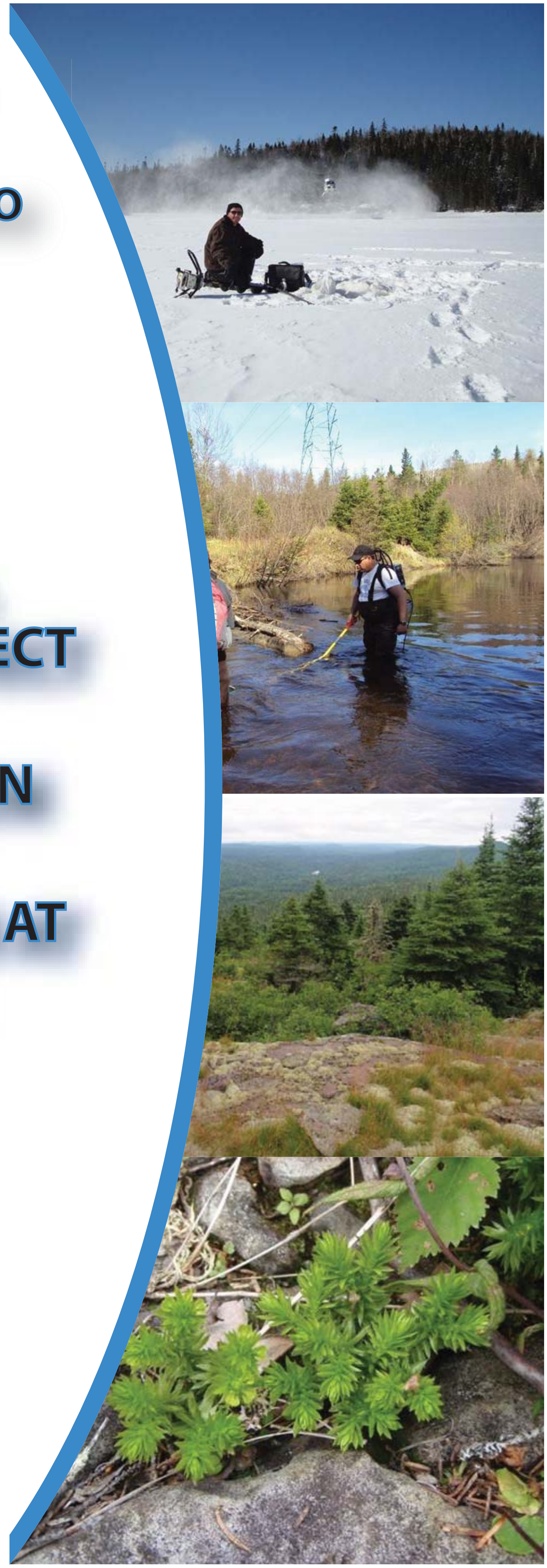
ENVIRONMENTAL ASSESSMENT FOR THE MARATHON PGM-Cu PROJECT AT MARATHON, ONTARIO



STILLWATER CANADA INC. MARATHON PGM-Cu PROJECT

SUPPORTING INFORMATION DOCUMENT No. 4 - GEOLOGICAL CONDITIONS AT THE MARATHON PGM-Cu PROJECT SITE

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GEOLOGICAL CONDITIONS AT THE MARATHON PGM-Cu PROJECT SITE

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EXECUTIVE SUMMARY

Stillwater Canada Inc. (SCI) proposes to develop a platinum group metals (PGMs), copper (Cu) and iron (Fe) open-pit mine and milling operation near Marathon, Ontario (the Project). EcoMetrix Incorporated was retained to summarize geological conditions at the Project site based on previous exploration work and other existing information.

The objectives of this assignment were twofold:

1. to provide a general understanding of the regional and local geological settings; and,
2. to characterize the nature and mechanisms of mineralization of the Marathon PGM-Cu deposit.

The Marathon PGM-Cu deposit is hosted within the Eastern Gabbro Series of the Proterozoic Coldwell Complex, which intrudes and bisects the much older Archean Schreiber-Hemlo Greenstone Belt. The sub-circular complex has a diameter of 25 km and a surface area of 580 km^2, and is the largest alkaline intrusive complex in North America. The Coldwell Complex was emplaced as three nested intrusive centres that were active during cauldron subsidence near where the northern end of the Thiel Fault intersected Archean rocks, on the north shore of Lake Superior.

Mineralization at the Marathon PGM-Cu property is part of a very large magmatic system that consists of at least two major intrusive events of predominantly olivine gabbroic units that form the Eastern Gabbro of the Coldwell Complex. The earlier of the two events is termed the Layered Gabbro Series (LGS) and is made up of alternating layers of gabbro, olivine gabbro and troctolite. The grain size for units within the LGS varies considerably, with some units, on the order of 100 m in thickness, being comprised of numerous 1-5 m thick layers of fine grained gabbro. The LGS was intruded by the Two Duck Intrusion (TDI) in multiple horizons within the stratigraphic package that makes up the LGS. The TDI is composed of coarse grained to pegmatitic relatively homogeneous gabbro and olivine gabbro or troctolite. Late quartz syenite and augite syenite dykes cut all of the gabbros but form a minor component of the intrusive assemblage. The TDI is the host rock for Cu-PGM mineralization and has been the focus of past exploration activities.

A very prominent feature of the Marathon PGM-Cu deposit is the local and extreme enrichment of PGMs 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 g/t = 1 ppm) might also contain very low concentrations of Cu and Ni (<0.02%). The separation of PGMs 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.

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ACRONYMS AND ABBREVATIONS

Au	Gold
BHP	BHP Engineering Pty Ltd.
CARs	Canadian Aviation Regulations
CEA Agency	Canadian Environmental Assessment Agency
Cu	Copper
CYSP	Marathon Municipal Airport
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMRD	Extraction Metallurgy Research Division
Euralba	Euralba Mining Ltd.
Fe	Iron
Geostat	Geostat Systems International
HO	Harmonization Order
Hwy	Highway
Ir	Iridium
JRP	Joint Review Panel
km	Kilometre
LGS	Layered Gabbro Series
LMOC	Layered Magnetite Olivine Cumulate
Ma	Million years old
MPGM	Marathon PGM Corp.
MPI	Marathon Pulp Inc.
m	Metre
Ni	Nickel
NoC	Notice of Commencement
O. Reg.	Ontario Regulation
OEA Act	Ontario Environmental Assessment Act
Pd	Palladium
PGE	Platinum Group Element
PGM	Platinum Group Metal
PSMF	Process Solids Management Facility
Pt	Platinum
Rh	Rhodium
RIB	Rheomorphic Intrusive Breccia
S	Sulphur

SCI	Stillwater Canada Inc.
SFL	Sustainable Forest License
SWC	Stillwater Mining Company
TDI	Two Duck Intrusion
ToR	Terms of Reference
VA	Voluntary Agreement

1.0 INTRODUCTION

Stillwater Canada Inc. (SCI) proposes to develop a platinum group metals (PGMs), copper (Cu) and possibly iron (Fe) open-pit mine and milling operation near Marathon, Ontario. A Notice of Commencement (NoC) of an environmental assessment (EA) in relation to the proposed Marathon PGM-Cu Project (the “Project”) was filed by the Canadian Environmental Assessment Agency (CEA Agency) under Section 5 of the Canadian Environmental Assessment Act on April 29, 2010 (updated July 19, 2010).

The EA was referred to an independent Review Panel by the Federal Minister of the Environment on October 7, 2010. On March 23, 2011 SCI entered into a Voluntary Agreement (VA) with the Province of Ontario to have the Project subject to the Ontario Environmental Assessment Act (OEA Act). This agreement was the instrument that permitted the provincial government to issue a Harmonization Order (HO) under Section 18(2) of the Canada-Ontario Agreement on Environmental Assessment Cooperation to establish a Joint Review Panel for the Project between the Minister of the Environment, Canada and the Minister of the Environment, Ontario.

The HO was issued on March 25, 2011. The Terms of Reference (ToR) for the Project Environmental Impact Statement (EIS) and the agreement establishing the Joint Review Panel (JRP) were issued on August 8, 2011.

The following provides an overview of the proposed development including its location, surrounding land uses, the exploration history of the site and the primary conceptual features of the mining and milling facilities. The information provided below, in the Environmental Impact Statement Report and supporting technical studies is based on the conceptual mine design for the Project. The conceptual design provides planning level information for the environmental assessment process. Final detailed design will commence following EA approval in concordance with the concepts presented herein.

1.1 Project Location

The Project is located approximately 10 km north of the Town of Marathon, Ontario (Figure 1.1.1). The town, population approximately 3,000, is situated adjacent to the Trans-Canada Highway 17 (Hwy 17) on the northeast shore of Lake Superior, about 300 km east and 400 km northwest (by highway) of Thunder Bay and Sault Ste. Marie, respectively.

The centre of the Project footprint sits at approximately 48° 47’ N latitude and 86° 19’ W longitude. The Project site is in an area characterized by relatively dense vegetation, comprised largely of a birch- and, to a lesser extent, spruce-dominated mixed wood forest. The terrain is moderate to steep, with frequent bedrock outcrops and prominent east-west oriented valleys. The climate of this area is typical of northern areas within the Canadian Shield, with long winters and short, warm summers.

Figure 1.1-1: Location of the Proposed Marathon PGM-Cu Project Site near Marathon, Ontario

1.2 Surrounding Land Uses

The Project site lies partially within the municipal boundaries of the Town of Marathon, as well as partially within the unorganized townships of Pic, O'Neil and McCoy. The primary zoning designation within the Project Site is 'rural'.

In the immediate vicinity of the Project there are several authorized aggregate sites, including SCI's licensed aggregate site located to the northeast of Hwy 17 along the existing site access road (Camp 19 Road).

The Marathon Municipal Airport (CYSP), which operates as a Registered Airport (Aerodrome class) under the Canadian Aviation Regulations (CARs; Subsection 302), is adjacent to, and south of the Project site. The airport occupies a land area of approximately 219 hectares and is accessed from Hwy 17.

Several First Nations and Métis peoples claim the Project site as falling within their traditional land use boundaries. Based on Aboriginal accounts, prior to the construction of the forestry road, the land and water uses associated with (or close to) the site would have typically been limited to the Pic River corridor, the Bamoos Lake-Hare Lake-Lake Superior corridor and the Lake Superior shoreline and near-shore area, rather than the interior of the Project site. Traditional land and water uses (or rights conferred by Treaty) that can be ascribed to the site could include:

- Hunting;
- Trapping;
- Fishing; and,
- Plant harvesting for food, cultural and medicinal uses.

Primary industries supporting the Town of Marathon, as well as the region, have historically been forestry, pulp and paper, mining and tourism. The Project site is located within the Big Pic Forest Management Area. The Big Pic Forest includes Crown land east and north of Lake Superior and is generally north, south and west of the community of Manitouwadge and includes the communities of Marathon, Caramat and Hillsport.

Until July 2010 the forest was managed under the authority of a Sustainable Forest License (SFL), which was held by Marathon Pulp Inc. This SFL was revoked, with the forest reverting to the Crown as a Crown Forest. Until recently, Marathon Pulp Inc. (MPI) operated a kraft pulp mill in Marathon on the shore of Peninsula Harbour. The mill announced its indefinite shut down (effective at the end of February 2009) on February 11, 2009, and as a result there has been a significant downturn in the local economy. A second mill operated in Terrace Bay was temporarily closed in December 2011.

The Hemlo Mining Camp is located 30 km to the southeast. There are currently two mines in production at the Camp (David Bell Mine, Williams Mine), which are estimated to be in operations until 2025.

1.3 Exploration History of the Site

Exploration for copper and nickel deposits on the Project site started in the 1920s and continued until the 1940s with the discovery of titaniferous magnetite and disseminated chalcopyrite occurrences. During the past four decades, the site has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drill programs, geological studies, resource estimates, metallurgical studies, mining studies, and economic analyses. These studies have successively enhanced the knowledge base of the deposit.

In 1963, Anaconda acquired the Marathon property and carried out systematic exploration work including diamond drilling of 36,531 m in 173 drill holes. This culminated in the discovery of a large copper-PGM deposit. Anaconda 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 Marathon PGM-Cu Project with the objective of improving the project economics by focusing on the platinum group element (PGE) values of the deposit. The Fleck drilling totaled 3,615 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 conventional flotation plant with marketing of copper concentrate and Kilborn Limited carried out a prefeasibility review for Fleck that included preliminary results from the Lakefield pilot plant tests (Kilborn Limited, 1987). The feasibility study indicated a low internal rate of return which was confirmed by Teck Corporation who concluded the project was uneconomic due to low metal prices at the time. On June 10, 1998, Fleck changed its name to PolyMet Mining Corp.

In 2000, Geomaque acquired certain rights to the Marathon PGM-Cu Project through an option agreement with PolyMet. Geomaque and its consultants carried out a study of the economic potential of the Marathon PGM-Cu Project. The study included a review of the geology and drill hole database, interpretation of the mineralized zones, statistics and geostatistics, computerized block model, resource estimation, open pit design and optimization, metallurgy, process design, environmental aspects, capital and operating cost.

Marathon PGM Corp. acquired the Marathon PGM-Cu deposit from PolyMet in December 2003. Marathon PGM Corp. funded programs of advanced exploration and diamond drilling on a continuous basis between June 2004 and 2009. Approximately 320 holes and 65,000 m were drilled from 2007 to 2009 to define and expand the resource and for condemnation holes outside of the pit area. A feasibility study was published in 2008 and updated in January 2010.

Stillwater Mining Company (SWC) and Marathon PGM entered into an agreement on September 7, 2010 pursuant to which SWC would acquire all of the outstanding shares of Marathon PGM. The acquisition agreement received ministerial approval under the Investment Canada Act on November 24, 2010 and the agreement closed on November 30, 2010. On December 31, 2010 Stillwater Mining Company formed a Canadian corporation, Stillwater

Canada Inc. In March 2012, MC MINING LTD (MC) purchased 25% interest in Stillwater Canada Inc. who is the proponent of the Marathon PGM-Cu Project.

1.4 Project Overview

The Project is based on the development of an open pit mining and milling operation. One primary pit and a satellite pit complex to the south (currently envisaged to be comprised of four satellite pits) are proposed to be mined. Ore will be processed (crushed, ground, concentrated) at an on-site processing facility. Final concentrates containing copper and platinum group metals will be transported off-site via road and/or rail to a smelter and refinery for subsequent metal extraction and separation. The total mineral reserve (proven and probable) is estimated to be approximately 91.5 million tonnes. It is possible that an iron concentrate may also be produced, depending upon the results of further metallurgical testing and market conditions at that time.

During the operations phase of the Project, ore will be fed to the mill at an average rate of approximately 22,000 tonnes per day. The operating life of the mine is estimated to be approximately 11.5 years. The construction workforce will average approximately 400 people and will be required for between 18 and 24 months. During operations the work force will comprise an estimated 365 workers. The mine workforce will reside in local and surrounding communities, as well as in an Accommodations Complex that will be constructed in the Town of Marathon.

Approximately 288 million tonnes of mine rock[1] will be excavated. It is estimated that between eighty five to ninety percent of this material is non-acid generating (NAG) and will be permanently stored in a purposefully built Mine Rock Storage Area (MRSA) located east of the primary pit. The NAG or so-called Type 1 mine rock will also be used in the construction of access roads, dams and other site infrastructure as needed. Drainage from the MRSA will be collected, stored, treated and discharged as necessary to the Pic River. During mine operations, about 20 million tonnes of mine rock could have the potential to generate acid if left exposed for extended periods of time. This mine rock is referred to as Type 2 mine rock or potentially acid generating (PAG). The Type 2 mine rock will be managed on surface during mine operations in temporary stock piles with drainage directed into the open pits. This material will be relocated to the bottom of the primary and satellite pits and covered with water to prevent potential acid generation and covered with Type 1 materials.

[1] Mine rock is rock that has been excavated from active mining areas but does not have sufficient ore grades to process for mineral extraction.

Process solids[2] will be managed in the Process Solids Management Facility (PSMF), as well as in the satellite pit complex. The PSMF will be designed to hold approximately 61 million m^3 of material, and its creation will require the construction of dams. Two streams of process solids will be generated. An estimated 85 to 90% of the total amount of process solids produced will be non-acid generating, or so-called Type 1 process solids. The remaining ten to fifteen percent of the process solids could be potentially acid generating and referred to as Type 2 process solids. The Type 2 process solids will be stored below the water table in the PSMF or below water in the pits to mitigate potential acid generation and covered with Type 1materials. Water collected within the PSMF, as well as water collected around the mine site other than from the MRSA will be managed in the PSMF for eventual reclamation in the milling process. Excess water not needed in the mill will be discharged, following treatment as is necessary, to Hare Lake.

Access to the Project site is currently provided by the Camp 19 Road, opposite Peninsula Road at Hwy 17. The existing road runs east towards the Pic River before turning north along the river to the Project site (approximately 8 km). The existing road will be upgraded and utilized from its junction with Hwy 17 for approximately 2.0 km. At this point a new road running north will be constructed to the future plant site. The primary rationale for developing the new road is to move traffic away from the Pic River. The new section of road will link two sections of forest access roads located on the site.

Power to the Project site will be provided via a new 115 kV transmission line that will be constructed from a junction point on the Terrace Bay-Manitouwadge transmission line (M2W Line) located to the northwest of the primary pit. The new transmission line will run approximately 4.1 km to a substation at the mill site. The width of the transmission corridor will be approximately 30 m.

Disturbed areas of the Project footprint will be reclaimed in a progressive manner during all Project phases. Natural drainage patterns will be restored as much as possible. The ultimate goal of mine decommissioning will be to reclaim land within the Project footprint to permit future use by resident biota and as determined through consultation with the public, Aboriginal peoples and government. A certified Closure Plan for the Project will be prepared as required by Ontario Regulation (O.Reg.) 240/00 as amended by O.Reg.194/06 “Mine Development and Closure under Part VII of the Mining Act” and “Mine Rehabilitation Code of Ontario”.

Maps showing the existing features and topography of the site, as well as the proposed conceptual development of the site are provided in Figure 1.4-1 and 1.4-2, below.

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[2] Process solids are solids generated during the ore milling process following extraction of the ore (minerals) from the host material.

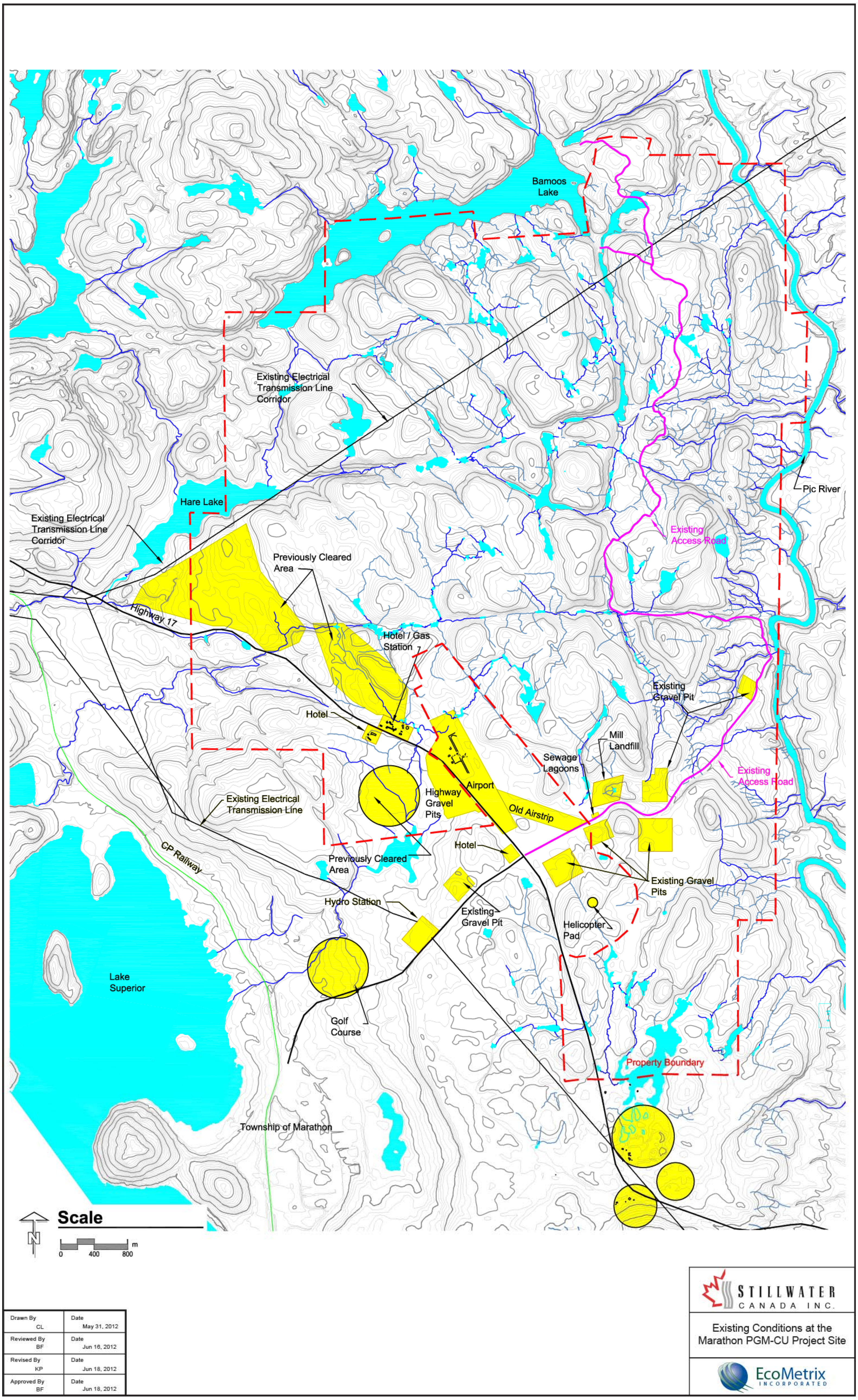

Figure 1.4-1: Existing Conditions at the Marathon PGM-Cu Project Site

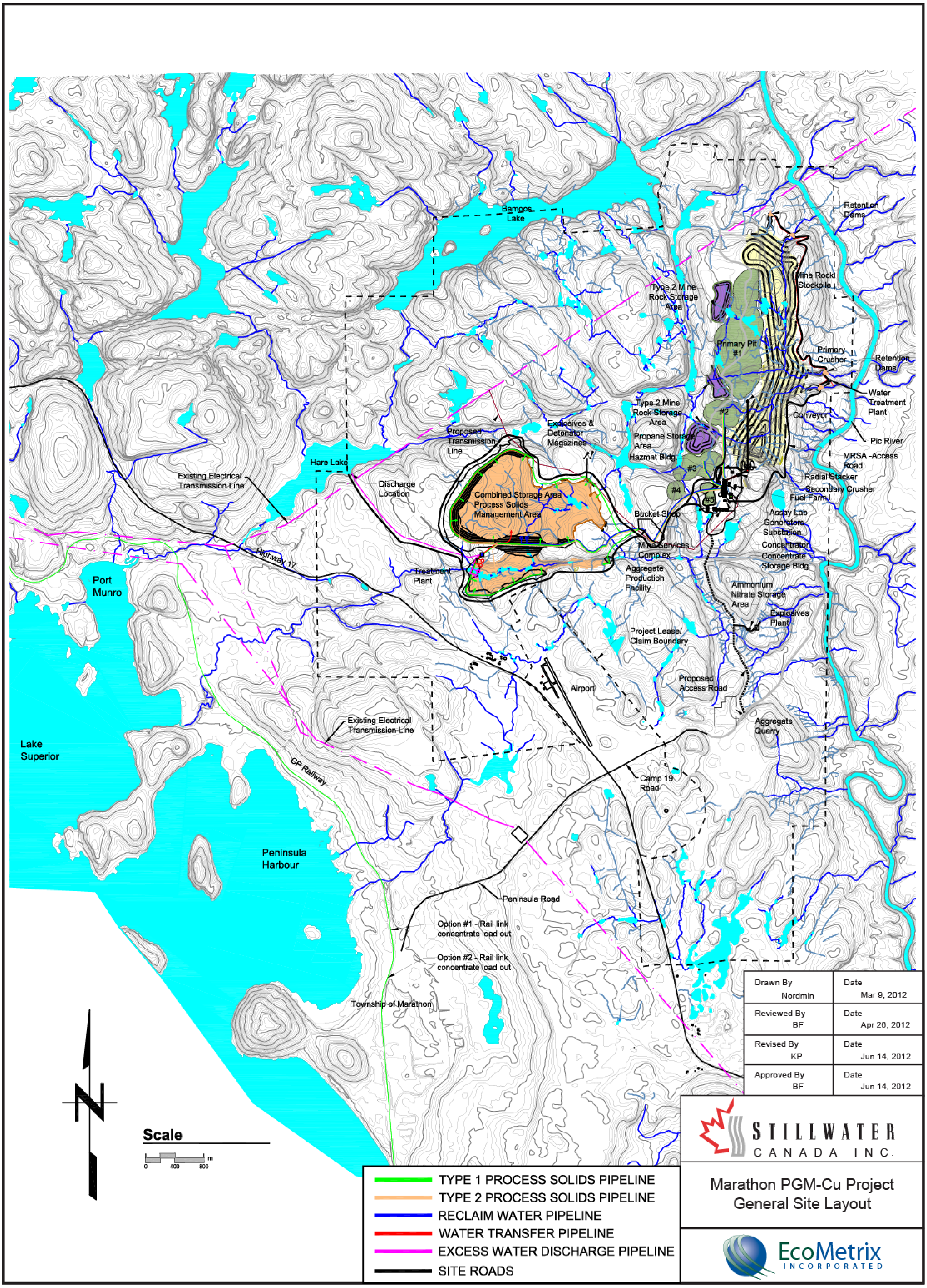

Figure 1.4-2: Marathon PGM-Cu Project General Site Layout

1.5 Scope of Work

The primary objectives of the characterization of geological conditions at the Marathon PGM-Cu Project site are twofold:

1. to provide a general understanding of the regional and local geological settings; and,
2. to characterize the nature and mechanisms of mineralization of the Marathon PGM-Cu deposit.

Much of the information provided is summarized from feasibility studies published in 2009 and 2010 (Micon, 2009; 2010). Additional information, particularly as it relates to regional geology, is drawn from various other sources.

1.6 Report Format

Following the introductory section the remainder of the report is organized as follows:

- Section 2 discusses the regional and local geological settings;
- Section 3 outlines of the proposed mechanisms of the mineralization of the Marathon deposit;
- Section 4 outlines the characteristics of mineralization of the Marathon property; and,
- Section 5 provides references that were consulted in the preparation of this report.

2.0 GEOLOGICAL SETTING

2.1 Regional Setting

The Marathon PGM-Cu deposit is hosted within the Eastern Gabbro Series of the Proterozoic Coldwell Complex which intrudes and bisects the much older Archean Schreiber-Hemlo Greenstone Belt. The sub-circular complex 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 Complex was emplaced as three nested intrusive centres (Centres I, II and III) (Mitchell and Platt, 1982) that were active during cauldron subsidence near where the northern end of the Thiel Fault intersected Archean rocks, on the north shore of Lake Superior (Figure 2.1-1). It is considered to be related to other intrusive complexes associated with the Mid Continental rift system such as the Duluth Complex, Logan Sills, and Crystal Lake Gabbro which were emplaced at around 1,108 Ma (Heaman and Machado, 1992).

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 2 km thick and strikes for 33 km around the eastern margin of the Coldwell Complex (Figure 2.1-2). It is considered the oldest intrusive phase of the Complex and is interpreted to have formed by at least three discrete intrusions of magma into restricted dilatant zones within a ring dyke possibly associated with ongoing caldera collapse (Walker et al., 1993, Shaw, 1997).

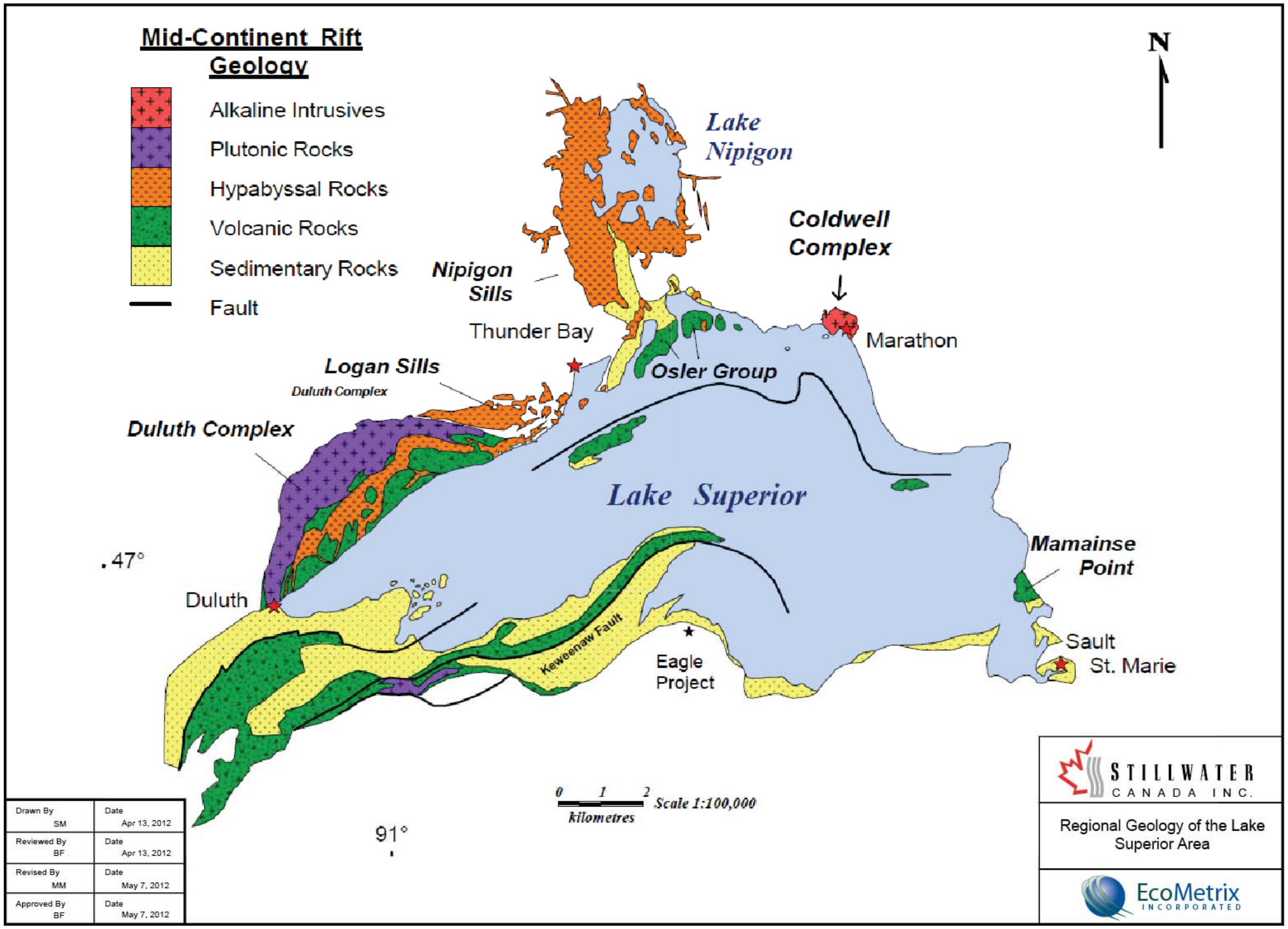

Figure 2.1-1: Regional Geology of the Lake Superior Area

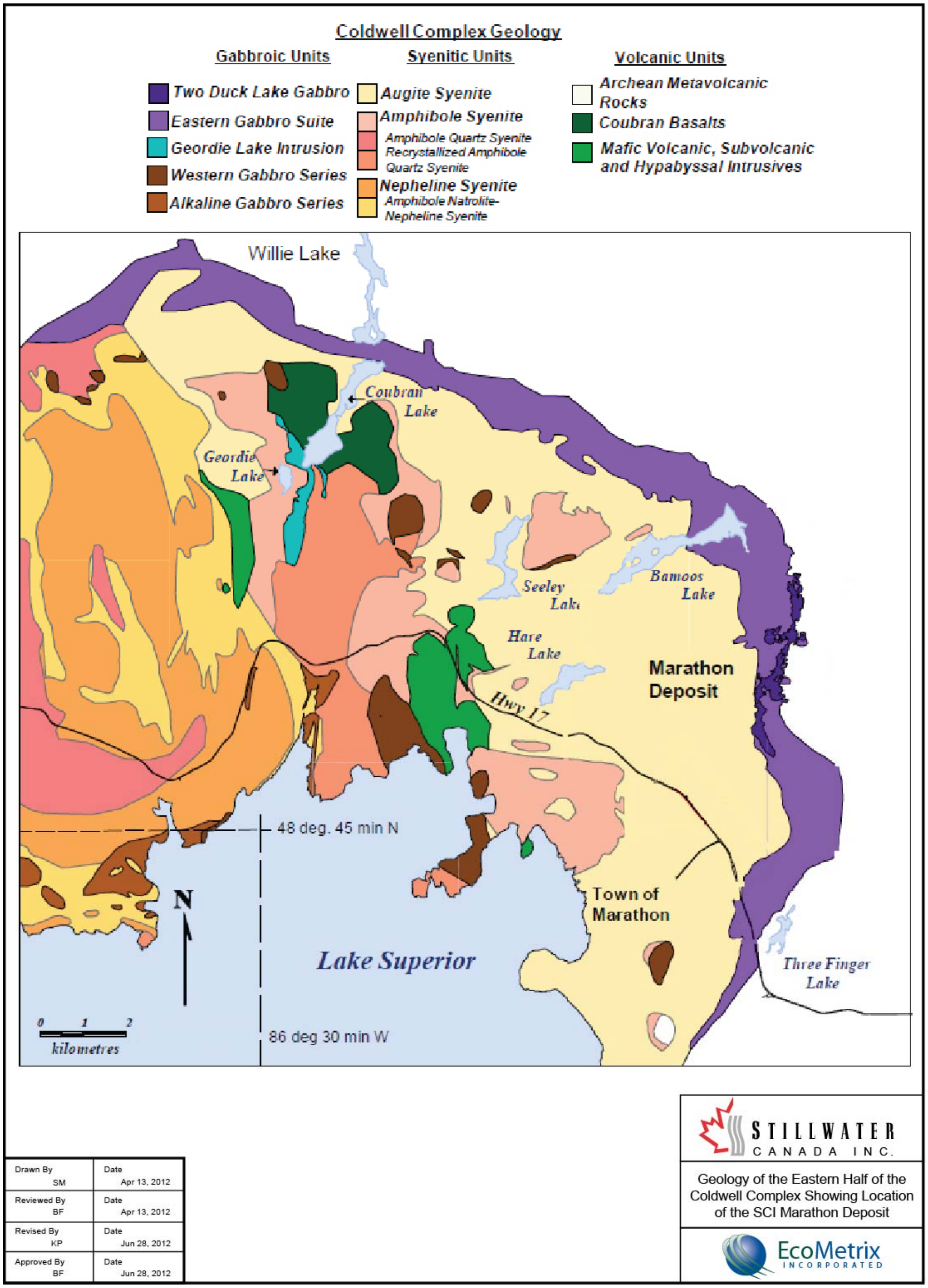

Figure 2.1-2: Geology of the Eastern Half of the Coldwell Complex Showing Locations of the Marathon PGM-Cu Deposit

2.2 Local Setting

2.2.2 Background Information

Mineralization at the Marathon PGM-Cu property is part of a very large magmatic system that consists of at least two major intrusive events of predominantly olivine gabbroic units that form the Eastern Gabbro of the Coldwell Complex (Figures 2.2-1 and 2.2-2). The earlier of the two events is termed the Layered Gabbro Series (LGS) and is made up of alternating layers of gabbro, olivine gabbro and troctolite. The grain size for units within the LGS varies considerably, with some units, on the order of 100 m in thickness, being comprised of numerous 1 - 5 m thick layers of fine grained gabbro. The LGS was intruded by the Two Duck Intrusion (TDI) in multiple horizons within the stratigraphic package that makes up the LGS. The TDI is composed of coarse grained to pegmatitic relatively homogeneous gabbro and olivine gabbro or troctolite. Late quartz syenite and augite syenite dykes cut all of the gabbros but form a minor component of the intrusive assemblage. The TDI is the host rock for Cu-PGM mineralization and has been the focus of exploration.

Previous workers have suggested the LGS and TDI are part of a single large layered intrusive complex with upper, lower and basal zones and TDI is the basal or contact phase of the Eastern Gabbro Layered Intrusion (Mainwaring et al., 1982; Good, 1993; Dahl et al., 2001; Barrie, 2001). However, the gabbro units clearly do not co-exist as an orderly assemblage similar to other layered intrusions. Recent detailed mapping of numerous exploration trenches shows that the TDI cross-cuts the LGS at multiple horizons with most of the TDI occurring at the base of the LGS; although a significant amount of TDI occurs higher up in the stratigraphy of the LGS as anastomozing or bifurcating series of dykes or sills that cut the pre-existing gabbros.

The TDI that occurs higher up in the LGS is a very distinct unit of the TDI because it locally contains significant amounts of Cu-PGM mineralization within layers of up to 90% cumulus magnetite that are tens of metres thick and so this unit is termed the layered magnetite olivine cumulate (LMOC). These magnetite rich layers were previously believed to form an oxide reef within the LGS (Mainwaring et al., 1982; Barrie, 2004) but recent mapping clearly shows the magnetite rich layers occur within zoned or layered dikes and pods that cut the LGS and does not form a continuous reef. The LMOC occur as complicated assemblages of cumulus olivine, magnetite and plagioclase and interstitial clinopyroxene.

Only the TDI occurs as a continuous and uninterrupted body and can be traced over a strike length of at least 7 km. All workers agree the cross cutting relationships complicate the geology. Whether the gabbros of the LGS and TDI intruded sequentially in a single event or there was a hiatus between intrusions is the focus of an ongoing U-Pb isotopic study.

There are many striking similarities between the TDI and the Partridge River intrusion within the Duluth Complex (Figure 2.2-1) which is host to major Cu-Ni-PGM deposits (for example, the Northmet deposit). The relevant features described in both locales as discussed by Good and Crocket (1994) includes similar ages (about 1,100 Ma) and tectonic origin (midcontinent rifting event), and composition and textures of gabbro and nature of sulphide mineralization.

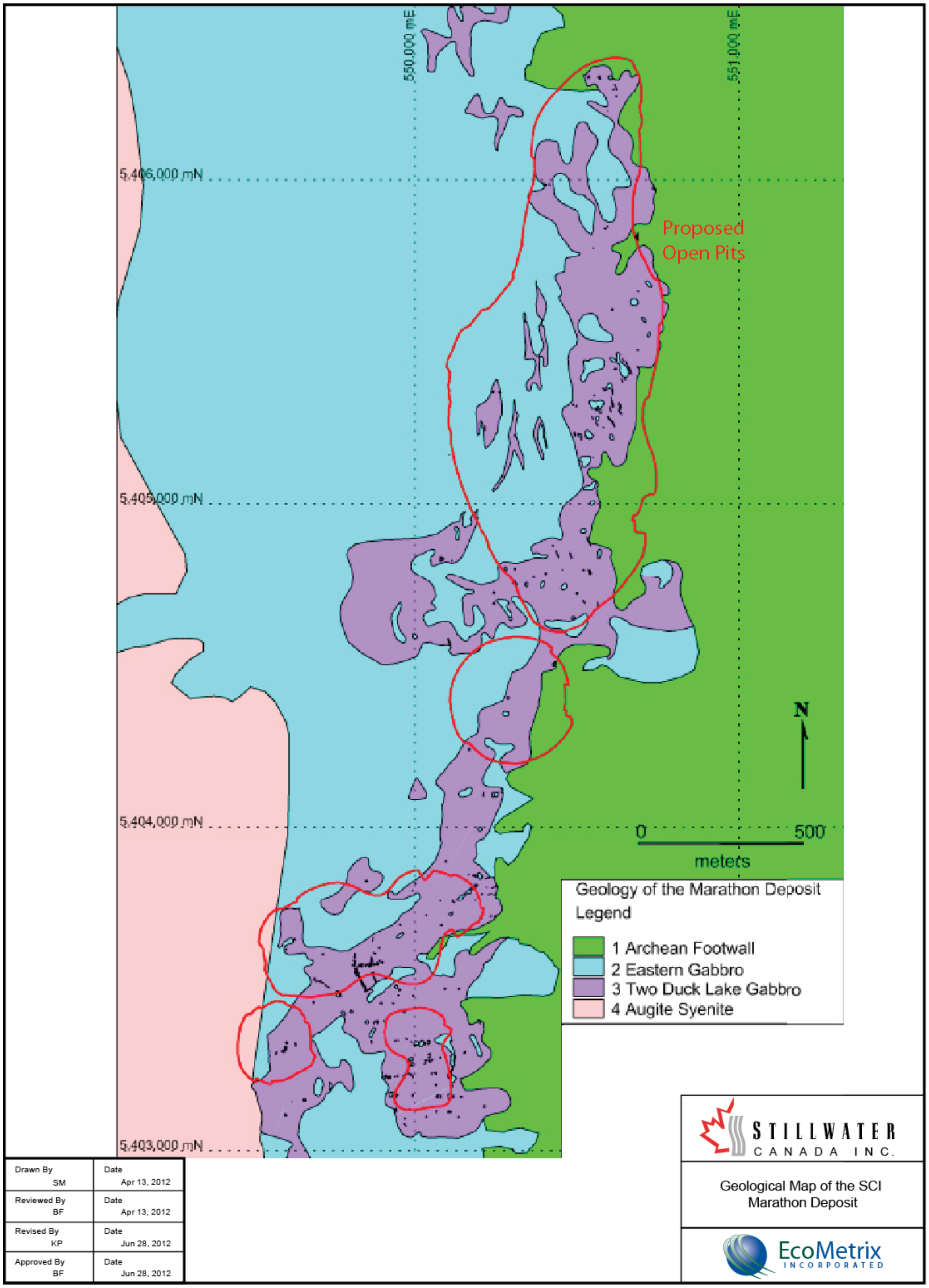

Figure 2.2-1: Geological Map of the Marathon Deposit

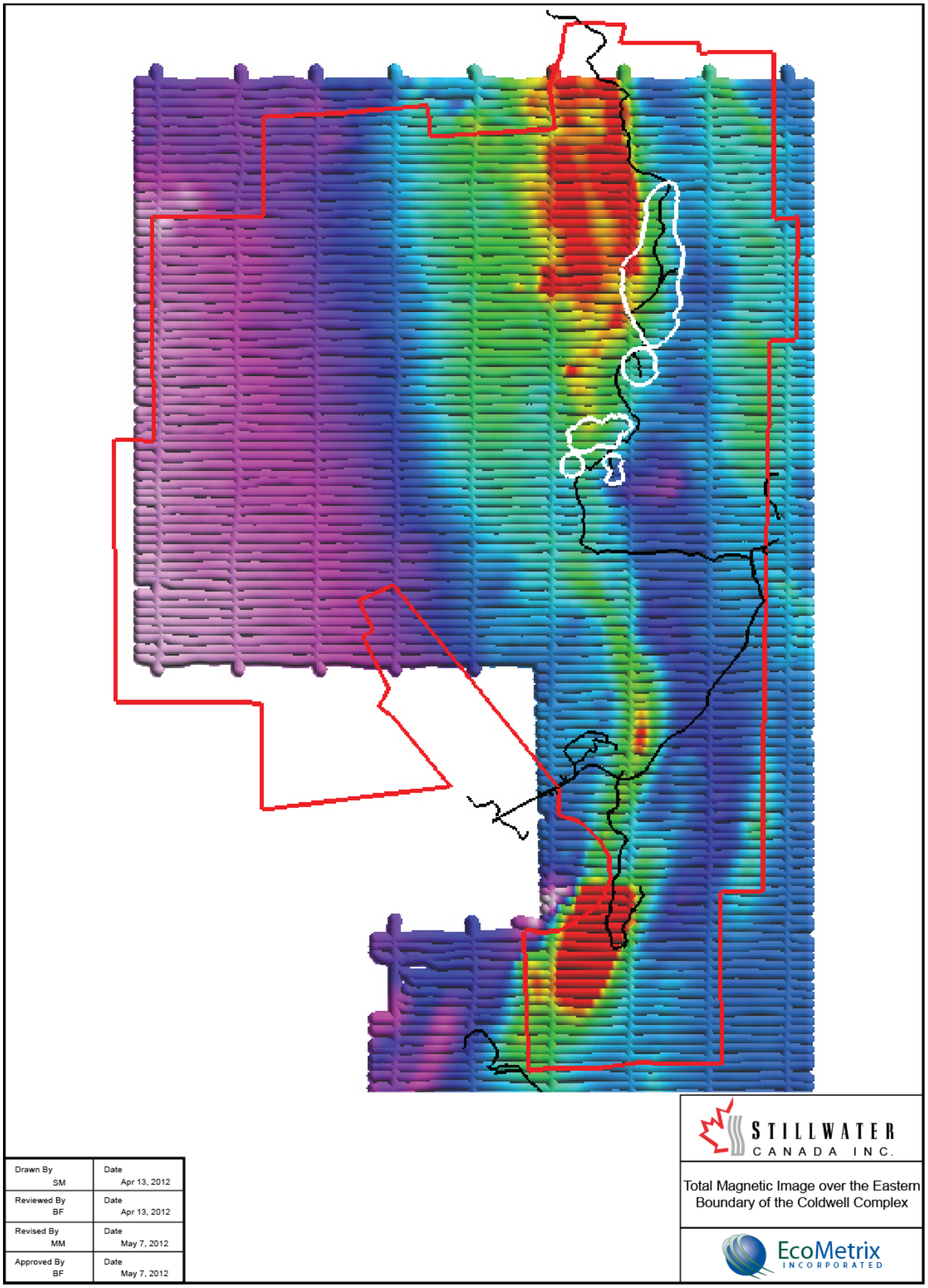

Figure 2.2-2: Total Magnetic Image over the Eastern Boundary of the Coldwell Complex

2.2.3 Footwall

The footwall of the Marathon PGM-Cu 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 Series. At the contact with 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. Locally, the footwall forms basins and ridges under the TDI.

In a detailed study of the RIB, 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.

2.2.4 Layered Gabbro Series

The Layered Gabbro Series forms the oldest and most diverse range of rock types in the Eastern Gabbro Series, but is composed predominantly of fine grained gabbro. The Series is up to 2 km thick, strikes near north and dips moderately to the west. At the base, fine grained gabbro is interlayered with footwall RIB and Archean pyroclastic rocks, and near the top it is intruded by syenite of Centre I magmatism of the Coldwell Complex. This igneous complex is not considered to be highly weathered and contains minerals of high hardness ratings (Table 2.2-1). The diverse range of rock types within this sequence was described by Good (1993) and Shaw (1997).

The most abundant rock type within the layered series is fine grained gabbro. It consists of subhedral clinopyroxene, olivine and magnetite with interstitial plagioclase. Layering can be detected at the metre scale by gradational changes in grain size. Thin layers of massive magnetite up to 20 cm thick occur locally within fine grained gabbro. Contacts with other gabbro units are sharp. A common feature within fine grained gabbro, particularly close to intrusions of TDI, is the formation of 1- to 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 by heating during intrusion of the TDI.

2.2.5 Layered Magnetite Olivine Cumulate

Layered Magnetite Olivine Cumulate (LMOC) occurs to the west of and stratigraphically above the TDI and makes up less than about 5% of the relatively older and finer grained Layered Gabbro Series. Locally, the LMOC is cut by thin units of TDI. Massive magnetite layers within the LMOC are commonly associated with disseminated chalcopyrite and minor pyrrhotite. They have been previously described as reef type accumulations of copper-PGM mineralization (Barrie et al., 2001). This igneous complex is not considered to be highly weathered.

The LMOC consists of alternating and gradational layers of medium to coarse grained magnetite and olivine cumulates with interstitial plagioclase. Magnetite cumulate layers, with up to 95% magnetite, range in thickness from several centimeters to tens of metres. The LMOC occurs as irregular and pod-shaped discontinuous units that strike north-south for a few tens of metres to up to 200 m and are interpreted to have intruded the predominantly fine grained Layered Gabbro Series. The hardness ratings of the minerals found in LMOC are presented in Table 2.2-1.

2.2.6 Two Duck Intrusion Gabbro

The TDI Gabbro is the host rock for the Marathon PGM-Cu 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 (see Figure 2.2-1) and, in general, dips west at angles from 5^{o} to 45^{o}. The TDI intrudes LGS, LMOC and the footwall RIB close to the basal contact of the Layered Gabbro Series. The TDI is intruded by thin dikelets of RIB that are partial melt derivatives and, also, by late north-northwest trending quartz syenite dikes.

The TDI is distinguished from other gabbro types in the Eastern Gabbro Series by cross cutting relationships and mineral textures resulting from the respective crystallization histories. In TDI, plagioclase crystallized first and forms elongate laths that are surrounded by ophitic textured clinopyroxene or olivine whereas in rocks of the Eastern Gabbro, olivine, clinopyroxene and magnetite crystallized first and the plagioclase is late and fills the voids between the cumulate minerals. Pegmatitic-textured TDI occurs locally as pods within coarse grained gabbro or as rims on Eastern Gabbro xenoliths. Mineralized pegmatite makes up less than about 5% of all mineralized zones.

An important aspect of TDI relative to other Cu-PGM deposits, such as at Lac des Isles, is the fresh unaltered nature of primary minerals and textures. There is some local development of secondary minerals such as chlorite, serpentine and calcite, but only at the thin-section scale where original minerals are replaced.

There is only a minor fluctuation in mineral compositions across the TDI (Good and Crocket, 1994). Plagioclase crystals are normally zoned with compositions between 65% and 52% anorthite and typically exhibit replacement at grain margins by a more calcic plagioclase (69-79% anorthite). The average olivine composition is 56.9% forsterite and contains 540 ppm Ni. Clinopyroxene and orthopyroxene lie respectively within the fields of augite and hypersthene with magnesium values between 0.6 and 0.7% MgO. Hardness scale ratings for the minerals found in this deposit are included in Table 2.2-1.

Table 2.2-1: Hardness Scale Rating for Gabbro Complexes

Rock Type	Mineral	Moh's Scale Hardness
Layered Gabbro Series		
Clinopyroxene	Augite	5.5 - 5
	Olivine	6.5 -6
	Magnetite	5 - 6
Layered Magnetite Olivine Cumulate		
	Olivine	6.5 - 7
	Magnetite	5 - 6
	Plagioclase	6 - 6.5
Two Duck Intrusion		
Clinopyroxene	Augite	5.5 - 6
	Olivine	6.5 - 7
Troctolite	Plagioclase	6 - 6.5
	Olivine	6.5 - 7
Syenite	Quartz	7
	Augite	5.5 - 6

2.2.7 Breccia Units

The TDI intruded by stoping its way along fracture sets or geologic contacts, such as the Eastern Gabbro/footwall RIB contact, and, thereby resulted in the anastomosing shape of the TDI and numerous offshoots into the surrounding rock and, also, in the formation of thick brecciated units. The brecciated units consist of heterogeneous subangular blocks of Eastern Gabbro or footwall RIB. Hanging wall breccia units are typically comprised of Eastern Gabbro blocks in a matrix of TDI whereas footwall brecciated units consist of footwall and Eastern Gabbro blocks. Brecciated units are usually associated with copper-PGM mineralization.

2.2.8 Local Fault Lines

The locations of the fault lines that are located within the Project boundary are shown in Figure 2.2-3.

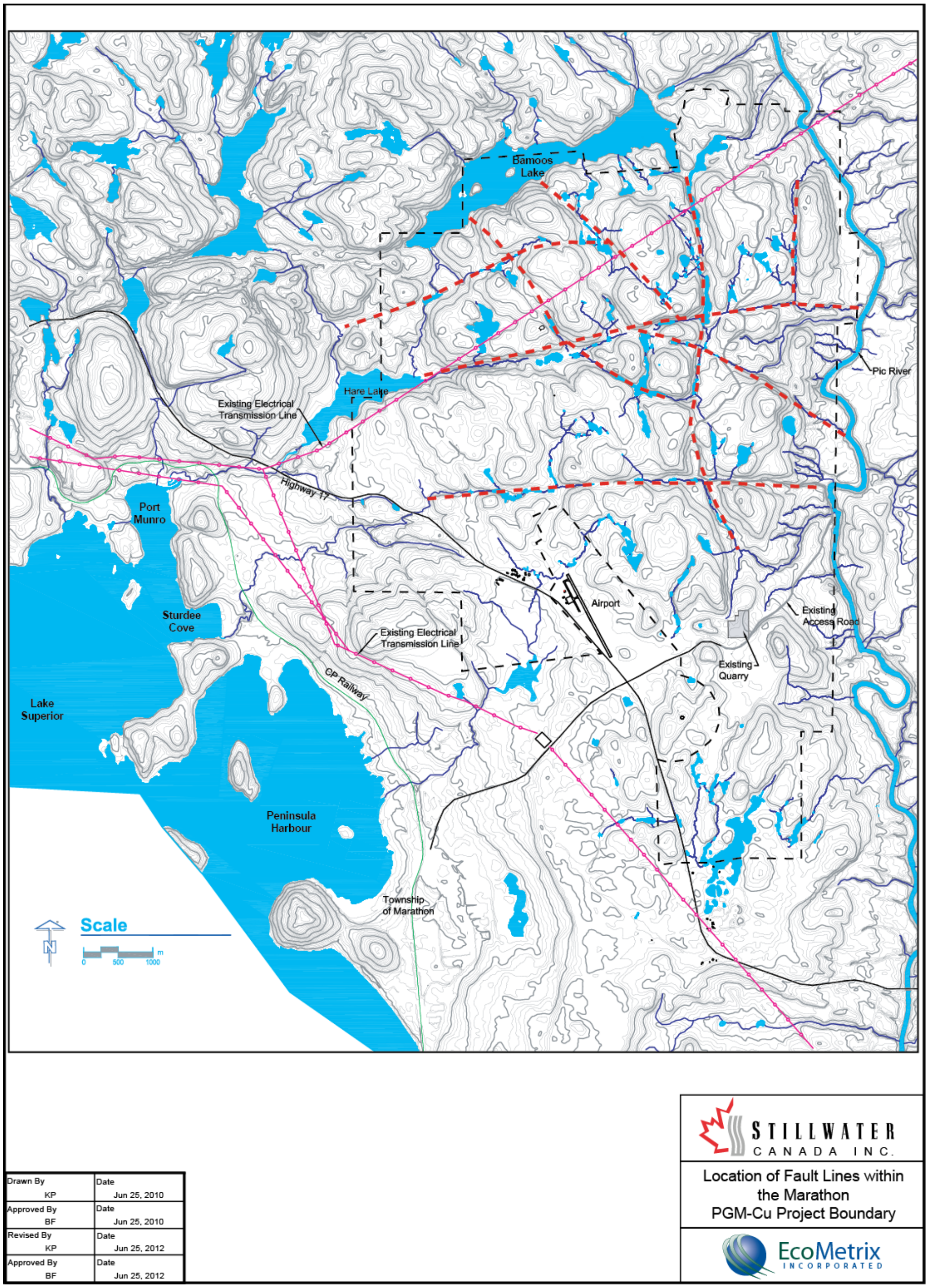

Figure 2.2-3: Location of Fault Lines within the Marathon PGM-Cu Project Boundary

3.0 DEPOSIT MODEL

The following summary descriptions are updates taken from an internal report issued to Marathon PGM Corp. by Dr. David Good titled “Geology of the Marathon Deposit” dated 24 October, 2009.

3.1 Mechanisms for Cu-PGM Concentration in the Marathon Deposit

At least three mechanisms for sulphide and PGM precipitation have been proposed for the Marathon Deposit including hydrothermal (Watkinson and Ohnenstetter, 1992), magmatic (Good and Crocket, 1994) and zone refining (Barrie, 2001). A hydrothermal mechanism at low or intermediate temperatures (< 600^{o}C) is not likely given the near total absence of hydrous minerals in the W Horizon and the significant correlation between Pd and Ir, which could not occur in the light of the virtually immobile behavior of Ir in hydrothermal fluids. The high temperature zone refining mechanism suggested by Barrie (2001) 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 does not fit with a mass balance calculation. There is just too much PGM and too little gabbro.

It seems most likely that more than one process operated at high temperatures (> 700^{o}C) to concentrate metals in the Marathon deposit. Three possible mechanisms include:

1. accumulation of sulphide liquid in fluid dynamic traps in the magma conduit;
2. ongoing interaction of sulphides with magma that is flowing through the conduit (N-factor); and,
3. 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 3.2-1. 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 (black dots) represent the average effects of both sulphide accumulation and N-factor enrichment. Finally, the removal of Cu from PGM enriched zones (W Horizon) is shown by the downward displacement of the samples from the high grade sample study (low Cu type) (red triangles).

3.2 Flow through Model for Marathon Mineralization

In the current exploration model, the present exposure of the Two Duck 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 current volume of gabbro, flowed through the conduit and formed the TDI. On the basis of mass balance calculations, and considering the TDI is less than 250 m thick, only a very large magmatic system such as this can explain the extreme enrichments of platinum metals such as 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 LMOC, very large volumes of magma are required to deposit the very thick layers (tens of metres) with > 75% magnetite.

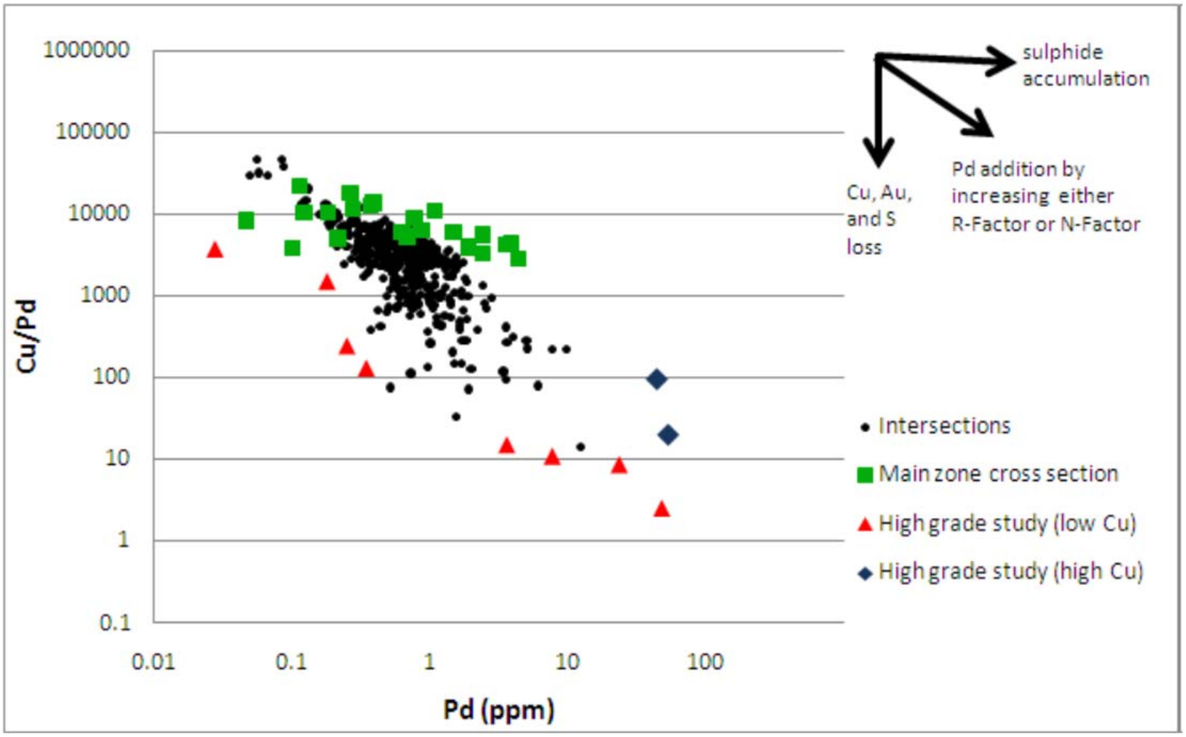

Figure 3.2-1: Diagram Illustrating the Effects on Metal Values of the Three Dominant Mechanisms Proposed to Explain the Concentration of Cu and PGM in the Marathon PGM-Cu Deposit

The relationship between the shape of the footwall and the abundance of sulphides is best shown at the south end of the Marathon PGM-Cu deposit in Figure 3.2-2 where the best intersections, identified by filtering out those intersections worth less than $75/t calculated NSR value, occur within valleys, troughs or basins in the footwall. In the flow through model, fluid dynamic factors that affected magma flow are relevant to exploration. Features such as cooling of TDI magma in basins within the footwall or brecciation of gabbro in the LGS by TDI magma as it stopes its way upward during ascent are important examples of how the magma was either slowed or interfered with enabling the precipitation of the more dense sulphide liquid from the magma. Conversely, above ridges or crests in the footwall, where TDI 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 PGM-Cu deposit, as well as the observed metal trends.

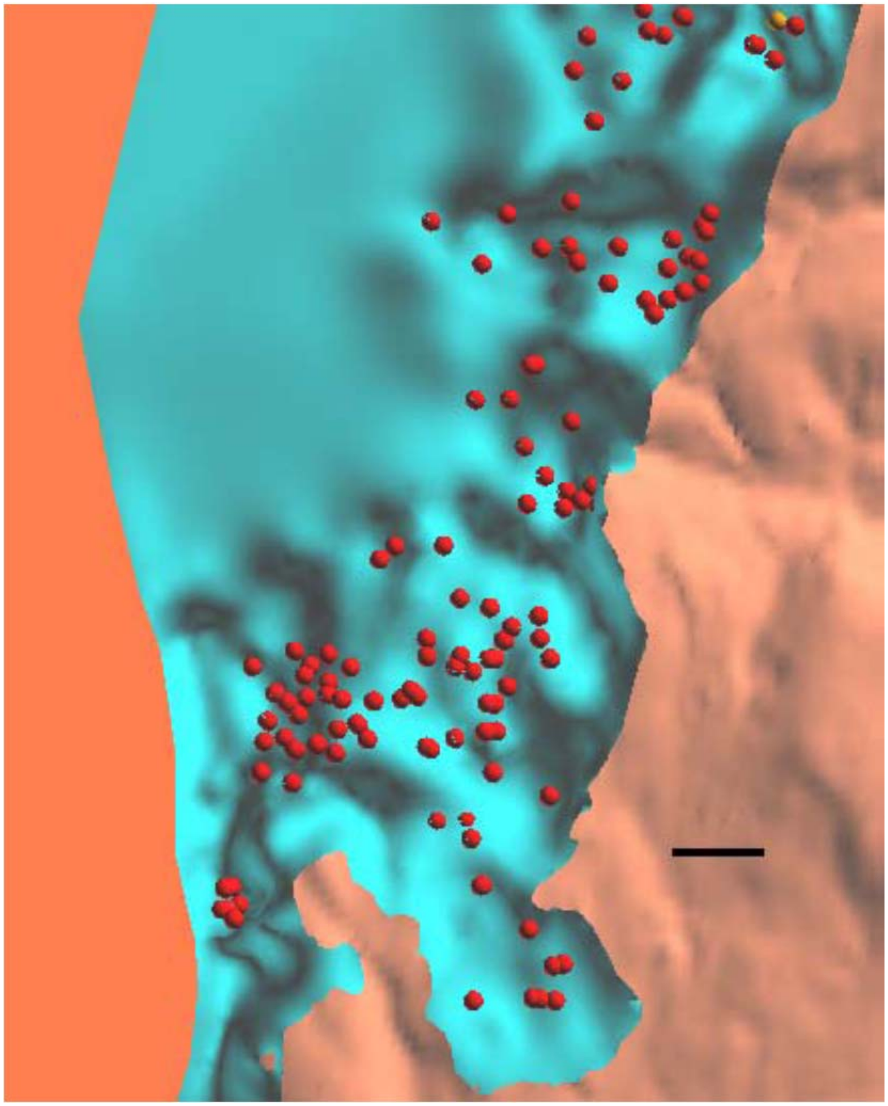

Figure 3.2-2: View of the Footwall of the Two Duck Intrusion (Light Blue) Showing the Distribution of the Highest Value Intersections (Red Dots) With Respect to Valleys and Troughs: Area shown is located between lines 4700N and 3100N. Black bar represents 200m scale.

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. The upgrading occurred as magma passed through the conduit and interacted with sulphides in the crystal pile possibly by stirring up early formed sulphides or by diffusion of metals out of the magma and down into the crystal pile. It also seems possible that sulphides were picked up and transported in the magma during flow through. This process of sulphide upgrading was used to describe the extreme enrichments of PGM relative to copper in disseminated sulphides at the Norilsk deposits by

Naldrett et al., (1995). Naldrett et al. (1995) 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 107 g/t over 2 m, or 45 g/t over 10 m, and metal trends such as the gradual increase in the proportion of chalcopyrite and the matching rapid increase in PGM+Au, are a result of continuous upgrading.

The envisaged magma conduits that describe variations in Cu/Pd ratios at the south end of the Marathon PGM-Cu deposit are shown in Figure 3.2-3. In the flow through model, very low Cu/Pd ratios for the sulphides correspond to very high volumes of magma interacting with the sulphides. A contour map of Cu/Pd ratios in samples from the W Horizon (not shown) is thus a remnant artifact of the magma flow.

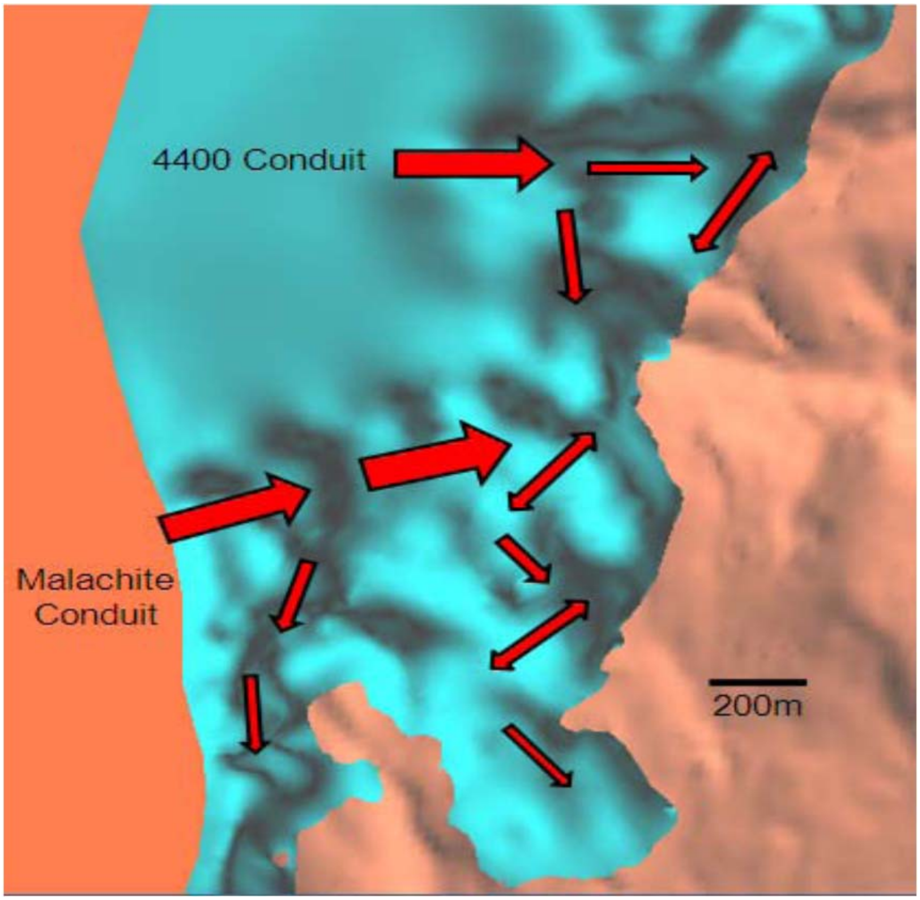

Figure 3.2-3: Proposed Magma Conduits and Flow Model for Two Duck Intrusion (The 4400 conduit and Malachite conduit represent troughs that have the lowest Cu/(Pt+Pd) ratios. The direction arrows represent contour lines for increasing Cu/(Pt+Pd) ratios. Data used for the contour map were taken from the W Horizon and have a range of Cu/(Pt+Pd) rations between 2 and 400.)

It is evident that S, Cu and Au were removed in some areas of the W Horizon presumably during interaction between pre-existing sulphides and sulphur undersaturated magma. This process would explain the few instances where up to 75 g/t Pd occurs in samples with only 0.01 to 0.02% Cu. These levels of Pd when recalculated to abundances in 100% sulphides correspond to untenable concentrations of between 2 and 4% Pd in 100% sulphide. This process would also explain the unusual feature shown in the detailed study of the PGM enriched samples where there is relative depletion of Au as compared to Pd. High temperature removal of Au, Cu and S (de-sulphurization) is proposed to account for the extreme ratios of Pd/Cu and Pd/S and the relative depletion of Au compared to PGM.

4.0 MINERALIZATION

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 analyzed and 39 different platinum group minerals and gold, as well as silver, alloys were identified.

The grain size distribution for platinum group minerals in the Main Zone is similar to that in the W Horizon (see Table 4.1-1). In general, approximately 60% of PGM grains are less than 5 μm in size. Forty percent of the PGM grains are greater than 5 μm.

The type and proportion of host minerals for the platinum group minerals are presented in Table 4.1-2. Note this does not represent volume percent, as grains included in plagioclase boundaries are smaller than those located elsewhere.

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 4.1-3). A total of 2,304 grains from 55 thin sections were analyzed from the two zones. Other minerals with less than 1% distribution in both deposits were excluded from this list. Indeed, of the 12 dominant platinum group minerals accounting for over 85% of the PGM reported in the W Horizon, none was found in the Main Zone. Conversely, of the 10 dominant minerals found in the Main Zone, accounting for over 91% of all PGM found, only 2.6% occurred in the W Horizon. This dramatic difference in the ranges of PGM for the two zones implies different conditions for crystallization of platinum group minerals.

Table 4.1-1: Size Distribution for PGM in the Main Zone Compared to the W Horizon

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

Table 4.1-2: Percent of Grains of PGM within Silicates, Sulphides or Other Platinum Group Metals

Zone	No. of grains	Plagioclase boundaries (%)	Sulphides (%)	Other PGM's (%)	Hydrous silicates (%)
Main	573	22.4	34.9	4.36	38
W Horizon	1731	25	53.7	16.5	4.3

Table 4.1-3: Dominant PGM 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-Sobolevskite$_{ss}$	$Pd_2Te(Bi,Pb)$	0.2%	34.9%

4.2 Distribution of Copper, Nickel and PGM

A very prominent feature of the Marathon PGM-Cu 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 g/t = 1 ppm) 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 4.2-1). 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.

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 a high temperature zone refining process, but this process is inconsistent with mass balance calculations and the close correlation between Pd and the other PGMs.

An understanding of the separation of PGM from Cu is important to define the model for deposition of the Marathon PGM-Cu 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.

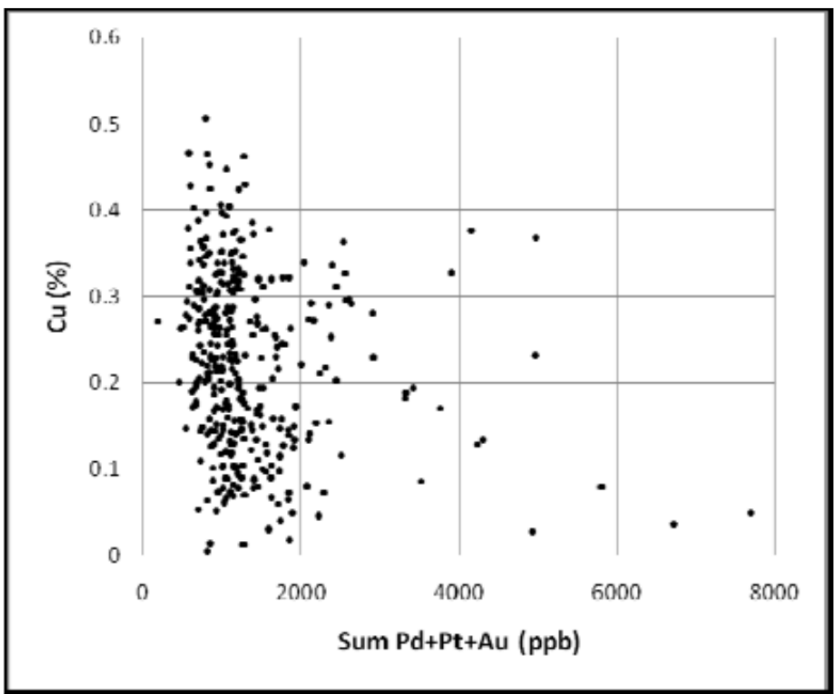

Figure 4.2-1: Plot of Cu Versus Pd+Pt+Au for Average Values of 356 Diamond Drill Hole Intersections (NSR cut-off value of $15)

4.3 Metal Ratios for the Marathon PGM-Cu Deposit

Inter element ratios for metals that show positive and significant correlation are calculated for a sub-set of samples representative of the Marathon PGM-Cu deposit, as shown in Table 4.3-1.

Table 4.3-1: Calculated Ratios for Cu, Ni, and the PGM

Ratio	Average	Standard Deviation	minimum	maximum	Number of samples
Cu/Ni	14.5	2.8	8.2	21	40
Pd/Pt	2.99	1.02	0.83	9.2	8663
Pd/Rh	40	19	10	84	32
Pd/Ir	910	636	147	2573	28
Pd/Au	9.6	6.6	0.3	80	8663

The Cu/Ni ratio was calculated for samples with > 3000 ppm Cu. The Pd/Pt ratio was calculated for intersection data plotted in Figure 4.2-1. Pd/Rh and Pd/Ir ratios were calculated using high precision and high accuracy data by Good (1993) and high grade sample study analyzed by Activation Laboratories.

4.4 Distribution of Copper in TDI

The sulphide assemblage in the Marathon PGM-Cu 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 4.4-1. Samples with the highest concentrations of PGM fall along or close to the curve representing 100% chalcopyrite.

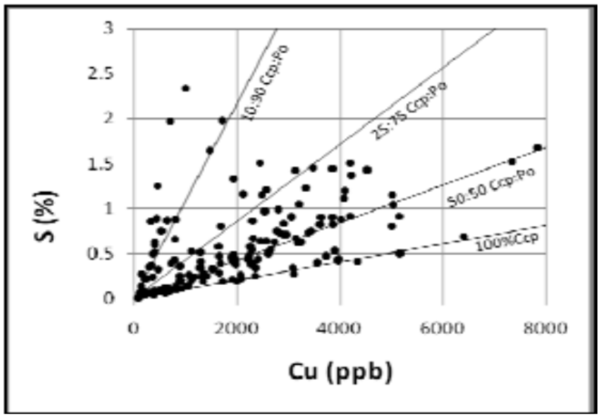

Figure 4.4-1: Sulphur Versus Copper for Samples Representative of Mineralization in the Marathon PGM-Cu Deposit

4.5 Distribution of Nickel Relative to Copper

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 and Cu, as shown in Figure 4.5-1, 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, as shown in Table 4.3-1, above. A small proportion of samples plotted in Figure 4.5-1 contain higher nickel and would, therefore, have a higher proportion of pentlandite than for a 16:1 ratio, but this is unusual. Inspection of the data set for the entire deposit reveals that the abundance of Ni is normally less than about 1,200 ppm and rarely greater than 1,500 ppm.

Nickel also resides in olivine (400-600 ppm, Good, 1993) and clinopyroxene. Nickel in silicates accounts for perhaps 60-100 ppm of the whole rock value (see Ni abundance where Cu = 0% in Figure 4.5-1).

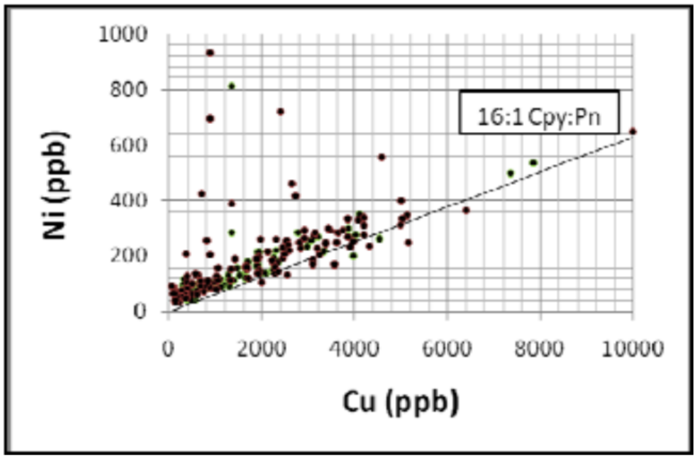

Figure 4.5-1: Plot of Ni Against Cu for a Sub-set of Main Zone Samples for which S (wt%) was Determined

4.6 Distribution of Platinum Group Metals

There is a strong and positive correlation between Pd and the other PGM (Pt, Rh and Ir) and Au for all types of mineralization in the Marathon PGM-Cu deposit (see Figure 4.6-1). In Figure 4.6-1, the majority of data fall between the curves for various metal:metal ratios. The calculated average values for PGM ratios are presented in Table 4.3-1, above.

The intersections plotted in Figure 4.6-1 are averages of drill core intervals of between 4 and 160 m of mineralization. Main Zone cross-section samples were analyzed by Good (1993). High-grade study samples are sub-samples of 2-m thick high grade intersections (analyzed by Activation Laboratories). 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 lengths of quartered core that were selected from the interval between 152 -156 m in hole “M-07-306” and 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.

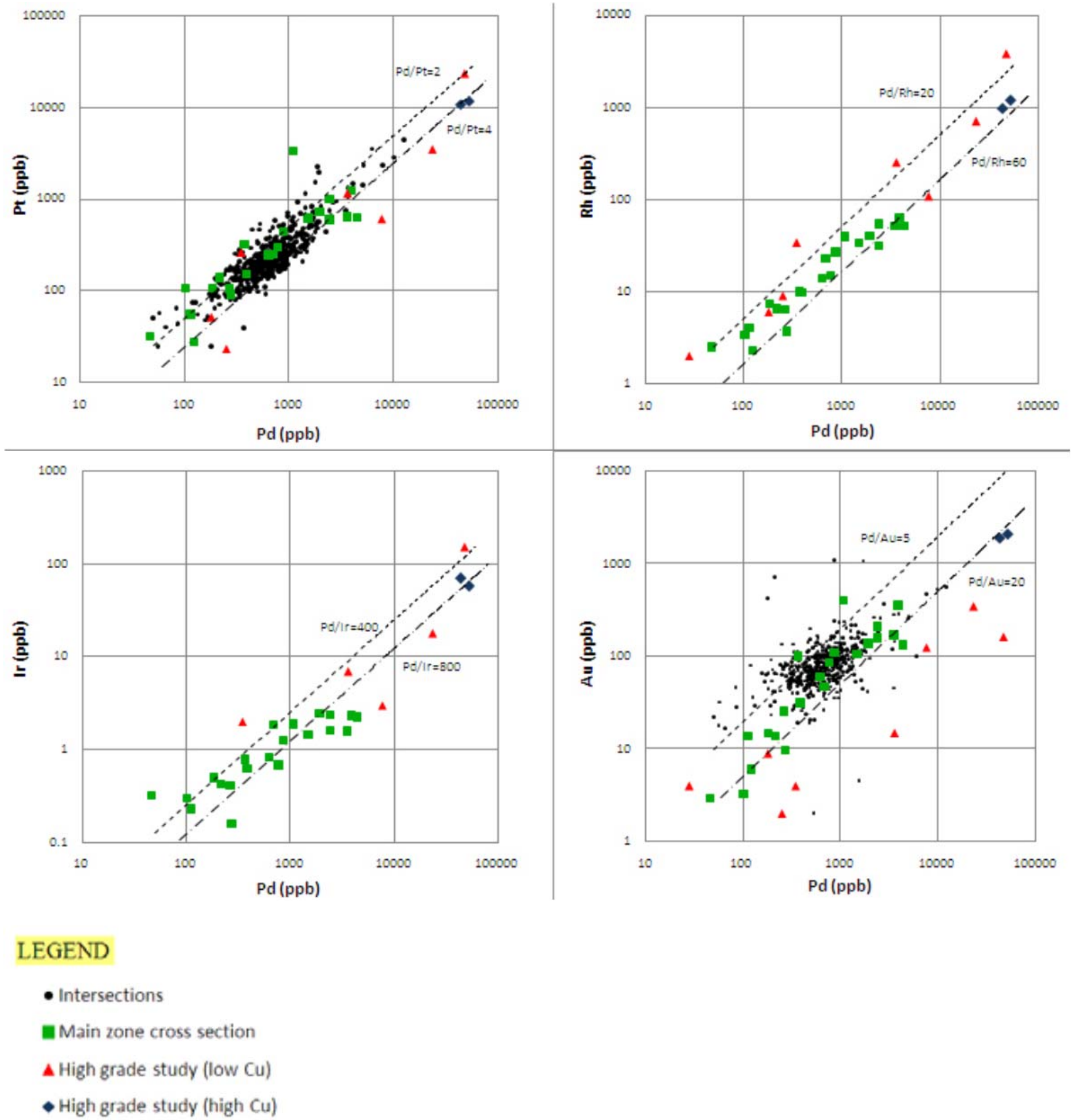

Figure 4.6-1: Plot of Pd versus Rh, Ir and Au for Representative Sample Groups of the Marathon PGM-Cu Deposit

4.7 Relationship between Sulphides and PGM Enrichment

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 demonstrated in Figure 4.7-1 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 4.2-1, above, where it was 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 Cu and Pd, implies that multiple concentrating mechanisms acted to concentrate Cu and PGM+Au.

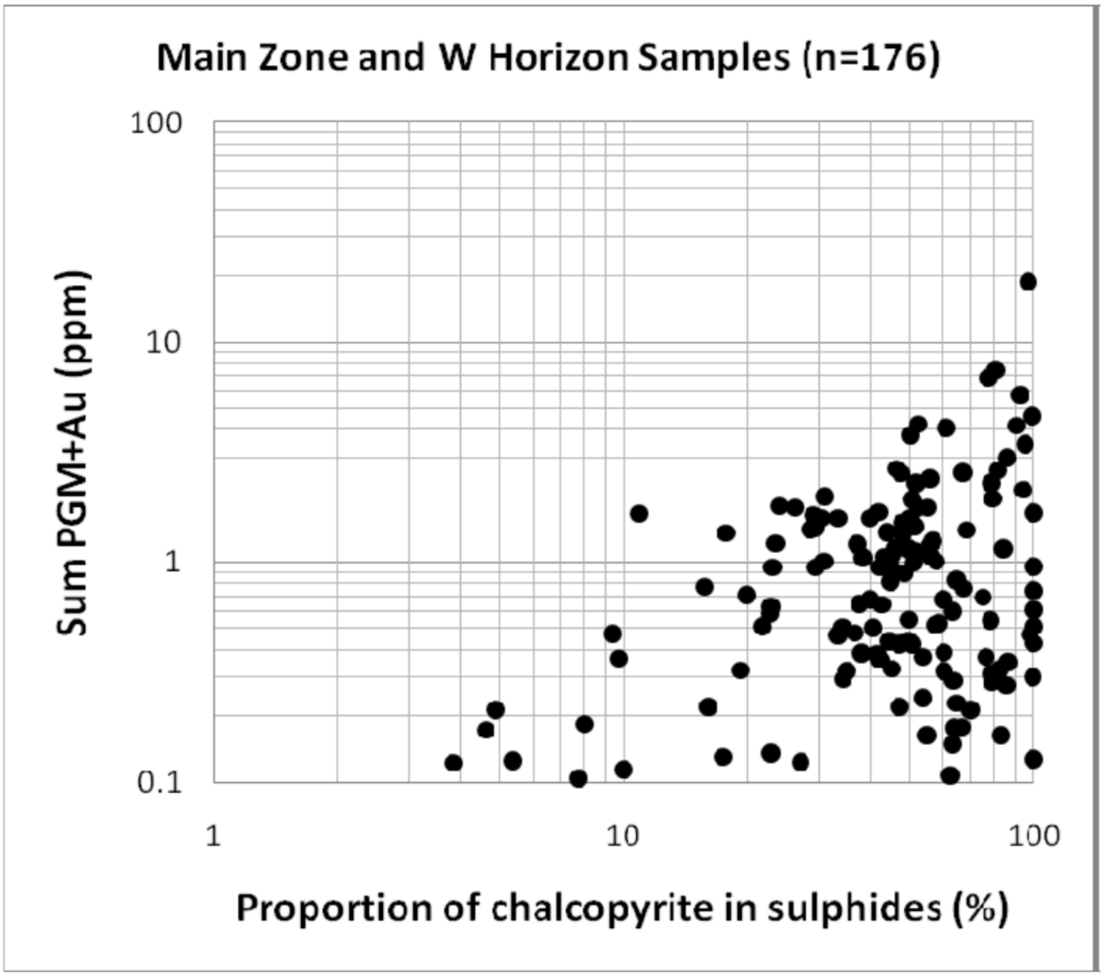

Figure 4.7-1: Sum of Pt+Pd+Au Versus Calculated Proportion of Chalcopyrite in Sulphide Assemblage

4.8 Variations of Copper, PGM, Sulphur and Chalcopyrite

Two different trends are shown by metal variation plots across mineralized zones in Figure 4.8-1 and Figure 4.8-2.

In Figure 4.8-1, 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. Figure 4.8-1 shows elevated PGM and Cu with increasing sulphur (sulphides) regardless of proportion of chalcopyrite.

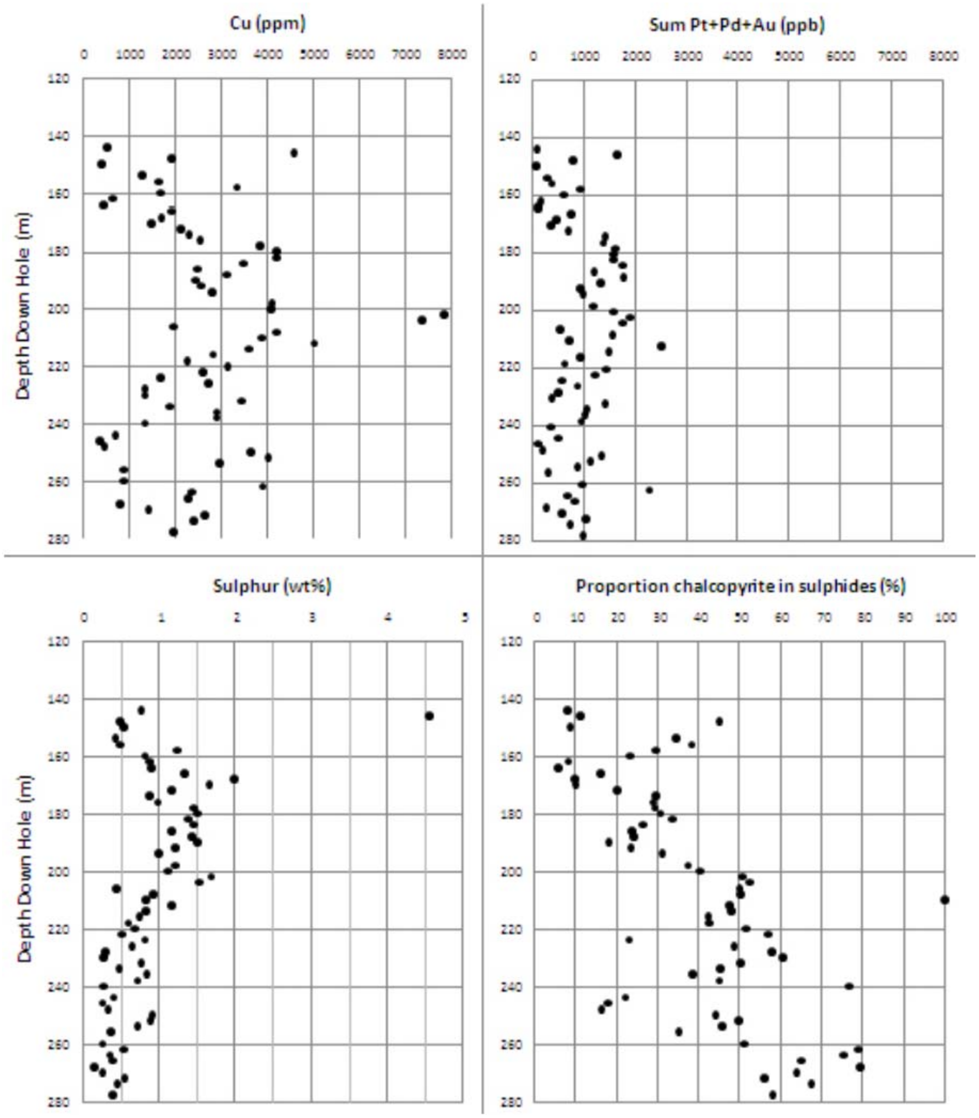

Figure 4.8-1: Metal Variation Down Diamond Drill Hole MB-08-10

In Figure 4.8-2, the abundance of Cu and the proportion of chalcopyrite increase up-section, the abundance of S stays consistent or decreases, and the Pd stays low but increases dramatically in the uppermost 12 m where the samples contain the highest proportion of chalcopyrite. Significant PGM enrichment is shown in the zone with highest proportion of chalcopyrite.

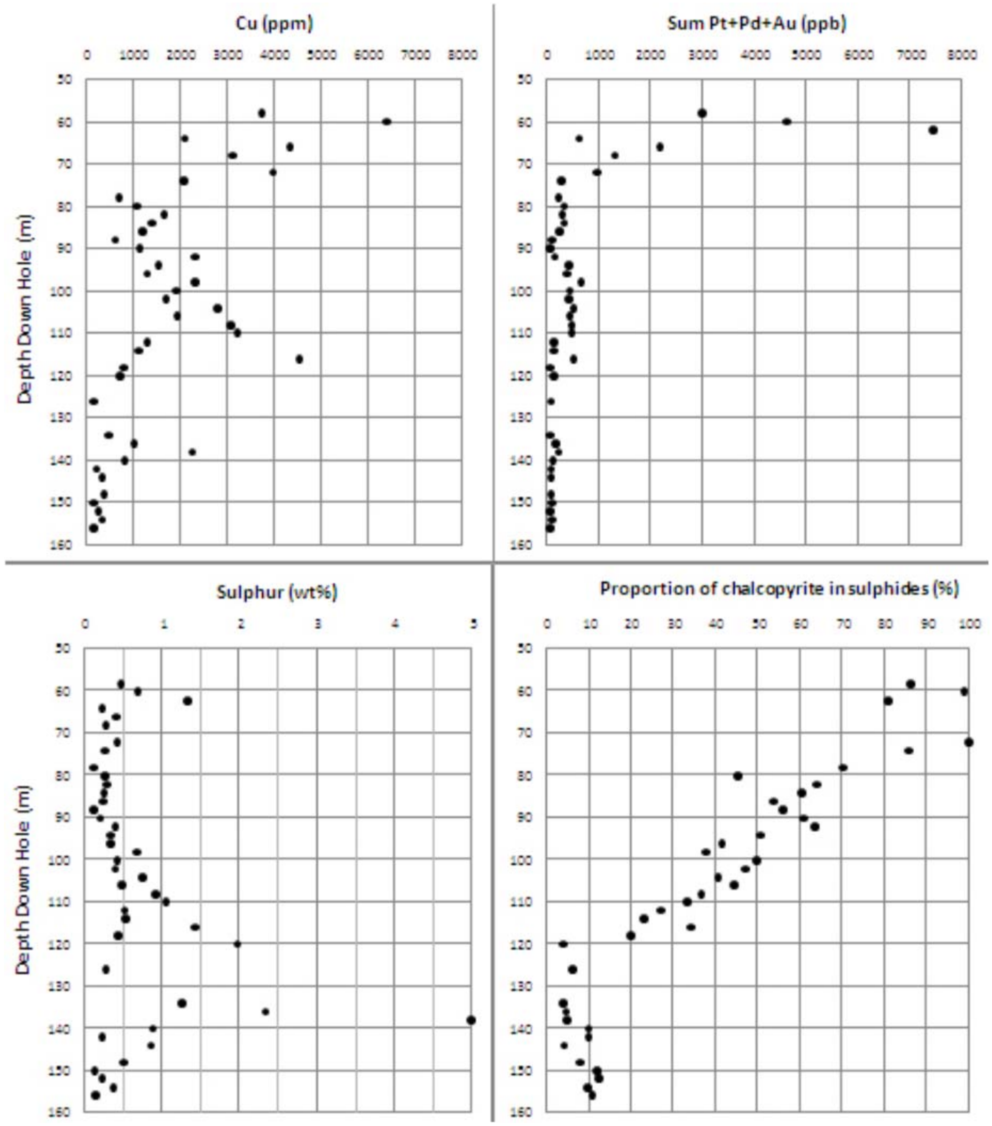

Figure 4.8-2: Metal Variation Down Diamond Drill Hole G9

4.9 Sulphide Mineralization in TDI

Sulphides in the TDI consist predominantly of chalcopyrite, pyrrhotite and minor amounts of pentlandite, cobaltite, bornite 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 in replacement zones at the margins of plagioclase crystals (Good and Crocket, 1994).

The sulphide assemblage changes gradually up section from the base to the top of mineralized zones. Sulphides at the base of the TDI consist predominantly of pyrrhotite and minor chalcopyrite but the relative proportion of chalcopyrite increases upsection 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 paleotopography of the footwall contact. For example, mineralization is best developed within basins of the footwall and thins or pinches out above prominent footwall ridges (see Figures 4.9-1 and 4.9-2).

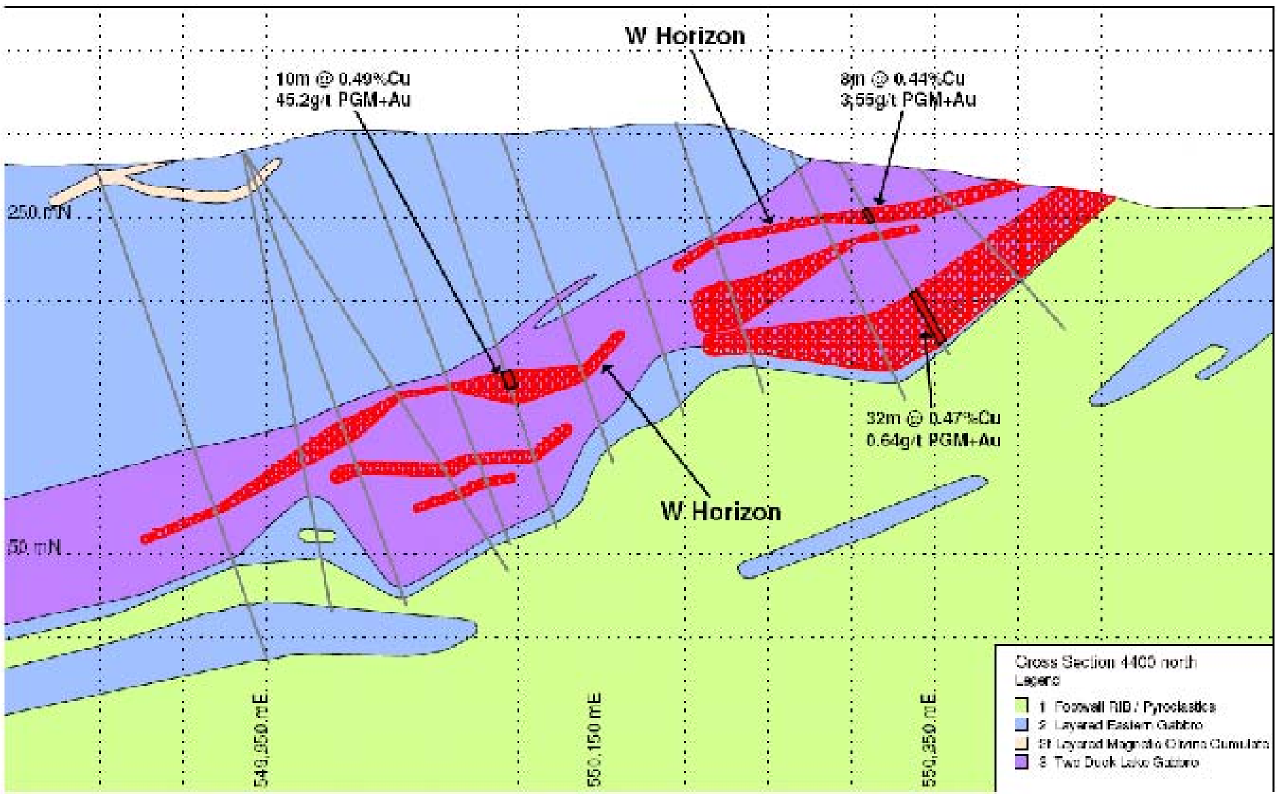

Figure 4.9-1: Cross-section of the Marathon PGM-Cu Deposit at 4400 North

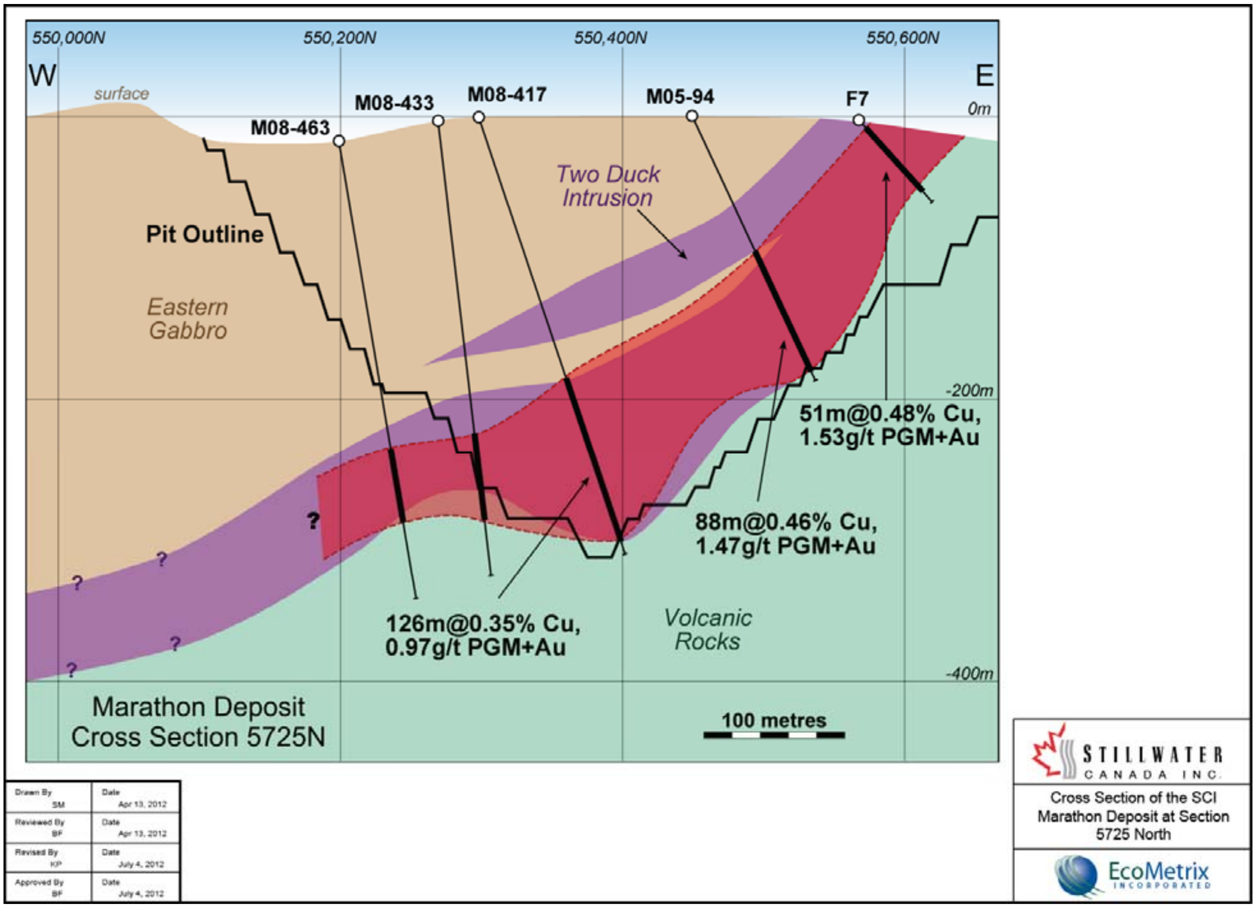

Figure 4.9-2: Cross-section of the Marathon PGM-Cu Deposit at 5725 North

4.10 Mineralized Zones

The Marathon PGM-Cu deposit consists of several large, thick and continuous zones of disseminated sulphide mineralization hosted within the TDI. The mineralized zones occur as shallow-dipping sub-parallel lenses that follow the basal gabbro contact and are labeled as Footwall, Main, and Hanging Wall Zones and the W Horizon. The Main Zone is the thickest and most continuous zone. A total of 516 intersections from the deposit were compiled using a cut-off NSR value of $8. The thickness of the intersections is between four and 183 m. The average thickness is 35 m and the standard deviation is 28 m.

4.11 The W Horizon

The W Horizon forms a nearly continuous sheet of mineralization that strikes north south for over 1 km from section 3450N to section 4500N and continues down dip for over 300 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 4.9-1). The zone is difficult to identify in drill cores 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 3,500.

Several very high grade lenses, ranging in size from 30 m to 200 m, occur within the W Horizon. The highest grade intersection to date contains 107 g/t PGM+Au, 1.04 g/t Rh and 0.02% Cu over 2 m, but the best intersection contains 45.2 g/t PGM+Au and 0.49% Cu over 10 m. In general, mineralized zones (mottled red) thicken in basins of the footwall and thin or pinch out over crests where the TDI unit becomes thinner.

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