MINE DEVELOPMENT ASSOCIATES
A DIVISION OF RESPEC

RESPEC

# Updated Technical Report and Resource Estimate for the Black Pine Gold Project, Cassia County, Idaho, USA

**Submitted to:**

Libertygold
The Science of Discovery©

Suite 1900, 1055 West Hastings
Vancouver, B.C., Canada V6E 2E9
Telephone: 604-632-4677


**Authors:**
Michael M. Gustin, C.P.G.
Gary L. Simmons, M.M.S.A.
Moira T. Smith, Ph.D., P.Geo.



775-856-5700
210 S Rock Blvd
Reno, NV 89502
www.mda.com



Report Date: August 18, 2021
Effective Date: June 20, 2021

MINE DEVELOPMENT ASSOCIATES
A DIVISION OF RESPEC

## CONTENTS

# TABLES

## FIGURES

## 1.0 SUMMARY (ITEM 1)

Mine Development Associates, a division of RESPEC ("MDA") has prepared this technical report on the Black Pine gold project in Cassia and Oneida counties, Idaho, for Liberty Gold Corp. ("Liberty Gold"), which is listed on the Toronto Stock Exchange (LGD). This report, with an Effective Date of June 20, 2021, has been prepared in accordance with the disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101 ("NI 43-101"), Companion Policy 43-101CP, and Form 43-101F1, as amended. The report includes the first resource estimate for the Black Pine gold project prepared in accordance with NI 43-101 guidelines.

## 1.1 Property Description and Ownership

The Black Pine property consists of a largely contiguous block of 603 unpatented federal lode mining claims within Cassia and Oneida counties, Idaho that occupy a combined area of 4,777 hectares. The approximate geographic center of the property is 42.082°N latitude and 113.047°W longitude. Annual claim-maintenance fees are the only federal payments related to unpatented mining claims, and these fees have been paid in full through September 1, 2021. County recording fees are also required annually. Liberty Gold's annual claim holding costs are estimated to be $US 106,829 in 2021.

Liberty Gold is the 100% owner of the Black Pine property, having purchased 345 of the unpatented claims from Western Pacific Resources Corp. ("Western Pacific") through an agreement dated June 15, 2016. Under this agreement Western Pacific received $800,000 in cash, a 0.5% net smelter royalty ("NSR") on production from the 345 unpatented claims, and 300,000 common shares of Liberty Gold. Western Pacific subsequently assigned the 0.5% NSR to Deer Trail Mining Company, LLC. Liberty gold expanded the property by staking 55 unpatented claims in October 2016, 2 claims in 2018, 293 claims in 2020, for a total of 603 claims. Mineral production from the entire property is subject to the Idaho Mine License Tax, equivalent to 1.0% of "ores mined or extracted and royalties received from mining".

According to its environmental experts, Liberty Gold is liable only for disturbance incurred as part of Liberty Gold's exploration activities, or if Liberty Gold causes disturbance to the historical leach pad or other designated areas.

## 1.2 Exploration and Mining History

Numerous prospects and small mines in the Black Pine Mountains exploited base- and precious-metal deposits commencing in the late 1800s and extending into the early 1900s, when minor amounts of zinc, silver, and mercury were produced. Gold was discovered in the late 1930s or early 1940s at the Tallman mercury mine, located within the current Black Pine project, and a small open pit was operated at Tallman from 1949 to 1955 with total production reported to be 109,000 tonnes with an average gold grade of 5.14 g Au/t.

From 1963 through mid-1990, Newmont Mining, Kerr Addison Mines Ltd, Gold Resources Inc. ("Gold Resources"), Permian Exploration Account, ASARCO, Pioneer Nuclear Inc., Pegasus Gold Corp. ("Pegasus"), Inspiration Resource Corp., and Noranda Exploration, Inc. ("Noranda") explored various portions of the Black Pine property. During this period, extensive soil-sample geochemical grids were completed and a total of 66,731 metres are known to have been drilled in 775 drill holes. Approximately 99% of the historical holes and metres drilled were completed using reverse-circulation ("RC") and, for some uncertain but small number of holes, conventional-rotary methods. A total of 8 of the holes were drilled using diamond-core ("core") methods, and some uncertain, but small, number of holes were drilled using.

In 1986 through 1989, Noranda completed 536 of the holes mentioned above and discovered and delineated several zones of disseminated, sedimentary-rock-hosted gold mineralization. Noranda then produced a feasibility study in 1990 prior to selling the property to Pegasus in June 1990. Pegasus put the property into production in late 1991 as an open-pit run-of-mine ("ROM") heap-leach operation that closed in 1997. During this period, Pegasus also drilled 1,080 RC holes and 18 core holes, for an aggregate total of 117,601 metres.

Approximately 26.5 million tonnes of waste rock and 31 million tonnes of ore were mined by Pegasus between 1991 and 1997, with 434,800 ounces of gold produced at an average gold recovery of 65%. The heap-leach pad was rinsed and reclaimed after production ceased.

The property was idle from 1999 to 2009. Western Pacific acquired the property by staking in 2009, carried out geophysical surveys, and drilled 35 RC holes for a total of 7,217 metres prior to vending the property to Liberty Gold in 2016.

Since acquiring the project, Liberty Gold has undertaken extensive data compilation and analysis, and has collected and analyzed 454 surface rock-chip samples. In addition, the project resource database includes 275 holes drilled by Liberty Gold, consisting of 259 RC holes for 68,697 metres, and 16 core holes for 3,604 metres.

## 1.3 Geology and Mineralization

As presently understood, the Black Pine property geology is comprised of a lower structural plate that includes the Devonian Jefferson Formation and Mississippian Manning Canyon Shale, a middle plate characterized by Pennsylvanian carbonate rocks of the Oquirrh Group, and an upper plate predominantly consisting of Permian siltstones and sandstones of the Oquirrh Group. Lithologic contacts within the lower plate are sheared and brecciated, and middle plate units are complexly structurally interleaved. Middle plate strata are considerably more deformed than strata in the upper and lower plates.

The middle plate, which hosts the gold mineralization of interest, has a structural thickness ranging from approximately 200 to 400 metres. At least two major deformational events are evident, manifested by Mesozoic thrust faults and tight to open folds, overprinted by Cenozoic, low- to high-angle normal faults.

Gold is distributed throughout the middle structural plate, with higher-grade mineralization occurring within favorable stratigraphic units, such as calcareous siltstones, as well as in and adjacent to breccia bodies and along variously orientated low- to high-angle brittle faults.

The Black Pine gold mineralization can be best classified as sedimentary rock-hosted, Carlin-style mineralization. Deposits of this type are characterized by finely disseminated gold that occurs primarily in silty, calcareous, and sometimes carbonaceous marine sedimentary rocks.

Three-dimensional modeling by Liberty Gold, utilizing surface mapping and drill data, envisions a relatively flat fault separating the lower and middle plates, with a structurally thickened middle plate centered on the outcropping area of mineralization and diminishing in thickness to the north and south. The distribution of higher-grade gold mineralization is controlled to a large extent by favourable stratigraphy as well as a series of north- to northwest-striking listric normal faults that bound the east side of an overthickened zone of massive limestone and dolostone.

## 1.4 Drilling

### 1.4.1 Liberty Gold Drilling

Liberty Gold carried out drilling activities in 2017, 2019 and 2020. The primary goals of the initial, 14-hole RC drilling program were to validate drilling carried out by previous operators and to familiarize Liberty Gold with both mineralized and unmineralized rock.

Drilling in 2019, which included 85 RC and six core holes, targeted the area between the historical B Pit, A Pit and A Basin target, where relatively high-grade mineralization remained in the highwalls of the pits and at surface in A Basin, and shallow historical drilling in the intervening area suggested that additional mineralization might lie at greater depth. Liberty Gold's drilling led to the discovery of two significant zones of oxidized gold mineralization: the Discovery 1 ("D-1") zone, a moderately northeast dipping zone in the hanging wall of a listric fault; and the Discovery 2 ("D-2") zone, extending northeastward from the D-1 zone toward the highwall of the A Pit. Highlight drill intercepts are 10s of m long and exceed 1 g Au/t. The core holes were designed to obtain materials for metallurgical testing.

Drilling in 2020 extended the D-1 zone, now recognized as mineralization in the hanging wall of a listric normal fault, to the northeast to the Tallman Extension Pit, and several hundred metres northwest of A Basin, for a total length of approximately 2 kilometres. Drilling to the west of the D-1 zone led to the discovery of the Discovery 3 ("D-3") zone, a steeply to moderately east dipping lens of mineralization in the hanging wall of a north-striking listric normal fault, which merges with the D-1 zone near A Basin. The resource database includes 160 RC holes and 10 core holes drilled in 2020. The core holes were again primarily drilled to supply metallurgical samples for testing.

The D-1, D-2 and D-3 zones lie in close proximity, separated by variably low-grade mineralization rock, and are collectively referred to as the Discovery Zone. Collectively, they form the largest zone of gold mineralization identified on the property to date.

### 1.4.2 Discussion

The overwhelming majority of sample intervals in the Black Pine resource database have a down-hole length of 1.52 metres (five feet), and sample intervals with lengths in excess of 3.05 metres were excluded from use in the resource grade estimation. The remaining sample lengths are appropriate for the style of the Black Pine mineralization.

The mineralization at Black Pine is predominated by gently dipping zones that mimic stratigraphic and low-angle and structural controls, and the drill holes cut these zones at high to moderate angles. There are a relatively few cases where holes cut mineralization at acute angles, however, and thereby generate down-hole lengths that can significantly exceed true thicknesses. This effect is entirely mitigated by the explicit modeling techniques employed in the estimation of the project resources.

No evidence of down-hole contamination in the RC or conventional-rotary holes drilled at Black Pine has been found. This is not surprising in light of the fact that the exploration holes have not intersected the groundwater table. This, in combination with the generally shallow down-hole depths of the historical holes and the use of center-return bits in Liberty Gold RC holes, has served to mitigate potential contamination issues.

Mr. Gustin is unaware of any sampling or sample-recovery factors that materially impact the accuracy and reliability of the drill-hole data, and he believes that the drill samples are of sufficient quality for the purposes used in this report.

## 1.5 Drill-Hole Sampling, Sample Preparation, Analysis and Security

While documentation is not complete, all of the historical operators were reputable, well-known mining/exploration companies, and the independent laboratories used to analyze the drill samples of the historical operators prior to the historical open-pit mining operation at the Black Pine project were also widely known and commonly used by the exploration and mining industry at the time. There is ample evidence that these companies and their chosen commercial laboratories followed accepted industry practices with respect to sample preparation, analytical procedures, and security.

The Pegasus drill samples generated during the historical mining operations, which comprise approximately half of the Black Pine resource database, were analyzed at their on-site laboratory. A small percentage of the analytical results in the resource database were derived from cyanide-leach analyses, which are usually partial gold determinations.

While documentation is incomplete for the methods and procedures used for historical sample preparation, analyses, and sample security, as well as for the QA/QC procedures and results, it is important to note that the historical sample data were used to develop a successful commercial mining operation that produced more than 400,000 ounces of gold.

The sample preparation, analysis, and security protocols of Liberty Gold, as well as their QA/QC program, were consistent with current industry norms, and no material issues were identified by their QA/QC results.

## 1.6 Data Verification

The historical drill-hole data have undergone extensive verification by both Liberty Gold and Mr. Gustin. This verification included checking of the database values using historical records, detailed evaluations inherent in the explicit modeling methods employed in the estimation of the current project resources, and statistical analyses.

The resource estimation was guided in a significant extent by Liberty Gold's lithological and structural (geological) models. Mr. Gustin is of the opinion that Liberty Gold's geological model is of high quality and provided the critical geological support that was required to support the estimation of the project resources.

Mr. Gustin believes the Black Pine data as a whole are acceptable for the purposes used in this report.

## 1.7 Metallurgical Testing and Mineral Processing

### 1.7.1 Historical Metallurgical Testing (1974-1988)

A significant number of historical reports that document metallurgical testing completed prior to the historical mining operations that began in 1991 were reviewed. Production records from the Pegasus operation indicate that the average gold recovery by ROM heap leaching from 1991 through 1998 was 64.1%. The highest annual average recovery reported was 80% in 1993, and the lowest was 54% in 1994.

### 1.7.2 Liberty Gold Testing (2018-2021)

Liberty Gold initiated metallurgical testing in 2019. Two metallurgical test programs were subsequently completed and a third is in progress. These programs include:

1. 2019 Bulk Sample Program – six backhoe bulk samples were excavated from five historic Pegasus Gold open pits and one surface resource area. The samples underwent geo-metallurgical characterization and bottle-roll and column-leach testing.

2. 2019 Large-diameter PQ Core Program (Phase 1) – Liberty gold drilled six large-diameter PQ core holes in the Discovery and Rangefront zones in late 2019. A total of 29 metallurgical composites were selected for geo-metallurgical characterization and bottle-roll and column-leach testing. Select samples were analyzed using the modified SMC comminution test procedure and Bond Abrasion (Ai) testing. Load-permeability testing and environmental characterization were also performed.

3. 2020 Large-diameter PQ Core Program (Phase 2) – In late 2020, Liberty Gold drilled nine additional PQ core holes in the Discovery and CD zones. A total of 44 metallurgical composites were selected for a testing program similar to that described in item 2 above. This work is ongoing.

Metallurgical characterization identified the following lithologic units as potential unique metallurgical recovery domains, where the numbers in parentheses indicate the number of samples that have been tested.

- PPos – sandstone, quartzite and siltstones (2)
- Pola – limestone and sandy limestone (8)
- Polb – siltstone, sandy limestone and dolomite (8)
- Polc – siltstone, limestone, sandstone and dolomite (20)
- Pold – limestone, dolomite, sandstone and quartzite (3)
- Pols – limestone, sandstone and quartzite (2)
- PMmc – shale, limestone and quartzite (0 – lower plate, underlies most gold mineralization)

Preliminary recovery equations have been assigned to each of the metallurgical zones, with recoveries varying by grade in addition to lithology. As more drilling and testing is conducted, it is expected that additional zones may be identified and/or some of the metallurgical domains may combine.

Mr. Simmons believes that samples tested are sufficiently representative to support the conclusions summarized herein. Metallurgical testing is ongoing and is designed in part to continue to evaluate all types and styles of mineralization.

## 1.8 Resource Estimate

The gold resources at the Black Pine project were modeled and estimated by:

- evaluating the drill data statistically;
- developing a geological model reflecting low-angle fault control of mineralization hosted in receptive carbonate host rocks;
- utilizing the geological model as the base for interpreting gold mineral domains on a set of 315°-looking cross sections spaced at 30-metre intervals
- projecting the sectional mineral-domain polygons horizontally to the drill data within each sectional window;
- slicing the projected mineral-domain polygons along 10-metre-spaced vertical planes oriented perpendicular to the cross sections, and using these slices to recreate and rectify the gold mineral-domain polygons on the 10-metre long-section planes
- coding a block model comprised of 10 x 10 x 5-metre blocks to the mineral domains using the long-sectional mineral-domain polygons;
- analyzing the modeled mineralization geostatistically to aid in the establishment of estimation and classification parameters; and
- interpolating gold grades into the model blocks using the gold-domain coding to explicitly constrain the estimation.

The Black Pine project mineral resources have been estimated to reflect potential open-pit extraction and potential processing by heap leaching. A pit optimization was completed to constrain the resources using the parameters summarized in Table 1.1. Gold recoveries applied to the optimization utilize the recovery equations discussed in Section 1.7.2.

**Table 1.1 Pit Optimization Cost Parameters**

| Parameter | Value Used | Unit |
|---|---|---|
| Mining Cost | $ 2.30 | $/tonne mined |
| Heap Leach Processing | $ 2.55 | $/tonne processed |
| Mill / Agitated Leach Processing | $ | $/tonne processed |
| G&A Cost | $ 8,000 | $1,000s/year |
| Processing Rate | 10,000 | 1,000s tonnes-per-year |
| G&A Cost | $ 0.80 | $/tonne processed |
| Gold Price | $ 1,800 | $/oz produced |
| Gold Refining Cost | $ 5.00 | $/oz produced |
| Royalty | 0.5% | NSR |

The in-pit resources were further constrained by the application of a cutoff of 0.2 g Au/t to all model blocks lying within the optimized pit shells. The portions of blocks coded as containing carbonaceous material were excluded from the resources.

The Black Pine project resources are summarized in Table 1.2. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

**Table 1.2 Black Pine Project Gold Resources**

| Classification | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| Indicated | 105,075,000 | 0.51 | 1,715,000 |
| Inferred | 31,211,000 | 0.37 | 370,000 |

1. Mineral Resources are comprised of all model blocks at a 0.2 g Au/t cutoff that lie within optimized resource pits, excluding material modelled as carbonaceous.
2. The Effective Date of the resource estimations is May 1, 2021.
3. Mineral resources that are not mineral reserves do not have demonstrated economic viability.
4. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
5. Rounding as required by reporting guidelines may result in apparent discrepancies between tonnes, grade, and contained gold content.

The Black Pine resources were classified on the basis of the number and distance of composites used in the interpolation of a block gold grade, as well as the number of holes that contributed composites to the interpolation (Table 14.10).

Although the authors are not experts with respect to any of the following aspects of the project, they are not aware of any unusual environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors not discussed in this report that could materially affect the potential development of the Black Pine project mineral resources as of the Effective Date of the report.

## 1.9 Conclusions and Recommendations

The Black Pine project data is considered to be acceptable for use in the estimation of the project mineral resources, and the authors are unaware of any significant risks or uncertainties that could be expected to affect the reliability of the estimated resources.

Significant opportunities for resource expansion exist, including a number of undrilled, sparsely drilled, or shallowly drilled areas that surround the historical pits and lie within soil anomalies that extend beyond the mined areas. Significant additional investment is warranted at the project.

A US $12,630,000 Phase 1 work program is recommended that includes the completion of a preliminary economic assessment based on the current project resources, further RC and core drilling, and a resource update. This drilling should focus on upgrading inferred portions of the current resources to indicated, step-out drilling along the margins of defined zones of mineralization, and testing of existing targets. Funds for the procurement of water and private land, as well as for furthering environmental permitting and continuing metallurgical testing, are also included in the Phase I program.

Subject to sufficiently positive Phase I results, a Phase II program totaling US $14,380,000 is recommended. The Phase II program would allow for continued exploration and resource-definition drilling, metallurgical testing, permitting activities, and procurement of water rights. Phase II work would culminate in the completion of a prefeasibility study.

The costs of the recommended programs are detailed in Table 1.3.

### Table 1.3 Recommended Black Pine Project Budget

(costs established in concert with Liberty Gold)

| Item | Phase I | Phase II |
|---|---|---|
| RC and Core Drilling (incl. access roads, drill pads, consumables, *etc*.) | $7,000,000 | $5,000,000 |
| Assaying and Geochemistry | $1,400,000 | $1,200,000 |
| Geology; Soil and Rock Sampling | $50,000 | $50,000 |
| Direct Salaries and Expenses | $1,500,000 | $2,000,000 |
| Land Holding Costs | $160,000 | $160,000 |
| Permitting and Environmental | $200,000 | $400,000 |
| Metallurgy | $450,000 | $500,000 |
| Updated Resource Estimation | $120,000 | $120,000 |
| Preliminary Economic Analysis | $350,000 | $0 |
| Prefeasibility (geotechnical drilling, ABA study, etc.) | $0 | $4,000,000 |
| Water rights | $500,000 | $400,000.00 |
| Private Land | $350,000 | $0.00 |
| Permanent Office Facilities | $250,000 | $250,000.00 |
| Legal | $200,000 | $200,000 |
| Administrative | $100,000 | $100,000 |
| ***Total*** | ***$12,630,000*** | ***$14,380,000*** |

# 2.0 INTRODUCTION AND TERMS OF REFERENCE (ITEM 2)

Mine Development Associates, a division of RESPEC ("MDA"), prepared this technical report on the Black Pine project for Liberty Gold Corp. ("Liberty Gold"), which is listed on the Toronto Stock Exchange (LGD). Liberty Gold holds its interest in the Black Pine project, located in Cassia County, Idaho, through its wholly owned subsidiary, Pilot Gold (USA) Inc., a Delaware, USA Corporation. This report has been prepared in accordance with the disclosure and reporting requirements set forth in the Canadian Securities Administrators' National Instrument 43-101 ("NI 43-101"), Companion Policy 43-101CP, and Form 43-101F1, as amended. For the purposes of this report, Liberty Gold Corp. and its subsidiaries are referred to as "Liberty Gold", except where the subsidiary name is used for clarity.

Liberty Gold is the 100% owner of the Black Pine property, having purchased the property from Western Pacific Resources Corp. ("Western Pacific") through an agreement dated June 15, 2016. Under this agreement Western Pacific received $800,000 in cash, a 0.5% net smelter royalty ("NSR"), and 300,000 common shares of Liberty Gold.

## 2.1 Project Scope and Terms of Reference

The purpose of this report is to provide an updated technical summary and first-time estimate of mineral resources for the Black Pine project, estimated in accordance with NI 43-101 guidelines, in support of Canadian securities exchange reporting. The Black Pine project was the site of open-pit mining and cyanide heap-leach processing from 1991 to 1998. In addition to the resource estimate, the scope of this report includes descriptions of the general setting, project history, geology, exploration activities and methodologies, resource database, metallurgy, and the project resources, as well as the interpretations, conclusions, and recommendations of the authors. References used in the preparation of this report are cited in the text and listed in Section 27.0. Of particular note, this report incorporates information and descriptions drawn from a report for Liberty Gold by Gustin et al. (2018) entitled "*Technical Report on the Black Pine Gold Project, Cassia County, Idaho, USA*" with an effective date of July 23, 2018.

This report has been prepared under the supervision of Michael M. Gustin, Senior Geologist for MDA. Mr. Gustin is a Qualified Person under NI 43-101 and has no affiliation with Liberty Gold except that of independent consultant/client relationship. The metallurgical section of this report (Section 13) was prepared by Gary L. Simmons, a Qualified Professional with respect to metallurgy. Mr. Simmons has no affiliation with Liberty Gold except that of independent consultant/client relationship.

Dr. Moira Smith, a Qualified Person under NI 43-101 who is not independent of Liberty Gold, provided the initial updating of Sections 5 through 11 of this report from the previous technical report referenced above. As Vice President, Exploration and Geoscience of Liberty Gold, Dr. Smith has visited the property on numerous occasions and is a central contributor to the detailed geologic descriptions and overall concepts of the geologic model described in this report.

Mr. Gustin visited the Black Pine property along with Dr. Smith on May 2nd, 2018, November 16th, 2019, and July 16, 2021. These site visits included geologic overviews of the project, detailed inspections of exposures in most of the historical open pits, reviews of Liberty Gold RC chips and drill core, the verification of drill-hole locations, and inspections of active drill sites. Each of the visits included detailed discussions of the evolving geologic understanding of the project and associated mineralization. As of the

Effective Date of this report, Mr. Simmons visited the Black Pine project site on June 3, 2019, October 18 and 19, 2019, June 22 and 23, 2020, and May 13, 2021. In respective chronology, during these site visits Mr. Simmons toured the project and reviewed relevant geology, the historical pits, and historical Noranda metallurgical sample locations; collected bulk samples for metallurgical testing; revisited the historical open pits, visited some drill sites, and discussed metallurgical aspects of the project with the on-site geologists; and, on the final visit, and in the company of other Liberty Gold consultants, determined potential heap leach and crusher locations for the purposes of the ongoing preliminary economic assessment.

This report is based almost entirely on data and information derived from work done by Liberty Gold and historical operators at Black Pine. Mr. Gustin has reviewed much of the available data, visited the project site, and has made judgments about the general reliability of the underlying data. Where deemed either inadequate or unreliable, the data were either eliminated from use or procedures were modified to account for lack of confidence in suspect information. Mr. Gustin has made such independent investigations as deemed necessary in his professional judgment to be able to reasonably present the conclusions, interpretations, and recommendations presented herein.

The Effective Date of this technical report is June 20, 2021.

## 2.2 Frequently Used Acronyms, Abbreviations, Definitions, and Units of Measure

In this report, measurements are generally reported in metric units unless original Imperial units are deemed to be best reported as-is. Where information was originally reported in Imperial units and converted to metric for the purposes of this report, conversions have been made according to the formulas shown below.

Currency, units of measure, and conversion factors used in this report include:

| | | |
|---|---|---|
| **Linear Measure** | | |
| 1 centimetre | = 0.3937 inch | |
| 1 metre | = 3.2808 feet | = 1.0936 yard |
| 1 kilometre | = 0.6214 mile | |
| **Area Measure** | | |
| 1 hectare | = 2.471 acres | = 0.0039 square mile |
| **Capacity Measure (liquid)** | | |
| 1 liter | = 0.2642 US gallons | |
| **Weight** | | |
| 1 tonne | = 1.1023 short tons | = 2,205 pounds |
| 1 kilogram | = 2.205 pounds | |

**Currency** Unless otherwise indicated, all references to dollars ($) in this report refer to currency of the United States.

**Frequently used acronyms and abbreviations that may appear in this report**

| | |
|---|---|
| AA | atomic absorption spectrometry |
| acre | acre = 0.405 hectares |
| Ag | silver |
| Au | gold |
| As | arsenic |
| Bi | bismuth |
| BLM | United States Department of the Interior, Bureau of Land Management |
| ˚C | centigrade degrees |
| Cd | cadmium |
| CIL | carbon-in-leach |
| cm | centimetre = 0.3937 inch |
| core | diamond drill core |
| CSAMT | controlled-source audio-frequency magneto-telluric geophysical surveying |
| DEM | digital elevation models created from terrain elevation data |
| g/t | grams per tonne (1 g/t = 1 ppm = 0.029167 oz/ton) |
| GIS | geographic information system |
| GPS | global positioning system, a satellite-based navigation system |
| ha | hectare = 2.471 acres |
| Hg | mercury |
| ICP/MS | inductively coupled plasma mass spectrometry analytical technique |
| In | indium |
| IP | induced-polarization geophysical surveying |
| kg | kilogram = 2.205 pounds |
| kV | kilovolt = 1000 volts |
| l | liter = 1.057 US quart |
| m | metre |
| Ma | million years old |
| µm | micron = one millionth of a metre |
| Mg | magnesium |
| mm | millimetre |
| Mo | molybdenum |
| NV | Nevada |
| oz | troy ounce (1 troy ounce = 34.2857 g Au) |
| Pb | lead |
| ppm | parts per million (1 ppm = 1 g/t) |
| ppb | parts per billion (1,000 ppb = 1 ppm) |
| RC | reverse-circulation drilling method |
| SEM | scanning electron microscope |
| Sb | antimony |
| t | metric ton = 1.1023 short tons |
| Te | tellurium |
| Tl | thallium |
| ton | short ton |
| U.S. | United States |

| | |
|---|---|
| USFS | United States Forest Service |
| USGS | United States Geologic Survey |
| VLF | very low frequency geophysical surveying |
| W | tungsten |
| Zn | zinc |
| 3D | three-dimensional |

## 3.0 RELIANCE ON OTHER EXPERTS (ITEM 3)

Mr. Gustin is not an expert in legal matters, such as the assessment of the validity of mining claims, mineral rights, and property agreements in the United States or elsewhere. Furthermore, Mr. Gustin did not conduct any investigations of the environmental, social, or political issues associated with the Black Pine project, and he is not expert with respect to these matters. Mr. Gustin has therefore relied fully upon information and opinions provided by Liberty Gold and its consultants with regards to the following:

- Section 4.2, which pertains to land tenure, was prepared by Mr. Gerald Heston, a Liberty Gold employee responsible for maintaining the property in good standing, in consultation with Michael Perry, a Nevada Consulting Landman who reviewed the legal status of the claims purchased from Western Pacific (Perry, 2016) and Thomas Erwin, a Nevada attorney who prepared mineral status reports in 2016, 2017, 2018, and 2019;
- Section 4.3, which pertains to legal agreements and encumbrances, was prepared by Mr. Gerald Heston, a Liberty Gold employee;
- Section 4.4, which pertains to environmental liabilities, was summarized by Mr. Gerald Heston from documents prepared by Stantec Consulting Services Inc. (Brown, 2016);
- Section 4.5, which pertains to environmental permits and licenses, was prepared by Gerald Heston, a Liberty Gold employee responsible for permitting at Black Pine; and
- Section 4.6, which pertains to water rights, was prepared by Gerald Heston, a Liberty Gold employee responsible for permitting at Black Pine.

Gerald Heston provided Mr. Gustin with the information attributed to him above on June 20, 2021.

Mr. Gustin has fully relied on Liberty Gold to provide complete information concerning the pertinent legal status of Liberty Gold and its affiliates, as well as current legal title, material terms of all agreements, and material environmental and permitting information that pertains to the Black Pine project.

# 4.0 PROPERTY DESCRIPTION AND LOCATION (ITEM 4)

Mr. Gustin is not expert with respect to land, legal, environmental, and permitting matters and expresses no opinion regarding these topics as they pertain to the Black Pine gold project. Subsections 4.2, 4.3, 4.4, 4.5, and 4.6 were prepared by Liberty Gold and its consultants.

Mr. Gustin does not know of any significant factors or risks that may affect access, title, or the right or ability to perform work on the property, beyond what is described in this report.

## 4.1 Location

The Black Pine gold project is located in Cassia and Oneida counties, Idaho, approximately 29 kilometres northwest of the town of Snowville, Utah, the nearest substantial community, and 13 kilometres north-northeast of Curlew Junction, the intersection of Utah State Highways 30 and 42 (Figure 4.1). The approximate geographic center of the Black Pine property is 42.082°N latitude and 113.047°W longitude.

**Figure 4.1 Location of the Black Pine Gold Project**
(from Liberty Gold, 2021; north is up)

## 4.2 Land Area

The Black Pine property consists of a largely contiguous block of 603 unpatented Federal lode mining claims within Cassia and Oneida counties, Idaho (Figure 4.2). The claims occupy a combined area of 4,777 hectares as of the Effective Date of this report. The unpatented claims lie in portions or all of Sections 13-16, 19-29, and 31-35 of T15S, R29E; Sections 1-6 and 8-12 of T16S, R29E; Sections 35 and 36, of T15S, R28E; and Sections 1 and 2, T16S, R28E, Boise Meridian.

The Black Pine property included a total of 345 unpatented Federal lode mining claims as of the date of acquisition by Liberty Gold. In October 2016, an additional 55 claims were located by Liberty Gold along the southeast margin of the original claim block, bringing the total to 400 claims. In 2018, two claims were located to cover an inlier of third party claims that were dropped. In January 2020, an additional 50 claims were located along the southern margin of the claim block, as well as to the east of it. In May 2020, an additional 122 claims were staked around the northern edge of the property, and another block of claims was staked 3 kilometres to the west of the property (Figure 4.2). In July 2020, 29 claims were located along the northern border of the main claim group. The irregular pattern of claims in the eastern part of the property reflects BLM lands that are not open to Mineral Location by staking (discussed further below).

The unpatented claims are monumented with 10-centimetre by 10-centimetre wooden posts bearing metal tags so as to meet Idaho State regulations. Liberty Gold represents that the unpatented claim map shown in Figure 4.2 is complete and accurate, and the claims shown are valid, as of the Effective Date of this report.

Ownership of the unpatented mining claims is in the name of the holder (locator), subject to the paramount title of the United States of America. The majority of the claims are under the administration of the U.S. Forest Service ("USFS"). A total of 90 claims in the eastern portion of the property lie partly or entirely within lands administered by the U.S. Bureau of Land Management ("BLM"). Under the Mining Law of 1872, which governs the location of unpatented mining claims on Federal lands, the locator has the right to explore, develop, and mine minerals on unpatented mining claims without payments of production royalties to the U.S. government, subject to the surface-management regulation of the USFS and the BLM. In recent years, there have been unsuccessful efforts in the U.S. Congress to amend the 1872 Mining Law to include, among other items, a provision for production royalties payable to the U.S. government. Annual claim-maintenance fees are the only Federal payments related to unpatented mining claims, and these fees have been paid in full through September 1, 2021. County recording fees are also required annually. Liberty Gold's annual holding costs for the Black Pine unpatented mining claims, exclusive of lease fees, were $106,829 in 2020 and will be same amount in 2021 (Table 4.1). The unpatented claims do not expire as long as the Federal and county fees are paid.

## Figure 4.2 Black Pine Property Map

(from Liberty Gold, 2021)

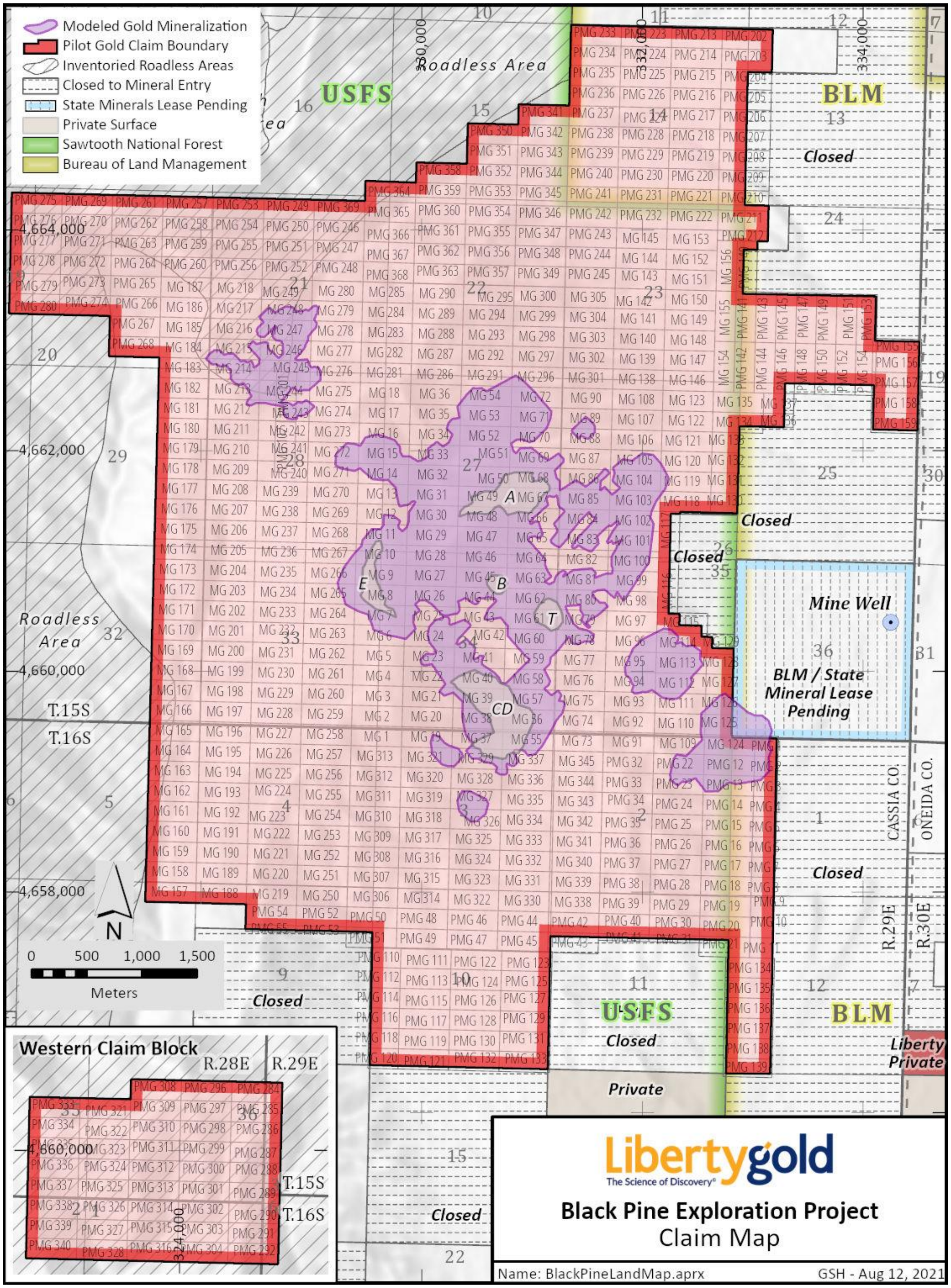


**Table 4.1 Annual Claim Holding Costs for the Black Pine Property**

| Annual Fee Type | 2020 | 2021 |
|---|---|---|
| Unpatented BLM Claim Fees | $ 106,425 | $ 106,425 |
| County Recording Fees | $ 404 | $ 404 |
| **Total Annual Claim Fees** | **$ 106,829** | **$ 106,829** |

Some Federal lands to the east and south of the project are closed to locatable mineral entry under the Bankhead-Jones Farm Tenant Act of 1937, Pub. L. No. 75-10, 50 Stat. 522 (codified as amended at 7 U.S.C. §§ 1010-1013a (2006)). Past operators have obtained Hardrock Prospector Permits allowing for gold and silver mining activities on Bankhead-Jones Act lands. However, recent rulings by the U.S. Government have restricted mining activities on these lands to energy minerals (e.g., uranium) on Bankhead-Jones Act lands. Whether or not a path exists for Liberty Gold to explore for gold or locate infrastructure on these lands, which are not part of Liberty Gold's landholdings, is under investigation.

As of the Effective Date of this report, a draft lease for mineral rights in Section 36, T15S R29E (259 ha) with the State of Idaho is under review.

## 4.3 Agreements and Encumbrances

Liberty Gold obtained its interest in the Black Pine property by means of an agreement with Western Pacific dated June 15, 2016. Under this agreement, Western Pacific received consideration of $800,000 in cash, a grant of a 0.5% NSR, and 300,000 common shares of Liberty Gold. As a result of this transaction, Liberty Gold is the 100% owner of the Black Pine property.

Western Pacific assigned the 0.5% NSR to Deer Trail Mining Company, LLC. This royalty applies to production from the original 345 claims obtained by Liberty Gold from Western Pacific. Mineral production from the entire property is subject to the Idaho Mine License Tax, equivalent to 1.0% of the value of "*ores mined or extracted and royalties received from mining*".

Surface rights for access, exploration, and mining of the unpatented claims are fully held by Liberty Gold under the Mining Law of 1872, subject to surface-use regulations under applicable Federal and State environmental law (see Section 4.5).

## 4.4 Environmental Liabilities

Liberty Gold retained Stantec Consulting Services Inc. ("Stantec") to review information regarding potential environmental liabilities or concerns, the results of which are documented in a report by Brown (2016). According to Stantec, Liberty Gold is liable only for disturbance incurred as part of Liberty Gold's exploration activities, or if Liberty Gold causes disturbance of the historical leach pad or other designated areas.

The historical heap-leach pad, which lies partially within the Black Pine property, was reclaimed prior to Liberty Gold's acquisition of the property (Figure 4.3). Pegasus stopped adding cyanide solution to the heap-leach pad in 1998. Since then, the USFS has been capturing runoff water at the base of the heap leach in buried concrete vaults, treating it with zero-valent iron, and delivering the treated water to a 40.5-hectare land-application area downhill from the leach pad. Water is sampled monthly during the land-application period and soils are analyzed every other year. The heap leach has ongoing issues with cyanide and elevated levels of nitrate and arsenic. The USFS provides annual water-quality monitoring reports to the Idaho Department of Environmental Quality ("IDEQ", (http://www.deq.idaho.gov/). The heap leach and land-application area are fenced off. A local rancher monitors the equipment and precipitation.

The USFS holds a $1.5 million bond from Pegasus, and the interest on this bond covers the cost of the ongoing water-monitoring program. This bond is expected to cover any future issues with the previous operations.

**Figure 4.3 View of the Reclaimed Black Pine Mine Heap-Leach Pad, Looking East**
(from Liberty Gold, 2017)

## 4.5 Environmental and Permitting

With the exception of claims along the eastern border of the property, which are on land administered by the BLM, all exploration work on unpatented claims between June 2011 and February 2019 was permitted under a Plan of Operations ("PoO") approved by the USFS, as described below. This PoO (#2011-030938-B) was granted to Western Pacific by the USFS on June 2, 2011 and subsequently amended on May 30, 2012. A cash bond totaling $67,300 was posted with the USFS to cover potential reclamation costs. PoO 2011-030938-B was transferred to Liberty Gold in 2016 and assigned a new number (#2016-063179), and the bond amount was increased to $206,400. PoO #2016-063179 authorizes 33.12 acres of disturbance (13.4 hectares).

A new Plan of Operations (#2017-072046) was submitted to the USFS on May 11, 2017 and approved on February 12, 2019. The new PoO allows for construction of roads and up to 370 drill sites, 47.9 kilometres of drill roads, and 57.1 ha of disturbance within a 7.3 $km^2$ area surrounding the historical mined pits and two satellite areas to the northwest and southeast. In February 2020, a revision to the PoO adding up to 154 drill sites, 24.6 kilometres of drill roads, and 20.5 ha of disturbance within a 4.7 $km^2$ area was submitted to the USFS and BLM. Approval was granted in March 2021, allowing access to lower elevation areas along the eastern range front. The most recent PoO revision also grants access to the mine production well and use of public roads on BLM-administered land (case number IDI-039132). Total permitted access includes up to 596 drill sites, 91.1 kilometres of drill roads, and 224.8 acres of disturbance within a 11.9 $km^2$ area. As of April 30, 2021, there are 87 open drill sites and 63 reclaimed drill sites, 24.6 kilometres of open drill roads, 5.1 kilometres of reclaimed drill roads, and 19.9 ha of open disturbance and 4.6 ha of reclaimed disturbance (total 24.4 ha).

There are no unique biological or cultural issues currently identified within the project area. Mitigation/avoidance procedures for such things as sage-grouse mating periods, mule-deer winter range, sensitive plant species, and introduction of noxious-weed species are stipulated in the PoO. At present, drilling is restricted to the months between June 30 and March 1 in the lower elevations to account for sage-grouse mating periods. In the far south, drilling is restricted to the months between March 15 and December 15 and some low-elevation roads are restricted until May 15 because of mule deer winter habitat. However, there are no restrictions for other areas, which comprise most of the mineralized zones and targets.

In addition to the $206,400 reclamation bond for the Western Pacific Resources PoO, the USFS holds a reclamation bond of $551,700 to cover Liberty Gold's work plans for 2019 through the first half of 2021. The BLM holds a reclamation bond of $41,465 for activities on BLM-administered lands. The total reclamation bond amount for the project is $799,565.

## 4.6 Water Rights

Several water wells are located immediately east of the property on BLM land. In accordance with Idaho Code 42-202A, Liberty Gold was granted temporary, 5 acre-foot per annum ("afa") water rights by the Idaho Department of Water Resources ("IDWR") in both 2019 and 2020. Water was used for drilling and dust suppression. The use of water for mining or exploration is considered a beneficial use approved by IDWR.

The water needs of the historical mining are presently being met through a single production well known as the Black Pine Mine Well, which produced upwards of 860 afa. Access to the well was granted to Liberty Gold as part of the PoO amendment in March 2021, allowing Liberty Gold to refurbish and start pumping from the well. In addition, in April 2021, Liberty Gold signed an agreement with a local rancher to supply 50 afa for exploration drilling.

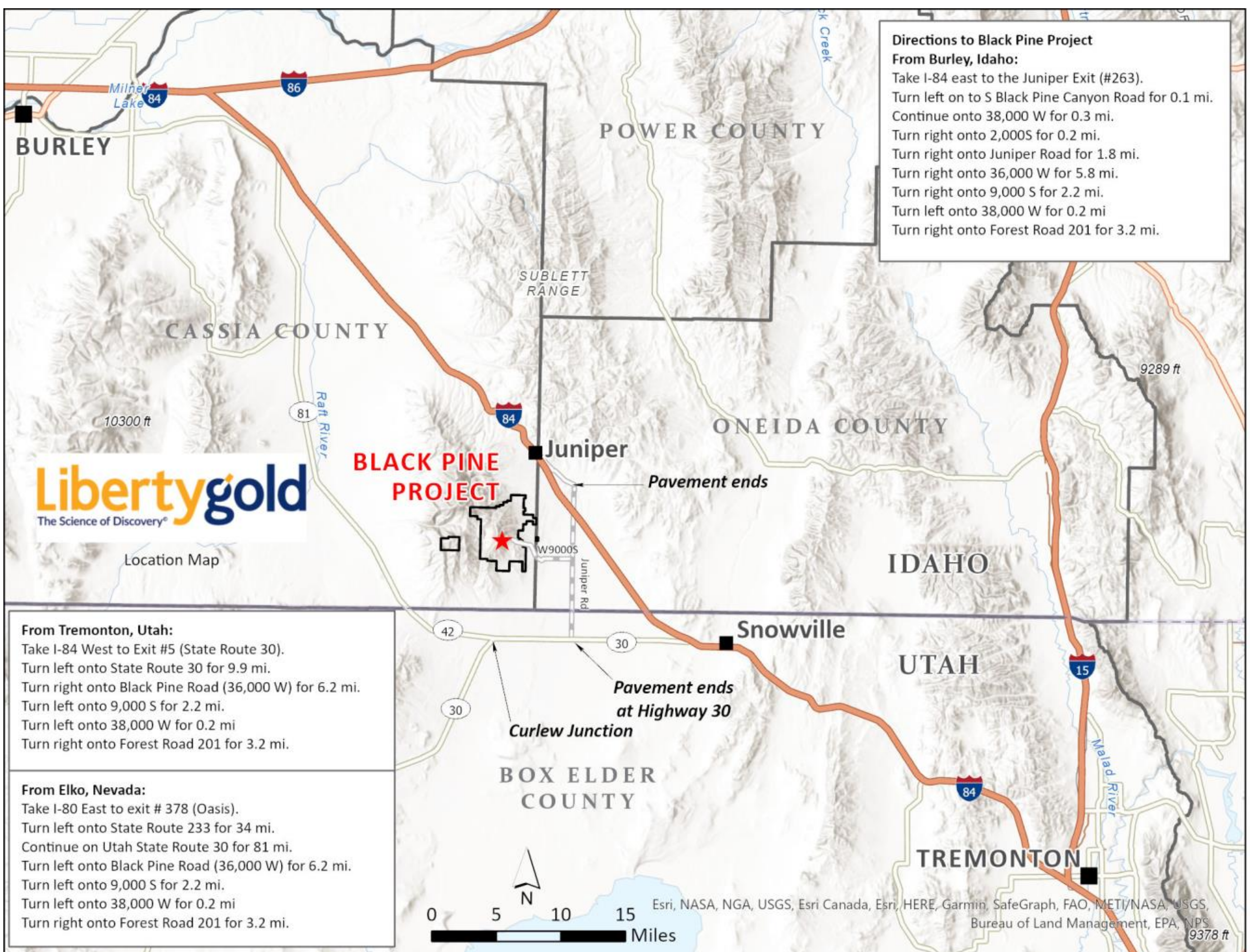
# 5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY (ITEM 5)

The information summarized in this section is derived from publicly available sources, as cited.

## 5.1 Access to the Property

The Black Pine project is located approximately 10 kilometres west of U.S. Interstate Highway 84 ("I-84") and access is available from I-84 and Utah State Highway 30 (Figure 4.1 and Figure 5.1) via improved gravel roads (County Road 36,000W and County Road 9,000S). These connect with Forest Route 201, a USFS-maintained gravel road, for 4.0 kilometres to the property entrance. The property can also be accessed from the north on I-84 via County Road 38,000W, an improved gravel road.

**Figure 5.1 Black Pine Project Access Map**
(from Liberty Gold, 2021)




There are a number of locked gates within the property. Permission to enter and keys must be obtained from Liberty Gold or the USFS.

A number of major population centers with commercial air service are located in the region surrounding the Black Pine project. The cities of Twin Falls, Idaho and Salt Lake City, Utah are located about 175 kilometres to the northwest and 190 kilometres to the southeast, respectively. Elko, Nevada is located approximately 300 kilometres southwest of the project, and Boise, Idaho is 340 kilometres to the northwest (Figure 4.1 and Figure 5.1).

## 5.2 Climate

The climate in the project area and the surrounding region is of the continental, intermontane type. Temperatures and precipitation can vary widely from the high-desert valleys directly east of the property to the crest of the Black Pine Mountains on the west side of the property. Annual precipitation is approximately 25 centimetres at the base of the range, with significant variations dependent on elevation. Summer temperatures in the valleys commonly range from 5$^{o}$C to over 40$^{o}$C. Winter temperatures generally vary from -10$^{o}$C to 10$^{o}$ C, but they can occasionally drop to -20$^{o}$C. Winter snowfall at the higher elevations can impede access from mid-November through late April unless snow removal equipment is deployed. Mining can be conducted year-round, but exploration activities can be impacted by winter snow storms.

## 5.3 Physiography

The Black Pine property straddles the eastern margin of the northerly-trending Black Pine Mountains. Elevations within the property range from a low of 1,650 metres along the eastern edge, to a maximum of approximately 2,440 metres in the western part of the property. The topography is moderately steep over much of the area. There are no perennial streams; all watersheds in the property eventually drain into the Great Salt Lake basin, located to the south. Vegetation in the lower elevations of the project area consists mainly of grasses and sagebrush. In the higher elevations, increased moisture allows juniper, piñon, mountain mahogany and locally, on steep, north-facing slopes, spruce to grow. A recent wildfire has denuded much of the range and only a few scattered patches of trees remain within the property.

## 5.4 Local Resources and Infrastructure

The small agricultural community of Snowville, Utah is the nearest town to the project, about 30 kilometres to the southeast. Basic lodging, fuel, and some supplies are available. Burley, Idaho, the Cassia County seat, is located 80 kilometres to the northwest, and Tremonton, Utah is located an equal distance to the southeast. Both are full-service communities with availability of food, lodging, fuel, banking, telecommunications, and other project needs. Heavy equipment and operators are available from numerous local contractors. Drilling, engineering, and heavy-equipment services are available in Salt Lake City, Utah and Elko, Nevada, as is skilled labor for mining and construction.

Grid electrical power is available from a transformer on a major power line about 10 kilometres southeast of the project, with three-phase power extending to the eastern property boundary. Water for exploration drilling needs is available from several wells on BLM land and private land immediately east of the property. The Black Pine Mine well (see Section 4.6), used during the historical mining operations, was drilled in the southeast quarter of the northeast quarter of Section 36, with water encountered just below 5,000 feet (1,524 metres) in elevation (USDA Forest Service, 1993).

# 6.0 HISTORY (ITEM 6)

The information summarized in this section was originally extracted and modified from Hefner et al. (1991), Shaddrick (2013), and unpublished company files, as well as other sources as cited, and it is largely unmodified from that presented in Gustin et al. (2018). Mr. Gustin has reviewed this information and believes this summary is materially accurate.

## 6.1 Exploration History

The Black Pine Mountains were first explored in the 1880s (Sawyer et al., 1997). Numerous prospects and small mines exploited base- and precious-metal deposits through the late 1800s and early 1900s, when minor amounts of zinc, silver, and mercury were produced. Gold was discovered in the late 1930s or early 1940s at the Tallman mercury mine, located on the current Black Pine project. The Virmyra Gold Mining Company operated a small open pit from 1949 to 1955 at the Tallman area (Prochnau, 1985). Total production was reported to be 120,000 tons with an average gold grade of 5.14 g Au/t (Hefner et al., 1991).

Modern exploration of the Black Pine project area began in the 1960s. Relatively little information is currently available concerning exploration work done in the 1960s to 1981. Much of what is known of that period is based on a summary in Threlkeld (1983) and archival material as follows:

**1963 - 1964:** Newmont Mining ("Newmont") carried out geologic mapping and surface geochemical sampling, which culminated in the drilling of 17 holes. Newmont terminated their involvement with the property in 1964 at approximately the same time as the Carlin deposit was discovered in Nevada.

**1974 - 1975:** Newmont Mining reacquired the property and drilled 20 holes. At least three of the holes encountered gold grades >1.71 g Au/t. Newmont also carried out soil geochemical surveys, as well as induced potential ("IP") and ground magnetic surveys over the Tallman mercury mine area. The geophysical work was done on NW-SE lines and detected a broad area of IP chargeability highs beneath the Tallman Pit area. Newmont terminated their second involvement with the property in 1975.

**1975:** Kerr Addison Mines Ltd. collected rock samples from unknown locations on the property and submitted them for Cu, Zn, and Au analyses.

**1974 - 1976:** Gold Resources Inc. ("Gold Resources") and Permian Exploration Account ("Permian") held claims over a portion of the property and collected numerous rock and soil samples. Liberty Gold has historical records that indicate Gold Resources drilled 16 holes during this time period. Kermadex also staked claims and carried out soil sampling in the region during this time, but little else is known of their work or results.

**1977 - 1978:** ASARCO leased the property from Gold Resources and Permian and carried out grid-based soil sampling, geological mapping, and geophysical surveys. The geophysics consisted of ground-based gravity, VLF, and IP surveys on two lines. A shallow conductor attributed to either disseminated sulfides or graphitic material was detected with the IP and VLF, but the gravity response was minimal (Paterson, 1979). ASARCO drilled 34 "percussion" holes before terminating their interest in 1978. No data are available for the 34 holes drilled by Asarco.

**1979 - 1981:** Pioneer Nuclear Inc. ("Pioneer") acquired the property in 1979. Pioneer carried out soil sampling and drilled 23 holes in 1979, of which 13 holes encountered gold grades greater than 0.51 g Au/t. In 1980 and 1981, Pioneer drilled five holes in and around the historical Tallman pit.

**1983 - 1986:** Permian and Pegasus formed a joint venture and drilled 88 holes at the property during 1983, and an additional 36 reverse-circulation rotary ("RC") holes and one diamond core ("core") hole in 1984. Pegasus re-assayed samples from selected Pioneer holes in 1985 and defined the Tallman and Tallman NE gold deposits to a significant extent with their drilling.

**1986:** Inspiration Resource Corp. ("Inspiration") took soil samples across several lines of existing soil grids. This work was likely completed as due-diligence confirmation sampling, as there doesn't appear to have been a joint venture agreement between Inspiration and Permian.

**1986 - 1990:** In 1986, Noranda Exploration, Inc. ("Noranda") acquired the property from Permian. Over four years, Noranda carried out an extensive exploration and drilling program, including soil and rock sampling, detailed geological mapping, and stratigraphic studies. In 1987, Noranda contracted TerraSense Inc. to complete an airborne magnetic survey over a significant portion of the Black Pine Mountains that included the current property. These data have not been digitized or fully interpreted by Liberty Gold. Noranda drilled a total of 532 RC and conventional rotary holes, as well as four core holes for metallurgical testing samples.

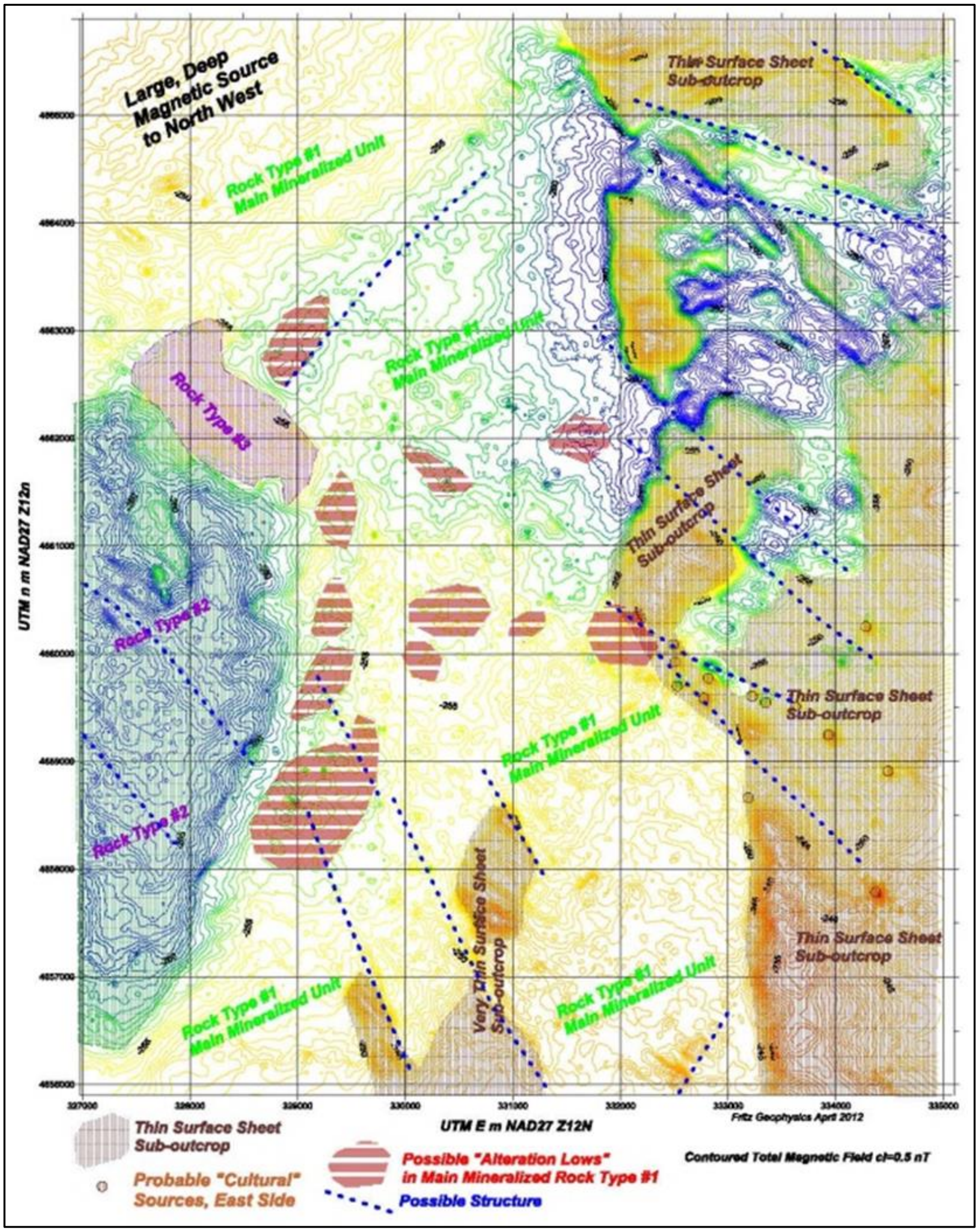
On the basis of this work, Noranda discovered most of the gold zones that were later mined by Pegasus. Noranda produced a feasibility study in early 1990 and sold the property to Pegasus in June 1990.

**1990 - 1998:** Pegasus put the property into production in late 1991 as an open-pit heap-leach operation. Pegasus did not build the mine as designed in the Noranda feasibility study, however, choosing to load the leach pads with run-of-mine ("ROM") mineralized material instead of crushing it. Pegasus drilled 1,080 RC holes and 18 core holes from 1990 through 1997. Soil samples were collected from grids along the southern range front and north of Mineral Gulch, and an extensive rock-sampling program was carried out. Three-dimensional deposit models were created based on domains of exploration drill-hole and blast-hole assays, without taking detailed geology into account. Mining ceased in late 1997, and the last gold was recovered from the heap in 1998. The USFS seized the reclamation bond and reclaimed the property.

**1999 – 2009:** The property was idle from 1999 to 2009. Western Pacific acquired the property by staking claims in 2009 and 2010.

**2010 - 2012:** Western Pacific contracted 82 line-kilometres of gravity and 20 line-kilometres of ground magnetic surveys, and also drilled a total of 38 RC holes, three of which have no available records. This was followed by an aeromagnetic survey in 2012 of 1,842 line-kilometres flown by EDCON-PRJ, Inc. and interpreted by Fritz Geophysics. (Fritz, 2012; Figure 6.1).

**Figure 6.1 2012 Total Field Airborne Magnetic Map, Black Pine Area**
(from Fritz, 2012)




(north is marked by the vertical grid lines)

## 6.2 Historical Geological Mapping

The regional to district-scale geology of the Black Pine project area is illustrated by the 1:50,000 scale U.S. Geological Survey ("USGS") map of the Strevell 15-Minute Quadrangle, Cassia County, Idaho by Smith (1982). Noranda geologists and consultants produced the most comprehensive geological map of the Black Pine property (Ohlin, 1988). Later mapping by Pegasus did not appear to improve upon the Noranda maps, even with the additional exposures afforded by the open pits.

Pit-geology maps generated by Willis (2011) for Western Pacific were imported into the Liberty Gold database and draped onto topography using Leapfrog software, which allowed Liberty Gold to conclude that the 2011 pit maps correlate well with down-hole lithology data.

Liberty Gold possesses numerous scanned geological maps from historical operators, which have either been integrated into the database or superseded by Liberty Gold mapping and modeling.

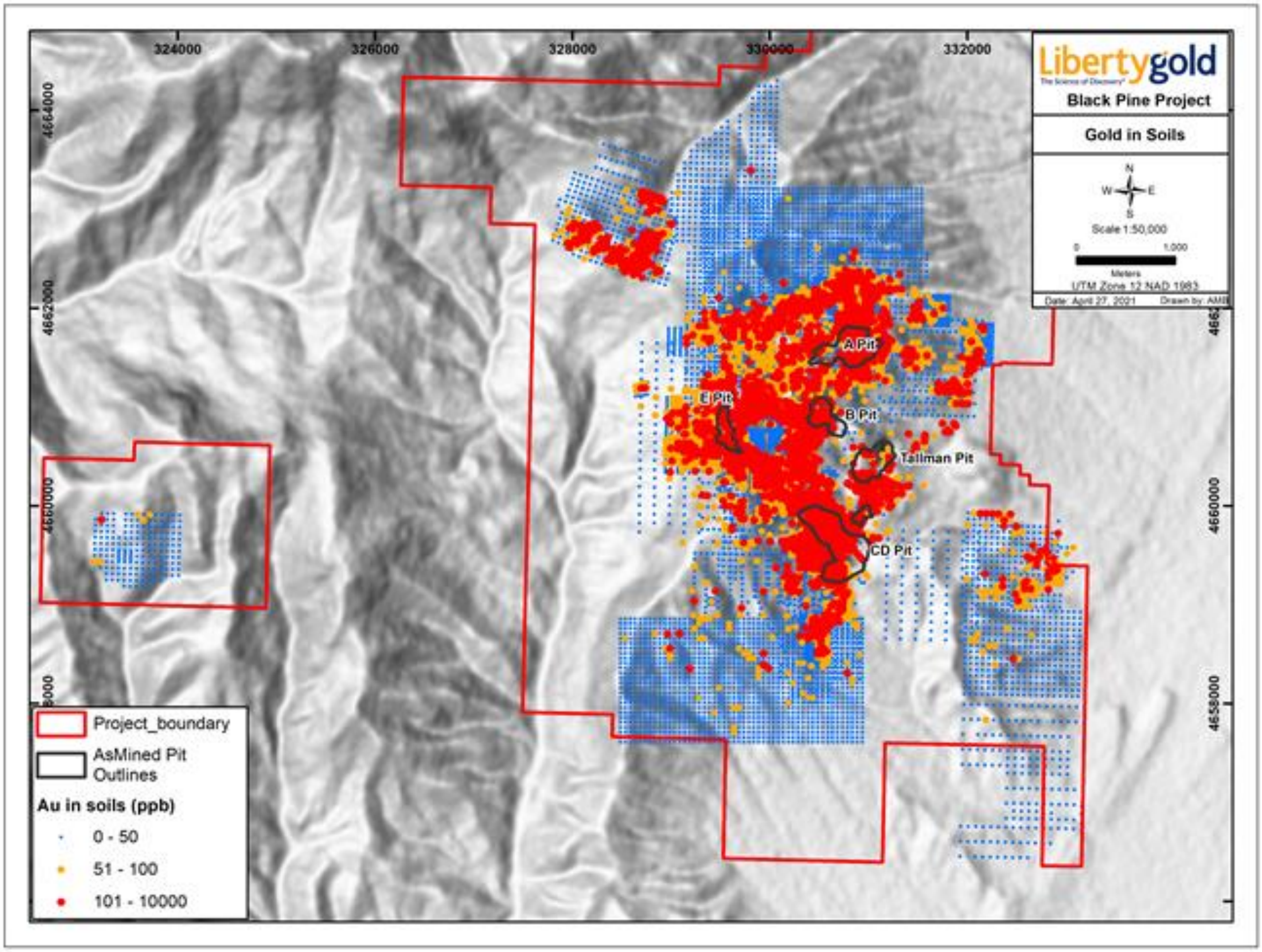
## 6.3 Historical Soil Sample and Stream Sediment Data

Liberty Gold has compiled and digitized geochemical data from 12,623 soil samples collected and analyzed by at least three historical operators, including Noranda, Pegasus, and Western Pacific (Figure 6.2). Relatively little is known about the soil-sampling methods used by operators prior to 2011. Soil sampling was primarily grid-based, with sample spacings ranging from ~15 to ~120 metres. There are also numerous scanned maps of earlier soil grids of limited extents from nearly every historical operator, including Gold Resources, Newmont, Kermadex, Inspiration, Permian, Asarco, Pegasus (pre-Noranda), and Pioneer. Where possible, these have been geospatially registered and digitized by Liberty Gold. Comparison of the Pegasus-era soil data with scanned maps of Noranda-era compiled soil samples indicates that Pegasus collected up to 2900 soil samples to the north of Mineral Gulch, south of the I Pit and Rangefront zone.

Western Pacific contracted two soil surveys. The northern grid (1,175 samples) was collected by contractors Rangefront Consulting LLC of Elko, Nevada, and the southern grid (1,300 samples) was collected by contractors North American Exploration of Salt Lake City, Utah. The work was done under the supervision of Western Pacific's qualified person. Samples were collected on 50- by 50-metre grids with locations established by handheld Global Positioning System ("GPS") units. Soil material was taken from the "B" horizon, where present, and omitted in areas of exposed rock.

The soil samples compiled by Liberty Gold delineate a strong gold-in-soil anomaly, with 4,986 samples that assayed in excess of 0.050 g Au/t and 3,205 samples that assayed greater than 0.100 g Au/t. These samples principally form a broad, diamond-shaped anomaly over the historical mine area, of approximately four kilometres north-south by about three kilometres in an east-west direction (Figure 6.2). It is clear that soil geochemistry played a critical part in determining historical exploration targets, owing to the excellent correlation between elevated gold-in-soils and the locations of historical deposits and pits, as well as its correlation with historical drill targets. Significant portions of the historical gold-in-soil anomalies have not been adequately drill tested at Black Pine and are high-priority drill targets for Liberty Gold.

**Figure 6.2 Historical Gold-in-Soil Samples at Black Pine**
(from Liberty Gold, 2021)




Stream-sediment surveys were carried out by previous operators across the broader Black Pine mountains as part of a regional exploration effort. This data is not presently being used by Liberty Gold, as it has largely been superseded by soil and rock data.

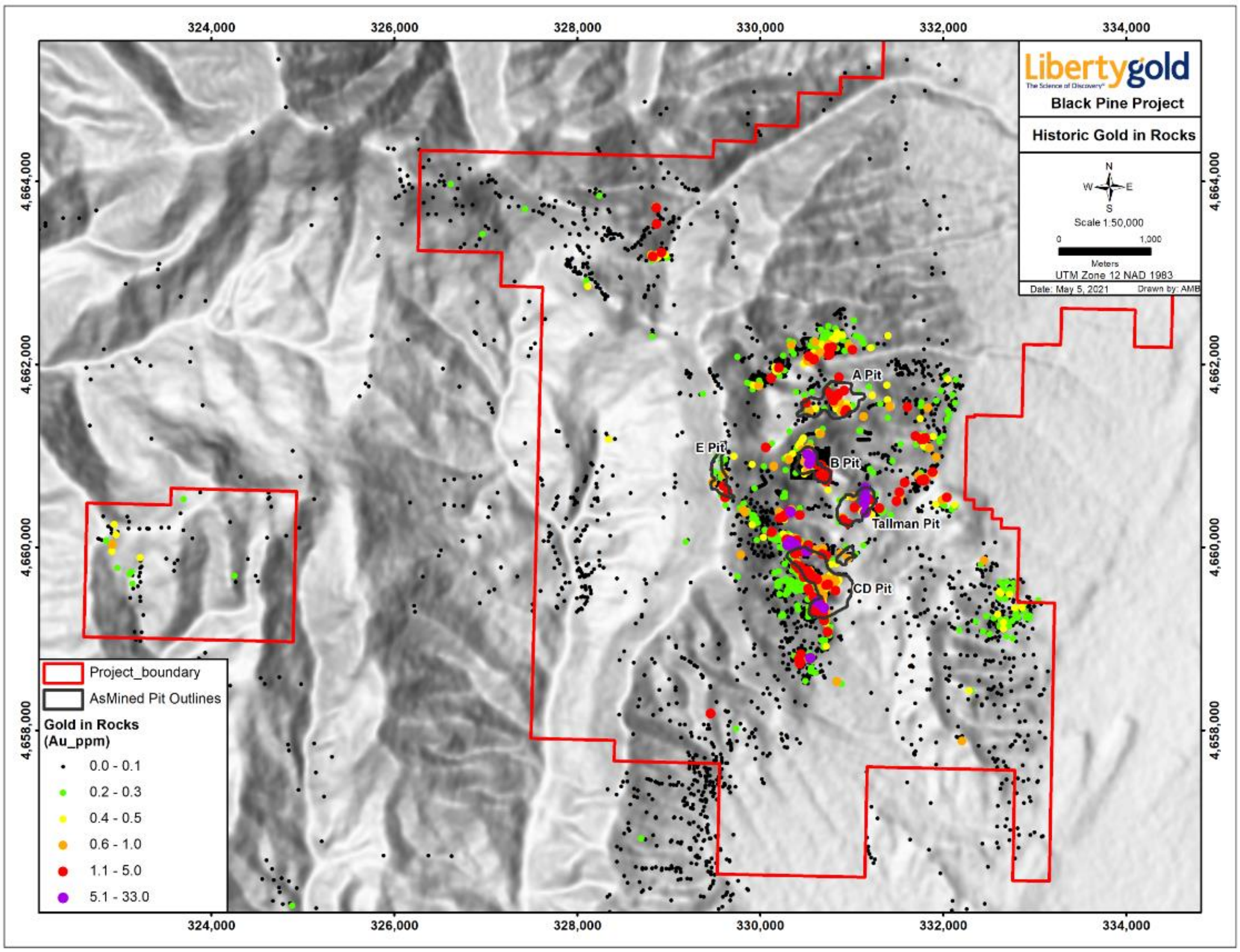
## 6.4 Historical Rock-Chip Geochemistry

A large number of historical surface rock samples have been taken over the course of exploration of the Black Pine property. A historical electronic database with 5,202 samples across the Black Pine Mountains was recovered from Pegasus' project archives, including 4,516 that were taken within the current property boundary. Of these, 59 are lacking location information. Liberty Gold has scanned and digitized all maps that could be georeferenced to validate the historical rock sample locations.

Western Pacific collected 251 rock-chip samples, primarily focused on existing pits and road cuts, that were intended to verify and expand the known mineralization indicated by the historical exploration and mining data (Shaddrick, 2013). A total of 250 of these samples are located within the current property boundary.

Of the 4,516 historical samples in the digital database taken within Liberty's current property boundary, 1,344 returned gold values in excess of 0.1 g Au/t, 168 were in excess of 1.0 g Au/t, and 19 samples assayed greater than 5.0 g Au/t. The presently compiled historical gold results from rock samples are shown in Figure 6.3.

**Figure 6.3 Gold in Historical Gold Rock Samples**
(from Liberty Gold, 2021)




## 6.5 Historical Drilling

This section summarizes the drilling carried out in the Black Pine property by historical operators. The information presented in this section of the report is derived from multiple sources, as cited.

### 6.5.1 Summary

Liberty Gold has compiled information for a total of 191,551 metres drilled in 1,873 holes at Black Pine, not including ASARCO holes for which no data were found. as summarized in Table 6.1. Three of the holes (MGR11-36, 37 and 38) lack validated location data. Of these, 1,851 holes, or 1,848 holes' location data, lie within the current property boundary. Approximately 99% of the holes and metres were drilled using conventional rotary and RC methods, and 26 of the holes were drilled using diamond-core methods. Other than the core holes, many of the historical holes lack explicit designation as to the type of drilling method, specifically conventional rotary versus RC. In many cases, these are assumed to be RC holes, but it is likely that some are conventional-rotary holes, especially the older holes. There is no assay data currently available for 34 conventional rotary or RC holes drilled by ASARCO in 1977, and no assay data for two Newmont holes drilled in 1964 (P16-64 and P17-64).

**Table 6.1 Summary of Black Pine Project Historical Drilling**

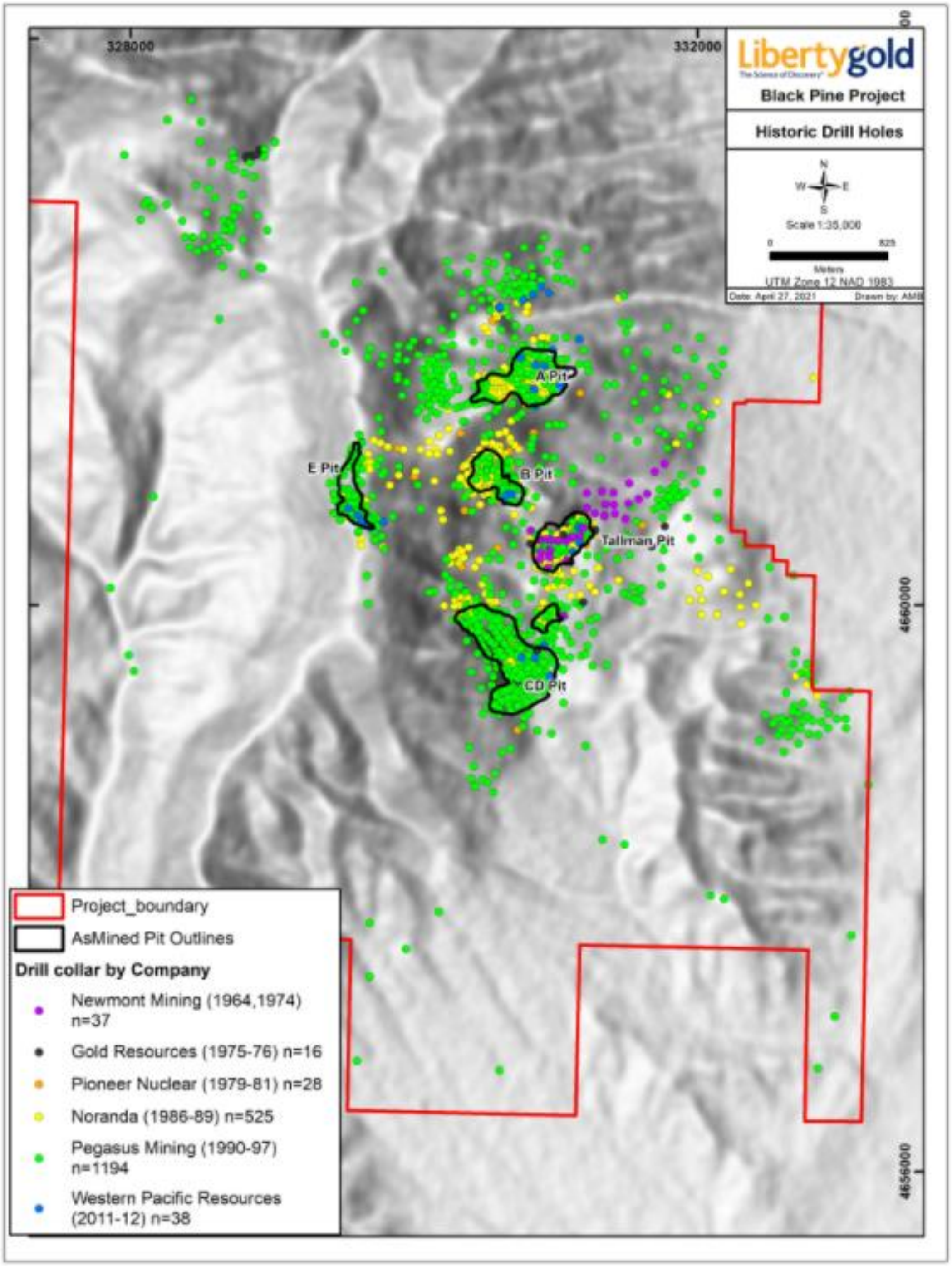
| Company | Year | RC/Rotary Holes | | Core Holes | | Total | |
|---|---|---|---|---|---|---|---|
| | | No. | Metres | No. | Metres | No. | Metres |
| Newmont | 1964, 1974 | 37 | 3,118 | - | - | 37 | 3,118 |
| Gold Resources | 1974-1976 | 13 | 1,083 | 3 | 135 | 16 | 1,218 |
| ASARCO | 1977 | 34 | - | - | - | 34 | - |
| Pioneer Nuclear | 1979-1981 | 28 | 2,458 | - | - | 28 | 2,458 |
| PEA/Pegasus | 1983-1985 | 123 | 8,245 | 1 | 76 | 124 | 8,321 |
| Noranda | 1986-1989 | 532 | 51,371 | 4 | 245 | 536 | 51,616 |
| Pegasus | 1990-1997 | 1,080 | 116,425 | 18 | 1,176 | 1,098 | 117,601 |
| Western Pacific | 2011-2012 | 35 | 7,219 | - | - | 35 | 7,219 |
| *Historical Totals* | | *1,882* | *189,919* | *26* | *1,632* | *1,908* | *191,551* |

The three Western Pacific holes that lack validated location data have been removed from the table.

The majority of the historical holes were drilled vertical, or within 10° of vertical; roughly one-third have been drilled as angled holes, including 676 holes drilled at angles shallower than -75º. The geometry of gold mineralization at Black Pine varies considerably but is generally gently dipping with some areas of more steeply dipping. Historical operators appear to have generally designed drill holes to intersect mineralization as obliquely as possible.

Figure 10.1 shows the locations of historical drill-hole collars within the Black Pine property.

**Figure 6.4: Map of Historical Black Pine Drill Holes**
(from Liberty Gold, 2021)




The authors are not aware of the details regarding the drilling contractors, drilling methods, sampling procedures, collar-survey methods, and types of drill rigs utilized in the historical Black Pine drilling programs other than those summarized below.

The historical drilling discovered and defined gold mineralization that was eventually mined from seven historical open pits. These pits produced approximately 435,000 ounces of recovered gold from a little more than 30 million tonnes of ore between 1991 and 1997. The pits lie within mineralized zones of various sizes, and only a portion of each mineralized zone was mined (Figure 6.5). Table 6.2 summarizes the size, average drilled grade, highest-grade drill-hole assay, and best gold intersection in terms of grade multiplied by thickness from each of the mined mineralized zones.

**Table 6.2 Summary of Mined Gold Zones and Drill Highlights**

| Gold Zone | Length | Width | Depth | Avg Mined Grade (g Au/t) | Highest-Grade Drill Assay (g Au/t over 1.5 m) | Highest Grade x Thickness Intercept* |
|---|---|---|---|---|---|---|
| E | 575 | 100 | 75 | 1.5 | 46.7 | 19.81 m @ 16.09 g/t Au |
| B | 350 | 300 | 100 | 1.38 | 38.26 | 73.16m @ 3.24 g/t Au |
| A | 650 | 350 | 100 | 0.6 | 8.57 | 96.0 m @ 1.03 g/t Au |
| Tallman | 350 | 200 | 120 | 0.9 | 11.31 | 50.3m @ 1.76 g/t Au |
| C/D | 800 | 250 | 100 | 0.58 | 25.27 | 103.6m @ 0.83 g/t Au |

* Intervals reported at 0.2 g Au/t cutoff and maximum 5 meters of internal waste

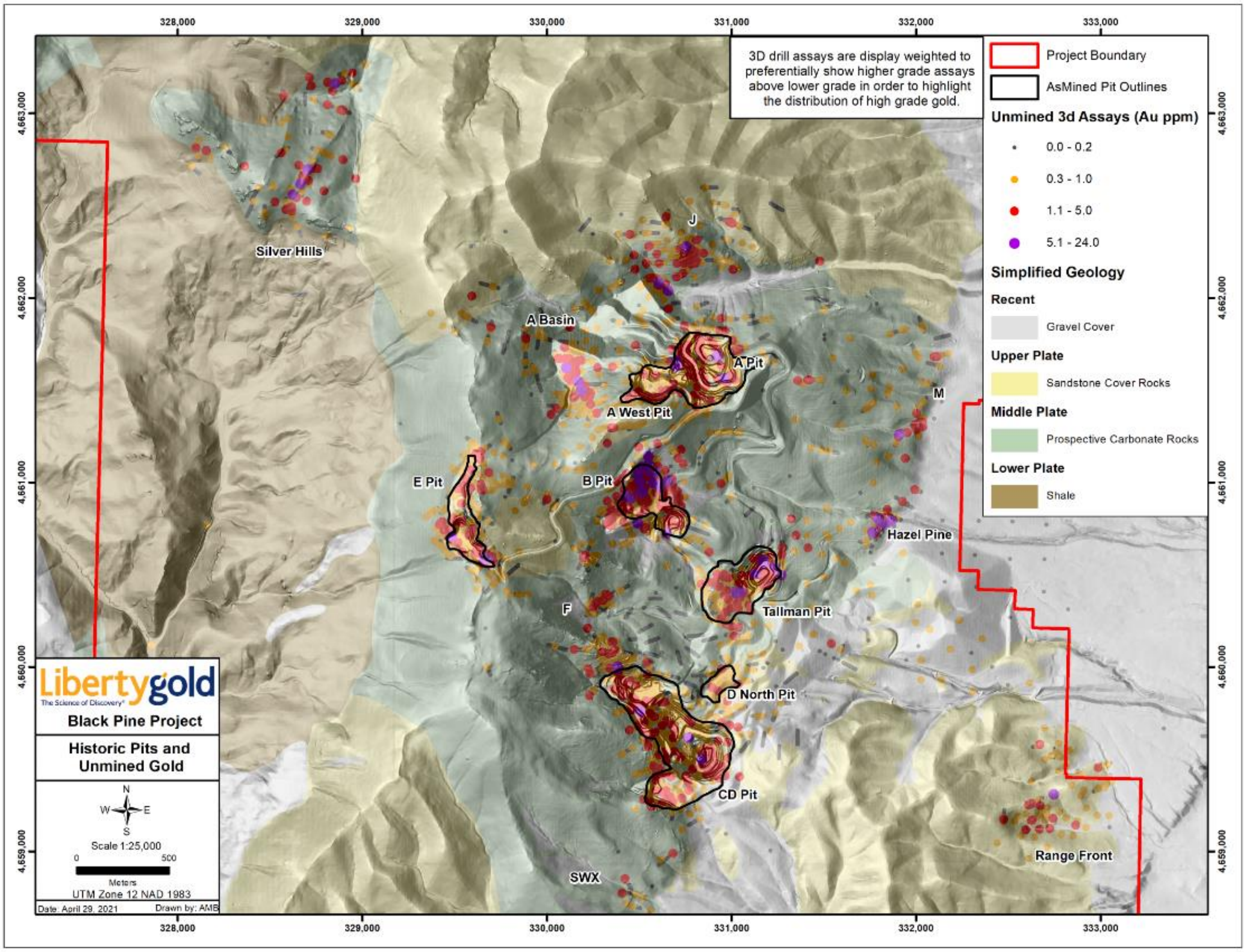
Several additional zones were identified by the drilling but were not mined, such as the A Basin, J Anomaly, and Rangefront Anomaly (Figure 6.5).

### 6.5.2 Newmont 1964 and 1974

Newmont drilled 17 rotary holes of uncertain type (RC or conventional rotary) in the area of the historical Tallman mine in 1964 and collected drill-chip samples over 1.52-metre (5-foot) intervals. Drilling was carried out by Sprague and Henwood, Inc. with 14.3-centimetre tricone and 12.1-centimetre hammer bits. Some or all of these holes were drilled with a truck-mounted Portadrill No. 753. Drilling was done both wet and dry; difficult drilling conditions were commonly noted. Newmont concluded the results of the drilling program "did not indicate sufficient strength of mineralization to encourage us to look further for an orebody" (Hardie, 1964) and terminated its interest in the property.

Newmont reacquired the property and in 1974 drilled 20 rotary and/or RC percussion holes. Eklund Drilling ("Eklund") of Elko, Nevada was the contractor and samples were collected over 1.52-metre intervals. Drilling was carried out to the northeast of the historical Tallman mine, exploring for a possible extension or offset of mineralization. An unknown quantity of drill-hole collar locations, but greater than five, were later surveyed by Desert West Land Surveys at the direction of Noranda.

**Figure 6.5 Historical Pits and Unmined Gold in Drill Intervals**
(from Liberty Gold, 2021)




## Newmont Evaluation of Drill Sampling:

### 6.5.3 Gold Resources and Permian 1974-1976

A total of 13 RC or rotary holes and three core holes, for a total of 1,218 metres, were drilled by Gold Resources and Permian. Udy Core Drilling of Leadore, Idaho carried out the core drilling and Drilling Services International carried out the RC drilling for Gold Resources and Permian, but no other information is available.

### 6.5.4 ASARCO 1977

ASARCO drilled 34 "percussion" holes, mostly at the G anomaly in the area of the top of Black Pine Cone Peak, with several holes west of Anomaly A and into A Basin. ASARCO abandoned their interest in the property in 1978. No other information is available.

### 6.5.5 Pioneer Nuclear 1979-1981

Pioneer Nuclear drilled 28 RC drill-holes for a total of 2,458 metres in 1979 through 1981, of which 13 holes intersected gold grades in excess of 0.55 g Au/t in at least one sample interval. Samples were collected variably on 1.52 to 3.05-metre intervals. An unknown number of collar locations were later surveyed by Desert West Land Surveys at the direction of Noranda.

### 6.5.6 Permian and Pegasus 1983-1986

The Permian Pegasus joint venture drilled 88 holes in 1983. At least some of the holes were sampled over 6.1-metre intervals. In 1984, 35 RC holes were drilled and sampled on 1.52-metre intervals. One core hole was also drilled. Drilling was carried out principally on the B anomaly, defining gold mineralization that would later be mined in the B and B Extension pits. Drill-hole collar locations were surveyed by plane table by Ron Willden, with an unknown quantity of collar locations later surveyed by Desert West Land Surveys of Burley, Idaho, at the direction of Noranda.

### 6.5.7 Noranda 1986-1990

Noranda drilled 532 RC holes and four metallurgical core holes over four years, for a total of 51,616 metres (Table 10.1). Typically, one or two truck- or track-mounted RC drill rigs were utilized, depending on access-road conditions. Some holes were drilled dry and others were drilled with water injection.

Boyles Bros. Drilling Company of Salt Lake City was the drilling contractor in 1987 for PQ-size core drilling. Eklund was the contractor for most of the 1988 drilling, with some RC drilling by Hard Rock Mineral Drilling Company of Fort Collins, Colorado at the end of the year. Dateline Drilling Inc. (“Dateline”) of Missoula, Montana provided some RC drilling in early 1989, followed by Modern International Inc. of Elko, Nevada, who used a track-mounted RC rig used for most of their 1989 drilling.

The locations of Noranda’s holes, as well as some holes drilled earlier by other operators, were surveyed by Desert West Land Surveys of Burley, Idaho using a Lazer Theodolite survey instrument; Grey Eagles Surveys also surveyed some collars.

### 6.5.8 Pegasus 1990-1997

Pegasus drilled 57 holes in 1990, 88 holes in 1991, 243 holes in 1992, 284 holes in 1993, 244 holes in 1994, 103 holes in 1995, 73 holes in 1996, and six holes in 1997, for a total of 117,601 metres. All were drilled with RC methods, with the exception of 16 core holes. Samples were collected over 1.52-metre intervals and assayed at the Black Pine mine laboratory. Little information is available about drill contractors used by Pegasus. Dateline and Hackworth Drilling Inc. of Elko, Nevada drilled the RC holes in 1992 and 1993. In 1995, O’Keefe Drilling Company of Elko, Nevada drilled wet RC holes using 14.0-centimetre hammer bits and 13.7-centimetre tricone bits.

### 6.5.9 Western Pacific 2011-2012

Western Pacific drilled 38 RC holes in two campaigns, for a total of 7,219 metres. Drill logs are available for holes 1 to 31, but logs for holes 32 to 35 are missing from the data files. Holes 36, 37, and 38 were not logged and no assay data for these holes are available. After completion of the holes, the collars were marked with stamped brass tags fastened onto a steel wire, and their locations were surveyed by an unknown method.

The drilling was conducted by Envirotech Drilling LLC of Winnemucca, Nevada. All drill samples were collected at the rig using a wet splitter.

### 6.5.10 Summary Statement – Historical Drilling

The predominant down-hole length of the drill samples in the resource database is 1.52 metres (5 feet), with 96% of the historical sample intervals with gold analyses in the resource database having this length. Other sample intervals are predominantly 3.05 metres (10 feet) or 6.1 metres (20 feet) (<2% each), with the small percentage of the remaining intervals having varied lengths. No sample intervals exceeding 3.05 metres in length were used in the estimation of the project resource grades. With these intervals excluded, the historical sample lengths are appropriate for the style of mineralization at Black Pine.

Although surveys of the historical drill-hole collars are limited, Liberty Gold has carefully checked the transformed database locations against historical aerial photos and drill-hole plan maps. MDA completed similar checks. Two holes were found to be mislocated, and these were corrected. While the locations of some of the historical holes in the resource database undoubtedly have errors, the verification steps undertaken by Liberty Gold serve to significantly limit the magnitude of these potential inaccuracies.

There are no down-hole survey data in the resource database for the historical holes. This lack is not unusual for projects drilled prior to the 1990s, especially considering the shallow depths of most of the drilling. Only 5% of the historical holes were drilled at angles of -75° or shallower, with a similar percentage having down-hole depths in excess of 150 metres. Hole deviations are typically limited for near-vertical holes, as well as for holes drilled to shallow depths. Mr. Gustin does not believe the level of uncertainty imparted by the historical drill-hole locations and lack of down-hole deviation data is a significant issue at Black Pine.

Historical references to “percussion drilling” are not clear as to whether the holes were drilled by RC or conventional rotary methods. While both drilling methods can experience down-hole contamination issues, RC can be superior to conventional rotary under certain drilling conditions. This topic is further discussed in Section 10.6.

Mr. Gustin is unaware of any drilling, sampling, or recovery factors that could materially impact the use of the historical drill-hole data in the estimation of the current project resources.

## 6.6 Historical Resource and Reserve Estimates

A number of estimations of mineralized materials at the Black Pine project were carried out by historical operators, only a few of which are summarized herein. Most of the mineralized materials included in these historical estimates was subsequently mined.

The classification terminology is presented as described in the original references. It is not known if this terminology conforms to the meanings ascribed to the Measured, Indicated, and Inferred mineral resource classifications, or the Proven and Probable reserve classifications of the Canadian Institute of Mining, Metallurgy and Petroleum's "CIM Definition Standards - For Mineral Resources and Reserves, Definitions and Guidelines" ("CIM Standards"). All of the estimates were originally reported in Imperial units of measure, and these units are retained for historical accuracy.

Prochnau (1985) carried out a "reserve estimate" for Noranda in the course of evaluating the Black Pine property for potential acquisition. The Tallman Pit area was divided into three zones (Tallman Pit, South Ore Body and North Ore Body). Using a polygonal estimate with a cutoff grade of 0.03 oz Au/ton, a tonnage factor of 13 $ft^3$/ton, and no dilution, Prochnau (1985) estimated "reserves" of 434,000 tons at a grade of 0.068 oz Au/ton. Other key assumptions, parameters and methods used to prepare this estimate are not known. The classification of these reserves differs from the CIM Definition Standards, but the extent and nature of these differences is not known. Mr. Gustin does not believe the historical estimate could be upgraded to current mineral resources or mineral reserves, as at least a portion of the historically estimated material was subsequently mined. This estimate is relevant because it provides some information as to the potential grade of small quantities of mineralized material at Black Pine. Mr. Gustin has not done sufficient work to classify the historical estimate as current mineral resources or mineral reserves, and Liberty Gold is not treating this historical estimate as current mineral resources or mineral reserves. This historical estimate should not be relied upon.

Noranda outlined "reserves" for various deposit areas at Black Pine as summarized in Table 6.4 (Noranda, 1989).

**Table 6.3 Mid-1989 Noranda "Reserves"**

| Deposit | Classification | Tons | Grade (opt) | Gold (ounces) |
|---|---|---|---|---|
| Tallman, A, B | Proven | 5,357,000 | 0.040 | 163,200* |
| Tallman, A, B | Probable | 1,016,000 | 0.040 | 30,900* |
| C, D, E | Drill Indicated | 3,597,000 | 0.057 | 155,900* |
| A-west | Proven** | 2,753,000 | 0.025 | 68,800* |
| G, A-south, J | Drill Indicated | 2,381,000 | 0.035 | 62,800* |
| Total | | 15,094,000 | 0.040 | 481,600* |
| Total in-ground | | | | 633,700 |

** = recoverable gold ounces*
*** = "sub-economic"*

The key assumptions, parameters and methods used to prepare these estimates are not known. The classification of these reserves differs from the CIM Definition Standards, but the extent and nature of these differences is not known. These estimates are not subject to upgrading to become current mineral resources or mineral reserves because a significant quantity, if not all, of the estimated materials were subsequently mined out. These estimates are relevant because they represent estimates of Black Pine mineralization prior to the initiation of the historical open-pit mining operation. Liberty Gold is not treating these historical estimates as current mineral resources or mineral reserves, and the estimates should not be relied upon.

### 6.6.1 Pegasus Historical Reserve Estimates

Pegasus produced a number of estimates of "reserves", "mineralized material", and "additional mineralized material" from 1991 through 1996 as summarized in Table 6.5. The key assumptions, parameters and methods used to prepare these estimates are not known. The classification of these estimates differs from the CIM Definition Standards, but the extent and nature of these differences is not known. These estimates are not subject to upgrading to become current mineral resources or mineral reserves, because a significant quantity, if not all, of the estimated materials were subsequently mined out. These estimates are relevant because they represent Pegasus' estimates of Black Pine mineralization during the historical open-pit mining operation. Liberty Gold is not treating these historical estimates as current mineral resources or mineral reserves, and the estimates should not be relied upon.

**Table 6.4 1990s Pegasus Historical Reserve Estimates**

| Area | 1991 | | 1992 | | 1993 | | 1994 | | 1995 | | 1996 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ounces | oz Au/ton | ounces | oz Au/ton | ounces | oz Au/ton | ounces | oz Au/ton | ounces | oz Au/ton | ounces | oz Au/ton |
| Tallman Pit | 68,487 | 0.023 | | | | | | | | | | |
| B Pit | 88,731 | 0.036 | 47,826 | 0.048 | 18,876 | 0.036 | | | | | | |
| A Pit | 181,345 | 0.019 | 181,345 | 0.02 | 249,840 | 0.018 | 49,667 | 0.19 | | | | |
| E Pit | | | 67,655 | 0.07 | 58,770 | 0.057 | 50,981 | 0.072 | | | | |
| B Extension | | | 39,471 | 0.023 | 25,106 | 0.026 | | | | | | |
| C/D | | | 125,600 | 0.022 | 61,600 | 0.027 | 155,700 | 0.016 | 94,768 | 0.015 | 6,539 | 0.014 |
| A Basin | | | 50,500 | 0.03 | | | | | | | | |
| J Anomaly | | | | | 20,300 | 0.025 | | | | | | |
| I Pit | | | | | | | | | 21,410 | 0.014 | | |
| NE Tallman | | | | | | | | | | | 26,320 | 0.017 |
| **Internal Documents** | **338,563** | **?** | **336,297** | **0.026** | **415,809** | **0.02** | **256,358** | **0.019** | **116,178** | **0.015** | **32,859** | **0.0165** |
| Annual Report | | | 336,297 | 0.026 | 346,000 | 0.018 | 256,000 | 0.019 | 116,000 | 0.015 | 29,959 | 0.017 |
| Mineralized Material* | 271,839 | 0.023 | 242,878 | 0.022 | 32,950 | 0.023 | 41,000 | 0.016 | | | 24,702 | 0.0135 |
| **Mineralized Material* + Addl. Mineralized Material*** | **271,839** | **0.023** | **242,878** | **0.022** | **32,950** | **0.023** | **421,000** | **?** | **420,417** | **0.013** | **443,802** | **0.013** |
| **All Mineralization** | **610,402** | | **579,175** | | **448,759** | | **677,358** | | **536,595** | | **476,661** | |

*Mineralized Material defined as "within a floating cone or whittle pit that is not included in the current mine plan, or that needs better sampling to better define the zone."

**Additional Mineralization defined as "all material within the computer block model at the measured/indicated level of geologic confidence but outside the current defined pits used for reserve definition. At Black Pine, some of this mineralization is surrounding mined-out pits and has a very low chance of becoming a future reserve." (Pegusus Gold Interoffice Memorandum, January 23, 1997)

In February 1997, late in the Black Pine mine life, "reserves" were estimated to be 1.8 million tonnes with a grade of 0.58 g Au/t, with "additional mineralized material" that totaled 1.7 million tonnes at a grade of 0.46 g Au/t (Metals Economics Group Report, 2012, quoting a 2/19/97 Pegasus press release). Key assumptions, parameters, and methods used in these historical estimates are not known. The classification of these reserves differs from the CIM Definition Standards, but the extent and nature of these differences is not known. Mr. Gustin does not believe that these estimates can be upgraded to current mineral resources or mineral reserves, as the economic conditions and relevant costs that form the basis of the estimates are dated, and the key assumptions, parameters, and methods used in these historical estimates are not known or understood. These estimates are considered relevant because they represent the mine operator's estimation of materials that remained very late in the mine life. Mr. Gustin has not done sufficient work to classify the historical estimates as current mineral resources or mineral reserves, and Liberty Gold is not treating these historical estimates as current mineral resources or mineral reserves. These estimates should not be relied upon.

## 6.7 Past Production

The Silver Hills, Ruth, Mineral Gulch, and Hazel Pine mines, all within the current property boundary, were located along the eastern edge of the Black Pine Mountains and operated between approximately 1915 and 1920, with the Silver Hills mine producing until 1932. Production was mostly on the order of a few tens to hundreds of tonnes from veins containing quartz, tetrahedrite, sphalerite, jamesonite, pyrite, and oxides of copper, zinc, antimony and iron (Anderson, 1931; Brady, 1984).

According to Prochnau (1985), the Virmyra Mining Company operated the Tallman pit from 1949 through 1955. Gold production from this operation was estimated to be 109,000 tonnes with an average gold grade of 5.14 g Au/t (Hefner et al., 1991). The ore was treated by cyanide vat leaching. The tailings from this operation contained an estimated 0.026 oz Au/ton (0.89 g Au/t), indicating recoveries of approximately 80% (Prochnau, 1985).

After acquiring the Black Pine property from Noranda in mid-1990, Pegasus constructed a cyanide heap-leach pad and gold recovery plant and began extraction of mineralized material from the Tallman pit in October 1991 (Pegasus 1993 Annual Report). The first gold was poured on January 9, 1992. Pegasus subsequently mined five additional pits through 1997. Material was mined from the open pits at a rate of approximately 37,000 tons (33,600 tonnes) per day and ROM ore was placed on a multiple-lift, valley-fill leach pad. Gold was recovered using carbon adsorption and doré bars were produced after solvent electrowinning. Approximately 26.5 million tonnes of waste rock and 31 million tonnes of ore were mined between 1991 and 1997 (Sawyer, undated).

Mining ceased at Black Pine in late 1997 and the heap-leach pad was subsequently rinsed and reclaimed (Sawyer, undated; Powell, 2012a). Table 6.6 summarizes the production reported by Pegasus in annual reports and SEC filings, which differ slightly from similar information found in other reports (e.g., Pegasus internal reports, Intierra website, Sawyer, undated).

**Table 6.5 1990s Production Summary of the Black Pine Mine**
(metric tonnes and grams)

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | Totals |
|---|---|---|---|---|---|---|---|---|
| *ROM Ore mined (tonnes 000's) | 2,850 | 3,270 | 5,810 | 7,050 | 8,730 | 2,650 | - | 30,360 |
| *Stripping ratio | - | 1.3 | 1.16 | 1.16 | 0.98 | 2.43 | - | 1.13 |
| *Average gold grade (g/t) | 0.55 | 0.82 | 0.69 | 0.72 | 0.52 | 0.55 | - | |
| *Gold recovery percentage | - | 80% | 54% | 59% | 60% | 61% | - | |
| **Ounces of gold to heap leach | 109,080 | 88,438 | 130,270 | 164,316 | 147,186 | 26,320 | | 665,610 |
| *Ounces of gold recovered | 48,700 | 66,100 | 65,700 | 108,500 | 87,900 | 44,100 | 13,800 | 434,800 |
| Calculated gold recovery | | | | | | | | 65% |
| *Ounces of silver recovered | 14,900 | 28,600 | 39,100 | 59,300 | 31,000 | 16,200 | - | 189,100 |

**from Pegasus Gold Annual Reports, SEC Form 10-K filings, and BPMI closure report by Sawyer et al.*
***from Pegasus Gold internal yearly production statements*

# 7.0 GEOLOGIC SETTING AND MINERALIZATION (ITEM 7)

The information presented in this section of the report is derived from multiple sources, as cited. Mr. Gustin has reviewed this information and believes this summary accurately represents the Black Pine project geology and mineralization as it is presently understood.

## 7.1 Regional Geology

The Black Pine property is located in the northeastern portion of the Basin and Range physiographic province, near the late Proterozoic rifted continental margin of North America. Rifting was followed by late Proterozoic and early Paleozoic subsidence, and accumulation of a thick sequence of continental margin siliciclastic and carbonate rocks ranging from near-shore sandstone and shale, to offshore carbonate reef and lagoonal deposits.

Beginning in the middle of the Paleozoic era, plate collisions from the west led to a series of intra-plate contractional orogenic events, starting with the emplacement of the Roberts Mountains allochthon ("RMA") in Late Devonian and Early Mississippian time. Although the RMA is located to the west of the Black Pine Mountains, it shed siliciclastic material into a foreland basin that stretched across much of what later became the eastern Great Basin, defined as the hydrographic region across the western United States that has no hydrologic connectivity to the ocean, including portions of Nevada, Oregon, Utah, California, Idaho, and Wyoming.

In Pennsylvanian time, the Humboldt orogeny (Theodore et al., 1998), affected areas to the west of Black Pine. In the Middle to Late Jurassic, much of the area along the Nevada-Utah border was affected by an orogenic event known as the Elko orogeny, characterized by thrusting and attenuation faulting, with local areas of low-grade metamorphism (Thorman and Peterson, 2004). It is not clear whether some of the folding seen at Black Pine can be attributed to this orogenic event, although the presence of a phyllitic cleavage locally in sheared Mississippian strata indicates that some rocks were affected by low grade metamorphism.

Subsequently, the Late Cretaceous Sevier orogeny resulted in development of widespread, primarily thin-skinned, east-vergent folds and thrust faults throughout the eastern Great Basin (e.g., DeCelles, 2004). There is some evidence that the Laramide orogeny may also have affected this region in latest Cretaceous-Paleocene time.

In the early Eocene, contractional deformation gave way to extensional deformation and intermediate to felsic volcanism across the Great Basin. Throughout most of the Cenozoic, extension involved movement along low-angle normal faults, with up to 100 kilometres of offset. Listric normal faults associated with these low-angle normal faults have tilted hanging wall strata as young as Miocene in age, generally in an eastward direction (e.g., Mueller et al, 1999).

The Black Pine Mountains lie in the hanging wall of the Raft River-Albion metamorphic core complex, located approximately 20 kilometres to the southwest. In this area, high-grade metamorphic rocks are separated from weakly or unmetamorphosed strata along a series of low angle detachment faults with top to the east displacement and likely 10s of kilometres of movement. The Black Pine Mountains is interpreted to lie in the hanging wall of one of these faults (Konstantinou et al, 2012). The faults were active between approximately 14 and 8 million years ago, thus likely post-dating gold mineralization.

The latest manifestations of extension are "Basin and Range" style block faults that divide the Great Basin into its characteristic horsts and grabens. Some of these faults are still active today.

The Black Pine Mountains are predominantly underlain by Devonian to Permian sedimentary rocks, some of which are weakly metamorphosed. These occur in two major structural blocks, separated by a fault which transects the range from southwest to northeast (Figure 7.1). The southern block, which includes the Black Pine project, consists largely of structurally interleaved members of the Permo-Pennsylvanian Oquirrh Group, including limestone, sandstone, dolomite, and siltstone. The Oquirrh Group is a regionally significant unit that hosts mineralization elsewhere in the northeastern Great Basin, for example, in the Bingham Canyon District (Shaddrick et al., 1991; Hintze, 1991). It is described in more detail below.

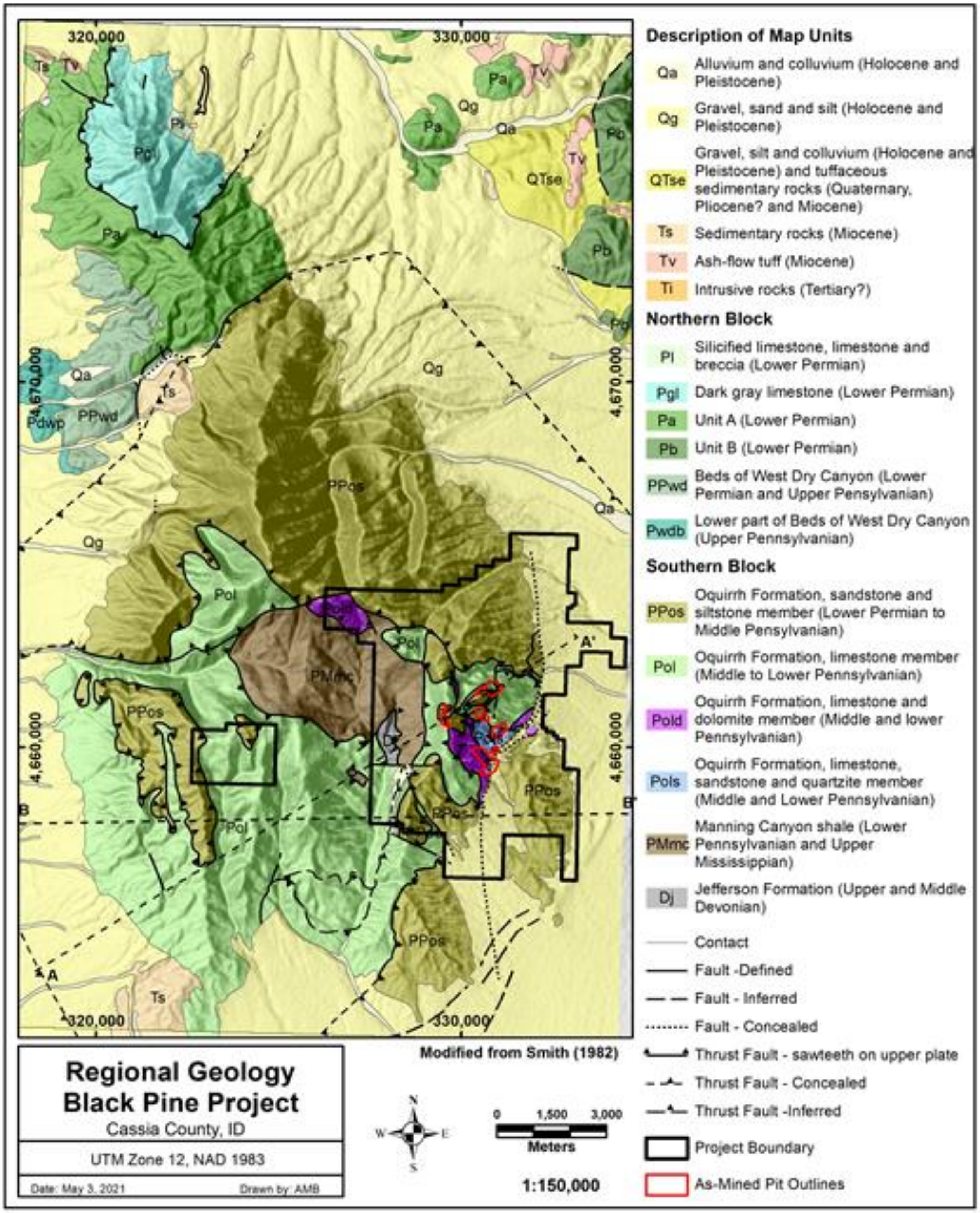
The southern block can be divided into three structural plates, bounded by low angle faults (Figure 7.1 and Figure 7.2). The lowest plate comprises the Devonian Jefferson Formation and the Upper Mississippian-Lower Pennsylvanian Manning Canyon Shale, which were deposited in the Antler orogenic foreland basin. The middle plate consists of structurally interleaved members of the Oquirrh Group, including limestone and minor dolomite, variably calcareous sandstone, and siltstone and quartzite, and it is of primary interest as a host rock for gold mineralization. The upper plate consists primarily of sandstone and siltstone of the upper portion of the Oquirrh Group. The lowermost plate is believed to structurally overlie a basement of weakly metamorphosed rocks of suspected Cambro-Ordovician age (Smith 1982; Figure 7.2).

The northern block is comprised of two thrust plates. The lower thrust plate consists of four informally-named stratigraphic units, ranging from Late Pennsylvanian to Early Permian in age, probably corresponding to the upper portion of the Oquirrh Formation. The upper plate consists of limestone and silicified limestone of Early Permian age.

Igneous rocks are not abundant in the Black Pine Mountains. The Paleozoic rocks have been intruded by a few small, altered, intermediate to mafic dikes and sills. Tertiary ash-flow tuff and a rhyolitic flow-dome overlie the Paleozoic rocks outside the property (Smith, 1982; Brady, 1984).

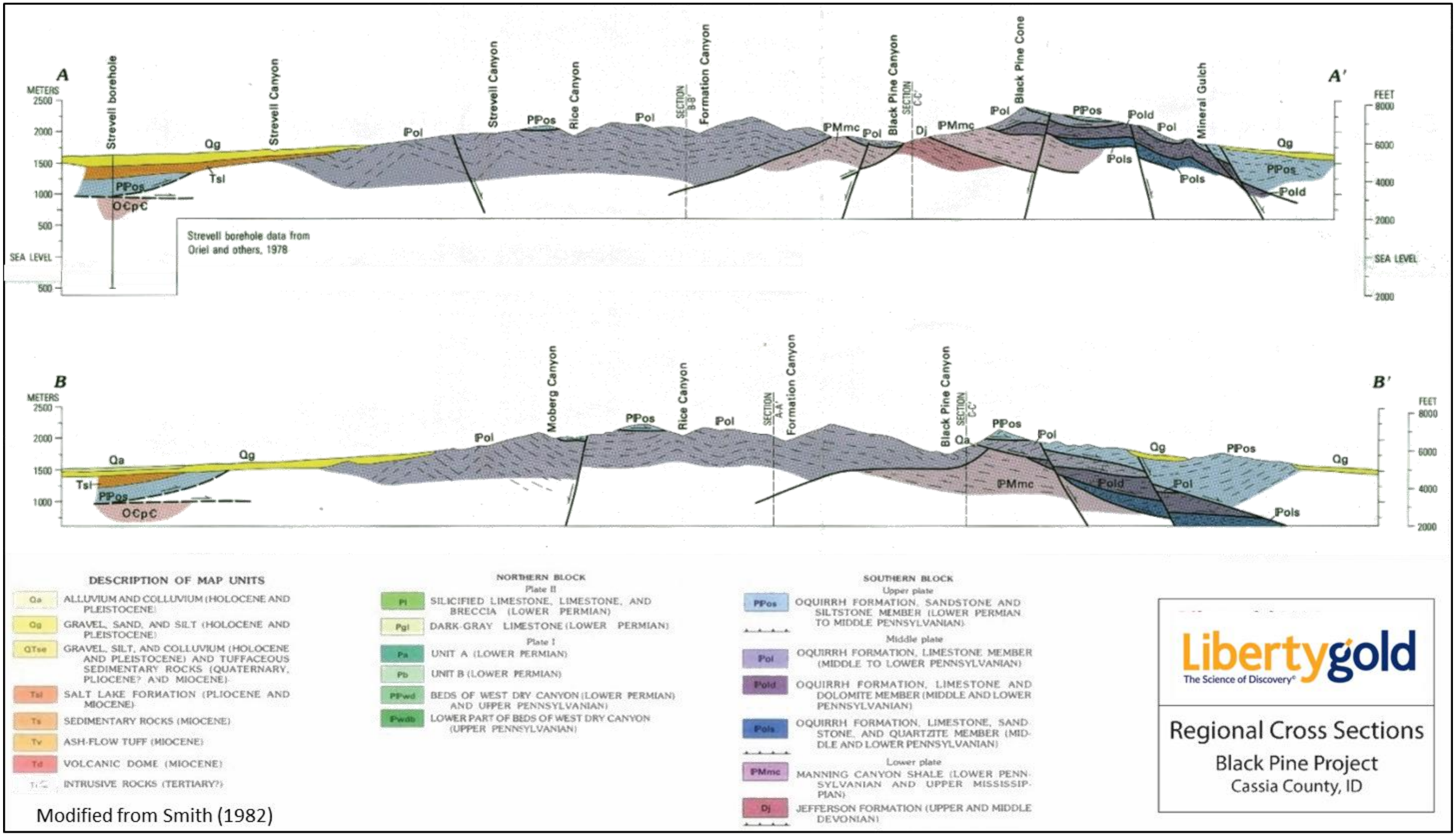
## Figure 7.1 Generalized Geological Map of the Black Pine Property

(modified from Smith, 1982; dashed black lines are cross sections shown in Figure 7.2)



## Figure 7.2 Schematic Cross Sections through the Black Pine Mountains

(lines of sections shown in Figure 7.1)

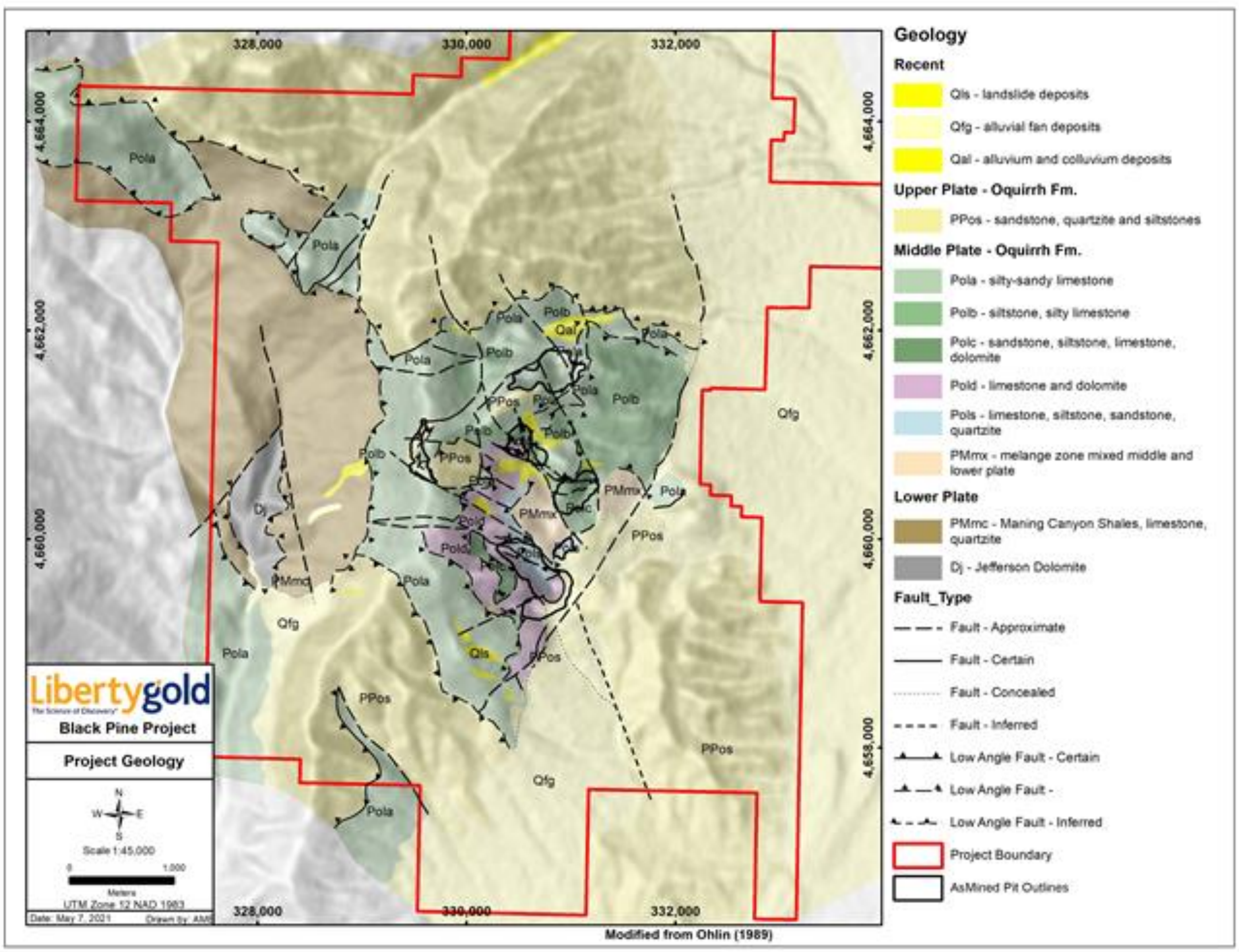


## 7.2 Property Geology

The Black Pine property is located within the southern structural block of the Black Pine Mountains where exposures consist of the lower plate units of the Jefferson Formation and Manning Canyon Shale, along with middle and upper plate units of the Oquirrh Formation, including weakly metamorphosed limestone and dolomite, silty and sandy limestone, calcareous sandstone and siltstone, quartzite, and shale (Figure 7.3).

The pre-Cenozoic strata shown in Figure 7.3 are strongly folded and cut by faults. All contacts between formations and units are interpreted or observed to be fault contacts (Smith, 1982; Liberty Gold internal files), making construction of a true stratigraphic sequence for the project area problematic, although fossil data do loosely constrain ages of the units (Smith, 1982, 1983).

**Figure 7.3 Geologic Map of the Black Pine Mine Area**
(from Liberty Gold, 2021)

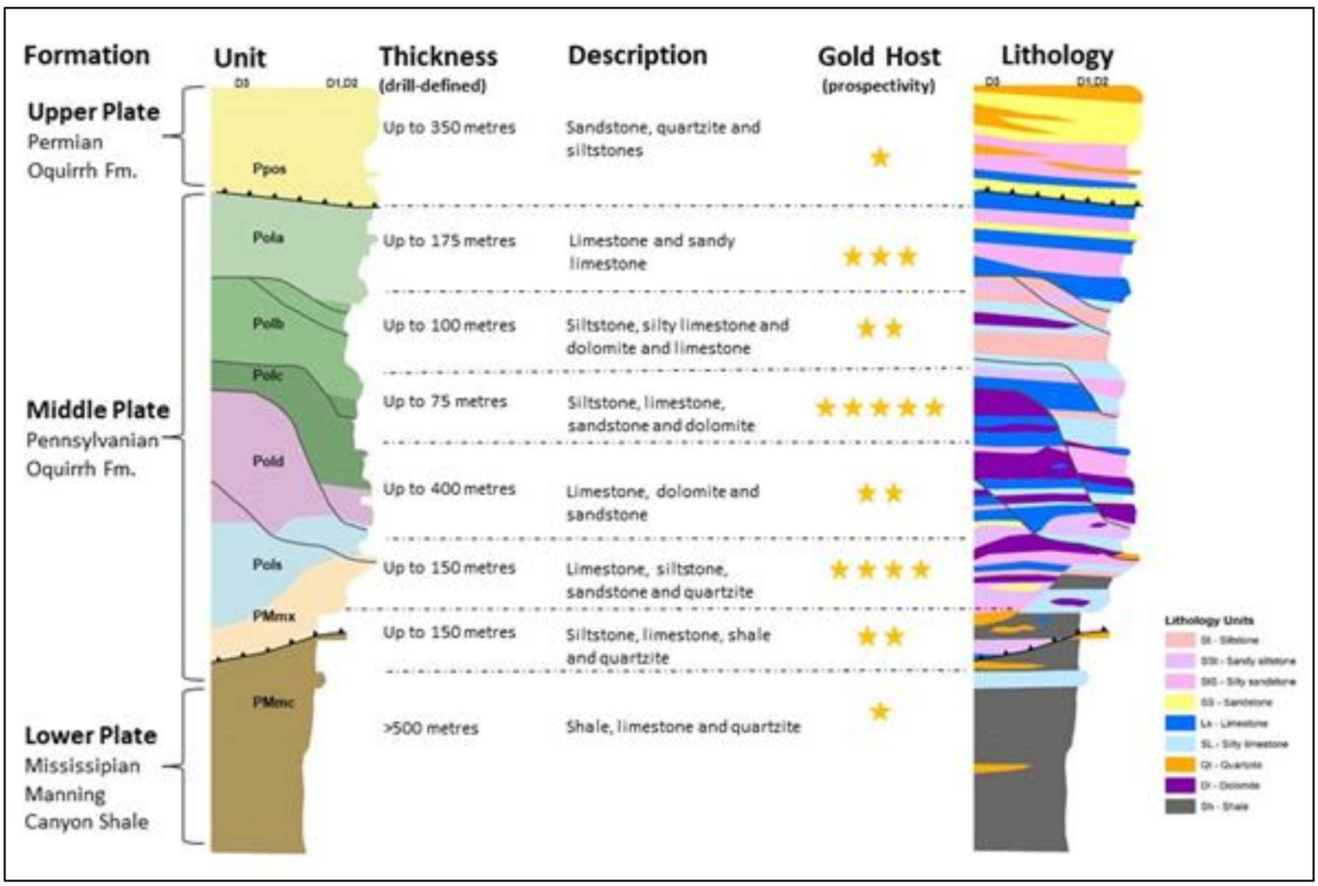


### 7.2.1 Stratigraphy

The stratigraphy in the project area records the transition from the top of the Devonian shelf and platform, through foreland-basin sedimentation associated with the mid-Paleozoic Antler orogeny, to basin and platform conditions that persisted throughout much of the late Paleozoic era. Figure 7.4 illustrates a simplified stratigraphic section for the property based on Liberty Gold mapping and drilling.

**Jefferson Formation (Dj):** The Jefferson Formation is the oldest stratigraphic unit exposed in the project area. It is Devonian in age, and consists of dolostone with minor sandstone and quartzite, representing very shallow water to intertidal conditions on the inner shelf, with some contribution of siliciclastic material from highlands to the east. It is found in the lower structural plate in the lowest-elevation areas in Black Pine Canyon in the western part of the property.

**Figure 7.4 Stratigraphic Column for the Black Pine Project Area**
(from Liberty Gold, 2021)




**Manning Canyon Shale (PMmc):** The Manning Canyon Shale consists of up to 2,000 metres of recessive-weathering, carbonaceous, dark grey to black argillite, shale and siltstone with minor quartzite and limestone. It is Late Mississippian in age in the Black Pine area (Smith, 1982). The Manning Canyon Shale formed in response to emplacement of the Roberts Mountains allochthon over areas to the west, reflecting foreland-basin sedimentation. It is present on surface in the lowest structural plate in the western part of the property, as well as in an area south of the historical Tallman and B pits. The upper contact of the Manning Canyon Shale is an important marker horizon in drilling, as it generally marks the bottom of the gold-bearing middle plate. In many locations, a weak phyllitic cleavage is present in shales along the upper (faulted) contact. In some areas, it is overlain by the PMmx member of the Oquirrh Group. When both units consist dominantly of carbonaceous shales, it can be difficult to distinguish the two units from one another. A distinguishing characteristic of the Manning Canyon Shale is the presence of elevated Cesium, which the PMmx unit lacks.

**Oquirrh Group:** The Oquirrh Group represents complex sedimentation patterns established over a long period of time with terrigenous input into a shallow basin and carbonate platform setting. Rocks assigned to the Oquirrh Group are present over much of the northwestern part of Utah and locally into southern Utah. In more well-studied portions of the Oquirrh Group, thicknesses and rock types vary significantly between adjacent mountain ranges, as well as between thrust sheets. In general, however, it consists of a lower Pennsylvanian unit dominated by limestone, a middle Pennsylvanian unit that is a mixture of quartz sandstone, shale, and limestone, and an upper Pennsylvanian/lower Permian unit dominated by quartz sandstone. These have been divided into a number of formations and members, depending on location.

The Oquirrh Group may range up to 5,000 metres thick in the Black Pine area, although interleaving and attenuation of the section by low-angle faults makes stratigraphic analysis extremely difficult. In the southern structural block in the Black Pine Mountains, Smith (1982), Loptien (1986), and Ohlin (1989) divided the Oquirrh Group into four informal members, three in the middle structural plate and one in the upper plate. Given that the rock descriptions and ages are overlapping, and the rocks are complexly interleaved along faults in and between the middle and upper structural plates (see Section 7.2.2), they may, in part, represent age-equivalent packages of rock that were subsequently brought into juxtaposition by faulting (Shaddrick, 2013).

*Pol - Limestone Member:* The Limestone Member of the Oquirrh Group is the thickest and most widespread of the three members of the middle structural plate. It forms the *structural* upper member of the middle plate and consists of a diverse assemblage of carbonate rocks, shale, siltstone and sandstone. This unit may be overturned (Smith, 1982) or may be stratigraphically continuous with the underlying Pold (Hefner et al., 1991). It is distinguished from the middle member of the middle plate by the first appearance of siltstone or sandy siltstone with interbedded limestone lenses. In the northeastern portion of the Black Pine Mine area, Liberty Gold recognizes the following submembers of the Pol unit, from stratigraphic/structural top to bottom of the sequence:

- P*ola:* Pola consists largely of medium gray, sandy limestone whose sandy texture is easily differentiated from Polb but harder to differentiate from overlying limy portions of the PPos. This unit has a "dirty" appearance due to the irregular mottled oxidation pattern of detrital sand grains in the limestone. Pola is thickly to massively bedded, with silty interbeds and rare dolomitic beds. In pit walls, the massive bedding and alternating thin interbeds are readily apparent. Black, recrystallized wavy calcite veins are common. This unit is typically highly fractured and brecciated. A 15-20 m-wide fault and breccia zone normally separates this unit from the underlying Polb. The contact with the overlying Ppos unit is often faulted, but may be stratigraphic, putting the Pola in the upper structural plate, rather than the middle plate.

- P*olb*: Polb is a diverse unit consisting mainly of calcareous to non-calcareous siltstone with thick to massive beds and lenses of limestone and dolostone. The non-calcareous siltstone is often a pale pinkish tan colour and strongly sheared. Overall this unit contains more evidence of ductile deformation than Pola, Polc or Pold (see structural geology section below). Where less affected by structural deformation Polb can host homogenous intervals of siltstone up to 75 metres thick. The base of the Polb unit often contains lenses of black, graphitic siltstone (logged as Poc; see below).

- P*olc*: Polc is the basal unit of the Pol member of the Oquirrh Group. Polc can include nearly all lithological types in the middle plate, including calcareous siltstone, limestone, dolomite and sandstone, often in alternating, 1-10 m-thick beds. However, the dominant rock type is a brownish, massive calcareous siltstone.

The Pola, b, and c members in the southwestern portion of the Black Pine Mine area (south and west of the CD and I pits) have not been studied in as much detail, but the section appears to be much more homogeneous than in the northeastern area, and consisting of thin to medium bedded limestone with interbeds of calcareous siltstone (equivalent to Polb and Polc?), becoming thicker-bedded and more limestone-dominant (Pola?) up section.

*Pold – Limestone and Dolomite Member*: This middle member of the middle structural plate is characterized by thick-bedded to massive, cliff-forming silty to sandy limestone and dolostone, limestone breccia, and local beds of sandstone and siltstone. The contact with the overlying Pol appears stratigraphic where exposed in roadcuts south of the CD pit, though elsewhere it is commonly faulted (Hefner et al., 1991); others believe that the contact is not conformable (Smith, 1982). The contact with the lower Pols member of the middle plate is faulted. The Pold member is up to three hundred m thick in the southwestern part of the Mine area, but thins dramatically and is discontinuous to the north and east, reflecting attenuation along a low angle normal fault or faults.

*Pols – Limestone, Sandstone and Quartzite Member*: This unit consists dominantly of thin-bedded to massive calcareous siltstone alternating with thick beds of silty and sandy limestone, with minor lenticular beds of calcareous sandstone and quartzite. Wavy bedding, crossbedding, and ripple marks characterize the limestone (Smith, 1982; Ohlin, 1989). The age is given as Early to Middle Pennsylvanian. Where exposed, the top and bottom contacts of the Pols Member are faulted. It is not present everywhere, suggesting that it has been faulted out along the lower plate contact.

*PPos – Sandstone and Siltstone Member*: This unit, comprising the upper structural plate, consists dominantly of poorly-sorted, quartz-rich, calcareous to non-calcareous sandstones and siltstones with minor silty, bioclastic limestone lenses. Calcite-cemented breccia zones and extensive fracturing are extremely common. It is brownish-weathering and relatively distinctive due to its structural position and relative lack of limestone, and appears to correlate with the upper, sandstone-dominated formations in the Oquirrh Group in more well-studied areas to the south (Smith, 1983). On this basis, it is assigned an age of Middle Pennsylvanian to Early Permian. This unit is at least several hundred m thick in the southern Black Pine Range and north of Mineral Gulch. It forms isolated klippe at the highest elevations in the central Mine area and flanks a dome of older rocks to the north, east and south of the Mine area.

In the Rangefront target area, the upper portion of the PPos unit contains a grey limestone unit with thin to thick bands of brown weathering sandy and silty limestone.

### Rock Types Not Associated With Specific Stratigraphic Intervals

Several rock types are logged in RC chips that cannot necessarily be correlated with discrete stratigraphic units, either because, as defined, they occur more than once in the stratigraphic sequence or because they are partly structural and/or hydrothermal in nature. These include:

- P*oc:* A unit consisting of dark grey to black, carbonaceous, variably calcareous siltstone. This unit is commonly found at the base of the Polb unit, where it ranges in thickness from 0 to locally over 200 metres in the northeastern part of the Black Pine Mine area. While carbonaceous material can be found throughout the stratigraphic section, this unit is more persistent, and can be a useful marker horizon. The Poc unit is also commonly located near the base of the middle plate (see below)

- *PMmx – Shale, Siltstone, Sandstone, and Quartzite Mixed Member*: This unit, recognized through drilling and geochemical analysis, is interpreted as a fault mélange containing a mix of rock types, consisting of lower plate carbonaceous shales and middle plate siltstone, sandstone, quartzite and limestone. A phyllitic cleavage is often noted. Zones of carbonaceous siltstone (Poc) are also present. This unit is discontinuous and is often similar in nature to the Manning Canyon Shale. However, the Manning Canyon Shale can be distinguished by the presence of elevated Cesium relative to the PMmx.

- *Calfm – "Calcite Formation"*: This designation is applied to massive zones of primarily white calcite. It can include massive coarse calcite, marble and calcite breccia, often with two or more of these end members observed together. This unit designation is necessary given that most of the drilling is RC, where it is often difficult or impossible to discern the origin of the calcite.

### Cenozoic Intrusive Rocks

Narrow dikes and sills 0.1 to 2 metres in width have intruded the middle plate rocks in the Black Pine project area. They are typically up to a metre in width with chilled margins and range from aphanitic to finely porphyritic, with small phenocrysts of feldspar, hornblende, and biotite. Alteration typically consists of chlorite, sericite, and pyrite with some clay. At surface and in drill holes, the dikes are strongly oxidized to a deep orange-brown color and strongly sericitized. In outcrop, they can be seen as sills in the Pold unit in the C/D pit highwall, and as clasts in, and cross-cutting the large collapse breccia body in the highwall of the A pit. A single whole rock analysis returned an SiO2 content of 46.9%, suggesting that the rock is a lamprophyre or other ultramafic rock. However, the rock is relatively low in in Mg, Cr, and other elements that are normally elevated in lamprophyres. Additional whole rock analysis is necessary to further characterize these intrusive rocks.

A sample was sent to the University of Arizona Laserchron Laboratory for U-Pb zircon analysis. 30 small zircons were analyzed with a 20 micron laser spot using an Element single-collector ICPMS. Grains ranged in age from 226 to 2,580 Ma, more characteristic of entrained detrital grains than igneous grains.

Fine-grained, pale grey-green intrusive rock has been noted in drill chips primarily hosted in lower plate shales in some locations. These dykes are strongly clay or sericite altered, and may contain up to a few percent disseminated brassy pyrite. A sample was sent to the University of Arizona Laserchron Laboratory for U-Pb zircon analysis. 30 small zircons were analyzed with a 20 micron laser spot using an Element single-collector ICPMS. Grains ranged in age from 419 to 1,645 Ma, more characteristic of entrained detrital grains than igneous grains.

### 7.2.2 Structural Geology

As discussed above, there are three stacked structural plates at the Black Pine property: a lower plate, comprising the Jefferson Formation and Manning Canyon Shale; a middle plate comprising the Pol, Pold and Pols units of the Oquirrh Group, and an upper plate consisting of the PPos member of the Oquirrh Group. Shale and siltstone in the lower plate are sheared, and strata in the middle plate are very complexly structurally interleaved. The middle plate in the project area is approximately 100 to 500 metres in thickness, decreasing in thickness in all directions from a maximum thickness of approximately 500 metres near the E pit. Rocks of the middle plate show evidence of at least two major deformation events, including thrust faults and folds, overprinted by low- to high-angle normal faults.

#### Mesozoic contractional event(s)

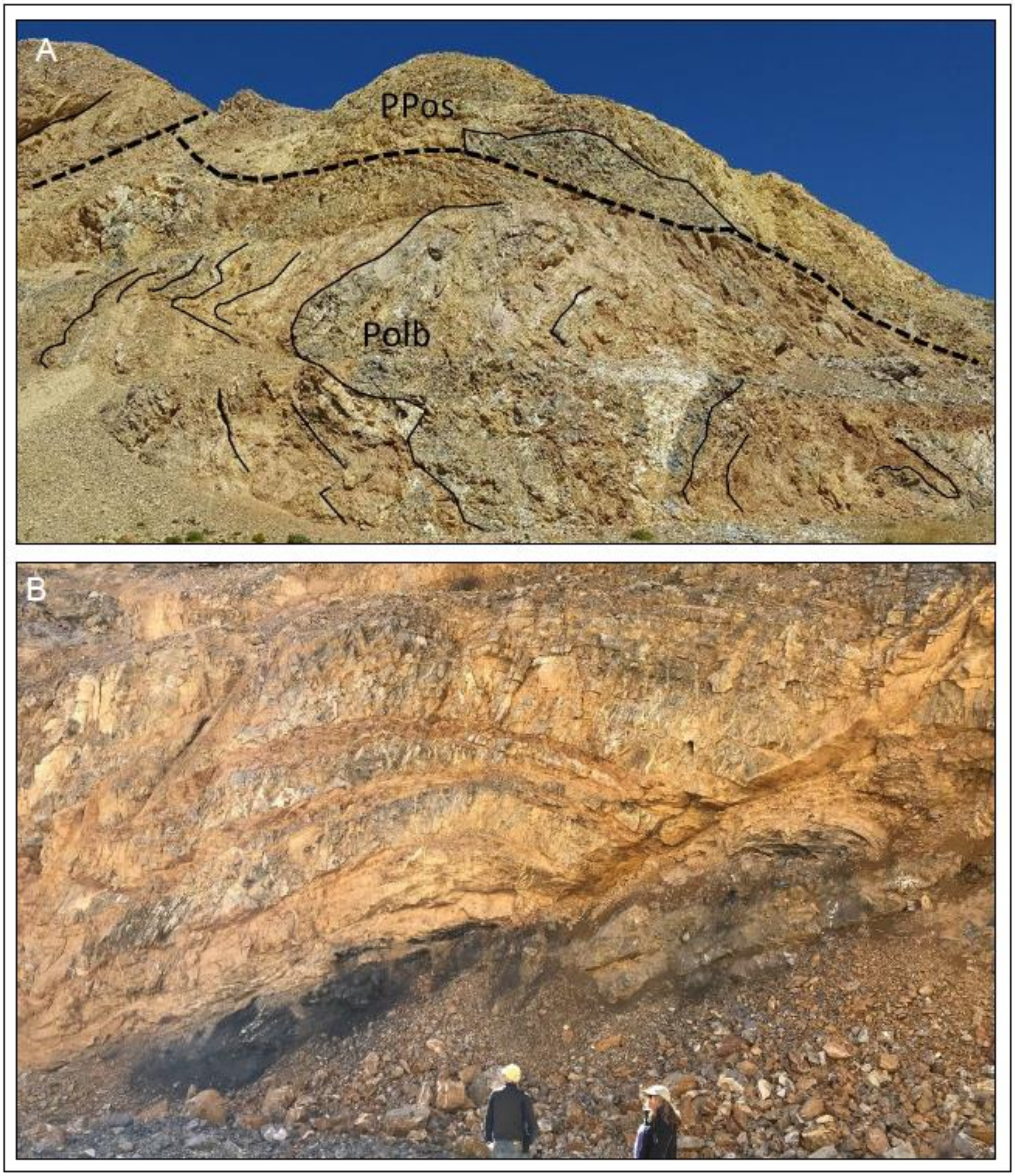
A polyphase, Mesozoic contractional event or events strongly affected rocks in the Black Pine Mountains.

Two contractional events of presumed Mesozoic age are noted at the Black Pine Property Figure 7.5). The first is manifested by: 1 to 30 metres scale, generally east- to northeast-vergent recumbent folds; weak axial-planar slaty to (rarely) phyllitic cleavage in silty to shaly rocks; and low angle, semi-ductile faults with reverse motion (as deduced from shear sense indicators, etc.). Higher strain zones are associated with areas of dominantly calcareous siltstone, such as in the Polb, Pols and upper PMmc units, whereas significantly less first-phase contractional deformation is recorded in more massive units such as the Pola and Pold.

The second phase of contractional deformation is manifested by open to tight, upright folds with rounded (in massive limestone) to chevron geometry (silty strata). Some folds appear to be drag folds located in the hanging walls of relatively flat, semi-brittle faults. Calcite veins perpendicular to beds are common in limestone, on a metre- to centimetre-scale. Sense of vergence is inconsistent across the property, suggesting that some of the faults could be back-thrusts associated with an otherwise northeast-vergent system. Property-wide, this deformation appears to be most prevalent in the Polc unit as observed in pit walls.

It is not known whether the two events represent a continuum or separate events. It is possible that both are associated with the Late Cretaceous Sevier Orogeny, which affected rocks throughout the eastern Great Basin and the Oquirrh Group in mountain ranges to the south and west of Black Pine. Another possibility is that the first event is associated with the mid-Jurassic Elko Orogeny (Thorman and Peterson, 2004) and the second with the Sevier orogeny.

## Figure 7.5 Styles of Mesozoic Folding




Styles of Mesozoic folding at Black Pine. A) First-phase recumbent folds with axial planar cleavage in limestone and siltstone of the Polb(?) unit in the E Pit highwall. View to the east. The upper plate Ppos sandstone is faulted over the top. B) Second phase open, upright fold with axial planar calcite veins in the hanging wall of a small thrust fault in the Tallman Extension Pit. View is to the southeast. The fault may be a back thrust, as sense of motion is to the southwest.

On a property scale, middle plate strata dip southward in the southern part of the property and northward in the northern part of the property, forming an open dome that is apparent in outcrop due to the presence of an over-thickened package of resistant massive dolostone and limestone beds in the Pold unit, possibly a result of duplexing during the first phase of folding. Stratigraphic units in the middle plate are faulted out against the lower plate contact, which does not appear to be folded.

### Cenozoic Extension

Episodic extension in the Great Basin commenced in the Eocene and persists to present day, accompanied by intermediate to felsic volcanism. Several major episodes of extension affect the Black Pine area, including:

- Eocene listric normal faulting and volcanism (likely timing of gold mineralization)
- Oligocene extension, deep metamorphism and plutonism
- Miocene unroofing of the Albion-Raft River metamorphic core complex along low angle detachment faults
- Basin and Range block faulting

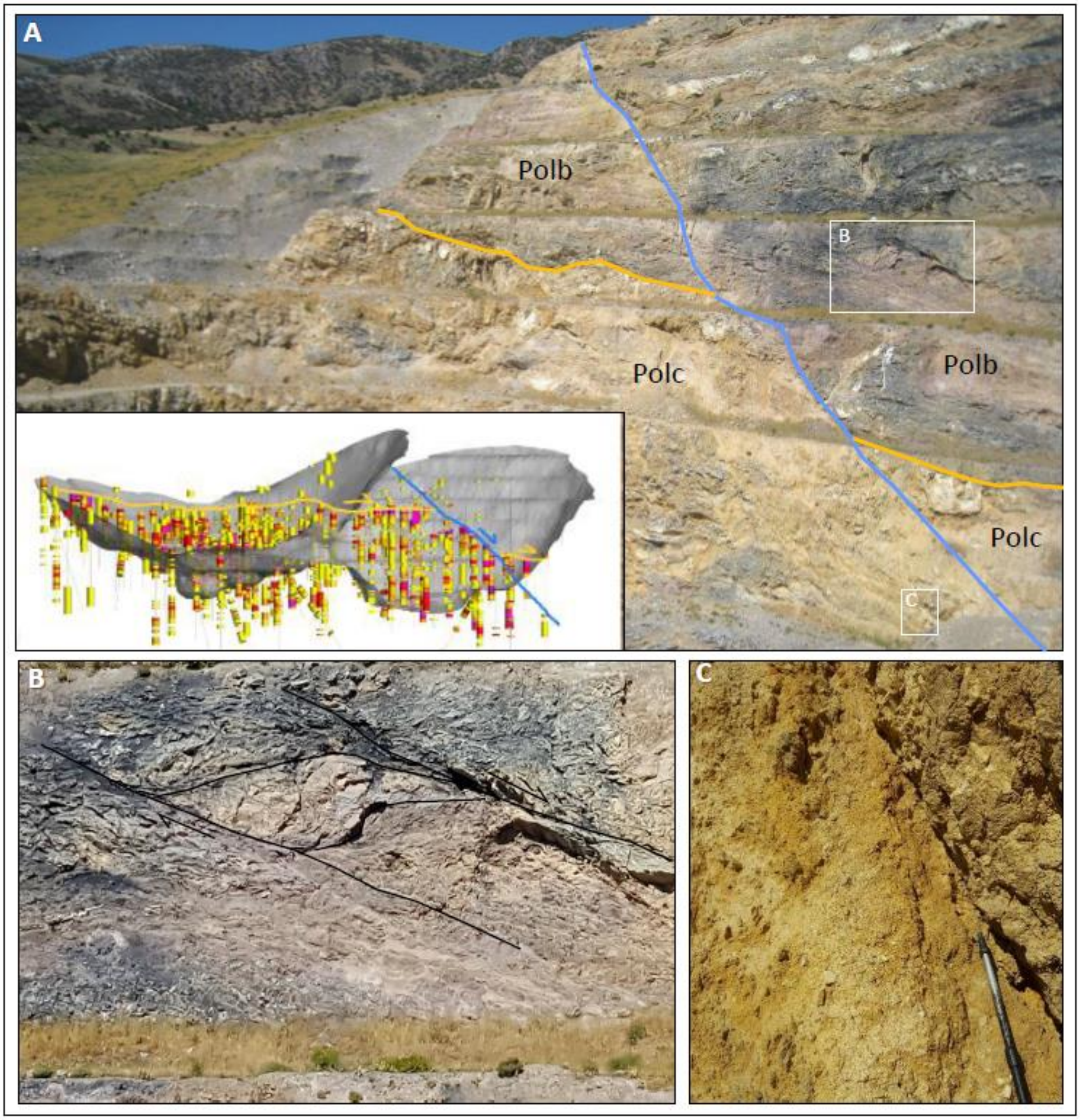
Elucidation of the structural framework of the mine area is hampered by a number of factors, including poor outcrop, almost exclusive use of RC drilling, relative lack of deep drill holes, lack of good marker beds and a large number of overprinting, largely coaxial episodes of contraction and extension. The structural model continues to evolve as more mapping and drilling is carried out.

*Eocene normal faults*: The normal faults of possible Eocene age in the project area are low to moderate angle, semi-ductile to brittle in nature and overprint the earlier contractional deformation (Figure 7.6). These faults are interpreted to be listric in nature and appear to exert significant control on the distribution of mineralization.

Two listric normal faults are interpreted to control mineralization over a wide area. One fault hosts mineralization in the D-1 zone along a relatively shallow, moderately NW-dipping segment of the fault, extending from north of A Basin to the Tallman Extension Pit. It is interpreted to flatten to the northeast, underlying the D-2 zone. A second, north-south striking listric normal fault is interpreted to underlie the D-3 zone, and may extend as far south as the CD Pit. It is interpreted to join the D-1 listric fault to the north. The fault has a relatively steep orientation along the west side of the D-3 zone, then shallows to the east, eventually soling into the lower plate contact. This fault may be responsible for a dramatic thinning of the Pold unit to the east.

*Oligocene – Miocene extension*: The Black Pine area was affected by two or more episodes of post-mineral normal faulting, including movement on faults related to unroofing of the Raft River-Albion metamorphic core complex, located to the west. Up to several kilometres of top to the east movement is postulated along one or more low angle detachment faults located between Black Pine and the Raft River Range, with related, down to the east listric normal faults tilting and extending strata in the hanging wall. It is possible that some of the normal faults in the Black Pine area may be related to this episode of extension, and that some or most of the movement along the middle plate – lower plate contact may be of this age as well. The latter would imply that the source of the gold mineralization may not be situated under the Black Pine Mine area at present, but may be located up to several tens of kilometres to the west.

**Figure 7.6 Examples of Normal Faults in the Tallman Extension Pit**




View to the northwest in the Tallman Extension Pit. A) the Polb unit low angle faulted contact with the Polc unit along a relatively low angle contact, which in turn is offset along a higher-angle, post-mineral fault. Inset map shows the distribution of gold, almost entirely within the Polc unit, which contains a high degree of internal brittle deformation. B) Detail of the pit wall showing semiductile shears with down to the east or northeast displacement in the Polb unit. C) Detail of post-mineral normal fault showing brittle gouge zone. Gold mineralization in this location is probably the result of entrainment in a post-mineral fault.

*Pliocene-Recent extension:* Basin and Range (Pliocene-Recent) faults are in evidence along the eastern range front. A large, steep to moderate east-dipping fault extends along the range front, bending southwest to extend along the southeastern edge of the C-D pit. This fault offsets stratigraphy in a down-to-the-east sense of displacement, and brittle, calcite- and silica-cemented breccias and gouge are in evidence in some locations. The fault is well-exposed in the south highwall of the CD Pit. A number of parallel faults are in evidence to the west of the fault in the Mineral Gulch area, and a number are inferred to exist to the east toward the range front south of the Black Pine access road.

## Breccias

Breccias are very common at Black Pine and are present on all scales, from centimetre- to pit wall-scale. Breccia types include:

*Collapse breccias*. Collapse breccias are widespread, and generally consist of angular, polymictic clasts ranging from cm sized to large blocks of limestone, dolostone, siltstone, sandstone, altered intrusive rock, calcite vein material and earlier breccias (Figure 7.7). Matrix, where present, consists of orange brown iron oxides and silty material. Abundant calcite cement is typically white and coarse-grained. Breccias range from clast supported to clasts floating in calcite cement and/or sandy matrix. Collapse breccias can be seen in pit walls and in drill holes on a cm to pit-wall scale. Collapse breccias are thought to be intimately related to hydrothermal alteration and gold mineralization through a process of “hydrokarst”, with progressive erosion and hollowing out of fault zones by acidic fluids, followed by collapse and cementation by calcite.

*Tectonic breccias*: Breccias are associated with late, low to high angle normal faults. These breccias contain milled clasts, are typically poorly indurated and accompanied by clay alteration and gouge.

*Crackle and Mosaic breccias*: Crackle and mosaic brecciation are almost ubiquitous throughout the Black Pine property, particularly in the PPos, Pola and Polc units. Fractures are cemented by calcite and iron oxide.

*Calcite breccias:* Breccias consisting almost entirely of clasts of white calcite, and cemented by white calcite and variable amounts of iron oxide, are common at Black Pine. Clasts range from angular to rounded, with a milled appearance. The genesis of these breccias is uncertain. In many cases, they appear to form relatively flat sheets that may correspond to calcite-filled fault zones. In other cases, the clasts appear to resemble marble. Additional observation and study is needed to describe and understand the genesis of these breccias.

**Figure 7.7 Collapse Breccia in the A Pit**


A large collapse breccia body occupies the southeast portion of the A pit. Limestone and dolomite clasts in a matrix of sand and calcite cement, giving way to nearly all calcite near the top of the body. Reddish-brown, elongate zones are lamprophyre(?) dikes, which crosscut the breccia, but can also be found as clasts in it. Inset: detail of breccia with angular limestone clasts in a sandy, calcite cemented matrix.

## Strain Partitioning and Tectonostratigraphy

As the foregoing indicates, strain partitioning is observed within and between the different members and submembers of the Middle Plate, with each member or submember characterized by the presence or prevalence of different structural fabrics on a meso-scale:

- Pola consists primarily of panels of massive to thick-bedded limestone beds that are cut and offset on low-angle thrust and normal faults. The limestone is also strongly fractured, with steep calcite veins.
- Polb consists largely of calcareous to non-calcareous siltstone with thick beds of limestone and dolomite. Polb is thus a relatively high-strain zone due to preponderance of "weak" siltstone. Recumbent folds are common in this unit, along with low angle thrust and normal faults. The dominant structural fabric is relatively low angle and ductile to semi-ductile in nature.
- Polc, consisting of alternating beds of non-calcareous siltstone, limestone and dolomite is characterized by the presence of low to moderate angle thrust faults with second phase folds, and

brittle structures including moderate to high angle brittle normal faults, jointing and widespread brecciation.

- Pold consists largely of massive limestone and dolostone. Where the Pold member forms thick, resistant outcrops in the core of the Black Pine gold system, it is characterized by low-strain zones showing relatively little evidence of internal folding or faulting, with the exception of some bedding-parallel, low angle normal or reverse faults such as observed in the C-D Pit highwall.
- Pols, consisting of silty limestones and calcareous siltstone, is rarely observed in outcrop, but where exposed in the C-D pit, it can be seen to contain tight, recumbent folds.

Gold mineralization can be found in all of the middle plate units, but is particularly well-developed in the Pola and Polc members, both characterized by the presence of areas of significant brittle deformation.

## 7.3 Alteration

Strata throughout the Black Pine Mine area are weakly to strongly hydrothermally altered and contain widespread gold mineralization over the entire thickness of the middle plate, and over an area measuring at least 14 $km^2$. In general, the rock types with higher porosity, permeability and geochemical reactivity, such as calcareous siltstone and sandstone, and a higher degree of brecciation, are more strongly altered.

Alteration types closely associated with gold mineralization include:

*Decalcification:* Defined as the removal by dissolution of calcite from the matrix of a carbonate rock, some degree of decalcification is common within gold-mineralized rocks. The highest gold grades are found in calcareous siltstone and sandstone, where decalcification forms spongy, porous zones with relatively low specific gravity. Selective decalcification is present along bedding planes, fractures and breccias. Large bodies of collapse breccias are present in the B Pit, A Pit and A Basin area, the end result of dissolution of more massive limestones and dolomites along faults, etc. and subsequent collapse of the resulting cavities (Figure 7.7). Sanding is observed locally in dolomitized rocks, a result of removal of calcite cement around dolomite rhombs.

*Silicification:* Silicification is present throughout the mineralized zones, but it rarely manifests as discrete zones of jasperoid. Silicification is far more common as areas of very weak, non-texture-destructive silicification in calcareous siltstone and sandstone, and as small (dm-scale) patches of more well-developed silicification or jasperoid locally.

*Marblization:* Zones of bleaching and recrystallization of grey limestone to a medium to coarse-grained marble are present throughout the Mine area, but are most common to the north in the northern D1 zone and A basin area, apparently in relation to large, variably brecciated, calcite veins. The marbleized zones can be distinguished from the veins by the preservation of relict bedding in the marble. This phenomenon is not spatially related to gold mineralization, but these zones are often located adjacent to zones of mineralization.

*Clay alteration:* Lithologic types such as siltstone and shale, or rocks containing a significant component of fine silt, are clay altered to some degree. The clay species have not been investigated, but it is likely that the clay is largely illite, based on analogy to other Carlin-type gold systems.

*Carbon:* Carbonaceous material is present to some degree in all calcareous rock types, particularly those with a high component of silt, and is probably derived from organic material incorporated when the rocks were deposited. Carbonaceous material is notably present in the Poc unit at the base of the Polb submember, in the PMmx unit and in the lower plate shales, forming bedding-parallel, tabular lenses. Carbonaceous material is also present as irregular small lenses throughout the middle plate, particularly in high-strain areas, suggesting that the carbonaceous material was mobilized and deposited in these locations. The stratigraphic carbonaceous zones rarely contain significant gold, but the irregular lenses may contain gold mineralization.

*Iron Oxide:* Virtually the entire rock mass in the middle and upper plates, with the exception of some massive limestones, contains at least some iron oxide, primarily “limonite” and goethite with minor hematite and jarosite, an indication of the original presence of pyrite and the degree to which most of the rock mass is thoroughly oxidized. Iron oxide ranges from disseminated in porous siltstones to fracture controlled in more massive rocks. Visually, the amount of iron oxide in the rock can be used as an indication of the presence of gold in the rock, with increasing amounts of iron oxide generally a favourable indicator of gold.

*Calcite:* Coarse, white calcite is ubiquitous throughout the Black Pine Mine area as veins, veinlets, breccia cement and breccia clasts. In some cases, calcite forms both the clasts and cement in some breccias. While a large amount of calcite is generally associated with lower gold grades, its presence in large quantities is a good indication of gold in adjacent rocks. Preliminary study of calcite fluorescence suggests that there are several distinct phases of calcite veining.

## 7.4 Gold Mineralization

### 7.4.1 Style of Mineralization

Gold mineralization, consisting of finely-disseminated, micron- and submicron-size gold particles, is hosted in middle plate, calcareous shale and siltstone, as well as fault and dissolution/collapse and tectonic breccias and zones of heavy fracturing developed in more massive limestone and dolomite. Gold mineralization is enhanced where these favourable stratigraphic units intersect, or lie along, large, pre- to syn-mineral, primarily listric normal faults. Gold was likely hosted within the lattice of arsenical pyrite rims on pyrite grains, but the mineralized rocks are now thoroughly oxidized, such that gold is present as “free” gold, associated with goethite, hematite, limonite, barite, calcite, quartz and rare scorodite. Gold-bearing rocks are typically strongly decalcified and weakly clay altered, with areas of weak to (rarely) moderate silicification. Areas of calcite veining or calcite-cemented breccias are common, probably as a result of decalcification. Lenses of carbonaceous material, either remobilized or concentrated by decalcification, are locally present. The alteration, gold mineralization, host rocks, and geochemical associations are consistent with a Carlin-style deposit model (Section 8.0).

Reflected-light microscopy has shown that native gold occurs in quartz and calcite veins, in hematite pseudomorphs after pyrite, and along grain boundaries (Hefner et al., 1991). In (rare) unoxidized material, an electron microscope is required to detect the gold grains, which are commonly less than 0.5 microns in diameter (Brady 1984). Gold is disseminated in clayey or silty matrix of clastic rocks and micrite groundmass of limestone. Carbon is locally present as both graphite and organic matter; gold is associated with organic matter in both clastic and carbonate sedimentary rocks.

Geochemically, gold shows an association with the typical Carlin pathfinder trace elements of arsenic, antimony, mercury, thallium, and tellurium, which are all elevated in the presence of elevated gold. However, while some samples with high gold grades do have a correspondingly high arsenic or antimony values, these elements do not always correlate strongly and sometimes even correlate negatively, possibly a result of mobility of the elements in the supergene environment. A correlation matrix between 117 Western Pacific and 139 Liberty Gold rock samples containing greater than 0.1 g Au/t and a suite of pathfinder elements (Figure 7.8) shows strong positive linear correlations between gold and tellurium and mercury, and weak to nearly negative correlations with arsenic, thallium, and antimony, typically strong Carlin-style pathfinder elements. There are no recognized alteration or spatial patterns to these positive or negative correlations between gold and the trace elements. Silver-copper-lead-zinc mineralization has a strong correlation with arsenic, antimony, mercury, and selenium.

**Figure 7.8 Geochemical Correlation Matrix**

(from Liberty Gold, 2021; Western Pacific and Liberty Gold rock samples containing >0.1 g Au/t)

| | Au_ppm | Ag_ppm | As_ppm | Ba_ppm | Bi_ppm | Cu_ppm | Hg_ppm | Pb_ppm | Sb_ppm | Se_ppm | Te_ppm | Tl_ppm | Zn_ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Au_ppm | 1 | | | | | | | | | | | | |
| Ag_ppm | 0.08594 | 1 | | | | | | | | | | | |
| As_ppm | 0.145795 | 0.386492 | 1 | | | | | | | | | | |
| Ba_ppm | 0.017894 | 0.057045 | 0.16161 | 1 | | | | | | | | | |
| Bi_ppm | 0.162439 | 0.375129 | 0.222959 | 0.053167 | 1 | | | | | | | | |
| Cu_ppm | 0.047508 | 0.786782 | 0.338202 | 0.126559 | 0.281439 | 1 | | | | | | | |
| Hg_ppm | 0.128402 | 0.663497 | 0.392043 | 0.037648 | 0.399398 | 0.419115 | 1 | | | | | | |
| Pb_ppm | 0.05002 | 0.495402 | 0.352998 | -0.034061 | 0.241915 | 0.161217 | 0.669035 | 1 | | | | | |
| Sb_ppm | -0.021989 | 0.183332 | 0.071825 | -0.001993 | 0.298709 | 0.044322 | 0.531694 | 0.054934 | 1 | | | | |
| Se_ppm | 0.116996 | 0.494268 | 0.343746 | -0.056987 | 0.339799 | 0.144053 | 0.510551 | 0.592814 | 0.016617 | 1 | | | |
| Te_ppm | 0.517836 | 0.090544 | 0.091513 | -0.117786 | 0.256648 | 0.00978 | 0.140288 | 0.194801 | 0.002562 | 0.231937 | 1 | | |
| Tl_ppm | 0.015929 | 0.090445 | 0.190828 | 0.047831 | 0.271418 | 0.016911 | 0.367656 | 0.042895 | 0.685551 | -0.010303 | 0.032952 | 1 | |
| Zn_ppm | 0.071329 | 0.459051 | 0.520863 | 0.104315 | 0.171896 | 0.33245 | 0.575885 | 0.657662 | 0.032221 | 0.525171 | 0.076932 | 0.013555 | 1 |

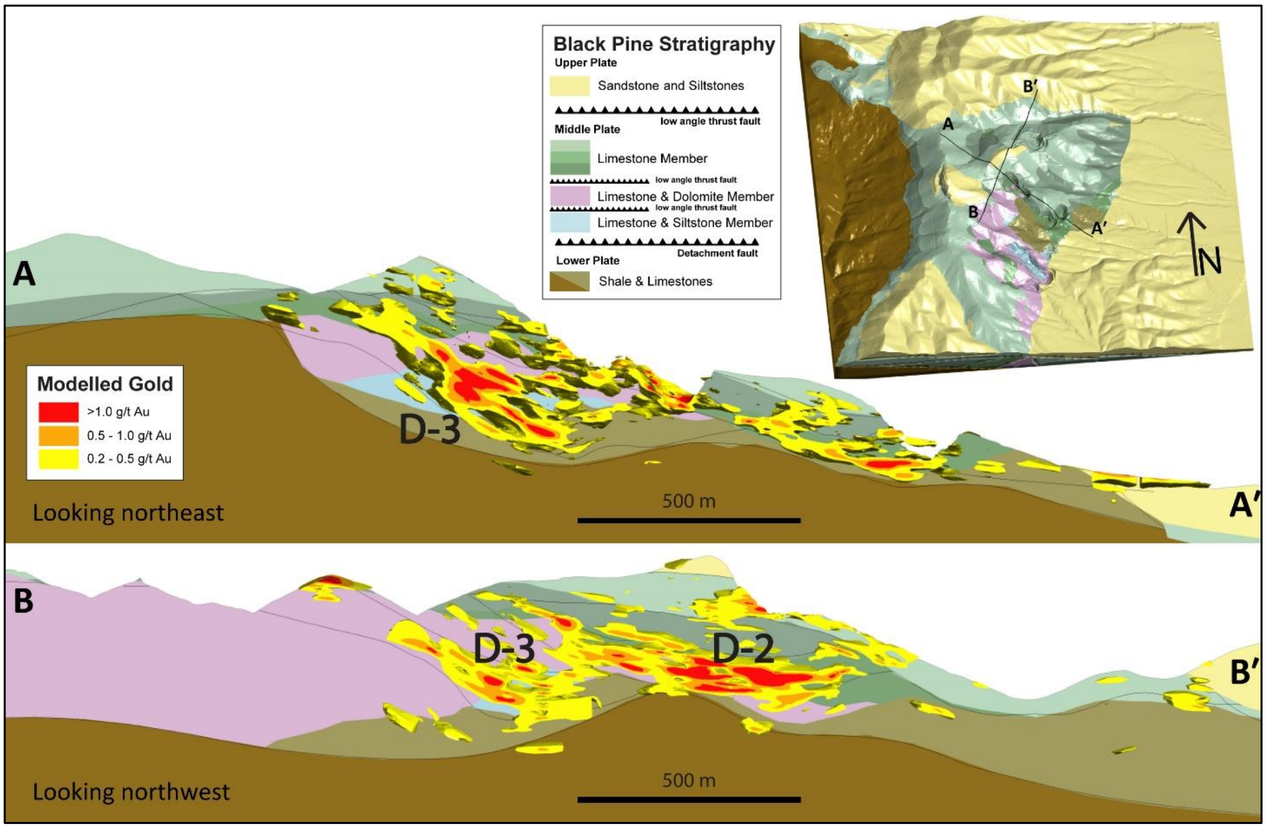
### 7.4.2 Location of Mineralization – Historical Pits and Vicinity

*Silver and Base Metals:* Silver and base-metal mineralization were historically mined on a small scale prior to the 1940s. These occurrences were located at Hazel Pine and along the Range Front, Anomaly K, northwest of the A Basin, northwest of D Pit, and in the Silver Hills (Back Range target; Figure 6.5). This type of mineralization is associated with steep faults, brown iron-oxide-stained hematitic silicification and quartz veins (Ohlin 1988). Host rocks are typically thick-bedded limestone with massive white calcite replacement beds. Liberty Gold has sampled stockpiles from historical mining containing >10% Zn in iron-oxide-cemented breccia. Short intervals of elevated silver-lead-zinc are relatively common in and around zones of gold mineralization, but there is virtually no correlation between elevated gold and elevated silver, lead and zinc. Therefore, it is likely that the two events are not closely related.

*Gold:* During the historical Pegasus mining operation, gold-mineralized material was extracted from six pits, including the Tallman pit, the B/B Expansion pit, A pit, E pit, I pit, and the C/D pit (Figure 6.5). Gold is distributed throughout the middle structural plate, but higher grades are focused in more favorable stratigraphic units, such as calcareous siltstones, and in association with moderate- to high-angle faults. Favorable faults are brittle in nature and strike northwest in the Tallman, B, C, D, and E pits. Others strike northeast in the Tallman, C, D, A, and I pits and north in the E pit. Gold appears to be concentrated along and in the immediate footwall of some of these faults, where less favorable massive limestone or sandstone are present in the hanging wall (Tallman NE and B Ex pits).

Gold is present in a large number of historical drill holes in unmined areas, particularly in areas adjacent to the historical open pits as shown in Figure 7.9. For example, historical "reserves" disclosed in Section 6.5 were defined to the north and west of the A pit, but these areas were never mined. Gold mineralization remains *in-situ* beneath and peripheral to the historical pits, as demonstrated in both historical and Liberty Gold drilling. The reader is referred to Section 10 of this report for descriptions and illustrations of the major zones of gold mineralization at Black Pine, defined through historical and Liberty Gold drilling.

**Figure 7.9 Schematic Cross Section of Middle Structural Plate**
(looking south; modified from Loptien, 1986)




## 7.4.3 Gold Mineralization and Soil Anomalies

Several drilled targets outside of the mined pits are also present, including the "J" anomaly on the north side of Mineral Gulch, and the SE Extension anomaly along the eastern edge of the property. All are open to expansion through further drilling. The possibility for discovering additional gold zones is also present in extensive, largely untested soil geochemical anomalies throughout the property. One of the largest is the F Trend anomaly that extends northwest from the C/D pit for approximately 1.0 kilometres to the south end of the E pit and for nearly 1.0 kilometres between the B pit and the northwest end of the C/D pit. Large soil anomalies are also present to the west of the I pit (SW Ex Anomaly), between the B pit and the northwest end of the C/D pit, northeast of the E pit, and the H anomaly west-southwest of the J anomaly. Very little drilling, to no drilling, has been carried out in these areas.

# 8.0 DEPOSIT TYPES (ITEM 8)

Black Pine mineralization is best described to be in the class of sedimentary rock-hosted, Carlin-type gold deposits ("CTGDs"). While CTGDs are not unique to the eastern Great Basin, they exist in far greater numbers and total resource size in northern Nevada than anywhere else in the world. They are characterized by concentrations of very finely disseminated gold principally in silty, carbonaceous, and calcareous marine sedimentary rocks. The gold is present as micron-size and smaller disseminated grains, often internal to iron-sulfide minerals (arsenical pyrite is most common), or with carbonaceous material in the host rock. Free particulate gold, and particularly visible free gold, is not a common characteristic of these deposits except where strongly oxidized.

CTGDs in the Great Basin have some general characteristics in common, although there is a wide spectrum of variants (Cline et al., 2005; Cline, 2018). Anomalous concentrations of silver, arsenic, antimony, and mercury are typically associated with the gold mineralization. Elevated concentrations of thallium, tungsten, tellurium, and molybdenum can also be present in trace amounts. Alteration of the gold-bearing host rocks is typically manifested by decalcification, often with the addition of silica, fine-grained disseminated pyrite and marcasite, remobilization and/or the addition of carbon, and the deposition of late-stage barite and/or calcite veins. Small amounts of white clay (illite) are generally present. Decalcification of the host produces volume loss, with incipient collapse brecciation that enhances the pathways of the mineralizing fluids. Due to the small size of the gold grains, CTGDs generally do not have coarse-gold assay issues common in many other types of gold deposits.

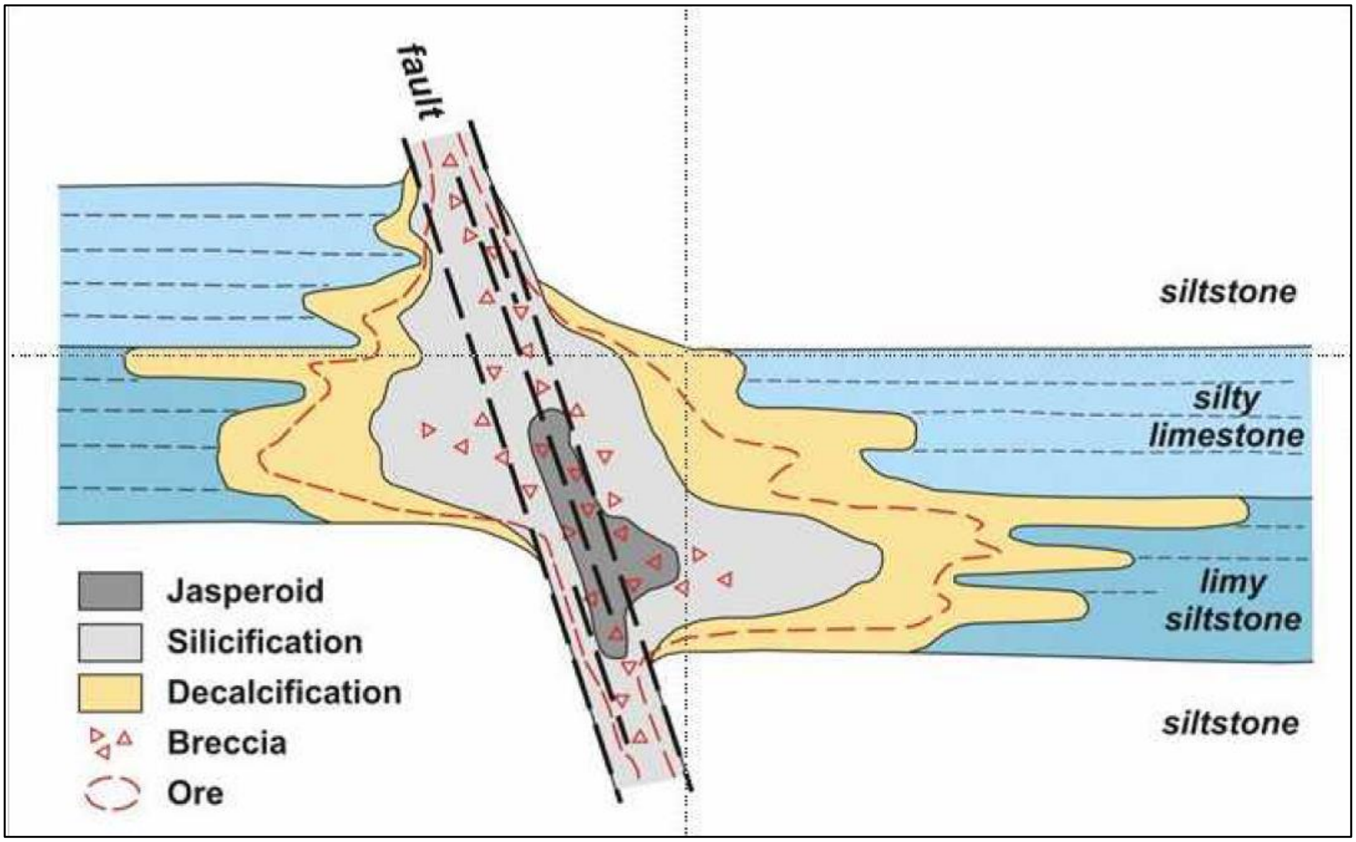
Deposit configurations and shapes are quite variable. CTGDs are typically somewhat stratiform in nature, with mineralization largely confined within specific favorable stratigraphic units. Fault and solution-collapse breccias can also be primary hosts to mineralization (Figure 8.1).

The gold mineralization identified at Black Pine shares many of the characteristics of CTGDs, including:

- Stratigraphic control of mineralization, primarily in calcareous siltstone units within the Pennsylvanian Oquirrh Group;
- Structural control in and adjacent to low-angle to high-angle normal faults, and in tectonic, collapse, and hydrothermal breccias;
- Geochemical association with elevated arsenic, mercury, antimony, and thallium, as well as silver and tellurium; base metals are elevated around the north and east sides of the system; and
- Gold is very fine grained, disseminated, and associated with decalcification, silicification, calcite and clay, as well as pyrite, arsenical pyrite, and their oxidized variants (limonite, goethite, hematite, etc.).

The Black Pine gold deposits also have characteristics that differ from typical CTGDs. The general location of the project is outside the major gold deposit trends in Nevada. There are multiple silver-lead-zinc occurrences within the Black Pine property, although the temporal association with the gold mineralization is not clear.

**Figure 8.1 Cross-Section Model of a Carlin-Style Sediment-Hosted Gold Deposit**
(from Robert *et al.*, 2007)



# 9.0 EXPLORATION (ITEM 9)

This section summarizes exploration work carried out by Liberty Gold at the Black Pine project. Mr. Gustin has reviewed this information and believes it accurately represents relevant work completed by Liberty Gold at the Black Pine project.

## 9.1 Historical Data Compilation and Project Database Construction

Liberty Gold inherited several historical data packages from Western Pacific Resources. The historical database upon which Western Pacific based their exploration program contained primarily exploration and development data up to the 1989 sale of the project to Pegasus, including compiled digital and hardcopy records of surface rock and soil samples, geological mapping, exploration drill-hole locations, assays, surveys, geological logs, and copies of drill assay certificates. Also included were various internal and external memoranda and reports.

After the purchase of Black Pine from Western Pacific, a hard drive was conveyed to Liberty Gold containing .zip files created during the Pegasus mining operation, with file stamps dating principally from 1990 to 1997. The data comprises numerous Surpac, PC EXPLOR, PC MINE and Gemcom project files, mine topography, and permitting design CAD files from throughout the mine life, as well as bench, road, and topographic survey files. Gemcom extraction files were recovered containing rock and soil sample databases and a compiled drill-hole database. This drilling database contains drill-hole location and orientation data, gold and silver assays, lithological data, and carbon analyses for all historical drilling on the property, notably including 1,098 Pegasus drill holes. Blast-hole data for the E pit, A pit, and some of the C, D and I pits have been recovered, representing approximately 40% of the total. Very few hard copy files from the Pegasus operation have been recovered.

Liberty Gold's compilation and verification efforts as of the Effective Date of this report include:

- Assembly and verification of raw data export files of drill-hole data into a coherent Access database. Pegasus data files without column headers were re-organized and verified using assay certificates and drill logs from pre-1990 drill-hole data. Assay data reported in troy ounces per short ton were converted to grams per metric tonne using a conversion factor of 34.286. Laboratory assay certificates and drill logs were available for most Noranda holes and some earlier holes, and these were used to validate down-hole assays. Down-hole lithological and alteration data were obtained from the same raw files, which included a primary lithological unit abbreviation and a secondary lithology or alteration, sometimes including presence of carbon.
- Conversion of historical mine-grid coordinates into the UTM NAD 83, Zone 12 coordinate system. Historical drill-hole collar coordinates, surface-sample locations, and topographic information were transformed using Western Pacific and 2010 Olympus aerial-survey data. The horizontal error ranged from less than 1 metre near the grid origin (near the C/D pit,) to 1.0 metres about 1 kilometre away, to 3.0 metres at the far edges of the project. This error range was determined by using 11 historical mine-grid control points that were found in the field and subsequently surveyed in UTM coordinates by Olympus Aerial Surveys, Western Pacific, BLM, and Liberty Gold. These survey results were then compared to the UTM locations of the control points as determined by the same transformation applied to the historical drill-collar locations.

- Verification of historical collar locations and surface samples after coordinate transformation. Air-photo disturbance images from 1992 and 1998, georeferenced drill-hole maps from Noranda, and CAD maps from Pegasus were used to validate drill-collar locations following the coordinate transformation. This led to the identification of only two drill holes that were mis-located, and the locations of these holes were corrected. Noranda road-cut rock samples from in the lower F zone and J anomalies were adjusted following coordinate transformation, with their correct locations apparent from sample distributions relative to present-day reclaimed road alignments and historical aerial photos, as well as geo-referenced sample maps.

- Creation of an as-mined bedrock surface topography through clipping and merging pre-mine topography beneath dumps. As-built pit topographic maps were merged, and as-mined pit topography maps were created by digitizing bench surveys in ArcGIS 3D. A pre-mining topographic surface was also created. For the as-mined topography compilation, CAD files in the local mine grid were imported into an ArcGIS Geodatabase using the coordinate transformation, and elevations in feet were converted to metres. Historically surveyed, as-mined topographic maps for the Tallman, B pit, I pit, and D-north pits, all currently partially back-filled, were used to create the as-mined topography. A 2010 Orthophoto digital elevation model ("DEM") was to create the as-mined topography for the Tallman NE, B Extension, A, and C/D pits, as these pits were for the most part not backfilled. Pit-wall failures or partial back filling occurred in the E, C/D, and A-West pits. Portions of historical topographic data, consisting of either pit designs corroborated with blast-hole data or digitized bench surveys, were used to reconstruct an accurate as-mined bedrock surface for these pits.

- Recovery and compilation of surface geochemical data (soil and rock samples) from Pegasus database exports. Verification of soil-sample locations included comparisons to georeferenced maps of original soil grids and rock-sample locations, where available. As of the Effective Date of this report, a total of 12,453 soil samples and 4,516 rock samples within the Liberty Gold property boundary have been attributed with coordinates and gold assay data. Of these, 8,029 soil samples and 1,664 rock samples have both assay certificates and location data.

- Geologic map compilation. Surface geological maps created by Noranda were not updated significantly during the Pegasus operations. The Noranda map by Ohlin (1989) is still the best available historical property-scale geological map. Registration, digitization, and spot checking of Ohlin's map have been performed. Pit maps by Willis (2011) for Western Pacific have been registered and transformed into UTM NAD83, but these have not been used or extensively field-checked, although the mapping correlates well with down-hole lithology. USGS mapping by Smith (1982) provides geological information on a regional scale. These maps are gradually being amalgamated into a single geological map for the entire property, as the pit maps provide geological information that was not available prior to mining.

- Recovery of blast hole data. As of the Effective Date of this report, a database of 61,704 blast-hole data points has been recovered, verified, and assembled. The blast holes are from E pit (12,987 - complete), A pit (36,398 – partial), C/D pit (7,418 – partial), and I pit (4,901 – partial). Also recovered are 63,861 blast-hole intervals from C/D pit with corrupted coordinates (currently unusable). Liberty Gold believes that there are more blast-hole data contained within the data files, and recovery efforts remain ongoing. Comparison of the complete set of blast-hole data and exploration drill-hole assays within the E pit demonstrates the importance of the data density provided by the blast holes in modeling the complex, strongly structurally controlled gold mineralization at Black Pine.

## 9.2 Liberty Gold Rock Sampling

Liberty Gold has carried out a limited surface rock-sampling program to characterize mineralization and alteration on the Black Pine property on underexplored gold-in-soil anomalies beyond the limits of historical pits. Between 2017 and the Effective Date of this report, 454 rock samples were collected throughout the property, primarily as grab samples (Figure 9.1). Gold assays of the samples ranged from below detection limit to a high of 3.01 g Au/t. In addition, Liberty Gold spot-checked many of the Western Pacific rock-chip sample sites. Liberty Gold believes the rock-chip sampling indicates gold is most closely associated with iron oxide, decalcification, and argillization, primarily in deformed silty limestones and calcareous siltstones, and is spatially associated with faults.

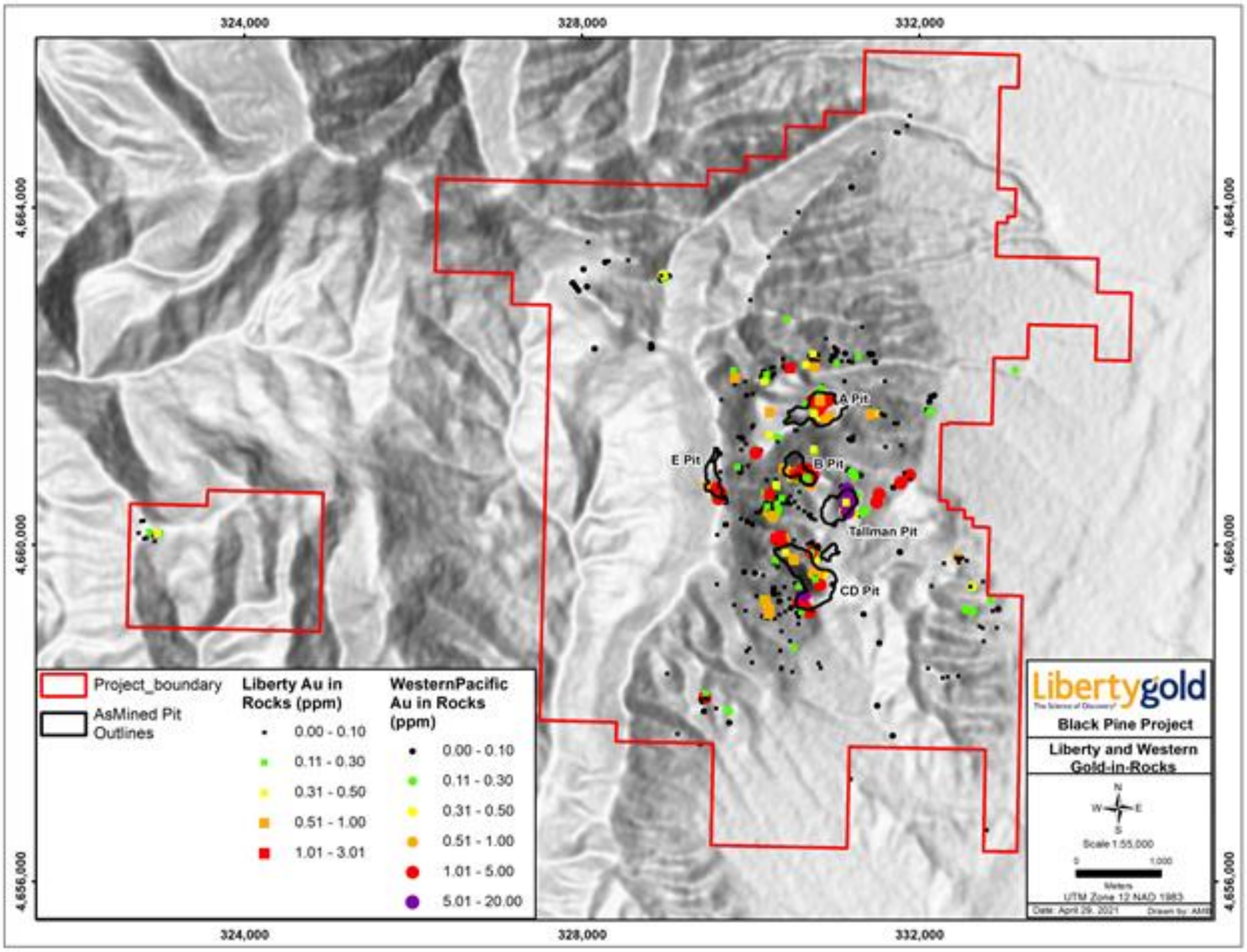
## 9.3 Three-Dimensional Modeling

Liberty Gold has created a three-dimensional geological model for the Black Pine property in Leapfrog, in order to integrate surface mapping, drilling and structural data and interpretations. The model is subject to revision as new data becomes available, and is the primary platform for real-time analysis of drill data and drill hole planning.

## 9.4 Summary Statement

The authors have not analyzed the sampling methods, sample quality, sample representativity, or possible presence of bias related to the Black Pine surface samples at the Black Pine project because these data are far superseded in relevance by the available drill data. Drill procedures and results are described in Section 10.0.

**Figure 9.1 Gold in Liberty Gold and Western Pacific Resources Rock Samples**
(from Liberty Gold, 2021)



# 10.0 DRILLING (ITEM 10)

This section summarizes all drilling carried out in the Black Pine property by Liberty Gold as of the Effective Date of this report. Historical drilling is discussed in Section 6.5.

## 10.1 Summary

Liberty Gold carried out drilling programs in 2017, 2019, and 2020. MDA's resource database includes 259 RC holes and 10 core holes, for a total of 72,301 metres (Table 10.1). Figure 10.1 shows the locations of Liberty Gold drill-hole collars within the Black Pine property, coded by year. Figure 10.3 Map of 3D Drill Assays and Cross Section Locations. Figure 10.3 shows all drill holes in the resource database and the outline of gold mineralization modeled as part of this resource study.

**Table 10.1 Summary of Liberty Gold Black Pine Project Drilling**

| Year | RC Holes | RC Metres | Core Holes | Core Metres | Total holes | Total Metres |
|---|---|---|---|---|---|---|
| 2017 | 14 | 2,274 | 0 | 0 | 14 | 2,271 |
| 2019 | 85 | 22,520 | 6 | 1,252 | 91 | 23,788 |
| 2020 | 160 | 43,903 | 10 | 2,352 | 170 | 46,227 |
| **Total** | **259** | **68,697** | **16** | **3,604** | **275** | **72,301** |

## 10.2 Drilling Description

The 2017 drilling contractor was Boart Longyear of Elko, Nevada. A track-mounted Foremost MPD 1500 drill rig was utilized with 14.0-centimetre diameter center-return bits. All drilling was done with water injection. Drill cuttings were split and sampled over 1.52-metre intervals using a rotating wet "cyclone" vane-type splitter. The split samples fell directly into pre-labeled water-permeable cloth sample bags that were sealed. Excess water drained from the sample bags as they sat at the drill sites. Sample weights were generally in the range of about five to 10 kilograms after drying.

The 2019 RC drilling was undertaken by Boart Longyear with two track-mounted Foremost MPD 1500 drill rigs that used 14.0-centimetre diameter center-return bits. Sample handling techniques were identical to that in 2018.

The 2019 core drilling contractor was Timberline Drilling Inc. of Elko Nevada. Drilling was carried out using a track-mounted Atlas Copco CS14 using primarily PQ (85-centimetre diameter core) tools.

The 2020 RC drilling contractor was Boart Longyear. Two track-mounted Foremost MPD 1500 drill rigs were utilized with 14.0-centimetre center-return bits, and one truck-mounted Atlas Copco Super 10 also with the same bits. Sample handling techniques were identical to that in 2019.

**Figure 10.1 Map of Liberty Gold Black Pine Drill Holes**
(from Liberty Gold, 2021)

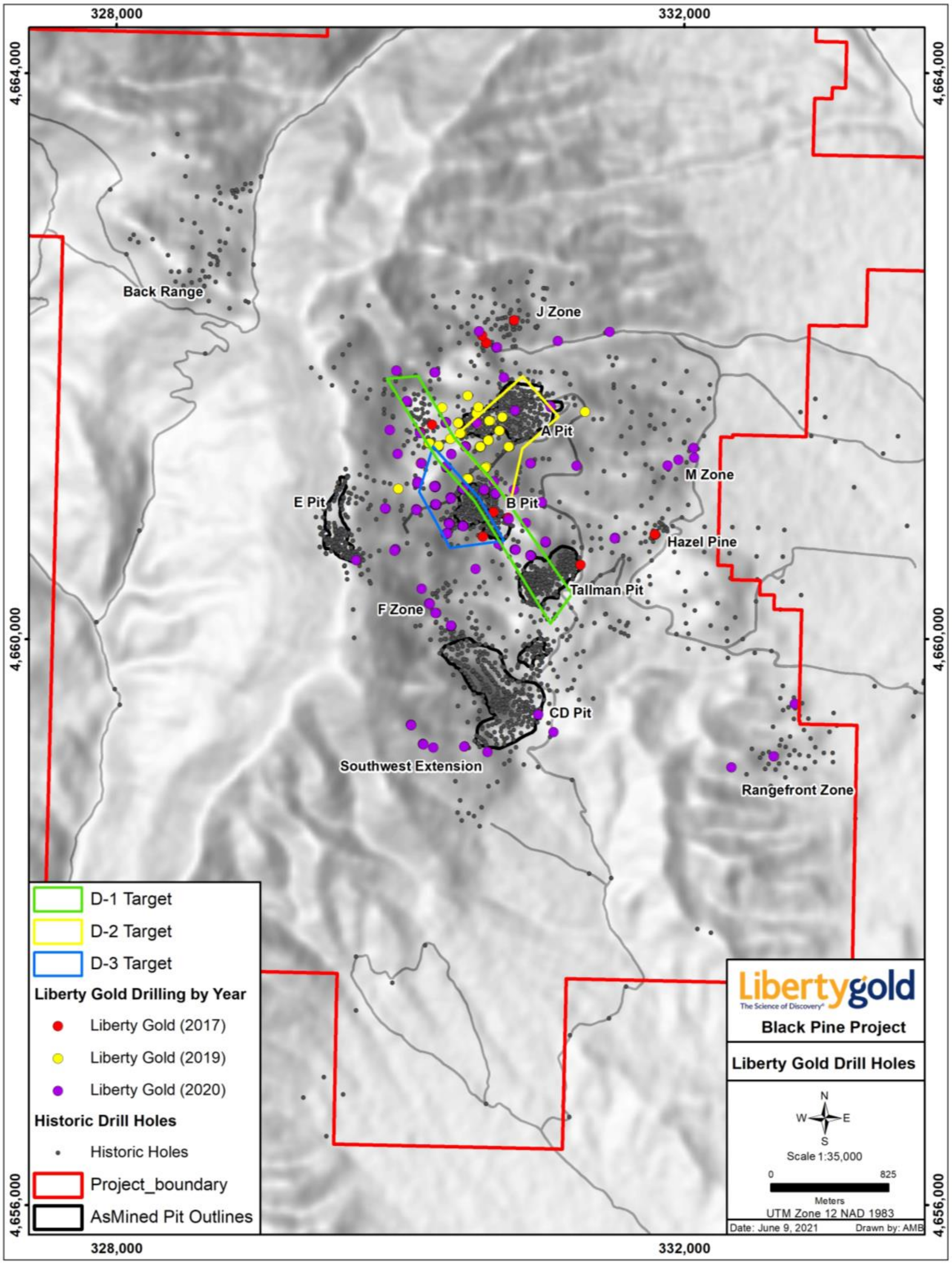
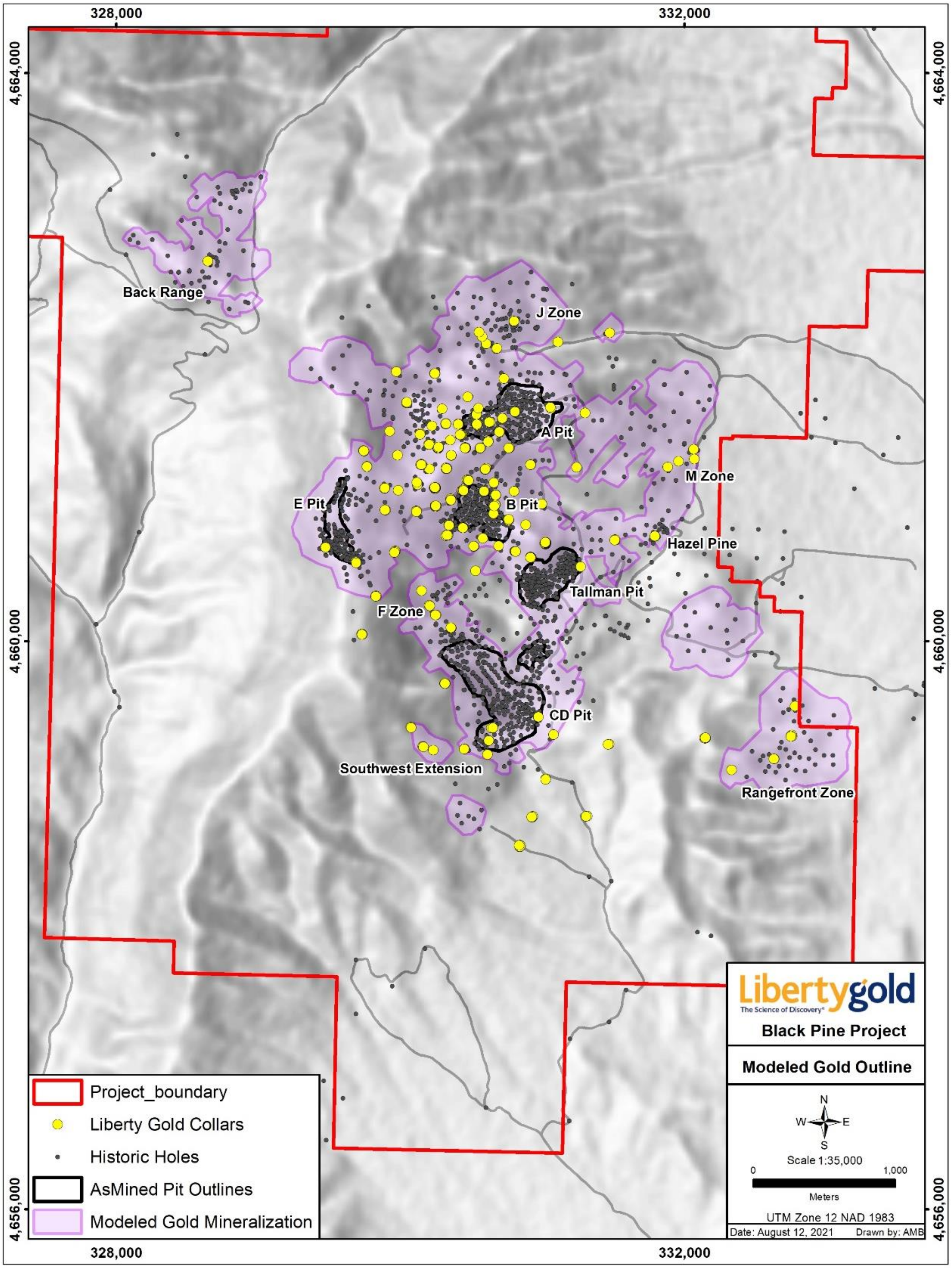


**Figure 10.2 Map of Black Pine Drill Holes with Outline of Modeled Gold Mineralization**



The 2020 core drilling contractor was Major Drilling of Salt Lake City Utah. Drilling was carried out using a track-mounted LF90 to recover primarily PQ (85-centimetre diameter) and some HQ (63.5-centimetre diameter) core.

## 10.3 Drill-Hole Collar Surveys

For the 2017 and 2019 drill collars, locations were initially marked in the field by Liberty Gold personnel using a Trimble GeoXH hand-held GPS receiver with differential correction accuracy of 0.5 metres horizontally and 1.0 metres vertically. Drill holes were abandoned in accordance with the State of Idaho Rules for Exploration Operations and Required Reclamation (IAR 20.03.02.06) as well as Sawtooth National Forest policies. After completion of the holes, the collars were marked with stamped brass tags fastened to a steel wire, and their locations were surveyed by Liberty Gold personnel using the Trimble GeoXH GPS receiver.

In 2020 drill collars were marked and abandoned in the same manner as the 2019 holes. A Juniper Systems Geode Sub-meter GPS receiver was used to survey the collar locations.

## 10.4 Down-Hole Surveys

For Liberty Gold’s 2017 drilling, down-hole deviation surveys were carried out by International Directional Services (“IDS”) of Elko, Nevada. IDS utilized a truck-mounted surface-recording gyro (“SRG”) survey instrument for some holes, and a north-seeking gyro (“NSG”) instrument for other holes. Readings were taken at the bottom and top of the holes, as well as at intervals of 15.2 metres along the lengths of each hole.

For Liberty Gold’s 2019 drill program, downhole surveys were conducted using a north-seeking, solid state gyroscopic tool ("Reflex EZ-Gyro") that was rented from Imdex Limited, along with a paired depth counter and a wireline winch mounted on a trailer. The tool was programmed to read at set depth intervals of 15.2 metres as it traveled down the hole, with a second survey run at the same intervals on the way out of the hole. The downhole surveys were completed by Liberty Gold personnel, who then manually downloaded the data from the tool to a handheld device where the data was checked for accuracy before the hole was abandoned.

For Liberty Gold’s 2020 surveys, a north-seeking, solid-state gyro tool made by SPT was rented from IDS, along with a blue-tooth-paired depth counter and wireline winch. The tool reads continuous as it travels the hole, with the Gyromaster software programmed to export a reading at each 15.2-metre interval. The downhole surveys were completed by Liberty Gold personnel, with specific protocol followed to verify precision of the survey before the hole was abandoned. The Gyromaster software compares the in-run and the out-run of each survey, and a threshold of <1.4% variance is met before any survey is considered complete. If needed, such as on deeper holes and holes steeper than -75 degrees, spring centralizers were installed on the tool to reduce rotation during the survey.

## 10.5 Liberty Gold Drilling Summary

In late 2017, Liberty Gold drilled five target areas (B Pit Extension, Tallman Pit NE, A Basin, J Anomaly, and Hazel Pine mine zone; Figure 10.3). The primary purposes of this drilling were to validate drilling carried out by previous operators and to familiarize Liberty Gold with both mineralized and unmineralized rock. As such, drill sites were either immediately adjacent to historical pits or at established target areas. The 2017 holes were drilled from sites permitted under Western Pacific's 2012 Plan of Operations. These site locations were designed without the benefit of knowledge of over 1,300 historical drill holes, the data from which were obtained later. Consequently, sites were not always optimally located relative to drill targets. Hole LBP012 was lost in underground mine workings at a depth of 13.2 metres and redrilled. All drill holes were inclined at angles ranging from -45° to -80°.

In 2019, after the receipt of a Plan of Operations that allowed access to most of the area of surface mineralization at Black Pine, Liberty Gold completed a much larger drill program encompassing 87 RC holes and six core holes. The core program was designed to obtain large diameter core for metallurgical testing, as described in Section 13. The RC program was designed to explore an area between the historical B Pit, historical A Pit and historical A Basin target, where 3D geological modeling had identified a large area believed to contain extensions of surface gold mineralization in the pit highwalls and A Basin beneath the limit of historical drilling. The 2019 drilling identified two significant zones of mineralization: "Discovery 1", or "D-1", a northwest-striking, moderately northeast-dipping zone of mineralization extending from the A Basin area to the historical B extension Pit; and "Discovery 2", or "D-2", a relatively flat-lying zone of mineralization extending in a northeasterly direction from the Discovery 1 zone to the A Pit highwall (Figure 10.3).

In 2020, RC drilling continued in the Discovery 1 area, discovering a north-striking, moderately to steeply east-dipping zone of gold mineralization lying immediately west of, and eventually merging with, the Discovery 1 zone. This zone has been named the "Discovery 3", or "D-3" zone. Other targets of RC drilling included:

- Southeast extension of the D-1 zone between the B Extension Pit and the Tallman Pit;
- Northwest extension of the D-1 zone;
- J Zone;
- F Anomaly between the CD Pit and B Extension Pit;
- M Zone;
- Rangefront Zone; and
- Southwest Extension target west of the I Pit

Core drilling was primarily for the purpose of obtaining samples for additional metallurgical testing in the D-2, D-3, E Pit, and CD Pit areas, as described further in Section 13.

Zones subject to Liberty Gold drilling are described in more detail below and are illustrated in Figure 10.3 through Figure 10.8.

**Figure 10.3 Map of 3D Drill Assays and Cross Section Locations**
(from Liberty Gold, 2021)

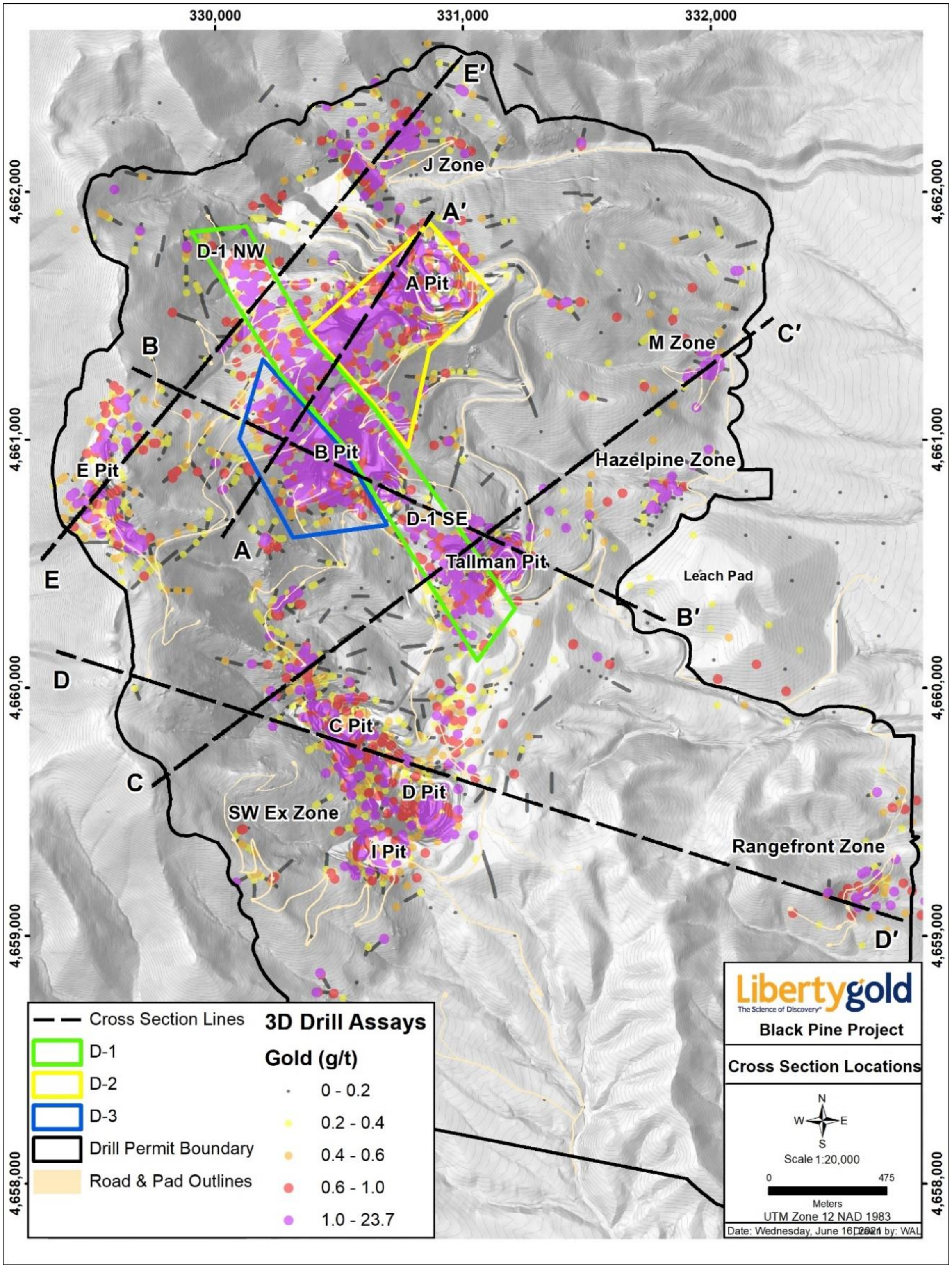
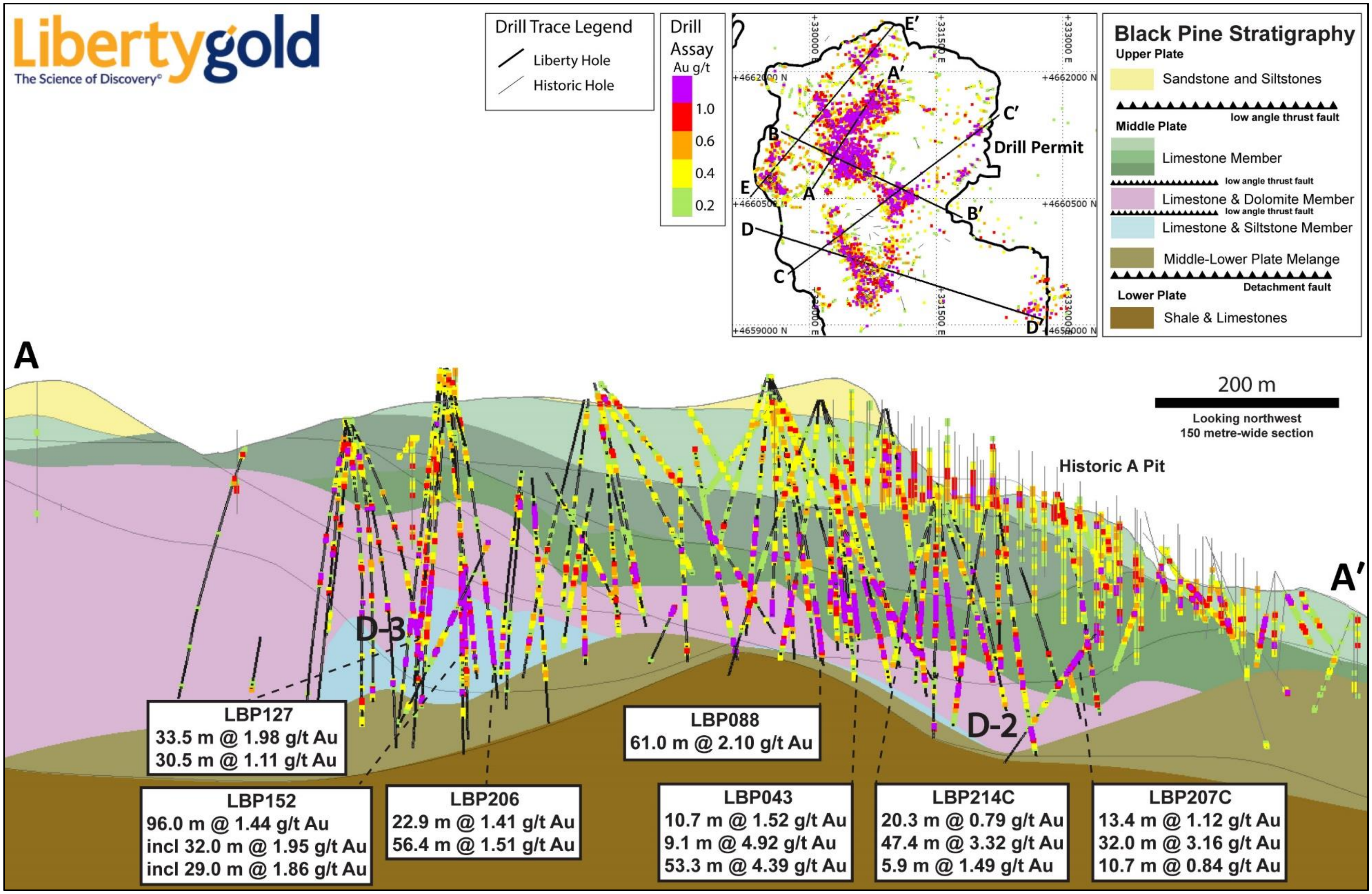
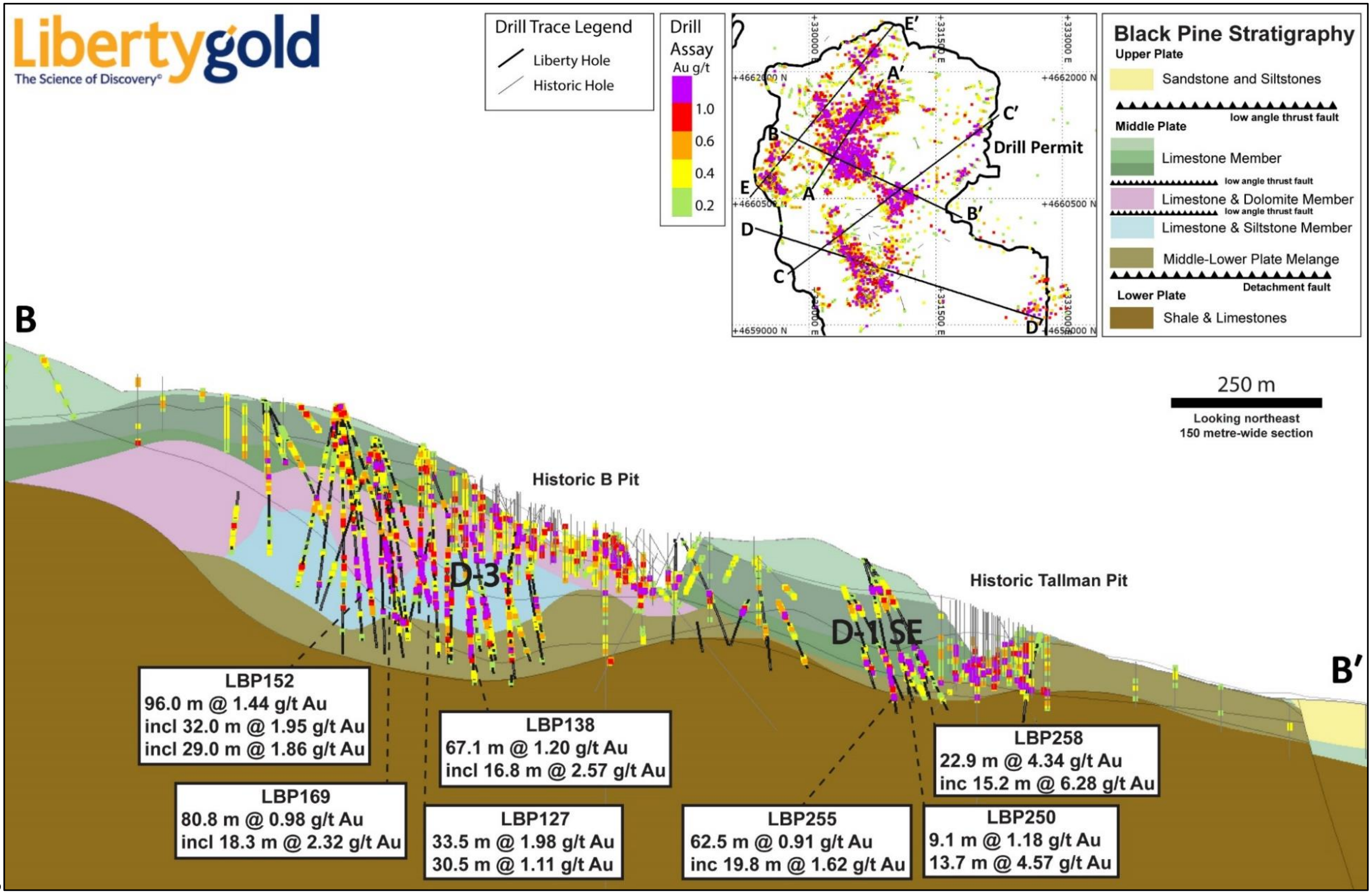


**Figure 10.4 Cross Section A-A′**
(from Liberty Gold, 2021)



## Figure 10.5 Cross Section B-B′

(from Liberty Gold, 2021)




3

**Figure 10.6 Cross Section C-C′**
(from Liberty Gold, 2021)

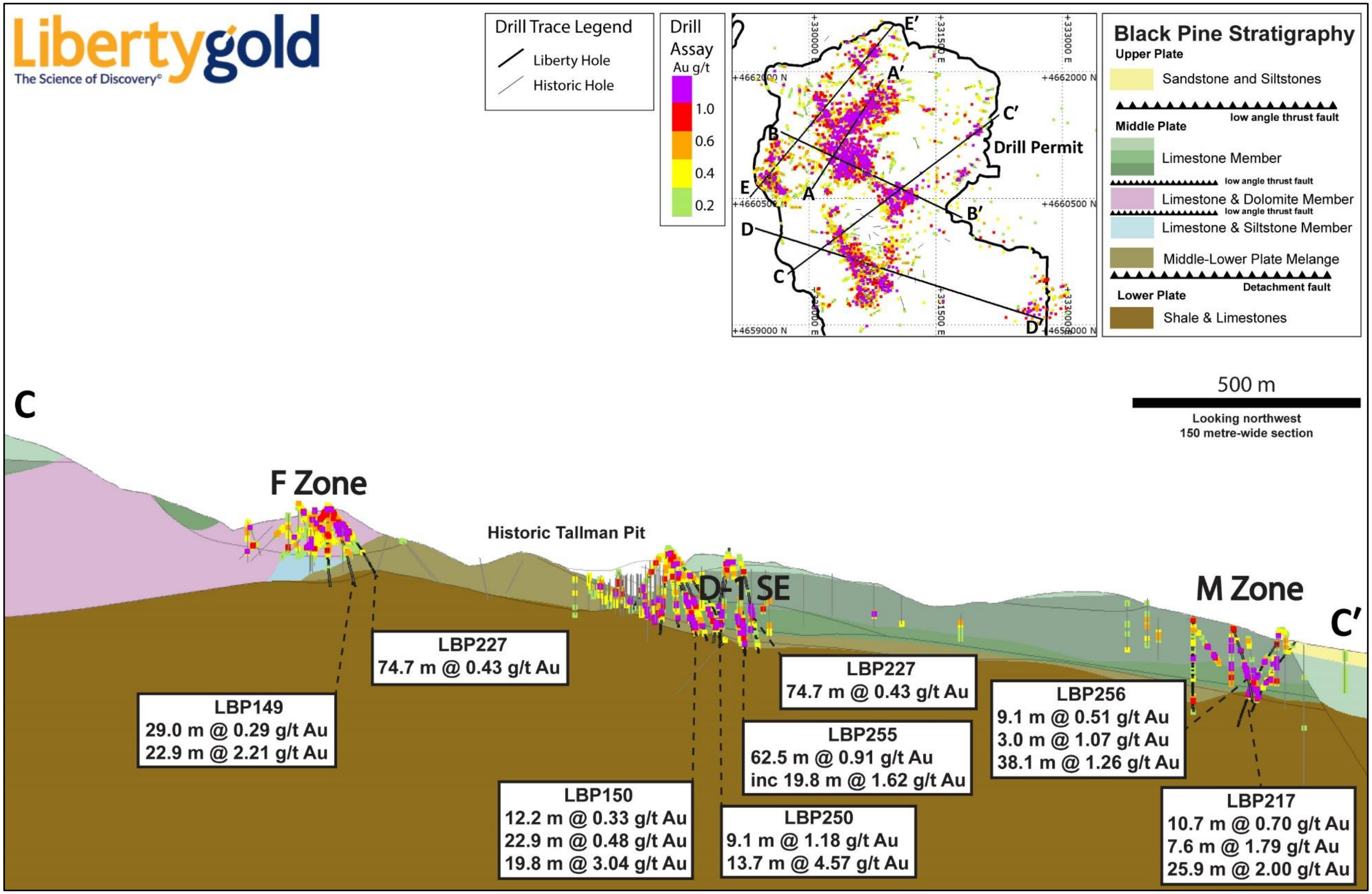


**Figure 10.7 Cross Section D-D′**
(from Liberty Gold, 2021)

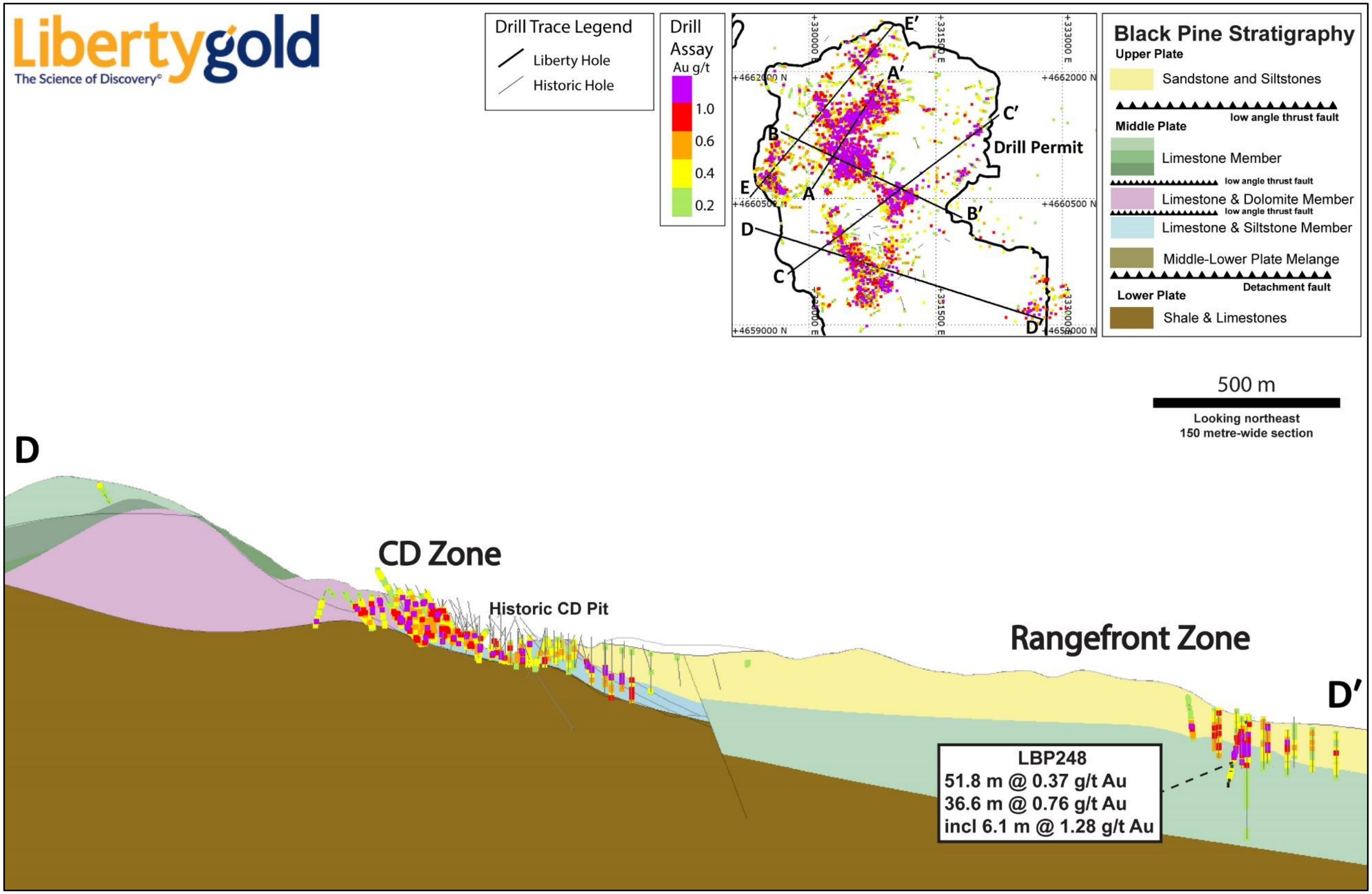
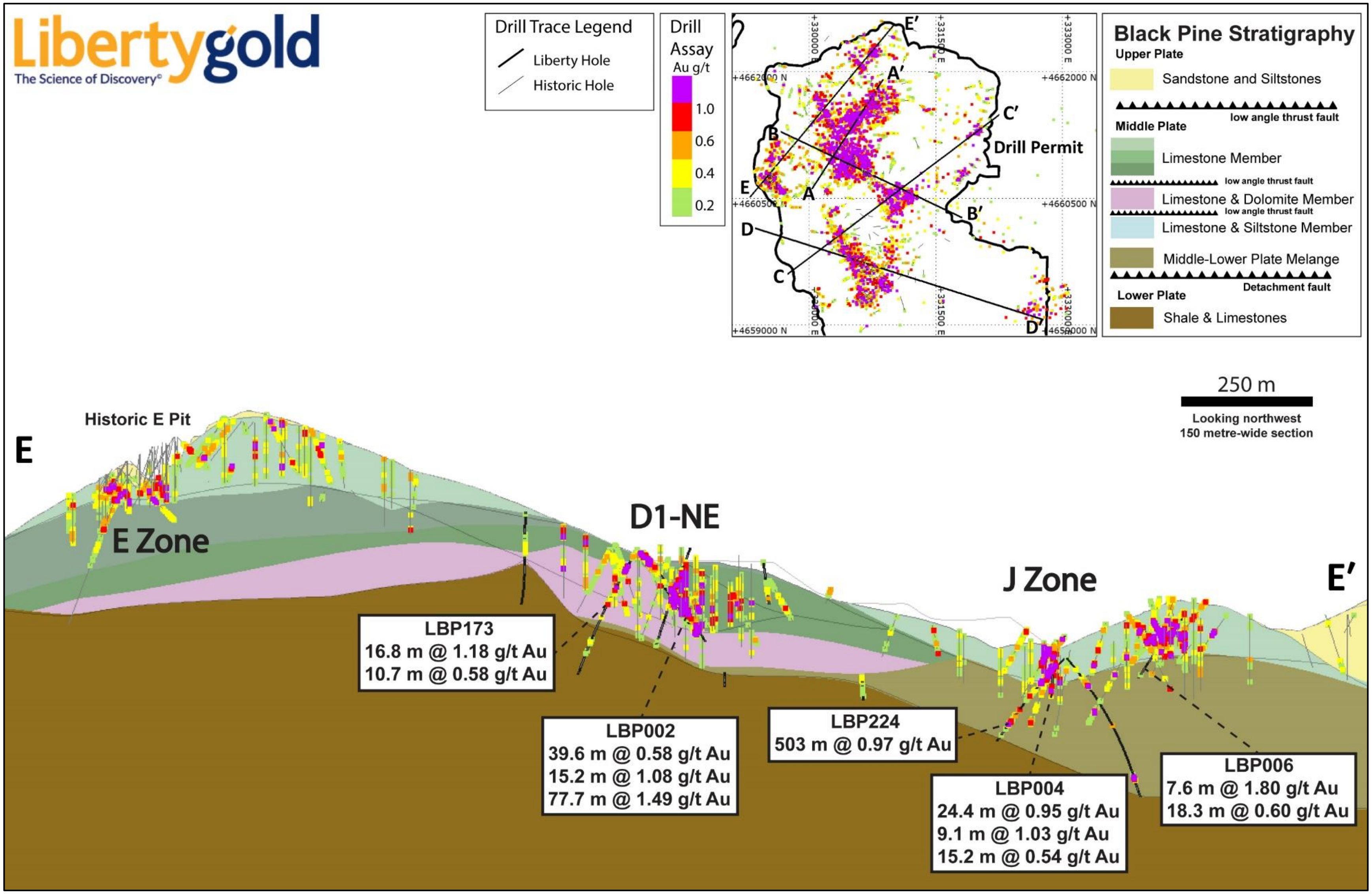


**Figure 10.8 Cross Section E-E′**
(from Liberty Gold, 2021)



### 10.5.1 Discovery Zone

The D-1, D-2 and D-3 zones are referred to collectively as the "Discovery Zone", as they lie in close proximity, with the D-2 Zone interpreted as a down-dip extension of the D-1 zone in the immediate hanging wall of a listric normal fault, and the D-3 Zone interpreted as lying in the hanging wall of a second listric normal fault that may sole into the D-1/D-2 structure at depth (Figure 10.3 and Figure 10.4).

The D-1 Zone was discovered with hole LBP021, drilled in the 700-metre gap between LBP002 in the A Basin area and the highwall of the B Pit. This hole returned a 47.2-metre interval at an average grade of 1.78 g Au/t (Table 10.2). Gold mineralized rocks are highly oxidized, and higher grades are associated with reddish brown, variably brecciated and strongly decalcified calcareous siltstone of the Polc member of the middle plate of the Oquirrh Group. Highlight intercepts are shown in Table 10.2, using cut-offs of 0.2, 1.0, and 5.0 g Au/t, with up to 5.0 metres of internal waste.

**Table 10.2 Highlight Drill Holes, Discovery 1 Zone**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **LBP002 (45, -50)** | **6.1** | **45.7** | **39.6** | **0.58** | 0.2 | 211.8 | **D-1 North** | Twinned historical hole and extended mineralization in lower 77.7 metre intercept | **155.2** |
| **including** | **19.8** | **24.4** | **4.6** | **1.54** | 1 | | | | |
| **and** | **88.4** | **103.6** | **15.2** | **1.08** | 0.2 | | | | |
| **including** | **89.9** | **97.5** | **7.6** | **1.55** | 1 | | | | |
| **and** | **111.3** | **189.0** | **77.7** | **1.49** | 0.2 | | | | |
| **including** | **118.9** | **134.1** | **15.2** | **3.23** | 1 | | | | |
| **including** | **146.3** | **149.4** | **3.0** | **1.61** | | | | | |
| **including** | **181.4** | **187.5** | **6.1** | **5.64** | | | | | |
| **LBP015** | 10.7 | 15.2 | 4.6 | 0.36 | 0.2 | 196.6 | **B Pit (D-1 Zone)** | | **81.9** |
| **and** | **67.1** | **115.8** | **48.8** | **1.50** | 0.2 | | | | |
| **including** | **77.7** | **80.8** | **3.0** | **1.31** | 1 | | | | |
| **including** | **91.4** | **94.5** | **3.0** | **6.19** | 1 | | | | |
| **and including** | **91.4** | **93.0** | **1.5** | **10.4** | 5 | | | | |
| **including** | **100.6** | **106.7** | **6.1** | **5.35** | 1 | | | | |
| **and including** | **102.1** | **105.2** | **3.0** | **8.03** | 5 | | | | |
| **and** | 123.4 | 132.6 | 9.1 | 0.32 | 0.2 | | | | |
| **and** | 138.7 | 144.8 | 6.1 | 0.68 | 0.2 | | | | |
| **including** | 140.2 | 141.7 | 1.5 | 1.86 | 1 | | | | |
| **LBP016** | 12.2 | 16.8 | 4.6 | 0.26 | 0.2 | 175.3 | **B Pit (D-1 Zone)** | | **69.3** |
| **and** | 51.8 | 56.4 | 4.6 | 0.29 | 0.2 | | | | |
| **and** | **89.9** | **135.6** | **45.7** | **1.46** | 0.2 | | | | |
| **including** | **93.0** | **121.9** | **29.0** | **2.00** | 1 | | | | |
| **and including** | 102.1 | 103.6 | 1.5 | 7.09 | 5 | | | | |
| **LBP021 (144, -75)** | 38.1 | 53.3 | 15.2 | 0.36 | 0.2 | 266.7 | **Discovery 1 Zone** | 250 metre step-out from intercept in hole LBP002, and 300 metre step-out from intercept in hole LBP016, along B Pit to A Basin Section | **91.1** |
| **and** | 83.8 | 89.9 | 6.1 | 0.22 | 0.2 | | | | |
| **and** | **189.0** | **236.2** | **47.2** | **1.78** | 0.2 | | | | |
| **including** | **199.6** | **222.5** | **22.9** | **3.24** | 1 | | | | |
| **and including** | **202.7** | **205.7** | **3.0** | **9.99** | 5 | | | | |
| **and including** | **216.4** | **217.9** | **1.5** | **5.73** | 5 | | | | |
| **including** | 231.6 | 233.2 | 1.5 | 1.39 | 1 | | | | |
| **LBP027 (038, -66)** | 32.0 | 38.1 | 6.1 | 0.50 | 0.2 | 269.7 | **A Basin (D-1 Zone)** | | **101.2** |
| **and** | **117.3** | **128.0** | **10.7** | **2.18** | 0.2 | | | | |
| **including** | **118.9** | **126.5** | **7.6** | **2.90** | 1 | | | | |
| **and** | **143.3** | **169.2** | **25.9** | **2.89** | 0.2 | | | | |
| **including** | **143.3** | **158.5** | **15.2** | **4.52** | 1 | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| and including | 144.8 | 150.9 | 6.1 | 6.63 | 5 | | | | |
| and including | 152.4 | 155.4 | 3.0 | 5.01 | 5 | | | | |
| LBP029 (105, -51) | 132.6 | 158.5 | 25.9 | 0.33 | 0.2 | 251.5 | Discovery 1 Zone | | 113.7 |
| and | 166.1 | 207.3 | 41.1 | 2.56 | 0.2 | | | | |
| including | 170.7 | 190.5 | 19.8 | 4.47 | 1 | | | | |
| and including | 172.2 | 176.8 | 4.6 | 8.76 | 5 | | | | |
| including | 195.1 | 196.6 | 1.5 | 1.28 | 1 | | | | |
| including | 199.6 | 202.7 | 3.0 | 2.53 | 1 | | | | |
| LBP067C (104, -66) | 11.6 | 34.6 | 23.0 | 0.38 | 0.2 | 273.7 | Discovery 1 Zone | | 185.2 |
| and | 78.6 | 81.7 | 3.0 | 1.03 | | | | | |
| and | 170.9 | 185.2 | 14.2 | 0.70 | | | | | |
| and | 188.7 | 244.5 | 55.9 | 2.92 | | | | | |
| including | 195.1 | 217.2 | 22.1 | 5.64 | 1 | | | | |
| and including | 203.9 | 211.2 | 7.3 | 12.39 | 5 | | | | |
| LBP115 (300, -80) | 27.4 | 82.3 | 54.9 | 0.32 | 0.2 | 361.2 | Discovery 1 Zone | | 68.2 |
| and | 144.8 | 160.0 | 15.2 | 0.24 | | | | | |
| and | 204.2 | 263.7 | 59.4 | 0.65 | | | | | |
| incl | 259.1 | 262.1 | 3.0 | 2.21 | 1 | | | | |
| and | 271.3 | 285.0 | 13.7 | 0.62 | 0.2 | | | | |

The D-2 Zone was discovered through the drilling of LBP023 in the approximately 600-metre gap between LBP021 and the A Pit highwall. As with the D-1 zone, higher grades are associated with reddish brown, variably brecciated and strongly decalcified calcareous siltstone assigned to the Polc member of the middle plate of the Oquirrh Group. Drill results are tabulated in Table 10.3 and illustrated in Figure 10.3 and Figure 10.4. The D-3 zone is interpreted to lie in the hanging wall of the same listric normal fault as that which underlies the D-1 Zone, but further down dip above a flatter section of the fault. D-2 is bounded to the northwest by a thick, steeply dipping zone of calcite breccia and calcite veining (Calfm). Mineralization is diminished in intensity to the south, but is still open for expansion in that direction.

### Table 10.3 Highlight Drill Intervals in the D-2 Zone

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| LBP023 (062, -51) | 25.9 | 32.0 | 6.1 | 0.32 | 0.2 | 278.9 | Discovery 2 | 240 metre offset from LBP021 toward A Pit | 103.1 |
| and | 42.7 | 50.3 | 7.6 | 0.43 | 0.2 | | | | |
| and | 56.4 | 59.4 | 3.0 | 0.69 | 0.2 | | | | |
| and | 102.1 | 109.7 | 7.6 | 0.52 | 0.2 | | | | |
| and | 114.3 | 120.4 | 6.1 | 0.23 | 0.2 | | | | |
| and | 123.4 | 128.0 | 4.6 | 0.27 | 0.2 | | | | |
| and | 204.2 | 253.0 | 48.8 | 1.78 | 0.2 | | | | |
| including | 214.9 | 216.4 | 1.5 | 1.29 | 1 | | | | |
| including | 224.0 | 239.3 | 15.2 | 4.72 | 1 | | | | |
| and including | 225.6 | 231.6 | 6.1 | 7.95 | 5 | | | | |
| and | 272.8 | 278.9 | 6.1 | 0.39 | 0.2 | | | | |
| LBP043 (102, -66) | 10.7 | 21.3 | 10.7 | 0.45 | 0.2 | 266.7 | Discovery 2 Zone | | 317.7 |
| and | 27.4 | 36.6 | 9.1 | 0.39 | | | | | |
| and | 83.8 | 89.9 | 6.1 | 0.54 | | | | | |
| and | 140.2 | 150.9 | 10.7 | 1.52 | | | | | |
| including | 143.3 | 149.4 | 6.1 | 2.25 | 1 | | | | |
| and | 158.5 | 167.6 | 9.1 | 4.92 | 0.2 | | | | |
| including | 160.0 | 166.1 | 6.1 | 7.22 | 1 | | | | |
| and including | 161.5 | 166.1 | 4.6 | 9.03 | 5 | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| and | 208.8 | 262.1 | 53.3 | 4.39 | 0.2 | | | | |
| including | 214.9 | 253.0 | 38.1 | 5.76 | 1 | | | | |
| and including | 221.0 | 233.2 | 12.2 | 12.05 | 5 | | | | |
| and including | 240.8 | 245.4 | 4.6 | 7.21 | | | | | |
| including | 254.5 | 257.6 | 3.0 | 2.69 | 1 | | | | |
| LBP048 (061, -63) | 0.0 | 21.3 | 21.3 | 0.34 | 0.2 | 251.5 | Discovery 2 Zone | | 90.3 |
| and | 25.9 | 45.7 | 19.8 | 0.33 | | | | | |
| and | 56.4 | 64.0 | 7.6 | 0.26 | | | | | |
| and | 79.2 | 89.9 | 10.7 | 0.38 | | | | | |
| and | 111.3 | 114.3 | 3.0 | 0.21 | | | | | |
| and | 173.7 | 204.2 | 30.5 | 0.78 | | | | | |
| including | 195.1 | 196.6 | 1.5 | 1.13 | 1 | | | | |
| including | 198.1 | 202.7 | 4.6 | 2.91 | | | | | |
| and | 208.8 | 248.4 | 39.6 | 1.16 | 0.2 | | | | |
| including | 210.3 | 213.4 | 3.0 | 1.95 | 1 | | | | |
| including | 225.6 | 243.8 | 18.3 | 1.82 | | | | | |
| LBP051 (187, -66) | 1.5 | 9.1 | 7.6 | 0.21 | 0.2 | 205.7 | Discovery 2 Zone | | 107.1 |
| and | 77.7 | 80.8 | 3.0 | 0.24 | | | | | |
| and | 131.1 | 172.2 | 41.1 | 2.51 | | | | | |
| including | 137.2 | 144.8 | 7.6 | 6.69 | 1 | | | | |
| and including | 137.2 | 141.7 | 4.6 | 9.11 | 5 | | | | |
| including | 146.3 | 147.8 | 1.5 | 1.07 | 1 | | | | |
| including | 149.4 | 157.0 | 7.6 | 4.85 | | | | | |
| and including | 152.4 | 155.4 | 3.0 | 8.52 | 5 | | | | |
| including | 164.6 | 166.1 | 1.5 | 1.06 | 1 | | | | |
| including | 169.2 | 172.2 | 3.0 | 1.14 | | | | | |
| and | 202.7 | 205.7 | 3.0 | 0.42 | 0.2 | | | | |
| LBP054 (52, -66) | 39.6 | 68.6 | 29.0 | 0.31 | 0.2 | 379.5 | Discovery 2 Zone | | 114.9 |
| and | 70.1 | 74.7 | 4.6 | 0.20 | | | | | |
| and | 79.2 | 91.4 | 12.2 | 0.23 | | | | | |
| and | 93.0 | 96.0 | 3.0 | 0.25 | | | | | |
| and | 150.9 | 153.9 | 3.0 | 0.33 | | | | | |
| and | 166.1 | 170.7 | 4.6 | 0.21 | | | | | |
| and | 172.2 | 176.8 | 4.6 | 0.31 | | | | | |
| and | 207.3 | 214.9 | 7.6 | 0.27 | | | | | |
| and | 222.5 | 225.6 | 3.0 | 0.33 | | | | | |
| and | 248.4 | 349.0 | 100.6 | 0.94 | | | | | |
| including | 253.0 | 268.2 | 15.2 | 1.65 | 1 | | | | |
| and including | 335.3 | 345.9 | 10.7 | 2.33 | | | | | |
| LBP055 (88, -68) | 4.6 | 36.6 | 32.0 | 0.47 | 0.2 | 300.2 | Discovery 2 Zone | | 123.1 |
| and | 57.9 | 62.5 | 4.6 | 0.46 | | | | | |
| and | 71.6 | 99.1 | 27.4 | 0.53 | | | | | |
| and | 166.1 | 179.8 | 13.7 | 1.21 | | | | | |
| and | 192 | 265.2 | 73.2 | 1.02 | | | | | |
| including | 192 | 208.8 | 16.8 | 2.39 | 1 | | | | |
| LBP062 (150, -72) | 76.2 | 85.3 | 9.1 | 0.40 | 0.2 | 221.0 | Discovery 2 Zone | poor recovery between reportable intervals | 152.7 |
| and | 109.7 | 118.9 | 9.1 | 1.12 | | | | | |
| and | 129.5 | 173.7 | 44.2 | 3.14 | | | | | |
| including | 135.6 | 152.4 | 16.8 | 6.53 | 1 | | | | |
| and including | 140.2 | 147.83 | 7.6 | 11.3 | 5 | | | | |
| LBP064 (110, -70) | 77.7 | 80.8 | 3.0 | 0.46 | 0.2 | 227.1 | Discovery Zone 2 | Poor recovery at base of intercept | 217.8 |
| and | 93.0 | 105.2 | 12.2 | 0.35 | | | | | |
| and | 112.8 | 175.3 | 62.5 | 3.40 | | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **including** | **141.7** | **175.3** | **33.5** | **5.01** | 1 | | | | |
| **and including** | **146.3** | **167.6** | **21.3** | **6.2** | 5 | | | | |
| **LBP066 (86, -60)** | 4.6 | 7.6 | 3.0 | 0.29 | 0.2 | 243.8 | **Discovery Zone 2** | Hole ended in grade | **100.2** |
| **and** | 12.2 | 15.2 | 3.0 | 0.45 | | | | | |
| **and** | 96.0 | 111.3 | 15.2 | 0.29 | | | | | |
| **and** | 131.1 | 146.3 | 15.2 | 0.46 | | | | | |
| **and** | 164.6 | 167.6 | 3.0 | 1.94 | | | | | |
| **and** | **173.7** | **243.8** | **70.1** | **1.15** | | | | | |
| **Including** | **175.3** | **190.5** | **15.2** | **2.92** | 1 | | | | |
| **and including** | **181.4** | **182.9** | **1.5** | **14.65** | 5 | | | | |
| **LBP068 (360, -75)** | 74.7 | 89.9 | 15.2 | 0.26 | 0.2 | 318.5 | **Discovery Zone 2** | | **105.5** |
| **and** | **96.0** | **143.3** | **47.2** | **0.41** | | | | | |
| **and** | **172.2** | **184.4** | **12.2** | **0.78** | | | | | |
| **and** | **228.6** | **249.9** | **21.3** | **2.38** | | | | | |
| **including** | **237.7** | **246.9** | **9.1** | **4.89** | 1 | | | | |
| **and including** | **239.3** | **245.4** | **6.1** | **5.93** | 5 | | | | |
| **and** | **266.7** | **301.8** | **35.1** | **0.63** | 0.2 | | | | |
| **LBP069 (74, -78)** | 12.2 | 16.8 | 4.6 | 0.33 | 0.2 | 303.3 | **Discovery Zone 2** | | **149.6** |
| | 22.9 | 25.9 | 3.0 | 0.34 | | | | | |
| | 70.1 | 86.9 | 16.8 | 0.32 | | | | | |
| | **160.0** | **217.9** | **57.9** | **1.52** | | | | | |
| **including** | **173.7** | **182.9** | **9.1** | **7.42** | 1 | | | | |
| **and including** | **176.8** | **181.4** | **4.6** | **12.2** | 5 | | | | |
| | **219.5** | **228.6** | **9.1** | **2.91** | 0.2 | | | | |
| **including** | **219.5** | **224.0** | **4.6** | **5.38** | 1 | | | | |
| | **271.3** | **285.0** | **13.7** | **1.96** | 0.2 | | | | |
| **including** | **271.3** | **281.9** | **10.7** | **2.30** | 1 | | | | |
| **LBP088 (75, -73)** | 30.5 | 41.1 | 10.7 | 0.34 | 0.2 | 327.7 | **Discovery Zone 2** | | **150.2** |
| **and** | 48.8 | 56.4 | 7.6 | 0.24 | | | | | |
| **and** | 57.9 | 62.5 | 4.6 | 0.43 | | | | | |
| **and** | 73.2 | 79.2 | 6.1 | 0.37 | | | | | |
| **and** | 88.4 | 93.0 | 4.6 | 0.43 | | | | | |
| **and** | 120.4 | 137.2 | 16.8 | 0.29 | | | | | |
| **and** | 210.3 | 214.9 | 4.6 | 0.45 | | | | | |
| **and** | 237.7 | 239.3 | 1.5 | 2.21 | | | | | |
| **and** | **257.6** | **318.5** | **61.0** | **2.10** | | | | | |
| **including** | **257.6** | **268.2** | **10.7** | **6.33** | 1 | | | | |
| **and including** | **257.6** | **260.6** | **3.0** | **16.2** | 5 | | | | |
| **LBP214C (125, -77)** | 69.2 | 72.2 | 3.0 | 0.68 | 0.2 | 285.6 | **Discovery Zone 2** | **Metallurgical PQ Core Hole** | **185.7** |
| **and** | 79.9 | 82.3 | 2.4 | 0.59 | 0.2 | | | | |
| **and** | **95.1** | **115.4** | **20.3** | **0.79** | 0.2 | | | | |
| **incl** | **101.2** | **104.3** | **3.1** | **2.90** | 1 | | | | |
| **and** | **124.2** | **171.6** | **47.4** | **3.32** | 0.2 | | | | |
| **incl** | **127.3** | **151.0** | **23.7** | **5.08** | 1 | | | | |
| ***and incl*** | ***130.2*** | ***135.9*** | ***5.8*** | ***12.5*** | *5* | | | | |
| ***and incl*** | ***142.0*** | ***145.4*** | ***3.4*** | ***7.99*** | *5* | | | | |
| **incl** | **163.7** | **170.2** | **6.6** | **4.36** | 1 | | | | |
| ***and incl*** | ***168.3*** | ***170.2*** | ***2.0*** | ***7.63*** | *5* | | | | |
| **and** | **269.0** | **274.9** | **5.9** | **1.49** | 0.2 | | | | |
| **incl** | **270.2** | **273.4** | **3.2** | **2.35** | 1 | | | | |
| **LBP095 (260, -82)** | 33.5 | 47.2 | 13.7 | 0.27 | 0.2 | 285.0 | **Discovery Zone 2** | | **130.7** |
| **and** | 70.1 | 80.8 | 10.7 | 0.30 | | | | | |
| **and** | 88.4 | 94.5 | 6.1 | 0.28 | | | | | |
| **and** | **157.0** | **201.2** | **44.2** | **1.14** | | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **including** | **193.5** | **196.6** | **3.0** | **1.77** | | | | | |
| **and** | **217.9** | **240.8** | **22.9** | **2.83** | 0.2 | | | | |
| **including** | **219.5** | **234.7** | **15.2** | **4.03** | 1 | | | | |
| **and including** | **227.1** | **231.6** | **4.6** | **5.99** | 5 | | | | |
| **and** | 257.6 | 269.7 | 12.2 | 0.57 | 0.2 | | | | |
| **LBP207C (240, -50)** | 30.6 | 37.2 | 6.6 | 0.27 | 0.2 | 271.9 | **Discovery Zone 2** | **Metallurgical PQ Core Hole** | **133.4** |
| **and** | **68.7** | **82.1** | **13.4** | **1.12** | | | | | |
| **incl** | **68.7** | **74.5** | **5.8** | **1.11** | 1 | | | | |
| **incl** | **76.8** | **80.0** | **3.2** | **2.05** | | | | | |
| **and** | **103.0** | **105.8** | **2.7** | **1.80** | 0.2 | | | | |
| **incl** | **103.0** | **104.2** | **1.2** | **2.91** | 1 | | | | |
| **and** | **114.9** | **146.9** | **32.0** | **3.16** | 0.2 | | | | |
| **incl** | **116.4** | **143.9** | **27.4** | **3.58** | 1 | | | | |
| ***and incl*** | **116.4** | **118.0** | **1.5** | **5.08** | 5 | | | | |
| ***and incl*** | **122.5** | **125.6** | **3.0** | **10.3** | | | | | |
| ***and incl*** | **140.8** | **142.3** | **1.5** | **6.90** | | | | | |
| **and** | **153.0** | **163.7** | **10.7** | **0.84** | 0.2 | | | | |
| **incl** | **159.1** | **160.6** | **1.5** | **2.95** | 1 | | | | |
| **and** | 207.9 | 212.5 | 4.6 | 0.36 | 0.2 | | | | |

The D-3 Zone was discovered in 2021 through drilling targeting the up-dip extension of the D-1 Zone to the west. LBP127 intercepted 33.5 m grading 1.98 g Au/t and 30.5 m grading 1.11 g Au/t in the footwall of the intended target area. Drill highlights are tabulated in Table 10.4 and illustrated in Figure 10.3, Figure 10.4, and Figure 10.5. The D-3 zone is relatively steeply dipping and is interpreted to lie in the hanging wall of a north-striking, east-dipping listric normal fault that merges with the D-1/D-2 structure to the north and down dip to the east along the low-angle normal fault that separates the middle plate from the lower plate. Based on limited drilling, the D-3 listric normal fault may continue further south and form the structure at the base of the F zone and CD Pit zones. Gold mineralization is hosted in brownish, oxidized, variably brecciated and decalcified calcareous siltstone and limestone of the Pols and PMmx members of the middle plate of the Oquirrh Group.

## Table 10.4 Highlight Drill Intercepts in the D-3 Zone

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **LBP127 (60, -58)** | 89.9 | 93.0 | 3.0 | 0.36 | 0.2 | 294.1 | **D-3** | Hole lost; last five assay intervals returned > 2 g Au/t: no recovery in some of the lower interval (assigned 0 grade) | **109.5** |
| **and** | 128.0 | 132.6 | 4.6 | 0.54 | | | | | |
| **and** | 155.4 | 158.5 | 3.0 | 0.57 | | | | | |
| **and** | 187.5 | 201.2 | 13.7 | 0.28 | | | | | |
| **and** | **224.0** | **257.6** | **33.5** | **1.98** | | | | | |
| **incl** | **239.3** | **254.5** | **15.2** | **3.93** | 1 | | | | |
| **and** | **263.7** | **294.1** | **30.5** | **1.11** | 0.2 | | | | |
| **incl** | **286.5** | **294.1** | **7.6** | **2.39** | 1 | | | | |
| **LBP129 (15, -65)** | 1.5 | 12.2 | 10.7 | 0.27 | 0.2 | 339.9 | **D-3** | | **69.2** |
| **and** | 32.0 | 41.1 | 9.1 | 0.33 | | | | | |
| **and** | 65.5 | 80.8 | 15.2 | 0.41 | | | | | |
| **and** | 137.2 | 157.0 | 19.8 | 0.31 | | | | | |
| **and** | **222.5** | **228.6** | **6.1** | **0.73** | | | | | |
| **and** | **240.8** | **269.7** | **29.0** | **1.60** | | | | | |
| **incl** | **243.8** | **263.7** | **19.8** | **2.09** | 1 | | | | |
| **LBP131 (15, -80)** | 1.5 | 4.6 | 3.0 | 0.76 | 0.2 | 373.4 | **D-3** | | **92.7** |
| **and** | 19.8 | 24.4 | 4.6 | 0.36 | | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **and** | 62.5 | 67.1 | 4.6 | 0.24 | | | | | |
| **and** | 73.2 | 77.7 | 4.6 | 0.32 | | | | | |
| **and** | 96.0 | 100.6 | 4.6 | 0.22 | | | | | |
| **and** | 102.1 | 115.8 | 13.7 | 0.25 | | | | | |
| **and** | 141.7 | 144.8 | 3.0 | 0.31 | | | | | |
| **and** | **169.2** | **245.4** | **76.2** | **0.82** | | | | | |
| **incl** | **187.5** | **210.3** | **22.9** | **1.65** | 1 | | | | |
| **and** | **257.6** | **269.7** | **12.2** | **0.58** | 0.2 | | | | |
| **and** | **275.8** | **288.0** | **12.2** | **0.77** | 0.2 | | | | |
| **and** | 304.8 | 307.8 | 3.0 | 0.33 | 0.2 | | | | |
| **LBP138 (33, -52)** | **117.3** | **126.5** | **9.1** | **1.43** | 0.2 | 284.9 | **D-3** | Hole ended in grade; last assay interval 0.84 g Au/t | **97.9** |
| **and** | 199.6 | 208.8 | 9.1 | 0.48 | 0.2 | 284.9 | **D-3** | Hole ended in grade; last assay interval 0.84 g Au/t | **97.9** |
| **and** | **217.9** | **285.0** | **67.1** | **1.20** | 0.2 | 284.9 | **D-3** | Hole ended in grade; last assay interval 0.84 g Au/t | **97.9** |
| **incl** | **217.9** | **234.7** | **16.8** | **2.57** | 1 | 284.9 | **D-3** | Hole ended in grade; last assay interval 0.84 g Au/t | **97.9** |
| **and incl** | **227.1** | **230.1** | **3.0** | **8.51** | 5 | 284.9 | **D-3** | Hole ended in grade; last assay interval 0.84 g Au/t | **97.9** |
| **LBP140 (240, -70)** | **61.0** | **77.7** | **16.8** | **0.51** | 0.2 | 342.9 | **D-3** | | **88.1** |
| **and** | **118.9** | **131.1** | **12.2** | **0.52** | 0.2 | 342.9 | **D-3** | | **88.1** |
| **and** | **190.5** | **196.6** | **6.1** | **6.33** | 0.2 | 342.9 | **D-3** | | **88.1** |
| **Incl** | **190.5** | **195.1** | **4.6** | **8.29** | 1 | 342.9 | **D-3** | | **88.1** |
| **and** | **205.7** | **221.0** | **15.2** | **1.12** | 0.2 | 342.9 | **D-3** | | **88.1** |
| **and** | **231.6** | **259.1** | **27.4** | **0.59** | 0.2 | 342.9 | **D-3** | | **88.1** |
| **and** | 318.5 | 323.1 | 4.6 | 0.29 | 0.2 | 342.9 | **D-3** | | **88.1** |
| **LBP152 (90, -79)** | 1.5 | 10.7 | 9.1 | 0.26 | 0.2 | 409.9 | **D-3** | | **152.0** |
| **and** | 18.3 | 30.5 | 12.2 | 0.32 | 0.2 | 409.9 | **D-3** | | **152.0** |
| **and** | 54.9 | 59.4 | 4.6 | 0.28 | 0.2 | 409.9 | **D-3** | | **152.0** |
| **and** | 172.2 | 176.8 | 4.6 | 0.22 | 0.2 | 409.9 | **D-3** | | **152.0** |
| **and** | **219.5** | **315.5** | **96.0** | **1.44** | 0.2 | 409.9 | **D-3** | | **152.0** |
| **incl** | **228.6** | **260.6** | **32.0** | **1.95** | 1 | 409.9 | **D-3** | | **152.0** |
| **and incl** | **253.0** | **254.5** | **1.5** | **5.31** | 5 | 409.9 | **D-3** | | **152.0** |
| **incl** | **263.7** | **292.6** | **29.0** | **1.86** | 1 | 409.9 | **D-3** | | **152.0** |
| **and incl** | **277.4** | **278.9** | **1.5** | **5.58** | 5 | 409.9 | **D-3** | | **152.0** |
| **incl** | **294.1** | **297.2** | **3.0** | **1.12** | 1 | 409.9 | **D-3** | | **152.0** |
| **incl** | **303.3** | **306.3** | **3.0** | **2.88** | 1 | 409.9 | **D-3** | | **152.0** |
| **and** | 332.2 | 342.9 | 10.7 | 0.46 | 0.2 | 409.9 | **D-3** | | **152.0** |
| **LBP189 (195, -62)** | 65.5 | 74.7 | 9.1 | 0.39 | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **and** | 94.5 | 103.6 | 9.1 | 0.35 | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **and** | 138.7 | 147.8 | 9.1 | 0.45 | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **and** | 190.5 | 195.1 | 4.6 | 0.66 | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **and** | 213.4 | 224.0 | 10.7 | 0.33 | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **and** | **266.7** | **329.2** | **62.5** | **1.01** | 0.2 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **incl** | **300.2** | **326.1** | **25.9** | **1.94** | 1 | 422.1 | **D-3** | Step-Out to the Southeast | **80.5** |
| **LBP169 (128, -71)** | 13.7 | 18.3 | 4.6 | 0.39 | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and** | 126.5 | 129.5 | 3.0 | 0.38 | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and** | 195.1 | 199.6 | 4.6 | 0.58 | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and** | 216.4 | 222.5 | 6.1 | 0.32 | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and** | **233.2** | **313.9** | **80.8** | **0.98** | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **incl** | **239.3** | **242.3** | **3.0** | **1.71** | 1 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **incl** | **248.4** | **253.0** | **4.6** | **1.60** | 1 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **incl** | **260.6** | **278.9** | **18.3** | **2.32** | 1 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and incl** | **263.7** | **266.7** | **3.0** | **5.60** | 5 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **and** | **373.4** | **381.0** | **7.6** | **2.19** | 0.2 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **incl** | **374.9** | **379.5** | **4.6** | **3.17** | 1 | 384.0 | **D-3** | Hole Lost in Mineralization | **103.4** |
| **LBP197C (45, -78)** | **58.8** | **75.3** | **16.5** | **1.44** | **0.2** | 322.5 | **D-3** | **Metallurgical PQ Core Hole** | **65.6** |
| **incl** | **61.9** | **74.1** | **12.2** | **1.66** | **1** | 322.5 | **D-3** | **Metallurgical PQ Core Hole** | **65.6** |
| **and** | 88.2 | 91.1 | 2.9 | 0.49 | 0.2 | 322.5 | **D-3** | **Metallurgical PQ Core Hole** | **65.6** |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| and | 107.3 | 110.6 | 3.4 | 0.33 | | | | | |
| and | 116.7 | 129.8 | 13.1 | 0.56 | | | | | |
| incl | 118.9 | 119.8 | 0.9 | 2.87 | 1 | | | | |
| and | 136.6 | 151.8 | 15.2 | 1.36 | 0.2 | | | | |
| incl | 136.6 | 147.1 | 10.5 | 1.81 | 1 | | | | |
| and | 157.9 | 165.5 | 7.6 | 1.23 | 0.2 | | | | |
| incl | 159.4 | 164.3 | 4.9 | 1.55 | 1 | | | | |
| and | 228.0 | 232.6 | 4.6 | 0.43 | 0.2 | | | | |
| LBP206 (52, -77) | 0.0 | 4.6 | 4.6 | 0.64 | 0.2 | 365.8 | D-3 | | 131.1 |
| incl | 1.5 | 3.1 | 1.5 | 1.30 | 1 | | | | |
| and | 22.9 | 27.4 | 4.6 | 0.37 | 0.2 | | | | |
| and | 56.4 | 70.1 | 13.7 | 0.37 | | | | | |
| and | 91.4 | 103.6 | 12.2 | 0.32 | | | | | |
| and | 236.2 | 259.1 | 22.9 | 1.41 | | | | | |
| incl | 243.8 | 257.6 | 13.7 | 1.93 | 1 | | | | |
| and | 271.3 | 327.7 | 56.4 | 1.51 | 0.2 | | | | |
| incl | 277.4 | 286.5 | 9.1 | 1.42 | 1 | | | | |
| incl | 292.6 | 317.0 | 24.4 | 2.36 | | | | | |
| *and incl* | 304.8 | 307.9 | 3.0 | 5.86 | 5 | | | | |
| incl | 318.5 | 326.1 | 7.6 | 1.04 | 1 | | | | |
| LBP208 (107, -69) | 4.6 | 30.5 | 25.9 | 0.26 | 0.2 | 434.3 | D-3 | | 103.0 |
| and | 179.8 | 192.0 | 12.2 | 0.43 | | | | | |
| and | 227.1 | 269.8 | 42.7 | 1.25 | | | | | |
| incl | 239.3 | 245.4 | 6.1 | 1.29 | 1 | | | | |
| incl | 257.6 | 268.2 | 10.7 | 3.01 | | | | | |
| and | 277.4 | 294.1 | 16.8 | 0.68 | 0.2 | | | | |
| incl | 285.0 | 288.0 | 3.0 | 1.87 | 1 | | | | |
| and | 300.2 | 330.7 | 30.5 | 0.71 | 0.2 | | | | |
| incl | 303.3 | 304.8 | 1.5 | 1.09 | 1 | | | | |
| incl | 310.9 | 317.0 | 6.1 | 1.02 | | | | | |
| incl | 318.5 | 321.6 | 3.0 | 1.93 | | | | | |
| and | 364.2 | 368.8 | 4.6 | 1.00 | 0.2 | | | | |
| incl | 364.2 | 367.3 | 3.0 | 1.16 | 1 | | | | |
| LBP222C (90, -79) | 3.1 | 10.8 | 7.8 | 0.32 | 0.2 | 345.0 | D-3 | Metallurgical PQ Core Hole | 116.1 |
| and | 47.9 | 59.7 | 11.9 | 0.29 | | | | | |
| and | 74.2 | 78.0 | 3.9 | 0.24 | | | | | |
| and | 84.4 | 88.7 | 4.3 | 0.40 | | | | | |
| and | 113.4 | 114.9 | 1.5 | 0.70 | | | | | |
| and | 134.7 | 139.4 | 4.7 | 0.28 | | | | | |
| and | 218.1 | 225.0 | 6.9 | 0.73 | | | | | |
| incl | 223.3 | 225.0 | 1.8 | 1.37 | 1 | | | | |
| and | 243.9 | 252.1 | 8.1 | 3.62 | 0.2 | | | | |
| *and incl* | 249.0 | 250.6 | 1.5 | 5.36 | 5 | | | | |
| and | 259.1 | 313.3 | 54.2 | 1.27 | 0.2 | | | | |
| incl | 262.2 | 265.8 | 3.6 | 2.47 | 1 | | | | |
| incl | 275.4 | 292.4 | 17.0 | 2.51 | | | | | |
| *and incl* | 279.8 | 281.0 | 1.3 | 6.37 | 5 | | | | |
| incl | 304.9 | 308.5 | 3.5 | 1.48 | 1 | | | | |
| and | 319.6 | 320.7 | 1.1 | 1.74 | 0.2 | | | | |

### 10.5.2 D-1 Southeast Extension

The D-1 Southeast Extension ("D-1 SE") comprises the area southeast of the original D-1 Zone discovery between the B Extension Pit and the Tallman Extension Pit. This 400-metre-long area was historically tested with a very few, shallow holes. Deeper drilling by Liberty gold shows that the listric normal fault that floors mineralization in the D-1 Zone continues to the southeast (Table 10.5 and Figure 10.3, Figure 10.5, and Figure 10.6). Gold mineralization extends from surface along the southeast side of the prominent ridge between the B and Tallman Extension pits northeastward, and it is remains open to the northeast. The host rock for oxidized mineralization consists of strongly decalcified calcareous siltstone suspected to be the Polc or Pols member of the middle plate. Some of the mineralization, particularly down dip to the northeast, is hosted in black, carbonaceous siltstone with variable, but generally low, cyanide solubility, and it is assigned to the Polc rock type. The D-1 SE Zone is still open for expansion to the north, and it may extend under cover to the southeast.

**Table 10.5 Highlight Drill Intervals from the D-1 Southeast Extension**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **LBP150 (117, -60)** | 19.8 | 22.9 | 3.0 | 0.70 | 0.2 | 251.5 | **D-1 Southeast Extension** | | **93.4** |
| **and** | **32.0** | **44.2** | **12.2** | **0.33** | | | | | |
| **and** | **50.3** | **56.4** | **6.1** | **0.26** | | | | | |
| **and** | **79.2** | **83.8** | **4.6** | **0.62** | | | | | |
| **and** | **138.7** | **146.3** | **7.6** | **0.83** | | | | | |
| **and** | **153.9** | **176.8** | **22.9** | **0.48** | | | | | |
| **and** | 185.9 | 189.0 | 3.0 | 0.47 | | | | | |
| **and** | **208.8** | **228.6** | **19.8** | **3.04** | | | | | |
| **incl** | **208.8** | **222.5** | **13.7** | **4.15** | 1 | | | | |
| **and incl** | **217.9** | **222.5** | **4.6** | **8.54** | 5 | | | | |
| **and** | 231.6 | 245.4 | 13.7 | 0.29 | 0.2 | | | | |
| **LBP168 (98, -45)** | 25.9 | 29.0 | 3.0 | 0.51 | 0.2 | 251.5 | **D-1 Southeast Extension** | | **51.6** |
| **and** | 36.6 | 41.2 | 4.6 | 0.29 | | | | | |
| **and** | 47.2 | 48.8 | 1.5 | 1.17 | | | | | |
| **and** | 79.3 | 96.0 | 16.8 | 0.34 | | | | | |
| **and** | **141.7** | **173.7** | **32.0** | **1.06** | | | | | |
| **incl** | **144.8** | **155.5** | **10.7** | **2.34** | 1 | | | | |
| **and** | 196.6 | 201.2 | 4.6 | 0.53 | 0.2 | | | | |
| **and** | **211.8** | **217.9** | **6.1** | **0.80** | | | | | |
| **incl** | 213.4 | 214.9 | 1.5 | 1.87 | 1 | | | | |
| **LBP171 (75, -45)** | 33.5 | 48.8 | 15.2 | 0.29 | 0.2 | 257.6 | **D-1 Southeast Extension** | | **31.8** |
| **and** | 71.6 | 88.4 | 16.8 | 0.36 | | | | | |
| **incl** | 79.3 | 80.8 | 1.5 | 1.22 | 1 | | | | |
| **and** | **164.6** | **205.7** | **41.1** | **0.52** | 0.2 | | | | |
| **incl** | **167.6** | **169.2** | **1.5** | **3.27** | 1 | | | | |
| **and incl** | **181.4** | **182.9** | **1.5** | **1.20** | | | | | |
| **LBP190C (122, -50)** | 18.6 | 20.1 | 1.5 | 1.28 | 0.2 | 244.1 | **D-1 Southeast Extension** | **Metallurgical PQ Core Hole** | **53.4** |
| **and** | 30.8 | 41.5 | 10.7 | 0.36 | | | | | |
| **and** | 49.1 | 51.8 | 2.7 | 1.51 | | | | | |
| **incl** | 50.3 | 51.8 | 1.5 | 2.00 | 1 | | | | |
| **and** | 74.7 | 80.8 | 6.1 | 0.43 | 0.2 | | | | |
| **and** | **143.7** | **161.8** | **18.1** | **0.69** | | | | | |
| **incl** | 145.1 | 146.9 | 1.8 | 1.62 | 1 | | | | |
| **incl** | **152.7** | **156.6** | **3.9** | **1.35** | 1 | | | | |
| **and** | 162.9 | 174.3 | 11.4 | 0.28 | 0.2 | | | | |
| **and** | 184.7 | 193.9 | 9.1 | 0.46 | | | | | |
| **incl** | 190.8 | 192.3 | 1.5 | 1.12 | 1 | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **and** | **208.9** | **223.1** | **14.2** | **1.61** | 0.2 | | | | |
| **incl** | **213.7** | **219.8** | **6.1** | **3.04** | 1 | | | | |
| **LBP258 (118, -55)** | 82.3 | 93.0 | 10.7 | 0.34 | 0.2 | 288.0 | **D-1 Southeast Extension** | | **102.8** |
| **and** | **181.4** | **204.2** | **22.9** | **4.34** | | | | | |
| **incl** | **181.4** | **196.6** | **15.2** | **6.28** | 1 | | | | |
| **and incl** | **187.5** | **193.5** | **6.1** | **10.8** | 5 | | | | |
| **LBP250 (160, -58)** | **57.9** | **67.1** | **9.1** | **1.18** | 0.2 | 263.7 | **D-1 Southeast Extension** | Reduced cyanide solubility in bottom intervals | **81.8** |
| **incl** | **59.4** | **64.0** | **4.6** | **1.74** | 1 | | | | |
| **and** | 77.7 | 97.5 | 19.8 | 0.32 | 0.2 | | | | |
| **and** | **176.8** | **190.5** | **13.7** | **4.57** | | | | | |
| **incl** | **178.3** | **189.0** | **10.7** | **5.77** | 1 | | | | |
| ***and incl*** | **178.3** | **184.4** | **6.1** | **8.65** | 5 | | | | |
| **and** | 214.9 | 221.0 | 6.1 | 0.34 | 0.2 | | | | |

### 10.5.3 D-1 Northwest Extension

The D-1 Northwest Extension, starting with drill hole LBP002 and extending northwest of the A Basin target along the postulated extension of the D-1 Zone listric normal fault, has been tested with several drill holes (Figure 10.2 Figure 10.8, and Table 10.6). Most drill holes contain shallow, relatively low-grade gold mineralization associated with abundant calcite veins and calcite-cemented breccia (Calfm).

**Table 10.6 Highlight Drill Intercepts from the D-1 Northwest Extension**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | g/t x m |
|---|---|---|---|---|---|---|---|---|
| **LBP179 (70, -65)** | 0.0 | 10.7 | 10.7 | 0.38 | 0.2 | 275.8 | **D-1 Northwest Extension** | **31.8** |
| **and** | 21.3 | 24.4 | 3.0 | 0.37 | | | | |
| **and** | 47.2 | 51.8 | 4.6 | 0.37 | | | | |
| **and** | **103.6** | **128.0** | **24.4** | **1.02** | | | | |
| **incl** | **109.7** | **120.4** | **10.7** | **1.38** | 1 | | | |

### 10.5.4 J Zone

The J Zone lies on the immediate north side of Mineral Gulch and was tested by a number of shallow historical holes. Liberty Gold followed up with two drill holes in 2017 and several holes in 2021 (Figure 10.3, Figure 10.8, and Table 10.7). J Zone mineralization appears to lie partially within massive, brecciated, variably decalcified limestone (Pola?) underlain by carbonaceous, pyritic siltstone (PMmx). Shallow J Zone mineralization above the level of the floor of Mineral Gulch is thoroughly oxidized, while much of the mineralization below the valley floor is carbonaceous with sporadic areas of disseminated pyrite. The J Zone is still open for expansion to the west and east.

### Table 10.7 Highlight Drill Intercepts from the J Zone

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| LBP004 (130, -45) | 0.0 | 7.6 | 7.6 | 0.38 | 0.2 | 190.5 | J Zone | | 43.6 |
| and | 10.7 | 35.1 | 24.4 | 0.95 | | | | | |
| including | 29.0 | 30.5 | 1.5 | 6.18 | 1 | | | | |
| and | 51.8 | 61.0 | 9.1 | 1.03 | 0.2 | | | | |
| including | 51.8 | 57.9 | 6.1 | 1.28 | 1 | | | | |
| and | 111.3 | 126.5 | 15.2 | 0.54 | 0.2 | | | | |
| LBP224 (226, -45) | 18.3 | 68.6 | 50.3 | 0.97 | 0.2 | 202.7 | J Zone | Reduced cyanide solubility | 61.9 |
| incl | 33.5 | 35.1 | 1.5 | 3.53 | 1 | | | | |
| incl | 42.7 | 45.7 | 3.0 | 4.09 | | | | | |
| *and incl* | 44.2 | 45.7 | 1.5 | 5.27 | 5 | | | | |
| incl | 59.4 | 67.1 | 7.6 | 2.24 | 1 | | | | |
| and | 93.0 | 97.5 | 4.6 | 0.44 | 0.2 | | | | |
| and | 128.0 | 131.1 | 3.0 | 0.73 | | | | | |
| and | 140.2 | 144.8 | 4.6 | 0.35 | | | | | |
| and | 155.5 | 166.1 | 10.7 | 0.68 | | | | | |
| incl | 163.1 | 164.6 | 1.5 | 1.28 | 1 | | | | |
| LBP239 (290, -55) | 44.2 | 62.5 | 18.3 | 0.39 | 0.2 | 268.2 | J Zone | | 27.6 |
| and | 82.3 | 105.2 | 22.9 | 0.65 | | | | | |
| incl | 82.3 | 85.3 | 3.0 | 1.60 | 1 | | | | |
| incl | 86.9 | 88.4 | 1.5 | 1.02 | | | | | |
| incl | 94.5 | 96.0 | 1.5 | 1.35 | | | | | |
| and | 111.3 | 128.0 | 16.8 | 0.33 | 0.2 | | | | |

## 10.5.5 F Zone

The F Zone is defined as the area between the northwest end of the CD Pit and the south end of the D-3 Zone (Figure 10.3 and Figure 10.6). Historical drilling in this area demonstrated that mineralization mined in the CD Pit continues to the north-northwest at shallow depth in the Pold and Pols units of the middle plate of the Oquirrh Group. Drilling beyond a few hundred metres north of the CD Pit is sparse due to steep terrain, but a series of historical holes drilled near the base of resistant outcrops of Pold returned shallow gold intercepts in what is interpreted as Pols siltstone and limestone overlying the PMmc. Drilling by Liberty Gold further to the west of these holes encountered scattered, relatively low-grade mineralization in the Pold unit, which appears to extend much deeper in this area than in the drill holes to the east. Drilling by Liberty Gold further to the south on a ridge separating the CD pit from the rest of the F zone to the north returned shallow mineralization over up to 74.7 metres, as demonstrated in Table 10.8. Additional drilling is planned to follow up on these holes and to continue to extend mineralization to the north toward the south end of the D-3 Zone. At present, the mineralization modeled by Liberty Gold in the CD Pit and D-3 Zone lies in the immediate hanging wall of the same listric normal fault.

### Table 10.8 Highlight Drill Intervals from the F Zone

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| LBP149 (80, -60) | 3.0 | 32.0 | 29.0 | 0.29 | 0.2 | 190.5 | F Zone | | 58.9 |
| and | 41.1 | 64.0 | 22.9 | 2.21 | | | | | |
| incl | 44.2 | 48.8 | 4.6 | 7.42 | 1 | | | | |
| LBP227 (50, -45) | 12.2 | 86.9 | 74.7 | 0.43 | 0.2 | 190.5 | F Zone | | 32.1 |
| incl | 50.3 | 53.3 | 3.0 | 1.40 | 1 | | | | |
| incl | 61.0 | 62.5 | 1.5 | 1.31 | | | | | |

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **incl** | **71.6** | **73.2** | **1.5** | **1.69** | | | | | |
| **LBP229 (10, -45)** | 7.6 | 13.7 | 6.1 | 0.36 | 0.2 | 172.2 | **F Zone** | | **44.2** |
| **and** | **39.6** | **102.1** | **62.5** | **0.64** | | | | | |
| **incl** | **73.2** | **83.8** | **10.7** | **1.33** | 1 | | | | |
| **incl** | **94.5** | **97.5** | **3.0** | **1.20** | | | | | |
| **and** | 115.8 | 120.4 | 4.6 | 0.44 | 0.2 | | | | |

## 10.5.6 Rangefront Zone

The Rangefront Zone lies immediately south of the Black Pine Mine access road along the mountain front (Figure 10.3 and Figure 10.7). In this area, the Ppos unit of the upper plate of the Oquirrh Group is exposed on surface. The unit is variably limy and brecciated, with widespread but relatively weak gold-in-soil anomalies. The Rangefront area was tested by shallow historical drilling, revealing widespread shallow gold mineralization. In 2019, Liberty Gold drilled a shallow core hole (LBP093C) in the middle of the Rangefront Zone, which returned 55.3 metres at a grade of 0.49 g Au/t from a depth of 46.2 metres. Mineralization appeared to start at the base of the Ppos unit at the contact of a limestone unit assigned to the Pola member of the middle plate. An additional three holes were drilled in 2020 (Table 10.9). The Rangefront Zone is open in all directions. The 1.5-kilometre gap between the Rangefront Zone and the main area of mineralization at Black Pine will be tested in 2021.

**Table 10.9 Highlight Drill Intercepts from the Rangefront Zone**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **LBP093C (0, -90)** | 21.8 | 25.3 | 3.5 | 0.41 | 0.2 | 119.8 | **Rangefront Target** | Metallurgical Core Hole. Hole ended in grade | **31.4** |
| **and** | 26.8 | 32.8 | 5.9 | 0.23 | | | | | |
| **and** | **46.2** | **101.5** | **55.3** | **0.49** | | | | | |
| **incl** | **93.2** | **96.9** | **3.7** | **1.80** | 1 | | | | |
| **and** | 113.7 | 119.8 | 6.1 | 0.28 | 0.2 | | | | |
| **LBP248 (250, -60)** | **32.0** | **83.8** | **51.8** | **0.37** | 0.2 | 202.7 | **Rangefront Zone** | | **46.7** |
| **and** | **93.0** | **129.5** | **36.6** | **0.76** | | | | | |
| **incl** | **96.0** | **102.1** | **6.1** | **1.28** | 1 | | | | |

## 10.5.7 M Zone

The M Zone is an area of shallow gold mineralization lying along the range front north of the historical heap leach pad (Figure 10.3 and Figure 10.6 ). Gold mineralization (Table 10.10) is present in the immediate footwall of the moderately east-dipping range-front fault in a zone that extends to the southwest. Shallower intervals, hosted in the Polc(?) member, are strongly oxidized, while some deeper intervals, possibly hosted in the PMmx member, are hosted in black, carbonaceous siltstone. The M Zone is open to the southwest.

**Table 10.10 Highlight Drill Intervals in the M Zone**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | Comments | g/t x m |
|---|---|---|---|---|---|---|---|---|---|
| **LBP217 (280, -45)** | **50.3** | **61.0** | **10.7** | **0.70** | 0.2 | 233.2 | **M Zone** | | **76.9** |
| **incl** | **56.4** | **59.4** | **3.0** | **1.39** | 1 | | | | |
| **and** | **94.5** | **102.1** | **7.6** | **1.79** | 0.2 | | | | |
| **and** | 109.7 | 120.4 | 10.7 | 0.37 | 0.2 | | | | |
| **and** | **126.5** | **152.4** | **25.9** | **2.00** | | | | | |
| **incl** | **128.0** | **149.4** | **21.3** | **2.31** | 1 | | | | |
| **LBP256 (100, -63)** | **4.6** | **13.7** | **9.1** | **0.51** | 0.2 | 182.9 | **M Zone** | | **55.9** |
| **and** | **59.4** | **62.5** | **3.0** | **1.07** | | | | | |
| **incl** | **59.4** | **61.0** | **1.5** | **1.27** | 1 | | | | |
| **and** | **89.9** | **128.0** | **38.1** | **1.26** | 0.2 | | | | |
| **incl** | **99.1** | **121.9** | **22.9** | **1.74** | 1 | | | | |

### 10.5.8 Hazelpine Zone

The Hazelpine Zone is located approximately 0.5 kilometres south of the M Zone (Figure 10.3). It appears to lie along a southwest-northeast-trending structure parallel to the M Zone. Historical shallow workings mined zinc and silver, but oxidized gold mineralization is also present. The target was tested with two holes, LBP012 and LBP013. The former was lost at shallow depth in a mine working, and the latter was terminated out of concern that it might also encounter mine workings. The zone is open to the north and southwest.

### 10.5.9 Southwest Extension Target

The Southwest Extension Target is a large area to the southwest of the CD and I pits (Figure 10.3). In this area, a gold-in-soil anomaly extends for over 1 square kilometre, where an over-thickened section of Pold is overlain by a sequence of platy limestone and siltstone equivalent to the Pola-b-c sequence to the north. Drill holes in this area returned shallow intercepts of relatively low-grade gold mineralization. One hole (LBP200) returned a more significant intercept (Table 10.11), possibly associated with a southwest-striking steep fault extending from the north end of the I Pit. Additional drilling is warranted.

**Table 10.11 Highlight Drill Intervals from the Southwest Extension Target**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | g/t x m |
|---|---|---|---|---|---|---|---|---|
| **LBP200 (45, -45)** | **0.0** | **15.2** | **15.2** | **0.58** | 0.2 | 172.2 | **Southwest Extension** | **10.4** |
| **and** | 25.9 | 30.5 | 4.6 | 0.36 | | | | |

### 10.5.10 E Pit Zone

A number of historical drill holes with shallow gold intercepts extend south, west, and north of the historical E Pit (Figure 10.3 and Figure 10.8). A single PQ core hole (LBP242C) tested this area with the objective to obtain material for metallurgical column testing. It returned two intercepts suitable for metallurgical testing (Table 10.12).

**Table 10.12 Highlight Drill Intervals from the E Pit Zone**

| Hole ID (Az, Dip) (degrees) | From (m) | To (m) | Intercept (m) | Au (g/t) | Au g/t Cut-Off | Hole Length (m) | Target | g/t x m |
|---|---|---|---|---|---|---|---|---|
| LBP242C (333, -45) | 40.1 | 53.3 | 13.3 | 0.71 | 0.2 | 95.4 | E Pit | 25.6 |
| and | 57.7 | 62.8 | 5.1 | 3.19 | | | | |
| incl | 57.7 | 61.3 | 3.6 | 4.31 | 1 | | | |

## 10.6 Sample Quality and Down-Hole Contamination

Down-hole contamination is always a concern with holes drilled by rotary (RC or conventional) methods. Contamination occurs when material originating from the walls of the drill hole above the bottom of the hole is incorporated with the sample being extracted at the bit face at the bottom of the hole. The potential for down-hole contamination increases substantially if significant water is present during drilling, whether the water is from in-the-ground sources or injected by the drillers. Conventional rotary holes, in which the sample is returned to the surface along the space between the drill rods and the walls of the drilled hole, are particularly susceptible to down-hole contamination.

While small areas of perched water have been intersected by Liberty Gold, no consistent groundwater table has been intersected Liberty Gold, and there are no records that indicate that the historical holes intersected significant water either. A Draft Environmental Impact Statement prepared for Pegasus states, “Pegasus exploration wells did not encounter any measurable groundwater at depths between 300 and 700 feet [91 to 213 metres] below the surface and there are no perennial or intermittent streams in the project area” (USDA Forest Service, 1993).

During the detailed explicit modeling of the gold mineral domains discussed in Section 14.8, none of the signs of potential down-hole contamination were recognized in any of the holes drilled by historical operators or Liberty Gold.

The lack of groundwater, coupled with the relatively shallow depths of the historical holes (average and median down-hole depths of 102 and 92 metres, respectively) played significant roles in the mitigation of material contamination issues at Black Pine. In addition, Liberty Gold required center-return bits to be used for all of their RC holes. This method minimizes the distance between the bit face as it breaks the rock and the collection of the sample into the inner tube of the RC drill pipe, which thereby further minimizes the potential for contamination.

## 10.7 Summary Statement

The overwhelming majority of sample intervals in the Black Pine resource database have a down-hole length of 1.52 metres (five feet), and sample intervals with lengths in excess of 3.05 metres were excluded from use in the resource grade estimation. The remaining sample lengths are appropriate for the style of the Black Pine mineralization.

The mineralization at Black Pine is predominated by gently dipping zones that mimic stratigraphic and low-angle, and structural controls, and the drill holes cut these zones at high to moderate angles. There are a few, relatively small areas where mineralized dips increase, and some holes cut this mineralization at acute angles that can yield exaggerated downhole widths. This effect is entirely mitigated by the explicit modeling techniques employed in the estimation of the current resources, which constrain all intercepts to lie within explicitly interpreted domains that appropriately respect the known and inferred geologic controls.

Mr. Gustin is unaware of any sampling or sample-recovery factors that materially impact the accuracy and reliability of the drill-hole data, and he believes that the drill samples are of sufficient quality for the purposes used in this report.

# 11.0 SAMPLE PREPARATION, ANALYSIS, AND SECURITY (ITEM 11)

This section summarizes all information known that relates to sample preparation, analysis, and security, as well as quality assurance/quality control ("QA/QC") procedures employed and results obtained, that pertain to the Black Pine project. This information has been compiled from historical records.

## 11.1 Sample Preparation and Analysis

### 11.1.1 Historical Surface and Drilling Samples

With the exception of Pegasus drill samples from 1990 through 1997, which were assayed at the Black Pine mine laboratory, all historical samples were analyzed at laboratories independent of the historical operators, and it is not known what, if any, certifications these laboratories held at the times they were used.

**Newmont 1963 and 1964:** Newmont submitted rock-chip samples to Union Assay for gold and silver analyses. Newmont's 1964 drilling samples were also sent to Union Assay for gold and silver by fire assay. MDA has no information on sample preparation procedures used by Union Assay on the Newmont samples.

**Newmont 1974:** Newmont submitted soil samples to Rocky Mountain Geochemical Corp. ("Rocky Mountain") in Midvale, Utah. These were analyzed for gold, silver, lead, and zinc by atomic absorption ("AA"), and arsenic was determined calorimetrically. Cuttings from the initial 11 holes drilled in 1974 were sent to Rocky Mountain's laboratory in Salt Lake City, Utah for gold and silver assays by AA. Drill cuttings from last nine holes drilled in 1974, as well as a few samples from the end of the last hole analyzed by Rocky Mountain, were sent to Skyline Labs ("Skyline") of Tucson, Arizona for gold and silver fire assays.

Check assays on 38 drill samples from the 1974 program were performed by fire assay by Union Assay for gold and silver. One hole was also assayed for lead and zinc by Union Assay, but the method of analysis is not known. MDA has no information on procedures and methods used for sample preparation by Rocky Mountain, Skyline, and Union Assay.

There is evidence that the Rock Mountain 1974 AA gold analyses were cyanide-soluble analyses. If true, the gold values in the resource database would represent only the cyanide-soluble portion of the total gold contents of the samples.

**Gold Resources 1974 - 1976:** Gold Resources submitted rock and soil samples to Rocky Mountain, and these were analyzed for gold, silver, arsenic, mercury, and copper; the methods of sample preparation and analysis are not known. The cuttings from their 1974 through 1976 drill holes and selected intervals of core were sent to Union Assay for fire assay analyses of gold and silver.

**Kerr Addison Mines Ltd. 1975:** Kerr Addison used Vangeochem Lab Ltd. of North Vancouver, B.C. for Cu, Zn, and Au analyses.

**Pioneer Nuclear 1979 - 1981:** Pioneer's 1979 drill samples were sent to Rocky Mountain and analyzed for gold by fire assay. The 1980 drill samples were sent to Union Assay in Salt Lake City, Utah where gold and silver were analyzed by fire-assay methods. Gold and silver from the single hole drilled in 1981 were analyzed by fire assay at Cone Geochemical Inc. in Denver, Colorado. No additional information on the methods of sample preparation and analysis that were used by these laboratories is available.

**Pegasus 1983 - 1985:** Pegasus collected several hundred rock-chip and soil samples across the Black Pine Mountains and the future mine area. Assay certificates and sample locations are not available, but summary sheets indicate they were assayed for gold, silver, and mercury, with occasional antimony and arsenic analyses as well. Drill samples in 1983 were analyzed for gold by fire assay methods by Union Assay and Rocky Mountain, both at their Salt Lake City, Utah, laboratories. No records are available with respect to the assaying of the samples from the 36 holes drilled in 1984, and no other information is available on the sample preparation and analytical methods used.

**Permian Exploration and Pegasus 1984:** Drill samples were sent to Union Assay in Salt Lake City, Utah for fire assay of gold and silver with 30-gram aliquots. Some samples were also sent to Rocky Mountain in Salt Lake City, Utah. No other information is available on the sample preparation and analytical methods used.

**Noranda 1986 - 1989:** Noranda carried out extensive soil sampling across the property. In 1986 through 1989, soil samples were analyzed at Chemex Labs Inc. ("Chemex") in Sparks, Nevada for gold by fire assay with an AA finish. In 1988 and 1989, Noranda's rock-chip samples were analyzed at Geochemical Services Inc. ("GSI") in Torrance, California for silver, arsenic, gold, mercury, and antimony. No other information is available on the methods and procedures used for sample preparation and analyses.

Samples from Noranda's 1986 drilling were analyzed at several laboratories. Rocky Mountain in West Jordan, Utah determined gold and silver by fire assay on 30-gram aliquots. Samples from previously analyzed holes were sent to Assay Lab Inc. ("Assay Lab") in West Jordan, Utah for 30-gram fire assay of gold and silver. Cuttings for at least 12 holes were sent to GSI for 30-gram fire assay with gravimetric finish. Samples from multiple holes were also sent to Chemex in North Vancouver, B.C., for 30-gram fire assays for gold. No other information is available on the methods and procedures used for sample preparation and analyses.

The 1987 and 1988 drilling samples were mainly sent to Analytical Services Inc. ("ASI") in Elko, Nevada for 30-gram fire assay of gold with a gravimetric finish. For some samples, gold was determined by fire assay at GSI and Chemex. Some check assays for gold were also done by ASI, and others were conducted by Legend Metallurgical Laboratory Inc. ("Legend") in Reno, Nevada and GSI using 30-gram fire assay with a gravimetric finish. No other information is available on the methods and procedures used for sample preparation and analyses.

All of the 1989 drill samples were analyzed for gold by Legend using a 30-gram fire assay procedure. No other information is available on the methods and procedures used for sample preparation and analyses in 1989.

**Pegasus 1990 - 1997:** Pegasus collected several thousand rock-chip samples across the Black Pine property. These were routinely analyzed for gold, silver, arsenic, barium, bismuth, antimony, and mercury, and occasionally for copper, lead, zinc, and molybdenum. No sample certificates are available and there is no information regarding assay laboratories, sample preparation, or analytical methods.

The Pegasus drill samples during this time period were assayed on-site at the Black Pine mine laboratory. Every sample was analyzed for gold by a hot cyanide leach ("HCL") procedure. If the HCL analysis reported was greater than 0.005 oz Au/ton (0.17 g Au/t), the sample was also analyzed for gold by fire assay, and the fire assay value was entered into the historical drill-hole database. If runs of typically up to five to ten consecutive samples returned HCL values of 0.005 oz Au/ton or less, a fire assay was also completed irrespective of the HCL grade. The remaining four to nine samples returning HCL values of 0.001 to 0.005 oz Au/ton for which no fire assay was completed were factored to create an "estimated fire assay" value, based on HCL-to-fire-assay ratios obtained from nearby sample intervals. This factoring led to estimated values that either did not increase from the HCL values or were increased by 0.001 or 0.002 oz Au/ton (0.034 or 0.068 g Au/t). These factored values were then entered into the database. There is no record of whether laboratory personnel or exploration staff assigned these factored gold values. The factoring for low-grade HCL assays was referenced in 1992 through1997 internal annual reports and evident in 1996 and 1997 assay worksheets from the Black Pine mine laboratory in the possession of Liberty Gold.

No other information is available on the methods and procedures used for sample preparation and gold assaying at the mine laboratory. The mine laboratory was not independent of Pegasus, and it is not known if the mine laboratory held any certifications.

**Western Pacific 2011 - 2012:** Drill samples were initially stored on site, then transported to the ALS Minerals sample preparation facility in Elko, Nevada by an ALS representative. No QA/QC samples were inserted.

Surface rock-chip and drilling samples were sent to the ALS Minerals ("ALS") laboratory in Elko, Nevada for sample preparation. The pulps were analyzed at ALS' facilities at Reno, Nevada. Gold was analyzed using a 30-gram fire-assay fusion with an atomic absorption ("AA") finish (ALS method code Au-AA23). Separate 1-gram aliquots of some samples were analyzed for 51 major, minor, and trace elements at the ALS laboratory in North Vancouver, B.C. using a combination of inductively-coupled-plasma atomic emission ("ICP-AES") and mass spectrometry ("MS") following an aqua-regia digestion (ALS method code ME-MS41).

There is no evidence that QA/QC samples were inserted for analysis along with the Western Pacific rock samples.

### 11.1.2 Liberty Gold Surface Samples

Between 2017 and the Effective Date of this report, a total of 454 rock samples were collected by Liberty Gold personnel and transported to the ALS sample preparation facility in Elko, Nevada. Sample weights were generally between 1 and 2 kilograms. The samples were crushed to 70% at -2.0 millimetres, split to obtain a 250-gram subsample, and the subsample was pulverized to 85% at -75 microns. The pulverized splits were shipped by ALS either to their assay laboratory in Reno, Nevada or North Vancouver, B.C., where in both cases gold was determined by 30-gram fire assay with an AA finish (method code Au-

AA23). Separate 1.0-gram aliquots were analyzed for 51 major, minor, and trace elements by ICP-AES and MS following aqua-regia digestion (ALS method code ME-MS41).

ALS is independent of Liberty Gold. The ALS analytical facility in North Vancouver, B.C., is certified to ISO 9001:2008 standards and has received ISO/IEC 17025:2005 accreditation from the Standards Council of Canada. The ALS laboratory in Reno, Nevada, is certified to ISO 9001:2008 standards and has received ISO/IEC 17025:2005 accreditation.

### 11.1.3 Liberty Gold Drilling Samples

RC drill samples were transported periodically by Liberty Gold personnel to the ALS laboratory in Elko, Nevada, or otherwise by ALS personnel or by a third-party contractor, Stott Trucking of Elko, Nevada. After drying and weighing, the samples were crushed to 70% at -2.0-millimetre particle size. The crushed material was riffle split to obtain a 250-gram subsample that was ring-mill pulverized to 85% at less than 75 microns. In 2019 and 2020, depending on sample load at the Elko facility, samples were shipped at various times to prep labs in Tucson, Thunder Bay, Reno, Vancouver, Hermosillo, Mexico, or Chihuahua, Mexico.

After logging on site, core samples were transported by Liberty Gold personnel to Liberty Gold's Elko office and core cutting facility for cutting by an independent contractor provided by Rangefront Mining Services of Elko, NV. After cutting the core into two halves lengthwise, samples were placed in numbered sample bags and then picked up by ALS personnel for transport to the Elko preparation facility. Core samples were prepared for analysis by ALS with the same procedures as the RC samples.

The sample pulps were shipped by ALS to their assay laboratory in Reno, Nevada, where 30-gram aliquots were analyzed for gold by fire assay fusion with an AA finish (ALS method code Au-AA23). Separate aliquots were also analyzed for cyanide-soluble gold by AA after a 1-hour agitated leach in a 0.25% NaCN solution (ALS method code Au-AA13). In 2020, ALS' fire assay laboratories in Lima, Peru and Vancouver, Canada were also utilized.

Drill samples returning results greater than 5.0 g Au/t were re-assayed using a new 30-gram aliquot and fire assay fusion followed by a gravimetric finish (ALS method code Au-GRA23). Silver and 50 major, minor, and trace elements were analyzed by a combination of ICP-AES and MS using a 1-gram aliquot following an aqua-regia digestion (ALS method code ME-MS41) at the ALS laboratory in North Vancouver, B.C.

Liberty Gold employed a blind numbering system for RC and core samples, such that the hole number and down-hole footage are not known to the assay laboratory.

## 11.2 Sample Security

No information is available concerning security measures used by historical operators for surface and drilling samples.

Liberty Gold's surface and RC samples were transported by Liberty Gold, ALS, or Stott Trucking personnel to the ALS sample preparation laboratory in Elko, Nevada. Chain of custody forms from the lab are archived at the Liberty Gold Elko Office. Drill samples were stored at the Black Pine drill sites for a few days prior to transport. Core samples were transported by Liberty Gold personnel to Liberty Gold's core cutting facility.

All pulps were returned to Liberty Gold and stored in Liberty Gold's secure warehouse. A selection of coarse rejects are stored in the warehouse or in other secure storage facilities.

## 11.3 Quality Assurance/Quality Control

### 11.3.1 Historical QA/QC Procedures

Historical records in the possession of Liberty Gold indicate that QA/QC procedures used by at least some of the historical operators involved check assays and, in certain cases, the submission of analytical standards, RC rig duplicates, and/or duplicates prepared from the coarse rejects of the original samples (preparation duplicates).

As a check on sampling procedures, Newmont collected coarse and fine materials that were not captured in the rotary or RC drill samples sent for assay (Hardie, 1964). These coarse and fine materials from 530 feet of drilling from seven of the 17 holes drilled in 1964 were sampled at the same five-foot intervals as the drill samples sent for assay. The fine materials consisted of "*dust-sized particles caught in the cyclone dust collector*", while the coarse materials were comprised of "*particles caught between the dust collector and the sample collector*." The fines and coarse samples were sent along with the standard drill samples to Union Assay Office, Inc. of Salt Lake City, Utah ("Union Assay") for gold assay. The results of Newmont's study are described in an untitled, anonymous memo and summarized in Table 11.1.

Newmont noted that both the fines and coarse materials that were collected to check the sampling methodology are representative of only small quantities of material that are not sampled relative to the original samples. Newmont further commented that the results of the study indicate that no serious downgrading or upgrading in gold grades are indicated, and therefore the original samples were sufficiently representative, in terms of gold grade, of the full volume of cuttings that were returned to the surface.

**Table 11.1 Newmont Evaluation of Black Pine Project Drilling**
(Original, Fines and Coarse gold grades reported as oz Au/ton)

| Hole ID | From | To | Original | Fines | Coarse |
|---|---|---|---|---|---|
| BP-5 | 285 | 330 | 0.011 | 0.007 | 0.008 |
| BP-6 | 80 | 100 | 0.007 | 0.007 | 0.006 |
| BP-8 | 250 | 300 | 0.022 | 0.027 | 0.021 |
| BP-11 | 30 | 95 | 0.016 | 0.015 | 0.017 |
| | 110 | 185 | 0.009 | 0.008 | 0.006 |
| | 210 | 240 | 0.013 | 0.010 | 0.011 |
| BP-13 | 55 | 70 | 0.030 | 0.039 | 0.034 |
| BP-14 | 50 | 120 | 0.027 | 0.029 | 0.028 |
| BP-15 | 100 | 260 | 0.003 | 0.005 | 0.004 |

In 1974, Newmont sent 38 drill-sample pulps from five of the holes drilled in 1974 to Union Assay for gold and silver check fire assays. While the means of the original and check analyses differ by only 3%, the dataset is small. In addition, the original analyses of the 21 drill samples were done by Rocky Mountain and the remainder by Skyline, complicating an evaluation of the results. In 1985 and 1986, Permian had check assays done at Rocky Mountain on 48 pulps from 38 holes drilled in 1983 by Pegasus. No further information is available. The Newmont and Permian/Pegasus check assays represent approximately 3% and 2% of the drilling assays of these operators in 1974 and 1988, respectively.

Noranda analyzed duplicates each year using "selected secondary splits stored at the drill sites." In 1986, an unknown number of samples from 1.52-metre intervals were sent to ASI for "check assays" of gold and silver to allow comparisons with 6.1-metre drill samples originally analyzed at Rocky Mountain. For the 1987 drilling, a total of 23 "check assays" of 1.52-metre samples from one hole were completed. In 1988, a total of 113 pulps and coarse rejects were analyzed. No further information is available concerning possible QA/QC procedures implemented by Noranda.

Records are incomplete, but 1996 and 1997 assay worksheets from the Black Pine mine laboratory refer to inserted standards for samples analyzed by the HCL procedure. The rate of standard insertion and the expected gold values for the standards are not known.

### 11.3.2 Liberty Gold QA/QC

The QA/QC program instituted by Liberty Gold for drilling in 2017 through the Effective Date of this report included the insertion of coarse blanks, certified reference materials ("CRMs" or "standards"), and RC field duplicates into the RC sample stream. A minimum of one CRM, one blank, and one field duplicate was inserted into the sample stream for every 36 drill samples, which is the number of samples in each ALS analytical batch. The results of these inserted control samples are summarized below.

### 11.3.3 QA/QC Results

**Certified Reference Materials:** CRMs were used to monitor and evaluate the analytical accuracy and precision of the Liberty Gold drill sample assays performed at ALS (Table 11.2). The insertion of CRMs can also be useful for detecting sample switches and numbering issues that can occur with primary drill samples.

Five of the CRMs were prepared by Minerals Exploration and Environmental Geochemistry ("MEG") of Carson City, Nevada, using drill samples from Liberty Gold. Three of these were prepared from samples from the Kinsley sediment hosted CTGD in eastern Nevada ("PG" prefixes in Table 11.2), one CRM is derived from Black Pine drill samples (LG 19001), and one is from drill samples from Fronteer Gold's Long Canyon CTGD in Nevada (FGS2011A). The sixth CRM was purchased from CDN Resource Laboratories of Langley, BC. The PG13001X, PG13002X, PG14001X, and CDN-GS-P6A standards have been in continuous use at Black Pine since 2017. The LG19001 standard was added in December 2019, and the FGS2011A standard was used primarily in the latter half of 2019.

A total of 1,381 CRMs were inserted into the drill sample stream between 2017 and 2020.

### Table 11.2 Liberty Gold Certified Reference Materials

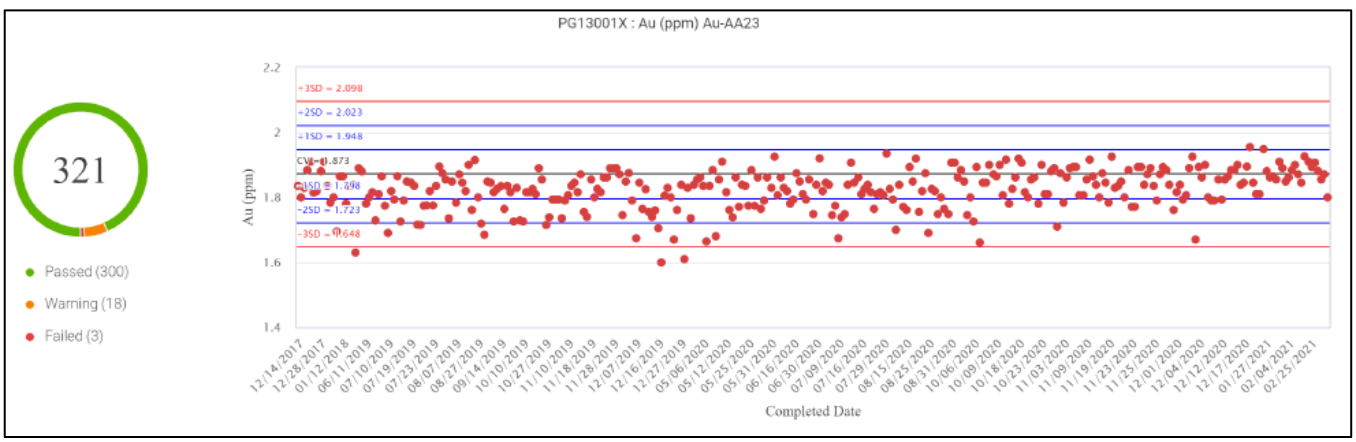
| CRM | Source | Certified Value (g Au/t) | Standard Deviation | No. of ALS Standard Analyses | No. of Failures |
|---|---|---|---|---|---|
| PG13001X | MEG | 1.873 | 0.075 | 321 | 3 |
| PG13002X | MEG | 2.188 | 0.087 | 118 | 2 |
| PG14001X | MEG | 0.328 | 0.017 | 494 | 2 |
| LG19001 | MEG | 0.698 | | 287 | 6 |
| FGS2011A | MEG | 7.13 | 0.373 | 51 | 0 |
| CDN-GS-P6A | CDN | 0.738 | 0.027 | 110 | 3 |
| **Totals** | | | | **1,381** | **16** |

In the case of normally distributed data, 95% of the CRM analyses would be expected to lie within two standard-deviations of the certified value, while only 0.3% of the analyses are expected to lie outside of the three standard-deviation limits. Note, however, that most assay datasets from metal deposits are positively skewed.

CRM analyses outside of three standard-deviation limits defined by the CRM are typically considered to be failures. As it is statistically unlikely that two consecutive analyses of standards would lie between the two and three standard-deviation limits, such samples are also considered to be failures unless further investigations suggest otherwise. All potential failures should trigger investigation, possible laboratory notification of potential problems, and possible re-analyses of all samples included with the failed standard result.

The ALS's performance with respect to assaying PG13001X is shown on Figure 11.1. The certified value of the CRM (gray line) along with one-, two-, and three- standard-deviation ("SD") limits (dark blue, light blue, and red lines, respectively) for the CRM are shown, as are the ALS analytical results of the CRM (red dots). The x-axis plots the ALS certificate numbers by increasing dates.

### Figure 11.1 Graph of ALS Analyses of CRM PG13001Xs – 2017 through 2021 Drill Programs



The PG13001X chart documents a consistent low bias in the ALS gold assays relative to the certified value. Similar results are seen in the PG13002X, FGS2011A, and, to a less consistent extent, LG19001 CRMs. PG13001X, PG13002X, and FGS2011A are the three highest-grade CRMs utilized at the project. Approximately 1% of the PG13001X standards failed low, with a significant number below 2SDs. The same trend was noted with the LG19001 standard. The ALS performance improved over time in LG19001 and, to some extent, PG13001X, suggesting that instrument drift at the lab may have been a factor.

A total of 16 failures were identified out of the 1,263 ALS analyses of the CRMs; none of the 51 analyses of FGS2011A failed. At least six of the failures are attributable to the low bias of the analysis, however. In other words, absent the low bias that characterizes the ALS analyses of some of the standards, these six analyses, and perhaps more, would not be considered to have failed.

The PG13002X, PG14001X, and LG19001 standards each produced a single very low value, and the CDN-GS-P6A standard a very high value, all of which were determined to be caused by misidentified CRMs. The number of issues determined to be such sample switches is a concern, and this issue needs to be investigated further.

If one accepts that at least six of the failures are due to the low bias in the ALS analyses of the respective CRMs, and four of the failures are due to errors in the identification of which standard was actually analyzed, a maximum of only six of the 1,263 CRM analyses by ALS were actually failures.

All standard failures were reported to the lab. Failures in drill-sample runs with grades above 0.2 g Au/t triggered a rerun of the standard and the ten drill samples analyzed immediately before and after the failed standard. Reruns typically fell within acceptable (2 SD) limits, but the associated drill samples returned results similar to the original analyses. To the extent that the 'failures' are actually caused by the low bias, the lack of change in the rerun analyses of drill samples is actually expected.

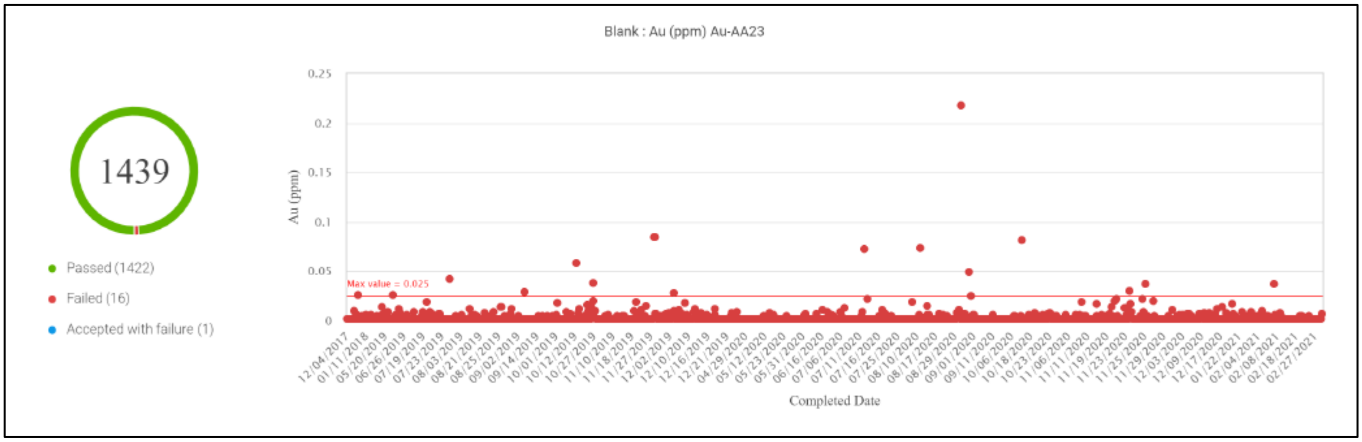
**Coarse Blanks:** Coarse blanks are samples of barren material that are used to monitor for possible contamination during sample preparation stages in the laboratory, and they are also useful for detecting sample switches and numbering issues. The detection limit of the ALS fire assay with AA finish is 0.005 g Au/t; blanks with assays in excess of 0.025 g Au/t (five times the lower detection limit) were therefore considered failures requiring investigation.

Liberty Gold's blanks consisted of Vigoro brand "pond pebbles", which are coarse enough to require primary and secondary crushing and thereby allows for the monitoring of the entire sample-preparation process applied to the drill samples. Blanks were inserted every approximately 36 samples, except in drill-core samples from intervals judged unlikely to be mineralized based on rock type or lack of macroscopically visible alteration. Where possible, the blanks were inserted within core intervals that were judged to have the potential to be mineralized.

A total of 1,439 blanks were inserted in the sample stream for the 2017 through 2020 programs. Of these, 16 ALS analyses of the blanks returned values in excess of 0.025 g Au/t, with six of these exceeding 0.050 g Au/t; most analyses were below the detection limit (Figure 11.2). One sample returned 0.026 g Au/t, which is technically a failure but at a level of possible contamination that would not have a material effect on the successive samples. As expected, the samples that failed were generally in intervals with relatively high-grade gold in adjacent samples. Without special protocols (e.g., crushing unmineralized quartz between drill-sample crushing), ALS accepts any blank that contains <1% of the metal content of the preceding samples. Using this metric, all of the failed samples are acceptable.

**Figure 11.2 Coarse Blank Analyses - 2017 Drilling Program**

(from Liberty Gold 2018; dashed red line is upper acceptable limit)




In the case of RC chips, the entire drill sample is crushed, making it impossible to replicate all stages of sample preparation if a new pulp was prepared for re-analysis.

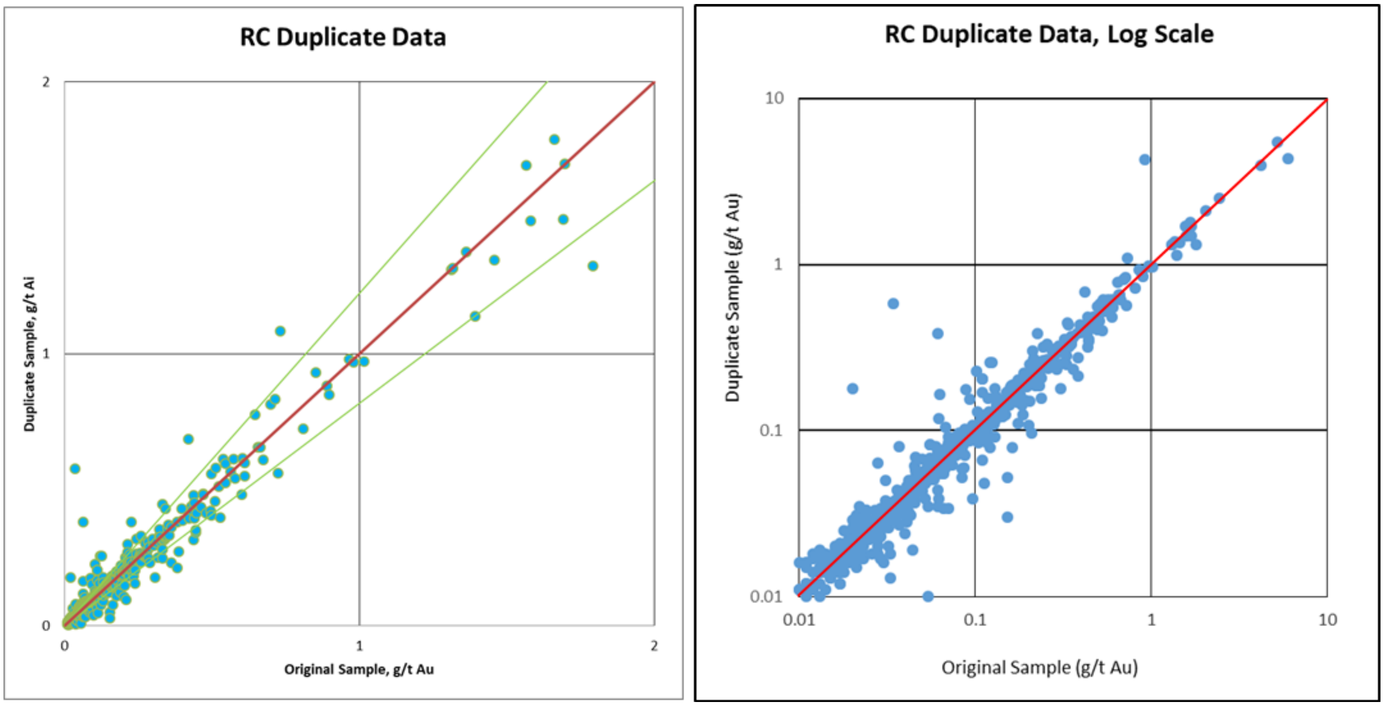
**RC Field Duplicates:** RC field duplicates are second splits of the RC chips collected at the sample splitter at the same time as the original sample splits during active drilling. Field duplicates are mainly used to assess geologic variability and sub-sampling variance. The field duplicate samples were submitted to ALS at the same time as their associated drill samples.

The cyclone discharge of the RC drill rig used by Liberty Gold was set up with a "Y" splitter. The primary samples were consistently collected from the same outlet of the "Y" splitter throughout the drilling campaign, while the field-duplicates were collected separately from the other outlet of the Y splitter, simultaneously with the primary sample. The field duplicates were collected randomly, which resulted in a large number of duplicates of unmineralized intervals. A total of 719 of the RC field duplicates collected were paired with an original drill sample that assayed in excess of 0.010 g Au/t in the course of the 2017 through 2020 drill programs.

Figure 11.3 shows two graphs that plot the gold assay values of the original RC drill sample versus those of the duplicate samples, using arithmetic and log scales; the log scale shows more detail in the lower-grade range. Trend lines are shown for both sets, and 30% variance lines are shown on the arithmetic chart.

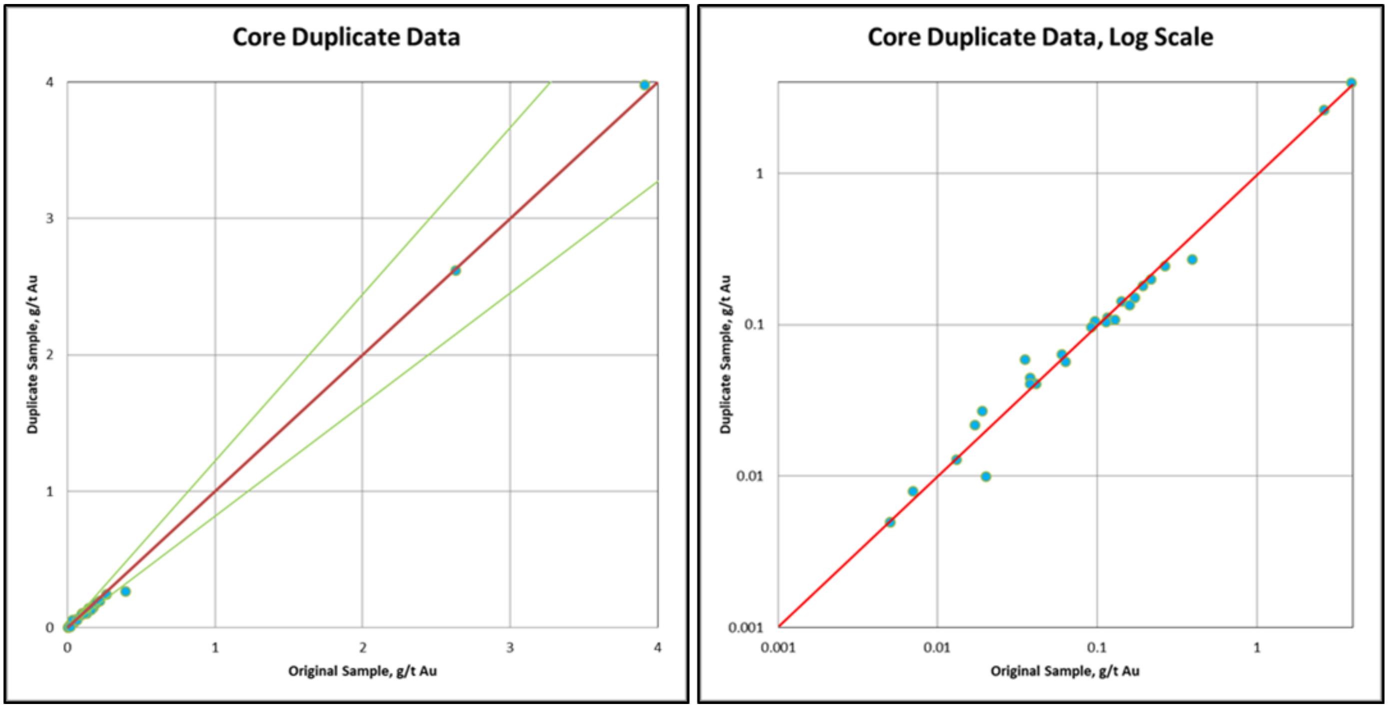
Of the 719 samples, 40 pairs differ by more than 30%. Of these, 34 pairs reflect an original assay of less than 0.2 g Au/t. While no bias is evident in the data, several data pairs in the RC subset show substantial differences, most of which are suspected to be sample switches based on multielement signatures. As with the sample switches determined by the control sample analysis, this is a concern and needs to be investigated further to determine if the mix-ups are occurring in the field or at the laboratory.

**Figure 11.3 RC Field Duplicate Data – Liberty 2017-2020 Drilling Programs**




**Core Field Duplicates:** A total of 27 core duplicates were collected during the 2019 and 2020 programs, by quartering the half core and submitting one quarter as the primary sample and one quarter as the duplicate sample. Data are summarized in Figure 11.4.

**Figure 11.4 Core Field Duplicate Sample Comparison, Liberty 2019-2020 Drilling**




Three sample pairs returned >30% variance, with original assays of 0.020 g Au/t or less; high variances are expected at this grade range, which is close to the detection limit for gold.

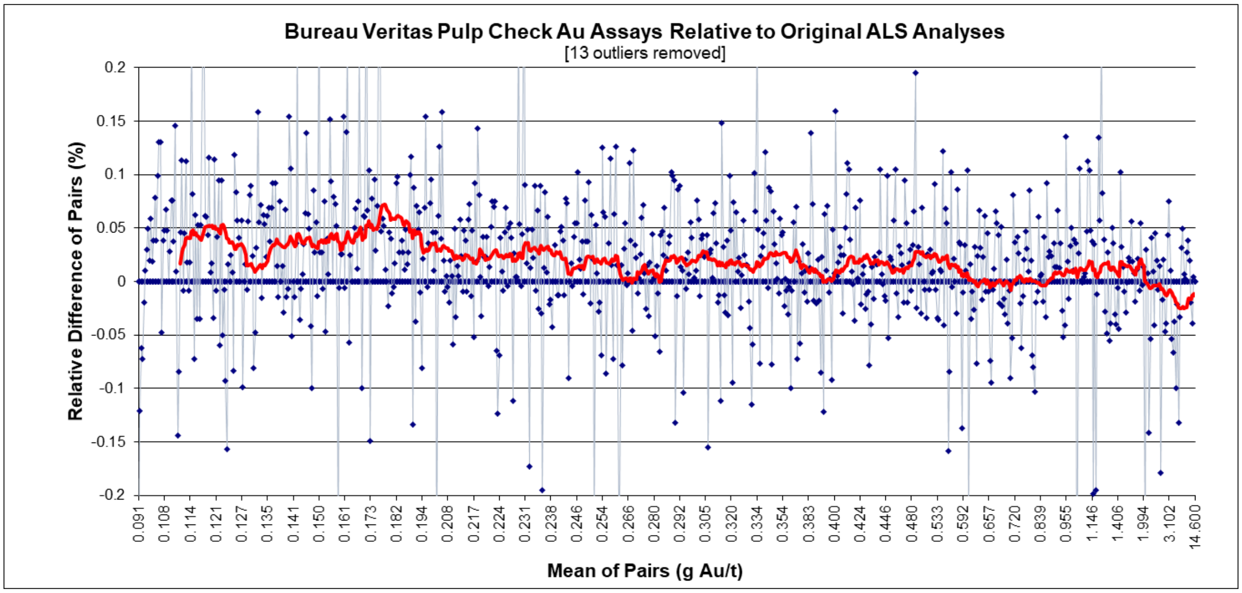
More core duplicates need to be collected before statistically meaningful conclusions as to core splitting and variability can be derived.

### Check Assays

As a further check on analytical accuracy, Liberty Gold selected a portion of the original drill-sample pulps prepared and analyzed by ALS from the 2017 and 2019 to 2020 drill programs, and these pulps were sent to Inspectorate/Bureau Veritas Laboratories ("BV") for re-assaying of gold content by fire assay with an AA finish. BV is an ISO 17025 accredited, independent laboratory situated in Sparks, Nevada. The procedure for selection of check assays consisted of querying all drill samples that returned greater than 0.1 g Au/t and assigning these a random number. The selection was then sorted on the random number and approximately 4% of these were selected for re-assay, for a total of 793 sample pulps. CRMs and blanks were also submitted to BV along with the ALS pulps. BV analyzed the samples by a method similar to that used by ALS.

The BV pulp-check analyses are compared to the original ALS assays in Figure 11.5, with three outlier pairs removed.

**Figure 11.5 Check Assay Data Analysis**




The mean of all of the BV analyses is 1% higher than the original ALS assays (0.611 versus 0.608 g Au/t, respectively), and the means are essentially identical at MOP cutoffs of 0.2 and 0.5 g Au/t. However, Figure 11.5 shows the BV analyses have a consistent positive bias (BV assays greater than ALS) up to MOP grades of at least ~0.5 to ~0.6 g Au/t. The mean of the BV analyses is 2% higher than the mean of the ALS assays within at MOP grade range of 0.2 to 0.5 g Au/t.

The BV analyses are slightly higher than ALS analyses in the grade range of 0.2 to 0.5 g Au/t; more data at higher grades are needed to ascertain if this relationship extends to higher-grade ranges.

## 11.4 Summary Statement

The independent laboratories used to analyze the primary drill samples of the historical operators prior to the open-pit mining operation at the Black Pine project include ASI, Chemex, GSI, Legend, Rocky Mountain, Skyline, and Union Assay. All of these laboratories were independent of the historical operators, widely known, and commonly used by the exploration and mining industry at the time. During the mining operation, the Pegasus drill samples were analyzed at the on-site mine laboratory.

While documentation is incomplete for the methods and procedures used for historical sample preparation, analyses, and sample security, as well as for the QA/QC procedures and results, it is important to note that the historical sample data were used to develop a successful commercial mining operation that produced more than 400,000 ounces of gold.

Liberty Gold's sample preparation and analyses were performed at a certified laboratory, and their sample security and QA/QC procedures were consistent with industry norms.

Mr. Gustin is satisfied that the Black Pine drill-hole assay data are reliable and can be used to support the current resources, interpretations, and conclusions summarized in this report.

# 12.0 DATA VERIFICATION (ITEM 12)

Data verification is the process of confirming that data has been generated with proper procedures, transcribed accurately from its original source into the project database, and is suitable for use as described in this technical report.

## 12.1 Verification of Historical Drill Data

Of the total of 2,149 holes in the resource database, 1,539 historical and 269 Liberty Gold holes directly contributed assays to the grade estimation of the project resources. Of these holes, 46% of the total drilled metres were by Pegasus, 31% by Liberty Gold, and 19% by Noranda, with the remaining by a combination of Western Pacific, Newmont, and Pioneer Nuclear. The data from Pegasus and Noranda are therefore of particular relevance in terms of the historical data that contribute to the estimation of the current mineral resources. Both of these companies were well-known and respected mining companies during their tenures at the Black Pine project, and Pegasus was the operator of the historical open-pit mining at Black Pine. Due to their significance with respect to the estimation of the project resources, the Pegasus and Noranda data verification are emphasized in this Section of the technical report.

Liberty Gold's construction and initial verification of the historical database is described in Section 9.1. The process Liberty Gold used to compile the project data was actively reviewed during this process by Mr. Gustin, who also provided guidance. The following subsections describe further data verification undertaken under the supervision of Mr. Gustin.

### 12.1.1 Drill-Hole Collars

The drill-hole collar locations provided in historical documents are in local mine-grid coordinates, so these records cannot be used directly for auditing purposes. There is very limited evidence of the locations of historical drill-hole collars in the field due to mining and later reclamation activities. The locations of two Western Pacific holes were found on the ground and checked by Mr. Gustin using a handheld GPS.

Scans of historical Noranda drill-hole plan maps show pre-mine topographic contours and drill-collar locations of many of the holes drilled through 1987. These maps were used to qualitatively assess the accuracy of the hole locations as represented in the current resource database. Ten percent of the holes drilled by Gold Resources, Pioneer Nuclear, Pegasus, and Noranda in this time period were checked, using visual assessments of drill-hole x-y locations relative to topographic contours, as well as approximate hole elevations as indicated by the contours. The database drill-hole locations of the holes checked were generally in agreement with the locations as indicated on the historical maps, although several appeared to be off by 15 to 30 metres. These discrepancies were reported to Liberty Gold and addressed.

### 12.1.2 Down-Hole Deviation Surveys

There are no down-hole deviation data for any of the historical drill holes, and it is likely that few, if any, of the holes actually had down-hole surveys. A majority of the Noranda holes were drilled vertically, while Pegasus holes were a mix of angled and vertical holes. The average down-hole depth of the Noranda and Pegasus holes that directly contributed assay data to the resource estimate are 97 and 104 metres, respectively. The deviation of vertical holes, as well as shallow holes of any orientation, is not typically material in deposits with the potential to be mined by open-pit methods. Liberty Gold RC and core holes of all orientations were typically significantly longer than the historical holes, but they did not deviate significantly, which suggests the geology of the deposit is not causing holes to significantly deviate.

Mr. Gustin believes that the lack of hole-deviation data for the historical holes is not material to the project resources.

### 12.1.3 Drill-Hole Assays

The assay values of a total of 12,477 sample intervals from 291 historical holes in the database provided to MDA were checked out of the total of 110,724 sample intervals from 1,874 historical holes. As there is no backup data from which to check the assay results for the 1,019 holes drilled by Pegasus from 1990 through 1995, over 25% of the sample intervals for which back-up data are available were checked. The backup data generally consisted of copies of original assay certificates, although handwritten gold results on geologic logs were sometimes used when no assay certificates were available. Excluding the treatment for less-than-detection values, the error rate of assay values audited is significantly less than one percent. The recording of the gold values from laboratory results to the historical database was quite accurate.

As an outcome of this review, a number of sample intervals, including for entire holes, were added to the database, primarily for holes drilled by Newmont.

The assay data auditing led to the recognition of many original 20-foot (6.096-metre) sample intervals, as well as some 10-foot (3.048-metre) sample intervals, that are represented in the historical database by five-foot (1.52-metre) intervals, with each of the five-foot intervals having the same assay value - the value of the single 20-foot or 10-foot sample interval that was actually assayed. For example, a single assay of a 20-foot sample interval was artificially 'decomposited' into four five-foot intervals, each having identical gold value (the assay of the 20-foot interval). These occurrences were found in portions of some of the holes drilled by Gold Resources in 1974 through 1976, Pioneer Nuclear in 1979 and 1980, Pegasus in 1983 and 1996, and Noranda in 1986 through 1989. It was determined that the original 10- and 20-foot sample lengths were derived from procedures implemented whereby samples were collected at five-foot sample intervals at the drill rig, as is normal, and then 10- or 20-foot composites of the five-foot samples were created and assayed. Following the receipt of results from these composited intervals, the original five-foot samples were sometimes sent in for assay. The assaying of the five-foot samples was often completed for composite intervals that returned values in excess of ~0.010 oz Au/ton (0.34 g Au/t), although exceptions to this were common. While the five-foot analyses are for the most part appropriately represented in the original historical database, the values of the 10- and 20-foot composites of intervals for which five-foot samples were not submitted for assaying are often improperly represented in the database as two- or four five-foot intervals, respectively, with identical values. More than 3,100 of these artificial five-foot assay intervals were recognized and removed from the database during auditing and replaced with the actual 10- and 20-foot intervals.

The historical drill-hole database provided to MDA included a significant quantity of low-precision Union Assay gold analyses that were reported in increments of 0.005 oz Au/ton (0.17 g Au/t). These low-precision analyses are primarily from the 20-foot composited intervals discussed above and include analyses of some samples from all holes drilled by Gold Resources, some holes drilled by Pioneer Nuclear, and some 1983 holes drilled by Pegasus. The five-foot samples from the composited intervals, if chosen to be analyzed, were assayed by higher-precision methods, typically by Rocky Mountain, but the low-precision analyses remained in the historical database for those intervals for which the five-foot samples were never analyzed. The low-precision analyses are inadequate for the estimation of mineral resources, especially for deposits that have the potential for low-cost heap-leach operations, as these are typically characterized by very low cutoff grades.

During the independent auditing and verification program summarized above, Liberty Gold, working with Mr. Gustin, completed a compilation of sample intervals and assays using original assay certificates for 130 holes drilled by Pioneer Nuclear, Gold Resources, and Newmont, as well as 87 holes drilled by Pegasus in 1983. This compilation was used to complete additional checking of the historical drill-hole assays and led to data being added to the ultimate resource database, including the replacement of some low-precision analyses with those with higher precision.

For the purposes of the construction of the resource database following the reviews, checking, and corrections summarized above, a field was created to identify historical drill-sample intervals that would not be used in the estimation of the gold resources. Due to the relatively thin widths of many of the higher-grade zones in the Black Pine deposit, sample intervals exceeding 10 feet (3.05 metres) in length were excluded, as were the low-precision gold assays that could not be replaced by higher-precision analyses. A total of 3,572 historical drill-hole assay intervals were thereby excluded from use in the estimation of resource grades.

In addition to the work described above, Mr. Gustin compiled Western Pacific assays from digital laboratory assay files and entered into them directly into the resource database.

### 12.1.4 Statistical Analysis

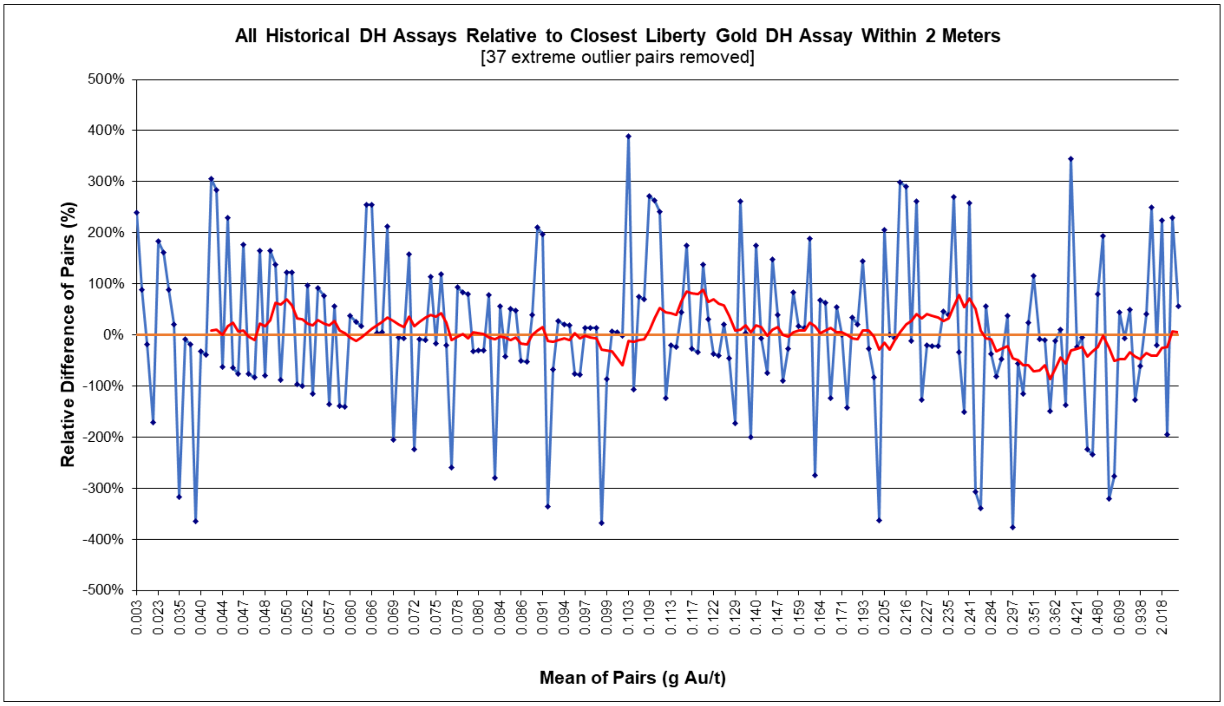
As further verification of the historical drill data, an analysis was completed by Mr. Gustin whereby the assays of historical drill-hole sample intervals were compared to nearby Liberty Gold drill-hole assays. Due to variable orientations of higher-grade mineralization and tight structural and stratigraphic controls on this mineralization, the distance between historical-Liberty Gold sample pairs in this analysis was minimized to avoid inappropriate sample pairings that will yield aberrant results, but consideration was also given to generating sufficient pairs to be statistically meaningful. With these considerations in mind, distances between the historical and Liberty Gold sample intervals of one to five metres were examined. Ultimately, sample pairs with a maximum distance between the samples in the pair of two metres were chosen for the analysis.

The Historical-Liberty Gold closest pairs at a two-metre maximum distance are compared on a relative-difference graph on Figure 12.1. The graph shows the percentage difference (plotted on the y-axis) of each historical-sample gold assay relative to its paired Liberty Gold assay lying within two metres of the historical sample. The relative difference ("RD") is calculated as follows:

$$100\,x\,\frac{(historical\ assay - Liberty\ Gold\ assay)}{lesser\ of\ (historical\ assay, Liberty\ Gold\ assay)}$$

Positive RD values indicate that the historical gold analysis is greater than the Liberty Gold assay, while a negative value indicates the opposite. The x-axis of the graph plots the mean gold values of the paired data (the mean of the pairs, or "MOP") in an increasing but non-linear fashion. The red line shows a moving average of the RDs of the pairs, which provides a visual guide to trends in the data that can aid in the identification of potential bias. A total of 37 outlier pairs, characterized by extremely high RDs, have been excluded from the analysis, leaving 196 pairs. Samples from historical holes drilled in 1974 through 1996 are included in this dataset.

**Figure 12.1 Historical Drill Assays Relative to Closest Liberty Gold Assay Within Two Metres**




As expected, due to the automated nature of the selection of pairs meeting the maximum distance of two-metre requirement, the variability in the RDs is high, with an average of the absolute values of the RDs of 110%. Due to the nature of the Back Pine higher-grade mineralization, it is impossible to completely remove the geologic variability that leads to inappropriate pairings without manual methods, but it would be difficult to do so without bringing in selection biases.

The graph shows that there is no high- or low-bias between the datasets, i.e., the RDs trend, on average, along the RD = 0 line. The mean of the historical assays in this dataset is 7% higher than the mean of the Liberty Gold analyses (0.225 vs 0.210 g Au/t, respectively), but the medians are essentially identical. In addition, if the two pairs with the highest MOPs are removed, the historical mean is 1% lower than the mean of the Liberty Gold analyses. This demonstrates how a small number of high-grade pairs can skew the statistics of the entire dataset. Similar statistical relationships are unchanged when a 0.2 g Au/t cutoff is applied to the MOPs.

As noted above, Liberty Gold has no historical records from which to check the Pegasus assay data from holes drilled in 1990 through 1995, and all Pegasus drill-samples from 1990 through 1997 were analyzed at their on-site mine laboratory. A similar relative-difference analysis was therefore completed comparing Pegasus drill-sample gold assays derived from the 1990 to 1995 time period to the closest Liberty Gold analyses within two metres. After removal of outliers, 106 pairs remained. As almost all of these pairs were also part of the dataset described above, the results were unsurprisingly very similar.

Liberty Gold and an independent firm contracted by Liberty Gold each completed their own examinations of the Pegasus 1990-1995 assay data and found no issue.

This analysis identified no significant issue in the historical gold assay data relative to Liberty Gold assays.

## 12.2 Verification of Liberty Gold Data

### 12.2.1 Drill-Hole Collars, Deviation Surveys, and Assays

Mr. Gustin used data provided by Liberty Gold, including original digital assay certificates, down-hole deviation surveys, drill-collar locations, and drill-log compilations, to vet and then import the information into MDA's resource database.

The digital assay certificates were compiled by Mr. Gustin and checked against Liberty Gold's version of the assay table. The few discrepancies encountered were due to reruns as the result of QA/QC failures or the choice of fire assays using gravimetric versus atomic absorption finishes in samples for which both analyses are available. Following the resolution to these items, MDA used this compilation to import the assays into the resource database.

Hole deviation data were spot checked against original digital down-hole survey files generated by IDS, with no discrepancies encountered.

A significant number of the Liberty Gold drill pads, many of which were used to drill multiple holes, were visited by Mr. Gustin in the field. The locations of the drill pads were confirmed using a detailed topographic map showing drill roads. While many of the drill collars have been buried or destroyed by subsequent traffic, tags with hole numbers were typically found for at least one of the holes sited on each pad.

## 12.3 Site Inspection

Mr. Gustin visited the Black Pine project site on May 2, 2018, November 15 and 16, 2019, and July 16, 2021. The site visits included inspections of the historical open pits, traverses outside of the pits, and detailed discussions with Liberty Gold technical staff. Mineralization from open-pit exposures was examined, as were numerous unaltered and altered (and possibly mineralized) outcrops beyond the limits of the open pits. Various active core and RC drill sites were visited during the latter two visits. RC drill chips and drill core from representative areas of the deposit were reviewed with the on-site geologists. Following the initial site visit, Mr. Gustin visited Liberty Gold's office in Elko and reviewed the digital drill-hole database and associated historical documents, and he also discussed the then-current geologic interpretations with Liberty Gold technical staff.

Mr. Gustin took handheld GPS measurements of three Liberty Gold and two Western Pacific drill-hole collars that were encountered during the initial site visit, and he also confirmed the locations of many other Liberty Gold drill sites during subsequent site visits by visually comparing the locations on the ground with those plotted on detailed topographic maps with drill roads. No historical holes drilled by operators prior to Western Pacific were found during the site visits, and very few are known by Liberty Gold to have survived the historical mining and subsequent reclamation activities of Pegasus.

No samples of mineralized material were collected during the site visit for verification purposes, as historical gold production from the open-pit heap-leach operations of Pegasus is well documented and is a matter of public record.

## 12.4 Summary Statement

The modeling of the Black Pine resources is based on a database that includes 1,848 historical RC holes, 26 historical core holes, and 259 RC and 16 core holes drilled by Liberty Gold. The historical holes that are most relevant to the estimation of the project resources were drilled from the mid-1980s through 1997 by Noranda and Pegasus Gold.

Extensive verification of the historical data has been undertaken, primarily by Mr. Gustin, Liberty Gold with the participation of Mr. Gustin, and MDA personnel under the supervision of Mr. Gustin. Extensive checking of the transcription of drill-hole data into the historical database was performed, missing information was added, and certain historical data were identified as having insufficient quality and removed from use in the estimation of the project mineral resources.

Liberty Gold's lithological and structural modeling at Black Pine, which was based on a combination of historical and Liberty Gold data, has been steadily refined over the course of their involvement in the project. Mr. Gustin has continually reviewed and worked with the various iterations of this modeling. It is Mr. Gustin's opinion that the current Liberty Gold's geological model is of high quality and provides the geological support required for the resource modeling.

The detailed hands-on work involved in the gold mineral-domain modeling of the project leads to further significant data verification. Details of the drill data, both current and historical, become evident during the explicit definition of the limits of low-, medium-, and high-grade gold domains. This work evidenced the consistency in Liberty Gold's drilling results with those of the historical drilling programs in terms of the continuity, widths, and grade of the gold mineralization. Statistical analyses of the historical versus Liberty Gold drill data further support this conclusion.

Finally, the decision by Pegasus to construct and operate the historical mining operation at Black Pine was based on the historical drill data, and the mine was economically successful.

Mr. Gustin experienced no limitations with respect to data verification activities related to the Black Pine project. In consideration of the information summarized in this and other sections of this report, Mr. Gustin has verified that the project data are acceptable as used in this report, most significantly to support the estimation and classification of the mineral resources reported herein.

# 13.0 MINERAL PROCESSING AND METALLURGICAL TESTING (ITEM 13)

This section has been prepared under the supervision of Mr. Gary Simmons based on historical and Liberty Gold test results as cited. The term "ore" is used in this section to refer to mineralized material used for test process feed and has no economic significance. Historical test parameters and results originally reported in Imperial units have not been converted to metric units and in some cases the author prefers to use a mixture of Imperial and metric units throughout the text as follows.

## 13.1 Metallurgical Work Completed Prior to Mining Operations

A significant number of historical reports are available that document metallurgical testing completed prior to the Pegasus mining operations that began in 1991. The reports reviewed by the authors as of the Effective Date of this report are summarized in chronological order below.

**Potter (1974):** The U.S. Bureau of Mines Salt Lake City Metallurgy Center carried out column-percolation cyanidation tests on two samples (BP7 and BP9) with calculated head assays of 2.71 g Au/t and 6.75 g Au/t, respectively. A total of 5 kg of minus 2-inch material from sample BP7 and 8 kg of minus 2-inch material from BP9 were leached in glass columns. BP7 was leached for 191 hours, recovering 87.4% of the gold to activated carbon. BP9 was leached for 701 hours, with 80.2% extracted to activated carbon.

**Ennis (undated – 1975?):** Gold Resources commissioned Newport Minerals, Inc. of Cripple Creek, Colorado to carry out crush-leach testing on a 136-kilogram composite sample with a head grade of approximately 15 g Au/t. Five tests were done at various particle sizes, including "as received", 1 inch, ¾ inch, ½ inch, and 3/8 inch. Samples were leached "in a barrel" for 7 days. The "as received" sample showed "approximately 70%" extraction, with 73% for the 3/8-inch sample.

**Dawson (1980):** Pioneer commissioned Dawson Metallurgical Laboratories, Inc. of Murray, Utah to carry out a 48-hour leach of a "composite of samples" ground to 90% passing 200 mesh. The conclusion was that "an appreciable portion of the gold does not leach", possibly "due to carbonaceous matter" in the tested sample.

**Dix (1984):** Kappes, Cassiday & Associates ("KCA") of Reno, Nevada carried out cyanide leach tests on three samples from the Tallman mine. Sample BP1 had a grade of 7 g Au/t; BP2 assayed 1.37 g Au/t, and BP3 had a gold content of 0.21 g Au/t. Two 58-day leach tests were carried out on minus 4-inch and minus ½-inch material from BP1, with gold extractions of 75% and 81%, respectively. Agitated cyanide tests were run for 24 hours on portions of pulverized head samples. The average extraction for BP1 and BP2 was 93%. BP3 was found to contain strongly "preg robbing" carbonaceous material.

**Defilippi (1988):** The Kappes, Cassiday & Associates (KCA-1988a) report is of particular interest as KCA tested a series of samples from four large diameter core holes and three bulk samples taken from historical pit locations and some core extending below the historical Black Pine pits mined by Pegasus. The materials sampled represent material types that will be mined in future operations. A typical log-normal plot of the various test feed sizes ($P_{80}$) vs. gold and silver extraction is shown in Figure 13.1 and Figure 13.2, for Noranda Core Hole BP87-93.

**Figure 13.1 Plot of 1988 Column $P_{80}$ (microns) vs. Gold Extraction (%)**

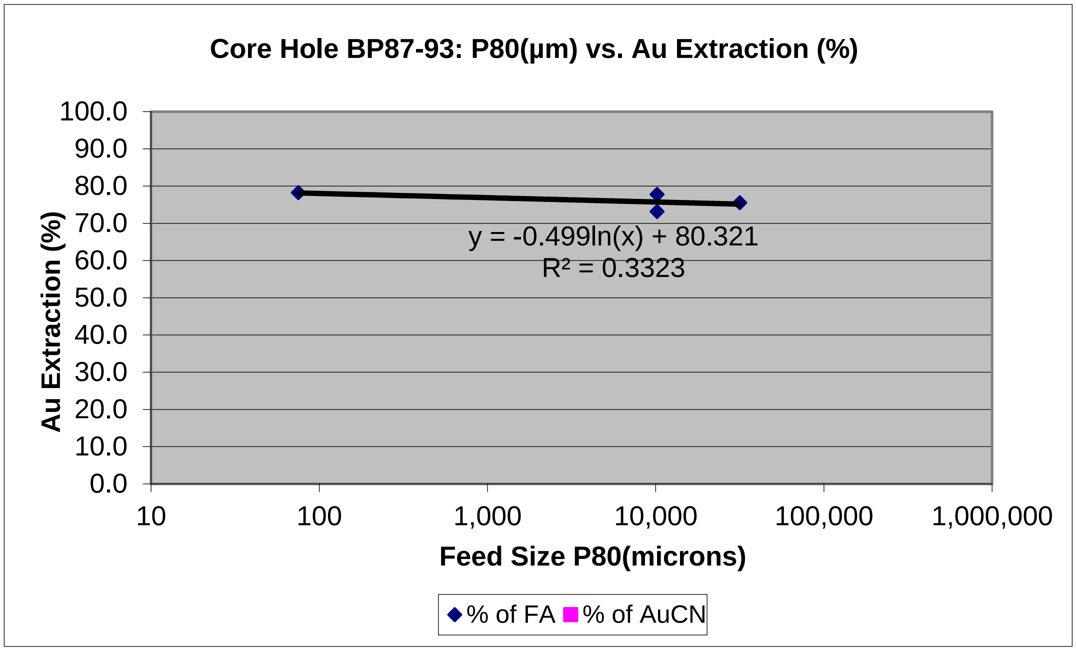
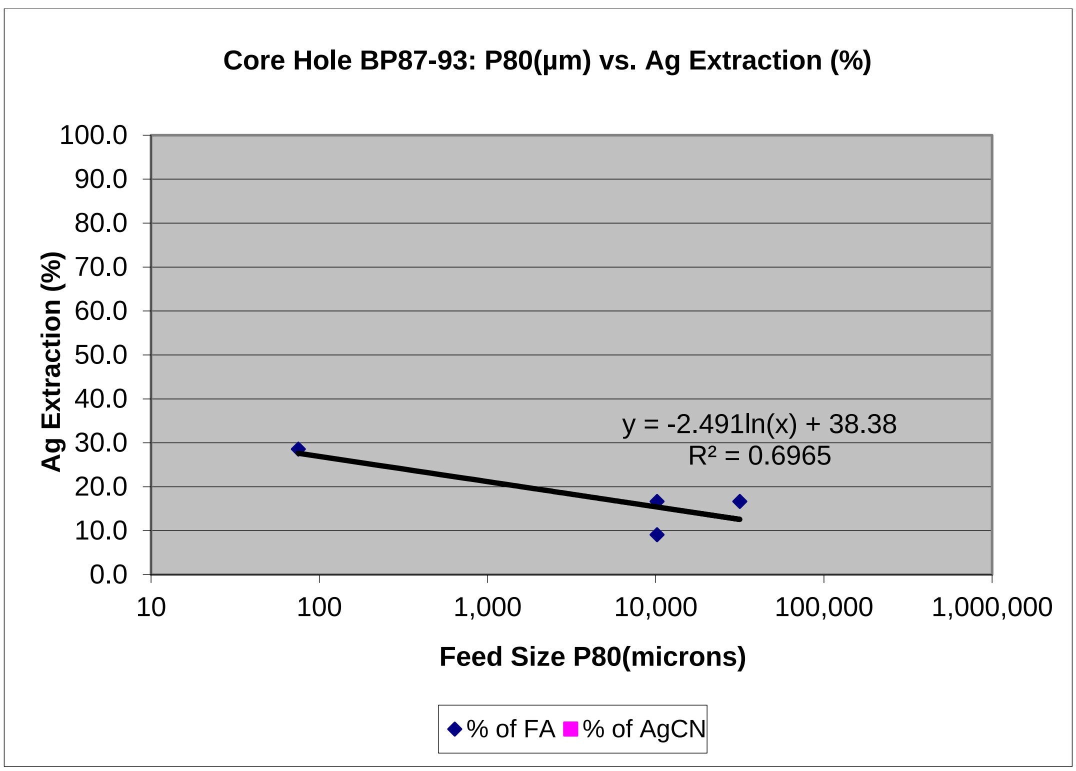



**Figure 13.2 Plot of 1988 Column $P_{80}$ (microns) vs. Gold Extraction (%)**



The test results derived from the KCA-1988 report were included with the more recent Liberty Gold testing by KCA in 2020 to develop gold (Table 13.19) and silver (Table 13.20) recovery models for Black Pine.

KCA also carried out tests on a composite sample of Black Pine carbonaceous mineralization, made up of 34.14 metres of drill core and a total weight of 372.2 kg. The sample was subjected to double oxidation, chlorination with hypochlorite, thiourea leaching, carbon-in-leach ("CIL"), and roast/cyanide leach tests. Most techniques did not significantly increase extractions over those obtained from direct cyanidation. However, "straight oxidation with hypochlorite gave gold recoveries of 88% with the addition of 320 pounds (145 kilograms) of calcium hypochlorite per ton of ore", and, "roasting the ore at 540 degrees C for two hours followed by straight cyanidation gave gold recoveries of 80%."

**Yernberg (1988):** According to a copy of a report by Senior Metallurgist W.R. Yernberg of KCA that is missing the first 18 pages and some details and results, eight bottle-roll tests were carried out on 500 grams of pulverized material that was agitated for 24 or 48 hours in different sets of tests. With one exception, gold extractions ranged from 78.3 to 89.7%. A single sample had an extraction of 50% and was found to be moderately preg robbing.

Continuously drained drip-leach column tests were carried out with backhoe samples and drill core. Backhoe samples included splits of three samples processed at minus 3-inch and minus 1-inch particle sizes, and these were leached for 60 days. Five core samples were crushed to 1.5 inch (37.5mm) and ½ inch (12.5mm) and were leached for 40 or 60 days in separate tests. Two of the 0.5 inch (12.5mm) columns required agglomeration. Tailings screen analyses were employed to look at the effectiveness of leaching in different size fractions within the samples. Leaching was significantly more effective for the smaller size fractions than the larger ones.

**Clemson (1988):** This study provided an in-depth look at the distribution of gold in oxidized and unoxidized mineralized materials in the Black Pine deposits. Extremely fine-grained native gold was noted in oxidized samples, averaging two microns in diameter, associated with hematite, quartz, and calcite. Some silica encapsulation was noted.

The report describes bottle-roll testing undertaken at Lakefield Research of Peterborough, Ontario, Canada. Samples of drill chips were ground to -20 mesh and screened at minus 35, 100, 200, and 500 mesh, and the various screen fractions were assayed for gold. No enrichment of gold in any of the size fractions was noted. Ten samples were used for the study, with results for the minus 200-mesh fraction reported for all samples. Gold extractions for seven of the ten samples ranged from 81.9% to 92.4%. Three of the samples yielded very low recoveries; these samples contained preg-robbing carbonaceous material. A number of techniques were applied to these samples in an attempt to improve extraction: grinding to 86% passing minus 400 mesh, roasting at 600 degrees C, and then leaching was found to be the most effective method.

**Dix (1990):** KCA performed 4-hour agitated cyanide-leach tests on 10 one-kilogram "as received" chip samples (nominally ¼-inch 6.25mm particle size), and the data were compared to conventional fire assays. Gold extractions ranged from 78.1% to 97.5% and averaged 87.5%.

## 13.2 Metallurgical Work Completed by Pegasus

Liberty Gold has no historical records documenting metallurgical testing that Pegasus may have carried out. However, Western Pacific Resources acquired the Black Pine Project in October 2012 and produced a summary report documenting Pegasus gold production records on December 13, 2012, titled: *Report on Heap Leach Production and Recovery - Black Pine Mine, Idaho*. Production records from the Pegasus operation indicate that from 1991 through 1998, the average gold recovery by ROM heap leaching was 64.1% (Table 13.1) These numbers do not include additional ounces recovered from wash/rinse, closure and reclamation activities, as these were carried out after Pegasus ceased to be operator.

**Table 13.1 Pegasus Heap Leach Production Summary**

(Compiled by Western Pacific Resources, Dec 13, 2012)

| Year | Tonnes to L Pad (000s) | Head Grade | | Reported Prod | | HL Feed | HL Pad Remaining | Calc. HL Pad Grade | Annual Rec. | Pad to Date |
|---|---|---|---|---|---|---|---|---|---|---|
| | | g/t | Kg Cont'd | Ozs Au | Rec, % | Ozs | Ozs | opt | % | % |
| | | | | | | | | | | |
| 1991 | 0 | 0.000 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1992 | 2850 | 1.200 | 3,420.0 | 48,700 | 65.0 | 109,947 | 61,247 | 0.0195 | 44.3 | 44.3 |
| 1993 | 3270 | 0.820 | 2,681.4 | 66,100 | 80.0 | 86,202 | 81,349 | 0.0121 | 76.7 | 58.5 |
| 1994 | 5810 | 0.690 | 4,008.9 | 65,700 | 54.0 | 128,879 | 144,527 | 0.0110 | 51.0 | 55.5 |
| 1995 | 7050 | 0.720 | 5,076.0 | 108,500 | 59.0 | 163,184 | 199,211 | 0.0095 | 66.5 | 59.2 |
| 1996 | 8730 | 0.520 | 4,539.6 | 87,900 | 60.0 | 145,940 | 257,251 | 0.0084 | 60.2 | 59.4 |
| 1997 | 2572 | 0.534 | 1,373.7 | 44,080 | -- | 44,172 | 257,343 | 0.0077 | 99.8 | 62.1 |
| 1998 | 0 | 0.000 | 0.0 | 13,800 | -- | 0 | 243,543 | 0.0073 | -- | 64.1 |
| **Totals** | **30,282** | | **21,099.6** | **434,780** | | **678,324** | **243,543** | **0.0073** | **64.1** | **64.1** |
| | | | | | | | | | | |

Western Pacific Resources speculated in their report that the total leach cycle may also have been compromised and an additional 50,899 recoverable ounces remained in the pad. If correct, this would have resulted in an increase of the overall expected gold recovery to 71.6%.

## 13.3 Liberty Gold 2019-2020 Bulk Sample Bottle-Roll and Column Leach Testing

In 2019 Liberty Gold initiated bottle-roll and column-leach testing at KCA on six backhoe extracted bulk samples taken from existing pit walls and benches from five of the historical Black Pine open pits and one road cut through the F Zone resource area (KCA 2020a).

Bulk Sample pit locations where metallurgical samples were extracted are as follows:

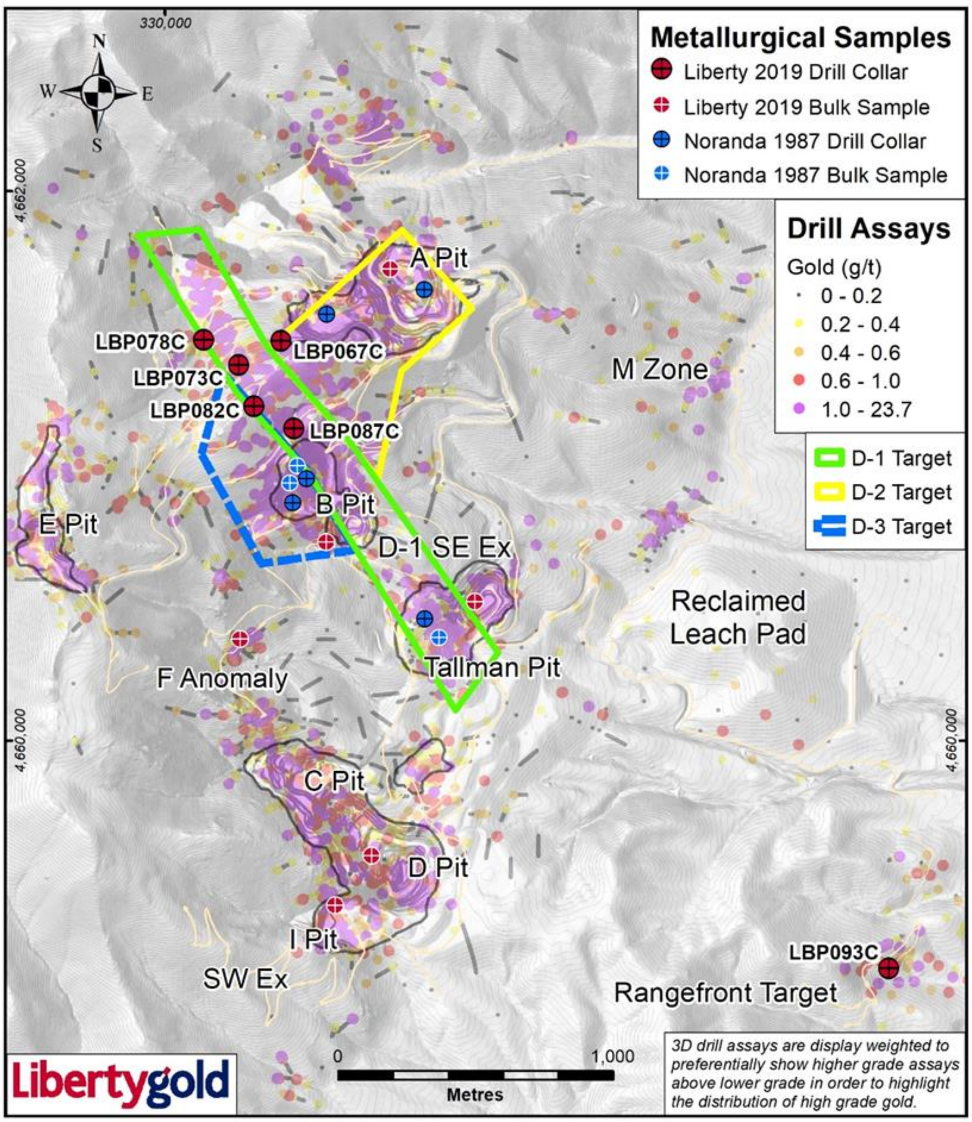
1. A Pit
2. Tallman Pit
3. Upper BX Pit

4. Lower F Zone
5. C/D Pit
6. I Pit

A map showing more precise locations of the Liberty Gold 2019 bulk samples (including the location of the Noranda bulk samples (Defilippi, 1988) and large diameter core) is shown in Figure 13.3.

The Liberty Gold bulk samples were collected in new 55-gallon steel drums and the average weight was 1,000 kg each. All composites were subjected to bottle-roll leach testing at target $P_{80}$ sizes of 75 µm and 1,700 µm, and to column-leach testing at 75.0 mm crush size. The main objective of the tests was to evaluate the laboratory-scale leachability character of the Black Pine resources in terms of gold extraction, extraction rate, reagent consumption, and sensitivity to feed size.

**Figure 13.3 Liberty and Noranda Bulk Sample and Large Diameter Core Collar Locations**



### 13.3.1 2019–2020 Black Pine Bulk Sample Head Assays

Head assays and geo-metallurgical characterization were obtained for the six bulk samples using a combination of four separate laboratories: KCA, ALS, University of British Columbia ("UBC") and FL Schmidt ("FLS"). The head assays and geo-metallurgical characterization data are tabulated in Table 13.2. A summary of findings is provided below:

- Gold grade ranged from 0.23 to 4.04 ppm and averaged 1.82 ppm;
- Silver grade ranged from 0.63 to 9.92 ppm and averaged 3.62 ppm;
- Organic carbon ranged from 0.06 to 0.12% and averaged 0.08%;
- Sulfide sulfur ranged from <0.01 to 0.03% and averaged 0.02%;
- Preg-robbing analysis ranged from 2.6 to 9.9% and averaged 4.5%. There is indication of minor clay borrowing and preg-robbing in some samples, but does not appear to materially affect gold or silver extraction.
- Copper values by ICP were very low, ranging from 9 to 465 ppm and averaged 95 ppm;
- Cyanide solubility of gold ranged from 51.9 to 86.1% and averaged 75.8%;
- Concentrations of the deleterious elements by ICP were: 9 ppm selenium; mercury ranged from 4.0 to 14.9 ppm, and arsenic was low at 31 to 1,105 ppm and averaged 271 ppm;
- Concentrations of the primary cyanide consumers were low and suggest minimum potential for affecting cyanide-consumption rates. Copper averaged 95 ppm, nickel averaged 98 ppm, and zinc averaged 250 ppm; and
- Silica ($SiO_2$) content ranged from 9.8 to 45.0% (by whole-rock analysis) and averaged 28.0%.

### 13.3.2 2019-2020 Bulk Sample Bottle-Roll Test Results

Bottle-roll leach cyanidation testing was conducted on six bulk composites to evaluate the leachability character of the Black Pine historical pit resources at fine to coarse particle size. Bottle-roll testing was conducted at two targeted feed sizes: 80% passing ($P_{80}$) 75 µm (200 mesh) and 80% passing 1,700 µm (10 mesh). Retention times were 72 hours for the 75 µm bottle roll tests and 144-hrs for the 1,700 µm tests. A second $P_{80}$ = 75 µm CIL bottle roll test was conducted to evaluate preg-robbing potential. The 75 µm bottle-roll and CIL testing followed a standard procedure outlined detail in the final KCA report (KCA 2020a). The 75 µm direct leach and CIL bottle-roll test procedure was the same as for the 1,700 µm bottle rolls, except the retention time was reduced from 144 to 72 hours. The 75 µm and 1,700 µm bottle-roll test results (along with the column leach test results – discussed later in this section) are shown in Table 13.3.

Three of the six bulk samples; A Pit, Upper BX Pit and Lower F Zone, contained significant -75µm fines (200 mesh), 12.5%, 17.7% and 10.9% respectively and were agglomerated with 2.0 kg/t of cement. The three remaining bulk composites, with lower fines content, were leached without agglomeration.

## Table 13.2 2019-2020 Bulk Sample Head Assays

| | | KCA Analysis | | | | | | | | | | | ALS Analysis | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Au & Ag Assays | | | | | Sulfur and Carbon Species | | | | | | | | | Preg-robb Analysis | | | Sulfur and Carbon Species | | | | | |
| KCA Sample No. | Mine Area | AuFA ppm | AuCN ppm | AuCN % | AgFA ppm | Cu ppm | C(tot) % | C(org) % | C(inorg) % | $S_{(total)}$ % | $S_{(sulfide)}$ % | $S_{(sulfate)}$ % | AuFA ppm | AuCN ppm | AuCN % | Au-AA31 w/spike | Au-AA31a w/o spike | Au PR % | C(tot) % | C(org) % | C(inorg) % | $S_{(total)}$ % | $S_{(sulfide)}$ % | $S_{(sulfate)}$ % |
| **2019 Black Pine Bulk Samples** | | | | | | | | | | | | | | | | | | | | | | | | |
| 87201B | A Pit | 1.182 | 0.82 | 69.4 | 5.23 | 30 | 5.91 | 0.26 | 5.65 | 0.07 | <0.01 | 0.07 | 1.200 | 0.82 | 68.3 | 4.09 | 0.79 | 3.8 | 5.97 | 0.09 | 5.88 | 0.06 | 0.01 | 0.05 |
| 87202B | Tallman Pit | 2.160 | 1.80 | 83.3 | 3.77 | 36 | 6.52 | 0.19 | 6.33 | 0.03 | <0.01 | 0.03 | 2.270 | 1.80 | 79.3 | 5.17 | 1.90 | 4.7 | 6.60 | 0.09 | 6.51 | 0.02 | 0.01 | 0.01 |
| 87203B | BX Pit | 4.040 | 3.48 | 86.1 | 9.92 | 465 | 3.30 | 0.17 | 3.13 | 0.03 | <0.01 | 0.03 | 4.010 | 3.48 | 86.8 | 6.53 | 3.44 | 9.9 | 3.37 | 0.12 | 3.25 | 0.03 | <0.01 | 0.04 |
| 87204B | F Zone | 0.775 | 0.62 | 80.0 | 1.25 | 20 | 7.38 | 0.22 | 7.16 | 0.01 | 0.01 | 0.01 | 1.220 | 0.62 | 50.8 | 4.04 | 0.70 | 2.6 | 7.46 | 0.08 | 7.38 | 0.01 | <0.01 | 0.02 |
| 87205B | CD Pit | 0.231 | 0.12 | 51.9 | 0.90 | 9 | 6.59 | 0.30 | 6.30 | 0.01 | <0.01 | 0.01 | 0.238 | 0.12 | 50.4 | 3.54 | 0.21 | 2.9 | 6.71 | 0.06 | 6.65 | 0.02 | 0.02 | <0.01 |
| 87206B | I Pit | 2.552 | 2.14 | 83.9 | 0.63 | 12 | 10.40 | 0.22 | 10.18 | 0.03 | <0.01 | 0.03 | 2.770 | 2.14 | 77.3 | 5.65 | 2.32 | 2.9 | 10.75 | 0.06 | 10.70 | 0.04 | 0.03 | 0.01 |

**Table 13.3 Summary Bottle Roll, CIL and Column Leach Test Results on 2019 Liberty Gold Bulk Samples**

| KCA Sample No. | Description | Test No | Geology | | Feed Size | | Leach Time (days/Hrs) | Au Balance | | Ag Balance | | Reagents | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mine Area | F-Form | Target P80 (µm) | Screen P80 (µm) | | Au Ext % | Calc Hd Au (ppm) | Ag Ext % | Calc Hd Ag (ppm) | NaCN kg/t | Lime kg/t | Cement kg/t |
| **2019 Liberty Bulk Samples** | | | | | | | | | | | | | | |
| 87201B | Bulk Sample | 87212 | A Pit | Polc | 75,000 | 58,600 | 100d | **79.8** | 1.161 | **30.7** | 5.27 | 0.46 | 0.00 | 2.1 |
| | Bulk Sample | 87207 A | A Pit | Polc | 1,700 | 1,960 | 144 | **74.6** | 1.170 | **27.3** | 6.49 | 0.16 | 0.75 | |
| | Bulk Sample | 87230 A | A Pit | Polc | 75 | 97 | 72 | **76.0** | 1.083 | **47.6** | 4.58 | 0.03 | 0.75 | |
| | Bulk Sample | 87232 A | A Pit | Polc | 75CIL | 97 | 72 | **79.6** | 1.162 | **49.7** | 4.61 | 0.58 | 0.75 | |
| | | | | | | | | | | | | | | |
| 87202B | Bulk Sample | 87215 | Tallman Pit | Polc | 75,000 | 74,400 | 100d | **79.7** | 1.995 | **29.1** | 3.71 | 0.60 | 0.75 | 0.0 |
| | Bulk Sample | 87207 B | Tallman Pit | Polc | 1,700 | 1,640 | 144 | **79.5** | 2.247 | **36.0** | 3.97 | 0.15 | 0.75 | |
| | Bulk Sample | 87230 B | Tallman Pit | Polc | 75 | 88 | 72 | **78.9** | 2.151 | **48.6** | 3.33 | 0.15 | 0.75 | |
| | Bulk Sample | 87232 B | Tallman Pit | Polc | 75CIL | 88 | 72 | **86.0** | 2.294 | **58.3** | 3.86 | 0.68 | 0.75 | |
| | | | | | | | | | | | | | | |
| 87203B | Bulk Sample | 87218 | Upper BX Pit | Polc | 75,000 | 55,900 | 100d | **92.8** | 3.377 | **56.2** | 9.25 | 0.76 | 0.00 | 2.0 |
| | Bulk Sample | 87207 C | Upper BX Pit | Polc | 1,700 | 1,520 | 144 | **90.1** | 3.736 | **59.4** | 9.50 | 0.50 | 0.75 | |
| | Bulk Sample | 87230 C | Upper BX Pit | Polc | 75 | 104 | 72 | **91.3** | 3.733 | **69.8** | 8.92 | 0.38 | 0.75 | |
| | Bulk Sample | 87232 C | Upper BX Pit | Polc | 75CIL | 104 | 72 | **93.3** | 4.033 | **72.3** | 9.78 | 1.10 | 1.00 | |
| | | | | | | | | | | | | | | |
| 87204B | Bulk Sample | 87221 | Lower F Zone | Pols | 75,000 | 51,300 | 100d | **78.2** | 0.803 | **8.5** | 1.18 | 0.53 | 0.00 | 1.9 |
| | Bulk Sample | 87208 A | Lower F Zone | Pols | 1,700 | 1,480 | 144 | **79.3** | 0.777 | **12.6** | 1.27 | 0.12 | 0.75 | |
| | Bulk Sample | 87230 D | Lower F Zone | Pols | 75 | 102 | 72 | **80.7** | 0.787 | **25.3** | 0.95 | 0.08 | 0.75 | |
| | Bulk Sample | 87232 D | Lower F Zone | Pols | 75CIL | 102 | 72 | **82.5** | 0.819 | **29.9** | 0.87 | 0.58 | 0.75 | |
| | | | | | | | | | | | | | | |
| 87205B | Bulk Sample | 87224 | C/D Pit | Pols | 75,000 | 71,900 | 100d | **76.8** | 0.233 | **28.6** | 0.49 | 0.60 | 0.76 | 0.0 |
| | Bulk Sample | 87208 B | C/D Pit | Pols | 1,700 | 1,580 | 144 | **64.5** | 0.245 | **14.8** | 1.08 | 0.03 | 0.75 | |
| | Bulk Sample | 87231 A | C/D Pit | Pols | 75 | 114 | 72 | **64.6** | 0.223 | **40.7** | 0.59 | 0.07 | 0.50 | |
| | Bulk Sample | 87233 A | C/D Pit | Pols | 75CIL | 114 | 72 | **76.6** | 0.261 | **44.1** | 0.59 | 0.54 | 0.75 | |
| | | | | | | | | | | | | | | |
| 87206B | Bulk Sample | 87227 | I Pit | Pold | 75,000 | 56,100 | 100d | **60.9** | 2.677 | **17.6** | 0.51 | 0.60 | 0.75 | 0.0 |
| | Bulk Sample | 87208 C | I Pit | Pold | 1,700 | 1,740 | 144 | **66.7** | 2.663 | **10.2** | 0.98 | 0.14 | 0.50 | |
| | Bulk Sample | 87231 B | I Pit | Pold | 75 | 107 | 72 | **74.8** | 2.670 | **34.0** | 0.50 | 0.09 | 0.50 | |
| | Bulk Sample | 87233 B | I Pit | Pold | 75CIL | 107 | 72 | **79.3** | 2.888 | **50.0** | 0.44 | 0.54 | 0.50 | |
| | | | | | | | | | | | | | | |

The following is a summary of the findings from the bottle-roll test results.

#### 13.3.2.1 75 µm (200-Mesh) Bottle-Roll Results

- Gold head grades for the bulk samples ranged from 0.22 to 3.77 ppm Au (average = 1.77 ppm Au).
- Gold extraction results ranged between 64.6 and 91.3% (weight average = 81.8%).
- Silver head grades ranged from 0.50 to 8.92 ppm Ag (average = 3.15 ppm Ag).
- Silver extraction results ranged from 25.3 to 69.8% (weight average = 56.6%).
- Cyanide consumption averaged 0.13 kg/t and lime consumption averaged 0.67 kg/t.

#### 13.3.2.2 75 µm (200-Mesh) CIL Bottle Roll Results

- Gold head grades for the bulk samples ranged from 0.26 to 4.03 ppm Au (average = 1.91 ppm Au).
- Gold extraction results ranged between 76.6 and 93.3% (weight average = 85.8%).
- Silver head grades for the bulk samples ranged from 0.44 to 9.78 ppm Ag (average = 3.56 ppm Ag).
- Silver extraction results ranged from 29.9 to 72.3% (weight average = 61.3%); and
- Cyanide consumption averaged 0.67 kg/t and lime consumption averaged 0.75 kg/t.

The weight average gold extraction % for the 75 µm CIL bottle roll tests were 85.8% vs. 81.8% for the direct leach 75 µm bottle roll test, indicating mild preg-borrowing or preg-robbing potential.

#### 13.3.2.3 1,700 µm (10-Mesh) Bottle-Roll Results

- Gold head grades for the bulk samples ranged from 0.25 to 3.74 ppm Au (average = 1.81 ppm Au).
- Gold extraction results ranged between 64.5 and 90.1% (weight average = 79.1%).
- Silver head grades for the bulk samples ranged from 0.98 to 9.50 ppm Ag (average = 3.88 ppm Ag).
- Silver extraction results ranged from 10.2 to 59.4% (weight average = 39.8%); and
- Cyanide consumption averaged 0.18 kg/t and lime consumption averaged 0.71 kg/t.

### 13.3.3 2019-2020 Bulk Sample Column-Leach Program

Column-leach cyanidation testing was conducted on six Black Pine bulk composites to evaluate laboratory-scale leachability characteristics of historical pit resources, at coarse particle size, in terms of gold/silver extraction, extraction rate and reagent consumption (KCA 2020a). Column testing was conducted at a target $P_{80}$ (feed size) of 75 mm. Laboratory column charges were leached for 100 days with dilute sodium cyanide solution.

The 75 mm column-leach testing followed a standard procedure outlined detail in the final KCA-2020a report. The column-leach test results are shown in Table 13.3. The column leach test parameters are presented in Table 13.4.

**Table 13.4 2019-2020 Bulk Sample Column-Leach Test Parameters**

| KCA Sample No. | KCA Test No. | Description | Crush Size, mm | Column Diameter, meters | Initial Charge Height, meters | Charge Weight, kilograms |
|---|---|---|---|---|---|---|
| 87201 B | 87212 | A Pit | 87.5 | 0.305 | 2.743 | 277.04 |
| 87202 B | 87215 | Tallman Pit | 87.5 | 0.305 | 2.921 | 308.83 |
| 87203 B | 87218 | Upper BX Pit | 87.5 | 0.305 | 2.553 | 283.44 |
| 87204 B | 87221 | Lower F Zone | 87.5 | 0.305 | 2.896 | 285.96 |
| 87205 B | 87224 | C/D Pit | 87.5 | 0.305 | 2.565 | 288.75 |
| 87206 B | 87227 | I Pit | 87.5 | 0.305 | 2.597 | 282.84 |

### 13.3.3.1 Column-Leach Test Extractions

Gold extractions ranged from 60.9% to 92.8% based on calculated head grades, which ranged from 0.23 to 3.38 ppm Au (Table 13.3). The sodium cyanide consumptions ranged from 0.46 to 0.76 kg/t. The material utilized in leaching was blended with 0.75 or 0.76 kg/t hydrated lime, with three of the composites agglomerated with 1.86 to 2.08 kg/t cement. Column test extraction results are based upon carbon assays vs. the calculated head (carbon assays + tail screen assays). The solution balance gold extraction profiles are presented graphically in Figure 13.4.

### 13.3.3.2 Head vs. Tails Screen Analysis

Tails screen assays demonstrate that gold extraction for all six of the Black Pine bulk samples are not sensitive to feed particle size. Figure 13.5 is a typical example of results for the A Pit bulk sample.

**Figure 13.4 2019-2020 Column-Leach Test Work, Gold Extraction vs. Days of Leach**

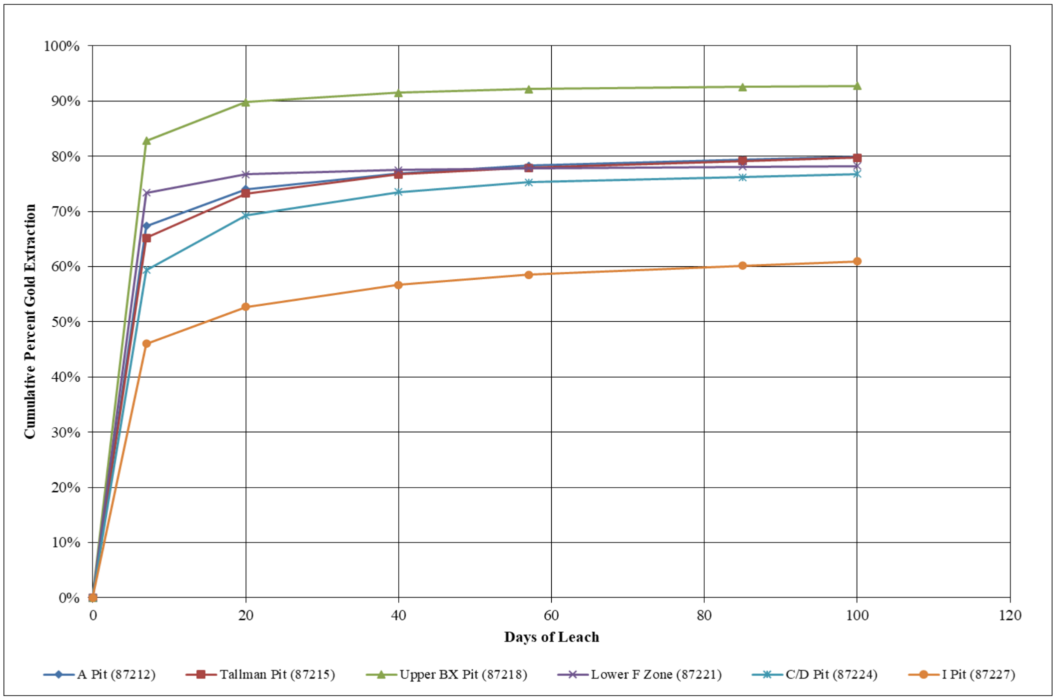
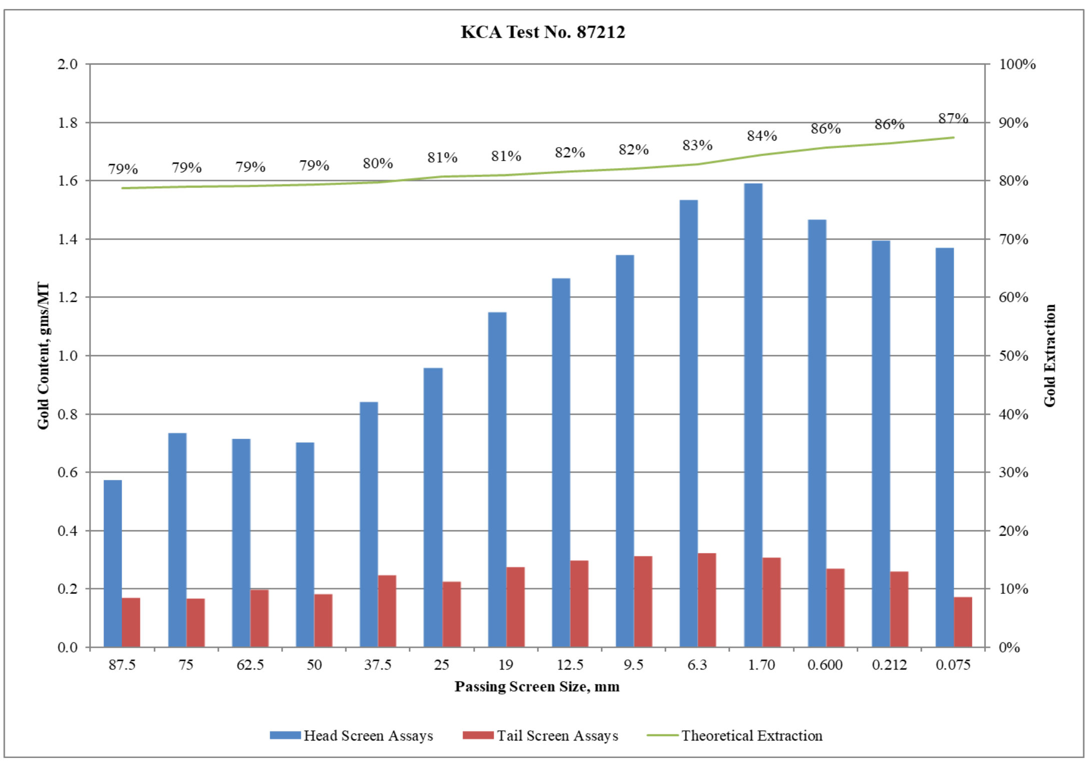



**Figure 13.5 A Pit Head vs. Tail Screen Analyses and Gold Extraction by Size Fraction**



## 13.4 2020 Phase 1 Variability Composite Testing

In 2019 Liberty Gold initiated bottle-roll and column-leach testing at KCA on 29 variability composites selected from six large diameter PQ metallurgical core holes, selected from Discovery Zone 1, Discovery Zone 2 and the Rangefront resource locations (KCA 2020b). The large diameter metallurgical core hole collar locations are shown on Figure 13.3.

Splits from eleven of the 29 composites were selected and shipped to Hazen Research, Inc. ("Hazen") in Golden, Colorado, for SAG mill comminution ("SMC") testing (SMC Test®) and Bond Abrasion index ("Ai") testing. Comminution and abrasion final test results are documented in a letter report (Stepperud 2020) from Stepperud (Hazen) to KCA.

One composite from the 2019 bulk sample program (the I Pit composite) and four variability composites from the 2019 PQ met core drilling program (BP73-7, BP73-10, BP78-12 and BP87-25) were selected for gold deportment mineralogy study and were shipped to AMTEL Ltd in Canada ("AMTEL") and are reported in AMTEL (2020).

Splits of all 29 composite heads were delivered to three separate laboratories for additional geo-metallurgical and environmental characterization analysis:

1. ALS Laboratory Group ("ALS") for ICP and gold cyanide solubility analysis,
2. FL Smith Inc. ("FLS") for "XRD" and "Whole Rock" analysis and
3. Western Environmental Testing Laboratories ("WETLAB") for environmental characterization of solids and aqueous solutions.

With reference to Section 7 of this technical report, the bulk sample and PQ core metallurgical composites reasonably sampled materials from the Pola, Polb, Polc, with minimal samples coming from PPos, Pold, and Pols, all members of the Oquirrh Group. A 2020 metallurgical PQ core drilling program was designed to fill major resource material gaps that were minimally sampled in 2019 (Polc, Pold and Pols). Results from this program are pending as of the Effective Date of this report.

### 13.4.1 2020 Black Pine Variability Composite Head Assays

Head assay details and geo-metallurgical characterization results are in the KCA 2020b report. A high-level summary of the geo-metallurgical characterization is presented below for gold, silver, copper, cyanide gold solubility, carbon and sulfur species, preg-robb analysis, as well as ICP multi-element analyses, whole-rock analyses and QXRD analyses. Select composite summary results for gold, silver, copper, carbon and sulfur speciation and preg-robb analysis, are detailed in Table 13.5:

- Gold grades ranged from 0.20 to 5.67 ppm and averaged 0.86 ppm.
- Silver grades ranged from 0.85 to 4.0 ppm and averaged 1.9 ppm.
- Organic carbon ranged from 0.07 to 0.20% and averaged 0.11%.
- Sulfide sulfur ranged from <0.01 to 0.01% and averaged <0.01%.

- Preg-robbing analyses ranged from 0.7 to 19.0% and averaged 4.9% (using a 1 ppm spike). Preg-robbing values <10% are considered within the error band of the test procedure and are classified as non-preg-robbing by KCA. Only two composites (BP78-13 and BP78-15) were >10% at 19.0 and 13.3% respectively.
- Copper values were very low, ranging from 10 to 78 ppm and averaged 34 ppm.
- Gold cyanide solubility ranged from 24.9 to 96.8% and averaged 83.4%.
- Concentrations of the deleterious elements were: selenium averaged 19 ppm, mercury ranged from 2.0 to 26.5 ppm with an average of 5.6 ppm, and arsenic levels were low, ranging from 49 to 404 ppm with an average of 155 ppm.
- Concentrations of the primary cyanide consumers were low and suggest minimum potential for affecting cyanide consumption rates. Copper averaged 34 ppm, nickel averaged 73 ppm, and zinc averaged 229 ppm; and
- Whole-rock silica content ranged from 15.5 to 80.2% and averaged 47.8 %.

## Table 13.5 2019 Black Pine Variability Composite Head Assays by KCA and ALS

| | | Head Assays | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ALS | | | KCA | | | | | | | | | | | | ALS (Preg-robb) | | |
| KCA Sample No. | Composite ID | AuFA ppm | AuCN ppm | AuCN % | AgFA ppm | AgCN ppm | AgCN % | Cu ppm | CuCN ppm | CuCN % | C(tot) % | C(org) % | C(inorg) % | $S_{(total)}$ % | $S_{(sulfide)}$ % | $S_{(sulfate)}$ % | AA31 w/spike | AA31a w/o | Au PR % |
| **2019 Phase 1 Variability Core Composites** | | | | | | | | | | | | | | | | | | | |
| 87234A | BP67-1 | 0.384 | 0.270 | 70.3 | 1.64 | 0.600 | 36.6 | 32 | 6.84 | 21.4 | 4.26 | 0.09 | 4.17 | 0.03 | <0.01 | 0.03 | 1.143 | 0.153 | 1.0 |
| 87235A | BP67-2 | 0.346 | 0.150 | 43.4 | 2.29 | 1.353 | 59.1 | 30 | 5.24 | 17.5 | 0.90 | 0.20 | 0.70 | 0.09 | <0.01 | 0.09 | 1.067 | 0.103 | 3.7 |
| 87236A | BP67-3 | 0.761 | 0.460 | 60.4 | 2.14 | 1.227 | 57.4 | 20 | 6.04 | 30.2 | 5.97 | 0.11 | 5.86 | 0.02 | <0.01 | 0.02 | 1.113 | 0.207 | 9.3 |
| 87237A | BP67-4 | 5.860 | 5.670 | 96.8 | 4.01 | 1.387 | 34.6 | 24 | 5.73 | 23.9 | 2.43 | 0.14 | 2.29 | 0.08 | <0.01 | 0.08 | 3.737 | 2.807 | 7.0 |
| 87238A | BP67-5 | 1.825 | 1.560 | 85.5 | 2.23 | 0.920 | 41.3 | 35 | 8.89 | 25.4 | 3.33 | 0.13 | 3.20 | 0.03 | <0.01 | 0.03 | 1.650 | 0.710 | 6.0 |
| 87239A | BP67-6 | 1.285 | 1.030 | 80.2 | 2.33 | 1.073 | 46.2 | 22 | 7.60 | 34.5 | 6.15 | 0.14 | 6.15 | 0.05 | <0.01 | 0.05 | 1.443 | 0.487 | 4.3 |
| 87240A | BP73-7 | 0.241 | 0.060 | 24.9 | 1.94 | 0.633 | 32.6 | 18 | 7.37 | 41.0 | 5.50 | 0.12 | 5.50 | 0.03 | <0.01 | 0.03 | 0.943 | 0.030 | 8.7 |
| 87241A | BP73-8 | 0.381 | 0.170 | 44.6 | 2.53 | 1.067 | 42.2 | 38 | 14.21 | 37.4 | 5.20 | 0.12 | 5.20 | 0.04 | 0.01 | 0.03 | 0.993 | 0.070 | 7.7 |
| 87242A | BP73-9 | 0.273 | 0.140 | 51.3 | 2.23 | 1.007 | 45.2 | 36 | 7.69 | 21.4 | 3.09 | 0.15 | 3.08 | 0.02 | <0.01 | 0.02 | 1.083 | 0.100 | 1.7 |
| 87243A | BP73-10 | 2.440 | 2.110 | 86.5 | 2.05 | 0.940 | 45.9 | 23 | 15.25 | 66.3 | 7.19 | 0.10 | 7.19 | 0.03 | <0.01 | 0.03 | 1.970 | 1.003 | 3.3 |
| 87244A | BP73-11 | 0.533 | 0.460 | 86.3 | 0.85 | 0.393 | 46.2 | 10 | 10.43 | 104.3 | 10.10 | 0.11 | 9.99 | 0.09 | <0.01 | 0.09 | 1.220 | 0.237 | 1.7 |
| 87245A | BP78-12 | 0.810 | 0.590 | 72.8 | 1.83 | 0.367 | 20.0 | 62 | 20.57 | 33.2 | 2.80 | 0.11 | 2.69 | 0.04 | <0.01 | 0.04 | 1.270 | 0.300 | 3.0 |
| 87246A | BP78-13 | 0.436 | 0.290 | 66.5 | 1.37 | 0.400 | 29.2 | 23 | 8.19 | 35.6 | 9.20 | 0.09 | 9.11 | 0.03 | <0.01 | 0.03 | 0.870 | 0.060 | 19.0 |
| 87247A | BP78-14 | 0.354 | 0.300 | 84.7 | 1.59 | 0.440 | 27.7 | 41 | 13.69 | 33.4 | 9.13 | 0.07 | 9.06 | 0.07 | 0.01 | 0.06 | 1.093 | 0.137 | 4.3 |
| 87248A | BP78-15 | 2.610 | 1.960 | 75.1 | 2.41 | 0.567 | 23.5 | 26 | 13.68 | 52.6 | 7.59 | 0.10 | 7.49 | 0.07 | <0.01 | 0.07 | 1.890 | 1.023 | 13.3 |
| 87249A | BP82-16 | 0.405 | 0.310 | 76.5 | 1.60 | 0.307 | 19.2 | 41 | 14.93 | 36.4 | 4.80 | 0.07 | 4.73 | 0.03 | <0.01 | 0.03 | 1.050 | 0.123 | 7.3 |
| 87250A | BP82-17 | 0.367 | 0.260 | 70.8 | 1.16 | 0.440 | 37.9 | 34 | 13.71 | 40.3 | 6.95 | 0.09 | 6.86 | 0.01 | <0.01 | 0.01 | 1.123 | 0.133 | 1.0 |
| 87251A | BP82-18 | 0.317 | 0.130 | 41.0 | 2.09 | 0.980 | 46.9 | 78 | 31.50 | 40.4 | 4.45 | 0.11 | 4.34 | 0.01 | <0.01 | 0.01 | 0.990 | 0.067 | 7.7 |
| 87252A | BP82-19 | 0.203 | 0.120 | 59.1 | 1.19 | 0.527 | 44.3 | 69 | 37.00 | 53.6 | 5.80 | 0.06 | 5.74 | 0.01 | <0.01 | 0.01 | 1.043 | 0.060 | 1.7 |
| 87253A | BP82-20 | 0.835 | 0.730 | 87.4 | 1.41 | 0.473 | 33.7 | 49 | 29.74 | 60.7 | 5.23 | 0.09 | 5.14 | 0.03 | <0.01 | 0.03 | 1.303 | 0.327 | 2.3 |
| 87254A | BP82-21 | 0.495 | 0.370 | 74.7 | 1.11 | 0.593 | 53.5 | 38 | 22.58 | 59.4 | 6.74 | 0.10 | 6.64 | 0.02 | <0.01 | 0.02 | 1.110 | 0.153 | 4.3 |
| 87255A | BP87-22 | 0.251 | 0.110 | 43.8 | 1.73 | 0.613 | 35.5 | 53 | 12.89 | 24.3 | 4.99 | 0.09 | 4.90 | 0.01 | <0.01 | 0.01 | 1.027 | 0.073 | 4.7 |
| 87256A | BP87-23 | 0.301 | 0.210 | 69.8 | 1.53 | 0.373 | 24.5 | 27 | 10.49 | 38.8 | 6.06 | 0.12 | 5.95 | 0.03 | <0.01 | 0.03 | 1.063 | 0.100 | 3.7 |
| 87257A | BP87-24 | 0.204 | 0.060 | 29.4 | 3.34 | 0.713 | 21.4 | 57 | 17.43 | 30.6 | 2.60 | 0.12 | 2.48 | 0.02 | <0.01 | 0.02 | 0.983 | 0.037 | 5.3 |
| 87258A | BP87-25 | 1.420 | 1.180 | 83.1 | 4.05 | 1.800 | 44.5 | 23 | 5.56 | 24.2 | 5.97 | 0.11 | 5.86 | 0.04 | <0.01 | 0.04 | 1.560 | 0.567 | 0.7 |
| 87259A | BP93-26 | 0.332 | 0.280 | 84.3 | 1.36 | 0.587 | 43.1 | 24 | 7.45 | 31.1 | 3.53 | 0.09 | 3.44 | 0.04 | 0.01 | 0.03 | 1.120 | 0.137 | 1.7 |
| 87260A | BP93-27 | 0.361 | 0.330 | 91.4 | 0.82 | 0.280 | 34.0 | 10 | 4.31 | 43.1 | 4.71 | 0.14 | 4.58 | 0.03 | <0.01 | 0.03 | 1.130 | 0.143 | 1.3 |
| 87261A | BP93-28 | 0.722 | 0.620 | 85.9 | 1.18 | 0.293 | 24.9 | 12 | 6.47 | 53.9 | 4.31 | 0.11 | 4.21 | 0.04 | <0.01 | 0.04 | 1.263 | 0.283 | 2.0 |
| 87262A | BP93-29 | 0.279 | 0.220 | 78.9 | 1.62 | 0.493 | 30.4 | 19 | 10.29 | 54.2 | 5.20 | 0.08 | 5.12 | 0.03 | <0.01 | 0.03 | 1.073 | 0.103 | 3.0 |

### 13.4.2 Acid-Base Accounting

A portion of the pulverized head material for each individual sample was submitted to Western Environmental Testing Laboratories ("WETLABS") for Acid-Base Accounting testing. Acid-Base Accounting is a static test to determine the acid producing or acid neutralizing potential of a material. It is a general analysis for the elements of acid generation and does not indicate the potential rate at which generation or neutralization may occur.

It is generally accepted that an NNP value greater than 20 is indicative of a non-acid producing material (acid neutralizing material), and that an NNP value less than -20 is an acid generating material. All of the 29 Black Pine met composites tested had NNP values >20 and are therefore considered to be non-acid producing.

### 13.4.3 Bottle Roll and Column Leach Testing

Coarse and fine milled bottle-roll leach tests were completed on each of the 29 samples. A portion of the head material for each individual sample was subjected to bottle-roll leach testing at target $P_{80}$ sizes of 75 µm and 1,700 µm, and to column-leach testing at either 12.5 mm or 25.0 mm crush sizes (Table 13.6). A second CIL bottle roll test was conducted at the 75µm feed size to evaluate the potential for preg-borrowing clays and/or preg-robbing organic carbon. The main objective of these tests was to evaluate the laboratory-scale leachability character of the Black Pine resources in terms of gold extraction, extraction rate, reagent consumption, and sensitivity to feed size.

**Table 13.6 2020 Nominal $P_{80}$ for Bottle-Roll and Column Leach Tests**

| Summary Black Pine Bottle Roll and Column Leach Tests | | | | |
|---|---|---|---|---|
| Bottle Rolls | | | Columns | |
| 75µm | 75µm (CIL) | 1,700µm | 12.5mm | 25mm |
| n = 29 | n = 29 | n = 29 | n = 9 | n = 20 |

The bottle-roll testing used standard procedures that are described in the final laboratory report (KCA 2020b), using 144 hours of retention time for 1,700 µm tests, and 72 hours for 75 µm direct leach and CIL tests.

Column-leach tests were conducted utilizing material crushed to their target $P_{80}$'s and placed in columns of 10 and 15 cm diameters. During testing the material was leached between 77-80 days with a dilute NaCN solution. After leaching, each column was washed/rinsed for four days with water. A portion of the leached and washed material ("tailings") from each column was assayed for "tail screen" analyses by size fraction.

Tailings material from all 29 columns was utilized for compacted permeability test work. Additionally, tailings material from nineteen columns was submitted to WETLAB in Sparks, Nevada, for acid-base accounting ("ABA") and meteoric-water mobility tests ("MWMT").

The following is a summary of the findings from the KCA 2020b report on bottle-roll and column test results.

### 13.4.4 Direct Leach and CIL Bottle-Roll Tests on 75 µm Composite Samples

Fine milled bottle-roll leach tests were completed on each of the 29 composites. The milled slurry was utilized for direct bottle-roll leach testing as well as CIL bottle-roll testing. The bottle-roll test procedures and results are described in detail in KCA 2020b.

- The direct leach gold head grades for the composites ranged from 0.21 to 5.78 ppm Au, with an average of 0.83 ppm Au. Gold extraction from this material ranged from 37.7 to 92.7%, with a weight average of 81.4%.
- The CIL leach gold head grades for the composites ranged from 0.18 to 6.15 ppm Au, with an average of 0.87 ppm Au. Gold extraction from this material ranged from 42.1 to 93.2%, with a weight average of 84.1%.
- The direct leach silver head grades for the composites ranged from 0.47 to 3.9 ppm Ag, with an average of 1.8 ppm Ag. Silver extraction from this material ranged from 11.3 to 59.0%, with a weight average of 26.0%.
- The CIL silver head grades for the composites ranged from 0.83 to 4.1 ppm Ag, with an average of 1.9 ppm Ag. Silver extraction from this material ranged from 3.9 to 57.3%, with a weight average of 26.8%.
- Cyanide consumption for the direct leach bottle roll tests averaged 0.15 kg/t and lime consumption averaged 0.71 kg/t; and
- Cyanide consumption for the CIL bottle roll tests averaged 0.73 kg/t and lime consumption averaged 0.60 kg/t.

### 13.4.5 Direct Leach Coarse Bottle-Roll Tests on 1,700 µm Composite Samples

Coarse bottle-roll leach tests were completed on each of the 29 composites. The coarse bottle-roll test procedure and results are described in detail in KCA 2020b.

- Gold head grades for the composites ranged from 0.20 to 6.25 ppm Au and averaged 0.86 ppm Au. Gold extraction ranged from 35.8 to 87.2%, with a weight average of 78.8% and
- Silver head grades for the composites ranged from 0.8 to 4.1 ppm Ag and averaged 2.0 ppm Ag. Silver extraction ranged from 6.3 to 41.5%, with a weight average of 16.4%.

### 13.4.6 Column-Leach Tests on Composite Samples

All 29 composites were subjected to laboratory column-leach testing at KCA. Nine columns were tested at a target $P_{80}$ = 12.5 mm and twenty composites at a target $P_{80}$ = 25 mm (KCA 2020b). Column test procedures are described in detail in KCA 2020b. Column test extraction results are based upon carbon assays vs. the calculated head (carbon assays + tail assays) and test result details are located in Table 13.7.

- Calculated gold head grades ranged from 0.214 to 5.44 ppm and averaged 0.84 ppm. Gold extractions ranged from 42.0% to 94.5%, with a weight average of 89.2%.
- Calculated silver head grades ranged from 0.80 to 3.83 ppm and averaged 2.1 ppm. Silver extractions ranged from 4.8% to 41.1%, with a weight average of 15.0%.

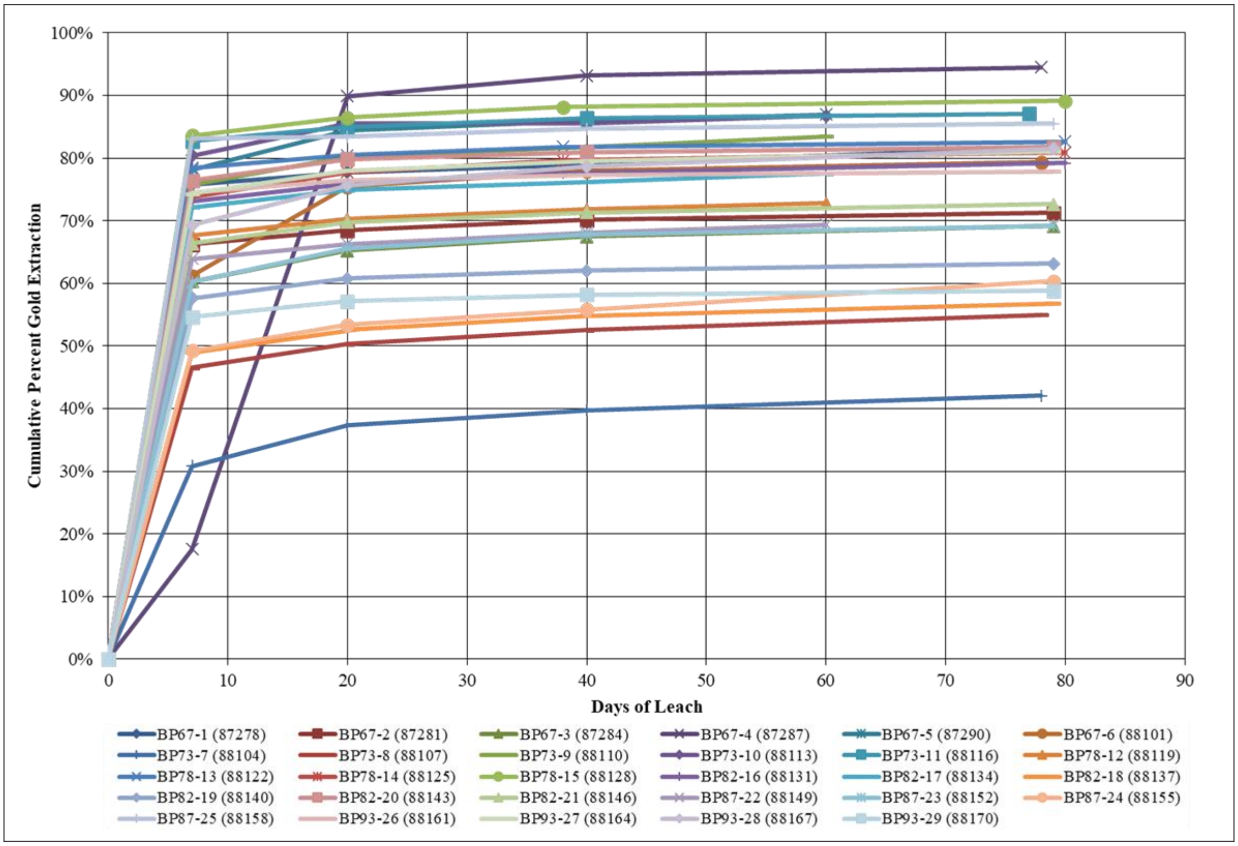
- Cyanide consumptions ranged from 0.29 to 0.90 kg/t and averaged 0.56 kg/t. Based upon KCA's experience with clean non-reactive ores, cyanide consumption in commercial production heaps would range between 25 to 33% of the laboratory column test consumptions.
- Lime consumption ranged from 0.99 to 1.52 kg/t. One column charge (BP67-2) was agglomerated with 4.0 kg/t of cement and did not require any lime.

Gold extraction plotted vs. days under leach is shown graphically in Figure 13.6 and are based upon column solution balances.

# Table 13.7 2020 Variability Column Test Results

| KCA Sample No. | Comp ID | Test No | Pilot Gold | | Feed Size | | | | | NaCN (g/l) | Leach Time (days) | Au Balance | | Ag Balance | | Reagents | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Structure | F-Form | Target P80 (µm) | Screen P80 (µm) | % - 200M | Load Perm Tests | Cement kg/t | | | Au Ext % | Calc Hd Au (ppm) | Ag Ext % | Calc Hd Ag (ppm) | NaCN kg/t | Lime kg/t | Cement kg/t |
| **2019 Variability Core Composites** | | | | | | | | | | | | | | | | | | |
| 87234A | BP67-1 | 87278 | Fz>Bx | Pola | 37,500 | 23,140 | 16.5 | Fail 75m | 0.0 | 0.5 | 79d | **81.8** | 0.550 | **19.5** | 2.26 | 0.64 | 1.00 | 0.0 |
| 87235A | BP67-2 | 87281 | Fz>Bx | Polb | 37,500 | 13,780 | 32.2 | Fail 50m | 4.0 | 0.5 | 79d | **71.3** | 0.418 | **41.1** | 2.65 | 0.56 | 0.00 | 4.0 |
| 87236A | BP67-3 | 87284 | Bx>Fz | Polc | 37,500 | 24,500 | 5.6 | Pass | 0.0 | 0.5 | 79d | **69.1** | 0.836 | **27.0** | 2.59 | 0.53 | 1.00 | 0.0 |
| 87237A | BP67-4 | 87287 | Fz>Bx | Polc | 37,500 | 23,160 | 16.6 | Pass | 0.0 | 0.5 | 78d | **94.5** | 5.438 | **11.7** | 3.83 | 0.55 | 0.99 | 0.0 |
| 87238A | BP67-5 | 87290 | Fz | Polc | 37,500 | 24,780 | 20.1 | Fail 100m | 0.0 | 0.5 | 78d | **86.9** | 1.693 | **16.5** | 2.31 | 0.56 | 1.51 | 0.0 |
| 87239A | BP67-6 | 88101 | Fz,Bx | Polc | 37,500 | 25,190 | 6.5 | Pass | 0.0 | 0.5 | 78d | **79.3** | 1.330 | **12.4** | 2.42 | 0.58 | 1.52 | 0.0 |
| 87240A | BP73-7 | 88104 | FZ/Bx | Polb,FZ | 37,500 | 22,760 | 24.5 | Pass | 0.0 | 0.5 | 78d | **42.0** | 0.264 | **11.7** | 2.13 | 0.45 | 1.50 | 0.0 |
| 87241A | BP73-8 | 88107 | Bx | Polb | 19,000 | 12,400 | 14.0 | Pass | 0.0 | 0.5 | 78d | **54.9** | 0.384 | **20.0** | 2.45 | 0.53 | 1.44 | 0.0 |
| 87242A | BP73-9 | 88110 | Fz | Polb | 19,000 | 11,110 | 21.9 | Pass | 0.0 | 0.5 | 78d | **83.5** | 0.278 | **18.5** | 2.27 | 0.69 | 1.50 | 0.0 |
| 87243A | BP73-10 | 88113 | Bx,Fz | Polc | 37,500 | 23,280 | 11.0 | Pass | 0.0 | 0.5 | 78d | **86.7** | 2.423 | **28.2** | 1.74 | 0.48 | 1.49 | 0.0 |
| 87244A | BP73-11 | 88116 | 0 | Polc | 19,000 | 12,360 | 5.2 | Pass | 0.0 | 0.5 | 77d | **87.1** | 0.464 | **18.8** | 0.85 | 0.41 | 1.48 | 0.0 |
| 87245A | BP78-12 | 88119 | Fz | Polb | 37,500 | 20,490 | 15.7 | Fail 100m | 0.0 | 0.5 | 77d | **72.8** | 0.817 | **7.0** | 2.30 | 0.57 | 1.50 | 0.0 |
| 87246A | BP78-13 | 88112 | 0 | Polc | 37,500 | 26,010 | 1.5 | Pass | 0.0 | 0.5 | 80d | **82.6** | 0.455 | **4.9** | 1.83 | 0.29 | 1.50 | 0.0 |
| 87247A | BP78-14 | 88125 | Bx | Pold | 37,500 | 23,900 | 4.2 | Pass | 0.0 | 0.5 | 80d | **79.2** | 0.380 | **8.8** | 1.59 | 0.31 | 1.34 | 0.0 |
| 87248A | BP78-15 | 88128 | Bx | Pold | 19,000 | 11,830 | 8.2 | Fail 100m | 0.0 | 0.5 | 80d | **89.1** | 2.245 | **9.0** | 3.01 | 0.49 | 1.50 | 0.0 |
| 87249A | BP82-16 | 88131 | Fz,Bx | Pola | 19,000 | 12,190 | 17.2 | Pass | 0.0 | 0.5 | 80d | **79.2** | 0.380 | **14.8** | 1.89 | 0.59 | 1.00 | 0.0 |
| 87250A | BP82-17 | 88134 | Fz | Pola | 19,000 | 12,240 | 19.6 | Fail 50m | 0.0 | 0.5 | 80d | **77.5** | 0.351 | **25.0** | 1.44 | 0.70 | 1.01 | 0.0 |
| 87251A | BP82-18 | 88137 | Fz | Fz/Pola | 37,500 | 24,390 | 24.9 | Fail 50m | 0.0 | 0.5 | 79d | **56.8** | 0.331 | **24.0** | 2.33 | 0.69 | 1.01 | 0.0 |
| 87252A | BP82-19 | 88140 | Fz | Polb | 37,500 | 23,660 | 15.6 | Pass | 0.0 | 0.5 | 79d | **63.1** | 0.214 | **7.6** | 1.57 | 0.55 | 1.02 | 0.0 |
| 87253A | BP82-20 | 88143 | 0 | Polc | 37,500 | 23,720 | 8.9 | Pass | 0.0 | 0.5 | 79d | **81.7** | 0.798 | **5.1** | 1.58 | 0.60 | 1.13 | 0.0 |
| 87254A | BP82-21 | 88146 | Fz=Bx | Polc | 37,500 | 25,190 | 19.0 | Fail 100m | 0.0 | 0.5 | 79d | **72.6** | 0.453 | **11.4** | 1.32 | 0.57 | 1.01 | 0.0 |
| 87255A | BP87-22 | 88149 | Fz,Bx | Pola | 19,000 | 14,310 | 19.3 | Fail 50M | 0.0 | 0.5 | 79d | **69.4** | 0.258 | **23.3** | 1.89 | 0.90 | 1.00 | 0.0 |
| 87256A | BP87-23 | 88152 | Fz | Polb | 37,500 | 23,940 | 13.4 | Fail 75m | 0.0 | 0.5 | 79d | **69.2** | 0.338 | **8.9** | 1.58 | 0.62 | 1.00 | 0.0 |
| 87257A | BP87-24 | 88155 | Fz | Polb | 19,000 | 10,570 | 27.2 | Fail 75m | 0.0 | 0.5 | 79d | **60.3** | 0.237 | **10.0** | 3.80 | 0.75 | 1.02 | 0.0 |
| 87258A | BP87-25 | 88158 | Fz>Bx | Polc | 37,500 | 25,650 | 6.2 | Psss | 0.0 | 0.5 | 79d | **85.5** | 1.331 | **12.6** | 3.81 | 0.52 | 1.00 | 0.0 |
| 87259A | BP93-26 | 88161 | Fz | PPos,FZ | 37,500 | 24,340 | 14.6 | Pass | 0.0 | 0.5 | 79d | **77.9** | 0.330 | **13.9** | 1.15 | 0.80 | 1.02 | 0.0 |
| 87260A | BP93-27 | 88164 | Bx=Fz | PPos | 37,500 | 22,970 | 13.2 | Pass | 0.0 | 0.5 | 79d | **81.1** | 0.338 | **4.8** | 1.26 | 0.47 | 1.00 | 0.0 |
| 87261A | BP93-28 | 88167 | Bx=Fz | Pola | 37,500 | 22,560 | 20.5 | Fail 75 | 0.0 | 0.5 | 79d | **81.5** | 0.601 | **9.2** | 1.31 | 0.44 | 1.01 | 0.0 |
| 87262A | BP93-29 | 88170 | Bx | Pola | 37,500 | 25,370 | 8.7 | Pass | 0.0 | 0.5 | 79d | **58.8** | 0.272 | **9.8** | 1.63 | 0.51 | 1.01 | 0.0 |

**Figure 13.6 2020 Gold Extraction vs. Days Under Leach for Column-Leach Tests**




## 13.4.7 Comminution Characterization at Hazen

Portions of the head material for 11 composite samples were stage crushed to 100% passing 37.5 millimetres and submitted to Hazen Research, Inc. in Golden, Colorado for semi autogenous grinding ("SAG") mill comminution ("SMC"), and Bond Abrasion Index ("Ai") testing. Details of the comminution testing procedures and test results are reported in Stepperud (2020).

A summary of the Ai test work is presented in Table 13.8 and the SMC comminution characterization in Table 13.9.

Black Pine Ai test results can be characterized as having low to very mild abrasion characteristics, indicating low wear rates on mine ground engaging equipment and process related crushing, screening and conveying equipment.

### Table 13.8 Bond Abrasion Testing Results

| HRI No. | Client ID | Ai (grams) |
|---|---|---|
| 55324-1 | 87234 A | 0.0564 |
| 55324-2 | 87238 A | 0.0269 |
| 55324-3 | 87240 A | 0.0216 |
| 55324-4 | 87243 A | 0.0078 |
| 55324-5 | 87248 A | 0.0510 |
| 55324-6 | 87252 A | 0.0386 |
| 55324-7 | 87254 A | 0.0178 |
| 55324-8 | 87255 A | 0.0114 |
| 55324-9 | 87258 A | 0.0956 |
| 55324-10 | 87260 A | 0.0396 |
| 55324-11 | 87261 A | 0.0206 |

### Table 13.9 SMC Comminution Characterization Test Results

| HRI No. | Client ID | Black Pine Project - SMC Comminution Characterization | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | sg | A | b | A x b | DWi kWh/m$^3$ | DWi % | $M_{ia}$ kWh/t | $M_{ih}$ kWh/t | $M_{ic}$ kWh/t | $t_a$ | SCSE kWh/t |
| 55324-1 | 87234 A | 2.50 | 57.8 | 1.00 | 57.80 | 4.33 | 21 | 14.8 | 10.1 | 5.2 | 0.60 | 8.29 |
| 55324-2 | 87238 A | 2.35 | 55.8 | 1.34 | 74.77 | 3.14 | 11 | 12.2 | 7.8 | 4.0 | 0.82 | 7.65 |
| 55324-3 | 87240 A | 2.56 | 60.1 | 1.28 | 76.93 | 3.32 | 13 | 11.7 | 7.5 | 3.9 | 0.78 | 7.46 |
| 55324-4 | 87243 A | 2.52 | 60.6 | 1.15 | 69.69 | 3.60 | 15 | 12.7 | 8.3 | 4.3 | 0.72 | 7.73 |
| 55324-5 | 87248 A | 2.67 | 59.0 | 1.08 | 63.72 | 4.17 | 20 | 13.5 | 9.1 | 4.7 | 0.62 | 8.05 |
| 55324-6 | 87252 A | 2.51 | 59.6 | 1.00 | 59.60 | 4.20 | 20 | 14.4 | 9.7 | 5.0 | 0.61 | 8.19 |
| 55324-7 | 87254 A | 2.59 | 59.9 | 1.24 | 74.28 | 3.48 | 14 | 12.0 | 7.8 | 4.0 | 0.74 | 7.55 |
| 55324-8 | 87255 A | 2.42 | 59.0 | 1.25 | 73.75 | 3.28 | 12 | 12.2 | 7.8 | 4.1 | 0.79 | 7.62 |
| 55324-9 | 87258 A | 2.65 | 63.3 | 0.81 | 51.27 | 5.19 | 31 | 16.2 | 11.4 | 5.9 | 0.50 | 8.78 |
| 55324-10 | 87260 A | 2.57 | 57.5 | 1.09 | 62.68 | 4.12 | 19 | 13.9 | 9.3 | 4.8 | 0.63 | 8.04 |
| 55324-11 | 87261 A | 2.60 | 61.8 | 0.89 | 55.00 | 4.74 | 26 | 15.4 | 10.9 | 5.5 | 0.55 | 8.48 |

SMC Parameters:
A = maximum breakage
b = relation between energy and impact breakage
A x b = overall AG-SAG hardness
DWi = drp[-weight index
$M_{ia}$ - coarse particle component
$M_{ic}$ = crusher component
$M_{ih}$ = high-pressure gringing roll component
SCSE = SAG circuit specific energy
sg = specific gravity of sample
$t_a$ = low energy abrasion component of breakage

The eleven composites were subjected to the modified SMC Test at Hazen to generate data for SAG mill comminution parameters and crushing index (“$M_{ic}$”) by JKTech (Stepperud, (2020). The 2020 SMC Test® results for the 11 samples are given in Table 13.9. This table includes the average rock specific gravity, A x b (a measure of resistance to impact breakage) and drop-weight index (“Dwi”) values that are the direct result of the SMC Test® procedure. The values determined for the $M_{ia}$, $M_{ih}$ and $M_{ic}$ parameters, and the definitions provided by SMCT, are also presented in Table 13.9.

The $DW_i$ ranged from 3.14 to 5.19 kWh/m$^3$, indicating soft materials, by comparing with the DWi % column, which ranks the samples in terms of energy required in the SMC worldwide database, 0% being the lowest and 100% being the highest.

$M_{ic}$ (kWh/t) is the SMC crusher component energy required and is used to assist in design and selection of conventional crushing circuits. The Black Pine samples tested can be considered amenable to conventional, multi-stage crushing and screening circuit design. $M_{ic}$, the SMC crusher component value, with an average of 4.7 kWh/t, would be ranked in the lower mid-range of the SMC worldwide database.

### 13.4.8 Load Permeability Test Work on Column Tailings

A portion of tailings material from each column-leach test was utilized for load permeability test work. The purpose of the load permeability test work was to examine the permeability of the crushed material under compaction loading equivalent to heap heights of 25 metres, 50 metres, 75 metres, and 100 metres.

The test cell utilized for modeling the permeability of stacked material, at various heap heights, was a steel column or cell. Staged axial (vertical) loading of the test material was utilized to simulate the incrementally increased pressure obtained when loading the heap. Drainage layers were installed at the top and at the base of the column. External load was applied to the charge of material in the column utilizing a perforated steel plate that moved freely within the walls of the column. A detailed description of the load permeability equipment, test procedure and evaluation criteria is given in KCA (2020).

All 29 columns were tested by KCA. Twelve of the columns failed at loading heights between 50 and 100 metres. Only one of the 12 columns was agglomerated with cement (BP67-2). Review of the column residue screen analysis show that 15 of the columns contained >15% of 75µm (200 mesh) fines in the column feed. Of these 15 columns, 10 failed load permeability testing (Table 13.10).

It is recommended that future column-leach test programs include additional agglomeration testing and evaluation to devise methods to identify material types that will require ROM blending and/or crushing/agglomeration, before being placed on a heap leach pad. One approach may be to consider that materials containing <15% of 200 mesh fines are suitable for ROM blending on the leach pad, whereas materials containing >15% of 200 mesh fines may require crushing and agglomeration prior to being placed on the pad for leaching.

### Table 13.10 Black Pine: % -200 Mesh vs. Pass/Fail Load Permeability Testing

| KCA Sample No. | Comp ID | Test No | Pilot Gold Geology | | Feed Size | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Structure | F-Form | Target P80 (µm) | Screen P80 (µm) | % - 200M | Load Perm Tests | Cement kg/t |
| 2019 Variability Core Composites | | | | | | | | | |
| 87234A | BP67-1 | 87278 | Fz>Bx | Pola | 37,500 | 23,140 | 16.5 | Fail 75m | 0.0 |
| 87235A | BP67-2 | 87281 | Fz>Bx | Polb | 37,500 | 13,780 | 32.2 | Fail 50m | 4.0 |
| 87236A | BP67-3 | 87284 | Bx>Fz | Polc | 37,500 | 24,500 | 5.6 | Pass | 0.0 |
| 87237A | BP67-4 | 87287 | Fz>Bx | Polc | 37,500 | 23,160 | 16.6 | Pass | 0.0 |
| 87238A | BP67-5 | 87290 | Fz | Polc | 37,500 | 24,780 | 20.1 | Fail 100m | 0.0 |
| 87239A | BP67-6 | 88101 | Fz,Bx | Polc | 37,500 | 25,190 | 6.5 | Pass | 0.0 |
| 87240A | BP73-7 | 88104 | FZ/Bx | Polb,FZ | 37,500 | 22,760 | 24.5 | Pass | 0.0 |
| 87241A | BP73-8 | 88107 | Bx | Polb | 19,000 | 12,400 | 14.0 | Pass | 0.0 |
| 87242A | BP73-9 | 88110 | Fz | Polb | 19,000 | 11,110 | 21.9 | Pass | 0.0 |
| 87243A | BP73-10 | 88113 | Bx,Fz | Polc | 37,500 | 23,280 | 11.0 | Pass | 0.0 |
| 87244A | BP73-11 | 88116 | 0 | Polc | 19,000 | 12,360 | 5.2 | Pass | 0.0 |
| 87245A | BP78-12 | 88119 | Fz | Polb | 37,500 | 20,490 | 15.7 | Fail 100m | 0.0 |
| 87246A | BP78-13 | 88112 | 0 | Polc | 37,500 | 26,010 | 1.5 | Pass | 0.0 |
| 87247A | BP78-14 | 88125 | Bx | Pold | 37,500 | 23,900 | 4.2 | Pass | 0.0 |
| 87248A | BP78-15 | 88128 | Bx | Pold | 19,000 | 11,830 | 8.2 | Fail 100m | 0.0 |
| 87249A | BP82-16 | 88131 | Fz,Bx | Pola | 19,000 | 12,190 | 17.2 | Pass | 0.0 |
| 87250A | BP82-17 | 88134 | Fz | Pola | 19,000 | 12,240 | 19.6 | Fail 50m | 0.0 |
| 87251A | BP82-18 | 88137 | Fz | Fz/Pola | 37,500 | 24,390 | 24.9 | Fail 50m | 0.0 |
| 87252A | BP82-19 | 88140 | Fz | Polb | 37,500 | 23,660 | 15.6 | Pass | 0.0 |
| 87253A | BP82-20 | 88143 | 0 | Polc | 37,500 | 23,720 | 8.9 | Pass | 0.0 |
| 87254A | BP82-21 | 88146 | Fz=Bx | Polc | 37,500 | 25,190 | 19.0 | Fail 100m | 0.0 |
| 87255A | BP87-22 | 88149 | Fz,Bx | Pola | 19,000 | 14,310 | 19.3 | Fail 50M | 0.0 |
| 87256A | BP87-23 | 88152 | Fz | Polb | 37,500 | 23,940 | 13.4 | Fail 75m | 0.0 |
| 87257A | BP87-24 | 88155 | Fz | Polb | 19,000 | 10,570 | 27.2 | Fail 75m | 0.0 |
| 87258A | BP87-25 | 88158 | Fz>Bx | Polc | 37,500 | 25,650 | 6.2 | Psss | 0.0 |
| 87259A | BP93-26 | 88161 | Fz | PPos,FZ | 37,500 | 24,340 | 14.6 | Pass | 0.0 |
| 87260A | BP93-27 | 88164 | Bx=Fz | PPos | 37,500 | 22,970 | 13.2 | Pass | 0.0 |
| 87261A | BP93-28 | 88167 | Bx=Fz | Pola | 37,500 | 22,560 | 20.5 | Fail 75 | 0.0 |
| 87262A | BP93-29 | 88170 | Bx | Pola | 37,500 | 25,370 | 8.7 | Pass | 0.0 |

Magenta color – correlation between % -200 Mesh and Load Permeability Pass/Fail Test Results

## 13.5 Mineralogy

Five column feed samples were selected for gold deportment mineralogy study and shipped to AMTEL in London, Ontario, Canada, including one sample from the Liberty Gold bulk sample program (I Pit) and four from the Phase 1 Variability testing program (BP73-7, BP73-10, BP78-12 and BP87-25) (AMTEL 2020). Select head assays for the five Black Pine mineralogy samples are provided in Table 13.11.

**Table 13.11 Select Head Assays for Black Pine Mineralogy Samples**

| Sample ID | g Au/t | | Fe (%) | | TOC (%) | | Stot (%) | $S_{SO4}$ (%) | Ctot (%) |
|---|---|---|---|---|---|---|---|---|---|
| | Independent | Site | Independent | Site | Independent | Site | | | |
| **BP73-7** | **0.264** ±0.004 | **0.23** | 1.4 | 1.2 | 0.08 | 0.05-0.08 | 0.02 | <0.01 | 4.8 |
| **BP73-10** | **2.012** ±0.028 | **2.47** | 1.5 | 1.6 | 0.05 | 0.04-0.08 | 0.02 | <0.01 | 7.4 |
| **BP78-12** | **0.789** ±0.009 | **0.83** | 2.6 | 2.7 | 0.03 | 0.04-0.04 | 0.035 | <0.01 | 2.8 |
| **BP87-25** | **1.290** ±0.013 | **1.33** | 1.1 | 0.9 | 0.02 | 0.00-0.04 | 0.04 | 0.02 | 5.8 |
| **I Pit** | **2.070** ±0.020 | **2.55** | 0.2 | 0.6 | 0.01[1] | 0.06 –nd | 0.015 | <0.01 | 10.8 |

- Independent assays by ALS Laboratories, Vancouver, Canada
- Gold represents the average of triplicate 30g fire assays –AAS finish
- Fe is the average of ICP & XRF assays
- TOC independent method C-IR06a; comparable to site's upper range.

The IPit sample was selected due to its high gold grade and lower gold extraction than all other higher-grade samples. The other four composite samples were selected based upon their variability in gold grade, clay and organic carbon content (potential for preg-robbing).

### 13.5.1 Mineralogy Summary

Five samples were received for gold deportment analysis. The samples are oxide composites showing variable gold extractions. The scope of the examination was to identify and quantify all gold forms/carriers in order to understand the factor(s) limiting gold recovery.

The samples were received coarsely crushed and were milled to $P_{80}$ of ~100µm for analysis. Selected assays of the samples are given in Table 13.11. They compare well generally with site assays, except the gold grades for BP73-10 and I-Pit samples that are ~20% lower than site. TOC assays are somewhat variable; grade discrepancies are attributed to low TOC content close to the method's detection limit.

### General Mineralogy

- In all five samples the principal rock minerals are: quartz, carbonates and clays/mica. The abundance of these minerals is highly variable in the five samples.
- Carbonates are calcite and dolomite with no Fe content.
- Clay/mica minerals are essentially illite/muscovite with lesser kaolinite and very minor biotite. No other clay minerals are present.
- Iron is mostly as oxide/oxyhydroxide minerals such as hematite and goethite. Combined they are termed FeOx. The FeOx content of the samples ranges from 0.2-3.4wt%.
- FeOx is present as massive particles, generally free, and fine-grained particles disseminated in rock. Disseminated FeOx is preferentially found with quartz/clay particles and lesser carbonates; and

- Sulphide minerals are very insignificant, consisting of trace pyrite and very rare chalcopyrite and covellite. The latter is too rare to impact cyanide consumption.

### 13.5.2 Gold Occurrence:

- **Gold grains**:
  - Are free milling gold particles >0.5µm; and
  - Gold grains are readily cyanidable; recovery is controlled by exposure vs. locking in rock.
- **Colloidal-gold particulates**:
  - Are particulates <0.5µm; they formed during weathering by coalescing gold atoms originally in solid solution form in pyrite.
  - Colloidal particulates are associated with the FeOx or in their near vicinity in rock; and
  - Colloidal gold is cyanidable. Recovery is ultimately controlled by exposure from rock.

### 13.5.3 Gold Deportment:

#### 13.5.3.1 Exposed Gold:

At $P_{80}$ of 90-100µm, 46 to 87.5% of the gold is exposed and cyanidable. The least exposed gold is in BP73-7 and the most in BP73-10 and BP87-25. Exposed gold is in the form of

- Free gold grains characterized by:
  - Contribute 37-51% of the head grade of the five ores.
  - Composition: gold grains are gold-silver alloys with generally low silver content. The average silver content of gold particles is 7 weight % in BP73-7 and 2-3 weight % in the other four samples.
  - Grain size: gold grains are predominantly very small, generally <10µm. Gold grains >10µm are in quantifiable quantity in BP87-25 and the I Pit sample.
- Attached colloidal particulates and gold grains:
  - Attached gold contributes 9 to 44% of the head grades of the five samples; the least in BP73-7.
  - With the exception of I Pit, in the other four samples most of the attached gold is contributed by colloidal particulates with the FeOx. In the I Pit sample, gold is also associated with rock.

#### 13.5.3.2 Enclosed Gold:

- Enclosed gold is mostly in the form of tiny gold grains not yet liberated.
- With the exception of the I Pit sample, enclosed gold is minor, carrying 0.02-0.08 g Au/t. In the I-Pit sample, enclosed gold is substantial, representing ~0.3 g Au/t or 13% of the head grade.

- In the I-Pit ore, the quantity of enclosed gold is a function of the grind fineness. With finer grinding, enclosed gold is reduced, gradually liberating from carbonates and largely liberated from quartz at grinds finer than 45µm.

#### 13.5.3.3 Refractory Gold:

- Ranges from 9-49% of the gold in the ores examined.
- Refractory gold comprises colloidal gold particulates that are not cyanidable even after ultra-fine grinding. These are the tiniest colloidal particulates and are associated with the smallest and most disseminated FeOx.

#### 13.5.3.4 Gold Preg-robbing by C-matter:

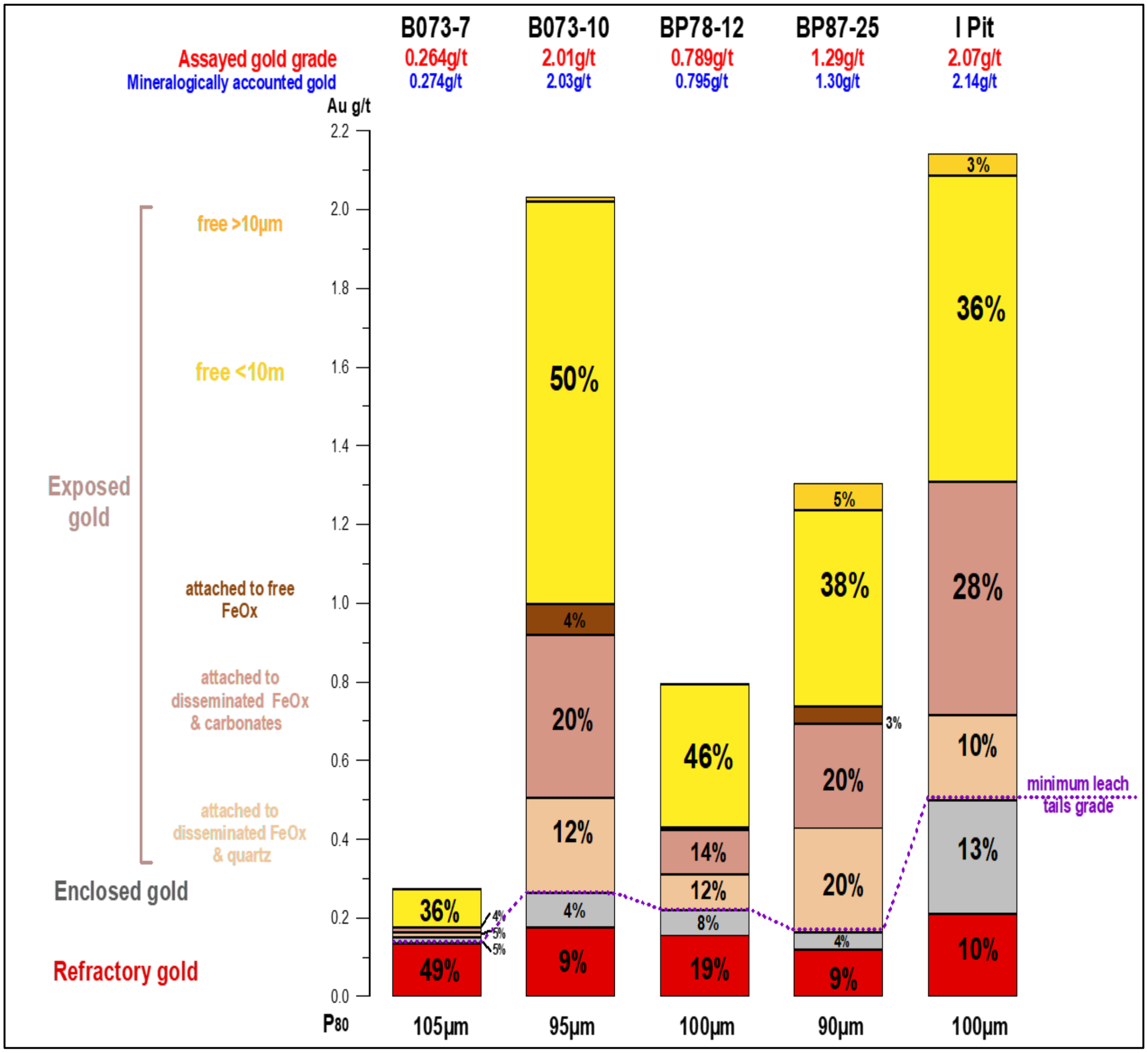
- C-matter occurs as very tiny 'specks' disseminated in quartz which liberate in the slimes. The tiny C-matter has high surface area, hence increased capacity to preg-robbing gold.
- To determine C-matter ability to preg-rob gold an independent CN test with and without gold spike was performed and, when possible, C-matter was picked for direct analysis.
- It was determined that:
    - AMTEL's spike test compares closely with KCA's under similar gold spiking concentration.
    - C-matter from all five ores is preg-robbing. Even a very small TOC content causes measurable preg-robbing.
    - CIL reduced preg-robbing but it did not prevent it entirely.

#### 13.5.3.5 Gold Preg-borrowing by Clays:

- To determine the ability of clay to preg-borrow gold, a clay-rich fraction was separated from the slimes (<10µm). The clay fraction was measured by TOF-RIMS after contact with gold in solution, and in the absence and presence of free cyanide and activated carbon.
- It was determined that clays are minor preg-borrowers. They release the gold when free cyanide is present. In CIL, clays do not preg-borrow gold.

The relative contributions of the different modes of occurrence of gold to each sample is illustrated graphically in Figure 13.7.

**Figure 13.7 Gold Deportment from a Leach Perspective**




### 13.5.4 AMTEL Mineralogy Conclusions

- Gold is present as tiny gold grains and even smaller colloidal particulates. The small size of gold grains and colloidal particulates contributes to fast leach kinetics.
- Gold grains are generally free. Colloidal gold particulates are largely associated with FeOx, especially the fine-grained disseminated type.
- Gold liberation as a function of grind fineness is not an issue except for with respect to the I Pit sample. KCA testwork for the four other samples determined only minor improvement in recovery by crushing from 10 mesh down to 200 mesh.

- Material refractoriness is the main factor limiting gold extraction. Refractoriness is attributed to very small colloidal gold particles carried by the highly disseminated FeOx in quartz (formerly disseminated pyrite deposited during silicification events).
- An attempt to determine if increased FeOx dissemination /material refractoriness correlates with the silica content or silica/alumina ratio in the material was unsuccessful.
- No other mineralogical indicators were identified to use as predictive tools for the lower-extraction samples. Samples' location within the geological domains may be more telling.
- C-matter affinity to preg-rob gold is an added problem. C-matter from all five samples showed preg-robbing capabilities. Under CIL conditions preg-robbing is reduced but not entirely eliminated. The TOC content of other future materials should be monitored.
- Gold preg-borrowing by clays is not an issue under CIL conditions.
- Predicted vs. achieved gold extraction in bottle roll tests is tabulated below in Table 13.12. CIL testwork performed at KCA is very well optimized, with the limitation of some preg-robbing taking place in CN leach bottle-roll tests.

**Table 13.12 Predicted vs. Achieved Gold Extraction**

| | Predicted Extraction @ $P_{80}$ of 100µm | | KCA Attained Extraction @ $P_{80}$ of 75µm | |
|---|---|---|---|---|
| | CIL Tails | Recovery | CN | CIL |
| BP73-7 | 0.148 | 45.9 | 29.5 | 42.1 |
| BP73-10 | 0.261 | 87.2 | 82.3 | 87.4 |
| BP78-12 | 0.218 | 72.6 | 71.7 | 74.2 |
| BP87-25 | 0.163 | 87.5 | 83.8 | 85.8 |
| I Pit | 0.496 | 76.8 | 74.8 | 79.3 |

## 13.6 Gold Recovery Methodology and Commercial Scale Recovery Models

### 13.6.1 Gold and Silver Recovery Methodology

The following is a brief description of the methodology used to derive the Black Pine gold-recovery models. Six steps are used in developing final commercial-scale gold recovery models:

- **Step 1**: Determining the gold extraction for each variability composite, using a combination of fine grind/crush bottle rolls and medium/coarse crush column tests.
- **Step 2**: Develop head grade vs. tails grade models to use in final development of the gold recovery equations.
- **Step 3**: Build a database of the laboratory solution-to-ore (S/O) ratio data at various percentages of total extractable gold. A correction factor is applied to each laboratory S/O ratio data point to scale up the laboratory data to commercial scale. Typical laboratory S/O ratio data is tabulated for the following percentages of total extractable gold: 60%, 70%, 80%, 90%, 95%, and 99%.
- **Step 4**: Estimate solution losses at the end of economic gold recovery operations/closure.

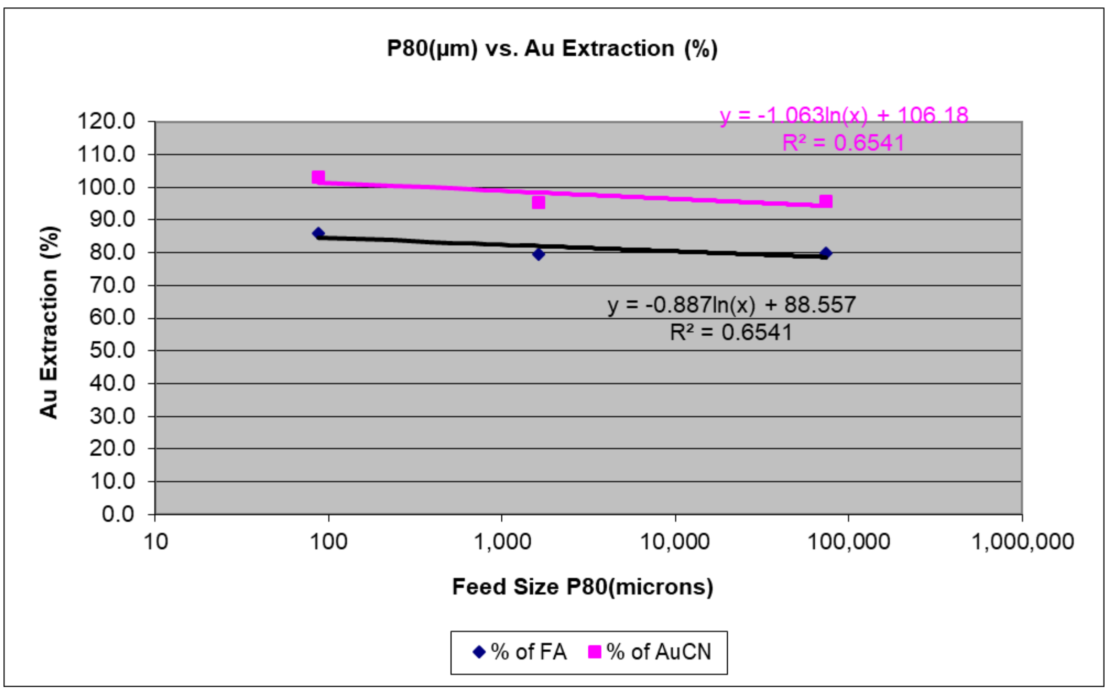
- **Step 5**: Determine operational scale-up inefficiencies for the heap leach flowsheet selected.
- **Step 6**: Incorporating steps 1-5 into final recovery models that reflect modeled test data met balances, commercial scale inefficiencies and deductions for solution losses, plus application of cumulative S/O rates over the life of the project to predict timing of gold recovery.

**Step 1: Determining the Gold Extraction for Each Composite**

- For each composite sample, perform a series of bottle-roll and column-leach tests at a range of reasonable $P_{80}$ particle sizes, typically 75 um, 1,700 m and 12.5 mm (minimum) and larger column feed sizes;
- Determine gold extraction as a percent (%) of the fire assay and cyanide-solubility value at each feed size, and plot gold extraction versus particle size on a log-normal graph;
- Fit an equation through the data; and
- Use the equation to calculate and extrapolate gold extraction to the desired ore-particle size, e.g., ROM size at 150 mm (150,000 microns).

An example log-normal plot of Feed $P_{80}$ vs. Gold Extraction % for the Black Pine Tallman Pit 2019 Bulk Sample No. 87202 B, is provided in Figure 13.8.

**Figure 13.8 Sample No. 87202 B – Tallman Pit Bulk Sample: $P_{80}$ vs. Gold Extraction (%)**




Gold extractions at various feed $P_{80}$ particle sizes are calculated (projected) using the gold fire assay (black) and gold cyanide solubility (magenta) equations in Figure 13.8. The projected gold extraction results for the Tallman Pit Bulk Sample composite are presented in Table 13.13. Only the fire assay gold extraction model equation is used for projection of heap-leach gold recovery for the Black Pine resources.

**Table 13.13 Example: Tallman Pit Bulk Sample - Projected Extractions at Various Feed $P_{80's}$**

| Feed $P_{80}$ | | | Au Rec | Au Rec |
|---|---|---|---|---|
| µm | mm | Inches | % of FA | % of AuCN |
| 75 | | | 84.7 | 101.6 |
| 1700 | 1.7 | | 82.0 | 98.3 |
| 12,500 | 13 | 0.50 | 80.2 | 96.2 |
| 25,000 | 25 | 1.0 | 79.6 | 95.4 |
| 50,000 | 50 | 2.0 | 79.0 | 94.7 |
| 75,000 | 75 | 3.0 | 78.6 | 94.2 |
| 100,000 | 100 | 4.0 | 78.3 | 93.9 |
| 125,000 | 125 | 5.0 | 78.1 | 93.7 |
| 150,000 | 150 | 6.0 | 78.0 | 93.5 |
| 175,000 | 175 | 7.0 | 77.8 | 93.3 |
| 200,000 | 200 | 8.0 | 77.7 | 93.2 |
| 250,000 | 250 | 10.0 | 77.5 | 93.0 |

Using the example cited in Figure 13.8 and Table 13.13, projected gold extraction is 78.0% at a ROM feed $P_{80}$ of 150,000µm (150mm). Corresponding gold extraction at a $P_{80}$ of 12,500 µm (12.5mm) is 80.2%. Gold extractions shown in Table 13.13 have not been corrected for commercial-scale operation inefficiencies. For a well-managed heap leach operation, gold scale-up and efficiently losses typically fall in the range of negative 2 to 5%, depending upon a number of factors, including, but not limited to the following: type of heap leach (ROM, fine/coarse crush, crush/agglomeration, conventional crush vs. HPGR and etc.), monitoring and control of heap leach Feed $P_{80}$, gold head grade, solution to ore (“S/O”) application ratios, and process losses.

Using the 2019 Black Pine Bulk Samples as an example, a summary of the gold extraction model results derived from the 2020 Black Pine bottle roll and column-leach testing is presented in Table 13.14.

### Table 13.14 Example: Black Pine Gold Extraction Model Results

| KCA Sample No. | Comp ID | Material Type | Black Pine 2019 Bulk Sample Modeled Au Extraction % | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Calc Hd Au(ppm) | 75 µm | 1,700 µm | P80 12.5 mm | P80 25 mm | P80 50 mm | P80 75 mm | P80 100 mm | P80 125 mm | P80 150 mm | P80 175 mm | P80 200 mm | P80 250 mm |
| **2019 Bulk Samples** | | | | | | | | | | | | | | | |
| 87201B | A Pit | Oxide | **1.14** | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 | 78.0 |
| 87202B | Tallman Pit | Oxide | **2.17** | 84.7 | 82.0 | 80.2 | 79.6 | 79.0 | 78.6 | 78.3 | 78.1 | 78.0 | 77.8 | 77.7 | 77.5 |
| 87203B | BX Pit | Oxide | **3.72** | 92.2 | 92.1 | 92.0 | 92.0 | 91.9 | 91.9 | 91.9 | 91.9 | 91.9 | 91.9 | 91.9 | 91.9 |
| 87204B | Lower F Zone | Oxide | **0.80** | 82.2 | 80.1 | 78.8 | 78.3 | 77.8 | 77.5 | 77.4 | 77.2 | 77.1 | 77.0 | 76.9 | 76.7 |
| 87205B | CD Pit | Oxide | **0.24** | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 | 72.6 |
| 87206B | I Pit | Oxide | **2.72** | 78.7 | 69.7 | 64.0 | 62.0 | 60.0 | 58.8 | 58.0 | 57.3 | 56.8 | 56.3 | 55.9 | 55.3 |

Extractions are color coded to reflect changes in Au Extraction % as Feed $P_{80}$ increases.

### Step 2: Head and Tail Grades, and Recovery Models

Head grade vs. Tails grade plots are derived after geo-metallurgical factors are taken into consideration and materials having similar gold extraction characteristics, are grouped together. Geo-metallurgical groupings (more often referred to as "ore types") and their corresponding Head vs. Tail grade plots (equations) are used to derive their own independent gold extraction equations. Using this approach, commercial gold recovery equation can be represented by incorporating the following components:

**Equation 1:**

$$\textit{Au Rec} = \frac{HG - TG}{HG} = HG - ((a \times HG + b) + \text{system losses} \qquad (1)$$

- Where HG = head grade in ppm (g/t);
- TG = tail grade in ppm (g/t);
- Where *a* and *b* are constants from the tails grade fitted equation. This example assumes a linear equation, but it can also be a log, power, or polynomial equation, whichever provides the best fit of the data; and
- System losses are composed of the following:
  - S/O ratio time related scale-up factors;
  - Solution losses due to solution hold up in the heap at the end of economic gold recovery;
  - Commercial scale-up losses, generally derived from benchmarking existing operations and/or engineering company design criteria factors for comparable operations.

Equation 1 calculates the expected gold recovery that can be achieved from a reasonably well operated heap leach. Under commercial heap-leach conditions, recovery takes place over an extended period of time and must be known as a function of time for planning purposes. To estimate time related gold recovery the S/O concept is used.

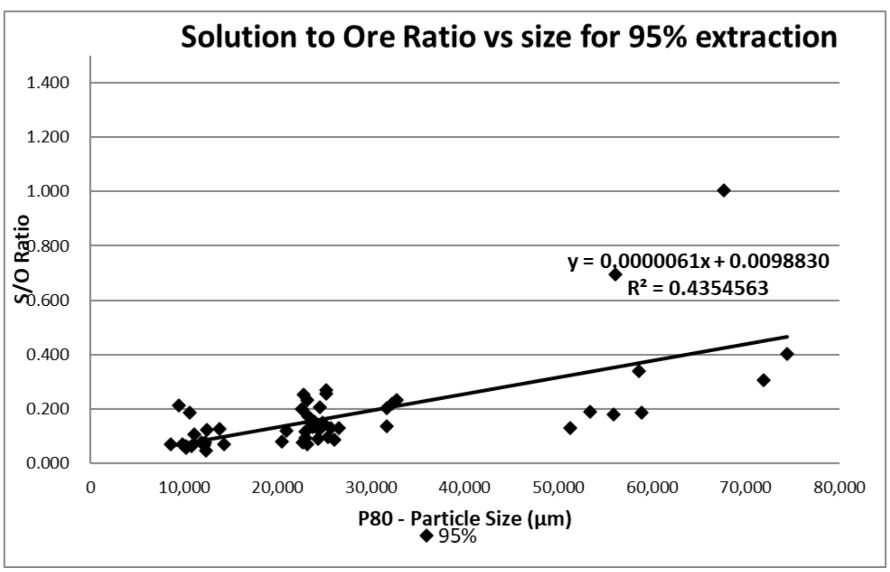
**Step 3: Solution to Ore Ratio Models**

Determine the % recovery of extractable gold, as a function of time, as represented by the S/O ratio.

- Since commercial heap-leach, coarse-particle material sizes, are not normally tested under laboratory conditions, S/O ratio requirements vs. $P_{80}$ particle size, need to be established to derive a value at the operational coarse-particle or ROM size;
- Scale up laboratory S/O ratio data to commercial heap height. Black Pine laboratory column tests were scaled up assuming a nine metres ROM heap height.
- Select percentages of the total extractable gold to be used, typically 60%, 70%, 80%, 90%, 95%, and 99% of total gold extraction;
- Construct a graph of particle size vs. S/O and obtain a graphical relationship. Example plot for 95% of total extractable gold is shown in Figure 13.9.
- From this graph and corresponding equation, the S/O ratio required at a specific particle size to achieve a target % of total gold extraction can be calculated;
- Data points are collected for all percentages of total extractable gold for all ore types for all variability composites tested;

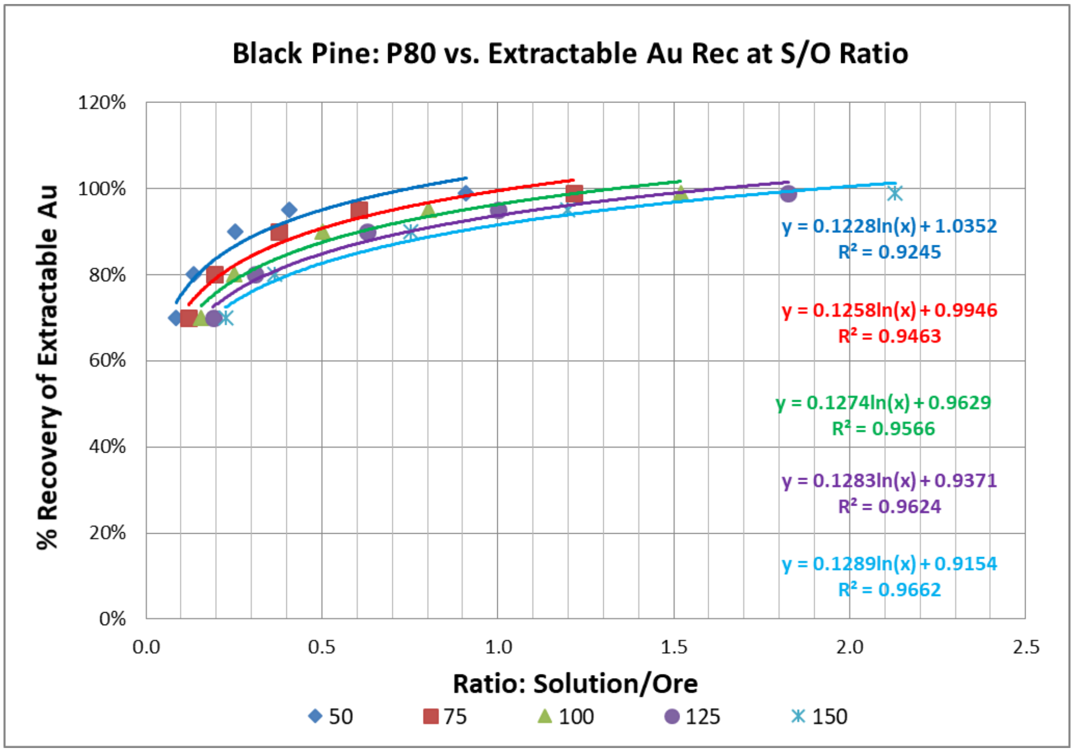
These values are graphed in Feed $P_{80}$ (particle size in microns or mm) vs. S/O ratio plots for the various percentages of total extractable gold content, i.e., 60%, 70%, 80%, 90%, 95%, and 99% (ultimate recovery) of total extractable gold content. An example S/O Ratio plot for achieving 90% recovery of total extractable gold is shown in Figure 13.9.

**Figure 13.9 Black Pine Feed $P_{80}$ vs. S/O Ratio Plot, 90% Recovery of Total Extractable Gold**




Using the equations from all the S/O ratio plots at 60%, 70%, 80%, 90%, 95%, and 99% (ultimate recovery) of total extractable-gold content, a relationship can be developed to predict the percent recovery of total extractable gold as a function of S/O ratio, for all potential heap-leach feed $P_{80}$ particle sizes. An example plot for heap leach ROM Feed $P_{80}$, up to 150mm (150,000 µm or 6 inches) is provided in Figure 13.10.

**Figure 13.10 Example: Black Pine S/O Ratio vs. % Recovery of Total Extractable Gold**




**Step 4: Solution Losses at the end of Economic Gold Recovery**

Solution losses have been estimated to be 0.0008 g Au/t and 0.008 g Ag/t at the end of economic gold recovery operations (including heap wash/rinse and closure operations).

**Step 5: Operational Scale-up Inefficiencies**

Commercial operational scale-up inefficiencies can be numerous in scope and difficult to assess for any given operation. For Black Pine operational benchmarks and engineering company design criteria factors were considered for this PEA. Engineering company general guidelines would predict that normal operational inefficiencies fall in the range of negative 2-5%, depending upon the final design flowsheet selected for the project, such as:

- Run-of-Mine (ROM) heap leach losses (variable depending upon ROM Feed $P_{80}$);
- Conventional coarse crush heap leach (two stage crush);
- Conventional fine crush heap leach (three stage crush);
- Conventional crush/agglomeration heap leach options (two or three stage);
- HPGR crush/agglomeration options and

- Other operational factors (carbon losses, refining losses, etc.).

For Black Pine S/O Ratio and operational/scale-up inefficiencies are estimated and shown in Table 13.15.

**Table 13.15 Black Pine Heap Leach S/O Ratio + Operational/Scale-up Inefficiencies**

| Heap Leach Flowsheet | Feed $P_{80}$ | Au Losses (%) | Ag Losses (%) |
|---|---|---|---|
| Crush/Agglomeration | 75mm | 2.0 | 5.0 |
| ROM | 150mm | 3.0 | 5.0 |

S/O ratio and operational/scale-up inefficiency losses have also been estimated for a ROM $P_{80}$ = 150mm and a conventional crush/agglomeration $P_{80}$ = 75mm heap leach if required.

**Step 6: Bringing All Steps Together**

Incorporating all steps, including S/O ratio and operational scale-up losses, results in the following changes to **Equation 1**, for gold and silver as shown in **Equations 2a** and **2b**:

**Equation 2: (Simplified Au and Ag Recovery Equations for ROM Heap Leach, $P_{80}$ = 150mm)**

***Equation 2a Gold Recovery %*** $= \dfrac{HG - ((a \times HG + b) + \text{solution losses}) \times 0.97}{HG}$

***Equation 2b Silver Recovery %*** $= \dfrac{HG - ((a \times HG + b) + \text{solution losses}) \times 0.95}{HG}$

## 13.6.2 Black Pine Deposit Recovery Models

Metal recovery, head grade vs. tail grade and S/O ratio models were developed from the data derived from reconstructed historical bottle roll and column-leach testing (KCA-1988a) and from the 2019-2020 metallurgical test programs commissioned by Liberty Gold (KCA-2020a and KCA-2020b).

## 13.6.3 Head Grade vs. Tail Grade Models

Metallurgical data used for developing the overall Black Pine resource head-tails gold-recovery relationship and S/O ratio models was extracted from the KCA-1988a, KCA-2020a and KCA-2020b final reports. Head grade vs. tails grade models were evaluated for six geo-metallurgy ("ore-type") recovery zones, based upon differences in geo-metallurgical factors, mainly incorporating gold cyanide solubility, lithology/formation, and gold recovery response are listed below. The number in parenthesis represents the number of variability composites that were tested and included in their respective gold recovery models.

- PPos – sandstone, quartzite and siltstones (2)
- Pola – limestone and sandy limestone (8)

- Polb – siltstone, sandy limestone and dolomite (8)
- Poc – Middle Plate, carbon
- Polc - siltstone, limestone, sandstone and dolomite (20)
- Pold – limestone, dolomite, sandstone and quartzite (3)
- Pols – limestone, sandstone and quartzite (2)
- Pmmx – siltstone, limestone, shale and quartzite
- PMmc - shale, limestone and quartzite (0 – Basement formation underlying gold mineralization)

Poc and PMmx are 2020-21 additions to modelled metallurgical recovery zones and samples are being evaluated in the current on-going Phase 3 testing.

The Mississippian Manning Canyon Shale (PMmc) is the basement formation underlying the mineralized gold bearing formations (above). There is little mineralization that penetrates into the PMmc and is of little significance at the current time.

**Example - Pola Head Grade vs. Tails Grade Model:** The Black Pine Pola material type Head Grade vs. Tails Grade model was developed for multiple crush sizes, up to ROM feed sizes, but only the conventional crush $P_{80}$ = 75,000 microns and ROM $P_{80}$ = 150,000 microns (150 mm), are shown below in Figure 13.11. Similar models were developed for the other material types and are not shown for brevity.

**Note:** Figure 13.11 the $P_{80}$ = 75 mm plot lies directly under the $P_{80}$ = 150mm plot and is not visible, except for the equation shown in blue. This is one of the unique features at Black Pine in that gold recovery is very insensitive to feed particle size. This phenomenon holds true for all other material types and not just Pola. Similar plots of gold extraction % vs. tails grade are available for each material type but is not shown in this report.

### 13.6.3.1 Black Pine S/O Ratio Model

The laboratory S/O data, reported by KCA, was adjusted to 9.0 m to represent commercial-scale ROM heap height. Figure 13.12 is a plot of heap-leach feed $P_{80}$ vs. S/O ratio required to achieve 90% recovery of total extractable gold. The largest columns tested were crushed to a target $P_{80}$ = 75 mm and are suitable for projecting to ROM size. The fitted straight-line equation obtained from the graph, along with the accompanying graphs (not shown) plotted for 60%, 70&, 80%, 95% and 99% recovery of total extractable gold, are all used to model S/O ratio for Black Pine resources.

**Figure 13.11 Black Pine Head Grade vs. Tails Grade Plot for Pola**

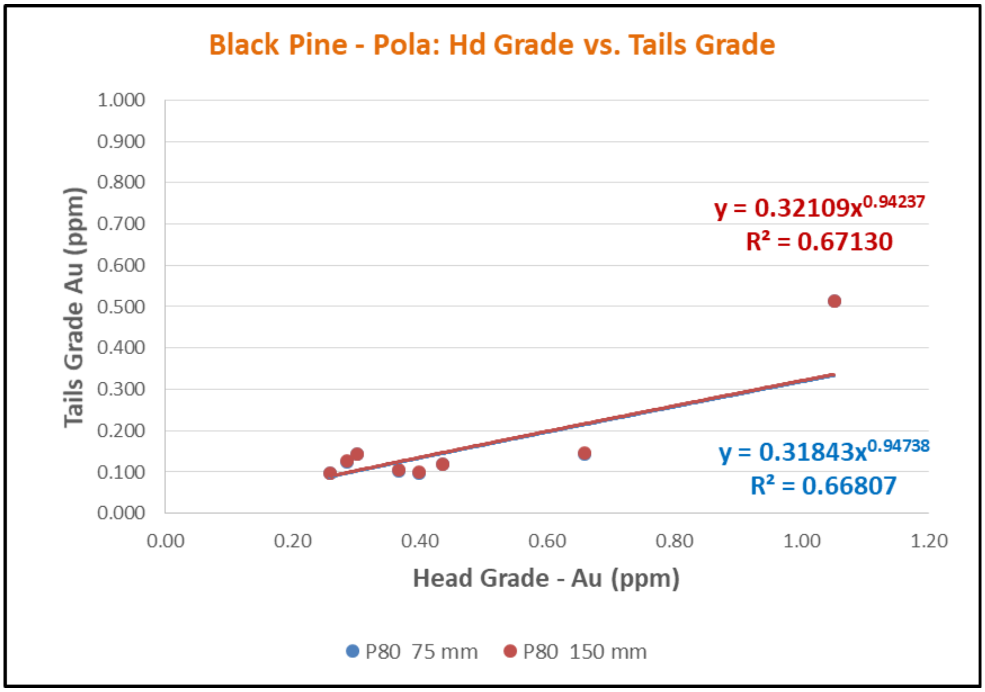
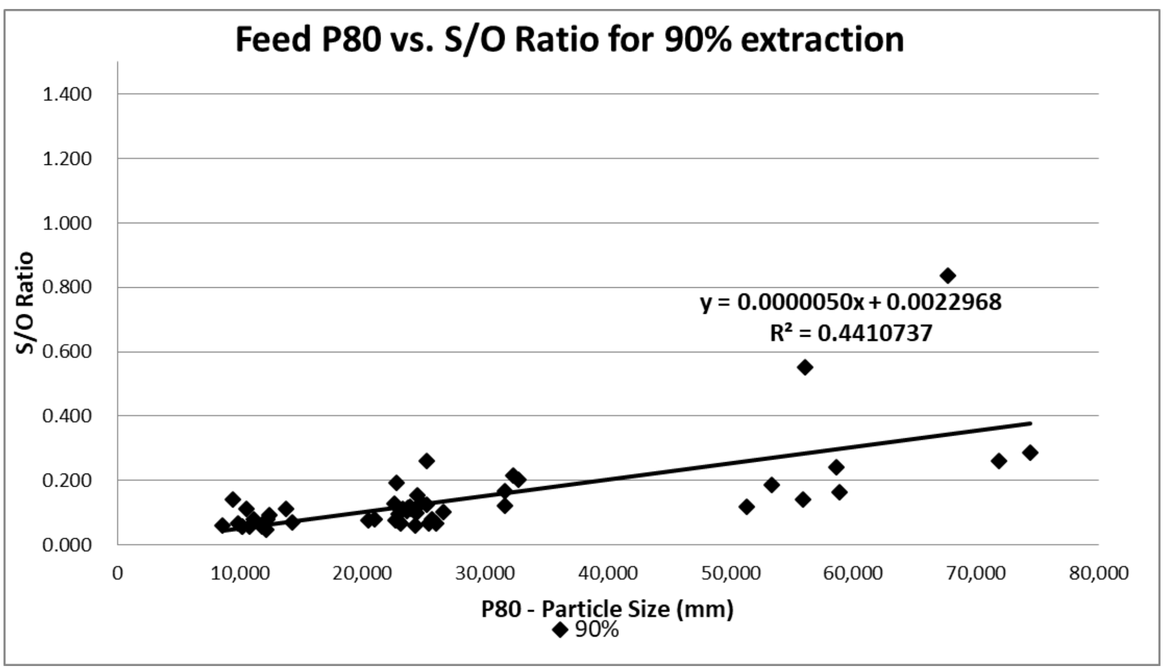



**Figure 13.12 Feed $P_{80}$ vs. S/O Ratio for 90% Recovery of Total Extractable Gold**



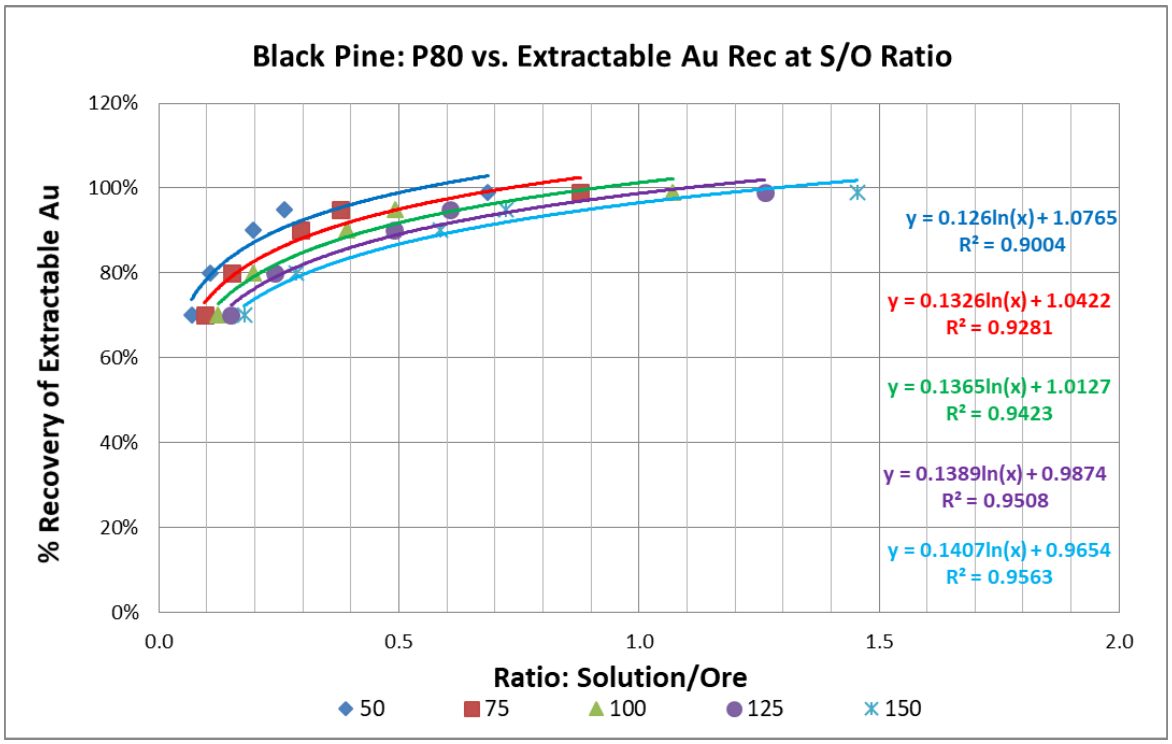

Incorporating the data derived from the six Feed $P_{80}$ vs. S/O ratio plots (described in the paragraph above) provides the equations needed to calculate the data shown in

Table 13.16 and is shown graphically in Figure 13.13, for heap leach feed $P_{80}$'s from 50 mm to 150 mm.

**Table 13.16 Feed P80 vs. S/O Ratio at Various % of Total Extractable Gold**

| % of Extractable Au | S/O Ratios: P80 Particle Size (mm) | | | | |
|---|---|---|---|---|---|
| | **50** | **75** | **100** | **125** | **150** |
| **70%** | 0.068 | 0.095 | 0.123 | 0.150 | 0.178 |
| **80%** | 0.106 | 0.151 | 0.196 | 0.241 | 0.286 |
| **90%** | 0.197 | 0.294 | 0.392 | 0.489 | 0.587 |
| **95%** | 0.262 | 0.377 | 0.492 | 0.607 | 0.722 |
| **99%** | 0.685 | 0.878 | 1.070 | 1.263 | 1.455 |
| P80 (Inches | **2.0** | **3.0** | **4.0** | **5.0** | **6.0** |

**Figure 13.13 Black Pine S/O Ratio vs. % of Total Extractable Gold, Various Heap-Leach Feed P80's**
(Assumes a 9-metre lift height)




For a nine-metre lift height, ROM heap leach, 99% recovery of total extractable gold is achieved at S/O ratio = 1.5, as shown in Table 13.14. If crushing were to be used at Black Pine, S/O ratios required to recover 99% of total extractable gold would be lower, depending upon the degree of particle size reduction. Equally significant, is that lowering the lift height would result in an increase in the S/O ratio. For example – reducing the heap leach lift height from 9 of 7 metres would increase the S/O ratio to 2.2 to achieve the same 99% recovery of total extractable gold.

The ROM 150 mm trend line equation fitted to the data in Table 13.14, and shown graphically in Figure 13.13, was used to obtain the log function equation constants *d* and *f* to be used in Equation 2a and 2b (Section 13.6.1). S/O losses are part of the system losses in Equation 1. In the Black Pine case *d* = 0.1407 and *f* = 0.9654.

Since the design criteria for Black Pine assumes a ROM heap leach feed $P_{80}$ = 150 mm and S/O ratio of 1.5 (at the end of commercial gold recovery operations) - by default the S/O component of solution losses in Equation 2a and 2b = 0.99 (since the S/O ratio model assumes that only 99% of the total laboratory extractable gold is recovered from the heap leach at closure). This simplifies Equation 2a and 2b as shown in Equation 3, below:

**Equation 3:**

$$\text{Recovery \%} = \frac{HG - ((a*HG^{b}) + \text{system losses}) \times (0.99 - \text{Additional Operational Scale-up Inefficiencies})}{HG}$$

### 13.6.3.2 Gold Recovery Model Equations for a ROM Heap Leach (P80 = 150 mm)

The heap leach values for the constants *a, b, d and f*, which are needed **Equation 2a** and **2b** are summarized in Table 13.17. The values associated with solution losses in the heap have been estimated to be 0.0008 ppm (g/t) Au.

Note: There is insufficient variability composite data to accurately model/predict gold recovery for material types; Pold, Pols and PPos. The variability composite Head vs. Tails grade data for Pold, Pols and PPos was overlaid on the Pola, Polb and Polc models to find the best fit correlation to apply to these material types. The Pold material type best fit with the Pola model, and Pols and PPos best fit with the Polc model. These best fit model correlations was adopted for predicting gold recovery for Pold, Pols and PPos material types.

**Table 13.17 Black Pine Equation 3 and 4 Functions**

| S/O Ratio: | 1.5 | | | | | | |
|---|---|---|---|---|---|---|---|
| Black Pine ROM (P80 = 150 mm) Tails Grade Equation 2 &3 Functions | | | | | | | |
| Function | Ore type | *a* | *b* | *d* | *f* | *d**log(S:O)+f | *Soln. Losses (ppm)* |
| *Power $f_x$* | Pola | 0.321 | 0.942 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| *Power $f_x$* | Polb | 0.289 | 0.740 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| *Power $f_x$* | Polc | 0.208 | 0.768 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| *Power $f_x$* | Pold | 0.321 | 0.942 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| *Power $f_x$* | Pols | 0.208 | 0.768 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| *Power $f_x$* | Ppos | 0.208 | 0.768 | 0.1326 | 1.0422 | 0.990 | 0.0008 |
| | ***a and b*** **from Black Pine Tails Grade Gold Recovery Plots (LN Function)** | | | | | | |
| | ***d*** **and *f* derived from S/O Ratio Model (Log Function).** | | | | | | |

**Note: Scale-up and operational losses are not included in Table 13-14.**

When the additional commercial scale-up and operational losses, from Table 13.13, are added to **Equation 4** (gold losses of an additional 2.0% and silver losses of an additional 4.0%), of total extractable gold/silver, simplifies **Equation 4,** as follows in **Equations 4a** and **4b**:

**Equation 4: Simplified Gold and Silver Recovery Equations**

**Equation 4a:** $Gold\ Recovery\ (\%) = \frac{HG-((a\times HG+b)-solution\ losses)(0.97)}{HG}$

**Equation 4b:** $Silver\ Recovery\ (\%) = \frac{HG-((a\times HG+b)-solution\ losses)(0.95)}{HG}$

### 13.6.3.3 Final Gold and Silver Recovery Equations

Example - Using the Polc Head vs. Tails grade models, S/O Ratio model, solution losses and project scale-up/operational inefficiency discount factors and applying **Equation 4a**, produces the final calculated gold recovery projection for the Polc material type in Table 13.18 and is shown graphically in Figure 13.14.

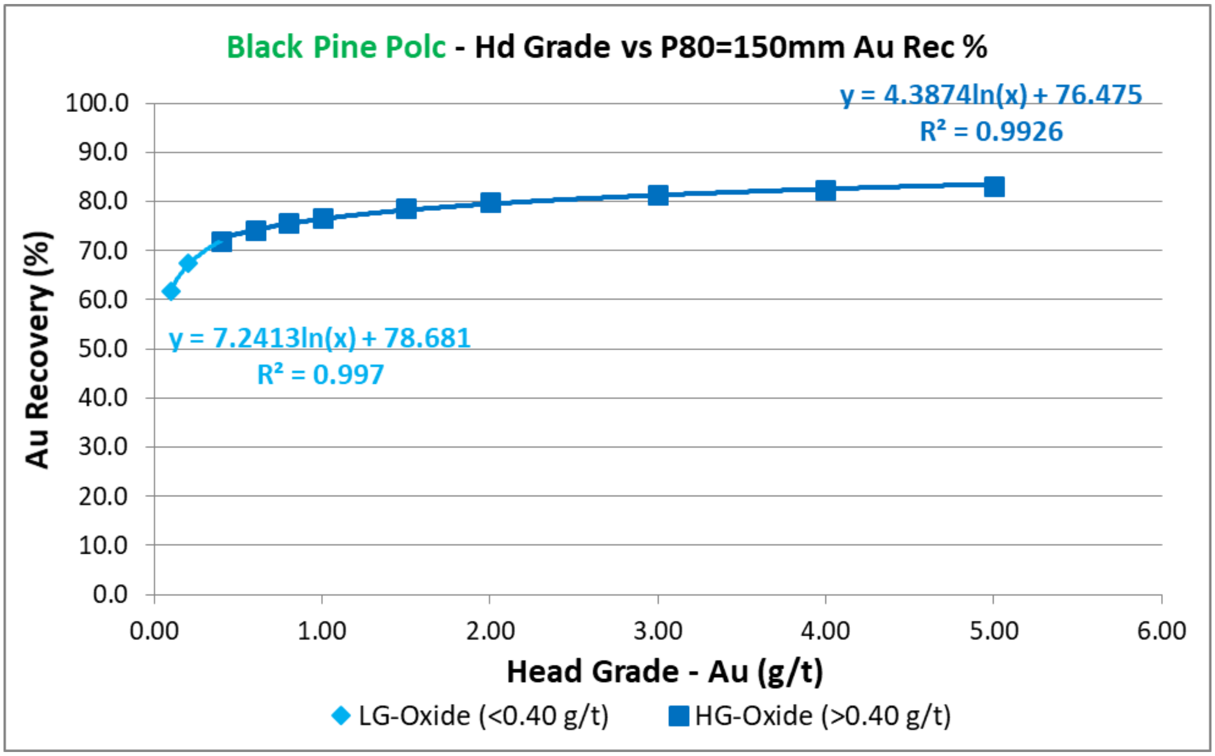
**Table 13.18 Head Grade, Tails Grade and Gold Recovery Projections: Polc Material Type**

| g Au/t | Crushed HL (75mm) | | ROM HL (150mm) | |
|---|---|---|---|---|
| | Tail Grade g Au/t | Au Rec % | Tail Grade g Au/t | Au Rec % |
| | | | | |
| 0.100 | 0.0351 | 62.8 | 0.0354 | 61.8 |
| 0.200 | 0.0597 | 68.3 | 0.0603 | 67.3 |
| 0.400 | 0.1016 | 72.9 | 0.1028 | 71.9 |
| 0.600 | 0.1387 | 75.2 | 0.1403 | 74.2 |
| 0.800 | 0.1729 | 76.7 | 0.1750 | 75.7 |
| 1.000 | 0.2051 | 77.8 | 0.2077 | 76.8 |
| 1.500 | 0.2799 | 79.7 | 0.2836 | 78.6 |
| 2.000 | 0.3490 | 80.9 | 0.3537 | 79.8 |
| 3.000 | 0.4762 | 82.4 | 0.4828 | 81.4 |
| 4.000 | 0.5936 | 83.4 | 0.6022 | 82.4 |
| 5.000 | 0.7044 | 84.2 | 0.7148 | 83.1 |
| | | | | |

Note: The Au Tails Grade is from the Head Grade vs. Tails Grade Model for Polc only. S/O ratio, solution losses and operational/scale up discount factors are only included in the Au Rec % calculation.

Final commercial scale gold recovery equations are show in Table 13.19 for all material types. Note: there are two equations for each material type, one for gold head grades <0.40 g/t and one for head grades >0.40 g/t.

## Figure 13.14 Polc Final Gold Recovery Model




## Table 13.19 Black Pine – ROM ($P_{80}$ = 150 mm) Final Gold Recovery Equations

| Geo met Recovery Zone | Equation | Gold Recovery, % | Range |
|---|---|---|---|
| **Pola** | 1 | =2.389*ln(HG) + 66.202 | Au HG < 0.40 g/t |
| | 2 | =1.821*ln(HG) + 65.730 | Au HG ≥ 0.40 g/t |
| **Polb** | 3 | =11.852*ln(HG) + 72.087 | Au HG < 0.40 g/t |
| | 4 | =6.761*ln(HG) + 68.370 | Au HG ≥ 0.40 g/t |
| **Polc** | 5 | =7.241*ln(HG) + 78.681 | Au HG < 0.40 g/t |
| | 6 | =4.387*ln(HG) + 76.475 | Au HG ≥ 0.40 g/t |
| **Pold** | 7 | =2.389*ln(HG) + 66.202 | Au HG < 0.40 g/t |
| | 8 | =1.821*ln(HG) + 65.730 | Au HG ≥ 0.40 g/t |
| **Pols** | 9 | = 7.241*ln(HG) + 78.681 | Au HG < 0.40 g/t |
| | 10 | =4.387*ln(HG) + 76.475 | Au HG ≥ 0.40 g/t |
| **PPos** | 11 | =7.241*ln(HG) + 78.681 | Au HG < 0.40 g/t |
| | 12 | =4.387*ln(HG) + 76.475 | Au HG ≥ 0.40 g/t |

### 13.6.4 Silver Recovery Model Equations for a ROM Heap Leach (P80 = 150 mm)

Silver recoveries were modeled and calculated in the same manner as for gold. Final silver recovery equations are shown in Table 13.20. Note: there are two equations for each material type, one for silver head grades <0.60 g/t and one for silver head grades >0.60 g/t.

**Table 13.20 Black Pine – ROM (P80 = 150 mm) Final Silver Recovery Equations**

| Geo met Recovery Zone | Equation | Silver Recovery, % | Range |
|---|---|---|---|
| **Pola** | 1 | =2.089*ln(HG) + 10.484 | Au HG < 0.60 g/t |
| | 2 | =0.298*ln(HG) + 10.529 | Au HG ≥ 0.60 g/t |
| **Polb** | 3 | =2.353*ln(HG) + 11.881 | Au HG < 0.60 g/t |
| | 4 | =0.360*ln(HG) + 11.006 | Au HG ≥ 0.60 g/t |
| **Polc** | 5 | =8.532*ln(HG) + 11.971 | Au HG < 0.60 g/t |
| | 6 | =1.650*ln(HG) + 16.655 | Au HG ≥ 0.60 g/t |
| **Pold** | 7 | =2.353*ln(HG) + 4.357 | Au HG < 0.60 g/t |
| | 8 | =0.360*ln(HG) + 3.500 | Au HG ≥ 0.60 g/t |
| **Pols** | 9 | = 2.353*ln(HG) + 8.814 | Au HG < 0.60 g/t |
| | 10 | =0.360*ln(HG) + 7.939 | Au HG ≥ 0.60 g/t |
| **PPos** | 11 | =2.353*ln(HG) + 4.942 | Au HG < 0.60 g/t |
| | 12 | =0.360*ln(HG) + 4.067 | Au HG ≥ 0.60 g/t |

## 13.7 Reagent Consumptions

Reagent consumptions and requirements, including cyanide, lime and cement were estimated by KCA based on metallurgical test work completed to date for the Black Pine materials and are summarized below.

### 13.7.1 Cyanide Consumptions

For the crushed ore, using average cyanide consumptions of the column tests at the nearest crush sizes and converting from lab result to field estimate, cyanide consumption is estimated at 0.14 kg/t. Typically lab column tests results are much higher than field consumption. Actual field cyanide consumption is typically 25% to 33% of column test results, depending upon the silver content.

Cyanide consumption for ROM ore is provisionally estimated at the same 0.14 kg/t.

### 13.7.2 Lime Consumptions,

Based upon the tests to date, the hydrated lime requirement for pH control is 0.98 kg/t. Converting to field quicklime requirements, 0.88 kg/t is estimated for both ROM and crushed ore pH control.

### 13.7.3 Cement Consumptions

There are fairly high amounts of minus 200 mesh fines present in all of the crushed ore column tests to date (12.2% average), with some as high as 30.2%. This alone implies that cement agglomeration is probably needed for crushed ore. Additionally, some of the load-permeability tests showed insufficient percolation rates at simulated stacking heights of 50 m and 75 m (with no cement), further supporting the conclusion that at least some of the crushed ore would benefit from cement agglomeration.

For crushed ore, it is recommended that the minimum equivalent of cement (2.6 kg/t) be substituted for lime for pH control and agglomeration. Additional cement agglomeration test work should eventually be done to confirm and optimize cement addition at the nominated crush size.

## 13.8 Summary

Mr. Simmons believes that samples tested are sufficiently representative to support the conclusions summarized herein. Metallurgical testing is ongoing and is designed in part to continue to evaluate all types and styles of mineralization."

# 14.0 MINERAL RESOURCE ESTIMATES (ITEM 14)

## 14.1 Introduction

The mineral resources for the Black Pine project were estimated in accordance with NI 43-101 guidelines. The modeling and estimation of the mineral resources were completed in May through early July 2021 under the supervision of Michael M. Gustin, a qualified person with respect to mineral resource estimations under NI 43-101. The Effective Date of the resource estimate is May 1, 2021, the date the last of Liberty Gold's drill-hole data were received and incorporated into the resource database.

Mr. Gustin is independent of Liberty Gold by the definitions and criteria set forth in NI 43-101; there is no affiliation between Mr. Gustin and Liberty Gold except that of an independent consultant/client relationship.

No mineral reserves have been estimated for the Black Pine project.

The Black Pine project resources are classified in order of increasing geological and quantitative confidence into Inferred, Indicated, and Measured categories in accordance with the "CIM Definition Standards - For Mineral Resources and Mineral Reserves" (2014) and therefore NI 43-101. CIM mineral resource definitions are given below, with CIM's explanatory text shown in italics:

**Mineral Resource**

*Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.*

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

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

*The term Mineral Resource covers mineralization and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of Modifying Factors. The phrase 'reasonable prospects for eventual economic extraction' implies a judgment by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction. The Qualified Person should consider and clearly state the basis for determining that the material has reasonable prospects for eventual economic extraction.*

*Assumptions should include estimates of cutoff grade and geological continuity at the selected cut-off, metallurgical recovery, smelter payments, commodity price or product value, mining and processing method and mining, processing and general and administrative costs. The Qualified Person should state if the assessment is based on any direct evidence and testing.*

*Interpretation of the word 'eventual' in this context may vary depending on the commodity or mineral involved. For example, for some coal, iron, potash deposits and other bulk minerals or commodities, it may be reasonable to envisage 'eventual economic extraction' as covering time periods in excess of 50 years. However, for many gold deposits, application of the concept would normally be restricted to perhaps 10 to 15 years, and frequently to much shorter periods of time.*

**Inferred Mineral Resource**

An Inferred Mineral Resource is that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

*An Inferred Mineral Resource is based on limited information and sampling gathered through appropriate sampling techniques from locations such as outcrops, trenches, pits, workings and drill holes. Inferred Mineral Resources must not be included in the economic analysis, production schedules, or estimated mine life in publicly disclosed Pre-Feasibility or Feasibility Studies, or in the Life of Mine plans and cash flow models of developed mines. Inferred Mineral Resources can only be used in economic studies as provided under NI 43-101.*

*There may be circumstances, where appropriate sampling, testing, and other measurements are sufficient to demonstrate data integrity, geological and grade/quality continuity of a Measured or Indicated Mineral Resource, however, quality assurance and quality control, or other information may not meet all industry norms for the disclosure of an Indicated or Measured Mineral Resource. Under these circumstances, it may be reasonable for the Qualified Person to report an Inferred Mineral Resource if the Qualified Person has taken steps to verify the information meets the requirements of an Inferred Mineral Resource.*

## Indicated Mineral Resource

An Indicated Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing and is sufficient to assume geological and grade or quality continuity between points of observation. An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Mineral Reserve.

*Mineralization may be classified as an Indicated Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralization. The Qualified Person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the project. An Indicated Mineral Resource estimate is of sufficient quality to support a Pre-Feasibility Study which can serve as the basis for major development decisions.*

## Measured Mineral Resource

A Measured Mineral Resource is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or to a Probable Mineral Reserve.

*Mineralization or other natural material of economic interest may be classified as a Measured Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such that the tonnage and grade or quality of the mineralization can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability of the deposit. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit.*

## Modifying Factors

Modifying Factors are considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors.

## 14.2 Data

The Black Pine gold resources were estimated using data generated by Liberty Gold and prior historical operators, particularly Noranda and Pegasus. The modeling of the resources is based on 1,848 historical RC holes, 26 historical core holes, and 259 RC and 16 core holes drilled by Liberty Gold. Various data and interpretations derived from these holes, as well as digital surfaces of the project area, were provided to MDA by Liberty Gold. The project drill-hole database is in UTM Zone 12 NAD83 coordinates (in metres).

Three digital topographic surfaces were provided to MDA: a pre-mining surface, a surface that represents the post-mining/pre-backfill topography, and present-day topography (see Section 9.1 for descriptions of the generation of these surfaces). The post-mining/pre-backfill surface did not cover the entire extents of the resource block model; MDA therefore spliced this topography into the pre-mining surface. This spliced surface, now a more extensive post-mining/pre-backfill topography, and Liberty Gold's present-day topographic surface, were used to code the resource block model.

## 14.3 Deposit Geology Pertinent to Resource Modeling

Gold at Black Pine occurs primarily as stratabound mineralization that almost exclusively occurs within the middle structural-plate units. In aggregate, favourable host stratigraphy of the middle plate comprise a gently east-dipping section of Pennsylvanian carbonate rocks up to 400 metres thick that is extensively folded and faulted. The mineralization often occurs at, or subparallel to, stratigraphic contacts, along which strata-parallel structural movement of uncertain extent is often evident. While less common, local examples of solution breccia-hosted mineralization are not unusual.

Gold is distributed throughout the middle structural plate, but the most extensive mineralization is usually focused within more favorable stratigraphic units, such as calcareous siltstones, in association with decalcification and/or low- to moderately-dipping faults.

## 14.4 Modeling of Geology

Liberty Gold provided MDA with digital fault surfaces and lithologic wireframe solids of the various units in the upper, lower, and middle structural plates, all of which were created using Leapfrog software with extensive explicit controls applied. This geological modeling covers the full extents of the mineralization at Black Pine. The digital surfaces and solids were used extensively as guides for the modeling of the gold mineral domains that served as the primary constraint on the estimation of project resources (see Section 14.8).

## 14.5 Groundwater

While pockets of perched groundwater have been intersected in drilling, a consistent water table has not been identified in the exploration drilling at Black Pine deposit to date. All project resources therefore appear to be above the water table.

## 14.6 Oxidation and Modeling of Carbonaceous Material

Gold mineralization intersected by historical and Liberty Gold drilling is overwhelmingly oxidized, although irregularly distributed bodies of unoxidized mineralization do occur in various middle-plate stratigraphic units and are typically associated with black carbonaceous zones. These zones are characterized by very low cyanide-soluble to fire-assay gold ratios and current metallurgical testwork confirms that these materials are preg-robbing, which is consistent with historical reports from Pegasus' mining operation. While typically of limited extents within mineralized zones, much larger bodies of unoxidized carbonaceous rock have been intersected in drilling in areas adjacent to mineralized zones. Exposures of carbonaceous rock can be seen in the walls of some of the historical open pits.

In light of the discussion in the previous paragraph, oxidation state was not modeled per se, but the unoxidized carbonaceous zones were modeled by Liberty Gold as Leapfrog solids that were used to code the resource block model.

Some areas of mineralization, most notably in the Polb unit, show cyanide gold solubilities that are somewhat lower than the adjacent Pola and Polc units and have little to no associated sulphides or carbonaceous materials. At present, these low-cyanide-solubility occurrences are hypothesized to be related to the presence of clays that inhibit the extraction of gold, at least during the cyanide shake-leach analyses performed routinely by ALS on the drill samples. While these occurrences are not explicitly modeled, they do influence the metallurgical recoveries of the Polb unit that are coded into the model (see Section 14.8.3).

## 14.7 Density Modeling

Liberty Gold requested ALS to perform bulk specific-gravity ("SG") determinations on a number of core samples from mineralized intervals in holes drilled in 2019 and 2020 in the Discovery, E Pit, CD Pit, and Rangefront areas. For the purposes of MDA's analysis of the SG data, the SGs of samples from fault zones, thin dikes, and calcite veins, all of which are beyond the scale of modeling, were excluded. As anticipated, the remaining data indicate that SGs are influenced primarily by lithology, with secondary effects related to the intensity of gold mineralization. In the case of intensity of mineralization, Liberty Gold logging indicates that gold grades tend to increase as porosity increases due to decalcification of receptive lithologies, and decalcification can lead to measurable decreases in SG. The Polc unit is a calcareous siltstone that hosts close to 40% of the project resources and has sufficient SG determinations to document the inverse relationship between grade and SG values. Polc SGs progressively decrease from gold domain 0 (barren) to domain 100 (low grade) to domain 200 (mid-grade) to domain 300 (high grade) (see Section 14.8.1 for gold-domain details).

While it is possible that units other than Polc may also have negative correlations between SG and gold grade, the SG data quantities are insufficient to confidently define such trends. In particular, Pola and Pols, as well as portions of Pold, are characterized by lithologies that could be receptive to decalcification and attendant SG effects.

Table 14.1 lists the lithologic units coded into the resource block model and their assigned SG values, which generally reflect the average, median, or value between the average and median SG for each lithology.

**Table 14.1 Block Model Specific Gravity by Lithology and Gold Domain**

| Lith Unit | Domain 0 | Domain 0 Count | Domain 100 | Domain 200 | Domain 300 | Domain 100-300 Count |
|---|---|---|---|---|---|---|
| PPos | 2.45 | 7 | 2.45 | 2.45 | 2.45 | 14 |
| Pola | 2.55 | 15 | 2.50 | 2.50 | 2.50 | 56 |
| Polb | 2.45 | 33 | 2.45 | 2.45 | 2.45 | 73 |
| Polc | 2.60 | 14 | 2.54 | 2.45 | 2.40 | 129 |
| Pold | 2.65 | 55 | 2.57 | 2.57 | 2.57 | 64 |
| Pols | 2.60 | 24 | 2.47 | 2.47 | 2.47 | 30 |
| PmMx | 2.60 | 20 | 2.55 | 2.55 | 2.55 | 9 |
| Pmmc | 2.60 | 1 | 2.60 | 2.60 | 2.60 | - |
| backfill | 1.90 | - | - | - | - | - |

## 14.8 Gold Modeling

The gold mineral resources at Black Pine were modeled and estimated by:

- Developing a geological model reflecting low-angle fault control of mineralization hosted in receptive carbonate host rocks, which was completed by Liberty Gold;
- evaluating the drill-hole gold assay data statistically;
- utilizing the geological model as the base for interpreting gold mineral domains on a set of 315°-looking cross sections spaced at 30-metre intervals;
- projecting the sectional mineral-domain polygons horizontally to the drill data within each sectional window, thereby creating three-dimensional polygons;
- slicing the three-dimensional mineral-domain polygons along 10-metre-spaced vertical planes oriented perpendicular to the cross sections, and using these slices to recreate and rectify the gold mineral-domain polygons on the 10-metre long-section planes;
- coding a block model comprised of 10 x 10 x 5 (x, y, z) metre blocks to the mineral domains using the long-sectional mineral-domain polygons;
- analyzing the modeled mineralization geostatistically to aid in the establishment of estimation and classification parameters;
- interpolating gold grades into the model blocks using the gold-domain coding to explicitly constrain the estimation; and
- evaluating the resulting model in detail prior to finalizing the mineral resource estimation.

### 14.8.1 Mineral Domains

A mineral domain encompasses a volume of rock that ideally is characterized by a single, natural grade population of a commodity that occurs within a specific geologic environment. In order to define the mineral domains at Black Pine, the natural gold populations were first identified on population-distribution graphs that plot the gold-grade distributions of all project drill-hole assays, as well as an additional plot of assays from core holes only. This analysis led to the identification of low-, medium-, and high-grade gold populations. Ideally, each of these populations can then be correlated with specific geologic characteristics that are captured in the resource database, which can be used in conjunction with the grade populations to interpret the bounds of each of the gold mineral domains. The approximate grade ranges of the low-grade (domain 100), medium-grade (domain 200), and high-grade (domain 300) domains are listed in Table 14.2.

**Table 14.2 Approximate Grade Ranges of Gold Mineral Domains**

| Domain | (g Au/t) |
|---|---|
| 100 | ~0.1 to ~0.5 |
| 200 | ~0.5 to ~3 |
| 300 | > ~3 |

Working closely with MDA, Liberty Gold geologists completed a first-pass modeling of the Black Pine gold mineralization by interpreting mineral-domain polygons on a set of vertical, 30-metre spaced, northwest-looking (Az. 315°) cross sections that span the presently drilled extents of the mineralization. The mineral domains were interpreted to respect the gold drill-hole assay data within the context of the Liberty Gold lithological and structural modeling described in Section 14.4. Receptive lithologies, contacts between lithologies in general, and low-angle faults were the primary controls on the modeling of the gold domains, with the latter two often coinciding. In addition, Liberty Gold created Leapfrog gold-grade shells that were influenced by orientations of all pertinent stratigraphic and structural orientations, and these grade shells were also used as secondary guides to the explicit mineral-domain modeling.

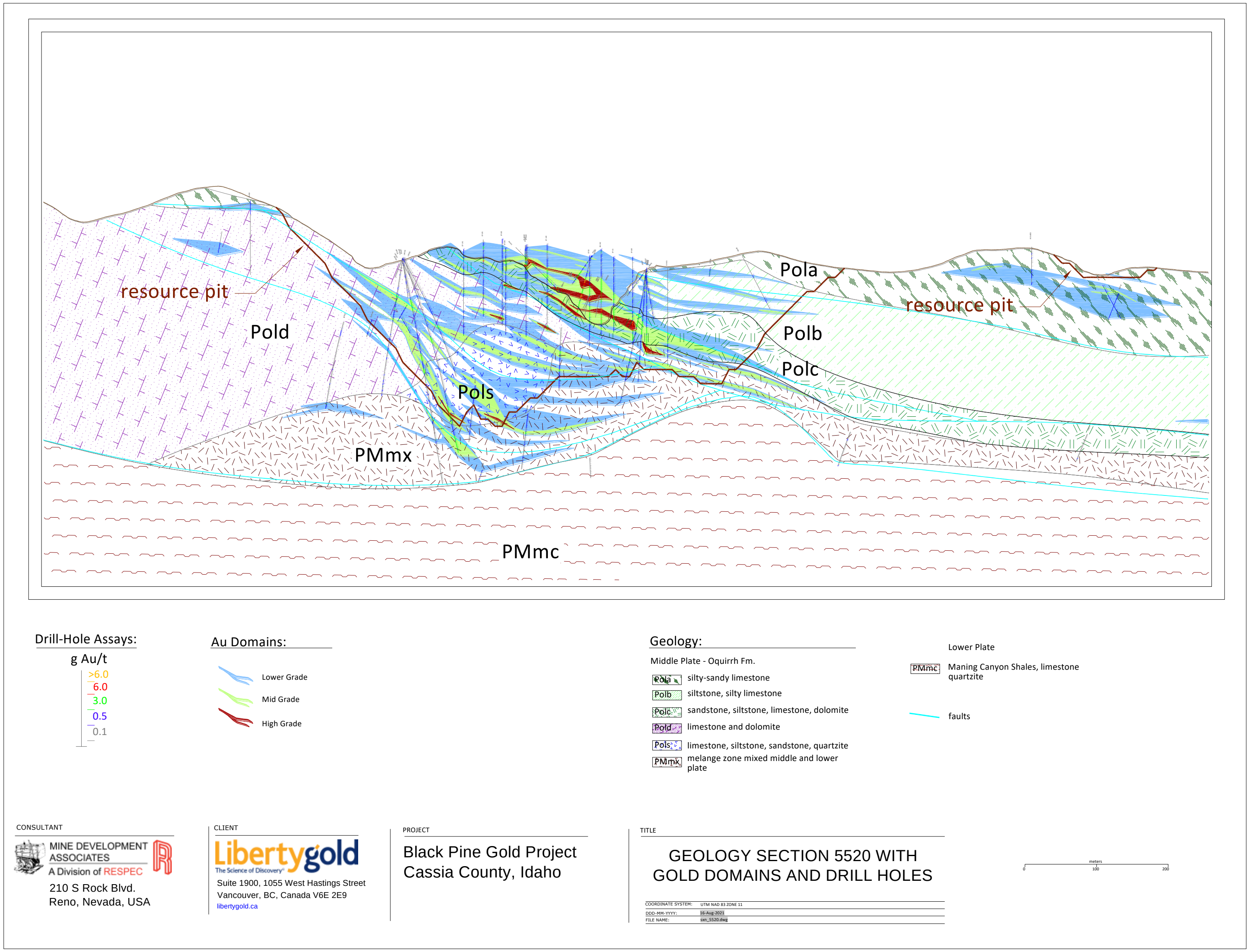
After Liberty Gold completed the first-pass cross-sectional gold-domain modeling, MDA completed a detailed, section-by-section review of the first-pass work and, where deemed warranted, revised the polygons. MDA's process of refining and finalizing the sectional gold domains utilized the same lithological, structural, and grade-shell guides as described.

While the modeled mineralization overwhelmingly lies within the bounds of the middle structural-lithological plate, minor volumes of the mineral domains were also modeled within the upper and lower plates, close to their structural contacts with the middle plate. A little more than 90% of all modeled gold mineralization is hosted within middle-plate units.

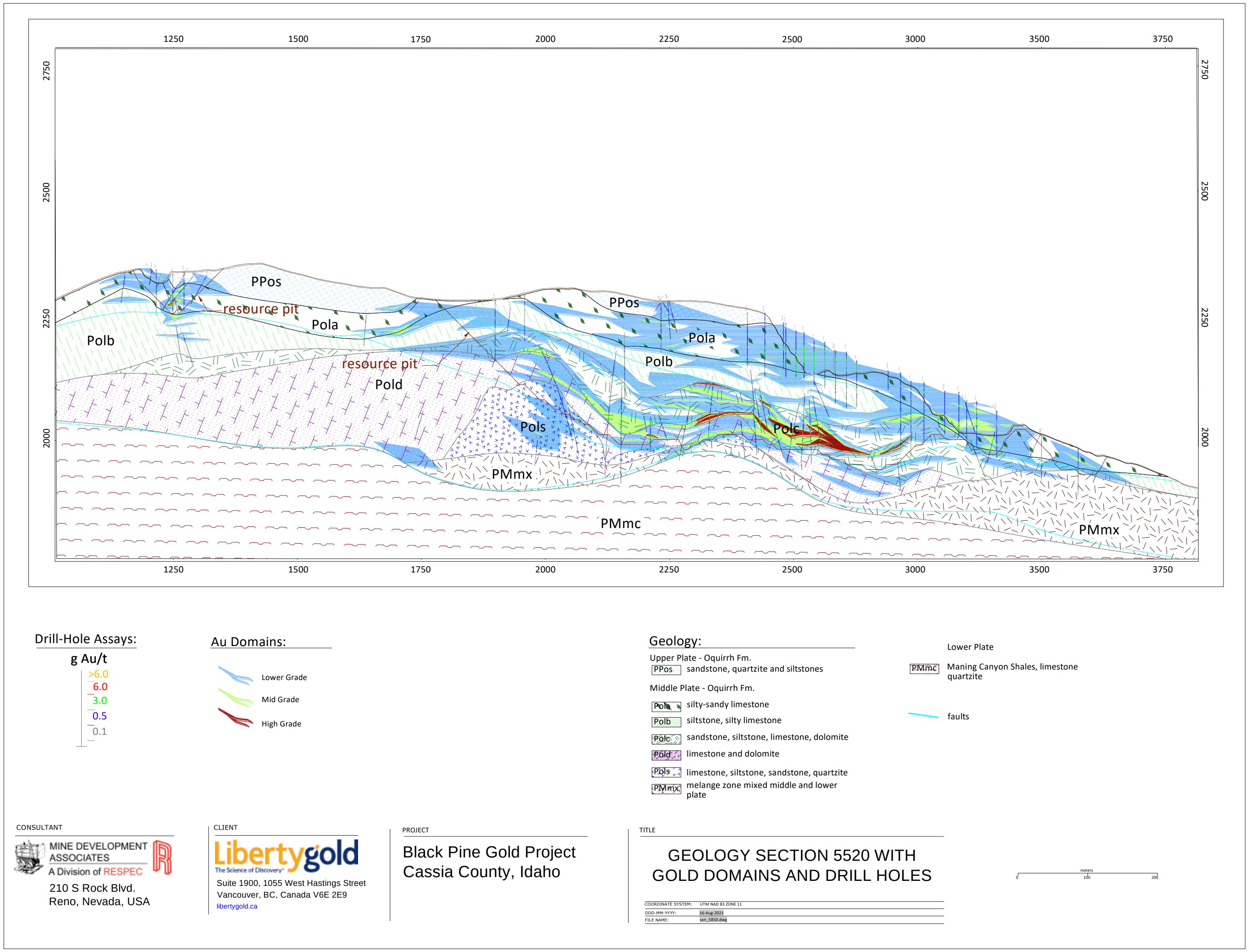
The mid-grade domain (domain 200) forms relatively thin, elongated zones that typical lie along or close to lithologic contacts and/or low-angle structures that parallel or transgress lithologic boundaries at acute angles. In strongly mineralized areas, this domain has excellent continuity both along strike and dip. High-grade domain (domain 300) mineralization is typically distributed erratically within the mid-grade domains, having much less continuity in general, except within and immediately adjacent to historically mined areas. Domain 300 mineralization is primarily associated with northwest- and northeast-striking fault corridors and breccias, as well as with strongly decalcified calcareous siltstone within the Polc unit. Low-grade mineralization captured within domain 100 both encompasses the two higher-grade domains, usually as much larger bodies of mineralization, and extends outwards as thin extensions at the terminations of these higher-grade domains along the same low-angle structures and lithologic contacts.

Cross-sections showing examples of the gold mineral-domain modeling are shown in Figure 14.1, and Figure 14.2.

## Figure 14.1 Black Pine Cross Section 5520NW Showing Gold-Domain Modeling



## Figure 14.2 Black Pine Cross Section 5850NW Showing Gold-Domain Modeling



The final cross-sectional gold mineral-domain polygons were projected horizontally to the drill data in each sectional window, and these three-dimensional polygons were then sliced vertically along 10-metre planes that are orthogonal to the cross sections. These slices, along with similar slices of Liberty Gold's lithologic solids and structural surfaces, were used to guide the final rectification of the gold mineral domains on the long sections. The 10-metre long-section plane locations coincide with resource-model block centroids along y-axis columns within the rotated model. Long sections were chosen over level plans for rectification purposes due to the generally gently dipping nature of the mineralization. The product of this work is a set of 10-metre-spaced long sectional gold domain polygons that span the full extents of the drilled mineralization.

The modeled mineralization at Black Pine extends discontinuously over a northwest extent of about 6,200 metres, a maximum northeast-southwest extent of 3,700 metres, and an elevation range of 985 metres, although the maximum true width of the mineralization is approximately 300 metres.

### 14.8.2 Assay Coding, Capping, and Compositing

Drill-hole gold assays were coded to the gold mineral domains using the cross-sectional polygons. As discussed in Section 12.1.3, certain sample intervals and assays were excluded from this coding and thereby not used in subsequent resource grade estimation. Assay caps were determined by the inspection of population distribution plots of the coded assays grouped by domain to identify high-grade outliers that might be appropriate for capping. Descriptive statistics of the coded assays by domain and visual reviews of the spatial relationships of the possible outliers and their potential impacts during grade interpolation were also considered in the definition of the assay caps (Table 14.3). Domain "0" represents all drill-hole assays not coded to one of the three mineral domains (see Section 14.8.4).

**Table 14.3 Gold Assay Caps by Mineral Domain**

| Domain | g Au/t | Number Capped (% of samples) |
|---|---|---|
| 100 | 1.0 | 78 (4.3%) |
| 200 | 5.0 | 15 (1.1%) |
| 300 | 30.0 | 6 (1.8%) |
| 0 | 0.8 | 15 (0.8%) |

In addition to the assay caps, the use of restrictions on the search distances of higher-grade portions of each of the domains for the purposes of gold-grade estimation was evaluated statistically and visually following estimation iterations. This led to search restrictions being applied to domains 100, 300, and 0 (discussed further in Section 14.8.4). The use of search restrictions may allow for decreasing the number of samples subjected to capping while properly respecting the highest-grade populations within each domain.

Descriptive statistics of the capped and uncapped coded assays are provided in Table 14.4.

**Table 14.4 Descriptive Statistics of Coded Gold Assays**

| Domain | Assays | Count | Mean (g Au/t) | Median (g Au/t) | Std. Dev. | CV | Min. (g Au/t) | Max. (g Au/t) |
|---|---|---|---|---|---|---|---|---|
| 0 | Au | 80,298 | 0.05 | 0.03 | 0.05 | 1.12 | 0.00 | 5.17 |
| | Au Cap | 80,298 | 0.05 | 0.03 | 0.04 | 0.95 | 0.00 | 0.80 |
| 100 | Au | 54,316 | 0.20 | 0.17 | 0.13 | 0.66 | 0.00 | 3.98 |
| | Au Cap | 54,316 | 0.20 | 0.17 | 0.12 | 0.62 | 0.00 | 1.00 |
| 200 | Au | 14,105 | 0.98 | 0.75 | 0.66 | 0.67 | 0.00 | 11.52 |
| | Au Cap | 14,105 | 0.98 | 0.75 | 0.65 | 0.67 | 0.00 | 5.00 |
| 300 | Au | 1,266 | 6.04 | 4.77 | 4.52 | 0.75 | 0.03 | 46.70 |
| | Au Cap | 1,266 | 6.01 | 4.77 | 4.30 | 0.72 | 0.03 | 30.00 |
| *100+200+300* | *Au* | *69,687* | 0.46 | 0.21 | 1.07 | 2.29 | 0.00 | 46.70 |
| | *Au Cap* | *69,687* | 0.46 | 0.21 | 1.04 | 2.25 | 0.00 | 30.00 |

The capped assays were composited at 3.05-metre (10-foot) down-hole intervals, respecting the mineral domain boundaries. The composite length is equal to twice the modal length of the coded samples; none of coded-assay lengths exceed the composite length.

Descriptive statistics of Black Pine composites by gold domain are shown in Table 14.5.

**Table 14.5 Descriptive Statistics of Gold Composites**

| Domain | Count | Mean (g Au/t) | Median (g Au/t) | Std. Dev. | CV | Min. (g Au/t) | Max. (g Au/t) |
|---|---|---|---|---|---|---|---|
| 0 | 42,352 | 0.05 | 0.03 | 0.04 | 0.85 | 0.00 | 0.80 |
| 100 | 29,368 | 0.20 | 0.17 | 0.11 | 0.53 | 0.00 | 1.00 |
| 200 | 8,105 | 0.98 | 0.80 | 0.57 | 0.58 | 0.00 | 5.00 |
| 300 | 772 | 6.01 | 4.97 | 3.80 | 0.63 | 0.10 | 30.00 |
| *100+200+300* | *38,245* | *0.46* | *0.21* | *1.00* | *2.15* | *0.00* | *30.00* |

### 14.8.3 Block Model Coding

The 10-metre-spaced long-sectional mineral-domain polygons were used to code 10 x 10 x 5 (x, y, z)-metre blocks that comprise a digital model rotated to a bearing of 315°. The percentage volume of each mineral domain, as coded directly by the long sections, is stored within each block as a "partial percentage", as is the partial percentage of the block that lies outside of the modeled gold domains (domain 0). In other words, each block stores the partial percentage of each of the four domains.

The Liberty Gold lithologic solids were used to code each block to a single lithology on a 'majority wins' basis. The Liberty Gold solids that model carbonaceous zones were used to code a 'carbon' attribute in each block on a partial-percentage basis that reflects the percentage of the block that is intersected by a modeled carbonaceous solid.

Estimated metallurgical recoveries were assigned to each block using the estimated gold value and the applicable recovery equation, which varies by lithology and grade (Table 13.19).

Two topographic surfaces were used to code the block model on a partial percentage basis: an as-mined surface and a present-day surface (Section 14.2). These digital topographic surfaces were used to define: (1) the percentage of each block that is presently bedrock; and (2) the percentage of each block that is comprised of material backfilled into the historical open pits or reflects surface dump material, both of which are defined as lying above the as-mined surface and below the present-day surface.

The modeled mineralization has a variety of orientations. Wireframe solids were therefore created to encompass model areas with similar mineral orientations, and the solids were used to code the model blocks to these areas on a block-in/block-out basis. This coding was then used to control search-ellipse orientations during gold-grade interpolations
.

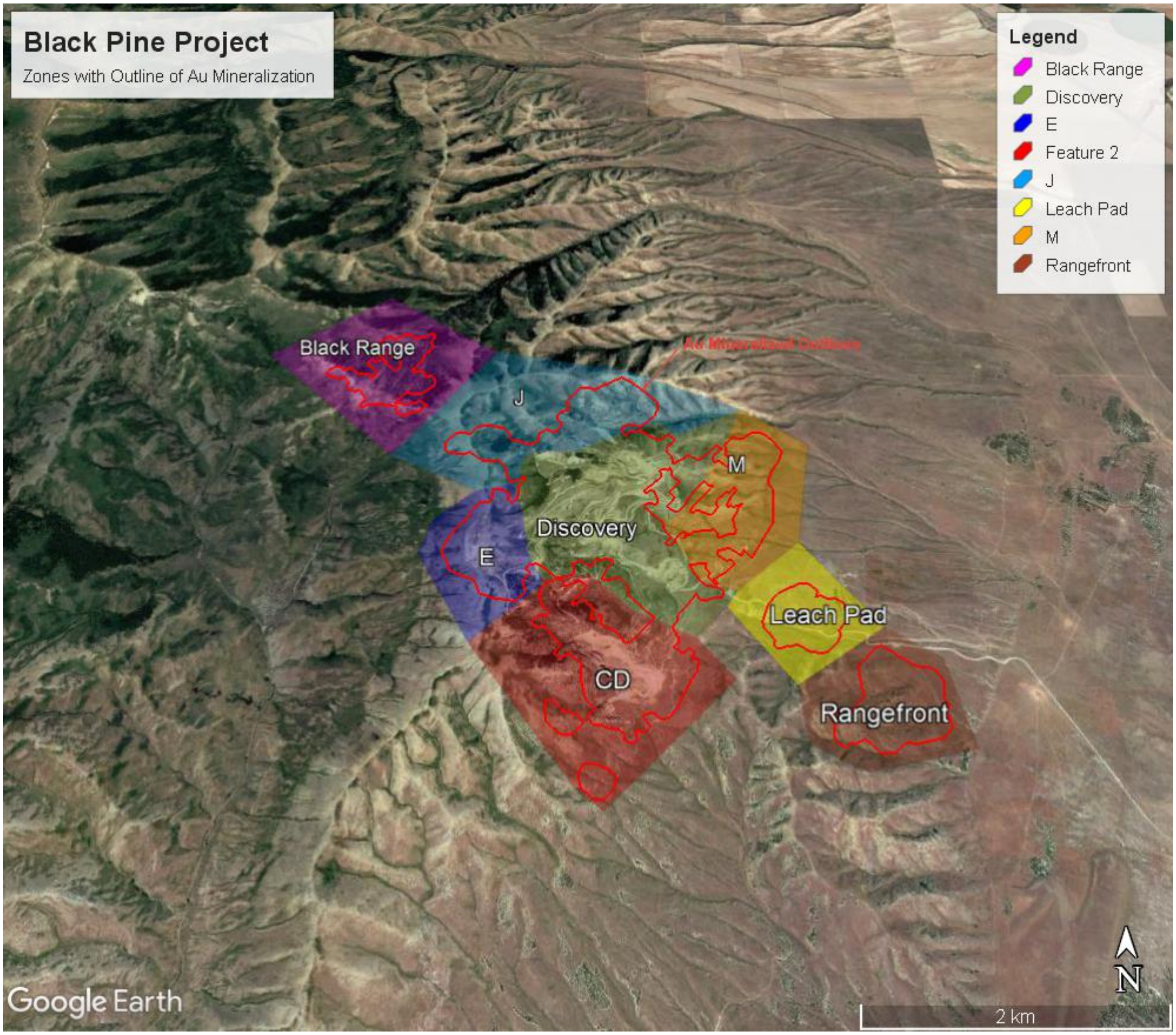
**Table 14.6 Estimation Area Orientations**

| Estimation Area | Bearing | Plunge | Tilt |
|---|---|---|---|
| 110 | 020 | 0 | -15 |
| 130 | 020 | 0 | -8 |
| 210 | 020 | 0 | -15 |
| 220 | 020 | 0 | -40 |
| 230 | 020 | 0 | -10 |
| 240 | 315 | 0 | 20 |
| 310 | 315 | 0 | -15 |
| 320 | 315 | 0 | -30 |
| 330 | 315 | 0 | -5 |

The specific-gravity values shown in Table 14.1 were assigned to model blocks based on the lithology and mineral-domain codes in each model block. Blocks coded as backfill or dump were assigned a specific gravity value of 1.9. Blocks coded as partially below the as-mined surface and partially within backfill were assigned a volume-weighted SG based on the percentages of the two SG units.

Liberty Gold provided polygons of ‘zones’ from which to define deposit areas for reporting the project resources. Wireframe solids of these zones were used to code the block model (Figure 14.3).

**Figure 14.3 Black Pine Project Zones of Mineralization**




## 14.8.4 Grade Interpolation

A variography study was completed using all composites from the mineral domains, as well as the composites from each of the three domains individually. Maximum strike and dip ranges of 60 to 70 metres were modeled in several directions. The variability in the orientations of the host lithologies and controlling faults led to variability in the orientation of the gold mineralization. It is possible that longer ranges could be obtained if sufficient composites lying within similarly orientated model areas were examined.

Gold grades were interpolated using inverse distance (various runs using second and third powers), ordinary kriging, and nearest-neighbor methods. The mineral resources reported herein were estimated by third-power inverse-distance interpolation, as this method led to results that were judged to most appropriately respect the drill data and the geology of the Black Pine deposit. This is particularly true with respect to the estimation of the lowest-grade areas in the model, where potential overestimation of volumes could materially impact the resource estimation at grades close to potential open-pit mining cutoffs. The nearest-neighbor estimation was completed for the purposes of statistical checking of the various estimation iterations. The parameters applied to the gold-grade estimations at Black Pine are summarized in Table 14.7; the orientation of search ellipses used in grade estimation was controlled by the block coding of estimation areas (Table 14.6).
.

**Table 14.7 Summary of Black Pine Estimation Parameters**

| Estimation Pass | Search Ranges (metres) | | | Composite Constraints | | |
|---|---|---|---|---|---|---|
| | Major | Semi-Major | Minor | Min | Max | Max/Hole |
| Pass 1 | 60 | 60 | 20 | 2 | 18 | 3 |
| Pass 2 | 150 | 150 | 50 | 1 | 18 | 3 |
| Pass 3 – (Doman 100 only) | 250 | 250 | 250 | 1 | 18 | 3 |

**Restrictions on Search Ranges**

| Au Domain | Search Restriction Threshold | Search Restriction Distance | Estimation Pass |
|---|---|---|---|
| Au 100 | >0.4 g Au/t | 45 metres | 1, 2, 3 |
| Au 300 | >9.0 g Au/t | 20 metres | 1, 2, 3 |
| Au 0 | >0.15 g Ag/t | 9 metres | 1, 2, 3 |

Gold-grade interpolation was completed using length-weighted 3.05-metre (10-foot) composites. The estimation passes were performed independently for each of the mineral domains, so that only composites coded to a particular domain were used to estimate grade into blocks coded to that domain. Blocks coded as having partial percentages of more than one gold domain had multiple grade interpolations, one for each domain coded into the block. The estimated grades for each of the gold domains 0, 100, 200, and 300 coded to a block were coupled with the coded partial percentages of those domains to enable the calculation of a single volume-weighted gold grade for each block. These final resource block grades are therefore diluted to the full block volumes using this methodology.

Almost all of the block model gold grades were estimated in the first two passes. However, domain 200 failed to estimate in the first two passes within a small group of blocks at the base of the middle plate. Domain 100 also failed to estimate in the first two passes in a relatively small number blocks scattered throughout the peripheries of the modeled mineralization, as well as in a larger set of blocks at the Leach Pad zone. The failure to estimate these Leach Pad low-grade blocks was expected, as they are in an area that was drilled primarily by holes whose assays were not used in grade estimation due to sample lengths exceeding 3.05 metres (10 feet), with most have sample lengths of 6.1 metres (20 feet). The third estimation pass was therefore implemented to estimate the blocks not estimated in the first two passes, using an isotropic pass (*i.e.*, without an orientation bias) and a long search distance. All blocks with domains estimated in Pass 3 are classified as Inferred, and almost all of these blocks lie outside of the resource-constraining pits and therefore do not report to the project mineral resources.

Initial grade-estimation runs indicated the higher-grade samples were affecting inappropriate volumes in the low- and high-grade domains (domains 100 and 300). This led to implementation of search restrictions, which limit the maximum distance the highest-grade composites in each domain lie from a block to be used in the interpolation of gold grades into that block. The final search-restriction parameters (Table 14.7) were determined following multiple interpolation iterations that employed various search-restriction parameters.

### 14.8.5 Model Checks

Polygonal sectional volumes derived from the sectional mineral-domain polygons were compared to the polygonal volumes derived from the long sections, as well as to the coded block-model volumes derived from the partial percentages, to assure close agreement. All block-model coding, including topographies, lithology, carbonaceous material, estimation areas, gold recoveries, mineral domains, and deposit zones, was checked visually. Polygonal grade and tonnage estimates using both the cross-sectional and long-sectional domain polygons, as well as the nearest-neighbor and ordinary-krige estimates, were used as a check on the inverse-distance estimation results. No unexpected relationships between the check estimates and the inverse-distance estimate were indicated in the final model. Various grade-distribution plots of assays and composites, along with the nearest-neighbor, ordinary-krige, and inverse-distance block grades were also evaluated as a check on both the global and local estimation results, which led to additional grade-interpolation iterations. Finally, the inverse-distance grades were visually compared to the drill-hole assay data in detail to assure that reasonable results were obtained.

## 14.9 Black Pine Project Mineral Resources

The Black Pine project mineral resources have been estimated to reflect potential open-pit extraction and potential processing by heap leaching. To meet the requirement of the resources having reasonable prospects for eventual economic extraction, a pit optimization was completed using the parameters summarized in Table 14.8. The recovery applied to the optimization varies by lithology and gold grade, as per the equations provided in Table 13.19.

**Table 14.8 Pit Optimization Cost Parameters**

| Parameter | Value Used | Unit |
|---|---|---|
| Mining Cost | $ 2.30 | $/tonne mined |
| Heap Leach Processing | $ 2.55 | $/tonne processed |
| Mill / Agitated Leach Processing | $ | $/tonne processed |
| G&A Cost | $ 8,000 | $1,000s/year |
| Processing Rate | 10,000 | 1,000s tonnes-per-year |
| G&A Cost | $ 0.80 | $/tonne processed |
| Au Price | $ 1,800 | $/oz produced |
| Au Refining Cost | $ 5.00 | $/oz produced |
| Royalty | 0.5% | NSR |

The pit shells created using these optimization parameters were used to constrain the project resources. The in-pit resources were further constrained by the application of a cutoff of 0.2 g Au/t to all model blocks lying within the optimized pits. The portions of blocks coded as containing carbonaceous material were excluded from the resources.

The Black Pine project resources are summarized in Table 14.9. Mineral resources that are not mineral reserves do not have demonstrated economic viability.

**Table 14.9 Black Pine Project Gold Resources**

| Classification | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| Indicated | 105,075,000 | 0.51 | 1,715,000 |
| Inferred | 31,211,000 | 0.37 | 370,000 |

6. Mineral Resources are comprised of all model blocks at a 0.2 g Au/t cutoff that lie within optimized resource pits, excluding material modelled as carbonaceous.
7. The Effective Date of the resource estimations is May 1, 2021.
8. Mineral resources that are not mineral reserves do not have demonstrated economic viability.
9. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
10. Rounding as required by reporting guidelines may result in apparent discrepancies between tonnes, grade, and contained gold content.

The Black Pine resources are classified on the basis of the number and distance of composites used in the interpolation of a block gold grade, as well as the number of holes that contributed composites to the interpolation (Table 14.10).

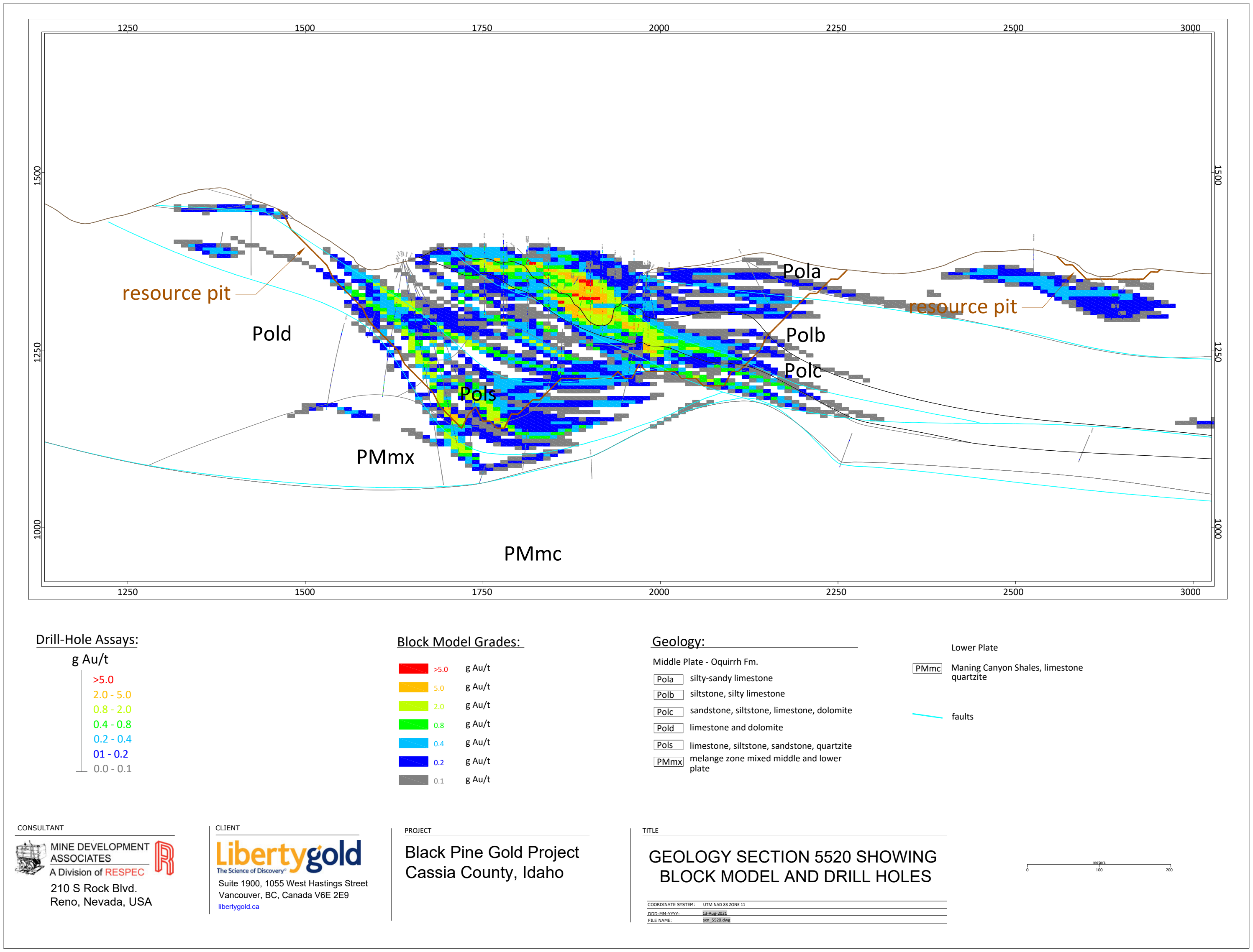
**Table 14.10 Black Pine Classification Parameters**

| Class | Additional Constraints |
|---|---|
| Indicated | Minimum of 2 holes contributing composites that lie within an average distance of 70 metres from the block being classified |
| Inferred | All blocks not classified as Indicated that meet the resource constraints |

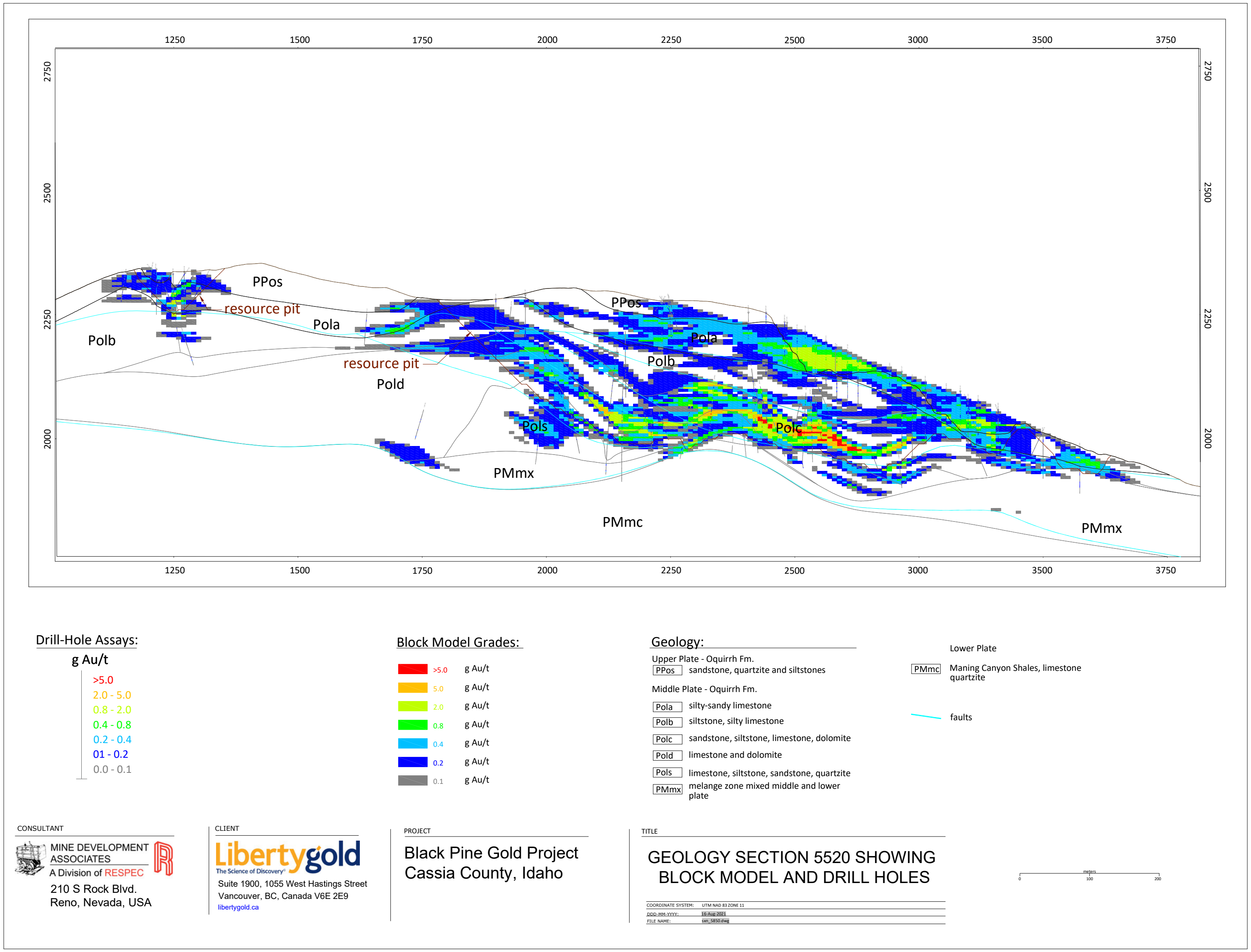
Although the authors are not experts with respect to any of the following aspects of the project, they are not aware of any unusual environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors not discussed in this report that could materially affect the potential development of the Black Pine project mineral resources as of the Effective Date of the report.

Figure 14.4, and Figure 14.5 are representative cross-sections showing the estimated block-model gold grades. These figures correspond to the mineral domain cross-sections presented in Figure 14.1, and Figure 14.2.

# Figure 14.4 Black Pine Cross Section 5520NW Showing Block-Model Gold Grades



## Figure 14.5 Black Pine Cross Section 5850NW Showing Block-Model Gold Grades



The resources reported by zone (see Figure 14.3) are provided in Table 14.11.

**Table 14.11 Black Pine Pit-Constrained Resources by Zone**

**Indicated**

| Zone | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| Black Range | 967,000 | 0.56 | 17,000 |
| J | 2,175,000 | 0.47 | 33,000 |
| Discovery | 77,103,000 | 0.54 | 1,342,000 |
| E | 4,074,000 | 0.41 | 54,000 |
| M | 1,521,000 | 0.67 | 33,000 |
| CD-F | 15,054,000 | 0.38 | 182,000 |
| Leach Pad | - | - | 0 |
| Rangefront | 4,181,000 | 0.40 | 53,000 |

**Inferred**

| Zone | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| Black Range | 2,481,000 | 0.54 | 43,000 |
| J | 935,000 | 0.34 | 10,000 |
| Discovery | 15,571,000 | 0.38 | 191,000 |
| E | 1,901,000 | 0.31 | 19,000 |
| M | 1,040,000 | 0.53 | 18,000 |
| CD-F | 1,177,000 | 0.32 | 12,000 |
| Leach Pad | 5,771,000 | 0.28 | 52,000 |
| Rangefront | 2,334,000 | 0.34 | 25,000 |

Table 14.12 presents the Black Pine gold resources tabulated based on increasing cutoff grades. This is presented to provide grade-distribution data that allows for detailed assessment of the project resources. All of the tabulations are constrained as lying within the same optimized pit shells used to constrain the current resources, which means the tabulations at cutoffs higher than the resource cutoff grade of 0.2 g Au/t represent subsets of the current resources.

**Table 14.12 Black Pine Pit-Constrained Resources at Various Cutoffs**

**Indicated**

| Cutoff (g Au/t) | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| ***0.20*** | ***105,075,000*** | ***0.51*** | ***1,715,000*** |
| 0.25 | 74,313,000 | 0.63 | 1,495,000 |
| 0.30 | 57,081,000 | 0.73 | 1,345,000 |
| 0.50 | 30,520,000 | 1.04 | 1,020,000 |
| 0.70 | 18,540,000 | 1.33 | 792,000 |
| 1.00 | 9,799,000 | 1.78 | 559,000 |
| 2.00 | 2,229,000 | 3.33 | 239,000 |

**Inferred**

| Cutoff (g Au/t) | Tonnes | g Au/t | oz Au |
|---|---|---|---|
| ***0.20*** | ***31,211,000*** | ***0.37*** | ***370,000*** |
| 0.25 | 19,352,000 | 0.46 | 286,000 |
| 0.30 | 10,970,000 | 0.60 | 211,000 |
| 0.50 | 4,440,000 | 0.94 | 134,000 |
| 0.70 | 2,539,000 | 1.20 | 98,000 |
| 1.00 | 1,212,000 | 1.61 | 63,000 |
| 2.00 | 185,000 | 3.60 | 21,000 |

1. The project mineral resources are shown in bold and are comprised of all model blocks at a 0.2 g Au/t cutoff that lie within optimized resource pits, excluding material modelled as carbonaceous.
2. Tabulations at higher cutoffs than used to define the mineral resources represent subsets of the mineral resources.
3. The Effective Date of the resource estimations is May 1, 2021.
4. Mineral resources that are not mineral reserves do not have demonstrated economic viability.
5. The estimate of mineral resources may be materially affected by geology, environment, permitting, legal, title, taxation, sociopolitical, marketing, or other relevant issues.
6. Rounding as required by reporting guidelines may result in apparent discrepancies between tonnes, grade, and contained gold content.

## 14.10 Independent Audit of MDA Resource Modeling

SLR Consulting (Canada) Ltd ("SLR") was retained by Liberty Gold to complete an independent audit of MDA's Black Pine resource modeling. SLR's scope of work included a review of the geologic model, database validation, drill sections, interpreted gold-grade domains, grade capping levels, resource estimation parameters, and classification categorization completed by MDA. SLR concluded that the current mineral resource estimate prepared by MDA, with an Effective Date of May 1, 2021, is of good quality, uses industry-standard practices, and is suitable for public disclosure in a Technical Report.

## 14.11 Discussion of Resource Modeling

Almost three-quarters of the total project resource ounces and slightly less than 80% of the total Indicated ounces lie within the Discovery zone, where the majority of Liberty Gold drill holes are located. In combination with the historical drill holes, the density of drilling in the Discovery zone allows for high-confidence geologic modeling, which in turn leads to high-confidence resource modeling.

Economic criteria for an open-pit heap-leach scenario as envisioned for the Black Pine project are likely to equate to a cutoff grade that is lower than the 0.20 g Au/t cutoff applied to define the project resources. This cutoff was chosen in light of the relatively low precision of the historical gold analyses at gold grades lower than ~0.2 g Au/t as compared to modern assays. Mr. Gustin believes that the use of a cutoff grade lower than 0.2 g Au/t would therefore add undue risk to the statement of the project resources. This is particularly true at Black Pine, which has significant volumes of very low-grade mineralization. For example, at a cutoff grade of 0.17 g Au/t (0.005 oz Au/ton), the total ounces of modeled gold (no resource pit applied) increase by 18% as compared to the total modeled ounces at a 0.20 g Au/t cutoff. This risk could be alleviated with additional drilling as the project continues to advance.

Irrespective of potential historical assay-precision issues, mineralized materials grading less than the 0.20 g Au/t resource cutoff grade exist at Black Pine - it is the quantity and grade of this material that, at this stage of the project, is in question.

Preg-robbing carbonaceous material was modeled by Liberty Gold and removed from the current resources. The carbonaceous material is largely confined to the poorly mineralized formations Polb and PMmx, above and below zones of strong gold mineralization. Elsewhere, the carbonaceous material is erratically distributed, especially within mineralized zones, and the volume of this material in any given area varies widely. It is important to note that these characteristics create some uncertainties with respect to the accuracy of the modeling of the carbonaceous zones. High-confidence modeling of the carbonaceous material within mineralized areas may only be possible at a drill-hole spacing more akin to blast holes than detailed surface drilling. This fact notwithstanding, it is believed that the total volume of carbonaceous material removed from the resources is reasonably representative of reality, even if particular portions of the modeled volumes are not.

# 15.0 MINERAL RESERVE ESTIMATES

There are no current mineral reserve estimates for the Black Pine project.

Item 15 (Mineral Reserve Estimates) through Item 22 (Economic Analysis) are not applicable to the Black Pine property as of the Effective Date of this report, and these sections of the report have therefore been omitted.

## 23.0 ADJACENT PROPERTIES

Liberty Gold controls a large land position covering all known gold occurrences in the southern Black Pine Range. There are no adjacent properties.

## 24.0 OTHER RELEVANT DATA AND INFORMATION (ITEM 24)

The authors are not aware of any relevant data or information available for the Black Pine project that have been excluded from this report.

# 25.0 INTERPRETATION AND CONCLUSIONS (ITEM 25)

Mr. Gustin has undertaken extensive verification of the project data and finds the data to be of sufficient quality to support the modeling, estimation, and classification of the project gold resources. The authors of this report are not aware of any significant risks or uncertainties that could be expected to affect the reliability of the exploration information or mineral resources presented in this report.

Significant historical gold production has occurred at the Black Pine project. Virmyra Mining Company ran a vat-leach operation from 1949 to 1955, mining 109,000 tonnes of ore with an average grade of 5.14 g Au/t from the Tallman open pit. Following a period of exploration by multiple companies, most notably Noranda, Pegasus acquired the property in 1990 and initiated an ROM open-pit heap-leach operation in 1991, with mining starting at the Tallman area and expanded to eventually include six pits. By the end of the operation in 1998, Pegasus had completed a substantial amount of exploration drilling and mined a total of about 31 million tonnes of ore at a waste-to-ore stripping ratio close to 1-to-1. Pegasus produced over 430,000 ounces of gold from their Black Pine operations and achieved an average recovery of about 65%.

Following the closure of the Black Pine mine, the heap-leach pad was rinsed and reclaimed. According to Liberty Gold's environmental consultants, Liberty Gold is liable only for disturbance incurred as part of Liberty Gold's exploration activities, or if Liberty Gold causes disturbance of the historical leach pad and other designated areas.

The Black Pine gold mineralization fits into the class of sediment-hosted Carlin-style gold deposits on the basis of, among other features, its stratigraphic controls and host-rock lithologies, geochemical associations, and micron-sized dissemination of gold that is associated with silicification, decalcification, and solution-collapse breccias. The host units at Black Pine have been strongly affected by multiple periods of compressional and extensional deformation, much of it occurring prior mineralization. This history of deformation, which is manifested by both folding and faulting and is well documented in pit walls, has led to structural complexities that are continuing to be studied and understood.

Extensive historical gold-in-soil data outline a consistent anomaly that extends for four kilometres in a north-south direction, with east-west extents of two kilometres over much of the north-south length. All of the historical open pits are encompassed by this anomaly.

The resource database is comprised of 1,874 historical drill holes for a total of 191,551 metres and 275 holes drilled by Liberty Gold for a total of 72,301 metres. Pegasus drilled 65% of the historical holes and Noranda 29%, with the remainder drilled by various other historical operators. A total of 26 of the historical holes and 16 of the Liberty Gold holes were drilled by diamond core methods, with all others drilled by either RC or conventional-rotary methods.

While a significant portion of the metres of historical drilling was mined out during the historical open-pit mining operations, unmined intersections suggested that significant quantities of mineralization could still be present. Recognizing this potential, Liberty Gold acquired the Black Pine property in mid-2016. This drilling led to the discovery of three, relatively high-grade and oxidized lenses of gold mineralization in the undrilled area between the historical A and B pits and the historical A Basin zone, thereby validating the presence of previously undrilled gold mineralization extending between at least some of historical shallow pits and historical mineralized zones along low-angle normal faults and subparallel zones of preferred host rocks.

Historical, pre-mining metallurgical testing by Noranda suggested that recoveries in a run-of-mine heap leach scenario was feasible, but some materials might benefit from crushing and agglomeration and others contained preg-robbing carbonaceous material. Pegasus' subsequent heap-leach operation performed moderately well without crushing and agglomeration, and despite the fact that some carbonaceous material was placed on the pad. Recent results from metallurgical testing of bulk samples and composites of Liberty Gold drill core have led to the formulation of recovery equations for each of the main lithologies that host gold mineralization.

Gold resources at Black Pine are constrained to lie within optimized pit shells and are tabulated using a cutoff grade of 0.2 g Au/t. Parameters used for the resource pit optimization reflect potential open-pit mining and heap-leach processing. The estimated resources are comprised of 105,075,000 tonnes averaging 0.51 g Au/t (1,715,00 ounces of gold) in the Indicated category and 31,211,000 tonnes at an average grade of 0.37 g Au/t (370,000 ounces of gold) classified as Inferred.

The current resources are the first to be estimated in accordance with NI 43-101 guidelines at Black Pine. Prior to Liberty Gold's involvement in the project, the only substantive exploration work since the historical mining operation ceased was undertaken by Western Pacific in 2011, which included a 35-hole RC drilling program. Significant opportunities for resource expansion remain, including a number of undrilled, sparsely drilled, or shallowly drilled areas surrounding the historical pits and within soil anomalies.

The Discovery zone resources, which contain almost three-quarters of the project resources, remain open for expansion to the west, southwest, southeast, and east. Targets include the area between the E and CD zones, as well as the potential connection of this northwest-trending target with the Discovery zone to the northeast; the large area to the south and southwest of the CD zone that has never been drill tested; and the ground between the Rangefront and Discovery zones. With the exception of the Rangefront-to-Discovery area, for which little soil data are available, all of these targets are characterized by gold-in-soil anomalies.

# 26.0 RECOMMENDATIONS (ITEM 26)

As discussed in Section 25.0, Liberty Gold has clear potential to outline mineralization of economic interest at the Black Pine property, and the project therefore warrants significant additional investment. Liberty Gold's drilling results to date, the size of the current gold resources, the open-ended nature of most drill-defined zones, and the quality of untested targets all justify the drill program that is currently being implemented, and this program should continue. This drilling should focus on: (i) upgrading Inferred portions of the resources to Indicated; (ii) step-out drilling along the margins of defined zones of mineralization; and (iii) testing of the under-drilled targets discussed in Section 25.0.

A Phase I work program totaling US $12,630,000 is recommended. This program should include a preliminary economic assessment based on the current mineral resources, significant RC and core drilling, continued metallurgical testing and environmental permitting activities, and an updated resource estimate. Liberty Gold intends to attempt to procure water rights and expand property rights, and Mr. Gustin believes these acquisitions are warranted.

Subject to positive Phase I results, a Phase II program totaling US $14,380,000 is recommended. The Phase II would continue exploration and resource drilling, metallurgical testing, permitting activities, and the procurement of water rights, with this work culminating in the completion of a prefeasibility study.

Details of the costs of the recommended programs are provided in Table 26.1. The Phase I program includes approximately 75,000 metres of RC drilling at an all-in cost of $80/metre and 3,850 metres of core drilling at an all-in cost of $260/metre. The Phase II budget envisions the same drilling costs, which are apportioned similarly to RC and core drilling as for the Phase I program.

**Table 26.1 Recommended Black Pine Project Budget**
(costs established in concert with Liberty Gold)

| Item | Phase I | Phase II |
|---|---|---|
| RC and Core Drilling (incl. access roads, drill pads, consumables, *etc*.) | $7,000,000 | $5,000,000 |
| Assaying and Geochemistry | $1,400,000 | $1,200,000 |
| Geology; Soil and Rock Sampling | $50,000 | $50,000 |
| Direct Salaries and Expenses | $1,500,000 | $2,000,000 |
| Land Holding Costs | $160,000 | $160,000 |
| Permitting and Environmental | $200,000 | $400,000 |
| Metallurgy | $450,000 | $500,000 |
| Updated Resource Estimation | $120,000 | $120,000 |
| Preliminary Economic Analysis | $350,000 | $0 |
| Prefeasibility (consulting, geotechnical drilling, ABA study, etc.) | $0 | $4,000,000 |
| Water rights | $500,000 | $400,000.00 |
| Private Land | $350,000 | $0.00 |
| Permanent Office Facilities | $250,000 | $250,000.00 |
| Legal | $200,000 | $200,000 |
| Administrative | $100,000 | $100,000 |
| ***Total*** | ***12,630,000*** | ***$14,380,000*** |

## 27.0 REFERENCES (ITEM 27)

Anderson, A.L., 1931, *Geology and Mineral Resources of Eastern Cassia County, Idaho*, Idaho Bureau of Mines and Geology Bulletin 14, 169 p.

Brady, Bruce T., 1984, *Gold in the Black Pine Mining District, Southeast Cassia County, Idaho,* U.S. Geological Survey Bulletin 1382-E, 15 p.

Brown, G.A., 2016, Stantec Consulting Services, Inc. *Review Report, Mineral Gulch WPR Project*, prepared for Pilot Gold USA Inc., Stantec Project Number 203706052, 4 p.

Clemson, J.E., 1988, *Delimiting heap leachable zones in the Black Pine Gold Deposit, Black Pine Gold District, Idaho*, Process Mineralogy VIII, edited by D.J.T. Cason and A.H. Vassiliou, The Minerals, Metals and Materials Society, p. 57-79.

Cline, J., 2018, *Nevada's Carlin-type gold deposits: What we've learned during the past 10 to 15 years:* Society of Economic Geologists, Inc., Reviews in Economic Geology, v. 20, p. 7-37.

Cline, J., Hofstra, A., Muntean, J., Tosdal, R. and Hickey, K., 2005, *Carlin-type gold deposits in Nevada: Critical geologic characteristics and viable models:* Economic Geology, 100th Anniversary Volume, p. 451-484.

Dawson, H.A., 1980, *Results of preliminary cyanide leach testing on composite of samples submitted by Pioneer Nuclear*: Dawson Metallurgical Laboratories Inc., File No. P-345, 3 p.

DeCelles, P.G., 2004. *Late Jurassic to Eocene evolution of the Cordilleran thrust belt and foreland basin system, western U.S.A.*: American Journal of Science, v. 304, p. 105–168.

Defilippi, C., 1988, *Black Pine carbonaceous lab testwork final report*, report by Kappes, Cassiday & Associates for Noranda Exploration, Inc., 9 p.

Dix, R.B., 1984, *Tallman Mine ore samples cyanide leach tests*, report by Kappes, Cassiday & Associates for Coeur d'Alene Mines Corporation, 6 p.

Dix, R.B., 1990, *Black Pine drill rejects agitated cyanide leach tests*, report by Kappes, Cassiday & Associates for Noranda Exploration, Inc., 7 p.

Ennis, K., undated (1975?), *Gold Resources Inc. Black Pine Property Crush-Leach Test*, internal report for Gold Resources Inc. by Newport Minerals Inc., 3 p.

Fritz, F.P., 2012, *Mineral Gulch Project, Cassia County, Idaho, Aeromagnetic Survey Interpretation*, internal Report for Western Pacific Resources, 9 p.

Hardie, Byron S., 1964, *Black Pine Gold Prospect, Cassia County, Idaho, Black Pine Mining District*, internal Newmont Exploration Ltd. Memorandum, 3 p.

Hefner, M.L., Loptien, G.D., Ohlin, H.N., 1991, *Geology and Mineralization of the Black Pine Gold Deposit, Cassia County, Idaho,* in Geology and Ore Deposits of the Northeastern Great Basin, Field Trip No. 5, edited by Shaddrick, D.R., Kizis, J.A., Hunsaker, E.L., Geological Society of Nevada, Reno, Nevada, 8 p.

Hintze, L.H., 1991, *Stratigraphic Evolution of the Northeastern Great Basin,* in Geology and Ore Deposits of the Northeastern Great Basin, Field Trip No. 5, *edited by* Shaddrick, D.R., Kizis, J.A., Hunsaker, E.L., Geological Society of Nevada, Reno, Nevada, 32 p.

Kappes, Cassiday & Associates (KCA-2020a), *Black Pine Project Bulk Pit Samples, Report of Metallurgical Test Work, June 2020,* by Kappes, Cassiday & Associates, Project No. 9315C, Report I.D.: KCA0190072_BP02_02, File: 9315, 175 p.

Kappes, Cassiday & Associates (KCA-2020b), *Black Pine Project Phase I Metallurgical Composites, Report of Metallurgical Test Work, October 2020*, by Kappes, Cassiday & Associates, Project No. 9315C, Report I.D.: KCA0200012_BP03_06, File: 9315, 1233 p.

Konstantinou, A., Strickland, A., Miller, E and Wooden, J.P., 2012, Multistage Cenozoic extension of the Albion –Raft River-Grouse Creek metamorphic core complex: Geochronologic and stratigraphic constraints: Geosphere, DOI:10.1130/GES00778.1, 38 p.

Loptien, G.D., 1986, *Paleozoic Rocks in the Black Pine Mountains, Cassia County, Idaho,* informal sketch in Noranda Exploration, Inc. files.

Mueller, K. J., Cerveny, P. K., Perkins, M. E, and Snee, L. W., 1999, *Chronology of polyphase extension in the Windermere Hills, northeast Nevada*: Geological Society of America Bulletin, v. 111, no. 1, p. 11 – 27.

Noranda, 1989, *Black Pine Project proposed offer to Kiewit to acquire Black Pine Mine, text and cash flow analysis*, internal Noranda Exploration, Inc. communication, 66 p.

Ohlin, H.N., 1988, *Geological Map of the Black Pine Mining District, Cassia County, Idaho, 1:500 scale*.

Ohlin, H.N., 1989, *Geology of the Black Pine Mining District,* internal consultant report for Noranda Exploration, Inc., 49 p.

Paterson, N.R., 1979, *Black Pine Project, Cassia Co., Idaho*, geophysical report for Asarco from Paterson, Grant and Watson Limited/Consulting Geophysicists, 4 p.

Potter, G.M., 1974, *Letter to Donald Curry re percolation cyanidation tests carried out by the US Bureau of Mines*, 1 p.

Powell, Randy, 2012a, *Report on Heap Leach Production and Recovery, Black Pine,* internal memorandum for Western Pacific Resource, 4 p.

Prochnau, J., 1985, *Memo to R. Willden re review of the Black Pine property*, Noranda Exploration, Inc. internal files, 21 p.

Robert, F., Brommecker, R., Bourne, B.T., Doback, P.J., McEwan, C.J., Rowe, R.R. and Zhou, X., 2007, *Models and exploration methods for major gold deposit types*, in Ore Deposits and Exploration Technology, Paper 48, edited by Milkereit, B., Proceedings of Exploration 07, Fifth Decennial International conference on Mineral Exploration, p. 691-711.

Sawyer, V., Scott, C.C., Comba, P., *Black Pine Mine Heap Leach Closure Pre-Closure Planning and First Year Closure Activities*, internal report for Pegasus Mining Corp., 20 p.

Shaddrick, D.R., 2013, *Technical report on the Mineral Gulch project, Cassia County, Idaho, USA,* NI 43-101 Technical Report for Western Pacific Resources Corp., 67 p.

Shaddrick, D.R.; Kizis, J.A., Jr.; Hunsaker, E.L., III, 1991, *The Geology and Ore Deposits of the Northeastern Great Basin, an Overview*, in Geology and Ore Deposits of the Northeastern Great Basin, Field Trip No. 5, edited by Shaddrick, D.R., Kizis, J.A., Hunsaker, E.L., Geological Society of Nevada, Reno, Nevada, 13 p.

Smith, J.F., Jr., 1982, *Geologic Map of the Strevell 15-Minute Quadrangle, Cassia County, Idaho,* U.S. Geological Survey Miscellaneous Investigations Series Map 1-1403, scale. 1:62,500.

Smith, J.F., Jr., 1983, *Paleozoic Rocks in the Black Pine Mountains, Cassia County, Idaho*, US Geological Survey Bulletin 1536, 36 p.

Stepperud, Erik C., (Stepperud 2020), Letter Report to Kappes, Cassiday & Associates, *Comminution Testing, Hazen Project 12752, Report and Appendicies A and B, May 22, 2020, 67 p.*

Theodore, T.G., Armstrong, A.K., Harris, A.G., Stevens, C.H. and Tosdal, R.M., 1998, *Geology of the Northern Terminus of the Carlin Trend, Nevada: Links Between Crustal Shortening During the Late Paleozoic Humboldt Orogeny and Northeast Striking Faults*, in Contributions to the Gold Metallogeny of Northern Nevada, USGS Open File Report 98-338, p. 69-105.

Thorman, C.H, and Peterson, Fred, 2004, *The Middle Jurassic Elko Orogeny: A Major Tectonic Event in Nevada-Utah,* Search and Discovery Article #3022, adapted from “extended abstract” for presentation at the AAPG Annual Meeting, Salt Lake City, Utah, May 11-14, 2003, 7 p.

Threlkeld, R.W., 1983, *Black Pine Project, Cassia County, Idaho*, internal report for Coeur Explorations Inc, 6 p.

USDA Forest Service - Sawtooth National Forest, 1993, *Draft Environmental Impact Statement, Black Pine Mine Expansion Project*.

Willis, G.F., 2004, *Pit Geologic Mapping for Mine Mappers*, internal geologic maps for Western Pacific Resources, 5 maps.

Yernberg, 1988, *Cyanide leach tests – final report*, partial internal report by Kappes, Cassiday & Associates for Noranda Exploration, Inc. (missing the first 18 pages), 88 p.

## 28.0 DATE AND SIGNATURE PAGE (ITEM 28)

| | |
|---|---|
| Effective Date of report: | June 20, 2021 |
| Completion Date of report: | August 18, 2021 |

***"Michael M. Gustin"***
Michael M. Gustin, Ph.D., CPG

Date Signed:
August 18, 2021

***" Moira T. Smith"***
Moira T. Smith, Ph.D., P. Geo.

Date Signed:
August 18, 2021

***" Gary L Simmons"***
Gary L. Simmons, M.M.S.A.

Date Signed:
August 18, 2021

## 29.0 CERTIFICATE OF QUALIFIED PERSON (ITEM 29)

**MICHAEL M. GUSTIN, CPG**

I, Michael M. Gustin, CPG, do hereby certify that I am currently employed as Senior Geologist by Mine Development Associates, Inc., 210 South Rock Blvd., Reno, Nevada 89502 and:

1. I graduated with a Bachelor of Science degree in Geology from Northeastern University in 1979 and a Doctor of Philosophy degree in Economic Geology from the University of Arizona in 1990. I have worked as a geologist in the mining industry for more than 35 years. I am a Licensed Professional Geologist in the state of Utah (#5541396-2250), a Licensed Geologist in the state of Washington (#2297), a Registered Member of the Society of Mining Engineers (4037854RM), and a Certified Professional Geologist of the American Institute of Professional Geologists (CPG-11462).

2. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101"). I have previously explored, drilled, and evaluated sediment-hosted gold deposits similar to Black Pine in Nevada, Idaho, Utah, and northern Mexico, and I have completed independent mineral resource estimations in accordance with NI 43-101 guidelines for a number of sediment-hosted gold deposits similar to Black Pine in the Great Basin Province of Nevada and Utah. I certify that by reason of my education, affiliation with certified professional associations, and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

3. I visited the Black Pine project site on May 2nd, 2018, November 16th, 2019, and July 16, 2021.

4. I am responsible for all sections of this report titled, "Updated Technical Report and Resource Estimate for the Black Pine Gold Project, Cassia County, Idaho, USA" dated August 18, 2021, with an effective date of June 20, 2021 (the "Technical Report"), subject to my reliance on other experts identified in Section 3.0.

5. I have had no other involvement with the property or project that is the subject of the Technical Report other than that directly associated with the completion of the Technical Report.

6. I am independent of Liberty Gold Corp. and all of its subsidiaries, as defined in Section 1.5 of NI 43-101 and in Section 1.5 of the Companion Policy to NI 43-101.

7. As of the effective date of this Technical Report, to the best of my knowledge, information, and belief, this Technical Report contains all the scientific and technical information that is required to be disclosed to make this Technical Report not misleading.

8. I have read NI 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

Dated this 18th day of August 2021.

*"Michael M. Gustin"*

Michael M. Gustin

## MOIRA T. SMITH, PH.D., P.GEO

I, Moira T. Smith, Ph.D., P.Geo., do hereby certify that I am a geologist residing at 928 Hardrock Place, Spring Creek, NV 89815, and am employed by Liberty Gold Corp. as Vice President, Exploration and Geoscience, and:

1. I graduated from Pomona College, with a B.A in Geology in 1983. I obtained a M.Sc. in Geology from Western Washington University in 1986, and a Ph.D. in Geology from the University of Arizona in 1990. I have practiced my profession continuously since 1990.

2. I am a Professional Geoscientist (P.Geo.) registered in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (#122720); I have relevant experience having led or participated in geological studies supporting 6 advanced exploration and development projects and/or operations, in 4 different countries.

3. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43- 101") and certify that, by reason of my education, affiliation with professional associations (as deemed in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

4. I have visited the Black Pine project site on a regular basis since 2016.

5. I assisted in the preparation of Sections 4 through 12 of this report titled, "*Updated Technical Report and Resource Estimate for the Black Pine Project, Cassia County, Idaho, U.S.A.*" dated August 18, 2021, with an effective date of June 20, 2021 (the "Technical Report").

6. I have worked on the Black Pine project in a technical capacity since August 2016. I am not independent of Liberty Gold Corp. (the "Issuer") applying all the tests in Section 1.5 of NI 43-101, and acknowledge that I hold securities of the Issuer in the form of stock and stock options.

7. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, the portions of the Technical Report for which I am responsible contain all of the scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

8. I have read NI 43-101 and Form 43-101F1, and the portions of the Technical Report that I am co-responsible for have been prepared in compliance with that instrument and form.

Dated this 18th day of August 2021.

"***Moira T. Smith***"

Moira T. Smith, Ph.D., P.Geo.

## Gary L. Simmons, MMSA QP

I, Gary L. Simmons do hereby certify that:

1. I am currently the Owner of GL Simmons Consulting, LLC, with an office at 15293 Shadow Mountain Ranch Road, Larkspur, Colorado 80118.

2. This certificate applies to the technical report titled "*Updated Technical Report and Resource Estimate for the Black Pine Gold Project, Cassia County, Idaho, USA"*, with an effective date of June 20, 2021 (the "Technical Report") prepared for New Placer Dome. ("the Issuer");

3. I am a Qualified Professional (QP) Member with special expertise in Metallurgy, QP No. 01013QP, registered with the Mining and Metallurgical Society of America (MMSA). I am also a Registered Member of the Society for Mining, Metallurgy and Exploration of the SME, Member ID 2959300.

   I am a graduate of the Colorado School of Mines with a B.Sc. in Metallurgical Engineering (1973). I have been involved in the Mining business since 1974 and have practiced my profession continuously since 1974. I have held senior mine and metallurgical production and corporate level management, technical and development positions for mining companies with operations in the United States, Canada, Australia, Indonesia, Peru and Mexico. I have worked as an independent consultant since 2008.

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

4. I visited the Black Pine project site on June 3, 2019, October 18 and 19, 2019, June 22 and 23, 2020, and May 13, 2021 as a consultant to Liberty Gold and a QP for the subsequent technical reports.

5. I am responsible for Section 1.7 and Section 13 of the Technical Report.

6. I am independent of the Issuer and Liberty Gold and related companies applying all of the tests in Section 1.5 of the NI 43-101.

7. I have had no involvement with the property that is the subject of the Technical Report prior to 2012.

8. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

9. As of the effective date of this Technical Report, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 18th day of August 2021 in Elko, Nevada

*"Gary L. Simmons"*

Gary L Simmons, MMSA QP