PRELIMINARY ECONOMIC ASSESSMENT UPDATE

NI 43-101 TECHNICAL REPORT

SILICON RIDGE, QC, CANADA

Prepared for ROGUE RESOURCES INC. by:

Henri Sangam, PhD., P. Eng., SNC Lavalin Inc.

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Marc Arpin, P.Geo., SNC Lavalin Inc.

Effective Date: May 23, 2017

Issue Date: July 7, 2017

DATE AND SIGNATURE PAGE – CERTIFICATES

Effective Date: May 23, 2017

Issue Date: July 7, 2017

CERTIFICATE OF QUALIFIED PERSON

Certificate of: **Henri Pilakani Sangam, PhD., P.Eng.**

To accompany the report entitled **"Preliminary Economic Assessment Update, NI 43-101 Technical Report, Silicon Ridge Project, Québec, Canada"** (the "Technical Report"), dated July 7, 2017. I, **Henri Pilakani Sangam** do hereby certify that:

1. I am a Senior Engineer, Director of Geotechnical and Mine Environment, employed at SNC-Lavalin Inc. located at 195 The West Mall, Toronto, Ontario, M9C 5K1, Canada.
2. I graduated with a Ph.D. degree in Geotechnical and Geo-Environment Engineering from The University of Western Ontario in London, Ontario, Canada in 2001.
3. I am a registered Professional Engineer and a member in good standing of the Professional Engineers Ontario (#100053196).
4. I have practiced my profession continuously since my graduation from university. I have gained direct experience on projects similar to the Silicon Ridge Project as a Geotechnical and Geo-environmental Engineer in Canada.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101) and certify that by reason of education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of this NI 43-101.
6. I am responsible for Sections 1.1 to 1.3, 1.9, 1.14, 1.16 to 1.19, 1.20.3, 1.20.4, 1.21.2, 2.0, 3.0 to 6.0, 12.1, 17.0, 19.0, 21.0 to 24.0, 26.2, and 27.0 of the Technical Report.
7. I have visited the Silicon Ridge Project property on June 28, 2017.
8. I am independent of Rogue Resources Inc., applying the test set out in Section 1.5 of the NI 43-101.
9. I have not had prior involvement with the Silicon Ridge Project property.
10. As of the date of this certificate and to the best of my knowledge, information and belief, Sections 1.1 to 1.3, 1.9, 1.14, 1.16 to 1.19, 1.20.3, 1.20.4, 1.21.2, 2.0, 3.0 to 6.0, 12.1, 17.0, 19.0, 21.0 to 24.0, 26.2, and 27.0, for which I am responsible for in this technical report, contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

This 7th day of July, 2017

LICENSED PROFESSIONAL ENGINEER
H.P. SANGAM
100053196
PROVINCE OF ONTARIO

Henri Pilakani Sangam, PhD, P.Eng.

Director Toronto - Mine Environment
SNC Lavalin Inc.

CERTIFICATE OF QUALIFIED PERSON

Certificate of: **Philip Vicker, P.Geo.**

To accompany the report entitled "Preliminary Economic Assessment Update, NI 43-101 Technical Report, Silicon Ridge Project, Québec, Canada" (the "Technical Report"), dated July 7, 2017. I, **Philip Vicker** do hereby certify that:

1. I am self-employed as an independent consultant located at 639 Lavoie St., Sudbury, Ontario, P3A-2B6, Canada.
2. I graduated with a Bachelor of Science (Honours) degree in Geology from Western University in London, Ontario, Canada in 1991, and with a Master of Science degree in Geology from University of Toronto in Toronto, Ontario, Canada in 1997.
3. I am a registered Professional Geologist and a member in good standing with the Association of Professional Geoscientists of Ontario (#1083).
4. I have practiced my profession continuously since 1991. I have gained direct experience on projects similar to the Silicon Ridge Project as an exploration geologist in both Quebec and Ontario in Canada, and as a Mineral Resource Geologist completing numerous Mineral Resource estimates at mining operations in Ontario.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of this NI 43-101 Technical Report.
6. I am responsible for Subsections 1.4, 1.5, 1.6, 1.7, 1.8, 1.10, 1.11, 1.12, 1.20.1, 1.21.1; all of Sections 7, 8, 9, 10, 11; Subsections 12.2, 12.3, 12.4, 12.4.1, 12.4.2, 12.4.3, 12.4.4, 12.4.5, 12.4.6; all of Sections 13, 14, 15, Subsections 25.1 and 26.1 of this Technical Report.
7. I have not visited the Silicon Ridge Project property.
8. I am independent of Rogue Resources Inc., applying the test set out in Section 1.5 of NI 43-101.
9. I have not had prior involvement with the Silicon Ridge Project property.
10. As of the date of this certificate and to the best of my knowledge, information and belief, Subsections 1.4, 1.5, 1.6, 1.7, 1.8, 1.10, 1.11, 1.12, 1.20.1, 1.21.1; all of Sections 7, 8, 9, 10, 11; Subsections 12.2, 12.3, 12.4, 12.4.1,12.4.2,12.4.3,12.4.4,12.4.5,12.4.6; all of Sections 13, 14, 15, Subsections 25.1 and 26.1, for which I am responsible in this Technical Report, contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

This 6th day of July, 2017

Philip A. Vicker, M.Sc., P.Geo.

Independent Consultant

CERTIFICATE OF QUALIFIED PERSON

Certificate of: **Kerrine L. Azougarh, P.Eng.**

To accompany the report entitled "Preliminary Economic Assessment Update, NI 43-101 Technical Report, Silicon Ridge Project, Québec, Canada" (the "Technical Report"), dated July 7, 2017. I, Kerrine L. Azougarh do hereby certify that:

1. I am a **Senior Mining Engineer** employed at **SNC Lavalin Inc.**, located at **195 The West Mall, Toronto,** Ontario, **M9C 5K1**, Canada.

2. I graduated with a **Bachelor of Science** degree in **Mine Engineering** from the **University of Alberta** in **Edmonton, Alberta**, Canada in **1993**.

3. I am a registered Professional Engineer and a member in good standing of the Professional Engineers Ontario (#100106200).

4. I have practiced my profession continuously since **1993**. I have gained direct experience on projects similar to the Silicon Ridge Project as a **Mining Engineer** in Canada.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101) and certify that by reason of education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of this NI 43-101.

6. I am responsible for all of Section 16, Subsections 1.13, 1.20.2, and 25.2 of the Technical Report.

7. I **have not** visited the Silicon Ridge Project property.

8. I am independent of Rogue Resources Inc., applying the test set out in Section 1.5 of the NI 43-101.

9. I **have not** had prior involvement with the Silicon Ridge Project property.

10. As of the date of this certificate and to the best of my knowledge, information and belief, Section16, Subsections 1.13, 1.20.2, and 25.2, for which I am responsible for in this technical report, contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

This 7th day of July, 2017

Kerrine L. Azougarh, P.Eng.

Senior Mining Engineer

SNC Lavalin Inc.

LICENSED PROFESSIONAL ENGINEER
K.L. AZOUGARH
100106200
PROVINCE OF ONTARIO

CERTIFICATE OF QUALIFIED PERSON

Certificate of: **Dominic Tremblay, P.Eng. M.A.Sc.**

To accompany the report entitled "Preliminary Economic Assessment Update, NI 43-101 Technical Report, Silicon Ridge Project, Québec, Canada" (the "Technical Report"), dated July 7, 2017. I, **Dominic Tremblay** do hereby certify that:

1. I am an Engineer, Manager of Mining Environment employed at SNC-Lavalin with an office at 5500 des Galeries Blvd., Quebec (Quebec), G2K 2E2, Canada.
2. I am a graduate of École Polytechnique de Montréal with B.Eng. in Mining Engineering in 2002 and a Master in Applied Science (M.A.Sc.) in Mineral Engineering in 2006.
3. I am a registered Professional in Mining Engineering and Mining Environment and a member in good standing of the "Ordre des Ingénieurs du Québec" (#133511).
4. I have practiced my profession continuously since my graduation from university. I have gained direct experience on projects similar to the Silicon Ridge Project as a Mining Engineer and Mining Environment specialist (tailings and mine waste management) in Canada.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101) and certify that by reason of education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of this NI 43-101.
6. I am responsible for Sections 1.15 and 18 of the Technical Report.
7. I have visited the Silicon Ridge Project property on June 28, 2017.
8. I am independent of Rogue Resources Inc., applying the test set out in Section 1.5 of the NI 43-101.
9. I have not had prior involvement with the Silicon Ridge Project property.
10. As of the date of this certificate and to the best of my knowledge, information and belief, Sections 1.15 and18, for which I am responsible for in this technical report, contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

This 7th day of July, 2017

Dominic Tremblay, P.Eng., M.A.Sc.

Manager - Mining Environment

Sustaining Capital and Consulting Service

SNC Lavalin Inc.

CERTIFICATE OF QUALIFIED PERSON

Certificate of: **Marc Arpin, P.Geo**

To accompany the report entitled "Preliminary Economic Assessment Update, NI 43-101 Technical Report, Silicon Ridge Project, Québec, Canada" (the "Technical Report"), dated July 7, 2017. I, **Marc Arpin, P.Geo** do hereby certify that:

1. I am a Professional Geologist employed at SNC-Lavalin located at 1140, de Maisonneuve West, Montréal, Québec Ontario, H3A 1M8, Canada.
2. I graduated with a Bachelor's degree in Geology from University of Montréal, Canada in 1981.
3. I am a registered Professional Geologist and a member in good standing in Québec of Ordre des Géologues du Québec (# 594).
4. I have practiced my profession continuously since 1986. I have gained direct experience on projects similar to the Silicon Ridge Project as a Geologist in Canada.
5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI43-101) and certify that by reason of education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of this NI 43-101.
6. I am responsible for Section 20 of the Technical Report.
7. I have not visited the Silicon Ridge Project property (on Date).
8. I am independent of Rogue Resources Inc., applying the test set out in Section 1.5 of the NI 43-101.
9. I have not had prior involvement with the Silicon Ridge Project property.
10. As of the date of this certificate and to the best of my knowledge, information and belief, Section 20.0, for which I am responsible for in this technical report, contains all scientific and technical information that is required to be disclosed to make this Technical Report not misleading.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

This 7thday of July, 2017

GÉOLOGUE / GEOLOGIST
MARC
ARPIN
#594
QUÉBEC

Marc Arpin, P.Geo., M.Sc., M.Env.

Director – Sustaining Capital Works – Quebec

SNC-Lavalin Inc.

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LIST OF ABBREVIATIONS

Abbreviation	Description
$	Dollar
$/t	Dollar per Metric Tonne
$CAN	Canadian Dollar
%	Percent
°	Degree
°C	Degree Celsius
2D	Two Dimensions
3D	Three Dimensions
AC	Authorization Certificate
Al2O3	Aluminum Oxide
ASL	Above Sea Level
A-T	After-Tax
az	Azimuth
BaO	Barium Oxide
bcm	Bank Cubic Metre (Volume of material in-situ)
CAD	Canadian Dollar
CaO	Calcium Oxide
CAPEX	Capital Expenditures
CDC	Claim désigné sur carte
CEAA	Canadian Environmental Assessment Agency
CEEA	Canadian Environmental Assessment Act
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
cm	Centimetre
CofA	Certificate of Authorization
CoG	Cut-Off Grade

Abbreviation	Description
COV	Coefficient of Variation
Cr2O3	Chromium Oxide
CRM	Certified Reference Materials
d	Day
DDH	Diamond Drill Hole
deg	Angular Degree
DGPS	Differential Global Positioning System
DXF	Drawing Interchange Format
E	East
EM	Electro Magnetic
Fe	Iron
Fe2O3	Iron Oxide
FOB	Freight on Board
ft	Feet
G&A	General and Administration
g/cm3	Grams per Cubic Centimetre
GESTIM	Gestion des Titres Miniers
GPS	Global Positioning System
ha	Hectare
HG	High Grade
ICP	Inductively Coupled Plasma
ID	Identification
IDW	Inverse Distance Method
IDW2	Inverse Distance Squared Method
IRR	Internal Rate of Return
K2O	Potassium Oxide

Abbreviation	Description
kl	Kilo Litre
km	Kilometre
km2	Kilometre Squared
kt	Kilo tonne
kt/yr	Kilo Tonne per Year
kV	Kilo volt
kW	Kilowatt
lcm	Loose Cubic Metres (with Swell 25%)
LG	Low Grade
LG-3D	Lerchs-Grossman – 3D Algorithm
LIMS	Laboratory Information Management System
LOI	Loss On Ignition
LOM	Life Of Mine
m	Metre
M	Million
m3	Cubic Metre
mASL	Mean Above Sea Level
MD&A	Management Discussion and Analysis
MDDELCC	Ministère du Développement durable de l'Environnement et de la Lutte contre les climatiques du Québecchangements
MERN	Ministère de l'Énergie et des Ressources Naturelles
MFFP	Ministère des Forêts de la Faune et des Parcs du Québec
MG	Metallurgical Grade
MgO	Magnesium Oxide
mm	Millimetre
MnO	Manganese Oxide
MOU	Memorandum of Understanding

Abbreviation	Description
MRC	Municipalité Régionale de Comté
Mt	Million Metric Tonnes
MVA	Mega Volt-Ampere
N	North
Na2O	Sodium Oxide
NE	North East
NI	National Instrument
NPV	Net Present Value
NQ	Drill Core Size (4.8 cm diameter)
NSR	Net Smelter Return
NW	North West
OB	Overburden
OGQ	Ordre des Géologues du Québec
OPEX	Operating Expenditures
P2O5	Phosphorus Oxide
PEA	Preliminary Economic Assessment
PF	Power Factor
PFS	Pre-Feasibility Study
phs	Phase
PP	Preproduction
PQ	Drill Core Size (8.5 cm diameter)
P-T	Pre-Tax
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QP	Qualified Person
ROM	Run of Mine (Feed)

Abbreviation	Description
RQD	Rock Quality Designation
SE	South East
SEDAR	System for Electronic Document Analysis and Retrieval
SG	Specific Gravity
SiO2	Silica
SO3	Sulphur Trioxide
SR	Stripping Ratio
SrO	Strontium Oxide
SW	South West
t	Metric Tonne
t/bcm	Tonnes per Bank Cubic Metres (in-situ)
t/m3	Metric Tonne per Cubic Metre
t/yr	Metric Tonne per Year
TiO2	Titanium Oxide
tonne	Metric Tonne
US	United States of America
USD	United States Dollar
UTM	Universal Transverse Mercator
VAC	Ventilation and Air Conditioning
VLF	Very Low Frequency
W	West
WST	Waste
wt%	Weight Percent
X	X Coordinate (E-W)
x	Times (Multiplier)
XRD	X-Ray Diffraction
RQD	Rock Quality Designation

Abbreviation	Description
XRF	X-Ray Fluorescence
XRT	X-Ray Transmission
Y	Y coordinate (N-S)
yr	Year
Z	Z coordinate (depth or elevation)
ZEC	Zone d'Exploitation Controlée

1.0 EXECUTIVE SUMMARY

1.1 Introduction

Rogue Resources (Rogue) is a Canadian mining company with a diverse portfolio of properties with its current focus on its 100%-owned Silicon Ridge Project. The Property is located approximately 42 km north of the City of Baie-Saint-Paul, on the north shore of the Saint Lawrence River, in the Province of Quebec.

This NI 43-101 Technical Report (Report) on the Silicon Ridge Project has been prepared at the request of Rogue to present the Preliminary Economic Assessment Update (PEA update) major findings. The PEA update is based on the Mineral Resources (effective date May 23, 2017) as issued by Rogue on May 23, 2017 in their corporate Press Release. The effective date of the Technical Report on the PEA update of the Silicon Ridge Project is May 23, 2017 and the report was completed July 7, 2017.

A PEA Study is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that the conclusions reached in the PEA update will be realized. Mineral Resources that are not Mineral Reserves cannot demonstrate economic viability.

Philip Vicker, P.Geo., and SNC-Lavalin Inc. (SNC-Lavalin) were requested by Rogue to provide a PEA Study update for the exploitation of the Silicon Ridge quartzite deposit. SNC-Lavalin was to provide plans for the mining, infrastructure, the compilation of capital and operating cost estimates at a confidence level of ± 35%, economic analysis and report preparation. The PEA Report update is intended to identify the potential for the Project at a mining rate of 200 kt per year, and a production rate of approximately 180 kt per year of silica product in order to justify proceeding to further phases of project development.

This Report derives from the DRA/Met-Chem Technical Report on the Silicon Ridge Preliminary Economic Assessment Quebec – Canada dated October 26, 2016, Buro et al. (2016).

1.2 Property Description and Location

The Property is located approximately 42 km north of the City of Baie-Saint-Paul, on the north shore of the Saint Lawrence River, Province of Quebec The Property is comprised of 8 contiguous map-designated mineral claims (CDC) that form a rectangular block covering a total area of 462.6 ha. All the claims are currently in good standing and Rogue Resources Inc. is the 100% recorded owner.

The Property is accessible from Baie-Saint-Paul via national highways and well-maintained forestry roads.

The Property is subject to a 2% Net Smelter Return (NSR) royalty to a vendor, which may be purchased, as well as a royalty of $0.08/t of extracted economic material to the Huron-Wendat Nation Council.

1.3 History

Data regarding the history is presented by Rogue in its “Technical Report on the Silicon Ridge Preliminary Economic Assessment, Quebec – Canada”, Buro et al. (2016). That information has been summarized here for the convenience of the reader.

The discovery of a quartzite occurrence in 1946 triggered exploration work in the general Property area. Documented modern exploration efforts in the region started in 1965, with Leeds Metals Company completing a drilling program. The discovery of new quartzite occurrences by the Quebec Mine Ministry and disclosure of mineral resource estimates in a series of deposits, from 1969 to 1974, brought renewed attention to the area. Silicium Québec and Sitec Quartz Inc., as well as GEX Silicium Limited and SOQUEM started mining in 1976. New exploration work targeted the region after J. Rondot delineated another ten quartzite occurrences of potential deposit size in 1984.

Rogue started the first recent and integrated exploration programs on the Silicon Ridge Property in September 2014. An initial Mineral Resource estimate on the property was presented in Buro et al. (2016). No prior quartzite production had been completed on the Property. The May 23, 2017 Mineral Resource estimate is listed in Table 1.1.

1.4 Geological Setting and Mineralization

The Property area is located in the high-grade metamorphic terranes of the Grenville Province of the Canadian Shield. At least four ductile and one brittle deformation events have affected the area.

The quartzite units and paragneiss form an anticline with a NE trending, steeply NW dipping axial plane (overturned fold) and a syncline to the SE, the axis of which passes along the north shore of Lac de la Grosse Femelle. The “G” and “H” units are interpreted to represent the same unit duplicated by fold repetition, with approximately 250 m of intervening quartz-biotite-garnet gneiss. Charnockitic gneiss lies at the northern and southern contacts of the “G” and “H” units.

The Property hosts several map-scale units of high purity quartzite. The width of the “G” quartzite unit varies along strike, but reaches a maximum of 260 m, with an average of 150 m.

The quartzite on the Property is generally coarse-grained, massive, and locally fractured. It may contain traces of biotite, muscovite, hematite, magnetite, ilmenite, fuchsite and rutile commonly associated with coloured quartzite. Clusters of sillimanite with pyrite were occasionally observed.

The quartzite exhibits internal zones distinguished by their colour or by shear zones that represent fairly continuous bands within the deposit.

1.5 Deposit Types

The quartzite on the Property is of the metamorphic type, of probable sedimentary origin, and occurs as large-amplitude folds formed in response to multiple episodes of folding. The controlling factors for the formation of the quartzite and for the presence of internal sub-units and structures are lithological (sediment precursor) and structural (recrystallization and formation of folds).

1.6 Exploration

Initial exploration work by Rogue began in September 2014 with mapping and sampling the quartzite units. This was followed by an airborne helicopter Magnetics and VLF survey to guide the delineation of the quartzite units and define the contacts with the paragneiss. Follow-up work consisted of line cutting, mapping and trenching (outcrop stripping and channel sampling). In 2015, Rogue selected the most promising quartzite units (“G” and “H”) to be tested by drilling, with both field and core quartzite samples submitted for chemical analysis and mineral processing investigation. These data were compiled into a Technical Report on an initial NI 43-101 compliant Mineral Resource estimate, reported in Buro et al. (2016). No new drilling or sampling activity has been undertaken on the property since that study.

A ground penetrating radar survey was completed over the central portion of the SW Zone in November 2016. The survey was carried out on a grid with a spacing of 50m. The survey was designed to test the thickness of the overburden cover over the proposed surface expression of the quarry. Results of the survey were used to quantify the volume of overburden over that portion of the South West Zone. In December 2016, SNC-Lavalin estimated that the volume of overburden was reduced by 36% from 624K m^3 to 402K m^3 based on Rogue's re- interpretation of the bedrock-overburden contact as supported by the identification of surface outcrop and the results of the ground penetrating radar.

1.7 Drilling

A drill program for a total of 11,822.30 m of core in 74 holes was completed between August 8, 2015 and December 16, 2015 over the "G" and 'H" quartzite units. Six holes (PQ and NQ core diameters) were drilled for technical evaluation (ANZAPLAN, 2016). No prior holes had been drilled before the Rogue drilling program.

Two holes were drilled on most of the sections in the "G" and "H" units. The South West portion of the "G" unit was drilled on sections 50 m apart. The North East portion of the "G" unit and the entire "H" unit were drilled along sections 100 m apart. The holes were drilled by Orbit Garant, with an office in Val-d'Or, Quebec. Core was generally recovered at a rate of 95% or better.

All the collars were surveyed and the downhole deviation was measured using a Flexit instrument and the core was oriented. A total of 4,740 assays covering 6,476.6 m of drill core length were sampled from the drilling

In addition to diamond drilling, there were 14 trench areas in which 25 channel sample lines were cut in stripped outcrop exposures. These lines were sampled (293 samples, 501.7 m), and assayed with the same analytical methodology as the drill core. These channels were also surveyed, and data was collected and stored in the Master Database.

1.8 Sample Preparation, Analysis and Security

Core logging included measurements of basic geotechnical parameters, core recovery, RQD, followed by description of lithological and structural features. Similar information was collected for the channel samples. A total of 4,740 samples with a targeted length of 2 m but reduced where appropriate to conform to changes in lithology, were collected (6,476.6 m), in addition to the QC samples inserted to monitor the laboratory performance. The core from the "H" quartzite unit was split with a hydraulic splitter whereas the "G" quartzite samples were cut with a diamond blade saw. In addition, 293 samples (501.7 m) were logged and sampled from surface channel lines cut with rock saws.

The Quality Assurance-Quality Control (QA/QC) protocol adhered to by Rogue included insertion of approximately 8% of Standard, Blank and Duplicate samples into the sample stream.

The samples were sent to ALS laboratories in Val-d'Or, for preparation and to ALS in Vancouver for analysis. Rogue requested ALS to apply pulverizing procedures specifically designed to avoid contamination of the samples by using non-ferrous (tungsten carbide) disks/rings and bowl mills.

All the samples were submitted for analysis by lithium borate fusion technique coupled with XRF (package of 14 major oxides). Loss on ignition (LOI) was also determined. Specific gravity (SG) was determined by ALS on every tenth sample by the bottle pycnometer method.

1.9 Data Verification

Henri Sangam, PhD, P.Eng., Director (Toronto) of SNC-Lavalin Geotechnical Engineering, Sustaining Capital & Consulting Services visited the site on June 28, 2017, along with Dominic Tremblay, P.Eng., Manager of Mine Environment, Sustaining Capital & Consulting Services. Both Henri and Dominic are QPs for this report.

The site visit was carried out together with Paul Davis included pit areas, the proposed areas for dumps and other infrastructure. Both ends of the proposed access and the core shack with drilling cores and rejects were also visited. Select photographs from the site visit are presented in **Appendix A**.

An independent examination of the quartzite assay compositions was conducted in 2016 and reported in Buro et al. (2016). Philip Vicker, P.Geo., has reviewed these data and concludes that the check analyses from their selected sample reruns support the grade and spatial distribution of the quartzites represented in the Rogue database. No new drilling or sampling activity has been undertaken on the property for the current Mineral Resource report since the previous Technical Report on the project by Buro et al. (2016).

Philip Vicker, P.Geo., reviewed the QA/QC protocols used by Rogue and examined the results obtained by the QC samples inserted by Rogue into the project sample stream. Some dispersion is observable in the analyses of silica and other elements, an expected result of their concentrations being close to the detection limits. However, Philip Vicker, P.Geo. believes that the reliability of the analytical results is reasonable and sufficiently high to be used in a Mineral Resource Estimate. Additional independent tests discussed in ANZAPLAN (2016) provide further confidence that the Silicon Ridge quartzites are of high silica content with variable but potentially very low deleterious element contents.

Examination of the assays in the Master Database provided by Rogue against the original assay certificates acquired from the independent laboratory was completed. Every sample in the database was identified and matched with the certificate. Additional verification included random checks of drill core photos against the drill logs, and no discrepancies were identified.

Additional validation of the database was undertaken to identify other potential errors such as overlaps, duplicates, or spurious data. A small number of errors were detected, and their cause was sourced and corrected.

1.10 Mineral Processing and Metallurgical Testing

ANZAPLAN was engaged in October 2015 to provide the first evaluation of the potential of the Silicon Ridge property quartzite in different high value applications and to investigate the mineralogy of the quartzites.

As reported in Buro et al. (2016), Dr. Reiner Haus, MD of Dorfner ANZAPLAN visited the Silicon Ridge property accompanied by Rogue's former Senior Vice President, E. Canova, P.Geo. Based on that visit, a pre-sample of quartzite totaling approximately 250 kilograms was selected. The material was delivered to ANZAPLAN's Laboratory facilities in Hirschau, Germany for preliminary chemical composition analysis. Based upon these results, ANZAPLAN was commissioned to complete the "Evaluation of a Quartzite Deposit in Canada for the Identification of Potential Applications" which was completed for Rogue in ANZAPLAN (2016).

Rogue provided ANZAPLAN with three PQ diamond drill cores (GF15-53, GF15-60 and GF15-62) and three corresponding NQ diamond drill cores (GF15-39, GF15-42 and GF15-46) in December 2015 and January 2016. The PQ drill cores were subjected to processing tests targeting the evaluation of the suitability of the quartzite for silicon and high value applications. The NQ drill cores were subjected to chemical and mineralogical analysis to better understand the speciation of impurities.

Five samples from each PQ drill core were defined for the processing tests based on the chemical analysis of the twinned NQ drill cores, the core logging as completed by Rogue and visual inspection of the PQ drill core samples. The purpose of the test work was to identify areas suitable to produce quartzite products for silicon and ferrosilicon production, but also indicated that the quartzite grades are at least somewhat characterized by colour.

Silicon production generally utilizes quartzite in particle sizes ranging from 20 to 120 mm. Based on the limited size of the PQ drill cores, a fraction of 20 – 80 mm was used for the processing tests. Each of the 15 quartzite samples were crushed using a jaw crusher and screened into fractions of <20 mm, 20 – 40 mm and 40 – 80 mm. Product fractions of 20 – 40 mm and 40 – 80 mm were washed and screened prior to sensor based sorting.

Results from processing tests of drill core GF15-53 indicated that 16.2 wt% of the entire drill core is suitable for ferrosilicon production. A total of 20 to 22 wt% of the samples are in the < 20 mm fraction and will serve as feed material for high value applications.

Results from processing tests of drill core GF15-60 indicated that 34.6 wt% of the entire drill core is suitable for ferrosilicon production. A total of 20 to 25 wt% of the samples are in the < 20 mm fraction and will serve as feed material for high value applications.

Results from processing tests of drill core GF15-62 indicated that 34.7 wt% of the entire drill core is suitable for ferrosilicon production. A total of 21 to 23 wt% of the samples are in the < 20 mm fraction and will serve as feed material for high value applications.

In the processing flowsheet postulated in ANZAPLAN (2016), the less than 20 mm fines and the optical sorting rejects could be stockpiled for potential further processing for high value applications.

It can be concluded from the ANZAPLAN (2016) examination that the potential exists to separate the Silicon Ridge quartzite into different grades of material with respect to iron content, and to a lesser degree, aluminum and titanium contents. This material segregation is not being proposed in the current study, as the project is being contemplated as direct shipping of quartzite with no on-site processing.

1.11 Mineral Resource Estimates Statement

Rogue completed the first ever drilling campaign into the “G” and ‘H” quartzite units on the Silicon Ridge property between August 8, 2015 and December 16, 2015. Philip Vicker, P.Geo., was mandated by Rogue to update the prior Mineral Resource estimate of Buro et al. (2016) for the current NI 43-101 compliant PEA update.

The drill holes database contained 74 drill holes and 25 trenches representing the exploration work performed in 2015. The Resource interpolation was performed using the Inverse Distance Weighted (IDW) at a power of two (IDW2).

The Mineral Resource estimate was generated by Philip Vicker, P.Geo., and the effective date is May 23, 2017.

The Mineral Resource classification follows the guidelines adopted by the CIM through the NI 43-101. The Mineral Resources are constrained by a Lerchs-Grossman (LG-3D) optimized pit shell using MineSight software. The LG-3D pit shell was defined using the following constraints; pit slopes of 50° on the hangingwall, 55°on the footwall; 85 m offset that includes 75 m offset from lakes and wetlands and 10 m buffer zone for pit road access, products sale prices of $85/t; processing costs of $2.00/t (primary crushing only); mining costs of $9.34/t for feed, $5.34/t waste, and $2.86/t for overburden; and a G&A cost of $2.25/t.

Table 1.1 provides a summary of the pit-constrained Mineral Resources for the three zones on the Silicon Ridge property.

The reader is cautioned that Mineral Resources that are not Mineral Reserves have no demonstrated economic viability. The estimate of Mineral Resources may be materially affected by mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and government factors (the “Modifying Factors”).

Table 1.1: Silicon Ridge Summary of the Pit Constrained Mineral Resources Estimate

(Cut-Off: ≥ 98.1% SiO_2, ≤ 0.80% Al_2O_3, ≤ 0.075% TiO_2, ≤ 0.24% Fe_2O_3)

ALL ZONES	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.5	98.62	0.061	0.543	0.097
Indicated	5.3	98.62	0.061	0.537	0.117
Measured + Indicated	7.7	98.62	0.061	0.539	0.110
Inferred	2.1	98.66	0.059	0.508	0.131

SOUTH WEST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.0	98.62	0.060	0.540	0.096
Indicated	3.1	98.62	0.060	0.545	0.104
Measured + Indicated	5.0	98.62	0.060	0.543	0.101
Inferred	0.9	98.69	0.059	0.519	0.097

NORTH EAST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	0.5	98.62	0.063	0.555	0.099
Indicated	1.1	98.62	0.065	0.533	0.118
Measured + Indicated	1.6	98.62	0.064	0.540	0.112
Inferred	0.2	98.63	0.063	0.561	0.124

CENTRE NORTH ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	n/a	n/a	n/a	n/a	n/a
Indicated	1.1	98.60	0.058	0.520	0.150
Measured + Indicated	1.1	98.60	0.058	0.520	0.150
Inferred	1.0	98.64	0.059	0.486	0.164

Notes:

CIM definitions and guidelines (May 10, 2014) were followed for classification of Mineral Resources.
Cut-off grades of 98.1% SiO_2, 0.80% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3
Density of 2.65 g/cm^3.
Metric tonnes.
Numbers may not add due to rounding.
Effective date of the Mineral Resource estimate is May 23, 2017.
LG-3D Pit Constraints include:
- 50° slope hangingwall, 55° slope footwall;
- Offset of 85 m from lakes and wetlands;
- Product sales price of $85.00/t;
- Processing cost of $2.00/t (primary crushing only);
- Mining costs of $9.34/t feed, $5.34/t waste, $2.86/t feed;
- G&A cost of $2.25/t.

1.12 Mineral Reserve Estimate

There are no Mineral Reserves on the Silicon Ridge property.

1.13 Mining Methods

SNC-Lavalin evaluated the potential for a quarry operation at Silicon Ridge to feed the direct ship feed with 180 kt per year of silica mineralization. The Mineral Resources used for the PEA update are based on the Resource estimate from May 23, 2017 press release by Rogue Inc. and are discussed fully in Section 14 of this report. Since this study is at a PEA level, NI 43-101 guidelines allow Inferred Mineral Resources to be used in the optimization and mine plan.

The mining method selected for this Project is a conventional truck and shovel, drill and blast quarry operation. Vegetation, topsoil and overburden will be stripped and stockpiled for future reclamation use. The mineralized material and waste rock will be mined with 5 m high benches, drilled, blasted and loaded into rigid frame haul trucks with hydraulic excavators. Based on client recommendations, contract operation was used as a basis for the PEA update; SNC-Lavalin was provided with a budgetary pricing from several contract operators in the region. These quotes were obtained during the initial PEA in 2016.

The seasonal quarry operation is based on the contractor operating 5 days per week, 12 hours per day, and 6 months of the year during the warmer seasons. Overburden removal may take place during the winter to take advantage of the frozen ground conditions.

Two of the three Resource pits were designed for the Silicon Ridge project in order to target 20 years of production at 200 kt of blasted resource per year from the South West (SW) and the North East (NE) pit. The Central North (CN) pit was not designed for the 20 year plan due to a higher overburden depth than in the NE pit, although it is still within the Resource Estimate. The quarry has a nominal capacity to extract 200 kt per year of run of mine to produce approximately 180 kt per year of lump silica.

The SW pit is approximately 635 m long and 170 m wide at surface with a maximum pit depth from surface of approximately 105 m to a bottom of 885m elevation. The total surface area of the pit is roughly 0.105 km^2. The SW pit contains 3.37 Mt of run of mine feed (ROM) above the cut-off grade (CoG) with an overall strip ratio (SR) of 1.93:1 waste tonnes to feed tonnes.

The NE pit is a string of 5 phased pits including a separate small pit at the west end (phase 1) and 3 mini pits at the east end (phase 5). The central 3 phases of the NE pit combine for one large pit in the middle. These 3 central phases overlap each other, relocating the pit access and haulage ramp within the pit further to the east with each phase. The combined 5 pits are approximately 1 km in length 130 m wide at surface with a maximum pit depth from surface of approximately 110 m. The total surface area of the pit is roughly 0.069 km^2. The NE pit contains 1.24 Mt of ROM above CoG with an overall SR of 2.01:1 waste tonnes to feed tonnes.

The proportion of Inferred Mineral Resources contained within the 20 year pit design is 20%.

The Silicon Ridge open pit Resources for the 20-year pit design are summarized in Table 1.2.

Table 1.2: Silicon Ridge Open Pit Resources (20 Year Pit Design)

PIT	ROM	Al2O3 (%)	Fe2O3 (%)	SiO2 (%)	TiO2 (%)	WST (Mt)	OB (Mt)
SW	2.65	0.55	0.100	98.61	0.0606	6.0	1.04
NE	1.35	0.52	0.169	98.55	0.0601	2.4	0.30
TOTAL	4.00	0.54	0.123	98.59	0.0604	8.4	1.34

1.14 Recovery Methods

The silica products will be crushed and screened by a contractor to minus 120 mm (top size) and 20 mm (bottom size).

1.15 Infrastructure

Infrastructure, buildings, and services that are required to complement the quarrying of the Silicon Ridge quartzite and to produce lump silica, have been added to complete the investment cost of the project.

Silicon Ridge is located approximately 13.4 km from Highway 381. Provision has been made to upgrade part of the existing gravel access road and the last part of the road that reaches the site along an existing access route.

In addition to site roads, water services, provisions have been made for office trailers and facilities such as a fueling station and portable toilets.

Stocks pile are planned on the properties to properly manage the excavated materials: temporary stock pile for overburden and low grade ore as well as the waste rock stockpile

No provision for camp site accommodation is required for this Project. The quarry is located approximately 55 km from Saint-Urbain, 70 km from Baie-Saint-Paul and 100 km from Chicoutimi and it is expected that employees will travel from these location to site where a parking area will be available.

1.16 Market Studies and Contracts

After preliminary metallurgical studies were prepared by Dorfner-ANZAPLAN GmBH in Q1 2016 and initial product applications were identified, Roskill Consulting Group (Roskill) was engaged by Rogue in the second quarter of 2016 to provide a report identifying the potential customer base by-product. Understanding of the market and pricing is also based on Roskill's multi-client report, *"Silicon and Ferrosilicon: Global Industry Markets and Outlook for 2014"*.

In summary, the Silicon Ridge material metallurgically qualifies for application into Glass, Ceramics, Silicon metal, various Fillers (including countertops) and Building Materials. For the purposes of base pricing in this study, the focus has been on selling silica for the production of Silicon metal, in addition to some Fillers. The section focuses on Silicon metal (specifically chemical grade silicon (silicon) and ferrosilicon) and is summarized based on the market studies completed by Rogue's consultants.

While Rogue has signed two non-binding Letters of Intent with PCC BakkiSilicon hf and with Thorsil ehf that establish the basic terms to be used in a potential comprehensive offtake agreement between Rogue, no contract or offtake agreements were signed to date with potential client(s).

1.16.1 Supply

Quartzite is the usual form of silica and is the basic raw material from which both silicon metal and ferrosilicon are produced.

Quartzite is brittle and is relatively easy to blast and crush. Silicon metal producers prefer quartzite lumps that exceed 2.54 cm in diameter with a minimum softening point of 1,700 C° and that do not decrepitate below 950 °C.

The rock should contain 98.5% SiO2 and less than 1.5% Fe2O3 + Al2O3, 0.2% CaO, 0.2% MgO and 0.2% LOI.

Metallurgical-grade and chemical grade silicon metal typically have a minimum silicon content of 98.5% SiO2. The reduction process for silicon metal is slagless and is why normal ash content coals cannot be used to produce silicon metal.

Quartzite prices reflect local transport distance rather than global market conditions. Import and export of quartzite is mostly focused on high purity grades used in the production of silicon metal and some specialty ferrosilicon grades.

Spain and Egypt are two countries that export significant volumes of high-grade quartz for silicon metal production.

1.16.2 Demand

Silicon Metal has 3 main end-users: aluminum alloys, silicones and polysilicon/solar. Approximately 90% of Ferrosilicon is consumed in iron and steel production with 10% in manufacture of primary magnesium. Silicon metal consumption was 47% aluminum, 36% silicones and 15% polysilicon with average growth rates of 4.2% per year predicted in 2014 from a base of 2.25 Mt in 2013. Polysilicon is predicted to be the fastest growing end use for silicon metal.

China is the dominant silicon metal producer representing 61% of the global total and 75% of global capacity. China exported 49% of its silicon metal production.

Dow Corning is one of the world's largest producers of silicon metal and the world's biggest manufacturer of silicone products. It operates several silicon metal plants in the USA, Brazil and Canada.

Potential end users are the following:

- Quebec Silicon Limited Partnership (Dow and Ferroglobe Joint Venture), Becancour, Quebec;
- Ferroglobe;
- Dow Corning;
- Elkem;
- CC Metals & Alloys Inc.
- PCC BakkiSilicon hf;
- Thorsil ehf

Ferrosilicon is 3 times the volume of production of silicon metal annually. Globally, Ferroglobe PLC (merge between GSM and Grupo Ferroatlantica) was the world's largest silicon metal producer. The BlueStar (Elkem) and Dow Corning are jointly the second largest silicon metal producers by capacity. BlueStar is majority owned by the Chinese Government but most of its silicon metal capacity is located at its Elkem plants in Norway. All of Canada's silicon metal production is produced at Becancour.

In addition, according to public sources, Iceland is becoming a major importer of silica, to feed its growing domestic silicon and ferrosilicon production. Elkem's Akranes ferrosilicon plant in Iceland is the second largest in the world, with 130 kt/yr, United Silicon HF is developing a plant in Iceland to produce 22 kt/yr silicon metal product, with ramp-up potential to quadruple the production rate. Thorsil is building a silicon metal product plant with the potential for 110 kt/yr; Silicor Material is planning a silicon metal product plant with the potential for 16 kt/yr and PCC plans one to produce 32 kt/yr of silicon metal product.

Ferroglobe has presented that a tonne of silicon metal product requires 2.8 t of silica in the manufacturing process.

1.16.3 Price

Silica is not an openly traded commodity. Prices are negotiated between end users and producers for annual and some long term contracts. Prices do vary according to different parameters such as purity, size and impurities.

Based on this information and understanding of the market, a price was developed by Rogue for the economic analysis. This price, based on a mix of ferrosilicon grade product and silicon metal product, was established at CAN$50.00/t. The price has a large impact on project economics and thus represents a high risk. The basis for the price will be further developed in the next phase of study.

1.17 Environmental Studies, Permitting and Social or Community Impact

At the start of the project in 2014, guidance was given by Service GFE (GFE) in a report presented in November 5, 2014, Rapport Sectoriel – Milieu Naturel et Humain, by Christine Beaumier, biol.. WSP Group plc (WSP) in 2015 provided guidance on several matters pertaining to the environmental obligations related to the development of a mining operation on the Silicon Ridge deposits.

SNC-Lavalin, on May 12, 2016, was granted the mandate to carry out the baseline study towards the CofA Request for a Quarry Operation. In order to comply with the MFFP and MDDELCC requirements and to avoid or reduce the impact of the project, biological surveys were completed.

This assessment of the potential environmental and social issues is based on preliminary infrastructure location that was provided to SNC-Lavalin for the biological surveys. A new environmental and social assessment will be completed throughout the design and engineering process as infrastructure location is being finalized and confirmed.

The project is located within a habitat that is conferred legal status by the Regulation respecting Wildlife Habitats. In June 2016 Rogue took steps towards securing the required authorizations which, if granted, will require certain mitigation measures being implemented. These mitigation measures include restriction periods for certain activities. Rogue is working proactively with the relevant authorities and is ready to apply the required mitigation measures.

Considering the presence of special status bat species in the study area, specific mitigation measures for these species could be required by the authorities concerned. The same applies to the potential habitats of special status voles. Regarding the Bicknell's Thrush, the MFFP could recommend full protection zones in the areas classified as optimal habitat while specific mitigation measures may be required inside or nearby habitats considered as sub-optimal.

According to Article 14 of the Regulation respecting pits and quarries, the operating site of any new quarry must be located at a minimum horizontal distance of 75 m from any swamp. A complementary inventory may be required depending on the Mines Site Layout to be completed throughout the design and engineering process.

Although bog-type wetlands are not covered by Article 14 of the Regulation respecting pits and quarries, encroachment on bog-type wetlands or their destruction is subject to an Authorization Certificate (AC) application, as provided for in Article 22 of the EQA. It is likely the MDDELCC will require compensation for bog losses caused by the project.

According to the Regulation respecting pits and quarries, the operating site of any new quarry must be located at a minimum horizontal distance of 75 m from any permanent stream or lake. Similarly, the operation of a quarry in a permanent stream or a lake is prohibited. Furthermore, a 15 m strip must be maintained for intermittent streams, as provided for in the Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains. Encroachment on these or destruction thereof is subject to an AC application as provided for by Article 22 of the EQA. The analysis of available data shows that there are several permanent and intermittent watercourses straddling the current Mine Site Layout or located nearby. However, the status of some watercourses should be reviewed with the authorities because it might not be defined as a watercourse within the meaning of the law.

The watercourses where fish was observed are also considered as fish habitats, i.e. a habitat subject to legal protection under *the Regulation respecting wildlife habitats*. To this end, if needed for intermittent watercourses, Rogue should apply for authorization to implement its project in these legally protected habitats as per Article 128.7 of the *Act respecting the conservation and development of wildlife*.

In terms of the potential social effects, as mentioned above, Rogue Inc. has interacted with the various local stakeholders since the start of the project: the Municipalities of Saint-Urbain, of Baie-Saint-Paul, and of Les Éboulement; the MRC of Charlevoix; the ZEC des Martres and the Huron-Wendat Nation Council. Stakeholders were kept informed on the project and the work development. In particular, the ZEC des Martres was kept informed of all exploration activities and the Company took the necessary measures to ensure the ZEC des Martres access roads were kept in a reasonable condition and provided grading of the roads when required.

It is foreseen that the social issues that could be raised by the implementation of the project will likely concern recreational and land use activities, and the preservation of the biophysical environmental. These take place throughout the year, with peaks during hunting and fishing seasons. The potential interactions between the project and such activities will likely be raised by stakeholders at the local and regional levels in the course of the consultation process.

In addition, it may be required to verify the archaeological potential on the project site. Given the remoteness of the site, it is likely that the archaeological potential will be low.

This area is also characterized by high unemployment rates (when compared to the nearby urban area of Quebec City) and by seasonal fluctuations in employment (Schéma d'aménagement, MRC Charlevoix, 2012). It is thus likely that the implementation of this project in the area could raise expectations in terms of employment and opportunities for contracts for local enterprises. Already, throughout the exploration program, local employment in the region was created, as well as hiring local contract operators for line cutting, outcrop stripping, cutting timber on drill pads, drill pad site preparation with an excavator, and restoration of drill sites. Purchasing locally in Saint-Urbain and Baie-Saint-Paul was highly encouraged and accommodations in the region were used during an eight month period in 2015.

Two main alternatives are under consideration for the access road to the project site. The southern alternative is preferred since it avoids the main road of ZEC des Martres. The impact assessment for this access road should be carried out after completion of the biological surveys for this project area and the results of the public consultation.

There are no known environmental liabilities to be reported (WSP 2015).

1.18 Capital and Operating Costs

1.18.1 Capital Costs

The capital cost estimate of Rogue's Silicon Ridge Project for silica production is based on a process rate of 180 kt per year. The capital cost estimate for the Roque Silicon Ridge Project is a Level-4 estimate in accordance with AACEI (American Association of Cost Engineers International) standards and procedures, and have an intended accuracy of +35%/-30%. The $3.5 M of initial capital cost estimate includes direct costs, indirect costs, Owner's costs, and contingency, but excludes risk and escalation. The capital cost estimate, shown in Table 1.3, is expressed in 2nd quarter 2017 Canadian dollars.

The capital cost estimate includes the material, equipment, labour and freight required for the mine pre-development, as well as infrastructure and services necessary to support the operation. Mine services and facilities as well as mine equipment are accounted for as operating costs since the operation of the quarry is based on contract operator fees. The initial capital cost estimate for the scope of work is estimated as $3.50 M including $2.04 M for direct costs, $6.44 M for indirect costs and $0.81 M for contingency. The total life of mine capital cost is estimated at $4.63 M of which $3.50 M is initial capital and $1.13 M is sustaining capital. The sustaining capital cost includes $0.40 M to cover site improvements and equipment replacement as well as $0.73 M for closure and progressive rehabilitation of the site up to Year 20 of production.

Table 1.3: Summary of the Investment Capital Costs Estimate

WBS	DESCRIPTION	TOTAL INITIAL CAPITAL COST ($)	TOTAL SUSTAINABLE CAPITAL ($)
DIRECT COST			
1000	Silicone Ridge Project	198,800	
1100	Infrastructure Area	418,664	
1200	Low Grade Stockpile Area	17,575	
1300	Waste rock Stockpile Area	15,983	
1400	Overburden Stockpile Area	23,718	
1500	Mine Site Roads Construction	136,988	
1600	Access Roads Construction / Upgrade	692,638	
1700	Southwest Quarry	538,915	400,000
1800	Closure and Rehabilitation		734,000
	TOTAL DIRECT COST	**2,043,280**	
INDIRECT COST			
9100	Construction Indirects	30,649	
9200	EPCM	204,328	
	TOTAL INDIRECT COST	**234,977**	
OTHER COST			
9300	Owner's Cost	408,656	
	TOTAL DIRECT + INDIRECT COST + OTHER COST	2,686,913	
9900	Contingency	806,074	
	TOTAL CAPITAL	**3,492,987**	**1,134,000**

The above capital costs estimate does not include escalation and costs related to various risks.

1.18.2 Operating Costs

Operating costs estimates have been developed by SNC-Lavalin for Mining, Processing and Site Services and Administration for the Project.

The sources of information used to develop the operating cost estimate includes SNC-Lavalin's in-house databases and outside sources particularly for materials, services and consumables. All amounts are in Canadian dollars (CAD).

The life of mine average operating cost estimate net of royalties, given as dollar per tonne of feed to the transport trucks amounts to $24.54 and is summarized in Table 1.4Table 1.4.

Table 1.4: Summary of LOM Average Operating Cost Estimate

AREA	LOM Average Operating Cost ($/$t_{product}$)
Mining	15.85
Processing	4.14
Admin, Infrastructure & Tech Services	4.47
Total	24.54

Table 1.5 presents the estimated personnel requirements for the Project. This workforce is comprised of staff as well as hourly employees. The administration employees works on a 5 days per week basis. The hourly workforce at the plant provides 10 hour per day coverage, 7 days per week, and on rotation.

Quarry operations is based on 6 month duration and conducted by a mining contractor. No employee requirement is shown for the quarry.

Table 1.5: Total Personnel Requirement

AREA	NUMBER
Processing	6
Management, Admin & Tech Services	2
Total Manpower	8

1.19 Economic Analysis

1.19.1 Economic Results

The economic/financial assessment of the Silicon Ridge Project of Rogue Resources Inc. is based on second quarter 2017 price projections and cost estimates in Canadian currency. No provision was made for the effects of inflation. The evaluation was carried out on a 100%-equity basis. Current Canadian tax regulations were applied to assess the corporate tax liabilities while the recently adopted regulations in Quebec (originally proposed as Bill 55, December 2013) were applied to assess the mining tax liabilities.

The financial indicators under base case conditions are given in Table 1.6.

Table 1.6: Base Case Financial Results

BASE CASE FINANCIAL RESULTS	UNIT	VALUE
Pre-Tax (P-T) NPV @ 10%	M CAD	33.8
After-Tax (A-T) NPV @ 10%	M CAD	23.4
P-T IRR	%	157.1
A-T IRR	%	131.9
P-T Payback Period	yrs	0.6
A-T Payback Period	yrs	0.7

A sensitivity analysis reveals that the Project's viability should not be significantly vulnerable to variations in capital and operating costs, within the margins of error associated with PEA level estimates. However, the Project's viability remains more vulnerable to the larger uncertainty in future market prices.

1.19.2 Important Caution Regarding the Economic Analysis

The economic analysis contained in this report is preliminary in nature. It incorporates Inferred Mineral Resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. It should not be considered a Pre-Feasibility or Feasibility study, as it is a PEA level study. There can be no certainty that the estimates contained in this report will be realized. In addition, Mineral Resources that are not Mineral Reserves, do not demonstrate economic viability.

The results of the economic analysis are forward-looking information that is subject to a number of known and unknown risks, uncertainties and other factors that may cause actual results to differ materially from those presented here.

1.20 Interpretation and Conclusions

1.20.1 Geology

The drill hole and channel sampling program conducted by Rogue in 2015 provided the assay and geological information for the current Mineral Resource estimate. With regard to the assays, the QAQC protocols instituted by Rogue were in accordance with the industry best practice guidelines and analytical checks, including independent analyses reported in Buro et al. (2016). In addition, verification of the assay database against laboratory certificate indicate that the assay data is of a high quality and sufficient for usage in the current Mineral Resource Estimate.

Overall Silicon Ridge is well drilled for the nature of the quartzite deposits, particularly above 125-150 m vertical depth, with typically two drill holes per section line, with 50 m sections in the core of the South West and North East zones, and typically 100 m sections on the margins of these zones and in the Centre North zone. Typically toe spacings are 25 to 60 m on sections. The quartzite exposed and sampled in the trenches located on drill sections provided good control on the attitude and quality of the quartzite. With regard to the geological interpretation, the original drill logs compare well with the modeled geological boundaries, although the three-dimensional wireframe shapes appear to be overly complicated in places, possibly due to difficulty transcribing the original two-dimensional sectional geological interpretation into three dimensions. This is particularly found locally in the South West zone where the banding of high silica and low silica quartzite is further complicated by internal shearing. While the domaining of these units was deemed important to retain for grade interpolation, it is recommended to re-interpret these areas as appropriate, particularly after new information is collected through surface exposure to better understand this grade domaining within the quartzite.

Although the performance of the QC samples has not been outstanding because of the concentrations of elements approaching the detection limits, Philip Vicker, P.Geo. believes that, globally, the analytical results used in the Mineral Resource estimation reflects the quality of the quartzite, with regard to the silica and impurities contents. It is important to note that there is possible risk associated with this slight variability which, if proven out during eventual production, could be mitigated by the sorting process that has been shown by ANZAPLAN (2016) to achieve significant reduction of the content of impurities in the mineralized material.

This Technical Report presents the results of Philip Vicker's, P.Geo.- estimation of the pit constrained Mineral Resource within the "G" and "H" quartzite units on the Silicon Ridge Property. The digital terrain model from a photogrammetric survey was used to constrain the surface for the Mineral Resources and the pit design, and the overburden depth was interpreted from both drill hole observations and refined from a ground penetrating radar survey interpretation. The Mineral Resource estimate follows the guidelines of NI 43-101 Form F (2011) and of the CIM Standard on Mineral Resources and Reserves (2014).

Philip Vicker, P.Geo., believes the data used in the current Mineral Resource estimate for the 'G" and "H" units is sufficiently reliable and complete, and adequately reflects the geological and grade continuity of the quartzite units within the boundaries of the block model.

1.20.2 Mine Planning

A seasonal quarry operation based on contract operation 5 days per week, 12 hours per day, 6 months of the year during the warmer seasons was considered for the Silicon Ridge Project. The contractor is responsible to provide crushed mineralized material (-120 mm) to the crushed material stockpiles when the quarry is not operating. The mine production schedule was developed based on a 20 year pit shell (Pit 10), limited to above lake level (870m elevation). This schedule includes a pre-production phase of two months, which is required for overburden stripping, road construction and pit development. During this period, 38 kt of overburden is to be mined.

1.20.3 Capital and Operating Costs

The initial capital cost for the scope of work is estimated as $3.50 M including $2.04 M for direct costs, $0.64 M for indirect costs and $0.81 M for contingency. The total life of mine (LOM) capital cost is estimated at $4.63 M, of which $3.50 M is initial capital and $1.13 M is sustaining capital. The sustaining capital cost includes $0.40 M to cover site improvements and equipment replacement as well as $0.73 M for closure and progressive rehabilitation of the site up to Year 20 of production.

The LOM average operating cost estimate is evaluated at $26.02/t of feed. Mine closure and rehabilitation cost have been estimated at $0.70 M.

1.20.4 Economic Analysis

The economic analysis of the project has demonstrated the potential viability of the project with recommendations to proceed to next level of Pre-Feasibility study. At an average sale price for silica product of $50.00/t (FOB Silicon Ridge), the financial results indicate a pre-tax Net Present Value (**NPV**) of $33.8 M at a discount rate of 10.0%. The pre-tax Internal Rate of Return (**IRR**) is 157.1% and the payback period is 0.6 years. The after-tax NPV is $23.4 M at a discount rate of 10.0%. The after-tax IRR is 131.9% and the payback period is 0.7 years.

1.21 Recommendations

SNC-Lavalin recommends that the Project continues to the next phase of development with a Pre-Feasibility Study. A series of additional studies and tests are recommended to advance to the next phase, maximize opportunities and minimize risks. The main recommendations are summarized below.

1.21.1 Geology

The following recommendations are made by Philip Vicker, P.Geo.:

- Expose through mechanical stripping a large cross-sectional area of the South West zone quartzite to facilitate geological data collection (detailed mapping and sampling)
  - Detailed mapping and sampling to investigate grade distribution at different scales;
  - Assess the potential for selective mucking from visual observation to reduce deleterious elements from a potential product.
- Further investigate grade distribution and reproducibility variance of ultra-high silica values to determine the precision and accuracy of an appropriate analytical methodology for any future activities on the Project.
- Use Certified Reference Material for standards in future QA/QC. Making a project standard from Silicon Ridge rock is a possibility.
- Use a more appropriate material for Blanks in future QA/QC. Possibly a high silica granite would be more appropriate than limestone.
- Medium (3-5 year term) - add diamond drill holes to improve grades estimate confidence and potentially upgrade the block classifications from Inferred to Indicated and Indicated to Measured.
- Avoid rotated block models in future Mineral Resource updates. These models do not relate well with a variety of other software.
- In future drilling or sampling programs:
  - Use Certified Reference Materials and a more appropriate (silicate) blank material;
  - Standardize and simplify the rock codes for easier interpretation as a large number of combinations of quartzite code with various qualifiers were found in the master database;
  - Standardize an appropriate minimum sample length (30 to 50 cm is recommended); and
  - Adopt a check-in/check-out database structure to minimize transcription errors, track, and standardize data collection.
- Remodel the South West Zone quartzites, incorporating results of surface mapping of the proposed stripped exposure. Utilize appropriate cut-off rules for grade domaining, including grades and widths appropriate for the mine design.
- Exploration potential exists to upgrade and add Mineral Resources both along strike and at depth through additional diamond drilling and surface exploration.
- Beneficiation opportunities (or mitigation of grade control issues) could be undertaken through automated ore sorting techniques based on rock colour (ANZAPLAN, 2016).

1.21.2 Mining, Marketing and Infrastructures

SNC-Lavalin recommends the following:

- Perform rock mechanics as well as hydrogeological studies to further confirm rock slopes, rock permeability, surface water and groundwater flows and water balance in order to validate the pit mining technical parameters.
- Evaluate the requirements of condemnation drilling for the Silicon Ridge Project mine site and infrastructure location (waste rocks disposal area, industrial site, fines storage area, etc.).
- A hydrological evaluation to establish the water table depth in each pit area and evaluate effects on mining below the water table for operational activities and mining cost.
- Carry out geotechnical investigation and studies for the infrastructure location including overburden stockpile area, waste rocks disposal area, low grade ore storage area, crushing and processing site area, new access road, etc.
- Further detailed design of pit phasing and haul ramp access into each phase to ensure access to all mining areas scheduled.
- Further evaluation of narrowing ramps at phased pit bottoms when the contractor preliminary equipment list is available.
- Further detailed mine plan to assess continuous rehabilitation throughout the quarry's life, in order to anticipate the final size of overburden stockpiles and haul cycles for contractor's trucking costs.
- In order to develop and firm up a construction budget estimate based on some pre-owned equipment; efforts should be made in identifying the suppliers and securing the equipment.
- Rogue should complete market analysis of potential end users as the planning process progresses in the future to determine if changes in the market warrant producing a secondary low grade product. In the event that no low grade product is added to the project, the low grade stockpile remains a mineralized waste dump/stockpile, designed to long term geotechnical design parameters.
- Further marketing assessment including detailed discussions and MoU with potential customers to increase certainty on product price and impact of freight.
- Further development on the road upgrades and extension to increase certainty on road costs.
- The estimated cost for work prior to the next study phase is provided in Table 1.7.

Table 1.7: Next Phase Estimated Costs

ACTIVITY	ESTIMATED COSTS (CAD)
Geotechnical & Hydrogeology Study Work	200,000
Certified Reference Materials and Advanced Study Work	275,000
TOTAL	**475,000**

2.0 INTRODUCTION

Rogue is a Canadian mining company with a diverse portfolio of properties with its current focus on its 100%-owned Silicon Ridge Project. The Property is located approximately 42 km north of the City of Baie-Saint-Paul, on the north shore of the Saint Lawrence River, in the Province of Quebec.

The services of SNC-Lavalin were retained by Rogue to produce an updated Mineral Resource estimate and subsequently complete a PEA level update of the Silicon Ridge Project.

This NI 43-101 Technical Report (Report) on the Silicon Ridge Project has been prepared at the request of Rogue to present the Preliminary Economic Assessment Update (PEA update) major findings. The PEA update is based on the Mineral Resources (effective date July 7, 2017) as issued by Rogue on May 23, 2017 in their corporate Press Release. The effective date of the Technical Report on the PEA update of the Silicon Ridge Project is July 7, 2017 and the report was completed July 7, 2017.

A PEA is preliminary in nature and includes Inferred Mineral Resources that are considered too speculative geologically to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. There is no certainty that the conclusions reached in this PEA update will be realized. Mineral Resources that are not Mineral Reserves cannot demonstrate economic viability.

2.1 Terms of Reference - Scope of Study

Philip Vicker, P.Geo., and SNC-Lavalin was requested by Rogue to provide a PEA Study update for the exploitation of the Silicon Ridge quartzite deposit. SNC-Lavalin was to provide plans for the mining, infrastructure, the compilation of capital and operating cost estimates at a confidence level of ± 35%, economic analysis and report preparation, integrating metallurgical testing and environment considerations for which information was provided by Rogue.

Preliminary process flowsheets were developed from a previous metallurgical testing program performed by ANZAPLAN. The capital cost and the operating cost estimates have been developed for a 180 kt per year of direct shipping feed supplying ferrosilicon and silicon metal producers.

The PEA report update is intended to identify the potential for the Project at a production rate of approximately 180 kt per year of silica production order to justify proceeding to further phases of project development.

2.2 Source of Information

The Qualified Persons have relied on information provided by Rogue and on expert opinions pertaining to mineral tenure, surface rights, royalties, environmental considerations and agreements with local communities.

Information related to geology and exploration was sourced from files published, or provided by Rogue and from previous Technical Reports including Beauregard and Gaudreault, (2014) and Buro et al. (2016). Information on environmental matters derives from work by WSP and by SNC-Lavalin. This Technical Report is also based on site visits by Qualified Persons (see Section 2.3) and on discussions with Rogue's personnel.

The selection of the cut-off grade for this resource estimate is supported by the results from metallurgical testing conducted by ANZAPLAN in Germany. An industrial minerals specialist, ANZAPLAN has extensive experience in the mining industry and background in silica projects. Other reference sources are as noted throughout this Report.

2.3 Site Visit

Henri Sangam, PhD, P.Eng., Director (Toronto) of SNC-Lavalin Geotechnical Engineering, Sustaining Capital & Consulting Services visited the site on June 28, 2017, along with Dominic Tremblay, P.Eng., Manager of Mine Environment, Sustaining Capital & Consulting Services. Both Henri and Dominic are QPs for this report.

The site visit was carried out together with Paul Davis, Vice president Rogue. Pit areas, the proposed areas for dumps and other infrastructure were visited. Both ends of the proposed access and the core shack with drilling cores and rejects were also visited. Select photographs from the site visit are presented in **Appendix A**.

Henri Sangam and Dominic Tremblay consider the site visit as current personal inspection, as defined under Section 6.2 of NI 43-101CP, on the basis that the material work completed on the Property was reviewed and that no new material scientific or technical information has been accumulated about the Property since that personal inspection.

2.4 Contributing Authors and Qualified Persons

Table 2.1 provides a list of qualified persons and their respective sections of responsibility. The certificates for people listed as Qualified Persons can be found at the beginning of the Report under Date and Signature – Certificates.

Table 2.1: Qualified Persons and their Respective Sections of Responsibilities

Section	Title of Section	Qualified Persons
1.0	Executive Summary	Henri Sangam, SNC-Lavalin
2.0	Introduction	Henri Sangam, SNC-Lavalin
3.0	Reliance on Other Experts	Henri Sangam, SNC-Lavalin
4.0	Property Description and Location	Henri Sangam, SNC-Lavalin
5.0	Accessibility, Climate, Local Resources, Infrastructure And Physiography	Henri Sangam, SNC-Lavalin
6.0	History	Henri Sangam, SNC-Lavalin
7.0	Geological Setting and Mineralization	Philip Vicker, Consultant
8.0	Deposit Types	Philip Vicker, Consultant
9.0	Exploration	Philip Vicker, Consultant
10.0	Drilling	Philip Vicker, Consultant
11.0	Sample Preparation, Analyses and Security	Philip Vicker, Consultant
12.0	Data Verification	Philip Vicker, Consultant
13.0	Mineral Processing and Metallurgical Testing	Philip Vicker, Consultant
14.0	Mineral Resource Estimates	Philip Vicker, Consultant
15.0	Mineral Reserve Estimates	Philip Vicker, Consultant
16.0	Mining Methods	Kerrine Azougarh, SNC-Lavalin
17.0	Recovery Methods	Henri Sangam, SNC-Lavalin
18.0	Project Infrastructure	Dominic Tremblay, SNC-Lavalin
19.0	Market Studies and Contracts	Henri Sangam, SNC-Lavalin
20.0	Environmental Studies, Permitting and Social or Community Impact	Marc Arpin, SNC-Lavalin
21.0	Capital and Operating Costs	Henri Sangam, SNC-Lavalin
22.0	Economic Analysis	Henri Sangam, SNC-Lavalin
23.0	Adjacent Properties	Henri Sangam, SNC-Lavalin
24.0	Other Relevant Data and Information	Henri Sangam, SNC-Lavalin
25.0	Interpretation and Conclusions	Henri Sangam, SNC-Lavalin
26.0	Recommendations	Henri Sangam, SNC-Lavalin
27.0	References	Henri Sangam, SNC-Lavalin

Capital and Operating Cost estimates as well as Conclusions and Recommendations were provided by those QPs involved in relevant areas of the Study.

3.0 RELIANCE ON OTHER EXPERTS

The Qualified Persons (QPs) involved in this report are responsible for the sections identified in the certificates of the Qualified Persons. The QPs have relied on expert opinions pertaining to mineral tenure, surface rights, royalties, environmental considerations, permitting and agreements with local communities as allowed under Item 3 of Form 43-101F1.

SNC-Lavalin relied on the following reports and opinions for information that is or out of its scope:

- Metallurgical testing provided by Rogue from Dorfner ANZAPLAN
- Information relative to pit slope parameters was provided by Rogue from Journeaux Assoc., Division of Lab Journeaux Inc.
- Information on Silica Pricing provided by Rogue with the support of the Roskill report.
- Survey and drill hole data provided by Rogue
- Geophysical GPR survey data provided by Rogue from Thermoroc Inc. ground penetration radar survey.

3.1 Surface Rights and Access

The QPs have not reviewed surface rights and access agreements, nor independently verified the legal status or ownership of the surface title and underlying property agreements. The QPs have relied upon and disclaim responsibly for information supplied by Rogue which is represented in Section 1.2 and Section 4.0 of this Technical Report.

3.2 Geophysical GPR Survey

An independent ground penetrating radar (GPR) survey to infer the overburden thickness for SW pit, Thermoroc Inc. an independent geophysical company retained by Rogue. The QPs have relied on this independent expert retained by Rogue for Section 16 of this Technical Report through the document titled “GPR investigation report, Overburden depth assessment over the projected quarry location at the Silicon Ridge Project, November 15, 2016.

3.3 Mine Geotechnical

Rogue commissioned Journeaux Assoc., Division of Lab Journeaux Inc. to provide pit slopes recommendations that were included in the initial PEA. The QPs have relied on this independent expert retained by Rogue for Sections 1.13 and 16 of this Technical Report.

3.4 Marketing

An independent marketing analysis was completed for the initial PEA by Roskill, an independent, industry-recognized marketing expert retained by Rogue. The QP’s have relied upon the results and conclusions produced by Roskill and previously included in the initial PEA, included in Section 1.13 and Section 16 of this Technical Report.

4.0 PROPERTY DESCRIPTION AND LOCATION

4.1 Property Location

The Property is located approximately 42 km north of the City of Baie-Saint-Paul, on the north shore of the Saint Lawrence River, Province of Quebec, approximately 95 km northeast of Quebec City (Figure 4-1).

The Property is located within the area covered by National Topographic System (NTS) map sheet 21M/15. The centre of the Property is approximately at Universal Transverse Mercator ("UTM") coordinates 381350 m E, 5294350 m N, North American Datum NAD83, Grid Zone 19N.

4.2 Property Description and Ownership

The Property is comprised of 8 contiguous map-designated mineral claims (CDC claims) that form a rectangular block covering a total area of 462.6 ha (Table 4.1**Error! Reference source not found.** Table 4.1 and Figure 4-2). All the claims are currently active and Rogue Inc. is the 100% recorded owner. The claims are in good standing and have an expiry date of April 21, 2018. All the claims are affected by a restriction related to a Wildlife Habitat protection.

The status of the claims was verified by SNC-Lavalin on May 24, 2017 using GESTIM, the government system for management of claims, available on the website of the Quebec "Ministère de l'Énergie et des Resources Naturelles" (MERN) (Table 4.1).

The amount of required work to keep the claims in good standing was reduced by 35% for a period of two years starting in December 2015, whereas the renewal fees were increased by 8% on January 1, 2016 and increased by another 8% on January 1, 2017.

Table 4.1: Silicon Ridge Property, List of Claims, Status, Work and Fees

Claim No	Area	Required Work ($)	Excess Work (Credit; $)	Required Fees ($)	Expiry Date	Restriction
2402787	57.83	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402788	57.83	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402789	57.83	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402790	57.83	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402791	57.82	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402792	57.82	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402793	57.82	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
2402794	57.82	780.00	1,114.00	59.67	2018-04-21	Wildlife Habitat
Total	**462.60**	**6,240.00**	8,912.00	477.36		

Figure 4-1 Property General Location

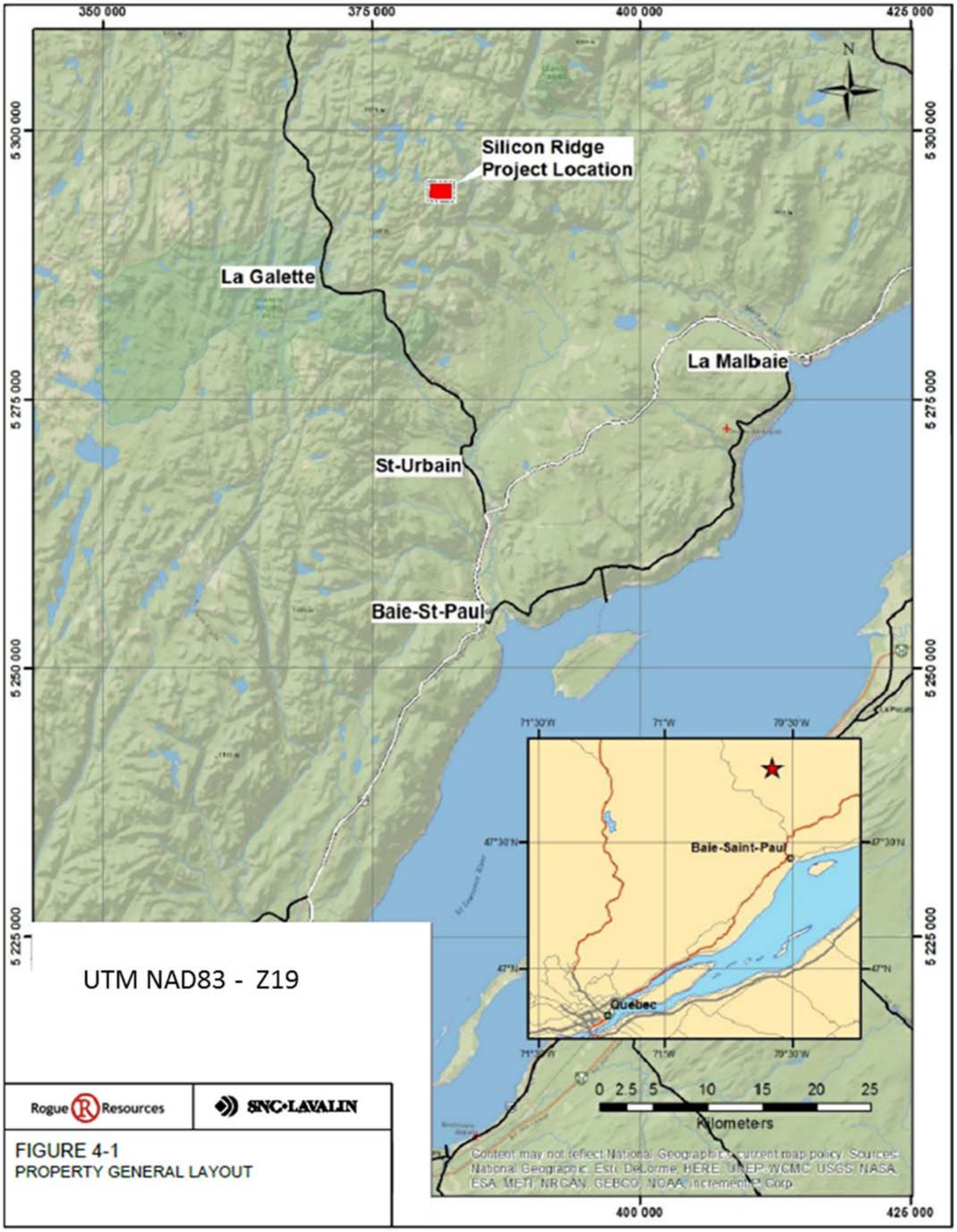
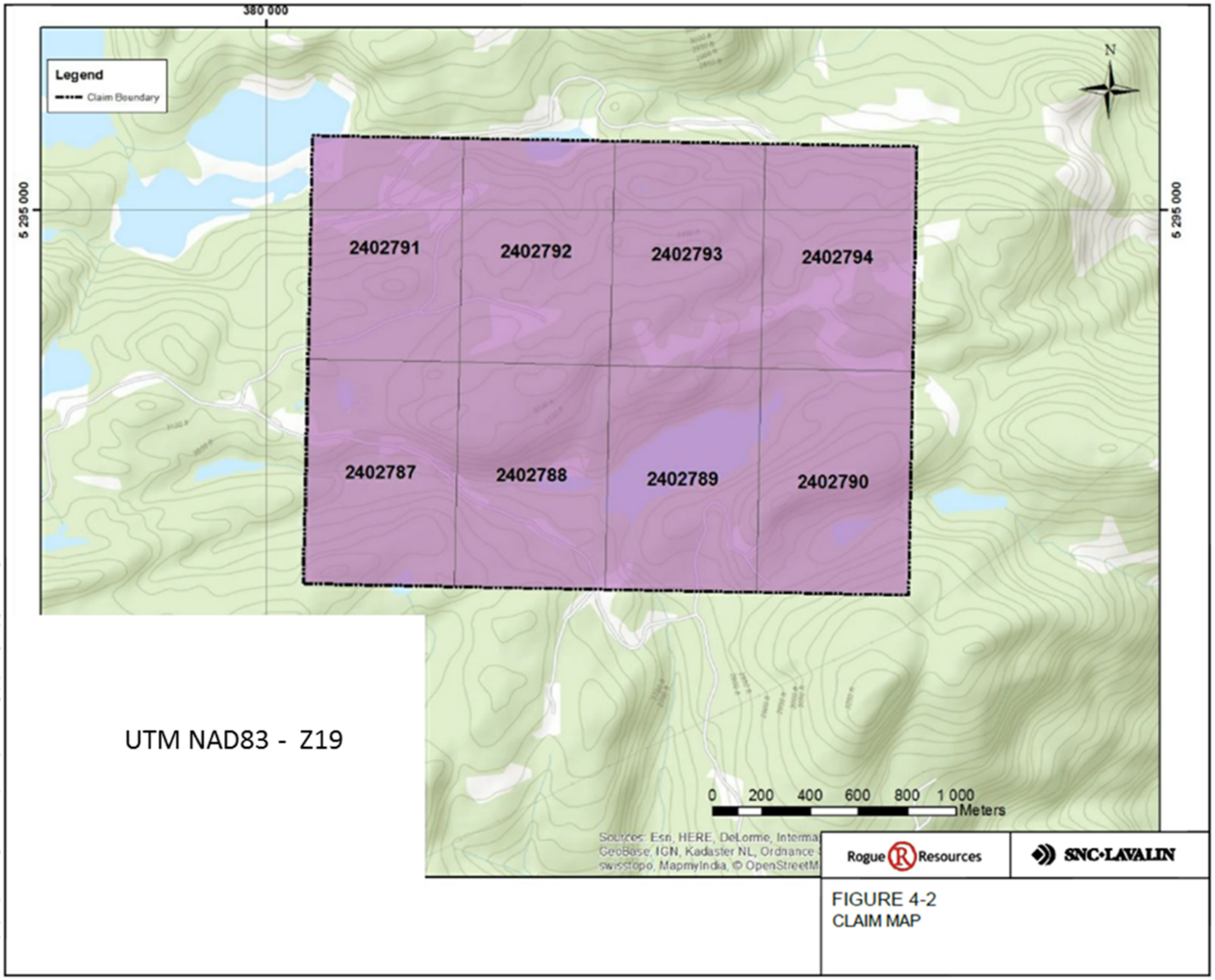


Figure 4-2 Property Location and Claims Map



The Property has not been legally surveyed but map-staked claims are defined on the basis of UTM coordinates and consequently the Property boundaries are deemed to be accurate.

4.3 Mineral Tenure in Quebec

Map designation is now the main means of acquiring a claim in Quebec. Once the Notice of Staking is approved, the claims are registered with the Registrar of the Quebec MERN. Within surveyed territory, the outline of a claim is the same as that of a land lot, or part of.

The claims have a validity of two years and can be renewed indefinitely for two-year periods, provided the renewal fees are paid and the required exploration work ("Assessment Work") is completed, under certain conditions.

Excess assessment work on one claim may be applied to the renewal of other contiguous claims held by the same owner within a radius of 4.5 km from the centre of the claim from which the credits will be used.

The claims give the owner exclusive rights to explore for any mineral substances in the public domain, with a few exceptions like:

- Hydrocarbons;
- Loose deposits such as sand, gravel and clay;
- Land that is also subject to an exploration or mining right for surface mineral substances.

Access to the claims is granted to carry out exploration work. However, the claim holder cannot enter land granted for non-mining purposes or land leased for mining surface mineral substances without permission from the current holder of these rights.

The claim holder may not erect or maintain any construction on lands of the domain of the State without first obtaining authorization from the Minister of Mines, except if the construction is located on the parcel of land subject to the claim and is a construction of a type defined by a ministerial order.

The information in this section is only a summary description of the mining rights and the reader seeking full and official definitions on titles or rights and obligations of the claim holders should refer to the website of the MERN of Quebec.

4.4 Underlying Agreements and Royalties, Encumbrances

Pursuant to an option agreement dated August 15, 2014, Rogue acquired an option to earn a 100% interest in the Property for a payment of 8.5 million shares. The Property is subject to a 2% NSR royalty, of which one-half (1%) may be purchased for $500 K and the remaining one-half (1%) may be purchased for a further $1 M (MD&A, July 31, 2015).

Rogue also entered into an MOU dated April 10, 2015 with the Huron-Wendat Nation Council in respect of the Project (MD&A, July 31, 2015). The agreement stipulates, among other obligations, that Rogue will pay a royalty of $0.08/t of extracted economic material upon commencing commercial production of quartzite.

Pursuant to the Regulation respecting mineral substances other than petroleum, natural gas and brine (c. 13.1, r. 2), the rights, fees, leases and other amounts provided for in section 61: Surface Mineral Substances; Stone and sand used as silica ore and any stone used for the preparation of cement, such as limestone, calcite and dolomite, pay a royalty to the Province of Quebec of $0.40/t of extracted substance as of January 1st, 2017.

Extensive community consultations have been carried out by Rogue management with various community groups in the region, including the Municipal Regional Offices of Saint-Urbain, Baie-Saint-Paul, the regional county municipalities (MRC) of Charlevoix and the administrators of the "Zones d'exploitation contrôlée des Martres" (ZEC, Controlled Harvesting Zone). (MD&A, July 31, 2015). A public consultation, required as part of the le bail d'exploitation minière (BEX) permit application on March 24, 2017 in the Municipalité de St-Urbain where members of the public were attended a presentation provided by Rogue and provide comments and questions regarding the Silicon Ridge project.

The Property is located within the "ZEC des Martres" located in public land areas of Quebec. ZECs were set up in 1978 by the Government of Quebec to take over from private hunting, fishing and trapping clubs, in order to provide timely access to recreational activities to the general public.

All the claims are registered at the MERN with an encumbrance related to the conservation of Wildlife Habitat (Restriction 16862). It seems that this will essentially consist of a restriction on exploration work during certain periods of the year, such as during the migration of caribou.

It is important to note that the Sitec silica mine that is located in the same restricted area, 4 km to the southwest from Rogue's Property, has been in operation for the past fifty years. In addition, the Property is located in a region that has been logged in recent years, resulting in a number of forestry roads facilitating access to different sectors of the Property.

4.5 Environmental Liabilities

WSP Group plc (WSP) provided initial guidance on all matters pertaining to the environmental obligations related to the development of a mining operation on the Silicon Ridge deposit.

The environmental characterization work carried out by WSP included:

- Identification of environmental issues:
- Special status wildlife (Woodland caribou);
- Wetlands and watercourses;
- Surficial deposits and borrow pits;
- Special-status flora and fauna species.
- Characterization of surface water and watercourses with high fish habitat potential:
- Sampling and analysis of water quality in Lac de la Grosse Femelle;
- Physical characterization of watercourses (substrate, type of flow, fish habitat);
- Description of present fish communities.

The environmental obligations with regard to the Quebec Environment Department, the Québec's Environment Quality Act or the Canadian Environmental Assessment Act are addressed by WSP.

Further guidance was also presented by Service GFE (GFE) in a report presented in November 5, 2014 (Rapport Sectoriel – Milieu Naturel et Humain, by Christine Beaumier, biol.), for the project area.

Full descriptions regarding the environmental matters are provided under Section 20 of this report.

4.6 Permits that must be acquired

Permits to conduct exploration work, including drilling, were obtained by Rogue. However, starting a mining operation on the Property will require either a "Mining Lease" (BM) or a "Lease to Mine Surface Mineral Substances" (BEX).

It is expected that the Project will require a number of approvals, permits and authorizations throughout all the stages of development and prior to initiation of mining.

4.7 Other Significant Factors and Risks

The Property is located within the Charlevoix Seismic Zone, one of the most seismically active regions in eastern Canada. A total of 308 micro-earthquakes were recorded over the past twelve months (May 24, 2016 to May 24, 2017), 12 of which were felt, although of low magnitudes ranging from 1.6 to 3.1 (Source: Natural Resources Canada, Earthquakes Canada). Despite these repetitive earthquakes, no surface rupture has ever been reported in historical accounts or in scientific reports. In addition to damaging buildings in areas where soft soils amplify ground motions, high-magnitude earthquakes may trigger landslides.

SNC-Lavalin is not aware of any risks or other encumbrances, environmental liabilities or other significant factors and risks that may affect access, title or the right or ability to perform work on the Property. SNC-Lavalin has not verified the validity of titles or rights on the property except for the information for the claims available on GESTIM. SNC-Lavalin relies on information provided by Rogue on these matters in this Report.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE & PHYSIOGRAPHY

5.1 Accessibility

The Property is accessible from Baie-Saint-Paul by driving north along Route 138 to Saint-Urbain, and along Route 381 to "Accueil Barley", the entrance point to the "ZEC des Martres". This entrance is located off Route 381, at Distance Marker Km 43, approximately 52.8 km north from Baie-Saint-Paul. From this point, the property can be reached by driving approximately 17 km eastward following forestry roads. The main gravel roads are maintained in good condition and are easily passable with a pickup truck or heavy equipment.

The Property can also be accessed via the road to the Sitec quartzite mine and forestry roads and trails, some of uncertain drivable condition.

5.2 Topography, Elevation and Vegetation

Rugged topography makes up most of the Property, dominated by northeast trending ridges and deeply incised river valleys. Elevations within the Property vary from approximately 870 to 990 m above mean sea level.

Vegetation is represented by balsam fir, white birch, yellow birch, as well as conifer regrowth in forested areas.

5.3 Population, Transportation

The Property is situated within a vast territory that is exploited mainly for forestry and recreational outdoor activities. The region has no permanent population and chiefly includes lands belonging to the State, such the "Réserve Faunique des Laurentides", the "Parc National des Grands-Jardins" and the "ZEC des Martres".

Saint-Urbain, with a population of 1,456 (as at July 1, 2014; Source: "Institut de la statistique du Québec") is the closest town from the Property. Baie-Saint-Paul, located 14.5 km to the south of Saint-Urbain, has a population of 7,331 (as at July 1, 2014) and is the largest urban centre in the region of the Property.

The Property is within a region serviced from Quebec City by provincial highways following the entire north shore of the Saint Lawrence River or connecting it to the City of Saguenay.

5.4 Climate

The Property is situated in a zone of a sub-humid, temperate continental climate with cold winters and warm, humid summers. Annual daily average temperature stands at 4ºC and total annual precipitations amount to 737 mm of rain and 2,565 mm of snow (Table 5.1). Rogue's field personnel have noticed that the temperature seems to be systematically lower in the Property area than at the Baie-Saint-Paul weather station by approximately 5º C.

Micro-climates characterized by significant temperature variations may prevail locally, owing to the proximity of the St. Lawrence River and the general rugged topography.

A year-round mining operation at the Property would probably be possible, except for the hunting season that stretches from September to mid-October and during the period of caribou migration. Although winter days can be cold and snow accumulation significant, the highways in the area are open year round and Canadian operating mines have experienced similarly harsh climatic conditions prevailing in the Project area. However, a mining operation extracting quartzite on the Property may be seasonal and thus would not be significantly affected by the harsh winter conditions.

Table 5.1: Baie-Saint-Paul; Ave. Monthly Climate Data & Extremes

(1981 to 2010 Source: Environment Canada)

Weather	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall, Monthly Average (mm)	13.3	16.1	40.2	77.2	97.9	93.8	87.4	83.4	79.5	77.4	59.6	11.2
Snowfall Monthly Average (cm)	60.7	48.7	40.7	14.3	0.1	0.0	0.0	0.0	0.0	1.7	26.2	64.0
Rainfall, Extreme Daily (mm)	49.5	72.6	90.0	65.0	91.8	63.4	80.4	69.0	92.4	62.2	55.0	41.9
Snowfall, Extreme Daily (cm)	49.8	65.8	37.0	33.0	12.7	0.0	0.0	0.0	0.0	7.8	37.4	58.4
Temperature, Daily Maximum (°C)	-6.7	-4.2	0.6	7.7	15.7	21.1	23.8	22.7	17.5	10.9	3.5	-2.9
Temperature, Daily Minimum (°C)	-17.9	-15.7	-9.6	-1.5	4.5	9.9	12.7	11.8	7.4	1.9	-4.2	-12.3
Prevailing Wind Direction (AZ°) (*)	315	315	315	337	292	337	0	292	337	90	315	292

((*) Source: Windfinder.com)

5.5 Surface Rights, Power, Water, Personnel

The imprint of a quartzite mining operation would be relatively small compared to the size of the Property. In preliminary review, it appears that sufficient space is available within the Property limits to accommodate the soil and waste dumps, as well as the necessary infrastructure. The construction of a large, complex process plant on the Property is not envisaged in this Report.

The closest major power line is located 5.4 km east-southeast of the southeast corner of the Property. However, in February 2015, the Government of Québec announced that, as part of its 2013-2020 Climate Change Action Plan, it would provide Sitec Quartz Inc., with over $2 M in financial assistance to build a 31 km hydro power line that will connect to the Hydro-Quebec power grid. This funding was significant for the Project as it brought hydroelectric power to within 4 km of the Project. The opportunity to connect with the Hydro-Quebec grid, should be initiated if a processing component is developed on the Project, and could be economically beneficial to the Project (MD&A, July 31, 2015). As of July 5th, 2016, the power line has been completed to the Sitec Quartz Inc. site).

The project will not access water from natural bodies of water including lakes, ponds and streams, however, water is available from Lac de la Grosse Femelle located in the central sector of the claim group.

Personnel for a mining operation can be found in nearby towns (Saint-Urbain, Baie-Saint-Paul, Clermont, La Malbaie, Saint-Hilarion) and among First Nation members. Part of the hired labour will likely be sourced from other cities in Quebec, due to requirement for skilled professionals.

6.0 HISTORY

6.1 Ownership

Globex Mining Enterprises Inc. staked the claims making up the Property in April 2014 and transferred them to a third party, Fiducie Ananke, in June 2014. The claims were transferred from Ananke to Rogue in April 2015. Globex received shares of Rogue and retains a NSR royalty. Rogue is currently the 100% registered owner of the Property.

6.2 Mineral Exploration Work

The Property and surrounding region became a target for prospecting and reconnaissance exploration following the discovery of a quartzite occurrence in 1946, two km east of Lac de la Galette, approximately 10 km southwest of the Property.

Documented modern exploration efforts in the region started in 1965, with Leeds Metals Company completing a drilling program on a quartzite occurrence and a Resource Estimate.

New quartzite occurrences with potential economic significance discovered by Jehan Rondot, for the Quebec Mine Ministry, from 1969 to 1972, in the Lac des Martres area brought renewed attention from different prospectors.

In 1974, J. Rondot estimated a significant Resource tonnage in a series of deposits, which attracted SKW (currently Silicium Québec SEC) and Baskatong Quartz Inc. (currently Sitec Quartz Inc.) who started mining in 1976.

GEX Silicium Limited (1976) mined a deposit from a small quarry for one year, and SOQUEM started a short-lived quartzite operation in 1975 and carried out sporadic exploration in the region between 1979 and 1995.

Further work by J. Rondot until 1984 delineated another ten quartzite occurrences of potential deposit sizes. Following this period, several companies and prospectors have completed exploration work in this area, among others, prospector Tremblay in 1999.

Additional details on exploration in the region of the Property, and a detailed list of reports filed with GESTIM, can be found in the NI 43-101 Technical Report on the Lac De la Grosse Femelle Silica Property, by Geologica Groupe-Conseil Inc., dated November 19, 2014 (Beauregard and Gaudreault, 2014).

6.3 Resources, Production

In June 2016, Met-Chem prepared a Mineral Resource estimate on behalf of Rogue and prepared an independent Technical Report. The result of the 2016 Preliminary Mineral Resource is presented in Table 6.1.

The Property has not seen any prior quartzite production. The same quartzite formations that are found on the Property extend along strike onto the Sitec mine 4 km to the SW.

Table 6.1: 2016 Historical Mineral Resource Estimate

ALL ZONES					
	Tonnes (Mt)	**SiO_2 (%)**	**TiO_2 (%)**	**Al_2O_3 (%)**	**Fe_2O_3 (%)**
Measured	3.2	98.61	0.061	0.556	0.101
Indicated	6.5	98.60	0.062	0.564	0.122
Measured + Indicated	**9.7**	**98.60**	**0.062**	**0.561**	**0.115**
Inferred	**4.6**	**98.64**	**0.062**	**0.532**	**0.131**
SOUTH WEST ZONE					
	Tonnes (Mt)	**SiO_2 (%)**	**TiO_2 (%)**	**Al_2O_3 (%)**	**Fe_2O_3 (%)**
Measured	2.4	98.60	0.061	0.560	0.101
Indicated	3.9	98.60	0.062	0.576	0.109
Measured + Indicated	**6.3**	**98.60**	**0.061**	**0.570**	**0.106**
Inferred	**2.5**	**98.70**	**0.061**	**0.544**	**0.096**
NORTH EAST ZONE					
	Tonnes (Mt)	**SiO_2 (%)**	**TiO_2 (%)**	**Al_2O_3 (%)**	**Fe_2O_3 (%)**
Measured	0.8	98.66	0.063	0.544	0.102
Indicated	1.4	98.63	0.066	0.556	0.123
Measured + Indicated	**2.2**	**98.64**	**0.065**	**0.552**	**0.116**
Inferred	**0.5**	**98.56**	**0.069**	**0.641**	**0.136**
CENTRE NORTH ZONE					
	Tonnes (Mt)	**SiO_2 (%)**	**TiO_2 (%)**	**Al_2O_3 (%)**	**Fe_2O_3 (%)**
Measured	0.001	98.31	0.047	0.589	0.150
Indicated	1.2	98.56	0.061	0.535	0.163
Measured + Indicated	**1.2**	**98.56**	**0.061**	**0.535**	**0.163**
Inferred	**1.6**	**98.56**	**0.060**	**0.479**	**0.183**

Notes:

1) CIM definitions (May 10, 2014) were followed for classification of Mineral Resources.
2) Cut-off grades of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3.
3) Density of 2.65 g/cm^3.
4) Metric tonnes.
5) Numbers may not add due to rounding.
6) Effective date of the Resource estimate is June 7, 2016.
7) 50° slope;
8) Offset of 85 m from lakes and wetlands;
9) Product sales price of $200/t and $100/t for high value and ferrosilicon, respectively;
10) Processing cost of $16.84/t and $45.84/t of feed for high value and ferrosilicon, respectively;
11) Mining cost of $6.73/t and a G&A cost of $2.00/t.
12) Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability

7.0 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Introduction

In addition to the geological information in this Section, detailed descriptions can be found in the previously SEDAR filed Technical Reports prepared by Beauregard and Gaudreault (2014) and Buro et al. (2016), and in the graduate thesis by Tremblay (1984, French language).

7.2 Regional Geology

The Property is located in a high-grade metamorphic terrane of the Grenville Province of the Canadian Shield. The region is interpreted to be underlain by meta-sedimentary and meta-volcanic rocks occurring as discontinuous units in a region predominated by charnockitic and anorthositic intrusive bodies. The paragneiss-quartzite sequences hosting the high silica quartzite on the Property belong to the Galette Formation, which is a sub-unit of the Groupe des Martres within the Tadoussac Complex. The paragneiss sequence is folded and has undergone upper amphibolite to granulite grade metamorphism.

7.3 Local Geology

The paragneiss are oriented in a regional synformal fold wrapped around the northern boundary of the St. Urbain anorthositic intrusion. Rocks of charnockitic composition occupy the core of the fold and border the sequence to the west and the north.

At least four ductile deformation events, overprinted by late brittle deformation have been interpreted to have affected the paragneiss sequence. The ductile tectonic events have generated large-scale NW-SE isoclinal folds, subsequent open folds, a NE-SW trending synformal fold, a syncline around the St. Urbain anorthosite and S-type folds encountered in several quartzite units. Part of the boudinage that is observable at the mesoscopic scale may derive from one or more of these tectonic events.

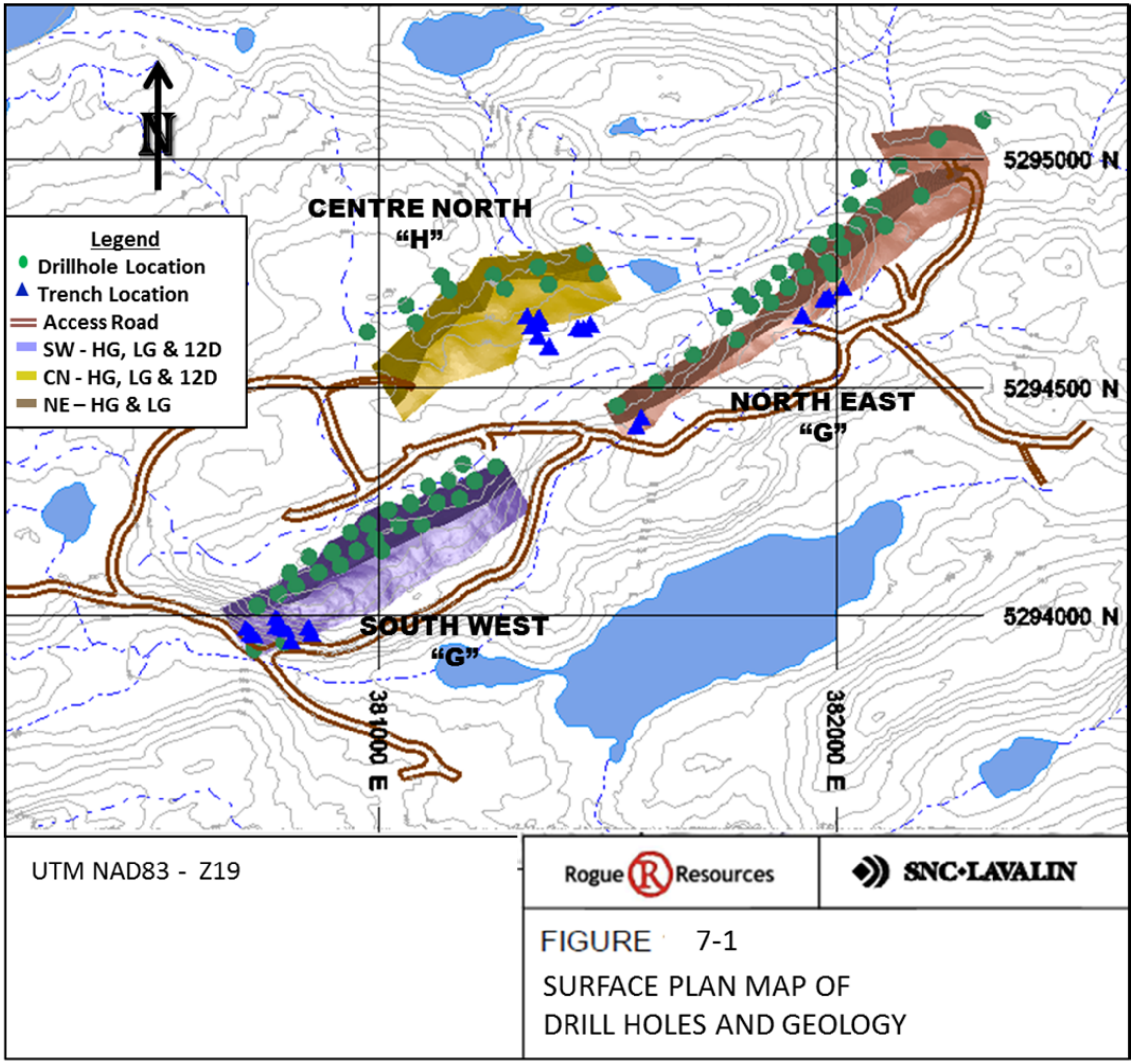
Brittle deformation is responsible for the penetrative fractures and the offsets along N and NE fault offsets affecting the quartzite. The re-distribution of impurities in the quartzite units has also been interpreted to be remobilization at least partly in response to the brittle deformation event.

7.4 Property Geology

7.4.1 Geology, Structure

The “G” and “H” quartzite and paragneiss in the central portion of the property form an anticline with a NE trending, steeply NW dipping axial plane (overturned fold) and a syncline to the SE, the axis of which passes immediately along the north shore of Lac de la Grosse Femelle (Figure 7-1)

Figure 7-1: Surface Plan Map of Drill Holes and Geology



The "G" and "H" units are interpreted to represent the same unit duplicated by fold repetition, with intervening quartz-biotite-garnet gneiss. Charnockitic gneiss lies at the northern and southern contacts of the "G" and "H" units. The following sequence is typically found in the "G" unit, from hangingwall to footwall:

- Quartz-feldspar-biotite-garnet paragneiss (nonmagnetic);
- Contact zone: paragneiss with intercalated quartzite intervals;
- Pure white quartzite, with local pink, buff and grey-green fractured sections;
- Fault zone that appears to follow the axial plane of the fold;
- White-pink-grey quartzite with local red coloring by oxidation;
- Charnockitic Gneiss (weakly magnetic).

7.4.2 Mineralization

The Property hosts several map-scale sequences that host high purity quartzites. Rogue selected two of these sequences ("G" and "H") as their primary drilling targets for potential further development. The "G" unit, hosting the South West and North East zones, trends SW-NE through the central portion of the Property, and the "H" unit, hosting the Centre North zone, is approximately 250 m to the north, in the northern sector of the Property (Figure 7-1). The width of the "G" quartzite unit varies along strike, reaching a maximum of 260 m, with an average thickness of 150 m.

The quartzite on the Property is generally coarse-grained, massive and locally fractured. It variably contains traces of biotite, muscovite, hematite, magnetite, ilmenite, fuchsite, rutile, and clusters of sillimanite with pyrite were occasionally observed. The different impurities cause the changes of colour in the quartzite. In the case of iron, fine hematite or magnetite crystals impart a pervasive pink or red colour to the quartzite, and iron staining (surface coating) is observed along fractures and fractured contact zones that promote water circulation.

The quartzite exhibits internal zones distinguished by their colour or by sheared zones that represent fairly continuous bands within the deposit, and the relative silica content within these bands is controlled by and inversely proportional to the impurities hosted in the gangue minerals. These bands of different tenors in impurities have been interpreted to have responded to different controlling factors:

- Lithological: precursor's original composition (protolith);
- Structural, indicated by:
    - The fact that these bands are folded sympathetic with the quartzite unit, rather than cross-cutting (synthetic folds with respect to the geometry of the large-scale fold in the quartzite unit);
    - Observed remobilization of mobile elements during metamorphism;
    - Evidence of late migration of iron along the fracture network.

ANZAPLAN (2016) reports a preliminary mineralogical investigation of three high silica quartzite specimens selected by differing colours, and the following features were described. The quartzite is comprised of isometric or elongate quartz crystals that reach a size of more than 1 cm. The complex regional geological/structural history has been recorded by the quartzite, as evidenced by features such as dynamic recrystallization and internal crystal deformation observed in these two thin sections. Films of hematite, imparting a reddish colour, of approximately 50 microns in size occur along grain boundaries and are interpreted to indicate primary sedimentary layering. In addition, the roundness of the zircons suggests a sedimentary precursor. The presence of muscovite flakes (occasionally altered), sillimanite prisms (occasionally altered to clay) and common rutile needles were observed. Abundant small fluid inclusions less than 20 microns were detected along annealed fractures and were interpreted to impart the whitish colour.

Analyses of high silica quartzite in the “G” sequence have in the past indicated low contents of impurities (Table 7.1). More recently, samples collected by Beauregard and Gaudreault (2014) returned similar values.

Table 7.1: “G” Quartzite, Historical Samples

Oxides	Quartzite Chemistry (wt.%)		
SiO_2	99.52	98.72	97.6 to 99.5
Fe_2O_3	0.39	0.43	0.28 to 0.69
Al_2O_3	0.46	0.70	0.07 to 0.21
TiO_2	0.04	0.06	0.02 to 0.13
Source:	*Original data from Tremblay et al. (1999) as reported in Beauregard and Gaudreault (2014)*		*Beauregard and Gaudreault (2014)*

These analytical results of surface grab samples are consistent with the assay results from channel sampling along the trenches and from the drill core collected by Rogue, which are described in more detail in this Report.

8.0 DEPOSIT TYPES

The classification of silica deposits includes the following types:

- Unconsolidated silica sands;
- Orthoquartzite (“quartzitic sandstone”);
- Quartzite (metamorphic, recrystallized);
- Massive quartz (hydrothermal – lode; segregations within intrusive bodies or pegmatite).

Silica deposits are widespread throughout the world and most of the production derives from silica sands. The Cape Flattery silica mine in Queensland, Australia, is the largest in the world and provides 2 Mt of silica sand each year. United States-based Unimin Corp./Sibelco is a significant producer of high purity silica worldwide.

Canada's main producers of silica are in Québec, Ontario and Alberta. The Québec Ministry of Energy and Natural Resources indicates there are approximately ten active silica quarries in the province, located in the Laurentides, Montérégie, Charlevoix, Fermont and Témiscamingue regions. Canadian silica is also produced in Saskatchewan, British Columbia, Nova Scotia and in Newfoundland and Labrador.

The quartzite on the Property is a product of metamorphism, of probable sedimentary origin, and occurs as large-amplitude folds formed in response to multiple episodes of metamorphism. The exploration model used by Rogue for the deposits on the Property primarily relies on field mapping, the positive topography resulting from the erosion-resistant quartzite, and the lack of magnetic susceptibility of the quartzite, in contrast with the geophysical signature of the magnetic paragneiss in the footwall of the “G” unit and in the hangingwall of the “H” unit.

A general indication of the quality of the quartzite on the property is provided by visual inspection in hand specimens of the colour imparted by the type and content of impurities.

9.0 EXPLORATION

9.1 Exploration Summary

Prior to Rogue in 2014, no systematic exploration had been conducted on the property, with only regional government geological survey activities covering the property. Initial exploration work by Rogue on the Project began in September 2014, focussed on mapping and sampling the quartzite units, resulting in the "NI 43-101 Technical Report on the Lac de la Grosse Femelle Silica Property" (Beauregard and Gaudreault (2014)). This was followed by an airborne helicopter Magnetics and VLF survey in December 2014 to assist in the interpretation defining the quartzites and magnetic paragneisses. Follow up work in 2015 by Rogue consisted of line cutting 22.12 km of grid lines oriented 330° and lines spaced at 200 m, followed by mapping the quartzites and collecting quartzite samples for chemical analysis and testing, determining the overall quartzite unit size along the strike and dip, trenching (outcrop stripping), channel sampling and diamond drilling. The exploration programs were designed by Rogue to gather sufficient data to prepare a Technical Report on an initial NI 43-101 compliant resource estimate, submitted in Buro et al. (2016).

A summary of the exploration work previously conducted by Rogue is provided in Table 9.1 (after Buro et al. (2016)).

Table 9.1: Summary of Exploration Work on the Property

Rogue Resources	2014	Rogue Resources Inc., 2014 NI 43-101 Technical Report On The Lac De La Grosse Femelle Silica Property, Charlevoix Regional County Municipality, Quebec, Canada, Beauregard and Gaudreault, 2014.
		Airborne Heli-Mag survey flown over the Property and a large swath of land to the North and the East by Geophysics GPR International Inc., Longueuil, Quebec; (316.5 line-km of MAG, of which approximately 50.0 km over the Property area) along NW-SE lines at 100-m spacing. Flown December 2014 and June 2015.
		Technical Report on the Lac de la Grosse Femelle Silica Property, Quebec, Canada; Report Prepared for Folkstone Capital Corp., by Mario Justino, M.Sc., P.Geo., May 30, 2014
	2015	Line-cutting (22.12 km); Outcrop stripping 446.7 m by 2 m wide; Channel sampling (“G” and “H” units, 293 samples); Mapping (22.12 km on grid lines and road mapping); Airborne VLF survey (287.4 line km); Geological-structural Evaluation, Exploration Consultant Dr. Trygve Hoy
		Drilling program (“G” quartzite unit), started mid-Aug., second drill rig testing the “H” unit and infill on “G” unit from mid-Sep.
		Topographic survey: Heliborne LiDAR survey (Digital Terrane Model, DTM)
		Helicopter-borne EM-VLF geophysical survey by Geophysics GPR International Inc., Longueuil, Quebec; (287.4 line-km along NW-SE lines at 100-m spacing), using the transmitting station in Cutler, Maine
		Processing and Interpretation of a Helicopter Borne Magnetic Survey, January 2015, by consulting geophysicist J. Simard, P. Geol./Geoph.
		Re-processing and modeling (inversion) of MAG and EM-VLF survey data by consulting geophysicist J. Simard, P. Geol./Geoph.
		ANZAPLAN visit to project. Viewed trenches, core visit with Rogue, collected 2 samples (100 kg) for preliminary testing
		Drill core from two PQ and corresponding NQ holes sent to ANZAPLAN for testing
	2016	Core from one additional PQ and twin NQ hole shipped to ANZAPLAN to carry out the additional test work
		Core from one additional PQ and twin NQ hole shipped to ANZAPLAN to carry out the additional test work
		Bulk Sample collection 1.6 t of “G” quartzite at Trench 7 – L5W, Bulk Sample Testing & Analysis by ANZAPLAN and flow sheet design.
		NI 43-101 Technical Report on the Silicon Ridge Mineral Resources Quebec, Canada; Prepared for Rogue Resources Inc. by Met-Chem, a division of DRA Americas in Buro et al., (2016)
		Ground penetrating radar survey was completed over the central portion of the SW Zone in November 2016 to assess the bedrock-overburden contact.

9.2 Trenching and Channel Sampling

Advanced exploration activities including drilling and channel sampling undertaken by Rogue in 2015 were designed to provide the geological information (assays and lithologies) within the “G” and “H” quartzite units on the property to facilitate an initial Mineral Resource estimate on the property which was reported in Buro et al. (2016).

A drill program comprising 74 drill holes totaling of 11,822.30 m including 4,740 assays was completed on the Silicon Ridge project between August 8, 2015 and December 16, 2015 targeting the “G” and ‘H” quartzite units. No prior holes had been drilled into the quartzite deposits on the property before the 2015 drilling program. As per the guidelines of Form NI 43-101 F1, detailed discussion of the drilling is allocated to Section 10 of this Report.

The quartzite and gneiss were exposed and sampled in a total of fourteen trenches comprising 25 channel sample lines on surface outcroppings of the “G” and “H” units between June 2, 2015 and July 11, 2015. These trenches are generally on the steep slopes of the ridges. Continuous channel sampling was carried out using diamond blade rock saws. A total of 293 samples were collected, analyzed, and added to the Master Database, which cumulatively total of 501.7 linear m of samples within 510.5 lineal m of cut channels. Locations of the channel samples are shown in Figure 7-1.

The trenches were surveyed by J. L Corriveau and Assoc. of Val-d’Or, Quebec, and the assays were submitted to ALS laboratories. The channels were logged with similar detail and methodology as the drilling, identifying distance from and to within the channel, and a lithological description of the samples for assay and the surveyed location for each sample. The assay analytical procedures for the channel sampling were the same as for the drill hole samples, and these are discussed in detail in Section 11. The channel sample assays represent approximately 6% of the total, or approximately 7% by length, of all samples used in the current Mineral Resource estimate with the bulk of the assay samples in the current Mineral Resource estimate (94% by total or 93% by length) deriving from the diamond drilling which is discussed in Section 10.

10.0 DRILLING

A drill program comprising 74 drill holes totaling of 11,822.30 m including 4,740 assays in the database was completed on the Silicon Ridge project between August 8, 2015 and December 16, 2015 targeting the “G” and ‘H” quartzite units. No known prior holes had been drilled into the quartzite deposits on the property before the 2015 Rogue drilling program. The distribution of the drilling on the property is shown in Figure 10-1 and a plan map with surface collar locations is shown in Figure 7-1.

The drill program included 3 aborted drill holes totaling 39 m, and 6 drill holes (PQ and NQ core diameters) for technical evaluation for metallurgical and processing applications (ANZAPLAN (2016)). PQ drill holes GF15-53, GF15-60 and GF15-62, totaling 472 m, were drilled and shipped as whole core for the metallurgical testing program and drill holes GF15-39, GF15-42 and GF15-46, totaling 478 m, were drilled as twin holes and shipped as quartered core for both assay and metallurgical analysis.

Most of the drill holes (95%) were drilled at dip angles of -45º to -55º, with a few at steeper angles ranging from -60° to -90°, toward the southeast (azimuth 150º). Drilling typically intersects the quartzite at 60-75° and perpendicular to the strike. The first three holes were drilled toward the northwest (azimuth 330º) because of the restricted access to suitable drilling platforms. The depths of the drill holes ranged from 78 m to 261 m (with the exception of the 3 aborted drill holes).

Typically, two drill holes were drilled on sections oriented perpendicular to the strike of 60° and the location of the trenches in the “G” unit had been selected to fall on, or close to, drilled sections. A typical cross section through the South West zone is shown in Figure 10-2. The South West portion of the “G” unit was drilled on sections 50 m apart, between 5+50W and 1+00E. The North East portion of the “G” unit was drilled along sections 100 m apart between 4+00E and 7+00E, and at a spacing of 50 m between 7+00E and 11+00E. Drilling was extended on three sections 100 m apart to 14+00E, which indicated that the quartzite unit terminates by a fold between 13+00E and 14+00E (Figure 7-1). The “H” unit was drilled on sections 100 m apart, between sections 0+00E and 5+00E.

The drill holes were drilled by Orbit Garant, with an office in Val-d’Or, Quebec. All the collars were surveyed with a Differential Global Positioning System (DGPS) by JL Corriveau and the downhole deviation was measured using a Flexit instrument. The core was oriented using a tool that cuts a groove in the surface of the core, which was done systematically at every sixth run (every 18 m).

Core recovery was generally very high, with the majority of the intervals at 100% recovery and 94% of the core recovered at a rate of 95% or better.

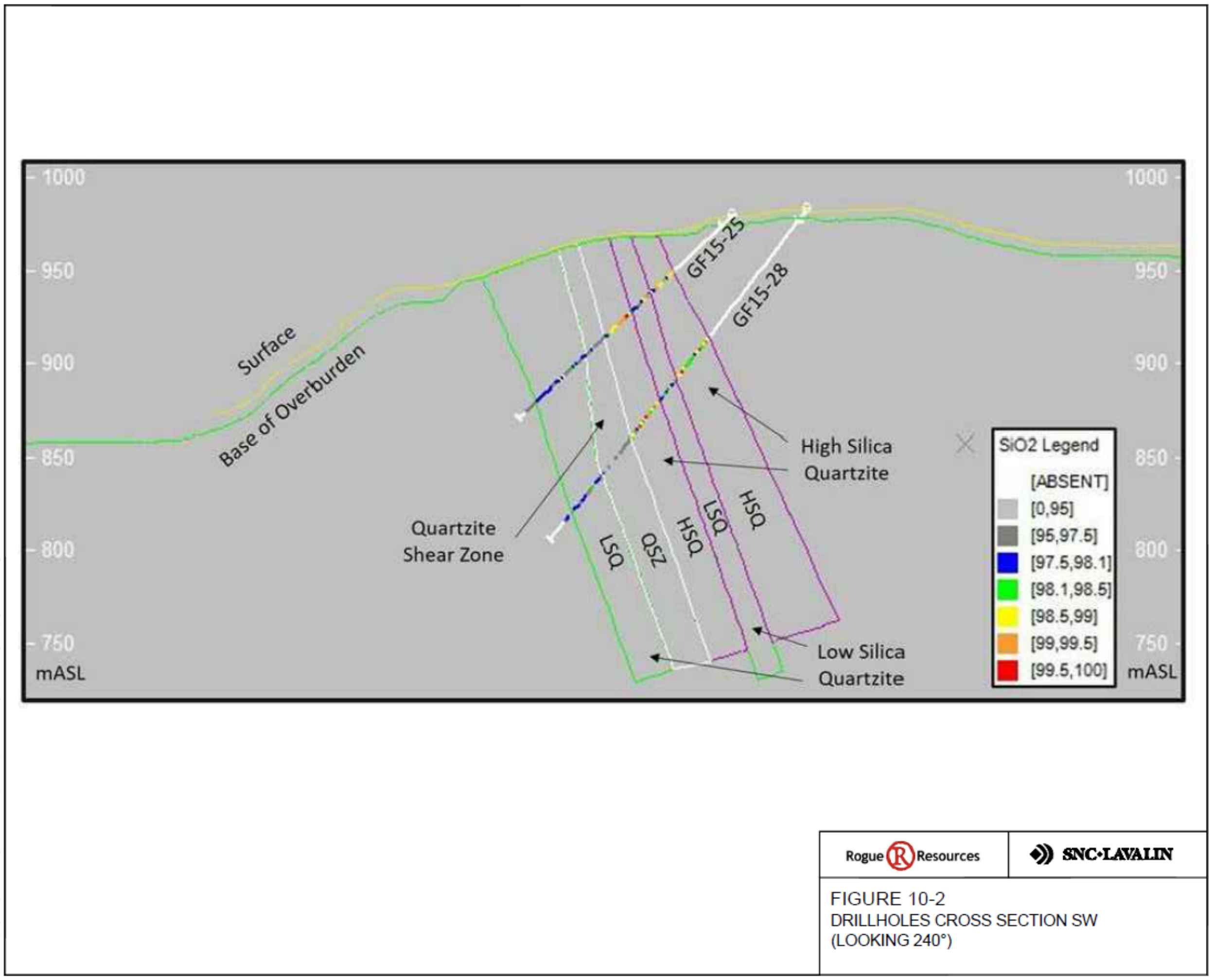
A total of 4,740 samples representing 6,476.6 m of core were sampled, in addition to the duplicate, standard and blank materials taken as QAQC samples to monitor the laboratory performance and the bulk core sent out for metallurgical testing. Sample lengths were targeted at 2 m lengths, but ranged from 0.06 m to 3.0 m to honour the lithological contacts and significant changes in the quality of the quartzite or for rubble sections to acquire sufficient sample volumes.

The drill program was designed to define the geometry, width, depth extension and quality of the portion of the quartzite located primarily above the floor of the valley. Drilling has confirmed a strike length of the “G” quartzite unit to 1,950 m and the “H” quartzite unit to 500 m, both of which remain open at depth and along strike , although the strike to the northeast is speculated to be limited by an interpreted fold nose.

A review of all the relevant data provided by Rogue, including drill core photos, a Master Drill Hole Database comprising assays, geology, down hole survey data and surface collar information (and including the surface channel sample data), and assay certificates were examined by Philip Vicker, P.Geo. The drill program was successful in defining the quartzite units in sufficient definition and density to support the current Mineral Resource estimation. The survey of all the hole collars and the use of a Flexit instrument to measure the hole deviation provide accurate location of the holes in the deposits, and the QA/QC for the assay program and the analytical procedures utilized by the laboratory meet or exceed industry standards in the opinion of Philip Vicker, P.Geo. No drilling or recovery factors that could materially impact the accuracy and reliability of the results were observed. Precision and accuracy for silica and the deleterious elements that are near their respective detection limits in the Silicon Ridge high silica quartzites could adversely affect local grade confidence depending upon the grade control requirements of the project, but in the opinion of Philip Vickers, P.Geo., the apparent lack of bias in the reproducibility of the assay results would suggest that there is no material impact to the grade on a zone or project scale. Further examination of this issue is discussed in Section 26.

Figure 10-1: Drill Holes – Oblique Longitudinal (Looking 330°)

Figure 10-2: Drill Holes – Typical Cross Section in South West Zone (Looking 240°)



11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

This Section is previously described in Buro et al. (2016). For further due diligence by Philip Vicker, P.Geo., drill core photos provided by Rogue were reviewed, all assay certificates were examined and are complete for all assays in the modeling database, and the assay laboratory procedural methodology was reviewed directly with the laboratory that conducted the analyses.

11.1 Core Handling

At the drill site, the driller placed the core into wooden boxes and covered them with sheets of protecting wrapping foam to keep pieces from shifting, before closing the boxes with a lid secured with baling wire. The core boxes were then transported to the core handling facilities at Les Éboulements.

Once at Rogue's facilities, the core stubs were fitted together so as to leave no space between them and the location of the depth marker blocks in the core boxes were verified and turned so the marking is visible. The core was then measured and the depths were marked with a crayon.

A digital photographic record of the entire core in wet condition was taken, in groups of four boxes, each picture including a card indicating the hole ID, box numbers, and the interval contained in these boxes. These photos were reviewed by Philip Vicker, P.Geo., and were found to be well organized and adequately provided a view of this historical drill core.

11.2 Core Logging and Sampling

The core boxes for entire holes were laid out on the ground and the contacts of the main units were located by a senior geologist, followed by a peer review, and recorded in a rough log. This data was used by the logging geologists who broke down the main units into sub-units and sample intervals.

Logging started with a geologist concentrating on measurements of geotechnical parameters: core recovery, RQD, as well as fractures systems, joints, faults, contacts and bedding. A core orientation tool made up of a scribe knife shoe at the base of the core barrel that cuts a groove in the surface of the core as it enters the mouth of the barrel was used at every sixth run (every 18 m). This reference line etched on the core allowed the geologist to measure both the Alpha and Beta angles (dip and strike, respectively) of the planar features. Rogue did not use dedicated software to log the core but designed different tables in an Excel spreadsheet.

The hole deviation path was measured at every second core run (6 m) using a Reflex instrument. In addition to the hole azimuth and plunge, the probe measured the temperature, the gravity field, the total magnetic field strength and its components. The data from both core orientation and down-hole survey were monitored by the 2016 QP geologist acting as project manager.

Other geologists record in detail the lithology of the units and sub-units and their main characteristics such as grain size, colour (5 classes (G1 to G5), from pure white to grey, to green, green-red), minerals present, angles of bedding, contacts, veins, as a general description. Fault zones and veins or dykes were entered as sub-units into the Geology 2 table of the database of 2016 of PEA report.

Rock types were assigned codes consistent with the legend utilized by Quebec Ministry of Energy and Mines to ensure consistent core logging and sampling.

Channel samples used in the modeling database were cut at surface with a rock saw, with a tag being left in the field in the channel groove. The location, geology and assay information was provided together with and in the same format as the drill hole database, and for modeling, these data were treated as "pseudo" drill holes since the spatial representation and resultant assay information is of a near-identical character as that derived from drill core.

11.3 Database Construction

A master drill hole excel file was provided by Rogue for the entire drill hole and trenching database. Originally, each drill hole was entered into separate tables in individual Excel spreadsheets, and transferred into a Master Excel Database for the Project. Table 11.1 presents the database tabs and the information that populates them. All the Tables are connected by a key consisting of the *Hole ID* and the *From* and *To* fields.

For due diligence, Philip Vicker, P.Geo. did random checks of the original logs versus the master spreadsheet, and found no material discrepancies that would affect the resource modeling. Review of the assays and geology in the master database identified a nominal amount of overlaps or missing samples, and these were corrected prior to modeling the current Mineral Resource Estimate. The assay certificates originally provided by Rogue were found to be lacking a large proportion of the database, and follow-up acquisition directly with the laboratory that conducted the analyses identified the certificate for each sample in the master database. Philip Vicker, P.Geo. cross checked all of the certificates with the master database used in the modeling for the current Mineral Resource Estimate, matched each sample in the database with a certificate value, and identified and corrected only a few minor clerical errors.

Table 11.1: Information Contained in the Master Database

Excel Tables	Information
Collars_Merge 2	Hole ID, UTM-E (mE), UTM-N (mN), Elevation (mASL), Hole Depth
Assays_Merge 2	Hole Id, Sample No., From (m), To (m), $Al2O3$ (%), BaO (%), CaO (%),$Cr2O3$ (%), $Fe2O3$ (%), $K2O$ (%), MgO (%), MnO (%), $Na2O$ (%), $P2O5$ (%), $SO3$ (%), $SiO2$ (%), SrO (%), $TiO2$ (%), Total (%), S.G. (g/cm3) (on selected samples)
Lithology	Hole Id, From (m), To (m), Litho, LCode, GCode
Surveys_Merge 2	Hole Id, Depth (m), Az (Deg), Dip (Deg)

11.4 Sampling, QA/QC System, Chain of Custody

The samples intervals were selected by the logging geologists based on visual assessment of the quality of the quartzite. The samples mostly respect the significant changes in quality and the sub-unit intervals do not straddle the contacts of the main geological units.

The samples have a nominal length of 2.0 m, which is the statistical mode. The sample lengths range from 0.06 m to 3.0 m, and of the 5,033 samples in the database, only 21 are < 0.5 m, and 18 are greater than 2.0 m in length. The sample limits were marked with a red crayon and with a laboratory sample tag stapled in the box at the end of the intervals. The sample booklets supplied by the assay laboratory contain tags with unique sequential numbers identified by a code bar.

A line was marked lengthwise on the core by the geologists as a guide for the operator of the core saw or splitter, to ensure that the pieces of core sent to the laboratory as closely as possible mirror the second half saved for future reference.

The core from the "H" quartzite unit was split with a hydraulic splitter and the "G" quartzite samples were sawn with a diamond blade saw. One half of the core was retained in the core box for future reference and audit and the second half was placed with the laboratory tag into polyethylene bags. Each piece of core was carefully washed after sawing, in order to avoid sample-to-sample contamination. The sample bags were placed into rice bags for shipment to the laboratory.

The QA/QC protocol adhered to by Rogue included insertion of Standard, Blank and Duplicate samples into the sample stream.

The Standard consists of fine quartz powder from Opta Minerals Inc. (Opta), marketed under the trade name of Barco Silica Sand and principally used in foundry applications. The declared values are listed in Table 11.2.

As presented in the drill hole master database provided by Rogue, there were 136 standards inserted into the sample stream over the course of the drill project.

Table 11.2: Technical Specifications of the Fine Silica Sand by Opta Minerals Inc.

Oxide	Declared Values (%)
SiO_2	99.70
Al_2O_3	0.14
Fe_2O_3	0.016
K_2O	0.04
Na_2O	< 0.01
MgO	< 0.01
CaO	< 0.01

White decorative stone having the composition of a dolomitic limestone was sourced from a hardware store and used as blank material.

As presented in the drill hole master database provided by Rogue, there were 142 blanks inserted into the sample stream over the course of the drill project.

The duplicate samples were prepared by Rogue's geologists by cutting in two the half core used for analytical purposes. These pairs of quarter-core samples introduce a volume variance, as compared to the half core making up the other samples. However, this variance was not expected to be very significant since the samples are generally 2 m long, which still provide a fair amount of weight for quarter core samples.

As presented in the drill hole master database provided by Rogue, there were 155 duplicates inserted into the sample stream over the course of the drill project.

At least 2 of the three QC samples types were selected by the geologists to be inserted into every batch of 25 samples. The geologist alternated the type of QC samples used in each batch, which brings the total target of eight (8) QC samples for every 100 samples.

Individual sample batches were sent to the laboratory for each hole, in order to minimize sample mix-ups.

Rogue maintained chain of custody from the drill site to shipment by its own selected carrier to the laboratories in Val-d'Or. Permanent presence from Rogue geologists at the core processing facilities ensured security of the core and the samples.

Philip Vicker, P.Geo. has no reason to believe that any tampering of the samples may have taken place at any time.

11.5 Sample Preparation and Analyses

The initial samples were sent to SGS and to Corem in Quebec City for sample preparation and chemical analysis, but early in the program management changed labs and the samples were sent to ALS Canada Ltd. (ALS) in Val d'Or for preparation and to ALS in Vancouver for analysis. All the original samples sent to SGS and COREM were subsequently re-analyzed by ALS. All the assays in the current resource estimate were completed by ALS, an ISO 17025 certified and accredited laboratory operating to the highest standards of the industry and independent of Rogue. The original SGS and Corem results were not reviewed by Philip Vicker, P.Geo. and they were not utilized in the current modeling, nor were these data provided to Philip Vicker, P.Geo. by Rogue.

At ALS in Val d'Or, the samples were identified and logged (Code: LOG-22) into the laboratory information management system (LIMS) by scanning the bar code on the sample tag placed in the sample bags. The weight of the samples as received was recorded (Code: WEI-21) and the samples were air-dried overnight, or in an oven at a maximum of 120ºC, if required. The entire samples were crushed to better than 70% passing 2 mm (Code: CRU-31). A riffle splitter was used to extract a 20-g sub-sample (Code: SPL-21) to be pulverized to at least 85% passing -75µm. Rogue requested ALS to apply pulverizing procedures specifically designed to avoid contamination of the samples by using non-ferrous (tungsten carbide) disks/rings and bowl mills (Code: PUL-33). The pulp samples were then sent to ALS Vancouver to be analyzed.

All the samples were submitted for whole rock analysis by lithium borate fusion technique, coupled with XRF (package of 14 elements, Code: ME-XRF26). The XRF whole rock analysis included the following elements reported as oxides: Al_2O_3, BaO, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, P_2O_5, SO_3, SiO_2, SrO_2, TiO_2, and Total percentage. In addition, Loss on Ignition was calculated by weighing a prepared sample after being placed into an oven at 1000°C for one hour (Code: OA-GRA05x).

SG was determined on every tenth sample by the bottle pycnometer method using methanol as a solvent (Code: OA-GRA08b).

Selected samples were used for mineralogical and petrographic studies for determination of metallurgical parameters, and additional trace element analyses were performed on selected drill holes. These additional data were not examined during the current study and are not included in the current Mineral Resource estimate.

ALS applies strict Quality Management System procedures at the stages of sample preparation and analysis, and all the activities are run under the LIMS system. QC testing of crushing and pulverizing efficiency is conducted on random samples. The routine analysis of Certified Reference Materials, blank and duplicate samples is an integral part of the internal QA system, as well as periodical calibration of the instruments. Independent inter-laboratory proficiency testing fits into the overall quality assurance plan. The ALS internal pulp and crush duplicates, and their internal standard and blank data results conducted during standard QA/QC during the Rogue analytical program were provided to and reviewed by Philip Vicker, P.Geo.

It is the opinion of Philip Vicker, P.Geo. that the sample preparation, security and analytical procedures used in the Rogue drilling program are appropriate for use in the current Mineral Resource estimate.

11.6 Core and Sample Storage

The core boxes are stacked in racks at the facilities used by Rogue in Les Éboulements. The core was moved to a secure area after the drilling program was complete and moved to Saint-Urbain, Hwy 381.

Each core box is identified by an aluminum tags stapled at the end of the box indicating the drill hole ID, box number and start and end depth (m) of the core it contains.

The rejects and pulps have been returned to Rogue from the ALS laboratory and are being stored at the Rogue facilities in Saint-Urbain.

11.7 Conclusion

Philip Vicker, P.Geo. as QP for this Section,is of the opinion that the core handling, logging and sampling protocol for the 2015 drilling program was established under geological supervision according to acceptable industry standards of QA/QC and security.

The logging and sampling data were validated by peer review of the logging activities and data entry throughout the drilling and trenching campaign. Philip Vicker, P.Geo. found very few clerical errors in the database in the final master database received from Rogue.

The analytical methodology utilized at ALS was appropriate for the current Mineral Resource estimate. Lithium borate fusion coupled with x-ray fluorescence spectroscopy is deemed to be a good procedure for the high silica quartzite material of interest on the Silicon Ridge property, and should be considered optimal for minimizing errors due to precision and accuracy in the oxide quantities of typical Resource grades on the project.

In conclusion, it is the opinion of Philip Vicker, P.Geo. that the sample handling, logging and sampling followed high industry standards and were completed by competent geologists and under constant supervision from senior geologists. The QP has not identified any reason to believe that the results of the drilling program are not of a quality providing a sufficient level of confidence for use in the current Mineral Resource estimate.

Philip Vicker, P.Geo. suggests that the use of dedicated logging software would have added another layer of validation and control at the stage of the data entry, that blanks of a more siliceous composition, possibly a high silica granite would be more appropriate than limestone, and that more concisely identifying an appropriate and accurate rock nomenclature at the logging phase would greatly improve the ability to interpret results.

12.0 DATA VERIFICATION

12.1 QP Visit

12.1.1 Field Visit

Henri Sangam, PhD, P.Eng., Director (Toronto) of SNC-Lavalin Geotechnical Engineering, Sustaining Capital & Consulting Services visited the site on June 28, 2017, along with Dominic Tremblay, P.Eng., Manager of Mine Environment, Sustaining Capital & Consulting Services. Both Henri and Dominic are QPs for this report.

The site visit was carried out together with Paul Davis, Vice president Rogue. Pit areas, the proposed areas for dumps and other infrastructure were visited. Both ends of the proposed access and the core shack with drilling cores and rejects were also visited. Select photographs from the site visit are presented in **Appendix A**.

The QPs consider the site visit as current personal inspection, as defined under Section 6.2 of NI 43-101CP, on the basis that the material work completed on the Property was reviewed and that no new material scientific or technical information has been accumulated about the Property since that personal inspection. The QP has taken the necessary steps to verify independently that there has been no material work done on the property since his last site visit.

12.2 Independent Check Samples

There has been no additional work conducted on the property nor any samples added to the database for the Mineral Resource estimate for this Report since the previous Technical Report on the project by Buro et al. (2016) in which they undertook an independent check on the reproducibility of assays. The Philip Vicker, P.Geo. has reviewed these data and has found the results and conclusions of the independent analytical investigation to be of high quality and accepts the responsibility as the current Qualified Person for the conclusions of this Section.

As described in Buro et al. (2016), 30 check samples from coarse rejects were analyzed at ALS laboratories using the same methodologies employed on the Rogue database. The samples were selected to represent a broad spatial distribution within the eastern and western portions of the “G” and in the “H” quartzite sequences. The distribution of the silica, aluminum, iron, and titanium contents in the selected samples covers a compositional range of the quartzites on the property, both above and below the current Mineral Resource estimate cut-off grades for each of these elements.

The check samples consisted of coarse rejects from the original samples. In addition to these samples, five additional quality control samples were inserted into the check sample sequence that consisted of one Blank and two Standard materials provided by Rogue, as well as of two additional Duplicate samples. The Duplicate samples were generated from splits of coarse rejects. The entire sequence of samples was re-numbered in that study to be submitted as blind samples to the ALS laboratory for analysis.

The major oxides in the independent study were analyzed using the XRF technique. LOI and Totals were determined, as well as sulphur by Leco furnace. Two samples were submitted for SG determination using the bottle pycnometer method. The same sample preparation, suite of elements and analytical methods that were routinely used for the Rogue samples were requested from the ALS laboratory.

The analytical results and the basic statistical parameters for the original and check samples are presented in Table 12.1. The results from the two duplicate quality control samples are tabulated in Table 12.2. The plot of Al_2O_3, Fe_2O_3 and TiO_2 on scatter diagrams, as well as the statistical parameters, show good correlation and no apparent bias between the individual pairs of original-duplicate samples (Figure 12-1 to Figure 12-4 and Table 12.1). However, the reproducibility correlation of SiO_2 is not as high (Figure 12-5) although it appears to be unbiased. The reproducibility variance observed could be indicative of an as yet uncharacterized internal mineralogical heterogeneity on a sample scale, or possibility of scatter due to some step in the analytical chain. The current Qualified Person cautions that this could have implications in eventual grade control and processing.

The correlation between the original and duplicate samples cannot be expected to be extremely high, considering that the analyses for these metals is close to the lower detection limit, while the silica values approach the upper detection limit of 100%. The degradation of accuracy while approaching detection limits is well-documented.

The two quality control duplicates, which are a check on the precision and accuracy of the lab, were well within the statistical expectations for the analytical methods and indicate that the laboratory is precise at these compositions of quartzite, although a larger volume of samples would be required to support this conclusion statistically.

Table 12.1: Independent Duplicate Check Samples –Analytical Results

Sample_ID		Al_2O_3 (%)		Fe_2O_3 (%)		TiO_2 (%)		SiO_2 (%)	
ORIG	DUP	ORIG	DUP	ORIG	DUP	ORIG	DUP	ORIG	DUP
R651010	S382710	1.20	1.21	0.05	0.19	0.10	0.11	97.90	97.56
R651037	S382711	3.39	3.62	0.88	1.00	0.25	0.26	93.02	92.80
R651511	S382713	0.60	0.60	0.30	0.27	0.07	0.08	98.00	98.68
R651512	S382714	0.50	0.46	0.05	0.07	0.05	0.05	98.20	98.43
R651550	S382715	1.70	1.82	0.20	0.27	0.12	0.12	96.80	96.82
R651634	S382716	0.30	0.38	0.05	0.04	0.05	0.06	98.60	99.33
R651677	S382717	2.00	1.92	0.20	0.21	0.13	0.12	95.60	96.55
R651755	S382718	0.58	0.59	0.08	0.06	0.05	0.05	98.55	98.80
R651756	S382719	0.51	0.48	0.13	0.12	0.05	0.06	98.29	98.59
S278008	S382720	0.67	0.63	0.13	0.11	0.07	0.05	98.03	98.29
S278049	S382722	0.53	0.53	0.05	0.06	0.05	0.05	98.93	99.55
S278287	S382723	0.49	0.61	0.48	0.59	0.08	0.09	99.07	98.17
S278532	S382724	2.44	2.18	0.30	0.27	0.14	0.14	96.12	96.43
S278533	S382725	1.09	0.94	0.20	0.15	0.12	0.11	97.76	98.53
S278698	S382727	0.53	0.46	0.09	0.04	0.06	0.05	98.34	99.42
S278776	S382728	0.23	0.22	0.05	0.03	0.05	0.04	99.98	99.54
S278819	S382730	1.24	1.23	0.16	0.16	0.09	0.10	97.85	97.35
S282282	S382731	0.64	0.69	0.07	0.10	0.06	0.06	99.48	98.30
S282791	S382732	0.38	0.38	0.10	0.07	0.06	0.06	99.38	98.91
S282792	S382733	0.58	0.58	0.07	0.04	0.06	0.06	98.46	98.65
S282826	S382735	1.25	1.48	0.16	0.21	0.07	0.09	97.38	97.82
S282984	S382736	0.57	0.54	0.32	0.29	0.07	0.07	98.52	98.20
S382587	S382737	0.78	0.70	0.71	0.71	0.04	0.04	97.29	98.23
S382633	S382738	1.16	1.22	0.27	0.31	0.09	0.09	96.92	97.52
S383079	S382739	1.02	1.04	0.19	0.14	0.06	0.09	98.77	97.86
S383312	S382740	0.19	0.23	0.09	0.07	0.05	0.05	99.04	99.40
S383350	S382741	0.75	0.76	0.10	0.09	0.06	0.06	99.21	98.56
S383801	S382742	0.95	0.90	0.09	0.09	0.06	0.05	98.97	98.35
S383802	S382743	1.52	1.30	0.13	0.11	0.10	0.09	97.36	97.76
S383814	S382744	0.48	0.44	0.17	0.17	0.06	0.06	99.17	98.84
Correl'n Coefficient		0.989		0.977		0.973		0.897	
Average		0.94	0.94	0.20	0.20	0.08	0.08	98.03	98.11
Maximum		3.39	3.62	0.88	1.00	0.25	0.26	99.98	99.55
Minimum		0.19	0.22	0.05	0.03	0.04	0.04	93.02	92.80

Although no statistical conclusion can be derived from the small number of QC samples, the duplicate samples from the reject splits submitted to examine laboratory reproducibility show that the data reproduced extremely well. One of the Standards yielded a SiO_2 result 0.65% below the expected value which is potentially concerning, but whether this is related to inhomogeneity of the sand or precision and accuracy variance of the lab at these ultrahigh SiO_2 values is not certain. The blank was reasonably close to the expected value.

Table 12.2: Independent QC Check Samples –Analytical Results

Sample_Type	Sample_ID	Al_2O_3 (%)	Fe_2O_3 (%)	TiO_2 (%)	SiO_2 (%)
Original	S382720	0.63	0.11	0.05	98.29
Duplicate of previous	S382721	0.65	0.12	0.05	98.42
Original	S382728	0.22	0.03	0.04	99.54
Duplicate of previous	S382729	0.23	0.04	0.04	99.28
Blank	S382726	0.23	0.13	0.02	8.87
Blank Average (n=140)	Dolomite	0.28	0.15	0.01	8.70
Standard	S382734	0.11	0.03	0.01	99.74
Standard	S382712	0.11	0.03	0.01	99.05
Declared Value	Barco Silica Sand	0.14	0.16	n/a	99.70

Figure 12-1: Independent Check Samples – Al_2O_3 Analyses of Original and Duplicate Samples

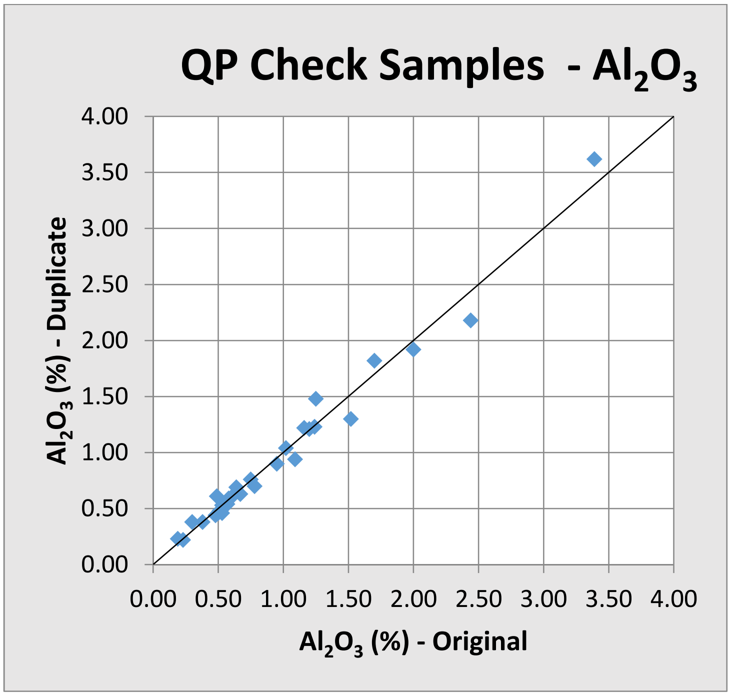


Figure 12-2: Independent Check Samples, Fe_2O_3 Analyses of Original and Duplicate Samples

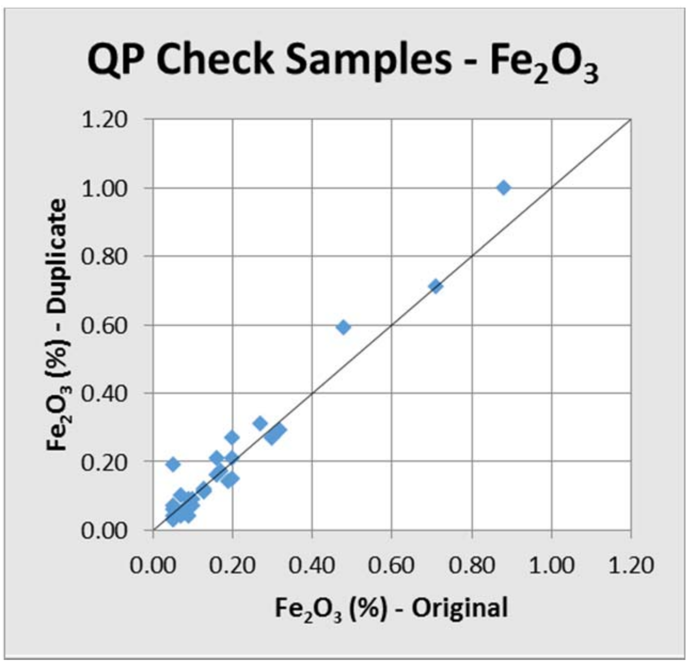


Figure 12-3: Independent Check Samples, TiO_2 Analyses of Original and Duplicate Samples

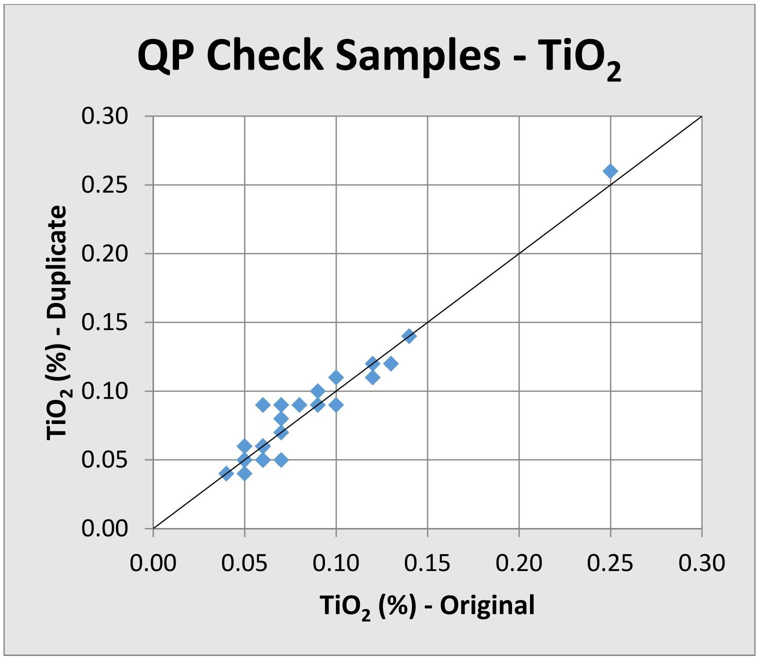
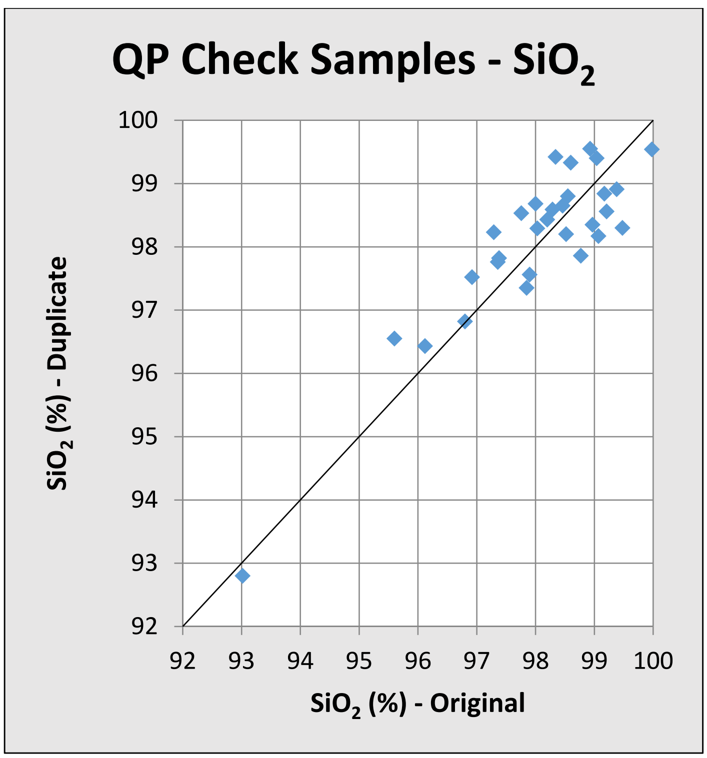


Figure 12-4: Independent Check Samples, SiO_2 Analyses of Original and Duplicate Samples



12.3 Database Validation

The data from the drill hole and channel sampling program were sent from Rogue to Philip Vicker, P.Geo. in Excel spreadsheet format. The database was examined in Access for duplicates, overlaps, gaps, and other potential errors. A total of eight errors were identified, including six from trench 13B-0, and two from drill hole GF15-35B. The trench data had three assays where the totals were apparently entered incorrectly, two lithology intervals that were transcribed incorrectly, and one sample that was duplicated. The drill hole errors were identified as two lithology intervals that were transcribed into the master database incorrectly as compared to the original log. These minor corrections were made to the drill hole database directly in Minesight®.

Additional validation completed by Philip Vicker, P.Geo. including cross referencing the assays in the database with their original assay certificate by compiling both sets of data in an Access database. The certificates initially provided by Rogue were found to be incomplete for a large amount of the database. The laboratory was contacted and all the original assays certificates for the Rogue sampling program were acquired. Every assay in the Rogue modeling database was accounted for and matched the certificate data, with the exception of the above mentioned clerical errors.

An additional issue identified in the current examination of the data, and previously pointed out in Buro et al. (2016) is that the lithology coding and descriptions for the original logs for high silica quartzites are inconsistent, and have potential for misinterpretation of results. The master database comprises an interpreted version of simplified yet still overcomplicated lithology as per the original logging. It is recommended that a more simplified project scale rock legend be designed to alleviate confusion in interpreting lithology from the logging.

Philip Vicker, P.Geo. believes that the database is free from major errors that may significantly impact the outcome of the current Mineral Resource estimate.

12.4 Verifications of the QA/QC Implemented by Rogue

12.4.1 General

Philip Vicker, P.Geo. examined the QA/QC program applied by Rogue and has extensively reviewed the verification of the results which were also presented in Buro et al. (2016).

12.4.2 Blank Samples

White decorative stone was sourced from a hardware store and used as QC blank samples. This material is not certified and the analytical data is not provided by the manufacturer. The following range of values was obtained from the multiple analyses of this material with the project samples (Table 12.3). These values indicate that this rock has the composition of a dolomitic limestone.

Table 12.3: Blank Material – Analytical Results

Oxide	Minimum %	Maximum %	Average %
CaO	44.70	51.20	49.12
MgO	2.08	4.40	2.77
SiO2	6.20	12.90	8.70
n=	142	142	142

A total of 142 results of XRF analyses of the blanks were found in the database, and the values indicate that no sample mix-up with a quartzite or a gneiss sample occurred (Table 12.3). However, a distinct change is visible on a line plot in the CaO% by XRF at samples 1 to 27 in the time sequence, relative to the subsequent samples (Figure 12-5) and three sills (moving averages) were detected in the Na_2O analyses. This pattern may be explained by lack of homogeneity of the decorative stone. No such change of variability with time occurred in the analyses of silica (Figure 12-6) or of the other elements, including LOI%. These tables are reproduced here from Buro et al (2016) as the sequencing of samples over time was not provided to or compiled by the QP of this Section. The results presented in Table 12-3 are identical between the 140 samples in Buro et al. (2016) and the current examination.

Figure 12-5: Analysis of CaO by XRF for the Blank Material

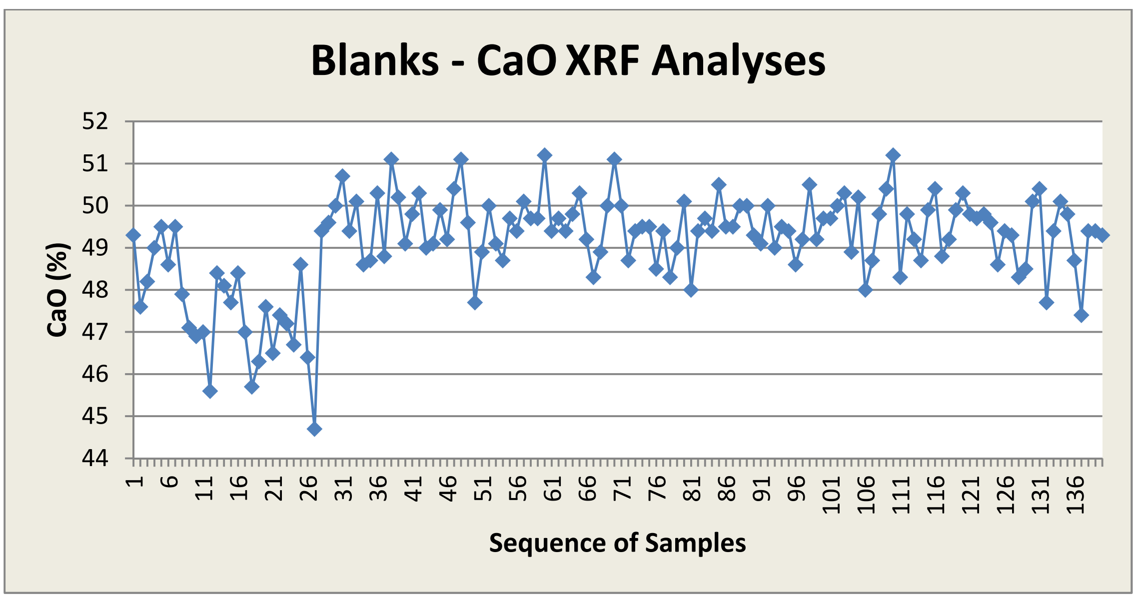
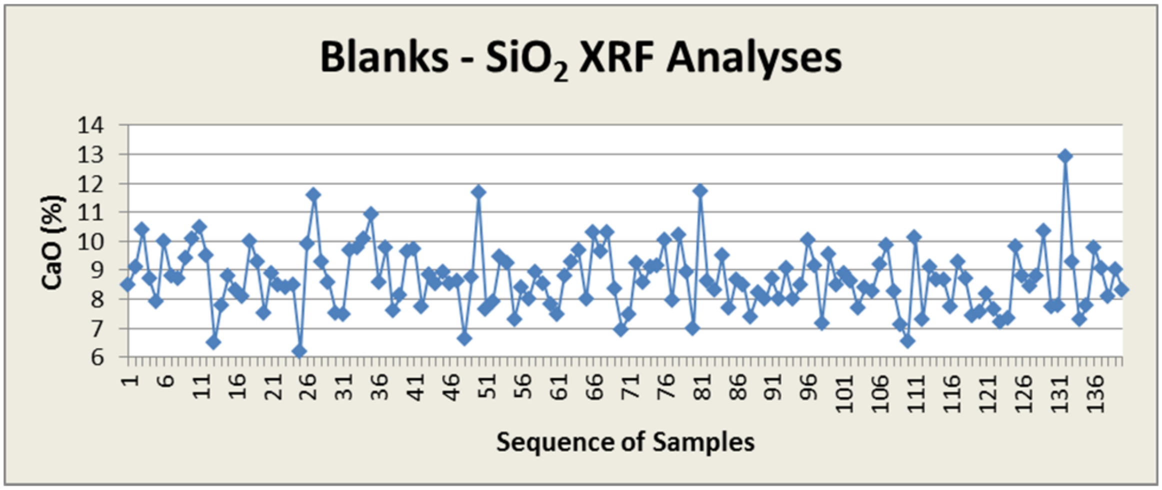


Figure 12-6: Analysis of SiO_2 by XRF for the Blank Material



12.4.3 Standard Reference Material

A "Fine Silica Blank" was sourced by Rogue from Analytical Solutions Ltd. (ASL), Mulmur, Ontario, to serve as a Standard for the project, marketed by the manufacturer under the name of "Barco Silica sand" and it is generally used for foundry applications. Opta provides the element concentrations (Table 12.4) but does not specify the analytical method(s) used to determine these elements nor supplies the confidence intervals (95% confidence limits). ASL has tested the silica sand for gold and has generally sold this material as blank material for gold projects. Thus, the Opta sand is certified for gold but it is not certified for SiO2 for the purpose of the current Project. It is recommended that Rogue acquire a proper CRM for future work, or create their own from Silicon Ridge quartzite.

Table 12.4: Technical Specifications of the Fine Silica Sand by Opta Minerals Inc. and Rogue Results Averages

Oxide	Declared Values (%)	Rogue Database Minimum (%)	Rogue Database Maximum (%)	Rogue Database Average (%)
SiO_2	99.70	98.0	100	99.3
Al_2O_3	0.14	0.09	0.14	0.10
Fe_2O_3	0.016	<0.02	0.06	0.04
K_2O	0.04	< 0.01	0.03	0.01
Na_2O	< 0.01	< 0.01	0.01	0.01
MgO	< 0.01	< 0.01	0.03	0.01
CaO	< 0.01	< 0.01	0.04	0.01

A total of 136 occurrences of XRF analyses of the Standard were found in the database. The majority of the results for Al_2O_3, Fe_2O_3, TiO_2 and SiO_2 fall within two standard deviations, which are acceptable

(Figure 12-7 to Figure 12-10). An episode of lower variability of the results for silica is apparent in the XRF analyses of the first 34 samples in the time sequence (Figure 12-10). This can possibly be attributed to lack of homogeneity of the Silica sand.

The results for all the above elements are systematically biased, relative to the declared value of the silica sand. The negative bias for silica and alumina, as well as the positive bias for iron are clearly visible in the line diagrams of Figure 12-7 to Figure 12-10. Each of Aluminum, iron, potassium, sodium, magnesium and calcium are at or near the detection limits for these elements by the lithium borate fusion couple with XRF methodology, so that their practicality in this Standard is dubious.

No conclusion can be drawn from the systematic bias relative to the accuracy of the analyses since the material is not certified.

Figure 12-7: Analysis of Alumina by XRF for the Reference Material

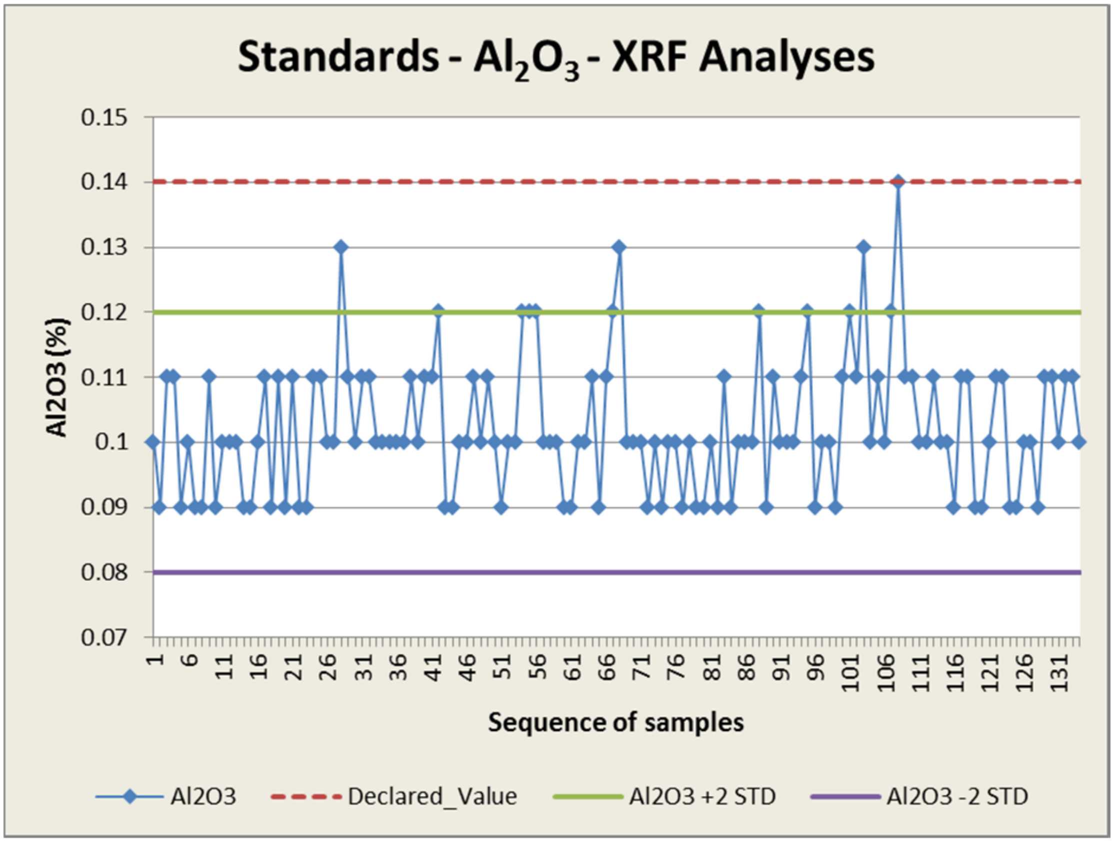


Figure 12-8: Analysis of Iron by XRF for the Reference Material

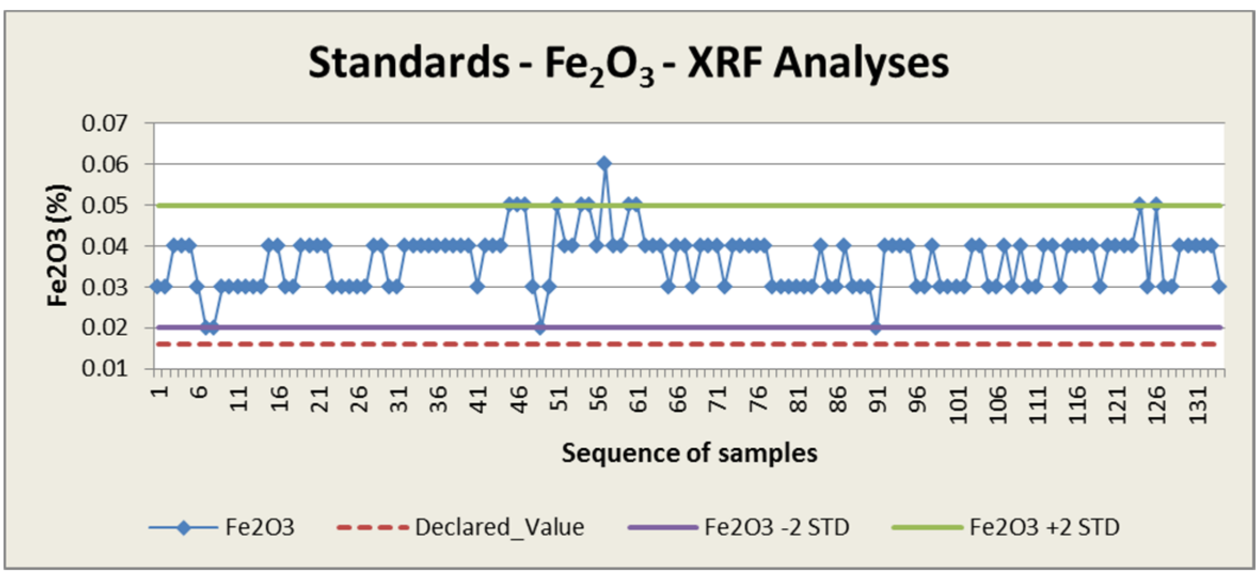


Figure 12-9: Analysis of Titanium by XRF for the Reference Material

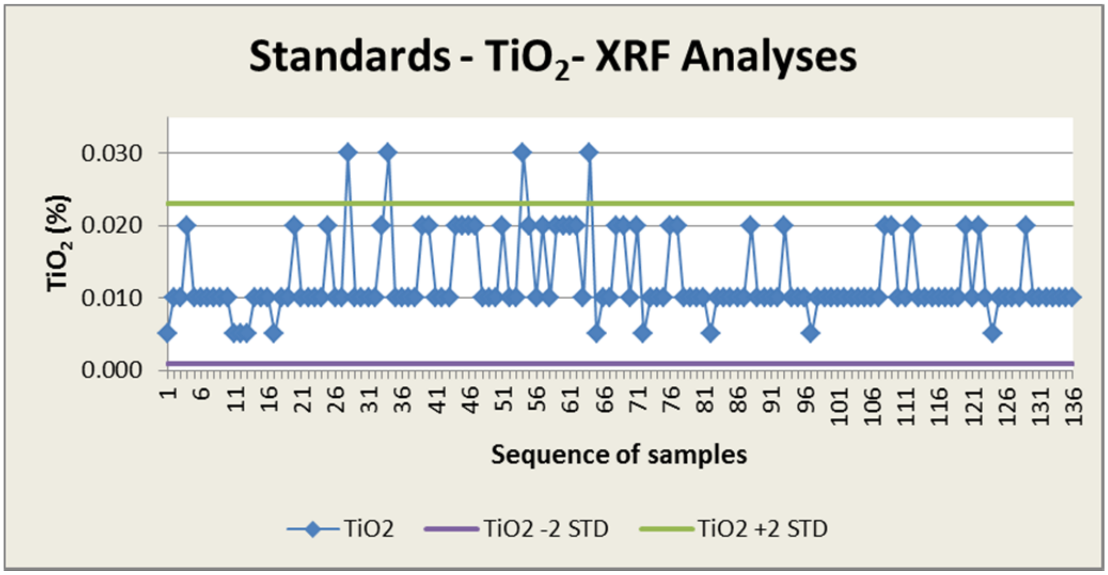
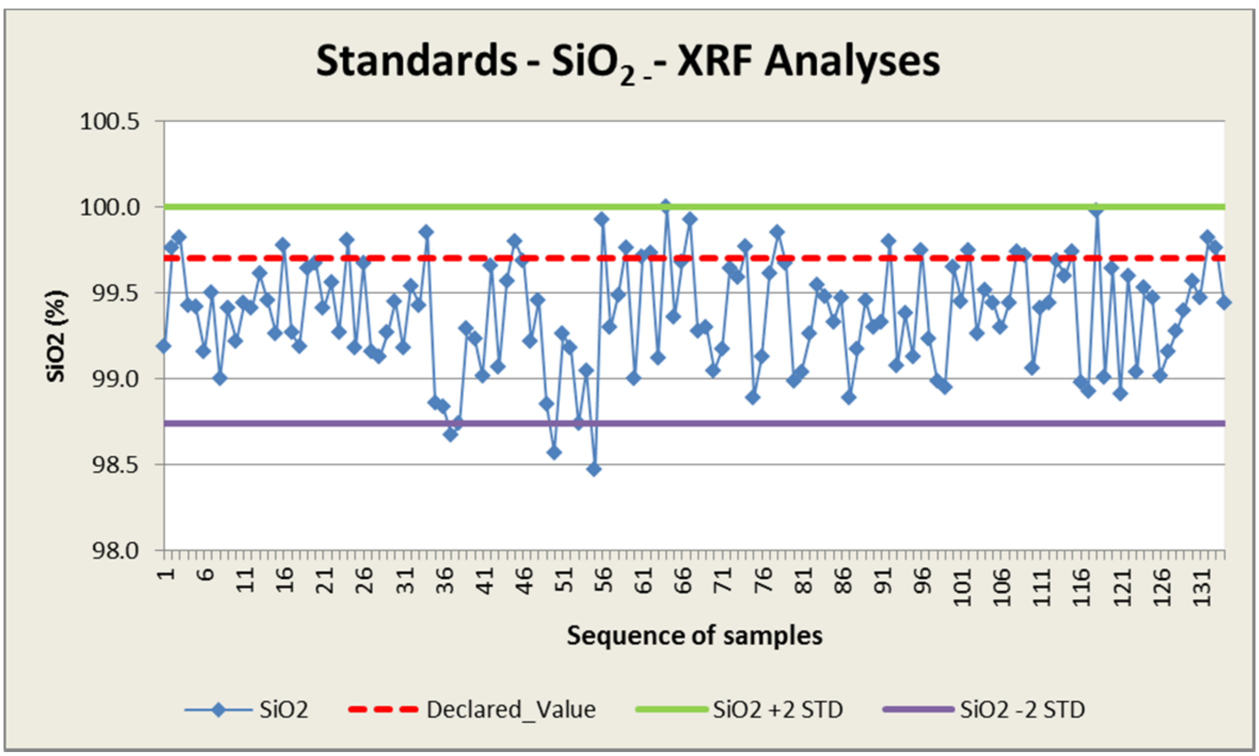


Figure 12-10: Analysis of Silica by XRF for the Reference Material



12.4.4 Duplicate Samples – Rogue Samples

Rogue used quarter-core samples to generate the 155 duplicate samples in the database from their QA/QC program. The relative percent difference is generally used to evaluate the laboratory precision from duplicate measurements. Their usefulness on the Silicon Ridge project are minimized somewhat due to the fact that the relative differences are generally very low for the silica analyses and very high for the alumina, iron and titanium values. This is due to the relative homogeneity of the quartzite and the consistently high silica and low metal contents that are close to the upper and lower detection limits of the analytical methods. In this case, the analytical precision can better be assessed by examining the difference between the pairs of original and duplicate samples.

The scatter plot and histogram of the XRF analyses of the individual original-duplicate sample pairs for silica originally presented in Buro et al. (2016) show a relatively significant dispersion (Figure 12-11 and Figure 12-12) of the differences in the consecutive pairs on both sides of the mode that is around 0% difference. The differences in the silica content in the pairs range from -0.93% to +1.23%, except for three occurrences. This sample scale reproducibility variance is not yet understood and further examination is warranted

Figure 12-11: Duplicate Samples – SiO_2 XRF Analyses

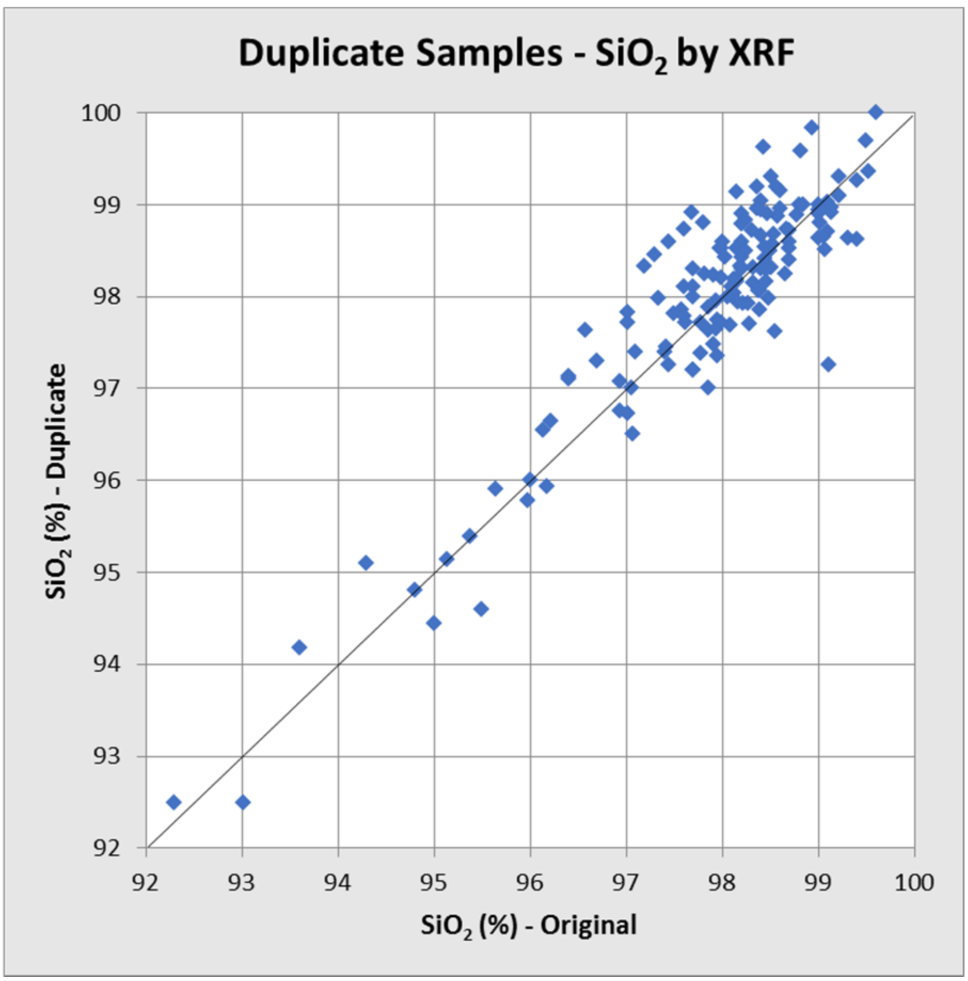
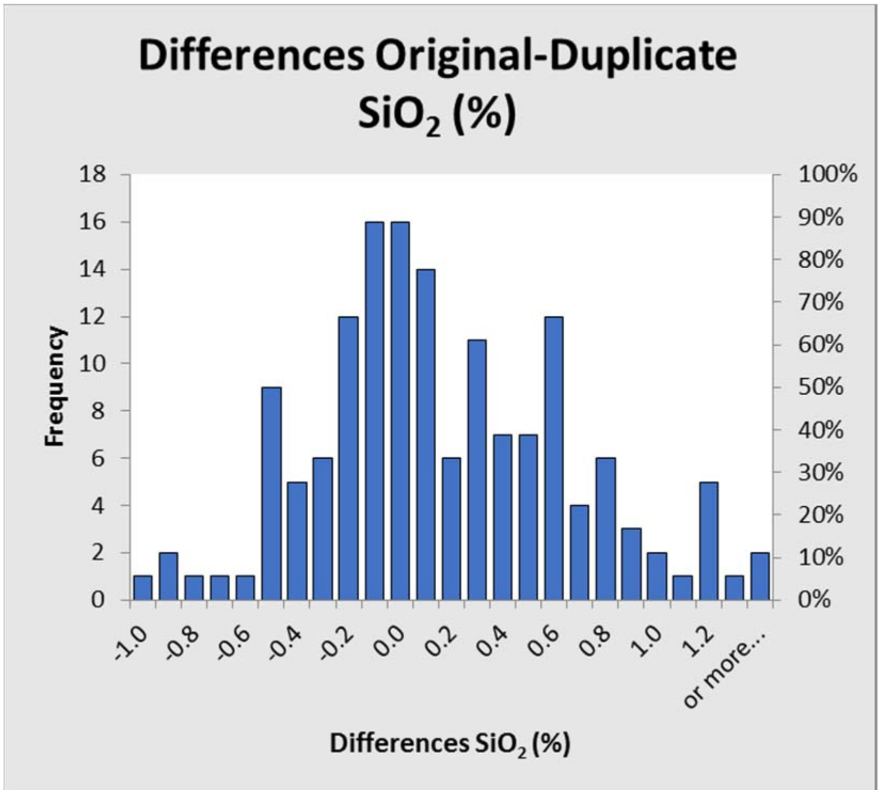


Figure 12-12: Duplicate Samples – SiO_2 (wt%) Difference in Original-Duplicate Pairs



Only 68.2% of the differences in the silica content between the pairs of samples range from -0.5% to +0.5%, which is not an outstanding performance (Table 12.5) on a percentage basis, but on a relative basis is not unexpected for the analytical specifications. This variability can possibly be explained by the values being close to the high detection limit of the XRF method. Also noted, at these high silica values, the impact of even minor sample heterogeneity in the course rejects would be exacerbated. The quantile-quantile plot shows a slightly high bias in the duplicate samples, relative to the original samples, a trend that is unexplained. However, the average silica content for 151 original samples is 97.69% and 97.88% for the duplicate samples. Alumina, iron and titanium in original and duplicate samples are well correlated (Table 12.5)

Table 12.5: Duplicate Samples – Difference in the Original-Duplicate Pairs (XRF Analyses)

Element	Differences Original-Duplicate Samples; Selected Range			Average all Samples (%)	
	From (%)	To (%)	Percent Within	Original	Duplicate
Al_2O_3	-0.20	+0.20	89.4	1.060	0.962
Fe_2O_3	-0.05	+0.05	85.6	0.365	0.351
TiO_2	-0.02	+0.02	86.1	0.116	0.109
SiO_2	-0.50	+0.50	68.2	97.69	97.88

Although some dispersion inherent in the analytical method was observed, the reliability of the analytical results is acceptable and sufficiently high to be used in the current Mineral Resource estimate.

Additionally, tests conducted independently by ANZAPLAN (2016) have shown that processing can significantly reduce the content of deleterious elements to achieve grades fit for generating various silicon products. Consequently, part of the variability of the analyses can be accommodated by processing of the run-of-mine material in a mining operation if doing so was critical to the product requirements. It is recommended to conduct follow up work to identify the reproducibility capability of assays more clearly.

12.4.5 Duplicate Samples – Re-Analysis of Pulp or Rejects

The rejects and pulps from a few batches for which some anomalous values had been observed by Rogue were re-analyzed and described by Buro et al. (2016). The results from these samples (111 samples) were examined to see whether re-analysis on “non-blind” (“Lab-aware”) samples submitted to the laboratory would show a different variability from the “blind” duplicate samples submitted by Rogue. These analytical results would also provide some insight into the volume variance effect between the different types of samples being re-analyzed: quarter core, coarse rejects or pulp samples.

The variability between the analytical results for silica from the pairs of original and duplicate samples appears to be similar to the variability observed in the blind samples (Figure 12-13). The fact that the variability observed in the results from the pulps is lower than in the rejects re-analyses is consistent with the generally higher homogeneity attained by the finer pulp material (Figure 12-14).

Figure 12-13: Duplicate Sample Re-Analysis of Rejects – SiO_2 (wt%)

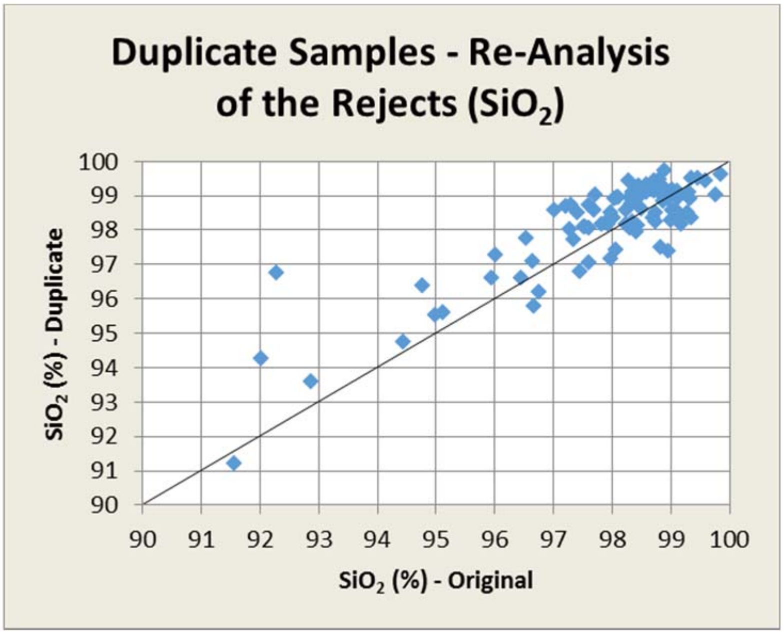
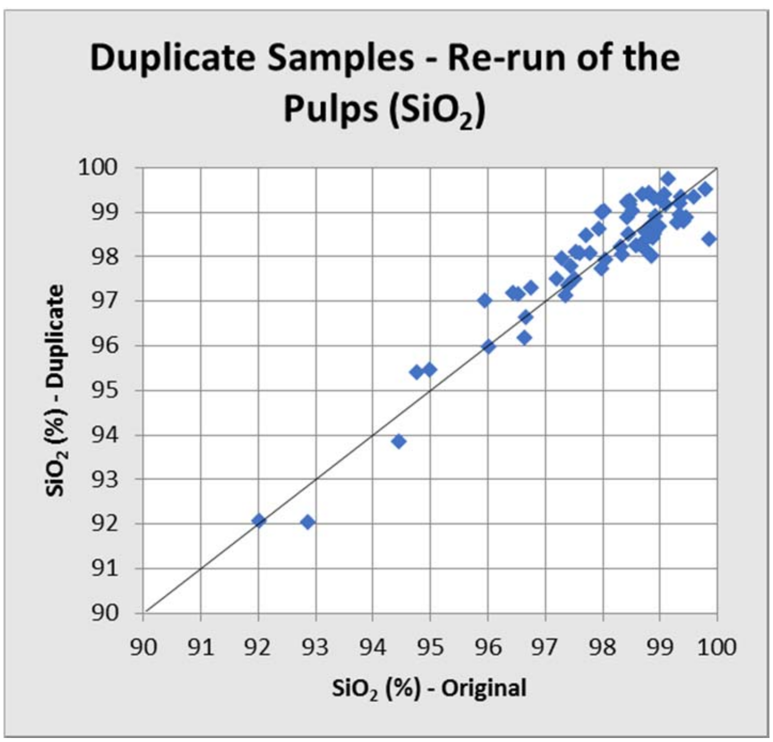


Figure 12-14: Duplicate Samples Re-Analysis of Pulps - SiO2 (wt%)



12.4.6 Specific Gravity

A total of 461 SG determinations in the modeling database used in the current were performed by ALS on quartzite samples using the bottle pycnometer method with a methanol solvent (Code OA-GRA08b). The SG results range from 2.470 g/cm^3 to 3.100 g/cm^3, with approximately 74% of them falling within 2.620 g/cm^3 and 2.680 g/cm^3. The average of all the values is 2.65 g/cm^3, which corresponds to the density of quartz. As was expected, no correlation is visible between SG and the silica, iron, alumina or titanium contents.

The pycnometer method is prone to generate values somewhat higher than the immersion method. Density determinations by water immersion provide the equivalent of an “in situ” measurement, commonly referred to as “bulk density” or “in situ density”. This method takes into account the porosity of the rock and is the preferred measurement to be used in a resource estimate.

Buro et al. (2016) recommends submitting a series of samples that have a pycnometer test to the immersion method to check whether differences may exist between the results from the two methods. If so, a sufficient number of tests have to be performed to calculate a regression formula in order to correct the original SG results. In addition, density determinations should be completed both on quartzite and gneiss samples (waste material) for future economic study and mine planning purposes. Philip Vicker, P.Geo. would argue that since the cut-off grade for the Project is 98.1% silica and that silica has a well-defined SG of 2.65 g/cm^3, utilizing 2.65 g/cm^3 for the high silica quartzite is a reasonable and cost-effective approach.

12.4.7 Conclusions

Rogue applied a strict QA/QC protocol starting from the field work to the final Master Database construction that was sent to Philip Vicker, P.Geo. Future programs should utilize more suitable high silica Blanks, and Certified Reference Material, ideally one from a similar deposit type if available, or make one specifically for Silicon Ridge.

Henri Sangam, PhD, P.Eng, Director (Toronto) of SNC-Lavalin Geotechnical Engineering, Sustaining Capital & Consulting Services visited the site on June 28, 2017, along with Dominic Tremblay, P.Eng., Manager of Mine Environment, Sustaining Capital & Consulting Services. Both Henri and Dominic are QPs for this report.

The site visit was carried out together with Paul Davis, Vice president Rogue. Pit areas, the proposed areas for dumps and other infrastructure were visited. Exploration trenches as well as collars of some of the drilled holes were observed. Both ends of the proposed access and the core shack with drilling cores and rejects were also visited. Select photographs from the site visit are presented in **Appendix A**.

Confidence in the accuracy of the Rogue drilling and sampling data is enhanced by their 2015 drill program protocols that included surveying of all the trenches and drill hole collars tracking the downhole deviation path of the holes to ensure reliable location of the rock units, samples and structures in the deposit, and orienting the drill core which allowed measurements of the alpha and beta angles..

The logging and sampling activities were supervised or completed by senior geologists who used ample peer review of data validation. The use of standards, blanks and duplicates inserted into the sample stream was adequate to monitor the laboratory performance. Photos were taken of all the drill core. Very minor clerical errors were identified during validation, and all samples in the database match their respective values in the original assay certificate on file at the independent laboratory.

The reproducibility variance identified in the independent check results is not unexpected given the ultra high silica and very low deleterious element content of the quartzites on the property. Philip Vicker, P.Geo. does not believe this variance had a significant impact on the current Mineral Resource estimate as there was no apparent bias to the results between duplicate pairs. In the event that very precise grades would be required for the project, the mechanical sorting method identified as amenable to the Silicon Ridge quartzite (ANZAPLAN 2016) could be an option. Other alternatives such as umpire-style commercial scale assay procedure could help mitigate the identified sample variance.

Philip Vicker, P.Geo. believes that the Rogue drilling and trenching programs were completed according to high industry standards, and has not identified any reason not to believe that these data are sufficiently reliable and complete to serve as the basis of the preparation of the current Mineral Resource estimate.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

Dorfner ANZAPLAN was engaged by Rogue in October 2015 to provide a preliminary evaluation of the potential for the Silicon Ridge property quartzite in different high value applications. This work was reviewed by Philip Vicker, P.Geo. in ANZAPLAN's final report to Rogue in ANZAPLAN (2016).

As reported in Buro et al. (2016), Dr. Reiner Haus, MD of Dorfner ANZAPLAN visited the Silicon Ridge property accompanied by Rogue's former Senior Vice President E. Canova, P.Geo. (Quebec). Based on that visit, a sample of quartzite totaling approximately 250 kilograms was selected. The material was delivered to ANZAPLAN's Laboratory facilities in Hirschau, Germany for preliminary chemical composition analysis. Based upon these results, ANZAPLAN was commissioned to complete the "Evaluation of a Quartzite Deposit in Canada for the Identification of Potential Applications" which was completed as a report for Rogue in ANZAPLAN (2016).

Rogue provided ANZAPLAN with three PQ diamond drill cores (GF15-53, GF15-60 and GF15-62) and three corresponding NQ diamond drill cores (GF15-39, GF15-42 and GF15-46) in December 2015 and January 2016. The PQ drill cores were subjected to processing tests targeting the evaluation of the suitability of the quartzite for silicon and high value applications. The NQ drill cores were subjected to chemical and mineralogical analysis to better understand the speciation of impurities.

13.2 Mineralogical and Chemical Analyses

Mineralogical investigation was undertaken by ANZAPLAN to identify impurities in the Silicon Ridge quartzite. Three samples of different colours were selected to generate polished thin sections for detailed examination. Selected samples were characterized by X-ray diffraction (XRD) analyses and the crystalline phases were identified. The three selected colours of quartzite included whitish, reddish, and clear greyish. The samples are dominated by quartz crystals up to two centimetres in length. The quartz shows evidence of plastic deformation, and indicates dynamic recrystallization with grain boundary migration evidenced in sutured grain boundaries. No strain-free recrystallized quartz was identified.

The reddish sample colour was indicated to be due to red iron oxide on trans-crystalline fractures that are partly annealed, and the whitish sample was coloured due to abundant tiny secondary fluid and fibrous inclusions. Mineral inclusions are present in all samples although the speciation apparently varies among the different colours of samples. Sillimanite is identified in each sample variant as fresh or altered grains up to 0.5mm. Zircon, fibrous rutile, and muscovite inclusions are also present in all samples examined, as is hematite in fractures which is most abundant in the reddish sample. Hematite with ilmenite grains were only identified in the reddish sample, and prismatic rutile was only identified in the greyish sample.

Fluid inclusions were present in each sample, with increased abundance in the whitish sample which is interpreted to be responsible for imparting the whitish colour. Fluid inclusions are typically present in trains along healed fractures, and vary in size from <5 to 30 microns. Five main fluid inclusion types were identified, including mono-phase liquid carbonic inclusions, rare two-phase aqueous carbonic inclusions, liquid-rich aqueous two-phase inclusions, rare halite-bearing three-phase inclusions and aqueous vapour inclusions.

The trace element analyses were completed by applying analytical techniques for the detection of impurities in quartz developed systematically by ANZAPLAN and led to the introduction of special quartz digestion methods. Raw quartz lump samples are prepared via a contamination free, optimized procedure, specifically applicable for high purity quartz. Chemical analysis was carried out by using inductively coupled plasma spectrometry.

13.3 Sample Definition

Three pairs of drill cores were received, each containing a whole PQ drill core (85 mm diameter) and a quarter of an NQ drill core (47.6 mm diameter). The pairing of the drill cores is listed in Table 13.1.

Table 13.1: PQ and NQ Drill Core Pairs

Section	PQ Drill Core	NQ Drill Core
100W	GF15-53	GF15-39
450W	GF15-60	GF15-42
950E	GF15-62	GF15-46

Five samples from each PQ drill core were defined for the processing tests based on the chemical analysis of the twinned NQ drill cores, the core logging as completed by Rogue and visual inspection of the PQ drill core samples. The purpose of the test work was to identify areas suitable to produce quartzite products for silicon and ferrosilicon production. The samples are defined in Table 13.2 for each of the PQ drill cores.

Table 13.2: Definition of samples for processing tests for silicon application

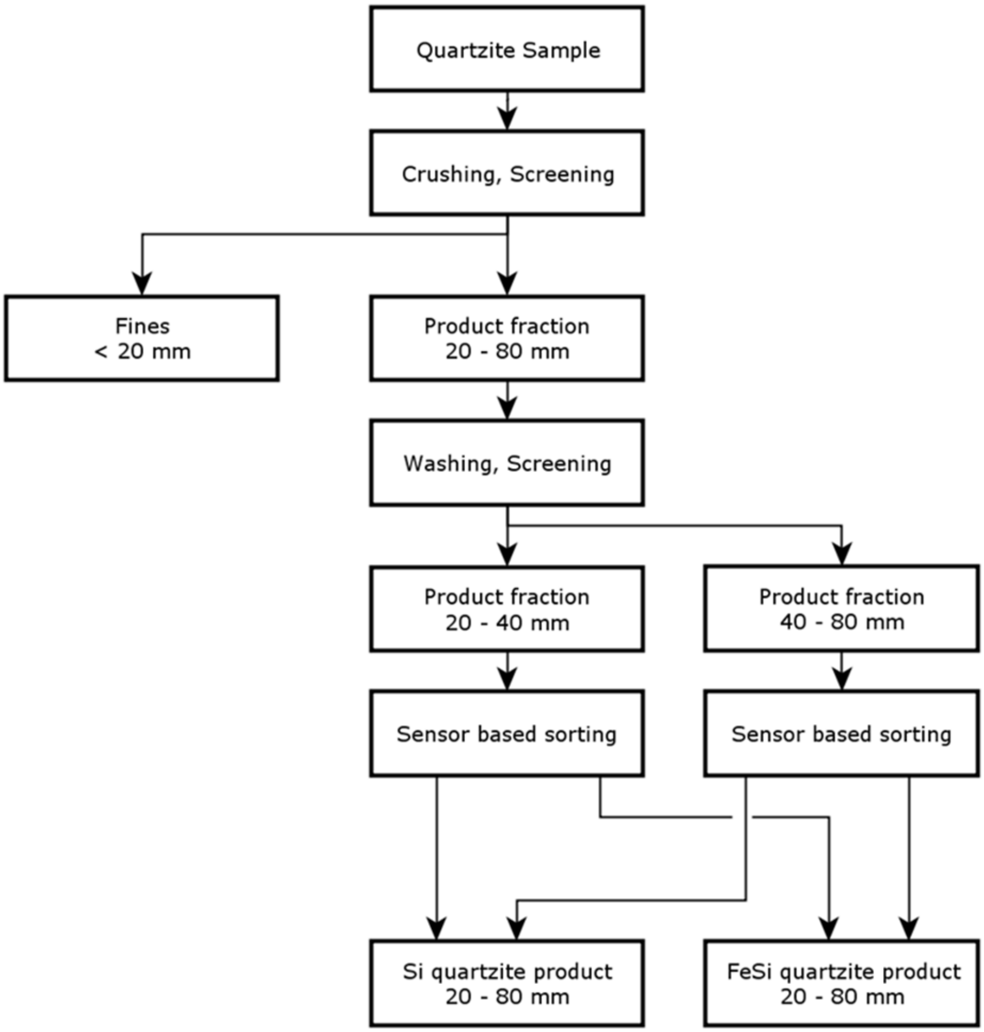
Sample ID	Drill Interval (m)	Description
Drill core GF15-53		
Sample 1	78.6 – 99.2	Above shear zone
Sample 2	99.2 – 111.7	
Sample 3	111.7 – 135	
Sample 4	135 – 156.8	Shear zone
Sample 5	156.8 – 186.2	Below shear zone
Drill core GF15-60		
Sample 1	38.3 – 66	Above shear zone
Sample 2	66 – 80	
Sample 3	80 – 97	
Sample 4	98 – 118	Shear zone
Sample 5	118 – 138	Below shear zone
Drill core GF15-62		
Sample 1	35.4 – 55.7	Above metagabbro
Sample 2	55.7 – 66.7	
Sample 3	66.7 – 83.7	
Sample 4	83.7 – 93.2	
Sample 5	105.8 – 116.8	Below metagabbro

13.4 Processing results for silicon / ferrosilicon application

Silicon production generally utilizes quartzite in particle sizes ranging from 20 to 120 mm. Based on the limited size of the PQ drill cores, a fraction of 20 – 80 mm was used for the processing tests as summarized in the following flow sheet (Figure 13-1).

Each of the 15 quartzite samples were crushed using a jaw crusher and screened into fractions of <20 mm, 20 – 40 mm and 40 – 80 mm. Product fractions of 20 – 40 mm and 40 – 80 mm were washed and screened prior to sensor based sorting.

Figure 13-1 Flow Sheet for silicon / ferrosilicon application



Automated optical sorting separated the quartzite into different fractions based on differences in colour. Examination of the separated fraction's chemical compositions after optical sorting show a good response for optical sorting to detect variance in iron oxide, aluminum, and titanium in both the 20 – 40 mm and 40 – 80 mm fraction. Compared to the typical values for iron oxide in quartz products for metallurgical grade silicon (MG-silicon) and ferrosilicon, low iron oxide contents are achievable through optical sorting, suitable for both applications. For alumina and titanium grades in the typical range for ferrosilicon production were achieved, however, ANZAPLAN (2016) indicates that the levels are still elevated compared to typical quartz feedstock materials used for MG-silicon production. They qualify that these typical values are not strict thresholds and producers rather indicate typical ranges of materials used which does not exclude the use of materials which are not exactly in the given ranges.

In addition to the successful optical sorting investigation, the applicability of X-ray transmission (XRT), Near-infrared (NIR) and Electromagnetic (EM) sensor technologies were also tested. Sensor screening tests confirmed that some of the samples can be sorted using NIR, however, optical sensor sorting provided significantly better results. There was no signal identified for conductivity with the EM sensor, and the XRT method test indicated that the trace impurity levels are below detection, and therefore both the EM and XRT sensors were identified to be of no use for automated sorting purposes on Silicon Ridge quartzite.

Results from processing tests of drill core GF15-53 indicated that 16.2 wt% of the entire drill core is suitable for ferrosilicon production. A total of 20 to 22 wt% of the samples are in the < 20 mm fraction and would serve as feed material for high value applications.

Results from processing tests of drill core GF15-60 indicated that 34.6 wt% of the entire drill core is suitable for ferrosilicon production. A total of 20 to 25 wt% of the samples are in the < 20 mm fraction and will serve as feed material for high value applications.

Results from processing tests of drill core GF15-62 indicated that 34.7 wt% of the entire drill core is suitable for ferrosilicon production. A total of 21 to 23 wt% of the samples are in the < 20 mm fraction and will serve as feed material for high value applications.

In the processing flowsheet postulated in ANZAPLAN (2016), the less than 20 mm fines and the optical sorting rejects could be stockpiled for potential further processing for high value applications.

It can be concluded from the ANZAPLAN (2016) examination that the potential exists to separate the Silicon Ridge quartzite into different grades of material with respect to iron content, and to a lesser degree, aluminum and titanium contents. This material segregation is not being proposed in the current study through processing, as the project is being contemplated as direct shipping of quartzite with no on-site processing.

14.0 MINERAL RESOURCE ESTIMATES

14.1 Mineral Resource Estimates Statement

Rogue completed the first drilling campaign into the "G" and 'H" quartzite units on the Silicon Ridge property between August 8, 2015 and December 16, 2015. An initial Mineral Resource estimate was reported for the Silicon Ridge project in Buro et al. (2016). Philip Vicker, P.Geo., as QP for this Section, was mandated by Rogue to update the prior Mineral Resource estimate of Buro et al. (2016) for the current NI 43-101 compliant PEA update.. The QP for this Section is not aware of any new drilling, assay, or other data collected on the property subsequent to the Buro et al. (2016) statement, with the exception of a ground penetrating radar survey which yielded a refined interpretation of the overburden thickness by Rogue that was used in the current Report to refine the upper limit of bedrock in a portion of the South West zone.

The exploration database used in the current Mineral Resource estimate comprises 74 drill holes including 3 holes (GF15-35, GF15-35A and GF15-51) that were abandoned due to drill casings breaking, and 25 channels in surface quartzite exposures from exploration work conducted by Rogue in 2015. The geological interpretation from these data was completed by the geological team of Rogue and used to construct the three-dimensional geological solids used for the initial Mineral Resource estimate on the Silicon Ridge property reported in Buro et al. (2016). The current Mineral Resource estimate utilizes the same geological interpretation wireframes as their initial study, with only very minor changes to remove small wireframing imperfections such as overlaps of wireframes and internal cross-overs. Variogram parameters were defined and used to create anisotropic search ellipses that were used during the Resource grade interpolation. The Resource interpolation was performed using the Inverse Distance Weighted ("IDW") at a power of two ("IDW2").

Philip Vicker, P.Geo. completed the Mineral Resource model in MineSight® software between April 2 – April 13, 2017. The effective date of this Mineral Resource estimate is May 23, 2017.

The current Mineral Resource estimated for the Silicon Ridge project follows the definitions and guidance adopted by the CIM in the Definition Standards – For Mineral Resources and Mineral Reserves (2014) and conforms to the rules dictated by NI 43-101 Standards of Disclosure for Mineral Projects updated in 2011. A summary of the CIM Definition Standards for Mineral Resource classification is provided in Section 14.2.

In addition to these guidelines, Philip Vicker, P.Geo., also considered data quality, drill spacing, expectations of geological continuity, geological complexity, and apparent grade distribution in the classification of the Mineral Resources. To assess the prospect of reasonable economic extraction, the Mineral Resource block model has been constrained by a LG-3D optimized pit shell using MineSight® software completed by Kerrine Azougarh, P.Eng., the QP for Section 16 in this Report.

The LG-3D pit shell was defined using the following constraints; 50° hangingwall and 55° footwall pit slopes; 85 m offsets including 75 m offset from lakes and wetlands and a 10 m buffer zone for pit road access; products sale price of \$85.00/t; processing costs of \$2.00/t (primary crushing); mining costs of \$9.34/t feed, \$5.34/t waste, and \$2.86/t overburden; and a G&A cost of \$2.25/t.

Table 14.1 provides a summary of the pit-constrained Resources for the three deposits.

Table 14.1: Silicon Ridge Summary of the Pit Constrained Mineral Resources Estimate

(Cut-Off: ≥ 98.1% SiO2, ≤ 0.8% Al2O3, ≤ 0.075% TiO2, ≤ 0.24% Fe2O3)

ALL ZONES	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.5	98.62	0.061	0.543	0.097
Indicated	5.3	98.62	0.061	0.537	0.117
Measured + Indicated	7.7	98.62	0.061	0.539	0.110
Inferred	2.1	98.66	0.059	0.508	0.131

SOUTH WEST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.0	98.62	0.060	0.540	0.096
Indicated	3.1	98.62	0.060	0.545	0.104
Measured + Indicated	5.0	98.62	0.060	0.543	0.101
Inferred	0.9	98.69	0.059	0.519	0.097

NORTH EAST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	0.5	98.62	0.063	0.555	0.099
Indicated	1.1	98.62	0.065	0.533	0.118
Measured + Indicated	1.6	98.62	0.064	0.540	0.112
Inferred	0.2	98.63	0.063	0.561	0.124

CENTRE NORTH ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	n/a	n/a	n/a	n/a	n/a
Indicated	1.1	98.60	0.058	0.520	0.150
Measured + Indicated	1.1	98.60	0.058	0.520	0.150
Inferred	1.0	98.64	0.059	0.486	0.164

Notes:

CIM definitions and guidelines (May 10, 2014) were followed for classification of Mineral Resources.
Cut-off grades of 98.1% SiO_2, 0.80% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3
Density of 2.65 g/cm^3.
Metric tonnes.
Numbers may not add due to rounding.
Effective date of the Mineral Resource estimate is May 23, 2017.
LG-3D Pit Constraints include:
- 50° slope hangingwall, 55° slope footwall;
- Offset of 85 m from lakes and wetlands;
- Product sales price of $85.00/t;
- Processing cost of $2.00/t (primary crushing only);
- Mining costs of $9.34/t feed, $5.34/t waste, $2.86/t feed;
- G&A cost of $2.25/t.

The reader is cautioned that Mineral Resources that are not Mineral Reserves have no demonstrated economic viability. The estimate of Mineral Resources may be materially affected by mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and government factors (the "Modifying Factors").

14.2 Definitions

According to the latest version of the CIM Standards/NI 43-101 that was adopted by CIM Council on May 10, 2014:

A Mineral Resource is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade or quality and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade or quality, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.

Material of economic interest refers to diamonds, natural solid inorganic material, or natural solid fossilized organic material including base and precious metals, coal, and industrial minerals.

> An **Inferred Mineral Resource** is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling.
>
> Geological evidence is sufficient to imply but not verify geological and grade or quality continuity.
>
> An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve.
>
> It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
>
> An **Indicated Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.
>
> Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation.
>
> An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.
>
> A **Measured Mineral Resource** is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit.
>
> Geological evidence is derived from detailed and reliable exploration, sampling and testing and is sufficient to confirm geological and grade or quality continuity between points of observation.
>
> A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource.
>
> It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

14.3 Mineral Resource Estimation Procedures

The estimation of the current Silicon Ridge Mineral Resource included the following steps and procedures:

- Validation of the Master Database received from Rogue (which includes the drill hole and channel sampling data)
- Validation against the Master Database data of the geological interpretation represented in the three-dimensional solids utilized in Buro et al. (2016); examine the cut-offs for SiO_2, TiO_2, Al_2O_3, Fe_2O_3 applied for modelling quartzite solids
- Importation of the database into MineSight®
- Verify the reproducibility and validity of the Buro et al. (2016) Mineral Resource estimate through a review of their project input data and execution steps within MineSight®; the current study adopted no new data inputs for the Mineral Resource modeling, other than very minor error corrections to the mineral wireframes and the assay data
- Characterize the wireframe components by zone and geology units including low grade and high grade quartzites for each of the South West, Centre North, and North East zones, and the quartzite shear zones modeled in the South West and Centre North areas, resulting in eight separate units for domain modeling the Mineral Resource estimate
- Validate the spatial and statistical parameters utilized in the Resource estimate including the spatial continuity of the assays characterized in the variography and the resultant search ellipse dimensions
- Define the composite length as supported by the raw assay data, and block size selections with consideration of drill spacing and speculated mining equipment; 2 m composites and 15x5x4 m block dimensions (in XYZ respectively) utilized in Buro et al. (2016) were also found acceptable for the current study
- Generation of a block model, rotated to be parallel to the strike of the deposit at 060^o, including interpolation of the SiO_2, TiO_2, Al_2O_3, Fe_2O_3 content for all blocks constrained within the mineralized solids
- Validation of the global Resource estimate, firstly against the mineral wireframes, and secondly by comparison to the previous results of Buro et al. (2016)
- Optimization of the Mineral Resource to the LG-3D pit shells using reasonable economic extraction criteria
- Classification of the Resource according to CIM/NI 43-101 standards
- Issue the Mineral Resource Statement (Press Release dated May 23, 2017).

14.4 Drill hole Database and Data Verification

14.4.1 Drill hole Database

The drill hole and trench sample database used in this Mineral Resource estimate was supplied from Rogue in Excel format. The entire database comprises 74 collars including 71 completed drill holes (70 of which intercepted the Silicon Ridge quartzite units), and 3 drill holes that were abandoned due to casing breaking, and 25 channel sample in 14 trenched areas across the "G" and "H" quartzites. Three large holes (PQ diameter), namely GF15-53, GF15-60 and GF15-62 were drilled as twin holes to provide core for metallurgical tests the results of which were reported in ANZAPLAN (2016). The whole core from these holes was shipped as part of the metallurgical test program and no assays from these 3 twin holes were used in the current Mineral Resource estimate.

Table 14.2 and Table 14.3 provide a summary of diamond drilling and trenching performed on the Silicon Ridge Property.

Table 14.2: Summary of Diamond Drilling on the Silicon Ridge Property

Quartzite Unit	Sections	Numbers of Holes	Cumulative Length (m)
G - South West Sector	5+50W to 1+00E	33	5,690.50
G-North East Sector	0+50E to 14+00E	30	4,298.80
H - Centre North	0+00 to 5+00E	11	1,833.00
TOTAL		74	11,822.30

Table 14.3: Summary of Trenching on the Silicon Ridge Property

Quartzite Unit	Sections	Numbers of Trenches	Cumulative Length (m)
G - South West Sector	5+50W to 1+00E	10	282.80
G-North East Sector	0+50E to 14+00E	6	111.10
H - Centre North	0+00 to 5+00E	9	116.60
TOTAL		25	510.50

Table 14.4 provides a summary of samples assayed during the drilling and trenching campaign.

Table 14.4: Summary of Exploration work

Source of information	Assays Samples	
	Number	Cumulative Length (m)
Drill holes	4,740	6,476.6
Trenches	293	501.7
TOTAL	5,033	6,978.3

The data from all the exploration drill holes and from the trenches was used for the geological modelling in Buro et al. (2016). The lithologies were used to perform a sectional geological interpretation and later for the construction of the different geological and domain envelopes. This interpretation was reviewed by Philip Vicker, P.Geo. and found to be reasonable for the drill and trench data from which it was derived. Minor cleanup to the wireframing was completed to remove some spurious crossovers and overlaps.

The assay data from holes and trenches that are located within the modelled geological solids were all used for grade interpolation. Only analytical results from the XRF method were used for compositing and grade interpolation. Other reported data included sporadic ICP analyses, but these were not compiled by Philip Vicker, P.Geo., as they were not deemed to be useful for the current project, and were not used in the Mineral Resource estimates, consistent with Buro et al. (2016).

As discussed in Section 12 of this Report, numerous steps have been undertaken by the QP of this Section and in Buro et al. (2016) to validate the quality of the data on the Silicon Ridge project to provide confidence in the input data for the Mineral Resource estimate. These steps have included:

- Checking for location and elevation discrepancies and other potentially spurious values;
- Checking for minimum and maximum values for each quality element to ensure that the range of the values fall within acceptable limits;
- Checking for inconsistencies in the lithological units and for overlaps in the lithology and assays intervals;
- Checking for gaps or duplicate intervals in the Master Database;
- Confirming all assays used in the Mineral Resource estimate match their associated laboratory certificate
- Reviewing the QAQC program instituted by Rogue for the drilling and sampling program, which included among other things: surveying of both collars and down hole, surveying trench sample locations, selection of an appropriate assay methodology for the analysis of high silica quartzite, taking photographs of all drill core, splitting core, and other examinations including assessing processing character of the material, mineralogical and physical parameters of the quartzite

An initial validation step was performed before importing the data into MineSight® through examination of the drill hole database provided by Rogue in both Excel and Access software. A further validation process was completed when importing the data into Torque, an SQL based database manager linked with MineSight®.

The fields contained in the drill hole database are summarized in Table 14.5 and assay statistics are summarized in Table 14.6. A small number of database errors identified in the course of validation were corrected in the current study. None of these errors were significant and are estimated to have had no significant impact on either the historical or current Mineral Resource estimates.

Table 14.5: Fields contained in the Master Drill Hole Database

Excel Tables	Information
Collars_Merge 2	Hole ID, UTM-E (mE), UTM-N (mN), Elevation (mASL), Hole Depth
Assays_Merge 2	Hole Id, Sample No., From (m), To (m) (representing distance from origin for channel samples or down hole depth in drill holes), Al2O3 (%), BaO (%), CaO (%),Cr2O3 (%), Fe2O3 (%), K2O (%), MgO (%), MnO (%), Na2O (%), P2O5 (%), SO3 (%), SiO2 (%), SrO (%), TiO2 (%), Total (%), S.G.(g/cm^3) (on selected samples)
Lithology	Hole Id, From (m), To (m), Litho, LCode, GCode
Surveys_Merge 2	Hole Id, Depth (m), Az (Deg), Dip (Deg)

Table 14.6: Descriptive Statistics of Quality Elements in the Master Database

	Arith. Average	Length Weighted Average	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	1.187	1.133	0.770	0.360	1.670	1.407	24.330	0.110	24.440	5033
BaO	0.008	0.008	0.005	0.005	0.013	1.562	0.305	0.005	0.310	5030
CaO	0.037	0.037	0.005	0.005	0.344	9.183	9.765	0.005	9.770	5033
Cr_2O_3	0.006	0.006	0.005	0.005	0.004	0.560	0.085	0.005	0.090	5033
Fe_2O_3	0.365	0.336	0.130	0.060	1.396	3.819	22.695	0.005	22.700	5033
K_2O	0.131	0.126	0.060	0.040	0.286	2.179	4.095	0.005	4.100	5033
MgO	0.077	0.072	0.010	0.005	0.460	5.985	9.125	0.005	9.130	5033
MnO	0.007	0.006	0.005	0.005	0.018	2.735	0.645	0.005	0.650	5033
Na_2O	0.014	0.015	0.010	0.005	0.075	5.149	2.645	0.005	2.650	5033
P_2O_5	0.014	0.013	0.005	0.005	0.075	5.391	1.825	0.005	1.830	5033
SO_3	0.023	0.022	0.005	0.005	0.105	4.542	3.445	0.005	3.450	5030
SiO_2	97.36	97.48	98.16	97.99	4.36	0.04	61.47	38.53	100.00	5033
SrO	0.005	0.005	0.005	0.005	0.002	0.422	0.075	0.005	0.080	5030
TiO_2	0.119	0.112	0.080	0.060	0.278	2.338	6.060	0.020	6.080	5033
Total	99.61	99.61	99.58	100.10	0.42	0.00	4.48	98.17	102.65	5033
SG	2.648	2.650	2.650	2.650	0.045	0.017	0.610	2.470	3.080	461

14.4.2 Geological Modeling Procedures

The geological interpretation was completed previously by Rogue for each of the South West, Centre North and North East zones based on vertical drill sections. These sectional interpretations were converted to three-dimensional geological solids after minor adjustments on the contacts and modifications on the lithology codes in Buro et al. (2016) by linking the different polylines. Philip Vicker, P.Geo. reviewed the interpretation as acceptable for the current Mineral Resource estimate, but recommends a reinterpretation upon the expected acquisition of new data inputs after the upcoming field season where additional surface exposures should help to better define the quartzite units. A reinterpretation should aim to minimize geological complexity and avoid spurious errors such as internal crossovers and overlaps of wireframes that were induced apparently in trying to respect a lesser quality sectional interpretation versus a more current method of modeling directly in three-dimensional space.

After the primary quartzite solids were built for each of the three zones of mineralization (South West, Centre North and North East) Buro et al. (2016) applied cut-offs supported by the ANZAPLAN (2016) study to develop a domaining approach to better guide the Mineral Resource interpolation. This was done in order to constrain high grade and low grade domains and avoid interactions between the different domain composites during grade interpolation. The domaining process, based on the different Al_2O_3%, Fe_2O_3%, TiO_2% and SiO_2% cut-offs helped to interpret and isolate secondary shear or fracture zones of lower quality silica parallel to the main shear zone visually identified in the South West zone of the quartzite mineralization, and to a lesser degree in the Centre North area. Taking into account both grade and geological continuity, domain modeling resulted in a high silica and low silica domained quartzite for each of the 3 zones. In addition, a quartzite shear zone domain was modeled for the South West and Centre North zones. The wireframing resulted in a total of eight discrete quartzite domains.

To constrain the geology at surface, Rogue provided a topographic surface generated by a LiDAR survey over the property. To constrain the geology to the overburden depth below topography, Rogue provided the results of a ground penetrating radar survey which was used to modify the Buro et al. (2016) lower boundary of the overburden surface completed by Kerrine Azougarh P.Eng. directly in Minesight® for the current study. The final wireframes utilized in the current study were cropped to either the base of the overburden or the surface topography in the absence of overburden. Figure 14-1 and Figure 14-2, show plan views of the quartzite solids.

The global tonnage of the quartzite modelled, all zones together and without application of any cut-off grade, is 84.6 Mt, which includes 79.6 Mt in the main high grade and low grade quartzite zones (versus 77.4 Mt identified in Buro et al. (2016)) and 4.9 Mt within the quartzite shear zone unit, which was not discretely modeled in Buro et al. (2016).

Based on the statistical analysis of 461 SG samples (Table 14.6) a value of 2.65 g/cm^3 was applied to all quartzite material.

14.5 Statistical Analysis and Compositing

The geological solids were used to constrain the assays used for the grade interpolation. Basic descriptive statistics were applied on the raw data in order to get a better understanding of statistical parameters. In Table 14.7, Table 14.8 and Table 14.9 statistics were calculated only on the assays constrained within the different geological solids built respectively for the South West, North East and Centre North zones. No cut-offs were applied at this stage to generate the solids used to constrain the assays used in Buro et al. (2016). Philip Vicker, P.Geo. re-examined these data for the current Mineral Resource wireframes with the current version of the assay database with the updated data corrections, and these tables are updated accordingly.

Figure 14-1: Plan view of the high silica content quartzite units

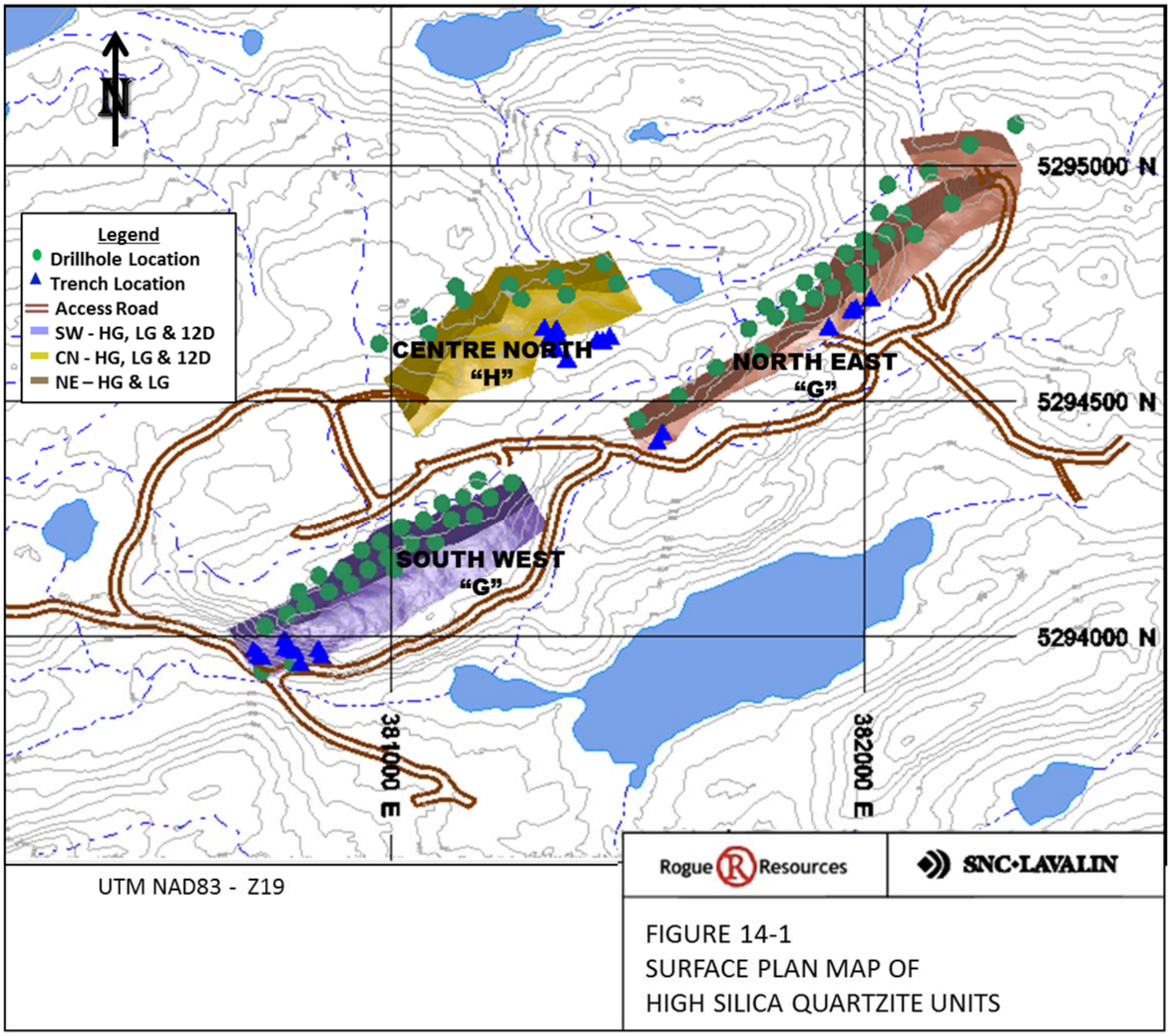


Figure 14-2: Plan View of the main high silica quartzite units

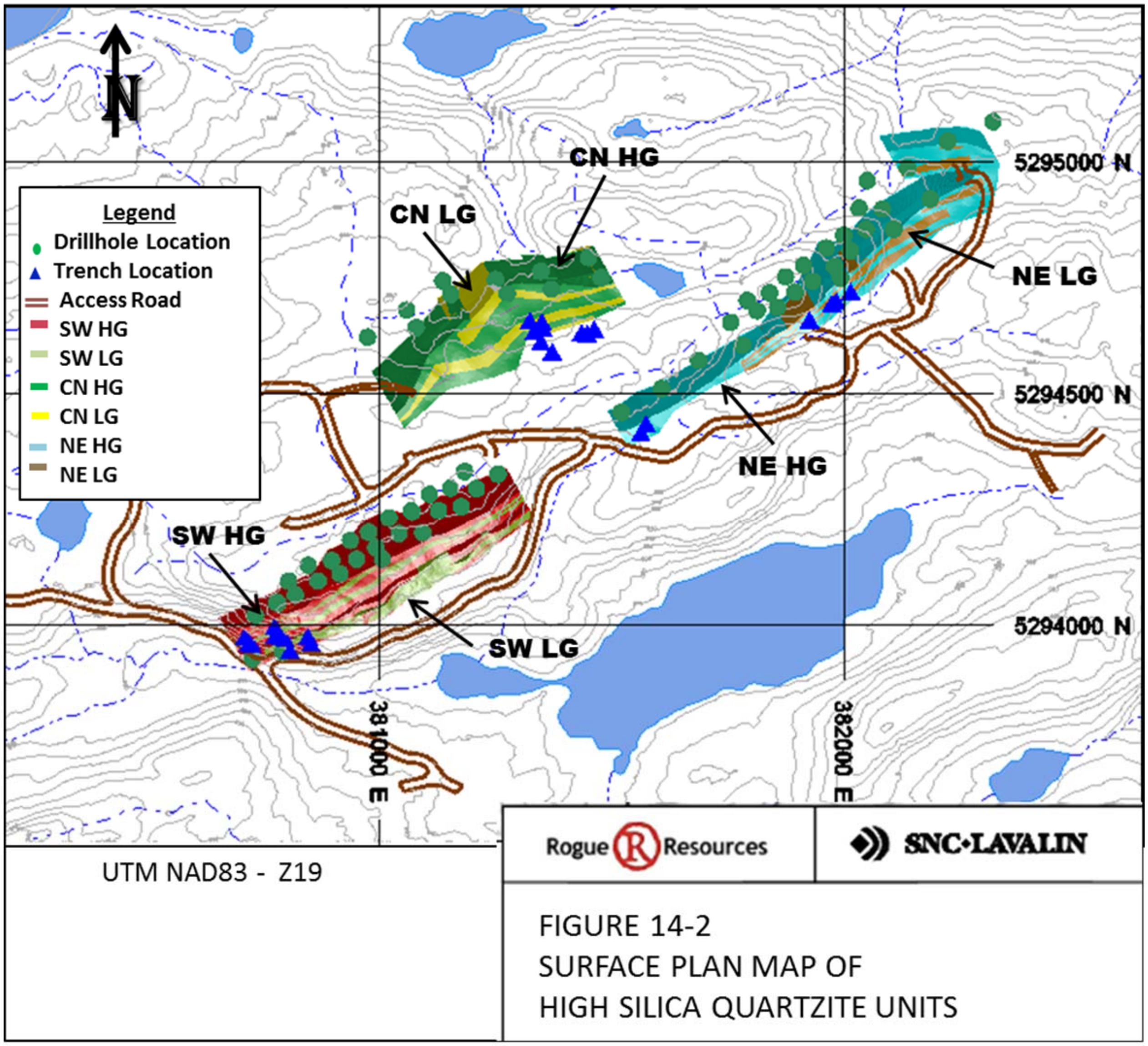


Table 14.7: Assays descriptive statistics for the South West Zone (No cut-offs applied, shear zone not incl.)

Descriptive Statistics for the South West Zone Assays (No Cut-offs)										
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	1.067	1.019	0.760	0.640	1.212	1.136	17.570	0.130	17.700	2548
BaO	0.008	0.007	0.005	0.005	0.010	1.374	0.235	0.005	0.240	2548
CaO	0.015	0.014	0.005	0.005	0.078	5.084	2.165	0.005	2.170	2548
Cr_2O_3	0.006	0.006	0.005	0.005	0.004	0.588	0.085	0.005	0.090	2548
Fe_2O_3	0.250	0.232	0.120	0.060	0.821	3.290	16.315	0.005	16.320	2548
K_2O	0.106	0.102	0.060	0.040	0.218	2.043	3.745	0.005	3.750	2548
MgO	0.038	0.033	0.010	0.005	0.293	7.779	8.165	0.005	8.170	2548
MnO	0.005	0.005	0.005	0.005	0.006	1.056	0.155	0.005	0.160	2548
Na_2O	0.009	0.009	0.005	0.005	0.011	1.121	0.225	0.005	0.230	2548
SiO_2	97.690	97.787	98.190	97.99	2.817	0.029	52.74	47.260	100.00	2548
SO_3	0.015	0.015	0.005	0.005	0.065	4.296	1.955	0.005	1.960	2548
SrO	0.005	0.005	0.005	0.005	0.001	0.146	0.025	0.005	0.030	2548
TiO_2	0.098	0.093	0.080	0.050	0.141	1.439	3.680	0.020	3.700	2548
Total	99.59	99.59	99.56	100.1	0.41	0.00	4.10	98.55	102.65	2548
SG	2.650	2.650	2.650	2.650	0.052	0.020	0.610	2.470	3.080	243

Table 14.8: Assays descriptive Statistics for the North East Zone (No cut-offs applied)

Descriptive Statistics for the North East Zone Assays (No Cut-offs)										
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	0.961	0.916	0.680	0.340	1.467	1.527	17.810	0.110	17.920	1157
BaO	0.008	0.008	0.005	0.005	0.012	1.554	0.195	0.005	0.200	1157
CaO	0.054	0.057	0.005	0.005	0.461	8.602	9.765	0.005	9.770	1157
Cr_2O_3	0.007	0.007	0.005	0.005	0.003	0.422	0.025	0.005	0.030	1157
Fe_2O_3	0.325	0.306	0.110	0.060	1.398	4.304	19.990	0.020	20.010	1157
K_2O	0.093	0.092	0.050	0.030	0.230	2.474	3.285	0.005	3.290	1157
MgO	0.056	0.054	0.010	0.005	0.362	6.417	9.125	0.005	9.130	1157
MnO	0.006	0.006	0.005	0.005	0.012	1.931	0.275	0.005	0.280	1157
Na_2O	0.016	0.017	0.010	0.005	0.112	6.887	2.645	0.005	2.650	1157
SiO_2	97.717	97.802	98.350	98.510	4.292	0.044	59.490	40.510	100.000	1157
SO_3	0.015	0.014	0.005	0.005	0.110	7.424	3.445	0.005	3.450	1157
SrO	0.005	0.005	0.005	0.005	0.003	0.575	0.075	0.005	0.080	1157
TiO_2	0.112	0.108	0.070	0.060	0.254	2.268	3.940	0.030	3.970	1157
Total	99.61	99.62	99.60	100.05	0.41	0.00	3.73	98.17	101.90	1157
SG	2.641	2.650	2.650	2.650	0.037	0.014	0.220	2.520	2.740	107

Table 14.9: Assays descriptive Statistics for the Centre North Zone (No cut-offs applied, shear zone not included)

Descriptive Statistics for the Centre North Zone Assays (No Cut-offs)										
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	1.091	1.071	0.670	0.750	1.936	1.774	24.290	0.150	24.440	586
BaO	0.009	0.009	0.005	0.005	0.021	2.261	0.305	0.005	0.310	583
CaO	0.038	0.042	0.005	0.005	0.286	7.588	4.655	0.005	4.660	586
Cr_2O_3	0.008	0.008	0.005	0.005	0.006	0.714	0.065	0.005	0.070	586
Fe_2O_3	0.388	0.381	0.160	0.120	1.121	2.887	12.240	0.020	12.260	586
K_2O	0.122	0.121	0.050	0.050	0.323	2.642	3.455	0.005	3.460	586
MgO	0.116	0.126	0.020	0.005	0.674	5.807	8.975	0.005	8.980	586
MnO	0.008	0.008	0.005	0.005	0.034	4.026	0.645	0.005	0.650	586
Na_2O	0.012	0.012	0.005	0.005	0.033	2.767	0.495	0.005	0.500	586
SiO_2	97.49	97.52	98.30	98.46	4.38	0.04	52.86	47.14	100.00	586
SO_3	0.022	0.023	0.005	0.005	0.084	3.731	1.735	0.005	1.740	583
SrO	0.005	0.005	0.005	0.005	0.002	0.381	0.025	0.005	0.030	583
TiO_2	0.108	0.106	0.070	0.050	0.179	1.664	2.420	0.020	2.440	586
Total	99.65	99.65	99.60	100.10	0.41	0.00	1.99	98.66	100.65	586
SG	2.648	2.650	2.640	2.640	0.030	0.011	0.197	2.571	2.768	63

The quartzite domains were then redefined based on indications of a suitable cut-off grade from ANZAPLAN (2016), which were set in Buro et al. (2016) as SiO_2% >= 98.1, Fe_2O_3% <= 0.24, TiO_2%<= 0.075, and Al_2O_3% <= 0.80. These cut-offs were also utilized for the current Mineral Resource. Buro et al. (2016) further applied the domaining approach to help delineate internal sheared or fractured quartzite units internal to the main quartzite bodies of the South West and Centre North zones. The current study allocated these sheared units to discrete domains to be applied to the grade interpolation with the intention to extract additional information on the internal waste within the postulated potential mining horizons. The resulting domain solids according to the cut-offs applied were used to constrain the assays and regenerate new descriptive statistics that are presented in Table 14.10, Table 14.11 and Table 14.12. These data are for all of the assays within the modeled high silica quartzites for the South West, North East, and Centre North zones respectively.

Table 14.10: Assays descriptive Statistics for the South West Zone (within modeled high silica quartzite)

Descriptive Statistics for the South West Zone Assays; Cut-off grades to model high silica quartzite of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3									
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	0.731	0.671	0.510	0.360	1.006	1.376	17.570	0.130	17.700	1176
BaO	0.007	0.007	0.005	0.005	0.009	1.280	0.195	0.005	0.200	1176
CaO	0.012	0.012	0.005	0.005	0.029	2.343	0.575	0.005	0.580	1176
Cr_2O_3	0.006	0.006	0.005	0.005	0.003	0.439	0.045	0.005	0.050	1176
Fe_2O_3	0.166	0.138	0.070	0.030	0.601	3.617	13.305	0.005	13.310	1176
K_2O	0.064	0.059	0.040	0.030	0.140	2.211	3.715	0.005	3.720	1176
MgO	0.022	0.017	0.005	0.005	0.140	6.368	3.685	0.005	3.690	1176
MnO	0.005	0.005	0.005	0.005	0.002	0.420	0.065	0.005	0.070	1176
Na_2O	0.008	0.008	0.005	0.005	0.007	0.828	0.125	0.005	0.130	1176
SiO_2	98.29	98.42	98.62	98.74	2.12	0.02	47.59	52.41	100.00	1176
SO_3	0.012	0.010	0.005	0.005	0.056	4.749	1.215	0.005	1.220	1176
SrO	0.005	0.005	0.005	0.005	0.000	0.091	0.005	0.005	0.010	1176
TiO_2	0.077	0.071	0.060	0.050	0.128	1.660	3.680	0.020	3.700	1176
Total	99.61	99.61	99.58	100.10	0.40	0.00	2.55	98.55	101.10	1176
SG	2.647	2.650	2.650	2.650	0.045	0.017	0.380	2.520	2.900	105

Table 14.11: Assays descriptive Statistics for the Northeast Zone (within modeled high silica quartzite)

Descriptive Statistics for the North East Zone Assays; Cut-off grades to model high silica quartzite of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3										
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	0.768	0.712	0.540	0.340	1.148	1.495	17.150	0.130	17.280	667
BaO	0.007	0.006	0.005	0.005	0.005	0.731	0.065	0.005	0.070	667
CaO	0.034	0.033	0.005	0.005	0.306	9.013	7.535	0.005	7.540	667
Cr_2O_3	0.007	0.007	0.005	0.005	0.003	0.422	0.025	0.005	0.030	667
Fe_2O_3	0.232	0.214	0.100	0.060	1.053	4.545	19.990	0.020	20.010	667
K_2O	0.069	0.068	0.040	0.030	0.114	1.656	1.735	0.005	1.740	667
MgO	0.046	0.042	0.010	0.005	0.406	8.809	9.125	0.005	9.130	667
MnO	0.006	0.006	0.005	0.005	0.012	2.106	0.275	0.005	0.280	667
Na_2O	0.010	0.010	0.010	0.005	0.028	2.788	0.705	0.005	0.710	667
SiO_2	98.13	98.23	98.49	99.26	3.22	0.03	59.49	40.51	100.00	667
SO_3	0.010	0.009	0.005	0.005	0.035	3.565	0.755	0.005	0.760	667
SrO	0.005	0.005	0.005	0.005	0.001	0.172	0.015	0.005	0.020	667
TiO_2	0.092	0.087	0.060	0.060	0.200	2.173	3.940	0.030	3.970	667
Total	99.60	99.60	99.58	100.20	0.40	0.00	2.73	98.17	100.90	667
SG	2.638	2.650	2.650	2.650	0.037	0.014	0.190	2.520	2.710	61

Table 14.12: Assays descriptive Statistics for the Centre North Zone (within modeled high silica quartzite)

Descriptive Statistics for the Centre North Zone Assays; Cut-off grades to model high silica quartzite of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3										
	Arith. Av.	Weighted Av.	Median	Mode	Std. Dev.	COV	Range	Min.	Max.	Samples Count
Al_2O_3	0.972	0.972	0.540	0.330	2.003	2.060	24.290	0.150	24.440	359
BaO	0.009	0.009	0.005	0.005	0.020	2.371	0.305	0.005	0.310	357
CaO	0.033	0.044	0.005	0.005	0.240	7.305	4.345	0.005	4.350	359
Cr_2O_3	0.008	0.008	0.005	0.005	0.005	0.697	0.065	0.005	0.070	359
Fe_2O_3	0.355	0.373	0.160	0.120	0.919	2.585	9.150	0.020	9.170	359
K_2O	0.111	0.117	0.050	0.030	0.263	2.379	2.850	0.010	2.860	359
MgO	0.110	0.135	0.020	0.005	0.660	6.004	7.485	0.005	7.490	359
MnO	0.006	0.007	0.005	0.005	0.010	1.646	0.165	0.005	0.170	359
Na_2O	0.010	0.011	0.005	0.005	0.021	1.975	0.225	0.005	0.230	359
SiO_2	97.69	97.63	98.46	98.46	3.97	0.04	39.96	59.97	99.93	359
SO_3	0.025	0.025	0.005	0.005	0.104	4.202	1.735	0.005	1.740	357
SrO	0.005	0.005	0.005	0.005	0.002	0.313	0.025	0.005	0.030	357
TiO_2	0.100	0.101	0.060	0.050	0.165	1.647	1.780	0.020	1.800	359
Total	99.63	99.63	99.58	100.10	0.41	0.00	1.99	98.66	100.65	359
SG	2.645	2.650	2.640	2.640	0.034	0.013	0.197	2.571	2.768	40

The sample length histogram of all assays was generated to visualise the sample length frequency to guide the determination of a suitable length to be used to composite all assays into a uniform length prior to the Resource interpolation. The length of the samples ranges from 0.06 m (samples were normally greater than 0.5 m) to 3.0 m with 2.0 m being the statistical mode. Figure 14-3 shows the sampling length histogram of assays. The statistical mode was selected as the composite length, consistent with Buro et al. (2016), which aims to minimize bias introduced by too short or too long assays.

A regular downhole compositing approach was used to composite assays restricted to each quartzite solid, whereby the composite begins at the top of the hole (or start of a trench), imparting the domain name into the composite, and continues to parse the hole at two metre intervals until a modeled domain boundary is reached, at which point the last sample is truncated. Upon the entry to a new modeled domain, two metre parsing begins anew, and the new domain name is imparted into the composite. All composites shorter than 0.5 m were discarded during the grade interpolation phase of the modeling to minimize bias introduced by unduly short intervals as these short intervals would always be on the down hole margin of each wireframe. Table 14.13, Table 14.14 and Table 14.15 show the descriptive statistics for the composites data for each mineralized solid. Figure 14-3 to

Figure 14-7 display the composite length histogram as well as the composites histograms for SiO_2%, Al_2O_3%, TiO_2% and Fe_2O_3% for the South West zone.

Figure 14-3: Sampling length histogram of assays within the quartzite unit (n-5,033)

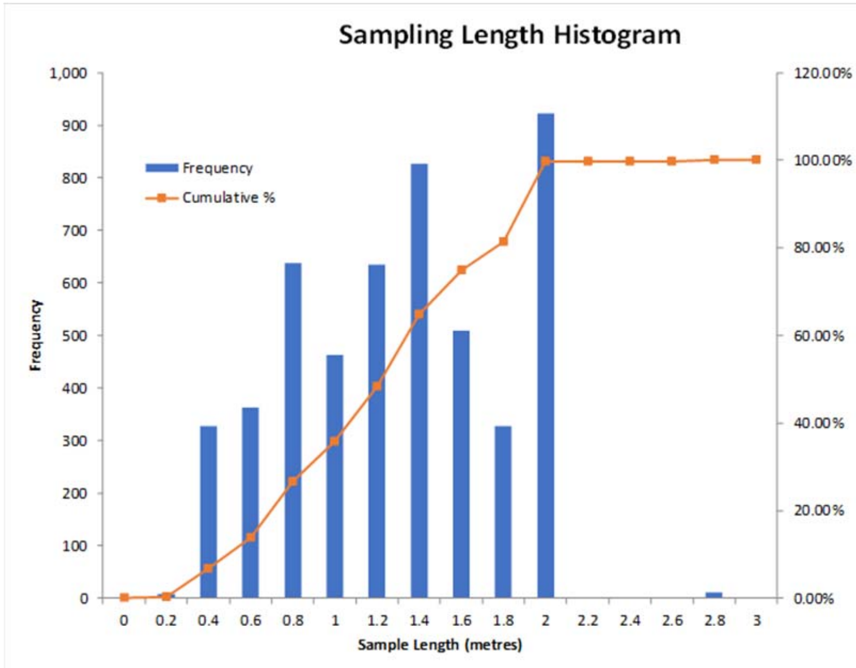


Table 14.13: Composites statistics within the cut-offs solid for the South West Zone

Composites statistics for the South West Zone; Cut-off grades of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3										
	Arith. Av.	Weight. Av.	Median	Mode	Std. Dev.	COV	Range	Minimum	Maximum	Samples Count
Al_2O_3	0.674	0.670	0.530	0.420	0.622	0.922	7.310	0.150	7.460	926
BaO	0.007	0.007	0.005	0.005	0.004	0.664	0.062	0.005	0.067	926
CaO	0.012	0.012	0.006	0.005	0.022	1.870	0.380	0.005	0.385	926
Cr_2O_3	0.006	0.006	0.005	0.005	0.002	0.329	0.020	0.005	0.025	926
Fe_2O_3	0.139	0.138	0.077	0.030	0.273	1.960	3.700	0.005	3.705	926
K_2O	0.060	0.059	0.044	0.040	0.080	1.343	1.159	0.010	1.169	926
MgO	0.017	0.017	0.007	0.005	0.055	3.176	0.960	0.005	0.965	926
MnO	0.005	0.005	0.005	0.005	0.001	0.149	0.016	0.005	0.021	926
Na_2O	0.008	0.008	0.006	0.005	0.005	0.661	0.100	0.005	0.105	926
P_2O_5	0.007	0.007	0.005	0.005	0.008	1.145	0.112	0.005	0.117	926
SiO_2	98.40	98.41	98.60	98.83	1.15	0.01	12.81	86.99	99.80	926
SO_3	0.011	0.011	0.005	0.005	0.036	3.245	0.508	0.005	0.513	926
SrO	0.005	0.005	0.005	0.005	0.000	0.081	0.005	0.005	0.010	926
TiO_2	0.071	0.071	0.060	0.050	0.055	0.774	0.970	0.020	0.990	926
Total	99.60	99.60	99.59	99.40	0.33	0.00	1.96	98.69	100.65	926
Length	1.871	1.948	2.000	2.000	0.380	0.203	1.950	0.050	2.000	926

Table 14.14: Composites statistics within the cut-off solids for the North East Zone

Composites statistics for the North East Zone; Cut-off grades of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3										
	Arith. Av.	Weight. Av.	Median	Mode	Std. Dev.	COV	Range	Minimum	Maximum	Samples Count
Al_2O_3	0.778	0.760	0.550	0.350	0.939	1.207	15.080	0.160	15.240	506
BaO	0.007	0.007	0.005	0.005	0.004	0.585	0.031	0.005	0.036	506
CaO	0.051	0.050	0.008	0.005	0.436	8.605	8.495	0.005	8.500	506
Cr_2O_3	0.007	0.007	0.005	0.005	0.003	0.369	0.016	0.005	0.021	506
Fe_2O_3	0.275	0.272	0.106	0.070	1.236	4.490	22.680	0.020	22.700	506
K_2O	0.072	0.070	0.046	0.030	0.089	1.237	0.793	0.005	0.798	506
MgO	0.060	0.059	0.011	0.005	0.398	6.661	6.445	0.005	6.450	506
MnO	0.006	0.006	0.005	0.005	0.016	2.484	0.305	0.005	0.310	506
Na_2O	0.013	0.012	0.008	0.005	0.057	4.527	1.195	0.005	1.200	506
P_2O_5	0.015	0.015	0.005	0.005	0.066	4.378	1.005	0.005	1.010	506
SiO_2	98.05	98.07	98.52	98.81	3.39	0.03	61.31	38.53	99.84	506
SO_3	0.011	0.011	0.005	0.005	0.036	3.187	0.484	0.005	0.489	506
SrO	0.005	0.005	0.005	0.005	0.003	0.489	0.055	0.005	0.060	506
TiO_2	0.100	0.099	0.070	0.060	0.267	2.659	5.410	0.030	5.440	506
Total	99.61	99.61	99.59	99.55	0.33	0.00	2.16	98.49	100.65	506
Length	1.866	1.944	2.000	2.000	0.381	0.204	1.950	0.050	2.000	506

Table 14.15: Composites statistics within the cut-offs solid for the Centre North Zone

Composites statistics for the Centre North Zone Cut-off grades of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3										
	Arith. Av.	Weigh. Av.	Median	Mode	Std. Dev.	COV	Range	Minimum	Maximum	Samples Count
Al_2O_3	0.995	0.979	0.565	0.330	1.782	1.791	21.300	0.170	21.470	300
BaO	0.009	0.009	0.005	0.005	0.017	1.913	0.204	0.005	0.209	299
CaO	0.042	0.043	0.006	0.005	0.276	6.613	4.019	0.005	4.024	300
Cr_2O_3	0.008	0.008	0.007	0.005	0.005	0.595	0.062	0.005	0.067	300
Fe_2O_3	0.371	0.368	0.165	0.120	0.852	2.298	8.810	0.020	8.830	300
K_2O	0.118	0.117	0.055	0.030	0.253	2.149	2.644	0.005	2.649	300
MgO	0.129	0.132	0.020	0.005	0.646	5.009	7.249	0.005	7.254	300
MnO	0.007	0.007	0.005	0.005	0.011	1.681	0.153	0.005	0.158	300
Na_2O	0.011	0.011	0.006	0.005	0.020	1.805	0.208	0.005	0.213	300
P_2O_5	0.010	0.010	0.005	0.005	0.022	2.162	0.223	0.005	0.228	300
SiO_2	97.61	97.63	98.45	98.73	3.77	0.04	36.91	62.90	99.81	300
SO_3	0.025	0.025	0.005	0.005	0.072	2.901	0.737	0.005	0.742	299
SrO	0.005	0.005	0.005	0.005	0.002	0.326	0.023	0.005	0.028	299
TiO_2	0.101	0.101	0.070	0.060	0.144	1.422	1.560	0.030	1.590	300
Total	99.18	99.15	99.60	99.76	5.91	0.06	100.22	0.28	100.50	300
Length	1.878	1.958	2.000	2.000	0.389	0.207	1.900	0.100	2.000	300

Figure 14-4: Composites histogram on SiO_2% for the South West Zone

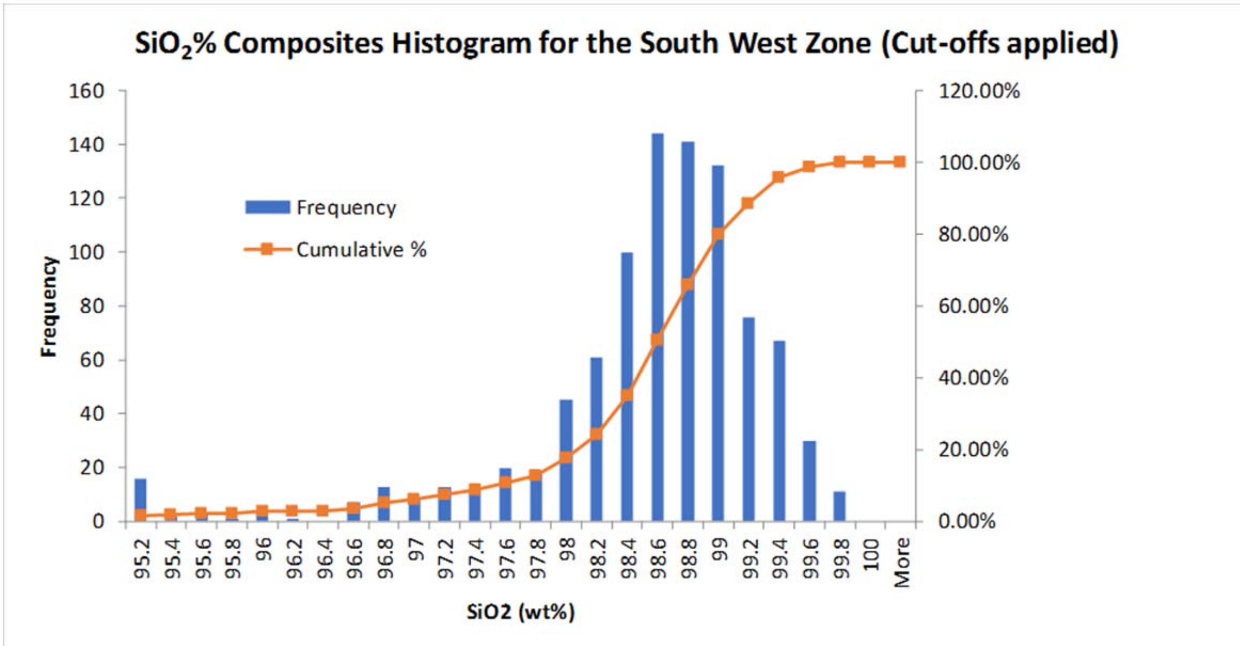


Figure 14-5 Composites histogram on Al_2O_3% for the South West Zone

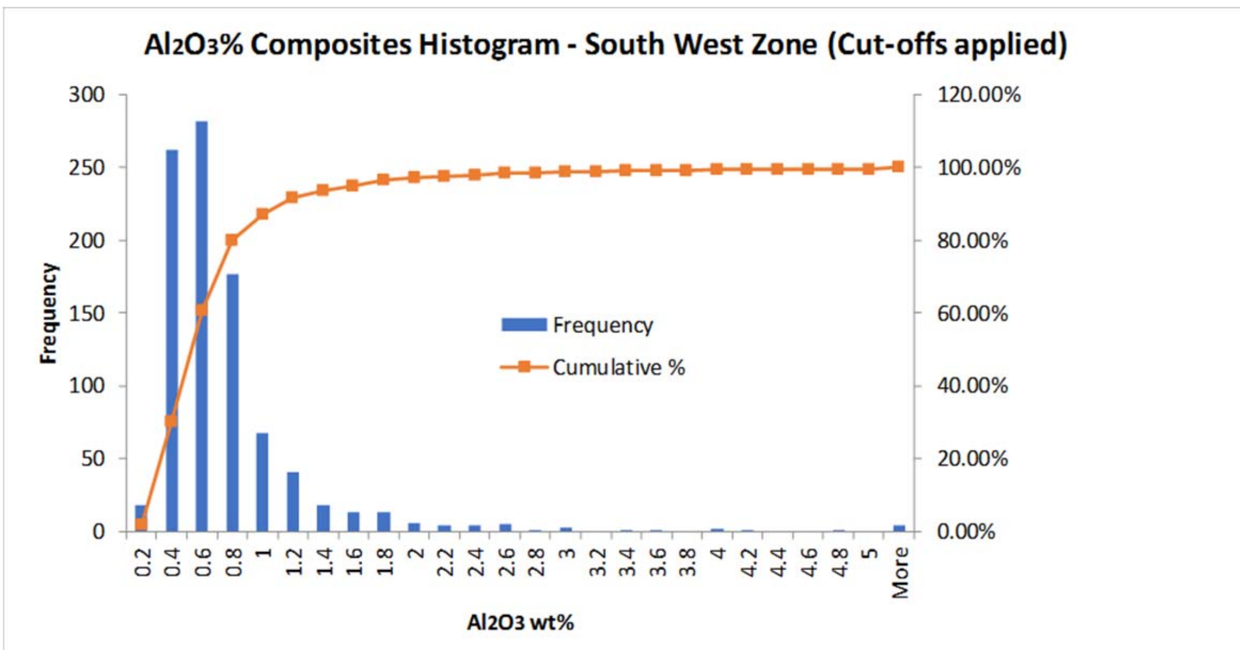


Figure 14-6 Composites histogram on TiO_2% for the South West Zone

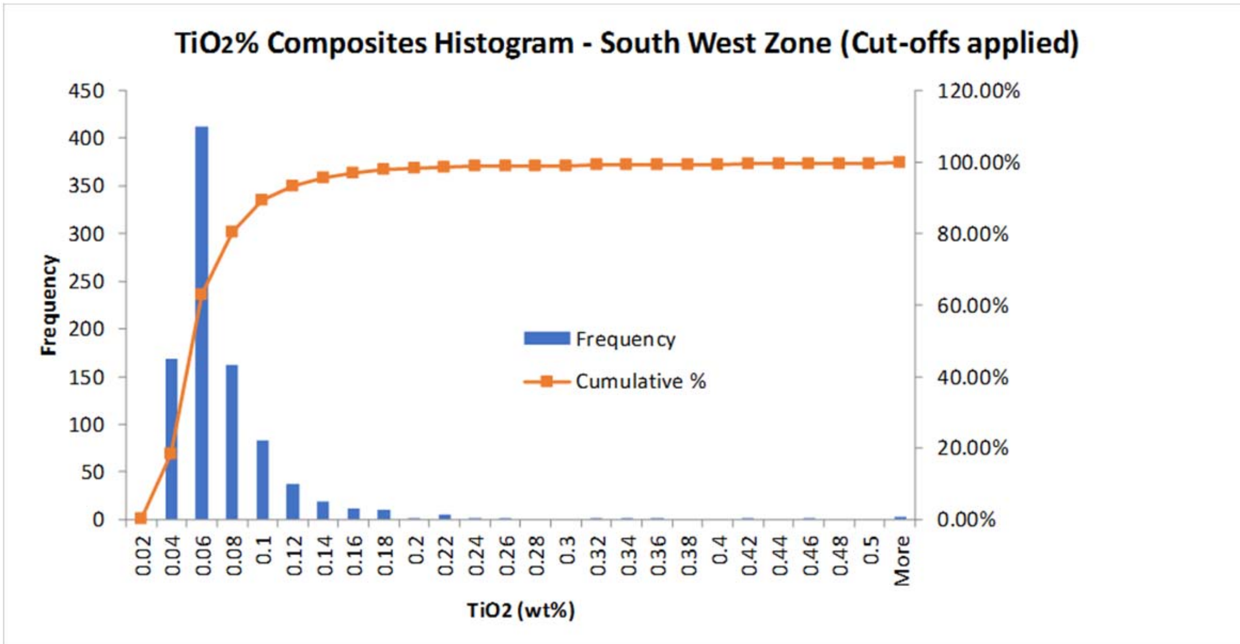
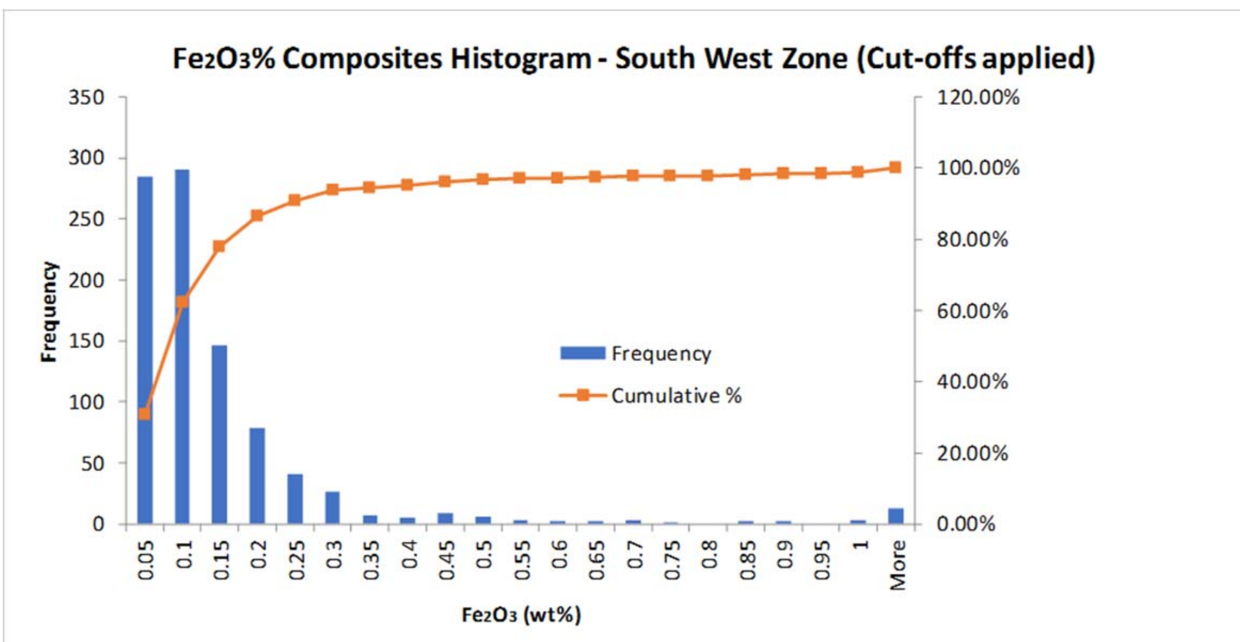


Figure 14-7 Composites histogram on Fe_2O_3% for the South West Zone



14.6 Variogram Modelling

Variograms were generated for the South West zone (for both mineralized grade solids) to analyze the spatial continuity of the mineralization and determine suitable parameters to guide the search ellipse dimensions and orientation for the grade interpolation. The module MineSight® Data Analyst was used to model the variograms from the composites data set for both SiO_2% and Al_2O_3%.

The variogram modelling process starts first with the generation of a set of combination of variograms covering the whole 360° horizontally with varying steps of 15° and a window of 7.5° and also covering the whole 90° vertically with varying steps of 10° and a window of 5°. The resulting combination set of multiples variograms are then analyzed to identify the different axes of continuity both in the strike and dip directions. Once the different axes of continuity are identified directional variograms are then generated for the selected quality elements in directions corresponding to the major axis (axis of better continuity), the semi-major axis (perpendicular to the major axis) and in the minor axis (in principle perpendicular to the major and the semi-major axis). In the present case the longer axis of continuity was found in the strike direction for both SiO_2% and Al_2O_3% with a range of 110 m for SiO_2% and a range of 125 m for Al_2O_3%.

The best variogram structure was obtained with SiO_2% as shown in Figure 14-8. For SiO_2% the dip direction was found at an azimuth of 240° and a dip of -60° with a less defined variogram structure in comparison with the strike structure. The corresponding range is 115 m as shown in

Figure 14-9. The combined downhole variogram is considered as an alternative to define the third structure of the search ellipse. Considering the presence of different shear zones in the mineralization and the definition of different cut-offs solids Buro et al. (2016) elected to just consider the maximum thickness of each modeled solid as its third constraining parameter to guide the composites selection during the resources interpolation. This was deemed to be acceptable for the current study and the same variography was used for the grade interpolation to generate the Mineral Resources for the current study.

The variogram parameters defined by the geostatistical analysis in addition to other considerations served as basis for the definition of the search parameters. The fact that some drill holes tested the quartzite formation down dip was also taken into account.

Figure 14-8 Variogram in the strike direction for SiO_2% in the South West Zone

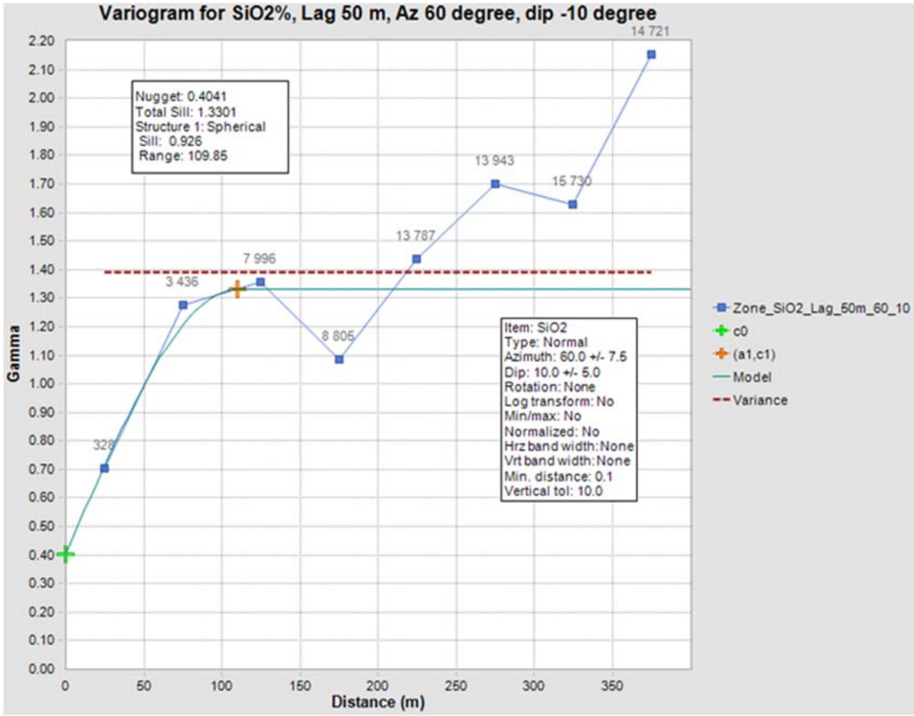
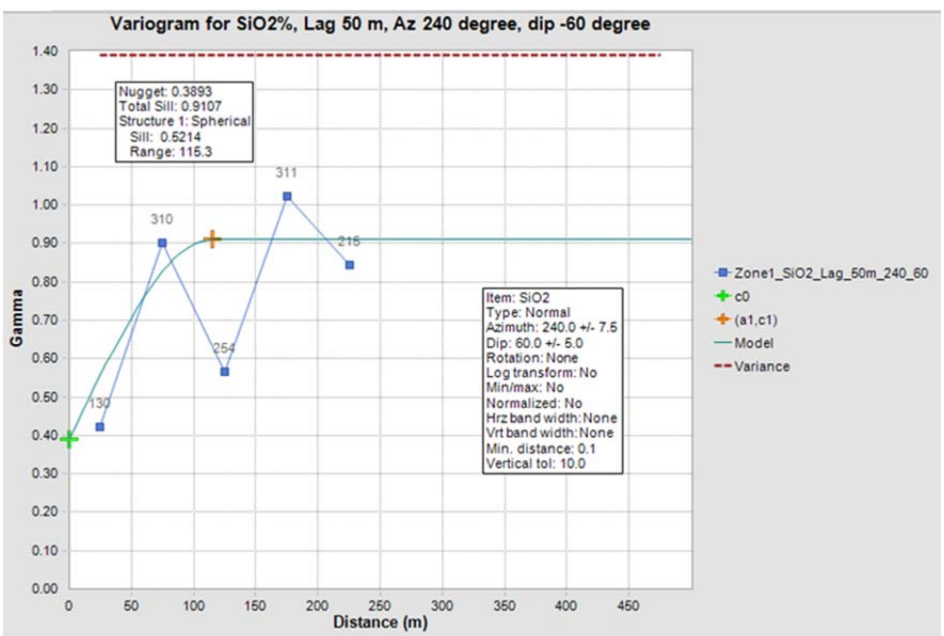


Figure 14-9 Variogram in the dip direction for SiO_2% in the South West Zone



14.7 Specific Gravity

For the current Mineral Resource estimate, examination was applied to the 461 SG measurements that were systematically performed on every tenth sample pulp using the pycnometer method (gas and bottle pycnometers). As shown clearly in Table 14.16, the measured SG of the Silicon Ridge quartzite is 2.65 g/cm^3, consistent with the SG of quartz which is also 2.65 g/cm^3. Therefore, all blocks in the model are given a grade of 2.65 g/cm^3. Any material approximating the cut-off grade for potential Silicon Ridge quartzite production would be within 1-2% of 100% SiO_2 (wt%), so it is reasonable that the maximum error on using an SG of 2.65 g/cm^3 for unbroken rock (dry) would be very small (<<1% relative error).

14.8 Block Model Setup/Parameters

A block model was created using MineSight® software package to generate a grid of regular blocks for estimating tonnes and grades. A unique block model was created for the South West, Centre North and North East zones. In the present Mineral Resource estimate, a block size of 15 m × 5 m × 4 m respectively in the X, Y and Z directions was used, consistent with Buro et al. (2016).

An industry standard is to consider block size in the range of one half (½) to one fourth (¼) of the average drilling spacing. Even for estimates not based on geostatistical methods such as the Inverse Distance Method (IDW), too small a block size would lead to estimates that do not reflect the confidence provided by the drilling spacing.

The average spacing between the drill sections is 50 m in the core of the SW and NE deposits and 100 m along the extremity of the NE deposits and on the CN deposit. Two or three holes were drilled along each section and the trenches are located on or near the drill sections.

For the X and Y directions, a block size of 15 m × 5 m, which corresponds to one third of the average drill spacing, was used. A height of 4 m was considered in the Z direction, as it is a multiple of the composite length and potentially close to a projected bench height. A rotated model was used in order to align the orientation of blocks with the strike of the mineralization, although in the future, Philip Vicker, P.Geo. recommends not doing this as it complicates comparing the model in other software that do not deal well with rotated models. Sub-celling could yield a similar result. The specific parameters used for the block modeling are summarised in Table 14.16.

Table 14.16: Silicon Ridge – Blocks Model Parameters

Direction	Minimum (UTM)	Maximum (UTM)	Block Size	Number of Blocks	Model Origin (UTM)
Easting (X)	379 075	383 606	15	200	380 575
Northing (Y)	5 293 300	5 297 648	5	300	5 293 300
Elevation (Z)	630	1 210	4	145	0
Rotation	Rot1= 330°, Rot2 = 0°, Rot3 = 0°, Invert Z axis: No				

14.9 Structural Domains for Interpolation

Domaining was imparted into the grade interpolation for high grade and low grade quartzites for each of the South West, Centre North, and North East zones, and the shear zones identified for the South West and Centre North zones. No additional domaining was applied.

14.10 Resource Interpolation

The Mineral Resources for the Silicon Ridge property were estimated using the Inverse Distance Squared Method (IDW2) which is a non-geostatistical estimation method. However, the search ellipse anisotropy was utilized in the grade interpolation, which makes the estimation methodology closer to the kriging method. In kriging estimation, the estimate of a block is a linear combination of all surrounding composites that are selected. In this linear combination, the weight of each composite is a function of its distance to the block centre and the quality of the variogram, range and nugget effect, in the related direction.

In the IDW2, the weighting factor is a function of the distance from the block centre to the composites where closer composites have more weight. The consideration of the ellipse anisotropy attributes more weight on composites situated in the better axis of continuity. Philip Vicker, P.Geo. shares the opinion stated in Buro et al. (2016) that the IDW2 methods should yield estimates similar to geostatistical methods in the case of continuous metasedimentary rocks such as a quartzite deposit, as well as in other rocks with consistent grade distribution and ample drilling.

Three interpolation passes were used in the estimation. It was elected to consider approximately half of the range defined by the variogram analysis for the first pass. The used ranges include 50 m in the strike and dip directions and 30 m in the minor axis. For the second pass the search ellipse was relaxed by a factor of 1.5 and the number of composites requirement reduced. For the third pass the search ellipse was widely relaxed to ascertain that all the blocks within each mineralized solid will be captured and coded. The interpolation parameters are summarized in Table 14.17.

An additional step to impart additional detail into the block model was applied to the current Mineral Resource estimate. The percentage of each block within each of the eight modeled quartzite domains, within the overburden, above topo, and other (unmodeled rock) was captured for each block. This detail permitted a very accurate calculation of how much material was in each domain for the post interpolation calculations of tonnes and grades.

Table 14.17: Interpolation Parameters

Items	Description		
Grade Interpolation Method	IDW2		
Compositing	By fixed length of 2 m, discarding composites < 0.5 m		
High Values Capping	SiO_2 values > 100% were reduced to 100%, other elements were reduced to their limit of detection		
Ellipse Orientation	Az: 60°, Dip: 65°		
Interpolation Pass	Pass 1	Pass 2	Pass 3
Min. Number of Composites/Block	18	12	3
Max. Number of Composites/Block	30	30	9
Max. Number of Composites/Hole	6	6	3
Ellipse Size on the Major Axis (Strike)	50	75	200
Ellipse Size on the Semi-Major Axis (Dip)	50	75	200
Ellipse Size on the Minor Axis	30	50	100

14.11 Resource Validation

Table 14.18 to Table 14.20 detail comparative statistics among the primary elements for assays (length weighted averages), composites (length weighted averages) and interpolated blocks (with no cut-off grades applied) within the main modeled high silica quartzites for each zone for the South West, North East and Centre North zones. This was done to assess whether assays and blocks statistics are reproduced consistently during the grade interpolation and that no significant bias was introduced. There is observed a slight bias toward lowering the overall grade during grade interpolation in each zone. Buro et al. (2016) ascribed this phenomenon to the third pass where the search ellipse was extremely relaxed to allow all the blocks to be informed. Smoothing of grades, to some degree, in inverse distance and Kriged block models is a common result. It is speculated that the model grade variance versus the assay data source would be minimized with better definition of the high silica zone in the wireframing. This apparent smoothing is potentially also a cautionary note to be wary of internal heterogeneity and the potential influence of not being able to segregate waste out of the main quartzite unit during mining.

Table 14.18: Comparison for Assays, Composites and Blocks on the South West Zone

South West Zone				
	$SiO_2\%$	$Al_2O_3\%$	$TiO_2\%$	$Fe_2O_3\%$
Assays	98.42	0.67	0.07	0.14
Composites	98.41	0.67	0.07	0.14
Blocks	98.28	0.75	0.08	0.15

Table 14.19: Comparison for Assays, Composites and Blocks on the North East Zone

North East Zone				
	$SiO_2\%$	$Al_2O_3\%$	$TiO_2\%$	$Fe_2O_3\%$
Assays	98.23	0.71	0.09	0.21
Composites	98.07	0.76	0.10	0.27
Blocks	97.68	0.95	0.11	0.36

Table 14.20: Comparison for Assays, Composites and Blocks on the Centre North Zone

Centre North Zone				
	$SiO_2\%$	$Al_2O_3\%$	$TiO_2\%$	$Fe_2O_3\%$
Assays	97.63	0.97	0.10	0.37
Composites	97.63	0.98	0.10	0.37
Blocks	97.35	1.11	0.11	0.45

In addition to the comparative examination between the Assays, the Composites and the estimated Blocks, the blocks were also examined visually on sections proximal to the drilling and composite data. The correlation was found to be reasonable, particularly for blocks estimated during the first two passes, and no major discrepancies were found. Blocks interpolated were well constrained within each mineralized solid. The search ellipse was also well oriented, where block grade trends follow the directions of best continuity, namely the strike and dip direction.

14.12 Resource Classification

The category used in Mineral Resource classification is primarily based on relative confidence as discussed in Section 14.2 of this report which refers to the definitions and guidance adopted by the CIM in the Definition Standards – For Mineral Resources and Mineral Reserves (2014) and conforms to the rules dictated by NI 43-101 Standards of Disclosure for Mineral Projects updated in 2011. Areas more densely drilled are usually better understood than areas with sparser drilling which could be considered to have a lower confidence level. However, in some rare cases, even tightly spaced drilling may not yield certainty on grade continuity. This is particularly the case of deposits showing high variability on grades and high nugget effect. The quartzite units hosting the Silicon Ridge deposits exhibit strong geological continuity, and very consistent grades. Equivalent quartzite units have been traced into adjacent properties and are mined by Sitec to the southwest of Rogue's property. The following factors are considered for the Mineral Resource classification of the Silicon Ridge deposit:

- Geology and grade continuity defined by relatively tight drilling pattern of 50 m and 100 m between the sections, with two or more holes per section; this information is complemented by ample outcrops and channel samples collected along drill sections;
- Full QA/QC program using peer review by Qualified Persons for the logging and sampling activities and monitoring of the laboratory performance with insertion of Standards, Blank and Duplicate samples into the sample stream;
- Simple geometry of the deposits affected by large-scale folds with no evidence of significant second-order folds or major fault offsets;
- Cut-off grades supported by preliminary metallurgical tests and Rogue outreach to potential consumers to value a direct shipping product.

Taking all of these factors into account, Philip Vicker, P.Geo. deems that it is appropriate to classify all blocks estimated during the first pass as Measured Mineral Resources, with the exception of a small amount (less than 10 kt) of blocks in the Centre North zone that were captured in the first pass but were downgraded to Indicated Mineral Resources due to their lack of significant continuity to support the higher classification. The blocks estimated during the second pass where the search ellipse was slightly relaxed, but still well within the ranges of sample spatial connectivity as indicated in the variography, are classified as Indicated Mineral Resources. The blocks estimated during the third pass are classified as Inferred Mineral Resources, which are more speculative in nature and will require additional drilling and/or surface exposure to upgrade their confidence level. The large size of the ellipse used to define the Inferred Resources resulted in relying on some relatively remote and sparse analytical data in the grade interpolation

Furthermore, the global block model was constrained by examination of a reasonable sequence of LG-3D pit shells run with potential engineering criteria, as indicated in section 14-1, to provide a degree of confidence that it is reasonable to speculate on the potential eventual economic extraction of the quartzite.

A plan view of the classified Mineral Resources is provided in Figure 14-10 while Figure 14-11 shows a typical vertical cross section from within the South West zone with classified blocks, and no cut-off grades applied.

Figure 14-10 Plan View of Classified Graded Block Model

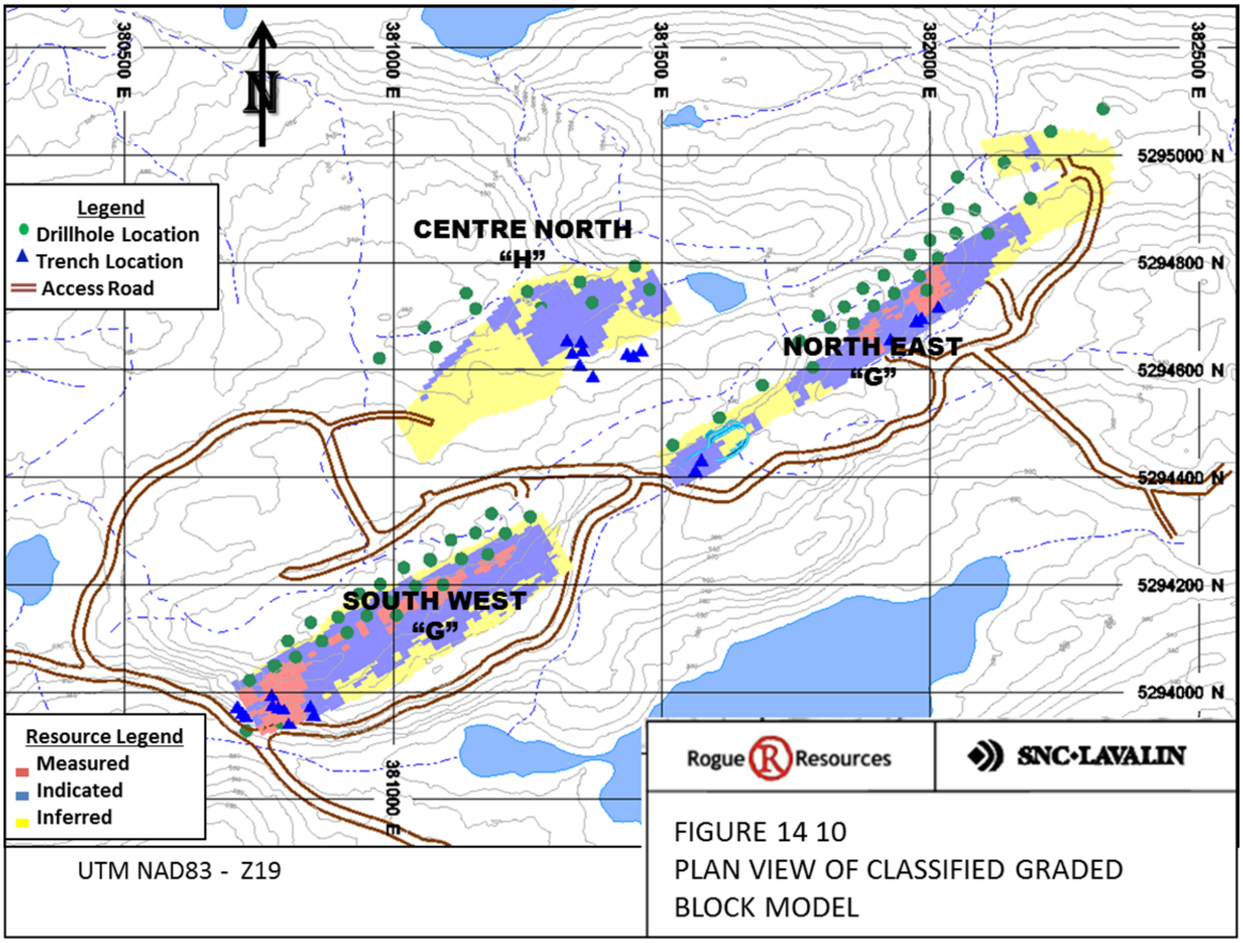
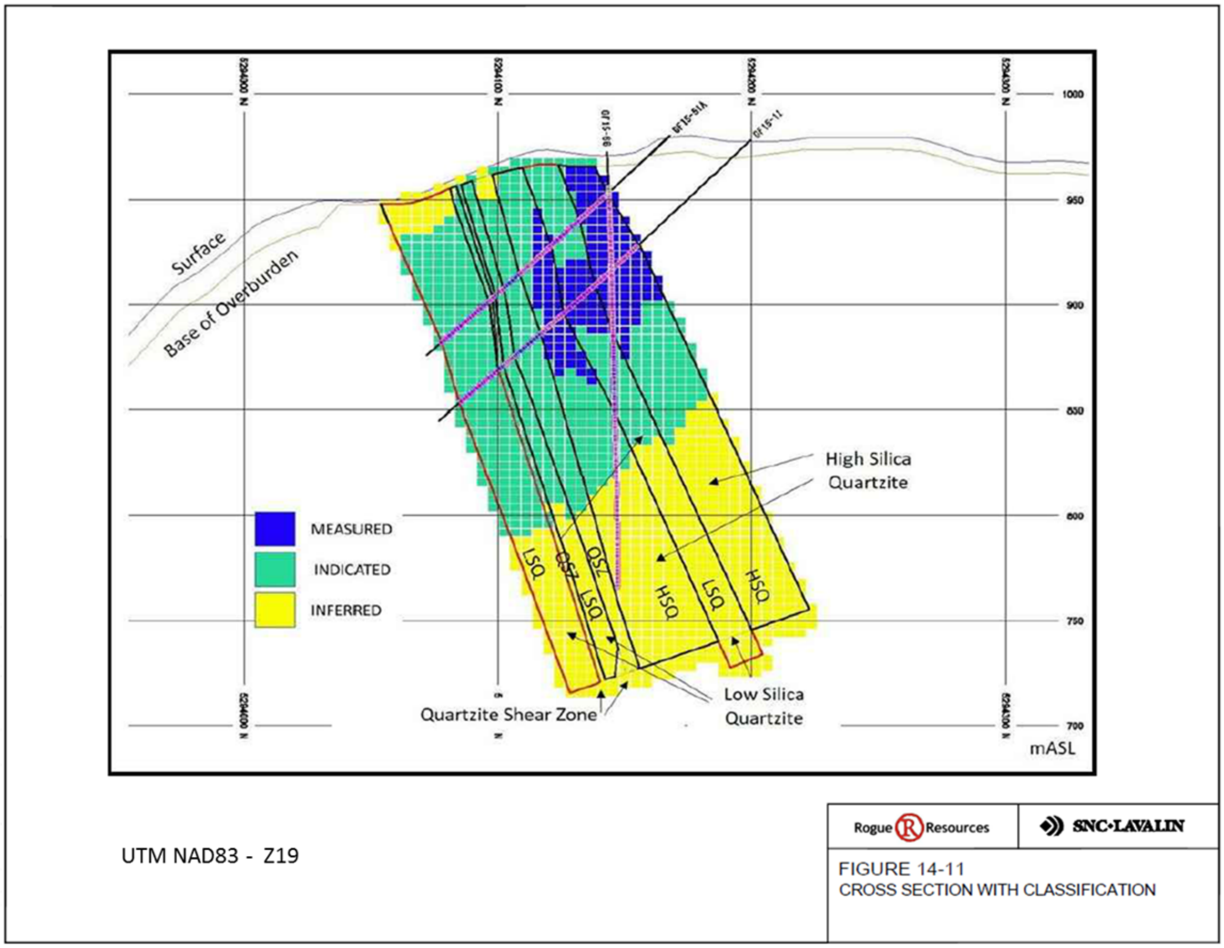


Figure 14-11 Typical Vertical Cross Section with Classified Blocks



14.13 Mineral Resource Statement

Mineral Resources are stated using multiple element cut-offs applied simultaneously as follows: ≥ 98.1% SiO_2, ≤ 0.80% Al_2O_3, ≤ 0.075% TiO_2, ≤ 0.24% Fe_2O_3. These cut-offs are supported by the results from metallurgical tests conducted by ANZAPLAN (2016). In addition to the quality cut-offs from ANZAPLAN (2016), the Mineral Resources were also constrained by open pit shells to assess a reasonable prospect of economic extraction. The optimized pit shells were carried out using the LG-3D method in MineSight® software by applying the economic parameters presented in Table 14.21.

Table 14.21: Optimized pit Economic Parameters (Canadian Dollars)

ITEM	UNITS	VALUE
Offsets	m	85 (75 water, 10 road buffer)
Slopes	°	50 hangingwall, 55 footwall
Mining Cost Feed	$/t	9.34
Mining Cost Waste	$/t	5.34
Mining Cost Overburden	$/t	2.86
Processing (Primary Crushing) Cost	$/t	2.00
General and Administration Cost	$/t	2.25
Product Sales Price	$/t	85.00

The Mineral Resource estimate for the Silicon Ridge Project contains 7.7 Mt of Measured and Indicated Mineral Resources at an average grade of 98.62% SiO_2, 0.061% TiO_2, 0.539% Al_2O_3 and 0.110% Fe_2O_3 and 2.1 Mt of Inferred Mineral Resources at an average grade of 98.66% SiO_2, 0.059% TiO_2, 0.508% Al_2O_3 and 0.131% Fe_2O_3 (using cut-off grades of 98.1% SiO_2, 0.8% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3).

The Mineral Resource estimate is summarized in Table 14.22 for all zones and separately for the South West Zone, the North East Zone and for the Centre North Zone.

The reader is cautioned that Mineral Resources that are not Mineral Reserves have no demonstrated economic viability. The estimate of Mineral Resources may be materially affected by mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and government factors (the “Modifying Factors”).

Table 14.22: Silicon Ridge – Summary of the Pit Constrained Mineral Resources Estimate

(Cut-Off: ≥ 98.1% SiO2, ≤ 0.8% Al2O3, ≤ 0.075% TiO2, ≤ 0.24% Fe2O3)

ALL ZONES	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.5	98.62	0.061	0.543	0.097
Indicated	5.3	98.62	0.061	0.537	0.117
Measured + Indicated	7.7	98.62	0.061	0.539	0.110
Inferred	2.1	98.66	0.059	0.508	0.131

SOUTH WEST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	2.0	98.62	0.060	0.540	0.096
Indicated	3.1	98.62	0.060	0.545	0.104
Measured + Indicated	5.0	98.62	0.060	0.543	0.101
Inferred	0.9	98.69	0.059	0.519	0.097

NORTH EAST ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	0.5	98.62	0.063	0.555	0.099
Indicated	1.1	98.62	0.065	0.533	0.118
Measured + Indicated	1.6	98.62	0.064	0.540	0.112
Inferred	0.2	98.63	0.063	0.561	0.124

CENTRE NORTH ZONE	Tonnes (Mt)	SiO2 (%)	TiO2 (%)	Al2O3 (%)	Fe2O3 (%)
Measured	n/a	n/a	n/a	n/a	n/a
Indicated	1.1	98.60	0.058	0.520	0.150
Measured + Indicated	1.1	98.60	0.058	0.520	0.150
Inferred	1.0	98.64	0.059	0.486	0.164

Notes:

CIM definitions and guidelines (May 10, 2014) were followed for classification of Mineral Resources.
Cut-off grades of 98.1% SiO_2, 0.80% Al_2O_3, 0.075% TiO_2 and 0.24% Fe_2O_3
Density of 2.65 g/cm^3.
Metric tonnes.
Numbers may not add due to rounding.
Effective date of the Resource estimate is May 23, 2017.
LG-3D Pit Constraints include:
- 50° slope hangingwall, 55° slope footwall;
- Offset of 85 m from lakes and wetlands;
- Product sales price of $85.00/t;
- Processing cost of $2.00/t (primary crushing only);
- Mining costs of $9.34/t feed, $5.34/t waste, $2.86/t feed;
- G&A cost of $2.25/t.

15.0 MINERAL RESERVE ESTIMATES

No Mineral Reserves have been estimated for the Silicon Ridge property to date.

16.0 MINING METHODS

16.1 Introduction

All work related to the mine design for the PEA update was carried out utilizing Minesight® Versions 12.0-2, and later 12.0-4 for exporting results (due to encountered errors in the 12.0-2 version Autoslicer tool function for splitting phased pits solids into separate bench solids). MineSight® data can be imported into newer versions easily, although not always the case in switching back to earlier versions. The 2016 PEA Study MineSight® data was used as a starting basis for this 2017 updated PEA Report. Updates were made from this point forward for the geological block model, as discussed in Section 14 of this report, and to the pit optimization, designs and schedule as discussed here in Section 16.

Buro et al. (2016) utilized MineSight® Version 10.0, which was successfully imported into Version 12.0-2 for data import and validation of methodology used in the previous PEA Study in 2016. The following Sections discuss the data and parameters utilized in this Report.

16.2 Topographic Surface.

The mine design for this Report was carried out utilizing the same topographic surface as Buro et al. (2016), which originated from a Laser Imaging Detection and Ranging Survey (LiDAR). The topographic surface was supplied to SNC-Lavalin as 1 m elevation contours, as well as point data in DXF format, SNC-Lavalin converted the LIDAR point data into a wireframe for mine planning development purposes. The wireframe was then expanded around the sides to ensure coverage of the entire MineSight® project limits.

16.3 Overburden Surface

Beginning with the previous overburden surface from Buro et al. (2016), based on previous DDH collars, new data was provided to SNC-Lavalin by Rogue and a new overburden (OB) wireframe surface was created by SNC-Lavaln to adjust the area in the South West pit area where survey data was updated. The new survey points were added to the DDH collar data used in Buro et al. (2016), creating a new updated overburden wireframe. The wireframe was expanded around the sides to ensure coverage of the entire MineSight® project limits. The OB wireframe was utilized to differentiate the non-mineralized material as either overburden or waste rock. This modified OB surface was one of the key purposes of updating the PEA Study from 2016, as the OB depth in the SW pit was found through the new data to be significantly thinner than previously assumed from only DDH collar data. The area of change did not have DDH collar data and was previously interpolated from other drill hole data in the SW pit area.

16.4 Resource Block Model

The mine design for the PEA Study update is based on the 3-dimensional geological block model that was prepared by Philip Vicker, P.Geo. within MineSight® Version 12.0-2 and is presented in Section 14 of this report. The following same block model size and limit parameters were used in this study as were used in Buro et al. (2016):

- Each block in the model is 15 m wide, 5 m long and 4 m high;
- The model is subject to rotation at an angle of 330°;
- Each block in the model contains Al_2O_3, SiO_2, TiO_2 and Fe_2O_3 grades; and
- The mineralized resource is classified as Measured, Indicated and Inferred.

The material classification utilized in this study is:

- ROM (Run of Mine feed) – mineralized rock above CoG;
- LG (Low Grade waste) - mineralized rock below CoG, but above SiO_2 of 97.5%;
- RK (Rock) – non mineralized waste rock; or
- OB (Overburden) – material above the overburden wireframe.

16.5 Material Properties

The material properties for the different rock types are outlined below. These properties are important in estimating the Mineral Resources as well as the dump and stockpile design capacities.

16.5.1 Density

As was discussed in Section 14 of this report, the in-situ dry density of the mineralized material is 2.65 t/m^3. Densities used for this study were 2.65 t/m^3 for all Rock (below the OB wireframe) and 2.1 t/m^3 for the Overburden (above the OB wireframe).

16.5.2 Swell Factor

The swell factor reflects the increase in volume of material from its in-situ state to after it is blasted and loaded into the haul trucks. A swell factor of 25% was used in this study, which is within a reasonable range for similar mining operations in the region.

16.5.3 Moisture Content

The moisture content reflects the amount of water that is present within the rock formation. It affects the estimation of haul truck requirements and should be considered during the payload calculations. A moisture content of 3% is assumed for this study. This value is typical for similar projects in the region. As the equipment fleet would be owned and operated by a contractor, these calculations and evaluation are not included in this report. It is recommended the client engage contractors and vendors with a RFQ (request for quotes) to update the quotations for the next stage of planning or study for this project.

The Mineral Resources are estimated using the dry density, therefore they are not affected by the moisture content value.

16.6 Open Pit Optimization

The pit optimization analysis uses economic criteria to determine to what potential extent the deposit can be mined profitably. As this is not a Pre-Feasibilty or Feasibility Study, but a PEA Study update, this exercise is to identify maximum economic potential for the project, not determine whether the project is economically feasible. Therefore, this PEA level pit optimization is intended to:

- Determine the updated Resource estimate within a chosen pit shell;
- Provide guidance to set the mine layout for where pits, roads, dumps, stockpiles and any other mine facilities should be located;
- Give an estimate of how much of the Resource pit shell is comprised of Measured and Indicated mineralized material;
- Indicate how much of the Resource pit shell is comprised of Inferred mineralized material that would require further drilling to “potentially” convert into Measured or Indicated mineralized material;

- Highlight any risks or opportunities to the project, such as but not limited to, steep slopes for haulage, areas of high waste coverage, limited access areas, or areas for condemnation drilling.

The pit optimization analysis was done using the MineSight® Economic Planner (MSEP) module of MineSight® Version 12.0-2. The optimizer uses the 3D Lerchs-Grossmann algorithm to determine the economic pit limits based on input of costs and revenue per block. The optimization was limited to proximity of 75 m from lakes/wetlands, plus 10m for roads around wetlands (85 m total limit), and 600 m meters from nearby campsites. Blocks classified in the Measured, Indicated and Inferred categories drove the pit optimizer for this study. These parameters are the same as was used in Buro et al. (2016).

The updated pit optimization parameters for this study are shown in Table 16.1. The cost and operating parameters that were used are preliminary estimates for developing the economic pit and should not be confused with the operating costs subsequently developed in Section 21. (All dollar amounts in this study are in Canadian Dollars, unless otherwise noted.)

Only one target product was utilized in this pit optimization, for high grade Run of Mine (ROM) feed. No other product was identified for the optimization process for this study.

The Cut-off Grade (CoG) for the mineralized material for ROM, remains the same in this study as was used for the high grade product in Buro et al. (2016), at:

- SiO_2 equal to or above 98.1%
- TiO_2 equal to or below 0.075%
- Al_2O_3 equal to or below 0.80%
- Fe_2O_3 equal to or below 0.24%

All material below CoG was deemed as waste, identified as LG, RK or OB as defined previous in Section 16.4.

The Net Present Value (NPV) of each shell was estimated assuming a base selling price of $50/t of product, and an annual mining of 200 kt of ROM Mineral Resources.

Figure 16-2 presents the results in a graphical format. The pit optimization analysis considered a 5% loss of Mineral Resource at the mine, this quantity is accounted for as waste material, reducing the annual production rate of ROM feed to 190 kt.

The discount rate for the resource estimate was 0% to encapsulate the entire potential footprint for mining within the future mine life. A discount rate of 10% was later used for the 20 year design life of mine (LOM) pit optimization (discussed in Section 16.7).

Using the costing and operating parameters as shown in Table 16.1, a series of pit shells were generated by varying the selling price from 50 to 200 $/t in $5/t increments.

Table 16.1: Pit Optimization Parameters

Item	Value	Units
Mining Cost (Overburden)	2.48	$/t (mined)
Mining Cost (Waste)	5.34	$/t (mined)
Mining Cost (ROM)	9.34	$/t (mined)
Processing Cost	2.00	$/t (milled)
Administration Cost	2.25	$/t (milled)
Base product Sales Price	50	$/t (product)
Mining Recovery	90	%
Mining Rate	200,000	t/yr
Pit Slope*	50 and 55	°

* A pit slope of 50° was used on hanging wall side of the deposit. A pit slope of 55° was used on the footwall side of the deposit. Based on recommendations from Journeaux Assoc.

Figure 16-1 gives a typical section through the deposit in the SW pit, with the $5/t incremental pit shells from $50/t to $200/t. Highlighted in the figure are:

- Pit 03 at $50/t, the Base Case
- Pit 04 at $55/t, the Case chosen for pit schedule optimization in the Section 16.7, to smooth out pit geometry that may have been geotechnically problematic in the base case for the SW pit;
- Pit 10 at $85/t, the Case chosen Resource estimate pit shell; and
- Pit 33 at $200/t, the maximum price utilized in Buro et al. (2016) for processing high grade material (not a scenario in this study).

Figure 16-1 demonstrates the incremental increase of price impacts the pit shell in almost a linear increase of depth and pit width, to pursue the mineralized blocks above CoG along the strike (330°) and dip (60°) of the orebody. This is most notable in the SW pit, as shown. The client recommended setting a depth limit for this study of lake level (870m elevation), to limit the dewatering component of mining costs required. The mine costing within this Report does not account for increased mining costs with depth that would be related to an increase in dewatering costs. Future mine planning efforts should include a hydrological study to establish the water table depth in each pit area and evaluate effects on mining below the water table for operational activities and mining costs.

The pit optimization PIT10 at $85/t was the pit shell agreed upon by SNC-Lavalin and Rogue for the Resource estimate in Section 14. This pit shell was chosen to ensure all potential economic mineralization within the deposit was captured for the Resource Estimate. This Resource pit shell contains 7.7Mt of Measured and Indicated, and 2.1 Mt Inferred Mineral Resources at a strip ratio of 3.48:1 (waste tonnes to feed tonnes).

The pit optimization analysis is constrained within the limits of the In-pit resources shell visible in Figure 16-1 as Pit 10 and is previously described in Section 14 of this report.

Figure 16-1: Cross Section of Pit Optimization Shells

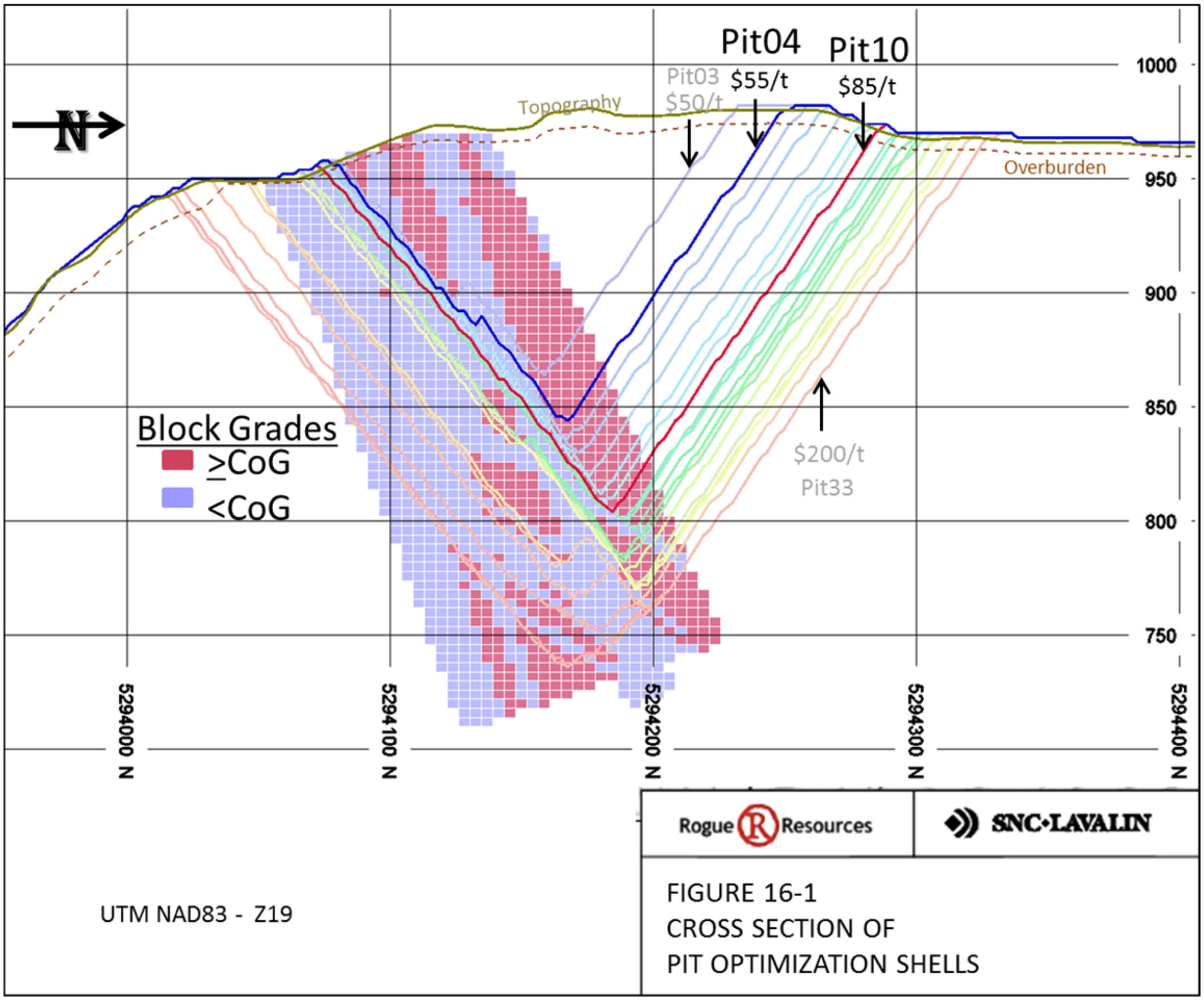


Figure 16-2 shows the ROM tonnes versus the total waste tonnes and strip ratio. The deposit has continuity in that as the mineable feed increases so does the waste and strip ratio, but at a faster rate than feed.

Figure 16-2: Pit Optimization Tonnage

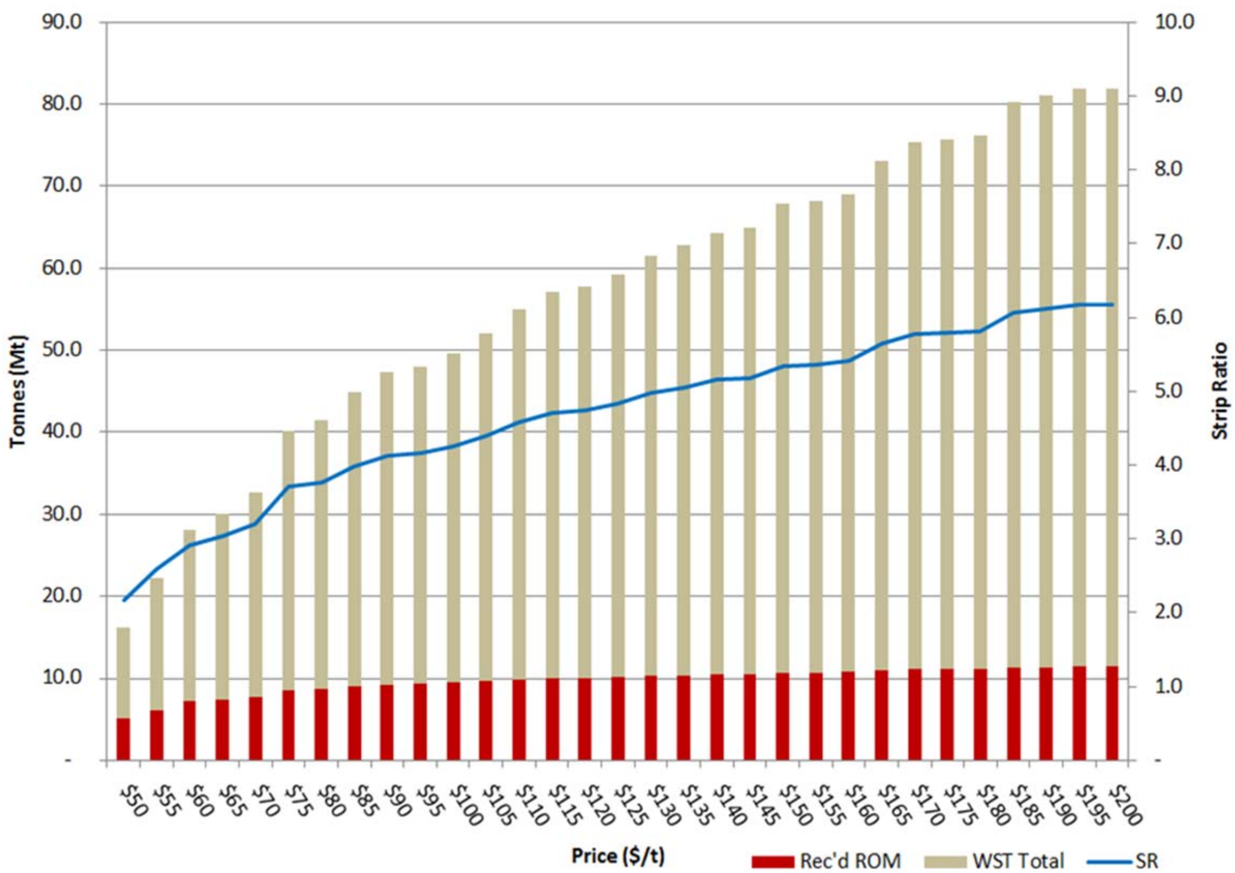
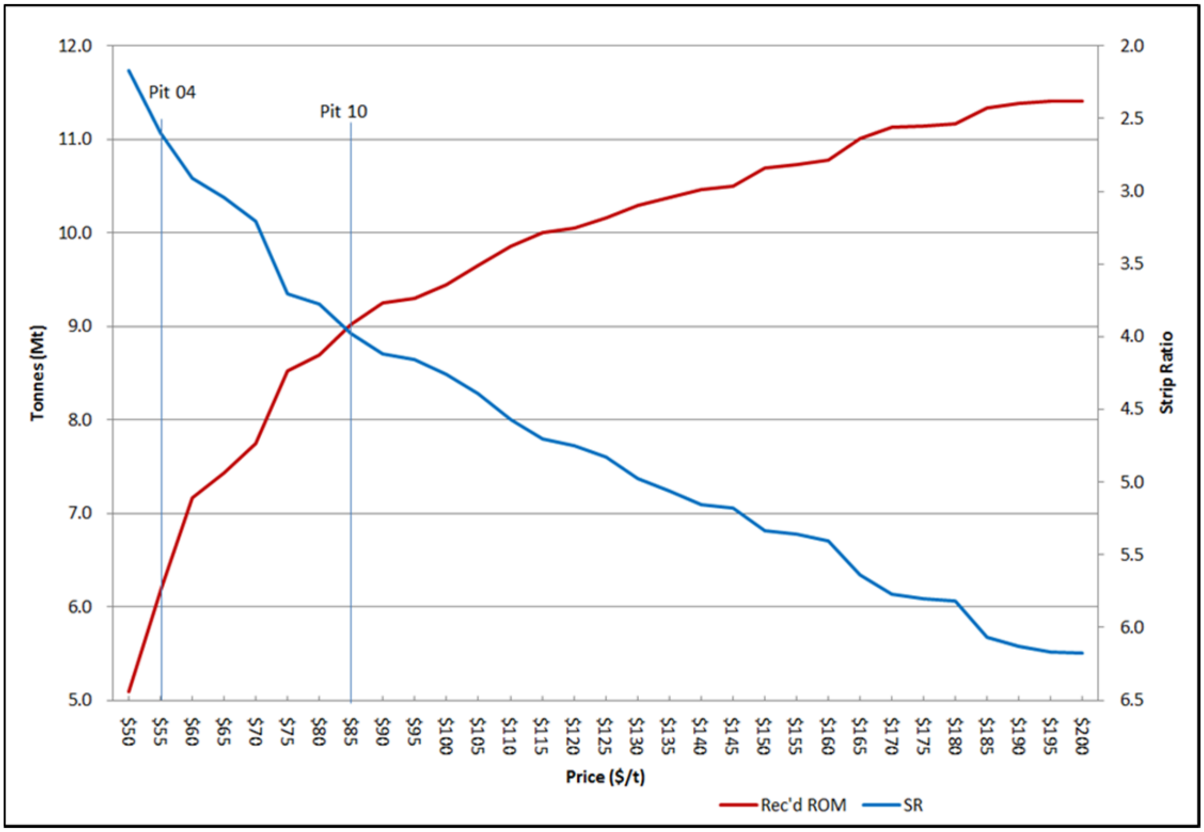


Figure 16-3 affirms this by showing the ROM tonnes versus the inverse strip ratio.

Figure 16-3: Pit Optimization ROM vs SR



The potential profitability indicated in Figure 16-4 does not appear to increase significantly, although the resource basis of 0% discount rate continues upward, at a 10% discount rate, the potential profitability drops significantly from Pit 03 to 07, normalizing by Pit 10 to a flat rate. This indicates that the Resource Pit 10 is the largest mineable portion of the deposit at the given parameters utilized in this Report.

Figure 16-4: Pit Optimization – Discount Rates

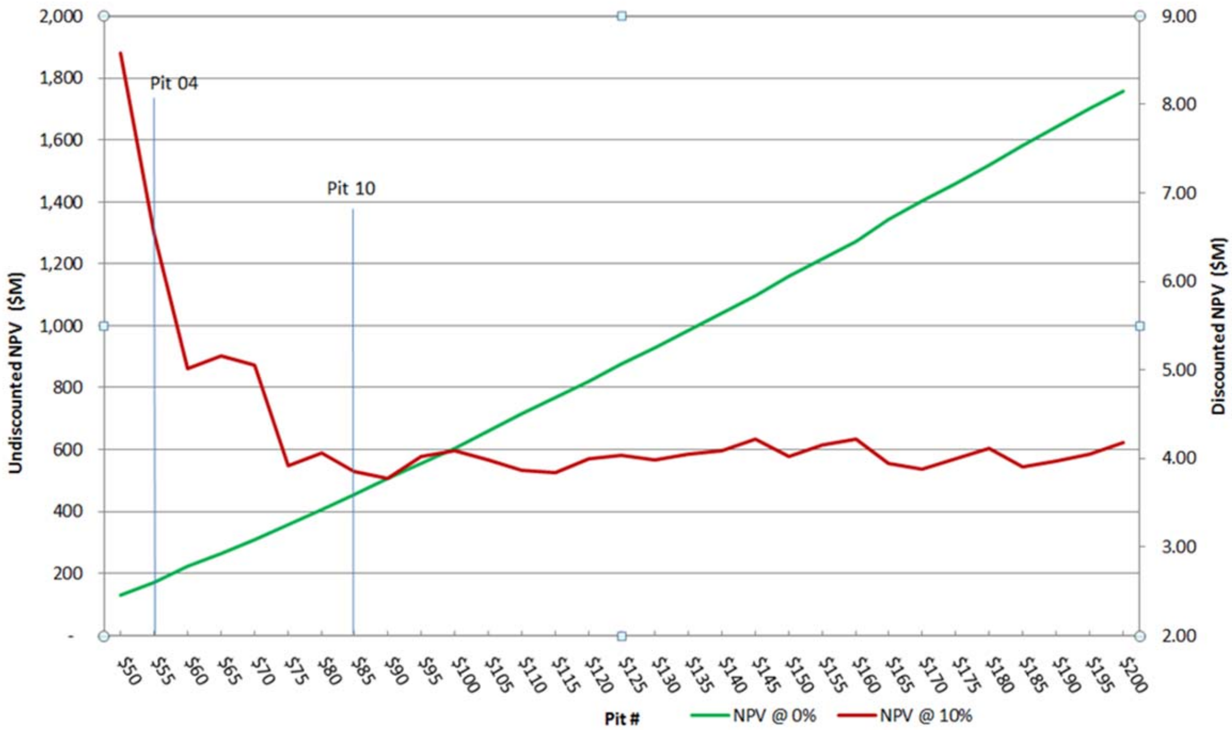
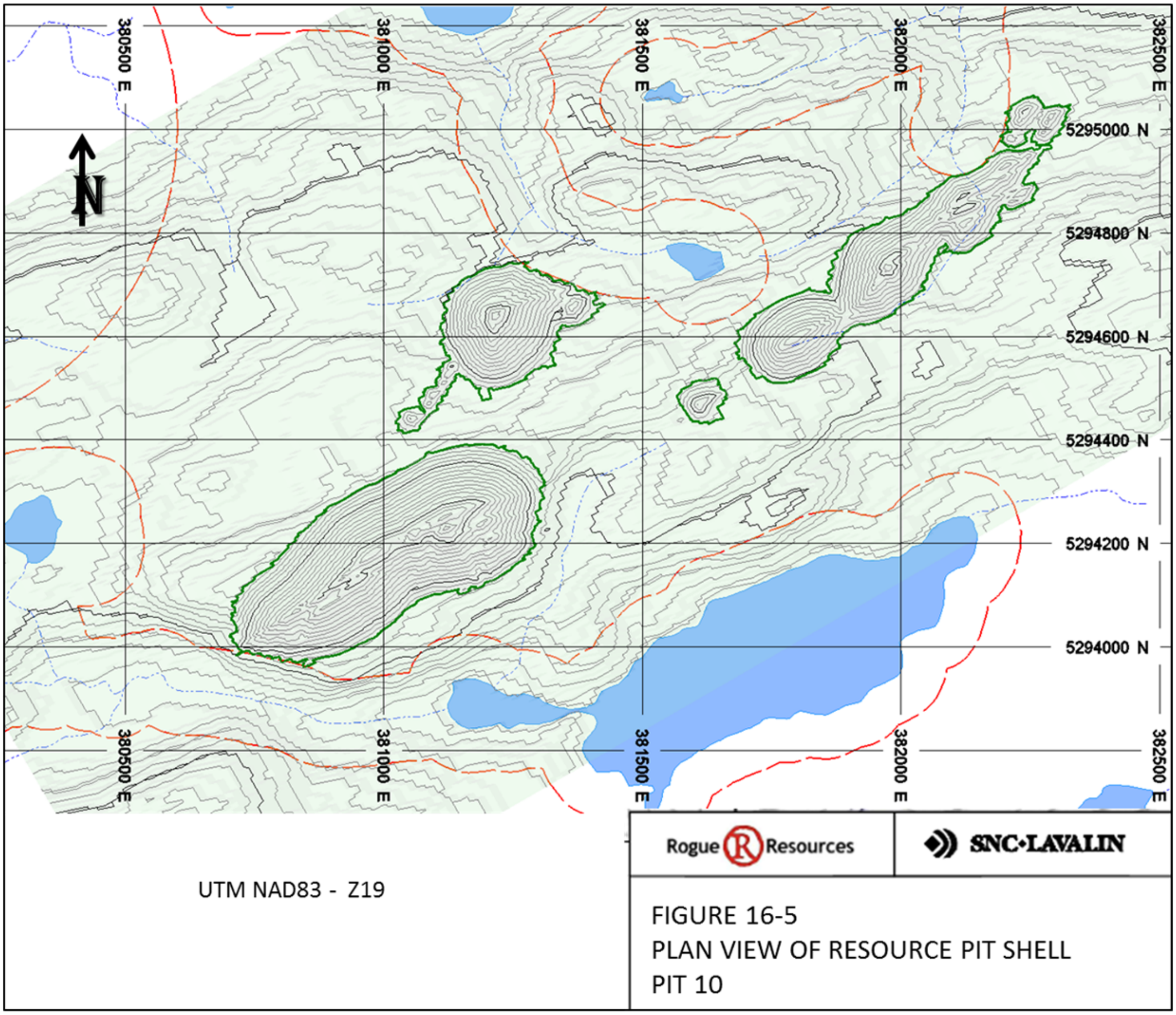


Figure 16-5 displays Pit10 in Plan-View. The Silicon Ridge Project is comprised of three distinct mining locations South West (SW), Centre North (CN) and North East (NE), each named relative to their location from west to east, respectively. The red lines indicate the 85 m limit from lakes and related waterways in the mining area. All three pits were restricted in size by these limits, as visible where the red lines touch the edge of the pits.

Figure 16-5: Plan View of Resource Pit Shell (Pit 10)



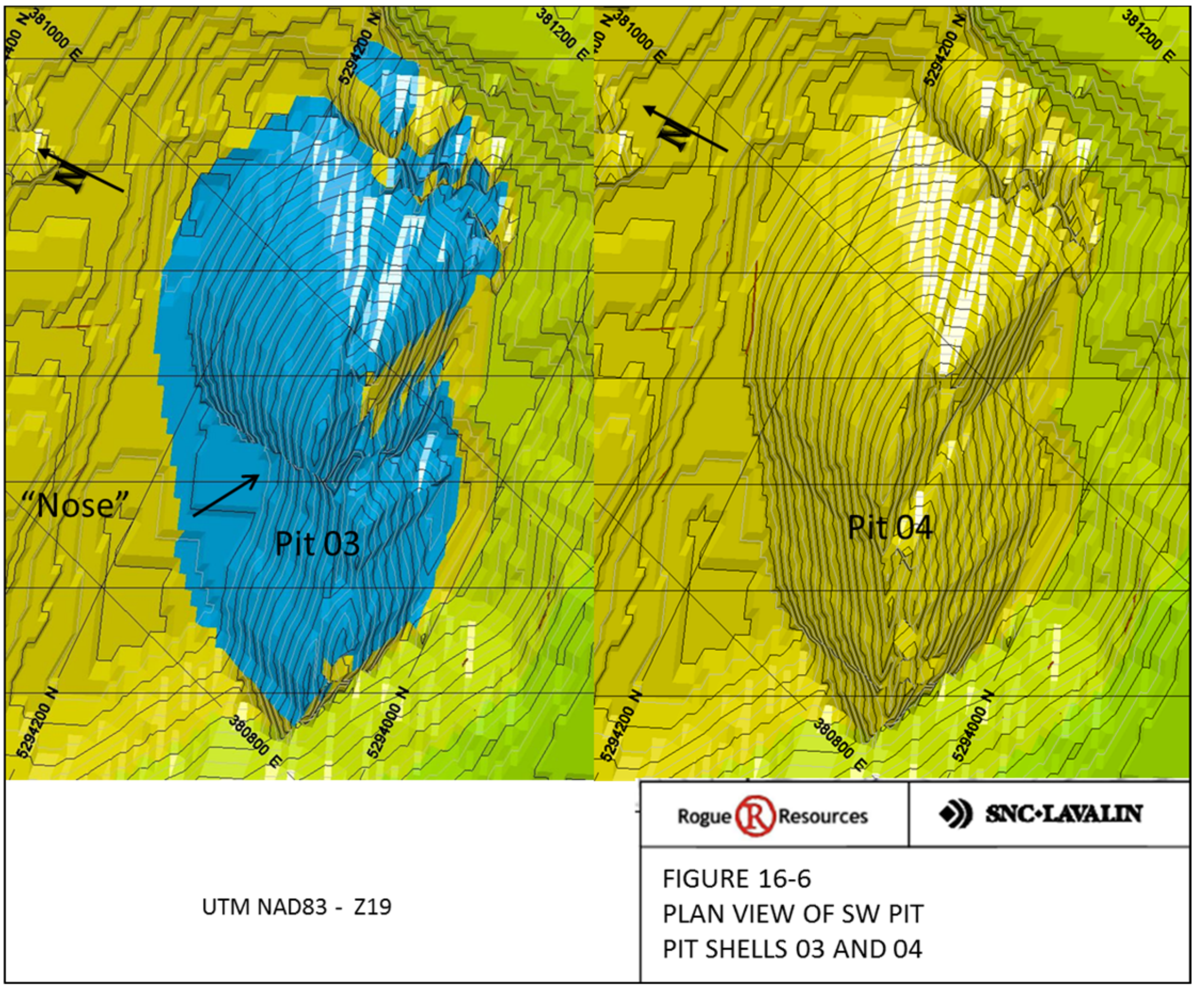
16.7 Pit Optimization (20 year pit)

From this point further in Section 16, all reference to the "Pit Design" deals exclusively with ROM feed material, and not Mineral Resources. As such ROM tonnes and grade are not separated by Measured, Indicated, and Inferred material. The pit design is not part of the Resource Estimate, but an additional estimate to identify opportunities and risks, as well as provide recommendations in mine planning for the next stages of project development.

Rogue requested SNC-Lavalin develop a 20 year mine plan based on a pit shell within the Mineral Resource pit shell, Pit 10, limited by depth and minimizing overburden (OB) rather than the full Pit 10 area. Based on these criteria, the design pits were to be in only two of the three zones, SW zone and NE zone, due to volume of OB in CN zone higher than in the other zones. Therefore a smaller pit shell than Pit 10, from the optimization discussed in Section 16.6, was chosen. The Base Case pit shell was Pit 03 at $50/t. It was agreed upon by Rouge and SNC-Lavalin to use Pit 04 at $55/t to best fit the above design criteria.

The difference between Pit 03 and Pit 04 from the pit optimization was limited to the SW Pit. Figure 16-6 illustrates this difference in the SW Pit, along the southwestern half of the footwall. Pit 03 narrows to leave a “nose” of waste, while Pit 04 takes the waste and straightens out the footwall. By straightening out the footwall, Pit 04 also increases with depth and opens up the bottom along the strike to access more material above CoG, increasing the overall ROM tonnes available in the SW Pit and allows for mining of one area beyond the 10 year mining permit.

Figure 16-6: Plan View of SW Pit (Pit Shells 03 and 04)



16.8 Open Pit Design

The pit design uses the chosen pit shell, Pit 04, as a guideline and includes the straightened and smoothed the pit wall, adding ramps to access the pit bottom and ensuring that the pit can be mined using the initially selected equipment. The following sections provide the parameters that were used for the open pit design and present the results.

16.8.1 Mining Methods

The mining method selected for the Project is a conventional drill and blast, truck and shovel quarry operation. Vegetation, topsoil and overburden will be stripped and stockpiled for future reclamation use. The mineralized material and waste rock will be mined with 5 m high benches, drilled, blasted and loaded into rigid frame haul trucks with hydraulic excavators.

16.8.2 Contract Operator

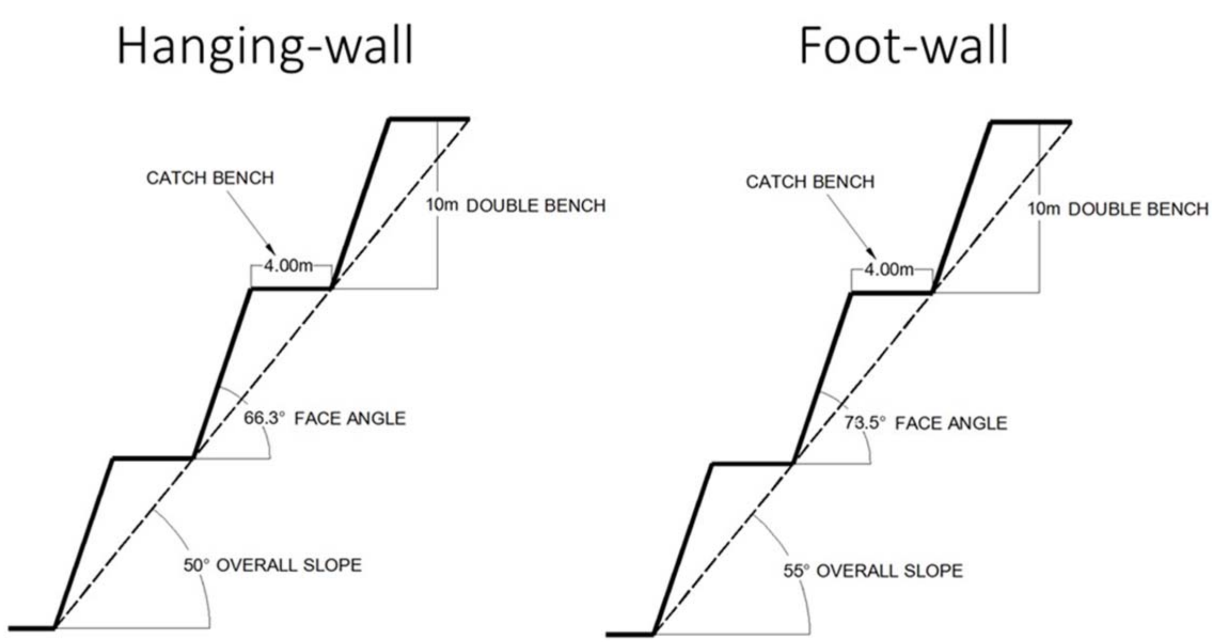
Based on client request, contract operation was used as a basis for the PEA Study update, and SNC-Lavalin was provided with budgetary pricing from Rogue.

16.8.3 Geotechnical Pit Slope Parameters

The geotechnical pit slope parameters were provided by Rogue, from Journeaux Assoc. (2016) who conducted a preliminary desktop review of the drill core log information provided by Rogue for Buro et al. (2016). No changes have been made in this study to these parameters for this PEA update.

Based on Journeaux's preliminary review of the SW zone, on the hangingwall side of the deposit, a face slope angle of 66.3° with an overall pit slope of 50° was recommended. On the footwall side of the deposit, a face slope of 73.5° with an overall pit slope 55° was recommended. This is considering 5 m bench heights and a 4 m wide catch bench per two benches. The pit wall configuration utilized for this study is illustrated in Figure 16-7.

Figure 16-7: Pit Wall Configuration



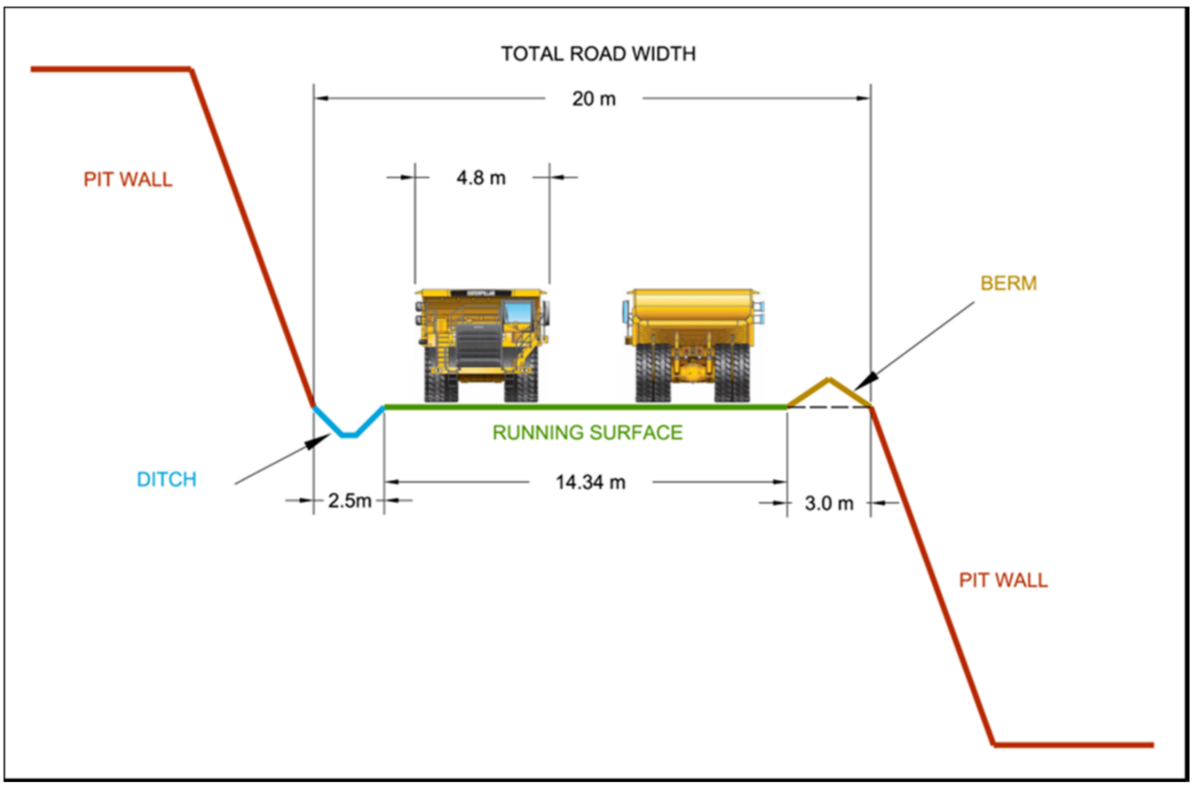
16.8.4 Haul Road Design

The same haul road parameters were used in this study as in Buro et al. (2016). The ramps and haul roads were designed with an overall width of 20 m. For double lane traffic, industry practice indicates the running surface width to be a minimum of 3 times the width of the largest truck. The overall width of a 36.5-tonne rigid frame haul truck is 4.8 m which results in a running surface of 14 m. The allowance for berms and ditches increases the overall haul road width to 20 m.

A maximum ramp grade of 10% was used. This grade is acceptable for a 36.5-tonne rigid frame haul truck. Figure 16-8 presents a typical section of the in-pit ramp design.

At the bottom of some of the phased designs (in the following section), the bottom two benches have 10m wide ramps for single lane traffic at the end of the pit life. This is a common practice in the mining industry when reaching the end of a small pit bottom. At this point in the plan less and small equipment may also be used such as a backhoe for the bottom bench. This should be further evaluated in future plans and designs when the contractor equipment list is determined.

Figure 16-8: Ramp Design



16.8.5 Mine Dilution and Mining Recovery

In mining separation of the mineralization and waste incurs some dilution and losses as a result of the scale of the mining equipment, the use of drilling and blasting equipment, and the nature of the lithology or geological deposit. There are several methods available to account for dilution and losses, which are highly dependent on the nature of the deposit and operation. As described in Section 14, this deposit is clearly defined, therefore should provide a visual contrast between waste zones and zones containing

Mineral Resources. In order to account for this dilution and loss of material in this deposit, as was done in Buro et al. (2016), for this Report SNC-Lavalin has also assumed a mining recovery of 95% in production scheduling. Therefore 5% of the mineralized material captured as above CoG has been reconsidered as waste, and moved into the waste tonnage within the production schedule.

16.8.6 Minimum Mining Width

A minimum mining width of 15 m was considered for the open pit design. This is based on a 9 m turning radius for a 36.5-tonne haul truck plus several meters on each side for safety.

16.8.7 Open Pit Design Results

Two of the three resource pits were designed for the Silicon Ridge project in order to target 20 years of production at 200 kt of blasted resource per year. The Southwest (SW) and the Northeast (NE) pit. The Central North (CN) pit was not designed for the 20 year plan due to a higher overburden depth than in the NE pit, although it is still within the resource estimate. Figure 16-9 presents the open pit design for the Silicon Ridge project.

The SW pit is approximately 635 m long and 170 m wide at surface with a maximum pit depth from surface of approximately 105 m to a bottom of 885m elevation. The total surface area of the pit is roughly 0.105 km^2. The SW pit contains 3.37 Mt of ROM above the CoG with an overall strip ratio (SR) of 1.93:1 waste tonnes to feed tonnes.

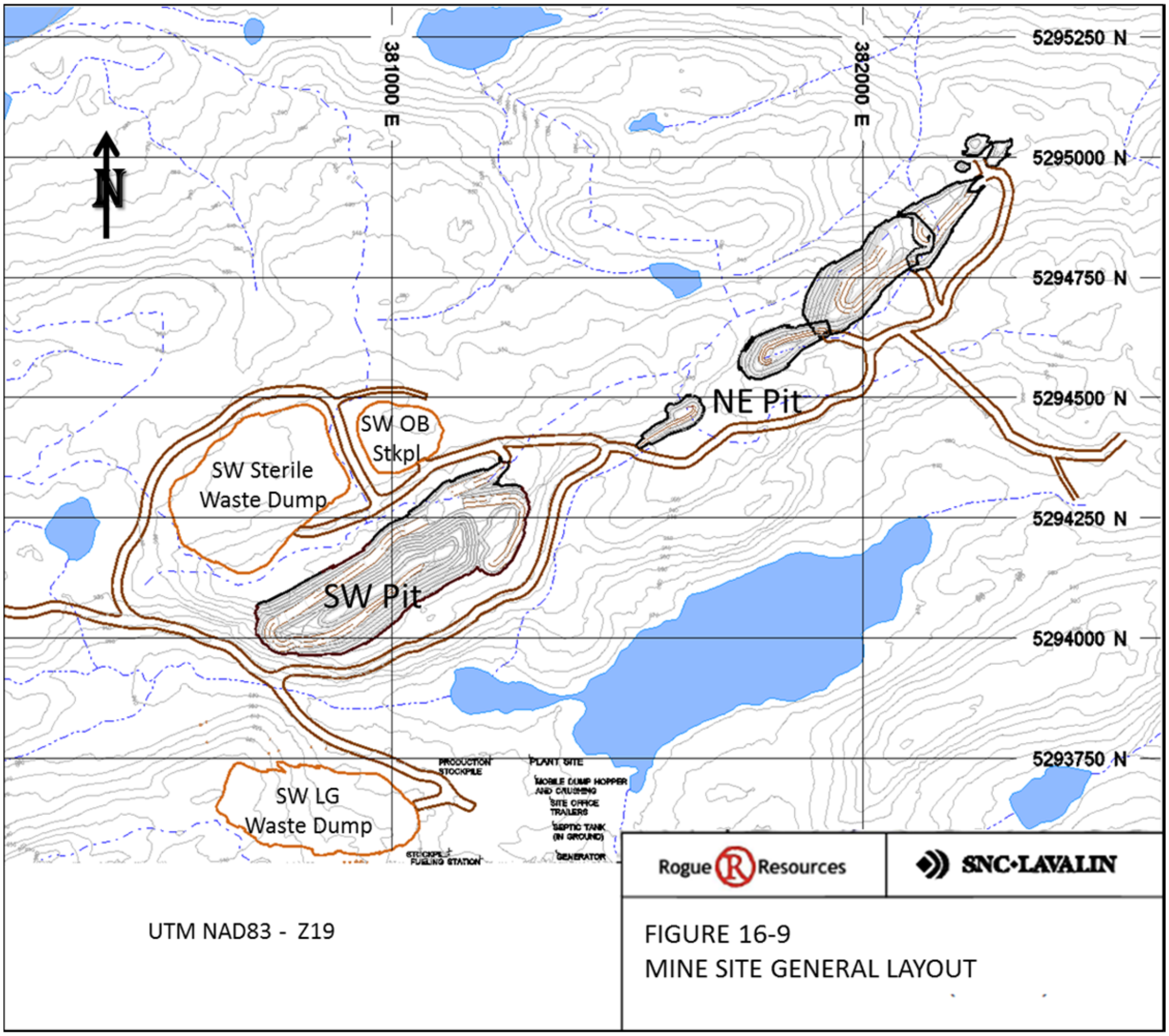
The NE pit is a string of 5 phased pits including a separate small pit at the west end (phase 1) and 3 mini pits at the east end (phase 5). The central 3 phases of the NE pit combine for one large pit in the middle. These 3 central phases overlap each other, relocating the pit access and haulage ramp within the pit further to the east with each phase. The combined 5 pits are approximately 1 km in length 130 m wide at surface with a maximum pit depth from surface of approximately 110 m. The total surface area of the pit is roughly 0.069 km^2. The NE pit contains 1.24 Mt of ROM above CoG with an overall SR of 2.01:1 waste tonnes to feed tonnes.

Table 16.2 contains the summary of SW and NE pits as designed, separated by phases. The SW and NE pits phase design figures are in the **Appendix B**.

Table 16.2: Phased Pit Results

	ROM					Waste					Total	
	Tonnes	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	LG	MNRL	OB	ROCK	SubTotal	Mined	SR
	Mt	*%*	*%*	*%*	*%*	*Mt*	*Mt*	*Mt*	*Mt*	*Mt*	*Mt*	*t:t*
SWphs1	0.33	98..568	0.0639	0.541	0.085	0.22	0.12	0.08	0.03	0.44	0.78	1.33
SWphs2	0.19	98.444	0.0654	0.621	0.203	0.14	0.05	0.04	0.94	1.17	1.36	6.15
SWphs3	0.17	98.580	0.0609	0.542	0.199	0.09	0.03	0.03	0.49	0.65	0.82	3.85
SWphs4	-	-	-	-	-	-	-	0.06	0.16	0.21	0.21	-
SWphs5	2.68	98.506	0.0657	0.603	0.103	1.66	0.52	0.13	1.73	4.04	6.72	1.51
SW PIt	**3.37**	**98.512**	**0.0653**	**0.595**	**0.112**	**2.11**	**0.71**	**0.34**	**3.35**	**6.51**	**9.89**	**1.93**
NEphs1	0.09	98.214	0.0759	0.873	0.164	-	-	-	0.05	0.05	0.14	0.51
NEphs2	0.15	98.327	0.0669	0.615	0.122	0.11	-	0.03	0.15	0.29	0.44	1.93
NEphs3	0.83	98.593	0.0687	0.574	0.115	0.65	-	0.07	1.08	1.80	2.64	2.17
NEphs4	0.14	98.761	0.0611	0.508	0.125	0.10	-	0.08	0.13	0.31	0.45	2.20
NEphs5	0.02	98.530	0.0762	0.637	0.111	-	-	0.03	-	0.03	0.05	1.55
NE Pit	**1.24**	**98.550**	**0.0683**	**0.595**	**0.121**	**0.86**	**-**	**0.21**	**1.41**	**2.48**	**3.72**	**2.01**
Total	**4.61**	**98.522**	**0.0661**	**0.595**	**0.114**	**2.97**	**0.71**	**0.56**	**4.75**	**9.00**	**13.60**	**1.95**

Figure 16-9 – Mine Site General Layout



There is opportunity in the next stage of mine planning to further modify the pit designs and improve on a few areas in sequencing the pit phases to:

- Design the starter pit in the SW to maximize initial access to ROM material outcropping along the strike;
- Ensure haul access is prioritized to allow more than one phase to be active at any time;
- Bring the NE Pit into the schedule sooner to reduce the strip ratio while opening up the lower half of the SW Pit;
- Split the lower half of the SW Pit into more phases to sequence and schedule in finer detail; and
- Optimize haulage cycle times.

16.8.8 Waste Rock and Overburden Stockpile

The SW overburden stockpile is designed on the north side of the SW pit, within current permitted boundary limits for the project. It is designed with an overall slope of 18.4° (2.5 H:1V) and a footprint area of approximately 0.020 km^2. Material placed in this stockpile is designated for future reclamation.

The SW waste dump is designed with an overall slope of 26.6° (2H:1V) and a footprint area of approximately 0.086 km^2. The waste dump is designed in 5 m high lifts and includes a safety berm of 20 m for every 3 lifts.

A low grade material stockpile footprint of approximately 0.063 km^2 is designed on the south side of the SW pit, along the haul road west of the fueling station. See Table 16.3 for the volume of waste material generated by the SW and NE pits, based on tonnages and converted from banked cubic meters (bcm) to loose cubic meters (lcm) with SG of 2.1t/bcm for overburden and 2.65t/bcm for rock, and a swell factor of 25%. Although a low grade product has not been included in the resource estimate, the sterile waste and a low grade waste have been separated for stockpile design and scheduling purposes, for the possibility of future potential marketed products. This provides options for future decisions and takes advantage of available space within the permit area near the contractor's crushing location.

Table 16.3: Waste Volume by Pit & Material

	LG Stockpile *k lcm*	OB Stockpile *k lcm*	ROCK Stockpile *k lcm*	Total Stockpiles *k lcm*
SW	994	160	1,500	2,654
NE	148	112	894	1,155
Total	1,143	273	2,394	3,809

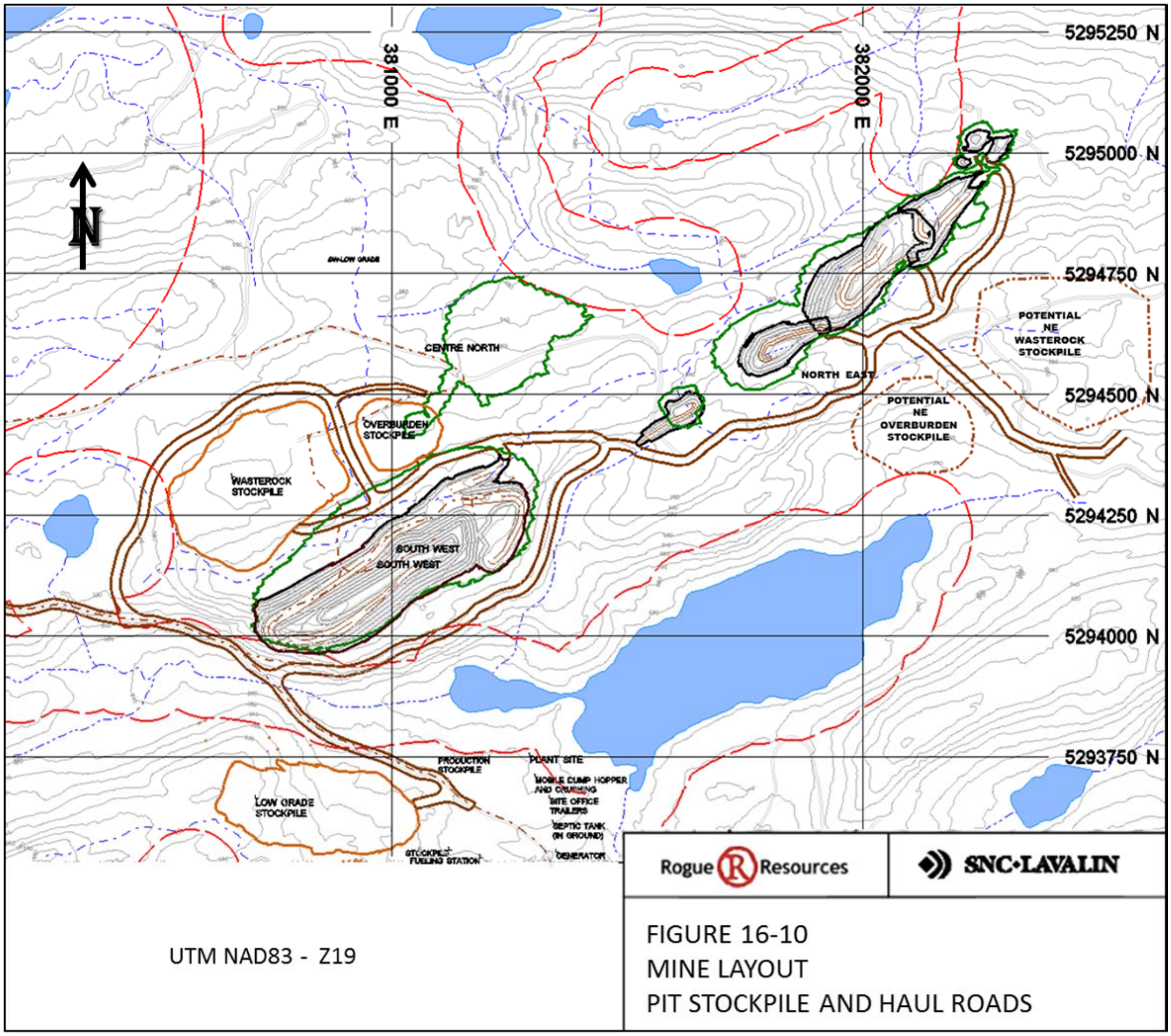
The waste material stockpiles for the NE pit have not been designed at this time. The capacity of the waste dump and overburden stockpile north of the SW pit may not have capacity for the NE pit waste material. The area to the north of the NE pit is largely off limits for stockpiling material, as it encroaches on the 75m limit surrounding all waterways and 10m road access limit (combined equals the red line in Figure 16-10).

The area between the SW and NE pits to the north is within the resource footprint (shown in green on Figure 16-10), therefore would not be an optimal site for long term stockpiles. Although the SW overburden stockpile does cover a small portion of the southwestern corner of the Central North (CN) resource area, the overburden is not intended as a permanent stockpile and should be reclaimed at a later date for closure of the SW pit area.

The footprints for the NE pit waste material stockpiling could potentially be located to the south of the NE pit, down the slope and to the east of the lake with possible footprints of 0.094 km^2 and 0.039 km^2 for waste and overburden, respectively. The other potential location for waste material from the NE pit is to place into the exploited portions of the SW pit, reducing the requirement for additional waste piles for the NE pit.

See Figure 16-10 for a map of the pits, haul roads, and waste stockpiles as discussed above.

Figure 16-10: Mine Layout – Pits, Stockpile & Haul Roads



16.9 Mine Planning

The mine plan forms the basis of the economic cash flow mine capital and operating cost estimate presented in Section 22. The mine plan was established annually for the first 10 years of production, followed by two 5 year periods for the remaining 10 years of the 20 year plan.

16.9.1 Mine Planning Parameters

No changes have been made by SNC-Lavalin to the mining parameters for the PEA update; they remain the same as in Buro et al. (2016). The contractor will operate a seasonal quarry operation with 5 days per week, 12 hours per day, 6 months of the year during the warmer seasons. Overburden removal may take place during the winter to take advantage of the frozen ground conditions.

During the weekend, the re-handling of crushed material may be done with a front end wheel loader.

The production schedule in Section 22 is derived from effective date of the Rogue's May 23, 2017 Press Release with the updated Mineral Resource estimate, based on the Pit 10 optimized pit shell as discussed in Section 16.6.

The phased pit designs were developed after May 23, 2017 and contain essentially the same resource material with slightly lower strip ratio (SR), from SR of 2.01 in the pit optimization to SR 1.95 inside the phased pit designs. The modifications to the mine design since May 23, 2017 include:

- Detailed design of pit phases;
- Addition of haulage ramps to all the phased pits;
- Sequencing of mining pit phases and benches.

16.9.2 Mine Production Schedule

The SW Pit is mined exclusively until the NE Pit begins in year 10. Note that SW phased pit 4 is a waste ramp connecting the initial phases to the ultimate pit haulage ramp along the footwall, which is why this phase has no ROM feed.

Pit phasing maps are in **Appendix B**.

Table 16.4 presents the mine production schedule that was developed for the 20-year plan of the quarry and referenced in the May 23, 2017 Rogue Press Release. This schedule includes a pre-production phase of two months for overburden stripping, road construction and pit development. During this period, 38 kt of overburden will be mined.

The annual mining rate during the 20-year period is constant at 200 kt with 95% recovery, for a final ROM product rate of 190 kt per year.

The combined 20 year designed pits contain 3.95 Mt of ROM above CoG with an overall SR of 2.01:1 waste tonnes to feed tonnes. The 20 year mine schedule does not completely mine out the NE pit as designed. This schedule mines 87% of the ROM available and related waste.

Table 16.4 presents a chart showing the tonnages mined each year for the first 10 year periods, then in 5 year periods from year 11 to 20.

Table 16.4: Mine Production Schedule

20 YEAR SCHEDULE											
	ROM					WASTE				Mined	
Period	Tonnes	SIO2	TIO2	AL2O3	FE2O3	MNRL	OB	ROCK	SubTotal	Total	SR
	Mt	%	%	%	%	Mt	Mt	Mt	MT	Total	t:t
PP							38	-	38	38	
1	150	98.63	0.06	0.52	0.15	165	-	120	285	435	1.90
2	200	98.75	0.06	0.47	0.14	195	0	273	469	669	2.34
3	200	98.76	0.06	0.49	0.09	269	53	183	505	705	2.52
4	200	98.66	0.06	0.52	0.09	145	0	132	277	477	1.38
5	200	98.67	0.06	0.53	0.09	195	37	67	299	499	1.50
6	200	98.57	0.06	0.53	0.09	273	21	30	324	524	1.62
7	200	98.61	0.06	0.51	0.07	273	14	59	345	545	1.73
8	200	98.54	0.06	0.58	0.08	223	21	55	299	499	1.49
9	200	98.64	0.06	0.52	0.07	261	1	41	303	503	1.52
10	200	98.58	0.06	0.56	0.15	272	19	292	583	783	2.92
11-15	1,000	98.68	0.06	0.53	0.11	910	145	635	1,690	2,690	1.69
16-20	1,000	98.56	0.06	0.56	0.11	1,168	109	1,262	2,539	3,539	2.54
Total	3,950	98.63	0.06	0.54	0.10	4,349	458	3,149	7,956	11,906	2.01

A detailed mine plan should be developed in the next planning stage to assess continuous rehabilitation throughout the quarry's life, in order to anticipate the final size of overburden stockpiles and haul cycles for contractor's trucking costs. This revision to the detailed mine plan should also focus closely on pit phasing, haul ramp location and sequencing of pit phases to minimize waste in the first few years and stabilize waste movement throughout the mine life. Particular attention to when the NE pit is brought in should assist in such an exercise, as there is significant waste movement required to open up the bottom half of the SW pit, as is visible in Figure 16-1 showing a cross section of the SW pit shells.

This large waste movement is due to the footwall pit slope of 55° as described in Section 16.8.3. Further geotechnical analysis of the pit slopes should be done prior to mine plan revisions. If the pit slopes are changed in the future, the pit optimization and phased pit designs should be revised as well.

17.0 RECOVERY METHODS

The silica product will be ROM with crushing and directly shipped. The crushing will be performed by a contractor. The 2016 PEA Study included a processing plant for separating a low grade product, which is no longer in the mine plan.

This study includes mine operations separating low grade material for stockpiling to keep marketing options open, but does not address processing of a secondary processed product. SNC-Lavalin recommends Rogue complete market analysis of potential end users as the planning process progresses in the future to determine if changes in the market warrant producing a secondary low grade product. In the event that no low grade product is added to the project, the low grade stockpile will remain as a mineralized waste dump/stockpile, designed to long term geotechnical design parameters.

18.0 PROJECT INFRASTRUCTURE

This section summarizes infrastructure, buildings, other facilities and services that are required to complement the processing of the Silicon Ridge quartzite and to produce lump silica.

All topographic information for the location of infrastructure was provided by Rogue with a LiDAR survey over the property and 1 m contours were used. It is to be noted that the LiDAR survey covers most of the property except for a 100 m wide area at the southern edge of the property.

There have been no geotechnical investigations for surface infrastructure performed to date. It is understood that appropriate field geotechnical investigations will be required for subsequent phases of the project. Illustrations of main access to site as well as an overall general site layout are provided on Figure 18-1 and Figure 18-2. The crushing and screening circuit, fuel depot, truck loading station and office facilities are located in the South-West corner of the property. Mineralization will be mined and send to the crushing and screening during a period of six months. The mining contractor will crush and screen the quartzite to generate a lump silica product with a size range from 20 mm to 120 mm and prepare stockpiles of material for shipment.

All off-road equipment traffic will be limited to the North of the industrial complex to eliminate intersections between off-highway equipment and highway trucks. Highway trucks will reach the property from the South.

General layouts of the crushing and screening circuit and office facilities were developed for the project. See Figure 18-3 for the crusher site layout.

18.1 Main Access Road

Main access to the Silicon Ridge property is from the paved all-weather Highway 381 from Baie-Saint-Paul (Quebec). The main-haul gravel logging road is reachable from the main access to the Sitec quartzite property. Silicon Ridge is located approximately 14.6km from Highway 381 (see Figure 18-1).

Provision has been made to upgrade part of the existing gravel access roads and the last part of the road that reaches the site along an existing access route and construction of new road to connect the southern access road with the Silicon Ridge property. Based on current access road alignment, approximately 7.6 km of existing trails will be upgraded and approximately 1.1 km of new road needs to be constructed.

Further work to develop a basis for the road upgrade and extension costs will be conducted in the next phase.

18.2 Power

Given the low power requirement for the Project, the electrical power shall be provided by on site, diesel generator(s) for the 20 years life of the quarry. No provisions have been made to extend the 25 kV Hydro-Quebec power line located approximately 13.4 km from the site.

Figure 18-1 Silicon Ridge Project Main Access Road

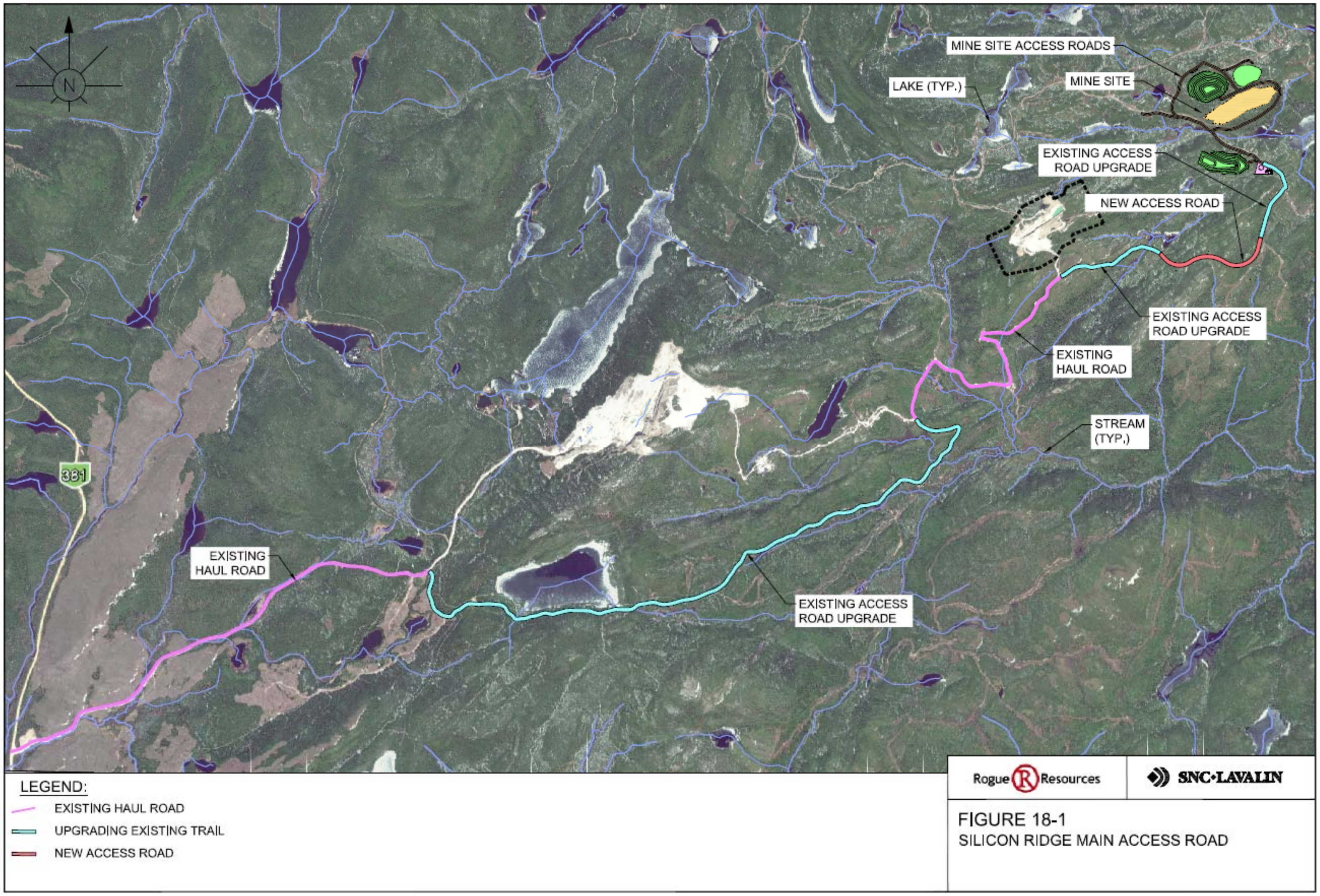


Figure 18-2 Silicon Ridge Project General Site Layout

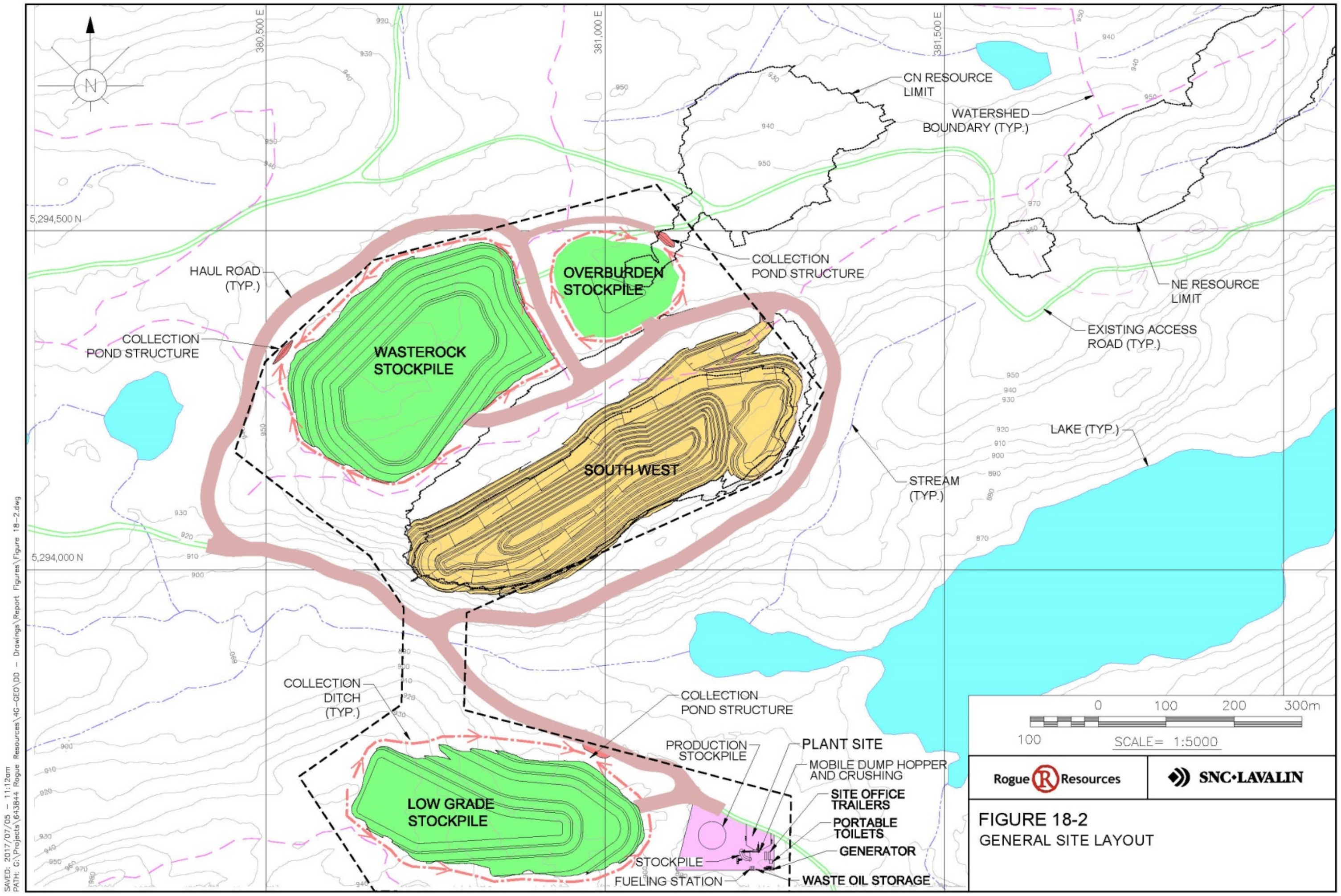
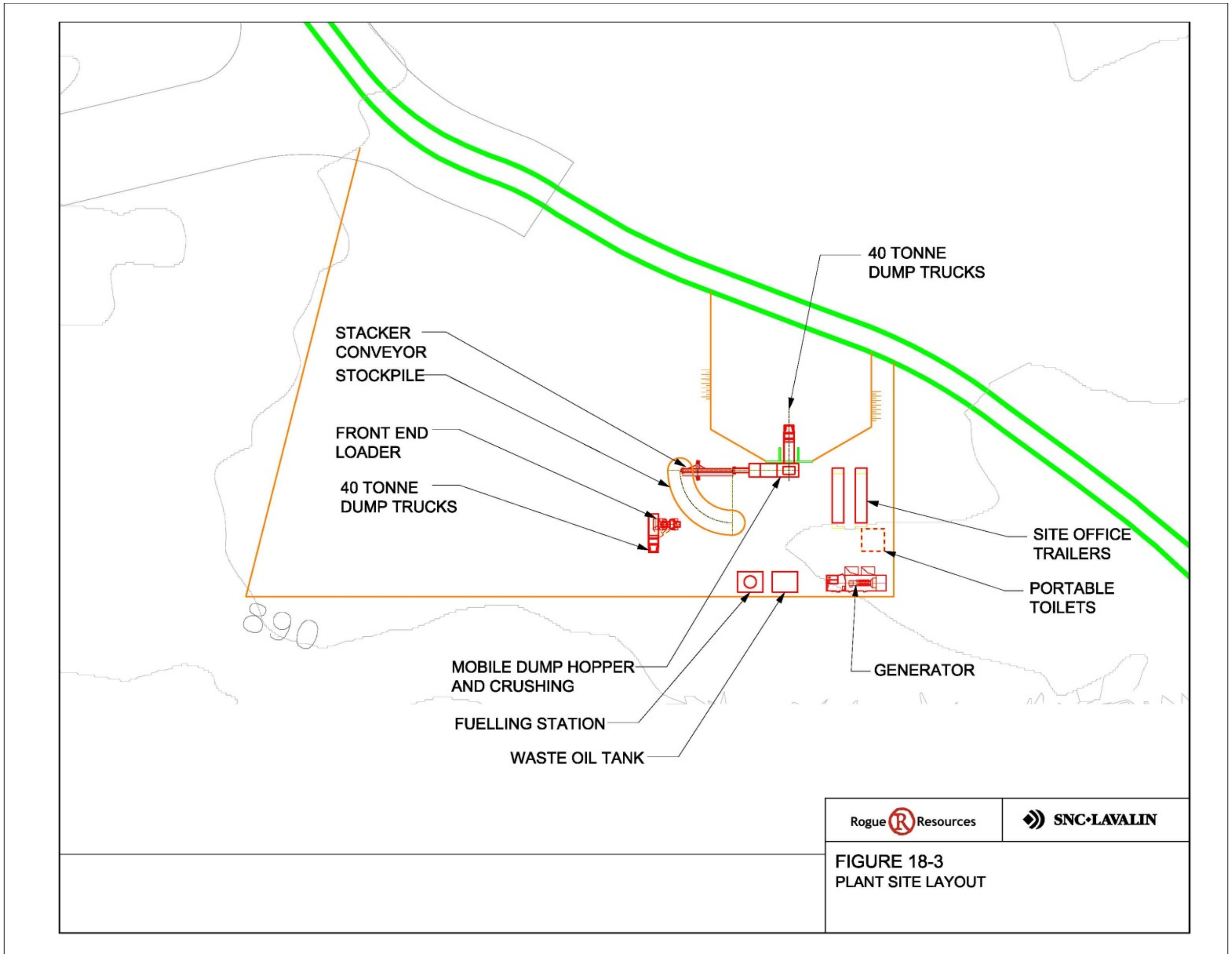


Figure 18-3 Silicon Ridge Crusher Site Layout



18.3 Camp Site Accommodations

No provision for camp site accommodation is required for the Project. The quarry is located approximately 55 km from Saint-Urbain, 70 km from Baie-Saint-Paul and 100 km from Chicoutimi and it is expected that employees will travel from these location to site where a parking area will be available.

18.4 Site Roads

Site and service roads will be 10 m wide, except for the mine haul roads which will be 20 m wide. They will take advantage of existing forest road network whenever possible. A site road will be required to provide access to the fresh water pumping station(s) from well(s) and the settling pond.

18.5 Stockpiles

Stocks pile are planned on the properties to properly manage the excavated materials: temporary stock pile for overburden and low grade ore as well as the waste rock stockpile. Stockpile locations are presented in Figure 18-2.

18.6 Buildings

The site will also include a modular prefabricated administration building located at the entrance of the site which will also serve as a gatehouse.

18.6.1 Offices

Provision has been made for a modular prefabricated office/gatehouse building at the entrance of the site. The single level 21 m x 5 m modular prefabricated building will accommodate one large area for visitors and it will have a first aid station.

18.6.2 Mine Equipment Maintenance

The mining contractor will be responsible for the maintenance of their equipment. Considering the small fleet that will be required and the quarrying operation will be restricted to the summer months it is expected that site maintenance will be limited and temporary required infrastructure (maintenance garage) will be provided by the contractor and located on the plant site pad.

18.6.3 Cold Warehouse

A few containers will be used to provide temporary storage of product big bags or mechanical equipment parts and located on the plant site pad.

18.7 Site Power and Communication

The power requirement of the Silicon Ridge Project was developed based on a preliminary power demand. Power will be supplied by one Diesel Generator (DG) unit1. It will be 60 kW 120/208 VAC @ 0.8 pf and installed in its own walk-in shelter. A provision of a back-up generator was made in the cost estimate.

The total power demand is estimated at 30 kW is necessary to cover requirements for electric rooms, lighting & heating for the office buildings.

Distribution lines to office/gatehouse building, fuelling station and fresh water pumping station will be required. It is assumed that separate diesel pumps will be used for the quarry dewatering (if required) and this is included in contractor costs.

No additional emergency diesel generator is provided in this design.

18.8 Site Services

Provision has been made in the project for a fresh water intake system (water well) including pipelines for water distribution in the plant site area to be installed near the Lac de la Grosse Femelle for the crushing area and for offices and operation areas. Bottled water is expected to be provided for drinking purposes. Domestic sewage will be stored in a portable waste tank that will be serviced by a local service provider on a regularly scheduled basis.

Fuel storage will be required for the diesel generator. It is estimated that one double walled horizontal tank with a capacity of 45,000 litres will be required for weekly storage.

Allowances for plant mobile equipment such as a loader with attachments, one grader and a water truck is included.

19.0 MARKET STUDIES AND CONTRACTS

After preliminary metallurgical studies were prepared by Dorfner ANZAPLAN GmBH in Q1 2016 and initial product applications were identified, Roskill Consulting Group (Roskill) was engaged by Rogue in the second quarter of 2016 to provide a report identifying the potential customer base by product. Understanding of the market and pricing is also based on Roskill's multi-client report, "*Silicon and Ferrosilicon: Global Industry Markets and Outlook for 2014*".

In summary, the Silicon Ridge material metallurgically qualifies for application into Glass, Ceramics, Silicon Metal for metal refining, various Fillers (including countertops) and Building Materials. For the purposes of base pricing in this Report, the focus has been on selling silica for the production of Silicon for metal refining and Ferrosilicon. (see Section 19.3)

The following sections focus on Silicon Metal, (specifically chemical grade silicon and silicon ("silicon") and ferrosilicon) and were distilled in Buro et al. (2016) from the market studies completed by the Rogue's consultants.

No contract or offtake agreements were signed to date with potential client.

19.1 Supply

Quartzite is the usual form of silica and is the basic raw material from which both silicon metal and ferrosilicon are produced.

The approximate specifications of quartzite used for silicon metal and ferrosilicon manufacture are shown in Table 19.1.

Table 19.1 Specifications of Quartz for Silicon Metal and Ferrosilicon Production (%)

	Silicon	Ferrosilicon
SiO_2	98.0 min	96.0 min
Al_2O_3	1.0 max	0.4 max
$Fe_2O_3 + Al_2O_3$	1.5 max	0.5 max
CaO	0.2 max	…
MgO	0.2 max	…
P_2O_5	nil	0.1 max
As_2O_3	nil	…

SOURCE: Roskill, USBM Mineral Facts and Problems [i]

Quartzite is brittle and is relatively easy to blast and crush. Silicon metal producers prefer quartzite lumps that exceed 2.54 cm in diameter with a minimum softening point of 1,700 C° and that do not decrepitate below 950 °C.

The rock should contain 98.5% SiO_2 and less than 1.5% $Fe_2O_3 + Al_2O_3$, 0.2% CaO, 0.2% MgO and 0.2% LOI.

If chemical grade silicon metal is being produced, the silica feed should have high reactivity and very low alumina.

Ferrosilicon producers can accommodate smaller lumps of silica rock ranging from 0.32 cm to 10.16 cm in diameter, and a lower SiO_2 content

Ferrosilicon manufacture requires quartzite with more than 96% SiO_2 and less than 0.2% Fe_2O_3 and the Al_2O_3 content affects the consumption of electricity during smelting.

Metallurgical-grade and chemical grade silicon metal typically have a minimum silicon content of 98.5% SiO_2.

The reduction process for silicon metal product is slagless and is why normal ash content coals cannot be used to produce silicon metal.

The silicon metal industry has been developing production of ultra-pure silicon metal, for direct use in solar cells as an alternative to polysilicon, but the process does not appear to have taken off with several producers cancelling their solar-grade silicon projects as the process involves intensive slag treatment and acid leaching to remove impurities and yield a product with minimum purity of 99.9% Si.

Ferrosilicon is manufactured the same way as silicon metal with the addition of iron.

The purity of silica is less critical when producing ferrosilicon where oxides of aluminium, calcium and magnesium can be tolerated up to 2 parts per thousand but there are stringent limits on the levels of arsenic, sulphur and phosphorus.

Ferrosilicon is a slagless process.

Based upon the average % cost of quartzite in the ex-plant costs the average price of the raw quartzite would be US$142.25/t for metal grade silicon and US$59.50 for ferrosilicon.

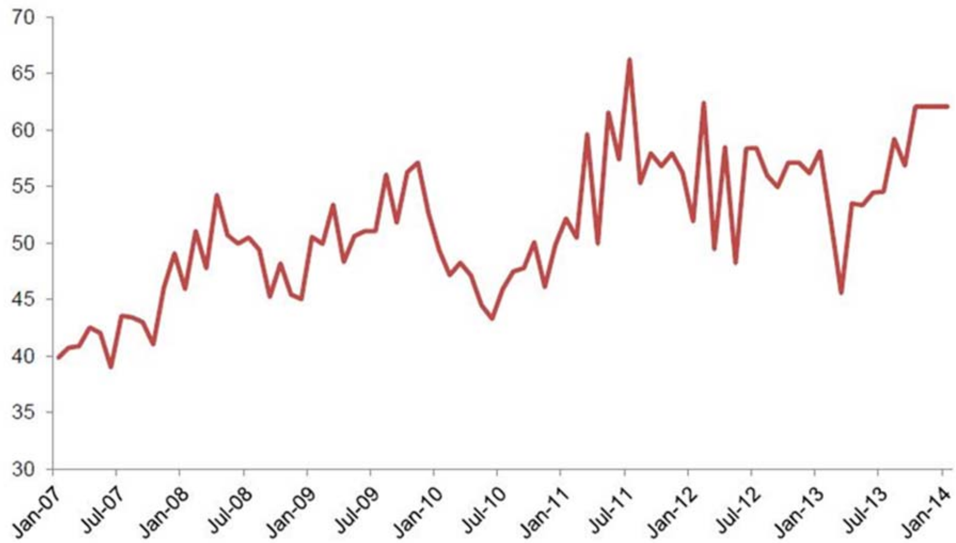
Quartzite prices reflect local transport distance rather than global market conditions.

Import and export of quartzite is mostly focused on high purity grades used in the production of silicon metal and some specialty ferrosilicon grades.

Spain and Egypt are two countries that export significant volumes of high-grade quartz for silicon metal production.

Figure 19-1 charts the monthly freight on board (FOB) export price for Spanish quartz as published by Eurostat.

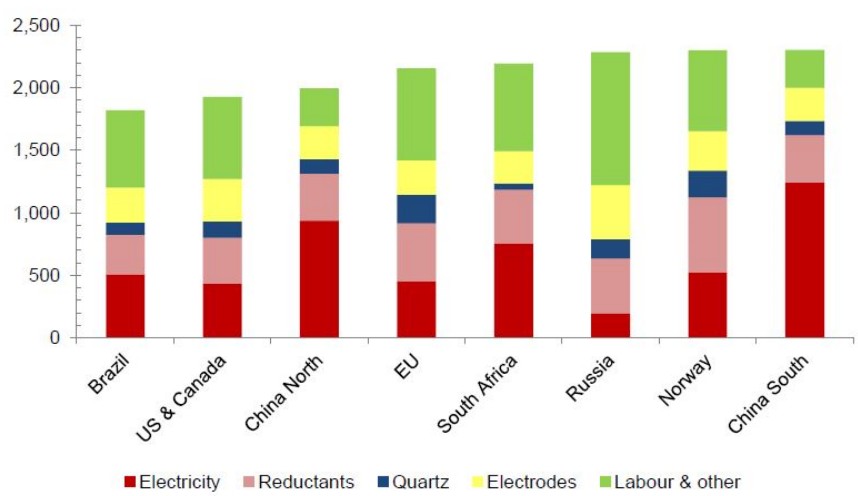
Figure 19-1 Spanish quartz export prices, monthly, 2007 to 2014 (US$/t)



SOURCE: Roskill, Eurostat [ii]

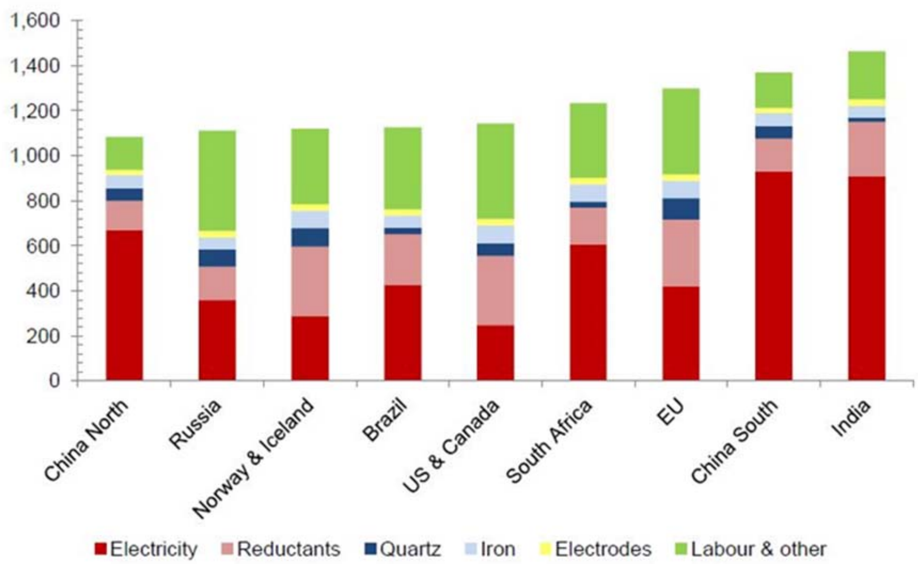
Figure 19-2 represents a graph of the ex-plant costs by region for Silicon Metal for metal that appears to indicate that the production costs are somewhat lower in US and Canada, however the percentage that quartz contributes to the costs is slightly higher. Figure 19-3 shows the regional ex-plant costs for ferrosilicon.

Figure 19-2 Silicon Metal Ex-Plant Cash Costs by Region and Component, 2014



SOURCE: Roskill[iii]

Figure 19-3 Ferrosilicon Ex-Plant Cash Costs by Region and Component, 2014



SOURCE: Roskill[iv]

19.2 Demand

Silicon is produced from quartz. Silicon Metal has 3 main end-users: aluminum alloys, silicones and polysilicon/solar. Approximately 90% of Ferrosilicon is consumed in iron and steel production with 10% in manufacture of primary magnesium. Silicon Metal consumption was 47% aluminum, 36% silicones and 15% polysilicon with average growth rates of 4.2% per year predicted in 2014 from a base of 2.25Mt in 2013. Polysilicon is predicted to be the fastest growing end use for silicon metal.

China is dominant silicon metal producer representing 61% of the global total and 75% of global capacity. China exported 49% of its silicon metal production.

Dow Corning is one of the world's largest producers of silicon metal and the world's biggest manufacturer of silicone products. It operates several silicon metal plants in the USA, Brazil and Canada.

Silicon metal prices in USA and European Union are much higher than Chinese spot because of import tariffs on Chinese silicon.

Ferrosilicon is projected to increase at 3.0% per year in 2014 with 8.08Mt production in 2013.

Electrical steel contains 3% silicon and stainless steel contains 1% silicon.

Carbon steel contains 0.29% silicon and represents 46% of ferrosilicon consumption.

China is the world's largest ferrosilicon producer representing 73% of world production.

China exports between 10% and 15% of ferrosilicon production. The 2013 utilization rate was estimated at 56% for China and 70% for non-Chinese production. The ferrosilicon industry is much less consolidated than silicon metal business with only 30% of production from top 20 companies.

Most ferrosilicon producers prefer quartzite as vein quartz is more brittle and gives rise to excessive fines during handling.

Silicon has the following commercial properties:

- It imparts high fluidity and low shrinkage to Al alloys;
- It acts as deoxidizer in steel;
- It acts as reducing agent in steel;
- It improves tensile strength, yield point and hardness in steel;
- It imparts electrical characteristics to steel;
- It turns carbon to graphite in cast iron production;
- It acts as reducing agent for primary magnesium;
- And it acts as precursor of silicones and polycrystalline silicon.

Silicon metal used for semiconductors and photovoltaic solar cells are processed through numerous intermediate steps by specialised processors who are mostly not involved in the production of silicon metal. Ferrosilicon is a grey, chemically stable material produced in powder, granule or lump form.

Ferrosilicon containing 72% to 80% Si melts between 1290 °C and 1340 °C. It is the most widely used vehicle for the addition of silicon to iron and steel.

Ferrosilicon is 3 times the volume of production of silicon metal annually.

19.2.1 Potential End Users

Quebec Silicon Limited Partnership (Dow and GSM Joint Venture) - Becancour, Quebec

The partnership was formed in August 2010 between Dow Corning (49%) and Timminco (51%). Timminco went bankrupt in 2012 and Globe Specialty Metals Inc. ("GSM") bought 51% interest. Becancour consists of 3 furnaces with capacity of 47 kt/yr silicon and 5 kt/yr ferrosilicon. Most production is shipped to the USA and Europe. Quartz is obtained from a leased mine at Sitec (4 km west of the Silicon Ridge Project) and under long term contract from Newfoundland. Timminco had been developing the production of solar grade silicon at Becancour and the assets were sold to Spain's Grupo Ferroatlantica.

Global Specialty Minerals (Ferroglobe)

It is a large US producer of silicon metal with around 75% of production. Globe is integrated into upstream raw materials to a greater extent than any major silicon metal producer. It produces its own high-grade quartzite through its subsidiary Alabama Sand & Gravel. *[In 2015 GSM and Grupo Ferroatlantica merged to form Ferroglobe PLC.]*

Dow Corning

It is the largest producer of silicones and therefore the world's largest consumer of silicon metal. Over the last 13 years Dow Corning has pursued a policy of upstream integration into silicon metal production which has seen the company make numerous acquisitions in the silicon metal industry.

Elkem Chicoutimi, Quebec

The plant consists of a single 30 MVA furnace with a capacity of 30 kt/yr of ferrosilicon. It was purchased by China National BlueStar (Group) Co. Ltd. ("BlueStar") in 2011. Historically it produced standard 75% ferrosilicon for Canadian Steel Industry. Over the past 10 years it had switched to producing ferrosilicon magnesium and inoculants for foundry sector that are mainly exported to the USA.

CC Metals & Alloys Inc.

It is usually the largest producer in the USA and it was acquired by the Optima Group in 2011, and then became part of Georgian American Alloys. Optima and Georgian American Alloys are controlled by the owners of Ukraine's Privat Group. It is located in Calvert City, Kentucky, and consists of 3 furnaces and has a capacity of around 90 kt/yr of ferrosilicon.

Generally speaking, ferrosilicon is 3 times the volume of production of silicon metal annually. Globally, Ferroglobe PLC was the world's largest silicon metal producer. The BlueStar and Dow Corning are jointly the second largest silicon metal producers by capacity. BlueStar is majority owned by the Chinese Government but most of its silicon metal capacity is located at its Elkem plants in Norway. All of Canada's silicon metal production is produced at Becancour.

In addition, according to public sources, Iceland is becoming a major importer of silica, to feed its growing domestic silicon and ferrosilicon production. Elkem's Akranes ferrosilicon plant in Iceland is the second largest in the world, with 130 kt/yr, United Silicon HF has developed a plant in Iceland to produce 22 kt/yr silicon metal, with ramp up potential to quadruple that. Thorsil is building a silicon metal plant with the potential for 110 kt/yr; Silicor Material is planning a silicon metal plant with the potential for 16 kt/yr and PCC plans one to produce 32 kt/yr of silicon metal.

Ferroglobe has presented that a tonne of silicon metal requires 2.8 t of silica in the manufacturing process.

19.3 Price

Silica is not an openly traded commodity. Prices are negotiated between end users and producers for annual and some long term contracts. Prices do vary according to different parameters such as purity, size and impurities.

Based on this information and understanding of the market, a price was developed by Rogue for the economic analysis. This price, based on a mix of ferrosilicon grade product and silicon metal grade product, was established at CAN$50.00/t.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Studies

At the start of the project in 2014, guidance was given by Service GFE (GFE) to Rogue in a report presented in November 5, 2014, *Rapport Sectoriel – Milieu Naturel et Humain*, by Christine Beaumier, biol. The report described and presented a list of components that would normally be included in the descriptive section of an environmental report: the physiography of the region, the vegetation, the wetlands, the fauna (reptiles, amphibians, birds, fish, caribou), and the human and social aspects for the area. The area was described as being used mainly for forestry, recreational purposes and silica mining in the vicinity of the proposed project area.

In 2015, follow-up work was carried out by WSP and included the following:

- Identification of environmental issues related to the development of a silica deposit:
  - Woodland caribou;
  - Fish with special status and its habitat;
  - Wetlands and watercourses;
  - Birds with special status and their habitats;
  - Land use for fishing and hunting activities.
- Characterization of surface water and watercourses with high fish habitat potential for the silica mining project:
  - Sampling and analysis of water quality in *Lac de la Grosse Femelle* at 4 stations;
  - Physical characterization of watercourses (substrate, type of flow, fish habitat, etc.);
  - Description of present fish communities from available information (desk top study);
  - Installation of a weather station at the project site;
  - Measurement of the water table level in diamond drill boreholes.

In order to comply with the requirements of the *Ministère des Forêts, de la Faune et des Parcs (MFFP)* and of the *Ministère du Développement durable, de l'Environnement et de la Lutte contre les Changements climatiques (MDDELCC)*, and to avoid or reduce the impact of the project, the following additional biological surveys were completed by SNC-Lavalin in 2016 in view of applying and obtaining a Certificate or Authorization (CofA) for a quarry operation:

- Birds:
  - Birds of prey;
  - Barrow's goldeneye;
  - Bicknell's thrush.
- Fish and fish habitat;
- Vegetation and wetlands;
- Potential habitats of voles with special status;
- Bats.

Each survey has been undertaken following approval of the survey protocols by the MFFP or by the MDDELCC. The field survey reports were completed in January 2017. The results of these field surveys are summarized in section 20.3.

Since the Project is located within a caribou habitat with legal protection status (caribou range south of the 52nd parallel) under the Regulation respecting wildlife habitat, approval from the MFFP must be obtained by way of the request for authorization as provided for in Section 128.7 of the Act respecting the conservation and development of wildlife. This request for authorization has been submitted to the MFFP in June 2016 and an initial meeting with the MFFP was held on June 22, 2016. An updated request has been submitted to the MFFP in February 2017 following a second meeting with the MFFP held on February 10, 2017.

20.2 Environmental Assessment and Review Process

In response to written and verbal requests sent by WSP regarding the Silicon Ridge Project's legal obligations, the MDDELCC provided written confirmation on December 21, 2015 that the project was not subject to the Regulation respecting environmental impact assessment and review (Chapter Q-2, r.23). However, the project does require a CofA under Section 22 of Quebec's Environment Quality Act. Accordingly, an environmental repercussion study was undertaken in April 2017. That study was submitted in June 2017 to the regional MDDELCC office (*Direction régionale de la Capitale-Nationale*).

Based on the available information and communications between WSP and the Canadian Environmental Assessment Agency (CEAA), the project is not subject to the federal environmental assessment procedure stipulated in the Regulations Designating Physical Activities under the Canadian Environmental Assessment Act (CEEA, 2012).

Rogue Resources Inc. has interacted with various local groups since the start of the project: the Municipalities of Saint-Urbain, Baie-Saint-Paul, Les Éboulements, the MRC de Charlevoix, the Huron-Wendat Nation and the ZEC des Martres. Stakeholders were kept informed about the project and the work development. Throughout the exploration program local employment in the region was created and local operators were contracted for line cutting, outcrop stripping, cutting timber on drill pads, drill pad site preparation with an excavator, and reclamation of drilling sites. Purchasing locally in Saint-Urbain and Baie-Saint-Paul was highly encouraged and accommodations in the region were used during an eight-month period in 2015.

The key environmental authorization will come from the MFFP (request for authorization as provided for Section 128.7 of the Act respecting the conservation and development of wildlife) since the project is located within a legally protected caribou habitat. On December 2016, an authorization request was presented to the *Ministère de l'Énergie et des Ressources naturelles (MERN)* to obtain a lease to mine surface mineral substances (BEX) for the project. The duration of this process approval should take approximately 4 months. Concurrently, Rogue has undertaken a public consultation with the local authorities (MRC de Charlevoix) and main stakeholders (ZEC des Martres, Chambers of Commerce, etc.) in compliance with the MERN's guidelines (see section 20.4).

Rogue will officially apply for the CofA under Section 22 delivered by the MDDELCC. The duration of this process should take approximately 75 working days.

20.3 Biophysical Environment and Survey Results

20.3.1 Baseline Study Areas

The core study area of the mine site corresponds to the 8 contiguous map-designated mineral claims ("CDC" claims) and covers an area of approximately 4.6 km^2. It is entirely located in the ZEC des Martres.

The survey area considered for the inventory of bird of prey nests includes the study area and a 1 km buffer zone surrounding it. The survey area is limited to the study area for the Barrow's Goldeneye and bats. The survey area for the Bicknell's Thrush, potential habitats of voles with special status, wetlands, special status plants, watercourse characterization and the fish inventory is larger than the current mine site layout. So, in this way, it can capture all the potential project environmental repercussions for the mine site.

20.3.2 Physical Environment

The mine site project area ranges between 870 and 990 m of elevation, and straddles the watersheds of *rivière Malbaie* and *rivière du Gouffre*. Its surficial deposits consist mainly of glacial deposits less than 1 m thick while the presence of organic deposits is limited. The *lac de la Grosse Femelle* is the largest water body in the study area, but several other small lakes are also present. The smaller water bodies include: lac du *Gros-Bec; lac du Gaie Bleu; lac du Moineau; lac Bicknell;* and the *Premier lac du Mont de Foin*. Several small permanent and intermittent watercourses are also present in the study area. The majority of these watercourses drain into the *rivière du Gouffre*.

20.3.3 Welands and Special Status Plants

SNC-Lavalin conducted wetland characterization activities and a search for special status plant species from August 16 to 23, 2016. The wetlands present in the study area were delineated by photo-interpretation before being validated or corrected after the fieldwork. Areas within the mine site layout that may have wetlands that are invisible by photo-interpretation were also surveyed. The inventory protocol was approved by the MDDELCC.

A total of 21 wetlands were identified and three classes of wetland were observed in the area: shrub swamps, shrub bogs and wooded bogs. Wetlands occupy a total surface area of 9.23 ha, which breaks down as follows: 4.36 ha of shrub swamps, 3.63 ha of wooded bogs and 1.23 ha of shrub bogs.

No forest habitat that could potentially harbor threatened, vulnerable or likely to be designated as threatened or vulnerable plant species was identified and no such species was observed during the inventory. In fact, no occurrence of threatened, vulnerable plant species or species likely to be so designated was reported in the study area or nearby following the request for information filed with the Quebec Natural Heritage Data Center[v].

20.3.4 Birds of Prey

A helicopter survey was conducted by SNC-Lavalin in the study area, above potential habitats identified beforehand by means of mapping and geomatics tools. The purpose of this survey was to establish the presence of the nesting sites of three species designated as vulnerable under Quebec's Act respecting threatened or vulnerable species: the Bald Eagle, the Peregrine Falcon (*anatum* subspecies) and the Golden Eagle. Flight lines, including all potential habitats, were flown over on June 3, 2016 in accordance with a MFFP-approved protocol.

Based on field observations, the nesting habitat potential for the three species is low. In fact, no nesting site was noted and no specimen was observed.

20.3.5 Barrow's Goldeneye

The areas likely to host breeding habitats that are suitable for the Barrow's Goldeneye were identified by means of geomatics tools and by targeting headwater lakes located at a minimum elevation of 500 m and covering a surface area of 0.2 ha to 15 ha. Flyover surveys were carried out by SNC-Lavalin on June 3, 2016 in accordance with the protocol approved by the MFFP-. No specimen of this species was observed during the flyover.

20.3.6 Bicknell's Thrush

Field visits were conducted by SNC-Lavalin in two separate phases: the inventory of the Bicknell's Thrush (June 14 to 17, 2016) and the characterization of its habitat (July 27, 2016). The habitat characterization phase was only to take place if specimens were identified in the course of the first phase. The fieldwork (inventory and habitat characterization) and the method used to determine the habitat category were carried out in accordance with an established protocol approved by the MFFP.

The specimen survey consisted in visiting 13 pre-determined stations, located in the preferred habitat of the species during its active periods. Bicknell's Thrush specimens were heard at 3 of the 13 stations visited, which confirmed the presence of the species in the study area during the nesting period. Other areas frequented by the Bicknell's Thrush could be present in non-surveyed sections of the mine site layout.

The vegetation of these three stations was subsequently characterized to categorize the type of habitat based on the preferences of the species. One of three stations had combinations of habitat features with optimal suitability for the species. However, the habitat is considered sub-optimal in most of the plots characterized. A mapping of habitat types, covering the entire study area, was conducted in order to extrapolate data from the characterization activity together with ecoforestry data, as requested by the MFFP. These analyses indicate that 257 ha (56% of the core study area of the mine site) can be considered as optimal or suboptimal habitats for this species.

20.3.7 Fish and Watercourses

Information about fish fauna and watercourses was obtained through fieldwork carried out in 2015 by WSP and by SNC-Lavalin in August 15 to 23, 2016. The watercourses potentially affected by the project were surveyed in order to characterize the fish habitat and also confirm the presence of fish specimens. In total, 6 watercourses and their tributaries were covered by the survey. The presence of fish was verified by means of electrofishing. The inventory protocol was pre-approved by the MFFP.

This characterization method was used to validate the presence of watercourses, their general location as well as their status (intermittent or permanent). Fishing activities allowed establishing the presence of a single fish species, the Brook Trout. Therefore, no special status fish species was observed in the surveyed watercourses.

20.3.8 Caribou

The Charlevoix Woodland Caribou is present in the study area. The Woodland Caribou is designated as "vulnerable" in Quebec under the *Act respecting threatened or vulnerable species*. A recovery plan for the Woodland Caribou in Quebec, covering the 2013-2023 period, was published in 2013. In Canada, the boreal caribou population is listed as a "threatened" species in Schedule 1 of the *Species at risk Act*. A federal recovery program was published in 2012. The study area is located in the Charlevoix range (QC2) associated with the Charlevoix Woodland Caribou. According to the Federal Recovery Strategy published in 2012, the caribou habitat disruption rate in the Charlevoix range was estimated at 80%.

A forest management plan in the area frequented by the Charlevoix Woodland Caribou was published in 2006 and a new version is being prepared. The plan aims to reconcile the survival of the caribou with economic development in an operational forest management plan. Special development arrangements apply and include, among others, the maintenance of a minimum proportion of 50 year old stands and older (minimum area of 65%) and softwood stands 80 years old and older (minimum area of 43%). The study area is located within an area that is intensively used by caribou (caribou forest block), called "*bloc lac des Martres*". The blocks are used annually by caribou for calving and rutting and during the summer and winter. The management plan applies to the legally recognized portion of the wildlife habitat that is part of the public domain. In fact, the study area is located in a *caribou range south of the 52^nd^ parallel*, which is a legal habitat under the Regulation respecting *Wildlife Habitats*.

20.3.9 Bats

The information related to the presence of bats was obtained through fieldwork carried out in the study area from June 22 to July 3, 2016 by a bat specialist, François Fabianek. The presence and nocturnal activity of bats in the area were characterized through a fixed acoustic inventory involving four listening stations located near water bodies and wetlands. In addition, efforts were made to identity any sign of a bat maternity by visually checking rocky slopes for recent deposits of bat guano. These checks were conducted three times (i.e. on June 22 and 28 and on July 3, 2016). The inventory protocol was approved by the MFFP.

The inventory confirmed the presence of two bat species already listed in the *Capitale-Nationale* region. The Hoary Bat (a species that is likely to be designated as threatened or vulnerable in Quebec) was the most active, followed by the Little Brown Bat (a species mentioned in the federal list of endangered species and in Schedule 1 of the *Species at Risk Act*). Adding to these are passages of *Myotis* bats, the Big Brown Bat/Silver-haired Bat complex and bats with unidentified genus and species. The activity index was relatively low. Night temperatures recorded at altitudes of more than 870 m may have contributed to such low activity figures. The visual inspection of outcrops yielded no results suggesting the presence of bat maternity in the areas visited.

20.3.10 Potential Habitats of Special Status Voles

The study area straddles the range of two mammal species that are likely to be designated threatened or vulnerable in Quebec, i.e. the Rock Vole and the Southern Bog Lemming. Fieldwork was carried out on July 19 and 20, 2016 by SNC-Lavalin in order to establish the presence of potential habitats of these two species in the project area. The inventory protocol was approved by the MFFP.

The fieldwork carried out led to the conclusion that there are potential habitats for these species in the study area and that some of the habitats overlap with the mine site layout. Various other species of voles, mice and shrews are likely to frequent the study area, but do not have protected status.

20.3.11 Other Mammals

The numerous moose tracks observed suggest that this is a common species in the study area. The North American Porcupine, the North American Beaver, and the Red Squirrel were also observed during the fieldwork carried out by SNC-Lavalin in 2016. Other species of medium- and large-size mammals are likely to frequent the study area include the Gray Wolf, the Coyote, the Red Fox, the Snowshoe Hare, the

Black Bear, the American Marten, the Woodchuck, the American Mink and the River Otter. None of these species has protection status.

20.3.12 Amphibians and Reptiles

Considering the location of the proposed project and its high altitude, no special status amphibian or reptile is likely present in the study area. Therefore, no specific inventory for these two groups of species was conducted. However, some species of amphibians were observed during other surveys carried out by SNC-Lavalin in 2016. These include the Northern Two-lined Salamander, the Eastern Newt, the Mink Frog, the Wood Frog and the American Toad. Other species of amphibians likely to frequent the study area are the Blue-spotted Salamander, the Yellow-spotted Salamander, the Spring Peeper, the Leopard Frog and the Green Frog. The only reptile species likely to be present in the study area is the Common Gartersnake.

20.4 Socio-economic Setting and Consultation Process

20.4.1 Socio-economic Context

The project site is located a remote area of the *Municipalité Régionale de Comté* (MRC) de Charlevoix, and the closest municipality is Saint-Urbain, a small town with approximately 1,373 people (Statistics Canada 2016). The area is characterized by a low population density, yet it attracts important numbers of tourists and outdoors enthusiast on a yearly basis, including for fishing and hunting and for several other types of recreational activities (MRC de Charlevoix, 2012). Indeed, this area is home to ecological reserves, outfitting zones, and Provincial parks, and the project site itself is located within the *ZEC des Martres*. The *ZEC des Martres* is part of Quebec's hunting zone #27 and fishing zone #27. In addition, several campgrounds are located outside the project site (>1 km), along the ZEC's main access road.

The most important industries in this area are health and social services, retail, manufactures, and lodging catering. The exploitation of natural resources, including forestry and agriculture, account for 7.7%[vi] of the economic activity at the local level (MRC de Charlevoix, 2012).

20.4.2 Consultation Process

Several stakeholders were contacted in the context of the Rogue Silica Project development to both provide information on the Project and obtain the comments of the participants.

Consultations were held by Rogue with local groups and stakeholders including the Municipality of Saint-Urbain, Baie-Saint-Paul, Les Éboulements, the MRC de Charlevoix, the Huron-Wendat Nation Council and the ZEC des Martres. In addition to formal meetings, many other informal discussions took place since 2014 with some of the stakeholders mentioned above. It should be noted that a MOU has been signed with the Huron-Wendat Nation in April 10, 2015 and Rogue continues to keep the Nation informed about project developments, and the MERN is expecting their comments as part of their authorization process (BEX). The Innu population of Mashteusiatsh and Essipit was invited to take part in the consultation process but did not provide any comments on the project. In addition, discussions were held with Mine Sitec – which already extracts silica in the vicinity of the project site – about sharing a section of the access road.

Stakeholders were informed of the project's advancement and encouraged to provide their comments during a public consultation held on March 24, 2017. This consultation was held in compliance with the MERN's guidelines[vii]. Over 70 participants took part in this public consultation. Issues raised included potential interference between the project and the ZEC's activities, potential effects on the landscape, potential economic benefits, and the overall protection of the environment, for instance. A summary of the consultation report is available on Rogue's corporate website.

20.5 Current/potential environmental & social issues, may affect extraction of Mineral Resources

During the preparation of the ERS (Environmental Repercussion Study), only the valued environmental components that may be impacted by the project are considered below after discussion with the MDDELCC

As mentioned in Section 20.3.8 (caribou), the project is located within a legally protected habitat under the Regulation respecting wildlife habitats. To this end, Rogue has filed a request for authorization to implement its project in the proposed site, as provided for in Section 128.7 of the Act respecting the conservation and development of wildlife. The cumulative effects of other anthropogenic disturbances taking place in the project area will be taken into account by the competent authorities when approving or rejecting activities in the legal caribou habitat. In June 2016, and later on in February 2017, Rogue took steps towards securing the required authorizations which, if granted, will require the implementation of certain mitigation measures. These mitigation measures will include, at a minimum, restriction periods for specific activities. Rogue is working proactively with the relevant authorities and is prepared to put in place the required mitigation measures.

Considering the presence of special status bat species in the study area, specific mitigation measures for these species could be required by the authorities. The same applies to the special status voles' potential habitats. Regarding the Bicknell's Thrush, the MFFP could recommend full protection zones in the areas classified as optimal habitat while specific mitigation measures may be required inside or nearby habitats considered as sub-optimal. Specific requirements for all of these species will be known after the analysis of all documents submitted to the MFFP.

According to Section 14 of the Regulation respecting pits and quarries, the operating site of any new quarry must be located at a minimum horizontal distance of 75 m from any swamp. Similarly, the operation of a quarry in a swamp is prohibited. According to the actual information, no swamp overlaps with the operating site of the quarry but two swamps are located nearby. A map was prepared showing all environmental constraints and resistances (Figure 20-1) in the study area. This map was used to locate all surface infrastructure in order to ensure that the environmental constraints and resistances were not affected by the Project. The mine site layout was reviewed based on the information provide on Figure 20-1.

Although bog-type wetlands are not covered by Section 14 of the Regulation respecting pits and quarries, encroachment on bog-type wetlands or their destruction is subject to a Certificate of Authorization (CoA) application, as provided for in Section 22 of the EQA. There are peatlands straddling the South West Zone and other parts of the mine site layout (Figure 20-1). Other bogs are present in the surveyed area. The MDDELCC may require compensation for bog losses caused by the project but only for the affected areas located along the access roads.

According to the Regulation respecting pits and quarries, the operating site of any new quarry must also be located at a minimum horizontal distance of 75 m from any permanent stream or lake. Similarly, the operation of a quarry in a permanent stream or a lake is prohibited. Furthermore, a 15 m strip must be maintained for intermittent streams, as provided for in the Protection Policy for Lakeshores, Riverbanks, Littoral Zones and Floodplains. Encroachment on these or destruction thereof is subject to a CA application as provided for by Section 22 of the Environment Quality Act (EQA). The analysis of available data shows that there are no permanent or intermittent watercourses straddling the operating site of the quarry or located nearby (Figure 20-1).

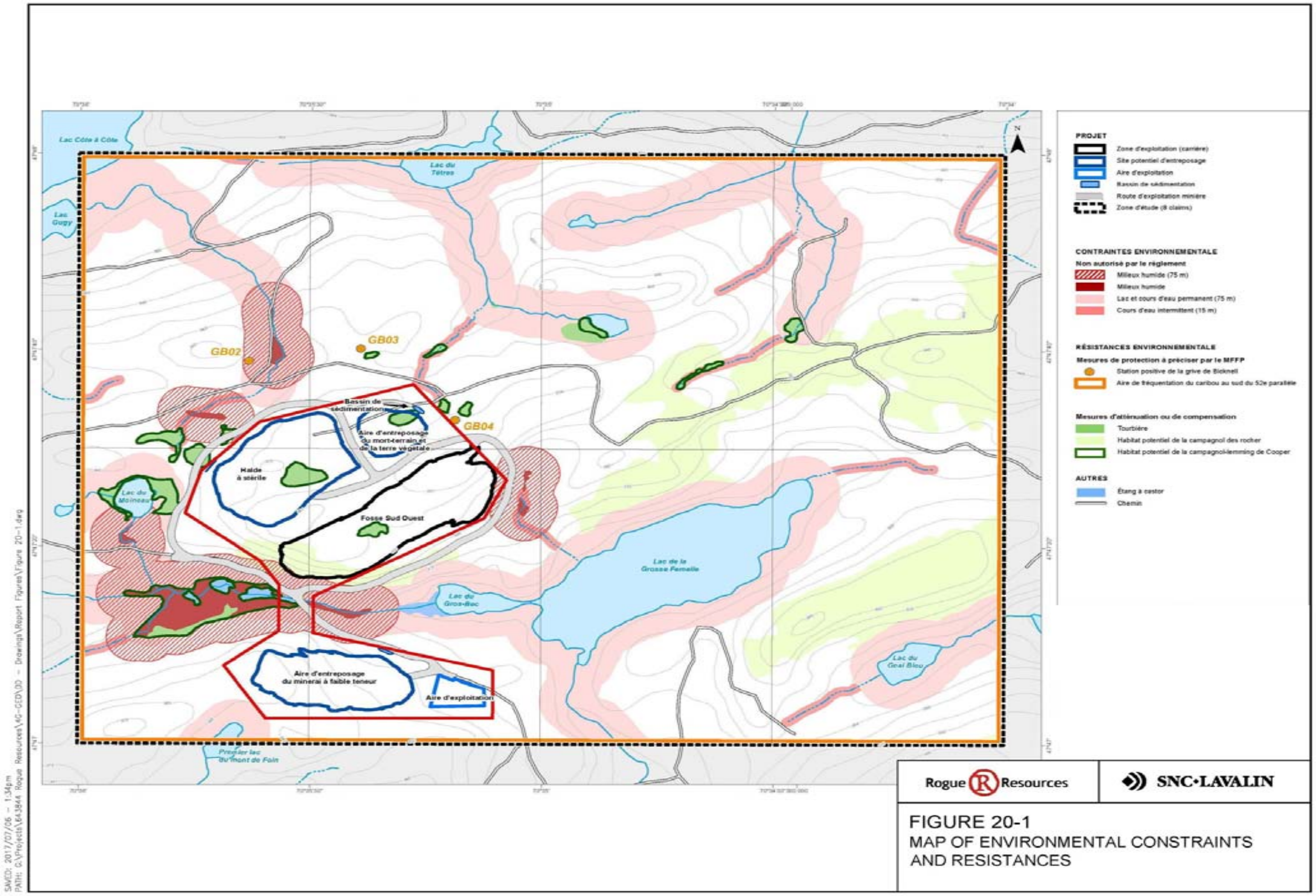
The watercourses where the Brook Trout was observed are also considered as fish habitats, i.e. a habitat subject to legal protection under the Regulation respecting wildlife habitats. To this end, if needed, Rogue would have to apply for authorization to implement its project in these legally protected habitats as per Section 128.7 of the Act respecting the conservation and development of wildlife.

In terms of the potential social effects, as mentioned above, Rogue has interacted with various local stakeholders since the start of the project: the Municipalities of Saint-Urbain, of Baie-Saint-Paul, and of Les Éboulements; the MRC de Charlevoix; the ZEC des Martres and the Huron-Wendat Nation Council. Stakeholders were kept informed on the project and on the work development. In particular, the ZEC des Martres was kept informed of all exploration activities and the Company took the necessary measures to ensure the ZEC des Martres access roads were kept in a reasonable condition and provided grading of the roads when required.

The social issues raised by the implementation of the project concerned the potential effects of the project on recreational and land use activities in the ZEC, and the preservation of the biophysical environment. Such activities take place throughout the year, with peaks during hunting and fishing seasons. The potential interactions between the project and such activities are of concern as they depend on the quality of the environment.

According to available information, the archaeological potential in the proposed project area seems to be low, and the project is not likely to affect any existing historical or patrimonial sites. However, it may be required to ascertain this before the construction of the proposed project. This area is also characterised by high unemployment rates (when compared to the nearby urban area of Quebec City) and by seasonal fluctuations in employment (*Schéma d'aménagement, MRC de Charlevoix, 2012).* The implementation of this project in the MRC raises expectations in terms of local employment and contracting opportunities for local enterprises. Already, throughout the exploration program, local employment was created and local operators were contracted for line cutting, outcrop stripping, cutting timber on drill pads, drill pad site preparation with an excavator, and restoration of drill sites. Purchasing locally in Saint-Urbain and Baie-Saint-Paul was highly encouraged and accommodations in the region were used during an eight month period in 2015.

Figure 20-1: Map of Environmental Constraints and Resistances



21.0 CAPITAL AND OPERATING COSTS

21.1 Capital Cost

This capital cost estimate covers the Project for an annual capacity of 200 kt of feed material. Location of the facilities is in a Greenfield area located approximately 42 km North of Baie Saint-Paul in the Province of Québec, Canada. The site is accessible by all-weather Highway 381 and existing forest roads. A 14.6 km road will be established to complete access to site along an existing access route and new road construction.

The capital cost estimate includes the material, equipment, labour and freight required for the mine pre-development, fines storage and management, as well as infrastructure and services necessary to support the operation. Mine services and facilities as well as mine equipment are accounted for as operating costs since the operation of the quarry is based on contract operator fees.

The capital cost estimate for the Roque Silicon Ridge Project is a Level-4 estimate in accordance with AACEI standards and procedures (American Association of Cost Engineers International) and have an intended accuracy of +35% / -30%. The $3.5 M of initial capital cost includes direct costs, indirect costs, Owner's costs, and contingency, but excludes risk and escalation. The capital costs shown in Table 21.1 are expressed in 2nd quarter 2017 Canadian dollars.

The scope of the estimate includes:

- 7.5 km of road upgrades as well as 1.0 km of new roads development;
- 25 ha of site clearing and grubbing;
- 96,148 m^3 of excavation to prepare the quarry and general site;
- 3,984 m^3 placement of engineered fills;
- 2 site office trailers, 12 ft. x 30 ft; and
- A water well, a diesel fueling station, and 2-60 kW generators along with electrical hookup to the trailers.

All quarry work will be done on a subcontract, unit rate basis. Process related equipment and infrastructure will not be capitalized by Rogue, but will be provided by the subcontractor and charged as an operating cost, either as a monthly lease cost, or included in the unit rate charged for quarrying.

21.1.1 Summary of the Cost Estimate

All amounts are expressed in Canadian dollars ($CAN) unless otherwise noted.

The initial capital cost for the scope of work is estimated as $3.5 M including $2.04 M for direct costs, $0.64 M for indirect costs and $0.81 M for contingency.

The total life of mine capital cost is estimated at $4.63 M of which $3.5 M is initial capital and $1.13 M is sustaining capital. The sustaining capital cost includes $0.40 M to cover equipment and/or building maintenance/replacement and road improvements and maintenance as well as $0.73 M for closure and rehabilitation of the site spread out as progress rehabilitation over the 20 year period starting in Year 3. More detailed mine planning should be developed in subsequent phases of the project to assess continuous rehabilitation throughout the quarry's life in order to anticipate more detailed sustaining rehabilitation cash flow. The capital cost is summarized in Table 21.1

Table 21.1: Summary of the Investment Capital Costs Estimate

WBS	DESCRIPTION	TOTAL INITIAL CAPITAL COST ($)	TOTAL SUSTAINABLE CAPITAL ($)
DIRECT COST			
1000	Silicone Ridge Project	198,800	
1100	Infrastructure Area	418,664	
1200	Low Grade Stockpile Area	17,575	
1300	Waste rock Stockpile Area	15,983	
1400	Overburden Stockpile Area	23,718	
1500	Mine Site Roads Construction	136,988	
1600	Access Roads Construction / Upgrade	692,638	
1700	Southwest Quarry	538,915	400,000
1800	Closure and Rehabilitation		734,000
	TOTAL DIRECT COST	**2,043,280**	
INDIRECT COST			
9100	Construction Indirects	30,649	
9200	EPCM	204,328	
	TOTAL INDIRECT COST	**234,977**	
OTHER COST			
9300	Owner's Cost	408,656	
	TOTAL DIRECT + INDIRECT COST + OTHER COST	2,686,913	
9900	Contingency	806,074	
	TOTAL CAPITAL	**3,492,987**	**1,134,000**

21.1.2 Basis of Cost Estimate – General

21.1.2.1 Base Date, Currency, Escalation

The base date for the cost estimate is the second quarter 2017. The estimate is expressed in Canadian dollars. The exchange rate used is US$1.00/CAN$0.76 when quotations were received in US dollars and €1/CAN$0.68 when quotations were received in Euros. No allowance for currency fluctuation is included.

21.1.2.2 Labour

The installation costs were estimated by factor.

21.1.2.3 Basis of Cost Estimate – Mining

The cost estimate is based on contract operation for the excavation of the overburden and the waste rock material and the excavation of the mineralization, the transportation to the crusher area where the contract operator is responsible to provide the screen plant with -120 mm crushed material to be screened to a size range between 20 mm and 120 mm and stockpile the material in prevision for transport from the property.

The mine development costs were estimated using the unit rates developed based on the local mining contractor quotes and the quantities for the pre-development of the open pit mine were taken from the mine schedule for the Project.

The haul road construction cost was estimated based on mining contractor quotes unit rates.

Mine services and facilities are supplied by the mining contractor during the quarry operating 6 months.

21.1.2.4 Basis of Cost Estimate – Power and Communication

Preliminary requirements were established for electrical power based on preliminary power demand. Process equipment as well as services and general power needs were considered. Power supply includes one diesel generator. Allowances for power distribution are included.

Estimation was based on recent similar projects and considers that the diesel generator will be purchased pre-owned.

21.1.2.5 Basis of Cost Estimate - Service Vehicles and Equipment

Preliminary requirements were established for service vehicles and equipment and costs were estimated based on rental of the vehicles and equipment for the operational period each year. A rental estimate for vehicles and equipment was received in April 2017 and all costs have been applied to operating costs for the Project.

Service vehicles include a loader with attachments, one grader and one water truck. Maintenance of the main access road will be sub-contracted.

21.1.2.6 Basis of Cost Estimate – Indirect Costs

The provisions for indirect costs and contingency were established by factors.

Taxes and duties, escalation and interests incurred during construction are excluded from the capital cost. Working capital is also excluded from the capital costs but provision for 3 months of operation cost is considered in the economic analysis.

The provision for contingency was established in consideration of the engineering development level, the available technical information required for design and the estimation methods of the Project.

21.1.2.7 Closure Costs

Provisions are made for progressive rehabilitation and closure and rehabilitation costs in the sustaining capital for 20 years with progressive rehabilitation starting in Year 3. It is assumed that the facilities salvage value will cover rehabilitation costs related to dismantling of infrastructure. For rehabilitation of the waste rock and overburden stockpiles quantities were derived from the layouts and estimation was based on unit rates from recent similar projects. The amount established and used in the economic analysis totals $734 K. More detailed mine planning should be developed in subsequent phases of the project to assess continuous rehabilitation throughout the quarry's life in order to anticipate more detailed yearly disbursement.

21.2 Operating Costs

This section provides information on the estimated operating costs of the Project and covers Mining, Processing, Site Services and Administration.

The sources of information used to develop the operating costs include actual quotes from local contract operators, in-house databases and outside sources particularly for materials, services and consumables. All amounts are in Canadian dollars (CAN$), unless specified otherwise.

21.2.1 Summary Operating Costs

The life of mine average operating cost estimate, given as dollar per tonne of feed to the processing circuit, is summarised in Table 21.2.

Table 21.2: Summary of Life of Mine (LOM) Average Operating Cost Estimate

AREA	LOM Average Operating Cost ($/$t_{product}$)
Mining	15.85
Processing	4.14
Admin, Infrastructure & Tech Services	4.47
Total	24.54

21.2.2 Summary of Personnel Requirements

Table 21.3 presents the estimated personnel requirements for the Project. This workforce is comprised of staff as well as hourly employees. The administration employees will work on a 5 days per week basis. The hourly workforce at the plant will provide 12 hour per day coverage, 7 days per week, and will work on a 2 weeks on, 2 weeks off rotation.

Quarry operations are based on a six (6) months duration and are conducted by a mining contractor. No employee requirement is shown for the quarry.

Table 21.3: Total Rogue Direct Personnel Requirement

Area	Number
Mining & Processing	2
Management, Administration & Technical Services	6
Total Manpower	**8**

Total annual costs for the Rogue direct personnel including base salary, bonus and benefits have been estimated at $364 K.

The above manpower costs are detailed in the following sections.

21.2.3 Mining Operating Costs

The mine operating cost was estimated based on budgetary pricing from local contract operation companies.

Table 21.4 presents the LOM average unit rates that were applied to the tonnages for each period of the mine plan to arrive at the total LOM operating costs for the quarry operations. These rates include the supply of explosives, equipment maintenance, surveying services as well as the delivery of -120 mm crushed mineralization to the plant.

Table 21.4: Summary of Estimated LOM Operating Costs by Type of Material

Type of material	LOM Cost ($)	Cost ($/t)	Product Sold ($/t)	Total (%)
Overburden	1,411,379	2.86	0.40	2
Waste material	35,864,836	4.85	10.09	50
Crushed mineralization	33,970,000	8.60	9.56	48
Total	**71,246,215**		**20.04**	**100**

21.2.4 Administration and Technical Services Costs

This section regroups the manpower costs for Management and site services as well as costs related to material and technical services and fuel. The operating cost summary, for a typical year, is given in Table 21.5. No requirement for room and board or catering is included for this project since it is expected that employees will be living in the nearby towns.

Table 21.5: Summary of Annual Plant Administration and Services Costs

Description	Total Annual Cost ($)	Cost of Feed ($/t)
General Administration Manpower	363,636	2.02
Administration – Material & Services	366,500	2.04
Fuel	75,000	0.42
Total	**831,155**	**4.47**

22.0 ECONOMIC ANALYSIS

The following includes results of the PEA study update that uses Mineral Resources that are not Mineral Reserves, and therefore, have not demonstrated economic viability. Also, it incorporates Inferred Mineral Resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. Therefore, the following economic analysis is limited to the potential viability of the Project and will serve as a decision tool to proceed or not with additional field work and studies on the Project.

The economic/financial assessment of the Silicon Ridge Project of Rogue is based on 3rd quarter 2016 price projections and cost estimates in Canadian currency. No provision was made for the effects of inflation. The evaluation was carried out on a 100%-equity basis. Current Canadian tax regulations were applied to assess the corporate tax liabilities while the recently adopted regulations in Quebec (originally proposed as Bill 55, December 2013) were applied to assess the mining tax liabilities.

The financial indicators under base case conditions are given in Table 22.1.

Table 22.1: Base Case Financial Results

Base Case Financial Results	Unit	Value
Pre-Tax (P-T) NPV @ 10%	M CAD	33.8
After-Tax (A-T) NPV @ 10%	M CAD	23.4
P-T IRR	%	157.1
A-T IRR	%	131.9
P-T Payback Period	years	0.6
A-T Payback Period	years	0.7

A sensitivity analysis reveals that the Project's viability will not be significantly vulnerable to variations in capital and operating costs, within the margins of error associated with PEA update estimates. However, the Project's viability remains more vulnerable to the larger uncertainty in future market prices. In the present case, the selling price of the product will have significant impact on the viability of the project

22.1 Assumptions

22.1.1 Macro-Economic Assumptions

The main macro-economic assumptions used in the base case are given in Table 22.2. The price forecast for the silicon product is a size-purity-dependent average provided by Rogue. Details on the derivation of this average price forecast are given in Section 19 of this Report. The sensitivity analysis examines a range of prices 30% above and below this base case forecast.

Table 22.2: Macro-Economic Assumptions

Item	Unit	Base Case Value
Average Silica Product Price (FOB Silicon Ridge)	CAD/t	50.00
Discount Rate	% per year	10
Discount Rate Variants	% per year	8 and 12

According to the definition of “Mineral Resource” in Subsection 248(1) of the Income Tax Act, paragraph (d) 3. affirms that a quartzite deposit, which is the subject of this Report, is a Mineral Resource. Thus, the current Canadian tax system applicable to Mineral Resource Income was used to assess the Project’s annual tax liabilities. These consist of federal and provincial corporate taxes as well as provincial mining taxes. The federal and provincial corporate tax rates currently applicable over the Project’s operating life are 15.0% and 11.5% (decreasing by 0.1% per year from 11.9% in 2016 to 11.5% in 2020) of taxable income, respectively. The marginal tax rates applicable under the recently adopted mining tax regulations in Quebec (originally proposed as Bill 55, December 2013) are 16%, 22% and 28% of taxable income and depend on the profit margin. As a beneficiation plant is required at the mine site, a processing allowance rate of 10% was assumed.

The assessment was carried out on a 100%-equity basis. Apart from the base case discount rate of 10.0%, 2 variants of 8.0% and 12.0% were used to determine the Net Present Value of the Project. These discount rates represent possible costs of equity capital.

22.1.2 Royalty Agreements

This Project incorporates three royalty agreements. The first is equivalent to an NSR agreement. This agreement calls for annual payments of 2% of FOB sales. The second agreement calls for annual payments of $0.08t of product sold. The third is pursuant to the Regulation respecting mineral substances other than petroleum, natural gas and brine (c. 13.1, r. 2), the rights, fees, leases and other amounts provided for in section 61: Surface Mineral Substances; Stone and sand used as silica ore and any stone used for the preparation of cement, such as limestone, calcite and dolomite, pay a royalty to the Province of Quebec of $0.40/t of extracted substance as of January 1st, 2017

22.1.3 Technical Assumptions

The main technical assumptions used in the base case are given in Table 22.3.

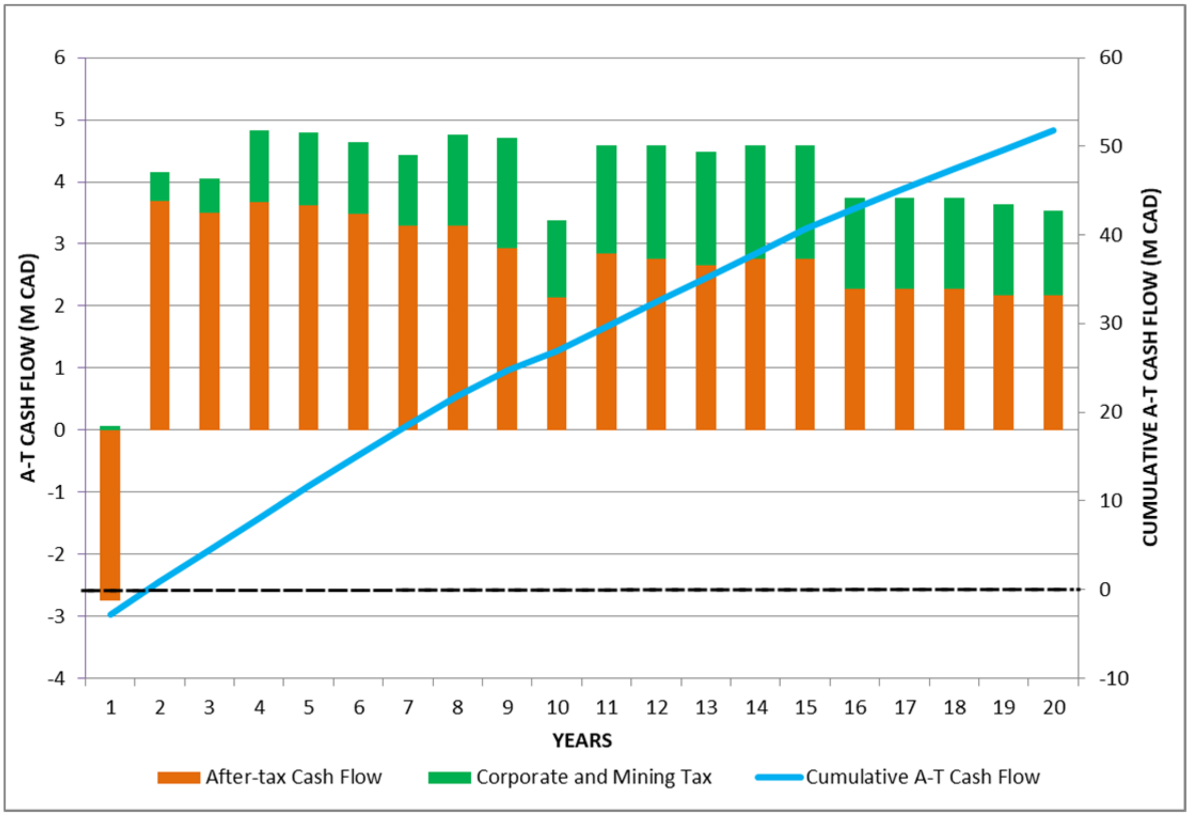
Table 22.3: Technical Assumptions

Item	Unit	Base Case Value
Open Pit Resource Mined	t	3,950,000
Average Grade	% SiO_2	98.6
Mining Rate	t/yr	200,000
Average Stripping Ratio	w : o	2.0:1
Mine Life	yr	20
Average Crusher Recovery	%	90
Average Silica Product Grade	% SiO_2	98.6
Average Silica Product Production Rate	t/yr	180,000
Average Mining Costs	$\$/t_{processed}$	13.73
Average General and Administration Costs	$\$/t_{processed}$	5.15
Average Total Costs (excludes royalty)	$\$/t_{processed}$	17.38
Average Total Costs (excludes royalty)	$\$/t_{product}$	24.54

22.2 Financial Model and Results

Figure 22-1 illustrates the after-tax cash flow and cumulative cash flow profiles of the Project for base case conditions. Note that the total height of a particular bar (i.e., after-tax cash flow plus corporate and mining taxes) represents in fact the before-tax cash flow. The intersection of the after-tax cumulative cash flow curve with the horizontal dashed line represents the payback period.

Figure 22-1 – After-tax Cash Flow and Cumulative Cash Flow Profiles



A summary of the evaluation results is given in Table 22.4 and Table 22.5 gives the cash flow statement, both for base case conditions.

The summary and cash flow statement indicate that the total pre-production (initial) capital costs were evaluated at $3.5 M. The sustaining capital requirement was evaluated at $0.4 M. Mine closure costs were estimated at an additional $0.7 M.

The cash flow statement shows a capital cost breakdown by area. Since operating costs vary annually over the mine life, additional amounts of working capital are injected or withdrawn as required.

The total revenue derived from the sale of the silica products was as estimated at $171.0 M, or on average, $50.00/t processed. The total operating costs, including royalty payments, were estimated at $89.0 M, or on average, $24.54/t processed.

The financial results indicate a pre-tax Net Present Value (NPV) of $ 33.8 M at a discount rate of 10.0%. The pre-tax Internal Rate of Return (IRR) is 157.1% and the payback period is 0.7 years.

The after-tax NPV is $23.4 M at a discount rate of 10.0%. The after-tax IRR is 131.9% and the payback period is 0.6 years.

Table 22.4: Project Evaluation Summary – Base Case

Item	Unit	Value
Total Revenue	M CAD	171.0
Total Operating Costs (includes royalty payments)	M CAD	89.0
Initial Capital Costs (excludes Working Capital)	M CAD	3.5
Sustaining Capital Costs	M CAD	0.4
Mine Closure Costs	M CAD	0.7
Total Pre-tax Cash Flow	M CAD	78.3
Pre-tax NPV @ 8%	M CAD	39.1
Pre-tax NPV @ 10%	M CAD	33.8
Pre-tax NPV @ 12%	M CAD	29.5
Pre-tax IRR	%	157.1
Pre-tax Payback Period	Years	0.7
Total After-tax Cash Flow	M CAD	251.8
After-tax NPV @ 8%	M CAD	26.8
After-tax NPV @ 10%	M CAD	23.4
After-tax NPV @ 12%	M CAD	20.6
After-tax IRR	%	131.9
After-tax Payback Period	Years	0.7

Table 22.5: Cash Flow Statement – Base Case

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
ROM (t)				150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,950,000**
Overburden (t)				37,673	27	52,997	146	36,759	21,269	13,928	20,832	1,265	18,792	29,010	29,010	29,010	29,010	29,010	28,950	28,950	28,950	28,950	28,950	**493,489**
Waste-1 (t)				164,720	147,428	221,278	144,718	195,138	272,789	272,540	223,236	261,080	272,417	126,907	126,907	126,907	126,907	126,907	246,136	246,136	246,136	246,136	246,136	**4,040,559**
Waste-2 (t) low grade				120,492	273,390	182,768	131,799	67,180	30,292	58,623	54,702	41,038	291,876	182,007	182,007	182,007	182,007	182,007	238,411	238,411	238,411	238,411	238,411	**3,354,253**
Total Waste (t)				322,885	420,845	457,044	276,662	299,077	324,350	345,092	298,770	303,383	583,085	337,924	337,924	337,924	337,924	337,924	513,497	513,497	513,497	513,497	513,497	**7,888,301**
Total Material Mined (t)				472,885	620,845	657,044	476,662	499,077	524,350	545,092	498,770	503,383	783,085	537,924	537,924	537,924	537,924	537,924	713,497	713,497	713,497	713,497	713,497	**11,838,301**
Stripping Ratio (w : o)				2.153	2.104	2.285	1.383	1.495	1.622	1.725	1.494	1.517	2.915	1.690	1.690	1.690	1.690	1.690	2.567	2.567	2.567	2.567	2.567	**1.997**
Mineralisation to Process Plant (t)	Mining Losses (%)	**0.0%**		150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,800,000**
Grade (%SIO2)				98.50	98.50	98.51	98.51	98.51	98.51	98.59	98.59	98.59	98.59	98.59	98.58	98.58	98.58	98.58	98.58	98.67	98.67	98.67	98.67	
Grade (%Al2O3)				0.557	0.557	0.556	0.565	0.544	0.546	0.529	0.529	0.529	0.529	0.529	0.555	0.555	0.555	0.555	0.555	0.523	0.523	0.523	0.523	
Grade (%Fe2O3)				0.152	0.152	0.147	0.143	0.164	0.177	0.129	0.129	0.129	0.129	0.129	0.113	0.113	0.113	0.113	0.113	0.093	0.093	0.093	0.093	
Grade (%TIO2)				0.061	0.061	0.060	0.061	0.060	0.061	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.061	0.061	0.061	0.061	
	Process Recovery (%)	**90.0%**		90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	
Total Product Sold (t)				90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	**3,420,000**
Total Sales ($)	Average Price – FOB Mine (CAD/t)	**50.00 $**		4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	**171,000,000**
Total Revenue ($)	Base Case			4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	171,000,000
Total Revenue ($)	Indexed for Sensitivity			**4,500,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**171,000,000**
CONTRACT COSTS																								
Total Mining Costs				**2,218,522 $**	**3,011,043 $**	**3,081,198 $**	**2,311,522 $**	**2,347,373 $**	**2,500,772 $**	**2,615,977 $**	**2,377,580 $**	**2,438,889 $**	**3,760,568 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**54,215,193**
Total Processing Costs				**562,500 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**14,250,000**
Total Mobilization and Demobilization				**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**167,200**
Total Contract Costs				**2,789,822 $**	**3,769,843 $**	**3,839,998 $**	**3,070,322 $**	**3,106,173 $**	**3,259,572 $**	**3,374,777 $**	**3,136,380 $**	**3,197,689 $**	**4,519,368 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**68,632,393**
OWNER'S OPERATING COSTS																								
Total Royalties				**154,800 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	5,061,600
Total G&A Costs				**909,936 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**20,359,184**
TOTAL OPERATING COSTS																								
Total Operating Costs				**3,699,758 $**	**4,841,379 $**	**4,911,534 $**	**4,141,858 $**	**4,177,709 $**	**4,331,108 $**	**4,446,313 $**	**4,207,916 $**	**4,269,225 $**	**5,590,904 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**88,991,577**
																								26.02
Operating Profit ($)				**800,242 $**	**4,158,621 $**	**4,088,466 $**	**4,858,142 $**	**4,822,291 $**	**4,668,892 $**	**4,553,687 $**	**4,792,084 $**	**4,730,775 $**	**3,409,096 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**82,008,423**
Mine Pre-production Capital Expenditure ($)																								
Silicone Ridge Project				339,849																				339,849
Infrastructure Area				715,706																				715,706
Low Grade Stockpile Area				30,044																				
Wasterock Stockpile Area				27,323																				
Overburden Stockpile Area				40,546																				
Mine Site Roads Construction				234,182																				
Access Roads Construction / Upgrade				1,184,064																				
Southwest Quarry				921,275																				921,275
Total	Base Case			3,492,987																				3,492,987
Total	Indexed for Sensitivity			3,492,987																				3,492,987
Residual Value ($)	Crushing & Process Plant	0.0%																						0
Working Capital ($)	Months of Annual Operating Costs	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sustaining Capital Expenditure ($)																								
General				0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Base Case				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Indexed for Sensitivity				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Capital Expenditure ($)			**0**	**3,492,987**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**3,792,987**
Closure Costs ($)				**0**	**0**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**224,000**	**734,000**
Federal Corporate Income Tax			0	0	0	0	0	0	0	0	264,409	575,377	419,971	569,250	555,050	556,091	556,519	555,488	458,501	459,387	460,047	460,539	437,323	6,327,954
Provincial Corporate Income Tax			0	0	0	63,402	461,865	462,482	447,867	436,941	457,982	450,924	328,893	441,306	428,985	428,772	428,387	427,092	352,380	352,808	353,136	353,387	335,499	7,012,107
Quebec Mining Tax			0	59,754	463,704	494,496	686,847	710,211	701,162	693,279	744,990	741,947	491,361	730,533	843,043	848,851	842,613	846,646	651,720	653,273	654,360	655,121	606,374	13,120,286
Total Corporate Income and Mining Taxes ($)			**0**	**59,754**	**463,704**	**557,898**	**1,148,712**	**1,172,693**	**1,149,029**	**1,130,219**	**1,467,381**	**1,768,249**	**1,240,225**	**1,741,089**	**1,827,078**	**1,833,714**	**1,827,519**	**1,829,225**	**1,462,602**	**1,465,468**	**1,467,544**	**1,469,048**	**1,379,196**	**26,460,348**
BEFORE-TAX CASH FLOW			**0**	**-2,692,745**	**4,158,621**	**4,058,466**	**4,828,142**	**4,792,291**	**4,638,892**	**4,423,687**	**4,762,084**	**4,700,775**	**3,379,096**	**4,588,461**	**4,588,461**	**4,488,461**	**4,588,461**	**4,588,461**	**3,736,813**	**3,736,813**	**3,736,813**	**3,636,813**	**3,542,813**	**78,281,678**
Cumulative B-T CF			0	-2,692,745	1,465,875	5,524,342	10,352,483	15,144,774	19,783,666	24,207,353	28,969,437	33,670,212	37,049,308	41,637,769	46,226,230	50,714,691	55,303,152	59,891,613	63,628,426	67,365,239	71,102,052	74,738,865	78,281,678	
Payback period work area				1.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AFTER-TAX CASH FLOW			**0**	**-2,752,499**	**3,694,916**	**3,500,568**	**3,679,430**	**3,619,598**	**3,489,862**	**3,293,468**	**3,294,703**	**2,932,527**	**2,138,871**	**2,847,372**	**2,761,383**	**2,654,747**	**2,760,942**	**2,759,236**	**2,274,211**	**2,271,345**	**2,269,269**	**2,167,765**	**2,163,616**	**51,821,330**
Cumulative A-T CF			0	-2,752,499	942,417	4,442,985	8,122,415	11,742,013	15,231,875	18,525,343	21,820,046	24,752,572	26,891,443	29,738,815	32,500,198	35,154,946	37,915,888	40,675,123	42,949,334	45,220,679	47,489,948	49,657,713	51,821,330	
Payback period work area				1.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

FINANCIAL INDICATORS				
Before Tax				
Payback Period (years)			**0.6**	
Total Cash Flow ($)			**78,281,678**	
Net Present Value ($)	Discount Rate	8.0%	**39,080,801**	
Net Present Value ($)	Discount Rate	10.0%	**33,815,075**	
Net Present Value ($)	Discount Rate	12.0%	**29,542,225**	
Internal Rate of Return			**157.1%**	
After Tax				Effective
Payback Period (years)			**0.7**	Tax Rates
Total CashFlow ($)			**51,821,330**	33.8%
Net Present Value ($)	Discount Rate	8.0%	**26,827,664**	31.4%
Net Present Value ($)	Discount Rate	10.0%	**23,397,255**	30.8%
Net Present Value ($)	Discount Rate	12.0%	**20,590,253**	30.3%
Internal Rate of Return			**131.9%**	

22.3 Sensitivity Analysis

A sensitivity analysis was carried out, with the base case described above as a starting point, to assess the impact of changes in total pre-production capital expenditure (CAPEX), operating costs (OPEX) and product price (PRICE) on the Project's NPV @ 10.0% and IRR. Each variable was examined one-at-a-time. An interval of ±30% with increments of 10.0% was used for the 3 variables.

The sensitivity of the Project's economic indicators to the USD/CAD exchange rate has not been explicitly determined. However, it can be stated that this sensitivity is just as important as that of the product price, because the exchange rate and the product price are both factors used in the determination of revenue. It is to be noted that the sensitivity of the Project to the USD/CAD exchange rate is inverse of that of the product price, i.e., as the exchange rate increases towards parity, the Project's profitability is reduced.

The before-tax results of the sensitivity analysis, as shown in Figure 22-2 and Figure 22-3, indicate that, within the limits of accuracy of the cost estimates in this Study, the Project's before-tax viability does not seem significantly vulnerable to the under-estimation of capital and operating costs, taken one at-a-time. As seen in Figure 22-2, the NPV is more sensitive to variations in OPEX than CAPEX, as shown by the steeper slope of the OPEX curve. As expected, the NPV is most sensitive to variations in price. The NPV becomes marginal at the lower limit of the price interval examined.

Figure 22-2 – Pre-tax NPV10%: Sensitivity to Capital Expenditure, Operating Cost and Price

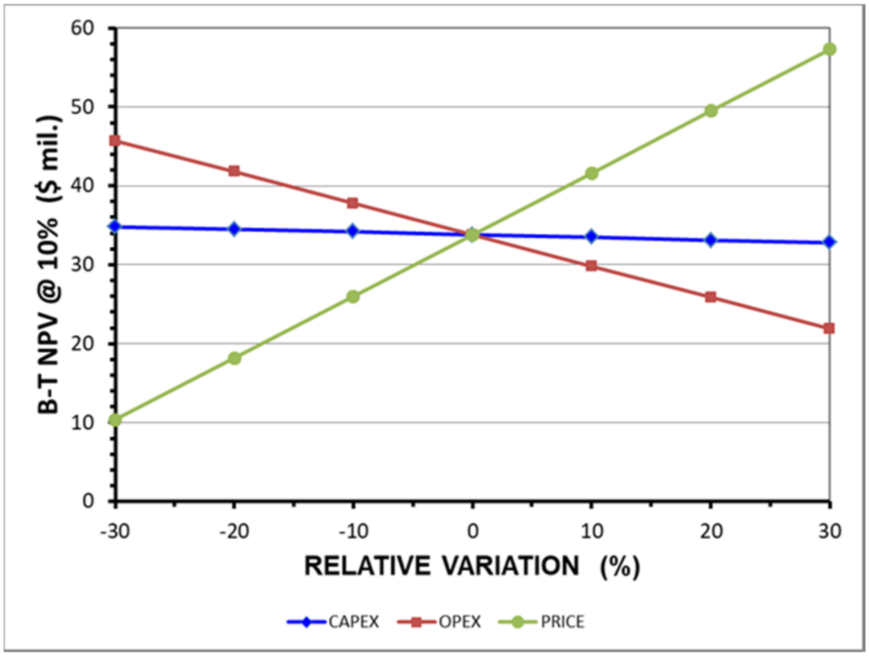
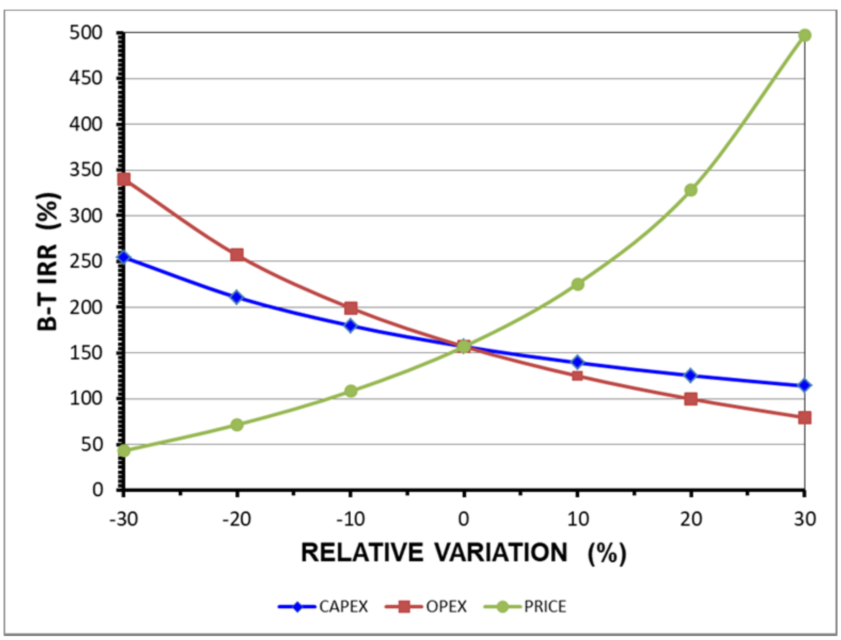


Figure 22-3, showing variations in internal rate of return, provides the same conclusions.

Figure 22-3 – Pre-tax IRR: Sensitivity to Capital Expenditure, Operating Cost and Price



The same conclusions can be made from the after-tax results of the sensitivity analysis as shown in Figure 22-4 and Figure 22-5.

Figure 22-4 indicates that the Project's after-tax viability is mostly vulnerable to a price forecast reduction, while being less affected by the under-estimation of capital and operating costs. The NPV becomes marginal at the lower limit of the price interval examined. Break-even conditions (i.e., a net present value of zero) are obtained at an average selling price of approximately $28.50/t of silica product (variation of -43% from base case price).

Figure 22-4 – After-tax NPV10%: Sensitivity to Capital Expenditure, Operating Cost and Price

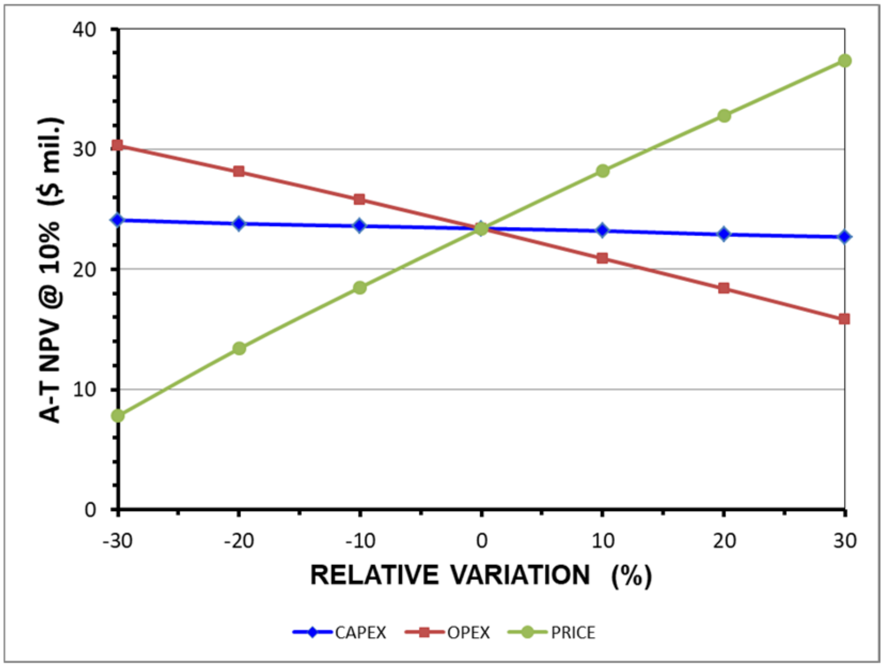
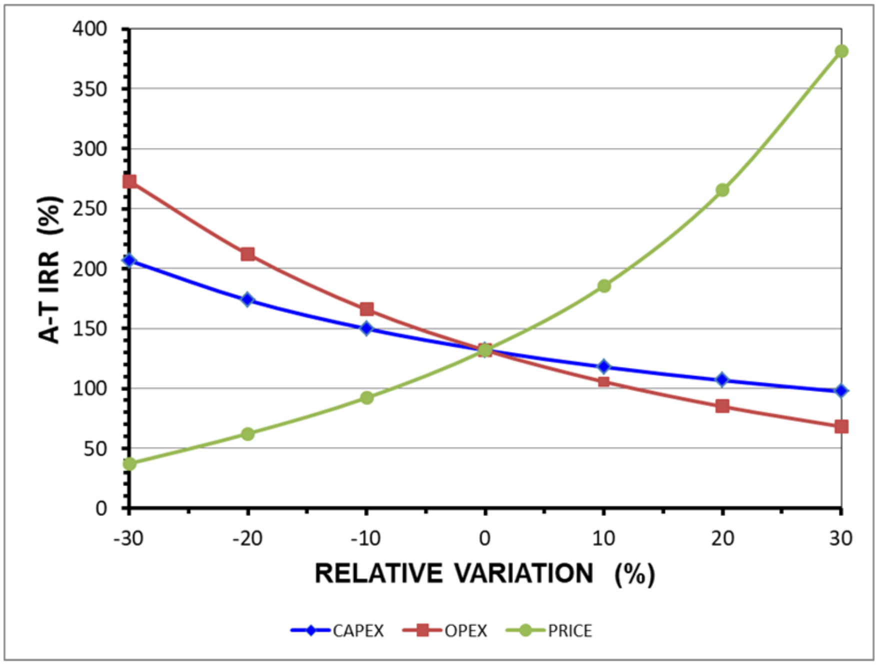


Figure 22-5, showing variations in internal rate of return, provides the same conclusions.

Figure 22-5 – After-tax IRR: Sensitivity to Capital Expenditure, Operating Cost and Price



22.4 Important Caution Regarding the Economic Analysis

The economic analysis contained in this report is preliminary in nature. It incorporates Inferred Mineral Resources that are considered too geologically speculative to have the economic considerations applied to them that would enable them to be categorized as Mineral Reserves. It should not be considered a Pre-Feasibility or Feasibility Study. There can be no certainty that the estimates contained in this Report will be realized. In addition, Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.

23.0 ADJACENT PROPERTIES

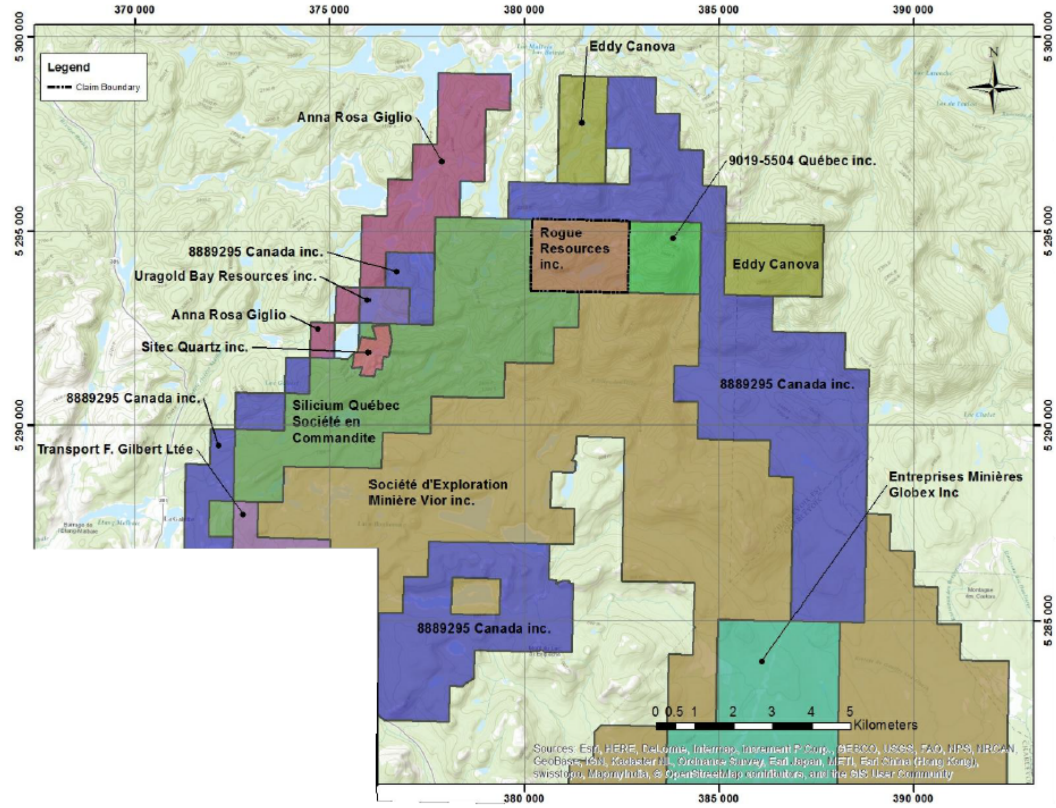
The Property is surrounded by claims on all sides (Figure 23-1) and the claims having a common side with the Property are registered under the names of:

- 9019-5504 Québec Inc., (Holdings company incorporated in 1995) on the east under option to MacDonald Mines Inc.;
- Société d'exploration Minière Vior Inc. on the south (eastern claims);
- Sitec Quartz Inc. on the south (western claims) and the west;
- 888295 Canada Inc. on the north (incorporated in the Province of Ontario in 2014).

The reader is advised that the information provided in this Section is publicly disclosed, derived from an Internet search and is mostly drawn from the Registry of Ministère des Ressources Naturelles (GESTIM) and various published maps and reports.

The Qualified Person, Henri Sangam, PhD, P.Eng., has not attempted to verify the data and results. The presence of quartzite units in adjacent properties is not necessarily indicative of the mineralization on the Property that is subject of the present Technical Report.

Figure 23-1 Map of Adjacent Mineral Properties



Rogue Resources | SNC·LAVALIN

FIGURE 23-1
MAP OF ADJACENT MINERAL PROPERTIES

24.0 OTHER RELEVANT DATA AND INFORMATION

No other relevant date or information is included in this Report.

25.0 INTERPRETATION AND CONCLUSIONS

25.1 Geology

In 2014, Rogue initiated the first modern and integrated exploration programs on the Silicon Ridge Property. Mapping, trenching and sampling of the quartzite units, followed by an airborne Magnetic-VLF survey facilitated the delineation of the quartzite units with their internal sub-units and to define the contacts with the paragneiss. The exploration results led Rogue to conclude that the “G” and “H” units were the most promising to be tested by diamond drilling.

The drill holes into the main “G” quartzite unit which hosts the South West and North East zones are largely on 50 m sectional spacing in the cores, and are 100 m spaced over the flanks of these zones and over the “H” unit which hosts the Centre North zone, with two or more holes typically drilled per section. The drill hole collars and the hole deviation were surveyed, as were the surface channel sample locations.

Several holes, including large-diameter holes, were drilled to collect material for metallurgical tests. The field and core quartzite samples were used for chemical analysis and metallurgical testing.

All drill core was logged and sampled in a single drill program, which generated a relatively homogeneous data set. Details were collected by the geologists, including photographic records of the core, detailed structural and preliminary geotechnical measurements made possible since the entire core was oriented.

Rogue’s database has been validated at different stages and the final version is free from major or systematic errors that would significantly affect the Mineral Resource Estimate.

Whole rock analysis by XRF on all samples in the database, supported by validation by comparison of all samples to sample certificates, provided good quality data for the Silicon Ridge quartzites. SG measurements were also performed by the laboratory.

The very high silica content and the very low levels of impurities in the quartzite are close to the high and low detection limits of the analytical method. Due to the large volume and wide distribution of samples across the deposit and the apparent lack of significant bias, it is interpreted that the identified reproducibility variance of SiO2 at the ultrahigh ranges of the Silicon Ridge quartzites which approach the upper detection limit of 100%, is mitigated by an apparent lack of bias, and therefore, did not have a significant impact on the confidence in results for the Mineral Resource Estimate. The reader is cautioned that small sample variance could be an issue on the Project moving forward, and mitigation of project risk should be further investigated.

The QA/QC system enforced by Rogue included Blank, Standard and Duplicate samples inserted in to the sample stream at regular and appropriate intervals. The relatively low variability of the analyses of the Standard, in view of the values close to the detection limits, is an indication of acceptable precision. However, the systematic bias observed in the results shows that the use of non-certified standards can only detect the more noticeable problems (sample swaps, large discrepancies) but cannot be used to monitor accuracy of the laboratory.

No spurious values were noted in the assay results from the blank samples, which indicate no mis-sequencing of the samples.

A generally good correlation exists between the original and second assays of the paired duplicate samples, and the same pattern was observed in the check samples independently collected and reported in Buro et al. (2016).

Although Rogue did not systematically use a secondary laboratory, a significant number of project or control samples that returned unexpected results were re-analyzed. As expected, a lower variability was observed in the re-analysis of pulp sample pairs, as compared to the coarse rejects duplicates, which is one example that attests to the good performance of the laboratory.

While constructing the three-dimensional geological solids, the main shear zone in the South West zone and minor shears in the Centre North zone were added as discrete quartzite domains using wireframe boundaries, in additional to the low silica (predominately below cut-off grade) and high silica (predominately above cut-off grade) wireframes for each of the South West, North East, and Centre North zones. These steps were followed in order to minimize smearing between domains containing quartzite that meet all the cut-offs and domains that do not. Finally, the blocks were constrained by both the cut-offs and by the LG-3D pit parameters to delineate the in situ Mineral Resources for the Silicon Ridge Property.

The cut-off grades for the quality elements (≥ 98.1% SiO2, ≤ 0.8% Al2O3, ≤ 0.075% TiO2, ≤ 0.24% Fe2O3) used for the Mineral Resource estimate were selected on the basis of the preliminary metallurgical tests completed by ANZAPLAN (2016), an expert in industrial minerals, with a strong background in silica projects.

The Inverse Distance Weighting Squared method was selected for grade interpolation. Although this is a non-geostatistical method, directional variograms were generated and used to determine the search ellipsoid parameters that would allow for anisotropy in the grade interpolation for the deposits.

The Mineral Resource categories were defined on the basis of reliability and adequacy of the data set and of the geological interpretation of the quartzite units, as well as on the continuity of the structure and grades within the deposits, the latter supported by the variography. The modeling and Resource estimates completed rely on the results from 71 diamond drill holes and from 25 surface channel sample lines which combine for a total of 5,033 assays in the Master Database.

The Mineral Resource is comprised of high silica quartzites with varying grade domains, which are broadly oriented as large-scale anticlines and synclines and show good continuity defined by mapping and drilling. The Resource estimate includes 3 zones referred to as the South West and North East within the “G” unit, and the Centre North zones within the “H” unit. The Mineral Resource estimate includes a pit constrained Measured and Indicated Resource of 7.7 Mt grading 98.62% SiO2 and an Inferred Resource of 2.1 Mt grading 98.66% SiO2.

Although the performance of the QC samples has not been outstanding because of the concentrations of elements approaching the detection limits, Philip Vicker, P.Geo. believes that, globally, the analytical results used in the Resource estimation reflects the quality of the quartzite with regard to the silica and impurities contents. It is important to note that there is possible risk associated with this slight variability which, if proven out during eventual production, could be mitigated by the process that has been shown by ANZAPLAN (2016) to achieve significant reduction of the content of impurities in the mineralized material.

This Technical Report presents the results of Philip Vicker’s, P.Geo. estimation of the pit constrained Mineral Resource within the "G" and "H" quartzite units on the Silicon Ridge Property. The digital terrain model from a photogrammetric survey was used to constrain the surface for the Mineral Resource model and for the pit design, as was the overburden depth interpreted from both drill hole observations and refined from a ground penetrating radar survey interpretation. The current Mineral Resource estimated for the Silicon Ridge Project follows the definitions and guidance adopted by the CIM in the Definition Standards – For Mineral Resources and Mineral Reserves (2014) and conforms to the rules dictated by NI 43-101 Standards of Disclosure for Mineral Projects updated in 2011.

Philip Vicker, P.Geo. believes the data used in the Resource estimate for the "G" and "H" units is sufficiently reliable and complete to adequately reflect the geological and grade continuity of the quartzite units within the boundaries of the block model.

25.2 Mine Plan

A seasonal quarry operation based on contract operation 5 days per week, 12 hours per day, 6 months of the year during the warmer seasons was considered for the Project. The contractor would be responsible to provide crushed mineralized material ranging in size between -20 mm and -120 mm to the crushed material stockpiles when the quarry is not operating. The mine production schedule was developed based on a 20 years pit shell. This schedule includes a pre-production phase of two months which is required for overburden stripping, road construction and pit development. During this period, 38 kt of overburden will be removed. Overburden removal may take place during the winter to take advantage of the frozen ground conditions.

Two of the three Resource pits were designed for the Silicon Ridge project in order to target 20 years of production at 200 kt of blasted resource per year from the South West (SW) and the North East (NE) pit. The Central North (CN) pit was not designed for the 20 year plan due to a higher overburden depth than in the NE pit, although it is still within the Resource Estimate. The quarry has a nominal capacity to extract 200 kt per year of run of mine to produce approximately 180 kt per year of lump silica.

The NE pit is a string of 5 phased pits including a separate small pit at the west end (phase 1) and 3 mini pits at the east end (phase 5). The central 3 phases of the NE pit combine for one large pit in the middle. These 3 central phases overlap each other, relocating the pit access and haulage ramp within the pit further to the east with each phase. The combined 5 pits are approximately 1 km in length 130 m wide at surface with a maximum pit depth from surface of approximately 110 m. The total surface area of the pit is roughly 0.069 km^2. The NE pit contains 1.24 Mt of ROM above CoG with an overall SR of 2.01:1 waste tonnes to feed tonnes.

The proportion of Inferred Mineral Resources contained within the 20 year pit design is 20%.

In addition to quarrying, infrastructure and services have been added to complete the investment cost of the Project.

The total LOM capital cost, at an accuracy level of ± 35%, is estimated at $4.63 M of which $3.50 M is initial capital and $1.13 M is sustaining capital. The sustaining capital cost includes $0.40 M to cover equipment and/or building maintenance/replacement and road improvements and maintenance as well as $0.73 M for closure and rehabilitation of the site spread out as progress rehabilitation over the 20 year period starting in Year 3. Future detailed mine plan should assess potential for continuous rehabilitation throughout the quarry's life.

The LOM average operating cost estimate is evaluated at $17.38/t of feed. Mine closure and rehabilitation cost have been estimated at $0.73 M.

At an average sale price of silica product of $50.00/t (FOB Silicon Ridge), the financial results indicate a pre-tax NPV of $33.8 M at a discount rate of 10%. The pre-tax IRR is 157.1% with a payback period of 0.6 years. The after-tax NPV is $23.4 M at a discount rate of 10%. The after-tax Internal Rate of Return is 131.9% and the payback period is 0.7 years.

The economic analysis of the project cannot demonstrated the potential viability of the project at a PEA level study, as it is preliminary in nature, therefore SNC-Lavalin recommendations proceeding to next level of Pre-Feasibility studies.

26.0 RECOMMENDATIONS

SNC recommends that the Project continues to the next phase of development with a Pre-Feasibility Study. A series of additional studies and tests are recommended to advance to the next phase, maximize opportunities and minimize risks. The main recommendations are summarized below.

26.1 Geology

The following recommendations are made by Philip Vicker, P.Geo.:

- Expose through mechanical stripping a large cross-sectional area of the South West zone quartzite to facilitate geological data collection (detailed mapping and sampling).
  - Detailed mapping and sampling to investigate grade distribution at different scales;
  - Assess the potential for selective mucking from visual observation to reduce deleterious elements from a potential product.
- Further investigate grade distribution and reproducibility variance of ultra-high silica values to determine the precision and accuracy of an appropriate analytical methodology for any future activities on the Project.
- Use Certified Reference Material for standards in future QA/QC. Making a project standard from Silicon Ridge rock is a possibility.
- Use a more appropriate material for Blanks in future QA/QC. Possibly a high silica granite would be more appropriate than limestone.
- Medium (3-5 year term) - add diamond drill holes to improve grades estimate confidence and potentially upgrade the block classifications from Inferred to Indicated and Indicated to Measured.
- Avoid rotated block models in future Mineral Resource updates. These models do not relate well with a variety of other software.
- In future drilling or sampling programs:
  - Use Certified Reference Materials and a more appropriate (silicate) blank material.
  - Standardize and simplify the rock codes for easier interpretation as a large number of combinations of quartzite code with various qualifiers were found in the master database;
  - Standardize an appropriate minimum sample length (30 to 50 cm is recommended); and
  - Adopt a check-in/check-out database structure to minimize transcription errors, track, and standardize data collection.
- Remodel the South West Zone quartzites, incorporating results of surface mapping of the proposed stripped exposure. Utilize appropriate cut-off rules for grade domaining, including grades and widths appropriate for the mine design.
- Exploration potential exists to upgrade and add Mineral Resources both along strike and at depth through additional diamond drilling and surface exploration.
- Beneficiation opportunities (or mitigation of grade control issues) could be undertaken through automated ore sorting techniques based on rock colour (ANZAPLAN, 2016).

26.2 Mining, Marketing and Infrastructures

SNC-Lavalin recommends the following:

- Perform rock mechanics as well as hydrogeological studies to further confirm rock slopes, rock permeability, surface water and groundwater flows and water balance in order to validate the pit mining technical parameters.
- A hydrological evaluation to establish the water table depth in each pit area and evaluate effects on mining below the water table for operational activities and mining cost.
- Carry out geotechnical investigation and studies for the infrastructure location including overburden stockpile area, waste rocks disposal area, low grade ore storage area, crushing and processing site area, new access road, etc.
- Further detailed design of pit phasing and haul ramp access into each phase to ensure access to all mining areas scheduled.
- Further evaluation of narrowing ramps at phased pit bottoms when the contractor preliminary equipment list is available.
- Further detailed mine plan to assess continuous rehabilitation throughout the quarry's life, in order to anticipate the final size of overburden stockpiles and haul cycles for contractor's trucking costs.
- In order to develop and firm up a construction budget estimate based on some pre-owned equipment; efforts should be made in identifying the suppliers and securing the equipment.
- Rogue should complete market analysis of potential end users as the planning process progresses in the future to determine if changes in the market warrant producing a secondary low grade product. In the event that no low grade product is added to the project, the low grade stockpile remains a mineralized waste dump/stockpile, designed to long term geotechnical design parameters.
- Further marketing assessment including detailed discussions and MoU with potential customers to increase certainty on product price and impact of freight.
- Further development on the road upgrades and extension to increase certainty on road costs.
- The estimated cost for work prior to the next study phase is provided in Table 26.1.

Table 26.1: Next Phase Estimated Costs

ACTIVITY	ESTIMATED COSTS (CAD)
Geotechnical & Hydrogeology Study Work	200,000
Certified Reference Materials and Advanced Study Work	275,000
TOTAL	**475,000**

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28.0 ENDNOTES

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[i] Roskill Information Services Ltd., Silicon and Ferrosilicon: Global Industry Markets and Outlook, Fourteenth Edition, 2014

[ii] Roskill Information Services Ltd., Silicon and Ferrosilicon: Global Industry Markets and Outlook, Fourteenth Edition, 2014

[iii] Roskill Information Services Ltd., Silicon and Ferrosilicon: Global Industry Markets and Outlook, Fourteenth Edition, 2014

[iv] Roskill Information Services Ltd., Silicon and Ferrosilicon: Global Industry Markets and Outlook, Fourteenth Edition, 2014

[v] Centre de données sur le patrimoine naturel du Québec (CDPNQ).

[vi] According to 2006 data, extracted from the *Schéma d'aménagement, MRC de Charlevoix, 2012*.

[vii] *Guide sur l'organisation d'une consultation publique par le promoteur d'un projet minier*, 2016 (https://www.mern.gouv.qc.ca/publications/mines/GuideConsutationPromoteurSecteurMinier_Web.pdf).

APPENDIX A

SITE VISIT PHOTOS

Photo 1: Looking Towards Waste Dump Area

Photo 2: Existing Site Access Road Seen from the Ridge

Photo 3: Looking Toward Proposed Crushing and Screening Area

Photo 4: End of Access Road (to be upgraded) at Mine Site

Photo 5: Collars of Drilled Holes at SW Pit

Photo 6: Collars of Drilled Holes at SW Pit (CITEC MINE in Background)

Photo 7: Trench Locations at SW Pit

Photo 8: Quartzite Outcrop at SW Pit

Photo 9: Exposed Quartzite – SW Pit

Photo 10: Exposed Quartzite - SW Pit

Photo 11: Core Shack

Photo 12: Core Boxes at Core shed with Identification

Photo 13: Reject Samples

Photo 14: Reject Samples

APPENDIX B

MINE PLAN

APPENDIX B1

GPR INVESTIGATION REPORT

Thermoroc inc. 367 rue Victoria Salaberry de Valleyfield J6T 1B5

GPR investigation report

Overburden depth assessment over the projected quarry location at the Silicon Ridge Project

Prepared by:

David Banville, ing., M. Sc.,
Thermoroc Inc.

Presented to:

Paul Davis
Rogue Ressources inc.

Thermoroc inc. 367 rue Victoria Salaberry de Valleyfield J6T 1B5

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1. Introduction

Between the 27th and the 29th of October 2016, **Thermoroc inc.** performed a ground penetrating radar (GPR) survey at the Silicon Ridge Project for **Rogue Resources Inc**. The goal of the survey was to estimate overburden thickness over the projected quarry site. Six GPR profiles were acquired along six grid lines spaced 50 m between and including L4+00W and L1+50W. After the survey, **Thermoroc inc**. processed the GPR profiles to obtain the final GPR profiles, which were interpreted to produce estimates of the overburden thickness. The interpreted GPR profiles are available at the end of this report in appendix A and a map of overburden thickness estimates in appendix B.

1.1 Site description and survey objective

The Silicon Ridge Project is located in the ZEC Les Martres north of the municipality of Baie Saint-Paul in the region of Charlevoix, Québec, Canada. The objective of the survey is to assess overburden depths over the projected quarry location at the Silicon Ridge Project (Figure 1).

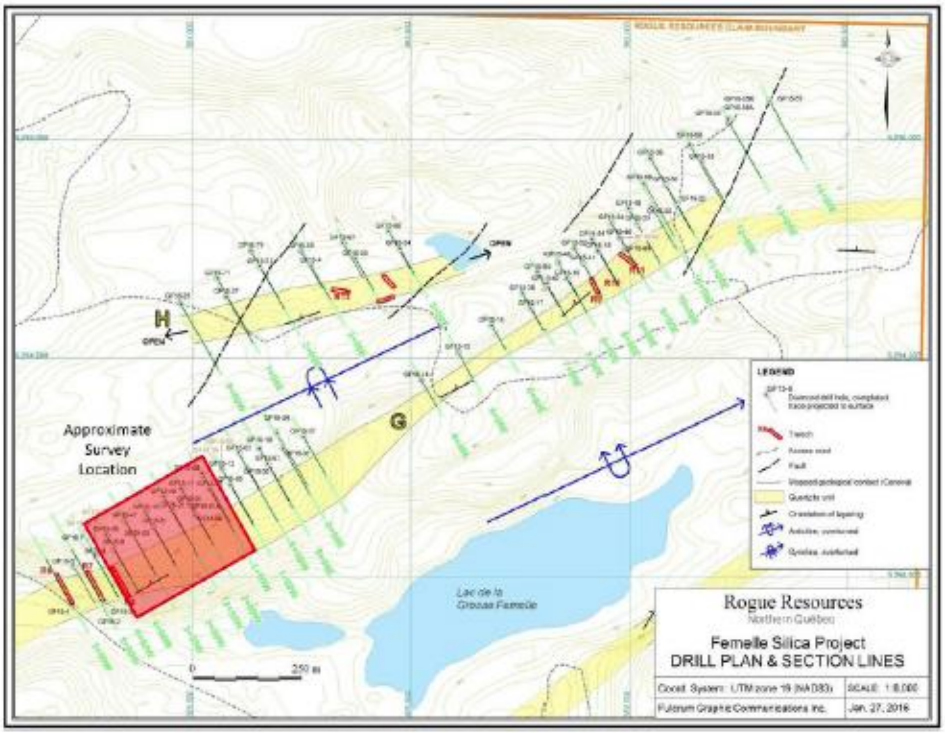

Figure 1: Approximate location of the GPR survey at the Silicon Ridge Project

1.2 Team members

A team of two persons was sent to the field. David Banville, ing., M.Sc. was in charge of data acquisition on the field. He also processed the data, produced the interpretations and the final report. Michel Pétrin was responsible for tree cutting and trimming during the survey as well as survey assistance.

1.3 Equipment

The GPR system used for data acquisition during this survey is the Mala ProEx Control Unit with the ProEx optical module and the XV11 monitor. The antennas were unshielded 100 MHz Rough Terrain Antennas (RTA) from RAMAC. With this system, the antennas are in an in-line configuration which enables towing by the operator over rough terrain such as encountered at the Silicon Ridge Project (Figure 2).

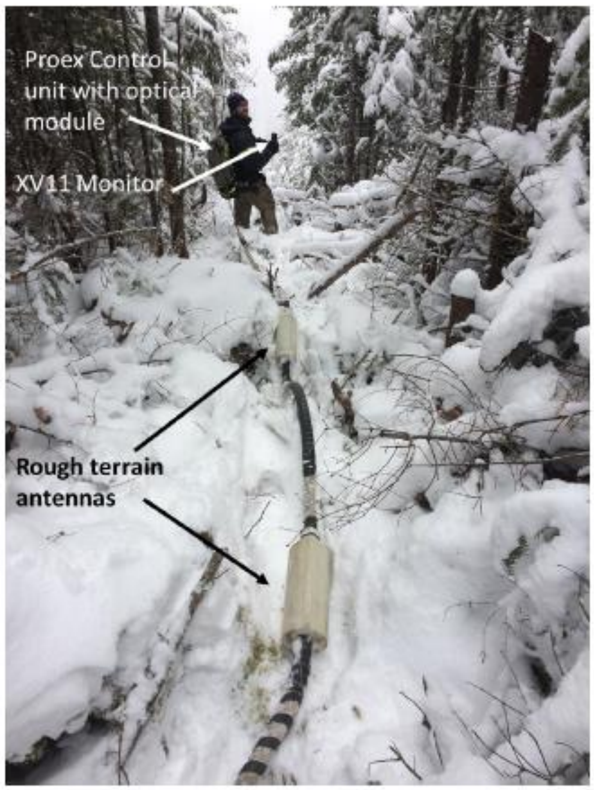

Figure 2: Rough terrain antennas attached to the operator which transports the ProEx Control unit and its optical module inside a backpack and carries the XV11 Monitor in front.

1.4 Data acquisition

GPR profiles were acquired along six grid lines with a spacing of 50 m between lines, from line L4+00W to L1+50W (Figure 3). For each profile, GPR traces were acquired every 0.2 m using a hip chain device. On each line, acquisition was started at the ridge of the forest north of the northernmost drill hole and ended when progression was no longer possible or very difficult because of steep slopes and/or fallen trees. The survey was completed in 2.5 days starting Thursday the

27th of October and ending Saturday the 29th. Table 1 summarizes the details of each GPR profiles. GPR profiles were located using a hand-held GPS model Oregon 450 from Garmin.

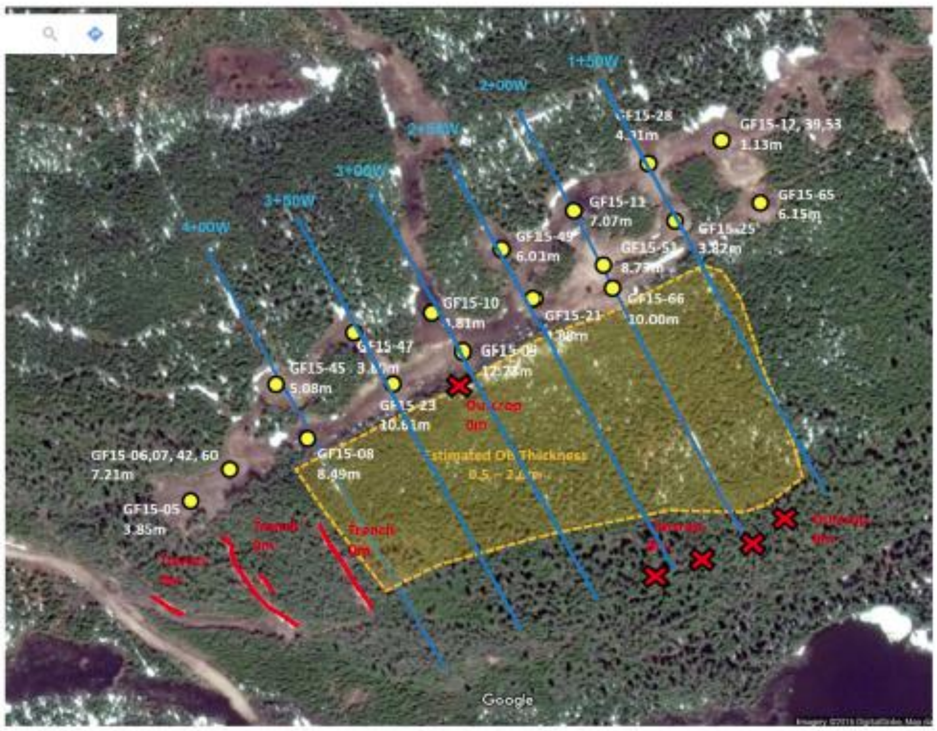

Figure 3: Location of the grid lines and available prior information on overburden thickness in the survey area

Table 1: Details of the GPR profiles acquired during the survey.

Grid line	Date of acquisition	Length of GPR profile(m)	Forest conditions
L4+00W	27-10-2016	166	Pre-cut
L2+00W	28-10-2016	216	Pre-cut
L3+00W	28-10-2016	162	Cut prior to acquisition
L3+50W	29-10-2016	188	Cut prior to acquisition
L2+50W	29-10-2016	135	Cut during acquisition
L1+50W	29-10-2016	180	Cut during acquisition

2. Data processing and interpretation

2.1 Data processing and production of final profiles

Listed below are the processing steps used to obtain the final GPR profiles from the raw profiles acquired during the survey.

1) DC and lower frequency filtering (dewow): Average removal was used to remove the low frequency variations of amplitude and bring the background value of each trace to zero.

2) Static corrections: Static corrections were applied to bring the first rising edge of the signal on each trace to t = 0 second.

3) Gain function: A depth varying gain function was applied to increase the amplitude of the deeper reflectors in comparison with the shallower reflectors.

4) Bandpass butterworth filter: A frequency filter was applied mainly to reduce high frequency noise and improve resolution at greater depth.

5) Running average: A running average of 7 traces was applied so that every trace of the final profile represents the average of the signal over a distance of 1.4 m. This creates a smoother looking profile, which facilitates the picking of coherent reflectors.

2.2 Interpretation of bedrock interface

Based on prior information of overburden thickness available from drill holes, several coherent reflectors were identified on the profiles underneath drill hole collars. These reflections were used to calibrate the depth scale of the profiles. This calibration was done using an average electromagnetic velocity of 0.12 m/ns.

Other coherent reflectors were identified on the calibrated GPR profile that were interpreted as the bedrock interface. Where no coherent reflector is available, overburden thickness estimation is impossible.

On the profiles of line L4+00W, L3+50W, L3+00W and L2+50W, wet conditions were present and a different radar texture is observed. These regions correspond to thick overburden based on available drill holes. They were therefore associated with a possible buried channel in the bedrock.

Because of strong multiples and sometimes chaotic patterns of reflections, a lot of uncertainty is introduced in the reflector identification. This means that the bedrock reflectors could be misidentified, causing large errors in thickness estimations. This is the main source of errors, and should be taken into consideration when using the thickness map presented in this work. Further boreholes or excavations could be used to reinterpret the GPR profiles in order to reduce this uncertainty.

3. Final products

3.1 Interpreted profiles

Appendix A shows the final calibrated GPR profiles with the coherent reflectors associated to bedrock interface highlighted in red. Also, shown on the profiles are the overburden thickness estimates available from drill holes and the regions interpreted as the intersection of a buried channel.

3.2 Map of overburden thickness estimates

Appendix B shows a map of overburden thickness estimates where coherent reflectors were visible on the GPR profiles. The GPR profiles were located using GPS waypoint acquired along the line during acquisition. The projected geographic coordinate system used for mapping is NAD83 zone 18.

The precision on overburden thickness is in the order of 1 to 2 meters. Based on the interpretation of the profiles and evidence on the field, a line was drawn on the map south of which overburden is estimated to be less than 1.5 m thick. Also, shown on the map is the approximate location of what is interpreted as a buried channel intersected on profiles L2+50W, L3+00W, L3+50W and L4+00W.

4. Conclusion

A GPR survey was performed for **Rogue Resources inc.** at the Silicon Ridge project to assess overburden thickness at the projected quarry location. GPR profiles were acquired along six grid lines with a line spacing of 50 m, from L4+00W to L1+50W. The GPR data was processed to produce GPR profiles suitable for interpretation.

Several coherent reflectors were identified on the profiles and positively associated with bedrock interface where overburden thickness information was available from drill holes. Elsewhere, coherent reflectors were identified which might be related to bedrock interface. Based on this interpretation, a map of overburden thickness was produced where overburden thickness estimates are available and where coherent reflectors have been identified on the GPR profiles. Raw data, processed profiles, interpreted profiles, overburden map and this report are available as numeric files.

It is hoped that the information presented in this report and on the accompanying map will be useful in planning overburden excavation work. We would like to reinforce that any estimates of overburden volumes are highly uncertain due to the difficulty of identifying a clear bedrock reflector and should be treated with caution.

David Banville, M.Sc.
Engineer at Thermoroc inc.
(OIQ No.: 5038215)

Thermoroc inc. 367 rue Victoria Salaberry de Valleyfield J6T 1B5

Certificate of qualification

1. I, the undersigned, David Banville, graduated with a B. Sc. A. in Physics from École Polytechnique de Montréal in 2012 and with a M.Sc. in applied geophysics from Université Laval in 2015.

2. I am a member of l'Ordre des Ingénieurs du Québec (O.I.Q. No.: 5038215)

3. I have no direct or indirect interests in the mining claims owned by **Rogue Resources Inc**., nor in the securities of this company and have no interest in receiving such interest.

Signed in Sainte-Catherine, this November 15th, 2016

Respectfully submitted,

David Banville, M.Sc.
Engineer at Thermoroc inc.
(OIQ No.: 5038215)

APPENDIX A

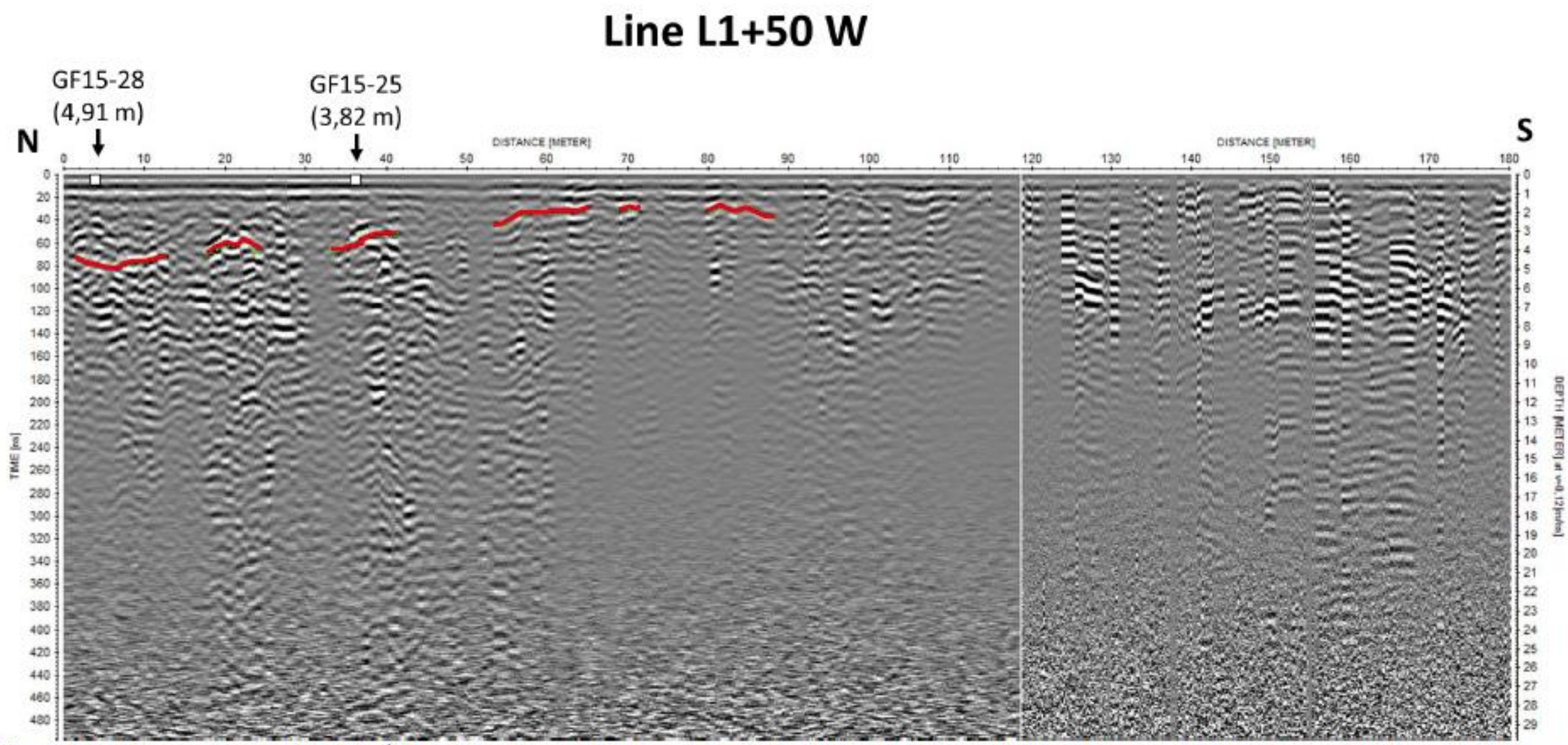

Figure A 1 : GPR profile along line L1+50 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates

Line L2+00 W

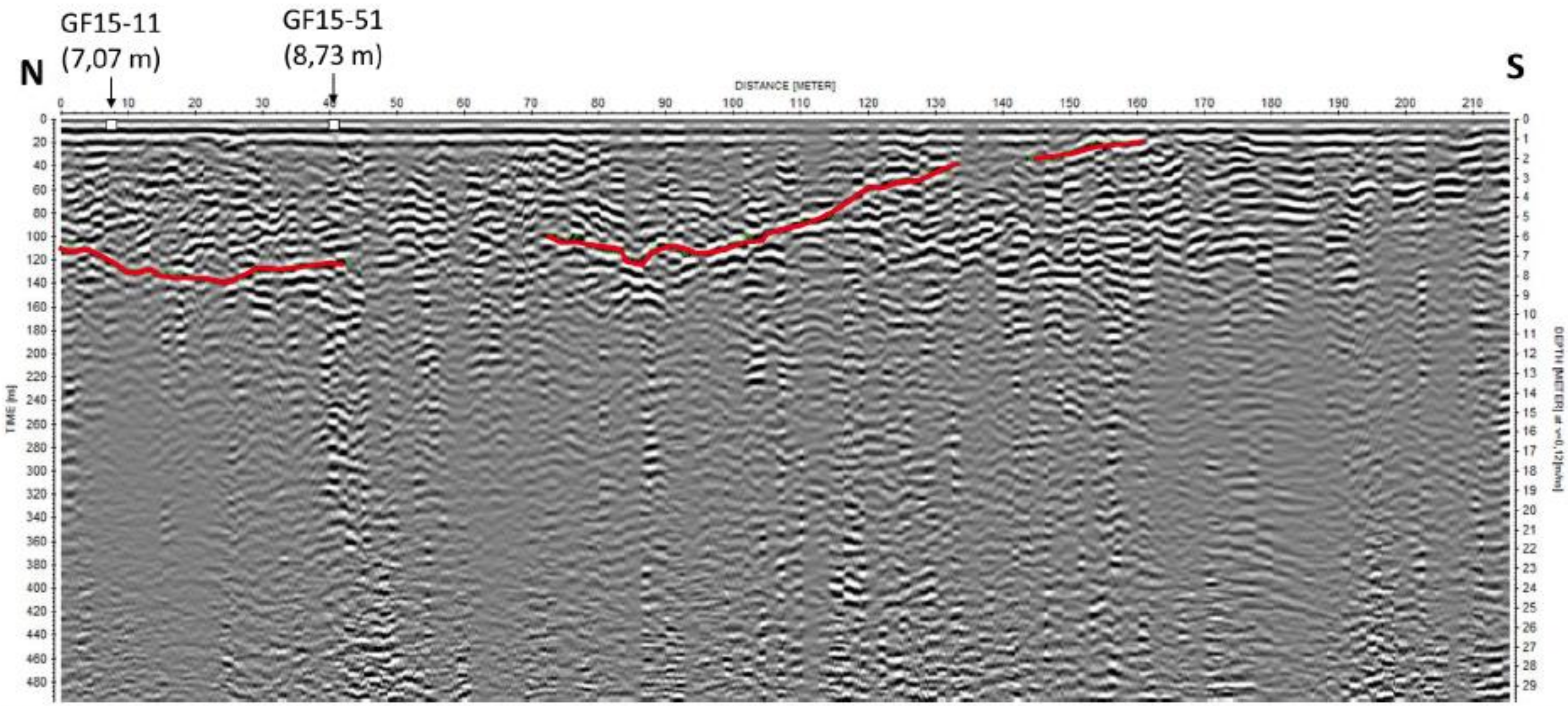

Figure A 2 : GPR profile along line L2+00 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates

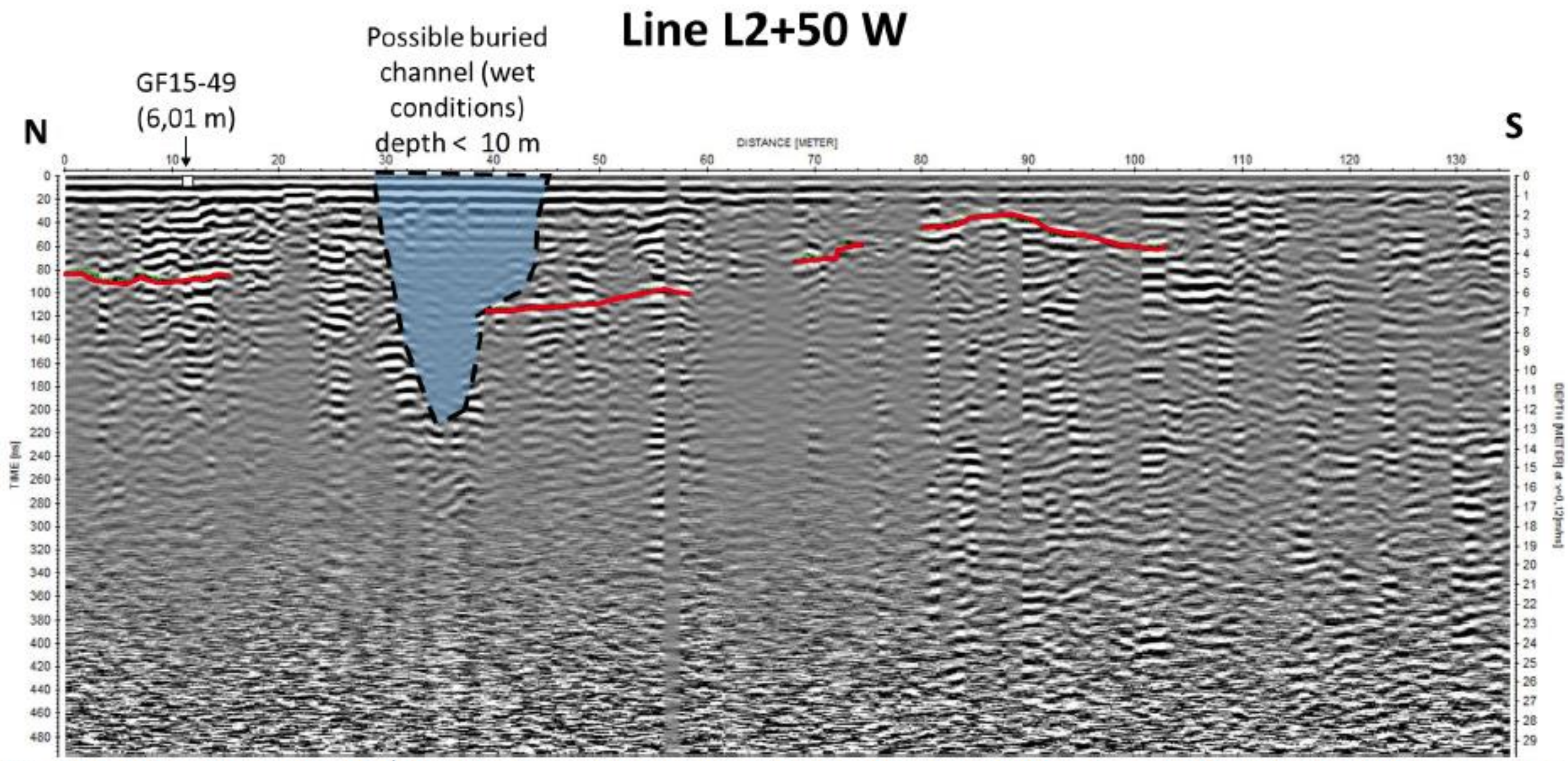

Figure A 3 : GPR profile along line L2+50 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates. Note the presence of wet conditions and a feature interpreted as a possible buried channel in bedrock.

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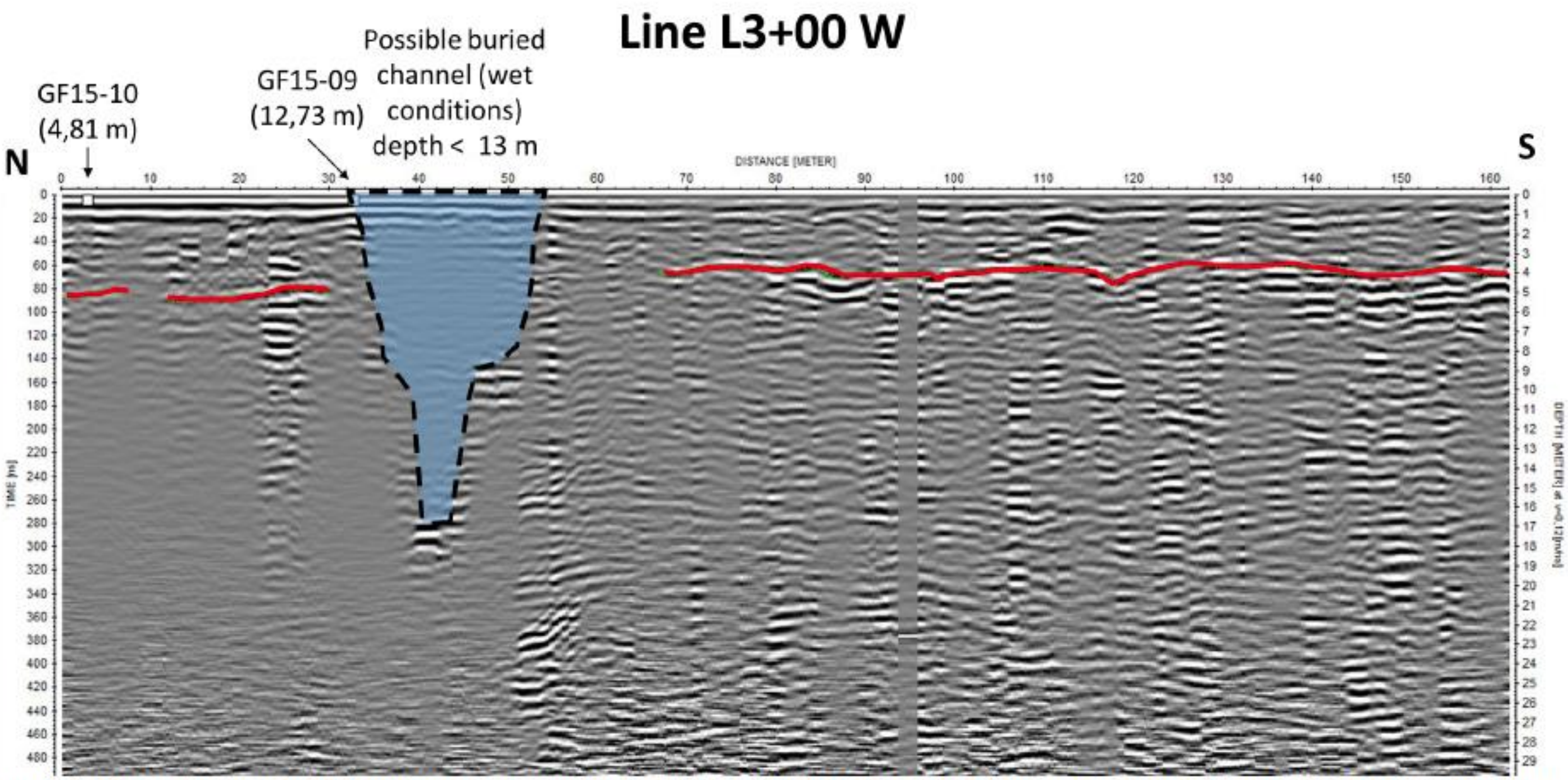

Figure A 4 : GPR profile along line L3+00 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates. Note the presence of wet conditions and a feature interpreted as a possible buried channel in bedrock.

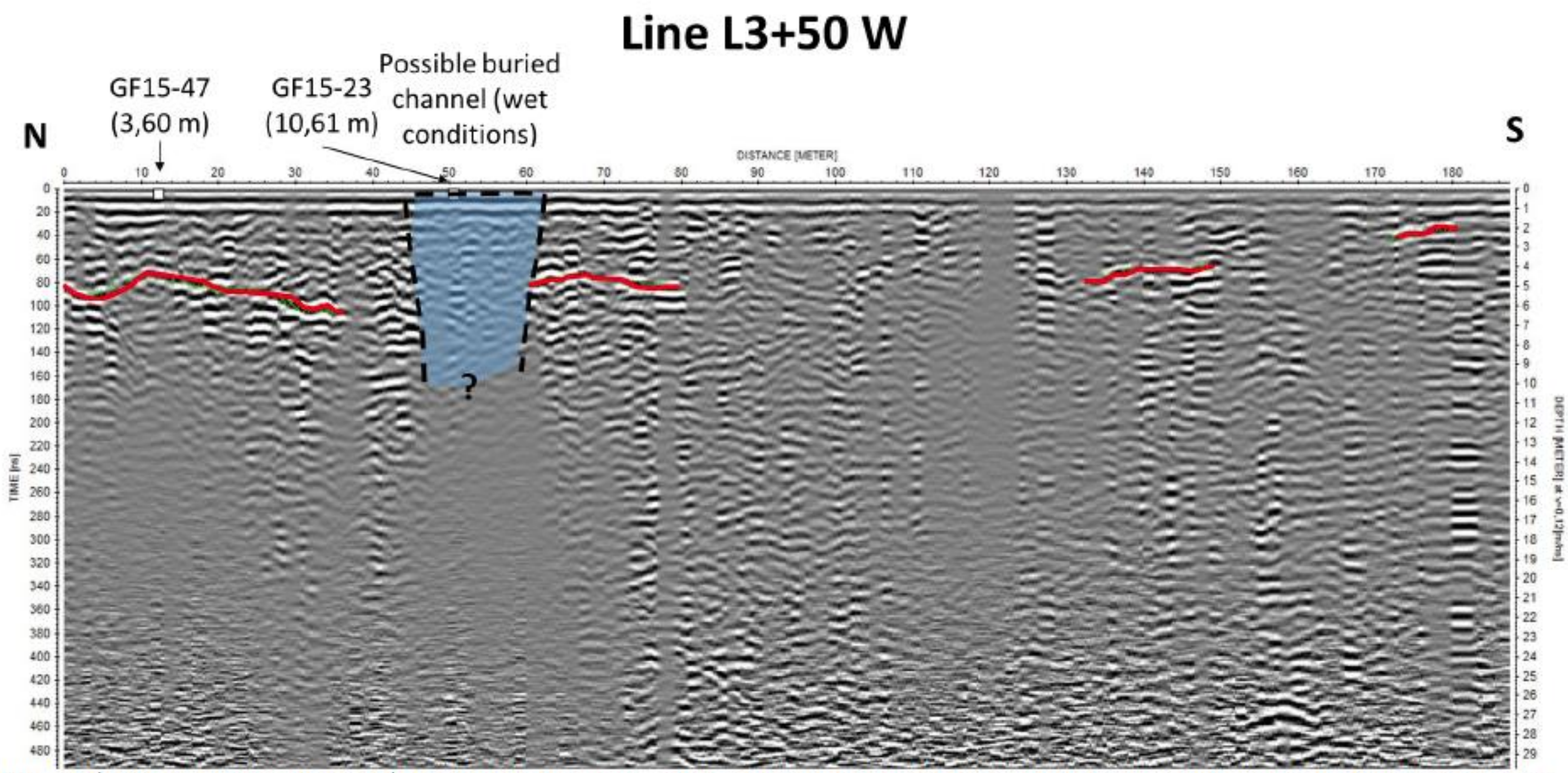

Figure A 5 : GPR profile along line L3+50 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates. Note the presence of wet conditions and a feature interpreted as a possible buried channel in bedrock.

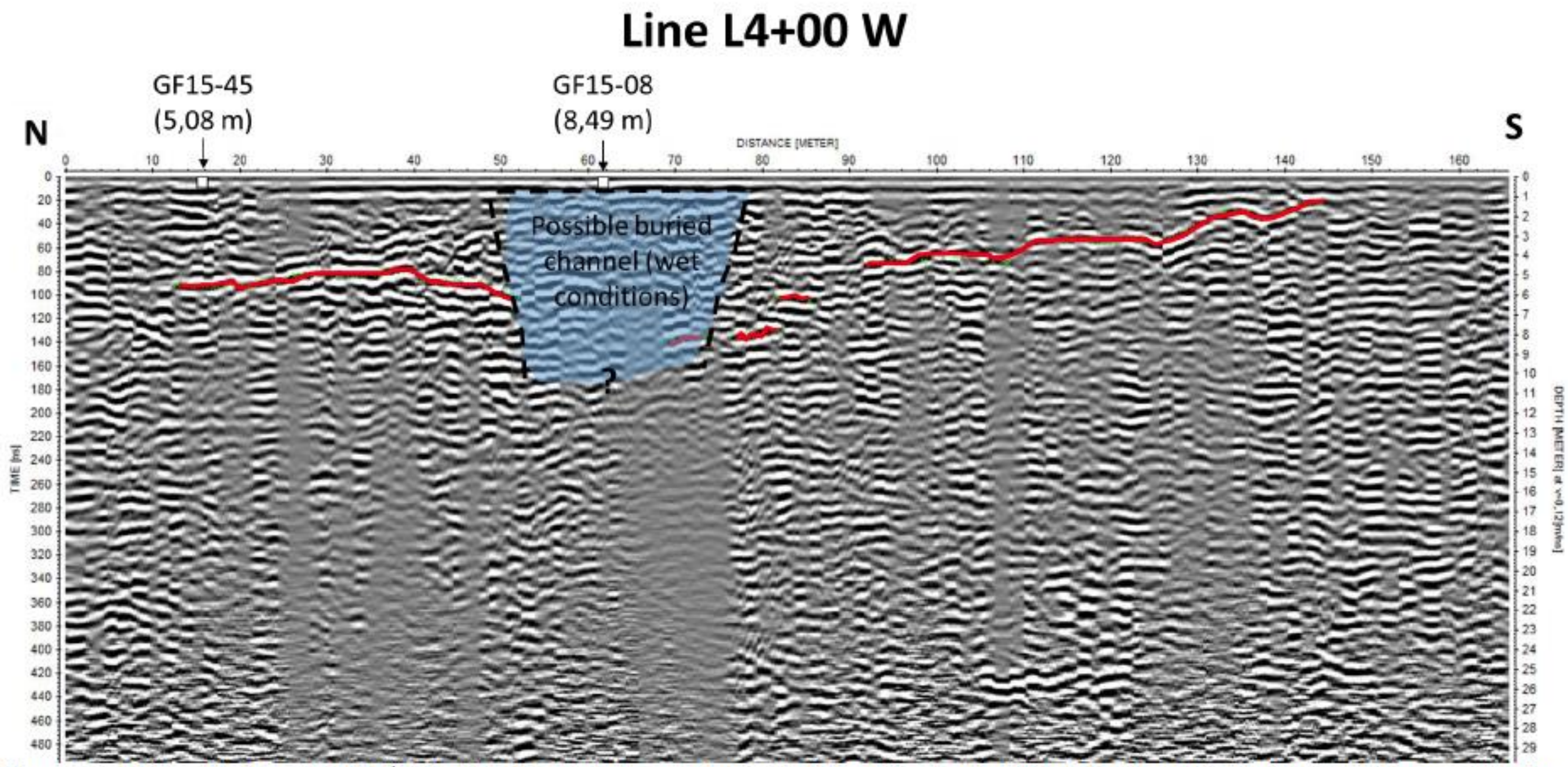

Figure A 6 : GPR profile along line L2+50 W with reflectors interpreted as bedrock (red lines) and drill hole location with overburden thickness estimates.

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APPENDIX B

Thermoroc inc. 367 rue Victoria Salaberry de Valleyfield J6T 1B5

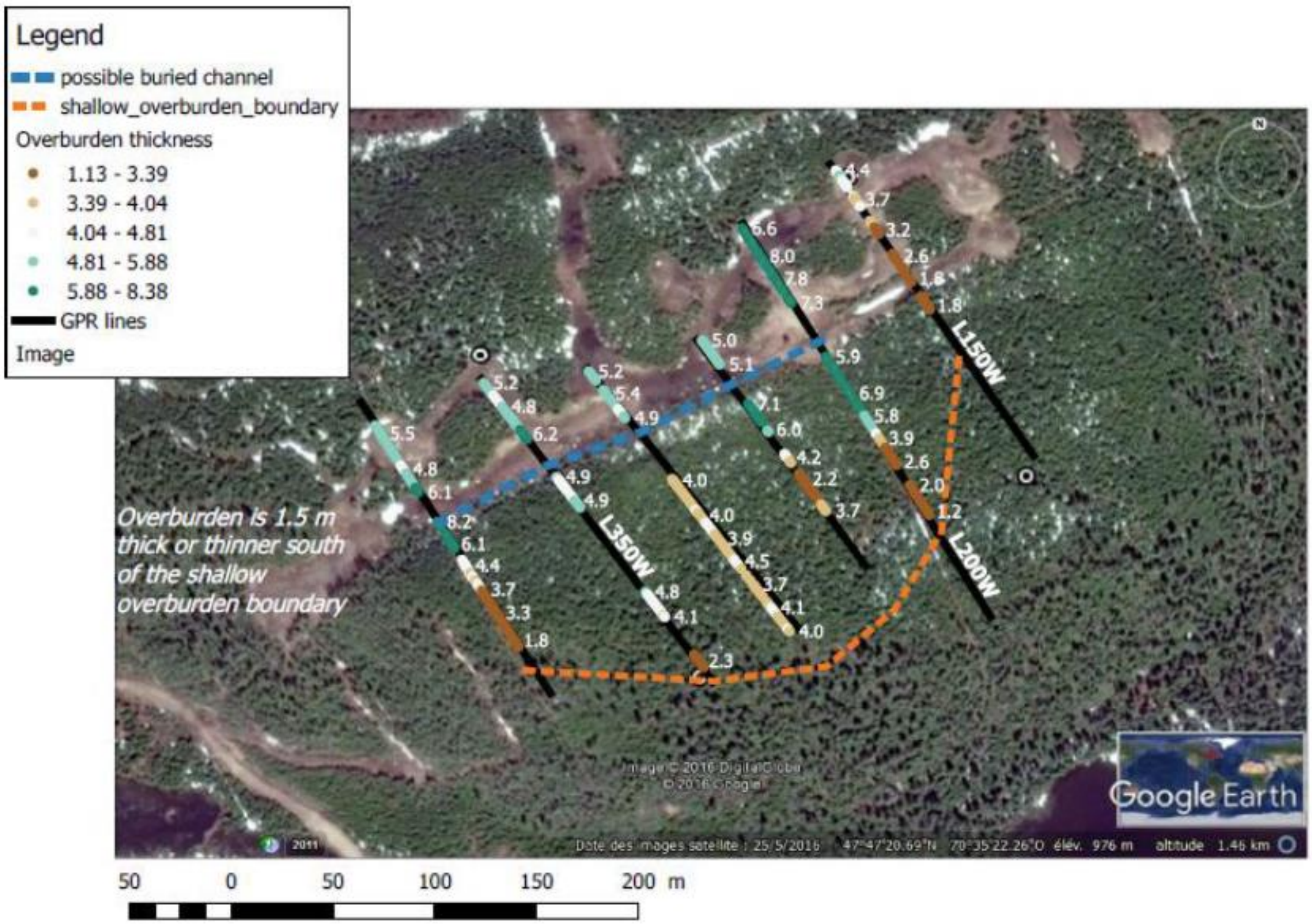


Figure B 1: Map of overburden estimates along GPR profiles from coherent reflectors associate to bedrock interface

APPENDIX B2

OB DRILL HOLE DATABASE
AUGUST 23, 2016

Hole ID	From (m)	To (m)	Description	Dip	O/B Depth	Section
GF15-1	0.00	12.30	OVB	-45	-8.70	555 W
GF15-2	0.00	0.70	Ov	-45	-0.49	500 W
GF15-3	0.00	3.00	Ov	-60	-2.60	500 W
GF15-4	0.00	2.20	Ov	-45	-1.56	300 E
GF15-5	0.00	5.45	Ov	-45	-3.85	500 W
GF15-6	0.00	11.90	Ov	-45	-8.41	450 W
GF15-7	0.00	9.50	OV	-65	-8.61	450 W
GF15-8	0.00	12.00	OV	-45	-8.49	400 W
GF15-9	0.00	18.00	OV	-45	-12.73	300 W
GF15-10	0.00	6.80	OV	-45	-4.81	300 W
GF15-11	0.00	10.00	OV	-45	-7.07	200 W
GF15-12	0.00	5.10	OVB	-45	-3.61	100 W
GF15-13	0.00	6.75	OV	-45	-4.77	0.00
GF15-14	0.00	3.00	MT	-45	-2.12	400 E
GF15-15	0.00	1.80	OV	-45	-1.27	500 E
GF15-16	0.00	3.90	OV	-45	-2.76	600 E
GF15-17	0.00	6.50	Ov	-45	-4.60	700 E
GF15-18	0.00	6.60	OV	-45	-4.67	800 E
GF15-19	0.00	5.85	Ov	-45	-4.14	900 E
GF15-20	0.00	2.20	OV	-45	-1.56	1000 E
GF15-21	0.00	6.90	OV	-45	-4.88	250 W
GF15-22	0.00	8.00	OV	-45	-5.66	1100 E
GF15-23	0.00	15.00	OV	-45	-10.61	350 W
GF15-24	0.00	12.70	Ov	-45	-8.98	500 E
GF15-25	0.00	5.40	OV	-45	-3.82	150 W
GF15-26	0.00	3.80	Ov	-45	-2.69	400 E
GF15-27	0.00	6.00	Ov	-45	-4.24	100 E
GF15-28	0.00	6.00	OV	-55	-4.91	150 W
GF15-29	0.00	9.35	OV	-45	-6.61	0.00
GF15-30	0.00	3.95	OV	-45	-2.79	50 W
GF15-31	0.00	4.00	OV	-45	-2.83	200 E
GF15-32	0.00	6.60	OV	-45	-4.67	50 E
GF15-33	0.00	8.80	OV	-45	-6.22	1200 E
GF15-34	0.00	4.50	OV	-45	-3.18	50 E
GF15-35B	0.00	12.50	OV	-45	-8.84	1300 E
GF15-36	0.00	6.60	OV	-45	-4.67	1100 E
GF15-37	0.00	3.35	OV	-45	-2.37	100 E
GF15-38	0.00	3.00	OV	-55	-2.46	700 E
GF15-39	0.00	0.30	OV	-45	-0.21	100 W
GF15-40	0.00	2.50	OV	-45	-1.77	760 E
GF15-41	0.00	3.40	OV	-45	-2.40	850 E
GF15-42	0.00	9.30	OV	-45	-6.58	450 W
GF15-43	0.00	3.40	Ov	-55	-2.79	800 E

Hole ID	From (m)	To (m)	Description	Dip	O/B Depth	Section
GF15-44	0.00	5.00	OV	-45	-3.54	900 E
GF15-45	0.00	6.20	OV	-55	-5.08	400 W
GF15-46	0.00	3.80	OV	-45	-2.69	950 E
GF15-47	0.00	4.70	OV	-50	-3.60	350 W
GF15-48	0.00	3.00	OV	-55	-2.46	1000 E
GF15-49	0.00	7.85	OV	-50	-6.01	250 W
GF15-50	0.00	2.60	OV	-55	-2.13	750 E
GF15-51A	0.00	12.35	OV	-45	-8.73	200 W
GF15-52	0.00	3.00	OV	-50	-2.30	850 E
GF15-53	0.00	1.60	OV	-45	-1.13	100 W
GF15-54	0.00	3.00	OV	-50	-2.30	950 E
GF15-55	0.00	3.90	OV	-45	-2.76	1050 E
GF15-56	0.00	3.70	OV	-50	-2.83	1100 E
GF15-57	0.00	3.00	OV	-45	-2.12	1400 E
GF15-58	0.00	6.45	OV	-50	-4.94	1200 E
GF15-59	0.00	6.65	OV	-45	-4.70	1050 E
GF15-60	0.00	10.20	OV	-45	-7.21	450 W
GF15-61	0.00	6.95	Ov	-45	-4.91	0.00
GF15-62	0.00	3.50	OV	-45	-2.47	950 E
GF15-63	0.00	6.40	OV	-50	-4.90	50 W
GF15-64	0.00	3.00	OV	-90	-3.00	950 E
GF15-65	0.00	8.70	OV	-45	-6.15	100 W
GF15-66	0.00	10.00	OV	-90	-10.00	200 W
GF15-67	0.00	6.90	OV	-50	-5.29	400 E
GF15-68	0.00	18.00	OV	-50	-13.79	500 E
GF15-69	0.00	12.45	OV	-50	-9.54	300 E
GF15-70	0.00	7.00	OV	-50	-5.36	200 E
GF15-71	0.00	6.00	OV	-50	-4.60	100 E

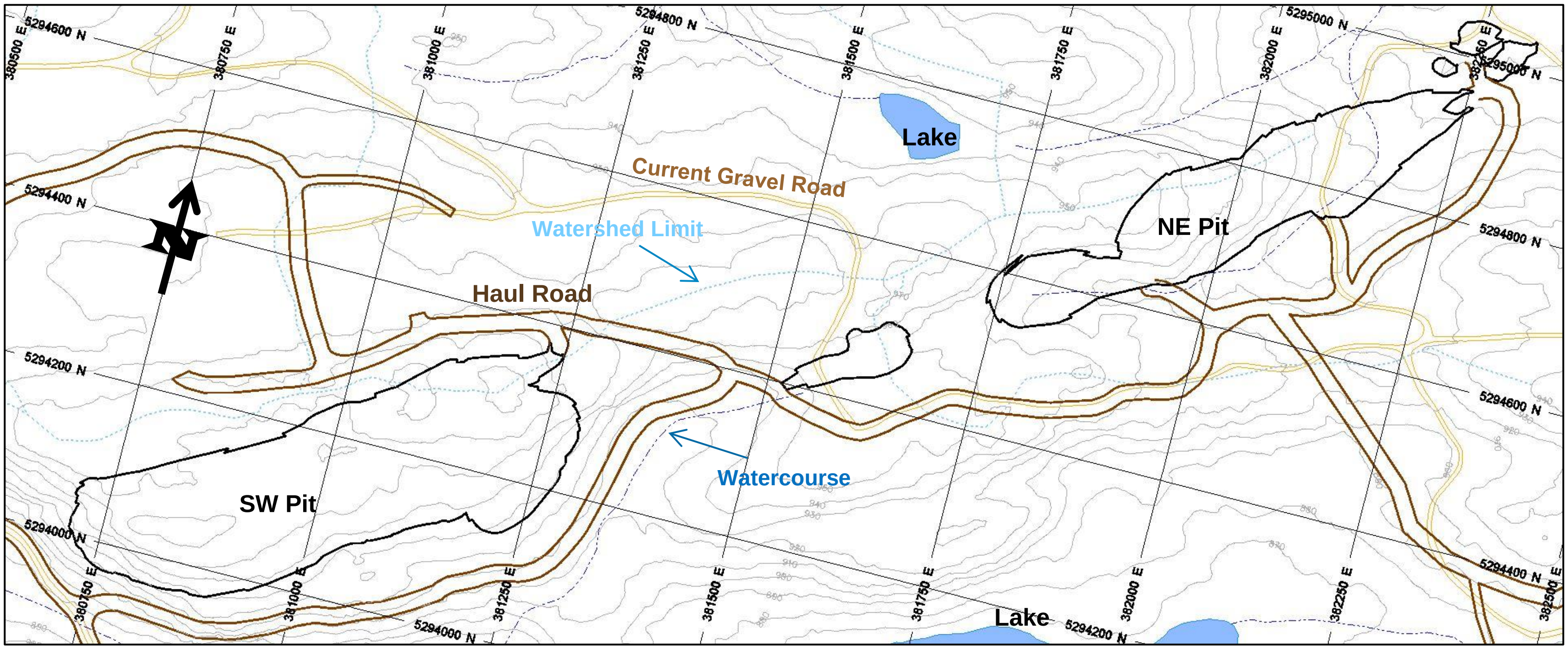
Ave OB Depth -4.73

SW Pit							
	Length (m)	Width (m)	OB (t)	SG OB	Vol (m3)	Area (m2)	Ave OB Depth (m)
	614.00	185.00	1,147,000	1.8	637,222	113,590	5.61
CN Pit							
	Length (m)	Width (m)	OB (t)	SG OB	Vol (m3)	Area (m2)	Ave OB Depth (m)
	400.00	185.00	337,000	1.8	187,222	74,000	2.53

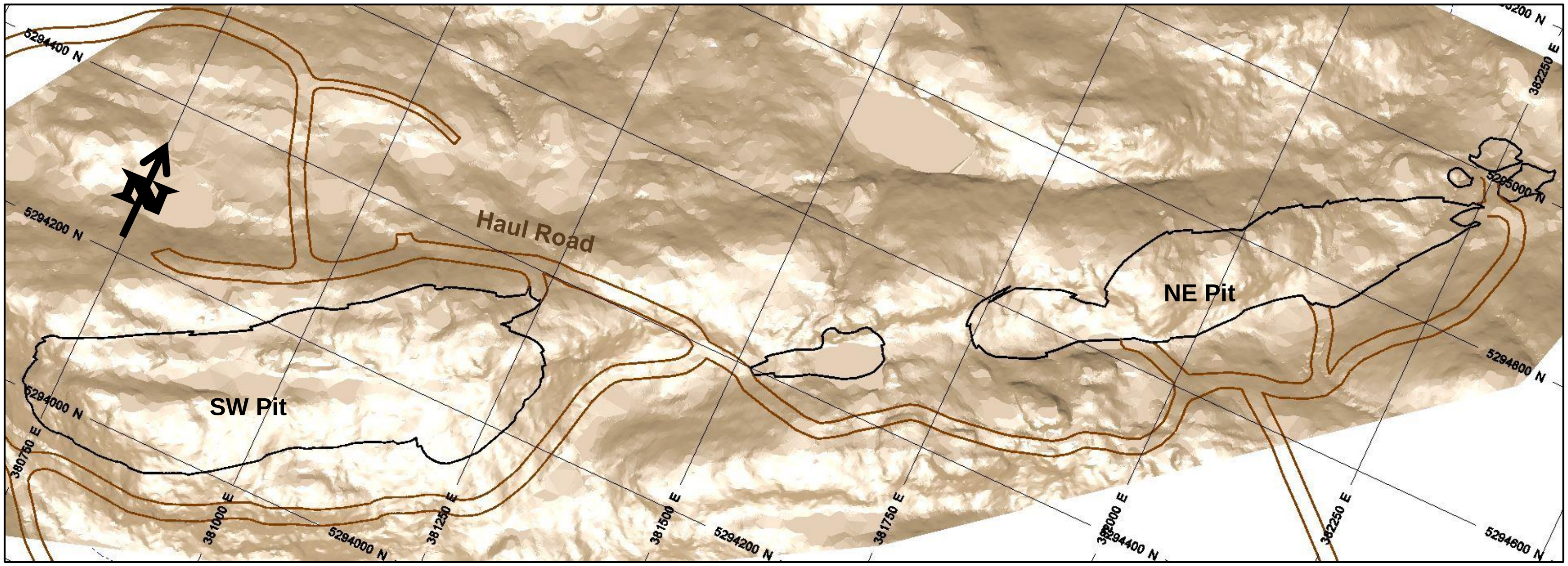
APPENDIX B3

MINE DESIGN MAPS

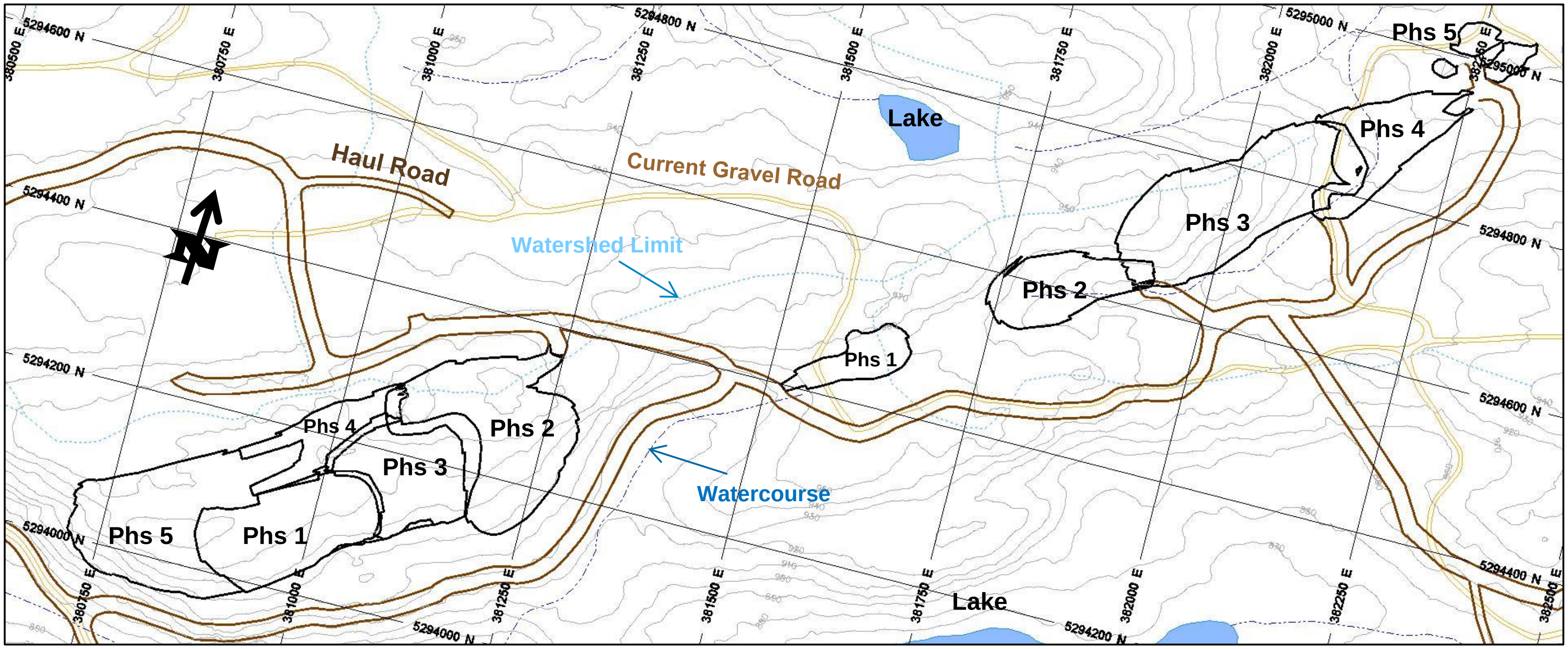
Mine Layout with SW & NE Pit Limits (10 m Contours)



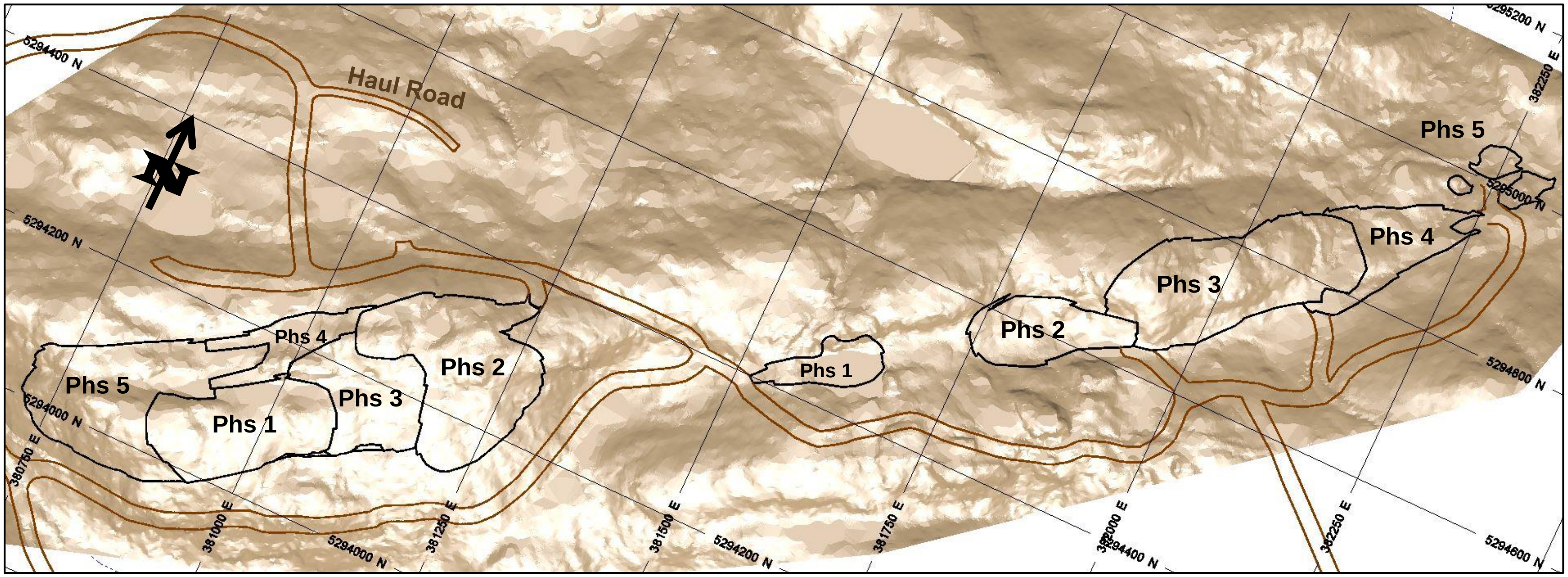
Mine Layout with SW & NE Pit Limits (3D Topography)



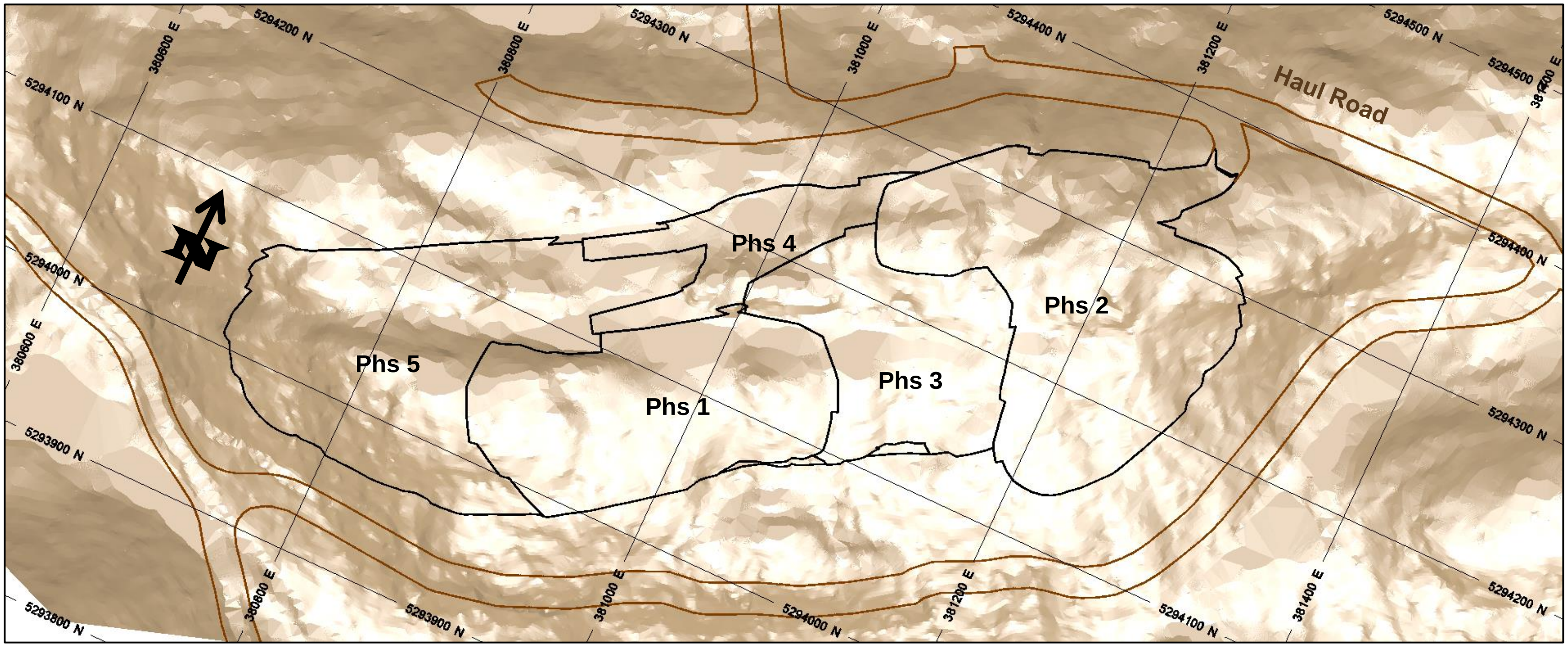
Mine Layout with SW & NE Phased Pit Limits (10 m Contours)



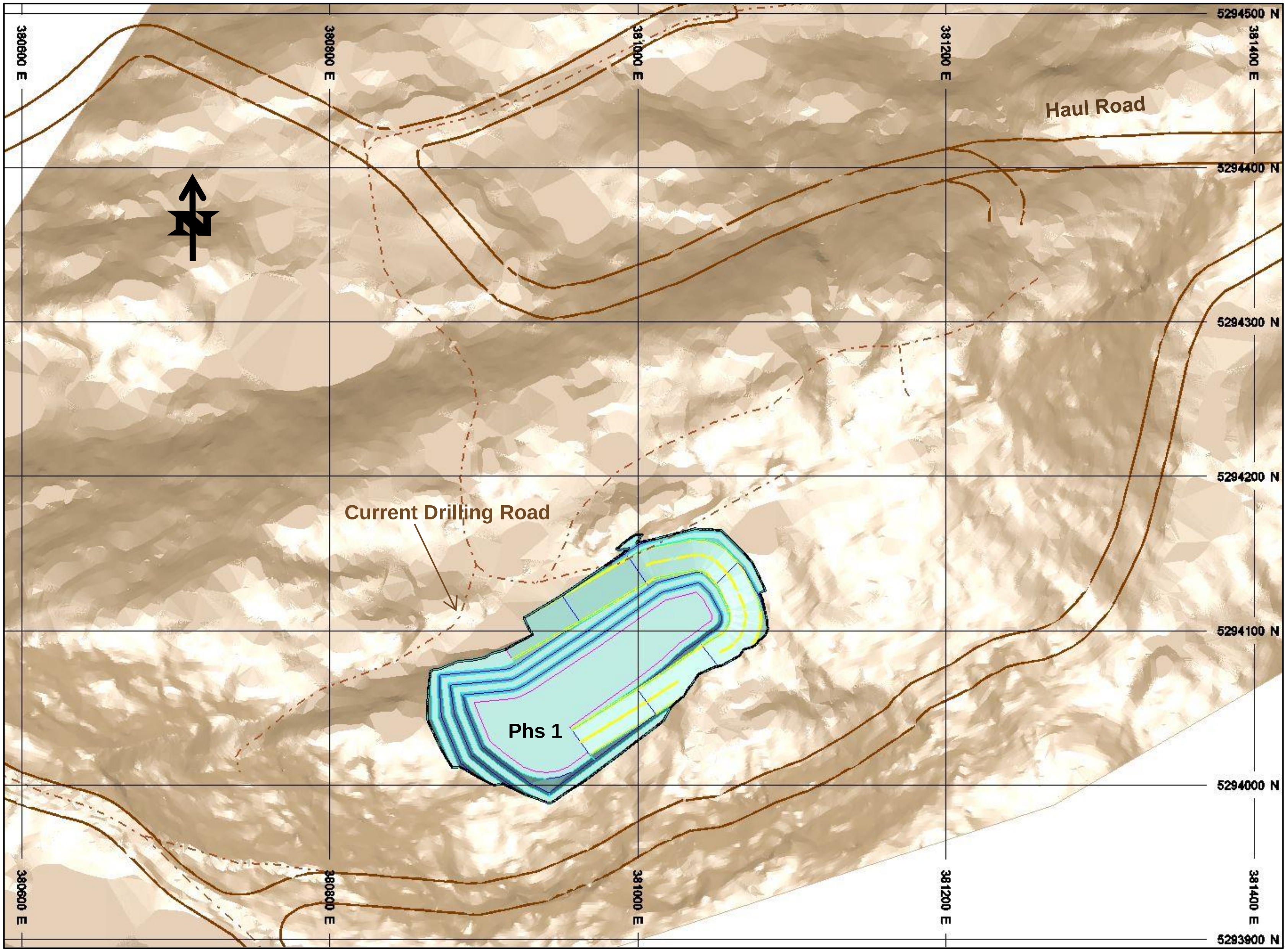
Mine Layout with SW & NE Phased Pit Limits (3D Topography)



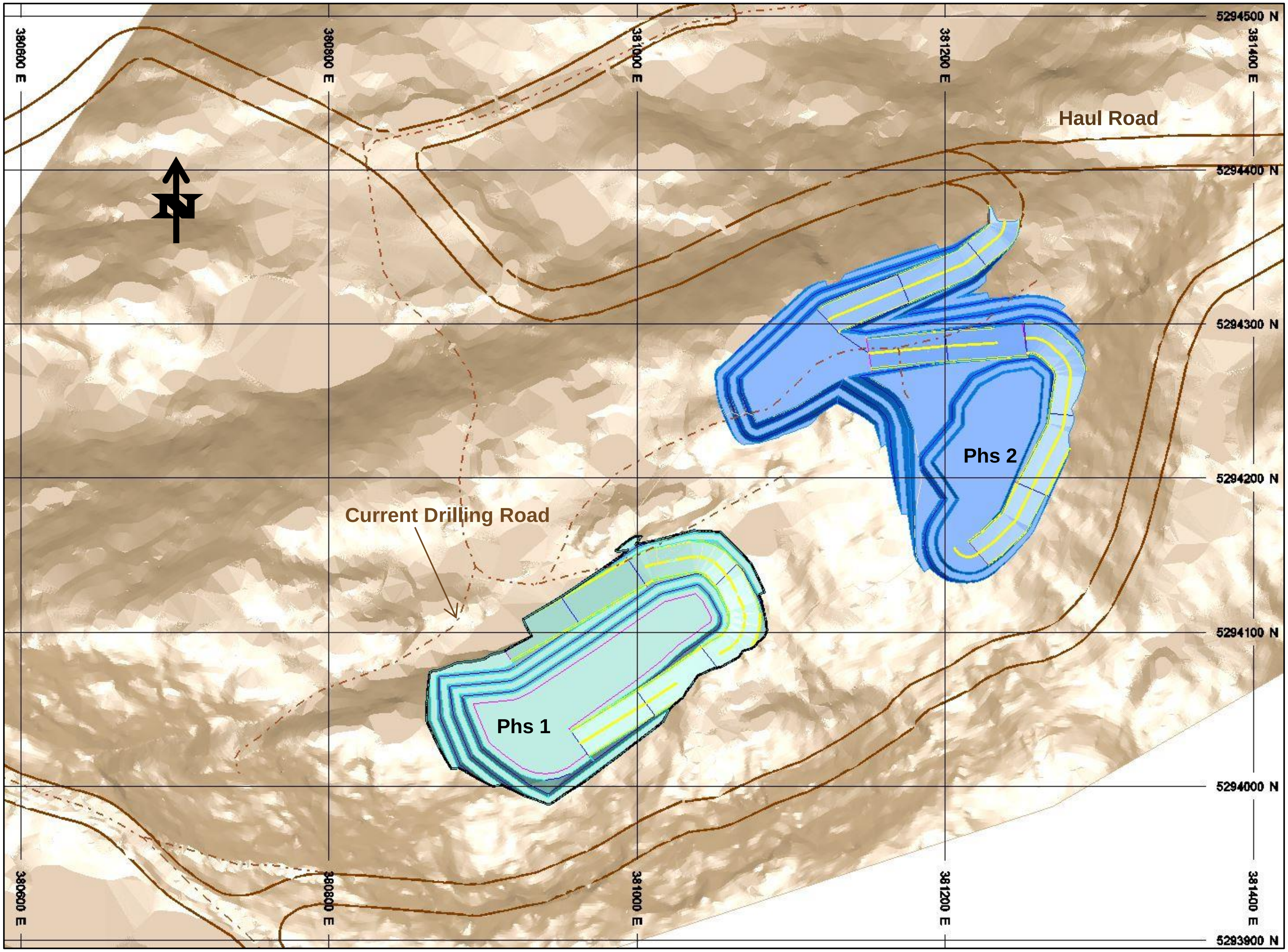
SW Phased Pit Limits (3D Topography)



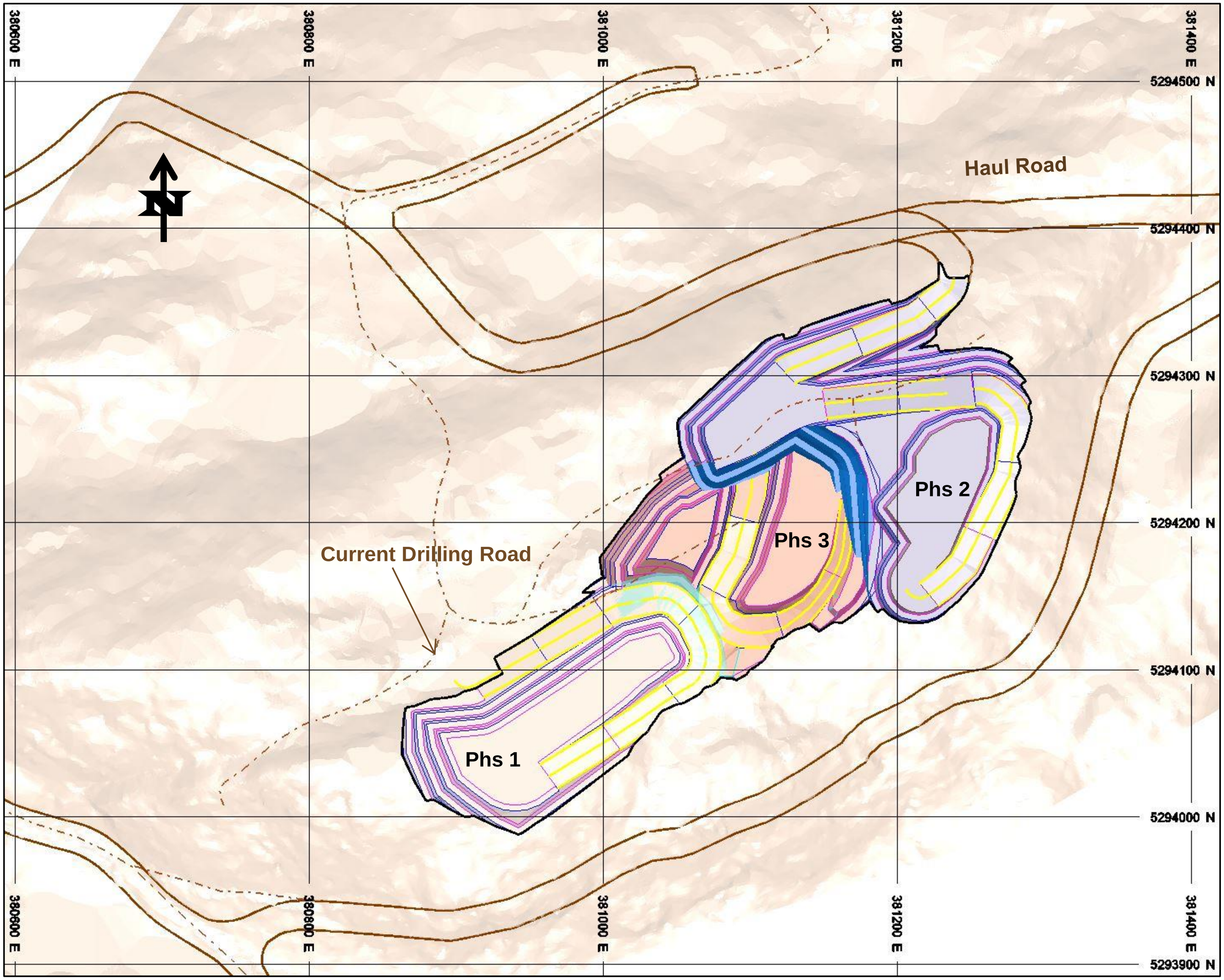
SW Phase 1 Pit Design



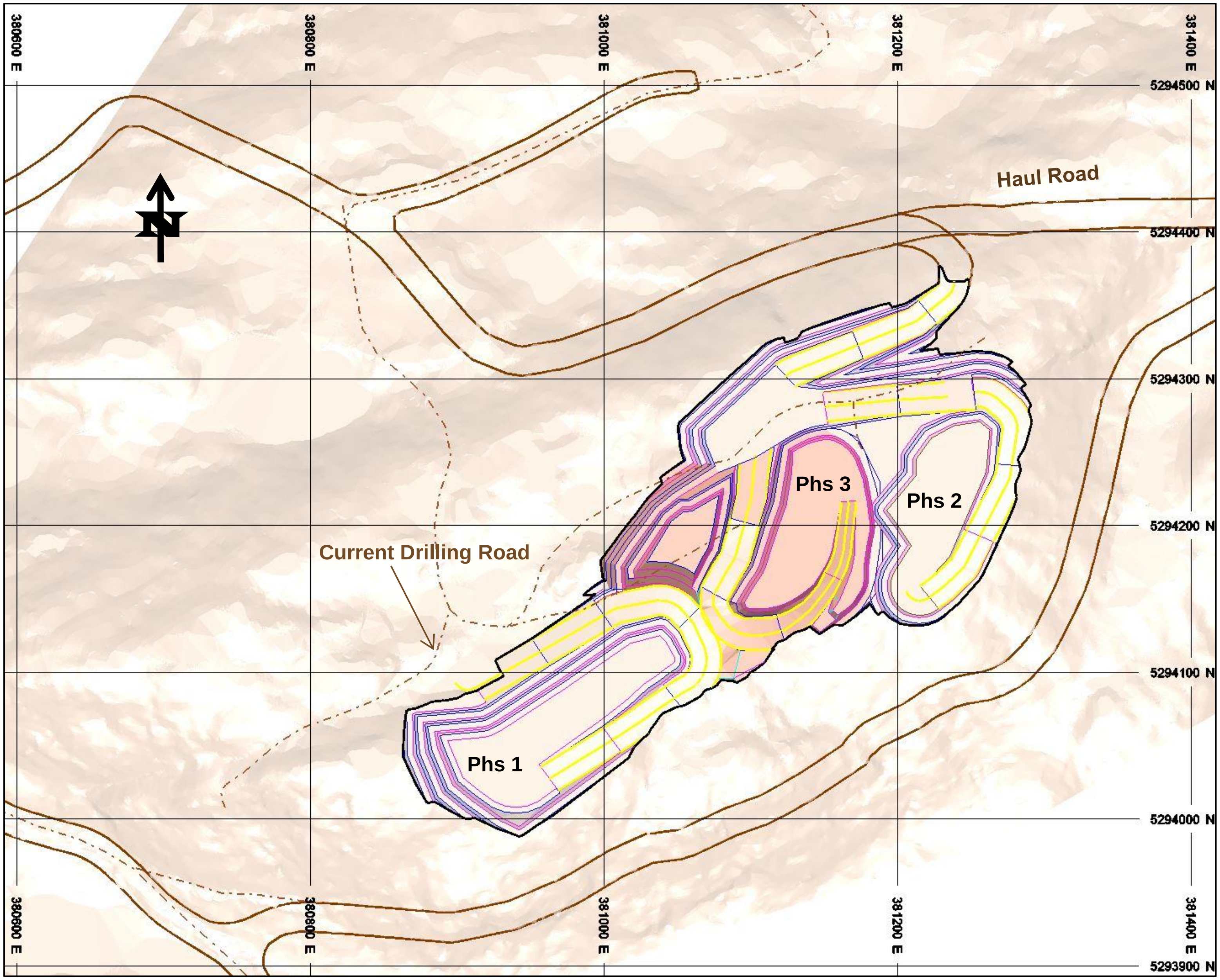
SW Phase 1 & 2 Pit Design



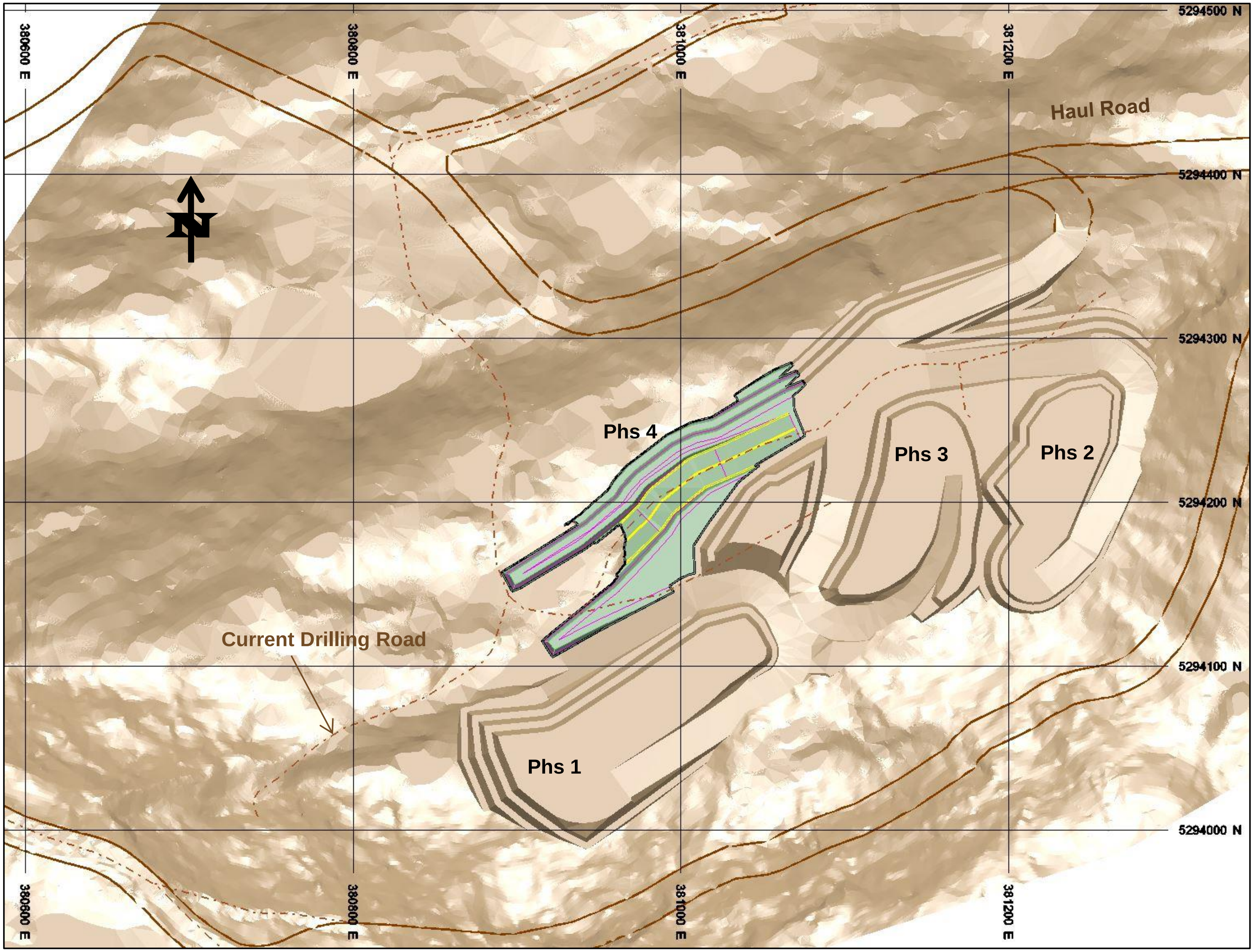
SW Phase 1 – 3 Pit Design & Pit Limits (with Phase Overlaps)



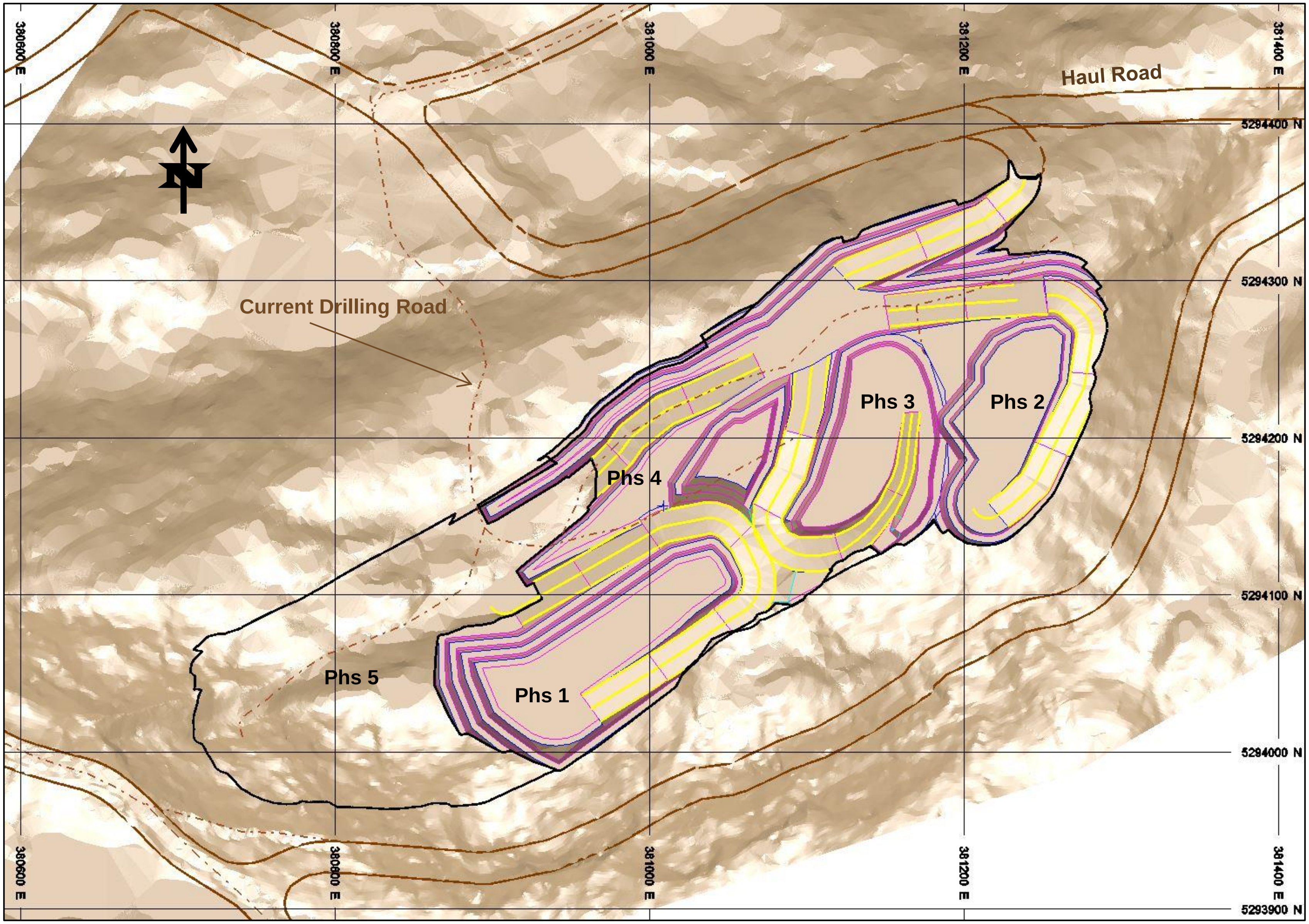
SW Phase 1 – 3 Pit Design & Pit Limits (without Overlap)



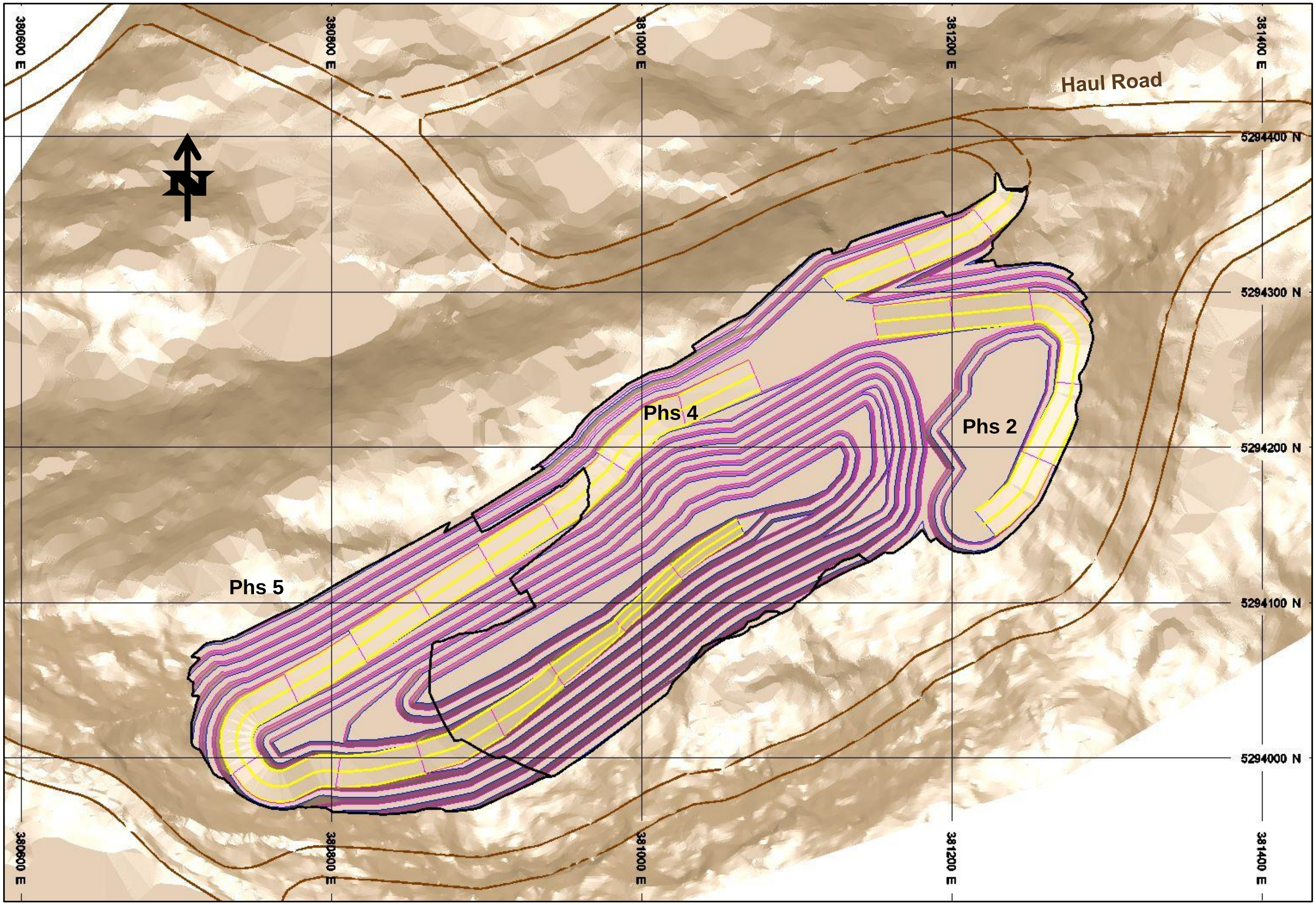
SW Phase 4 Pit Design (with Phase 1-3 Mined Out)



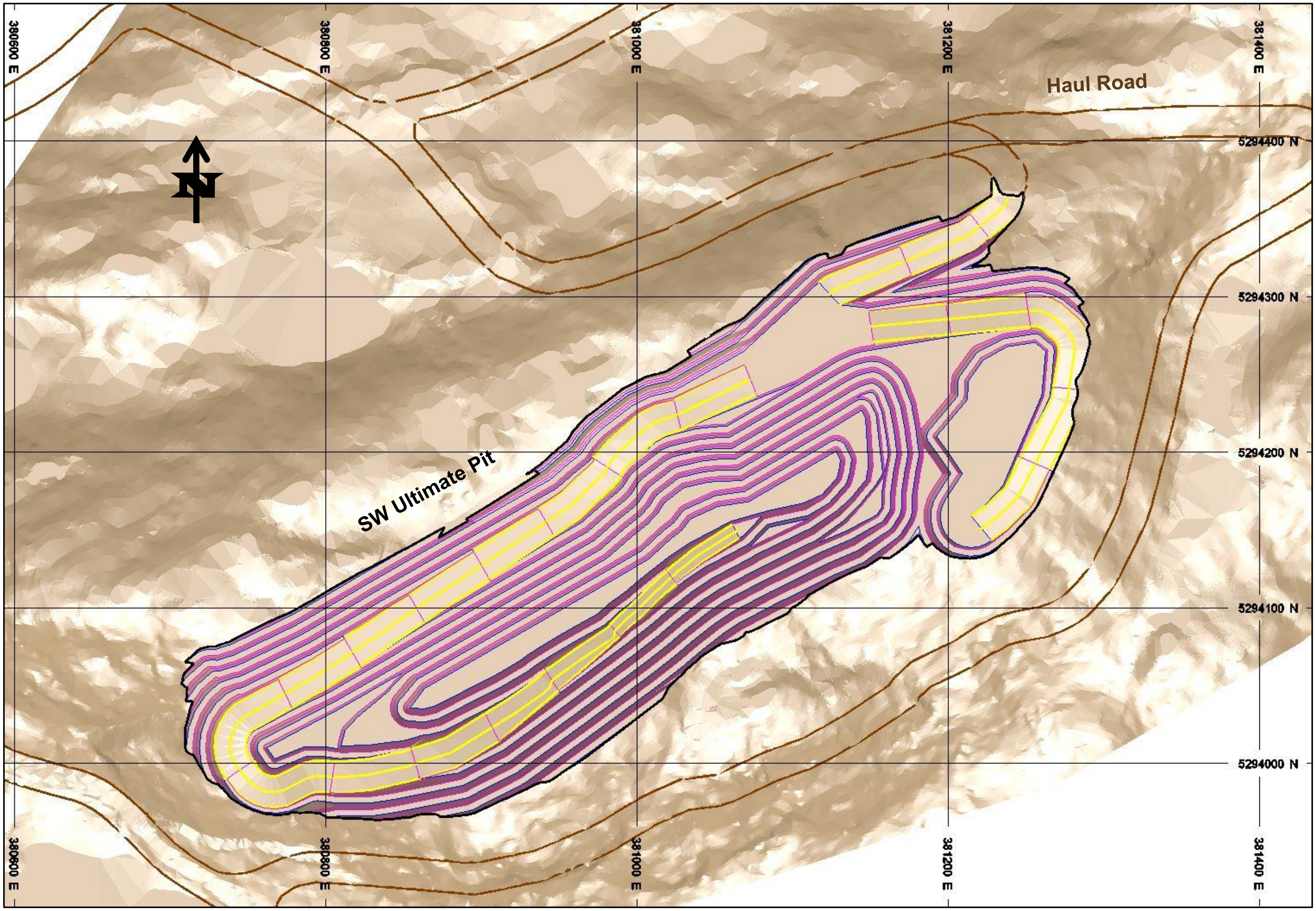
SW Phase 1 - 4 Pit Design & Pit Limits



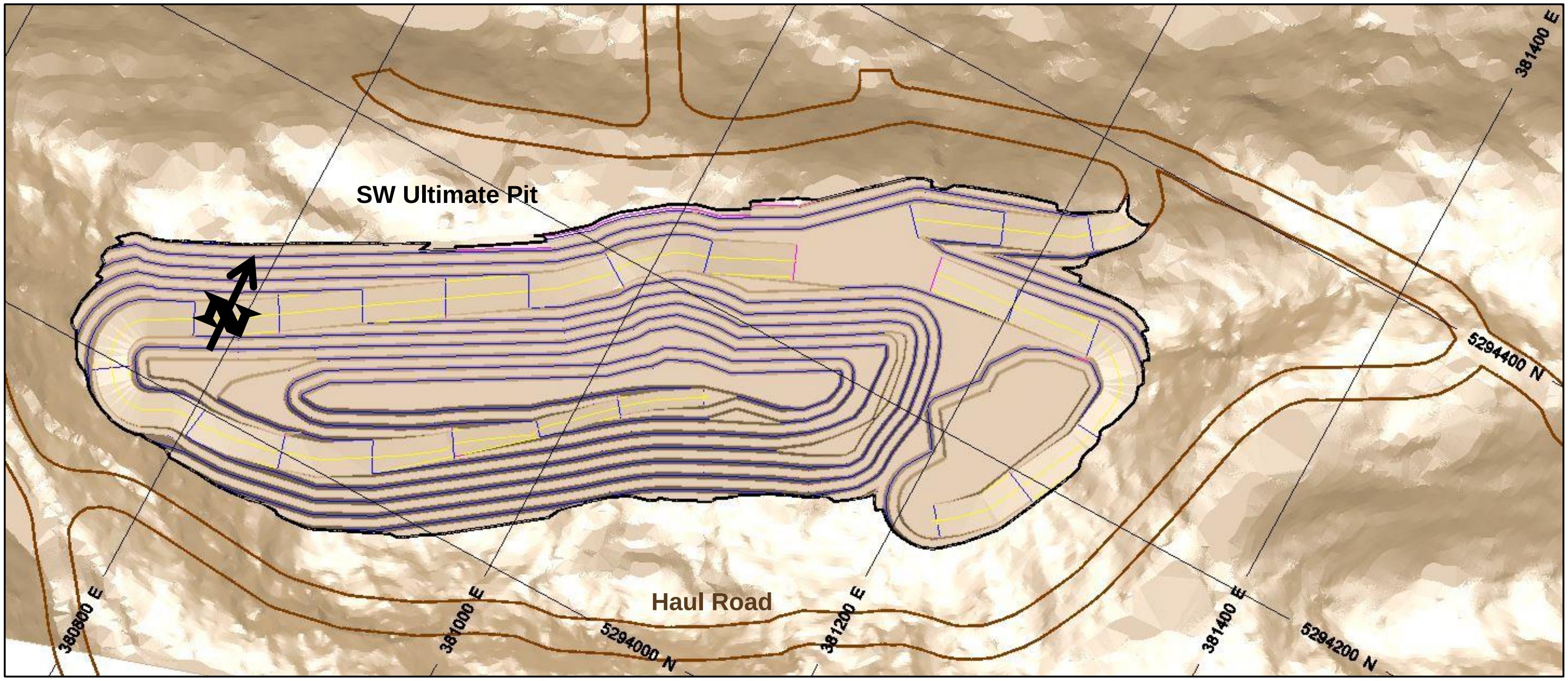
SW Phase 5 (Ultimate) Pit Design & Phases 1-4 Limits



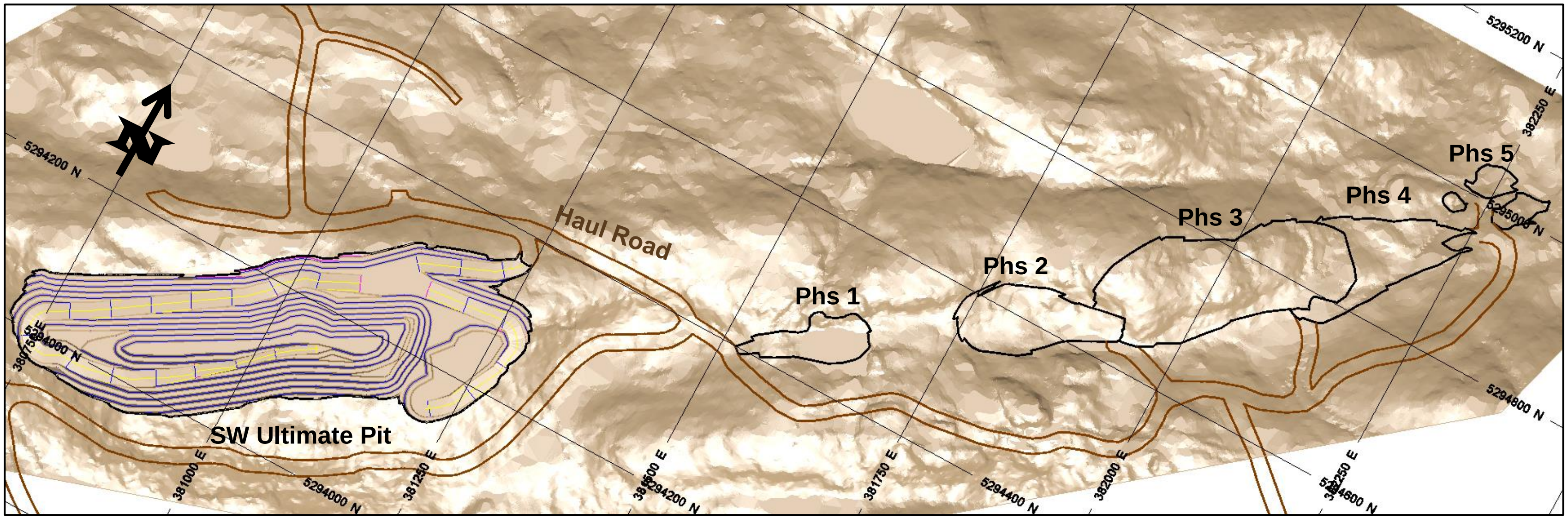
SW Ultimate Pit Design & Final Pit Limit



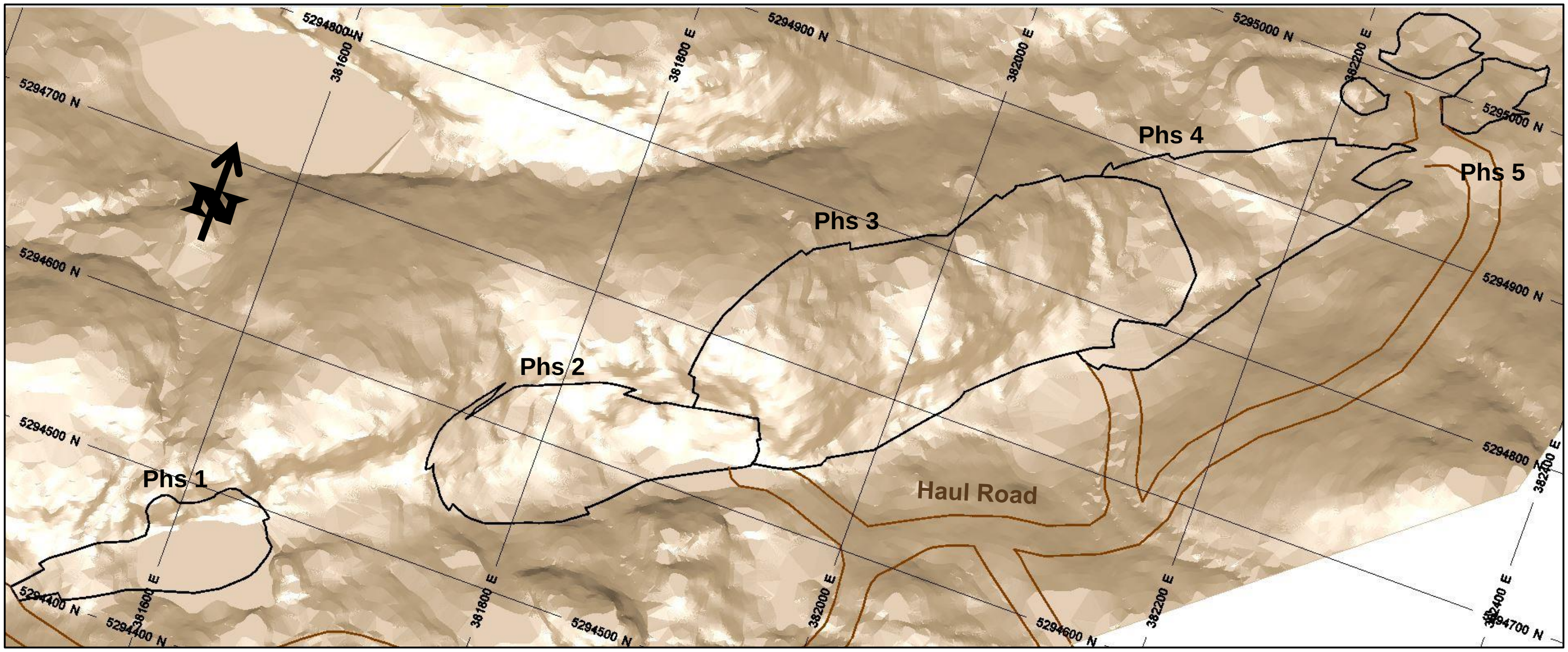
SW Ultimate Pit Design & Final Pit Limit



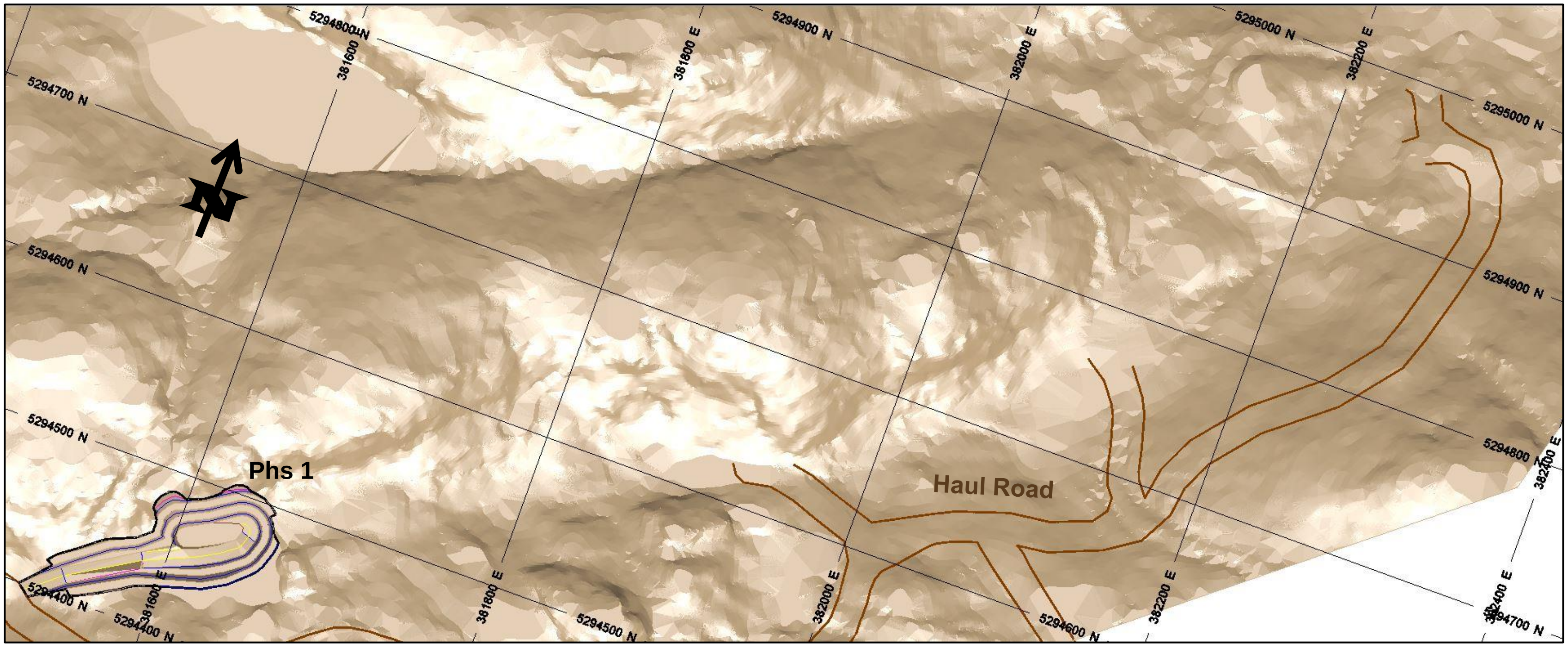
SW Ultimate Pit Design & NE Phased Pit Limits



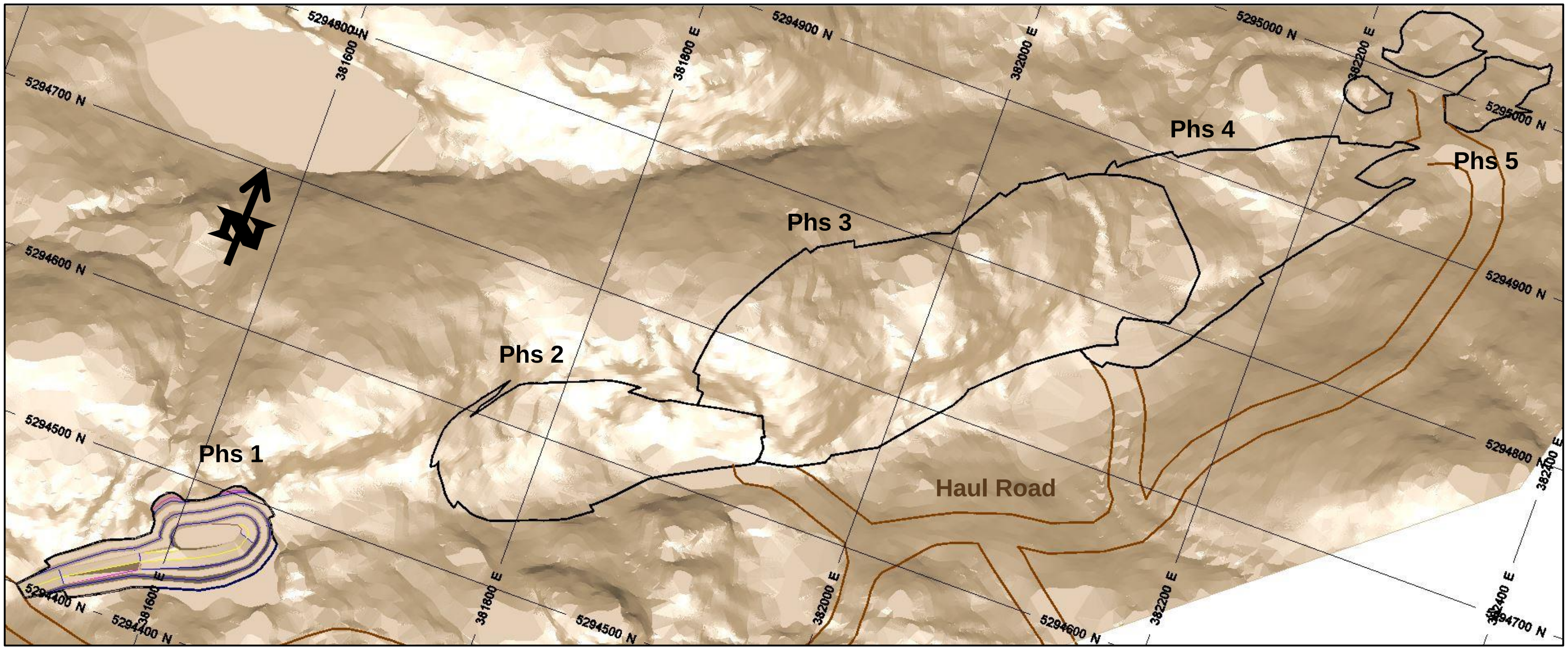
NE Phased Pit Limits



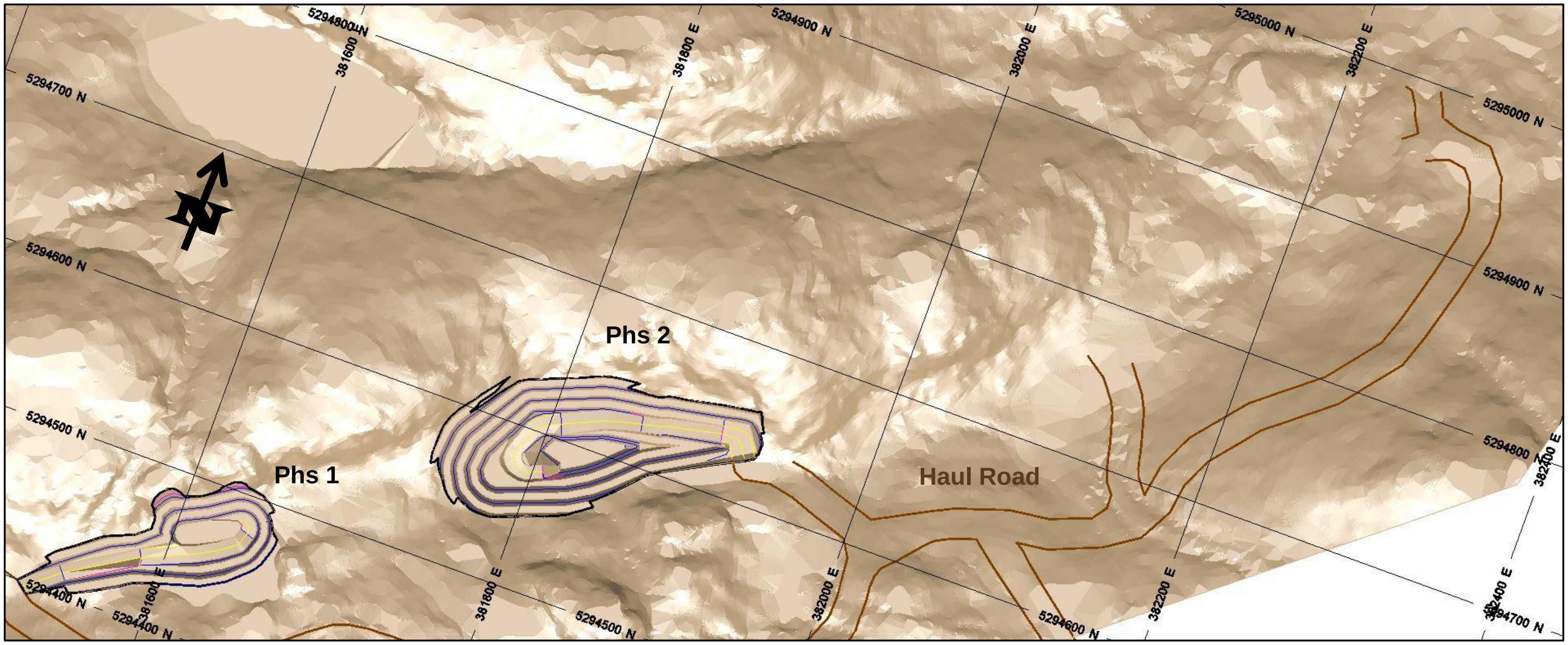
NE Phase 1 Pit Design



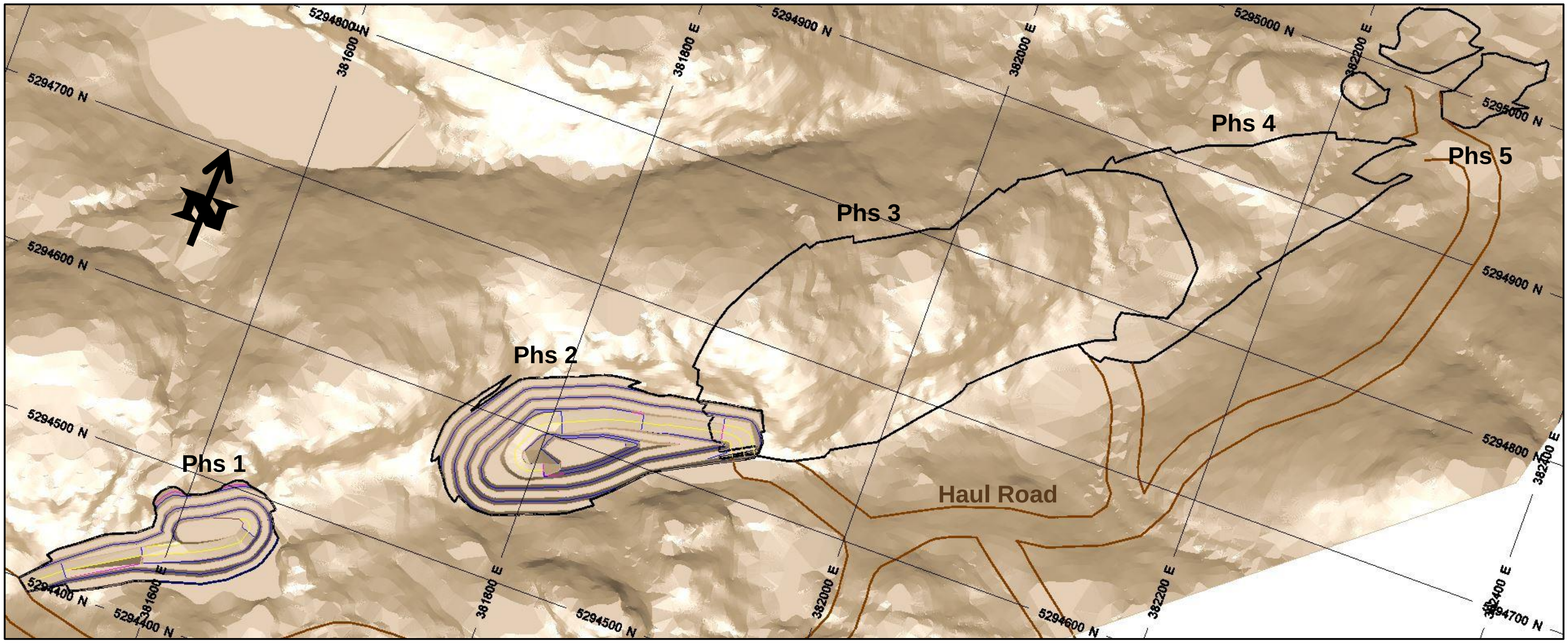
NE Phase 1 Pit Design & Phased Pit Limits



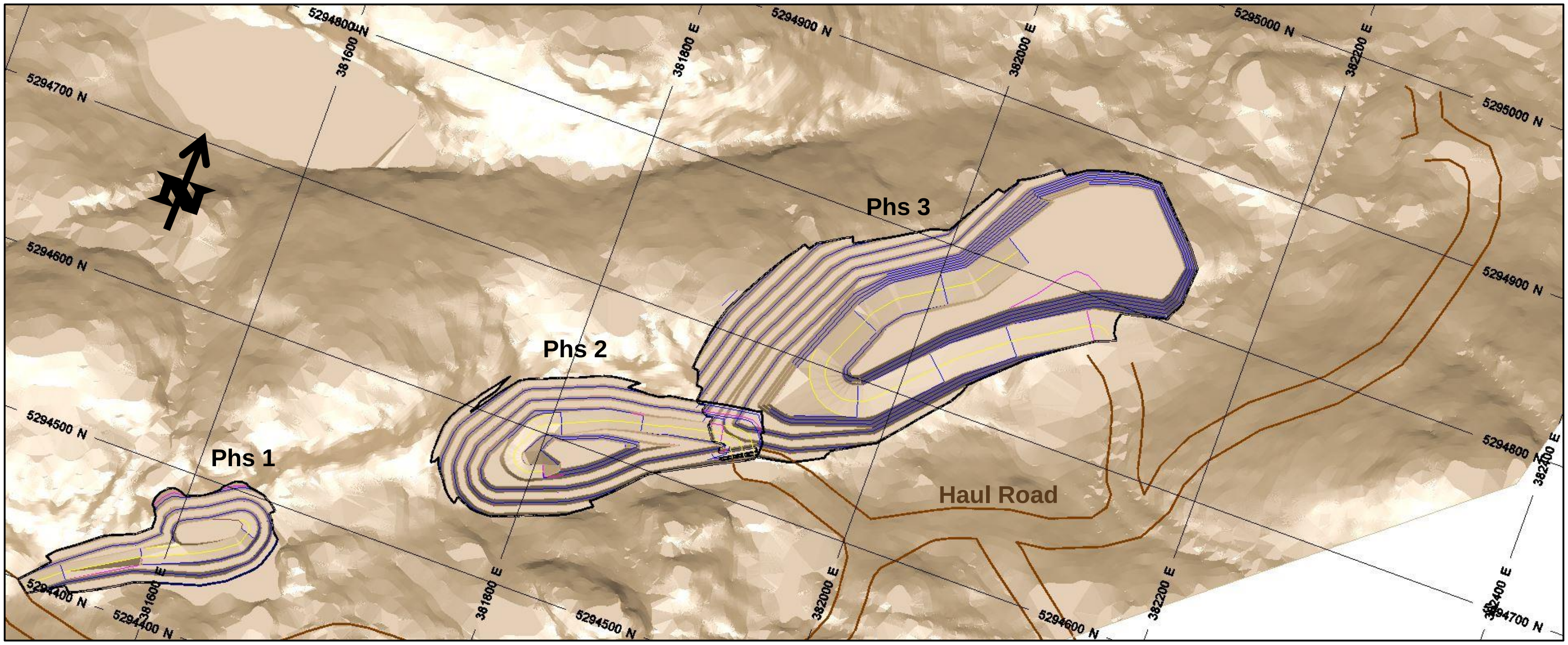
NE Phase 1 -2 Pit Design



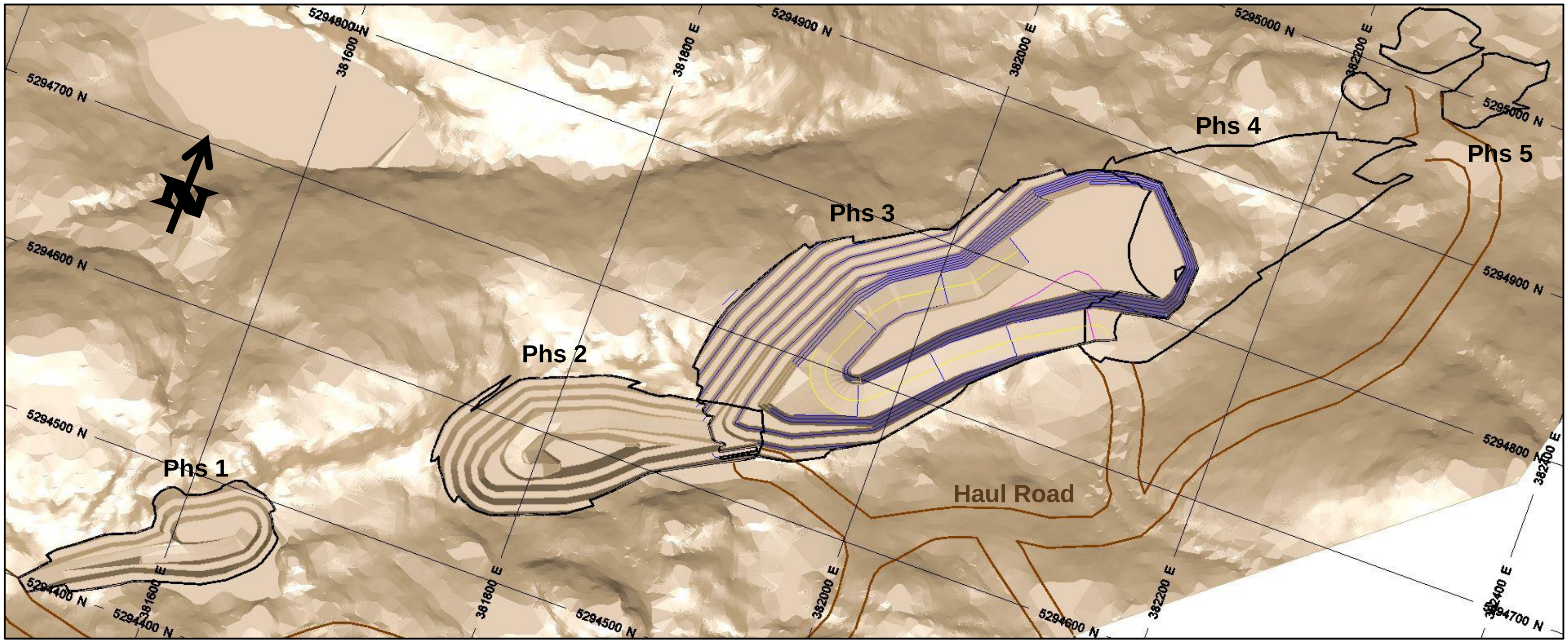
NE Phase 1 -2 Pit Design & Phased Pit Limits



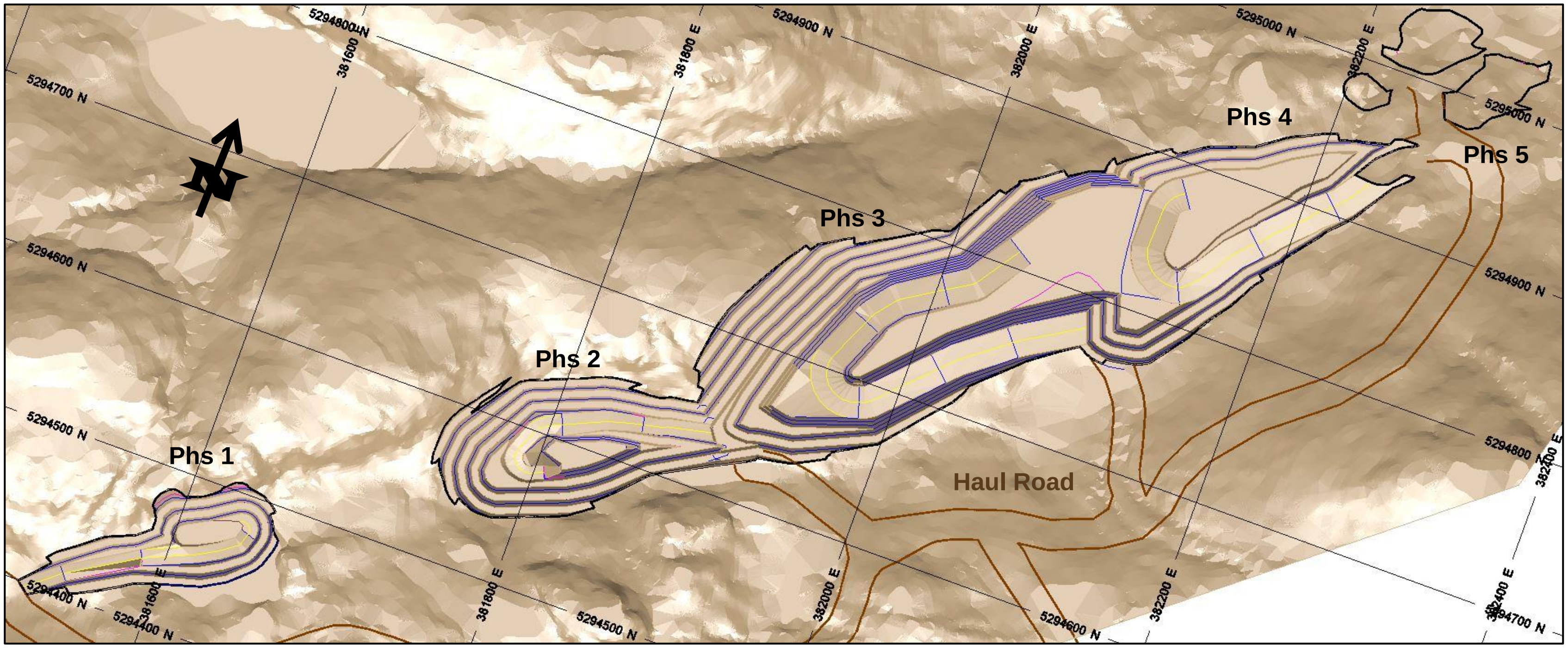
NE Phase 1 -3 Pit Design



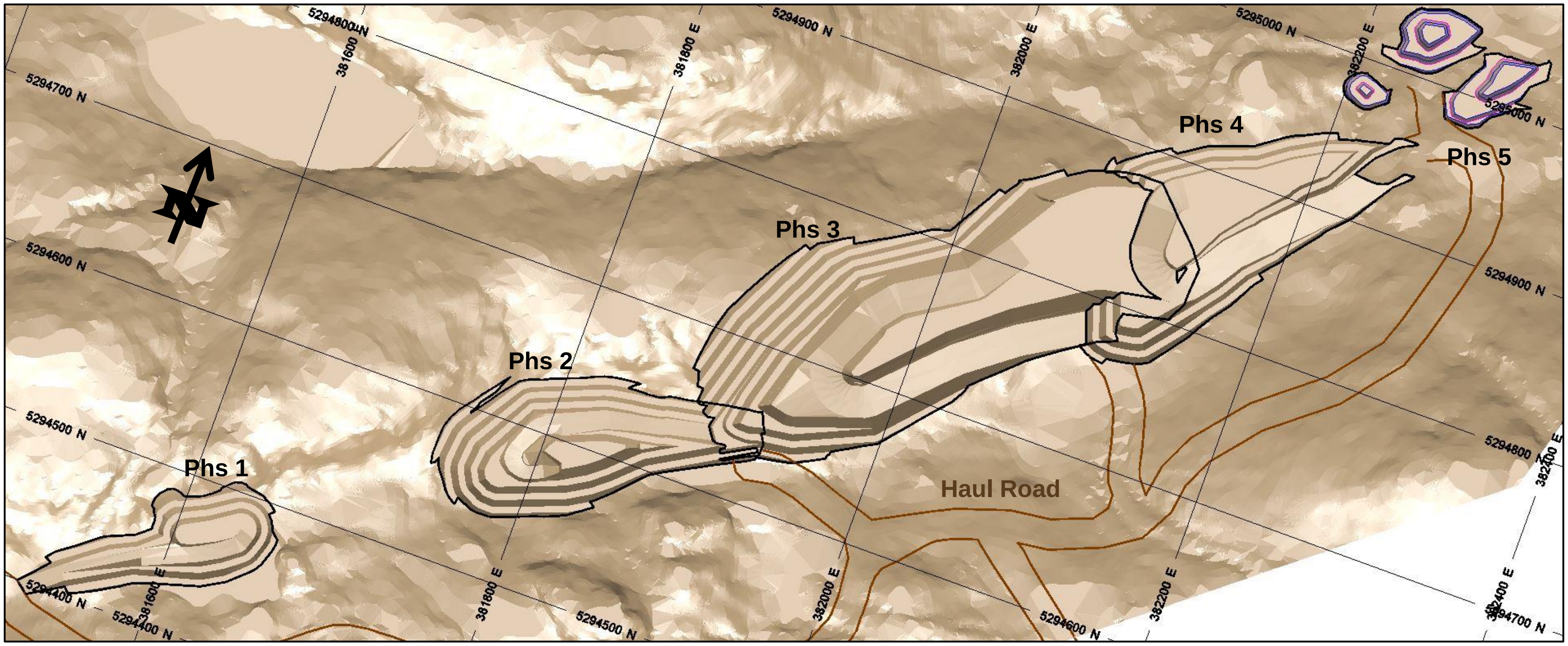
NE Phase 1 -3 Pit Design & Phased Pit Limits



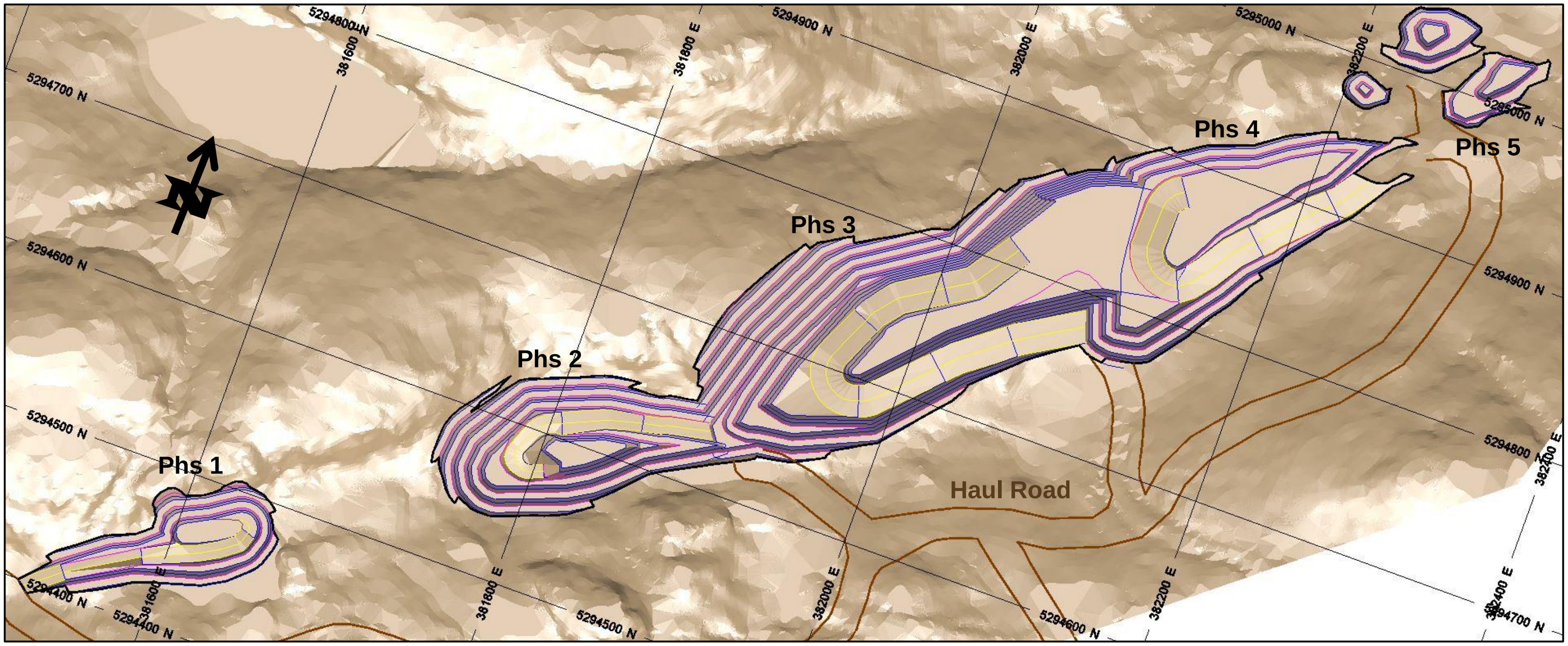
NE Phase 1 -4 Pit Design & Phased Pit Limits



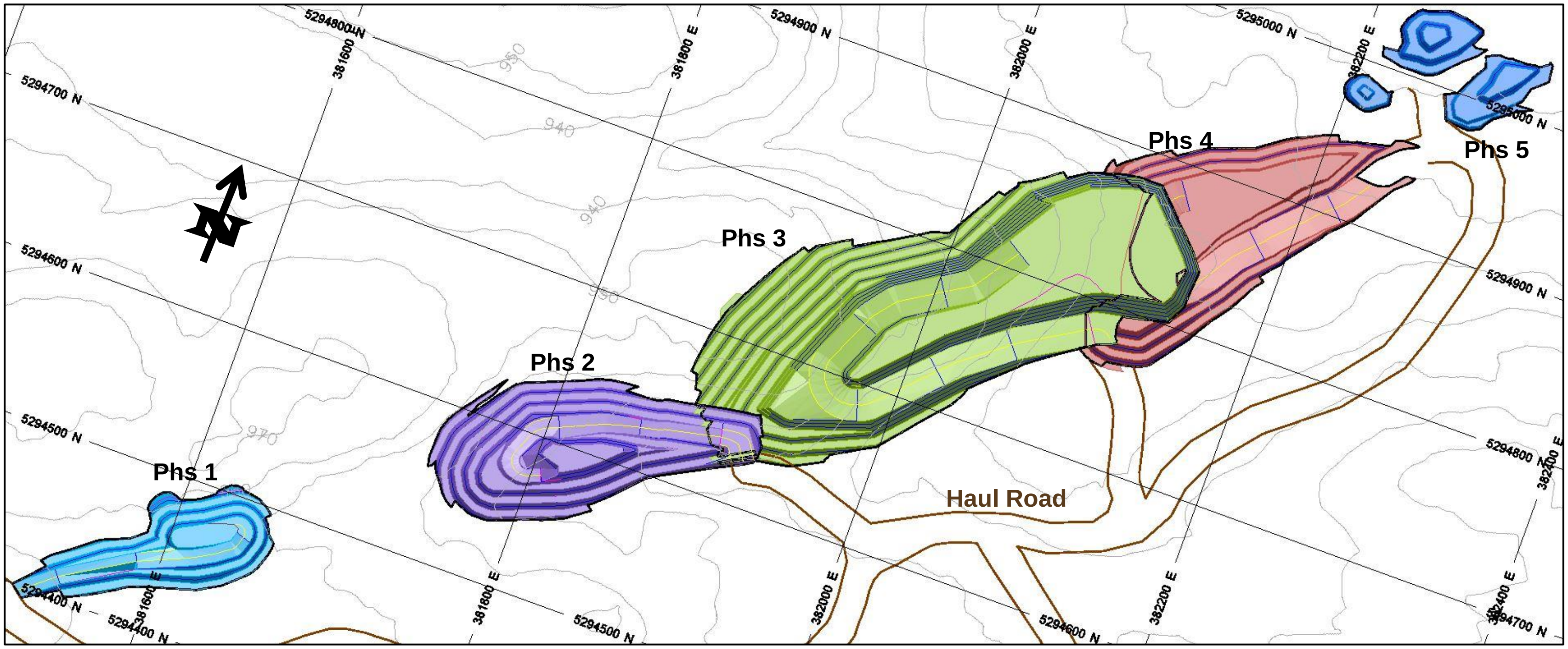
NE Phase 1 -4 Pit Design & Phased Pit Limits



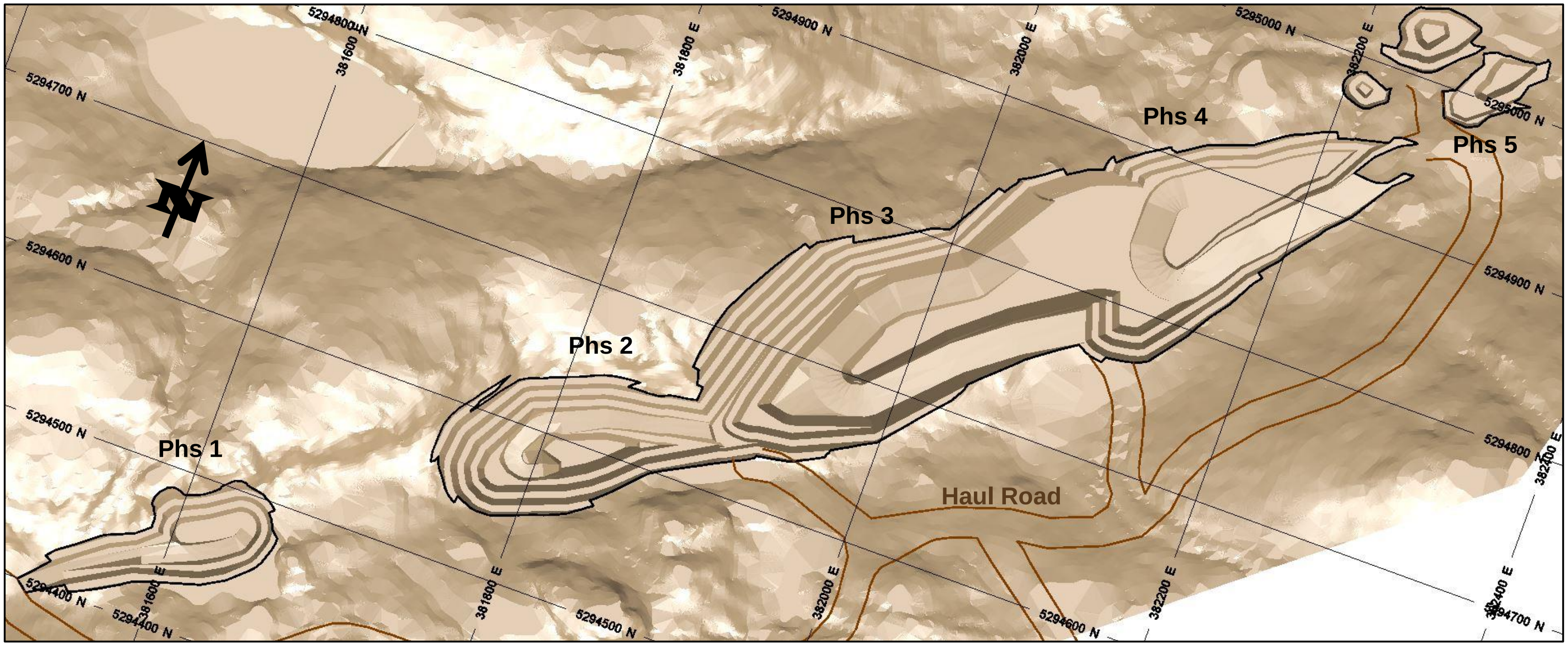
NE Phase 1 -5 (Ultimate) Pit Design & Final Pit Limit



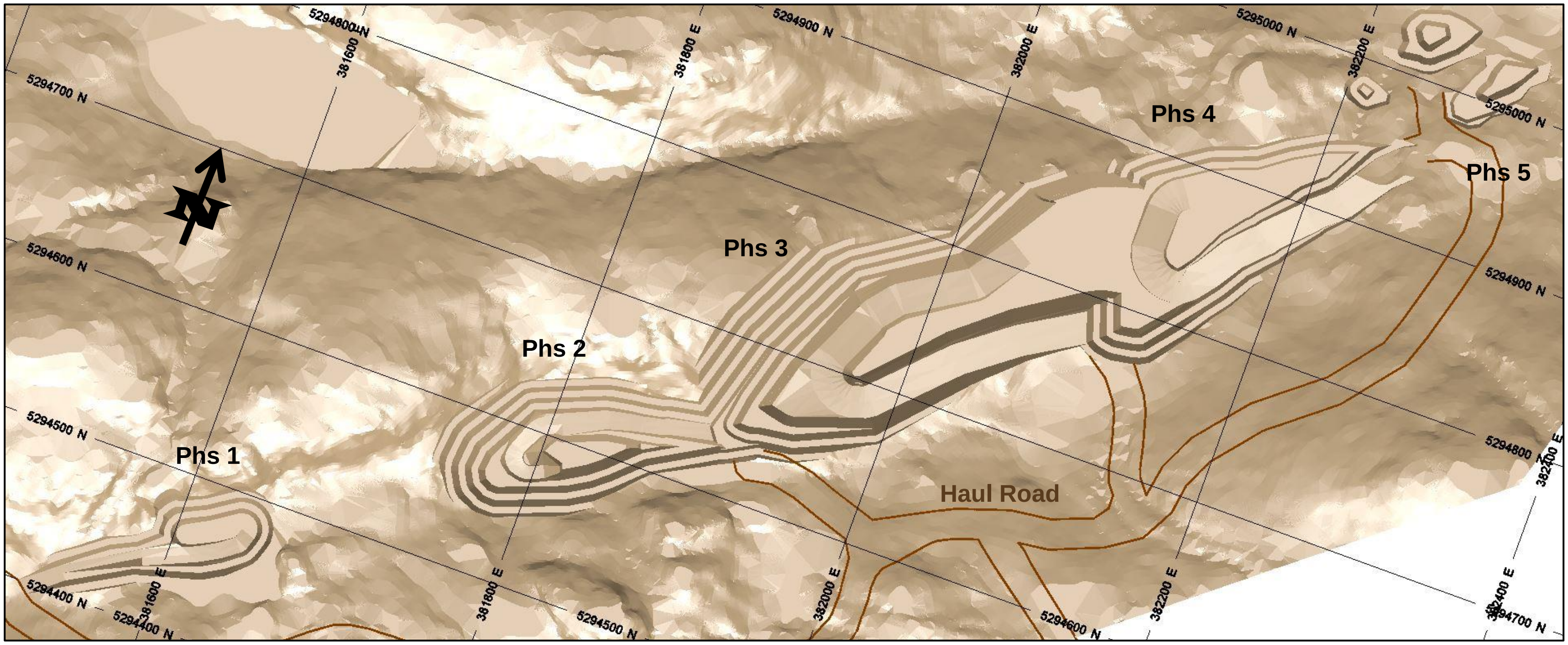
NE Phase 1 -5 Pit Designs & Phases Pit Limits (10 m Contours)



NE Ultimate Pit Design & Final Pit Limit



NE Ultimate Pit Design Mined Out (without Pit Limit)



APPENDIX C

CAPEX

	Capital Cost Estimate	Revision #	Revision Date	Page
SNC·LAVALIN	643844-0000-33KC-0001	EPA	2017/03/20	i

SILICONE RIDGE PROJECT

CLIENT: **ROGUE RESOURCES**

PROJET: **SILICONE RIDGE PROJECT**

SITE: **BAIE SAINT-PAUL, QUÉBEC, CANADA**

Prepared by Marc-André Bergeron
Gestionnaire en contrôle projet, M&M
Date:

Revised by James Alarcon
Chef estimateur, M&M
Date:

Revised by Henri Sangam
Directeur de projet
Date:

Approved by
Client
Date:

SILICONE RIDGE PROJECT

REVISION LIST

Revision					Revised Pages	Remarks
No.	**By**	**Rev.**	**App.**	**Date**		
EPA	MAB	JA	HS	March 20, 2017		For internal comments

INSTRUCTIONS TO PRINT CONTROL (Indicate X where applicable)

X	Entire document revised. Reissue all pages
	Reissue revised pages only

STAMP THE SPECIFICATION AS FOLLOWS

X	Issued for internal and management review
	Issued for client review and comments
	Released to client for PEA Estimate

SNC·LAVALIN

Date
2017/03/20

SILICONE RIDGE PROJECT

SILICONE RIDGE PROJECT

Summary by WBS

WBS	Description	TOTAL
DIRECT COST		
1000	Silicone Ridge Project	198,800 $
1100	Infrastructure Area	418,664 $
1200	Low Grade Stockpile Area	17,575 $
1300	Wasterock Stockpile Area	15,983 $
1400	Overburden Stockpile Area	23,718 $
1500	Mine Site Roads Construction	136,988 $
1600	Access Roads Construction / Upgrade	692,638 $
1700	Southwest Quarry	538,915 $
	TOTAL DIRECT COST	**2,043,280 $**
INDIRECT COST		
9100	Construction Indirects	30,649 $
9200	EPCM	204,328 $
	TOTAL INDIRECT COST	**234,977 $**
OTHER COST		
9300	Owner's Cost	408,656 $
	TOTAL DIRECT + INDIRECT COST + OTHER COST	**2,686,913 $**
9900	Contingency	806,074 $
	CAPEX TOTAL	**3,492,987 $**
	Escalation	Excluded
	Risks	Excluded

Adjust EPCM costs down givem limited scope of project and management of project by Rogue
Reduced Owners cost to 10% given limited scope of project
Reduced Contingency to 20% given limited scope of project

Code du taux unitaire	Description	Unit Rate	PF	Unit
41A	Civil Works = Clearing & Grubbing	$5.38	1.0	m3
41B	Civil Works = Rockfill (0-300 mm)	$11.50	1.0	m3
41C	Civil Works = Overburden excavation	$5.38	1.0	m3
41D	Civil Works = Overburden stockpile	$0.94	1.0	m3
41E	Civil Works = Load / Haul Waste	$3.17	1.0	m3
41F	Civil Works = Existing road upgrade	$75,000.00	1.0	km
41G	Civil Works = Road construction	$90,000.00	1.0	km

Adjusted costs to Average Estimates Provided by St. Gelais and the Wendat and not the average Cost of all bids.

Direct Cost

	D	E	F	G	H	J	K	L	M	N	S	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AR	AS	AT	AU	AV	BQ	BR	BS	BT	BU	BV
1										137,969.17																		$0	$0	$41,832	$0	$2,001,448	$2,043,280
2	Estimate										01 - LI -	02 - E-P - Equipment Permanent						03 - M-P - Material Permanent					05 - S-C - Sub-contract Construction										
3	WBS	WBS Name	Item Code	Discipline	Discipline Nam	Add Description	UoM	Quantity	Growth Factor	Quantity - w/growth	Unit Co	Unit cost	UoM	Currency	Factor	Cost t	CP	Unit cost	UoM	Currency	Factor	Cost type	Unit cost	UoM	Currency	Factor	Cost type	LAB	EQP	MAT	SHOP FAB	SUB	TOT
4	1000	Silicone Ridge Project	41-001	41	Civil	Mobilization / Demobilization	LOT	1.00	1	1.00				CAD						CAD			8,800.00	LOT	CAD	1.0	B	$0	$0	$0	$0	$8,800	$8,800
5	1000	Silicone Ridge Project	41-002	41	Civil	Site supervision - 20 weeks of construction	UNIT	20.00	1	20.00				CAD						CAD			4,500.00	UNIT	CAD	1.0	B	$0	$0	$0	$0	$90,000	$90,000
6	1000	Silicone Ridge Project	41-003	41	Civil	Surveyor - 20 weeks of construction	UNIT	20.00	1	20.00				CAD						CAD			5,000.00	UNIT	CAD	1.0	B	$0	$0	$0	$0	$100,000	$100,000
7	1100	Infrastructure Area	41-004	41	Civil	Clear & Grub - Infrastructure Area - 0.3 m deep	m3	3,141.00	1.05	3,298.05	41A			CAD						CAD			5.38	m3	CAD	1.0	E	$0	$0	$0	$0	$17,744	$17,744
8	1100	Infrastructure Area	41-005	41	Civil	Load / Haul clearing - Infrastructure Area	m3	3,141.00	1.05	3,298.05	41E			CAD						CAD			3.17	m3	CAD	1.0	B	$0	$0	$0	$0	$10,455	$10,455
9	1100	Infrastructure Area	41-006	41	Civil	0-150 m stone - Infrastructure Area (from 10 km quarry)	m3	1,571.00	1.05	1,649.55	41B			CAD				10.00	m3	CAD	1.0	E	11.50	m3	CAD	1.0	E	$0	$0	$16,496	$0	$18,970	$35,465
10	1200	Low Grade Stockpile Area	41-007	41	Civil	Clear & Grub - Low grade stockpile - 0.3 m deep (including hauling and spreading)	m3	2,544.00	1.05	2,671.20	41A			CAD						CAD			5.38	m3	CAD	1.0	E	$0	$0	$0	$0	$14,371	$14,371
11	1200	Low Grade Stockpile Area	41-009	41	Civil	Diversion ditch excavation - Low grade stockpile - including Hauling and spreading	m3	518.00	1.05	543.90	41C			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$2,926	$2,926
12	1200	Low Grade Stockpile Area	41-011	41	Civil	Water structure area (fill) - Low grade stockpile	m3	281.00	1.05	295.05	41D			CAD						CAD			0.94	m3	CAD	1.0	B	$0	$0	$0	$0	$277	$277
13	1300	Wasterock Stockpile Area	41-012	41	Civil	Clear & Grub - Wasterock stockpile - 0.3 m deep (including hauling and spreading)	m3	2,611.00	1.05	2,741.55	41A			CAD						CAD			5.38	m3	CAD	1.0	E	$0	$0	$0	$0	$14,750	$14,750
14	1300	Wasterock Stockpile Area	41-014	41	Civil	Diversion ditch excavation - Wasterock stockpile -including Hauling and spreading	m3	185.00	1.05	194.25	41C			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$1,045	$1,045
15	1300	Wasterock Stockpile Area	41-016	41	Civil	Water structure area (fill) - Wasterock stockpile	m3	191.00	1.05	200.55	41D			CAD						CAD			0.94	m3	CAD	1.0	B	$0	$0	$0	$0	$189	$189
16	1400	Overburden Stockpile Area	41-017	41	Civil	Clear & Grub - Overburden stockpile - 0.3 m deep (including hauling and spreading)	m3	3,466.00	1.05	3,639.30	41A			CAD						CAD			5.38	m3	CAD	1.0	E	$0	$0	$0	$0	$19,579	$19,579
17	1400	Overburden Stockpile Area	41-019	41	Civil	Diversion ditch excavation - Overburden stockpile - including Hauling and	m3	618.00	1.05	648.90	41C			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$3,491	$3,491
18	1400	Overburden Stockpile Area	41-021	41	Civil	Water structure area (fill) - Overburden stockpile	m3	656.00	1.05	688.80	41D			CAD						CAD			0.94	m3	CAD	1.0	B	$0	$0	$0	$0	$647	$647
19	1500	Mine Site Roads Construction	41-022	41	Civil	Clear & Grub - Mine Site Roads construction - 0.3 m deep (including hauling and spreading)	m3	9,780.00	1.05	10,269.00	41A			CAD						CAD			5.38	m3	CAD	1.0	E	$0	$0	$0	$0	$55,247	$55,247
20	1500	Mine Site Roads Construction	41-024	41	Civil	Topsoil excavation - Mine Site Roads construction - including Hauling and spreading	m3	4,827.00	1.05	5,068.35	41C			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$27,268	$27,268
21	1500	Mine Site Roads Construction	41-026	41	Civil	0-150 m stone - Mine Site Roads construction (from 10 km quarry)	m3	2,413.00	1.05	2,533.65	41B			CAD				10.00	m3	CAD	1.0	E	11.50	m3	CAD	1.0	E	$0	$0	$25,337	$0	$29,137	$54,473
22	1600	Access Roads Construction / Upgrade	41-027	41	Civil	Existing access road upgrade	km	7.55	1.05	7.93	41F			CAD						CAD			75,000.00	m3	CAD	1.0	B	$0	$0	$0	$0	$594,641	$594,641
23	1600	Access Roads Construction / Upgrade	41-028	41	Civil	New access road construction	km	1.04	1.05	1.09	41G			CAD						CAD			90,000.00	m3	CAD	1.0	B	$0	$0	$0	$0	$97,997	$97,997
24	1700	Southwest Quarry	41-029	41	Civil	Clear & Grub Quarry (including hauling and spreading)	m3	5,400.00	1.05	5,670.00	41A			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$30,505	$30,505
25	1700	Southwest Quarry	41-031	41	Civil	Quarry excavation Quarry - including Hauling and spreading	m3	90,000.00	1.05	94,500.00	41C			CAD						CAD			5.38	m3	CAD	1.0	B	$0	$0	$0	$0	$508,410	$508,410
26	1100	Infrastructure Area	44-001	44	Architecture	Site Office Trailers 12' x 30'	UNIT	2.00	1	2.00				CAD						CAD			30,000.00	UNIT	CAD	1.0	E	$0	$0	$0	$0	$60,000	$60,000
27	1100	Infrastructure Area	45-001	45	Mechanical	Generator (60 kw x 2) with sound attenuation cabinet, cables, skid mounted with alternator, battery rack, control panel and muffler	LOT	1.00	1	1.00				CAD						CAD			100,000.00	LOT	CAD	1.0	E	$0	$0	$0	$0	$100,000	$100,000
28	1100	Infrastructure Area	47-001	47	Electrical	Electrical installation (infras)	LOT	1.00	1	1.00				CAD						CAD			20,000.00	LOT	CAD	1.0	E	$0	$0	$0	$0	$20,000	$20,000
29	1100	Infrastructure Area	45-002	45	Mechanical	Fueling station with containment area for filling	LOT	1.00	1	1.00				CAD						CAD			100,000.00	LOT	CAD	1.0	E	$0	$0	$0	$0	$100,000	$100,000
30	1100	Infrastructure Area	41-033	41	Civil	Septic Tank	LOT	1.00	1	1.00				CAD						CAD			50,000.00	LOT	CAD	1.0	E	$0	$0	$0	$0	$50,000	$50,000
31	1100	Infrastructure Area	41-034	41	Civil	Water Well	LOT	1.00	1	1.00				CAD						CAD			25,000.00	LOT	CAD	1.0	E	$0	$0	$0	$0	$25,000	$25,000
32	1000	Silicone Ridge Project	41-035	41	Civil	Loader 980K Caterpillar - Rental	UNIT	1.00	1	1.00		0.00	UNIT	CAD	1	E				CAD					CAD			$0	$0	$0	$0	$0	$0
33	1000	Silicone Ridge Project	41-036	41	Civil	Bulldozer D8H Caterpilar - Rental	UNIT	1.00	1	1.00		0.00	UNIT	CAD	1	E				CAD					CAD			$0	$0	$0	$0	$0	$0

Direct Cost

	D	E	F	G	H	J	K	L	M	N	S	Z	AA
35		Growth allowance:											
36		Steel	5%										
37		Concrete	3%				**SW Pit Initial Stripping**						
38		Civil	5%				**Width (m)**		60	8,480.00			
39		Piping	5%				**Length (m)**		300	8,703.33			
40							**Grub Depth (m)**		0.3	11,553.33			
41							**Overburden Depth (m)**		5	32,600.00			
42							**Area (m2)**		18,000				
43							**Volume Grub (m3)**		5,400				
44							**Volume OB (m3)**		90,000				
45													
46							**I need a breakdown of the size of the areas to be cleared for the overburden, waste and low grade stockpiles. Only need a portion developed for first 5 years. Project should mainly only generate overburden and low grade stockpiles in the first few years.**						
47													
48													
49													
50													
51													
52													
53													
54							**Plan at Renting Equipment for Rogue activities**						
55							**No need for D8H Bulldozer to be supplied by Mining Contractor**						
56							**Need to consider a grader to maintain access and quarry roads**						
57													

SILICON RIDGE PROJECT – Rogue Resources- *Direct Ship Ore with Optmized Mine Case*

All monetary values in CAD except where specified otherwise

Exchange Rate (USD per CAD) **1.000**

Year				**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**Total**
ROM (t)				150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,950,000**
Overburden (t)				37,673	27	52,997	146	36,759	21,269	13,928	20,832	1,265	18,792	29,010	29,010	29,010	29,010	29,010	28,950	28,950	28,950	28,950	28,950	**493,489**
Waste-1 (t)				164,720	147,428	221,278	144,718	195,138	272,789	272,540	223,236	261,080	272,417	126,907	126,907	126,907	126,907	126,907	246,136	246,136	246,136	246,136	246,136	**4,040,559**
Waste-2 (t) low grade				120,492	273,390	182,768	131,799	67,180	30,292	58,623	54,702	41,038	291,876	182,007	182,007	182,007	182,007	182,007	238,411	238,411	238,411	238,411	238,411	**3,354,253**
Total Waste (t)				322,885	420,845	457,044	276,662	299,077	324,350	345,092	298,770	303,383	583,085	337,924	337,924	337,924	337,924	337,924	513,497	513,497	513,497	513,497	513,497	**7,888,301**
Total Material Mined (t)				472,885	620,845	657,044	476,662	499,077	524,350	545,092	498,770	503,383	783,085	537,924	537,924	537,924	537,924	537,924	713,497	713,497	713,497	713,497	713,497	**11,838,301**
Stripping Ratio (w : o)				2.153	2.104	2.285	1.383	1.495	1.622	1.725	1.494	1.517	2.915	1.690	1.690	1.690	1.690	1.690	2.567	2.567	2.567	2.567	2.567	**1.997**
Mineralisation to Process Plant (t)	Mining Losses (%)	**0.0%**		150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,800,000**
Grade (%SIO2)				98.50	98.50	98.51	98.51	98.51	98.51	98.59	98.59	98.59	98.59	98.59	98.58	98.58	98.58	98.58	98.58	98.67	98.67	98.67	98.67	
Grade (%Al2O3)				0.557	0.557	0.556	0.565	0.544	0.546	0.529	0.529	0.529	0.529	0.529	0.555	0.555	0.555	0.555	0.555	0.523	0.523	0.523	0.523	
Grade (%Fe2O3)				0.152	0.152	0.147	0.143	0.164	0.177	0.129	0.129	0.129	0.129	0.129	0.113	0.113	0.113	0.113	0.113	0.093	0.093	0.093	0.093	
Grade (%TIO2)				0.061	0.061	0.060	0.061	0.060	0.061	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.061	0.061	0.061	0.061	
	Process Recovery (%)	**90.0%**		90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	
Total Product Sold (t)				90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	**3,420,000**
Total Sales ($)	Average Price – FOB Mine (CAD/t)	**50.00 $**		4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	**171,000,000**
Total Revenue ($)	Base Case			4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	171,000,000
Total Revenue ($)	Indexed for Sensitivity			**4,500,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**171,000,000**
CONTRACT COSTS																								
Total Mining Costs				**2,218,522 $**	**3,011,043 $**	**3,081,198 $**	**2,311,522 $**	**2,347,373 $**	**2,500,772 $**	**2,615,977 $**	**2,377,580 $**	**2,438,889 $**	**3,760,568 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**54,215,193**
Total Processing Costs				**562,500 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**14,250,000**
Total Mobilization and Demobilization				**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**167,200**
Total Contract Costs				**2,789,822 $**	**3,769,843 $**	**3,839,998 $**	**3,070,322 $**	**3,106,173 $**	**3,259,572 $**	**3,374,777 $**	**3,136,380 $**	**3,197,689 $**	**4,519,368 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**68,632,393**
OWNER'S OPERATING COSTS																								
Total Royalties				**154,800 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	5,061,600
Total G&A Costs				**909,936 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**20,359,184**
TOTAL OPERATING COSTS																								
Total Operating Costs				**3,699,758 $**	**4,841,379 $**	**4,911,534 $**	**4,141,858 $**	**4,177,709 $**	**4,331,108 $**	**4,446,313 $**	**4,207,916 $**	**4,269,225 $**	**5,590,904 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**88,991,577**
																								26.02
Operating Profit ($)				**800,242 $**	**4,158,621 $**	**4,088,466 $**	**4,858,142 $**	**4,822,291 $**	**4,668,892 $**	**4,553,687 $**	**4,792,084 $**	**4,730,775 $**	**3,409,096 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**82,008,423**
Mine Pre-production Capital Expenditure ($)																								
Silicone Ridge Project				339,849																				339,849
Infrastructure Area				715,706																				715,706
Low Grade Stockpile Area				30,044																				
Wasterock Stockpile Area				27,323																				
Overburden Stockpile Area				40,546																				
Mine Site Roads Construction				234,182																				
Access Roads Construction / Upgrade				1,184,064																				
Southwest Quarry				921,275																				921,275
Total	Base Case			3,492,987																				3,492,987
Total	Indexed for Sensitivity			3,492,987																				3,492,987
Residual Value ($)	Crushing & Process Plant	0.0%																						0
Working Capital ($)	Months of Annual Operating Costs	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sustaining Capital Expenditure ($)																								
General				0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Base Case				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Indexed for Sensitivity				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Capital Expenditure ($)			**0**	**3,492,987**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**3,792,987**
Closure Costs ($)				**0**	**0**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**224,000**	**734,000**
Federal Corporate Income Tax			0	0	0	0	0	0	0	0	264,409	575,377	419,971	569,250	555,050	556,091	556,519	555,488	458,501	459,387	460,047	460,539	437,323	6,327,954
Provincial Corporate Income Tax			0	0	0	63,402	461,865	462,482	447,867	436,941	457,982	450,924	328,893	441,306	428,985	428,772	428,387	427,092	352,380	352,808	353,136	353,387	335,499	7,012,107
Quebec Mining Tax			0	59,754	463,704	494,496	686,847	710,211	701,162	693,279	744,990	741,947	491,361	730,533	843,043	848,851	842,613	846,646	651,720	653,273	654,360	655,121	606,374	13,120,286
Total Corporate Income and Mining Taxes ($)			**0**	**59,754**	**463,704**	**557,898**	**1,148,712**	**1,172,693**	**1,149,029**	**1,130,219**	**1,467,381**	**1,768,249**	**1,240,225**	**1,741,089**	**1,827,078**	**1,833,714**	**1,827,519**	**1,829,225**	**1,462,602**	**1,465,468**	**1,467,544**	**1,469,048**	**1,379,196**	**26,460,348**
BEFORE-TAX CASH FLOW			**0**	**-2,692,745**	**4,158,621**	**4,058,466**	**4,828,142**	**4,792,291**	**4,638,892**	**4,423,687**	**4,762,084**	**4,700,775**	**3,379,096**	**4,588,461**	**4,588,461**	**4,488,461**	**4,588,461**	**4,588,461**	**3,736,813**	**3,736,813**	**3,736,813**	**3,636,813**	**3,542,813**	**78,281,678**
Cumulative B-T CF			0	-2,692,745	1,465,875	5,524,342	10,352,483	15,144,774	19,783,666	24,207,353	28,969,437	33,670,212	37,049,308	41,637,769	46,226,230	50,714,691	55,303,152	59,891,613	63,628,426	67,365,239	71,102,052	74,738,865	78,281,678	
Payback period work area				1.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AFTER-TAX CASH FLOW			**0**	**-2,752,499**	**3,694,916**	**3,500,568**	**3,679,430**	**3,619,598**	**3,489,862**	**3,293,468**	**3,294,703**	**2,932,527**	**2,138,871**	**2,847,372**	**2,761,383**	**2,654,747**	**2,760,942**	**2,759,236**	**2,274,211**	**2,271,345**	**2,269,269**	**2,167,765**	**2,163,616**	**51,821,330**
Cumulative A-T CF			0	-2,752,499	942,417	4,442,985	8,122,415	11,742,013	15,231,875	18,525,343	21,820,046	24,752,572	26,891,443	29,738,815	32,500,198	35,154,946	37,915,888	40,675,123	42,949,334	45,220,679	47,489,948	49,657,713	51,821,330	
Payback period work area				1.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

6,327,954	8.1%
7,012,107	9.0%
13,120,286	16.8%
26,460,348	33.8%

FINANCIAL INDICATORS				
Before Tax				
Payback Period (years)			**0.6**	
Total Cash Flow ($)			**78,281,678**	
Net Present Value ($)	Discount Rate	8.0%	**39,080,801**	
Net Present Value ($)	Discount Rate	10.0%	**33,815,075**	
Net Present Value ($)	Discount Rate	12.0%	**29,542,225**	
Internal Rate of Return			**157.1%**	
After Tax				Effective Tax Rates
Payback Period (years)			**0.7**	
Total CashFlow ($)			**51,821,330**	33.8%
Net Present Value ($)	Discount Rate	8.0%	**26,827,664**	31.4%
Net Present Value ($)	Discount Rate	10.0%	**23,397,255**	30.8%
Net Present Value ($)	Discount Rate	12.0%	**20,590,253**	30.3%
Internal Rate of Return			**131.9%**	

Enable Sensitivity Tables? No

Change these to vary selected components when sensitivity tables are not enabled

PRICE Index (1+ relative variation	1.00
OPEX Index	1.00
PRECAPEX Index	1.00
SUSCAPEX index	1.00

Links to Sensitivity Tables	1.00
DO NOT CHANGE	1.00
	1.00
	1.00
	1.000

Debt Financing Considerations

Enable Debt Financing Scenario?		No
Overall Proportion of CAPEX to be Borrowed		60.0%
Total Funds to be Borrowed	2,095,792	
Proportion of Year -2 CAPEX to be Borrowed		0.0%
Funds to be Borrowed in Year -2	0	
Proportion of Year -1 CAPEX to be Borrowed	60.0%	
Funds to be Borrowed in Year -1	2,095,792	
Annual Interest Rate		8.0%
Capitalised Amount at Beginning of Production	0	
Repayment Period		5
Anual Payment over Repayment Period	0	

Principal Repayment Schedule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Payment Schedule			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Balance Owed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Capitalized interest		0																				0

APPENDIX D

OPEX

SILICON RIDGE PROJECT – Rogue Resources- *Direct Ship Ore with Optmized Mine Case*

All monetary values in CAD except where specified otherwis

Exchange Rate (USD per CAD) **DO NOT USE** **1.000**

Year					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
ROM (t)					150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Overburden (t)					37,673	27	52,997	146	36,759	21,269	13,928	20,832	1,265	18,792	29,010	29,010	29,010	29,010	29,010	28,950	28,950	28,950	28,950	28,950
Waste-1 (t)					164,720	147,428	221,278	144,718	195,138	272,789	272,540	223,236	261,080	272,417	126,907	126,907	126,907	126,907	126,907	246,136	246,136	246,136	246,136	246,136
Waste-2 (t) low grade					120,492	273,390	182,768	131,799	67,180	30,292	58,623	54,702	41,038	291,876	182,007	182,007	182,007	182,007	182,007	238,411	238,411	238,411	238,411	238,411
Total Waste (t)					322,885	420,845	457,044	276,662	299,077	324,350	345,092	298,770	303,383	583,085	337,924	337,924	337,924	337,924	337,924	513,497	513,497	513,497	513,497	513,497
Total Material Mined (t)					472,885	620,845	657,044	476,662	499,077	524,350	545,092	498,770	503,383	783,085	537,924	537,924	537,924	537,924	537,924	713,497	713,497	713,497	713,497	713,497
Stripping Ratio (w : o)					2.153	2.104	2.285	1.383	1.495	1.622	1.725	1.494	1.517	2.915	1.690	1.690	1.690	1.690	1.690	2.567	2.567	2.567	2.567	2.567
Mineralisation to Process Plant (t)	Mining Losses (%)	0.0%			150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Product		90.0%			135,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
CONTRACT COSTS	Factor for Sensitivity	0%																						
Mining Costs																								
Overburden		2.50 $	/t		94,181	67	132,492	365	91,897	53,173	34,821	52,081	3,161	46,980	72,525	72,525	72,525	72,525	72,525	72,376	72,376	72,376	72,376	72,376
Stockpiling		0.36 $	/t		13,562	10	19,079	53	13,233	7,657	5,014	7,500	455	6,765	10,444	10,444	10,444	10,444	10,444	10,422	10,422	10,422	10,422	10,422
Drill, Blast, Extraction, Mining		2.60 $	/t		1,131,551	1,614,126	1,570,521	1,238,942	1,202,027	1,308,010	1,381,024	1,242,639	1,305,507	1,987,163	1,323,177	1,323,177	1,323,177	1,323,177	1,323,177	1,779,822	1,779,822	1,779,822	1,779,822	1,779,822
Ore Transport		2.25 $	/t		337,500	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000
Waste Transport		2.25 $	/t		641,727	946,840	909,105	622,162	590,216	681,932	745,117	625,360	679,765	1,269,660	695,057	695,057	695,057	695,057	695,057	1,090,231	1,090,231	1,090,231	1,090,231	1,090,231
Total Mining Costs					**2,218,522**	**3,011,043**	**3,081,198**	**2,311,522**	**2,347,373**	**2,500,772**	**2,615,977**	**2,377,580**	**2,438,889**	**3,760,568**	**2,551,203**	**2,551,203**	**2,551,203**	**2,551,203**	**2,551,203**	**3,402,851**	**3,402,851**	**3,402,851**	**3,402,851**	**3,402,851**
Processing Costs																								
Crushing		2.50 $	/t		375,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000
Screening		1.25 $	/t		187,500	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Processing Costs					**562,500**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**	**750,000**
Seasonal Mob/Demob		8,800 $			8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800
Total Mobilization and Demobilization					**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**	**8,800**
Total Contract Costs					**2,789,822**	**3,769,843**	**3,839,998**	**3,070,322**	**3,106,173**	**3,259,572**	**3,374,777**	**3,136,380**	**3,197,689**	**4,519,368**	**3,310,003**	**3,310,003**	**3,310,003**	**3,310,003**	**3,310,003**	**4,161,651**	**4,161,651**	**4,161,651**	**4,161,651**	**4,161,651**
Contractor Unit Cost			/t		**$ 18.60**	**$ 18.85**	**$ 19.20**	**$ 15.35**	**$ 15.53**	**$ 16.30**	**$ 16.87**	**$ 15.68**	**$ 15.99**	**$ 22.60**	**$ 16.55**	**$ 16.55**	**$ 16.55**	**$ 16.55**	**$ 16.55**	**$ 20.81**	**$ 20.81**	**$ 20.81**	**$ 20.81**	**$ 20.81**
OWNER'S OPERATING COSTS																								
Labour	weeks per annum		rate per hour	Hrs/wk																				
Supervisor	28	87,360 $	62 $	50	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360	87,360
EH&S + Community Relations	28	54,600 $	39 $	50	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600	54,600
General Site Maintanence	28	63,700 $	33 $	70	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700	63,700
Loader Operator	28	81,536 $	42 $	70	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536	81,536
Grade Quality Control	28	76,440 $	39 $	70	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440	76,440
Total Labour					**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**	**363,636**
Consumables																								
Fuel for P/U Truck, grader, genset, loader		75,000 $	/yr		75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total Consumables					**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**	**75,000**
Other Costs																								
Loading of Product		1.00 $	/t		150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000
Corporate SG&A (Marketing, PR)		- $	/t		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
General Site Office		7,000 $	/yr		7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Grader, Loader, Water Truck Rental		129,000 $	/yr		129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000	129,000
Road Maintenance		20,000 $	/yr		20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000	20,000
EH&S		7,000 $	/yr		7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Portable Toilets		3,500 $	/yr		3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Total Other Costs					**316,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**	**366,500**
Royalties																								
Quebec Silica		0.4 $	/t		54,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000	72,000
Royalty 2		0.08 $			10,800	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400	14,400
Royalty 3		2%			90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Total Royalties					**154,800**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**	**266,400**
Total Owner's Operating Costs					**909,936**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**	**1,071,536**
Total Owner's Unit Cost			/t		**$ 6.07**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**	**$ 5.36**
TOTAL OPERATING COSTS																								
Total Operating Costs					**3,699,758**	**4,841,379**	**4,911,534**	**4,141,858**	**4,177,709**	**4,331,108**	**4,446,313**	**4,207,916**	**4,269,225**	**5,590,904**	**4,381,539**	**4,381,539**	**4,381,539**	**4,381,539**	**4,381,539**	**5,233,187**	**5,233,187**	**5,233,187**	**5,233,187**	**5,233,187**

APPENDIX E

CASH FLOW ESTIMATE

SILICON RIDGE PROJECT – Rogue Resources- *Direct Ship Ore with Optmized Mine Case*

All monetary values in CAD except where specified otherwise

Exchange Rate (USD per CAD) 1.000

Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
ROM (t)				150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,950,000**
Overburden (t)				37,673	27	52,997	146	36,759	21,269	13,928	20,832	1,265	18,792	29,010	29,010	29,010	29,010	29,010	28,950	28,950	28,950	28,950	28,950	**493,489**
Waste-1 (t)				164,720	147,428	221,278	144,718	195,138	272,789	272,540	223,236	261,080	272,417	126,907	126,907	126,907	126,907	126,907	246,136	246,136	246,136	246,136	246,136	**4,040,559**
Waste-2 (t) low grade				120,492	273,390	182,768	131,799	67,180	30,292	58,623	54,702	41,038	291,876	182,007	182,007	182,007	182,007	182,007	238,411	238,411	238,411	238,411	238,411	**3,354,253**
Total Waste (t)				322,885	420,845	457,044	276,662	299,077	324,350	345,092	298,770	303,383	583,085	337,924	337,924	337,924	337,924	337,924	513,497	513,497	513,497	513,497	513,497	**7,888,301**
Total Material Mined (t)				472,885	620,845	657,044	476,662	499,077	524,350	545,092	498,770	503,383	783,085	537,924	537,924	537,924	537,924	537,924	713,497	713,497	713,497	713,497	713,497	**11,838,301**
Stripping Ratio (w : o)				2.153	2.104	2.285	1.383	1.495	1.622	1.725	1.494	1.517	2.915	1.690	1.690	1.690	1.690	1.690	2.567	2.567	2.567	2.567	2.567	**1.997**
Mineralisation to Process Plant (t)	Mining Losses (%)	**0.0%**		150,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	**3,800,000**
Grade (%SIO2)				98.50	98.50	98.51	98.51	98.51	98.51	98.59	98.59	98.59	98.59	98.59	98.58	98.58	98.58	98.58	98.58	98.67	98.67	98.67	98.67	
Grade (%Al2O3)				0.557	0.557	0.556	0.565	0.544	0.546	0.529	0.529	0.529	0.529	0.529	0.555	0.555	0.555	0.555	0.555	0.523	0.523	0.523	0.523	
Grade (%Fe2O3)				0.152	0.152	0.147	0.143	0.164	0.177	0.129	0.129	0.129	0.129	0.129	0.113	0.113	0.113	0.113	0.113	0.093	0.093	0.093	0.093	
Grade (%TIO2)				0.061	0.061	0.060	0.061	0.060	0.061	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.061	0.061	0.061	0.061	
	Process Recovery (%)	**90.0%**		90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	90.00%	
Total Product Sold (t)				90,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	**3,420,000**
Total Sales ($)	Average Price – FOB Mine (CAD/t)	**50.00 $**		4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	**171,000,000**
Total Revenue ($)	Base Case			4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	171,000,000
Total Revenue ($)	Indexed for Sensitivity			**4,500,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**9,000,000**	**171,000,000**
CONTRACT COSTS																								
Total Mining Costs				**2,218,522 $**	**3,011,043 $**	**3,081,198 $**	**2,311,522 $**	**2,347,373 $**	**2,500,772 $**	**2,615,977 $**	**2,377,580 $**	**2,438,889 $**	**3,760,568 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**2,551,203 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**3,402,851 $**	**54,215,193**
Total Processing Costs				**562,500 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**750,000 $**	**14,250,000**
Total Mobilization and Demobilization				**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**8,800 $**	**167,200**
Total Contract Costs				**2,789,822 $**	**3,769,843 $**	**3,839,998 $**	**3,070,322 $**	**3,106,173 $**	**3,259,572 $**	**3,374,777 $**	**3,136,380 $**	**3,197,689 $**	**4,519,368 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**3,310,003 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**4,161,651 $**	**68,632,393**
OWNER'S OPERATING COSTS																								
Total Royalties				**154,800 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	**266,400 $**	5,061,600
Total G&A Costs				**909,936 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**1,071,536 $**	**20,359,184**
TOTAL OPERATING COSTS																								
Total Operating Costs				**3,699,758 $**	**4,841,379 $**	**4,911,534 $**	**4,141,858 $**	**4,177,709 $**	**4,331,108 $**	**4,446,313 $**	**4,207,916 $**	**4,269,225 $**	**5,590,904 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**4,381,539 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**5,233,187 $**	**88,991,577**
																								26.02
Operating Profit ($)				**800,242 $**	**4,158,621 $**	**4,088,466 $**	**4,858,142 $**	**4,822,291 $**	**4,668,892 $**	**4,553,687 $**	**4,792,084 $**	**4,730,775 $**	**3,409,096 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**4,618,461 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**3,766,813 $**	**82,008,423**
Mine Pre-production Capital Expenditure ($)																								
Silicone Ridge Project				339,849																				339,849
Infrastructure Area				715,706																				715,706
Low Grade Stockpile Area				30,044																				
Wasterock Stockpile Area				27,323																				
Overburden Stockpile Area				40,546																				
Mine Site Roads Construction				234,182																				
Access Roads Construction / Upgrade				1,184,064																				
Southwest Quarry				921,275																				921,275
Total	Base Case			3,492,987																				3,492,987
Total	Indexed for Sensitivity			3,492,987																				3,492,987
Residual Value ($)	Crushing & Process Plant	0.0%																						0
Working Capital ($)	Months of Annual Operating Costs	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sustaining Capital Expenditure ($)																								
General				0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Base Case				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Sustaining Capital Expenditure	Indexed for Sensitivity				0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	300,000
Total Capital Expenditure ($)			**0**	**3,492,987**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**3,792,987**
Closure Costs ($)				**0**	**0**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**30,000**	**224,000**	**734,000**
Federal Corporate Income Tax			0	0	0	0	0	0	0	0	264,409	575,377	419,971	569,250	555,050	556,091	556,519	555,488	458,501	459,387	460,047	460,539	437,323	6,327,954
Provincial Corporate Income Tax			0	0	0	63,402	461,865	462,482	447,867	436,941	457,982	450,924	328,893	441,306	428,985	428,772	428,387	427,092	352,380	352,808	353,136	353,387	335,499	7,012,107
Quebec Mining Tax			0	59,754	463,704	494,496	686,847	710,211	701,162	693,279	744,990	741,947	491,361	730,533	843,043	848,851	842,613	846,646	651,720	653,273	654,360	655,121	606,374	13,120,286
Total Corporate Income and Mining Taxes ($)			**0**	**59,754**	**463,704**	**557,898**	**1,148,712**	**1,172,693**	**1,149,029**	**1,130,219**	**1,467,381**	**1,768,249**	**1,240,225**	**1,741,089**	**1,827,078**	**1,833,714**	**1,827,519**	**1,829,225**	**1,462,602**	**1,465,468**	**1,467,544**	**1,469,048**	**1,379,196**	**26,460,348**
BEFORE-TAX CASH FLOW			**0**	**-2,692,745**	**4,158,621**	**4,058,466**	**4,828,142**	**4,792,291**	**4,638,892**	**4,423,687**	**4,762,084**	**4,700,775**	**3,379,096**	**4,588,461**	**4,588,461**	**4,488,461**	**4,588,461**	**4,588,461**	**3,736,813**	**3,736,813**	**3,736,813**	**3,636,813**	**3,542,813**	**78,281,678**
Cumulative B-T CF			0	-2,692,745	1,465,875	5,524,342	10,352,483	15,144,774	19,783,666	24,207,353	28,969,437	33,670,212	37,049,308	41,637,769	46,226,230	50,714,691	55,303,152	59,891,613	63,628,426	67,365,239	71,102,052	74,738,865	78,281,678	
Payback period work area				1.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
AFTER-TAX CASH FLOW			**0**	**-2,752,499**	**3,694,916**	**3,500,568**	**3,679,430**	**3,619,598**	**3,489,862**	**3,293,468**	**3,294,703**	**2,932,527**	**2,138,871**	**2,847,372**	**2,761,383**	**2,654,747**	**2,760,942**	**2,759,236**	**2,274,211**	**2,271,345**	**2,269,269**	**2,167,765**	**2,163,616**	**51,821,330**
Cumulative A-T CF			0	-2,752,499	942,417	4,442,985	8,122,415	11,742,013	15,231,875	18,525,343	21,820,046	24,752,572	26,891,443	29,738,815	32,500,198	35,154,946	37,915,888	40,675,123	42,949,334	45,220,679	47,489,948	49,657,713	51,821,330	
Payback period work area				1.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

6,327,954	8.1%
7,012,107	9.0%
13,120,286	16.8%
26,460,348	33.8%

FINANCIAL INDICATORS				
Before Tax				
Payback Period (years)			**0.6**	
Total Cash Flow ($)			**78,281,678**	
Net Present Value ($)	Discount Rate	8.0%	**39,080,801**	
Net Present Value ($)	Discount Rate	10.0%	**33,815,075**	
Net Present Value ($)	Discount Rate	12.0%	**29,542,225**	
Internal Rate of Return			**157.1%**	
After Tax				Effective
Payback Period (years)			**0.7**	Tax Rates
Total CashFlow ($)			**51,821,330**	33.8%
Net Present Value ($)	Discount Rate	8.0%	**26,827,664**	31.4%
Net Present Value ($)	Discount Rate	10.0%	**23,397,255**	30.8%
Net Present Value ($)	Discount Rate	12.0%	**20,590,253**	30.3%
Internal Rate of Return			**131.9%**	

Enable Sensitivity Tables? No

Change these to vary selected components when sensitivity tables are not enabled

PRICE Index (1+ relative variation	1.00
OPEX Index	1.00
PRECAPEX Index	1.00
SUSCAPEX index	1.00

Links to Sensitivity Tables	1.00
DO NOT CHANGE	1.00
	1.00
	1.00
	1.000

Debt Financing Considerations

Enable Debt Financing Scenario?		No
Overall Proportion of CAPEX to be Borrowed		60.0%
Total Funds to be Borrowed	2,095,792	
Proportion of Year -2 CAPEX to be Borrowed		0.0%
Funds to be Borrowed in Year -2	0	
Proportion of Year -1 CAPEX to be Borrowed	60.0%	
Funds to be Borrowed in Year -1	2,095,792	
Annual Interest Rate		8.0%
Capitalised Amount at Beginning of Production	0	
Repayment Period		5
Anual Payment over Repayment Period	0	

Principal Repayment Schedule	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest Payment Schedule			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Balance Owed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Capitalized interest		0																				0

SNC DSO Case						
Net Present Value (10%)	($)	23,397,255 $				
Mining Losses (%)	(%)	0%				
Process Recovery (%)	(%)	90%				
FeSi	(%)/($/t)	50%	40.00 $			
MgSi	(%)/($/t)	50%	60.00 $			
Counter Tops	(%)/($/t)	0%	150.00 $			
Construction Material	(%)/($/t)	0%	36.00 $			
Glass	(%)/($/t)	0%	80.00 $			
Average Price – FOB Mine	(C$/t)	100%	50.00 $			
Mine Operating Cost						
Overburden	($/t)		2.50 $			
Stockpiling	($/t)		0.36 $			
Drill, Blast, Extraction, Mining	($/t)		2.60 $			
Ore Transport	($/t)		2.25 $			
Waste Transport	($/t)		2.25 $			
Processing Cost	($/t)					
Crushing	($/t)		2.50 $			
Screening	($/t)		1.25 $			
Loading of Product	($/t)		1.00 $			
Seaaonal Mob/Demob	($/yr)		8,800.00 $			
Owner Costs						
Labour				Wks/yr	$/hr	hr/wk
Supervisor	($/yr)		87,360 $	28	62.40 $	50
EH&S + Community Relations	($/yr)		54,600 $	28	39.00 $	50
General Site Maintanence	($/yr)		63,700 $	28	32.50 $	70
Loader Operator	($/yr)		81,536 $	28	41.60 $	70
Grade Quality Control	($/yr)		76,440 $	28	39.00 $	70
Consumables						
Fuel for P/U Truck, grader, genset, loader	($/yr)		75,000 $			
Other Costs						
Loading of Product	($/t)		1.00 $			
Corporate SG&A (Marketing, PR)	($/t)		- $			
General Site Office	($/yr)		7,000 $			
Grader, Loader, Water Truck Rental	($/yr)		129,000 $			
Road Maintenance	($/yr)		20,000 $			
EH&S	($/yr)		7,000 $			
Portable Toilets	($/yr)		3,500 $			

Concentrate Transportation Cost ($/t)		
Ground Transportation	($/t)	12.00 $
Ocean Transportation	($/t)	36.11 $
Total Transportation	($/t)	48.11 $

Royalty Payments		
Quebec Silica Tax	($/t)	0.40 $
Wendat ($/t)	($/t)	0.08 $
Globex (NSR)	(%)	2%

Crushing & Process Plant	(%)	0%

Months of Annual Operating Costs	(months)	0

FINANCIAL INDICATORS

Before Tax		
Payback Period	(years)	0.65
Total CashFlow	($)	78,281,678 $
Net Present Value (8%)	($)	39,080,801 $
Net Present Value (10%)	($)	33,815,075 $
Net Present Value (12%)	($)	29,542,225 $
Internal Rate of Return	(%)	157%

After Tax			Effective Tax Rate
Payback Period	(years)	0.74	
Total CashFlow	($)	51,821,330 $	33.8%
Net Present Value (8%)	($)	26,827,664 $	31.4%
Net Present Value (10%)	($)	23,397,255 $	30.8%
Net Present Value (12%)	($)	20,590,253 $	30.3%
Internal Rate of Return	(%)	131.9%	

SILICON RIDGE PROJECT – Rogue Resources

PURPOSE: List the main assumptions on whitch the present Tax Model is based.

1.0 General assumptions

1.1- Project

a) It is assumed that the Project will be exploited by a Corporation;

b) It is assummed that each Financial Period of the Corporation will end on December 31;

c) It is assumed that construction would be in 2017 (year -1);

d) It is assumed that the Project would come into operation in 2018 (corresponding to year 1);

e) In the present Model it is assumed that no interest is paid. If interest was paid, it would be deductible for income tax purposes but not for mining taxes;

f) In the present Model it is understood that a royalty is paid. Such royalty is deductible for income tax purposes but not for mining taxes;

g) It is assumed that there are closing costs, but these do not need to be garanteed at the beginning of production.

1.2 - Income tax (federal & Quebec)

a) It is assumed that the general Corporation tax rate will apply;

b) It is assumed that the Project qualifies as a "mineral resource" for the purpose of the federal and Quebec income tax calculation;

c) It is assumed that the corporate federal tax rate of 15% that is currently applicable wil remain unchanged during the Project's operating life;

d) It is assumed that the current Quebec corporate tax rate of 11,9% will be reduced by 0.1% per year starting in 2017 and ending in 2020, reaching a rate of 11.5% tha twill remain constant for the rest of the Project's life;

e) It is assumed that the Quebec capital tax will remain eliminated;

f) Tax depreciation: The "half-year rule" is considered in the simulation. This rule implies that, in the year in which an asset is acquired, only half of the otherwise allowed depreciation can be claimed;

g) It is assumed there are unclaimed non-capital losses, CEE and CDE from prior years in the following amounts:
- Federal corporate taxes
- Provincial corporate taxes
- Quebec mining taxes

h) Mine development costs (pre-production stripping):

NOTE #1: Under 2013 federal Budget changes, mine development cost are now deemed to be Canadian Development Expenses ("CDE") instead of Canadian Exploration Expenses as previously provided, subject to transitional rules.
This implies that "Mine development costs" will be depreciable at 30% on a declining-balance basis, instead of at a rate of 100%.

NOTE #2: Since it is assumed that construction of the mine would be in 2017, the impact of the new rule and its transitional provisions are as follows:
- Mine Development costs incurred in 2016 (if any): 60% CEE and 40% CDE;
- Mine Development costs incurred in 2017 (if any): 30% CEE and 70% CDE;
- Mine Development costs incurred in 2018 (if any): 0% CEE and 100% CDE.

i) Depreciable assets acquired during the construction period of a new mine (referred to as Class 41 A-1 assets):

NOTE #1: Under the 2013 federal Budget changes, restrictions have been proposed in the rate of depreciation of mining assets acquired before the start of production of a new mine.
Under the pre-Budget rules, depreciation is calculated on a two (2) step basis:
- a) Basic depreciation of 25% calculated on a declining-balance basis; and
- b) If there is still a tax profit after all deductions have been taken, including the basic depreciation, then an additional depreciation is allowed, up to the lower of:
  - the profit immediately before that additional depreciation; and
  - 100% of the not yet depreciated basis.

NOTE #2: The "additional depreciation" will be gradually eliminated, as follows:
- Additional depreciation taken in 2017: 90% of the not yet depreciated basis
- Additional depreciation taken in 2018: 80% of the not yet depreciated basis
- Additional depreciation taken in 2019: 60% of the not yet depreciated basis
- Additional depreciation taken in 2020: 30% of the not yet depreciated basis
- Additional depreciation taken in 2021: 0% of the not yet depreciated basis

NOTE #3: Thus, by 2021, the "additional depreciation" will have been eliminated; only the basic 25% rate will apply.

1.3 - Mining Taxes

a) The mining Regime discussed in the DEPARTMENT OF FINANCE interpretation bulletin 2013-3 (May 6, 2013) and in Bill 55 has beeen implemented into the Legislation.
This means that the MODEL REFLECTS:
1- The new mandatory minimum royalty of 4 %, calculated on the output value at the mine shaft head ("OVMSH") (1% for first annual OVMSH of $80 million);
2- As discussed in more detail hereafter in paragraph f), the proposed more generous processing allowance (10% instead of 7%);
3- The proposed increased limitations for calculating the processing allowance (max. of 75 % of "profit" and 30% of OVMSH;
4- The increased tax rates, respectively 22% and 28%, when the "PROFIT MARGIN" exceeds the proposed 35% limitation (hereafter referred to as the "SURTAX");

b) It is assumed that the current basic rate of 16% and the PROPOSED SURTAXES will remain constant during the life of the Project;

c) Insurance payments are not deductible for Mining Tax purposes. No specific amount is however considered in this respect in the present Mining tax calculation.

d) General administrative expenditures are not deductible for Mining Tax purposes. Only payments in direct relation to the mining operation are allowed. We have assumed that 10% of "General and Administration Costs" would not be deductible for mining Tax purposes (example: insurance expenses)

e) Operating expenses may include royalties and payments related to a Benefit Agreement. Such payments, if paid, would be not deductible for Mining Tax purposes, but wouild be deductible for income tax purposes.

2.0 Specific assumptions concerning income tax calculation

2.1 Pre-production Capital Expenditure

a) Income tax treatment of pre-production expenditures	**2016** year-2	**DSO 2017** year-1	
1-CEE (PRE-PRODUCTION EXP. & DEV.)			
Proportion considered as CEE per Budget:	0%	0%	
MINE DEVELOPMENT: Pre-stripping	0	0	
2-CDE (PRE-PRODUCTION EXP. & DEV.)			
Proportion considered as CDE per Budget:	0%	0%	
MINE DEVELOPMENT: Pre-stripping	0	0	
MINE DEVELOPMENT: Pre-stripping	**0**	**0**	0 339,849
3- CLASS 41 A-1			
Mine site:			
Silicone Ridge Project	0	339,849	
Infrastructure Area	0	715,706	
Low Grade Stockpile Area	0	30,044	
Wasterock Stockpile Area	0	27,323	
Overburden Stockpile Area	0	40,546	
Mine Site Roads Construction	0	234,182	
Access Roads Construction / Upgrade	0	1,184,064	
Southwest Quarry	0	921,275	
TOTAL OF CLASS 41 A-1 PRE-PRODUCTION EXPENDITURES	**0**	**3,492,987**	
4- CLASS 41 B			
None during construction (see however section 2.2)	**0**	**0**	
TOTAL OF ALL PRE-PRODUCTION EXPENDITURES	**0**	**3,492,987**	
Pre-production expenditues indexed for sensitivity (as per cash flow sheet)	0	3,492,987	

b) Mining Taxes: classification of pre-production expenditures

1- EXPLORATION (PRE-BUDGET 2010)	**0**	**0**
Assumed to be nil for the simulation		
2- EXPLORATION (POST-BUDGET 2010)	**0**	**0**
Assumed to be nil for the simulation		
3- DEVELOPMENT (PRE-PRODUCTION)		
i) Mine Development	**0**	**339,849**
4- DEVELOPMENT (POST-PRODUCTION)		
None during construction	**0**	**0**
5- DEPRECIABLE ASSETS		
Mine site:		
Silicone Ridge Project	0	339,849
Infrastructure Area	0	715,706
Low Grade Stockpile Area	0	30,044
Wasterock Stockpile Area	0	27,323
Overburden Stockpile Area	0	40,546
Mine Site Roads Construction	0	234,182
Access Roads Construction / Upgrade	0	1,184,064
Southwest Quarry	0	921,275
TOTAL OF PRE-PRODUCTION DEPRECIABLE ASSETS	**0**	**3,492,987**
TOTAL OF ALL PRE-PRODUCTION EXPENDITURES	**0**	**3,832,836**
Pre-production expenditues indexed for sensitivity (as per cash flow sheet)	0	3,492,987

c) Determination of processiong assets (for the purpose of the processing allowance)

It is assumed that 90% of processing items will qualify as "processing assets".

Processing assets acquired:	0	1,758,095
Qualifying assets (per assumption):	90%	90%
Qualifying processing assets:	0	1,582,285

2.2 Underground Development and Sustaining Capital Expenditure

	0	1	2	3	4	5	6	7	8	9	10	11	12	13
a) Summary of Underground Development and Sustaining Capital Expenditures														
Underground Development		0	0	0	0	0	0	0	0	0	0	0	0	0
Underground Mine Equipment and Infrastructure		0	0	0	0	0	0	0	0	0	0	0	0	0
General mine site		0	0	0	0	0	0	0	100,000	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
Total capital expenditures (pre-production, underground development and sustaining capital)														
b) Income tax treatment of Underground Development and Sustaining Capital														
1- CUMULATIVE DEVELOPMENT EXPENSES (CDE)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- DEPRECIABLE ASSETS (CLASS 41 B)	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**
c) Mining Tax treatment of sustaining expenditures														
1- POST-PRODUCTION DEVELOPMENT EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- DEPRECIABLE ASSETS	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	100,000	0	0	0	0	0
2.3 Mine closure and rehabilitation expenses	0	0	0	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000

	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
a) Summary of Underground Development and Sustaining Capital Expenditures															
Underground Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Underground Mine Equipment and Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General mine site	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Total	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Total capital expenditures (pre-production, underground development and sustaining capital)															3,792,987
															3,792,987
b) Income tax treatment of Underground Development and Sustaining Capital															
1- CUMULATIVE DEVELOPMENT EXPENSES (CDE)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- DEPRECIABLE ASSETS (CLASS 41 B)	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Total	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**300,000**
c) Mining Tax treatment of sustaining expenditures															
1- POST-PRODUCTION DEVELOPMENT EXPENSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- DEPRECIABLE ASSETS	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Total	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	**300,000**
2.3 Mine closure and rehabilitation expenses	30,000	30,000	30,000	30,000	30,000	30,000	224,000	0	0	0	0	0	0	0	**734,000**

SILICON RIDGE PROJECT – Rogue Resources

Years		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Cash flow - operations																														
Revenues		0	4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	0	0	0	0	0	0	0	175,500,000
Less: Royalty		0	154,800	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	0	0	0	0	0	0	0	5,216,400
Less: Interest		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Total Operating Costs, excluding Interest & Royalty		0	3,544,958	4,574,979	4,645,134	3,875,458	3,911,309	4,064,708	4,179,913	3,941,516	4,002,825	5,324,504	4,115,139	4,115,139	4,115,139	4,115,139	4,115,139	4,966,787	4,966,787	4,966,787	4,966,787	4,966,787	0	0	0	0	0	0	0	87,474,935
Operating profit		0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Taxable income calculation																														
Operating profit		0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Less: Restauration Trust Fund Payments		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Closure Costs		0	0	0	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-224,000	0	0	0	0	0	0	0	-734,000
Plus: Recuperation of Restauration Trust Fund		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Salvage Value		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Mining Taxes Payable		0	-59,754	-463,704	-494,496	-686,847	-710,211	-701,162	-693,279	-744,990	-741,947	-491,361	-730,533	-843,043	-848,851	-842,613	-846,646	-651,720	-653,273	-654,360	-655,121	-606,374	0	0	0	0	0	0	0	-13,120,286
Sub-total		0	740,488	3,694,916	3,563,970	4,141,295	4,082,079	3,937,729	3,830,409	4,017,094	3,958,828	2,887,735	3,857,928	3,745,418	3,739,610	3,745,848	3,741,815	3,085,092	3,083,540	3,082,453	3,081,692	2,936,439	0	0	0	0	0	0	0	68,954,379
Less: Depreciation Class 41 B	A	0	0	0	0	0	0	0	0	-12,500	-21,875	-16,406	-12,305	-9,229	-6,921	-17,691	-25,768	-19,326	-14,495	-10,871	-8,153	-18,615	-26,461	-19,846	-14,884	-11,163	-8,372	-6,279	-4,710	-285,871
Less: Depreciation Class 41 A-1	B	0	0	-873,247	-299,850	-89,955	-47,226	-35,420	-26,565	-19,924	-14,943	-11,207	-8,405	-6,304	-4,728	-3,546	-2,659	-1,995	-1,496	-1,122	-841	-631	-473	-355	-266	-200	-150	-112	-84	-1,451,704
Sub-total		0	740,488	2,821,669	3,264,120	4,051,340	4,034,853	3,902,310	3,803,844	3,984,670	3,922,011	2,860,121	3,837,218	3,729,885	3,727,961	3,724,611	3,713,387	3,063,772	3,067,549	3,070,460	3,072,697	2,917,193	-26,935	-20,201	-15,151	-11,363	-8,522	-6,392	-4,794	67,216,803
Less: CDE	C	-2,135,189	-1,494,632	-1,046,243	-732,370	-512,659	-358,861	-251,203	-175,842	-123,089	-86,163	-60,314	-42,220	-29,554	-20,688	-14,481	-10,137	-7,096	-4,967	-3,477	-2,434	-1,704	-1,193	-835	-584	-409	-286	-200	-140	-7,116,970
Sub-total		-2,135,189	-754,144	1,775,427	2,531,750	3,538,681	3,675,992	3,651,107	3,628,002	3,861,581	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	-28,127	-21,036	-15,735	-11,772	-8,809	-6,592	-4,934	60,099,833
Less: Supplementary Depreciation Class 41 A-1	D	0	0	-1,420,341	-539,730	-80,959	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,041,030
Sub-total		-2,135,189	-754,144	355,085	1,992,021	3,457,722	3,675,992	3,651,107	3,628,002	3,861,581	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	-28,127	-21,036	-15,735	-11,772	-8,809	-6,592	-4,934	58,058,803
Less: CEE	E	0	0	-355,085	-1,992,021	-2,150,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4,497,446
Taxable income before losses		-2,135,189	-754,144	0	0	1,307,382	3,675,992	3,651,107	3,628,002	3,861,581	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	-28,127	-21,036	-15,735	-11,772	-8,809	-6,592	-4,934	53,561,357
Less: Losses from previous years		0	0	0	0	-1,307,382	-3,675,992	-3,651,107	-3,628,002	-2,098,851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-14,361,333
Taxable income		-2,135,189	-754,144	0	0	0	0	0	0	1,762,730	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	-28,127	-21,036	-15,735	-11,772	-8,809	-6,592	-4,934	39,200,023
Federal Income Tax	15%	0	0	0	0	0	0	0	0	264,409	575,377	419,971	569,250	555,050	556,091	556,519	555,488	458,501	459,387	460,047	460,539	437,323	0	0	0	0	0	0	0	6,327,954
Quebec Income Tax (reduction from 2017 to 2020)	11.5%	0	0	0	0	0	0	0	0	202,714	441,123	321,978	436,425	425,538	426,336	426,665	425,874	351,518	352,197	352,703	353,080	335,281	0	0	0	0	0	0	0	4,851,432
Losses from previous years																														
Beginning Balance	11,472,000	11,472,000	13,607,189	14,361,333	14,361,333	14,361,333	13,053,952	9,377,960	5,726,853	2,098,851	0	0	0	0	0	0	0	0	0	0	0	0	0	28,127	49,163	64,898	76,670	85,479	92,071	
Less: Losses expired		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Current year loss		2,135,189	754,144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28,127	21,036	15,735	11,772	8,809	6,592	4,934	2,986,338
Sub-total		13,607,189	14,361,333	14,361,333	14,361,333	14,361,333	13,053,952	9,377,960	5,726,853	2,098,851	0	0	0	0	0	0	0	0	0	0	0	0	28,127	49,163	64,898	76,670	85,479	92,071	97,005	
Less: Losses used in current year		0	0	0	0	1,307,382	3,675,992	3,651,107	3,628,002	2,098,851	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14,361,333
Ending balance		13,607,189	14,361,333	14,361,333	14,361,333	13,053,952	9,377,960	5,726,853	2,098,851	0	0	0	0	0	0	0	0	0	0	0	0	0	28,127	49,163	64,898	76,670	85,479	92,071	97,005	
Years		**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**Total**
ACQUISITIONS																														
CEE (PRE-PRODUCTION EXPLORATION & DEV.)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLASS 41 A-1		0	3,492,987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,492,987
CLASS 41 B		0	0	0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
CDE (PRE & POST-PRODUCTION DEV.)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL ASSETS ACQUIRED		**0**	**3,492,987**	**0**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3,792,987
			3,492,987																											
			3,492,987																											
CLASS 41 B – General Mining Assets																														
Declining-balance depreciation rate	25%																													
Beginning balance	0	0	0	0	0	0	0	0	0	0	87,500	65,625	49,219	36,914	27,686	20,764	103,073	77,305	57,979	43,484	32,613	24,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Plus: Additions		0	0	0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Sub- total		0	0	0	0	0	0	0	0	100,000	87,500	65,625	49,219	36,914	27,686	120,764	103,073	77,305	57,979	43,484	32,613	124,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Less: 50% of additions		0	0	0	0	0	0	0	0	50,000	0	0	0	0	0	50,000	0	0	0	0	0	50,000	0	0	0	0	0	0	0	
Sub- total		0	0	0	0	0	0	0	0	50,000	87,500	65,625	49,219	36,914	27,686	70,764	103,073	77,305	57,979	43,484	32,613	74,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Depreciation	A	0	0	0	0	0	0	0	0	12,500	21,875	16,406	12,305	9,229	6,921	17,691	25,768	19,326	14,495	10,871	8,153	18,615	26,461	19,846	14,884	11,163	8,372	6,279	4,710	285,871
Ending balance		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**87,500**	**65,625**	**49,219**	**36,914**	**27,686**	**20,764**	**103,073**	**77,305**	**57,979**	**43,484**	**32,613**	**24,460**	**105,845**	**79,384**	**59,538**	**44,653**	**33,490**	**25,117**	**18,838**	**14,129**	
CLASS 41 A-1 – New Mine Assets																														
Declining-balance depreciation rate	25.0%																													
Up to 100 % if required, but limited by the transitional rule (2013 Budget)																														
Beginning balance	0	0	0	3,492,987	1,199,399	359,820	188,905	141,679	106,259	79,694	59,771	44,828	33,621	25,216	18,912	14,184	10,638	7,978	5,984	4,488	3,366	2,524	1,893	1,420	1,065	799	599	449	337	
Plus: Additions		0	3,492,987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,492,987
Sub- total		0	3,492,987	3,492,987	1,199,399	359,820	188,905	141,679	106,259	79,694	59,771	44,828	33,621	25,216	18,912	14,184	10,638	7,978	5,984	4,488	3,366	2,524	1,893	1,420	1,065	799	599	449	337	
Less: 50% of additions		0	1,746,494	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sub- total		0	1,746,494	3,492,987	1,199,399	359,820	188,905	141,679	106,259	79,694	59,771	44,828	33,621	25,216	18,912	14,184	10,638	7,978	5,984	4,488	3,366	2,524	1,893	1,420	1,065	799	599	449	337	
Regular depreciation (25%)	B	0	0	873,247	299,850	89,955	47,226	35,420	26,565	19,924	14,943	11,207	8,405	6,304	4,728	3,546	2,659	1,995	1,496	1,122	841	631	473	355	266	200	150	112	84	1,451,704
Sub- total		0	3,492,987	2,619,741	899,549	269,865	141,679	106,259	79,694	59,771	44,828	33,621	25,216	18,912	14,184	10,638	7,978	5,984	4,488	3,366	2,524	1,893	1,420	1,065	799	599	449	337	253	
Comparable		0	0	1,775,427	2,531,750	3,538,681	3,675,992	3,651,107	3,628,002	3,861,581	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	0	0	0	0	0	0	0	
Special depreciation (>25%) - if 100% was allowed		0	0	1,775,427	899,549	269,865	141,679	106,259	79,694	59,771	44,828	33,621	25,216	18,912	14,184	10,638	7,978	5,984	4,488	3,366	2,524	1,893	0	0	0	0	0	0	0	
Rate allowed by transitional rule		**100%**	**90%**	**80%**	**60%**	**30%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	
Special depreciation (>25%)	D	0	0	1,420,341	539,730	80,959	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,041,030
Ending balance		**0**	**3,492,987**	**1,199,399**	**359,820**	**188,905**	**141,679**	**106,259**	**79,694**	**59,771**	**44,828**	**33,621**	**25,216**	**18,912**	**14,184**	**10,638**	**7,978**	**5,984**	**4,488**	**3,366**	**2,524**	**1,893**	**1,420**	**1,065**	**799**	**599**	**449**	**337**	**253**	
CEE (EXPLORATION & DEVELOPMENT)																														
Declining-balance depreciation rate	100.0%																													
Beginning balance	4,497,446	4,497,446	4,497,446	4,497,446	4,142,361	2,150,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Plus: Additions		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		4,497,446	4,497,446	4,497,446	4,142,361	2,150,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable		0	0	355,085	1,992,021	3,457,722	3,675,992	3,651,107	3,628,002	3,861,581	3,835,848	2,799,808	3,794,998	3,700,332	3,707,273	3,710,130	3,703,250	3,056,676	3,062,582	3,066,983	3,070,263	2,915,489	0	0	0	0	0	0	0	
Deduction	E	0	0	355,085	1,992,021	2,150,340	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,497,446
Ending balance		**4,497,446**	**4,497,446**	**4,142,361**	**2,150,340**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
CDE (PRE & POST-PRODUCTION DEVELOPMENT)																														
Declining-balance depreciation rate	30.0%																													
Beginning balance	7,117,297	7,117,297	4,982,108	3,487,476	2,441,233	1,708,863	1,196,204	837,343	586,140	410,298	287,209	201,046	140,732	98,513	68,959	48,271	33,790	23,653	16,557	11,590	8,113	5,679	3,975	2,783	1,948	1,364	954	668	468	
Plus: Additions		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		7,117,297	4,982,108	3,487,476	2,441,233	1,708,863	1,196,204	837,343	586,140	410,298	287,209	201,046	140,732	98,513	68,959	48,271	33,790	23,653	16,557	11,590	8,113	5,679	3,975	2,783	1,948	1,364	954	668	468	
Deduction	C	2,135,189	1,494,632	1,046,243	732,370	512,659	358,861	251,203	175,842	123,089	86,163	60,314	42,220	29,554	20,688	14,481	10,137	7,096	4,967	3,477	2,434	1,704	1,193	835	584	409	286	200	140	7,116,970
Ending balance		4,982,108	3,487,476	2,441,233	1,708,863	1,196,204	837,343	586,140	410,298	287,209	201,046	140,732	98,513	68,959	48,271	33,790	23,653	16,557	11,590	8,113	5,679	3,975	2,783	1,948	1,364	954	668	468	327	

TAXABLE INCOME CONCILIATION

TOTAL INCOME	175,500,000		
LESS: ROYALTY	-5,216,400		
LESS: INTEREST	0		
LESS: TOTAL OPERATING COSTS, excluding royalties & interest	-87,474,935		
SUB-T0TAL (operating profit)	82,808,665	82,808,665	
PLUS: SALVAGE VALUE	0		
LESS: CAPITAL EXPENDITURES	-3,792,987		
LESS: CLOSURE COSTS	-734,000		
CASH FLOW	**78,281,678**	78,281,678	
LESS: MINING TAXES	-13,120,286		
PLUS: CAPITAL EXP. NOT DEPRECIATED	14,709		
TAXABLE INCOME FOR INCOME TAXES	**65,176,100**	53,561,357	11,614,743
FEDERAL INCOME TAXES	**6,327,954**		
EFFECTIVE PERCENTAGE OF CASH FLOW (L. 119/L. 114)	**8.08%**		

SILICON RIDGE PROJECT – Rogue Resources

Years			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Cash flow - operations																															
Revenues			0	4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	0	0	0	0	0	0	0	175,500,000
Less: Royalty			0	154,800	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	0	0	0	0	0	0	0	5,216,400
Less: Interest			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Total Operating Costs, excluding Interest & Royalty			0	3,544,958	4,574,979	4,645,134	3,875,458	3,911,309	4,064,708	4,179,913	3,941,516	4,002,825	5,324,504	4,115,139	4,115,139	4,115,139	4,115,139	4,115,139	4,966,787	4,966,787	4,966,787	4,966,787	4,966,787	0	0	0	0	0	0	0	87,474,935
Operating profit			0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Taxable income calculation																															
Operating profit			0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Less: Restauration Trust Fund Payments			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Closure Costs			0	0	0	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-224,000	0	0	0	0	0	0	0	-734,000
Plus: Recuperation of Restauration Trust Fund			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Salvage Value			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Mining Taxes Payable			0	-59,754	-463,704	-494,496	-686,847	-710,211	-701,162	-693,279	-744,990	-741,947	-491,361	-730,533	-843,043	-848,851	-842,613	-846,646	-651,720	-653,273	-654,360	-655,121	-606,374	0	0	0	0	0	0	0	-13,120,286
Sub-total			0	740,488	3,694,916	3,563,970	4,141,295	4,082,079	3,937,729	3,830,409	4,017,094	3,958,828	2,887,735	3,857,928	3,745,418	3,739,610	3,745,848	3,741,815	3,085,092	3,083,540	3,082,453	3,081,692	2,936,439	0	0	0	0	0	0	0	68,954,379
Less: Depreciation Class 41 B		A	0	0	0	0	0	0	0	0	-12,500	-21,875	-16,406	-12,305	-9,229	-6,921	-17,691	-25,768	-19,326	-14,495	-10,871	-8,153	-18,615	-26,461	-19,846	-14,884	-11,163	-8,372	-6,279	-4,710	-285,871
Less: Depreciation Class 41 A-1		B	0	0	-746,800	-112,020	-33,606	-17,643	-13,232	-9,924	-7,443	-5,582	-4,187	-3,140	-2,355	-1,766	-1,325	-994	-745	-559	-419	-314	-236	-177	-133	-99	-75	-56	-42	-31	-962,904
Sub-total			0	740,488	2,948,117	3,451,950	4,107,689	4,064,436	3,924,497	3,820,484	3,997,151	3,931,371	2,867,142	3,842,483	3,733,834	3,730,923	3,726,833	3,715,053	3,065,021	3,068,486	3,071,163	3,073,224	2,917,588	-26,638	-19,979	-14,984	-11,238	-8,428	-6,321	-4,741	67,705,604
Less: CDE		C	-255,000	-178,500	-124,950	-87,465	-61,226	-42,858	-30,000	-21,000	-14,700	-10,290	-7,203	-5,042	-3,530	-2,471	-1,729	-1,211	-847	-593	-415	-291	-203	-142	-100	-70	-49	-34	-24	-17	-849,961
Sub-total			-255,000	561,988	2,823,167	3,364,485	4,046,464	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	-26,780	-20,078	-15,054	-11,287	-8,463	-6,345	-4,758	66,855,643
Less: Supplementary Depreciation Class 41 A-1		D	0	-505,789	-1,792,319	-201,636	-30,245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2,529,989
Sub-total			-255,000	56,199	1,030,848	3,162,849	4,016,218	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	-26,780	-20,078	-15,054	-11,287	-8,463	-6,345	-4,758	64,325,653
Less: CEE		E	0	-56,199	-1,030,848	-2,356,526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-3,443,573
Taxable income before losses			-255,000	0	0	806,323	4,016,218	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	-26,780	-20,078	-15,054	-11,287	-8,463	-6,345	-4,758	60,882,080
Less: Losses from previous years			0	0	0	-255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-255,000
Taxable income			-255,000	0	0	551,323	4,016,218	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	-26,780	-20,078	-15,054	-11,287	-8,463	-6,345	-4,758	60,627,080
Federal Income Tax		15%	0	0	0	82,698	602,433	603,237	584,174	569,923	597,368	588,162	428,991	575,616	559,546	559,268	558,765	557,076	459,626	460,184	460,612	460,940	437,608	0	0	0	0	0	0	0	9,146,227
Quebec Income Tax (reduction from 2017 to 2020)		11.5%	0	0	0	63,402	461,865	462,482	447,867	436,941	457,982	450,924	328,893	441,306	428,985	428,772	428,387	427,092	352,380	352,808	353,136	353,387	335,499	0	0	0	0	0	0	0	7,012,107
Losses from previous years																															
Beginning Balance		0	0	255,000	255,000	255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,780	46,859	61,912	73,199	81,662	88,007	
Less: Losses expired			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Current year loss			255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,780	20,078	15,054	11,287	8,463	6,345	4,758	347,765
Sub-total			255,000	255,000	255,000	255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,780	46,859	61,912	73,199	81,662	88,007	92,765	
Less: Losses used in current year			0	0	0	255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	255,000
Ending balance			255,000	255,000	255,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26,780	46,859	61,912	73,199	81,662	88,007	92,765	

Years			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
ACQUISITIONS																															
CEE (PRE-PRODUCTION EXPLORATION & DEV.)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CLASS 41 A-1			0	3,492,987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,492,987
CLASS 41 B			0	0	0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
CDE (PRE & POST-PRODUCTION DEV.)			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL ASSETS ACQUIRED			**0**	**3,492,987**	**0**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**100,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3,792,987
				3,492,987																											
				3,492,987																											
CLASS 41 B – General Mining Assets																															
Declining-balance depreciation rate		25%																													
Beginning balance		0	0	0	0	0	0	0	0	0	0	87,500	65,625	49,219	36,914	27,686	20,764	103,073	77,305	57,979	43,484	32,613	24,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Plus: Additions			0	0	0	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	300,000
Sub- total			0	0	0	0	0	0	0	0	100,000	87,500	65,625	49,219	36,914	27,686	120,764	103,073	77,305	57,979	43,484	32,613	124,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Less: 50% of additions			0	0	0	0	0	0	0	0	50,000	0	0	0	0	0	50,000	0	0	0	0	0	50,000	0	0	0	0	0	0	0	
Sub- total			0	0	0	0	0	0	0	0	50,000	87,500	65,625	49,219	36,914	27,686	70,764	103,073	77,305	57,979	43,484	32,613	74,460	105,845	79,384	59,538	44,653	33,490	25,117	18,838	
Depreciation		A	0	0	0	0	0	0	0	0	12,500	21,875	16,406	12,305	9,229	6,921	17,691	25,768	19,326	14,495	10,871	8,153	18,615	26,461	19,846	14,884	11,163	8,372	6,279	4,710	285,871
Ending balance			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**87,500**	**65,625**	**49,219**	**36,914**	**27,686**	**20,764**	**103,073**	**77,305**	**57,979**	**43,484**	**32,613**	**24,460**	**105,845**	**79,384**	**59,538**	**44,653**	**33,490**	**25,117**	**18,838**	**14,129**	
CLASS 41 A-1 – New Mine Assets																															
Declining-balance depreciation rate		25.0%																													
Up to 100 % if required, but limited by the transitional rule (2013 Budget)																															
Beginning balance		0	0	0	2,987,198	448,080	134,424	70,573	52,929	39,697	29,773	22,330	16,747	12,560	9,420	7,065	5,299	3,974	2,981	2,235	1,677	1,257	943	707	530	398	298	224	168	126	
Plus: Additions			0	3,492,987	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,492,987
Sub- total			0	3,492,987	2,987,198	448,080	134,424	70,573	52,929	39,697	29,773	22,330	16,747	12,560	9,420	7,065	5,299	3,974	2,981	2,235	1,677	1,257	943	707	530	398	298	224	168	126	
Less: 50% of additions			0	1,746,494	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sub- total			0	1,746,494	2,987,198	448,080	134,424	70,573	52,929	39,697	29,773	22,330	16,747	12,560	9,420	7,065	5,299	3,974	2,981	2,235	1,677	1,257	943	707	530	398	298	224	168	126	
Regular depreciation (25%)		B	0	0	746,800	112,020	33,606	17,643	13,232	9,924	7,443	5,582	4,187	3,140	2,355	1,766	1,325	994	745	559	419	314	236	177	133	99	75	56	42	31	962,904
Sub- total			0	3,492,987	2,240,399	336,060	100,818	52,929	39,697	29,773	22,330	16,747	12,560	9,420	7,065	5,299	3,974	2,981	2,235	1,677	1,257	943	707	530	398	298	224	168	126	94	
Comparable			0	561,988	2,823,167	3,364,485	4,046,464	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	0	0	0	0	0	0	0	
Special depreciation (>25%) - if 100% was allowed			0	561,988	2,240,399	336,060	100,818	52,929	39,697	29,773	22,330	16,747	12,560	9,420	7,065	5,299	3,974	2,981	2,235	1,677	1,257	943	707	0	0	0	0	0	0	0	
Rate allowed by transitional rule			**100%**	**90%**	**80%**	**60%**	**30%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	
Special depreciation (>25%)		D	0	505,789	1,792,319	201,636	30,245	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,529,989
Ending balance			**0**	**2,987,198**	**448,080**	**134,424**	**70,573**	**52,929**	**39,697**	**29,773**	**22,330**	**16,747**	**12,560**	**9,420**	**7,065**	**5,299**	**3,974**	**2,981**	**2,235**	**1,677**	**1,257**	**943**	**707**	**530**	**398**	**298**	**224**	**168**	**126**	**94**	
CEE (EXPLORATION & DEVELOPMENT)																															
Declining-balance depreciation rate		100.0%																													
Beginning balance		3,443,573	3,443,573	3,443,573	3,387,374	2,356,526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Plus: Additions			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total			3,443,573	3,443,573	3,387,374	2,356,526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable			0	56,199	1,030,848	3,162,849	4,016,218	4,021,578	3,894,496	3,799,484	3,982,450	3,921,081	2,859,939	3,837,441	3,730,305	3,728,452	3,725,103	3,713,843	3,064,174	3,067,893	3,070,747	3,072,933	2,917,385	0	0	0	0	0	0	0	
Deduction		E	0	56,199	1,030,848	2,356,526	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3,443,573
Ending balance			**3,443,573**	**3,387,374**	**2,356,526**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
CDE (PRE & POST-PRODUCTION DEVELOPMENT)																															
Declining-balance depreciation rate		30.0%																													
Beginning balance		850,000	850,000	595,000	416,500	291,550	204,085	142,860	100,002	70,001	49,001	34,301	24,010	16,807	11,765	8,236	5,765	4,035	2,825	1,977	1,384	969	678	475	332	233	163	114	80	56	
Plus: Additions			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total			850,000	595,000	416,500	291,550	204,085	142,860	100,002	70,001	49,001	34,301	24,010	16,807	11,765	8,236	5,765	4,035	2,825	1,977	1,384	969	678	475	332	233	163	114	80	56	
Deduction		C	255,000	178,500	124,950	87,465	61,226	42,858	30,000	21,000	14,700	10,290	7,203	5,042	3,530	2,471	1,729	1,211	847	593	415	291	203	142	100	70	49	34	24	17	849,961
Ending balance			595,000	416,500	291,550	204,085	142,860	100,002	70,001	49,001	34,301	24,010	16,807	11,765	8,236	5,765	4,035	2,825	1,977	1,384	969	678	475	332	233	163	114	80	56	39	

TAXABLE INCOME CONCILIATION

TOTAL INCOME	175,500,000		
LESS: ROYALTY	-5,216,400		
LESS: INTEREST	0		
LESS: TOTAL OPERATING COSTS, excluding royalties & interest	-87,474,935		
SUB-T0TAL (operating profit)	82,808,665	82,808,665	
PLUS: SALVAGE VALUE	0		
LESS: CAPITAL EXPENDITURES	-3,792,987		
LESS: CLOSURE COSTS	-734,000		
CASH FLOW	**78,281,678**	78,281,678	
LESS: MINING TAXES	-13,120,286		
PLUS: CAPITAL EXP. NOT DEPRECIATED	14,262		
TAXABLE INCOME FOR INCOME TAXES	**65,175,653**	60,882,080	4,293,573
QUEBEC INCOME TAXES	**7,012,107**		
EFFECTIVE PERCENTAGE OF CASH FLOW (L. 119/L. 114)	**8.96%**		

SILICON RIDGE PROJECT – Rogue Resources

Years		0	1	2	3	4	5	6	7	8	9	10	11	12	13
Cash flow - operations															
Revenues		0	4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000
Less: Royalty		0	154,800	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400
Less: Interest		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Total Operating Costs, excluding Interest & Royalt		0	3,544,958	4,574,979	4,645,134	3,875,458	3,911,309	4,064,708	4,179,913	3,941,516	4,002,825	5,324,504	4,115,139	4,115,139	4,115,139
Operating profit		0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461
Mining income calculation															
Operating profit		0	800,242	4,158,621	4,088,466	4,858,142	4,822,291	4,668,892	4,553,687	4,792,084	4,730,775	3,409,096	4,618,461	4,618,461	4,618,461
Plus: Royalty paid or payabl		0	154,800	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400
Plus: Interest paid or payabl		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Non-deductible portion of "General administrative exp	10%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Restauration Trust Fund Payment		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Closure costs		0	0	0	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000
Plus: Recuperation of Restauration Trust Fun		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Salvage value		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		0	955,042	4,425,021	4,324,866	5,094,542	5,058,691	4,905,292	4,790,087	5,028,484	4,967,175	3,645,496	4,854,861	4,854,861	4,854,861
Less: Depreciation allowanc	A	0	-4,247	-1,046,622	-732,636	-512,845	-358,991	-251,294	-175,906	-153,134	-107,194	-75,036	-52,525	-36,767	-25,737
Sub-total		0	950,795	3,378,398	3,592,231	4,581,697	4,699,699	4,653,998	4,614,182	4,875,350	4,859,982	3,570,460	4,802,336	4,818,093	4,829,124
Less: Allowance for development (post-prod	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		0	950,795	3,378,398	3,592,231	4,581,697	4,699,699	4,653,998	4,614,182	4,875,350	4,859,982	3,570,460	4,802,336	4,818,093	4,829,124
Less: Processing allowanc	C	0	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229
Sub-total		0	792,567	3,220,170	3,434,002	4,423,468	4,541,471	4,495,769	4,455,953	4,717,121	4,701,753	3,412,232	4,644,107	4,659,865	4,670,895
Less: Allowance for Mine in Northern Quebe	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		0	792,567	3,220,170	3,434,002	4,423,468	4,541,471	4,495,769	4,455,953	4,717,121	4,701,753	3,412,232	4,644,107	4,659,865	4,670,895
Less: Exploration allowance (explor. pre april 201	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		0	792,567	3,220,170	3,434,002	4,423,468	4,541,471	4,495,769	4,455,953	4,717,121	4,701,753	3,412,232	4,644,107	4,659,865	4,670,895
Less: Exploration allowance (explor. post april 201	G	0	-79,257	-322,017	-343,400	-442,347	-454,147	-449,577	-445,595	-471,712	-470,175	-341,223	-464,411	-9,712	0
Sub-total		0	713,310	2,898,153	3,090,602	3,981,122	4,087,324	4,046,192	4,010,358	4,245,409	4,231,578	3,071,009	4,179,697	4,650,153	4,670,895
Less: Allowance for development (pre-prod	F	0	-339,849	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total		0	373,461	2,898,153	3,090,602	3,981,122	4,087,324	4,046,192	4,010,358	4,245,409	4,231,578	3,071,009	4,179,697	4,650,153	4,670,895
Addition to depreciation		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taxable income		**0**	**373,461**	**2,898,153**	**3,090,602**	**3,981,122**	**4,087,324**	**4,046,192**	**4,010,358**	**4,245,409**	**4,231,578**	**3,071,009**	**4,179,697**	**4,650,153**	**4,670,895**
Profit margin		**0.0%**	**8.3%**	**32.2%**	**34.3%**	**44.2%**	**45.4%**	**45.0%**	**44.6%**	**47.2%**	**47.0%**	**34.1%**	**46.4%**	**51.7%**	**51.9%**

Surtax based on profit margin

Margin	Tax rate	Surtax
0%	16%	0%
35%	22%	6%
50%	28%	6%

Years		0	1	2	3	4	5	6	7	8	9	10	11	12	13
BASE TAX @ 16 %		**0**	**59,754**	**463,704**	**494,496**	**636,979**	**653,972**	**647,391**	**641,657**	**679,265**	**677,052**	**491,361**	**668,751**	**744,025**	**747,343**
MARGIN OVER 35 % @ 6 % ADDITIONNAL		**0**	**0**	**0**	**0**	**49,867**	**56,239**	**53,772**	**51,621**	**65,725**	**64,895**	**0**	**61,782**	**90,009**	**91,254**
MARGIN OVER 50 % @ 6 % ADDITIONNAL		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9,009**	**10,254**
TOTAL: "REGULAR" MINING TAX BEFORE CREDIT FOR MINIMUM ROYALTY		**0**	**59,754**	**463,704**	**494,496**	**686,847**	**710,211**	**701,162**	**693,279**	**744,990**	**741,947**	**491,361**	**730,533**	**843,043**	**848,851**
Mining Tax - minimum royalty															
Revenues		0	4,500,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000
Less: Allowed operating expenses (simplified calculatio		0	-1,481,236	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336
NOTE: operating costs less mining costs & non-deductible part of G&A															
Plus: Royalty and part of G & A expenses related to mining	0%	0	154,800	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400	266,400
NOTE: because included in amount deducted in operating costs															
NOTE: 0% of G & A assumed to be related to mining (i.e. contract mining)															
Less: Tax depreciation (100% assumed to qualify)	100%	0	-4,247	-1,046,622	-732,636	-512,845	-358,991	-251,294	-175,906	-153,134	-107,194	-75,036	-52,525	-36,767	-25,737
NOTE: 0% assumed to be depreciation of mining assets (i.e. contract mining)															
NOTE: any reduction of depreciation is not reflected (problem of circularity)															
Less: Processing allowance		0	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229
Sub-total		0	3,011,089	6,231,213	6,545,200	6,764,991	6,918,844	7,026,542	7,101,930	7,124,701	7,170,642	7,202,800	7,225,311	7,241,068	7,252,098
Comparable - minimum 10 % of revenues	10%	0	450,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000	900,000
Basis for royalty		0	3,011,089	6,231,213	6,545,200	6,764,991	6,918,844	7,026,542	7,101,930	7,124,701	7,170,642	7,202,800	7,225,311	7,241,068	7,252,098
Amount subject to royalty		0	3,011,089	6,231,213	6,545,200	6,764,991	6,918,844	7,026,542	7,101,930	7,124,701	7,170,642	7,202,800	7,225,311	7,241,068	7,252,098
Amount subject to 1% royalty	80,000,000	0	3,011,089	6,231,213	6,545,200	6,764,991	6,918,844	7,026,542	7,101,930	7,124,701	7,170,642	7,202,800	7,225,311	7,241,068	7,252,098
1% royalty	1%	0	30,111	62,312	65,452	67,650	69,188	70,265	71,019	71,247	71,706	72,028	72,253	72,411	72,521
Amount subject to 4% royalty		0	0	0	0	0	0	0	0	0	0	0	0	0	0
4% royalty	4%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total royalty		**0**	**30,111**	**62,312**	**65,452**	**67,650**	**69,188**	**70,265**	**71,019**	**71,247**	**71,706**	**72,028**	**72,253**	**72,411**	**72,521**
"REGULAR" MINING TAX BEFORE CREDIT FOR MINIMUM ROYALTY		**0**	**59,754**	**463,704**	**494,496**	**686,847**	**710,211**	**701,162**	**693,279**	**744,990**	**741,947**	**491,361**	**730,533**	**843,043**	**848,851**
LESS: Credit for excess royalty in same year - test 1		0	0	0	0	0	0	0	0	0	0	0	0	0	0
LESS: Credit for excess royalty in same year - test 2		0	-30,111	-62,312	-65,452	-67,650	-69,188	-70,265	-71,019	-71,247	-71,706	-72,028	-72,253	-72,411	-72,521
Sub-total		0	29,643	401,392	429,044	619,197	641,023	630,897	622,259	673,743	670,241	419,333	658,280	770,632	776,330
LESS: Credit for excess royalty in previous years		0	0	0	0	0	0	0	0	0	0	0	0	0	0
"REGULAR" MINING TAX AFTER CREDIT FOR MINIMUM ROYALTY		**0**	**29,643**	**401,392**	**429,044**	**619,197**	**641,023**	**630,897**	**622,259**	**673,743**	**670,241**	**419,333**	**658,280**	**770,632**	**776,330**
NOTE: Two tests are required in respect of royalty in same year in case															
the royalty exceeds the Regular Mining Tax when their is Regular tax payable.															
Previous year Excess		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Excess of royalty over regular mining tax		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative Excess of royalty over regular mining tax		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deduction for excess of royalty over regular m. Tax		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative Excess of royalty over regular mining tax		0	0	0	0	0	0	0	0	0	0	0	0	0	0

Years	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Cash flow - operations															
Revenues	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	0	0	0	0	0	0	0	175,500,000
Less: Royalty	266,400	266,400	266,400	266,400	266,400	266,400	266,400	0	0	0	0	0	0	0	5,216,400
Less: Interest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Total Operating Costs, excluding Interest & Royalt	4,115,139	4,115,139	4,966,787	4,966,787	4,966,787	4,966,787	4,966,787	0	0	0	0	0	0	0	87,474,935
Operating profit	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Mining income calculation															
Operating profit	4,618,461	4,618,461	3,766,813	3,766,813	3,766,813	3,766,813	3,766,813	0	0	0	0	0	0	0	82,808,665
Plus: Royalty paid or payabl	266,400	266,400	266,400	266,400	266,400	266,400	266,400	0	0	0	0	0	0	0	5,216,400
Plus: Interest paid or payabl	0	0	0	0			0	0	0	0	0	0	0	0	
Plus: Non-deductible portion of "General administrative exp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Restauration Trust Fund Payment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less: Closure costs	-30,000	-30,000	-30,000	-30,000	-30,000	-30,000	-224,000	0	0	0	0	0	0	0	-734,000
Plus: Recuperation of Restauration Trust Fun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plus: Salvage value	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	4,854,861	4,854,861	4,003,213	4,003,213	4,003,213	4,003,213	3,809,213	0	0	0	0	0	0	0	87,291,065
Less: Depreciation allowanc	-48,016	-33,611	-23,528	-16,470	-11,529	-8,070	-35,649	0	0	0	0	0	0	0	-3,709,806
Sub-total	4,806,845	4,821,250	3,979,685	3,986,743	3,991,684	3,995,143	3,773,564	0	0	0	0	0	0	0	83,581,259
Less: Allowance for development (post-prod	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	4,806,845	4,821,250	3,979,685	3,986,743	3,991,684	3,995,143	3,773,564	0	0	0	0	0	0	0	83,581,259
Less: Processing allowanc	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	0	0	0	0	0	0	0	-3,164,570
Sub-total	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	80,416,689
Less: Allowance for Mine in Northern Quebe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	80,416,689
Less: Exploration allowance (explor. pre april 201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub-total	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	80,416,689
Less: Exploration allowance (explor. post april 201	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-4,293,573
Sub-total	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	76,123,116
Less: Allowance for development (pre-prod	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-339,849
Sub-total	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	75,783,267
Addition to depreciation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Taxable income	**4,648,616**	**4,663,021**	**3,821,457**	**3,828,515**	**3,833,456**	**3,836,914**	**3,615,335**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**75,783,267**
Profit margin	**51.7%**	**51.8%**	**42.5%**	**42.5%**	**42.6%**	**42.6%**	**40.2%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**43.2%**
BASE TAX @ 16 %	**743,779**	**746,083**	**611,433**	**612,562**	**613,353**	**613,906**	**578,454**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**12,125,323**
MARGIN OVER 35 % @ 6 % ADDITIONNAL	**89,917**	**90,781**	**40,287**	**40,711**	**41,007**	**41,215**	**27,920**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**957,002**
MARGIN OVER 50 % @ 6 % ADDITIONNAL	**8,917**	**9,781**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**37,961**
TOTAL: "REGULAR" MINING TAX BEFORE CREDIT FOR MINIMUM ROYALTY	**842,613**	**846,646**	**651,720**	**653,273**	**654,360**	**655,121**	**606,374**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13,120,286**
Mining Tax - minimum royalty															
Revenues	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	9,000,000	0	0	0	0	0	0	0	175,500,000
Less: Allowed operating expenses (simplified calculatio	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	-1,830,336	0	0	0	0	0	0	0	-36,257,620
Plus: Royalty and part of G & A expenses related to mining	266,400	266,400	266,400	266,400	266,400	266,400	266,400	0	0	0	0	0	0	0	5,216,400
Less: Tax depreciation (100% assumed to qualify)	-48,016	-33,611	-23,528	-16,470	-11,529	-8,070	-35,649	0	0	0	0	0	0	0	-3,709,805
Less: Processing allowance	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	-158,229	0	0	0	0	0	0	0	-3,164,570
Sub-total	7,229,819	7,244,224	7,254,308	7,261,366	7,266,307	7,269,765	7,242,186	0	0	0	0	0	0	0	**137,584,404**
Comparable - minimum 10 % of revenues	900,000	900,000	900,000	900,000	900,000	900,000	900,000	0	0	0	0	0	0	0	
Basis for royalty	7,229,819	7,244,224	7,254,308	7,261,366	7,266,307	7,269,765	7,242,186	0	0	0	0	0	0	0	
Amount subject to royalty	7,229,819	7,244,224	7,254,308	7,261,366	7,266,307	7,269,765	7,242,186	0	0	0	0	0	0	0	
Amount subject to 1% royalty	7,229,819	7,244,224	7,254,308	7,261,366	7,266,307	7,269,765	7,242,186	0	0	0	0	0	0	0	
1% royalty	72,298	72,442	72,543	72,614	72,663	72,698	72,422	0	0	0	0	0	0	0	1,375,844
Amount subject to 4% royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4% royalty	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total royalty	**72,298**	**72,442**	**72,543**	**72,614**	**72,663**	**72,698**	**72,422**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1,375,844**
"REGULAR" MINING TAX BEFORE CREDIT FOR MINIMUM ROYALTY	**842,613**	**846,646**	**651,720**	**653,273**	**654,360**	**655,121**	**606,374**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13,120,286**
LESS: Credit for excess royalty in same year - test 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LESS: Credit for excess royalty in same year - test 2	-72,298	-72,442	-72,543	-72,614	-72,663	-72,698	-72,422	0	0	0	0	0	0	0	-1,375,844
Sub-total	770,314	774,204	579,177	580,660	581,697	582,424	533,952	0	0	0	0	0	0	0	**11,744,442**
LESS: Credit for excess royalty in previous years	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
"REGULAR" MINING TAX AFTER CREDIT FOR MINIMUM ROYALTY	**770,314**	**774,204**	**579,177**	**580,660**	**581,697**	**582,424**	**533,952**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11,744,442**
Previous year Excess	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Excess of royalty over regular mining tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative Excess of royalty over regular mining tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Deduction for excess of royalty over regular m. Tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cumulative Excess of royalty over regular mining tax	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

MINING ALLOWANCES DETERMINATION

Years		0	1	2	3	4	5	6	7	8	9	10	11	12	13
ACQUISITIONS															
EXPLORATION (PRE-QUEBEC BUDGET 2010)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXPLORATION (POST-QUEBEC BUDGET 2010)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEVELOPMENT (PRE-PRODUCTION)		0	339,849	0	0	0	0	0	0	0	0	0	0	0	0
DEVELOPMENT (POST-PRODUCTION)		0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE ASSETS		0	3,492,987	0	0	0	0	0	0	100,000	0	0	0	0	0
TOTAL ASSETS ACQUIRED		0	3,832,836	0	0	0	0	0	0	100,000	0	0	0	0	0
QUALIFYING PROCESSING ASSETS															
ANNUAL ACQUISITIONS		0	1,582,285	0	0	0	0	0	0	0	0	0	0	0	0
CUMULATIVE COSTS		0	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285
ALLOWANCE FOR A MINE LOCATED IN NORTHERN QUEBEC															
Any amount over first three production years															
not to exceed maximum allowance	0														
Beginning balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Comparable		0	792,567	3,220,170	3,434,002	4,423,468	4,541,471	4,495,769	4,455,953	4,717,121	4,701,753	3,412,232	4,644,107	4,659,865	4,670,895
Deduction	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0
PROCESSING ALLOWANCE															
Annual allowance based on															
Cumulative value of processing assets	10.0%														
Not to exceed the greater of:															
- Profit before this deduction	75.0%														
- Value of production before this deduction	30.0%														
Cumulative value of processig assets		0	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285
Amount based on cumulative asset value		0	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229
Maximum based on OVMSH		0	950,795	1,916,833	2,011,029	2,076,966	2,123,122	2,155,431	2,178,047	2,184,879	2,198,661	2,208,308	2,215,062	2,219,789	2,223,098
Maximum based on profit		0	713,096	2,533,799	2,694,173	3,436,273	3,524,774	3,490,498	3,460,636	3,656,512	3,644,986	2,677,845	3,601,752	3,613,570	3,621,843
Maximum between OVMSH & Profit		0	950,795	2,533,799	2,694,173	3,436,273	3,524,774	3,490,498	3,460,636	3,656,512	3,644,986	2,677,845	3,601,752	3,613,570	3,621,843
Processing allowance	C	**0**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**
EXPLORATION ALLOWANCE, pre 2010 Budget															
Maximum of profit before this deduction	100.0%														
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additions		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Comparable		0	792,567	3,220,170	3,434,002	4,423,468	4,541,471	4,495,769	4,455,953	4,717,121	4,701,753	3,412,232	4,644,107	4,659,865	4,670,895
Deduction	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EXPLORATION ALLOWANCE, post 2010 Budget															
Maximum of profit before this deduction	10%														
Beginning balance	4,293,573	4,293,573	4,293,573	4,214,316	3,892,299	3,548,899	3,106,552	2,652,405	2,202,828	1,757,233	1,285,521	815,346	474,122	9,712	0
Additions		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		4,293,573	4,293,573	4,214,316	3,892,299	3,548,899	3,106,552	2,652,405	2,202,828	1,757,233	1,285,521	815,346	474,122	9,712	0
Comparable		0	79,257	322,017	343,400	442,347	454,147	449,577	445,595	471,712	470,175	341,223	464,411	465,986	467,090
Deduction	G	0	79,257	322,017	343,400	442,347	454,147	449,577	445,595	471,712	470,175	341,223	464,411	9,712	0
Ending balance		**4,293,573**	**4,214,316**	**3,892,299**	**3,548,899**	**3,106,552**	**2,652,405**	**2,202,828**	**1,757,233**	**1,285,521**	**815,346**	**474,122**	**9,712**	**0**	**0**
DEPRECIATION ALLOWANCE															
Declining-balance depreciation rate	30.0%														
Beginning balance		0	0	3,488,741	2,442,118	1,709,483	1,196,638	837,647	586,353	410,447	357,313	250,119	175,083	122,558	85,791
Additions		0	3,492,987	0	0	0	0	0	0	100,000	0	0	0	0	0
Sub- total		0	3,492,987	3,488,741	2,442,118	1,709,483	1,196,638	837,647	586,353	510,447	357,313	250,119	175,083	122,558	85,791
Comparable		0	955,042	4,425,021	4,324,866	5,094,542	5,058,691	4,905,292	4,790,087	5,028,484	4,967,175	3,645,496	4,854,861	4,854,861	4,854,861
Deduction possible		0	1,047,896	1,046,622	732,636	512,845	358,991	251,294	175,906	153,134	107,194	75,036	52,525	36,767	25,737
Deduction	A	**0**	**4,247**	**1,046,622**	**732,636**	**512,845**	**358,991**	**251,294**	**175,906**	**153,134**	**107,194**	**75,036**	**52,525**	**36,767**	**25,737**
Addition to depreciation		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance		**0**	**3,488,741**	**2,442,118**	**1,709,483**	**1,196,638**	**837,647**	**586,353**	**410,447**	**357,313**	**250,119**	**175,083**	**122,558**	**85,791**	**60,054**
Calculation of depreciation to optimize processing allowance		0	4,247	3,134,573	3,034,353	4,133,889	4,082,673	3,863,532	3,698,955	4,039,521	3,951,937	2,063,824	3,791,488	3,791,488	3,791,488
PRE-PROD. DEVELOPMENT ALLOWANCE															
Declining-balance depreciation rate	100.0%														
Beginning balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additions		0	339,849	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		0	339,849	0	0	0	0	0	0	0	0	0	0	0	0
Comparable		0	713,310	2,898,153	3,090,602	3,981,122	4,087,324	4,046,192	4,010,358	4,245,409	4,231,578	3,071,009	4,179,697	4,650,153	4,670,895
Deduction possible		0	339,849	0	0	0	0	0	0	0	0	0	0	0	0
Deduction	F	0	339,849	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
POST-PROD. DEVELOPMENT ALLOWANCE															
Declining-balance depreciation rate	30.0%														
Beginning balance		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Additions		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Comparable		0	950,795	3,378,398	3,592,231	4,581,697	4,699,699	4,653,998	4,614,182	4,875,350	4,859,982	3,570,460	4,802,336	4,818,093	4,829,124
Deduction possible		0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deduction	B	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Years	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
ACQUISITIONS															
EXPLORATION (PRE-QUEBEC BUDGET 2010)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EXPLORATION (POST-QUEBEC BUDGET 2010)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEVELOPMENT (PRE-PRODUCTION)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	339,849
DEVELOPMENT (POST-PRODUCTION)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEPRECIABLE ASSETS	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	3,792,987
TOTAL ASSETS ACQUIRED	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	**4,132,836**
QUALIFYING PROCESSING ASSETS															
ANNUAL ACQUISITIONS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,582,285
CUMULATIVE COSTS	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	
ALLOWANCE FOR A MINE LOCATED IN NORTHERN QUEBEC															
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	
Deduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PROCESSING ALLOWANCE															
Cumulative value of processig assets	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	1,582,285	
Amount based on cumulative asset value	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	158,229	
Maximum based on OVMSH	2,216,414	2,220,736	2,223,761	2,225,878	2,227,361	2,228,398	2,220,124	0	0	0	0	0	0	0	
Maximum based on profit	3,605,134	3,615,937	2,984,764	2,990,058	2,993,763	2,996,357	2,830,173	0	0	0	0	0	0	0	
Maximum between OVMSH & Profit	3,605,134	3,615,937	2,984,764	2,990,058	2,993,763	2,996,357	2,830,173	0	0	0	0	0	0	0	
Processing allowance	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**158,229**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3,164,570
EXPLORATION ALLOWANCE, pre 2010 Budget															
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Additions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	
Deduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
EXPLORATION ALLOWANCE, post 2010 Budget															
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Additions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable	464,862	466,302	382,146	382,851	383,346	383,691	361,534	0	0	0	0	0	0	0	
Deduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,293,573
Ending balance	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
DEPRECIATION ALLOWANCE															
Beginning balance	60,054	112,037	78,426	54,898	38,429	26,900	18,830	83,181	83,181	83,181	83,181	83,181	83,181	83,181	
Additions	100,000	0	0	0	0	0	100,000	0	0	0	0	0	0	0	3,792,987
Sub- total	160,054	112,037	78,426	54,898	38,429	26,900	118,830	83,181	83,181	83,181	83,181	83,181	83,181	83,181	
Comparable	4,854,861	4,854,861	4,003,213	4,003,213	4,003,213	4,003,213	3,809,213	0	0	0	0	0	0	0	
Deduction possible	48,016	33,611	23,528	16,470	11,529	8,070	35,649	24,954	24,954	24,954	24,954	24,954	24,954	24,954	
Deduction	**48,016**	**33,611**	**23,528**	**16,470**	**11,529**	**8,070**	**35,649**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	3,709,806
Addition to depreciation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance	**112,037**	**78,426**	**54,898**	**38,429**	**26,900**	**18,830**	**83,181**	**83,181**	**83,181**	**83,181**	**83,181**	**83,181**	**83,181**	**83,181**	
Calculation of depreciation to optimize processing allowance	3,791,488	3,791,488	2,574,848	2,574,848	2,574,848	2,574,848	2,574,848	0	0	0	0	0	0	0	
PRE-PROD. DEVELOPMENT ALLOWANCE															
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Additions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	339,849
Sub- total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable	4,648,616	4,663,021	3,821,457	3,828,515	3,833,456	3,836,914	3,615,335	0	0	0	0	0	0	0	
Deduction possible	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Deduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	339,849
Ending balance	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
POST-PROD. DEVELOPMENT ALLOWANCE															
Beginning balance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Additions	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub- total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Comparable	4,806,845	4,821,250	3,979,685	3,986,743	3,991,684	3,995,143	3,773,564	0	0	0	0	0	0	0	
Deduction possible	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Deduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ending balance	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	

CONCILIATION OF MINING TAXES

TOTAL INCOME
LESS: ROYALTY:
LESS: INTEREST
LESS: OPERATING EXPENSES, excluding royalties & interest
SUB-T0TAL (operating profit)
PLUS: SALVAGE VALUE
LESS: CAPITAL EXPENDITURES
LESS: CLOSURE COSTS
CASH FLOW
PLUS: ROYALTY (non deductible)
PLUS: INTEREST (non deductible)
PLUS: NON- DEDUCTIBLE G&A EXPENSES
PLUS: CAPITAL EXP. NOT DEPRECIATED
LESS: PROCESSING ALLOWANCE
PLUS: POST-PRODUCTION DEV. EXP. NOT DEPRECIATED
LESS: NORTHERN MINE ALLOWANCE
TAXABLE INCOME - FOR MINING TAXES
MINING TAXES
EFFECTIVE PERCENTAGE OF CASH FLOW (L. 201/L. 191)