NI 43-101 Technical Report

Selkirk Nickel Project North East District, Republic of Botswana

Prepared for:

PREMIUM NICKEL RESOURCES LTD.

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IMPORTANT NOTE

General Conditions and limitations

Use of the report and its contents

This report has been prepared for the exclusive use of Premium Nickel Resources Ltd. or its agents. The factual information, descriptions, interpretations, comments, recommendations and electronic files contained herein are specific to the projects described in this report and do not apply to any other project or site. Under no circumstances may this information be used for any other purposes than those specified in the scope of work unless explicitly stipulated in the text of this report or formally interpreted when taken individually or out-of-context. As well, the final version of this report and its content supersedes any other text, opinion or preliminary version produced by G Mining Services Inc.

NI 43-101 Technical Report – Selkirk Nickel Project

Final Version

North East District, Republic of Botswana

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1 SUMMARY

1.1 Introduction

G Mining Services Inc. ("GMS") has prepared the following Technical Report on behalf of Premium Nickel Resources Ltd. ("PNRL") for the Selkirk Property ("the Property", or "Project") in north-eastern Botswana. This Technical Report was prepared in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101"). The Property has been subject to numerous economic studies in the past, the most recent being a Bankable Feasibility Study ("BFS") undertaken by WorleyParsons Limited ("WorleyParsons") on behalf of BCL Limited in 2015 - 2016.

Despite this, the Property is considered by PNRL as an "early-stage exploration property" as defined by Section 1.1 of NI 43-101, and this report does not contain a Mineral Resource Estimate, Mineral Reserve Estimate or economic study such as a preliminary economic assessment, pre-feasibility study or a feasibility study. In its current state, the scientific data existing on the Property does not support the estimation of a Mineral Resource, as significant data verification work is required.

GMS, the MSA Group ("MSA"), SLR Consulting (South Africa) Pty. Ltd. ("SLR") and Phillip Mackey participated in the compilation of this report, and their responsibilities are as follows:

- GMS: overall report coordination, introduction, reliance on experts, property description and location, accessibility, history, geology, deposit types, exploration, sample preparation, analysis and security, adjacent properties, other relevant data, interpretations, conclusions and recommendations.
- MSA: data verification.
- Phillip Mackey, P.Eng., Independent Consultant, PJ MacKey Technology Inc: metallurgical test work.
- SLR: history, environmental studies, permitting, social and community impacts.

1.2 Terms of Reference

Unless stated otherwise, information used in this Technical Report has been provided by PNRL and carefully reviewed by the authors. However, GMS cannot guarantee the accuracy and completeness of the information provided on the Selkirk Project solely based on the technical expertise and site visits of the qualified persons ("QP").

All measurement units used in this report are in the metric system, unless stated otherwise. Currency is expressed in Canadian dollars ("CAD") unless stated otherwise.

The Selkirk Property consists of a single mining licence containing one past producing mine (i.e., Selkirk Mine), and four (4) prospecting licenses.

1.3 Property Description and Location

The Selkirk Property is located in northeastern Botswana, 28 km southeast of the city of Francistown, the nation's second largest city, and 450 km northeast of the national capital, Gaborone. The Property consists of a single mining licence covering an area of 1,458 ha (14.58 km^2) and four prospecting licenses covering a total of 12,670 ha (126.7 km^2). The mining licence, 2022/7L, is centred approximately at 21°19'13" S and 27°44'17" E. Premium Nickel Group Proprietary Limited ("PNGB"), a subsidiary of PNRL holds the mining licence for ten years commencing on May 27th, 2022, ending on May 26, 2032. The four prospecting licences (PL050/2010, PL051/2010, PL210/2010 and PL071/2011) are valid for a period of two years effective from October 1, 2022. The Property has changed ownership several times since exploration began in the mid-1960s. PNRL acquired the Project in 2022 after BCL, the previous owners, filed for liquidation in 2017.

1.4 Accessibility, Climate, Local Resources, Infrastructure & Physiography

The Project is accessible all-year-round through well maintained, all-weather roads from Gaborone, Botswana national capital, and Francistown, Botswana second most populated city. Francistown is a small industrious town of around 120,000 people with a burgeoning young population and an International Airport with customs clearing.

The local climate is tropical, with hot, wet summers and mild, dry winters. Greenfield exploration on the prospecting licences may be affected by heavy rains during rainy seasons (e.g., January and February), but Brownfield exploration with well established sites can operate all-year-round. Isolated hills outcrop the flat surface, and narrow and gentle streams form a dendritic drainage pattern. The rivers of the Selkirk area are part of the Shashe / Tati River systems. The Property is relatively flat with an average elevation of 980 m. The general slope of the area is eastwards, towards the Ramokgwebane River.

With the exception of highly specialized technical experts required during the construction phase, PNRL believes that there is a local skills base with sufficient capacity to cater for its further needs with regards to the Project and its general organizational development requirements. Strategic services (e.g., electricity and water supplies) could be provided by the Botswana Power Corporation and from existing governmental water pipelines within the Francistown road reserve, and potable water could be sourced on-site from boreholes. A railway line crosses 30 km west of the Selkirk area.

1.5 History

The Selkirk site is known for ancient copper workings. Anglo American Corporation of South Africa ("AAC") established the presence of nickel and copper occurrences at the sites of the ancient workings in 1929, but significant exploration only started in the mid-1960s by the Tati Territory Exploration Company ("TTE"). The first exploration campaigns included soil sampling, trench sampling, ground geophysics and diamond drilling. At least four exploration and mining companies have worked on the Property since the 1960s and extensive work has been done to properly characterize the economic potential.

The Selkirk underground mine was operated from 1989 to 2002 by Tati Nickel Mining Company (Pty) Ltd ("TNMC") a company created specifically to exploit the deposit. More than 1 million tonnes (Mt) of material grading 2.6% Ni and 1.6% Cu was extracted from a semi-elliptical deposit of massive sulphide up to 20 m thick. Since 2003, extensive exploration has been completed to characterize the lower-grade / higher-tonnage halo of disseminated sulphides both surrounding and down-plunge (south) of the high-grade mineralization. Comprehensive exploration was by conducted by LionOre Mining International Ltd. ("LionOre") and, subsequently, by Norilsk Nickel Group of Companies ("Norilsk Nickel") through their ownership in TNMC. The Selkirk Mine is currently under care and maintenance and is owned by PNRL via its subsidiary, PNGB.

Numerous Mineral Resource Estimates ("MRE") have been completed on the Selkirk deposit by various parties under various international standard of disclosure for mineral projects (e.g., NI 43-101, SAMREC, JORC). The most recent MRE dates to 2016 and was produced by Worley Parsons under the South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC) reporting code. Using a lower cut-off of 0.2% Ni, the Mineral Resource was reported to be 44.7 Mt at 0.31% Ni, 0.31% Cu, 0.13 g/t Pt, 0.50 g/t Pd and 0.06 g/t Au in the Measured category, 7.4 Mt at a grade of 0.38% Ni, 0.28% Cu, 0.23 g/t Pt, 0.24 g/t Pd and 0.06 g/t Au in the Indicated category, and 24.0 Mt at 0.24% Ni and 0.04% Cu, 0.06 g/t Pt, 0.07 g/t Pd and 0.02 g/t Au in the Inferred category. The 2016 SAMREC MRE should be considered as historical in nature, as insufficient data verification has been conducted by the QP to verify the tonnages and grades and PNRL is not treating the 2016 SAMREC MRE as a current Mineral Resource estimate. Details on historical mineral resource estimates are outlined in Section 6. It is unlikely that any of the historical resources would comply with current NI 43-101 criteria or CIM Standards and Definitions.

1.6 Geological Setting and Mineralization

The Property lies within the Tati granite-greenstone belt of the Zimbabwe craton. The main lithologies within the Tati greenstone belt include volcanic and sedimentary rocks metamorphosed to the lower greenschist to lower amphibolite facies intruded by granitoids of unknown age. The mineralized body of the Selkirk deposit is hosted within the Selkirk Formation (>1 km thick) which consists mainly of dacitic and rhyolitic volcaniclastic rocks and minor amounts of mafic volcanic rocks, quartzites and quartz sericite schists. The Selkirk Formation also hosts the Phoenix, Selkirk and Tekwane meta-gabbronoritic intrusions and the Sikukwe meta-peridotite intrusion (Maier et al., 2007). The area around the historic Selkirk Mine hosts additional intrusive magmatic nickel-copper-platinum group elements (Ni-Cu-(PGE)) sulphide deposits, namely the Phoenix deposit, as well as the Tekwane and Cinderella exploration prospects.

Two styles of mineralization are found at Selkirk: (1) massive sulphides (mined-out), located within the metagabbro intrusion and small, massive sulphide accumulations at the base of the taxitic metagabbro intrusive, and (2) matrix and disseminated sulphides as a halo surrounding and down-plunge of the mined-out massive sulphide body. The disseminated zone that once included the mined-out sulphide lens, lies 50 to 100 m above the basal contact of the footwall quartz diorite and mimics the footwall contact. Currently available drilling suggests that the shallow, previously mined, massive sulphide lens was synformal in shape and measured up to 70 to 90 m wide, averaged 20 m thick and had a plunge extent of 200 m. The disseminated sulphide mineralization surrounding the massive sulphides is also synformal in shape, averages 120 m wide, and 100 to 150 m thick and plunges shallowly to the south at 20°. It is defined from surface over a distance of 900 m and remains open at depth. Mineralization consists of pentlandite, pyrrhotite, chalcopyrite and pyrite (Johnson, 1986). At least three generations of dykes crosscut the mineralized metagabbro. Two sets of dykes intrude longitudinally across the Selkirk metagabbro: a feldspar porphyry set in a N-S to NE-SW direction followed by a diabase dyke set, in a similar N-S to NE-SW trend. The Karoo dolerite dykes crosscut all the above along a NW-SE / W-E trending direction. Numerous faults traversing the deposit have been described in surface and underground mapping, none of which present significant displacement at the deposit- scale. The Selkirk metagabbro host has been attributed an age of 2.7 Ga.

1.7 Deposit Types

The Selkirk deposit has been previously described by various authors as a magmatic Ni-Cu-(PGE) deposit and its nature is well documented. Magmatic sulphide deposits are hosted by mafic to ultramafic units (e.g., komatiite, gabbro, gabbronorite, dunite, peridotite, pyroxenite, boninitic and picritic rocks). These types of deposits form as a result of segregation and concentration of immiscible sulphide melt from mafic and ultramafic magmas, as well as enrichment in chalcophile element (e.g., Ni, Cu and PGEs) from particular and adequate physical environment. The particular conditions in which mafic and ultramafic magmas form magmatic massive sulphide deposits include: (1) abundances of metals and sulphide in the magmas, (2) capacity of the magmas to interact with it's surrounding (i.e., nature of the wall rocks), and (3) the composition, temperature, viscosity, and volatile content of the magmas.

1.8 Exploration

Since the mid-1960s, the Property has been extensively studied by several companies and exploration campaigns, including mapping, geochemistry, geophysics, channeling, and drilling. AAC, under its Botswana subsidiary Sedge Botswana (Pty) Limited ("Sedge") undertook detailed outcrop mapping of the Property in 1970 and outlined the mineralized metagabbro hosting the Selkirk massive sulphide lens. The 1970-1971 drilling campaign undertaken by Sedge defined the near surface portion of the Selkirk deposit that was subsequently mined between 1989 and 2002.

It was only in the early 2000s that the Selkirk Property was studied using modern mineral exploration techniques. LionOre acquired 85% of the Project in 2002 and launched a broad exploration program including mapping, geochemical and geophysical surveys, resampling of existing drillholes for PGE mineralization and borehole geophysics. In mid-2007, the Property changed ownership and Norilsk Nickel became the operator of the Project. Norilsk Nickel concentrated their exploration efforts on the Selkirk Mining Licence, completing property wide geophysical and geochemical campaigns. Geological modelling of the Selkirk deposit was pursued by the geology team of Norilsk Nickel and an underground exploration drive was also developed to better characterize the Selkirk mineralization.

Prospecting licences surrounding the Selkirk Mine were acquired by TNMC in 2010 and exploration work conducted included compilation and analysis of existing data, an airborne versatile time-domain electromagnetic ("VTEM") survey, outcrop and structural mapping, ground geophysics and remote sensing. The Project was acquired by BCL in 2015 and no exploration work has been completed since then.

1.9 Drilling

The first drilling at Selkirk was in the mid-1960s by TTE, followed by a major drilling campaign by Sedge in 1970-1971 delineated the Selkirk deposit. A total of 117 diamond drillholes were completed, but the drill core has since been lost or destroyed. From 1998 to 2008, 96 underground delineation and crown pillar boreholes and 270 delineation surface diamond drillholes were completed by various operators. In addition, a total of 96 underground grab samples were taken from muck piles after blasting, and 50 grab samples and 14 channel samples were taken from an underground exploration drift.

The boreholes collar positions were surveyed using real time kinematics ("RTK") methodology and the orientation and deviations were surveyed with a Gyro. The Gyro tool is appropriate in a massive sulphide deposit since it is not influenced by magnetic rocks. In October 2022, a resurvey campaign was conducted on the Selkirk Mine Area, resulting in the resurveying of a total of 320 drillholes.

The drilling procedures integrated during the various drill campaigns on the Property are considered adequate and have been reviewed by the QP for Section 10. The current drill pattern is dense enough to interpret the deposit geometry and continuity with good confidence. However, it is the QP's opinion that considerable data compilation efforts are required to improve confidence in the drilling database, including the compilation of core recovery data, downhole survey validation and resampling of drill core.

1.10 Sample Preparation, Analyses and Security

Sampling and assaying of drill core from the Selkirk deposit was conducted primarily at the TNMC laboratory facilities located at the Phoenix Mine. The sample preparation, analysis and security procedures have been reviewed by the QP for Section 11 and are generally considered adequate.

Pulp duplicates generally show good analytical precision. However, it has been observed by GMS that coarse duplicates from 1989 to 2002 shows greater variation and should be investigated further. In addition, quality assurance and quality control ("QA/QC") results from 2007 to mid-2008 shows numerous failures beyond acceptable limits, and the QP recommends investigating this further. There are also significant precision issues from PGE-rich material analyzed at the Phoenix Mine Laboratory. Most standards have returned significantly lower value than their certified values. PGE assays in the database should only be used as an indicator until further investigation and data validation is completed. All the certified standards provided in the database are not certified for gold, therefore no conclusions on the quality of the analysis can be drawn. Overall, the analytical data of Ni and Cu appears to be reliable, and only drillholes from 2007 to mid-2008 (where QA/QC results showed numerous failures) should be further investigated. An industry best practice QA/QC protocol should also be implemented, and a complete suite of base and precious metals should be analyzed in future drilling programs.

1.11 Data Verification

Mr. David Dodd, MSc, *Pr.Sci.Nat*, MSA principal consultant and QP of Section 12, conducted a site visit with Gerry Katchen (Exploration Manager from PNRL) from August 30 to September 3, 2022, in order to validate historic exploration activities. During the site visit, the QP validated:

- The presence of drill cores on site and the distribution and location of collars.

- The lithologies and mineralization observed in the drill cores and logged in the database.
- The sampling protocol, sampled intervals, and historic assay database.

During the site visit, the presence of Ni-Cu mineralization was observed both in outcrop and in selected drill core intercepts in sufficient quantities to validate values present in the historic assay database. Samples were also collected from drill cores to validate historic assays. The storage of core, reverse circulation ("RC") chip trays and pulps seems appropriate, although a comprehensive inventory and classification of available core would be necessary if a complete re-assaying campaign is undertaken.

1.12 Mineral Processing and Metallurgical Testing

Since the early 1970s, several former owners of the Selkirk deposit carried a range of metallurgical tests to develop a suitable processing scheme. This early metallurgical testing showed that the Selkirk deposit has complex mineralogy, and generally consists of finely disseminated sulphide mineralization. Many of the early attempts at processing however typically focused on the production of a low-grade nickel-copper concentrate suitable for processing material at the former BCL smelter (now closed), thus potentially limiting options which may have altered or improved the metallurgy.

PNRL conducted a new metallurgical test program in 2021 to assess if marketable separate copper and nickel concentrates could be produced, along with information on metal recovery levels.

The flowsheet adopted was more typical of modern Ni-Cu processing practice. For this work, two samples were prepared from 2016 drillhole number DSLK278 that had been targeted down-plunge of previous underground mine workings. Low-grade and high-grade composites were prepared from semi-continuous drill intervals to represent potential open pit and underground type ores. Testwork results showed that the primary sulphide minerals were pyrrhotite, pentlandite and chalcopyrite with minor pyrite. Nickel was fairly well liberated based on the conditions adopted and the fineness of grind tested. The Selkirk material was considered hard to very hard.

The copper-nickel and pyrrhotite circuits in laboratory testing met grade targets and recovery expectations. The laboratory scale testwork successfully produced a high-grade copper concentrate low in nickel. The final nickel concentrate grade was 10% Ni, which is towards the current lower limit for market concentrate. The copper concentrate will likely attract a good payability from Pd and Au credits, while the nickel concentrate will likely attract a good payability from Pt and Pd credits. The bulk of the tailings (pyrrhotite scavenger tails) assayed 0.59% S which is considered potentially non-acid generating. The high-sulphur tailings could potentially be stored in a main tailings storage facility encased by the low sulphur tailings material.

The 2021 testwork was a rapid yet an effective demonstration that good metallurgy was possible for the Selkirk deposit. To further develop all aspects of the processing flowsheet, it is envisioned that there will be several further phases of metallurgical development in the near future.

1.13 Mineral Resources Estimate

The Property is not considered an "advanced property" under NI 43-101 at this stage. The drilling database is not currently being used to support a Mineral Resource Estimate as more data validation is required to improve confidence.

1.14 Mineral Reserve Estimate

The Property is not considered an "advanced property" under NI 43-101 at this stage. The drilling database is not currently being used to support a Mineral Reserve Estimate.

1.15 Mining Methods

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, mining methods have not been established and are not currently dealt with in this report.

1.16 Recovery Methods

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, recovery methods have not been established and are not currently dealt with in this report.

1.17 Project Infrastructure

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, project infrastructures have not been established and are not currently dealt with in this report.

1.18 Market Studies and Contracts

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, market studies have not been completed on the Selkirk deposit.

1.19 Environmental Studies, Permitting & Social or Community Impact

The Selkirk Mine is located to the southeast of Francistown in Botswana and started production as an underground operation in 1989 for the extraction of nickel and copper. The mine was put under care and maintenance in 2002. In 2008, an Environmental Impact Assessment ("EIA") was carried out for the redevelopment of the mine; however, no redevelopment was undertaken, and the authorization lapsed. Similarly, in 2016, an Environmental Management Plan ("EMP") was compiled for the potential construction of an open pit operation within the Selkirk Mining Licence area. This EMP was authorized in July 2016 but lapsed in 2018. In order to complete any potential redevelopment of the underground mine or the construction of an open-pit operation, the EISA and the EMP would need to be updated and resubmitted.

Baseline environmental studies should be implemented, including visual, air quality, noise and traffic studies.

1.20 Capital and Operating Costs

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, capital and operating costs of the Project have not been calculated.

1.21 Economic Analysis

The Property is not considered an "advanced property" under NI 43-101 at this stage. Therefore, an economic analysis of the Project has not been completed.

1.22 Adjacent Properties & Other Relevant Data and Information

The past producing Phoenix Mine is located 15 km north of Selkirk and both deposits share a similar exploration and ownership history. Production commenced at Phoenix in 1995, with material extracted via an open pit operation. Compared to the Selkirk deposit, Phoenix exhibits a more structurally controlled style of mineralization. The mineralization includes fine and blebby disseminations, vein and stringer style of sulphide minerals including pyrrhotite, pentlandite and chalcopyrite with lesser sphalerite, molybdenite and galena. Infrastructure at the Phoenix Mine includes an open pit, a concentrator, a dense media separation plant, a tailing storage facility, water storage dams, a power substation, a medical clinic, workshops, and warehouses. The TNMC administration offices, assay lab and the core storage facility are also at the Phoenix Mine.

1.23 Recommendations and Conclusions

An initial future milestone would be the declaration of a current MRE in accordance with CIM (2014) Definition Standards incorporated by reference in NI 43-101, which would form the basis of a Preliminary Economic Assessment ("PEA") to determine the economic potential of an open pit mine at Selkirk. Simultaneously, PNRL would advance their understanding of the metallurgical properties and zonation of the deposit, particularly in relation to PGE mineralization which has been understudied in the past.

At the time of writing, it is the opinion of GMS that the drilling database in its current state is not robust enough to form the basis of a current MRE. Validation drilling is required to confirm the presence and tenors of mineralization in historical drilling, especially considering the QA/QC failures observed in the past. A complete recompilation of assay certificates is required, and a more detailed study of QA/QC results is recommended.

- The understanding of the geology and mineralization styles at Selkirk is considered to be good.
- The methods of drilling and sampling undertaken in the past appear to be acceptable and appropriate for the style of mineralization.
- Although the spatial coverage of drilling and assays is good regarding Ni and Cu, there are large gaps in the drill spacing for PGE assays (Pd, Pt and Au). These gaps would need to be filled to include Pd, Pt and Au into an updated MRE in the future.
- Past metallurgical studies have highlighted several challenges in regard to metallurgy, recognizing that the focus of early work was generally on the production of a low-grade bulk Ni-Cu concentrate. Early level metallurgical testwork in 2021 has indicated that it is possible to produce separate marketable Ni and Cu concentrates at Selkirk.

A summary of the costs associated with this recommended work program is shown in Table 1-1.

Table 1-1: Recommendations per Discipline and Associated Costs

Item	Cost (CAD)
Exploration Camp and Support Infrastructure	$520,000
Geology	$5,708,000
Geophysics	$70,000
Metallurgy	$1,362,000
Future Mining Activities	$213,000

Item	Cost (CAD)
Exploration Work	$1,050,000
Environmental Baseline Studies	$77,000
Total	**$9,000,000**

These costs remain an estimate, and are subject to fluctuations in the financial markets, cost inflation and the ability of PNRL to fund exploration activities.

2 INTRODUCTION

The following Technical Report has been prepared for Premium Nickel Resources Ltd. ("PNRL") in accordance with National Instrument 43-101 – Standards of Disclosure for Mineral Projects ("NI 43-101") and is generally based on a compilation of various technical documents and reports released by past operators of the Selkirk Property ("the Property" or "the Project") such as Norilsk Nickel Group of Companies ("Norilsk Nickel"), LionOre Mining International ("LionOre") and BCL Limited ("BCL"). The Property has been subject to numerous economic studies in the past, the most recent being a Bankable Feasibility Study ("BFS") undertaken by WorleyParsons on behalf of BCL in 2015-2016.

This report contains all relevant technical and scientific information that investors and their professional advisors would expect to find in the report, for the purpose of making a reasoned and balanced judgement regarding a potential investment. The Property is considered by PRNL as an "early-stage exploration property" as defined by Section 1.1 of NI 43-101, and does not contain a Mineral Resource Estimate, Mineral Reserve Estimate nor an economic study such as a preliminary economic assessment, pre-feasibility study or a feasibility study. In its current state, the scientific data existing on the Property does not support the estimation of a Mineral Resource, as significant data verification work is required.

The intention of this Technical Report is to provide sufficient, clear and unambiguous technical and scientific information relating to the Property available at the effective date of the report for use by PNRL. The QPs understand that a copy of this report may be included in any documentation filed on SEDAR (www.sedar.com) with the securities commissions in the provinces and territories of Canada, the TSX Venture Exchange and sent to both existing and potential shareholders.

2.1 Scope of Work

The Technical Report responsibilities of the various participating consultants are as follows:

- G Mining Services Inc ("GMS"): overall report coordination, property description and location, accessibility, history, geology, deposit types, exploration, sample preparation, analysis and security, adjacent properties, other relevant data, interpretations, conclusions and recommendations.
- The MSA Group ("MSA") – data verification.
- Phillip Mackey, P.Eng., PhD, FCIM, FAIME, Independent Consultant, P. J. Mackey Technology Inc.: metallurgical test work.
- SLR Consulting (South Africa) Pty Ltd. ("SLR"): history, environmental studies, permitting, social and community impacts.

A summary of the qualified persons ("QP") responsible for each section of the report is detailed in Table 2-1.

Table 2-1: Summary of Qualified Persons

Qualified Person	Company	Title	Report Sections
James Purchase, P.Geo.	G Mining Services Inc.	Consulting Geologist	1.1 – 1.5, 1.13 – 1.18, 1.20 – 1.23, 2, 3, 4, 5, 6.1 - 6.4, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25.1, 26.1, 26.2, 26.4, 26.5, 26.6, 26.8, 27
Julie-Anais Debreil, P.Geo., PhD	G Mining Services Inc.	Senior Resource Geologist	1.6 – 1.10, 7, 8, 9, 10, 11, 25.1, 26.1, 26.2, 26.5, 26.6, 26.8, 27
David Dodd, *Pr.Sci.Nat.*	The MSA Group	Head of Department, Geology	1.11, 12, 25.1, 26.1, 26.8, 27
Phillip Mackey, P.Eng., PhD, FCIM, FAIME	P. J. Mackey Technology Inc.	Independent Consultant	1.12, 13, 25.2, 26.3, 26.8, 27
Sharon Meyer, *Pr.Sci.Nat.*	SLR Consulting (South Africa) Pty Ltd	Associate Environmental Consultant	1.19, 6.5, 20, 26.7, 26.8, 27

2.2 Sources of Information and Data

Unless otherwise stated, all the information and data contained in the Technical Report or used in its preparation has been provided by PNRL up to the effective date of this report. The above-named QPs have no reason to doubt the reliability of the information provided. Some sources contain conflicting information in regard to dates of events and meterage of drilling during the various campaigns; however, none of these conflicts are deemed material to the validity of the underlying data.

Sources of information include:

- Discussions with GMS and PNRL personnel
- Inspection of the Selkirk Property area, including outcrop, drill core, and underground openings
- Review of exploration data compiled and provided by PNRL
- Additional information from public domain sources
- Technical and scientific reports by previous operators
- All figures and tables cited using references in Section 27

All currencies in this Report are expressed in Canadian dollars (CAD) unless otherwise stated.

2.3 Site Visits

Site visit dates and scopes are summarized in Table 2-2.

Table 2-2: Site Visit Dates of Qualified Persons

Qualified Person	Site Visit Scope	Dates
Julie-Anais Debreil, P.Geo.	Geology	September 22 to 24, 2021
James Purchase, P.Geo.	Did not visit the site	N/A
David Dodd, *Pr.Sci.Nat*	Geology, Data Verification	August 30 to September 3, 2022
Phillip Mackey, P.Eng	Did not visit the site	N/A
Sharon Meyer, *Pr.Sci.Nat*	Did not visit the site	N/A

Site visits were conducted by two of the authors of the Technical Report, during which drill core, mineralized outcrops and underground workings were inspected. In addition, sample preparation and storage facilities were toured, and check samples were taken for analysis in an independent laboratory. Gerry Katchen, Exploration Manager for PNRL, accompanied both Ms. Debreil and Mr. Dodd during their separate site visits.

2.4 Units of Measure, Abbreviations and Nomenclature

The units of measure presented in this Technical Report, unless noted otherwise are in the metric system.

A list of the main abbreviations and terms used throughout this Report is presented in Table 2-3.

Table 2-3: List of Main Abbreviations

Abbreviations	Full Description
Ag	Silver
Al	Aluminium
As	Arsenic
Au	Gold
Bi	Bismuth
BWP	Botswana pula
C	Carbon

Abbreviations	Full Description
CAD	Canadian Dollar
Cd	Cadmium
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
Co	Cobalt
CoG	Cut-off Grade
Cu	Copper
DDH	Diamond Drilling
DEA	Department of Environmental Affairs
DGPS	Differential Global Positioning System
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
F	Degrees Fahrenheit
FA	Fire Assay
Fe	Iron
FS	Feasibility Study
G	Giga – (000,000,000’s)
g	Gram
gpt or g/t	Grams per tonne
g/L	Gram per litre
GMS	G Mining Services Inc.
gpm	Gallons per minute (US)
GPS	Global Positioning System
ha	Hectares
h	Hour
h/d	Hours per day
h/y	Hours per year
h/wk	Hours per week
hp	Horsepower
HQ	Drill Core Diameter (63.5 mm)
Hz	Hertz
ID	Inverse Distance
ISO	International Organization for Standardization
k	Kilo – (000’s)
kg	Kilograms
kg/t	Kilograms per tonne
kV	Kilovolts

Abbreviations	Full Description
km	Kilometre
km/h	Kilometre per hour
kPa	Kilopascal
kW	Kilowatts
kWh	Kilowatts per hour
L	Litre
LiDAR	Light Detection and Ranging
LIMS	Laboratory Information Management System
M	Mega or Millions (000,000's)
masl	Metres above sea level
m	Metre
m/min	Metre per minute
m/s	Metre per second
m^2	Square metre
m^3	Cubic metre
mg	Milligram
mg/L	Milligram per litre
min	Minute
mL	Milliliter
mm	Millimeter
ml	Milliliter
Mo	Month
Mt	Million tonnes
Mtpd	Metric tonne per day
Mtpy	Metric tonne per year
MW	Megawatt
Ni	Nickel
NI 43-101	National Instruments 43-101- Canadian Standards of Disclosure for Mineral Projects
NQ	Drill Core Diameter (47.6 mm)
Ø	Diameter
OK	Ordinary Kriging Methodology
oz	Troy Ounce (31.10348 grams)
OCR	Off-Channel Reservoir
Pb	Lead
Pd	Palladium
PEA	Preliminary Economic Assessment

Abbreviations	Full Description
PFS	Pre-feasibility Study
PGE	Platinum Group Elements
PNRL	Premium Nickel Resources Ltd.
PNGB	Premium Nickel Group Proprietary Limited
ppb	Parts per Billion
ppm	Parts per Million
psi	Pounds per square inch
PQ	Drill Core Diameter (85mm)
Pt	Platinum
RC	Reverse Circulation
Rh	Rhodium
RoM	Run-of-mine
rpm	Revolutions per minute
S	Sulphur
Sb	Antimony
Se	Selenium
Sec	Second (time)
t	Tonnes (1,000 kg) (metric ton)
t/y or tpy	Tonnes per year
t/d or tpd	Tonnes per day
t/h or tph	Tonnes per hour
t/m^3	Tonnes per cubic metre
Te	Tellurium
USD	United States Dollar
V	Volt
wk	Week
XRF	X-ray Fluorescence
y	Year
Zn	Zinc

3 RELIANCE ON OTHER EXPERTS

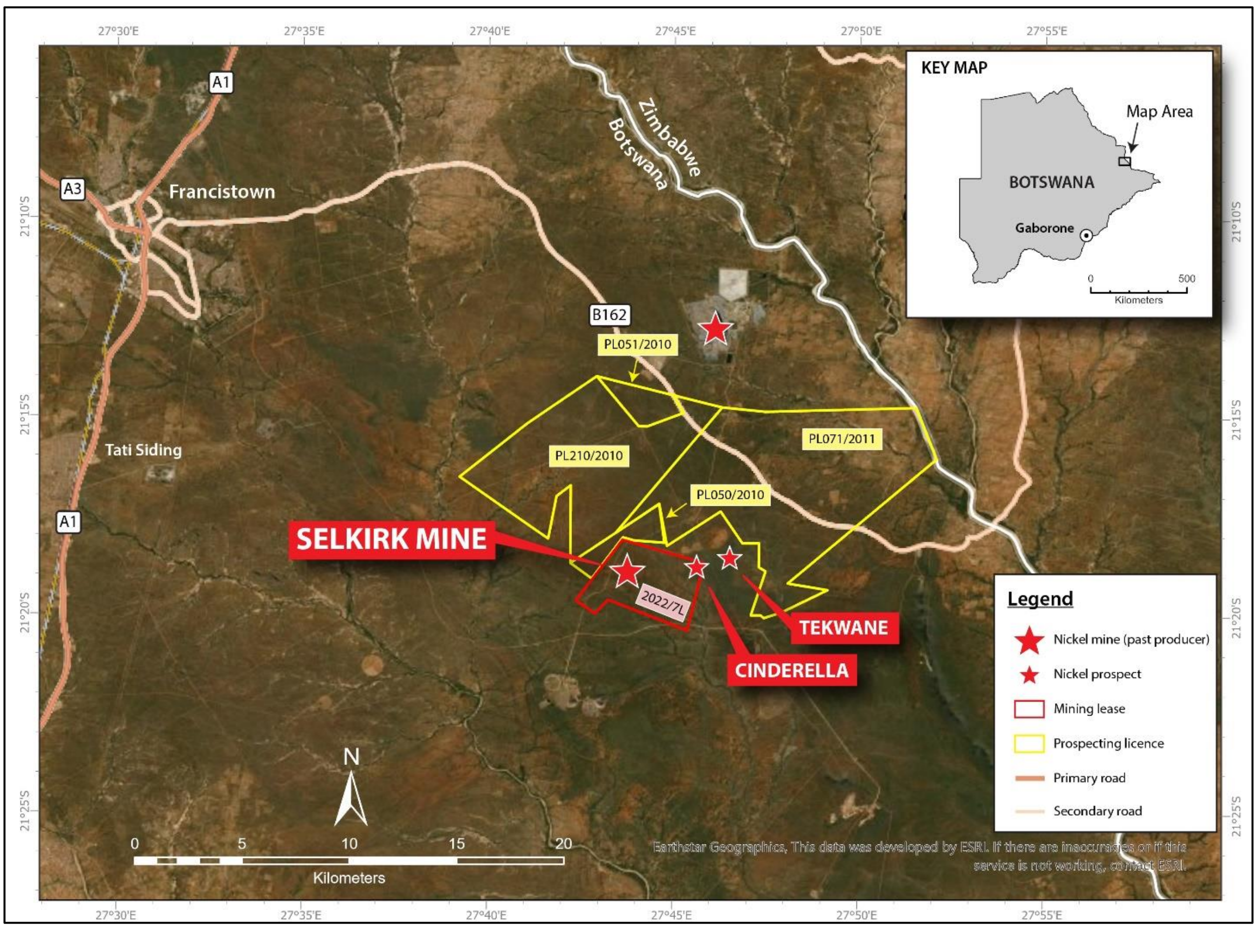
This Technical Report has been prepared by G Mining Services Inc. for Premium Nickel Resources Ltd. and is solely based on material provided by PNRL relating to the Selkirk Project. While the authors have carefully reviewed, within the scope of their technical expertise, all the information presented to them as of the effective date of this report, they express no opinion regarding the accuracy and completeness of the information.

For this Technical Report, GMS has relied on property ownership information provided by PNRL. PNRL has relied on a legal opinion by Bookbinder Business Law based in Gaborone, Botswana dated November 23, 2022, entitled OPINION: PREMIUM NICKEL GROUP PROPRIETARY LIMITED, and this opinion is relied upon in Section 4 and the Summary of this Technical Report. GMS has made all efforts possible to confirm the validity of the property ownership via government sources, however we express no opinion as to the ownership status of the Property.

4 PROPERTY DESCRIPTION AND LOCATION

The Project consists of a single mining licence ("ML") covering an area of 1,458 ha (14.58 km^2) and four (4) prospecting licences (PLs) covering a total area of 12,670 ha (126.7 km^2). The Project is located approximately 28 km southeast of the city of Francistown, and 450 km northeast of the national capital Gaborone. The mining licence, 2022/7L (the "Selkirk Mining Licence"), is centred approximately at 21°19'13" S and 27°44'17" E and is presented in Figure 4-1. This mining licence gives PNGB the right to mine copper and nickel ores and associated minerals contained in these mined ores for a period of ten years commencing on May 27, 2022, and ending on May 26, 2032. It also provides the right to carry out care and maintenance and exploration work from both surface and underground. The four (4) PLs, PL050/2010, PL051/2010, PL210/2010 and PL071/2011 give PNGB the exclusive right to prospect for base metals for a period of two (2) years, effective October 1, 2022.

Figure 4-1: Selkirk Property



Source: PNRL, 2022

4.1 Land Tenure

Mining licence 2022/7L was granted to Premium Nickel Group Proprietary Limited ("PNGB") on May 27, 2022, over the Selkirk deposit discovered under mining licence 88/2. Premium Nickel Group Proprietary Limited (PNGB) is an indirect subsidiary of PNRL, being a wholly owned subsidiary of Premium Nickel Resources Selkirk Group (Barbados) Limited which is in turn wholly owned by Premium Nickel Resources International Limited, a direct wholly-owned subsidiary of PNRL. The original licence, 88/2 which had been granted to Tati Nickel Mining Company (Pty) Ltd ("TNMC") on November 29, 1988, was later amended to include the Phoenix Mine located 15km to the north of the Property. It was granted for a period of 25 years and was renewed on November 28, 2013, for a period of 11 years, and was set to expire on November 27, 2024. The new mining licence is limited to the Selkirk deposit and the surrounding areas and expires on May 26, 2032.

The terms and conditions for the renewal of the mining licence are framed by the relevant sub-sections of Section 42 of the Mines Act ("the Act") and indicate that:

(4) The Minister shall grant an application for renewal if satisfied that-
- *(a) the applicant is not in default;*
- *(b) development of the mining area has proceeded with reasonable diligence;*
- *(c) the proposed programme of mining operations will ensure the most efficient and beneficial use of the mineral resources in the mining area; and*

(5) The Minister shall not reject an application on the ground referred to in-
- *(a) Subsection (4)(a), unless the applicant has been given details of the default and has failed to remedy the same within three months of such notification;*
- *(b) Subsection (4)(b), unless the applicant has been given reasonable opportunity to make written representations thereon to the Minister; or*
- *(c) Subsection (4)(c) unless the applicant has been so notified and has failed to propose amendments to his proposed programme of mining operations satisfactory to the Minister within three months of such notification.*

(6) Subject to the provisions of this Act, the period of renewal of a mining licence shall be such period, not exceeding 25 years, as is reasonably required to carry out the mining programme.

(7) On the renewal of a mining licence the Minister shall append thereto the programme of mining operations to be carried out in the period of renewal.

In order to maintain the mining licence in good order, the holder must make annual payments on its anniversary date in accordance with Section 71 of the Act, and monthly royalty payments according to Section 66 of the Act, if appropriate, in each case to the Government of Botswana. The royalties payable are percentages of the gross market value of mineral or mineral products as follows: precious stones (10%), precious metals (5%), and other minerals or mineral products (3%). The term gross market value is defined in the Act as the sale value receivable at the mine gate in an arms-length transaction without discounts, commissions, or deductions for the mineral or mineral product on disposal. No annual payments are required until the mine is in production.

The four (4) PLs were transferred to PNGB effective October 1, 2022, and give PNGB the exclusive right to explore for base metals for a period of two years. Upon issuance of the licence and each anniversary thereof, a charge equal to BWP 5.00 (CAD 0.53) multiplied by the number of square kilometres, subject to a minimum of BWP 1,000.00 (CAD 105.84), is payable to the office of the Director of Mines.

The terms and conditions for the renewal of the prospecting licences are framed by the relevant sub-sections of Section 17 of the Act and indicate that:

(2) The holder of a prospecting licence may, at any time not later than three months before the expiry of such licence, apply to the Minister by completing Form I set out in the First Schedule for renewal thereof stating the period for which the renewal is sought and submitting together with the application-
  - *(a) a report on prospecting operations so far carried out and the direct costs incurred thereby; and*
  - *(b) a proposed programme of prospecting operations to be carried out during the period of renewal and the estimated cost thereof.*

(3) Subject to this Act, the applicant shall be entitled to the grant of no more than two renewals thereof, each for the period applied for, which periods shall not in either case exceed two years, provided that-
  - *(a) the applicant is not in default; and*
  - *(b) the proposed programme of prospecting operations is adequate.*

(4) Before rejecting an application for renewal under subsection 3(a), the Minister shall give notice of the default to the applicant and shall call upon the applicant to remedy such default within a reasonable time.

(5) Before rejecting an application for renewal under (3)(b), the Minister shall give the applicant opportunity to make satisfactory amendments to the proposed programme of prospecting operations.

(6) Notwithstanding the provisions of subsection (3), the Minister may renew a prospecting licence for a period or periods in excess of the periods specified in that subsection where a discovery has been made and evaluation work has not, despite proper efforts, been completed.

At the time of writing, it is not clear which renewal cycle the PLs are subject to. This uncertainty is a result of the PLs being transferred rather than newly issued, therefore some ambiguity exists regarding their expiry date. They may be in the final 2-year cycle, in which event they would only be renewable if a discovery has been made (see subsection (6)). PNRL are currently seeking clarification on this matter.

Table 4-1 shows the details of each PL as well as Mining Licence 2022/7L.

Table 4-1: Selkirk Property Tenure

Description	Area (km^2)	Issue Date	Expiry Date	Annual Fee (BWP)	Annual Fee (CAD)	Annual Exploration Expenditure			
						Year 1 (BWP)	Year 1 (CAD)	Year 2 (BWP)	Year 2 (CAD)
ML 2022/7L	14.58	May 27, 2022	May 26, 2032	No Fee	No Fee				
PL050/2010	4.1	Oct. 1, 2022	Sept. 30, 2024	1,000.00	105.84	140,000	14,818	1,250,000	132,303
PL051/2010	4.4	Oct. 1, 2022	Sept. 30, 2024	1,000.00	105.84	115,000	12,172	790,000	83,616
PL210/2010	46.8	Oct. 1, 2022	Sept. 30, 2024	1,000.00	105.84	375,000	39,691	1,150,000	121,719
PL071/2011	71.4	Oct. 1, 2022	Sept. 30, 2024	1,000.00	105.84	700,000	74,090	4,240,000	448,773
Total	141.28					1,300,000	137,596	7,430,000	786,412

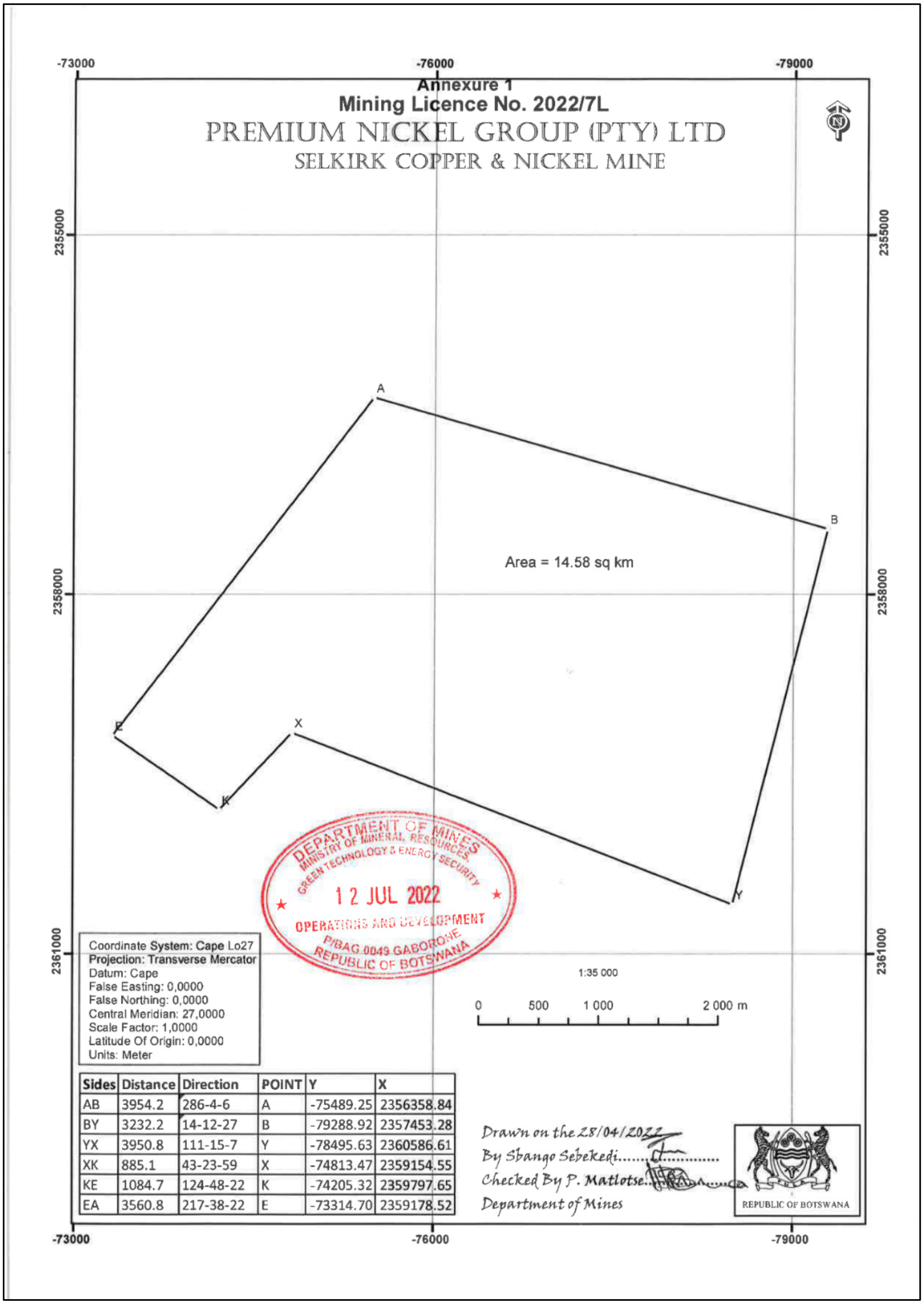
**Exchange Rate 1 BWP = 0.10584 CAD*

GMS have seen and reviewed an opinion titled OPINION: PREMIUM NICKEL GROUP PROPRIETARY LIMITED by Bookbinder Law based in Gaborone, Botswana regarding the validity of the land tenure described in this section. The document concludes that PNGB is in good standing under Botswana Law, and both the mining licence and the four prospecting licences are in good standing at the effective date of this report.

4.2 Property Surveys

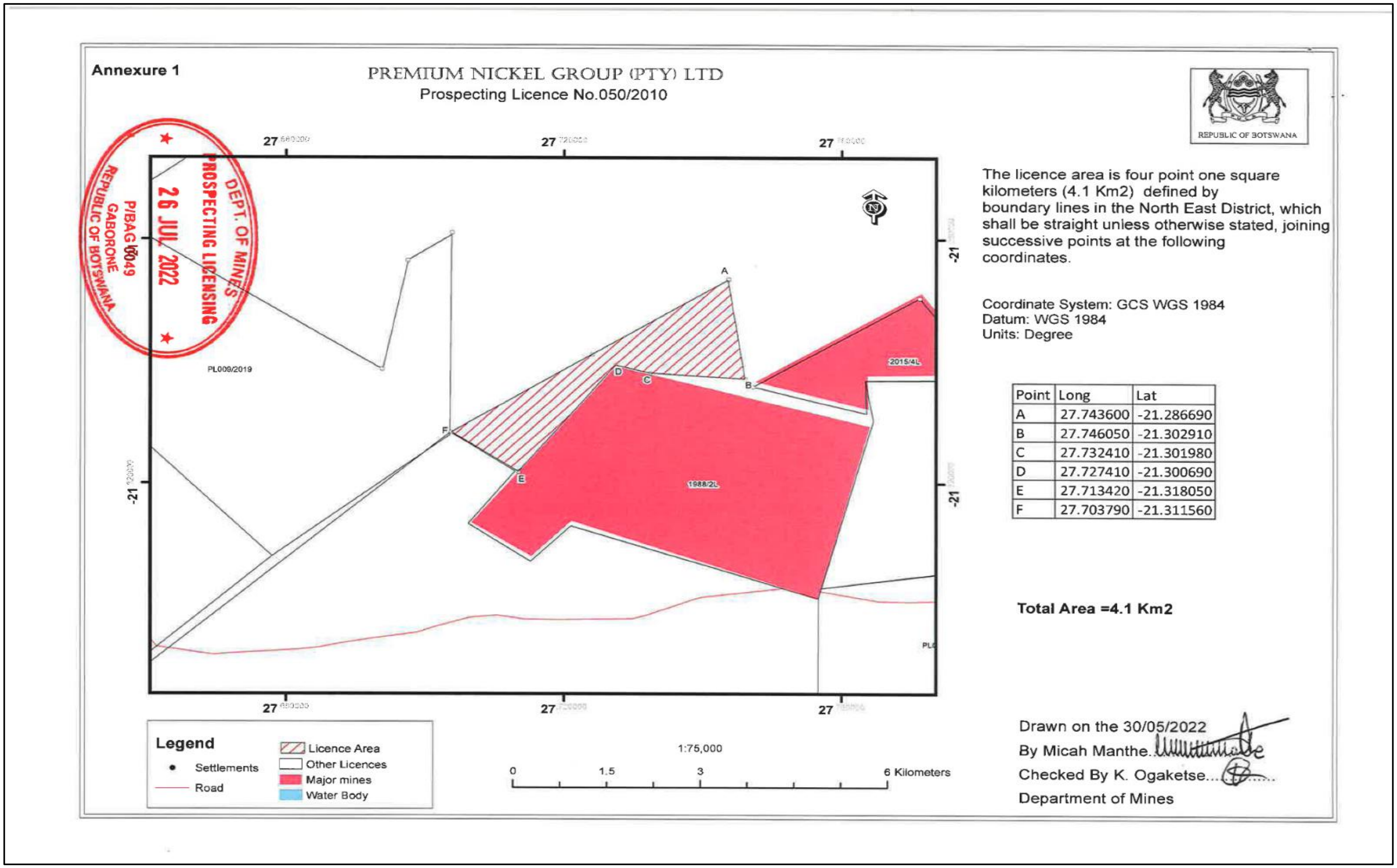
The mining licence has a cut survey line with concrete beacons established at all corners. The coordinates were surveyed in Cape Datum LO27 Projection (Figure 4-2). The PL survey plans are shown in Figure 4-3 through Figure 4-6 and boundaries are defined in WGS84 coordinates.

Figure 4-2: Selkirk ML 2022/7L Survey Plan



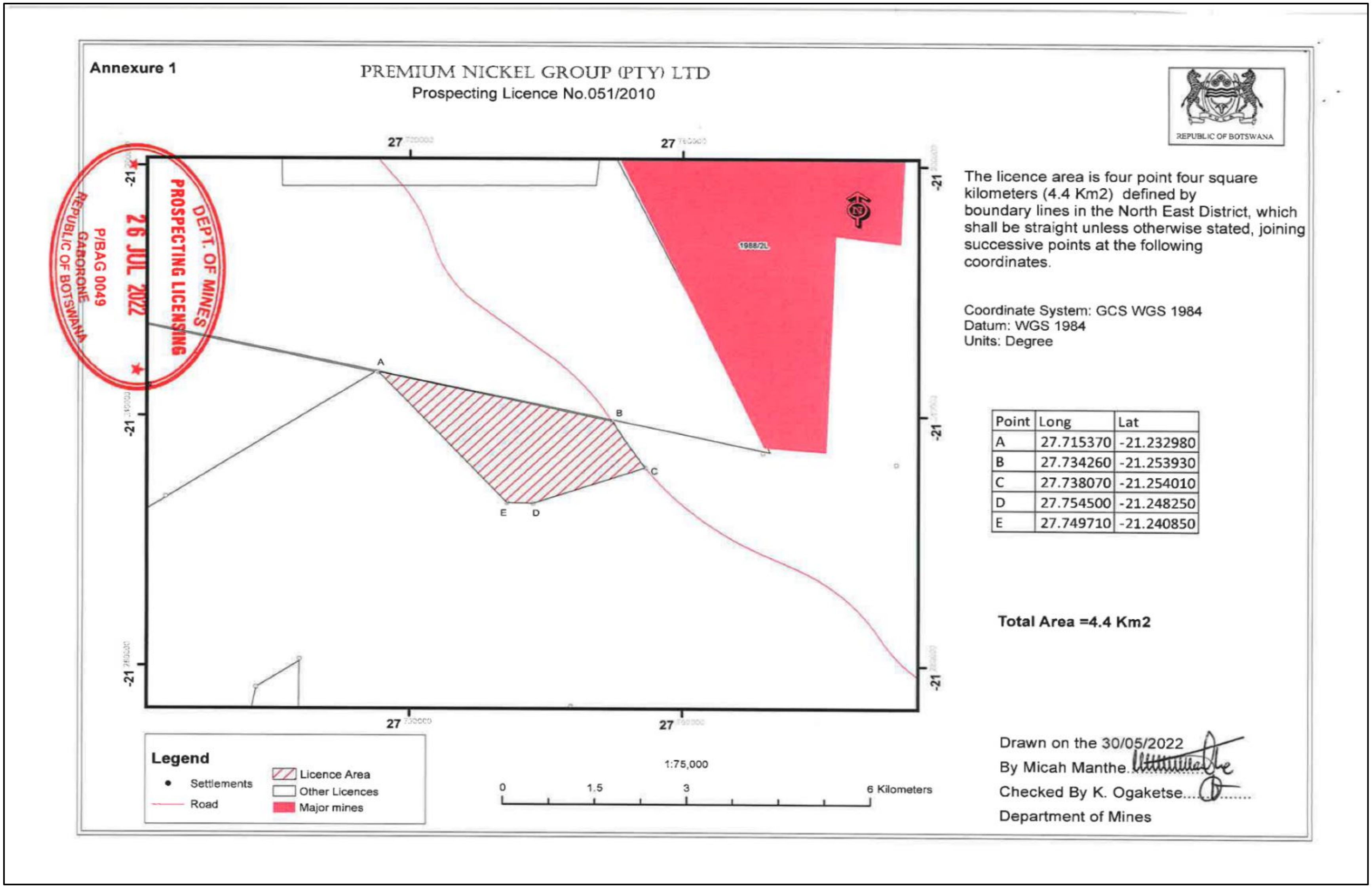
Source: Department of Mines Botswana, 2022

Figure 4-3: PL050/2010 Survey Plan



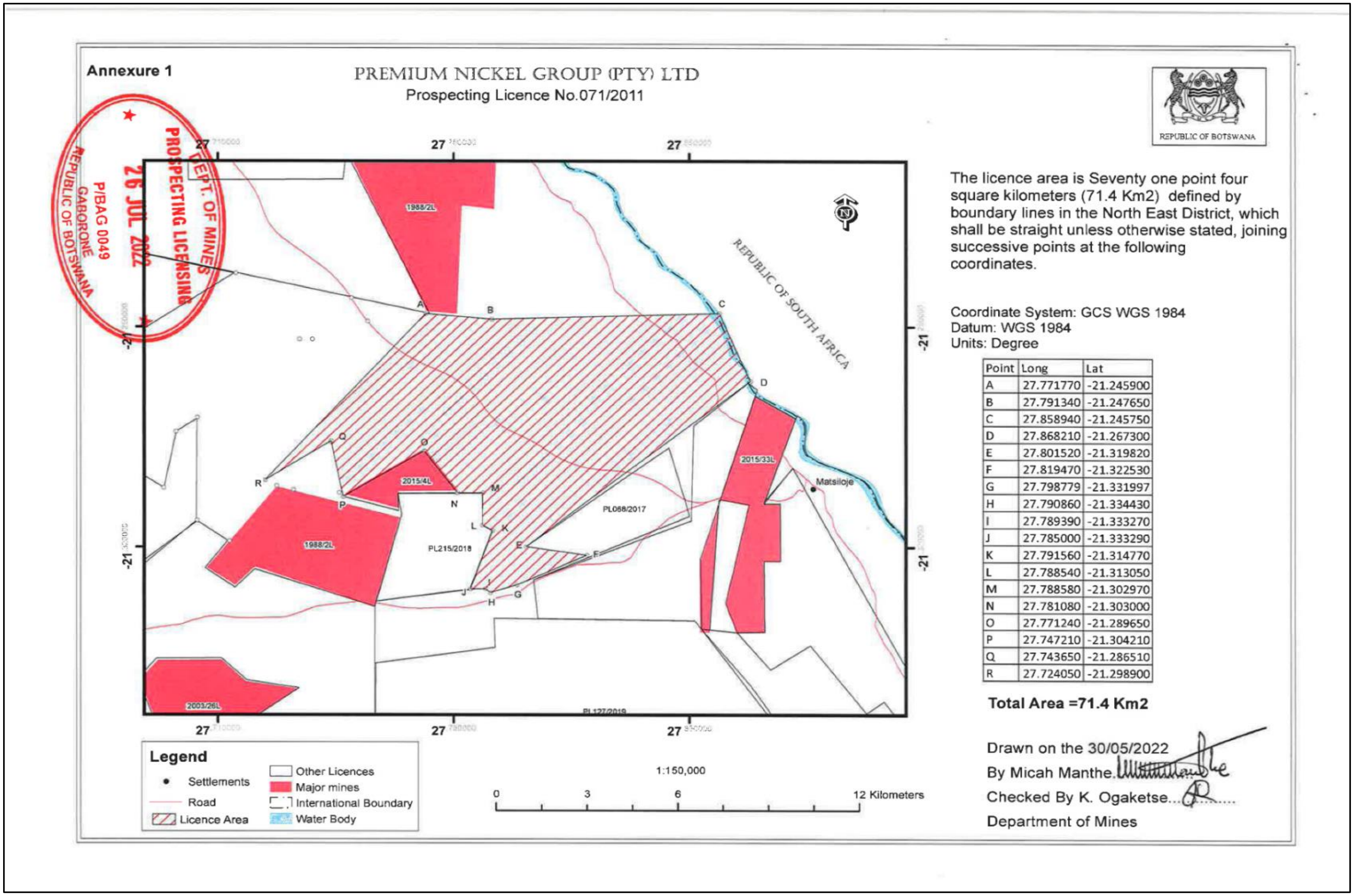
Source: Department of Mines Botswana, 2022

Figure 4-4: PL051/2010 Survey Plan



Source: Department of Mines Botswana, 2022

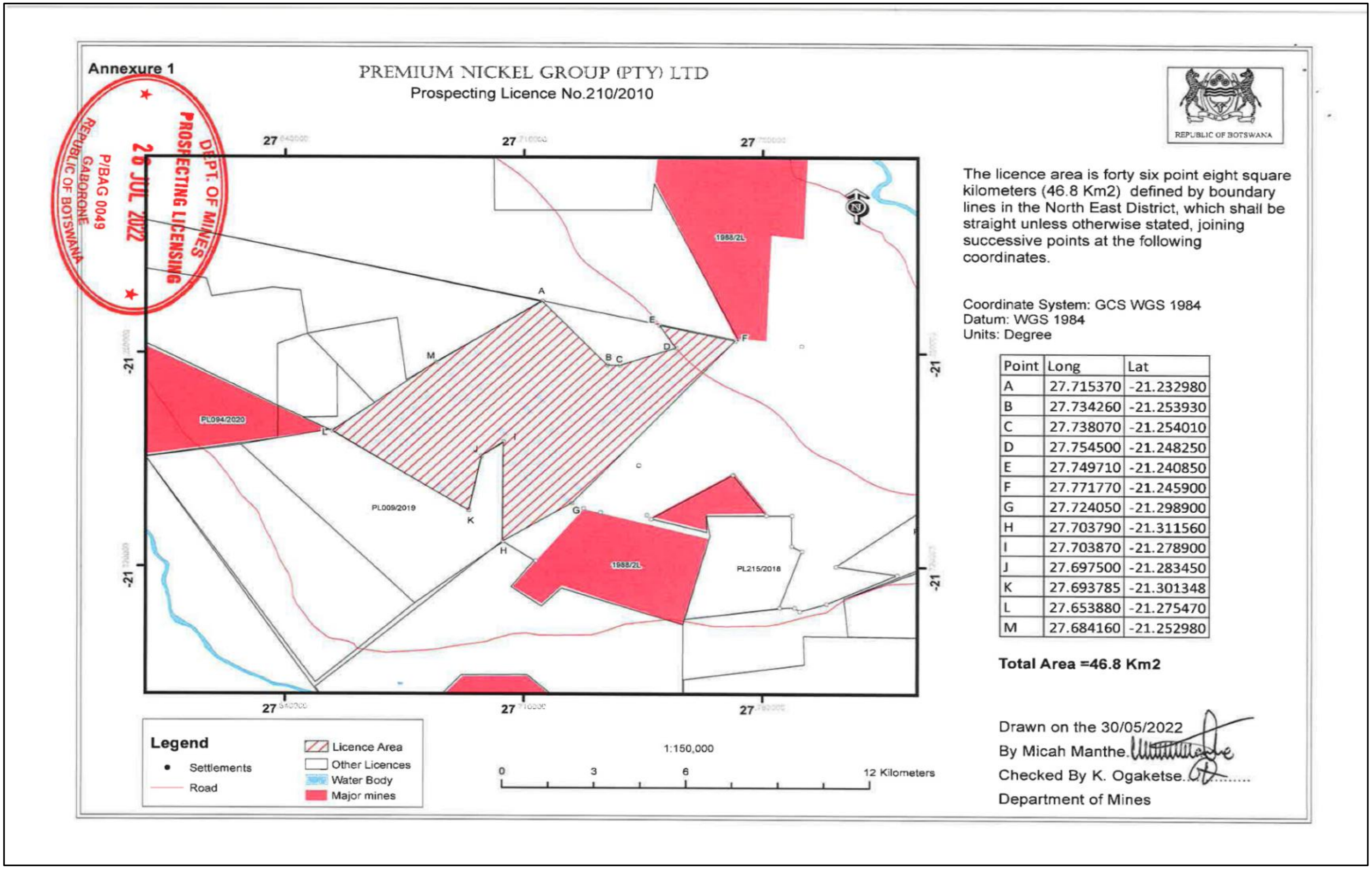
Figure 4-5: PL071/2011 Survey Plan



Point	Long	Lat
A	27.771770	-21.245900
B	27.791340	-21.247650
C	27.858940	-21.245750
D	27.868210	-21.267300
E	27.801520	-21.319820
F	27.819470	-21.322530
G	27.798779	-21.331997
H	27.790860	-21.334430
I	27.789390	-21.333270
J	27.785000	-21.333290
K	27.791560	-21.314770
L	27.788540	-21.313050
M	27.788580	-21.302970
N	27.781080	-21.303000
O	27.771240	-21.289650
P	27.747210	-21.304210
Q	27.743650	-21.286510
R	27.724050	-21.298900

Source: Department of Mines Botswana, 2022

Figure 4-6: PL210/2010 Survey Plan



Source: Department of Mines Botswana, 2022

4.3 Mineral Rights

In Botswana, mining activities are regulated under the Mining Act, which is administered by the Ministry of Mineral Resources, Green Technology and Energy Security ("MMGE"). The Act regulates the issuance of exploration and mining licences as well as harmonizing mining activities and environmental impacts. The Act entails:

- Introduction of the retention licence which allows exploration companies that have confirmed the discovery of a mineral deposit to retain rights over a period of three years, renewable once for a period of no more than three (3) years.
- Issuing of a prospecting licence for up to 1,000 km^2 for an initial period of three years and renewed for two (2) periods of two (2) years each.
- Allowing for the Botswanan government to acquire up to 15% in new mining ventures on commercial terms.
- Royalty rates of 3% for all minerals except precious stones and precious metals, which are 10% and 5%, respectively.
- The granting, renewal, and transfer of licences is automated and predictable.

The Income Tax Act, as it pertains to mining, includes:

- A generalized tax regime that applies to all minerals except diamonds, with corporate income tax of 25%.
- Immediate 100% capital write off in the year that the investment is made, with unlimited carry forward of losses.
- Introduction of a variable rate income tax formula.

The Mining Act further stipulates that the holder of the mineral concession shall:

- Conduct operations in a manner that will preserve the natural environment.
- Where unavoidable, promptly treat pollution and contamination of the environment. In the event of an emergency or extraordinary circumstances requiring immediate action, the holder of a mineral concession shall forthwith notify the Director of Mines and shall take all immediate action in accordance with the reasonable directions of the Director of Mines.

- Prepare and submit an Environmental Impact Assessment (EIA) report as part of the mining licence application or renewal.
- Restore the land substantially to the condition in which it was prior to the commencement of operations during and at the end of operations.
- The holder of a mineral concession shall make adequate on-going financial provision for compliance with environmental obligations as stipulated by the Act.

Any abstraction of water in Botswana is regulated through the Water Act of 1967.

4.4 Surface Rights

The Project is area is subject to freehold land, with the Selkirk Mining Licence situated on portions of Farms 73NQ and 75NQ. A lease rental agreement, 201-NQ, between TNMC and Nkobiwa Emmanuel Keeng Selebe, the owner of Farm 73-NQ, was signed on April 2, 1998, with an effective date of October 1, 1988. This agreement, remains effective for the lifetime of the mining licence, including renewals. The area covers only a small portion (52.008 ha) of the mining licence and PNGB will need to expand the surface rights area for the potential development of an open pit mine. If the landowner and PNGB cannot come to a mutual agreement, then the Office of the Director of Mines will determine the fair value of the annual rental fee in accordance with the Mines and Minerals Act, specifically:

Section 62 (1) (iii):

> *An arbitrator appointed in pursuance of this subsection may, on application by any interested party, apportion any rent payable under this subsection between the owner and any lawful occupier;* and

Section 62 (2):

> *In assessing any rent payable under the provisions of this section, an arbitrator shall determine the matter in relation to values at the time of arbitration current in the area in which the mining licence or retention licence or minerals permit is situated for land of a similar nature to the land concerned but without taking into account any enhanced value due to the presence of minerals.*

4.5 Royalties and Other Encumbrances

PNGB has signed a royalty agreement and contingent compensation agreement with the Liquidator. A 2% net smelter return ("NSR") exists on the sale of concentrates (or any other economic mineral resource material produced and sold) subject to specific rights of purchase by the purchaser and the Government of Botswana:

- The Selkirk NSR can be purchased (100%) for US$2 million. There is a first right of refusal in favor of PNRG if the Government of Botswana assigns the royalty agreement to a third party.

There is also a contingent compensation agreement whereby PNGB would pay additional compensation to the Government of Botswana if and when it discovers additional resources over and above the base case scenario of 15.9 Mt:

- New resource discovery up until the end of the seven-year mine life of the base case resource of 15.9 Mt (minimum grade of 2.5% Ni equivalent (NiEq) at Decision to Mine)
  - 25 Mt < new deposit > 50 Mt US$0.50 per metric tonne
  - 50 Mt < new deposit > 75 Mt US$0.20 additional per incremental metric tonne
  - 75 Mt < new deposit > 100 Mt US$0.30 additional per incremental metric tonne
  - New deposit > 100 Mt US$0.40 additional per incremental metric tonne
- The payment of contingent compensation shall be made from operating cash flow of the mine(s) once in operation and subject to adequate liquidity.

4.6 Environmental, Social and Permitting Considerations

GMS is not aware of any environmental liabilities on the Property which was assumed by PNGB pursuant to the Selkirk Purchase Agreement. PNGB has all required permits to conduct the proposed exploration work on the Property described in Section 26. GMS is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the Property.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

The Selkirk deposit is located in the North East District of Botswana, about 30 km southeast of Francistown, the country's northern most city. The Property sits across the farms 73NQ and 75NQ about 20 km from the Zimbabwean border, near Matsiloje village. The Tati River lies to the south of this area. Francistown, in close proximity to the west, being the main centre in the area with a burgeoning and industrious young population of around 120,000, provides a good source of labour and a growing skills base. The rural farming population has very low density and lives generally in cattle posts situated close to sources of groundwater, generally near the main rivers which have a more or less constant supply of groundwater in their sandy beds.

5.1 Accessibility

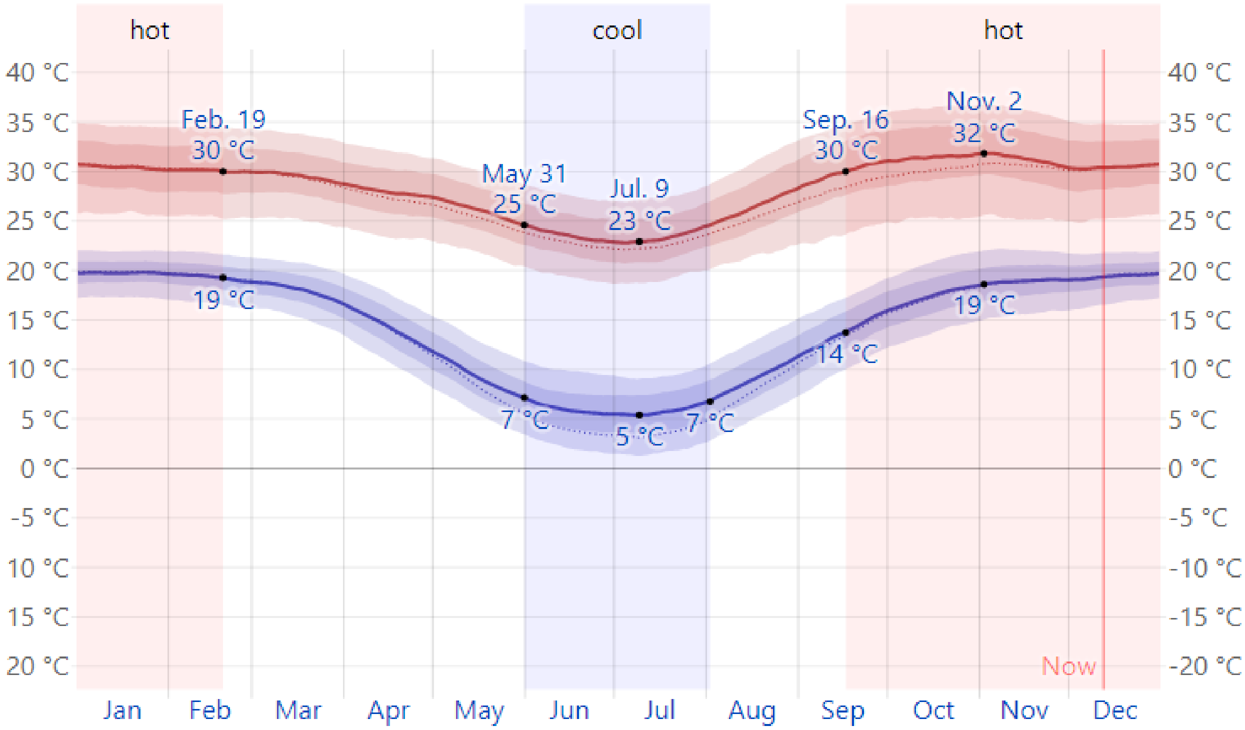
The railway line and Highway A1 from Bulawayo to Gaborone pass through Francistown, located 30 km to the northwest of Selkirk. From Francistown, access is made via an all-weather tarred surface road to Matsiloje that passes 7 km north of the Selkirk deposit, with the main access to Selkirk being a well-maintained and graded unsurfaced road.

All forms of transportation are readily available and accessible to the population, mainly light and medium vehicles, mini-bus type taxis and larger public bus transportation. Francistown has a tarred airstrip and International Airport with customs clearing.

5.2 Climate

The climate is tropical, with hot, wet summers and mild, dry winters (Figure 5-1). Most of the rainfall occurs during the period from October to April, usually in the form of scattered thundershowers, with massive surface run-off. The average rainfall is around 460 mm per annum as recorded at Francistown Airport.

Figure 5-1: Average Annual Temperatures at Francistown Airport



Source: Weatherspark.com, 2022.
**Notes: The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.*

Due to the climate, most greenfield exploration field work is carried out during the winter period when the rivers and streams are practically dry and vegetation less dense. However, where good access infrastructure exists at brownfield sites such as Selkirk, work can continue all year round.

Similarly, the operating season for physical mining operations continue all year round and generally only experience interruptions of short durations during severe thunderstorms. These interruptions are procedurally enforced for safety reasons due to low traction conditions prevalent on the roads.

5.3 Local Resources

5.3.1 Labour Resource

No specific deficiencies in the general labour resource have been identified as the former mining company TNMC had engaged in the training and development of local Botswana skills from the growing and youthful population of Francistown and other regional communities such as Matseloje and Matshelagabedi. With the exception of highly specialized technical experts required during the construction phase, PNRL believes that there is a local skills base with sufficient capacity to cater for its further needs with regards to the Project and its general organizational development requirements.

5.4 Infrastructure, Power, Water and Supply

The area is in a rural district and the available infrastructure is minimal. However, the sufficient availability of strategic services, i.e., bulk electrical power and bulk water supplies, and the related delivery infrastructure has most recently been studied in 2016 as part of a BFS undertaken by WorleyParsons under contract to BCL. WorleyParsons concluded that that an external water supply would be required to supply operations during the dry months of the year and this water was proposed to be sourced from existing governmental water supply pipelines within the Francistown road reserve. Potable water can be sourced from a nearby borehole in the short term, and it may be possible to obtain potable water from a nearby Botswana military camp in the future.

In the 2016 BFS study, power was proposed to be supplied via the existing Botswana Power Corporation powerline which runs along the Mopane access road to the Selkirk Mine infrastructure. However, in the 2016 study, power needs at Selkirk were limited to client and contractor offices, lighting and water management systems, which included pit dewatering. This power plan will need to be re-visited in the event of potential development in the future.

5.5 Physiography

5.5.1 Topography

The Property and the proposed infrastructural sites are located in a relatively flat area of Botswana, with a mean elevation of 980 m. Isolated hills, comprised of geological units less susceptible to weathering, outcrop the flat surface. The prevailing drainage pattern is dendritic, with irregular branching tributaries. The valleys of the streams and rivers are narrow (3-5 m wide) and gently sloped. The general slope of the area is eastwards towards the Ramokgwebane River. Various unnamed tributaries flow across the Property.

5.5.2 Soils

The Property falls within the hardveld, comprising here the Archaean Basement System featuring granite / gneiss, amphibolite, quartzite, calcitic and marble, limestone and graphitic schist, and banded ironstone. Soils found in the region generally derive from these rock types and are poorly structured with a low moisture retaining capacity, having limited amounts of essential plant minerals and are thus deemed as infertile.

Regionally, soils found are comprised of predominantly Luvisol, Regosol and Arenosol with minor occurrences of Cambisol, Fluvisol, Gelysol, Planosol, Solonchak and Vertisol. Other soil type occurrences are negligible within the region. Luvisols and Regosols both tend to have a mixed mineralogy, often being an accumulation of materials formed through water or wind migration and erosion processes.

Luvisols may contain more clay and Regosols more loam, but the composition of both soils derives from the hardveld parent materials. Arenosols are a sandier soil type, associated with desert margins, and may be found in this hardveld region through movement and accumulation from the sandveld to the west or weathering of local quartz rich material.

5.5.3 Surface Water

The Property falls within the greater Shashe / Tati River systems. All the main rivers considered in this Project are ephemeral, with irregular but rapid surface flows after heavy summer rainfall. Major surface water requirements are met from the Shashe Dam.

5.5.4 Groundwater

Two (2) aquifers are present in the Project area, namely the fractured granitoids and alluvial sands. Both aquifer types have limited storage capacity, are unconfirmed and are vulnerable to contamination. The alluvial aquifers are restricted to rivers such as the Ramokgwebane River. On the other hand, the fractured granitoid aquifers are controlled by the degree of fracturing and/or weathering. Both aquifer groups are typically shallow with up to 100 m thicknesses obtainable from fractured granitoids and 10 m from alluvial aquifers. Recharge to the groundwater regime is from rains and ephemeral surface flow. Overall, the groundwater potential in the area is limited, hence the fact that all major water requirements are met from the Shashe Dam.

5.5.5 Vegetation

The type of vegetation cover is fairly uniform although the nature of the underlying strata and the amount of grazing does have some bearing on the richness of the vegetation cover. On the Botswana vegetation map, the whole area is described as being within a tree savanna type (specifically Mixed Mopane Bushveld). The vegetation therefore consists of trees and shrubs of several species, but *Colophospermum mopane* (Mopane), *Combretum hereroense* (Mokabe) and *Senegalia erubescens* (Blue thorn / Moloto) are the dominant species. The density of grass cover depends on the extent of grazing. At Selkirk it is mostly overgrazed with species diversity being relatively low.

5.5.6 Animals

Large species of wild animals are almost non-existent, except where they have been reintroduced by game farmers. However, many of the smaller species of wildlife occur and birds are common. The area is predominantly utilized for livestock grazing. No flora or fauna red data species have, to date, been identified within the Selkirk Mining Licence area.

6 HISTORY

The following paragraphs regarding the history of the Project are largely extracted from a previous technical report prepared by Botepe (2013). Historical Mineral Resource Estimates have only been mentioned if the original source document was available, and the information pertaining to estimation methodologies was sufficiently detailed for disclosure.

6.1 Prior and Current Ownership

The first record of mineral rights occurred in 1964 when Tati Territory Exploration Co. Ltd. acquired mineral rights over a large area that included the Selkirk Property.

The government of Botswana granted a 25-year mining licence over the Selkirk and Phoenix deposits in November 1988 to TNMC, a new company comprised of Lexan Trading Inc. (51%) and Francistown Mining and Exploration Ltd. (49%). These two founding companies have changed ownership several times and Table 6-1 presents a summary of the parent company ownership of the Selkirk Property. The government acquired a 15% interest in TNMC in 1995, resulting in ownership of Lexan Trading Inc. (43.35%), Francistown Mining and Exploration Ltd. (41.65%) and the Botswana government (15%). BCL, through its wholly owned subsidiary BCL investments (Pty) Ltd, acquired Lexan Trading Inc. and Francistown Mining and Exploration Ltd.in 2015.

Table 6-1: History of Ownership at Selkirk

Year	Company
1964	Tati Territory Exploration Co. Ltd (TTE) acquired the large Tati Concession.
1970	Anglo-American Corporation of South Africa (AAC) acquired the rights to prospect for a period of 15 months, ending June 5, 1971, under agreement with TTE.
1971	Concessions are returned to TTE after negotiations with AAC fail to extend the agreement.
1979	New prospecting licence granted to TTE; however, they fail to honour exploration expenditures.
1984	UK Investment firm Morex through its local subsidiary Morex Botswana (Pty) Limited (together Morex) was granted a prospecting licence covering the Phoenix and Selkirk orebodies.
1985	Morex founded Francistown Mining and Exploration Ltd in 1985 .
1988	Morex transfers the Prospecting Licence to newly formed company TNMC, wholly owned by Morex.
1988	TNMC ownership changes to Lexan Trading Inc. (51%; Swiss trading affiliate of RTZ Corp identified as Centametall) and Francistown Mining and Exploration Ltd. (49%, Morex).

Year	Company
1989	AAC acquires 51%.
1995	Government of Botswana acquires 15% of TNMC. Ownership of TNMC is AAC 43.35%, Morex 41.65%, Government of Botswana 15%
1996	LionOre acquires 41.65% of TNMC . Ownership of TNMC is AAC 43.35%, LionOre 41.65%, Government of Botswana 15%
2002	LionOre purchased AAC's interest in TNMC. TNMC ownership is LionOre 85%, Government of Botswana 15% .
2007	Norilsk Nickel acquired LionOre. TNMC ownership is Norilsk Nickel 85%, Government of Botswana 15%.
2015	BCL purchased Norilsk Nickel's interest in TNMC through its wholly owned subsidiary BCL investments (Pty) Ltd. TNMC ownership is 85% BCL, 15% Government of Botswana.
October 9, 2016	BCL and TNMC operations placed on care and maintenance, placed in provisional liquidation.
June 15, 2017	BCL placed into final liquidation.
May 27, 2022	PNGB awarded the Mining Licence over the Selkirk deposit .
August 22, 2022	PNRL completes the asset purchase agreement for the Selkirk Assets under its local subsidiary Premium Nickel Group Proprietary Limited (PNGB)

6.2 Exploration History

The Phoenix and Selkirk sites are known for ancient copper workings and were also investigated for their gold potential after the rediscovery of gold in the area in 1866 (Marsh, 1979). AAC established the presence of nickel and copper occurrences at the sites of the ancient workings in 1929 through the commissioning of Messer's Brown and Tulloch to evaluate the mining potential of the area.

The first large scale systematic work was conducted from 1964-1969 by TTE. Eighteen holes in 2,394.4 m were drilled in 1965-1966, but TTE was unable to determine the potential of the geological setting of the mineralization. In the late 1960s, DeBeers and AAC conducted regional mapping, widely spaced soil sampling and commissioned Geoterrex Limited of Canada to fly an airborne magnetic and INPUT electromagnetic (EM) survey. AAC, through its local subsidiary, Sedge Botswana (Pty) Limited ("Sedge"), subsequently explored the Selkirk prospect from March 1970 to 1971 under a 15-month prospecting agreement negotiated with TTE. Detailed work included 1:500 scale geological outcrop mapping, soil sampling, trench sampling, ground geophysics and diamond drilling. A total of 117 drillholes for 27,377.5 m were drilled and assay results were used for a mineral resource estimate. Mineralogical studies and metallurgical testwork were completed, and a subsequent economic study was carried out. Potential for additional reserves was identified at Phoenix, but AAC was unsuccessful at renegotiating the option agreement with TTE. All the drill core from this period of exploration was destroyed, apart from a few examples that were stored at the Geological Survey Department of Botswana in Lobatse.

The exploration agreement between AAC and TTE expired in 1971, and no significant exploration work was conducted until Morex was awarded a prospecting licence in 1984 over the Selkirk and Phoenix deposits. Morex approached Rio Tinto to conduct a preliminary study on the Selkirk and Phoenix deposits in August 1984. Two (2) holes, one (1) at Selkirk and one (1) at Phoenix, were drilled to obtain samples for metallurgical testwork. Rio Tinto presented several options, including mining the high-grade massive sulphides and shipping the mined mineralization to the BCL smelter.

The Selkirk underground mine was commissioned in 1989 and extracted massive sulphide from a near surface, shallow dipping, and semi-elliptical deposit of massive sulphide up to 20 m thick for direct smelting at BCL. The mine ceased operations in August 2002 after exhausting the massive sulphide and undertaking partial pillar extraction. Over 1 million tonnes of material grading 2.6% Ni and 1.6% Cu was extracted from the mine since 1989.

More recent exploration dates back to 2003 when TNMC conducted a Titan 24 geophysical survey over the Selkirk deposit. Results of this work, along with earlier Sedge work indicated the presence of mineralization down plunge of the underground mine. This was followed by a series of diamond drill campaigns which defined a large body with thick intervals of disseminated sulphides extending in excess of 1,500 m down plunge to the southwest of the initial massive sulphide discovery.

Further exploration of Selkirk by LionOre included soil sampling, gravity, magnetic and induced polarization (“IP”) surveys. Drilling of geophysical and geochemical targets followed by resource definition drilling took place from 2004 until 2007.

Work between 2008 and 2015 was focussed on gathering data to support a BFS and consisted of additional metallurgical studies and geotechnical drilling. The Selkirk Mine has been under care and maintenance since 2002 and is generally inactive. Despite the mine has been idle for twenty years since production, the underground workings are accessible and safe to enter. A ventilation fan and dewatering pumps are occasionally in operation.

6.3 Historic Drilling

Three major drillhole campaigns occurred at Selkirk from the 1960s up to 2007. The first drill program, operated by Sedge in 1970-1971, was designed to delineate the massive sulphide portion of the deposit that was subsequently mined from 1989 to 2002. LionOre conducted drill programs between 2003 and 2007, with initial holes testing for down-plunge extensions and later holes drilled to delineate the disseminated portion of the deposit surrounding and located down plunge of the massive sulphides. This work was then followed with Norilsk Nickel, with infill drilling to improve the understanding of the mineral resources.

More details on drilling campaigns and meterage's are provided in Section 10.

6.4 Historic Mineral Resources Estimates

The first historic mineral resource estimate on the Selkirk deposit was prepared by Sedge in 1971 (Hall, 1971), with a high-grade historic resource estimate prepared on the same drill data in 1985 (McMillan, 1985). Since then, several Minera Resource Estimates ("MRE") have been released under the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definitions Standards for Mineral Resources and Mineral Reserves (CIM Definition Standards, 2005) in NI 43-101 and the Australian Joint Ore Reserve Committee (JORC) Code (2012). The most recent MRE was prepared under the South African Code for the Reporting of Exploration Results, Mineral Resources and Mineral Reserves (SAMREC Code) in 2016 by WorleyParsons.

Table 6-2 provides a summary of these historical mineral resource estimates.

These mineral resource estimates reported herein should be considered as historical in nature and should not be relied upon, as insufficient data verification has been conducted by the QP to verify the tonnages and grades summarized in the compilation below. Only historical mineral resource estimates with supporting reports were included in the compilation, of which further details are provided later in this section. It should be noted that it is not clear if historical resources were reported constrained (limited at depth by a conceptual pit shell), or unconstrained, which is not in accordance with current CIM Best Practice Guidelines (CIM 2019). It is unlikely that any of the resources estimates would comply with current NI 43-101 criteria or CIM Standards and Definitions.

Table 6-2: Summary of Historical Mineral Resource Estimates at Selkirk

Date	Company and Reference	Cut-off Grade	Tonnage	Grade	Classification	Comments
March 2007	LionOre (TMP, 2007)	0.10% Ni	230.6 Mt	0.24% Ni, 0.21% Cu	Indicated	Initial MRE at Selkirk in accordance with NI 43-101
November 2007	Norilsk Nickel (TWP, 2007)	0.10% Ni	130.7 Mt	0.19% Ni, 0.22% Cu	Measured & Indicated	Geological interpretation more restricted leading to lower tonnages, and historical data (pre-2003) was discarded
November 2008	Anglo American plc (MinRED, 2008)	0.10% Ni	214.9 Mt	0.18% Ni, 0.21% Cu	Measured & Indicated	Produced by AAC (MinRED department) in conjunction with Norilsk Nickel and TNMC geologists.
			19.2 Mt	0.21% Ni, 0.24% Cu	Inferred	
January 2013	Norilsk Nickel, (Gipronickel Institute, 2013)	0.10% Ni	128.4 Mt	0.21% Ni, 0.23% Cu	Measured & Indicated	Introduced sub-celling of block model, no major changes to geological model, recategorization of Indicated to Inferred
			123.8 Mt	0.17% Ni, 0.19% Cu	Inferred	
September 2016	BCL (WorleyParsons, 2016)	0.20% Ni	52.2 Mt	0.32% Ni, 0.31% Cu	Measured & Indicated	Modified classification, new geological model (0.20% Ni cut-off).
			24.0 Mt	0.24% Ni, 0.04% Cu	Inferred	

Source: Modified from Botepe, 2013

6.4.1 LionOre (2006)

The LionOre MRE was prepared by Dexter Ferreira of Lower Quartile Solutions (LQS) in accordance with NI 43-101 guidelines and described in a Selkirk Pit Optimization Report authored by LQS (Mushi, 2006), and an Independent Technical Report authored by TWP Consulting (Pty) Ltd ("TWP") with an effective date of September 20, 2006 (TWP, 2006) and in a 2007 pre-feasibility study ("PFS") authored by TMP Consulting (Pty) Ltd ("TMP") for LionOre and TNMC in accordance with NI 43-101 guidelines and dated March 5, 2007 (TMP, 2007).

The block model was constrained within the gabbro wireframe, assumed an oxidization depth of 30 m, excluded the mined-out area, and had a block size of 5 m x 5 m x 5 m, that was reblocked to 10 m x 10 m x 10 m during pit optimization.

The mineral resources estimated at Selkirk were all classified as 'Indicated Mineral Resource', and it is unclear if they were constrained by an optimized pit shell. The resource was estimated at different cut-off grades between 0.15% and 0.40% Ni as shown in Table 6-3. This table shows that the tonnage is very sensitive to the cut-off grade at low grades. TWP (2006) highlighted that at a feasible mining cut-off grade of 0.15% Ni, the Indicated Mineral Resource is very significant at 165.3 Mt grading 0.28% Ni and 0.24% Cu.

Table 6-3: Total Indicated Resources at Various Lower Cut-offs (TWP, 2006)

Cut-off Ni (%)	M Tonnes	Ni (%)	Cu (%)
0.10	230.6	0.24	0.21
0.15	165.3	0.28	0.24
0.20	105.3	0.35	0.28
0.25	67.4	0.42	0.31
0.30	46.9	0.49	0.33
0.35	33.3	0.56	0.35
0.40	22.7	0.65	0.35

6.4.2 Norilsk Nickel (2007)

The MRE that was used in the Norilsk BFS in 2007 was prepared by LQS and reported by TWP in accordance with CIM Definition Standards in NI 43-101 guidelines. In accordance with the guidelines, the historic pre-TNMC drill assays were excluded from the resource estimate because the drill core was not available to verify the information in the database. This resulted in a significant decrease in tonnage and grade compared to the resource estimate prepared for LionOre that was used in the 2006 PFS (Table 6-4).

Table 6-4: Total Measured and Indicated Resources Used in the Bankable Feasibility Study (TWP, 2007)

Cut-off Ni (%)	M tonnes	Ni (%)	Cu (%)	Pt (g/t)	Pd (g/t)	Au (g/t)
0.10	130.7	0.19	0.22	0.08	0.32	0.04
0.15	81.1	0.24	0.28	0.09	0.39	0.05
0.20	43.1	0.29	0.35	0.11	0.46	0.05

This updated MRE by LQS is well documented and utilized Ordinary Kriging (“OK”) methodology of interpolation into a block model with 30 m x 30 m x 15 m block dimensions. A revised geological model, which incorporated barren dykes and separated the gabbro into two distinct intrusions was used, and five elements were interpolated: Ni, Cu, Pd, Pt and Au.

Combined Measured and Indicated Mineral Resources were stated at 130.7 Mt at a grade of 0.19% Ni, 0.22% Cu, 0.08 g/t Pt, 0.32 g/t Pd and 0.04 g/t Au using a lower cut-off of 0.1% Ni. It is unclear if the mineral resources are constrained by a pit shell, and the report provides no further breakdown of resource categories other than Measured and Indicated categories combined.

6.4.3 Norilsk Nickel (2008)

An updated geology and resource model was prepared in May 2008 by the Mineral Resource Evaluation Department (MinRED) of AAC in conjunction with Norilsk Nickel / TNMC geologists. The geological interpretation remained the same as the previous estimate, however the bulk density values were partly based on a regression formula with Ni to populate missing Cu, Au, Pt and Pd intervals in the database. Unsampled intervals in the database were populated with a half detection limit grade for all elements. OK was used to estimate all elements. Due to inconsistent sampling for platinum group elements (“PGE”), regression curves were defined between Ni and each PGE element, and unestimated blocks were populated using this method. Classification was undertaken using kriging variances at < 0.3 (Measured), 0.3-0.7 (Indicated) and > 0.7 (Inferred). A study of the historic versus current data was made prior to the study, resulting in the exclusion of historic data where no quality assurance quality control (“QA/QC”) was performed.

Table 6-5 shows the MRE at various cut-off grades.

Combined Measured and Indicated Mineral Resources were stated at 214.9 Mt at a grade of 0.18% Ni, 0.21% Cu, 0.08 g/t Pt, 0.40 g/t Pd and 0.06 g/t Au using a lower cut-off of 0.10% Ni. Inferred Mineral Resources were stated at 19.2 Mt at a grade of 0.21% Ni, 0.24% Cu, 0.07 g/t Pt, 0.39 g/t Pd and 0.05 g/t Au using a lower cut-off of 0.10% Ni. It is unclear if the mineral resources are constrained by a pit shell.

Table 6-5: Selkirk Mineral Resource Estimate at Various Cut-offs, May 06, 2008 (Geldenhuys, 2008)

% Ni Cut-off	Category	M Tonnes	% Ni	% Cu	Pt (g/t)	Pd (g/t)	Au (g/t)
0.10	Measured	122.7	0.19	0.22	0.09	0.41	0.06
	Indicated	92.2	0.18	0.21	0.07	0.39	0.05
	M + I	**214.9**	**0.18**	**0.21**	**0.08**	**0.4**	**0.06**
	Inferred	19.2	0.21	0.24	0.07	0.39	0.05
0.15	Measured	74.7	0.23	0.27	0.11	0.48	0.06
	Indicated	49.3	0.22	0.27	0.09	0.46	0.06
	M + I	**124**	**0.23**	**0.27**	**0.10**	**0.47**	**0.06**
	Inferred	11.3	0.27	0.30	0.09	0.47	0.06
0.20	Measured	40.7	0.28	0.32	0.12	0.53	0.07
	Indicated	33.3	0.24	0.30	0.10	0.49	0.06
	M + I	**74.0**	**0.26**	**0.31**	**0.11**	**0.51**	**0.06**
	Inferred	8.0	0.31	0.34	0.09	0.50	0.07
0.25	Measured	21.2	0.34	0.37	0.13	0.58	0.07
	Indicated	12.3	0.28	0.35	0.11	0.51	0.07
	M + I	**33.4**	**0.32**	**0.36**	**0.12**	**0.55**	**0.07**
	Inferred	3.3	0.42	0.44	0.1	0.54	0.08
0.30	Measured	11.7	0.39	0.41	0.14	0.60	0.07
	Indicated	1.9	0.33	0.38	0.11	0.54	0.08
	M + I	**13.6**	**0.38**	**0.41**	**0.13**	**0.60**	**0.07**
	Inferred	0.9	0.82	0.71	0.13	0.65	0.10

6.4.4 <u>Norilsk Nickel (2013)</u>

As part of the 2013 feasibility study ("FS") by Gipronickel institute, the block model was reworked to improve the variography, domaining and sub celling, and to improve the classification which was considered aggressive in the previous version of the mineral resource. Methodologies generally remained the same, however the block size was adapted to 15 m x 15 m x 15 m to improve definition between domains. Oxidized material was identified and reported separately in the mineral resource statement.

The model was audited by TWP, and alterations required to make the model compliant with the SAMREC Code were identified. The fourth version of the resource model created based on newly constructed 3D variograms, as recommended by TWP (van Wyk, 2012) is documented in Kolesnikov et al., 2013. The mineral resource at a cut-off grade of 0.1% Ni is shown in Table 6-6.

Combined Non-Oxidized Measured and Indicated Mineral Resources were stated at 128.4 Mt at a grade of 0.21% Ni, 0.23% Cu, 0.10 g/t Pt, 0.44 g/t Pd and 0.06 g/t Au using a lower cut-off of 0.10% Ni. Inferred Mineral Resources were stated at 123.8 Mt at a grade of 0.17% Ni, 0.19% Cu, 0.08 g/t Pt, 0.34 g/t Pd and 0.03 g/t Au using a lower cut-off of 0.10% Ni. It is unclear if the mineral resources are constrained by a pit shell. Oxidized and non-oxidized material were reported separately.

Table 6-6: Selkirk Mineral Resources at a Lower Cut-off Grade of 0.10% Ni. Adapted from Kolesnikov, 2013

Material Type	Category	M Tonnes	Ni, %	Cu, %	Pt, g/t	Pd, g/t	Au, g/t
Within Mineralization Envelope							
Oxidized	Measured	5.1	0.20	0.26	0.12	0.48	0.05
	Indicated	0.01	0.15	0.14	0.05	0.18	0.04
	M & I	**5.1**	**0.20**	**0.26**	**0.12**	**0.48**	**0.05**
Non-Oxidized	Measured	124.8	0.21	0.23	0.10	0.44	0.06
	Indicated	3.6	0.15	0.16	0.07	0.28	0.06
	M & I	**128.4**	**0.21**	**0.23**	**0.10**	**0.44**	**0.06**
TOTAL M & I		133.5	0.21	0.23	0.10	0.44	0.06
Outside of Mineralization Envelope							
Oxidized	Inferred	7.8	0.17	0.20	0.07	0.25	0.03
Non-Oxidized	Inferred	123.8	0.17	0.19	0.08	0.34	0.03
TOTAL Inferred		131.6	0.17	0.19	0.08	0.33	0.03

6.4.5 BCL (2016)

A geological data audit was completed as part of the updated FS undertaken by WorleyParsons for BCL. Some points of concern were raised and most of these were addressed through the completion of a 3D structural interpretation that takes into account all faults and offset blocks, shears, barren dykes, intrusions and loss zones that affect the mineralized portion of the Selkirk meta-gabbros. The resource classification was also modified using a combination of kriging efficiency, minimum distance to composites and search ellipse dimensions. Lastly, the reporting cut-off was increased to 0.20% Ni to reflect increased mining and processing costs. An updated block with a smaller selective mining unit ("SMU") size (5 m x 5 m x 5 m) was created.

Combined Measured and Indicated Mineral Resources of 52.2 Mt at 0.32% Ni, 0.31% Cu, 0.15 g/t Pt, 0.46 g/t Pd and 0.06 g/t Au were stated. Inferred Mineral Resources were stated at 24.0 Mt at a grade of 0.24% Ni, 0.04% Cu, 0.06 g/t Pt, 0.07 g/t Pd and 0.02 g/t Au using a lower cut-off of 0.20% Ni (Table 6-7). It is unclear if the mineral resources are constrained by a pit shell.

Table 6-7: Summary of 2016 Mineral Resource Estimates at Selkirk at a Lower Cut-off of 0.20% Ni

Category	M Tonnes	Ni %	Cu %	Pt g/t	Pd g/t	Au g/t
Measured	44.7	0.31	0.31	0.13	0.50	0.06
Indicated	7.4	0.38	0.28	0.23	0.24	0.06
M & I	52.2	0.32	0.31	0.15	0.46	0.06
Inferred	24.0	0.24	0.04	0.06	0.07	0.02

6.5 History of Environmental Considerations

The Selkirk Mine started production in 1989 as an underground operation. In 2002, the underground mine was put under care and maintenance due to the depletion of copper and nickel ores that were accessible via underground mining method. Selkirk Mine has been operated at a depth of 105 m below surface.

In 2008, an EIA was carried out to obtain authorization for a redevelopment of the Selkirk Mine. No redevelopment took place and, therefore, the authorization lapsed. Thereafter, TNMC wished to construct and operate Selkirk Open Pit Mine within the mining licence area. The Department of Environmental Affairs ("DEA"), after evaluation of the Project Brief, advised TNMC that an Environmental Management Plan

("EMP") should be prepared to guide the implementation of the proposed Project. TNMC contracted Sangwenu Engineering & Environmental Consultants to develop an EMP on their behalf.

In 2016, the EMP was compiled for the potential construction and operation of an open pit within the mining licence area. This open pit would extend the life of mine by about five years and would generate 5 million tons of end product per annum. The original intention was that the end product would be treated by the BCL Smelter in Selebi Phikwe. In July 2016, the EMP submitted on behalf of TNMC was approved by the DEA in terms of Section 12 (1) of the Environmental Assessment Act No. 10 of 2011, reference number DEA/BOD/F/EXT/MNE 030 (13). The DEA used the 2008 EIA as input to the 2016 EMP.

The 2016 authorization was valid for a period of two (2) years, which lapsed in July 2018. Furthermore, the authorization stated that the requisite licence to operate the Project must be obtained from the licensing authority prior to Project implementation.

If PNRL elects to proceed with the development of the Selkirk Project, it is recommended that the updated EMP rely on some of the 2016 and 2008 information, but that new specialist studies and environmental assessments be conducted:

- To identify any changes to the receiving environment over time.
- To address any changes to relevant national and international legislation and best-practice in terms of environmental impact assessment and sustainability.
- To confirm the updated Project scope and detail in order to effectively identify potential impacts and affirm the Project footprint.

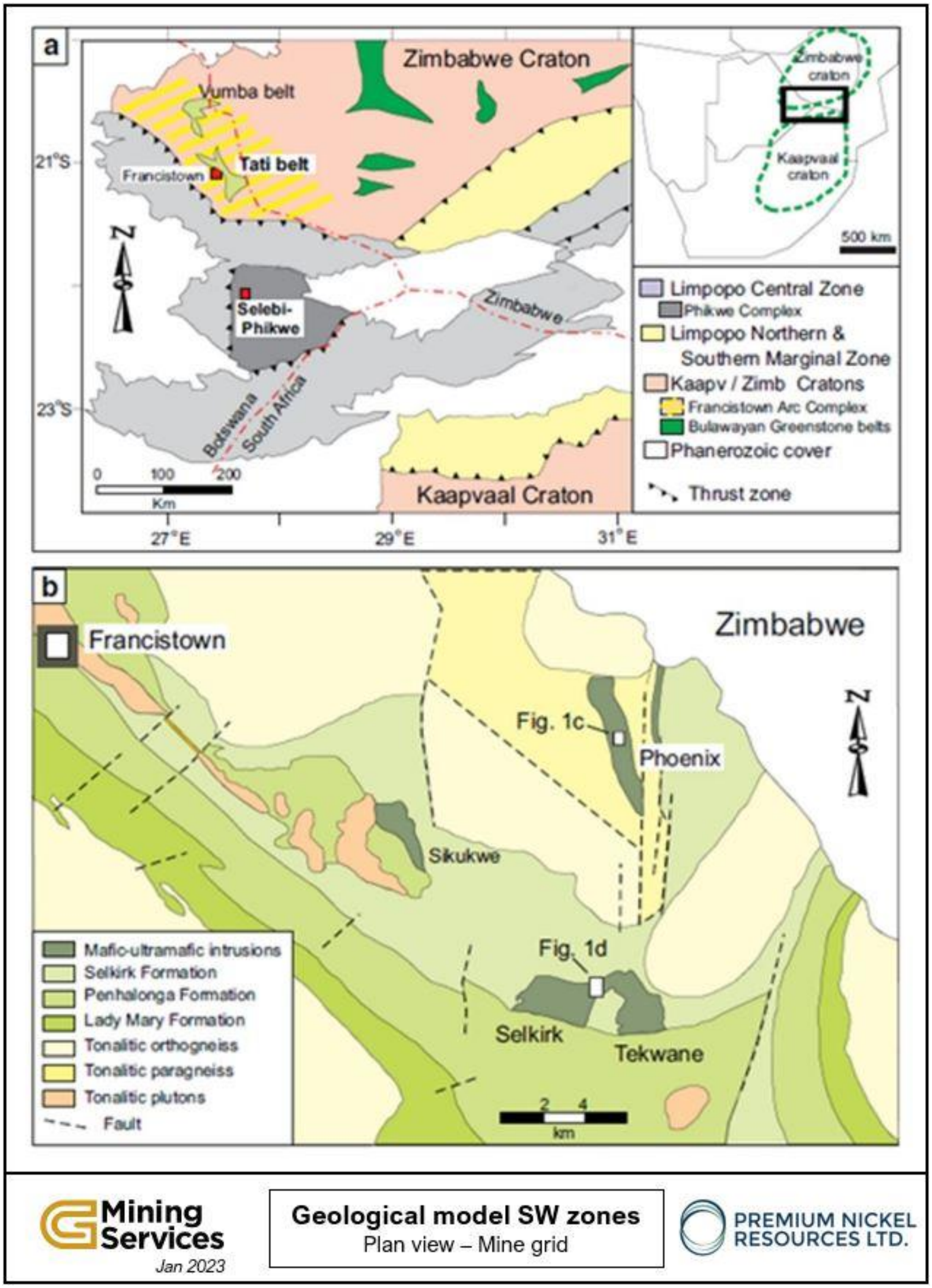
7 GEOLOGICAL HISTORY AND MINERALIZATION

7.1 Regional Geology

The Phoenix and Selkirk mines are located in the eastern part of Botswana in the Tati granite-greenstone belt of the Zimbabwe craton (Key, 1976), approximately 30 km southeast of city of Francistown (Figure 7-1). This area hosts several intrusive magmatic Ni–Cu–(PGE) sulphide deposits, including the mine at Phoenix and the Selkirk deposit. The stratigraphy of the east Botswana mines and deposits consists of major meta-volcanic and sedimentary groups. The main lithologies within the Tati greenstone belt consist of lower greenschist to lower amphibolite facies volcanic and sedimentary rocks intruded by granitoids of unknown age (Maier et al., 2007). The volcano-sedimentary succession has been subdivided into three (3) formations: Lady Mary, Penhalonga and Selkirk Formations that contain a progressively higher proportion of felsic volcanic rocks (Key, 1976). At the base is the < 1,600 m Lady Mary Formation that consists mainly of altered komatiite and komatiitic basalt and lesser amounts of quartzitic schist, limestone and iron formation. The overlying > 10-km-thick Penhalonga Formation consists of basaltic, andesitic and rhyolitic volcanics and volcaniclastic rocks, as well as phyllites, black shales, limestones and jaspilites. This is capped by the Selkirk Formation (> 1 km thick) which consists mainly of dacitic and rhyolitic volcaniclastic rocks and minor amounts of mafic volcanic rocks, quartzites and quartz sericite schists. The Selkirk Formation also hosts the Phoenix, Selkirk and Tekwane metagabbronoritic intrusions and the Sikukwe metaperidotite intrusion (Maier et al., 2007). Van Geffen (2004) dated a gabbro at Phoenix Mine at 2,703 ± 30 Ma, which place the Tati greenstone belt within the 2.7 Ga Francistown Arc Complex (Carney et al., 1994; McCourt et al., 2004).

Three (3) main deformation events affected the stratigraphy and the emplacement of intrusive unit as gabbro and granodiorite, which has implications in the local and regional controls on the Ni-Cu-PGEs mineralization. The first deformation event, D_1 is associated with NNW-SSE oriented principal stress axes and is of brittle-ductile nature and is evidenced by the occurrence of kilometre scale fold, faults and shear zones. The second deformation event resulted from NE-SW oriented compressional stress and is recognizable by the presence of folded and asymmetric boudinaged quartz veins and faults that crosscut D_1 structures. The third deformation created by the minimum NE-SW principal stress, D_3 produced the fracture, stylolitic cleavages, extensional and columnar joints, which crosscut all the D_1 and D_2 structures. (Dirks, 2005).

Figure 7-1: a) Schematic Map of Limpopo Belt and Adjacent Cratons Showing Studied Localities b) Geological Map of the Central Portion of the Tati Greenstone Belt Indicating Locality of Phoenix, Selkirk and Tekwane Deposits



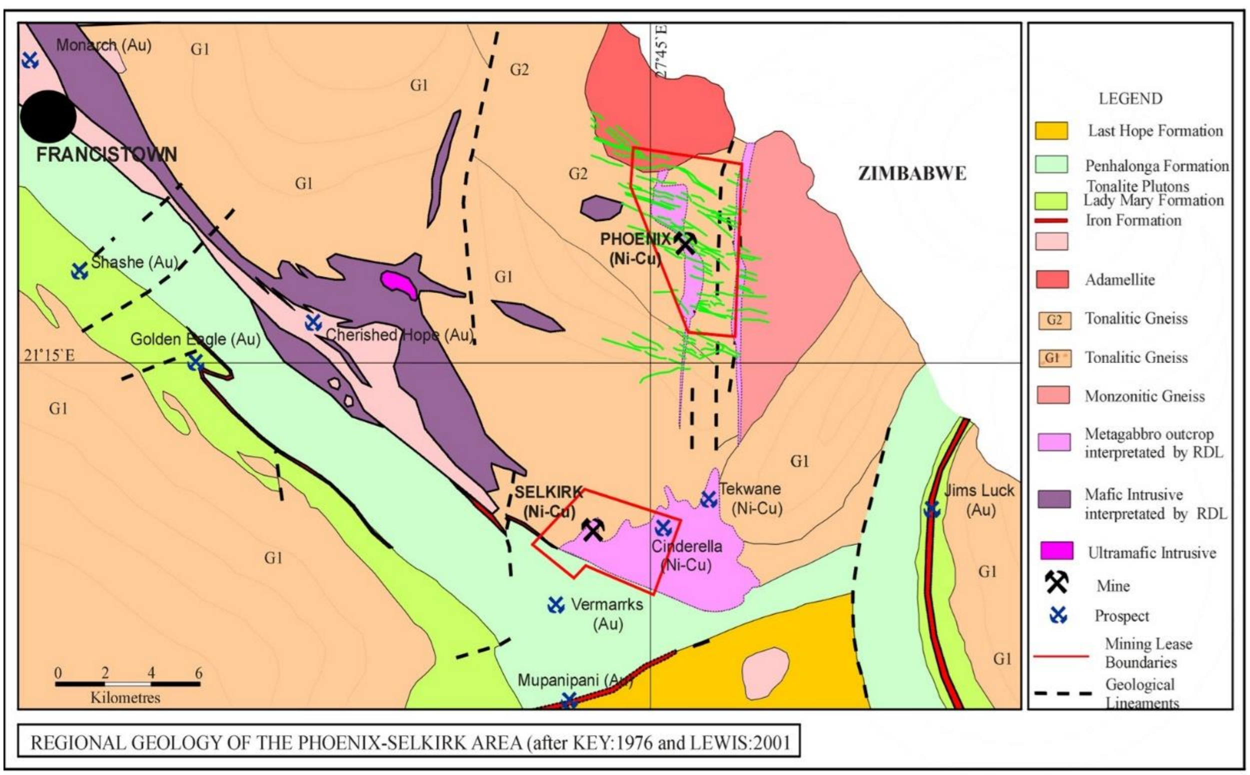
Source: Johnson (1986)

The eastern Botswana Ni–Cu–(PGE) deposits may be subdivided into two (2) groups. The first group of deposits, hosted by the Phoenix, Selkirk and Tekwane intrusions occurs within and in the periphery of the Tati greenstone belt. The deposits were explored in the 1960s by TTE, AAC and DeBeers, based on mapping and soil geochemistry. The second group of deposits, comprising Phikwe, Dikoloti, Lentswe and Phokoje, are hosted by the Selebi-Phikwe mafic-ultramafic intrusions that occur within gneisses of the Limpopo metamorphic belt some 200 km to the south of the Tati belt (Gordon, 1973; Baldock et al., 1976). Most of the deposits were discovered by BCL (Bamangwato Concessions) between 1963 and 1966 using soil geochemistry (Maier et al., 2007).

7.2 Property Geology

The Tati greenstone belt has a long mining history spanning as far back as ancient copper workings which exploited gossan outcrops of the present operations (Dirks, 2005). Two deposits have been exploited by TNMC: one at Selkirk and the other being the Phoenix Mine, located 15 km to north (Figure 7-2). Other associated Ni-Cu prospects in the vicinity of Selkirk Property include the Tekwane and Cinderella exploration prospects.

Figure 7-2: Simplified Geological Map of the Northern Tati Greenstone Belt



Source: Dirks, 2005; after Key, 1976 and Lewis, 2001

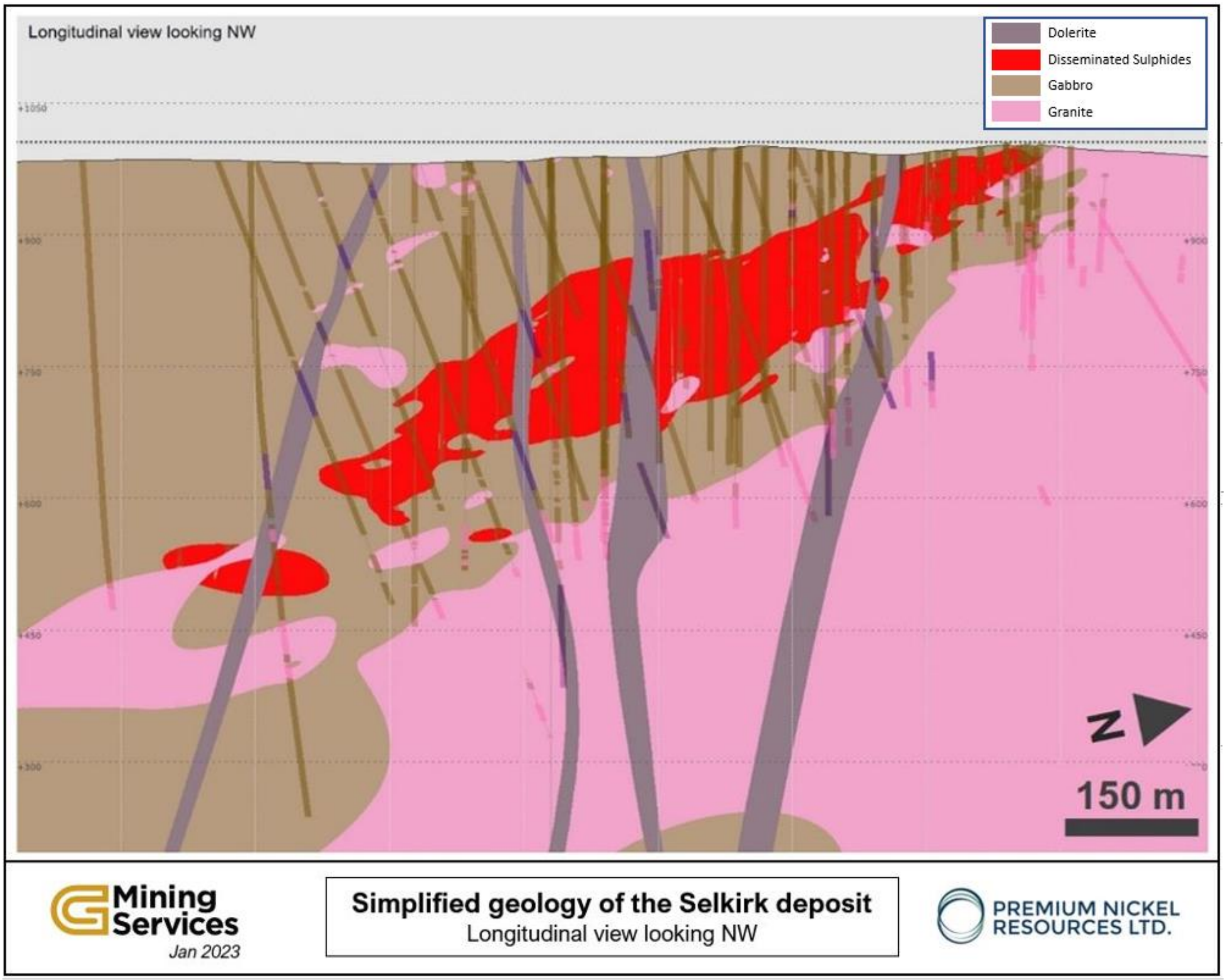
7.2.1 Selkirk Deposit

The geology of the Selkirk Mine has been described and discussed by Hunt and Dirks (2005) and Maier et al., 2007, who stated that the deposit is hosted by two (2) types of metagabbro units, namely, taxitic and leucocratic porphyritic metagabbro. The taxitic metagabbro is characterized by Ni-Cu sulphide mineralization of low to high grade, whereas the leucocratic porphyritic gabbro is barren (Carney et al., 1994). Northwest trending Karoo-age dolerite dykes and south trending feldspar porphyries crosscut these metagabbro units. Alteration assemblages consist of epidote-chlorite, fuchsite and saussurite (Dirks, 2005).

The general stratigraphy of the main lithological units of the Selkirk licence area is defined as follows (Figure 7-3):

- Dikgaka meta-gabbro (Ni-depleted meta gabbro in the hanging wall).
- Selkirk meta-gabbro (taxitic contaminated and Ni-enriched meta-gabbro).
- Quartz-diorite (footwall basement).
- Penhalonga Formation (andesitic, mafic and ultramafic volcanics that were thrust over the former lithologies along a prominent NW trending regional thrust zone at the northern border of the Tati greenstone belt).

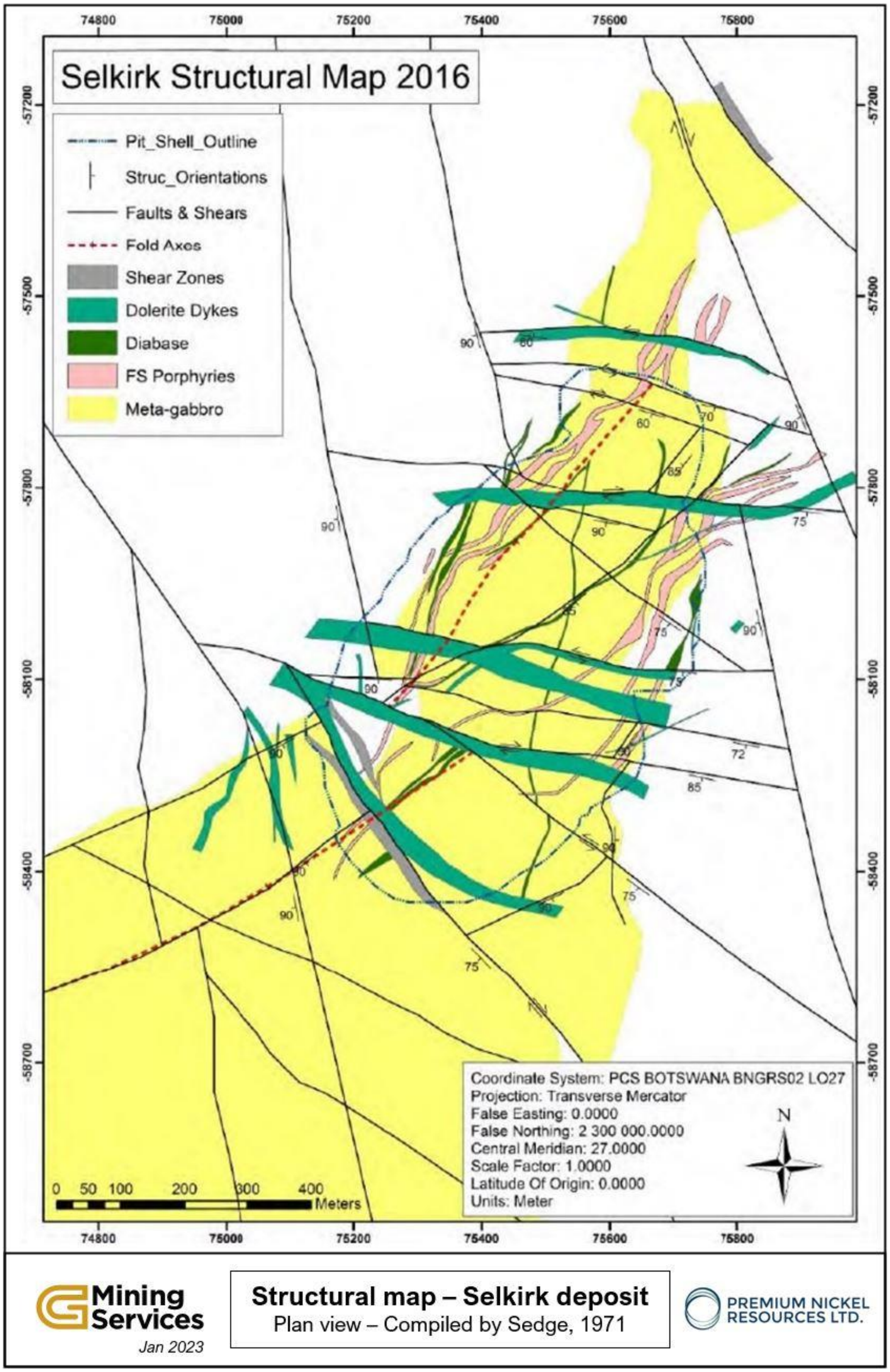
Figure 7-3: Simplified Geology in Longitudinal View Through the Selkirk Deposit



Source: GMS, 2022

A structural geology study of the area in 2016 discovered numerous faults that have lateral and vertical displacement, resulting in the displacement and movement of bodies of mineralization (WorleyParsons, 2016; Figure 7-4). The Selkirk deposit plunges at 20° to the south, with a gossanous outcrop located at surface above the underground mine stopes.

Figure 7-4: Detailed Geological Map of the Selkirk Deposit



Source: Sedge, 1971

7.3 Mineralization

7.3.1 Selkirk Deposit

Two (2) district styles of mineralization can be found at Selkirk:

1. Massive-sulphide accumulations within the “keel” of the gabbro intrusion, and along the contacts with the surrounding volcano-sedimentary host rocks.
2. Matrix and disseminated sulphide accumulations as a halo and down-dip of the massive sulphide mineralization.

Ni-Cu-PGE mineralization is hosted within pentlandite, pyrrhotite, chalcopyrite and pyrite (Johnson, 1986).

The intrusion once hosted a lens of massive sulphide measuring approximately 20 m thick and 200 m long that is mantled by a zone of disseminated sulphides (approximately 20 vol.% of host rock) that averages 120 m wide and 100-150 m thick (Figure 7-5). Pyrrhotite constitutes up to 90 vol.% of the massive mineralization. Pentlandite occurs as flame-like lamellae and granular aggregates in pyrrhotite. Chalcopyrite predominantly occurs in the disseminated sulphides (Figure 7-6). Magnetite locally constitutes up to 15% of the opaque fraction, occurring as subhedral grains that may be distinctly rounded. In some cases, pyrite may constitute approximately 5% of the sulphides, forming late-stage veins and euhedral or subhedral crystals. The massive sulphides may also contain distinctly rounded silicate inclusions reminiscent of *durchbewegung* textures (Vokes 1969).

Surface and underground geological mapping, as well as information obtained from historic and current drilling campaigns and surface geophysical surveys, have confirmed the synclinal nature of the massive sulphide body hosted within the surrounding disseminated sulphide halo in the metagabbro (Figure 7-7). The axis of this “syncline” appears to plunge at about 20 to 25 degrees to the SW, which was also confirmed by ground geophysical methods (EM, IP and resistivity), as well as drilling.

The disseminated sulphide continues along strike to the SW beyond the massive sulphide mineralization, and averages approximately 100-150 m in thickness. Fieldwork and studies of the Selkirk drill core indicate that the Selkirk metagabbro is 2.7 Ga (Maier et al., 2007).

Figure 7-5: Map of Part of the Selkirk Intrusion.

Source: Maier et al, 2007

Figure 7-6: Disseminated Chalcopyrite–Pyrrhotite Mineralization Collected 4 m Below Massive Sulphide Body. Sample S1, Selkirk

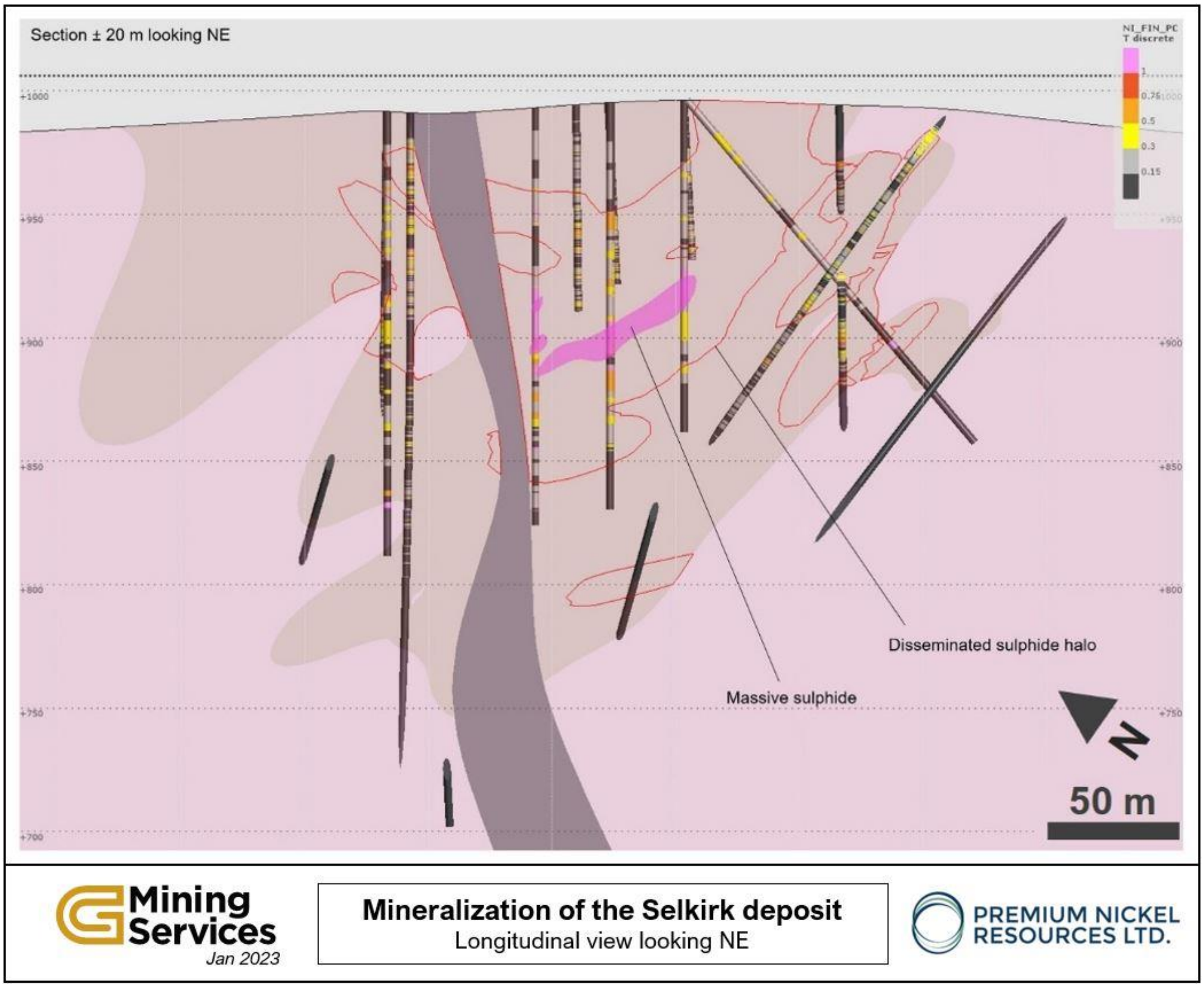
Mining Services Jan 2023

Disseminated mineralization of the Selkirk deposit
Maier et al., 2007

PREMIUM NICKEL RESOURCES LTD.

Source: Maier et al, 2007

Figure 7-7: Section Through Selkirk Deposit Showing the Massive Sulphide and the Halo of Disseminated Sulphide Overprinting the Geology. Drillhole Traces Present the Ni Content in %.



Source: GMS, 2022

8 DEPOSIT TYPES

The Ni-Cu-PGEs sulphide deposits occur in cratons and orogenic belts worldwide (Arndt et al., 2005). Sulphide deposits are broadly classified into two (2) types: hydrothermal and magmatic. The Selkirk deposit belong to the magmatic type.

Magmatic Ni-Cu sulphide deposits form as the result of segregation and concentration of droplets of liquid sulphide from mafic or ultramafic magma, and the partitioning of chalcophile elements into these from the silicate melt. Sulphide saturation of a magma is not enough in itself to produce economic accumulations of metals. The appropriate physical environment is required so that the sulphide liquid mixes with enough magma to become adequately enriched in chalcophile metals, and then is concentrated in a restricted locality so that the resulting concentration is of economic grade (Naldrett et al., 2004).

Magmatic sulphide deposits are hosted by mafic and ultramafic units, i.e., komatiite, gabbro, gabbronorite, dunite, peridotite, pyroxenite, boninitic and picritic rocks. Fundamental parameters for the formation of magmatic sulphide deposits include the ability of the mantle melt enriched in chalcophile elements (i.e., Ni, Cu and PGEs) to interact with sulphur, usually sourced from mantle and reaching sulphide saturation through progressive fractionation, or externally from sulphur rich contact wall rocks such as sediments (Barnes and Maier, 1999; Li et al., 2002, 2019). The placement localities such as faults and basins concentrate the sulphide enriched melts, which result in different geometries such as tabular and massive magmatic sulphide bodies. The magmatic sulphide deposits are the most dominant Ni-Cu-PGE type, which include Kabanga in Tanzania, Norilsk Talnakh in Russia, Pechanga in China, Voisey's Bay in Canada, Mount Keith in Western Australia, Bushveld Complex in South Africa, Great Dyke in Zimbabwe and Selebi Phikwe in Botswana (Barnes and Lightfoot, 2005).

The capacity of a magma to form an economic Ni-Cu-(PGE) deposit is controlled mainly by 1) the abundances of metals in the magma; 2) the sulphide saturation state of the magma; and 3) the capacity of the magma to interact with its surroundings. In practice, the ability of magma to interact with wall rocks depends on the nature of the wall rocks, the mode of emplacement, and the composition, temperature, viscosity, and volatile content of the magma itself (Arndt et al., 2005; Lesher et al., 2001).

9 EXPLORATION

9.1 Preamble

The Selkirk deposit is hosted within a metagabbroic intrusion plunging shallowly to the south and trending in a NE – SW direction. High-grade massive sulphides had a synformal shape and extended from near surface over a plunge distance of about 200 m (to 105 m vertical depth) and a width of 70-90 m. The Selkirk Mine was operated between 1989 and 2002 using an underhand room and pillar mining method, extracting 90% of the massive sulphides for 1.0 Mt at grades of 2.6% Ni and 1.5% Cu. On the hanging wall and footwall of this deposit, a halo of disseminated sulphides grading about 0.5% Ni is present, extending down plunge to unknown depths. Further down plunge of the deposit, the mineralized taxitic metagabbro is overlain by a barren Dikgaka gabbro unit characterized by feldspar megacrysts and some cumulative mafic minerals (Worley Parsons, 2016).

9.2 Early Exploration

The Selkirk site is known for ancient copper workings and was also investigated for its gold potential after the rediscovery of gold in the area in 1866 (Marsh, 1979). AAC established the presence of nickel and copper occurrences at the sites of the ancient workings in 1929 through the commissioning of Messer's Brown and Tulloch to evaluate the mining potential of the area.

9.3 1960s Tati Territory Exploration Company, Anglo and DeBeers

The first large scale systematic work was conducted from 1964-1969 by TTE. A number of 18 holes, SK1 through SK18 in 2,394.4 m were drilled at Selkirk in 1965-1967 (Malan, 1968), but TEE was unable to determine the potential of the geological setting of the mineralization.

Between 1967-1968, under an agreement with TTE, DeBeers and AAC compiled and studied all available information on the geology and mineral deposits of the area. Topographic maps were acquired and overlain with geology information from the Botswana Geological Survey. A 1:25,000 photo mosaic of the area was prepared by (illegible) Studio Production (Pty) Limited of Johannesburg and soil geochemistry collected by TTE was overlain on the mosaic. Two areas, totalling approximately 1,100 sq miles, were selected and flown by Geoterrex Limited of Canada using the Barringer INPUT EM and magnetometer system and a four-channel radiometric system, measuring total radiation and uranium, thorium, potassium individually (Nel, 1969). A total of 3,363.8-line miles were flown during 1969, with individual lines orientated N65ºE and spaced at a ¼ mile interval. The sensor was flown at an average height of 400 ft above the land surface. Eleven (11) six-channel INPUT anomalies, named TH01 to TH11, were selected for follow-up, initially by reconnaissance mapping and vertical loop surveys, and detailed as needed with 1:5000 scale detailed geological mapping, soil sampling and geophysical coverall by horizontal loop EM and magnetics and in some cases, long wire EM (Turam) surveys (Grobler, 1969).

9.4 1970s Anglo American Corporation of South Africa Limited

AAC, under its Botswana subsidiary Sedge, began exploration at Selkirk in February 1970 under an agreement with TTE, with drilling starting in early March (Hall, 1971). Sedge undertook geological outcrop mapping over an area 1,400 m x 1,000 m, excavated trenches at 30 m line spacing, and logged historical pits. This led to a detailed geological map of the Selkirk area, with mineral potential and lithologies recorded (Figure 9-1). This work showed that the host of the mineralization was a wedge-shaped body of metagabbro with a north-east trending long axis in contact with quartz-diorite on two (2) of its sides (east and west), crosscut by three (3) generations of dykes (feldspar-porphyry dykes, fine-grained mafic dykes and WNW-ESE Karoo-age dolerite dykes).

A B-zone soil geochemistry program was previously undertaken by TTE over a large area that included the Selkirk prospect. The area with coincident nickel and copper anomalies was selected for a C-zone sampling program. C-zone samples were taken for nickel and copper analysis on a square grid of 30 m covering an area of 1,200 m by 1,350 m over the Selkirk prospect. The results of this investigation showed that:

1. A north-easterly trend for the areas was enclosed by the 750 ppm Ni and 1,000 ppm Cu isolines.
2. The metagabbro area approximately coincided with the 750 ppm Ni and 1,000 ppm Cu isolines and was the main host rock for the mineralization.
3. There was a possible truncation of the mineralization at the southwestern end of the axis as the anomaly has a steep gradient there.
4. The highest C-zone values for both nickel and copper were greater than 2,000 ppm.

Geophysical surveys completed over the deposit included EM (Turam, horizontal loop), gravity and magnetometer surveys. Of these, the EM and gravity surveys successfully outlined the major mineralized body, however drilling on additional gravity anomalies proved unsuccessful. The magnetometer survey helped delineate the dolerite dykes.

An average of nine (9) Sullivan 2211 rigs drilled 117 boreholes at Selkirk, totaling 27,377.5 m. Drilling took place on a 30 m x 30 m grid. Seventy-two (72) boreholes intersected mineralization. Of these, fifty-four (54) lie within the proposed open-pit area. The holes intersected a core of massive sulphides surrounded by disseminated sulphides. At depth, the massive sulphides pinched out, with only disseminated sulphides remaining.

Trenches were dug next to all the parallel drill section lines (30 m apart) to enable geological contacts to be accurately determined. Trenches 420 m long were dug along all sections to cover the area enclosed by the 1,000-ppm copper and 750 ppm nickel isolines.

Outside this area additional trenches were excavated to investigate the nature and location of the contacts of meta-gabbro with quartz-diorite. A total of 16,660 m of trenching was completed.

Continuous chip samples were taken over 2 m lengths in the bottom of the majority of trenches. Samples were analyzed for copper and nickel in parts per million (ppm). Results indicated that the meta-gabbro was the source of the copper and nickel anomalies. Maximum values were over 4,000 ppm for nickel and 800 ppm for copper.

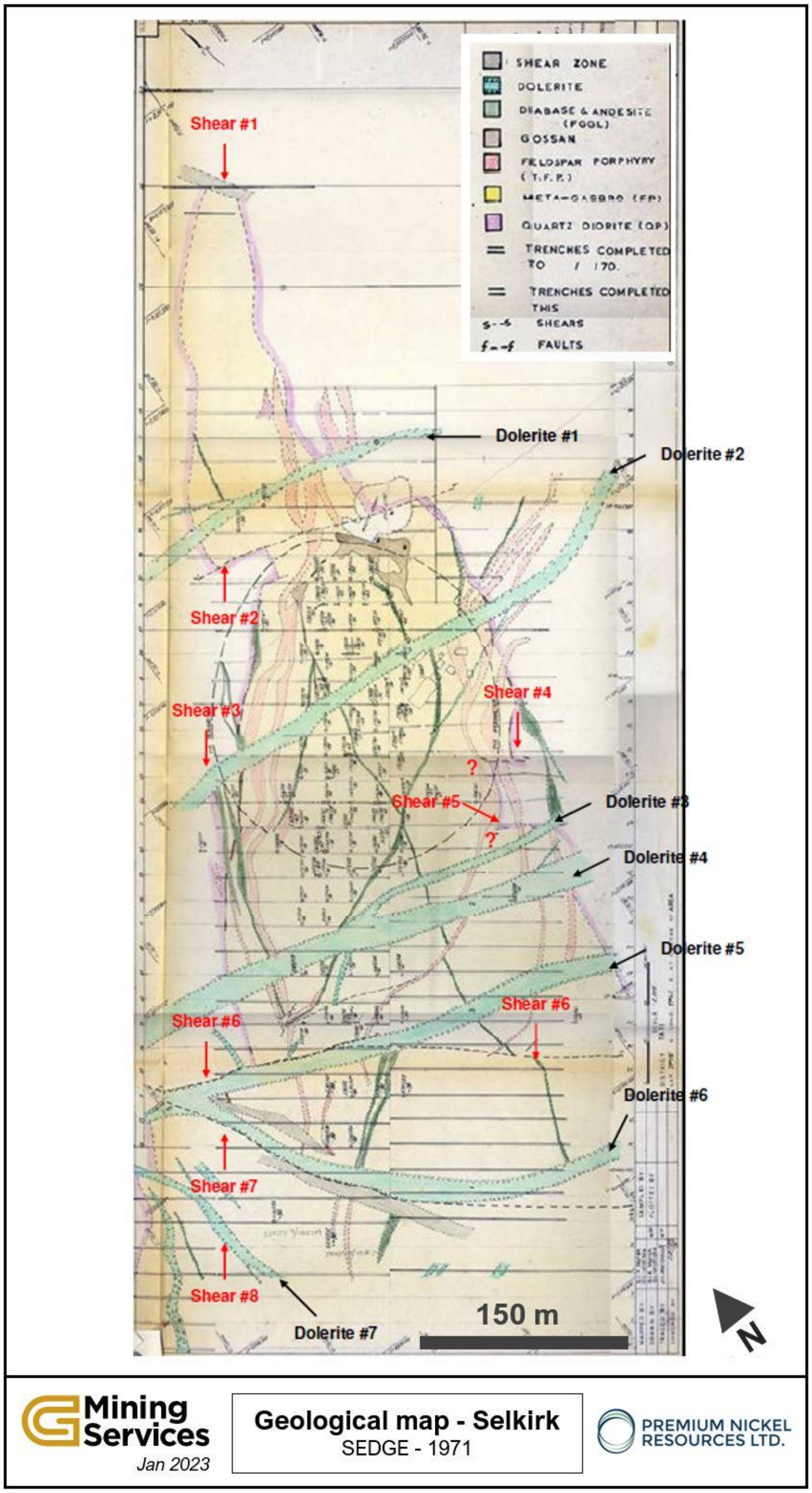
9.5 1980s Morex Botswana (Pty) Limited

In 1984, UK Investment firm Morex through its local subsidiary Morex Botswana (Pty) Limited (together "Morex") was granted Prospecting Licence 26/84 covering the Phoenix and Selkirk deposits.

Morex did not carry out any exploration, but instead focussed on the development of the Selkirk deposit. During the study phase, one vertical hole, 66 m in depth, was drilled in November 1984 to obtain material for metallurgical testing (McMillan, 1985), and two (2) vertical NQ sized holes in 254 m were drilled in late 1987 for geological verification and metallurgical samples (Morex, 1987).

The mining licence application, submitted by Morex under TNMC, was approved on November 30, 1988. The mine went into production in 1989, with the material mined and hauled to the BCL Smelter in Selebi-Phikwe under a management contract negotiated between Morex and BCL.

Figure 9-1: Detailed Geological Map of the Selkirk Deposit and Surrounding Area



Source: Hall, 1971

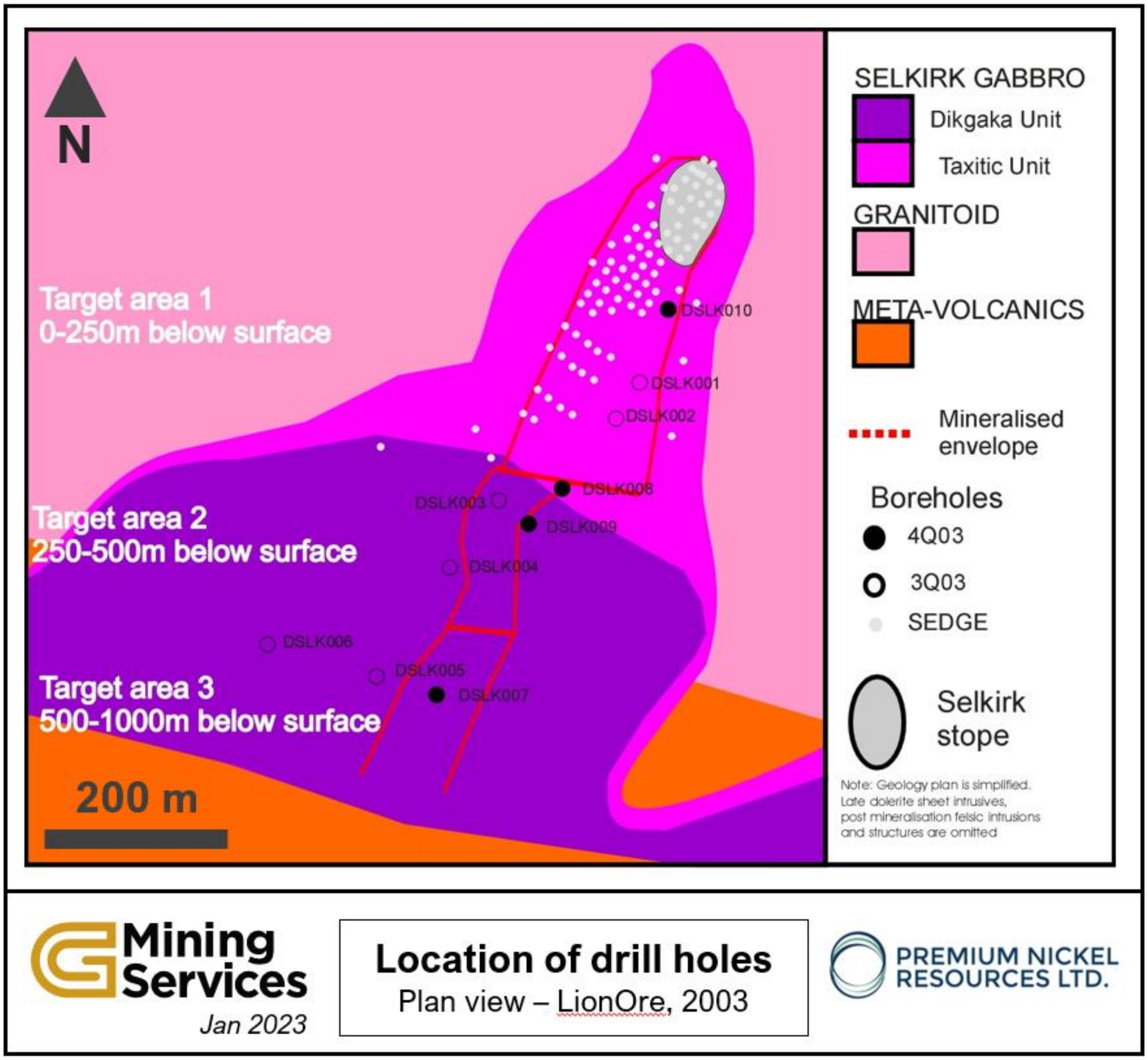
9.6 2003–2007 LionOre Exploration

Under the direction of LionOre, a broad exploration program was initiated in 2003, and included geological studies, geochemistry (soil sampling) and geophysics (airborne data processing and interpretation, a Titan 24 direct currently IP ("DCIP") and magnetotelluric ("MT") survey, ground magnetics, gravity, and downhole EM). The drilling programs following these surveys resulted in the discovery and definition of a low-grade, high-volume area of disseminated sulphides down plunge of the historically mined massive sulphides. It was also during this period that the first PGE analyses on core samples were routinely obtained.

A reconnaissance Titan 24 survey was completed at Selkirk by Quantec Geoscience of Canada in 2003. The Titan 24 system is a distributed array system that collects both IP and MT data. The survey was carried out over seven (7) lines on the Selkirk Mining Licence, including one longitudinal survey line, and a second survey line perpendicular to the plunge of the deposit. The survey results imaged a subtle chargeability anomaly extending down-plunge from surface over a distance of 1,500 m, with the uppermost area corresponding to the known Selkirk mineralization and extending southwards where there was no drilling. Similar strata-bound anomalism of a lesser amplitude was detected coincident with the modelled taxitic gabbro target throughout the mining licence area.

Ten (10) widely spaced scout drillholes, with reverse circulation ("RC") heads and diamond tails were completed in 2003 (Figure 9-2). This work defined the extension of mineralization down plunge of the massive sulphide zone as a broad envelope of consistent disseminated and sporadic massive pyrrhotite-chalcopyrite mineralization developed in a meta-gabbro host. This envelope is significantly greater than that defined by the Sedge phase of drilling in 1970-1971. The deepest hole drilled intersected massive sulphides at 1,200 m. Sulphide enrichment is well developed in a 50- to 100 m-thick zone within the host. For the first time, selected drill core samples were sent for PGE analyses.

Figure 9-2: Location of 2003 Drillholes by LionOre Exploration



Source: TWP, 2006

No drilling was completed in 2004.

The 2005 exploration program included a resource drill program on a 60 m x 100 m grid, with oriented NQ sized drill core and detailed litho-geochemical analyses. 3D geological and structural modelling integrated available geological, geophysical, geochemical and drillhole datasets.

NQ sized holes were drilled to validate and confirm historical drillhole data, and to gain information of the extent of the host gabbro especially in areas where previous drilling did not obtain full intersections to the footwall contact. Drilling was required in the east to constrain the host metagabbro to refine the resource model boundary.

Drilling confirmed the continuity of a thick package of gabbro-hosted disseminated sulphides around and down plunge of the underground mine. The mineralization was typically blebby or stringered, with thin lenses of massive sulphides in places. The bulk of the disseminated sulphides contained nickel values of around 0.3%, with massive sulphide lenses yielding nickel tenors in excess of 2%. In some places massive sulphides were intersected below the footwall contact. These remobilized sulphides were generally enriched in chalcopyrite and often associated with shearing. During the period, a total of 17,642 m of diamond drilling was completed. (ITR TWP, 2006).

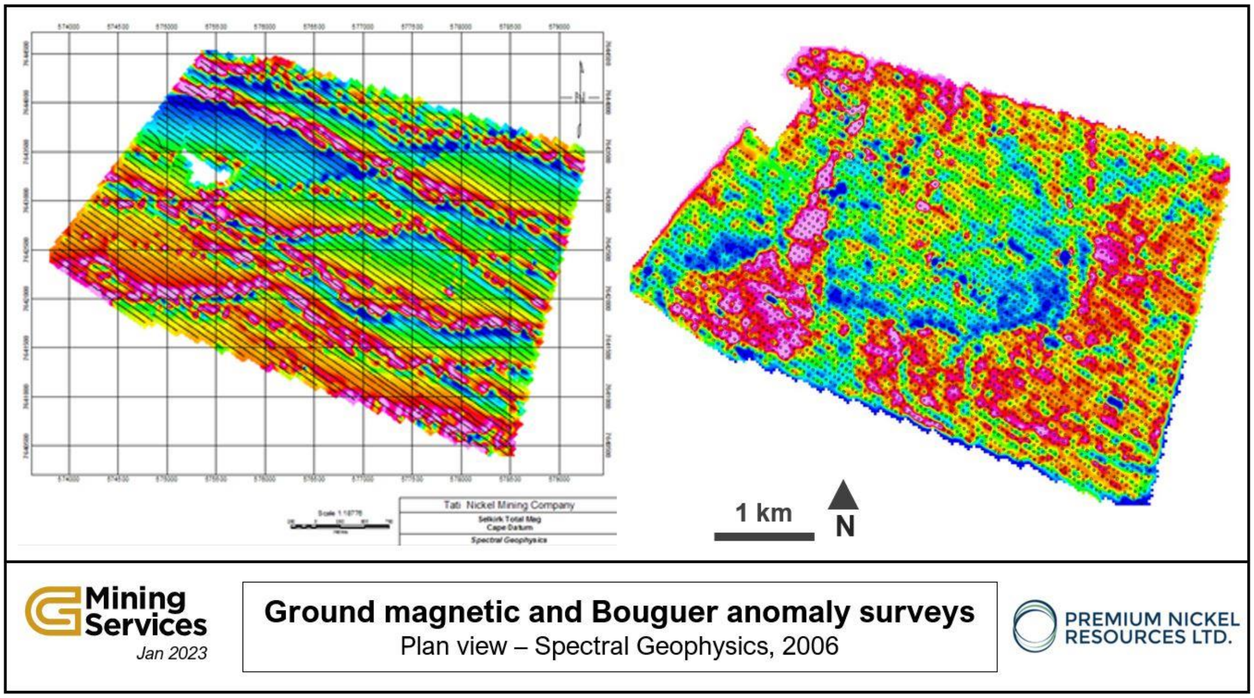
In 2006, two (2) orientation soil sampling campaigns were initiated in the Selkirk Mine area. While the first campaign focused on the Selkirk deposit, a second orientation campaign was completed to determine the optimum analytical technique and criteria for interpretation of subsequent soil geochemical surveys on Ni-Cu-PGE mineralization of the Tati granite-greenstone belt.

Licence-wide ground magnetic and gravity surveys were carried out by Spectral Geophysics in 2006. The magnetometer was used in “WalkMag” mode, yielding a sample interval of less than 1 m. For the tie lines, the magnetometer was used in “Mobile” mode, with reading intervals of some 5 m. The total line kilometres walked during this survey at the line spacing of 60 m was about 250 km. The gravity survey used a Scintrex CG3 Autograv gravity meter and a Leica differential GPS. The survey was read on 60 m spaced lines at nominal 50 m station spacing.

The magnetic data was dominated by that of the WNW-trending Karoo dyke swarm and the gravity data provide an excellent tool for mapping the regional geology of the Selkirk Mining Licence (Figure 9-3).

Seven holes were drilled in the southeastern portion of the Mining Licence to test regional geochemical and geophysical targets; however, information is scarce regarding this drilling.

Figure 9-3: Detailed Ground Magnetic (left) and First Derivative Bouguer Anomaly Survey (right)



Source: Spectral Geophysics, 2006

LionOre began to analyze selected drill core for PGEs in 2003. For holes drilled in 2003 and 2005, the analysis of PGE was undertaken only on drilling intervals that had a concentration of Ni > 0.15%, which created an incomplete dataset with a bias towards high-grader grade PGE assays. Beginning in 2007, all new drillholes were analyzed for PGE content.

A 3D model of the deposit was produced from the historic and newly acquired database to better understand the lithological and structural control on the mineralization.

9.7 2007–2015 Norilsk Nickel Exploration

In June 2007, Norilsk Nickel acquired the Project from LionOre (LionOre, 2007). The new owners concentrated their efforts both on the future development of the Selkirk historical resource and exploration for new deposits, both on the Selkirk Mining Licence and on newly acquired prospecting licences (PLs).

Efforts on advancing the resource focused on data validation and gaining a better understanding of geology. A drillhole validation exercise in 2008 compared results from old drillholes to new drillholes to determine if historic results could be included in the resource. It was concluded that the historic holes showed higher grades and care had to be taken in data handling to avoid overestimation of resources. A random selection of 10% of pulps were sent to Genalysis Laboratories in Western Australia to be assayed as check samples, against those assayed at the Tati Mine laboratory.

The Selkirk Tunnel Project started in May 2008 to evaluate the characteristics of the Selkirk mineralization and collect representative grab and bulk samples for metallurgical testing. A total of 522 tonnes of material were sent to Council for Mineral Technology ("Mintek") in South Africa for testwork. Geological mapping of the three faces was essential in order to document rock types, structural features and mineralization types in the tunnel. A medium grained taxitic melanocratic metagabbro was observed by the geologist team during underground mapping. Disseminations, blebs and stringers of chalcopyrite and pyrrhotite were also observed, with local semi-massive sulphide lenses. Multiple joint systems are pervasive from the start to the end of the tunnel. Joints, fractures, and shear zones host secondary mineralization in form of in-fills (Mogotsi, 2008).

A total of 96 grab samples collected from the muck pile after each blast were submitted to the TNMC Laboratory. Average grades of grab samples collected after tunnel blasts are reported in Table 9-1. On average, 0.34% Ni, 0.41% Cu, 0.12 g/t Pt, 0.59 g/t Pd and 0.12 g/t Au were reported from grab samples.

Table 9-1: Average Grades Based on Assay Results All the Grab Samples Collected in the Tunnel.

	Ni %	Cu %	Fe %	S %	Pt (g/t)	Pd (g/t)	Au (g/t)
Average	0.34	0.41	11.49	3.95	0.12	0.59	0.12

The channel sampling consisted of 10 m long samples collected from the gallery sidewalls and divided equally into three samples. The analysis returned values from 0.16% to 0.66% Ni, 0.15% to 0.66% Cu, 0.01% to 0.49 g/t Pt, 0.01% to 3.21 g/t Pd and 0.01 g/t to 0.29 g/t Au, (Mogotsi, 2008), as shown in (Table 9-2).

Table 9-2: Underground Channel Sampling Results from Norilsk Nickel Annual Report, 2008.

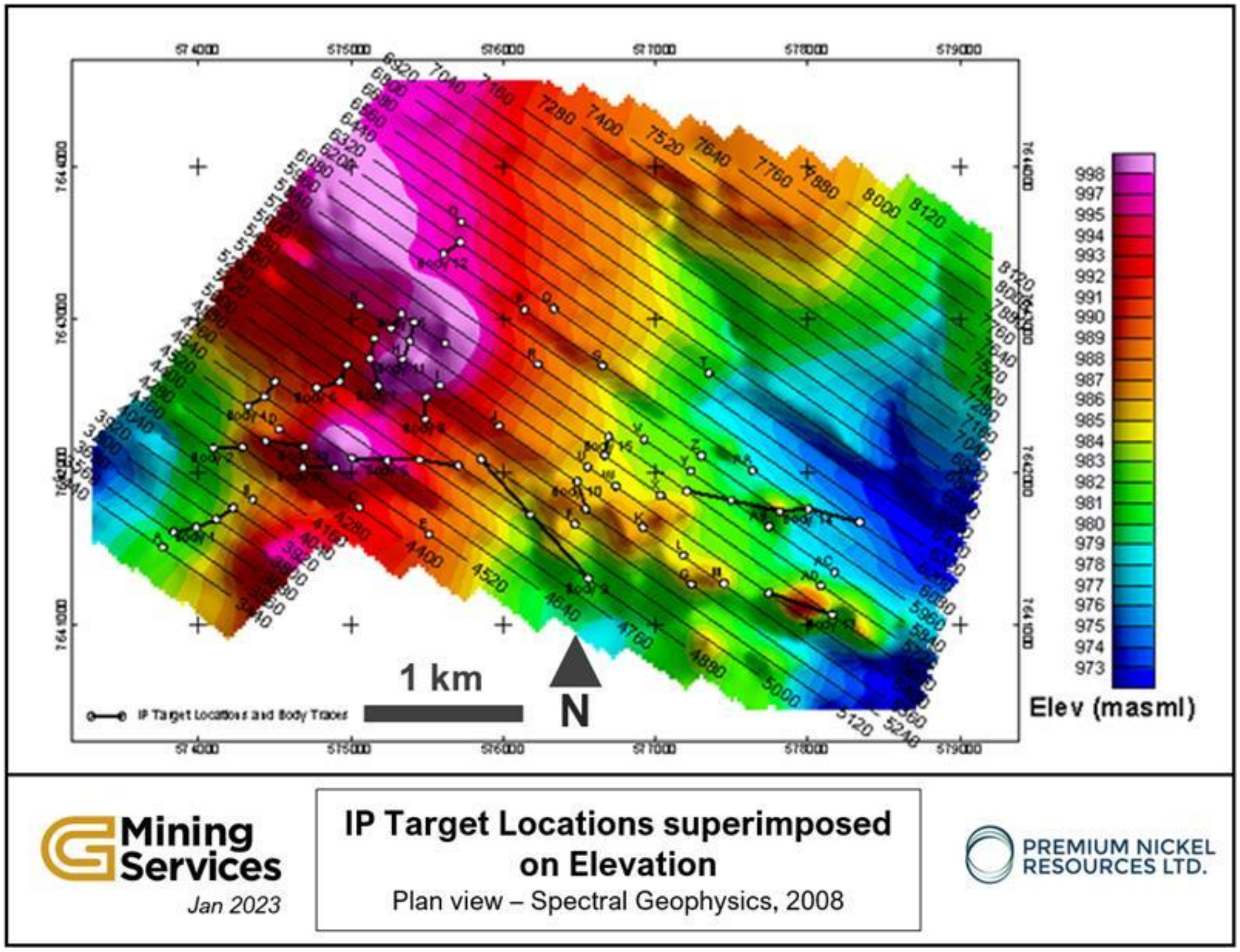
Channel Sample ID	Sample Type	Ni %	Cu %	Fe %	S %	Au (ppm)	Pd (ppm)	Pt (ppm)
SCH0055	Weighted Average	0.30	0.49	10.85	3.33	0.07	0.69	0.13
SCH0056	Weighted Average	0.16	0.15	8.31	1.48	0.03	0.42	0.07
SCH0057	Weighted Average	0.19	0.35	9.84	2.84	0.05	0.59	0.14
SCH0058	Weighted Average	0.25	0.17	11.21	4.00	0.04	0.53	0.15
SCH0059	Weighted Average	0.39	0.27	11.89	4.49	0.03	0.45	0.11
SCH0060	Weighted Average	0.33	0.29	11.38	3.35	0.04	0.70	0.14
SCH0061	Weighted Average	0.33	0.45	11.20	3.46	0.06	0.78	0.16

Channel Sample ID	Sample Type	Ni %	Cu %	Fe %	S %	Au (ppm)	Pd (ppm)	Pt (ppm)
SCH0062	Weighted Average	0.48	0.55	0.00	0.00	0.29	3.21	0.49
SCH0063	Weighted Average	0.44	0.66	11.31	0.00	0.00	0.00	0.00
SCH0064	Weighted Average	0.50	0.57	12.05	0.00	0.00	0.00	0.00
SCH0065	Weighted Average	0.30	0.33	11.52	3.50	0.00	0.00	0.00
SCH0066	Weighted Average	0.43	0.29	13.73	5.19	0.05	0.99	0.14
SCH0067	Weighted Average	0.18	0.22	0.00	0.00	0.03	0.42	0.08
SCH0068	Weighted Average	0.66	0.22	8.77	N/A	N/A	N/A	N/A

Exploration work on the Selkirk Mining Licence included licence-wide IP and soil geochemistry surveys in 2007 and 2008.

From October 2007 to February 2008, an IP survey was conducted by Spectral Geophysics over the Selkirk Mining Licence (Figure 9-4). The survey was only 2/3 completed. Several chargeability anomalies were outlined by this geophysical campaign and indicated the presence of chargeable bodies at depth (Botepe, 2013).

Figure 9-4: IP Survey at Selkirk from Spectral Geophysics, 2008.



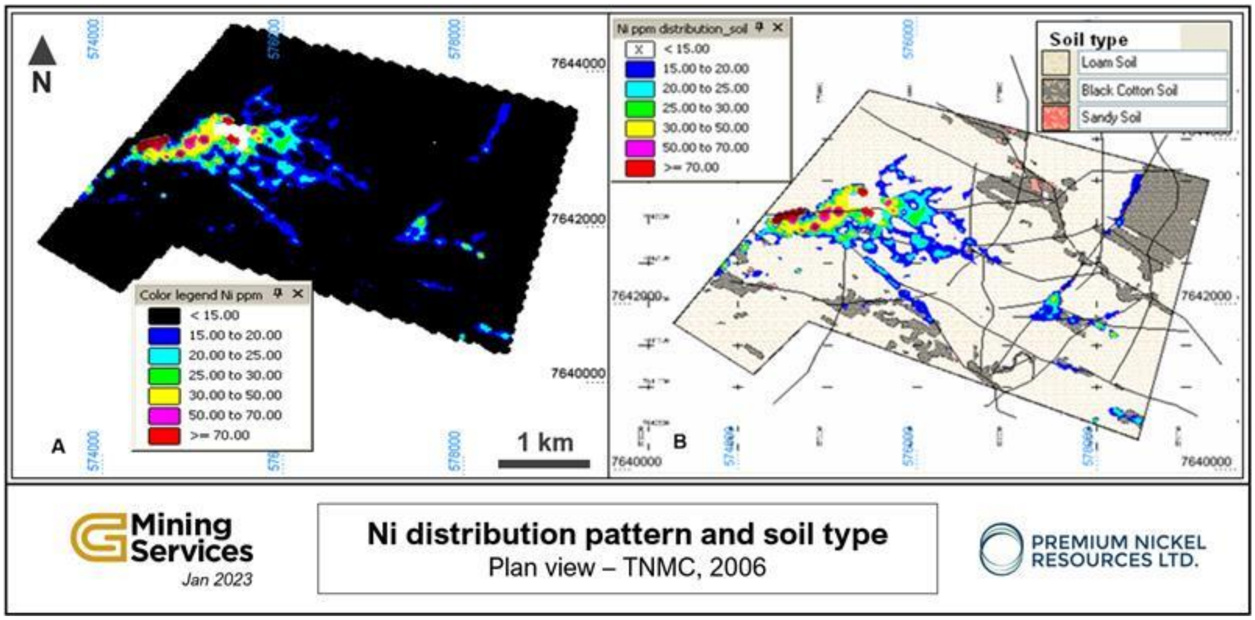
Source: Botepe, 2013 (originally from Spectral Geophysics, 2008)

Between May and September 2007, soil samples were collected over the entirety of the Selkirk Mining Licence (approximately 15 km^2) using the recommendations from the soil orientation surveys carried out in 2006. Samples were preferentially collected from the B horizon, approximately 30 cm below surface, at virtual station locations located by GPS. The virtual lines were oriented 125º-305º at a 60 m interval and samples were collected at a 50 m station interval. A total of 4,972 samples were collected and the 80# fraction of these samples was assayed for pathfinder elements selected during the orientation survey.

The results of the orientation survey had shown that Pt, Pd and Au were detected using strong decomposition, while partial digestion was not able to extract any of the PGEs or Au. Therefore, samples were analyzed by total digestion. Soil samples were prepared at Genalysis Laboratory Services Pty, Ltd, RSA and analyzed at Genalysis Laboratory Services Pty, Ltd, Australia.

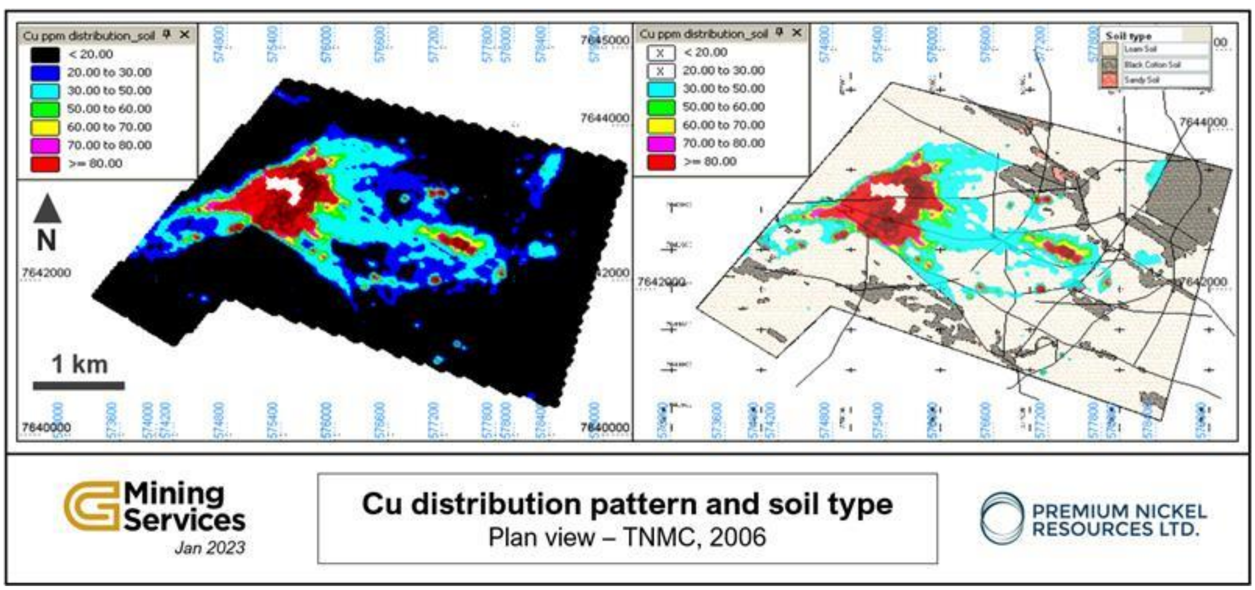
Results showed clear Ni and Cu anomalies over the Selkirk deposit and Cinderella (target 3) area (Figure 9-5 and Figure 9-6). The copper soil anomalies appear to show that the Selkirk and Cinderella systems are located along an easterly to north-easterly trending soil geochemical strike that can be followed in a northerly direction into the Ramokgwebana mafic intrusive complex.

Figure 9-5: a) Distribution Pattern Showing Concentrations of Ni at Selkirk.
b) Ni Concentrations Superimposed with Soil Type and Geological Structures.



Source: TNMC, 2008

Figure 9-6: a) Distribution Pattern Showing Concentrations of Cu at Selkirk.
b) Cu Concentrations Superimposed with Soil Type and Geological Structures.

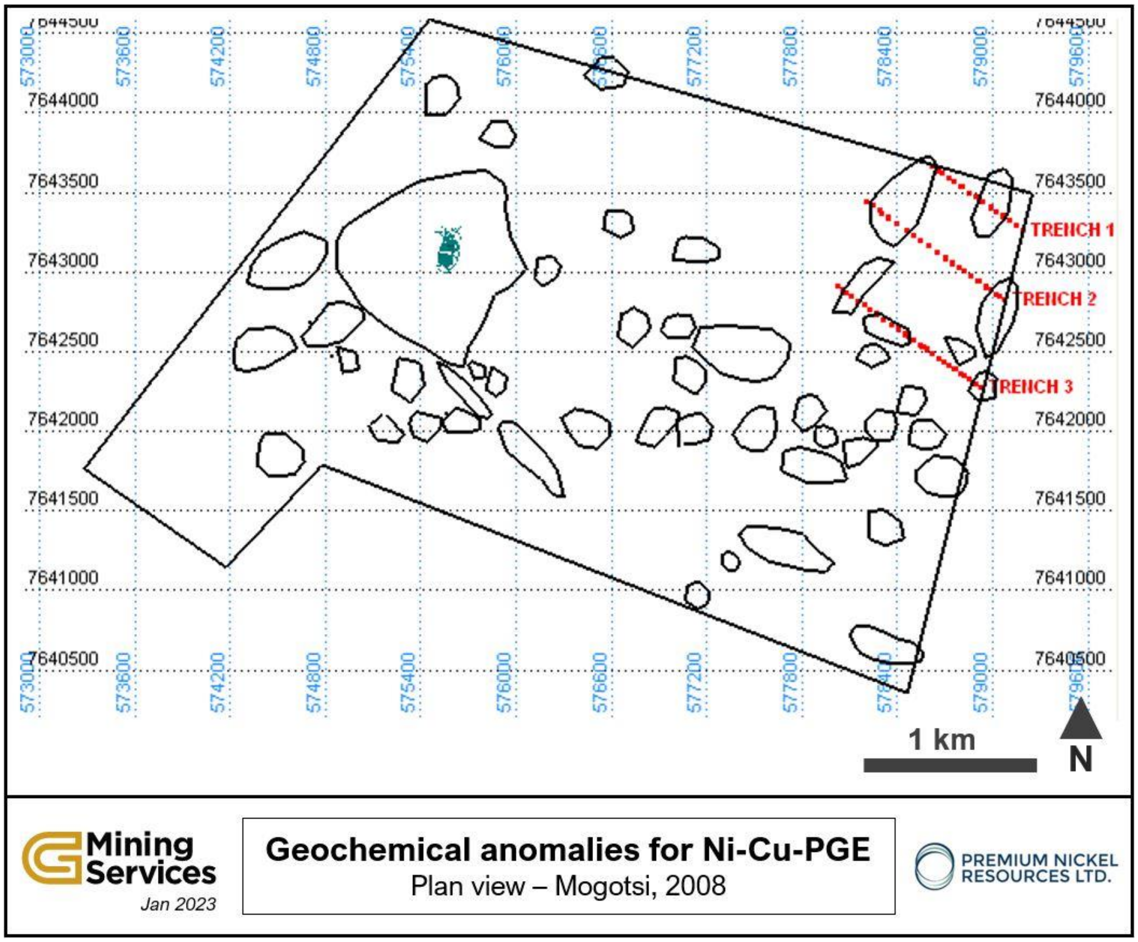


Source: TNMC, 2008

The results were analyzed, and several target areas were identified where anomalous concentrations of associated elements coincide. Forty-nine (49) geochemical anomalies were generated from the soil sample analysis (Figure 9-7).

Three (3) trenches totalling 2,858 m were excavated in 2008. The trenches were located east of the Selkirk deposit over regional soil geochemical anomalies. Melanocratic to leucocratic metagabbro with iron staining were observed by geologists while mapping the trenches (Mogotsi, 2008).

Figure 9-7: Geochemical Anomalies for Ni-Cu-PGE Mineralization on Selkirk Mining Licence and Trenches Dug East of the Property

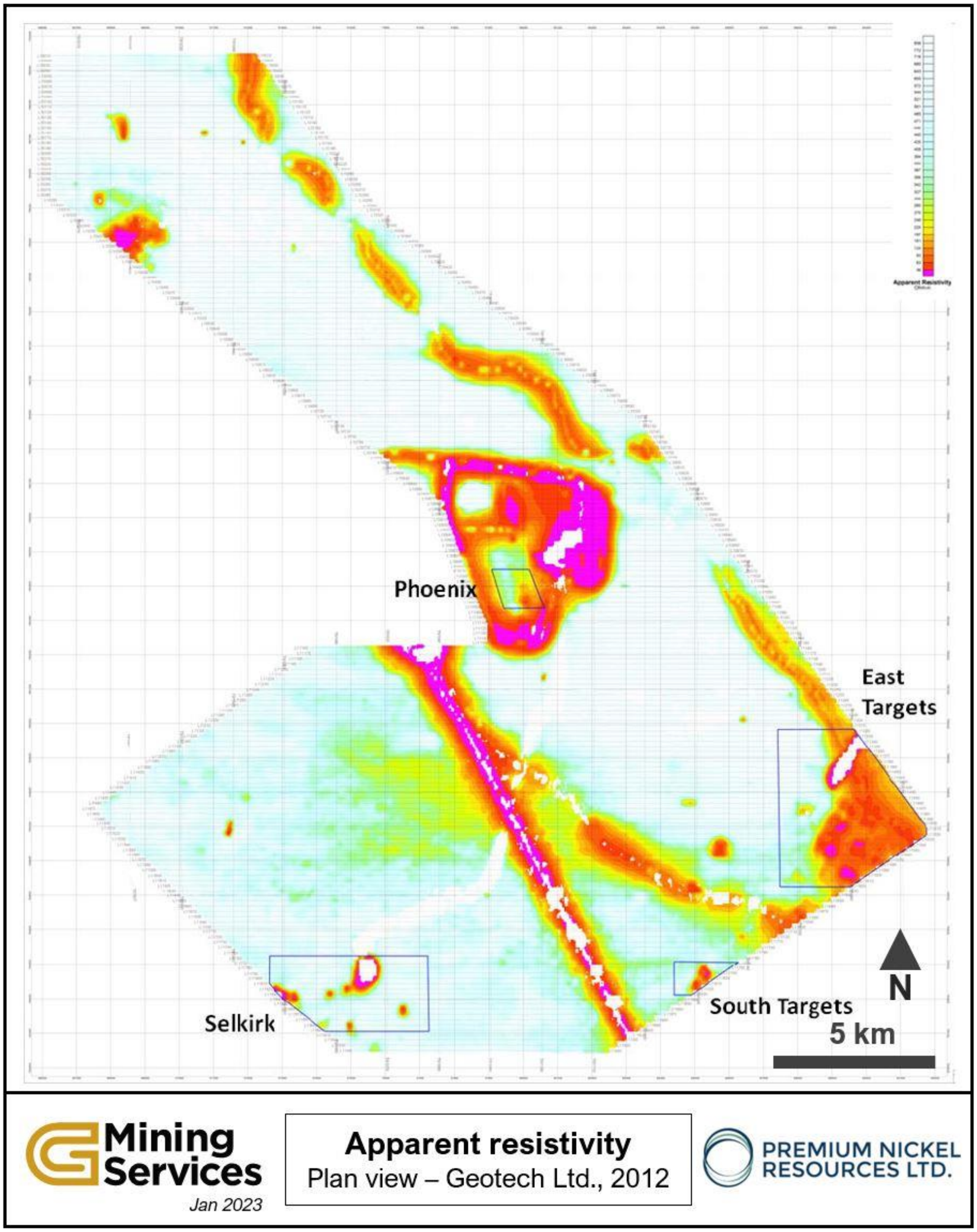


Source: Mogotsi, 2008

TNMC was granted five additional PLs in 2010, Exploration advanced on all PLs with complete soil geochemistry coverage and complete EM coverage by means of a versatile time-domain electromagnetic ("VTEM") survey in 2012.

From November 2011 to January 2012, a helicopter borne VTEM and aeromagnetic geophysical survey was flown over the entire TNMC PLs. In total, 2,526-line kilometres were flown over the TNMC lands (Han et al., 2012). Anomalous responses were interpreted, and 14 targets in four areas of interest were investigated in detail using Maxwell Plate Modelling, and a complete 3D magnetic inversion (Figure 9-8). Although two (2) areas of interest are located near known mineralization (i.e., Selkirk and Phoenix historic mines), the VTEM and aeromagnetic survey helped identify two new potential sources of mineralization location east and north-east of the Selkirk deposit (Figure 9-8).

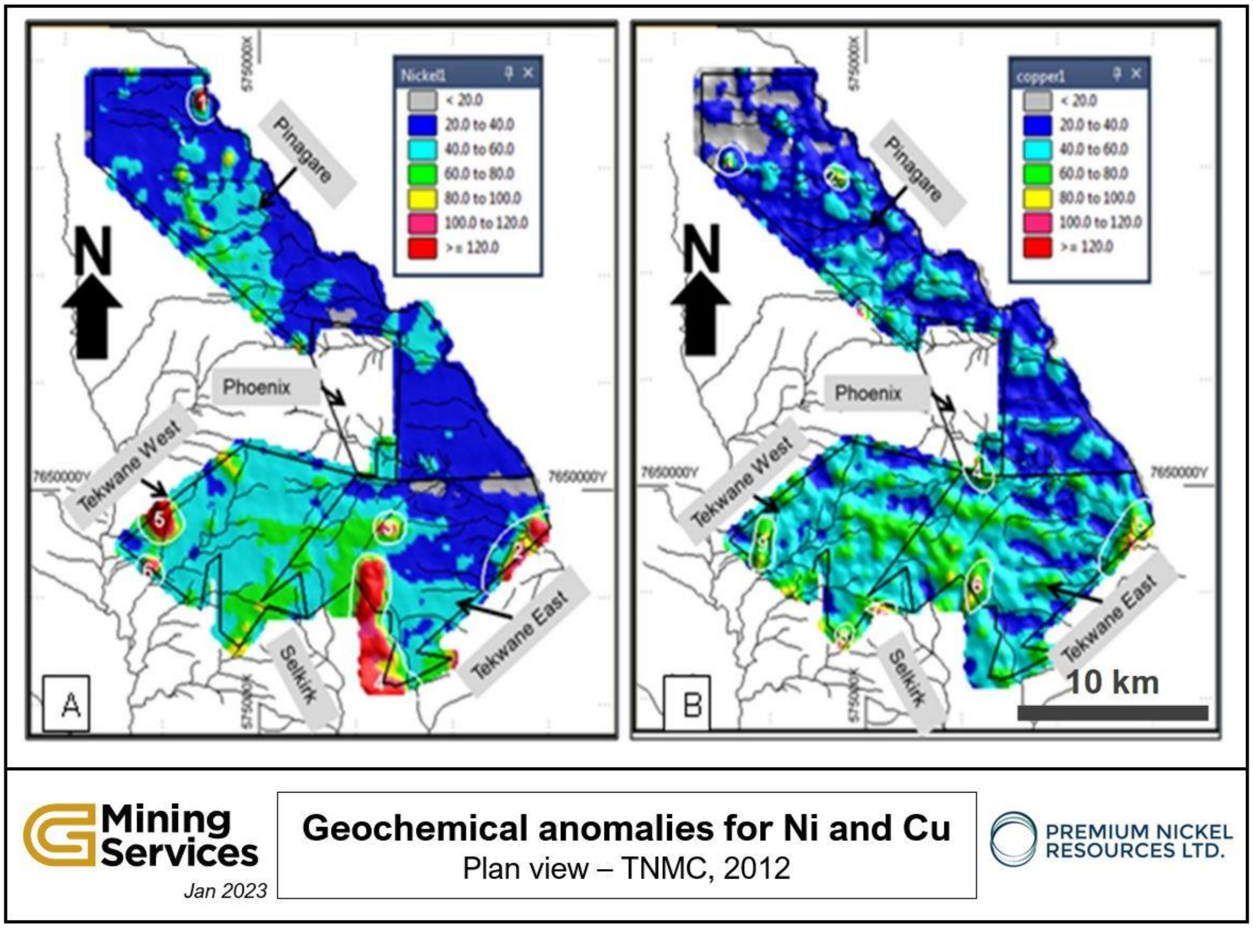
Figure 9-8: Apparent Resistivity at 250 m Below Surface.



Source: Han et al., 2012
**Note: the 4 targets identified from the VTEM and EM surveys (i.e., Selkirk, Phoenix, East and South targets).*

Norilsk Nickel completed a soil geochemical campaign over the PLs in 2012 (TNMC, 2012). A total of 6,392 soil samples were analyzed for lithogeochemistry, and interpretation of nickel and copper assay results defined six (6) prospective areas over the exploration properties (Figure 9-9).

Figure 9-9: Geochemical Anomalies for Ni and Cu Over the TNMC PLs

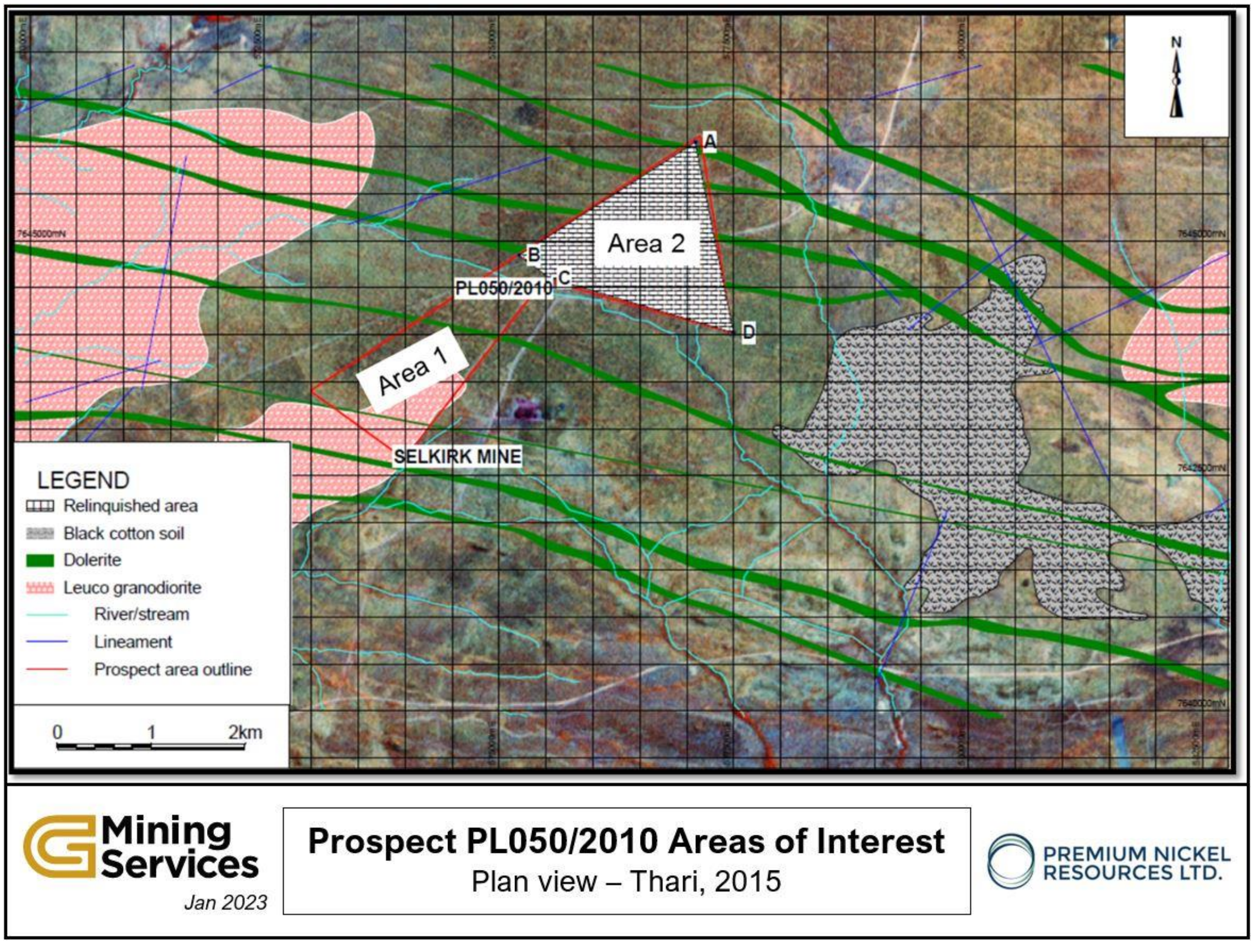


Source: TNMC, 2012

From 2014 to 2015, exploration for nickel mineralization on prospecting licences PL050/2010, PL051/2010, and PL071/2011 situated around the Selkirk and Phoenix mines was undertaken. Remote sensing, geological and structural mapping, petrological analysis, as well as drilling were completed on the exploration licences (Thari, 2015).

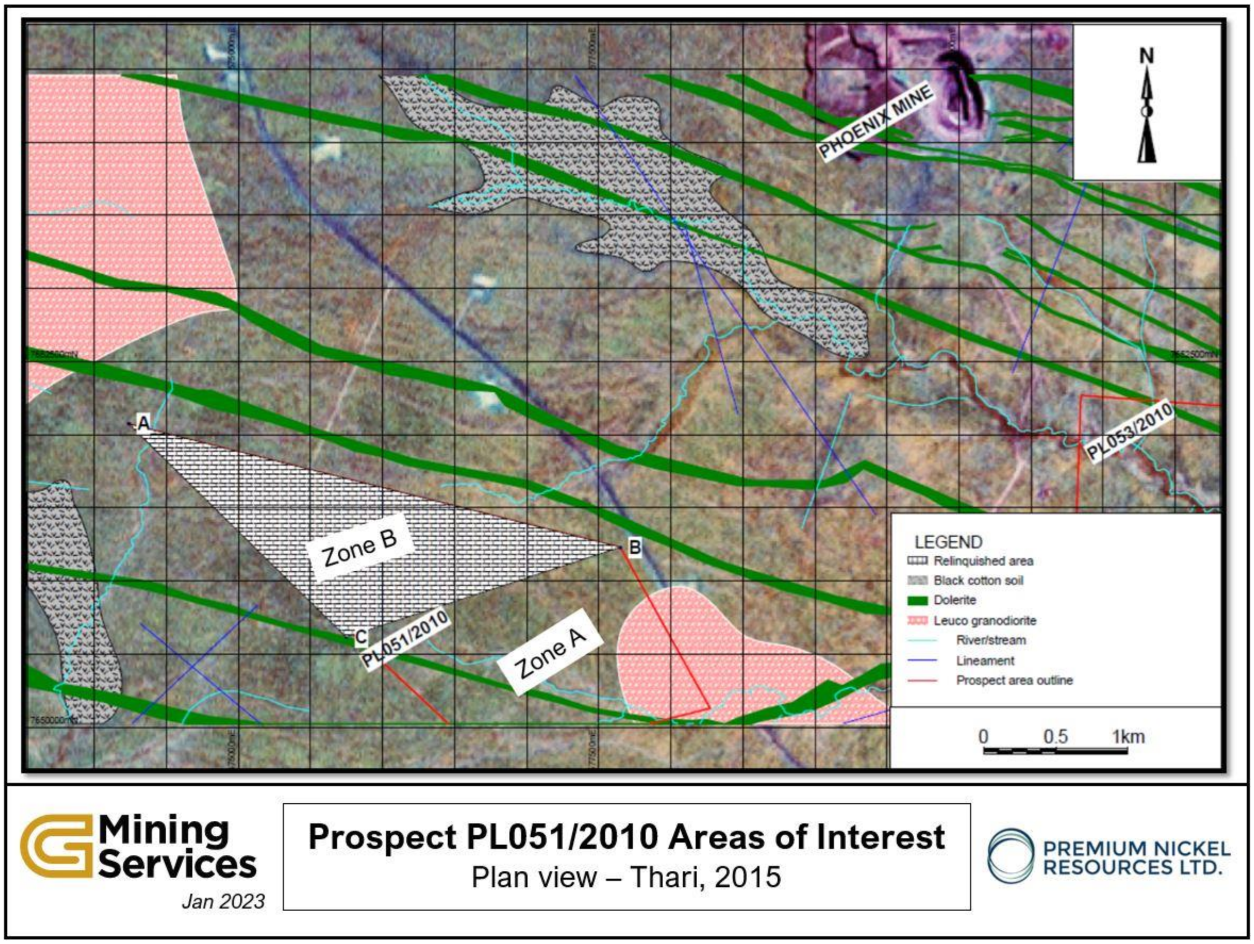
PL050/2010 and PL051/2010 are located in the northwest corner of the Selkirk Mine and in the south-west corner of the Phoenix Mine, respectively (Figure 9-10 and Figure 9-11). Exploration work on PL050/2010 and PL051/2010 consisted mainly of compilation and interpretation of existing dataset acquired since the acquisition of the deposits in 2007. LANDSAT imageries were also interpreted to better differentiate between felsic and mafic lithologies. Two areas of interest around the Selkirk Mine (PL050/2010 areas 1 and 2) and one area of interest around the Phoenix Mine (PL051/2010 Zone A) were set as high priority for nickel mineralization exploration. Exploration on Zone B on PL051/2010 southwest of the Phoenix mine was not conclusive and it was suggested that the exploration rights should be surrendered. It was also noted that the resolution of the LANDSAT imageries was too low to properly delineate the felsic and mafic bodies. Advanced Spaceborne Thermal Emission and Reflection Radiometer ("ASTER") imagery could provide better resolution and more insight on the large-scale geology around Selkirk and Phoenix mines (Thari, 2015).

Figure 9-10: PL050/2010 Areas of Interest



Source: Thari, 2015

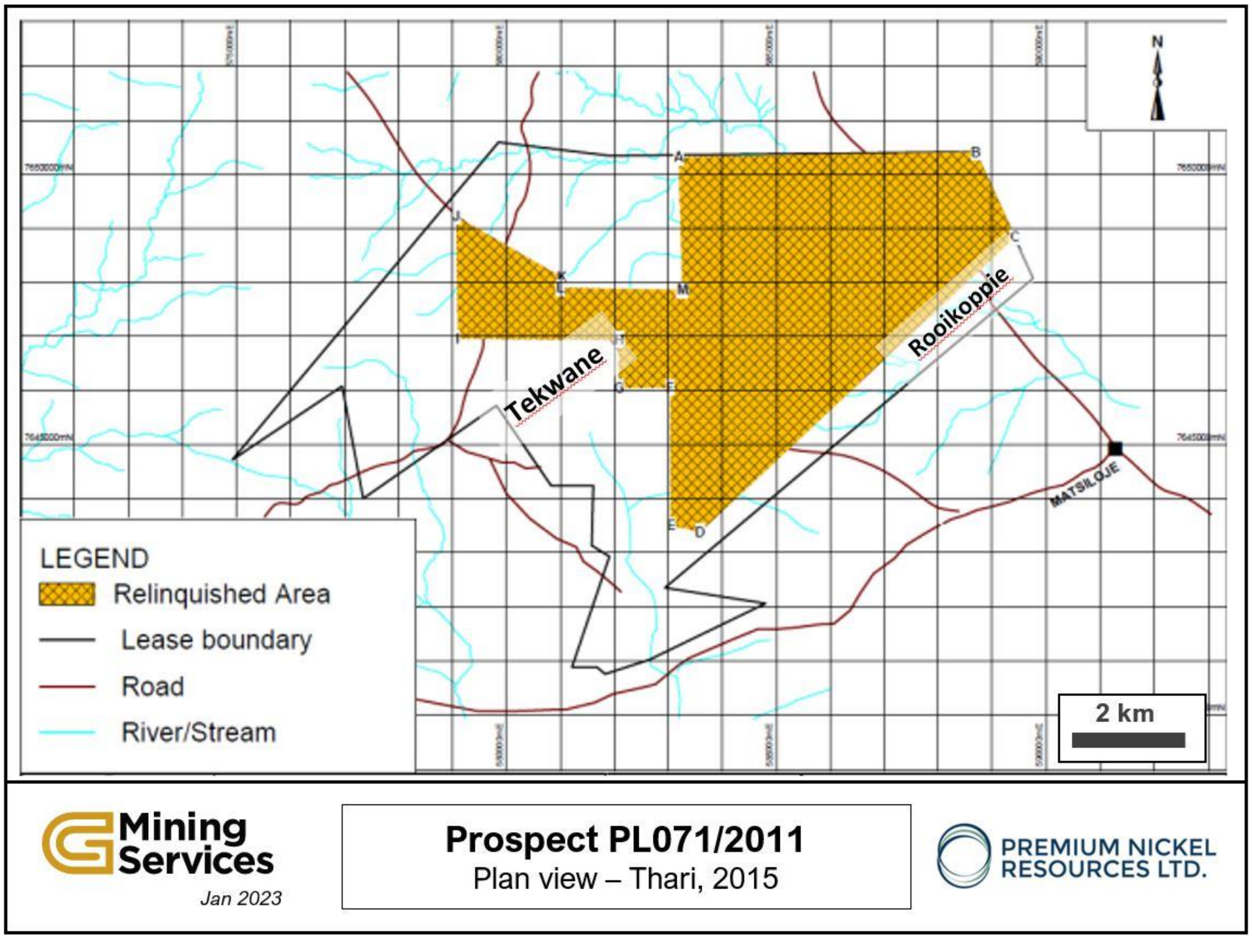
Figure 9-11: PL051/2010 Areas of Interest



Source: Thari, 2015

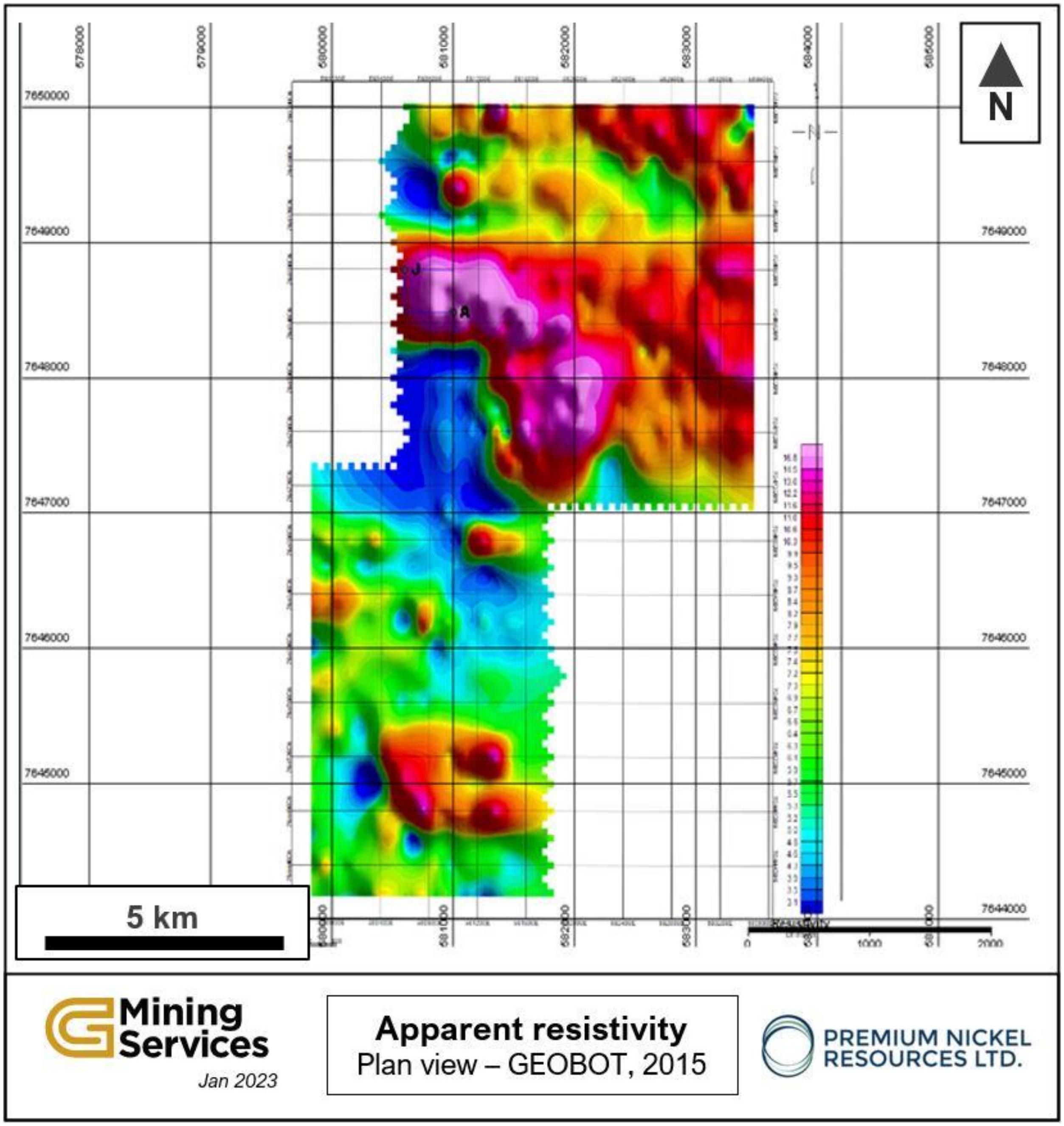
PL071/2011 is located south-east of the Selkirk deposit, at the southeastern extremity of the Selkirk exploration licences. Norilsk Nickel discovered two (2) Ni-Cu-PGE mineralized zones through previous geochemical, geophysical and geological exploration campaigns, namely the Tekwane and Rooikoppie deposits (Figure 9-12). Between 2014 and 2016, geological and structural mapping of the outcrops located near the Rooikoppie Shear Zone ("RSZ") was conducted. Several northeast striking shear zones with parallel gossan outcrops were noted. A thorough structural analysis was also completed and resulted in better understanding of the RSZ deformation phases. An IP survey with station spaced at 100 m along 200 m spaced lines was completed around the mineralized zones (Figure 9-13). Several anomalies were discovered and two exploration drillholes (DTE001 and DTE002) were completed to test targets A and J, with results shown in Table 9-3. The recommendation from the 2015 Annual Report concluded that about half of the exploration rights of the PL071/2011 prospect should be surrendered and that exploration around the Tekwane and Rooikoppie mineralized zones should be kept a high priority for later exploration campaigns.

Figure 9-12: Prospect PL071/2011 Areas of Interest



Source: Thari, 2015

Figure 9-13: Prospect PL071/2011 IP Geophysical Survey



Source: Thari, 2015

Table 9-3: Prospect PL071/2011 Drillhole Results, Prospection Licence Annual Reports, 2015.

Project	Hole ID	Sample	Depth (From)	Depth (To)	Length	Ni %	Cu %	Fe %	S %	Pt (ppm)	Pd (ppm)	Au (ppm)
TEK	DTE002	OTE002_01	132.97	133.97	1.00	0.03	0.01	8.00	0.00	0.02	0.02	0.01
TEK	DTE002	OTE002_02	133.97	134.50	0.53	0.03	0.01	0.00	0.00	0.00	0.01	0.01

Project	Hole ID	Sample	Depth (From)	Depth (To)	Length	Ni %	Cu %	Fe %	S %	Pt (ppm)	Pd (ppm)	Au (ppm)
TEK	DTE002	OTE002_03	134.50	135.00	0.50	0.03	0.01	0.52	0.02	0.00	0.00	0.00
TEK	DTE002	OTE002_04	135.00	136.00	1.00	0.02	0.01	0.56	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_05	136.00	137.00	1.00	0.02	0.01	0.49	0.00	0.00	0.02	0.01
TEK	DTE002	OTE002_06	137.00	138.00	1.00	0.02	0.00	0.50	0.00	0.00	0.00	0.02
TEK	DTE002	OTE002_07	138.00	139.00	1.00	0.02	0.00	0.42	0.00	0.00	0.00	0.00
TEK	DTE002	OTE002_08	139.00	140.00	1.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
TEK	DTE002	OTE002_09	140.00	141.00	1.00	0.02	0.00	0.62	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_10	141.00	142.00	1.00	0.03	0.01	0.41	0.05	0.00	0.01	0.01
TEK	DTE002	OTE002_11	142.00	143.00	1.00	0.02	0.00	0.20	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_12	143.00	144.00	1.00	0.02	0.00	0.11	0.01	0.00	0.00	0.01
TEK	DTE002	OTE002_13	144.00	145.00	1.00	0.02	0.00	0.43	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_14	145.00	146.00	1.00	0.03	0.01	0.55	0.04	0.00	0.00	0.01
TEK	DTE002	OTE002_15	146.00	147.00	1.00	0.02	0.00	0.21	0.00	0.00	0.00	0.00
TEK	DTE002	OTE002_16	147.00	148.00	1.00	0.02	0.00	0.35	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_17	148.00	149.00	1.00	0.02	0.00	0.29	0.00	0.00	0.00	0.00
TEK	DTE002	OTE002_18	149.00	149.37	0.37	0.02	0.01	1.70	0.00	0.00	0.00	0.01
TEK	DTE002	OTE002_19	149.37	150.00	0.63	0.03	0.02	7.86	0.00	0.00	0.00	0.01

9.8 2015 – 2016 BCL Exploration

The Property was acquired by BCL in October 2014. No exploration was carried out on either the Selkirk Mining Licence or the exploration PL's. Drilling during 2015 and 2016 supported various aspects of the BFS. Seven (7) holes, DSLK268 to 274, in 1,957 m, were drilled to collected metallurgical samples for the Mintek testwork. Three holes, DSLK288 to 290, in 750 m were holes drilled for water pump tests.

DSLK275 to 287 are HQ sized holes located in the core storage area at the Phoenix Mine and were unlogged and unsampled. These have been sampled by PNRL, with results described in Section 11.

10 DRILLING

PNRL has not completed any drilling on the Project as of the effective date of this Technical Report. All currently available drilling information available for the Project was completed by previous operators. The following paragraphs are summarized from a previous competent person report prepared by Norilsk Nickel (2013), and conclusions formulated by GMS using the drilling database available at the time of writing.

10.1 RC Drilling

Brief protocols were historically outlined by the TNMC exploration section where RC drilling was used to pre-collar diamond drillholes. The size of the RC hole was 16.5 cm in diameter with a mean rock density of 3.01 g/cm^3 using the Archimedean principle. Assuming 100% recovery, one metre of RC chips at the Selkirk deposit weighed approximately 64.4 kg and consisted of materials less than or equal to 2 cm diameter. The sample was collected in a bag attached to the cyclone and split using a series of riffle splitters to produce two (2) 100 g samples, one for submission to the laboratory and a duplicate reference material. Splitting equipment included a 50/50 Jones riffle and three tier stack of riffle splitters. The sample submitted to the laboratory underwent crushing to 6 mm and milling to 75 µm until an 18 g sub-sample was extracted for X-ray fluorescence (“XRF”) and a 50 g subsample was extracted for fire assay for PGEs and Au if sufficient Ni was detected.

It should however be noted that RC drilling was not used in subsequent mineral resource estimations due to concerns surrounding sampling method and sample recovery.

10.2 Diamond Drill Data

Diamond drilling was principally used for exploration and resource delineation in the Selkirk deposit, with NQ size core being the most frequently utilized. PQ-size core was only used to collar the holes the first 5 to 10 m in unconsolidated ground. PQ-sized drillholes were drilled for the collection of metallurgical samples and geotechnical studies.

Core was metre-marked and logged by the geologist prior to sampling. Detailed logging described and separated all lithological units greater than 40 cm, and these were logged as ‘Main’ units. Samples taken in ‘Main’ units were split along lithological boundaries and boundaries defined by percentage of visible sulphide minerals.

Samples were marked by geologists for cutting and sampling, and sample length ranged from a minimum of 10 cm for massive mineralization to 100 cm for disseminated, low-grade mineralization. This produced samples with weights between 250 g for massive mineralization (10 cm length and 4.69 g/cm^3 rock density) and 2.4 kg for disseminated, low-grade mineralization (100 cm and 3.01 g/cm^3 density). Once appropriately labelled, the samples were sent to the laboratory for assay.

Quality control procedures used were as follows:

- All core was transported to the Phoenix Mine Site, located 15 km north of Selkirk for logging and sampling and returned to Selkirk for storage.
- Core was logged by trained geologists and samples were selected at the time that the drillhole core was logged.
- All sample intervals conformed to a minimum of 10 cm and a maximum of 100 cm. Sampling took the geological host rock in consideration.
- A continuous saw cut line was made along the drill core.
- Core was cut using a diamond saw, with half of the core sent for analyses and the remaining half returned to the core box for reference purposes.
- A 20 cm waste sample was taken of the material bounding the mineralized intersections.
- Specific gravity measurements were carried out on all the half drillhole core samples submitted to the laboratory, prior to the crushing stage of sample preparation.
- Samples were dispatched to the laboratory at the Phoenix Mine as a batch of 50 samples of which two of the samples were blank samples, and two were certified reference pulp samples (SARM-7 and GBM396-1).

10.3 Drilling Campaigns at Selkirk

The first drilling campaign at Selkirk was carried out by TTE in 1968. Eighteen (18) holes in 2,394 m were drilled at the site of the historic Selkirk Mine (Malan, 1968); however, these drillholes are not present in the database.

Since 1970, 505 diamond drillholes (both surface and underground) have been completed at Selkirk for a total of 108,757 m, including 11 holes for metallurgical purposes, five (5) holes for hydrogeology studies and six (6) holes for condemnation purposes (Table 10-1). In addition, 96 underground grab samples were taken from muck piles after blasting and 50 grab samples and 14 underground channel samples were taken along the wall of the underground workings, and 25 shallow auger holes were completed for soil sampling. Nine RC pre-collars were drilled in 2003, assumed to be a cost-saving measure. These statistics were based on a drilling database provided to GMS.

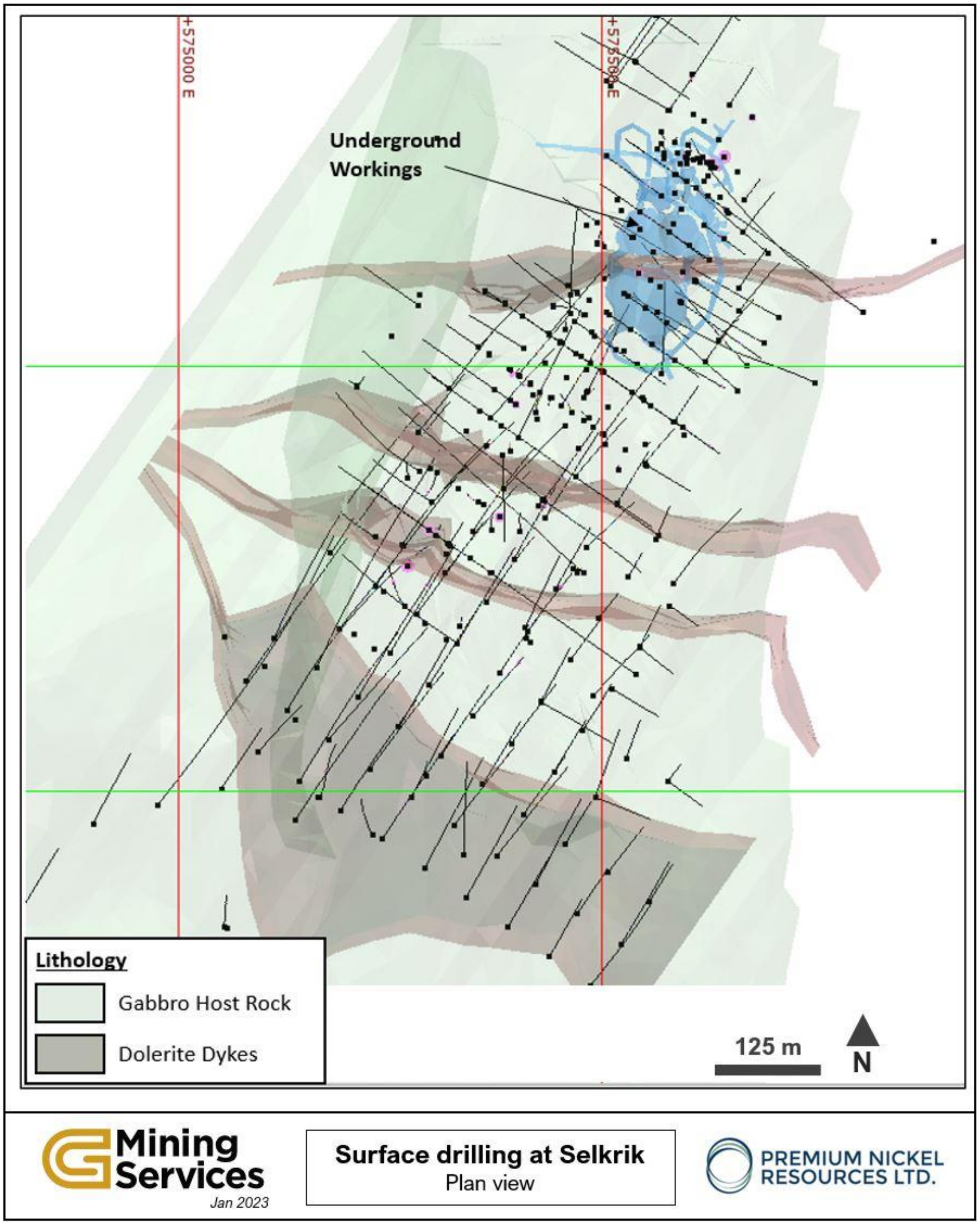
Table 10-1: History of the Various Drilling Campaigns at the Selkirk Deposit

Series (Prefix)	Company	Years	Description	# Holes	Metres
SK	TTE	1965-1967	Core not available Holes not in database	18*	2,394.4*
S0-	Sedge	1970-1971	Exploration and Resource Drilling, core destroyed	117*	27,377.5 *
TNW	Morex	1984	Metallurgical hole Not in database	1*	66.0
S-	Morex	1987	Geological confirmation & Metallurgical testwork Not in database	2*	253.53
RSLK-*	TNMC	2003	Pre-Collar RC holes to the DSLK001-010	9	273
DSLK-	TNMC	2003-2008	Delineation drilling Verification drilling Testing of geochemical and geophysical targets	270	73,159
DSLK-	TNMC	2016	HQ MET Holes	11	2,938
DSLK-	TNMC	2016	HQ hydro holes	5	1,250
DSLK-	TNMC	2016	Sterilization holes	6	793
USLK-	TNMC	2008	UG Drilled at the exploration drift	13	457
SK-	TNMC	1998-2006	UG Delineation and Crown Pillar Drilling	83	2,726
	TOTAL	**1970-2016**		**505**	**108,767**
SEL-	TNMC	2003	Auger drilling (0.4 m Depth)	25	10
SCH-	TNMC	2008	UG Channel Samples along wall of UG workings	14	177

**Note: Excluded from total meterage*

Details on each drilling campaign are scarce, however ongoing work on the compilation of the drilling database will likely result in greater confidence in the various drilling campaigns and the pertaining data. Figure 10-1 shows the drillholes currently digitized in the drilling database, with the underground workings and geology shown for comparative purposes.

Figure 10-1: Plan View of Surface Drilling in the Current Drilling Database



Source: GMS, 2022

10.4 Collar Surveying and Downhole Surveying

Hole inclinations and directions were determined down-hole using the Gyro tool provided through Digital Survey services. This tool was best suited as it remains unaffected by the influence of magnetic rocks.

Comparisons with other tools were made before choosing the Gyro, and the surveys were undertaken by Digital Survey, a South Africa Company.

Core orientation was carried out in most holes by the use of the Ezy-mark system, and later the Ace tool provided by the drilling contractor.

Collar positions were located by mine surveyors based on a drill plan issued by exploration geologists, and actual positions surveyed after drilling using RTK methodology.

Between the October 13 and 17, 2022, PNGB contracted Drysdale and Associates of Francistown, Botswana, to conduct a resurvey campaign of all available drill collars on the Selkirk Property. Leica GS12 and Leica GS10 GPS Units were used, all with current Leica Blue Certificates. Coordinates were provided in WGS84, UTM zone 35 South, with geoidal heights. Three (3) monuments were located to calibrate the positing, all of which gave precisions with < 50 mm error. Approximately 320 drillholes were resurveyed.

10.5 QP comment

The QP is of the opinion that the drilling procedures used by TNMC are consistent with generally recognized industry best practices. The resultant drilling pattern is sufficiently dense to interpret the geometry and the boundaries of the massive sulphide with good confidence. The core samples were collected by trained personnel, and the process was undertaken or supervised by suitably qualified geologists. The QP believes that the samples are representative of the source materials and that there is no evidence that the sampling process has introduced a bias. The QP believes that there are no drilling, sampling or recovery factors that could materially impact the accuracy and reliability of the results.

Considerable data compilation efforts are required to improve confidence in the drilling database, including data entry of original survey information and downhole resurveying of a selection of drillholes to validate existing values in the database.

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

Sampling and assaying of drill core for the Selkirk Deposit was conducted primarily at the Phoenix Mine Site using the laboratory facilities associated with the mine ("Phoenix Mine Laboratory"). There was no active drilling, sampling or assaying when the QP visited site, so this section is a summary of previous reports outlining sampling practices, assaying and QA/QC.

11.1 Sampling and Analysis Quality Control

A competent person report from Botepe (2013) describes the quality control of the samples once collected as follows.

11.1.1 Sampling Quality Control

The procedures for analysis of drill core samples at the Phoenix Mine Laboratory is summarized below:

- Four (4) certified reference pulp samples were submitted at the beginning of each batch by the laboratory.
- For every batch the first sample was a blank sample, to minimize any contamination at the crushing stage of the sample preparation.
- Blank samples were sourced from the nickel barren Adamellite granitoid to the north of the Project area.
- The laboratory completed a check nickel and copper analysis with the original nickel and copper analyses.
- Every tenth sample submitted was re-analyzed as a duplicates pulp sample.
- Certified Reference Materials (CRMs) pulp samples were sourced from GEOSTATS (Geostats Base Metal) of Australia and from Mintek of South Africa, and AMIS (African Mineral Standards).
- A selection of samples was submitted to independent laboratories.
- The daily submission rate of samples for analysis to the laboratory was initially 150 to 200 samples per day but was subsequently increased to 400 samples per day.
- Specific gravity measurements were carried out on all the half-core samples submitted to the laboratory, prior to the crushing stage of sample preparation.

- Samples were dispatched as a batch of 50 samples, of which two of the samples were blank samples, and two were certified reference pulp samples (SARM-7 and GBM396-1).

Sheets (2006) did a thorough review of drilling and sampling protocol at the mine; his conclusions are summarized below.

"Assessments of analytical quality for 2004 (Exploration Section, 2004; Gushée, 2004) are poor with 90% of replicates (coarse duplicates at 6 mm size) only producing a precision of between ± 40% to ± 80%, but duplicates (pulp duplicates at 75 µm size) fair much better with 90% being between ± 12% to ± 13% precision. General industry practice at the time was for 90% of coarse duplicates to be within ± 20% precision and 90% of pulped duplicates to be within ± 10% precision if sampling theory shows these precisions are acceptable and for compositions greater than 10 times the detection limit (currently the detection limit is 0.01 wt% Ni)."

GMS observes that the coarse duplicates from this period ("replicate" using TNMC terminology) show greater variation and should be investigated further, however variations in the pulp duplicates (duplicates using TNMC terminology) are considered acceptable.

11.1.2 Sample Preparation, Analyses and Security

Samples were analyzed at the Phoenix Mine Laboratory. In the laboratory, the samples were crushed twice to reach the less than 6 mm size where a 100 g split (duplicate) was taken for milling. The type of splitter used is unknown. This subsample was milled to 80% passing 75 µm where aliquots are taken for XRF (Axios and Magics PRO, supplied by Panalytic). The remaining sample was kept as a duplicate pulp in special sealed envelopes. Both pulp and crushed sample duplicates were returned to the exploration department for storage, and later use as checks for QA/QC. Results from the laboratory were posted electronically through the LIMS / GBiS system against each sample as per the sample number into a working file where they were validated against lithological logging data; then they were imported into the GBiS database for storage.

Samples were assayed for Ni and Cu by XRF, and PGEs + Au by fire assay method Ni and Cu were measured as percentages, while PGEs (Pt, Pd and Au) were measured in ppm.

11.2 QA/QC

GMS was provided with a QA/QC database dated of March 1, 2016, for Selkirk, which was sourced from the server from the mine site. The following section presents the QA/QC compilation completed from this database. The QA/QC database has not been validated in detail using hard copy records, therefore it is likely that mis-labelled QA/QC samples and errors are present.

11.2.1 Blank

The expected value for the blanks was assumed at 0.01% for Ni and Cu and 0.01 g/t for Au, Pt, Pd (Table 11-1). The maximum tolerance for passing the QA/QC was set at 10 times the detection limit.

When considering Ni and Cu, it is notable that the laboratory had sample contamination issues towards the end of 2006 for Ni, and into 2007 for Cu (Table 11-1 and Figure 11-1). Some blank assays returned above 1% Cu where all other elements returned acceptable results, indicating the possibility that some standards were erroneously labelled blanks in the database.

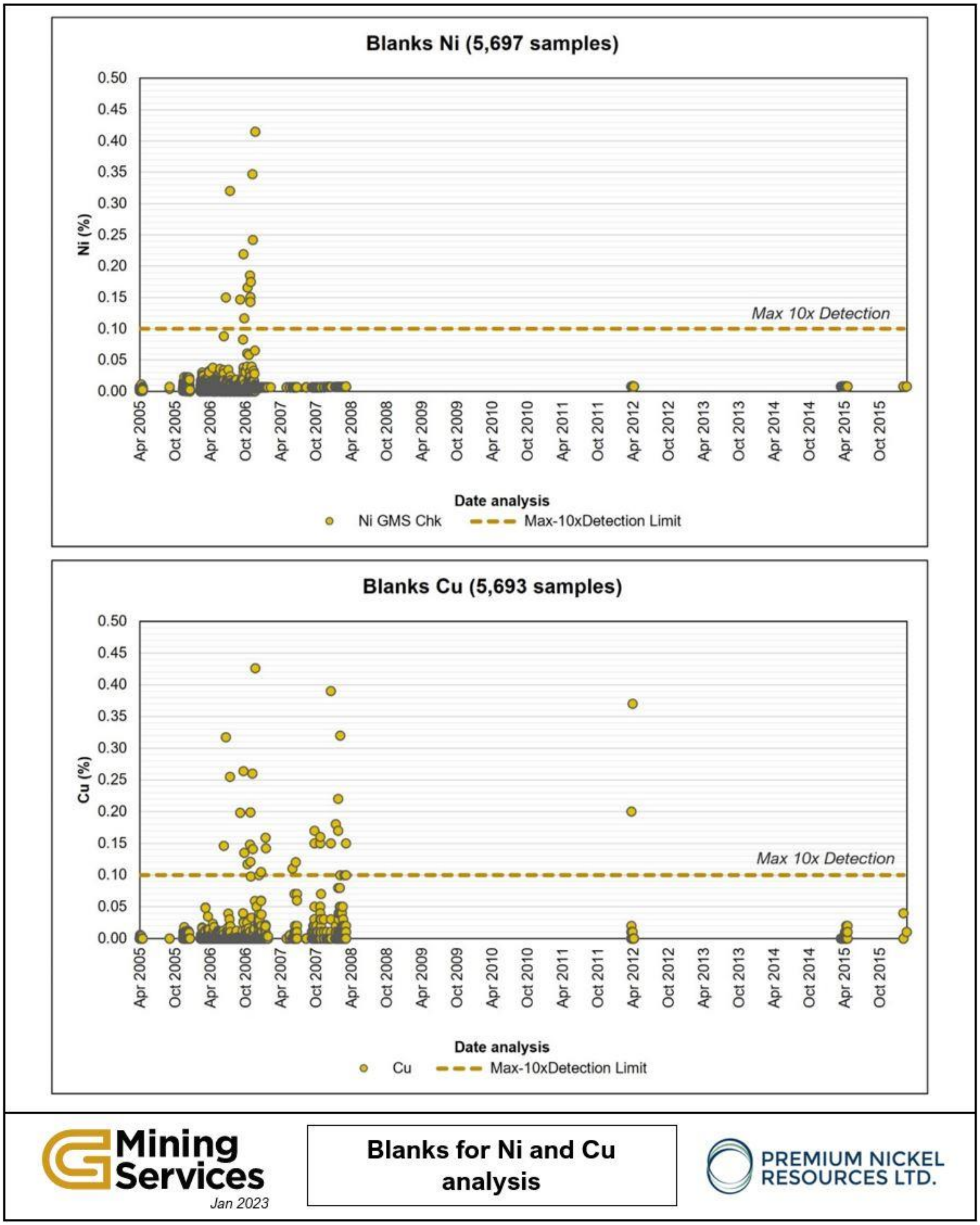
For the PGE blank assays, 6.7% of the total Pt analysis did not pass the 10 times detection limit threshold, and 13.8% of analysis failed for Pd (Table 11-1 and Figure 11-2). All the outliers (> 1 g/t for Pd and Pt) returned acceptable values for Cu and Ni. For PGEs, there was a significant level of blank failure, and the observed variability suggests either a major contamination problem, instrument calibration / precision or data entry issues. The QP strongly recommends that this be investigated further, and a re-analysis of samples should be considered in the future.

Further work required to increase confidence in the assay database includes drilling twin holes in strategic areas, resampling the core, and/or potentially using pulps for re-assay, and investigating the batches that were affected by erroneous blank analysis.

Table 11-1: Summary of the QA/QC on Blanks

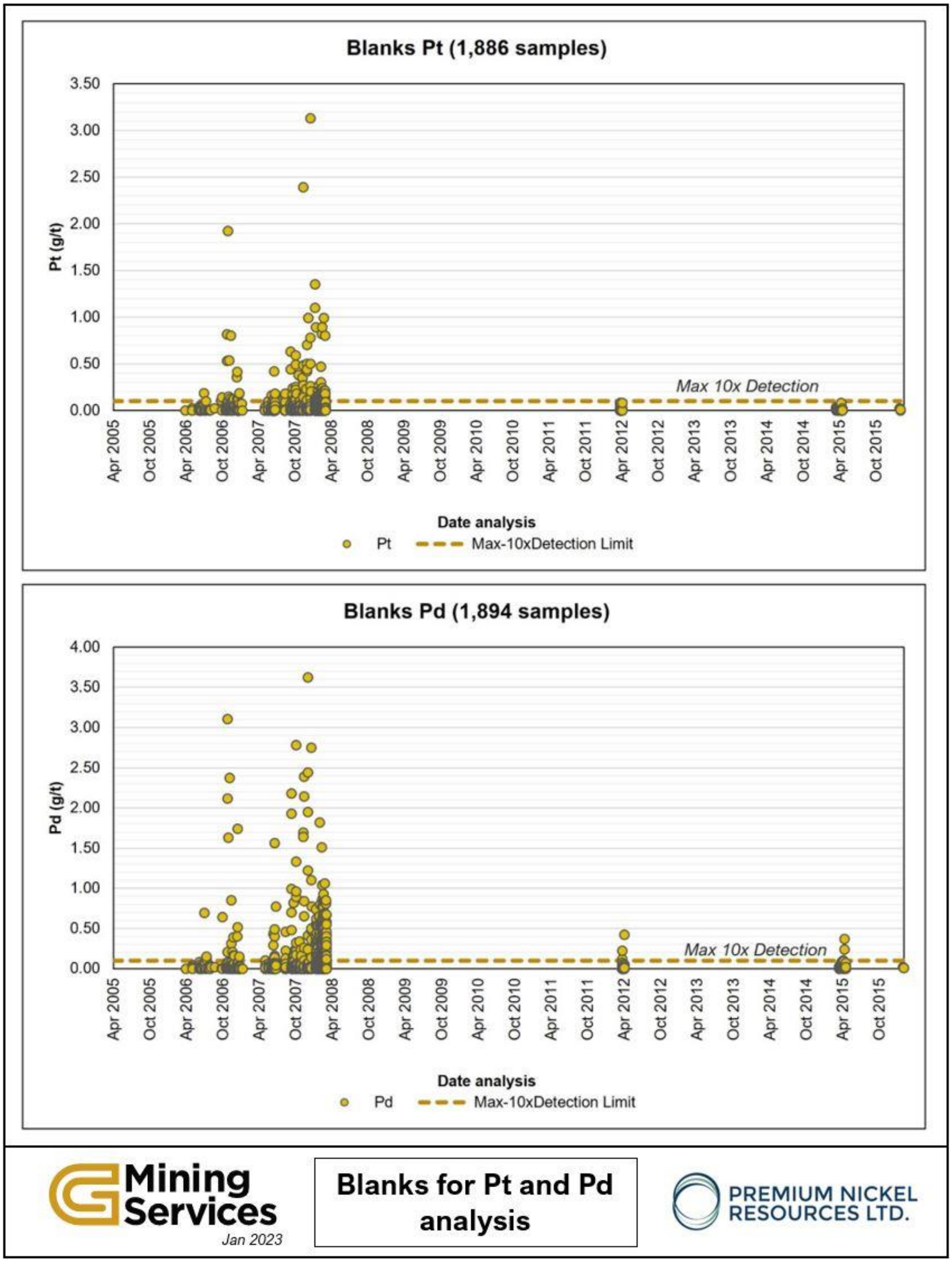
Blank					
	Ni %	**Cu %**	**Pt g/t**	**Au g/t**	**Pd g/t**
Mean	0.01	0.00	0.04	0.03	0.12
Minimum	0	0	0	0	0
Maximum	0.42	2.08	9.04	1.14	11.20
Count	5,697	5,693	1,886	1,882	1,894
Fail Count	17	38	126	78	262
% Fail	0.3%	0.7%	6.7%	4.1%	13.8%

Figure 11-1: Evolution of Blank Results for Ni and Cu Through Time



Source: GMS, 2022

Figure 11-2: Evolution of Blank Results for Pd and Pt Through Time



Source: GMS, 2022

11.2.2 Standards (Certified Reference Materials)

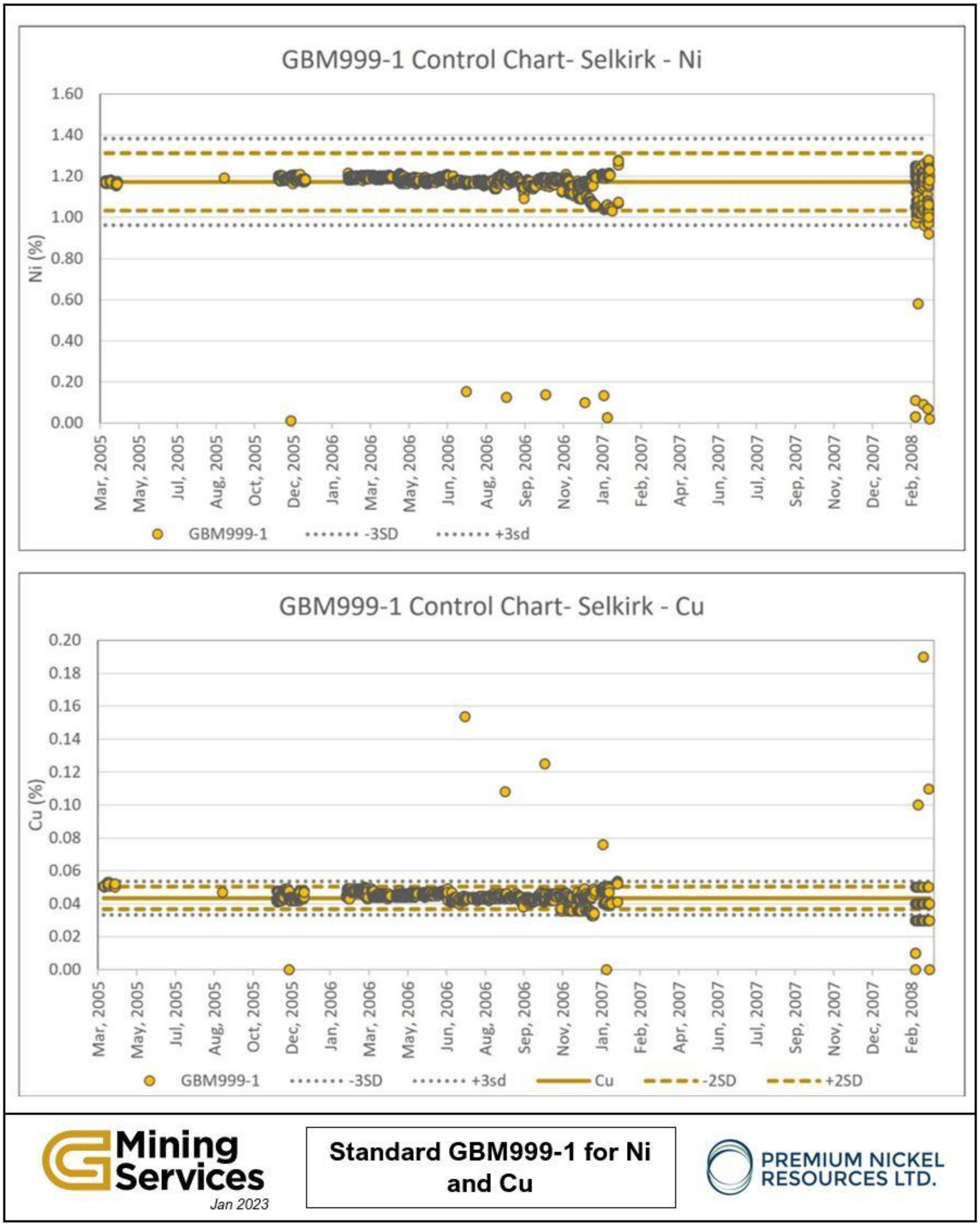
A set of 12 different standards were inserted into the sample stream in the past, of which seven (7) were for Ni-Cu only, and the remainder certified for PGEs. In this study, analyses that fall outside of three (3) standard deviations (SD) from the reference value were considered as a failure. The number and percent of assay that did not pass the 2 SD test are also noted in Table 11-2 and Table 11-3.

Regarding Ni and Cu, the various standards return results generally falling within the 3 SD bracket. For the outliers visible in both graphs (Figure 11-3 and Figure 11-4), both elements (Ni and Cu) failed the 3 SD test. Further investigation should be undertaken, but it is in the belief of the QP that these analyses correspond to either a labelling error (either different standard were meant to be analysis, or a sample / standard switch happened), and they do not necessarily correspond to laboratory failure. Looking at the temporal evolution of the mean of the analysis for these standards, it is noticeable that there was an increase in the SD for samples at the end of 2007. The wider range of value for standard GBM396-1 is potentially due to the low value of analysis for both Ni (around 0.2%) and Cu (around 0.3%).

Table 11-2: Summary of the Ni-Cu Standard Evaluation at Selkirk

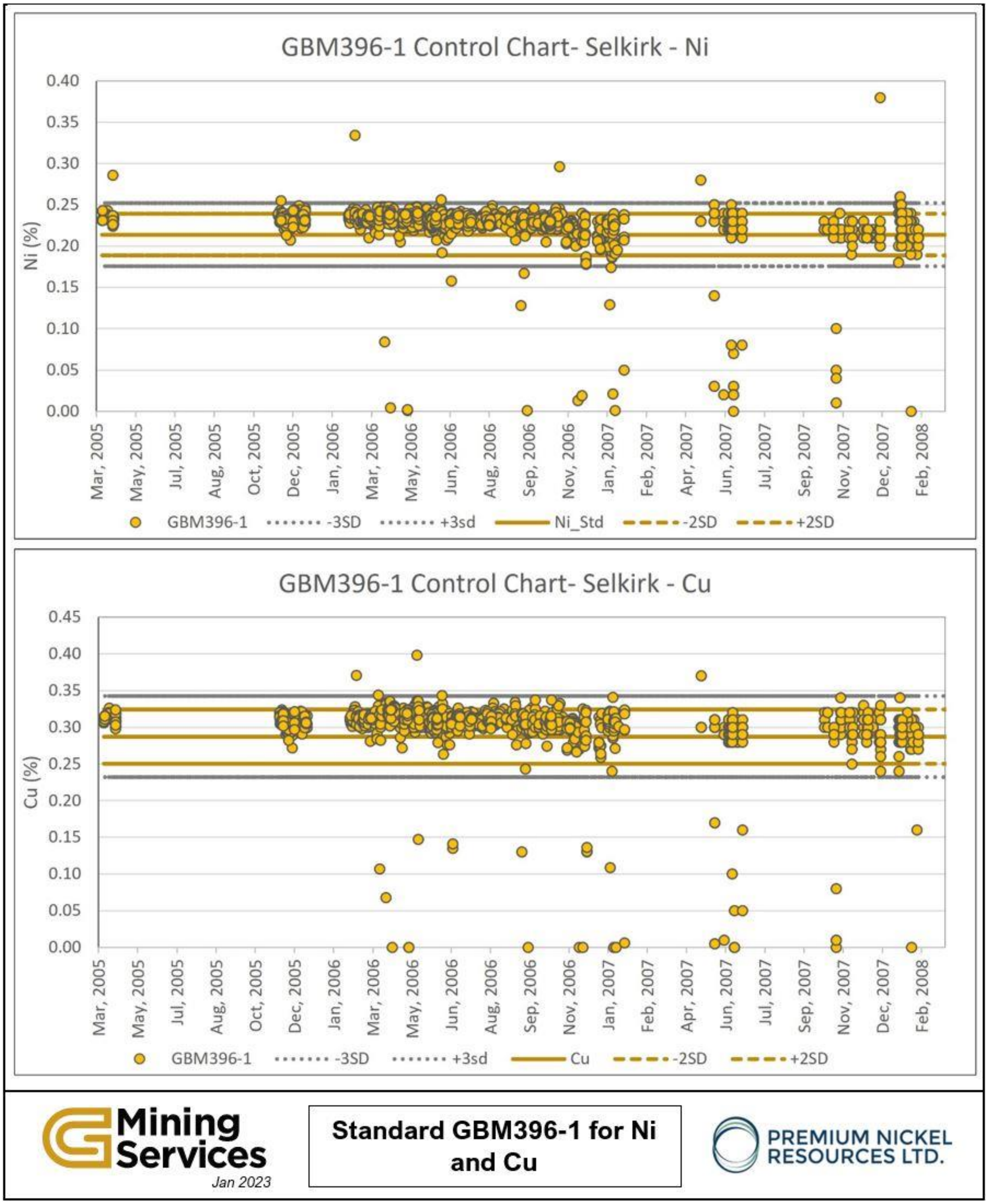
	GBM396-1		GBM999-1		GBM398-5		GBM397-8		SARM 73	
	Ni %	Cu %	Ni %	Cu %	Ni %	Cu %	Ni %	Cu %	Ni %	Cu %
Std Value	0.214	0.287	1.173	0.044	0.194	0.122	0.132	0.144	0.215	0.102
Mean	0.225	0.300	1.160	0.045	0.174	0.134	0.146	0.149	0.222	0.108
SD	0.029	0.043	0.118	0.030	0.026	0.034	0.032	0.012	0.014	0.021
Median	0.230	0.307	1.180	0.044	0.180	0.130	0.146	0.150	0.225	0.104
Count	1,618	1,618	1,571	1,571	160	160	1,402	1,402	489	489
Fail Number	45	47	19	102	4	15	11	10	2	59
Fail %	2.8%	2.9%	1.2%	6.5%	2.5%	9.4%	0.8%	0.7%	0.4%	12.1%
Fail 2SD	217	121	44	178	19	16	259	38	5	63
Fail 2SD %	13.4%	7.5%	2.8%	11.3%	11.9%	10.0%	18.5%	2.7%	1.0%	12.9%

Figure 11-3: Standard Control Chart for GBM999-1 for Ni and Cu, as Function of Time



Source: GMS, 2022

Figure 11-4: Standard Control Chart for GBM396-1 for Ni and Cu, as Function of Time



Source: GMS, 2022

Only about 40% of the drillholes at Selkirk were analyzed for PGE, and the analysis started in 2006. For standards that include PGE data, there is a large percentage which failed the 3 SD test. These failures are in samples that generally did not fail the analysis for Ni and Cu (Figure 11-5), and the dispersion presented by the analysis demonstrates a very poor precision for PGEs (Figure 11-6), or some major issues relating to misidentification/mislabelling of QA/QC samples in the database.

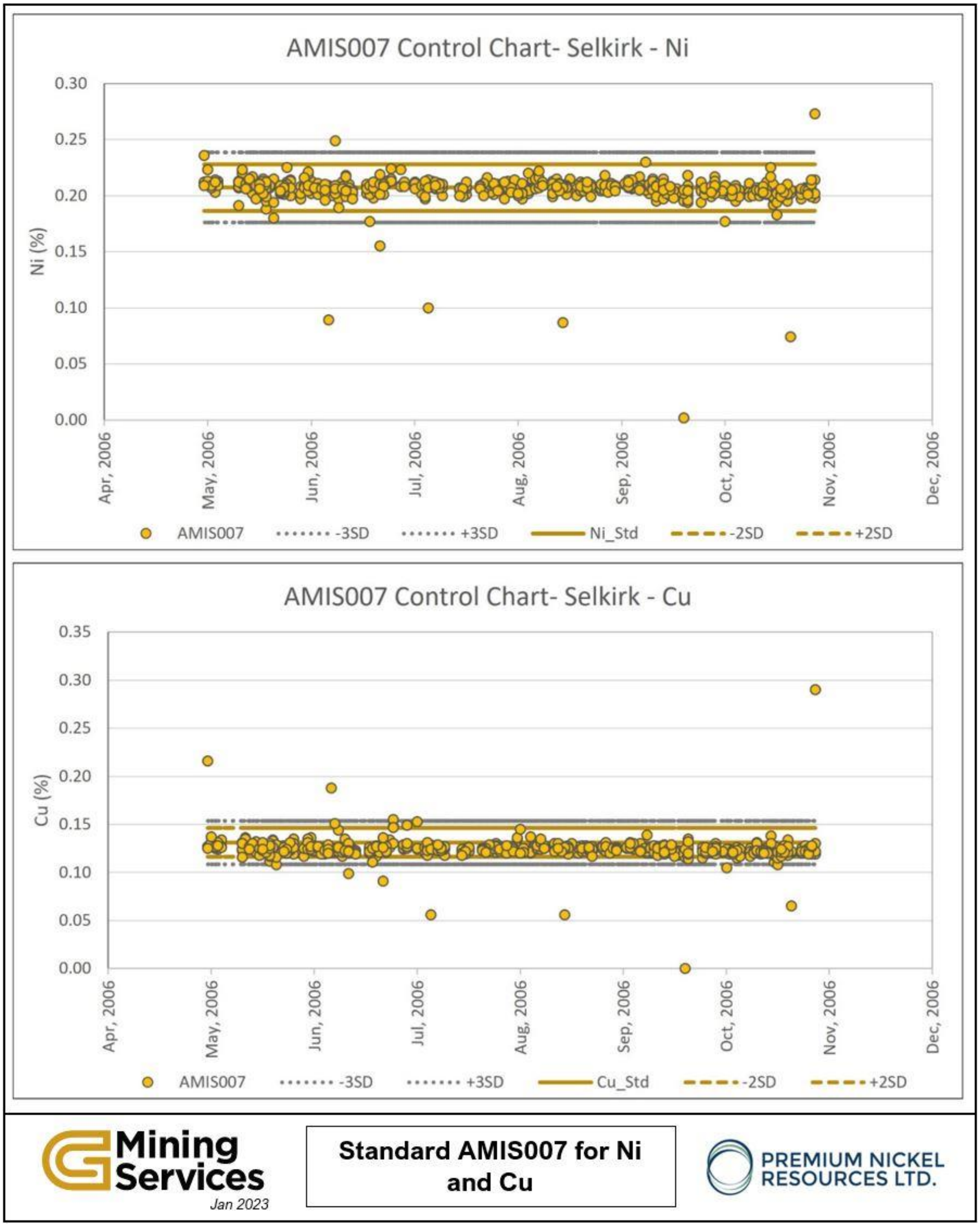
Significant work is required to improve confidence in the drilling database (especially regarding PGE assays), including drilling twin holes, resampling drill core, and/or potentially using the pulps for re-analysis, using an external laboratory.

Table 11-3: Summary of the Ni-Cu-Pt-Pd Standard results at Selkirk

	AMIS0329				AMIS0093			
	Ni %	Cu %	Pt g/t	Pd g/t	Ni %	Cu %	Pt g/t	Pd g/t
Std Value	0.214	0.142	0.27	0.55	0.271	0.295	0.11	0.47
Mean	0.200	0.143	0.14	0.65	0.262	0.312	0.10	0.46
SD	0.000	0.005	0.10	0.04	0.013	0.025	0.02	0.08
Median	0.200	0.140	0.18	0.63	0.260	0.300	0.11	0.47
Count	3	3	3	3	56	56	56	56
Fail Number	0	0	2	2	22	20	18	17
Fail %	0.0%	0.0%	100.0%	66.7%	39.3%	35.7%	32.1%	30.4%
Fail 2SD	0	0	3	2	37	23	18	26
Fail 2SD %	0.0%	0.0%	100.0%	66.7%	66.1%	41.1%	32.1%	46.4%

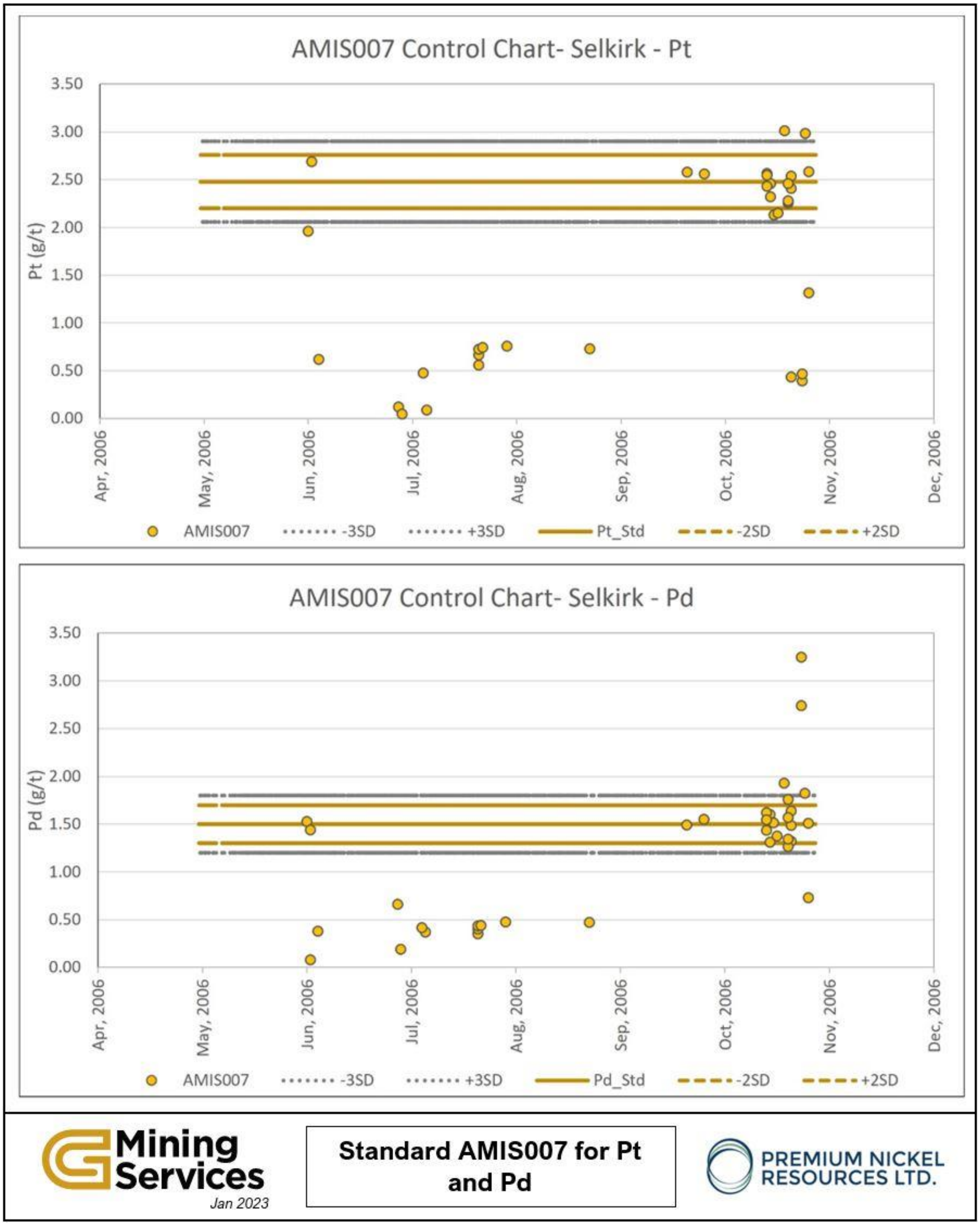
	AMIS007				AMIS0061			
	Ni %	Cu %	Pt g/t	Pd g/t	Ni %	Cu %	Pt g/t	Pd g/t
Std Value	0.207	0.131	2.48	1.50	3.585	1.330	0.46	3.53
Mean	0.206	0.125	1.64	1.21	2.918	0.953	0.36	2.71
SD	0.015	0.012	0.99	0.70	0.475	0.170	0.18	1.41
Median	0.207	0.124	2.15	1.41	2.875	0.900	0.36	3.11
Count	585	585	35	36	32	32	32	32
Fail Number	8	13	18	17	29	30	21	22
Fail %	1.4%	2.2%	51.4%	47.2%	90.6%	93.8%	65.6%	68.8%
Fail 2SD	14	29	20	19	29	32	24	25
Fail 2SD %	2.4%	5.0%	57.1%	52.8%	90.6%	100.0%	75.0%	78.1%

Figure 11-5: Standard AMIS007 for Ni and Cu



Source: GMS, 2022

Figure 11-6: Standard AMIS007 for Pt and Pd



Source: GMS, 2022

11.2.3 Pulp Duplicates

Original samples were double checked at every tenth sample. The same pulp (duplicate) for the original sample was used and these samples were analyzed as check samples. The results were then plotted against original samples to check for precision in sample repeatability. General industry practice is for 90% of pulped duplicates to be within ± 10% precision if sampling theory shows these precisions are acceptable.

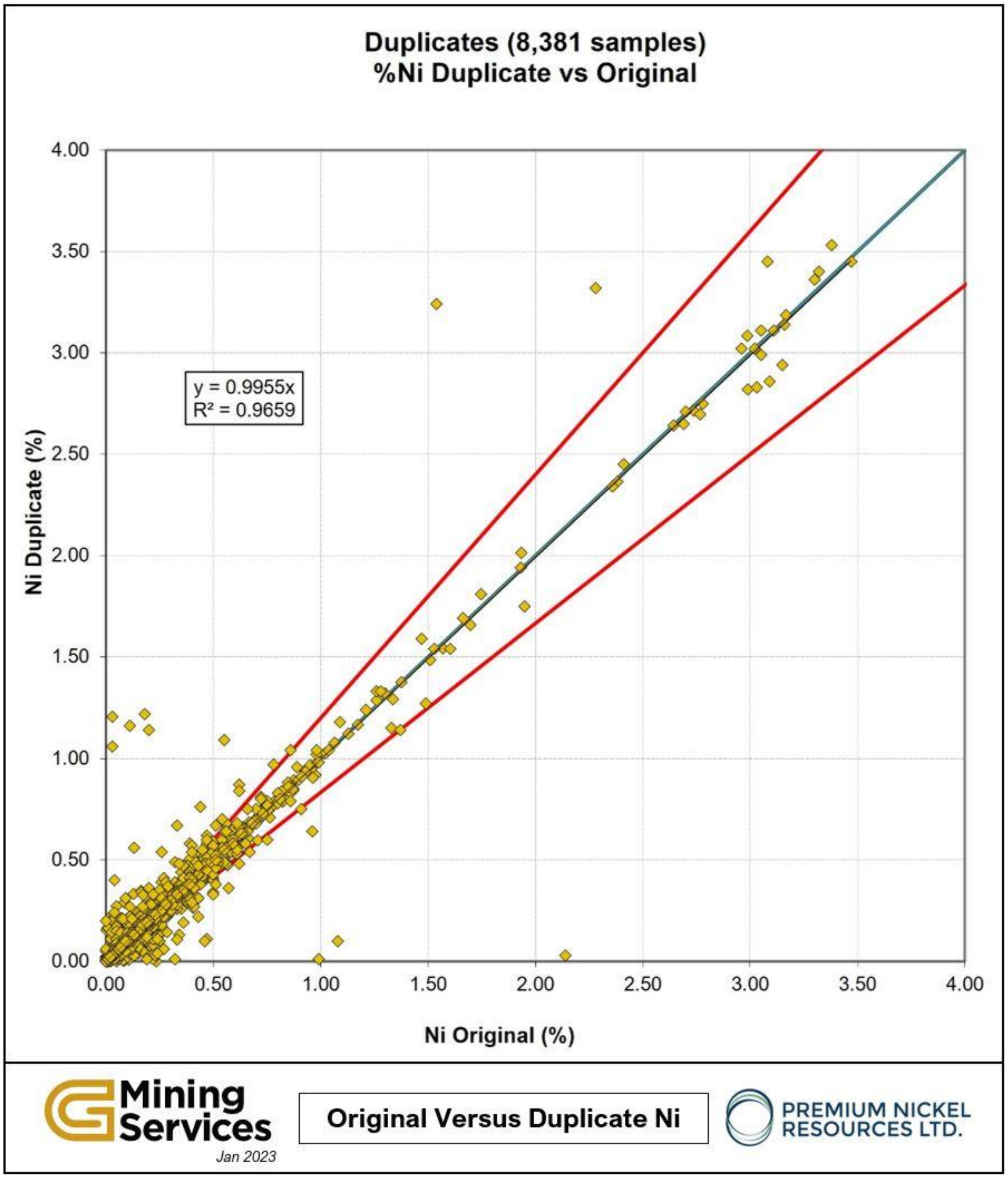
The plot of duplicate versus original for Ni analysis (Figure 11-7) shows a good correlation between original core sample results and the duplicate results. Approximately 91% of the analyses have a relative difference under 10% (Table 11-4) and a correlation coefficient of 0.97 that suggests a good repeatability of the duplicates and original samples.

The Cu analysis of duplicate versus original (Figure 11-8) also presents a good correlation between original core sample results and the duplicate results. Approximately 83% of the analyses have a relative difference under 10% (Table 11-4) and a correlation coefficient of 0.98, which suggests a good repeatability of the duplicates and original samples. For the PGE elements (Pt, Pd, Au; Figure 11-9, Figure 11-10 and Figure 11-11), the analysis of duplicate versus original presents a low correlation coefficient. The proportion of samples that have a relative difference of greater than 10% are as follows; Pt 42%, Pd 52% and Au 33%. This demonstrates a poor repeatability of the duplicates and original samples. For this report, the analysis has been completed on the provided database, and no corrections have been made to account for mislabelled samples or database errors.

Table 11-4: Duplicate vs. Original Statistics for all Elements

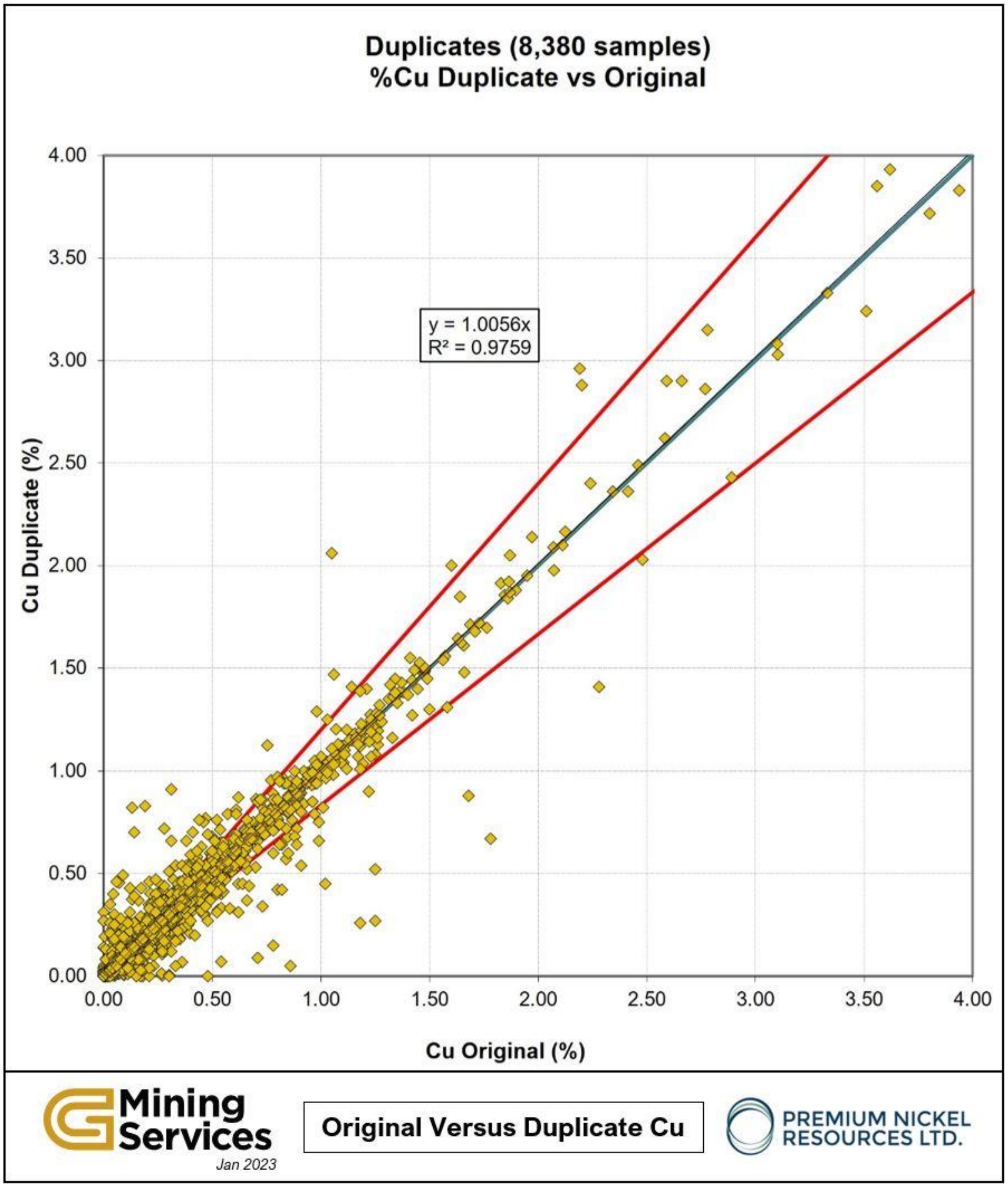
		Ni %	Cu %	Pt g/t	Pd g/t	Au g/t
	Total	8,381	8,380	3,486	3,498	3,497
	% Below 10%	91%	83%	42%	52%	33%
	R squared	0.97	0.98	0.09	0.32	0.13
Original	Min	0.00	0.00	0.00	0.00	0.00
Dup	Min	0.00	0.00	0.00	0.00	0.00
Original	Max	3.47	30.30	1.75	12.00	3.93
Dup	Max	3.53	30.80	19.00	13.90	2.36
Original	Average	0.16	0.20	0.08	0.35	0.05
Dup	Average	0.16	0.20	0.09	0.37	0.05

Figure 11-7: Original Versus Duplicate Ni Concentration Plot. Red Lines Show +-10% Difference.



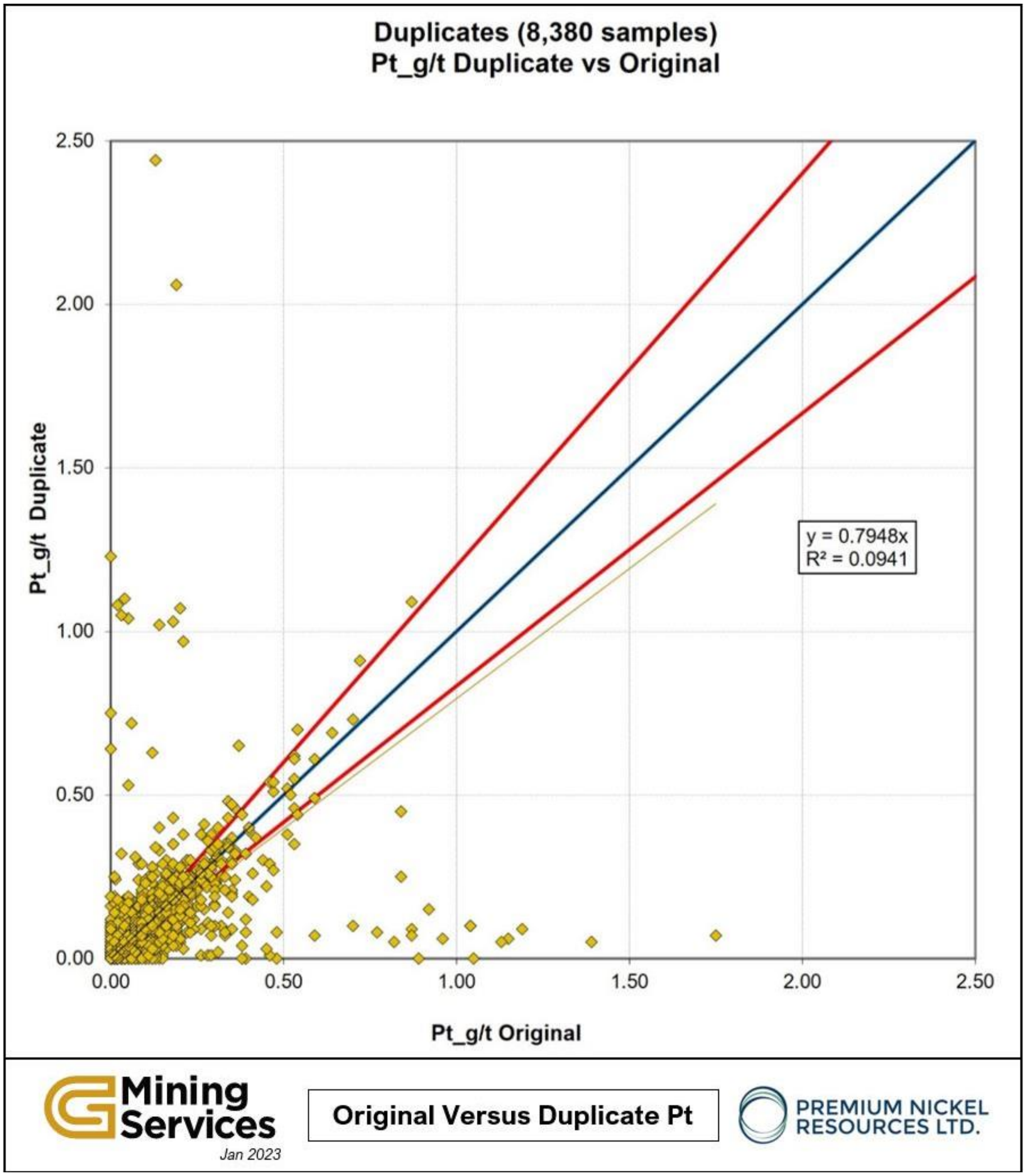
Source: GMS, 2022

Figure 11-8: Original Versus Duplicate Cu Concentration Plot. Red Lines Show +-10% Difference.



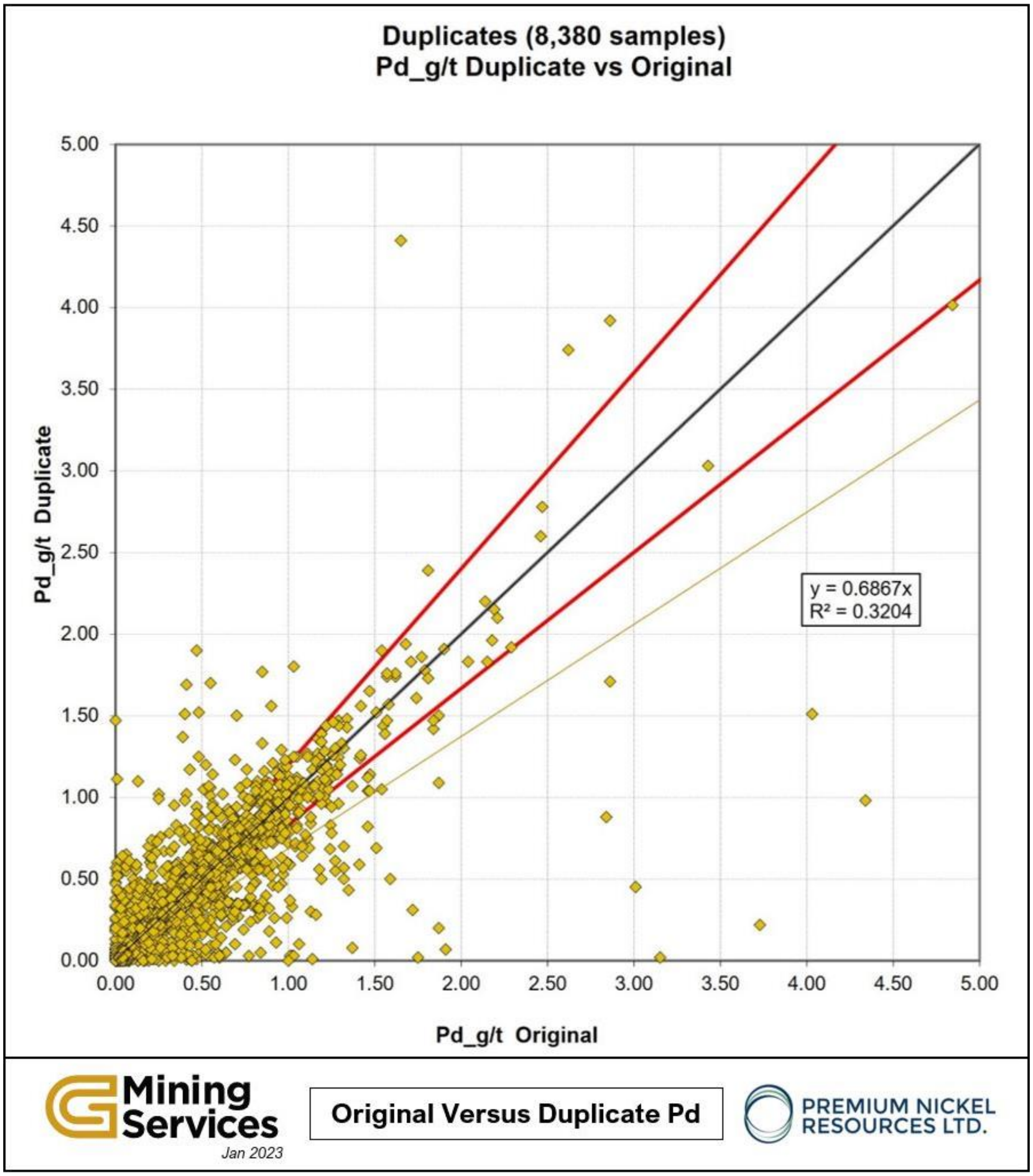
Source: GMS, 2022

Figure 11-9: Original Versus Duplicate Pt Concentration Plot. Red Lines Show +-10% Difference.



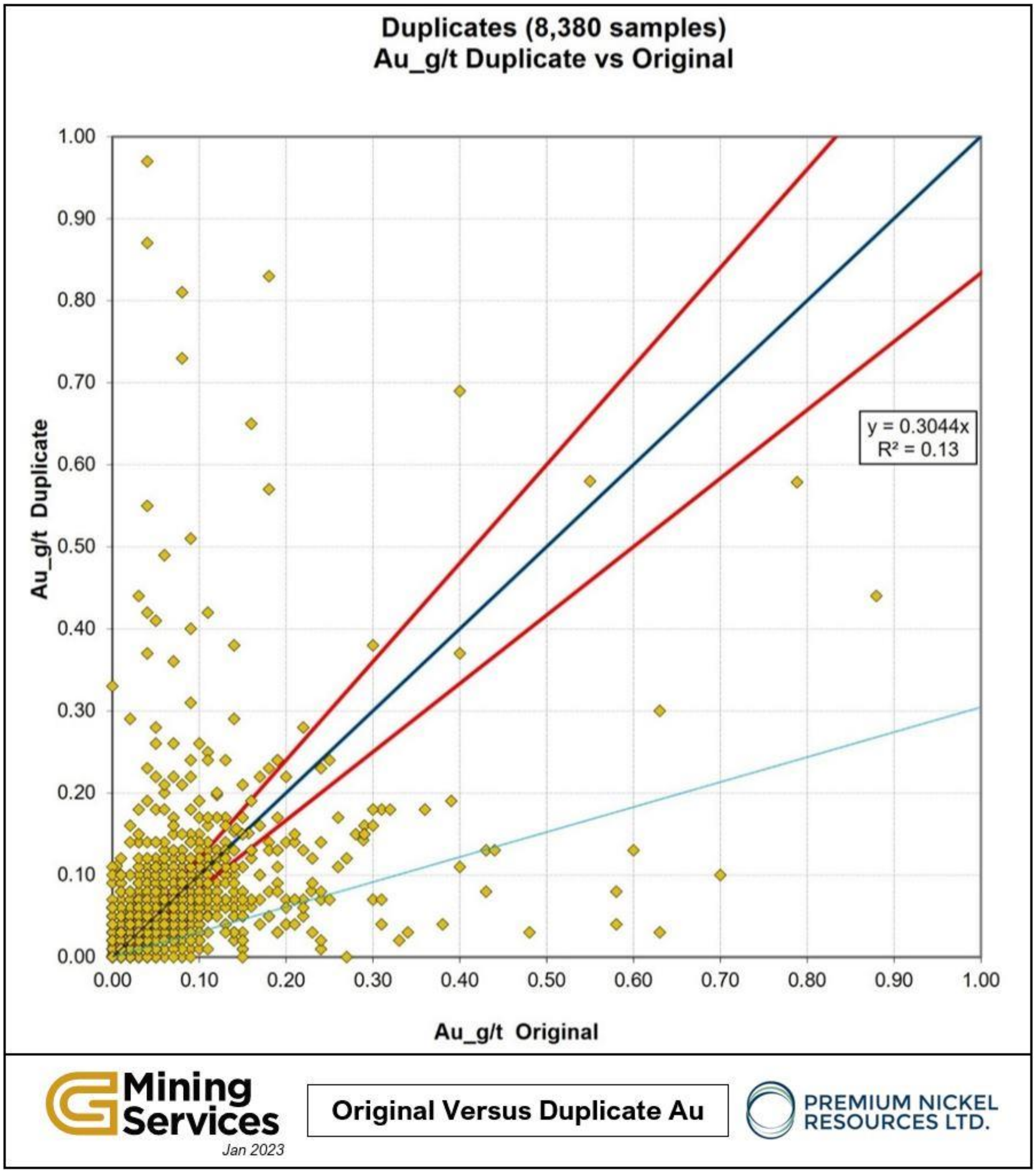
Source: GMS, 2022

Figure 11-10:Original Versus Duplicate Pd Concentration Plot. Red Lines Show +-10% Difference.



Source: GMS, 2022

Figure 11-11: Original Versus Duplicate Au Concentration Plot. Red Lines Show +-10% Difference.



Source: GMS, 2022

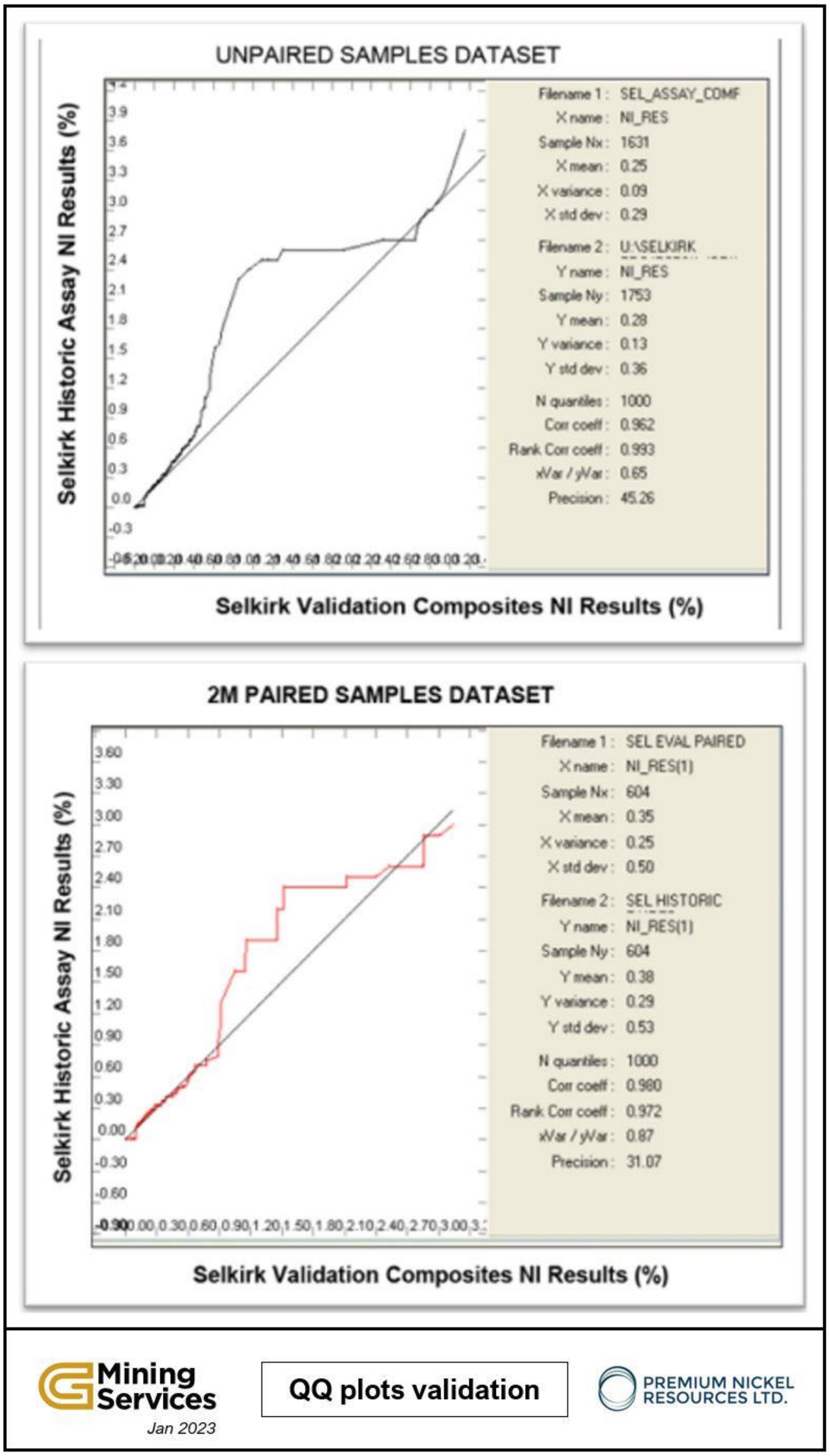
11.2.4 Historical Drillhole Database

A statistical comparison of the more recent drilling results and historical drilling results was undertaken by TNMC (Botepe, 2013) in order to confirm whether the historic assays (S- prefixed holes from 1969) could be used in the resource evaluation. The other objective was to determine if there was any bias in the historical assays and the more recent assays. This was achieved by comparing composited results of the validation holes with their twin historic counterparts using Quantile-Quantile ("QQ") plots, histograms and normal statistical means, e.g., mean, standard deviations, and coefficient of variance. Two sets of data were used for comparison, all the composited results and results of paired samples at 2 m.

In QQ plots where individual twin holes were plotted, the correlation coefficients between the historical holes and the validation holes ranged from 0.66 to 0.99 with the majority of the ranges greater than 0.88, indicating a relatively high rate of reproducibility between the old / historic holes and validation holes. In holes where the correlation coefficients were low, there were intersections of high-grade to massive mineralization in one hole which were not intersected in the adjacent twin hole. This is the case on twinned holes DSLK212 vs S069059, DSLK220 vs. S078068, DSLK231 vs. S075050 and DSLK234 vs. S084023 where the correlation coefficients are low. The holes indicated a high variability in grades over short distances. The general trend for the individual holes showed that 66% were biased towards the historic holes.

The QQ plots for the whole dataset for unpaired data showed a bias towards historic holes at a cut-off grade of 0.30% Ni (Figure 11-12). The historic data had a mean of 0.28% Ni compared to 0.25% Ni for the validation holes. The paired data showed good correlation at lower grades; however, it became biased towards historic holes at higher grades (Figure 11-12). The historic data had a mean of 0.38% Ni compared to 0.35% Ni for validation holes with a measured variability of 0.03%.

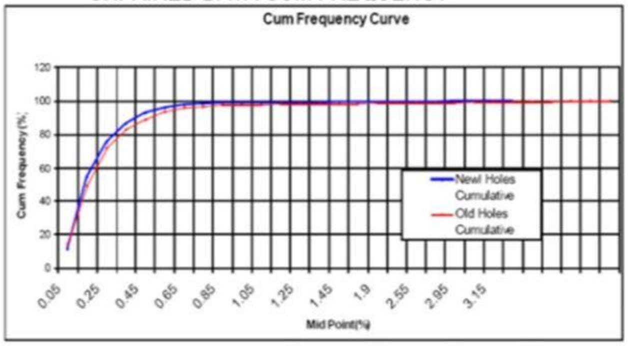
Figure 11-12: QQ Plots for Unpaired and Paired Samples Dataset



Source: Botepe, 2013

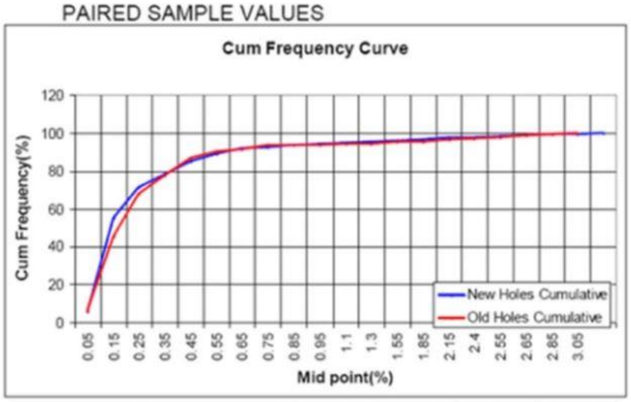
Figure 11-13: Cumulative Frequency Graph for Unpaired and Paired Samples Dataset

UNPAIRED DATA CUM FREQUENCY



NORMAL STATISTICS	NI_Old	NI_New	CU_Old	CU_New
Minimum	0.005	0	0.005	0
Maximum	3.8	3.35	21	5.58
No of points	1753	1631	1753	1631
Sum	486.95	412.30	585.67	522.58
Mean	0.28	0.25	0.33	0.32
Variance	0.13	0.09	0.64	0.13
Std dev	0.36	0.29	0.80	0.35
Rel std dev/Coefficient of Varience	1.31	1.16	2.40	1.11

PAIRED SAMPLE VALUES



NORMAL STATISTICS	NI_Old	NI_New	CU_Old	CU_New
Minimum	0.005	0.05	0.005	0.03
Maximum	3	3.14	10.7	5.58
No of points	603	603	603	603
Sum	226.54	212.14	279.74	253.43
Mean	0.38	0.35	0.46	0.42
Variance	0.29	0.25	0.67	0.31
Std dev	0.53	0.50	0.82	0.56
Rel std dev/Coefficient of Variance	1.42	1.42	1.76	1.33

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Jan 2023

Cumulative frequency graph validation

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Source: Botepe, 2013

The cumulative frequency graphs for unpaired data show small variability between the two (2) datasets up to grades of 0.85% Ni, which accounts for over 90% of the data (Figure 11-13). However, the cumulative frequency curve for paired data also shows small variability of up to grades of 0.5% accounting for approximately 85% of the data.

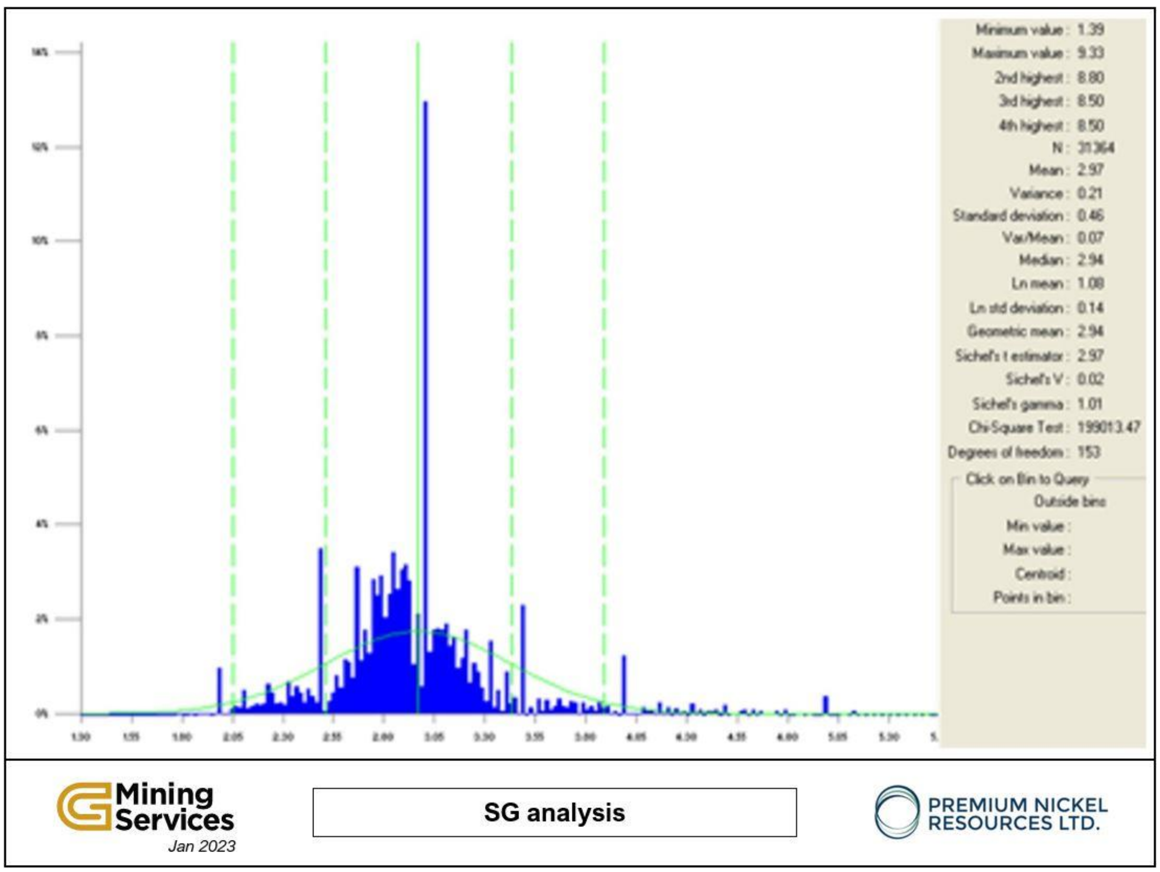
The high correlation coefficient indicates relatively good precision between historic and validation holes even though there is a bias towards historic data as shown by both methods used. The difference in mean is 0.03% for Ni and roughly 0.04% for Cu. However, when the difference is converted to tonnage, it could lead to an over-estimation of the resource.

11.3 Bulk Density Determinations

All diamond drillhole half core samples are analysed for bulk density using a spring balance on site at Selkirk. The bulk density data is initially captured on paper hard copy, following which it is input into an MS Excel spreadsheet.

The calibration of the spring balance was checked on a daily basis prior to any sample analyses. Bulk density data that is returned outside of a specific range (2.00 g/cc to 5.00 g/cc) are subsequently investigated and either corrected or discarded from the final dataset. A total of 31,364 bulk density analyses have been collected, with a mean bulk density of 2.97 g/cc and a standard deviation of 0.46. The distribution of the specific gravity ("SG") analyses is presented in Figure 11-14 below.

Figure 11-14: Distribution of SG Analyses. N = 31,364



Source: GMS, 2022

Some conclusions from Botepe, 2013 on bulk density measurements are as follows.

"Errors with regard to SG analyses are often the result of wrongly entered or captured data, the variation of elasticity of the spring balance with age, and wrongly marked samples. As part of daily QA/QC all SG measurements lower than 2.0 and greater than 5 are reviewed to ascertain the values. The inaccuracy of spring balances is managed by constant calibration. Whenever there is a very low or large SG value the spring balance is checked. In addition, in measurements of every batch of 50 samples, there is a 10% check. After receiving the assay results, all high SGs are further checked against grade to determine any anomalies. Furthermore, during the estimation process, a regression of SG vs Ni is developed to correct all outlier SGs. All these are routine QA/QC procedures on SG measurements. Anomalous SGs would invariably be excluded from the estimation database."

11.4 Sampling by PNRL in 2021

PNRL geologists examined underground workings and confirmed continuous visible sulphides along an exploration drift extending 144 m across the interpreted primary sulphide horizon, in a southwestern direction from the previous mining operations. PNRL collected and submitted twenty 10 kg grab samples from this exploration drift for assay to determine the variability in the grade of the mineralization. Results are presented in Table 11-5.

Table 11-5: Grab Sample Assay Results from Underground Drift at Selkirk

SAMPLE ID	Ni %	Cu %	Co %	Pt g/t	Pd g/t	Au g/t	NiEq(1) %	EASTING	NORTHING	ELEVATION
TD00826	0.323	0.411	0.004	0.124	0.494	0.035	0.664	575413.3	7642664.3	897.4
TD00827	0.177	0.307	0.001	0.071	0.348	0.03	0.418	575418.0	7642666.0	897.4
TD00828	0.608	0.536	0.036	0.219	1.045	0.107	1.272	575422.7	7642667.7	897.3
TD00829	2.34	0.201	0.132	0.568	2.44	0.011	3.554	575427.4	7642669.5	897.2
TD00831	0.379	0.255	0.02	0.169	0.631	0.031	0.746	575432.1	7642671.2	897.2
TD00832	0.578	1.55	0.03	0.186	0.888	0.052	1.543	575436.8	7642672.9	897.1
TD00833	0.564	0.675	0.03	0.131	0.874	0.067	1.192	575441.5	7642674.6	897.0
TD00834	0.485	0.35	0.024	0.127	0.658	0.045	0.904	575446.2	7642676.3	897.0
TD00835	0.354	0.547	0.018	0.138	0.57	0.03	0.803	575450.9	7642678.1	896.9
TD00836	0.638	0.306	0.032	0.213	0.857	0.03	1.127	575455.6	7642679.8	896.9
TD00838	0.341	0.557	0.017	0.131	0.626	0.085	0.822	575460.3	7642681.5	896.8
TD00839	0.393	0.349	0.022	0.108	0.559	0.022	0.768	575465.0	7642683.2	896.7
TD00840	0.333	0.292	0.015	0.068	0.503	0.036	0.651	575469.7	7642684.9	896.7
TD00841	0.223	0.295	0.01	0.061	0.381	0.027	0.490	575474.4	7642686.7	896.6
TD00842	0.726	1.435	0.034	0.241	0.92	0.029	1.669	575479.0	7642688.4	896.5
TD00844	0.369	0.273	0.015	0.278	0.961	0.06	0.853	575483.7	7642690.1	896.5
TD00845	0.377	0.476	0.016	0.17	0.684	0.066	0.843	575488.4	7642691.8	896.4
TD00846	0.295	0.857	0.011	0.131	0.611	0.099	0.874	575493.1	7642693.6	896.4
TD00847	0.071	0.099	0.001	0.028	0.205	0.023	0.183	575497.8	7642695.3	896.3
TD00848	0.274	0.193	0.014	0.126	0.542	0.025	0.569	575502.5	7642697.0	896.2
AVERAGE	0.492	0.498	0.024	0.164	0.740	0.046	0.997			

**Note: 1) Nickel equivalent (NiEq) calculation based on London Metal Exchange prices as of August 29, 2022: nickel: $21,633.00 per metric ton, copper: $8,160.50 per metric ton, cobalt: $51,955.00 per metric ton, platinum: $865.00 per ounce, palladium: $2,056.00 per ounce, gold: $1,736.60 per ounce. Length refers to drillhole length and not true width. True width is interpreted to be approximately 85% of drillhole length. No adjustments were made for recovery or payability.*

As part of the due diligence core review, five (5), unsampled HQ sized core (63.5 millimeters) holes drilled immediately prior to the closure of TNMC Operations, were identified. These five (5) holes, DSLK277, DSLK278, DSLK281, DSLK282 and DSLK283, were taken to the core processing facility at Phikwe, where they were sampled at approximately 1 metre intervals, bagged and sent for assays. A total of 56 half core samples from drill hole DSLK278 were sent to SGS Canada in Lakefield, Ontario for metallurgical studies, with the pulps sent to ALS Global in Vancouver Canada for a wider analysis.

For the metallurgical study, samples sent to Canada to both of ALS Global in Canada and SGS Canada reported on select intervals between 63 and 177 m. While the reliability of such assays cannot be confirmed as no QA/QC protocols were adopted, the results of two (2) independent labs (both testing for copper and nickel) have subsequently been confirmed to be consistent. In addition, 210 quarter core samples from DSLK278 were sent to ALS Global in Johannesburg, as well as samples from the remaining four (4) holes. Drill core were cut in half and then halved again by a diamond saw at the core processing facility in Phikwe. The remaining three-quarters of the core is retained for reference purposes. Samples are generally 1.0 to 1.5 m intervals or less at the discretion of the site geologists.

Company-inserted QA/QC samples consisting of certified blanks and matrix-matched Ni-Cu standards were inserted into the sample stream at a rate of 1 in every 20 regular samples. Analysis for Ni, Cu and Co were completed using a peroxide fusion preparation and inductive coupled plasma atomic emission spectrometry (“ICP-AES”) finish (ME-ICP81). Analyses for Pt, Pd, and Au were by fire assay (30 grams nominal sample weight) with an ICP-AES finish (PGM-ICP23). Results are presented in Table 11-6 below:

Table 11-6: Assay Results from Unsampled Historic Drill Core at Selkirk

Hole ID	FROM m	TO m	LENGTH m	Ni %	Cu %	Co %	Pt g/t	Pd g/t	Au g/t	NiEq(1) %
DSLK277	13.5	93.7	80.12	0.20	0.17	0.01	0.117	0.512	0.037	0.469
Incl.	164.7	207.7	43.0	0.29	0.28	0.01	0.144	0.673	0.065	0.661
Incl.	164.7	187.7	25.0	0.32	0.32	0.01	0.172	0.764	0.068	0.738
and	198.7	207.3	8.6	0.37	0.35	0.02	0.151	0.791	0.089	0.834
DSLK278	74.2	213.7	139.5	0.46	0.54	0.03	0.210	0.888	0.093	1.058
Incl.	126.7	150.7	24.0	0.64	0.64	0.03	0.289	1.139	0.116	1.369
and	171.7	175.7	4.0	0.90	0.58	0.05	0.373	1.664	0.096	1.820
and	193.7	201.7	8.0	0.62	1.00	0.03	0.318	1.183	0.193	1.522
DSLK281	115.0	229.2	114.2	0.38	0.40	<0.01	0.141	0.612	0.056	0.751
Incl.	120.0	160.2	40.2	0.40	0.36	<0.01	0.134	0.595	0.067	0.752
and	172.4	191.7	19.3	0.54	0.61	<0.01	0.197	0.862	0.060	1.074
and	193.7	201.7	8.0	0.62	1.00	0.03	0.318	1.183	0.193	1.522
DSLK282	56.9	63.9	7.0	0.21	0.26	<0.01	0.080	0.376	0.041	0.444
DSLK283	85.2	110.8	25.6	0.25	0.28	0.01	0.125	0.594	0.046	0.589
	94.6	110.8	16.2	0.27	0.31	0.01	0.142	0.665	0.051	0.646

**Note: 1) Nickel equivalent (NiEq) calculation based on London Metal Exchange prices as of August 29, 2022: nickel: $21,633.00 per metric ton, copper: $8,160.50 per metric ton, cobalt: $51,955.00 per metric ton, platinum: $865.00 per ounce, palladium: $2,056.00 per ounce, gold: $1,736.60 per ounce.*

11.5 Sample Storage and Security

Sample storage facilities were inspected at the Phoenix Mine during the site visit, and we found to be secure and fit-for-purpose. More details are presented in Section 12.

11.6 QP Opinion

Based on the review of blanks and standards, the QP suggests investigating and potentially reanalyzing drillholes or pulps that were assayed during the period between the end of 2007 to mid-2008. The QP is of the opinion that the QA/QC data for all elements during this period is highly irregular and should not be included in a mineral resource estimate without further verification.

For the PGEs, the QA/QC review completed suggests that there are significant precision issues at the Phoenix Mine Laboratory, and most standards returned significantly lower values during analysis than their certified values. In addition, resampling of drill core described in Section 12 suggests that Pd values in the database are slightly underestimated. The PGE assays in the database should only be used as an indicator at this point in time, until further verification is undertaken. Some suggestions of work that could be completed to increase the degree of confidence in the analysis include twinning existing drillholes to verify the original drill logs and assays, re-analyses in an external laboratory of the pulp if the storage condition allows it, and if the core is still in good condition, quarter splitting the core to send to a laboratory for re-analysis.

Regarding Au analysis, all the standards provided in the database are not certified for gold, therefore no conclusions on the quality of the analysis can be drawn.

Overall, the analysis of Ni and Cu appear reliable, and only drillholes from end of 2007 to 2008 should be further investigated. For PGE analysis, it is highly recommended to complete a deeper investigation and to try to reproduce the results obtained in the past, as the QA/QC results are inconclusive.

The current database is fully assayed for Ni and Cu, and only partially assayed for Pt, Pd and Au. There are no cobalt assays available (although cobalt was a known by-product in the concentrate during production). The QP recommends assaying for a complete suite of base and precious metals for all future drilling (using an appropriate digestion and ICP analysis) and taking regular SG measurements down hole. Also, an industry best-practice QA/QC protocol should be written, with appropriately matrix-matched, certified standards included in the sample stream. Both quarter core and coarse-reject duplicates should be taken also as part of the QA/QC protocol, as well as the selection of an ISO-certified independent commercial laboratory.

12 DATA VERIFICATION

This section outlines field verification undertaken by MSA for the Selkirk deposit, and the inspection of drill core and sample storage and security. The Selkirk deposit is not considered an “advanced property” under NI 43-101 at this stage; therefore, no significant verification of the current drilling database was undertaken as it is not currently being used to support a Mineral Resource Estimate.

12.1 Site Visit

In accordance with NI 43-101 guidelines, David Dodd, MSc, *Pr.Sci.Nat.*, MSA principal consultant and QP for Section 12 conducted a site visit with Gerry Katchen (PNRL Exploration Manager) from August 30 to September 3, 2022, in order to validate historic exploration activities which included the review of historic core to assess the following:

- Physical evidence for drillholes included in the database
- Validation that logged lithologies correspond to intercepted lithologies in the core
- Validation of sampling protocol
- Validation of assay values
- Validation of drillhole collar positions

The site visit did not take place during active drilling activities. Drillholes DSLK011; 012; 014; 025; 065; 083; 099; 135; 147; 207; 224; 213 and 278 were selected for viewing on the basis of their spatial distribution across the resource in addition to them containing significantly mineralized intercepts.

12.1.1 Physical Evidence of Drillholes

A large area of stacked core (Figure 12-1) containing many of the drillholes in the drillhole database was viewed at a core storage facility located at the Phoenix Mine, validating that the drillholes exist. Drillhole collars were visited (Figure 12-2) to validate the distribution of holes across the resource and to provide further evidence that drilling at Selkirk took place.

Figure 12-1: Core Storage for Selkirk and Phoenix Deposits at Phoenix Mine

Source: MSA, 2022

Figure 12-2: Selkirk Drillhole Collar - DSLK203

Source: MSA, 2022

12.1.2 Validation of Logging / Intercepted Lithologies

Lithologies logged in the database correlated well with the lithologies viewed in the core. The lithologies reviewed are as follows:

- Dikgaka Gabbro (unmineralized – Figure 12-3)
- Selkirk Gabbro (mineralized, taxitic texture – Figure 12-4 and Figure 12-5)
- Quartz Diorite (footwall)

These lithologies are cut by Karoo dolerite dykes which have an E-W orientation as well as porphyry dykes which have a NE-SW orientation parallel or slightly oblique to the mineralization. These dykes are unmineralized and dilute the mineralization.

The lithologies mentioned above were all viewed in the core to verify the same sequence, texture and mineralization as the drillhole logs reflect.

Figure 12-3: DSLK278 – Dikgaka Gabbro

Source: MSA, 2022

Figure 12-4: Mineralized Taxitic Gabbro with Massive Sulphides (BH083: 192 – 197 m)

Source: MSA, 2022

Figure 12-5: Typical Taxitic Gabbro (Drillhole DSLK147)

Source: MSA, 2022

12.1.3 Validation of Sampling Protocol

Sampling protocols were reviewed by the QP, and the following observations were noted:

- Some drillholes were terminated in mineralization.
- Sampling was conducted over very short intervals, often in the order of 30 cm to 50 cm and quite frequently cuts across geological / mineralized intervals. For example, an individual sample may end mid-way within a massive sulphide intercept. Nonetheless, all drilled mineralization is sampled.
- Most mineralization has been analyzed for Ni and Cu but frequently not for Pt, Pd and Au.
- It is evident that the Ni assays correlate visually with the percentage of sulphide observed within a drillhole, but this is not always the case when comparing samples between drillholes. This could be due to differing nickel tenors (amount of nickel calculated for 100% sulphide).
- The amount of sulphur reporting in assays does not always correlate with the amount of visible sulphides.
- The Pd values do not always correlate with the amount of visible sulphides or the Ni values, implying that Pd may not always be hosted within sulphides.

The deposit is asymmetric with a higher percentage of sulphides having accumulated on the south-eastern deeper portion of the mineralized zone. The sulphides are predominantly hosted within the taxitic gabbro, and the upper and lower portions of this taxitic gabbro (wrapping around the mineralized zone) are poorly mineralized. The sulphide distribution within the zone of mineralization could be attributed to gravity settling with sulphides having a relatively high specific gravity. There are no obvious hard contacts between the mineralized taxitic gabbro and the unmineralized / poorly mineralized gabbro surrounding it, but it is possible that these represent different magma flows, resulting in a central sulphide bearing taxitic gabbro surrounded by poorly mineralized taxitic gabbro. It should be noted that there are occasional massive sulphide veins hosted within the otherwise largely unmineralized taxitic gabbro at its base close to the quartz diorite footwall.

12.1.4 Validation of Collar Coordinates

Drillhole co-ordinates are tabulated below (Table 12-1) and show the historic coordinates from a differential GPS survey carried out by Drysdale and Associates (Drysdale DGPS Survey) compared to the GPS coordinates from the site visit using a handheld GPS.

Table 12-1: Verification of Drill Collar Coordinates

Drysdale DGPS Survey				Site Visit GPS Readings			Difference Between Historical Data and Site Visit		
ID	E	N	ELEV.	E	N	ELEV.	Diff E	Diff N	Diff Elev.
DSLK014	575374.73	7642623.32	994.31	575377	7642622	998	-2.27	1.32	-3.69
DSLK123	575302.33	7642400.78	983.23	575302	7642398	986	0.33	2.78	-2.77
DSLK197	575556.91	7642970.35	1001.03	575559	7642970	1006	-2.09	0.35	-4.97
DSLK203	575592.65	7642947.40	1004.32	575593	7642948	1012	-0.35	-0.60	-7.68
DSLK236	575580.20	7642917.51	1005.36	575580	7642914	1015	0.20	3.51	-9.64
DSLK251	575400.92	7642677.31	999.83	575404	7642675	1004	-3.08	2.31	-4.17
DSLK261	575451.36	7642704.37	999.18	575453	7642703	1001	-1.64	1.37	-1.82
DSLK265	575328.07	7642544.89	989.09	575330	7642546	990	-1.94	-1.11	-0.91
DSLK275	575312.45	7642476.26	985.36	575314	7642474	989	-1.55	2.26	-3.64

Bearing in mind the limited precision of a handheld GPS, the check GPS positions are consistent with the Drysdale DGPS Survey values. Compared to the Drysdale Survey readings, the easting shows an average variation of 1.49 m, the northing an average difference of 1.73 m, and for elevation the average difference is 4.37 m.

12.2 QP Check Samples

A total of 116 samples (excluding QA/QC samples) were submitted by the QP to ALS South Africa in order to verify historical assay values in the drilling database. Of the 116 samples, 27 were taken from drillhole DSLK014; 20 from DSLK083; 26 from DSLK207; 23 from DSLK 213 and 20 from DSLK 224. Certified reference materials were inserted using CRFM-100; 101 and 102 which give an appropriate spread of Ni, Cu, Pt and Pd values to cover typical metal values encountered at Selkirk. The reference materials returned values that were mostly within two standard deviations from the accepted mean for Ni, Cu, Pt, Pd and Au showing the accuracy of the laboratory is acceptable. Most blanks showed little to no metal values, confirming that sample contamination has not been incurred during sample preparation. Assessing assay precision with an external umpire laboratory using duplicates was not undertaken. However, coarse reject duplicates were obtained and assayed using the same procedure, exhibiting strong correlation between Ni, Cu, Co, Pt and Pd.

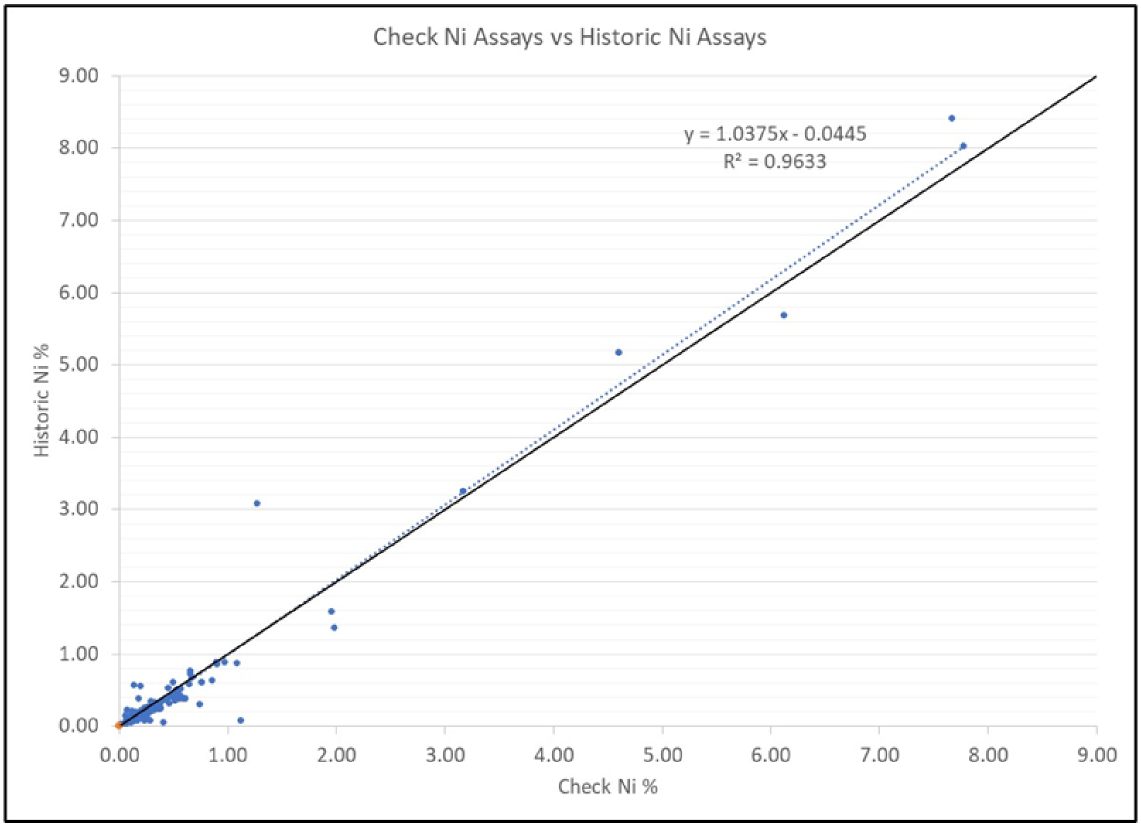
A comparison of the historic assays with the check samples is presented in Table 12-2.

Table 12-2: Comparison of Mean Grades Between Historical Assays and Check Assays

Element	Correlation Coefficient	Historical Average Grade	ALS (PNRL) Average Grade
Ni (%)	0.96	0.61	0.59
Cu (%)	0.84	0.52	0.52
Pt (ppm)	0.33	0.15	0.15
Pd (ppm)	0.53	0.65	0.73
Au (ppm)	0.09	0.07	0.06
S (%)	0.96	4.75	6.46

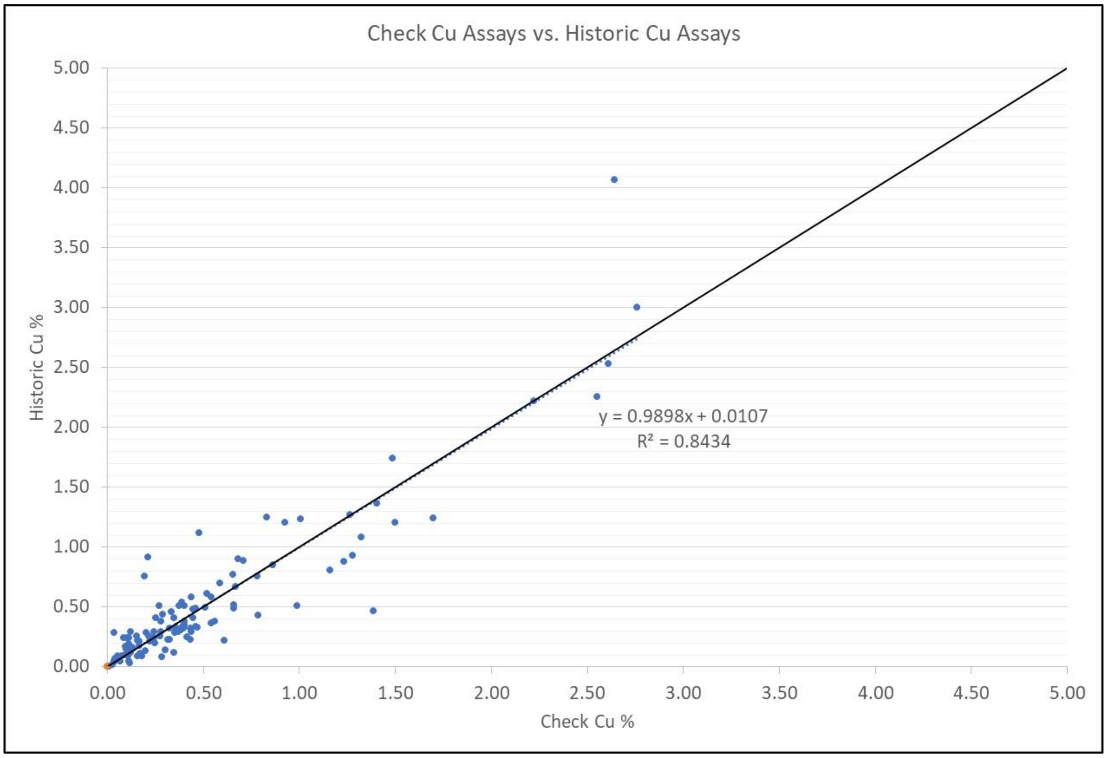
With a few select outliers removed, results show a strong correlation between the historical and the check assays for Ni and Cu values (Figure 12-6 and Figure 12-7), but a poor correlation between the laboratories for Pd (Figure 12-8), Au and Pt. As seen in the correlation coefficient, Ni shows a stronger correlation between the datasets than Cu does. Sulphur also shows a strong correlation between the datasets although the check assay results for Pd and S are generally higher than the historical results, which is also reflected in their respective average values as shown in Table 12-2 and shown per sample in Figure 12-9 through to Figure 12-12.

Figure 12-6: Ni Correlation Plot. Black Line = 1 :1, Blue = Trendline



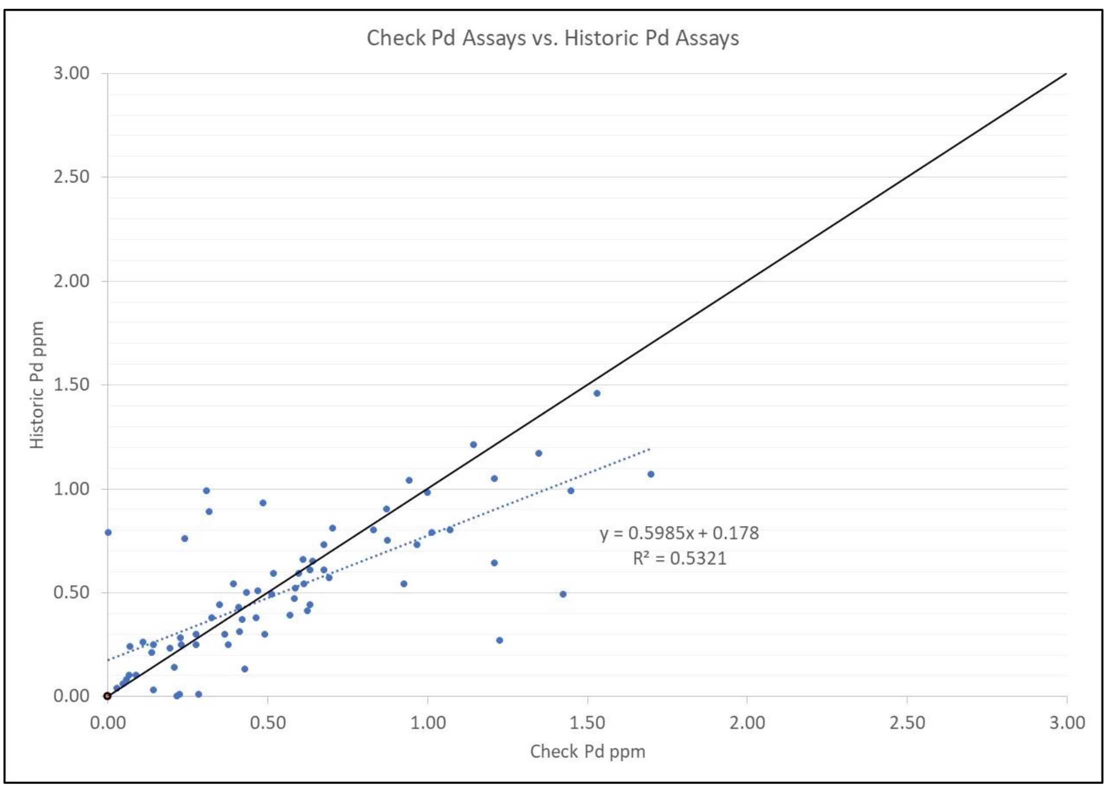
Source: MSA, 2022

Figure 12-7: Cu Correlation Plot. Black Line = 1 :1, Blue = Trendline



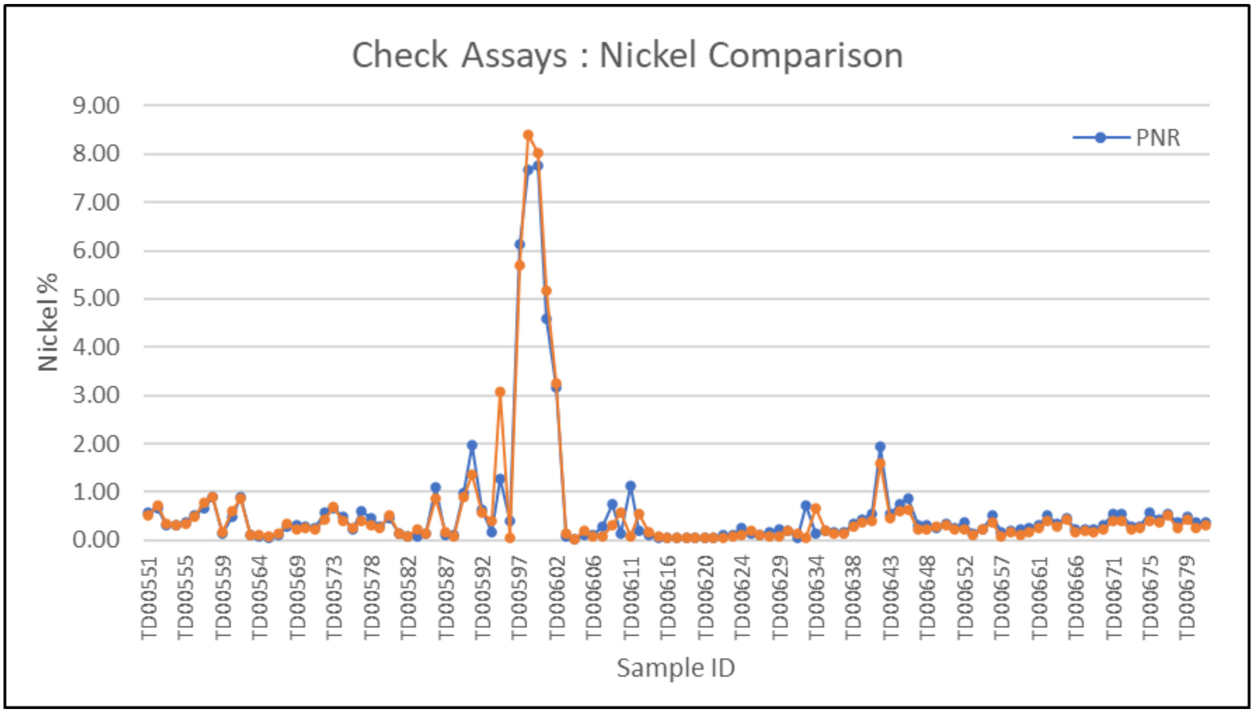
Source: MSA, 2022

Figure 12-8: Pd Correlation Plot. Black Line = 1 :1, Blue = Trendline



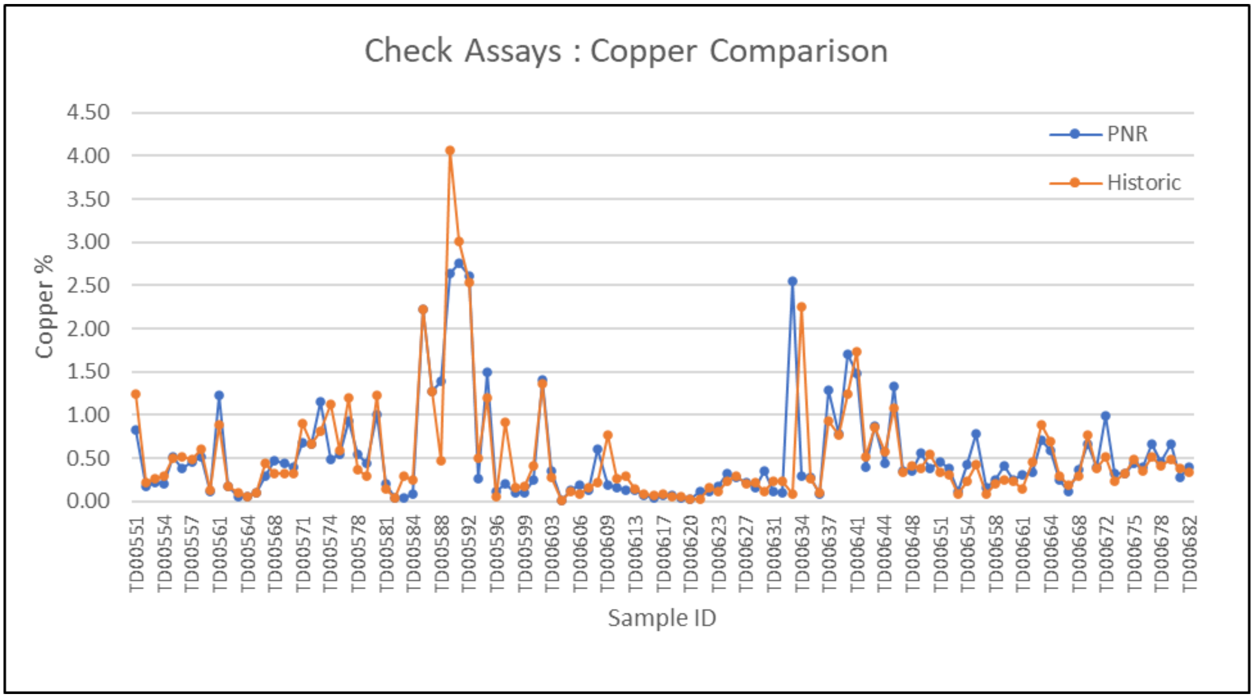
Source: MSA, 2022

Figure 12-9: Sample by Sample Comparison – Ni



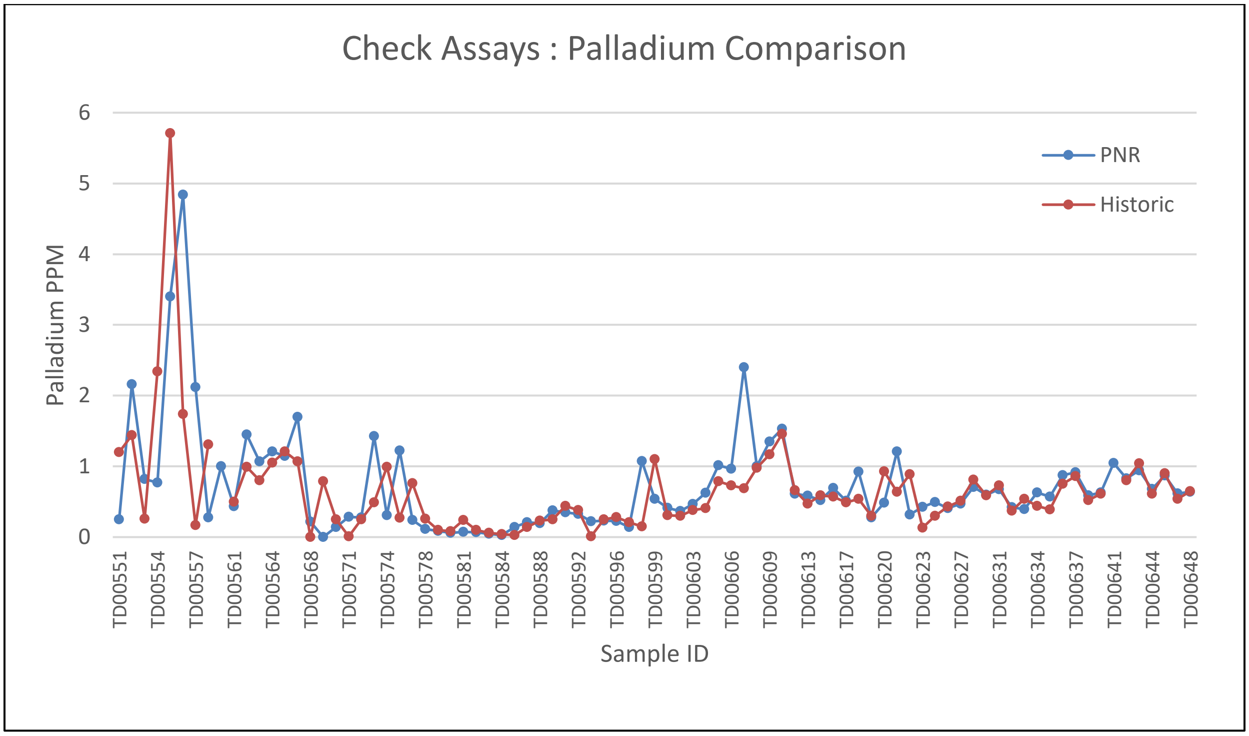
Source: MSA, 2022

Figure 12-10: Sample by Sample Comparison – Cu



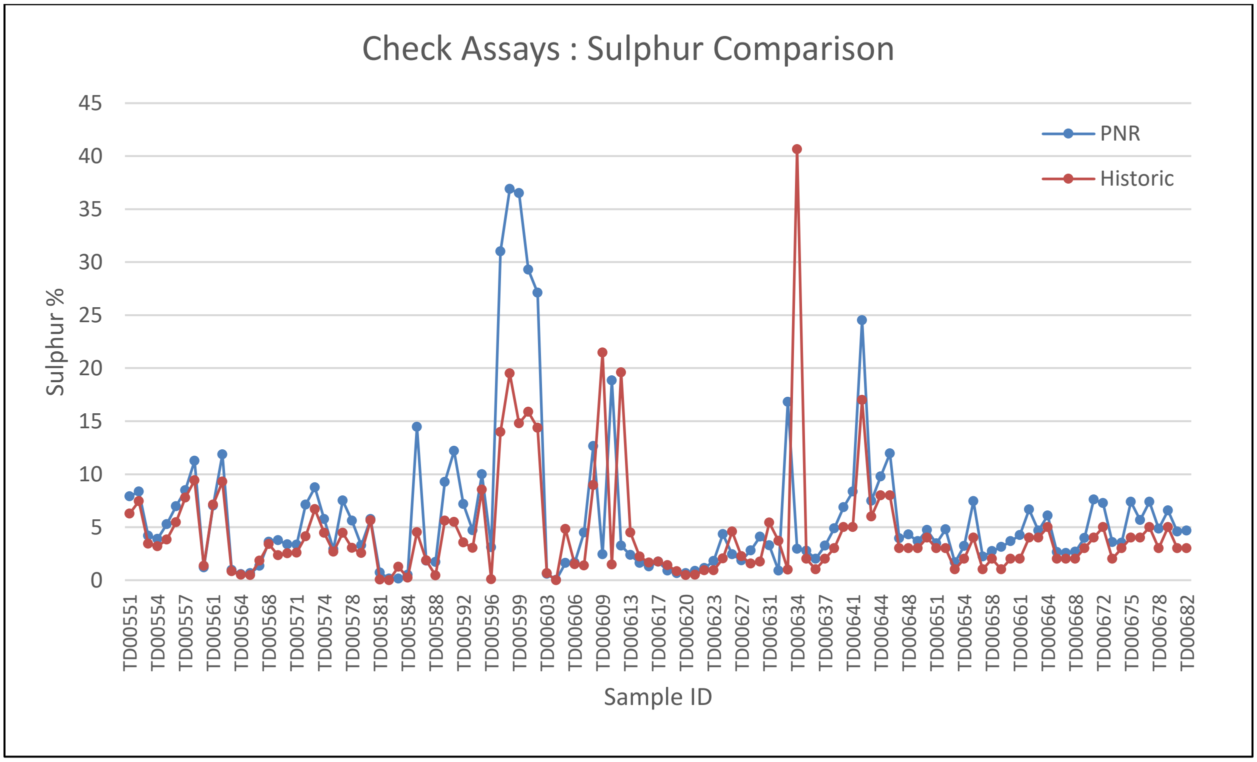
Source: MSA, 2022

Figure 12-11: Sample by Sample Comparison – Pd



Source: MSA, 2022

Figure 12-12: Sample by Sample Comparison – Sulphur



Source: MSA, 2022

The commodities of economic interest at Selkirk are Ni, Cu and Pd, of which the historical Ni and Cu show a reasonable correlation with the ALS results. Historical Pd values appear to have been under-reported and are systematically lower than those returned during the check assay sampling. Many of the historic samples were also not analyzed for Pd. Historical sulphur values appear to also have been under reported.

12.3 QP Opinions

During the site visit, the presence of Ni-Cu mineralization was observed both in outcrop and in selected drill core intercepts in sufficient quantities to validate values present in the assay database. The QP is of the opinion that the concentrations of mineralization observed on site also appears to be sufficient to explain previous mining activities.

The strong correlation in sulphur values between the historic and ALS values shows that calculations of Ni tenor would generally be correct in a relative sense (when comparing drillholes within the resource) although absolute Ni tenor values based on historic data may be elevated as the ALS values show the historic readings under-reported sulphur. The differences in the ALS and historical sulphur values on certain samples validates the field observation that sulphur values do not always correspond with the amount of visible sulphides.

The storage of core appears appropriate, although a comprehensive inventory and classification of available core would be necessary if a comprehensive re-assaying campaign is undertaken.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

The Selkirk Mine was commissioned in 1989 with massive sulphide material being trucked directly to the BCL furnace for smelting with no upgrading at a concentrator. Mining ceased in 2002 when the massive sulphides were exhausted, leaving behind a deposit described as being highly disseminated. Early testwork generally examined the material to produce a low-grade bulk concentrate for the BCL smelter. The main objective of the metallurgical testwork since 2005 has been to optimize the processing of the disseminated mineralization.

Although some investigators considered the possibility to produce separate nickel and copper concentrates, producing a low-grade nickel concentrate was generally accepted and most early studies focused on the production of a bulk, low-grade nickel-copper concentrate that would meet the specifications of the BCL smelter in Phikwe.

Historic testing tracked PGE content but did not focus on the optimization of PGE recoveries. The following sections summarize testwork completed by previous owners between 1970 and 2016.

13.1 Historical Processing and Metallurgical Testing

13.1.1 Anglo American, 1971

Reporting by AAC (Hall, 1971) summarizes mineralogical and beneficiation work carried out at a laboratory scale at the Anglo-American Research Laboratory in 1970 and 1971, where the focus was the assessment of flotation behavior of the nickel and copper minerals with the purpose of maximizing recoveries and concentrate grades. Drill core material was received in February 1970 with work being conducted using small subsamples and drill core. In addition, four bulk weighted samples from the Selkirk deposit were also made available for precious metal determination.

Mineralogical studies using electron microprobe analyses confirmed that nickel has two (2) modes of occurrence:

- In solid solution within pyrrhotite. The levels of concentration are low, likely representing < 1% of the total nickel content in the sample.
- In the mineral pentlandite. As free equi-dimensional grains, mostly less than 20 µm in diameter, occasionally as large as 50 µm in diameter, representing roughly 10% of the total nickel content. In close association with pyrrhotite, the balance of the nickel was either as equidimensional grains

attached to pyrrhotite grains or more commonly as ex-solution lamellas (±0.002 by 0.05 mm in the pyrrhotite).

Copper was present within chalcopyrite, which occurred as coarser grains predominantly as separate bodies in the gangue but was also associated with the pyrrhotite.

Metallurgical testwork results confirmed the mineralogical and electron microprobe examination that showed that the extremely fine nickel disseminations would likely preclude the production of a high-grade bulk concentrate. An acceptable nickel / copper separation could be achieved but only showed a marginal improvement of the grade of the nickel concentrate.

Grinding tests showed that liberation of copper was achieved at particle sizes varying between 35 and 65 mesh (230 – 500 microns), and nickel was liberated at an average of 150 mesh (100 micron). Flotation testwork concluded that although high recoveries of nickel and copper could be achieved, the concentrate Ni grades in this particular test program were low; further ultrafine grinding resulted in little additional liberation of pentlandite from pyrrhotite.

Flotation testwork initially focused on finding the best reagents and reagent combinations to maximize metal recoveries into a low-grade bulk concentrate suitable for the BCL smelter. It was demonstrated that high recoveries of both nickel and copper were possible. A selective flotation technique was developed to produce both a nickel and copper concentrate with the results shown in Table 13-1. It was determined However that there was no buyer for the copper concentrate in Central or Southern Africa, and this avenue was not pursued. The BCL smelter had a requirement for 800 dry tons of bulk, low-grade concentrate per day, with a guaranteed minimum of 650 dry tons per day. The resource defined in 1971 did not support such an arrangement with BCL, and therefore, there was no outlet for the concentrate.

Table 13-1: Results of Flotation Test Work by Anglo American in 1971

		Assay Grades		Distribution %	
Description	**Wt %**	**Ni %**	**Cu %**	**Ni**	**Cu**
Heads	100	0.865	0.753	100	100
Cu Concentrate	2.5	0.692	22.590	2	75
Ni Concentrate	28.5	2.610	0.396	86	15
Bulk Concentrate. (Ni + Cu)	31.0	2.379	2.119	88	90
Tailings	69.0	0.153	0.111	12	10

As noted, four (4) bulk samples were taken from the Selkirk deposit to determine precious metal contents. These samples were also subjected to flotation testwork to determine the possible recoveries into the nickel and copper concentrates. Head grades of the four (4) samples are shown in Table 13-2. Given the metal prices in 1971 and expected smelter terms, no value was given to the precious metals.

Table 13-2: Head Grades of Precious Metals of the four (4) Selkirk Bulk Samples and Results of Flotation Test Work by Anglo American in 1971

Description	Pt	Pd	Au	Ag
Sample 1 (g/t)	0.41	1.77	0.32	3.74
Sample 2 (g/t)	0.36	1.56	0.10	3.56
Sample 3 (g/t)	0.25	1.01	1.01	2.92
Sample 4 (g/t)	0.27	0.85	0.10	2.29
Weighted Head Grade (g/t)	0.32	1.30	0.13	3.17
Metal Recoveries (%)	71	87	67	86
Concentrate Grade (g/t)	0.71	3.53	0.37	8.52

13.1.2 Morex (Rio Tinto), 1985

In 1985, Rio Tinto Zimbabwe, under an agreement with Morex, prepared a report documenting a preliminary assessment of the then present-day potential of the Phoenix and Selkirk deposits. The report included mineralogical and metallurgical testwork results, using samples from a single hole drilled on each property in November 1984 (MacMillan, 1985). The drill core was delivered to Eiffel Flats, Zimbabwe in January 1985 where it underwent mineralogical and metallurgical studies.

A mineralogical examination of a sample of massive sulphide from Selkirk is summarized in MacMillan, 1985. A polished section was prepared and examined using a Zeiss reflected light microscope.

The sample was found to consist mainly of a matrix of pyrrhotite (hexagonal) with abundant ex-solution laths of pentlandite (confirmed by X-ray diffraction analysis). Coarse grained euhedral and sub-hedral magnetite was common. Chalcopyrite occurred as coarse and fine anhedral particles associated with magnetite and pyrrhotite, and rarely with pentlandite. It was estimated that 60% of the pentlandite occurred as exsolution laths, and the remainder as coarser veining and granular inclusions in pyrrhotite. Very small amounts of sphalerite were seen associated with chalcopyrite. Table 13-3 shows the approximate particle sizes while Table 13-4 shows the estimated distribution of minerals and calculated analysis using theoretical compositions. The geochemical analyses of split and crushed drill core are shown below in Table 13-5.

Table 13-3: Approximate Particle Sizes of Minerals Rio Tinto 1985

Approximate Particle Sizes	Largest	Average	Smallest
Chalcopyrite	600 µm	150 µm	30 µm
Pentlandite (coarser)	80 µm	30 µm	10 µm
Pentlandite laths	15 x 20 µm	14 x 4 µm	3 x 1 µm
Magnetite	900 µm	240 µm	18 µm
Pyrrhotite	massive		

Table 13-4: Estimated Weight Percentage Distribution of Minerals and Calculated Analysis Using Theoretical Compositions Rio Tinto 1985

	Wt %	Cu%	Fe%	Ni%	S%	O%
Chalcopyrite	3.0	1.04	0.92	-	1.04	
Pentlandite	10.0	-	4.20	2.20	3.60	
Magnetite	15.0	-	10.86	-	-	4.14
Pyrrhotite	72.0	-	43.50	-	28.50	
TOTAL	100	1.04	59.48	2.20	33.14	4.14

Table 13-5: Assays of Split and Crushed Drill Core Rio Tinto 1985

Depth m	Ni %	Cu %	Co %	Pt g/t	Pd g/t	Rh g/t	Au g/t	Ag g/t
20	0.36	0.33	0.02	0.2	0.6	0.03	0.1	3.2
30.7	0.56	0.45	0.04	0.3	0.8	0.03	0.2	5.6
35.7	0.69	0.67	0.04	0.3	0.9	0.04	0.2	2.8
36.75	2.97 2.91	1.91 1.85	0.14 0.12	0.4 0.4	2.5 2.4	-	0.2 0.2	5.6 4.2
37.8	2.80 2.89	2.57 2.75	0.14 0.14	0.5 0.4	2.6 2.6	-	0.4 0.5	6.2 7.1
38.8	2.74 2.84	2.13 1.96	0.15 0.15	1.0 0.5	2.7 2.8	-	0.1 0.2	5.3 4.5
39.8	2.50 2.65	3.45 2.77	0.17 0.15	0.4 0.4	3.2 3.3	0.04	0.4 0.5	9.4 7.9
40.9	2.78 2.86	1.24 0.93	0.16 0.15	0.4 0.4	3.0 3.0	-	0.1 0.1	7.8 3.4
41.8	2.60 2.42	1.30 1.24	0.16 0.13	0.4 0.4	2.8 2.7	-	0.1 0.3	2.8 3.3
42.8	2.75	0.98	0.14	0.6	2.4	0.15	0.4	3.4
44.7	2.78	1.09	0.15	0.4	2.1	0.19	0.3	3.5
46.6	2.72	0.83	0.14	0.6	2.2	0.14	0.4	2.6
48.6	2.89	1.03	0.16	0.5	2.3	0.20	0.3	1.1
50.5	2.11	1.32	0.12	0.9	2.2	0.19	0.4	3.5
52.4	1.08	2.50	0.07	0.5	1.6	0.13	0.3	5.4
60.2	0.74	0.79	0.07	0.4	1.6	0.02	0.1	2.7
62.1	0.55	0.37	0.02	0.2	0.8	0.02	0.1	1.6
64.1	0.26	0.52	0.02	0.3	0.4	0.02	0.2	4.3

Available documentation reports only the metallurgical testwork on four (4) Phoenix samples. The conclusions drawn from this specific Phoenix metallurgical testwork were that acceptably high recoveries of nickel and copper could only be achieved into a low-grade, bulk concentrate; there seemed to be less focus on pyrrhotite rejection. It was considered that the high iron, high-sulphur concentrate was suitable for a flash furnace such as at BCL.

13.1.3 Morex (Mintek), 1985

Mintek conducted metallurgical testwork at the request of Morex in 1985 (Guest et al., 1985) to determine if low grade concentrates could be produced to meet the specifications of the BCL smelter. BCL had shown interest in smelting such concentrates, provided that the combined copper and nickel was higher than 5% and the ratio of copper to nickel did not exceed 1.15 – the maximum value set by the smelter.

The testwork was completed on five samples, in the form of split core, from both Phoenix and Selkirk, with three of the samples from Selkirk. The three (3) Selkirk samples received by Mintek are shown below in Table 13-6. Pyrrhotite was found to be the most abundant sulphides, interlaced in part with massive pentlandite and chalcopyrite. Magnetite is a major contaminate and some chalcopyrite appears to be associated with the magnetite. Massive sulphide disseminated sulphide and the dyke with disseminated mineralization contained 5.0%, 0.13% and 0.12% magnetite, respectively.

Table 13-6: Selkirk Half-Core Samples Received by Mintek in 1985

Mintek No.	Mass kg	Ni %	Cu %	Description
J982	103	2.79	1.67	Massive sulphide
J983	31	0.34	0.59	Disseminated sulphide
J984	9	0.20	0.38	Dike with disseminated sulphide

Testwork on the samples included: (1) upgrading by coarse crushing with low-intensity magnetic separation, (2) upgrading by coarse grinding and low intensity magnetic separation to remove barren magnetite and pyrrhotite, (3) flotation tests, and (4) gravity separation tests. Single flotation tests on the Selkirk samples yielded recoveries ranging from 43 to 79% for nickel and 60 to 96% for copper with a combined concentrate grade of 5%. Flotation concentrates produced had a copper to nickel ratio above 1.15 to 1, which was the maximum ratio tolerated by the BCL smelter. Pre-concentration by gravity and magnetic separation was found to be unsuccessful.

A range of flotation tests on the Selkirk samples showed fairly high copper to nickel ratios and a range of nickel recovery levels. Cobalt recovery from the massive sulphide sample closely followed nickel, which could indicate that cobalt was associated with pentlandite. A grade-recovery curve was prepared and showed nickel recoveries at 20% less than copper at a combined grade of 5%. Selected curves at higher combined grades were also presented. However, no optimization was carried out and it is possible that these results could have been improved.

Magnetic separation was attempted at sizes between 10 mm and 1 mm without any success. For the massive sulphide sample, all material was magnetic and for the disseminated portion, all material was non-magnetic. An attempt using particle sizes finer than 600 and 100 µm showed some separation but upgrading was poor. In the case of the massive sulphide sample, most of the nickel was in the magnetic portion and copper in the non-magnetic portion.

Samples were crushed to finer than 600 µm and concentrated on a shaker table. There was no upgrading of the massive sulphide portion and even though the disseminated material was upgraded, it was at lower recoveries for both nickel and copper, analyses of the concentrate are shown in Table 13-7. While levels of lead and zinc in concentrate were not shown, the report noted that levels of these two elements could exceed BCL's specifications.

Table 13-7: Analyses of Head Grade and Concentrates Mintek 1985

Description	Unit	Selkirk Massive	Selkirk Disseminated	Selkirk Massive Float Concentrate	Selkirk Disseminated Float Concentrate
Ni	%	2.79	0.34	24.8*	Generally (Ni+Cu) 5%
Cu	%	1.67	0.59	2.57*	
Co	%	0.13	<0.05	0.25	0.18
Fe	%	57.8	12.4	48.5	37.3
S	%	36.6	3.8	36.7	33.0
SiO_2	%	0.73	35.5	<0.2	5.61
Ag	ppm	5	6		
PGM + Au	ppm	2.93	1.01		
CaO	%	0.2	6.3	0.27	1.83
Al_2O_3	%	0.53	15.4	<0.5	2.3
MgO	%	-	8.87	<0.5	1.0
Mn	ppm	198	1300	-	-
Pb	ppm	104**	235	-	-
Zn	ppm	607**	560	-	-
As	ppm	14	110	-	-

**Data for one set of values reported*
***Repeat assays averaged*
**Note: Both samples were found to be low in the following minor elements (<17 ppm): Bi, Sb, Se and Te.*

13.1.4 Morex (Biomet), 1986

Biohydrometallurgy (Pty) Ltd (Biomet) carried out batch-wise bacterial leaching on a Selkirk sample containing 2.20% Ni, 0.09% Co and 1.50% Cu, received in the form of a fine powder. The first test was carried out on a sample “as received” and the second test was run on a pre-acid leached sample, allowed to stand for 24 hours with periodic stirring. The sample was found in both tests to be amenable to bacterial attack. Nickel and cobalt were solubilized to a similar extent, with copper less so. Metal extractions recoveries were: 43.3% for Ni, 44.0% for Co and 6.8% for Cu, and 70.9% for Ni, 88.9% for Co and 8.9% for Cu in the two (2) tests with acid H_2SO_4 consumption of 322 and 307.3 kg/ton respectively. In these tests, leaching took 14 days, but it is likely that the leach time could be reduced in a continuous operation.

13.1.5 LionOre (Mintek), 2000-2005

LionOre commissioned a preliminary assessment of the Selkirk deposit in 2006 that included a review of mineralogical and metallurgical studies undertaken by Mintek on both massive sulphide and disseminated ores at Selkirk. Work was completed both at the laboratory scale in 2000 and at the Phoenix mill, including processing at the dense media separation (“DMS”) plant in 2005. Part of the work explored the idea of producing low grade concentrates suitable for the BCL smelter.

The following is adapted from the TWP Independent Technical Report (Clegg, 2006).

The source of the samples for the Mintek study were drillhole core samples (Part 1), Stope 2 and Stope 9 (Part 2) and Stope 9c (Part 3). Testwork included mineralogy, sample characterization, magnetic separation, gravity separation, heap leaching (bottle roll tests), and flotation.

Mineralogical studies included electron microprobe analysis and QEMSCAN work. The electron microprobe analyses indicated that less than 1% of the nickel occurs as solid solution with pyrrhotite and approximately 10% of the nickel occurs as free pentlandite. The remaining nickel is present in close association with pyrrhotite, either as equidimensional grains attached to pyrrhotite grains, as exsolution lamellae in the pyrrhotite, or a small proportion locked in silicate gangue. The QEMSCAN work confirmed these results.

Run-of-mine (ROM) size distributions from underground stopes indicated that the bulk (~70%) of all three (3) samples reported to the coarse size fraction (-25 + 12 mm). The hardness of the sample was confirmed by milling testwork, classifying the ores as hard to very hard. The Ni grades in the finer size fractions (-1 mm) were higher (~0.26% Ni) than in the coarser fractions for all stope samples.

As a result of the close association of pentlandite with pyrrhotite, magnetic separation was not considered a feasible option before flotation because <5% of the material is ferro-magnetic.

Heavy liquid separation ("HLS") work on Selkirk stope material indicated that a possible high-grade fraction at a density cut point of about 3.0 kg/m^3 could be obtained within mineralization. HLS work on Selkirk stope samples also indicated that the mineralization consisted of material close to the density cut-off point since a significant difference in mass pull towards the sinks was obtained with a change in density cut point from 2.9 to 3.0 kg/m^3.

The change in the density cut point did not influence the grades obtained and a discardable waste product of <0.07% Ni could be obtained to the floats at an SG of 2.9. Misplaced material of floats going to the sinks at an SG 2.94 was considered due to the shape of the particles. No sinks were displaced to the floats and therefore a clean product could be obtained.

Bottle-roll leach characterization testwork was carried out on Selkirk stope material to investigate the potential of heap leaching of the Selkirk mineralization. The aim of the testwork was to obtain information regarding Ni and Cu recoveries, leach kinetics and acid consumption. Ferric (oxidative) roll bottle tests carried out on the milled Selkirk material gave Ni recoveries of both 90% at 25°C and 48°C at pH 1.5. Tests carried out on 8 mm material obtained Ni recoveries of 80% at 48°C and 60% at 25°C. Tests carried out on the milled sample indicate maximum "benchmark" recoveries that can be achieved on a heap operating over extended leach periods. It may be possible to only achieve temperatures of 48°C in the heap if sufficient sulphur is present to generate exothermic heat. Roll bottle tests carried out in the presence of sulphuric acid gave acid consumption of between 75 and 350 kg/t, which may make the heap leaching uneconomical in the absence of a cheap acid source.

Flotation testwork has concluded that the Selkirk mineralization can be processed through a milling and rougher flotation plant to upgrade the Ni grade from 0.3% (after prior upgrading in the DMS) to 2.5% Ni in the flotation concentrate at a Ni recovery across the flotation plant of 75%. Regrinding and cleaning of the rougher concentrate can be used to upgrade this product to a grade to 4% Ni and a recovery of 62% Ni. The flotation process was sensitive to the primary grind as significant losses occurred if the grind went below 55% -75 µm.

Mineralogy on the Selkirk stope material rougher flotation tails indicated that the material only contains ~0.2 mass % pentlandite which is locked and occurs within the +38 µm fractions. The pentlandite in the flotation tails could only be recovered by milling the flotation feed to a size finer than the current ~60% passing 75 µm. This evaluation also indicated that the pyrrhotite was successfully depressed during flotation.

Pilot plant-scale flotation testwork was recommended for disseminated sulphides to determine the best economic flotation operating conditions for the processing of the Selkirk mineralization and to evaluate the potential to move the Ni grade-recovery curves for this mineralization to a higher operating range through more effective classification, milling and flotation.

In conclusion, a concentrate (final product) after gravity separation (DMS), milling and rougher flotation testwork could be obtained with an overall mass yield of ~11%. The sample could be upgraded from 0.22% to 1.5% Ni; 0.24% to 2.0% Cu and 0.66g/t to 3.65 g/t total PGM and Au. A total Ni recovery of 72%; a total Cu recovery of 90% and a total PGM and Au recovery of 60% could be achieved. About 89% of the waste could be rejected in the DMS floats (at an SG of 2.94) and DMS tailings with a grade of <0.08% Ni.

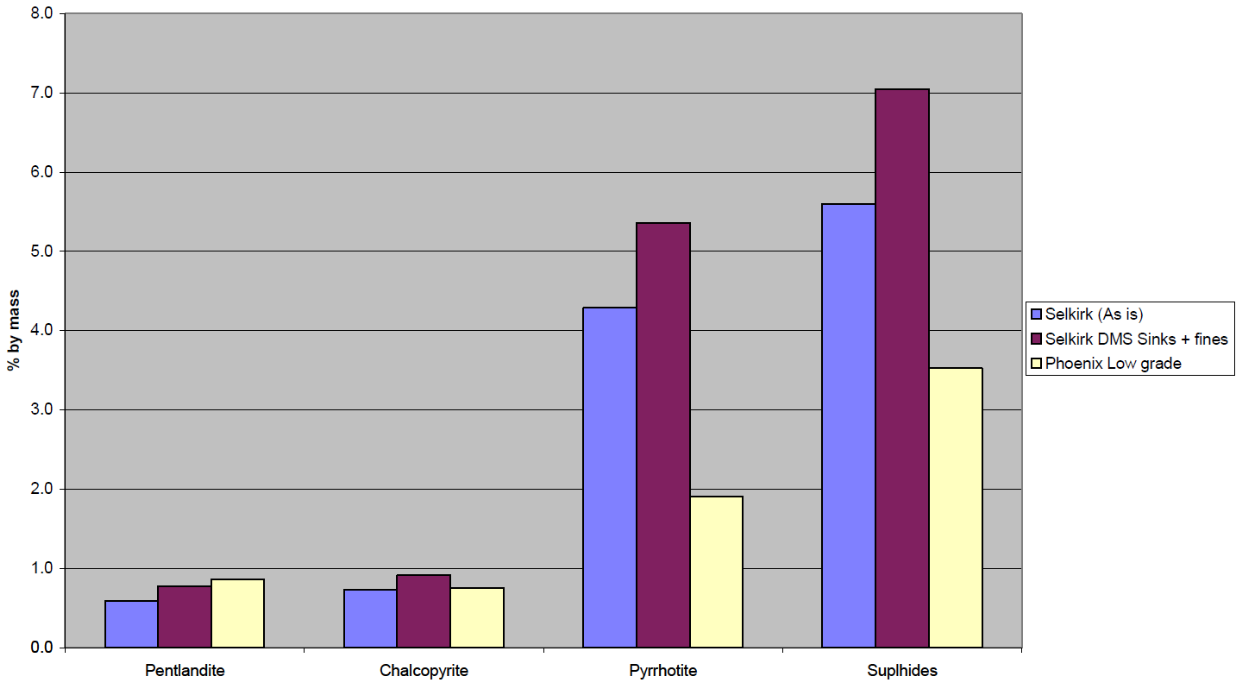
It became clear that recoveries were related to grind size with an extra 10% nickel recovery when milling from 60 to 80% less than 75 microns. It was also determined that it would not be possible to achieve a reasonable grade in a rougher stage with 80% of the nickel as fast floating.

Nickel grades in the concentrate were low (yet suitable for the BCL smelter), and the addition of a cleaner stage increased nickel grade to 2.8% Ni, and the addition of depressants to suppress pyrrhotite flotation could achieve a concentrate grade of 3.5% Ni. The use of weaker sodium ethyl xanthate (SEX) instead of sodium isobutyl xanthate (SIBX) did not enhance the nickel grade of the rougher concentrate over the control.

The grade of the precious metals in a rougher concentrate was 0.16 g/t Au, 2.4 g/t Pd, 0.41 g/t Pt, and 0.02 g/t Rh. The palladium recovery was high at 84% whereas the platinum recovery was only 66%.

Testing in 2005 focused on processing of Selkirk samples through the Phoenix plant and this has been hampered by significant differences between Selkirk and Phoenix samples. Grinding tests on Selkirk samples showed that liberation of copper was achieved at particle sizes varying between 35 and 65 mesh (230 – 500 microns), and nickel was liberated at an average of 150 mesh (100 micron). Ultrafine grinding resulted in very little additional liberation of pentlandite from pyrrhotite. In contrast, detailed mineralogical analysis of Phoenix showed that the flotation feed exhibited good liberation (with between 82 and 95% of the pentlandite and pyrrhotite coarser than 75 microns being liberated with the finer material showing almost complete liberation). For similar nickel (pentlandite) and copper (chalcopyrite) significantly more iron and sulphur (pyrrhotite) are present in Selkirk mineralization. Figure 13-1 shows the difference in feed compositions (TWP, 2006). The increased quantity of iron sulphides being mainly pyrrhotite in Selkirk mineralization and its mineral associations were likely to impact detrimentally on Phoenix when processed as a blend.

Figure 13-1: Comparison of Selkirk and Phoenix Plant Feed Compositions



Source: TWP 2006

13.1.6 LionOre (Mintek), 2007

LionOre, in conjunction with TWP, approached Mintek to conduct metallurgical testwork to evaluate options to pre-concentrate the disseminated sulphide mineralization at Selkirk as potential feed for LionOre's Activox® technology. The Activox® technology can, in theory, economically treat low-grade nickel concentrate (at least 4% Ni) and generally attain higher recoveries than in conventional smelting.

Two Selkirk samples were delivered to Mintek, with grades of 0.5% Ni and 0.24% Ni. A final concentrate grade of around or >4% Ni after flotation was targeted for this particular work. The work included sample characterization, comparison of crushing methods, heavy liquid separation, DMS, flotations, and optimization testwork, magnetic separation and mineralogy.

Two (2) scenarios, a high-grade concentrate (>4.5% Ni) at a low recovery and a lower-grade concentrate (<4% Ni) at higher recoveries were developed (King et al., 2007). Both scenarios had a provision for high grade saleable copper concentrate. Results are shown below in Table 13-8.

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Table 13-8: Final Mass Balance Data Mintek 2007

Description	Test	Cu Concentrate					Ni Concentrate				
		Mass (%)	Ni (%)	Rec Ni (%)	Cu (%)	Rec Cu (%)	Mass (%)	Ni (%)	Rec Ni (%)	Cu (%)	Rec Cu (%)
Low Grades, High Recovery	Rougher Rate Base Case	Only 1 Concentrate					10.5	1.78	86	3.82	76
	Ni Re-Cleaner, Guar, pH 10.5	0.9	1.06	4	31.47	54	3.7	3.53	61	2.81	20
High Grades, Low Recovery	Ni Re-Cleaner + Regrind	1.0	1.11	5	34.36	65	2.1	4.30	42	2.53	10
	Guar + Regrind (5 min)	1.2	1.79	10	27.61	61	1.6	4.68	34	4.11	12

The initial goal of producing a nickel grade of >4% and recoveries of 80% was not achieved in these particular tests due to the complex mineralogy of the Selkirk mineralization. The test data was able to show that a Ni and Cu concentrate of grade suitable for the Activox® plant could be achieved, but unfortunately the mass pull and recovery percentages were below acceptable levels. Scrutiny of the test data also showed that there is upside potential for investigations into bio-leaching technologies to improve the overall metal recoveries from the process plant.

Nickel recovery was dependent on the grade of the feed sample. Most of the chalcopyrite was concentrated in the first 3 minutes, of which 75% was completely liberated up to 70 µm in diameter. Pyrrhotite was well liberated. In 0-3 minutes, 70% of the pyrrhotite contains pentlandite and in 3-40 minutes, 60% of the pyrrhotite contains pentlandite. The majority of the pyrrhotite grains (>70%) were monoclinic. A discardable tailings product of <0.1% Ni could be obtained.

Testwork classified the Selkirk samples as hard to very hard, with an average Bond Work Index of 22.3 kWh/t. No significant benefit was obtained from crushing the samples to ~12 mm using a Vertical Impact Crusher (Barmac crusher) to using a conventional cone crusher.

Nickel upgraded towards the finer (~1 mm fractions). Pre-concentration studies concluded that gravity separation was not viable on the ~1 mm material. There was a significant change in mass in the range from 2.9 to 3.05 g/cm^3. Mineralogy indicated that most of the pentlandite (99%) was less than 10 µm of which more than half was locked in pyrrhotite in both samples as flame-line inclusions. Magnetic separation was not effective in separating pentlandite from pyrrhotite and was not recommended.

13.1.7 Norilsk Nickel (Mintek), 2009

In 2009, Mintek carried out laboratory and pilot tests on the separation of mineralization using heavy media liquids. Studies were carried out on two (2) bulk samples: the first sample was 270 t total mass (the sample consisted of seven (7) separate samples of ~40 t each); the second sample was 206 t. The DMS laboratory and pilot testing objectives were as follows:

- Determination of density level required to produce improved sinks grade at achieving acceptable recovery rate along with producing floats that are removed from the process and contain substantial feed mass.
- Verification of the results produced at the pilot scale.

Densitometric tests were carried out based on the first bulk sample, with separate tests for each of seven (7) sub-samples, and a single test based on the composite. Each sample was subject to separation in heavy liquid at eight density values: 2.8, 2.9, 2.95, 3.0, 3.1, 3.2, 3.3 and 3.4 g/cm^3.

13.1.8 Norilsk Nickel (Gipronickel Institute), 2010-2011

Gipronickel Institute, under contract to Norilsk Nickel, completed a feasibility analysis study on the Phoenix and Selkirk deposits in 2011. That work included additional geochemistry, mineralogy and flotation testwork.

A 314.2 kg sample of Selkirk disseminated mineralization was delivered to the Gipronickel Institute in St. Petersburg, Russia in August 2010. The material, 5 cm through 30 cm in size, was sampled at site from the disseminated stockpile on surface. Three (3) samples of the bulk material were weighed, and volume measured using a pycnometer. The resulting densities averaged 3.10 g/cm^3 (3.02 g/cm^3; 3.12 g/cm^3; and 3.17 g/cm^3). The samples were tested for the possibility of pre-concentration by radio-resonance method, used for mineralogical studies and flotation process testing.

A representative sample was taken with a -3 mm grain size and ground to -71 µm; chemical analyses were performed at the Gipronickel Institute Analytical Research Centre. Results are given in Table 13-9. The analyses of total nickel (0.22%) and nickel in sulphide (0.21%) indicates that the nonrecoverable share of nickel is 4.5%.

Table 13-9: Selkirk Mineralization Sample Chemical Composition Gipronickel 2011

Sample Type	Content (%)								Content (g/t)			
	SiO_2	TiO_2	Al_2O_3	FeO	CaO	MgO	K_2O	Na_2O	Pt	Pd	Au	Ag
Selkirk 1236	41.4	0.31	19.2	10.8	9.81	10.6	0.13	1.05	0.1	0.44	0.03	1.22
	P_2O_5	LOI	Cr_2O_3	Ni Total	Ni Sulphide	Cu	Co	S				
	0.05	4.08	0.15	0.22	0.21	0.19	0.017	2.18				

**Note: LOI is Loss on Ignition.*

The high level of silica was considered due to the silica composition typical for all the minerals contained in gabbro, as well as by free quartz presence. High levels of magnesium and aluminum oxides were reflected by the secondary silica minerals, i.e., chlorite and amphiboles (thermolite-actinolite and hornblende). The presence of sodium oxide relates to deanortization of the principal plagioclases and to albite formation. Iron enters the composition of magnetite and iron hydroxides associated with magnetite, being also present in silica (amphiboles and zoisite). Titanium is associated with ilmenite disseminations, while phosphorus is associated with grains of apatite. The relatively high LOI level was explained by the presence of chlorite, amphiboles and mica in the sample.

Mineralogical studies included: petrographic analyses in transparent thins sections and study of minerals in polished sections using Leica optical microscope; XRM of silicate and minerals in polished microsections and in artificial preparations of flotation products using CamScan Microscope completed with an energy dispersive (ED) spectrometer.

The host rock to the mineralization is intensively altered gabbro (metagabbro), with plagioclase and clinopyroxene being the principal minerals. Additional textural and details are in the Kozyrev, 2011 report.

Mineralogical studies showed that pyrrhotite, chalcopyrite and pentlandite are the principal base metal minerals, while pyrite, sphalerite and cobaltite occurred sparsely. Magnetite is a concomitant mineral. Sulphide content was found to be uneven in nature. In fine dissemination, sulphide grains size was 0.1-0.4 mm; in more dense and coarse dissemination, sulphide phases' size increased up to 1-2 mm. The magnetite content was substantially higher in rock with high sulphide content compared to disseminated sulphides.

In disseminated sulphides, pentlandite forms flame-like phases (from initial microns to 0.1 x 0.8 mm in size) oriented along the pyrrhotite cleavage (lamellae) and grained phases of up to 0.8 x 1 mm in size (mainly, 0.1 x 0.3 mm). In massive sulphides, pentlandite forms flame-like inclusions and rims around separate pyrrhotite crystals; sparsely, it forms fine-grained phases. Flame-like and rim phases measure 3-10 μm and 0.05 x 20 mm in size, respectively.

Pyrrhotite was presented by monoclinic and hexagonal varieties in approximately equal ratio. Nickel content in pyrrhotite varied from 0.22 to 1.35%, while those of sulphur and iron varied from 38.8 to 40.8% and 59.0 to 60.8% respectively. Average pyrrhotite content is: 0.6% Ni, 59.9% Fe and 39.4% S. Nickel also occurred in pyrite (up to 0.4%). Chalcopyrite composition was: 33.9% Cu, 30.7% Fe and 35.2% S.

Pentlandite is the principal Ni-bearing mineral, and 84.1% sulphide nickel relates to it, while only 14.9% Ni relates to pyrrhotite. Quite a negligible portion of nickel relates to pyrite making 0.9%. According to the chemical analysis results, share of non-recoverable silicate nickel occurring as isomorphic impurity or as ultrafine inclusions in chlorite and amphiboles, makes about 5%. This converts to an average of 0.04% Ni.

The ratio of pentlandite's flame and granular forms has been calculated in the polished micro-sections prepared from Selkirk samples, and a typical sample grading 0.2% Ni contains roughly 11% of pentlandite attributed to flame type, and 89% attributed to granular textures.

The presence of nickel in silicate minerals was also studied. Nickel content in chlorite and amphiboles appears to be similar: 0.2 to 0.5% and 0.2-0.4%, respectively. In pentlandite grains, nickel content varied from 34.4 to 36.7%, while sulphur content variations were from 32.4 to 34.0%. In flame pentlandite, chemical composition fluctuations were observed, and variations in Ni and S content make 29.1 to 36.0% and 32.3 to 34.0%, respectively. Average pentlandite composition was 34.0% Ni, 31.3% Fe and 33.4%. There was cobalt as an impurity in pentlandite in the amount of 0-2.6%.

The Gipronickel Institute also included a study on the precious metals minerals (PMM, which includes PGEs and gold). Possible occurrence of Pd isomorphic impurity in pyrrhotite and pentlandite has been defined using X-Ray Spectrum Microanalysis at CamScan completed with ED-Spectrometer. Based on the study results, there was no palladium impurity in pentlandite and pyrrhotite. PMMs were found in the heavy fraction of the flotation concentrate, namely: merenskyite, sperrylite, and gold. In addition, a mineral with a Pd (Te, Bi, Sb) 2 composition was found that might be attributed to the kotulskite-sobolevskite group with antimony impurity. The total PMM grain count was 29, including: merenskyite (13); sperrylite (4); mineral of Pd (Te, Bi, Sb) 2 composition (11) and finally gold (1). In the flotation concentrate, PMMs occur in the form of free grains or in aggregation with each other or with fine phases of altaite (Alt) and hessite (Hes) and, rarely, in aggregation with chalcopyrite and pentlandite. The average grain size was ~ 25 x 35 μm, sometimes ranging up to 50 x 55 μm. Most coarse grains were typically merenskyite.

Based on the results of chemical analysis of gravity concentration tails and sludge, a substantial proportion of PMM (-20 µm in size) reported to the flotation concentrate (Table 13-10). They could be in the form of free PMM or in the form of aggregation with non-ferrous metal sulphides and with gangue minerals.

Table 13-10: Pt, Pd and Au Content in the flotation Concentrate Light Fraction

Product	Content (g/t)		
	Pt	Pd	Au
Flotation concentrate feed for gravity separation (concentration)	2.06	12.4	1.09
Tails of laboratory gravity concentration based on flotation concentrate feed	1.95	10.4	0.72

Since Pt, Pd and Au content in the light fraction is close to its level in the input flotation concentrate, fine grains of PMMs could have the highest mass share in the concentrate and likely be widespread in Selkirk mineralization.

The Gipronickel Institute also studied potential flowsheets to optimize metallurgical recoveries which is described in the following section: According to the earlier studies results, the optimum flotation feed size is 70% at passing less than 0.071 mm. Major nickel and copper portions were distributed into fine fractions, namely: 29.71% Ni and 28.79% Cu to -0.045 + 0.020 mm; 40.86% Ni and 40.95% Cu to -0.020 mm.

With the aim of improving metal recovery into the concentrate, additional tests were performed by applying various reagents conditions for the Cleaner Circuits, including using sodium dimethyldithiocarbamate (SDDC) as a pyrrhotite' depressing agent and tests on dosing TETA (Tri-ethylene-tetramine) in combination with sodium sulphite. This combination resulted in a substantial removal of pyrrhotite from the collective concentrate.

A laboratory-scale magnetic separation test was carried out with the results showing that an excess of 20% Ni could be recovered from the flotation tails, producing a 6-7% Ni concentrate.

Process conditions adjustment for Ni-Cu collective concentrate production in the closed cycle was performed due to the closed-cycle flow sheet consisting of Rougher Circuit, Cleaner, Re-cleaner and Scavenger Cleaner Circuits followed by Dump Tails 2 removal and Flotation Tails Magnetic Separation. Results are presented in Table 13-11 and Table 13-12, which includes projected grades of concentrate based on the batch tests.

Table 13-11: Projected Results from the Test for Ni, Cu, S and SiO_2 Gipronickel 2011

Product	Mass Pull (%)	Content (%)				Recovery (%)			
		Ni	Cu	S	SiO_2	Ni	Cu	S	SiO_2
Ni-Cu Conc	2.3	7.21	9.02	29.20	5.84	66.38	81.39	2.10	0.32
Magnetic Product	2.1	0.80	0.07	32.02	6.40	6.80	0.57	2.10	0.62
Tails	95.6	0.07	0.05	32.02	43.19	26.82	18.04	95.79	99.05
Head	100.0	0.25	0.25	31.96	41.68	100.00	100.00	100.00	100.00

Table 13-12: Results of the Closed-Circuit Test for Pt, Pd and Au Gipronickel 2011

Product	Mass Pull (%)	Content (g/t)			Recovery (g/t)		
		Pt	Pd	Au	Pt	Pd	Au
Ni-Cu Conc	2.3	1.95	10.4	0.72	44.85	54.36	55.2

In summary, based on the projections, the tests indicated the potential of an overall combined Ni-Cu concentrate grading 7.21% Ni, 9.02% Cu, 0.45% Co, 29.2% S, 5.84% SiO_2, 2.47% Al_2O_3, 1.92% MgO, 2.11% CaO and 38.5% Fe. The feed grade was 0.25% Ni and 0.25% Cu.

Use of magnetic separation on flotation tails made it possible to recover additional sulphide product having 0.8% Ni content at 6.8% recovery. PGE recovery into the collective concentrate was achieved as follows: 44.85% Pt recovery at 1.95 g/t Pt content; 54.36% Pd recovery at 10.4 g/t Pd content and 55.2% Au recovery at 0.72 g/t Au content.

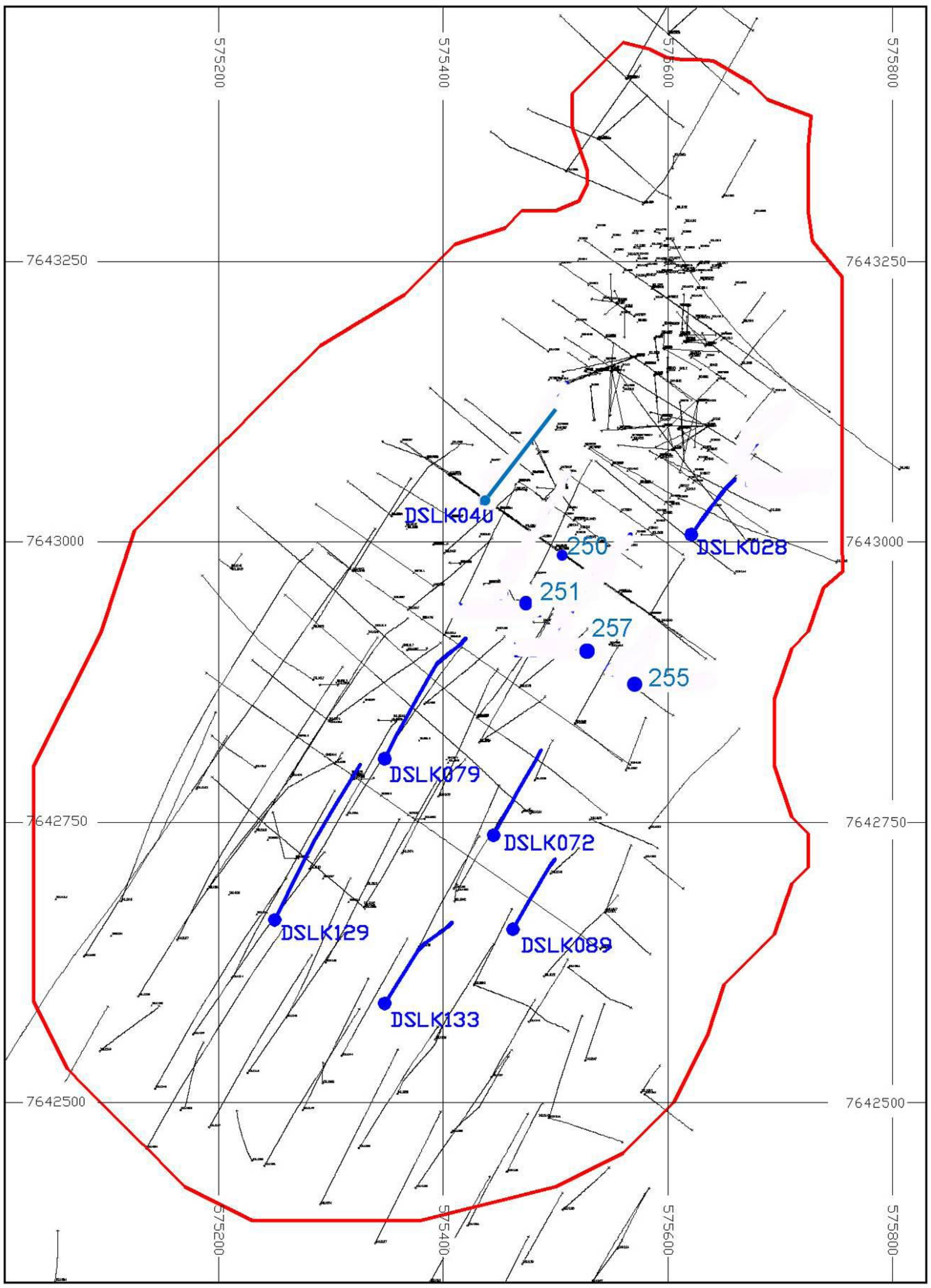
13.1.9 Norilsk Nickel (Gipronickel Institute), 2012

Additional metallurgical work was completed in 2012 to address two (2) aspects highlighted by TNMC and Gipronickel Institute specialists. The first task was defining the specifications of the various nickel grades and designing an efficient process for the treatment including process parameters. The second task was the creation of a geo-metallurgical model for the Selkirk deposit.

Twenty-eight (28) low volume samples were collected from 2012 drillholes DSLK250, DSLK251, DSLK255, and DSLK257. DMS and flotation tests were carried out at the TNMC Laboratory in April-May 2012 on twenty-four (24) of these samples. The produced flotation tails were dispatched to the Gipronickel Institute in St. Petersburg, Russia to be used for magnetic separation testing.

For the creation of the geo-metallurgical model, samples from the 2003-2008 drill campaigns were also studied. Samples from drillholes DSLK028, DSLK040, DSLK072, DSLK079, DSLK129, and DSLK133 as well as four (4) samples from 2012 drillhole DSLK257 were sent to the Gipronickel Institute in May 2012 (Figure 13-2).

Figure 13-2: Location Plan of Boreholes Used for Selkirk Deposit' Geo-Metallurgical Mapping. Coordinate System is UTM Zone 35S, Cap Datum.



Source: Kozyrev (2012)

Twenty-eight (28) samples were taken from quarter core of 43 mm diameter core, with a weight between 17.8 and 42.2 kg. The validity of using historic core was confirmed by parallel test results in DSLK033 and DSLK250, drilled 15 m apart. Samples grading 0.39% Ni / 0.59% Cu and 0.37% Ni / 0.59% Cu respectively occurred at equivalent downhole depths. Ni grade in the concentrate derived from new core was 3.65% at 67.3% recovery, while the concentrate derived from the historic core was 3.44% at 75.1% recovery. Cu grade in the concentrate derived from new core was 5.31% at 89.06% recovery while the concentrate derived from historic core was 4.51% at 87.3% recovery.

Samples with Ni grades over 0.3% were subjected to flotation without pre-concentration, while samples with Ni grades below 0.3% were treated according to the DMS + flotation process flowsheet. DMS was carried out based on -20 mm feed using 2.95 g/cm^3 density heavy liquid. Flotation was performed according to both TNMC's baseline flowsheet and the one recommended by the Gipronickel Institute.

Microscopic studies of mineralization were carried out based on core samples taken from two (2) boreholes: DSLK250 and DSLK255. Studies were performed based on polished sections and transparent thin sections using a Leica Universal Microscope. The chemical composition of the principal sulphides was determined using an electron probe micro-analyzer (EPMA) method with CamScan equipped with ED-Spectrometer. Chemical analysis of flotation products based on testing of 24 samples was performed at the TNMC Laboratory using XRF.

Quantitative calculations of the mineral composition of the samples, sulphide phases and sulphide liberation behavior in milled material were carried out on each sample at the Gipronickel Institute facility.

The samples were subsequently subjected to crushing and DMS stages before flotation testwork, which is described below:

- Sample was crushed up to 20 mm fraction in closed cycle followed by recrushing of +20 mm fraction.
- Crushed material was screened to be classified into -20 + 10 mm, -10 + 2 mm, and -2 + 0 mm fractions.
- Fractions -20 + 10 mm and -10 + 2 mm were divided, according to density, into sinks and floats using heavy liquids. The material-weighted sample was merged into a vessel filled with a heavy liquid (2.97 g/cm^3 density) and was subject to mixing. Depending on the ratio of mineral density / liquid density, grains were identified, according to the 'occupied position', as follows: (i) emerging, or floats; (ii) settling to the bottom, or sinks; and (iii) equilibrium-like, i.e. grains having equal density with the liquid. Floats were removed from the liquid with the help of a 'mesh spoon', while sinks and the equilibrium fraction were separated from the liquid using a mesh strainer.

- After the weighted sample separation into sinks and floats, the heavy liquid residue was removed. This was achieved with the help of acetone or ethyl alcohol: the heavy liquid residue was placed into a vessel containing one of the above-mentioned cleaning fluids, thoroughly agitated, separated from the cleaning fluid and dried. After drying, sinks' and floats' mass pull was determined. Then, the fractions were recrushed up to -2 mm, and representative samples of both sinks and floats were collected for chemical and mineralogical analysis.
- Sinks of -25 + 10 mm and -10 + 2 size, re-crushed up to -2 mm, were blended with the previously prepared -2 mm fraction in accordance with the fractions mass pull.
- Samples were taken for chemical assay and 2 kg subsamples were prepared for tests involving milling and flotation.

Flotation laboratory tests were conducted using the following procedures.

Weighted mineralization samples of -2 mm size were milled in a laboratory-scale mill at the standard residence time, i.e. ~10 min residence time required for Phoenix ROM mineralization, and regrinding up to 60% passing of -0.075 mm (TNMC plant flotation feed size). The first weighted milled sample was submitted for particle size analysis, mineralogical analysis and chemical assay, the remainder being subject to flotation tests. Chemical analysis was performed at te TNMC Laboratory, while mineralogical analysis was carried out at the Gipronickel Institute facility using a Mineral Liberation Analyzer (MLA) system.

Flotation tests tests were carried out according to three variants of the process flow-sheet and reagent conditions:

a. TNMC baseline process flow-sheet (Figure 13-3);
b. Optimized process flow-sheet including Cleaner and Re-cleaner circuits (Figure 13-4);
c. Optimized process flow-sheet including Cleaner circuit (Figure 13-5).

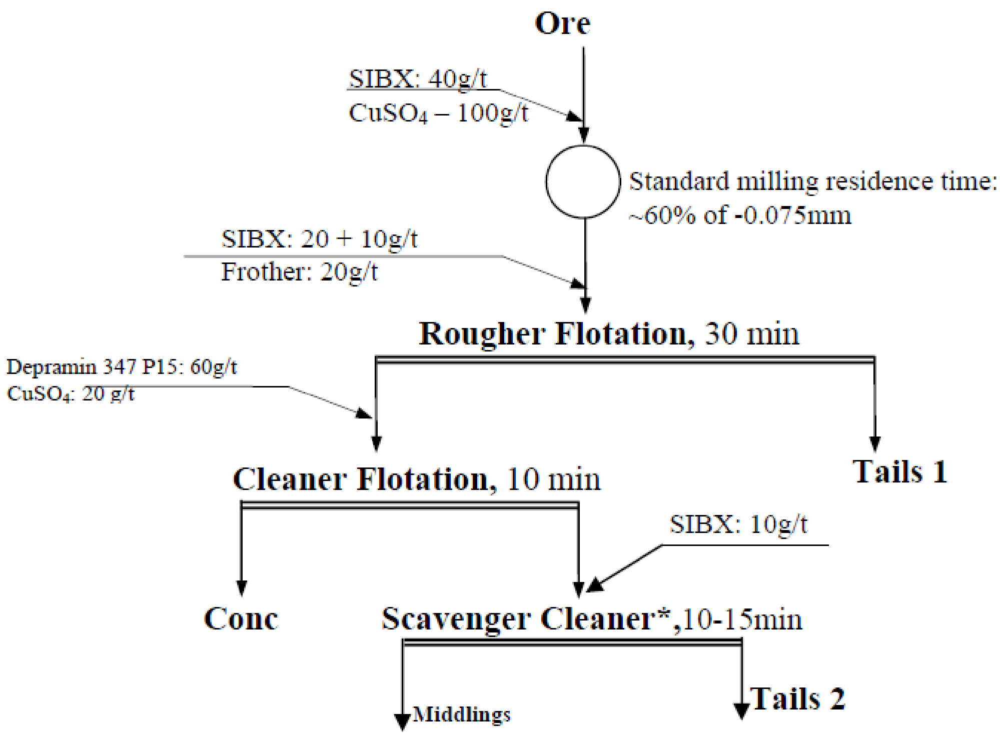
The reagents used in the flotation testwork are summarized below:

- MIBC (Methyl-isobutyl-carbinol), Frother manufactured by Orica (Australia)
- DSP 017, Collector with foaming effect, manufactured by Orica (Australia)
- Depramin 347P15, gangue Depressant, manufactured by AkzoNobel (Netherlands)
- TETA, Triethylenetetraamine, pyrrhotite' Depressant
- Na2SO3 (Sodium sulphite), Modifying agent

- SIBX (Sodium isobutyle xanthate), TNMC's baseline collector

Magnetic separation of rougher tails and scavenger tails was carried out separately.

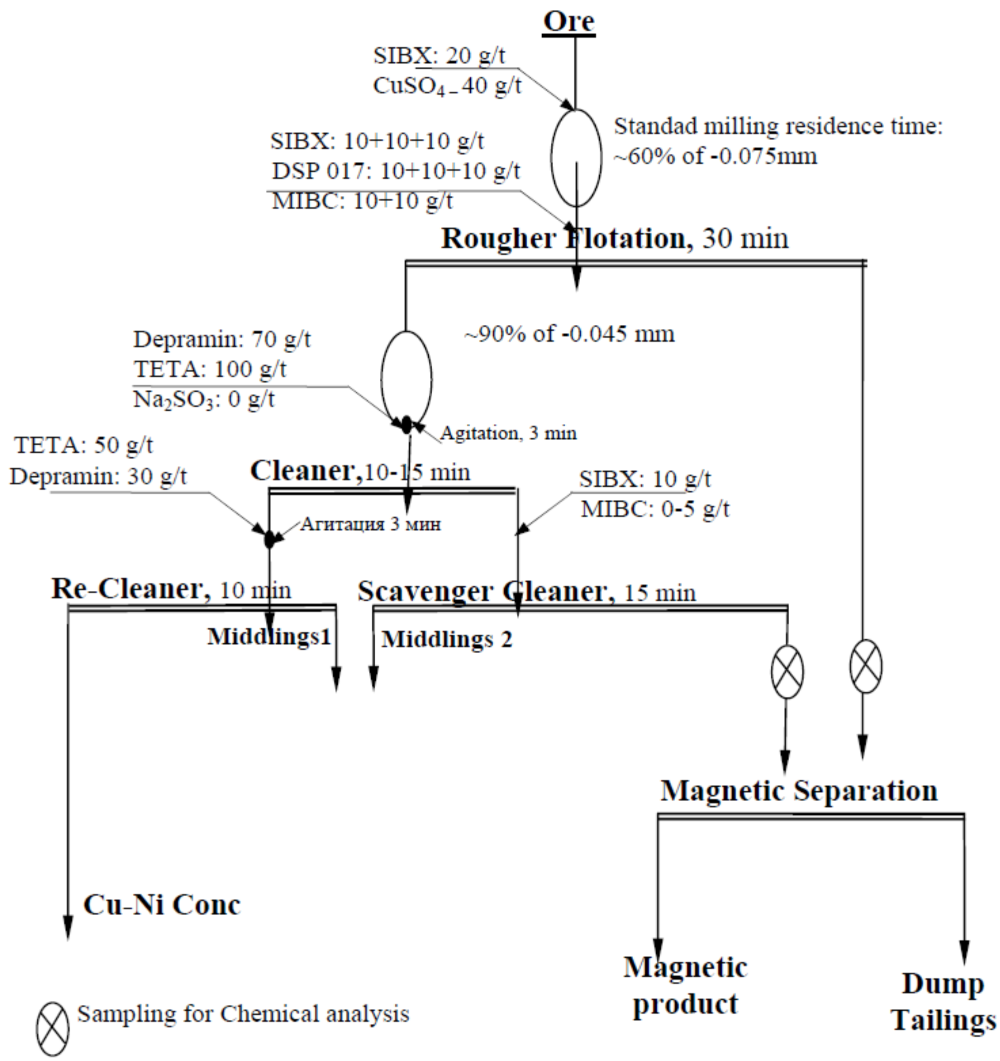
Figure 13-3: TNMC Baseline Flotation Process Flowsheet



* Scavenger Cleaner Circuit is introduced for the closed cycle flow-sheet calculations

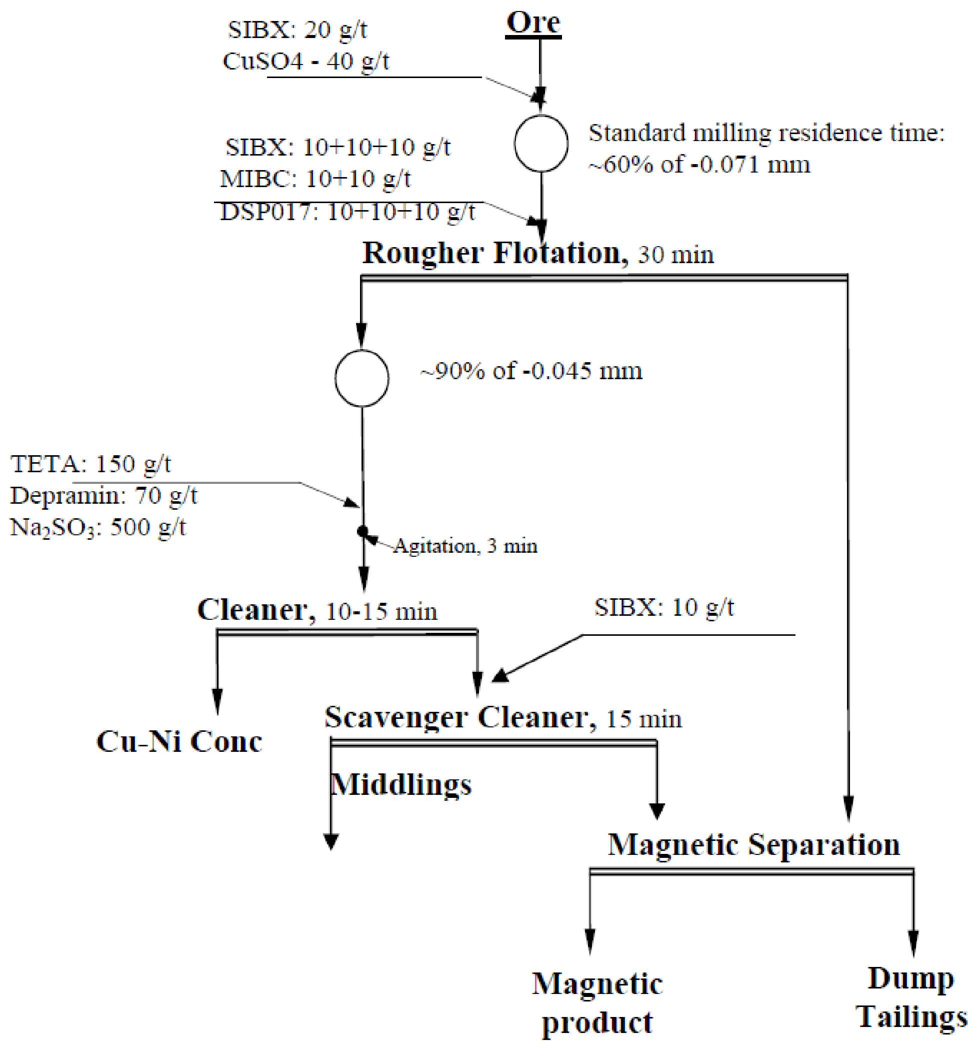
Source: Kozyrev (2012)

Figure 13-4: Optimized Flotation Process Flowsheet Including Cleaner and Re-cleaner Circuits



Source: Kozyrev (2012)

Figure 13-5: Optimized Flotation Process Flowsheet Including Cleaner Circuit



Source: Kozyrev (2012)

DMS testing was performed on samples with Ni grades below 0.3% Ni. Results are shown in Table 13-13. The DMS tests performed at TNMC in 2012 based on 24 samples essentially confirmed the results of the DMS study completed by Mintek in 2009 using 476 t of rock. For DMS treatment of the Selkirk deposit, a separation density of 3.05 g/cm^3 was considered to be the optimal choice.

Table 13-13: Results of DMS Tests Gipronickel 2012

Borehole	Interval, m	Content in Samples, %		Content in DMS Products, %								Recovery into DMS Products, %							
				Sinks		Floats		2 mm		Total		Sinks		Floats		2 mm		Total	
		Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu	Ni	Cu
DSLK250	38.0-68.0	0.16	0.16	0.36	0.34	0.11	0.14	0.13	0.13	0.27	0.26	83.3	80.5	8.6	11.2	8.1	8.3	100.0	100.0
DSLK250	68.0-98.0	0.24	0.26	0.22	0.21	0.06	0.08	0.21	0.24	0.20	0.20	76.4	72.4	4.1	5.4	19.6	22.2	100.0	100.0
DSLK250	233.0-248.3	0.16	0.19	0.25	0.25	0.06	0.05	0.12	0.2	0.17	0.18	79.1	74.9	10.0	7.9	10.9	17.3	100.0	100.0
DSLK255	27.3-57.78	0.21	0.21	0.34	0.3	0.08	0.09	0.2	0.2	0.23	0.21	71.5	67.9	11.3	13.7	17.1	18.4	100.0	100.0
DSLK255	57.78-87.5	0.26	0.33	0.45	0.39	0.07	0.09	0.25	0.3	0.35	0.33	84.9	80.0	3.2	4.5	11.9	15.6	100.0	100.0
DSLK255	87.5-118.5	0.21	0.27	0.31	0.37	0.06	0.11	0.19	0.27	0.21	0.27	75.3	69.9	8.7	12.4	16.0	17.7	100.0	100.0
DSLK255	161.5-177.95	0.24	0.3	0.81	0.41	0.09	0.14	0.37	0.27	0.57	0.32	85.1	75.7	3.5	9.6	11.4	14.7	100.0	100.0
DSLK251	38.0-68.0	0.14	0.14	0.15	0.16	0.03	0.07	0.13	0.14	0.13	0.15	79.3	76.8	2.6	5.5	18.2	17.8	100.0	100.0
DSLK251	68.0-84.0	0.19	0.2	0.18	0.16	0.09	0.07	0.14	0.15	0.16	0.14	77.6	76.9	11.5	10.0	10.9	13.1	100.0	100.0
DSLK251	84.0-106.48	0.14	0.17	0.14	0.18	0.05	0.06	0.12	0.18	0.12	0.15	71.4	69.8	10.3	9.4	18.3	20.8	100.0	100.0
DSLK251	106.48-142.37	0.25	0.26	0.37	0.59	0.06	0.08	0.26	0.28	0.28	0.42	79.5	84.5	5.1	4.5	15.3	11.0	100.0	100.0
DSLK251	142.37-173.0	0.28	0.44	0.42	0.56	0.07	0.06	0.28	0.49	0.34	0.47	82.2	79.4	3.1	1.9	14.7	18.7	100.0	100.0
DSLK251	173.0-188.0	0.33	0.44	0.39	0.38	0.09	0.09	0.32	0.33	0.36	0.35	83.8	83.1	2.0	2.0	14.2	14.9	100.0	100.0

The effect of particle size on flotation was also examined. Samples of -2 mm size were ground in the 10 L laboratory-scale rod mill at the standard milling residence time of 10 minutes. The Selkirk sample demonstrated different rates of milling (Table 13-14). For the standard residence time, the -0.075 mm fraction content varied between 52.68% to 98.60%, with the average content being about 72%. Size distribution analysis was performed using a typical laboratory-scale vibrating screen arrangement fitted with the standard set of sieves; before commencing the screening procedure, the -40 μ fraction was washed off. Fine fraction analysis was carried out using Warman Cyclosizer – fine fractions' hydraulic classifier.

Table 13-14: Results of Flotation on Sized Feed

Borehole	Interval, m	Fraction Mass Pull, %					
		+71	-71+45	-45+20	-20+10	-10	Total
DSLK250	38.0-68.0	40.98	12.21	14.23	12.53	20.06	100.00
	68.0-98.0	38.45	13.53	16.64	13.19	18.19	100.00
	98.0-113.0	19.74	18.33	22.02	15.94	23.97	100.00
	113.0-128.0	19.40	18.67	20.32	14.86	26.76	100.00
	128.0-145.65	25.13	16.97	18.88	14.93	24.08	100.00
	145.65-173.0	19.13	20.73	20.33	14.81	25.00	100.00
	173.0-188.0	19.41	18.86	20.35	19.47	21.90	100.00
	188.0-218.0	30.17	17.47	16.00	13.61	22.75	100.00
	218.0-233.0	25.33	20.22	19.57	15.11	19.78	100.00
	233.0-248.3	35.38	15.67	18.85	13.65	16.44	100.00
DSLK251	38.0-68.0	47.32	12.07	12.38	10.91	17.31	100.00
	68.0-84.0	1.40	11.64	34.91	25.22	26.83	100.00
	84.0-106.48	31.14	16.75	17.97	13.92	20.23	100.00
	106.48-142.37	41.96	12.40	16.07	12.90	16.67	100.00
	142.37-173.0	29.72	17.62	18.90	14.65	19.11	100.00
	173.0-188.0	20.75	20.95	22.82	15.98	19.50	100.00
	188.0-218.0	22.58	18.67	19.75	15.39	23.61	100.00
	218.0-248.0	27.81	18.05	17.33	14.07	22.74	100.00
	248.0-274.83	20.78	20.10	17.05	14.19	27.88	100.00
DSLK255	27.29-57.78	27.98	18.87	18.00	14.32	20.82	100.00
	57.78-87.51	35.19	14.42	16.35	13.65	20.38	100.00
	87.51-118.48	31.98	16.75	17.26	14.11	19.90	100.00
	118.48-133.55	35.19	15.07	14.45	12.32	22.97	100.00

Mineralogy studies showed that the primary minerals are pyrrhotite, chalcopyrite and pentlandite; less common minerals including cobaltine, mackinawite and merenskyite were also found.

Disseminated and blebby mineralization is formed by pyrrhotite with granular pyrrhotite phases located between the borders of pyrrhotite grains and flame-like pentlandite, the latter occurring in the internal portion of pyrrhotite crystals. Granular pentlandite was typically 0.3-1.0 mm in size, while flame-like pentlandite size was 0.01-0.1 mm in size. Also, predominantly chalcopyrite pockets with pyrrhotite and, less often, pentlandite inclusions occurred. Granular formations of sphalerite were found in chalcopyrite. Massive mineralization was formed by pyrrhotite with regular inclusions of flame-like pentlandite, granular chalcopyrite, as well as by rarer inclusions of pyrite and magnetite. Granular pentlandite occurrence was seldom found; it framed the edge portions of massive pyrrhotite. Mackinawite formed laminated (scaly) phases in chalcopyrite, while cobaltine formed rounded grains in pyrrhotite.

Pyrrhotite was presented by hexagonal and monoclinic varieties; there was nickel contamination in the pyrrhotite, its average content being 0.8 w/w% Ni based on 28 measurements. Granular and flame-like pentlandite showed little difference in chemical composition. Pentlandite is characterized by the increased nickel content relative to stoichiometric one (36.4 w/w% Ni); Co as an impurity was found in the average amount of 2.1% (based on 34 measurements). Chalcopyrite typically had the standard chemical composition. The chemical composition of the principal sulphides was determined using the EPMA method with CamScan equipped with ED-Spectrometer (Table 13-15).

Table 13-15: Chemical Composition of Principal Sulphide Minerals by EPMA

Mineral (number of measurements)	Content, w/w%				
	S	Fe	Co	Ni	Cu
Pentlandite (34)	31.5	30.0	2.1	36.4	
Pyrrhotite (28)	37.2	61.6		0.8	
Chalcopyrite (4)	33.9	32.0			34.1

The Gipronickel Institute analyzed 23 of the composite samples to determine the amount of silicate nickel in each sample, the variation in cobalt content and the content of the refractory slag-forming components. Table 13-16 presents analytical results for the 23 samples. The non-recoverable silicate nickel averaged 0.04% Ni.

Table 13-16: Analytical Results from Samples of Holes DSLK250, 250, 255

Hole	Interval (m)	Ni Total (%)	Ni Sulphide (%)	Cu (%)	S (%)	Fe (%)	MgO (%)	SiO2 (%)	Al2O3 (%)	Co (%)	CaO (%)
DSLK250	38.0-68.0	0.23	0.19	0.20	2.14	8.85	11.4	41.3	16.9	0.015	10.4
	68.0-98.0	0.35	0.31	0.32	3.7	11.36	10.6	39.7	16.5	0.022	10.4
	98.0-113.0	0.37	0.33	0.39	4.2	11.97	10.1	37.8	16.3	0.022	9.42
	113.0-128.0	0.48	0.47	0.52	5.5	14.2	8.82	34.7	13.1	0.026	8.01
	128.0-145.65	0.49	0.49	0.57	5.9	13.8	7.20	33.3	12.6	0.027	7.96
	145.65-173.0	0.57	0.56	0.78	7.0	16.1	7.59	32.0	12.4	0.033	7.23
	173.0-188.0	0.54	0.54	0.66	7.0	16.0	6.83	31.5	12.2	0.031	7.1
	188.0-218.0	0.48	0.48	0.55	5.3	13.2	5.78	32.4	13.4	0.026	9.1
	218.0-233.0	0.35	0.33	0.42	4.4	12.22	8.57	39.5	16.3	0.023	10.2
	233.0-248.3	0.26	0.23	0.30	3.27	10.32	8.06	41.3	17.1	0.018	11.0
DSLK251	38.0-68.0	0.18	0.15	0.17	2.01	8.71	11.5	41.9	17.5	0.014	10.7
	68.0-84.0	0.23	0.18	0.20	2.14	8.96	9.56	40.6	18.1	0.014	10.6
	84.0-106.48	0.19	0.16	0.24	2.44	10.06	10.7	41.6	17.6	0.016	10.8
	106.48-142.37	0.33	0.31	0.34	3.8	11.19	11.1	41.5	16.5	0.022	10.4
	142.37-173.0	0.39	0.35	0.52	4.8	13.18	10.4	39.3	16.0	0.024	9.77
	173.0-188.0	0.46	0.41	0.48	5.8	15.12	9.43	34.7	15.5	0.027	9.16
	188.0-218.0	0.53	0.52	0.64	6.6	15.5	7.09	32.8	13.0	0.030	6.79
	218.0-248.0	0.51	0.46	0.57	5.4	14.5	7.22	40.0	13.3	0.029	7.45
	248.0-274.83	0.49	0.49	0.48	5.8	13.4	5.61	33.2	16.2	0.028	9.28
DSLK255	27.29-57.78	0.38	0.33	0.32	2.7	10.19	10.9	40.5	16.7	0.019	8.98
	57.78-87.51	0.36	0.31	0.33	2.55	9.53	10.5	41.0	16.5	0.019	10.4
	87.51-118.48	0.35	0.30	0.39	2.65	10.20	10.3	40.5	15.7	0.019	10.1
	118.48-133.55	1.08	0.88	0.60	6.4	16.3	7.45	37.0	14.4	0.041	7.74

13.1.10 BCL (Mintek, 2015)

After a change of TNMC ownership to BCL, Mintek of Randburg, South Africa was engaged to determine what changes would be needed at the Phoenix concentrator to produce a flotation concentrate that would meet the BCL smelter specifications. Although several metallurgical studies had been previously carried out, there was concern about the representativity of the previous samples used, and there was debate regarding the best approach to processing. A new sample was then collected, and this sample was also used to support a separate study of the potential for coarse waste rejection.

The new sample consisted of 700 kg of ROM material and 11 kg of drill core.

The mineralogy work confirmed that the new sample contained more disseminated mineralization and less massive mineralization as compared to the previous samples tested. This was confirmed by heavy media tests that indicated little potential for significant barren waste rejection by a DMS plant. Furthermore, detailed mineralogical work on samples, milled to the plant grind of 80% passing -75 μm, revealed that a significant amount of the nickel was present as pentlandite flames in the 5-20 μm size range within pyrrhotite. Liberation of pentlandite from pyrrhotite without compromising on nickel flotation recovery proved to be difficult. The strategy for the flotation plant was to ensure that the pyrrhotite was recovered into the final flotation product. Liberation data indicated that pyrrhotite was well liberated from the silicate gangue.

Scoping open-circuit laboratory flotation testwork indicated it would be possible to treat the Selkirk mineralization though the Phoenix plant. The only change to the then current operation would be an increase in $CuSO_4$ dosage in the grinding mill. Flotation with two (2) stages of cleaning using the following reagent suite was carried out: 50 g/t $CuSO_4$ in the mill, 85 g/t SIBX, 50 g/t Depramin347 and 40 g/t Dow200. This made a 7.6% mass pull to the re-cleaner concentrate with, for the level of testing adopted, the following specifications, which was expected to meet the smelter product specification except for the lowish Ni grade: 3.7% Ni, 3% Cu, 37% Total S, 54.9% Fe, 2.3% SiO_2, 0.7% Al_2O_3 and 0.8% MgO.

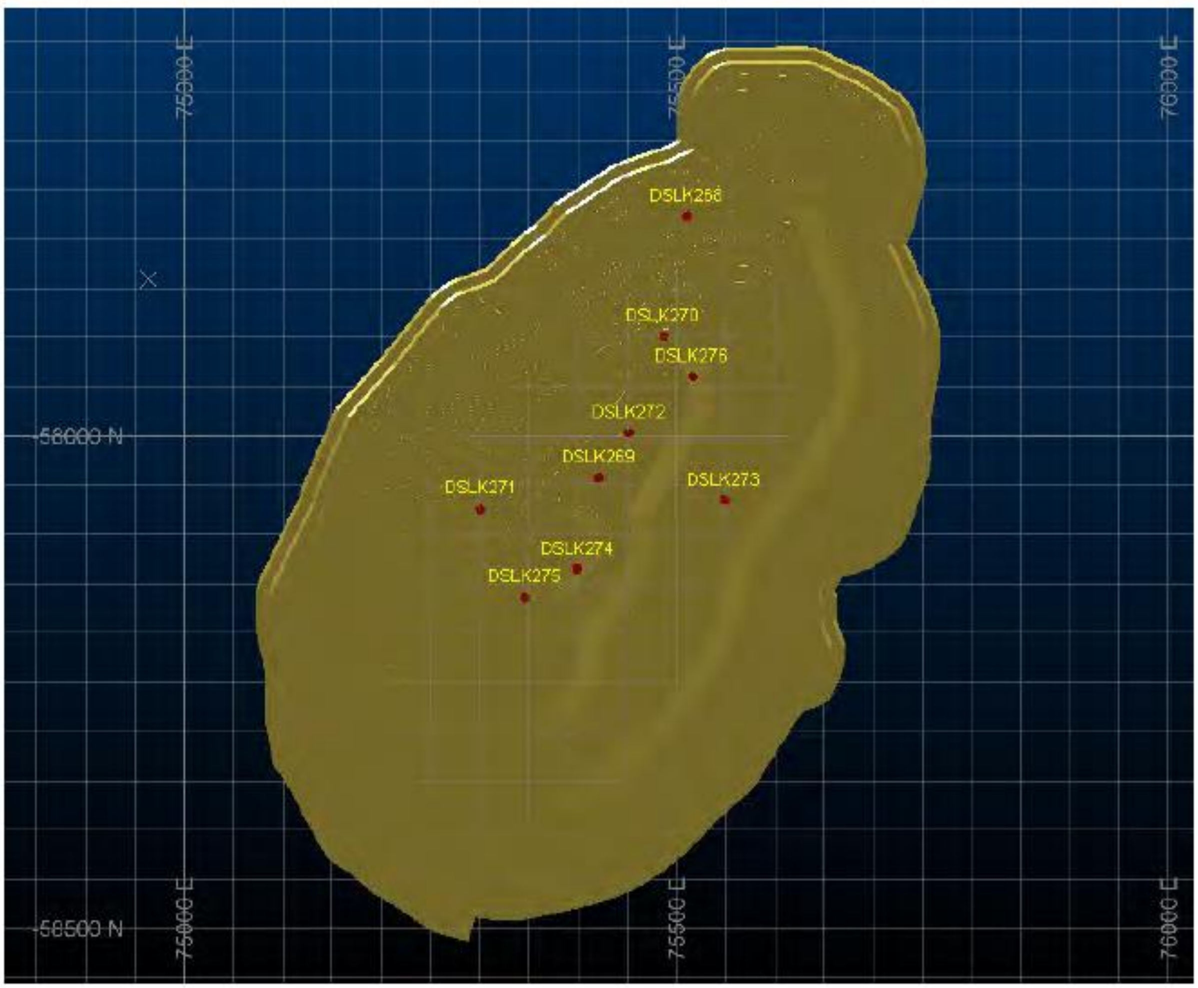
The product Ni grade shown above was achieved at an 81% Ni recovery and 83% Cu recovery. Additional processes such as the scavenging of flotation tails and reprocessing of tails through a magnetic separation stage was not considered a necessity. It was considered that locked cycle testwork could be used to define more closely whether the final product grade could be further enhanced.

13.1.11 BCL (Mintek, 2016)

A previous scoping study by Mintek (Bennie et al., 2015) indicated that it was possible to produce a flotation concentrate with a Cu grade of 3% and Ni grade of 3.7% at recoveries of 83% and 81%, respectively. However, the testwork was carried out on a single sample with a head grade of 0.33% Ni, which was higher than the expected feed grade of about 0.25% Ni. There was therefore concern that the grades and recoveries could potentially be overstated, and additional testing was warranted. Mintek, at the request of WorleyParsons and BCL, conducted variability testing in 2016 to evaluate the impact of a lower head grade on concentrate grades and recoveries.

Seven (7) new drillholes with uniform spacing across the proposed pit design, were drilled with the purpose of collecting metallurgical samples (Figure 13-6). One quarter of each of these drill cores was assayed in the TNMC laboratory to determine the grade distribution down hole. Each drill core was composited "down hole" to generate fourteen variability samples, three metallurgical samples, two (2) mineralized samples for flotation test work – one of lower grade (<0.2% Ni) and the second of a higher grade (>0.2% Ni) where possible, and a third barren sample (<0.1% Ni) which would be utilized for the comminution testwork. Note that DSLK275 and DSLK276 were not included in the testwork program.

Figure 13-6: Location of 2016 Metallurgical Drilling in Relation to Proposed Pit Design



Source: Worley Parsons (2016)

The following is a summary based on the Mintek work and report (Teme et al., 2018).

A high-grade and a low-grade composite sample were made from each of the seven (7) holes DSLK268 to DSLK274, to make 14 variability samples. The samples were prepared by a WorleyParsons geologist, who removed all the pockets of massive mineralization. Work included: chemical analysis, comminution testwork, flotation testwork to evaluate the effect of head grade on the grade-recovery response, mineralogical analysis, open circuit flotation testwork on typical projected feed grade for plant, locked cycle flotation testwork on each composite sample and settling testwork on flotation tailings from a bulk global composite.

Table 13-17 shows the head grades of each of the 14 variability samples. In addition to the variation in Ni grades, a high variation was also observed in the S and Fe contents which are indicative of variable pyrrhotite / pyrite / pentlandite content across the deposit which might affect the upgrading potential. Note that Rh was not reported as it was below the analytical method detection limit (< 0.01 ppm) and thus it was not considered significant. Each sample was subjected to an open circuit Rougher-Cleaner-Recleaner test utilizing the milling time, flotation configuration, residence times and reagent regime.

Table 13-17: Head Grade of Variability Samples Mintek 2016

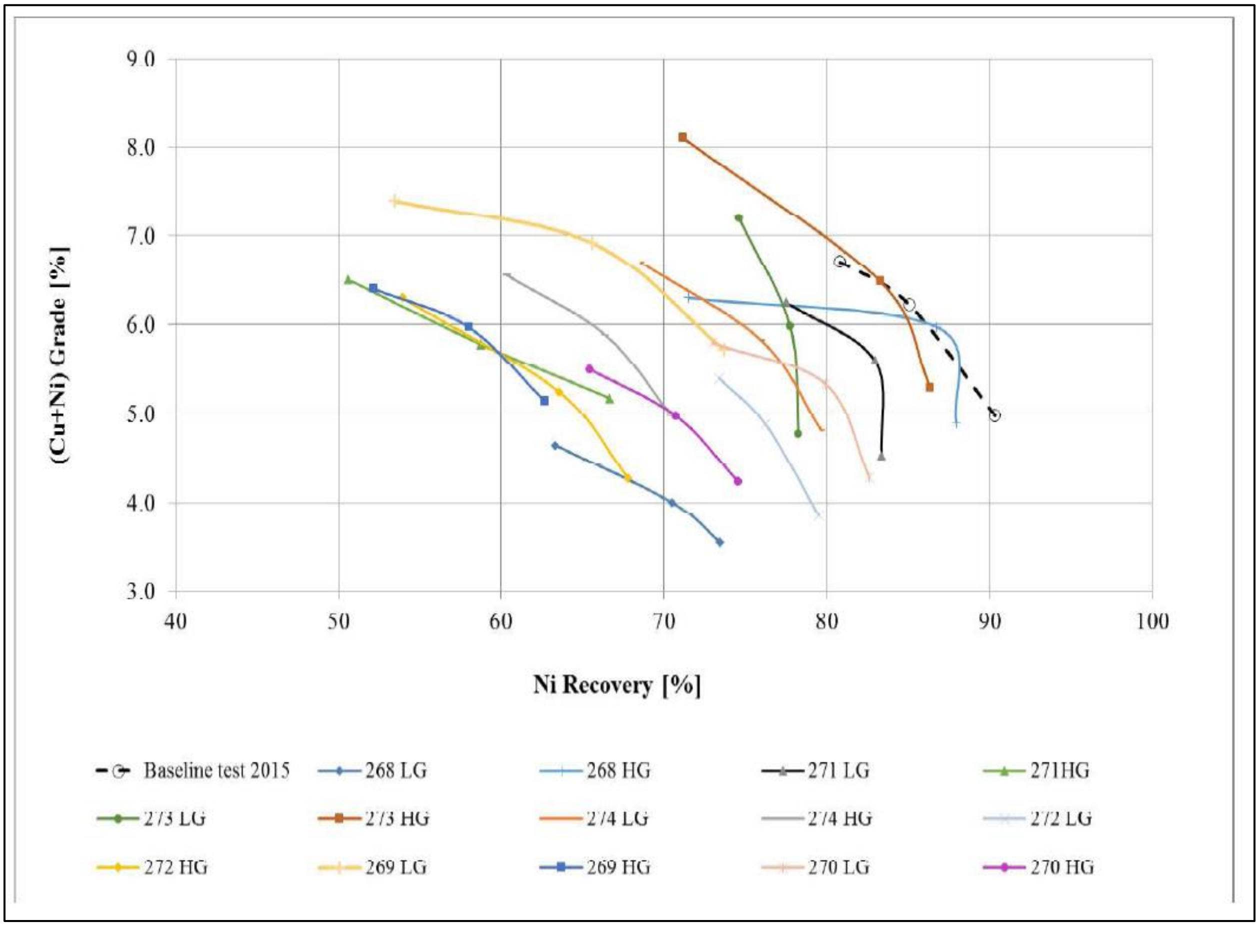
Sample No.	Cu %	Ni %	Fe %	S %	SiO_2 %	Al_2O_3 %	CaO %	MgO %	Pt ppm	Pd ppm	Au ppm	2E+Au ppm
Baseline 2015	0.28	0.33	10.2	3.72	39.4	15.7	10.3	9.26	-	-	-	-
268 LG	0.19	0.14	9.50	2.40	41.7	16.5	10.1	8.86	0.11	0.29	0.05	0.45
268 HG	0.31	0.18	9.71	2.88	42.8	16.2	9.30	8.81	0.12	0.45	0.06	0.63
271 LG	0.17	0.15	8.62	1.78	43.0	16.7	9.92	9.72	0.09	0.30	0.19	0.58
271 HG	0.32	0.21	10.5	3.31	40.9	16.0	9.43	9.78	0.14	0.51	0.08	0.73
273 LG	0.18	0.17	7.40	1.43	44.3	17.0	10.0	8.95	0.10	0.48	0.09	0.67
273 HG	0.24	0.25	8.06	2.04	43.0	17.9	10.1	8.95	0.14	0.56	0.18	0.88
274 LG	0.19	0.21	7.39	2.11	45.3	18.1	11.1	11.2	0.14	0.31	0.09	0.54
274 HG	0.42	0.40	10.60	4.43	38.3	16.1	10.2	10.1	0.13	0.71	0.11	0.95
269 LG	0.32	0.27	9.31	3.27	43.7	18.2	10.6	10.5	0.09	0.39	0.09	0.57
269 HG	0.68	0.49	13.20	6.98	36.0	16.1	9.77	10.0	0.13	0.78	0.11	1.02
270 LG	0.21	0.18	8.05	2.43	40.7	18.1	10.8	10.5	0.09	.034	0.08	0.51
270 HG	0.24	0.19	8.18	2.47	39.6	16.5	9.69	9.73	0.10	0.33	0.07	0.50
272 LG	0.20	0.16	8.51	2.18	42.6	17.9	10.8	11.6	0.08	0.29	0.06	0.43
272 HG	0.66	0.48	13.1	6.87	36.1	15.9	9.70	9.28	0.13	0.38	0.20	0.71
Maximum	0.68	0.49	13.20	6.98	45.3	18.2	11.1	11.6	0.14	0.78	0.20	1.02
Minimum	0.17	0.14	7.39	1.43	36.0	15.7	9.30	8.81	0.08	0.29	0.05	0.43
Median	0.24	0.21	9.31	2.47	41.7	16.5	10.1	9.73	0.12	0.39	0.09	0.61

A modified flotation flowsheet was used in this work as the 2015 baseline conditions were found to be unsuitable for some of the variability samples. Table 13-18 shows the results of the re-cleaner tests. From Table 13-18, the variability in the hardness across the deposit can be seen. The grind achieved at a fixed milling time of 78 minutes ranged from 45 to 80% passing 75 µm. Figure 13-7 also shows the grade recoveries curves for the variability samples.

Table 13-18: Summary of Baseline Re-cleaner Test Results Summary on Variability Samples - Mintek 2016

Sample	RT Grind	Cu Head Grade	Ni Head Grade	Cu+Ni	Rougher Concentrate								Recleaner Concentrate						
					Mass Pull	Grade (%)				Recovery (%)			Mass Pull	Grade (%)			Recovery (%)		
	%-75µm	%	%	%	%	Cu	Ni	Cu+Ni	Total S	Cu	Ni	Total S	%	Cu	Ni	Cu+Ni	Cu	Ni	Total S
Baseline 2015**	80**	0.28	0.33	0.62	11.3	2.20	2.79	4.98	44.3	89.7	90.3	96.3	7.61	3.01	3.70	6.71	83.0	80.8	81.8
268 LG	79.6	0.19	0.14	0.33	6.71	2.02	1.54	3.56	27.6	83.8	73.4	86.9	4.51	2.68	1.97	4.65	74.8	63.3	71.1
268 HG	80.5	0.31	0.18	0.49	7.49	3.19	1.71	4.90	28.9	88.7	80.3	85.7	4.74	4.10	2.20	6.30	72.1	65.3	70.1
271 LG	70.5	0.17	0.15	0.32	6.42	2.63	1.90	4.53	23.2	90.5	81.8	94.1	4.19	3.55	2.70	6.25	79.7	76.0	88.5
271 HG	72.9	0.32	0.21	0.53	10.8	3.33	1.85	5.18	30.4	95.3	86.5	91.9	7.94	4.10	2.20	6.30	86.3	75.7	84.4
273 LG	53.0	0.18	0.17	0.35	6.30	2.63	2.14	4.77	20.2	84.3	78.3	91.9	4.02	4.00	3.20	7.20	81.6	74.6	88.8
273 HG	57.1	0.24	0.25	0.49	8.33	2.72	2.58	5.30	21.6	89.2	86.4	91.6	4.78	4.40	3.70	8.10	82.8	71.2	77.2
274 LG	77.4	0.19	0.21	0.40	6.81	2.51	2.31	4.81	25.7	91.5	79.7	93.5	4.36	3.60	3.10	6.70	84.0	68.6	78.3
274 HG	70.1	0.42	0.41	0.83	13.2	2.54	2.72	5.26	26.4	89.8	88.2	92.4	9.89	3.10	3.30	6.40	82.2	80.4	82.9
269 LG	45.0	0.32	0.27	0.59	10.6	2.63	2.00	4.64	27.2	91.5	85.2	88.7	5.47	4.60	2.70	7.30	82.8	59.5	62.6
269 HG	79.2	0.67	0.50	1.18	10.1	4.04	3.3	7.31	29.1	89.5	86.7	90.5	6.38	6.15	4.20	10.35	86.8	70.5	63.1
270 LG	69.5	0.21	0.18	0.39	8.89	2.37	1.91	4.28	22.6	89.9	83.8	90.6	5.80	3.20	2.60	5.80	79.1	74.4	80.6
270 HG	74.8	0.24	0.19	0.43	6.74	2.25	1.99	4.24	26.8	77.2	74.6	77.9	4.70	3.00	2.50	5.50	71.7	65.4	68.0
272 LG	61.6	0.20	0.16	0.36	8.00	2.12	1.74	3.86	22.0	78.7	79.5	90.5	5.35	3.00	2.40	5.40	74.4	73.4	84.1
272 HG	81.2	0.65	0.48	1.12	16.45	3.17	2.45	5.62	30.5	92.2	87.8	90.0	7.26	6.80	3.70	10.50	87.3	58.5	43.2

Figure 13-7: Grade-Recovery Curves of Variability Samples Re-cleaner Tests



Source: Teme et al (2018)

Based on results, three composites were created for optimization of the rougher-cleaner flotation. Table 13-19 shows the grade of the three (3) composites.

Table 13-19: Head Grade of Composites [%] - Mintek 2016

Sample #	Cu	Ni	Cu+Ni	Tot S	Fe	SiO_2	$Al_2 0_3$	CaO	MgO
Composite 1	0.37	0.31	0.68	3.10	9.54	41.1	17.7	9.85	9.70
Composite 2	0.21	0.21	0.42	2.06	7.94	42.3	17.2	10.2	9.95
Composite 3	0.18	0.15	0.33	1.83	10.8	41.1	16.2	10.7	10.2

Results of the locked cycle flotation work on the three composites with variable Ni grades demonstrated that the current Phoenix concentrator could process the Selkirk mineralization with minor modifications on the process operating conditions

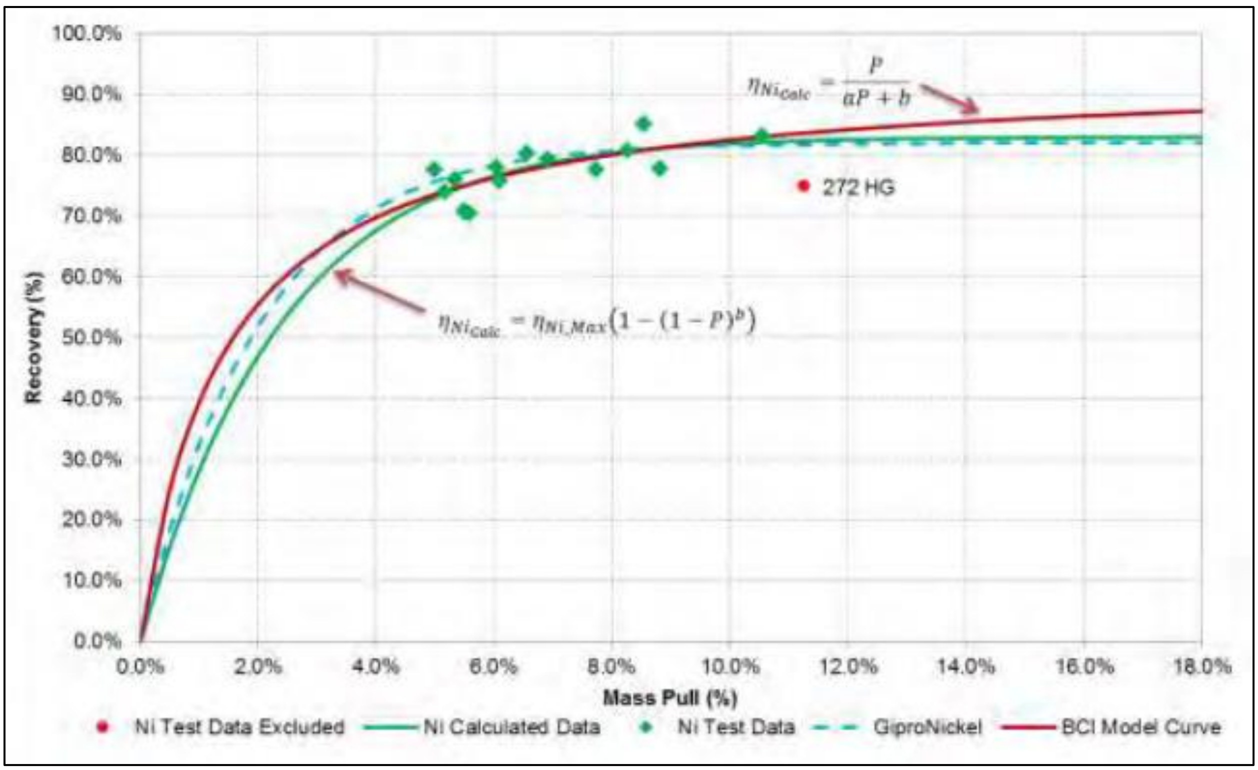
The projected flotation concentrate for each composite was:

- Composite 1: (0.31 % Ni feed grade), 11% mass pull, 4.9% Cu+Ni grade at 88% Ni recovery.
- Composite 2: (0.21 % Ni feed grade, 8% mass pull, 5.0 % Cu+Ni grade at 87% Ni recovery
- Composite 3: (0.15 % Ni feed grade), 7% mass pull, 4.1% Cu+Ni grade at 84% Ni recovery.

The figures below show nickel and copper recoveries plotted as a function of mass pull (Figure 13-8 and Figure 13-10) and as a function of head grade (Figure 13-9 and Figure 13-11). Recovery curves were not obtained for Pt, Pd and Au as the results were too erratic and showed little relation with mass pull or head grade.

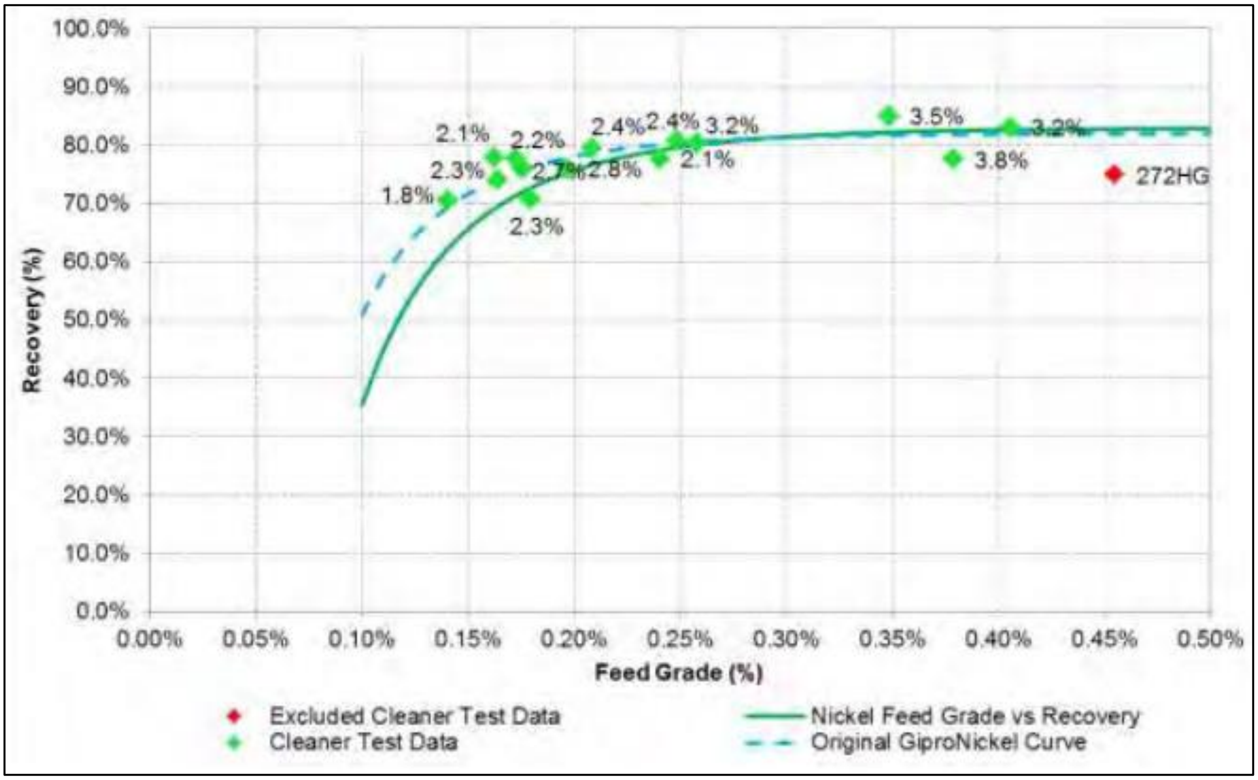
Although the average nickel concentrate grade achieved for the composite open circuit tests was 2.4%, marginally less than the targeted 2.5%, this was a function of the tests being configured to maximize recovery. The variability tests undertaken have demonstrated that a nickel concentrate grade of 2.5% is attainable at acceptable recoveries.

Figure 13-8: Nickel Recovery vs Mass Pull



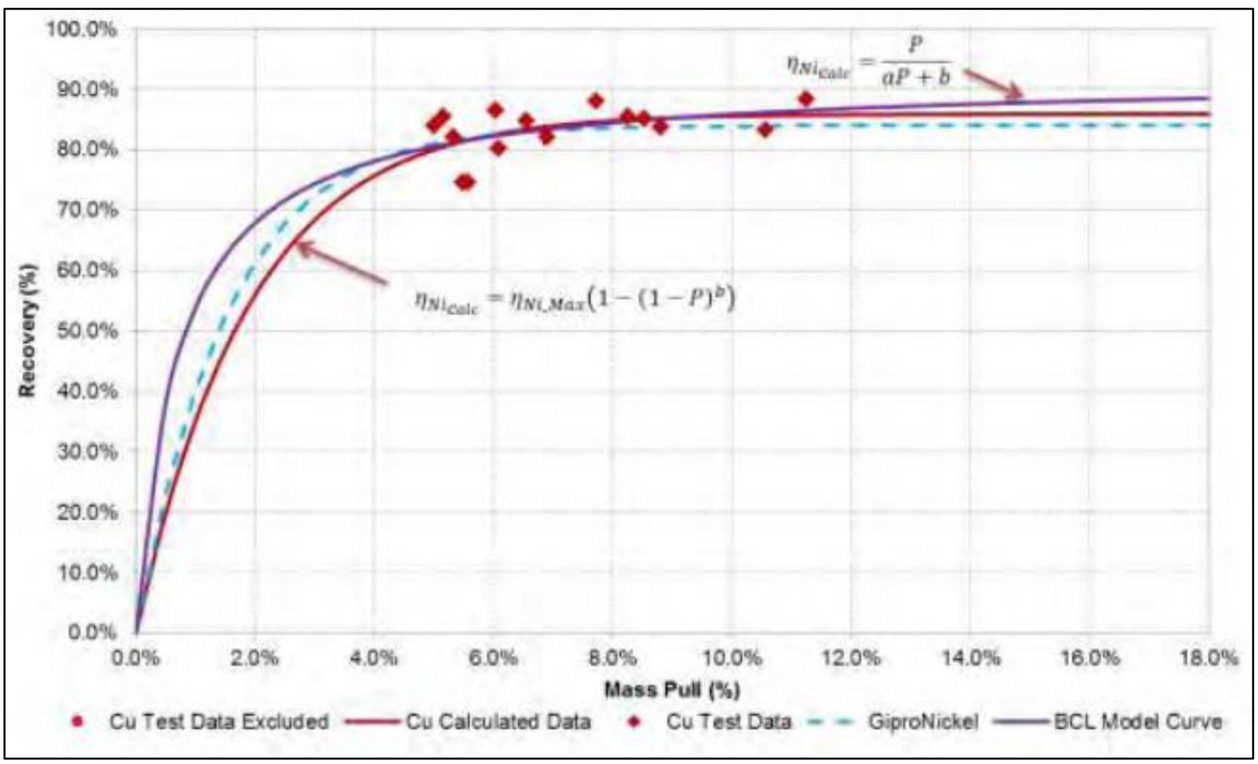
Source: WorleyParsons (2016)

Figure 13-9: Nickel Recovery vs Nickel Head Grade



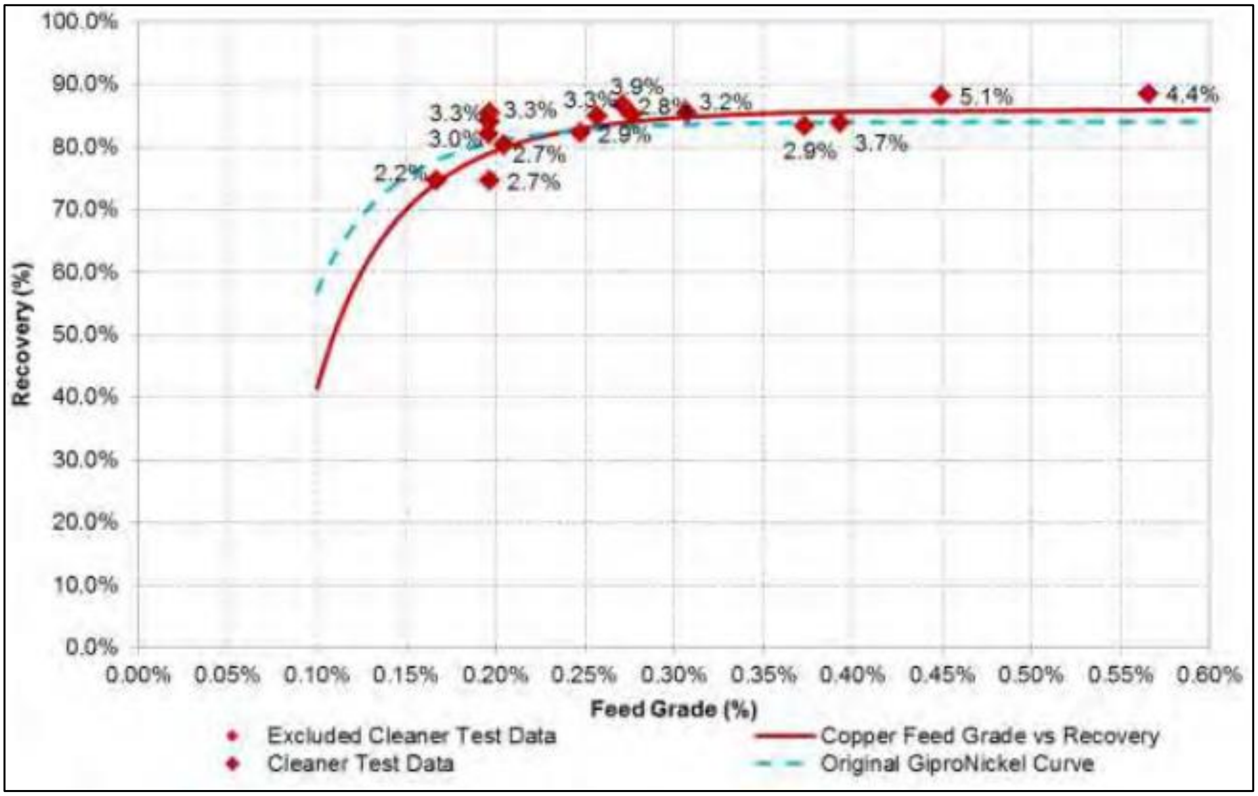
Source: WorleyParsons (2016)

Figure 13-10: Copper Recovery vs Mass Pull



Source: WorleyParsons (2016)

Figure 13-11: Copper Recovery vs Copper Head Grade



Source: WorleyParsons (2016)

13.2 Recent Metallurgical Test Program

PNRL conducted a metallurgical test program in 2021 to assess if marketable separate copper and nickel concentrates could be produced, along with information on metal recovery levels. The program followed a similar program conducted by PNRL on samples from the Selebi mines which had demonstrated that in this case required metallurgical objectives could be achieved.

Two (2) samples were prepared from 2016 drillhole DSLK278 which had not been previously sawn or assayed; hole DSLK278 was drilled through the center of the deposit, down-plunge of the historic underground workings. A low-grade ("LG") and high-grade ("HG") composite were prepared from semicontinuous intervals to represent potential open pit and underground type mineralization. The LG composite was comprised of 36, ~1 m semi-continuous intervals between 63.24 m downhole to 136.37 m while the HG composite was comprised of 20, ~1 m semi-continuous intervals between 126.67 m to 176.67 m. The core was sawn in half with half core sent to SGS Canada for metallurgical testing and the other half returned to the core boxes. The head assay for the two (2) composites is provided in Table 13-20.

Table 13-20: Head Assays of 2016 Drillhole DSLK278 for PNR Test Program in 2021

Analyte	Unit	LG Comp	HG Comp
Cu	%	0.55	0.66
Ni	%	0.44	0.77
Ni (s)	%	0.412	0.745
Fe	%	12.7	20.1
S	%	5.76	10.5
Si	%	16.3	13.4
Au	g/t	1.07	0.08
Pt	g/t	0.18	0.37
Pd	g/t	0.82	1.28
Rh	g/t	< 0.02	< 0.02

The samples at a grind size of ~ 100 µm were submitted for mineralogical characterization. This allowed for determination of the liberation and associations of the key minerals at the likely plant grind size. The mineralogy mostly confirmed the previous observations. The primary sulphide minerals were pyrrhotite, pentlandite and chalcopyrite with minor levels of pyrite. The pyrrhotite: pentlandite ratio was ~ 10:1 as expected. Pyrrhotite and chalcopyrite had good liberation while the pentlandite was only ~ 50% liberated. Most of the middling pentlandite was associated with pyrrhotite. All three sulphides had ~10% association with the silicate minerals, which could limit their recovery. Pentlandite liberation was acceptable for the – 53-micron fraction, and very good for the – 20-micron fraction. Pentlandite liberation was poor above 53 microns.

A full suite of comminution tests was conducted on the two (2) composites as shown in Table 13-21. The Selkirk samples were considered hard to very hard for semi-autogenous grinding (SAG) milling and ball milling, which confirms previous observations; the Selkirk mineralization was considered not a good candidate for SAG milling.

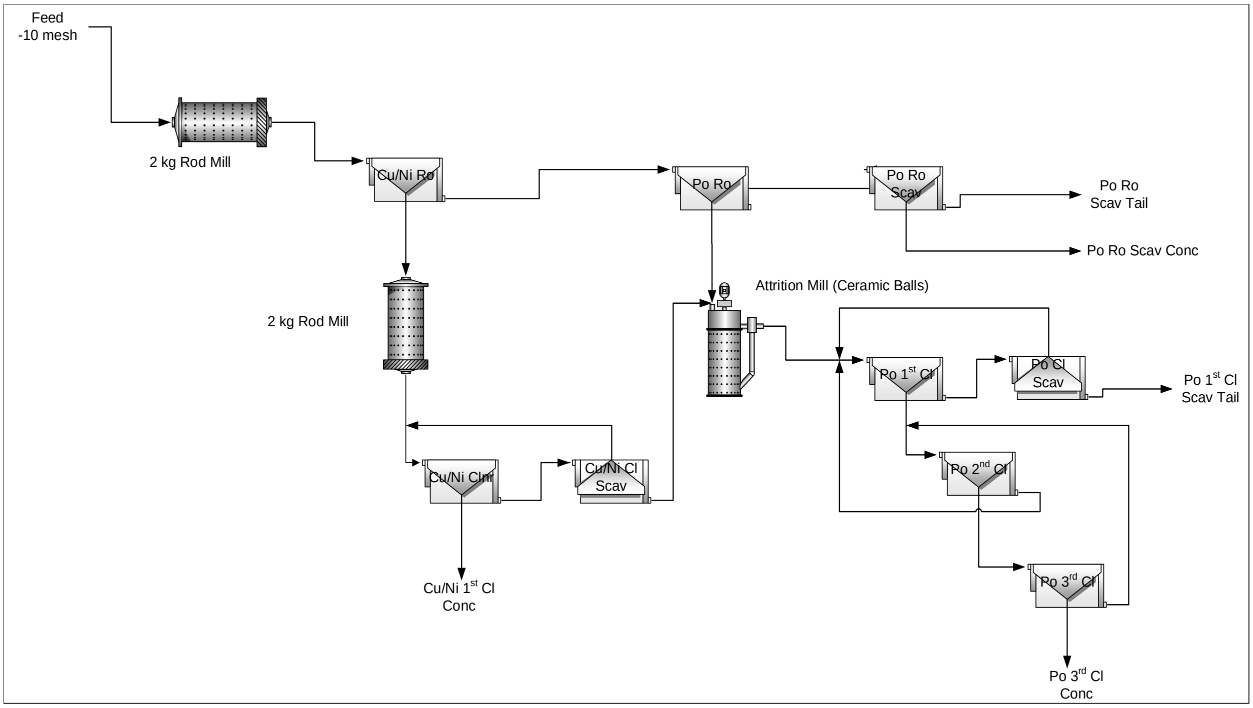
Table 13-21: Summary of Selkirk Comminution Results

Comp	SMC			Ai	RWI	BWI
	A x b	ta	SCSE (kWh/t)	g	kWh/t	kWh
LG	23.9	0.20	14.3	0.334	18.6	19.6
HG	30.1	0.23	12.8	0.249	15.8	16.0

**Notes: SMC = Steve Morrell Comminution, RWI = Rod Work Index, BWI = Ball Mill Work Index, SCSE = SAG Circuit Specific Energy, AI = Bond Abrasion Index, A x b and ta = JK Rock Breakage Parameters.*

Historical flotation testing had been generally focused on producing a low-grade bulk Ni-Cu concentrate, with maximum achievable metal recovery, for delivery to the (now closed) BCL smelter. The PNRL program was instead aimed at producing marketable separate Ni and Cu concentrates. The flowsheet (Figure 13-12) adopted is more typical of current Ni-Cu material processing practice, including pyrrhotite rejection. The Ni-Cu circuit is operated fairly selectively with low xanthate dosage so that the pyrrhotite does not actively float. The objective is to maximize copper recovery and available pentlandite to produce a higher-grade bulk Ni-Cu concentrate, which is subsequently transferred to the Cu separation circuit to float off a high-grade Cu concentrate, leaving a good quality Ni concentrate. The low xanthate dosage aids in the Cu separation. A small dosage of carboxy methyl cellulose ("CMC") was added to the Ni-Cu cleaner to limit gangue flotation. The pyrrhotite circuit focused on recovering the remaining pentlandite, seen as flame textures within the pyrrhotite. A fine regrind (15 µm) was required to achieve a reasonable degree of liberation to produce a secondary Ni concentrate with low Cu which can report to the Ni concentrate. High dosage of xanthate is required to actively float the pyrrhotite containing pentlandite flame textures. A pyrrhotite scavenger using $CuSO_4$ is included with the circuit to de-sulphurize the scavenger tailings to produce a non-acid to low acid generating tailings.

Figure 13-12: Flowsheet Used in PNRL Testing



Source: Liu (2021

A limited number of batch tests were conducted prior to locked cycle testing (LCT) to demonstrate the process and provide a metallurgical projection for the LG sample. The LCT consisted of two (2) LCTs with the initial test conducting the Ni-Cu and pyrrhotite circuit portions of the flowsheet, followed by a Cu separation LCT. The results of the test are shown in Table 13-22. The Ni-Cu and pyrrhotite circuits performed well, meeting grade targets and recovery expectations. The Cu separation performed well but could potentially be improved with a higher Cu recovery to the Cu concentrate as also reflected by the low Ni content contained within (0.33% Ni versus a target 0.7% Ni). The quality of the Cu concentrate was considered excellent. The final Ni concentrate grade showed 10% Ni, which was about at the lower limit currently typically considered for smelter-grade Ni concentrate. The Cu concentrate was considered to potentially attract good payability for Pd and Au, while the Ni concentrate was considered to likely attract good payability for Pt and Pd. Note that the bulk of the tailings (pyrrhotite scavenger tails) assayed 0.59% S which is considered potentially non-acid generating. The high-sulphur tailings product could potentially be stored in the main tailing's storage facility encased by the low sulphur tailings material.

Table 13-22: Locked Cycle Test Results for the SLK-LG Sample

Product	Weight %	Assay					
		Cu %	Ni %	S %	Pt g/t	Pd g/t	Au g/t
Cu Conc. & Ni Conc.	3.6	11.7	7.8	34.1	3.45	15.9	2.46
Cu 3rd Cl Conc.	**0.9**	**33.2**	**0.32**	34.4	**1.79**	**36.0**	**5.03**
Cu Ro Scav. Tail	2.3	5.88	10.3	33.1	3.65	7.96	1.59
Po 3rd Cl Conc.	0.4	5.03	10.5	36.5	5.91	14.4	1.50
Po 1st Cl Tails	13.3	0.20	0.75	22.6	0.23	0.57	0.06
Po Ro Scav. Conc.	4.0	0.12	0.53	25.1	0.25	0.54	0.06
Po Rougher Tail	79.1	0.05	0.05	0.59	0.08	0.20	0.03
Comb. Ni Conc. (Cu Ro Scan Tails +Po 3rd Cl Conc.)	**2.7**	**5.74**	**10.3**	33.7	**4.02**	**9.02**	**1.58**
Head (Calc.)	100.0	0.49	0.44	5.72	0.23	0.83	0.12
Head (Dir,)		0.55	0.44	5.76	0.18	0.82	0.07
Product	**Weight %**	**% Distribution**					
		Cu %	**Ni %**	**S %**	**Pt %**	**Pd %**	**Au %**
Cu Conc. & Ni Conc.		86.2	63.2	21.6	54.8	69.4	74.4
Cu 3rd Cl Conc.	0.9	54.6	0.7	5.7	7.3	40.1	38.8
Cu Ro Scav. Tail	2.3	27.1	52.2	13.0	36.1	21.6	30.0
Po 3rd Cl Conc.	0.4	4.5	10.4	2.8	11.4	7.7	5.5
Po 1st Cl Tails	13.3	5.4	22.3	52.5	13.7	9.1	7.0
Po Ro Scav. Conc.	4.0	1.0	4.8	17.8	4.5	2.6	2.1
Po Rougher Tail	79.1	7.4	9.7	8.2	27.0	18.9	16.6
Comb. Ni Conc. (Cu Ro Scan Tails +Po 3rd Cl Conc)	2.7	31.6	62.5	15.8	47.5	29.3	35.6
Head (Calc.)	100.0	100	100	100	100	100	100

Detailed concentrate assays (Table 13-23) found the Cu and Ni concentrates to be clean with

<1% MgO and no deleterious elements (As, Bi, Pb, Cl, F, Hg etc.) close to penalty levels. The Ni concentrate (Cu scavenger tails) assayed 0.64% Co which is well into the typical payable range for Ni concentrates. The Co concentration in the Cu concentrate was very low at 176 g/t.

Table 13-23: Detailed Concentrate Analysis from Copper Separation Products

Analyte	Unit	LCT-5 Cu 3rd Cl Conc B-E	LCT-5 Cu Ro Scav. Tails B-E	Analyte	Unit	LCT-5 Cu 3rd Cl Conc. B-E	LCT-5 Cu Ro Scav. Tails B-E
Cu	%	33.5	6.57	Mo	g/t	< 10	< 10
Ni	%	0.34	10.0	Na	g/t	243	985
S	%	33.8	32.5	P	g/t	< 200	< 200
Au	g/t	2.90	1.06	Pb	%	0.016	0.021
Pt	g/t	1.85	3.58	Rb	%	< 0.002	< 0.002
Pd	g/t	41.6	8.78	Sb	g/t	48	76
Rh	g/t	0.08	0.12	Se	g/t	66	64
Ag	g/t	72	48	Sn	g/t	< 20	< 20
Al	g/t	1010	10900	Sr	g/t	2.4	13.1
As	g/t	< 30	< 30	Ti	g/t	28	135
Ba	g/t	4	11	Tl	g/t	< 40	< 40
Bi	g/t	< 50	< 50	U	g/t	< 100	< 100
Ca	g/t	2160	13900	V	g/t	< 20	< 20
Cd	g/t	41	22	Y	g/t	< 0.5	< 0.5
Co	g/t	176	6370	Zn	g/t	1340	777
Cr	g/t	< 10	267	Te	g/t	91	31
Fe	g/t	366000	405000	F	%	0.030	0.026
K	g/t	< 200	< 200	Cl (HNO3 soluble)	g/t	18	22
Li	g/t	< 20	< 20	Si	%	0.21	1.95
Mg	g/t	524	5760	Hg	g/t	< 3	< 3
Mn	g/t	20	157				

13.3 Discussion of Past and Present Metallurgical Testwork

The initial metallurgical work on Selkirk samples was carried out by Anglo American Research Laboratory in 1970 / 1971 and initially considered processing options that permitted the production of separate Ni and Cu concentrates of marketable grades. Mineralogical studies indicated that the fine-grained Ni disseminations precluded such results at the level of testing carried out; instead, the testwork showed that realistically, at the time, only a fairly low-grade Ni concentrate that was typically handled at the BCL smelter was possible.

Later mineralogical work by Rio Tinto in 1985 produced similar results as the work by AAC and concluded that the high iron and sulphur content of the concentrate indicated acceptable handling in a flash furnace such as at BCL (now closed). Several options of exploitation were provided in an economic evaluation, including mining the massive sulphide portion of the orebody and direct shipping ore (DSO) to the BCL smelter.

The high-grade massive-sulphide mineralization at Selkirk was mined from 1989 to 2002, leaving behind a deposit described as being highly disseminated. The main objective of the testwork since then has been to maximize the value of processing of the disseminated mineralization through upgrading the feed, optimizing reagents and residence time, and optimizing grinding, producing a low-grade concentrate suitable for the BCL smelter. All studies have characterized the rock hardness as hard to very hard.

Mineralogical work carried out by Mintek in 2000 indicated that less than 1% of the nickel occurred as solid solution with pyrrhotite and approximately 10% of the nickel occurred as free pentlandite. The remaining nickel was present in close association with pyrrhotite, either as equidimensional grains attached to pyrrhotite grains, as exsolution lamellae in the pyrrhotite, or a small proportion locked in silicate gangue. This suggested that the pyrrhotite could potentially have a significant diluting effect on the metal grade in the concentrate. Fine grinding and long flotation residence time was indicated. As a result of the close association of pentlandite with pyrrhotite, magnetic separation was not considered a feasible option before flotation because <5% of the material was ferro-magnetic.

Additional subsequent metallurgical testing by Mintek included: magnetic separation, gravity separation, heap leaching (bottle roll tests), and flotation. In summary, magnetic separation was not considered a feasible option because as noted, <5% of the material was ferro-magnetic. Heap leaching showed nickel recoveries of 80 and 90% over extended periods of time but required a cheap source of sulphuric acid to be economic. DMS gave mixed results when comparing different studies. DMS was effective at upgrading to higher grade feed but when the cut-off Ni grade was lowered, a large volume of disseminated rock with potentially economic grades was discarded.

During 2005, Selkirk samples were processed at the Phoenix concentrator with mixed results. The Selkirk samples contain significantly more iron and sulphur than Phoenix samples with equivalent Ni and Cu content, resulting in lower Ni concentrate grades and lower Ni recoveries. The particle size of sulphide mineralization is also much smaller in the Selkirk samples. Testwork confirmed that fine grinding of the rougher concentrate and increased cleaner residence time produced improved results. More detailed studies were recommended at the time.

Additional testwork in 2007 evaluated the options to pre-concentrate the disseminated sulphide mineralization at Selkirk as potential feed for LionOre's Activox® technology. Two scenarios, a high-grade concentrate (>4.5% Ni) at a low recovery and a lower grade concentrate (<4% Ni) at higher recoveries were presented. Both scenarios had a provision for high-grade saleable Cu concentrate. The initial goal of producing a Ni grade of >4% and recoveries of 80% was not achieved in these particular tests due to the complex mineralogy of the Selkirk mineralization. A grade of >4% could only be obtained at low nickel recoveries (<40%).

Studies by Gipronickel between 2010 and 2012 studied methods to improve recoveries by applying a number of reagents, analyzing the effect particle size on flotation, and increasing recoveries using dense media and magnetic separation. Magnetic separation on the flotation tails made it possible to recover additional product having 0.8% Ni content at 6.8% recovery. Gipronickel also studied the nickel present in silicates. Further, they identified precious metal minerals of merenskyite, sperrylite and a mineral with a $Pd(Te, Bi, Sb)_2$ composition that might be attributed to the kotulskite-sobolevskite group. Gipronickel recognized a spatial variation in the nickel to iron content across the Selkirk deposit and also recognized the importance of a geo-metallurgical resource model.

Subsequent mineralogical work by Mintek in 2015 and 2016 was focused on identifying the changes required at the Phoenix concentrator to process Selkirk feed. Studies gave similar results, highlighting the sensitivity to primary grind and the presence of flame pentlandite.

PNRL's plans to redevelop Selkirk do not include processing of feed at the former Phoenix concentrator and therefore the recent testing by PNRL has focused on the ability to produce saleable nickel and copper concentrates. The flowsheet adopted is more typical of current Ni-Cu material processing practice, including pyrrhotite rejection. The laboratory scale testwork successfully produced a high-grade Cu concentrate with low Ni. The Ni-Cu and pyrrhotite circuits in the laboratory performed well, meeting grade targets and recovery expectations. The final Ni concentrate grade was 10% Ni, which is towards the current lower limit for market concentrate. The Cu concentrate will likely attract a good payability from Pd and Au credits, while the Ni concentrate will likely attract a good payability from Pt and Pd credits. Note that the bulk of the tailings (pyrrhotite scavenger tails) assayed 0.59% S which is considered potentially non-acid generating. The high-sulphur tailings could potentially be stored in the main tailing's storage facility encased by the low sulphur tailings material.

13.4 Future Metallurgical Testing

The current program was a rapid demonstration of what the metallurgy could potentially be today for the Selkirk deposit. There was insufficient time to rigorously develop all aspects of the flowsheet. It is envisioned that there will be three to four more phases of metallurgical development:

Rigorous development of the process would include:

- Primary grind target
- Regrind target
- Optimize reagent conditions
- Conduct multiple LCTs
- Characterize the low sulphur tailings:
    - Chemically
    - Environmentally
    - Physically

Variability testing would involve:

- Assess the variability within the deposit from geo domains and by head grade:
    - Heads
    - Mineralogy
    - Comminution
    - Flotation response

Conduct a pilot plant with the primary objective of producing products for physical characterization:

- Rougher concentrates for regrind power requirements
- Final concentrates for settling, filtration and rheology characterization

- Final concentrate for angle of repose and self-heating
- Concentrates for smelter samples
- Final tailings for environmental and physical characterization

The pilot plant would also demonstrate the metallurgical response:

- Cu Separation would be performed at laboratory scale as a large, locked cycle test.

A final phase of testing would address any gaps found from the above test programs.

14 MINERAL RESOURCE ESTIMATES

Not applicable at this stage of the Project.

15 MINERAL RESERVE ESTIMATES

Not applicable at this stage of the Project.

16 MINING METHODS

Not applicable at this stage of the Project.

17 RECOVERY METHODS

Not applicable at this stage of the Project.

18 PROJECT INFRASTRUCTURE

Not applicable at this stage of the Project.

19 MARKET STUDIES AND CONTRACTS

Not applicable at this stage of the Project.

20 ENVIRONMENTAL STUDIES, PERMTTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Introduction

The Selkirk Mine, currently under care and maintenance, was acquired by PNRL in 2022 through an asset purchase agreement with the Liquidator of TNMC. Prior to liquidation, TNMC had been in the process of evaluating the extraction of disseminated sulphides in an open pit operation. During this evaluation, numerous studies were carried out and an EIA was submitted and approved in 2008; and an EMP that included an Archaeological Impact Assessment (AIA) had been approved in 2016.

Prior to the asset purchase, PNRL engaged Ecosurv and MSA to conduct environmental and social due diligence review (Parry, 2021). The aim of the work was to identify existing material environmental and social risks and liabilities and identify whether the International Finance Corporation (IFC) Social and Environmental Performance Standards were met.

PNRL engaged archaeologist Catrien van Waarden of Marope Research to complete the archaeological mitigation work recommended under the 2019 AIA.

Below is a summary of the previous studies carried out by TNMC.

20.1.1 Background / Status of Permits

The Selkirk Mine started production in 1989 as an underground operation. In 2002, the underground mine was put under care and maintenance due to the depletion of high-grade copper and nickel ores that were accessible via underground mining method. The Selkirk Mine has been operated to a depth of 105 m below surface.

In 2008, an EIA was submitted to the DEA to obtain authorization for a redevelopment of the Selkirk Mine. The EIA was approved on April 17, 2008 in accordance with section 14 (1a) of the EIA Act, No. 6 of 255. The EIA was valid for a period of twenty-five (25) years, with some conditions attached. As no redevelopment took place, the authorization lapsed. Thereafter, TNMC decided to construct and operate an open pit mine (the “Selkirk Open Pit Mine”) within the Selkirk Mining Licence area. DEA, after evaluation of the Project Brief, advised TNMC that an EMP should be prepared to guide the implementation of the proposed project. TNMC contracted Sangwenu Engineering & Environmental Consultants to develop an EMP on their behalf.

In 2016, the EMP was compiled for the potential construction and operation of an open pit within the Selkirk Mining Licence area. This open pit would generate 5 million tons of end product per annum. The original intention was that the end product would be processed at the Phoenix concentrator and treated at the BCL smelter in Selebi Phikwe. In July 2016, the EMP submitted on behalf of TNMC was approved by the DEA in terms of Section 12(1) of the Environmental Assessment Act No. 10 of 2011, reference number DEA/BOD/F/EXT/MNE 030 (13). The DEA used the 2008 EIA as input to the 2016 EMP.

It should be noted that the authorization was valid for a period of two (2) years. However, as the Project was not implemented during this time, the authorization lapsed in July 2018. Furthermore, the authorization states that the requisite licence to operate the Project must be obtained from the licensing authority prior to Project implementation.

In terms of the potential impact to cultural heritage, the Botswana National Museum has issued a permit for drilling to continue. In the interim, there are archaeological studies ongoing, which will be completed over the next 12 to 18 months. Prior to any potential construction activities, the final deliverables of this cultural heritage study should be submitted and approved. More information is provided in Section 20.2.11 of this chapter.

Note that this chapter is based on information provided within the following documents:

- Sengwenu Engineering & Environmental Consultants, 2016.
- Department of Environmental Affairs, 2016.

20.2 <u>Environmental Baseline Considerations and Impacts</u>

Environmental studies were carried out in 2008 and in 2016 for the proposed development of the Selkirk Open Pit Mine. The studies were carried out to determine the baseline environmental conditions and assess the potential impact to the site. Whilst a brief summary of the comprehensive studies undertaken is provided hereunder, it should be considered that these impacts were generated to some degree by the original mining operation, all being an underground mining activity. The impacts as discussed below should be considered in terms of the nature of the receiving environment and the location of sensitive receptors relevant to any redevelopment at Selkirk. Note that there may be additional potential impacts that were not included as part of the original Project scope in the 2008 and 2016 studies.

20.2.1 Climate

The climate of the broad Project area, similar to the rest of Francistown and the North East District, is semi-arid with hot and relatively rainy summers and cool and dry winters. The climate for the Project area is, therefore, classified as semi-arid and subtropical.

Rainfall in the Project area is highly variable and occurs in summer with annual ranges of between 360 mm and 420 mm. An annual rainfall variation is around 40% with a reliability of 50%. Rainfall and other precipitation peaks around January and February. The time around July is driest.

The maximum temperatures in the Project area are fairly uniform with an annual average temperature of 20°C; however, the minimum temperature is only uniform in summer and drastically drops in winter months reaching temperature as low as (-5°C) on average and average minimum temperature of 13°C. This indicates that the Project area is characterized by hot summers and extremely cold winters.

20.2.1.1 Climate Risk and Adaptation

There is a significant global initiative towards promoting the 2030 Climate and Energy Framework to reduce greenhouse gas emissions to at least 40% below the 1990 levels by the year 2030. This is termed the "net-zero emissions" plan for 2030. Therefore, it is highly recommended that responsible project planning should address reduced emission alternatives. Many international mining companies are fast adapting to renewable energy operations. Any planned mining developments or redevelopments must include climate risk and adaptation assessments. The Sustainable Development Goal 13 calls for an "urgent action to combat climate change and its impacts".

International funding organizations and national environmental permitting authorities will be considering effective action and responsible stewardship of the climate change crisis.

20.2.2 Topography

The topography in the Project area in the North East District is gently undulating with an altitude of 850-1,000 m masl. The area where the Selkirk is located is rocky terrain with relatively flat to gently undulating terrain with a few hills in the area. However, excavations and construction works have resulted in alteration of the landscape.

Potential Impacts: Topography will be altered through the excavation of the pit and the deposition of materials on surface. The Project site should be restored as close to the original topography as practical.

Operational management of topography may include berms, revegetation of stockpiles and concurrent backfilling of the pit.

20.2.3 Geology, Geomorphology and Soils

The geology of the Project area is composed largely of the Selkirk Formation that consists of felsic and mafic volcanic intruded by mafic bodies, usually altered to metagabbros hosting the Phoenix and Selkirk deposits. The Selkirk deposit exits in the North East District of Botswana where the regional geology is dominated by Archean lithologies of the south-western portion of the Zimbabwe Craton.

The Selkirk Mining Licence area is located in the Hard Veld characterized by generally well drained and moderately deep sandy loams and sandy clay soils. Soils on top of the escarpments / small hills are rocky brown sandy clay loams. At the bottom of the hills, the soils are sandy loams. Given the high proportions of sand particles, the soils are vulnerable to erosion and contamination since the infiltration on loamy sands is quite high. The water infiltration rate for sands is quite high at more than 5 cm/h implying high vulnerability to contamination.

Potential Impacts: The geological impacts will be directly related to the development of a pit. These impacts are unavoidable but will be dealt with through the construction phase and managed through the implementation of the EMP.

Soils disturbance and erosion, as well as soil pollution, were identified as the most important potential soil impacts generated by the proposed development of the Selkirk Mine. These impacts can be well managed through the implementation of the EMP, and will form a significant component of on-site monitoring, management and mitigation actions.

20.2.4 Hydrology, Hydrogeology and Water Quality

The Project area is situated on elevated ground at approximately 1,001 masl within the Sikukwe and Tekwane sub-catchment area of the Tati River. The site has several kopjes; the most pronounced being the one intended for the proposed open pit mine excavation. This high point has characteristics of a small plateau where drainage is such that rainwater is rapidly lost to tributaries of the Tekwane and Sikukwe rivers. This tends to promote high erosion that bares decomposed granites to the southeast of the Selkirk Mining Licence area.

The major river in the area is the Tati River which flows south eastwards and discharges into the Shashe River at a point located approximately 20 km downstream. The Project area is positioned on a localized watershed within a sub-catchment located between two (2) ephemeral tributaries of the Tati River as mentioned above. Under normal rainfall conditions, rain falling near the mine dissipates rapidly into, or evaporates from, the soil. However, during abnormally high storm events, runoff from the site is directed predominantly southeast feeding into the Tekwane River and southwards along poorly defined drainages that feed into the Sikukwe River. The Tekwane River is an ephemeral drainage characterized by erratic short lived flow events on only two to three days of the year.

Borehole information in the Selkirk Mining Licence area obtained through drilling and testing of yields by Francistown Jobbers (Pty) Ltd indicates that:

- Water aquifers were struck at 30 m and 60 m;
- Boreholes were drilled to between 75 and 80 m;
- The yields range from 2.7 to 3.6 m^3 per hour; and
- The water rest level is at 28.5 m depth.

This data is fairly representative of aquifers in the area. However, aquifers are affected by rainfall amounts responsible for the recharge.

Potential Impacts: The quantity and quality of water required for the operation will need to be determined. The nearest significant surface water body to the Project area is the Ramokgwebana River 20 km away. There are some boreholes around the Project site which source groundwater for various uses. Industrial water is used at the Phoenix Mine and is sourced from the Shashe Dam. Potable water can be sourced from a pipeline which supplies the Marsiloje village. However, this will need to be discussed with the Water Utilities Corporation ("WUC").

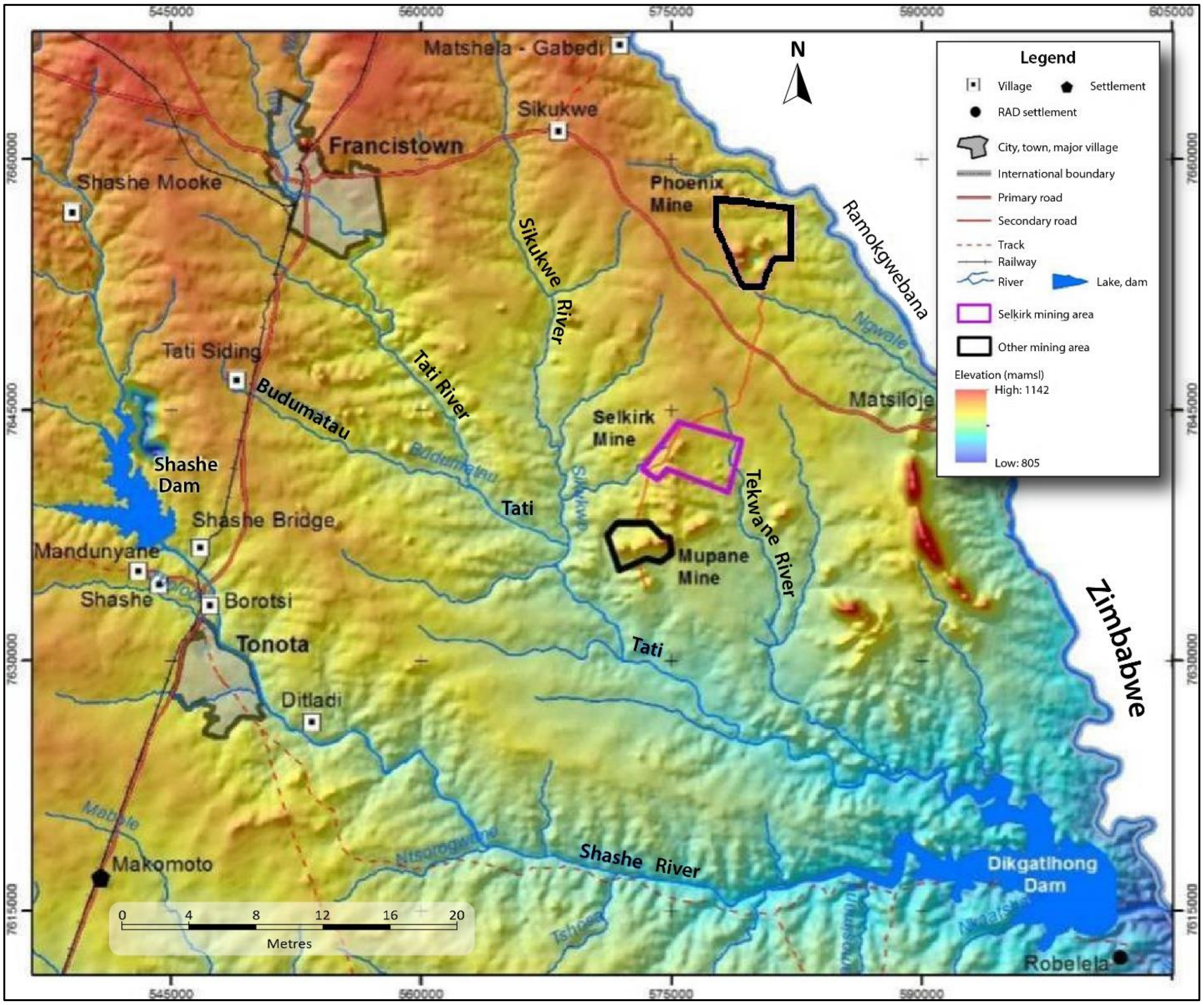
Surface water may be impacted by the proposed operation in terms of changes in quality and stream flow regime fluctuations relating to discharge of treated water from the mine into the surface water system.

Groundwater will need to be modelled to understand the impact of the operation on the pollution plume over time. Effects on quality and quantity of groundwater will be generated by dewatering activities, drawdown as well as acid mine drainage. A numerical groundwater model will be required in order to assess the direction, rate and significance of impacts, and to advise on potential cut-off infrastructure or other means of minimizing the effects of the impact (Figure 20-1).

The sources of pollution to groundwater and surface water will be related to:

- Excavations and exposing rock materials to oxidation;
- Surface and groundwater pollution from low grade stockpiles and runoff from workshops and offices;
- Spillage of hydrocarbons from storage areas and from vehicles;
- Pollution runoff from solid waste stockpiles and disposal areas; and/or
- Spillages or seepage of nickel concentrates and other heavy metals at the storage dam or other storage facility.

Figure 20-1: Hydrology in the Project Area



Source: PNRL, 2022.

20.2.4.1 Acid Rock Drainage Potential

Acid mine drainage can be released anywhere on the mine where sulphides are exposed to air and water — including waste rock piles, tailings, open pits, underground tunnels, and leach pads. Acidity from the mine water as well as heavy metals and sulphates may impact on the surface water habitats and ecosystems as well as the availability of the clean water to local water users. Strategies to reduce the impact of acid mine drainage should include management measures to minimize the oxidation of sulphide materials, to prevent or minimize contaminants polluting the environment, and treatment to allow the re-use of materials.

20.2.5 Flora

The Selkirk Mine is located within an area of tree savannah, dominated by Mopane – Acacia mixed woodlands. Mopane thickets dominate the deeper soils, *Combretum hereroense* (Mokabe) occurs on the rocky hillslope areas and shallow slopes. The mixed savannah main species, apart from Mopane and Mokabe trees include typical savannah trees and shrubs such as:

- Senegalia erubescens;
- Burkea africana;
- Acacia nigrescens;
- Comiphora pyracanthoides;
- Grewia bicolor;
- Grewia flavenscens;
- Grewia subspathulata;
- Dichrostacys cinerea; and
- Boszia faetidia.

The vegetation at the Selkirk Mine was cleared during previous mining operations.

Potential Impacts: Key identified impacts included destruction and loss of vegetation species, habitat fragmentation and the risk of veld fires. However, the study indicated that the vegetation on site is typical of the region and no protected species were identified on site. Furthermore, redevelopment of the mine may require additional tree removal and clearance. None of the protected or Red Data tree species as listed in the Forest (Declaration of Protected Trees) Order (1981) have been identified within the Project site. However, it would be recommended that a biodiversity specialist be appointed to confirm that none of the trees require permitting for removal. Moreover, education around the risk of veld fires should be promoted with contractors and Project team.

20.2.6 Fauna

There is little wildlife in the Project area, the surrounding communal and freehold farms. The most common wildlife species that are normally seen in the area are steenbok, kudu, duiker, jackals, leopards, squirrels, and scrub hare. There are also bird species identified on site. However, no endangered or protected species were expected on site and the species known to populate the area are common.

Potential Impacts: The key impact was highlighted around disturbance and displacement of bird animal species. While the site may support a small population of fauna, the fragmentation of habitat will increase vulnerability of these faunal communities.

20.2.7 Air Quality

Potential Impacts: The predominant sources of air pollution from the construction and operation of the mine will be related to dust from excavations, blasting, drilling, hauling and crushing. The other emission will be the carbon monoxide from the haulage of materials into and off the mine. While these dust and vehicle emissions can be managed and reduced through mitigation actions, there should be a design included within the mining plan to minimize the production of dust and vehicle emissions through innovative engineering. Long term monitoring of dusts and emissions will be required.

20.2.8 Waste Management and Sanitation

Domestic waste generated in the broad Project area is collected and transported by the North East District Council for disposal at a dumpsite. In the case of industrial waste, the District Council encourages companies to be responsible for the disposal of the solid waste they generate. There is no WUC sewer line passing in the vicinity of the Project sites; the Project is using a sewer system that disposes water into residue tanks and then, into slime dam water for re-use in the plant at the Phoenix Mine.

Potential Impacts: Health impacts are potentially linked to poor waste management and disposal practices. The proposed Project development and its associated activities such as fueling and servicing of construction vehicles will generate waste, and this waste would need to be managed in an environmentally friendly manner. Solid waste and liquid waste will be generated.

The mine will be required to plan for and adequately manage all forms of waste generated by the construction, operation, rehabilitation and decommissioning. Current infrastructure that will need to accommodate waste from the development would be:

- Existing sewer system that disposes water into residue tanks and disposes this at the slimes dam for re-use at the Phoenix concentrator;
- Dumela Landfill Site in Francistown for general waste;
- Recycling of appropriate waste;
- Waste Rock Dumps; and
- Tailings Facilities.

Liquid wastes can be treated and re-used as process water, but this will need to be licensed through the appropriate legislation as discussed later in the document. A Waste Management Plan will be required to understand waste streams, volumes of waste, and appropriate handling and disposal thereof for the development.

20.2.9 Land Use

The predominant local land use is mining and livestock farming.

Potential Impacts: Where the mine infrastructure needs to be developed outside of the current mining rights, there may be a conflict of land use with the farmers. Loss of land for agricultural use may have an impact on local farmers due to decreased agricultural and grazing capacity. This issue should be addressed with the farmers currently utilizing the freehold farms.

Additionally, land use modifications including reduced agricultural or grazing capacity, introduction of non-native species, increased infrastructure, etc. may result in disturbances to existing services and aesthetic, noise or visual nuisances to local communities.

20.2.10 Noise and Vibration

Potential Impacts: Mining activities will increase the local noise and vibrations generated within the area, and it will be important to assess these impacts and identify potential sensitive receptors. Tests will need to be done on the stability of infrastructure in terms of vibrations from blasting and initial conditions of such infrastructure should be documented to compare with any future claims of damage from vibrations once the construction and operation commences. Noise monitoring will be a long-term requirement and technical mitigation for noise sources should be investigated. Noise and vibration should also be assessed against employee effects.

20.2.11 Archeology

Approximately 60 archaeological sites of interest were identified and recorded in the vicinity of the Selkirk Mine. A high density of ancient gold and copper mines have been found in the area. There are old mine shafts recorded within the Project area.

Potential Impacts: A detailed archaeological and cultural heritage study has been initiated for the site. All site work has been completed and the identified artefacts have been cleared and bagged. These will be logged and analyzed over the next 12 months. The area has been demarcated as highly significant in terms of the archaeological findings and a management, maintenance and avoidance plan will be required as a deliverable from the cultural heritage study. In addition, it is essential that a “chance find” protocol is in place to immediately report this find and to avoid any further impact to the site.

Note that the Botswana National Museum has issued a permit for drilling to commence prior to the submission of the completed cultural heritage study.

20.2.12 Socio-Economic

As the major centre of formal employment within the region, Francistown is the focal point for migrants in the region, with most of them retaining strong links with their traditional homes and with rural economy. The dominant activities in terms of the number of persons employed are wholesale and retail, manufacturing and public administration. The mining industry has had a major positive impact on employment.

The Project area has functional proximity to the City of Francistown and has economically benefitted from that in terms of employment. Most residents of Matsiloje / Matshelagabedi and the surrounding areas are employed in Francistown and commute every day to work there.

The study area has health facilities in the major villages. Nyangabwe Primary Hospital serves as a referral centre for the Northern Region of Botswana. There is a fully equipped clinic at the Phoenix Mine Site. In Botswana as a whole, and in the North East District in particular, HIV / AIDS pose a great challenge. Due to a very strong stigma associated with the virus, some people still decline to declare their HIV status for the fear of being rejected by the families.

Potential Impacts: The identified socio-economic impacts were highlighted as significant and would need to be managed post-closure of the mine. The socio-economic impacts would include:

- Loss of, or impact to, environmental resources that have social and economic value to the communities.
- Post-mining land use and the risk of rehabilitation not being implemented effectively, or at all.
- Risks to health and safety through transmission of AIDS by migrant workers, health and safety of the mining vehicles operating on public roads and infrastructure health and safety which may affect employees or the public.
- Heavy vehicle traffic on roads leading to traffic congestion.
- Influx of migrant labour.

Potential negative socio-economic impacts have been assessed as moderate to high. There will need to be a detailed socio-economic study to support an application for future activity at the Selkirk Mine.

A positive impact of the proposed project would be the employment opportunities, entrepreneurial opportunities for secondary and tertiary industries and the upskilling of local labour force and job seekers. The potential for positive impacts of the Project is moderate. These impacts should be optimized as far as possible.

20.3 Environmental Management Plan

A summary of some of the key hazards of mining to the environmental are provided in Table 20-1. The release of heavy metals into the air and into the water resources are a key environmental impact, which also causes health issues. Management of stockpiles and waste storage facilities is important to reduce the potential for impact. Handling of dangerous goods and hazardous wastes must be well implemented in order to avoid environmental and human impacts.

Table 20-1: Summary of Key Environmental Hazards of Mining*

<table>
<tr><th>Risk</th><th>Environmental Aspect</th><th>Relevant Dangerous Good / Hazardous Waste</th></tr>
<tr><td>Overtopping of tailings dam</td><td rowspan="3">Groundwater
Surface water
Soil</td><td rowspan="10">Solid and liquid waste:
-Radionuclides including thorium and uranium.
-Heavy metals.
-Acids.
-Fluorides.
-Air Emissions:
-Radionuclides including thorium and uranium.
-Heavy metals.
-HF, HCl, SO, etc.</td></tr>
<tr><td>Collapse of tailings dam by poor construction and maintenance</td></tr>
<tr><td>Pipe leakage</td></tr>
<tr><td>Ground of tailings pond leaking</td><td>Groundwater</td></tr>
<tr><td>Waste rock stockpiles exposed to rainwater</td><td>Groundwater
Surface water
Soils</td></tr>
<tr><td>Dust fallout from waste rock and tailings</td><td>Air
Soil</td></tr>
<tr><td>No rehabilitation at end of life of mine</td><td>Land use
Long term contamination of soil, groundwater and surface water</td></tr>
<tr><td>Emission generation without flue gas filters</td><td>Air
Soil</td></tr>
<tr><td>Processing without wastewater treatment</td><td>Surface water</td></tr>
</table>

**This table has been adopted from the Selkirk EMP (Sangwenu Engineering & Environmental Consultants; May 2019)*

An EMP is a tool for proactive management of the environmental aspects of a proposed project so as to minimize the significance of negative impacts and environmental hazards as listed in Table 20-1. The EMP enhances the positive impacts by moderating the spatial extent and duration of an impact. During project construction and operation phases, proactive management is vital for avoiding or minimizing environmental effects. The EMP serves as a guide in ensuring that the environmental issues are taken into consideration during the construction and operation of the proposed development project.

The EMP for this proposed project was developed in 2016 and seeked to achieve reactive management of environmental impacts associated with the proposed construction and operation of the Selkirk Open Pit Mine by TNMC during the construction, operation and decommissioning phases. This EMP will now need to be revisited.

Furthermore, the EMP indicates the following liabilities that would need to be considered when accepting responsibility for the mining rights area:

- Mine equipment such as:
    - Drainage systems;
    - Underground mine equipment;
    - Office blocks and other storage buildings;
    - Pit dewatering system;
    - Open pit;
    - Waste dumps;
    - Access roads; and / or
    - Trenches.

These liabilities would need to be addressed in terms of what infrastructure could be utilized in the redevelopment of the mine, and which infrastructure would require long-term monitoring and management, which would have financial implications and long-term environmental considerations.

20.4 Social and Community Commitments

There are a number of stakeholders that may be affected by the operation and eventual closure of the Selkirk Mine. The stakeholders identified for the Project are:

- PNGB Project Supervisor / Safety, Health, Environment (SHE) Technical Manager Projects and Technical Team;
- Department of Mines (Francistown);
- North East District Council; Physical Planning (Tati Siding Resource Centre);
- Water Utilities Corporation (Francistown);
- Botswana Power Corporation;
- Department of Water Affairs (Francistown);
- Department of Waste Management and Pollution Control;
- Department of Wildlife and National Parks (Masunga);
- Department of Forestry and Range Resources (Francistown);
- District Administration, District officer Development;

- Department of Roads (Francistown Office);
- Department of Occupational Health and Safety (Francistown);
- Tribal Administration and local community Matsiloje and Matshelagabedi;
- Area Councillor Mma Mpetsane: Matsiloje / Matshelagabedi;
- Freehold Farmers;
- District AIDS Committee Francistown DAMSAC; and
- Botswana Police Services, Matsiloje.

Following a stakeholder engagement process undertaken by TNMC as part of the 2016 EMP for the Selkirk Open Pit Mine, the following issues and agreements were negotiated between TNMAC and the community:

- Waste management is the duty of the mine.
- Waste separation at source is essential and must be enforced.
- Occupational health issues associated with dust and noise must be addressed through established methods of preventative actions and use of recommended personal protective equipment (PPE).
- Water bodies, especially underground aquifers, must be protected through efforts that ensure absolute avoidance of pollutants into water courses.
- Ground-water monitoring must be done regularly through water sampling of boreholes.
- Vegetation clearance to straighten roads and for siting facilities must be preceded by a survey of vegetation species and necessary permits from Department of Forestry and Range Resources.
- Jobs should be provided to jobless Batswana.
- Mining methods applied must be effective and efficient to ensure maximum resource exploitation that leads to a much longer life of the mine.
- Water resources must be used wisely, applying recycle / re-use options as much as possible.
- Design appropriate methods that limit accidents on the roads and at the intersection with the primary road to Matsiloje.
- Good neighbourliness is of utmost importance that requires miners to respect property of their farm neighbours e.g., desisting from poaching and careless driving that results in collision with livestock.
- Fencing of the road to TNMC must be carried out.

- A fund for final pit rehabilitation must be established to facilitate comprehensive decommissioning of the pit.
- Neighbouring farmers must receive routine information on progress of mining and changes that may affect them.

20.5 Operating and Post-Closure Requirements and Plans

20.5.1 Environmental Monitoring and Reporting

Site environmental monitoring and reporting requirements should be undertaken to ensure compliance with the relevant approvals and licence conditions.

20.5.2 Mine Closure Plan

There is a Selkirk Mine Decommissioning Plan as part of the 2016 EMP which covers the decommissioning of the existing underground mine infrastructure. The closure and decommissioning include the following:

- Engineers must have a Closure Plan.
- Removing appropriate equipment, and materials such as the underground mining equipment.
- Demolishing structures, dismantling or salvaging of materials / equipment.
- Land improvement or rehabilitation of the disturbed sites.
- The Project will also require planning, mapping, design, bidding, and demolition plan.
- Documentation of the project equipment.
- Periodic checks and monitoring.
- The mine must set up a fund that will ensure the suggested mitigations are catered for in terms of The Mines and Mineral Act (1999), Section 65(9) which states that “The holder of a mineral concession shall make adequate ongoing financial provision for compliance with his obligations under this section”.

It is estimated that the decommissioning phase will take twelve (12) months to complete. No decommissioning has yet commenced.

20.6 Legal Framework

The fundamental acts, plans, policies and standards related to the environmental and social considerations and health in Botswana are shown in Table 20-2.

Table 20-2: Acts, Plans, Policies and Standards Related to Environmental and Social Considerations and Health in Botswana Permitting Process

No.	Details
Environmental Management	
1.	Environmental Assessment Act No 10 of 2011, 2011
2.	Environmental Assessment Regulations, 2012 (amended 2016)
Mining	
3.	Mines and Minerals Act, 1999
4.	Mines, Quarries, Works and Machinery Act, 1978
Water	
5.	Water Act, 1968
6	Water Utilities Corporation Act, 1970
7.	National Water Policy, 2012
Biodiversity and Conservation	
8.	Wildlife Conservation and National Parks Act, 1992
9.	Wildlife Conservation Policy, 2013
10.	National Policy on Natural Resources Conservation and Development, 1990
11.	National Biodiversity Strategy Action Plan, 2004
Agriculture and Forestry	
12.	Forest Act,1968
13.	Agricultural Resources Conservation Act, 1974
14.	Herbage Preservation Act (Prevention of Fires), 1978
Heritage Resources	
15.	Monument and Relics Act, 1970 (revised 2001)
Waste Management	
16.	Botswana Waste Management Act, 1998
17.	Botswana's Waste Management Strategy, 1998
18.	Guidelines for Disposal of Waste by Landfill, 1997

No.	Details
19.	Botswana Recycling Guidelines, 2012
Air Quality	
20.	Atmospherics Pollution (Prevention) Act, 1971
Health	
21.	Public Health Act, 2013
22.	National Policy on HIV/AIDS of 1998, revised 2013 (and National Policy in HIV and Gender, 2006
Industrial	
23.	Factories Act, 1979
24.	Standards Act, 1996
Land Use and Planning	
25.	Town and Country Planning Act, 2002
26.	State Land Act, 1966 (amended 2003)
27.	Tribal Land Act, 1968 (amended 2008)
28.	Botswana Land Policy, 2015
Development Planning	
29.	National Development Plan 11
30.	Vision 2036 (2016 – 2036)
31.	North East Development Plan (2000-2025)
32.	National Master Plan for Arable Agricultural and Dairy Development, 2002
33.	National Master Plan for Wastewater and Sanitation, 2003
Standards	
34.	Ambient Air Quality – Limits for Common Pollutants (BOS 498:2012)
35.	Maximum Permissible Limits for Environmental Noise (BOS 575:2013)
36.	Wastewater – Physical, Microbiological and Chemical Requirements (BOS 93:2012)
37.	Drinking Water – Specification (BOS 32:2015)
38.	Drinking Water for Livestock and Poultry – Specification (BOS 365:2010)
39.	Water Quality for Irrigation – Specification (BOS 463:2011)
40.	BOS ISO14001:2015 Environmental Management Standard

Whilst all the act, policies and plans detailed above will need to be complied with, key legislation related to the proposed mining activities is the following:

20.6.1 Environmental Assessment Act, 2011

The Environmental Assessment Act provides for EIAs and/or EMPs to be used to assess the potential environmental and social effects of planned development activities; to determine and to provide mitigation measures for effects of such activities that may have a significant adverse impact on the environment and communities; to put in place a monitoring process and evaluation of the environmental impacts of implemented activities; and to provide for matters incidental to the foregoing. Only after the competent authority (DEA) has approved the EIA and/or EMP can the project proceed.

The environmental impact assessment process normally entails:

- The identification of potential environmental and social impacts.
- The identification of measures to mitigate the adverse impacts and enhance the positive effects.
- Undertaking consultations to inform and solicit the views and concerns of interested and affected parties about the proposed project.
- The development of an EMP that outlines the proposed measures to mitigate identified environmental, social and archaeological impacts.

For the undertaking of environmental studies in compliance with the Environmental Assessment Act (2011), the Environmental Assessment Regulations (2012, amended 2016) have been developed. The Environmental Assessment Regulations clearly outline the activities to be undertaken for an EIA study / EMP, as well as the information and format to be submitted to the DEA for review. As part of the EIA process includes the undertaking of specialist studies where required this includes Archaeological Impact Assessment which is required under the Monuments and Relics Act (2001).

Implications: Given the nature and scope of the proposed developments the DEA had mandated that an EMP be developed for all stages for the Selkirk Open Pit Mine project. This EMP was compiled and approved in 2016. The EMP had a two (2) year validity period and will therefore need to be updated and re-submitted for approval. The EMP will be subject to stakeholder engagement with all Interested and Affected Parties ("I&APs"). The EMP will also require revised specialist studies, including but not limited to, the following:

- Archaeological Assessment;

- Biodiversity Assessment (terrestrial and freshwater ecology);
- Hydrological and Geohydrological Assessment;
- Air Quality Assessment;
- Waste Assessment;
- Socio-economic Assessment; and
- Climate Risk and Adaptation Assessment.

20.6.2 Mines and Minerals Act, 1999

The Mines and Minerals Act covers all aspects of mining; to provide for the granting, renewal and termination of mineral concessions; to provide for the payment of royalties; and for matters incidental to and connected to the foregoing. Over and above licensing of mining companies, the Act clearly stipulates the environmental obligations of the licence holders and the requirement for licence application. The Act makes provision for the exploration for and development of mineral resources.

Implications: The relevant licence will need to be obtained from the Departments of Mines and Energy prior to mining activities commencing should the project progress to this phase.

20.6.3 Mines, Quarries, Works and Machinery, 1978

The Mines, Quarries, Works and Machinery Act provides for the safety, health and welfare of persons engaged in prospecting, mining and quarrying operations including any works which are part of and ancillary to mining and quarrying operations and to make provision with respect to the inspection and regulation of mines, quarries, works, and of machinery used in Mines and quarries.

Implications: All sections are relevant and must be considered should the project progress to mining construction and operation. However, PNRG will have to comply with sections that specify construction of dumps, maintenance of all machinery used in the mine, and protection against incidental damage to men and equipment.

Chapter 44:02 includes persons engaged in prospecting, mining, quarrying operations and provision for inspection of regulations of mines. It also includes sections on slimes dams, fuel and oil spills, and effluent water.

Sections 595 to 598 which require reporting on "labour and wages figures, Health and Mortality Returns and Returns Mineral output" have been reviewed. As soon as infrastructure drawings are completed, they will need to be submitted as per these sections.

20.6.4 The Water Act, 1968

The Water Act primarily provides for the prevention of the misuse and pollution of water through enforcement of penalties. The Act also addresses the ownership, protection and the rights to use public water, and requires that the water resources within the Project area and beyond should not be polluted by any matter derived from the mining operation. Under the Act, development proponents must first obtain water rights from the Water Apportionment Boards ("WAB") before any act such as constructing a dam or proceeding to store, use or discharge any effluent into the public water. The process also includes applying for water rights that will provide the permission required to do such. Under these provisions, it is an offence to pollute or foul any public water by either discharging any substance likely to pollute or by dumping any material in a place where water is likely to flow and carry the pollutants along. Such offences are liable to penalties to be paid by the polluter.

According to the Act the state owns all water resources and have appointed Water Authorities for development rights and water users in specific areas:

- The WUC has the duty to provide safe drinking water to all urban areas in so-called water working areas. The WUC charges full resource costs to end users in these areas to recuperate costs.
- The Department of Water Affairs ("DWA") is charged with the establishment of reticulated water supply system in rural villages. Here DWA is responsible for operation and maintenance of these systems.

Implications: The Act introduces the issuing of Water Rights for the use of public water other than for watering livestock, washing and cooking, or use in a vehicle. This implies that should the management require using public water for any other use not listed above it should apply for permission to do so. The management is also advised to use recycled water for construction works instead of using potable water. The operations of the Selkirk Open Pit Mine therefore requires that the management safeguard against discharges and pollution of public water. Furthermore, should the liquid wastes be treated and used as process water, a Water Right will need to be obtained from the DWA.

20.6.5 Atmospheric Pollution (Prevention) Act, 1971

This Atmospheric Pollution (Prevention) Act provides for the prevention of pollution of the atmosphere as a result of different processes and activities conducted country wide. With regards to the proposed project the Act requires that emission of objectionable matter be controlled. The objectionable matter as defined in Section 2 of the Act, refers to “smoke, gases including noxious or offensive gases, vapours, fumes, dust or any other matter capable of being dispersed or suspended in the atmosphere which is produced or likely to be produced by any industrial process”.

Implications: Given the nature of the proposed project, it is anticipated that matters such as dust and gaseous fumes will be produced during construction, operation and from transporting trucks and other earth moving machinery, waste carriers, and backup generators. However, these impacts will be of high significance as it is recommended that the management ensure that they regularly service the equipment and encourage TNMC to use road worthy trucks around the Selkirk Open Pit Mine so as to minimize emissions from exhaust fumes.

Additional implications for atmospheric pollution are related to climate change and the emission of greenhouse gases. The project design should strongly consider low emission alternatives, such as solar photovoltaic (“PV”) energy sources, at all levels of the construction, operation and decommissioning of the mine and supporting facilities and infrastructure.

20.7 Permit Requirements

The following permits will need to be obtained:

- Updated and approved EMP by the DEA (subject to stakeholder engagement);
- Permit from the Botswana National Museum to commence with full construction activities;
- Licence from the Department of Mines and Energy; and
- Water Right for liquid waste processing and re-use by the DWA.

In addition, a Waste Management Plan and Decommissioning Plan will be required.

The following specialist studies to support these applications are envisaged:

- Archaeological Assessment, which has commenced;

- Biodiversity Assessment (terrestrial and freshwater ecology);
- Hydrological and Geohydrological Assessment;
- Air Quality Assessment;
- Waste Assessment;
- Socio-economic Assessment; and
- Climate Risk and Adaptation Assessment.

21 CAPITAL AND OPERATING COSTS

Not applicable at this stage of the Project.

22 ECONOMIC ANALYSES

Not applicable at this stage of the Project.

23 ADJACENT PROPERTIES

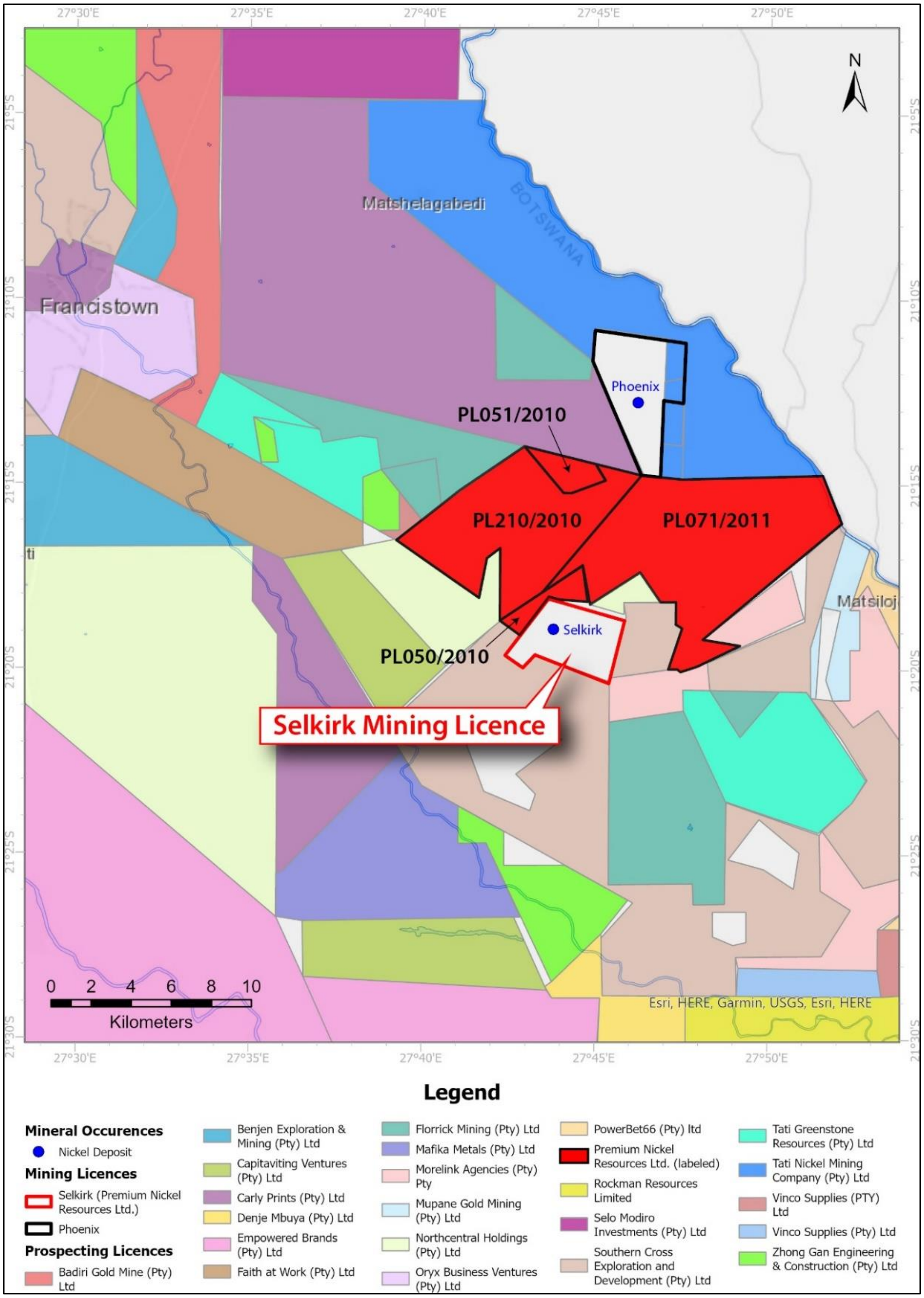
The Selkirk Mining Licence, located 15 km to the south-west of the Phoenix Mine, is surrounded by numerous exploration licence holders. The Mupane gold mine, located 30 km south-east of Francistown and 6 km south-west of the Selkirk Mining Licence, is the only operating gold mine in Botswana at the time of writing, and has recently changed ownership, in May 2022, from Galane Gold to Hawks Mining Company Pty Ltd ("Hawks Mining"). Exploration licences directly to the south of the Selkirk Mining Licence are held by Hawks Mining as part of the package of licences surrounding the Mupane Mine.

PNGB has also acquired four exploration licences that cover the ground between the Selkirk Mining Licence and the Phoenix Mine, which were transferred from TNMC to PNGB effective October 1, 2022. Details are provided in Section 4.

Figure 23-1 presents the various exploration licence holders surrounding the Selkirk Mining Licence.

The QP has not relied on information from adjacent properties for this Technical Report and has been unable to verify information regarding properties outside the Selkirk Property. Information in respect of adjacent properties is not necessarily indicative of the mineralization at the Selkirk Property that is the subject of this Technical Report.

Figure 23-1: Map Showing Surrounding Claim Holders Around the Selkirk Mining Licence and the Prospecting Licences

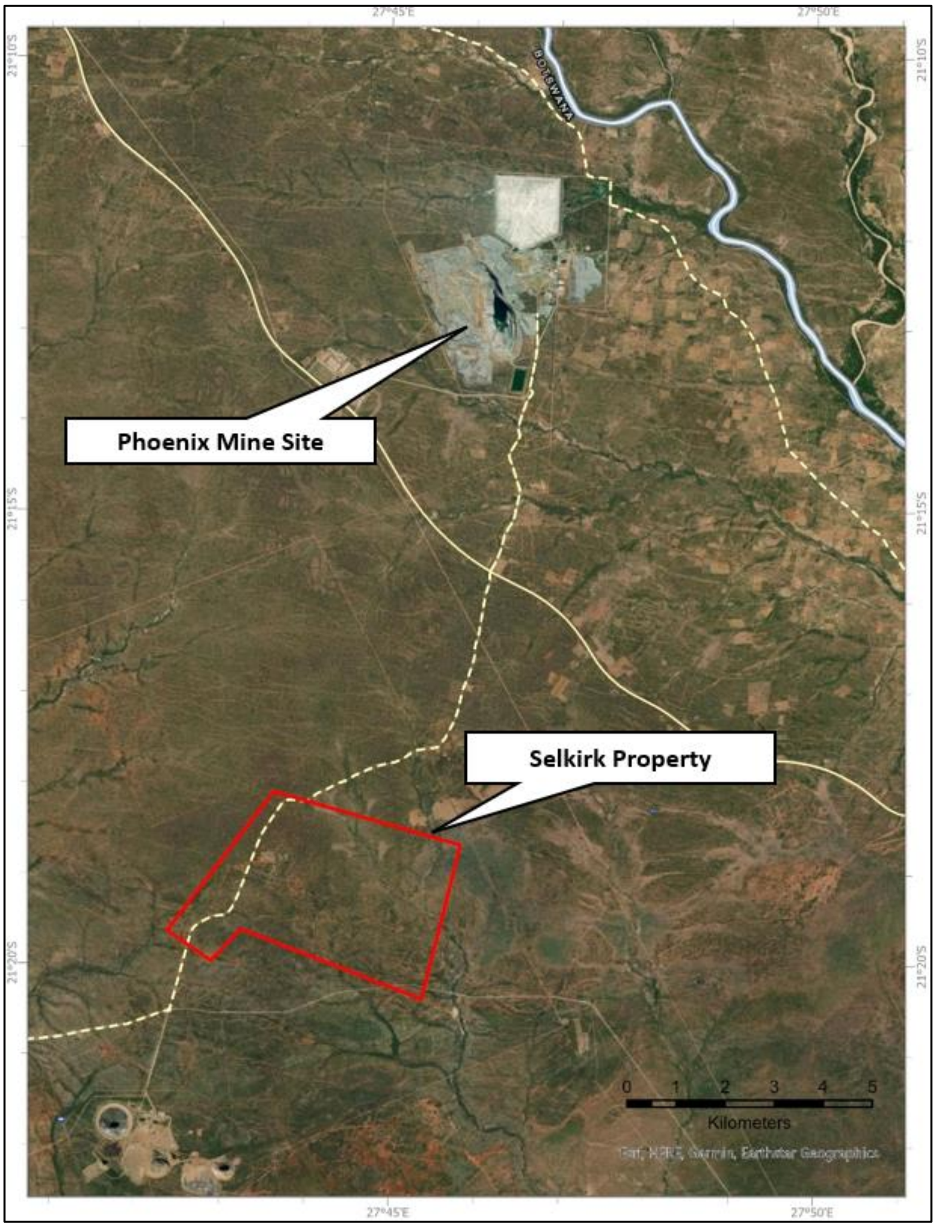


Source: PNRL, 2022

24 OTHER RELEVANT DATA AND INFORMATION

Although the Phoenix deposit was not acquired by PNRL as part of the Selkirk transaction, due to its close proximity and historic common ownership the author believes it is relevant to include details of the Phoenix deposit which was mined extensively between 1995 and 2016. The Phoenix deposit was not acquired by PNRL as part of the Selkirk transaction. The Phoenix deposit is located 15 km to the north of Selkirk in similar geology but exhibits a more structurally controlled style of mineralization compared to the neighboring Selkirk deposit.

Figure 24-1: Location of Selkirk in Relation to the Phoenix Mine Site



Source: PNRL, 2022

Production at Phoenix started in 1995 while the Selkirk Mine was still in operation. Whereas the mineralization at Selkirk was massive sulphides sent directly to the BCL smelter, the Phoenix Operations included on-site processing facilities. The processing plant was commissioned in 1995 to coincide with the open pit operations.

24.1 Infrastructure

Infrastructure at the Phoenix Mine includes an open pit, a concentrator, a dense media separation plant, a tailing storage facility, water storage dams, a power substation, a medical clinic, workshops and warehouses. Figure 24-2 shows the location of these infrastructure in relation to the Selkirk Mining Licence.

The concentrator, commissioned in 2002 from Murray and Roberts, has a primary gyratory crusher and four Sandvik H880 secondary cone crushers, milling and flotation process with a stated capacity of 3.6 Mtpa. There are two (2) 5 MW Fuller Vecor overflow ball mills with capacity of 5.04 Mtpa at a utilization of 93%. The flotation section comprises eleven 130 m^3 tank cells for rougher flotation, two (2) 50 m^3 and one (1) 20 m^3 cleaner flotation tank cells and five (5) 20 m^3 re-cleaner flotation tank cells. Two (2) Outokumpu high-rate thickeners of 35 m and 12 m diameter are used to de-water the concentrate. The thickened final concentrate is pumped to the horizontal pressure Larox plate filter for dewatering to <10% moisture.

The old jaw crushers were still operational at liquidation, with high-grade mineralization fed into the old jaw crusher and low-grade material is upgraded by a dense media separation before going to the mill. The dense media separation plant was introduced in 2006 and became fully operational in 2008. It has four (4) identical modules with capacity of 12 Mtpa.

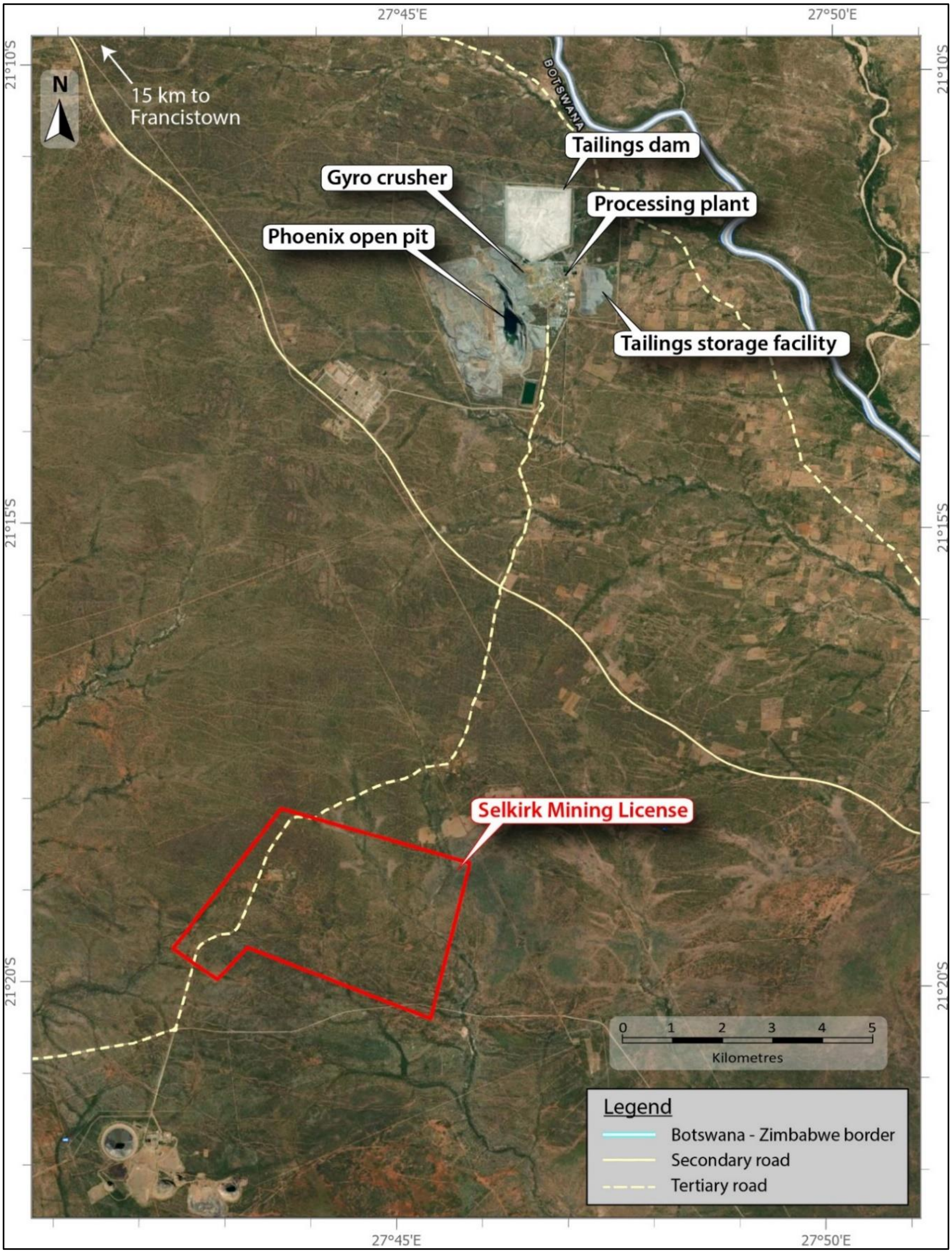
The tailings storage facility (TSF) and associated return water system at the Phoenix Mine covers an area of 180 ha. The facility comprises one (1) large dam (100 ha) with four (4) compartments each with a central penstock and toe drains to remove decanted water from the tailings. The TSF was designed to reach a height of 30 m. There is a pit dewatering storage dam with a storage capacity of 410,000 m^3 and a footprint of 82,000 m^2 and a processing water storage dam with a three-day capacity. The Phoenix site currently operates a permitted extended aeration wastewater treatment plant to treat sewage on site.

There is no smelter on site as concentrate was transported to the BCL smelter.

Water is received from the Water Utilities Corporation via a dedicated 450 mm diameter glass reinforced polyester (GRP) water line from the Shashe Dam that has the capacity of delivering 13 ML of raw water per day to the site.

Phoenix receives its power from Botswana Power Corporation and has installed capacity of 60 MVA and a substation equipped with a transformer base: two (2) 20 MVA and two (2) 10 MVA 66/11 kV units.

Figure 24-2: Infrastructure Present at the Phoenix Mine Site



Source: PNRL, 2022

25 INTERPRETATION AND CONCLUSIONS

At Selkirk, it is the opinion of the QP that PNRL has a clear pathway to advance the development of the Selkirk Property with a strategic plan in place to de-risk certain disciplines and undertake economic studies in the near to medium term.

An initial future milestone would be the declaration of a current MRE in accordance with CIM (2014) Definition Standards incorporated by reference in NI 43-101, which would form the basis of a Preliminary Economic Assessment ("PEA") to determine the economic potential of an open pit mine at Selkirk. Simultaneously, PNRL would advance their understanding of the metallurgical properties and zonation of the deposit, particularly in relation to PGE mineralization which has been understudied in the past.

25.1 Geology and Mineral Resources

- At the time of writing, it is the opinion of GMS that the drilling database in its current state is not robust enough to form the basis of a current MRE. Validation drilling is required to confirm the presence and tenors of mineralization in historical drilling, especially considering that most sample analysis was undertaken on site and not by an external laboratory. A complete recompilation of assay certificates is required, and a more detailed study of QA/QC results is recommended.
- The understanding of the geology and mineralization styles at Selkirk is considered to be good. Underground development has provided detailed access to the mineralized bodies, and grade continuity has been confirmed between drillings.
- The methods of drilling and sampling undertaken in the past appear to be acceptable and appropriate for the style of mineralization; however, a degree of uncertainty remains regarding downhole surveys. A resurveying campaign is recommended to confirm historical values in the database (especially due to the magnetic nature of the host rocks).
- Although the spatial coverage of drilling and assays is good regarding Ni and Cu, there are large gaps in the drill spacing for PGE assays (Pd, Pt and Au). These gaps would need to be filled to include Pd, Pt and Au into an updated MRE in the future.

25.2 Metallurgy

- Past metallurgical studies have highlighted several challenges in regard to metallurgy, recognizing that the focus of early work was generally on the production of a low-grade bulk Ni-Cu concentrate. Early level metallurgical testwork in 2021 has indicated that it is possible to produce separate marketable Ni and Cu concentrates at Selkirk. An optimization program is currently underway to advance the understanding of the mineralogical and metallurgical zonation of the deposit.

26 RECOMMENDATIONS

PNRL has formulated a comprehensive work plan and recommendations that will be implemented in 2023 relating to the development of the Selkirk deposit. It is the opinion of the QPs that all of the recommended work is warranted. The QPs appreciate that the nature of the programs and expenditures may change as further studies are undertaken, and that the final expenditures and results may not be the same as originally proposed. The recommendations and cost-estimates in this section are high-level and are designed to inform the reader of the potential order of magnitude of costs associated with advancing the Project to the point where a feasibility study could be undertaken.

The QPs are of the opinion that the PNRL's recommended work program and proposed expenditures are appropriate and well-thought out. The QPs believe that the proposed budget contained herein reasonably reflects the type and amount of activities required to advance the Selkirk Project.

26.1 Geology and Resources

Despite numerous feasibility studies existing on the Selkirk Project, the historical and disparate nature of information and data signifies that a comprehensive data validation work program is required. A work program has been formulated to bring the drilling database up to a level where it can be included in the estimation of a mineral resource, and includes the following:

- Acquisition of a high-definition topography surface (LiDAR survey).
- Validation of all assay certificates to identify errors associated with mislabelled standards, blanks and duplicates.
- Digitization of supporting information contained in hardcopy logging sheets (including further validation of assay results).
- Re-assay of drill core where only Ni and Cu have been analyzed, and PGEs + Au remain unanalyzed.
- Thorough review of all QA/QC data pertaining to the drilling at Selkirk to better understand the poor QA/QC results identified during certain periods of time, as described in Section 11 of this report.

In addition to the data validation activities, a comprehensive drilling campaign is planned to address gaps in the drilling configurations, gaps in the coverage of PGE assays and twin holes to verify previous results:

- Fifty-two (52) drillholes (approximately 15,000 m) as resource definition and validation drilling. Most holes will be planned to fill gaps in the spatial distribution of PGE assays and to validate historical assays; however, four holes will be extended beyond pit designs outlined in previous studies to improve confidence in grade continuity and identify possible extensions to the deposit.
- All holes will be analyzed for multi-element geochemistry and be subject to industry best practice QA/QC protocols.

Once all data validation and drilling has been completed, the company intends to undertake Mineral Resource estimation in accordance with CIM (2014) Definition Standards.

The costs associated with this work program are shown in Table 26-1.

Table 26-1: Costs Associated with Future Geology-Related Activities

Item	Description	Cost (CAD)
Data Validation Activities	Digitization of logging and assay certificates.	$32,000
Re-Assaying	Resampling and submitting 2,000 samples to laboratory for PGEs + Au.	$51,000
LiDAR Survey	Acquisition of high-definition LiDAR topographic survey.	$20,000
Drilling	48 holes 12,375 m + 4 holes 2,675 m for 15,050 m total. Gyro and TN-14 rental.	$3,700,000
Software, Computers, Logging Facilities, Core Storage, Drilling and Field Supplies	Software and hardware include computers, logging software, magnetic susceptibility meters, GPS, camera. Field and drilling supplies – CRMs, samples bags.	$200,000
Assaying	Includes both assays and whole rock analyses	$1,500,000
Labour	Includes 3 geologists, 4 geotechnicians and 4 general laborers.	$130,000
Mineral Resource Estimate	Geological modelling, geostatistics, block modelling, declaration of Mineral Resource.	$75,000
	Total	$5,708,000

26.2 Geophysical Studies

In areas of the deposit that are dominated by semi-massive to massive sulphide mineralization, downhole electromagnetics (BHEM) will be used to map out both in-hole and off-hole conductors and assist in drill planning and targeting of higher-grade mineralization.

The costs associated with this work program are shown in Table 26-2.

Table 26-2: Costs Associated with Future Geophysical-Related Activities

Item	Description	Cost (CAD)
BHEM Acquisition	-	$70,000
Interpretation	In-house	-
	Total	$70,000

26.3 Metallurgical Studies

A large metallurgical program is planned at Selkirk for 2022 and 2023. Twelve variability samples of 50 kg each (total 600 kg), three (3) composite samples of 100 kg each (total 300 kg), and one (1) 150 kg sample for comminution testing will be collected from a wide variety of mineralization types and identified metallurgical domains for the purpose of designing the metallurgical flowsheet. The metallurgical samples will be collected from HQ/PQ drill core using whole, unweathered intervals.

The costs associated with this program are shown in Table 26-3.

Table 26-3: Costs Associated with Future Metallurgical-Related Activities

Item	Description	Cost (CAD)
Metallurgical Drilling	HQ and PQ diameters diamond drilling 3,150 m in total	$800,000
Metallurgical Testwork	Comprehensive metallurgical program including flotation tests, comminution tests	$500,000
Labour	Includes 2 geologists, 2 geotechnicians and 2 general laborers	$62,000
	Total	$1,362,000

26.4 Mining, Geotechnical and Hydrogeological Studies

No accurate survey exists of the underground workings at Selkirk and the current understanding is not sufficiently accurate for mine planning purposes. An up-to-date Cavity Monitoring System (CMS) or LiDAR survey will be completed to accurately map the underground development and underground stopes. This can likely be completed either via a drone or by a contractor if ground conditions are deemed acceptable.

In support of a potential future feasibility study update, drilling is required to understand the geotechnical characteristics of the host rock at Selkirk, and to optimize the potential slope angles of a future open pit. In addition, condemnation drilling will be required in areas proposed for surface infrastructure.

The costs associated with this program are shown in Table 26-4.

Table 26-4: Costs Associated with Future Mining and Geotechnical Related Activities

Item	Description	Cost (CAD)
Geotechnical Drilling	Six holes for 1,035 m	$100,000
Sterilization Drilling	Ten holes for 750 m	$75,000
Assaying	50 samples	$5,000
Labour	Includes 3 geologists, 4 geotechnicians and 4 general labourers	$33,000
	Total	$213,000

26.5 Exploration Work

The Selkirk Mining Licence and surrounding prospecting licences have exploration potential as outlined in Section 4. Recommendations for future work include:

- Comprehensive data compilation, verification, interpretation, and integration of all previous work.
- Prospecting, geological mapping, soil geochemistry and surface geophysical surveys to refine drill targets.
- Drilling of targets.

The costs associated with this program are shown in Table 26-5.

Table 26-5: Costs Associated with Exploration Work

Item	Description	Cost (CAD)
Data Compilation	Digitization of hard copy data, gathering of documentation.	$50,000
Exploration Work	Prospecting, geological mapping, soil sampling, trenching, surface geophysical surveys, diamond drilling. Actual work will be determined based on results of compilation.	$1,000,000
	Total	**$1,050,000**

26.6 Exploration Camp and Support Infrastructure

The past producing Selkirk Mine is currently on care and maintenance and the previous administration of the Project was based at the Phoenix Mine. A budget is allowed for the establishment of a temporary exploration work camp at the Selkirk site, including purchase of portable offices, vehicles, computer hardware and software, internet, communications, infrastructure for potable water, sewage and electrical services, and security.

The costs associated with this program are shown in Table 26-6.

Table 26-6: Costs Related to Exploration Camp and Support Infrastructure

Item	Description	Cost (CAD)
Exploration Camp and Support Infrastructure	Camp infrastructure to support ongoing exploration activities.	$520,000
	Total	**$520,000**

26.7 Environmental Work

It is recommended that environmental baseline studies be carried out in preparation for a possible decision to move the project forward. Initial work should include visual, air quality, noise and traffic studies.

The costs associated with this program are shown in Table 26-7.

Table 26-7: Costs Related to Environmental Work

Item	Description	Cost (CAD)
Environmental Baseline Studies	Visual Study Air Quality Study Noise Study Traffic Study	$77,000
	Total	**$77,000**

26.8 Costs Summary

A summary of the costs associated with this recommended work program is shown in Table 26-8.

Table 26-8: Costs Summary

Item	Cost (CAD)
Exploration Camp and Support Infrastructure	$520,000
Geology	$5,708,000
Geophysics	$70,000
Metallurgy	$1,362,000
Future Mining Activities	$213,000
Exploration Work	$1,050,000
Environmental Baseline Studies	$77,000
Total	**$9,000,000**

These costs remain an estimate, and are subject to fluctuations in the financial markets, cost inflation and the ability of PNRL to fund exploration activities.

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