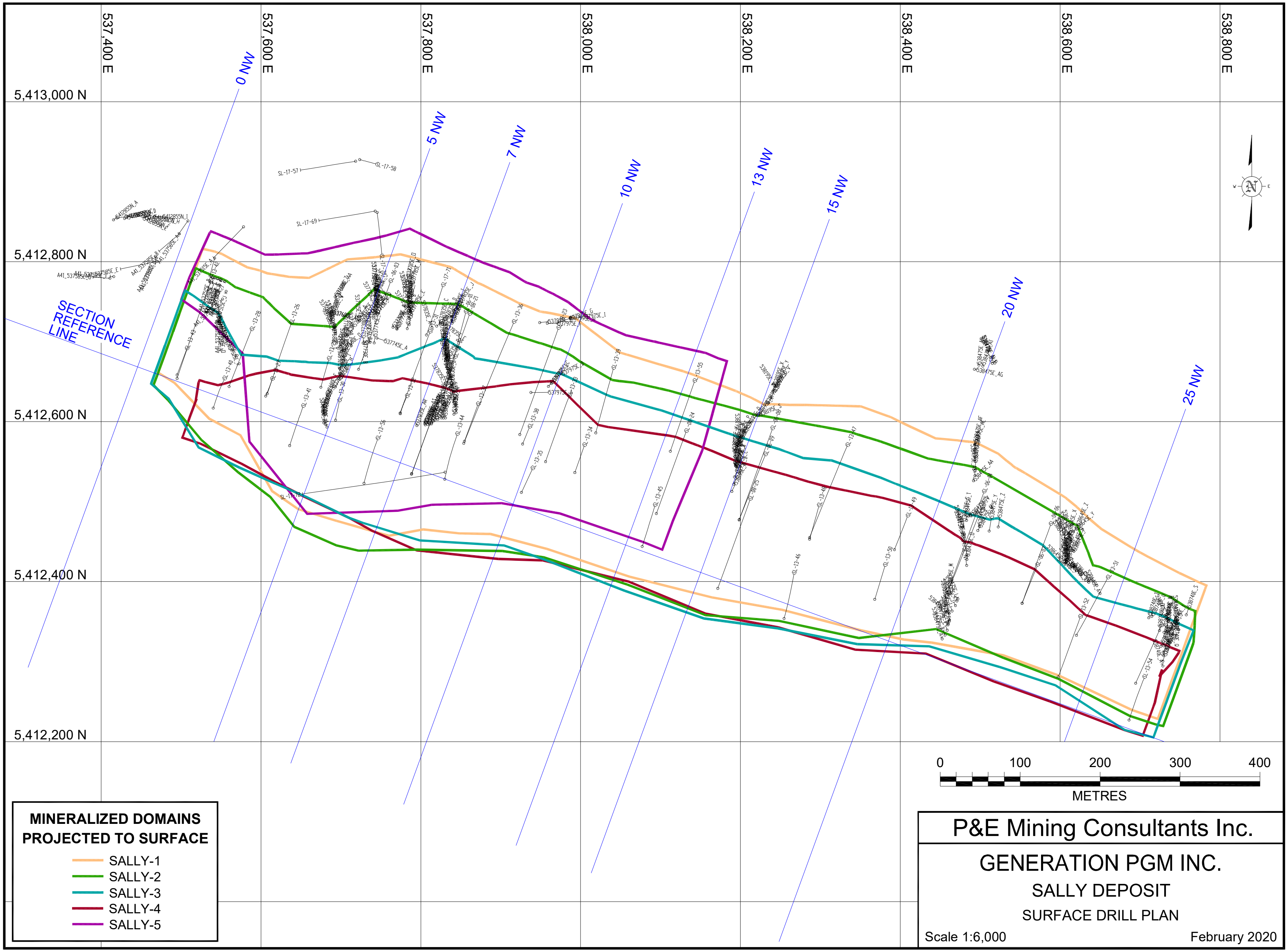

537,000 E
537,200 E
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
N
5,408,400 N
5,408,200 N
5,408,000 N
5,407,800 N
5,407,600 N
5,407,400 N
5,407,200 N
5,407,000 N
5,406,800 N
PIT OUTLINE
G-06-03
G-00-09
G-06-02
MINERALIZED DOMAINS
PROJECTED TO PLAN
MAIN
HW1
HW2
HW3
HW4
HW5
CLASS
INDICATED
INFERRED
0
100
200
300
400
500
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
GEORDIE DEPOSIT
CLASS BLOCK MODEL PLAN 120 EL
Scale 1:8,000
February 2020

APPENDIX S GEORDIE OPTIMIZED PIT SHELL

GEORDIE DEPOSIT
OPTIMIZED PIT SHELL

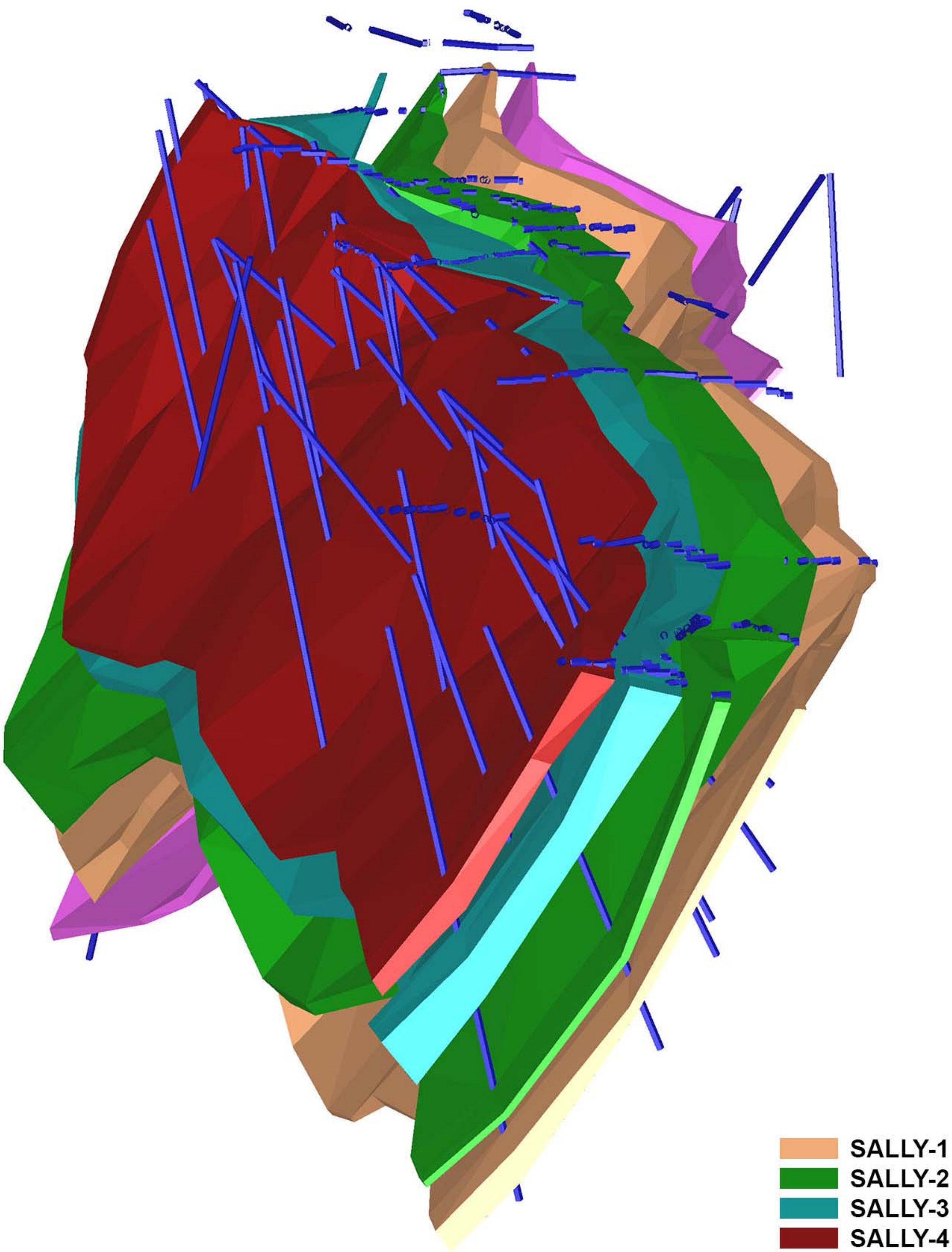


APPENDIX T SALLY SURFACE DRILL PLAN

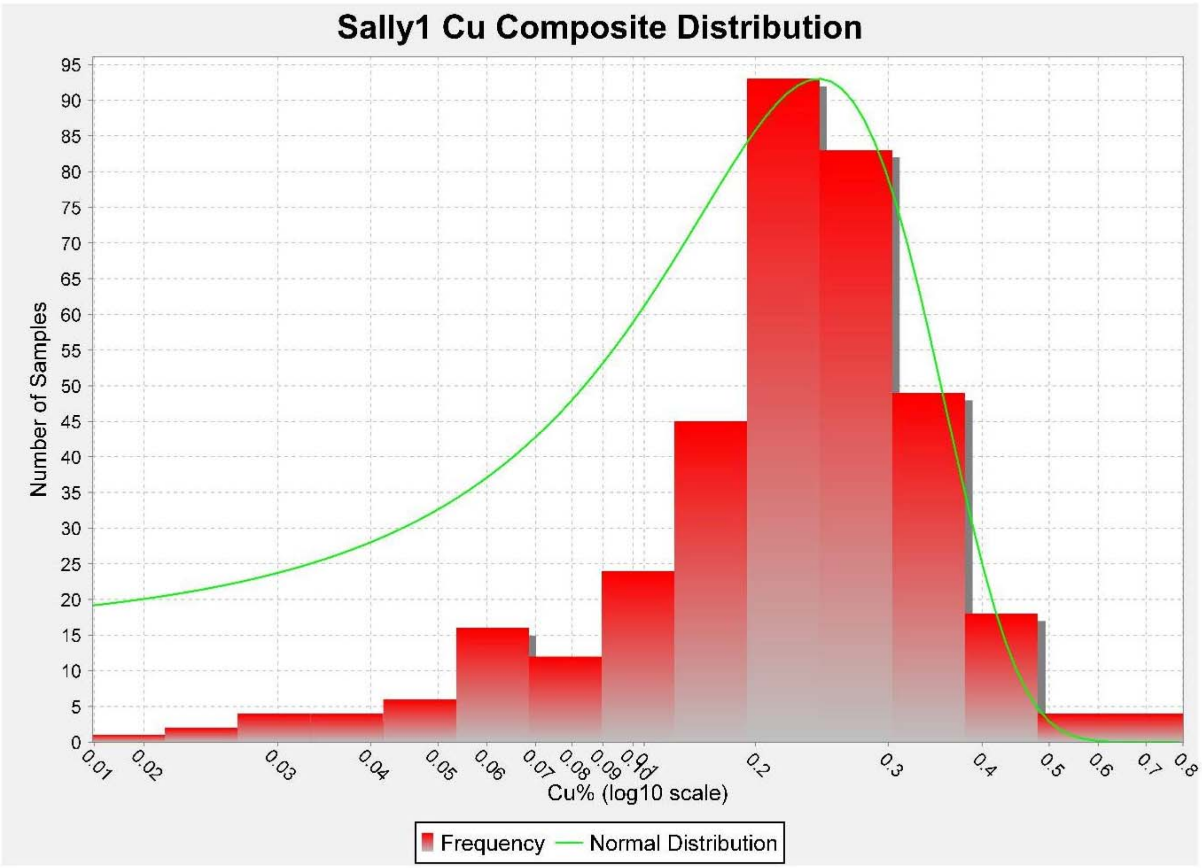

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
0 NW
5 NW
7 NW
10 NW
13 NW
15 NW
20 NW
25 NW
SECTION REFERENCE LINE
N
0
100
200
300
400
METRES
MINERALIZED DOMAINS PROJECTED TO SURFACE
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
SURFACE DRILL PLAN
Scale 1:6,000
February 2020

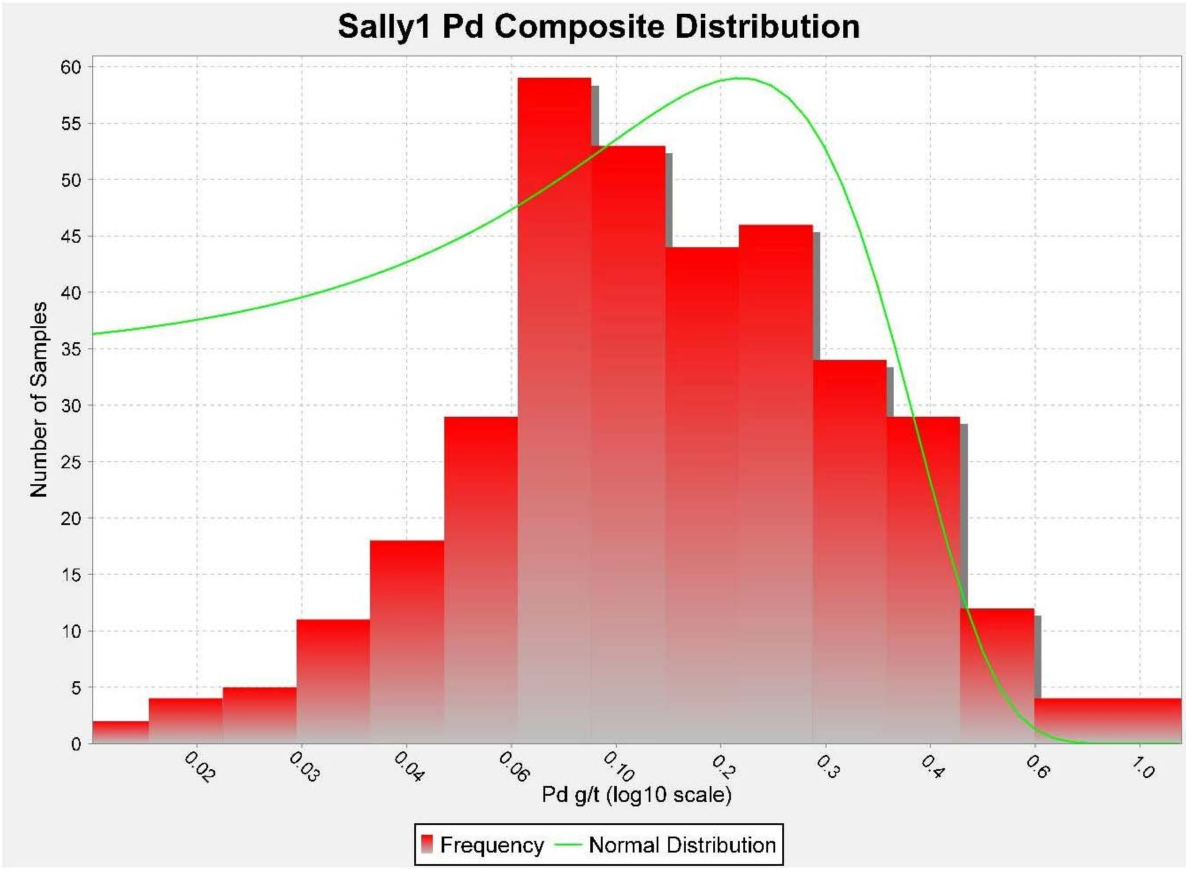
APPENDIX U SALLY 3-D DOMAINS

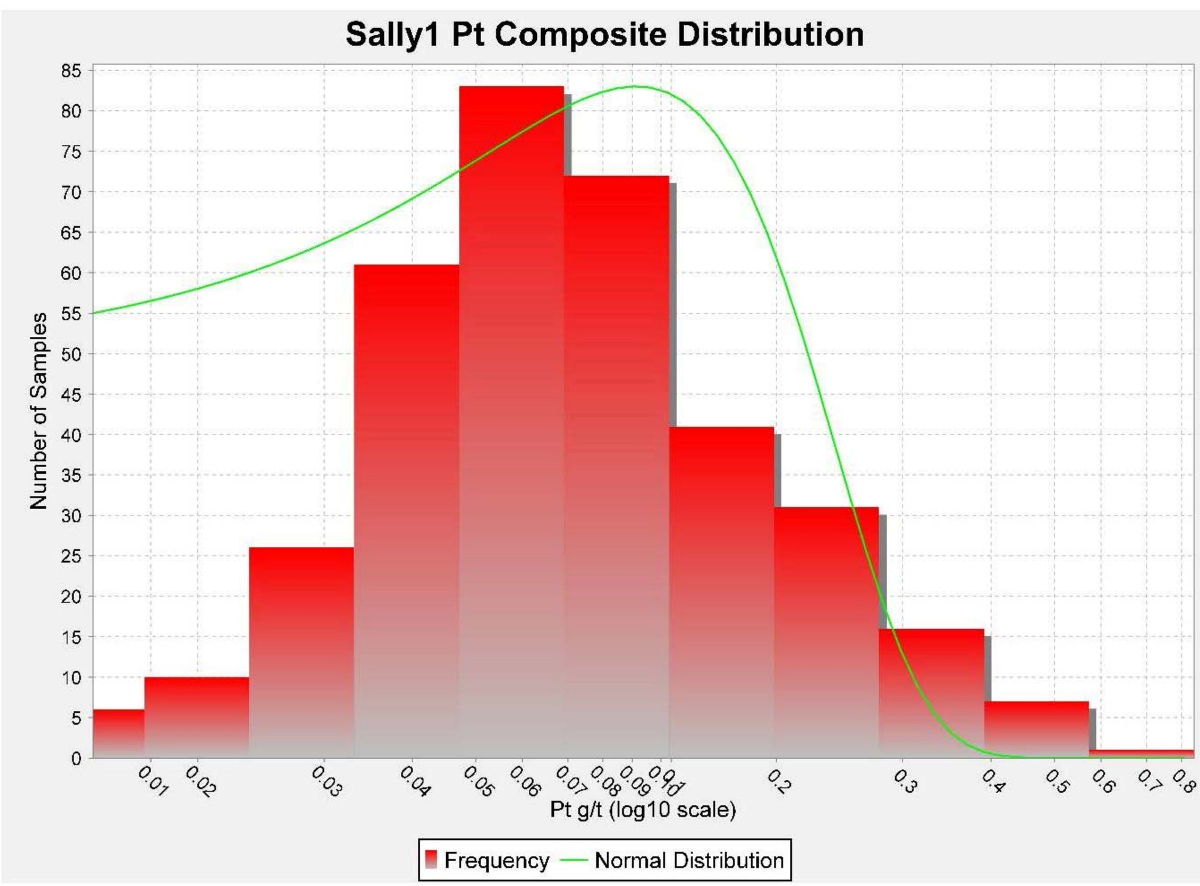
SALLY DEPOSIT - 3D DOMAINS

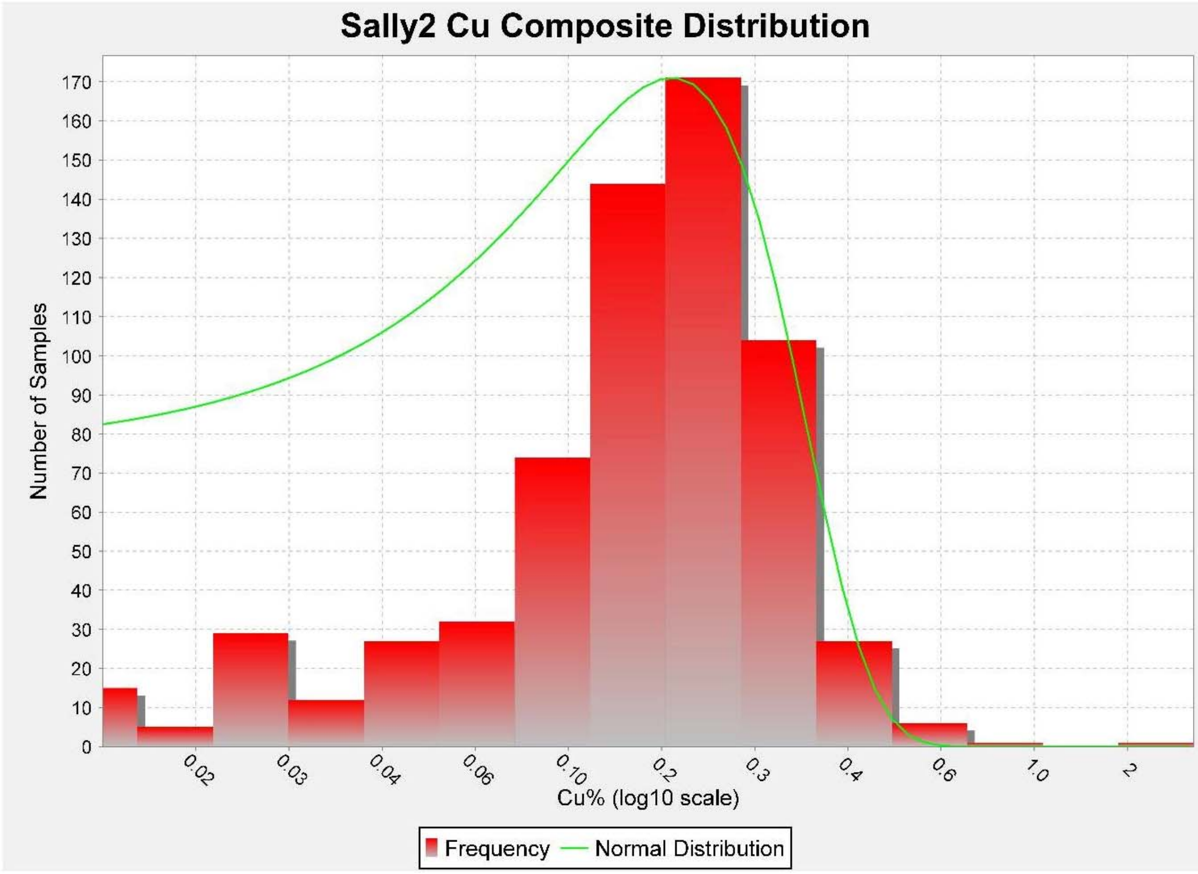


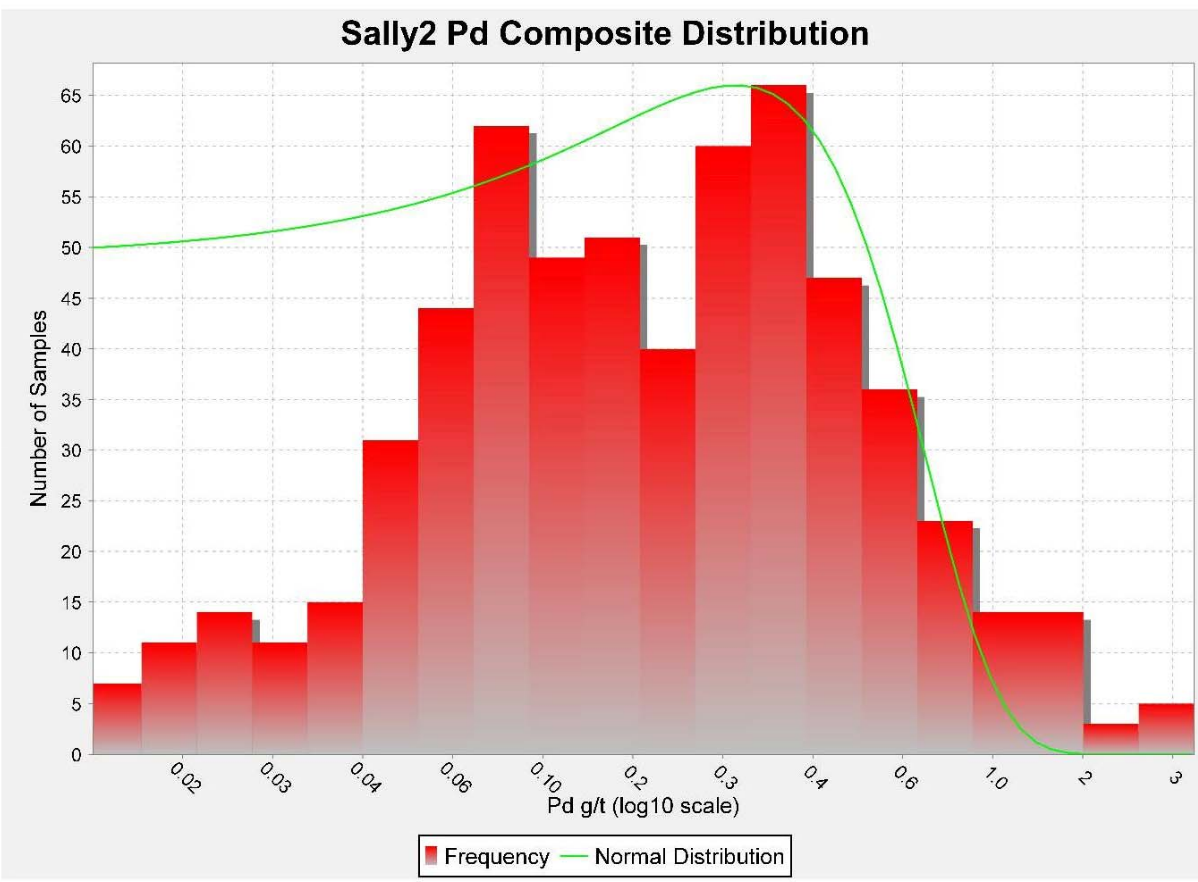
APPENDIX V SALLY LOG NORMAL HISTOGRAMS

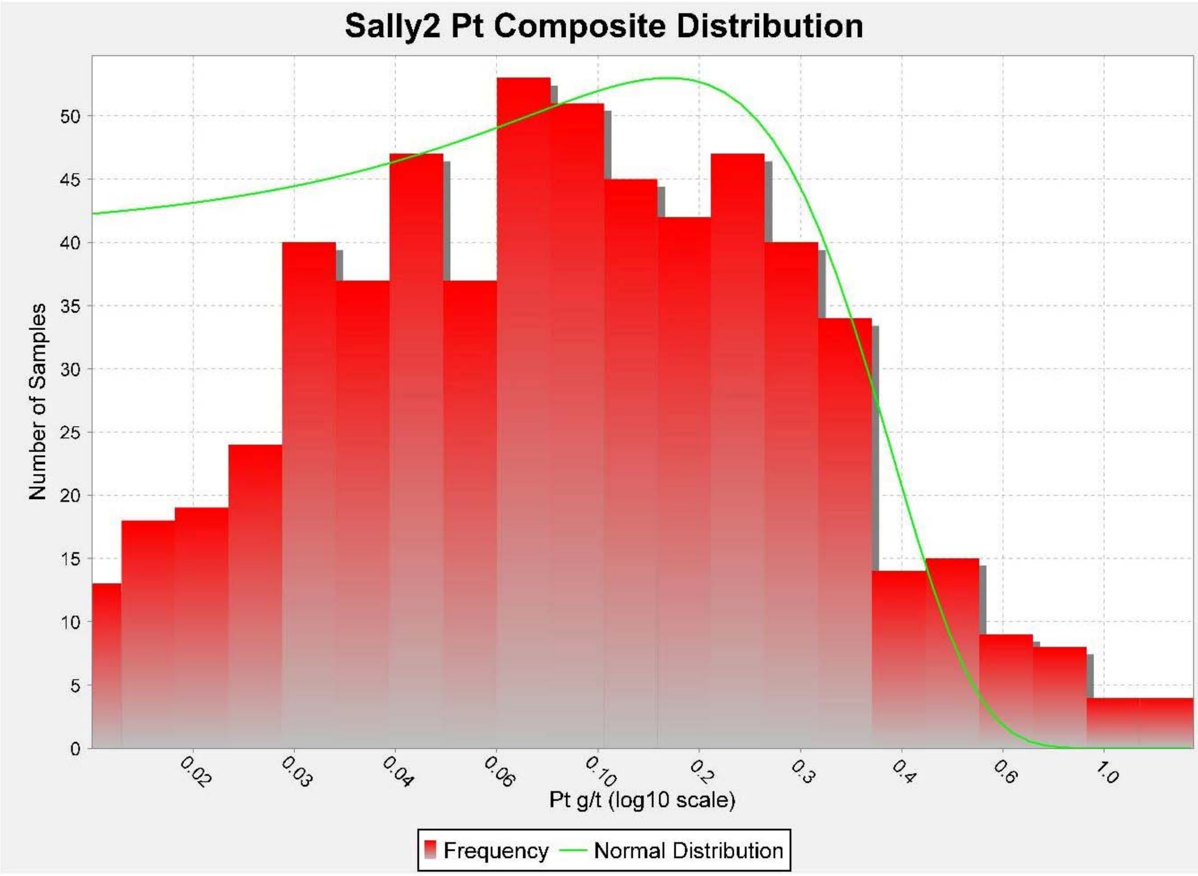


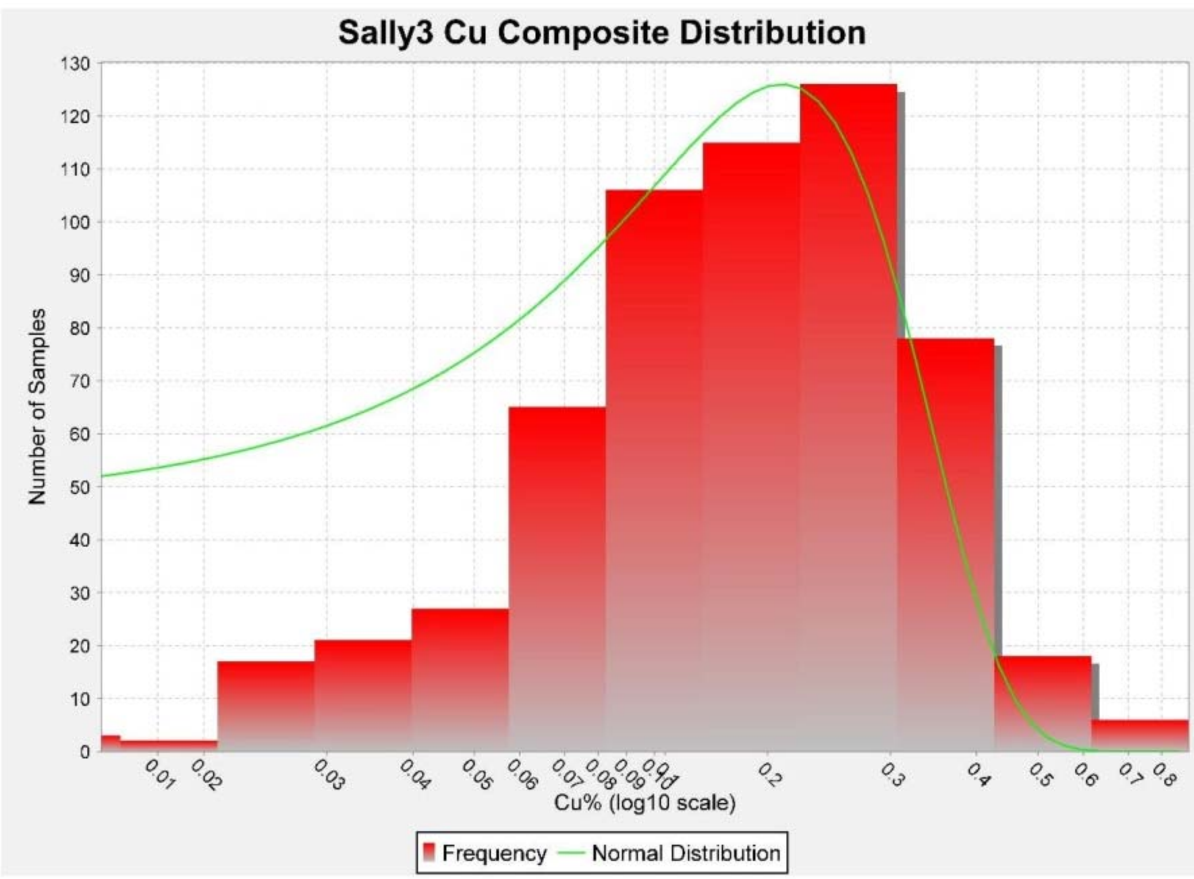

Sally1 Pd Composite Distribution
Number of Samples
Pd g/t (log10 scale)
Frequency
Normal Distribution

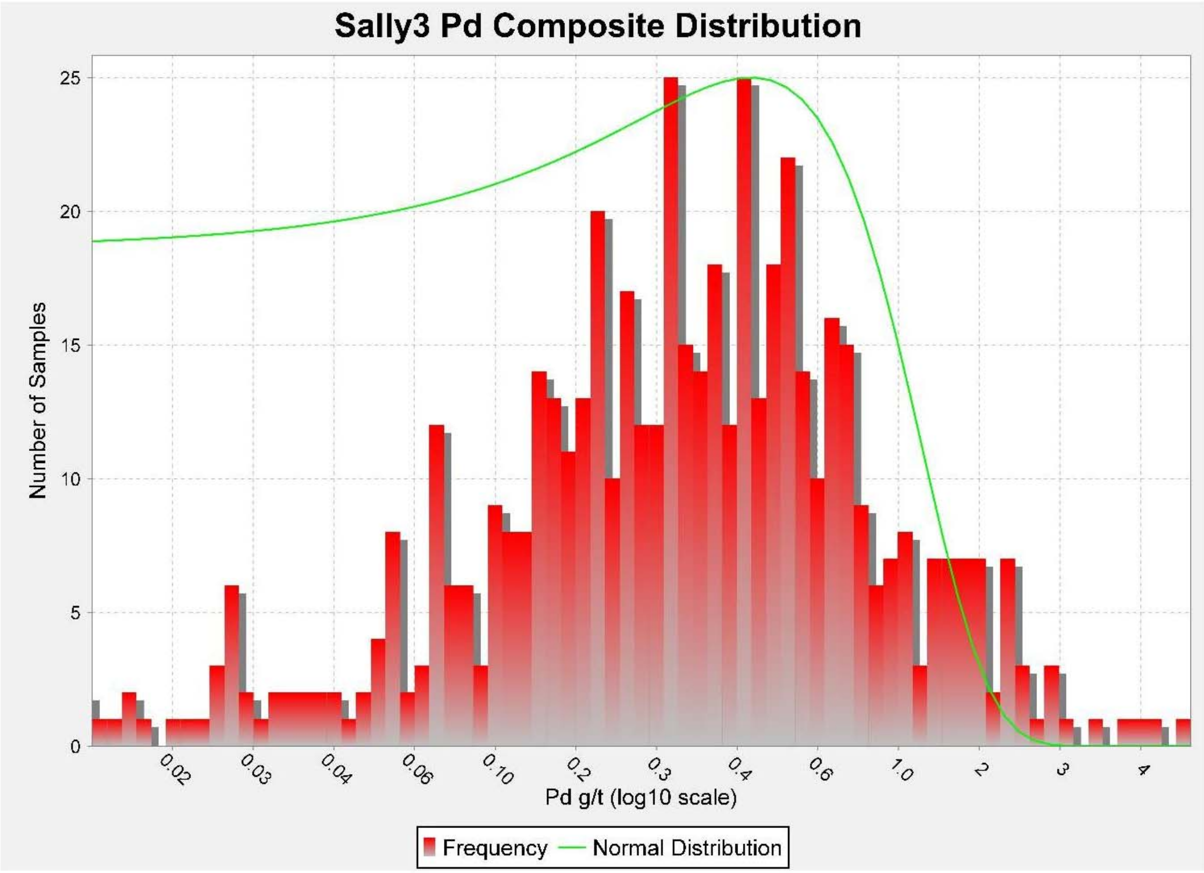

Sally1 Pt Composite Distribution
Number of Samples
Pt g/t (log10 scale)
Frequency
Normal Distribution

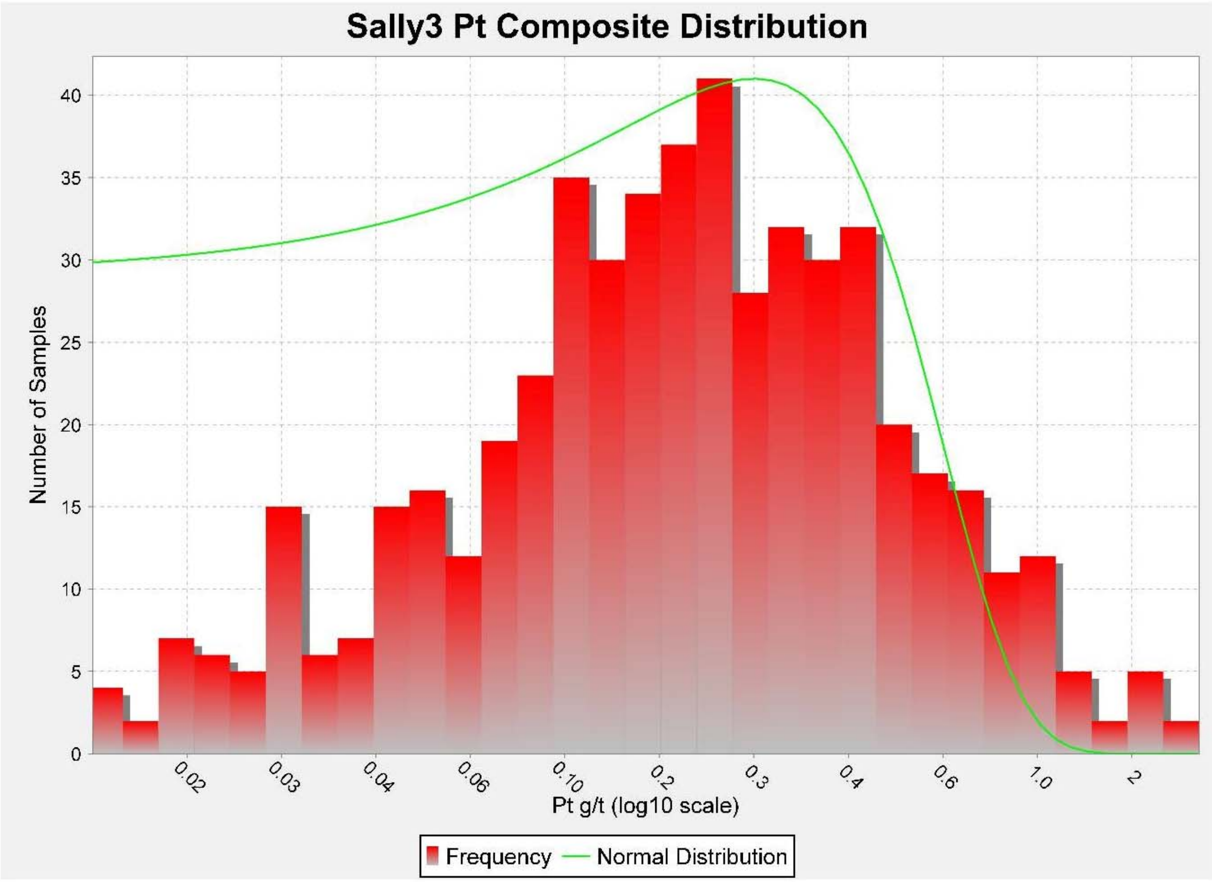

Sally2 Cu Composite Distribution
Number of Samples
Cu% (log10 scale)
Frequency
Normal Distribution

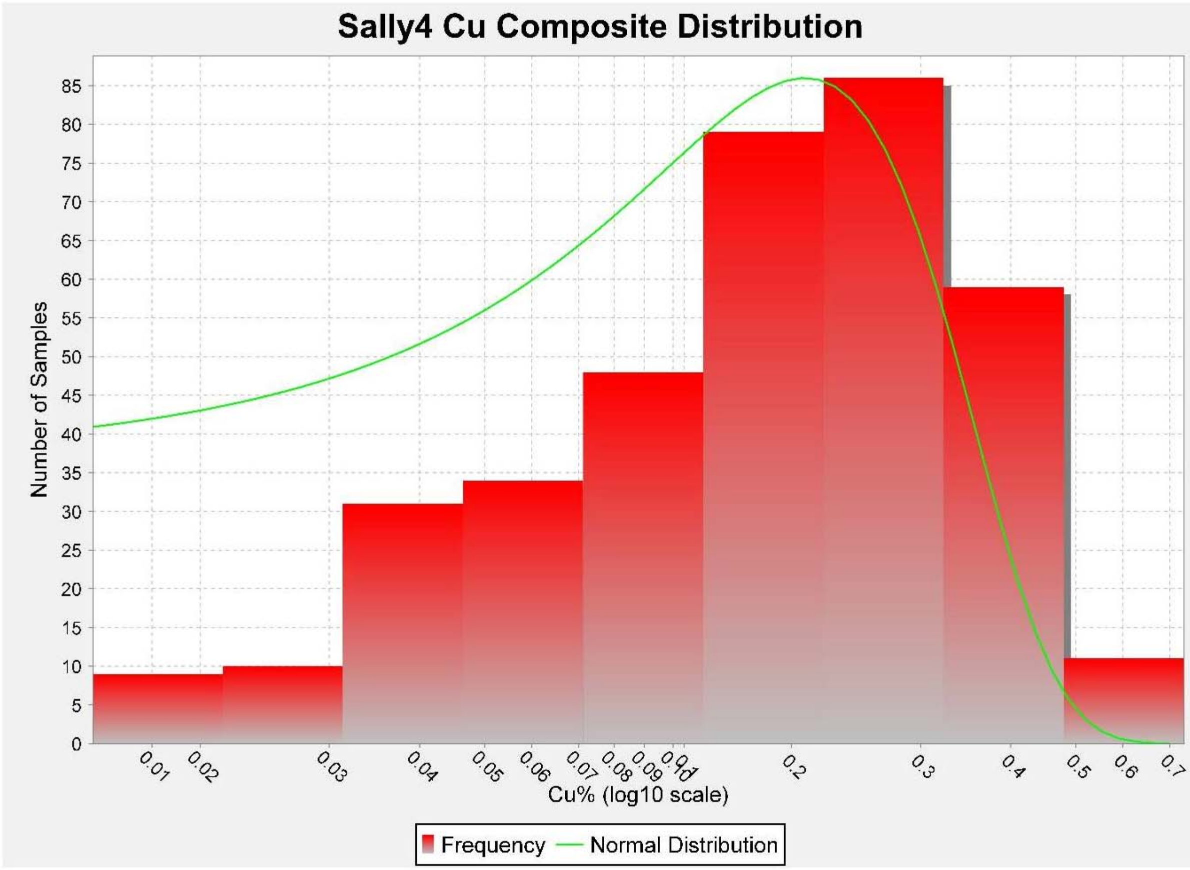

Sally2 Pd Composite Distribution
Number of Samples
Pd g/t (log10 scale)
Frequency
Normal Distribution

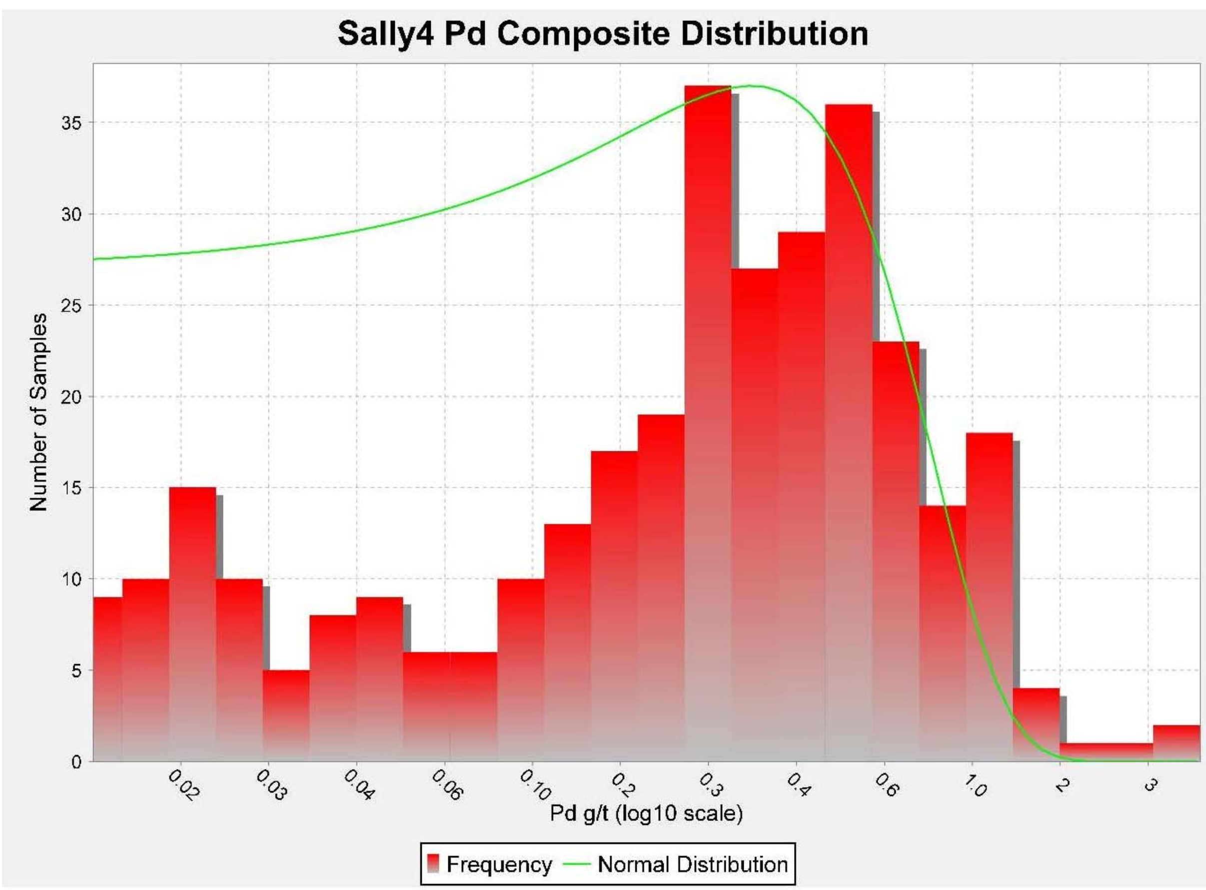

Sally2 Pt Composite Distribution
Number of Samples
0
5
10
15
20
25
30
35
40
45
50
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
Pt g/t (log10 scale)
Frequency
Normal Distribution

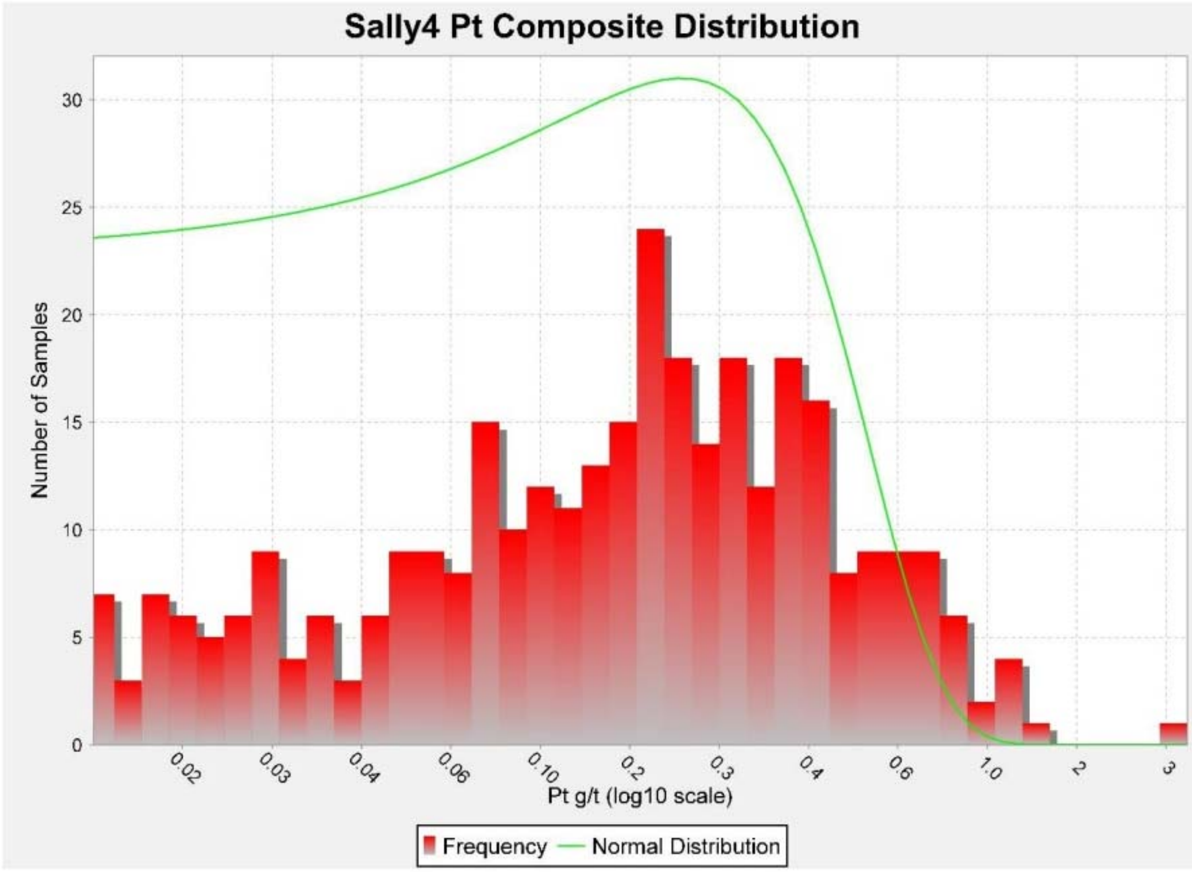

Sally3 Cu Composite Distribution
Number of Samples
0
10
20
30
40
50
60
70
80
90
100
110
120
130
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Cu% (log10 scale)
Frequency
Normal Distribution

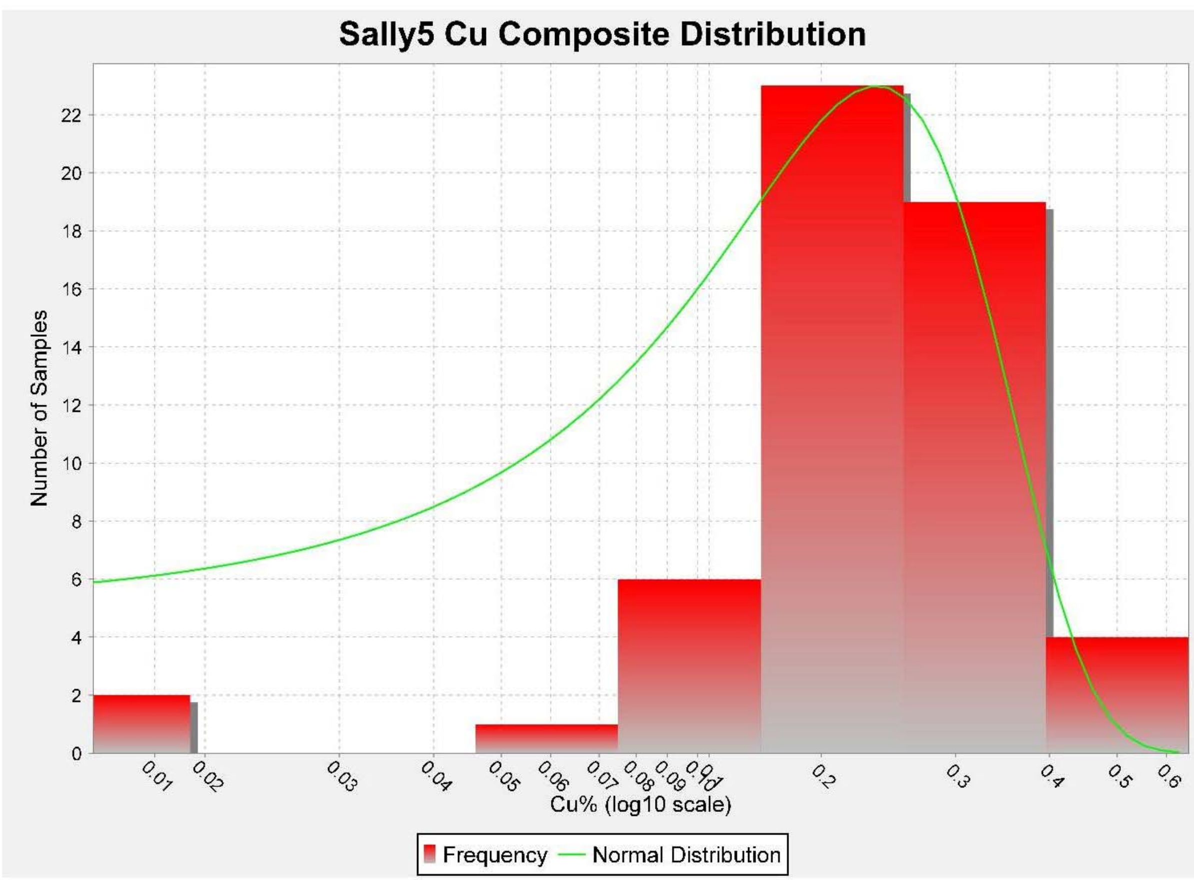

Sally3 Pd Composite Distribution
Number of Samples
0
5
10
15
20
25
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
2
3
4
Pd g/t (log10 scale)
Frequency
Normal Distribution

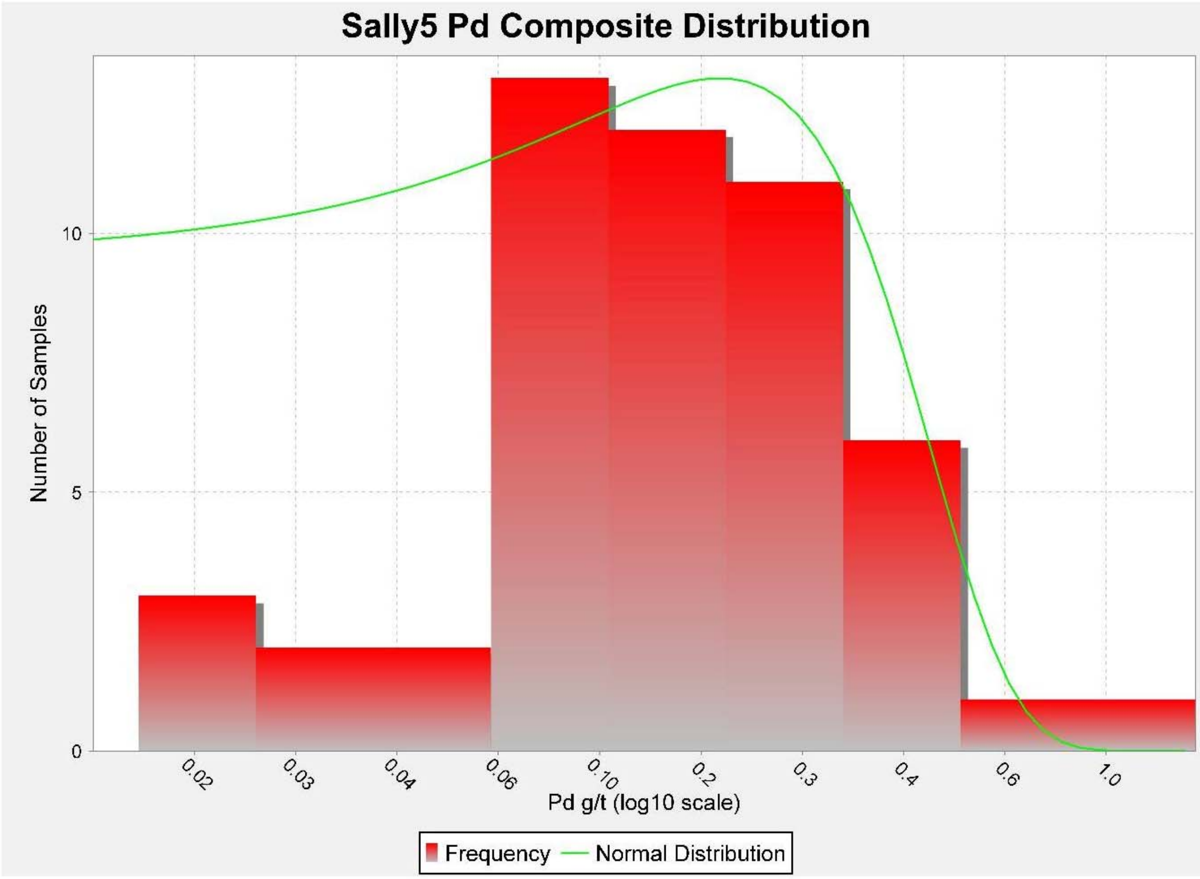

Sally3 Pt Composite Distribution
Number of Samples
0
5
10
15
20
25
30
35
40
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
2
Pt g/t (log10 scale)
Frequency
Normal Distribution

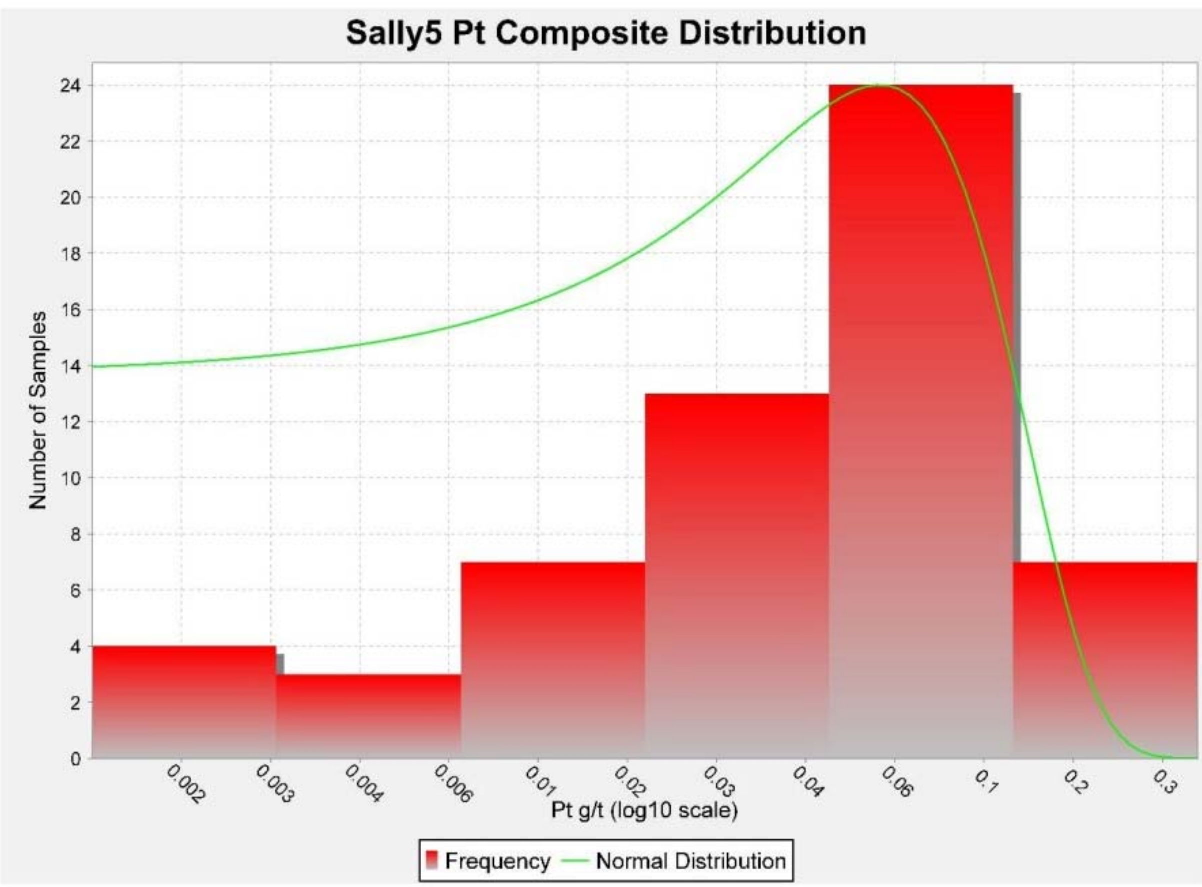

Sally4 Cu Composite Distribution
Number of Samples
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.2
0.3
0.4
0.5
0.6
0.7
Cu% (log10 scale)
Frequency
Normal Distribution


Sally4 Pd Composite Distribution
Number of Samples
0
5
10
15
20
25
30
35
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
2
3
Pd g/t (log10 scale)
Frequency
Normal Distribution

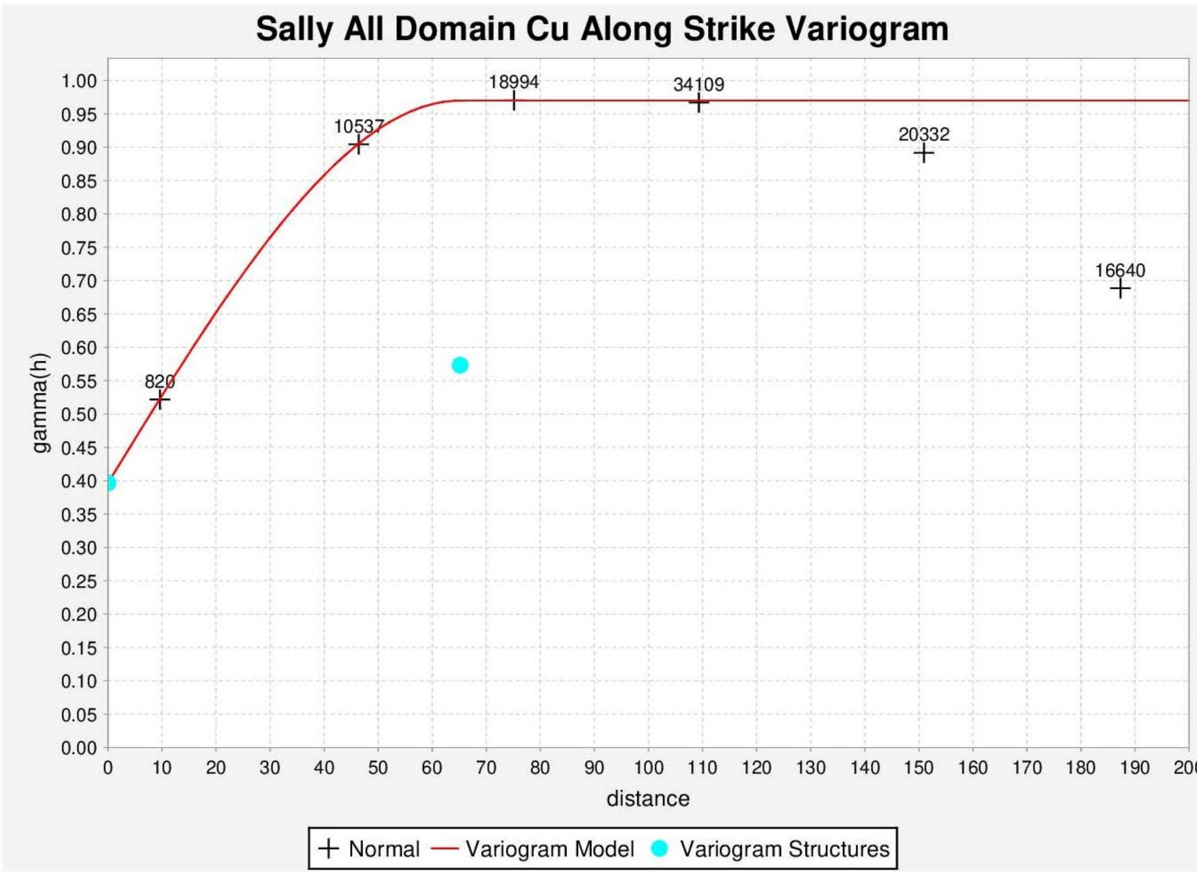

Sally4 Pt Composite Distribution
Number of Samples
0
5
10
15
20
25
30
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
2
3
Pt g/t (log10 scale)
Frequency
Normal Distribution

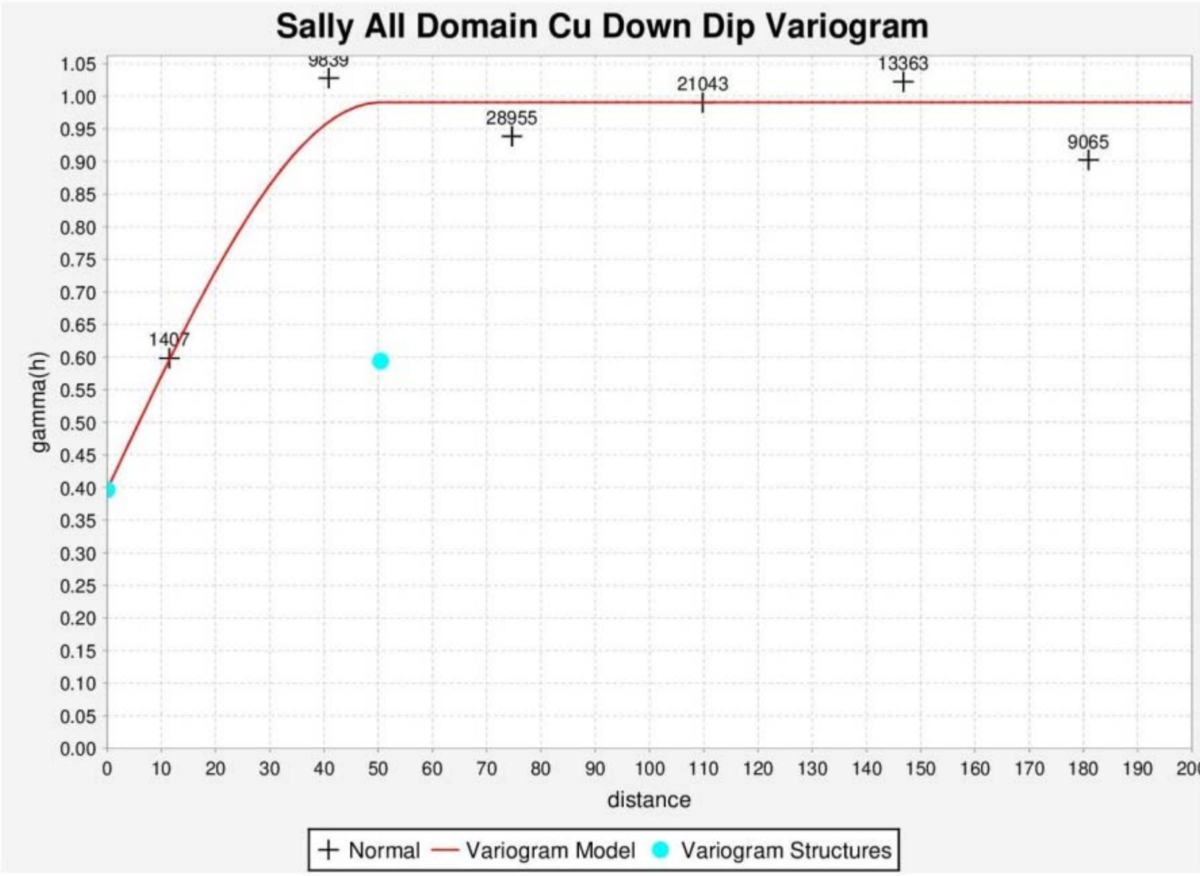

Sally5 Cu Composite Distribution
Number of Samples
0
2
4
6
8
10
12
14
16
18
20
22
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.2
0.3
0.4
0.5
0.6
Cu% (log10 scale)
Frequency
Normal Distribution

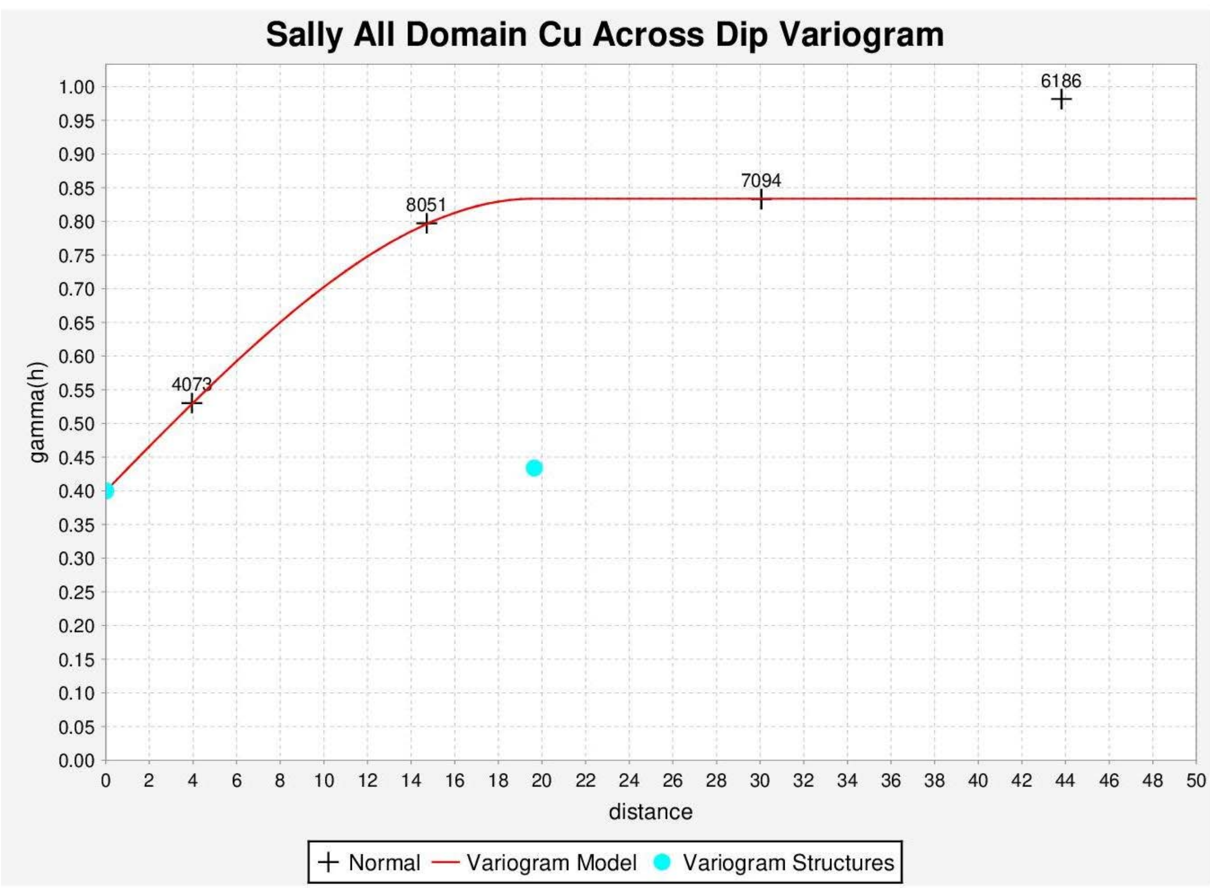

Sally5 Pd Composite Distribution
Number of Samples
0
5
10
0.02
0.03
0.04
0.06
0.10
0.2
0.3
0.4
0.6
1.0
Pd g/t (log10 scale)
Frequency
Normal Distribution

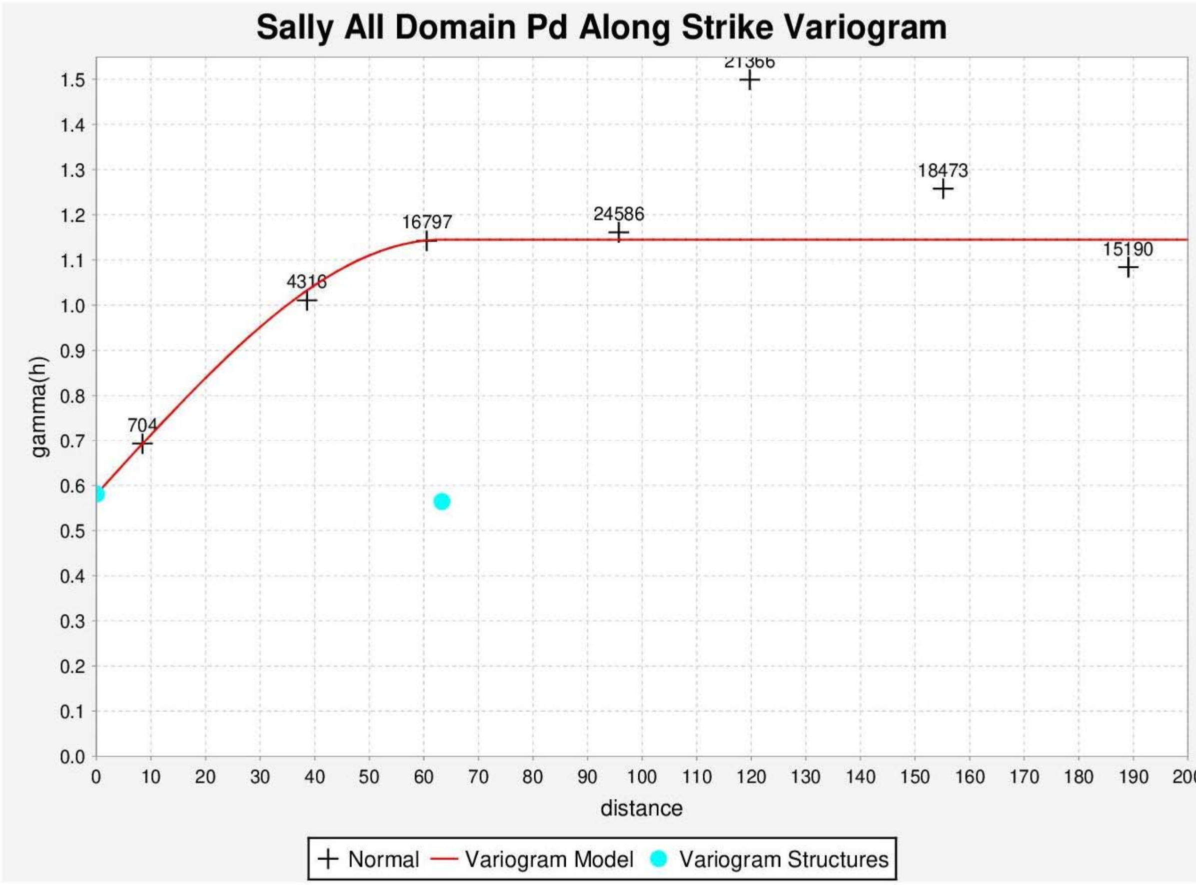

Sally5 Pt Composite Distribution
Number of Samples
0
2
4
6
8
10
12
14
16
18
20
22
24
0.002
0.003
0.004
0.006
0.01
0.02
0.03
0.04
0.06
0.1
0.2
0.3
Pt g/t (log10 scale)
Frequency
Normal Distribution

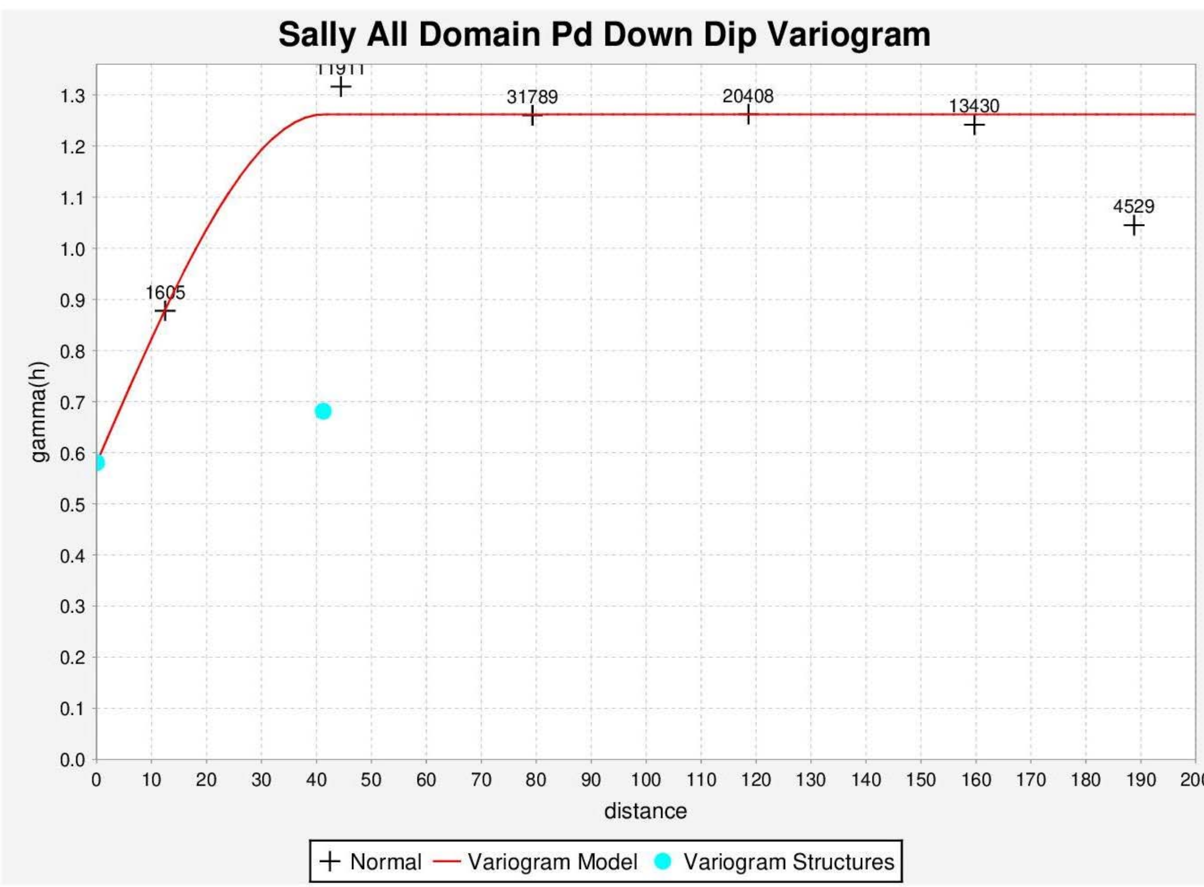
APPENDIX W SALLY VARIOGRAMS

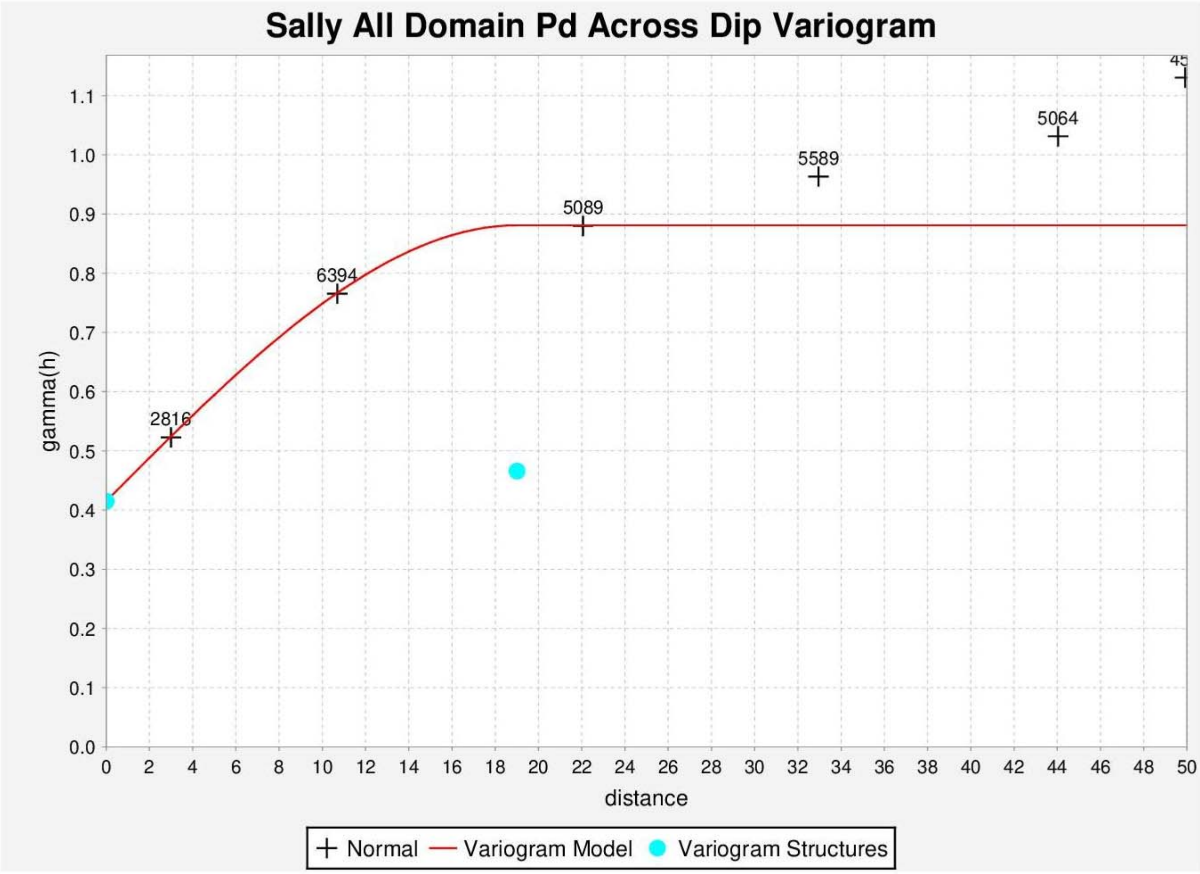



Sally All Domain Cu Down Dip Variogram
gamma(h)
distance
9839
13363
21043
28955
9065
1407
Normal
Variogram Model
Variogram Structures

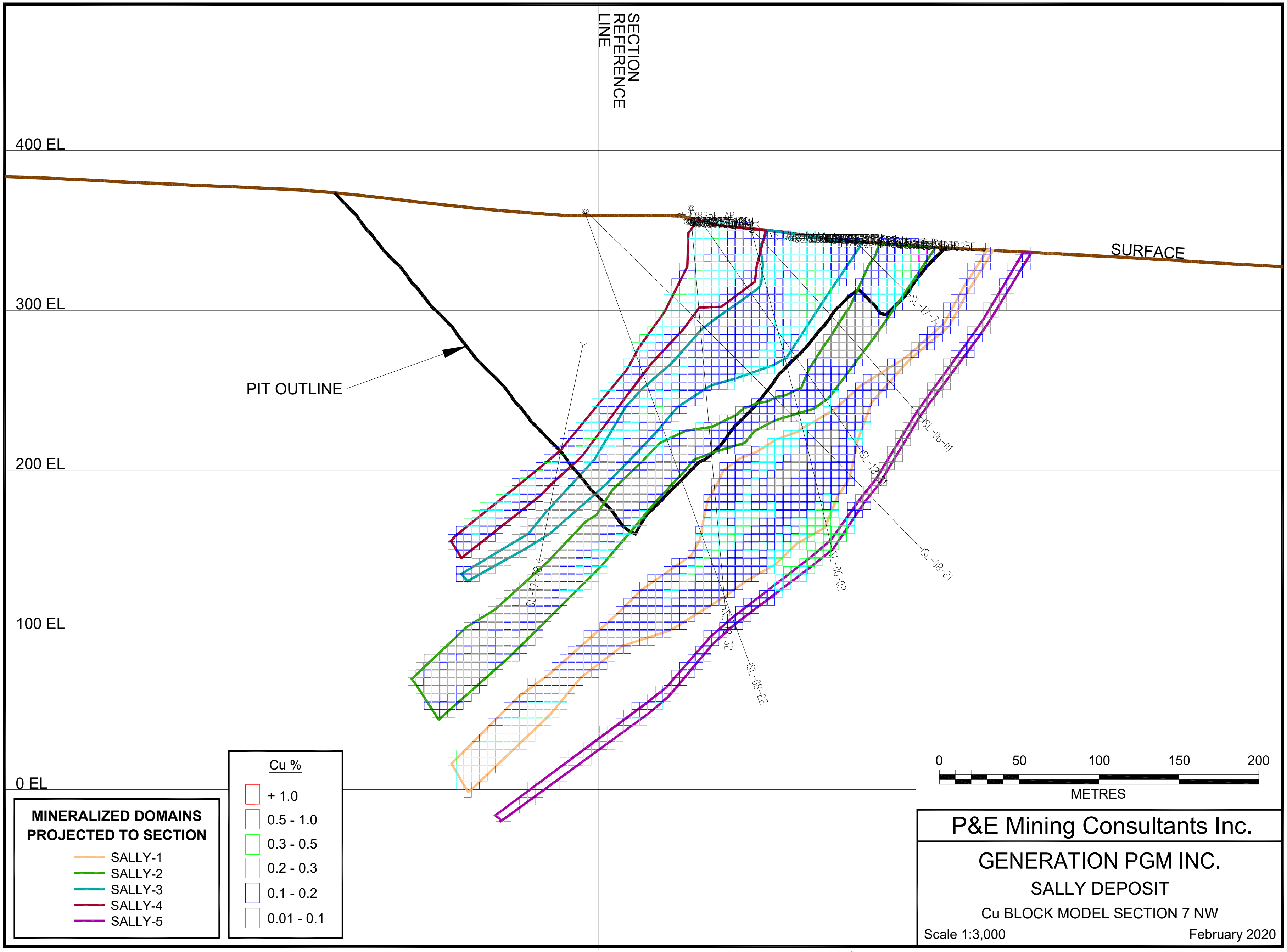

Sally All Domain Cu Across Dip Variogram
gamma(h)
distance
6186
7094
8051
4073
Normal
Variogram Model
Variogram Structures

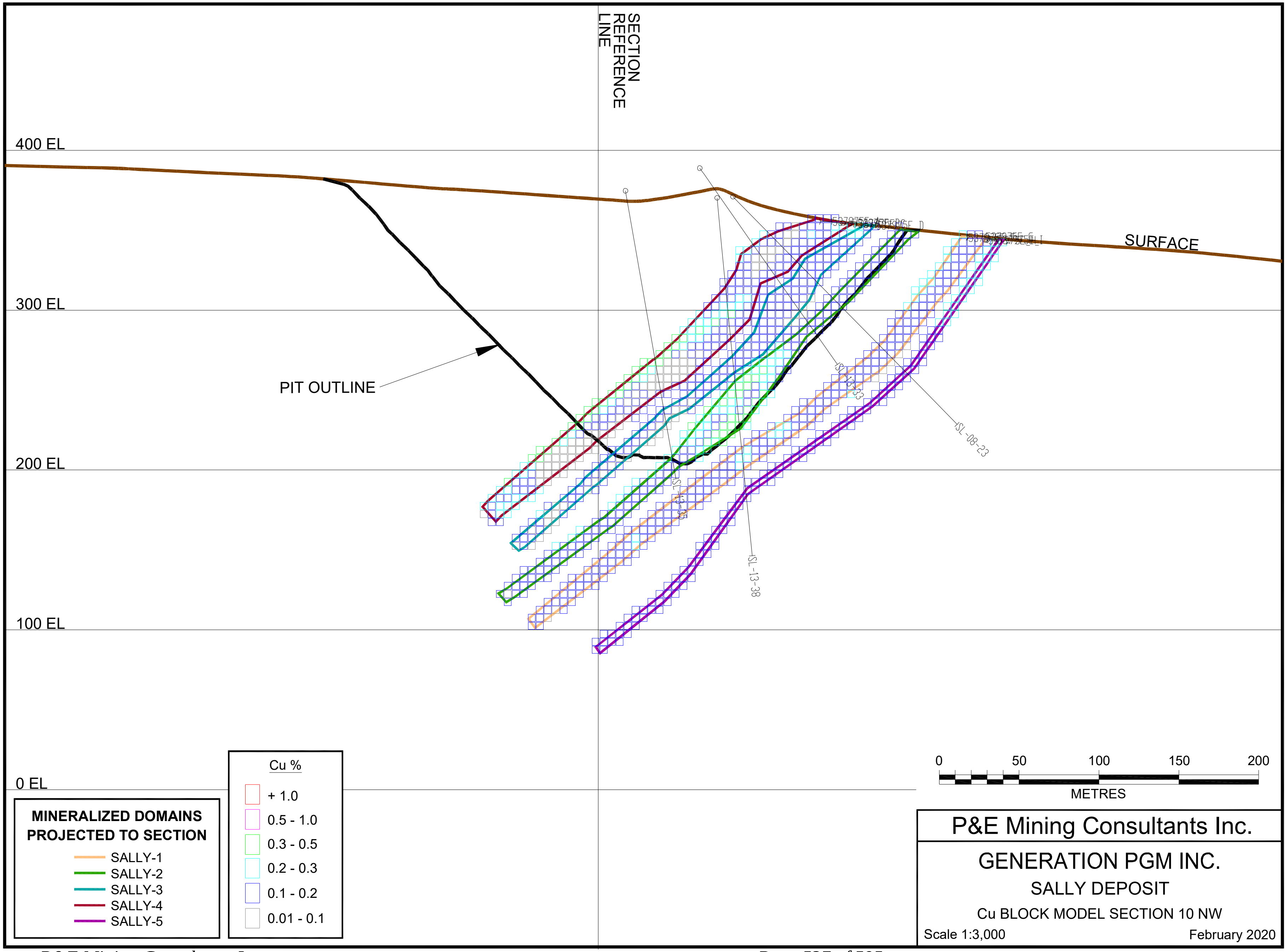

Sally All Domain Pd Along Strike Variogram
gamma(h)
distance
21366
18473
24586
16797
15190
4316
704
Normal
Variogram Model
Variogram Structures


Sally All Domain Pd Down Dip Variogram
gamma(h)
distance
11911
31789
20408
13430
4529
1605
Normal
Variogram Model
Variogram Structures

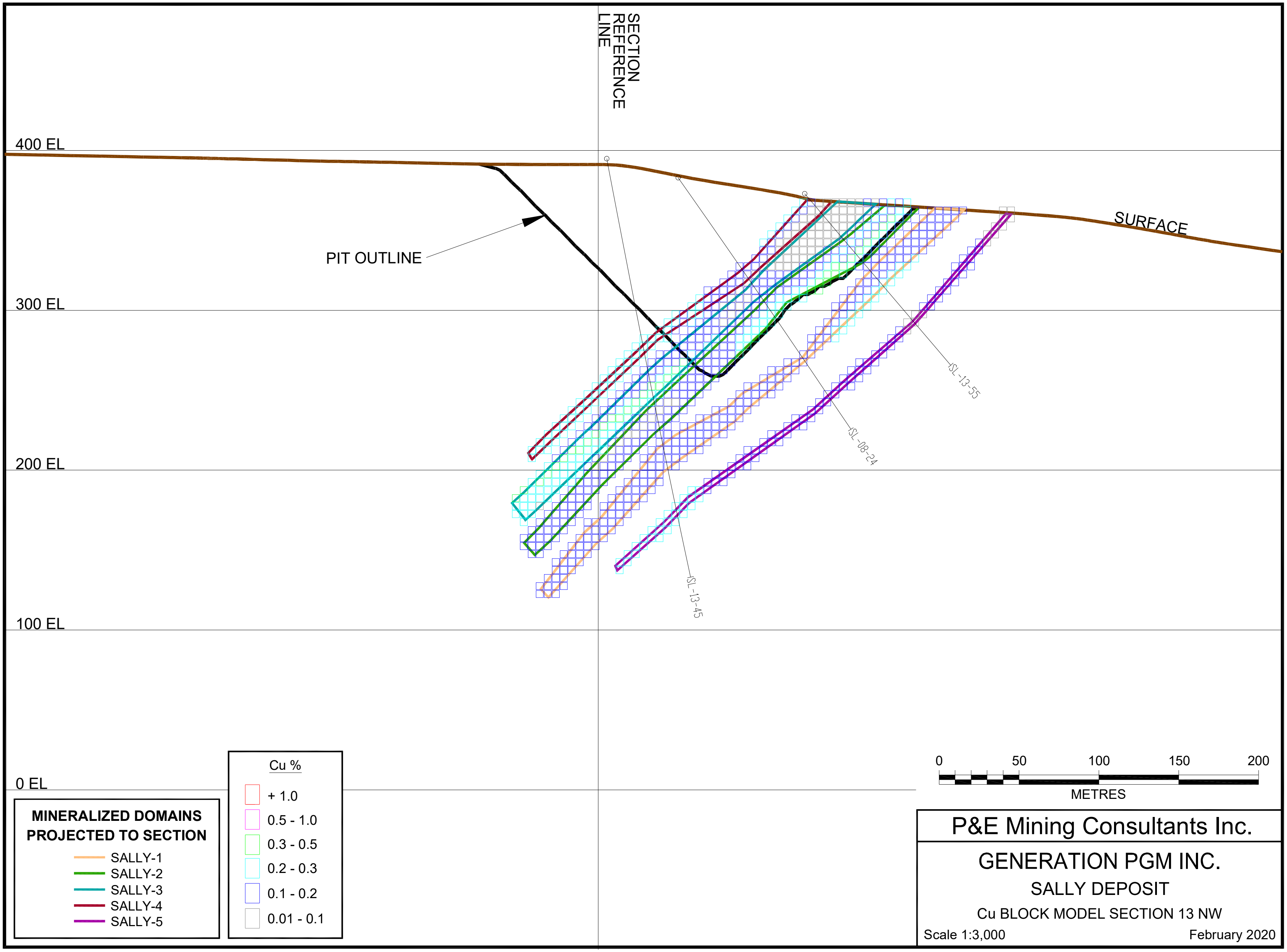

Sally All Domain Pd Across Dip Variogram
gamma(h)
distance
2816
6394
5089
5589
5064
Normal
Variogram Model
Variogram Structures

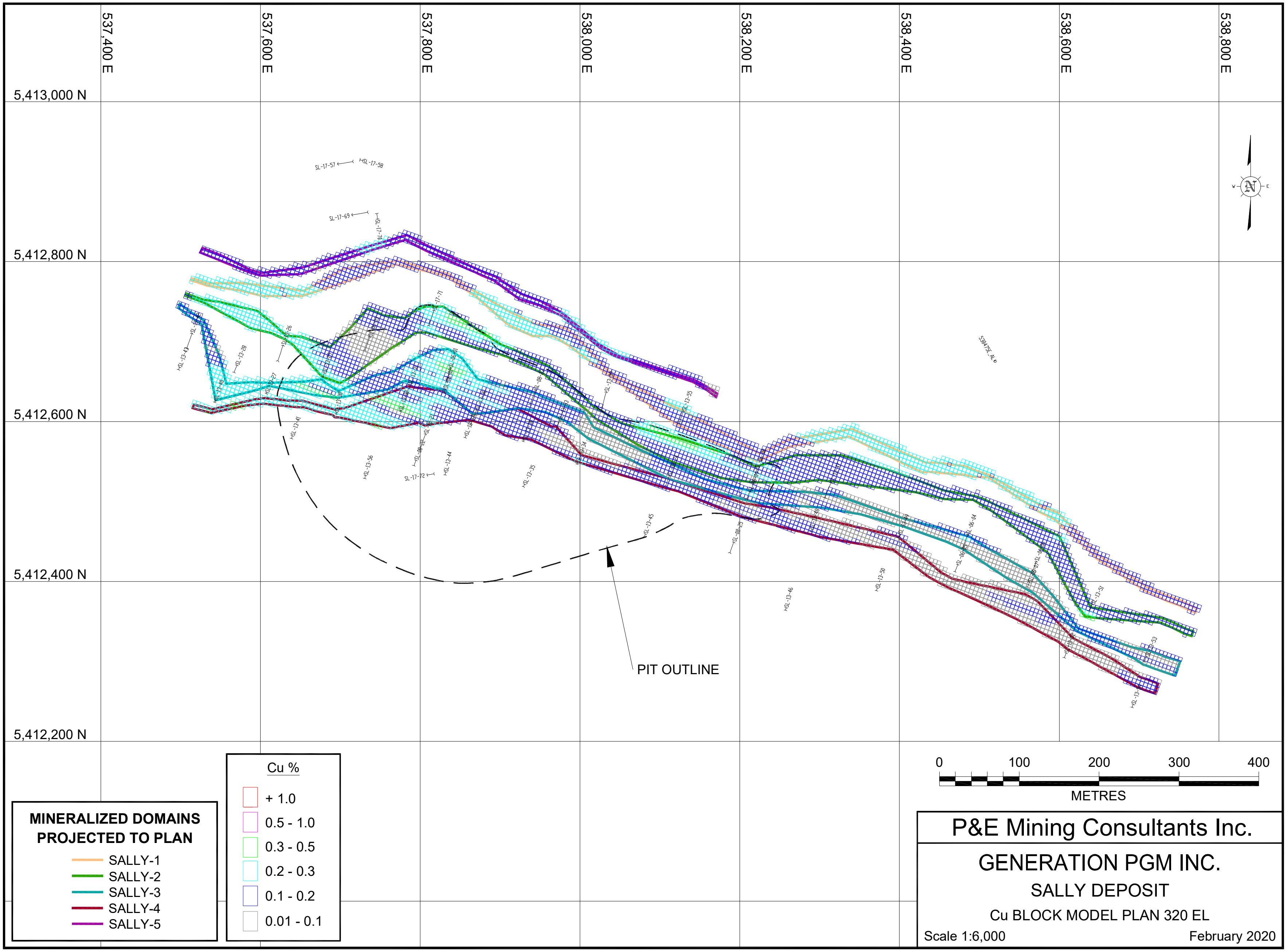
APPENDIX X SALLY CU BLOCK MODEL CROSS SECTIONS AND PLANS

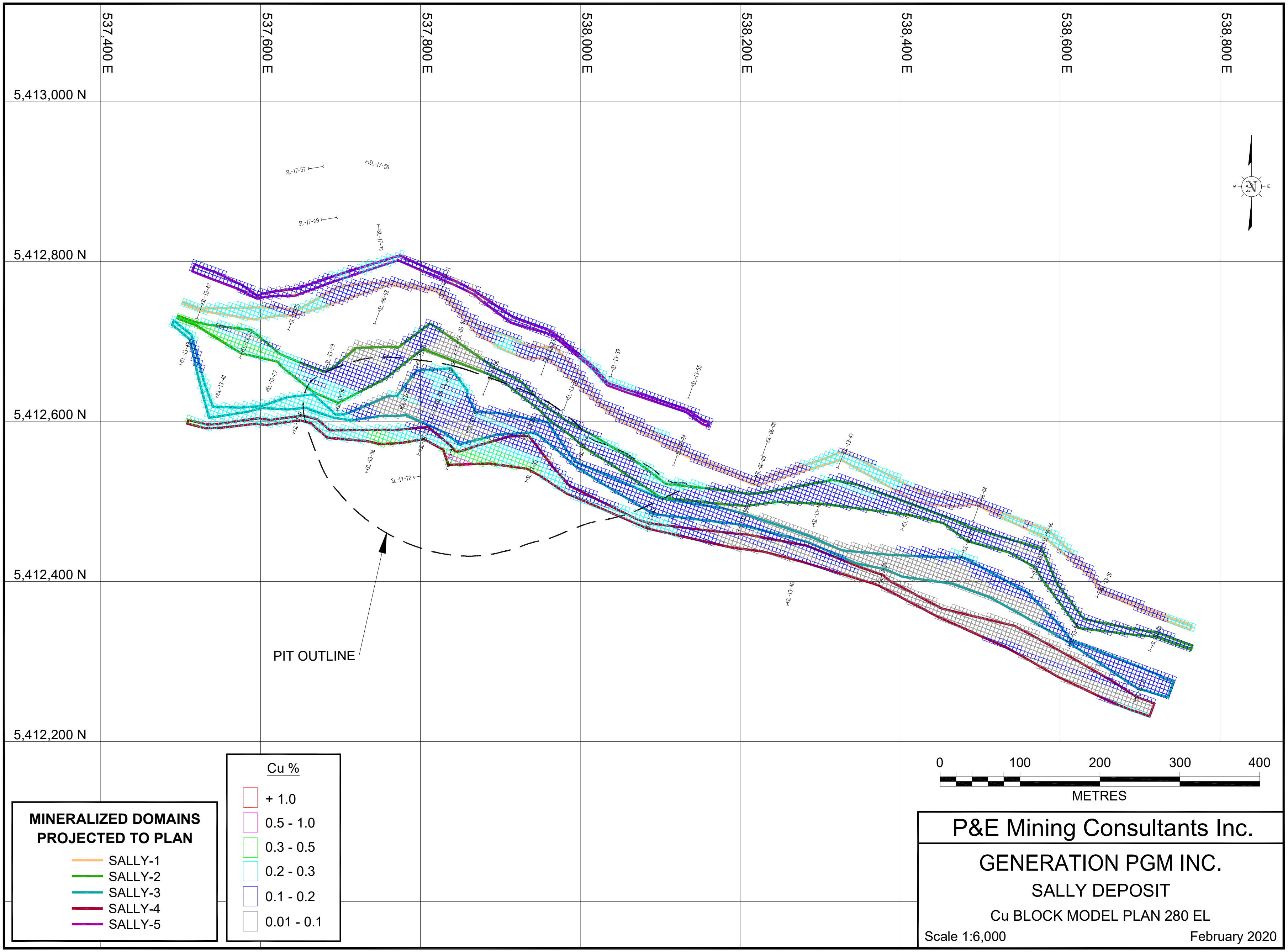

SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL SECTION 7 NW
Scale 1:3,000
February 2020

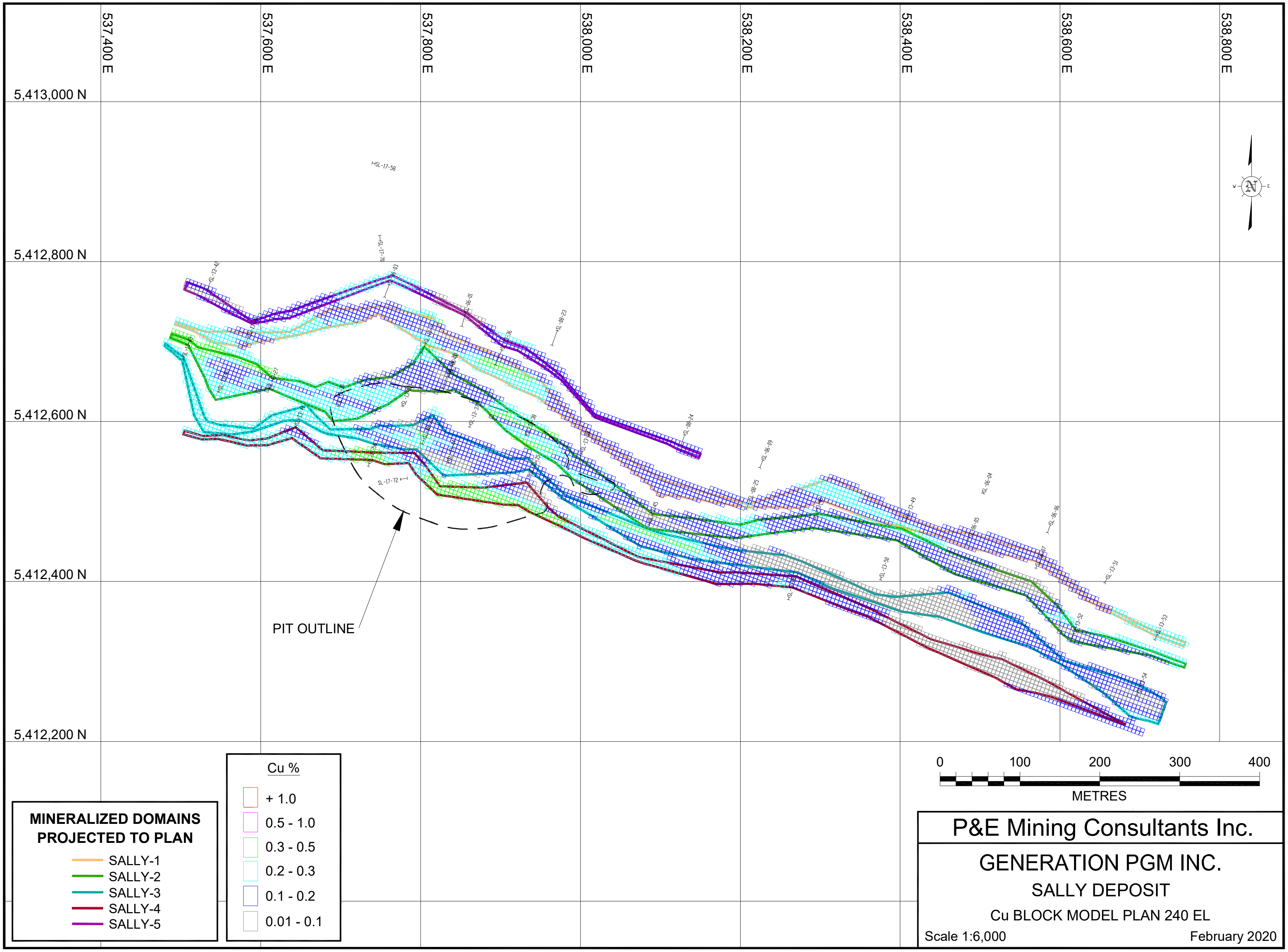


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
ISL-13-33
ISL-08-23
ISL-13-35
ISL-13-38
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL SECTION 10 NW
Scale 1:3,000
February 2020

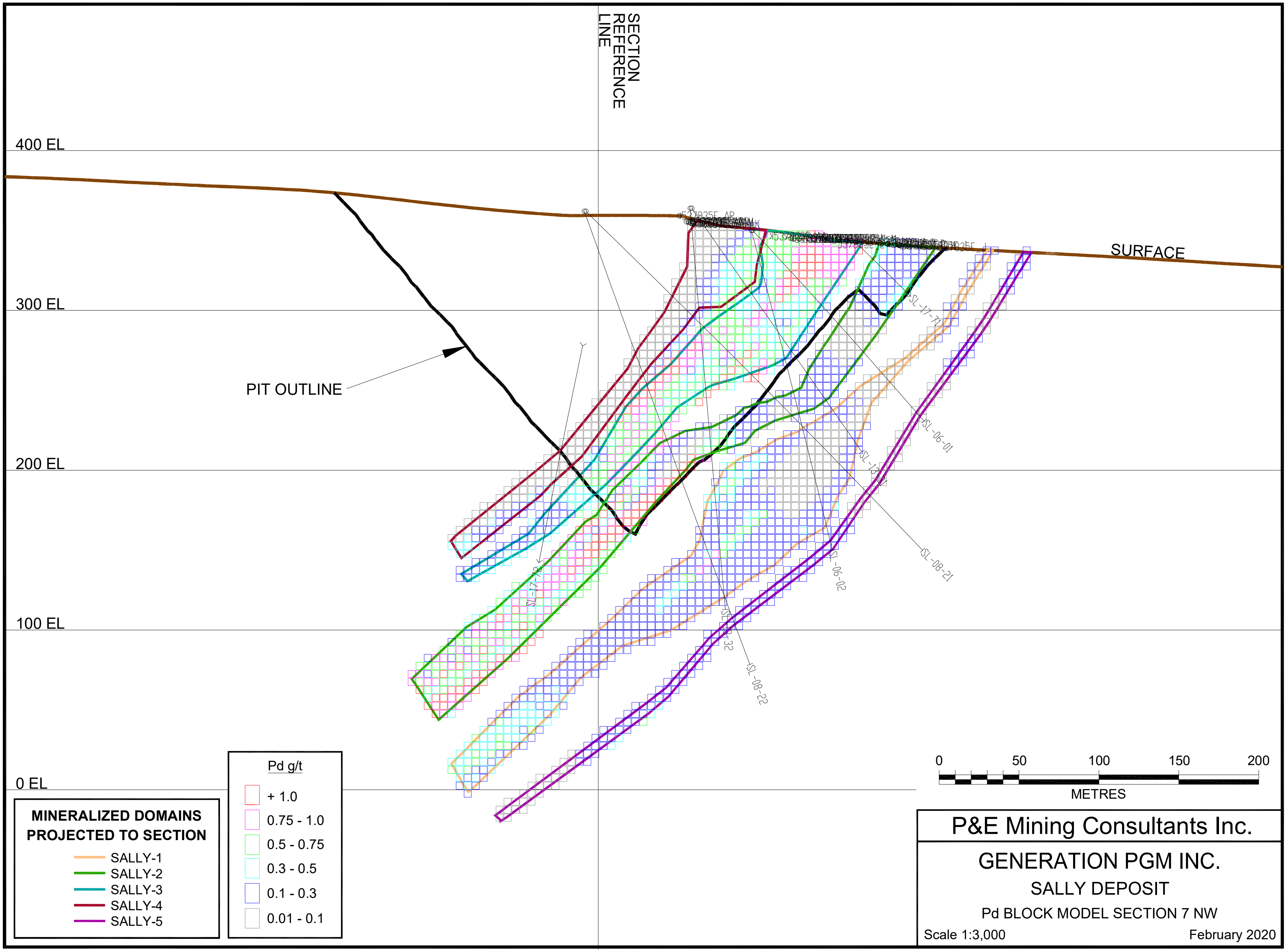

SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
PIT OUTLINE
SURFACE
ISL-13-55
ISL-08-24
ISL-13-45
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL SECTION 13 NW
Scale 1:3,000
February 2020


537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL PLAN 320 EL
Scale 1:6,000
February 2020

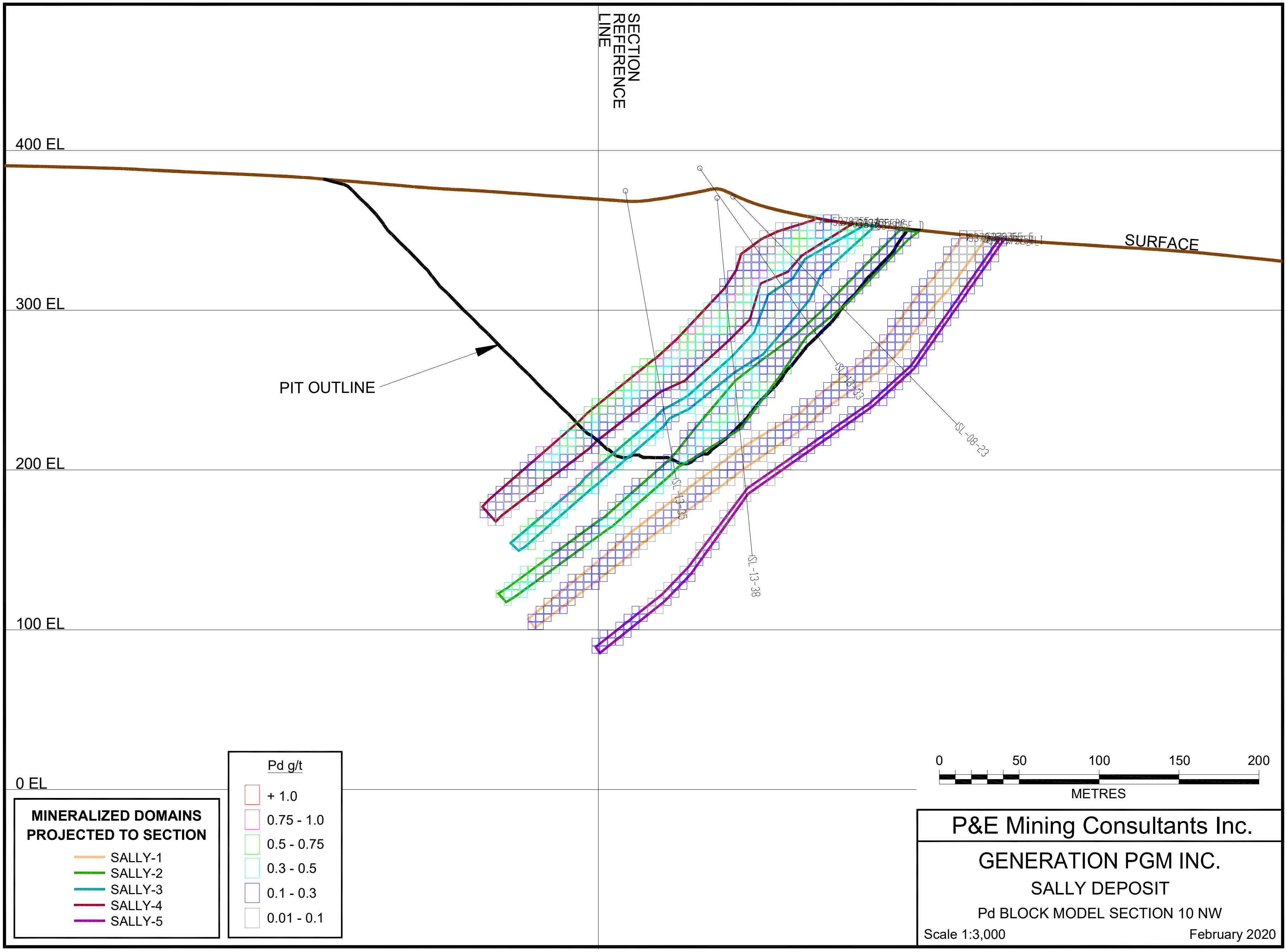

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL PLAN 280 EL
Scale 1:6,000
February 2020

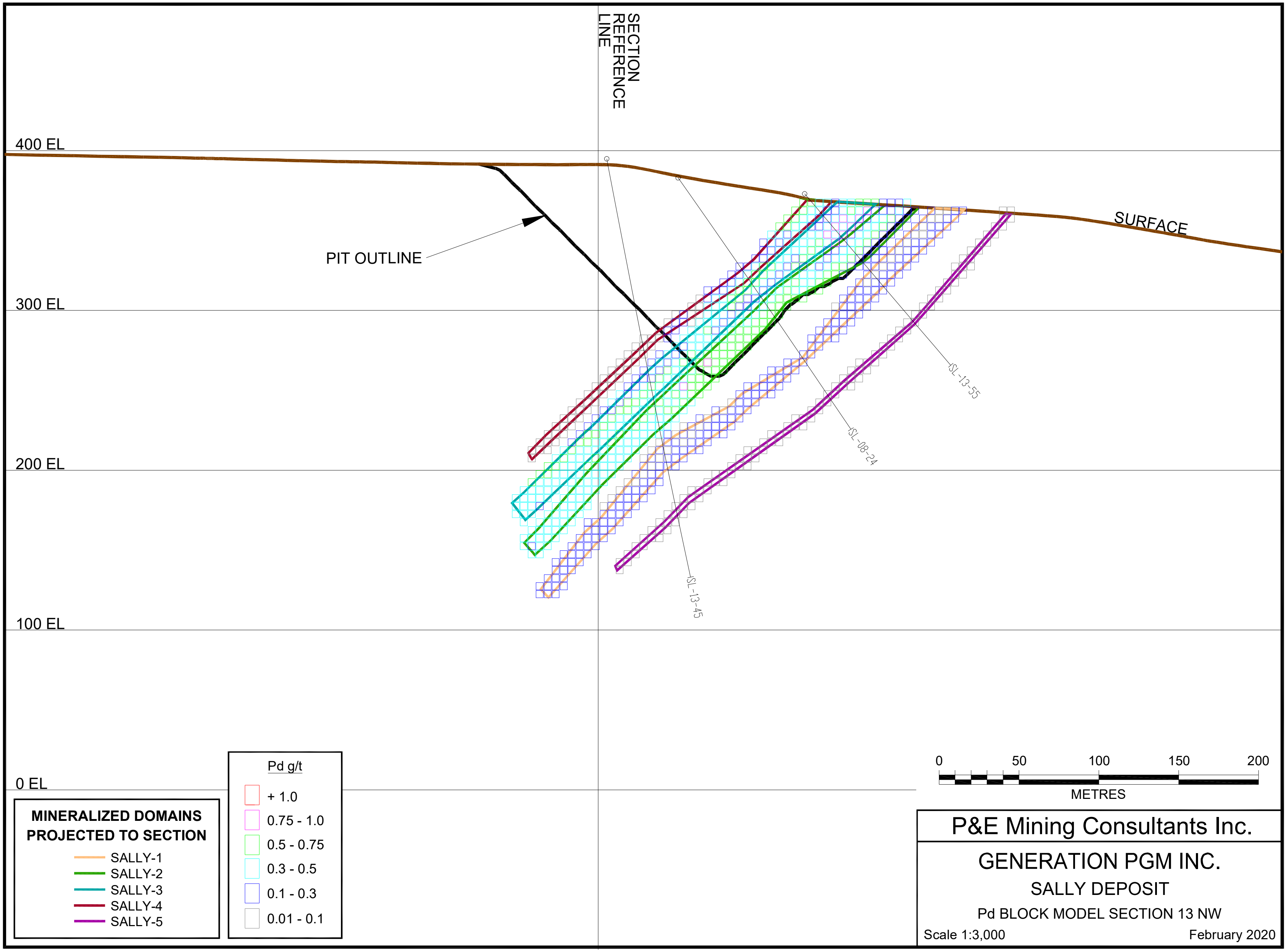

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Cu %
+ 1.0
0.5 - 1.0
0.3 - 0.5
0.2 - 0.3
0.1 - 0.2
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Cu BLOCK MODEL PLAN 240 EL
Scale 1:6,000
February 2020

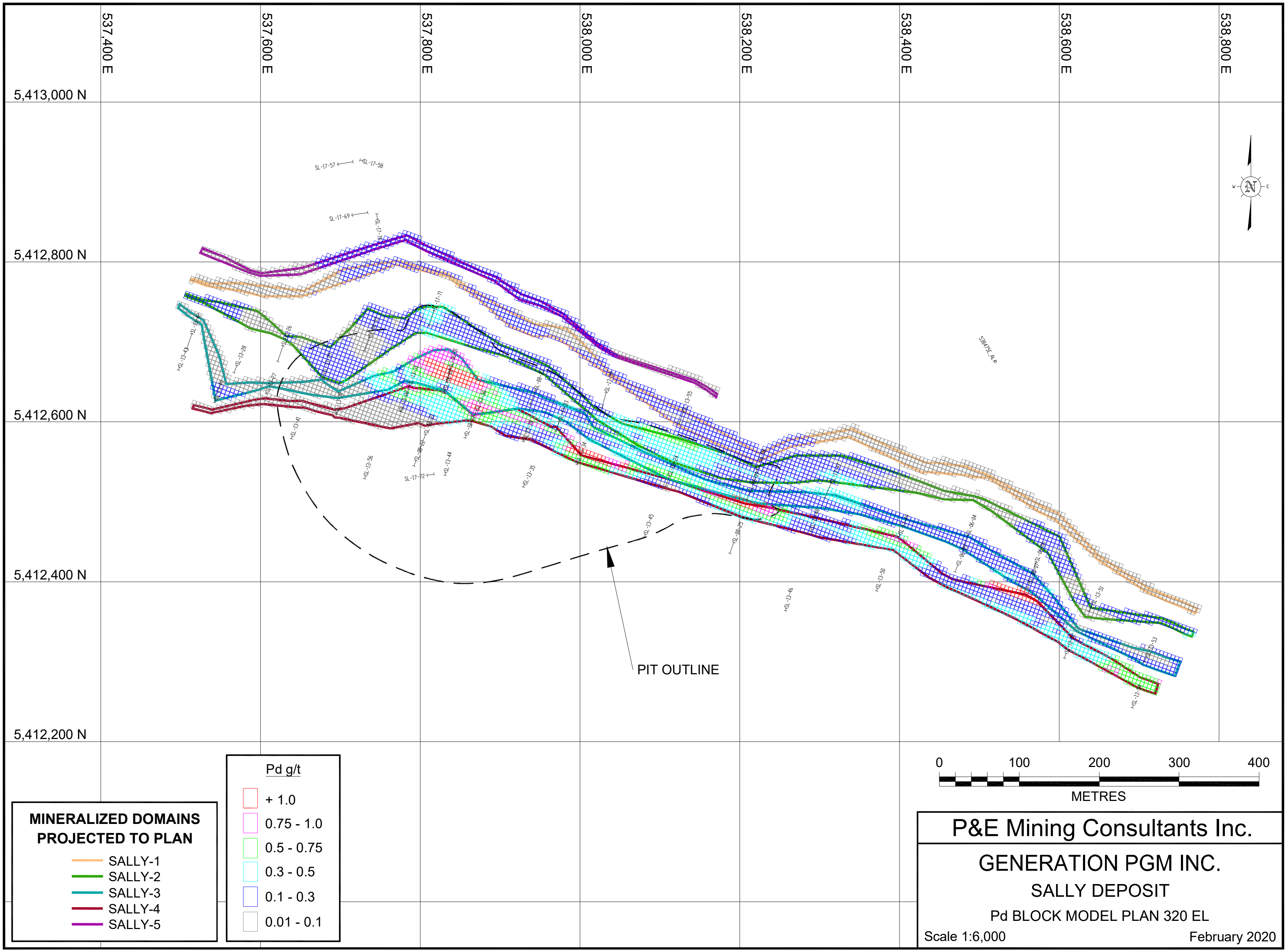
APPENDIX Y SALLY PD BLOCK MODEL CROSS SECTIONS AND PLANS



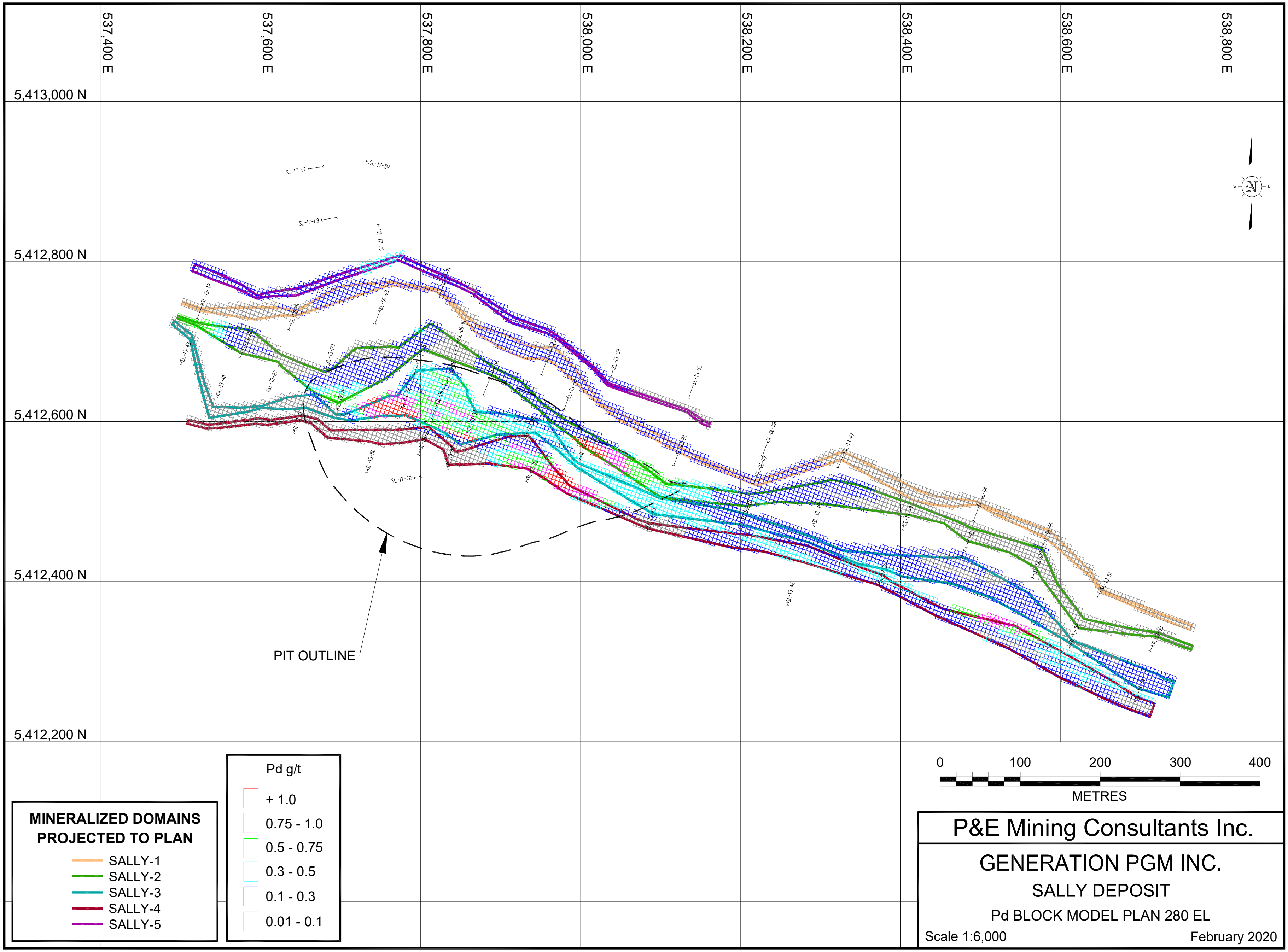
SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL SECTION 7 NW
Scale 1:3,000
February 2020

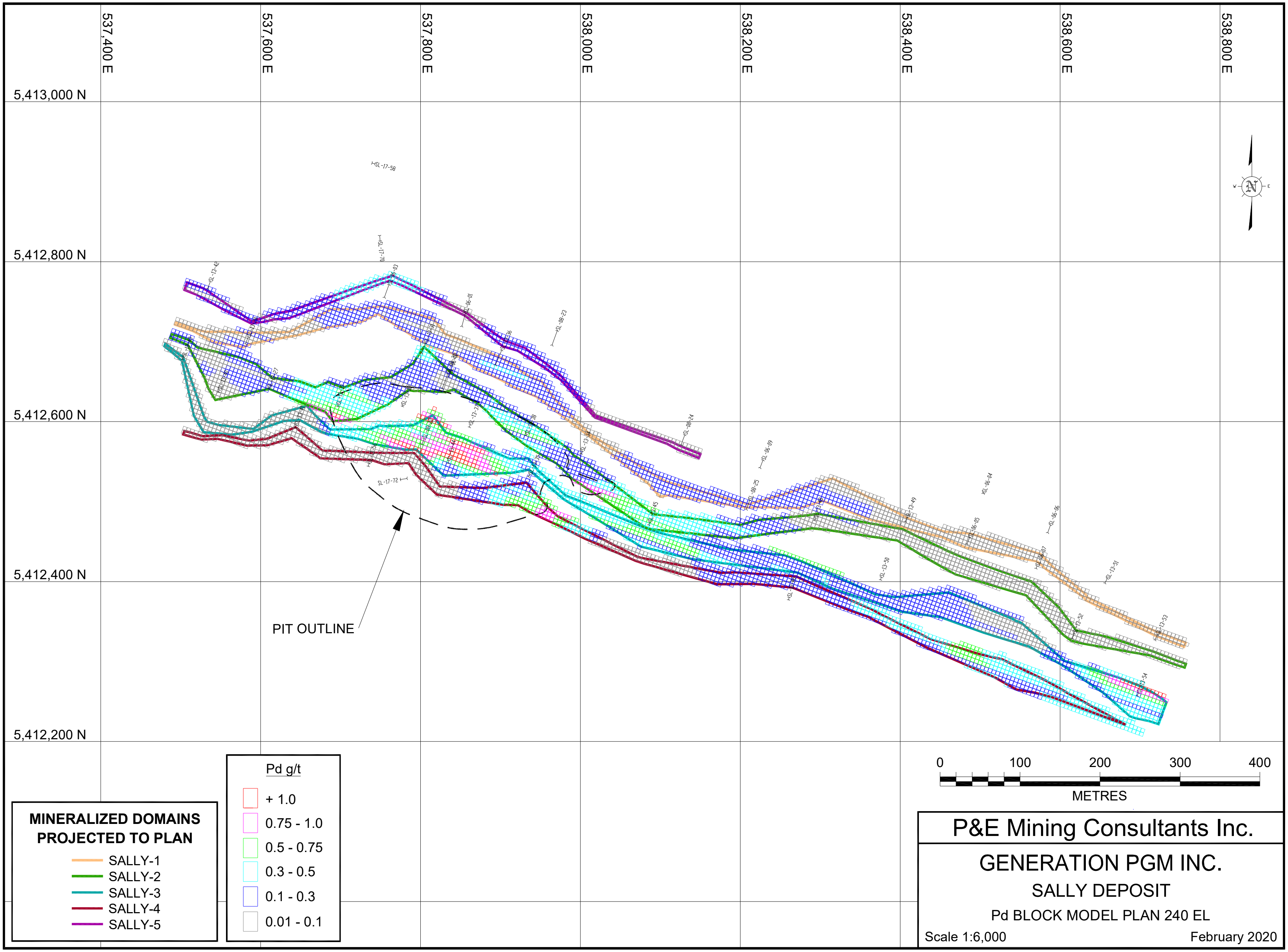

SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
SL-13-33
SL-08-23
SL-13-35
SL-13-38
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL SECTION 10 NW
Scale 1:3,000
February 2020


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
PIT OUTLINE
SURFACE
ISL-13-55
ISL-08-24
ISL-13-45
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL SECTION 13 NW
Scale 1:3,000
February 2020

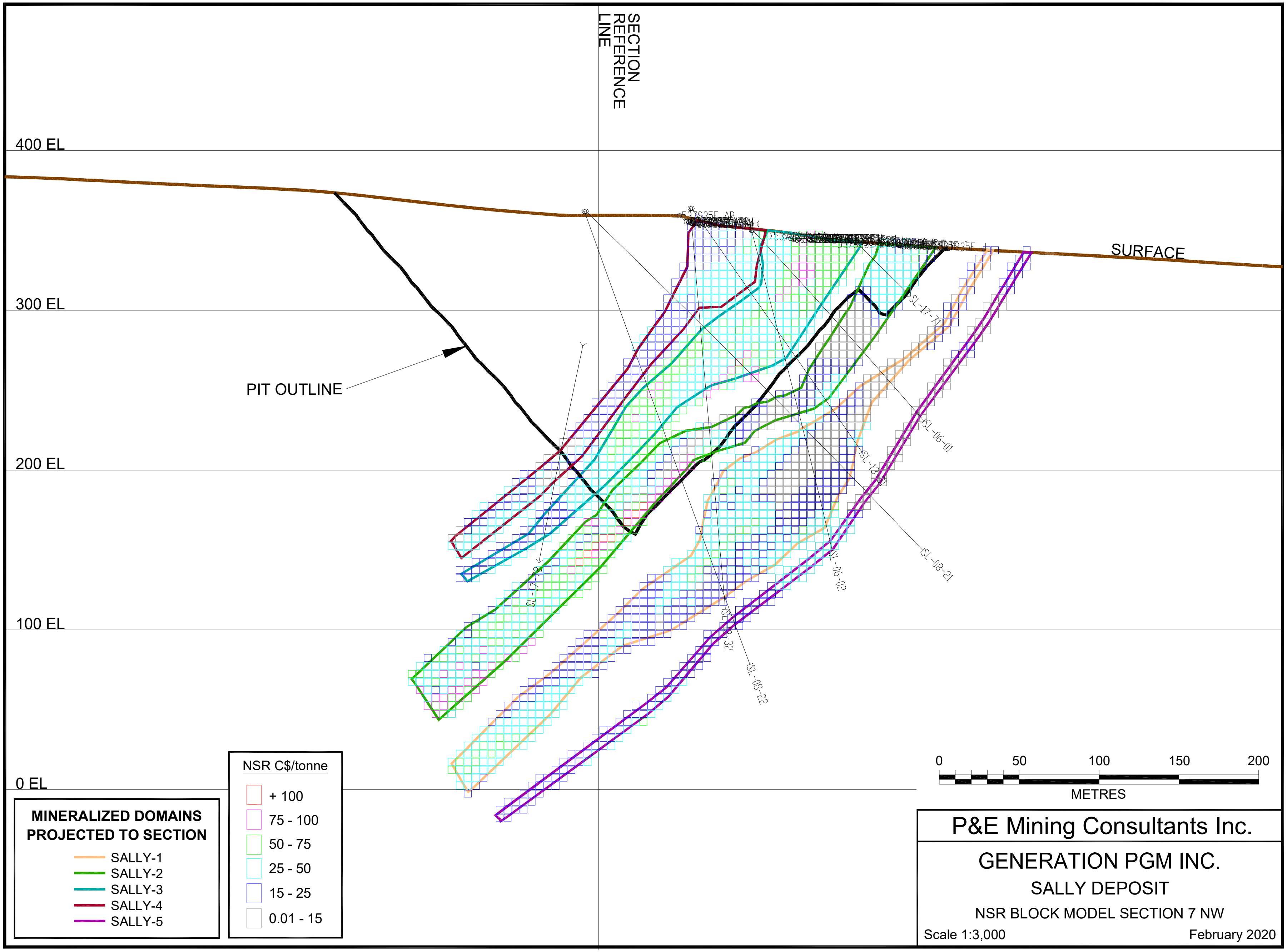


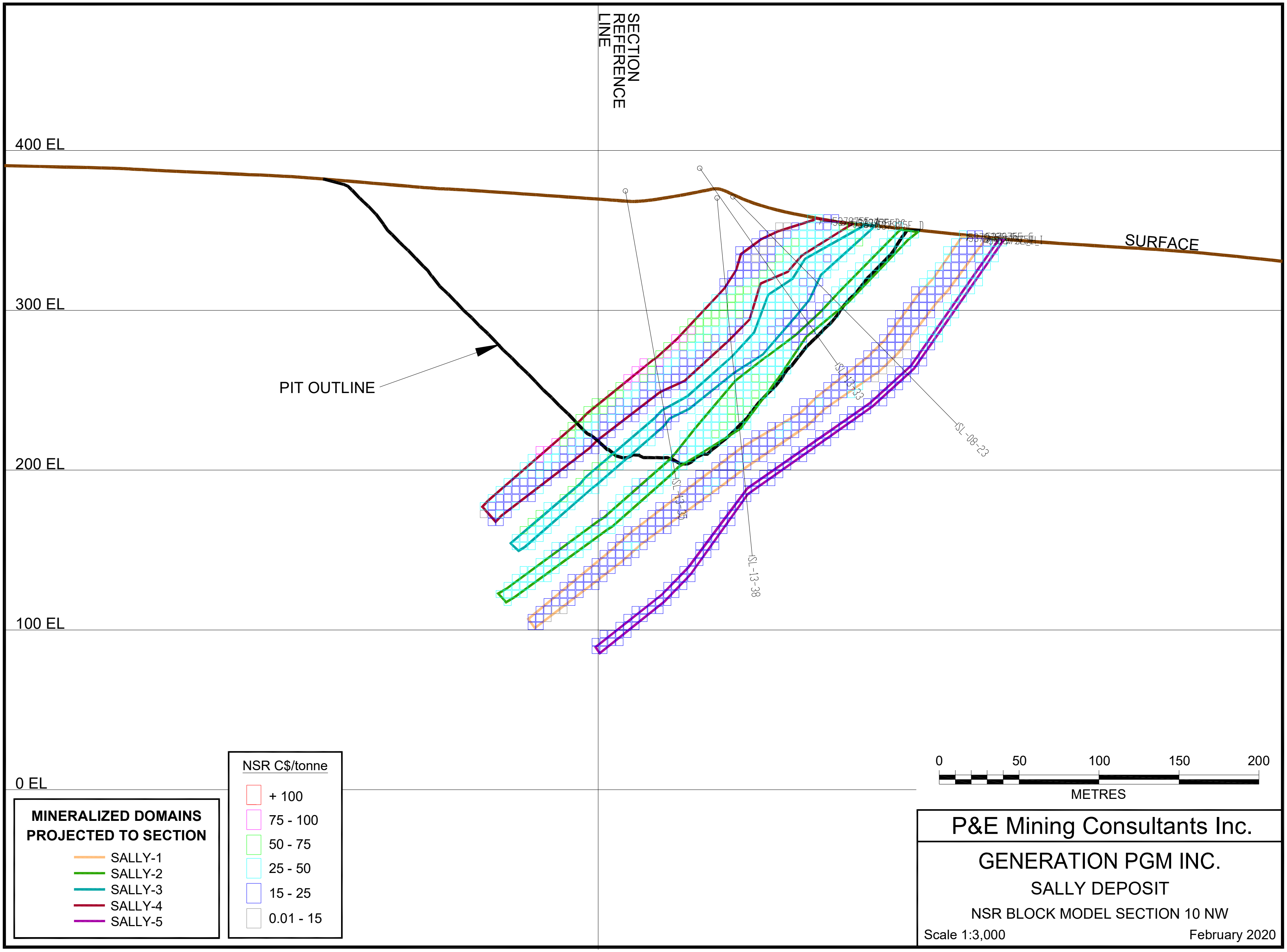
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS
PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL PLAN 320 EL
Scale 1:6,000
February 2020

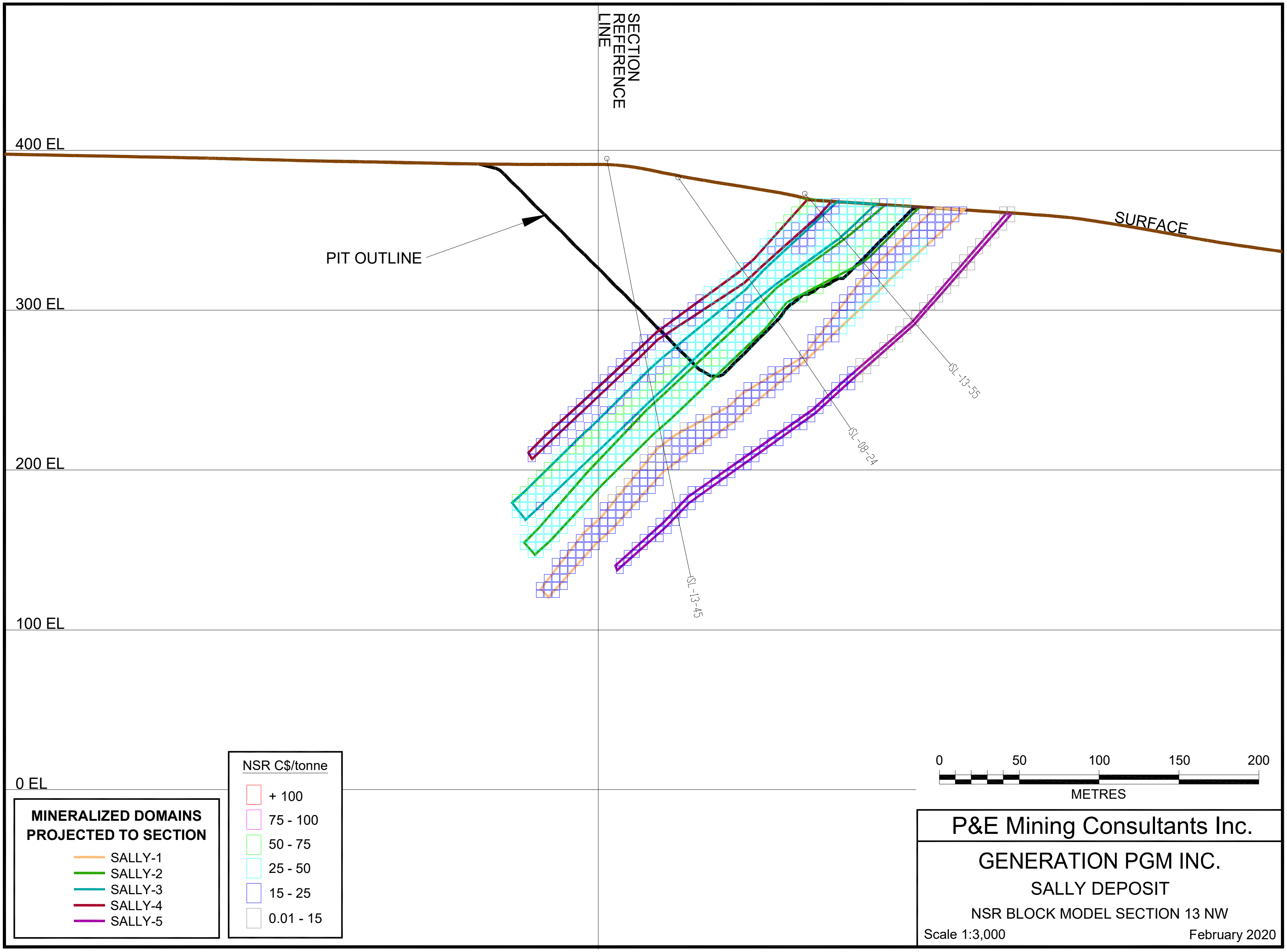

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL PLAN 280 EL
Scale 1:6,000
February 2020

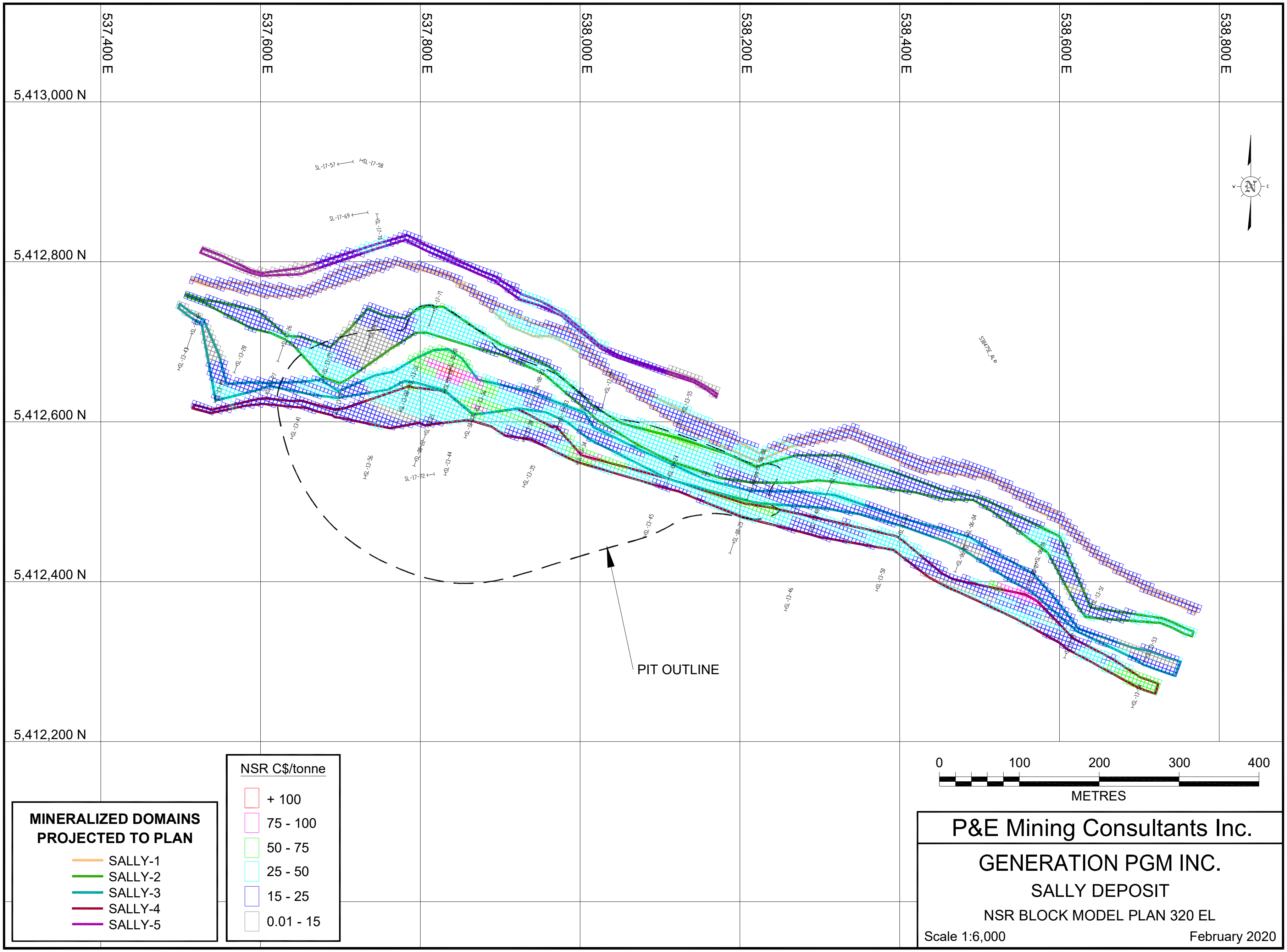

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
N
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
Pd g/t
+ 1.0
0.75 - 1.0
0.5 - 0.75
0.3 - 0.5
0.1 - 0.3
0.01 - 0.1
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
Pd BLOCK MODEL PLAN 240 EL
Scale 1:6,000
February 2020

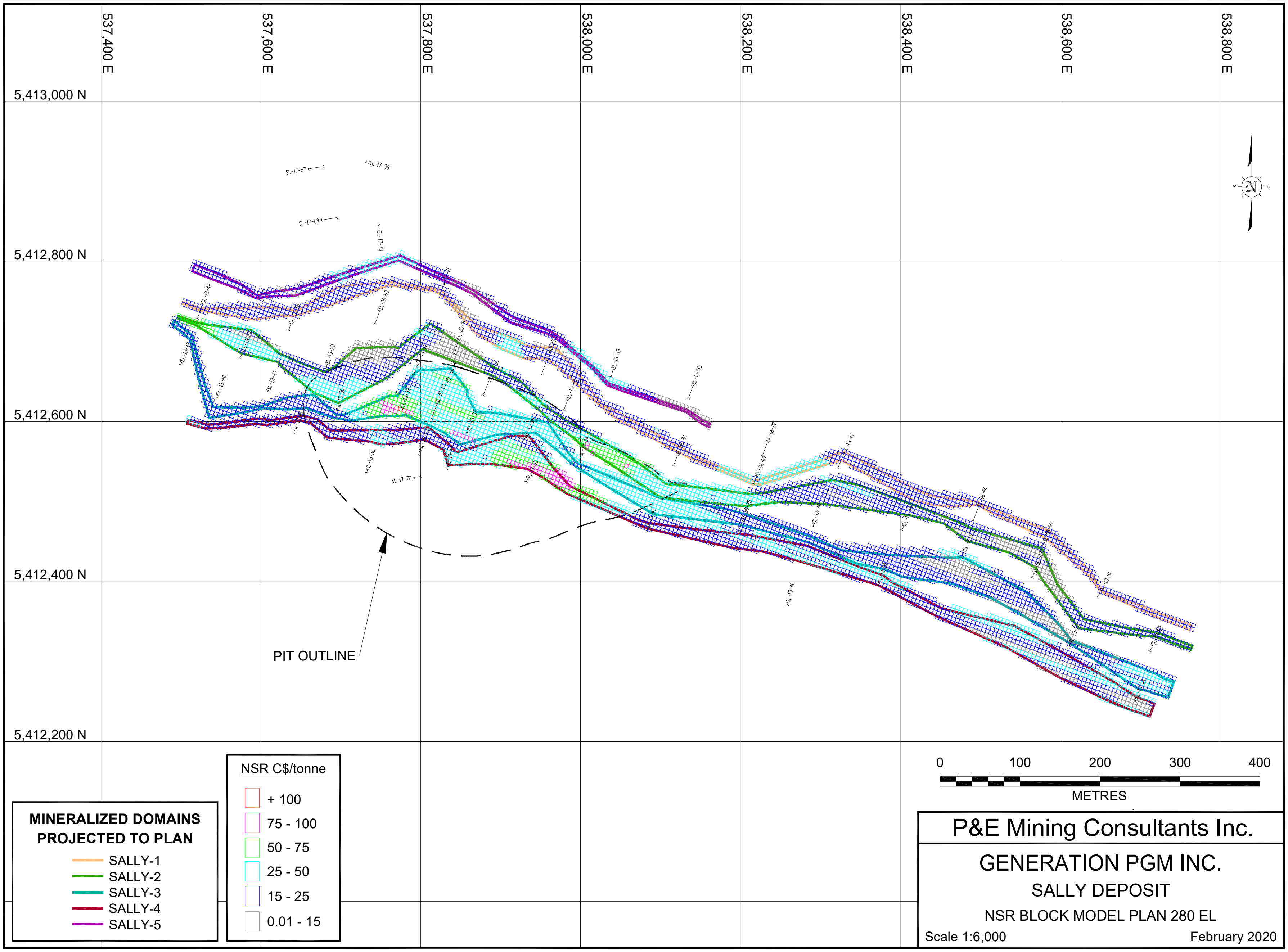
APPENDIX Z SALLY NSR BLOCK MODEL CROSS SECTIONS AND PLANS


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
SL-06-01
SL-06-02
SL-08-21
SL-08-22
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL SECTION 7 NW
Scale 1:3,000
February 2020

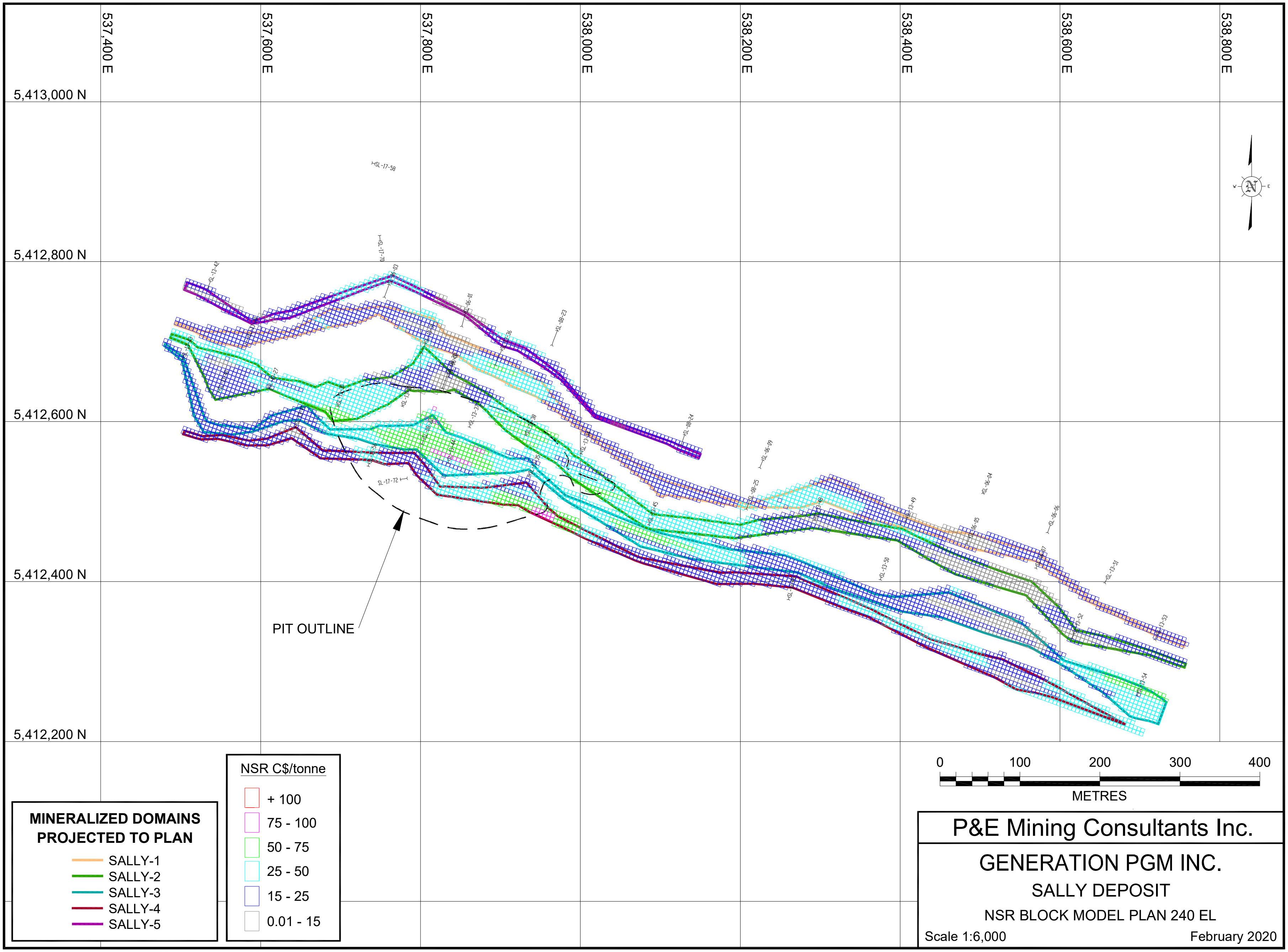

SECTION
REFERENCE
LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
SL-08-23
SL-13-38
MINERALIZED DOMAINS
PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL SECTION 10 NW
Scale 1:3,000
February 2020


SECTION
REFERENCE
LINE
400 EL
300 EL
200 EL
100 EL
0 EL
PIT OUTLINE
SURFACE
ISL-13-55
ISL-08-24
ISL-13-45
MINERALIZED DOMAINS
PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0 50 100 150 200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL SECTION 13 NW
Scale 1:3,000
February 2020

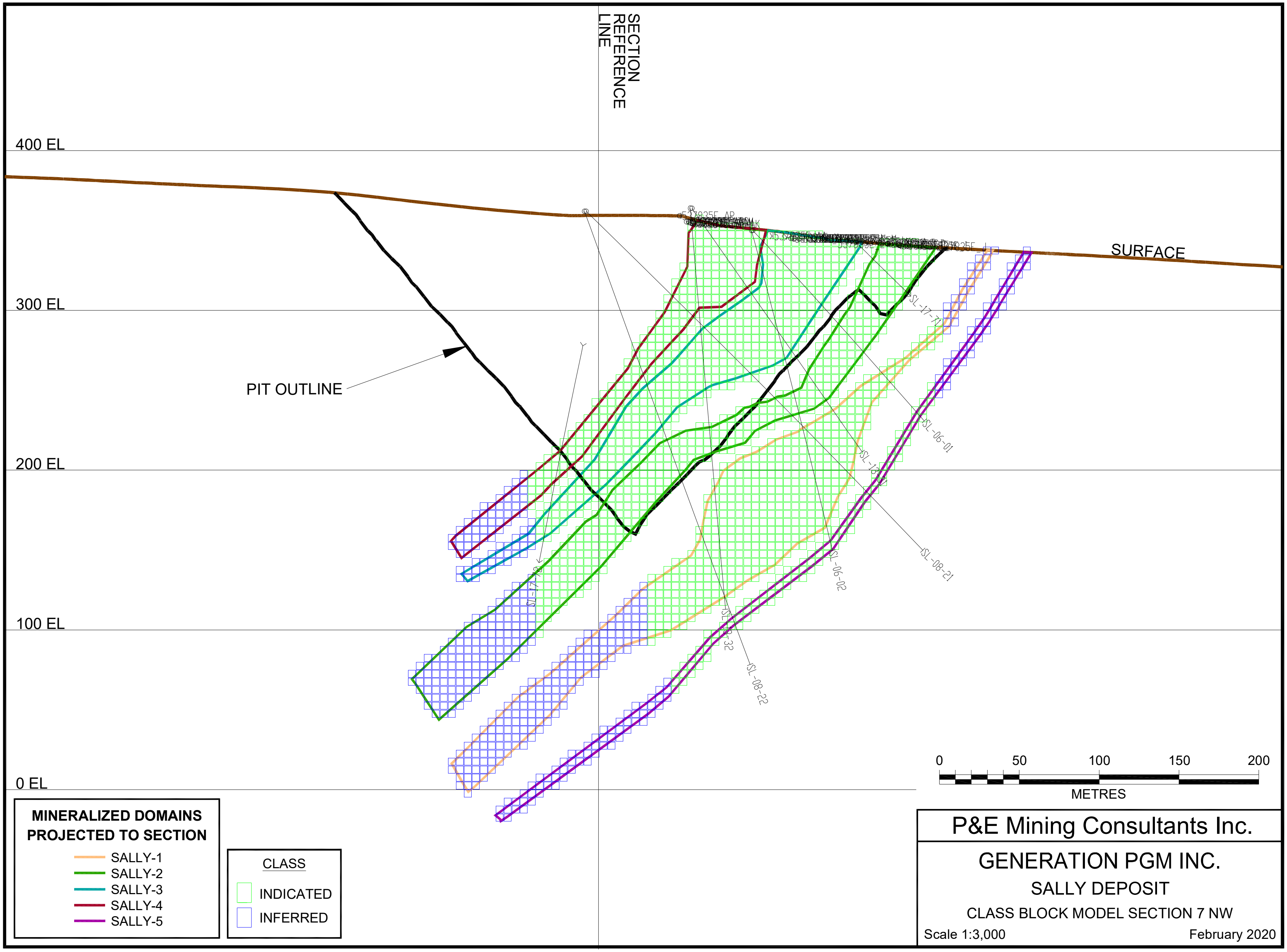

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL PLAN 320 EL
Scale 1:6,000
February 2020

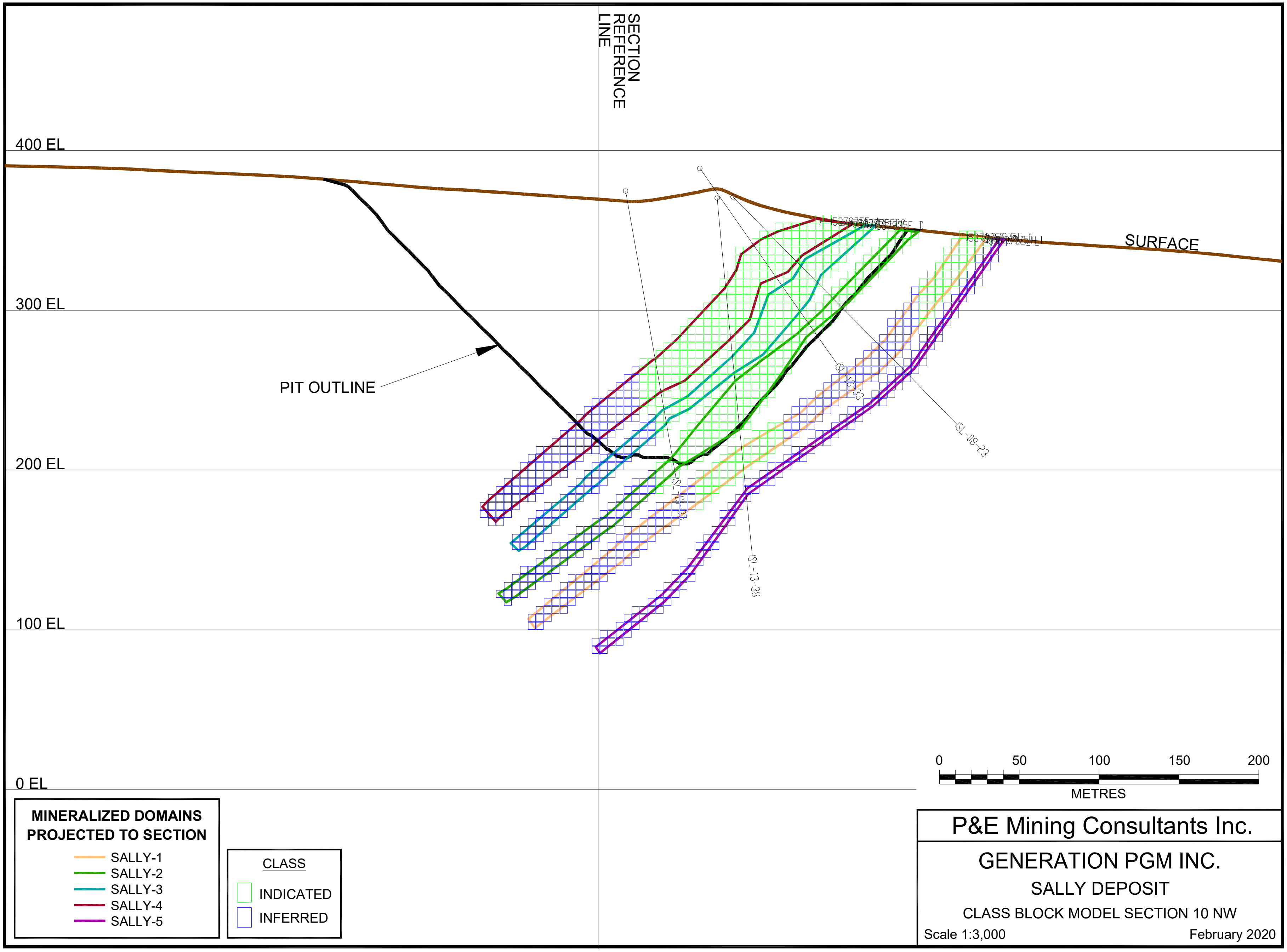


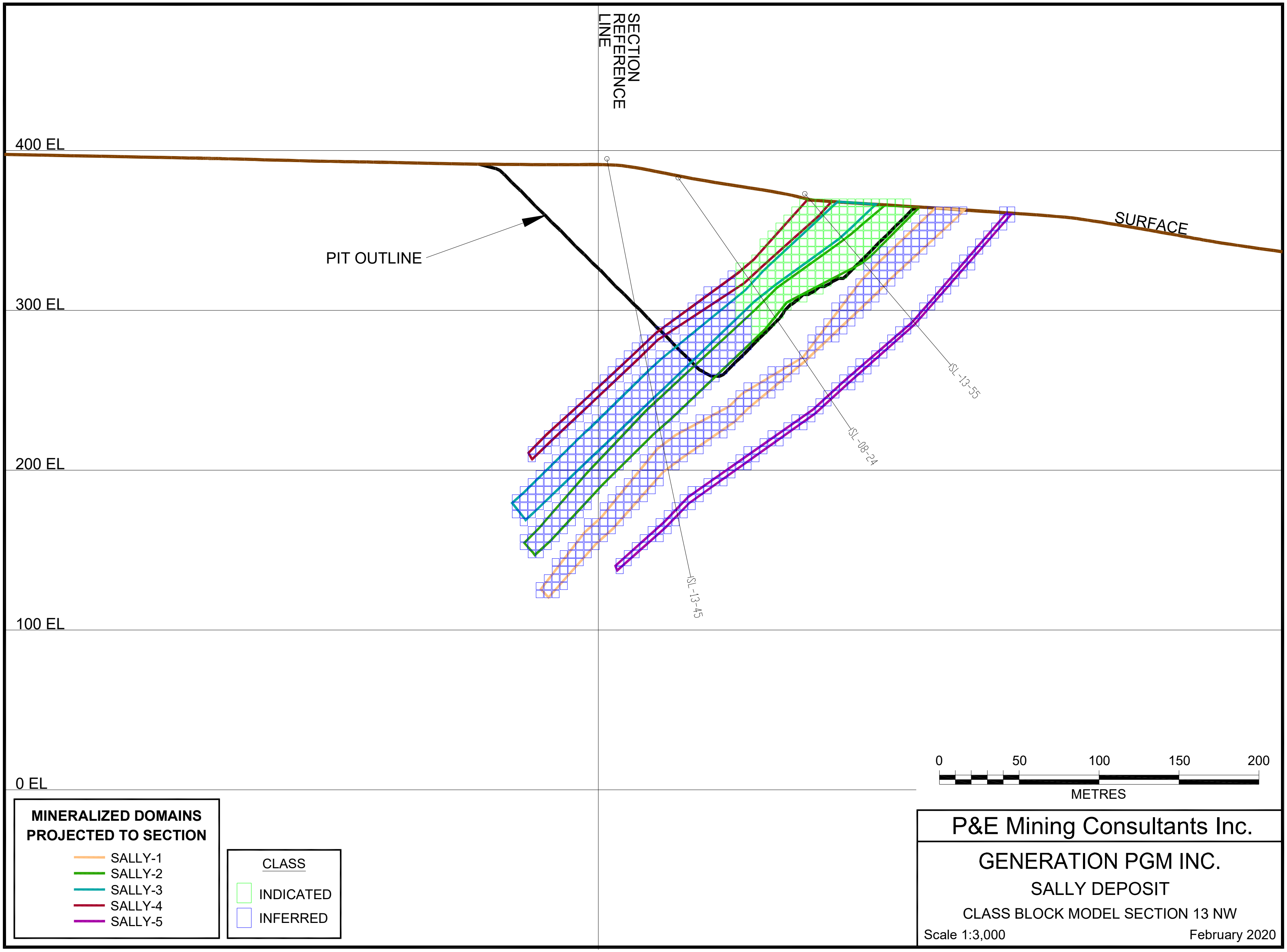
537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL PLAN 280 EL
Scale 1:6,000
February 2020

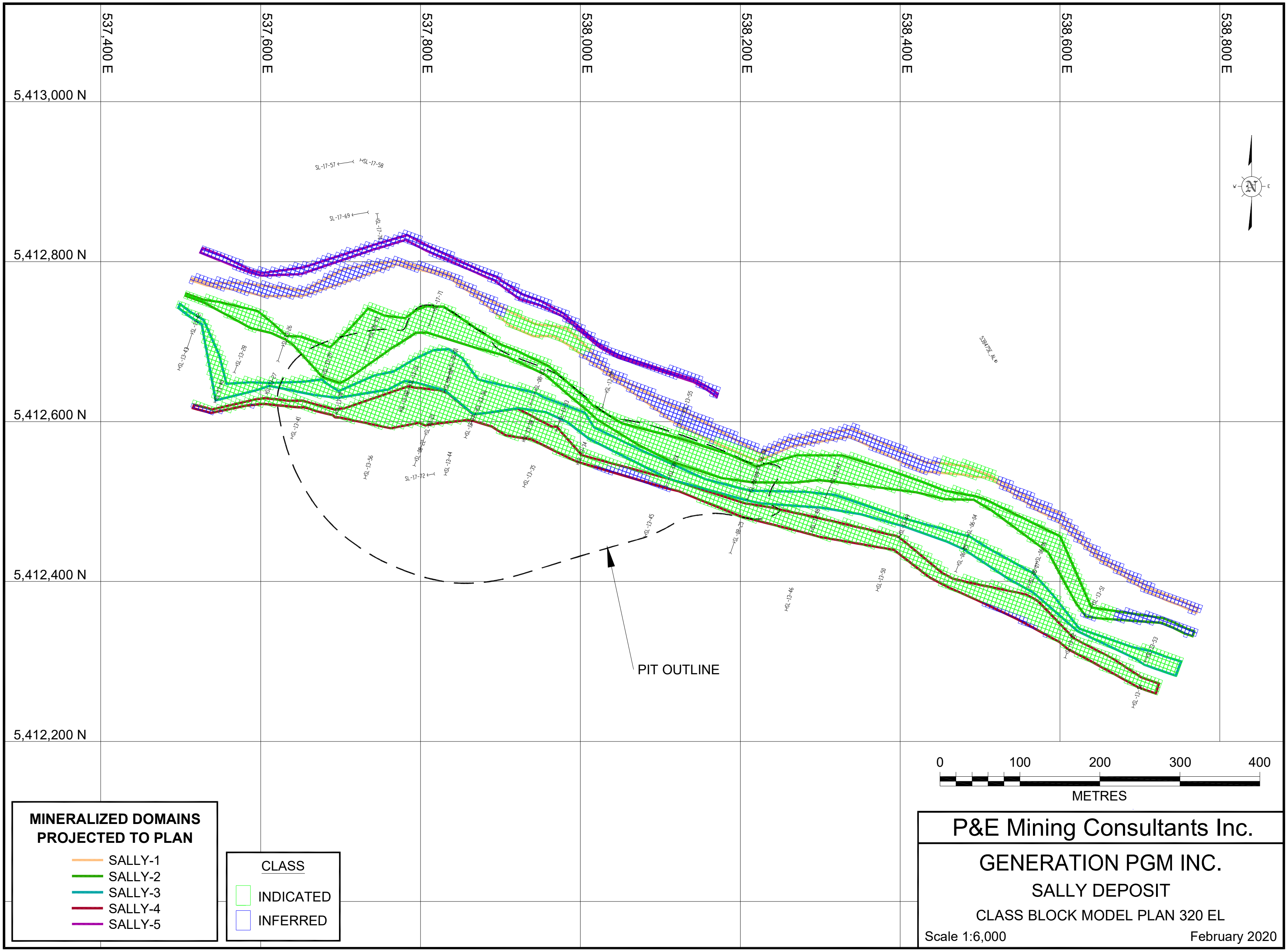

537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
NSR C$/tonne
+ 100
75 - 100
50 - 75
25 - 50
15 - 25
0.01 - 15
0
100
200
300
400
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
NSR BLOCK MODEL PLAN 240 EL
Scale 1:6,000
February 2020

APPENDIX AA SALLY CLASSIFICATION BLOCK MODEL CROSS SECTIONS AND PLANS


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
PIT OUTLINE
SURFACE
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
0
50
100
150
200
METRES
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL SECTION 7 NW
Scale 1:3,000
February 2020


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
SURFACE
PIT OUTLINE
SL-13-33
SL-08-23
SL-13-35
SL-13-38
0
50
100
150
200
METRES
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL SECTION 10 NW
Scale 1:3,000
February 2020


SECTION REFERENCE LINE
400 EL
300 EL
200 EL
100 EL
0 EL
PIT OUTLINE
SURFACE
ISL-13-55
ISL-08-24
ISL-13-45
0
50
100
150
200
METRES
MINERALIZED DOMAINS PROJECTED TO SECTION
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL SECTION 13 NW
Scale 1:3,000
February 2020



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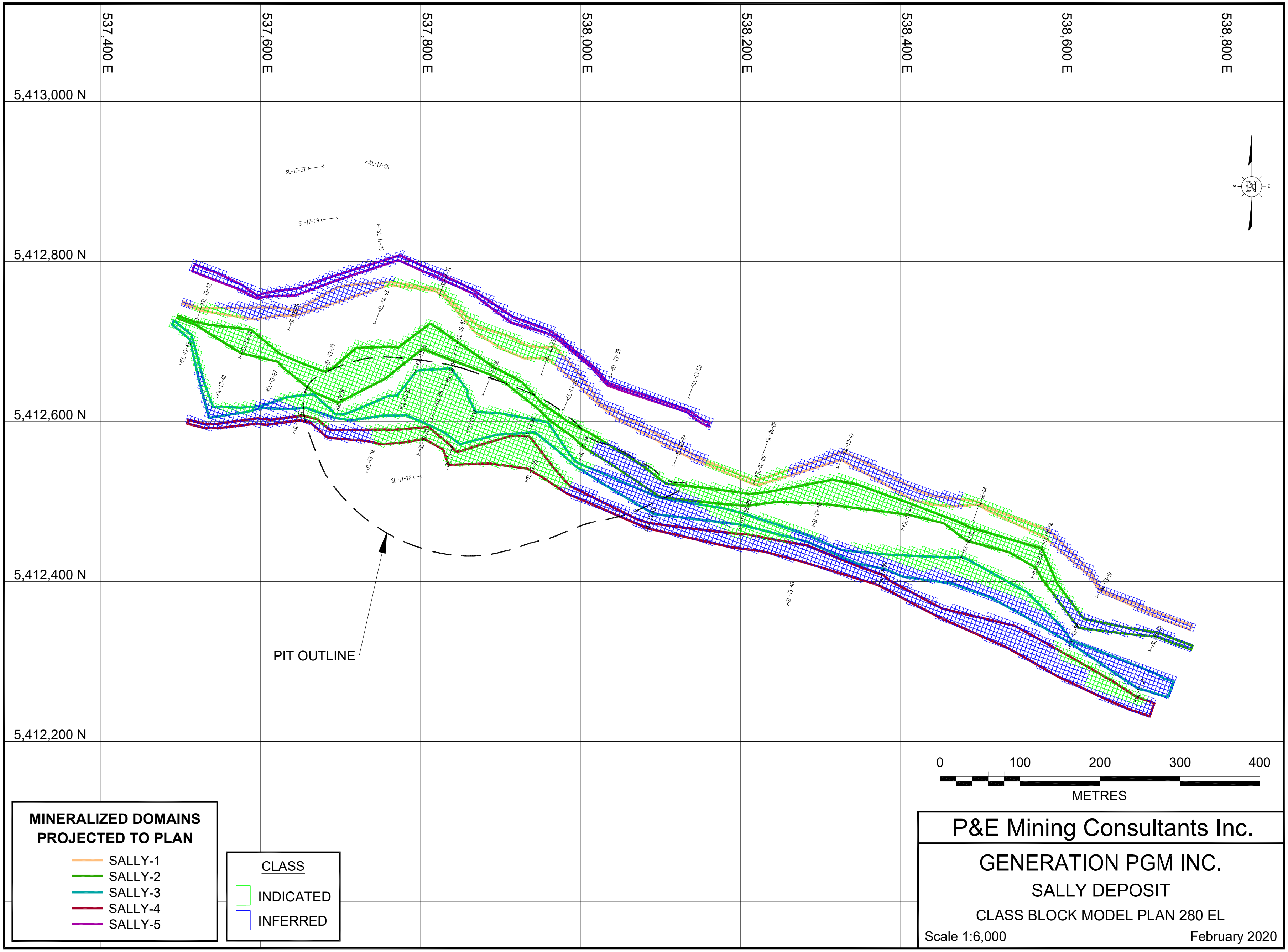
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
0
100
200
300
400
METRES
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL PLAN 320 EL
Scale 1:6,000
February 2020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538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
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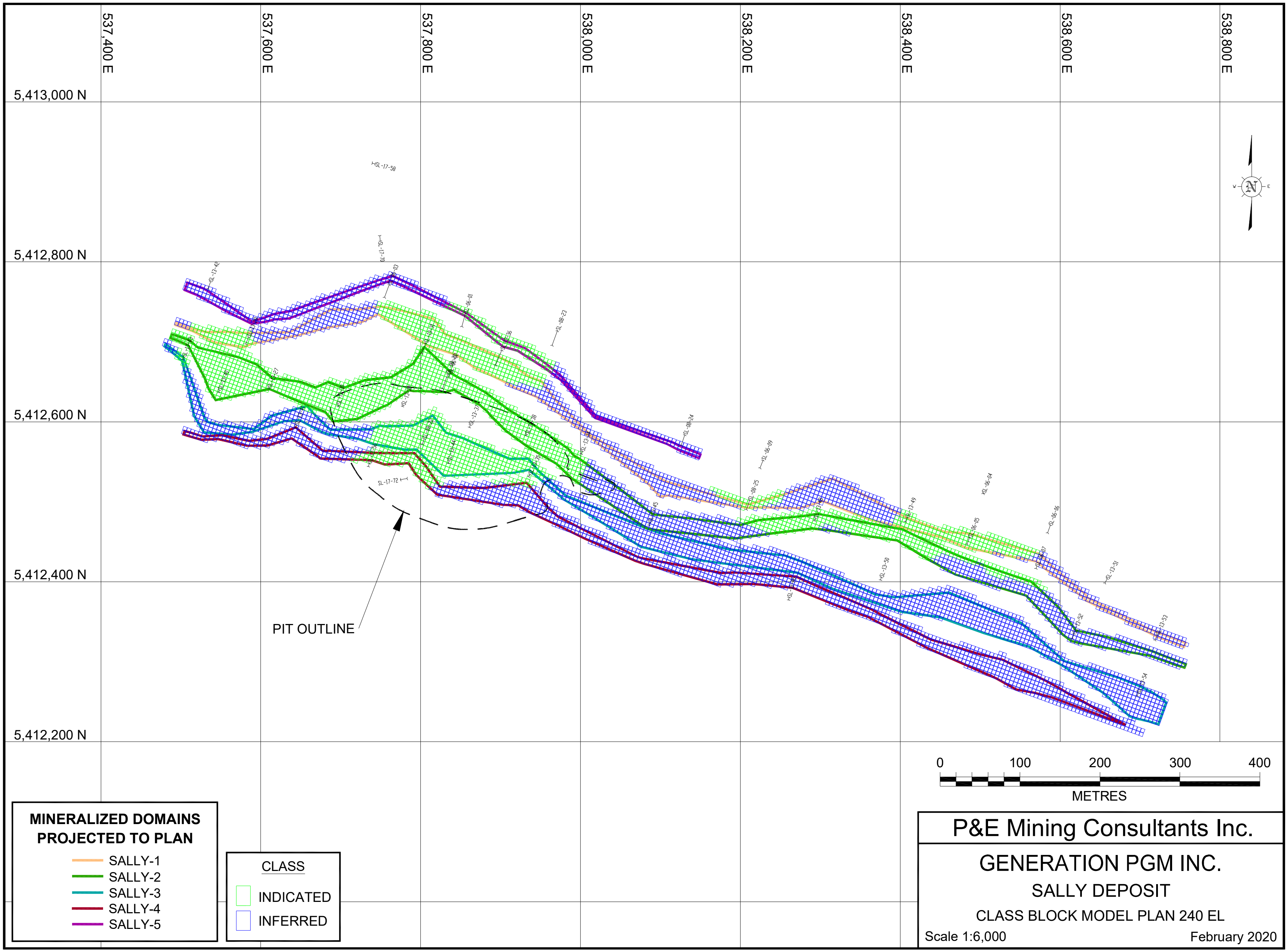
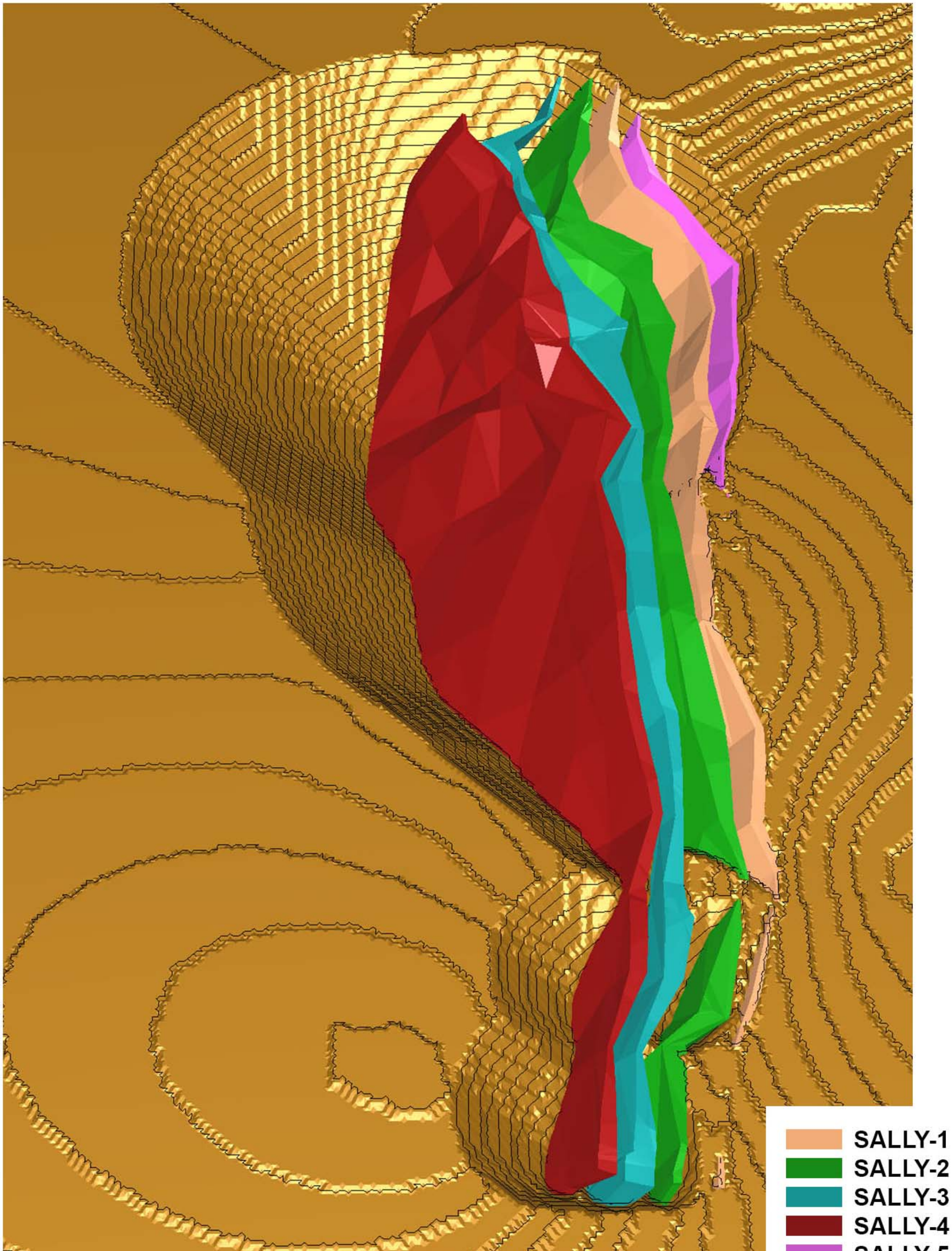
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
N
0
100
200
300
400
METRES
MINERALIZED DOMAINS
PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL PLAN 280 EL
Scale 1:6,000
February 2020



537,400 E
537,600 E
537,800 E
538,000 E
538,200 E
538,400 E
538,600 E
538,800 E
5,413,000 N
5,412,800 N
5,412,600 N
5,412,400 N
5,412,200 N
PIT OUTLINE
0
100
200
300
400
METRES
MINERALIZED DOMAINS PROJECTED TO PLAN
SALLY-1
SALLY-2
SALLY-3
SALLY-4
SALLY-5
CLASS
INDICATED
INFERRED
P&E Mining Consultants Inc.
GENERATION PGM INC.
SALLY DEPOSIT
CLASS BLOCK MODEL PLAN 240 EL
Scale 1:6,000
February 2020

APPENDIX BB SALLY OPTIMIZED PIT SHELL

SALLY DEPOSIT - OPTIMIZED PIT SHELL



APPENDIX CC LAND RECORDS

MARATHON LEASES

MARATHON PROPERTY LEASES	
Lease Numbers	**Area (ha)**
LEA-107094	216.742
LEA-107112	1110.55
LEA-107323	65.393
LEA-108529	25.301
LEA-108530	23.006
LEA-108531	22.039
LEA-108532	11.627
LEA-108533	2.165
LEA-108534	9.522
LEA-108535	16.79
LEA-108536	12.052
LEA-108537	19.291
LEA-108538	29.174
LEA-108539	5.787
LEA-108540	26.369
LEA-108541	13.796
LEA-108542	3.411
LEA-108543	18.506
LEA-108544	7.62
LEA-108545	22.521
LEA-108546	16.888
LEA-108547	17.79
LEA-108548	13.472
LEA-108549	8.413
LEA-108550	19.255
LEA-108551	19.397
LEA-108552	4.435
LEA-108553	9.81
LEA-108554	11.024
LEA-108555	22.889
LEA-108556	19.117
LEA-108557	8.098
LEA-108558	29.324
LEA-108559	16.527
LEA-108560	1.716

MARATHON PROPERTY LEASES	
Lease Numbers	**Area (ha)**
LEA-108561	15.864
LEA-108562	180.866
LEA-108563	185.014
LEA-108564	224.54
LEA-108565	271.423
LEA-109338	125.369
LEA-109441	1302.612
LEA-109525	71.698
LEA-109720	433.299
LEA-109811	119.683
PAT-51026	
Total	**4,810.185**

ENCUMBRANCES, PRODUCTION ROYALTIES AND RETAINED RIGHTS

Marathon Project Area

1. Pursuant to the Fenwick/Leishman Agreement with Marathon PGM Corporation ("Marathon") dated August 16, 2005 – 3% NSR royalty in favour of Kenneth Fenwick and Don Leishman on mining claims TB 1247007, TB 1247010 and TB 1247011. Marathon has the right at any time to acquire up to one-third of the royalty (up to an aggregate of 1%) upon a payment of $500,000 for every 0.5% of the royalty purchased. Consent to assignment is required together with written consent to be bound. Section 4(e) contains requirement for statements.

2. Pursuant to the Seafield Agreement with Marathon dated November 2, 2004 - 2% NSR royalty in favour of Seafield Resources Ltd. on mining claim TB 1205330. Stillwater Canada has the right at any time to acquire up to half of the royalty (up to an aggregate of 1%) upon a payment of $1,000,000. Section 5(f) contains the reporting requirements. Consent to assignment is required together with written consent to be bound.

3. Pursuant to the Dunlop Agreement with Marathon dated March 21, 2006 – 3% NSR in favour of W. Bruce Dunlop on mining claims TB 104122 and TB 104118 – 104121 inclusive. Marathon has the right at any time to acquire up to one half of the royalty (an aggregate of 1.5% NSR royalty) upon payment of $500,000 for every 0.5% of the royalty purchased. Consent to assignment is required together with written consent to be bound. Marathon PGM has ROFR on transfers of royalty by Bruce Dunlop.

4. Pursuant to the Gionet Agreement with Marathon in May, 2007 - 1% NSR royalty, with a right of first refusal on the sale of the royalty in favour of Brian D. Gionet and Michael Dorval on mining claims 4208442 and 3014935. Consent to assignment is required together with written consent to be bound. Section 5(e) sets out the statements required. Marathon has ROFR on transfers of royalty by Gionet. Section 5(e) contains the reporting requirements.

5. Pursuant to the Michano/Gionet Agreement with Marathon dated April 21, 2005 - 2% NSR on mining claims TB 3012177, TB 3006862, TB 3012173, TB 3019790, TB 4204047, TB 4204048 and TB 4204049. Marathon has the right at any time to acquire up to one half of the royalty (an aggregate of 1% NSR royalty) upon payment of $1,000,000. Royalty payor must give prior notice of intended surrender or allowing to lapse and if royalty recipient so elects the property must be transferred with 12 months' of assessment credits paid up. Consent to assignment is required together with written consent to be bound.

6. Pursuant to the Benton Agreement dated March 25, 2009, certain conditions of which were modified by the Benton Resources Corp ("Benton")/Stillwater Mining Co. Agreement dated December 16, 2010 – Agreements March 25, 2009 and Dec 16, 2010 are for different ground. The first is for the Bamoos claims and on Bermuda Claim, while the second agreement is for the rest of the Bermuda ground. 2% NSR and $0.05 per tonne waste material fee (the "Waste Dumping Fee") in favour of Teck Cominco Limited ("Teck") on the Bamoos property comprising mining claims 1240016, TB101224, TB101225, TB101578,

TB101579, TB101580, TB101581, TB101583, TB103572, TB103573, TB103574, TB103575, TB103583, TB103584, TB106983 and TB107641. Note that the property caught should also be TB103657 and Lease 107094. The Agreement states that Teck has a 2% net smelter return royalty in respect of the Bamoos leases referenced in Schedule "A". Consent to assignment is required. Royalty recipient has rights to access records. Royalty payor at its own expense must audit the calendar year royalty statement by a national firm of chartered accountants. Royalty payor can acquire up to 1/2 of the royalty on payment of $1 million. Consent to assignment is required together with written consent to be bound.

The May 12, 2005 Bamoos agreement is with respect to Mining Lease 107094. It appears that Bamoos' rights are now those of Teck and Benton's obligation are now those of Marathon/Stillwater.

The definition of waste material is waste rock, other mined material, tailings or other residual material from ore processing from the property or another source. Within 10 days after each calendar quarter, Bamoos must be notified if Benton commences depositing waste rock. Bamoos has the right to enter on to the property to observe operations and inspect records. Benton agrees to perform condemnation drilling in the area of the proposed deposit of waste material to a depth of 110 metres below surface in accordance with standard industry practice. Section 20 contains an area of interest clause that provides that there is a 2 km area of interest. However, Section 25.1 states that except with respect to net smelter returns and waste material payments, upon the expiry of the back in right, the Agreement terminates. Section 22 provides that if Benton wishes to dispose of any rights under the Agreement it must first offer to sell them to Bamoos and similarly if Bamoos wishes to dispose of any rights under the Agreement it must first offer to sell them to Benton. Schedule 2 contains the NSR royalty provisions. Section 2.02(b) thereof contains the reporting requirements. Section 3.03 thereof states that the royalty holder has the right to request that the royalty payor have its independent external auditors provide their audit certification for royalty statements.

The Agreement also mentions a 1% net smelter return royalty to Stephen Stares in respect of the Bermuda claims which are listed in the Schedule as 1246640, 1246641, 1246642, 1246643, 4209026, 1240554, 1240016, 1240552, 1240553, 1240017, 1240555. The remainder of the claims listed in Schedule A of the March 25, 2009 agreement are the claims that make up the Bamoos Lease and are not subject to the Stares royalty.

7. Pursuant to the Michano/Gionet/Dorval Agreement with Marathon dated July 12, 2011 - 2% NSR on mining claims TB 4246277, TB 4242127 and TB 4246285. Marathon has the right at any time to acquire up to one half of the royalty (an aggregate of 1% NSR royalty) upon payment of $1,000,000. Consent to assignment is required together with written consent to be bound. Royalty payor must give prior notice of intended surrender or allowing to lapse and if royalty recipient so elects the property must be transferred with 12 months' of assessment credits paid up. Section 5(e) is the reporting section.

8. Pursuant to the Michano/Gionet Agreement with Marathon dated July 12, 2011 - 2% NSR on mining claims TB 4246283 and TB 4246284. Marathon has the right at any time to acquire up to one half of the royalty (an aggregate of 1% NSR royalty) upon payment of $1,000,000. Consent to assignment is required together with written consent to be bound. Royalty payor

must give prior notice of intended surrender or allowing to lapse and if royalty recipient so elects the property must be transferred. Section 5(e) is the reporting section.

9. Pursuant to the Wahl Agreement with Marathon dated July 8, 2008 - 2% NSR on mining claims TB 3015131, TB 3015132 and TB 3015133. Marathon has the right at any time to acquire up to one half of the royalty (an aggregate of 1% NSR royalty) upon payment of $1,000,000. The acquisition right is only after commencement of Commercial Production not at any time. The royalty payor must give notice to the royalty recipient of the date on which Commercial Production is achieved. Section 7 of Schedule B sets forth reporting. Section 9 of Schedule B sets forth a right of inspection to royalty recipient. Section 10 of Schedule B provides that the royalty payor must annually have an audit statement prepared by its auditors within 90 days of its fiscal year end and must forthwith deliver a copy of such statement to the royalty recipient.

Bermuda Project Area

10. Stares agreement dated December 15, 2003, amended October 18, 2005 between Stephen Stares and Benton relating to TB 1240016 1240017, 1240018, 1240019, 1240548, 1240549, 1240550, 1240551, 1240552, 1240553, 1240554, 1240555, 1245401, 1246640, 1246641, 1246642 and 1246643. The Agreement provides for a 1% NSR with a 1 kilometre area of interest. The amendment dated October 18, 2005 provides that the royalty applies to the area of interest but not lands acquired by Benton from Bamoos Minerals Inc. by agreement dated May 12, 2005, as amended June 30, 2005 Section 16 of Schedule A states that within 120 days of the end of each calendar year, the royalty payor must provide the royalty recipient with an annual report of all activities and operations conducted during the preceding calendar year together with a description of the activities and operations anticipated during the current year including estimates of expenditures, production, ore reserves and any net smelter returns payable. note: In December 2011 Stares sold one half of the subject royalty (an aggregate of 0.5% NSR) to Gold Royalties Corp.

11. Pursuant to the Benton Resources/Stillwater Mining Co. Agreement dated December 16, 2010 - 2% NSR royalty (the "Newmont Royalty") in favour of Newmont (now held by Franco-Nevada) on mining leases CLM 121, CLM 122, CLM123, CLM124, TB101845, TB101846, TB101847, TB101849, TB101850, TB101864, TB101865, TB101866, TB101869, TB101870, TB101871, TB101845, TB101891, TB101892, TB101893, TB101894, TB101895, TB101896, TB101897, TB101898, TB101899, TB101900, TB101901, TB101902, TB101903, TB101904, TB101905, TB101910, TB101915, TB101916, TB101917, TB101924, TB108223 and TB108224.

    Redstone agreement dated April 20, 2005 between Redstone Resources Inc. and Benton (Redstone being referred to as "Newmont"). This Agreement relates to the following claims: 101850, 101870, 101871, 101864, 101866, 101865, 101845, 101846, 101847, 101849,101869,101910,101915,101916,101917,101924,CLM 121, 122, 123, 124, 108244, 101892, 1021893, 101894,101895, 101896,101897,101898, 101899, 101900, 101901, 101902, 101903, 101904, 101905, 18223 and 101891. The Agreement provides for a 2% NSR. Newmont may register the royalty. There is an AOI within the external boundaries of the property. If there is a transfer, the assignee must agree in writing to be bound by the Agreement. Section 20 provides for reporting obligations. Section 21 provides for obligations on the part of royalty payor to provide right to royalty recipient pre abandonment of property or if taxes are to go unpaid. The royalty recipient may elect to take in kind. There are consultation restrictions vis a vis issuing a press release. Section 7.3 states that if royalty payor establishes a mineral resource or mineral reserve on any of the property royalty payor must provide to Newmont the amount of such resource or reserve as soon as practicable after royalty payor makes a public declaration. Section 8.18 of the royalty agreement provides that if royalty payor or any successor enters into any development agreement with Superior Wind Energy Development Inc. Newmont is entitled to receive 20% of the gross revenue received by royalty payor. Sibanye has advised that the royalty was transferred to Franco-Nevada. Franco-Nevada has annually requested an annual report.

12. Pursuant to the Benton Resources/Stillwater Mining Company Agreement dated December 16, 2010 - 1% (conditional) NSR in favour of Benton on mining leases CLM 121, CLM 122, CLM123, CLM124, TB101845, TB101846, TB101847, TB101849, TB101850, TB101864, TB101865, TB101866, TB101869, TB101870, TB101871, TB101845, TB101891, TB101892, TB101893, TB101894, TB101895, TB101896, TB101897, TB101898, TB101899, TB101900, TB101901, TB101902, TB101903, TB101904, TB101905, TB101910, TB101915, TB101916, TB101917, TB101924, TB108223, TB108224 and mining claims 4204476, 4204477, 4204478, 4207281, 4207280, 4207283, 4209025, 1240551, 1240553, 1240548, 1240552, 1240549, 1240018, 1240019,4207863, 4207858, 4207859, 4207861, 4207860, 4207857, 4207282, 4203971, 1240550, 4207856, 1245401, 1246640, 1246641, 4203972, 1246642, 1240555, 1240017, 4209026, 1246643 and 1240554. The NSR is conditional upon 2.5M ounces of gold, platinum and palladium having been produced. This Agreement references the Stares royalty in the amount of 1% and the Newmont Royalty (now Franco-Nevada royalty) in the amount of 2%.

Geordie Project Area

13. Pursuant to underlying agreements of record that remained in effect subsequent the acquisition of Discovery PGM Corp. by a predecessor of Stillwater Canada, the Geordie Lake property is encumbered by - 2½ % NSR in favor of Superior Prospects Inc. and Melvin Joa (in aggregate) on mining claims 1184283, 1184297, 1209682, 1209683, 1209684, 1237697, 1237698 and 1237699.

14. Pursuant to the Gryphon/L.E.H. Ventures Ltd. ("LEH") Agreement dated June 3, 1999, Gryphon Metals Corp. ("Gryphon") retains the right upon the completion and presentation of a definitive feasibility study on the Geordie Lake Property to back into a 12.5% interest on the property by paying Stillwater Canada a total of 31.25% of all exploration and development costs incurred on the property to that point. This Agreement relates to 1209682, 1209683, 12109684, 1184283, 1184297 and references that Superior Prospects Inc. and Melvin Joa have a 2.5% NSR that may be reduced to 1.5% on payment of $1.0 million.

15. Yozipovic agreement dated November 14, 2011 between Tony Robert Yozipovic and Marathon. This is with respect to claim TB3006106. There is a 2% NSR royalty payable. The

entire royalty may be purchased for $1.0M (together with payment of accrued but unpaid royalties). This Agreement is not signed by Marathon. Section 5(e) relates to reporting. Royalty payor must give prior notice of intended surrender or allowing to lapse and if royalty recipient so elects the property must be transferred with 12 months' of assessment credits paid up.

Generation PGM Inc. Claims

BCMC = boundary cell mining claims
SCMC = single cell mining claims

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
260281	Bermuda	BCMC		200		200
124057	Bermuda	BCMC			200	200
280335	Bermuda	BCMC		200		200
124056	Bermuda	BCMC			200	200
268282	Bermuda	BCMC		200		200
291402	Bermuda	BCMC			200	200
155919	Bermuda	BCMC		200		200
236183	Bermuda	BCMC			200	200
295847	Bermuda	BCMC		200		200
303513	Bermuda	BCMC			200	200
301811	Bermuda	BCMC		200		200
333334	Bermuda	BCMC			200	200
265222	Bermuda	BCMC		200		200
265337	Bermuda	BCMC			200	200
264685	Bermuda	BCMC		200		200
304492	Bermuda	BCMC			200	200
169483	Bermuda	BCMC	200			200
153444	Bermuda	BCMC	200			200
198743	Bermuda	BCMC	200			200
115333	Bermuda	BCMC	200			200
245137	Bermuda	BCMC		200		200
334439	Bermuda	BCMC		200		200
218902	Bermuda	BCMC		200		200
333034	Bermuda	BCMC		200		200
220374	Bermuda	BCMC	200			200
275573	Bermuda	BCMC	200			200
246869	Bermuda	BCMC		200		200
154873	Bermuda	BCMC		200		200
246871	Bermuda	BCMC		200		200
302681	Bermuda	BCMC		200		200
154874	Bermuda	BCMC		200		200
108297	Bermuda	BCMC		200		200
331141	Bermuda	BCMC		200		200
336611	Bermuda	BCMC		200		200

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
155028	Bermuda	BCMC		200		200
308997	Bermuda	BCMC		200		200
302682	Bermuda	BCMC		200		200
331123	Bermuda	BCMC		200		200
227591	Bermuda	BCMC		200		200
185158	Bermuda	BCMC		200		200
227592	Bermuda	BCMC		200		200
270652	Bermuda	BCMC		200		200
335995	Bermuda	BCMC		200		200
110954	Bermuda	BCMC		200		200
315704	Bermuda	BCMC		200		200
203376	Bermuda	BCMC		200		200
157598	Bermuda	BCMC		200		200
211411	Bermuda	BCMC		200		200
294335	Bermuda	BCMC			200	200
311810	Bermuda	BCMC		200		200
333033	Bermuda	BCMC		200		200
218904	Bermuda	BCMC	200			200
206781	Bermuda	BCMC	200			200
218871	Bermuda	BCMC	200			200
201200	Bermuda	BCMC		200		200
253177	Bermuda	BCMC		200		200
293074	Bermuda	BCMC		200		200
160474	Bermuda	BCMC		200		200
174959	Bermuda	BCMC		200		200
145362	Bermuda	SCMC		200		200
279554	Bermuda	SCMC		200		200
128316	Bermuda	SCMC		200		200
279555	Bermuda	SCMC		400		400
101842	Bermuda	SCMC		200		200
278189	Bermuda	SCMC		200		200
260137	Bermuda	SCMC		200		200
312770	Bermuda	SCMC		200		200
259491	Bermuda	SCMC		400		400
211500	Bermuda	SCMC		400		400
212178	Bermuda	SCMC		400		400
279713	Bermuda	SCMC		400		400
204082	Bermuda	SCMC		400		400
297005	Bermuda	SCMC		400		400
260138	Bermuda	SCMC		400		400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
102007	Bermuda	SCMC		400		400
230971	Bermuda	SCMC		400		400
117127	Bermuda	SCMC		400		400
260139	Bermuda	SCMC		400		400
297007	Bermuda	SCMC		400		400
297006	Bermuda	SCMC		400		400
158264	Bermuda	SCMC		400		400
296850	Bermuda	SCMC		400		400
211409	Bermuda	SCMC		200		200
117044	Bermuda	SCMC		200		200
202812	Bermuda	SCMC		200		200
211408	Bermuda	SCMC		200		200
314084	Bermuda	SCMC		200		200
143484	Bermuda	SCMC		200		200
203393	Bermuda	SCMC		200		200
307953	Bermuda	SCMC		200		200
325123	Bermuda	SCMC		400		400
325122	Bermuda	SCMC		400		400
172396	Bermuda	SCMC		400		400
191384	Bermuda	SCMC		400		400
335573	Bermuda	SCMC		200		200
220680	Bermuda	SCMC		200		200
172397	Bermuda	SCMC		400		400
155918	Bermuda	SCMC		400		400
127909	Bermuda	SCMC		400		400
104775	Bermuda	SCMC		200		200
287212	Bermuda	SCMC		400		400
127910	Bermuda	SCMC		400		400
307954	Bermuda	SCMC		400		400
321306	Bermuda	SCMC		400		400
167991	Bermuda	SCMC		400		400
284250	Bermuda	SCMC		400		400
265223	Bermuda	SCMC		400		400
264686	Bermuda	SCMC		400		400
115302	Bermuda	SCMC		400		400
253178	Bermuda	SCMC		400		400
187101	Bermuda	SCMC		400		400
253179	Bermuda	SCMC		400		400
187102	Bermuda	SCMC		400		400
245138	Bermuda	SCMC		400		400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
321307	Bermuda	SCMC		400		400
227844	Bermuda	SCMC		400		400
127089	Bermuda	SCMC		400		400
267594	Bermuda	SCMC		200		200
267593	Bermuda	SCMC		400		400
246870	Bermuda	SCMC		400		400
138234	Bermuda	SCMC		400		400
144205	Bermuda	SCMC		400		400
144204	Bermuda	SCMC		400		400
190214	Bermuda	SCMC		400		400
238872	Bermuda	SCMC		400		400
185159	Bermuda	SCMC		400		400
318431	Bermuda	SCMC		400		400
258907	Bermuda	SCMC		400		400
128240	Bermuda	SCMC		400		400
277446	Bermuda	SCMC		400		400
117075	Bermuda	SCMC		400		400
230273	Bermuda	SCMC		400		400
202837	Bermuda	SCMC		400		400
258908	Bermuda	SCMC		400		400
277447	Bermuda	SCMC		400		400
222987	Bermuda	SCMC		400		400
117088	Bermuda	SCMC		400		400
203358	Bermuda	SCMC		400		400
157554	Bermuda	SCMC		400		400
201363	Bermuda	SCMC		400		400
294296	Bermuda	SCMC		400		400
172128	Bermuda	SCMC		400		400
201362	Bermuda	SCMC		400		400
202816	Bermuda	SCMC		400		400
203396	Bermuda	SCMC		400		400
326124	Bermuda	SCMC		400		400
157579	Bermuda	SCMC		400		400
115931	Bermuda	SCMC		400		400
100643	Bermuda	SCMC		400		400
115930	Bermuda	SCMC		400		400
115929	Bermuda	SCMC		400		400
157517	Bermuda	SCMC		400		400
223530	Bermuda	SCMC		400		400
296853	Bermuda	SCMC		400		400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
157578	Bermuda	SCMC		400		400
172130	Bermuda	SCMC		400		400
172129	Bermuda	SCMC		400		400
324110	Bermuda	SCMC		400		400
115932	Bermuda	SCMC		400		400
157518	Bermuda	SCMC		400		400
100644	Bermuda	SCMC		200		200
324111	Bermuda	SCMC		200		200
311393	Bermuda	SCMC		200		200
296264	Bermuda	SCMC		200		200
296263	Bermuda	SCMC		400		400
100403	Bermuda	SCMC		400		400
296262	Bermuda	SCMC		400		400
258881	Bermuda	SCMC		400		400
163527	Bermuda	SCMC		400		400
314013	Bermuda	SCMC		400		400
100404	Bermuda	SCMC		400		400
258882	Bermuda	SCMC		400		400
230235	Bermuda	SCMC		400		400
143407	Bermuda	SCMC		200		200
258883	Bermuda	SCMC		200		200
157519	Bermuda	SCMC		200		200
302679	Bermuda	SCMC		400		400
266814	Bermuda	SCMC		400		400
286892	Bermuda	SCMC		400		400
302678	Bermuda	SCMC		400		400
118164	Bermuda	SCMC		400		400
125696	Bermuda	SCMC		400		400
200190	Bermuda	SCMC		400		400
200189	Bermuda	SCMC		400		400
125598	Bermuda	SCMC		400		400
266224	Bermuda	SCMC		400		400
189077	Bermuda	SCMC		400		400
302680	Bermuda	SCMC		400		400
310710	Bermuda	SCMC		400		400
286893	Bermuda	SCMC		400		400
293073	Bermuda	SCMC		400		400
226446	Bermuda	SCMC		400		400
286894	Bermuda	SCMC		400		400
125697	Bermuda	SCMC		400		400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
266225	Bermuda	SCMC		400		400
208218	Bermuda	SCMC		400		400
153675	Bermuda	SCMC		400		400
249206	Bermuda	SCMC		400		400
212500	Bermuda	SCMC		400		400
181526	Bermuda	SCMC		400		400
256300	Bermuda	SCMC		400		400
292968	Bermuda	SCMC		400		400
256301	Bermuda	SCMC		400		400
188962	Bermuda	SCMC		400		400
237633	Bermuda	SCMC		400		400
188963	Bermuda	SCMC		400		400
311684	Bermuda	SCMC		400		400
267767	Bermuda	SCMC		400		400
157575	Bermuda	SCMC		400		400
100487	Bermuda	SCMC		400		400
314083	Bermuda	SCMC		400		400
128288	Bermuda	SCMC		400		400
168575	Bermuda	SCMC		400		400
168574	Bermuda	SCMC		400		400
321388	Bermuda	SCMC		400		400
277495	Bermuda	SCMC		400		400
211483	Bermuda	SCMC		400		400
100488	Bermuda	SCMC		400		400
203391	Bermuda	SCMC		400		400
112617	Bermuda	SCMC		400		400
198544	Bermuda	SCMC		400		400
265300	Bermuda	SCMC		400		400
230299	Bermuda	SCMC		400		400
117128	Bermuda	SCMC		400		400
326119	Bermuda	SCMC		400		400
128289	Bermuda	SCMC		400		400
223525	Bermuda	SCMC		400		400
332703	Bermuda	SCMC		400		400
133075	Bermuda	SCMC		400		400
111199	Bermuda	SCMC		400		400
271263	Bermuda	SCMC		400		400
244476	Bermuda	SCMC		400		400
244475	Bermuda	SCMC		400		400
318485	Bermuda	SCMC		400		400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
186414	Bermuda	SCMC		400		400
133076	Bermuda	SCMC		400		400
128294	Bermuda	SCMC		400		400
128293	Bermuda	SCMC		400		400
211485	Bermuda	SCMC		400		400
296854	Bermuda	SCMC		400		400
259470	Bermuda	SCMC		400		400
163608	Bermuda	SCMC		400		400
277499	Bermuda	SCMC		400		400
279026	Bermuda	SCMC		200		200
163588	Bermuda	SCMC		400		400
314067	Bermuda	SCMC		400		400
100470	Bermuda	SCMC		200		200
143485	Bermuda	SCMC		200		200
326107	Bermuda	SCMC		400		400
211461	Bermuda	SCMC		400		400
279009	Bermuda	SCMC		200		200
326123	Bermuda	SCMC		400		400
230300	Bermuda	SCMC		400		400
203392	Bermuda	SCMC		200		200
277412	Bermuda	SCMC		400		400
211410	Bermuda	SCMC		400		400
202813	Bermuda	SCMC		400		400
203375	Bermuda	SCMC		200		200
279008	Bermuda	SCMC		200		200
100469	Bermuda	SCMC		200		200
223004	Bermuda	SCMC		200		200
326105	Bermuda	SCMC		200		200
211460	Bermuda	SCMC		200		200
222953	Bermuda	SCMC		200		200
163521	Bermuda	SCMC		200		200
296255	Bermuda	SCMC		400		400
278948	Bermuda	SCMC		400		400
143471	Bermuda	SCMC		400		400
258945	Bermuda	SCMC		400		400
128266	Bermuda	SCMC		400		400
163587	Bermuda	SCMC		400		400
143470	Bermuda	SCMC		400		400
258876	Bermuda	SCMC		200		200
324021	Bermuda	SCMC		400		400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
255852	Bermuda	SCMC		400		400
113254	Bermuda	SCMC		400		400
311808	Bermuda	SCMC		400		400
334438	Bermuda	SCMC		400		400
141991	Bermuda	SCMC		400		400
170727	Bermuda	SCMC		400		400
311809	Bermuda	SCMC		400		400
334440	Bermuda	SCMC		400		400
112618	Bermuda	SCMC		400		400
272535	Bermuda	SCMC		400		400
272029	Bermuda	SCMC		400		400
187185	Bermuda	SCMC		400		400
109766	Bermuda	SCMC			400	400
155029	Bermuda	SCMC			400	400
238984	Bermuda	SCMC			200	200
127090	Bermuda	SCMC			200	200
137727	Bermuda	SCMC			400	400
127088	Bermuda	SCMC			400	400
194327	Bermuda	SCMC			400	400
296077	Bermuda	SCMC			400	400
109473	Bermuda	SCMC			400	400
194326	Bermuda	SCMC			400	400
312953	Bermuda	SCMC			400	400
248941	Bermuda	SCMC			400	400
194328	Bermuda	SCMC			400	400
228080	Bermuda	SCMC			400	400
228079	Bermuda	SCMC			400	400
312954	Bermuda	SCMC			400	400
140278	Bermuda	SCMC			400	400
140277	Bermuda	SCMC			400	400
140276	Bermuda	SCMC			400	400
211039	Bermuda	SCMC			400	400
312955	Bermuda	SCMC			400	400
208679	Bermuda	BCMC	200			200
333503	Bermuda	BCMC		200		200
208680	Bermuda	BCMC	200			200
319326	Bermuda	BCMC		200		200
272575	Bermuda	SCMC			400	400
197295	Bermuda	SCMC			400	400
252487	Bermuda	SCMC			400	400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
196627	Bermuda	SCMC			400	400
204589	Bermuda	SCMC			400	400
175751	Bermuda	SCMC			400	400
153966	Bermuda	SCMC			400	400
321951	Bermuda	SCMC			400	400
198581	Bermuda	SCMC			400	400
319050	Bermuda	SCMC			400	400
301213	Bermuda	SCMC			400	400
152718	Bermuda	SCMC			400	400
153967	Bermuda	SCMC			400	400
272576	Bermuda	SCMC			400	400
331269	Bermuda	SCMC			400	400
152719	Bermuda	SCMC			400	400
149742	Bermuda	SCMC			400	400
245049	Bermuda	SCMC			200	200
274675	Bermuda	BCMC	200			200
133879	Bermuda	BCMC	200			200
206113	Bermuda	BCMC		200		200
253790	Bermuda	BCMC	200			200
208665	Bermuda	BCMC			200	200
220721	Bermuda	BCMC	200			200
133149	Bermuda	BCMC			200	200
111266	Bermuda	SCMC			400	400
149743	Bermuda	SCMC			400	400
264613	Bermuda	SCMC			200	200
287592	Bermuda	BCMC			200	200
143403	Bermuda	BCMC		200		200
311416	Bermuda	SCMC			400	400
294334	Bermuda	SCMC			400	400
114818	Bermuda	SCMC			400	400
228286	Bermuda	SCMC			200	200
324139	Bermuda	SCMC			400	400
209450	Bermuda	SCMC			400	400
228285	Bermuda	SCMC			400	400
172155	Bermuda	SCMC			400	400
257480	Bermuda	SCMC			400	400
155571	Bermuda	SCMC			400	400
221527	Bermuda	SCMC			400	400
155570	Bermuda	SCMC			400	400
287593	Bermuda	SCMC			400	400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
190215	Bermuda	SCMC			400	400
344937	Bermuda	SCMC			400	400
144206	Bermuda	SCMC			400	400
218108	Bermuda	SCMC			400	400
300505	Bermuda	SCMC			400	400
151994	Bermuda	SCMC			400	400
111326	Bermuda	SCMC			400	400
318432	Bermuda	SCMC			400	400
271264	Bermuda	SCMC			400	400
252486	Bermuda	SCMC			400	400
263844	Bermuda	SCMC			400	400
151995	Bermuda	SCMC			400	400
263843	Bermuda	SCMC			400	400
303512	Bermuda	BCMC			200	200
172398	Bermuda	BCMC			200	200
139377	Bermuda	BCMC		200		200
235333	Bermuda	BCMC			200	200
128220	Bermuda	BCMC			200	200
143404	Bermuda	SCMC			400	400
157516	Bermuda	SCMC			400	400
279025	Bermuda	SCMC			400	400
216734	Bermuda	BCMC			200	200
211413	Bermuda	BCMC			200	200
158913	Bermuda	BCMC		200		200
211412	Bermuda	SCMC			200	200
325555	Bermuda	SCMC			200	200
326122	Bermuda	SCMC			400	400
296852	Bermuda	SCMC			400	400
259468	Bermuda	SCMC			200	200
223527	Bermuda	SCMC			200	200
157577	Bermuda	BCMC			200	200
296254	Bermuda	BCMC			200	200
554561	Bermuda	SCMC		400		400
554562	Bermuda	SCMC		400		400
554563	Bermuda	SCMC		400		400
554564	Bermuda	SCMC		400		400
554565	Bermuda	SCMC		400		400
554566	Bermuda	SCMC		400		400
554567	Bermuda	SCMC		400		400
554568	Bermuda	SCMC		400		400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
554569	Bermuda	SCMC		400		400
554570	Bermuda	SCMC		400		400
554571	Bermuda	SCMC		400		400
554572	Bermuda	SCMC		400		400
554573	Bermuda	SCMC		400		400
554574	Bermuda	SCMC		400		400
554575	Bermuda	SCMC		400		400
554576	Bermuda	SCMC		400		400
554577	Bermuda	SCMC		400		400
554578	Bermuda	SCMC		400		400
554579	Bermuda	SCMC		400		400
554580	Bermuda	SCMC		400		400
554581	Bermuda	SCMC		400		400
554582	Bermuda	SCMC		400		400
554583	Bermuda	SCMC		400		400
554584	Bermuda	SCMC		400		400
554585	Bermuda	SCMC		400		400
554586	Bermuda	SCMC		400		400
554587	Bermuda	SCMC		400		400
554588	Bermuda	SCMC		400		400
554589	Bermuda	SCMC		400		400
554590	Bermuda	SCMC		400		400
554591	Bermuda	SCMC		400		400
554592	Bermuda	SCMC		400		400
554593	Bermuda	SCMC		400		400
554594	Bermuda	SCMC		400		400
554595	Bermuda	SCMC		400		400
554596	Bermuda	SCMC		400		400
554597	Bermuda	SCMC		400		400
554598	Bermuda	SCMC		400		400
554599	Bermuda	SCMC		400		400
554600	Bermuda	SCMC		400		400
554601	Bermuda	SCMC		400		400
554602	Bermuda	SCMC		400		400
554603	Bermuda	SCMC		400		400
554604	Bermuda	SCMC		400		400
554605	Bermuda	SCMC		400		400
554606	Bermuda	SCMC		400		400
554607	Bermuda	SCMC		400		400
554608	Bermuda	SCMC		400		400

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
554609	Bermuda	SCMC		400		400
554610	Bermuda	SCMC		400		400
554611	Bermuda	SCMC		400		400
554612	Bermuda	SCMC		400		400
554613	Bermuda	SCMC		400		400
554614	Bermuda	SCMC		400		400
554615	Bermuda	SCMC		400		400
554616	Bermuda	SCMC		400		400
554617	Bermuda	SCMC		400		400
554618	Bermuda	SCMC		400		400
554619	Bermuda	SCMC		400		400
554620	Bermuda	SCMC		400		400
554621	Bermuda	SCMC		400		400
554622	Bermuda	SCMC		400		400
554623	Bermuda	SCMC		400		400
554624	Bermuda	SCMC		400		400
554625	Bermuda	SCMC		400		400
554626	Bermuda	SCMC		400		400
554627	Bermuda	SCMC		400		400
554628	Bermuda	SCMC		400		400
554629	Bermuda	SCMC		400		400
554630	Bermuda	SCMC		400		400
554631	Bermuda	SCMC		400		400
554632	Bermuda	SCMC		400		400
554633	Bermuda	SCMC		400		400
554634	Bermuda	SCMC		400		400
554635	Bermuda	SCMC		400		400
554636	Bermuda	SCMC		400		400
554637	Bermuda	SCMC		400		400
554638	Bermuda	SCMC		400		400
326106	Geordie	BCMC		200		200
128291	Geordie	BCMC		200		200
277477	Geordie	BCMC		200		200
128290	Geordie	BCMC		200		200
128317	Geordie	BCMC		200		200
296851	Geordie	BCMC		200		200
157561	Geordie	BCMC		200		200
277497	Geordie	BCMC		200		200
163629	Geordie	BCMC		200		200
211484	Geordie	BCMC		200		200

Marathon Claims Held by Generation PGM Inc.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
259492	Geordie	BCMC		200		200
177740	Geordie	BCMC			200	200
143483	Geordie	BCMC		200		200
102006	Geordie	BCMC			200	200
277478	Geordie	BCMC		200		200
164285	Geordie	BCMC			200	200
143472	Geordie	BCMC		200		200
258946	Geordie	BCMC		200		200
277496	Geordie	BCMC			200	200
145363	Geordie	SCMC		400		400
172157	Geordie	SCMC		400		400
325554	Geordie	SCMC		400		400
128217	Geordie	SCMC		400		400
277413	Geordie	SCMC		400		400
128218	Geordie	SCMC		400		400
157515	Geordie	SCMC		400		400
277414	Geordie	SCMC		400		400
296257	Geordie	SCMC		400		400
296256	Geordie	SCMC		400		400
157537	Geordie	SCMC		400		400
296297	Geordie	SCMC		400		400
296296	Geordie	SCMC		400		400
277445	Geordie	SCMC		400		400
230249	Geordie	SCMC		400		400
296295	Geordie	SCMC		400		400
157538	Geordie	SCMC		400		400
230250	Geordie	SCMC		400		400
100427	Geordie	SCMC		400		400
325573	Geordie	SCMC		400		400
325557	Geordie	SCMC		400		400
211416	Geordie	SCMC		400		400
117047	Geordie	SCMC		400		400
172160	Geordie	SCMC		400		400
311421	Geordie	SCMC		400		400
275491	Geordie	SCMC		400		400
325427	Geordie	SCMC		400		400
156876	Geordie	SCMC		400		400
127580	Geordie	SCMC		400		400
258266	Geordie	SCMC		400		400
294340	Geordie	SCMC		400		400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
257483	Geordie	SCMC		400		400
144771	Geordie	SCMC		400		400
222317	Geordie	SCMC		400		400
295623	Geordie	SCMC		400		400
172159	Geordie	SCMC		400		400
201400	Geordie	SCMC		400		400
278950	Geordie	SCMC		400		400
296267	Geordie	SCMC		400		400
296266	Geordie	SCMC		400		400
128219	Geordie	SCMC		400		400
278951	Geordie	SCMC		400		400
325559	Geordie	SCMC		400		400
325558	Geordie	SCMC		400		400
258877	Geordie	SCMC		400		400
128221	Geordie	SCMC		400		400
230236	Geordie	SCMC		400		400
296268	Geordie	SCMC		400		400
314014	Geordie	SCMC		400		400
275490	Geordie	SCMC		400		400
117129	Geordie	SCMC		400		400
143480	Geordie	SCMC		400		400
163605	Geordie	SCMC		400		400
143481	Geordie	SCMC		400		400
279024	Geordie	SCMC		400		400
326121	Geordie	SCMC		400		400
287595	Geordie	BCMC			200	200
230234	Geordie	BCMC			200	200
311420	Geordie	SCMC			400	
155574	Geordie	SCMC			400	
155573	Geordie	SCMC			400	
210762	Geordie	SCMC			400	
115085	Geordie	SCMC			400	
325426	Geordie	SCMC			400	
229575	Geordie	SCMC			400	
224325	Geordie	BCMC			200	200
277498	Geordie	BCMC		200		200
314738	Geordie	BCMC			200	200
163606	Geordie	BCMC		200		200
177739	Geordie	BCMC			200	200
157576	Geordie	BCMC		200		200

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
177741	Geordie	SCMC			400	
314739	Geordie	SCMC			400	
102120	Geordie	SCMC			400	
268281	Geordie	SCMC			400	
116475	Geordie	SCMC			400	
212816	Geordie	SCMC			400	
164907	Geordie	SCMC			400	
202814	Geordie	BCMC			200	200
126273	Geordie	BCMC			200	200
128315	Geordie	SCMC			400	400
296265	Geordie	SCMC			400	400
221530	Geordie	SCMC			400	400
221529	Geordie	SCMC			400	400
230316	Geordie	SCMC			400	400
172158	Geordie	SCMC			400	400
211415	Geordie	SCMC			400	400
142801	Geordie	SCMC			400	400
100401	Geordie	SCMC			400	400
277416	Geordie	SCMC			400	400
100402	Geordie	SCMC			400	400
296259	Geordie	SCMC			400	400
314010	Geordie	BCMC			200	200
142802	Geordie	BCMC		200		200
163524	Geordie	SCMC			400	400
163523	Geordie	SCMC			400	400
145505	Geordie	SCMC			400	400
224203	Geordie	SCMC			400	400
164286	Geordie	SCMC			400	400
277415	Geordie	SCMC			400	400
296258	Geordie	SCMC			400	400
194148	Geordie	BCMC			200	200
100400	Geordie	BCMC			200	200
278949	Geordie	SCMC			400	400
163522	Geordie	SCMC			400	400
314009	Geordie	BCMC			200	200
231613	Geordie	BCMC			200	200
297004	Geordie	SCMC			400	400
128992	Geordie	SCMC			400	400
163604	Geordie	SCMC			400	400
145506	Geordie	SCMC			400	400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
212177	Geordie	SCMC			400	400
143482	Geordie	SCMC			400	400
231612	Geordie	BCMC			200	200
128993	Geordie	BCMC			200	200
164287	Geordie	BCMC			200	200
280334	Geordie	BCMC			200	200
116474	Geordie	BCMC			200	200
117130	Geordie	BCMC			200	200
206776	Marathon	BCMC	200			200
150705	Marathon	BCMC	200			200
198766	Marathon	BCMC	200			200
198765	Marathon	BCMC	200			200
275834	Marathon	BCMC	200			200
151252	Marathon	BCMC	200			200
303281	Marathon	BCMC	200			200
206112	Marathon	BCMC	200			200
252582	Marathon	BCMC	200			200
168857	Marathon	BCMC	200			200
321231	Marathon	BCMC		200		200
156036	Marathon	BCMC	200			200
150675	Marathon	BCMC		200		200
150706	Marathon	BCMC	200			200
134699	Marathon	BCMC	200			200
156037	Marathon	BCMC	200			200
265224	Marathon	BCMC		200		200
218903	Marathon	BCMC		200		200
321501	Marathon	BCMC		200		200
149843	Marathon	BCMC		200		200
235551	Marathon	BCMC	200			200
265368	Marathon	BCMC	200			200
206780	Marathon	BCMC	200			200
303280	Marathon	BCMC	200			200
271359	Marathon	BCMC	200			200
111269	Marathon	BCMC	200			200
133150	Marathon	BCMC	200			200
143275	Marathon	BCMC	200			200
143276	Marathon	BCMC	200			200
137830	Marathon	BCMC	200			200
275986	Marathon	BCMC	200			200
334721	Marathon	BCMC	200			200

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
239825	Marathon	BCMC		200		200
171947	Marathon	BCMC			200	200
319364	Marathon	BCMC	200			200
344487	Marathon	BCMC		200		200
136420	Marathon	BCMC		200		200
190289	Marathon	BCMC		200		200
231905	Marathon	BCMC			200	200
305685	Marathon	BCMC		200		200
208560	Marathon	BCMC		200		200
190290	Marathon	BCMC		200		200
304952	Marathon	BCMC		200		200
208479	Marathon	BCMC		200		200
241555	Marathon	BCMC			200	200
256297	Marathon	BCMC		200		200
316784	Marathon	BCMC			200	200
188960	Marathon	BCMC		200		200
279909	Marathon	BCMC			200	200
321671	Marathon	BCMC			200	200
211645	Marathon	BCMC			200	200
292966	Marathon	BCMC		200		200
177294	Marathon	BCMC			200	200
344056	Marathon	BCMC		200		200
207625	Marathon	BCMC		200		200
182471	Marathon	BCMC		200		200
125046	Marathon	BCMC		200		200
312532	Marathon	BCMC			200	200
153038	Marathon	BCMC		200		200
256568	Marathon	BCMC			200	200
125045	Marathon	BCMC		200		200
218898	Marathon	BCMC	200			200
303284	Marathon	BCMC	200			200
167917	Marathon	BCMC		200		200
143274	Marathon	BCMC	200			200
331274	Marathon	BCMC	200			200
272852	Marathon	BCMC	200			200
137814	Marathon	BCMC	200			200
197873	Marathon	BCMC	200			200
137815	Marathon	BCMC	200			200
305787	Marathon	BCMC	200			200
157365	Marathon	BCMC	200			200

Marathon Claims Held by Generation PGM Inc.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
312531	Marathon	BCMC		200		200
172007	Marathon	BCMC	200			200
238569	Marathon	BCMC		200		200
321504	Marathon	BCMC	200			200
334400	Marathon	BCMC		200		200
206782	Marathon	BCMC	200			200
206778	Marathon	BCMC	200			200
198767	Marathon	BCMC	200			200
115328	Marathon	BCMC	200			200
303288	Marathon	BCMC	200			200
265367	Marathon	BCMC	200			200
198810	Marathon	BCMC	200			200
306361	Marathon	BCMC	200			200
333840	Marathon	BCMC	200			200
303325	Marathon	BCMC	200			200
332804	Marathon	BCMC	200			200
168858	Marathon	BCMC	200			200
245073	Marathon	BCMC		200		200
218935	Marathon	BCMC	200			200
153437	Marathon	BCMC	200			200
275572	Marathon	BCMC	200			200
244404	Marathon	SCMC		200		200
244406	Marathon	SCMC		200		200
111129	Marathon	SCMC		200		200
149086	Marathon	SCMC		200		200
263948	Marathon	SCMC		200		200
111130	Marathon	SCMC		200		200
169511	Marathon	SCMC	400			400
218899	Marathon	SCMC	400			400
321498	Marathon	SCMC	400			400
150704	Marathon	SCMC	400			400
303307	Marathon	SCMC		400		400
319892	Marathon	SCMC		200		200
150019	Marathon	SCMC	400			400
218239	Marathon	SCMC	200			200
318699	Marathon	SCMC	200			200
218238	Marathon	SCMC	200			200
153454	Marathon	SCMC	400			400
284928	Marathon	SCMC	400			400
319891	Marathon	SCMC	200			200

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
198788	Marathon	SCMC	200			200
169535	Marathon	SCMC	400			400
226190	Marathon	SCMC	400			400
303306	Marathon	SCMC	400			400
150721	Marathon	SCMC	200			200
133241	Marathon	SCMC	200			200
284929	Marathon	SCMC		400		400
198789	Marathon	SCMC		200		200
133242	Marathon	SCMC		400		400
226191	Marathon	SCMC		400		400
153455	Marathon	SCMC		200		200
169536	Marathon	SCMC		200		200
235550	Marathon	SCMC		400		400
153442	Marathon	SCMC		400		400
319367	Marathon	SCMC		400		400
206779	Marathon	SCMC		400		400
167896	Marathon	SCMC	200			200
201997	Marathon	SCMC	200			200
239824	Marathon	SCMC	200			200
172029	Marathon	SCMC		200		200
110624	Marathon	SCMC		400		400
291532	Marathon	SCMC		400		400
256377	Marathon	SCMC		200		200
156595	Marathon	SCMC		200		200
343752	Marathon	SCMC		200		200
256376	Marathon	SCMC		200		200
136421	Marathon	SCMC		200		200
304953	Marathon	SCMC		400		400
156596	Marathon	SCMC		400		400
110625	Marathon	SCMC		200		200
267833	Marathon	SCMC		200		200
181593	Marathon	SCMC		200		200
311766	Marathon	SCMC		200		200
136423	Marathon	SCMC		200		200
274443	Marathon	SCMC		400		400
304954	Marathon	SCMC		200		200
201721	Marathon	SCMC		200		200
142476	Marathon	SCMC		200		200
304955	Marathon	SCMC		200		200
343753	Marathon	SCMC		200		200

Marathon Claims Held by Generation PGM Inc.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
189033	Marathon	SCMC		200		200
258497	Marathon	SCMC		200		200
202469	Marathon	SCMC		200		200
143683	Marathon	SCMC		400		400
275150	Marathon	SCMC		400		400
275149	Marathon	SCMC		200		200
202470	Marathon	SCMC		200		200
257105	Marathon	SCMC		400		400
257104	Marathon	SCMC		400		400
292967	Marathon	SCMC		200		200
156527	Marathon	SCMC		400		400
201139	Marathon	SCMC		400		400
272850	Marathon	SCMC	400			400
226249	Marathon	SCMC	200			200
115388	Marathon	SCMC	200			200
206848	Marathon	SCMC	200			200
151304	Marathon	SCMC	200			200
206849	Marathon	SCMC	400			400
272851	Marathon	SCMC	200			200
333922	Marathon	SCMC	400			400
115389	Marathon	SCMC	200			200
273036	Marathon	SCMC		400		400
169673	Marathon	SCMC		400		400
321670	Marathon	SCMC		400		400
265583	Marathon	SCMC		400		400
102686	Marathon	SCMC		400		400
273037	Marathon	SCMC		400		400
182470	Marathon	SCMC		200		200
207624	Marathon	SCMC		200		200
235555	Marathon	SCMC	400			400
235554	Marathon	SCMC	400			400
321502	Marathon	SCMC	400			400
303285	Marathon	SCMC	400			400
272770	Marathon	SCMC	400			400
272769	Marathon	SCMC	400			400
218906	Marathon	SCMC	400			400
325307	Marathon	SCMC	200			200
256609	Marathon	SCMC	200			200
275976	Marathon	SCMC	200			200
334720	Marathon	SCMC	400			400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
312583	Marathon	SCMC	400			400
312582	Marathon	SCMC	200			200
222041	Marathon	SCMC	400			400
258012	Marathon	SCMC	200			200
272774	Marathon	SCMC	400			400
272773	Marathon	SCMC	400			400
265370	Marathon	SCMC	400			400
235557	Marathon	SCMC	400			400
134734	Marathon	SCMC	400			400
321505	Marathon	SCMC	400			400
226211	Marathon	SCMC	400			400
170062	Marathon	SCMC	400			400
285451	Marathon	SCMC	400			400
333883	Marathon	SCMC	400			400
133265	Marathon	SCMC	400			400
319903	Marathon	SCMC	400			400
218936	Marathon	SCMC	400			400
151253	Marathon	SCMC	400			400
333884	Marathon	SCMC	400			400
271336	Marathon	BCMC	200			200
185177	Marathon	BCMC		200		200
303095	Marathon	BCMC			200	200
167893	Marathon	BCMC	200			200
149085	Marathon	BCMC		200		200
149084	Marathon	SCMC		200		200
111128	Marathon	SCMC		400		400
285633	Marathon	SCMC			400	400
321672	Marathon	SCMC			400	400
111125	Marathon	BCMC			200	200
109585	Marathon	BCMC			200	200
315645	Marathon	SCMC			400	400
241554	Marathon	SCMC			400	400
175440	Marathon	SCMC			400	400
230024	Marathon	SCMC			400	400
192910	Marathon	SCMC			400	400
140916	Marathon	BCMC			200	200
194455	Marathon	SCMC			400	400
249564	Marathon	SCMC			400	400
140918	Marathon	SCMC			400	400
140917	Marathon	BCMC			200	200

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
308905	Marathon	SCMC			200	200
175441	Marathon	BCMC			200	200
311680	Marathon	BCMC		200		200
181524	Marathon	BCMC		200		200
129383	Marathon	BCMC			200	200
300157	Marathon	SCMC			200	200
201140	Marathon	BCMC		200		200
132075	Marathon	BCMC			200	200
136344	Marathon	BCMC		200		200
132074	Marathon	BCMC			200	200
231906	Marathon	BCMC			200	200
305684	Marathon	BCMC		200		200
177295	Marathon	SCMC			200	200
223863	Marathon	SCMC			200	200
250880	Marathon	SCMC			200	200
338880	Marathon	SCMC			400	400
152066	Marathon	BCMC			200	200
301081	Marathon	SCMC			200	200
132483	Marathon	SCMC			400	400
267762	Marathon	SCMC			400	400
152067	Marathon	SCMC			200	200
132485	Marathon	SCMC			200	200
132484	Marathon	SCMC			200	200
256294	Marathon	SCMC			400	400
167251	Marathon	SCMC			200	200
337992	Marathon	SCMC			400	400
149078	Marathon	SCMC			400	400
188956	Marathon	SCMC			400	400
208477	Marathon	BCMC			200	200
274532	Marathon	BCMC			200	200
332647	Marathon	SCMC			200	200
318427	Marathon	SCMC			400	400
252422	Marathon	SCMC			400	400
311676	Marathon	SCMC			400	400
143049	Marathon	BCMC			200	200
142403	Marathon	BCMC			200	200
157801	Marathon	SCMC			200	200
238413	Marathon	SCMC			400	400
209781	Marathon	SCMC			400	400
292965	Marathon	SCMC			400	400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	Project	Title Type	Amount Required Per Year ($)			Work Required ($)
			2020	2021	2022	
323980	Marathon	SCMC			400	400
207242	Marathon	BCMC	200			200
149744	Marathon	BCMC			200	200
136479	Marathon	SCMC			400	400
169277	Marathon	SCMC			200	200
273230	Marathon	SCMC			200	200
187736	Marathon	BCMC	200			200
244405	Marathon	BCMC		200		200
200673	Marathon	SCMC			200	200
170694	Marathon	SCMC			200	200
208681	Marathon	BCMC		200		200
115334	Marathon	BCMC	200			200
323981	Marathon	SCMC			200	200
237770	Marathon	SCMC			200	200
220737	Marathon	BCMC	200			200
265451	Marathon	BCMC	200			200
156038	Marathon	BCMC	200			200
272849	Marathon	BCMC	200			200
235553	Marathon	BCMC	200			200
136480	Marathon	BCMC	200			200
186486	Marathon	BCMC	200			200
169276	Marathon	BCMC			200	200
343821	Marathon	BCMC			200	200
331128	Marathon	BCMC			200	200
137000	Marathon	BCMC			200	200
156521	Marathon	BCMC			200	200
189626	Marathon	SCMC			400	400
110708	Marathon	SCMC			400	400
256295	Marathon	BCMC			200	200
137001	Marathon	BCMC			200	200
182191	Marathon	SCMC			200	200
245070	Marathon	SCMC	400			400
271358	Marathon	SCMC	400			400
332802	Marathon	SCMC	400			400
205353	Marathon	SCMC		400		400
149760	Marathon	SCMC		400		400
152744	Marathon	SCMC	400			400
264637	Marathon	SCMC	400			400
152743	Marathon	SCMC	400			400
133166	Marathon	SCMC		400		400

MARATHON CLAIMS HELD BY GENERATION PGM INC.						
Claim ID	**Project**	**Title Type**	**Amount Required Per Year ($)**			**Work Required ($)**
			2020	**2021**	**2022**	
152742	Marathon	SCMC		400		400
245072	Marathon	SCMC		400		400
321230	Marathon	SCMC		400		400
332803	Marathon	SCMC		200		200
245071	Marathon	SCMC		400		400
264638	Marathon	BCMC	200			200
264684	Marathon	BCMC	200			200
171948	Marathon	SCMC			200	200
285632	Marathon	BCMC		200		200
137248	Marathon	BCMC			200	200
265584	Marathon	BCMC		200		200
132456	Marathon	BCMC			200	200
238266	Marathon	BCMC			200	200
142402	Marathon	BCMC			200	200
337986	Marathon	BCMC			200	200
188413	Marathon	BCMC			200	200
167246	Marathon	BCMC			200	200
257853	Marathon	BCMC			200	200
238570	Marathon	BCMC	200			200
312584	Marathon	BCMC	200			200