TECHNICAL REPORT ON THE MINERAL RESOURCE AND MINERAL RESERVE ESTIMATES FOR THE BLACK FOX COMPLEX

(compliant with National Instrument 43-101 and Form 43-101F1)

Project Location

Latitude: 48º 32´ North; Longitude: 80º 20’ West
Beatty and Hislop Townships
Province of Ontario, Canada

Qualified Person:
Harold Brisson, Eng.

Effective Date: June 19, 2014
Signature Date: June 30, 2014

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

CERTIFICATE OF AUTHOR – HAROLD BRISSON

I, Harold Brisson, Eng, PhD, from Québec (Québec) do hereby certify that:

1. I am a professional engineer and I have been working since April 29, 2013 as Resource Manager for Primero Mining Corp, 79 Wellington Street West, Toronto, Ontario.
2. I am a registered member of the Ordre des Ingénieurs du Québec (OIQ, member #41433) since January 1988.
3. I graduated from the Université Laval, Québec, in 1983 with a BScA degree in Geological Engineering, and I hold also a MSc degree in Geology from Université Laval (1988) and a PhD in Mineral Resources from Université du Québec à Chicoutimi (1998).
4. I have practiced my profession in mineral exploration, geoscientific research, resource geology and mine geology over the last 30 years. My experience includes Researcher at the Université du Québec à Chicoutimi; Project Responsible for the Quebec Natural Resources Ministry; Senior Projects Responsible for Aurizon Mines and Cambior; Senior Geoscientist, Resource Geoscientist and Geology & Mine Exploration Assistant Superintendent for Iamgold Corp.
5. This Certificate applies to the report entitled "Technical report on the Mineral Resource and Reserve Estimates for the Black Fox Complex" with an effective date of June 19, 2014.
6. I am a "Qualified Person" according to the National Instrument 43-101 (NI 43-101).
7. The report is based on the contributions of several experts. I was responsible for the supervision of the experts, I have reviewed all the information included in the report, and I take overall responsibility for the entire report.
8. I most recently visited the Black Fox Complex from May 6 to May 15, 2014.
9. I am not independent of Primero Mining Corp.
10. I have read NI 43-101 and this report that I am responsible for has been prepared in accordance with NI 43-101.
11. As at June 30, 2014, to the best of my knowledge, information and belief the portions of the technical report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 30th day of June, 2014.

(signed and sealed on original)
Harold Brisson, Eng, PhD
Resource Manager
Primero Mining Corp.

1 SUMMARY

1.1 INTRODUCTION

In April 2014, InnovExplo Inc. ("InnovExplo") was retained by Gabriel Voicu, Vice President Geology and Exploration for Primero Mining Corp. ("Primero" or "the issuer"), to perform an Updated Mineral Resource Estimate for the Black Fox Complex in accordance with the reporting requirements of Canadian National Instrument 43 101 ("NI 43 101") and Form 43-101F1. The Black Fox Complex includes the Black Fox mine and the Grey Fox deposit.

The Mineral Reserve update was performed by Black Fox mine personnel, all employees of Primero. Primero also provided the sections on mining methods, project infrastructure, market studies and contracts, capital and operating costs, and economic analysis.

Soutex provided the section on mineral processing, metallurgical testing, and recovery methods.

AMEC provided the section on environmental studies, permitting and social/community impacts.

InnovExplo is an independent mining and exploration consulting firm based in Val-d'Or, Québec. The mineral resource estimate was performed by InnovExplo. InnovExplo also provided the sections on geology and a part of the conclusions and recommendations. InnovExplo was responsible for assembling all items of the technical report and for preparing the Mineral Resource Estimate.

Harold Brisson of Primero Mining Corp. supervised the preparation of, and takes overall responsibility for this Technical Report

1.2 PROPERTY DESCRIPTION AND LOCATION

The Black Fox Complex is located 11 kilometres east of Matheson, Ontario, on Highway 101 East. The Black Fox open pit mine and the Black Fox mill have been in operation since May 2009 and commercial production from the underground mine commenced in October 2011.

The Black Fox Complex consists of one (1) block of land comprising thirty-two (32) parcels and twenty-two (22) mining titles for a total of 1,750.27 ha. Some parcels and mining titles are subject to royalties. All parcels and mining titles are either freehold mining lands (mining patents), a mining lease, or a licence of occupation. The Black Fox Complex is located in the Beatty and Hislop townships.

1.3 GEOLOGICAL SETTING AND MINERALIZATION

The Black Fox Complex lies within the Abitibi Subprovince (Abitibi Greenstone Belt) of the Archean Superior craton, in eastern Canada along the northern margin of the Destor-Porcupine Deformation Zone. The rocks in the Black Fox Complex are predominantly composed of metavolcanic rocks, metasedimentary rocks, and related intrusions.

Gold mineralization at the Black Fox mine occurs in several different geological environments within the main ankerite alteration zone. This mineralized envelope occurs primarily within komatiitic ultramafics and lesser mafic volcanics within the outer boundaries of the Destor-Porcupine Deformation Zone. 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 mineralization observed on the Grey Fox deposit occurs in association with quartz-carbonate veins that are often sheeted and occur at shallow to moderate core axis angles in holes drilled from east to west with westerly azimuths, which is the dominant drilling direction. The veins in examined drill intersections form closely spaced sets 0.2 to 10 cm thick. Veins often have a complex, polygenerational history.

1.4 DEPOSIT TYPE

The Black Fox Complex is located with other gold deposits near the Destor-Porcupine Deformation Zone. The auriferous zones seem to be associated with an orogenic gold occurrence related to longitudinal shear zones (greenstone-hosted quartz-carbonate vein deposit). They correspond to structurally controlled, complex epigenetic deposits hosted in deformed metamorphosed terranes.

Although the gold zones of Grey Fox are readily integrated in an orogenic model, they could also be associated with a low sulphidation epithermal gold model. Extensional, pull-apart basins formed between regional strike-slip faults, or at transitions between these faults, provide favourable sites for intrusions and epithermal deposits.

1.5 DATA VERIFICATION

InnovExplo verified the assay certificates for most of the holes drilled during the 2012 and 2013 programs at both the Black Fox mine and the Grey Fox deposit.

1.5.1 Black Fox Mine

Although some errors remain in the database used for the Black Fox mine resource estimate, these are considered minor due to the nature of the errors and the percentage they represent over the entire database. InnovExplo considers the database for the Black Fox mine to be sufficiently valid and reliable for the purpose of this report.

That being said, InnovExplo believes that a thorough review of the entire Black Fox database is warranted. The emphasis should be on validating all drill hole locations and assay results.

Regarding QA/QC at the Black Fox mine, a total of 152 blanks (8.1% of the verified 1,871 blanks) from the October 2010 to September 2013 drilling programs failed to return gold values lower than ten times the detection limit. Many of these returned values significantly higher than the threshold (see Figs. 12.17 to 12.19). After performing an audit of the QA/QC protocols in September 2013, InnovExplo recommended several corrective measures. Consequently, only 7 blanks (1.05% of the 639 verified blanks) during the September to December 2013 drilling program exceeded the recommended threshold (see Figs. 12.24 to 12.26), representing a significant improvement.

Similarly, a total of 420 CRM samples (25% of the 1,955 CRMs) failed to return acceptable values from October 2010 to September 2013 at the Black Fox mine (see Table 12.2) and thus 25% of the batches warrant re-analysis, whereas only 11.04% of the batches for September to December 2013 drilling program warrant re-analysis (see Table 12.3). Although the percentage of failed values for CRM samples dropped from 25% to 11% since InnovExplo's verification of the QA/QC protocol in September 2013, there is still room for additional improvement.

InnovExplo recommends that all batches that failed, whether due to blank or standards, should be re-assayed in order to increase the confidence level in the database.

InnovExplo is of the opinion that the data verification process conducted for the purpose of this report identified numerous aspects that would warrant improvement. Despite the fact that some errors can still be found in the drill hole database, that whole core is being sampled which prevents certain validation procedures, and that uncertainties remain in the underground void distribution and drill hole surveys, InnovExplo considers the available data to be valid and of sufficient quality to be used for mineral resource estimation.

1.5.2 Grey Fox Deposit

InnovExplo considers the database for the Grey Fox deposit to be valid and reliable.

For the drilling programs from June 2013 to December 2013, only 2 blanks (0.11% of the 1,788 blanks) exceeded the recommended threshold (see Figs. 12.31 and 12.32). For the same period, a total of 10 CRM samples (0.58% of the 1,706 CRMs) failed to return acceptable values (see Table 12.4).

The coefficients of correlation for the original-duplicate pairs are 42.10% and 80.26% (see Figs. 12.33 and 12.34), which are considered quite low. However, in light of the excellent CRM results, it is thought that these low coefficients of correlation most likely reflect a strong nugget effect at the Grey Fox deposit.

InnovExplo is in the opinion that the sample preparation, analysis, QA/QC and security protocols used by Brigus Gold (now Primero) at the Grey Fox Deposit was adequate and that the database is well maintained. The database can be considered valid and of good quality for mineral resource estimation.

1.6 MINERAL PROCESSING AND METALLURGICAL TESTING

The Black Fox Mill has operated successfully treating the Black Fox ore at consistent throughputs and recoveries. The process design is appropriate for treatment of the Grey Fox materials. Minor changes to the milling process are required to obtain optimum gold recovery and operating cost. The average design processing rate is 1890 t/d which was attained easily in previous operations with the plant. This rate is slightly lower than the throughput obtained with the Black Fox materials because the grinding work index of the Grey Fox material is higher. A 2300 t/d throughput might be achievable albeit at the cost of a lowered gold recovery.

The metallurgical testwork conducted was conclusive with the proposed throughput and flowsheet. The highlights of the testwork are the large variability in the cyanidation gold recovery and the hardness.

There is no new technical information that materially alters the validity of any previous work. Plant design concepts are reasonable and reflect typical, state-of-the-art, design concepts and application practices. The resultant sizing of major equipment items was reviewed by Stratum and Soutex, with no design issues identified. The equipment selection is based on the generally-accepted application principles and practices.

1.7 MINERAL RESOURCE ESTIMATES

The Mineral Resource Estimates herein were performed by InnovExplo geologist Pierre-Luc Richard (P.Geo.) using all available results. The main objectives of InnovExplo's work were to: 1) update the Black Fox Mine interpretation; 2) validate the updated Grey Fox interpretation; and 3) publish the results of an updated mineral resource estimate for the Black Fox Complex. The result of the study is two mineral resource estimates, one for the Black Fox mine and one for the Grey Fox deposit, comprising Indicated and Inferred Resources for an in-pit volume and a complementary underground volume, as well as a stockpile resource classified as Measured. These Mineral Resources are not mineral reserves as they have no demonstrable economic viability. The effective date of the Mineral Resource Estimates is December 31, 2013.

The Mineral Resource statements presented in this Technical Report are estimates only and no assurance can be given that the anticipated tonnages and grades will be achieved or that the expected level of recovery will be realized. There are numerous uncertainties inherent in estimating Mineral Resources, including many factors beyond InnovExplo's control. Mineral Resource estimation is, in part, a subjective process, and the accuracy of any Mineral Resource estimate is a function of the quantity and quality of available data, and of the assumptions and judgments made regarding the geological interpretation.

Due to the uncertainties attached to Inferred Mineral Resources, there is no assurance that continued exploration will demonstrate sufficient geological continuity to upgrade the Inferred resources to another category.

1.7.1 Black Fox Mine

InnovExplo produced a mineral resource estimate for the Black Fox mine that includes:

- An in-pit resource estimate, within the pit shell prepared by InnovExplo for the Fault Zone and the Life-of-mine pit design for the Main Envelope area ;
- An underground resource estimate, outside the pit shell;
- A stockpile resource as provided by Primero.

Based on the density of the processed data, the search ellipse criteria, and the specific interpolation parameters, the Mineral Resources can be classified as Indicated and Inferred. The stockpiles can be classified as Measured Resources. The estimate follows CIM standards and guidelines for reporting mineral resources and reserves. A minimum mining width of 3 m (true width) and cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Black Fox mine has a Measured Resource of 716,200 tonnes grading 1.07 g/t Au (24,706 ounces of gold), an Indicated Resource of 3,992,800 tonnes grading 5.08 g/t Au (652,560 ounces of gold), and an Inferred Resource of 690,400 tonnes grading 7.56 g/t Au (167,786 ounces of gold).

Table 1.1 presents the combined resources by category for the Black Fox mine. The Mineral Resource is presented inclusive of Mineral Reserves, meaning that Mineral Reserves were not subtracted from the resources presented herein.

Table 1.1 – Mineral Resource Statement for the Black Fox mine (inclusive of Mineral Reserves)

BLACK FOX - DECEMBER 2013 MINERAL RESOURCE ESTIMATE					
Resource Class	**Cut-off Grade (g/t Au)**	**Potential Material**	**Tonnes**	**Capped Au (g/t)**	**Contained Au (oz)**
Indicated	>3.00	Underground	1,852,800	7.48	445,336
	>0.90	Open Pit	1,423,900	3.99	182,518
		Total Indicated	**3,276,700**	**5.96**	**627,854**
Stockpiles (Classified as Measured)			**716,200**	**1.07**	**24,706**
Grand Total (Measured + Indicated)			**3,992,800**	**5.08**	**652,560**
Inferred	>3.00	Underground	326,300	9.52	99,889
	>0.90	Open Pit	364,100	5.80	67,897
		Total Inferred	**690,400**	**7.56**	**167,786**

InnovExplo developed a new interpretation for the Black Fox mine using section and plan views. The interpretation defined twenty-three (23) mineralized zones enclosed within a gold-bearing envelope, and one (1) independent mineralized fault zone.

After conducting a detailed review of all pertinent information and completing the Mineral Resource Estimate, InnovExplo concludes the following:

- The geological and grade continuities of the gold mineralized zones of the Black Fox Mine have been demonstrated;
- The Black Fox mine contains at least twenty-four (24) continuous mineralized zones, including the mineralized fault zone;
- The lenses have strike lengths up to 630 m;
- Despite of the current drill spacing, geological continuity seems steady throughout the mineralized zones;
- The potential is high for upgrading Inferred Resources to Indicated Resources with additional diamond drilling in all zones;
- The potential is high for adding new resources in the fault zone extensions with additional diamond drilling;
- The potential is high for identifying new parallel zones with additional diamond drilling;
- Compiling and using assays from the mining operations (muck samples, channels, chip samples, etc), in parallel with improving the confidence in the underground void model and the drill hole and assay database, may upgrade more resources to the Measured category.

1.7.2 Grey Fox Deposit

InnovExplo produced a Mineral Resource Estimate for the Grey Fox deposit that includes:

An in-pit resource estimate, within the pit shell prepared by InnovExplo;

- An underground resource estimate, outside the pit shell;

Based on the density of the processed data, the search ellipse criteria, and the specific interpolation parameters, the author are of the opinion that the current Mineral Resources can be classified as Indicated and Inferred. The estimates follow CIM standards and guidelines for reporting Mineral Resources and Reserves. A minimum mining width of 5 m (true width) and cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Grey Fox deposit has Indicated Resources of 5,276,300 tonnes grading 3.29 g/t Au (557,655 ounces of gold) and Inferred Resources of 1,551,600 tonnes grading 4.39 g/t Au (218,820 ounces of gold).

InnovExplo validated Primero's updated interpretation for the Grey Fox deposit using section and plan views. Thirteen (13) mineralized geological zones characterize the Grey Fox deposit.

The reader should be aware that the pit shell used for the Grey Fox Resource Estimate extends slightly beyond the property limits in its southern portion. Although the entire resource lies within the property limits, some waste material outside the property limits will need to be removed to access some of the resource. Consequently, this portion of the pit may need to be re-examined in a future economic study. Table 1.2 presents the combined resources by category for the Grey Fox deposit.

Table 1.2 – Mineral Resource Statement for the Grey Fox deposit

GREY FOX - DECEMBER 2013 MINERAL RESOURCE ESTIMATE					
Resource Class	**Cut-off Grade (g/t Au)**	**Potential Material**	**Tonnes**	**Capped Au (g/t)**	**Contained Au (oz)**
Indicated	>3.00	Underground	1,394,300	5.42	243,041
	>0.90	Open Pit	3,882,000	2.52	314,615
		Total Indicated	**5,276,300**	**3.29**	**557,655**
Inferred	>3.00	Underground	1,065,100	5.13	175,511
	>0.90	Open Pit	486,500	2.77	43,309
		Total Inferred	**1,551,600**	**4.39**	**218,820**

After conducting a detailed review of all pertinent information and completing the present Mineral Resource Estimate, InnovExplo concludes the following:

- The geological and grade continuities of the gold mineralized zones of the Grey Fox deposit have been demonstrated;
- The deposit contains at least thirteen (13) continuous mineralized geological zones;
- The lenses have strike lengths up to 1,500 m;
- Despite the current drill spacing, geological continuity seems steady throughout the mineralized zones;
- The zones encountered at the Grey Fox deposit have significant possibility to expand at depth. The only limitations are the property boundary to the south and the regional fault to the northeast;
- The potential is high for upgrading Inferred Resources to the Indicated category with additional diamond drilling in all of the zones;
- The potential is high for adding new resources to the extensions of known zones with additional diamond drilling;

- The potential is high for identifying new parallel zones with additional diamond drilling.

1.8 MINERAL RESERVE ESTIMATES

The Black Fox Mineral Reserve Estimate includes open pit, underground and stockpile reserves. Mineral Resources are converted to Mineral Reserves by applying mining cut-off grades, mining dilution, and mining recovery factors. All in situ resources are classified as Indicated or Inferred. Indicated Resources have been converted to Probable Reserves.

Mine cut-off grades of 1.0 and 3.4 g/t Au were used for open pit and underground reserve estimates respectively. The calculated breakeven open pit cut-off grade is 0.9 g/t Au, but Primero has used a slightly higher operational cut-off. The parameters used for calculating the cut-off grade grades are summarized in Table 1.3.

Table 1.3 – Cut-off grade calculation parameters

Parameter	Units	Value
Underground Mining Cost	CAD per tonne	$98.95
Open Pit Mining Cost	CAD per tonne	$3.14
Processing Cost	CAD per tonne	$26.81
G&A Cost	CAD per tonne	$11.86
Gold Metallurgical Recovery	Percent	94%
Gold Price	USD per ounce	$1,250.00
Exchange Rate	CAD/USD	0.9

Black Fox Mineral Reserves have been estimated as per Table 1.4 below.

Table 1.4 – Summary of Estimated Mineral Reserves for the Black Fox mine as at 31 December 2013

Black Fox	Proven Reserves			Probable Reserves			Proven and Probable Reserves		
	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)
Open Pit	0	0	0	1,468,500	3.7	173,900	1,468,500	3.7	173,900
Underground	0	0	0	1,663,900	6.3	339,100	1,663,900	6.3	339,100
Stockpile	716,200	1.1	24,700	0	0	0	716,200	1.1	24,700
Total	716,200	1.1	24,700	3,132,500	5.1	513,000	3,848,700	4.3	537,700

The previous Black Fox Mineral Reserve Estimate was presented in the Black Fox Technical Report issued in January 2011. Since then, reserves have been estimated by depleting the 2011 Reserves with production tonnes and grade. The Mineral Reserve Estimate outlined in this report has been developed from an updated resource block model using updated mining shapes. Changes to the Mineral Resources have had the greatest impact on the reserve estimate, but the change in mining method, increase in cut-off grade, and different reserve estimation methodology have also contributed to the difference in reserve estimates.

1.9 MINING METHODS

The Black Fox mine includes an open pit and an underground mine. Total mill throughput in 2013 was approximately 753,000 tonnes (2,063 tonnes per day) (“tpd”), of which 297,000 tonnes (39%) were mined from the underground operation.

Open pit mining is conducted using a conventional truck-and-shovel mining method. Underground mining uses three predominant mining methods: longhole stoping, cut-and-fill and shrinkage stoping. The mining method is selected based on the geometry of the orebody. Ground conditions and the stability of the hanging wall are also taken into consideration when selecting a mining method.

Longhole stopes are mined both longitudinal and transverse, with the latter being applied to ore widths greater than 10 m. Development waste is used for backfill where possible, however cemented backfill is used where adjacent stopes are planned, to minimize dilution and maximize ore recovery.

1.10 RECOVERY METHODS

The Black Fox Mill has operated successfully treating the Black Fox ore at consistent throughputs and recoveries. The proposed changing of the crushing circuit is expected to increase the Black Fox Mill existing capacity to 2300 tpd from 2200 tpd and the peak capacity to 2500 tpd. As the crushing circuit represents the current main bottleneck in production capacity, no changes to the Black Fox Mill process is required.

1.11 PROJECT INFRASTRUCTURE

Project infrastructure for the mine consists of supports services, health and safety considerations, surface facilities, tailings storage and water management.

The infrastructure provides essential services and facilities that are required for the mine to operate and follow all laws and regulations. Services such as compressed air, electrical systems and communications are necessary to operate the mine. Facilities such as water treatment ponds, explosives storage and refuge stations are necessary to ensure that the Black Fox mine adheres to all laws and regulations.

1.12 CAPITAL AND OPERATING COSTS

The budgeted capital expenditures for Black Fox for 2014 is $47,479,000.

The 2014 Budget in unit cost terms by major cost centre is shown in Table 1.5.

Table 1.5 – Unit budget by cost centre

Cost Center	Cost / Tonnes
Underground	$98.95
Open Pit	$3.09
Milling	$24.88
G&A	$11.54

1.13 ECONOMIC ANALYSIS

Primero, being a producing issuer, is not required to include information under Item 22. There is currently no plan to expand the current Black Fox mine production of 2,300 tpd.

1.14 RECOMMENDATIONS

1.14.1 RECOMMENDATIONS FROM INNOVEXPLO

InnovExplo believes the Black Fox interpretation would benefit from a more detailed lithological and structural interpretation. Also, recent base metal values encountered in the gold-mineralized Fault Zone should be further investigated. The current interpretation of the Grey Fox deposit should be better defined. A broad lithological approach has been used thus far, but the confidence level would be greatly improved if a zone-by-zone approach was developed.

Considering the good potential for upgrading Inferred Resources to Indicated through additional diamond drilling, the author recommends additional in-fill drilling. Also, the mineralized zones encountered at the Black Fox and Grey Fox deposits have significant potential for expansion at depth and the potential is high for adding new underground resources.

The ground east of the Grey Fox deposit is currently classified as country rock. No resource has been estimated in these country rocks, but numerous significant gold intervals were encountered during historical drilling programs. Additional exploration drilling is therefore warranted.

Following in-fill and at-depth drilling programs at the Grey Fox deposit, InnovExplo recommends a prefeasibility study to determine the potential economic viability of the mineral resources. Both open pit and underground scenarios should be evaluated under the same model for the Grey Fox deposit.

Based on the current interpretation of the Black Fox and Grey Fox deposits, the author believes that, given the geological setting of the property, there is a reasonable likelihood of identifying new mineralized zones. A comprehensive compilation of historical work over the entire property is recommended to fully understand the relationship between faults, shear zones and gold mineralization. Geophysical surveys may be needed depending on the results of the property-scale compilation. A property-scale drilling program should then be performed to assess the full economic potential of the Black Fox Complex.

Going forward, InnovExplo is of the opinion that the sample preparation, analysis, QA/QC and security protocols used by Brigus Gold (now Primero) for the Black Fox mine could be greatly improved. The protocols in use at the Grey Fox deposit are in accordance with industry standards and could be implemented at the Black Fox mine.

The author also recommends that efforts be directed at resolving issues with the assay database, QA/QC protocols, drill hole surveys, and missing historical information in the Black Fox database.

InnovExplo is of the opinion that the character of the Black Fox Complex is of sufficient merit to justify the recommended program described below. The program is divided into two (2) phases. Expenditures for Phase I of the work program are estimated at C$22,137,500 (including 15% for contingencies). Expenditures for Phase II of the work program are estimated at C$2,213,750 (including 15% for contingencies). The grand total is C$24,351,250 (including 15% for contingencies). Phase 2 of the program is contingent upon the success of Phase 1.

Phase 1 – Economic studies, drilling program and compilation

Phase 1a) Engineering Studies on the Grey Fox Deposit
InnovExplo recommends a prefeasibility study for evaluating the economics of both the Open-Pit and Underground mining scenarios. Additional metallurgical testing is warranted to better understand recovery throughout the deposit and in the Grey Fox South area where no metallurgical testing has ever been conducted. A lithological approach should be considered and treated independently. Rock mechanics studies should also be initiated in order to provide adequate data for economic studies. In light of such studies, reserves could be established and a mine plan produced.

Phase 1b) In-fill Drilling on the Black Fox and Grey Fox Deposits
InnovExplo recommends further definition drilling to upgrade Inferred resources to the Indicated category within the Fault Zone on the Black Fox mine. Additionally, delineation drilling should be drilled on the Grey Fox deposit.

Phase 1c) Drilling Extensions of the Mineralized Zones
InnovExplo recommends further exploration drilling on the Black Fox deposit to increase Inferred resources. More specifically, the program should target the already identified ore shoots at depth. The intersection of the main mineralized envelope and the Fault Zone has never been drilled. InnovExplo is of the opinion that this area should be a priority. Exploration drifts may be warranted to reach some targets.

Phase 1d) QA/QC Program and Historical Compilation on the Black Fox Mine
A thorough QA/QC program should be established for the Black Fox deposit in order to reduce the QA/QC failure percentage. A significant amount of assayed core would need to be re-assayed. Additionally, efforts should be made to increase the confidence of drill hole surveys and to locate all missing historical underground information. An emphasis should be placed on recovering missing drifts and stopes, and also on compiling all channel, muck and chip samples. Efforts should also be deployed to model lithologies and assign more realistic densities rather than using the fixed value of 2.84 g/cm3 that is currently being applied to all rocks throughout the deposit. Such a compilation could lead to establishing measured resources from the underground block model.

Phase 1e) Property-scale Compilation Work and Target Generation
Based on the current interpretation of the Black Fox and Grey Fox deposits, the author believes that there is a reasonable likelihood of identifying new mineralized zones given the geological setting of the property. A comprehensive compilation of all historical work should be undertaken in order to potentially provide new insights and targets on the property. Based on such a compilation, property-scale exploration programs such as geophysical surveys could be recommended. The main objectives of such studies should be to: 1) better understand the gold distribution of already known showings; and 2) establish new targets on the property.

Phase 2 – Property-scale drilling program and resource estimate update on the Black Fox deposit

Phase 2a) Resource Estimate Update on the Black Fox and Grey Fox Deposits
Based on the results of Phase 1, InnovExplo recommends producing a resource estimate update following Phase 1 and updating the economic studies to refine the potential economic viability of the Mineral Resource. Both open pit and underground scenarios should be evaluated within the same model for both the Black Fox and Grey Fox deposits.

Phase 2b) Property-scale Drilling Program

InnovExplo recommends further exploration drilling on the Black Fox Complex. The targets will need to be determined after completing Phase 1. A provision has been included in this budget, but will need to be adjusted based on the results of Phase 1.

1.14.2 RECOMMENDATIONS FOR BLACK FOX

Historically, Black Fox has relied on longhole stopes for the majority of the production as they have a higher productivity than cut and fill or conventional mining. With the current ore blocks outlined in the resources, it is apparent that areas suitable for longhole stopes are not as abundant as in the past. It will be important for Black Fox to not only focus on longhole stopes but also on alternative mining methods, such as conventional mining, to ensure that the production targets from the underground can be met.

Generally, block models of the Black Fox ore body have had limited success in predicting mining areas with the necessary detail that is needed to generate a mining plan and designs. To achieve the necessary detail, a methodical definition drilling program needs to be used in conjunction with the block model to ensure that plans and designs are developed using solid information.

The future price of gold is variable and is an unknown. Although Black Fox cannot control the price of gold, Black Fox can control their production costs. It is recommended that a cost control program be implemented that focuses on promoting a cost control culture among employees. A cost control culture would help Black Fox be better suited to deal with any prolonged downturns in the price of gold.

1.14.3 SOUTEX'S RECOMMENDATIONS

Metallurgical Testing (Grey Fox Deposit)
Soutex recommends conducting additional testwork along with mineralogical analyses to investigate the large variability obtained in the whole sample cyanidation tests and to confirm the gold recovery.

Additional testwork is also recommended to confirm the hardness. The mineralogical analysis shows the presence of micas that may introduce a bias in the Bond ball mill work index results since the test is conducted using a screen to classify the material while hydrocyclones are used in the plant. The mica will have a different behavior in each classification unit due to its flaky nature. Testing should be done to confirm the relationship between the P80 and the gold recovery to evaluate the optimal plant throughput.

An estimated C$200,000 is required to pursue the recommended testwork programs. It is assumed this program will use the remaining core sample from the 2012/13 drilling programs.

Metallurgical Testing (Black Fox Mine)
Soutex recommends conducting additional testwork on material from the Black Fox mine. The testwork should include cyanidation tests to confirm the gold recovery as well as tests to confirm the hardness.

An estimated C$200,000 is required to pursue the recommended testwork programs.

2 INTRODUCTION

In April 2014, Gabriel Voicu, Vice President of Geology and Exploration for Primero Mining Corp. (“Primero” or “the issuer”), retained InnovExplo Inc. (“InnovExplo”) to perform an updated mineral resource estimate for the Black Fox Complex and to assemble a technical report (the “Technical Report”) in accordance with the reporting requirements of Canadian National Instrument 43-101 (“NI 43-101”) and Form 43-101F1. The Black Fox Complex includes the Black Fox mine and the Grey Fox deposit. InnovExplo is an independent mining and exploration consulting firm based in Val-d’Or, Québec.

This Technical Report presents the NI 43-101 compliant updated Mineral Resource and Mineral Reserve Estimate for the Black Fox Complex. The Mineral Resource Estimate was performed by InnovExplo. The Mineral Reserve was performed by Black Fox mine and corporate personnel, all employees of Primero.

Primero also provided the sections on mining methods, project infrastructure, market studies and contracts, capital and operating costs, and economic analysis.

InnovExplo also provided the sections on geology and a part of the conclusions and recommendations.

Soutex provided the section on mineral processing, metallurgical testing, and recovery methods.

AMEC provided the section on environmental studies, permitting and social/community impacts.

InnovExplo was responsible for assembling all items of the Technical Report. Harold Brisson of Primero Mining Corp. supervised the preparation of, and takes overall responsibility for this Technical Report.

2.1 OVERVIEW OF PRIMERO MINING CORP.

The issuer was incorporated as “Apoka Capital Corporation” in November 2007. In July 2008, the issuer was listed on the TSXV as a Capital Pool Company under the symbol “ACK.P”.

In October 2008, the issuer completed its qualifying transaction under the TSXV’s Capital Pool Company policy by acquiring privately-owned Mala Noche Resources Corp. The Qualifying Transaction was a reverse takeover under Canadian GAAP and the policies of the TSXV whereby the issuer acquired all of the outstanding securities of Mala Noche in exchange for common shares of the issuer and options to purchase Common Shares. Concurrent with the completion of the Qualifying Transaction, the issuer, as the resulting issuer, changed its name to “Mala Noche Resources Corp.” In October, 2008, the issuer commenced trading on the TSXV as a Tier 2 Mining Issuer under the symbol “MLA”.

On August 6, 2010, the issuer acquired the San Dimas mine, mill and related assets from Desarrollos Mineros San Luis, S.A. de C.V., and the shares of Silver Trading (Barbados) Ltd from Goldcorp Silver (Barbados) Ltd, each indirect, wholly-owned subsidiaries of Goldcorp Inc. With this last acquisition, the issuer changed its name to “Primero Mining Corp.” Primero is listed on the New York Stock Exchange (NYSE: PPP) and the Toronto Stock Exchange (TSX: P). Primero is a Canadian-based precious metals producer with operations in Mexico and Canada.

On March 5, 2014, Primero acquired the shares of Brigus Gold Corp. (“Brigus Gold”) and a 100% interest in the Black Fox Complex, mill and related assets. Brigus Gold was a Canadian mid-tier gold producer. Brigus Gold was formed from the merger of Apollo Gold Corporation and Linear Gold Corporation in June 2010.

2.2 TERMS OF REFERENCE

This Technical Report was assembled by InnovExplo. It supports the disclosure of the updated mineral reserve and resource estimate covering the area of the Black Fox open pit and underground gold project and the Grey Fox deposit, near the town of Matheson in the Province of Ontario.

2.3 QUALIFIED PERSONS AND INSPECTION ON THE PROPERTY

Harold Brisson, PhD, Eng., Resources Manager for Primero, supervised, and takes overall responsibility for the entire Technical Report.

InnovExplo was responsible for assembling and preparing the present report. Sections were contributed by the staff of InnovExplo, Primero, Soutex Inc. (“Soutex”), and AMEC Environment & Infrastructure (AMEC), a Division of AMEC Americas Limited (“AMEC”). The following list presents the Qualified Persons (“QPs”) for this Technical Report as defined by the Canadian Securities Administrators’ National Instrument 43-101 (“NI 43-101”), in conformity with generally accepted guidelines of the CIM for “Exploration Best Practices” and “Estimation of Mineral Resources and Mineral Reserves Best Practices”.

- All QPs who contributed to the Technical Report are listed in Table 2.1 Each QP retains the responsibility for their contribution as noted below:
- Pierre-Luc Richard, M.Sc., P.Geo., Project Manager for InnovExplo, is responsible for the Mineral Resource Estimate and data verification. Pierre-Luc Richard visited the Black Fox Complex on numerous occasions between August 28, 2013 and January 10, 2014.
- Karl Dessureault, B.Sc., P.Eng., Senior Engineer for Primero, is responsible for the Mineral Reserve Estimate, Mining Methods, and Infrastructure.
- Debbie Dyck, BASc., P.Eng., Senior Associate Environmental Engineer for AMEC, is responsible for the environmental section.
- Pierre Roy, M.Sc. P.Eng., Senior Metallurgist for Soutex, is responsible for the process plant sections.

Table 2.1 – List of qualified persons for the 2014 Technical Report on the Black Fox Complex

Author	Position	Employer	Independent of Primero	Sections
Pierre-Luc Richard, P.Geo.	Project Manager	InnovExplo	Yes	1.5, 1.7, 1.14.1, 12, 14, 25.4, 25.6, 26.1
Karl Dessureault, P. Eng.	Senior Engineer	Primero	No	1.8, 1.9, 1.11, 1.13, 1.14.2, 15, 16, 18, 21, 25.7, 25.8, 25.10, 25.11, 26.2
Pierre Roy, P.Eng	Senior Metallurgist	Soutex	Yes	1.5, 1.10, 1.14.3, 13, 17, 25.5, 26.3
Debbie Dyck, P.Eng	Senior Associate Environmental Engineer	AMEC	Yes	20
Harold Brisson, Eng.	Resources Manager	Primero	No	1.1, 1.2, 1.3, 1.4, 1.12, 1.15, 1.16, 1.17, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 19, 22, 23, 24, 25.1, 25.2, 25.3, 25.11, 25.12, 25.13, 27
Other Experts Whose Contributions Assisted the Qualified Persons				
Expert	**Position**	**Employer**	**Independent of Primero**	**Sections or contributions**
Bruno Turcotte, P.Geo.	Project Manager	InnovExplo	Yes	2 to 11,, 23, 24, 25.1, 25.2, 25.3, and 27
Luke Buchanan	Principal Engineer	Primero	No	15 and 16
Even Stavre	Chief Mine Exploration Geologist	Primero	No	Technical information for the Black Fox Mine Resource Estimate.
Mike Mayhew	Mine Manager	Primero	No	Technical information for the Black Fox

				Mine Resource Estimate.
John Dixon	Exploration Manager – Northern Ontario	Primero	No	Technical information for the Grey Fox Resource Estimate
Christa Kernohan, P. Geo	Senior Project Geologist	Primero	No	Updated interpretation for the Grey Fox deposit
Venetia Bodycomb			Yes	Linguistic review

2.4 PRINCIPAL SOURCES OF INFORMATION

The author's review of the Black Fox Complex was based on published material in addition to the data, professional opinions and unpublished material submitted by the Primero and/or by its agents. The author also consulted other information sources, such as the Mining Claims Information database for the status of mining titles and the Geology Ontario online warehouse for assessment work, both available via the Ministry of Northern Development and Mines website, as well as technical reports, annual information forms, annual reports, management's discussion and analysis reports, and press releases published by Brigus Gold and Primero on the SEDAR website.

The author conducted a review and appraisal of the available information used to prepare all items in this report and to formulate its conclusions and recommendations, and believes that such information is valid and appropriate considering the status of the project and the purpose for which the report is prepared. The author has fully researched and documented the conclusions and recommendations made in the Technical Report.

2.5 EFFECTIVE DATE

The effective date of the 2014 Mineral Resource herein is December 31, 2013.

The effective date of the 2014 Mineral Reserve herein is December 31, 2013.

The effective date of the Technical Report is June 19, 2014.

2.6 UNITS AND CURRENCIES

All currency amounts are stated in Canadian Dollars (C$) or US dollars (US$). Quantities are stated in metric units, as per standard Canadian and international practice, including metric tons (tonnes, t) and kilograms (kg) for weight, kilometres (km) or metres (m) for distance, hectares (ha) for area, and grams (g) or grams per metric ton (g/t) for gold grades. Wherever applicable, imperial units have been converted to the International System of Units (SI units) for consistency. A list of abbreviations used in this report is provided in Appendix I.

3 RELIANCE ON OTHER EXPERTS

Primero supplied information on the mining titles, option agreements, royalty agreements, environmental liabilities, and permits with respect to the Black Fox Complex. The authors are not qualified to express any legal opinion with respect to the property titles or current ownership and possible litigation.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 LOCATION

The Black Fox Complex is located in the Beatty and Hislop townships, approximately 60 km east of the city of Timmins in the Province of Ontario, Canada (Fig. 4.1). The property lies within NTS map sheet 42A/08. The approximate coordinates for the geographic centre of the Black Fox Complex are 48° 32' 2" N and 80° 20' 2" W (UTM coordinates: 549170E and 5375871N, NAD 83, Zone 17).

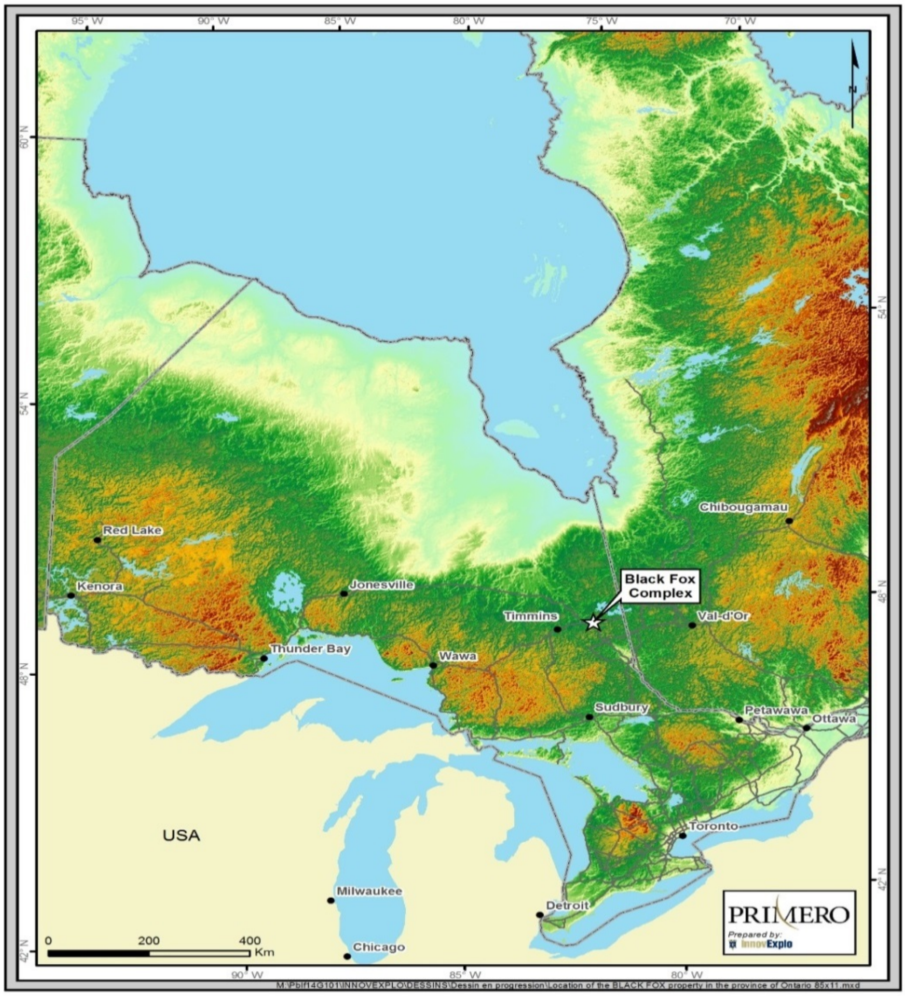


Figure 4.1 – Location map for the Black Fox Project

4.2 MINING TENURES AND CLAIMS STATUS

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.

4.2.1 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.

4.2.2 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 a 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.

4.2.3 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.

4.2.4 Licence of Occupation

Prior to 1964, mining licences of occupation (MLO) were issued generally for 10 year terms by the MNDM to permit the mining of minerals under the beds of bodies of water. As an MLO is held separate and apart from the related mining claim, it must be transferred separately from the transfer of the related mining claim. The transfer of an MLO requires the prior written consent of the Ministry. As an MLO is a licence, it does not create an interest in land.

4.2.5 Land Use Permit

Prospectors may also apply for and obtain a land use permit (LUP) from the MNR. An LUP is not a form of mining tenure and is generally used where there is no intention to erect extensive or valuable improvements on the subject lands. LUPs are often obtained when the land is to be used for the purposes of an exploration camp. When an LUP is issued, the MNR retains future options for the subject lands and controls its use. LUPs are personal to the holder and cannot be transferred or used as security.

4.3 BLACK FOX PROPERTY

Claim status was supplied by John Dixon, Chief Exploration Geologist of Primero. InnovExplo verified the status for all claims using the Ministry of Northern Development and Mines (MNDM) online claim management system via the Geo-Claims website at:

http://www.geologyontario.mndm.gov.on.ca/website/geoclaims.

The Black Fox Complex (Fig. 4.2) consists of one (1) block of land comprising thirty-two (32) parcels and twenty-two (22) mining titles for a total of 1,750.27 ha (Table 4.1). Some parcels and mining titles are subject to royalties (Fig. 4.3 and Table 4.1). All mining titles and parcels are located in the Beatty and Hislop townships and their boundaries are defined by the MNDM. All parcels and mining titles are one of the following: a freehold mining land (mining patent), a mining lease, or a licence of occupation.

The parcel number is the Land Registry depository of registered transactions affecting this land. Mining Licences of Occupation are registered solely with the MNDM and are not assigned to a parcel number. While all patents and leases have a parcel number, the MNDM may not have it on record. The PIN number is a numeric-alpha reference to the newly automated depository of registered transactions.

Figure 4.2 – Location map showing mining titles and mineral and surface rights constituting the Black Fox Complex

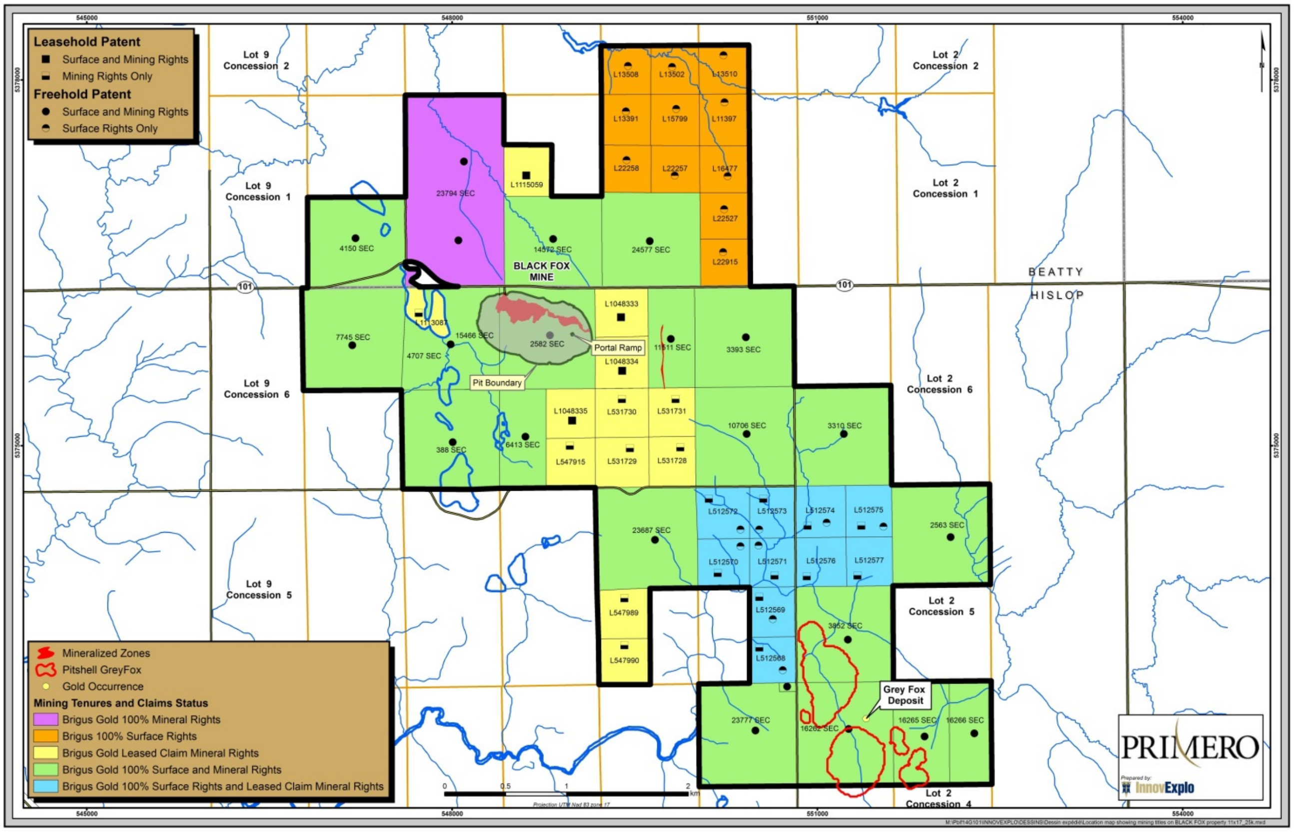


Figure 4.3 – Location map showing royalties relating to the Black Fox Complex

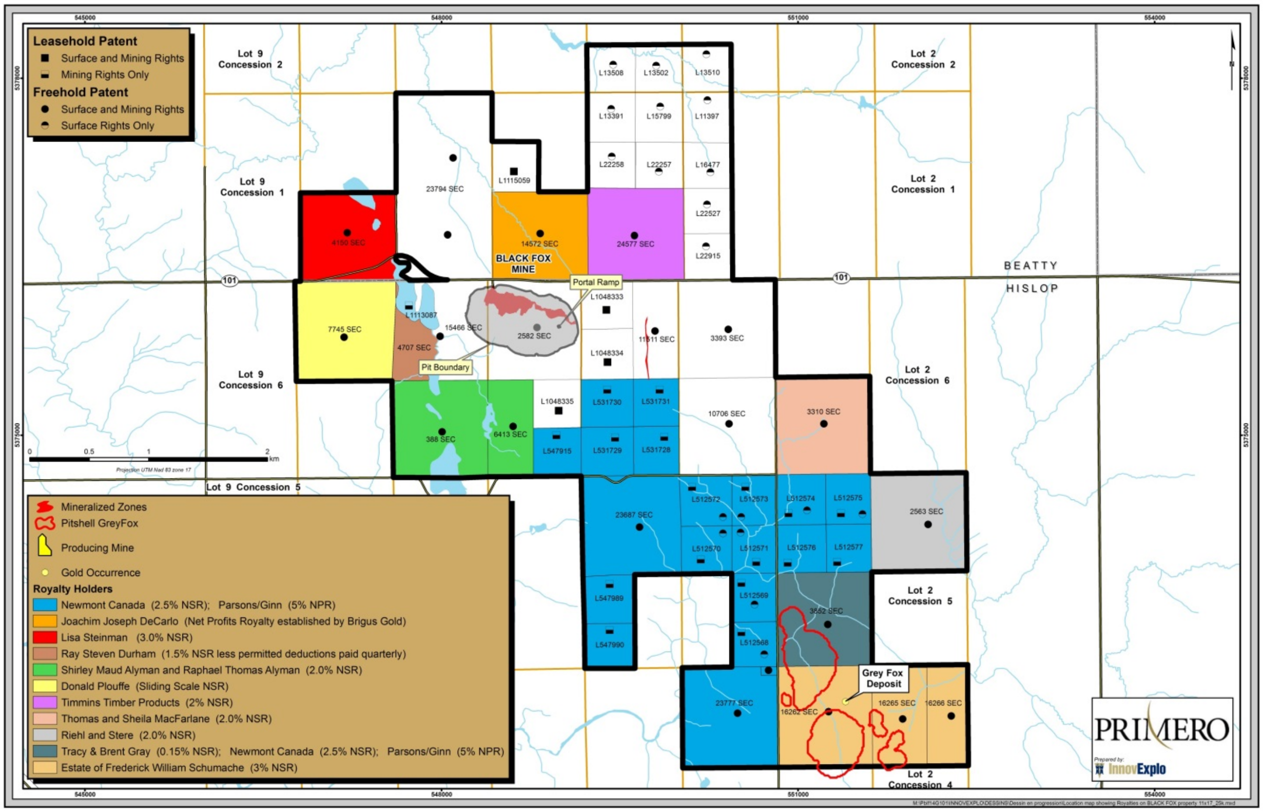


Table 4.1 – Mineral and surface rights constituting the Black Fox Complex

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
Beatty	65366-0126	1	5	24577 SEC		62.71	Mining Patent	Surface and Mineral Rights	Timmins Forest Product Ltd	a) 2% NSR paid quarterly (<u>only Parcel 24577 SEC</u>) and 1% NSR can be purchased by Brigus Gold for C$500,000. b) Mineral rights for the other parcels owned by Canadian Royalties Inc.
		1	5	L13391		16.92	Mining Patent	Surface Rights Only		
		1	5	L15799		16.80	Mining Patent	Surface Rights Only		
		1	5	L22257		15.61	Mining Patent	Surface Rights Only		
		1	5	L22258		15.60	Mining Patent	Surface Rights Only		
		1	4	L11397		17.39	Mining Patent	Surface Rights Only		
		1	4	L16477		15.77	Mining Patent	Surface Rights Only		
		1	4	L22527		15.54	Mining Patent	Surface Rights Only		
		1	4	L22915		15.96	Mining Patent	Surface Rights Only		
		2	4	L13510		16.46	Mining Patent	Surface Rights Only		
		2	5	L13508		16.29	Mining Patent	Surface Rights Only		
		2	5	L13509		15.77	Mining Patent	Surface Rights Only		
Beatty	65366-0127	1	6	14572 SEC		59.49	Mining Patent	Surface and Mineral Rights	Joachim Joseph DeCarlo	a) Net Profits Royalty. Royalty Account established by Brigus Gold (owner) with the following expenses deducted: preproductions, 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.

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
										b) In the event of a debit balance in the royalty account, Brigus Gold retains all new profits.
Beatty	65366-0129	1	7	23874 SEC		124.02	Mining Patent	Mineral Rights Only	No Royalty Holder	No Royalty
Beatty	65366-0143	1	8	4150 SEC		59.36	Mining Patent	Surface and Mineral Rights	Lisa Steinman	a) 3.0% NSR paid quarterly b) 1% NSR can be purchased by Brigus Gold for C$1,000,000
Beatty	65366-0199	1	6		L1115059	16.56	Mining Lease	Mineral Rights Only	No Royalty Holder	No Royalty
Hislop	65380-0520	5	4	23687 SEC		69.22	Mining Patent	Surface and Mineral Rights	i) Newmont Canada ii) Parsons/Ginn	i) 2.5% NSR ii) Advance royalty of C$3,000 payable each year ii) 5% Net Proceeds Royalty ii) Sliding Production Royalty based on the price of gold
Hislop	65380-0489	4	3	16262 SEC		64.14	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		32.48	Mining Patent	Surface and Mineral Rights	Estate of Frederick William	3% NSR

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
									Schumacher, c/o The Canada Trust Company	
Hislop	65380-0491	4	2	16266 SEC		32.48	Mining Patent	Surface and Mineral Rights	Estate of Frederick William Schumacher, c/o The Canada Trust Company	3% NSR
Hislop	65380-0498	5	3	3852 SEC		58.03	Mining Patent	Lease Mineral Rights	i) Tracy & Brent Gray ii) Newmont Canada iii) Parsons/Ginn	i) 0.15% NSR ii) 2.5% NSR iii) Advance royalty of C$3,000 payable each year iii) 5% Net Proceeds Royalty
Hislop	65380-0526	2	5	2563 SEC		66.25	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 Brigus Gold for C$1,000,000
Hislop	65380-0530	6	3	3310 SEC		64.92	Mining Patent	Surface and Mineral Rights	Thomas MacFarlne	a) 2% NSR

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
									Sheila MacFarlane	b) 1% NSR can be purchased by Brigus Gold for C$1,000,000
Hislop	65380-0531	6	4	10706 SEC		66.29	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0532	6	6	6413 SEC		31.10	Mining Patent	Surface and Mineral Rights	Shirley Maud Alyman Raphael Thomas Alyman	a) 2% NSR paid quarterly b) 1% NSR can be purchased by Brigus Gold for C$1,000,000 within one year of the commencement of commercial production c) time period to purchase 1% NSR may be extended at the Alymans' discretion
Hislop (suite)	65380-0532									
Hislop	65380-0534	6	7	388 SEC		65.32	Mining Patent	Surface and Mineral Rights	Shirley Maud Alyman Raphael Thomas Alyman	a) 2% NSR paid quarterly b) 1% NSR can be purchased by Brigus Gold for C$1,000,000 within one year of the commencement of commercial production c) time period to purchase 1% NSR may be extended at the Alymans' discretion
Hislop	65380-0552	6	8	7745 SEC		70.02	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):

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
										- 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 Brigus Gold for C$1,000,000
Hislop	65380-0553	6	7	4707 SEC		17.53	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 Brigus Gold for C$2,000,000 at any time

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
Hislop	65380-0555	6	7	15466 SEC		39.83	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0557	6	6	2582 SEC		65.77	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0558	6	5	11511 SEC		31.62	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0559	6	4	3393 SEC		67.29	Mining Patent	Surface and Mineral Rights	No Royalty Holder	No Royalty
Hislop	65380-0566	4	4	23777 SEC		64.95	Mining Patent	Surface and Mineral Rights	i) Newmont Canada ii) Parsons/Ginn	i) 2.5% NSR ii) Advance royalty of C$3,000 payable each year ii) 5% Net Proceeds Royalty ii) Sliding Production Royalty based on the price of gold
Hislop	65380-0636	5	4	1725 LC	L512568	16.19	Mining Lease	Mineral Rights Only	i) Newmont Canada ii) Parsons/Ginn	i) 2.5% NSR ii) Advance royalty of C$3,000 payable each year ii) 5% Net Proceeds Royalty ii) Sliding Production Royalty based on the price of gold
		5	4	1725 LC	L512569	16.19	Mining Lease	Mineral Rights Only		
		5	4	1725 LC	L512570	17.03	Mining Lease	Mineral Rights Only		
		5	4	1725 LC	L512571	15.20	Mining Lease	Mineral Rights Only		
		5	4	1725 LC	L512572	18.57	Mining Lease	Mineral Rights Only		
		5	4	1725 LC	L512573	15.82	Mining Lease	Mineral Rights Only		
		5	3	1725 LC	L512574	17.74	Mining Lease	Mineral Rights Only		
		5	3	1725 LC	L512575	16.04	Mining Lease	Mineral Rights Only		
		5	3	1725 LC	L512576	16.69	Mining Lease	Mineral Rights Only		
		5	3	1725 LC	L512577	15.24	Mining Lease	Mineral Rights Only		
Hislop	65380-0637	5	5	1726 LC	L547989	17.43	Mining Lease	Mineral Rights Only	i) Newmont Canada	i) 2.5% NSR
		5	5	1726 LC	L547990	15.99	Mining Lease	Mineral Rights Only		

Township	PIN Number	Concession Number	Lot Number	Parcel Number	Mining Claims	Hectares	Mining Tenures	Status	Royalty Holder	Royalties or Financial Obligations of Brigus Gold
									ii) Parsons/Ginn	ii) Advance royalty of C$3,000 payable each year ii) 5% Net Proceeds Royalty ii) Sliding Production Royalty based on the price of gold
Hislop	65380-0638	6	5	1726 LC	L531728	15.82	Mining Lease	Mineral Rights Only	i) Newmont Canada	i) 2.5% NSR
		6	5	1726 LC	L531729	18.17	Mining Lease	Mineral Rights Only		
		6	5	1726 LC	L531730	17.65	Mining Lease	Mineral Rights Only	ii) Parsons/Ginn	ii) Advance royalty of C$3,000 payable each year
		6	5	1726 LC	L531731	15.25	Mining Lease	Mineral Rights Only		ii) 5% Net Proceeds Royalty
		6	6	1726 LC	L547915	16.32	Mining Lease	Mineral Rights Only		ii) Sliding Production Royalty based on the price of gold
Hislop	65380-0670	6	5		L1048334	18.50	Mining Lease	Mineral Rights Only	No Royalty Holder	No Royalty
		6	6		L1048335	16.22	Mining Lease	Mineral Rights Only		
Hislop	65380-0671	6	7		L1113087	9.07	Licence of occupation	Mineral Rights Only	No Royalty Holder	No Royalty
Hislop	65380-0676	6	5		L1048333	17.65	Mining Lease	Mineral Rights Only	No Royalty Holder	No Royalty

4.4 AGREEMENTS AND ENCUMBRANCE

Many agreements have been executed in the acquisition of the Black Fox Complex and most of the parcels and mining titles are subject to charges/mortgages in favour of RMB Resources Inc. Moreover, Newmont Canada Corporation has the first right to negotiate to purchase the property under Instrument Number CB56690.

4.4.1 Acquisition by Apollo Gold

Purchase of the Glimmer mine

Apollo Gold Corporation ("Apollo Gold") concluded an option to purchase 100% 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 (Fig. 4.4). The purchase involved a payment of C$3,159,000 and the issuance of 2 million shares of Apollo Gold (now Brigus 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. The property is not subject to any production royalties. Apollo Gold acquired 100% ownership and control of the property and all mineral, surface, and forestry rights.

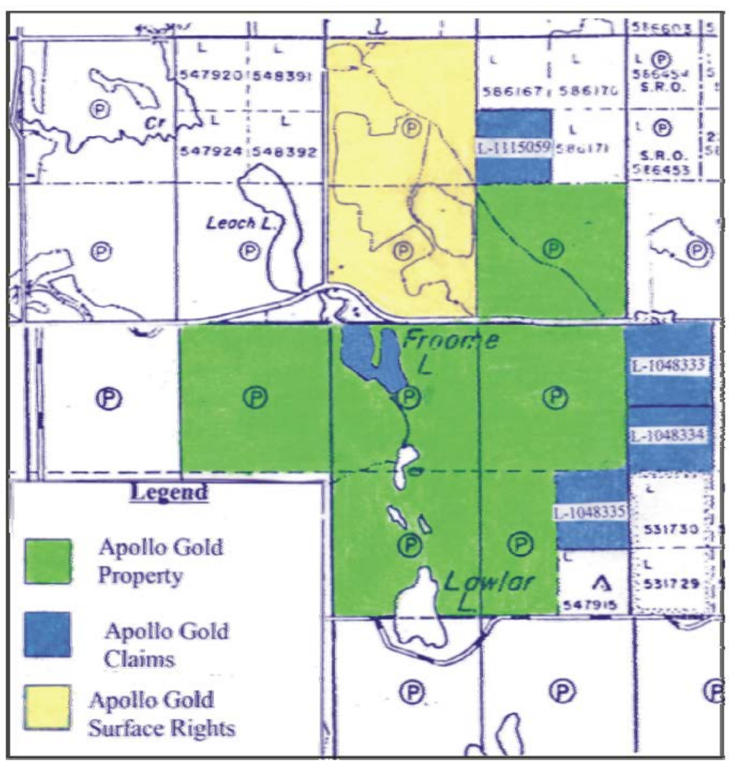


Figure 4.4 – Black Fox property purchased in 2002 by Apollo Gold (from Prenn, 2003)

Acquisition of adjacent land of the Glimmer mine

The Plouffe property, consisting of Parcel 7745 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%
From $225 to $249.99: 0.50%
From $250 to $274.99: 0.75%
From $275 to $299.99: 1.00%
From $300 to $324.99: 1.25%
From $325 to $349.99: 1.50%
From $350 to $374.99: 1.75%
From $375 to $399.99: 2.00%
From $400 to $424.99: 2.25%
From $425 to $449.99: 2.50%
From $450 to $474.99: 2.75%
From $475 to $499.99: 3.00%
Above $500: 3.25%

The Durham property, consisting of Parcel 4707 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% NSR less permitted deductions paid quarterly must be paid to the royalty holder.

Additional adjacent land was purchased by Apollo Gold late in 2003. The Ewen property, consisting of parcels 11511 and 3393 in Hislop Township, was purchased in November 2003 for $180,000 (Prenn, 2004). No resources or reserves have been defined on the Ewen property, but if found would be subject to a 3% 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. According to Brigus Gold's financial obligation documents, there is no known royalty attached to parcels 11511 and 3393.

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 carries mineral rights, and all carry surface rights. Parcel 24577 SEC is subject to a 2% NSR royalty. Apollo Gold has a first right to buy out 1% 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 Parcel 4150 in Beatty Township, was purchased in July 2007 for C$200,000 (Young et al., 2007). The property is subject to a 2.5% NSR. Apollo Gold has a first right to buy out 1% of the NSR for C$1,000,000.

On November 6, 2007, Apollo Gold leased the surface and mining rights from the Frederick William Schumacher estate to parcels 16262, 16265 and 16266, all in Hislop Township (Apollo Gold press release of November 27, 2007). The terms of the lease are as follows:

- Term of twenty (20) years, with twenty-year extensions at the discretion of Apollo Gold.
- Exploration expenditures of C$1,000,000 due on or before November 6, 2009.
- Annual rent of C$100,000 due on the 6th day of November in each and every year up to and including November 6, 2010.
- Pre-commercial production subject to Consumer Price Indexing: A minimum annual prepayment production royalty of C$100,000 payable in equal quarterly instalments of C$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.
- Commercial production subject to Consumer Price Indexing: A sum equal to the greater of C$100,000 or the Production Royalty equivalent to a 3% NSR paid quarterly less the total of all prepaid production royalties paid under (C) above with a minimum annual payment of C$100,000 paid quarterly.

Pike River property agreement

On September 9, 2009, Apollo Gold, completed the acquisition of the Pike River property from Newmont Canada Corporation (Brigus Gold, 2010 Annual Information Form). The Pike River property comprises the surface and mineral rights to approximately 1,145 acres consisting of parcels 23687 SEC, 23777 SEC, 3852 SEC and 11125 SEC, 1735 LC (mining claims L512568 to L512577), 1726 LC (mining claims L531728 to L531731; L547989 and L547990; L547915).

Pursuant to the terms of the purchase agreement, Apollo Gold paid Newmont Canada Corporation the sum of $100,000 and granted Newmont Canada Corporation a perpetual 2.5% 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 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.

Mining claims L512568 to L512577 (Parcel 1735 LC), mining claims L531728 to L531731 (Parcel 1726 LC), mining claim L547915 (Parcel 1726 LC), and mining claims L547989 to L547990 (Parcel 1726 LC), Parcel 3852 SEC, Parcel 23777 SEC, and Parcel 23687 SEC are also liable to other financial obligations with royalty holder Parsons-Ginn. The terms of the financial obligations of Apollo Gold are as follows:

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

Parcel 3852 is also liable to other financial obligations of Brigus Gold with royalty holders Brent George Gray and Tracy Edwin Gray. The terms of the financial obligation are as follows:

- Net Smelter Royalty of 0.15% 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.

4.4.2 Acquisition by Brigus Gold

Additional adjacent land was purchased by Brigus Gold. The MacFarlane property consisting of Parcel 3310 SEC 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% NSR in favour of Thomas and Sheila MacFarlane. Brigus Gold has the right but not the obligation to purchase 1% of the NSR for the sum of C$1,000,000.

The Riehl and Stere property, consisting of Parcel 2563 SEC 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% NSR in favour of the Riehl and Stere parties. The 2% NSR is allocated as follows: 25% to David Ross Riehl, 25% to Helen Bernadette Riehl, 25% to Dale Richard Stere, 12.5% Russell Rae Stere, and 12.5% to Trevor Verle Stere. Brigus Gold has the right but not the obligation to purchase 1% of the NSR for the sum of C$1,000,000.

4.5 GOLD STREAM AGREEMENT

On November 9, 2010, Brigus Gold entered into the Gold Stream Agreement with Sandstorm Resources Ltd (“Sandstorm”) pursuant to which Sandstorm agreed to purchase 12% of the gold production from the Black Fox mine beginning in January 2011 and 10% of future production from the Black Fox Extension covering a portion of the adjoining Pike River property (Brigus Gold, 2010 Annual Information Form). Sandstorm made an upfront payment of US$56.3 million of which Brigus Gold used a portion to effectively settle the balance of its forward gold sales contracts eliminating the obligation to deliver 99,409 ounces from October 2011 to March 2013 and as a result Brigus Gold is now an unhedged gold producer with no gold derivative contracts. Sandstorm will also pay Brigus Gold ongoing per-ounce payments of US$500 subject to an inflationary adjustment beginning in 2013, not to exceed 2% per annum. Brigus Gold has the option, for a 24-month period, to reduce the Gold Stream Agreement to 6% of production from the Black Fox mine and 4.5% of production from Black Fox Extension for a payment of US$36.6 million.

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% of the Gold Stream Agreement relating to production from the Black Fox mine and 3.7% of the production from Black Fox Extension. Sandstorm is now entitled to 8% of the production from the Black Fox mine and 6.3% 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.

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.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Black Fox Complex (Fig. 5.1) is located approximately 10 km east of the town of Matheson, which lies 55 km north-northwest of Kirkland Lake (population ~8,200), and 60 km east of Timmins (population ~43,000). 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 2,600. Access within the property is achieved by various drill roads and all-terrain vehicle (ATV) trails.

5.2 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 mm (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 km/hr (Dyck, 2007). It is possible to conduct exploration activities year-round.

5.3 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 deposit 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.

5.4 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 0.7 km west of the mine, Leach Lake located 1.4 km northwest of the mine and Lawler Lake located 1.7 km to the south. Two others, Salve Lake and Nickel Lake respectively located 5.2 and 5.9 km north of the mine, form the headwaters of Salve Creek. Salve Lake is designated as a Forest Reserve and Recommended Conservation Reserve (Dyck, 2007).

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).

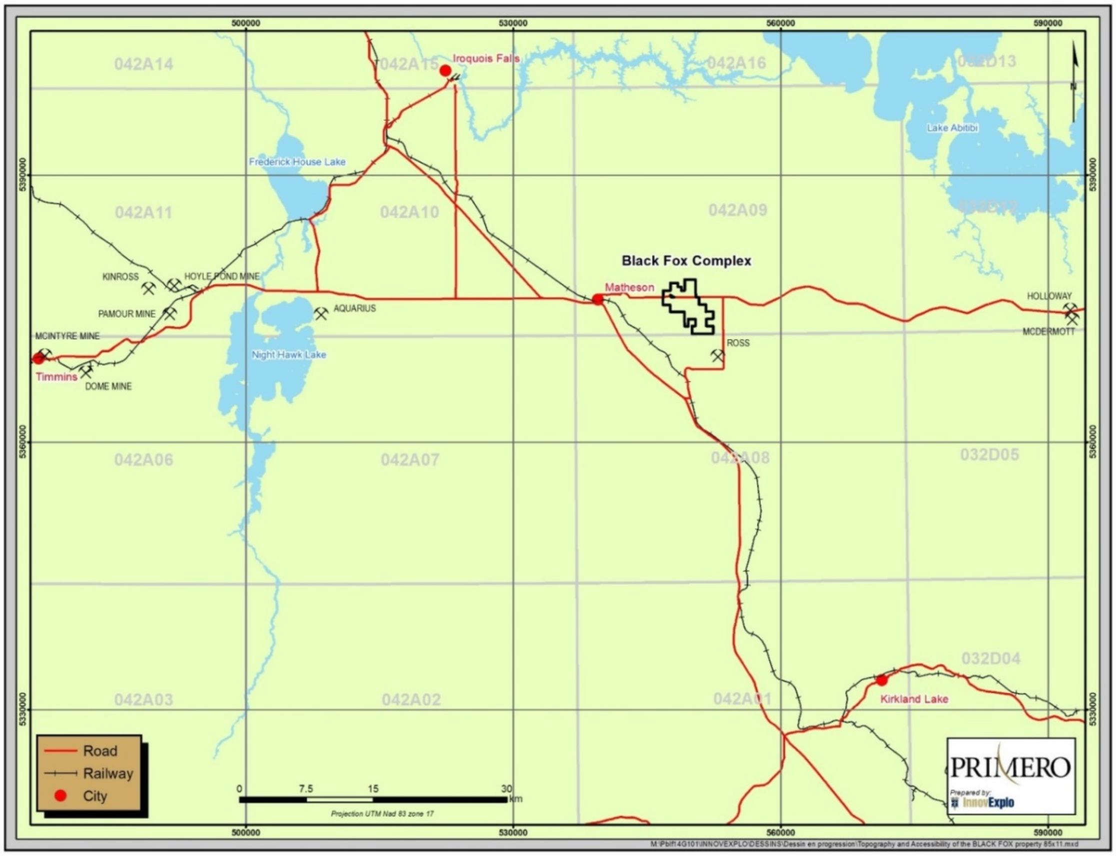


Figure 5.1 – Black Fox property access

6 HISTORY

6.1 BLACK FOX MINE AREA

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% interest in the property. Between 1989 and 1994, Noranda, and later Hemlo Gold Mines Inc., completed eight drill programs. In all, 27,800 m (91,206 ft) 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 m. Drill-indicated reserves cut to 34 g/t Au were calculated to be 634,234 tonnes averaging 11.72 g/t Au, including a mineable reserve of 499,490 tonnes averaging 11.14 g/t Au. 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% 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 6.1).

Table 6.1 – Production history of the Glimmer mine from 1997 to 2001

Year	Metric tonnes	Grade g/t Au	Ounces	Gold Recovery (%)
1997	194,460	6.79	39,884	96.38
1998	308,734	6.67	64,319	96.90
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 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 m was drilled in 399 surface holes, and another 79,184 m in 396 holes from underground development. In addition to diamond drilling, exploration was conducted by way of IP surveys.

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 Au at a cut-off grade of 1.0 g/t Au (730,000 oz) and underground reserves were 2,110,000 tonnes grading 8.8 g/t Au at a cut-off grade of 3.0 g/t Au (600,000 oz). Underground reserves assumed 95% mining recovery, with 17% planned and 5% 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 Project 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 property.

Apollo Gold and Linear Gold Corporation merged to form Brigus Gold Corporation in June 2010. The drilling surface program completed 14 condemnation drill holes (3,468 m) around the Black Fox mine. A helicopter-borne, high-resolution magnetometer survey was completed in September 2010, covering the 17-km2 Black Fox Complex.

A total of 1,570 holes (total of 145,919 m) 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 2013 is summarized in Table 6.2.

Table 6.2 – Production history of the Black Fox mine since 2009

Black Fox mine	2009	2010	2011	2012	2013	March 31, 2014	Total
Open pit ore tonnes mined	631,000	792,482	433,267	907,077	663,428	199,861	3,627,115
Underground ore tonnes mined			170,889	164,926	297,110	66,621	699,546
Total ore tonnes mined	631,000	792,482	604,156	1,072,003	960,538	266,482	4,326,661
Tonnes milled	531,000	718,400	725,541	735,573	752,959	189,799	3,653,272
Head grade of ore (g/t Au)	3.28	3.17	2.54	3.43	4.34	3.04	3.34
Recovery (%)	93%	92%	94%	95%	94%	93%	93.6%
Gold ounces produced	52,152	67,499	55,756	77,374	98,710	17,394	368,885

6.2 GREY FOX DEPOSIT AREA

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 Au. This included 1,270,000 tonnes at 7.0 g/t Au (Garber and Dahn, 1997). The second estimate, calculated from Gemcom software via polygonal method, was reported as 1,163,897 tonnes @ 6.4 g/t Au (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 Au 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 m 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 m.

The 2010 Brigus Gold exploration drilling program completed 69 drill holes (26,805 m) at the Grey Fox and Pike River properties that included 34 drill holes (12,703 m) on the Contact Zone, 14 drill holes (5,123 m) on the Gibson deposit/shear, 3 drill holes (1,503 m) on the Grey Fox South Zone, 11 drill holes (4,336 m) on the Hislop North target and 7 drill holes (3,139 m) on the 147 Zone.

The 2011 Brigus Gold exploration drilling program completed 247 drill holes (92,273 m) at the Grey Fox and Pike River properties comprising 79 drill holes (27,881 m) on the Contact Zone, 28 drill holes (8,798 m) on the Gibson deposit/shear, 2 drill holes (883 m) on the Grey Fox South Zone and 138 drill holes (54,710 m) 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 m 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 Au. The total Inferred Resource was 1,692,267 t at a grade of 1.67 g/t Au. The classified Mineral Resources are shown in Table 6.3.

Table 6.3 – 2012 resource estimate for the Contact and 147 zones, Black Fox Complex (Daigle, 2012)

Resource Class	Cut-off Grade (g/t Au)	Potential Material	Tonnes (t)	Capped Au (g/t)	Contained Au (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 drill holes (76,566 m) at the Grey Fox deposit area, comprising 64 drill holes (20,285 m) on the Contact Zone, 140 drill holes (33,902 m) on the 147 Zone, 1 drill hole (260 m) on the new Whiskey Jack Zone and 56 drill holes (22,119 m) 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 6.4 presents the combined 2013 resources by category for the overall Grey Fox Project.

Table 6.4 – 2013 Resource estimate results for the Grey Fox project (Richard et al., 2013)

Grey Fox – 2013 MINERAL RESOURCE ESTIMATE					
Resource Class	**Cut-off Grade (g/t Au)**	**Potential Material**	**Tonnes**	**Capped Au (g/t)**	**Contained Au (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**

The 2013 Brigus Gold drilling program focused on expanding and infill-drilling the 147, Contact and Grey Fox South zones. A total of 139 drill holes for 62,918 m were drilled on the Grey Fox deposit area in 2013.

No hole was 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 m.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 REGIONAL GEOLOGICAL SETTING

7.1.1 Archean Superior Province

The Archean Superior Province (Fig. 7.1) forms the core of the North American continent and is surrounded by provinces of Paleoproterozoic age to the west, north and east, and by the Grenville Province of Mesoproterozoic age to the southeast. Tectonic stability has prevailed since approximately 2.6 Ga in large parts of the Superior Province. Proterozoic and younger activity is limited to rifting of the margins, emplacement of numerous mafic dyke swarms (Buchan and Ernst, 2004), compressional reactivation, large-scale rotation at approximately 1.9 Ga, and failed rifting at approximately 1.1 Ga. With the exception of the northwest and northeast Superior margins that were pervasively deformed and metamorphosed at 1.9 to 1.8 Ga, the craton has otherwise escaped ductile deformation.

A first-order feature of the Superior Province is its linear subprovinces, or “terranes”, of distinctive lithological and structural character, accentuated by subparallel boundary faults (e.g., Card and Ciesielski, 1986). Trends are generally east-west in the south, west-northwest in the northwest, and northwest in the northeast. In Figure 7.1, the term “terrane” is used in the sense of a geological domain with a distinct geological history prior to its amalgamation into the Superior Province during the 2.72 Ga to 2.68 Ga assembly events, and a “superterrane” shows evidence for internal amalgamation of terranes prior to the Neoarchean assembly. “Domains” are defined as distinct regions within a terrane or superterrane.

The Black Fox Complex is located within the Abitibi Terrane. The Abitibi Terrane hosts some of the richest mineral deposits of the Superior Province (Fig. 7.1), including the giant Kidd Creek massive sulphide deposit (Hannington et al., 1999) and the large gold camps of Ontario and Québec (Robert and Poulsen, 1997; Poulsen et al., 2000).

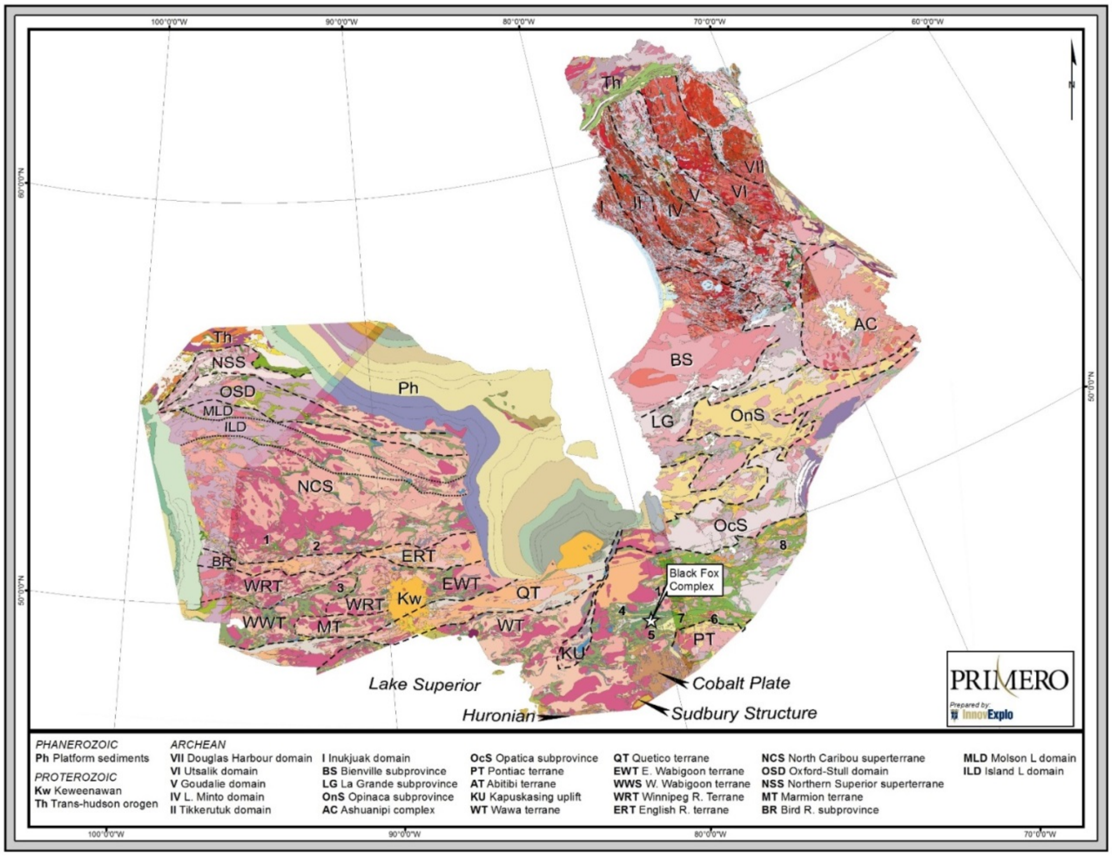


Figure 7.1 – Mosaic map of the Superior Province showing major tectonic elements, from Percival (2007). Data sources: Manitoba (1965), Ontario (1992), Thériault (2002), Leclair (2005). Major mineral districts: 1 = Red Lake; 2 = Confederation Lake; 3 = Sturgeon Lake; 4 = Timmins; 5 = Kirkland Lake; 6 = Cadillac; 7 = Noranda; 8 = Chibougamau;.

7.1.2 Abitibi Terrane (Abitibi Subprovince)

The Black Fox Complex lies within the Abitibi Subprovince (Abitibi Greenstone Belt) of the Archean Superior craton, in eastern Canada (Fig. 7.1), along the northern margin of the Porcupine-Destor Deformation Zone (PDDZ; a.k.a. the Porcupine-Destor-Manneville Deformation Zone on the Québec side). This and the Larder Lake–Cadillac Fault Zone are the most important deformation zones within the Abitibi Subprovince in terms of both structural effects and gold production.

The Abitibi Subprovince is divided into the Southern and Northern volcanic zones (SVZ and NVZ; Chown et al. 1992) representing a collage of two arcs delineated by the DPFZ (Mueller et al. 1996). The SVZ is separated from the Pontiac Terrane accretionary prism sediments (Calvert and Ludden 1999) to the south by the Larder Lake–Cadillac Fault Zone. The fault zones are terrane "zippers" that display the change from thrusting to transcurrent motion as documented in the turbiditic flysch basins unconformably overlain by, or in structural contact with, coarse clastic deposits in strike-slip basins (Mueller et al. 1991, 1994, 1996; Daigneault et al. 2002). A further subdivision of the NVZ into external and internal segments is warranted, based on distinct structural patterns with the intra-arc Chicobi sedimentary sequence representing the line of demarcation. Dimroth et al. (1982, 1983a) recognized this difference and used it to define internal and external zones (Fig, 7.2) of the Abitibi Greenstone Belt. Subsequently, numerous alternative Abitibi divisions were proposed (see Chown et al., 1992), but all models revolved around a plate tectonic theme. The identification of a remnant Archean north-dipping subduction zone by Calvert et al. (1995) corroborated these early studies.

The 2735-2705 Ma NVZ is ten (10) times larger than the 2715-2697 Ma SVZ, and both granitoid bodies and layered complexes are abundant in the former. In contrast, plume-generated komatiites, a distinct feature of the SVZ, are only a minor component of the NVZ, observed only in the Cartwright Hills and Lake Abitibi area (Daigneault et al. 2004). Komatiites rarely constitute more than 5% of greenstone sequences and the Abitibi is no exception (Sproule et al. 2002). The linear sedimentary basins are significant in the history because they link arcs and best chronicle the structural evolution and tempo of Archean accretionary processes. The NVZ is composed of volcanics cycles 1 and 2, which are synchronous with sedimentary cycles 1 and 2, whereas the SVZ exhibits volcanic cycles 2 and 3, with sedimentary cycles 3 and 4 (Mueller et al. 1989; Chown et al. 1992; Mueller and Donaldson 1992; Mueller et al. 1996).

The southern Abitibi, in Ontario, is now interpreted to consist of nine autochthonous volcanic or sedimentary supracrustal assemblages (Ayer et al., 2002), whereas it was previously interpreted as an amalgamation of numerous allochthonous terranes (Dimroth et al., 1983a; Jackson, 1994; Daigneault et al., 2002). In this autochthonous model, volcano-sedimentary successions throughout the Abitibi span 75 million years (2750-2675 Ma) and have conformable, unconformable, or disconformable contacts, which may be structurally modified.

The Abitibi Subprovince displays a prominent E-W structural trend resulting from regional E-trending folds with an axial-planar schistosity that is characteristic of the Abitibi Greenstone Belt (Daigneault et al. 2002). The schistosity displays local variations in strike and dip, which are attributed to either oblique faults cross-cutting the regional trend, or deformation aureoles around resistant plutonic suites. Although dominant steeply-dipping fabrics are prevalent in the Abitibi Subprovince, shallow-dipping fabrics are recorded in the Pontiac Subprovince and at the SVZ-NVZ interface in the Preissac-Lacorne area.

The PDDZ (Hurst, 1936; Pyke, 1982) is the principal structure in the area of the Black Fox Complex. It is a poorly exposed, regionally extensive fault zone that is characterized by steeply clipping penetrative foliations and serpentinite and talc-chlorite schists (Pyke, 1982). The PDDZ is interpreted as a steeply dipping, long-lived strike-slip structure, more than 450 km long, which was active between ca. 2680 and 2600 Ma. There is no significant difference in crustal level on either side (hence there is negligible net dip-slip component) but there is a minimum lateral offset of several kilometres (Bleeker, 1997). Diamond drilling indicates that the ductile component of the PDDZ is some hundreds of metres across, consisting of high-strain zones principally in ultramafic rocks, anastomosing around lower strain lozenges.

The metamorphic grade in the Abitibi Subprovince displays greenschist to sub-greenschist facies (Joly, 1978; Powell et al., 1993; Dimroth et al., 1983b; Benn et al., 1994) except around plutons where amphibolite grade prevails (Joly, 1978). In contrast, two (2) extensive high-grade zones coincide with areas of shallow-dipping fabrics. They are: (1) the turbiditic sandstone and mudstone of the Pontiac Subprovince at the SVZ contact which exhibit a staurolite-garnet-hornblende-biotite assemblage (Joly, 1978; Benn et al., 1994); and (2) the Lac Caste Formation turbidites at the SVZ-NVZ interface (Malartic segment) with sandstone and mudstone metamorphosed to biotite schist with garnet and staurolite. Feng and Kerrich (1992) suggested that the juxtaposition of greenschist and amphibolite grade domains indicates uplift occurred during the compressional stage of collisional tectonics. According to Berger (2002), most of the rocks of southern Abitibi, in the region of the Black Fox Complex, contain metamorphic mineral assemblages indicative of regional greenschist-facies metamorphism. Primary plagioclase, amphibole and, less commonly, pyroxene are largely replaced by metamorphic chlorite and epidote in mafic metavolcanic rocks. Epidote and quartz knots and stringers are locally abundant in pillow selvages and occur as amygdules. Leucoxene commonly replaces magneto-ilmenite, and secondary quartz occurs in narrow stringers in many places. Secondary amphibole occurs only adjacent to alkalic plutons and is considered part of a contact metamorphic aureole. Low-grade metamorphism is not apparently preserved in the mafic metavolcanic rocks, since zeolite minerals were not identified in the field or in thin section. Greenschist-facies metamorphic minerals in pelitic metasedimentary rocks are characteristically iron-rich chlorite and, less commonly, white mica. Primary detrital grains are well preserved in all metasedimentary rocks that have not undergone extensive hydrothermal alteration. In most places, biotite is absent indicating that metamorphism at low greenschist facies affected much of the area. Biotite does occur in metasedimentary rocks adjacent to some of the alkalic plutons, which is interpreted as a product of contact metamorphism.

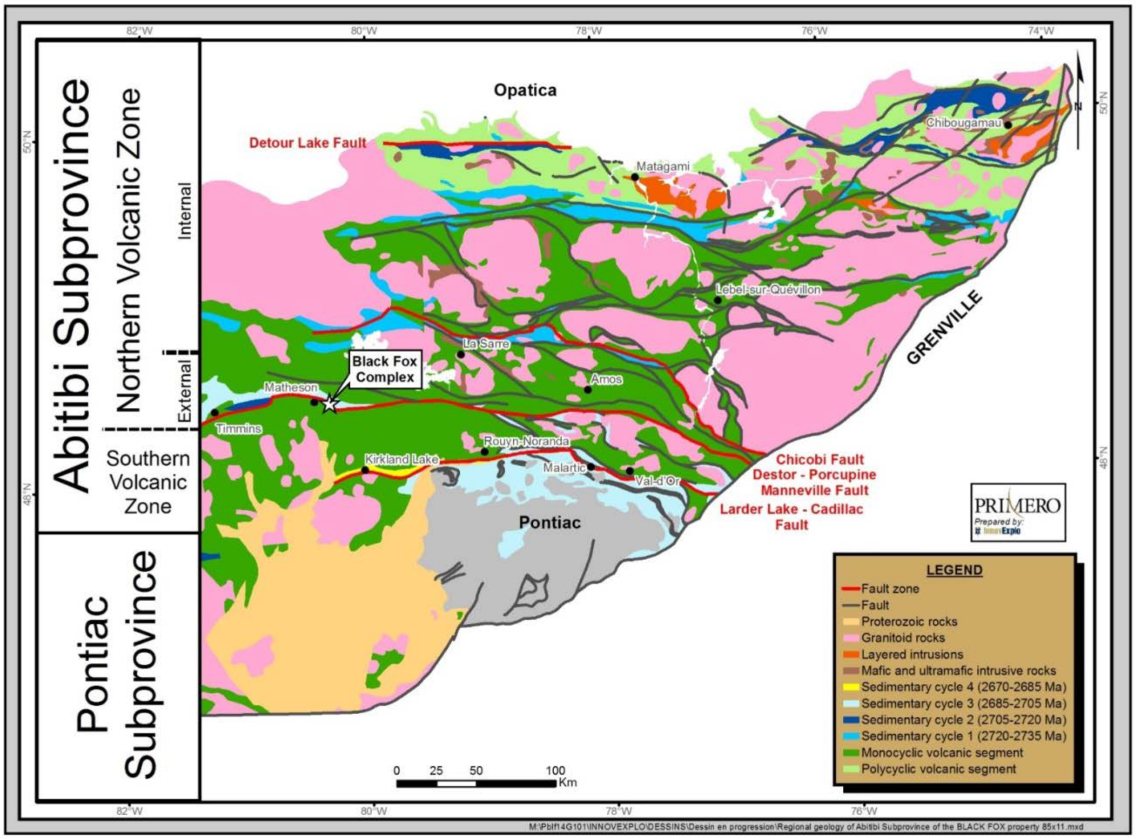


Figure 7.2 – Location of the Black Fox Complex on a map of the Abitibi Greenstone Belt showing divisions into Southern and Northern volcanic zones (SVZ and NVZ), with external and internal segments in the NVZ. Modified from Chown et al. (1992), Daigneault et al. (2002, 2004), and Mueller et al. (2009).

7.2 REGIONAL GEOLOGICAL SETTING

The local geological setting in the Highway 101 area is represented by Neoarchean supracrustal rocks intruded by Paleoproterozoic 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). These rocks are divided into five (5) distinct packages based on morphology, petrography, geochemistry and geochronology (Fig. 7.3). The packages or assemblages in the Highway 101 area (cf. Thurston, 1991) correlate with regional assemblages proposed by Jackson and Fyon (1991) and modified by Ayer et al. (1999b). The five assemblages are (from oldest to youngest): Kidd-Munro, Tisdale, Kinojevis, 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.

7.2.1 Tisdale Assemblage

The Tisdale Assemblage underlies the part of Hislop Township to the north of the Arrow Fault (local name) and to the 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. Jackson and Fyon (1991) referred to these rocks as the Bowman Assemblage, although Ayer et al., (1999a) and Ayer et al. (1999b) included these rocks with the Tisdale Assemblage based on U/Pb ages (ca. 2704 Ma) 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% 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.

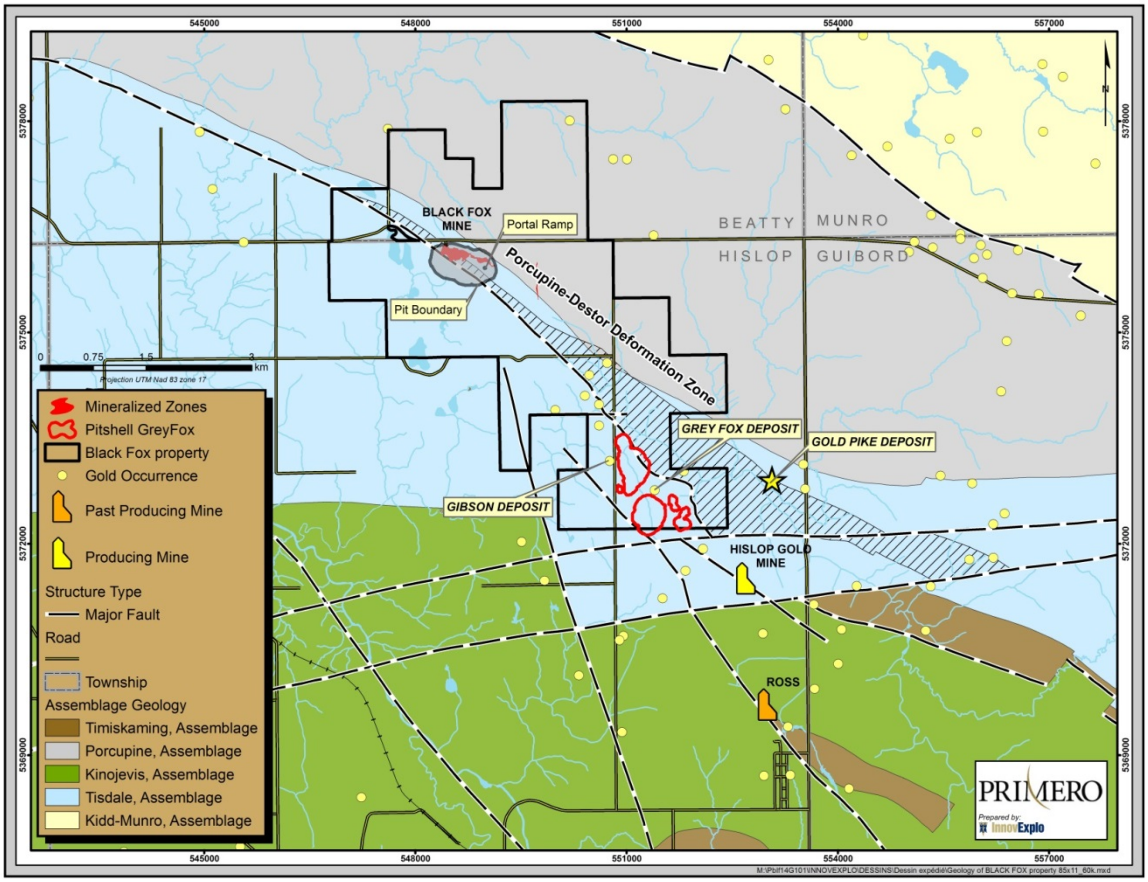


Figure 7.3 – Regional geological setting of the Black Fox Complex geology (adapted and modified from Ayer et al., 2005)

Pillowed flows are common. The pillows measure 60 to 70 cm long by 30 to 40 cm wide and display rims up to 2 cm thick (Berger, 2002). They are generally well formed and may be either closely packed with little interpillow material or may have up to 15% 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 cm in size, but average 2 to 8 cm. 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 St Andrew Goldfields Ltd contain 30 to 85% varioles that are commonly coalesced. Some outcrops that appear massive and display green-grey weathering contain microscopic variole structures. 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 Fe to Mg 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 Glimmer mine (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 km to the west (Berger, 2000b).

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. (1999) indicated that the Porcupine Assemblage is widespread in the Abitibi Subprovince and, in general, the youngest detrital zircons are approximately 2695 Ma.

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 cm thick are common, although massive wacke beds up to 70 cm thick were observed 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% 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).

Light green to black argillite beds, a few millimetres to 5 cm thick, commonly overlie wacke beds and locally form units up to 3 m thick near the contact with the Kidd–Munro and Tisdale assemblages (Berger, 2002). Argillite beds that cap wacke are commonly laminated or massive and, as such, form the D and E subdivisions of the Bouma sequence (Walker 1992). Recognition of the Bouma sequence indicates that turbidity currents deposited these sediments in a subaqueous environment below the wave base. Argillite is composed of very fine-grained quartz, feldspar, white mica and chlorite. Graphite and less common disseminated pyrite are the opaque minerals that comprise up to 65% of the rock near Guibord Hill and most likely account for airborne electromagnetic conductors in this area.

Pebble conglomerate occurs near the Talisman gold mine in northern Guibord Township (Berger, 2002). The outcrop area is heavily overgrown, but observations largely support previous data collected by Bath (1990). The conglomerate is confined to a narrow interval approximately 1.5 to 2 m wide and is composed of 1 to 7 mm subangular to subrounded fragments, which are composed of chert, argillite, siltstone, felsic metavolcanic and quartz-feldspar porphyry clasts. Carbonate and sericite alteration, combined with quartz veining and rusty weathered pyrite, mask the surface relationships with other rock types. More than 25% of the pebbles were derived from felsic metavolcanic and quartz-feldspar porphyry sources. Some of the felsic clasts are amphibole-phyric and a calc-alkaline geochemical affinity is inferred. Quartz occurs as clasts, as phenocrysts within fragments, and in the matrix as detrital grains and as secondary crystals introduced by alteration events. Silicification, combined with carbonate and sericite alteration, masks many of the primary textures. The rock is texturally immature indicating that transportation and reworking of the fragments was not extensive.

7.2.3 Faults

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 km. The PDDZ strikes southeast in Hislop Township and generally becomes more east striking along the rest of Highway 101 (Gerber, 2002). The deformation zone is complex, with different structural styles restricted to specific segments. Each segment is bounded, 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 (Fig. 7.4).

West of the Hislop Fault, the PDDZ strikes southeast to east and dips moderately (45 to 65°) to the south (Fig. 7.4). 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 m 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) and south-over-north thrusting is interpreted on the fault zone in the Monteith area.

The main trace of the PDDZ (Fig. 7.4) 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 m 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 Kinojevis 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.

Hislop Fault

The Hislop Fault (Fig. 7.4) is located near the west limit of the Grey Fox property. This fault strikes approximately N345° and extends from south of the Grey Fox property area through the east-central part of Hislop Township. The Hislop Fault represents a pronounced lineament across which there is a 40° 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 Kinojevis 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 2001).

Ross Fault

Jensen (1985) identified the Ross Fault as the northwest-striking lineament immediately east of the Ross mine (Fig. 7.4). 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 (Fig. 7.4) is a local name applied to a shear zone striking 085° located near of the south limit of the Grey Fox property. 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.

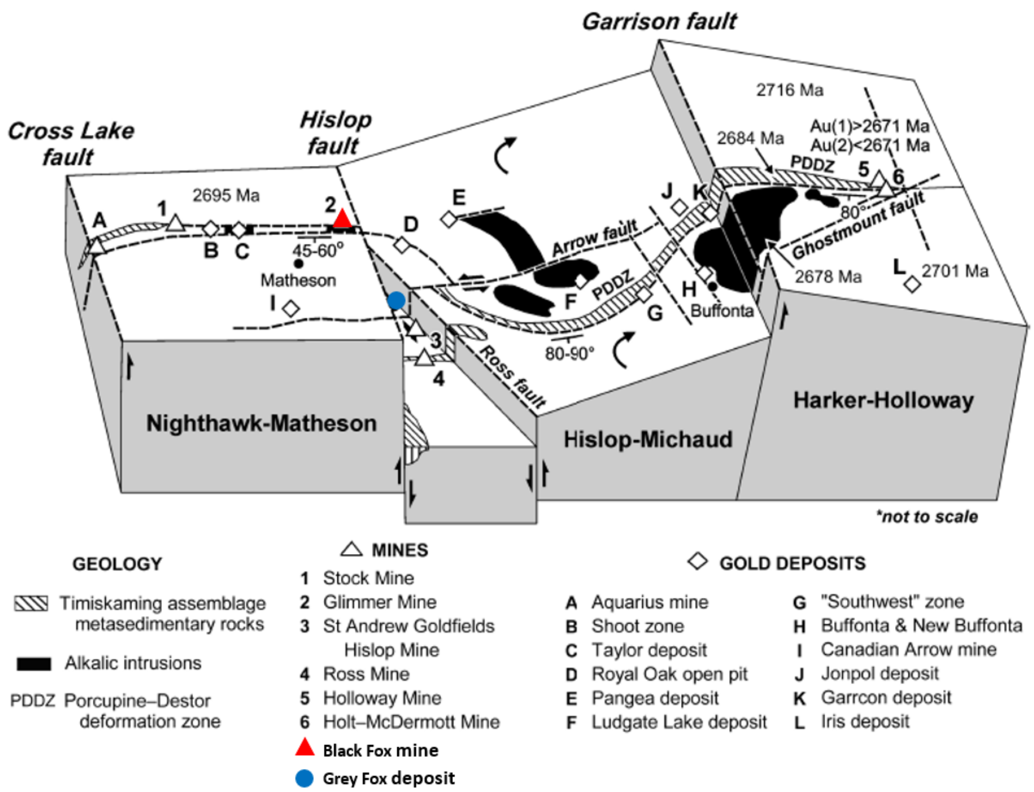


Figure 7.4 – Inferred movement on segments in the Highway 101 area (adapted and modified from Berger, 2002)

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 20 m 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 (Fig. 7.5) strikes southeast across the property, along the southeast strike of the Porcupine-Destor Deformation Zone (PDDZ). This structure and the surrounding stratigraphy dip to the southwest at approximately 45°. These altered and deformed komatiites are generally bleached to a light grey-buff colour with ankerite-talc and ankerite-quartz-sericite-fuchsite assemblages. This alteration package is underlain to the north by a thin, fine-grained, green greywacke-type sedimentary unit, a thick sequence of massive to pillowed tholeiitic mafic volcanics, 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 ankerite zone are green, relatively undeformed, very fine-grained and pillowed tholeiitic mafic volcanics with lesser 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 ankerite 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, yellow, 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 ankerite zone. They are generally weakly altered and probably postdate much of the alteration and deformation. Diabase dykes are the youngest rocks in the area, occupying very late north-striking crustal fractures.

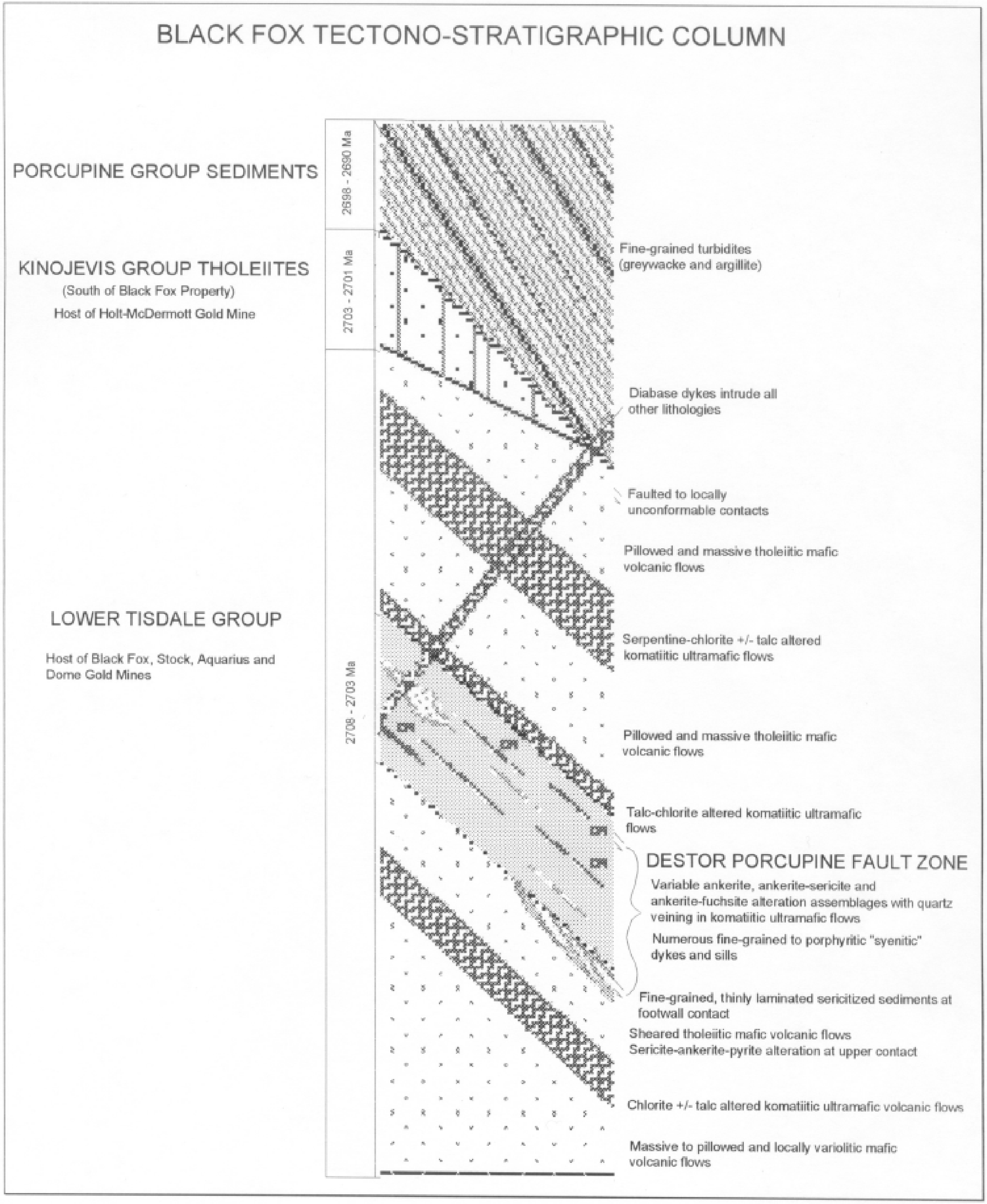


Figure 7.5 – Black Fox mine stratigraphic column (from Berentsen et al., 2004)

7.3.2 Geology of the Grey Fox Deposit Area

The following description of the Grey Fox deposit area geology was modified and summarized from Ross and Rhys (2011).

The Grey Fox property geology essentially consists of Tisdale Assemblage mafic volcanic rocks and adjacent Timiskaming clastic sedimentary rocks. The Timiskaming sediments here form a northwest-trending lens that is approximately 4 km long and several hundred metres wide, spatially associated on its southwest side with an alkaline intrusion of probable syenitic composition. Texture, composition and the spatial association of the intrusion with Timiskaming sedimentary rocks suggest that the intrusion may be part of the regional syn-Timiskaming magmatic suite. This magmatic suite is spatially associated with fault-related basins, associated Timiskaming clastic sedimentary rocks, and locally coeval alkaline volcanic rocks which are interbedded with the Timiskaming sediments in basins along and spatially associated with the Porcupine-Destor and Larder Lake–Cadillac fault systems throughout the region.

Like similar basins elsewhere in the region, the northwest-trending syenite- Timiskaming sediment band associated with the mineralized area may represent a subsidiary fault bounded basin to the PDDZ, extending as a second-order feature southeastward from the main fault system, as is interpreted for the Gibson Shear which is interpreted to form the structural contact of the southwestern margin of the syenite-sediment band. Such faults, which are analogous to the Dome Fault in the Timmins area, may represent what were initially major brittle structures that formed prior to regional metamorphism, and which have been subsequently remobilized to varying degrees by regional ductile shear zones during the post-Timiskaming greenschist grade metamorphism and syn-metamorphic deformation that affected the region. At the local scale, where remobilized, individual syn-Timiskaming fault strands form favourable sites for mineralization within them or in adjacent rheologically competent lithologic units that can focus vein formation.

7.4 MINERALIZATION

7.4.1 Black Fox Mine

The following description of mineralization at the Black Fox mine was modified and summarized from Berentsen et al. (2004).

Gold mineralization at the Black Fox mine occurs in several different geological environments within the main ankerite alteration zone, which has a strike length of over 1000 m and a variable true width ranging from 20 m to over 100 m. 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.

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 shallow dipping (20-50°) quartz veins and stockworks in green carbonate and ankerite altered ultramafic rocks (U0, BO, B2, and Al structures);
- Gold-bearing pyrite associated with syenitic sill-like bodies (JO, RO/Ri structures);
- Gold associated with fine-grained pyrite within bleached ankerite-sericite altered mafic volcanic rocks (CO structure);

- Free gold in steeply dipping sigmoidal quartz veins associated with shear zones within green carbonate alteration zones (SO/S1 structures) (Hoxha and James, 1998).

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 subhorizontal zones along the structure often have the greatest thickness, on the order of 10 to 15 m (33-49 ft), and the highest grades. This subhorizontal 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 m (3-16 ft).

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 Deposit

The following description was taken from Ross and Rhys (2011).

Mineralized zones at the Grey Fox deposit occur along and adjacent to the eastern end of the Timiskaming lens, which in the area of the mineralized zones trends northerly and dips steeply to the east. Drilling suggests that east of the mafic-sedimentary contact, the stratigraphy in the mafic volcanic sequence also trends north and dips steeply east. The sequence comprises alternating massive, pillowed and variolitic mafic units, and local thin volcanosedimentary horizons. Drill core observations show that the sequence is generally weakly foliated, despite proximity to the intense ductile strands of the PDDZ fault system to the north, although some lithologies including sedimentary horizons and contacts may have localized displacement, as suggested by cataclastic breccias and narrow semi-brittle shear zones associated with mineralization.

Alteration associated with mineralization

Mineralization at the Grey Fox deposit is associated with hematization which occurs in albite-carbonate dominant alteration assemblages (Fig. 7.6), often peripheral to mineralized zones and also as outer envelopes to some veins. Pyritic carbonate-albite-sericite alteration generally overprints the hematite, suggesting that much of the pervasive hematite is early, although later structurally controlled hematite is suggested in vein envelopes as well. The hematite association, with associated 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. This may suggest a magmatic contribution to mineralizing fluids, as has been interpreted in several Archean Western Australian orogenic gold systems (e.g., Kalgoorlie, Wallaby) and may also be common in west African Proterozoic-aged deposits that show similar alteration assemblages, parageneses and associations with late alkaline to subalkaline intrusions. 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.

Figure 7.6 – Altered variolitic host unit to the 147 Zone, from the mineralized interval (32m to 36m) in GF11-244 (32m to 36m).
Note the variolitic, elliptical relict textures in the core, which also shows the typical pale green-grey colour of the dominantly albite-carbonate-quartz-chlorite alteration (photo from Ross and Rhys, 2011).

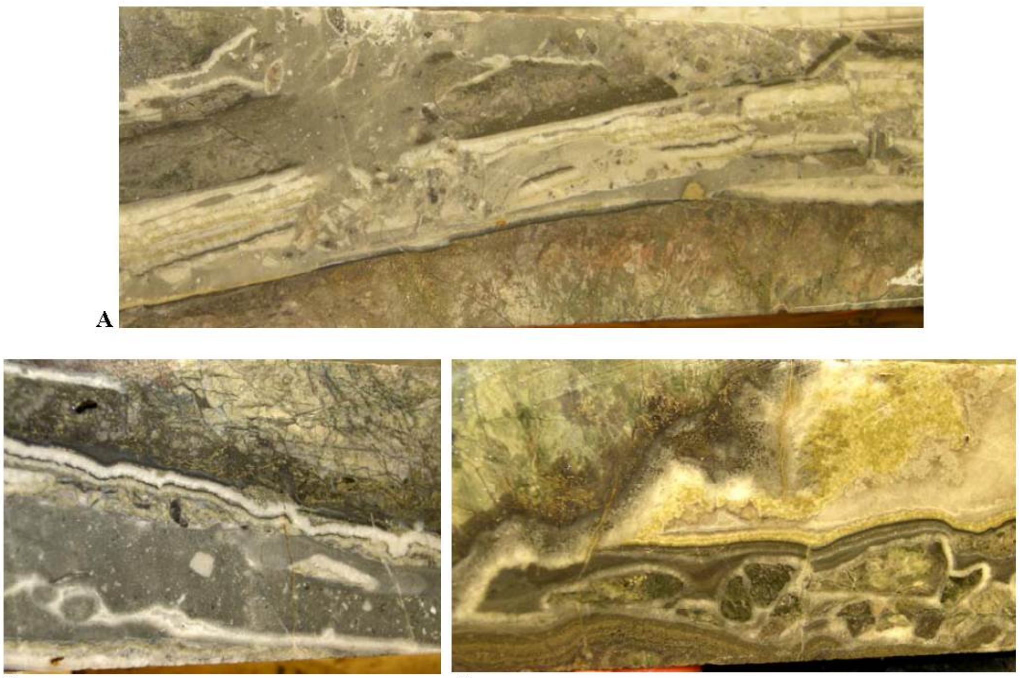
Style of gold mineralization

Mineralization at the Grey Fox deposit occurs in association with quartz-carbonate veins that are often sheeted and occur at shallow to moderate core axis angles in holes drilled with from east to west with westerly azimuths, which is the dominant drilling direction. The veins in examined drill intersections form closely spaced sets 0.2 to 10 cm thick. Veins often have a complex, polygenerational history. In the 147 Zone, 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 (Fig. 7.7).

These veins also often have thin, dark green-grey breccia selvages with abundant disseminated pyrite; petrography indicates they are carbon-bearing. Visible gold was most commonly observed in these dark pyritic rims. Outer reddish selvages beyond the greenish-grey pyritic rims are locally present, and also occur surrounding some veinlets (Fig. 7.7A), suggesting redox changes during vein evolution which likely contributed to gold deposition. In other areas, veins form brittle networks that may anastomose but are generally subparallel and sheeted, with earlier vein generations containing grey quartz and later crosscutting carbonate-dominant phases.

Minor brittle (cataclasite breccia) and semi-brittle shear zones with moderate to shallow core axis angles were also observed in association with veins in the 147 Zone. This likely forms networks that both occur parallel to and cut across the mafic sequence, and which may have aided in vein localization, forming a permeable fracture network which likely controlled the distribution of mineralization. The deformation style is brittle-ductile suggesting alternation between these structural styles, likely due to changes in fluid pressure, temperature and fault displacement increments (strain rate) episodically occurring during vein formation.

In the Contact Zone, mineralization occurs on both sides of the mafic-sedimentary contact. The contact itself is not faulted in the examined drill hole intersection, but a broad zone of structural disruption which includes semi-brittle contact parallel minor shear zones (Fig. 7.7A) and slip surfaces is host to the mineralization. As with the 147 Zone, core axis angles of veins are shallow to moderate. The complex polygenerational crustiform veining observed in the 147 intercepts is not as well developed in the Contact Zone intercept, but veins do display compatible textures and style. Where developed in the Timiskaming sequence, the veins are oblique to and cut across bedding, often offsetting bedding planes, suggesting that they accommodate some shear displacement (Figs. 7.7B and 7.7C). As with the 147 veins, the crosscutting nature of the individual veins with respect to the steeply dipping stratigraphy suggest that the veins are stacked en echelon along the contact, in association with a network of contact-parallel minor faults and shear zones.



A B C

Figure 7.7 – Samples illustrating vein textures in the mineralized interval between 31m and 36m in drill hole GF11-244 (Ross and Rhys, 2011).

The veins are from a high-grade interval grading 20.11 g/t Au over 16.0 m. Veins occur at shallow core axis angles and would therefore cut across the steeply east-dipping sequence in this drill hole which was drilled along a moderate west dip. The veins are complex and polygenerational, with thin crustiform quartz-carbonate bands along their margins. An early breccia phase around which additional crustiform quartz has overgrown the earlier fragments is illustrated in the lower part of the vein in Figure 7.7C. The central parts of the veins in Figures 7.7A and 7.7B are filled with cream to pale grey fine-grained quartz-carbonate matrix vein breccia which incorporates fragments of the earlier crustiform quartz. A late pale grey breccia phase, evident in photo A, affects upper parts of the vein and extends into the wallrock. In all photos, the veins have dark green-grey pyrite-rich envelopes; petrography indicates they are carbon bearing. These dark envelopes probably form the earliest phase of the fine-grained breccia, which overprints the green-grey albite-chlorite-carbonate altered wallrock and early foliation. Late greenish fill in the central parts of the vein in photo C is likely epidote. In figure 7.7A, note the reddish hematite in the vein envelope below the vein.

Control on mineralization

A significant control on mineralization in the 147 and Contact zones is lithology, since veins are developed in brittle lithologies 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. Similar textures are developed at the Holloway deposit to the east, where variolitic flows with hyaloclastic breccia textures host much of the mineralization.

The 147 and Contact Zone mineralization occurs in association with breccia veins, crustiform veining and thin quartz-carbonate matrix cataclastic-hydrothermal breccias. 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.

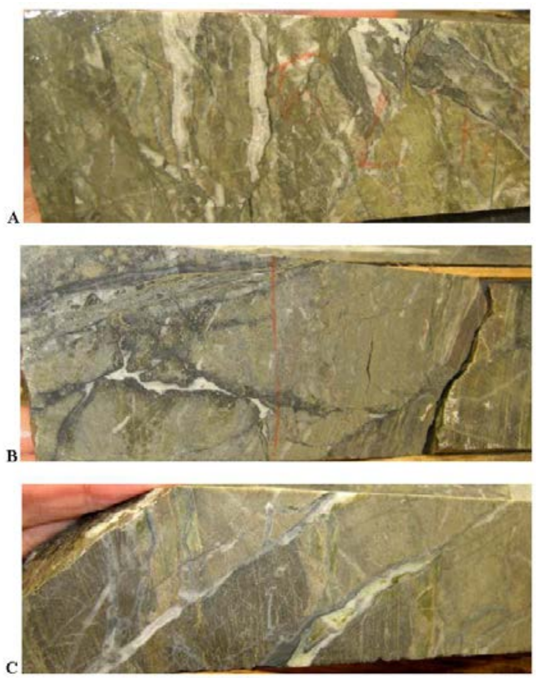


Figure 7.8 – Samples from the Timiskaming clastic sediments adjacent to the contact with the mafic volcanic sequence, illustrating structural styles associated with mineralization (Ross and Rhys, 2011).

The samples were taken between 130.7m and 134m in drill hole GF10-125; contact with the mafic volcanic sequence is at 130.7 m. A: Semi-brittle shear zone parallel to bedding in the sedimentary sequence, suggesting a steep easterly dip. This structure is narrow and sericite-rich (pale green) with carbonaceous stylolites, discontinuous deformed quartz-carbonate veinlets and diffuse bands of grey, siliceous cataclastic breccia. Such structures may exert local control on the vein systems, as a discontinuous network along and adjacent to the contact. B and C: Photos of veining and vein breccia styles, illustrating their orientation and structural style. In both photos veining occurs at shallow to moderate core axis angles, and cuts across bedding which is at a high core axis angle (brown banding at right in B and at left in C). In B, note the quartz breccia vein in the upper left which is at shallow core axis angle and is surrounded by additional breccia that extends into the wallrock. Also in B at lower right, a thin veinlet offsets bedding. Bedding offsets are clearly apparent in photo C and indicate that these veins are shear veins, and are likely stacked echelon upward along the contact area. Displacement direction is unclear as the core could not be re-oriented.

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 8.1, 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.

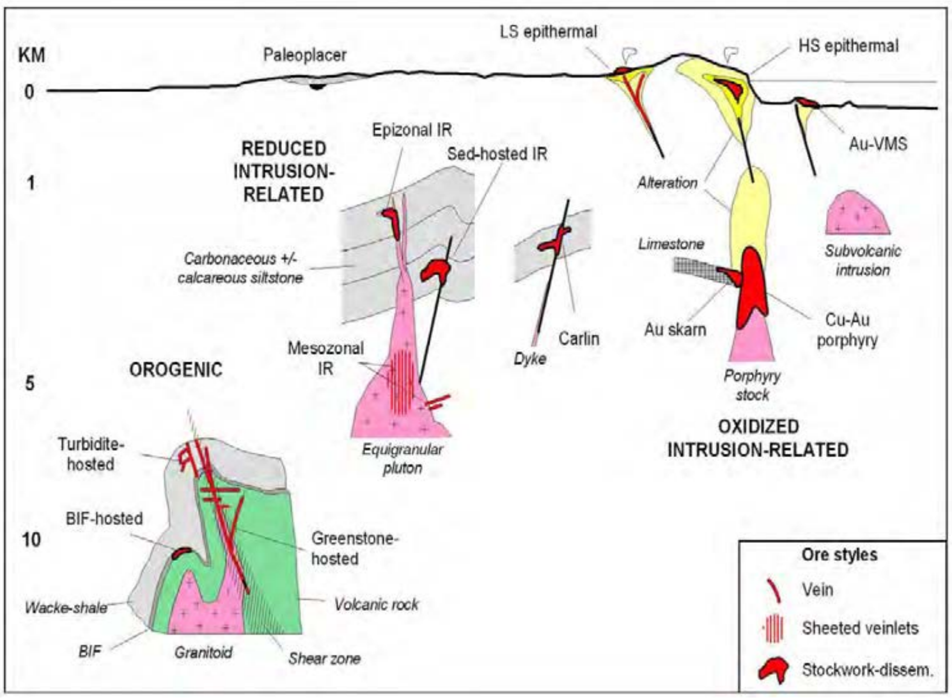


Figure 8.1 – Schematic cross section showing the key geologic elements of the main gold systems and their crustal depths of emplacement. Note the logarithmic depth scale. Modified from Poulsen et al. (2000) and Robert (2004).

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, Au-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 Project 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 (Fig. 8.2) (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 (Fig. 8.1) (Dubé and Gosselin, 2007).

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 km 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 M oz Au 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).

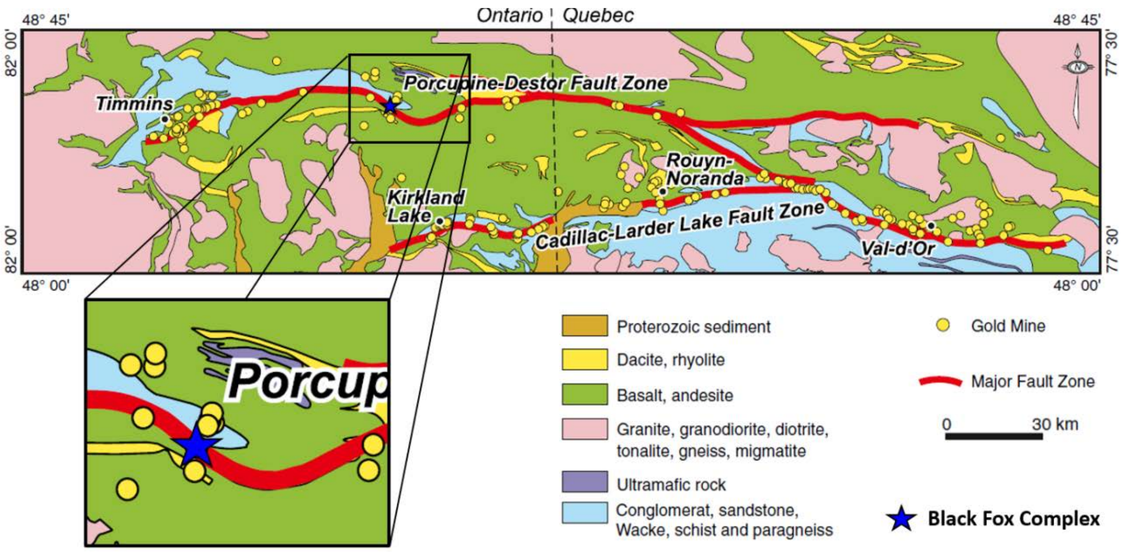


Figure 8.2 – Simplified geological map of the Abitibi Greenstone Belt showing the distribution of major fault zones and of gold deposits. Adapted and modified from Robert et al. (2005) and Rabeau et al. (2013)

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% 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 Hislop Fault. (Fig. 7.4) 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).

Grey Fox deposit 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 Au 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 owing to the fact that 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 (Corbet, 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 (e.g., Cinola), 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 channelways 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 (Fig. 8.3). 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.

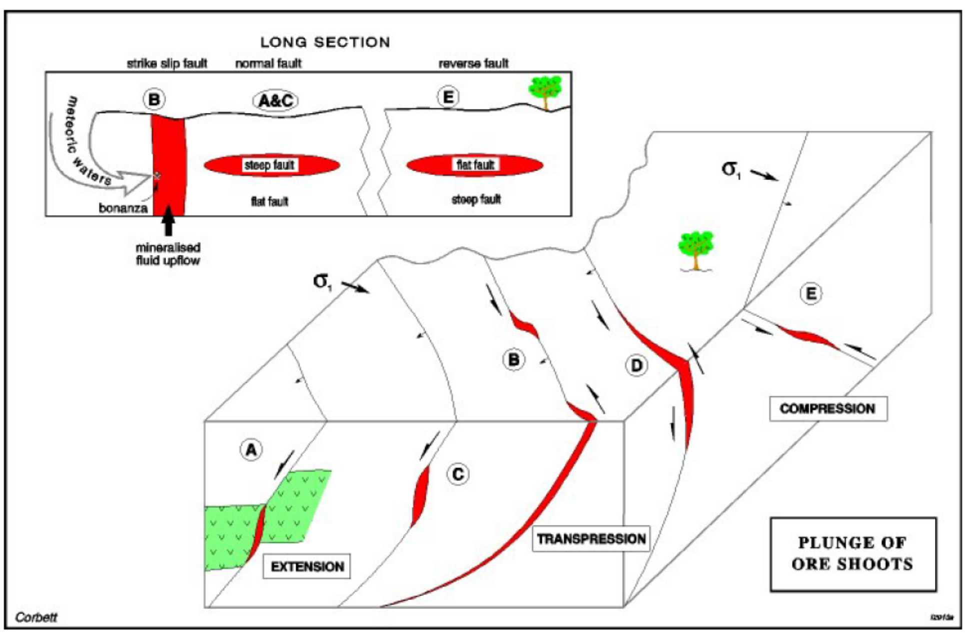


Figure 8.3 – Illustration of the structural control on ore shoot formation in different structural environments and associated ore shoot orientations (from Corbet, 2007)

Epithermal quartz gold deposits are characterized as Ag-poor often bonanza Au grades, developed at great distances from magmatic source rocks (Fig. 8.4), in association with only minor quartz, illite, chlorite and local pyrite gangue, and so can be difficult to identify (Corbet, 2007). Typically, Ag:Au ratios for epithermal deposits, though variable, tend to be higher in low-sulphidation gold deposits than in high-sulphidation gold deposits (Taylor, 2007).

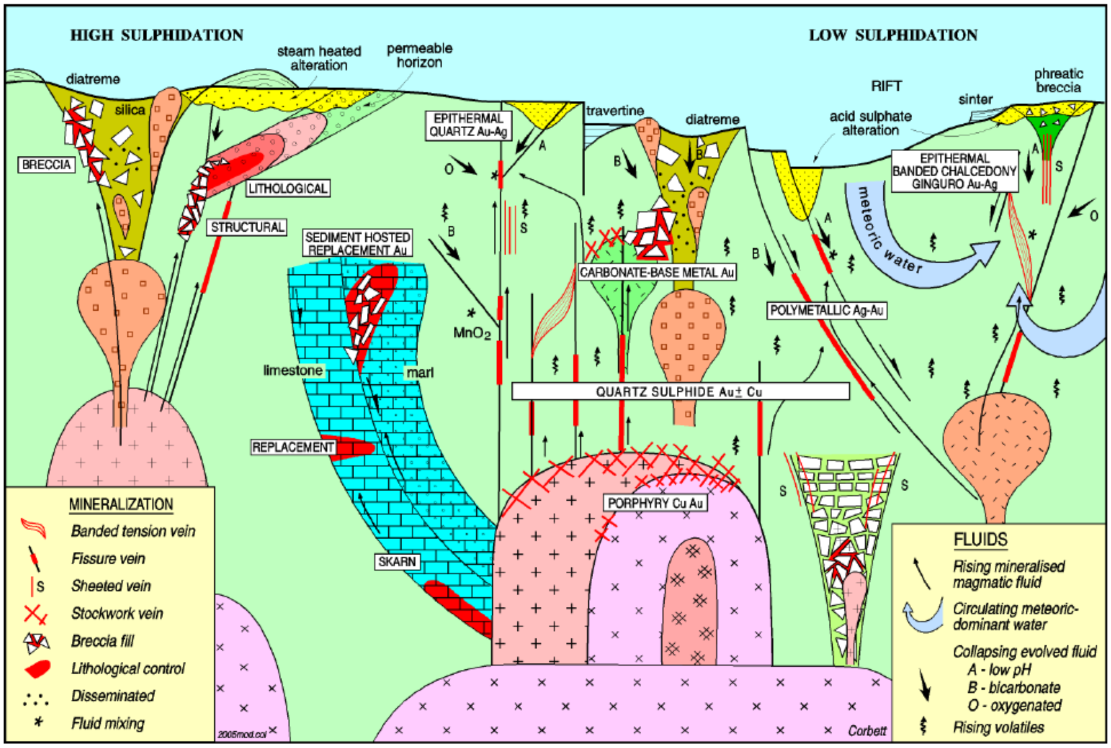


Figure 8.4 – Conceptual model illustrating styles of magmatic arc porphyry Cu-Au and epithermal Au-Ag mineralization (Corbet, 2007)

9 EXPLORATION

The most recent exploration work performed by the issuer on the Black Fox Complex consisted exclusively of diamond drilling, which is discussed in Item 10. The reader is referred to Item 6 for historical exploration work.

10 DRILLING

10.1 BLACK FOX MINE

The information in this section was obtained from the Black Fox mine team and combined with InnovExplo's database compilation work.

Between January 1, 2008 and December 31, 2013, Brigus Gold drilled 1,570 diamond drill holes at the Black Fox mine for a total of 145,919 m. The goal of the 2013 drilling program was to better define the Black Fox mine resource.

From January 1 to March 5, 2014, Brigus Gold drilled 127 diamond drill holes at the Black Fox mine for a total of 13,042 m. Primero became the owner of the Black Fox Complex on March 5, 2014. Between March 5 and May 23, 2014, Primero drilled 326 diamond drill holes at the Black Fox mine for a total of 31,338 m, which includes capitalized (exploration and delineation) and operational definition drilling. None of the 2014 holes were included in the current mineral resource estimate.

10.2 GREY FOX DEPOSIT

The information in this section was obtained from the Primero exploration team and combined with InnovExplo's database compilation work.

Between June 10, 2013 and December 31, 2013, Brigus Gold drilled 62 diamond drill holes on the Grey Fox deposit for a total of 28,442 m. The 2013 drilling program focused on infill-drilling and expanding the resources on the 147 Zone, Contact and Grey Fox South zones.

No drilling was performed by Brigus Gold from January 1, 2014 to March 5, 2014. Between March 5, 2014 to May 23, 2014, Primero drilled 39 diamond drill holes on the Grey Fox deposit for a total of 11,920 m. None of the 2014 holes were included in the current mineral resource estimate.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Primero did not carry out any sampling or sample analyses at the Black Fox Complex prior to the reporting date of December 31, 2013 of the Resources and Reserves Estimates presented in this Technical Report.

Sample preparation and analyses carried out by Brigus Gold are discussed in Item 12.

12 DATA VERIFICATION

Multiple databases were received from Brigus Gold and Primero for both the Black Fox mine and the Grey Fox deposit. The diamond drill hole databases used for the resource estimates presented in this report were provided by the issuer and are referred to as the “Primero databases” in this item. Drilling was underway at the time this report was being written. A cut-off date of December 31, 2013 was applied for the database verification process to match the effective date of the report.

InnovExplo’s data verification included field visits and a review of the following: core (when available); drill hole collar locations; assays; lithology, alteration and structural descriptions; downhole surveys; and mined-out areas.

The historical information used in this report was taken in part from reports produced before the implementation of NI 43-101. In some cases, little information is available about sample preparation, analytical and security procedures for the historical work in the reviewed documents. InnovExplo assumes that the exploration activities conducted by earlier companies were in accordance with prevailing industry standards at the time.

12.1 PRIMERO DATABASES

12.1.1 Black Fox Mine

The author verified assay certificates for most of the holes drilled in 2012 and 2013.

Overall, a total of 61,359 intervals with sample numbers had no corresponding gold values in the GEMS database provided by Primero. Discussions with Primero’s representatives revealed that these intervals either had not been sampled or had been sampled but the results were nil. Consequently, InnovExplo assigned these intervals a value of 0.00 g/t Au. It was noted that the gold values for eleven (11) sampled intervals (9,582 g/t Au or 9,583 g/t Au) match the collar elevation in metres (local grid) of the drill hole from which they were taken. A value of 0.00 g/t Au was assigned to these intervals.

The database also includes numerous cases where sample numbers are not unique, adding to the difficulty of validating the database. As explained by Even Stavre, Chief Mine Exploration Geologist at the Black Fox mine, this situation was caused by sample numbers being used more than once by core loggers over the course of the project.

Minor errors of the type normally encountered in a project database were addressed and most of them corrected. Although some errors remain in the database used for the resource estimate, these are considered minor due to the nature of the errors and the percentage they represent over the entire database. InnovExplo considers the database for the Black Fox Project to be sufficiently valid and reliable for the purpose of this report. A total of 259 cases remained unresolved. InnovExplo decided, on a case-by-case basis, whether the value in GEMS or the value in the certificate was most likely to be valid and built the database accordingly.

12.1.2 Grey Fox Deposit

The author verified the assay certificates for most of the holes for the Grey Fox deposit. Errors were noted in the original database, but these were considered minor and of the type normally encountered in a project database. These were corrected and none of the observed errors in the original database remain in the database used for the resource estimates. The final database is considered to be of good overall quality. InnovExplo considers the database for the Grey Fox deposit to be valid and reliable.

12.2 DIAMOND DRILLING

12.2.1 Black Fox Mine

Every surface drill hole collar on the Black Fox deposit was either professionally surveyed or surveyed using a hand held GPS. Underground drill holes are located using surveyed stations. The majority of the holes were also surveyed by a downhole instrument. InnovExplo did not verify surveys in the field, but did check to make sure that no unrealistic data were present in the database.

Some issues were raised concerning the azimuth and dip for drill holes in the 03 series at the Black Fox mine. Recent development in waste material, instead of the anticipated high-grade material, had relied on data from historical hole 03BF055 which indicated the presence of high-grade mineralization (Fig. 12.1). InnovExplo consulted the original hardcopy of the log and discovered a comment made by the logger mentioning a potential error in the downhole survey values. Unfortunately, the reported azimuth and dip were entered in the database despite the comment. It is of InnovExplo's opinion that this hole should either be resurveyed and that other random checks should be performed throughout the 03 series. InnovExplo also observed similar location issues with holes from the 12, 80, 630, 685, 686, 704 and 722 series.

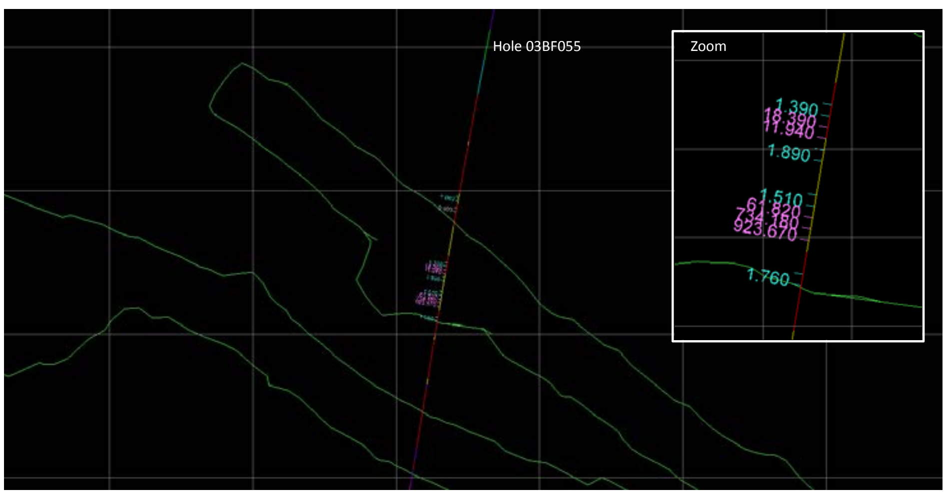


Figure 12.1 – Plan view showing the development that was expected to access a high-grade zone predicted by hole 03BF055. It appears that the downhole survey for hole 03BF055 may have been erroneous, thereby explaining why waste material was encountered in this development instead of the anticipated high-grade material.

At one time, Brigus Gold representatives had also raised doubts about the 235 series, mentioning that it might be possible that the magnetic deviation of 11.8° had not been deducted from the survey readings before entering the values in the database. InnovExplo's review of 59 hardcopy logs could not conclusively confirm whether the magnetic survey results had been taken into account because there is no trail from the original survey to the corrected one. In 2014, Primero employees Doug A. Dominick (Chief Surveyor) and John Dixon (Exploration Manager, Northern Ontario) resurveyed the collars of some of the holes for which doubts were raised. InnovExplo was not present during the resurvey program. Table 12.1 shows the information contained in the current database and the new survey performed on January 7 and January 11, 2014.

Table 12.1 – Results of the resurvey validation performed as part of the data verification process

	Current GEMS database					Surveyed Jan. 7-10 2014				
DDH No.	**Easting**	**Northing**	**Elevation**	**Azimuth**	**Dip**	**Easting**	**Northing**	**Elevation**	**Azimuth**	**Dip**
235-176	10237.75	9875.80	9770.78	356.00	-11.30	10238.14	9875.87	9771.63	356.44	-11.22
235-177	10237.83	9875.81	9770.54	0.00	-25.70	10238.20	9875.91	9771.51	358.75	-25.70
235-178	10237.80	9875.81	9770.37	0.30	-35.50	10238.24	9875.69	9771.59	0.04	-35.47
235-179	10237.80	9875.81	9769.87	0.80	-55.00	10238.20	9875.76	9771.47	359.12	-55.05
237-182	10237.02	9875.51	9769.57	6.00	-86.50	10238.17	9875.98	9771.19	359.70	-81.51

Based on the results, Even Stavre (Chief Mine Exploration Geologist) and John Dixon (Exploration Manager – Northern Ontario), confirmed that the 235 series is free of errors and that the current database is valid.

No surface drilling was underway during the site visits. The surveys conducted on the Black Fox deposit are considered adequate for the purpose of a resource estimate, although a professional survey campaign is recommended for any collar that was only surveyed using a hand held GPS. InnovExplo also recommends addressing the location issues identified during the data verification process.

12.2.2 Grey Fox Deposit

Every drill hole collar on the Grey Fox deposit was either professionally surveyed or surveyed using a hand held GPS. The surveys conducted on the Grey Fox deposit are considered adequate for the purpose of a resource estimate, although a professional survey campaign is recommended for any collar that was only surveyed using a hand held GPS. The majority of the holes were also surveyed by a downhole instrument.

12.3 MINED-OUT SURVEYS

12.3.1 Black Fox Mine

InnovExplo received several files containing underground drifts and stopes polylines and solids. Although believed accurate, none of the solids were valid from a construction point of view and could not be used in their original state. InnovExplo therefore slightly modified the solids for use in GEMS. The changes are considered insignificant in terms of volume and do not affect the location of such voids. It was determined through many discussions with Primero personnel that some underground mining drifts and stopes are missing from the current database. These are from historical workings that were excavated before Primero was involved on the project. According to Primero personnel, there is no way to assess the extent of the missing information and InnovExplo was asked to use the available information received from Primero to conduct the current resource estimate. InnovExplo believes that the voids currently in the Project are reasonably accurate based on all available data. Although improvements could be made, they are suitable for the purpose of this resource estimate. Figure 12.2 shows the compiled underground voids resulting from InnovExplo's validation work.

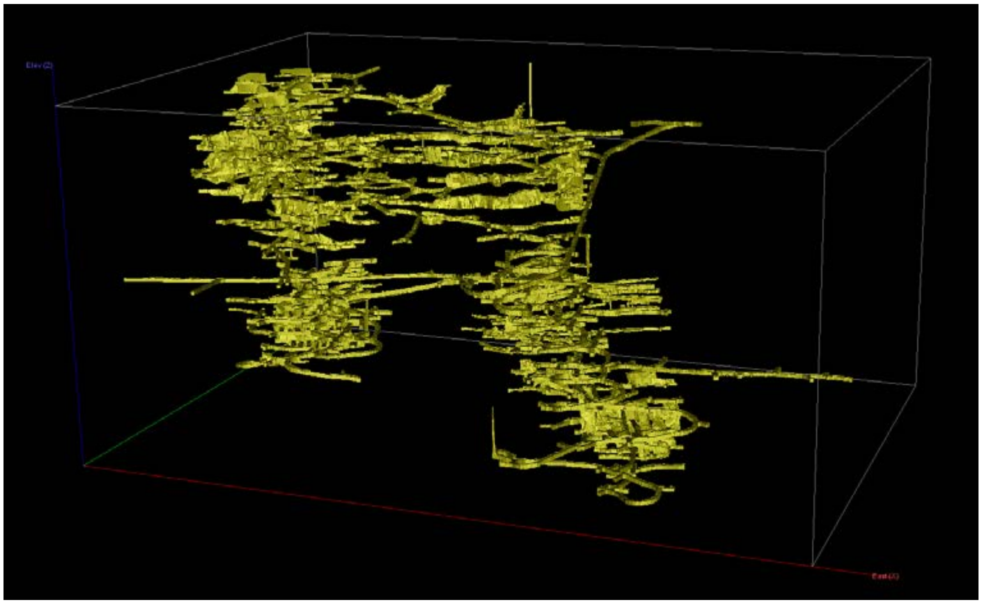


Figure 12.2 – Compilation of mined-out underground voids.

12.3.2 Grey Fox Deposit

A ramp is present to the west of the Grey Fox deposit. However, it is entirely located within the country rock according to the latest interpretation of the Grey Fox deposit; no known resource is located near this ramp.

InnovExplo did not validate the ramp because it does not affect the current resource estimate.

12.4 SAMPLING AND ASSAYING PROCEDURES

12.4.1 Black Fox Mine

It was brought to InnovExplo's attention that whole core samples were being used for analytical purposes, which is not unusual for definition drilling in producing mines. The author was therefore unable to perform a thorough review of selected mineralized core sections during site visits. The only drill core available for review was in the boxes currently being logged at the time of the site visits. Figure 12.2 shows some of the examined core.

Primero personnel explained the entire path taken by the drill core, from the drill rig to the logging and sampling facility and finally to the laboratories (Figs. 12.3 to 12.8). Although InnovExplo is of the opinion that half the core should be kept for future reference, the described protocols were deemed otherwise suitable and adequate.

Permanent core box storage had not been necessary before the effective date of this report because once the whole core samples were shipped to the laboratory, the rest of the barren drill core was discarded. The absence of stored core boxes prevented InnovExplo from reviewing tags and identifying any errors that could have potentially led to database errors.

Figure 12.3 – General views of some of the core from active drilling at the time of a site visit before it was sampled or discarded (photos from InnovExplo's site visits).

Figure 12.4 – General views of the area dedicated to core logging (photos from InnovExplo's site visits).

Figure 12.5 – Photos of the preparation laboratory at the Black Fox mine site (photos from InnovExplo's site visits).

Figure 12.6 – Black Fox Mill laboratory building and its receiving room (photos from InnovExplo's site visits).

Figure 12.7 – Crushing room where samples are crushed and pulverized (photos from InnovExplo's site visits).

Figure 12.8 – Fire assay ovens and atomic absorption spectrometer (photos from InnovExplo's site visits).

12.4.2 Grey Fox Deposit

InnovExplo reviewed several mineralized core sections from ongoing drilling during the site visits. Figures 12.9 and 12.10 show some of the reviewed core. Sample tags were still present in the boxes. It was possible to validate sample numbers and confirm the presence of mineralization for each of the samples in the mineralized zones.

Drilling was underway during InnovExplo's site visits and the author was able to follow the entire path taken by the drill core, from the drill rig to the logging and sampling facility (Figs. 12.11 and 12.12).

All core boxes were labelled and properly stored outside (Fig. 12.13).

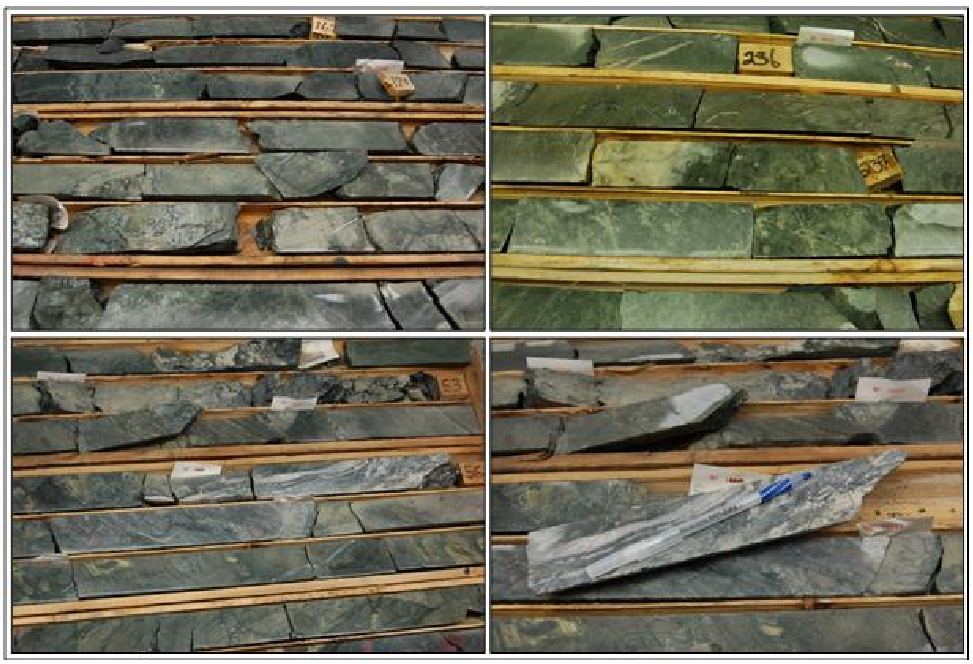


Figure 12.9 – General views of some of the core from the Grey Fox deposit reviewed during a site visit. The pen points to an occurrence of visible gold.

Figure 12.10 – General views of some of the core from the Grey Fox deposit reviewed during a site visit. Epithermal textures observed throughout the deposit are well represented in these particular intervals.

Figure 12.11 – Photos of the logging and sampling facility for the Grey Fox deposit: (top) general views of the area dedicated for logging; (bottom left) the sawing facility; and (bottom right) bags of samples ready to be sent to the laboratory.

Figure 12.12 – Standards and blanks used in the QA/QC program for the Grey Fox deposit

Figure 12.13 – Core shed and outdoor core storage for the Grey Fox deposit

12.5 SAMPLE PREPARATION, ANALYSES AND SECURITY

This section provides a description of sample preparation, analyses, and security procedures for the 2012-2013 drilling programs at the Black Fox mine and the 2013 drilling program at the Grey Fox deposit. The information is based on previous reports, discussions with Brigus Gold representatives during on-site visits, a review of the drill hole database received from Brigus Gold, and all available laboratory protocols made available to the author.

12.5.1 Sample Preparation

Black Fox Mine

The drill core was boxed, covered and sealed at the drill rigs, and transported by drilling employees to the logging facility where Brigus Gold personnel would take over the core handling. The core was logged and sampled by or under the supervision of Brigus Gold geologists at the core shack of the Black Fox mine. Each sample was tagged.

Drill core samples were bagged by technicians and then grouped in batches. The sample batches were shipped to one of the five following laboratories in Ontario during the period of reference: Black Fox Mill Laboratory (“Black Fox Mill”) located between Matheson and Timmins; Cattarello Assayers (“Cattarello”) in Timmins; Accurassay Laboratories (“Accurassay”) in Thunder Bay; ALS Laboratory (“ALS”) in Thunder Bay; and PolyMet Labs (“PolyMet”) in Cobalt. They were prepared according to each laboratory’s sample preparation protocol for the given analytical procedure. The decision of where to send a batch was based on several reasons, including pickup schedules and turnaround time.

The sampling and assay QA/QC protocol consisted of an in-field component managed by Brigus Gold logging and sampling personnel and an in-laboratory component managed by the laboratories. The in-field QA/QC consisted of inserting blanks and certified reference standards. Reject and pulp duplicates (“prep duplicates”) were also inserted by Brigus Gold staff, but no field duplicates were prepared before September 2013. Core samples were placed in sealed bags and sent for analysis.

Grey Fox Deposit

The drill core was boxed, covered and sealed at the drill rigs, and transported by drilling employees to the logging facility where Brigus Gold personnel would take over the core handling. The core was logged and sampled by or under the supervision of Brigus Gold geologists at the Grey Fox core shack. Each sample was tagged with a unique number.

Drill core samples were cut by technicians and then bagged and sealed before being grouped in batches. The sample batches were shipped to PolyMet Labs (“PolyMet”) in Cobalt, SGS Canada Laboratory (“SGS”) in Cochrane, or Agat Laboratory (“Agat”) in Mississauga where they were prepared according to each laboratory’s sample preparation protocol for the given analytical procedure. The decision of where to send a batch was based on pickup schedules and turnaround time.

The sampling and assay QA/QC protocol consisted of an in-field component managed by Brigus Gold logging and sampling personnel and an in-laboratory component managed by Polymet, SGS and Agat. The in-field QA/QC consisted of inserting blanks, certified reference standards, and field duplicates consisting of the second half of core samples.

12.5.2 Laboratories Accreditation and Certification

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories sets out the criteria for laboratories wishing to demonstrate that they are technically competent, operating an effective quality system, and able to generate technically valid calibration and test results. The standard will form the basis for the accreditation of competence of laboratories by accreditation bodies. ISO 9001 is for management support, procedures, internal audits and corrective actions. It provides a framework for existing quality functions and procedures.

The main difference between ISO/IEC 17025 and ISO 9001 is the accreditation and certification. ISO/IEC 17025 stands for accreditation, which means the recognition of competence of specific technical competence. ISO 9001 stands for certification, which means accordance with a standard assessed by management systems, certified by any independent body that is internationally agreed. Also, there is the difference with the accurate products. ISO 9001 does not mean accurate products are produced. For that, product should be approved by ISO/IEC 17025. Every conformity assessment body should have the ISO/IEC 17025 accreditation.

The general requirements for the competence of testing and calibration laboratories are described in the document CAN-P-4E (ISO/IEC 17025:2005). These requirements are designed to apply to all types of calibration and objective testing and therefore need to be interpreted with respect to the type of calibration and testing concerned and the techniques involved. The document CAN-P-1579:2014 is the Standard Council of Canada's ("SCC") requirements for the accreditation of mineral analysis testing laboratories. The program is designed to ensure mineral analysis testing laboratories meet minimum quality and reliability standards and to ensure a demonstrated uniform level of proficiency among these mineral analysis testing laboratories. CAN-P-1579:2014 identifies the minimum requirements for accreditation of laboratories supplying mineral analysis testing services. This includes, but is not limited to, the measurement of all media used in mining exploration and processing including sediments, rocks, ores, metal products, tailings, other mineral samples, water and vegetation.

Black Fox Mine

Five laboratories in Ontario were used to analyze the gold contents of core samples from the Black Fox mine during the reference period:

- Accurassay Laboratories has ISO/IEC 17025 accreditation through the SCC. Accurassay is an independent commercial laboratory.
- ALS Laboratory is part of the ALS Global Group and has ISO 9001 certification and ISO/IEC 17025 accreditation through the SCC. ALS is an independent commercial laboratory.
- Black Fox Mill Laboratory is owned by Primero and was previously owned by Brigus Gold at the time Brigus Gold was operating the Black Fox mine. This laboratory is not accredited or certified by the SCC.
- Cattarello Assayers is not accredited or certified by the SCC. Cattarello is an independent commercial laboratory.

- PolyMet Labs is only certified with ISO 9001 certification through the SCC. PolyMet is an independent commercial laboratory.

Grey Fox Deposit

Three laboratories in Ontario were used to analyze the gold contents of core samples from the Grey Fox deposit during the reference period:

Agat Laboratory has ISO 9001 certification and ISO/IEC 17025 accreditation through the SCC. Agat is an independent commercial laboratory.
PolyMet Labs is only certified with ISO 9001 certification through the SCC. PolyMet is an independent commercial laboratory.
SGS Canada Laboratory has ISO 9001 certification and ISO/IEC 17025 accreditation through the SCC. SGS is an independent commercial laboratory.

12.5.3 Gold Analysis

Black Fox Mine

At Black Fox Mill, gold was analyzed by lead fire assay with atomic absorption spectrometry finish using a 30-gram nominal sample weight. For high values (typically over 30.0 g/t Au), samples were re-assayed with a gravimetric finish.

At Cattarello, gold was analyzed by lead fire assay with atomic absorption spectrometry finish. For high values, samples were re-assayed with a gravimetric finish. The certificates do not indicate the nominal sample weight or the values for which a gravimetric finish was conducted.

The certificates from Accurassay and ALS do not indicate the method used, the nominal sample weight, or the laboratory protocol.

At PolyMet, gold was analyzed by lead fire assay with gravimetric finish.

Grey Fox Deposit

At SGS, gold was analyzed by lead fire assay with ICP-OES (optical emission spectrometer) finish using a 30-gram nominal sample weight. For grades over 3.0 g/t Au, samples were re-assayed with a gravimetric finish.

At PolyMet, gold was analyzed by lead fire assay with gravimetric finish.

At Agat, gold was analyzed by lead fire assay with ICP-OES (optical emission spectrometer) finish. For grades over 10.0 g/t Au, samples were re-assayed with a gravimetric finish.

12.6 QUALITY ASSURANCE AND QUALITY CONTROL

In September 2013, as part of an internal mandate, InnovExplo conducted a review and verification of existing QA/QC protocols at the Black Fox Complex and recommended certain corrective measures to be taken. The discussion below is thus divided into two time periods: 1) from the last mineral resource update in October 2010 (Maunula et al., 2011) until September 2013, the time of InnovExplo's audit and recommendations; and 2) from September 2013 to the end of December 2013, the effective date of this report.

12.6.1 Black Fox Mine

QA/QC from October 2010 to September 2013

During the period, Brigus Gold inserted a total of 1,874 blanks and 1,672 standards in the batches for a total of 3,546 in-field QA/QC materials. A total of 799 coarse crush duplicates were also inserted.

In addition to Brigus Gold's QA/QC procedures, each laboratory used an internal QA/QC system that included tracking certified reference materials and in-house quality assurance standards.

Blanks

The field blank used for drilling from October 2010 to September 2013 was derived from unmineralized segments of drill core and from barren quarry rock. Each was placed into a plastic sample bag and given a routine sample identification number. Blanks were sent to three of the five laboratories used (Black Fox Mill, Accurassay, and ALS).

InnovExplo's recommended quality control protocol stipulates that if any core or quarry blank yields a gold value above ten times the detection limit, the entire batch should be re-analyzed. For the period from October 2010 to September 2013, 152 blanks (8.1% of the blank samples) exceeded this recommended threshold (Figs. 12.14 to 12.16).

Many blank samples returned values significantly higher than ten times the detection limit (up to greater than 10 g/t Au); these may represent carry-over contamination, inherent mineralization, or tag mix-ups (Standards or mineralized core sent as Blanks).

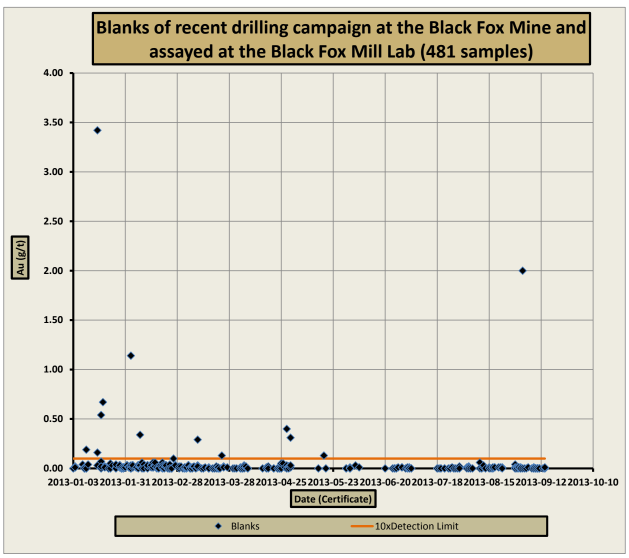


Figure 12.14 – Distribution graph showing results for assayed blanks from the October 2010 to September 2013 drilling at the Black Fox mine, sent to Black Fox Mill

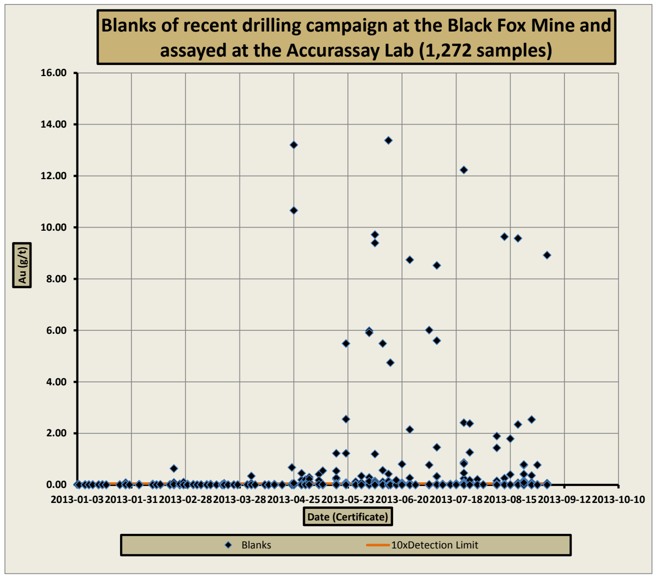


Figure 12.15 – Distribution graph showing results for assayed blanks from the October 2010 to September 2013 drilling at the Black Fox mine, sent to Accurassay

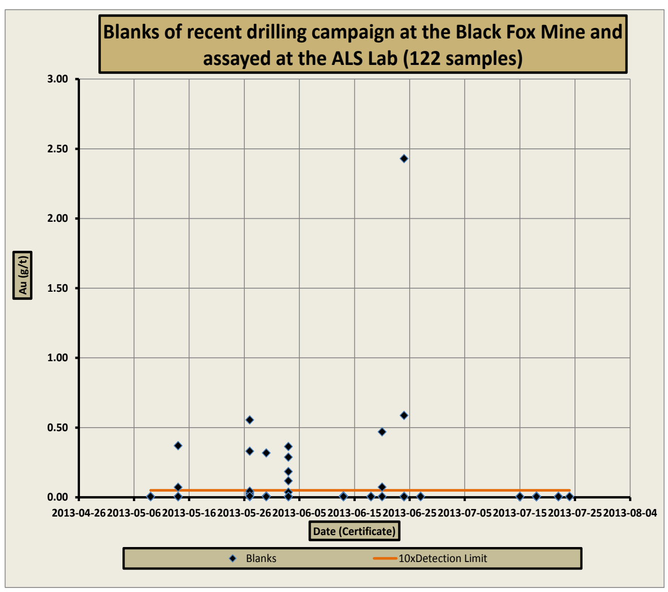


Figure 12.16 – Distribution graph showing results for assayed blanks from the October 2010 to September 2013 drilling at the Black Fox mine, sent to ALS

Reference materials (standards)

The standards consisted of Certified Reference Materials (CRMs) provided by CDN Resource Laboratories Ltd and RockLabs Ltd. The standards used were CDN-GS-2L, CDN-GS-7E, CDN-GS-9A, SK62, SL61 and SN50. According to databases received from the issuer, a total of 1,955 standards were inserted during the October 2010 to September 2013 period.

According to recommended quality control protocols, a batch should be re-analyzed if its standard yields a gold value above or below three standard deviations of the standard grade (i.e., an outlier). Applying such criteria to the databases received from the client, InnovExplo determined that 25% of the batches warrant re-analysis (Table 12.2).

Table 12.2 – Summary of CRM failures during the October 2010 to September 2013 drilling program at the Black Fox mine

Standard Name	Standard Value	BlackFoxMill		Catarello		Accurassay		ALS		Total	
		Count	% Failures (>3σ)	Count	% Failures (>3σ)	Count	% Failures (>3σ)	Count	% Failures (>3σ)	Count	% Failures (>3σ)
CDN-GS-2L	2.340	136	12%	14	0%	262	6%	26	0%	438	7%
SK62	4.075	94	67%	48	17%	183	78%	24	50%	349	65%
SL61	5.931	81	36%	71	17%	11	91%			163	31%
CDN-GS-7E	7.400	121	21%	14	14%	236	9%	25	4%	396	13%
SN50	8.685	30	37%	13	0%					43	26%
CDN-GS-9A	9.310	75	20%			196	17%	12	8%	283	18%
Total		537	30%	160	14%	888	25%	87	16%	1672	25%

Duplicates

Duplicates are used to check the representativeness of the results obtained for a given population. A series of duplicate samples taken at each stage of the sampling and sample preparation process enables the precision to be monitored incrementally through the stages. The number of duplicate types depends on the number of process steps, but typically there should be three: a field duplicate, a coarse crush duplicate, and a pulp duplicate.
From October 2010 to September 2013, Black Fox mine coarse crush duplicates and pulp duplicates were prepared at the laboratories, but Brigus Gold did not prepare any field duplicates.

It should be noted that field duplicates are used to determine random error (i.e., reproducibility) of the sampling and sample preparation process. When used in conjunction with other duplicates, they help provide a more thorough determination of the incremental loss of precision through each stage of the sampling, preparation and assaying process. For the field duplicate increment, this can indicate whether loss of precision is caused by the initial sample size or to the homogeneity of mineralization by analyzing original-duplicate pairs.

A total of 799 original-duplicate sample pairs (635 crush duplicates and 164 pulp duplicates) were identified in the database for the period from October 2010 to September 2013. Figures 12.17 to 12.19 plot the crush duplicate pairs, whereas Figure 11.20 plots the pulp duplicate pairs. Correlation coefficients vary from 92.33% to 97.08% for the crush duplicates depending on the laboratory. All pulp duplicate results are from the Black Fox Mill laboratory and show a correlation coefficient of 92.37%. The correlation coefficient (%) is given by the square root of R^2 and represents the degree of scatter around the linear regression slope. Results correlate well for this type of deposit.

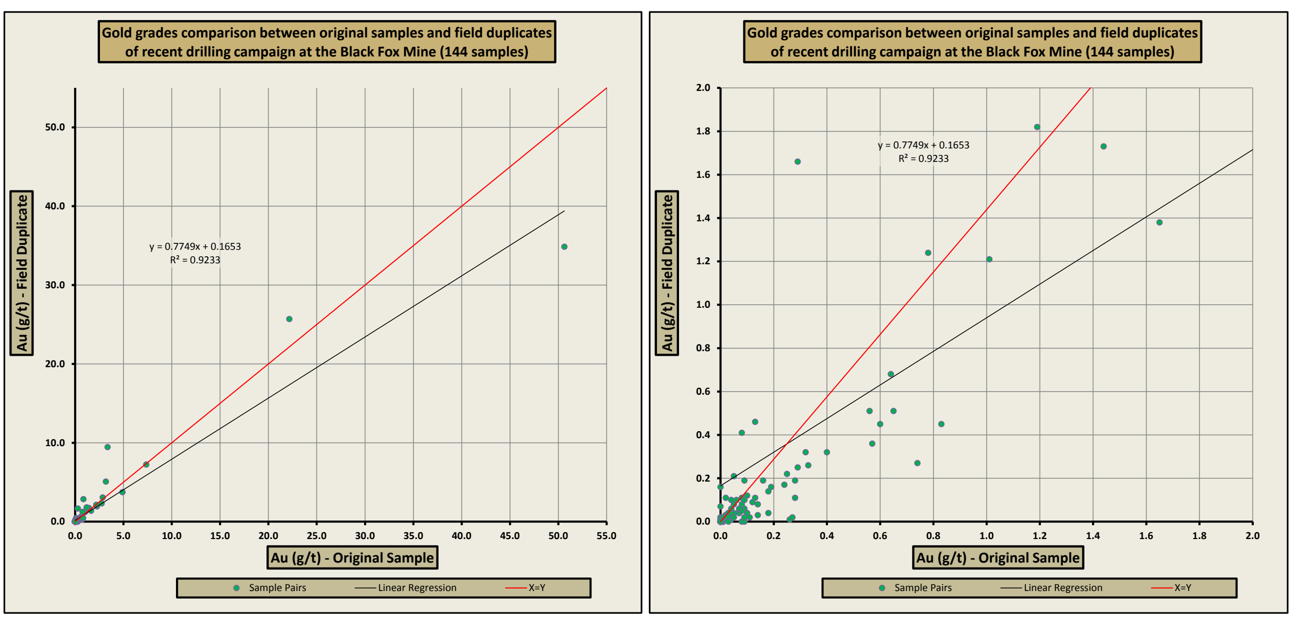


Figure 12.17 – Linear graph comparing crush duplicates from Black Fox Mill for the October 2010 to September 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

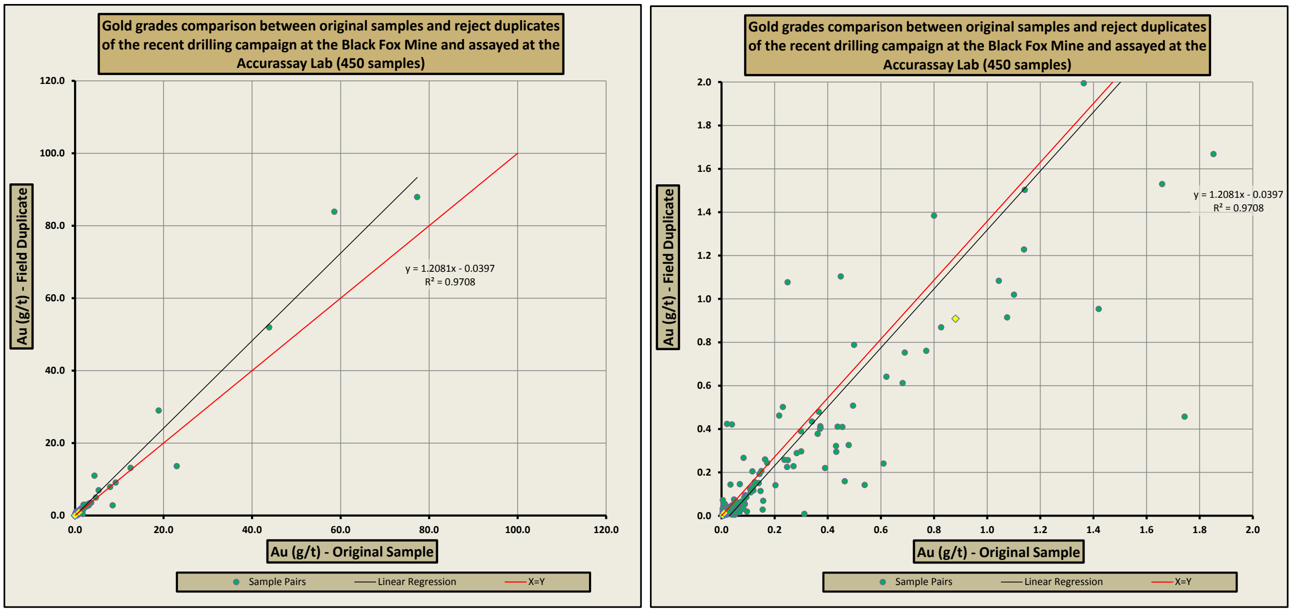


Figure 12.18 – Linear graph comparing crush duplicates from Accurassay for the October 2010 to September 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

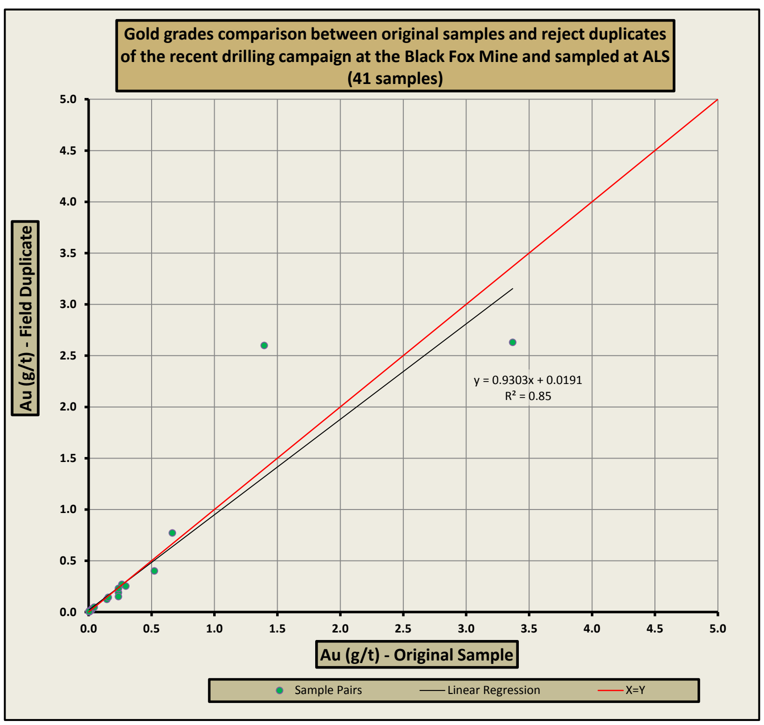


Figure 12.19 – Linear graph comparing crush duplicates from ALS for the October 2010 to September 2013 drilling at the Black Fox mine.

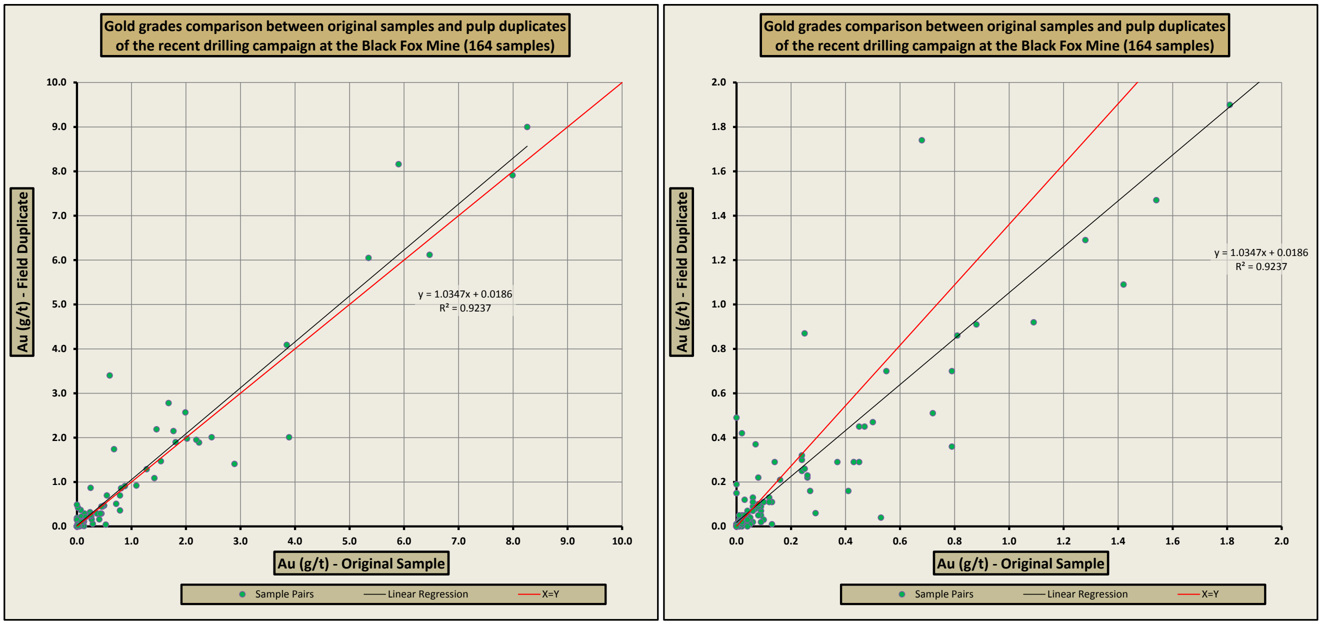


Figure 12.20 – Linear graph comparing pulp duplicates from Black Fox Mill for the October 2010 to September 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

QA/QC from September 2013 to December 2013

Blanks

The field blank used for the period from September 2013 to December 2013 was derived from unmineralized segments of drill core and from barren quarry rock. Each was placed into a plastic sample bag and given a routine sample identification number. Blanks were sent to three of the five laboratories used (Black Fox Mill, Accurassay, and PolyMet).

InnovExplo’s recommended quality control protocol stipulates that if any core or quarry blank yields a gold value above ten times the detection limit, the entire batch should be re-analyzed. For the period from September 2013 to December 2013, 7 blanks (1.05% of the 639 verified blanks) exceeded this recommended threshold (Figs. 12.21 to 12.23).

A few blanks that returned values significantly higher than ten times the detection limit (up to about 7.5 g/t Au) may represent either carry-over contamination, inherent mineralization, or tag mix-ups (Standards or mineralized core sent as Blanks).

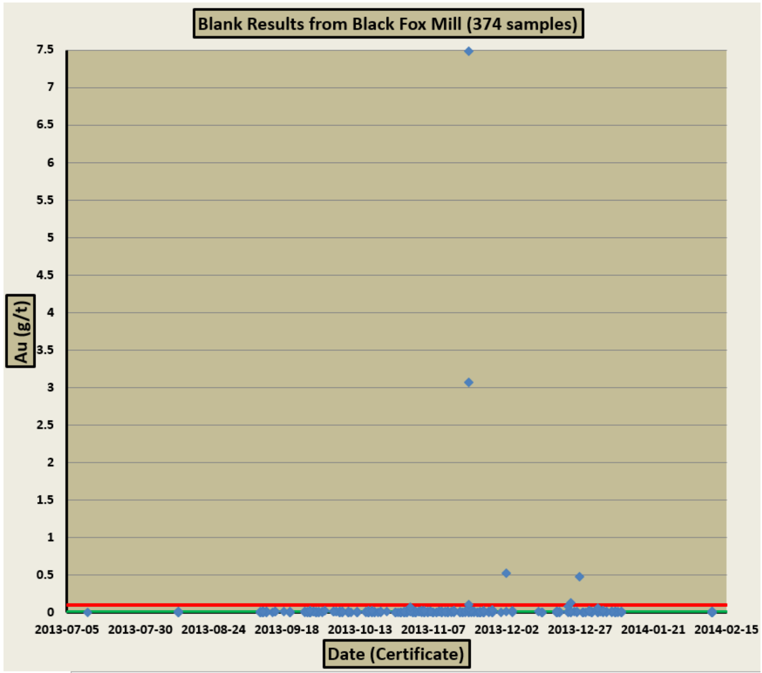


Figure 12.21 – Distribution graph showing results for assayed blanks from the September 2013 to December 2013 drilling on the Black Fox mine, sent to Black Fox Mill (green line= detection limit, red line= 10x detection limit)

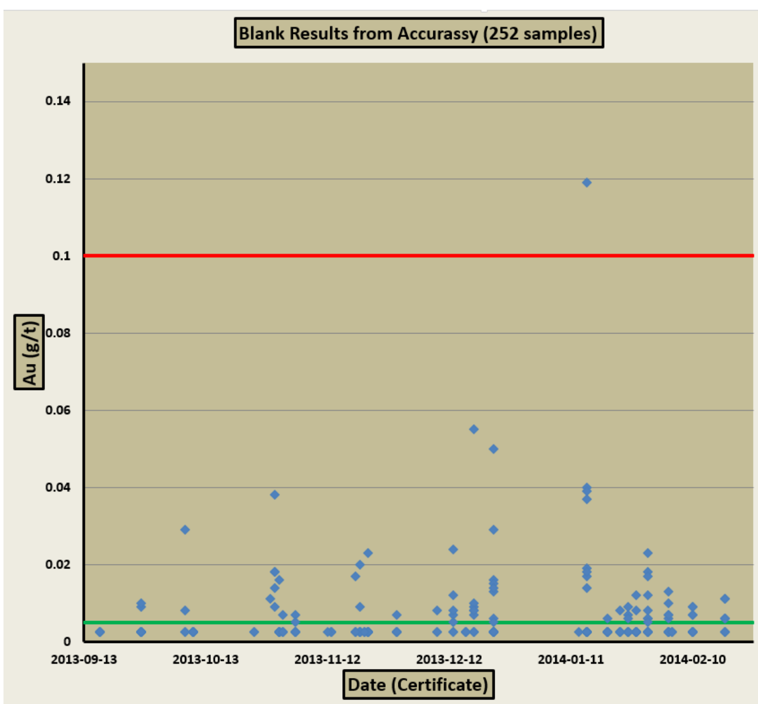


Figure 12.22 – Distribution graph showing results for assayed blanks from the September 2013 to December 2013 drilling on the Black Fox mine, sent to Accurassay (green line= detection limit, red line= 10x detection limit)

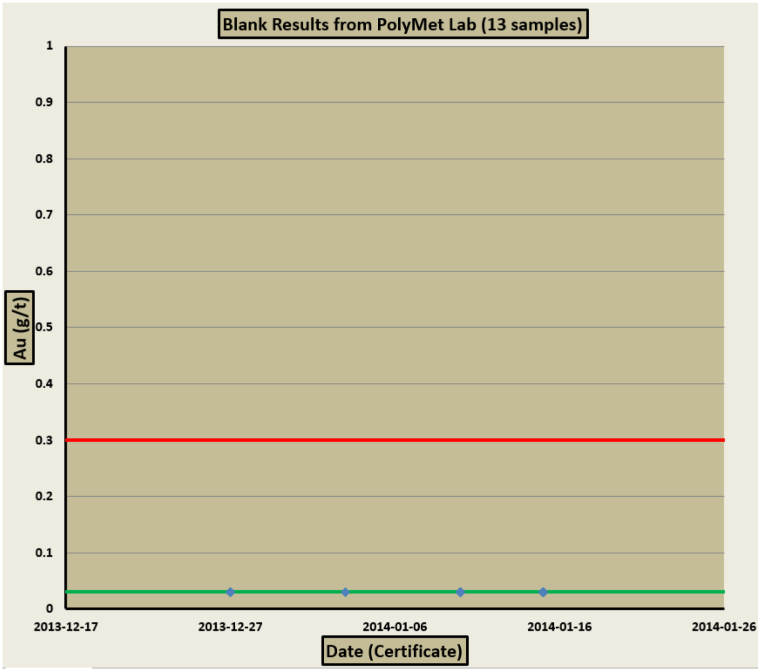


Figure 12.23 – Distribution graph showing results for assayed blanks from the September 2013 to December 2013 drilling on the Black Fox mine, sent to PolyMet (green line= detection limit, red line= 10x detection limit)

Certified reference materials (standards)

The standards consisted of CRMs provided by CDN Resource Laboratories Ltd, Ore Research & Exploration PTY Ltd, and RockLabs Ltd. During the three-month period from September 2013 to December 2013, fifteen (15) standards were used (Table 12.3). According to the databases received from the issuer, a total of 661 standards were inserted during the period. Seventy-three (73) outliers were identified from the results for 661 standards.

According to recommended InnovExplo quality control protocols, a batch should be re-analyzed if its standard yields a gold value above or below 10% of the certified grade for the standard (i.e., an outlier). Applying such criteria to the databases received from the client, InnovExplo determined that 11.04% of the batches from September 2013 to December 2013 warrant re-analysis (Table 12.3).

InnovExplo observed that many of the CRMs used are specifically intended for oxide-type deposits. This type of standard is not suitable for the Black Fox mine and may explain, in part, the significantly high rate of failure. InnovExplo strongly recommends that all oxide-type standards be discarded and replaced by sulphide-type standards from now on. Batches that used oxide-type standards should be re-validated using suitable CRMs.

Table 12.3 – Summary of CRM failures during the period from September 2013 to December 2013 at the Black Fox mine

Black Fox Mine									
Standard (CRM)	Standard supplier	Certified gold value (g/t)	Laboratory	Analytical method	Amount of results	Lower process limit (±10%)	Upper process limit (±10%)	Outliers	(%) passing quality control
OxG98	Rocklabs Ltd	1.017	Accurassay	FA/AA	5	0.9153	1.1187	0	100.00%
OxG98	Rocklabs Ltd	1.017	Black Fox Mill	FA/AA	3	0.9153	1.1187	0	100.00%
Si64	Rocklabs Ltd	1.780	Accurassay	FA/AA	12	1.602	1.958	1	91.67%
Si64	Rocklabs Ltd	1.780	Black Fox Mill	FA/AA	2	1.602	1.958	1	50.00%
Oxi96	Rocklabs Ltd	1.802	Accurassay	FA/AA	19	1.6218	1.9822	1	94.74%
Oxi96	Rocklabs Ltd	1.802	Black Fox Mill	FA/AA	8	1.6218	1.9822	0	100.00%
OREAS 16b	Ore Research & Exploration PTY LTD	2.21	Accurassay	FA/AA	13	1.989	2.431	2	84.62%
OREAS 16b	Ore Research & Exploration PTY LTD	2.21	Black Fox Mill	FA/AA	13	1.989	2.431	3	76.92%
CDN-GS-2L	CDN Resources Laboratories Ltd	2.34	Accurassay	FA/AA	19	2.106	2.574	2	89.47%
CDN-GS-2L	CDN Resources Laboratories Ltd	2.34	Black Fox Mill	FA/AA	46	2.106	2.574	6	86.96%
OxK110	Rocklabs Ltd	3.601	Accurassay	FA/AA	9	3.2409	3.9611	0	100.00%
OxK110	Rocklabs Ltd	3.602	Black Fox Mill	FA/AA	3	3.2418	3.9622	0	100.00%
SK62	Rocklabs Ltd	4.075	Accurassay	FA/AA	2	3.6675	4.4825	0	100.00%
SK78	Rocklabs Ltd	4.134	Accurassay	FA/AA	4	3.7206	4.5474	1	75.00%
SK78	Rocklabs Ltd	4.134	Polymet	FA/GRAV	8	3.7206	4.5474	0	100.00%
CDN-GS-5L	CDN Resources Laboratories Ltd	4.74	Accurassay	FA/AA	11	4.266	5.214	0	100.00%
CDN-GS-5L	CDN Resources Laboratories Ltd	4.74	Black Fox Mill	FA/AA	13	4.266	5.214	5	61.54%
CDN-GS-6A	CDN Resources Laboratories Ltd	5.79	Accurassay	FA/AA	14	5.211	6.369	1	92.86%
CDN-GS-6A	CDN Resources Laboratories Ltd	5.79	Black Fox Mill	FA/AA	42	5.211	6.369	6	85.71%
OxL93	Rocklabs Ltd	5.841	Accurassay	FA/AA	25	5.2569	6.4251	6	76.00%
OxL93	Rocklabs Ltd	5.841	Black Fox Mill	FA/AA	23	5.2569	6.4251	1	95.65%
SL61	Rocklabs Ltd	5.931	Polymet	FA/GRAV	5	5.3379	6.5241	0	100.00%
CDN-GS-7E	CDN Resources Laboratories Ltd	7.40	Accurassay	FA/AA	45	6.66	8.14	5	88.89%
CDN-GS-7E	CDN Resources Laboratories Ltd	7.40	Black Fox Mill	FA/AA	111	6.66	8.14	15	86.49%
OxN92	Rocklabs Ltd	7.643	Accurassay	FA/AA	18	6.8787	8.4073	1	94.44%
OxN92	Rocklabs Ltd	7.643	Black Fox Mill	FA/AA	11	6.8787	8.4073	0	100.00%
CDN-GS-9A	CDN Resources Laboratories Ltd	9.31	Accurassay	FA/AA	70	8.379	10.241	5	92.86%
CDN-GS-9A	CDN Resources Laboratories Ltd	9.31	Black Fox Mill	FA/AA	106	8.379	10.241	11	89.62%
CDN-GS-9A	CDN Resources Laboratories Ltd	9.31	Polymet	FA/GRAV	1	8.379	10.241	0	100.00%

Duplicates

From September 2013 to December 2013, Brigus Gold prepared only 13 field duplicates and thus no graph is presented for these samples. The results for the coarse crush duplicates and pulp duplicates are discussed below.

A total of 571 original-duplicate sample pairs (285 crush duplicates and 286 pulp duplicates) were identified in the database for the period from September 2013 to December 2013. Figures 12.24 and 12.25 plot the crush duplicate pairs, whereas Figure 12.26 and 12.27 plots the pulp duplicate pairs. Correlation coefficients range from 95.34% to 98.66% for the crush duplicates depending on the laboratory. All pulp duplicates are from the Black Fox Mill and Accurassay laboratories and show a correlation coefficient varying from 89.45% to 97.42%. The correlation coefficient (%) is given by the square root of R^2 and represents the degree scatter of data around the linear regression slope. Results correlate well for this type of deposit.

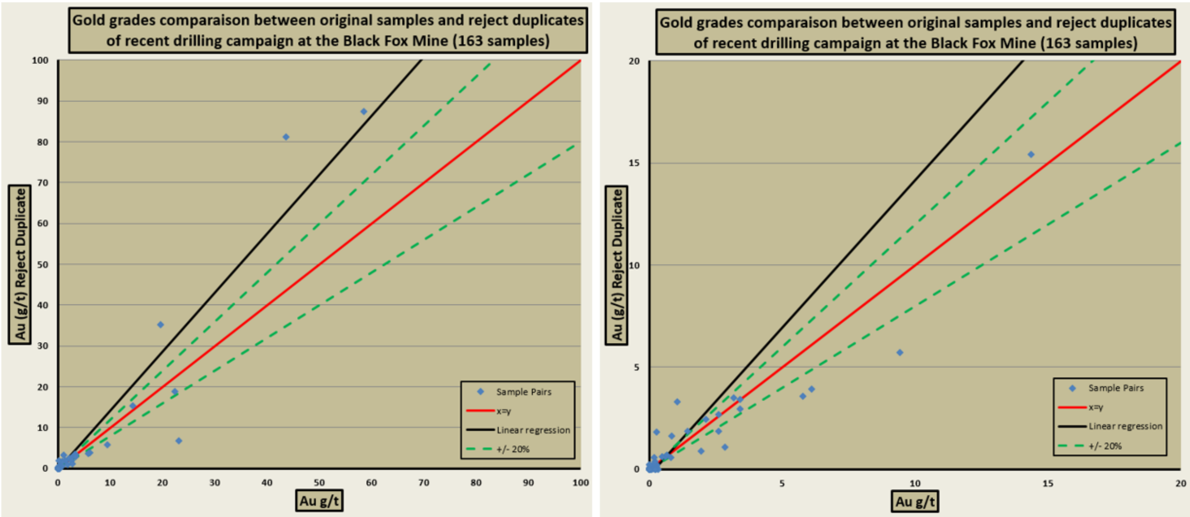


Figure 12.24 – Linear graph comparing crush duplicates from Black Fox Mill for the September 2013 to December 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

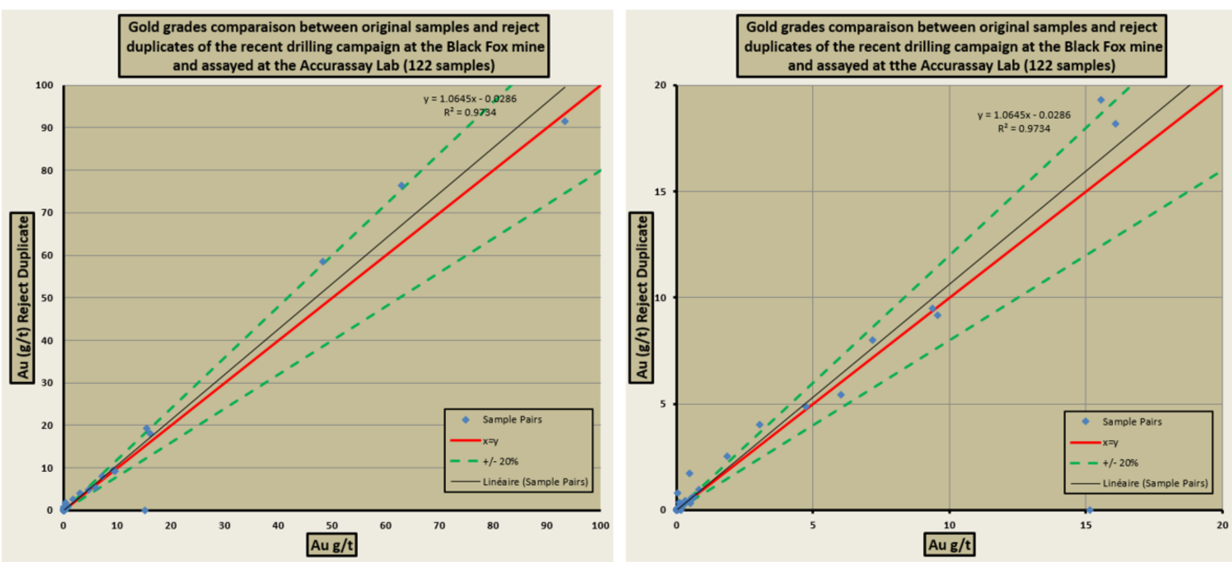


Figure 12.25 – Linear graph comparing crush duplicates from Accurassay for the September 2013 to December 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

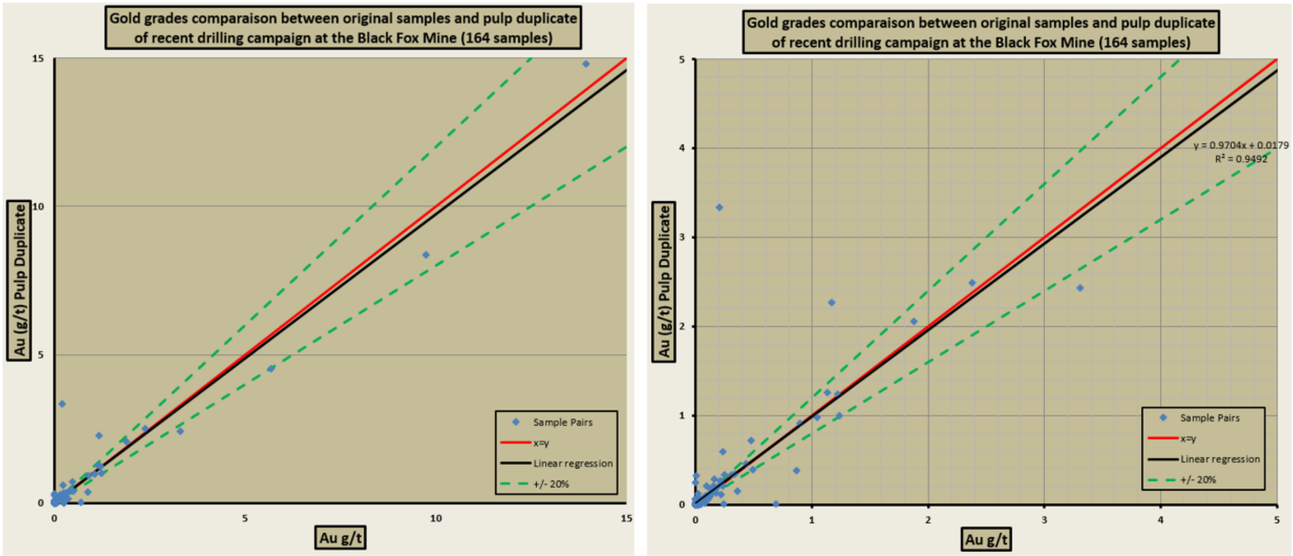


Figure 12.26 – Linear graph comparing pulp duplicates from Black Fox Mill for the September 2013 to December 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

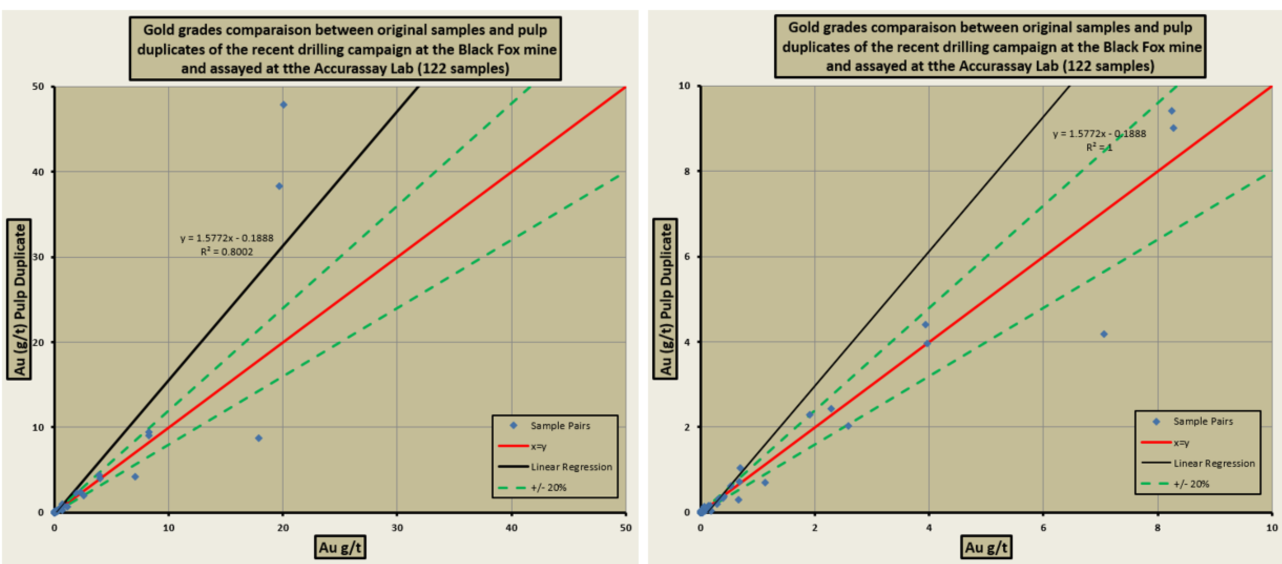


Figure 12.27 – Linear graph comparing pulp duplicates from Accurassay for the September 2013 to December 2013 drilling at the Black Fox mine. The graph on the right presents the same information with an enlargement of lower values.

12.6.2 Grey Fox Deposit

Blanks

The field blank used from June 2013 to December 2013 at the Grey Fox deposit was derived from unmineralized segments of drill core and from barren quarry rock. Each was placed into a plastic sample bag and given a routine sample identification number. Blanks were sent to two of the three laboratories used (Agat and Polymet).

InnovExplo's recommended quality control protocol stipulates that if any core or quarry blank yields a gold value above ten times the detection limit, the entire batch should be re-analyzed. From June 2013 to December 2013, only 2 blanks (0.11% of the 1,788 blank samples) exceeded this recommended threshold (Figs. 12.28 and 12.29).

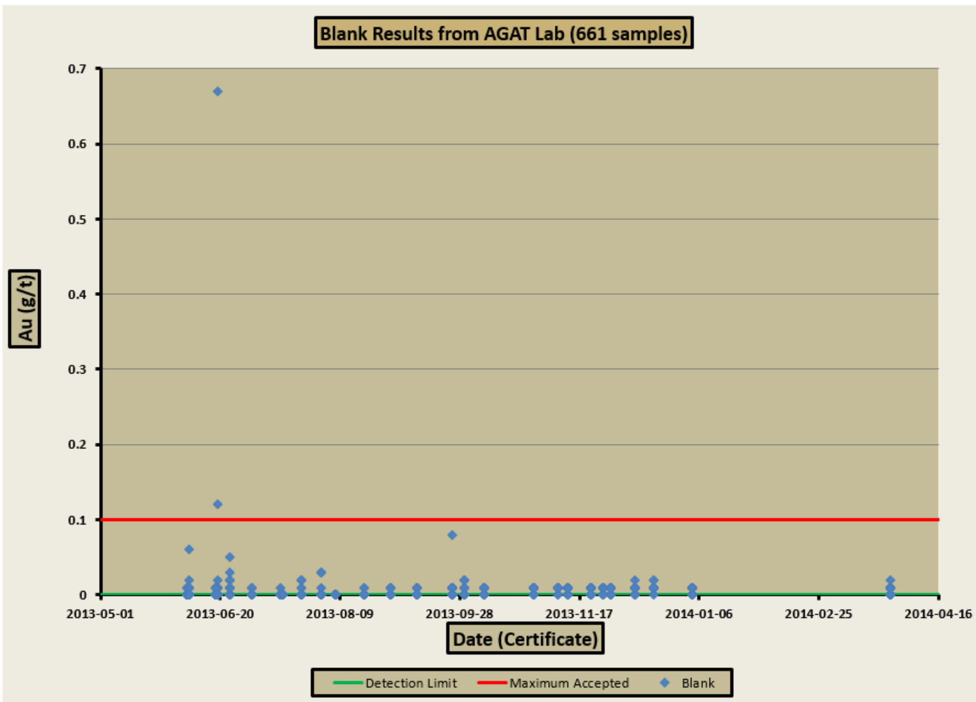


Figure 12.28 – Distribution graph showing results for assayed blanks from the June 2013 to December 2013 drilling on the Grey Fox deposit, sent to Agat (green line= detection limit, red line= 10x detection limit)

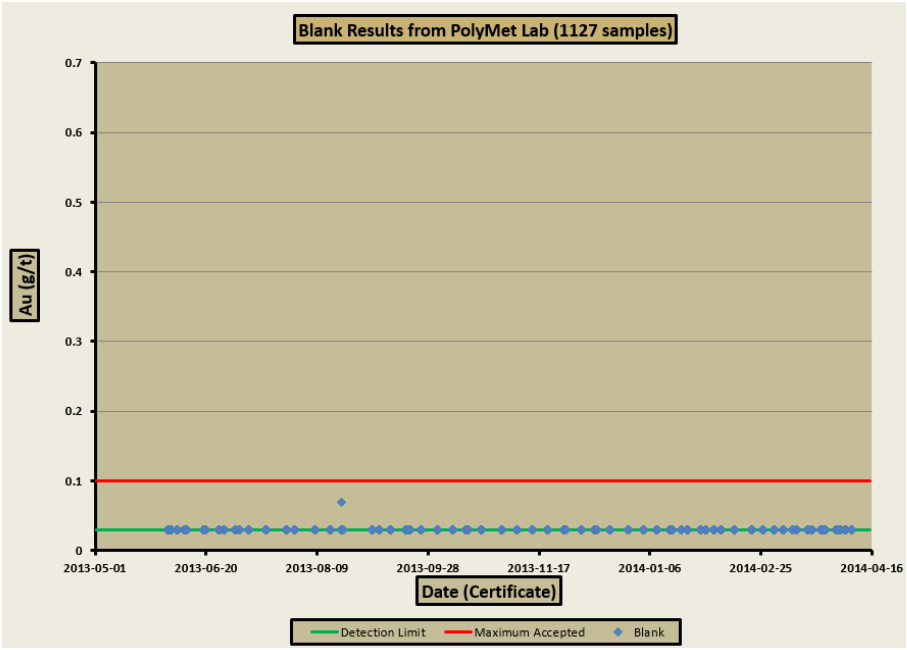


Figure 12.29 – Distribution graph showing results for assayed blanks from the June 2013 to December 2013 drilling on the Grey Fox deposit, sent to PolyMet (green line= detection limit, red line= 10x detection limit)

Certified reference materials (standards)

The standards consisted of CRMs provided by RockLabs Ltd. The standards used were SK62, SL61 and SK78. According to the databases received from the issuer, a total of 1,706 standards were inserted during the June 2013 to December 2013 period.

According to recommended InnovExplo quality control protocols, a batch should be re-analyzed if its standard yields a gold value above or below 10% of certified values the standard grade (i.e., an outlier). Applying such criteria to the databases received from the issuer, InnovExplo determined that 0.58% of the batches from June 2013 to December 2013 warrant re-analysis (Table 12.4). Ten (10) outliers were identified from the 1,706 results of standards.

Table 12.4 – Summary of CRM failures during the June 2013 to December 2013 drilling at the Grey Fox deposit

Grey Fox Deposit									
Standard (CRM)	Standard supplier	Certified gold value (g/t)	Laboratory	Analytical method	Amount of results	Lower process limit (±10%)	Upper process limit (±10%)	Outliers	(%) passing quality control
SK62	Rocklabs Ltd	4.075	AGAT	FA/ICP-OES	440	3.6675	4.4825	1	99.77%
SK62	Rocklabs Ltd	4.075	Polymet	FA/GRAV	499	3.6675	4.4825	1	99.80%
SK78	Rocklabs Ltd	4.134	AGAT	FA/ICP-OES	63	3.7206	4.5474	1	98.41%
SK78	Rocklabs Ltd	4.134	Polymet	FA/GRAV	394	3.7206	4.5474	0	100.00%
SL61	Rocklabs Ltd	5.93	AGAT	FA/ICP-OES	97	5.337	6.523	2	97.94%
SL61	Rocklabs Ltd	5.93	Polymet	FA/GRAV	213	5.337	6.523	5	97.65%

Duplicates

A total of 3,159 original-duplicate sample pairs (all field duplicates) were identified in the database for the June to December 2013 drilling period. Figures 12.30 and 12.31 plot these field duplicate pairs. All duplicates are from Agat and PolyMet and show correlation coefficients of 42.1% and 80.26%. The correlation coefficient (%) is given by the square root of R^2 and represents the degree of scatter around the linear regression slope. Results likely illustrate a nugget effect for the deposit.

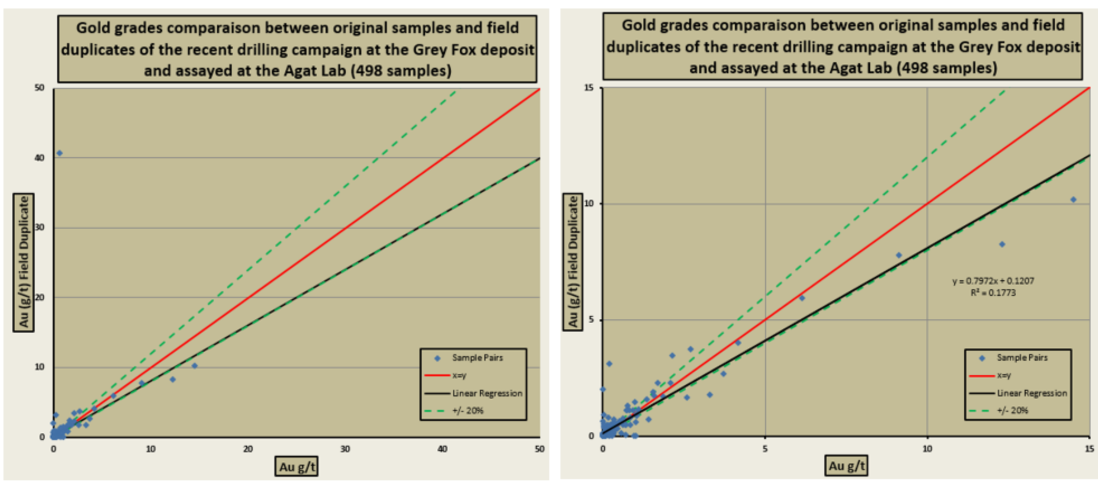


Figure 12.30 – Linear graph comparing field duplicates from Agat for the June 2013 to December 2013 drilling at the Grey Fox deposit. The graph on the right presents the same information with an enlargement of lower values.

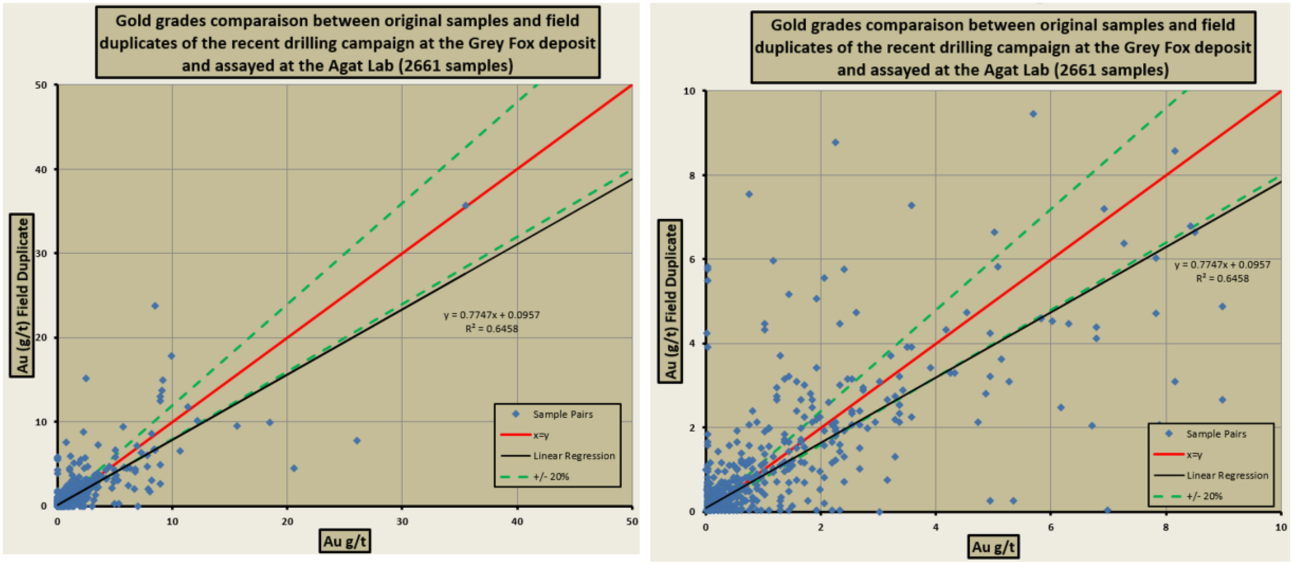


Figure 12.31 – Linear graph comparing field duplicates from PolyMet for the June 2013 to December 2013 drilling at the Grey Fox deposit. The graph on the right presents the same information with an enlargement of lower values.

12.7 SURFACE AND UNDERGROUND SITE VISITS

InnovExplo personnel visited the Black Fox Complex on numerous occasions between April 2013 and June 2014. Details are provided below.

12.7.1 Black Fox Mine

InnovExplo was granted access to the open pit (Fig. 12.32) and the underground mine (Fig. 12.33) as well as the crushing and loading facility on surface (Fig. 12.34). It was therefore possible to assess the current level of workings and observe mineralization both in-pit and underground. It was also possible to assess the extent of the 2012 ground failure in the North wall (Fig. 12.35).

Figure 12.32 – General view of the pit and view from the bottom of the pit looking at the main zone in the West wall (photos from InnovExplo's site visit).

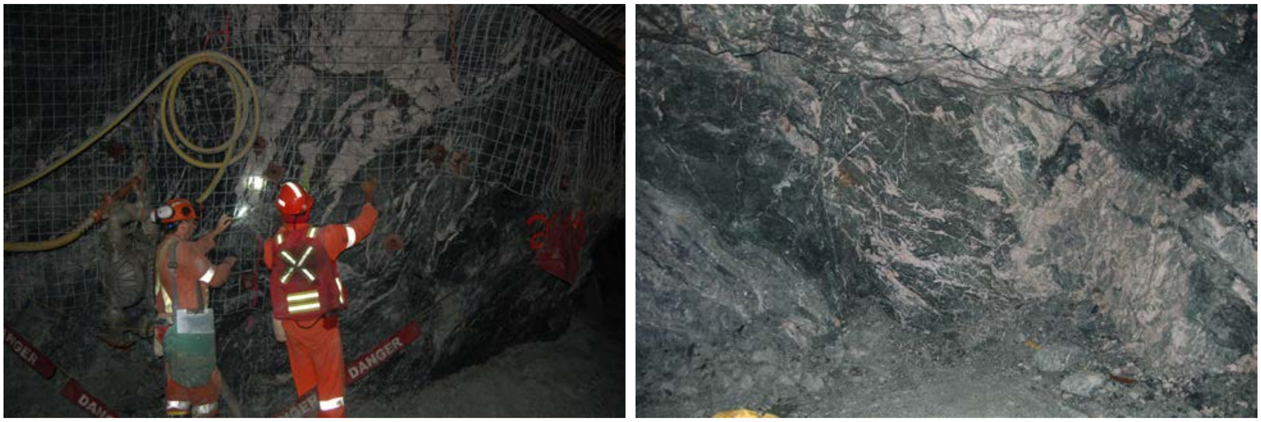


Figure 12.33 – General view of two development drifts examined during the underground site visit (photos from InnovExplo's site visit)

Figure 12.34 – General view of the crushing and loading facility (photo from InnovExplo's site visit)

Figure 12.35 – General view of the ground failure in the North wall (photo from InnovExplo's site visit)

12.7.2 Grey Fox Deposit

During the Grey Fox site visit, the author was able to access drill sites via well-maintained roads (Fig. 12.36). Four drill rigs were operating (Fig. 12.37) and the author identified numerous casings at drill sites (Fig. 12.38).

Figure 12.36 – Well-maintained road access to the drilling sites

Figure 12.37 – Four drill rigs in operation during one of the author's site visits

Figure 12.38 – Some of the drill sites observed during one of the site visits

12.8 DATA VERIFICATION CONCLUSION

12.8.1 Black Fox Mine

InnovExplo believes that a thorough review of the entire Black Fox database is warranted. Emphasis should be put on validating all drill hole locations and assay results.

Regarding QA/QC, a total of 152 blanks (8.1% of the verified 1,871 blanks) from the October 2010 to September 2013 drilling programs at the Black Fox mine failed to return gold values lower than ten times the detection limit. From those, numerous blank samples returned values significantly higher than this threshold (see Figs. 12.14 to 12.16). For the period from September 2013 to December 2013, only 7 blanks (1.05% of the 639 verified blanks) exceeded the recommended threshold (see Figs. 12.21 to 12.23). This represents a significant improvement since InnovExplo's first audit.

Also, a total of 420 CRM samples (25% of the 1,955 CRMs) from October 2010 to September 2013 failed to return acceptable values (see Table 12.2). For the September 2013 to December 2013 period, InnovExplo determined that 11.04% of the batches warrant re-analysis (see Table 12.3). Although the percentage of failed values for CRM samples dropped from 25% to 11% since

InnovExplo's verification of the QA/QC protocol in September 2013, there is still room for additional improvement.
The graphs of the original-duplicate pairs at the Black Fox mine (see Figs. 12.17 to 12.20 and 12.24 to 12.27) show good coefficients of correlation for this type of deposit and are considered acceptable.

InnovExplo recommends that all batches that failed, whether due to blanks or standards, should be re-assayed in order to improve the confidence level in the database.

InnovExplo is of the opinion that the data verification process conducted for the purpose of this report identified numerous aspects that would warrant improvement. Despite the fact that some errors can still be found in the drill hole database, that whole core is being sampled which prevents certain validation procedures, and that uncertainties remain in the underground void distribution and drill hole surveys, InnovExplo considers the available data to be valid and of sufficient quality to be used for mineral resource estimation.

12.8.2 Grey Fox Deposit

For the period from June 2013 to December 2013, only 2 blanks (0.11% of the 1,788 blank samples) exceeded the recommended threshold at the Grey Fox deposit (see Figs. 12.28 and 12.29).

For the same time period, a total of 10 CRM samples (0.58% of the 1,706 CRMs) failed to return acceptable values (see Table 12.4).

The coefficients of correlation for the original-duplicate pairs at the Grey Fox deposit are 42.10% and 80.26%, which are considered quite low (see Figs. 12.30 and 12.31). However, in light of the excellent CRM results, it is thought that these low coefficients of correlation most likely reflect a strong nugget effect at the Grey Fox deposit.

Overall, InnovExplo is of the opinion that the sample preparation, analysis, QA/QC and security protocols used by Brigus Gold at the Grey Fox deposit is adequate and that the database is well maintained. The available database can be considered valid and of good quality to be used for mineral resource estimation.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 BLACK FOX MINE

13.1.1 Mineralogy

Mineralization at the Black Fox mine is divided into two (2) main zones: the East Zone and the West Zone.

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

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

The historical proportion of mafic/ultramafic material being sent to the Black Fox Mill is in the order of 70%–30%. Future estimated proportions are in the order of 60%–40%. 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 new 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 Assay

The gold head grades of the material sent for processing at the mill from May 2009 to June 2014 are presented in Figure 13.1. The listed gold grades represent the weekly averages for the gold head grades measured at the mill feed.

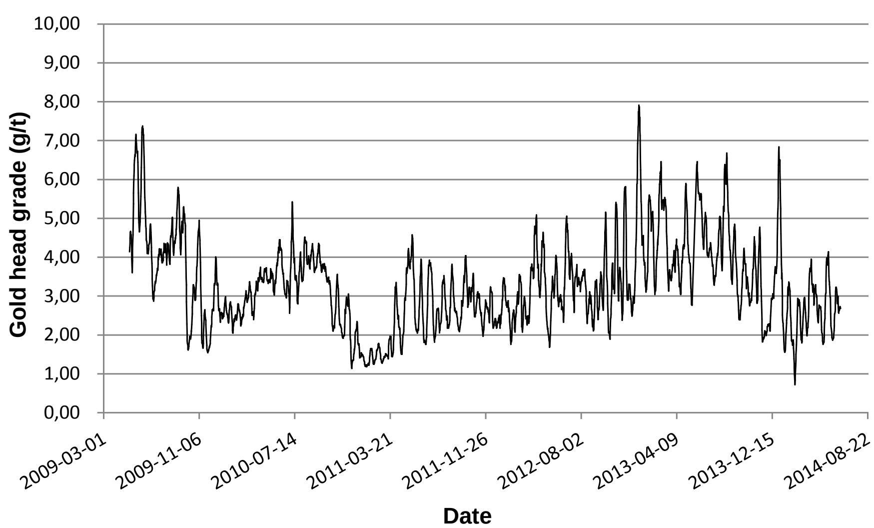


Figure 13.1 – Measured weekly average gold head grades

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.

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. Additional exploration drilling should be carried out to validate this.

13.1.3 Concentrator Recovery

The gold recoveries measured at the mill from May 2009 to June 2014 are presented in Figure 13.2. The presented gold recoveries represent the weekly averages for the overall gold recoveries measured at the mill.

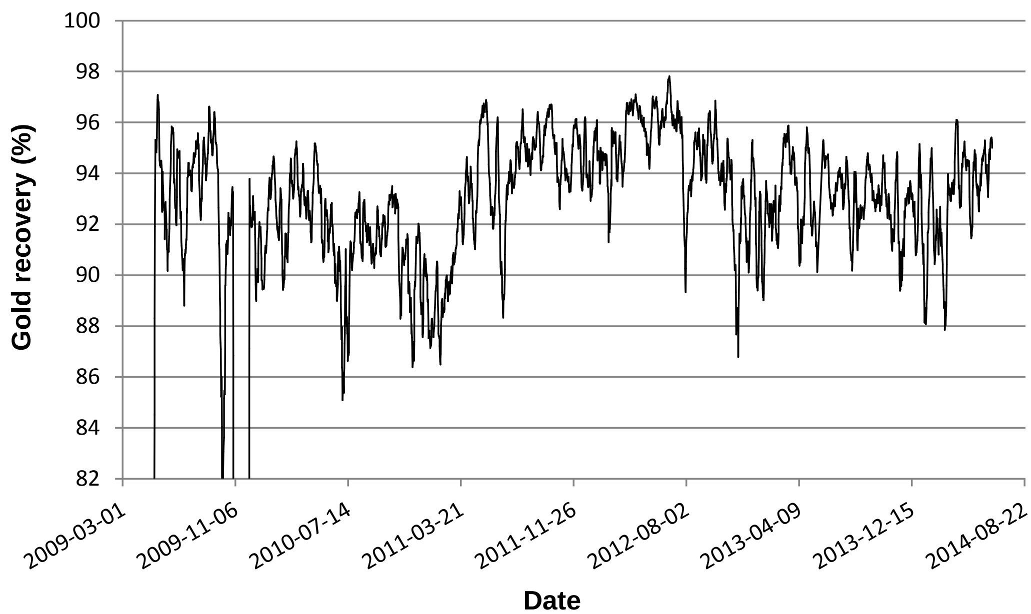


Figure 13.2 – Measured weekly average gold recoveries

The gold recoveries 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 can be confirmed while comparing the measured gold head grades to the final tails gold grade. The final tails grade measured at the mill from May 2009 to June 2014 are presented in Figure 13.3.

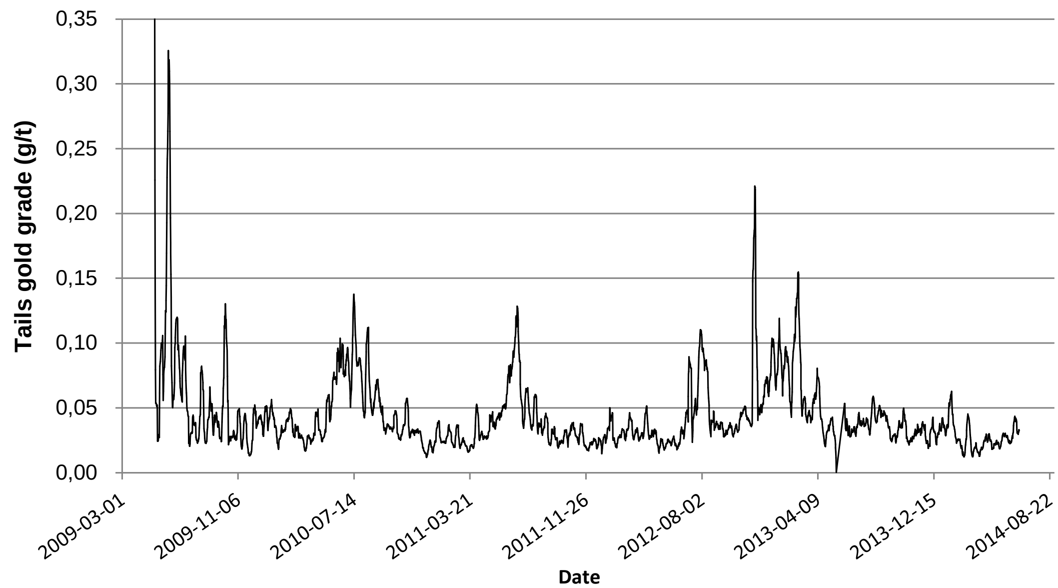


Figure 13.3 – Measured weekly average final tails gold grade

While the gold head grades vary significantly, the final tails gold grade shows much less variability and low values generally below 0,05 g/t. As a consequence, the calculated gold recoveries present a variability similar to the measured gold head grades.

No general trend appears in the evolution of the measured gold recoveries. As material identified by the 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. To validate this, cyanidation bottle roll with pre-aeration with air testing on exploration samples should be carried out.

13.1.4 Grindability

For exploration samples, communition testwork determines the grindability characteristics and determines the size and energy consumption of the crusher and ball mills. To date, no samples from exploration drilling at the Black Fox mine have been subject to testing for the Bond ball mill and rod mill work index determinations. As material identified by exploration drilling shows mineralization similar to what is being observed in the East and West zones, it is unlikely that future material hardness will differ significantly from what is currently being processed at the mill. Work index testing should be carried out, to validate this.

13.1.5 Cyanidation

To date, no samples from exploration drilling at the Black Fox mine have been subject to testing for recovery of gold by cyanidation. As material identified by the exploration drilling shows a mineralization similar to what is being observed in the East and West zones, it is unlikely that future concentrator gold recoveries will differ significantly from what is currently being measured at the mill. To validate this, the cyanidation bottle roll with pre-aeration with air testing should be carried out.

13.2 GREY FOX DEPOSIT

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.

13.2.1 Mineralogy

The eight (8) variability composites from the Grey Fox deposit were submitted to a QEMSCAN analysis to define the material mineralogy. The results are presented in Figure 13.4.

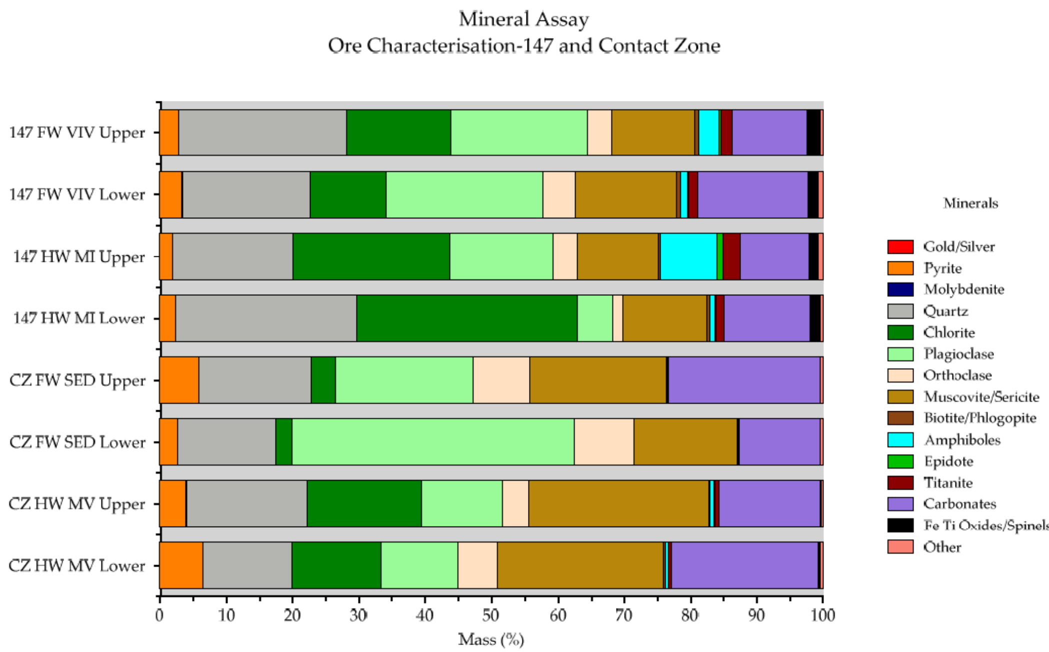


Figure 13.4 – Sample mineralogy (SGS)

13.2.2 Head Assay

The head assay of the variability samples from the 147 Zone and the Contact Zone composites are summarized in Table 13.1. An external reference distribution (ERD) was performed on each to establish the samples gold values.

Table 13.1 – Sample head grades

			HEAD ASSAYS													
Comp Details	COMP#	Target Au ppm	Au ppm (ERD)	Si	Al	Fe	Mg	Ca	Na	K	Ti	Mn	Cr	As	S	C (t)
147 FW VIV 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
147 FW VIV 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
CZ FW SED 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
CZ FW SED 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 from pyrite.

13.2.3 Grindability

Communition 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 13.2.

Table 13.2 – Bond ball work index (SGS)

Sample Name	Mesh of Grind	F80 (µm)	P80 (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

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.

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 13.3.

Table 13.3 – Bond rod mill index (SGS)

Sample Name	Mesh of Grind	F80 (µm)	P80 (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

Both the Contact and 147 Zone Master Composites were within the 99-100 percentile of the SGS database and indicate this very hard material.

13.2.4 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 13.4. The results show that the samples reacted well to gravity separation**.**

Table 13.4 – 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	28.0
					Knelson/Mozley Tailing	99.87	2.15	72.0
					Head (Calculated)		2.98	100
G-8	147	74	10	CN-16	Mozley Concentrate	0.10	1142	32.1
					Knelson/Mozley Tailing	99.90	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	4.50	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	

13.2.5 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 kg samples. The results are presented in Table 13.5.

Table 13.5 – Whole sample cyanidation results (SGS)

CN	Ore Type	Feed Size	Reagent Consumption							
Test No.	/Comp	P_{80} µm	kg/t of CN Feed		% Au Ext	Residue Au, g/t	Carbon Au, g/t	Head, Au, g/t		
			NaCN	CaO	48 h			Calc	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 Gold

A second series of cyanidation tests was conducted at XPS on whole samples on 1 kg charges. Table 13.6 presents the results of gold recovery obtained after 48 hours of leaching.

Table 13.6 – 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	**4.0**	**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	3.0	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 µm to 114 µm), the gold recoveries obtained show that there is no significant relationship between grind size and gold recovery. Figure 13.5 outlines the results of gold recovery as a function of sample feed grind size.

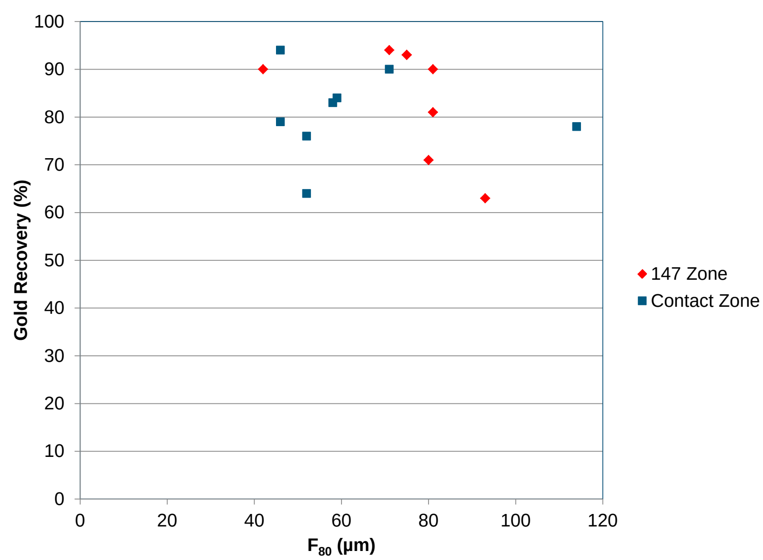


Figure 13.5 – Gold recoveries as a function of sample feed grind size

13.2.6 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 13.7.

Table 13.7 – 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
CO3 NP	T CaCO3/1000 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 13.8. The tests indicated that the tailings were net non-acid generating.

Table 13.8 – Net acid generation test results

Parameter	Unit	CND1-2 Treated Residue	CND2-2 Treated Residue
LIMS		10297-FEB13	14277-FEB13
Sample weight	g	1.50	1.52
Vol H_2O_2	mL	150	150
Final pH	units	10.43	10.87
NaOH	Normality	0.10	0.10
Vol NaOH to pH 4.5	mL	0.00	0.00
Vol NaOH to pH 7.0	mL	0.00	0.00
NAG (pH 4.5)	kg H_2SO_4/tonne	0.0	0
NAG (pH 7.0)	kg H_2SO_4/tonne	0.0	0

14 MINERAL RESOURCE ESTIMATES

The Mineral Resource Estimates herein were performed by InnovExplo geologist Pierre-Luc Richard (P.Geo.) using all available results. The main objectives of InnovExplo's work were to: 1) update the Black Fox mine interpretation; 2) validate the updated Grey Fox interpretation; and 3) publish the results of an updated Mineral Resource Estimate for the Black Fox Complex. The result of the study is two Mineral Resource Estimates, one for the Black Fox mine and one for the Grey Fox deposit, comprising Indicated and Inferred Resources for an in-pit volume and a complementary underground volume, as well as a stockpile resource classified as Measured. These mineral resources are not mineral reserves since they have no demonstrable economic viability. The effective date of the mineral resource estimates is December 31, 2013.

This item is subdivided in two parts to independently discuss the resource estimates for the Black Fox mine and the Grey Fox deposit.

14.1 BLACK FOX MINE

14.1.1 Methodology

The Mineral Resource Estimate for the Black Fox mine was made using 3D block modelling. The inverse distance squared (ID2) interpolation method was used on an area of the Black Fox mine with a strike-length of 1.5 km and a width up to approximately 1.0 km, down to a vertical depth of 900 m below surface. Twenty-four (24) mineralized zones have been interpreted in transverse sections, plan views, and 3D views, as well as one (1) mineralized envelope containing 23 of the 24 mineralized zones.

14.1.2 Drill Hole Database

The issuer supplied InnovExplo with a GEMS / MS Access diamond drill hole database for the Black Fox mine. Following a verification, corrections and updates, the database used for the resource estimation contains 3,639 diamond drill holes with conventional gold assay results, as well as coded lithologies from the drill log descriptions. Primero had discarded a total of 377 drill holes falling within the interpreted area due to incomplete information in the historical logs or doubts about their location (n= 192); and drill holes drilled in 2014 (n = 185). InnovExplo rejected another 30 drill holes falling within the interpreted area due to significant doubts about their locations. The remaining 3,232 drill holes cover the strike-length of the project at a drill spacing of up to 25 m. The database discussed in this chapter will refer to this subset of 3,232 drill holes.

In addition to the basic tables of raw data, the updated GEMS database contains several tables containing the calculated drill hole composites for wireframe solid intersections, which were used in the statistical evaluation and the resource block modelling. The 3,232 drill hole database contains a total of 277,559 analyses taken from 473,363 m of drilled core.

14.1.3 Interpretation of Mineralized Zones

In order to conduct accurate resource modelling of the Black Fox mine, InnovExplo updated a mineralized-zone solid model delimiting the defined extent of the mineralized zones using a 1.5-km strike-length corridor measuring 1.0 km wide and extending down to 900 m below surface.

The mineralized-zone model was constructed to outline zones of grade continuity in accordance to geological observations and orientations. The interpretation yielded one (1) mineralized main envelope along a steep, roughly E-W trend, one (1) mineralized fault zone roughly NW-SE, and twenty-three (23) sub-parallel mineralized zones showing higher grades within the main envelope (Fig. 14.1; Table 14.1).

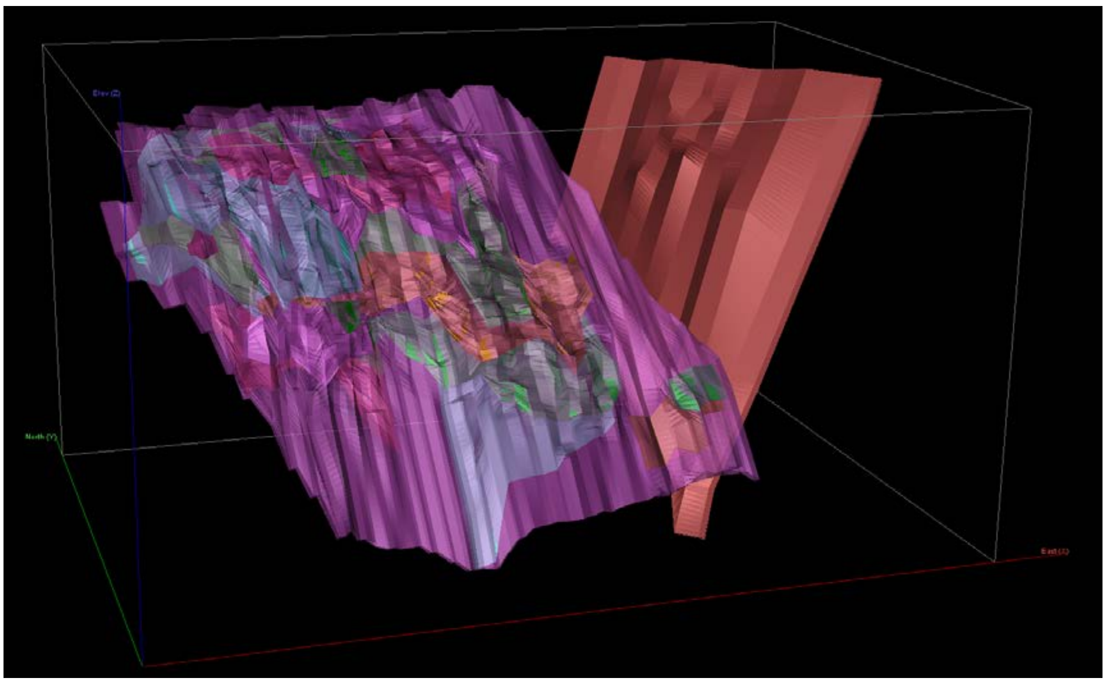


Figure 14.1 – General view showing the Fault Zone (red), the Main Envelope (purple) and the twenty-three (23) interpreted mineralized zones (various colors within the Main Envelope) looking northeast.

The wireframe solids of the mineralized zone model were created by digitizing an interpretation onto sections spaced 25 m apart (locally 12.5 m), and onto plan views spaced 10 m apart. A rough version was used to create intercepts while a smoothed version was used to create the final solids.

Country Rock was defined as the part of the block model volume still remaining once the mineralized solids were removed.

Table 14.1 – List of the interpreted geological zones on the Black Fox mine

Geological Zone	Blockcode	Rockcode
Zone A	101	Zone_A
Zone B	102	Zone_B
Zone C	103	Zone_C
Zone D	104	Zone_D
Zone E	105	Zone_E
Zone F	106	Zone_F
Zone G	107	Zone_G
Zone H	108	Zone_H
Zone I	109	Zone_I
Zone J	110	Zone_J
Zone K	111	Zone_K
Zone L	112	Zone_L
Zone M	113	Zone_M
Zone N	114	Zone_N
Zone O	115	Zone_O
Zone P	116	Zone_P
Zone Q	117	Zone_Q
Zone R	118	Zone_R
Zone S	119	Zone_S
Zone T	120	Zone_T
Zone U	121	Zone_U
Zone V	122	Zone_V
Zone W	123	Zone_W
Envelope	20	ENVA
Fault Zone	70	FLTZ

14.1.4 High Grade Capping

Drill hole assay intersecting interpreted mineralized zones were automatically coded in the database from 3D solids and were used to determine high grade capping.

Statistics on the overall assay data and on datasets grouped by zones were performed using raw analytical assay data for a total of 172,734 diamond drill hole samples, all of which fall inside the mineralized solids.

Figures 14.2 and 14.3 present the decile analyses, probability plots and percentage of metal cut for two zones. Similar studies were performed for all individual zones. Based on these studies, a capping ranging from 30 g/t to 300 g/t was used.

Within the DDH database, a total of 215 samples were capped at the determined capping limits. The capping of high assays affected 0.12% of all samples within wireframes for the DDH population (Appendix II). This results in 25.8% of the metal being cut for the entire deposit. Table 14.2 summarizes statistics by zone.

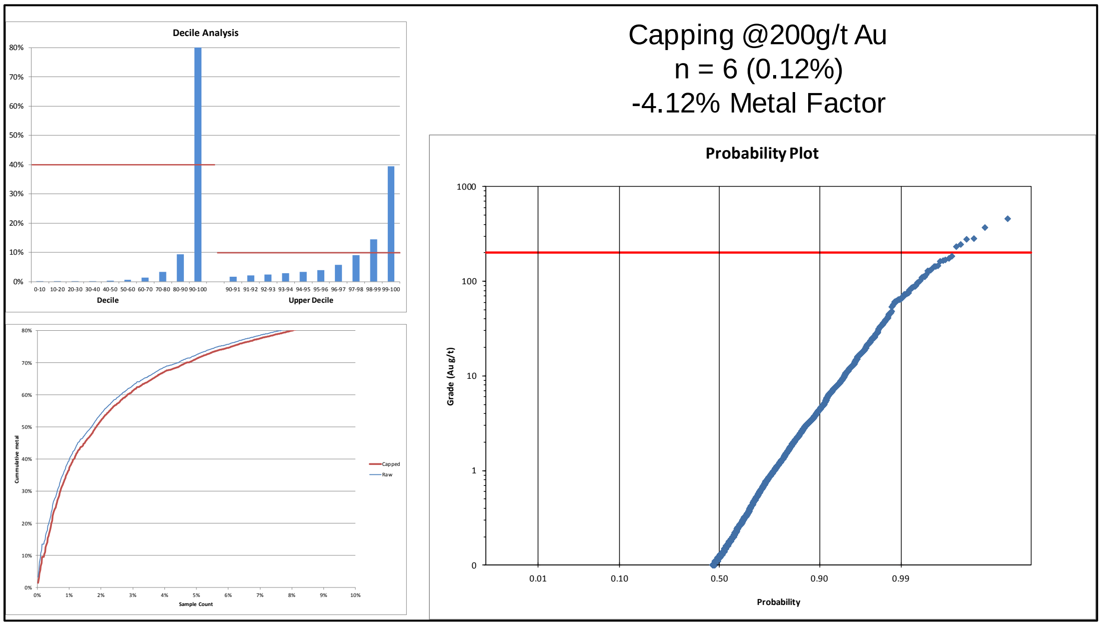


Figure 14.2 – Statistical graphs for the capping determination for Zone A. The red line represents the established capping at 200 g/t Au.

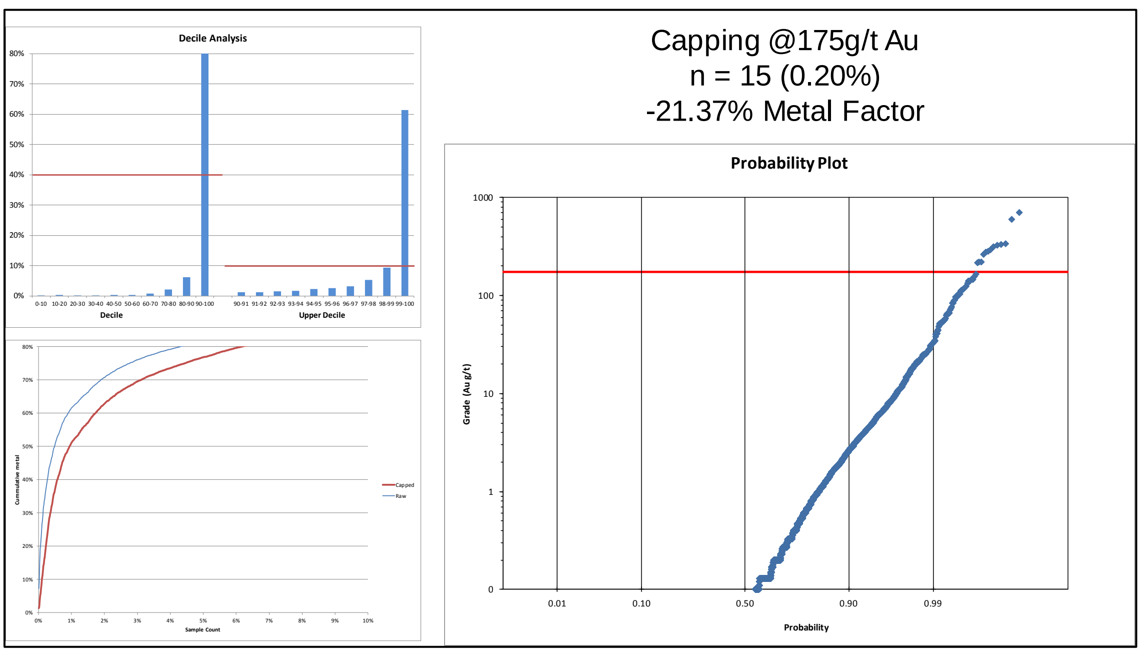


Figure 14.3 – Statistical graphs for the capping determination for Zone B. The red line represents the established capping at 175 g/t Au.

Table 14.2 – Summary statistics for the DDH assays by zone

Zone	Blockcode	Number of samples	Max (g/t Au)	Uncut mean (g/t Au)	High grade capping (g/t Au)	Cut mean (g/t Au)	Number of samples cut	Percentage of samples cut	Percentage of Metal Factor cut
Zone A	101	5,133	456.94	3.13	200.00	2.99	6	0.12%	4.12%
Zone B	102	7,469	1,174.00	2.51	175.00	1.95	15	0.20%	21.37%
Zone C	103	561	145.02	2.05	65.00	1.74	3	0.53%	13.48%
Zone D	104	313	19.54	0.62	65.00	0.62	-	0.00%	0.00%
Zone E	105	798	55.77	0.99	65.00	0.99	-	0.00%	0.00%
Zone F	106	1,752	3,884.43	14.93	200.00	7.28	12	0.68%	48.02%
Zone G	107	681	923.67	5.82	65.00	2.26	10	1.47%	53.27%
Zone H	108	2,518	10,000.00	12.35	130.00	2.85	13	0.52%	70.99%
Zone I	109	9,061	2,969.41	3.37	300.00	3.37	5	0.06%	7.38%
Zone J	110	2,132	680.00	3.10	100.00	2.67	8	0.38%	15.72%
Zone K	111	4,512	519.55	2.42	200.00	2.33	6	0.13%	4.42%
Zone L	112	6,745	650.00	2.69	130.00	2.29	16	0.24%	13.79%
Zone M	113	68	149.35	4.13	65.00	2.81	1	1.47%	34.98%
Zone N	114	4,084	1,370.64	3.69	130.00	2.84	10	0.24%	23.70%
Zone O	115	2,950	608.08	5.10	100.00	4.18	13	0.44%	17.90%
Zone P	116	157	143.36	2.81	65.00	2.24	1	0.64%	24.04%
Zone Q	117	190	116.00	2.46	65.00	1.92	2	1.05%	20.64%
Zone R	118	117	186.08	4.60	65.00	3.45	1	0.85%	12.73%
Zone S	119	206	44.00	2.14	65.00	2.14	-	0.00%	0.00%
Zone T	120	793	120.91	5.41	85.00	5.37	1	0.13%	0.88%
Zone U	121	249	26.48	1.49	65.00	1.49	-	0.00%	0.00%
Zone V	122	96	3.56	1.05	65.00	1.05	-	0.00%	0.00%
Zone W	123	153	60.72	2.75	65.00	2.75	-	0.00%	0.00%
Envelope	20	121,453	3,448.67	0.58	65.00	0.38	87	0.07%	32.09%
Fault Zone	70	543	105.50	1.71	30.00	1.42	5	0.92%	15.57%
Total		**172,734**	**10,000.00**	**1.64**	**variable**	**1.16**	**215**	**0.12%**	**25.80%**

14.1.5 Compositing

Any drill hole assays intersecting the interpreted geological zones were used to generate composites.

In order to minimize any bias introduced by variable sample lengths, the capped gold assays were composited to equal lengths of 1 metre (“1m” composites) within all intervals defining each of the mineralized zones. The selected composite length was based on raw assay lengths and mineralized zone thicknesses. From all the composites generated within the DDH population (172,114 composites), a total of 3,797 (2.2%) were less than 0.25 m long and these were removed from the block model interpolation. A grade of 0.00 g/t Au was assigned to missing sample intervals. Table 14.3 summarizes the basic statistics for the 1m DDH composites.

Table 14.3 – Summary statistics for DDH composites

Zone	Blockcode	Number of composites	Max (g/t Au)	Mean (g/t Au)	Standard deviation	Coefficient of variation
Zone A	101	4,624	200.00	2.354	10.46	4.44
Zone B	102	7,383	175.00	1.827	10.59	5.80
Zone C	103	548	65.00	1.502	5.90	3.93
Zone D	104	316	11.03	0.484	1.40	2.90
Zone E	105	683	55.77	0.852	3.79	4.45
Zone F	106	1,494	200.00	5.735	19.36	3.38
Zone G	107	586	65.00	2.084	8.86	4.25
Zone H	108	2,096	130.00	2.411	11.39	4.72
Zone I	109	8,438	299.97	2.351	10.87	4.62
Zone J	110	2,022	100.00	2.382	8.43	3.54
Zone K	111	4,259	200.00	1.990	9.56	4.80
Zone L	112	6,490	130.00	1.951	8.73	4.48
Zone M	113	56	65.00	3.053	8.93	2.93
Zone N	114	3,536	130.00	2.346	9.21	3.93
Zone O	115	2,509	100.00	3.835	10.24	2.67
Zone P	116	149	65.00	2.213	9.09	4.11
Zone Q	117	169	65.00	1.253	6.36	5.07
Zone R	118	97	65.00	2.827	7.51	2.66
Zone S	119	189	29.36	1.664	4.60	2.77
Zone T	120	881	85.00	3.742	8.85	2.37
Zone U	121	230	15.94	1.315	2.11	1.61
Zone V	122	99	3.46	0.894	0.80	0.90
Zone W	123	182	25.91	1.666	3.25	1.95
Envelope	20	120,763	65.00	0.277	2.11	7.60
Fault Zone	70	518	30.00	1.352	4.01	2.97
Total		**168,317**	**299.97**	**0.86**	**5.80**	**6.78**

14.1.6 Variography and Ellipsoids

Variography was conducted on composites from the interpreted mineralized zones, and the results were used to determine ellipsoids ranges.

3D directional-specific variography was completed on 1m DDH composites of the capped gold assay data for representative mineralized zones. The study involved 10º incremental searches in the horizontal plane, followed by 10º incremental searches in the vertical planes of the indicated preferred azimuths, as well as planes normal to the preferred azimuth. The best-fit major variogram for zones I and L (the two most populated zones) are shown as Figures 14.4 and 14.5 (note the different scales). The maximum range in both cases is approximately 56 m.

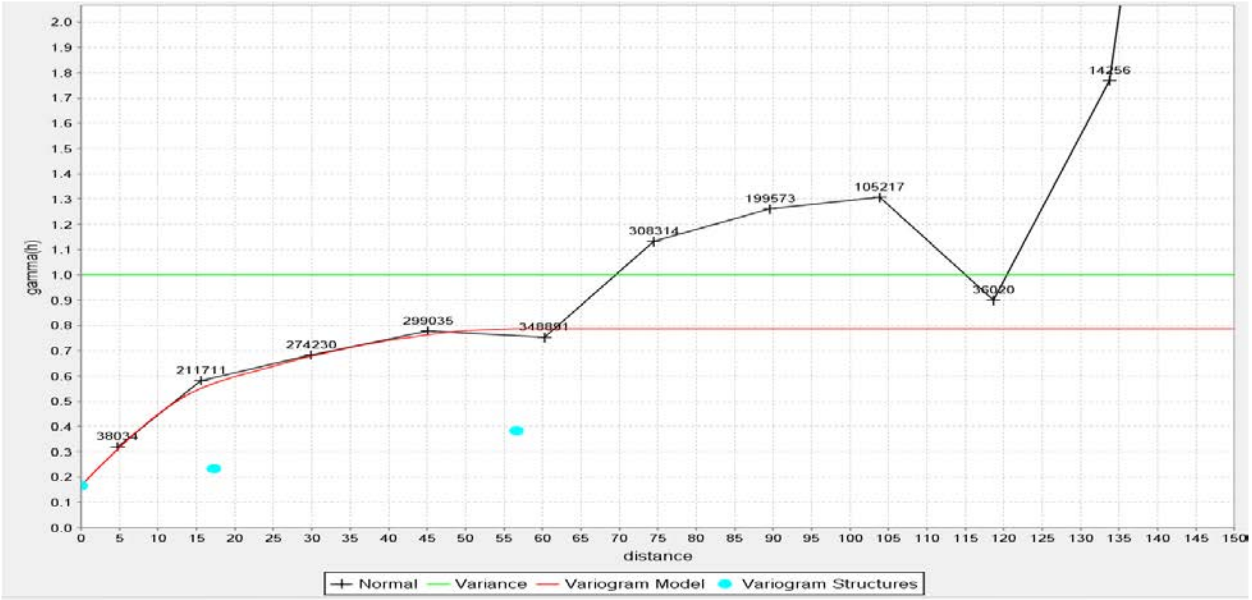


Figure 14.4 – 3D variogram along the major axis of Zone I

Figure 14.5 – 3D variogram along the major axis of Zone L

The results of the linear and 3D variographic studies on the DDH composites are consistent with the geological features of the deposit. The 3D directional-specific variography yielded the best-fit model along an orientation that roughly corresponds to the strike and dip of the mineralized zones.

Some minor changes were applied to the best-fit models to better correspond with the geological model. The search ellipse configuration was defined using variography as a guide, combined with drill hole spacing and the geometry of the deposit. The Main Envelope and Zones A to W ellipsoids were oriented using Gems' Azimuth, Dip, Azimuth Search Anisotropy convention of 80 Principal Azimuth, -15 Principal Dip, and 5 Intermediate Azimuth while the Fault Zone used Gems' Rotation ZXZ Search Anisotropy convention of 125 Rotation about Z, -55 Rotation about X, and 0 Rotation about Z. The search radiuses were as follows:

Pass 1
Main Envelope: 55m x 45m x 15m
Fault Zone: 50m x 30m x 15m
Zones A to W: 55m x 45m x 15m

Pass 2
Main Envelope: 110m x 90m x 30m
Fault Zone: 100m x 60m x 30m
Zones A to W: 110m x 90m x 30m

14.1.7 Bulk Density

For the current mineral resource estimate, a fixed density of 2.84 g/cm^3 was applied to all material, which is the rock density currently in use by the issuer.

InnovExplo attempted to validate this value, but was not provided with the necessary databases or measurements to do so. InnovExplo considers the density of 2.84 g/cm^3 to be plausible considering the mineralized rock types encountered. However, rock types vary from felsic to ultramafic units and large density variations are expected. Density measurements should be taken throughout the deposit in order to improve the model.

A density of 2.00 g/cm^3 has been assigned to the overburden (OB), 2.84 g/cm^3 to the country rock, and 1.00 g/cm^3 to underground voids.

Bulk densities were used to calculate tonnages from the volume estimates in the resource-grade block model.

14.1.8 Block Model

The block model extends far enough away from the mineralized zones to cover an area sufficiently large to host an open pit. The model has been pushed down to a depth of 900 m below surface. The limits of the block model are as follows:

Easting:	9,420 to 11,460	(680 columns x 3m each)
Northing:	9,160 to 11,960	(600 rows x 3m each)
Elevation:	9,097 to 10,057	(320 levels x 3m each)

The block model was not rotated (Y-axis oriented along a N000 azimuth). The individual block cells have dimensions of 3 m long (X-axis) by 3 m wide (Y) by 3 m vertical (Z). Block dimensions reflect the sizes of the mineralized zones and plausible mining methods.

Table 14.4 provides details about the naming convention for the corresponding GEMS solids and surfaces, the rock codes, and the block codes assigned to each individual solid. The one-folder block model thus generated was used in the mineral resource estimation.

Table 14.4 – Black Fox block model

Workspace	GEMS TRIANGULATION NAME			ROCKCODE	BLOCKCODE	PRECEDENCE
	NAME 1	NAME 2	NAME 3			
RES2014	Surface	Topo	F140429	-	-	-
	Surface	Bedrock	F140427	-	-	-
	Fault		F131018	-	-	-
	Pitshell	LOM_Even_2013-11-11	F131111	-	-	-
	Pitshell	Resource_Lego	F140605	-	-	-
	Surface	Pitshell_EOY2013	F140424	-	-	-
	Voids	Stopes	F140501	Voids	10	2
	Voids	Drifts	F140501	Voids	10	3
	Stopes_Added	CMS2	F140530	Voids	10	2
	Stopes_Added	DRBLK	F140530	Voids	10	2
	Zone_Smooth	Zone_A	F140520	Zone_A	101	4
	Zone_Smooth	Zone_B	F140520	Zone_B	102	5
	Zone_Smooth	Zone_C	F140520	Zone_C	103	6
	Zone_Smooth	Zone_D	F140520	Zone_D	104	7
	Zone_Smooth	Zone_E	F140520	Zone_E	105	8
	Zone_Smooth	Zone_F	F140520	Zone_F	106	9
	Zone_Smooth	Zone_G	F140520	Zone_G	107	10
	Zone_Smooth	Zone_H	F140520	Zone_H	108	11
	Zone_Smooth	Zone_I	F140520	Zone_I	109	12
	Zone_Smooth	Zone_J	F140520	Zone_J	110	13
	Zone_Smooth	Zone_K	F140520	Zone_K	111	14
	Zone_Smooth	Zone_L	F140520	Zone_L	112	15
	Zone_Smooth	Zone_M	F140520	Zone_M	113	16
	Zone_Smooth	Zone_N	F140520	Zone_N	114	17
	Zone_Smooth	Zone_O	F140520	Zone_O	115	18
	Zone_Smooth	Zone_P	F140520	Zone_P	116	19
	Zone_Smooth	Zone_Q	F140520	Zone_Q	117	20
	Zone_Smooth	Zone_R	F140520	Zone_R	118	21
	Zone_Smooth	Zone_S	F140520	Zone_S	119	22
	Zone_Smooth	Zone_T	F140520	Zone_T	120	23
	Zone_Smooth	Zone_U	F140520	Zone_U	121	24
	Zone_Smooth	Zone_V	F140520	Zone_V	122	25
	Zone_Smooth	Zone_W	F140520	Zone_W	123	26
	Zone_Smooth	ENVA	F140507	ENVA	20	27
	Zone	FLTZ	F140424	FLTZ	70	28
	Zone	CR	F140509	CR	7	33
	Zone	Bedrock	F140509	OB	5	1

14.1.9 Grade Block Model

The geostatistical results summarized in this item provided the parameters to interpolate a grade model using the 1m composites from the capped grade data in order to produce the best possible grade estimate for the Black Fox mine resource. The interpolation was run on a point area workspace extracted from the DDH dataset.

The interpolation profiles were customized to estimate grades separately within individual mineralized zones for the DDH composite population. The inverse distance squared (ID2) method was selected for the final resource estimation for all zones.

The composite points were assigned rock codes and block codes corresponding to the mineralized zone in which they occur. The interpolation profiles specify a single target and sample rock code for each mineralized-zone solid, thus establishing hard boundaries between the mineralized zones and preventing block grades from being estimated using sample points with different block codes than the block being estimated. The search/interpolation ellipse orientations and ranges defined in the interpolation profiles used for grade estimation correspond to those developed in the geostatistics studies for this report. Other specifications to control grade estimation are as follows:

Pass 1 (Main Envelope, Zones A to W, and Fault Zone)
- Minimum of six (6) and maximum of sixteen (16) sample points in the search ellipse for interpolation;
- Maximum of five (5) sample points from any one DDH;
- Minimum of two (2) drill holes for interpolation.

Pass 2 (Zones A to W, and Fault Zone)
- Minimum of two (2) and maximum of sixteen (16) sample points in the search ellipse for interpolation;
- Minimum of one (1) drill hole for interpolation.

Pass 2 (Main Envelope)
- Minimum of six (6) and maximum of sixteen (16) sample points in the search ellipse for interpolation;
- Maximum of five (5) sample points from any one DDH;
- Minimum of two (2) drill holes for interpolation.

14.1.10 Mineral Resource Classification, Category and Definition

The resource classification definitions used for this report are those published by the Canadian Institute of Mining, Metallurgy and Petroleum in their document “CIM Definition Standards for Mineral Resources and Reserves”.

Measured Mineral Resource: that part of a Mineral Resource for which quantity, grade or quality, densities, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough to confirm both geological and grade continuity.

Indicated Mineral Resource: that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

Inferred Mineral Resource: that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

By default, interpolated blocks were assigned to the Inferred category during the creation of the grade block model. The reclassification to an Indicated category was done for any blocks meeting all the conditions below:

- Blocks interpolated with Pass 1;
- Blocks interpolated with a minimum of two (2) drill holes;
- Blocks for which the distance to the closest composite is less than 20 m.

An interpretation on longitudinal views was generated using the criteria described above and the blocks were recoded accordingly. Within this clipping boundary, some inferred blocks have been upgraded to the Indicated category, whereas outside the boundary, some Indicated blocks have been downgraded to the Inferred category. InnovExplo is of the opinion that this was a necessary step to homogenize (smooth out) the resource volumes in each category.

In the end, the average distance to drill holes of all blocks coded as Indicated is 7.55 m.

14.1.11 Pit shell parameters

The Life-of-mine pit design provided by Even Stavre, Chief Mine Exploration Geologist at the Black Fox Mine was used to constrain the potential open pit material for the Main Envelope area. InnovExplo produced a pit shell using Whittle and used it to constrain the potential open pit material for the Fault Zone.

The potential underground material is based on the remaining resource outside the pit shells.

A gold price of US$1,300/oz and an exchange rate of US$1.00=C$1.10 was used in for the Fault Zone pit shell parameters. The Life-of-mine pit design was validated and used as received from Primero. Underground and open-pit mining costs, process costs, and G&A costs were estimated using experience gained from Primero’s Black Fox mine.

14.1.12 Mineral Resource Estimation

InnovExplo produced a mineral resource estimate for the Black Fox mine that includes:

- An in-pit resource estimate, within the pit shell prepared by InnovExplo for the Fault Zone and the Life-of-mine pit design for the Main Envelope area ;
- An underground resource estimate, outside the pit shells;
- A stockpile resource as provided by Primero.

Based on the density of the processed data, the search ellipse criteria, the specific interpolation parameters, and the confidence in the information provided, InnovExplo has classified the mineral resource as Measured, Indicated and Inferred. The estimate is compliant with CIM standards and guidelines for reporting mineral resources and reserves. Cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Black Fox mine has a Measured resource of 716,200 tonnes grading 1.07 g/t Au (24,706 ounces of gold), an Indicated resource of 3,992,800 tonnes grading 5.08 g/t Au (652,560 ounces of gold), and an Inferred resource of 690,400 tonnes grading 7.56 g/t Au (167,786 ounces of gold).

Table 14.5 presents the combined resources by category for the Black Fox mine. Tables 14.6 and 14.7 show the sensitivity to different cut-offs for the indicated and inferred categories respectively. The mineral resource is presented inclusive of mineral reserves, meaning that mineral reserves were not subtracted from the resources presented herein.

Table 14.5 – Mineral Resource Statement for the Black Fox mine (inclusive of Mineral Reserves)

BLACK FOX - DECEMBER 2013 MINERAL RESOURCE ESTIMATE					
Resource Class	**Cut-off Grade (g/t Au)**	**Potential Material**	**Tonnes**	**Capped Au (g/t)**	**Contained Au (oz)**
Indicated	>3.00	Underground	1,852,800	7.48	445,336
	>0.90	Open Pit	1,423,900	3.99	182,518
		Total Indicated	**3,276,700**	**5.96**	**627,854**
Stockpiles (Classified as Measured)			**716,200**	**1.07**	**24,706**
Grand Total (Measured + Indicated)			**3,992,800**	**5.08**	**652,560**
Inferred	>3.00	Underground	326,300	9.52	99,889
	>0.90	Open Pit	364,100	5.80	67,897
		Total Inferred	**690,400**	**7.56**	**167,786**

- The Independent and Qualified Person for the Mineral Resource Estimate, as defined by NI 43-101, is Pierre-Luc Richard, M.Sc., P.Geo. (InnovExplo Inc.), and the effective date of the estimate is December 31, 2013.
- CIM definitions and guidelines were followed for Mineral Resources.
- Mineral resources are not mineral reserves as they do not have demonstrated economic viability.
- The mineral resource is presented inclusive of mineral reserves, meaning that mineral reserves were not subtracted from the resources presented herein.
- The quantity and grade of the reported Inferred resources in this estimate are uncertain in nature. There has been insufficient exploration to define these resources as Indicated or Measured and it is uncertain whether further exploration would result in upgrading any of the Inferred resource to an Indicated or Measured category.
- The Stockpile resource was provided by Primero and accepted as is by InnovExplo. All stockpile material was assigned the Measured category. The Indicated category is defined by combining various statistical criteria, such as a minimum of two drill holes within the

search area and a maximum distance of 20 m to the closest composite. A clipping boundary was interpreted to either upgrade or downgrade some of the resources based on confidence and geological continuity.

- While the results are presented undiluted and in situ, the reported mineral resources are considered to have reasonable prospects for economic extraction.
- Resources were estimated using GEOVIA GEMS 6.6. The database used for the estimate contained diamond drill core composites and assays. The estimate is based on 3,232 diamond drill holes (473,363m) drilled from 1990 to 2013. A minimum true thickness of 3.0 m was applied, using the grade of the adjacent material when assayed or a value of zero when not assayed.
- Supported by statistical analysis and the high grade distribution within the deposit, a top cut ranging from 30 g/t to 300 g/t was applied to assay grades prior to compositing grades for interpolation into model blocks using the inverse distance squared (ID2) method, and was based on 1m composites within a 3m long x 3m wide x 3m high block model. Two passes for each of the mineralized zones were used for interpolation.
- A bulk density of 2.84 g/cm^3 was provided by Primero and used for all types of lithological material in the block model. A fixed density of 2.00 g/cm^3 was applied to overburden and 1.00 g/cm^3 to underground voids.
- The Life-of-mine pit design provided by Even Stavre, Chief Mine Exploration Geologist at the Black Fox Mine was used to constrain the potential open pit material for the Main Envelope area. A pit shell was produced with Whittle and used to constrain the potential open pit material for the Fault Zone. The potential underground material is based on the remaining resource outside the pit shells. In-Pit and Underground resources were compiled at cut-off grades from 0.40 to 5.00 g/t Au (for sensitivity characterization). A cut-off grade of 0.90 g/t Au was selected as the official in-pit cut-off grade and a cut-off grade of 3.00 g/t Au was selected as the official underground cut-off grade. Cut-off grades must be re-evaluated in light of prevailing market conditions (gold price, exchange rate and mining cost).
- A gold price of US$1,300/oz and an exchange rate of US$1.00=C$1.10 was used in the gold cut-off grade calculations and for the Fault Zone pit shell parameters. The Life-of-mine pit design was validated and used as received. Underground and open-pit mining costs, process costs, and G&A costs were estimated using experience gained from Primero's Black Fox mine.
- Ounce (troy) = metric tons x grade / 31.10348. Calculations used metric units (metres, tonnes and g/t).
- The number of metric tons was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding effects; rounding followed the recommendations in NI 43-101.
- InnovExplo is not aware of any environmental, permitting, legal, title-related, taxation, socio-political or marketing issues or any other relevant issue that could materially affect the mineral resource estimate.

Table 14.6 – Mineral Resource Estimate for the Indicated category at different cut-off grades

Indicated Category (Open Pit Potential)				Indicated Category (Underground Potential)			
Cut-off	Tonnage	Au (g/t)	Ounces	Cut-off	Tonnage	Au (g/t)	Ounces
0.40	2,380,500	2.63	201,024	0.40	9,526,300	2.34	716,363
0.50	2,080,400	2.94	196,710	0.50	8,302,800	2.62	698,766
0.60	1,857,700	3.23	192,790	0.60	7,371,400	2.88	682,369
0.70	1,685,500	3.49	189,200	0.70	6,627,800	3.13	666,869
0.80	1,543,500	3.74	185,783	0.80	6,028,800	3.37	652,463
0.85	1,482,000	3.86	184,152	0.85	5,767,100	3.48	645,523
0.88	1,446,800	3.94	183,173	0.88	5,621,400	3.55	641,472
0.90	1,423,900	3.99	182,518	0.90	5,528,400	3.59	638,811
1.00	1,324,700	4.21	179,494	1.00	5,100,900	3.82	625,767
1.50	974,100	5.29	165,679	1.50	3,694,600	4.80	570,531
2.00	749,900	6.35	153,162	2.00	2,846,400	5.72	523,317
2.50	593,800	7.44	141,966	2.50	2,258,400	6.63	481,044
2.54	584,500	7.51	141,207	2.54	2,222,600	6.69	478,138
3.00	491,600	8.41	132,970	3.00	1,852,800	7.48	445,336
3.50	417,700	9.33	125,270	3.50	1,552,700	8.29	414,070
4.00	360,800	10.21	118,433	4.00	1,321,200	9.09	386,218
4.50	318,000	11.01	112,602	4.50	1,135,000	9.89	360,841
5.00	281,400	11.83	107,020	5.00	981,200	10.69	337,385

Table 14.7 – Mineral Resource Estimate for the Inferred category at different cut-off grades

Inferred Category (Open Pit Potential)				Inferred Category (Underground Potential)			
Cut-off	Tonnage	Au (g/t)	Ounces	Cut-off	Tonnage	Au (g/t)	Ounces
0.40	401,600	5.32	68,709	0.40	4,747,800	1.52	231,718
0.50	395,500	5.40	68,620	0.50	3,809,600	1.78	217,921
0.60	389,100	5.48	68,507	0.60	3,064,700	2.08	204,705
0.70	381,600	5.57	68,350	0.70	2,673,000	2.29	196,535
0.80	372,800	5.68	68,137	0.80	2,384,200	2.47	189,568
0.85	369,100	5.73	68,040	0.85	2,243,200	2.58	185,834
0.88	366,600	5.77	67,968	0.88	2,167,400	2.64	183,727
0.90	364,100	5.80	67,897	0.90	2,129,400	2.67	182,641
1.00	355,000	5.92	67,619	1.00	1,901,900	2.87	175,654
1.50	332,500	6.24	66,732	1.50	867,300	4.87	135,700
2.00	312,500	6.53	65,600	2.00	595,300	6.30	120,570
2.50	292,600	6.82	64,172	2.50	411,500	8.12	107,410
2.54	291,500	6.84	64,084	2.54	404,800	8.21	106,867
3.00	278,300	7.03	62,895	3.00	326,300	9.52	99,889
3.50	260,700	7.29	61,063	3.50	262,900	11.05	93,358
4.00	243,900	7.53	59,046	4.00	238,400	11.80	90,422
4.50	227,100	7.77	56,736	4.50	215,600	12.60	87,292
5.00	207,000	8.07	53,667	5.00	193,300	13.50	83,909

Table 14.8 presents the breakdown of the underground portion of the current resource estimate by elevation range. The "0 to 250" elevations can be considered as partly historically mined, whereas "250 to 500" is the general range for the current mine workings and "below 500" represents future and potential development. The groupings are based solely on elevations and should not be taken as exact representations of the descriptions above. The reader should also note that the Fault Zone, which has never been mined, is also included in these numbers.

Table 14.8 – Underground Resource breakdown based on mine elevation. Mine elevations are the approximate distances to surface in metres.

BLACK FOX - UNDERGROUND INDICATED RESOURCES				
Resource Class	Cut-off Grade (g/t Au)	Tonnes	Capped Au (g/t)	Contained Au (oz)
Levels 0 to 250	>3.00	554 700	7,42	132 384
Levels 250 to 500		1 189 200	7,64	292 232
Levels 500 and below		108 900	5,92	20 720
BLACK FOX - UNDERGROUND INFERRED RESOURCES				
Levels 0 to 250	>3.00	60 600	7,15	13 949
Levels 250 to 500		68 600	14,02	30 900
Levels 500 and below		197 200	8,68	55 040

14.1.13 Reconciliation

InnovExplo attempted to conduct reconciliation studies for both the underground and open-pit mining methods but problems in the available data prevented the study from being completed for the underground portion and significant discrepancies in the mine-to-model reconciliation for the open-pit portion warrant further investigation.

Underground Mining Method

Black Fox mine staff evaluate the grades for the underground stopes from drift production samples collected below and above the stopes. Muck samples are later collected to further evaluate the material contained in each stope.

The Black Fox mine manager, Mike Mayhew, provided the data for all voids at the Black Fox mine up to December 31, 2013. The chief mine exploration geologist, Even Stavre, provided a longitudinal view of a selection of stopes as well as Excel spreadsheets listing a selection of underground stopes with their respective on-site reconciliation data. The chief surveyor, Doug A. Dominick, explained the in-house process of slicing the voids according to the longitudinal view in order to make them correspond to the voids listed in the spreadsheets.
InnovExplo found that the stope volumes in the spreadsheet did not match the stope volumes in the Gems project. Numerous attempts were made to obtain matching shapes so that tonnages and grades from the spreadsheet could be compared to the block model, but all attempts failed. The survey to mine cross-over nomenclature was even verified with Even Stavre and Doug A. Dominick to make sure no errors had been made that could explain the issues encountered, but none were found. Other versions of the stopes obtained from Dominick (CMS survey) also showed different tonnages.

Since all versions of the solids received by InnovExplo are significantly different than the volumes found in the spreadsheets, it is impossible at the moment to comment on mine-to-model reconciliation, other than recommending a thorough review of the underground mining procedures currently in use. Improvements in the procedures, from the surveying method to the sampling method, need to be addressed and would eventually lead to a database that allows a reconciliation study to be carried out.

Open-Pit Mining Method

InnovExplo carried out a reconciliation study on two levels (9922 and 9925).

Katie Papineau, Black Fox Open-Pit Geologist, provided all packets for elevation 9922 and 9925. InnovExplo used the packets exactly as received (i.e., shapes, grades and number of packets were not validated). Packets were provided as DXF lines with gold grades as text. InnovExplo calculated the tonnage of all packets by using the surface area, an elevation of 3 metres, and a density of 2.84 g/cm^3. InnovExplo then produced a volumetric report for all blocks contained within the pit shell for each level in order to compare the current block model to the mined out material.

When using a cut-off grade of 0.90 g/t Au, packets received from elevation 9922 (n = 126) returned a tonnage of 96,110 tonnes with a grade averaging 2.25 g/t compared to a tonnage of 111,394 tonnes with an average grade of 3.73 g/t on elevation 9922 in the current block model. Packets received from elevation 9925 (n = 146) returned a tonnage of 94,020 tonnes with a grade averaging 2.10 g/t compared to a tonnage of 108,344 tonnes with an average grade of 3.48 g/t on elevation 9925 in the block model. It is should be noted that the packets are reported with internal dilution while the block model results are not. Also, all blocks in the model were considered regardless of continuity. These two factors could partly explain the differences.

InnovExplo believes that the discrepancies, which amount to 13% less tonnage and 48% less ounces, are significant and warrant further investigation. InnovExplo recommends a reconciliation study be carried out on a larger scale.

14.2 GREY FOX DEPOSIT

14.2.1 Methodology

The Mineral Resource Estimate detailed in this Technical Report was made using 3D block modelling. Ordinary Kriging (OK) and the inverse distance squared (ID2) interpolation methods were used on an area of the Grey Fox deposit with a strike-length of 1.3 km and a width of up to approximately 1.0 km, down to a vertical depth of 600 m below surface. Sixteen geological zones have been interpreted in transverse sections spaced 12.5 m apart, thirteen of which host mineralization and three are sterile.

14.2.2 Drill Hole Database

InnovExplo received a Gems / MS Access diamond drill hole database for the Grey Fox project. Following adequate verifications and updates, the database used for the resource estimate contains 985 surface diamond drill holes with conventional gold assay results, as well as coded lithologies from the drill core logs descriptions. A total of 145 drill holes are either outside the resource area or not pertinent for the current resource estimate (ex. Geotechnical holes) and therefore discarded. Additionally, 16 holes were drilled in the beginning of 2014, therefore past the effective date of the current resource estimate. The remaining 824 drill holes cover the strike-length of the project at a drill spacing mostly ranging from 15 m to 25 m. The database discussed in this chapter will refer to the 824 drill holes subset.

In addition to the basic tables of raw data, the updated Gems database contains several tables with the various drill hole and wireframe solid intersection composite calculations required for statistical evaluation and resource block modeling. The database contains a total of 113,570 analyses taken from 288,312 m of drilled core.

14.2.3 Interpretation of Mineralized Zones

In order to conduct accurate resource modeling of the Grey Fox deposit, Christa Kernohan, P.Geo., Senior Project Geologist for Primero, provided InnovExplo with an updated geological model delimiting the geologically defined extent of the mineralized zones using a 1.3 km strike-length corridor measuring 1.0 km wide and extending down to 600 m below surface.

The geological-zone model was constructed to outline zones of geological continuity. Overall, fourteen (14) geological zones have been interpreted along a steep, roughly NNW trend (Fig. 14.6; Table 14.8). InnovExplo completed the interpretation by creating two types of country rocks: 1) predominantly mafic volcanic units to the west; and 2) predominantly ultramafic units northeast of the Porcupine-Destor Deformation Zone (PDDZ) that crosscut the deposit.

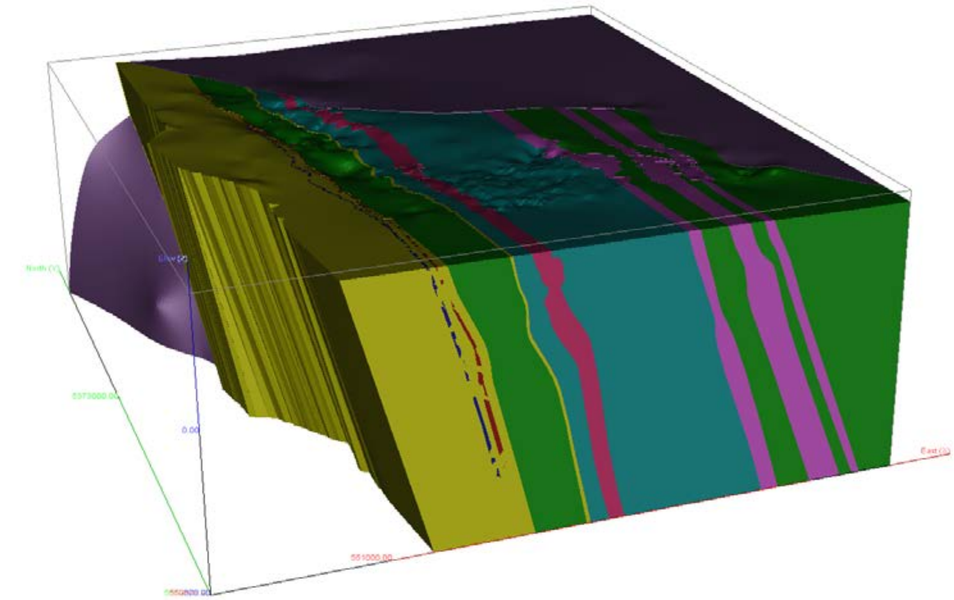


Figure 14.6 – General view showing the 15 interpreted geological zones looking NNE.

The country rock to the west has been removed to improve the visual representation.

The wireframe solids of the geological zone model were created by digitizing an interpretation onto sections spaced 12.5 m apart, and then using tie-lines between sections to complete the wireframes for each solid.

The Ultramafic geological zone was defined as all material in the footwall of the PDDZ. Country Rock (not shown in Fig. 14.4) was defined as the part of the block model volume still remaining once the geological zone solids were removed.

As established in the 2013 Technical Report (Richard et al, 2013), three key areas at the Grey Fox deposit, with arbitrary but previously defined outlines, are referred to as the "147 Area", "Contact Area" and "Grey Fox South Area". These areas should not be confused with the geological zones of the same name ("147 Zone" and "Contact Zone") that are not constrained to any one particular area. Figure 14.7 shows the locations of these areas.

Table 14.9 – List of the 16 interpreted geological zones at the Grey Fox deposit

Geological Zone	Blockcode	Rockcode
Contact	100	CONTACT
DIA	101	DIA
SED	102	SED
MIFW	103	MIFW
MV	104	MV
VIV	105	VIV
MIHW	106	MIHW
SED2	107	SED2
VIV1	121	VIV1
VIV2	122	VIV2
VIV3	123	VIV3
MV1	132	MV1
MV2	133	MV2
MV3	134	MV3
UM	150	UM
CR	99	CR

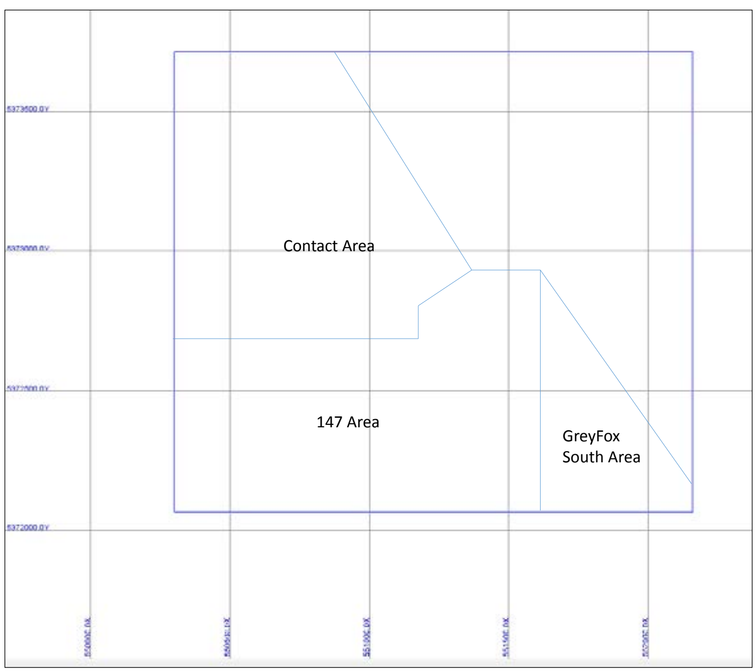


Figure 14.7 – Plan view with sketch illustrating the location of the Contact Area, 147 Area and Grey Fox South Area. The dark blue contour represents the block model boundary.

14.2.4 High Grade Capping

Drill hole assay intersecting interpreted mineralized zones were automatically coded in the database from 3D solids and were used to determine high grade capping.

Statistics on the overall assay data and on datasets grouped by zones were performed using raw analytical assay data for a total of 106,353 diamond drill hole samples, all of which fall inside the geological solids.

Figures 14.8 and 14.9 present the decile analyses, probability plots and percentage of metal cut for two zones. Similar studies were performed for all individual zones. Based on this study, a capping ranging from 30 g/t to 100 g/t was used.

Within the DDH database, a total of 78 samples were capped at the determined capping limits. The capping of high assays affected 0.07% of all samples within wireframes for the DDH population (Appendix III). This results in 21.04% of the metal being cut for the entire deposit. Table 14.9 summarizes statistics by zone.

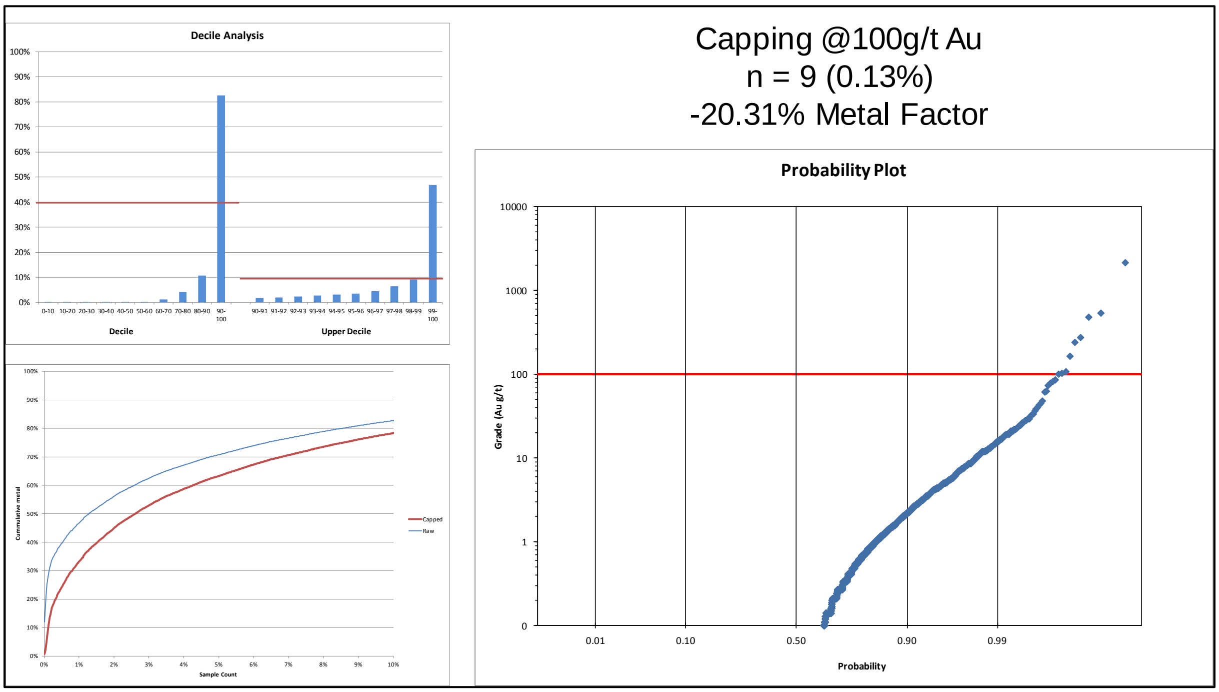


Figure 14.8 – Statistical graphs for the capping determination for the Contact Zone. The red line represents the established capping at 100 g/t Au.

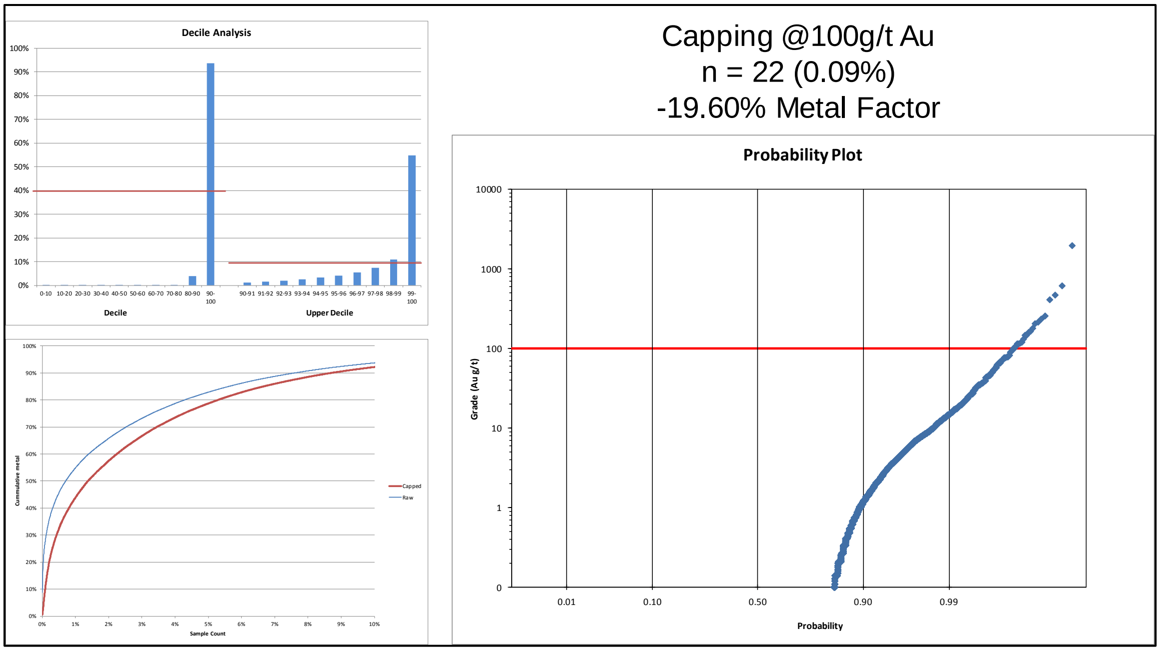


Figure 14.9 – Statistical graphs for the capping determination for the VIV Zone.
The red line represents the established capping at 100 g/t Au.

Table 14.10 – Summary statistics for the DDH assays by zone

Zone	Blockcode	Number of samples	Max (g/t Au)	Uncut mean (g/t Au)	High grade capping (g/t Au)	Cut mean (g/t Au)	Number of samples cut	Percentage of samples cut	Percentage of Metal Factor cut
CONTACT	100	7,138	2,142.87	1.52	100.00	1.07	9	0.13%	20.31%
MIFW	103	6,479	124.94	0.44	30.00	0.40	7	0.11%	10.21%
MIHW	106	17,795	564.00	0.44	90.00	0.38	5	0.03%	14.56%
MV	104	11,900	4,156.15	0.83	100.00	0.36	3	0.03%	54.27%
MV1	132	2,648	40.77	0.17	30.00	0.17	1	0.04%	1.45%
MV2	133	2,568	70.70	0.31	30.00	0.29	2	0.08%	7.69%
MV3	134	4,302	289.03	0.37	30.00	0.30	5	0.12%	19.13%
SED	102	3,136	208.96	0.94	90.00	0.82	6	0.19%	12.27%
SED2	107	11,786	281.77	0.37	50.00	0.34	3	0.03%	6.84%
VIV	105	23,868	2,008.75	1.06	100.00	0.81	22	0.09%	19.60%
VIV1	121	5,369	33.84	0.27	30.00	0.27	2	0.04%	0.40%
VIV2	122	6,149	140.26	0.38	30.00	0.35	8	0.13%	5.77%
VIV3	123	4,812	108.72	0.24	30.00	0.21	5	0.10%	11.90%
Total		**107,950**	**4,156.15**	**0.67**		**0.50**	**78**	**0.07%**	**21.04%**

14.2.5 Compositing

Composites were generated from drill holes intersecting the interpreted geological zones.

In order to minimize any bias introduced by variable sample lengths, the capped gold assays were composited to equal lengths of 2 metres (“2m” composites) within all intervals defining each of the geological zones. The selected composite length was based on raw assay lengths and mineralized zone thicknesses. From all the composites generated within the DDH population (131,332 composites), a total of 940 (0.72%) were less than 0.50 m long and these were removed from the block model interpolation. A grade of 0.00 g/t Au was assigned to missing sample intervals. Table 14.10 summarizes the basic statistics for the 2m DDH composites.

Table 14.11 – Summary statistics for DDH composites

Zone	Blockcode	Number of composites	Max (g/t Au)	Mean (g/t Au)	Standard deviation	Coefficient of variation
CONTACT	100	4,192	55.64	0.87	3.10	3.58
MIFW	103	15,033	29.91	0.09	0.75	8.64
MIHW	106	35,242	57.15	0.10	0.98	10.29
MV	104	24,745	50.02	0.08	0.85	10.11
MV1	132	2,813	11.83	0.08	0.54	6.72
MV2	133	1,482	16.88	0.24	1.05	4.32
MV3	134	3,968	24.97	0.16	0.95	5.86
SED	102	2,111	56.24	0.61	3.33	5.42
SED2	107	18,104	25.38	0.11	0.73	6.52
VIV	105	13,372	99.78	0.70	3.40	4.83
VIV1	121	3,134	16.46	0.23	0.78	3.45
VIV2	122	3,310	30.00	0.32	1.26	3.95
VIV3	123	3,826	22.93	0.13	0.92	7.17
Total		**131,332**	**99.78**	**0.20**	**1.54**	**7.60**

14.2.6 Variography and Ellipsoids

Variography was conducted on composites from the interpreted mineralized zones, and the results were used to determine ellipsoids ranges.

3D directional-specific variography was completed on 2m DDH composites of the capped gold assay data for all geological zones. The study involved 10º incremental searches in the horizontal plane, followed by 10º incremental searches in the vertical planes of the indicated preferred azimuths, as well as planes normal to the preferred azimuth. The best-fit major variograms for the Contact and VIV zones are shown as Figures 14.10 and 14.11.

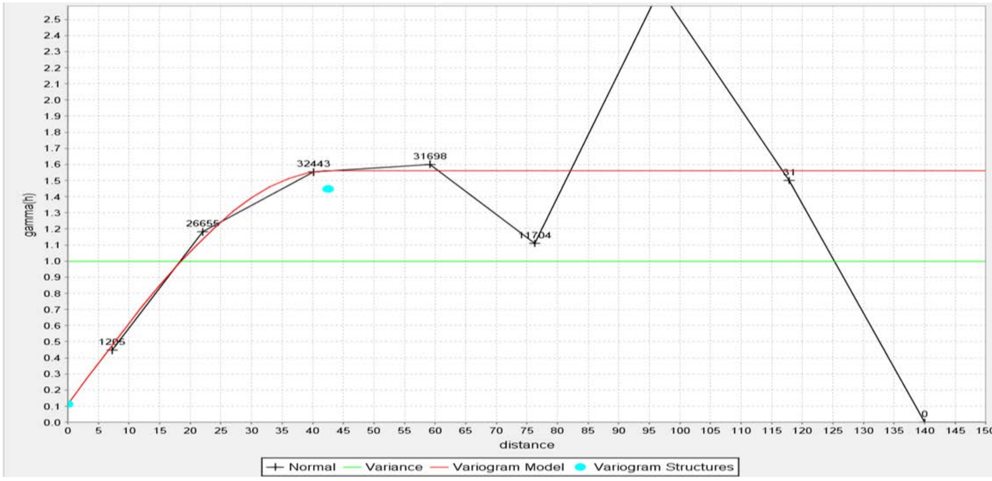


Figure 14.10 – 3D variogram along the major axis of the Contact zone

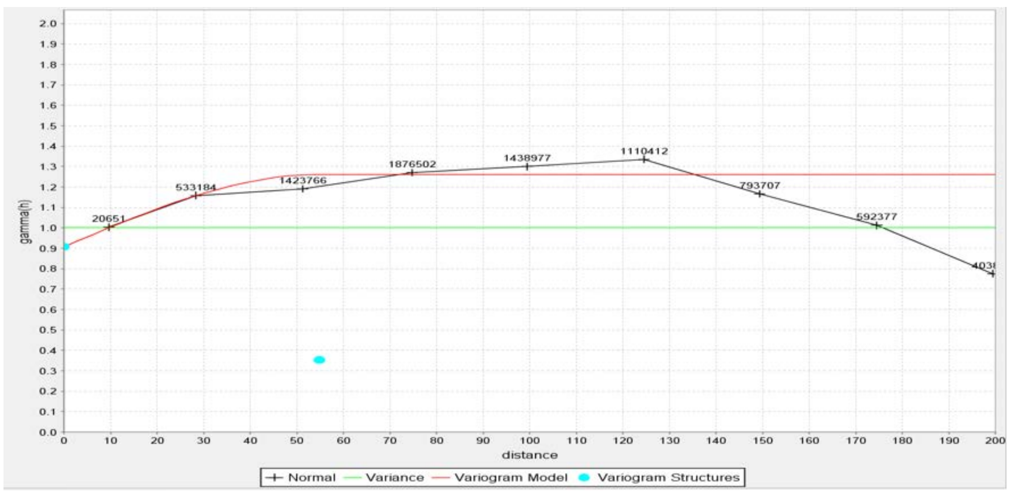


Figure 14.11 – 3D variogram along the major axis of the VIV zone

The results of the linear and 3D variographic studies on the DDH composites are consistent with the geological features of the deposit. The 3D directional-specific variography yielded the best-fit model along an orientation that roughly corresponds to the strike and dip of the mineralized zones.

Some minor changes were applied to the best-fit models to better correspond with the geological model. The search ellipse configuration was defined using variography as a guide, combined with drill hole spacing and the geometry of the deposit. All zones were oriented using Gems' Azimuth, Dip, Azimuth Search Anisotropy convention of 223 Principal Azimuth, 69 Principal Dip, and 347 Intermediate Azimuth. The search radiuses were as follows:

Contact Zone:

- Pass 1: 43m x 22m x 5m
- Pass 2: 86m x 44m x 10m

VIV Zone:

- Pass 1: 55m x 29m x 5m
- Pass 2: 110m x 58m x 10m

Other Zones:

- Pass 1: 50m x 23m x 5m
- Pass 2: 100m x 46m x 10m

14.2.7 Bulk Density

For the current mineral resource estimate, a bulk density was calculated for each of the geological zones independently. InnovExplo received a database containing 2,514 measures taken within the deposit area, of which 2,436 fall within the interpreted geological zones. The data and established densities are presented in Table 14.11.

Table 14.12 – Specific gravity determination

Zone	Blockcode	Number of measures	Min (g/cm3)	Max (g/cm3)	Mean (g/cm3)
CONTACT	100	127	2.56	3.37	2.83
DIA	101	16	2.71	3.04	2.90
MIFW	103	244	2.58	3.30	2.91
MIHW	106	561	2.58	3.31	2.92
MV	104	308	2.28	3.33	2.87
MV1	132	82	2.58	2.94	2.81
MV2	133	54	2.72	3.01	2.82
MV3	134	145	2.69	3.08	2.89
SED	102	32	2.57	3.06	2.78
SED2	107	169	2.68	3.01	2.77
VIV	105	262	2.66	3.23	2.89
VIV1	121	135	2.69	3.13	2.81
VIV2	122	184	2.70	3.12	2.77
VIV3	123	117	2.76	3.27	2.91
Total		**2436**	**2.28**	**3.37**	**2.87**

A density of 2.00 g/cm^3 was assigned to the overburden (OB). For the country rock, a value of 2.87 g/cm^3 was assigned to country rock west of the deposit (representing a weighted average of all measures available, believed to be similar material), and 3.00 g/cm^3 was assigned to country rock within the fault zone to the northeast (believed to be ultramafic units).

Bulk densities were used to calculate tonnages from the volume estimates in the resource-grade block model.

14.2.8 Block Model

The block extends far enough away from the mineralized zones to cover an area of sufficiently large to host open pits. The model has been pushed down to a depth of 630 m below surface. The limits of the block model are as follows:

Easting: 550,300 to 552,160 (620 columns x 3m each)
Northing: 5,372,065 to 5,373,715 (550 rows x 3m each)
Elevation: -355 to 320 (225 levels x 3m each)

The block model was not rotated (Y-axis oriented along a N000 azimuth). The individual block cells have dimensions of 3 m long (X-axis) by 3 m wide (Y) by 3 m vertical (Z). Block dimensions reflect the sizes of the mineralized zones and plausible mining methods.

Table 14.12 provides details about the naming convention for corresponding GEMS solids and surfaces, the rock codes, and the block codes assigned to each individual solid. A one-folder block model thus generated was used in the Mineral Resource estimation.

Table 14.13 – Grey Fox block model

Workspace	GEMS TRIANGULATION NAME			ROCKCODE	BLOCKCODE	PRECEDENCE
	NAME 1	NAME 2	NAME 3			
RES2014	Surface	Topo	F140513	-	-	-
	Surface	Bedrock	F140513	-	-	-
	Surface	Fault	F140522	-	-	-
	Pitshell	Resource_Smooth	F140604	-	-	-
	Zone	CONTACT	C_140521	CONTACT	100	7
	Zone	DIA	C_140521	DIA	101	3
	Zone	MIFW	C_140521	MIFW	103	16
	Zone	MIHW	C_140521	MIHW	106	17
	Zone	MV	C_140521	MV	104	12
	Zone	MV1	C_140521	MV1	132	13
	Zone	MV2	C_140521	MV2	133	14
	Zone	MV3	C_140521	MV3	134	15
	Zone	SED	C_140521	SED	102	18
	Zone	SED2	C_140521	SED2	107	19
	Zone	VIV	C_140521	VIV	105	8
	Zone	VIV1	C_140521	VIV1	121	11
	Zone	VIV2	C_140521	VIV2	122	10
	Zone	VIV3	C_140521	VIV3	123	9
	Solid	Bedrock	F140522	OB	5	1
	Solid	CR	F140522	CR	99	20
	Solid	CR-UM	F140522	UM	150	2

14.2.9 Grade Block Model

The geostatistical results summarized in this item provided the parameters to interpolate a grade model using the 2m composites from the capped grade data in order to produce the best possible grade estimate for the Grey Fox deposit resource. The interpolation was run on a point area workspace extracted from the DDH dataset.

The interpolation profiles were customized to estimate grades separately within individual geological zones for the DDH composite population. The Ordinary Kriging (OK) method was selected for the final resource estimation for the Contact and 147 zones, and the inverse distance squared (ID2) method for the remaining zones.

The composite points were assigned rock codes and block codes corresponding to the geological zone in which they occur. The interpolation profiles specify a single target and sample rock code for each geological-zone solid, thus establishing hard boundaries between the geological zones and preventing block grades from being estimated using sample points with different block codes than the block being estimated. However, due to pervasive distribution of gold grades along the contact, the search ellipsoids for the VIV and the MIHW zones were allowed to "see" both composites from the VIV and the MIHW zones. The search/interpolation ellipse orientations and ranges defined in the interpolation profiles used for grade estimation correspond to those developed in the geostatistics studies for this report. Other specifications to control grade estimation are as follows:

- Minimum of three (3) and maximum of sixteen (16) sample points in the search ellipse for interpolation;
- Maximum of two (2) sample points from any one DDH;
- Minimum of two (2) drill holes for interpolation.

14.2.10 Mineral Resource Classification, Category and Definition

The resource classification definitions used for this report are those published by the Canadian Institute of Mining, Metallurgy and Petroleum in their document "CIM Definition Standards for Mineral Resources and Reserves". See section 14.1.10 for the full definitions.

By default, interpolated blocks were assigned to the Inferred category during the creation of the grade block model. Reclassification to the Indicated category was done for blocks meeting all the conditions below:

- Blocks interpolated with Pass 1;
- Blocks interpolated with a minimum of three (3) drill holes;
- Blocks for which the average distance to composites is less than 25 m;
- Blocks for which the distance to the closest composite is less than 15 m.

An interpretation on section and plan views was generated using the criteria described above and the blocks were recoded accordingly. Within this clipping boundary, some inferred blocks have been upgraded to the Indicated category, whereas outside the boundary, some Indicated blocks have been downgraded to the Inferred category. InnovExplo is of the opinion that this was a necessary step to homogenize (smooth out) the resource volumes in each category**.**

In the end, the average distance to drill holes of all blocks coded as Indicated is 10.89 m.

14.2.11 Pit shell parameters

A Whittle optimized constraining pit shell was generated to constrain the potential open pit material. The potential underground material is based on the remaining resource outside of the pit shell.

A gold price of US$1,300/oz and an exchange rate of US$1.00=C$1.10 was used in for the pit shell parameters. Underground and open-pit mining costs, process costs, and G&A costs were estimated using experience gained from Primero's Black Fox mine.

14.2.12 Mineral Resource Estimation

InnovExplo produced a mineral resource estimate for the Grey Fox deposit that includes:

- An in-pit resource estimate, within Whittle-optimized pit shells;
- An underground resource estimate, outside Whittle-optimized pit shells.

Based on the density of the processed data, the search ellipse criteria, and the specific interpolation parameters, the authors are of the opinion that the current mineral resources can be classified as Indicated and Inferred. The estimates follow CIM standards and guidelines for reporting mineral resources and reserves. Cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Grey Fox deposit has Indicated Resources of 5,276,300 tonnes grading 3.29 g/t Au (557,655 ounces of gold) and Inferred Resources of 1,551,600 tonnes grading 4.39 g/t Au (218,820 ounces of gold).

Table 14.13 presents the combined resources by category for the Grey Fox deposit. Tables 14.14 and 14.15 show the sensitivity to different cut-offs for the indicated and inferred categories, respectively.

The reader should be aware that the pit shell used for the Grey Fox resource estimate extends slightly beyond the property limits in its southern portion. Although the entire resource lies within the property limits, some waste material outside the property limits will need to be removed to access some of the resource. Consequently, this portion of the pit may need to be re-examined in a future economic study.

Table 14.14 – Mineral Resource Statement for the Grey Fox deposit

GREY FOX - DECEMBER 2013 MINERAL RESOURCE ESTIMATE					
Resource Class	Cut-off Grade (g/t Au)	Potential Material	Tonnes	Capped Au (g/t)	Contained Au (oz)
Indicated	>3.00	Underground	1,394,300	5.42	243,041
	>0.90	Open Pit	3,882,000	2.52	314,615
		Total Indicated	**5,276,300**	**3.29**	**557,655**
Inferred	>3.00	Underground	1,065,100	5.13	175,511
	>0.90	Open Pit	486,500	2.77	43,309
		Total Inferred	**1,551,600**	**4.39**	**218,820**

- The Independent and Qualified Person for the Mineral Resource Estimate, as defined by NI 43-101, is Pierre-Luc Richard, M.Sc., P.Geo. (InnovExplo Inc.), and the effective date of the estimate is December 31, 2013.
- CIM definitions and guidelines were followed for Mineral Resources.
- Mineral Resources are not Mineral Reserves as they do not have demonstrated economic viability.
- The quantity and grade of the reported Inferred resources in this estimate are uncertain in nature. There has been insufficient exploration to define these resources as Indicated or Measured and it is uncertain whether further exploration would result in upgrading any of the Inferred resource to an Indicated or Measured category.
- The Indicated category is defined by combining various statistical criteria, such as a minimum of three drill holes within the search area, a maximum distance of 15 m to the closest composite, and a maximum average distance of 25 m to composites. A clipping

boundary was interpreted to either upgrade or downgrade some of the resource based on confidence and geological continuity.

- While the results are presented undiluted and in situ, the reported mineral resources are considered to have reasonable prospects for economic extraction.
- The resource was estimated using GEOVIA GEMS 6.6. The database used for the estimate contained diamond drill core composites and assays. The estimate is based on 824 diamond drill holes (288,312 m) drilled from 1993 to 2013, of which the vast majority (>95%) were drilled between 2008 and 2013. A minimum true thickness of 5.0 m was applied, using the grade of the adjacent material when assayed or a value of zero when not assayed.
- Supported by statistical analysis and the high grade distribution within the deposit, a top cut ranging from 30 g/t to 100 g/t was applied to assay grades prior to compositing grades for interpolation into model blocks using Ordinary Kriging and Inverse Distance Weighting Squared methods, and was based on 2m composites within a 3m long x 3m wide x 3m high block model. The ordinary kriged grade model for the VIV and the Contact zones and ID2 for the rest of the deposit was felt to best represent the continuity and distribution of the gold grade based on the current geological models.
- Bulk densities were calculated for individual interpreted lithological domains based on 638 density measurements. The calculated bulk densities vary from 2.76 g/cm^3 to 2.96 g/cm^3. A fixed density of 2.00 g/cm^3 was applied to overburden. Country rocks were attributed a density ranging from 2.87 g/cm^3 to 3.00 g/cm^3.
- A Whittle optimized constraining pit shell was generated to constrain the potential open pit material. The potential underground material is based on the remaining resource outside of the pit shell. In-Pit and Underground resources were compiled at cut-off grades from 0.40 to 5.00 g/t Au (for sensitivity characterization). A cut-off grade of 0.90 g/t Au was selected as the official in-pit cut-off grade and a cut-off grade of 3.00 g/t Au was selected as the official underground cut-off grade. Cut-off grades must be re-evaluated in light of prevailing market conditions (gold price, exchange rate and mining cost).
- A gold price of US$1,300/oz and an exchange rate of US$1.00=C$1.10 was used in the gold cut-off grade calculations. Underground and open-pit mining costs, process costs and G&A costs were estimated using experience gained from Primero's Black Fox mine.
- Ounce (troy) = metric tons x grade / 31.10348. Calculations used metric units (metres, tonnes and g/t).
- The number of metric tons was rounded to the nearest thousand. Any discrepancies in the totals are due to rounding effects; rounding followed the recommendations in NI 43-101.
- InnovExplo is not aware of any environmental, permitting, legal, title-related, taxation, socio-political or marketing issues or any other relevant issue that could materially affect the mineral resource estimate.

Table 14.15 – Mineral Resource Estimate for the Indicated category at different cut-off grades

Indicated Category (Open Pit Potential)				Indicated Category (Underground Potential)			
Cut-off	Tonnage	Au (g/t)	Ounces	Cut-off	Tonnage	Au (g/t)	Ounces
0.40	6,123,100	1.82	358,869	0.40	18,432,800	1.29	766,672
0.45	5,785,600	1.90	354,257	0.45	16,655,700	1.39	742,419
0.50	5,491,500	1.98	349,773	0.50	15,142,200	1.48	719,326
0.55	5,228,200	2.05	345,331	0.55	13,821,400	1.57	697,061
0.60	4,990,400	2.12	340,937	0.60	12,686,600	1.66	676,104
0.65	4,765,300	2.20	336,418	0.65	11,673,600	1.75	655,757
0.72	4,482,200	2.29	330,190	0.72	10,480,200	1.87	629,503
0.90	3,882,000	2.52	314,615	0.90	8,089,700	2.18	567,687
1.00	3,585,700	2.65	305,577	1.00	7,100,000	2.35	537,520
1.40	2,668,400	3.15	270,589	1.40	4,498,100	3.04	438,917
1.80	2,017,600	3.66	237,326	1.80	3,092,300	3.70	367,396
2.20	1,541,300	4.18	206,889	2.20	2,272,300	4.31	315,118
2.40	1,353,600	4.44	193,036	2.40	1,991,800	4.60	294,397
2.63	1,169,500	4.74	178,177	2.63	1,726,300	4.92	272,960
2.72	1,102,400	4.86	172,399	2.72	1,634,200	5.04	265,038
3.00	938,600	5.22	157,369	3.00	1,394,300	5.42	243,041
4.00	541,200	6.52	113,372	4.00	859,400	6.65	183,869
5.00	328,500	7.85	82,918	5.00	560,900	7.82	140,988

Table 14.16 – Mineral Resource Estimate for the Inferred category at different cut-off grades

Inferred Category (Open Pit Potential)				Inferred Category (Underground Potential)			
Cut-off	Tonnage	Au (g/t)	Ounces	Cut-off	Tonnage	Au (g/t)	Ounces
0.40	890,900	1.79	51,156	0.40	21,234,400	1.12	762,653
0.45	821,000	1.90	50,201	0.45	18,899,900	1.20	730,819
0.50	761,600	2.01	49,295	0.50	17,036,100	1.28	702,407
0.55	706,000	2.13	48,359	0.55	15,439,900	1.36	675,496
0.60	662,900	2.23	47,566	0.60	14,061,900	1.44	650,052
0.65	632,400	2.31	46,953	0.65	12,770,700	1.52	624,096
0.72	593,400	2.42	46,095	0.72	11,228,000	1.64	590,230
0.90	486,500	2.77	43,309	0.90	8,345,300	1.92	515,820
1.00	445,600	2.94	42,073	1.00	7,178,300	2.08	480,218
1.40	332,300	3.53	37,756	1.40	4,128,000	2.75	365,415
1.80	267,200	4.01	34,472	1.80	2,603,500	3.44	288,134
2.20	222,800	4.42	31,638	2.20	1,861,900	4.02	240,766
2.40	204,200	4.61	30,264	2.40	1,605,300	4.30	221,830
2.63	183,300	4.85	28,575	2.63	1,351,600	4.63	201,349
2.72	177,800	4.92	28,101	2.72	1,275,000	4.75	194,768
3.00	154,100	5.23	25,916	3.00	1,065,100	5.13	175,511
4.00	90,600	6.49	18,897	4.00	620,400	6.34	126,363
5.00	52,700	7.95	13,480	5.00	415,300	7.26	96,867

14.3 UNCERTAINTY IN THE ESTIMATION OF MINERAL RESOURCES

The Mineral Resource statements presented in this technical report on the Black Fox Complex are estimates only and no assurance can be given that the anticipated tonnages and grades will be achieved or that the expected level of recovery will be realized. There are numerous uncertainties inherent in estimating mineral resources, including many factors beyond InnovExplo's control. Mineral Resource estimation is, in part, a subjective process, and the accuracy of any mineral resource estimate is a function of the quantity and quality of available data, and of the assumptions and judgments made regarding the geological interpretation.

Due to the uncertainties attached to Inferred Mineral Resources, there is no assurance that continued exploration will demonstrate sufficient geological continuity to upgrade the Inferred resources to another category.

15 MINERAL RESERVE ESTIMATES

15.1 INTRODUCTION

The Black Fox Mineral Reserve Estimate includes open pit, underground and stockpile reserves. Mineral Resources are converted to Mineral Reserves by applying mining cut-off grades, mining dilution, and mining recovery factors. All in situ resources are classified as Indicated or Inferred. Indicated Resources have been converted to Probable Reserves. The ore stockpile has been classified as Measured Resources and has been converted to Proven Reserves at 100%.

15.2 METHODOLOGY

15.2.1 Open Pit Reserve Methodology

The Open Pit Mineral Reserves have been constrained to the Phase 3 pit design, completed in November 2013. This pit design is based on the same pit optimization shell that was used for the Black Fox January 2011 Mineral Reserve Estimate. However, the ramp has been redesigned at the bottom of the pit and step-out benches have been incorporated at the toe of the failure on the north wall of the pit, which occurred in 2012. Mining of Phase 1 and Phase 2 is complete.

The pit optimization was based on the parameters in Table 15.1. Although these parameters are now out-of-date, with slightly higher current operating costs and gold price, Primero considers the pit optimization results remain representative as the cut-off grade is largely unchanged. Overall slope angles for the optimization varied from 41° to 54.5° for different geotechnical domains. Shallower wall angles were assumed for the overburden material.

Table 15.1 – Pit Optimization Parameters

Parameter	Units	Value
Gold Price	USD per ounce	1,150.00
Exchange Rate	CAD:USD	0.96
Metallurgical Recovery	%	0.94
Refinery Payable	%	1.00
Mining cost - Rock	USD per tonne	2.65
Mining cost - Overburden	USD per tonne	1.81
Ore Handling Cost	USD per tonne	5.46
Processing Cost	USD per tonne	13.83
Assay Lab Cost	USD per tonne	1.64
G&A Cost	USD per tonne	4.87

The optimization shell selected as the basis for Phase 3 pit design used a revenue factor equivalent to a gold price of USD 975 per ounce. This shell was selected as the ultimate pit because it resulted in the optimum value while minimizing the risk of fluctuations in gold price and reliance on high-grade pods driving increased waste stripping. The pit also had to adhere to the following restrictions:

- Waste rock storage volumes.
- The proximity of the highway and lease boundary.
- Interaction with the underground mine.
- Proposed locations of the waste dump and surface infrastructure.

A plan view of the remaining pit benches, as of December 31, 2013, is shown in Figure 15.1. The waste dump design is shown to the south of the pit. The pit design has geotechnical benches on an 18 m inter-berm change in elevation. The bench widths are 8 m. The 18 m geotechnical bench is mined in 6 m high lifts for waste or 3 m high lifts for ore. Haul roads are 23 m wide for two-way traffic and 14 m for one-way traffic. The design haul road gradient is 10%.

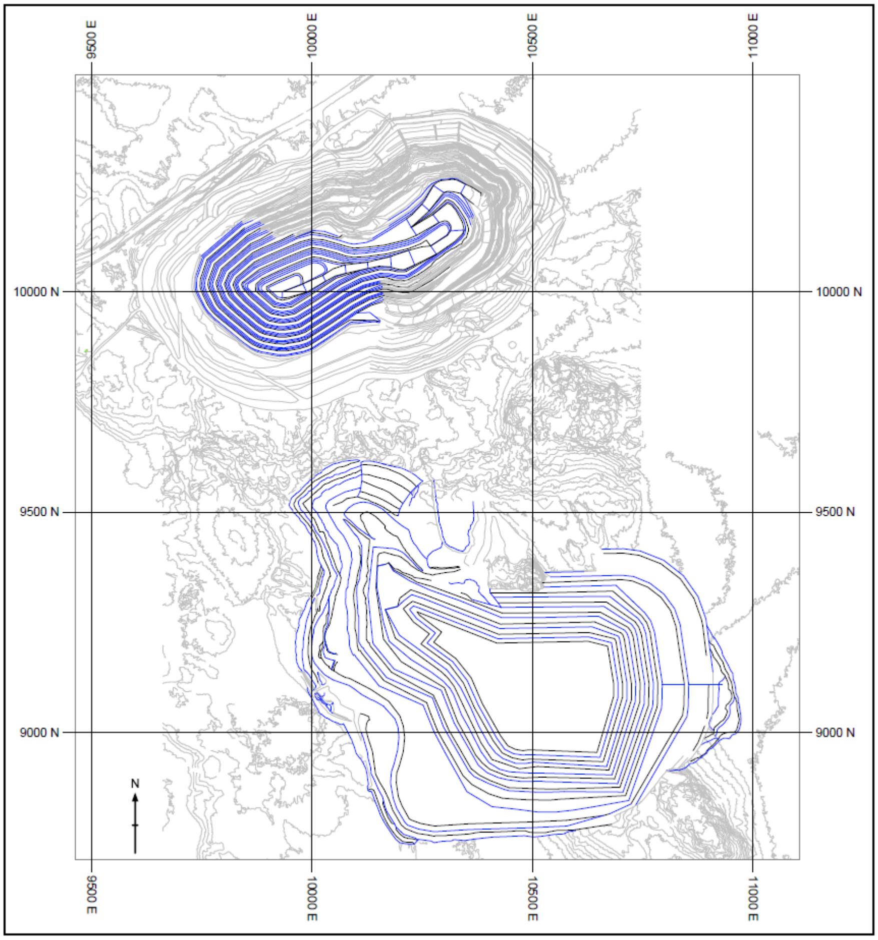


Figure 15.1 – Phase 3 pit design and waste dump design

15.2.2 Underground Reserve Methodology

Two methods have been used for estimating the Underground Mineral Reserves at Black Fox. Primero has assumed that resources below Level 235 will be mined by bulk mining methods, such as long hole mining, and created mining stope shapes that were then evaluated against the block model. The upper underground resources, on the other hand, are typically narrower veins and Primero has assumed this ore to be mined by shrinkage stoping and mechanized cut-and-fill. For these resources, Primero has applied dilution and recovery factors to blocks above cut-off grade.

The outlines for the long hole stope shapes were created on north-south sections at intervals between 3 m and 15 m, depending on the continuity and geometry of the orebody. An example cross section, showing the Mineral Reserve outline in black against the block model is shown in

Figure 15.2. In the creation of the outlines, Primero engineers took the following into account, based on operating experience at Black Fox:

- 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; and
- Resource grade.

The outlines for each lens were then linked into separate wireframes and evaluated against the block model. Shapes that fell below cut-off grade were omitted and shapes that were further from existing infrastructure underwent an economic evaluation to ensure that the stope revenue was sufficient cover the operating costs and capital cost to access and mine the zone.

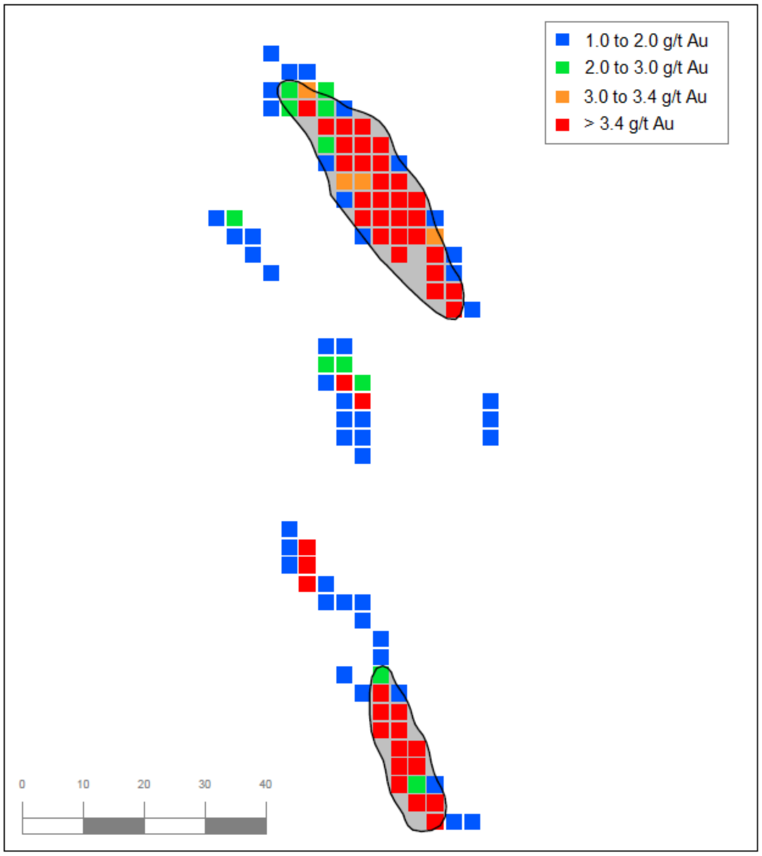


Figure 15.2 – Underground reserve outline cross section

15.3 MINING CUT-OFF GRADE

Mine cut-off grades of 1.0 and 3.4 g/t Au were used for open pit and underground Mineral Reserve estimates respectively. The calculated breakeven cut-off grade for the open pit is 0.9 g/t Au, but Primero has used a slightly higher operational cut-off. The parameters used for calculating the cut-off grade grades are summarized in Table 15.2. Operating costs and metallurgical recoveries are in line with actual costs for 2013.

Table 15.2 – Cut-off grade calculation parameters

Parameter	Units	Value
Underground Mining Cost	CAD per tonne	$98.95
Open Pit Mining Cost	CAD per tonne	$3.14
Processing Cost	CAD per tonne	$26.81
G&A Cost	CAD per tonne	$11.86
Gold Metallurgical Recovery	Percent	94%
Gold Price	USD per ounce	$1,250.00
Exchange Rate	CAD/USD	0.9

15.4 DILUTION AND MINING RECOVERY FACTORS

15.4.1 Dilution

The first stage of applying dilution at Black Fox, for both open pit and underground reserves, is converting the proportional resource block model to a regularized mine planning model. The high grade "zones" of the resource model are merged with the lower grade "envelope" to produce an average grade for each 3 m by 3 m by 3 m block. Primero considers the 3 m block size to be an appropriate selective mining unit for the open pit and a conservative minimum mining width for underground, based on the current mining methods.

To the regularized mine planning model, an addition 15% dilution is applied to open pit reserves at a zero grade.

In the process of creating mineable stope shapes around the resources below Level235, dilution equivalent to 47% at 1.5 g/t is added to the regularized block model. This dilution estimate is consistent with operational reconciliation data. The same 47% dilution at 1.5 g/t has been applied to regularized resources above Level 235. Once dilution has been applied, both through regularization and application of the dilution factor, the cut-off grade is applied.

15.4.2 Mining Recovery Factors

A mining recovery factor of 95% was applied to underground reserves for zones below 235 Level that have not previously been mined, based on operational experience. A lower recovery of 85% was applied to zones where previous underground mining has occurred and Primero expects a portion of the resource to be tied up in unrecoverable pillars or no longer accessible. A recovery factor of 85% has also been used for underground reserves above Level 235, apart from the crown pillar which has a 50% mining recovery factor.

15.5 MINERAL RESERVES ESTIMATE

15.5.1 Mineral Reserves Statement

Black Fox Mineral Reserves have been estimated as per Table 15.3 below.

Table 15.3 – Summary of Estimated Mineral Reserves as at 31 December 2013

Black Fox	Proven Reserves			Probable Reserves			Proven and Probable Reserves		
	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)
Open Pit	0	0	0	1,468,500	3.7	173,900	1,468,500	3.7	173,900
Underground	0	0	0	1,663,900	6.3	339,100	1,663,900	6.3	339,100
Stockpile	716,200	1.1	24,700	0	0	0	716,200	1.1	24,700
Total	716,200	1.1	24,700	3,132,500	5.1	513,000	3,848,700	4.3	537,700

Notes to Mineral Reserve estimate:
Mineral Reserves stated as at 31 December 2013.
Open pit cut-off grade of 1.00 g/t Au and underground cut-off grade of 3.4 g/t
Gold price assumed is US$1,250 per troy ounce.
Processing gold recovery factor 94% assumed.
Exchange rate assumed is CAD1.00/USD0.90

15.5.2 Conversion of Indicated Resources to Reserves

Overall, 82% of Black Fox Measured and Indicated Resources have been converted to Reserves.

For the open pit, Reserve tonnes are 3% higher than Resource tonnes, with a gold grade 8% lower. This is largely due to mining dilution. Open pit Reserve ounces are 5% less than Resource ounces because of mining dilution and the use of a slightly higher cut-off grade for the reserve estimate.

Underground Reserve tonnes are 10% less than Indicated Resource tonnes at a 15% lower gold grade. Reserve gold ounces are 24% less than Resource ounces; this is mainly a reflection of stope design and areas that are not economically viable under the reserve cost and price parameters because of grade and/or location. The underground mining recovery factors of between 50% and 95% have also reduced the conversion of gold ounces from resources to reserves.

15.6 COMPARISON TO PREVIOUS RESERVE ESTIMATES

The previous Black Fox Mineral Reserve Estimate was presented in the Black Fox Technical Report issued in January 2011. Since then, reserves have been estimated by depleting the 2011 Reserves with production tonnes and grade. Using this approach, the total Proven and Probable Mineral Reserve at Black Fox, as at December 31 2013, is 4,469,000 tonnes at 5.2 g/t for 822,500 ounces of gold.

The Mineral Reserve Estimate outlined in this report has been developed from an updated resource block model using updated mining shapes. Changes to the mineral resources have had the greatest impact on the reserve estimate, but the change in mining method, increase in cut-off grade, and different reserve estimation methodology have also contributed to the difference in reserve estimates.

16 MINING METHODS

16.1 GENERAL DESCRIPTION

The Black Fox gold mine includes an open pit and an underground mine. Total mill throughput in 2013 was approximately 753,000 tonnes (2,063 tonnes per day), of which 297,000 tonnes (39%) was mined from the underground operation. A longsection of the Black Fox mine, looking north, is shown in Figure 16.1. Shown in gray are the pit surface and underground excavations, as of December 31, 3013. The final Phase 3 pit design is shown in blue and the underground stope shapes are shown in orange.

Open pit mining is conducted using a conventional truck-and-shovel mining method. The first two phases of the open pit have been depleted, with the third phase currently being mined. Overburden removal in Phase 3 is complete. The third phase is planned as the final phase of the Black Fox pit although the potential for an additional pushback is being evaluated.

Underground mining utilizes three predominant mining methods, longhole stoping, cut-and-fill, and shrinkage stoping. The mining method is selected based on the geometry of the orebody. Longhole stoping is utilized whenever the dip of the orebody is steep enough to allow ore to roll down the footwall and the continuity of the ore is sufficient to allow suitable stoping blocks. Ground conditions and the stability of the hangingwall are also taken into consideration.

Longhole stopes are mined both longitudinal and transverse, with the latter being applied to ore widths greater than 10 m. Development waste is used for backfill where possible, however cemented backfill is used where adjacent stopes are planned, to minimize dilution and maximize ore recovery

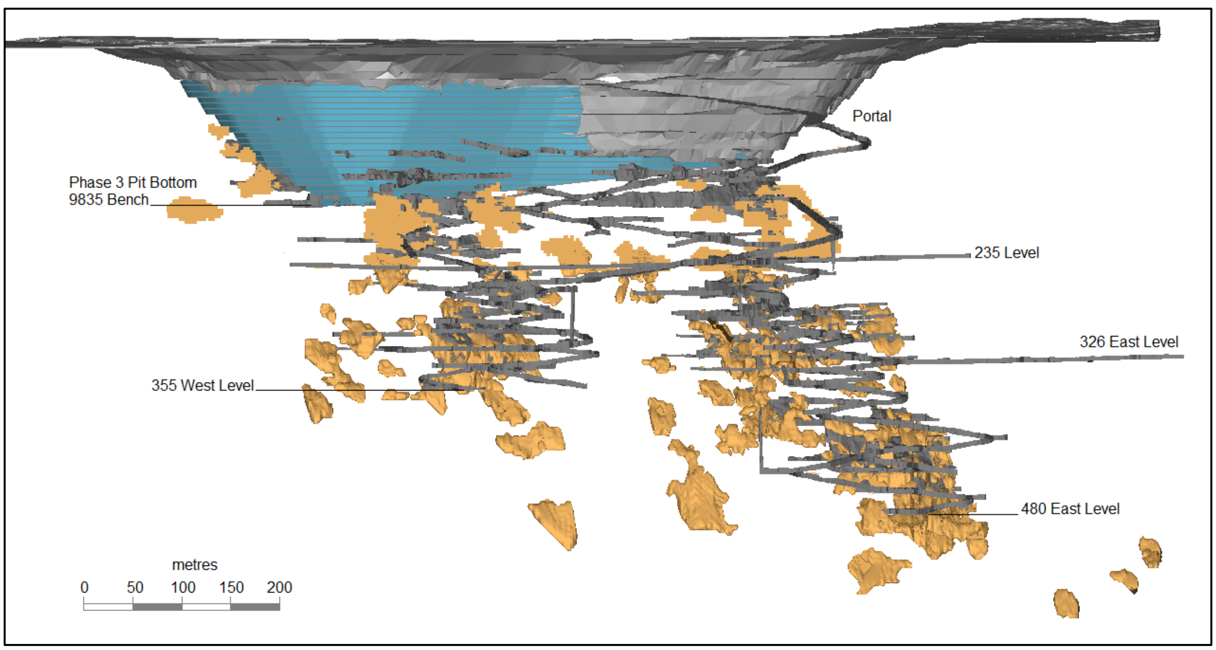


Figure 16.1 – Longsection View of Black Fox Open Pit and Underground Mines

16.2 OPEN PIT MINING METHODS

Open pit mining at Black Fox utilizes conventional drill-and-blast methods to break the rock and truck-and-shovel for loading and haulage of ore and waste. In 2013, total material movement averaged 29,600 tonnes per day at an operating strip ratio of 7.57. Waste shots are mined to the full bench height of 6 m. Ore is typically mined with greater selectivity at 3 m bench heights and using smaller excavators, to minimize dilution.

Open pit planning begins with the block model projection of each 6 m thick mineable bench. This bench is evaluated against the block model and drill holes to distinguish areas of ore and waste.

The waste section of the bench will be drilled off as a waste shot. A waste shot is defined as a blast pattern that requires no sampling. The drill holes are 6 inch diameter and the holes are drilled on a 4.0 m by 4.6 m pattern. Once blasted, the waste is mined at the full bench height of 6 m. Waste is mined using the Komatsu PC 2000 excavator or the Caterpillar 992 front end loader.

An ore shot is drilled using 4 inch diameter holes, drilled on a 3.0 m by 3.3 m pattern. Once blasted, this material is mined at half bench elevations to minimize dilution of the ore. Two samples are taken per drill hole in the ore shot, one in the top 3 m and on in the bottom 3 m of the hole. Ore is mined using Caterpillar 385 excavators.
Drill patterns in the vicinity of historic underground workings are drilled as breakthrough patterns, requiring specific drill-and-blast procedures. In breakthrough patterns, longer holes are drilled to confirm the location of the underground void and determine if the void is open or has collapsed.

Open pit ore is mined using the Caterpillar 385 excavators, which allows more selective mining and less dilution compared to the larger excavator. This is especially important when mining the narrow vein areas. Waste removal is completed using the Caterpillar 992 front end loader and Komatsu PC 2000 excavator with larger bucket capacities.

16.3 UNDERGROUND DEVELOPMENT AND ACCESS

Access to the underground mine is by a system of ramps with the portal to surface located on the 9913 bench of the open pit (87 vertical metres below surface). Underground trucks haul material to the portal, and then open pit trucks haul the material up the open pit ramp to the ROM pad, stockpile, or waste dump. The main underground ramps are typically 5.0 m high by 5.0 m wide and are generally driven at a gradient of 15%.

A single main ramp exists between the portal and 235 Level, at which point the ramp splits into the west ramp and east ramp. All ramps and infrastructure are located on the hangingwall of the orebody at a minimum stand-off distance of 25m from the ore. As of December 31 2013, the east ramp extended down to 480 Level and the west ramp extended down to 355 level. The orebody is open at depth to the east and west and ramp development is continuing.

Mining levels are typically located at 20 m vertical intervals. Truck loading is done on each mining level to minimize scoop-tram haulage distances. Remuck bays are driven every 150 m to facilitate the clean-up of the heading and expedite the blast-muck cycle while advancing the face. Remucks are driven 5 m wide by 5 m high and are typically 15 m long.

Typical level layouts for the east zone and west zone are shown in Figure 16.2 and Figure 16.3 respectively. An access drift is driven from the truck loading area near the main ramp to the ore contact. Often, as with the 440 East Level, the access drift extends through the hangingwall lens (stockwork) to the footwall lens (BMV). From the access drift, ore sill drifts are typically driven east and west along the strike of the orebody, following the ore contact. The dimensions of the ore sill drifts are dependent on the ore width.

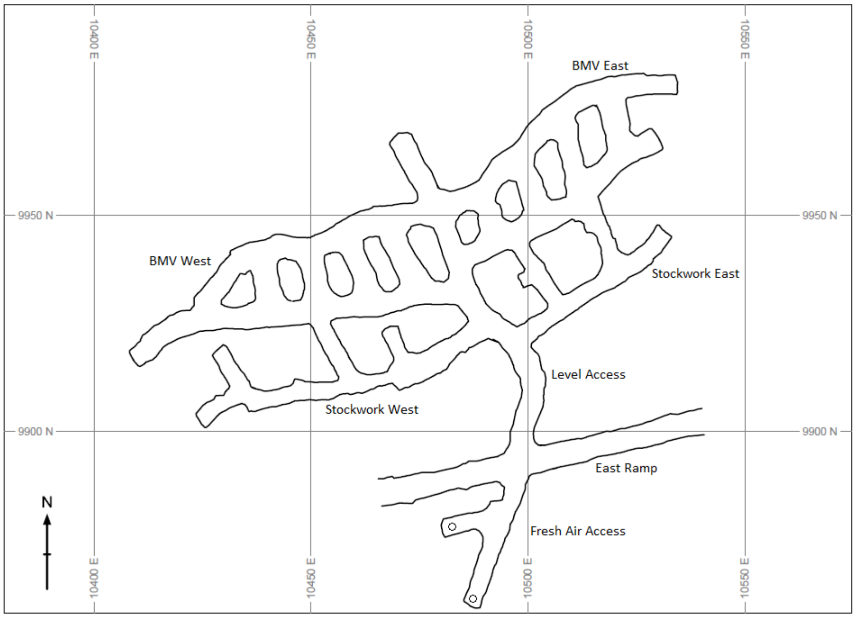


Figure 16.2 – Typical East Level Layout (440 East Level)

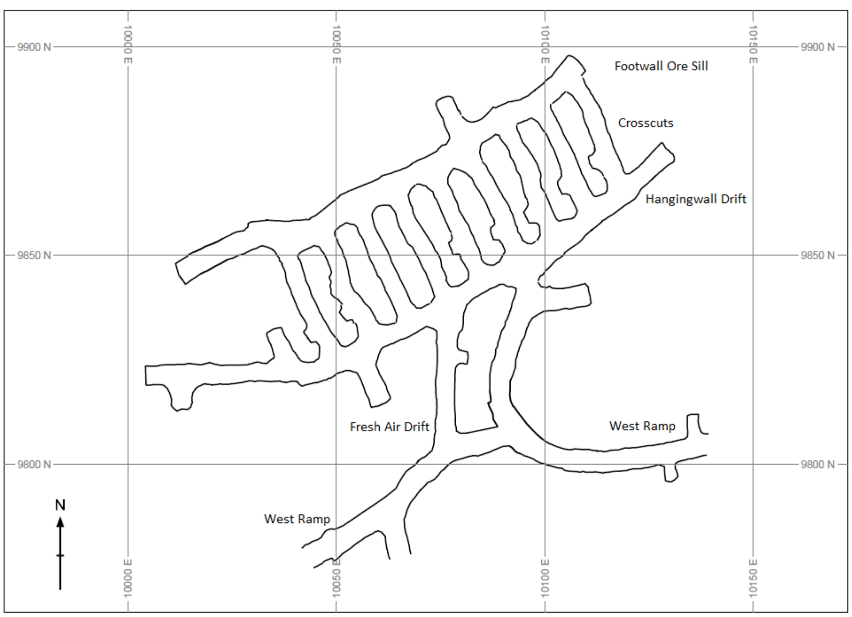


Figure 16.3 – Typical West Level Layout (335 West Level)

16.4 UNDERGROUND MINING METHODS

The predominant underground mining methods at Black Fox are longhole stoping, mechanized cut-and-fill, and shrinkage stoping.

The stope design process begins with the mine geologists providing wireframes of the ore showing the hangingwall and footwall contact. From this, the planning engineer will select the optimum mining method, apply the cut-off grade, and create mineable stope shapes.

Longhole stoping is selected wherever the orebody geometry and geotechnical conditions are suitable. Level intervals are typically 20 m, but range from 15 m to 25 m. Several levels, typically three of four, comprise one mining block which is mined from bottom up, to minimize the use of sill pillars. Depending on the width of the orebody, a stoping block can be mined longitudinally or transverse in a primary-secondary sequence. A schematic diagram of a transverse longhole stoping block is shown in Figure 16.4.

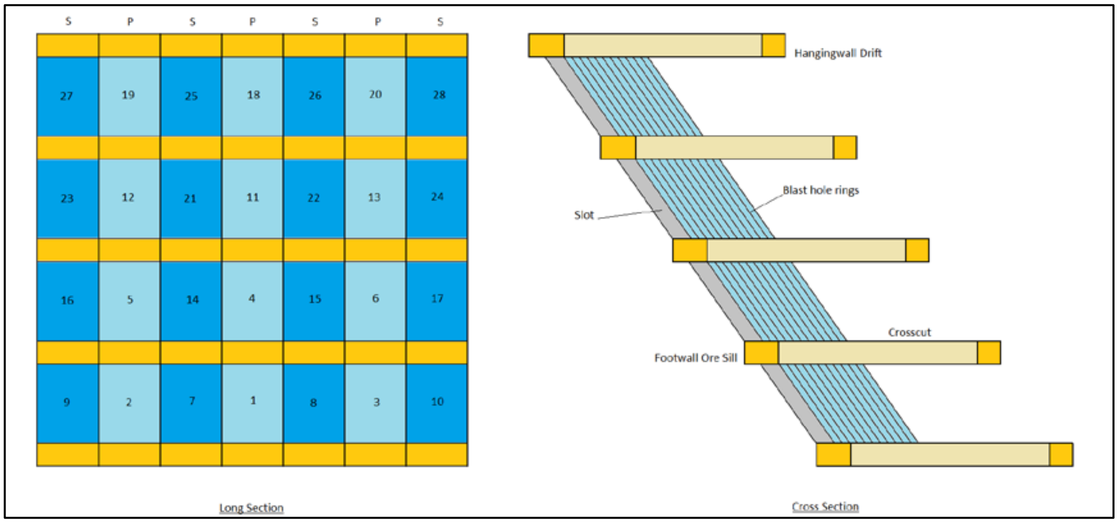


Figure 16.4 – Transverse Longhole Stoping Layout and Sequence

Hanging wall drifts are developed on each level through waste, or following the stockwork ore zone where possible. A footwall drift is developed along the footwall contact of the orebody. Cross cuts extend from the hangingwall drift to the footwall drift to provide a drilling horizon and act as the drawpoint for stope mucking.

A drop-raise provides the initial void of the stope on the footwall contact. This is then expanded to form a slot across the full span of the stope. Stable stope spans are determined through geotechnical analysis and typically range from 12 m to 15 m. Drill rings are blasted into the open void and the ore is mucked from the bottom cross cut by scoop-tram with remote control.

The long section in Figure 16.4 shows a generic mining sequence for transverse stopes with stopes labelled as primary (P) or secondary (S). Primary stopes on the bottom level of a block are mined first and then backfilled with cemented backfill. Two lifts of primary stopes are mined before the first secondary stopes are started to allow the drilling drifts to be reused as mucking drifts for the next level above. Secondary stopes are filled with uncemented development waste where possible.

When mining cannot begin at the bottom of an orebody, the bottom of the lower stoping level is filled with higher strength backfill to facilitate underhand mining of the upper level stopes of the mining block below. This sequence will ensure availability of multiple stopes on different sublevels.

Mechanized cut-and-fill is used at Black Fox where the dip of the orebody is too shallow for longhole stoping or if the ground conditions are not suitable for longhole stoping. A stope ramp is driven down to the sill cut of the stope where mining begins. Depending on the width of the orebody, mining is done with a full face jumbo round and slashing. The height of the cut is limited to 4m, primarily for the grade control, and for ground stability. When the cut has been mined, development waste rock is hauled into the stope for backfill and to establish a floor from which to mine the next cut. Access to the next cut is created by slashing the back of the stope ramp. The sequence is repeated for a total of six cuts or lifts, covering a vertical interval of 24 m.

Shrinkage stoping is also used for narrow and steeply dipping veins at Black Fox mine. To begin the shrinkage stope, a raise is driven, at the end of the structure, to follow the ore vein. Once the raise is completed, breasting or uppers commence from the raise moving towards the end of strike. The muck blasted from each round is left on the floor as a pad to work from. The mining continues as breasting or uppers until the end of strike is reached. The procedure is continued until all the lifts as per the design are completed. Once all of the lifts are completed, the muck is then removed from the stope with remote-controlled scoop-trams.

16.5 GEOTECHNICAL AND HYDROGEOLOGICAL CONSIDERATIONS

16.5.1 Open Pit Slope Stability

The open pit phase 3 design is based on the recommendations from geotechnical studies and the experiences from the first two phases of open pit mining. The phase 3 design parameters are summarized in Table 16.1.

Table 16.1 – Open Pit

Design Sector	Bench Height (m)	Overall Slope Angle (degrees)	Inter-ramp Angle (degrees)	Bench Angle (degrees)	Berm Width (m)
North Wall	18	48	52.8	55 to 60	8
East Wall	18	48	52.8	55	8
South Wall	18	48	52.8	65	8
West Wall	18	46	50.5	65	8

Survey prisms are installed on the pit wall and monitored for movement by the mine surveyors. In particular, the segment of the north wall that experienced a slip in 2012 is monitored closely. Two localized ground falls occurred in 2013, both of which occurred during periods of heavy rain and changing temperatures.

16.5.2 Underground Ground Support

Development headings are supported with resin rebar, split sets and screen. Various ground supports standards are used, depending on the profile of the heading and the purpose of the drift. Two ground support examples, for a ramp heading and an ore access heading, are shown in Figure 16.5.

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.

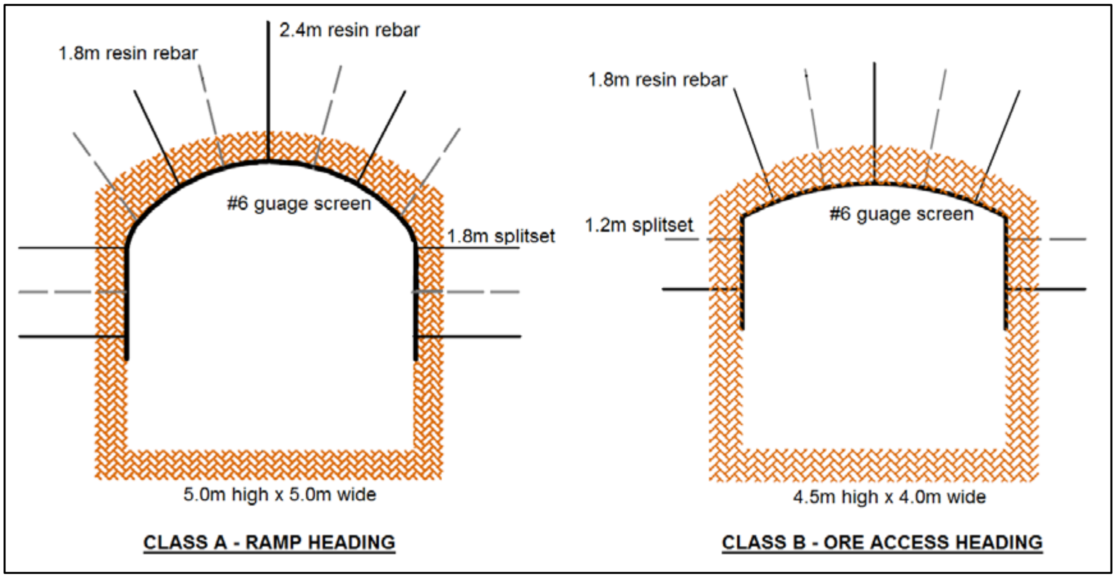


Figure 16.5 – Ground Support Standard Examples

16.5.3 Underground Stope Stability

Typical ground conditions at Black Fox are Poor to Fair, with an average Q' value of 4.4. Currently, due to the shallow depth, neither stress driven failures and ground instabilities nor relaxation or lack of confinement are major concerns.

Stope stability is controlled through designing stope dimensions based on sound geomechanical information and principles, in addition to 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.

The Stability Number, N, is determined as:

$$N = Q' * A * B * C$$

Where:

Q' is the rock quality index with the Stress Reduction Factor and the Joint Water Reduction Factor equal to one.

Factor A is designed to account for the influence of high stresses reducing the rock mass stability. The A value is determined by the ratio of the unconfined compressive strength of the intact rock divided by the maximum induced stress parallel to the opening surface.

Factor B looks at the influence of the orientation of discontinuities with respect to the surface analysed.

Factor C considers the orientation of the surface being analysed.

From this analysis, and with level intervals of 20 m, average stope spans for transverse open stoping are 12 to 15 m.

16.6 ORE & WASTE HAULAGE

Open pit ore at Black Fox hauled from the pit bench to the ore stockpile using Caterpillar 777 trucks.

Underground stope and development ore is mucked by scoop-tram and loaded into trucks on each level. A combination of 30-ton and 50-ton underground trucks is used at Black Fox. 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 in regards 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.

There are two distinct waste groups in the open pit, clean waste and dirty waste. Clean waste is material that is outside of the main mineralization zone and contains no metals or sulphides. Each waste type is stored as per environmental standards at diverse dumping locations on the mine site.

Underground development waste is generally moved to stopes as fill.

16.7 PERSONNEL AND EQUIPMENT

The workforce at Black Fox is made up of company personnel and contractor personnel. Table 16.2 is a breakdown of Primero employees as of June 2014, including nine personnel working in exploration.

Table 16.2 – Black Fox and Grey Fox Personnel at June 2014

Department	Employees
Open Pit Operations	65
Open Pit Maintenance	28
Geology	32
Engineering	14
UG Operations	97
UG Maintenance	22
Mill Operations	25
Mill Maintenance	10
Prep & Assay Lab	18
Accounting & Warehouse	14
Human Resources	2
Health & Safety	6
Security	15
Environmental	5
Mine Admin	3
Exploration	9
Summer Students	9
Total	**374**

The open pit equipment list, at June 2014, is shown in Table 16.3. The PC2000 excavator, with a 12 cubic metre bucket, and Caterpillar 992 front end loader are used for loading waste, while the Caterpillar 385 excavators are used for loading ore. Caterpillar 777F 91 tonne trucks are used for all open pit material haulage.

Blast hole drilling is carried out using Atlas Copco CM785 and DM45 drills.

The major support equipment includes one Caterpillar D9T production dozer with ripper, two Caterpillar D8 general purpose dozers, one Caterpillar D6 dozer, one Caterpillar 16H motor grader for road maintenance, Caterpillar 988 and 980 general purpose front end loaders, a DX340 rockbreaker excavator and a Caterpillar 769 water truck. Ancillary equipment includes fuel, lube, mechanics, welding and flatbed trucks together with lighting towers, crew van and other small pieces of equipment.

Open pit equipment is maintained in the surface shop.

Table 16.3 – Open Pit Equipment Summary

Unit	Description	Quantity
Caterpillar 777F	Haul Truck	6
Caterpillar 988	Front End Loader	1
Caterpillar 992	Front End Loader	1
Caterpillar 980	Front End Loader	1
Caterpillar 385CL	Excavator	2
Komatsu PC2000	Excavator	1
Atlas Copco DM45	Drill	1
Atlas Copco CM785	Drill	2
Caterpillar 769	Water Truck	1
John Deere 340	Skidsteer	1
Doosan 340	Excavator with Rock breaker	1
Komatsu PC 300	Excavator	2
Caterpillar D6	Dozer	3
Caterpillar D8	Dozer	2
Caterpillar D9	Dozer	1
Caterpillar 16H	Grader	1

A list of underground mobile equipment, at June 2014, is shown in Table 16.4. Black Fox has a total of 13 Scoop-trams, in a range of sizes to suit the various drift profiles. The majority of the scoops are equipped with remote control to allow remote mucking of stopes.

Six underground articulated dumps trucks haul ore and waste. The trucks have dump box trays, apart from two 30 ton trucks which are equipped with push boxes.

Ancillary equipment includes utility vehicles, a fuel/lube truck, and [XX] jack-leg drills.

Underground mobile underground equipment is maintained in the 235 Level shop and mechanics truck used to perform emergency repairs underground.

Table 16.4 – Underground Equipment Summary

Unit	Description	Quantity
Sandvik DD420	2 Boom Jumbo	3
Sandvik DD310	1 Boom Jumbo	1
Sandvik LH204	2 yrd Scoop	2
Wagner ST2D	2 yrd Scoop	3
Sandvik LH307	4 yrd Scoop	2
Sandvik LH410	6 yrd Scoop	5
Sandvik LH514	8 yrd Scoop	1
Sandvik TH430	30 Ton Truck	3
Sandvik TH540	40 Ton Truck	1
Toro T50D	50 Ton Truck	2
J&S SLX 5000	Scissor Lift	4
Miller M86	Grader	1
Getman A64	Boom Truck	1
Minecat	Tractor	2

16.8 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 and return air raises, as shown in Figure 8. Two 200 horsepower main fans are installed in parallel on the surface and push fresh air down a 4.5 m 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. Note that the 235 to 440 return air raise is planned to be converted to a fresh air raise in 2014, to increase the air quantity at the bottom of the east ramp.

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 MW propane heater for use in the winter months to heat the intake air as it enters the mine. Ladderways are installed in the fresh air raises to serve as a second means of egress.

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 340,000 cubic feet per minute. However, at full capacity, the ventilation system is capable of providing 400,000 cubic feet per minute.

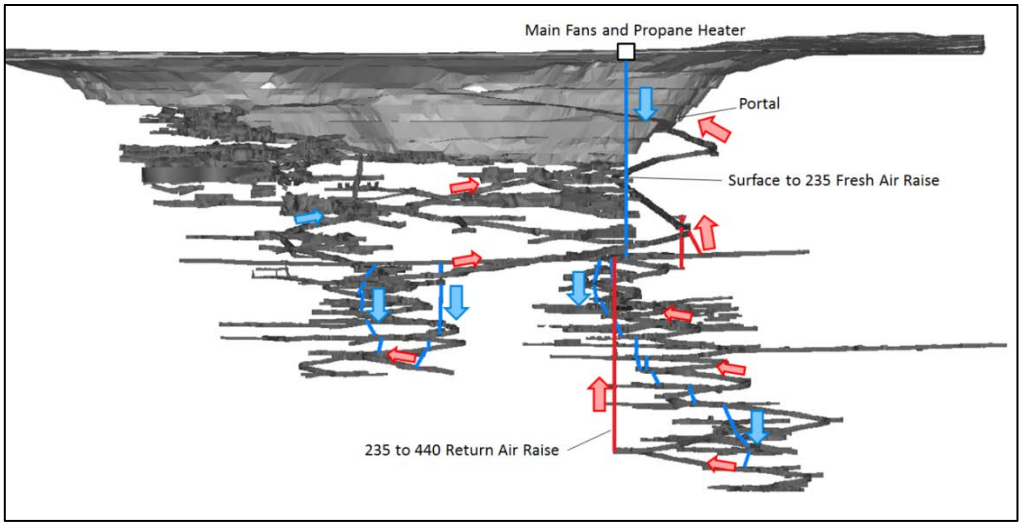


Figure 16.6 – Primary Ventilation Circuit Schematic

16.9 BACKFILL

Primary stopes are completely backfilled with a cemented rock fill mixture and secondary stopes are backfilled with cemented rock fill mixture for the bottom 5 m with the remainder being backfilled with unconsolidated rock fill. The cemented rock fill consists of 90.5% rock fill and 9.5% cement slurry (6% cement and 3.5% water). Local delivery of cemented rock fill is done by scoop-trams.

16.10 WATER MANAGEMENT

The presence of historic 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. Black Fox currently has four pumps that can deliver a total capacity of 300 m3 per hour to the surface holding pond:

- 130 level dam wall with two 100 hp pumps in series
- 140 level sump with a 58 hp pump
- 235 level west sump with three 75 hp pumps in parallel
- 235 EZ wall with a 250 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 58 hp. However, Black Fox is in the process of transitioning to a new dewatering system, in which all level sumps will be connected with a 5 inch drain hole to two main sumps at the bottom of the East and West Zones. Water will be pumped directly from the bottom of the mine to 235 Level, and from there to surface.

16.11 WATER SUPPLY

Mine supply water from the process freshwater tank is distributed to the underground levels via 4 inch diameter pipelines. Further distribution to work headings is via 2 inch diameter water lines.

Pressure reducers are located along the main ramp. Process water is retrieved from the dewatering stream following de-sedimentation. Existing diamond drill holes making water also augment the mine supply water.

16.12 COMPRESSED AIR

Compressed air is used for stopers, jacklegs, longhole drills, secondary pumping, ANFO loading, and blast hole cleaning. The underground mine has dedicated compressed air system, consisting of four 500 L/s compressors providing 1,000 L/s. Compressed air is delivered underground in a 150 mm diameter pipe via the main ramp, and 100 mm pipes in the sublevel development and stopes. The underground mobile drilling equipment such as jumbos and production drills are equipped with their own compressors.

16.13 EXPLOSIVES

ANFO is used at Black Fox for open pit blasts, underground development, and underground stope blasts. Packaged explosives are used as primers, for wet holes, and for the lifter holes in development headings. Blasts are initiated using NONEL detonators.

The main ANFO storage is on surface. Two powder magazines and two detonator magazines are located underground, in the east and west zones.

All personnel underground are required to be on surface during underground blasting. A central blast system is used to initiate blasts from the mine portal at the end of the shift.

16.14 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.

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.

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.

16.15 PRODUCTION & SCHEDULING

Table 16.5 – Black Fox Mine Production Budget 2014

		Total 2014
Underground	Ore Mined (t)	180,712
	Au Grade (g/t)	5.21
	Ounces (oz)	30,289
Open Pit	Ore Mined (t)	853,956
	Au Grade (g/t)	2.31
	Ounces (oz)	63,484

Processing	Ore Processed (t) Au Grade (g/t) Au Recovery (%) Au Ounces Recovered (oz)	688,543 3.54 92% 72,323

16.16 MINING RECOMMANDATIONS

Selecting mining methods is generally dictated by economics and orebody geometry. Long hole mining, with the proper ground conditions remains the most economic method. Black Fox, however, is a multi-method mine. The orebody is in many instances long in strike, thick in width and with a dip that is suitable for long hole mining. But there are sectors were the orebody is too flat or narrow. As the depletion of long hole mining resources progresses. The need for alternative conventional mining methods will prove more pressing. Underground workers will need to be trained for narrow and flat vein mining. This would allow time for geology to replace resources that can be mined with long hole.

17 RECOVERY METHODS

The ore from the Black Fox mine are processed at the Black Fox Mill. Some modifications were made to the plant in recent years with more modifications yet to be implemented. 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.

17.1 PROCESS FLOWSHEET SUMMARY

The simplified process flowsheet for the Black Fox Mill is presented in Figure 17.1. 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. The loaded carbon is washed with nitric acid solution to remove scale before being sent through a carbon regeneration kiln. 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. Fine carbon is constantly removed and recovered from the process to avoid gold loss, while fresh carbon is continuously added to the process. The high-grade electrowinning concentrate is sent to a bullion furnace for smelting of doré.

17.2 PROCESS DESCRIPTION

17.2.1 CRUSHING

From a stockpile on the storage pad, the mineralized rocks are reclaimed into a feed hopper that feeds a vibrating feeder and a scalping screen that discharges onto a jaw crusher. The jaw crusher product is discharged to a secondary cone crusher. The cone crusher product combined with the tertiary cone crusher product feed a double deck vibrating screen. The screen oversize material feeds the tertiary cone crusher. The screen undersize is sent to a fine ore bin. The crusher building is equipped with a bag-house dust collector.

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.

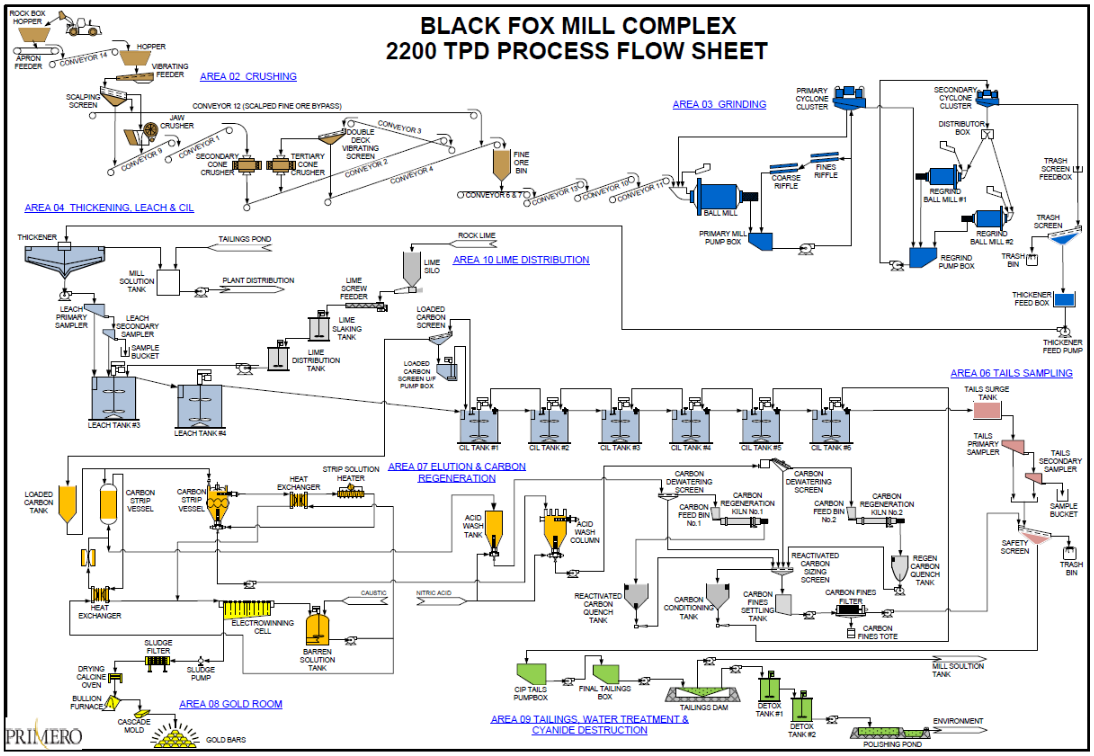


Figure 16.7 – Simplified process flowsheet

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.

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. The solution 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 6-12 mesh granular carbon.

Six (6) CIL tanks are present at the mill complex, however tanks #1 & #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 & #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 pre-aeration tank 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 t 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 to the tails surge tank on the safety screen. 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.

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 electro winning 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% nitric acid wash before the carbon is sent through a carbon regeneration kiln. The kiln is operated at 700°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 t 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. 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 26-32 wt% 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 as an oxidizing agent 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 in 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 17.1.

Table 17.1 – Concentrator Design Criteria

Parameter	Value	Units
Feed Characteristics		
Gold Head Grade (Average)		g/t
Moisture Content	2	% w/w
Specific Gravity		-
Operating Schedule		
Scheduled Operating Days	365	d/y
Operating Hours	24	h/d
Plant Availability	95	%
Shifts	2	shift/d
Production Rate		
Plant Feed Rate (Nominal)	2200	tpd
Operation Plant Feed Rate	96.5	t/h
Grinding Size	75	µm
Gold Recovery (Average)	90	%

Further testwork should be conducted to improve the accuracy of the gold recovery for the life of the mine.

17.3.2 Equipment List

The major process equipment present at the Black Fox Mill are listed in Table 17.2.

Table 17.2 – 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

Equipment Name	Description
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, 400 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

Table 17.2 – Process equipment list (cont'd)

Equipment Name	Description
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	40 //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

17.3.3 Future Modifications to the Concentrator Configuration

The crushing circuit is scheduled to be replaced in Q3 2014. The current crushing circuit is to be decommissioned and bypassed. The new crushing circuit will be located at the Black Fox mine site. The crushed material will be trucked to the Black Fox mine where it will be processed.

The future crushing configuration is 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.

The proposed flowsheet modifications are expected to increase the Black Fox Mill existing capacity from 2200 tpd to 2300 tpd and the peak capacity to 2500 tpd. As the crushing circuit represents the main bottleneck in production capacity in the current plant, no modifications to the final crushed material size distribution seem necessary for a nominal throughput increase. A stable 2300 tpd operation has already been achieved at the mill.

The major process equipment to be present at the Black Fox mine once the replacement of the crushing circuit is to be implemented are listed in Table 17.3.

Table 17.3 – Process equipment list following replacement of crushing circuit

Equipment Name	Description
Vibrating Feeder	1.3 m x 7.3 m
Jaw Crusher	1.1 m x 1.4 m
Secondary Cone Crusher	300 HP
Tertiary Cone Crushers	2 x 400 HP
Vibrating Screens	2 x 1.8 m x 6.1 m

18 PROJECT INFRASTRUCTURE

Project infrastructure for the mine consists of supports services, health and safety considerations, surface facilities, tailings storage and water management.

The infrastructure provides essential services and facilities that are required for the mine to operate and follow all laws and regulations. Services such as compressed air, electrical systems and communications are necessary to operate the mine. Facilities such as water treatment ponds, explosives storage and refuges stations are necessary to ensure that the Black Fox mine adheres to all laws and regulations.

18.1 STAFFING

The Black Fox Project requires highly trained underground miners, support staff, diesel mechanics, and a technical management group that is familiar with long hole, conventional and mechanized cut and fill mining techniques. This project is an active open pit and underground mining area where such individuals with the required training and education are readily available. Demand for such individuals, in the mining field, has dramatically increased with a subsequent substantial increase in wages and benefits that is to be paid to attract experienced individuals. An on-the-job training program has been designed to ensure that properly trained and experienced miners are available for the mine operation.

A rigorous safety training program has been implemented to create a continuous improvement program required for a modern mining operation. Critical safe working procedures have been established and are enforced.

Many of the salaried level positions are shared between the open pit and underground operations to achieve greater efficiencies in the Black Fox operations. These positions include engineering and geology staff, environmental, human resources and safety.

18.2 SUPPORT SERVICES

18.2.1 Supplies and Debris Handling

Mining supplies, rockbolts, screen, pipes, vent ducts, etc., are brought down to the mining areas using utility vehicles. Unused excavations, such as remuck bays, diamond drill stations, abandoned headings, etc., if required, can be converted to laydown/storage bays. The same vehicles will backhaul lunchroom refuge and other debris to surface.

18.2.2 Compressed Air

Compressed air is required in the development and production headings to operate the hand held jackleg and stopper drills for drilling holes for ground control bolts, Alimak raise contractors, and utility requirements throughout the mine.

18.2.3 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. Black Fox currently has four pumps that can deliver a total capacity of 300 m^3 per hour to the surface holding pond:

- 130 level dam wall with two 100 hp pumps in series
- 140 level sump with a 58 hp pump
- 235 level west sump with three 75 hp pumps in parallel
- 235 EZ wall with a 250 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 58 hp. However, Black Fox is in the process of transitioning to a new dewatering system, in which all level sumps will be connected with a 5-inch drain hole to two main sumps at the bottom of the East and West zones. Water will be pumped directly from the bottom of the mine to Level 235, and from there to surface.

18.2.4 Water Supply

Mine supply water from the process freshwater tank is distributed to the underground levels via 4-inch diameter pipelines. Further distribution to work headings is via 2-inch diameter water lines. Pressure reducers are located along the main ramp. Process water is retrieved from the dewatering stream following de-sedimentation. Existing diamond drill holes making water also augment the mine supply water.

18.2.5 Electrical Systems

The feeders include a 5 MVA/3500 system that splits into 2.5 MVA in the east part of the mine and the remaining 2.5 MVA in the west part. Power is then to supply 5KV-600V transformer substations.

18.2.6 Electrical power consumption

Electrical power is being supplied to the mine site from the Hydro One network. Peak power demand is currently 1.5MV resulting in a peak energy consumption of 950 MWh per month (figures are approximate). From information supplied by Primero engineering personnel, the site is limited to drawing a maximum of 10 MW from Hydro One. There is sufficient line capacity to meet projected power requirements in order to support current expansion plans.

18.2.7 Communications

Underground communications is an important part of managing the safe development and production requirements of the mine operation. The mine currently has a hard line underground mine phone located at strategic locations throughout the mine. As the mine expands, the mine phone system will be expanded. New phones will be installed at the new permanent underground ventilation and electrical facilities, the underground shop and the refuge stations as required. The existing leaky feeder communication system will also be upgraded as required to allow better communications within the mine. Offset communications for phones and data is through a supply and service contract provided by a local telecommunications provider.

18.2.8 Underground Garage

There is a small underground garage on Level 235 (elevation 9765) for running repairs. Major repairs and scheduled preventive maintenance work will be performed in the main shop on surface.

18.2.9 Equipment maintenance and support

The surface shop is being used to perform most of the maintenance requirements on the underground equipment fleet. Routine tire repairs, oil changes and preventive maintenance procedures will be performed at this facility. The facility will be equipped with an overhead crane, compressed air, lighting, welding equipment, equipment wash down area, and a small secure warehouse area.

18.2.10 Haulage Route Maintenance

Haulage routes both surface and underground, are maintained on a regular basis to maintain optimal haul route performance. A Cat -135H performs this function underground and a Cat 16H performs this on surface.

18.2.11 Explosives Storage

For surface operations, powder and detonator magazines have been installed. For underground operations, explosives will be delivered by local suppliers direct to site where they will be transferred to a mine utility vehicle and delivered directly to underground powder and cap magazines for storage.

18.3 HEALTH AND SAFETY CONSIDERATIONS

18.3.1 Refuge Stations

Refuge stations have been installed in accordance with provincial and national requirements for underground mines. The stations were constructed in muckbays that are no longer needed at strategic locations around the mine. There is one in the East side production area on Level 235 and one in the West side on Level 415. There are also 2 Mine Arc portable refuge stations installed in the lower levels of the East and West ramps. Each station is supplied with air (from the compressed air line), water, and communication equipment including mine phones and leaky feeder connections.

18.3.2 Mine Rescue

Primero has prepared a Memorandum of Understanding with the local MASHA authority that establishes the responsibilities for the underground mine. The number of miners underground at any one time will require that 15 trained mine rescue personnel be onsite. The mine will use MASHA supplied equipment and training as part of the workplace safety insurance premiums that are paid by the mine.

In the event of a mine incident that requires the immediate evacuation of the mine, stench gas (methyl mercaptan) will be introduced to the compressed air system as well as the main ventilation fans on surface. Miners are trained to make their way quickly to the closest station along well marked escape routes.

18.3.3 Emergency Response

The Black Fox Emergency Response Plan (ERP) establishes procedures for responding to emergencies at the Primero property that may jeopardize the health or safety of personnel, the natural environment, or property. The ERP addresses potential emergencies identified through site risk assessments.

The ERP has been developed by Primero personnel, and is required by changes in activities, legislation or policies. At a minimum, the procedures related to spills are reviewed annually and updated as required by the Metal Mining Effluent Regulation (MMER).

The ERP is designed to promote effective response with minimal confusion and disruption of activities at the Black Fox Mine site. It is constructed so that it can be initiated and operated by on duty personnel until such time as additional personnel support is required. The plan is also intended to define responsibilities and to establish priorities for essential activities.

18.3.4 Second Egress

The Main Vent Raise will be outfitted with a number of different services including an escape manway which is serving as the principal secondary means of egress. Use of the secondary egress is governed by the Mine Emergency Respond Plan.

18.4 SURFACE FACILITIES FOR UNDERGROUND MINE

Lockers, change room and shower (dry) facilities for 350 personnel are available and include facilities for both a woman's and visitors dry. Office areas are made up of seven fully serviced modular buildings. These are configured to support a dry, main office, underground engineering & geology, pit operations, pit geology, surface pit supervision and exploration.

18.4.1 Maintenance Shop, Warehouse and Cold Storage

The surface maintenance shop is being used to perform most of the maintenance requirements on the entire equipment fleet. Routine tire repairs, oil changes and preventive maintenance procedures are being performed at this facility. The facility is equipped with an overhead crane, compressed air, lighting, welding equipment, equipment wash down area, and a small secure warehouse area. Sufficient outside and covered cold storage areas exist for regular mine consumables.

18.4.2 Compressed Air Plant

The current compressed air plant configuration, located on surface, includes a Sullair 25-200 and a Sullair 25-300 feeding a 1000 gallon receiver located on Level 235 via an 8-inch line. Another receiver is located in the 280 East manway. A third compressor, a Sullair 25-200, is located at the 330 and a fourth one, a Ingersoll Rand 200 Hp compressor, is located on Level 390. Distribution from Level 235 is transferred via 4-inch air lines.

18.4.3 Backfill

Backfill facilities are installed on surface. Four (4) 3-inch holes have been drilled to link the surface plant building to the East and West backfill mixing stations. Primero engineering personnel are studying options for installing a sandfill batch plant in the surface building, changing the cemented rock fill to sandfill.

18.5 TAILINGS STORAGE FACILITY AT STOCK MILL

The ore from the Black Fox site will be processed from the Stock Mill. On October 28, 2010, Wardrop conducted a site visit at the Black Fox milling site to observe the existing tailings and review operational practices. In addition, Wardrop reviewed the construction as-built documents for the Phase 4 tailings management area and the Phase 5 water management area to assess conformance with design parameters and evaluate best engineering practices.

Site observations

Wardrop was present at the above referenced site on October 28, 2010 and noted the following conditions:

- Observations of the perimeter dam showed no lateral displacement or distress of slopes.
- Ponding of water outside the dam perimeter was not observed.
- Operations surface water and erosion control practices appear to be effective.
- Tailings decant water appears to be managed satisfactorily by site personnel. No presence of water beyond the facility perimeter was observed.
- The Phase 5 water management pump station has been operating without problems and appeared to be functioning as designed.

Review of As-Built Drawings

Wardrop reviewed the as-built reports prepared by AMEC for the Phase 4 tailings management area and the Phase 5 water Management area to assess compliance with design parameters and best industry practices.

The Phase 4 Tailings Management Area and Phase 5 Water Management Pond were constructed and operational in early 2010. Review of the above reference as-built drawings showed that the tailings management structures were constructed in substantial conformance with design parameters. Furthermore, design and construction have been accomplished with current best practices for such structures.

Based upon site observations, discussions with site personnel and the review of as-built drawings, the tailings management facility presently provides adequate containment for tailings as designed.

18.6 MINE SITE WATER MANAGEMENT

AMEC carried out an overall site water management study for the Black Fox site, with a holding pond as the water management center. The following sections describe the details of the concept and design features.

Design Criteria and Considerations

- The holding pond serves as the central water management facility for the entire site. Contaminated water from the Open Pit, Underground Operations and Dirty Waste Rock Stockpile is pumped to the holding pond and from there sent to the treatment plant for treatment. The holding pond was designed to provide sufficient storage capacity for a minimum 5-day retention time for the 1:25 year rainfall storm volume Environmental

Design Flood (EDF). The pond water will be allowed to spill for the flood events exceeding EDF.

- Surface runoff from the Open Pit will be continuously pumped to the holding pond with a capacity that prevents substantial accumulation of water in the pit (leading to production disruption) for hydrologic events up to a 1:25 year event.
- Runoff from the dirty waste rock stockpile is collected for temporary storage and pumped to the holding pond for treatment. The collection system was designed for the 1:25 year event. The pump was sized to effectively draw down the collection pond to the minimum operating level within 5 days after the design event.
- No runoff collection or treatment system is required for the clean waste rock stockpile and the overburden stockpile. Surface runoff is discharged to the environment with sediment control measures in place, if required.

18.7 SUMMARY OF DESIGN PARAMETERS

18.7.1 Open Pit

The required pumping capacity is designed at 33,020 m^3/d (about 6,060 gpm) to be able to pump the runoff resulting from a 1:25 year 24-hr storm together with the seepage from underground workings. The inflow design parameters used for deriving the required pumping rate are summarized in Table 18.2.

Table 18.2 – Open pit pump capacity design parameters

Description	Parameter
Total footprint area for the Open Pit	33.0 ha
Rainfall depth corresponding to the design event (1 in 25 year 24-hr rainfall)	98.3 mm
Total runoff volume corresponding to the design event	32,440 m^3
Seepage from Open Pit and Underground workings to the design duration	580 m^3
Total flow volume corresponding to the design event	33,020 m^3

18.7.2 Dirty Waste Rock Stockpile

The seepage and runoff emerging along the perimeter toe of the Dirty Waste Rock Stockpile is isolated from the clean runoff from the surrounding areas by a containment berm and will be directed to a pump sump at the low lying area at the northwest corner of the stockpile. The collected water from the sump is pumped to the holding pond. The storage capacity of the sump pump is designed for a 1:25 year 24-hr rainfall event as in Table 18.3.

Table 18.3 – Dirty waste rock stockpile sump pump design parameters

Description	Parameters
Total footprint area for the Dirty Waste Rock Stockpile (within the diversion berm)	55.0 ha
Runoff coefficient used for the waste rock stockpile	0.8
Rainfall depth corresponding to the design event (1 in 25 year 24-hr rainfall)	98.3 mm
Total runoff volume corresponding to the design event (without pumping)	44,300 m^3
Storage requirement corresponding to the design event (with 700 gpm constant pumping rate)	40,500 m^3

The collection pond would be pumped to the minimum operation level in about 5 days with the design pumping rate of 3,800 m^3/d (about 700 gpm), under the 1:25 year hydrologic event.

18.7.3 Holding Pond

Table 18.4 summarizes the inflow design parameters used to derive the required pumping rate and storage capacity in the holding pond.

Table 18.4 – Holding pond inflow design parameters

Description	Annual Volume (m^3/year)	1:25 year 24-hour Volume (m^3/d)
Inflows		
Direct precipitation over the pond surface	109,000	12,800
Seepage from underground workings and open pit	211,000	580
Runoff from open pit	238,000	32,400
Runoff from dirty rock stockpile	278,000	3,800
Outflows		
Evaporation from the pond surface	59,000	negligible
Seepage losses	conservatively ignored	negligible
Treatment plant	777,000	5,000

Design parameters for the holding pond are summarized below:

- Dead storage: A volume of 29,000 m^3 is assumed for the sediment containment. The top elevation of the sediments is at 291.5 m, 0.5 m above the pond bottom.
- Minimum normal pond operating level: Minimum pond operating level is set at 292.0 m, 1.0 m above the bottom of the pond.
- Normal operating volume in the pond: The normal operation volume of 174,000 m^3 will be required to retain contaminated water under average year runoff condition.
- Maximum normal operating level: The maximum water level for an average runoff year is at elevation 293.5 m
- Design pumping rate: Water from the holding pond will be pumped to the treatment plant at the following rates:
  - For an average year: 2,130 m^3/d
  - For 1:25 year rainfall event: 5,000 m^3/d
- Emergency spillway invert elevation (operation); Determined by the operating and no spill criteria, this elevation was selected at 293.9 m, providing a total storage capacity of 282,000 m^3
- Emergency spillway configuration: A trapezoidal spillway channel (3H:1V) was designed with a bottom width of 3 m and a longitudinal slope of 0.5%.
- Dam crest: Dam crest elevation was designed at 294.5m, provides a 0.3 m freeboard above the maximum water level of 294.5 m in a 1:100 year hydrologic event during operation.

On October 28, 2010, Wardrop conducted a site visit at the Black Fox site to observe existing site water management controls and assess operational practices.
In addition, Wardrop reviewed the construction as-built documents of the transitional settling and holding ponds to assess conformance with design parameters and evaluate best engineering practices.

Site observations

Wardrop was present at the above referenced site on October 28, 2010 and noted the following conditions:

- The holding ponds perimeter earthen dams appeared stable with no evidence of lateral displacement, sloughing, cracking or budging at the toe of the slope.
- Seepage of water through the dam or ponding of water at the toe of the slope was not observed.
- The area surrounding the pond appeared to be stable without evidence of ponding and/or boiling due to an elevated hydraulic gradient.
- Discussions with operational personnel indicated that the ponds were operating satisfactorily and they had not noted any structural or containment problems.

Review of As-Built Drawings.

Wardrop reviewed the transitional settling and holding ponds as-built report prepared by AMEC) to assess conformance with design parameters and best industry practices.

The transitional settling ponds and holding pond were constructed in late 2008 and completed in 2009. Based upon the review of the as-built report it appears that the ponds were constructed in substantial conformance with design parameters and generally in accordance with the best practices.

19 MARKET STUDIES AND CONTRACTS

19.1 MARKETS

Markets for doré are readily available. Gold markets are mature, global markets with reputable smelters and refiners located throughout the world. Demand has been steady over the last year, following an unprecedented fall in 2013 and is presently moderate with prices for gold increasing slightly off 2013 lows. The 36-month average London PM gold price fix through June 1, 2014 is US$1,530/oz.

19.2 CONTRACTS

The Black Fox Complex has signed contracts which will be directly associated with operations. These contracts, shown below, are also modeled in the economic analysis.

Goldstream Agreement
On November 9, 2010, Brigus Gold entered into a Goldstream Agreement with Sandstorm Resources Ltd. ("Sandstorm") pursuant to which Sandstorm agreed to purchase 12% of the gold production from the Black Fox mine beginning in January 2011 and 10% of future production from the Black Fox Extension covering a portion of the adjoining Pike River property.

Sandstorm made an upfront payment of $56.3 million of which a portion was used to effectively settle the balance of the previous owner of the Black Fox Complex's forward gold sales contracts eliminating the obligation to deliver 99,409 ounces from October 2011 to March 2013.

Sandstorm will also pay the Black Fox Complex ongoing per ounce payments of $500 subject to an inflationary adjustment beginning in 2013, not to exceed 2% per annum.

Brigus Gold had the option, for a 24 month period, to reduce the Goldstream Agreement to a minimum of 6% of production from the Black Fox mine and 4.5% of production from the Black Fox Extension for a payment of US$36.6 million.

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

Ore transport agreement
LPL Contacting with Wahgoshig Limited Partnership entered into an agreement to load and transport ore to the Stock Mill. Load and hauling to the Stock Mill is quoted at Cdn$4.80/t with a standby surcharge.

Equipment lease
The Company has finance leases with banks and equipment suppliers that aggregate approximately $14 million. All finance lease agreements provide that the Company can purchase the leased equipment at the end of the lease term for a nominal amount. Interest payable on the various leases range from a fixed rate of 5.32% to 8.60% per annum. The lessors hold first security rights over the assets which are being leased.

Transport of gold bars to the refinery.
Brinks Canada Limited entered into an agreement to transport gold bars from the Stock Mill to the refinery (Johnson Matthey Limited) February 2009. The armoured transportation rates are

Cdn$928.82 per call for the first $500,000, plus Cdn$0.67 per $1,000 from $500,001 to $2,000,000, plus Cdn$0.48 per $1,000 from $2,000,001 to $4,000,000. The rates are subject to an annual 3% increase.

Refining of doré.
Smelting and refining of doré will be performed under the terms of an agreement with Johnson Matthey. Refining will be at a cost of Cdn$0.55 per total ounce received. Payable gold will be 99.91%.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

AMEC Environment & Infrastructure (AMEC), a Division of AMEC Americas Limited, was requested by Primero Mining Corp. ("Primero" or "the issuer"), via email dated May 27, 2014, to provide a summary of the current environmental and permitting status at the Black Fox mine site for inclusion in the issuer's 43-101 technical report.

To the best of AMEC's knowledge, based on our current work at the site and data provided to AMEC by site staff during the course of this work, the following is an environmental, permitting and social/community status summary for the Black Fox mine site.

Environmental and operating performance reporting for the Black Fox mine site is submitted to the Ministry of Environment on an annual basis. Effluent discharge quality has continued to meet permit requirements and receiving water quality has achieved provincial water quality criteria and/or background conditions. Two environmental issues of note are related to failures at the waste rock pile, and higher than anticipated seepage into the open pit.

Waste rock pile failures occurred at the east side of the pile in October 2012, May 2013 and August 2013, as a result of rapid shear strength loss in the soft clay foundation underlying the pile footprint. Primero reported the incidents and the Ministry of Labour (MOL) visited the site on August 2, 2013 to investigate the potential safety aspects of the pile. Pursuant to the visit, an order was issued by the MOL requiring a professional engineer's report certifying the design and safety of the pile to be submitted by February 2014. AMEC was retained by Primero and a drilling investigation of the foundation materials was undertaken in December 2013. A revised pile design was prepared and submitted to the MOL by the required due date. The corrective actions undertaken by Primero to address the stability of the pile included expanding the waste rock footprint, reducing the bench heights and flattening the overall slope of the pile. To date, no further failures have been reported.

A marked increase in groundwater seepage flowing into the open pit mine was observed starting in approximately February 2013, when stripping of the western portion of the open pit towards the ultimate footprint commenced. A hydrogeological study was conducted shortly thereafter and concluded that sand encountered at the western edge of the open pit was hydraulically connected to the adjacent esker, originally thought to terminate further west beyond the pit footprint. The interception of this esker appears to be the source of the higher seepage inflows to the mine workings. The resulting excess mine water has put a strain on the site water management facilities from a volume perspective. The corrective actions undertaken by Primero 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. Primero is currently planning to proceed with detailed designs in 2014 and implementation of those modifications by 2015.

To account for the recent and proposed future modifications to the site's water management facilities and expanded rock pile footprint, Primero is in the process of obtaining an amendment to the site's Environmental Compliance Approval (ECA), Permit to Take Water, and the approved Closure Plan. The Closure Plan amendment will also require an update to the financial assurance to account for the expanded waste rock pile footprint and the resulting increase in runoff volumes that will require collection and treatment during the closure phase. The primary closure cost is associated with long term treatment of arsenic in runoff from the waste rock pile. The corrective action undertaken by Primero to minimize runoff volumes from the rock pile requiring treatment during the closure phase, and thereby partially offset the additional financial assurance related to collection and treatment, involves progressively rehabilitating the west portion of the waste rock pile by placing a low permeability soil cover over the pile. The cover is expected to shed natural runoff, thus reducing the volumes of water to be collected for treatment to seepage waters only. Aboriginal and public consultation meetings were held by Primero as part of the approval process for the existing Closure Plan. At this time, it is understood that additional consultation by Primero will not be required for the proposed upcoming amendments, however, Provincial regulators will inform the local Aboriginal communities of any permit/approval amendment applications for the site as part of their review and approval process.

The Aboriginal community having a primary interest in the Primero mining operations is the Wahgoshig First Nation, located on the Abitibi Indian Reserve 70, approximately 25 km east of the site, of which a number of members are employed at the mine site. Primero has an Impact Benefit Agreement (IBA) with the Wahgoshig First Nation that was signed in June 2011. In accordance with this IBA, Primero maintains on-site representation from the Wahgoshig First Nation community through a designated IBA Liaison Coordinator. The IBA Liaison Coordinator attends and participates in daily management meetings, where all environmental and permitting related issues are regularly discussed.

To date, the actions undertaken by Primero have been sufficient and no long term environmental damage is expected.

21 CAPITAL AND OPERATING COSTS

21.1 CAPITAL COSTS

The 2014 capital expenditure budget for Black Fox is summarized in Table 21.1.

Table 21.1 – 2014 capital expenditure budget for Black Fox

Capex Expenditures (in $000)	Forecast
2014 Black Fox Capex	
UG	$14,622
UG Capital Equipment	$4,730
Open Pit	$5,328
Shared Projects (pumping requirements)	$3,074
ROM – Power to New Crushing plant	$336
Overhauls	$2,649
Mill & Assay Lab	$5,768
G&A	$564
Total Black Fox Capex	$37,069
2013 Carryover	
UG – Alimak FAR from 2013 by Stratum	$447
UG – Hydraulic Fill Plant	$900
Open Pit – Water Management	$500
Mill – Piping & Cyanide Destruction Upgrades	$130
Total Carryover	$1,977
2014 Black Fox Exploration (as presented)	
UG Drilling at Black Fox	$6,200
Surface Drilling at Black Fox	$1,000
UG Exploration Development	$1,233
Total Black Fox Capital Exploration	$8,433
TOTAL BLACK FOX CAPEX	**$47,479**

21.2 OPERATING COSTS

The 2014 Budget in unit cost terms by major cost centre is shown in Table 21.3.

Table 21.3 – Unit budget by cost centre

Cost Center	Cost / Tonnes
Underground	$98.95
Open Pit	$3.09
Milling	$24.88
G&A	$11.54

22 ECONOMIC ANALYSIS

Under NI 43-101 rules, producing issuers may exclude the information required for economic analysis on properties currently in production, unless the technical report includes a material expansion of current production.

Primero, being a producing issuer, is not required to include information under Item 22. There is currently no plan to expand the current Black Fox mine production of 2,300 tpd.

23 ADJACENT PROPERTIES

There are three known deposits in the properties adjacent to the Black Fox Complex: the Hislop mine, the Ross mine and the Gold Pike deposit (Figure 23.1). These properties are not owned by Primero and are not material to Primero. Information about these properties is publically available. The presence of mineralization on these adjacent properties is not necessarily indicative of similar mineralization on the Black Fox Complex.

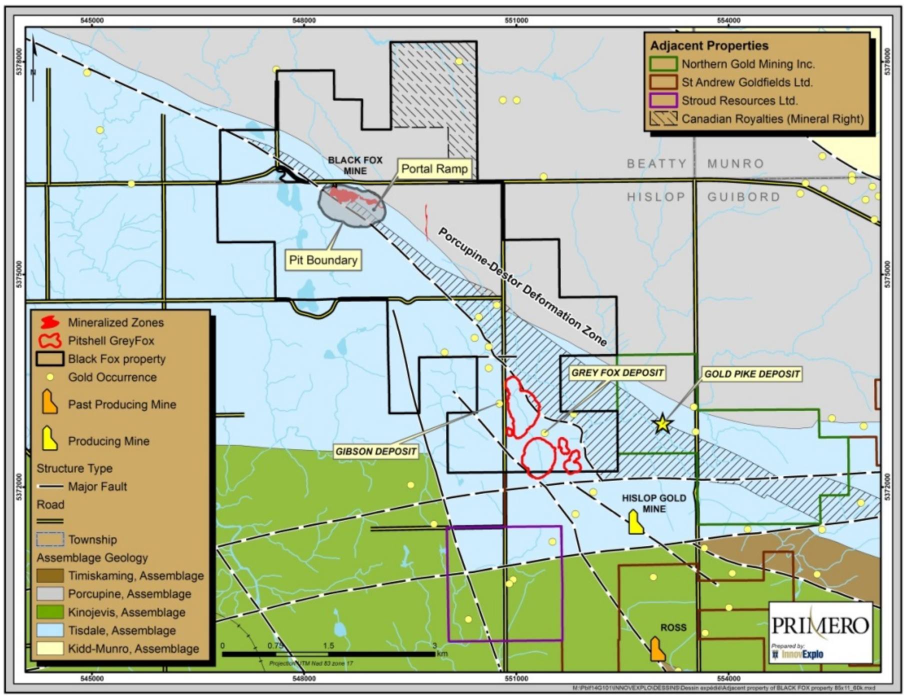


Figure 23.1 – Adjacent properties to the Black Fox Complex

24 OTHER RELEVANT DATA AND INFORMATION

24.1 RISKS AND UNCERTAINTIES

Primero's exploration and development activities expose the issuer to various financial and operational risks and uncertainties, which are inherent to all exploration mining activities. The risks associated with the Black Fox Complex are similar to those for any exploration project.

24.1.1 Property Rights, Permits and Licencing

Primero derives the rights to most of Black Fox Complex from patented mining claims, leaseholds or purchase option agreements which require the payment of maintenance fees, rents, purchase price installments, exploration expenditures, or other fees. If Primero fails to make these payments when they are due, its rights to the property may lapse. In addition, some contracts with respect to Primero's mineral properties require development or production schedules. Primero's ability to transfer or sell its rights to some of its mineral properties requires government approvals or third party consents, which may not be granted.

While Primero has no reason to believe that its rights to mine on Black Fox Complex are in doubt, titles to mining properties are subject to potential claims by third parties claiming an interest in them.

24.1.2 Exploration, Development and Operation Risk

Primero's current activities are primarily directed towards mining operations at the Black Fox Complex. Mining operations generally involve a high degree of risk. Primero's operations are subject to all the hazards and risks normally encountered in the exploration, development and production of gold and silver including unusual and unexpected geologic formations, seismic activity, rock bursts, cave-ins, flooding and other conditions involved in the drilling and removal of material, any of which could result in damage to, or destruction of, mines and other producing facilities, causing delay or indefinite postponement of exploration, development or production, damage to life or property, environmental damage and possible legal liability. Although appropriate precautions to mitigate these risks are taken, mining operations are subject to hazards such as equipment failure or failure of retaining dams around tailings disposal areas which may result in environmental pollution and consequent liability.

The exploration for and development of mineral deposits, like the Grey Fox deposit, involves significant risks which even a combination of careful evaluation, experience and knowledge may not eliminate. While the discovery of an ore body may result in substantial rewards, few properties which are explored are ultimately developed into producing mines. Major expenses may be required to locate and establish Mineral Reserves, to develop metallurgical processes and to construct mining and processing facilities at a particular site. It is difficult to ensure that the exploration or development programs planned by Primero will result in a profitable commercial mining operation. Whether a mineral deposit will be commercially viable depends on a number of factors, some of which are: the particular attributes of the deposit, such as size, grade, metallurgy and proximity to infrastructure; metal prices which are highly cyclical; and government regulations, including regulations relating to prices, taxes, royalties, land tenure, land use, importing and exporting of minerals and environmental protection.

24.1.3 Development of New Projects

Decisions regarding future projects, like the Grey Fox deposit, are subject to the successful completion of feasibility studies, issuance of necessary governmental permits and receipt of adequate financing. Development projects have no operating history upon which to base estimates of future cash flow.

24.1.4 Government Regulations, Consents and Approvals

Exploration and development activities and mining operations are subject to laws and regulations governing health and work safety, employment standards, environmental matters, mine development, prospecting, mineral production, exports, taxes, labour standards, reclamation obligations and other matters. It is possible that future changes in applicable laws, regulations, agreements or changes in their enforcement or regulatory interpretation could result in changes in legal requirements or in the terms of permits and agreements applicable to Primero or Black Fox Complex which could have a material adverse impact on the Primero’s operations and exploration program and future development projects.

Where required, obtaining necessary permits and licences can be a complex, time consuming process and there can be no assurance that required permits will be obtainable on acceptable terms, in a timely manner or at all. The costs and delays associated with obtaining permits and complying with these permits and applicable laws and regulations could stop or materially delay or restrict Primero from proceeding with the development of an exploration project or the operation or further development of a mine.

Any failure to comply with applicable laws and regulations or permits, even if inadvertent, could result in interruption or closure of exploration, development or mining operations or material fines, penalties or other liabilities, which could have an adverse effect on the business, financial condition or results of operation of Primero.

24.1.5 Environmental Risks and Hazards

The Canadian mining industry is subject to federal and provincial environmental protection legislation. This legislation imposes strict standards on the mining industry in order to reduce or eliminate the effects of waste generated by extraction and processing operations and subsequently emitted into the air or water. Consequently, drilling, refining, extracting and milling are all subject to the restrictions imposed by this legislation. In addition, the construction and commercial operation of a mine typically entail compliance with applicable environmental legislation and review processes, as well as the obtaining of permits, particularly for the use of the land, permits for the use of water, and similar authorizations from various government bodies.

Canadian federal, provincial, and local laws and regulations relating to the exploration for and development, production and marketing of mineral production, as well as environmental and safety matters have generally become more stringent in recent years, often imposing greater liability on a larger number of potentially responsible parties. Because the requirements imposed by such laws and regulations are frequently changed, Primero is unable to predict the ultimate cost of compliance with such requirements. There is no assurance that environmental laws and regulations enacted in the future will not adversely affect the Primero's financial condition and results of operations. Primero is subject to potential risks and liabilities associated with environmental compliance and the disposal of waste rock and materials that could occur as a result of Primero's mineral exploration and production.

24.1.6 Permitting

Primero's operations are subject to receiving and maintaining permits (including environmental permits) from appropriate governmental authorities. Although Primero currently has all required permits for Black Fox mine operations as currently conducted, there is no assurance that delays will not occur in connection with obtaining all necessary renewals of such permits for the existing operations, additional permits for any possible future changes to operations, or additional permits associated with new legislation.

Furthermore, prior to any development on the Black Fox Complex, Primero must receive permits from appropriate governmental authorities. There can be no assurance that the Company will continue to hold or obtain, if required to, all permits necessary to develop or continue operating at the Black Fox Complex.

24.1.7 First Nations Considerations

Primero is committed to maintaining a positive, cooperative and mutually beneficial relationship with the local First Nations community and all of its neighbours in the community around the Black Fox Complex and mill. The local First Nations community comprises the Wahgoshig First Nations of Ontario ("Wahgoshig").

Brigus Gold recognized the Wahgoshig's unique cultural, developmental, educational, training and employment needs, land use, and environmental interests. On June 3, 2011, Brigus Gold signed an Impact Benefit Agreement ("IBA") with the Wahgoshig. The IBA provides a framework for how the parties work together during the construction, development and operations of the Black Fox Complex and mill.

Primero's current and future operations on the Black Fox Complex are subject to a risk that the local First Nations community may oppose continued operation, further development, or new development of Primero's projects or operations.

25 INTERPRETATION AND CONCLUSIONS

25.1 PROPERTY DESCRIPTION AND LOCATION

The Black Fox Complex is located 11 kilometres east of Matheson, Ontario, on Highway 101 East. The Black Fox open pit mine and the Black Fox mill have been in operation since May 2009 and commercial production from the underground mine commenced in October 2011.

The Black Fox Complex consists of one (1) block of land comprising thirty-two (32) parcels and twenty-two (22) mining titles for a total of 1,750.27 ha. Some parcels and mining titles are subject to royalties. All parcels and mining titles are either freehold mining lands (mining patents), a mining lease, or a licence of occupation. The Black Fox Complex is located in the Beatty and Hislop townships.

25.2 GEOLOGICAL SETTING AND MINERALIZATION

The Black Fox Complex lies within the Abitibi Subprovince (Abitibi Greenstone Belt) of the Archean Superior craton, in eastern Canada along the northern margin of the Destor-Porcupine Deformation Zone. The rocks in the Black Fox Complex are predominantly composed of metavolcanic rocks, metasedimentary rocks, and related intrusions.

Gold mineralization at the Black Fox Mine occurs in several different geological environments within the main ankerite alteration zone. This mineralized envelope occurs primarily within komatiitic ultramafics and lesser mafic volcanics within the outer boundaries of the Destor-Porcupine Deformation Zone. 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 mineralization observed on the Grey Fox deposit occurs in association with quartz-carbonate veins that are often sheeted and occur at shallow to moderate core axis angles in holes drilled from east to west with westerly azimuths, which is the dominant drilling direction. The veins in examined drill intersections form closely spaced sets 0.2 to 10 cm thick. Veins often have a complex, polygenerational history.

25.3 DEPOSIT TYPE

The Black Fox Complex is located with other gold deposits near the Destor-Porcupine Deformation Zone. The auriferous zones seem to be associated with an orogenic gold occurrence related to longitudinal shear zones (greenstone-hosted quartz-carbonate vein deposit). They correspond to structurally controlled, complex epigenetic deposits hosted in deformed metamorphosed terranes.

Although the gold zones of Grey Fox are readily integrated in an orogenic model, they could also be associated with a low sulphidation epithermal gold model. Extensional, pull-apart basins formed between regional strike-slip faults, or at transitions between these faults, provide favourable sites for intrusions and epithermal deposits.

25.4 DATA VERIFICATION

InnovExplo verified the assay certificates for most of the holes drilled during the 2012 and 2013 programs at both the Black Fox mine and the Grey Fox deposit.

25.4.1 Black Fox Mine

Although some errors remain in the database used for the Black Fox mine resource estimate, these are considered minor due to the nature of the errors and the percentage they represent over the entire database. InnovExplo considers the database for the Black Fox mine to be sufficiently valid and reliable for the purpose of this report.

That being said, InnovExplo believes that a thorough review of the entire Black Fox database is warranted. The emphasis should be on validating all drill hole locations and assay results.

Regarding QA/QC at the Black Fox mine, a total of 152 blanks (8.1% of the verified 1,871 blanks) from the October 2010 to September 2013 drilling programs failed to return gold values lower than ten times the detection limit. Many of these returned values significantly higher than the threshold (see Figs. 12.17 to 12.19). After performing an audit of the QA/QC protocols in September 2013, InnovExplo recommended several corrective measures. Consequently, only 7 blanks (1.05% of the 639 verified blanks) during the September to December 2013 drilling program exceeded the recommended threshold (see Figs. 12.24 to 12.26), representing a significant improvement.

Similarly, a total of 420 CRM samples (25% of the 1,955 CRMs) failed to return acceptable values from October 2010 to September 2013 at the Black Fox mine (see Table 12.2) and thus 25% of the batches warrant re-analysis, whereas only 11.04% of the batches for September to December 2013 drilling program warrant re-analysis (see Table 12.3). Although the percentage of failed values for CRM samples dropped from 25% to 11% since InnovExplo's verification of the QA/QC protocol in September 2013, there is still room for additional improvement.

InnovExplo recommends that all batches that failed, whether due to blank or standards, should be re-assayed in order to increase the confidence level in the database.

InnovExplo is of the opinion that the data verification process conducted for the purpose of this report identified numerous aspects that would warrant improvement. Despite the fact that some errors can still be found in the drill hole database, that whole core is being sampled which prevents certain validation procedures, and that uncertainties remain in the underground void distribution and drill hole surveys, InnovExplo considers the available data to be valid and of sufficient quality to be used for mineral resource estimation.

25.4.2 Grey Fox Deposit

InnovExplo considers the database for the Grey Fox deposit to be valid and reliable.

For the drilling programs from June 2013 to December 2013, only 2 blanks (0.11% of the 1,788 blanks) exceeded the recommended threshold (see Figs. 12.31 and 12.32). For the same period, a total of 10 CRM samples (0.58% of the 1,706 CRMs) failed to return acceptable values (see Table 12.4).

The coefficients of correlation for the original-duplicate pairs are 42.10% and 80.26% (see Figs. 12.33 and 12.34), which are considered quite low. However, in light of the excellent CRM results, it is thought that these low coefficients of correlation most likely reflect a strong nugget effect at the Grey Fox deposit.

InnovExplo is in the opinion that the sample preparation, analysis, QA/QC and security protocols used by Brigus Gold (now Primero) at the Grey Fox Deposit was adequate and that the database is well maintained. The database can be considered valid and of good quality for mineral resource estimation.

25.5 MINERAL PROCESSING AND METALLURGICAL TESTING

The Black Fox Mill has operated successfully, treating the Black Fox ore at consistent throughputs and recoveries. The process design is appropriate for treatment of the Grey Fox materials. Minor changes to the milling process are required to obtain optimum gold recovery and operating cost. The average design processing rate is 1890 tpd which was easily attained in previous operations with the plant. This rate is slightly lower than the throughput obtained with the Black Fox ore because the grinding work index of the Grey Fox material is higher. A 2300 t/d throughput might be achievable albeit at the cost of lowered gold recovery.

The metallurgical testwork was conclusive with the proposed throughput and flowsheet. The highlights of the testwork are the large variability in the cyanidation gold recovery and the hardness.

There is no new technical information that materially alters the validity of any previous work. Plant design concepts are reasonable and reflect typical, state-of-the-art, design concepts and application practices. The resultant sizing of major equipment items was reviewed Soutex, with no design issues identified. The equipment selection is based on generally accepted application principles and practices.

25.6 MINERAL RESOURCE ESTIMATES

The Mineral Resource estimates herein were performed by InnovExplo geologist Pierre-Luc Richard (P.Geo.) using all available results. The main objectives of InnovExplo’s work were to: 1) update the Black Fox Mine interpretation; 2) validate the updated Grey Fox interpretation; and 3) publish the results of an updated mineral resource estimate for the Black Fox Complex. The result of the study is two mineral resource estimates, one for the Black Fox mine and one for the Grey Fox deposit, comprising Indicated and Inferred Resources for an in-pit volume and a complementary underground volume, as well as a stockpile resource classified as Measured. These mineral resources are not mineral reserves as they have no demonstrable economic viability. The effective date of the mineral resource estimates is December 31, 2013.

The Mineral Resource statements presented in this technical report are estimates only and no assurance can be given that the anticipated tonnages and grades will be achieved or that the expected level of recovery will be realized. There are numerous uncertainties inherent in estimating mineral resources, including many factors beyond InnovExplo’s control. Mineral resource estimation is, inpart, a subjective process, and the accuracy of any mineral resource estimate is a function of the quantity and quality of available data, and of the assumptions and judgments made regarding the geological interpretation.

Due to the uncertainties attached to Inferred Mineral Resources, there is no assurance that continued exploration will demonstrate sufficient geological continuity to upgrade the Inferred resources to another category.

25.6.1 Black Fox Mine

InnovExplo produced a mineral resource estimate for the Black Fox mine that includes:

- An in-pit resource estimate, within the pit shell prepared by InnovExplo for the Fault Zone and the Life-of-mine pit design for the Main Envelope area ;
- An underground resource estimate, outside the pit shell;
- A stockpile resource as provided by Primero.

Based on the density of the processed data, the search ellipse criteria, and the specific interpolation parameters, the mineral resources can be classified as Indicated and Inferred. The stockpiles can be classified as Measured resources. The estimate follows CIM standards and guidelines for reporting mineral resources and reserves. A minimum mining width of 3 m (true width) and cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Black Fox mine has a Measured resource of 716,200 tonnes grading 1.07 g/t Au (24,706 ounces of gold), an Indicated resource of 3,992,800 tonnes grading 5.08 g/t Au (652,560 ounces of gold), and an Inferred resource of 690,400 tonnes grading 7.56 g/t Au (167,786 ounces of gold).

InnovExplo developed a new interpretation for the Black Fox mine using section and plan views. The interpretation defined twenty-three (23) mineralized zones enclosed within a gold-bearing envelope, and one (1) independent mineralized fault zone.

After conducting a detailed review of all pertinent information and completing the mineral resource estimation, InnovExplo concludes the following:

- The geological and grade continuities of the gold mineralized zones of the Black Fox Mine have been demonstrated;
- The Black Fox Mine contains at least twenty-four (24) continuous mineralized zones, including the mineralized fault zone;
- The lenses have strike lengths up to 630 m;
- Despite of the current drill spacing, geological continuity seems steady throughout the mineralized zones;
- The potential is high for upgrading Inferred Resources to Indicated Resources with additional diamond drilling in all zones;
- The potential is high for adding new resources in the fault zone extensions with additional diamond drilling;
- The potential is high for identifying new parallel zones with additional diamond drilling;
- Compiling and using assays from the mining operations (muck samples, channels, chip samples, etc), in parallel with improving the confidence in the underground void model and the drill hole and assay database, may upgrade more resources to the Measured category.

25.6.2 Grey Fox Deposit

InnovExplo produced a mineral resource estimate for the Grey Fox deposit that includes:

- An in-pit resource estimate, within the pit shell prepared by InnovExplo;
- An underground resource estimate, outside the pit shell;

Based on the density of the processed data, the search ellipse criteria, and the specific interpolation parameters, the author are of the opinion that the current mineral resources can be classified as Indicated and Inferred. The estimates follow CIM standards and guidelines for reporting mineral resources and reserves. A minimum mining width of 5 m (true width) and cut-off grades of 0.9 g/t (open pit potential) and 3.0 g/t Au (underground potential) were used in the resource estimation. InnovExplo estimates that the Grey Fox deposit has Indicated Resources of 5,276,300 tonnes grading 3.29 g/t Au (557,655 ounces of gold) and Inferred Resources of 1,551,600 tonnes grading 4.39 g/t Au (218,820 ounces of gold).

InnovExplo validated Primero's updated interpretation for the Grey Fox deposit using section and plan views. Thirteen (13) mineralized geological zones characterize the Grey Fox deposit.

After conducting a detailed review of all pertinent information and completing the present Mineral Resource Estimate, InnovExplo concludes the following:

- The geological and grade continuities of the gold mineralized zones of the Grey Fox deposit have been demonstrated;
- The deposit contains at least thirteen (13) continuous mineralized geological zones;
- The lenses have strike lengths up to 1,500 m;
- Despite the current drill spacing, geological continuity seems steady throughout the mineralized zones;
- The zones encountered at the Grey Fox deposit have significant possibility to expand at depth. The only limitations are the property boundary to the south and the regional fault to the northeast;
- The potential is high for upgrading Inferred resources to the Indicated category with additional diamond drilling in all of the zones;
- The potential is high for adding new resources to the extensions of known zones with additional diamond drilling;
- The potential is high for identifying new parallel zones with additional diamond drilling.

The reader should be aware that the pit shell used for the Grey Fox resource estimate extends slightly beyond the property limits in its southern portion. Although the entire resource lies within the property limits, some waste material outside the property limits will need to be removed to access some of the resource. Consequently, this portion of the pit may need to be re-examined in a future economic study.

25.7 MINERAL RESERVE ESTIMATE

The Black Fox Mineral Reserve estimate includes open pit, underground and stockpile reserves. Mineral Resources are converted to Mineral Reserves by applying mining cut-off grades, mining dilution, and mining recovery factors. All in situ resources are classified as Indicated or Inferred. Indicated Resources have been converted to Probable Reserves.

Mine cut-off grades of 1.0 and 3.4 g/t Au were used for open pit and underground reserve estimates respectively. The calculated breakeven open pit cut-off grade is 0.9 g/t Au, but Primero has used a slightly higher operational cut-off. The parameters used for calculating the cut-off grade grades are summarized in Table 25.1.

Table 25.1 – Cut-off grade calculation parameters

Parameter	Units	Value
Underground Mining Cost	CAD per tonne	$98.95
Open Pit Mining Cost	CAD per tonne	$3.14
Processing Cost	CAD per tonne	$26.81
G&A Cost	CAD per tonne	$11.86
Gold Metallurgical Recovery	Percent	94%
Gold Price	USD per ounce	$1,250.00
Exchange Rate	CAD/USD	0.9

Black Fox Mineral Reserves have been estimated as per Table 25.2 below.

Table 25.2 – Summary of Estimated Mineral Reserves as at 31 December 2013

Black Fox	Proven Reserves			Probable Reserves			Proven and Probable Reserves		
	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)	Tonnes (t)	Gold Grade (g/t)	Gold (oz)
Open Pit	0	0	0	1,468,500	3.7	173,900	1,468,500	3.7	173,900
Underground	0	0	0	1,663,900	6.3	339,100	1,663,900	6.3	339,100
Stockpile	716,200	1.1	24,700	0	0	0	716,200	1.1	24,700
Total	716,200	1.1	24,700	3,132,500	5.1	513,000	3,848,700	4.3	537,700

The previous Black Fox Mineral Reserve Estimate was presented in the Black Fox Technical Report issued in January 2011. Since then, reserves have been estimated by depleting the 2011 Reserves with production tonnes and grade. The Mineral Reserve Estimate outlined in this report has been developed from an updated resource block model using updated mining shapes. Changes to the mineral resources have had the greatest impact on the reserve estimate, but the change in mining method, increase in cut-off grade, and different reserve estimation methodology have also contributed to the difference in reserve estimates.

25.8 MINING METHODS

The Black Fox gold mine includes an open pit and an underground mine. Total mill throughput in 2013 was approximately 753,000 tonnes (2,063 tonnes per day), of which 297,000 tonnes (39%) were mined from the underground operation.

Open pit mining is conducted using a conventional truck-and-shovel mining method. Underground mining uses three predominant mining methods, longhole stoping, cut-and-fill and shrinkage stoping. The mining method is selected based on the geometry of the orebody. Ground conditions and the stability of the hanging wall are also taken into consideration when selecting a mining method.

Longhole stopes are mined both longitudinal and transverse, with the latter being applied to ore widths greater than 10 m. Development waste is used for backfill where possible, however cemented backfill is used where adjacent stopes are planned, to minimize dilution and maximize ore recovery.

25.9 RECOVERY METHODS

The Black Fox Mill has operated successfully, treating the Black Fox ore at consistent throughputs and recoveries. The proposed changing of the crushing circuit is expected to increase the Black Fox Mill existing capacity from 2200 tpd to 2300 tpd and the peak capacity to 2500 tpd. As the crushing circuit represents the current main bottleneck in production capacity, no changes to the Black Fox Mill process is required.

25.10 PROJECT INFRASTRUCTURE

Project infrastructure for the mine consists of supports services, health and safety considerations, surface facilities, tailings storage and water management.

The infrastructure provides essential services and facilities that are required for the mine to operate and follow all laws and regulations. Services such as compressed air, electrical systems and communications are necessary to operate the mine. Facilities such as water treatment ponds, explosives storage and refuges stations are necessary to ensure that the Black Fox mine adheres to all laws and regulations.

25.11 CAPITAL AND OPERATING COSTS

The budgeted capital expenditures for Black Fox for 2014 is $47,479,000.

The 2014 Budget in unit cost terms by major cost centre is shown in Table 25.3.

Table 25.3 – Unit budget by cost centre

Cost Center	Cost / Tonnes
Underground	$98.95
Open Pit	$3.09
Milling	$24.88
G&A	$11.54

25.12 ECONOMIC ANALYSIS

Primero, being a producing issuer, is not required to include information under Item 22. There is currently no plan to expand the current Black Fox mine production of 2,300 tpd.

25.13 RISKS AND OPPORTUNITIES

Table 25.1 summarizes risks identified on the Project while Table 25.2 summarizes opportunities.

Table 25.1 – Risks on the Black Fox Complex

RISK	POTENTIAL IMPACT	POSSIBLE RISK MITIGATION
QA/QC program (certified standards)	Possibility that portions of the assays currently included in the database are not as sound as expected.	Perform re-assays in an independent laboratory on all certified standard samples that failed to return acceptable results. Depending on the new results, this may lead to a re-assay program for batches of samples that contained the failed standards.
QA/QC program (blanks and duplicates)	Possibility that portions of the assays currently included in the database are not as sound as expected.	Perform re-assays in an independent laboratory on all samples in a batch for which the blank and/or the duplicate failed to return acceptable results.
Uncertainties regarding underground mined-out areas	Possibility that an unknown number of mined-out historical drifts and stopes are not included in the current database.	Perform a compilation of all historical reports, plans, sections and longitudinal views, and drill certain areas to confirm the absence of voids.
Uncertainties regarding drill hole collar and downhole surveys	Possibility that an unknown number of drill holes currently have erroneous locations, azimuths and/or dips.	Perform a re-survey program for a large number of underground and surface holes in order to confirm or correct the database.
Reconciliation impossible to assess	Not being able to conduct a reconciliation study on the project limits efforts to validate the current block model and do not allow for improvements.	Develop a sampling program at all stages of production and at the mill in order to produce a stope-by-stope reconciliation report.
Ground failures	Possibility that new ground failures in the pit wall will occur or that earlier ground failures will continue to grow.	Monitor ground stability throughout the mine site.
Metallurgical recoveries at the Grey Fox deposit	The metallurgical recoveries in this study are based on numerous tests but the actual recoveries may vary. A drop in recoveries would have a direct impact on project economics.	Continued testwork and plant optimization will improve the metallurgical recoveries.
Metallurgical recoveries at the Black Fox mine	Possibility that the recovery is lower than the historical recoveries in new areas. No testwork has been performed on material from the zone identified by exploration drilling. A drop in recoveries or plant throughput would have a direct impact on project economics.	Ore hardness and cyanidation testwork will need to be performed on exploration samples.
Lack of long hole stopes	The amount of areas suitable for long hole stoping may not be enough to sustain the production rate from the underground in the short term.	Locations suitable for conventional mining techniques should be exploited to augment the production rate from underground.
Block model interpretation	Due to the highly variable characteristics of the ore body, the accuracy of the block model may not be reliable enough to use for production planning purposes.	A definition drilling program in conjunction with the block model should be used for production planning purposes.
Price of gold	It is impossible to confirm the future price of gold. A prolonged drop in the price of gold may have a negative impact on the Project.	Managing operating costs will help deal with any fluctuations in future gold prices.

Table 25.2 – Opportunities on the Black Fox Complex

OPPORTUNITIES	EXPLANATION	POTENTIAL BENEFIT
Muck and channel samples	Muck and channel samples are not taken into account in the current model because they cannot be adequately compiled. Adding muck and channel samples to the model could increase confidence in the resource and upgrade part of it to the measured category.	Adding measured resources increases the economic value of the mining project.
Main envelope open at depth	Additional resources could be discovered at depth along the strike of the main envelope.	Adding resources increases the economic value of the mining project and potentially its mining life.
Fault Zone open in all directions	Additional resources could be discovered within the Fault Zone, especially where it reaches the main envelope.	Adding resources increases the economic value of the mining project and potentially its mining life.
Price of gold	It is impossible to confirm the future price of gold.	A prolonged gain in the price of gold may have a positive impact on the Project.

26 RECOMMENDATIONS

26.1 RECOMMENDATIONS FROM INNOVEXPLO

InnovExplo believes the Black Fox interpretation would benefit from a more detailed lithological and structural interpretation. Also, recent base metal values encountered in the gold-mineralized Fault Zone should be further investigated. The current interpretation of the Grey Fox deposit should be better defined. A broad lithological approach has been used thus far, but the confidence level would be greatly improved if a zone-by-zone approach was developed.

Considering the good potential for upgrading Inferred resources to Indicated through additional diamond drilling, the author recommend additional in-fill drilling. Also, the mineralized zones encountered at the Black Fox and Grey Fox deposits have significant potential for expansion at depth and the potential is high for adding new underground resources.

The ground east of the Grey Fox deposit is currently classified as country rock. No resource has been estimated in these country rocks, but numerous significant gold intervals were encountered during historical drilling programs. Additional exploration drilling is therefore warranted.

Following in-fill and at-depth drilling programs at the Grey Fox deposit, InnovExplo recommends a prefeasibility study to determine the potential economic viability of the mineral resources. Both open pit and underground scenarios should be evaluated under the same model for the Grey Fox deposit.

Based on the current interpretation of the Black Fox and Grey Fox deposits, the author believe that, given the geological setting of the property, there is a reasonable likelihood of identifying new mineralized zones. A comprehensive compilation of historical work over the entire property is recommended to fully understand the relationship between faults, shear zones and gold mineralization. Geophysical surveys may be needed depending on the results of the property-scale compilation. A property-scale drilling program should then be performed to assess the full economic potential of the Black Fox property.

Going forward, InnovExplo is of the opinion that the sample preparation, analysis, QA/QC and security protocols used by Brigus Gold (now Primero) for the Black Fox mine could be greatly improved. The protocols in use at the Grey Fox deposit are in accordance with industry standards and could be implemented at the Black Fox mine.

The author also recommend that efforts be directed at resolving issues with the assay database, QA/QC protocols, drill hole surveys, and missing historical information in the Black Fox database.

InnovExplo is of the opinion that the character of the Black Fox property is of sufficient merit to justify the recommended program described below. The program is divided into two (2) phases. Expenditures for Phase I of the work program are estimated at C$22,137,500 (including 15% for contingencies). Expenditures for Phase II of the work program are estimated at C$2,213,750 (including 15% for contingencies). The grand total is C$24,351,250 (including 15% for contingencies). Phase II of the program is contingent upon the success of Phase I.

Phase 1 – Economic studies, drilling program and compilation

Phase 1a) Engineering Studies on the Grey Fox Deposit

InnovExplo recommends a prefeasibility study for evaluating the economics of both the Open-Pit and Underground mining scenarios. Additional metallurgical testing is warranted to better understand recovery throughout the deposit and in the Grey Fox South area where no metallurgical testing has ever been conducted. A lithological approach should be considered and treated independently. Rock mechanics studies should also be initiated in order to provide adequate data for economic studies. In light of such studies, reserves could be established and a mine plan produced.

Phase 1b) In-fill Drilling on the Black Fox and Grey Fox Deposits

InnovExplo recommends further definition drilling to upgrade Inferred resources to the Indicated category within the Fault Zone on the Black Fox mine. Additionally, delineation drilling should be drilled on the Grey Fox deposit.

Phase 1c) Drilling Extensions of the Mineralized Zones

InnovExplo recommends further exploration drilling on the Black Fox deposit to increase Inferred resources. More specifically, the program should target the already identified ore shoots at depth. The intersection of the main mineralized envelope and the Fault Zone has never been drilled. InnovExplo is of the opinion that this area should be a priority. Exploration drifts may be warranted to reach some targets.

Phase 1d) QA/QC Program and Historical Compilation on the Black Fox Mine

A thorough QA/QC program should be established for the Black Fox deposit in order to reduce the QA/QC failure percentage. A significant amount of assayed core would need to be re-assayed. Additionally, efforts should be made to increase the confidence of drill hole surveys and to locate all missing historical underground information. An emphasis should be placed on recovering missing drifts and stopes, and also on compiling all channel, muck and chip samples. Efforts should also be deployed to model lithologies and assign more realistic densities rather than using the fixed value of 2.84 g/cm^3 that is currently being applied to all rocks throughout the deposit. Such a compilation could lead to establishing measured resources from the underground block model.

Phase 1e) Property-scale Compilation Work and Target Generation

Based on the current interpretation of the Black Fox and Grey Fox deposits, the author believe that there is a reasonable likelihood of identifying new mineralized zones given the geological setting of the property. A comprehensive compilation of all historical work should be undertaken in order to potentially provide new insights and targets on the property. Based on such a compilation, property-scale exploration programs such as geophysical surveys could be recommended. The main objectives of such studies should be to: 1) better understand the gold distribution of already known showings; and 2) establish new targets on the property.

Phase 2 – Property-scale drilling program and resource estimate update on the Black Fox deposit

Phase 2a) Resource Estimate Update on the Black Fox and Grey Fox Deposits

Based on the results of Phase 1, InnovExplo recommends producing a resource estimate update following Phase 1 and updating the economic studies to refine the potential economic viability of the mineral resource. Both open pit and underground scenarios should be evaluated within the same model for both the Black Fox and Grey Fox deposits.

Phase 2b) Property-scale Drilling Program

InnovExplo recommends further exploration drilling on the Black Fox Complex. The targets will need to be determined after completing Phase 1. A provision has been included in this budget, but will need to be adjusted based on the results of Phase 1.

Table 26.1 – Budget estimate for the Phase I and II work programs

	Phase 1 - Work Program **Drilling programs, QA/QC program and property-scale compilation**	**Budget**	
		Description	**Cost**
1a	Engineering studies on the Grey Fox deposit		$ 200,000
1b	In-fill drilling on the Black Fox and Grey Fox deposits	34,000 m	$ 4,500,000
1c	Exploration drilling on the Black Fox and Grey Fox deposits	90,000 m	$ 11,700,000
1c	Exploration drifting on the Black Fox deposit	620 m	$ 2,500,000
1d	QAQC program and historical compilation on the Black Fox mine		$ 150,000
1e	Property-scale compilation work and target generation		$ 200,000
	Contingencies (~ 15%)		$ 2,887,500
	Phase 1 subtotal		**C$ 22,137,500**

	Phase 2 - Work Program **Property-scale drilling program and updated studies**	**Budget**	
		Description	**Cost**
2a	Resource estimate update and economic studies on the Black Fox and Grey Fox deposits		$ 300,000
2b	Property-scale drilling program	12,500 m	$ 1,625,000
	Contingencies (~ 15%)		$ 288,750
	Phase 2 Subtotal		**C$ 2,213,750**

TOTAL (Phase 1 and Phase 2) **C$ 24,351,250**

26.2 RECOMMENDATIONS FOR BLACK FOX

Historically, Black Fox has relied on longhole stopes for the majority of the production as they have a higher productivity than cut and fill or conventional mining. With the current ore blocks outlined in the resources, it is apparent that areas suitable for longhole stopes are not as abundant as in the past. It will be important for Black Fox to not only focus on longhole stopes but also on alternative mining methods, such as conventional mining, to ensure that the production targets from the underground can be met.

Generally, block models of the Black Fox ore body have had limited success in predicting mining areas with the necessary detail that is need to generate a mining plan and designs. To achieve the necessary detail, a methodical definition drilling program needs to be used in conjunction with the block model to ensure that plans and designs are developed using solid information.

The future price of gold is variable and is an unknown. Although Black Fox cannot control the price of gold, Black Fox can control their production costs. It is recommended that a cost control program be implemented that focuses on promoting a cost control culture among employees. A cost control culture would help Black Fox be better suited to deal with any prolonged downturns in the price of gold.

26.3 SOUTEX'S RECOMMENDATIONS

26.3.1 Metallurgical Testing (Grey Fox Deposit)

Soutex recommends conducting additional testwork along with mineralogical analyses to investigate the large variability obtained in the whole sample cyanidation tests and to confirm the gold recovery.

Additional testwork is also recommended to confirm the hardness. The mineralogical analysis shows the presence of micas that may introduce a bias in the Bond ball mill work index results since the test is conducted using a screen to classify the material while hydrocyclones are used in the plant. The mica will have a different behavior in each classification unit due to its flaky nature. Testing should be done to confirm the relationship between the P80 and the gold recovery to evaluate the optimal plant throughput.

An estimated C$200,000 is required to pursue the recommended testwork programs. It is assumed this program will use the remaining core sample from the 2012/13 drilling programs.

26.3.2 Metallurgical Testing (Black Fox Mine)

Soutex recommends conducting additional testwork on material from the Black Fox mine. The testwork should include cyanidation tests to confirm the gold recovery as well as tests to confirm the hardness.

An estimated C$200,000 is required to pursue the recommended testwork programs.

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APPENDIX I

UNITS, CONVERSION FACTOR, ABBREVIATION

Units

Units in this report are metric unless otherwise specified. Precious metal content is reported in gram of metal per metric ton (g/t Au or Ag) except otherwise stated. Tonnage figures are dry metric tons unless otherwise stated. The ounces are in Troy ounces.

Abbreviation used

°C	Degrees Celsius	oz	Troy ounces
g	Grams	oz/t	Ounces per short tons
ha	Hectares	g/t	Grams per metric tons
kg	Kilograms	ppb	Part per billion
km	Kilometres	ppm	Part per million
masl	Metres above sea level	st	Short tons
mm	Millimetres	t	Metric tons
’	Feet		

Conversion factors for measurements

Imperial Unit	Multiplied by	Metric Unit
1 inch	25.4	mm
1 foot	0.3048	m
1 acre	0.405	ha
1 ounce (troy)	31.10348	g
1 pound (avdp)	0.454	kg
1 ton (short)	0.907	t
1 ounce (troy) / t (short)	34.286	g/t