Technical Report for the Black Fox Complex, Canada

Report Prepared for

McEwen Mining Inc.

Report Prepared by

SRK Consulting (Canada) Inc.
3CM041.001
April 6, 2018

Technical Report for the Black Fox Complex, Canada

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SRK Project Number 3CM041.001

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Signature date: April 6, 2018

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Cover: Black Fox Complex, Black Fox Mill and tailings pond, Matheson, Ontario

IMPORTANT NOTICE

This report was prepared as a National Instrument 43-101 *Standards of Disclosure for Mineral Projects* Technical Report for McEwen Mining Inc. (McEwen Mining) by SRK Consulting (Canada) Inc. (SRK). The quality of information, conclusions, and estimates contained herein are consistent with the quality of effort involved in SRK's services. The information, conclusions, and estimates contained herein are based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by McEwen Mining subject to the terms and conditions of its contract with SRK and relevant securities legislation. The contract permits McEwen Mining to file this report as a Technical Report with Canadian securities regulatory authority pursuant to National Instrument 43-101. Except for the purposes legislated under provincial securities law, any other uses of this report by any third party is at that party's sole risk. The responsibility for this disclosure remains with McEwen Mining. The user of this document should ensure that this is the most recent Technical Report for the property as it is not valid if a new Technical Report has been issued.

1 Executive Summary

Introduction

The Black Fox Complex is located in the Beatty and Hislop townships, approximately 10 kilometres from Matheson and 65 kilometres east of the city of Timmins in the Province of Ontario, Canada.

McEwen Mining Inc. (McEwen Mining) holds a 100 percent interest in the Black Fox Complex which it acquired on October 6, 2017 from the previous owner, Primero Mining Corp. (Primero).

McEwen Mining is a Toronto-based mining company focused on the operation, development, exploration and acquisition of precious metal projects. It is listed on the New York and Toronto Stock Exchanges under the ticker symbol MUX. McEwen Mining is a precious metals producer with three mining operations and four exploration / development projects located in Canada, United States, Mexico and Argentina.

In December 2017, McEwen Mining commissioned SRK Consulting (Canada) Inc. (SRK) to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report following the guidelines of Canadian Securities Administrators' National Instrument 43-101 (NI 43-101) for the Black Fox Complex. The technical report was undertaken to satisfy certain NI43-101 requirements following the acquisition of the Black Fox Complex by McEwen Mining from Primero.

The Black Fox Complex, comprises the operational underground Black Fox Mine, the adjacent advanced Grey Fox and Froome exploration projects, and the Black Fox Mill located on the nearby Stock property.

Property Description and Ownership

The Black Fox Complex consists of one (1) block of land comprising twenty-eight (28) mining right parcels and thirty-five (35) overlapping surface right parcels for a total of 1,788 hectares of mining land and 1,541 hectares of surface land. Some mining right parcels are subject to royalties. All surface right and mining right parcels are located in the Beatty and Hislop townships and their boundaries are defined by the Cochrane Land Registry Office. All parcels are one of the following: a freehold mining land (mining patent), a mining lease, a freehold surface land, or a surface lease.

On August 25, 2017, McEwen Mining entered into an Asset Purchase Agreement (the "APA") with Primero, whereby it purchased all the assets and liabilities related to the Black Fox Complex for total cash consideration of US$27.5 million, which is the purchase price of US$35.0 million less closing adjustments. The transaction was completed on October 6, 2017.

Geology and Mineralization

The Black Fox Complex property is underlain by rocks of the 2,750- to 2,670-million-year-old Southern Abitibi Greenstone Belt (SAGB) in the central part of the Wawa-Abitibi Subprovince, southeastern Superior Province, and northeastern Ontario. The local geological setting is represented by Neoarchean supracrustal rocks intruded by Matachewan and Keweenawan diabase dykes and Mesozoic kimberlite dykes and pipes. The supracrustal rocks are composed of ultramafic, mafic, intermediate and felsic metavolcanic rocks, related intrusive rocks, clastic and chemical metasedimentary rocks, and a suite of ultramafic to felsic alkalic plutonic and metavolcanic rocks.

The Froome Project area is underlain by moderately to steeply dipping to the southwest clastic metasedimentary, mafic metavolcanic, and ultramafic metavolcanic rocks and chlorite ± talc schists. Feldspar porphyry and lamprophyre dikes intrude the ultramafic volcanic rocks and chlorite-talc schist. The Grey Fox Project is underlain by an overturned, steeply dipping to the east assemblage of metasedimentary and massive, pillowed, and variolitic mafic metavolcanic with minor interflow sedimentary rocks.

Four different styles of gold mineralization have been identified within the mineralized envelope at the Black Fox Mine. These are:

- Free gold associated with east to south east striking (100 to 170 degrees) moderately to steeply dipping (40 to 80 degrees) quartz-carbonate-chlorite shear veins; sigmoidal vein arrays that strike to the west, north-west (290 to 315 degrees) and dip moderately (30 to 60 degrees) to the north. Visible gold is observed along chlorite stylolites, slip surfaces and within the vein matrix itself.
- Gold-bearing pyrite associated with albite-carbonate-sericite altered syenitic and plagioclase porphyry sill-like bodies spatially associated with gold-bearing quartz-carbonate vein systems.
- Gold associated with disseminated fine-grained pyrite within intensely sheared Fe-carbonate-sericite-albite altered mafic volcanic rocks adjacent to or within ultramafic rocks. These zones are associated with variably deformed quartz-carbonate veins that can host visible gold as well.
- A much less common form of gold mineralization occurs in carbonate-quartz-talc alteration as disseminated free gold flakes, seen in the Deep Central Zone in areas of elevated matrix quartz and/or quartz veinlets in the altered ultramafic volcanic rocks matrix.

Exploration Status

Significant upside potential at the Black Fox Complex exists as it is located within a highly favourable geological setting with proven gold endowment, along the Destor Porcupine Fault in Southern Abitibi Sub-Province. The property has multiple mineralized structural trends and multiple mineralization styles encountered in various host rock lithologies. In 2018 and in future exploration programs, McEwen Mining will look to expand the existing resources at the Black Fox Mine, Froome and Grey Fox projects, as well as drill test nearby structural and geophysical targets.

Optimisation of all available geoscientific information including historical drillhole data, geophysical surveys (Magnetic, Titan 24 I.P., new VTEM) was used to develop the geological understanding and define priority target areas.

At the Black Fox Mine, drilling will be done along strike and down plunge of known gold mineralization, and historic assay values will be followed up on in conjunction with understanding of the geological and structural control of the gold mineralization. Deep drilling below the Black Fox Mine will also be undertaken to assess its potential at depth and the continuity of the deposit. Compared to other similar deposits within the Timmins and Matheson camp averaging vertical depths in the order of 1,300m, the current known extent of gold mineralization at Black Fox Mine is relatively shallow with the mineral resource only extending to a depth of approximately 870 metres vertical.

At the Froome Project, a drill program to follow up on the deepest intercepts and historic positive gold intersections will be undertaken. Additionally, a drill program will explore potential lateral extensions of the deposit, in response to the positive results encountered in holes to the northwest and southeast of Froome over approximately one-kilometer strike length. Geophysical anomalies (including chargeability, resistivity, and magnetic) located along the Froome (Gibson-Kelore) trend will continue to be tested.

At the Grey Fox Project, the depth potential of the north-south structures will be tested, as well as the orientations of controls on mineralization (north-northwest and south-southeast dipping structures) in the hanging wall and footwall of the north-south structures controlling mineralization. Deep drilling will be designed with the objective of extending mineralization outside current resource.

Development and Operations

The Black Fox Mine plan was completed by the McEwen Mining Technical Department on site at the Black Fox Mine and was reviewed by SRK for inclusion in the mineral reserve estimate. The mine plan does not include the mineral resources at the Froome Project or the Grey Fox Project as these satellite resources have not demonstrated economic viability at the time of this report.

The life of mine (LOM) plan supporting the mineral reserve estimate for Black Fox Mine contains a total of 395,000 tonnes with an average gold grade of 8.88 grams of gold per tonne (g/t gold) for a total of 113,000 ounces of contained gold (inclusive of 15 percent dilution).

The production rate is based on available stopes as of October 31, 2017 (the time that the assets were transferred from Primero to McEwen Mining). Consequently, the mine has a variable monthly mining rate, averaging approximately 500 tonnes per day. The average number of gold ounces recovered at the mill per day is approximately 140, which equates to approximately 50,000 ounces per year.

The LOM plan duration is 2 years and 2 months with no ramp down period during the final year of the plan (2019). The current mineral reserves are exhausted by the end of December 2019.

LOM development requirements are approximately 4,400 metres total. This development consists of 935 metres of ramps, and 2,030 metres of lateral development, 1,280 metres of sills and 140 metres of raises.

The mine is accessed by a portal located at a depth of 87 metres within the Black Fox pit.

Stopes are typically mined in 15-metre lengths along the strike with widths varying from 5 metres up to 20 metres.

The mining method is long hole retreat. The stope sequencing has generally been top-down as new ore is found at depth.

Cemented hydraulic backfill is used in almost all stopes. Stopes are mined in alternating sequence using backfilled stopes as pillars for subsequent mining of adjacent stopes.

Mineralized material from the Black Fox Mine is processed at the Black Fox Mill. The mineralized rocks from the stockpile are crushed in a jaw crusher followed by secondary and tertiary cone crushers. The crushed material is then sent to a ball mill operated in closed circuit with cyclones followed by regrind mills also operated in closed circuit with cyclones. Gold is extracted in a carbon-in-leach (CIL) circuit. Gold is removed from the loaded carbon by elution (stripping) followed by electrowinning.

The stripped carbon is regenerated in reactivation kilns before being returned to the process. Nitric acid washing to remove scale occurs prior to the thermal regeneration step. Fine carbon is constantly removed and recovered from the process to avoid gold loss, while fresh carbon is continuously added to the process. Fresh and regenerated carbon is sized prior to addition to the system. A carbon fines surge tank and filter press have been added to the circuit. The high-grade electrowinning concentrate is sent to a bullion furnace for smelting of doré. Carbon fines are transferred to a custom pyro-metallurgical facility for pay-metal recovery.

Mineral Resource and Mineral Reserve Estimates

The Canadian Institute of Mining, Metallurgy and Petroleum (CIM) *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014) defines a mineral resource as follows:

> *"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."*

The "reasonable prospects for eventual economic extraction" requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade, considering extraction scenarios and processing recoveries. In order to meet this requirement, McEwen Mining considers that the majority of the Black Fox Complex is amenable for underground extraction.

The database for the Black Fox Mine, Froome and Grey Fox projects was compiled and maintained by McEwen Mining, and was audited by SRK. The initial geological model and outlines for the gold mineralization were constructed by McEwen Mining, and were audited and revised in collaboration with McEwen Mining by SRK.

It is SRK's opinion that the current drilling information is sufficiently reliable to interpret with confidence the boundaries for gold mineralization and that the assay data are sufficiently reliable to support mineral resource estimation. The geological and gold mineralization models for each project is a reasonable representation of the distribution of the targeted mineralization at the current level of sampling.

The geostatistical analysis, variography and grade models for the Black Fox Mine and the Grey Fox Project were completed by SRK, whereas the mineral resource modelling for the Froome Project were undertaken by Primero / McEwen Mining and audited by SRK.

SRK performed and / or reviewed each step of the mineral resource estimation process for all three deposits and is of the opinion that the procedures applied broadly conform to industry best practice, but also implemented appropriate grade estimation methodologies to enhance the local accuracy of the grade estimates.

The "reasonable prospects for eventual economic extraction" requirement contained in the CIM standards generally implies that the quantity and grade estimates meet certain economic thresholds and that the Mineral Resource is reported at an appropriate cut-off grade, taking into account extraction scenarios and processing recoveries. Mineral resources are generally amenable to underground extraction as presented at a cut-off grade of 3.00 g/t gold for the Black Fox Mine, 3.20 g/t gold for the Froome Project, and 3.60 g/t gold for the Grey Fox Project.

The combined Mineral Resource Statement for Black Fox Complex, inclusive of mineral reserves, is presented in Table i. Mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent resource estimates. Mineral resources may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors. The effective date of the Mineral Resource Statement is October 31, 2017.

Table i: Mineral Resource Statement, Black Fox Complex, SRK Consulting (Canada) Inc., October 31, 2017

Classification		Cut-off Grade Gold (g/t)	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Indicated Mineral Resource					
Underground	Black Fox	3.00	2,145	7.80	538
	Froome	3.20	941	5.26	159
	Grey Fox	3.60	2,177	6.64	465
Total Indicated			**5,263**	**6.87**	**1,162**
Inferred Mineral Resource					
Underground	Black Fox	3.00	216	6.35	44
	Froome	3.20	125	4.70	19
	Grey Fox	3.60	453	6.83	100
Total Inferred			**794**	**6.36**	**163**

* Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures rounded to reflect the relative accuracy of the estimates. Composites were capped where appropriate. Mineral resources reported at variable cut-off grades as indicated, assuming an underground extraction scenario, a gold price of US$1,500/oz, C$:US$ exchange rate of 1.25; and metallurgical gold recoveries of 96 percent for Black Fox, 90 percent for Froome and 80 percent for Grey Fox.

The Black Fox Complex hosts several mineralized trends and structures. Although only the three deposits documented in this technical report have been identified, delineated, modelled and reported on to date, the Black Fox Complex land package remains largely under explored and has considerable upside potential.

Based on a holistic appreciation of the structural controls of gold mineralization on the property, a focussed and comprehensive drill program is planned for 2018 whereby exploration targets will be identified, prioritised and drill tested. Exploration efforts should focus on both regional exploration targets as well as strike and depth extensions of the currently modelled and estimated mineralization to potentially expand the mineral resource base.

Based on current practice, actual performance and cost data, and current technical and economic conditions, the Black Fox Mine operation will sustain production until the end of 2019 with a production rate of 480 tonnes per day. Mining will continue using longhole mining methods with access provided underground via the current surface portal in the Black Fox open pit.

The mineral reserves identified at a cut-off grade of 3.72 g/t gold for the Black Fox Mine deposit and is presented in Table ii. The effective date of the Mineral Reserve Statement is October 31, 2017. The LOM plan supporting the mineral reserve estimate for the Black Fox Mine were generated by McEwen Mining, supported by and audited by SRK. The mineral reserve LOM plan requires capital costs of US$24.5 million and results in an operating cost of C$171 per tonne milled. By auditing the LOM plan and providing support to its generation, SRK confirms that the mineral reserve declared herein provides a positive cash flow given the technical and economic conditions at the time of writing this report.

Table ii: Mineral Reserve Statement, Black Fox Mine, SRK Consulting (Canada) Inc., October 31, 2017

Classification	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Proven Mineral Reserve			
Underground	-	-	-
Total Proven	**-**	**-**	**-**
Probable Mineral Reserve			
Underground	395	8.88	113
Total Probable	**395**	**8.88**	**113**
Proven and Probable Mineral Reserve			
Underground	395	8.88	113
Total Proven and Probable	**395**	**8.88**	**113**

* Mineral reserves are included in the mineral resources. All figures have been rounded to reflect the relative accuracy of the estimate. Mineral reserves are based on a cut-off value of 3.72 g/t gold (4.28 g/t including 15% dilution) assuming a gold price of US$1,250/oz, a C$:US$ exchange rate of 1.25:1:00, milling recoveries of 96%, royalty of 4.55%, and operating cost of C$171/t. Mineral reserves are stated at a mill feed reference point and include for diluting materials and mining losses.

Environmental and Social Aspects

The Black Fox Complex includes the existing Black Fox Mine, as well as the proposed Froome and the Grey Fox projects. Ore from the Black Fox Complex is currently milled at the Black Fox Mill, and ore mined from the Black Fox Complex in the future, including from the Froome and Grey Fox projects, if they are developed, will also be processed at the Black Fox Mill.

The Black Fox Mine and the Black Fox Mill are both permitted and operational facilities. If a decision is made to mine the Froome Project, some modifications of the existing permits would be required. Within the context of the environmental approvals and permits already granted, the changes that would be required for the Froome Project are relatively minor. If the Grey Fox Project is mined, additional approvals related to mine water treatment, air emissions, and mine dewatering, would be required. These approvals would be similar in scope to the existing approvals and permits currently in place for the Black Fox Complex. It is expected that processing of material from Froome and Grey Fox at the Black Fox Mill would be straightforward from an environmental perspective, but would require further environmental characterization of the material to be processed.

Accepted closure plans are in place for both the Black Fox Complex and the Black Fox Mill. The planned closure measures represent typical best practices and extensive monitoring programs are in place at both sites. Financial Assurance in the form of letters of credit have been provided to the MNDM to cover the cost of closure.

Conclusion and Recommendations

In the opinion of McEwen Mining and SRK, the Black Fox Complex mineral resource and mineral reserve estimates summarized herein have received appropriate geological and engineering consideration to be included in this Report being compliant with the generally accepted CIM *Exploration Best Practices Guidelines* and CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines*. A mineral resource can be reported for the Black Fox, Froome and Grey Fox projects and mineral reserve can be reported for the Black Fox deposit, which is an operating mine at the effective date and submission date of this report.

Complexly deformed high-grade gold mineralization within the Black Fox Complex present challenges to current and future mining, that can be addressed by well-designed exploration programs that can potentially increase reportable mineral resources on the property, but also serve to extend the life of mine at the Black Fox Mine.

To provide the framework for future mining on the Black Fox Complex, SRK proposes that McEwen Mining implement an innovative exploration program to expand future mining opportunities on the property, and to undertake multi-disciplinary studies to support future mining evaluations. An opportunity exists to expand reported mineral resources through innovative discovery and for the conversion of mineral resources to mineral reserves at the Black Fox Complex.

The Black Fox Mine currently has mineral resources to approximately 870 metres below surface and the gold mineralization remains open at depth. If the Black Fox deposit extends to a similar depth to other mines in the Timmins and Kirkland Lake mining camps, the potential of gold mineralization to continue to depths of 1,500 metres or more at the Black Fox deposit needs to be evaluated. It is strongly recommended to continue deep exploration targeting at the Black Fox Mine.

The Black Fox Complex remains under explored and it is recommended that McEwen Mining continue to compile all digital geological data to facilitate the continued refinement of a property scale geological model for exploration targeting. Despite the complexity of the geology the potential for new discoveries remains high.

McEwen Mining has planned a five-year exploration program at the Black Fox Complex to fully assess the existing property and to evaluate the potential of further expansion through acquisition. McEwen Mining estimates that the required exploration expenditures over the next 5 to 10 years will be in the order of US$5 to 10 million dollars annually. The initial focus of this exploration will be to expand mineable mineral reserves at the Black Fox Mine. This program also intends to test various greenfield targets.

The current 2018 drill program at the Black Fox Complex includes +75,000 metres of surface diamond drilling at an estimated cost of US$8.6 million.

SRK is unaware of any other significant factors and risks that may affect access, title, or the right or ability to perform the exploration work recommended for the Black Fox Complex.

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2 Introduction and Terms of Reference

The Black Fox Complex is located in the Beatty and Hislop townships, approximately 10 kilometres from Matheson and 65 kilometres east of the city of Timmins in the Province of Ontario, Canada.

McEwen Mining Inc. (McEwen Mining) holds a 100 percent interest in the Black Fox Complex, which it acquired on October 6, 2017 from the previous owner Primero Mining Corp. (Primero).

McEwen Mining is a Toronto-based mining company focused on the operation, development, exploration and acquisition of precious metal projects. It is listed on the New York and Toronto Stock Exchanges under the ticker symbol MUX. McEwen Mining is a precious metals producer with three mining operations and four exploration / development projects located in Canada, United States, Mexico and Argentina. The operating assets are the El Gallo Mine (Mexico), the San Jose Mine (Argentina) and the Black Fox Complex (Canada). The exploration / development assets are the Gold Bar project (United States), the El Gallo Silver project (Mexico) and the Los Azules project (Argentina).

In December 2017, McEwen Mining commissioned SRK Consulting (Canada) Inc. (SRK) to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report following the guidelines of Canadian Securities Administrators' National Instrument 43-101 (NI 43-101) for the Black Fox Complex. The Black Fox Complex, comprises the operational underground Black Fox Mine, the adjacent advanced Grey Fox and Froome exploration projects and the Black Fox Mill located on the nearby Stock property.

The previous NI 43-101 technical report for the Black Fox Complex was generated by Primero Mining Corp. (Primero) and filed on June 30, 2014, documenting mineral resources and mineral reserves for the Black Fox Mine as of June 19, 2014 (Brisson, 2014). This NI 43-101 technical report documents the mineral resource statements for the Black Fox Mine, Froome and Grey Fox projects and the Mineral Reserve Statement for the Black Fox Mine as of December 31, 2017, prepared by McEwen Mining and SRK. It was prepared following the guidelines of the Canadian Securities Administrators' National Instrument 43-101– Standards of Disclosure for Mineral Projects (NI 43-101) and Form 43-101F1. The Mineral Resource Statement and the Mineral Reserve Statement reported herein were prepared in conformity with generally accepted Canadian Institute of Mining, Metallurgy and Petroleum (CIM) *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines*.

This report provides a summary of the current status of the Black Fox Complex, including the operational Black Fox Mine, documenting revised mineral resource estimates for all three assets and a revised mineral reserve estimate for the Black Fox Mine, as at the effective date of this report.

2.1 Scope of Work

The scope of work, as defined in a letter of engagement executed on December 4, 2017 between McEwen Mining and SRK was to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report following the guidelines of Canadian Securities Administrators' National Instrument 43-101 (NI 43-101) for the Black Fox Complex located near Matheson, Ontario. The reported mineral reserves also need to be compliant with SEC Guide 7 guidelines.

This work typically involves the assessment of the following aspects of each project comprising the Black Fox Complex:

- Topography, landscape, access
- Regional and local geology
- Exploration history
- Audit of exploration work
- Geological modelling
- Metallurgical work
- Mineral resource estimation and validation
- Preparation of a Mineral Resource Statement
- Preparation of a Mineral Reserve Statement
- Mine design and schedule
- Rock geotechnical assessment
- Mineral processing
- Tailings management facility assessment
- Environment and social impact
- Cost estimation
- Recommendations for additional work

2.2 Work Program

The Mineral Resource Statement reported herein was a collaborative effort between McEwen Mining and SRK personnel. The exploration database for the Black Fox Mine, Froome and Grey Fox projects was compiled and maintained by McEwen Mining, and was audited by SRK. The initial geological model and outlines for the gold mineralization were constructed by McEwen Mining, and were audited and revised in collaboration with McEwen Mining by SRK. In the opinion of SRK, the geological and gold mineralization models for each project is a reasonable representation of the distribution of the targeted mineralization at the current level of sampling. The geostatistical analysis, variography and grade models for the Black Fox Mine and the Grey Fox project were completed by SRK, whereas the mineral resource modelling for the Froome Project were undertaken by Primero / McEwen Mining and audited by SRK. Revised mineral resource statements are derived for Black Fox Mine, Froome and Grey Fox projects, whereas a Mineral Reserve Statement has only been generated for the Black Fox Mine.

The life of mine plans supporting the mineral reserve estimate for the Black Fox Mine were generated by McEwen Mining, supported by and audited by SRK. The mineral resource statements for the Black Fox Mine, Froome and Grey Fox projects and the Mineral Reserve Statement for the Black Fox Mine are reported herein as of October 31, 2017.

The Mineral Resource Statement reported herein was prepared in conformity with the generally accepted CIM *Exploration Best Practices Guidelines* and CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines*. This technical report was prepared following the guidelines of the Canadian Securities Administrators' National Instrument 43-101 and Form 43-101F1.

The technical data supporting this technical report was generated during December to March 2018 whereas the technical report was assembled in SRK Toronto and Sudbury offices during the months of January to March 2018.

2.3 Basis of Technical Report

This report is based on information collected by SRK staff during a site visits performed between January and March 2018 on additional information provided by McEwen Mining throughout the course of the project. McEwen Mining technical staff contributed to many sections of the technical report, which were subsequently reviewed by the respective qualified person and audited by SRK. EcoMetrix Inc. (EcoMetrix) were responsible for Section 20 of the report. The responsibilities for each report section are listed in Table 1. SRK has no reason to doubt the reliability of the information provided by McEwen Mining. Other information was obtained from the public domain. This technical report is based on the following sources of information:

- Discussions with McEwen Mining personnel
- Inspection of the Black Fox Mine, Froome and Grey Fox projects areas including underground and drill core
- Review of exploration and operations data provided by McEwen Mining
- Additional information from public domain sources

Table 1: Responsibility for Technical Report Sections

Section	Title	Responsible	Qualified Person
1	Executive Summary	SRK / McEwen	All
2	Introduction	SRK	A Mitrofanov (SRK)
3	Reliance on Other Experts	SRK	A Mitrofanov (SRK)
4	Property Description and Location	McEwen	E Alexander (McEwen)
5	Accessibility, Climate, Local Resources, Infrastructure and Physiography	McEwen	E Alexander (McEwen)
6	History	McEwen	E Alexander (McEwen)
7	Geological Setting and Mineralization	McEwen	E Alexander (McEwen)
8	Deposit Types	McEwen	E Alexander (McEwen)
9	Exploration	McEwen	E Alexander (McEwen)
10	Drilling	McEwen	E Alexander (McEwen)
11	Sample Preparation, Analysis, and Security	McEwen	E Alexander (McEwen)
12	Data Verification	McEwen / SRK	E Alexander (McEwen)
13	Mineral Processing and Metallurgical Testing	McEwen	N Stubina (McEwen)
14	Mineral Resource Estimates	SRK	A Mitrofanov (SRK) / D Machuca (SRK)
15	Mineral Reserve Estimates	McEwen	M Selby (SRK)
16	Mining Methods	McEwen	M Selby (SRK)
17	Recovery Methods	McEwen	N Stubina (McEwen)
18	Project Infrastructure	McEwen	N Fung (McEwen) N Stubina (McEwen)
19	Market Studies and Contracts	McEwen	N Fung (McEwen)
20	Environmental Studies, Permitting, and Social or Community Impact	EcoMetrix*	J Martin (EcoMetrix)
21	Capital Cost and Operating Costs	McEwen	N Fung (McEwen)
22	Economic Analysis	McEwen	M Selby (SRK)
23	Adjacent Properties	McEwen	E Alexander (McEwen)
24	Other Relevant Data and Information	SRK	A Mitrofanov (SRK)
25	Interpretation and Conclusions	SRK	M Selby (SRK) / A Mitrofanov (SRK)
26	Recommendations	SRK	M Selby (SRK) / A Mitrofanov (SRK)
27	References	SRK / McEwen	N Fung (McEwen)

* EcoMetrix = EcoMetrix Inc.

2.4 Qualifications of SRK and SRK Team

The SRK Group comprises of more than 1,400 professionals, offering expertise in a wide range of resource engineering disciplines. The independence of the SRK Group is ensured by the fact that it holds no equity in any project it investigates and that its ownership rests solely with its staff. These facts permit SRK to provide its clients with conflict-free and objective recommendations. SRK has a proven track record in undertaking independent assessments of mineral resource and mineral reserve estimates, project evaluations and audits, technical reports and independent feasibility evaluations to bankable standards on behalf of exploration and mining companies, and financial institutions worldwide. Through its work with a large number of major international mining companies, the SRK Group has established a reputation for providing valuable consultancy services to the global mining industry.

The mineral resource and mineral reserve estimates and the compilation of this report were undertaken by a team comprising McEwen Mining and SRK staff. The Qualified Persons responsible for the content of this technical report are Dr. Aleksandr Mitrofanov, PGeo (APGO#2824), Dr. David Machuca, PEng. (PEO 100508889), Mr. Michael Selby, PEng (PEO# 100083134), Dr. Nathan Stubina, PEng (PEO#44888501), Mr. Jeff Martin, PGeo (PEO# 90262890), Mr. Nigel Fung, PEng (PEO#100173276) and Mr. Eric Alexander, PGeo (APGO#28540). By virtue of their education, membership to a recognized professional association and relevant work experience, these professionals are Qualified Persons as this term is defined by NI 43-101. Additional contributions were provided by Ms. Ali Gelinas, PGeo (APGO#2714), Mr. Steven Scott, PGeo (APGO# 2506), Mr. Jacob Francoeur, PEng (PEO#100178508).

Mr. Glen Cole, PGeo, (APGO#1416), a Principal Consultant (Resource Geology) with SRK, reviewed drafts of this technical report prior to their delivery to McEwen Mining as per SRK internal quality management procedures. Mr. Cole visited the project.

2.5 Site Visit

In accordance with NI 43-101 guidelines, SRK visited the Black Fox Complex on various occasions between November 2017 and January 2018. These visits were undertaken by SRK consultants Dr. Aleksandr Mitrofanov, PGeo, Dr. Erwann Lebrun, Mr. Michael Selby, PEng, and Mr. Glen Cole, PGeo accompanied by McEwen Mining staff.

The site visits by Dr. Mitrofanov and Mr. Cole did not take place during active drilling, but all aspects that could materially impact the integrity of the data informing the mineral resource estimates for the three projects (core logging, sampling, analytical results, and database management) were discussed with McEwen Mining staff. SRK interviewed mine staff to ascertain exploration and production procedures and protocols. SRK examined core selected boreholes and confirmed that the logging information accurately reflects actual core.

Dr. Lebrun analyzed the structural controls of gold mineralization, discussed core logging procedures with McEwen Mining technical staff and provided the necessary structural input for the mineral resource modelling at the Grey Fox Project. Mr. Selby visited the site to collaborate with McEwen Mining mine engineering staff regards mine planning procedures and reporting protocols.

SRK was given full access to relevant data and conducted interviews with McEwen Mining personnel to obtain information on the past exploration work, to understand procedures used to collect, record, store and analyze historical and current exploration data.

2.6 Acknowledgement

SRK would like to acknowledge the support and collaboration provided by McEwen Mining personnel for this assignment. Their collaboration was greatly appreciated and instrumental to the success of this project. Mr. Nigel Fung, Director Mining from McEwen Mining Corporate and the team on the Black Fox site under the direction of Mr. Rick Anderson, General Manager provided invaluable input and direction to the project, including Mr. Joel Bastien, Mr. James Montague, Mr. David Campsall and Mr. Harri Ollila.

2.7 Declaration

SRK's opinion contained herein and effective October 31, 2017 is based on information collected by SRK throughout the course of SRK's investigations. The information in turn reflects various technical and economic conditions at the time of writing this report. Given the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

This report may include technical information that requires subsequent calculations to derive subtotals, totals, and weighted averages. Such calculations inherently involve a degree of rounding and consequently introduce a margin of error. Where these occur, SRK does not consider them to be material.

SRK is not an insider, associate or an affiliate of McEwen Mining, and neither SRK nor any affiliate has acted as advisor to McEwen Mining, its subsidiaries or its affiliates in connection with this project. The results of the technical review by SRK are not dependent on any prior agreements concerning the conclusions to be reached, nor are there any undisclosed understandings concerning any future business dealings.

3 Reliance on Other Experts

SRK has not performed an independent verification of land title and tenure information as summarized in Section 3 of this report. SRK did not verify the legality of any underlying agreement(s) that may exist concerning the permits or other agreement(s) between third parties, but has relied on McMillan LLP, as expressed in a legal opinion provided to McEwen Mining Inc. (McEwen Mining) on October 3, 2017. This legal opinion specifically relates to certain properties formerly owned by Primero Mining Corp. (Primero), which formed part of the purchase agreement between Primero as the vendor and McEwen Mining as the purchaser dated August 25, 2017.

The reliance applies solely to the legal status of the rights disclosed in Sections 4.1 below.

SRK was informed by McEwen Mining that there are no known litigations potentially affecting the Black Fox Complex.

4 Property Description and Location

The Black Fox Complex Gold Project is located in the Beatty and Hislop townships, approximately 60 kilometres east of the city of Timmins in the Province of Ontario, Canada (Figure 1). The property lies within NTS map sheet 42A/08. The approximate coordinates for the geographic centre of the Black Fox Mine are 48° 32' 2" N and 80° 20' 2" W (UTM coordinates: 549170E and 5375871N, NAD 83, Zone 17). The approximate coordinates for the geographic centre of the Grey Fox Project are 48°30'20.0" N and 80°18'20.0" N (UTM coordinates: 551100E and 5372750N, NAD 83, Zone 17). The surrounding land has an altitude of about 275 to 325 metres above mean sea level.

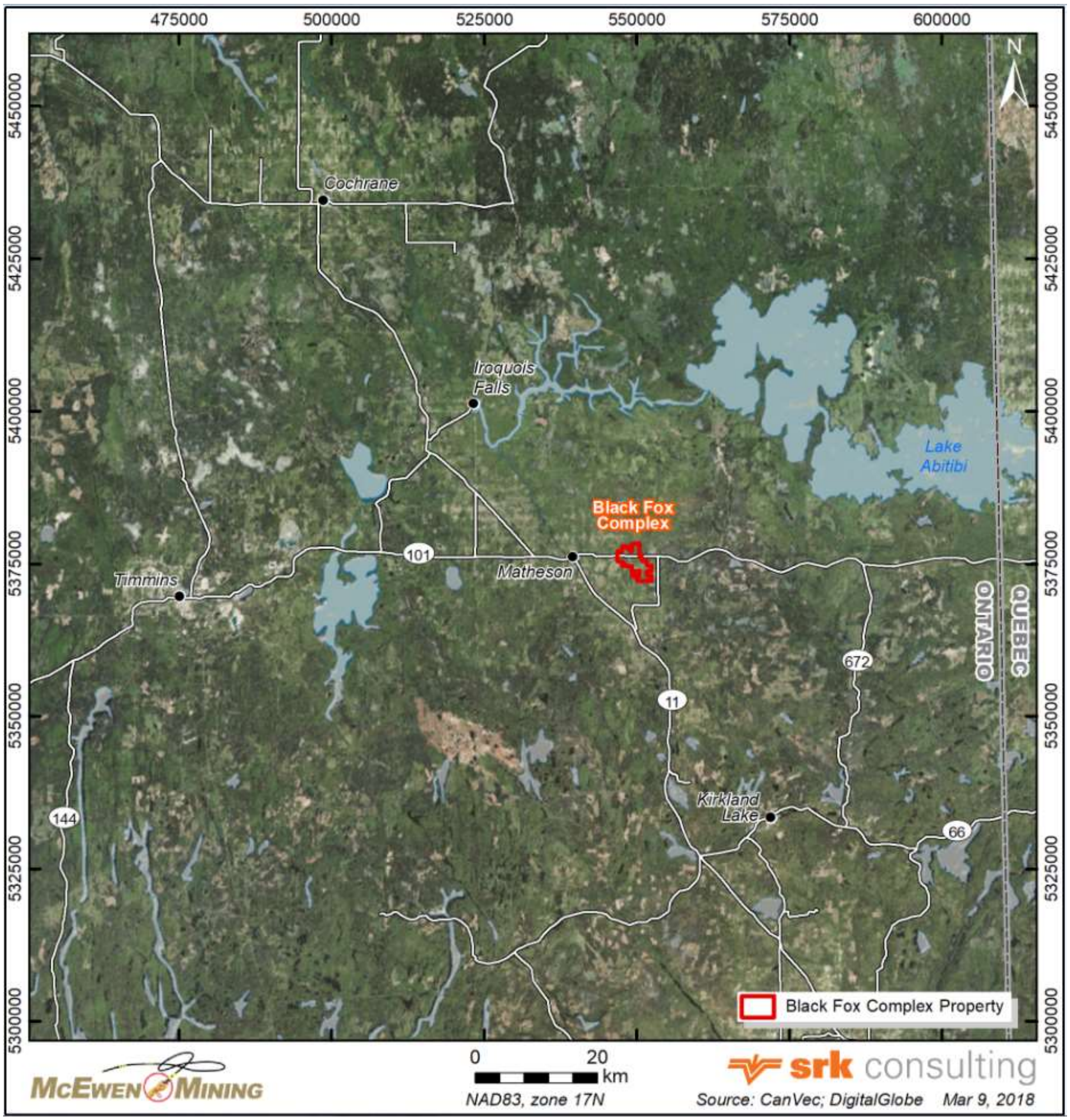


Figure 1: Location Map, Black Fox Complex, Ontario

4.1 Land Tenure

Claim status was supplied by the Exploration Department at McEwen Mining. SRK has not verified the status for all claims using the Ministry of Northern Development and Mines (MNDM) online claim management system via the Geo-Claims website, but has relied upon McEwen Mining's legal counsel to do so.

The Black Fox Complex consists of one (1) block of land comprising twenty-eight (28) mining right parcels and thirty-five (35) overlapping surface right parcels for a total of 1788 hectares of mining land and 1,541 hectares of surface land (Figure 2 and Figure 3). Some mining right parcels are subject to royalties (Figure 4, Table 2). All surface right and mining right parcels are located in the Beatty and Hislop townships and their boundaries are defined by the Cochrane (06) Land Registry Office. All parcels are one of the following: a freehold mining land (mining patent), a mining lease, a freehold surface land, or a surface lease.

The PIN (Property Identification Number) is a numeric reference issued by the Land Registry Office referencing the newly automated depository of registered transactions affecting the land. All land belonging to the Black Fox Complex is contained within the boundaries of the Cochrane (06) Land Registry Office.

Many agreements have been executed in the acquisition of the Black Fox Mine. Moreover, Newmont Canada Corporation has the first right to negotiate to purchase the property under Instrument Number CB56690 (Figure 5).

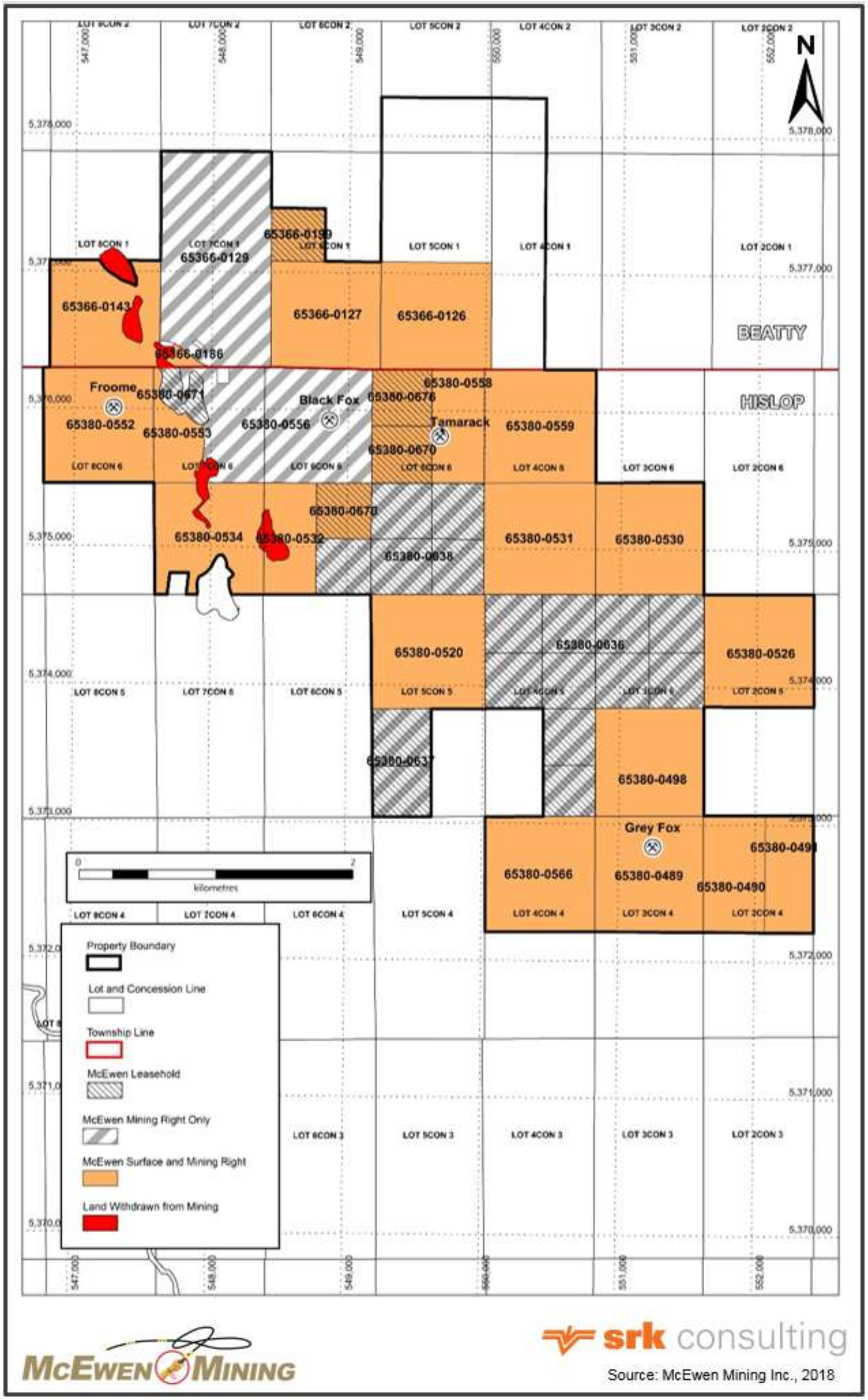


Figure 2: Location Map Showing Mining Titles for the Black Fox Complex

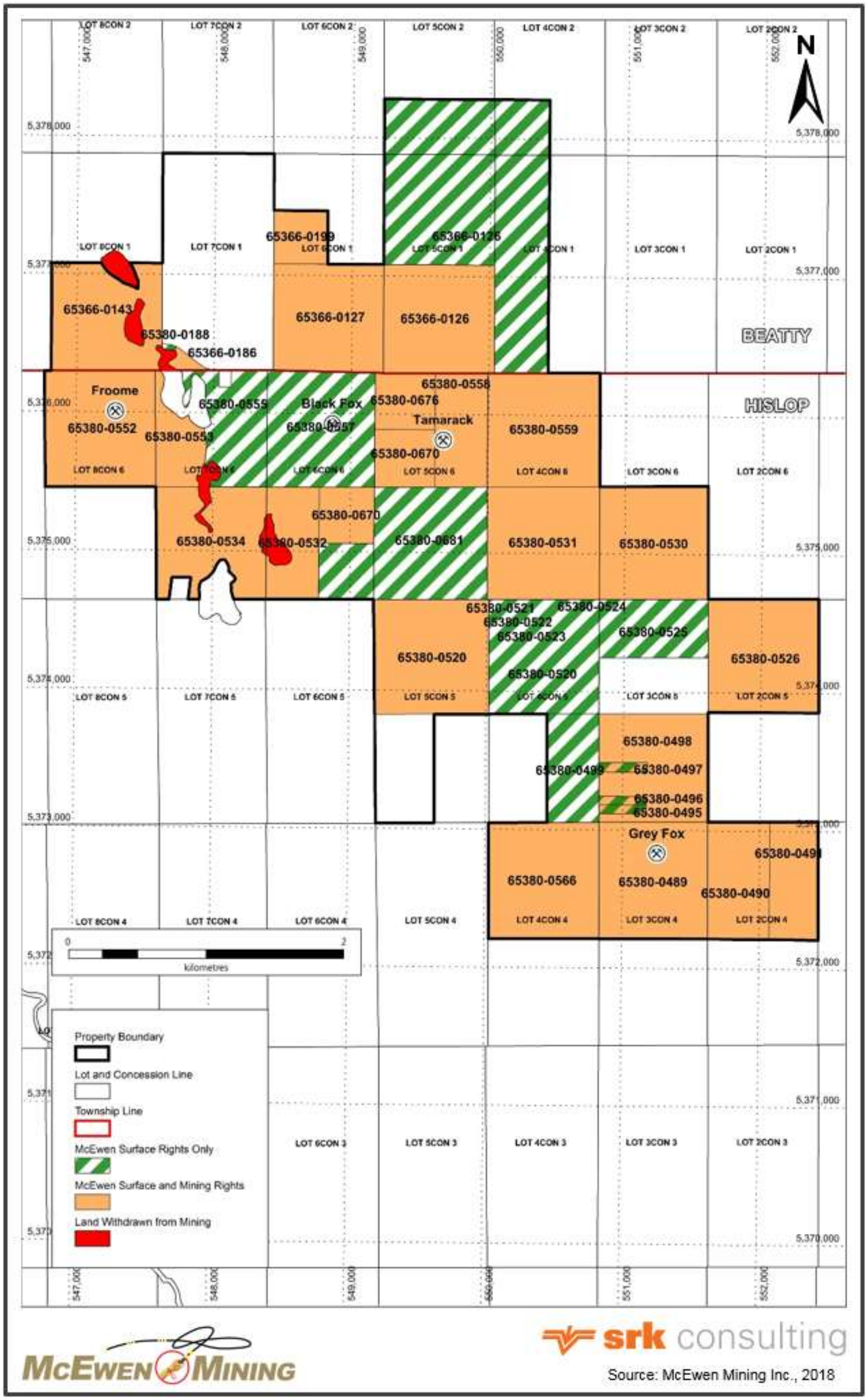


Figure 3: Location Map Showing Surface Rights for the Black Fox Complex

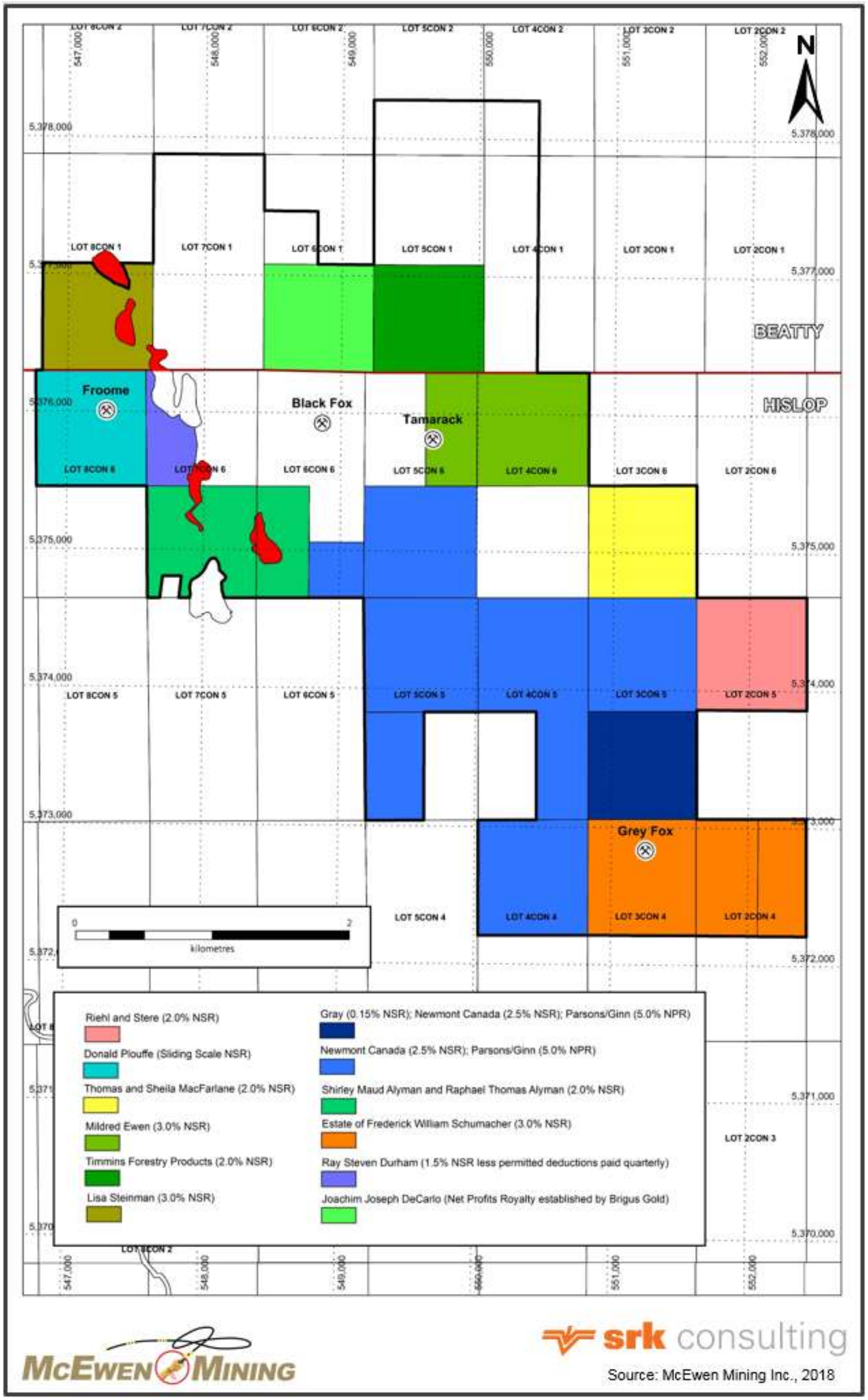


Figure 4: Location Map Showing Royalties Relating to the Black Fox Complex

Table 2: Mineral and Surface Rights Constituting the Black Fox Mine

Township	PIN	Concession No.	Lot No.	Parcel No.	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
Beatty	65366-0126	1	5	24577 SEC		237.02	Mining Patent	Surface and Mineral Rights	Timmins Forest Product Ltd.	a) 2% NSR paid quarterly (only Parcel 24577 SEC) and 1% NSR can be purchased by McEwen Mining Inc. for C$500,000. b) Mineral rights for the other parcels owned by Canadian Royalties Inc.
		1	5	L13391			Mining Patent	Surface Rights Only		
		1	5	L15799			Mining Patent	Surface Rights Only		
		1	5	L22257			Mining Patent	Surface Rights Only		
		1	5	L22258			Mining Patent	Surface Rights Only		
		1	4	L11397			Mining Patent	Surface Rights Only		
		1	4	L16477			Mining Patent	Surface Rights Only		
		1	4	L22527			Mining Patent	Surface Rights Only		
		1	4	L22915			Mining Patent	Surface Rights Only		
		2	4	L13510			Mining Patent	Surface Rights Only		
		2	5	L13508			Mining Patent	Surface Rights Only		
		2	5	L13509			Mining Patent	Surface Rights Only		
Beatty	65366-0127	1	6	14572 SEC		60.84	Mining Patent	Surface and Mineral Rights	Joachim Joseph DeCarlo	a) Net Profits Royalty. Royalty Account established by McEwen Mining Inc. (owner) with the following expenses deducted: pre-productions, working capital, operating losses, post production capital expenditures, interest charges and reserve charges - net profits are applied to first reduce the amounts debited to the royalty account then net profits in an amount equal to the credit balance in the royalty account are distributed within 20 days of the end of each month with a final settlement to be made within 90 days of the end of each calendar year. b) In the event of a debit balance in the royalty account, McEwen Mining Inc. retains all new profits
Beatty	65366-0129	1	7	23874 SEC		124.25	Mining Patent	Mineral Rights Only	No Royalty Holder	No Royalty
Beatty	65366-0143	1	8	4150 SEC		58.69	Mining Patent	Surface and Mineral Rights	Lisa Steinman	a) 3.0% NSR paid quarterly b) 1% NSR can be purchased by McEwen Mining Inc. for C$1,000,000
Beatty	65366-0186	1	7	13005 SEC		2.14	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Beatty	65366-0188	1	7	13006 SEC		0.67		Surface Rights Only	No Royalty Holder	No Royalty
Beatty	65366-0199	1	6		L1115059	16.10	Mining Lease	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0489	4	3	16262 SEC		63.87	Mining Patent	Surface and Mineral Rights	Estate of Frederick William Schumacher, c/o The Canada Trust Company	3% NSR
Hislop	65380-0490	4	2	16265 SEC		32.96	Mining Patent	Surface and Mineral Rights	Estate of Frederick William Schumacher, c/o The Canada Trust Company	3% NSR
Hislop	65380-0491	4	2	16266 SEC		30.62	Mining Patent	Surface and Mineral Rights	Estate of Frederick William Schumacher, c/o The Canada Trust Company	3% NSR
Hislop	65380-0495	5	3	21256 SEC		2.02		Surface Rights Only		
Hislop	65380-0496	5	3	21255 SEC		2.03		Surface Rights Only		
Hislop	65380-0497	5	3	21254 SEC		2.03		Surface Rights Only		
Hislop	65380-0498	5	3	3852 SEC		54.17	Mining Patent	Surface and Mineral Rights	Tracy & Brent Gray, Newmont Canada, Parsons/Ginn	a) 0.015% NSR b) 2.5% NSR c) Advance royalty of C$3,000 payable each year d) 5% Net Proceeds Royalty e) Sliding Production Royalty based on the price of gold
Hislop	65380-0499	5	4	11125 SEC		32.30		Surface Rights Only		
Hislop	65380-0520	5	5	23687 SEC		121.62	Mining Patent	Surface and Mineral Rights	Newmont Canada, Parsons/Ginn	a) 2.5% NSR b) Advance royalty of C$3,000 payable each year c) 5% Net Proceeds Royalty d) Sliding Production Royalty based on the price of gold
Hislop	65380-0521	5	4	24023 SEC		3.14		Surface Rights Only		
Hislop	65380-0522	5	4	16736 SEC		5.03		Surface Rights Only		
Hislop	65380-0523	5	4	24024 SEC		3.13		Surface Rights Only		
Hislop	65380-0524	5	4	19093 SEC		0.61		Surface Rights Only		
Hislop	65380-0525	5	4	10255 SEC		33.90		Surface Rights Only		

Table 2: Mineral and Surface Rights Constituting the Black Fox Mine (2/3)

Township	PIN	Concession No.	Lot No.	Parcel No.	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
Hislop	65380-0526	2	5	2563 SEC		65.83	Mining Patent	Surface and Mineral Rights	David Ross Riehl (25%) Helen Bernadette Riehl (25%) Dale Richard Stere (25%) Russell Rae Stere (12.5%) Trevor Verle Stere (12.5)	a) 2% NSR b) 1% NSR can be purchased by McEwen Mining Inc. for C$1,000,000
Hislop	65380-0530	6	3	3310 SEC		64.97	Mining Patent	Surface and Mineral Rights	Thomas MacFarlane Sheila MacFarlane	a) 2% NSR b) 1% NSR can be purchased by McEwen Mining Inc. for C$1,000,000
Hislop	65380-0531	6	4	10706 SEC		67.06	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0532	6	6	6413 SEC		32.29	Mining Patent	Surface and Mineral Rights	Shirley Maud Alyman Raphael Thomas Alyman	a) 2% NSR paid quarterly b) 1% NSR can be purchased by McEwen Mining Inc. for C$1,000,000 within one year of commencement of commercial production c) Time period to purchase 1% NSR may be extended at the Alyman's discretion
Hislop	65380-0534	6	7	388 SEC		59.14	Mining Patent	Surface and Mineral Rights	Shirley Maud Alyman Raphael Thomas Alyman	a) 2% NSR paid quarterly b) 1% NSR can be purchased by McEwen Mining Inc. for C$1,000,000 within one year of commencement of commercial production c) Time period to purchase 1% NSR may be extended at the Alyman's discretion
Hislop	65380-0552	6	8	7745 SEC		66.11	Mining Patent	Surface and Mineral Rights	Donald Plouffe	a) Sliding scale NSR based on the price of gold and paid quarterly as follows (all amounts in American dollars): - Less than $200.00 = No royalty - $200.00 to $224.99 = 0.25% NSR - $225.00 to $249.99 = 0.50% NSR - $250.00 to $274.99 = 0.75% NSR - $275.00 to $299.99 = 1.00% NSR - $300.00 to $324.99 = 1.25% NSR - $325.00 to $349.99 = 1.50% NSR - $350.00 to $374.99 = 1.75% NSR - $375.00 to $399.99 = 2.00% NSR - $400.00 to $424.99 = 2.25% NSR - $425.00 to $449.99 = 2.50% NSR - $450.00 to $474.99 = 2.75% NSR - $475.00 to $499.99 = 3.00% NSR - Above $500.00 = 3.25% NSR b) 100% NSR can be purchased by McEwen Mining Inc. for C$1,000,000
Hislop	65380-0553	6	7	4707 SEC		18.64	Mining Patent	Surface and Mineral Rights	Ray Steven Durham	a) Advance royalty of C$20,000 per year to be paid quarterly and payments to be credited against buy-out b) 1.5% NSR less permitted deductions paid quarterly c) 100% NSR can be purchased by McEwen Mining Inc. for C$2,000,000
Hislop	65380-0555	6	7	15466 SEC		50.98		Surface Rights Only		
Hislop	65380-0556	6 6	6 7	23876 SEC		115.86	Mining Patent	Mineral Rights Only	No Royalty Holder	No Royalty
Hislop	65380-0557	6	6	2582 SEC		62.00		Surface Rights Only		
Hislop	65380-0558	6	5	11511 SEC		32.11	Mining Patent	Surface and Mineral Rights	Mildred Ewen	a) Advance royalty of C$500 payable each year b) 3% NSR paid quarterly
Hislop	65380-0559	6	4	3393 SEC		66.68	Mining Patent	Surface and Mineral Rights	Mildred Ewen	a) Advance royalty of C$500 payable each year b) 3% NSR paid quarterly
Hislop	65380-0566	4	4	23777 SEC		64.99	Mining Patent	Surface and Mineral Rights	a) Newmont Canada b) Parsons/Ginn	a) 2.5% NSR b) Advance royalty of C$3,000 payable each year c) 5% Net Proceeds Royalty d) Sliding production royalty based on the price of gold

Table 2: Mineral and Surface Rights Constituting the Black Fox Mine (3/3)

Township	PIN	Concession No.	Lot No.	Parcel No.	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
Hislop	65380-0636	5 5 5 5 5 5 5 5 5 5	4 4 4 4 4 4 3 3 3 3	1735 LC	L512568 L512569 L512570 L512571 L512572 L512573 L512574 L512575 L512576 L512575	163.80	Mining Lease	Mineral Rights Only	a) Newmont Canada b) Parsons/Ginn	a) 2.5% NSR b) Advance royalty of C$3,000 payable each year c) 5% Net Proceeds Royalty d) Sliding production royalty based on the price of gold
Hislop	65380-0637	5 5	5 5	1726 LC	L547989 L547990	32.18	Mining Lease	Mineral Rights Only	a) Newmont Canada b) Parsons/Ginn	a) 2.5% NSR b) Advance royalty of C$3,000 payable each year c) 5% Net Proceeds Royalty d) Sliding production royalty based on the price of gold
Hislop	65380-0638	6 6 6 6 6	5 5 5 5 6	1726 LC	531728 531729 531730 531731 547915	83.69	Mining Lease	Mineral Rights Only	a) Newmont Canada b) Parsons/Ginn	a) 2.5% NSR b) Advance royalty of C$3,000 payable each year c) 5% Net Proceeds Royalty d) Sliding production royalty based on the price of gold
Hislop	65380-0670	6 6	5 6		L1048334 L1048335	32.50	Mining Lease	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0671	6	7		L1113087	8.95	Mining Lease	Mineral Rights Only	No Royalty Holder	No Royalty
Hislop	65380-0676	6	5		L1048333	11.71	Mining Lease	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0681	6 6 6 6 6	5 5 5 5 6		531728 531729 531730 531731 547915	83.69		Surface Rights Only		

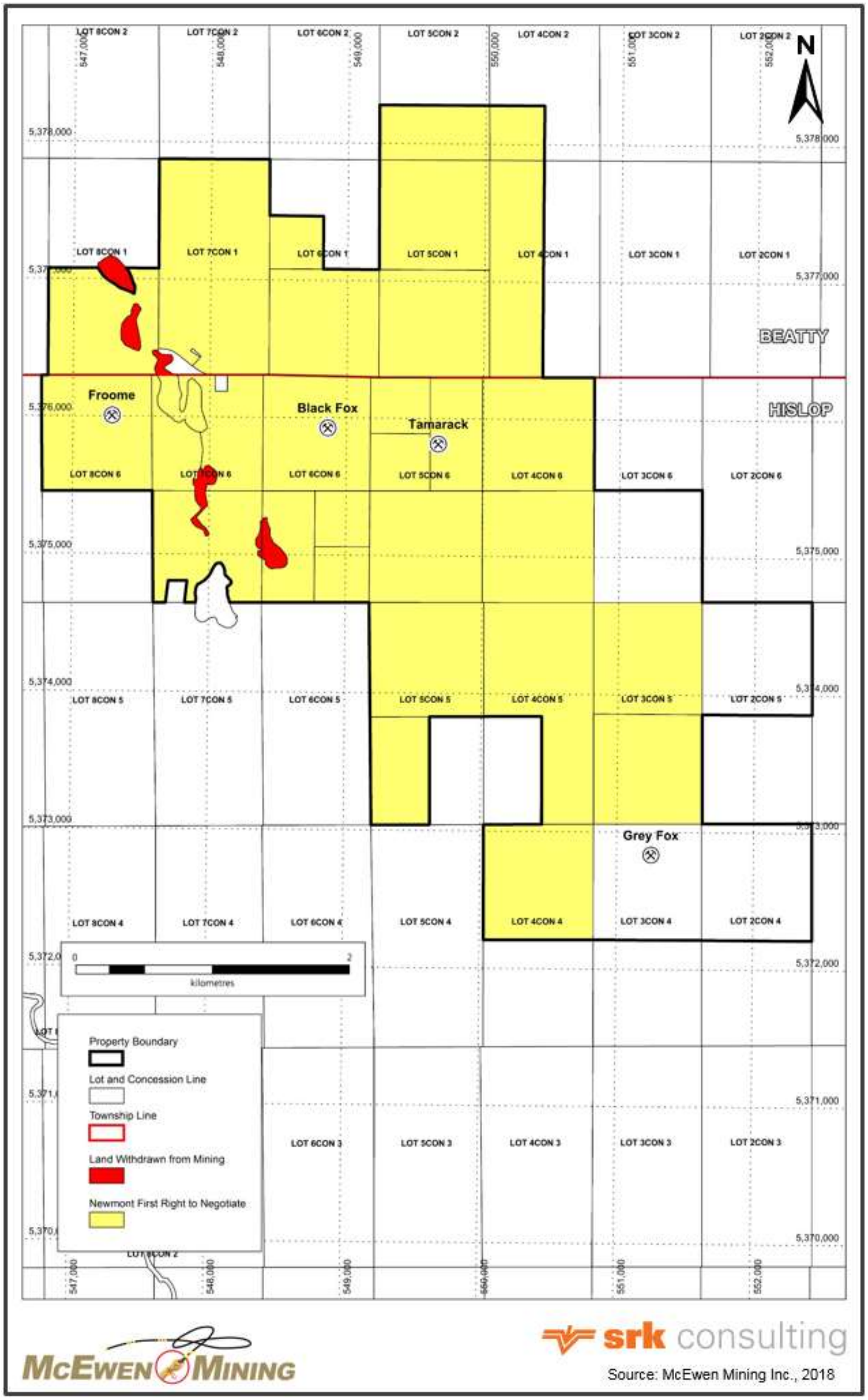


Figure 5: Location Map Showing Newmont Canada Corporation's First Rights to Negotiate Relating to the Black Fox Mine

4.1.1 Acquisition by Apollo Gold Corporation

Purchase of the Glimmer Mine

Apollo Gold Corporation (Apollo Gold) concluded an option to purchase 100 percent of the Glimmer mine (later, the Black Fox Mine) for which the change of property title was transferred on September 9, 2002. The Black Fox property was purchased from Exall Resources Ltd and Glimmer Resources, constituting the Glimmer Mine Joint Venture (Figure 6). The purchase involved a payment of C$3,159,000 and the issuance of 2 million shares of Apollo Gold to the joint venture. The purchase agreement contains an anti-dilution provision requiring Apollo Gold to increase the number of common shares issued during a four-month period following closing. Apollo Gold issued 80,000 common shares to the joint venture in addition to the 2 million shares noted above. An additional cash payment of C$3,000,000 is due to the joint venture at the time the mine reaches commercial production. Apollo Gold acquired 100 percent ownership and control of PIN 65380-0557, 65380-0555, 65380-0556, 65380-0532, 65380-0534, 65366-0127, 65366-0129 as well claims L1113087, L1048334, L1048335, L1048333 and L1115059.

The Alyman Property, consisting of PIN 65380-0532 and 65380-0534 in Hislop Township, was purchased in September of 2002 as a part of the Glimmer mine. The property is subject to a 2.0 percent NSR.

The De Carlo Property, consisting of PIN 65366-0127 in Beatty Township, was purchased in September of 2002 as part of the Glimmer mine. The property is subject to a NPR agreement.

Acquisition of Adjacent Land of the Glimmer Mine

The Plouffe property, consisting of PIN 65380-0552 in Hislop Township, was purchased in January 2003 for C$100,000 with a Buy-Out Payment in the amount of C$1,000,000 to purchase out the NSR rights (Young et al., 2007). The property is subject to a sliding scale NSR as follows (all amounts in US dollars):

- Less than $200: no royalty
- From $200 to $224.99: 0.25 percent
- From $225 to $249.99: 0.50 percent
- From $250 to $274.99: 0.75 percent
- From $275 to $299.99: 1.00 percent
- From $300 to $324.99: 1.25 percent
- From $325 to $349.99: 1.50 percent
- From $350 to $374.99: 1.75 percent
- From $375 to $399.99: 2.00 percent
- From $400 to $424.99: 2.25 percent
- From $425 to $449.99: 2.50 percent
- From $450 to $474.99: 2.75 percent
- From $475 to $499.99: 3.00 percent
- Above $500: 3.25 percent

The Durham property, consisting of PIN 65380-0553 in Hislop Township, was purchased by Apollo Gold in February 2003 for C$100,000 with a Buy-Out Payment in the amount of C$2,000,000 to purchase out the NSR rights (Young et al., 2007). An Advanced Royalty Payment of C$20,000 will be paid quarterly and payments will be credited against the buy-out. Moreover, 1.5 percent NSR less permitted deductions paid quarterly must be paid to the royalty holder.

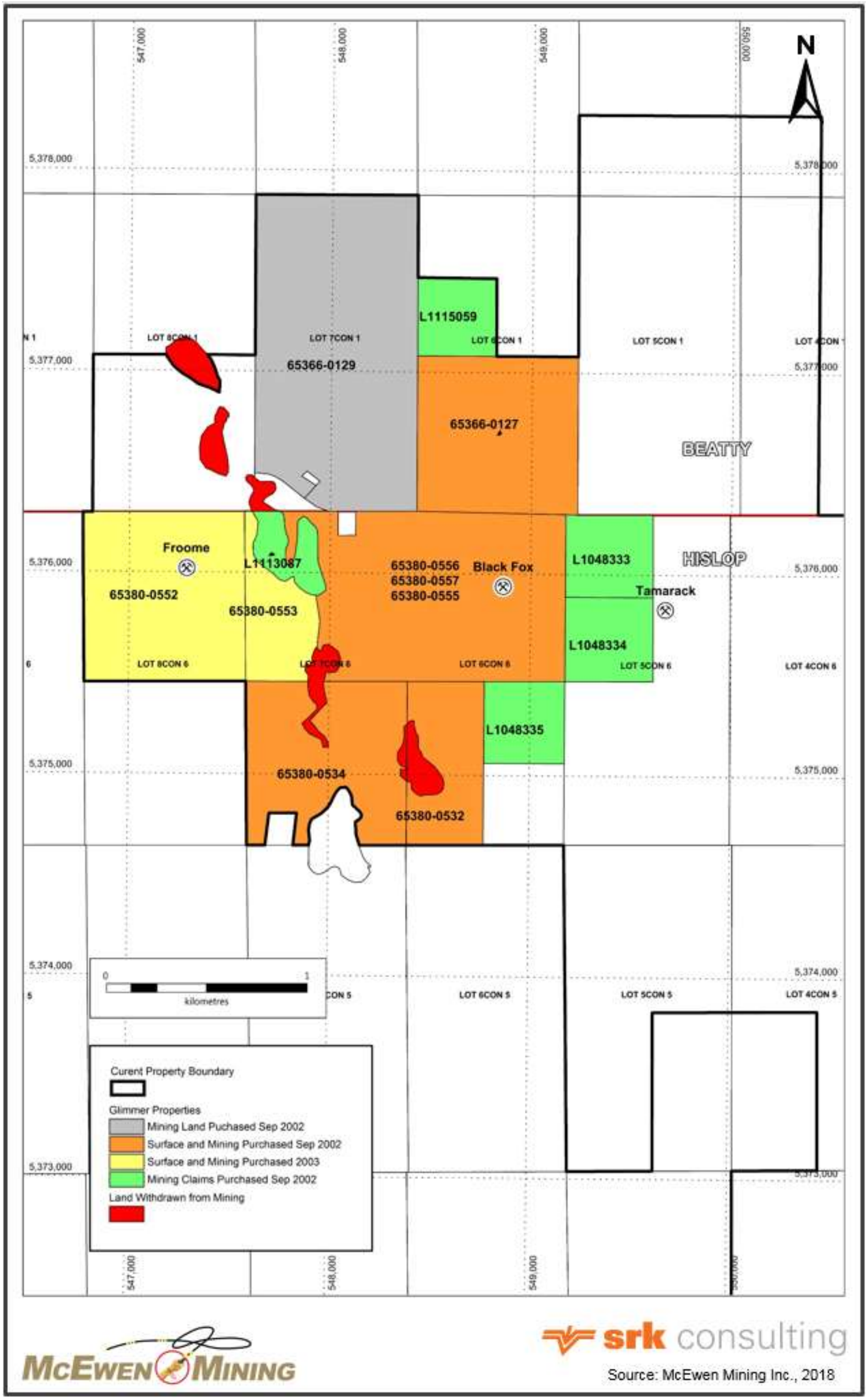


Figure 6: Black Fox Project as Purchased in 2002 by Apollo Gold Corporation

Additional adjacent land was purchased by Apollo Gold late in 2003. The Ewen property, consisting of PIN 65380-0558 and 65380-0559 in Hislop Township, were purchased in November 2003 for $180,000 (Prenn and Taggart, 2004). No mineral resources or reserves have been defined on the Ewen property, but if mineral resources are located, they would be subject to a 3 percent NSR. A C$500 annual minimum royalty applies to the property. The seller has first right of refusal to the property after mining and reclamation has been completed.

Apollo Gold reached an agreement with Timmins Forest Products for the purchase of the surface and mineral rights of adjacent lands for C$100,000 (Prenn, 2006). Only one of the 12 parcels carry mineral rights, and all carry surface rights. PIN 65366-0126 is subject to a 2 percent NSR royalty. McEwen Mining has a first right to buy out 1 percent of the NSR for C$500,000. The Mineral rights for the 11 remaining parcels are owned by Canadian Royalties Inc.

The Steinman property, consisting of PIN 65366-0143 in Beatty Township, was purchased in July 2007 for C$200,000 (Young et al., 2007). The property is subject to a 2.5 percent NSR. McEwen Mining has a first right to buy out 1 percent of the NSR for C$1,000,000.

On November 6, 2007, Brigus Gold, leased the surface and mining rights from the Frederick William Schumacher estate PIN 65380-0489, 65380-0490, 65380-0491, all in Hislop Township (Apollo Gold press release of November 27, 2007).

The terms of the lease are as follows:

- A) Term of twenty (20) years, with twenty-year extensions at the discretion of McEwen Mining.
- B) Exploration expenditures of $1,000,000 due on or before November 6, 2009.
- C) Annual rent of $100,000 due on the 6th day of November in each and every year up to and including November 6, 2010.
- D) Pre-commercial production subject to Consumer Price Indexing: A minimum annual prepayment production royalty of $100,000 payable in equal quarterly instalments of $25,000 due on the 1st day of the calendar quarter from the date of the fourth anniversary of lease commencement (November 6, 2011). The first quarterly payment is due on February 1, 2012.
- E) Commercial production subject to Consumer Price Indexing: A sum equal to the greater of $100,000 or the Production Royalty equivalent to a 3 percent NSR paid quarterly less the total of all prepaid production royalties paid under (C) above with a minimum annual payment of $100,000 paid quarterly.

On September 9, 2009, Apollo Gold, completed the acquisition of the Pike River property from Newmont Canada Corporation. The Pike River property comprises the surface and mineral rights to approximately 1,145 acres consisting of mining right PIN 65380-0638, 65380-0637, 65380-0636, 65380-0499; surface and mining right PIN 65380-0566, 65380-0520, 65380-0498.

Pursuant to the terms of the purchase agreement, Apollo Gold paid to Newmont Canada Corporation the sum of $100,000 and granted to Newmont Canada Corporation a perpetual 2.5 percent net smelter production royalty from the sale or other disposition of all materials produced from the Pike River property. In addition, as further consideration, within thirty (30) days following the earlier of the following, Apollo Gold shall pay to Newmont Canada Corporation the additional sum of $1,000,000: (i) the date that at least 500,000 ounces of gold equivalent minerals sufficient to be reported pursuant to Canadian National Instrument 43-101 ("NI 43-101") as combined reserves (proven and probable) and resources (measured, indicated and inferred) are determined to exist within the Pike River property; or (ii) the commencement of commercial production from any portion of the Pike River property.

PIN 65380-0638, 65380-0637, 65380-0636, 65380-0499, 65380-0566, 65380-0520, 65380-0498 are also liable to other financial obligations of McEwen Mining with royalty holder Parsons-Ginn. The terms of the financial obligation are as follows:

- A) Advance Royalty of $3,000 payable January 1 of each year, divided as follows: Peter Ginn = $1,500, Gail Lackey = $750, Gerry Leckie = $750
- B) 5 percent Net Proceeds Royalty shared 50/50 between Ginn (Peter Ginn) and Parsons (Gail Lackey and Gerry Leckie)
- C) Sliding Production Royalty based on the price of gold (parties elect annually as to which royalty will apply for that year).

PIN 65380-0498 is also liable to other financial obligations of McEwen Mining with royalty holders Brent George Gray and Tracy Edwin Gray. The terms of the financial obligation are as follows:

- A) Net Smelter Royalty of 0.15 percent on all material that undergoes commercial production, provided however that the Net Smelter Royalty due to the Royalty Holder is capped at the sum of C$1,000,000.

4.1.2 Acquisition by Brigus Gold

Additional adjacent land was purchased by Brigus Gold Corp (Brigus Gold). The MacFarlane property consisting of PIN 65380-0530 in Hislop Township was purchased in 2010. No resources or reserves have been defined on the MacFarlane property, but if found would be subject to a 2 percent NSR in favour of Thomas and Sheila MacFarlane. McEwen Mining has the right but not the obligation to purchase 1 percent of the NSR for the sum of C$1,000,000.

The Riehl and Stere property, consisting of PIN 65380-0526 in Hislop Township, was purchased in 2010. No resources or reserves have been defined on the Riehl and Stere property, but if found would be subject to a 2 percent NSR in favour of the Riehl and Stere parties. The 2 percent NSR is allocated as follows: 25 percent to David Ross Riehl, 25 percent to Helen Bernadette Riehl, 25 percent to Dale Richard Stere, 12.5 percent Russell Rae Stere, and 12.5 percent to Trevor Verle Stere. McEwen Mining has the right but not the obligation to purchase 1 percent of the NSR for the sum of C$1,000,000.

Gold Stream Agreement

On November 9, 2010, Brigus Gold, which owned the Black Fox Complex at the time, entered into a gold streaming agreement with Sandstorm Resources Ltd. (“Sandstorm”) pursuant to which Sandstorm agreed to purchase 12 percent of the gold production from the Black Fox Mine beginning in January 2011 and 10 percent of future production from the Black Fox Extension covering a portion of the adjoining Pike River property for a fixed price of US$500 per ounce (the “Goldstream”). Sandstorm made an upfront payment of $56.3 million to Brigus Gold relating to the Goldstream.

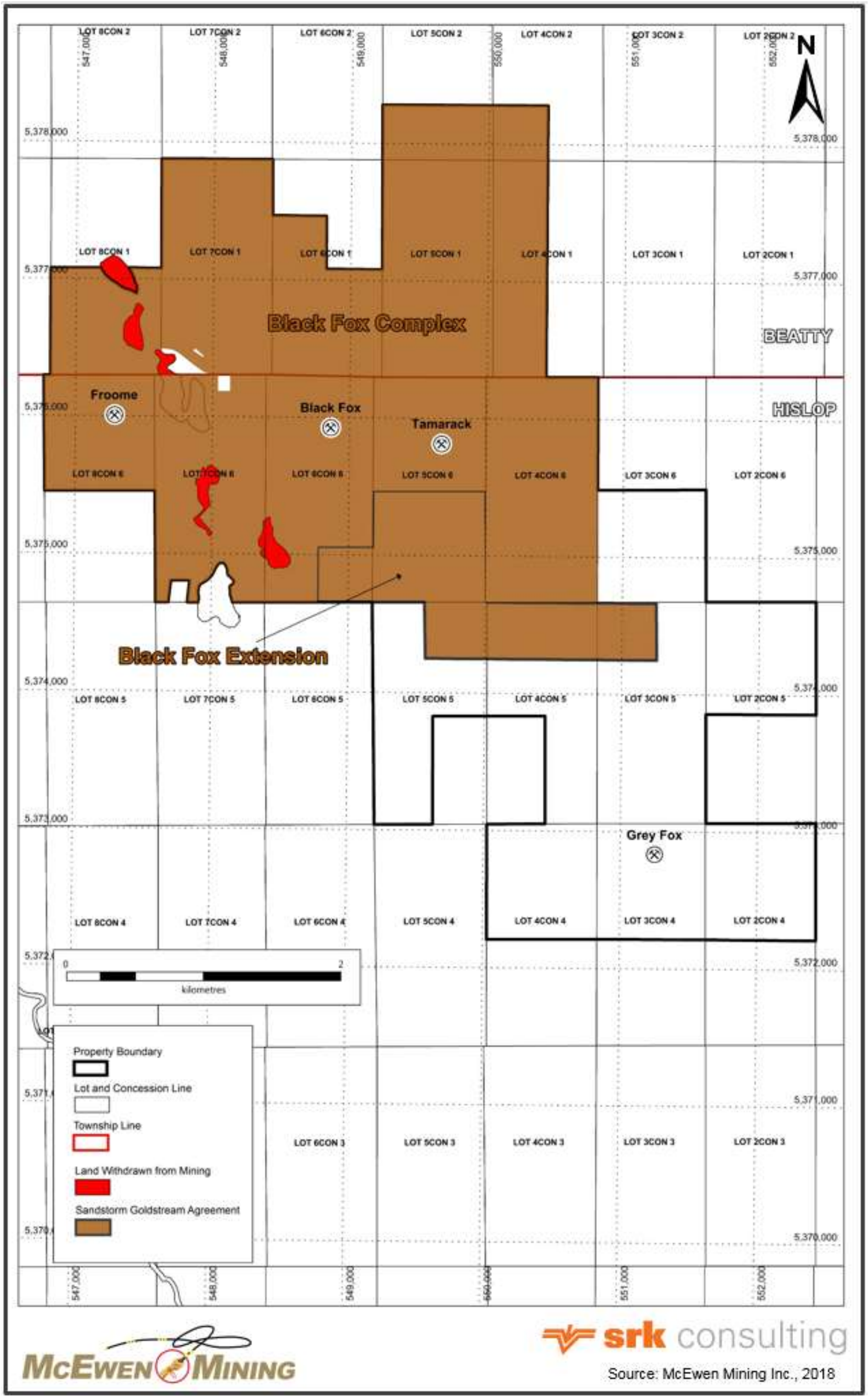


Figure 7: Location Map Showing Sandstorm Gold Stream Properties Relating to the Black Fox Mine

In 2011, 50,897 ounces of the total annual production were sold by Brigus Gold at spot rates, at an average realized price of US$1,589 per ounce (Brigus Gold Corp, 2011 Management's Discussion & Analysis). The remaining 6,104 ounces were delivered against the Gold Stream Agreement with Sandstorm at an average realized price of US$1,072. Sales to Sandstorm resulted in cash proceeds of US$500 per ounce as well as the recognition of deferred revenue of US$3.5 million.

In 2012, 65,275 ounces were sold at spot prices by Brigus Gold at an average realized price of US$1,665 per ounce and 8,416 ounces were delivered against the Gold Stream Agreement with Sandstorm (Brigus Gold Corp, 2012 Management's Discussion & Analysis). On November 5, 2012, Brigus Gold exercised its option to repurchase a portion of the Gold Stream Agreement from Sandstorm. Brigus Gold used US$24.4 million to repurchase 4 percent of the Gold Stream Agreement relating to production from the Black Fox Mine and 3.7 percent of the production from Black Fox Extension. Sandstorm is now entitled to 8 percent of the production from the Black Fox Mine and 6.3 percent of the production from Black Fox Extension. The average realized price for sales under the Gold Stream Agreement prior to the repurchase was US$1,072 per ounce, consisting of cash proceeds of US$500 per ounce and deferred revenue of US$572 per ounce. As a result of the repurchase, the average realized price for sales under the Gold Stream Agreement is US$982 per ounce, consisting of US$500 per ounce and deferred revenue of US$482 per ounce.

On November 5, 2012, Brigus Gold elected to exercise their option and repurchased 4 percent of the Goldstream on Black Fox, and 3.7 percent of the Goldstream on the Black Fox Extension, for $24.4 million. This reduced Sandstorm's stream on future production at Black Fox to 8 percent and the Black Fox Extension to 6.3 percent.

In 2013, 91,330 ounces were sold at spot prices by Brigus Gold, for an average realized price of US$1,413 per ounce, and the remaining 7,905 ounces were delivered against the Gold Stream Agreement (Primero Mining Corp, March 2014 Management's Discussion & Analysis).

For the three months ended March 31, 2014, a total of 14,176 ounces were sold at spot prices by Brigus Gold, for an average realized price of US$1,242 per ounce, and the remaining 1,444 ounces were delivered against the Gold Stream Agreement (Primero Mining Corp, March 2014 Management's Discussion & Analysis). During the first quarter, Primero owned the Black Fox Mine for 26 days. A total of 5,008 ounces were sold at spot prices, for an average realized price of US$1,272 per ounce, and the remaining 315 ounces were delivered against the Gold Stream Agreement.

Currently, McEwen Mining sells 8 percent of the gold production from the Black Fox Mine to Sandstorm at a price of US$540 per ounce (reflecting a contractual annual inflation adjustment). Sales pursuant to the Goldstream will continue for the foreseeable future, or as long as the Black Fox Mine remains in production.

4.1.3 Acquisition by Primero Mining Corp.

On March 5, 2014, Primero Mining acquired all of the issued and outstanding common shares of Brigus Gold pursuant to a plan of arrangement (the "Arrangement"), thereby taking control of the Black Fox Complex. On March 28, 2014, Brigus changed its name to Primero Gold Canada Inc.

Under Primero Mining's ownership the Black Fox Mine produced 63,900 ounces of gold in 2014 (10 months), 70,000 ounces in 2015, 62,171 ounces in 2016, and 51,209 ounces in 2017 (9 months).

4.1.4 Acquisition by McEwen Mining Inc.

On August 25, 2017, McEwen Mining entered into an Asset Purchase Agreement (the "APA") with Primero Mining Corp. ("Primero"), whereby it purchased all the assets and liabilities related to the Black Fox Complex for total cash consideration of US$27.5 million, which is the purchase price of US$35.0 million less closing adjustments. The Black Fox Complex includes the Black Fox Mine site, mill, property, plant and equipment and adjacent exploration properties located in Township of Black River-Matheson, Ontario, Canada. The transaction was completed on October 6, 2017.

4.1.5 Black Fox Mine

The Black Fox Mine open pit and underground mine is located within the boundaries of PIN 65380-0556. The mine complex is situated on PIN 65380-0555, 65380-0557, 65380-0558, 65380-0670 and 65380-0676.

Tamarack Zone

The Tamarack mineralized zone is situated approximately 100 metres to the east of the Black Fox Mine open pit. The mineralized zone is within the boundaries of PIN 65380-0670, 65380-0676, 65380-0558.

4.1.6 Froome Project

The entire mineralized zone for the Froome Project is situated within the boundaries of PIN 65380-0552. The zone is situated approximately 700 metres west of the Black Fox Mine open pit.

4.1.7 Grey Fox Project

The entire mineralized zone for the Grey Fox Project is situated within the boundaries of PIN 65380-04998, 65380-0489, 65380-0490 and 65380-0491. The zone is located approximately 3 kilometres south-east of the Black Fox Mine.

4.2 Permits and Authorization

4.2.1 Black Fox Complex

The Black Fox Complex has obtained the following key environmental permits:

- Environmental Compliance Approval (ECA) No. 0328-8XVPXT. This ECA relates to the collection and treatment of water from the underground mine, the open pit, and waste rock piles at the site. Treated water is discharged to the Pike River.
- ECA No. 2435-8STJY8 (Air) for air emissions from the Black Fox Complex Gold Project.
- Permit to Take Water (PTTW) No. 2737-9L6N4U for dewatering purposes at the Black Fox Complex Gold Project.

If a decision was made to mine the Froome Project, McEwen Mining would need to apply to amend the above-noted environmental approvals and permits to address changes that would occur. These changes could include:

- Additional mine water requiring treatment.
- Changes to air emissions.
- Additional mine dewatering requirements.

Within the context of the environmental approvals and permits already granted, the changes that would be required for the Froome Project are relatively minor.

If a decision is made to mine the Grey Fox Project, additional approvals related to mine water treatment, air emissions, and mine dewatering, would also be required. These approvals would be similar in scope to the existing approvals and permits noted above for the Black Fox Complex.

For both the Froome and Grey Fox projects, other permits and approvals may be required, however these would be of a routine nature and not expected to create considerable issues with respect to the project.

The Black Fox Mill has obtained the following environmental permits:

- ECA No. 0043-9ZDK6Z (Industrial Sewage) for tailings management at the Black Fox Mill,
- ECA (Air) No. 5793-9E8UXP for air emissions from the mill site including assaying, grinding, thickening, leaching, elution, electrowinning, tailings, water treatment, and cyanide destruction.
- PTTW No. 6286-AU9SUW for water taking from North Driftwood Creek and the Stock Mine workings.

It is not anticipated that amendments to these permits will be required in order to process additional ore from the Black Fox Complex, however there is a condition in ECA No. 0043-9ZDK6Z that requires McEwen Mining to provide information on new sources of ore. This would only apply if Froome or Grey Fox were to be mined, and in that case, it is not expected that there will be any changes to the existing approval, once the new information is provided.

4.3 Environmental Considerations

The Black Fox Complex includes the existing Black Fox Mine, as well as the proposed Froome and Grey Fox projects. Ore from the Black Fox Mine is currently milled at the Black Fox Mill, and ore mined from the Black Fox Complex in the future, including from the Froome and Grey Fox projects, will also be processed at the Black Fox Mill.

The Black Fox Mine and the Black Fox Mill are both permitted and operational facilities. For mining of the Froome Project, some modifications of the existing permits will be required. Within the context of the environmental approvals and permits already granted, the changes that will be required for the Froome Project are relatively minor. If the Grey Fox Project is mined, additional approvals related to mine water treatment, air emissions, and mine dewatering, will be required. These approvals would be similar in scope to the existing approvals and permits currently in place for the Black Fox Mine. It is expected that processing of material from Froome and Grey Fox at the Black Fox Mill will be straightforward from an environmental perspective, but will require an environmental characterization of the material to be processed.

Accepted closure plans are in place for both the Black Fox Mine and the Black Fox Mill. The closure measures planned represent typical best practices and extensive monitoring programs are in place at both sites. Financial Assurance in the form of letters of credit have been provided to the MNDM to cover the cost of closure. Amendments to both closure plans are in preparation. It is expected that the amendment for the Black Fox Mine will result in a decrease in Financial Assurance, and no change in Financial Assurance is expected for the Black Fox Mill.

The Black Fox Complex includes the existing Black Fox Mine gold mining operations, as well as the proposed Froome and the Grey Fox projects. Ore from the Black Fox Mine is currently milled at the Black Fox Mill, and ore mined from the Black Fox Complex in the future, including from the Froome and Grey Fox projects, if they are developed, will also be processed at the Black Fox Mill.

4.4 Mining Rights in Ontario, Canada

In the Province of Ontario, mining is largely regulated by the provincial government, with the Ontario Ministry of Northern Development and Mines (MNDM) and the Ontario Ministry of Natural Resources (MNR) acting as the two main oversight bodies. The Canadian federal government may also be involved in the mining process when First Nations matters arise or where the subject lands are federally regulated, as is the case for uranium mining or for lands with water bodies classified as navigable.

4.4.1 Staking Claims

Unpatented mining claims can only be staked by an entity that holds a prospector's licence from the MNDM. A licenced prospector is permitted to enter onto provincial Crown and private lands that are open for exploration and stake an unpatented mining claim on those lands. Notice of the staked claim can then be recorded in the mining recording office maintained by the MNDM. Once staked, it can be recorded or assigned to another individual or company. Once the unpatented mining claim has been recorded, the holder is permitted to conduct exploratory and assessment work on the subject lands. To maintain the mining claim and keep it in good standing, the holder must adhere to relevant staking regulations and conduct all prescribed work thereon. The prescribed work is currently set at C$400 per annum per 16-hectare claim unit. The prescribed work must be completed prior to the anniversary date (and since 2012 payments in lieu of work in certain circumstances can be made). No minerals may be extracted from lands that are the subject of a mining claim – the holder must complete a certain amount of assessment then apply for and obtain a mining lease to mine the land. The holder of an unpatented mining claim does not have an interest in land, the holder is a mere tenant at will of the Crown.

A mining claim can be transferred or charged by the holder without obtaining any consents. Notice of the change of owner of the mining claim or charge thereof must be recorded in the mining recording office maintained by the MNDM in order to have effect.

4.4.2 Mining Lease

If the holder of an unpatented mining claim wants to extract minerals, the holder may apply to the MNDM for a mining lease. A mining lease, which is usually granted for a term of 21 years, grants an exclusive right to the lessee to enter upon and search for, and extract, minerals from the land, subject to the holder obtaining other required permits and adhering to applicable regulations.

Pursuant to the provisions of the Ontario Mining Act (the Act), the holder of an unpatented mining claim is entitled to a lease if it has complied with the provisions of the Act in respect of those lands. An application for a mining lease may be submitted to the MNDM at any time after the first prescribed unit of work in respect of the mining claim is performed and approved. The application for a mining lease must specify whether it requests a lease of mining and surface rights or mining rights only and requires the payment of fees.

A mining lease can be renewed by the lessee upon submission of an application to the MNDM within 90 days before the expiry date of the lease, provided that the lessee provides the documentation and satisfies the criteria set forth in the Act in respect of a lease renewal.

A mining lease cannot be transferred or mortgaged by the lessee without the prior written consent of the MNDM. The consent process generally takes between two and six weeks and requires the lessee to submit various documentations and pay a fee.

4.4.3 Freehold Mining Lands

Until 1989 it was possible to make an application to MNDM to acquire the freehold interest in the subject lands. If the application was approved, the freehold interest was conveyed to the applicant by way of the issuance of a mining patent. A mining patent can include surface and mining rights or mining rights only.

The mining patent vests in the patentee all of the provincial Crown’s title to the subject lands and to all mines and minerals relating to such lands, unless something to the contrary is stated in the patent.

As the holder of a mining patent enjoys the freehold interest in the lands that are the subject of such patent, no consents are required for the patentee to transfer or mortgage those lands.

5 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

5.1 Accessibility

The Black Fox Complex is located approximately 10 kilometres east of the town of Matheson, which lies 55 kilometres north-northwest of Kirkland Lake (population approximately 8,000), and 60 kilometres east of Timmins (population approximately 42,000). Access is via Highway 101 East, which crosses the Black Fox property from east to west through its centre. The mine site and facilities are located on the south side of Highway 101 East. The population of the Black River-Matheson Township, which includes the communities of Holtyre, Matheson, Ramore, Shillington, Val Gagne and Wavell, is approximately 2,500. Access within the property is achieved by various drill roads and all-terrain vehicle (ATV) trails.

5.2 Local Resources and Infrastructure

Supplies and services are available in Matheson or Timmins, and materials can be delivered with a 12-hour turnaround time. Forestry and mining are the primary industries, and the property is located within a well-established mining camp. Mining and exploration personnel as well as equipment can therefore be locally sourced.

Electrical power is readily available at the exploration site of the Grey Fox Project via power lines along Tamarack Road. Electrical services were historically available on the property during production of the Gibson West Mine during the early 1980s.

5.3 Climate

The minimum mean annual temperatures in the region range from -22°C in January to +10°C in July. The maximum mean annual temperatures in the region range from -9°C in January to +25°C in July. The mean annual rainfall for the region is 825 millimetres (www.worldweatheronline.com).

Rapid melting of accumulated snowfall can produce local flooding on the property for short periods during the spring months. Average monthly wind speeds for the region are 11 to 15 kilometres per hour (Dyck, 2007). It is possible to conduct exploration activities year-round.

5.4 Physiography

The Black Fox Complex area is predominantly agricultural land with a mature willow shrub, poplar, black spruce and white birch forest along the southern and eastern edges of the property. The region is characterized by outwash deposits from continental glaciation, including raised beaches, flat clay pans and eskers. The low to moderate topography is marked by rock knobs and ridges (Dyck, 2007). The elevation ranges from 295 to 330 metres above mean sea level (masl) (Prenn, 2006).

Surface waters include lakes, rivers and their associated habitats. Lakes include Froome Lake located 0.25 kilometres west of the mine, Leach Lake located 1.4 kilometres northwest of the mine and Lawler Lake located 1.7 kilometres to the south. Two others, Salve Lake and Nickel Lake respectively located 5.2 and 5.9 kilometres north of the mine, form the headwaters of Salve Creek.

The property is located within the Salve Creek and Pike River watersheds, which are both tributaries of Black River. Black River flows north into Abitibi River which in turn flows into Moose River. Moose River ultimately flows into James Bay (Dyck, 2007). Typical landscape in the Black Fox Complex area is shown in Figure 8.

Figure 8: Typical Landscape in the Black Fox Complex Area

A: Aerial view of Black Fox Mill and surrounding landscape

B: Black Fox Mill looking south from tailings pond

C: Black Fox crusher

D: Typical landscape, waterscape and vegetation in the Matheson, Ontario area

6 History

6.1 Black Fox Mine

The author has relied upon the report, "Technical Report on the Mineral Resource and Mineral Reserve Estimates for the Black Fox Complex" dated June 30, 2014 prepared by Harold Brisson for the history of the Black Fox Mine and Grey Fox Project, sections 6.1 and 6.3.

Drilling appears to have been first carried out on this property by Dominion Gulf in 1952 followed by Hollinger in 1962. The holes were drilled near diabase dykes located in the eastern most part of the property. In 1988, Glimmer Mine Inc. put together the property package using a combination of crown and private lands. In 1989, Noranda Exploration Company Ltd entered into a joint venture agreement with Glimmer to earn a 60 percent interest in the property. Between 1989 and 1994, Noranda, and later Hemlo Gold Mines Inc., completed eight drill programs. In all, 27,800 metres (91,206 feet) of drilling was completed in 142 holes. In addition to diamond drilling, exploration was conducted by way of geological, magnetic and gradiometer surveys, a UTEM survey, and a limited IP survey. In 1996, a final feasibility study on the Glimmer Gold Project was based on probable reserves outlined to a depth of 250 metres. Drill-indicated reserves cut to 34 grams of gold per tonne (g/t gold) were calculated to be 634,234 tonnes averaging 11.72 g/t gold, including a mineable reserve of 499,490 tonnes averaging 11.14 g/t gold. These "resources" are historical in nature and should not be relied upon. It is unlikely they conform to current NI 43-101 criteria or to CIM Standards and Definitions, and they have not been verified to determine their relevance or reliability. They are included in this section for illustrative purposes only and should not be disclosed out of context.

Exall Resources Limited purchased the property from Hemlo Gold Inc. in April 1996, obtaining approximately 60 percent interest in the property, with Glimmer Resources Inc. holding the remaining portion. Production ore from the Black Fox Mine property was custom milled from 1997 through 2001, subsequent to mineral tests carried out by Lakefield Research and others (Table 3).

In September 9, 2002, Apollo Gold completed the acquisition of certain real estate and related assets of the Glimmer mine from Exall Resources and Glimmer Resources. The project was renamed the Black Fox Project. Between 2003 and 2007, Apollo Gold completed five drill programs. A total of 106,541 metres was drilled in 399 surface holes, and another 79,184 metres in 396 holes from underground development. In addition to diamond drilling, exploration was conducted by way of IP surveys.

Table 3: Production History of the Glimmer Mine from 1997 to 2001

Year	Metric Tonnes	Grade	Ounces	Gold Recovery (%)
1997	194,460	6.79	39,884	96.38
1998	308,734	6.67	64,319	96.9
1999	258,699	5.82	48,266	97.76
2000	255,234	5.82	46,418	97.04
2001	81,700	4.53	11,895	98.19
Total	**1,098,827**	**5.97**	**210,782**	**97.14**

In 2008, Apollo Gold produced a bankable feasibility study. The mineral reserves were calculated based on a gold price of US$650 per ounce. Open pit reserves included 4,350,000 tonnes grading 5.2 g/t gold at a cut-off grade of 1.0 g/t gold (730,000 ounces) and underground reserves were 2,110,000 tonnes grading 8.8 g/t gold at a cut-off grade of 3.0 g/t gold (600,000 ounces). Underground reserves assumed 95 percent mining recovery, with 17 percent planned and 5 percent unplanned dilution at a grade of 0 g/t. On July 28, Apollo Gold completed the acquisition from St Andrew Goldfields Ltd of its Stock Mill and related equipment, infrastructure, property rights, laboratory and tailings facilities, located near Timmins, Ontario.

In October 2008, Apollo Gold awarded a contract for the removal of the glacial till material over the open pit site and work commenced on October 23. During the same year, Apollo Gold received all necessary permits and approvals required to commence mining activities of the open pit. Apollo Gold received a Certified Closure Plan Approval, an Amended Certificate of Approval for Industrial Sewage Works, and a Permit to Take Water (Surface and Ground Water).

Apollo Gold commenced open-pit mining at the Black Fox Mine in March 2009. The 2009 drilling program included the first six (6) holes drilled on the Pike River property to test the northern extension of mineralization from the adjoining Grey Fox Project.

Apollo Gold and Linear Gold Corporation merged to form Brigus Gold Corporation in June 2010. The drilling surface program completed 14 condemnation drillholes (3,468 metres) around the Black Fox Mine. A helicopter-borne, high-resolution magnetometer survey was completed in September 2010, covering the 17-square-kilometre Black Fox Complex.

A total of 1,570 holes (total of 145,919 metres) were drilled, logged and sampled at the Black Fox Mine by Apollo Gold and Brigus Gold from January 1, 2008 to December 31, 2013.

Production ore from the Black Fox Mine between 2009 and 2017 is summarized in Table 4. The previous Mineral Resource Statement for the Black Fox Mine was reported by Brisson (2014) for Primero as tabulated in Table 5.

Table 4: Production History of the Black Fox Mine Since 2009

Black Fox Mine	Units	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
OP ore mined	t	631,000	792,482	433,267	907,077	663,428	775,403	849,668	0	0	5,052,325
UG ore mined	t	0	0	170,889	164,926	297,110	122,249	140,836	234,518	263,549	1,394,077
Total ore mined	t	631,000	792,482	604,156	1,072,003	960,538	897,652	990,504	234,518	263,549	6,446,402
Tonnes milled	t	531,000	718,400	725,541	735,573	752,959	695,131	875,833	913,235	685,293	6,632,965
Head grade ore	g/t Au	3.28	3.17	2.54	3.43	4.34	3.00	2.58	2.22	3.14	3.04
Recovery	%	93%	92%	94%	95%	94%	95%	96%	96%	96%	95%
Gold produced	oz	52,152	67,499	55,756	77,374	98,710	64,018	69,733	62,171	66,733	613,052

Table 5: Mineral Resource Statement for the Black Fox Mine, Primero Mining Corp, June 2014

Classification	Mining Method	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Measured	Stockpiles	716	1.07	25
Indicated	Open Pit	1,424	3.99	183
	Underground	1,853	7.48	455
Measured + Indicated		**4,043**	**5.02**	**653**
Inferred	Open Pit	364	5.80	68
	Underground	326	9.52	100
Total Inferred		**690**	**7.56**	**168**

6.2 Froome Project

The Froome Project is located on the western part of the Black Fox Complex, approximately 800 metres west of the Black Fox Pit. The property was optioned in 2002 and acquired by Apollo Gold in 2003. The property is currently 100 percent owned by McEwen Mining.

In 2014 Primero Mining completed a diamond drilling program targeting an induced polarization anomaly, intercepting 23 metres (core length) of silicified rock with disseminated pyrite, grading 2.00 g/t gold. Through the latter part of 2015 and early 2016, subsequent diamond drilling defined mineralization over a strike length of approximately 150 metres and dip length of approximately 300 metres. In addition to the main ore body, drilling in 2016 identified a second zone of mineralization, 25 metres (core length) grading 2.51 g/t gold, below the current deposit. The extent, geometry and economic potential of the lower mineralized zone remains to be defined.

No mining activity has been undertaken at the Froome Project.

6.3 Grey Fox Project

Drilling appears to have been first carried out on this area by Abuy Gold Mines Ltd in 1939 followed by Martin-Bird Gold Mines Ltd in 1949. Their holes were drilled in the historical Gibson deposit area. In 1973, Nevada Exploration Ltd drilled more holes and reported gold values. In 1983, Geddes Resources Ltd and Armco Minerals Exploration Ltd completed geophysical surveys, trenching, and drilling. In 1986, Goldpost Resources Inc. completed a surface drilling program and initiated an exploration decline ramp to explore anomalous gold tenors. Between 1987 and 1989, Goldpost Resources Inc. completed underground development and underground drilling.

In 1993-1995 Noranda Exploration Company followed by Hemlo Gold Mines explored the property and carried out surface diamond drilling and geophysical surveys. In 1996, Hemlo Gold Mines merged with Battle Mountain Gold Company. Battle Mountain Gold in conjunction with Cameco Gold carried out drilling on the Contact Zone. The resource estimates done by Battle Mountain in 1997 produced three separate numbers. The initial estimate from the drilling program via a “Boreserve” computerized program produced a resource of 2,186,000 tonnes at 4.8 g/t gold. This included 1,270,000 tonnes at 7.0 g/t gold (Garber and Dahn, 1997). The second estimate, calculated from Gemcom software via polygonal method, was reported as 1,163,897 tonnes at 6.4 g/t gold (Garber and Dahn, 1997). Another estimate was noted in a 1998 Exall Memorandum which stated there was an indicated resource of 1,541,000 tonnes at 7.0 g/t gold on the Contact Zone (Buss, 2010). Another 347,000 tonnes at an unknown grade was estimated as an inferred resource (Trimble, 1997). These “resources” are historical in nature and should not be relied upon. It is unlikely they conform to current NI 43-101 criteria or to CIM Standards and Definitions, and they have not been verified to determine their relevance or reliability. They are included in this section for illustrative purposes only and should not be disclosed out of context.

Apollo Gold acquired the land and drilled 16 holes for 3,063 metres on the southern extension of the Contact Zone. Four drill core samples were sent out from the drilling program in 2008 for mineralogical analysis. Another 52 holes were drilled in 2009 by Apollo Gold on the main portion of the Contact Zone. Total metres drilled in 2009 amounted to 9,731 metres.

The 2010 Brigus Gold exploration drilling program completed 69 drillholes (26,805 metres) at the Grey Fox and Pike River properties that included 34 drillholes (12,703 metres) on the Contact Zone, 14 drillholes (5,123 metres) on the Gibson deposit/shear, 3 drillholes (1,503 metres) on the Grey Fox

South Zone, 11 drillholes (4,336 metres) on the Hislop North target and 7 drillholes (3,139 metres) on the 147 Zone.

The 2011 Brigus Gold exploration drilling program completed 247 drillholes (92,273 metres) at the Grey Fox and Pike River properties comprising 79 drillholes (27,881 metres) on the Contact Zone, 28 drillholes (8,798 metres) on the Gibson deposit/shear, 2 drillholes (883 metres) on the Grey Fox South Zone and 138 drillholes (54,710 metres) on the 147 Zone. Drilling results continued to show gold continuity in multiple shallow, mineralized zones on the Contact Zone and the newly discovered 147 Zone.

In October 2012, Tetra Tech published a mineral resource estimate (Daigle, 2012). The mineral resource was reported at a 0.65 g/t gold cut-off grade for potential open-pit material and at a 2.63 g/t cut-off grade for the potential underground material. The limit between open-pit and underground potential was established by an arbitrary boundary 200 metres below surface; no optimized pit shell was created. The total Indicated Resource was reported as 7,105,378 t at a grade of 2.11 g/t gold. The total Inferred Resource was 1,692,267 t at a grade of 1.67 g/t gold. The classified mineral resources are shown in Table 6.

Table 6: 2012 Mineral Resource Estimate for the Contact and 147 Zones, Grey Fox Project (Daigle, 2012)

Resource Class	Cut-off Grade (g/t Au)	Potential Material	Tonnes (t)	Capped Gold (g/t)	Contained Gold (oz)
Indicated	2.63	Underground	231,478	5.44	40,506
	0.65	Open Pit	6,873,900	1.99	440,342
		Total Indicated	**7,105,378**	**2.11**	**480,849**
Inferred	2.63	Underground	143,852	3.72	17,219
	0.65	Open Pit	1,548,415	1.48	73,843
		Total Inferred	**1,692,267**	**1.67**	**91,061**

The 2012 Brigus Gold exploration drilling program completed 261 drillholes (76,566 metres) at the Grey Fox Project area, comprising 64 drillholes (20,285 metres) on the Contact Zone, 140 drillholes (33,902 metres) on the 147 Zone, 1 drillhole (260 metres) on the new Whiskey Jack Zone and 56 drillholes (22,119 metres) on the newly discovered Grey Fox South. The bulk of the Contact and 147 Zone drilling program was focused on converting the inferred resources to the indicated category.

On January 4, 2013, InnovExplo was retained to complete a mineral resource estimate and a technical report for the Grey Fox Project (Richard et al. (2013). The main objectives of InnovExplo's work were to: 1) update the interpretation; and 2) publish the results of an updated mineral resource estimate for the Grey Fox Project. The result of the study was a single mineral resource estimate for all mineralized zones, with Indicated and Inferred Resources, for both a Whittle optimized in-pit volume and a complementary underground volume. The effective date of the mineral resource estimate was June 21, 2013. The estimate is compliant with CIM standards and guidelines for reporting mineral resources and mineral reserves. Table 7 presents the combined 2013 mineral resources by category for the overall Grey Fox Project.

Table 7: 2013 Mineral Resource Estimate Results for the Grey Fox Project (Richard et al., 2013)

Resource Class	Cut-off Grade (g/t Au)	Potential Material	Tonnes (t)	Capped Gold (g/t)	Contained Gold (oz)
Indicated	>2,84	Underground	1,275,000	6.2	255,000
	>0.72	Open Pit	3,041,500	2.6	252,400
		Total Indicated	**4,316,500**	**3.7**	**507,400**
Inferred	>2.84	Underground	1,025,100	5.6	184,800
	>0.72	Open Pit	488,900	2.8	43,800
		Total Inferred	**1,514,000**	**4.7**	**228,600**

No holes were drilled between January 1 and March 5, 2014. From March 5 to May 23, Primero drilled, logged and sampled 39 holes for a total of 11,920 metres. Between March 5, 2014 and December 31, 2015, Primero drilled 263 diamond drillholes on the Grey Fox Project for a total of 111,618 metres. The 2014 and 2015 drilling programs focused on infill-drilling and expanding the resources on the 147 zone, Contact and Grey Fox South zones. All holes are included in the current mineral resource estimate. A total of 26 holes were drilled on the Primero-owned properties surrounding the Grey Fox Project. This program totaled 12,111 metres and these results are not included in the current or previous resource estimates.

7 Geological Setting and Mineralization

7.1 Regional Geology

The Black Fox Complex property is underlain by rocks of the 2,750- to 2,670-million-year-old Southern Abitibi Greenstone Belt (SAGB) in the central part of the Wawa-Abitibi Subprovince, southeastern Superior Province, and northeastern Ontario (Figure 9 and Figure 10). The AGB consists of autochthonous assemblages of 2,750- to 2,695-million-year-old metavolcanic rocks and their intrusive equivalents, which are unconformably or disconformably overlain by the 2690-2685 Ma Porcupine and 2,677- to 2,670-million-year-old Timiskaming metasedimentary assemblages and alkalic intrusive rocks. Across the SAGB, metavolcanic rocks define east-trending, steeply dipping to vertical synclines which alternate with east-trending bands of turbiditic wackes. The overlying Porcupine and Timiskaming assemblages are typically proximal to major crustal-scale faults (Thurston et al., 2008).

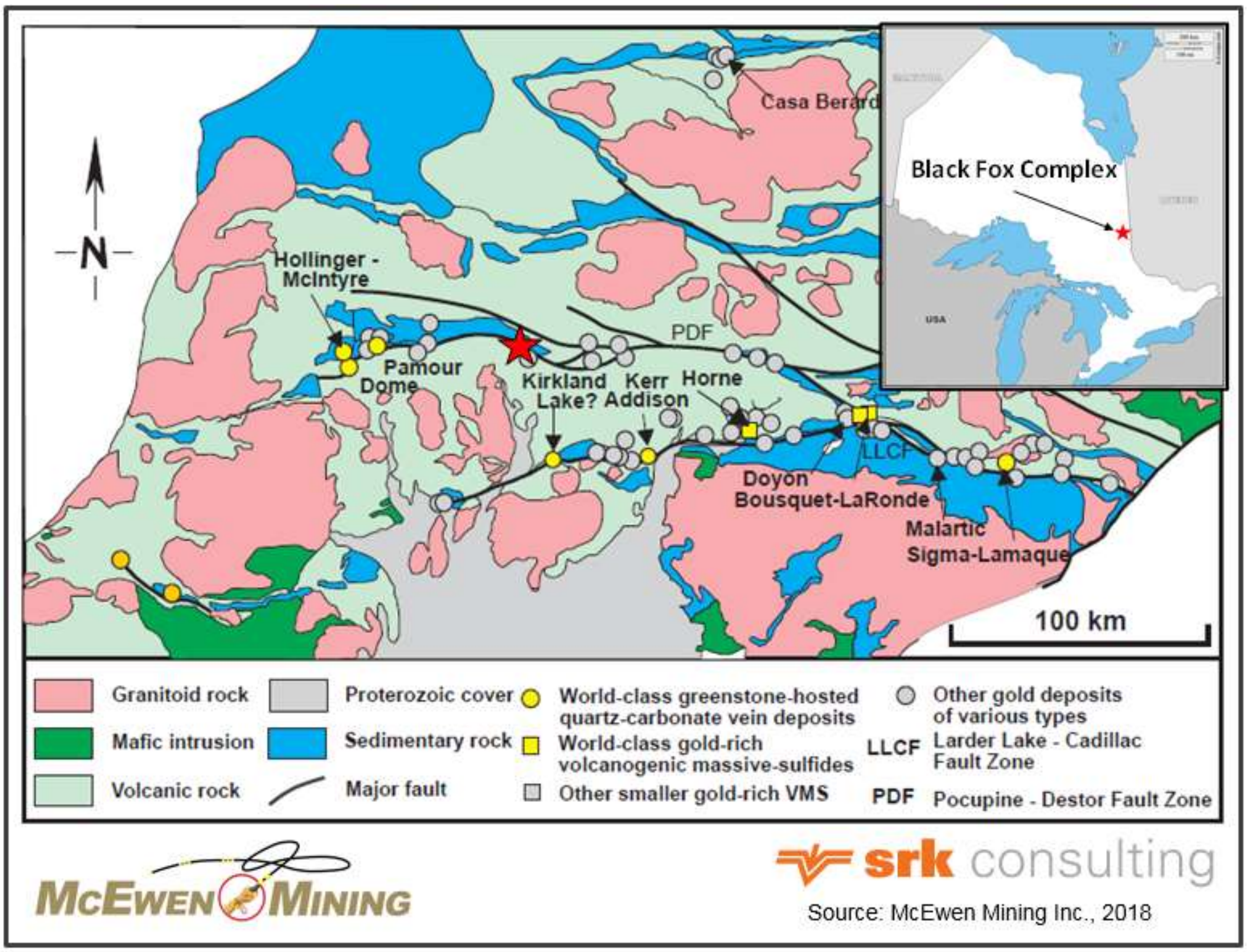


Figure 9: Map of the Abitibi Greenstone Belt Showing Distribution of Gold Deposits and Major Fault Zones

Modified from Poulsen et al, 2000 and Dube and Gosselin, 2007.

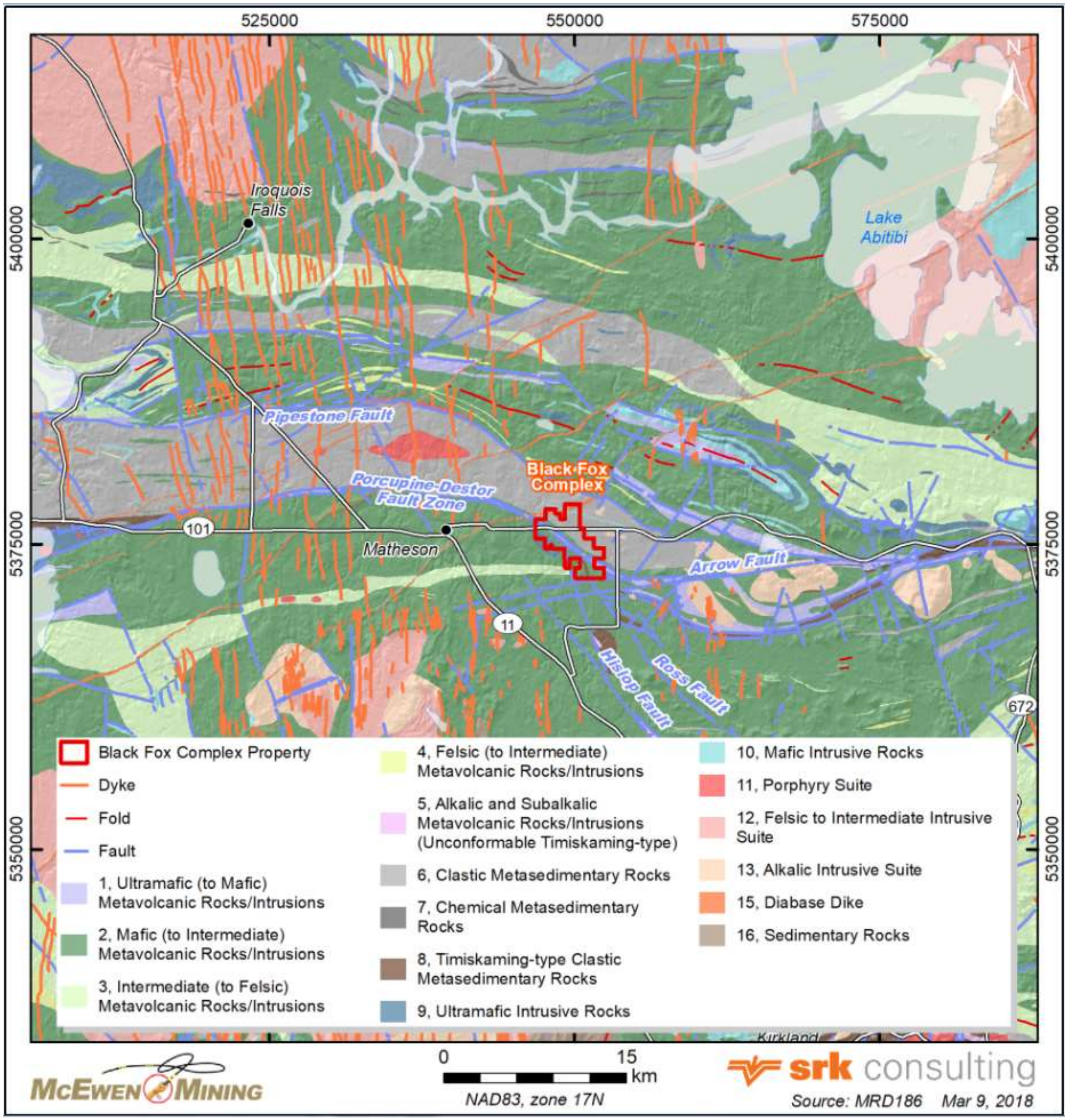


Figure 10: Regional Geology of the Black Fox Complex

Major crustal-scale faults, such as the Porcupine-Destor Deformation Zone (PDDZ) and Cadillac-Larder Lake Deformation Zone (CLDZ) commonly occur at assemblage boundaries and are spatially associated with east-trending belts of Porcupine and Timiskaming assemblage metasedimentary rocks. These major faults record multiple generations of deformation, including normal, strike-slip, and reverse movements. The Porcupine-Destor and Cadillac-Larder Lake deformation zones define a corridor of gold deposits, generally known as the Timmins-Val D’Or camp (Robert *et al.* 1990), which accounts for the bulk of historic and current gold production from the Superior Province.

7.2 Property Geology

The local geological setting in the Highway 101 area (Figure 11) is represented by Neoarchean supracrustal rocks intruded by Matachewan and Keweenawan diabase dykes and Mesozoic kimberlite dykes and pipes. The supracrustal rocks are composed of ultramafic, mafic, intermediate and felsic metavolcanic rocks, related intrusive rocks, clastic and chemical metasedimentary rocks, and a suite of ultramafic to felsic alkalic plutonic and metavolcanic rocks (Berger, 2002).

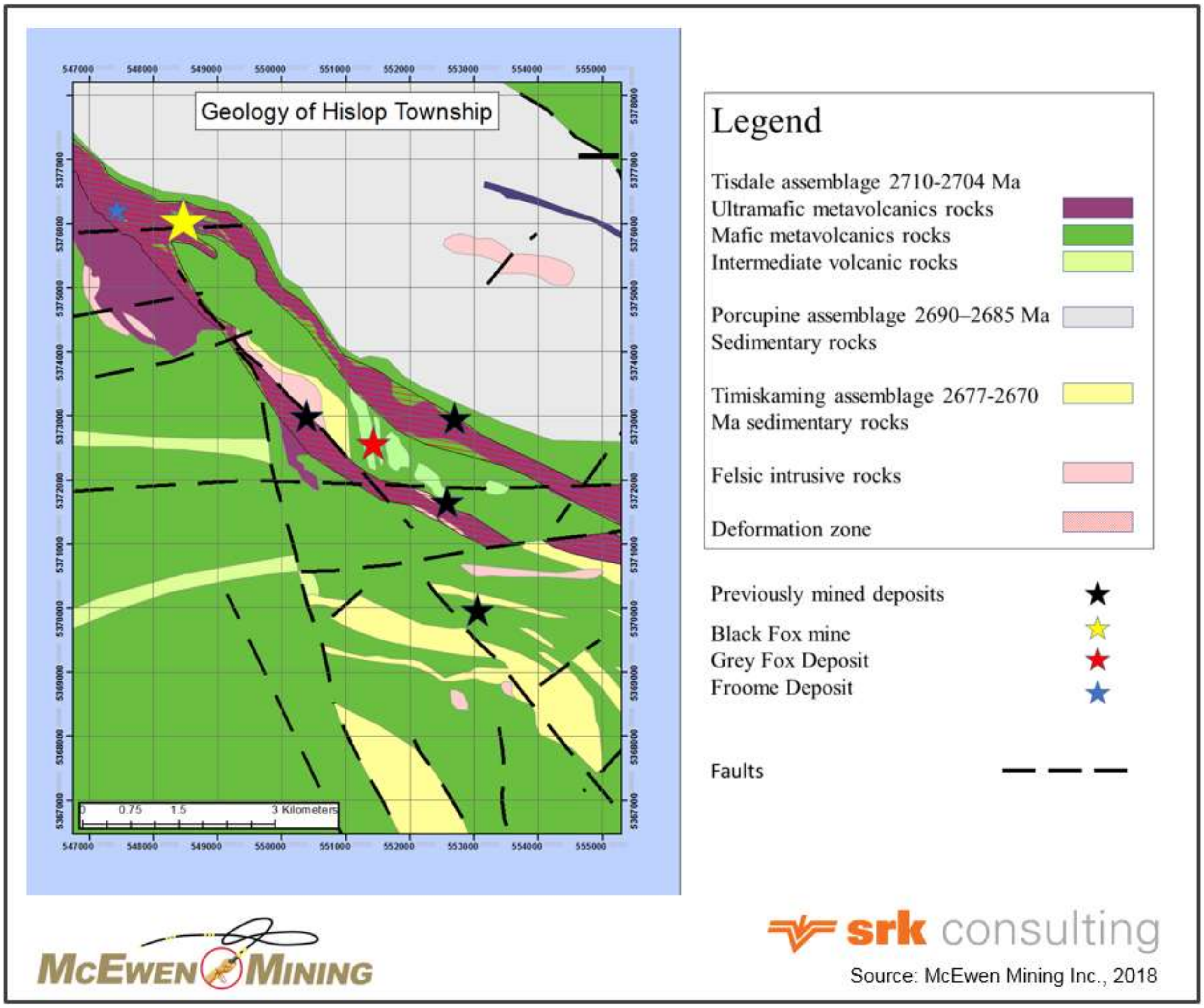


Figure 11: Local Geology of Black Fox Complex
Modified from Berger et al, 2002 and Chappell, 2018

These rocks are divided into five distinct packages based on morphology, petrography, geochemistry and geochronology. The packages or assemblages in the Highway 101 area correlate with regional assemblages proposed by Jackson and Fyon (1991) and modified by Ayer *et al.* (1999b) and Thurston *et. al.* (2008). The five assemblages are (from oldest to youngest): Kidd-Munro, Tisdale, lower Blake River, Porcupine and Timiskaming. The first three are predominantly composed of metavolcanic rocks, whereas the last two are predominantly metasedimentary rocks, although alkaline metavolcanic rocks and related intrusions also occur within the Timiskaming Assemblage. The Black Fox Complex is essentially underlain by the Tisdale and Porcupine assemblages with less abundant Timiskaming assemblage.

7.2.1 Tisdale Assemblage

The Tisdale Assemblage underlies the part of Hislop Township north of the Arrow Fault (local name) and south of the PDDZ. In the Guibord and Michaud townships, the rocks south of the Arrow Fault and north of the PDDZ have been correlated with the Tisdale Assemblage based on rock type morphology, geochemistry and structures. The Tisdale Assemblage predominantly comprises tholeiitic mafic and komatiitic metavolcanic rocks with subordinate calc-alkaline intermediate and felsic flows, pyroclastics, and epiclastic deposits. Ayer et al., (1999a) and Ayer et al. (1999b) included these rocks with the Tisdale Assemblage based on U/Pb ages (circa 2,704 million years old) that are similar to those in the type area at Timmins.

Ultramafic metavolcanic rocks of the Tisdale Assemblage are restricted to the PDDZ in Hislop Township (Berger, 2002). Talc-chlorite schist is most common, and green mica, iron carbonate and quartz veins are observed in hydrothermally altered zones. Altered schist is dark green to black to orange-brown. It is generally fissile, but is locally indurated where silica and albite are present. Relict spinifex-textured flows occur at the Royal Oak open pit in Hislop Township and are reported in diamond-drill logs near the Glimmer mine (Black Fox Mine). Massive, spinifex-textured and brecciated flows are common in less deformed areas. Elsewhere, ultramafic metavolcanic rocks are poorly exposed and their distribution is inferred based on diamond-drill data and airborne geophysical magnetic surveys.

Mafic metavolcanic rocks comprise approximately 50 percent of the Tisdale Assemblage and are predominantly composed of massive, pillowed and pillow breccia flows (Berger, 2002). Chlorite schist is common in faults and shear zones, and iron carbonate, albite, sericite and quartz occur in hydrothermally altered zones. Variolitic flows, flow breccia and hyaloclastite are common whereas tuff is rare. Massive flows are exposed in several areas and are generally green, fine- to medium-grained, equigranular rocks with no distinguishing features.

Pillowed mafic metavolcanics flows are common. The pillows measure 60 to 70 centimetres long by 30 to 40 centimetres wide and display rims up to 2 centimetres thick (Berger, 2002). They are generally well formed and may be either closely packed with little interpillow material or may have up to 15 percent interpillow chert and hyaloclastite. Flows are generally a few metres thick and commonly capped by flow breccia and hyaloclastite.

Fragmental rocks are interpreted as mafic intrusion breccia, younger than the Porcupine Assemblage metasedimentary rock (Berger, 2002). These deposits are heterolithic with aphanitic and phaneritic mafic metavolcanic clasts, wacke, argillite, framboidal pyrite clasts and rare felsic porphyry clasts that are up to 30 centimetres in size, but average 2 to 8 centimetres. The clasts are angular to round; some have reaction rims, some chilled margins, a few have very angular boundaries, and most are subangular massive mafic metavolcanic clasts. The deposits are generally clast supported with a matrix composed of fine-grained mafic tuff or rarely highly indurated, very fine-grained hyaloclastite. The deposits are poorly sorted; clast gradation and bedding planes are absent. Pyrite is common throughout the deposits both as clasts and as disseminations in the matrix.

Mafic schist occurs in faults and shear zones throughout the Tisdale Assemblage and is characterized by light to dark green fissile rock that retains few if any primary features (Berger, 2002). Chlorite and secondary amphibole are common minerals in unaltered schist. Iron carbonate, white mica and quartz are common minerals in hydrothermally altered schist.

Variolitic flows occur throughout the Tisdale Assemblage, but are less abundant than in the Kidd-Munro Assemblage (Berger, 2002). Variolitic flows north of the New Kelore mine shaft and northeast of the Hislop mine belonging to Kirkland Lake Gold Ltd. extend north into the Grey Fox Project area of the Black Fox Complex. These variolitic flows contain 30 to 85 percent varioles that are commonly coalesced. Variolitic flows were also observed at the Royal Oak open pit. The strong spatial association of variolitic flows with gold mineralization in the Abitibi Subprovince appears to be a function of the iron to magnesium ratio (Fe/Mg) and brittle failure of the altered flows in response to stress (Fowler et al., 2002; Ropchan, 2000; Jones, 1992).

White albitite dykes intruded ultramafic and mafic schist at the Black Fox Mine in northern Hislop Township (Berger, 2002). Although the dykes are relatively narrow and discontinuous, they contain high-grade gold mineralization where stringer and disseminated pyrite are present. The dykes also contain fluorapatite, as does the albitite at the Taylor gold deposit approximately 20 kilometres to the west (Berger, 2002).

7.2.2 Porcupine Assemblage

The Porcupine Assemblage is composed of wacke, siltstone, argillite and rare pebble conglomerate (Berger, 2002). Gabbro, quartz-feldspar porphyry, syenite stocks and lamprophyre dykes intruded the metasedimentary rocks. Rare felsic metavolcanic tuff is interbedded with the metasedimentary rocks in Beatty Township. Ayer et al. (1999a) indicated that the Porcupine Assemblage is widespread in the Abitibi Subprovince and, in general, the youngest detrital zircons are approximately 2,695 million years old.

Fine- to very fine-grained wacke and siltstone are the most abundant meta-sedimentary rock types and commonly weather light brown to light grey with a grey to dark grey fresh surface (Berger, 2002). Graded beds 2 to 25 centimetres thick are common, although massive wacke beds up to 70 centimetres thick are reported north of Highway 101 in Munro Township. Other common bed forms include “rip-up” argillite and, rarely, chert clasts as well as load casts. In thin section, plagioclase and quartz are most abundant; lithic fragments generally comprise less than 5 percent of the framework grains. Wacke is texturally immature with angular to subrounded grains that are clast- to matrix-supported, with a matrix characterized by white mica, chlorite and rarely epidote. The absence of biotite indicates that metamorphism at low greenschist facies affected these rocks (Winkler, 1979).

7.2.3 Timiskaming Assemblage

The Timiskaming Assemblage is composed of clastic metasedimentary rocks that unconformably overlie older metavolcanic rocks and/or Porcupine assemblage rocks and less abundant alkaline extrusive and intrusive rocks. Throughout the SAGB the Timiskaming assemblage clastic metasedimentary rocks occur as conglomerate, wacke-sandstone, siltstone, argillite and schist, and are closely associated with the PDDZ (Berger, 2002). Polymictic conglomerates were observed east of the Hislop Fault in Hislop Township, and contains unsorted large boulders, up to 50 centimetres in size, composed mainly of mafic scoria, syenite, feldspar porphyry and diorite with lesser quantities of vein quartz, sulphide clasts, jasper and felsic metavolcanic rocks (Berger 2002). Sandstones and wackes are the most abundant rock type in the Timiskaming assemblage and are commonly composed of fine to very fine grained laminated, bedded to massive argillites with interbedded siltstones. Robust minerals such as quartz and plagioclase are the major detrital grains whereas white mica, carbonate, biotite and minor chlorite make up the matrix of the metasedimentary rocks (Berger, 2002).

Alkaline intrusive rocks are common throughout Hislop Township and the Black Fox Complex. Amphibole-biotite bearing lamprophyre, albite-syenite, syenite, and feldspar-porphyritic intrusive rocks are observed intruding the Tisdale assemblage mafic and ultramafic rocks spatially associated with high strain zones (Berger 2002, Rhys 2016, and Chappell 2018). Fine to coarse grained pink to mauve syenite and white albite altered dykes can occur as large intrusive bodies 1,500 to 2,000 metres long by 50 to 100 metres in width in the western portion of the Grey Fox Project (the Gibson intrusive complex). More commonly, alkaline intrusive rocks of the Timiskaming assemblage occur as narrow (1 to 5 metres wide) dykes or dyke swarms that are often highly deformed, boudinaged and discontinuous (Hoxha, 1998, Rhys 2016, Chappell 2018). These dykes are associated with significant gold mineralization throughout the SAGB (e.g. Timmins Camp, Bateman et al, 2008; Kirkland Lake Camp, Ispolatov et al, 2008).

7.2.4 Structural Geology

Porcupine-Destor Deformation Zone

The Porcupine-Destor Deformation Zone (PDDZ) extends across the Highway 101 area, continuing westward to the Kapuskasing Structural Zone (Ayer et al., 1999) and eastward through Québec to the Grenville Front area (Mueller et al., 1996), for a total distance of more than 600 kilometres. The PDDZ strikes southeast in Hislop Township and generally becomes more east striking along the rest of Highway 101 (Berber, 2002). The deformation zone is complex, with different structural styles restricted to specific segments. Each segment is bound, to a first-order approximation, by prominent north-northwest-striking faults that transect the PDDZ. For example, distinct differences in structural style occur across the Hislop and Garrison faults (Figure 12).

West of the Hislop Fault, the PDDZ strikes southeast to east and dips moderately (45 to 65 degrees) to the south (Figure 12). The PDDZ marks the contact between the Porcupine and Tisdale assemblages and is characterized by mafic and ultramafic schist in zones that range from 250 to 800 metres wide, as well as numerous foliation-parallel and crosscutting brittle faults. The PDDZ also contains albitite, lamprophyre and quartz-feldspar porphyritic sills and dykes that intruded the zone. Basalt and some clastic metasedimentary rocks occur as relatively undeformed wedges within the deformation zone and provide competent hosts for gold mineralization. Kinematics are poorly understood along this portion of the PDDZ, however a reverse vertical movement (south-over- north) is interpreted at the Glimmer mine (Black Fox Mine).

The main trace of the PDDZ (Figure 12) is accurate between the Hislop and Garrison faults (Berger, 2002). Clastic and chemical metasedimentary rocks of the Timiskaming Assemblage occur within the deformation zone that varies between 100 and 1,500 metres wide. Talc-chlorite schist occurs along the north margin of the deformation zone in the Tisdale Assemblage and is indicative of ductile strain. The southern limit of the deformation zone is marked by brittle-ductile faulting accompanied by diabase dyke intrusions and abrupt contacts between the Lower Blake River and Timiskaming assemblages. The deformation zone is near vertical and kinematics are poorly constrained. North-northeast and north-northwest brittle and brittle-ductile faults transect and offset the PDDZ. Several poorly exposed shear zones occur parallel to and splay off of the main PDDZ to the north. The map pattern suggests that high strain and clockwise rotation affected the entire area between the PDDZ and the Arrow Fault.

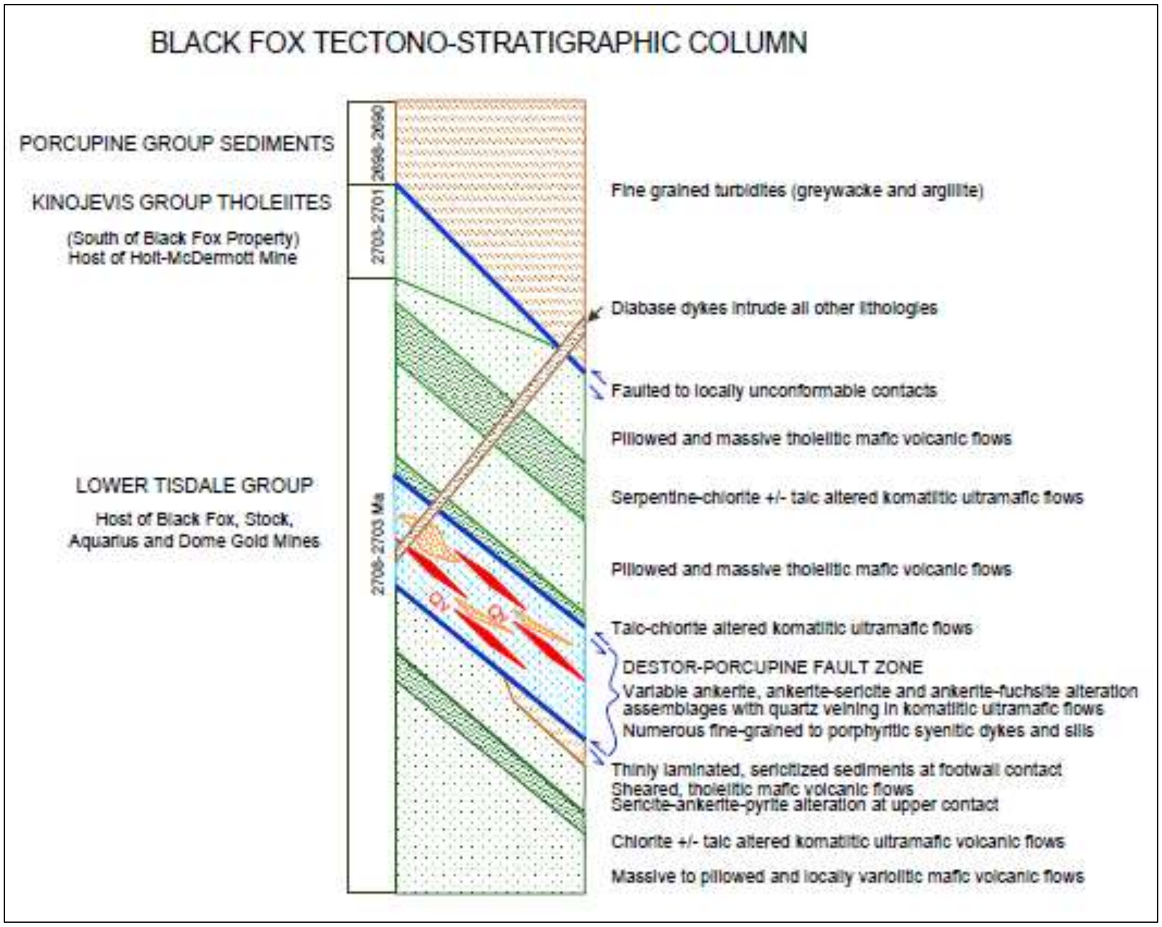


Figure 12: Black Fox Mine Stratigraphic Column

Source: McEwen Mining Inc., 2018. Modified from Berentsen et al. (2004), Brisson (2014).

Hislop Fault

The Hislop Fault (Figure 12) is located near the west limit of the Grey Fox Project. This fault strikes approximately N345° and extends from south of the Grey Fox Project area through the east-central part of Hislop Township. The Hislop Fault represents a pronounced lineament across which there is a 40-degree clockwise rotation of the airborne magnetic pattern, corresponding to a change in the strike of the stratigraphy (Berger, 2002). The fault is described from diamond-drill data as a brittle-ductile structure containing schist, fault gouge and extensive fracturing. Feldspar porphyry and syenite dykes are reported to intrude along the fault. Based on airborne geophysical magnetic patterns, Drost (1987) suggested that the Hislop Fault represents a “mega-kink” structure that reflects a phase of development along the PDDZ. However, the fault appears to have a fundamental control on geology and gold mineralization beyond that associated with kink-folding in the study area. West of the fault, the stratigraphy is an east-striking, south-facing homoclinal sequence. Structural fabrics are commonly nonpenetrative fracture cleavages.

Gold mineralization is largely confined to the vicinity of alkaline plutons, such as the Canadian Arrow deposit. East of the Hislop Fault, stratigraphy is folded about southeast-trending axes in the Tisdale Assemblage and is a homoclinal south-facing sequence in the Lower Blake River Assemblage. Ductile structures associated with folding are overprinted by brittle-ductile faults. Hydrothermal alteration and associated gold mineralization occur in a variety of structural and geological settings. The metasedimentary and alkaline metavolcanic rocks of the Timiskaming Assemblage are most common adjacent to the east side of the Hislop Fault. These data indicate that the Hislop Fault most likely controlled deposition of the Timiskaming Assemblage sediments and is characterized by east-side-down vertical movement, and also that it separates different structural blocks in the study area. The Hislop Fault is one of the five regionally-bounding cross-faults that separate different segments along the PDDZ from Timmins to Québec. The structural style and setting of gold mineralization in each segment is different and knowledge of these differences can be used to tailor exploration programs specific to each segment (Berger 2002).

Ross Fault

Jensen (1985) identified the Ross Fault as the northwest-striking lineament immediately east of the Ross mine (Figure 12). Berger (2002) has modified the extent and strike of the fault based on detailed airborne geophysical data. The fault is located near or on the inferred axis of an anticline that closes in the vicinity of the Ross mine. The fault is a brittle-ductile structure characterized by schist in the vicinity of the mine and by extensive fracturing and veining to the southeast. Berger (2002) believes that the Ross Fault is one of the important structural features responsible for localization of gold mineralization at the Ross mine.

Arrow Fault

The Arrow Fault (Figure 12) is a local name applied to a shear zone striking 085 degrees located near of the south limit of the Grey Fox Project. The fault is defined by a prominent linear disruption in airborne magnetic patterns and corresponds to sheared rock on the ground (Berger, 2002). The Arrow Fault transects strongly sericitized and carbonatized basalt near the Pike River bridge in Hislop Township. The Arrow Fault appears to transect the PDDZ, but its relationship to the regional structures is poorly understood due to lack of exposure and study.

7.3 Local Geological Setting

7.3.1 Geology of the Black Fox Mine Area

The following description of the Black Fox Mine area geology was modified and summarized from Berentsen et al. (2004).

Most of the project area is rather flat and lacking in outcrops. Pleistocene overburden averages 20m thick and is composed of lacustrine clay, gravel and till.

A variably sheared, faulted, carbonatized and mineralized sequence of komatiitic ultramafic volcanics belonging to the Lower Tisdale Group (Figure 12) strikes southeast across the property, along the southeast strike of the PDDZ. These altered and deformed komatiites are generally bleached to a light grey-buff colour with carbonate-talc and carbonate-quartz-sericite-fuchsite assemblages. This alteration package is underlain to the north by a sequence of intercalated massive to pillowed (tholeiitic) mafic metavolcanics and variably sheared/fragmented komatiitic metavolcanics, and lastly by the regionally extensive package of argillites and wackes of the Porcupine Group sediments which underlie the northeastern portion of the property.

To the south and forming the hanging wall of the main carbonate zone are green, relatively undeformed, very fine-grained and pillowed tholeiitic mafic volcanics with intercalations of black komatiitic ultramafic flows displaying chlorite-serpentine, chlorite and talc-chlorite alteration.

Numerous syenitic and feldspar±quartz porphyry sills and dykes of various ages occur primarily within the main carbonate alteration zone. They are commonly massive to brecciated, silicified and pyritic with occasional sericite and hematite alteration and a more common black chlorite alteration at the contacts. They vary in colour from pink, grey, whitish, pale green and reddish. Fragments of these dykes frequently occur within the more strongly deformed green carbonate zones. Very narrow, massive, dark green to buff-green mafic dykes and sills commonly occur within the main carbonate zone. Diabase dykes are the youngest rocks in the area, occupying very late north-striking crustal fractures.

Within the main carbonate zone of the Black Fox deposit, metavolcanic rocks and to a lesser degree the intrusive rocks have undergone variable amounts of strain that resulted in a penetrative schistosity. When observed within the volcanic rocks, this fabric is expressed as microliths of elongate carbonate-albite and microdomains of talc-sericite-chlorite-fuchsite. Though rarely observed within the intrusive rocks it is expressed as a carbonate-sericite+/-biotite+/-chlorite cleavage. The schistosity cuts across lithologies and becomes increasingly more developed with proximity to high strain zones. This fabric generally strikes east-southeast and dips to the south-southwest with a pronounced down dip stretching lineation defined by chlorite-carbonate groves along foliation planes as well as stretched carbonate and albite crystals.

This fabric, and lithological contacts are folded by north verging drag folds that plunge shallowly to the west with an east striking south dipping axial planar cleavage. These drag folds formed during south-over-north shear that also produced well developed C and S fabric in high strain zone consistent with the observed reverse movement sense (Figure 13). Felsic and mafic intrusive rocks observed within these high strain zones are folded and boudinaged by this deformation. Gold-bearing quartz-carbonate veins cut across the regional schistosity and lithological contacts. Quartz-carbonate veining is common throughout the Black Fox Mine site and are one the major constituents of the ore. These veins are observed being folded by the drag folds with younger quartz-carbonate veins overprinting the axial planar cleavage indicating that these veins are syn-shear (Hoxha, 1998; Berger, 2002; Rhys, 2016; Chappell 2018). Minor folds with z-asymmetry are observed in the Black Fox Mine deforming the transposed schistosity. These folds plunge moderately to the southwest and have a steep axial planar cleavage that strikes southwest and dips steeply to the north.

In the Black Fox Mine, the dominant structure is the A1 fault. This fault is south of and parallel to the PDDZ. The A1, strikes (80 to 120 degrees) and dips to the south-southwest between 45 to 60 degrees. The fault has a pronounced cleavage, is gouge rich and its width ranges from tens of centimeters to several meters. This fault is primarily hosted within carbonate altered ultramafic volcanic rocks adjacent to mafic volcanic rocks. Within the fault, there are multiple movements observed that occurred during a protracted deformation history. The primary movement along this fault is consistent with south-over-north reverse displacement (Hoxha and James, 1998; Rhys, 2016; Chappell 2018) with subsequent normal to oblique right-lateral normal movement (Rhys 2016.)

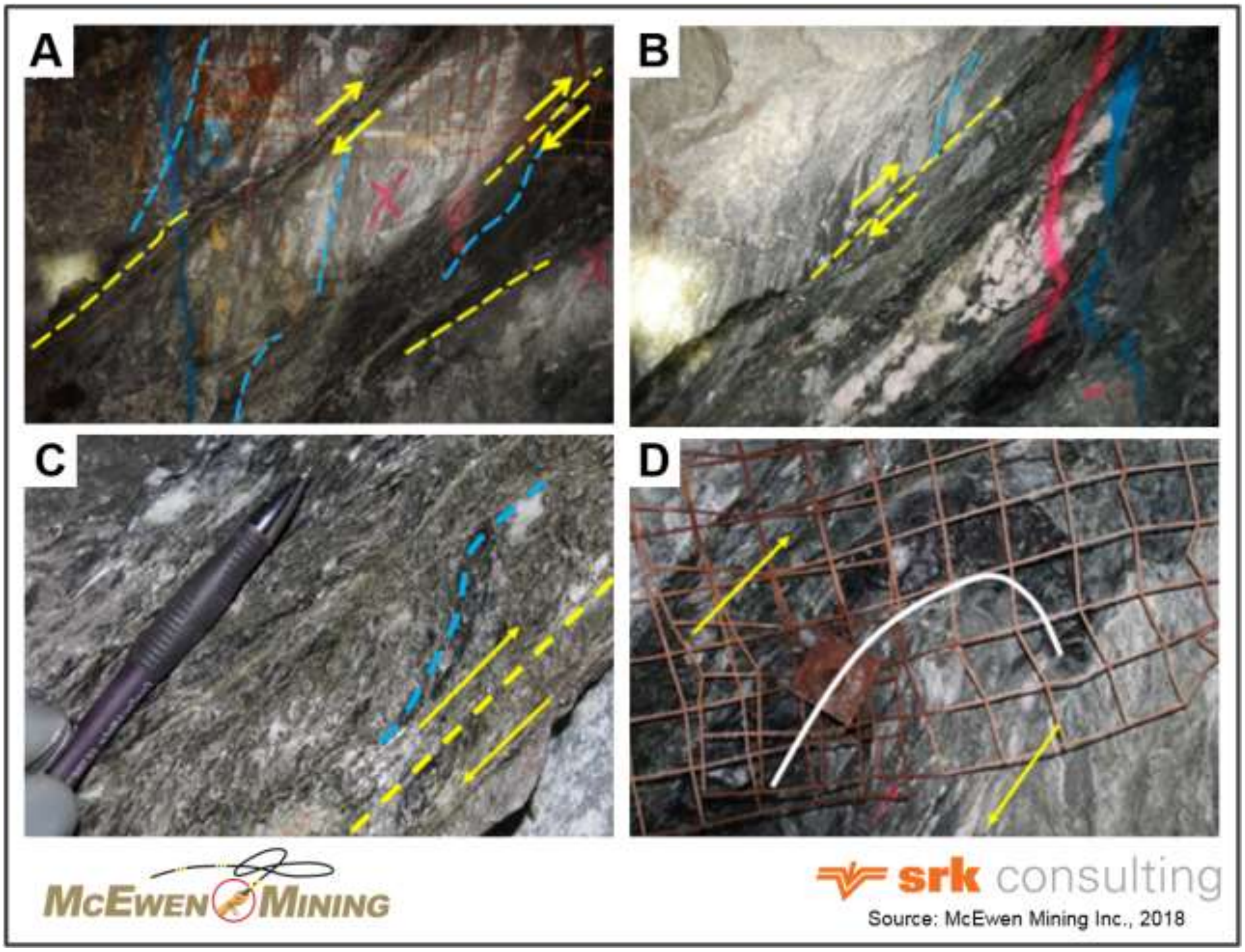


Figure 13: Photographs Depicting South-Side Up Movement Observed at the Black Fox Mine

A: Deformed schistosity in talc-carbonate altered ultramafic volcanic rocks. The yellow lines show high strain zones and the arrows indicate movement sense. Blue lines highlight the schistosity warped by shearing (Rhys,2016).

B: Contact between talc-carbonate altered and chlorite-carbonate altered ultramafic contact. Lithological contacts are areas where strain is increased.

C: Close up view of a high strain zone with a well-developed C and S fabric consistent with south-side up movement.

D: Boudinaged and folded chlorite altered ultramafic rock within a high strain zone. Yellow arrows display the movement sense and white line outlines the folded ultramafic rock.

7.3.2 Geology of the Grey Fox Project Area

The Grey Fox Project is underlain by an overturned, steeply dipping to the east assemblage of metasedimentary and massive, pillowed, and variolitic mafic metavolcanic with minor interflow sedimentary rocks. In the western part of the area, a syenitic to dioritic feldspar porphyry, locally referred to as the Gibson Intrusive intrudes the metasedimentary unit. The deposit area is bound to the west by the steeply dipping to the southwest Gibson-Kelore Deformation Zone (GKDZ) which juxtaposes chlorite – talc schist, typical of the GKDZ at the Black Fox Complex, and brecciated feldspar porphyry. This fault contact is locally crosscut by diabase dikes, likely of the Matachewan dike swarm. To the east, the Grey Fox Project is bound by a moderately to steeply dipping to the west to southwest fault contact between steeply dipping to the east mafic metavolcanic rocks comprising the hanging wall of the Grey Fox area, and moderately to steeply dipping to the southwest ultramafic and mafic metavolcanic rocks correlated with those hosting the Black Fox deposit. A penetrative foliation is developed with the bounding faults, and locally in narrow intra-package shear zones associated with mineralization and along contacts No tectonic fabric corresponding to the regional fabric has been identified within the metasedimentary-metavolcanic-feldspar porphyry package hosting the deposit.

The metasedimentary package, assigned to the Timiskaming Assemblage by Berger (2002), is up to 350 metres true width and consists of graded sandstone to mudstone layers, with bedding tops to the west. The west side of metasedimentary package is locally hornfelsed and/or metasomatized within 50 to 100 metres of the contact with the Gibson intrusive. The intrusive contact generally has a moderate to steep dip to the east. To the east, the contact between metasedimentary assemblage and the mafic volcanic assemblage is a tectonically reactivated angular unconformity, with intense shearing along the metasediment-metavolcanic contact destroying primary bedding. At the Contact Zone, the sedimentary-mafic volcanic contact is steeply dipping to the east from surface to a depth of approximately 300 metres, below which the contact rolls to a steep dip to the west. West of the 147 Zone, the sedimentary-volcanic contact steeply dips to the east from surface to the extent of drilling at 500 metres below surface.

The mafic metavolcanic package, assigned to the Tisdale Assemblage by Berger (2002), is situated between the east dipping sedimentary package to the west and west dipping ultramafic volcanic package to the east. The metavolcanic package ranges from 300 metres true width in the north to at least 800 metres at the southern boundary of the property. The mafic metavolcanic package consists of interleaved massive to pillowed mafic flows and massive to pillowed variolitic mafic interflows, with true widths ranging from 10 to 130 metres true width. The mafic volcanic flows dip steeply to the east and are truncated by the sheared contact with ultramafic volcanic rocks to the east. In the central part of the deposit, an outcrop of pillowed variolitic metavolcanic suggest flow tops are to the west.

Structure

- Bounding fault define fault panel characterized by relatively undeformed mafic volcanic and sedimentary rocks.
- No pervasive, penetrative regional foliation developed in the rocks hosting mineralization at the Grey Fox Project, local development of foliation along contact between sedimentary and mafic volcanic assemblages.
- Mineralization controlled by north-northwest dipping, south dipping, and east dipping damage zones where quartz-carbonate veining with mesothermal to epithermal vein textures (e.g. multi-generation vein breccias with quartz-carbonate cement, crustiform vein margins, angular pull-apart veins define a branched vein system).

7.3.3 Geology of the Froome Project Area

The Froome Project area is underlain by moderately to steeply dipping to the southwest clastic metasedimentary, mafic metavolcanic, and ultramafic metavolcanic rocks and chlorite ± talc schists. Feldspar porphyry and lamprophyre dikes intrude the ultramafic volcanic rocks and chlorite-talc schist. The chlorite-talc schist is characteristic of the steeply dipping to the southwest Gibson-Kelore Deformation Zone (GKDZ), striking northwest-southeast across the Black Fox Complex. The hanging wall of the GKDZ is characterized by southwest dipping massive to pillowed ultramafic volcanic rocks, grading into chlorite-talc schist. Within the GKDZ a package of silicified arkose to lithic sandstone flanked by chlorite-talc schist hosts the deposit. The footwall of the deposit is characterized by a melange of chlorite ± talc ± fuchsite schist, variably deformed and altered massive to pillowed mafic volcanic flows and maroon aphanitic to locally feldspar phyric (syenitic to monzonitic or volcanic equivalents?) igneous rocks. The footwall of the GKDZ ranges, being gradational in where the footwall cuts rheologically weak (e.g. ultramafic volcanic) units, and sharp where the footwall cuts rheologically strong (e.g. mafic volcanic) units or where a pre-existing fabric can accommodate the strain (e.g. sedimentary beds).

7.4 Mineralization

7.4.1 Black Fox Mine

Gold mineralization at the Black Fox Mine occurs in several different geological environments within the main carbonate alteration zone, which has a strike length of over 1,000 metres and a variable true width ranging from 10 metres to over 100 metres. This mineralized envelope occurs primarily within komatiitic ultramafics and lesser mafic volcanics within the outer boundaries of the PDDZ. The auriferous zones have several modes of occurrence, from concordant zones that follow lithological contacts and have been subsequently deformed, to slightly discordant zones associated with syenitic sills and quartz veins or stockworks.

The Black Fox Mine deposit has an overall first order south-southwest plunge (SSE in mine grid) with a second order westerly internal gold mineralization plunge. The first order plunge is parallel to stretching/intersection lineations and dominant folds, plus the local elongation of units. The second order plunge is at a high angle to the stretching lineation and controlled by stacking of S-SW dipping (to true north) reverse shear vein systems, vein arrays and shear zones which dip more shallowly to the south than the overall dip of the ultramafic host unit and faults that are parallel to it, and are stacked vertically within carbonate-talc-chlorite altered parts of the ultramafic unit (Rhys, 2016). This secondary ore control could be controlled by the north verging drag folds (Chappell, 2018).

Work carried out to date has identified four different styles of mineralization within the mineralized envelope at the Black Fox Mine. These are:

- Free gold associated with east to south east striking (100 to 170 degrees) moderately to steeply dipping (40 to 80 degrees) quartz-carbonate-chlorite shear veins; sigmoidal vein arrays that strike to the west, north-west (290 to 315 degrees) and dip moderately (30 to 60 degrees) to the south. Visible gold is observed along chlorite stylolites, slip surfaces and within the vein matrix itself (Figure 14A).
- Gold-bearing pyrite associated with albite-carbonate-sericite altered syenitic and plagioclase porphyry sill-like bodies spatially associated with gold-bearing quartz-carbonate vein systems (Figure 14B).
- Gold associated with disseminated fine-grained pyrite within intensely sheared Fe-carbonate-sericite-albite altered mafic volcanic rocks adjacent to or within ultramafic rocks. These zones are associated with variably deformed quartz-carbonate veins that can host visible gold as well (Rhys 2016). This type of mineralization is denoted as BMV (Figure 14C).
- A much less common form of gold mineralization occurs in carbonate-quartz-talc alteration as disseminated free gold flakes (Figure 14D), seen in the Deep Central Zone in areas of elevated matrix quartz and/or quartz veinlets in the altered ultramafic volcanic rocks matrix (Rhys 2016).

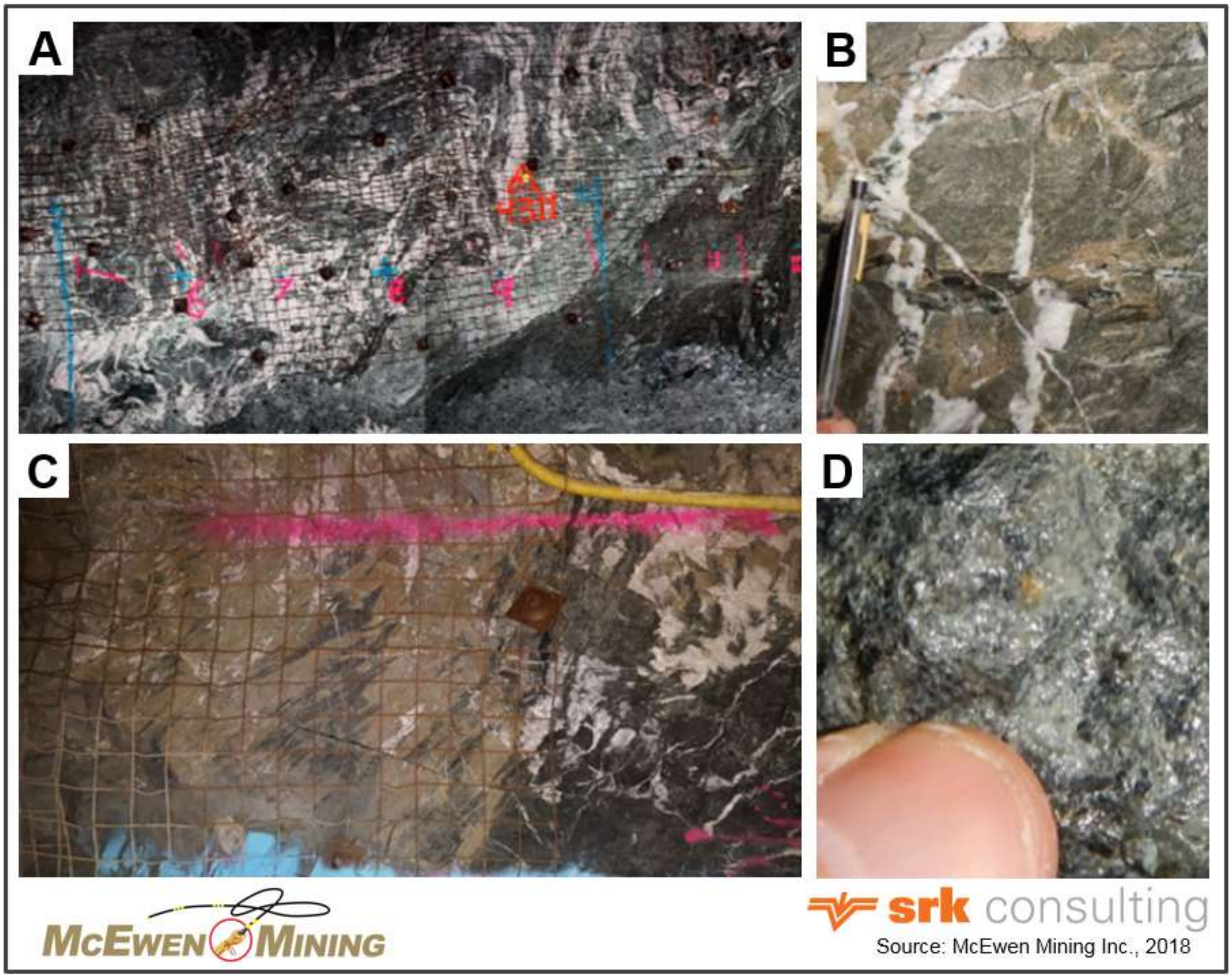


Figure 14: Different Styles of Mineralization at the Black Fox Mine

A: Spectacular shallow dipping, reverse sigmoidal extension vein array is developed on both walls in CGY altered ultramafic and hosts higher grades. The vein array dips overall shallowly to the south, with internal veins that have steeper dips, and sits just above an intense high strain zone in its footwall that lies on the margin of a band of AUV/talc-chlorite alteration (Rhys 2016).

B: This syenite dyke is several metres wide and is altered to a pale grey colour with secondary albite-carbonate alteration. Quartz veinlets are of variable orientation here, and some have tan Fe-carbonate envelopes. Patchy to disseminated pyrite occur in a quartz-chlorite vein at upper right. Good gold grades locally occur here in the dyke (Rhys 2016).

C: The mineralization is banded by deformation and transposes gold-bearing quartz veins. The mineralization is overprinted by younger barren extensional veins. Tan coloured domains are pyrite-carbonate-sericite-albite altered, as transposed, coalescing envelopes to quartz veins, while darker green lenses and bands are more chlorite-rich and less pyritic. Mineralized portions of the talc-carbonate altered ultramafic volcanic rocks. This example has only weak foliation development. It is generally finer grained than surrounding ultramafic rocks (Rhys 2016).

D: Less common form of gold mineralization occurs in carbonate-quartz-talc alteration as disseminated free gold flakes

More than 15 separate mineralized structures have been identified to date within the ankerite envelope (Hoxha and James, 1998). The two main auriferous zones are the Al at the hanging wall contact and the CO located at the footwall contact. The many other smaller zones between them generally have less continuity and width and represent parallel mineralized shears and faults. From previous underground work, it appears that the sub horizontal zones along the structure often have the greatest thickness, on the order of 10 to 15 metres (33 to 49 feet), and the highest grades. This sub horizontal zones are interpreted as dilation zones formed during episodes of folding and structural movements. The majority of other mineralized zones and quartz veins range in width from 1 to 5 metres (3 to 16 feet).

More than three generations of quartz veining have been identified in the Black Fox Mine workings. Shear/fault zones paralleling the main mineralized envelope are responsible for the localized formation of these quartz vein and stockwork zones. The presence of sigmoidal vein structures, multiple quartz injections and re-sheared vein material with chloritic slips indicate complex and repeated structural movements at the time of formation. Visible gold commonly occurs as fracture-fillings within the veined zones associated with chloritic slips. Gold mineralization is erratic in places within the quartz stockwork zones, probably due to the fact that only certain vein sets carry gold while others are barren.

7.4.2 Grey Fox Project

The Grey Fox Project consists of four mineralized zones. From west to east these are (1) the Gibson Zone, hosted within the Gibson Intrusive including the historic Gibson deposit, (2) the Contact Zone, hosted along the steeply dipping to the east metasediment-metavolcanic contact with secondary structures at a high-angle to the contact, (3) the 147 Zone, hosted along the steeply dipping to the east contact between variolitic mafic metavolcanic and massive gabbroic metavolcanic flows and secondary structures at a high-angle to the contact, and (4) the Grey Fox South Zone, hosted within a steeply dipping to the east variolitic flow. Within these four zones, all rock types between the bounding faults are mineralized.

Alteration Associated with Mineralization

Alteration at the Grey Fox Project consists of an early hematite alteration overprinted by albite - sericite - carbonate ± silica, typically conforming to the damage zones proposed by Lebrun (2018) and (Brisson 2014). Overprinting these earlier alteration assemblages is a silica-albite-carbonate (ankerite to calcite) ± hematite alteration associated with mineralized quartz-carbonate veins (Chappell, personal communication; Kelley, personal communication; Ross and Rhys 2011). Rhys (2011) commented that the hematite association with albite-carbonate is common as an early alteration phase in several deposits along the Porcupine-Destor corridor, particularly where associated with syenitic intrusions that are syn-Timiskaming in age, inferring a magmatic contribution to the mineralizing fluids. This inference by Ross and Rhys (2011) is in agreement with the conclusions of Gelinas (2012) and Tuba (personal communication).

At the Contact and 147 zones, alteration haloes along the steeply dipping to the east mineralized structures are pervasive. In the hanging wall of these structures, the alteration haloes are closely associated with the north and south dipping mineralized quartz - carbonate veins and breccias. In the Grey Fox south zone, silica - albite ± hematite alteration is ubiquitous in the variolitic volcanic package, suggesting a more pervasive alteration style, rather than vein-controlled alteration style. Marginal to the mineralized zones, quartz - ankerite veins gradationally become quartz - calcite/dolomite to calcite – epidote composition, with grades decreasing as calcite content increases with distance from mineralization.

The presence of hydrothermal hematite and carbon in vein envelopes suggest that alternating redox states, potentially in response to fluid mixing or evolution, may have contributed to gold deposition.

Style of Gold Mineralization

In all rock types, mineralization is associated with quartz - ankerite ± hematite ± molybdenite veins and breccias, ranging from 0.2 millimetres to > 1 metre thick, with albite – silica - ankerite - hematite alteration haloes that can extend up to meters from the vein margin. The mineralized veins often have thin margins of crustiform banded quartz, overgrown by crustiform quartz matrix breccia, and later development of cores of fine-grained, matrix-supported quartz-carbonate matrix lithified vein breccia containing fragments of earlier quartz phases (Rhys 2011). These veins also often have thin, dark green-grey breccia selvages with abundant disseminated pyrite with graphite or molybdenite (Ross and Rhys, 2011).

Visible gold is hosted by quartz-ankerite veins, with gold grains ranging in size from <1 millimetres to 5 millimetres, most commonly associated with the oldest and second oldest generation of vein material. Gold mineralization is also associated with fine-grained (<1 millimetre) pyrite disseminated both within and along the margins of the polygenerational quartz - carbonate veins and breccias, and within the silica – albite - hematite alteration haloes surrounding the mineralized veins.

At the Contact Zone, mineralization is focused along the steeply dipping to the east contact between metasediments and metavolcanic rocks. The contact itself is characterized by a broad zone of structural disruption which includes semi-brittle contact parallel minor shear zones (Rhys 2011) and slip surfaces which host mineralization. Crosscutting metasedimentary layers in the footwall, the metasediment-metavolcanic contact, and flow contacts in the footwall are moderately to steeply dipping to the north-northwest and south-southwest quartz - carbonate veins and breccias.

At the 147 Zone, mineralization is focused along the steeply dipping to the east contact between a massive mafic metavolcanic and a pillowed to massive variolitic mafic metavolcanic flow. Like the Contact Zone, the contact itself is not faulted, but is characterized by a broad zone of structural disruption. Crosscutting the contact between the massive and variolitic mafic metavolcanic flows are two moderately to steeply dipping to the north-northwest corridors of quartz – carbonate veins and breccias. These crosscutting corridors are more prevalent and persistent in the hanging wall than the footwall of the 147 Zone, inferred to reflect the rheological contrast between the massive mafic metavolcanic and the variolitic mafic metavolcanic.

At the Grey Fox south zone, no steeply dipping to the east contact analogous to those at the Contact and 147 zones has been identified. Instead, mineralization appears to be associated with corridors of steeply dipping to the north-northwest and south-southwest quartz - carbonate veins and breccias within variolitic mafic metavolcanic flows.

Similar to the Grey Fox south zone, mineralization in the Gibson Zone is controlled by moderately to steeply dipping to the north-northwest and south-southeast veinlets and breccias in quartz – carbonate veinlets and veins hosted within the hematite-silica altered Gibson Intrusive. Mineralization at the historic Gibson deposit is described as being a north-northwest dipping quartz - carbonate breccia near a brecciated and altered contact between syenite and basalt (Troop, 1989), analogous to the north-northwest dipping quartz-carbonate veins and breccias of the Contact, 147, and Grey Fox south zones.

Control on Mineralization

Lebrun (2018) proposed structural controls on mineralization at the Grey Fox Project can be broadly characterized as north-south, east-northeast to northeast, and west-northwest trending. These orientations are consistent with the observations of Scott (2015) and Chappell (personal communication). Scott (2015) observed the quartz - carbonate veins and breccias dipping steeply to the east, moderately to steeply to the north-northwest and south-southwest in oriented core drilled at the Contact and Grey Fox south zones. The east dipping structures are most prevalent along the metasediment-metavolcanic contact Away from the steeply dipping to the east contact at the Contact Zone and throughout the Grey Fox south zone the veins define predominantly north-northwest dipping ore shoots. It is the intersection of these east and north-northwest dipping domains that define the steep to the north-northeast plunge of mineralization along the east dipping ore shoots at the Contact and 147 Zones.

In the framework proposed by Lebrun (2018) the north-south trending contacts approximate the orientation of the expected stretching plane within the deformation zone bound by the GKDZ to the west and the footwall fault to the east. During this deformation event, the east dipping contacts likely accommodated shear, deforming the contacts and forming the north-northwest and south-southwest dipping damage zones, consistent with a Ridellian-type deformation zone.

Within the east, north-northwest and south-southwest dipping ore shoots north-northwest and southwest dipping veins are mutually crosscutting. Where these veins or ore shoots intersect, where the veins are hosted within a dilational zone of Lebrun (2018), or where pull-apart veins have formed, quartz - carbonate breccias are common. Where quartz-carbonate breccias haven’t formed, the mineralized veins typically form straight to sigmoidal branched networks.

In addition to the structural controls, rock type also exhibits a strong control on mineralization. Veins are preferentially developed in brittle rock types or at lithologic contacts. In the 147 Zone the mineralization is preferentially developed in a variolitic unit which displays a fine-grained hyaloclastic texture, suggesting it was originally a glassy unit that was susceptible to later hydrothermal albite-carbonate-quartz-chlorite alteration (Rhys, 2011). In addition to the more brittle nature of the albitized variolitic mafic metavolcanic flows, the variolitic flows are iron-rich. Where the north-northwest and south-southwest dipping veins can be traced across flows, the vein mineral assemblage can be seen to change from quartz-ankerite to quartz-dolomite or quartz-calcite, reflecting the composition of the country rock. This suggests the high-iron variolitic flows provide both a chemical and structural trap for mineralization.

The overall mineralization style is brittle compared to other deposits in the region, and the crustiform textures are reminiscent of high-level epithermal mineralization, although such textures can also be developed in shallow orogenic gold systems. The latter is suggested by the association with ductile carbonate-quartz-sericite shear zones that form narrow networks in association with and on the margins of mineralized veins and vein networks in several intercepts, which are typical orogenic style. The more brittle nature of the mineralization compared to many other deposits may also reflect the albite-rich alteration style (albite deforms in a brittle style up to high temperatures). Brittle styles of mineralization in feldspar-altered wallrock are common at Kirkland Lake (K-feldspar dominant there), where early hematization is also prevalent (Rhys 2011).

7.4.3 Froome Project

Known mineralization at the Froome Project is hosted within an intensely silicified, steeply to the southwest-dipping metasedimentary unit, up to 40 metres true width, within the Gibson-Kelore Deformation Zone. The upper 100 to 200 metres of the unit is mineralized throughout, with mineralization becoming restricted to within approximately 10 metres of the hanging wall below approximately 200 metres.

Alteration Associated with Mineralization

From surface to a depth of approximately 200 metres below surface, the metasedimentary unit is intensely silicified, with alteration being intense enough to destroy primary structures and textures. The silicified metasediment is cut by quartz-carbonate stockwork and breccias, with up to 10 percent fine-grained pyrite disseminated in the silicified metasediment. Below approximately 200 metres, the hanging wall is intensely silicified and mineralized, with silicification and pyrite content decreasing as sericite alteration increases towards the footwall. As silicification decreases, relict bedding and rounded grains become evident in the host rock.

Style of Mineralization

Throughout the deposit, the mineralization style consists of disseminated fine-grained pyrite, comprising up to 10 percent of the rock mass, associated with quartz-carbonate stockwork and breccias. The stockworks and breccias typically have sharp, planar contacts with wall rock.

Visible gold has not been noted in the deposit, although a qualitative correlation between pyrite content and fire assay values has been noted.

Control on Mineralization

Mineralization at the deposit is controlled by disseminated fine-grained pyrite associated with quartz - carbonate stockworks and breccias hosted within an intensely silicified metasedimentary unit. The metasedimentary unit steeply dips to the southwest and plunges steeply to the west-northwest. With the metasedimentary unit, mineralization dips steeply to the southwest and plunges steeply to the southeast. The relationship between the orientation of the host unit and mineralization, suggests the metasedimentary unit was stretched, with the stretching axis plunging to the west-northwest, with structures analogous to boudin necks forming perpendicular to the stretching axis. These “boudin” necks then served to localize mineralizing fluids.

8 Deposit Types

Much has been published on gold deposits in the last decade, leading to: (1) significant improvement in the understanding of some models; (2) the definition of new types or sub-types of deposits; and (3) the introduction of new terms (Robert et al., 2007). However, significant uncertainty remains regarding the specific distinction between some types of deposits. Consequently, certain giant deposits are ascribed to different deposit types by different authors.

As represented in Figure 15, thirteen globally significant types of gold deposits are presently recognized, each with its own well-defined characteristics and environments of formation. Minor types of gold deposits are not discussed in this paper. As proposed by Robert et al. (1997) and Poulsen et al. (2000), many of these gold deposit types can be grouped into clans; i.e., families of deposits that either formed by related processes or that are distinct products of large-scale hydrothermal systems.

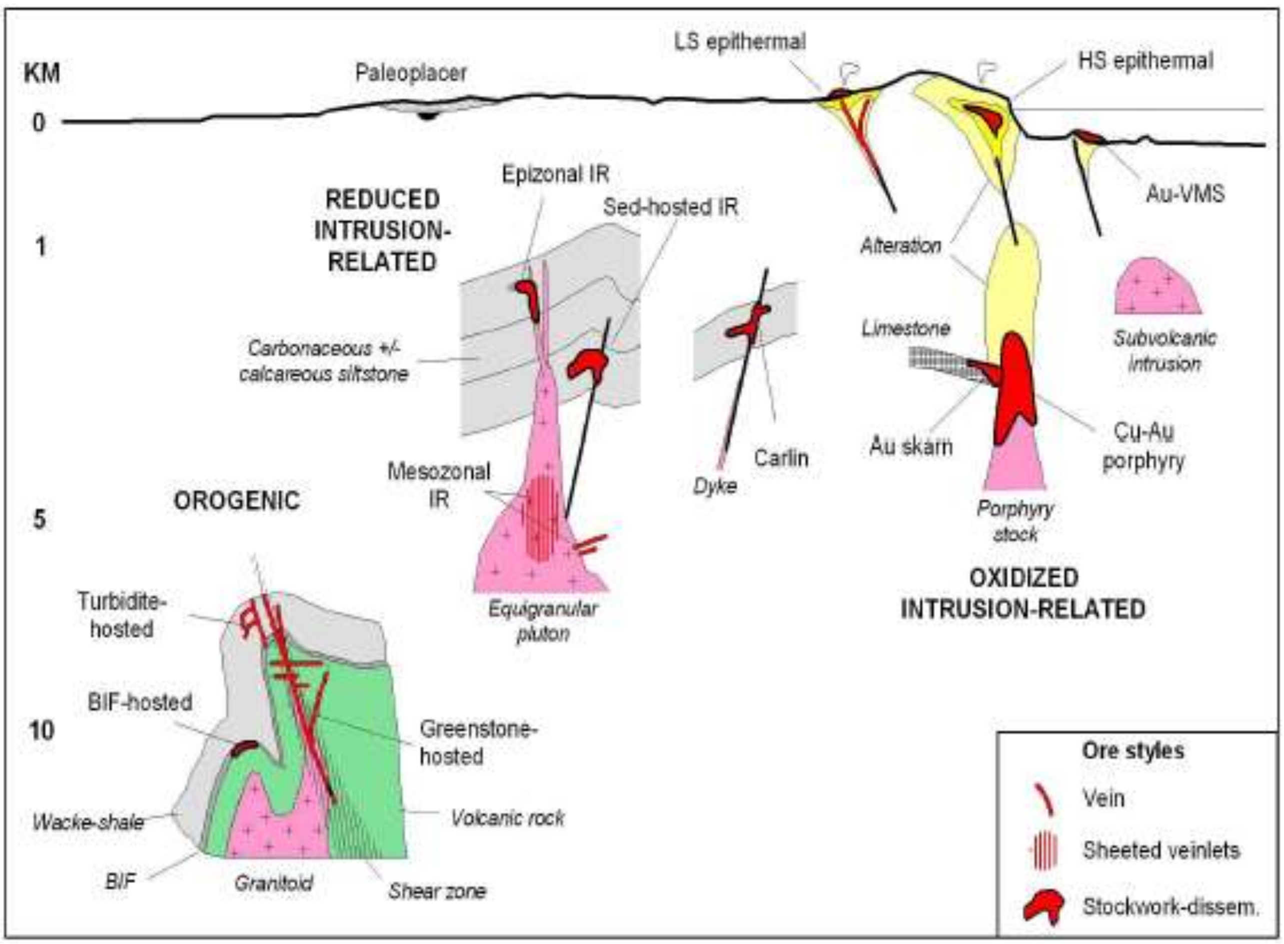


Figure 15: Schematic Cross Section Showing the Key Geologic Elements of the Main Gold Systems and their Crustal Depths of Emplacement

Note the logarithmic depth scale.

Source: Modified from Poulsen et al., 2000, and Robert, 2004.

These clans effectively correspond to the main classes of gold models, such as the reduced intrusion-related, and oxidized intrusion-related orogenic classes (Hagemann and Brown, 2000). Deposit types such as Carlin, gold-rich VMS, and low-sulphidation are viewed by different authors either as stand-alone models or as members of the broader oxidized intrusion-related clan. They are treated here as stand-alone deposit types, whereas high- and intermediate-sulphidation and alkaline epithermal deposits are considered as part of the oxidized intrusion-related clan.

The auriferous zones of the Black Fox Complex seem to be associated with an orogenic gold occurrence related to longitudinal shear zones (greenstone-hosted quartz-carbonate vein deposit). Greenstone-hosted quartz-carbonate vein deposits are a subtype of lode-gold deposits (Poulsen et al., 2000). They correspond to structurally controlled, complex epigenetic deposits hosted in deformed metamorphosed terranes (Dubé and Gosselin, 2007).

The Black Fox Complex is located, along with other gold deposits, near the Porcupine-Destor Deformation Zone (PDDZ). Many gold deposits are distributed along major compressional to transtensional crustal-scale fault zones in deformed greenstone terranes of the Abitibi (Figure 16) (e.g.; the PDDZ and the Larder Lake–Cadillac Fault Zone). Greenstone-hosted quartz-carbonate veins are thought to represent a major component of the greenstone deposit clan (Figure 15) (Dubé and Gosselin, 2007).

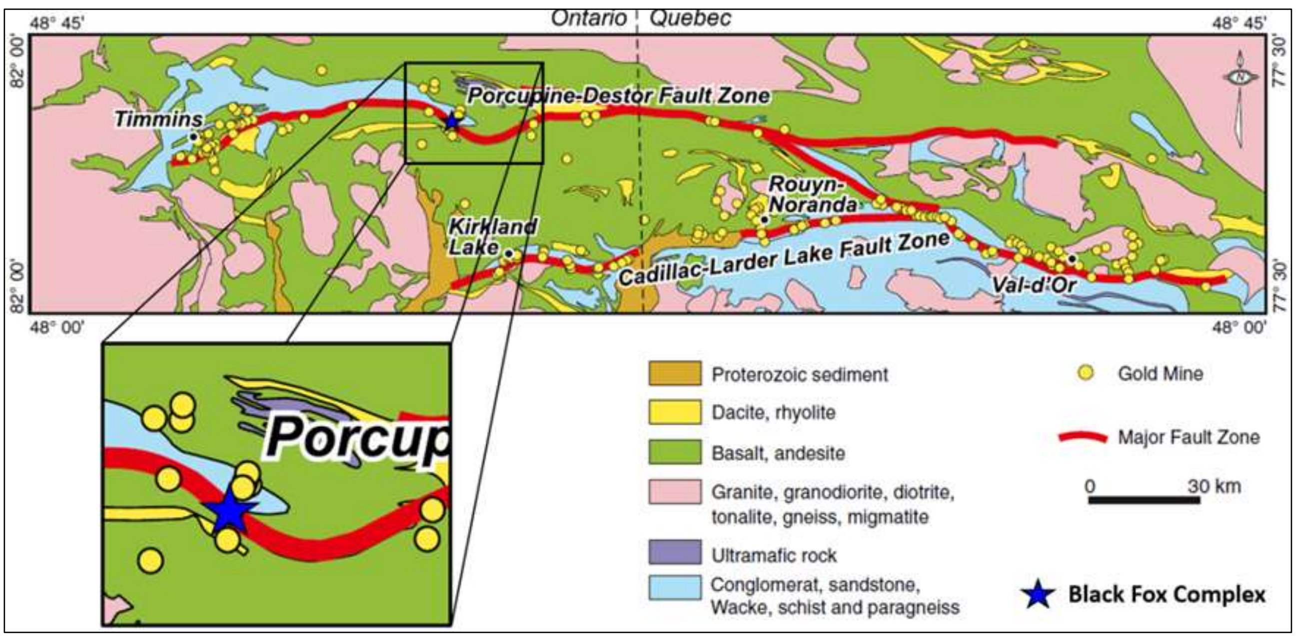


Figure 16: Simplified Geological Map of the Abitibi Greenstone Belt Showing the Distribution of Major Fault Zones and of Gold Deposits

Source: Adapted and modified from Robert et al. (2005) and Rabeau et al. (2013)

8.1 Greenstone-Hosted Quartz-Carbonate Vein Deposits

Greenstone-hosted quartz-carbonate-vein deposits typically occur in deformed greenstone terranes of all ages (Dubé and Gosselin, 2007), especially those with commonly variolitic tholeiitic basalts and ultramafic komatiitic flows intruded by intermediate to felsic porphyry intrusions, and sometimes swarms of albitite or lamprophyre dykes (ex: Timmins and Red Lake districts). The deposits are associated with collisional or accretionary orogenic events. They are typically distributed along reverse-oblique crustal-scale major fault zones, commonly marking the convergent margins between major lithological boundaries such as volcano-plutonic and sedimentary domains (e.g., the PDDZ and the Larder Lake–Cadillac Deformation Zone) These major structures are characterized by different increments of strain, and consequently several generations of steeply dipping foliations and folds resulting in a fairly complex geological collisional setting.

The crustal-scale faults are thought to represent the main hydrothermal pathways towards higher crustal level. However, the deposits are spatially and genetically associated with higher order compressional reverse-oblique to oblique brittle-ductile high-angle shear zones commonly located less than 5 kilometres away and best developed in the hanging wall of the major fault (Robert, 1990). Brittle faults may also be the main host to mineralization as illustrated by the Kirkland Lake Main Break, a brittle structure hosting the 25-million-gold-ounce Kirkland Lake deposit. The deposits typically formed late in the tectonic-metamorphic history of the greenstone belts (Groves et al., 2000) and the mineralization is syn- to late-deformation and typically post-peak greenschist facies and syn-peak amphibolite facies metamorphism (cf. Kerrich and Cassidy, 1994; Hagemann and Cassidy, 2000).

The greenstone-hosted quartz-carbonate vein deposits are also commonly spatially associated with Timiskaming-like regional unconformities. Several deposits are hosted by a Timiskaming-like regional unconformity (e.g., the Pamour and Dome deposits in Timmins) or located next to one (e.g., the Campbell-Red Lake deposit in Red Lake) (Dubé et al., 2003), suggesting an empirical time and space relationship between large-scale greenstone quartz-carbonate gold deposits and regional unconformities (Hodgson, 1993; Robert, 2000; Dubé et al., 2003).

Stockworks and hydrothermal breccias may represent the main host to the mineralization when developed in competent units such as granophyric facies of gabbroic sills. Due to the complexity of the geological and structural setting and the influence of strength anisotropy and competency contrasts, the geometry of the vein network varies from simple, such as the Silidor deposit in Canada, to more complex geometries with multiple orientations of anastomosing and/or conjugate sets of veins, breccias, stockworks and associated structures (Dubé et al., 1989; Hodgson, 1989; Robert et al., 1994; Robert and Poulsen, 2001).

Ore-grade mineralization also occurs as disseminated sulphides in altered (carbonatized) rocks along vein selvages. Ore shoots are commonly controlled by: 1) the intersections between different veins or host structures, or between an auriferous structure and an especially reactive and/or competent rock type such as iron-rich gabbro (geometric ore shoot); or 2) the slip vector of the controlling structure(s) (kinematic ore shoot). For laminated fault-fill veins, the kinematic ore shoot will be oriented at a high angle to the slip vector (Robert et al., 1994; Robert and Poulsen, 2001).

At the district scale, the greenstone-hosted quartz-carbonate-vein deposits are associated with large-scale carbonate alteration commonly distributed along major fault zones and associated subsidiary structures (Dubé and Gosselin, 2007). At the deposit scale, the nature, distribution and intensity of the wall-rock alteration is largely controlled by the composition and competence of the host rocks and their metamorphic grade. Typically, the alteration haloes are zoned and characterized – at greenschist facies – by iron-carbonatization and sericitization, with sulphidation of the immediate vein selvages (mainly pyrite, less commonly arsenopyrite).

The main gangue minerals are quartz and carbonate with variable amounts of white micas, chlorite, scheelite and tourmaline. The sulphide minerals typically constitute less than 10 percent of the ore. The main ore minerals are native gold with pyrite, pyrrhotite and chalcopyrite without significant vertical zoning (Dubé and Gosselin, 2007).

The Black Fox Mine is typical of gold mineralization within the PDDZ, west of the Hislop Fault. High-grade gold is confined to discontinuous quartz veins, pyritic albitite dykes and as free gold on chloritic fractures. Carbonate, sericite (commonly as green mica), quartz and albite are common alteration minerals that are tightly focused around the ore zones. Ore zones are also commonly hosted in ultramafic and mafic metavolcanic schist. Exploration for these types of deposits is difficult; however, IP surveys, supplemented with ground magnetometer surveys, may prove useful anywhere along the PDDZ (Berger, 2002).

The Grey Fox Project can be interpreted in an orogenic model as well, but at higher crustal level than Black Fox Mine, in accordance with the brittle style of the structural control.

8.2 Low-Sulphidation Epithermal Gold Deposits

Although the gold zones of Grey Fox are readily integrated in an orogenic model, it is important to consider, as an alternative hypothesis, that they could also be associated with a low sulphidation epithermal gold model. The tectonic setting of epithermal gold deposits is characterized by extension, at least at the district scale or larger, localizing and facilitating emplacement of magma and, at higher levels, hydrothermal fluids (Taylor, 2007). Regionally extensive rift zones can also provide the extensional framework. Extensional, pull-apart basins formed between regional strike-slip faults, or at transitions between these faults, provide favourable sites for intrusions and epithermal deposits. Synchronous tectonic and hydrothermal activity is indicated in some deposits by the fact that many of the vein-bearing faults were active during and after vein filling; tectonic vein breccias and displaced mineralized and altered mineralized and altered rocks resulted.

Low-sulphidation epithermal gold deposits are harder to recognize in ancient terranes since their commonly found alteration mineral assemblages are not unique, especially in regional metamorphic terranes, or may no longer be present, depending on the grade of subsequent metamorphism, and that these deposits are often not as intimately associated with igneous rocks (Taylor, 2007).

Low-sulphidation epithermal gold deposits are distinguished from high-sulphidation deposits primarily by the different sulphide mineralogy (pyrite, sphalerite, galena, chalcopyrite) typically within quartz veins with local carbonate, and associated near neutral wall rock alteration (illite clays) deposited from dilute hydrothermal fluids (Corbett and Leach, 1998).

Nearly any rock type, even metamorphic rocks, may host epithermal gold deposits, although volcanic, volcaniclastic, and sedimentary rocks tend to be more common (Taylor, 2007). Typically, epithermal deposits are younger than their enclosing rocks, except in the cases where deposits form in active volcanic settings and hot springs. Here, the host rocks and epithermal deposits can be essentially synchronous with spatially associated intrusive or extrusive rocks, within the uncertainty of the determined ages in some cases. Lithological control occurs mainly as competent or brittle host rocks which develop through going fractures as vein hosts, although permeability is locally important. In interlayered volcanic sequences epithermal veins may be confined to only the competent rocks while the intervening less competent sequences host only fault structures (Corbett, 2007).

Low-sulphidation gold deposits that occur further removed from active magmatic vents may be more apparently controlled by structural components, zones of fluid mixing, and emplacement of smaller magmatic bodies (e.g., dykes) (Taylor, 2007). Meteoric waters dominate the hydrothermal systems, which are more nearly pH neutral in character. Low-sulphidation gold deposits related geothermal systems are more closely linked to passive rather than to active magmatic degassing (if at all), and sustained by the energy provided by cooling, subvolcanic intrusions or deeper subvolcanic magma chambers.

The morphology of epithermal vein-style deposits can be quite variable. Deposits may consist of roughly tabular lodes controlled by the geometry of the principal faults they occupy, or comprise a host of interrelated fracture fillings in stockwork, breccia, lesser fractures, or, when formed by replacement of rock or void space, they may take on the morphology of the lithologic unit or body of porous rock replaced (e.g., irregular breccia pipes and lenses). Volumes of rock mineralized by replacement may be discordant and irregular, or concordant and tabular, depending on the nature of porosity, permeability, and water-rock interaction. In deposits of very near-surface origin, an upward enlargement of the volume of altered and mineralized rocks may be found centred about the hydrothermal conduits. Brecciation of previously emplaced veins can form permeable zones along irregularities in fault planes: vertically plunging ore zones in faults with strike-slip motion and horizontal ore zones in dip-slip faults.

Structures act as fluid channel ways and more dilational portions of the host structures may represent sites of enhanced fluid flow and so promote the development of ore shoots which host most mineralization in many low-sulphidation vein systems (Corbett, 2002). Elsewhere fault intersections host ore shoots at sites of fluid mixing. Several structural settings provide ore shoots of varying orientations Figure 17. Steep dipping strike-slip structures provide vertical ore shoots in flexures and fault jogs. Tension veins and dilatant sheeted veins dominate in the latter setting. Normal, and in particular listric faults, in extensional settings host wider and higher-grade veins as flat ore shoots in steep dipping vein portions. In compressional settings, reverse faults host flat-plunging ore shoots.

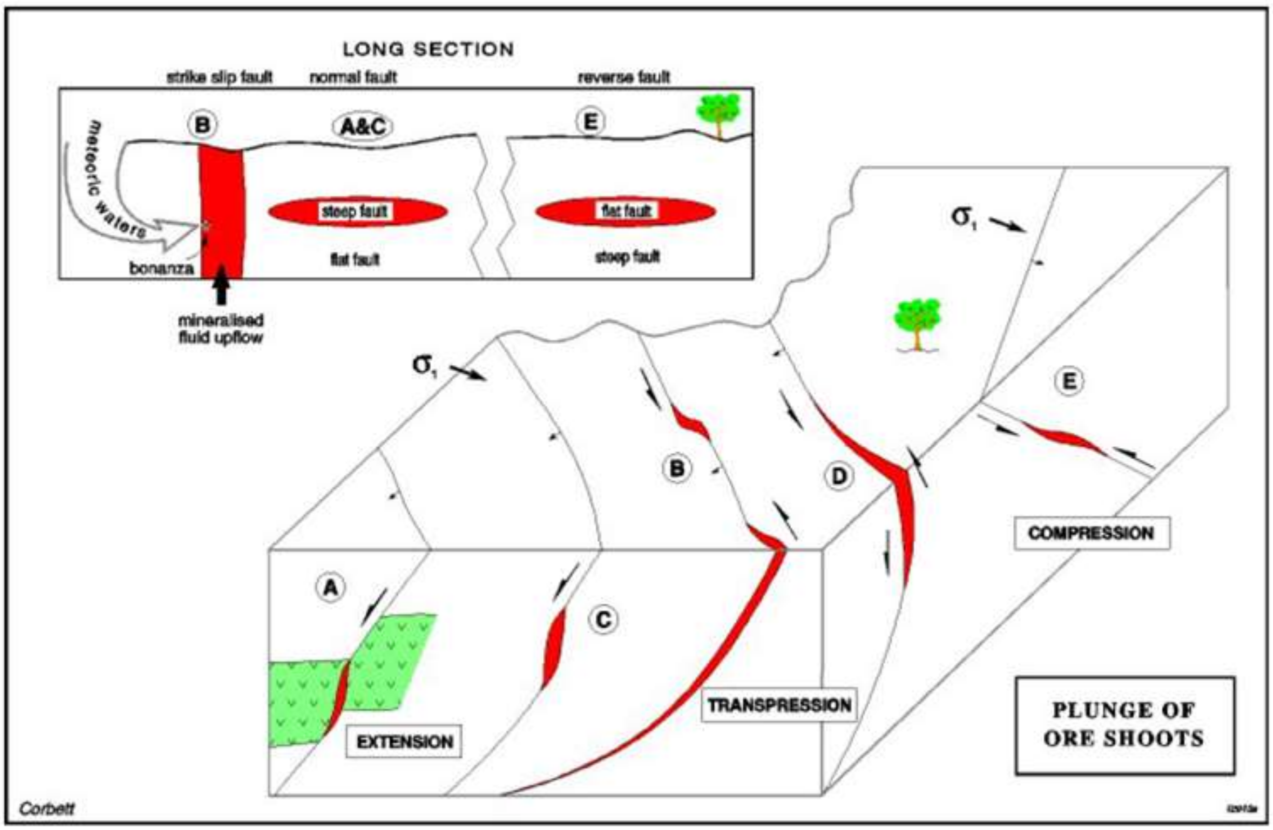


Figure 17: Illustration of the Structural Control on Ore Shoot Formation in Different Structural Environments and Associated Gold Mineralization Plunge Orientations

Source: Corbett, 2007

Epithermal quartz gold deposits are characterized as Ag-poor often bonanza Gold grades, developed at great distances from magmatic source rocks, in association with only minor quartz, illite, chlorite and local pyrite gangue, and so can be difficult to identify (Corbett, 2007). Typically, silver to gold ratios for epithermal deposits, though variable, tend to be higher in low-sulphidation gold deposits than in high-sulphidation gold deposits (Taylor, 2007).

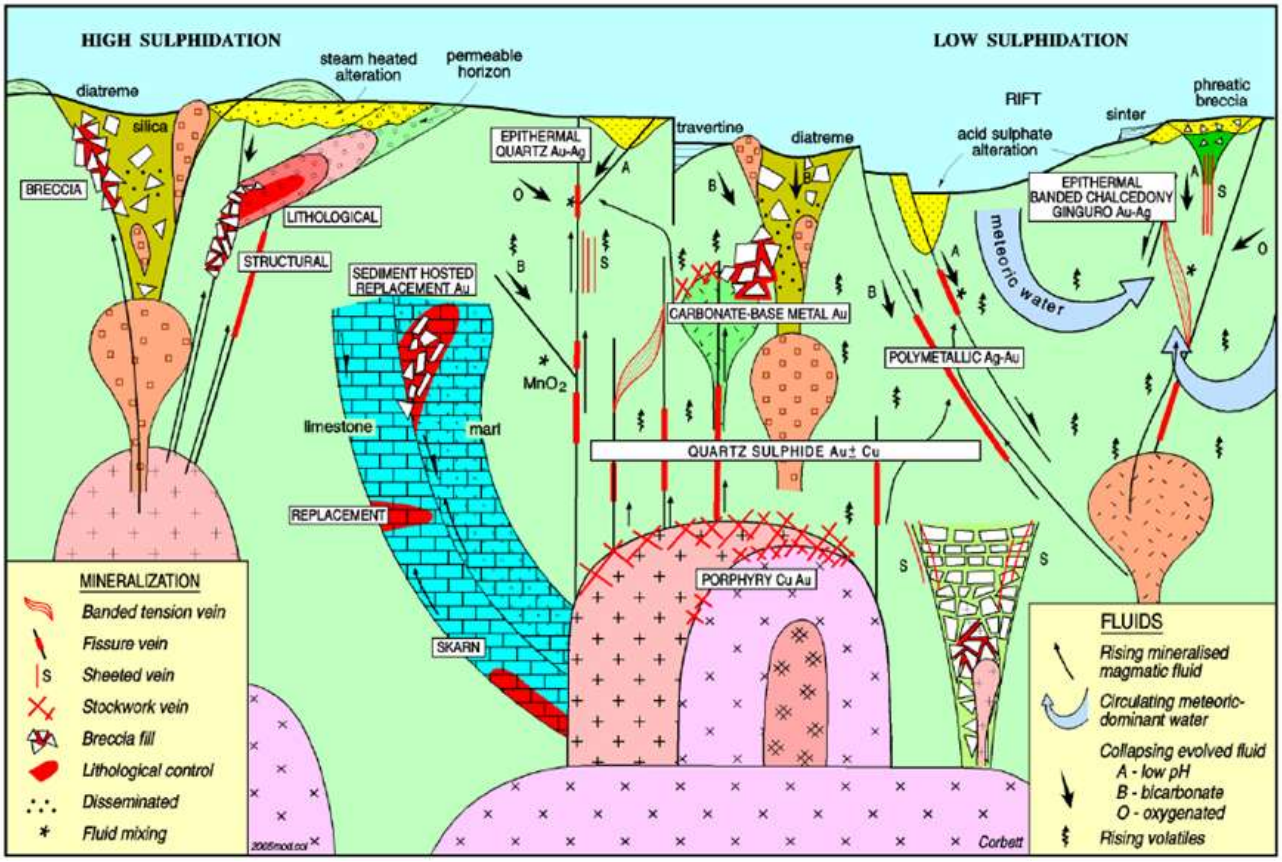


Figure 18: Conceptual Model Illustrating Styles of Magmatic Arc Porphyry Copper-Gold and Epithermal Gold-Silver Mineralization

Source: Corbett, 2007

9 Exploration

Exploration activities undertaken on the Black Fox Complex prior to 2014 are documented in Brisson (2014).

9.1 Black Fox Mine

9.1.1 Bedrock Mapping

The Black Fox Mine area is overlain by up to 30 metres of overburden. The only outcrop in the Black Fox Mine area consists of massive to pillowed mafic volcanic rocks south of the pit, which is now nearly completely buried by waste rock. No bedrock mapping has been undertaken in the Black Fox area.

9.1.2 Outcrop Stripping

The massive to pillowed mafic volcanic outcrop south of the pit, where not covered by waste rock, has not been stripped.

9.1.3 Geophysical Surveys

Prior to McEwen Mining's acquisition of the Black Fox Complex the Black Fox area was covered by the 2003 TITAN-24 geophysical survey conducted by Quantec Geoscience and the 2010 airborne magnetics survey conducted by Scott Hogg & Associates Ltd.

9.1.4 Diamond Drilling

The reader is referred to Section 6.1 for historical diamond drilling and Section 10 for recent diamond drilling.

9.1.5 Other Activities

In 2016, prior to McEwen Mining's acquisition of the Black Fox Complex, GeoGuido Consulting, carried out a chemostratigraphic study at the Black Fox Mine using a portable XRF analyzer. The purpose of this study was in part to better constrain the alteration mineral assemblages and path finder elements associated with gold mineralization. In conclusion of the study a copy of the results, 3D model and presentation were delivered to the Black Fox geology department to aid in continued drilling activities and target evaluation.

9.2 Froome Project

9.2.1 Bedrock Mapping

The Froome Project area is overlain by up to 20 metres of overburden. The only exposed bedrock, consisting of a Matachewan diabase dike and minor mafic volcanic rocks, is west of the Black Fox Complex property boundary. No bedrock mapping has been undertaken in the Froome Project area.

9.2.2 Outcrop Stripping

No outcrop stripping has been undertaken in the Froome Project area.

9.2.3 Geophysical Surveys

Prior to McEwen Mining's acquisition of the Black Fox Complex, the Froome Project area was covered during the 2003 TITAN-24 geophysical survey conducted by Quantec Geoscience and the 2010 airborne magnetics survey conducted by Scott Hogg & Associates Ltd. In 2016 Exsics Exploration conducted a down-hole mise-à-la-masse survey in two holes within the core of mineralization at the deposit. In both holes, the mise-á-la-masse survey indicated the Froome body dips to the south-southwest and has a strike-length of 125 to 175 metres, consistent with the interpretation from diamond drilling. The lower mineralized zoned could not be reached at the time of the 2016 mise-á-la masse survey.

9.2.4 Diamond Drilling

The reader is referred to Section 6.2 for historical diamond drilling and Section 10 for recent diamond drilling.

9.3 Grey Fox Project

9.3.1 Bedrock Mapping

The Grey Fox Project area is overlain by up to 30 metres of overburden, with 1 to 2 percent outcrop exposure. The majority of outcrops are unmineralized massive to pillowed mafic volcanics. No bedrock mapping has been undertaken in the Grey Fox Project area.

9.3.2 Outcrop Stripping

Prior to McEwen Mining's acquisition of the Black Fox Complex, three outcrops northeast of the 147 Zone were stripped to expose pillowed mafic, pillowed variolitic mafic, and massive volcanic rocks. Detailed mapping of the outcrops was completed as part of the field work done by two Master's of Science students from Laurentian University. Stripping at one outcrop exposed a steeply dipping to the north-northwest quartz-carbonate breccia vein. One grab sample from the vein was fire assayed, returning an assay value of 9.15 g/t gold. Channels measuring approximately 1 metre in length by 0.05 metres wide were cut across the outcrop cut by the quartz-carbonate breccia vein showed mineralization is restricted to within approximately 1 metre of the vein margins. The other two outcrops proved to be barren with respect to gold mineralization.

9.3.3 Geophysical Surveys

Prior to McEwen Mining's acquisition of the Black Fox Complex, the Grey Fox Project area was covered by the 2003 TITAN-24 geophysical survey conducted by Quantec Geoscience and the 2010 airborne magnetic survey conducted by Scott Hogg & Associates Ltd.

9.3.4 Diamond Drilling

No diamond drilling has been undertaken by McEwen Mining at the Grey Fox Project at the time of this report. The reader is referred to Section 6.1 for historical exploration work up to the most recent drilling by Primero Mining in 2015.

9.4 Future Exploration at the Black Fox Complex

Significant upside potential at the Black Fox Complex exists as it is located within a highly favourable geological setting with proven gold endowment, along the Destor Porcupine Fault in Southern Abitibi Sub-Province. The property has multiple mineralized structural trends and multiple mineralization styles encountered in various host rock lithologies. McEwen Mining 2018 and future exploration programs will look to expand the existing resources at the Black Fox Mine, Froome and Grey Fox projects, as well as drill test nearby structural and geophysical targets.

Optimisation of all available geoscientific information including historical drillhole data, geophysical surveys (Magnetic, Titan 24 I.P., new VTEM) is used to develop the geological understanding and define priority target areas.

At Black Fox Mine drilling will be done along strike and down plunge of known gold mineralization, and historic assay values will be followed up on in conjunction with understanding of the geological and structural control of the gold mineralization. Deep drilling below the Black Fox Mine will also be undertaken to assess its potential at depth and the continuity of the deposit. Compared to other similar deposits within the Timmins and Matheson camp averaging vertical depths in the order of 1,300 metres, the current known extent of gold mineralization at Black Fox Mine is relatively shallow with the mineral resource extending to a depth of approximately 870 metres vertical.

At Froome, a drill program to follow up on the deepest intercepts and historic positive gold intersections (which have returned comparable results to known mineralization) will be undertaken. Additionally, a drill program will explore potential lateral extensions of the deposit, in response to the positive results encountered in holes to the northwest and southeast of Froome over approximately 1-kilometre strike length. Geophysical anomalies (including chargeability, resistivity, and magnetic) located along the Froome (Gibson-Kelore) trend will continue to be tested.

At Grey Fox, the depth potential of the north-south structures will be tested, as well as the orientations of controls on mineralization (north-northwest and south-southeast dipping structures) in the hanging wall and footwall of the north-south structures controlling mineralization. Deep drilling will be designed with the objective of extending mineralization outside of the current mineral resource.

10 Drilling

Prior to McEwen Mining acquiring the Black Fox Complex, a total of 2,839 diamond drillholes totalling 507,422 metres were drilled in the Black Fox Mine, Froome Project and Grey Fox Project areas on the property between January 1, 2014 and October 31, 2017 (Figure 19). Most of this drilling was NQ diameter drill core. For the surface diamond drilling programs, most of drilling was completed by Norex Drilling. Collar locations for all areas were surveyed by site personnel, using a differential GPS. The GPS unit consists of a Leica GS15 receiver, a Leica CS15 controller, a Leica GS10 base station, and a Pacific Crest ADL Advantage Pro radio at the base station.

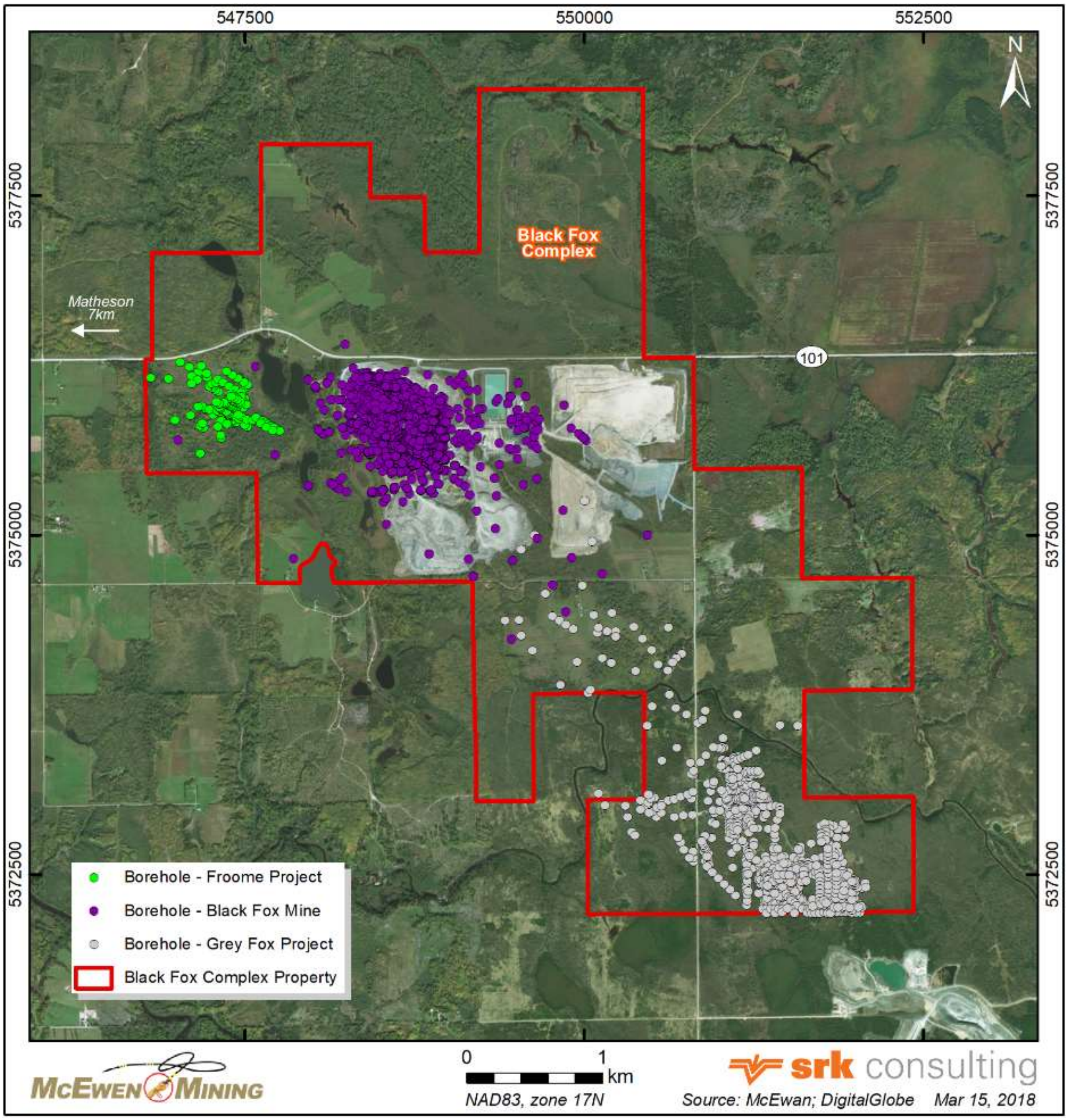


Figure 19: Plan Showing the Distribution of Surface Drilling at the Black Fox Complex

10.1 Black Fox Mine

Between January 1, 2014 and October 31, 2017, a total of 2,365 diamond drillholes were drilled at the Black Fox Mine for a total of 335,899 metres. Since McEwen Mining's acquisition of the Black Fox Complex, 32 diamond drillholes were drilled from October 6, 2017 to October 31, 2017. These included exploration, delineation and definition holes for a total of 4,843 metres.

A plan showing the collar locations of all the surface drilling conducted on the Black Fox Mine property is shown in Figure 20.

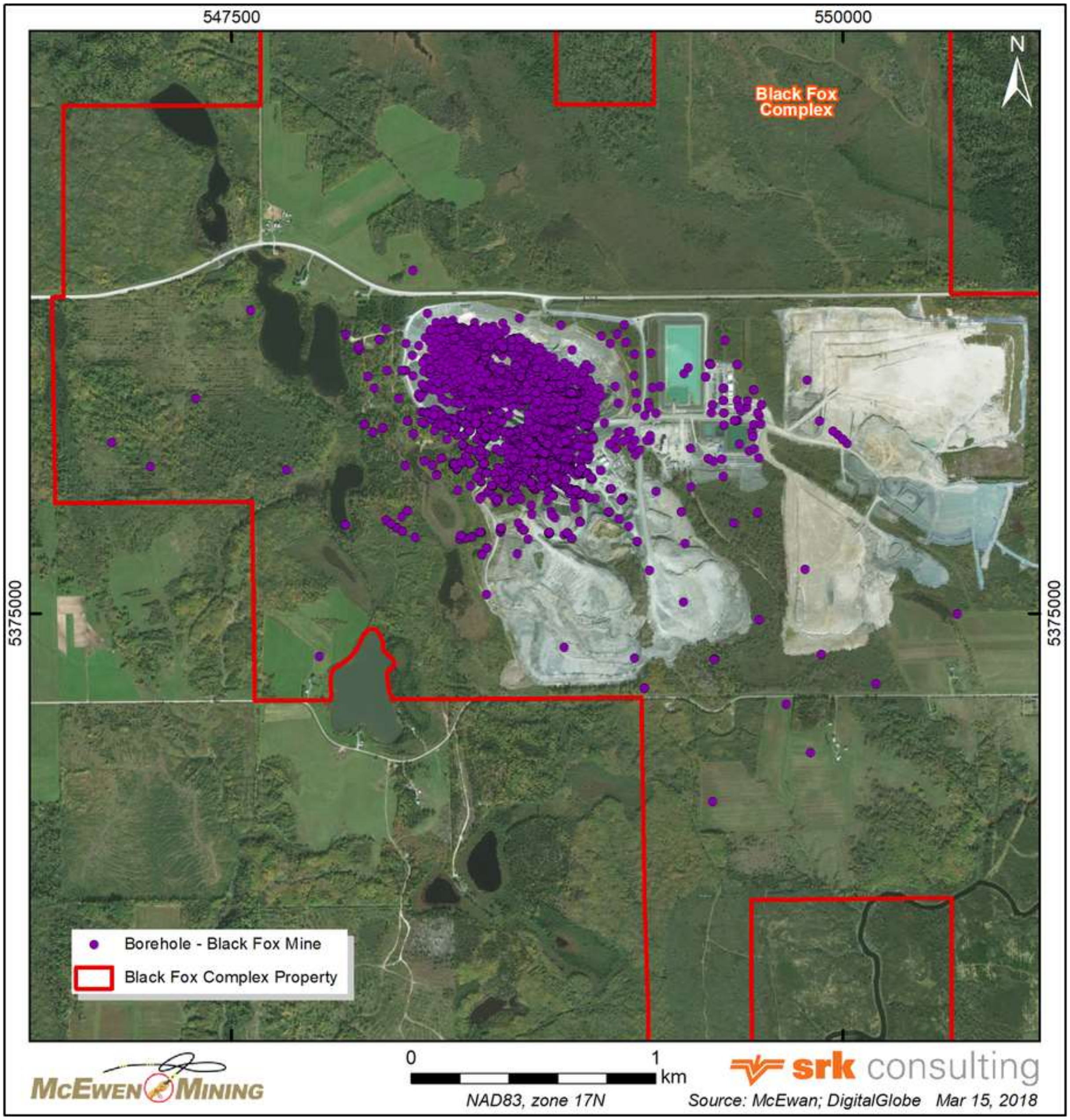


Figure 20: Plan Showing the Distribution of Surface Drilling at the Black Fox Mine

Drilling completed between January 1, 2014 and October 31, 2017 was conducted with three main objectives:

1) Exploration drilling targeting along strike and down dip/plunge of known mineralized trends and structures to expand and grow mineral resources.
2) Delineation drilling following up on successful exploration drilling to expand on known mineralized zones and to upgrade Inferred to Indicated mineral resources.
3) Definition drilling to gain better control on gold mineralization distribution and to support near term mine and stope planning.

10.2 Froome Project

The reader is referred to Section 6 for a summary of historical exploration work up to the most recent drilling by Primero in 2017.

Between 2014 and the first quarter of 2017 Primero drilled 237 NQ diameter diamond drillholes totalling 72,017 metres in, and along strike of, the Froome deposit. Within the deposit area drilling was carried out over a grid approximately 150 metres by 125 metres with 12.5 metres spacing. The majority of holes drilled in the deposit area were drilled with an azimuth of 030 degrees (true) and dips ranging between -45 degrees and -75 degrees. Outside the deposit area, one hole (15PR-G016) was drilled on a northwesterly azimuth, down the plunge of the deposit, to test continuity, and one hole (15PR-G011) was drilled on a southwesterly azimuth to confirm the orientation of the deposit before the infill program was undertaken.

Along strike holes were drilled with an azimuth of 25 degrees (true) to 35 degrees (true) and dips of -45 degrees to -65 degrees with a spacing of 100 to 200 metres. Where promising results were intercepted, addition holes were drilled at half the increment (i.e. 50 to 100 metres spacing).

Collars and back sights were located using the differential GPS described above. Downhole surveys were completed using a Reflex EZ-Gyro at 50-metre intervals. When the diamond drillholes were completed, collar locations were surveyed using the differential GPS described above.

All drillholes up to October 16, 2016 are considered in the current mineral resource estimate.

In Q4 2017 McEwen Mining completed three diamond drillholes in the Froome Project area. Ground conditions in the hanging wall of the target zone cause the first two holes to be abandoned. The third hole was drilled to completion.

Table 8: Metres Drilled on the Froome Project Between 2014 to 2017

Year	No. Collars	Metres	Company
2014	4	2,131	Brigus
2015	63	24,470	Primero
2016	161	41,522	Primero
2017	9	3,894	Primero/McEwen
Total	**237**	**72,017**	

A plan showing the collar locations of all the surface drilling conducted on the Froome property is shown in Figure 21.

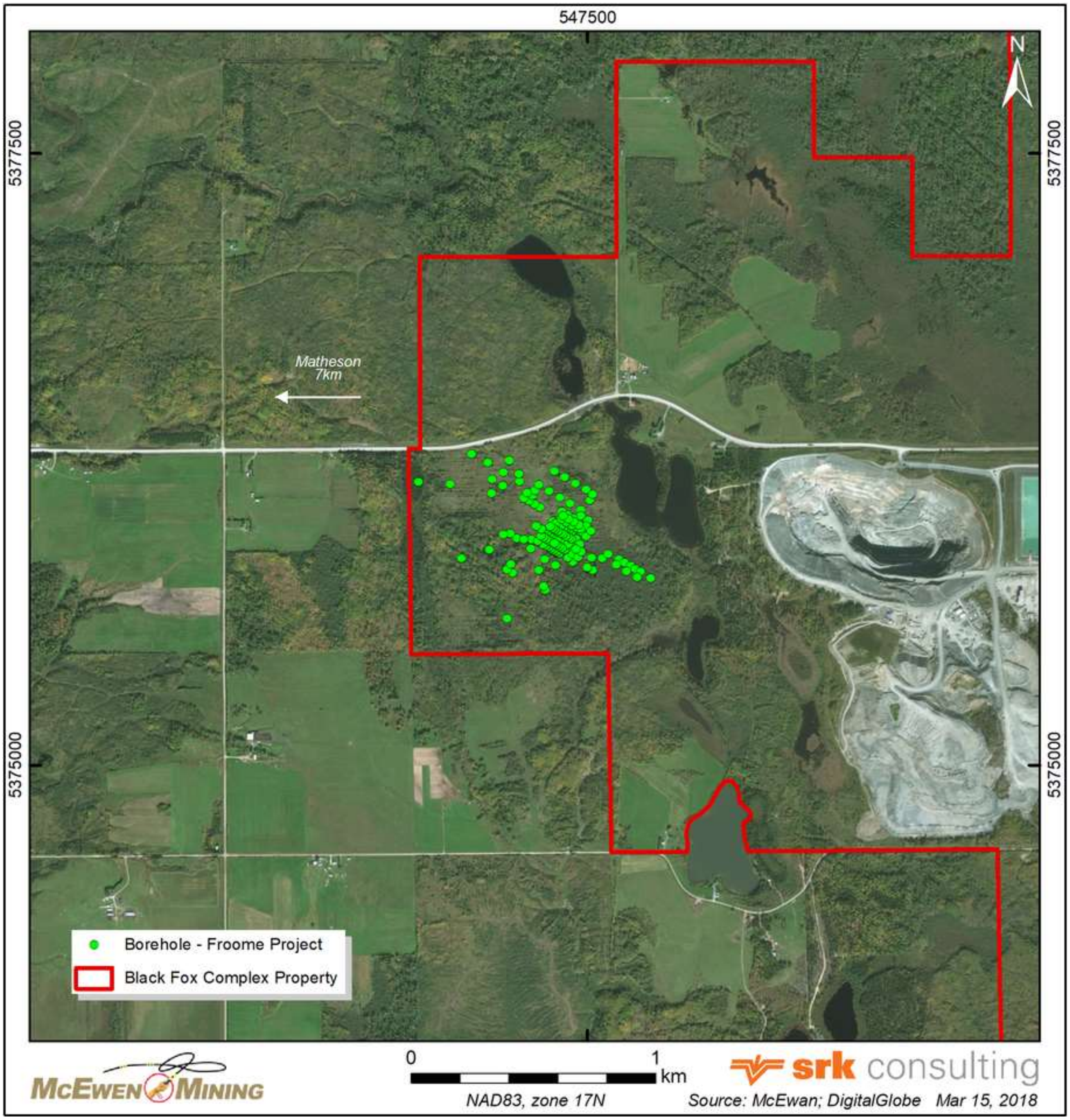


Figure 21: Plan Showing the Distribution of Surface Drilling at the Froome Project

10.3 Grey Fox Project

McEwen Mining did not complete any drilling on the Grey Fox Project during 2017. The reader is referred to Section 6 for historical exploration work.

Between 2008 and 2015, 1,068 NQ diamond drillholes for a total of 389, 244 metres of core were drilled by Norex Drilling. Of these holes, 375 diamond drillholes totalling 135, 482 are in the Contact Zone, 424 diamond drillholes totalling 149,410 metres are in the 147 Zone, 189 diamond drillholes totalling 75,439 metres are in the Grey Fox South Zone, and 80 diamond drillholes totalling 28,913 metres are in the Gibson Zone.

Within each of the zones, drilling followed a grid with drillholes spaced at approximately 12.5 metres. Most of diamond drillholes completed between 2008 and the second half of 2014 were drilled with an azimuth of 270 degrees (true) and dips between -50 degrees and -70 degrees. Between the second half of 2014 and the end of 2016, diamond drillholes were drilled on 210 degrees (true) and 330 degrees (true) azimuths with dips between -50 degrees and -70 degrees, reflecting an improved understanding of the structural controls on mineralization.

Collars were located using Garmin GPSmap 60CSx and backsights were aligned using a tripod mounted Brunton Geo. Downhole surveys were completed using a Reflex EZ-Shot at 50-metre intervals. When the diamond drillholes were completed, collar locations were surveyed using the differential GPS described above.

All holes up to the end of 2015 are included in the current resource estimate.

Table 9: Metres Drilled on the Grey Fox Project Until 2015

Year	No. Collars	Metres	Company
Pre-2008	64	20,249	Noranda
2008	16	3,715	Apollo
2009	53	9,974	Apollo
2010	69	26,800	Apollo/Brigus
2011	274	101,952	Brigus
2012	271	81,846	Brigus
2013	148	65,451	Brigus
2014	181	73,756	Brigus/Primero
2015	56	25,750	Primero
Total	**1,132**	**409,493**	

A plan showing the collar locations of all the surface drilling conducted on the Grey Fox Project is shown in Figure 22.

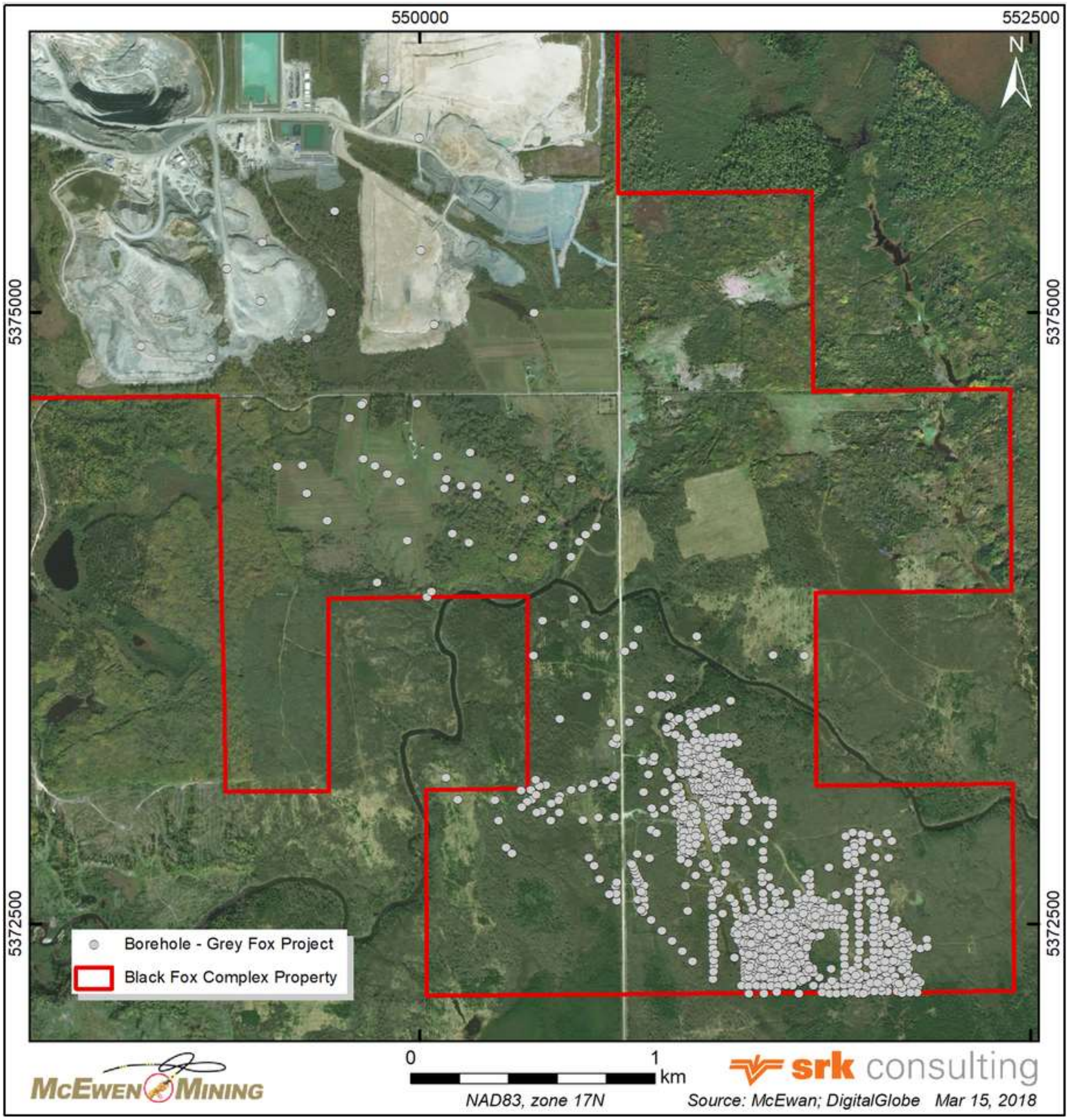


Figure 22: Map Showing the Distribution of Drilling at the Grey Fox Project

11 Sample Preparation, Analyses, and Security

This section provides a description of drill core sampling, sample preparation, sample analyses and security procedures for the 2014 to 2017 drilling program conducted at the Black Fox Mine, the 2014 to 2017 drill program conducted at the Froome Project and the 2014 to 2015 drill program conducted at the Grey Fox Project. A cut-off date of October 31, 2017 was used for the mineral resource estimate and the same time frame will be applied when discussing all sampling procedures. All sampling procedures methods were transferred with the acquisition of the Black Fox Complex by McEwen Mining. Sampling procedures prior to 2014 have been documented in previous technical reports (Brisson, 2014).

11.1 Drill Core Sampling Method

11.1.1 Black Fox Mine

Drill core was boxed, covered and sealed at the drill rig site. Core boxes were labelled with the official drillhole name and identified in numerical sequence starting from beginning of the hole to the end. Wooden blocks with the corresponding down hole meterage were inserted after every drill run. Drill core boxes were transported by drilling employees to the logging facility where McEwen Mining personnel would take over the core handling.

All drill core was logged using the Gem's Logger application and sampled by or under the supervision of McEwen Mining geologists at the core shack of the Black Fox Mine. All samples were marked up on the drill core, and all samples were tagged with a unique sample identification number. All sample information was logged into the Gem's Logger application and is loaded to the main "ApolloDrill" drillhole workspace. All sample books were archived.

Underground definition and delineation drill core samples were whole core sampled. All samples were bagged and sealed by McEwen Mining technicians and grouped into batches of approximately 10 samples. Each sample batch was put into a large rice bag which was sealed and labelled with the corresponding sample series. The drill core samples were shipped to the Black Fox Mill laboratory located between Matheson and Timmins. In some cases, definition and delineation drill core samples were sent to external laboratories for gold analysis.

Underground exploration drill core samples were cut into two halves. Half of the drill core sample was kept in its original core box in the proper meterage sequence. The other half of the drill core samples were bagged and sealed by McEwen Mining technicians and grouped into batches of approximately 10 samples. Each sample batch was put into a large rice bag which was sealed and labelled with the corresponding sample series. The sample batches were shipped to external laboratories for gold analysis.

11.1.2 Froome Project

Drill core was boxed, covered and sealed at the drill rig site. Core boxes were labelled with the official drillhole name and identified in numerical sequence starting from beginning of the hole to the end. Wooden blocks with the corresponding down hole meterage were inserted after every drill run. Drill core boxes were transported by McEwen Mining employees to the logging facility where McEwen Mining personnel would take over the core handling.

All drill core was logged using the Gem's Logger application and sampled by or under the supervision of McEwen Mining geologists at the core shack of the Black Fox Mine. All samples were marked up on the drill core, and all samples were tagged with a unique sample identification number. All sample information was logged into the Gem's Logger application and is loaded to the main "GKLOGGER" drillhole workspace. All sample books were archived.

All drill core samples were cut into two halves. Half of the drill core sample was kept in its original core box in the proper meterage sequence. The other half of the drill core samples were bagged and sealed by McEwen Mining technicians and grouped into batches of approximately 10 samples. Each sample batch was put into a large rice bag which was sealed and labelled with the corresponding sample series. The sample batches were shipped to external laboratories for gold analysis.

11.1.3 Grey Fox Project

Drill core was boxed, covered and sealed at the drill rig site. Core boxes were labelled with the official drillhole name and identified in numerical sequence starting from beginning of the hole to the end. Wooden blocks with the corresponding down hole meterage were inserted after every drill run. Drill core boxes were transported by McEwen Mining employees to the logging facility where McEwen Mining personnel would take over the core handling.

All drill core was logged using the Gem's Logger application and sampled by or under the supervision of McEwen Mining geologists at the core shack of the Black Fox Mine. All samples were marked up on the drill core, and all samples were tagged with a unique sample identification number. All sample information was logged into the Gem's Logger application and is loaded to the main "LOGGERGF" drillhole workspace. All sample books were archived.

All drill core samples were cut into two halves. Half of the drill core sample was kept in its original core box in the proper meterage sequence. The other half of the drill core samples were bagged and sealed by McEwen Mining technicians and grouped into batches of approximately 10 samples. Each sample batch was put into a large rice bag which was sealed and labelled with the corresponding sample series. The sample batches were shipped to external laboratories for gold analysis.

11.2 Sample Preparation and Analysis

Underground definition and delineation drill core samples from the Black Fox Mine drill program were sent to McEwen Mining's internal Black Fox Mill laboratory for gold analysis. In some cases, definition and delineation samples from the Black Fox Mine drill program were sent to external laboratories. Exploration drill core from the Black Fox Mine, Froome, and Grey Fox drill programs were sent to external laboratories for gold analysis.

Sample preparation and analysis were also conducted by external laboratories. AGAT Laboratory in Mississauga, Accurassay Laboratories LTD in Thunder Bay, Activation Laboratories LTD in Timmins, Black Fox Mill laboratory in Shillington, PolyMet Labs in Cobalt, SGS Canada in Cochrane, and Swastika Laboratories in Swastika. All labs, excluding the Black Fox Mill, are external commercial laboratories independent of McEwen Mining. The Black Fox Mill lab is an internal lab owned by McEwen Mining. All laboratories are located in Ontario, Canada.

Accurassay Laboratories has an ISO/IEC 17025 accreditation through the SCC. Accurassay is an independent commercial laboratory that did gold analysis on samples from the Black Fox Mine and Froome drill programs. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining, weighed, and then dried. Once dried samples were prepped following a preparation package, that was not noted on the certificate, which involved:

- Crushing
- Rifle split to 250 grams
- 250 grams crushed split was pulverized

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and sent for lead fire assay with an AA-finish. Samples that returned greater than 10 ppm gold were sent for lead fire assay with a gravimetric finish.

Activation Laboratories has an ISO 9001 certification and ISO/IEC17025 accreditation through the SCC. Activation Laboratories is an independent commercial laboratory that did gold analysis on samples from the Black Fox Mine and Froome drill programs. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining and then dried. Once dried, the samples were prepped following their RX1 preparation package which involved:

- Crush to 90 percent passing 2 millimetres
- Riffle split to 250 grams
- 250 grams crushed split pulverized to 105 micrometres

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and followed the 1A2 package which consisted of lead fire assay with an AA-finish. Samples that returned greater than 10 ppm gold were sent for the 1A4 lead fire assay package with a gravimetric finish.

AGAT Laboratories has an ISO 9001 certification and ISO/IEC17025 accreditation through the SCC. AGAT Laboratories is an independent commercial laboratory that did gold analysis on samples from the Grey Fox drilling program. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining, weighed, and then dried. Once dried samples were prepped following a preparation package, that was not noted on the certificate, which involved:

- Crushing
- Riffle split to 250 grams
- 250 grams crushed split was pulverized

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and followed the 202-052 package which consisted of lead fire assay with an ICP-OES finish. Samples that returned greater than 10 ppm gold were sent for the 202-064 lead fire assay package with a gravimetric finish.

The Black Fox Mill laboratory is owned by McEwen Mining and is not accredited. In October 2017, the Black Fox Mill laboratory participated in the gold category of the Geostats assay round-robin, and it is McEwen Mining's intention to continue participating. The Black Fox Mill lab completed gold analysis on samples from the Black Fox Mine drilling program. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining, and then dried. Once dried samples were prepped following the following preparation:

- Crush to 80 percent passing 2 millimetres
- Riffle split to 250 grams
- 250 grams crushed split pulverized to 95 percent passing 74 micrometres

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed and sent for lead fire assay with an AA finish. Samples that returned greater than 10ppm gold were sent for lead fire assay with a gravimetric finish.

PolyMet Labs has an ISO 9001 certification through the SCC. PolyMet Labs is an independent commercial laboratory that did gold analysis on samples from the Black Fox Mine, Froome, and Grey Fox drilling program. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining, weighed, and then dried. Once dried, the samples were prepped following a preparation package, that was not noted on the certificate, which involved:

- Crushing
- Riffle split to 250 grams
- 250 grams crushed split was pulverized

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and sent for lead fire assay with a gravimetric finish.

SGS Canada Cochrane Laboratory has an ISO 9001 certification and ISO/IEC17025 accreditation through the SCC. SGS Canada Cochrane Laboratory is an independent commercial laboratory that did gold analysis on samples from the Black Fox Mine and Froome drill programs. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining and then dried. Once dried, the samples were prepped following their PRP90 preparation package which involved:

- Crush to 90 percent passing 2 millimetres
- Riffle split to 250 grams
- 250 grams split pulverized to 85 percent passing 106 micrometres

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and followed the GE FAA313 package which consisted of lead fire assay with an AA-finish. Samples that returned greater than 10 ppm gold were sent for the GO FAG303 lead fire assay package with a gravimetric finish.

PolyMet Labs has an ISO 9001 certification through the SCC. PolyMet Labs is an independent commercial laboratory that did gold analysis on samples from the Black Fox Mine, Froome, and Grey Fox drilling program. Once samples were received, they were logged against chain-of-custody sheets provided by McEwen Mining, weighed, and then dried. Once dried, the samples were prepped following their preparation protocol which included:

- Crushing to 80 percent passing 1,700 micrometres
- Riffle split to 250 grams
- 250 grams crushed split was pulverized to 90 percent passing 75 micrometres

The pulverized samples were sent for fire assay. 30 grams of the pulverized material was weighed out and sent for lead fire assay with an AA-finish. Samples that returned greater than 10 ppm gold were sent for lead fire assay with a gravimetric finish.

11.3 Specific Gravity Data

11.3.1 Black Fox Mine

Very few of the drillholes in the Black Fox Mine drill program were tested for specific gravity. The data was collected in-house by weighing an approximately 10-centimetre segment of dry core, and then weighing the same piece of core suspended in water to obtain its weight in water. The dry and wet weights were used in the following formula to determine the density.

Density = (dry weight)/ [(weight in air)- (weight in water)]

The density data was collected and manually entered into the Gem's Logger application which would be loaded into the main "ApolloDrill" drill database.

Moving forward in the 2018 drilling program, McEwen Mining will have the external labs calculate the SG on every tenth sample that they receive.

11.3.2 Froome Project

Many of the drillholes on the Froome Project drill program had specific gravity data collected. The data was collected in-house by weighing an approximately 10-centimetre segment of dry core, and then weighing the same piece of core suspended in water to obtain its weight in water. The dry and wet weights were used in the following formula to determine the density.

Density = (dry weight)/ [(weight in air)- (weight in water)]

The density data was collected and manually entered into the Gem's Logger application which would be loaded into the main "GKLOGGER" drill database.

Moving forward in the 2018 drilling program, McEwen Mining will have the external labs calculate the specific gravity on every tenth sample that they receive.

11.3.3 Grey Fox Project

Some of the drillholes on the Grey Fox Project drill program had specific gravity data collected. The data was collected in-house by weighing an approximately 10-centimetre segment of dry core, and then weighing the same piece of core suspended in water to obtain its weight in water. The dry and wet weights were used in the following formula to determine the density.

Density = (dry weight)/ [(weight in air)- (weight in water)]

The density data was collected and manually entered into the Gem's Logger application which would be loaded into the main "LOGGERGF" drill database.

Moving forward in the 2018 drilling program, McEwen Mining will have the external labs calculate the specific gravity on every tenth sample that they receive.

11.4 Quality Assurance and Quality Control Programs

11.4.1 Introduction

Quality assurance and quality control (QA/QC) programs are typically set in place to ensure the reliability and trustworthiness of exploration data. They include written field procedures and independent verifications of aspects such as drilling, surveying, sampling and assaying, data management, and database integrity. Appropriate documentation of quality control measures and regular analysis of quality control data are important as a safeguard for project data and form the basis for the quality assurance program implemented during exploration.

Analytical control measures typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation, and assaying. They are also important to prevent sample mix-up and monitor the voluntary or inadvertent contamination of samples. Assaying protocols typically involve regular duplicate and replicate assays and insertion of quality control samples to monitor the reliability of assaying results throughout the sampling and assaying process. Check assaying is typically performed as an additional reliability test of assaying results. This typically involves re-assaying a set number of rejects and pulps at a second umpire laboratory.

Industry standard QA/QC programs have been implemented at the Black Fox Mine, Froome and Grey Fox projects. Programs and procedures adopted since 2014 are summarized individually below, with programs adopted prior to that discussed in previous technical reports for these projects.

11.4.2 Black Fox Mine

The 2014 to 2017 Black Fox Mine drill program sampling procedures included in-field QA/QC program that was implemented and managed by the McEwen Mining Database Geologist. This position was held by several employees throughout the program. The program comprises of the insertion of quality control (QC) samples into the drill core sampling sequence. One blank sample, one standard reference material sample and one duplicate sample were inserted in every batch of 20 samples. QC samples were handled similarly to the drill core samples; each QC sample was given a unique sample identification number, which followed the same sample sequence number as the drill core samples. The QC samples and tags were bagged, sealed and sent to the laboratory for analyses. In addition to this program, pulp samples from the labs were sent to umpire labs to confirm the original assayed value.

In addition to the QA/QC sampling program implemented on site, each laboratory used their own internal QA/QC protocols which included in the insertion of blank samples, standard reference material samples, and duplication of reject or pulp material.

Blanks

Blank samples used in the 2014 to 2017 Black Fox Mine drill program were comprised of blank samples made from unmineralized marble garden stone. Blank samples were inserted into the sampling series to monitor for any possible contamination throughout the sample analysis process.

Certified Reference Materials (Standards)

Standard samples used in the 2014 to 2017 Black Fox Mine drill program consisted of certified reference material (CRMs) purchased from RockLabs Ltd. and CDN Resource Laboratories Ltd. (Table 10). The CRMs used throughout the programs were SE68, OxG98, SG84, SG66, SH82, SH69, SI54, Oxi96, Oxi121, OxJ95, OxJ120, SJ63, SJ80, OxK110, SK78, OxL93, OxN92, SN75, SP59, QxQ90 and CDN-GS-9A. The CRMs were inserted into the sampling series to monitor the accuracy and precision of the results obtained by the lab.

Duplicates

Duplicate samples used in the 2014-2017 Black Fox Mine drill program consisted of "pulp duplicate" and "reject duplicate" samples. The duplicate samples were prepared by the laboratory that was performing the analysis. The lab would receive a sample bag only containing the sample tag with the labeled duplicate type. This sample bag would be attached to the core sample that is to be duplicated. The lab would prepare the reject duplicate after the initial crush phase, and the lab would prepare the pulp duplicate at the pulp phase. Duplicate samples were inserted into the samples sequence to monitor the labs ability to reproduce the result of the same sample.

Table 10: Certified Reference Materials Used During the Black Fox Mine 2014 to 2017 Drilling Program

Reference Material	Source	Expected Value (Au ppm)	Standard Deviation (Au ppm)	Number of Samples
SE68	Rocklabs	0.599	0.013	1446
OxG98	Rocklabs	1.017	0.1012 *	39
SG84	Rocklabs	1.026	0.025	439
SG66	Rocklabs	1.086	0.032	98
SH82	Rocklabs	1.333	0.027	427
SH69	Rocklabs	1.346	0.026	551
SI54	Rocklabs	1.780	0.034	329
Oxi96	Rocklabs	1.802	0.039	658
Oxi121	Rocklabs	1.834	0.050	568
OxJ95	Rocklabs	2.337	0.057	616
OxJ120	Rocklabs	2.365	0.063	577
SJ63	Rocklabs	2.632	0.055	448
Sj80	Rocklabs	2.656	0.057	801
OxK110	Rocklabs	3.602	0.053	80
SK78	Rocklabs	4.134	0.138	1985
OxL93	Rocklabs	5.841	0.169	5
OxN92	Rocklabs	7.643	0.242	21
SN75	Rocklabs	8.671	0.199	181
CDN-GS-9A	CDN Labs	9.310	0.345	13
SP59	Rocklabs	18.120	0.360	203
QxQ90	Rocklabs	24.880	0.560	1

* The certificate for OxG98 cannot be located, using the +/- 10 percent control limit that was used in the previous NI-43101 for Black Fox

11.4.3 Froome Project

The Froome Project 2014 to 2017 exploration drilling program sampling procedures included in-field QA/QC program that was implemented and managed by the McEwen Mining Database Geologist. The program consisted of the insertion of QC samples into the drill core sampling sequence. One blank sample, one standard reference material sample and one duplicate sample were inserted in every batch of 20 samples. QC samples were handled in the same manner as the drill core sample; each QC sample was given a unique sample identification number, which followed the same sample sequence number as the drill core samples. The QC samples and tags were bagged, sealed and sent to the laboratory for analyses. In addition to this program, pulp samples from the labs were sent to umpire labs to confirm the original assayed value.

In addition to the QA/QC sampling program implemented on site, each laboratory used their own internal QA/QC protocols which included in the insertion of blank samples, standard reference material samples, and duplication of reject or pulp material.

Blanks

Blank samples used in the Froome Project 2014 to 2017 drilling program consisted of "core blank" and "quarry blank" samples. Core blank samples derived from unmineralized sections of core which was quarter cut. Quarry blank samples consisted of certified blank pulp material. Blank samples were inserted into the sampling series to monitor any possible contamination throughout the sample analysis process.

Certified Reference Materials (standards)

Standard samples used in the 2014 to 2017 Froome Project drill program consisted of certified reference material (CRMs) purchased from Rocklabs Ltd. The CRMs used throughout the programs were SE68, Ox98, Oxi121, OxJ120, SJ63, SK78, SG66, SN75. The CRMs were inserted into the sampling series to monitor the accuracy and precision of the results obtained by the lab.

Duplicates

Duplicate samples used in the Froome Project 2014 to 2017 drilling program consisted of "field duplicate" samples. The duplicate sample was prepared from the original core samples by quarter cutting the half of the core that was to be sent to the lab. Each quarter of core was put into a plastic sample tag with its own sample tag. Duplicate samples were inserted into the samples sequence to monitor the labs ability to reproduce the result of the same sample.

Table 11: Certified Reference Materials Used During the Froome Project 2014 to 2017 Drilling Program

Reference Material	Source	Expected Value (Au ppm)	Standard Deviation (Au ppm)	Number of Samples
SE68	Rocklabs	0.599	0.013	49
OxG98	Rocklabs	1.017	0.1012 *	1
SG66	Rocklabs	1.086	0.032	760
Oxi121	Rocklabs	1.834	0.050	12
OxJ120	Rocklabs	2.365	0.063	7
SJ63	Rocklabs	2.632	0.055	2
SK78	Rocklabs	4.134	0.138	622
SN75	Rocklabs	8.671	0.199	291

* The certificate for OxG98 cannot be located, using the +/- 10 percent control limit that was used in the previous NI-43101 for Black Fox

11.4.4 Grey Fox Project

The Grey Fox Project 2014 to 2015 exploration drilling program sampling procedures included in-field QA/QC program that was implemented and managed by the McEwen Mining Database Geologist. The program consisted of the insertion of QC samples into the drill core sampling sequence. One blank sample, one standard reference material sample and one duplicate sample were inserted in every batch of 20 samples. QC samples were handled in the same manner as the drill core sample; each QC sample was given a unique sample identification number, which followed the same sample sequence number as the drill core samples. The QC samples and tags were bagged, sealed and sent to the laboratory for analyses. In addition to this program, pulp samples from the labs were sent to umpire labs to confirm the original assayed value.

In addition to the QA/QC sampling program implemented on site, each laboratory used their own internal QA/QC protocols which included in the insertion of blank samples, standard reference material samples, and duplication of reject or pulp material.

Blanks

Blank samples used in the 2014 to 2015 Grey Fox Project drill program consisted of "core blank" and "quarry blank" samples. Core blank samples derived from unmineralized sections of core which was quarter cut. Quarry blank samples consisted of certified blank pulp material. Blank samples were inserted into the sampling series to monitor any possible contamination throughout the sample analysis process.

Certified Reference Materials (Standards)

Standard samples used in the 2014-2015 Grey Fox Project drill program consisted of certified reference material (CRMs) purchased from Rocklabs Ltd. The CRMs used throughout the programs were SK78, SG66, and SN75. The CRMs were inserted into the sampling series to monitor the accuracy and precision of the results obtained by the lab (Table 12).

Duplicates

Duplicate samples used in the 2014 to 2015 Grey Fox Project drilling program consisted of "field duplicate" samples. The duplicate sample was prepared from the original core samples by quarter cutting the half of the core that was to be sent to the lab. Each quarter of core was put into a plastic sample tag with its own sample tag.

Table 12: Certified Reference Materials Used During the Grey Fox Project 2014 to 2015 Drilling Program

Reference Material	Source	Expected Value (Au ppm)	Standard Deviation (Au ppm)	Number of Samples
SK78	Rocklabs	4.134	0.138	2616
SG66	Rocklabs	1.086	0.032	862
SN75	Rocklabs	8.671	0.199	477

11.4.5 SRK Comments

In the opinion of SRK, the sampling preparation, security and analytical procedures used by McEwen Mining on the Black Fox, Froome and Grey Fox projects are consistent with generally accepted industry best practices and are, therefore, suitable to support mineral resource estimation.

12 Data Verification

12.1 Verifications by McEwen Mining

Exploration and production work completed by McEwen Mining is conducted using documented procedures and involves detailed verification and validation of data prior to being considered for geological modelling and mineral resource estimation. During drilling, experienced geologists implement best practices designed to ensure the reliability and trustworthiness of the exploration data.

This section provides a description of the data verification that McEwen Mining completed for the data informing the mineral resource statements documented in this technical report. A cut-off date of October 31, 2017 was used for the mineral resource estimate and the same time frame was applied when discussing data verification. Data verification measures prior to January 2014 have been discussed and in previous technical reports on these projects. For this technical report McEwen Mining verified data from the January 2014 to October 31, 2017.

12.1.1 Black Fox Mine

All data pertaining to drillholes (collar locations, down hole surveys, assays etc..) from the Black Fox Mine 2014 to 2017 drilling program was collected and added to the main “ApolloDrill” drillhole workspace in the “BFOreControl_SQL” sequel Gem’s project. McEwen Mining randomly chose 5 percent of drillholes in the 2014-2017 Black Fox Mine drill program to be verified.

All surface drillhole collar locations on the Blank Fox Mine deposit were either professionally surveyed or surveyed using a hand-held GPS device. Underground drillholes were marked up by underground survey technicians using a Leica 1203+1000 Total Station providing fore sights and back sights for each drillhole.

The majority of all drillholes were surveyed using a down hole instrument. Most down hole surveys were completed with a single shot down hole tool. Starting in 2016 to present, underground exploration drillholes were professionally surveyed by a technician using a north seeking Gyro instrument, and definition and delineation drillholes were surveyed with a single shot instrument or Devico’s Devi-flex survey tool. Throughout the 5-percent database check, McEwen Mining was unable to verify all down hole surveys for drilling completed prior to 2016 due to loss of some survey test hard copies. A visual check was completed to ensure no significant errors were included in the survey data.

All logging data was entered into a Gem’s Logger access-based application which would then be directly loaded into the BFOreControl_SQL Gems project.

Throughout the 5-percent database check McEwen Mining noted rounding differences between the assay reported in the database and those on the certificate. Other error types included incorrect date formatting, lack of information recorded, (certificate numbers, dates), and typos with regards to certificate numbers. These errors are not considered to have a material impact on the overall integrity of the database.

QC sample data was regularly monitored by the database geologist. Blank samples were considered a fail if the assay value returned values greater than 10 times the laboratory's detection limit. CRM samples were considered a fail if the assay value that returned was greater than 3 standard deviations of the expected value from the CRM. Reject duplicate samples were monitored, however, due to the possible nugget effect, samples with an absolute difference greater than 25 percent may have been geologically overridden. Pulp duplicate samples were monitored, however, due to the possible nugget effect, samples with an absolute difference greater than 10 percent may have been geologically overridden. A tabulation of all the analytical quality control data generated by McEwen Mining for the Black Fox Mine during the period 2014 to 2017 is provided in Table 13. SRK notes that the ratio of QC sampling to total sample count is high at 15.20 percent.

Table 13: Summary of Analytical Quality Control Data Generated by McEwen Mining for the Black Fox Mine 2014 to 2017 Drilling Program

		Total	(%)	Sample Type
Sample Count		**190,728**		
Blanks		**9,843**	**5.16%**	
	Core Blank	9,843		Barren Stone
Standards		**9,486**	**4.97%**	
	SE68	1,446		0.599 ppm Au Pulp
	OxG98	39		1.017 ppm Au Pulp
	SG84	439		1.026 ppm Au Pulp
	SG66	98		1.086 ppm Au Pulp
	SH82	427		1.333 ppm Au Pulp
	SH69	551		1.346 ppm Au Pulp
	SI54	329		1.780 ppm Au Pulp
	Oxi96	658		1.802 ppm Au Pulp
	Oxi121	568		1.834 ppm Au Pulp
	OxJ95	616		2.337 ppm Au Pulp
	OxJ120	577		2.365 ppm Au Pulp
	SJ63	448		2.632 ppm Au Pulp
	Sj80	801		2.656 ppm Au Pulp
	OxK110	80		3.602 ppm Au Pulp
	SK78	1,985		4.134 ppm Au Pulp
	OxL93	5		5.841 ppm Au Pulp
	OxN92	21		7.643 ppm Au pulp
	SN75	181		8.671 ppm Au Pulp
	CDN-GS-9A	13		9.31 ppm Au Pulp
	SP59	203		18.12 ppm Au Pulp
	QxQ90	1		24.880 ppm Au Pulp
Duplicates		**9,667**	**5.07%**	
	Field	148		Field Dup
	Pulp	4,885		Pulp
	Reject	4,634		Reject
Total QC Samples		**28,996**	**15.20%**	
Check assay to umpire laboratory		NA		

12.1.2 Froome Project

All data pertaining to drillholes (collar locations, down hole surveys, assays etc.) from the 2014 to 2017 Froome drill program were collected and added to the main “GKLOGGER” drillhole workspace in the “GreyFoxSQL” sequel Gems project. Throughout the entire drill program, the database geologist performed regular QA/QC audits on collar locations, down hole surveys, and assay certificates. Once verified drillholes would be locked in the gems project to ensure no changes to the data could occur. McEwen Mining also randomly chose 5 percent of drillholes in the 2014 to 2017 Froome drill program to be verified.

Every drillhole collar on the Froome Project were either professionally surveyed or surveyed using a hand-held GPS device. After the drilling of a drillhole was completed the collar location was professionally surveyed again. The final professional survey data would override the pre-drilling survey location.

All drillholes were surveyed by use of a downhole instrument. At the beginning of the project down hole survey were completed with a single shot instrument and switched to a down-hole North Seeking Gyro tool for more accurate readings. Throughout McEwen Mining’s 5-percent database check no errors were noted with the down hole survey data.

All logging data was entered into a Gem’s Logger access-based application which would then be directly loaded into the GreyFoxSQL gems project. Data loaded into gems was validated using the “Gems Validation” tool to ensure no overlapping, nested intervals or duplicated sample numbers.

Assay data in the gems project was regularly checked against certificates to ensure there were no errors. Throughout the 5 percent database check McEwen Mining only noted rounding differences between the assay reported in the database and those in the certificate.

QC sample data was regularly monitored by the database geologist. Blank samples were considered a fail if the assay value returned values greater than 10 times the laboratory’s detection limit. The CRM samples were considered a fail if the assay value returned was greater than 3 standard deviations of the entire specific CRM population excluding gross outliers. Field duplicate samples were monitored, however, due to the possible nugget affect samples with an absolute difference greater than 25 percent may have been geologically overridden. Reject duplicate samples were monitored, however, due to the possible nugget affect samples with an absolute difference greater than 25 may have been geologically overridden. Pulp duplicate samples were monitored, however, due to the possible nugget effect samples with an absolute difference greater than 10 percent may have been geologically overridden. A small random selection of pulp samples was selected and sent to an umpire laboratory. These samples were noted as pulp duplicates and were to check the ability for another lab to reproduce the same results with a +/- 10 percent difference.

A tabulation of all the analytical quality control data generated by McEwen Mining for the Froome Project during the period 2014 to 2017 is provided in Table 14. SRK notes that the ratio of QC sampling to total sample count is high at 14.85 percent.

Table 14: Summary of Analytical Quality Control Data Generated by McEwen Mining for the Froome Project 2014 to 2017 Drilling Program

		Total	(%)	Sample Type
Sample Count		**35,526**		
Blanks		**1,790**	**5.04%**	
	Quarry Blank	1,784		Pulp
	Core Blank	**6**		**Barren Core**
Standards		**1,744**	**4.91%**	
	SE68	49		0.599 ppm Au Pulp
	OxG98	1		1.017 ppm Au Pulp
	SG66	760		1.086 ppm Au Pulp
	Oxi121	12		1.834 ppm Au Pulp
	OxJ120	7		2.365 ppm Au Pulp
	SJ63	2		2.632 ppm Au Pulp
	SK78	622		4.134 ppm Au Pulp
	SN75	291		8.671 ppm Au Pulp
Duplicates		**1,742**	**4.90%**	
	Field	1,729		Quarter Core
	Pulp	7		Pulp
	Reject	6		Reject
Total QC Samples		**5,276**	**14.85%**	
Check assay to umpire laboratory		577	1.62%	

12.1.3 Grey Fox Project

All data pertaining to drillholes (collar locations, down hole surveys, assays etc..) from the 2014-2015 Grey Fox Project drill program were collected and added to the main “LOGGERGF” drillhole workspace in the “GreyFoxSQL” sequel Gems project. McEwen Mining also randomly chose 5 percent of drillholes in the 2014 to 2015 Grey Fox Project drill program to be verified.

Every drillhole collar on the Grey Fox Project was either professionally surveyed or surveyed using a hand-held GPS device.

All drillholes were surveyed by use of a downhole single shot instrument. At the beginning of the project down hole survey were completed with a single shot instrument and switched to a down-hole North Seeking Gyro tool for more accurate readings. Throughout McEwen Mining’s 5-percent database check no errors were noted with the down hole survey data.

All logging data was entered into a Gem’s Logger access-based application which would then be directly loaded into the GreyFoxSQL gems project. Data loaded into gems was validated using the “Gems Validation” tool to ensure no overlapping, nested intervals or duplicated sample numbers.

Assay data in the gems project was regularly checked against certificates to ensure there were no errors. Throughout the 5-percent database check McEwen Mining only noted rounding differences between the assay reported in the database and those in the certificate.

QC sample data was regularly monitored by the database geologist. Blank samples were considered a fail if the assay value returned values greater than 10 times the laboratory’s detection limit. CRM samples were considered a fail if the assay value returned was greater than 3 standard deviations of the entire specific CRM population excluding gross outliers. Field duplicate samples were monitored, however, due to the possible nugget affect samples with an absolute difference greater than 25 percent may have been geologically overridden. A small random selection of pulp samples was selected and sent to an umpire laboratory. These samples were noted as pulp duplicates and were to check the ability for another lab to reproduce the same results with a +/- 10 percent difference.

A tabulation of all the analytical quality control data generated by McEwen Mining for the Grey Fox Project during the period 2014 to 2017 is provided in Table 15. SRK notes that the ratio of QC sampling to total sample count is high at 15.78 percent.

Table 15: Summary of Analytical Quality Control Data Generated by McEwen Mining for the Grey Fox Project 2014 to 2015 Drilling Program

		Total	(%)	Sample Type
Sample Count		**75,998**		
Blanks		**4,066**	**5.35%**	
	Quarry Blank	3,975		Pulp
	Core Blank	91		Barren Core
Standards		**3,955**	**5.20%**	
	SK78	2,616		4.134 ppm Au Pulp
	SG66	862		1.086 ppm Au Pulp
	SN75	477		8.671 ppm Au Pulp
Field Duplicates		**3,973**	**5.23%**	**Quarter Core**
Total QC Samples		**11,994**	**15.78%**	
Check assay to umpire laboratory		1,327	1.75%	

12.2 Verifications by SRK

12.2.1 Site Visit

In accordance with NI 43-101 guidelines, SRK visited the Black Fox Complex on various occasions between November 2017 and January 2018. These visits were undertaken by SRK consultants Dr. Aleksandr Mitrofanov, PGeo, Dr. Erwann Lebrun, Mr. Michael Selby, PEng, and Mr. Glen Cole, PGeo accompanied by McEwen Mining staff.

The site visits by Dr. Mitrofanov and Mr. Cole did not take place during active drilling, but all aspects that could materially impact the integrity of the data informing the mineral resource estimates for the three projects (core logging, sampling, analytical results, and database management) were discussed with McEwen Mining staff. SRK interviewed mine staff to ascertain exploration and production procedures and protocols. SRK examined core selected boreholes and confirmed that the logging information accurately reflects actual core.

Dr. Lebrun analyzed the structural controls of gold mineralization, discussed core logging procedures with McEwen Mining technical staff and provided the necessary structural input for the mineral resource modelling at the Grey Fox Project. Mr. Selby visited the site to collaborate with McEwen Mining mine engineering staff regards mine planning procedures and reporting protocols.

12.2.2 Discussion

To assess the accuracy and precision of analytical quality control data, SRK routinely analyzes such data. Analytical quality control data typically comprises analyses from standard reference material, blank samples, and a variety of duplicate data. Analyses of data from standard reference material and blank samples typically involve time series plots to identify extreme values (outliers) or trends that may indicate issues with the overall data quality. To assess the repeatability of assay data, a number of tests can be performed, of which most rely on certain statistical tools. SRK routinely plots and assesses the following charts for duplicate data:

- Bias charts
- Quantile-quantile (Q-Q) plots
- Mean versus half relative deviation (HRD) plots
- Mean versus half absolute relative deviation plot
- Ranked half absolute relative deviation (HARD) plot

SRK reviewed the available analytical quality control data provided by McEwen Mining for the Black Fox, Froome and Grey Fox projects to confirm that the analytical results from these projects are reliable for informing mineral resource estimates. All data were provided to SRK by McEwen Mining in Microsoft Excel format as both tabulated data and charts from McEwen Mining.

Control samples (blanks and CRM) were summarized on time series plots to highlight the performance of the control samples. Field duplicates and umpire laboratory pulp duplicates were analyzed using bias charts, quantile-quantile, and relative precision plots.

The analytical quality control data produced between 2014 and early 2017 are summarized in Table 13, Table 14 and Table 15 and a representative selection of this data charted by McEwen Mining is presented in Appendix A. The total quality control data (combined from blanks, standards and duplicates) produced at the Black Fox Complex projects are Black Fox Mine (15.20 percent), Froome Project (14.85 percent) and Grey Fox Project (15.78 percent), respectively.

13 Mineral Processing and Metallurgical Testing

Historical metallurgical testing has previously been summarized in other technical reports, such as the one prepared by Brigus Gold (National Instrument 43-101 - January 6, 2011) and Primero Mining (National Instrument 43-101 - June 19, 2014).

13.1 Black Fox Mine

13.1.1 Mineralogy

Historically, mineralization at the Black Fox Mine was divided into two (2) main zones: the East Zone and the West Zone.

More recently, three zones are being mined: the East, West and Center. Not a lot of mining is currently occurring in the West Zone anymore, however, there are some remnants that will continue to be mined.

Material from the East Zone is mainly mafic volcanics and is known to contain sulphides (up to 5 percent), mainly as pyrite. Typical gold recoveries attained from this zone are in the 81 to 91 percent range.

Material from the West Zone is mainly ultramafics containing carbonates, but few sulphides. Metallurgical performances tend to indicate that the West Zone is less refractory as typical gold recoveries range between 94 to 95 percent with recoveries of up to 97 percent for certain areas. For both zones, the presence of problematic minerals such as graphite is low.

The historical proportion of mafic/ultramafic material sent to the Black Fox Mill was in the order of 70 to 30 percent. Future estimated proportions are in the order of 60 to 40 percent. Such a change in the feed should not lead to significant changes in the overall concentrator gold recovery.

A high-grade gold intersection directly below the current underground mining operations at the Black Fox Mine has been identified by exploration drilling. The material from this zone appears mainly to be comprised of a combination of material similar to what is present in the East and West zones.

13.1.2 Head Assays

The gold head grades of the material sent for processing at the mill from May 2009 to June 2014 are presented in Figure 23. The listed gold grades represent the weekly averages for the gold head grades measured at the mill feed.

The gold head grades measured at the mill express variable tendencies. Much of this variability arises from the apparent Poisson skewness in the distribution of measured gold grades. This skewness leads to frequent slight underestimations of the actual gold head grade and the occasional significant overestimations of the actual grades.

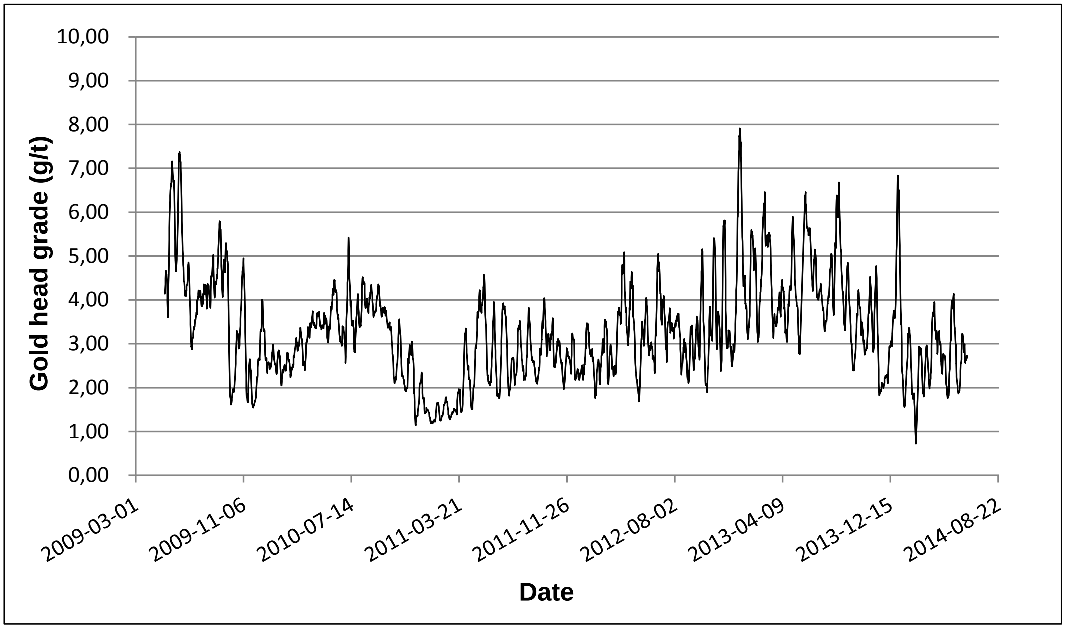


Figure 23: Measured Weekly Average Gold Head Grades

No general trend appears in the evolution of the measured gold head grades. As material identified by the exploration drilling shows a mineralization similar to what is being observed in the East and West zones, no future significant changes are expected in the gold head grades of the material processed at the mill.

More recent head gold grades are shown below. There has been an increase in head grade as compared to historical data.

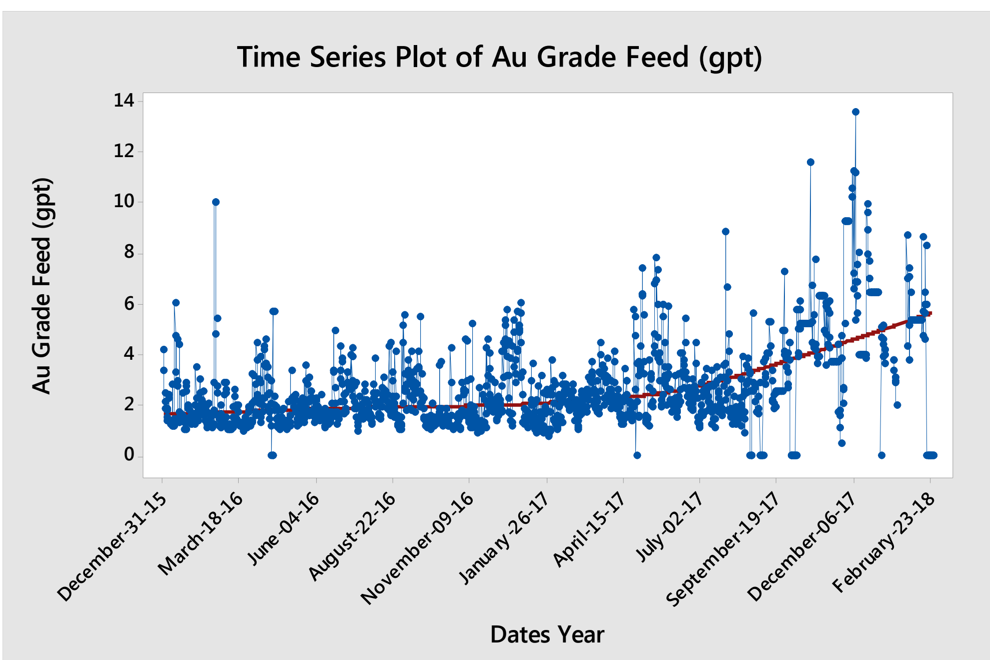


Figure 24: Recent Head Gold Grades

13.1.3 Concentrator Recovery

Gold recoveries measured at the mill from May 2009 to June 2014 are presented in Figure 25. The presented gold recoveries represent the weekly averages for the overall gold recoveries measured at the mill.

The gold recoveries measured at the mill also express variable tendencies. Much of this variability arises from the apparent Poisson skewness in the distribution of measured gold grades.

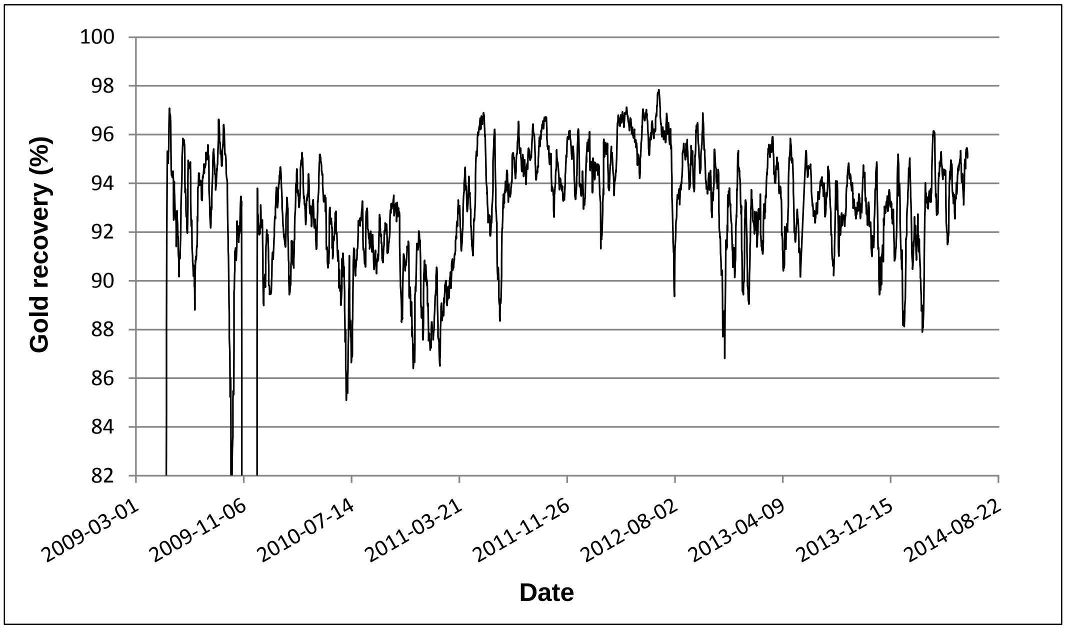


Figure 25: Measured Weekly Average Gold Recoveries

No general trend appears in the evolution of the measured gold recoveries. As material identified by exploration drilling shows a mineralization similar to what is being observed in the East and West zones, it is unlikely that future gold recoveries will differ significantly from what is currently being experienced at the mill.

Data including more recent mill gold recoveries and tailings grades are shown below. The upwards trend in tailings assays correspond to a similar trend in the feed gold assay.

The recovery data does not allow for the process retention time, but rather, the tailings assays represent the recovery based on the head grade measured 36 hours earlier. At the mill, the calculated gold recovery utilizes Total Losses (solid and soluble losses).

A timeline illustrating some of the major milestones in the life of the mill is shown in Figure 28.

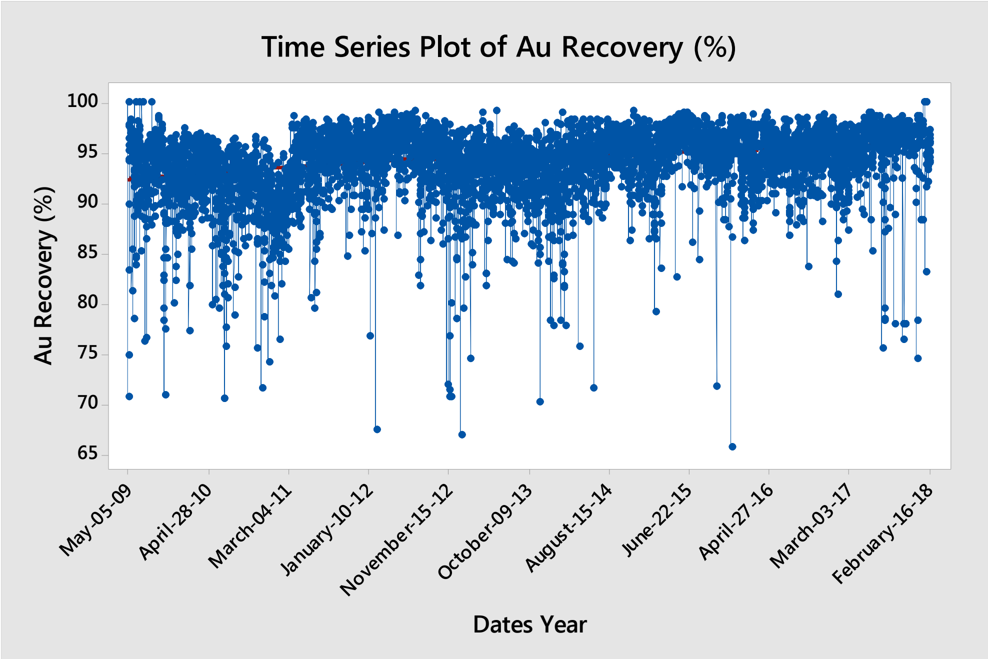


Figure 26:Time Series Plot of Gold Recovery

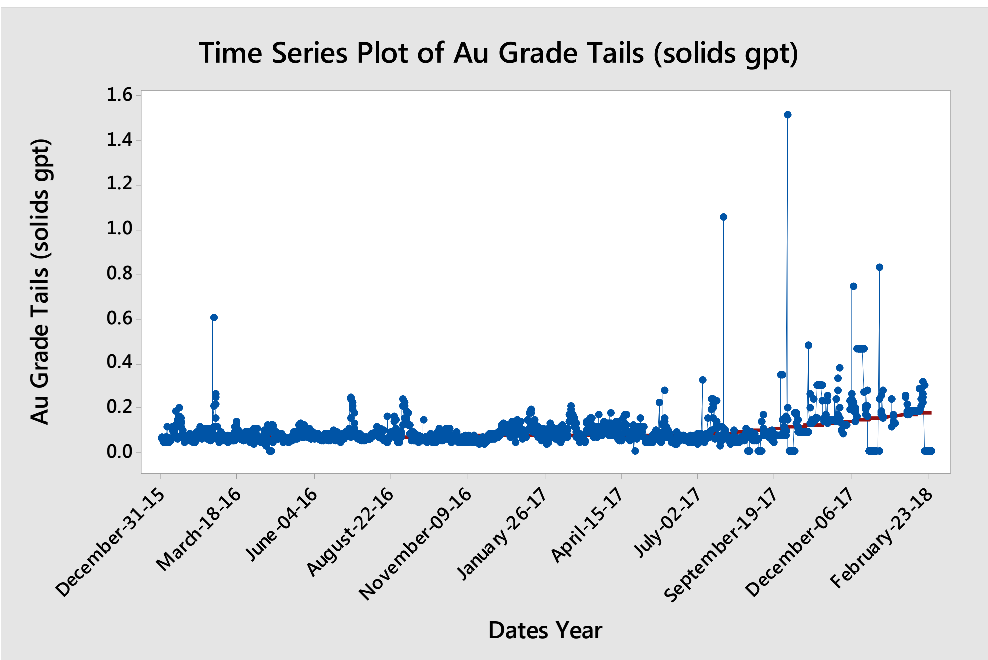


Figure 27: Time Series Plot of Gold Grade Tails

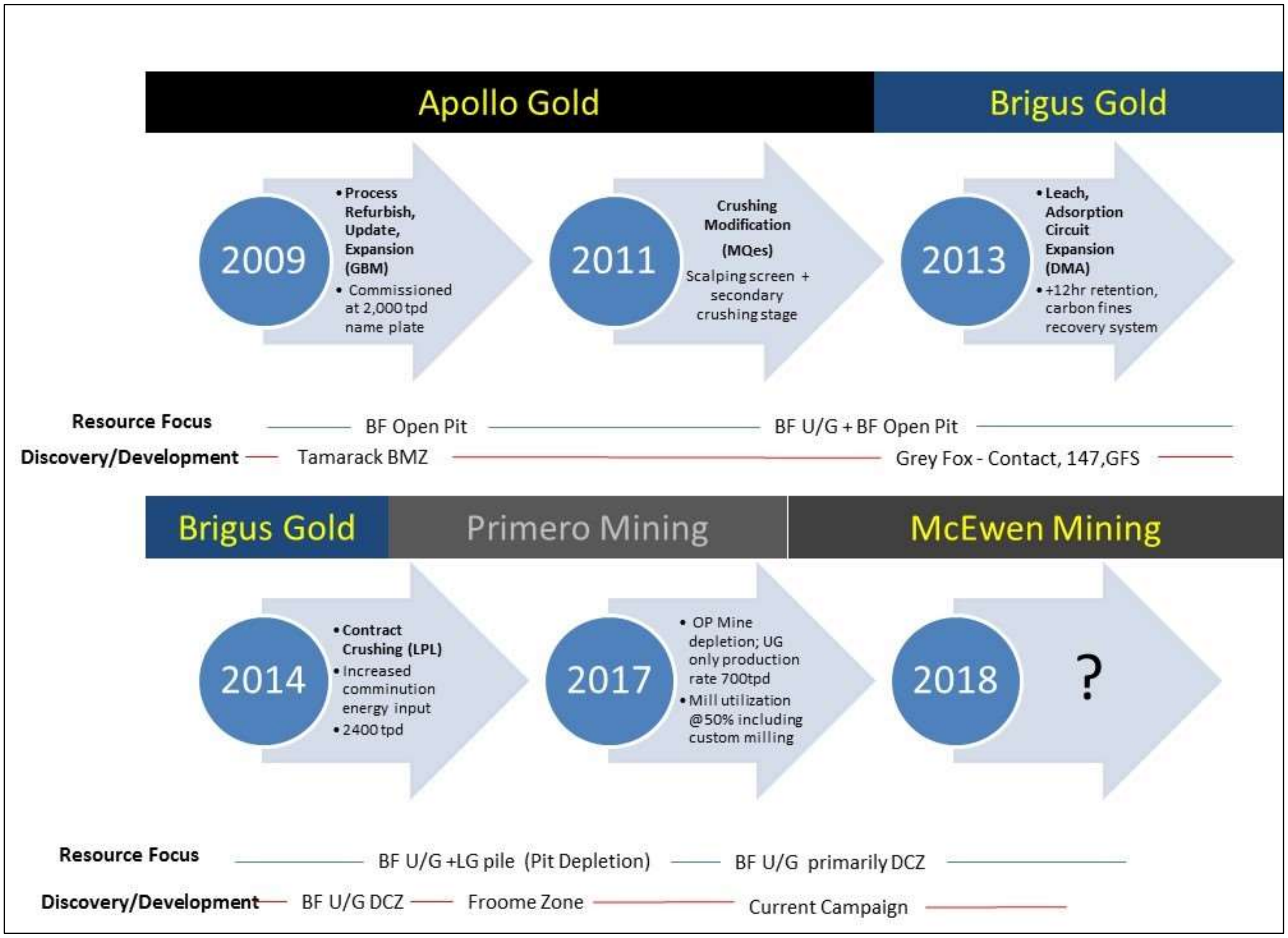


Figure 28: Timeline Illustrating Major Milestones in the Life of the Black Fox Mill

13.2 Froome Project

Primero previously evaluated the potential for development of the Froome Project. The project concept includes processing of Froome material at the Black Fox Mill. Accordingly, Primero engaged ALS Metallurgy, located in Kamloops, British Columbia to conduct a testwork program to confirm amenability of Froome material to the Black Fox process and to conduct an environmental testwork program. The metallurgical work was completed in February 2017 and an ALS report "Metallurgical Testing on Samples from the Froome Zone" dated February 21, 2017 was delivered.

Metallurgical testwork was conducted on several composite sample from representing underground material from the Froome Project, including an overall composite (master composite), four domain composite samples and a sample representing material from a proposed pit. All samples were essentially free of deleterious elements liable to create processing or environmental concerns and all responded well to standard cyanidation processing.

Predicted leach recovery for the master and domain composites is 89.5 percent at the current Black Fox Mill grind. The lower grade pit sample expected extraction, depending on grade and grind, is estimated at 85 percent. Scoping level thickening tests indicated no difficulty with liquid/solid separation.

Summary chemical analyses for the composites are shown in Table 16 below. The low organic carbon analyses suggest that gold losses to active carbon is unlikely.

Table 16: Composite Chemical Analyses

Product	Analysis (g/t, %)						
	Au	S	S(s)	$S(SO_4)$	C	TOC	C(g)
Master composite	5.73	1.59	1.56	0.03	1.62	0.02	0.01
Silica MS composite	4.83	1.42	1.39	0.03	1.5	0.03	0.01
Silica WM composite	5.54	1.65	1.62	0.03	1.33	0.03	<0.01
Py 1-3 composite	5.06	1.41	1.38	0.03	1.62	0.03	0.01
Py 3-5 composite	6.15	1.84	1.81	0.03	1.37	0.03	0.01
Low grade pit composite	3.2	1.52	1.52	<0.01	4.79	0.02	0.04

Whole rock analyses were conducted on the underground composite:

Table 17: Whole Rock Analyses

	Analysis, %				
	Master Comp	Silica MS Comp	Silica WM Comp	Py 1-3 Comp	Py 3-5 Comp
Al_2O_3	12.3	13.9	13.5	13.3	12.6
BaO	0.04	0.04	0.04	0.06	0.02
CaO	2.94	2.48	2.62	3.01	2.46
Cr_2O_3	0.07	0.06	0.06	0.07	0.06
Fe_2O_3	5.45	5.34	5.59	6.06	5.19
K2O	0.6	0.73	0.37	0.56	0.63
MgO	3.06	2.64	3.29	3.91	2.63
MnO	0.07	0.06	0.07	0.07	0.06
Na_2O	5.41	6.29	6.31	5.74	5.6
P_2O_5	0.12	0.13	0.11	0.1	0.12
SiO_2	59.6	60.1	60.8	58.6	61.3
TiO_2	0.52	0.55	0.54	0.55	0.52

13.2.1 Comminution

Bond rod mill, ball mill, and abrasion tests were performed on the master composite. The rod mill work index test was performed at the standard closing screen of 1,180 micrometres and returned an index value of 19.1 kilowatt hours per tonne indicating a relatively hard material. The ball mill index was determined at a closing screen size of 75 micrometres and yielded a ball mill index of 20.9 kilowatt hours per tonne, also indicating a relatively hard material. The Bond abrasion index was measured at 0.36, indicating a relatively abrasive material.

13.2.2 Cyanidation Testwork

Master Composite

Six standard bottle roll tests including one CIL test were conducted at grinds ranging from 45 to 119 micrometres (K80). All were 48-hour kinetic tests, with intermediate sampling at 2, 6, and 24 hours. The following Table and Figure summarize the results of these tests. Extractions were significantly grind dependent with moderate reagent requirements. The CIL test (Test 5) showed no indication of potential preg-robbing. At the current nominal Black Fox Mill grind of 75 micrometres, leaching is substantially complete after 24 hours

Table 18: Master Composite Gold Extraction

Test	Grind K80 µm	48 Hour Extraction %	Residue Au Grade g/tonne	NaCN Consumption kg/t	Lime Consumption kg/t
T01	55	91.1	0.51	0.8	0.9
T02	82	89.4	0.61	0.7	0.7
T03	119	85	0.88	0.5	0.6
T04	82	89.3	0.61	0.8	0.9
T05	82	88.2	0.66	0.9	0.8
T06	45	93.3	0.36	2.9	0.7

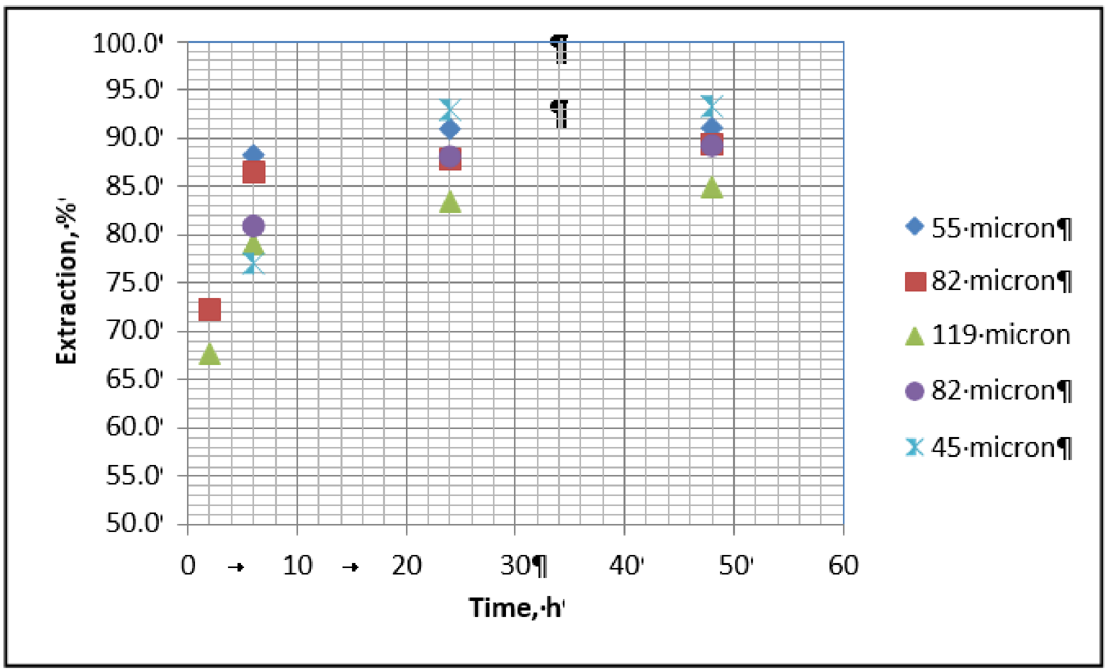


Figure 29: Master Composite Kinetics

The following table summarizes the cyanidation test results for the domain composites. Predicted master composite and domain sample extraction at a 75-micrometre grind is 89.5 percent.

Table 19: Domain Composites Extraction

Domain	Test	Grind K80, µm	48 Hour Extraction %	Residue Au g/t	NaCN Consumption kg/t	Lime Consumption kg/t
Silica MS						
	T07	62	90.6	0.46	0.9	1
Silica WM						
	T08	66	89.8	0.58	1.1	0.9
Py -1-3	T09	58	90.4	0.45	1.1	0.9
Py 3-5	T10	59	89.7	0.71	0.9	0.9

The following graph summarizes the effect of grind on 48-hour extraction for the master and domain composites. The domain composites results lie close to the master composite trend line indicating no significant differences in behaviour.

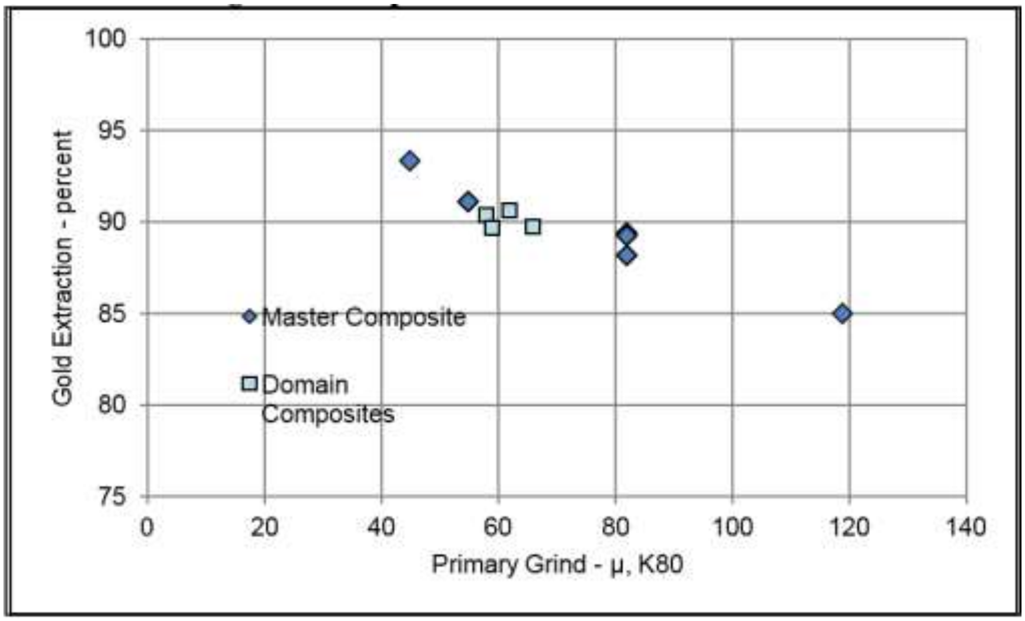


Figure 30: Underground Samples; Effect of Grind

13.2.3 Domain and Pit Samples

The four domain samples were evaluated in single tests at a target grind of 70 micrometres, with actual grinds ranging from 58 to 66 micrometres. Extractions were very similar for all four sample composites.

Table 20: Domain Sample Gold Extractions

Domain	Test	Grind K80 µm	48 Hour Au Extraction %	Residue Au Grade g/t	NaCN Consumption kg/t	Lime Consumption kg/t
Silica MS	T07	62	90.6	0.46	0.9	1
Silica WM	T08	66	89.8	0.58	1.1	0.9
Py -1-3	T09	58	90.4	0.45	1.1	0.9
Py 3-5	T10	59	89.7	0.71	0.9	0.9

Gold extractions for the low-grade pit composite ranged between 81 and 88 percent. Similar to the master composite, gold leach kinetics were rapid, with gold extraction typically near completion after 24 hours. No improvement in gold extraction was recorded in a carbon-in-leach (CIL) test compared to a whole ore leach test at an identical primary grind sizing of 76 micrometres K80, indicating the absence of preg-robbing. Sodium cyanide consumption ranged from 0.9 to 1.3 kilograms per tonne, with highest consumption measured for the finest primary grind sizing. Lime consumption ranged from 0.5 to 0.8 kilograms per tonne.

The results for the pit composite are shown below. The correlation between extraction and grind is relatively poor but the trend appears similar to the master composite. At a K80 of 75 micrometres, predicted extraction is 85 percent.

Table 21: Gold Deportment in Tailings

Test	Calc Head g/t	Extraction %	Grind K80, µm
12CN	2.74	83.9	76
14CN	2.91	83.8	90
15CN	2.86	86	66
16CN	3.01	87.9	56
13CIL	2.57	81.4	76

The cyanidation leach tails from master composite test 2 was submitted to the University of Western Ontario for an assessment of gold losses. The leach residue assayed about 0.6 g/t gold at a grind of 82 micrometres, and was analyzed by Dynamic SIMS (D-SIMS) with the objective of quantifying the sub-microscopic gold content of pyrite. This study determined that approximately 10 percent of the gold contained in the sample was submicroscopic in pyrite and not recoverable by direct cyanide leaching. By inference, some of the contained gold may be accessible via finer grinding.

13.2.4 Thickening

Qualitative thickening testwork was conducted on master composite leach slurry using Cytec A- 130 flocculant which, in scoping tests, out-performed the current Black Fox flocculant (Kemira N-100). Dosages of 0, 2, 5, 10 and 15 g/t were tested. Although the test procedure does not permit definitive thickener sizing, the free settling rate results indicate that settling performance is satisfactory and achievable with relatively low flocculant dosages; perhaps as low as 5 g/t.

13.3 Grey Fox Project

A first mineralogical and metallurgical characterization was performed in 2013 by SGS (Legault and Geldart, 2013). Two (2) sets of samples were selected and shipped to SGS for the testwork realized in two (2) stages:

- Samples of the 147 Zone and Contact Zone master composite materials were provided as coarse assay rejects. The hole selections were done by Tetra Tech while DMA verified the samples and the testwork performed. EHA Engineering provided instructions for the preparation of the composites.

- Samples containing intervals from 16 grid zones, eight (8) from the 147 Zone and eight (8) from the Contact Zone. The intervals were combined to generate variability composites according to the grid and zone. The samples were selected by Brigus; there was no third party involved in the selection of the samples or in the supervision of the testwork.

The samples of the 147 Zone and Contact Zone master composite materials were analyzed for mineral content using QEMSCAN. The grindability of the material was assessed to determine the Bond ball mill work index and the Bond rod mill work index. The gold recovery was achieved by gravity and cyanidation on the gravity tailings of the master composites. The gold recovery was achieved by cyanidation only on the whole composites. Finally, a basic environmental test program including modified acid base accounting and net acid generation testing was conducted to characterize the cyanide destruction residue samples.

In light of the first tests realized at SGS, a second mineralogical and metallurgical characterization was requested to XPS in 2013 to confirm the gold recovery obtained on variability samples. The samples were selected by XPS in order to represent the material that will be used in the concentrator as accurately as possible. The following key factors were the basis for the selection of the variability composites:

- The composites were targeted to be similar in gold grade.
- Fresh core was used as opposed to assay rejects in order to have a consistent feed size.
- The composites were selected across the zone for added spatial representativeness.

Four (4) composite samples were collected from the 147 Zone and four (4) from the Contact Zone. The feed samples were submitted to a mineralogical analysis using QEMSCAN and gold recovery was assessed through cyanidation.

13.3.1 Mineralogy

The eight (8) variability composites from the Grey Fox Project were submitted to a QEMSCAN analysis to define the material mineralogy. The results are presented in Figure 31.

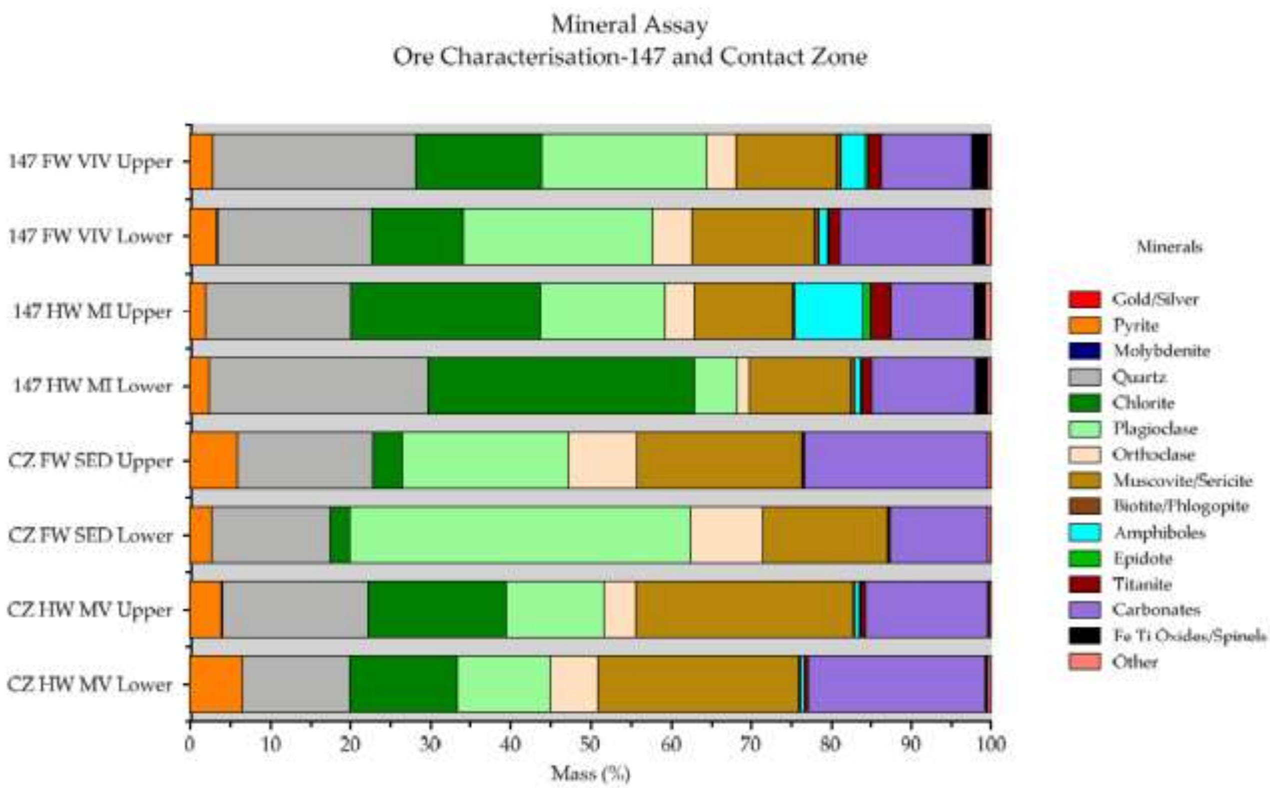


Figure 31: Sample Mineralogy (SGS)

13.3.2 Head Assay

The head assay of the variability samples from the 147 Zone and the Contact Zone composites are summarized in Table 22. An external reference distribution (ERD) was performed on each to establish the samples gold values.

Table 22: Sample Head Grades

Comp Details	Comp No	Target (Au ppm)	Au ppm (ERD)	Si	Al	Fe	Mg	Ca	Na	K	Ti	Mn	Cr	As	S	C (t)
147FWVIV Upper	1	2.97	4.31	23.19	5.72	10.49	1.69	5.19	1.99	1.11	0.91	0.19	0.12	0.01	1.18	1.61
147FWVIV Lower	2	2.92	6.37	21.22	5.66	10.28	1.98	5.79	2.14	1.29	0.85	0.19	0.10	0.01	1.47	2.65
147 HW MI Upper	3	3.08	2.20	21.22	5.93	9.79	3.12	6.92	1.40	1.17	0.65	0.14	0.08	0.01	0.93	1.98
147 HW MI Lower	4	2.90	3.15	20.19	5.50	9.79	3.41	7.29	0.68	1.00	0.71	0.14	0.06	0.01	1.14	2.39
CZFWSED Upper	5	2.96	3.37	21.97	6.67	4.33	2.00	7.79	2.10	2.02	0.32	0.12	0.08	0.01	2.12	3.07
CZFWSED Lower	6	2.99	5.70	25.34	7.62	3.57	1.40	4.53	3.58	1.74	0.32	0.09	0.08	0.00	1.33	1.82
CZ HW MV Upper	7	2.96	2.36	20.05	6.83	7.27	3.27	6.71	1.31	1.95	0.36	0.15	0.08	0.01	1.41	2.86
CZ HW MV Lower	8	2.97	3.03	17.25	6.09	8.46	2.99	9.08	1.20	1.89	0.32	0.17	0.07	0.01	2.92	3.60

The samples contain little sulphur which is consistent with the presence of few sulphide minerals in the mineralized zones. The sulphide minerals contribution comes mainly from pyrite.

13.3.3 Grindability

Comminution testwork determines the grindability characteristics and determines the size and energy consumption of the crusher and ball mills. Samples of the 147 Zone and Contact Zone master composites were tested at SGS for the Bond ball mill work index and the Bond rod mill work index determination.

Bond Ball Mill Test

The Bond index expresses the materials resistance to ball milling. A high index value means the material is more difficult to grind. The Bond ball mill indices performed on samples from the 147 and Contact zones are outlined in Table 23.

The Bond ball mill work test indicates that this material is among the hardest within the SGS database (over 10,000 samples) and that a significant amount of energy will be required to process it.

Table 23: Bond Ball Work Index (SGS)

Sample Name	Mesh of Grind	F_{80} (µm)	P_{80} (µm)	Gram per Revolution	Work Index (kWh/t)	% Reduction	Hardness Percentile
147 Zone Master Comp	200	2,582	59	0.54	27.1	-	100
147 Zone Master Comp HPGR Prod	200	2,130	57	0.56	26.5	2	99
CZ Master Comp	200	2,590	56	0.68	21.9	-	97
CZ Master Comp HPGR Prod	200	2,230	58	0.75	20.8	5	95

Bond Rod Mill Test

The Bond rod mill test indicates the materials' resistance to processing through a rod mill. The Bond rod mill indices are summarized in Table 24.

Both the Contact and 147 Zone master composites were within the 99 to 100 percentiles of the SGS database and indicate this very hard material.

Table 24: Bond Rod Mill Index (SGS)

Sample Name	Mesh of Grind	F_{80} (µm)	P_{80} (µm)	Gram per Revolution	Work Index (kWh/t)	Hardness Percentile
147 Zone Master Comp	14	10,828	939	4.39	23.1	100
CZ Master Comp	14	10,695	957	5.08	21.5	99

13.3.4 Gravity Separation

Recovery of gold by gravity separation was investigated at SGS on the 147 Zone master composite and the Contact Zone master composite. Gravity separation improves the accounting process since it is removed early on in the process. It reduces the risks of accumulation of coarse gold nuggets in the circuit dead zones such as sumps, pump boxes and gaps between liners. Such accumulations are greatly reduced in a plant where cyanide is added in the grinding circuit.

The gravity separation results are presented in Table 25. The results show that the samples reacted well to gravity separation.

Table 25: Gravity Separation Results (SGS)

Gravity Test No.	Ore Type /Comp	Feed Size P80, µm	Feed Weight kg	Tests on Gravity Tailing	Product	Mass %	Assays Au, g/t	% Distribution
G-5	147	91	10	F-8	Mozley Concentrate	0.13	629	28
					Knelson/Mozley Tailing	99.87	2.15	72
					Head (Calculated)		2.98	100
G-8	147	74	10	CN-16	Mozley Concentrate	0.1	1142	32.1
					Knelson/Mozley Tailing	99.9	2.36	67.9
					Head (Calculated)		3.47	100
					Head (Direct)		3.35	
G-3	CZ	97	10	F-7	Mozley Concentrate	0.18	511	17.2
					Knelson/Mozley Tailing	99.82	4.5	82.8
					Head (Calculated)		5.43	100
G-9	CZ	69	10	CN-17	Mozley Concentrate	0.09	1242	21.6
					Knelson/Mozley Tailing	99.91	4.22	78.4
					Head (Calculated)		5.38	100
					Head (Direct)		4.64	

13.3.5 Cyanidation

The standard method of recovering gold is through cyanidation, where gold is dissolved by cyanidation and further concentrated by either precipitation through the addition of zinc dust or by adsorption through activated carbon.

Recovery of gold by cyanidation was investigated at SGS on the whole samples from the 147 Zone and Contact Zone master composites.

The tests were performed in a cyanidation bottle roll and included pre-aeration with air. The whole sample cyanidation tests were conducted on 1-kilogram samples. The results are presented in Table 26.

Table 26: Whole Sample Cyanidation Results (SGS)

CN Test No.	Ore Type /Comp	Feed Size P80 µm	Reagent Consumption kg/t of CN Feed NaCN	Reagent Consumption kg/t of CN Feed CaO	% Au Ext 48 h	Residue Au, g/t	Carbon Au, g/t	Head, Au, g/t Calc	Head, Au, g/t Direct	Client
CN-1	147 Zone 1	75	0.24	0.83	93	0.19	112	2.75	2.68	2.95
CN-2	147 Zone 2	81	0.36	1.27	90	0.36	148	3.67	2.82	3.03
CN-3	147 Zone 3	71	0.33	1.46	94	0.14	86	2.09	1.5	2.09
CN-4	147 Zone 4	42	0.45	1.65	90	0.58	237	5.93	4.2	4.75
CN-5	147 Zone 5	75	0.43	1.03	93	0.24	140	3.46	4.51	3.36
CN-6	147 Zone 6	81	0.61	1.33	81	0.43	78	2.26	1.66	2.08
CN-7	147 Zone 7	80	0.25	0.84	71	0.21	22	0.73	0.65	1.17
CN-8	147 Zone 8	93	0.39	1.28	63	0.9	62	2.41	2.29	2.47
CN-9	Contact Zone 1	114	0.16	0.79	78	0.42	64	1.91	1.73	2.69
CN-10	Contact Zone 2	52	0.69	1.26	64	1.25	95	3.48	3.33	3.15
CN-11	Contact Zone 3	58	0.27	2.39	83	0.77	165	4.6	4.78	4.66
CN-12	Contact Zone 4	52	0.33	1.02	76	0.63	84	2.56	2.12	2.9
CN-13	Contact Zone 5	46	0.57	1.11	94	0.43	304	7.45	11.1	7.43
CN-14	Contact Zone 6	59	0.57	1.15	84	0.64	151	4.12	4.98	6.12
CN-15	Contact Zone 7	71	0.35	1.06	90	0.9	377	9.3	9.24	9.17
CN-16	Contact Zone 8	46	0.33	1.24	79	0.66	108	3.14	2.88	2.75

Note: The 48-hour extraction is the sum of gold in solution and loaded onto carbon

Calc: This is the calculated gold head grade from the cyanidation test

Direct: This is the average of two (2) 30 g gold fire assays performed at SGS Lakefield

Client: This is the average gold assay supplied by Brigus GoldCalc: This is the calculated gold head grade from the cyanidation test

A second series of cyanidation tests was conducted at XPS on whole samples on 1-kilogram charges. Table 27 presents the results of gold recovery obtained after 48 hours of leaching.

Table 27: Whole Sample Cyanidation Results (XPS)

Sample Name	Gold Head Grade	Feed P80	Gold Recovery	Reagent Consumption g/t NaCN
147 FW VIV Upper	4.3	61	84.8	1859
147 FW VIV Lower	6.4	56	93.4	2452
147 HW VIV Upper	2.2	58	86.2	1383
147 HW VIV Lower	3.2	61	89.3	2081
147 Zone Average	4	59	88.4	1944
CZ FW SED Upper	3.4	57	87.5	2109
CZ FW SED Lower	5.7	64	92.8	1725
CZ HW SED Upper	2.4	59	76.6	1258
CZ HW SED Lower	3	59	70	1667
Contact Zone Average	3.6	60	81.7	1690

The material collected for the tests realized at XPS was carefully selected in order to be as representative as possible of the Grey Fox material that will be processed in the concentrator. Therefore, the recovery results obtained at XPS should be used as a reference for the plant gold recovery. The grind size expected for the Grey Fox milling is, however, coarser than the grind size used for the tests at XPS. Based on the results obtained from the tests realized at SGS on the two (2) zones, in the range of grinding sizes used for the tests (42 to 114 micrometres), the gold recoveries obtained show that there is no significant relationship between grind size and gold recovery. Figure 32 outlines the results of gold recovery as a function of sample feed grind size.

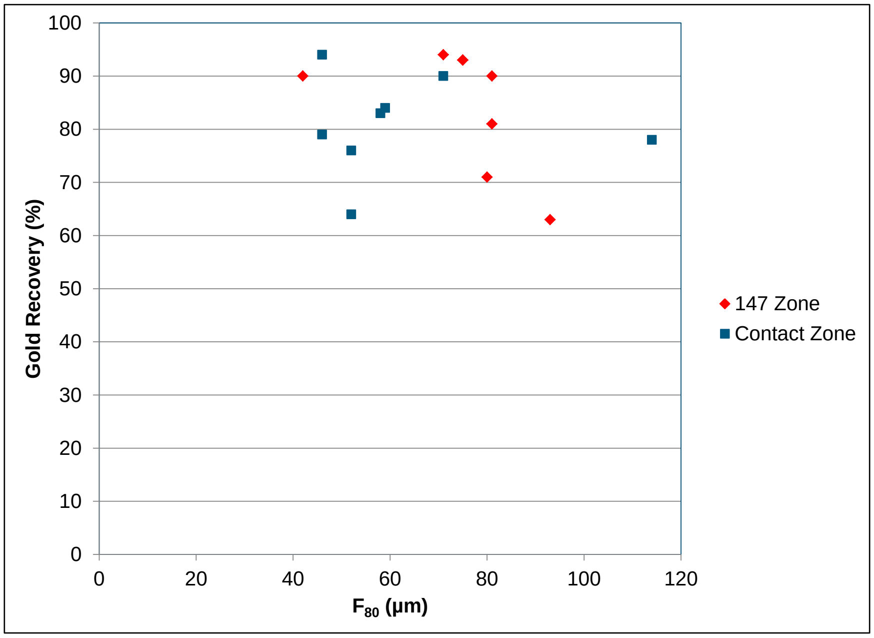


Figure 32: Gold Recoveries as a Function of Sample Feed Grind Size

13.3.6 Modified Acid Base Accounting and Net Acid Generation Test

The environmental tests were conducted on the samples from the 147 Zone and Contact Zone master composites. The modified acid base accounting test was conducted to determine the propensity of the tailings and waste rocks to generate acidic conditions. The results are presented in Table 28.

Table 28: Modified Acid Base Accounting Results

Parameter	Unit	CND1-2 Treated Residue	CND2-2 Treated Residue
NP	t $CaCO_3$/1000 t	190	137
AP	t $CaCO_3$/1000 t	26.9	66.9
Net NP	t $CaCO_3$/1000 t	163	70.1
NP/AP	Ratio	7.05	2.05
Sulphide	%	0.86	2.14
CO_3 NP	T $CaCO_3$/1000 t	176	130

The net acid generating tests were assessed to validate the acid rock drainage characteristics of each sample based on the complete oxidation of the samples sulphide content. The results are presented in Table 29. The tests indicated that the tailings were net non-acid generating.

Table 29: Net Acid Generation Test Results

Parameter	Unit	CND1-2 Treated Residue	CND2-2 Treated Residue
LIMS		10297-FEB13	14277-FEB13
Sample weight	g	1.5	1.52
Vol H2O2	mL	150	150
Final pH	units	10.43	10.87
NaOH	Normality	0.1	0.1
Vol NaOH to pH 4.5	mL	0	0
Vol NaOH to pH 7.0	mL	0	0
NAG (pH 4.5)	kg H_2SO_4/tonne	0	0
NAG (pH 7.0)	kg H_2SO_4/tonne	0	0

13.3.7 Grey Fox - Metallurgical Test Work

Metallurgical test work for the Grey Fox Project has been ongoing for several years with initial grindability work being conducted by SGS in 2012. This work resulted in revelations that the materials in both the 147 and Contact zones are quite hard and abrasive with a BWI of 26-27 and 22-22 respectively. Apart from the hardness concerns, SGS also highlighted concerns about the expected mill recovery for some of the Grey Fox material. Specific follow up work was commissioned through XPS in 2013, 2014 and on into 2015 through a series of phased studies. The following general conclusions were made (Buss, 2015):

- Mineralogical analysis reveals that some gold is finely distributed in sulphides (pyrite).
- Sulphur/gold ratio is a good indicator of poor metallurgical performance.
- High grade samples always perform well.
- Low grade/high sulphur samples always perform poorly.
- Low grade/low sulphur samples show significant scatter in metallurgical response.
- Creating a flotation sulphide/gold concentrate followed by a regrind of this concentrate may have merit in increasing total mill throughput, but does not appreciably improve recovery.

During the course of the economic evaluations of the open pit options, it was important to consider the refractory nature of some sections of the deposit. Unfortunately, detailed assay data on sulphur grades have not been routinely or consistently collected throughout all phases of the drilling programs to date. Therefore, back analysis to identify the specific problematic zones, or problematic regions within a specific zone, cannot be done. This was addressed by creating a series of risk adjusted recovery curves to reflect the potential that lower grades would likely have lower recoveries. The chart below shows two recovery curves used to reflect the metallurgical recovery throughout the mine evaluation process.

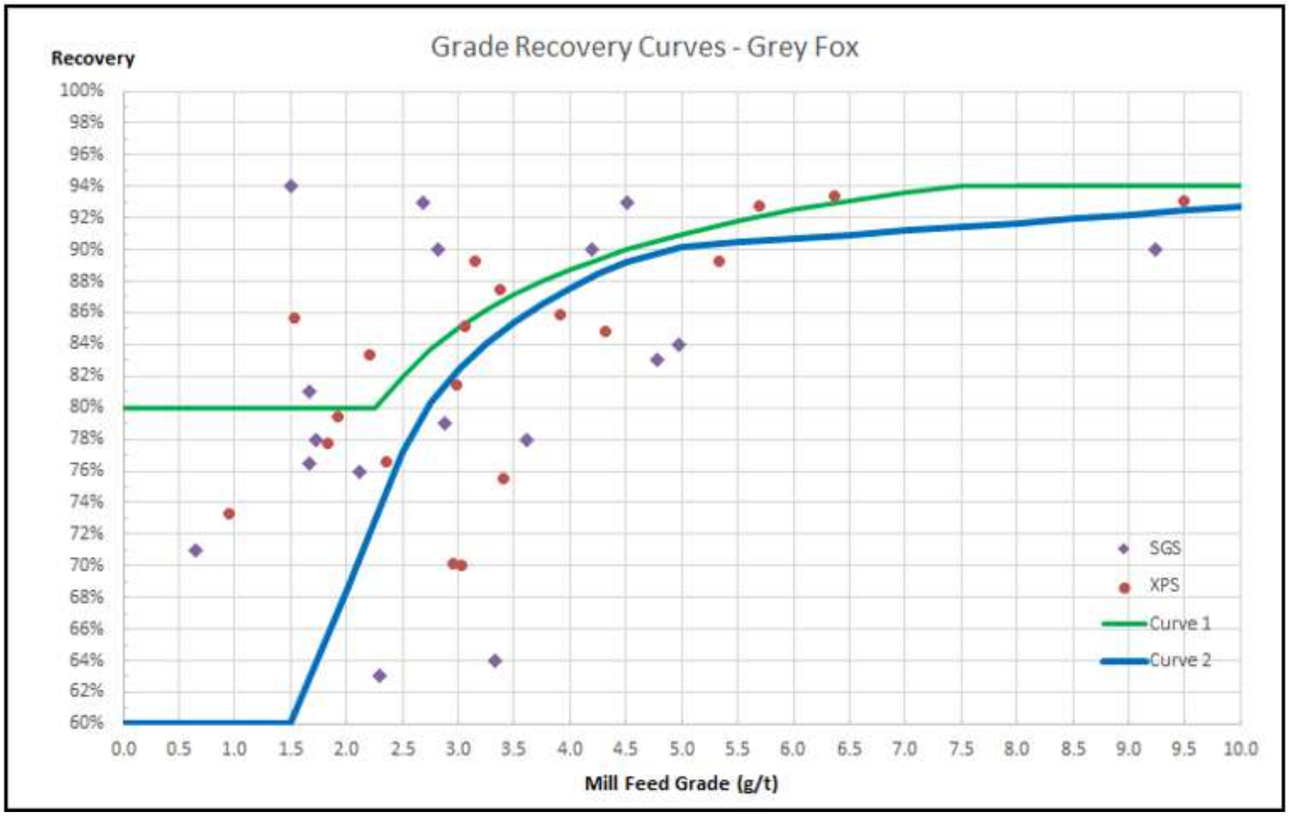


Figure 33: Grade/Recovery Curves for Grey Fox Project

Curve 1 was used early on as a best fit curve for the selected data sets that focused primarily on the SGS data. Curve 2 was used after much of the XPS data had been reviewed and a consensus of the SME's was arrived at for a "risk adjusted" curve based on the latest and more complete understanding of the underlying drivers of metallurgical performance. The following Table provides the specific calculations for these curves.

Table 30: Recovery Curve Details - Grey Fox Project

Curve 1		Curve 2	
Head Grade Range	**Curve**	**Head Grade Range**	**Curve**
< 2.25 g/t	80% flat	< 1.5 g/t	60% flat
2.25 to 7.50 g/t	(HG - 0.45) / HG	1.5 to 2.5 g/t	17 x HG + 34.5
> 7.50 g/t	94% flat	2.5 to 5.0 g/t	73 + 3.7 x SQRT ((31.5 – (HG – 8)2)
		> 5.0 g/t	HG / 2 + 87.7

A February 10, 2014 report prepared by XPS for Brigus Gold concluded that: characterization work on Grey Fox is not absolutely complete, since there is an unverified assumption that the Contact pyritic ore is mappable for the purpose of ore economic evaluation and mine planning. This is a reasonable hypothesis based upon existing observations, but needs to be substantiated using actual pyrite mapping within the Contact Zone. Mapping of sulphur within Contact ore needs to be followed up with sampling and testing of the "Pyritic" and "Low-S" ore subtypes.

13.4 Black Fox Open Pit

Initially run as a fairly limited operation, the Black Fox open pit was expanded over the years to become a major contributor to the overall feed to the Black Fox Mill. In fact, in the period from January 2013 to the end of February 2015, the open pit mine contributed more than 70 percent of the mill feed. The pit has reached the end of its active life as it can no longer generate a positive cash flow at current metal prices. A review of the potential to extend the pit life was conducted in April 2015 by internal Primero pit planning resources and a potential push back of the southwest wall (Phase 4) was identified. In early 2015 it was felt that there was little potential productive merit in this option and that there were practical physical barriers to developing this push back, so the plan was abandoned.

13.4.1 Black Fox Stockpile

The Black Fox open pit had to mine through a significant amount of marginal grade material over the last few years. A low-grade stockpile was placed near the pit containing approximately material with a grade of approximately 1 g/t. The economic value of processing the stockpile in order to augment the feed to the Black Fox Mill was evaluated. As of 2018, this low-grade stockpile has been processed through the Black Fox Mill.

13.4.2 Back Analysis of Historic Production Data

On the recovery side, the mill has been quite successful in getting exceptionally good recovery from their process. The chart below shows the month on month average recovery data from the mill over the 26-month period ending February 2015.

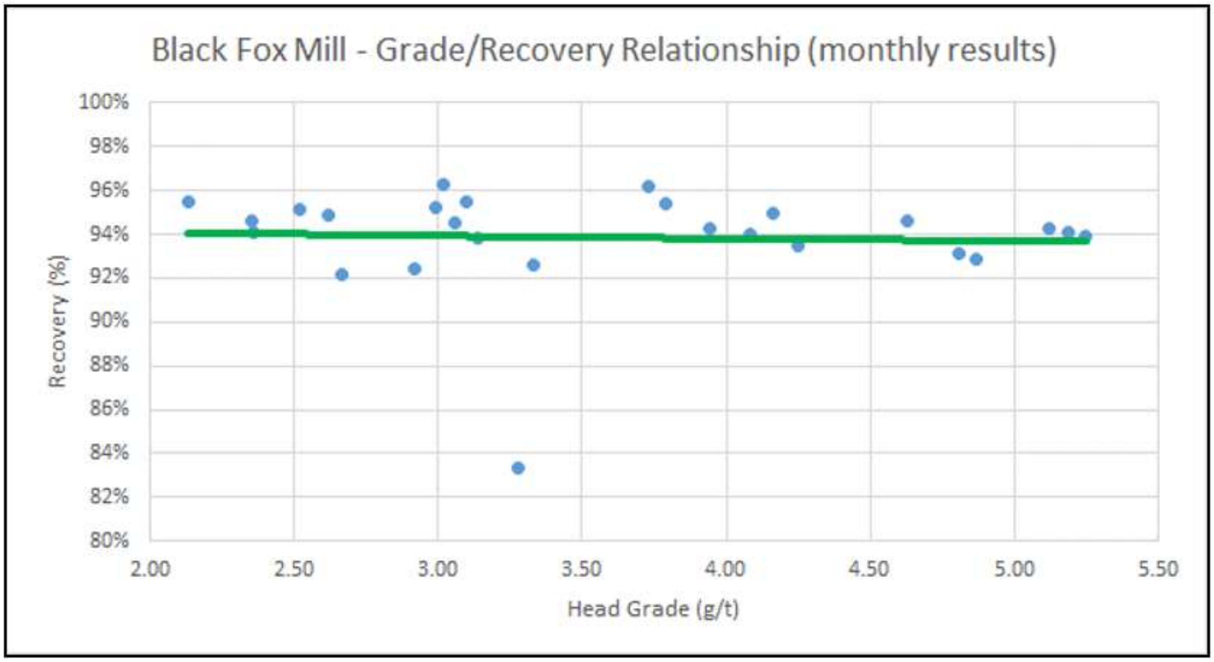


Figure 34: Black Fox Mill - Monthly Grade/Recovery Data

While this chart shows a relatively consistent recovery trend at approximately 94 percent across a very broad range of feed head grades, the process is quite capable of outperforming this recovery on a shorter-term basis. For example, the chart below presents the daily grade/recovery relationship over a much larger sample size (Jan 1, 2015 through April 12, 2015).

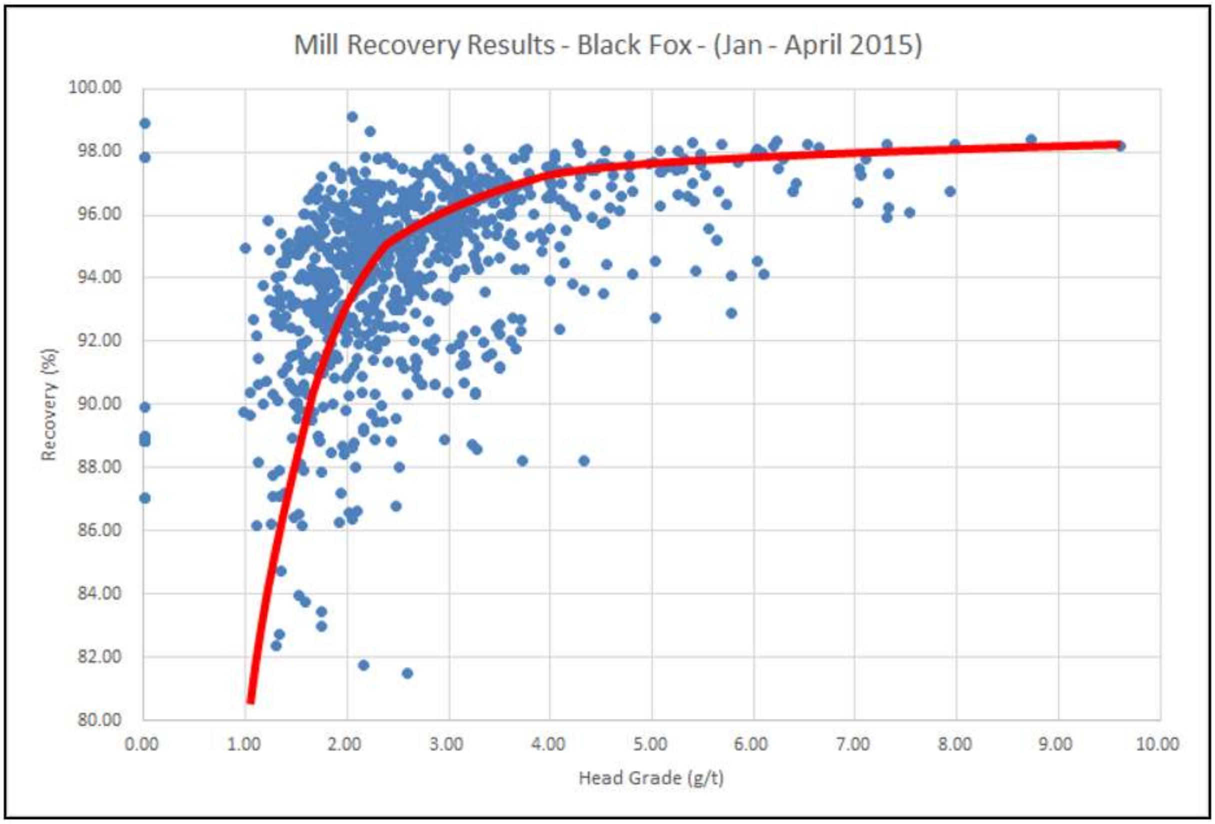


Figure 35: Black Fox Mill – Daily Grade/Recovery Data

Significant scatter exists in the recovery data across all head grades, with some high-grade days showing recoveries ranging from 92 to 98 percent. The range on recovery data at lower grades is even more broadly scattered. Whether this is feed related, or specific to the process stability on that particular day is unknown and irrelevant in that the “best fit” curve is meant to represent the average process capability over a broad range of operating conditions. Looking at the trends in the best fit curve, the data indicates that at higher grades, say above 5 g/t, the process is capable of recovering in excess of 97 percent to 98 percent of the gold in feed. Recoveries remain very good (approximately 95 percent) even at grades as low as 2.5 g/t. This grade does, however, appear to be a key threshold point as recoveries drop very quickly below this grade. This is quite typical of most gold milling processes. Recoveries for low grade material, say near 1 g/t, can only be expected to be somewhere in the range of 80 percent. While this drop off point will not affect the Black Fox underground production recoveries, the low-grade material as was stockpiled at the pit can be expected to be significantly reduced.

13.4.3 Possible Mill Flowsheet Reconfiguration

Metallurgical testwork has been carried out by XPS Consulting and Testwork Services over the past several years on samples from the Grey Fox Project. A series of four test programs were completed to understand the likely metallurgical performance of the Grey Fox material. A certain portion of this material is pyrite associated and is somewhat refractory in nature. Results from the Phase 4 test program indicate that, for the Grey Fox materials, there may be merit in reducing the initial grind size in the primary mill, conducting primary flotation to generate a high-grade sulphide con, regrinding the con, conducting an intense cyanide leach of the con, and then co-mingling the con residue with the remaining coarse flotation tails. A schematic of this flow sheet is shown below.

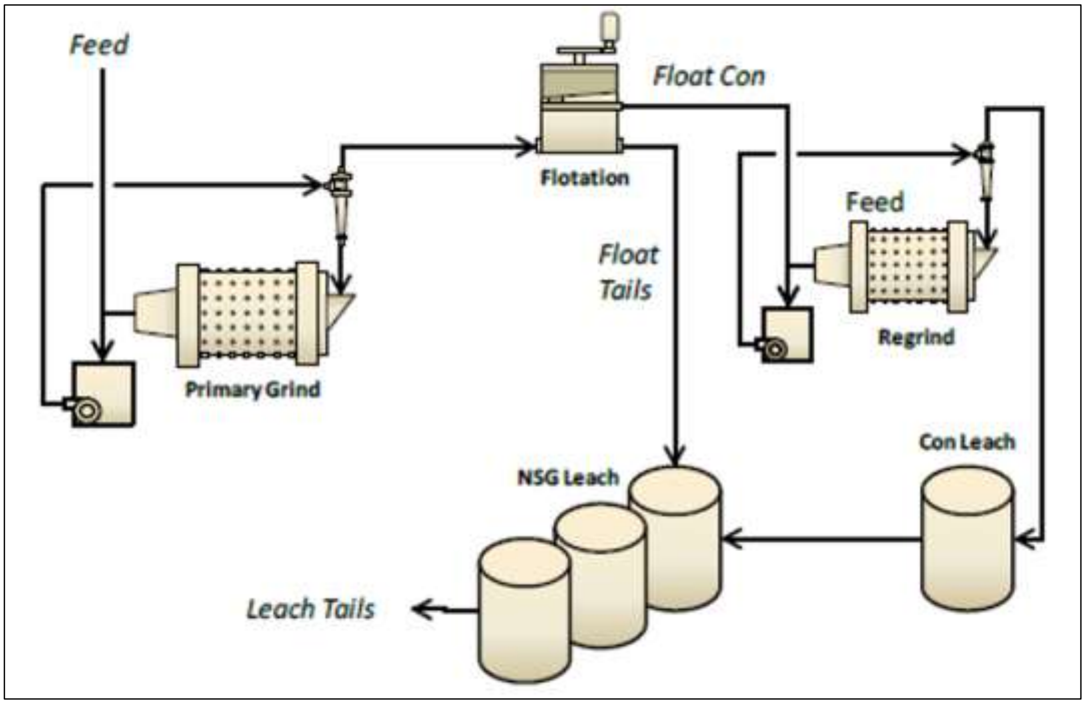


Figure 36: Potential Flotation Circuit with Regrind

In these tests, primary grind size was "relaxed" from a P80 of 60 micrometers to 120 micrometers. There was no net gain or loss in total recovered gold.

The flotation con generated from the Grey Fox samples represented 14 percent of the mass of the total feed which contains 94 percent of the gold. This effectively provides a means of selectively treating the more refractory, sulphide associated gold, while reducing the grinding effort required to liberate the gold in that portion of the feed that is deemed to be more "free milling". It should be noted, however, that blended feed composites with Black Fox and Grey Fox materials have not been tested against this flowsheet, nor has a detailed mass balance been assembled for this case.

Before this flowsheet can be implemented, the following is recommended:

- Conduct composite testing of the recovery impacts of this flowsheet on a blended feed of Black Fox and Grey Fox materials.
- Confirm the flowsheet configuration.
- Assemble full mass balances.
- Assemble appropriate schematics, general arrangement drawings, and piping and instrumentation diagrams for the new flowsheet.
- Generate capital expenditure, operating expenditure, internal rate of return, net present value and construction schedules for this flowsheet.

14 Mineral Resource Estimates

14.1 Introduction

This section presents revised mineral resource estimates for the Black Fox and Grey Fox projects and a maiden mineral resource estimate for the Froome Project prepared in accordance with the Canadian Securities Administrators' National Instrument 43-101.

These mineral resource estimates are the result of a close collaboration between technical staff from McEwen Mining and SRK. The responsibility for the analytical database used for the geology and mineral resource modelling process is undertaken by McEwen Mining technical staff under the supervision of Luke Willis, Director Mineral Resources at McEwen Mining. The Black Fox and Grey Fox mineral resource models were prepared by Dr. Aleksandr Mitrofanov (APGO#2824) from SRK, whereas the Froome mineral resource model was prepared by Primero / McEwen Mining and audited by David Machuca, PEng (PEO 100508889) from SRK. All mineral resource estimation work was independently supervised by Mr. Glen Cole, PGeo (APGO#1406) from SRK. Dr. Mitrofanov, Dr. Machuca and Mr. Cole are appropriate independent Qualified Persons as this term is defined in National Instrument 43-101. The effective date of the mineral resource statements is October 31, 2017.

14.2 Resource Estimation Procedures

The mineral resource evaluation methodology adopted for all three deposits involved the following procedures:

- Database compilation and verification.
- Construction of wireframe models for the boundaries of the structural and lithological domains.
- Definition of solids to be applied as mineral resource domains.
- Data conditioning (compositing and capping) for geostatistical analysis and variography.
- Block modelling and grade interpolation.
- Resource classification and validation.
- Assessment of "reasonable prospects for eventual economic extraction" and selection of appropriate cut-off grades and
- Preparation of the Mineral Resource Statement.

14.3 Black Fox Mine

14.3.1 Introduction

In November 2017, McEwen Mining commisioned SRK Consulting (Canada) Inc. (SRK) to prepare a new mineral resource model for the Black Fox deposit. A previous model was constructed by Primero Mining Corp in 2014. This section summarizes the data, methodology, and parameters considered by SRK to prepare the mineral resource model for the Black Fox deposit.

The mineral resource modelling process, including the data review, domain modelling, geostatistical analysis and grade interpolation, was completed by Dr. Aleksandr Mitrofanov (APGO#2824), supported by Mr. Glen Cole, PGeo (APGO#1416) and Dr. Oy Leuangthong, PEng

(PEO#90563867), all full-time employees of SRK. Dr. Mitrofanov and Mr. Cole are the appropriate independent Qualified Persons as this term is defined in NI 43-101. The effective date of the mineral resource statements is October 31, 2017.

This section describes the resource estimation methodology and summarizes the key assumptions considered by SRK. In the opinion of SRK, the resource evaluation reported herein is a reasonable representation of the global gold mineral resources found at the Black Fox deposit at the current level of sampling. The mineral resources have been estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* and are reported in accordance with National Instrument 43-101. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into mineral reserve.

The database used to estimate the Black Fox mineral resources was audited by SRK. SRK believes the current drilling information is sufficiently reliable to interpret with confidence the boundaries for gold mineralization and that the assay data are sufficiently reliable to support mineral resource estimation.

14.3.2 Resource Database

The resource database comprises primarily of samples from core boreholes drilled from surface and underground. SRK was provided with a database comprising 6,041 core boreholes (863,367 metres). SRK excluded seven boreholes from the database due to the absence of survey information which resulted in 6,034 boreholes (862,389 metres) used in the estimation. This represents an addition of 2,802 boreholes (389,026 metres) since the 2014 model. According to the McEwen Mining personnel, all the database errors defined in 2014 Primero Technical report were addressed.

The database contains 452,740 intervals assayed for gold, which represents the addition of 175,181 samples since 2014. The mineralized domains contain 382,785 assay intervals.

The database also contains 174,442 intervals of lithological logging that was used for constructing the lithological wireframe model by McEwen Mining.

SRK received the sampling data as MS Excel file from McEwen Mining for import from into Datamine Studio and Leapfrog software and performed the following validation steps:

- Checked minimum and maximum values for each quality value field and confirmed/edited that outside of expected ranges.
- Checked for gaps, overlaps, and out of sequence intervals for both assays and lithology tables.

Dr. Mitrofanov and Mr. Cole from SRK visited the Black Fox Project in November 2017. SRK is satisfied that the exploration work carried out by McEwen Mining is conducted in a manner consistent with industry best practices and, therefore, the exploration data and the drilling database are sufficiently reliable to support a preliminary mineral resource evaluation.

There was no topography surface provided. SRK constructed the topography wireframe from the pit contour and the collar position of the boreholes. SRK was also provided with the overburden surface that limits the mineralization extent from above. Given that most of the subsurface mineralized zones were already mined this appears to be immaterial.

14.3.3 Geological Modelling

Gold mineralization at the Black Fox Mine occurs in several different geological settings within the main Ankerite Alteration Zone, which has a strike length of over 1,000 metres and a variable true width ranging from 20 metres to over 100 metres. This mineralized envelope occurs primarily within komatiitic ultramafic rock types and lesser mafic volcanics within the outer boundaries of the Porcupine-Destor Deformation Zone. The zones of the mineralization have been developed within the main lithological and alteration units:

- AUV – ankerite-chlorite-sericite and ankerite-fuchsite ultramafic rocks.
- CGY – pale grey ultramafic rocks with ankerite-talk alteration.
- BMV – bleached mafic volcanic rocks.
- MV – mafic volcanic rocks.
- BUV – bleached ultramafic rocks with calcite-sericite alteration.
- FLT – Tamarack zone (500 metres from the Black Fox to the north-east).
- UVW – deep zone in the east part of the Black Fox deposit.

SRK was provided with the original geological and mineralized wireframes constructed by McEwen Mining. The more detailed description is provided in the subsections below.

High-Grade Domains

59 high-grade domain wireframes were constructed by the McEwen Mining geologist Ali Gelinas in 2017 using the full resource database available. These wireframes define the gold mineralized areas using a general threshold of 2 g/t gold. The overview of the provided domains is presented in Figure 37.

In SRK opinion these high-grade domains correctly outline the extent and the location of the higher grade Black Fox mineralization. However, they do include a significant proportion of the internal waste intervals that were required to maintain the continuity of the defined domains (Figure 38).

SRK defined a lower grade threshold for the mineralized zone equal to 0.1 g/t gold (Figure 39) and used this to develop subdomains contained within the wireframes provided by McEwen Mining (Figure 40), which exclude a significant amount of unmineralized material that are required for mineral resource estimation.

Although the overall volume of the ‘higher-grade’ domains decreased by 36 percent, SRK is of the opinion it will benefit the following estimation procedure by avoiding the over-smoothing of the non-mineralized grades in the zones of mineralization.

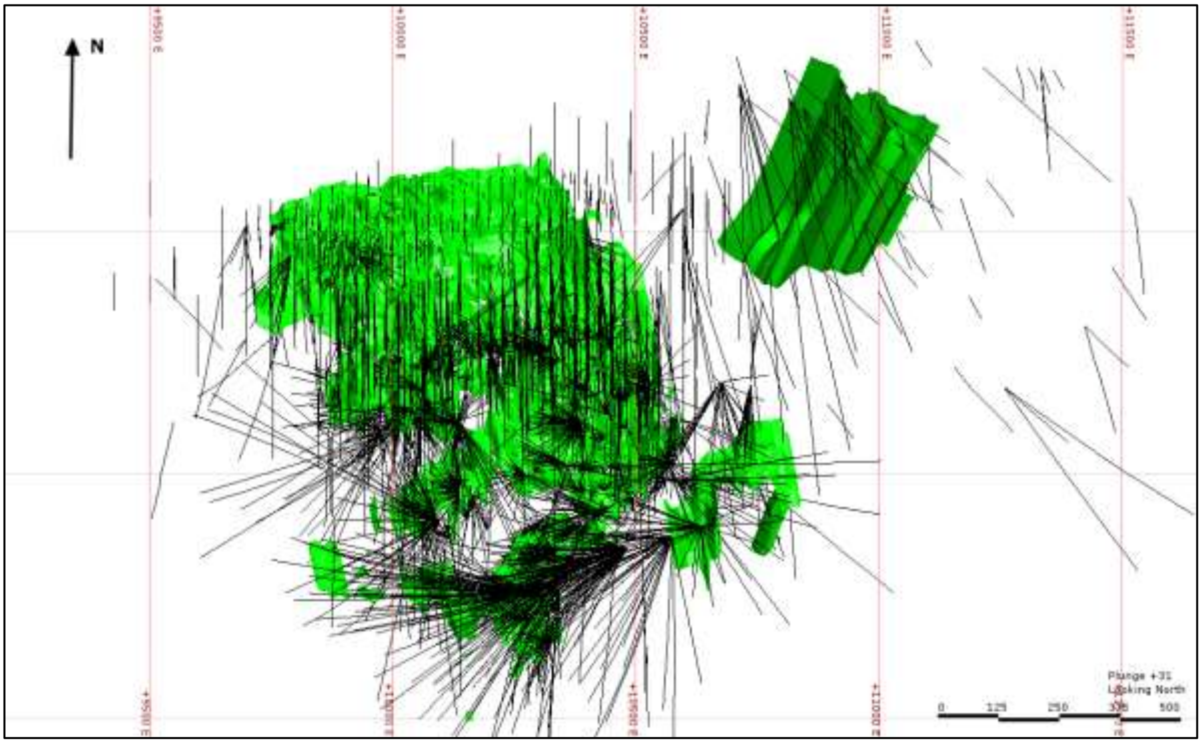


Figure 37: The Original High-Grade Domains (Green Colour) Overview

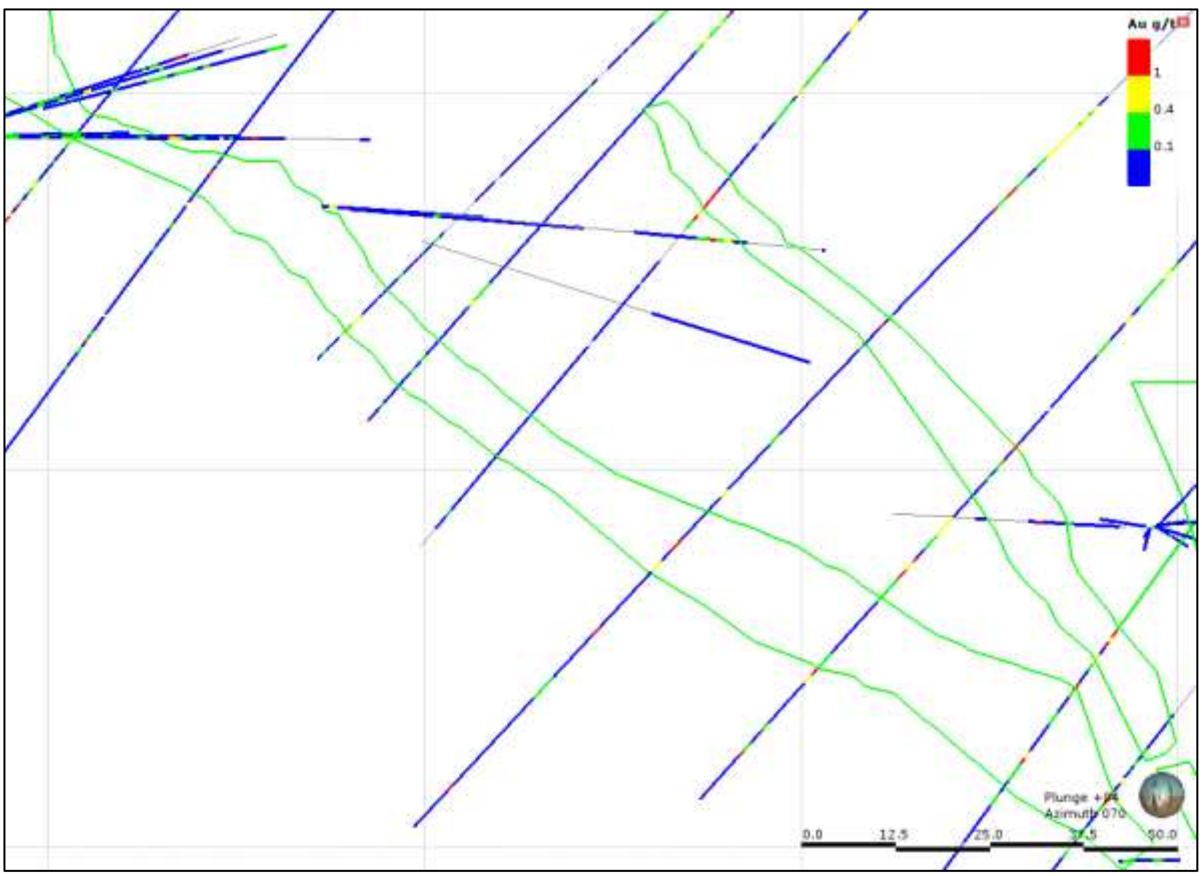


Figure 38: The Internal Waste (Blue Code) Within the Original Domains (Green Outline)
View azimuth 070°, plunge 04°

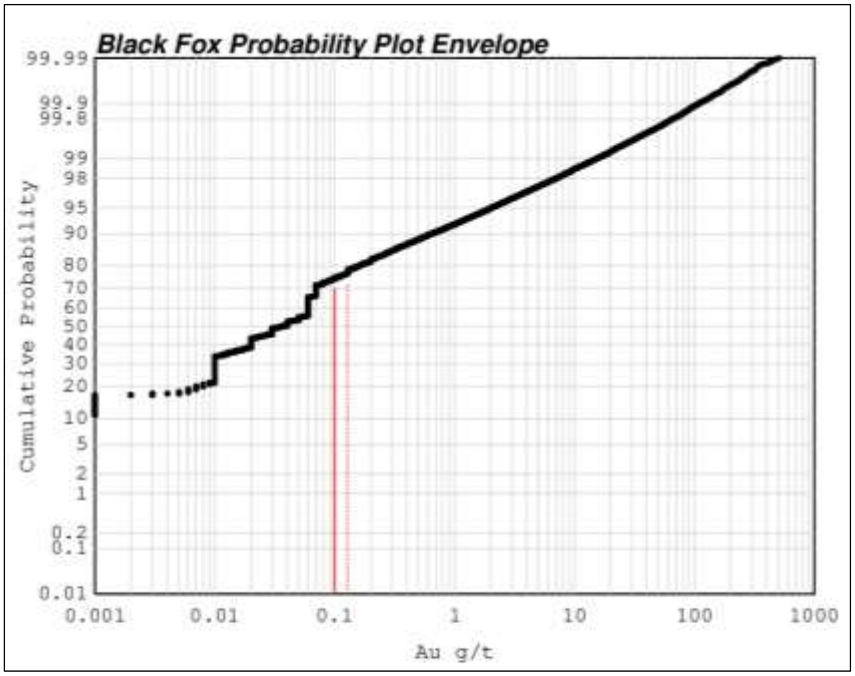


Figure 39: Probability Plot of the Length-Weighted Assay Intervals

The grade threshold ~0.13 g/t was rounded to 0.1 g/t for contouring purposes

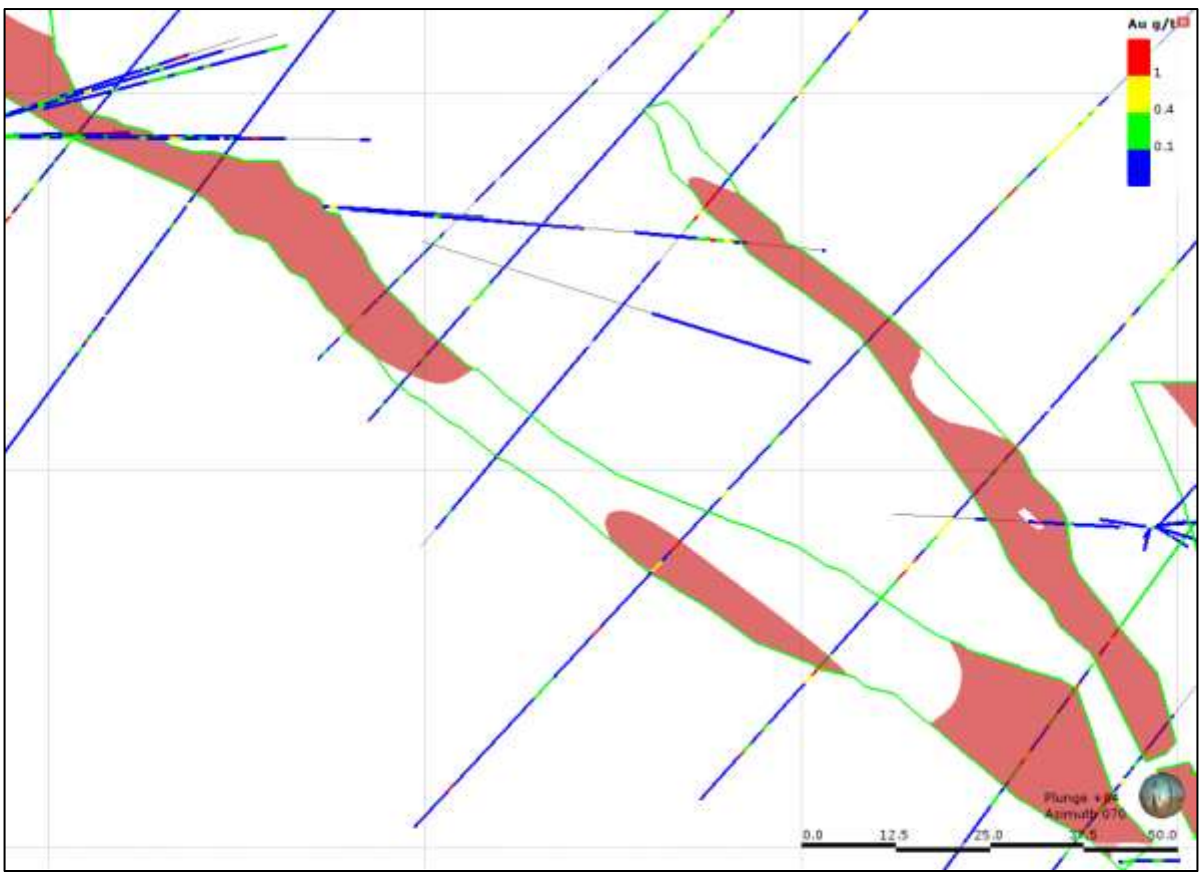


Figure 40: High-Grade Subdomains Developed by SRK (Filled Red) Within the Original McEwen Mining Domains (Green Outline)

View azimuth 070°, plunge 04°

Low-Grade Domains

In the 2014 mineral resource model, grades outside of the modelled higher-grade domains were estimated within the broad envelope that represented the area of ankerite alteration. In SRK opinion this approach can cause the underestimation of the low-grade material outside the high-grade domains by the significant amount of the waste intervals within the alteration envelope. To avoid this SRK developed the additional low-grade shells in to constrain the low-grade mineralization (>0.1 g/t gold) external to the higher-grade domains.

SRK developed the lower grade domains in every lithological and alteration unit using the geological wireframes provided by McEwen Mining.

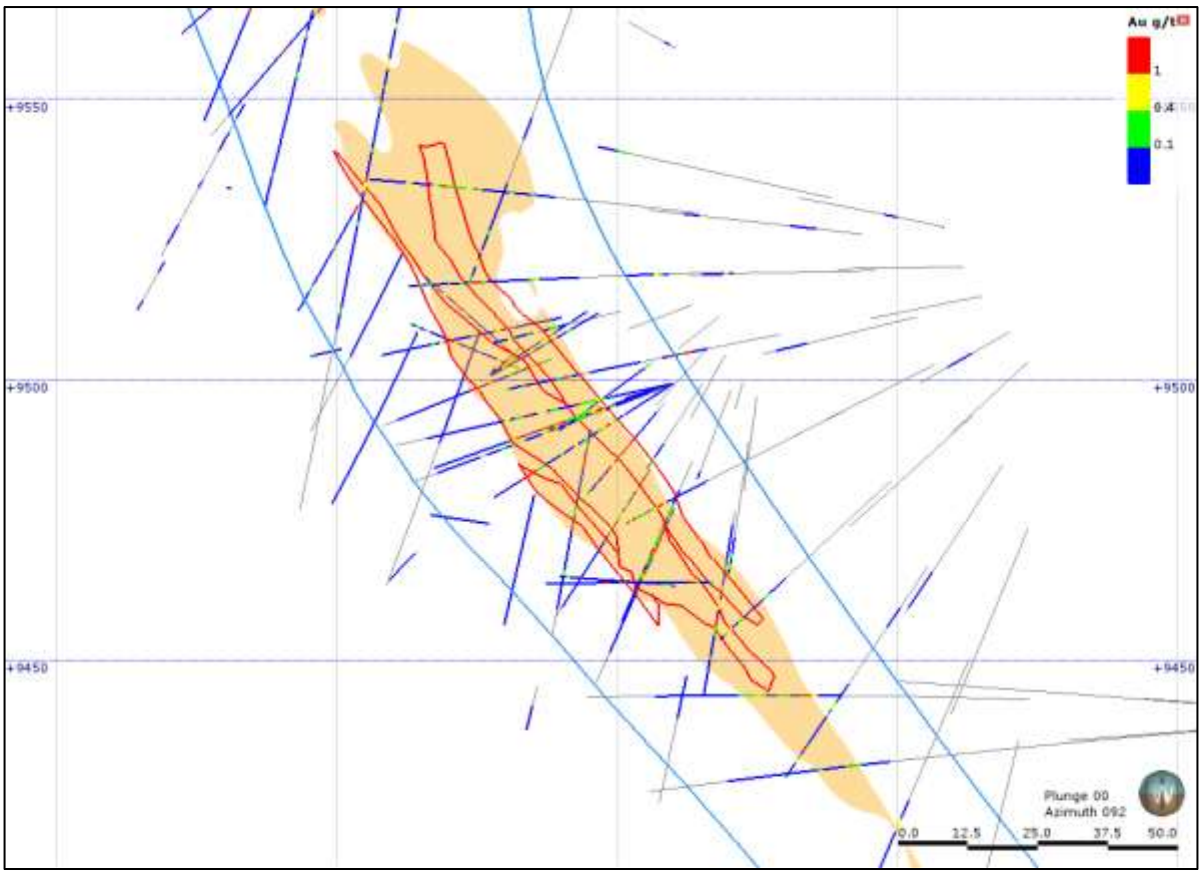


Figure 41: Low-Grade Halo (Filled Orange) and Higher Grade (Red Lines) Domains Within the Ankerite Envelope (Blue Line)

View azimuth 092°, plunge 00°

Mineralized Envelopes

As the external boundary of the mineralization SRK used the ankerite zone envelope developed by McEwen Mining in 2017. SRK extended these to accommodate the new drilling data, but these changes were minimal.

In addition, SRK also developed the external envelope for the Tamarack zone.

Domain Summary

The overview of the domains used for the estimation is presented in Figure 42, the summary of the estimation domains is provided in Table 31.

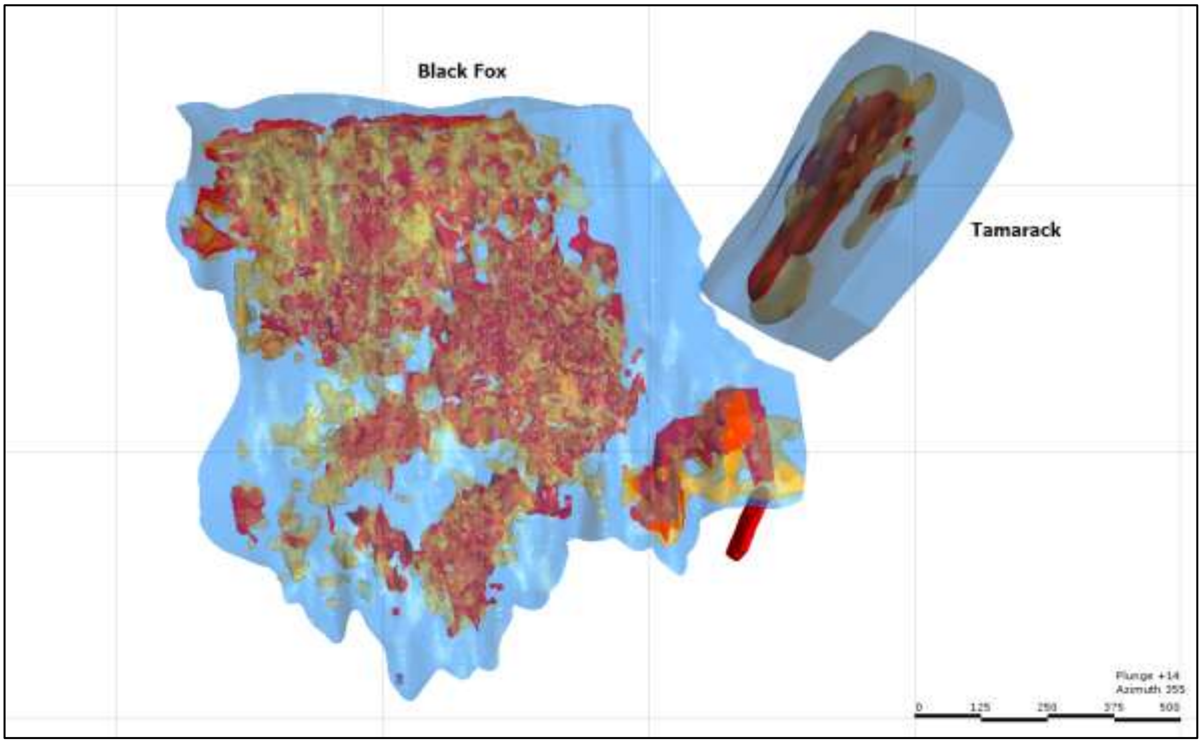


Figure 42: Overview of the Black Fox Mineralized Domains (Red – Higher Grade, Orange – Lower Grade Domains, Blue – Lithological Envelopes)

View azimuth 355°, plunge 14°

Table 31: Summary of the Estimation Domains Used by SRK for the Black Fox Mine

Domain Type	McEwen 2017	SRK 2017			
		Domains	**Types**	**Amount**	**Codes**
High-Grade	59 domains	59 domains with internal waste excluded	AUV	27	101-127
			BMV	5	201-205
			BUV	1	301
			CGY	17	401-417
			MV	4	501-504
			FLT	2	601-602
			UVW	3	701-703
Low-Grade	Not used	Five low-grade domains (threshold 0.1 g/t) split by geological domains	AUV	1	801
			CGY	1	802
			MV	1	803
			FLT	1	804
			UVW	1	805
Envelope	One envelope	One updated envelope for Black Fox and one additional for Tamarack Zone		2	901 and 902
Total	**60 domains**	**66 domains**			

14.3.4 Statistical Analysis and Compositing

The assay data within the mineralization domains was extracted and analyzed to determine an appropriate composite length (Figure 43). Most of the analytical samples were collected at 1-metre intervals. A modal composite length of approximately 1.0 metres was applied to all the data, generating composites as close to 1.0-metres as possible, while creating residual intervals of up to 0.5 metre in length (borehole assays). In all cases, composite files were derived from raw values within the modelled resource domains.

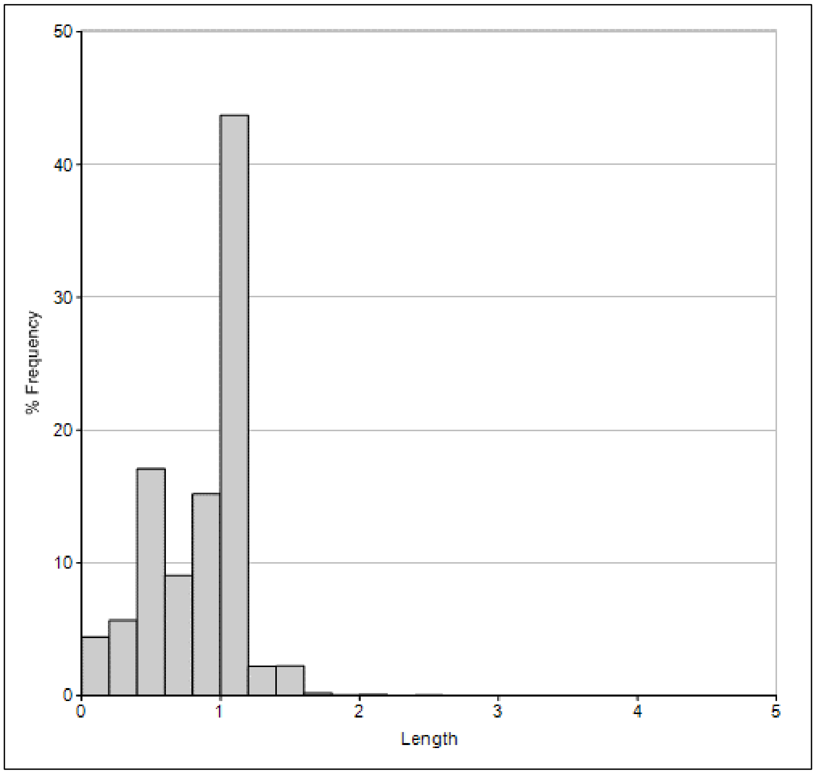


Figure 43: Length Frequency Distribution of the Samples Within the Mineralization Domains

14.3.5 Evaluation of Outliers

The impact of outliers was examined on composite data using log probability plots and cumulative statistics (Appendix B). Upon review, SRK is of the opinion that capping is required to restrict the influence of outliers. SRK aggregated domains having the similar geological characteristics, resulting in the following defined groups:

- 100 - AUV_HG (capping value 130 g/t).
- 200 - BMV_HG (capping value 70 g/t).
- 300 - BUV_HG (no capping applied).
- 400 - CGY_HG (capping value 90 g/t).
- 500 - MV_HG (capping value 55 g/t).
- 600 - FLT_HG (capping value 40 g/t).
- 700 - UVW_HG (no capping applied).
- 801 - AUV_LG (capping value 50 g/t).

- 802 - CGY_LG (capping value 50 g/t).
- 803 - MV_LG (capping value 40 g/t).
- 804 - FLT_LG (no capping applied).
- 805 - UVW_LG (no capping applied).
- 901 – Envelope Black Fox (capping values 10 g/t for the general estimation and 30 g/t for restricted “zero” run).
- 901 – Envelope Tamarack (no capping applied).

The summary statistics for the defined mineral resource domains is tabulated in Table 32.

14.3.6 Specific Gravity

For the current mineral resource estimate, a constant specific gravity value of 2.84 was applied to all material, which reflects the specific gravity value currently in use by the mine site. SRK has not reviewed the specific gravity databases to support this value, however, considers the 2.84 to be reasonable considering the mineralized rock types encountered. Although, the rock types vary from felsic to ultramafic units and large density variations are expected, the most abundant mineralized zones are usually associated with the areas of strong alteration which reduces the differences between the original type of rocks. However, density measurements should be taken throughout the deposit to improve the model.

A specific gravity value of 2.00 has been assigned to the overburden (OB), 2.84 to the country rock, and 0 to underground voids.

Table 32: Summary Basic Statistics for Raw Sample, Composite and Capped Composite Data for Black Fox Domains (Std Dev = standard deviation, COV = coefficient of variation)

Domain	Original Assays						Composites						Capped Composites						Assay length / number of comp	Mean Change		Std Dev Change		COV Change	
	Length (m)	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Assay to composites	Assay to composites	Capping	Assay to composites	Capping	Assay to composites	Capping
101	1028	0.00	592.00	3.51	23.63	6.74	1032	0.00	333.26	3.54	18.68	5.28	1032	0.00	130.00	3.09	12.89	4.17	0%	1%	-13%	-21%	-31%	-22%	-21%
102	42	0.00	55.30	3.43	8.99	2.62	38	0.01	39.81	3.65	7.80	2.14	38	0.01	39.81	3.65	7.80	2.14	-10%	6%	0%	-13%	0%	-18%	0%
103	165	0.00	201.89	4.76	17.97	3.77	166	0.00	108.22	4.62	14.41	3.12	166	0.00	108.22	4.62	14.41	3.12	0%	-3%	0%	-20%	0%	-17%	0%
104	1087	0.00	677.43	11.41	43.15	3.78	1092	0.00	464.28	11.53	33.54	2.91	1092	0.00	130.00	10.09	23.30	2.31	0%	1%	-13%	-22%	-31%	-23%	-21%
105	36	0.00	52.30	3.52	9.27	2.63	36	0.00	43.24	3.53	7.88	2.23	36	0.00	43.24	3.53	7.88	2.23	1%	0%	0%	-15%	0%	-15%	0%
106	84	0.00	9.19	1.10	1.91	1.74	84	0.00	9.19	1.10	1.74	1.57	84	0.00	9.19	1.10	1.74	1.57	0%	1%	0%	-9%	0%	-10%	0%
107	194	0.00	40.63	1.18	4.68	3.96	194	0.00	34.75	1.22	4.30	3.53	194	0.00	34.75	1.22	4.30	3.53	0%	3%	0%	-8%	0%	-11%	0%
108	667	0.00	258.87	1.58	10.45	6.64	670	0.00	212.94	1.57	9.17	5.84	670	0.00	130.00	1.45	6.48	4.48	0%	0%	-8%	-12%	-29%	-12%	-23%
109	278	0.00	1063.20	12.74	76.92	6.04	279	0.00	822.77	12.69	69.07	5.44	279	0.00	130.00	7.43	19.49	2.62	0%	0%	-41%	-10%	-72%	-10%	-52%
110	393	0.00	35.60	1.58	3.91	2.47	400	0.00	21.26	1.59	3.15	1.98	400	0.00	21.26	1.59	3.15	1.98	2%	0%	0%	-19%	0%	-20%	0%
111	523	0.00	179.59	1.96	7.08	3.61	524	0.00	65.40	2.00	5.61	2.81	524	0.00	65.40	2.00	5.61	2.81	0%	2%	0%	-21%	0%	-22%	0%
112	401	0.00	724.93	13.92	60.54	4.35	400	0.00	681.09	13.88	52.78	3.80	400	0.00	130.00	10.13	22.03	2.17	0%	0%	-27%	-13%	-58%	-13%	-43%
113	48	0.00	146.76	4.89	20.86	4.26	47	0.01	120.07	4.90	17.56	3.58	47	0.01	120.07	4.90	17.56	3.58	-2%	0%	0%	-16%	0%	-16%	0%
114	4	0.05	2.61	1.38	1.15	0.84	4	0.11	2.61	1.35	1.13	0.84	4	0.11	2.61	1.35	1.13	0.84	-8%	-2%	0%	-2%	0%	0%	0%
115	2026	0.00	2031.10	4.24	40.29	9.51	2022	0.00	883.69	4.29	31.46	7.33	2022	0.00	130.00	3.37	13.77	4.09	0%	1%	-22%	-22%	-56%	-23%	-44%
116	4049	0.00	3448.67	4.25	57.15	13.43	4072	0.00	2,414.15	4.28	45.79	10.70	4072	0.00	130.00	3.00	10.75	3.58	1%	1%	-30%	-20%	-77%	-20%	-66%
117	2159	0.00	650.00	3.96	22.03	5.56	2161	0.00	393.03	3.96	18.66	4.71	2161	0.00	130.00	3.47	11.75	3.38	0%	0%	-12%	-15%	-37%	-15%	-28%
118	517	0.00	341.77	3.15	17.23	5.46	528	0.00	240.03	3.04	14.41	4.74	528	0.00	130.00	2.83	11.47	4.05	2%	-4%	-7%	-16%	-20%	-13%	-14%
119	245	0.00	2837.32	3.32	23.12	6.96	247	0.00	108.06	3.29	11.98	3.64	247	0.00	108.06	3.29	11.98	3.64	1%	-1%	0%	-48%	0%	-48%	0%
120	1125	0.00	330.00	2.28	16.13	7.08	1124	0.00	205.47	2.17	12.35	5.69	1124	0.00	130.00	2.03	10.44	5.13	0%	-5%	-6%	-23%	-15%	-20%	-10%
121	114	0.01	40.44	3.79	5.20	1.37	114	0.01	31.03	3.76	4.49	1.19	114	0.01	31.03	3.76	4.49	1.19	0%	-1%	0%	-14%	0%	-13%	0%
122	3592	0.00	271.55	1.94	8.59	4.43	3576	0.00	161.47	1.95	7.14	3.67	3576	0.00	130.00	1.94	6.88	3.55	0%	0%	-1%	-17%	-4%	-17%	-3%
123	38	0.00	15.77	1.72	2.89	1.68	39	0.01	15.77	1.75	2.77	1.59	39	0.01	15.77	1.75	2.77	1.59	2%	2%	0%	-4%	0%	-6%	0%
124	88	0.00	133.88	2.71	12.56	4.63	87	0.00	47.32	2.74	8.62	3.15	87	0.00	47.32	2.74	8.62	3.15	-1%	1%	0%	-31%	0%	-32%	0%
125	785	0.00	186.08	2.24	9.71	4.33	782	0.00	96.67	2.15	6.85	3.19	782	0.00	96.67	2.15	6.85	3.19	0%	-4%	0%	-29%	0%	-26%	0%
126	40	0.00	140.68	7.85	24.55	3.13	39	0.00	93.89	8.36	20.18	2.41	39	0.00	93.89	8.36	20.18	2.41	-2%	7%	0%	-18%	0%	-23%	0%
127	39	0.05	20.43	2.41	3.81	1.59	39	0.06	12.66	2.32	2.66	1.15	39	0.06	12.66	2.32	2.66	1.15	0%	-3%	0%	-30%	0%	-28%	0%
201	1206	0.00	97.33	3.84	8.09	2.11	1222	0.00	88.99	3.89	7.15	1.84	1222	0.00	70.00	3.87	6.98	1.80	1%	1%	0%	-12%	-2%	-13%	-2%
202	20	0.04	16.87	2.84	3.98	1.40	19	0.06	11.79	2.77	3.13	1.13	19	0.06	11.79	2.77	3.13	1.13	-5%	-2%	0%	-21%	0%	-20%	0%
203	1983	0.00	3011.28	6.41	45.29	7.06	1987	0.00	1304.30	6.41	31.68	4.94	1987	0.00	70.00	5.50	9.91	1.80	0%	0%	-14%	-30%	-69%	-30%	-64%
204	3005	0.00	562.00	4.39	13.56	3.09	3002	0.00	266.49	4.40	10.52	2.39	3002	0.00	70.00	4.24	8.55	2.01	0%	0%	-4%	-22%	-19%	-23%	-16%
205	131	0.00	93.33	3.38	7.50	2.22	131	0.00	57.10	3.36	6.16	1.83	131	0.00	57.10	3.36	6.16	1.83	0%	-1%	0%	-18%	0%	-17%	0%
301	452	0.00	31.10	1.37	2.04	1.48	454	0.00	22.17	1.38	1.83	1.33	454	0.00	22.17	1.38	1.83	1.33	0%	1%	0%	-10%	0%	-11%	0%
401	984	0.00	1530.00	4.17	37.67	9.03	984	0.00	498.29	4.10	22.17	5.41	984	0.00	90.00	3.28	10.83	3.30	0%	-2%	-20%	-41%	-51%	-40%	-39%
402	2792	0.00	844.30	6.46	33.12	5.13	2796	0.00	582.81	6.44	27.76	4.31	2796	0.00	90.00	5.10	14.75	2.89	0%	0%	-21%	-16%	-47%	-16%	-33%
403	4576	0.00	1528.79	3.38	23.04	6.82	4553	0.00	554.16	3.41	15.76	4.63	4553	0.00	90.00	3.03	10.39	3.42	-1%	1%	-11%	-32%	-34%	-32%	-26%
404	126	0.00	55.90	1.68	6.91	4.11	126	0.01	34.26	1.60	5.21	3.25	126	0.01	34.26	1.60	5.21	3.25	0%	-5%	0%	-25%	0%	-21%	0%
405	706	0.00	233.60	1.03	9.14	8.91	712	0.00	157.14	1.04	7.07	6.77	712	0.00	90.00	0.95	5.18	5.45	1%	2%	-9%	-23%	-27%	-24%	-19%
406	1338	0.00	145.02	1.45	7.00	4.83	1349	0.00	98.24	1.43	5.79	4.06	1349	0.00	90.00	1.42	5.69	4.01	1%	-2%	0%	-17%	-2%	-16%	-1%
407	19	0.00	3.67	0.65	1.01	1.55	19	0.04	3.67	0.68	0.99	1.45	19	0.04	3.67	0.68	0.99	1.45	1%	4%	0%	-2%	0%	-6%	0%
408	414	0.00	168.20	2.20	9.70	4.41	413	0.00	118.18	2.22	7.84	3.53	413	0.00	90.00	2.15	6.89	3.20	0%	1%	-3%	-19%	-12%	-20%	-9%
409	5183	0.00	630.92	2.84	17.21	6.07	5196	0.00	403.45	2.84	13.72	4.83	5196	0.00	90.00	2.51	9.22	3.67	0%	0%	-12%	-20%	-33%	-20%	-24%
410	277	0.00	63.33	1.00	5.37	5.38	279	0.00	53.26	1.00	4.72	4.72	279	0.00	53.26	1.00	4.72	4.72	1%	0%	0%	-12%	0%	-12%	0%
411	125	0.00	77.85	6.06	12.33	2.04	124	0.00	45.25	6.07	8.87	1.46	124	0.00	45.25	6.07	8.87	1.46	-1%	0%	0%	-28%	0%	-28%	0%
412	933	0.00	1941.63	6.68	61.19	9.16	933	0.00	1489.96	6.69	51.94	7.76	933	0.00	90.00	4.68	13.32	2.84	0%	0%	-30%	-15%	-74%	-15%	-63%
413	1462	0.00	588.47	2.67	19.99	7.48	1462	0.00	495.75	2.63	16.62	6.33	1462	0.00	90.00	2.18	8.23	3.78	0%	-2%	-17%	-17%	-50%	-15%	-40%
414	73	0.00	86.35	2.01	8.75	4.34	74	0.02	36.42	1.98	5.51	2.79	74	0.02	36.42	1.98	5.51	2.79	1%	-2%	0%	-37%	0%	-36%	0%
415	3708	0.00	1174.00	3.93	31.69	8.06	3729	0.00	1174.00	3.90	29.27	7.50	3729	0.00	90.00	2.75	9.87	3.59	1%	-1%	-30%	-8%	-66%	-7%	-52%
416	3276	0.00	239.33	1.94	10.16	5.24	3302	0.00	235.00	1.94	8.80	4.54	3302	0.00	90.00	1.82	6.71	3.68	1%	0%	-6%	-13%	-24%	-13%	-19%
417	1682	0.00	680.00	2.96	20.17	6.83	1690	0.00	613.17	2.91	17.71	6.08	1690	0.00	90.00	2.49	8.38	3.36	0%	-1%	-15%	-12%	-53%	-11%	-45%
501	406	0.00	133.33	1.89	8.37	4.42	396	0.00	106.66	1.87	6.97	3.74	396	0.00	55.00	1.74	5.29	3.05	-2%	-1%	-7%	-17%	-24%	-16%	-18%
502	1296	0.00	246.67	1.93	7.72	4.00	1296	0.00	98.93	1.94	5.67	2.92	1,296	0.00	55.00	1.89	4.95	2.62	0%	1%	-3%	-27%	-13%	-27%	-10%
503	1293	0.00	360.00	2.20	10.47	4.77	1291	0.00	169.94	2.18	7.94	3.65	1291	0.00	55.00	2.00	5.67	2.83	0%	-1%	-8%	-24%	-29%	-24%	-22%
504	147	0.00	46.16	2.49	5.73	2.30	146	0.00	32.73	2.49	5.14	2.07	146	0.00	32.73	2.49	5.14	2.07	-1%	0%	0%	-10%	0%	-10%	0%

Table 32: Summary Basic Statistics for Raw Sample, Composite and Capped Composite Data for Black Fox Domains (Std Dev = standard deviation, COV = coefficient of variation) (Continued 2/2)

Domain	Original Assays						Composites						Capped Composites						Assay length / number of comp	Mean Change		Std Dev Change		COV Change	
	Length (m)	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Assay to composites	Assay to composites	Capping	Assay to composites	Capping	Assay to composites	Capping
601	410	0.00	105.50	2.11	6.67	3.16	415	0.00	100.54	2.24	6.92	3.09	415	0.00	40.00	2.05	4.92	2.40	1%	6%	-8%	4%	-29%	-2%	-22%
602	135	0.00	59.97	1.57	6.17	3.93	135	0.00	40.57	1.32	4.56	3.44	135	0.00	40.00	1.32	4.52	3.43	0%	-16%	0%	-26%	-1%	-13%	0%
701	751	0.00	26.48	1.02	1.80	1.77	747	0.00	25.73	1.03	1.61	1.57	747	0.00	25.73	1.03	1.61	1.57	0%	1%	0%	-11%	0%	-11%	0%
702	86	0.00	3.47	0.70	0.81	1.16	85	0.00	3.43	0.70	0.78	1.12	85	0.00	3.43	0.70	0.78	1.12	-1%	0%	0%	-3%	0%	-4%	0%
703	530	0.00	61.72	1.47	3.18	2.17	530	0.00	36.49	1.46	2.61	1.78	530	0.00	36.49	1.46	2.61	1.78	0%	0%	0%	-18%	0%	-18%	0%
801	18412	0.00	399.29	0.81	6.11	7.59	18255	0.00	192.62	0.80	4.84	6.01	18255	0.00	50.00	0.73	3.31	4.52	-1%	0%	-9%	-21%	-32%	-21%	-25%
802	26645	0.00	2837.32	0.64	10.95	17.16	26551	0.00	1094.48	0.64	8.36	13.09	26551	0.00	50.00	0.53	2.54	4.81	0%	0%	-17%	-24%	-70%	-24%	-63%
803	3348	0.00	201.89	0.74	3.32	4.49	3320	0.00	64.14	0.73	2.71	3.70	3320	0.00	40.00	0.72	2.44	3.39	-1%	-1%	-2%	-18%	-10%	-18%	-8%
804	1714	0.00	105.50	0.30	0.93	3.11	1716	0.00	14.62	0.30	0.68	2.27	1716	0.00	14.62	0.30	0.68	2.27	0%	0%	0%	-27%	0%	-27%	0%
805	1184	0.00	9.89	0.36	0.51	1.40	1185	0.00	3.84	0.36	0.45	1.23	1185	0.00	3.84	0.36	0.45	1.23	0%	0%	0%	-12%	0%	-12%	0%
901	196762	0.00	3884.43	0.10	6.02	58.85	197157	0.00	1554.26	0.10	3.93	38.94	197157	0.00	30.00	0.08	0.73	9.00	0%	-1%	-20%	-35%	-81%	-34%	-77%
902	3925	0.00	18.79	0.03	0.26	8.62	3934	0.00	11.05	0.03	0.22	7.19	3934	0.00	11.05	0.03	0.22	7.19	0%	3%	0%	-14%	0%	-17%	0%
HG total	**59290**	**0.00**	**3448.67**	**3.59**	**28.19**	**7.85**	**59393**	**0.00**	**2414.15**	**3.59**	**22.71**	**6.32**	**59393**	**0.00**	**130.00**	**3.05**	**10.20**	**3.35**	**0%**	**0%**	**-15%**	**-19%**	**-55%**	**-19%**	**-47%**
LG total	**51303**	**0.00**	**2837.32**	**0.69**	**8.75**	**12.72**	**51027**	**0.00**	**1094.48**	**0.69**	**6.73**	**9.80**	**51027**	**0.00**	**50.00**	**0.60**	**2.77**	**4.61**	**-1%**	**0%**	**-12%**	**-23%**	**-59%**	**-23%**	**-53%**
Envelopes	200688	0.00	3884.43	0.10	5.96	59.08	201091	0.00	1554.26	0.10	3.89	39.09	201091	0.00	30.00	0.08	0.72	9.03	0%	-1%	-20%	-35%	-81%	-34%	-77%

14.3.7 Statistical Analysis and Variography

SRK evaluated the spatial distribution of gold. All spatial metrics were considered to infer the appropriate structure of each element. The domains were merged for variography similarly to that undertaken for the capping analysis but with no variogram modelled for the envelope domains.

All variogram analyses and modelling were performed using Geostatistical Software Library (GSLib). Primary directions and orientations of the variograms were observed in the data visually in 3D space. These orientations were then examined statistically within the software packages to ensure they represented the best possible fit for the variography. The general orientation of the variogram model for all Black Fox domains was 175° dip azimuth, 55° dip angle and -55° plunge in the north-east direction. The dip azimuth for Tamarack area as 240° with dip angle 55° and no plunge considered.

The stability of the variograms was evaluated by varying the direction specification and comparing the resulting experimental variograms. The developed variograms displayed two structures and three rotations to match the strike, dip and plunge of the modelled mineralization. Table 33 summarizes the modelled variograms, whereas Figure 44 illustrates the fitted variogram model for gold for the 200 domain. All other modelled variograms are provided in Appendix C.

Table 33: Gold Variogram Parameters for the Black Fox Mine

Domain Code	Domain	Nugget	Structure 1		Range, m			Structure 2		Range, m		
			Type	Sill	Strike	Dip	Vertical	Type	Sill	Strike	Dip	Vertical
100	AUV_HG	0.35	Sph	0.5	17	17	7	Sph	0.15	40	40	12
200	BMV_HG	0.2	Sph	0.55	70	20	3	Sph	0.25	90	55	10
300	BUV_HG	0.2	Exp	0.6	18	18	8	Sph	0.2	55	55	13
400	CGY_HG	0.3	Exp	0.45	25	30	5	Sph	0.25	30	50	10
500	MV_HG	0.25	Sph	0.55	15	45	12	Sph	0.2	30	45	18
600	FLT_HG	0.2	Sph	0.55	50	30	30	Sph	0.25	60	50	30
700	UVW_HG	0.35	Sph	0.5	32	32	2.5	Sph	0.15	45	45	7
801	AUV_LG	0.3	Exp	0.3	50	50	4	Sph	0.4	50	50	7
802	CGY_LG	0.3	Exp	0.5	20	20	9	Sph	0.2	60	60	10
803	MV_LG	0.3	Exp	0.5	40	25	5	Sph	0.2	40	40	15
804	FLT_LG	0.25	Sph	0.35	120	20	5	Sph	0.4	120	60	40
805	UVW_LG	0.2	Exp	0.6	15	27	3.5	Sph	0.2	55	55	6

Sph – spherical, Exp – Exponential Variogram Models

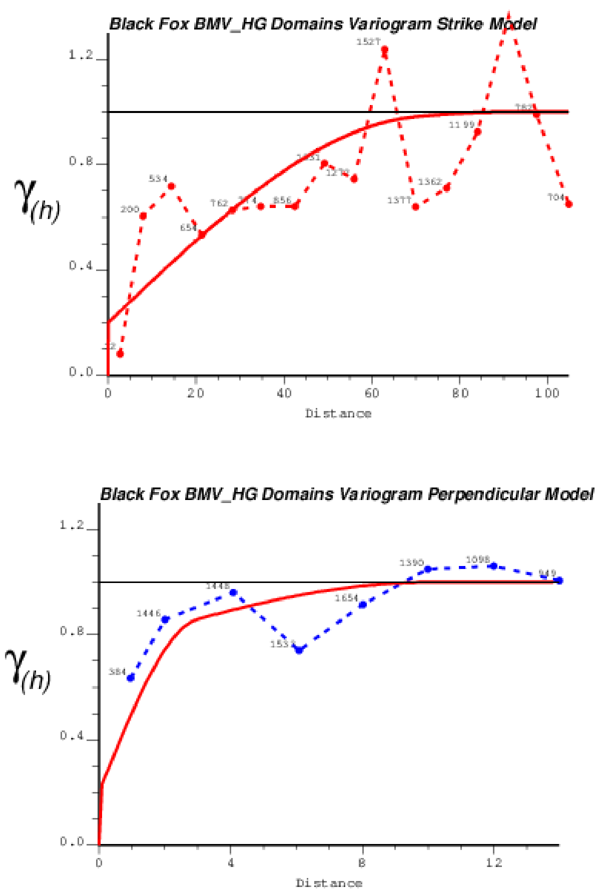


Figure 44: Variogram Model for the BMV_HG Domain

14.3.8 Block Model and Grade Estimation

The criteria used in the selection of block size include borehole spacing, composite length, the geometry of the modelled zone and the anticipated mining method. A block size of 3 by 3 by 3 metres was used, similar to the 2014 model. Sub-cells were used, allowing a resolution of 1 by 1 by 1 metres to better reflect the shape of the mineralization domain. Sub-cells were assigned the same values as their parent cell. No rotation was applied to the block model. The characteristics of the block model are summarized in Table 34. The sub-celling is efficient in filling the wireframe volumes.

The block model contains the information about the estimation domaining from the wireframes.

Table 34: Black Fox Gold Project Block Model Specifications

Axis	Block Size (metres)	Origin*	Number of Cells	Rotation
X	3	9,650	548	0
Y	3	9,550	435	0
Z	3	9,003	359	0

* Local Coordinates

The “zero” estimation run or Pass 0 was performed for Envelope domains to include the samples above the 10 g/t and below the 30 g/t to the estimation. The following parameters were used.

- “0” run – High-grade samples estimation within the Envelope domains:
  - Search ellipse: 5 by 5 by 3 metres (roughly to estimate 1 to 2 blocks in each direction).
  - The same estimation domain constraints and search ellipse orientation were applied.
  - Minimum 1, maximum 12 samples.
  - Samples were capped by the 30 g/t value.
  - Inverse distance method interpolation was used with the power 3.

Three subsequent runs (1, 2 and 3) were used to estimate the main part of the block model. A series of sensitivity runs were performed to examine the impact of various parameters on the estimation. Parameters were selected, and gold was estimated using ordinary kriging as the primary estimator (and inverse distance method with power 3 for the Envelope domains) informed by capped composite boreholes data within the mineralization domains. Each subsequent estimation run used increasing search neighbourhoods sized from variography results. The search parameters are summarized in Table 35. The third estimation pass was increased in order to estimate all of the blocks. Samples from a minimum of three boreholes were required to estimate any block in the first run.

14.3.9 Model Validation

The block model was validated by:

- Visual comparison of informing sample data with resource blocks data (on plan and section) (Figure 45).
- Validation (Swath) plots (section by section) comparison between ordinary kriging (OK) estimation and original declustered dataset (3-metre composites interpolated by nearest neighbourhood method) (Figure 46).

The results of the validation show that the block model acceptably reflects the assay sample data.

Table 35: Search Parameters Used in Block Estimation for the Black Fox Mine

Domain	Orientation Rotation			Domain Group	Pass 1 Distances (1 variogram range)			Pass 2 Distances (2 variogram ranges)			Pass 3 Distances (expanded to fill the volume)		
	OZ	OX	OZ		X (dip)	Y (strike)	Z (perp)	X (dip)	Y (strike)	Z (perp)	X (dip)	Y (strike)	Z (perp)
101	175	55	-55										
102	175	55	-55										
103	175	55	-55										
104	175	55	-55										
105	175	55	-55										
106	175	55	-55										
107	175	55	-55										
108	175	55	-55										
109	175	55	-55										
110	175	55	-55										
111	175	55	-55										
112	155	55	-55										
113	135	45	-55										
114	175	55	-55	100	40	40	12	80	80	24	200	200	60
115	175	55	-55										
116	Dynamic search volume												
117	165	45	-55										
118	175	55	-55										
119	175	55	-55										
120	160	60	-55										
121	125	75	-55										
122	Dynamic search volume												
123	175	55	-55										
124	175	55	-55										
125	165	30	-55										
126	175	40	-55										
127	175	30	-55										
201	175	55	-55										
202	175	55	-55										
203	165	55	-55	200	55	90	10	110	180	20	275	450	50
204	170	55	-55										
205	175	55	-55										
301	170	70	-55	300	55	55	13	110	110	26	275	275	65
401	175	55	-55										
402	175	55	-55										
403	160	55	-55										
404	165	75	-55										
405	175	55	-55										
406	170	60	-55										
407	175	55	-55										
408	175	55	-55										
409	160	55	-55	400	50	30	10	100	60	20	250	150	50
410	155	70	-55										
411	175	60	-55										
412	170	65	-55										
413	170	60	-55										
414	165	65	-55										
415	165	55	-55										
416	165	50	-55										
417	165	45	-55										

Table 35: Search Parameters Used in Block Estimation (Continued 2/2)

Domain	Orientation Rotation			Domain Group	Pass 1 Distances (1 variogram range)			Pass 2 Distances (2 variogram ranges)			Pass 3 Distances (expanded to fill the volume)		
	OZ	OX	OZ		X (dip)	Y (strike)	Z (perp)	X (dip)	Y (strike)	Z (perp)	X (dip)	Y (strike)	Z (perp)
501	175	55	-55	500	45	30	18	90	60	36	225	150	90
502	165	55	-55										
503	175	55	-55										
504	175	55	-55										
601	240	55	0	600	50	60	30	100	120	60	250	300	150
602	240	55	0										
701	165	50	-55	700	45	45	7	90	90	14	225	225	35
702	165	45	-55										
703	165	55	-55										
801	Dynamic search volume			801	50	50	7	100	100	14	250	250	35
802	Dynamic search volume			802	60	60	10	120	120	20	300	300	50
803	Dynamic search volume			803	40	40	15	80	80	30	200	200	75
804	240	55	0	804	60	120	40	120	240	80	300	600	200
805	180	50	-55	805	55	55	6	110	110	12	275	275	30
901	175	55	-55	900	50	50	10	100	100	20	250	250	50
902	240	55	0										
Octant Search						Yes			No			No	
Octants Needed						4			-			-	
Minimum Number of Composites per Octant						1			-			-	
Maximum Number of Composites per Octant						3							
Minimum Number of Composites						7			4			2	
Maximum Number of Composites						12			15			18	
Maximum Number of Composites per Boreholes						3			3			-	

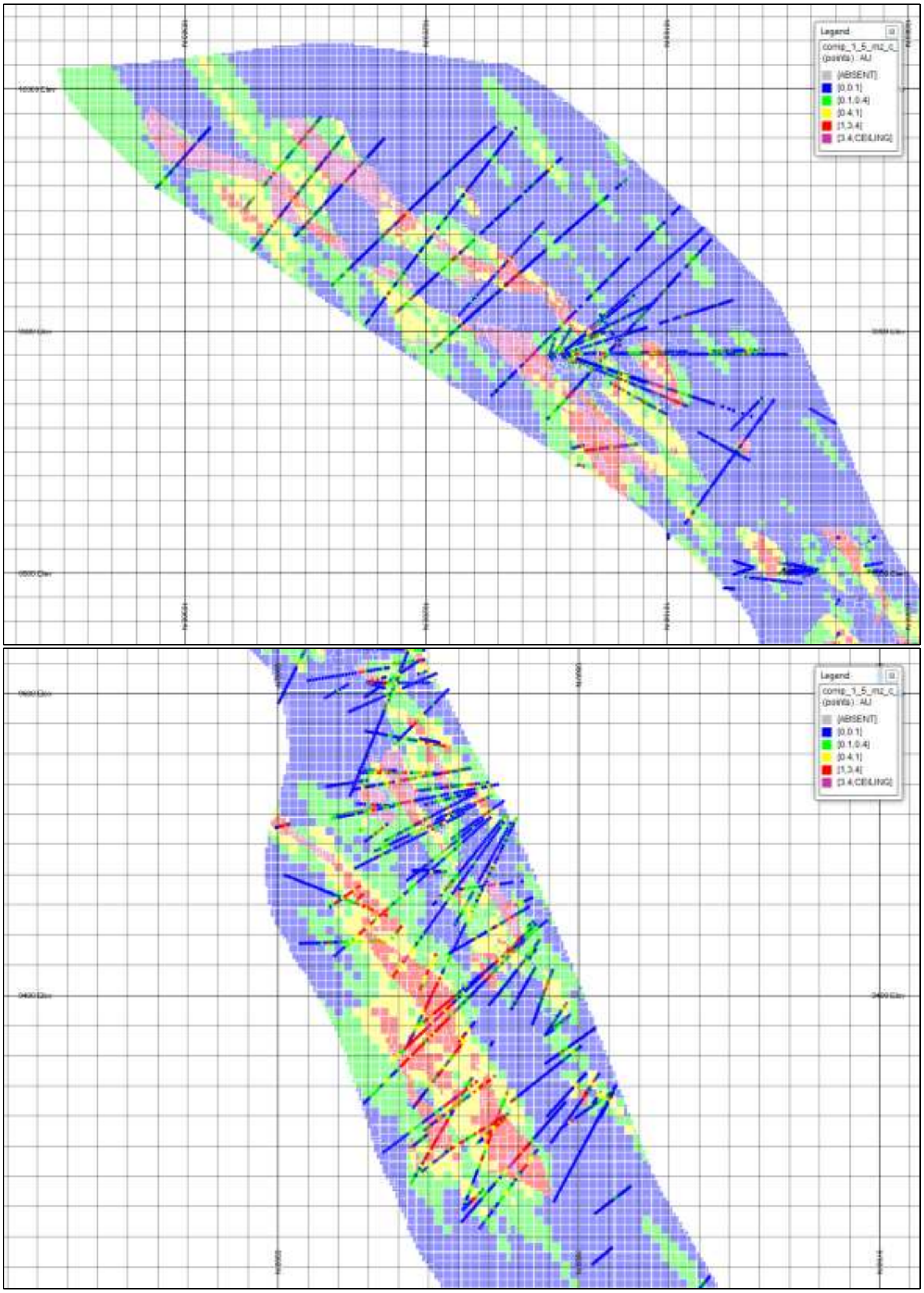


Figure 45: Vertical Sections 10315E (top) and 10415E (bottom), looking east. Comparing Block Grade Estimates to Informing Data

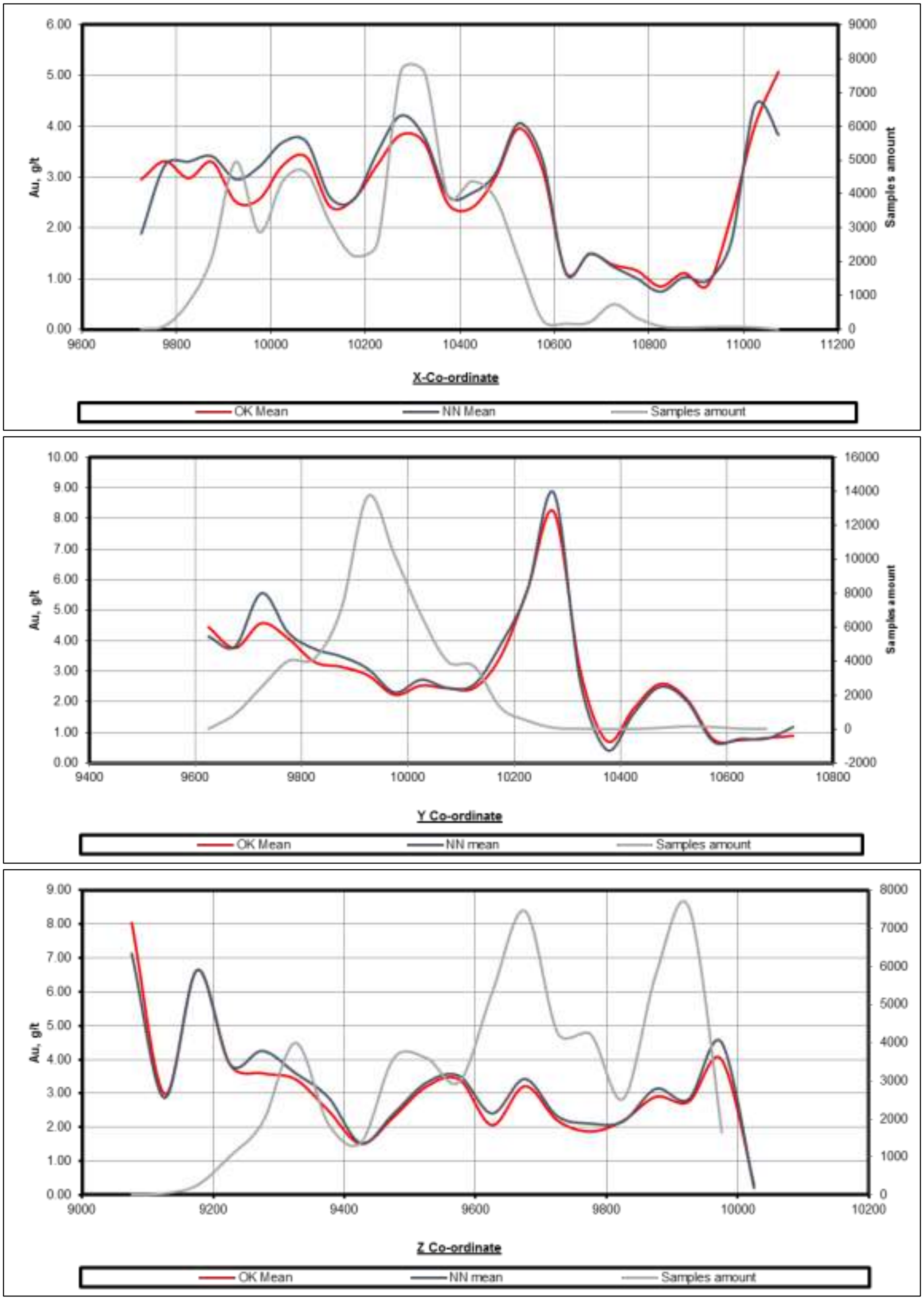


Figure 46: Validation Plots Along X, Y and Z Directions for High-Grade Domains

Comparison Between Gold Grades in Block Model Estimated by OK and Declustered NN Estimation, with Available Samples Overlaid

14.3.10 Underground Workings Depletion

McEwen Mining provided several versions of the mined-out shapes to SRK. SRK merged these to generate the final void model used for the block model depletion (Figure 47). The original mined-out wireframes however are characterised by a significant amount of self-intersections and errors. SRK recommends resurveying the undergrounds workings to get more reliable mined-out wireframe for the further estimations.

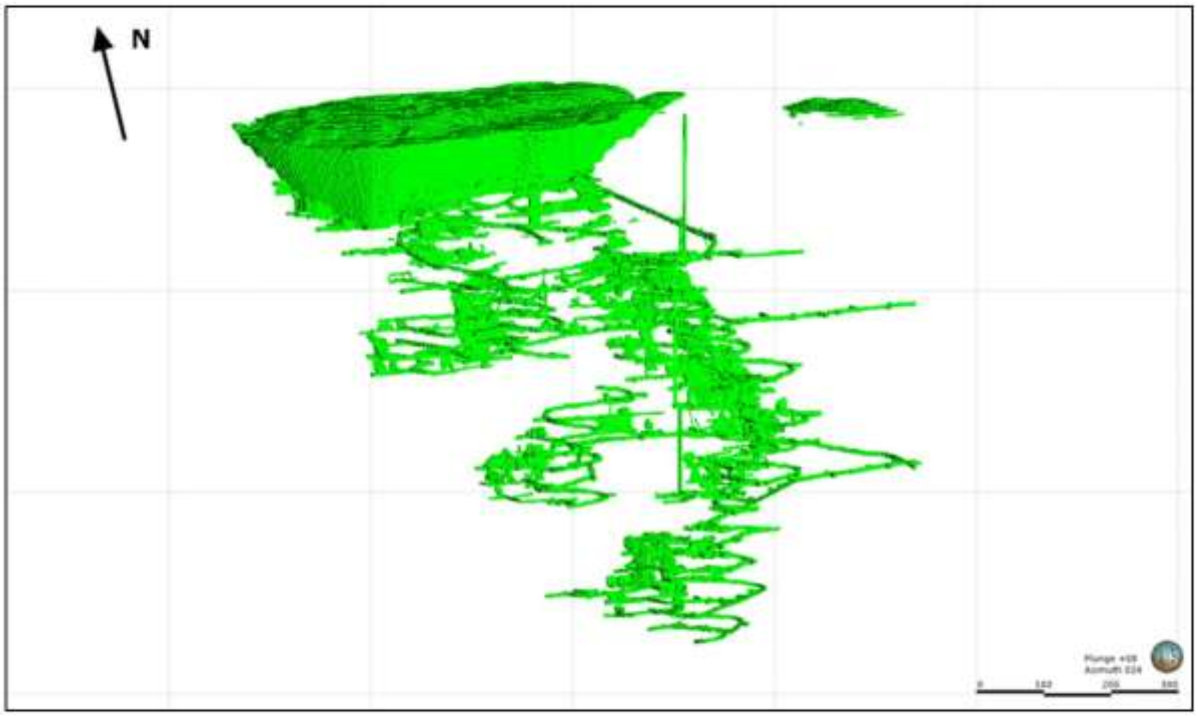


Figure 47: Modelled Mined-out Shapes
View azimuth 024°, plunge 08°

14.3.11 Mineral Resource Classification

Mineral resource classification is typically a subjective concept, and industry best practices suggest that classification should consider the confidence in the geological continuity of the mineralized structures, the quality and quantity of exploration data supporting the estimates, and the geostatistical confidence in the tonnage and grade estimates. Appropriate classification criteria should aim at integrating these concepts to delineate regular areas at similar resource classification as well as the continuity of the deposit at the reporting cut-off grade.

SRK is satisfied that the mineralization model honours the current informing data from the geological database. The location of the samples and the assay data are sufficiently reliable to support resource evaluation and do not present a risk that should be considered for block classification. The mineral resource model is constrained by mineralization domains based on lithological, alteration and grade criteria and is modelled from boreholes drilled on a somewhat irregular grid, but usually 5 to 25 metres apart. The controls on the distribution of the gold mineralization are well understood, and the confidence in its geological continuity is reasonable. In addition, the Black Fox Mine is an active mine characterised by a significant amount of operation data that supporting the geological appreciation of the spatial controls of gold distribution.

SRK considers that drilling spacing is sufficient to assume reasonable continuity of the gold mineralization within the meaning of the CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014). Accordingly, block estimates were classified using a combination of criteria, including confidence in the mineralization's continuity, drilling spacing and estimation results. An Indicated classification was assigned to those continuous blocks informed by at least three boreholes within a 40 m. An Indicated wireframe surface, to limit and smooth the Indicated category, was also developed. No Indicated category was stated in Tamarack zone. All other blocks estimated during subsequent estimation passes were assigned an Inferred classification. There are no Measured blocks classified in this model.

14.3.12 Mineral Resource Statement

The mineral resource modelling process, including the data review, domain modelling, geostatistical analysis and grade interpolation, was completed by Dr. Aleksandr Mitrofanov (APGO#2824), under the supervision of Mr. Glen Cole, PGeo (APGO#1416) and Dr. Oy Leuangthong, PEng (PEO#90563867), all full-time employees of SRK. Dr. Mitrofanov and Mr. Cole are the appropriate independent Qualified Persons as this term is defined in National Instrument 43-101. The effective date of the Mineral Resource Statement is October 31, 2017.

CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014) defines a mineral resource as:

> *"[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."*

The "reasonable prospects for eventual economic extraction" requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade that considers extraction scenarios and processing recoveries. SRK considers that the gold mineralization of the Black Fox property is amenable for underground extraction. McEwen Mining has reviewed the mineral resource model and the grade distribution, and has advised that a reporting cut-off grade of 3.0 g/t gold is appropriate for this project considering a gold price of US$1,500 per ounce of gold and a gold recovery of 96 percent.

Table 36: Mineral Resource Statement*, Black Fox Mine, SRK Consulting (Canada) Inc., October 31, 2017

Classification	Cut-off Grade Gold (g/t)	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Indicated Mineral Resource				
Underground	3.00	2,145	7.80	538
Total Indicated	**3.00**	**2,145**	**7.80**	**538**
Inferred Mineral Resource				
Underground	3.00	216	6.35	44
Total Inferred	**3.00**	**216**	**6.35**	**44**

* Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures rounded to reflect the relative accuracy of the estimates. Composites were capped where appropriate. Mineral resources reported at a cut-off grade of 3.0 g/t gold, assuming an underground extraction scenario, a gold price of US1,500 per ounce, and a metallurgical recovery of 96 percent.

14.3.13 Grade Sensitivity Analysis

Mineral resources are sensitive to the selection of a cut-off grade. To illustrate this sensitivity, block model quantities and grade estimates at different cut-off grades are presented in Table 37 for the Indicated and Inferred material. The reader is cautioned that the figures presented in these tables should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a cut-off grade. Figure 48 and Figure 49present this sensitivity as grade tonnage curves.

Table 37: Grade Tonnage Data* for the Indicated and Inferred Material for the Black Fox Mine

Cut-off	Indicated			Inferred		
Grade (Au g/t)	Quantity (000't)	Grade (g/t Au)	Metal (000'oz)	Quantity (000't)	Grade (g/t Au)	Metal (000'oz)
0.00	95,585	0.35	1,063	122,747	0.08	335
0.30	15,974	1.80	926	7,167	0.82	188
0.50	10,974	2.45	864	3,652	1.23	145
0.80	7,482	3.30	793	1,686	1.96	106
1.00	6,173	3.81	756	1,209	2.38	92
1.40	4,564	4.73	695	673	3.33	72
1.80	3,595	5.58	645	430	4.33	60
1.80	3,595	5.58	645	430	4.33	60
2.20	2,941	6.38	603	334	5.00	54
2.60	2,494	7.10	569	264	5.70	48
3.00	2,145	7.80	538	216	6.35	44
3.40	1,880	8.45	510	189	6.80	41
3.80	1,657	9.10	485	171	7.15	39
4.50	1,353	10.21	444	146	7.65	36
6.00	937	12.45	375	102	8.69	29
7.00	776	13.69	342	76	9.44	23
8.00	646	14.94	310	51	10.43	17
9.00	547	16.11	283	35	11.33	13
10.00	470	17.19	260	26	12.00	10

* The reader is cautioned that the figures in this table should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a cut-off grade. Figures are rounded to reflect the accuracy of the estimate.

** An underground extraction scenario, a gold price of US$1,500 per ounce, and a metallurgical recovery of 96 percent were assumed

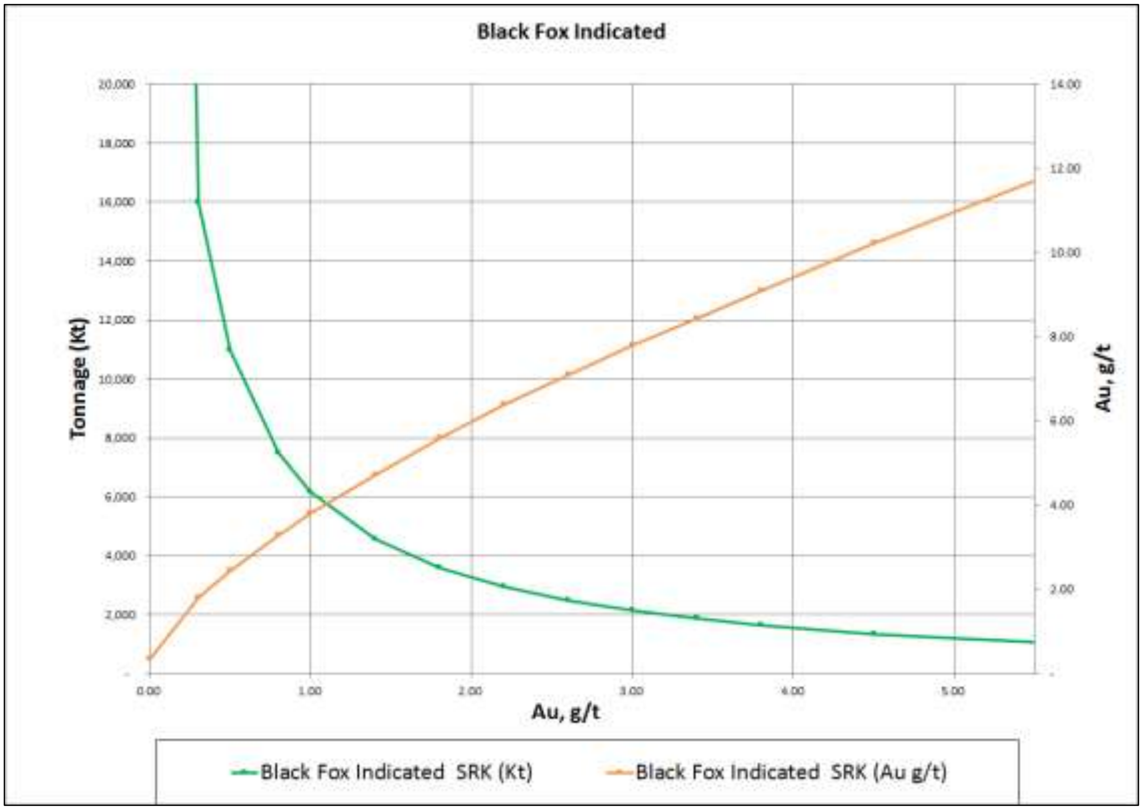


Figure 48: Grade Tonnage Curve for the Indicated Material

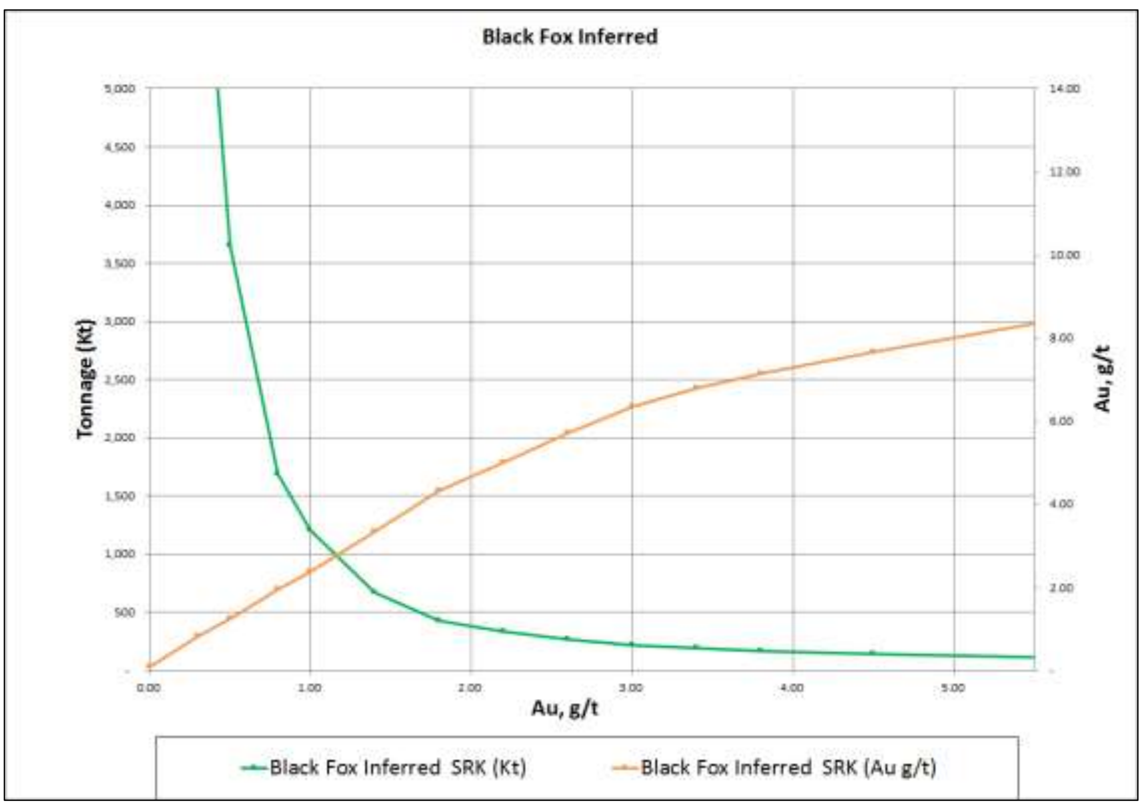


Figure 49: Grade Tonnage Curve for the Inferred Material

14.3.14 Previous Mineral Resource Estimates

The previously reported mineral resource model was developed by Primero in 2014. Subsequent to this, Primero undertook several mineral resource estimations for the Black Fox deposit for internal purposes only which were not reported. SRK herewith compare the results of the current mineral resource model to the 2014 mineral resource model.

Table 38 compares the metal price and recovery assumptions considered for the preparation of the 2014 and 2017 mineral resource statements whereas Table 39 shows the comparative 2014 and 2017 mineral resource statements.

Material changes on Black Fox Mine since the 2014 Mineral Resource Statement include:

- Due to active exploration, the database used for the mineral resource estimation has almost doubled.
- Open pit material and the stockpile material has been removed and processed.
- Much of the previously reported underground mineral resources has been depleted.

Comparing the mineral resource statements in Table 39, the combined Measured and Indicated tonnage and contained metal has decreased. However, the underground portion of combined Measured and Indicated has increased (+16 percent in tonnes and +18 percent in ounces). The Inferred portion of the reported mineral resources has decreased.

Table 38: Metal Price and Recovery Assumptions Considered in 2014 and 2017

Metal	Cut-off Grade g/t		Metal Price (US$/oz)		Metal Recovery %	
	2014	2017	2014	2017	2014	2017
Gold	0.9 g/t (OP) 3.0 g/t (UG)	3.0 g/t (UG)	1,300	1,500	Not disclosed	96%

Table 39: Comparative 2014 and 2017 Mineral Resource Statements for the Black Fox Mine

Classification	Mining Method	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
2014				
Measured	Stockpiles	716	1.07	25
Indicated	Open Pit	1,424	3.99	183
	Underground	1,853	7.48	455
Measured + Indicated		**4,043**	**5.02**	**653**
Inferred	Open Pit	364	5.80	68
	Underground	326	9.52	100
Total Inferred		**690**	**7.56**	**168**
2017				
Indicated	Underground	**2,145**	**7.80**	**538**
Inferred	Underground	**216**	**6.35**	**44**
Comparisons				
Measured + Indicated	Underground	**16%**	**4%**	**18%**
	Total	**-47%**	**55%**	**-18%**
Inferred	Underground	**-34%**	**-33%**	**-56%**
	Total	**-69%**	**-16%**	**-74%**

14.3.15 Recommendations

SRK constructed the mineral resource model in November 2017 using the geological and estimation support from McEwen Mining. Gold mineralization domains are based on the current on-site geological understanding of the gold mineralization distribution which incorporates lithological, alteration and grade criteria. SRK considers the data density to be of adequate quality and quantity for mineral resource estimation.

SRK propose that the following enhancements be considered for future geological / mineral resource modelling processes:

- The geological model used by McEwen Mining can be updated by considering the most recent drilling data.
- Continue developing the lower grade domains within the main geological and alteration units (AUV, CGY, etc.) and analyzing the threshold and modelling method for each higher-grade sub-domains separately within every lower-grade domain.
- Optimization of the large database by using the implicit modelling techniques to accurately define geological and resource domains.
- Collect additional representative specific gravity samples for all main geological and alteration units to refine local tonnage estimation.
- Survey and update of the current mined-out underground workings shapes which may optimize mineral resource estimation results and facilitate underground mine planning.

14.4 Froome Project

The Mineral Resource Statement presented herein represents the first mineral resource evaluation prepared for the Froome project in accordance with the Canadian Securities Administrators' National Instrument 43-101.

The mineral resource model which was prepared by Primero in 2017 and audited by SRK considers 204 core boreholes drilled by Primero during the period of October 2014 to November 2016. The Primero (2017) resource model was audited by David Machuca, PEng (PEO 100508889), an appropriate independent Qualified Person as this term is defined in National Instrument 43-101. The effective date of the Mineral Resource Statement is October 31, 2017.

This section describes the resource estimation methodology and summarizes the key assumptions considered by Primero. In the opinion of SRK, the resource evaluation reported herein is a reasonable representation of the global gold mineral resources found in the Froome project at the current level of sampling. The mineral resources have been estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* and are reported in accordance with the Canadian Securities Administrators' National Instrument 43-101. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into mineral reserve.

SRK is of the opinion that the current drilling information is sufficiently reliable to interpret with confidence the boundaries for the gold mineralization and that the assay data are sufficiently reliable to support mineral resource estimation.

Primero used Leapfrog Geo™ software to construct the geological solids, and GEOVIA GEMS™ was used to prepare assay data for geostatistical analysis, construct the block model, estimate metal grades, and tabulate mineral resources.

The resource evaluation methodology involved the following procedures:

- Database compilation and verification.
- Construction of wireframe models for the boundaries of the alteration and lithological domains.
- Definition of the alteration solids as the most important resource domains.
- Data conditioning (compositing and capping) for geostatistical analysis and variography.
- Block modelling and grade interpolation.
- Resource classification and validation.
- Assessment of "reasonable prospects for eventual economic extraction" and selection of appropriate cut-off grades.
- Preparation of the Mineral Resource Statement.

14.4.1 Resource Database

McEwen Mining provided the resource database as exports from a GEMS™ project database on November 29, 2017. The drilling database comprises the header, downhole survey, lithology, alteration and assays tables for 204 boreholes drilled by Primero between October 14, 2014 to November 10, 2016.

All borehole collars were surveyed to UTM coordinates (NAD 83, Zone 17). Primero completed down- hole surveys at 5 metres intervals when a gyroscope and at intervals of approximately 50 metres when using a Reflex down-hole survey tool.

The total length drilled by diamond holes in the Froome project is 59,109.6 metres. Out of the 24,500 core intervals in the assays table, 23,603 intervals contain gold assay values and 897 intervals are missing. SRK did not receive information about core recovery.

14.4.2 Geological Modelling

Primero constructed the three-dimensional geological model for the Froome Project using a combination of implicit and explicit modelling techniques to shape the alteration and lithological units that control the gold mineralization. The geological model was last updated on December 2016 and comprises the eight alteration and lithological units described in Table 40.

Table 40: Lithological and Alteration Domains in the Froome Geological Model

Abbreviation	Code	Description	Estimation Domain
UTIM_HG	300	Intensely silicified with disseminated pyrite and quartz-ankerite stringers and breccias. Ore zone.	Yes
UTIM_LG	301	Weakly silicified, sericitic, metasediment. Patchy, discontinuous mineralization.	Yes
MI_UTIM	23	Mafic intrusive(?) crosscutting ore zone. Unmineralized.	Yes
LTIM	40	Sheared ultramafic volcanics flanking UTIM_LG and UTIM_HG domains	Yes
MV	31	Mafic volcanic.	No
PORPH	60	Quartz feldspar porphyry.	No
UMV	10	Ultramafic volcanic, relatively undeformed	No
OB	5	Overburden.	No

Of these eight geological domains, only the UTIM_HG, UTIM_LG, MI_UTIM and LTIM solids were considered as estimation domains. The wireframes built by Primero also contain the topography surface interpolated from surveyed borehole collars and the overburden-bedrock contact surface. Figure 50 shows a vertical section illustrating all the geological domains at the Froome Project.

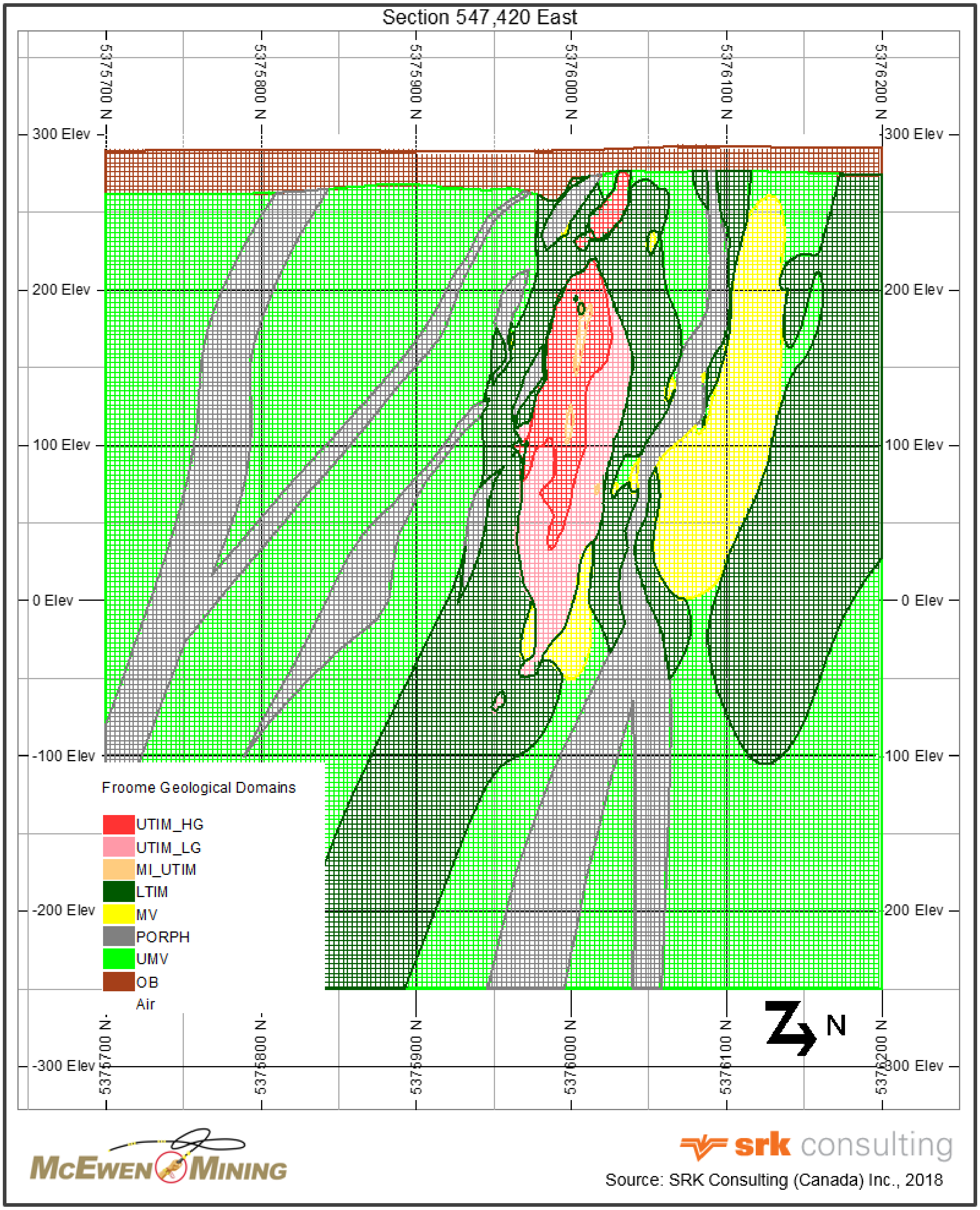


Figure 50: Vertical Section Looking West of the Froome Geological Model

14.4.3 Statistical Analysis and Compositing

Table 41 summarizes the assay statistics for the Froome Project, tagged by mineral resource model domains. This tagging of the data was not provided by Primero, but obtained by SRK intersecting the borehole traces with the domains solids. The gold assays statistics show that the mineralisation in the UTIM_HG is clearly different from the other domains. Figure 51 shows the distribution of assay lengths in the entire Froome Project. Approximately 88 percent of assay samples measure 1.0 metres or less. Based on this observation and to maintain the number of data available for grade estimation, Primero chose to composite at 1.0 metres. Table 42 presents the clustered and declustered statistics for the gold grades in the composites of the four estimation domains.

Table 41: Basic Statistics for Assay Data in the Froome Project

Variable	Domain	Count	Minimum	Maximum	Mean	Std. Dev.	Variance	COV
Gold Grade* (g/t)	UTIM_HG	4,320	0.00	34.59	4.21	3.86	14.94	0.92
	UTIM_LG	2,878	0.00	27.53	0.57	1.09	1.18	1.92
	LTIM	6,773	0.00	18.16	0.11	0.66	0.43	5.86
	MI_UTIM	287	0.00	14.67	1.01	2.02	4.07	1.99
	MV	1,569	0.00	289.03	0.40	7.79	60.66	19.34
	PORPH	4,843	0.00	9.94	0.09	0.37	0.14	4.12
	UMV	2,804	0.00	9.05	0.03	0.23	0.05	8.26
	OB	-	-	-	-	-	-	-
	Total	**23,474**	**0.00**	**289.03**	**0.95**	**3.11**	**9.67**	**3.27**
Length (m)	UTIM_HG	4,322	0.01	2.00	0.91	0.19	0.04	0.21
	UTIM_LG	2,883	0.03	21.28	0.94	0.42	0.18	0.45
	LTIM	7,464	0.01	62.50	1.67	4.02	16.20	2.41
	MI_UTIM	287	0.08	1.55	0.89	0.24	0.06	0.27
	MV	1,703	0.03	38.40	1.44	3.13	9.78	2.17
	PORPH	5,250	0.01	60.40	1.36	2.80	7.86	2.06
	UMV	3,708	0.01	98.20	3.21	7.37	54.37	2.30
	OB	-	-	-	-	-	-	-
	Total	**25,617**	**0.01**	**98.2**	**1.60**	**3.92**	**15.40**	**2.46**

* Gold grade statistics are length-weighted

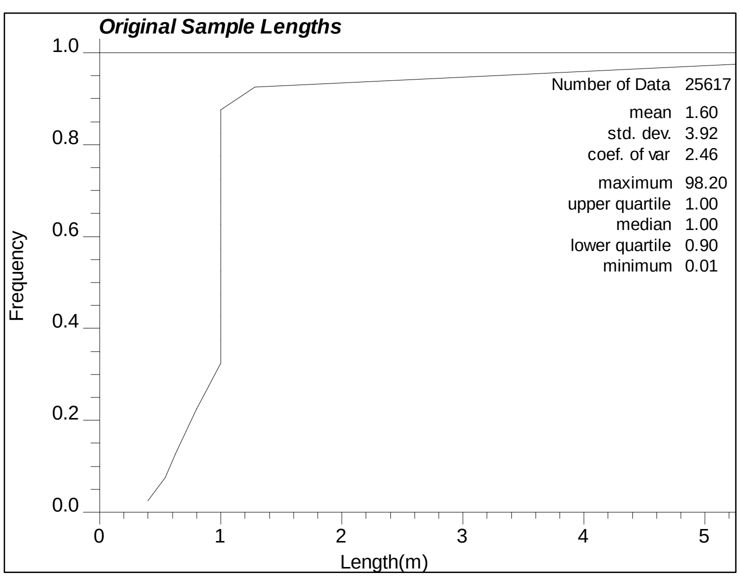


Figure 51: Cumulative Histogram for Borehole Sample Length from the Froome Project

Table 42: Basic Statistics for Composite Gold Grades in the Froome Project in the Estimation Domains

Domain	Count	Minimum (g/t)	Maximum (g/t)	Clustered Stats. Mean (g/t)	Clustered Stats. Std. Dev. (g/t)	Declustered* Stats. Mean (g/t)	Declustered* Stats. Std. Dev. (g/t)
UTIM_HG	3,941	0.00	29.49	4.22	3.64	4.09	3.58
UTIM_LG	2,679	0.00	24.51	0.57	1.01	0.58	1.01
LTIM	6,043	0.00	16.35	0.11	0.59	0.1	0.58
MI_UTIM	255	0.01	14.67	1.02	1.94	0.93	1.81

* Declustering weights were obtained using inverse distance to a power of two

14.4.4 Evaluation of Outliers

After compositing the raw samples to a regular length of 1 metre, Primero decided not to cap the outlier grades as is was considered that capping will not materially impact the global mineral resources. SRK performed a capping analysis of gold grades per domain to confirm this. Figure 52 shows the capping analysis plots for the most important domains in the Froome Project mineral resource model, UTIM HG and UTIM LG.

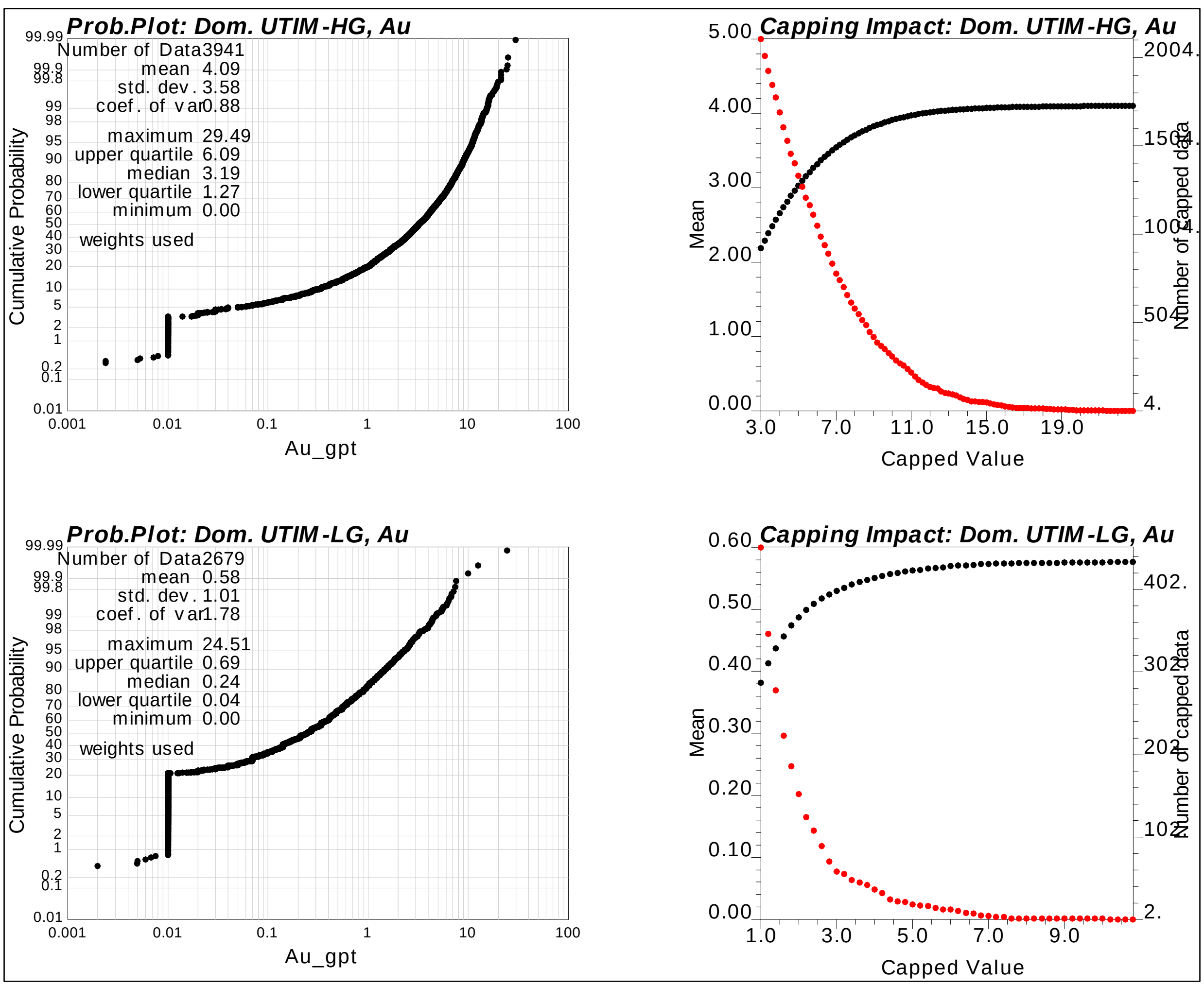


Figure 52: Probability and Capping Impact Plots for Gold Grades in Domains UTIM HG and UTIM LG of the Froome Project Mineral Resource Model

The cumulative probability plots for these two domains show breaks at around 15.0 g/t gold and 7.0 g/t gold, respectively. At those thresholds, the curves representing the impact on the gold grade average and on the number of capped composites are practically flat for both domains. This suggests capping at those thresholds may not impact materially the global estimates. However, high grade composites may have a local impact constrained by the use of a power of two estimator in the inverse distance interpolation. Similar analysis and reasoning were adopted to support the decision of not to cap the composite gold grades in the other estimation domains.

14.4.5 Specific Gravity

The specific gravity values used by Primero for the mineral resources estimation is based on 656 measurements located in the domains UTIM_HG, UTIM_LG and MI_UTIM. Table 43 shows the statistics of the specific gravity data. In the mineral resource model, the specific gravity for each of these three domains is considered constant and equivalent to the average of their corresponding measurements. This is a reasonable assumption since the standard deviation of the specific gravity data is small. Thus, the whole of the UTIM_HG, UTIM_LG and MI_UTIM domains were assigned with constant specific gravity values of 2.733, 2.749 and 2.787, respectively. For the other domains, including LTIM, MV, PORPH and UMV, a constant specific gravity of 2.748 was used. This value is the average specific gravity obtained for the ultramafic material from a historical dataset not provided to SRK. A constant specific gravity of 2.0 was assumed for the overburden material based on the standard density for wet gravel (http://www.engineeringtoolbox.com/dirt-mud-densities-d_1727.html).

Table 43: Specific Gravity Statistics in the Main Mineralized Domains for the Froome Project

Domain	Number of Samples	Mean	Median	Standard Deviation	Coefficient of Variation	Minimum	Maximum
UTIM_HG	386	2.733	2.733	0.066	0.024	2.400	3.120
UTIM_LG	198	2.749	2.759	0.072	0.026	2.530	3.007
MI_UTIM	72	2.787	2.800	0.076	0.027	2.557	2.960

14.4.6 Statistical Analysis and Variography

Primero modelled the experimental variograms along the major axis of mineralisation for the domains UTIM_HG and UTIM_LG, combined, and the domains MI_UTIM and LTIM, independently. Table 44 presents the variogram model parameters. These variograms were used for sensitivity ordinary kriging runs and for informing the search ellipsoids geometry for inverse distance interpolation.

Table 44: Gold Variogram Parameters for the Froome Project

Domain	Orientation - SURPAC Rotation (ZXY LRL)			Variogram Model						
	Azimuth	Plunge	Dip	Nugget*	Structure	Type	CC*	Y Range	X Range	Z Range
UTIM_HG + UTIM_LG	215	-80	23	0.32	1	Spherical	0.33	12	12	6
					2	Spherical	0.35	50	50	24
LTIM	215	-75	0	0.35	1	Exponential	0.65	26	22	25
MI_UTIM	327	67	-33	0.34	1	Spherical	0.49	28	17	15

* Nugget effect and sills normalized to 1.0.

14.4.7 Block Model and Grade Estimation

Table 45 summarizes the block model parameters for the Froome mineral resource model. Prior to grade estimation, each of the 3 × 3 × 3 metres blocks was coded by the geological domains and assigned with the corresponding density. The final mineral model was populated with gold values using inverse distance to a power of two in the mineralized domains, and applying up to two estimation runs with progressively relaxed search ellipsoids and data requirements. The first estimation pass is based on an octant search with search radii up to the variogram range. The second pass use an ellipsoidal search with search set to up to 1.5 times the variogram range. The orientations of the search ellipsoids follow those of the variogram models presented in Table 44.

Table 46 summarizes the data requirements for the estimation of gold grades. The LTIM_HG and LTIM_LG share the same grade interpolation parameters. In order to minimize the smearing of high grades, the contact between these two domains was considered as soft when estimating the LTIM_HG blocks, but hard when estimating the LTIM_LG blocks. All other contacts between the estimation domains were considered as hard.

Table 45: Block Model Parameters for the Froome Project

Direction	Origin*	Size (metre)	Number of Blocks
East-West	546,950	3	284
North-South	5,375,700	3	167
Vertical	-249	3	184

* UTM coordinates datum NAD83 Zone 17

Table 46: Grade Interpolation Parameters for the Froome Mineral Resource Model

Domain	Method	Est. Pass	Search Type	No. Data		Max Comp per Hole	Search Ellipse			Octant Parameters	
				Min	Max		Svx* (m)	Svy* (m)	Svz* (m)	Min Num Octants	Max Comp per Octant
LTIM_HG + LTIM_LG	ID2	1	Octant	8	24	3	50	50	24	5	3
		2	Ellipsoidal	5	24	3	75	75	36	-	-
LTIM	ID2	1	Octant	8	30	3	187	43	32	5	6
		2	Ellipsoidal	5	24	3	187	65	48	-	-
MI_UTIM	ID2	1	Octant	8	24	3	26	28	17	5	3
		2	Ellipsoidal	5	24	3	26	42	25	-	-

14.4.8 Model Validation

SRK validated the block model using a visual comparison of block estimates and informing composites, and statistical comparisons between composites and block model distributions.

Table 47 presents the global (without considering a cut-off grade) average gold grade comparison between the block estimates and the informing data. Globally there is a negligible underestimation of the average gold grade in the richest domain (UTIM HG), and a slight overestimation and underestimation in the UTIM LG and MI UTIM domains, respectively. The underestimation of the average gold grade in the LTIM domain may seem large, but this is a very low-grade domain.

The swath plots in Figure 53 shows that for domains UTIM HG and UTIM LG, the estimates reproduce well the gold grade vertical trend in the vertical direction.

Table 47: Global Average Grade Comparisons Between Estimates and Informing Data per Domain for the Froome Project

	Estimation Domain			
	UTIM HG	UTIM LG	MI UTIM	LTIM
Estimated gold grade	4.05	0.62	0.88	0.04
Declustered gold grade	4.09	0.58	0.93	0.10
Relative difference	**-1%**	**7%**	**-5%**	**-60%**

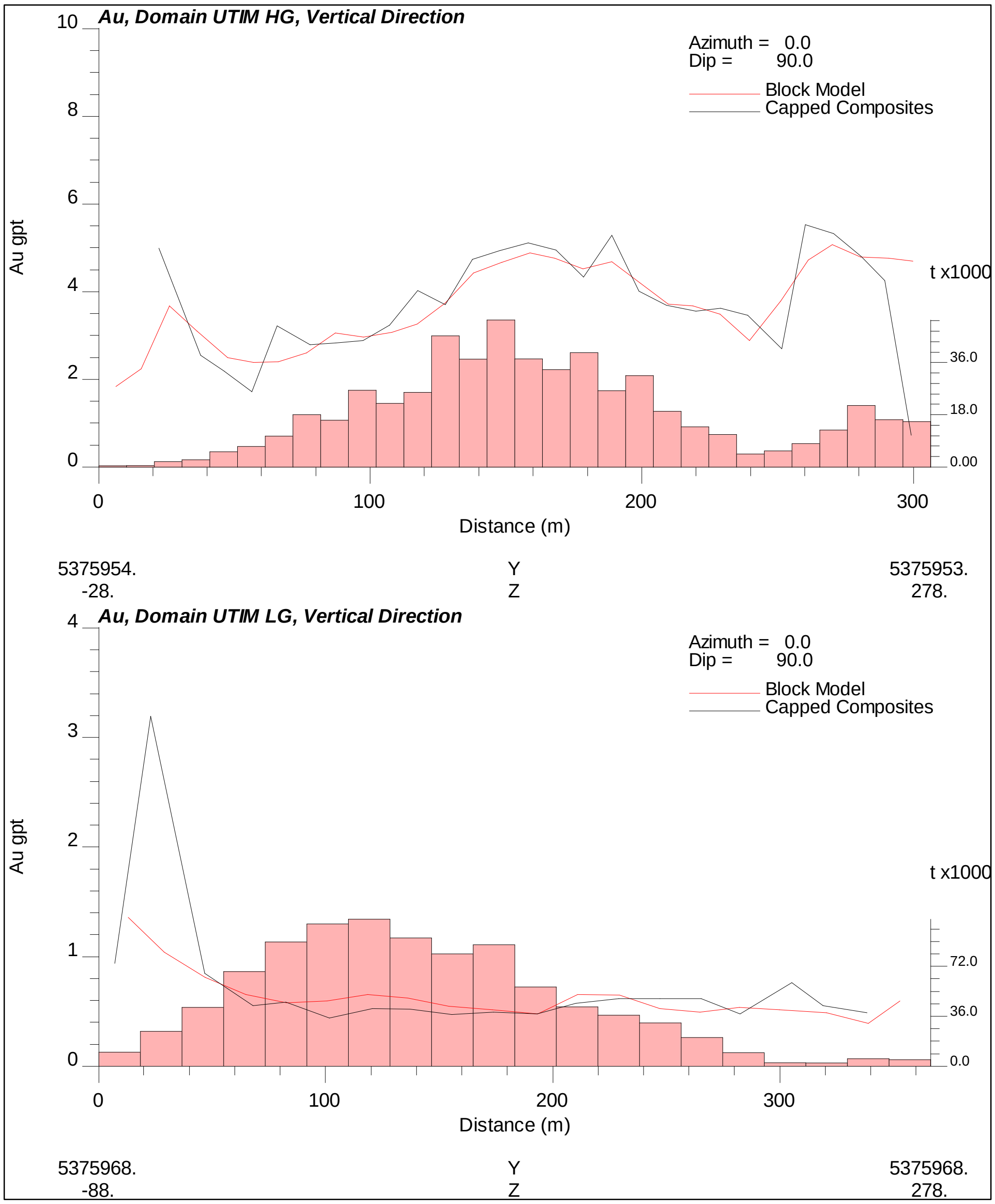


Figure 53: Swath Plots for the Domains UTIM HG and UTIM LG in the Vertical Direction
(left: bottom of the model, right: top of the model)

14.4.9 Mineral Resource Classification

Mineral resource classification is typically a subjective concept. Industry best practices suggest that resource classification should consider the confidence in the geological interpretation and geological continuity of mineralization, the quality and quantity of the exploration data supporting the estimates, and the geostatistical confidence in the quality of the tonnage and grade estimates. Appropriate classification criteria should aim at integrating these concepts to delineate regular areas at similar classification.

Primero classified all blocks estimated during the first pass as Indicated, using at least eight composited from at least 3 boreholes located in at least 3 octants. The maximum distance to the samples allowed for the samples conditioning the Indicated Resources blocks was 30 metres. All other blocks estimated during the second pass were classified as Inferred Resources. No Measured Resources were classified.

Under these mineral resource classification criteria, the indicated mineral resources blocks were estimated, in average, with 17 composites taken from 6 holes located 16 metres apart from the blocks.

14.4.10 Mineral Resource Statement

The resource estimation work was completed by Primero and audited by SRK.

CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014) defines a mineral resource as:

> *"[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."*

The "reasonable prospects for eventual economic extraction" requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recoveries. SRK considers that the gold mineralization of the Froome property is amenable for underground extraction. McEwen Mining has reviewed the mineral resource model and the grade distribution, and has advised that a reporting cut-off grade of 3.2 g/t gold is appropriate for this project considering a gold price of US$1,500 per ounce of gold and a gold recovery of 90 percent.

Table 48: Mineral Resource Statement*, Froome Project, Ontario, SRK Consulting (Canada) Inc., March 30, 2018

Classification	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Measured	-	-	-
Indicated	941	5.26	159
Total Measured and Indicated	**941**	**5.26**	**159**
Inferred	125	4.70	19

* Mineral resources are not mineral reserves and have not demonstrated economic viability. All figures are rounded to reflect the relative accuracy of the estimates. Mineral resources are reported at a gold cut-off grade of 3.20 g/t assuming metal prices of US$1,500 per ounce of gold and metal recovery of 90 percent for gold.

14.4.11 Grade Sensitivity Analysis

The mineral resources of the Froome Project are sensitive to the selection of a reporting cut-off grade. To illustrate this sensitivity, the global quantities and grade estimates in the resource block model are presented at various cut-off grades in Table 49, and grade tonnage curves are presented in Figure 54.

The reader is cautioned that these figures should not be misconstrued as a Mineral Resource Statement. The reported quantities and grades estimates are only presented as a sensitivity of the resource model to the selection of a reporting cut-off grade.

Table 49: Block Model Quantity and Grade Estimates* at Various Cut-off Grades for the Froome Project

Cut-off	Indicated			Inferred		
Grade (Au g/t)	Quantity (000't)	Grade (g/t Au)	Metal (000'oz)	Quantity (000't)	Grade (g/t Au)	Metal (000'oz)
0.50	2,038	3.26	214	892	1.61	46
1.00	1,617	3.92	204	430	2.58	36
1.50	1,438	4.26	197	283	3.29	30
2.00	1,297	4.53	189	212	3.82	26
2.50	1,153	4.82	179	169	4.21	23
3.00	1,000	5.13	165	136	4.56	20
3.20	941	5.26	159	125	4.70	19
3.40	880	5.40	153	113	4.85	18
3.60	816	5.54	146	98	5.05	16
3.80	753	5.70	138	87	5.22	15
4.00	694	5.85	131	79	5.37	14
4.50	558	6.24	112	57	5.79	11
5.00	439	6.65	94	41	6.20	8

* The reader is cautioned that the figures presented in this table should not be misconstrued as a Mineral Resource Statement. The reported quantities and grades are only presented as a sensitivity of the deposit model to the selection of a reporting cut-off grade.

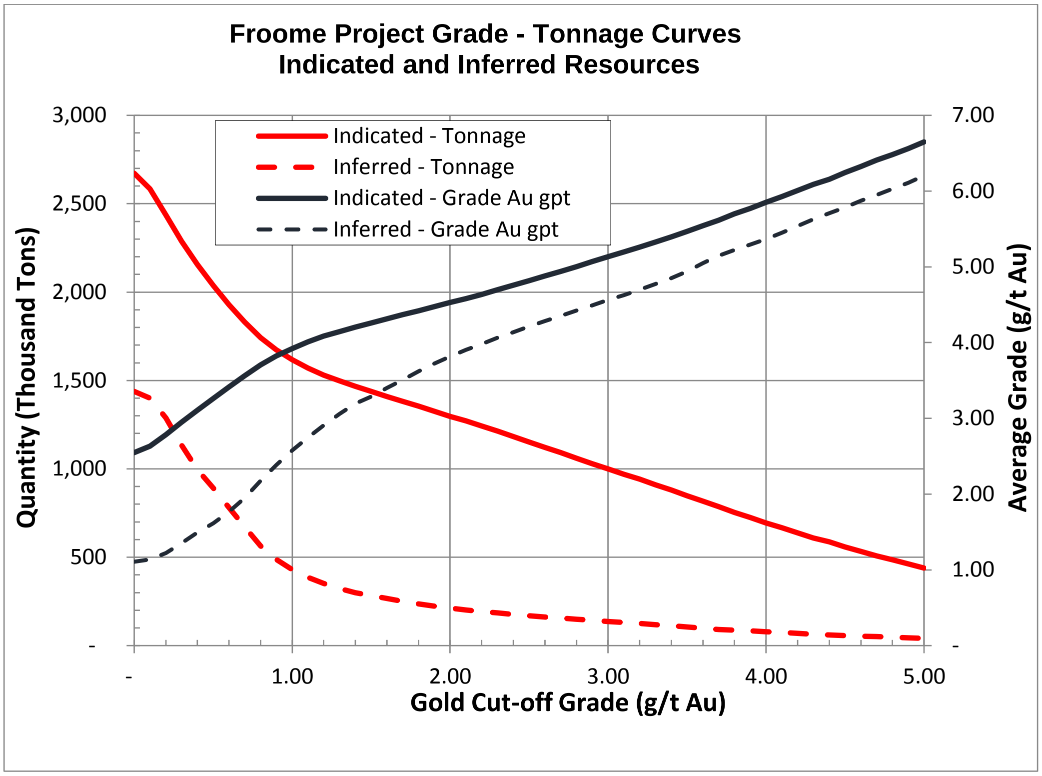


Figure 54: Grade Tonnage Curve for all Mineralized Domains of the Froome Project

14.5 Grey Fox Project

14.5.1 Introduction

In November 2017, McEwen Mining commisioned SRK Consulting (Canada) Inc. (SRK) to prepare a new mineral resource model for the Grey Fox Project. A previous mineral resource model was constructed by AMC Mining Consultants (Canada) Ltd. (AMC) in 2015. This section summarizes the data, methodology, and parameters considered by SRK to prepare the mineral resource model for the Grey Fox Project.

The mineral resource modelling process, including the data review, domain modelling, geostatistical analysis and grade interpolation, was completed by Dr. Aleksandr Mitrofanov (APGO#2824), supported by Mr. Glen Cole, PGeo (APGO#1416), both full-time employees of SRK. Dr. Mitrofanov and Mr. Cole are both appropriate independent Qualified Persons as this term is defined in National Instrument 43-101. The effective date of the Mineral Resource Statement is October31, 2017.

This section describes the resource estimation methodology and summarizes the key assumptions considered by SRK. In the opinion of SRK, the resource evaluation reported herein is a reasonable representation of the global gold mineral resources found at the Grey Fox Project at the current level of sampling. The mineral resources have been estimated in conformity with generally accepted CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines* and are reported in accordance with National Instrument 43-101. Mineral resources are not mineral reserves and have not demonstrated economic viability. There is no certainty that all or any part of the mineral resource will be converted into mineral reserve.

The database used to estimate the Grey Fox Project mineral resources was audited by SRK. SRK believes the current drilling information is sufficiently reliable to interpret with confidence the boundaries for gold mineralization and that the assay data are sufficiently reliable to support mineral resource estimation.

14.5.2 Resource Database

The mineral resource database comprises primarily of samples from core boreholes drilled from surface. SRK was provided with a database comprising 1,172 core boreholes (425,490 metres). SRK excluded two boreholes from the database because of the absence of survey information which resulted in 1,170 boreholes (425,325 metres) used in the estimation. This represents an addition of 61 boreholes (28,348 metres) since the 2015 model.

The database contains 191,570 intervals assayed for gold, which represents the addition of 37,432 samples since 2015. The mineralized domains contain 23,809 assay intervals. SRK has noticed minor differences in the historical drilling database to that reported in the AMC (2015) technical report, but has collaborated closely with McEwen Mining staff to ensure that all available data has been utilized for the current mineral resource estimation.

SRK note that boreholes were typically not sampled over their full length (Figure 55). According to the McEwen Mining staff these intervals were not assayed as they were considered not to contain any gold and were therefore assigned background gold grade (0.00025 g/t) for the mineral resource estimation.

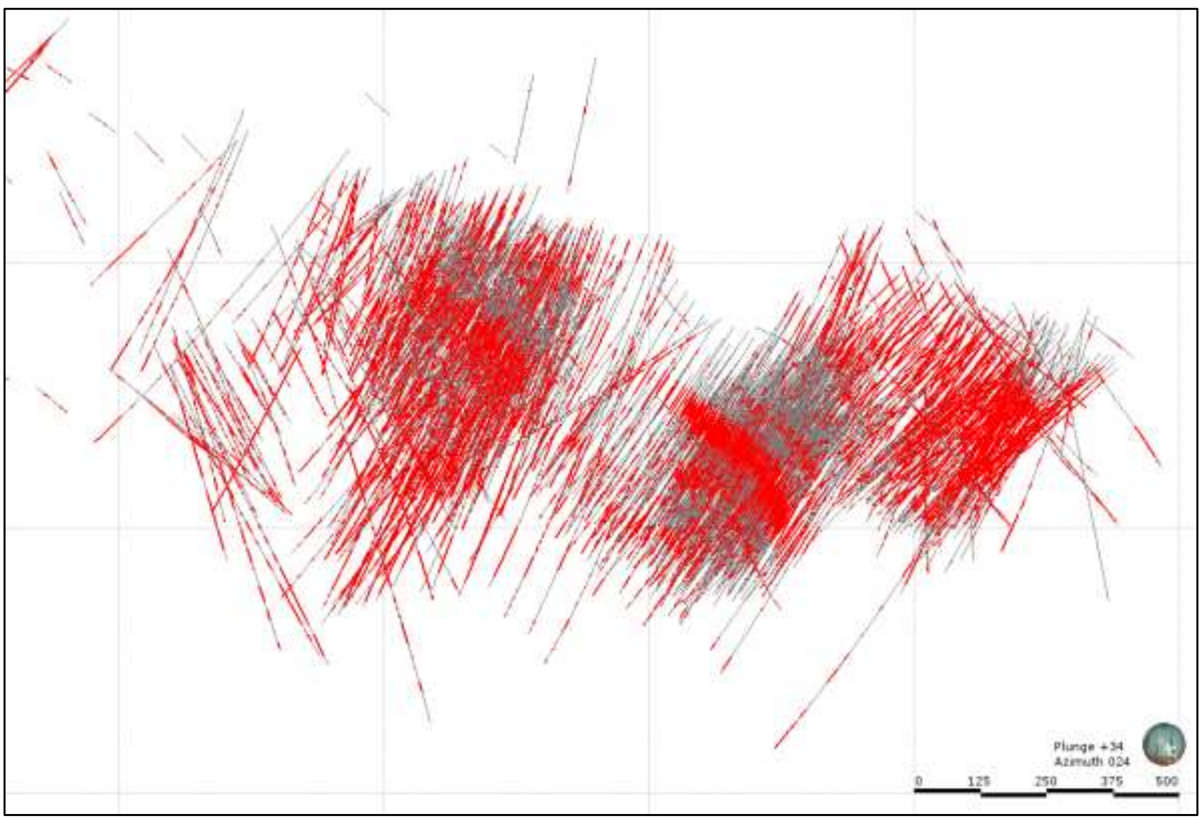


Figure 55: Grey Fox Project Database Spatial Overview: Red Intervals Were Sampled, Grey – No Data

SRK received the sampling data as MS Excel file for import into Datamine Studio and Leapfrog software and performed the following validation steps:

a. Checked minimum and maximum values for each quality value field and confirmed/edited that outside of expected ranges.
b. Checked for gaps, overlaps, and out of sequence intervals for both assays and lithology tables.
c. Checked the collar coordinates in three-dimensional space to ensure they matched the topography provided.

Dr. Mitrofanov and Mr. Cole from SRK visited the Grey Fox Project as the part of the Black Fox Complex visit in November 2017. Additionally, Dr. Erwann Lebrun, a SRK Consultant (Structural Geology) visited the Grey Fox Project in January 2018. During this visit, Dr. Lebrun and McEwen Mining Senior Geologist Steven Scott analyzed the structural controls of gold mineralization, discussed core logging procedures and provided the necessary structural input for the mineral resource modelling.

SRK is satisfied that the exploration work carried out by McEwen Mining is conducted in a manner consistent with industry best practices and, therefore, the exploration data and the drilling database are sufficiently reliable to support a preliminary mineral resource evaluation.

The topography surface was constructed from the LIDAR data in Aug 2011 and was provided to SRK by McEwen Mining. SRK was also provided by the overburden surface that caps the mineralization extent.

14.5.3 Geological Modelling

Mineralization Zones

The Grey Fox project area can be subdivided into the four zones that have different mineralization-controlling structure orientations. The initial input wireframes of the mineralization zones were developed by Steven Scott from McEwen Mining in collaboration with SRK. The general overview of the main zones and the original McEwen Mining wireframes is presented in Figure 56.

The geological domains presented in Figure 56 were grouped based on the primary orientation of the mineralized structures and were coloured and coded as the following:

- 11 – red, east-west oriented domains within the Contact zone (dip azimuth 355°, dip 80).
- 12 – green, north-south oriented domain within the Contact zone (dip azimuth 85°, dip 85).
- 21 – pink, south-east oriented domain within the Gibson zone (dip azimuth 215°, dip 80).
- 31 – yellow, north-south oriented domains within the 147 zone (dip azimuth 80°, dip 70).
- 32 – orange, east-west oriented domains within the 147 zone (dip azimuth 15°, dip 80).
- 33 – dark blue, north-east oriented domain within the 147 and Grey Fox South zones (dip azimuth 315°, dip 75).
- 34 – brown, north-east oriented domain within the Grey Fox South zone (dip azimuth 330°, dip 65).
- 35 – light blue, north-south oriented domains within the Grey Fox South zone (dip azimuth 80°, dip 75).

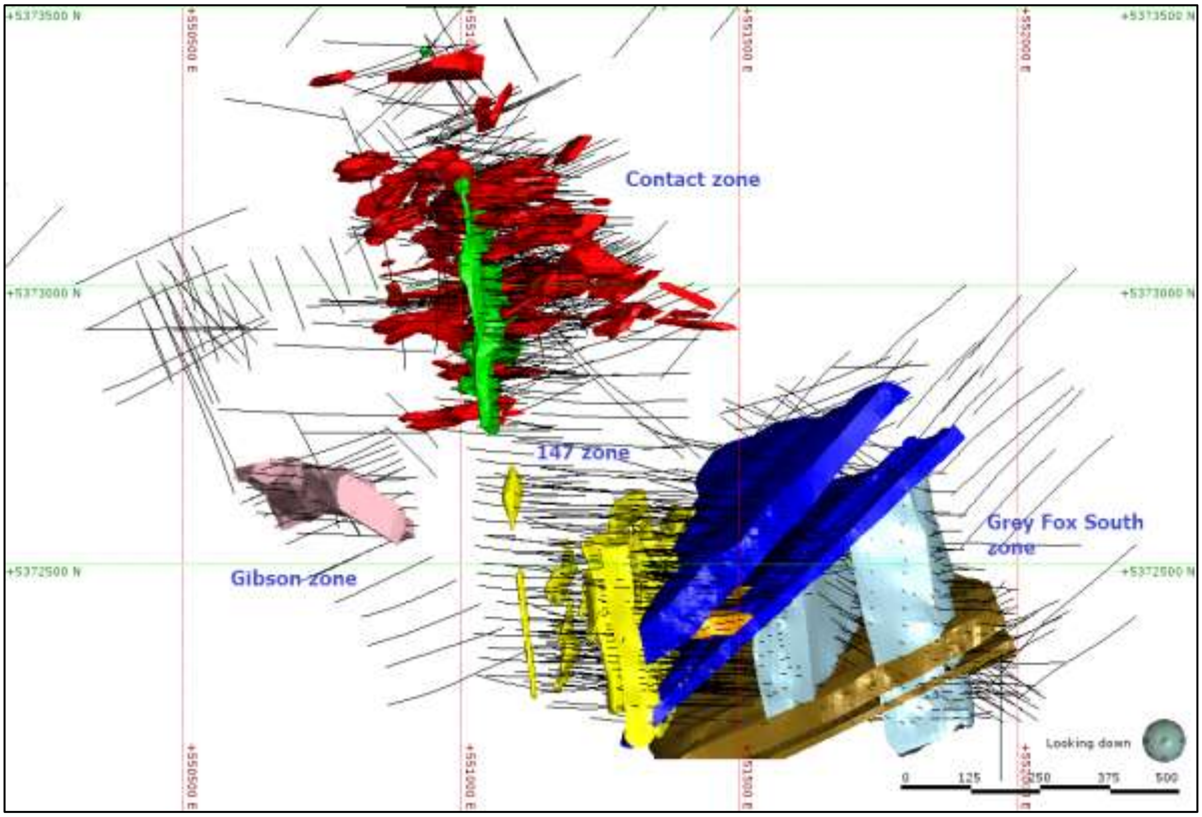


Figure 56: Grey Fox Project Geological Domains (McEwen Mining Inc) Plan View

As the original domains provided to SRK contain a significant amount of non-mineralized material, SRK generated the mineralized sub-domains for the mineral resource estimation using the grade threshold 0.1 g/t (Figure 57). This was done to avoid dilution by barren grades in the mineralization zones.

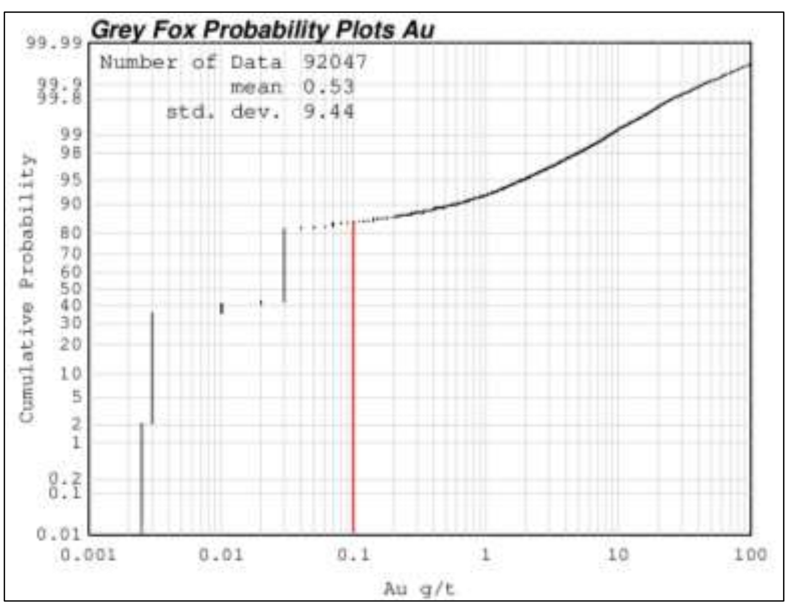


Figure 57: Probability Plot of the Length-Weighted Assay Intervals Within Geological Domains

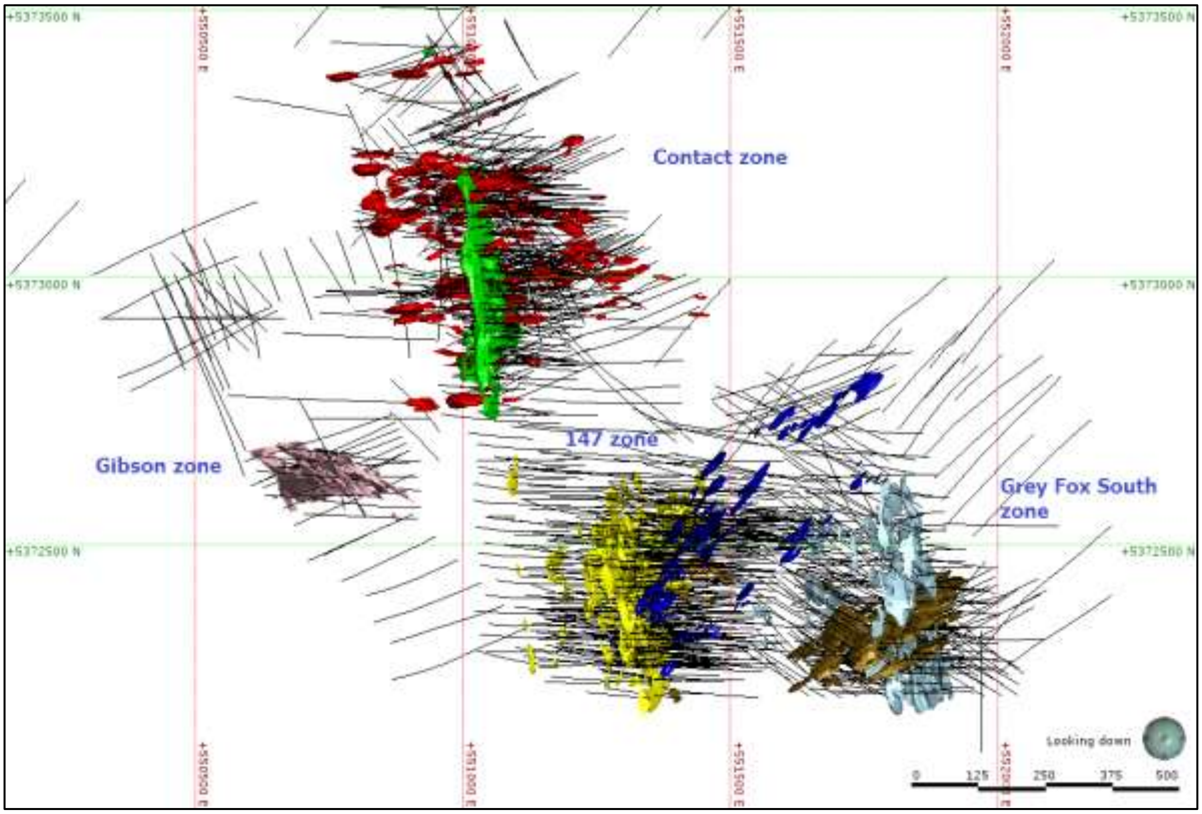


Figure 58: Plan View of SRK Grey Fox Project Subdomains Used for the Mineral Resource Estimation

An overview of the mineral resource estimation sub-domains is presented in Figure 58 (using the same colour legend as Figure 57.

Unconstrained Zones of Disseminated Mineralization

The mineralized domains include a significant amount of mineralized intersections that can be reliably modelled as continious zones. To account for the mineralized intersections that are external to mineral resource domains, SRK undertook an unconstrained interpolation.

To guide grade interpolation SRK generated buffer zones within which the orientation of the search ellipsoid is guided by the global orientation of the mineralized zones. The buffer zones are presented in Figure 59. The area outside of the buffers were interpolated using the isotropic search volume.

14.5.4 Statistical Analysis and Compositing

The assay data within the mineralization domains was extracted and examined to determine an appropriate composite length (Figure 60). The majority of the analytical samples were collected at 1-metre intervals. A modal composite length of approximately 1.0 metre was applied to all the data, generating composites as close to 1.0 metre as possible, while creating residual intervals of up to 0.5 metre in length (borehole assays). In all cases, composite files were derived from raw values within the resource domains.

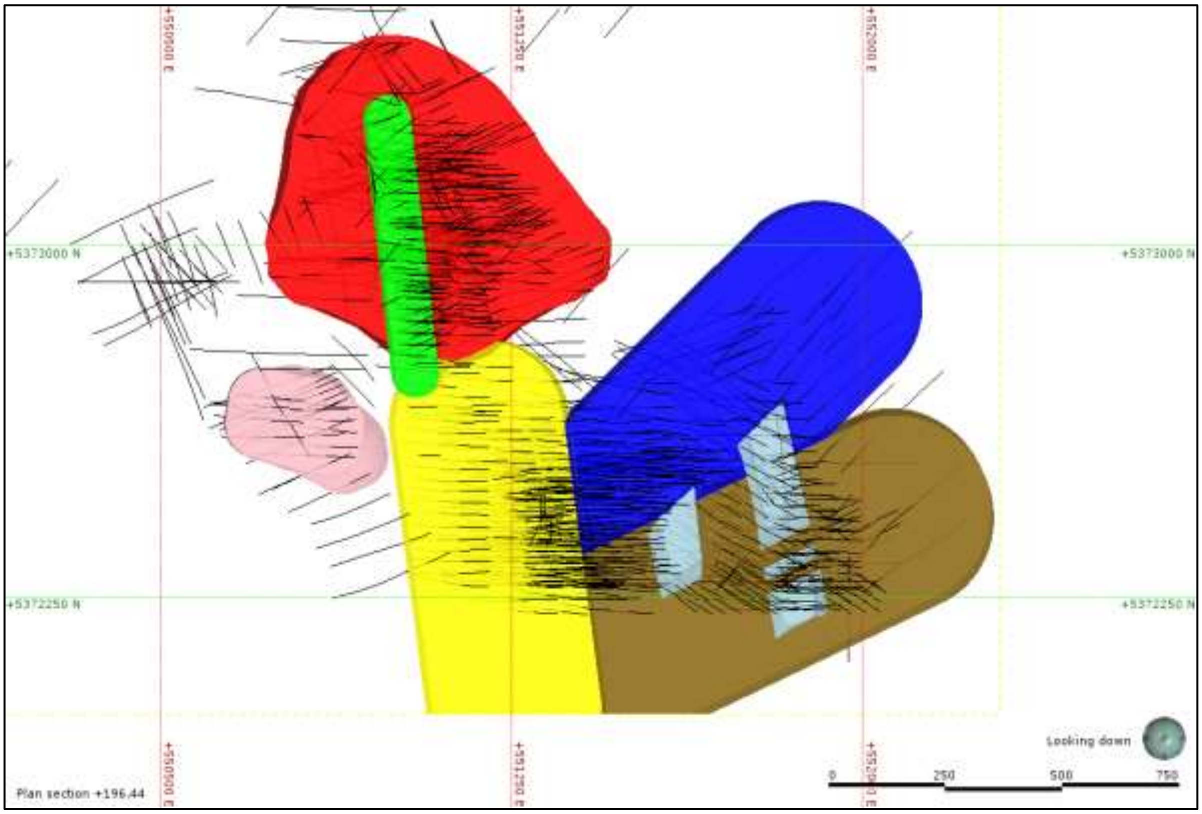


Figure 59: Buffers Used for the Unconstrained Interpolation Plan View

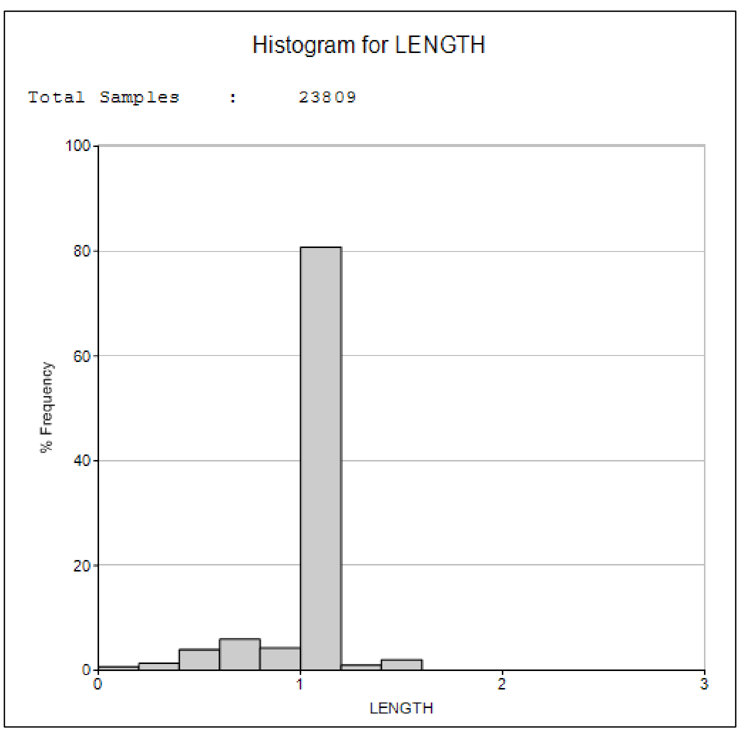


Figure 60: Length Frequency Distribution of the Samples Within the Mineralization Domains

14.5.5 Evaluation of Outliers

The impact of outliers was examined on composite data using log probability plots and cumulative statistics (Figure 61). Upon review, SRK is of the opinion that capping is required to restrict the influence of outliers.

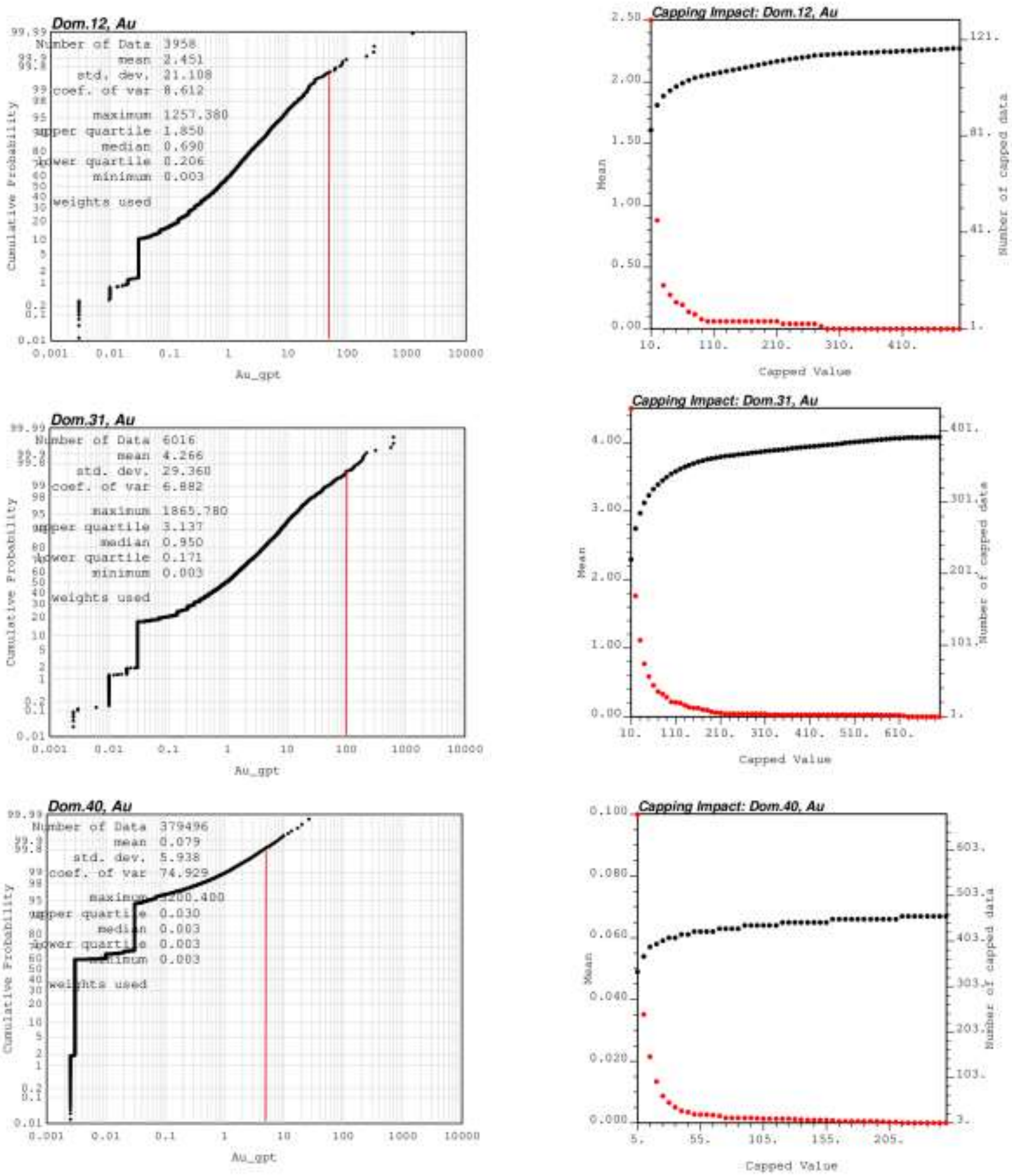


Figure 61: Capping Analysis for Grey Fox Project

SRK conducted the analysis separately for the mineralized domains:

- 11 – 50 g/t gold.
- 12 - 50 g/t gold.
- 21 - 15 g/t gold.
- 31 - 100 g/t gold.
- 32 - 4 g/t gold.
- 33 - 25 g/t gold.
- 34 - 40 g/t gold.
- 35 - 16 g/t gold.
- 40 (unconstrained zones) – 5 g/t gold.

The summary statistics for all of the mineral resource estimation domains is presented in Table 50.

14.5.6 Specific Gravity

SRK was provided with the density measurements database, however, most of the density samples were collected in the Grey Fox South zone and probably may not be representative for three other zones.

After the discussion with McEwen Mining, a constant average density of 2.87 grams per cubic centimetre was applied to all mineralized material in this study. This corresponds to the average density of the mineralized zones that was used in the previous resource estimates. A density of 2.00 grams per cubic centimetre has been assigned to the overburden (OB). For the fresh country rock the density of 2.87 grams per cubic centimetre was applied to the mafic rocks and 3.00 grams per cubic centimetre was assigned to country rock within the fault zone to the northeast (ultramafic rocks).

SRK recommends collecting the representative set of density measurements samples for mineralized Contact, Gibson and 147 zones and updating the current geological model in order to assign the density values to the country rock model.

Table 50: Summary Basic Statistics for Raw Sample, Composite and Capped Composite Data for Grey Fox Project Domains (Std Dev = standard deviation, COV = coefficient of variation)

Domain	Assays						Composites						Capped Composites						Assay length / number of comp	Mean Change		Std Dev Change		COV Change	
	Length (m)	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Number of Samples	Min (g/t)	Max (g/t)	Mean (g/t)	Std Dev	COV	Assay to composites	Assay to composites	Capping	Assay to composites	Capping	Assay to composites	Capping
11	5323	0.0025	221.42	2.14	7.13	3.33	5382	0.003	166.07	2.12	6.22	2.93	5382	0.003	50.00	2.02	4.68	2.31	1%	-1%	-5%	-13%	-25%	-12%	-21%
12	3932	0.0025	2097.24	2.49	26.07	10.46	3958	0.003	1257.38	2.48	21.70	8.76	3958	0.003	50.00	1.97	4.41	2.24	1%	-1%	-20%	-17%	-80%	-16%	-74%
21	1202	0.003	38.26	1.37	2.71	1.97	1211	0.01	38.26	1.38	2.65	1.92	1211	0.01	15.00	1.32	2.17	1.64	1%	0%	-4%	-2%	-18%	-2%	-15%
31	5975	0.0025	2079.51	4.28	32.75	7.64	6016	0.003	1865.78	4.26	29.91	7.01	6016	0.003	100.00	3.53	9.47	2.68	1%	0%	-17%	-9%	-68%	-8%	-62%
32	149	0.01	38.95	1.19	3.42	2.89	153	0.010	27.49	1.18	2.75	2.33	153	0.010	4.00	0.89	1.07	1.21	3%	-1%	-25%	-20%	-61%	-19%	-48%
33	1300	0.0025	1258.91	3.13	35.26	11.28	1309	0.003	1008.03	3.15	29.08	9.25	1309	0.003	25.00	2.04	3.56	1.75	1%	1%	-35%	-18%	-88%	-18%	-81%
34	2841	0.0025	310.15	2.16	8.43	3.91	2890	0.003	310.15	2.14	8.23	3.84	2890	0.003	40.00	1.94	4.41	2.27	2%	-1%	-9%	-2%	-46%	-2%	-41%
35	2126	0.0025	43.00	0.89	2.01	2.26	2144	0.003	43.00	0.89	1.90	2.15	2144	0.003	16.00	0.87	1.63	1.87	1%	0%	-2%	-5%	-15%	-5%	-13%
40	379569	0.0025	4892.89	0.08	8.25	102.76	379496	0.003	3200.40	0.08	6.12	76.67	379496	0.003	5.00	0.05	0.31	6.28	0%	-1%	-39%	-26%	-95%	-25%	-92%

14.5.7 Statistical Analysis and Variography

SRK evaluated the spatial distribution of gold using variograms and correlograms as well as its normal score transformation. All spatial metrics were considered to infer the correlation structure of the gold. The same mineralized domains used for the capping analysis were used for the variography. For the unconstrained disseminated mineralization zones the omnidirectional variogram model was used to determine the range as a measure of spatial correlation.

All variogram analyses and modelling were performed using Geostatistical Software Library (GSLib). Primary directions and orientations of the variograms were observed in the data visually in 3D space. These orientations were then examined statistically within the software packages to ensure they represented the best possible fit for the variography. The general orientation of the variogram models correspond with the orientation of the mineralized zones. The stability of the variograms was evaluated by varying the direction specification and comparing the resulting experimental variograms. The developed variograms displayed two structures and two rotations to match the strike and dip of the modelled mineralization. Table 51 tabulates the fitted variogram models for gold for the 12 domains, whereas several modelled variograms are illustrated in Figure 62.

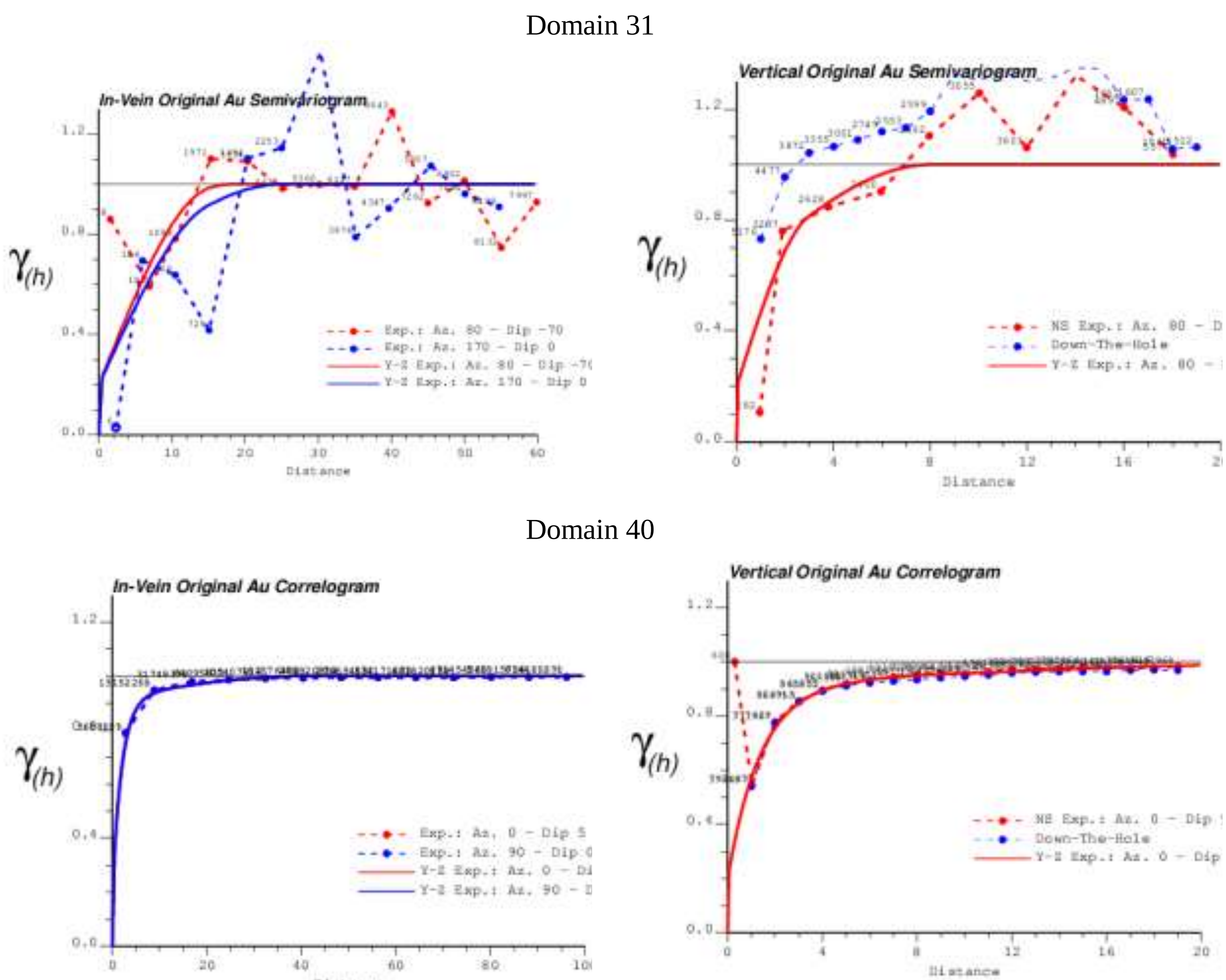


Figure 62: Variogram Model for the 12 Domain

Table 51: Gold Variogram Parameters for the Grey Fox Project. Sph – Spherical, Exp – Exponential Variogram Models

Domain	Nugget	Structure 1		Range			Structure 2		Range			Comments
		Type	Sill	Strike	Dip	Perp	Type	Sill	Strike	Dip	Perp	
11	0.2	Exp	0.7	21	21	4.2	Sph	0.1	30	30	8	- Major In-Vein and perpendicular directions fitted on the correlogram - Minor In-Vein direction fitted on back-transformed gaussian variogram
12	0.15	Sph	0.45	6	18	2	Sph	0.4	20	20	5	- Major and Minor In-Vein directions fitted on the semivariogram - Perpendicular direction fitted on the correlogram
21	0.25	Sph	0.55	5	5	4	Sph	0.2	40	40	5	- Major and Minor In-Vein directions fitted on the correlograms and back-transformed Gaussian variograms - Isotropy preferred in the in-vein plane because scarce data and inconclusive experimental variograms - Perpendicular direction fitted on the correlogram
31	0.2	Sph	0.4	15	15	3	Sph	0.4	25	18	8	- All directions fitted on the semivariograms
32	0.2	Sph	0.5	22	22	3	Sph	0.3	30	30	4	- All directions fitted on the correlograms - Isotropy in the in-vein plane preferred since experimental variograms are inconclusive and data scarce - The experimental variograms in the perpendicular direction are omnidirectional
33	0.2	Exp	0.7	33	33	2.7	Sph	0.1	60	60	10	- In-vein directions fitted on the semivariograms - Isotropy in the in-vein plane preferred since experimental variograms are inconclusive and data scarce - Perpendicular direction fitted on correlogram, coincidently, it also fits the down-the-hole semivariogram
34	0.2	Exp	0.6	24	24	3.3	Sph	0.2	60	60	12	- In-vein directions fitted on the semivariograms - Isotropy in the in-vein plane preferred since experimental variograms are inconclusive and data scarce - Perpendicular direction fitted on correlogram, coincidently, it also fits the down-the-hole semivariogram
35	0.25	Sph	0.35	10	10	2	Sph	0.4	30	30	3.5	- All directions fitted on the semivariograms
40	0.2	Exp	0.72	6	6	4.2	Sph	0.08	40	40	30	- All directions fitted on the correlograms - omnidirectional experimental variograms used

14.5.8 Block Model and Grade Estimation

The criteria used in the selection of block size included borehole spacing, composite length, as well as the geometry of the modelled zone, and the anticipated mining method. A block size of 5 by 5 by 5 metres was used, the same as the 2015 model. Sub-cells were used, allowing a resolution of 1 by 1 by 1 metres to better reflect the shape of the mineralization domain. Sub-cells were assigned the same values as their parent cell. No rotation was applied to the block model. The characteristics of the block model are summarized in Table 52. The sub-celling is efficient in filling the wireframe volumes.

The block model contains the information about the estimation domaining from the wireframes.

The estimation of the mineralized zones (domains 11-35) was conducted in three successive runs (1, 2 and 3). A series of sensitivity runs were performed to examine the impact of various parameters on the estimation. Parameters were selected, and gold was estimated using ordinary kriging as the primary estimator informed by capped composite boreholes data within the mineralization domains. Each subsequent estimation run used increasing search neighbourhoods sized from variography results. The search parameters are summarized in Table 53. The third estimation pass was increased in order to estimate all of the blocks.

The unconstrained estimation of the disseminated mineralization was conducted in one run. The buffer zones (Figure 59) were used as soft boundaries and did not constrain the composites for the estimation. The gold was estimated using inverse distance method with power 3 as the primary estimator informed by capped composite boreholes data. Blocks located within the buffer zones were estimated using the anisotropic search (Table 53), all other blocks were estimated by isotropic search volume. The size of the search volumes was determined using the omnidirectional variogram model. The blocks outside the mineralization domains that were not estimated by unconstrained estimation procedure were assigned with the background gold value 0.00025 g/t.

Table 52: Grey Fox Project Block Model Specifications

Axis	Block Size (metres)	Origin*	Number of Cells	Rotation
X	5	550,400	315	0
Y	5	5,327,150	267	0
Z	5	-510	170	0

* UTM Coordinates

14.5.9 Model Validation and Sensitivity

The block model was validated by:

- Visual comparison of informing sample data with resource blocks data (on plan and section) (Figure 63 and Figure 64).
- Validation (Swath) plots (section by section) comparison between ordinary kriging (OK) estimation and original declustered dataset (5-metre composites interpolated by nearest neighbourhood method) (Figure 78).

The results of the validation show that the block model adequately reflects informing assay sample data.

Table 53: Search Parameters Used in Block Estimation for the Grey Fox Project

Domain	Orientation Rotation			Domain Group	Pass 1 Distances (1 variogram range)			Pass 2 Distances (2 variogram ranges)			Pass 3 Distances (expanded to fill the volume)		
	OZ	OX	OZ		X (strike)	Y (dip)	Z (perp)	X (strike)	Y (dip)	Z (perp)	X (strike)	Y (dip)	Z (perp)
11	355	80			30	30	8	60	60	16	150	150	70
12	Dynamic search volume				20	20	5	40	40	10	100	100	25
21	215	80	0		40	40	5	80	80	10	200	200	25
31	80	70	0	Mineralized zones	25	18	8	50	36	16	125	90	40
32	15	80	0		30	30	4	60	60	8	150	150	20
33	315	75	0		60	60	10	120	120	20	300	300	50
34	330	63	0		60	60	12	120	120	24	300	300	60
35	80	75	0		30	30	3.5	60	60	7	150	150	50
111	355	80	0										
112	85	85	0										
121	215	80	0										
131	80	70	0	Unconstrained estimation	40	40	20						
133	315	75	0										
134	330	63	0										
135	80	75	0										
Isotropic	0	0	0		30	30	30						
Octant Search					Yes			No			No		
Octants Needed					4			-			-		
Minimum Number of Composites per Octant					1			-			-		
Maximum Number of Composites per Octant					3			-			-		
Minimum Number of Composites					6			6			2		
Maximum Number of Composites					15			15			20		
Maximum Number of Composites per Boreholes					5			5			-		

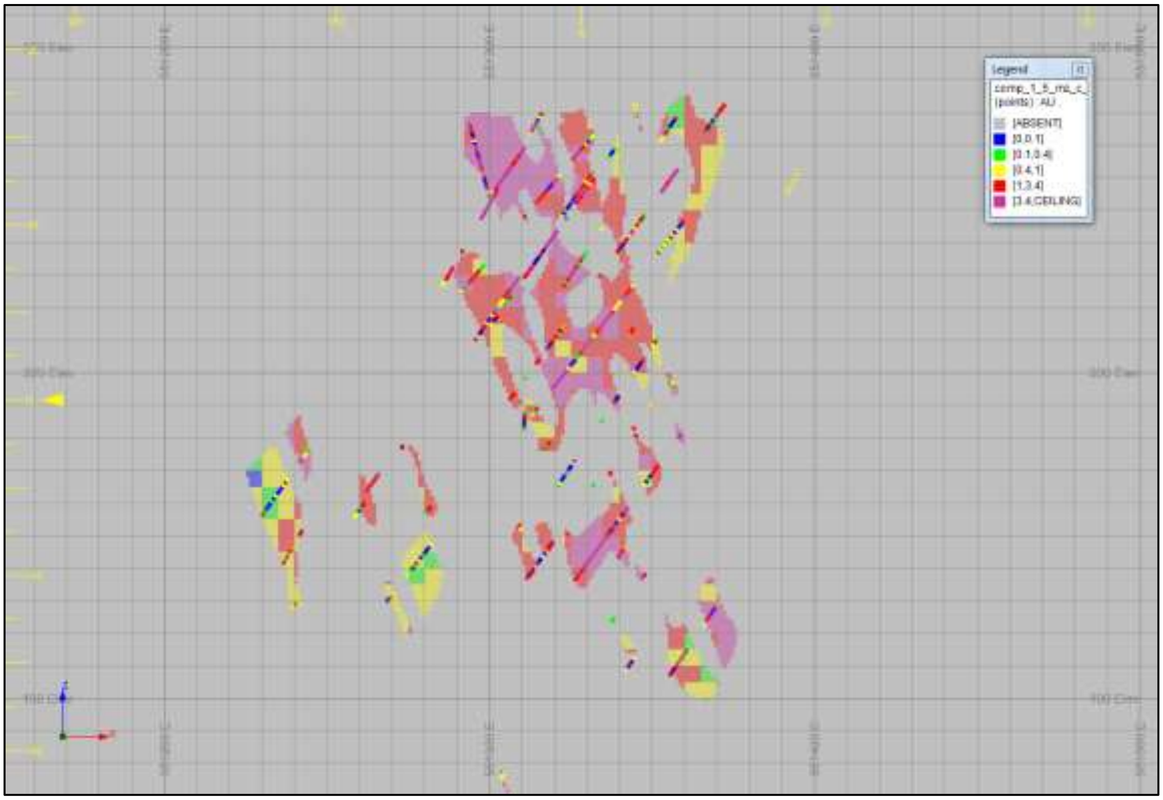


Figure 63: Vertical Section 5372375N, Looking North

Comparing Block Grade Estimates to Informing Data within the Mineralized Zone

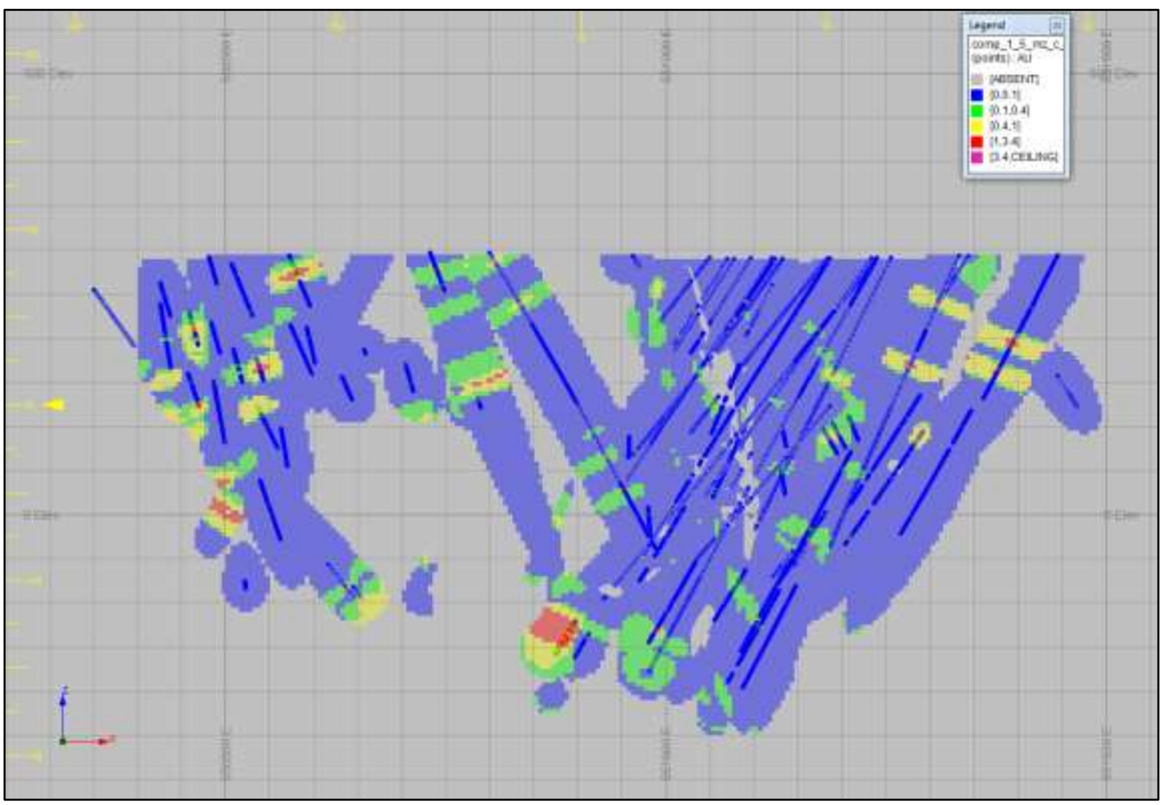


Figure 64: Vertical Section 5372945N, Looking North

Comparing Block Grade Estimates to Informing Data within the Zone of Unconstrained Estimation

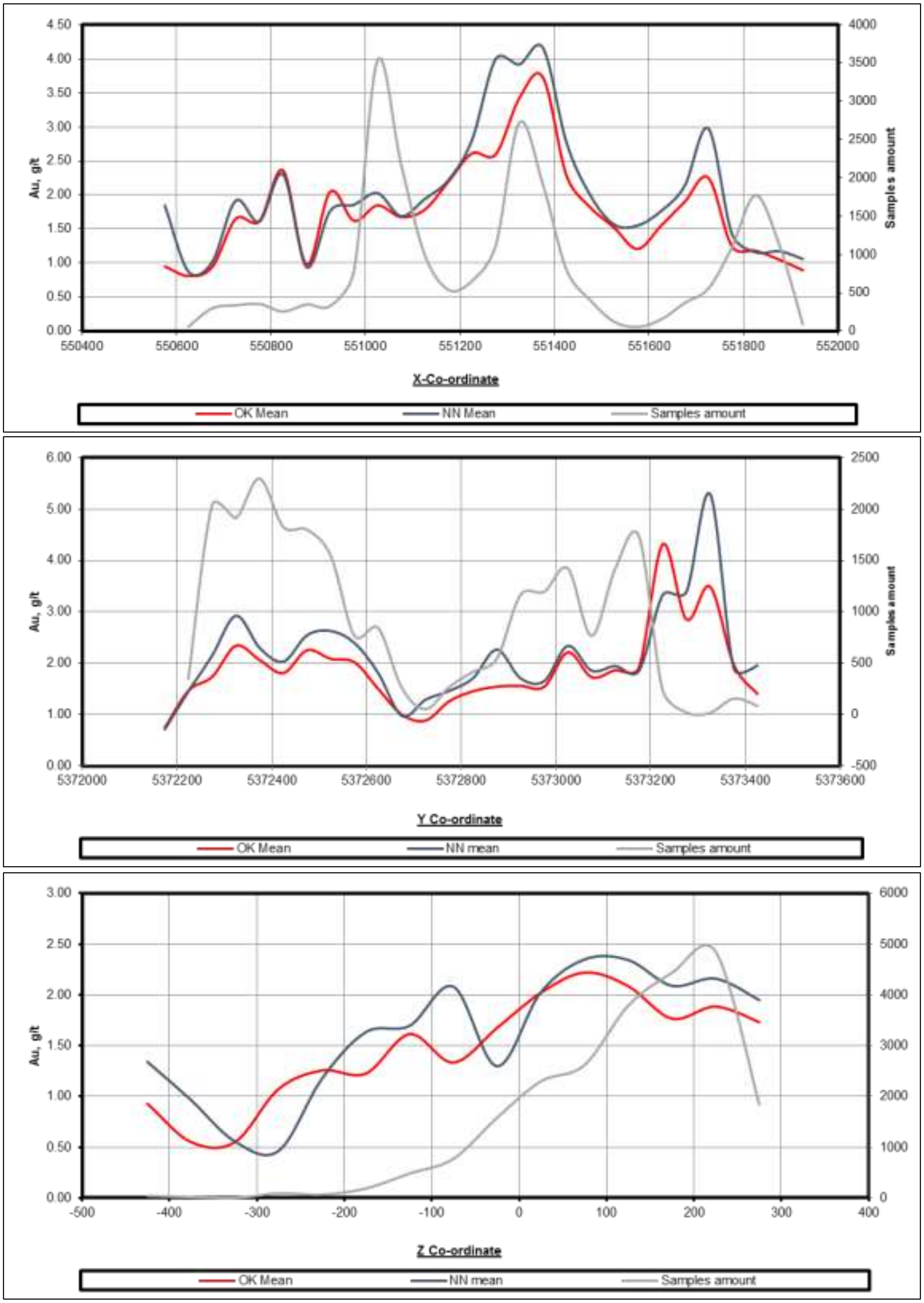


Figure 65: Validation Plots Along X, Y and Z Directions for Estimation Domains 11-35

Comparison Between Gold Grades in Block Model Estimated by OK and Declustered NN Estimation, with Available Samples Overlaid

14.5.10 Mineral Resource Classification

Mineral resource classification is typically a subjective concept, and industry best practices suggest that classification should consider the confidence in the geological continuity of the mineralized structures, the quality and quantity of exploration data supporting the estimates, and the geostatistical confidence in the tonnage and grade estimates. Appropriate classification criteria should aim at integrating these concepts to delineate regular areas at similar resource classification as well as the continuity of the deposit at the reporting cut-off grade.

SRK is satisfied that the Grey Fox mineralization model honours the current informing data from the geological database. The location of the samples and the assay data are sufficiently reliable to support mineral resource evaluation and do not present a risk that should be considered for block classification. The mineral resource model is constrained by mineralization domains based on lithological, alteration and grade criteria and is modelled from boreholes drilled on a somewhat irregular grid, but usually 5 to 50 metres apart. The controls on the distribution of the gold mineralization are well understood, and the confidence in its geological continuity is reasonable.

SRK considers that drilling spacing is sufficient to assume reasonable continuity of the gold mineralization within the meaning of the CIM D*efinition Standards for Mineral Resources and Mineral Reserves* (May 2014). Accordingly, block estimates were classified using a combination of criteria, including confidence in the mineralization's continuity, drilling spacing and estimation results. There are no Measured blocks classified in this model. An Indicated classification was assigned to those continuous blocks within the mineralized domains informed by at least three boreholes within a distance of 30 metres. An Indicated wireframe surface, to limit and smoothen the Indicated category, was also developed.

All other blocks estimated during subsequent estimation passes within the mineralized zones were assigned an Inferred classification. All the blocks estimated by the unconstrained interpolation were unclassified.

14.5.11 Mineral Resource Statement

The mineral resource modelling process, including the data review, domain modelling, geostatistical analysis and grade interpolation, was completed by Dr. Aleksandr Mitrofanov (APGO#2824), under the supervision of Mr. Glen Cole, PGeo (APGO#1416), both full-time employees of SRK. Dr. Mitrofanov and Mr. Cole are the appropriate independent Qualified Persons as this term is defined in National Instrument 43-101. The effective date of the Mineral Resource Statement is October 31, 2017.

CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 2014) defines a mineral resource as:

> *"[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."*

The “reasonable prospects for eventual economic extraction” requirement generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resources are reported at an appropriate cut-off grade that takes into account extraction scenarios and processing recoveries. McEwen Mining and SRK consider that the gold mineralization of the Grey Fox Project is amenable for underground extraction.

McEwen Mining reviewed the mineral resource model and the grade distribution, and advised that a reporting cut-off grade of 3.6 g/t gold is appropriate for this project considering a gold price of US$1,500 per ounce of gold and a gold recovery of 80 percent.

The Gibson zone represents a different style of mineralization in comparison with all three other zones within the Grey Fox Project and it was excluded from the current Mineral Resource Statement.

Table 54: Mineral Resource Statement*, Grey Fox Project, SRK Consulting (Canada) Inc., October 31, 2017

Classification		Cut-off Grade Gold (g/t)	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Indicated Mineral Resource					
Underground	Contact Zone	3.60	782	5.91	149
	147 Zone	3.60	1,096	7.49	264
	South Zone	3.60	298	5.48	53
Total Indicated		**3.60**	**2,177**	**6.64**	**465**
Inferred Mineral Resource					
Underground	Contact Zone	3.60	302	7.12	69
	147 Zone	3.60	95	6.74	20
	South Zone	3.60	56	5.40	10
Total Inferred		**3.60**	**453**	**6.83**	**100**

* Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures rounded to reflect the relative accuracy of the estimates. Composites were capped where appropriate. Mineral resources reported at a cut-off grade of 3.6 g/t gold, assuming an underground extraction scenario, a gold price of US1,500 per ounce, and a metallurgical recovery of 80 percent.

** The Gibson Zone is not included in the Mineral Resource Statement

14.5.12 Grade Sensitivity Analysis

Mineral resources are sensitive to the selection of a cut-off grade. To illustrate this sensitivity, block model quantities and grade estimates at different cut-off grades are presented in Table 55 for the Indicated and Inferred material. The reader is cautioned that the figures presented in these tables should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a cut-off grade.

Figure 66 and Figure 67 present this sensitivity as grade tonnage curves.

Table 55: Grade Tonnage Data* for the Indicated and Inferred Material for the Grey Fox Project

Cut-off Grade (Au g/t)	Indicated Quantity (000′t)	Indicated Grade (g/t Au)	Indicated Metal (000′oz)	Inferred Quantity (000′t)	Inferred Grade (g/t Au)	Inferred Metal (000′oz)
0.00	15,493	2.05	1019	5,984	1.58	305
0.01	15,493	2.05	1019	5,984	1.58	305
0.30	14,847	2.13	1015	5,648	1.67	303
0.50	13,373	2.32	996	5,019	1.82	294
0.80	10,819	2.71	942	3,887	2.17	271
1.00	9,316	3.00	899	3,110	2.48	248
1.40	7,095	3.57	814	2,074	3.14	209
1.80	5,472	4.16	731	1,423	3.83	175
1.80	5,472	4.16	731	1,423	3.83	175
2.20	4,319	4.74	658	1,000	4.62	148
2.60	3,493	5.29	594	784	5.23	132
3.00	2,875	5.83	539	622	5.86	117
3.40	2,387	6.37	489	501	6.51	105
3.60	2,177	6.64	465	453	6.83	100
4.50	1,479	7.89	375	340	7.76	85
6.00	859	9.85	272	236	8.90	68
7.00	616	11.18	221	188	9.52	57
8.00	449	12.57	181	111	10.96	39
9.00	342	13.85	152	80	11.91	31
10.0	262	15.18	128	51	13.31	22

* The reader is cautioned that the figures in this table should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a cut-off grade. Figures are rounded to reflect the accuracy of the estimate.

** An underground extraction scenario, a gold price of US1,500 per ounce, and a metallurgical recovery of 80 percent were assumed

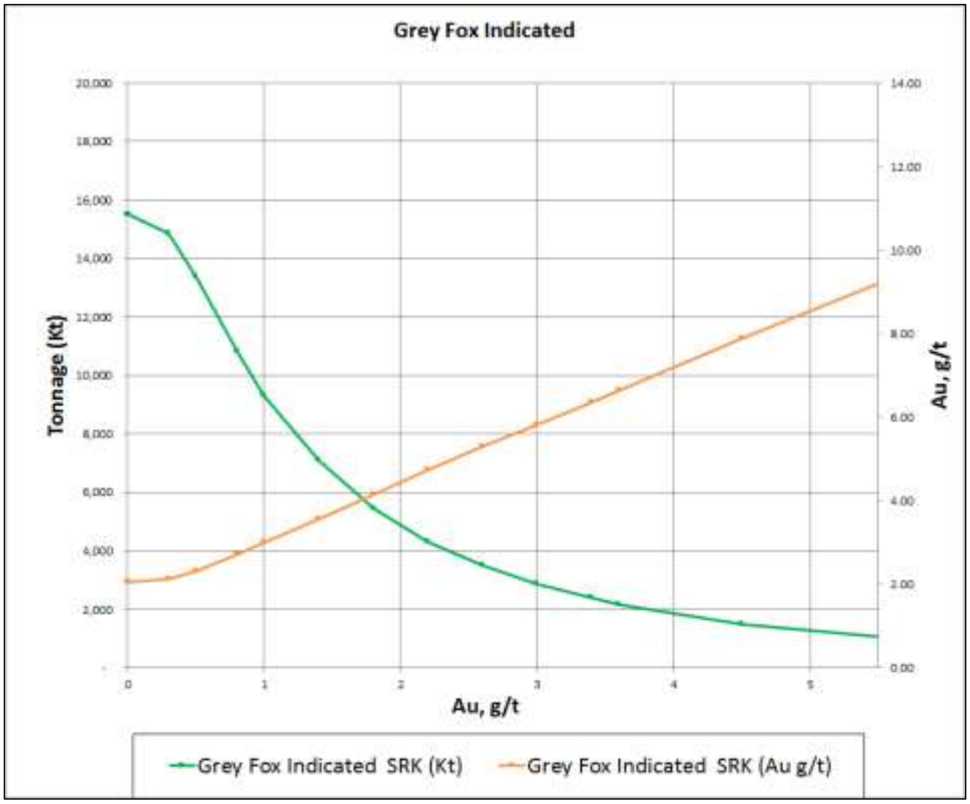


Figure 66: Grade Tonnage Curve for the Indicated Material

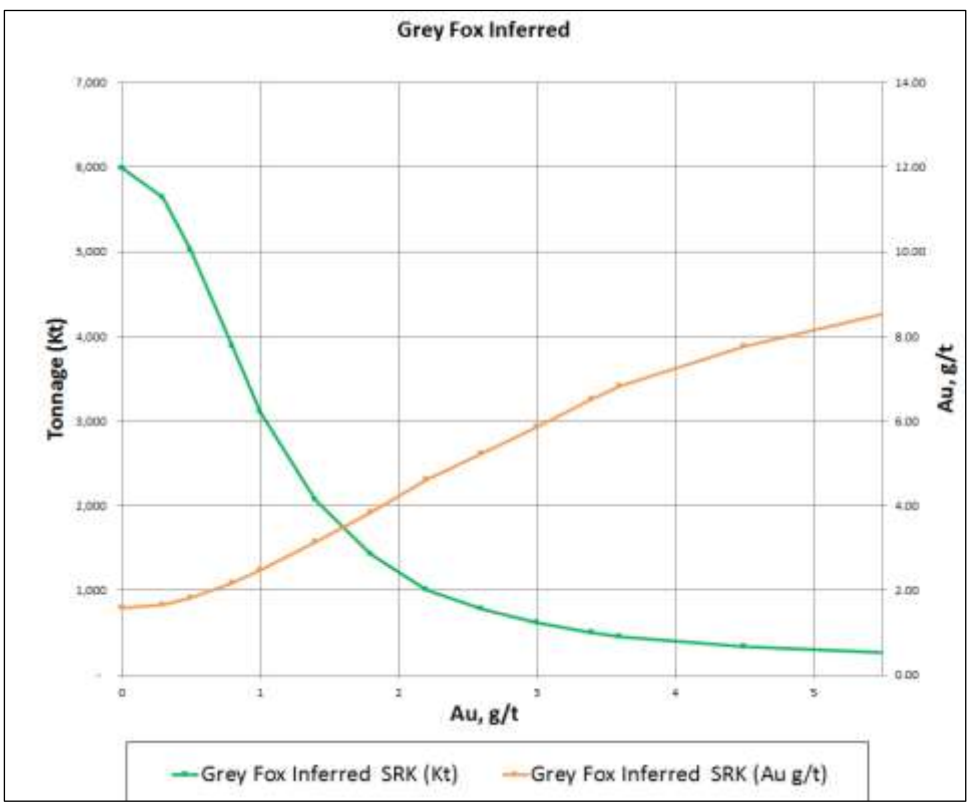


Figure 67: Grade Tonnage Curve for the Inferred Material

14.5.13 Previous Mineral Resource Estimates

The previously reported mineral resource model was developed in 2015. The current mineral resource model is compared to the 2015 mineral resource model in this section.

Table 56 compares the metal price and recovery assumptions considered for the preparation of the 2015 and 2017 mineral resource statements whereas Table 57 shows the comparative 2015 and 2017 mineral resource statements.

Material changes on the Grey Fox Project since the 2015 Mineral Resource Statement include:

- As a result of active exploration in 2014 and 2015, the database used for the mineral resource estimation has increased significantly.
- After discussions with McEwen Mining, SRK did not consider an open pit mining option as in 2015.

Comparing the mineral resource statements in Table 57, the Indicated tonnage and contained metal has decreased. However, the underground portion of combined Measured and Indicated has increased (+31 percent in tonnes and +47 percent in ounces). The Inferred portion of the reported mineral resources has decreased.

Table 56: Metal Price and Recovery Assumptions Considered in 2014 and 2017

Metal	Cut off Grade (g/t)		Metal Price (US$/oz)		Metal Recovery (%)	
	2015	2017	2015	2017	2015	2017
Gold	1.0 g/t (OP) 3.0 g/t (UG)	3.6 g/t (UG)	Not disclosed	1,500	Not disclosed	80%

Table 57: Comparative 2015 and 2017 Mineral Resource Statements for the Grey Fox Project

Classification	Mining Method	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
2015				
Indicated	Open Pit	2,970	3.60	345
	Underground	1,720	5.90	323
Total Indicated		**4,690**	**4.44**	**668**
Inferred	Open Pit	280	2.90	26
	Underground	1,010	4.60	148
Total Inferred		**1,290**	**4.23**	**174**
2017				
Indicated	Underground	2,177	6.64	465
Inferred	Underground	453	6.83	100
Comparisons				
Indicated	Underground	27%	13%	44%
	Total	**-54%**	**50%**	**-30%**
Inferred	Underground	-55%	48%	-33%
	Total	**-65%**	**61%**	**-43%**

14.5.14 Open Pit Sensitivity Scenario

As the part of the current assignment SRK also undertook a sensitivity analysis of the Grey Fox project mineral resource reporting to mining method selection. To determine the quantities of material offering “reasonable prospects for eventual economic extraction” by an open pit, the Lerchs-Grossman algorithm was used by SRK to evaluate the profitability of each resource block based on its value. Conceptual pit optimization considered parameters selected in discussion with McEwen Mining (Table 58).

Upon review of pit optimization results, model blocks located within the resulting conceptual shell may show ‘reasonable prospects’ for eventual economic extraction by an open pit. It should be noted that the pit optimization results are used solely for testing the “reasonable prospects for eventual economic extraction” and do not represent an attempt to estimate mineral reserves. Mineral reserves can only be estimated within an mining economic study. There are no mineral reserves at the Grey Fox Project. The optimization results are used solely to identify areas of the mineral resource that have the potential to be extracted by open pit mining.

The overview of the pit shells used for the sensitivity analysis is presented in Figure 68. SRK applied a 1.10 g/t gold cut-off grade as a mineral resource reporting threshold for potential mineralized material within an open pit. The results of the open pit sensitivity analysis are presented in Table 59. The reader is cautioned that the figures presented in these tables should not be misconstrued with a Mineral Resource Statement. The figures are only presented to show the sensitivity of the block model estimates to the selection of a mining method.

In comparison with the base case selected for the Mineral Resource Statement reporting (underground only scenario), Indicated tonnage and contained metal increases (+37 percent and +13 percent respectively) and grade decreases (-21 percent), if mineral resource reporting considers a combined open pit and underground mining scenario. Material external to the conceptual open pit is considered to have the potential to be extracted by underground mining methods. Reported Inferred material does not change significantly.

Table 58: Grey Fox Project Optimization Parameters

Parameter	Base Case Value
Pit Slope Angle (°)	45 (fresh rocks); 8 (overburden)
Mining Cost (US$/tonne)	3.40 (fresh rocks); 3.10 (overburden)
Process Cost (US$/tonne of ore)	21.60
Gold Recovery (%)	80
Mining Recovery / Mining Dilution (%)	95 / 10
Gold Price (US$/oz)	1,500
Selling Cost (%)	0.5
G&A (US$/tonne of ore)	5
Revenue Factor	1

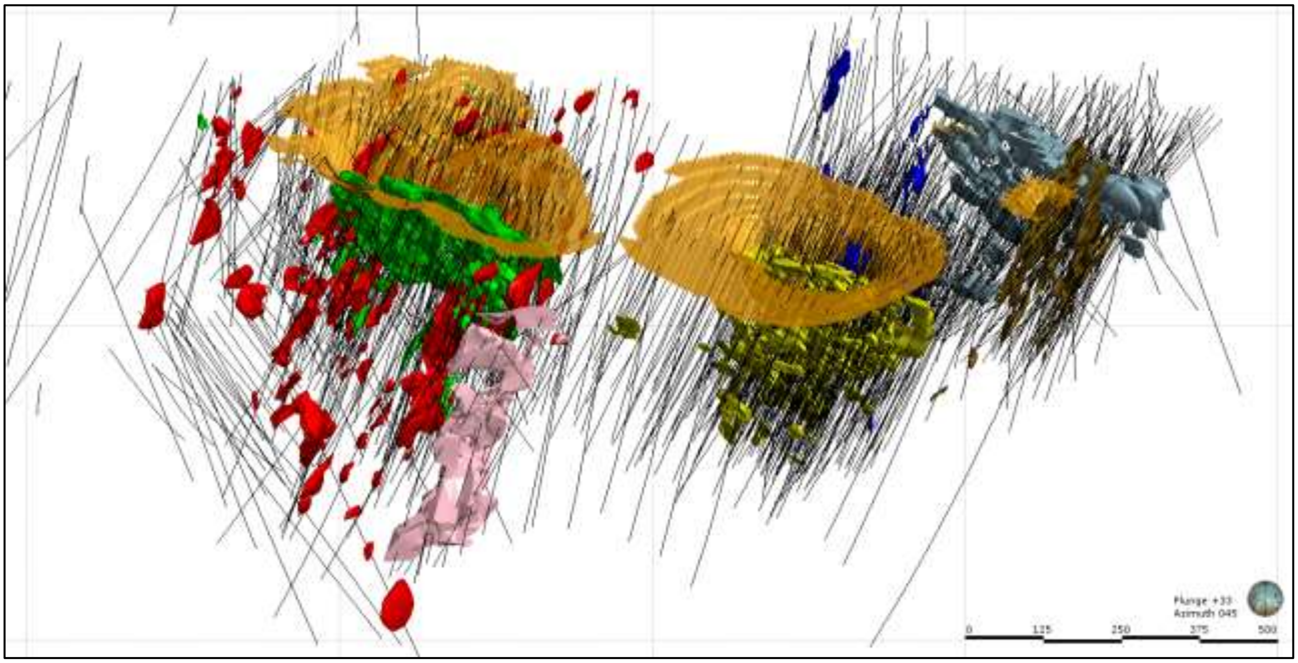


Figure 68: Grey Fox Project Open Pit Overview
The view azimuth 045, dip +33

Table 59: Comparative Tonnage and Grade Estimation for the Grey Fox Project Considering a Combined Open Pit + Underground Extraction Scenario

Classification		Cut-off Grade Gold (g/t)	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Indicated Category					
Open pit	Contact Zone	1.10	637	3.94	81
	147 Zone	1.10	529	4.54	77
	South Zone	1.10	37	2.77	3
	Total Open Pit	**1.10**	**1,203**	**4.17**	**161**
Underground	Contact Zone	3.60	528	5.52	94
	147 Zone	3.60	885	7.35	209
	South Zone	3.60	290	5.50	51
	Total Underground	**3.60**	**1,703**	**6.47**	**354**
Total Indicated			**2,905**	**5.52**	**515**
Inferred Category					
Open pit	Contact Zone	1.10	9	3.16	1
	147 Zone	1.10	18	6.65	4
	South Zone	1.10	8	2.25	1
	Total Open Pit	**1.10**	**35**	**4.76**	**5**
Underground	Contact Zone	3.60	300	7.15	69
	147Zone	3.60	84	6.29	17
	South Zone	3.60	56	5.40	10
	Total Underground	**3.60**	441	6.76	96
Total Inferred			**475**	**6.61**	**101**

14.5.15 Recommendations

SRK constructed the mineral resource model in February 2018 using the geological and estimation inputs provided by McEwen Mining. Gold mineralization domains are based on the current on-site geological understanding of the gold mineralization distribution which incorporates lithological, structural, alteration and grade criteria. SRK considers the data density to be of adequate quality and quantity for mineral resource estimation.

SRK propose that the following enhancements be considered for future geological / mineral resource modelling processes:

- The structural orientation of the mineralization zones can be updated with new oriented core drilling with resultant reinterpretation of the mineralization-bearing structures.
- The disseminated gold mineralization outside of the mineralization zones can also be reinterpreted to increase continuity and confidence.
- Optimization of the large database by using the implicit modelling techniques to accurately define geological and resource domains.
- Collect additional representative specific gravity samples for all main geological and alteration units to refine local tonnage estimation.
- The Grey Fox mineral resource model can be used for exploration drill-targeting, focussing on areas of sparse information to potentially expand the mineral resource
- Addition mining sensitivity studies should be undertaken to evaluate the merit of open pit mining at the Grey Fox Project.

15 Mineral Reserve Estimates

15.1 Black Fox Mine

This section summarizes the key assumptions, parameters, and methods used in the preparation of the Mineral Reserve Statement for the Black Fox Mine. The Mineral Reserve Statement presented herein was prepared for public disclosure.

The mineral reserve estimate was completed by McEwen Mining's Technical Department on site at the operating Black Fox Mine. SRK reviewed the assumptions, parameters, and methods used to prepare the Mineral Reserve Statement and is of the opinion that the mineral reserve is estimated in conformity with CIM *Mineral Resource and Mineral Reserves Estimation Best Practices Guidelines* (November 2003) and is classified according to CIM *Definition Standards for Mineral Resources and Mineral Reserves* (May 9, 2016) guidelines.

The Mineral Reserve Statement is reported in Table 60 and is in accordance with National Instrument 43-101. The reference point at which the mineral reserve is identified is where ore is delivered to the processing plant (i.e. "mill feed"). SRK is unaware of any environmental, permitting, legal, title, taxation, socioeconomic, marketing, political, or other relevant issues that may materially affect the mineral reserve. However, the mineral reserve may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent mineral resource and mineral reserve estimates. The mineral reserve may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors. The effective date of the Mineral Reserve Statement is October 31, 2017.

Table 60: Mineral Reserve Statement*, Black Fox Mine, SRK Consulting (Canada) Inc., October 31, 2017

Classification	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Proven Mineral Reserve			
Underground	-	-	-
Total Proven	**-**	**-**	**-**
Probable Mineral Reserve			
Underground	395	8.88	113
Total Probable	**395**	**8.88**	**113**
Proven and Probable Mineral Reserve			
Underground	395	8.88	113
Total Proven and Probable	**395**	**8.88**	**113**

* Mineral reserves are included in the mineral resources. All figures have been rounded to reflect the relative accuracy of the estimate. Mineral reserves are based on a cut-off value of 3.72 g/t gold (4.28 g/t including 15% dilution) assuming a gold price of US$1,250/oz, a C$:US$ exchange rate of 1.25:1:00, milling recoveries of 96%, gold stream equivalent to a royalty of 4.55%, and operating cost of C$171/t. Mineral reserves are stated at a mill feed reference point and include for diluting materials and mining losses.

The mineral reserve accounts for 21 percent of the contained gold in the Indicated mineral resource (113 thousand ounces of 538 thousand ounces). The difference is based on the following two main reasons:

- Cut-off grade
  - The mineral resource cut-off grade is based on a 20 percent improvement on costs or positive move in gold price versus the mineral reserve cut-off grade assumptions. This permits future conversion of resource to reserves if gold price improves and/or adopted cost saving operational strategies are successful.

- Location of the Ore
  - Mineral resources in proximity to the pit wall are not mineable.
  - Mineral resources in the crown pillar are not mineable.
  - Mineral resources included in economic stope shapes that could not afford the required access development were excluded.
  - Mineral resources in proximity to the open pit walls that cannot be practically mined were excluded.
  - Mineral resources in proximity to historical mining that cannot be practically mined were excluded.

The Black Fox Mine Mineral Reserve Statement includes only underground reserves as the open pit mine and stockpile reserves were depleted in 2016 and 2017, respectively. The mineral resource is converted to the mineral reserve by applying cut-off grades, dilution, and mining recovery factors.

All in-situ mineral resources are classified as Indicated or Inferred. In this study, the Indicated mineral resources have been converted to Probable mineral reserves.

15.2 Methodology

15.2.1 Open Pit Reserve Methodology

The open pit mineral reserves were depleted at the end of the open pit mine life in 2016 and optimized pit shell algorithms do not produce economic open pits at current economic conditions. Thus, none of the resources at present can be classified as an open pit reserve. However, should the gold price increase sufficiently, operating costs reduce sufficiently, and/or additional resources be defined via exploration drilling, the open pit reserve potential will be revisited.

15.2.2 Underground Reserve Methodology

McEwen Mining has assumed that mineral resources will be mined by bulk mining methods, such as long hole mining, and created mining stope shapes applicable to these mining methods that were then evaluated against the block model.

The outlines for the stope shapes were created on north-south sections at intervals of 3 metres. An example cross section, showing the mineral reserve outline in yellow against the block model is shown in Figure 69. In the creation of the outlines, the following was considered based on operating experience at the Black Fox Mine:

- Mining method
- Existing level development and access
- Minimum pillar requirements between adjacent lenses
- Minimum mining widths

- Minimum footwall dip
- Continuity of the ore along strike
- Resource grade
- Wireframes are constrained by lithology

The outlines were then linked into separate wireframe shapes and evaluated against the block model. Following the application of dilution, shapes that evaluated below cut-off grade were omitted and shapes that were removed a great distance from existing infrastructure underwent an economic evaluation to ensure that the stope revenue was sufficient to cover the operating costs and capital cost associated with their access.

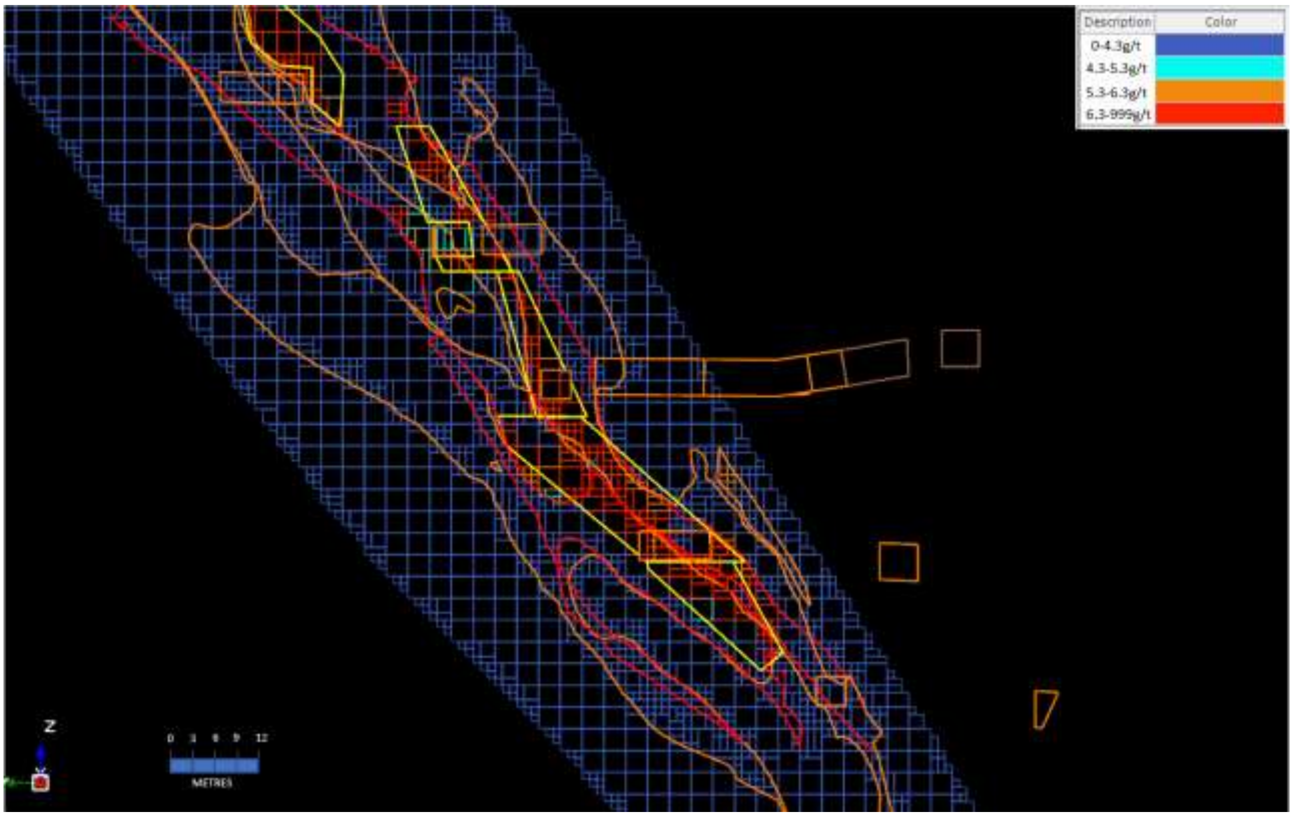


Figure 69: Underground Mineral Reserve Outline Cross Section (East View)

15.3 Cut-off Grade

A cut-off grade of 3.72 g/t gold was used to identify the mineral reserve. This equates to an in-situ cut-off grade of 4.28 g/t gold when including 15 percent external sterile dilution.

The parameters used for calculating the cut-off grade is summarized in Table 61. Operating costs and metallurgical recoveries are in line with actual costs for 2017 and the 2018 budget.

Table 61: Cut-off Grade Calculation Parameters

Parameter	Units	Value
Mining Cost	C$/tonne	$99.00
Contract Crush and Haul	C$/tonne	$12.00
Processing Cost	C$/tonne	$27.00
G & A Cost	C$/tonne	$31.10
Assay Lab	C$/tonne	$1.90
Metallurgical Recovery	%	96%
Sandstorm Stream	% Royalty Equivalent	4.55%
Gold Price	US$/ounce	$1,250.00
Exchange Rate	C$:US$	1.25:1.00

15.4 Stope Dimensions

The preliminary stope dimensions at the Black Fox Mine have been examined using the Rock Mass Rating (RMR) and Q' methods of rock mass classification along with the Matthews-Potvin Stability Graph Method. In this manner, the stope stability is determined as a function of the hydraulic radius and rockmass characteristics. Stope sizes vary based on geological wireframes, with the upper limit of stope sizes at 15 metres on strike, 20 metres in height, and 5 to 12 metres in width.

15.5 Design Approval

The designed layout is completed by the Mine Planner and is reviewed and approved by the Mine Manager, Engineering Superintendent, Chief Geologist, Underground Superintendent, Mine Captain, Ground Control Engineer, Ventilation Engineer, and Senior Engineer. During the review process, mining methods, stope sequence, heading priorities, excavation stability, ore body uncertainties, rock type, equipment and practical availabilities are discussed.

15.6 Dilution and Mining Recovery Factors

Planned dilution depends on the shape of the design stopes versus the geometry of the above cut-off grade material. Planned dilution has been included within the tonnage and grade of each stope shape when it is evaluated against the block model.

In addition to planned dilution, an unplanned dilution factor of 15 percent has been applied and a mining recovery factor of 95 percent has been applied based on operational experience.

15.7 Comparison to Previous Reserve Estimates

Previous mineral reserves for the Black Fox Mine were updated annually by Primero. These mineral reserves date back to December 31, 2013 and are provided in Table 62 for comparison to the current mineral reserve. The changes in tonnage and grade following 2013 are due to depletion and change in cut-off grade. The change following 2016 was due to a new methodology for creating the reserves using the lithology.

Table 62: Comparison of Past and Present Mineral Reserve Estimates

	Cut-off Grade	Quantity (Mt)	Grade (g/t Au)	Metal ('000 oz)
December 31, 2013	3.40	3.8	4.30	538
January 1, 2015	4.44	0.9	6.25	190
January 1, 2016	4.74	0.6	6.70	133
December 31, 2016*	4.74	0.4	6.80	96
January 1, 2017	4.74	0.5	6.85	116
October 31, 2017	4.28	0.4	8.88	113

* Issued as a press release

16 Mining Methods

The mine plan was initially completed by the McEwen Mining Technical Department on site at the Black Fox Mine and has been reviewed by SRK for inclusion in the mineral reserve estimate. The mine plan reported in this section is for the Black Fox Mine only, as the mineral resources at the Froome Project and the Grey Fox Project are not considered feasible given current economic conditions. Further, the mine plan considers only underground mining, as the open pit at the Black Fox Mine is no longer in operation.

The stopes included in the mineral reserve are illustrated in red in Figure 70 below. Ore from this plan is hauled to surface where it is crushed and hauled by a contractor to the Black Fox Mill approximately 35 kilometres (west) from the mine (Figure 71).

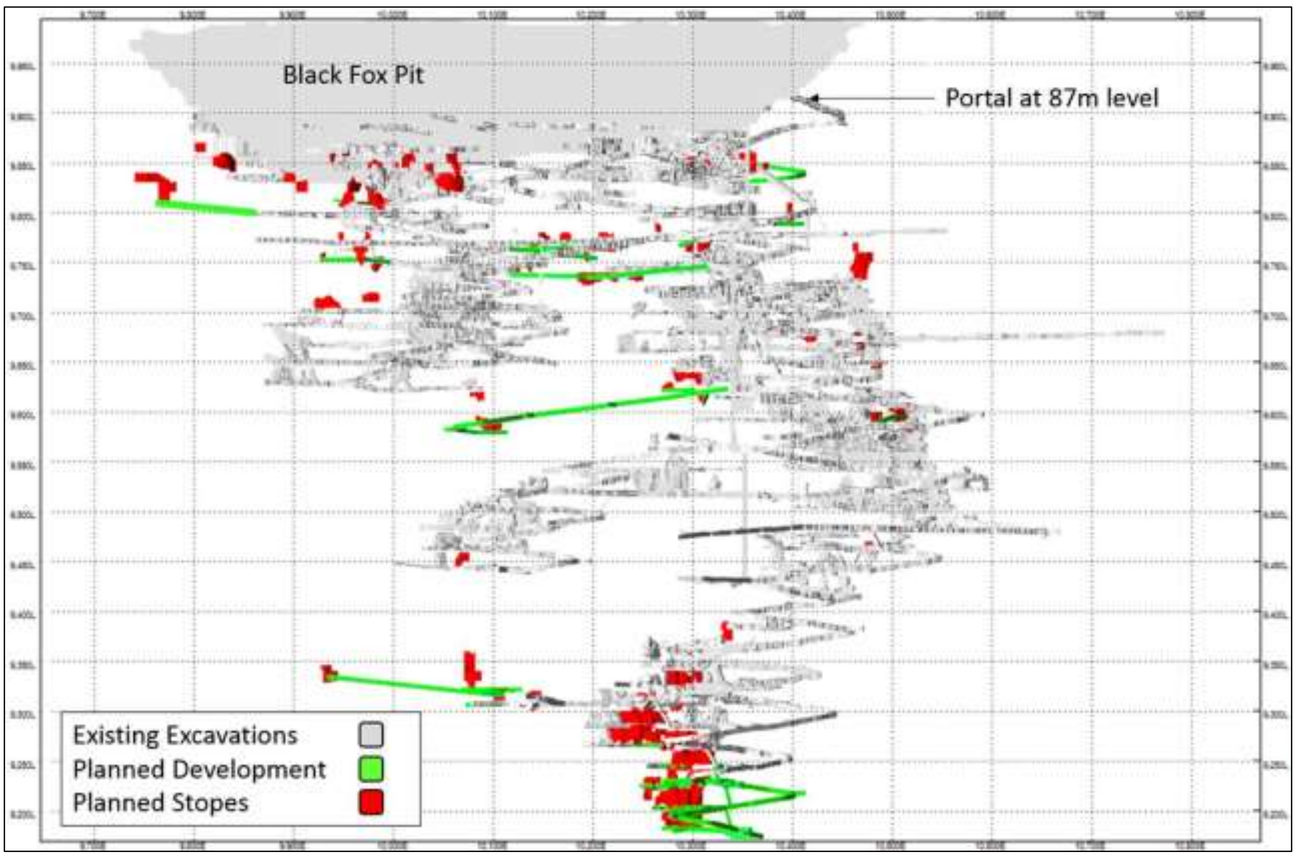


Figure 70: Mineral Reserves Stopes and Planned Development – Longitudinal Section Looking North

(Grey=existing voids; Red=planned stopes; Green = planned development)

Figure 71: Ore Haulage Route from Black Fox Mine to Black Fox Mill

The life of mine (LOM) plan supporting the mineral reserve estimate for Black Fox Mine herein contains a total of 395,000 tonnes with an average gold grade of 8.88 g/t for a total of 113,000 ounces of contained gold. These figures include application of 15 percent dilution.

The production rate is based on available stopes as of October 31, 2017 (the time that the assets were transferred from Primero to McEwen Mining Ontario). Consequently, the mine has a variable monthly mining rate, averaging approximately 500 tonnes per day. The average ounces recovered at the mill per day is approximately 140, which is equal to an average of 4,200 ounces per month over the 26 months in the LOM.

The LOM duration is 2 years and 2 months with no ramp down period during the final year of the plan (2019). The current mineral reserves are exhausted by the end of December 2019.

LOM development requirements are approximately 4,400 metres total. This development consists of 935m of ramps, and 2,030 metres of lateral development, 1,280 metres of sills and 140 metres of raises.

The mine is accessed by a portal located at a bench at a depth of 87 metres within the Black Fox Pit as shown in Figure 72.

Stopes are typically mined in 15-metre lengths along the strike with widths varying from 5 up to 20 metres.

The mining method is long hole retreat. The stope sequencing has generally been top-down as new ore is found at depth.

Cemented hydraulic backfill is used in almost all stopes. Stopes are mined in alternating sequence using backfilled stopes as pillars for subsequent mining of adjacent stopes.

Ore mined is crushed and hauled to the mill. The ore is stockpiled at the mill until there is sufficient material to run the mill at full capacity.

Figure 72: Current Closed Open Pit Houses the Access Portal to Underground Black Fox Mine

16.1 Mining Methods and Excavation Design

Historically, shrinkage, cut and fill as well as long hole open stoping with delayed unconsolidated rock backfill and cemented hydraulic sand backfill have been employed at the Black Fox Mine. For the long hole open stoping areas, stopes were typically mined longitudinally on retreat with wider portions mined transversely following a primary/secondary extraction.

16.1.1 Long Hole Open Stoping

Geotechnical design has led to stope sizes of 12.5 to 20 metres along strike, depending on rock type and ground condition, with mineralization widths up to 20 metres wide, and level intervals of 20 metres. There are occasions where level intervals were increased to 25 metres and 30 metres where permitted due to rock strength and geometry. As shown in Figure 73, stope extraction sequencing generally follows a top-down longitudinal retreat, following the ramp and level development. A 3- to 5-metre sill pillar is left below the stope when it is necessary. Stopes are filled with cemented sand fill where mining is planned alongside stopes. Otherwise, unconsolidated rock fill is used.

Where mineralized zone widths are greater than 20 metres, multiple transverse stopes (each with 5- to 12-metre transverse width) are mined in primary-secondary mining sequence. After the primary stopes are mined, they are filled with a cemented hydraulic sand backfill of adequate strength to allow exposure of a 20-metre high fill wall alongside the secondary stopes.

Longhole stopes are generally developed by driving a 3-metre wide by 3-metre high or 4-metre wide by 4.5-metre high access drift along the mineralization. The access drifts are driven under geology control when the actual mineralization shape or extension are off the plan, otherwise, they are driven under engineering/survey control. Where necessary for optimized drilling, the drive is slashed or drilling bays are excavated.

An inverse slot raise is blasted towards the end of the stope, furthest from the access. Sub-vertical rings are then blasted into the slot raise while retreating towards the hanging wall. The stope is mucked with the use of remote-operated LHDs from the bottom of the stope.

Mining Dilution Factors

Overbreak and underbreak are currently well-controlled with recent reconciliation calculations indicating total overall dilution versus production stopes in the 10 to 12 percent range.

Figure 73: Stope Sequencing

16.1.2 Shrinkage Stoping

Historically, shrinkage stoping was used in narrow and steeply dipping ore zones, however currently shrinkage stoping is not used.

To begin the shrinkage stope, a raise was driven, at the end of the structure, to follow the ore vein. Once the raise was completed, breasting or uppers would commence from the raise moving towards the end of strike. The muck blasted from each round was left on the floor as a pad to work from. The mining continued as breasting or uppers until the end of strike was reached. The procedure was continued until all the lifts as per the design were completed. Once all the lifts were completed, the muck was removed from the stope remotely.

16.1.3 Cut and Fill

Historically, cut and fill mining was used in shallow dipping ore zones. Currently, cut and fill is not used.

A stope ramp was driven down to the sill cut of the stope where mining begins. Depending on the width of the orebody, mining would be done with a full face jumbo round and slashing. The height of the cut was limited to 4m, primarily for the grade control and ground stability. When the cut had been mined, development waste rock was hauled into the stope for backfill and to establish a floor from which to mine the next cut. Access to the next cut was created by slashing the back of the stope ramp. The sequence was repeated for a total of 6 cuts or "lifts", covering a vertical interval of 24m. The second and subsequent cuts were also mined by opening above the fill floor below. In areas where the ore width is greater than stable spans, a lift was mined by drift-and-fill method, starting from the hanging wall far end and retreating to the access ramp.

16.1.4 Mining Access

Underground access is provided by a main ramp located in the hanging wall of the deposit. The ramp dimensions are 5.0 metres wide by 5.0 metres high. Mining levels are located at 20-metre vertical intervals. Haulage trucks are loaded on each mining level to minimize LHD haulage distances. The current planning shows the ramp continuing to the deepest mining at the 840 Level (note levels are named based on their depth below surface in metres).

Remuck stations are driven every 150 metres laterally to facilitate the clean-up of the heading and expedite the blast-muck cycle while advancing the face. Remucks are typically driven 5 metres wide by 5 metres high by 15 metres long.

Stope access drifts are driven from the truck loading area near the main ramp towards the stopes in the footwall. In certain areas, the stope access drifts intersect the hanging wall stope to permit access into any footwall stopes. The stope access drifts (ore sills) are driven to follow the hanging wall contact. The dimensions of the ore sills are dependent on the vein width.

Ventilation access drifts are driven on each level to ensure fresh air raise connections to the stoping levels. The air exhausts through the ramp. The ventilation access drifts are approximately 5 metres wide by 5 metres high.

16.1.5 Underground Ground Support

Development headings are supported with resin rebar, split sets and screen. Various ground support standards are used, depending on the profile and the purpose of the drift. Two ground support examples, for a ramp heading and an ore access heading, are shown in Figure 74.

Additional support is used in areas of poor ground conditions, where wedges are formed, and at intersections. A shotcrete machine was purchased in early 2014 and shotcrete is applied based on the recommendation of geotechnical personnel.

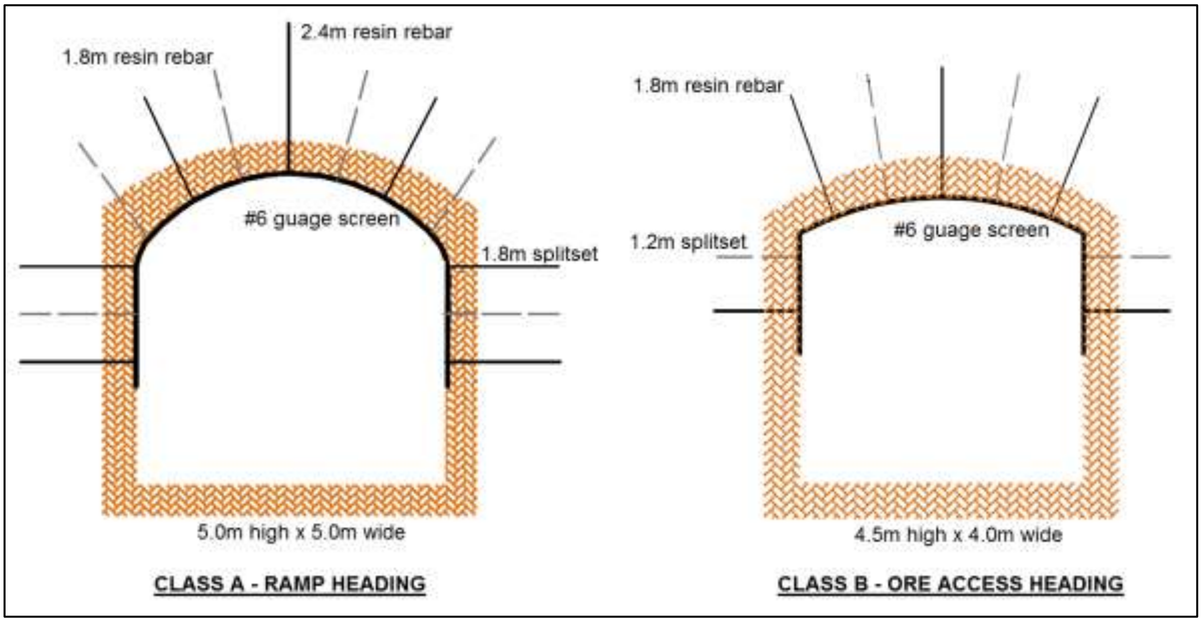


Figure 74: Ground Support Standard Examples

Underground Excavation Support

The minimum support requirements for the underground infrastructure excavations are shown in Table 63.

Table 63: Minimum Support Requirements for Underground Infrastructure

		Main Ramp, Electrical Sub Station, Refuge Station, Cap/ Powder Magazine,Main Pump Station, Sumps, etc.	Level Access & Footwall Sill Development	Ore Sills
Excavation Size	Width (m)	5	4	3
	Height (m)	5	4.5	3
Support System	Walls	1.8m long 30mm diameter split sets and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows. bottom row of bolts and screen installed to 1.8m above floor.	1.2m long 30mm diameter split sets and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows. bottom row of bolts and screen installed to 1.8m above floor.	1.2m long 30mm diameter split sets and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows. bottom row of bolts and screen installed to 1.2m above floor.
	Back	2.4m long 16mm diameter resin rebars and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows	1.8m long 16mm diameter resin rebars and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows	1.8m long 16mm diameter resin rebars and 6'x11' #6 gauge screen. Bolts installed on a 1.5m x 1.5 m pattern with dice bolts between rows
	Intersection	3m to 3.2m long 7 strand bulged spin cables on a 1.5mx1.5m square pattern	1.8m long 16mm diameter resin rebars installed on a 1.5m x 1.5 m pattern with dice bolts between rows	1.8m long 16mm diameter resin rebars installed on a 1.5m x 1.5 m pattern with dice bolts between rows

16.1.6 Underground Stope Stability

Typical ground conditions at Black Fox are Poor to Fair in the sills (Q values in the 3 to 4 range), fair to good for ramp and level infrastructure (Q' values in the 4 to 6 range). Currently, due to the shallow depth, stress driven failures and ground instabilities are not a major concern. Relaxation or lack of confinement are also not major concern.

Stope stability is controlled through designing stope dimensions based on sound geomechanical information and principles, in addition to the timely placement of properly designed backfill.

Stope design dimensions are based on the Mathews stope stability graph, which evaluates the stability of open stopes through a number of factors such as the rock mass competence, mining induced stress, the effect of gravity, the dimension and geometry of the openings, and the orientation of prominent geological structures. These parameters are used to calculate the Stability Number. This factor is plotted against the Shape Factor, or the hydraulic radius, to determine the stability of the surface under examination (Figure 75).

To minimize the requirement for cable bolting the transverse stopes were limited to a maximum width of 6m, however they may be larger where rock quality permits.

Flexibility exists in the mining method where a reduction in the longitudinal stope length can be made during the production planning stage when more local information is available.

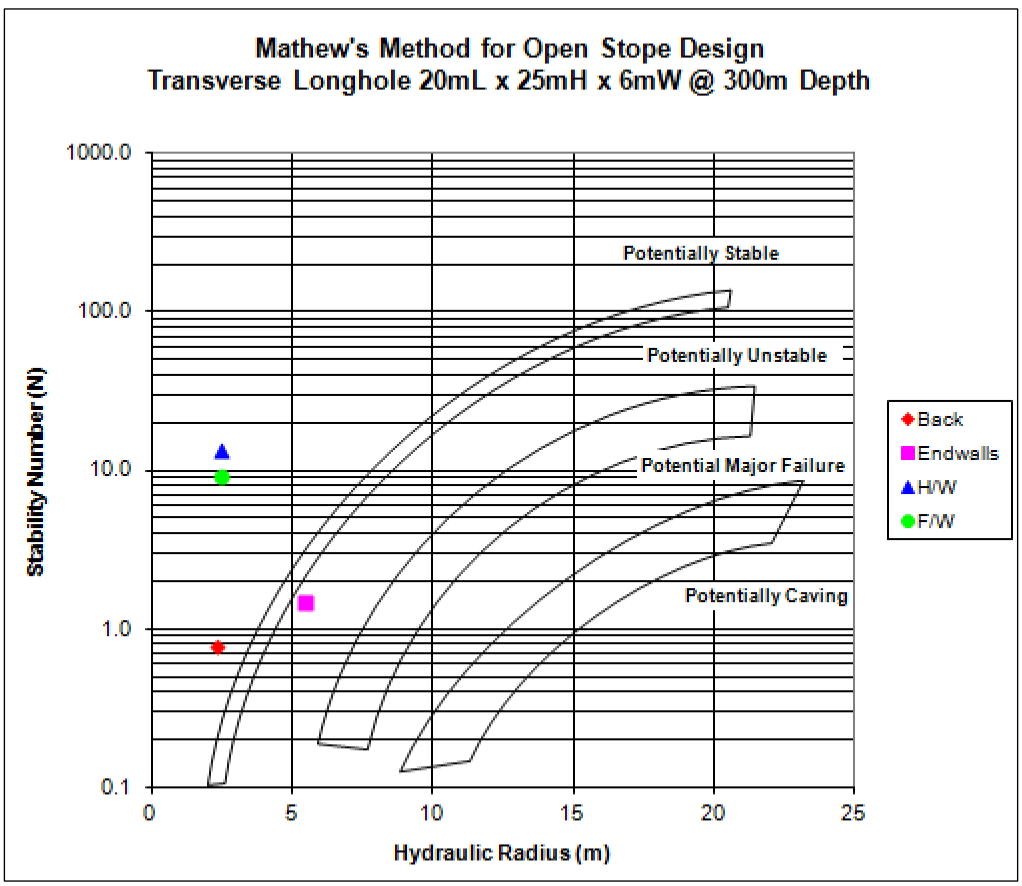


Figure 75: Mathew's Method for Open Stope Design Example

As shown in Figure 76, the mine ground control engineer works with consultants from Knight-Piésold to update the Mathew’s stability graph with actual stope performance in order to calibrate the geotechnical model for site specific conditions.

From this analysis, and with level intervals of 20 metres, average stope spans for transverse open stopes of 12 to 15 metres are stable.

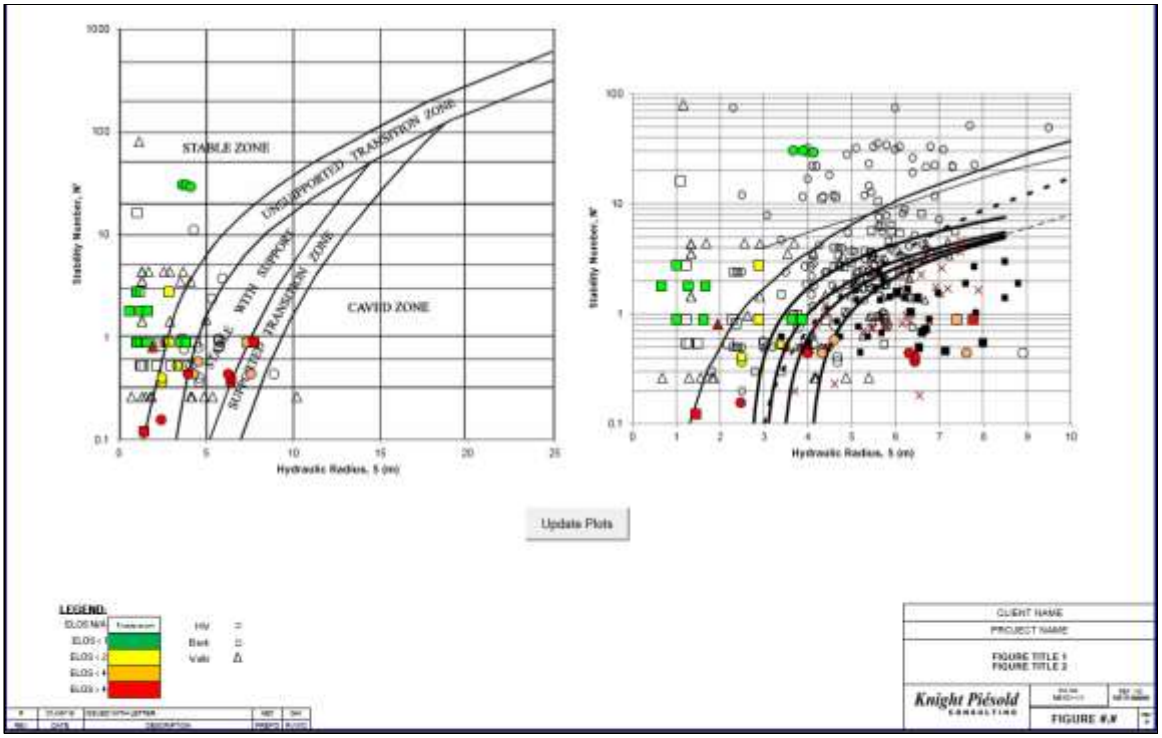


Figure 76: Mathew’s Method for Open Stope Design: Actual Black Fox data

16.2 Underground Infrastructure and Services

The following sections describe the well established, existing underground infrastructure and services at the Black Fox Mine. Existing infrastructure will continue to be used for the duration of the LOM and services distribution systems will be extended to the lowest level as mining advances.

16.2.1 Explosives and Detonator Storage

Explosives are stored underground in permanent magazines on 330 Level and 620 Level, while detonation supplies (NONEL, electrical caps, detonating cords, etc.) are stored in separate magazines.

A mixture of ammonium nitrate and fuel oil (ANFO) is used as the major explosive for mine development and stoping. Packaged emulsion is used as a primer and for loading lifter holes in the development headings and for all long hole stopes. Smooth blasting techniques are used as required in main access development headings, with the use of trim powder for loading the perimeter holes.

All underground personnel are required to be on surface during blasting. A central blast system is used to initiate blasts remotely from a safe control point located at the portal entrance for all loaded development headings and production stopes at the end of the shift only.

16.2.2 Fuel Storage and Distribution

A 45,000-litre fuel tank is located near the portal to provide fuel for the underground mobile equipment fleet and an additional fuel bay is located at the 235 Level in proximity to the garage. As well, a fuel-lube truck is used to fuel the mobile equipment when needed.

Portable satellite fueling stations, or fuel-lube-Sats, are used for the underground mobile fleet. There are two units available, one for fuel and one for lubes located near the active levels. The fuel-lube-Sats house a lubrication/oil dispenser in addition to fuel. Fuel-lube-Sats come complete with emergency spill catchment, automatic roll-down doors and fire suppression per local code and regulations.

16.2.3 Mobile Equipment Maintenance

Mobile underground equipment is maintained in the 235 Level shop or the surface shop depending on the type of work that is required. A fire suppression system is installed in the 235 Level shop.

All maintenance work is scheduled by the maintenance planner and is managed by the maintenance supervisors. The role of the supervisors is to ensure that all the work is performed safely and that the priorities are being managed according to production demands.

A computerized maintenance system is used to track work history, equipment cost and preventative maintenance (PM) schedules. The maintenance planner creates work orders, schedules the work, and triggers a monthly plan. In addition, the maintenance planner works closely with the supervisors to ensure the plan is being followed as well as reviews the operator equipment cards and executes emergency work orders when and if required.

16.2.4 Hydraulic Sand Backfill

Production

The hydraulic sand backfill at Black Fox Mine is produced with portable batch equipment common to the concrete industry, utilizing sand available on site and a nearby pit. The equipment is operated by a contractor, Custom Concrete. The process uses three ready mix concrete trucks to mix and deliver the batches from the portable batch plant to the borehole hoppers located approximately 120 metres away.

The sand is collected from two sources. One source is from the overburden collected during the open pit mine development. This sand is located east of the open pit, approximately 1.0 kilometre from the batch plant. The other source of sand is located 10 kilometres from the mine site and is trucked in on a daily basis. This source is considerably coarser and is blended with the on-site source at a ratio of 1:1 to improve flowability and the strength of the hydraulic sand backfill.

Quality control is achieved by casting four cylinders every two days for strength tests. Strength results average 1 megapascal at 28 days.

Distribution

There are four boreholes from surface; two for the East Zone and two for the West Zone. The boreholes were drilled with HQ diamond drill and the drill casing (3.25-inch ID) was left in place to case the hole. The backfill is distributed on the levels via runs of 4-inch schedule 10 black pipe with rolled grooves for Victaulic couplings.

16.2.5 Ore and Waste Haulage

Underground stope and development ore is mucked by LHD and loaded into trucks on each level. A combination of 30-ton, 40-ton and 50-ton underground trucks are used. Ore is trucked up the main ramps and tipped outside the portal, on the open pit 9913 bench. From here, a Caterpillar 992 front-end loader loads the ore into open pit Caterpillar 777 trucks, which haul the ore up the pit ramp to the ore stockpile.

Once ore is transported to the stockpile, all ore is segregated, crushed and piled separately. Proper signage is utilized within the quarry boundaries to ensure that there is no mishandling of the ore. Transportation of ore to the mill is by the means of ‘over the road’ 40-tonne trucks. Haulage of the ore takes place on day shift only. If there is a surplus of high grade ore, truck fleets and schedules may be subject to change. A truck tagging system is in place, both when exiting the mine and entering the mill site. Each different ore type has an associated coloured tag to avoid confusion with regard to hauled material. All road ore trucks are weighed upon arrival to the mill. Once delivered to the mill site, the ore is stockpiled separately according to ore type and shipping grade.

16.2.6 Ventilation

The Black Fox primary ventilation system is designed to push fresh air to the underground workings through a system of raises, with return air being exhausted through the main ramp, as shown in Figure 77. Two 200-horsepower main fans are installed in parallel on surface and push fresh air down a 4.5-metre diameter fresh air raise to the 235 Level. From here, the fresh air is directed down the east and west side of the mine in a series of fresh air raises which are extended as levels are being developed.

Fresh air is supplied to each working heading and active stope through the use of auxiliary fans and ducting. Ventilation regulators, doors, and bulkheads are also used to control airflow in the mine. The surface fans are equipped with a 4.1-megawatt propane heater for use in the winter months to heat the intake air as it enters the mine.

Ventilation flows are based on regulatory requirements for the workforce and diesel equipment operating in each zone. The primary fans are currently configured to provide a total airflow of approximately 400,000 cubic feet per minute.

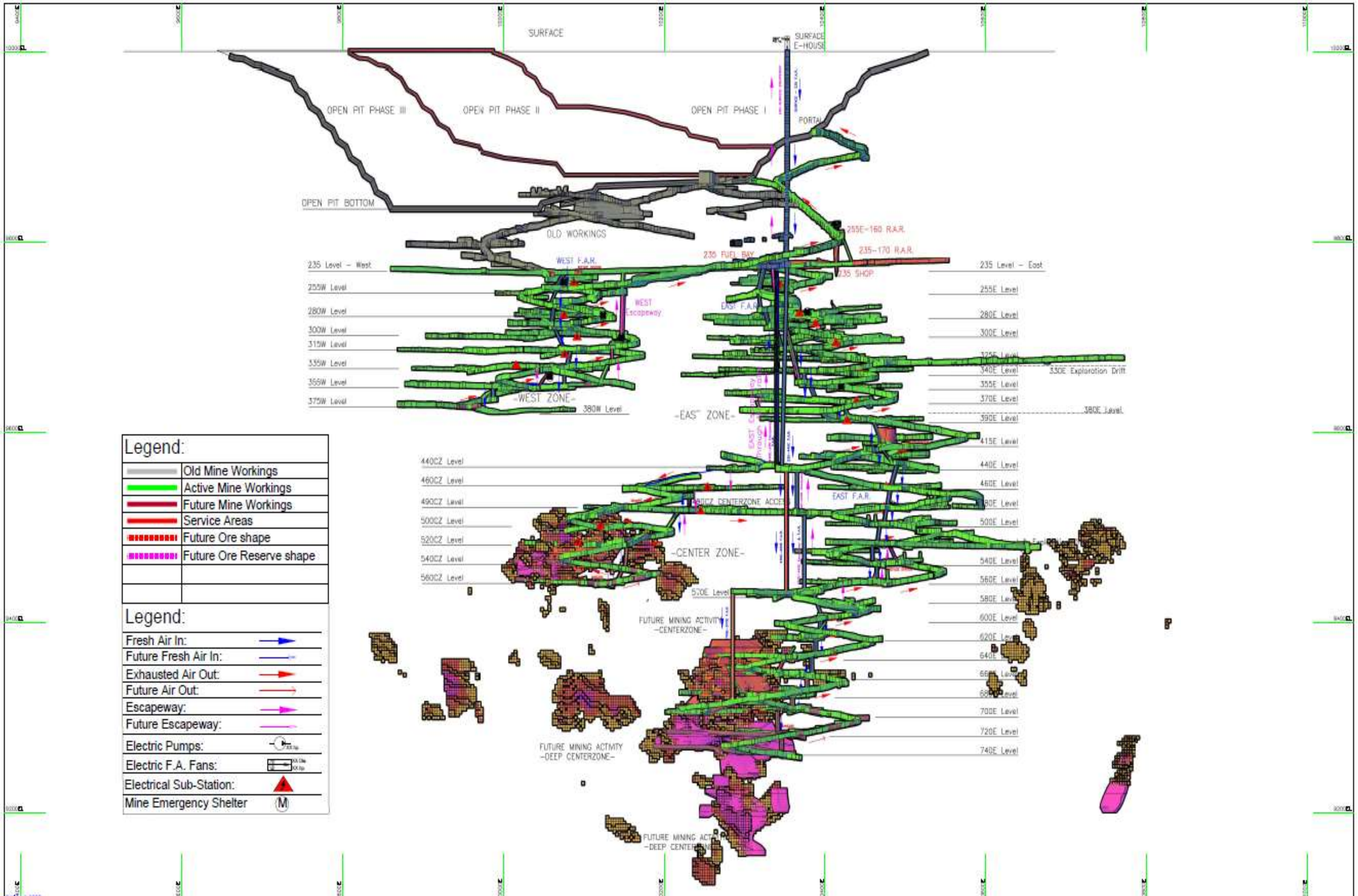


Figure 77: Primary Ventilation Circuit Schematic

Source: McEwen Mining Inc., May 15, 2017

16.2.7 Mine Safety

Self-contained portable refuge stations are provided in the main underground work areas. The refuge chambers are designed to be equipped with compressed air, potable water, and first aid equipment. In addition, they are also supplied with a fixed telephone line and emergency lighting. The refuge chambers are capable of being sealed to prevent the entry of gases. The portable refuge chambers are moved to the new locations as the working areas advance, eliminating the need to construct permanent refuge stations. The permanent refuge stations are located on the 235, 415, and 540 Levels. Currently, there is a refuge station being constructed on the 660 Level.

Fire extinguishers are provided and maintained in accordance with regulations and best practices at the underground electrical installations, pump stations, fuelling stations, and other strategic areas. Every vehicle carries at least one fire extinguisher of adequate size.

The main ramp provides primary access to the underground workings while the intake ventilation raise with a dedicated ladderway provides the secondary egress in case of emergency.

16.2.8 Water Management

The presence of historical underground workings in the pit floor allows the water from the open pit to drain into the underground operations. Because of this, minimal pumping is required in the open pit and the focus is on preventing water from entering the pit. This is achieved through berms diverting surface water away from the pit crest.

Water is pumped from underground using a series of pumps throughout the mine as shown in Figure 78 (each numbered box represents a pump or pump set). There are two main pump sets that can deliver a total capacity of 300 cubic metres per hour to the surface holding pond:

- 235 Level west side sump with three 75 HP pumps in parallel
- 235 Level east side wall dam with two 250 HP pumps in parallel

During the summer months the dewatering capacity to surface is augmented by two additional pumps situated at shallower elevations:

- 130 Level dam wall with two 100 HP pumps in series
- 140 Level sump with a 58 HP pump

Water is pumped from the sumps on each working level to these main pumps by a series of submersible pumps. These level pumps range in size from 27 HP to 60 HP.

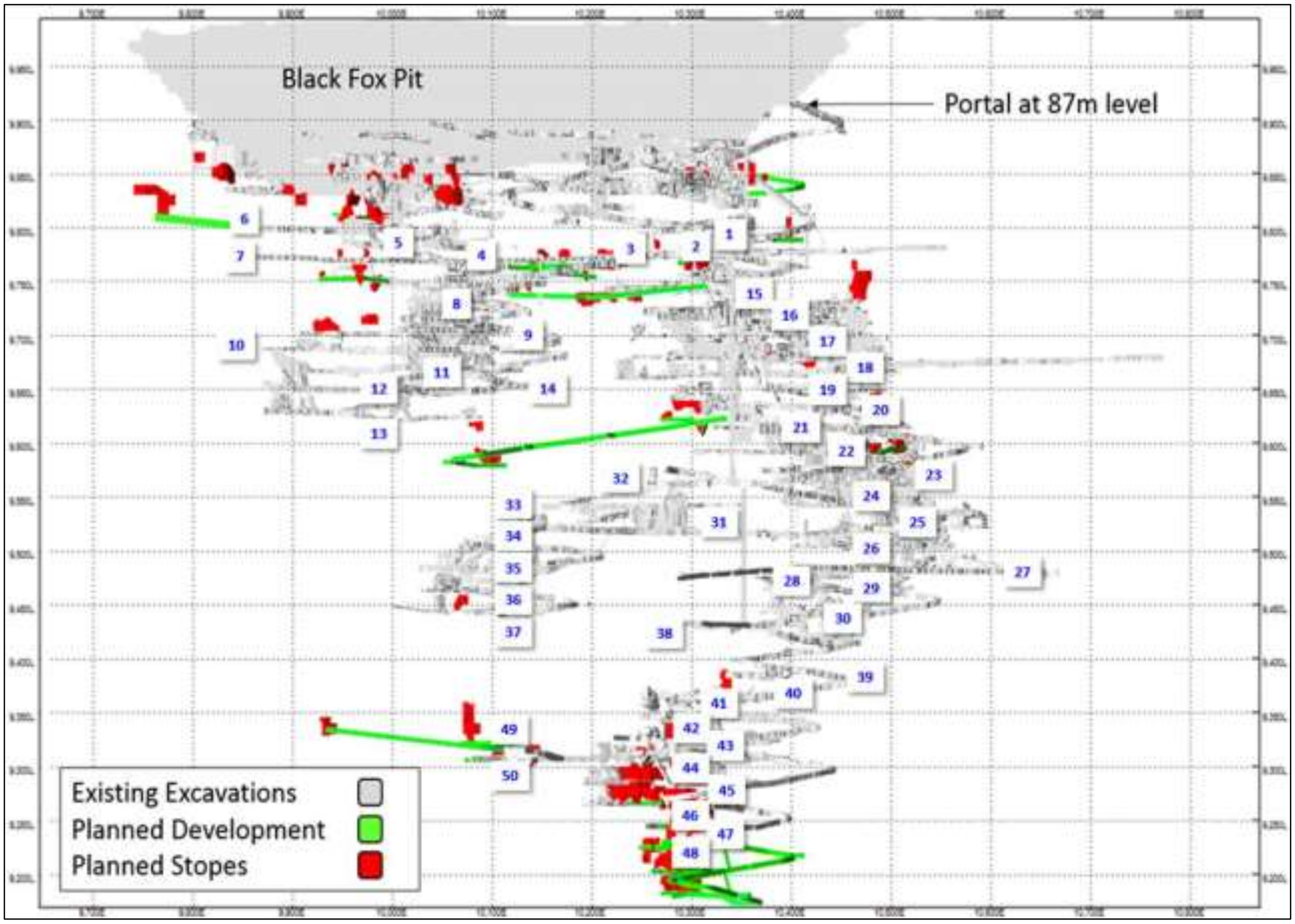


Figure 78: Black Fox Dewatering Longitudinal Section showing Pump Locations

16.2.9 Water Supply

Mine supply water from the surface holding pond is distributed to the underground levels via 4-inch diameter pipelines located in the main ramp. Further distribution to work headings is via 2-inch diameter water lines. Pressure reducers are located along the main ramp.

16.2.10 Compressed Air

Compressed air is used for stopers, jacklegs, long hole drills, secondary pumping, ANFO loading, and blast hole cleaning. The underground mine has a dedicated compressed air system, consisting of five compressors: two 300 HP compressors and one 200 HP compressor at surface and one 200 HP compressor at the 570 Level and another 200 HP compressor at the 640 Level.

Compressed air is delivered underground in a 150-millimetre diameter pipe via fresh air raise to the main ramp, then down 100-millimetre pipes in the level development and stopes. The underground mobile drilling equipment such as jumbos and production drills are equipped with their own compressors. There are five 1,060-gallon receiver tanks located throughout underground.

16.3 Mining Schedule

Nominal production at the Black Fox Mine is currently 500 tonnes per day, which is enough to run the mill at approximately 1000 tonnes per day every other week. There is currently a plan to stockpile the ore at the mill and then run the mill for several months at full capacity before shutting it down during hot and cold months when electricity demand in Ontario peaks. The expected life of the Black Fox Mine is currently 2.3 years based on current reserves and production rate. Table 64 presents the mineral reserve LOM schedule.

Table 64: Black Fox Mining Schedule for October 31, 2017 Reserve Estimate

Life of Mine Schedule	2017*	2018	2019	Total
Stope tonnes	32,400	135,000	181,100	**348,500**
Stope Grade (g/t Au)	7.98	10.36	9.02	**9.45**
Stope Contained Ounces	8,300	45,000	52,500	**105,800**
Ore Development Tonnes	18,000	16,800	11,900	**46,700**
Ore Development Grade (g/t Au)	4.32	4.17	5.86	**4.66**
Ore Development Contained Ounces	2,500	2,200	2,200	**6,900**
Total Ore Tonnes	**50,400**	**151,800**	**193,000**	**395,200**
Total Ore Grade (g/t Au)	**6.68**	**9.68**	**8.83**	**8.88**
Total Ore Contained Ounces	**10,800**	**47,200**	**54,700**	**112,700**
Recovered Ounces (from Mill)	**10,400**	**45,300**	**52,600**	**108,300**
Capital Lateral Development Metres	190	520	610	**1,320**
Operating Lateral Development Metres	920	1,050	960	**2,930**
Total Lateral Development	1,110	1,570	1,560	**4,250**
Capital Raise Development Metres	0	90	50	**140**
Waste Development Tonnes	16,500	45,000	58,700	**120,300**
Backfill Tonnes	14,900	85,400	106,000	**206,400**

* 2017 includes production for November and December only

16.3.1 Personnel

The workforce is comprised of permanent company personnel and fluctuating number of contractor personnel. Table 65 provides a breakdown of McEwen Mining employees including for mining, milling, and general and administration roles.

16.3.2 Mobile Equipment

The Black Fox Mine has an active and producing underground fleet of mobile equipment listed in Table 66. There is also a surface fleet of mobile equipment (Table 67) that was used to its full extent before the open pit was closed. It is currently used for moving sand for the backfill plant and rehandling ore to and from the crusher as well as for the maintenance of roads and other surface infrastructure.

Table 65: Black Fox Personnel (Current)

Department	Employees
Surface Operations	12
Surface Maintenance	11
Geology and Exploration	20
Engineering	9
Underground Operations	100
Underground Maintenance	25
Mill Operations	16
Mill Maintenance	9
Prep and Assay Lab	8
Accounting and Warehouse	8
Human Resources	3
Health and Safety	5
Security	10
Environmental	4
Mine Admin	7
Exploration	9
Coop Students	1
Total	**257**

Table 66: Underground Fleet

Equipment Type	Quantity
Bolter on Scissor lift	1
Boom Trucks	3
Forklift/excavator	2
Grader	1
Jumbo 1 boom	2
Jumbo 2 boom	2
Lube truck	1
Personnel carrier (Truck)	8
RDH Block Holer	1
Rock Trucks 30T	3
Rock Trucks 40T	3
Rock Trucks 50T	2
Scissor lift	4
LHD 2yd	2
LHD 4yd	3
LHD 6yd	6
LHD 8yd	1
Sprayer	1
Toyota Pickups	6
Tractor	3
Transmixer	1
EMT UPC Buggy	2

Table 67: Surface Equipment Fleet

Equipment Type	Quantity
100t Truck - CAT 777	2
Articulated Dump Truck	1
Bulldozer - CAT D8	1
Bulldozer - CAT D6	1
Bulldozer - CAT D9	1
Excavator – CAT 385	1
Excavator – Komatsu PC300	1
Fuel trucks	2
Grader - CAT 16H	1
Loader - CAT 992	1
Loader - CAT 930	1
Loader - CAT 988	1
Lube Truck	1
Pick Up Trucks	30
Rock Breaker	1
Service Truck	1
Skid Steer Loader	1
Warehouse Forklift	1
Water Truck	1
Welding Truck	1

17 Recovery Methods

Ore from the Black Fox Mine is processed at the Black Fox Mill. A brief description of the current process flowsheet is outlined in this section. This is the flowsheet that is being used to process material from the Black Fox Mine. The Black Fox Mill also periodically processes ores from third parties.

17.1 Process Flowsheet Summary

The simplified process flowsheet for the Black Fox Mill is presented in Figure 80. The mineralized rocks from the stockpile are crushed in a jaw crusher followed by secondary and tertiary cone crushers. The crushed material is then sent to a ball mill operated in closed circuit with cyclones followed by regrind mills also operated in closed circuit with cyclones. Gold is extracted in a carbon-in-leach (CIL) circuit. Gold is removed from the loaded carbon by elution (stripping) followed by electrowinning. The stripped carbon is regenerated in reactivation kilns before being returned to the process. Nitric acid washing to remove scale occurs prior to the thermal regeneration step. Fine carbon is constantly removed and recovered from the process to avoid gold loss, while fresh carbon is continuously added to the process. Fresh and regenerated carbon is sized prior to addition to the system. A carbon fines surge tank and filter press have been added to the circuit. The high-grade electrowinning concentrate is sent to a bullion furnace for smelting of doré. Carbon fines are transferred to a custom pyro-metallurgical facility for pay-metal recovery.

17.2 Process Description

17.2.1 Crushing

Crushing is currently carried out at the mine site via a contract service (LPL Contracting). McEwen Mining does not own the crushing equipment. The crushed material is trucked to the Black Fox mine where it is processed.

The crushing configuration is shown in Figure 79 and comprises a three (3) stage semi-portable circuit. Mineralized rocks are reclaimed into a feed hopper that feeds a vibrating feeder from which rocks enter a jaw crusher. The crushed product is discharged to a secondary cone crusher. The cone crusher product feeds two (2) screens where the undersize material is the final crushed product. Screen oversize is split to feed two (2) tertiary cone crushers. The crushed product is returned to the screens.

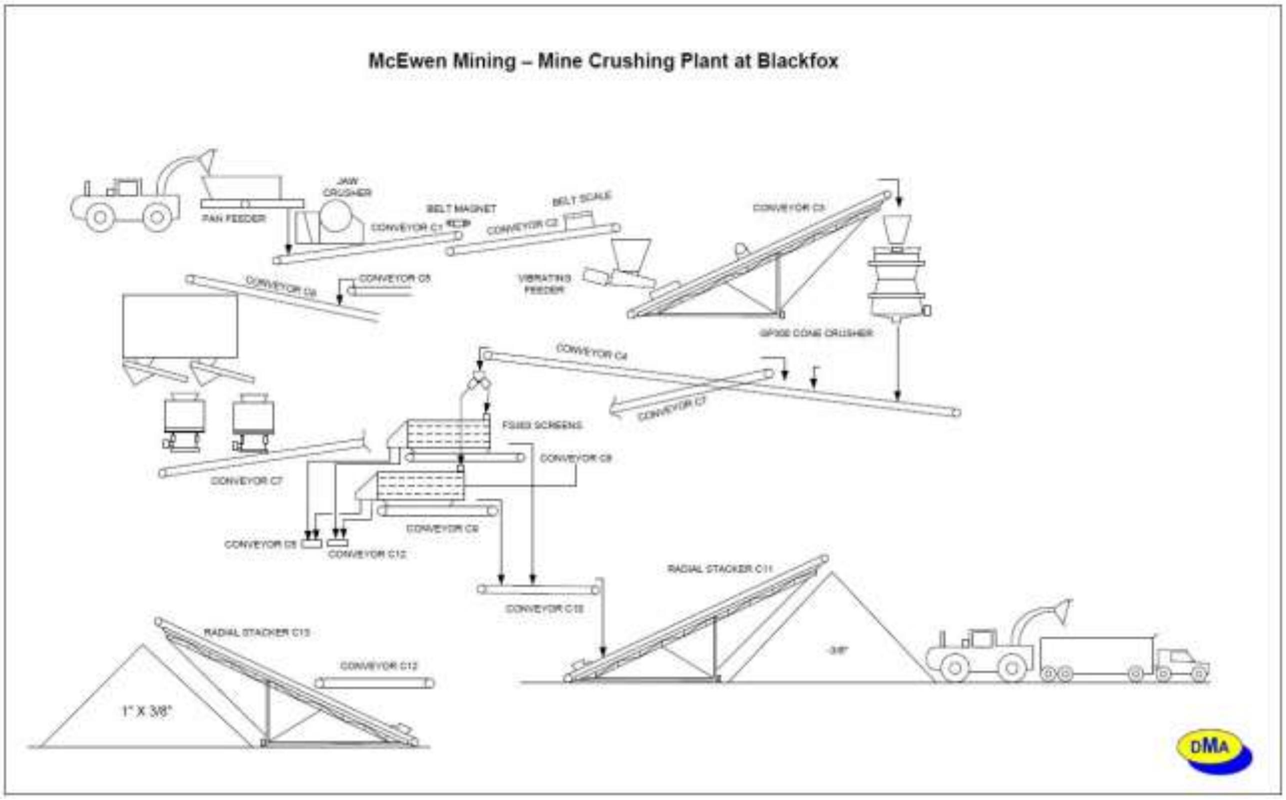


Figure 79: Diagram of the Mine Crushing Plant at the Black Fox Mine

17.2.2 Grinding

The crushed material is conveyed from the fine ore bin to the feed chute of the primary ball mill which is operated in closed circuit with three (3) hydro cyclones. The cyclone underflow is recirculated to the ball mill while the overflow is further ground in one of the two (2) regrind mills. The regrind mills are operated in closed circuit with five (5) secondary cyclones. The overflows from the secondary cyclones flow to a vibrating trash screen. The trash screen undersize falls into the thickener feed pump box. The head sampler removes feed aliquots on 20-minute intervals from the thickener feed line.

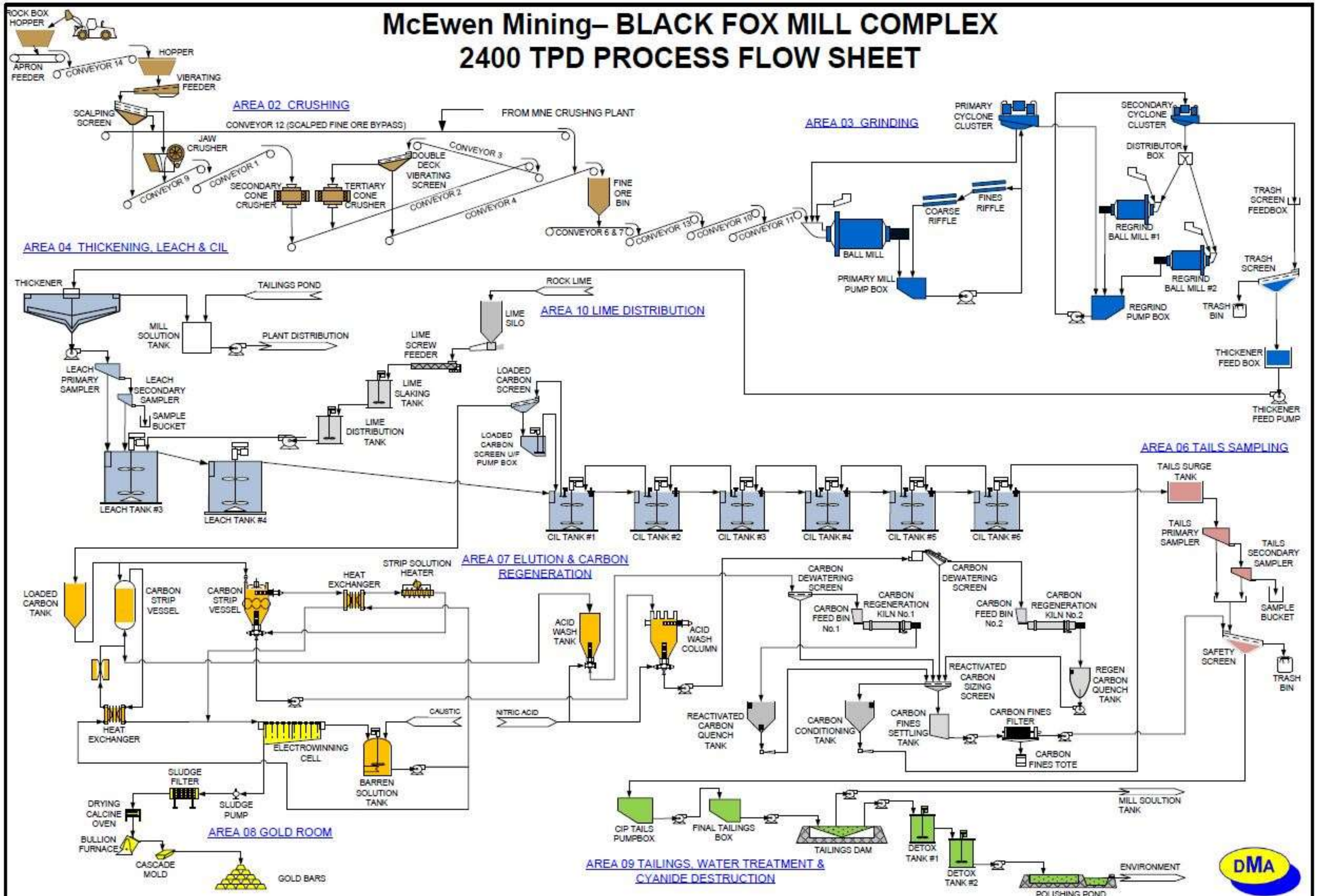


Figure 80: Simplified Process Flowsheet – Black Fox Complex

17.2.3 Gravity Circuit

A gravity circuit comprised of a fines riffle and a coarse riffle in series is present in the mill. The gravity circuit was installed as a trial unit and has yet to be commissioned. The riffles are currently not being used without any future commissioning being planned.

There is a #6 Deister shaking table in the grinding section that is currently not in use.

17.2.4 Leaching

The ground slurry is then pumped to a thickener for dewatering. The thickener underflow is pumped to the first of two (2) leach tanks. An alternate head sampler exists on the leach feed line but is currently not in service. The slurry flows by gravity from the first tank to the second. Lime slurry is added to the first leach tank for pH control.

The overflow from this leach tank flows to a series of two (2) additional leach tanks and four (4) CIL tanks, where the gold now in solution is adsorbed onto 6 to 12 mesh granular carbon.

Six (6) CIL tanks are present at the mill complex, however tanks #1 and #2 are currently being used as the two (2) additional leaching tanks as their inter-tank screen assemblies are not currently installed. If warranted, tanks #1 and #2 can be commissioned after installation of their interstage screens.

The four (4) leach tanks and the four (4) CIL tanks provide a minimum of 36 hours of residence time. Each operational CIL tank is equipped with an interstage screen and a carbon-transfer pump and is agitated to maintain the solids in suspension. Air is injected in the bottom of the leach tanks and in each CIL tank for gold dissolution. Carbon is advanced in the opposite direction to the slurry flow (counter-current) until it reaches CIL tank #3. It can then be pumped to the loaded carbon screen feeding the 3-tonne strip circuit. The loaded carbon oversize flows to the loaded carbon tank. Fresh and regenerated carbon is added into the last CIL tank.

The solution from the last CIL tank overflow goes over the safety screen to the tails surge tank. The screen prevents the loss of carbon in the eventuality of a failure of the last CIL tank interstage screen. The carbon is recovered at the screen oversize. The screen undersize is discharged to the tailings dam. A tailings sampler removes residual product on 20-minute intervals from the final tails discharge line.

17.2.5 Carbon Stripping and Electrowinning

From the loaded carbon tank, the carbon is transferred to the carbon strip vessel where the gold is removed from the carbon by a concentrated solution of caustic soda and sodium cyanide at 142°C. The pregnant solution flows out of the strip tank through a heat exchanger to an electro winning cell where the gold is plated onto stainless steel electrodes. Periodically the gold sludge is removed from the electrodes by pressure washing. It is then pumped out of the electro winning cell into a filter press where it is dewatered. On a regular basis the sludge is removed from the filter press, dried and smelted in an induction furnace before being poured to produce a doré bar. The tails from the electrowinning cell are pumped into a barren solution tank. From there they are pumped through the heat exchanger and an electric inline heater back into the strip vessel. Stripped carbon is transferred from the strip vessel to an acid wash tank where scaling is removed by a 3 percent nitric acid wash before the carbon is sent through a carbon regeneration kiln. The kiln is operated at 650°C to remove volatile contaminants from the carbon.

The discharge from the kiln falls into a quench tank. New carbon is also added to this tank and, after attrition, it is transferred to the reactivated carbon sizing screen where fine carbon is removed. The oversize from that screen falls into the carbon conditioning tank from where it is transferred to the CIL circuit as required. The original 1-tonne batch strip circuit remains as an alternative stand-by circuit.

17.2.6 Cyanide Destruction and Water Management

Makeup water is pumped from the tailings pond by a barge-mounted pump either to the mill solution tank or into the first of two (2) water treatment tanks. Air, Sodium metabisulphite and copper sulphate solutions are added to the first tank to destroy the residual cyanide. Ferric sulphate is added to the second tank to precipitate arsenic when required.

The treated water flows into a polishing pond to allow for completion of the cyanide destruction reactions and the settling of particles before it is discharged into the environment.

17.2.7 Reagents

The reagents used throughout the process are described below:

- Sodium cyanide (NaCN) is used for gold leaching in the CIL circuit to dissolve the gold and to strip the carbon in the carbon elution circuit to improve the efficiency of the process. Sodium cyanide is supplied as 26 to 32 wt percent solution.
- Flocculant is used in the pre-leach thickener to improve the settling rate.
- Lime is used to control the pH in the carbon-in-leach (CIL) and cyanide destruction circuits thus preventing the cyanide acid (HCN) formation.
- Sodium metabisulphite is used to generate $S0_2$ in the cyanide destruction process.
- Nitric acid (HNO_3) is used for the carbon acid wash.
- Copper sulphate ($CuSO_4$) is used as a catalyst in the cyanide destruction process.
- Ferric sulphate is used for co-precipitation of arsenic after the cyanide destruction process.
- Sodium hydroxide (NaOH) is used for carbon stripping and after the carbon acid wash to neutralize the residual acid in the dilute acid tank and the acid wash column.

17.3 Concentrator Design

17.3.1 Design Criteria

The main design criteria of the mill facility are presented in Table 68.

Table 68: Concentrator Criteria

Parameter	Value	Units
Feed Characteristics	6,000	µm
	14.0	kWh/tonne
Gold Head Grade (Average)	6.0	g/t
Moisture Content	3.5	% w/w
Specific Gravity	2.8	tonne/m³
Operating Schedule		
Current Schedule	7 days on – 7 days off	
Scheduled Operating Days	365	d/y
Operating Hours	24	h/d
Plant Availability	95	%
Shifts	2	shift/d
Production Rate		
Plant Feed Rate (Nominal)	2,400	tpd
Operation Plant Feed Rate	96.5	t/h
Grinding Size	75	µm
Gold Recovery (Average)	95	%

17.3.2 Equipment List

The major process equipment present at the Black Fox Mill are listed in Table 69.

Table 69: Process Equipment List

Equipment Name	Description
Fines Screen Double Deck	5 m x 3 m
Jaw Crusher	0.6 m x 0.9 m
Secondary Cone Crusher	200 HP
Tertiary Cone Crusher	300 HP
Double Deck Vibrating Screen	1.8 m x 6.1 m
Fine Ore Bin	1500 live tonne storage
Ball Mill	3.7 m x 5.5 m, 1600 HP
Primary Cyclones Cluster	4 cyclones (381 mm)
Regrind Mill #1	2.9 m x 3.7 m, 600 HP
Regrind Mill #2	2.7 m x 3.4 m, 450 HP
Secondary Cyclones Cluster	6 cyclones (254 mm)
Trash Screen	0.9 m x 2.4 m
Thickener	High Rate, 19.8 m diameter
Leach Tank #3	1350 m^3
Leach Tank #4	1350 m^3
CIL Tank #1	295 m^3
CIL Tank #2	295 m^3
CIL Tank #3	295 m^3
CIL Tank #4	295 m^3
CIL Tank #5	295 m^3
CIL Tank #6	295 m^3
Loaded Carbon Screen	1.5 m x 2.4 m
Carbon Elution System	3 t
Carbon Regeneration Kilns	(2) 1.5 tonnes/day
Electrowinning Cell	3.5 m^3
Barren Solution Tank	52 m^3
Sludge Filter	1.9 m x 0.8 m x 1.2 m
Drying Calcine Oven	7 HP
Bullion Furnace	300 lbs. steel, 1.3 m x 0.7 m x 1.6 m
Tails Surge Tank	3.4 m x 1.7 m x 2.1 m
Detox Tank #1	74 m^3
Detox Tank #2	35.4 m^3
Carbon Safety Screen	1.5 m x 2.4 m

18 Project Infrastructure

Site infrastructure comprises support services, health and safety considerations, surface facilities, tailings storage and water management located one of two project sites: the Black Fox Mine site and the Black Fox Mill site. The two sites are located approximately 35 kilometres apart via Highway 101. The site infrastructure provides essential services and facilities that are required for the mine and mill to operate and follow all laws and regulations.

18.1 Black Fox Mine Site

The major infrastructure at the Black Fox Mine site is shown in Figure 81 and Figure 82. The major infrastructure includes:

- Roads.
- Services facilities including maintenance and truck shops, crushing plant, shops and storage buildings, and miscellaneous infrastructure.
- Portal.
- Ventilation raises.
- Mine water management ponds.
- Administrative buildings.
- Water supply and distribution.
- Waste management.
- Fuel storage.
- On-site explosive storage.
- Powerhouse and electrical distribution system.
- Overburden and waste dumps and ore stockpile.

18.1.1 Site Access Road

The site can be accessed by Highway 101 year-round from Matheson, Ontario located 11 kilometres to the west. Access by highway from Toronto follows Highway 11 directly to Matheson via Bracebridge, North Bay and Kirkland Lake. Access is controlled to site by a gate and security house.

18.1.2 Mine Access Portal

The Black Fox underground mine portal, shown in Figure 83, is located at a bench at a depth of 87 metres within the Black Fox pit.

Figure 81: Black Fox Mine Site

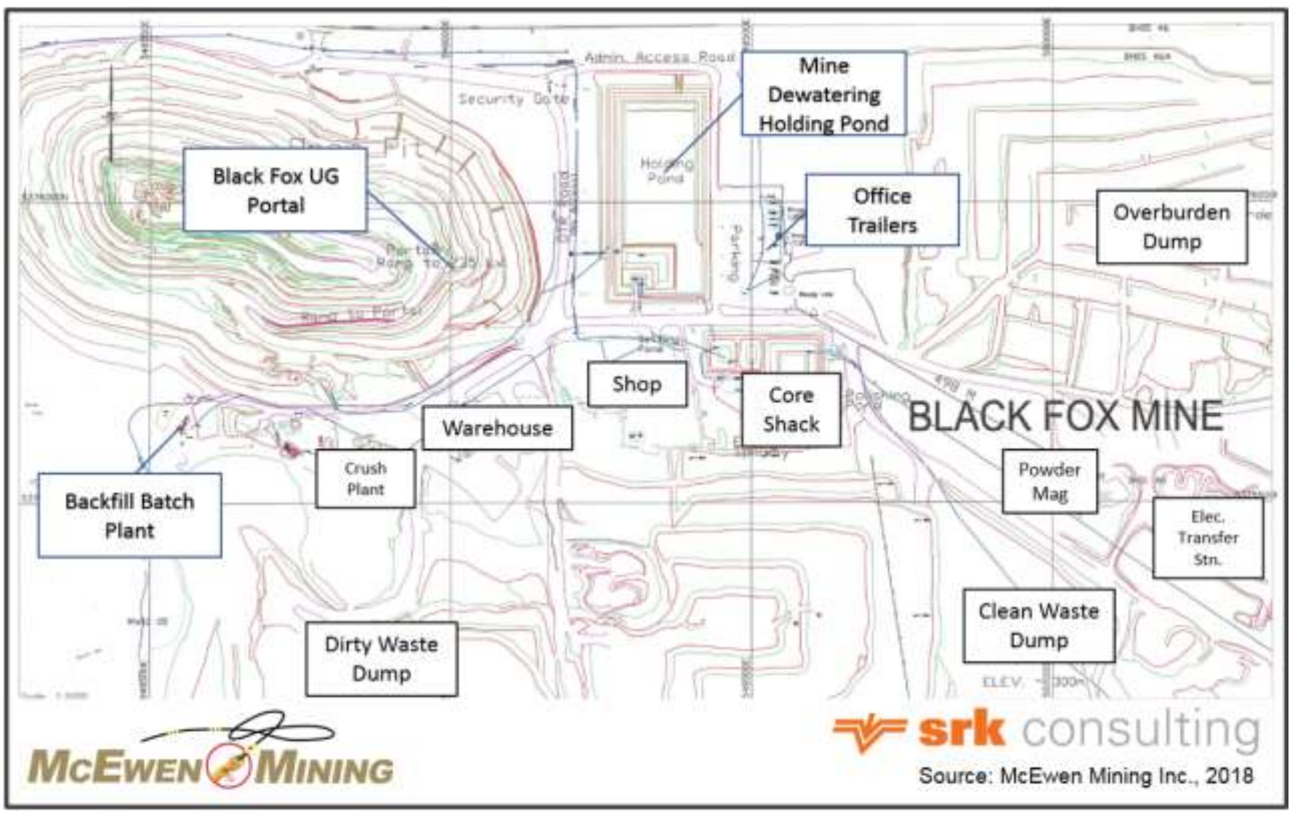


Figure 82: Site Layout: Actual Infrastructure Diagram for 2018

Source: McEwen Mining Inc., 2018

Figure 83: Black Fox Portal in the Black Fox Pit

18.1.3 Stockpiles and Dumps

The former lower-grade open pit mine stockpile has been depleted. Only smaller stockpiles remain, used for temporary storage of material before it is hauled to the mill. There are two dumps on site, the overburden dump and the waste dump. The waste dump is subdivided into dirty waste and clean waste areas.

18.1.4 Camp

There are no camp facilities at the Black Fox Mine nor at the Mill. However, there are two company houses where visiting and rotational staff can stay.

18.1.5 Maintenance Facilities

There is a fully serviced maintenance shop on surface with three bays and a wash bay.

18.1.6 Power

Electrical power is provided via a 27,600-volt transmission line from Ontario Hydro. The distribution system provides 5.6 megawatts of power to site. The electrical power steps down on 2 systems for underground to 4,160 volts and 13,800 volts. The 13,800-volt system is on a 5-megavolt-ampere transformer and the 4,160-volt system is on a 5-megavolt-ampere transformer. Subsequently the voltage is stepped down for the surface fans, main surface shop and crusher to 600 volts. The fans, crusher, and main shop are on dedicated transformers ranging in size from 1.5 megavolt amperes to 2.0 megavolt amperes. All other buildings are stepped down to either single phase or 3 phase pole transformers as required for the building.

18.1.7 Water

Potable water is sourced by Aqua-Nor water distributors.

18.1.8 Sewage Disposal

At the Black Fox Mine sewage is treated and discharged into a septic tank system. The septic system at the Black Fox Mine is a mound system, which is pumped every second day by a vacuum truck to prevent leakage from the system. There is a new sewage disposal system onsite, which was upgraded and expanded and will be functional in April of 2018. There is a tank system at the surface shop and behind the finance trailers.

18.1.9 Fuel Storage

Fuel farms and propane tanks are for fuel storage at three locations:

- Security gate: 600 gallons
- Portal: 1500 gallons
- Underground at the 235 Level: 600 gallons

18.1.10 Explosives Storage

For the Black Fox Mine site, detonators and bulk explosives are stored in magazines in designated areas.

18.2 The Black Fox Mill Site and Tailings Management Area

The Black Fox Mill site (formerly the Stock Mine site) is shown via aerial imagery from 2016 in Figure 84 and Figure 85. The site contains the mill and associated infrastructure, the tailings management area, and the water management infrastructure.

18.2.1 Mill and Associated Infrastructure

Site Access Road

The mill site is accessed by a 1.4-kilometre all-weather gravel-topped mill access road which joins Highway 101 approximately 48 kilometres east of Timmins (20 kilometres west of Matheson). There is a gatehouse for security at the mill entrance.

Mill

The milling process and equipment is described in detail in Section 17. To summarize, the mill is comprised of a crushing plant, a transfer house, grinding mills, CIL recovery circuits, dewatering thickeners, offices, test laboratory, storage and a maintenance facility. The mill buildings are pre-engineered, steel construction, steel clad, insulated structures. The foundations, floors and perimeter walls of the structure are concrete to contain slurry and solution spillage. The product from the processing facility (doré bars) is transported by armored vehicle to a third-party refinery.

Figure 84: Aerial Image of the Black Fox Mill Showing Major Site Infrastructure and Features of Adjacent Lands

Figure 85: Aerial Image - Black Fox Mill Showing Key Site Infrastructure

Other Buildings and Structures

Some other active buildings on site include:

- Emergency diesel generator buildings
- An electrical control building
- A cold storage building for reagents, such as lime, caustic soda, soda ash and carbon.
- A cold storage building for oil.
- A building for chemicals, such as flocculent and cyanide.
- A single-bay garage and shop building used for mechanical maintenance and servicing of mobile equipment.

There are some historical structures on site associated with the former Stock Mine including a 32-metre-tall headframe, coarse ore and waste rock bins, and underground ventilation structures.

Power Lines and Distribution

Electrical power is supplied to the Black Fox Mill site via a 1.6-kilometre company owned 27.6-kilovolt distribution line from the Ontario Hydro power net on the south side of Highway 101. A fenced transformer station is located along the south side of the hoist room. All power distribution is via buried power/pipe line trenches.

The total power usage for the combined Black Fox Mill is approximately 4.5 megawatts. The electrical distribution system at the Mill has an installed capacity of 7.2 megawatts.

The main power line feeding the Black Fox Mill site was upgraded over the summer of 2012 with several poles and insulators being changed, the addition of the load break switch and a grounding system from the main Hydro line to the substation.

Pipe Lines

With the exception the surface installed tailings and reclaim water lines, all inter-building piping for water, air and sewage is buried.

Two 200-millimetre diameter tailings lines and one 200-millimetre diameter insulated reclaim water return line follow an approximate 200-metre long trestle from the north-east corner of the mill building to the south tailings dyke. The treatment plant effluent pipe line, also a 200-millimetre diameter insulated pipe, leaves the mill's east wall and then is directed south along the leach tank and thickener perimeter wall to the secondary pond.

Chemical Storage

Lime, cyanide, oxygen, sodium hydroxide, nitric acid and a flocculant are used in the milling process. Lime, sodium metabisulphite and copper sulphate are also used in the wastewater treatment cyanide destruction circuit. Ferric sulphate is available for arsenic treatment.

The majority of the lime is received in bulk in the form of hydrated lime [$Ca(OH)_2$] and is stored in a 30-tonne silo. This product is screw fed to a mixing tank within the chemical mix section of the mill.

Cyanide is received in liquid form from Cyanco. Cyanide is stored in bulk tanks with a capacity of 13,500 US gallons (51.1 cubic metres).

Sodium hydroxide is received in 25-kilogram bags, which are stored in the same area as the lime. Empty bags are discarded to refuse containers.

Nitric acid is delivered to the onsite bulk holding tank. The bulk storage tank has a capacity of 20 tonnes

Assay and metallurgical laboratory chemicals consist of various acids, bases, and other chemicals required to carry out analytical and other test work. These chemicals are stored in designated storage areas within the respective laboratory sections. Non-compatible chemicals are separated such that an accidental spill of both would not endanger equipment or employee health and safety.

There are no polychlorinated biphenyls at the Black Fox Mill site. Past transformer oil testing by Westinghouse indicated a less than 5 parts per million (ppm) polychlorinated biphenyl content. Voltesso 35 transformer oil is currently used in all "wet" type transformers.

Fuel Storage

There is one fixed 1,000-litre above ground diesel fuel storage tank and two 500-litre capacity mobile aboveground diesel fuel storage tanks. The diesel fuel is used for diesel operated mobile surface and mining equipment. The tanks have secondary containment.

Lubricating, hydraulic oils and grease are received in a mixture of 205-litre drums, 20-litre and 55-kilogram containers and these are distributed as required to the shop and to the mill lubricant storage area. Active oils (drums in use) are kept within the mill and shop buildings where any spills can be contained and picked up. On the average no more than 2,500 litres of oil is stored at the mill site at any one time.

Waste oils are collected in 205-litre, 120-litre, and 60-litre drums, as well as some 20-litre containers. These are stored separately from new oils in an area south-west of the ventilation raise. The company has a waste oil generator number (ON1129200) and regularly disposes of this product through a licensed carrier and disposal agent.

Stockpiles

Ore from the Black Fox Mine is temporarily stockpiled west of the mill building. There is one relatively small stockpile of ore including northwest of the mill and one mill-reject pile north of the mill. The mill-reject ore is stockpiled for re-circulation though the mill.

Waste Management

There is no approved landfill site at the mill. All domestic waste is stored in a dumpster for transportation to a local licensed landfill site. Scrap steel is stockpiled for removal by a local recycler. Wood wastes are stored on site for burning under permit.

18.2.2 Tailings Management Area

The tailings management area was developed in stages beginning in 1989. The most recent design and construction drawings were completed for Primero by Golder in early 2017. Example drawings are included here in Figure 86 and Figure 87 which are the current layout and the construction design sections respectively for the “Phase 8B” raise of the tailings management area.

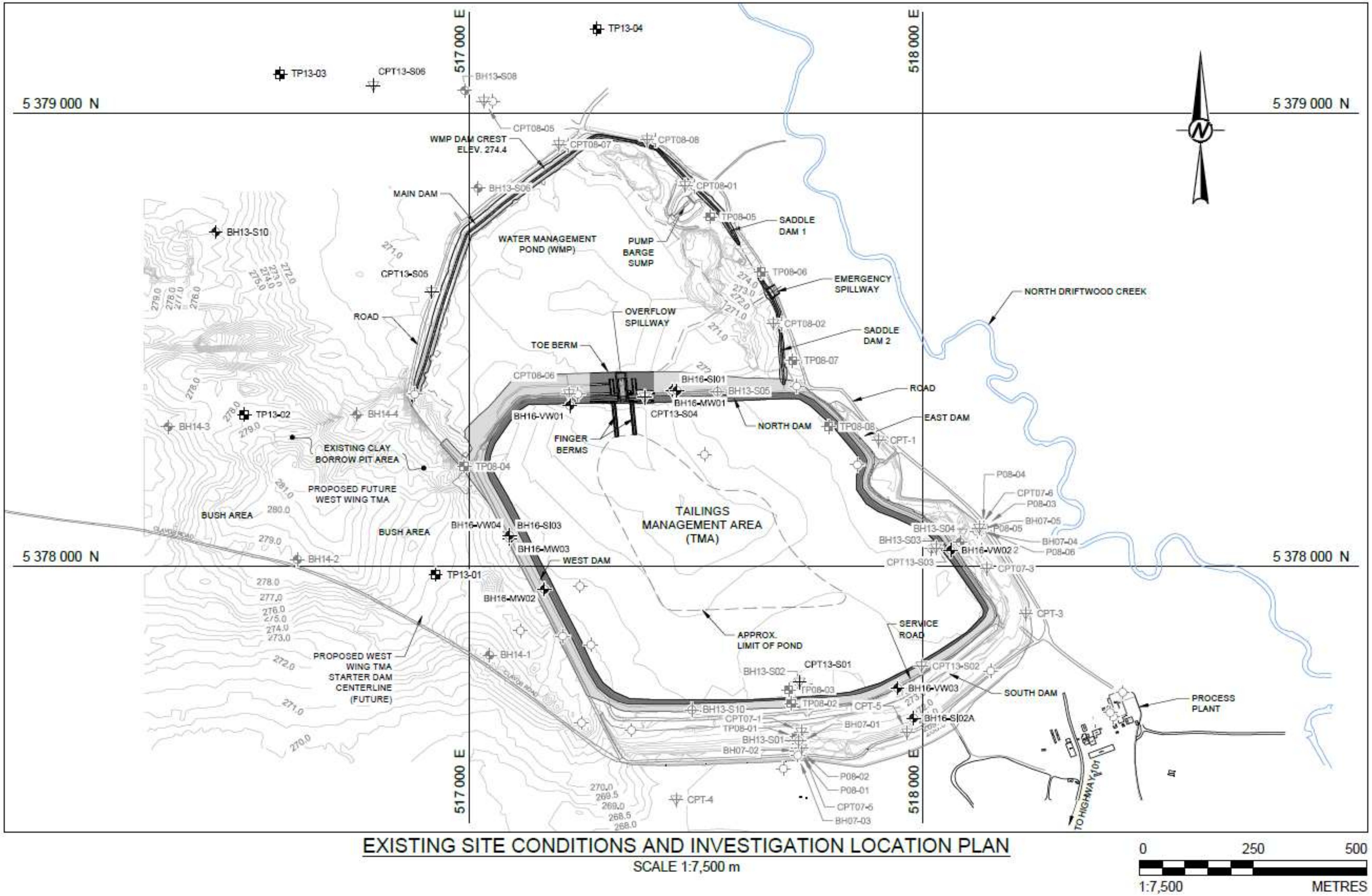
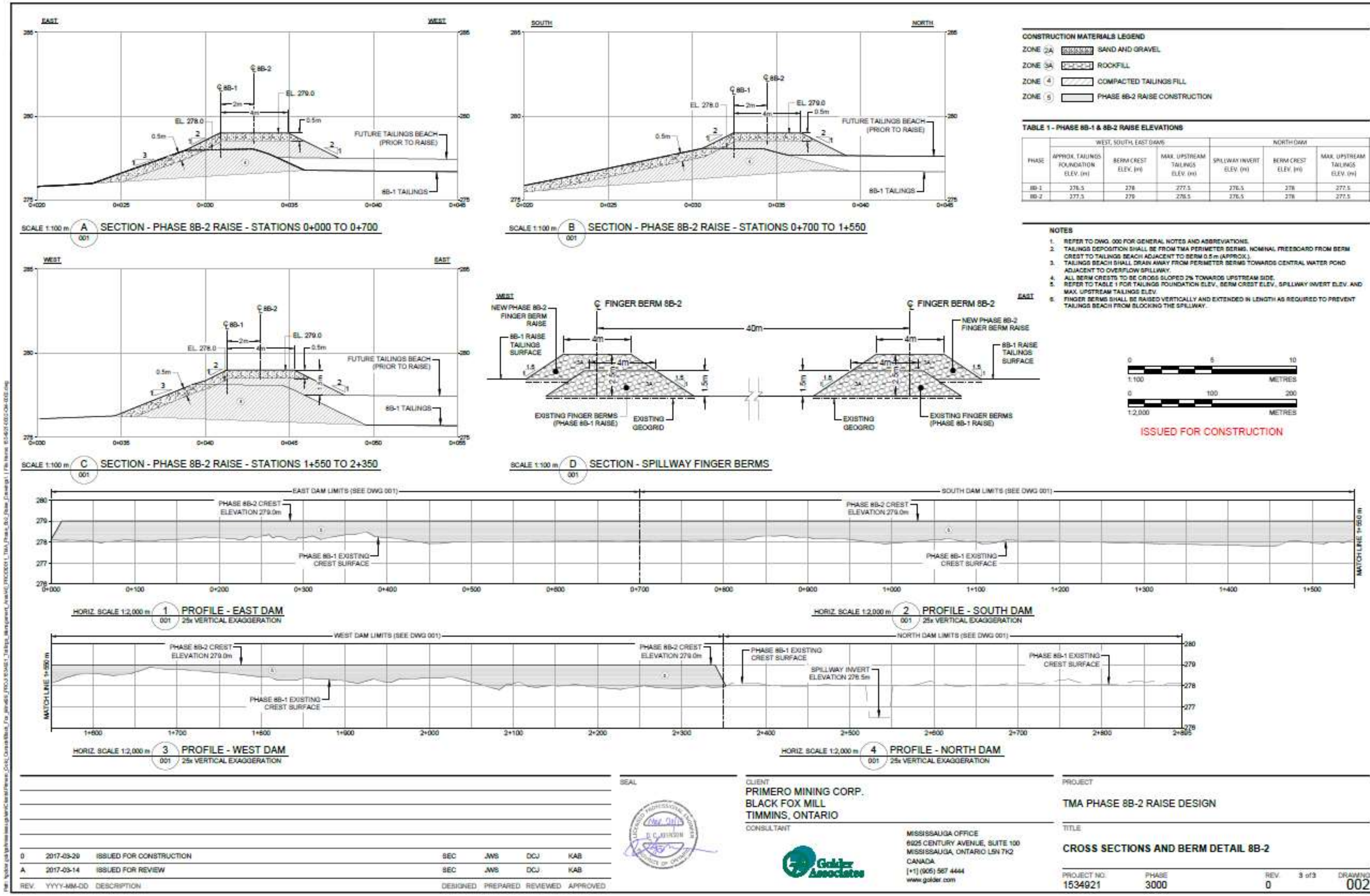


Figure 86: Existing Conditions Plan of Tailings Management Area



PHASE	WEST, SOUTH, EAST DAMS			NORTH DAM		
	APPROX. TAILINGS FOUNDATION ELEV. (m)	BERM CREST ELEV. (m)	MAX. UPSTREAM TAILINGS ELEV. (m)	SPILLWAY INVERT ELEV. (m)	BERM CREST ELEV. (m)	MAX. UPSTREAM TAILINGS ELEV. (m)
8B-1	276.5	278	277.5	276.5	278	277.5
8B-2	277.5	279	278.5	276.5	278	277.5

Figure 87: Construction Design Sections for Tailings Management Area Dam Raise

The tailings management area is located in a generally northwest to southeast trending depression which is confined on the east and west sides by two parallel ridges (characterized by variable highs and lows).

It is understood that the original ground at the site of the tailings management area previously drained directly into Reid Creek (originating from Reid Lake located about 1.7 kilometres west of the Black Fox Mill tailings management area), except for its eastern sector, which drained directly into North Driftwood Creek. Since construction of the tailings management area, the watershed at the site is contained by the tailings management area perimeter dams. Reid Creek flows east, to the area located south of the tailings management area, joins with the truncated old creek that originated from the original ground at the tailings management area site and flows south to join with the North Driftwood Creek. This flow regime information is based on examination of the available air photos and general topography maps.

The tailings management area is roughly rhombus-shaped and is contained by high ground (the previously mentioned ridges), a dam on the south and southeast sides, a dam on the north side, and saddle dams across depressions on the ridges. The tailings impoundment facility has been developed in stages starting from 1989; the Phase 3 construction was carried out in 2003. Some of the significant features of the perimeter dams are summarized as follows:

- The dams were built directly on the surficial peat deposit and experienced extensive settlement due to compression of the organics during the early stages.
- Settlement has continued to occur over the years and required frequent dam crest raises.
- The dams are earth-fill structures and comprise heterogeneous fill materials. They were built to complex configurations using tailings (upstream construction), granular pads, dumped clay, and clay layers. The South Dam is essentially an upstream tailings dam.
- A breach had occurred in the east segment of the South Dam. The cause and mechanism of failure are not known.
- In summary, the dams comprise heterogeneous fill zones and layers (variable in different segments of the perimeter dams and at a given locations of the dam). There are no filter zones, finger drains, toe drains, etc. to control seepage flow or phreatic surface location across the dams.

Since 2008, the Phase 4 to 7 dam raises have been constructed. The Phase 4 design of the perimeter dams was intended to increase their margin of safety. Structural elements of the Phase 4 tailings management area dam raise consisted of the following:

- Installation of downstream toe stability berms.
- Excavation of the existing tailings dam crest to reduce the downstream slope of the tailings dam.
- Placement of an erosion control cover in the downstream slope area.
- Construction of a tailings discharge berm upstream of the existing tailings dam crest.

The Phases 5 design involved the construction of a water management pond north of the tailings management area. There were three low perimeter dams, with the structure elements of the water management pond dams consisting of the following:

- A homogeneous silty clay fill embankment founded on stripped and intact crust zone of the silty clay foundation stratum.
- A 0.5-metre central core trench to penetrate the surficial fissured zone of the silty clay crust.

- A rip rap layer on the upstream slope, and an erosion protection layer on the downstream slope.
- A 0.5-metre thick downstream toe filter zone to control the phreatic surface across the dam.
- Construction of a tailings discharge berm upstream of the existing Phase 4 tailings deposition berm.

Phases 6 and 7 involved only the tailings deposition berm raises. Each berm raise was constructed on the tailings beach upstream of the previous deposition berm. All the tailings deposition berms were constructed with the tailings sand.

An emergency spillway was constructed at the Saddle Dam 2 that consists of a concrete cut-off wall with a 10-metre rectangular discharge section. The spillway is riprap lined with a slope of 3.5 percent

The most recent phase of tailings management area development was Phase 8b, which was completed in 2017. Phase 8 involved constructing 2-metre berm raises at the east, south and west dams. The berms were constructed using tailings and were constructed on the upstream tailings beach of the previous berm (Phase 7).

The North Dam elevation at the completion of Phase 8 was 278 metres while West, South and East Dams are 279 metres. The spillway raise was designed to safely convey water resulting from a probable maximum flood event. The spillway was raised using rockfill within and on the slopes of the channel. The spillway invert was raised using phased approach to minimize the volume of ponded water and maximize the tailings storage capacity with the tailings management area (AMEC, 2014c).

Tailings Dams – Future Construction and General Design

Future tailings management area construction includes Phases 8C through 8E dam raises to increase the storage capacity of the tailings management area by 4,310,000 tonnes (Golder, 2015). Upon completion of the Phase 8C through 8E dam raises, the tailings management area will have a total storage capacity of 8,250,000 tonnes.

The dam raises will be constructed using upstream dam raise methods and will primarily be constructed using tailings. The raises will be constructed in succession, with each raise founded on the tailings beach from the previous phase. After the Phases 8B through 8E dam raises are constructed, the West, South and East Dams will have a crest elevation of 285 masl, whereas the North Dam will have a crest elevation of 284 masl.

Finger berms will be constructed on either side of the spillway to allow for the development of a tailings beach along the North Dam and to prevent blockage of the spillway with tailings. The tailings beach is required to provide a foundation for the upstream raise construction. The finger berms will be constructed using rockfill.

As part of the Phases 8B to 8D North Dam raises, the invert of the spillway in the North Dam will be raised in succession. Each raise of the invert of the spillway invert was designed to safely convey water resulting from a Timmins Storm (12-hour) flood event. The spillway channel will be lined with riprap to prevent erosion.

18.2.3 Water Management Infrastructure

Water Management Pond

The water management pond is located immediately north of the tailings management area and was designed to collect and store tailings supernatant and runoff from the tailings management area for use as process water in the mill. Any excess water that is not used for mill processing is conveyed to the water treatment plant and is discharged into the polishing pond prior to release to the receiving environment.

The water management pond was constructed in 2010, as part of the Phase 5 tailings management area dam raises. The original ground surface along the north and west section of the water management pond dam is generally flat laying at an elevation of approximately 270 masl. The east segment of the dam is characterized by a ridge with two depressions. The original footprint of the water management pond was approximately 800 metres by 550 metres (44 hectares) in size. The area is contained by earthfill perimeter dams.

The original water management pond perimeter dams were comprised the following three segments each with a dam raise between approximately 2.0 to 3.0 metres:

- The Main Dam, located in the north and west section of the water management pond.
- Saddle Dam 1, located in the northeast section of the water management pond.
- Saddle Dam 2, located in the southeast section of the water management pond.

The dams were constructed with homogenous silty clay fill dam core, with a sand and gravel erosion protection layer underlain by geotextile on the upstream slopes. A blanket drain was constructed to control the phreatic surface across the dam.

The water management pond was designed to contain the runoff water volume resulting from a 1:100-year critical hydrological event, defined as 1:100 year 30-day spring runoff event.

An open channel emergency spillway was constructed in Saddle Dam 2 to safely convey any water resulting from a probable maximum flood event. The channel is lined with geotextile overlain with rip rap. The spillway width is 13 metres, with side slopes that vary from 2. 5H:1V to 3. 5H:1V.

An increase to the water management pond capacity was required to provide 4 months of supply water for the milling process during the winter months. The design also considered sufficient storage capacity to contain a 1:100 year 30-day spring runoff event within the water management pond and an emergency spillway that can safely convey any water resulting from a probable maximum flood event. To this end, the dam crest elevation was raised by 2 metres. The dam raise construction materials were similar to those used to construct the original dams.

Miscellaneous Ponds

Two ponds, referred to as “Settling Pond Cell #1” and “Settling Pond Cell #2” are located west of the gate house building, as depicted in the Site Plan (Figure 82). Based on the review of available information, it seems likely that these cells were settling ponds for dewatering of the underground workings; though there is no description available of the functionality of the ponds.

Now, the ponds are not used for any specific mill-related function. Cell 1 has naturally vegetated with aquatic and semi-aquatic plants and would generally be expected to hold water at all times of the year. Cell 2 has also naturally vegetated with semi-aquatic plants and grasses. Although standing water can be found in this area at certain times (e.g., spring run-off), Cell 2 does not impound water per se. Water drains naturally from this area towards Reid Creek.

Mill Process Water

Mill process water is primarily sourced from the water management pond located adjacent to the tailings management area and immediately north of tailings impoundment. Mill process water is supplemented by sourcing water from North Driftwood Creek, at times when there is an insufficient quantity of water within the water management pond, in accordance with the Ministry of Environment issued Permit to Take Water Number 6377-88UJE5.

Potable Water

Potable water for the mill site is supplied by both bottled water and a drilled on-site well. Drinking water is provided via bottled water stations. Shower, toilet and cleaning water is supplied from the drilled on-site well. A 3.66-metre diameter by 3.66-metre high tank (approximately 35,000 litres) situated in a small building beside the water tower is used for domestic water storage. The water is distributed by a pressurized system via buried 100-millimetre diameter pipeline to the shop, mill dry, mill, administration offices and the trailer camp. The water receives no treatment and is sampled on a regular monthly basis for fecal and total coliform bacteria.

Sewage Disposal

One septic tank at the office building is used for sewage. Sludge from this tank is removed from site by a licensed contractor to an approved landfill site.

Mill sewage is pumped through a piping system inside the buried, timbered trench to a below-ground 10,000-litre lift station from which it is pumped on demand to the mill tailings pump box. Sewage is then mixed with the mill process tailings stream and pumped to the tailings pond.

19 Market Studies and Contracts

19.1 Market Studies

Markets for doré are readily available. Gold markets are mature, global markets with reputable smelters and refiners located throughout the world. Demand has been stable during 2016 and 2017, with prices fluctuating mostly in the US$1,200 to US$1,350 per ounce range. The 36-month average London PM gold price fix through March 1, 2018 is US$1,225 per ounce.

19.2 Contracts

The contract below is material to the operation and is modelled in the cash flow analysis used to confirm the economics of the mineral reserve.

19.2.1 Goldstream Agreement

On November 9, 2010, Brigus Gold, which owned the Black Fox Complex at the time, entered into a gold streaming agreement with Sandstorm Resources Ltd. ("Sandstorm") pursuant to which Sandstorm agreed to purchase 12 percent of the gold production from the Black Fox Mine beginning in January 2011 and 10 percent of future production from the Black Fox Extension covering a portion of the adjoining Pike River property for a fixed price of US$500 per ounce (the "Goldstream"). Sandstorm made an upfront payment of $56.3 million to Brigus Gold relating to the Goldstream.

On November 5, 2012, Brigus Gold elected to exercise their option and repurchased 4 percent of the Goldstream on Black Fox, and 3.7 percent of the Goldstream on the Black Fox Extension, for $24.4 million. This reduced Sandstorm's stream on future production at Black Fox to 8 percent and the Black Fox Extension to 6.3 percent.

Currently, McEwen Mining sells 8 percent of the gold production from the Black Fox Mine to Sandstorm at a price of US$540 per ounce (reflecting a contractual annual inflation adjustment). Sales pursuant to the Goldstream will continue for the foreseeable future, or as long as the Black Fox Mine remains in production.

20 Environmental Studies, Permitting, and Social or Community Impact

20.1 Introduction

The Black Fox Complex includes existing and proposed gold mining operations within an area approximately 10 kilometres east of Black River-Matheson, on the south side of Highway 101. The complex includes the existing Black Fox Mine, as well as the Froome and the Grey Fox resources.

20.1.1 Black Fox Mine

The property encompassed by the Black Fox Mine was first operated as an underground mine from 1997 to 2001. A ramp was utilized to access the mine during that period. Subsequently, additional exploration resulted in the development of the Black Fox open pit, which operated from 2009 through 2015. Further underground mining, utilizing a ramp developed within the pit, started in 2011 and is ongoing as of 2018. Ore is brought to surface, crushed on-site and shipped via truck to the McEwen Mining Black Fox Mill west of Black River-Matheson. Waste from the open pit operations was stored in one of two dedicated waste rock storage facilities on-site – the Potentially Metal Leaching (PML) waste rock storage area and the non-PLM waste rock storage area. Waste rock generated by current underground mining activities is used to backfill underground mine workings. Water collected from the underground workings and from on-site aspects is directed to the mine water management pond where chemical treatment of waste is conducted prior to being discharged from the site to the Pike River. Current infrastructure at the Black Fox Mine is shown in Figure 82. More information on the history of the Black Fox Mine can be found in Section 6.

20.1.2 Froome Project

The Froome Project is a resource located approximately 800 metres west of the Black Fox open pit. If a decision is made to mine Froome, it would likely be mined underground utilizing a drift from the Black Fox Mine underground workings. Surface infrastructure would then likely include: access road; cleared area; backfill plant; backfill stockpile; exhaust raise/escapeway; power line; transformer station. Development rock would be managed in existing rock storage facilities at the Black Fox Complex, or used underground for backfill. Mine water would be managed within the existing mine water management system. Management of potential environmental effects from the additional infrastructure planned for the Froome Project would be a relatively straightforward addition to activities at the Black Fox Complex, however amendments to existing permits and approvals would be required, as discussed below.

20.1.3 Grey Fox Project

The Grey Fox Project is also a resource, and is located approximately 3 kilometres southeast of the Black Fox open pit. It would also likely be mined from underground. Operations at the site would involve more local infrastructure than that required for the Froome Zone. The Grey Fox Zone would be accessed via the existing Gibson Portal/Ramp, which has been backfilled, and which would need to be re-opened. Ore from the project would be brought to surface, crushed on-site using portable crushing equipment and shipped via truck to the McEwen Mining Black Fox Mill west of Black River-Matheson for further processing. Waste rock generated by excavation of the Gibson Portal/Ramp would be stored on surface in a dedicated waste rock storage area. Waste rock generated by underground mining activities would be used to backfill underground mine workings. Water collected from the underground workings would be pumped to surface, treated, and released to the Pike River. Infrastructure that would be developed to facilitate mining would include upgrading an existing a site access road that links the Grey Fox Project to Tamarack Road, waste rock and temporary ore storage areas, portable rock crushing equipment, temporary support buildings (trailers) to accommodate mine staff, a light vehicle shop, storage facilities (sea-cans), a vent raise to provide air circulation to the mine workings, a paste backfill plant, power lines and electrical transformers, and water management infrastructure. Management of potential environmental effects from the additional infrastructure contemplated for the Grey Fox Zone would be smaller in scope to activities already ongoing at the Black Fox Complex, however additional permits and approvals would be required, as discussed below.

20.1.4 Black Fox Mill

The Black Fox Mill is located approximately 35 kilometres west of the Black Fox Complex. Ore from the Black Fox Complex is currently milled at the Black Fox Mill, and ore mined from the Black Fox Complex in the future, including from the Froome and Grey Fox projects, will also be processed at the Black Fox Mill.

20.2 Project Permitting

The Black Fox Complex and the Black Fox Mill are permitted and operational facilities. Existing permits and approvals are discussed below, along with key potential future permitting and approval requirements, which would be required for mining of the Froome and Grey Fox projects. Closure Plans for the Black Fox Complex and the Black Fox Mill are discussed in Section 20.3.

20.2.1 Black Fox Complex Permits and Approvals

The Black Fox Complex has obtained the following key environmental permits:

- Environmental Compliance Approval (ECA) No. 0328-8XVPXT. This ECA relates to the collection and treatment of water from the underground mine, the open pit, and waste rock piles at the site. Treated water is discharged to the Pike River.
- ECA No. 2435-8STJY8 (Air) for air emissions from the Black Fox Complex Gold Project.
- Permit to Take Water (PTTW) No. 2737-9L6N4U for dewatering purposes at the Black Fox Complex Gold Project.

If a decision was made to mine the Froome Project, McEwen Mining would need to apply to amend the above-noted the environmental approvals and permits to address changes that would occur. These changes could include:

- Additional mine water requiring treatment.
- Changes to air emissions.
- Additional mine dewatering requirements.

Within the context of the environmental approvals and permits already granted, the changes that would be required for the Froome Project are relatively minor.

If a decision was made to mine the Grey Fox Project, additional approvals related to mine water treatment, air emissions, and mine dewatering, would also be required. These approvals would be smaller in scope to the existing approvals and permits noted above for the Black Fox Complex.

For both the Froome and Grey Fox projects, other permits and approvals may be required, however these would be of a routine nature and not of issue with respect to the project.

20.2.2 Black Fox Mill Permits and Approvals

The Black Fox Mill has obtained the following environmental permits:

- ECA No. 0043-9ZDK6Z (Industrial Sewage) for tailings management at the Black Fox Mill,
- ECA (Air) No. 5793-9E8UXP for air emissions from the mill site including assaying, grinding, thickening, leaching, elution, electrowinning, tailings, water treatment, and cyanide destruction.
- PTTW No. 6286-AU9SUW for water taking from North Driftwood Creek and the Stock Mine workings.

It is not anticipated that amendments to these permits will be required in order to process additional ore from the Black Fox Complex, however there is a condition in ECA No. 0043-9ZDK6Z that requires McEwen Mining to provide information on new sources of ore. This would only apply if Froome or Grey Fox were to be mined, and in that case, it is not expected that there will be any changes to the existing approval, once the new information is provided.

20.3 Closure Planning under Ontario Regulation 240/00

Closure Plans have been accepted by Ontario’s Ministry of Northern Development and Mines (MNDM) for both the Black Fox Complex and the Black Fox Mill.

20.3.1 Closure Plan – Black Fox Complex

A Closure Plan for the Black Fox Complex was filed in 2008 and amended in 2010. McEwen Mining is currently in the process of preparing an amendment to the Closure Plan for the Black Fox Complex. The amendment will likely address potential mining at Froome, as well as infrastructure changes at the site, and an updated decommissioning strategy for water management.

Closure Plans

The current closure plan on filed with the MNDM for the Black Fox Complex includes the following closure measures:

- Permanent concrete caps for openings to surface (shafts, raises).
- Sealing portals and declines at surface using clean backfill.
- Crown pillar stability assessment and rehabilitation if necessary.
- Removal of buildings, infrastructure and equipment.
- Rehabilitation of roads, powerlines and pipelines.
- Removal of petroleum products, chemicals, explosives, wastes.
- Soil assessment and mitigation as required.
- Revegetation of disturbed areas.
- Flooding of the open pit to a near-surface natural groundwater elevation, accompanied by a stability analysis to ensure pit walls are stable in a flooded condition.
- Long-term water treatment of seepage from waste rock until arsenic concentrations are acceptable for discharge without treatment.
- One-time batch treatment of flooded open pit, prior to discharge.

The amendment to the closure plan currently being developed will likely include the following changes and additions:

- Long-term water management water requiring treatment by diversion and collection in the open pit, with periodic batch treatment and discharge of pit water.
- Waste rock piles to be rehabilitated by regrading to ensure long-term stability and application of a low permeability soil cover to reduce the volume of water that will required treatment.
- Inclusion of closure measures related to the Froome Project.

Monitoring Programs

Monitoring at the site is comprehensive. In addition to monitoring specifically required by the Closure Plan, McEwen Mining conducts Environmental Effect Monitoring (EEM) required under the federal Metal Mine Effluent Regulation (MMER), monitoring required by the ECA for the collection and treatment of water, and monitoring required under the PTTW. After operations cease, all three monitoring programs will continue for an extended period, until water quality has improved such that treatment can be discontinued. Further monitoring will then be conducted to confirm rehabilitation has been successful.

Closure Costs

Closure costs have been estimated to carry out the rehabilitation and monitoring described above. An estimated $15 million (present value) closure cost for the site was certified by the proponent of the project as part of the 2010 closure plan and was filed (accepted) by Ontario's MNDM. The MNDM holds financial assurance for the closure of the site in the form of irrevocable letters of credit.

As part of the amendment to the Closure Plan that is currently in progress, alternative treatment strategies are being contemplated, which will result in a reduction in the estimated cost for post-closure treatment at the site. Additional closure costs related to the Froome Project will be added to the overall closure cost, however it is anticipated that the overall changes to the closure plan will result in a reduction in the closure cost estimate. Present closure cost estimates for the Grey Fox Site includes financial assurance for advanced exploration in the amount of $215,323.99.

20.3.2 Closure Plan – Black Fox Mill

The Closure Plan for the Black Fox Mill was originally prepared in 1993 and has been updated periodically. The latest amendment accepted by the Ontario MNDM is dated 2010. McEwen Mining is currently in the process of preparing an amendment to the Closure Plan for the Black Fox Mill. It is not expected that the amendment will change the amount of Financial Assurance required for the site.

Closure Plans

The current closure plan filed with the MNDM for the Black Fox Mill includes the following closure measures:

- Permanent concrete caps for openings to surface (shafts, raises).
- Continue to monitor stability of the 203-subsidence zone, and if shown to be necessary, review the remedial measures to identify if any further remediation is required.
- Removal of buildings, concrete structures, infrastructure and equipment.
- Rehabilitation of roads, powerlines and pipelines.
- Removal of petroleum products, chemicals, wastes.
- Soil assessment and mitigation as required.

- Revegetation of disturbed areas.
- Decommission polishing pond when no longer required.
- Install and interim ferric sulphate dosing system in the area of the tailings management area North Dam. For an estimated three years water that drains the tailings management area will be directed to the ferric sulphate dosing system and then the treated water will be allowed to drain into the water management pond. Over this period the water management pond will function as a polishing.
- Once treatment of water quality from the tailings management area becomes acceptable for discharge without treatment, the existing treatment system will be removed, Saddle Dam 1 within the water management pond will be breached, and the water management pond and tailings management area will cease to function as water containment structures. The breached area and channel downstream to North Driftwood Creek will be enhanced to ensure long-term stability.

Monitoring Programs

Monitoring at the mill site is also comprehensive. In addition to monitoring specifically required by the Closure Plan, McEwen Mining conducts Environmental Effect Monitoring (EEM) required under the federal Metal Mine Effluent Regulation (MMER), monitoring required by the ECA for the collection and treatment of water, and monitoring required under the PTTW. After operations cease, all three monitoring programs will continue until water quality has improved such that treatment can be discontinued. Further monitoring will then be conducted to confirm rehabilitation has been successful.

Closure Costs

Closure costs have been estimated to carry out the rehabilitation and monitoring described above. An estimated $15 million (present value) closure cost for the site was certified by the proponent of the project as part of the 2010 closure plan and was filed (accepted) by Ontario’s MNDM. The MNDM holds financial assurance for the closure of the site in the form of irrevocable letters of credit.

20.4 Environmental Studies and Potential Environmental Issues

Numerous environmental studies have been completed for the Black Fox Complex and the Black Fox Mill, in order to obtain and update the approvals and permits noted in Section 20.3, and to prepare the accepted Closure Plans described in Section 20.3. In addition, periodic aquatic environment assessments are carried out as required under MMER. Key future studies that are planned, and potential environmental issues, are described below.

In 2012 and 2013 waste rock pile failures occurred as result of a soft clay underlying the pile footprint. A revised pile design was prepared to address the stability of the pile and included expanding the waste rock footprint, reducing bench heights and flattening the overall slope of the pile. To date, no further failures have been reported.

An increase in groundwater seepage flowing into the open pit mine was observed starting in 2013, when stripping of the western portion of the open pit towards the ultimate footprint commenced. A hydrogeological study was conducted which concluded that sand encountered at the western edge of the open pit was hydraulically connected to the adjacent esker. The interception of this esker appears to be the source of the higher seepage inflows to the mine workings. This resulted in excess mine water reporting to the site water management facilities. The corrective actions undertaken to date include the installation of three interceptor wells in November 2013 at the western perimeter of the pit to divert and reduce groundwater inflows to the pit, and installation of additional pumping and pipelines to increase treated effluent discharges. In addition, a site-wide water management study was completed to identify required modifications to the existing water management facilities to regain operating flexibility of the mine water collection and treatment facilities. Subsequently the required modifications to the water collection and treatment system were made.

20.5 First Nations and Public Consultation

McEwen Mining has a signed Impact Benefit Agreement (IBA) with the Wahgoshig First Nation, located on the Abitibi 70 reserve, and the First Nation community in closest proximity to the Black Fox Complex and Mill. Part of the agreement includes the discussion of all projects that require permit or approval applications to the government. Prior to the submission of any application to the government, whether consultation is required or not, the project and associated permits are discussed in advance with representatives of the community. Any questions or concerns raised are addressed within this process.

Public consultation has been accomplished through posting of the applications for permits, approvals and closure plans on Ontario’s Environmental Bill of Rights (EBR) registry.

20.6 Summary

The Black Fox Complex includes the existing Black Fox Mine, as well as the proposed Froome and the Grey Fox projects. Ore from the Black Fox Complex is currently milled at the Black Fox Mill, and ore mined from the Black Fox Complex in the future, including from the Froome and Grey Fox projects, if they are developed, will also be processed at the Black Fox Mill.

The Black Fox Complex and the Black Fox Mill are both permitted and operational facilities. If a decision is made to mine the Froome Project, some modifications of the existing permits would be required. Within the context of the environmental approvals and permits already granted, the changes that would be required for the Froome Project are relatively minor. If the Grey Fox Zone is mined, additional approvals related to mine water treatment, air emissions, and mine dewatering, would be required. These approvals would be similar in scope to the existing approvals and permits currently in place for the Black Fox Complex. It is expected that processing of material from Froome and Grey Fox at the Black Fox Mill would be straightforward from an environmental perspective, but will require an environmental characterization of the material to be processed.

Accepted closure plans are in place for both the Black Fox Complex and the Black Fox Mill. The closure measures planned represent typical best practices and extensive monitoring programs are in place at both sites. Financial Assurance in the form of letters of credit have been provided to the MNDM to cover the cost of closure. Amendments to both closure plans are in preparation. It is expected that the amendment for the Black Fox Complex will result in a decrease in Financial Assurance, and no change in Financial Assurance is expected for the Black Fox Mill.

21 Capital and Operating Costs

This section summarizes the costs reviewed by SRK in the cash flow model to confirm the economics of the mineral reserve estimate for the Black Fox Mine. The costs were prepared by the accounting department at the Black Fox Mine site and are based on the data generated during the formal 2018 budget process.

SRK reviewed the assumptions, parameters, and methods used to prepare the cash flow model and is of the opinion that they are sufficient for the purposes of validating the economics of the mineral reserve.

The cost estimates were completed in C$ and, where required, converted to US$ at an exchange rate of C$1.25:US$1.00. Cash costs and all-in sustaining costs (AISC) per payable ounce of gold sold are non-GAAP financial measures.

21.1 Capital Costs

The estimated capital costs required to achieve the mineral reserve life of mine are summarized in Table 70. The capital costs were estimated from historical construction costs and equipment purchase prices, actual development costs, as well as results from study work completed by McEwen Mining. Where costs were not available for some minor components, an experience based allowance was included.

The sustaining development costs include direct costs for lateral, ramp, and vertical development as well as the accompanying indirect costs (mine services, haulage, equipment maintenance, engineering, etc.) to advance the mine to from the 740 Level to the 800 Level.

The sustaining projects costs include:

- Electrical plant and ventilation equipment.
- Tailings management area expansions.
- Backfill plant and re-handling facility improvements.
- Mobile equipment such as new and replacement purchases and major rebuilds based on the estimated hours of operation.

Table 70: Capital Costs Estimate

Cost Component	Value C$ Million
Capital sustaining development	19.0
Capital sustaining projects	3.4
Closure cost	15.0
Total Capital Cost	**37.5**

21.2 Operating Costs

The operating costs were estimated based on the actual operating expenditures at the Black Fox Mine in 2017 and used in the 2018 budget.

The operating expenses used to estimate the stope cut-off grades and to validate the positive cash flow for the mineral reserve life of mine are summarized as totals in Table 71 and as unit costs at steady state production in Table 72.

The mining expense includes all labour, supplies/consumables, and equipment maintenance to complete mining related processes/activities, less exploration diamond drilling and capital excavations and construction. The development unit costs are based on the 2017 actual costs as shown in Table 73.

The milling expense includes all labour and supplies/consumables to complete milling related processes/activities. The administrative expense includes all labour, supplies/consumables, and equipment maintenance to complete administrative, finance, human resources, environmental, safety, supply chain, site services, camp and kitchen, and travel related processes/activities.

The 2018 budget cash costs, which include mining, processing and administrative costs (net of capital development), royalties and refining costs, total US$1,025 per payable ounce of gold sold. AISC, which includes infrastructure capital, capital development, capitalized exploration and reclamation, total US$1,210 per payable ounce of gold sold.

For context, historical operating costs are summarized in Table 74.

Table 71: Total Operating Cost Estimate

Cost Component	Value C$ Million	
UG Mining Costs (incl Backfill)	39.1	
Ore Crushing and Haulage	4.5	
Milling Costs	10.7	
Assay Lab	0.8	
G&A	12.3	
Total Operating Mining Cost		**67.4**
Lateral Waste Development Cost	6.7	
Lateral Ore Development Cost	3.5	
Total Lateral Development Cost		**10.2**
Total Operating Expense		**77.6**

Table 72: Operating Cost per Tonne Milled

Cost Component	Value C$/t Milled
UG Mine Cost	99.00
Crush and Haul	11.46
Mill Cost	27.00
Assay Lab	1.90
G&A	31.10
Operating Expense (OPEX)	**170.46**

Table 73: Actual Black Fox Mine 2017 Development Unit Costs, 2017 Year-to-Date Cost at October 31, 2017

Development Category	Cost (C$)	Metres	Unit Cost (C$/M)
Drifts	4,789,679	1,375	3,483.10

Table 74: Historical Operating Costs

Historic Results	2014*	2015	2016	2017**
Open pit ore mined (kt)	764.2	849.7	-	-
Average gold grade (g/t)	2.1	2.1	-	-
Underground ore mined (000's)	122.4	140.8	234.5	263.5
Average gold grade (g/t)	4.20	4.80	4.98	6.03
Mill throughput (kt)	695.1	875.8	913.2	606.2
Average head grade (g/t)	3.02	2.60	2.22	2.73
Average gold recovery rate (%)	95.0%	96.0%	96.0%	96.0%
Gold production (koz Au)	63.9	69.7	62.2	51.2
Operating Costs (US$M)	62.7	75.5	64.6	61.8
Operating Cost (US$/oz)	982	1,083	1,038	926

Note: The average head grade and mill throughput include material from the stockpile in addition to open pit and underground mining sources.

* Figures only include production after Primero closed the acquisition of the Black Fox Mine on March 5, 2014

** Figures only include production before McEwen Mining closed the acquisition of the Block Fox Mine on November 1, 2017

22 Economic Analysis

Financial information has been excluded as McEwen Mining is a producing issuer and the Black Fox Complex is currently in production.

SRK, through auditing the mining, milling, and site infrastructure plans and operating and capital cost estimations, confirms that the mineral reserve declared herein provides a positive cash flow given the technical and economic conditions at the time of writing this report. Due to the nature of the mining business, these conditions can change significantly over relatively short periods of time. Consequently, actual results may be significantly more or less favourable.

23 Adjacent Properties

Various properties are located adjacent to the Black Fox Complex (Figure 88). These adjacent properties are briefly discussed in this section.

23.1 Kirkland Lake Gold Ltd. – Hislop Mine

Kirkland Lake Gold holds the mineral and surface rights to claims associated with the Hislop Mine property bordering the Black Fox Complex to the south and southeast. The Hislop Mine was intermittently active from 1990 to 2013, during which 1.99 million tonnes were milled with an average grade of 0.062 ounces per tonne (Bleeker et al. 2014, OFR 6300). All mineralization at the Hislop property is reported to be felsic intrusion related, with the main control on mineralization being a silicified feldspar syenite (Rocque and Cater, 2017, KLG Hislop 43-101) Since 2015, the mine has been on care and maintenance, with limited exploration work completed.

23.2 Romios Gold Resources Inc. – Hislop Property

The Romios Gold Resources Inc. – Hislop Property is located along the western-most part of the southern border of the Black Fox Complex. Historic diamond drilling by Chevron Minerals intercepted gold mineralization in six diamond drillholes. In 2012 and 2013, Romios Gold drilled four holes and compiled all available historic data, resulting in the identification of four potential parallel gold-bearing zones that transect the property (Romios, 2013). No recent exploration work has been completed on the property.

23.3 Osisko Mining Inc. – Gold Pike Property

Osisko Mining’s Gold Pike property is located along the eastern boundary of the Black Fox Complex. Within the Gold Pike property is the historic Royal Oak Mines open pit, which mined 100,000 tons grading 3.3 g/t gold (Osisko Mining Website). Mineralization on the property is reported to be hosted within green carbonate altered ultramafic and carbonate altered mafic rocks with disseminated pyrite. Visible gold is also reported to have been present in quartz veins at surface. No recent exploration work has been completed on the property.

23.4 Jien Canada Mining Ltd.

To the north, the Black Fox Complex property boundary is shared with Jien Canada Mining. Ltd., who acquired the property as part of its acquisition of Canadian Royalties in 2010. No further information is available at this time.

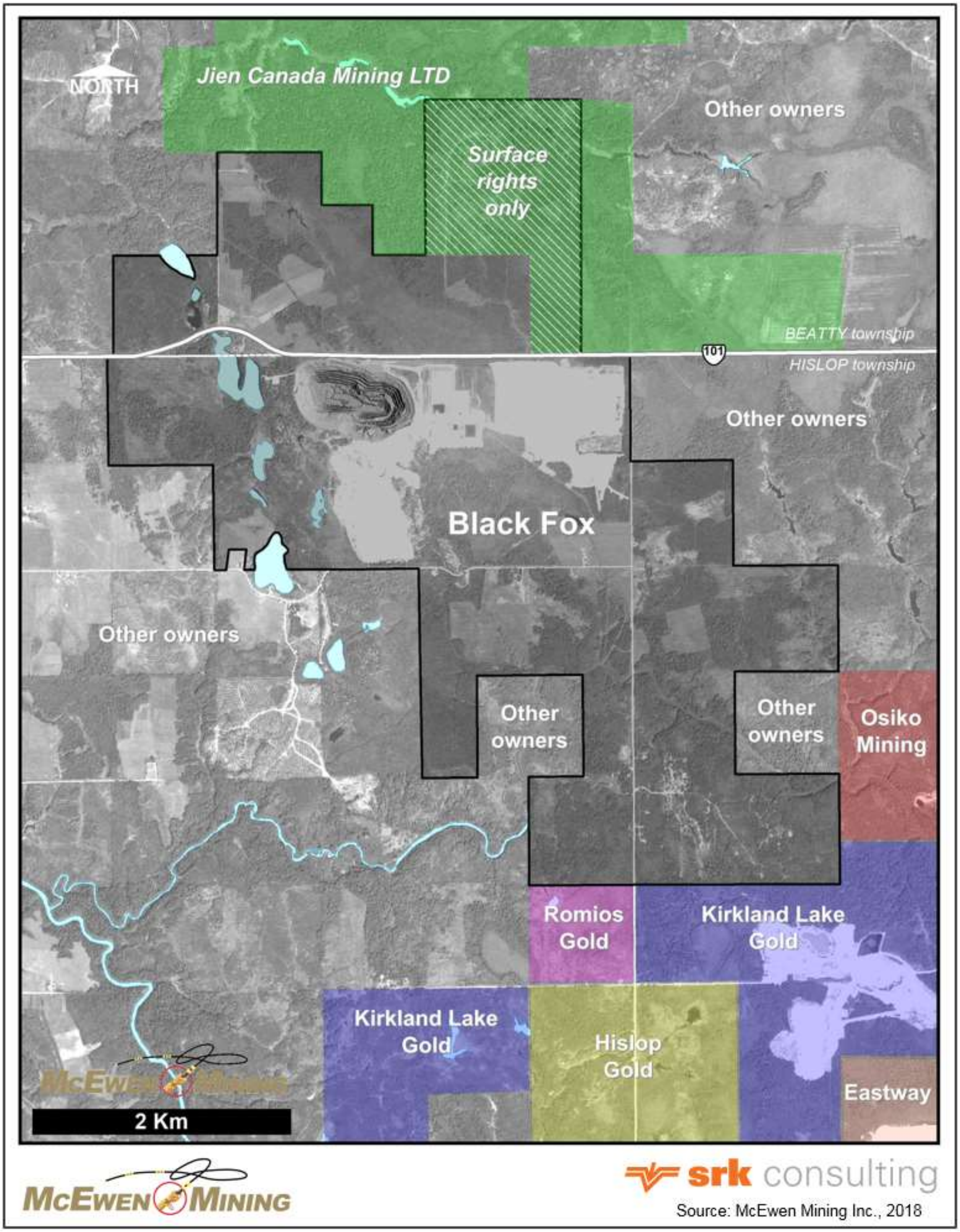


Figure 88: Properties Adjacent to the Black Fox Complex

24 Other Relevant Data and Information

There is no other relevant data available about the Black Fox Complex.

25 Interpretation and Conclusions

McEwen Mining holds a 100 percent interest in the Black Fox Complex, which it acquired on October 6, 2017 from previous owner Primero. The Black Fox Complex, comprises the operational underground Black Fox Mine, the adjacent advanced Grey Fox and Froome exploration projects and the Black Fox Mill located on the nearby Stock property.

In December 2017, McEwen Mining commissioned SRK to provide technical support for the generation of updated mineral resources (Black Fox, Froome and Grey Fox) and mineral reserves (Black Fox only) and for the preparation of a technical report following the guidelines of Canadian Securities Administrators' National Instrument 43-101 (NI 43-101) for the Black Fox Complex.

In the opinion of McEwen Mining and SRK, the Black Fox Complex mineral resource and mineral reserve estimates summarized herein have received appropriate geological and engineering consideration to be included in this report being compliant with the generally accepted CIM *Exploration Best Practices Guidelines* and CIM *Estimation of Mineral Resource and Mineral Reserves Best Practices Guidelines.*

A mineral resource can be reported for the Black Fox Mine, Froome and Grey Fox projects and mineral reserve can be reported for the Black Fox Mine, which is in operation at the effective date and submission date of this report.

Neither McEwen Mining or SRK are aware of any significant risks and uncertainties that could be expected to affect the reliability or confidence in the information discussed herein.

25.1 Mineral Resources

The database for the Black Fox Mine, Froome and Grey Fox projects was compiled and maintained by McEwen Mining, and was audited by SRK. The initial geological model and outlines for the gold mineralization were constructed by McEwen Mining, and were audited and revised in collaboration with McEwen Mining by SRK.

In the opinion of SRK, the current drilling information is sufficiently reliable to interpret with confidence the boundaries for gold mineralization and the assay data are sufficiently reliable to support mineral resource estimation. The geological and gold mineralization model for each project is a reasonable representation of the distribution of the targeted mineralization at the current level of sampling.

The geostatistical analysis, variography and grade models for the Black Fox Mine and the Grey Fox Project were completed by SRK, whereas the mineral resource modelling for the Froome Project was undertaken by Primero / McEwen Mining and audited by SRK.

SRK performed and / or reviewed each step of the mineral resource estimation process for all three deposits and is of the opinion that the procedures applied broadly conform to industry best practice, but also implement appropriate grade estimation methodologies to enhance the local accuracy of the grade estimates.

The "reasonable prospects for eventual economic extraction" requirement contained in the CIM standards generally implies that the quantity and grade estimates meet certain economic thresholds and that the mineral resource is reported at an appropriate cut-off grade, taking into account extraction scenarios and processing recoveries. Mineral resources are generally amenable to underground extraction as presented at a cut-off grade of 3.00 g/t gold for the Black Fox Mine, 3.20 g/t gold for the Froome Project, and 3.60 g/t gold for the Grey Fox Project.

The combined Mineral Resource Statement for Black Fox Complex, inclusive of mineral reserves, is presented in Table 75. Mineral resources may be affected by further infill and exploration drilling that may result in increases or decreases in subsequent resource estimates. The mineral resource may also be affected by subsequent assessments of mining, environmental, processing, permitting, taxation, socio-economic, and other factors. The effective date of the Mineral Resource Statement is October 31, 2017

Table 75: Mineral Resource Statement*, Black Fox Complex, SRK Consulting (Canada) Inc., October 31, 2017

Classification		Cut-off Grade Gold (g/t)	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Indicated Mineral Resource					
Underground	Black Fox	3.00	2,145	7.80	538
	Froome	3.20	941	5.26	159
	Grey Fox	3.60	2,177	6.64	465
Total Indicated			**5,263**	**6.87**	**1,162**
Inferred Mineral Resource					
Underground	Black Fox	3.00	216	6.35	44
	Froome	3.20	125	4.70	19
	Grey Fox	3.60	453	6.83	100
Total Inferred			**794**	**6.36**	**163**

* Mineral resources are not mineral reserves and do not have demonstrated economic viability. All figures rounded to reflect the relative accuracy of the estimates. Composites were capped where appropriate. Mineral resources reported at variable cut-off grades as indicated, assuming an underground extraction scenario, a gold price of US$1,500/oz, C$:US$ exchange rate of 1.25; and metallurgical gold recoveries of 96 percent for Black Fox, 90 percent for Froome and 80 percent for Grey Fox.

The Black Fox Complex hosts several mineralized trends and structures. Although only the three deposits documented in this technical report have been identified, delineated, modelled and reported on to date, the Black Fox Complex land package remains largely under-explored and has considerable upside potential.

Based on a holistic appreciation of the structural controls of gold mineralization on the property, a focussed and comprehensive drill program is planned for 2018 whereby exploration targets will be identified, prioritised and drill tested. Exploration efforts should focus on both regional exploration targets as well as strike and depth extensions of the currently modelled and estimated mineralization to potentially expand the mineral resource base.

25.2 Mineral Reserves

Based on current practice, actual performance and cost data, and current technical and economic conditions, the Black Fox Mine operation will sustain production until the end of 2019 with a production rate of 480 tonnes per day. Mining will continue using longhole mining methods with access provided underground via the current surface portal in the Black Fox open pit.

The mineral reserves identified at a cut-off grade of 3.72 g/t gold for the Black Fox Mine deposit and is presented in Table 76. The effective date of the Mineral Reserve Statement is October 31, 2017.

The life of mine (LOM) plan supporting the mineral reserve estimate for the Black Fox Mine was generated by McEwen Mining, supported by and audited by SRK. The mineral reserve LOM plan requires capital costs of US$24.5 million and results in an operating cost of US$171 per tonne milled.

By auditing the LOM plan and providing support to its generation, SRK confirms that the mineral reserve declared herein provides a positive cash flow given the technical and economic conditions at the time of writing this report.

Table 76: Mineral Reserve Statement*, Black Fox Mine, SRK Consulting (Canada) Inc., October 31, 2017

Classification	Quantity ('000 t)	Grade Gold (g/t)	Contained Metal Gold ('000 oz)
Proven Mineral Reserve			
Underground	-	-	-
Total Proven	**-**	**-**	**-**
Probable Mineral Reserve			
Underground	395	8.88	113
Total Probable	**395**	**8.88**	**113**
Proven and Probable Mineral Reserve			
Underground	395	8.88	113
Total Proven and Probable	**395**	**8.88**	**113**

* Mineral reserves are included in the mineral resources. All figures have been rounded to reflect the relative accuracy of the estimate. Mineral reserves are based on a cut-off value of 3.72 g/t gold (4.28 g/t including 15% dilution) assuming a gold price of US$1,250/oz, a C$:US$ exchange rate of 1.25:1:00, milling recoveries of 96%, royalty of 4.55%, and operating cost of C$171/t. Mineral reserves are stated at a mill feed reference point and include for diluting materials and mining losses.

25.3 Environmental Issues

In terms of environmental issues, it is noted that the Black Fox Complex and the Black Fox Mill are both permitted and operational facilities. If a decision is made to mine the Froome Project, some modifications of the existing permits would be required. Within the context of the environmental approvals and permits already granted, the changes that would be required for the Froome Project are relatively minor.

If the Grey Fox Project is mined, additional approvals related to mine water treatment, air emissions, and mine dewatering, would be required. These approvals would be similar in scope to the existing approvals and permits currently in place for the Black Fox Complex. It is expected that processing of material from Froome and Grey Fox at the Black Fox Mill would be straightforward from an environmental perspective, but will require an environmental characterization of the material to be processed.

Filed closure plans are in place for both the Black Fox Complex and the Black Fox Mill. The closure measures planned represent typical best practices and extensive monitoring programs are in place at both sites. Financial Assurance in the form of letters of credit have been provided to the MNDM to cover the cost of closure. Amendments to both closure plans are in preparation. It is expected that the amendment for the Black Fox Complex will result in a decrease in Financial Assurance, whereas no material change in Financial Assurance is expected for the Black Fox Mill. To mine the Froome and Grey Fox projects, a further amendment to the Black Fox Complex Closure Plan would be required.

26 Recommendations

Complexly deformed high-grade gold mineralization within the Black Fox Complex presents challenges to current and future mining that can be addressed by well-designed exploration programs that can potentially increase reportable mineral resources on the property, but also serve to extend the life of mine at the Black Fox Mine.

To provide the framework for future mining on the Black Fox Complex, SRK proposes that McEwen Mining implement an innovative exploration program to expand future mining opportunities on the property, and to undertake multi-disciplinary studies to support future mining evaluations. Recommended exploration and technical studies to unlock the potential of the Black Fox Complex are discussed below.

26.1 Exploration

An opportunity exists to expand reported mineral resources through innovative discovery and for the conversion of mineral resources to mineral reserves at the Black Fox Complex.

The Black Fox Mine currently has mineral resources to approximately 870 metres below surface and the gold mineralization remains open at depth. If the Black Fox deposit extends to a similar depth to other mines in the Timmins and Kirkland Lake mining camps, the potential of gold mineralization to continue to depths of 1,500 metres or more at the Black Fox deposit needs to be evaluated. It is strongly recommended to continue deep exploration targeting at the Black Fox Mine.

The Black Fox Complex remains under explored and it is recommended that McEwen Mining continue to compile all digital geological data to facilitate the continued refinement of a property scale geological model for exploration targeting. Despite the complexity of the geology the potential for new discoveries remains high.

McEwen Mining has planned a five-year exploration program at the Black Fox Complex to fully assess the existing property and to evaluate the potential of further expansion through acquisition. McEwen Mining estimates that the required exploration expenditures over the next 5 to 10 years will be in the order of US$5 to 10 million dollars annually. The initial focus of this exploration will be to expand mineable mineral reserves at the Black Fox Mine. This program also intends to test various greenfield targets.

The initial focus of this exploration will be to expand mineable mineral reserves at the Black Fox Mine. This program also intends to test various greenfield targets such as the Tamarack Deep, Gibson, Froome deep and Grey Fox. There is also active exploration occurring at the Stock deposit in the immediate vicinity of the Black Fox Mill.

The current 2018 drill program at the Black Fox Complex includes +75,000 metres of surface diamond drilling at an estimated cost of US$8.6 million.

26.1.1 Black Fox Mine

- With a relatively short mineral reserve life at the Black Fox Mine, underground drilling should be prioritized to both convert mineral resources to mineral reserves and add to the mineral resource base at the Black Fox Mine.
- Underground and surface drilling to be carried out to extend depth extension of the mine.
- Deepest holes expected at 1,000 metres from underground to target depth extension at 1,400 metres vertical depth – major step outs are required.
- McEwen Mining also needs to explore the lateral extents to the northwest and southeast along strike.
- As the geological understanding of gold distribution on the Black Fox Mine improves, SRK recommends updating project mineral resource models regularly and refining the Black Fox Mine plan to determine modifications to the production plan and provide guidance for further exploration and mining focus.

26.1.2 Exploration Projects

- Exploration required over the Black Fox Complex to initially focus on the addition and extension of existing resources at Froome, Grey Fox and confirmation of mineralization at upper and lower Tamarack zones.
- Drill testing and assessment of multiple known exploration targets along the various mineralized and structural trends on the favourable geological settings found on the properties.
- Structural geology investigations on the property should be ongoing as new drilling data is generated and these should be integrated into geology model updates on all projects.

26.2 Technical Studies

- Preliminary economic assessments of existing and new discoveries including Froome, Grey Fox and Tamarack.
- Ongoing metallurgical testwork should accompany exploration and mining studies.
- Further characterization of potential ore and waste rock should be conducted at Froome and Grey Fox projects.
- To conduct underground exploration at the Froome Project, a Permit to Take Water (PTTW) will be required. It is likely that water that is generated at the Froome site will be managed via existing infrastructure at the Black Fox Mine and that this may necessitate an amendment to the existing Black Fox Mine Environmental Compliance Approval (ECA).
- To conduct underground exploration activities at the Grey Fox Project a PTTW and an ECA to discharge water will be required. It is recommended that background studies be undertaken to support the applications for these permits and approvals.
- Mining studies should evaluate an open pit pushback to the Black Fox open pit.
- As the geological understanding of the Black Fox Complex of deposits improves, SRK recommends testing the conversion of mineral resources at Grey Fox and Froome to mineral reserves.
- Continue the evaluation of various McEwen Mining cost saving strategies across the operation. These strategies include:
  - Efficient management of electrical power.
  - Optimize the production and delivery of backfill to stopes methodology.
  - Ore rehandle optimization on surface.
  - Further evaluate strategies to increase mill throughput to reduce milling unit costs.

- Assess the use of electrical/battery powered underground equipment to reduce underground ventilation requirements, improve safety and reduce labour requirements.

SRK is unaware of any other significant factors and risks that may affect access, title, or the right or ability to perform the exploration work recommended for the Black Fox Complex.

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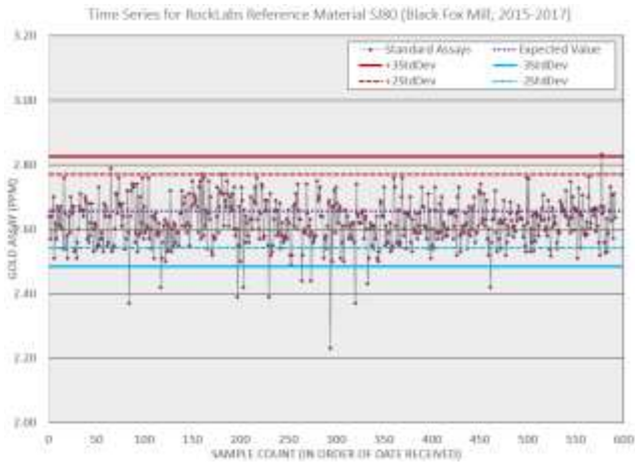
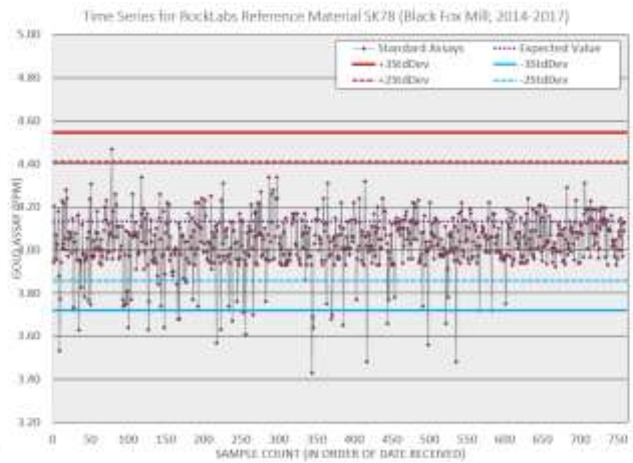
APPENDIX A

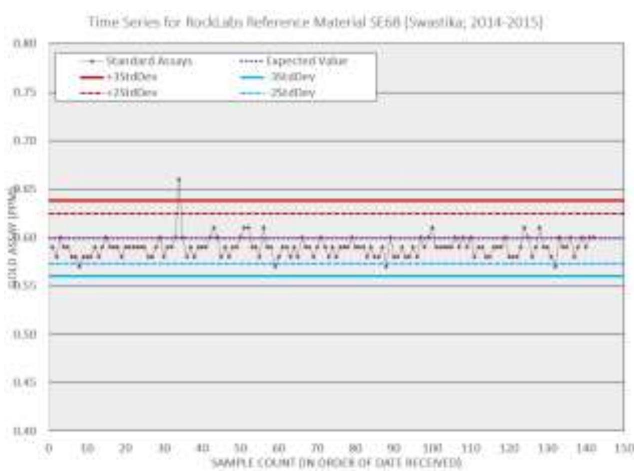
Representative Selection of Black Fox Complex Analytical Quality Control Data Charts

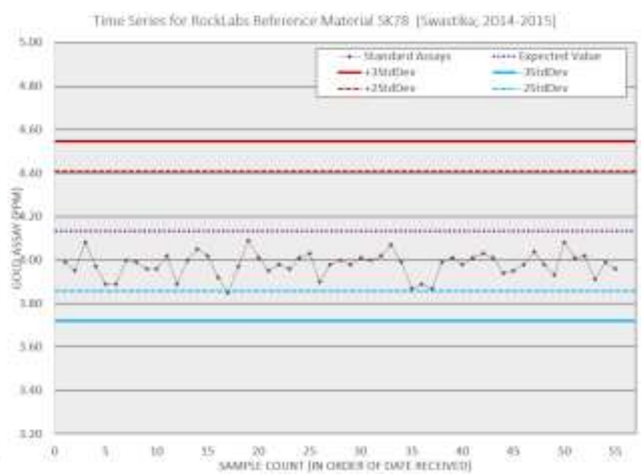
Black Fox Mine: Black Fox Mill Laboratory Standards SJ80 and SK78



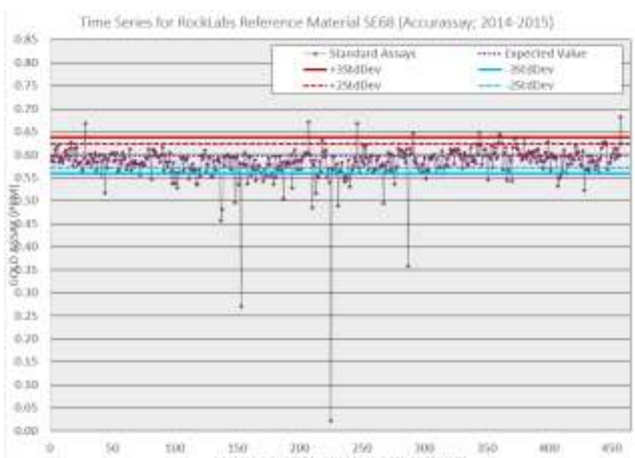


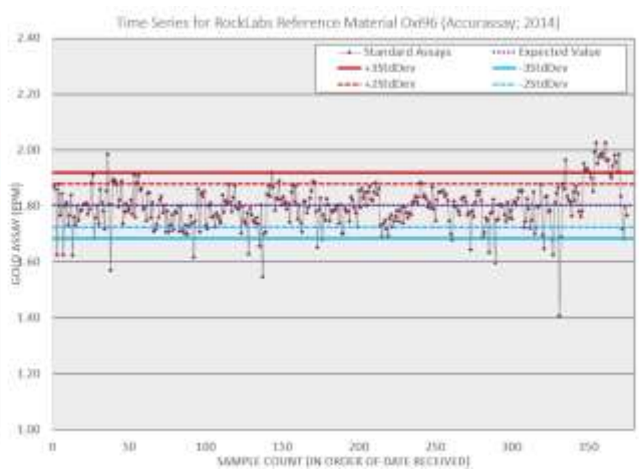
Black Fox Mine: Swastika Laboratory Standards SE68 and SK78



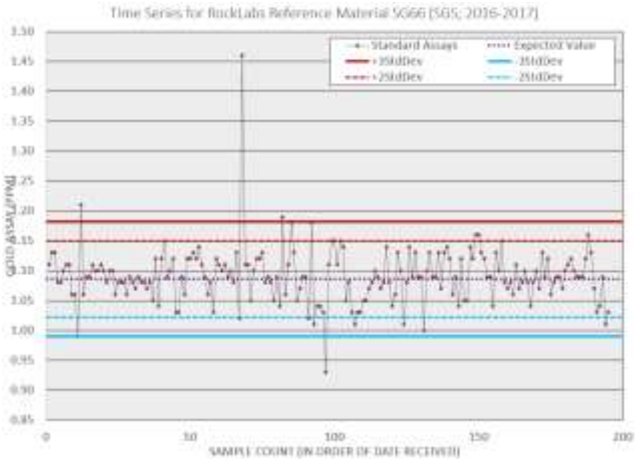


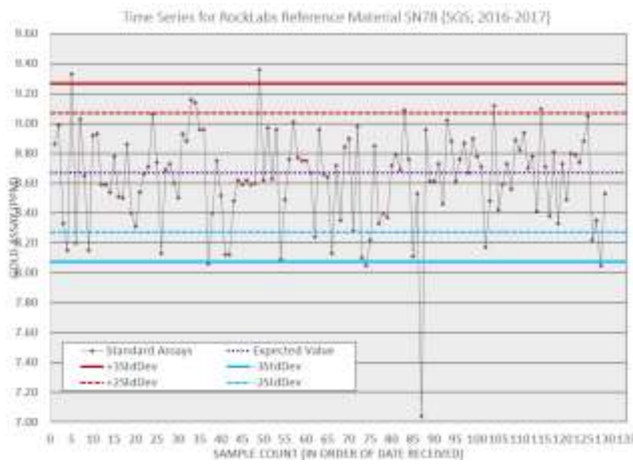
Black Fox Mine: AccuraAssay Laboratory Standards SE68 and Oxi96



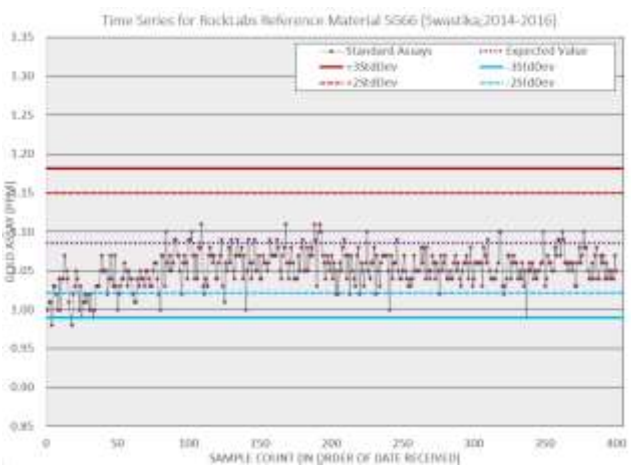


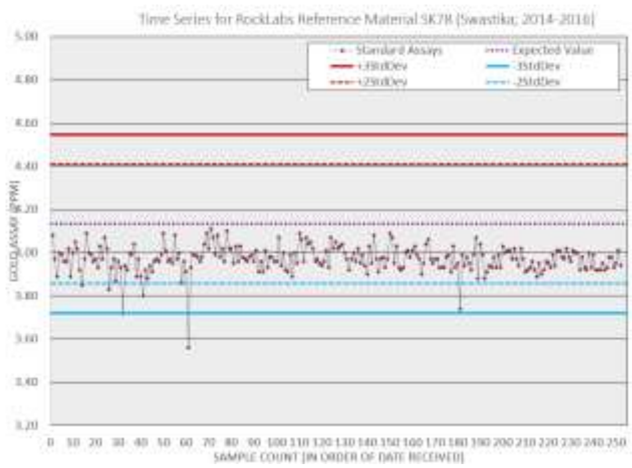
Froome Project: SGS Laboratory Standards SG66 and SN78



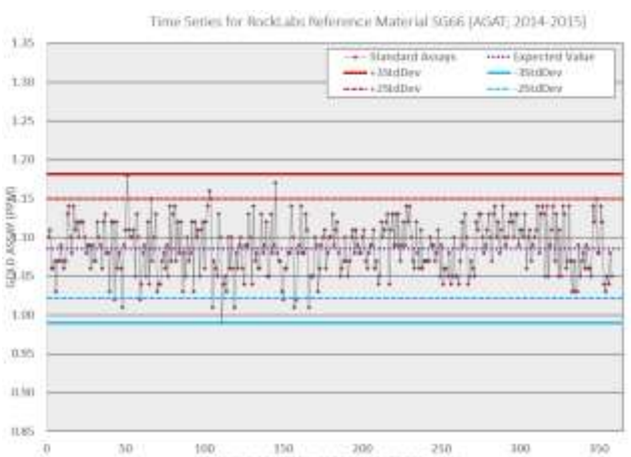


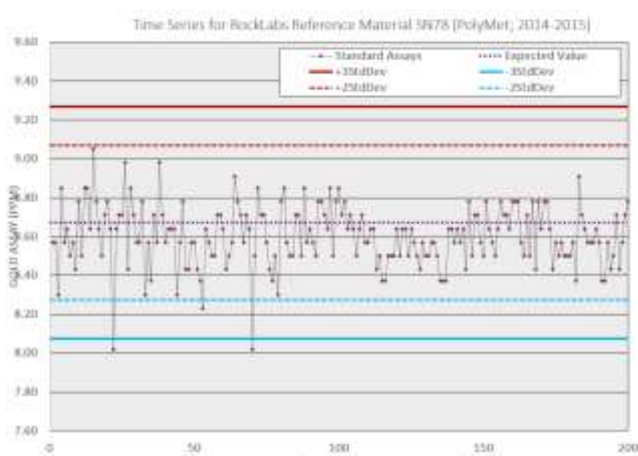
Froome Project: Swastika Laboratory Standards SG66 and SK78



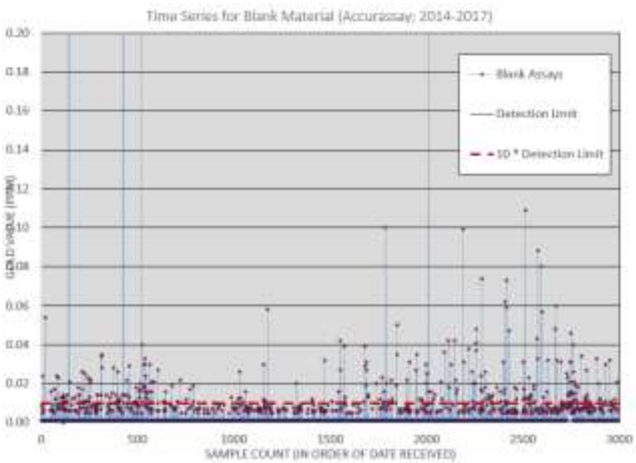


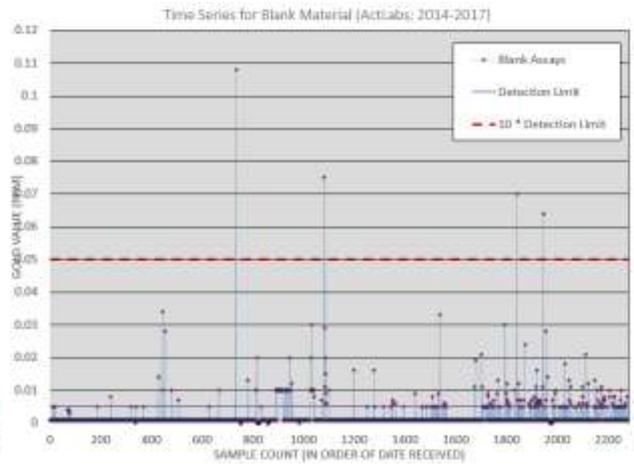
Grey Fox Project: AGAT and PolyMet Laboratory Standards SG66 and SN78



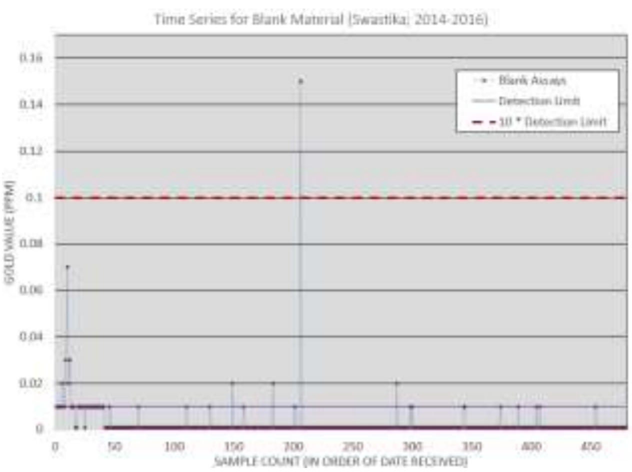


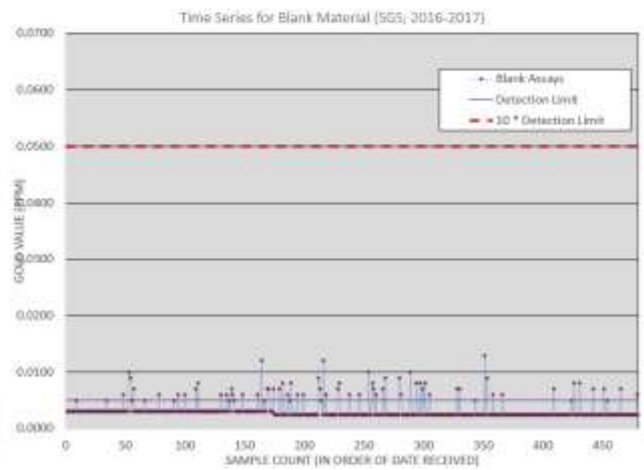
Black Fox Mine: AccuraAssay and Actlabs Laboratory Blanks



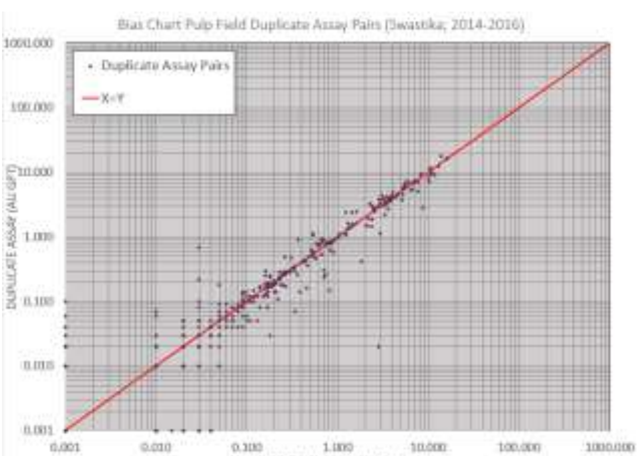


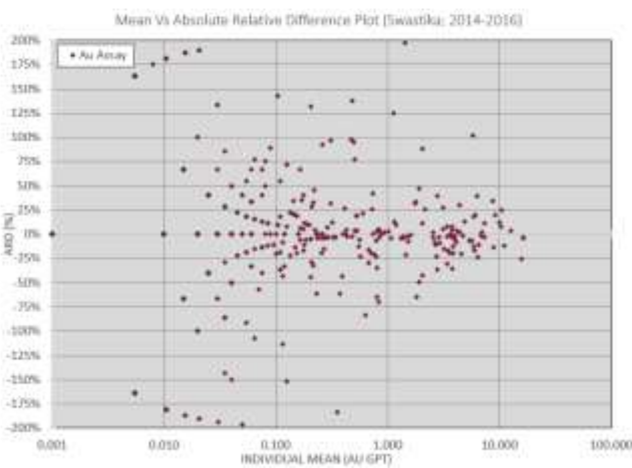
Froome Project: Swastika and SGS Laboratory Blanks



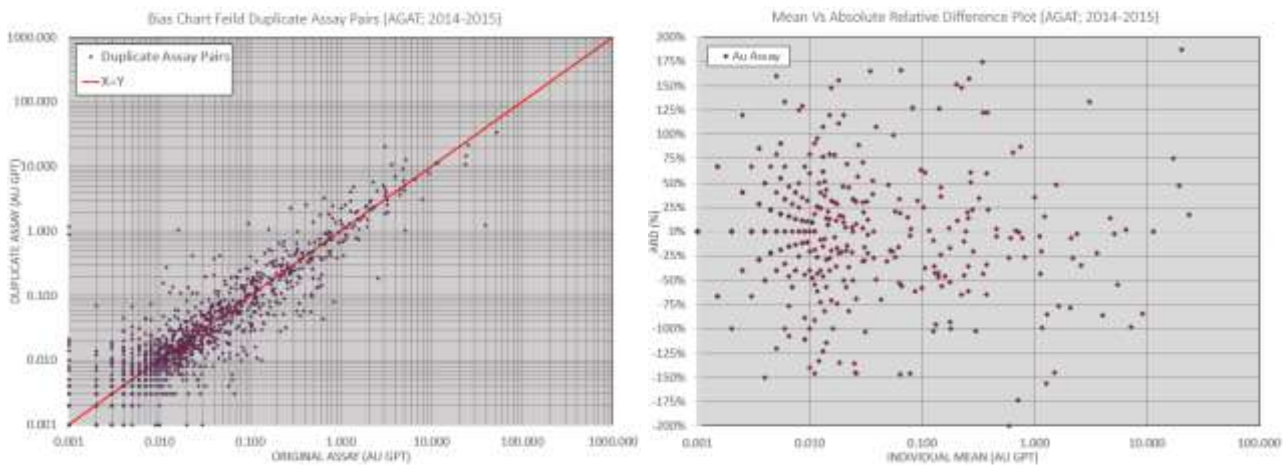


Froome Project: Swastika Laboratory Field Duplicates and Mean vs Relative Difference Plots



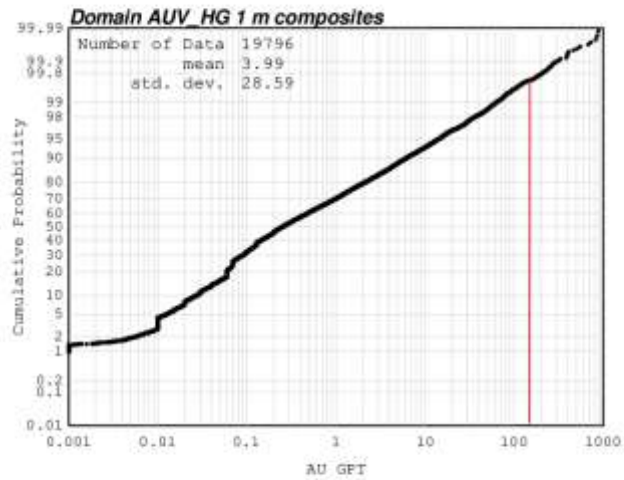


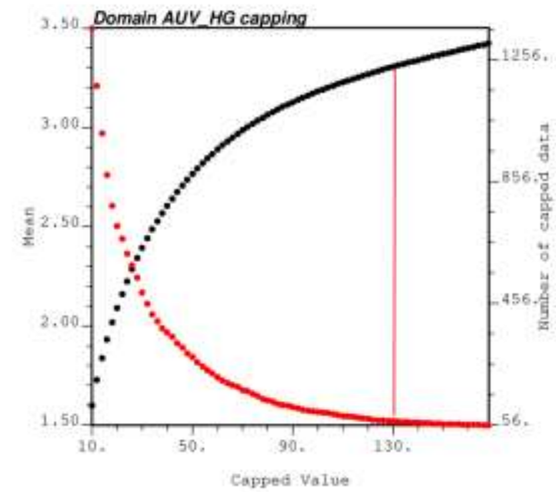
Grey Fox Project: AGAT Field Duplicate Chart and Mean vs Absolute Relative Difference Plots

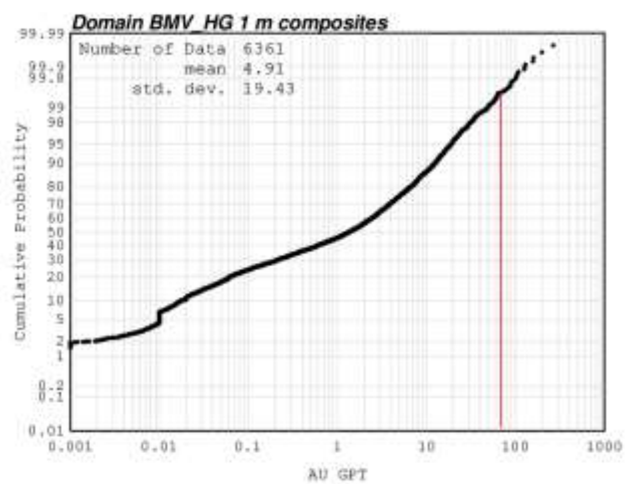


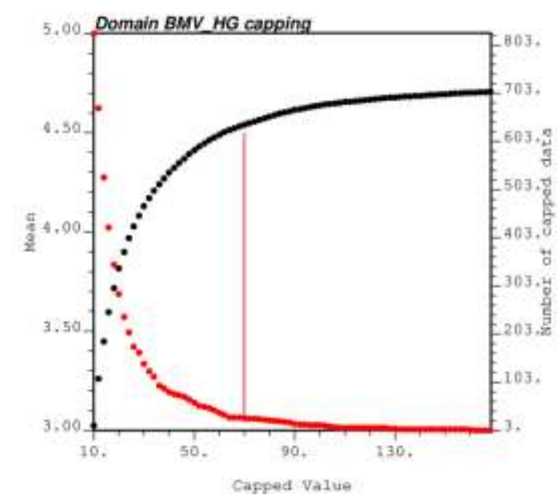
APPENDIX B

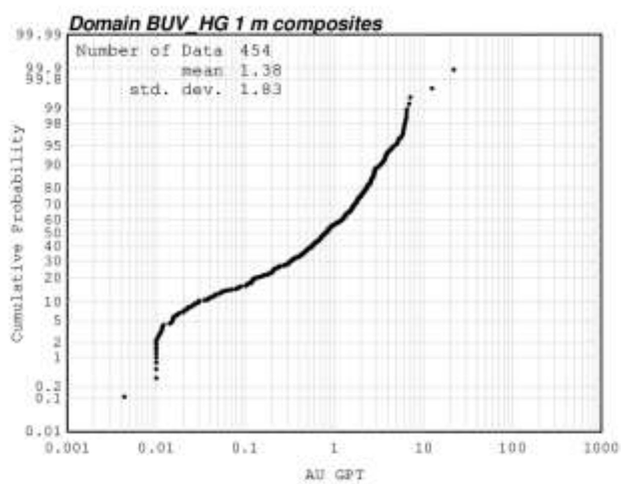
Black Fox Mine Capping Analysis

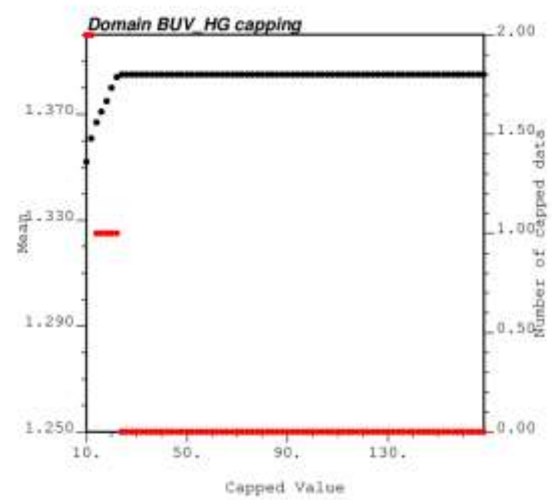

Domain AUV_HG 1 m composites
Number of Data 19796
mean 3.99
std. dev. 28.59
Cumulative Probability
AU GPT

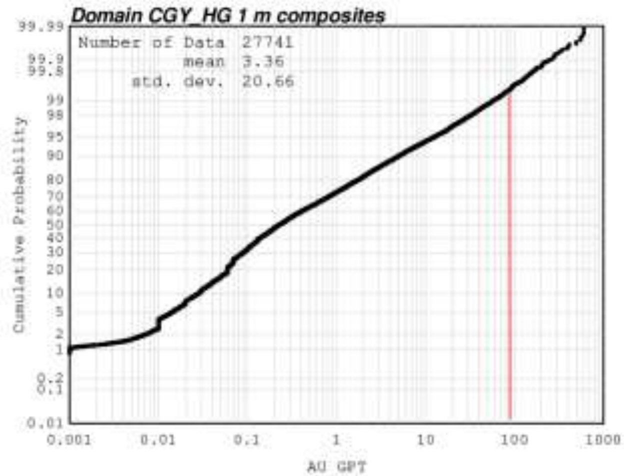

Domain AUV_HG capping
Mean
Number of capped data
Capped Value

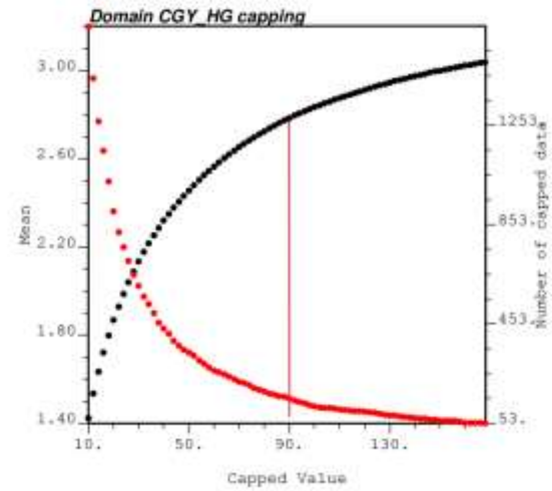

Domain BMV_HG 1 m composites
Number of Data 6361
mean 4.91
std. dev. 19.43
Cumulative Probability
AU GPT

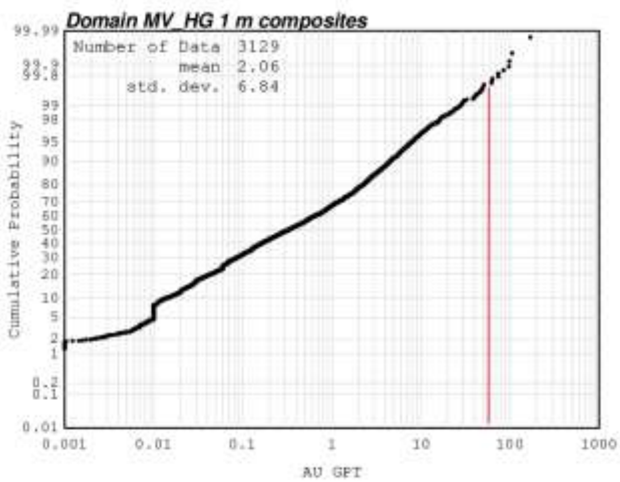

Domain BMV_HG capping
Mean
Number of capped data
Capped Value

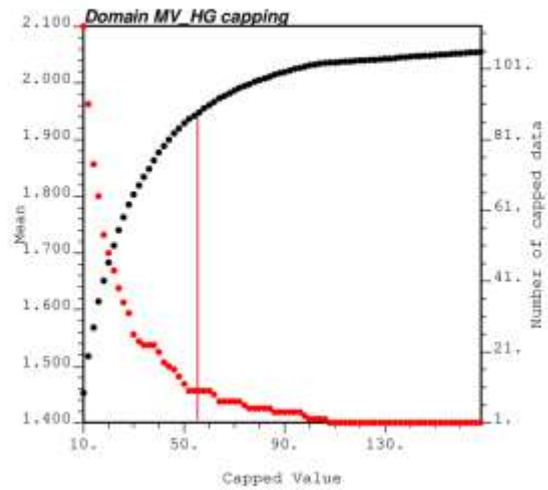

Domain BUV_HG 1 m composites
Number of Data 454
mean 1.38
std. dev. 1.83
Cumulative Probability
AU GPT

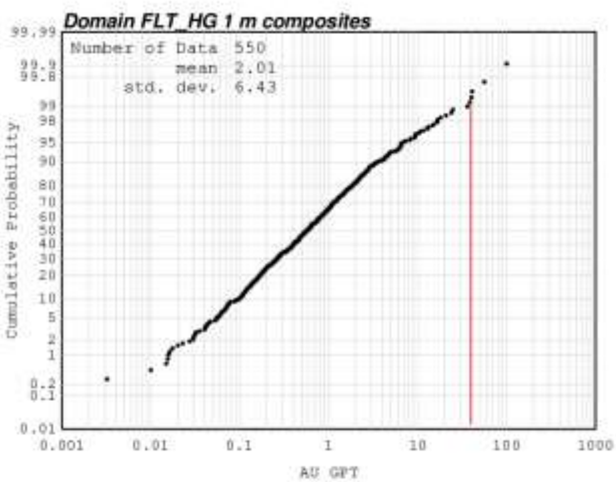

Domain BUV_HG capping
Mean
Number of capped data
Capped Value

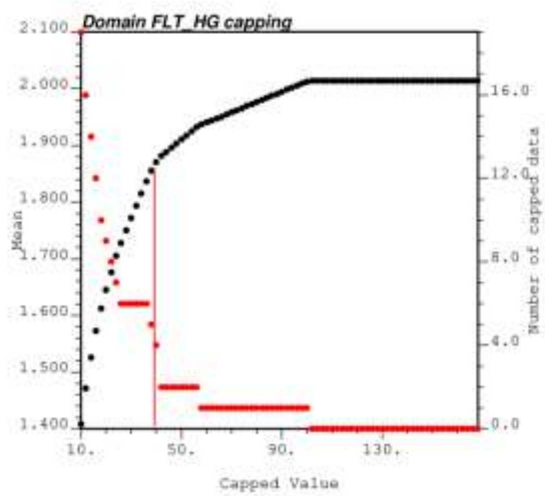

Domain CGY_HG 1 m composites
Number of Data 27741
mean 3.36
std. dev. 20.66
Cumulative Probability
AU GPT

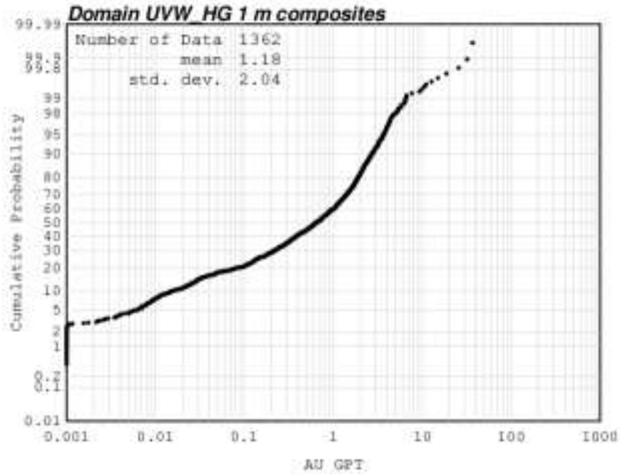

Domain CGY_HG capping
Mean
Number of capped data
Capped Value

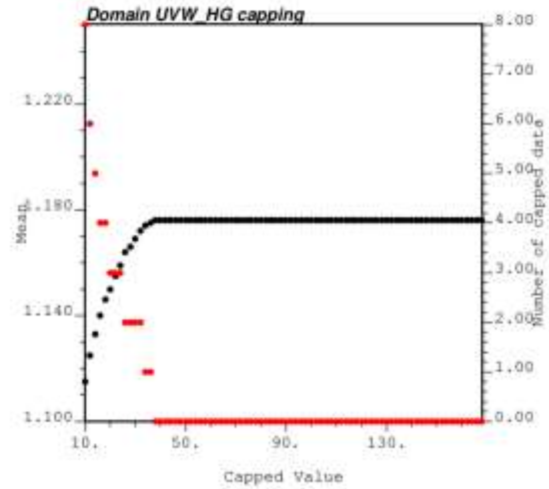

Domain MV_HG 1 m composites
Number of Data 3129
mean 2.06
std. dev. 6.84
Cumulative Probability
AU GPT

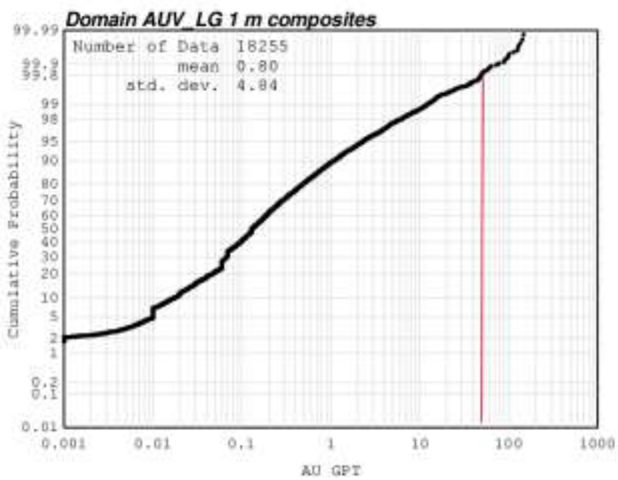

Domain MV_HG capping
Mean
Number of capped data
Capped Value

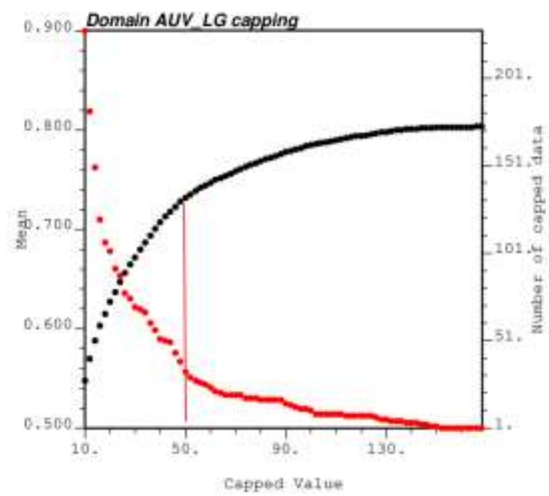

Domain FLT_HG 1 m composites
Number of Data 550
mean 2.01
std. dev. 6.43
Cumulative Probability
AU GPT

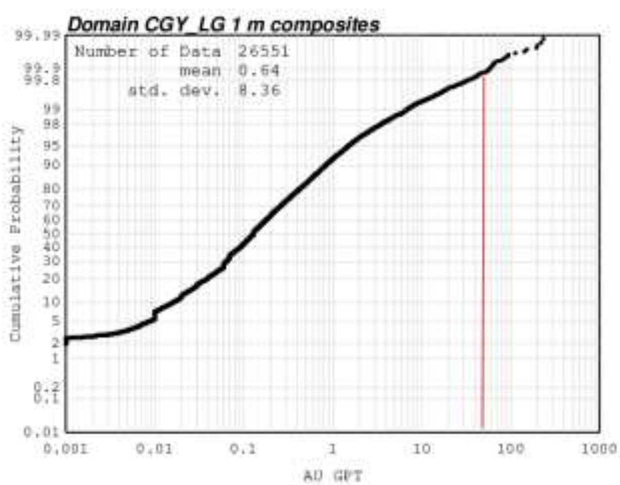

Domain FLT_HG capping
Mean
Number of capped data
Capped Value

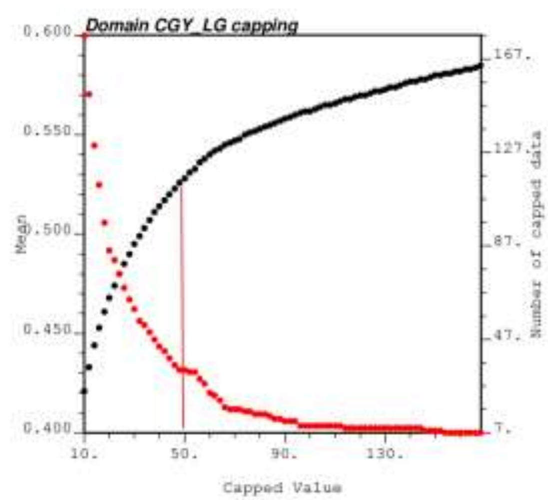

Domain UVW_HG 1 m composites
Number of Data 1362
mean 1.18
std. dev. 2.04
Cumulative Probability
AU GPT

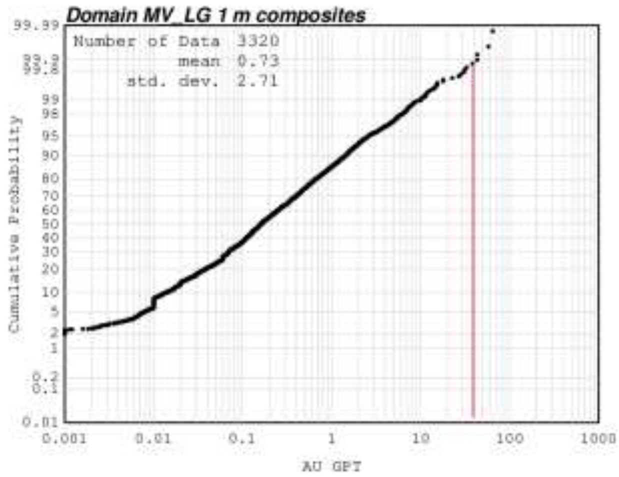

Domain UVW_HG capping
Mean
Number of Capped data
Capped Value

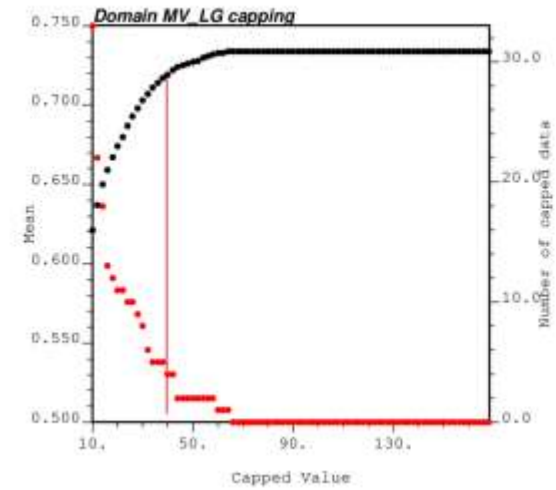

Domain AUV_LG 1 m composites
Number of Data 18255
mean 0.80
std. dev. 4.84
Cumulative Probability
AU GPT

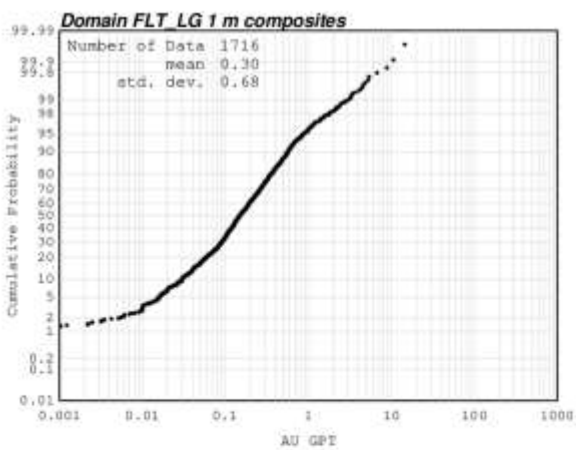

Domain AUV_LG capping
Mean
Number of capped data
Capped Value

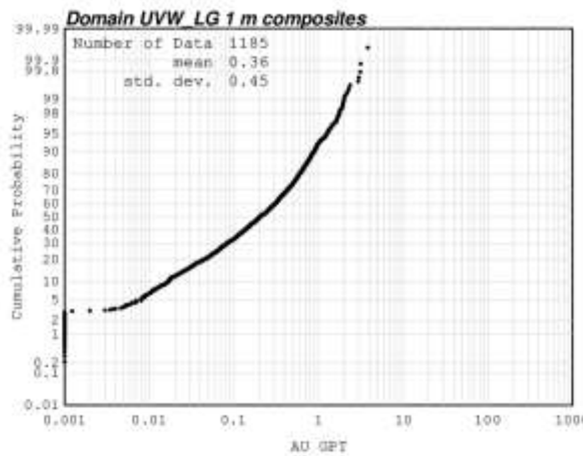

Domain CGY_LG 1 m composites
Number of Data 26551
mean 0.64
std. dev. 8.36
Cumulative Probability
AU GPT

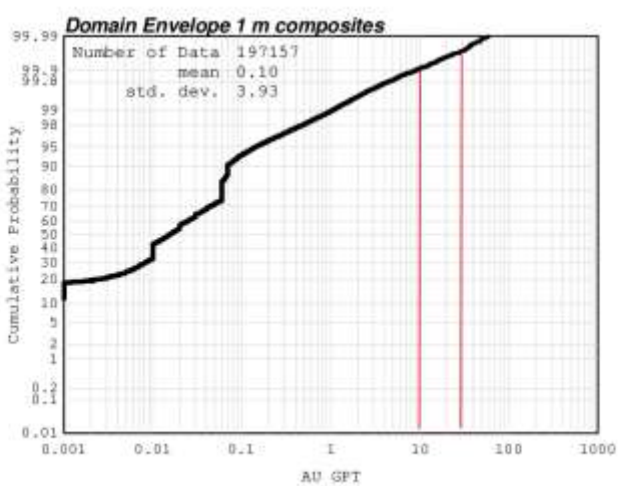

Domain CGY_LG capping
Mean
Number of capped data
Capped Value

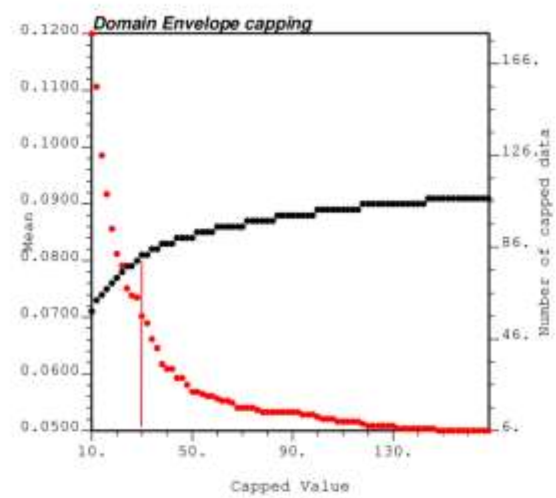

Domain MV_LG 1 m composites
Number of Data 3320
mean 0.73
std. dev. 2.71
Cumulative Probability
AU GPT

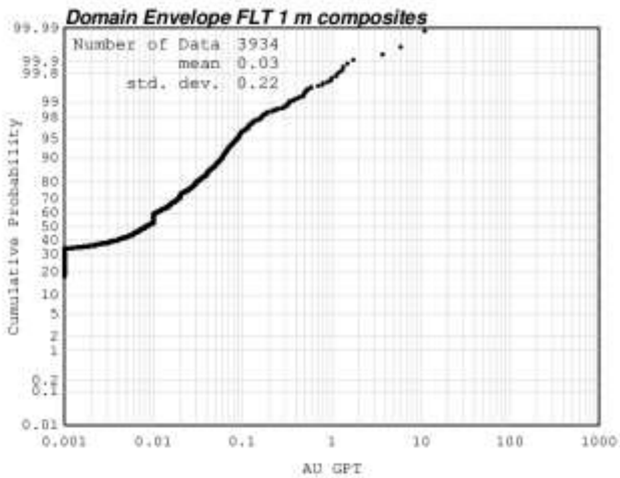

Domain MV_LG capping
Mean
Number of capped data
Capped Value


Domain FLT_LG 1 m composites
Number of Data 1716
mean 0.30
std. dev. 0.68
Cumulative Probability
AU GPT


Domain UVW_LG 1 m composites
Number of Data 1185
mean 0.36
std. dev. 0.45
Cumulative Probability
AU GPT

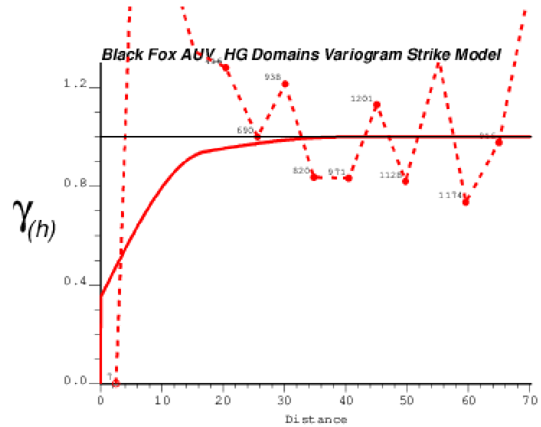

Domain Envelope 1 m composites
Number of Data 197157
mean 0.10
std. dev. 3.93
Cumulative Probability
AU GPT

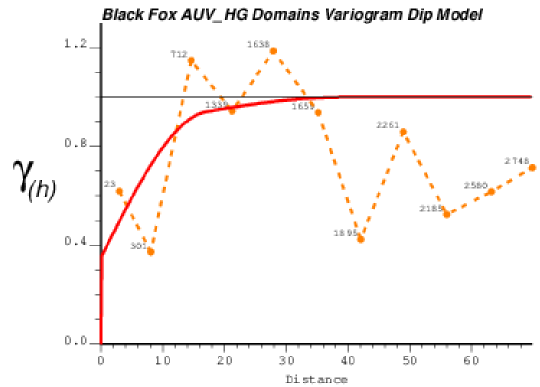

Domain Envelope capping
Mean
Number of capped data
Capped Value

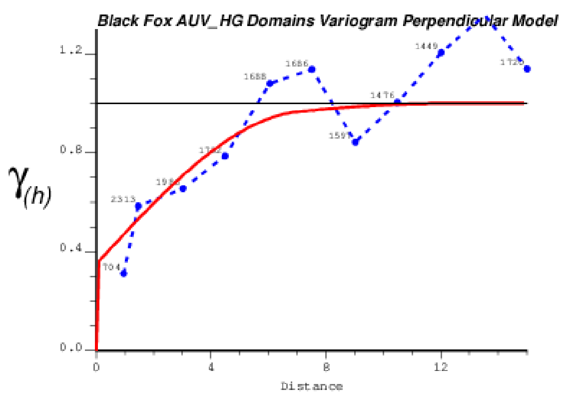

Domain Envelope FLT 1 m composites
Number of Data 3934
mean 0.03
std. dev. 0.22
Cumulative Probability
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.2
0.1
0.01
0.001
0.01
0.1
1
10
100
1000
AU GPT

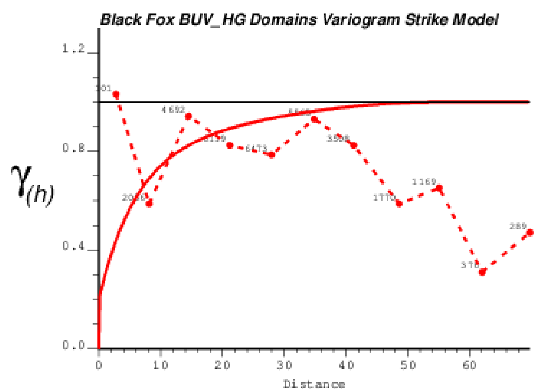
APPENDIX C

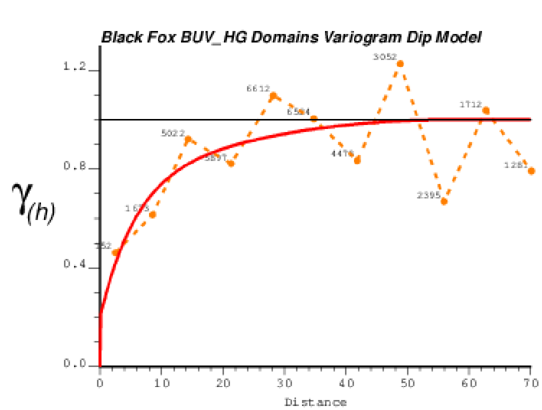
Black Fox Mine Variogram Models

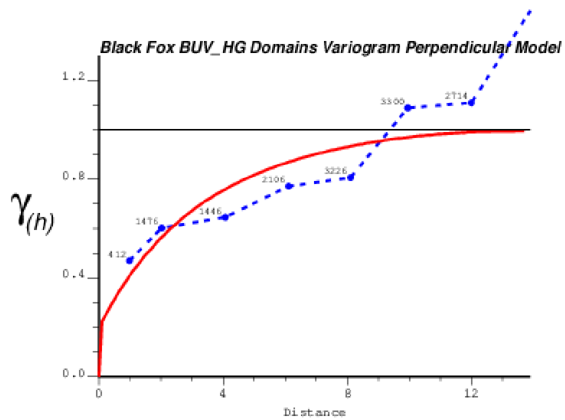

Black Fox AUV_HG Domains Variogram Strike Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60 70
Distance

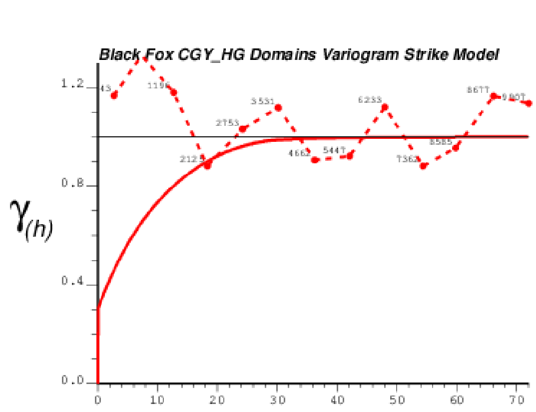

Black Fox AUV_HG Domains Variogram Dip Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60
Distance

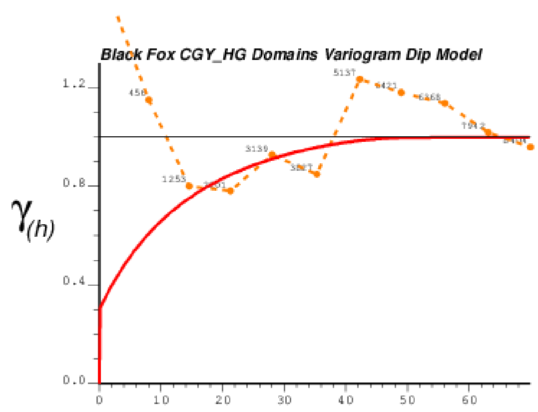

Black Fox AUV_HG Domains Variogram Perpendicular Model
γ(h)
1.2
0.8
0.4
0.0
0 4 8 12
Distance

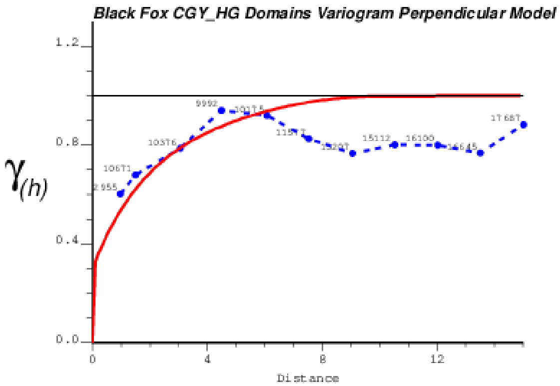

Black Fox BUV_HG Domains Variogram Strike Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60
Distance

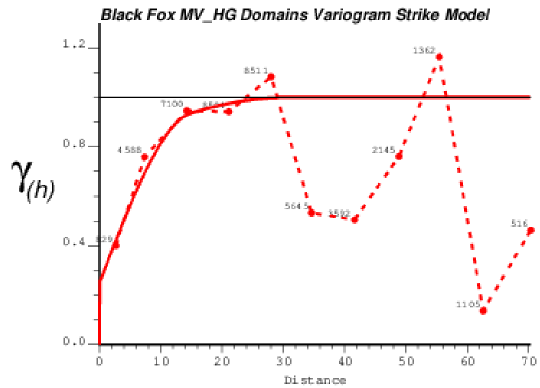

Black Fox BUV_HG Domains Variogram Dip Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60 70
Distance

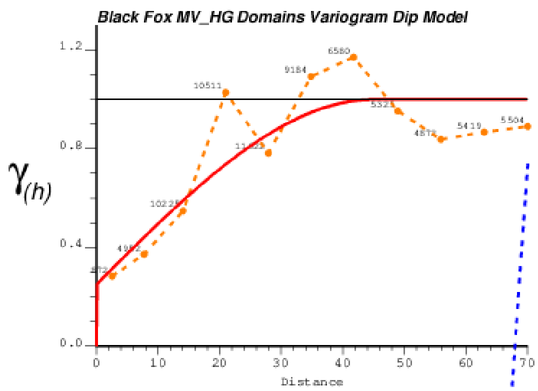

Black Fox BUV_HG Domains Variogram Perpendicular Model
γ(h)
1.2
0.8
0.4
0.0
0 4 8 12
Distance

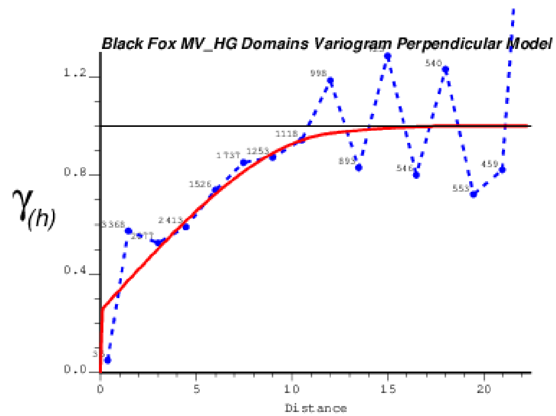

Black Fox CGY_HG Domains Variogram Strike Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60 70
Distance

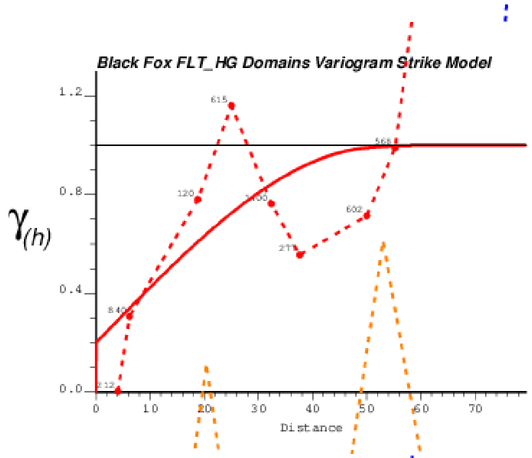

Black Fox CGY_HG Domains Variogram Dip Model
γ(h)
1.2
0.8
0.4
0.0
0 10 20 30 40 50 60
Distance

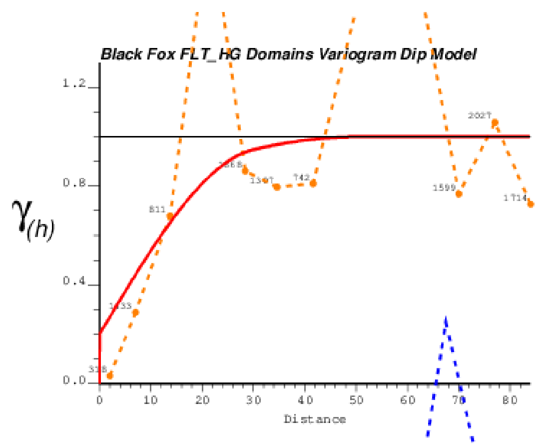

Black Fox CGY_HG Domains Variogram Perpendicular Model
γ(h)
Distance

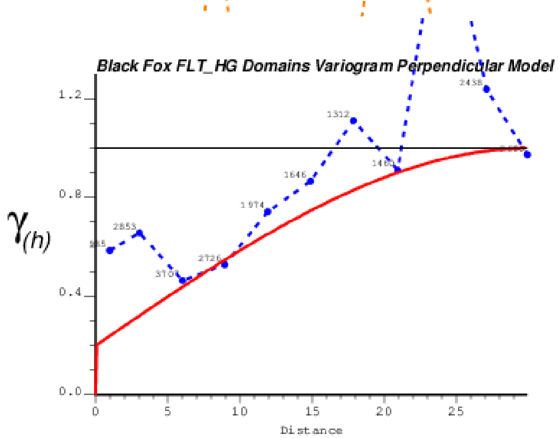

Black Fox MV_HG Domains Variogram Strike Model
γ(h)
Distance

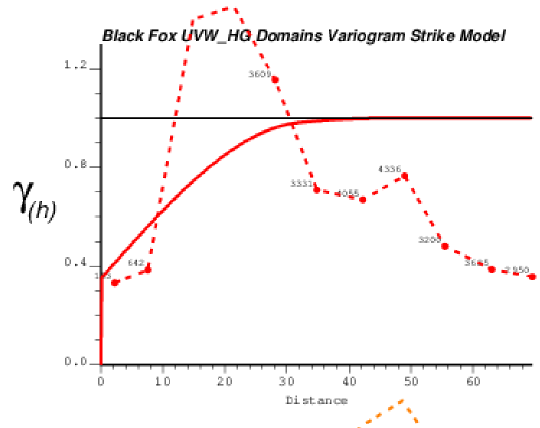

Black Fox MV_HG Domains Variogram Dip Model
γ(h)
Distance

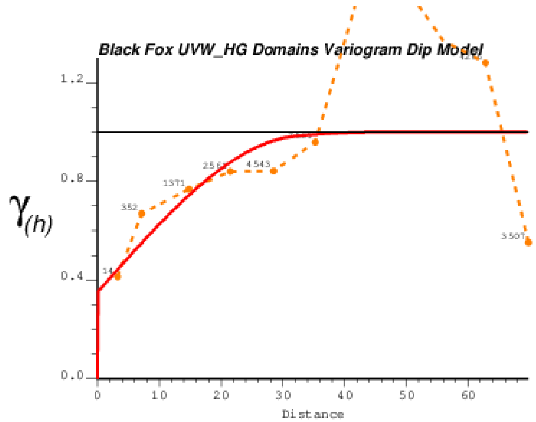

Black Fox MV_HG Domains Variogram Perpendicular Model
γ(h)
Distance

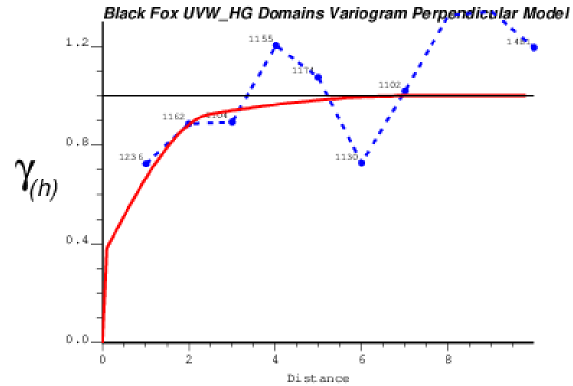

Black Fox FLT_HG Domains Variogram Strike Model
γ(h)
Distance

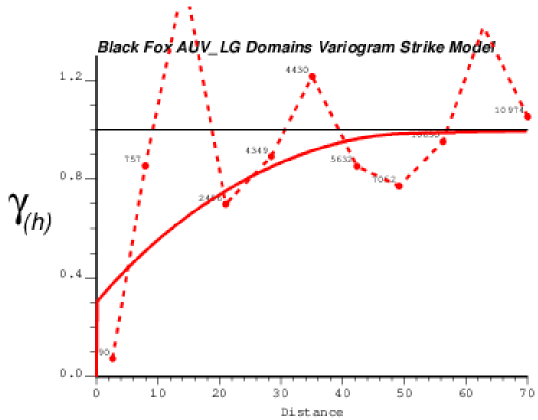

Black Fox FLT_HG Domains Variogram Dip Model
γ(h)
Distance

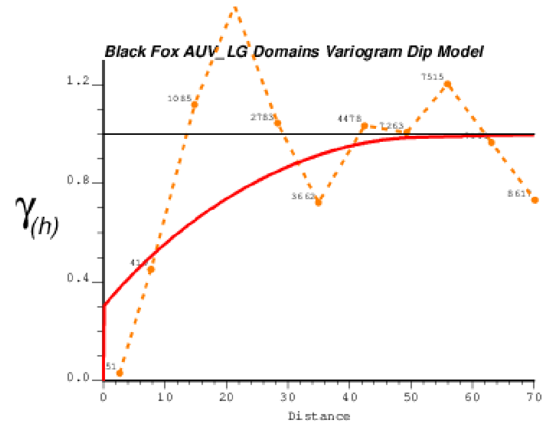

Black Fox FLT_HG Domains Variogram Perpendicular Model
γ(h)
Distance

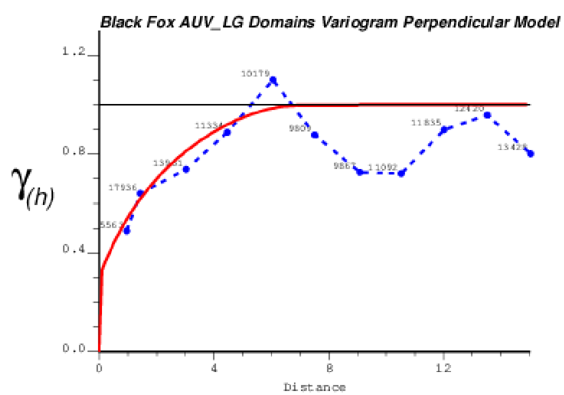

Black Fox UVW_HG Domains Variogram Strike Model
γ(h)
Distance

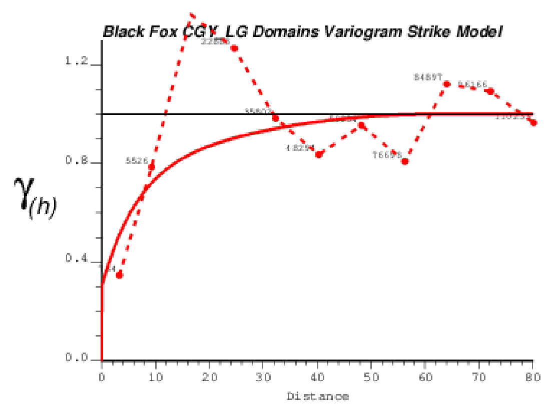

Black Fox UVW_HG Domains Variogram Dip Model
Distance

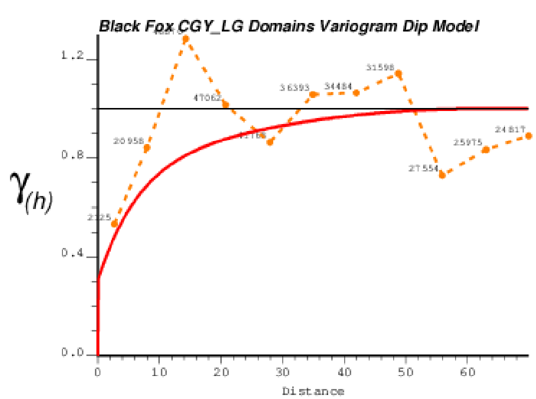

Black Fox UVW_HG Domains Variogram Perpendicular Model
Distance

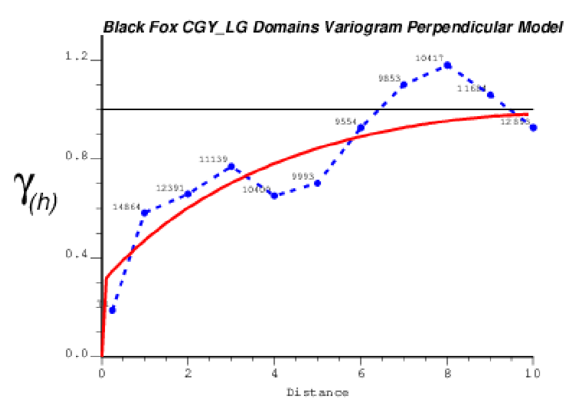

Black Fox AUV_LG Domains Variogram Strike Model
Distance

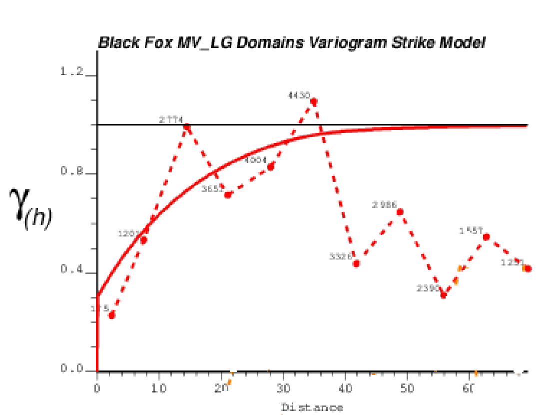

Black Fox AUV_LG Domains Variogram Dip Model
Distance

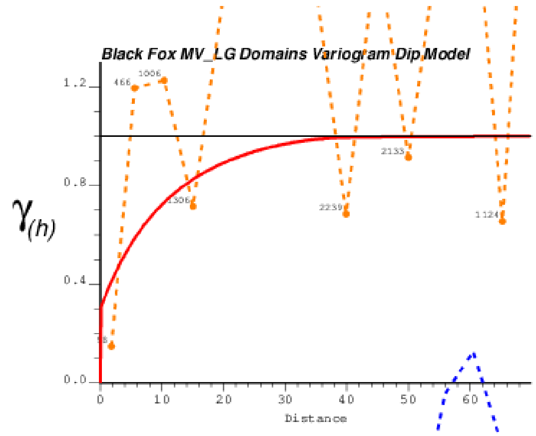

Black Fox AUV_LG Domains Variogram Perpendicular Model
Distance

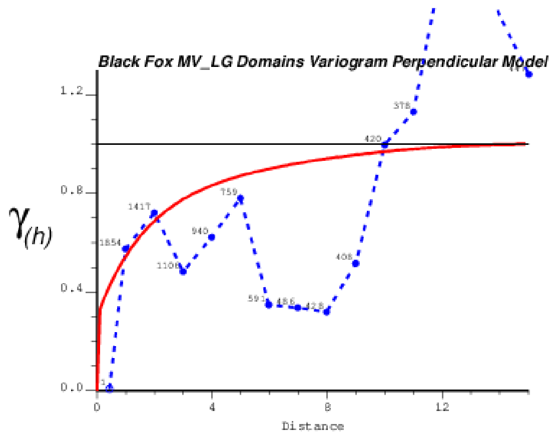

Black Fox CGY_LG Domains Variogram Strike Model
Distance

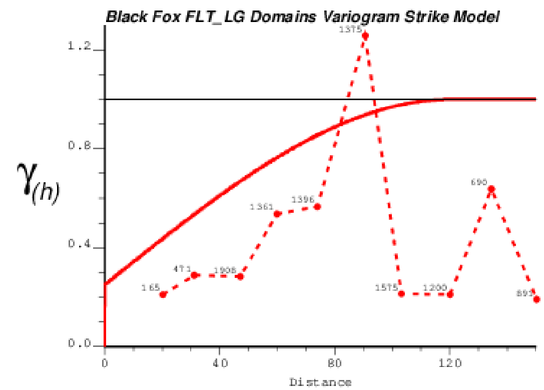

Black Fox CGY_LG Domains Variogram Dip Model
Distance

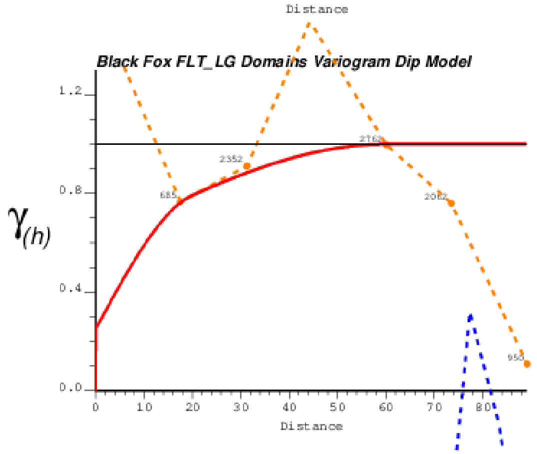

Black Fox CGY_LG Domains Variogram Perpendicular Model
Distance

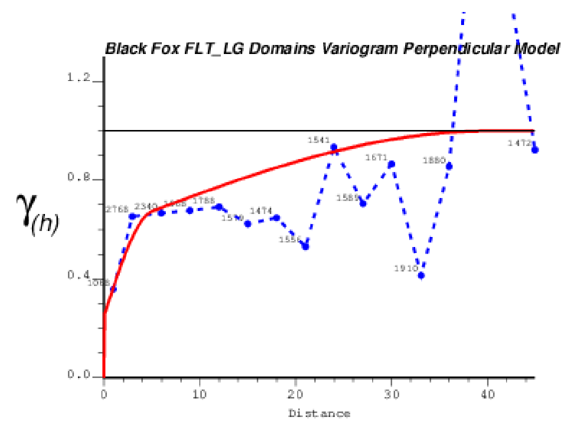

Black Fox MV_LG Domains Variogram Strike Model
Distance

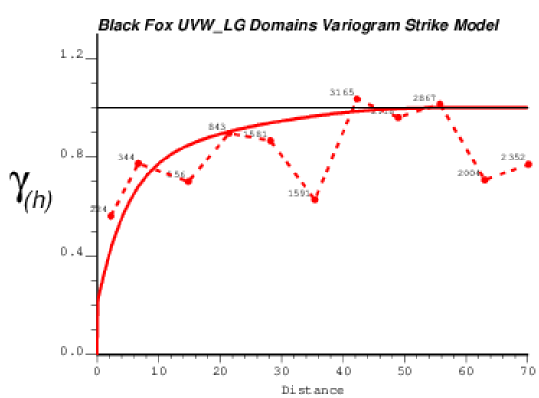

Black Fox MV_LG Domains Variogram Dip Model
Distance

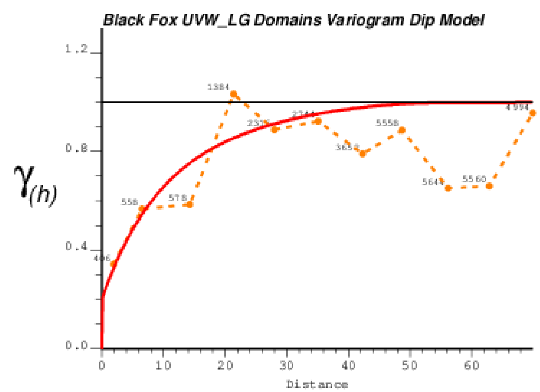

Black Fox MV_LG Domains Variogram Perpendicular Model
Distance

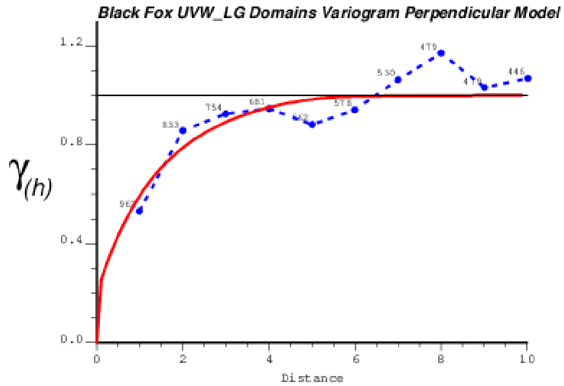

Black Fox FLT_LG Domains Variogram Strike Model
Distance


Black Fox FLT_LG Domains Variogram Dip Model
Distance


Black Fox FLT_LG Domains Variogram Perpendicular Model
Distance


Black Fox UVW_LG Domains Variogram Strike Model
Distance


Black Fox UVW_LG Domains Variogram Dip Model
Distance


Black Fox UVW_LG Domains Variogram Perpendicular Model
γ(h)
1.2
0.8
0.4
0.0
0
2
4
6
8
10
Distance
833
754
681
578
530
479
446

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Aleksandr Mitrofanov, do hereby certify that:

1) I am a Senior Consultant (Resource Geology) with the firm of SRK Consulting (Canada) Inc. (SRK) with an office at Suite 1500, 155 University Avenue, Toronto, Ontario, Canada;
2) I am a graduate of Moscow State University, where in 2013 I obtained a doctorate in geology, in 2010 I obtained a MSc and in 2008, a BSc. I have practiced my profession continuously since 2009. I have experience in exploration projects, geological modelling and mineral resource estimation. Since joining SRK Consulting in 2013, my responsibilities have included geological and structural modelling, preparation of geological chapters on mineral resources for 43-101 and JORC-code reports: scoping study, pre-feasibility study, feasibility study and all other geological activities;
3) I am a professional Geologist registered with the Association of Professional Geoscientists of Ontario (APGO#2824);
4) I have personally inspected the subject project on November 20 to 22, 2017;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I, as a Qualified Person, I am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the co-author of this report and responsible for sections 1 2, 3, 14.1, 14.2, 14.3, 14.5, 24, 25, and 26 and accept professional responsibility for those sections of this technical report;
8) I have had no prior involvement with the subject property;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
10) SRK Consulting (Canada) Inc. was retained by McEwen Mining Inc. to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators National Instrument 43-101 guidelines. The preceding report is based on a site visit, a review of project files and discussions with McEwen Mining Inc. personnel;
11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Black Fox Complex or securities of McEwen Mining Inc., and
12) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Toronto, Ontario, Canada
April 6, 2018

Aleksandr Mitrofanov, PhD, PGeo (APGO#2824)
Senior Consultant (Resource Geology)
SRK Consulting (Canada) Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, David Machuca, do hereby certify that:

1) I am a Senior Consultant (Geostatistics) with the firm of SRK Consulting (Canada) Inc. (SRK) with an office at Suite 1500, 155 University Avenue, Toronto, Ontario, Canada;
2) I am a graduate of the University of Alberta in 2010, with a doctorate in Mining Engineering (Geostatistics). In 2002 I graduated from MINES ParisTech Fontainebleau with a MEng in Mining Geostatistics. In 2000 I graduated from Pontificia Universidad Católica del Perú, Lima, with a BSc in Mining Engineering. I have practiced my profession continuously since 2000. I specialize in geostatistical resource modelling, evaluation and auditing for various types of deposits, metals and energy resources, including base metals in skarn deposits, narrow vein, and disseminated gold deposits. My areas of expertise are geostatistical resource estimation and simulation, and the development of geostatistical algorithms and applications;
3) I am a professional Engineer registered with Professional Engineers Ontario (PEO#100508889);
4) I have not personally visited the project area but relied on a site visit conducted on November 20 to 22, 2017 by Dr. Aleksandr Mitrofanov, a co-author of this technical report;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I, as a Qualified Person, I am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the co-author of this report and responsible for sections 1, 14.1, 14.2, and 14.4 and accept professional responsibility for those sections of this technical report;
8) I have had no prior involvement with the subject property;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
10) SRK Consulting (Canada) Inc. was retained by McEwen Mining Inc. to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators National Instrument 43-101 guidelines. The preceding report is based on a site visit, a review of project files and discussions with McEwen Mining Inc. personnel;
11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Black Fox Complex or securities of McEwen Mining Inc., and
12) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

	["Original signed and sealed"]
Toronto, Ontario, Canada	David Machuca, PhD, PEng (PEO#100f08889)
April 6, 2018	Senior Consultant (Geostatistics)
	SRK Consulting (Canada) Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Michael Selby, do hereby certify that:

1) I am a Principal Consultant (Mining) with the firm of SRK Consulting (Canada) Inc. (SRK) with an office at Suite 101, 1984 Regent Street South, Sudbury, Ontario, Canada;
2) I am a graduate of Queen's University in 2001, I obtained a Bachelor of Science in Mining Engineering. I have practiced my profession continuously since 2001 in operating, engineering, and consultancy roles. I have extensive experience in conducting mining technical studies, including: trade-off studies on cut-off value, mining method, primary access, ore and waste handling. My experience also includes the design and execution of mining stopes, lateral and vertical development, underground infrastructure and construction. I have worked extensively with developing production schedules, labour and mobile equipment profiles, capital, sustaining and operating cost estimates, and narrow vein long-hole mining methods;
3) I am a professional Engineer registered with Professional Engineers Ontario (PEO#100083134);
4) I have personally inspected the subject project December 12, 2017;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I, as a Qualified Person, I am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the co-author of this report and responsible for sections 15, 16, 22, 24, 25 and 26 and accept professional responsibility for those sections of this technical report;
8) I have had no prior involvement with the subject property;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
10) SRK Consulting (Canada) Inc. was retained by McEwen Mining Inc. to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators National Instrument 43-101 guidelines. The preceding report is based on a site visit, a review of project files and discussions with McEwen Mining Inc. personnel;
11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Black Fox Complex or securities of McEwen Mining Inc., and
12) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Sudbury, Ontario, Canada
April 6, 2018

Michael Selby, PEng (PEO#100083134)
Principal Consultant (Mining)
SRK Consulting (Canada) Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Glen Cole, do hereby certify that:

1) I am a Principal Consultant (Resource Geology) with the firm of SRK Consulting (Canada) Inc. (SRK) with an office at Suite 1500, 155 University Avenue, Toronto, Ontario, Canada;
2) I am a graduate of the University of Cape Town in South Africa with a BSc (Hons) in Geology in 1983; I obtained a MSc (Geology) from the University of Johannesburg in South Africa in 1995 and a MEng in Mineral Economics from the University of the Witwatersrand in South Africa in 1999. I have practiced my profession continuously since 1986. Between 1986 and 1989 I worked as a staff geologist on various Anglo-American mines. Between 1989 and 2005 I worked at several exploration projects, underground and open pit mining operations in Africa and held various senior positions, with the responsibility for estimation of Mineral Resources and Mineral Reserves for development projects and operating mines. Since 2006, I have estimated and audited Mineral Resources for a variety of early and advanced international base and precious metals projects;
3) I am a professional Geologist registered with the Association of Professional Geoscientists of Ontario (APGO#1416);
4) I have personally inspected the subject project on November 20 to 22, 2017;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I, as a Qualified Person, I am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the reviewer of this report and responsible for the review of all sections and accept professional responsibility for those sections of this technical report;
8) I have had no prior involvement with the subject property;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
10) SRK Consulting (Canada) Inc. was retained by McEwen Mining Inc. to provide technical support for the generation of mineral resources and mineral reserves and for the preparation of a technical report using CIM *Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* and Canadian Securities Administrators National Instrument 43-101 guidelines. The preceding report is based on a site visit, a review of project files and discussions with McEwen Mining Inc. personnel;
11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Black Fox Complex or securities of McEwen Mining Inc., and
12) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Toronto, Ontario, Canada
April 6, 2018

Glen Cole, PGeo (APGO#1416)
Principal Consultant (Resource Geology)
SRK Consulting (Canada) Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Jeffrey Martin, do hereby certify that:

1) I am a Senior Geological/Environmental Engineer with the firm of EcoMetrix Incorporated, with an office at 6800 Campobello Road, Mississauga, Ontario, Canada;
2) I am a graduate of the University of Toronto. In 1985, I obtained a Bachelor of Applied Science degree. I have practiced my profession continuously since July 1990. I have over 30 years of industry, government, and environmental consulting experience across Canada and internationally, primarily with respect to: mine development, operations, and closure, including assessment and selection of mine closure strategies; development of mine closure plans; and assessment and management of Metal Leaching / Acid Rock Drainage (ML/ARD). My experience also includes: numerous environmental due diligence and peer review assignments for mining projects; hydrogeological assessments; participation in risk assessments, environmental impact assessments; and permitting of mining and recycling facilities;
3) I am a Professional Engineer registered with Professional Engineers Ontario (PEO#90262890);
4) I have not personally visited the project area but relied on numerous site visits conducted by Nigel Fung, a co-author of this technical report;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I, as a Qualified Person, I am independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the co-author of this report and responsible for Sections 4.2.1, 4.3 and 20, and accept professional responsibility for those sections of this technical report;
8) I have had no prior involvement with the subject property;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith;
10) EcoMetrix Inc. was retained by McEwen Mining Inc. to prepare Sections 4.2.1, 4.3 and 20 of this technical report. The preceding report is based on a review of project files and discussions with McEwen Mining Inc. personnel;
11) I have not received, nor do I expect to receive, any interest, directly or indirectly, in the Black Fox Complex or securities of McEwen Mining Inc.; and
12) That, as of the date of this certificate, to the best of my knowledge, information and belief, Sections 4.2.1, 4.3 and 20 of this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Mississauga, Ontario, Canada
April 6, 2018

Jeffrey Martin, PEng(PEO#90262890)
Senior Geological/Environmental Engineer
EcoMetrix Incorporated

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Nathan M. Stubina, do hereby certify that:

1) I am a Managing Director with the firm of McEwen Mining Inc. with an office at Suite 2800, 150 King Street West, Toronto, Ontario, Canada;
2) I am a graduate of McGill University in 1980, I obtained a BEng (Metallurgical Engineering). I also am a graduate of the University of Toronto in 1987 with a PhD in Metallurgy and Materials Science. I have practiced my profession continuously since 1987. My relevant experience over the past 30 years includes: plant operations, plant design, plant management and corporate roles involving technology development, lab management, financial evaluations and mergers and acquisitions. I have worked and lived in Norway, Belgium, Sweden, Ontario and Québec;
3) I am a professional Engineer registered with Professional Engineers Ontario, (PEO#44888501);
4) I have personally inspected the subject project on more than one occasion between September 12, 2017 and February 14, 2018;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I am employed by the issuer, McEwen Mining Inc, and therefore am not independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am the co-author of this report and responsible for Sections 13, 17 and 18.2 and accept professional responsibility for those sections of this technical report;
8) I am currently an employee of McEwen Mining Inc. which is the owner of McEwen Ontario Inc. which owns the assets reported upon in this report since October 6, 2017;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith; and
10) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Toronto, Ontario, Canada
April 6, 2018

Nathan M. Stubina, PhD, FCIM, PEng (PEO# 44888501)
Managing Director
McEwen Mining Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Nigel Fung, do hereby certify that:

1) I am the Director of Mine Planning with the firm of McEwen Mining Inc. with an office at Suite 2800, 150 King Street West, Toronto, Ontario, Canada;
2) I am a graduate of McGill University in 2001, I obtained a Bachelor of Engineering I have practiced my profession continuously since 2001. I have worked as a short-term planning intern at Penoles' Naica Mine in Mexico and at Syncrude in Alberta, Canada. I spent seven years working for Caterpillar's Global Mining Group performing technical sales and studies for mining customers throughout Africa, the Middle East and Central Asia. I subsequently spent three and a half years as short-term planner and project engineer at Iamgold's Rosebel mine in Suriname before joining Wardrop/Tetra tech in 2011 as a mining engineer. Since January 2013 (over five years) I have served as the Director of Mine Planning for McEwen Mining Inc.;
3) I am a professional Engineer registered with Professional Engineers Ontario (PEO #100173276);
4) I have personally inspected the subject project bi-weekly from October 2017 until the present date;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I am employed by the issuer, McEwen Mining Inc, and therefore am not independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am a co-author of this report and responsible for sections 4.1.3, 4.2, 18.1, 19, 21 and 27 of the report and accept professional responsibility for those sections of this technical report;
8) I am currently working for McEwen Mining Inc. which is the owner of McEwen Ontario Inc. which owns the assets reported upon in this report since October 6, 2017.
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith and
10) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

["Original signed and sealed"]

Toronto, Ontario, Canada
April 6, 2018

Nigel S. Fung, PEng (PEO#100173276)
Director – Mine Planning
McEwen Mining Inc.

CERTIFICATE OF QUALIFIED PERSON

To Accompany the report entitled: **Technical Report for the Black Fox Complex, Canada, April 6, 2018.**

I, Eric Alexander, do hereby certify that:

1) I am the Senior Production Geologist with the firm of McEwen Ontario Inc., a wholly-owned subsidiary of McEwen Mining Inc., with an office at 2839 Hwy 101 East, Matheson, Ontario, Canada;
2) I am a graduate of St. Mary's University in 2012, I obtained a Bachelor of Science, majoring in Geology and I have practiced my profession since 2012. I have worked continuously at the Black Fox Mine since January 2013 and have held several positions, most currently as Senior Production Geologist for the last 3 years;
3) I am a professional Geologist registered with the Association of Professional Geoscientists of Ontario (APGO#2854);
4) I am currently employed by McEwen Ontario Inc., at the Black Fox Mine site of the Black Fox Complex;
5) I have read the definition of Qualified Person set out in National Instrument 43-101 and certify that by virtue of my education, affiliation to a professional association, and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of National Instrument 43-101 and this technical report has been prepared in compliance with National Instrument 43-101 and Form 43-101F1;
6) I am employed by McEwen Ontario Inc., a wholly-owned subsidiary of the issuer, McEwen Mining Inc., and therefore am not independent of the issuer as defined in Section 1.5 of National Instrument 43-101;
7) I am a co-author of this report and responsible for sections 4.1.1, 4.1.2, 4.1.4, 4.1.5, 4.1.6, 4.4, 5, 6, 7, 8, 9, 10, 11, 12 and 23 of the report and accept professional responsibility for those sections of this technical report;
8) I am currently employed by McEwen Ontario Inc., the owner of the assets reported upon in this report, since October 6, 2017. Prior to that I was employed continuously at the Black Fox Mine, through its previous ownership, since January 2013;
9) I have read National Instrument 43-101 and confirm that this technical report has been prepared in compliance therewith; and
10) That, as of the date of this certificate, to the best of my knowledge, information and belief, this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

	["Original signed and sealed"]
Matheson, Ontario, Canada	Eric R. Alexander, PGeo (APGO#2854)
April 6, 2018	Senior Production Geologist
	McEwen Ontario Inc.