MADSEN GOLD PROJECT

2017 MINERAL RESOURCE ESTIMATE

prepared for Pure Gold Mining Inc.

Madsen Gold Project, Red Lake Mining District, Ontario, Canada

Effective: August 2, 2017
Signed: September 12, 2017

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GINTO CONSULTING INC.   puregold   EQUITY

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1.0 Summary

A mineral resource estimate for the Madsen Gold Project, located in the Red Lake Mining District of northwestern Ontario is provided herein. The Madsen Gold Project, which is 100% owned by Pure Gold Mining Inc. ("Pure Gold") is centred around an historical gold producer, the Madsen Mine, which produced 2.5 million ounces at an average grade of 9.7 g/t gold between 1938 and 1999 (Lichtblau et al., 2017). The Madsen Gold Project comprises a contiguous group of 258 mining leases, mining patents and unpatented mining claims covering an aggregate area of 4,769 hectares (47.7 km^2). Infrastructure includes paved highway access, a mill and tailings facility and access to power and water. Pure Gold has been exploring the Madsen Gold Project since 2014 and this resource estimate is the first new resource estimate since 2009 (Cole et al., 2016).

The Madsen Gold Project is focused on exploration and delineation of orogenic gold deposits within mafic and ultramafic volcanic and intrusive rocks of the Archean Red Lake Greenstone Belt which is part of the Uchi subprovince of the Superior Province craton. This greenstone belt has been a significant gold producer with continuous production since 1927 including present-day production at the Red Lake Gold Mines operation of Goldcorp Inc.

At the Madsen Mine, and other targets of the Madsen Gold Project, the main phase of gold deposition occurred during an early deformation event as evidenced by later deformation and metamorphism which has overprinted gold occurrences. For example, most gold at the 8 Zone and Russet South is contained within quartz veins which are strongly recrystallized, folded and/ or boudinaged. Wallrock alteration at these targets and at the Madsen Mine is strongly transposed by D_2 deformation and replaced by metamorphic mineral phases related to a penetrative, belt-scale deformation event. Exploration, therefore, is focused on tracing early, locally cryptic, structures which controlled hydrothermal fluid flow and gold deposition. A second style of gold deposition occurred across the Madsen Gold Project and is characterized by extensional, discontinuous quartz-tourmaline veins that cut the main S_2 foliation and are structurally late.

Recent exploration at the Madsen Mine has been advanced by geological interpretation of a large historical drillhole database comprising more than 14,000 holes and significant past underground exploration and geologic mapping. The geological relationships between gold mineralization and lithological contacts have been used to determine the location of early mineralized structures and these have been systematically extrapolated into areas with negligible drilling to target resource expansion and exploration opportunities. More preliminary exploration on exploration targets across the Madsen Gold Project has utilized soil and rock geochemistry, geological mapping, mechanical overburden stripping, airborne magnetic geophysics and drilling to advance targets outside of the Madsen Mine footprint. An active exploration program from both surface and underground is continuing on the project and a Preliminary Economic Assessment by Nordmin Engineering is currently underway.

Using both the historical drill hole database and new holes drilled by Pure Gold to April 11, 2017, an updated mineral resource estimate for Madsen Mine reports 1,648,000 indicated ounces of gold (from 5,785,000 tonnes at an average grade of 8.9 g/t Au) and 178,000 inferred ounces of gold (from 587,000 tonnes at an average grade of 9.4 g/t Au) at a cut-off grade of 4.0 g/t Au. This

estimate was prepared by Ginto Consulting Inc. of Vancouver, Canada and includes estimates for the Austin, South Austin, A3, 8 Zone, and McVeigh gold domains.

The qualified persons conclude that the current estimation of the mineral resources is a realistic representation of the mineral resources of the Madsen Gold Project, based on the current geologic understanding and available information.

2.0 Introduction

This technical report has been prepared for Pure Gold., an issuer listed on the TSX Venture Exchange ("TSX-V") to summarize the mineral resource estimate prepared for the Madsen Gold Project as disclosed in a news release dated August 2, 2017, and to comply with the requirements of continuous disclosure of the TSX-V. It describes the results of a new mineral resource estimate for the Madsen Gold Project that replaces the 2016 resource estimate included in the technical report prepared for Pure Gold by G. Cole, K. Niemala and J. Folinsbee entitled "NI 43-101 Technical Report on the Preliminary Economic Assessment for the Madsen Gold Project. Technical report written for Pure Gold, dated April 20, 2016" (the "PEA"). Consequently, the 2016 Preliminary Economic Assessment (PEA) (Cole et al., 2016), which relies on the 2016 resource estimate, is no longer current, and this technical report therefore only includes National Instrument 43-101 Standards of Disclosure for Mineral Projects ("NI 43-101") Form 1 items relevant to the resource estimate (Items 1-14, 23-27). Those items relevant to advanced properties (Items 15-22) are currently being updated as part of a new Preliminary Economic Assessment (PEA). Details of the updated PEA will be provided in an updated technical report following disclosure of the results.

This mineral resource estimate is based on 13,151 core drill holes which were drilled at an overall average spacing of 6.3 m in the high-grade domains and 9.5 m in the low-grade domains to April 11, 2017. The data for these drill holes was collected by Pure Gold and previous operators of the Madsen Gold Project, including Madsen Red Lake Gold Mines, Claude Resources Ltd. ("Claude") and Placer Dome Limited. ("Placer Dome"). Other information used in the preparation of this report included personal observations and exploration work carried out on the Madsen Gold Project by Pure Gold and Equity Exploration Consultants Ltd. ("Equity") personnel, assessment reports filed with the Ontario Ministry of Northern Development and Mines ("MNDM"), data and private reports supplied by Pure Gold, news releases issued by Pure Gold, published scientific papers and regional geological publications by the Ontario Geological Survey. A complete list of references is provided in Section 27.

Author Jutras, an independent Qualified Person under the meaning of NI 43-101 is Principal, Mineral Resources with Ginto Consulting Inc. Ginto was retained by Pure Gold in late 2016 to review the Madsen resources. Jutras inspected the property on August 30, 2017.

Author Baker, an independent Qualified Person under the meaning of NI 43-101 is President of Equity, which managed surface exploration programs comprising geological mapping and soil and rock geochemical surveys in 2014, 2015, 2016 and 2017 and diamond drilling programs in 2016 and 2017. He inspected the property during these campaigns, completed 30 days of geological mapping and has prepared geological interpretations along 142 cross sections and 32 level plans through the Madsen Mine and surrounding areas. His most recent personal inspection was on June 29, 2017.

Author Smerchanski, a non-independent Qualified Person under the meaning of NI 43-101 was Director, Geoscience for Pure Gold from April 2014 to April 2016 and since April 2016 has held the position of Vice President, Exploration. Since 2014, he has been involved in the technical aspects of the exploration programs of the Madsen Gold Project and has visited the Project several times; having completed supervision of geoscience programs, targeting and target modelling, review of historical records, and examination of drill core and outcrops. His most recent property visit was August 9 to 15, 2017.

Author Lee, a non-independent Qualified Person under the meaning of NI 43-101 is Chief Geoscientist with Pure Gold and has held this role since April 2016. From April 2014 to April 2016 he held the role of Structural Geologist with Pure Gold. He has visited the Madsen Gold Project numerous times having completed detailed geological surface and underground mapping, geological modelling, review of historical hard copy plan maps and diamond drill logs and examination of historical and recent drill core. He is directly responsible for geological modelling of the high-grade resource domains. His most recent property visit was August 29 to September 1, 2017.

Units used in this report generally follow conventions of the International System of Units (SI). Units and abbreviations used in this report are defined in Table 2.1 and Table 2.2.

Table 2.1: Units used in text

Unit	Definition
˚C	degree Celsius
cm	centimetre
C$	Canadian dollar
g	gram
g/t	grams per tonne
ha	hectare
km	kilometre
km^2	square kilometre
kg	kilogram
m	metre
ML	million litres
mm	millimetre
M tonne	million tonnes
µm	micrometre
oz	troy ounce (1 oz = 31.104 g)
oz/ton	troy ounce per short ton (1 oz/ton = 34.2857 g/t)
ppm	part per million
tonne	metric tonne (1 tonne = 1000 kg)
ton	short ton (1 ton = 907.2 kg)

Table 2.2: Abbreviations used in text

Abbreviation	Definition
AAS	atomic absorption spectroscopy
APS	azimuth pointing system
ARD	acid rock drainage
Au	gold
ca.	circa
CRM	certified reference material
CV	coefficient of variation
DDH	diamond drill hole
ECA	Environmental Compliance Approval
EM	electromagnetic
Ga	billion years or billion years ago
GPS	global positioning system
HLEM	horizontal loop electromagnetics, a geophysical technique
IP	induced polarization, a geophysical technique
ISO	International Standards Organization
Ma	million years or million years ago
MOECC	Ministry of the Environment and Climate Change
MNDM	Ministry of Northern Development and Mines

Abbreviation	Definition
N	north
NAD83	North American Datum (1983)
NI 43-101	National Instrument 43-101 Standards of Disclosure for Mineral Projects
NSR	net smelter return
QAQC	Quality Assurance and Quality Control
SARA	Species at Risk Act
TSX-V	Toronto Stock Exchange – Ventures
UTM	Universal Transverse Mercator
VLF-EM	very low frequency electromagnetics, a geophysical technique

3.0 Reliance on Other Experts

In Section 4.1 and 4.2, the authors have relied upon a title opinion of the ownership and royalty interests in the mineral tenure comprising the Madsen Gold Project. The title opinion is in the form of a letter dated February 22, 2017 and provided by McMillan LLP (McMillan LLP, 2017).

In Sections 4.2, 4.3 and 4.4 the authors have relied upon information provided in an internal Pure Gold report by Vendrig (2017) related to environmental liabilities, community relations, and permitting at the Madsen Gold Project.

4.0 Property Description and Location

4.1 Mineral Tenure

The Madsen Gold Project comprises a contiguous group of 258 mining leases, mining patent claims and unpatented mining claims covering an aggregate area of 4,769 hectares (47.7 km^2) in northwestern Ontario (Figure 4.1). The Property is centred at 50.97˚ North latitude and 93.91˚ West longitude (UTM Projection NAD83, Zone 15 North coordinates 5646000N, 435000E) within the Baird, Heyson and Dome Townships of the Red Lake Mining District. Claim data is summarized in Table 4.1 and shown in Figure 4.2.

Figure 4.1: Madsen Gold Project location map. Provided by Pure Gold, September 10, 2017

Pure Gold owns 100% of all mining leases, patents and unpatented claims comprising the Madsen Gold Project. Other than the royalties described in Table 4.2, the authors are unaware of any other royalties, back-in rights, payments or other agreements and encumbrances to which the property is subject. None of the royalties described apply to tenure covering the current mineral resource statement.

Unpatented mining claims confer title to hard-rock mineral tenure only, and claims must be converted to leases before mining can take place. Their boundaries are defined by the physical location of claim posts on the ground and were surveyed in 2017. Annual assessment work valued at $400 per claim unit (generally each claim unit measures 16 ha) must be carried out to maintain unpatented mining claims in good standing. Significant work credits exist on these claims or adjacent patent claims. Work credits can be transferred from adjoining claims.

Patented mining claims ("patents") confer fee-simple rights to hard-rock mineral tenure and allow extraction and sale of minerals. Most of the Pure Gold patents also include the surface rights above the mineral tenure; some easements for municipal services have been granted and a few claims have other surface owners. Typically, boundaries of mining patents are defined by legal surveys done prior to patenting. Patents do not require assessment work but are subject to an annual Mining Land Tax of approximately $4/ha.

Unpatented mining claims can be converted to mining leases which grant the right to extract and sell minerals for a renewable period of 21 years. Surface rights can be granted with the mining lease if they were previously held by the Crown; if not, an agreement with the surface rights owner must be completed as part of the leasing process. Boundaries of mining leases are defined by legal surveys done at the time of lease conversion. Leases do not require assessment work but are subject to an annual rent of $3/ha.

Table 4.1: Tenure data

Claim No.	No. of Claims	Area (ha)	Type		Claim No.	No. of Claims	Area (ha)	Type
Madsen Mine					Aiken			
11502 – 11509	8	158	Patented		19367 – 19368	2	32	Patented
11509A	1	17	Patented		19719 – 19720	2	35	Patented
12521 – 12529	9	158	Patented		21316 – 21318	3	55	Patented
12527A	1	19	Patented		21316A	1	25	Patented
12601 – 12605	5	99	Patented		19684 – 19688	5	94	Patented
12638 – 12641	4	97	Patented		19278 – 19281	4	90	Patented
12658 – 12663	6	115	Patented		20169 – 20171	3	64	Patented
12664 – 12669	6	108	Patented		18728 – 18729	2	58	Patented
12673 – 12684	12	229	Patented		18778	1	23	Patented
12836 – 12838	3	81	Patented		20585 – 20588	4	86	Patented
12921 – 12922	2	17	Patented		20585A – 20587A	3	63	Patented
13024	1	20	Patented		21378	1	24	Patented
36016 – 36019	4	66	Patented		19788	1	7	Patented
38091 – 38094	4	58	Patented		21273 – 21278	6	51	Patented
Grouping Total	66	1,242			21280 – 21281	2	25	Patented
Starratt-Olsen					Grouping Total	40	732	
12963 – 12965	3	55	Patented		Ava			
12704 – 12706	3	51	Patented		19247 – 19254	8	127	Patented
12642 – 12648	7	129	Patented		19306 – 19313	8	104	Patented
12730	1	24	Patented		19428 – 19430	3	61	Patented
12642A – 12644	3	56	Patented		Grouping Total	19	292	
12953 – 12955	3	89	Patented		Killoran			
12858 – 12866	9	112	Patented		47990 – 47996	7	108	Leased
12875 – 12883	9	154	Patented		50992 – 50993	2	27	Leased
12881A – 12882A	2	30	Patented		51018 – 51021	4	68	Leased
Grouping Total	40	700			Grouping Total	13	203	
Russet					Hager			
19235 – 19238	4	80	Patented		1184229	1	26	Unpatented
19181 – 19182	2	46	Patented		1184231	1	21	Unpatented
12820 – 12824	5	70	Patented		1184902	1	19	Unpatented
12726 – 12728	3	63	Patented		51287 – 51290	4	52	Leased
Grouping Total	14	259			Grouping Total	7	118	
Mills					My-Ritt			
19223 – 19226	4	52	Patented		456	1	16	Patented
12758 – 12760	3	49	Patented		407 – 408	2	40	Patented
12764 – 12766	3	37	Patented		457 – 461	5	82	Patented
16672 – 16673	2	39	Patented		Grouping Total	8	137	
Grouping Total	12	177			Nova Co			
Newman-Heyson					1445 – 1451	7	121	Patented
13060 – 13062	3	54	Patented		1452	1	21	Patented
13068 – 13069	2	40	Patented		Grouping Total	8	142	
13241 – 13244	4	87	Patented		Derlak			
13254 – 13255	2	41	Patented		12746 – 12756	11	219	Patented
13082 – 13084	3	64	Patented		Grouping Total	11	219	
13475 – 13477	3	57	Patented		Pending Claim*			
13659 – 13660	2	36	Patented		4282890	1	168	Unpatented
Grouping Total	19	380						

**Claim 4282890 was staked and filed in early August, 2017 but has not yet been processed by MNDM Lands Section.*

Table 4.2: Summary of royalty agreements affecting Madsen tenure

Claim No.	No. Claims	Royalty Holder	Royalty
18728, 18729, 19367, 19368, 19687, 19688, 19720, 20169 - 20171, 20585 - 20588, 20585A–20588A, 21273, 21274, 21275 - 21278, 21280, 21281, 21316 - 21318, 21316A, 21378, 12726–12728, 12820–12824, 19181, 19182, 19235–19237, 19328	44	Franco-Nevada Corporation	1% NSR to a maximum of C$1 million
18728, 18729, 19367, 19368, 19687, 19688, 19720, 20169–20171, 20585–20588, 20585A–20588A, 21273, 21274, 21275–21278, 21280, 21281, 21316–21318, 21316A, 21378, 12726–12728, 12820–12824, 19181, 19182, 19235–19237, 19328	44	Canhorn Mining Corporation*	1% NSR to a maximum of C$1 million
13060 to 13062, 13069, 13241 to 13244 , 13255 , 13554 , 13659 , 13660, 13068, 13082 to 13084, 13254 , 13475 to 13477 , 407 , 408, 456, 457, 458 to 461O, 1444 to 1452, 1476	38	Sandstorm Gold Ltd.	0.5% NSR
13060 to 13062, 13069 , 13241 to 13244 , 13255 , 13554 , 13659 , 13660 , 13068 , 13082 to 13084, 13254 , 13475 to 13477	20	Franco-Nevada Corporation	1.5% on first 1M oz-equiv; 2% on production beyond first 1M oz-equiv
407 , 408 , 456 –, 457 , 458 to 461	8	My-Ritt Red Lake Gold Mines Ltd	3% NSR
K 1445 to 1452	8	Camp McMann Red Lake Gold Mine Ltd.	3% NSR
12746 – 12756	11	Fechi Inc.	3% NSR, 1% purchasable for C$1M

4.2 Surface and Other Rights

Table 4.3 shows surface rights ownership for Madsen Property claims, patents and leases. Pure Gold owns surface rights as indicated in the table. Where Pure Gold does not hold surface rights they are dominantly held by the Crown, as administered by the Province of Ontario. Timber rights are reserved to the Crown and water rights are held for the public use. A First Nations owned timber company has obtained a timber harvest licence covering the northwestern portion of the property and has been granted access by Pure Gold through an agreement. A single trapping tenure is held over the entire property and Pure Gold maintains good relations with the tenure holder. A local outfitter has Bear Management Area licence over the Property which requires consent of the landowner for access. Several registered easements for highway and utility lines cross the property. The authors are aware of no other conferred rights on the Property.

Table 4.3: Summary of Surface Rights

Claim No.	No. Claims	Disposition Type
1445-1452, 407-408, 456-461, 11502-11509, 12521-12529, 12601-12605, 12638-12648, 12658-12669, 12673-12684, 12704-12706, 12726-12728, 12730, 12746-12756, 12758-12760, 12764-12766, 12820-12824, 12836-12838, 12858-12866, 12875-12883, 12921-12922, 12953-12955, 12963-12965, 13024, 13060-13061, 13068-13069, 13082-13084, 13241-13244, 13254-13255, 13475-13477, 13554, 13659, 13660, 16672-16673, 18728-18729, 18778, 19181-19182, 19223-19226, 19235-19238, 19247-19254, 19278-19281, 19306-19313, 19367-19368, 19428-19430, 19684-19688, 19719-19720, 19788, 20169-20171, 20585-20588, 21273-21278, 21280-21281, 21316-21318, 21378, 11509A, 12527A, 12642A-12644A, 12881A-12882A, 20585A-20587A, 21316A, 2890	229	Patent, surface and mining rights
50992, 50993, 51018, 51019, 51020, 51021, 51287, 51288, 51289, 51290	10	Lease, surface and mining rights
4229, 4231, 4902	3	Crown retained surface rights
13062, 38093	2	Licence of Occupation, surface and mining rights
47990, 47991, 47992, 47993, 47994, 47995, 47996	7	Lease, mining rights only
36016, 36017, 36018, 36019, 38091, 38092, 38094	7	Patent, mining rights only
4282890	1	Claim Pending, Crown retained surface rights

The property is located in the October 1873 Treaty #3 area. On acquiring the Madsen Property Pure Gold initiated engagement with the Grand Council of Treaty #3, who identified five First Nation communities to Pure Gold as needing to be informed and engaged with respect to Pure Gold activities and plans. Pure Gold has to date shared its plans and regular updates of its activities with these five nations: Wabauskang First Nation; Lac Seul First Nation; Wabaseemoong First Nation; Grassy Narrows First Nation; Naotkamegwanning First Nation; and the Métis Nation of Ontario. The MNDM has indicated to Pure Gold that only Wabauskang First Nation and Lac Seul First Nation need to be engaged and consulted at this stage, and further, that the MNDM will fulfill the duty to consult. At this time, the primary role of Pure Gold with First Nations is to ensure that appropriate information sharing occurs. The MNDM will consider additional development and advise, if and when a more formal consultation role should be undertaken by Pure Gold. Figure 4.3 shows the locations of Treaty No.3 First Nations relative to the Madsen Property.

Pure Gold considers that it has good relations with First Nations and is making efforts to enhance and strengthen those relations. Pure Gold has developed a Consultation Plan and is seeking to align this with First Nations requirements. Pure Gold has an extensive record of all consultation with First Nations since taking ownership of the project. Pure Gold and the identified First Nations are jointly developing an Exploration Agreement to formally define a cooperative and mutually beneficial relationship. This Exploration Agreement focuses on Pure Gold exploration activities up to the point of a Positive Production decision and predefines the key expectations of all signatories, should the project pass that critical milestone. Pure Gold posts all employment opportunities at Wabauskang First Nation and Lac Seul First Nation and also encourages its prime contractors to do so. Several employees of Pure Gold and its contractors identify as local First Nations members. Pure Gold maintains regular communication with the Red Lake Municipality council and administration and regularly sponsors community events. The company held a community information forum in late 2016 with approximately 60 local residents attending to hear about project activities and plans.

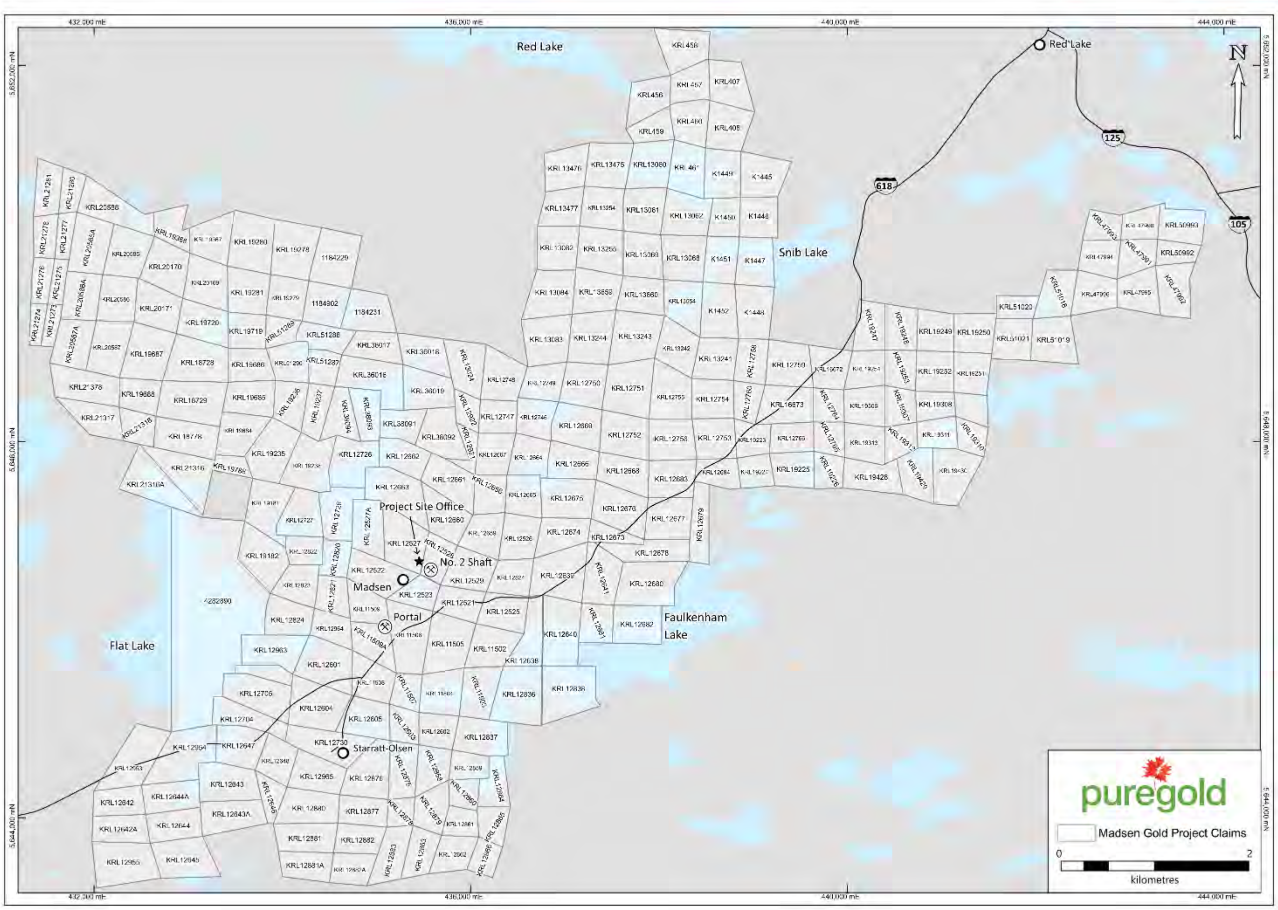


Figure 4.2: Madsen Gold Project tenure map. Provided by Pure Gold, September 10, 2017.

Figure 4.3: Treaty No.3 First Nations. Provided by Pure Gold, September 10, 2017.

4.3 Environmental Liabilities

The information on Environmental Liabilities in this section is taken from Vendrig (2017).

Pure Gold inherited a mining site with a history of almost a century of exploration, mining and minerals processing as well as an unfunded closure program submitted by Claude. The closure plan was updated and additional required funding was submitted by Pure Gold. Pure Gold has also undertaken, at its own expense, a site cleanup that has seen significant amounts of waste removed from the site, off-site tire and metal recycling, derelict building removal, PCB storage site decommissioning and rehabilitation, road upgrading and re-vegetation of critical areas. Tailings from historical operations are present at Madsen and Starratt. Reopening of the mine will require an update of the closure plan and additional funding of that plan. These actions will facilitate eventual final mine closure by allowing Pure Gold to fund further progressive reclamation of the Project site.

4.4 Permitting

Information on Permitting contained in this section is derived from Vendrig (2017).

Pure Gold has worked to maintain the permits that existed for the Madsen Mine under Claude. As the future project design has evolved and continues to change including operational enhancements and as regulations have changed over time, some permits will require updating should the project transition into operations. The following permits and authorisations are in currently in good standing:

- Permit To Take Water (0202-AHJL45): This permit was updated in 2017 and is in good standing allowing Pure Gold to pump approximately 6.5 ML of water per day from the mine workings.
- Advanced Exploration Closure Plan: In 2016, Pure Gold requested that the Madsen Portal Advanced Exploration area to be taken out of Temporary Suspension and put into Advanced Exploration. The closure plan for these proposed activities was accepted by the regulators along with additional funding for the Advanced Exploration program closure.
- Species at Risk (SAR) Exemption and Benefit Program Under Clause 17(2)c of SAR for Endangered Bats: Pure Gold discovered protected bats in the decline leading from the Madsen portal during the reopening of the portal in 2017. A new permit allowing Pure Gold to exclude the bats with the requirement to provide alternate outdoor bat house habitat and research on the bats was granted in June of 2017. The permit is in good standing until 2026.
- Registered Hazardous Waste Generation Site: Pure Gold maintains its registration as a hazardous waste site. This is renewed annually and is in good standing for 2017.
- MTO: Pure Gold holds several permits for drill road access from Highway 618 and a building and land use permit which allows exploration drilling in the Highway Permit Control area.

The following existing permits will require updating due to process changes or regulatory changes:

- Environmental Compliance Approval (ECA) Industrial Sewage Works Permit: Pure Gold is currently undertaking baseline studies focussed on optimizing water resource usage, recovery and recycling and has presented an updated operation general arrangement in the Project Definition.
- ECA for Air and Noise: Due to expected new equipment and operational changes to minimize power, energy and water usage, a new air and noise ECA will be required
- Mine Closure Plan, MNDM: Claude submitted an unfunded Mine Closure Plan to the MNDM on May 24, 1995 with an amended yet still unfunded closure plan re-submitted to the MNDM in July 2011. Pure Gold submitted an enhanced closure plan along with a performance bond of $2,517,025 to fully satisfy regulatory agencies, in February, 2014. Current funding is considered to be adequate for closure of the current mine status in Temporary Suspension and considerable site cleanup has been undertaken by Pure Gold outside of the closure plan funding. Given the new Project Definition and the considerable effort that has been made to clean up the site at Pure Gold's own cost, the closure plan will require updating should the mine be returned to operational status.
- Permit to Mine, MNDM: A Notice of Project Status was received and acknowledged by the MNDM on April 24, 2007; it allows for dewatering to 2900 feet (883.92 m). This would require updating if dewatering were to occur below this level.

Other Permits that may be required include:

- ECA for Sewage: For approval to construct and operate a domestic sewage treatment system, or Health Unit approval for smaller systems.
- Work Permit: Any construction/relocation of a transmission line, work on Crown land or for work in water.
- Plans and Specifications Approval: For construction of dams or berms, including those associated with tailings facilities and/or new ponds and ditches.
- Forest Resource License: Annual license for clearing of merchantable Crown timber.
- Aggregate Permit: Aggregate Resources Act For extraction of aggregate for dam construction.
- Leave to Construct: For approval to construct a transmission line.
- Notice of Construction: Notice is required before any contractor or construction activities take place.
- SARA Approvals: For migratory birds and their breeding areas.

4.5 Other Factors and Risks

The authors are not aware of any other significant factors and risks that may affect access, title or the right or ability to perform work on the property.

5.0 Accessibility, Climate, Local Resources, Infrastructure and Physiography

5.1 Accessibility

The Madsen Gold Project is located adjacent the community of Madsen, within the Red Lake Municipality of north-western Ontario, approximately 565 km by road (430 km direct) northwest of Thunder Bay and approximately 475 km by road (260 km direct) east-northeast of Winnipeg, Manitoba. Red Lake can be reached via Highway 105 from the Trans-Canada Highway 17. Red Lake is also serviced with daily flights from Thunder Bay and Winnipeg by Bearskin Airlines.

The Madsen Gold Project is accessible from Red Lake via Highway 618, a paved secondary road maintained year-round by the Ministry of Transportation of Ontario. The Madsen Mine site is 10 km southwest of Red Lake. A series of intermittently maintained logging roads and winter trails branching from Highway 618 provide further access to other portions of the property.

5.2 Local Resources and Infrastructure

The Red Lake Municipality, with a population of approximately 5,000, comprises six communities: Red Lake, Balmertown, Cochenour, Madsen, McKenzie Island, and Starratt-Olsen. Mining and mineral exploration is the primary industry in the area, with production mainly from Goldcorp's 1850 tonne/day Red Lake gold mine. Other industries include logging and tourism. The town of Red Lake offers a full range of services and supplies for mineral exploration and mining, including both skilled and unskilled labour, bulk fuels, freight, heavy equipment, groceries, hardware and mining supplies. Many of the Madsen Gold Project staff live in the surrounding area and out of town employees stay in local accommodations in Red lake.

The Madsen Mine site is serviced by a 44kV Ontario Hydro transmission line. Water is supplied via a municipal treatment facility from nearby Russet Lake. The project site is connected to municipal wastewater service.

5.3 Physiography and Climate

The topography within the Madsen Gold Project is gentle to moderate, with elevations ranging from 360 to about 430 m. Topography is dominated by glacially scoured southwest-trending ridges, typically covered with jack pine and mature poplar trees. Swamps, marshes, small streams, and small to moderate-size lakes are widespread. Rock exposure varies, but rarely exceeds 15% at ground surface and averages between 5–10%. Glacial overburden depth is generally shallow, rarely exceeding 20 m, and primarily consists of ablation till, minor basal till, minor outwash sand and gravel, and silty-clay glaciolacustrine sediments.

Vegetation consists of thick second growth boreal forest composed of black spruce, jack pine, poplar, and birch. Plate 5.1 illustrates typical landscape and vegetation around the Madsen Gold Project.

Plate 5.1: Typical landscape surrounding the Madsen Gold Project. Winter view looking southeast over Russet South (foreground with drilling rig) towards the No. 2 Madsen shaft and mill complex (upper right).

The climate in the Red Lake area is described as warm-summer humid continental (climate type Dfb according to the Köppen climate classification system). Mean daily temperatures range from -18˚C in January to +18˚C in July. Annual precipitation averages 70 cm, mainly occurring as summer showers but including a total of about two metres of snow. Snow usually starts falling during late October, and starts melting during March but is not normally fully melted until late April. Late-season snow in May is not rare.

Fieldwork and drilling are possible year-round on the property although certain wetter areas are more easily accessible in the winter when frozen.

6.0 History

This section is largely reproduced or summarized from Cole et al. (2016) and references therein, with the information relating to the Derlak property summarized from Reddick and Lavigne (2012).

Gold was originally reported in the Red Lake area in 1897 by R.J. Gilbert but intensive exploration of the district followed discovery in 1925 of the gold showings which eventually formed the basis for the Howey mine (Lebourdaix, 1957).

Since 1927, a total of 28 mines have operated in the Red Lake district, producing 29 million ounces of gold at an average recovered grade of 15.6 g/t Au. Approximately 89% of this gold was produced from three mines (Campbell Mine, Dickenson/Red Lake Mine and Madsen Mine) with the Madsen Gold Project accounting for 9% of the district's production (Lichtblau et al., 2017).

Highlights of the exploration and mining history of the Madsen Gold Project within the Red Lake area are tabulated in Table 6.1.

The Madsen Gold Project can be divided into five claim groups with separate histories of mining and exploration until they were acquired and amalgamated with the original Madsen Mine property over the past forty years: Madsen, Starratt (acquired in 1980), Russet (timing unknown, but acquired between 1989 and 1997), Newman-Madsen (2014) and Derlak (2017). The following sections describe the exploration and mining work carried out during each main stage of property accretion:

- from 1925, when gold mineralization was first discovered at Red Lake, until 1980 when the Madsen and Starratt mine properties were unified;
- from 1980 until 1998 when Claude acquired the Madsen, Starratt and Russet properties; and
- from 1998 until 2014 when Laurentian (subsequently renamed Pure Gold) purchased the project.

Exploration conducted by Pure Gold after acquisition of the Madsen Gold Project in 2014 is described in Section 9.0.

Table 6.1: Exploration and mining history highlights of the Madsen Gold Project

Year	Activity
1925	Gold discovered at Red Lake.
1926	First claims staked in Madsen area
1935	Madsen Red Lake Gold Mines incorporated, No. 1 shaft sunk to 163 m.
1936	Discovery of Austin zone.
1937	Madsen No. 2 shaft sunk to access Austin zone. Ultimately reaches to 1275 m with 27 levels.
1938	Madsen mill facility initiates 36 year continuous production.
1948	Starratt-Olsen mine opens with production for 8 years.
1956	Production halted at Starratt-Olsen mine. Total production of 823,554 tonnes at a recovered grade of 6.19 g/t (163,990 oz Au).
1969	Discovery of Zone 8 located between levels 22 and 27 of the Madsen Mine.
1974	Production halted at Madsen Mine. Total production of 7,593,906 tonnes at a recovered grade of 9.91 g/t (2,416,609 oz Au).
1974	Madsen operation sold to Bulora Corporation.
1976	Bulora Corporation files for bankruptcy.
1980	E.R. Rowland acquires Madsen and Starratt properties.
1990	Red Lake Buffalo Resources acquires Madsen and Starratt properties from Rowland estate, changes name to Madsen Gold Corp. in 1991.
Prior to 1998	Madsen Gold Corp. acquires Aiken and Russet claims and amalgamates with the Madsen and Starratt properties (collectively referred to hereinafter as the Madsen Gold Project).
1998	Claude purchases Madsen Gold Corp. and commences dewatering Madsen workings and mining from the Madsen shaft.
1998–2000	Claude drills 230 holes (~21,000 m) on the Madsen Gold Project.
1999	Claude mines and mills from the Madsen shaft until October 1999. Total production for Claude of 278,773 tonnes at a recovered grade of 3.99 g/t (35,779 oz) Au.
2001	Placer Dome options the Madsen Gold Project and stops dewatering.
2001–2004	Placer Dome drills 115 holes (60,725 m) on the Madsen Gold Project, most on targets outside the Madsen and Starratt mine areas. Discovers Fork and Treasure Box zones.
2002	Wolfden acquires the Newman-Madsen Property and explores it in joint venture with Kinross (2002-03; 17 holes; 4,193 m) and Sabina (2004-2011; 48 holes; 18,684 m).
2006	Placer Dome exits Madsen Gold Project, returning it 100% to Claude.
2007–2013	Claude drills 346 holes (198,913 m) on the Madsen Gold Project, including >200 holes (>80,000 m) on targets outside the Madsen Mine itself. Dewaters from level 6 (2007) to level 16 (2010) and below, pumping halted in 2013.
2012	Sabina purchases 100% interest in Newman-Madsen Property and issues 0.5% NSR to Premier Gold Mines Limited.
2012	Sabina drills 13 holes (4,332 m) on Newman-Madsen Property.
2014	Laurentian Goldfields Ltd. purchases the Madsen Gold Project from Claude.
2014	Laurentian, renamed Pure Gold, purchases the Newman-Madsen Property from Sabina and amalgamates it into the Madsen Gold Project. SRK restates 2009 resource
2014–2017	Pure Gold drills 355 holes (114,583.5 m) on the Madsen Gold Project until April 11, 2017, with drilling continuing to the present.
2016	Nordmin completes positive Preliminary Economic Assessment* for Pure Gold on a limited portion of the known resource
2017	Pure Gold opens Madsen Portal and initiates ramp reconditioning
2017	Pure Gold initiates permitting study and environmental baseline work
2017	Pure Gold purchases the Derlak property from Orefinders Resources Inc. and merges it into the Madsen Gold Project.
2017	Pure Gold stakes claim on Flat Lake area to cover Balmer Assemblage rocks recently mapped
2017	Pure Gold completes new resource estimate and initiates new PEA
	* 2016 PEA no longer considered current

6.1 1925–1980

6.1.1 Madsen

The first claims staked in the Madsen area date back to 1927, but no work from this period is recorded. Marius Madsen staked part of the property in 1934 and Madsen Red Lake Gold Mines was incorporated in 1935. Early prospecting uncovered several gold showings in the area. Initially, the work focused on an auriferous quartz vein hosted by felsic volcanic rock on claim 11505 near High Lake. The No. 1 shaft was sunk to a depth of 175 m, and four levels were developed. In 1936, Austin McVeigh located a gold-bearing zone (later determined to be part of the McVeigh Deposit) on the northern edge of what is now the Process Water Pond. Drilling on this zone carried out in late 1936 delineated the important Austin Deposit. The underground development of the No. 2 Madsen shaft (Plate 6.1) commenced in 1937 with the sinking of a three-compartment shaft to a depth of 163 m. The shaft eventually reached a depth of 1,273 m with 24 shaft-accessible levels and 3 additional ramp-accessible levels totalling 27 underground levels of development for approximately 67 linear km. The mill began operating in August 1938 and operated continuously until 1974.

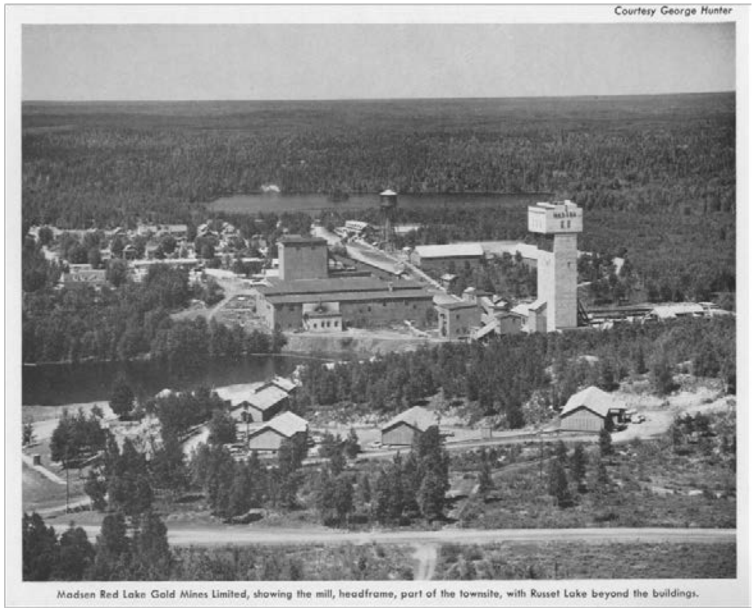


Plate 6.1: Madsen Mine Site in the 1960s

Total recorded production from 1938–1999 at the Madsen Mine is 7,872,679 tonnes at an average recovered grade of 9.69 g/t Au. This production accounted for 2,452,388 ounces of gold (Lichtblau et al., 2017). Annual production for the period 1938–1976 is summarized in Table 6.2 (excludes data from certain periods).

Table 6.2: Gold production for Madsen Mine from 1938–1976

Year	Gold Production (ounces)	Tonnage Milled (tons)	Year	Gold Production[1] (ounces)	Tonnage Milled (tons)
1938	n/a	n/a	1958	123,489	302,200
1939	13,909	65,460	1959	118,805	301,999
1940	25,716	140,674	1960	119,084	306,377
1941	30,088	141,109	1961	106,096	301,031
1942	30,971	145,534	1962	100,878	311,705
1943	39,195	146,346	1963	107,131	306,247
1944	33,733	144,179	1964	n/a	n/a
1945	36,825	127,870	1964	94,869	305,823
1946	25,438	98,472	1965	87,632	94,869
1947	34,977	143,371	1967	70,033	277,566
1948	32,421	143,391	1968	56,196	265,268
1949	35,579	150,779	1969	60,579	238,473
1950	65,444	282,050	1970	40,569	184,530
1951	61,687	302,227	1971	44,497	146,162
1952	67,337	304,251	1972	37,696	138,250
1953	82,596	285,018	1973	29,163	126,070
1954	82,333	286,246	1974	2,102	11,112
1955	104,874	295,713	1975	n/a	n/a
1956	100,995	294,913	1976	2,196	12,840
1957	103,181	305,300			

[1]Production figures extracted from available Madsen Mine annual reports, 1938-1976. n/a = data not available. Table from Cole et al. (2016).

The operation was sold to Bulora Corporation in 1974 and was acquired by E.R. Rowland in 1980.

6.1.2 Starratt

The Starratt-Olsen Mine, located approximately 2.2 km southwest of Madsen Mine, operated from 1948 through 1956 and produced approximately 163,990 ounces of gold from 823,554 metric tonnes at an average recovered grade of 6.19 g/t Au (Lichtblau et al., 2017).

The original staking and prospecting in the Starratt area dates back to 1926 and 1927, soon after gold was discovered in Red Lake. Only minor work was completed at the time, and the claims were allowed to lapse. Claims were staked by David Olsen and R.W. Starratt in 1934 and optioned by Val d'Or Mineral Holdings (Val d'Or) in 1935. The early exploration focused on three showings termed the Olsen, De Villiers, and Starratt showings. Trenching and core drilling were performed on the De Villiers and Starratt showings during 1936 and 1937. In 1938, New Faulkenham Mines optioned the property and sank a three-compartment shaft to a depth of 53 m but did not complete any further work. In 1939, Val d'Or continued exploration underground on the 53 m level and outlined four mineralized shoots.

The property remained idle during the war years 1940 to 1944, after which exploration resumed. A drilling campaign in 1945 was sufficient to outline an ore reserve, and Starratt-Olsen Gold Mines Limited was incorporated. Sinking of the Starratt shaft to a depth of 450 m and level drifting were completed between 1945 and 1947. Mining operations were carried out at the Starratt shaft between 1948 and 1956 (Plate 6.2). In 1957, the company name was changed to Starratt Nickel Mines Limited.

Plate 6.2: Starratt-Olsen Mine in 1949

The New Faulkenham Mines property is located east-southeast of the Starratt claim group and consists of 18 patented claims that were originally staked by the Faulkenham Lake Gold Syndicate in 1935. Some surface exploration was carried out between 1935 and 1938, mostly on

Claim 12881. During this time, a three-compartment shaft was sunk to a depth of 105 m and three levels were established. No historical production data are available for the Faulkenham shaft. Exploration commenced again in 1958 with the completion of 11 surface holes. The property was acquired by Starratt Nickel Mines Limited in 1963. In 1965, Starratt Nickel itself was acquired by Dickenson Mines Limited.

Further core drilling was conducted by Dickenson Mines in 1963 and 1964 mainly in the De Villiers zone but with three holes to the west of the Olsen zone.

E.R. Rowland acquired the property in 1980 and amalgamated it with the Madsen Property.

6.1.3 Russet

The Russet Red Lake Syndicate was formed in 1936, acquired eight claims in the southern part of Russet Lake and completed limited prospecting work. Russet Red Lake Gold Mines was incorporated in 1943 and acquired the Syndicate's claims and six other claims. Their exploration commenced in 1944 with trenching and 24 short holes on Claims 19181 and 19235 just west of Russet Lake. This work focused on a seemingly complexly folded zone of interflow iron formation hosted by mafic volcanic rock that crops out on Claim 19235. Work then shifted about 350 m to the east to explore another zone of gold mineralization hosted by altered mafic volcanic rock near the western contact of the Russet Lake ultramafic sequence. In 1946 and 1947, a total of 105 shallow holes tested both the Main zone and the No. 3 Zone near Russet Lake, after which the property remained idle until it was amalgamated with the Aiken ground to the west in 1965.

Aiken Red Lake Gold Mines Limited was incorporated in 1945 to acquire claims previously held by several smaller prospecting syndicates. Work in 1945 consisted of prospecting, trenching, and core drilling on the No. 1 and No. 2 veins located on Claims 18728 and 20585, respectively. No further work was conducted on the property until it was merged with the Russet ground to the east in 1965.

International Mine Services carried out a three-hole drilling program in the No.3 zone area in 1966. A further 21 holes were completed on the Russet mineralized zones in 1968, based on a geological and structural re-interpretation.

Five holes in 1969 tested the stratigraphy south of the No.3 zone. During the winter of 1974, a 22-hole program was completed in the No.3 zone area. This work was followed by a small surface stripping program. One hole was drilled in the northern part of the property in 1977 to test an EM conductor.

6.1.4 Newman-Madsen

Coin Lake Gold Mines Ltd. ("Coin Lake") acquired the property historically referred to as the My-Ritt from Red Lake Bay Mines Ltd. in 1936. Coin Lake completed an intensive program of stripping and trenching from 1936 to 1939. During this time a magnetometer survey was completed and at least 22 holes were drilled. Information about the total length of the holes is unavailable.

Between 1943 and 1946, Cockeram Red Lake Gold Mines completed a total of 35 core holes (5,674 m), primarily testing for gold mineralization along strike from the Madsen Mine. Results from these drilling programs are not available. Additional drilling in this area was done in 1943 by Central Patricia Gold Mines Ltd., who drilled 14 core holes of unknown type and length.

An area south of Coin Lake was held as part of a large land package owned by Rajah Red Lake Gold Mines Ltd in the mid-1950s. In 1957, the company's charter was cancelled and ownership of the Heyson Township claims was transferred to H.A. Newman. The only recorded work on the Heyson Township claims consists of geological and magnetometer surveys completed in 1959. Mespi Mines Ltd. also completed an aeromagnetic survey over the area in 1959.

Assessment file records are scarce for the time period between 1959 and 1971 but it is known that My-Ritt Gold Mines Ltd. held the property at some point during this time period.

In 1971, Cochenour-Willans Gold Mines Ltd. obtained the property from My-Ritt Gold Mines Ltd. and completed VLF-EM, IP and soil geochemical surveys, followed by three core holes totalling 527.65 m. However, the exact location of these holes is unknown and results are unavailable.

6.1.5 Derlak

The earliest records on the Derlak property indicate that stripping, trenching, magnetometer surveying and diamond drilling were done by Derlak Red Lake Gold Mines Limited in 1936–1937. Nine holes (~518 m) tested about 500 m of strike length of a porphyry dyke. Mineralized shear zones associated with it had a maximum width of ~12 m but low gold values.

In 1944, Derlak Red Lake Gold Mines Limited drilled another eight diamond drill holes testing below the same zones without success.

Madsen Red Lake Gold Mines Limited optioned Derlak and drilled 13 holes in 1967 with a maximum assay of 2.3 g/t Au.

6.2 1980–1998

6.2.1 Madsen/Starratt

E. R. Rowland controlled the combined property from 1980 to 1988 when Red Lake Buffalo Resources acquired the ground from his estate. Under an option agreement, Noranda Exploration carried out mapping and core drilling between 1980 and 1982. On the Starratt claims, Noranda's 11 holes focused on the down-dip extension of the De Villiers vein. Three of these holes hit significant gold mineralization including an intersection grading 16.46 g/t Au over 1.55 m.

Red Lake Buffalo Resources was reorganized into Madsen Gold Corp. ("Madsen Gold") in 1991. Madsen Gold drilled 29 holes (2,480 m) at Starratt in 1998.

6.2.2 Russet

United Reef Petroleums carried out an exploration program on the Russet property between 1987 and 1988, which included airborne and ground geophysical surveys and a 78-hole drilling program. The majority of the drilling focused on the Russet Main and No.3 zones, but drilling was also directed to various other targets on the property.

The Russet property was acquired by Red Lake Buffalo Resources or Madsen Gold prior to 1998 and combined with the Madsen and Starratt properties.

6.2.3 Newman-Madsen

Between 1981 and 1982 Noranda Inc. apparently completed four holes of unknown length in the central part of the Newman-Madsen claims. Their location, orientation and assay results are unavailable. No further exploration on the property was reported until 2002, when the property was acquired by Wolfden Resources Corporation ("Wolfden").

6.2.4 Derlak

Selco Inc. optioned Derlak and completed geological mapping, magnetometer, VLF-EM, HLEM surveys and diamond drilling (six holes) in 1980–81. No significant gold mineralization was found.

The property was reportedly optioned by Seine Explorco Ltd. in 1981 and by Redaurum Red Lake Mines Ltd. in 1985 but the report has not been located.

Placer Dome optioned the property in 1997 and undertook IP, magnetometer, geological mapping and rock sampling surveys. Twelve rock samples (probably selective grab samples) exceeded 10 g/t Au on the western part of the property, including a quartz vein that returned 370 g/t Au. Placer Dome drilled four holes on the property in 1998, intersecting weak quartz-carbonate veining in shear zones without significant gold values.

6.3 1998–2014

6.3.1 Madsen/Starratt/Russet

After the acquisition of the Madsen Mine and surrounding property in April 1998, Claude began mining portions of the McVeigh and Austin deposits from the Madsen portal and ramp.

In 1998, Claude extracted 85,417 tonnes, of which 81,740 tonnes were milled for a total production of 8,929 ounces of gold at an average recovered grade of 3.43 g/t (0.10 oz/ton) Au. Mill recovery was estimated to be 86.75%, suggesting a head grade of approximately 3.91 g/t (0.114 oz/ton) Au. Stoping occurred within the Austin Deposit between levels 2 and 5 of the mine and in the McVeigh Deposit.

Information available for the final seven months ending October 1999 indicate a mill throughput of 99,726 tonnes at 4.39 g/t (0.128 oz/ton) Au for a total of 13,260 ounces of gold. Reconciliation between milled and mined data revealed a significant grade variance, ascribed to excessive mining dilution (Olson et al., 1999).

After 15 months, the Madsen Mine and mill complex was put on care and maintenance status in October of 1999. Total recorded production for the Madsen Mine property, inclusive of that produced by Claude, during the periods 1938 to 1974 and 1998 to 1999, is 7,872,679 metric tonnes at an average recovered grade of 9.69 g/t (0.283 oz/ton) Au for a production of 2,452,388 ounces of gold (Lichtblau et al., 2017).

At the same time, Claude compiled all historic geophysical, geological, geochemical, and drilling data on the Madsen Gold Project (Panagapko, 1998) and surveyed 11.7 line-km of gradient array IP over the Austin and McVeigh deposits. The IP survey successfully outlined a chargeability anomaly related to sulphide mineralization associated with the auriferous tuff intervals and was also helpful in delineating silica alteration in basalt.

Between 1998 and 2000, Claude evaluated several near surface targets including the McVeigh West, De Villiers, and No. 1 shaft zones (Panagapko, 1999). This involved mapping, stripping, trenching, limited test-mining and drilling of 133 holes. Table 6.3 summarizes the extent and distribution of drilling on the Madsen Gold Project, as far as known, between Claude's purchase of the property in 1998 and its sale to Pure Gold in 2014.

Table 6.3: Distribution of 1998–2013 drilling on the Madsen Gold Project

Operator		Zone					Total
		Madsen	Starratt	Fork	Treasure Box	Other	
Claude (1998-2000)	holes	≥85	≥33	-	-	≥15	230
	metres	>6,417	na	-	-	≥1,296	21,000
Placer Dome (2001-2004)	holes	>12	9	16	49	>12	115
	metres	15,244	4,830	6,160	24,356	>7,969	60,725
Claude (2007-2012)	holes	≥108	35	105	51	≥15	346
	metres	≥93,883	19,344	45,179	13,573	≥10,560	198,913
Total (1998-2013)	holes	≥205	≥77	121	100	≥42	691
	metres	≥115,598	>24,174	51,339	37,929	≥19,825	280,638

At the McVeigh West area, which is located about 750 m west of the Madsen shaft, 80 surface holes explored several new zones of gold mineralization extending to at least 90 m below surface. Exploration drilling in the 2-11N and 2-13N raise areas of the McVeigh zone confirmed the presence of gold-bearing lenses above the known workings on the second level.

The surface expression of the No. 1 Shaft quartz vein system was stripped, mapped and channel sampled, delineating four shoots on surface. Three benches were mined for approximately 7,920 tonnes of vein and wallrock. An additional waste stockpile of 5,440 tonnes was generated with a reported average grade of 4.83 g/t gold. Fifteen holes were drilled on the No. 1 Shaft vein shoots; several decimetre-scale zones of gold mineralization were intersected but most holes encountered either minor or no veining at all.

The De Villiers area on the Starratt property, about 2.5 km southwest of the Madsen shaft, was stripped, mapped, and sampled, exposing a discontinuous zone of quartz veins and stringers. Seventeen holes were drilled on the De Villiers vein, with 16 intersecting veins and/or silicification. The best intercept was 9.9 g/t Au over 2.8 m. Two benches were mined for a total of 2,667 tonnes.

In 2001, Claude granted Placer Dome an option to earn 55% of the Madsen project. Placer Dome failed to produce the required bankable feasibility study in time and Goldcorp returned the property to Claude in September 2006 following their acquisition of the Placer Dome Red Lake assets.

Most of Placer Dome's efforts (information taken from Dobrotin and Landry, 2001; Dobrotin, 2002; Crick, 2003; Dobrotin, 2003; Dobrotin and McKenzie, 2003; Dobrotin, 2004b, a) were directed at drilling the Madsen Mine at depth and other broad property-scale targets (Table 6.3) but they also carried out surface mapping and geochemistry and a 45 km^2 airborne magnetic/gravity survey.

From 2001 to 2005, Placer Dome drilled 115 holes (60,725 m) to test the footwall stratigraphy of the main Madsen auriferous zones within a mafic-ultramafic sequence up-dip of various targets on the property, including: 8 Zone, Starratt, Treasure Box, Russet South, and Fork, among others. Several zones of anomalous gold mineralization were encountered and several of these areas remain as high priority targets. Mobile metal ion and conventional soil sampling to the north, west, and around Russet Lake in 2001 outlined five relatively small and low magnitude anomalies. Re-logging of historical drill holes and compilation of historical geochemical, geophysical and drill data led to drilling of eight holes (5,028 m) in 2002 on the northern shore of Russet Lake, in an area now referred to as the Treasure Box zone. Of these eight holes, three intersected visible gold, and all eight intersected gold grades ranging from 1 to 48 g/t Au. A further 41 holes (19,328 m) were drilled at Treasure Box in 2003 and 2004, with some of the better composites including 9.6 m at 4.58 g/t Au, 4.9 m at 10.6 g/t Au, and 4.2 m at 17.9 g/t Au.

Five holes (2,664 m) were drilled on the western shore of Russet Lake in 2002. Four of the holes intersected gold values ranging from 1 to 14.5 g/t Au with a best intercept of 10.6 g/t Au over 1.22 m. A further 3 holes (2,356 m) were drilled in this area in 2003, outlining a broad corridor of ductile deformation with gold values from 1 to 8.83 g/t Au over 0.3 to 1.2 m widths.

In 2003, Placer Dome drilled two holes on a target termed the Fork Zone, located where the Starratt trend (southwest) and the Madsen Mine trend (northeast) converge. The holes intersected highly altered and deformed basalt and ultramafic rock with the best intersection grading 4.0 g/t Au over 1.2 m. Another 14 holes were subsequently drilled in the area, intersecting widespread alteration and mineralization, including intervals grading up to 6.1 g/t Au over 2.8 m and 47.0 g/t Au over 1.3 m.

Nine holes were drilled in the Starratt area in 2003, intersecting numerous quartz-chlorite-epidote altered vein structures, some with visible gold but widths were generally narrow and the continuity was irregular. A new discovery, tested by only two holes, graded 5.97 g/t Au over 1.2 m within Madsen-style altered rock.

After Claude re-acquired the Madsen Gold Project in 2006, they focused mainly on drilling, historical data compilation, and dewatering and rehabilitation of the Madsen Mine. Mine dewatering commenced in 2007 and was discontinued in late 2013. Claude drilled 346 holes (198,913 m) on the Madsen Gold Project between 2007 and 2012 (Table 6.3).

Claude drilled at least 108 holes in the Madsen Mine area, both from surface and underground. Their main targets were the down-dip extension of 8 Zone, the McVeigh target near the western end of known mineralization, near-surface mineralization in the Austin zone in an area known as Apple, and its down-plunge extension.

Extensive infill drilling on the Fork Zone in 2008 and 2009 showed two subparallel southeast-dipping shear systems hosting narrow discontinuous visible gold-bearing vein systems over a strike length in excess of 400 m. Highlight intersections included 8.39 m grading 13.91 g/t Au and 7.62 m grading 15.77 g/t Au.

Claude drilled 51 holes in the Treasure Box area in 2007, testing the system to depths in excess of 350 m. Anomalous gold values were present throughout, with several narrow high grade zones associated with quartz-tourmaline veining over a strike length of 165 m. The best intersections included 6.05 m grading 12.94 g/t Au and 1.22 m grading 38.47 g/t Au.

During the first half of 2008, Claude drilled 18 holes testing the mafic-ultramafic trend in the footwall of the Starratt-Olsen mine workings. Hole ST-08-03 intersected high grade, shear-hosted vein systems associated with the footwall contact of the ultramafic unit. This success was followed up by an additional 13 closely-spaced holes later in 2008, defining two narrow zones of gold mineralization. Claude drilled another four holes in 2010, intersecting 1.0 to 8.6 g/t Au over narrow widths of 1.5 to 3.5 m.

6.3.2 Newman-Madsen

The Newman-Heyson property was explored under a joint venture between Wolfden and Kinross Gold Corporation (“Kinross”) in 2002 and 2003. In 2002, the Wolfden/Kinross joint venture completed line-cutting, ground magnetics, soil geochemical surveys and six holes (1,786 m) testing targets in the Dome stock (Klatt, 2003a). Assay results were mixed, with rare high-grade intersections including hole KRL-02-05 which intersected 9.25 g/t gold over 3.55 m. In 2003, the joint venture drilled 11 holes (2,407 m) on widely spaced targets, but no gold mineralization was encountered (Klatt, 2003b).

In 2004, Wolfden created the Newman-Madsen project by amalgamation of the My-Ritt, Nova Co, and Newman-Heyson properties. Exploration on Newman-Madsen was completed under a joint venture between Wolfden and Sabina Resources Ltd. (“Sabina Resources”), whereby Sabina Resources earned a 50% interest in the property. In 2004, the joint venture completed a drilling program comprising 31 holes (9,531 m) with Wolfden as operator. Drilling intersected abundant gold mineralization, primarily along a regional structure. In this area, mineralization is spatially associated with an arsenic soil geochemical anomaly, which is also located in the Dome stock granodiorite. This mineralized zone was subsequently termed the Evade zone (Toole, 2005).

In 2006 the joint venture drilled four holes (2,964 m) to test targets along or near the Balmer-Confederation unconformity. All holes intersected anomalous gold values; an intercept of 22.57 g/t Au over 2.0 m was encountered in hole DDH NM06-02 (Long, 2007).

In 2010, the joint venture, now under the operatorship of Sabina Gold & Silver Corp. (“Sabina”) completed four holes (3,183 m) to test the far northeast extension of the Madsen Mine trend stratigraphy at levels significantly deeper than previously explored. Drilling was successful in intersecting the targeted stratigraphy and delineating an area of hydrothermal alteration with significant gold, including a high-grade intercept of 43.51 g/t Au over 0.65 m in hole NM-10-02.

In 2011, the joint venture drilled nine holes (3,006 m) to test targets interpreted to comprise folded mafic and ultramafic rock sequences of the Balmer assemblage where they are coincident with favourable D2 structures, geochemical signatures, and resistivity anomalies. These targets were selected to present opportunities to intersect mineralization similar to that of the Red Lake Mine High-Grade zone style and returned a series of anomalous and significant gold values.

In January 2012, Sabina acquired 100% interest in the Newman-Madsen Property for a cash payment of C$500,000 and issuance of a 0.5% net smelter return royalty to Premier Gold Mines Limited. Following this transaction, Sabina drilled 13 holes (4,332 m), focusing on higher priority areas including extensions of the Buffalo mine trend, the Dome Stock contact, and the Balmer assemblage.

In March 2013, Sabina contracted a 37.4 line-km IP survey using a Volterra-3DIP instrument array in an attempt to delineate the extent of the Buffalo and Madsen trends, and potentially outline the contact between the Dome stock and adjacent Balmer Assemblage volcanic rock.

In October 2013, Sabina mobilized a four-person mapping crew to the Newman-Madsen project to renew surface observations of stratigraphy and structure. Sabina did no further work on the Newman-Madsen Property before selling it in June 2014 to Pure Gold, who amalgamated it into the Madsen Gold Project. Table 6.4 summarizes historical drilling on the former Newman-Madsen Project.

Table 6.4: Summary of drilling on former Newman-Madsen Project

Operator	Year	No. of Holes	Total Length (m)
Coin Lake Gold Mines Ltd	1930s	~221	unknown
Cockeram Red Lake Gold Mines	1943–1946	35	5,674
Cochenour-Willans Gold Mines Ltd.	1971	3	528
Noranda Inc.	1981–1982	4	unknown
Wolfden Resources Ltd./Kinross Gold Corporation	2002–2003	17	4,193
Wolfden Resources Ltd. / Sabina Resources Ltd	2004–2006	35	12,495
Premier Gold Mines Ltd / Sabina Gold & Silver Corp.	2010–2011	13	6,189
Sabina Gold & Silver Corp.	2012	13	4,332
Totals		~360	~29,200

6.3.3 Derlak

Reddick and Lavigne (2012) reported no further exploration on the Derlak property after 1998.

6.4 Previous Mineral Resource and Mineral Reserve Estimates

6.4.1 Pre-NI 43-101 Mineral Resource and Mineral Reserve Estimates

The reader is cautioned that the historical mineral resource and mineral reserve estimates discussed in this section were prepared before the development of NI 43-101. A qualified person has not done sufficient work to classify the historical estimate as current mineral resource or mineral reserve. Hence, the reader is cautioned that the figures should not be relied upon. The historical mineral resource and mineral reserve estimates are superseded by the Mineral Resource Statement reported in Section 14 of this document.

Annual estimates of mineral resource and mineral reserves inventories for the Madsen Mine were undertaken internally by mine staff using various sampling data. Typically, sampling from exposed development and stoping was used to estimate proven reserves, whereas closely spaced core drilling data were used for estimating probable reserves. Indicated and Inferred resources were extrapolated from widely spaced holes only. Independent audits were undertaken by ACA Howe in 1998 and 1999. Aspects of the last audit performed in 1999 (Patrick, 1999) are described in this section.

Mineral reserves for the Austin and McVeigh zones above level 6 were estimated by Madsen Mine staff using a polygonal methodology and the following parameters:

i. Assays were capped at 1 ounce of gold per ton (34.2857 g/t gold);

ii. Minimum geological width of 4 feet (1.22 m);

iii. Minimum mining width of 6 feet (1.83 m);

iv. A 15% dilution factor at 0.34 g/t gold for shrinkage mining, and a 20% dilution factor at 0.34 g/t gold for longhole stoping mining methods;

v. The tonnage factor of 2.85 tonnes per cubic metre;

vi. Area of influence around a drill intersection is defined as a rectangular block with horizontal and vertical sides tangential to a 7.62 m (25 feet) radius around the drill pierce point on a vertical longitudinal projection;

vii. Reported at a cut-off grade of 4.85 g/t gold derived from a gold price of US$325/oz. and a mill gold recovery of 95%.

Based on the above criteria, historical mineral resources and reserves were classified into the following categories:

i. **Inferred Resources** included blocks above the cut-off grade estimated from drill intersections with pierce points that were further apart than 22.86 m (75 feet). Confidence level 10–30%;

ii. **Indicated Resources** were blocks above the cut-off grade defined by three or more drill intersections with pierce points less than 22.86 m apart (75 feet). Confidence level 30–60%;

iii. **Probable Reserves** were restricted to 7.62 m (25 feet) above and below a drill intersection when grouped together in sets of four or less. Confidence level 75%;

iv. **Proven Reserves** lay adjacent to sampled mine openings, usually supported by drill intersections. The spatial characteristics, size, and mineral content of ore blocks were well established and ore blocks were at or above the mine cut-off grade. Proven reserves were extended to a maximum of 7.62 m (25 feet) beyond a sampled development if core or other sampling information supported the extension. Confidence level 85–90%.

An additional 76,245 tonnes at a grade of 11.71 g/t gold in proven pillar reserves above level 6 were not considered mineable at the time by the mine staff. ACA Howe included this material in the proven reserve category as they considered this material to represent a future reserve.

Although Madsen Mine staff did not process any data below level 6, ACA Howe considered it prudent to define all the material previously identified by previous operators as undiluted reserves below level 6 as Indicated resources. In addition, ACA Howe also identified additional Inferred resources for the Austin and McVeigh mineralized zones below level 6. A table summarizing the historical Madsen reserve and resource inventory as reported by ACA Howe is provided in Table 6.5. The reader is cautioned that the historical mineral resource and mineral reserve estimate was prepared before the development of National Instrument 43-101 guidelines, and that the figures reported in this table should not be relied upon. This historical mineral resource and mineral reserve estimate is superseded by the Mineral Resource Statement reported in Section 14 of this report.

Table 6.5: 1999 resource and reserve inventory for the Madsen Mine (Patrick, 1999)

Classification* / Zone	Quantity (tonnes)	Grade (g/t Au)	Contained Metal (ounces Au)	Quantity (tonnes)	Grade (g/t Au)	Contained Metal (ounces Au)
	Above Level 6			**Below Level 6**		
Reserves						
Proven						
Austin	72,153	10.97	25,451			
McVeigh	49.867	11.66	18,689			
No 1 Shaft	5,418	5.83	1,015			
Total	127,438	11.02	45,156			
Probable						
Austin	57,373	11.31	20,870			
McVeigh	130,407	6.86	28,750			
No 1 Shaft						
Total	187,780	8.22	49,620			
Resources						
Indicated						
Austin	63,286	8.57	17,440	565,331	12.38	225,086
McVeigh	36,108	8.91	10,349			
No 1 Shaft				801	7.89	203
Total	99,394	8.70	27,789	566,132	12.38	225,289
Inferred						
Austin	21,135	7.54	5,126	136,065	7.54	32,997
McVeigh	23,585	7.54	5,719	181,420	7.54	43,996
No 1 Shaft						
Total	44,720	7.54	10,845	317,485	7.54	76,993

**The reader is cautioned that the historical mineral resource and mineral reserve estimates were prepared before the development of National Instrument 43-101. A qualified person has not done sufficient work to classify the historical estimate as current mineral resources or reserves. Hence, the figures reported in this table should not be relied upon. The historical mineral resource and mineral reserve estimates are superseded by the Mineral Resource Statement reported in this report.*
The resource and reserve inventory reported in this table has been converted to metric system. Reported at a cut-off grade of 4.85 g/t gold considering a gold price of US$325 per troy ounce gold and metallurgical recoveries of 95%. Estimates include pillar reserves. This table is reproduced from Cole et al. (2016) without verifying figures.

6.4.2 Previous NI 43-101 Compliant Mineral Resource and Mineral Reserve Estimates

In 2008, Claude commissioned SRK Consulting (Canada) Inc. ("SRK") to prepare a resource estimate to NI 43-101 standards for four separate auriferous zones (Austin, South Austin, McVeigh, and 8 Zone) of the Madsen Mine. This resource estimate for the Austin, South Austin and McVeigh zones is based on 13,617 drill holes (808,344 m) and 550,687 gold assays, current to September 27, 2009. For Zone 8, the resource estimate is based on a mixture of exploration holes, stope definition holes and stope chip samples, with the database current to July 7, 2009.

SRK divided the auriferous zones into 16 domains for geostatistical analysis, variography and grade estimation. Assays were composited to 2 m length in the Austin, South Austin and McVeigh zones and to 1 m length in Zone 8. In different domains, high-grade composites were capped at 12–150 g/t Au, depending upon the grade distribution in each domain. Resource blocks in all zones measured 5 m x 5 m x 5 m; their grades were estimated by ordinary kriging.

In the Austin, South Austin and McVeigh zones, Indicated Resources were deemed to consist of resource blocks with a minimum of 2 composites within variogram range; those blocks with one composite within twice the variogram range were deemed to be Inferred Resources. For 8 Zone, an Indicated classification was assigned to blocks located at elevations within 25 m below the lowest stope (elevation of 190 m), whereas an Inferred classification was assigned to all blocks below that elevation.

A cut-off grade of 5.0 g/t Au was used for the resource estimate, based on a gold price of US$1,000 per ounce and an assumed metallurgical recovery of 94%.

A table summarizing the Madsen reserve and resource inventory as reported by Cole et al. (2010) is provided in Table 6.6. This mineral resource estimate is superseded by the Mineral Resource Statement reported in Section 14 of this report. It has been included here for information only, and should not be relied upon.

Table 6.6: 2009 Madsen Gold Project mineral resource estimate (Cole et al., 2010)

Class*	Zone	Quantity ('000 tonnes)	Au Grade (g/t)	Contained Metal ('000 oz Au)
Indicated	Austin	1,677	7.92	427
	South Austin	850	9.32	254
	McVeigh	374	9.59	115
	Zone 8	335	12.21	132
	Total	**3,236**	**8.93**	**928**
Inferred	Austin	108	6.30	22
	South Austin	259	8.45	70
	McVeigh	104	6.11	20
	Zone 8	317	18.14	185
	Total	**788**	**11.74**	**297**

**Mineral resources are not mineral reserves and have not demonstrated economic viability. All figures have been rounded to reflect the relative accuracy of the estimates. Reported at a cut-off grade of 5.0 g/t gold based on US$1,000 per troy ounce gold and gold metallurgical recoveries of 94%. The mineral resource estimate in this table is superseded by the Mineral Resource Statement reported in Section 14 of this report and should not be relied upon.*

7.0 Geological Setting and Mineralization

7.1 Regional Geology

The Madsen Gold Project is located within the Archean craton of the Superior Province of the Canadian Shield. The Superior Province comprises gneissic and granite-greenstone terranes that extend across northwestern Quebec through Ontario and southwest to Minnesota in a series of east-northeast trending sub-provinces (Figure 7.1). The northern and southern extents of the Superior Province are characterized by high-grade gneiss-dominated subprovinces whereas the core contains subprovinces that are dominated by either plutonic, metasedimentary or volcanic-plutonic rocks (Card and Ciesielski, 1986).

The Madsen Gold Project occupies part of a regional geologic domain characterized by volcanic-plutonic rocks termed the Uchi Subprovince which is bound to the north by the Berens River Subprovince (pluton dominated) and to the south by the English River Subprovince (metasediment dominated). These three subprovinces amalgamated through tectonic processes at ca. 2700 Ma during the Kenoran orogeny (Stott et al., 1989).

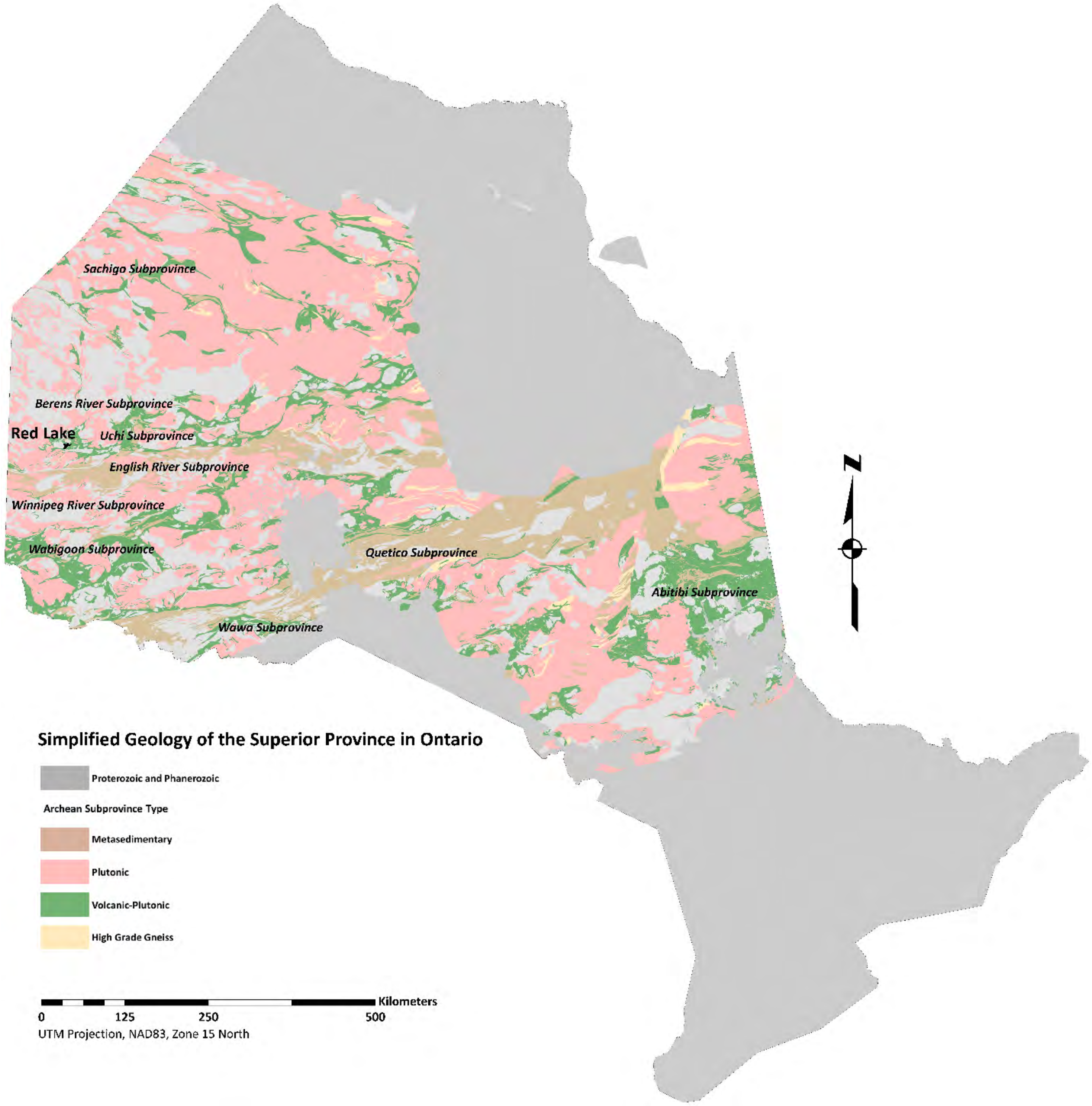


Figure 7.1: Geology of the Superior Province showing location of Red Lake and Uchi Subprovince (after Ontario Geological Survey by P. Smerchanksi, September 8, 2017).

7.1.1 Uchi Subprovince

The Uchi Subprovince is approximately 570 km long by 50 km wide and comprises a series of plutonic rocks discontinuously surrounded by arcuate belts of supracrustal rocks, predominately volcanic and subordinate metasedimentary rocks. Continuously trending packages of supracrustal rocks are referred to as greenstone belts due to their typically green colour owing to widespread greenschist-grade metamorphism. Globally, Archean greenstone belts are responsible for about 18% of historical gold production (Roberts, 1988) and the Uchi Subprovince is a significant contributor. Most Uchi greenstone belts have some recorded historical gold production but all pale by comparison to the well-endowed Red Lake Greenstone Belt which boasts 28.9 million ounces of gold production to the end of 2016 (Lichtblau et al., 2017).

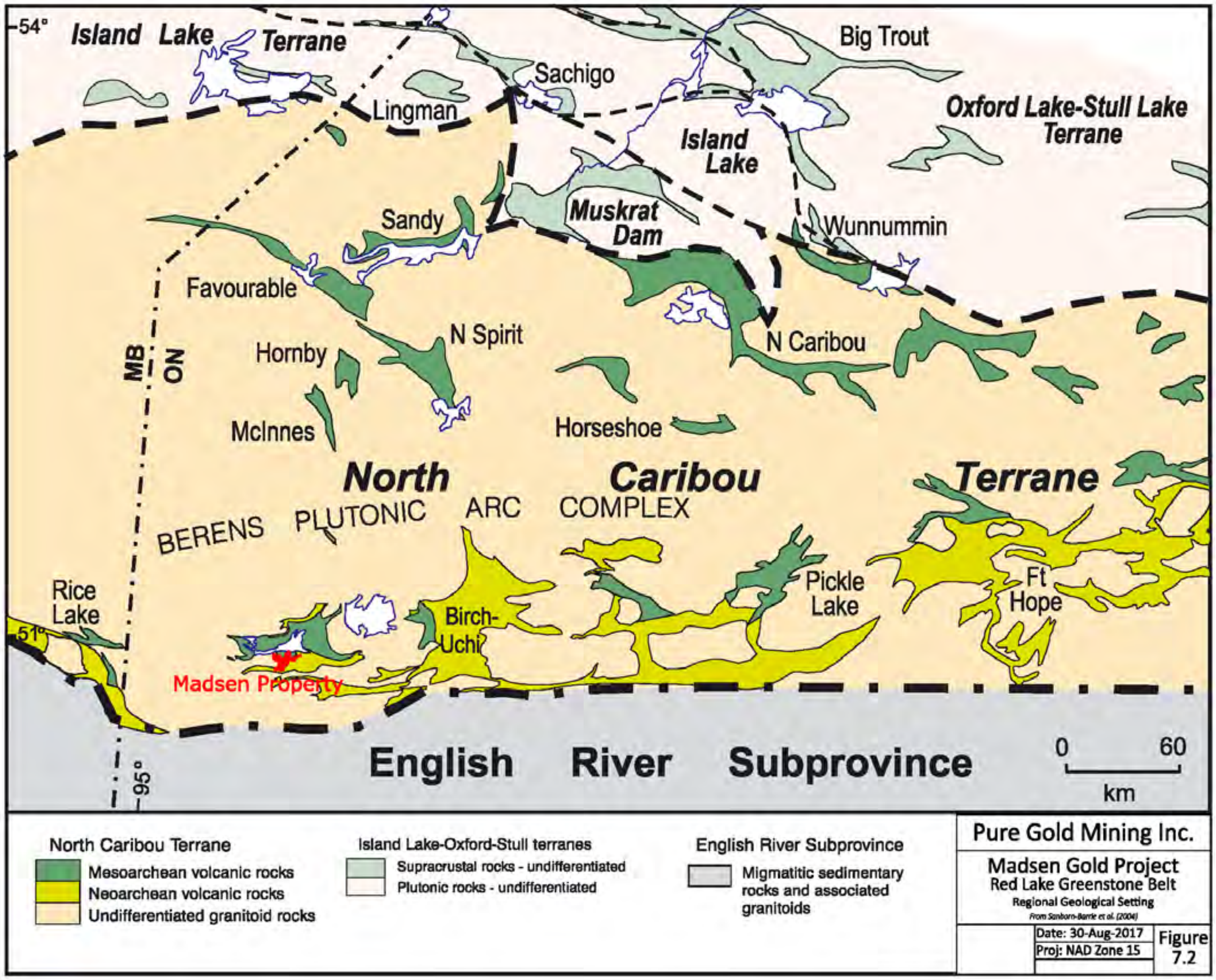


Figure 7.2: Geology of the Uchi Subprovince showing location of the Madsen Property in the Red Lake Greenstone Belt. From Sanborn-Barrie et al. (2004b) and drafted by Equity August 30, 2017.

7.1.2 Red Lake Greenstone Belt

The Red Lake Greenstone Belt is approximately 50 km by 40 km in dimension and comprises a series of ca. 2.99–2.70 Ga supracrustal rocks intervening between three main grainitoid batholiths ranging from 7 to 20 km across (Figure 7.3). The supracrustal rocks have been stratgraphically divided into eight assemblages and the following descriptions of these are taken from Sanborn-Barrie et al. (2004b).

7.1.2.1 Balmer assemblage

The oldest volcanic rocks in the Red lake greenstone belt comprise predominately tholeiitic mafic and komatiitic ultramafic rocks of the at ca. 2.99–2.96 Ga Balmer assemblage. Significantly, all the belt's major gold deposits are hosted in Balmer rocks. The assemblage consists of lower, middle, and upper massive to pillowed tholeiitic sequences separated by distinctive felsic and ultramafic volcanic rocks. Metasedimentary rocks also occur within the assemblage, mainly as thinly bedded magnetite-chert iron formation.

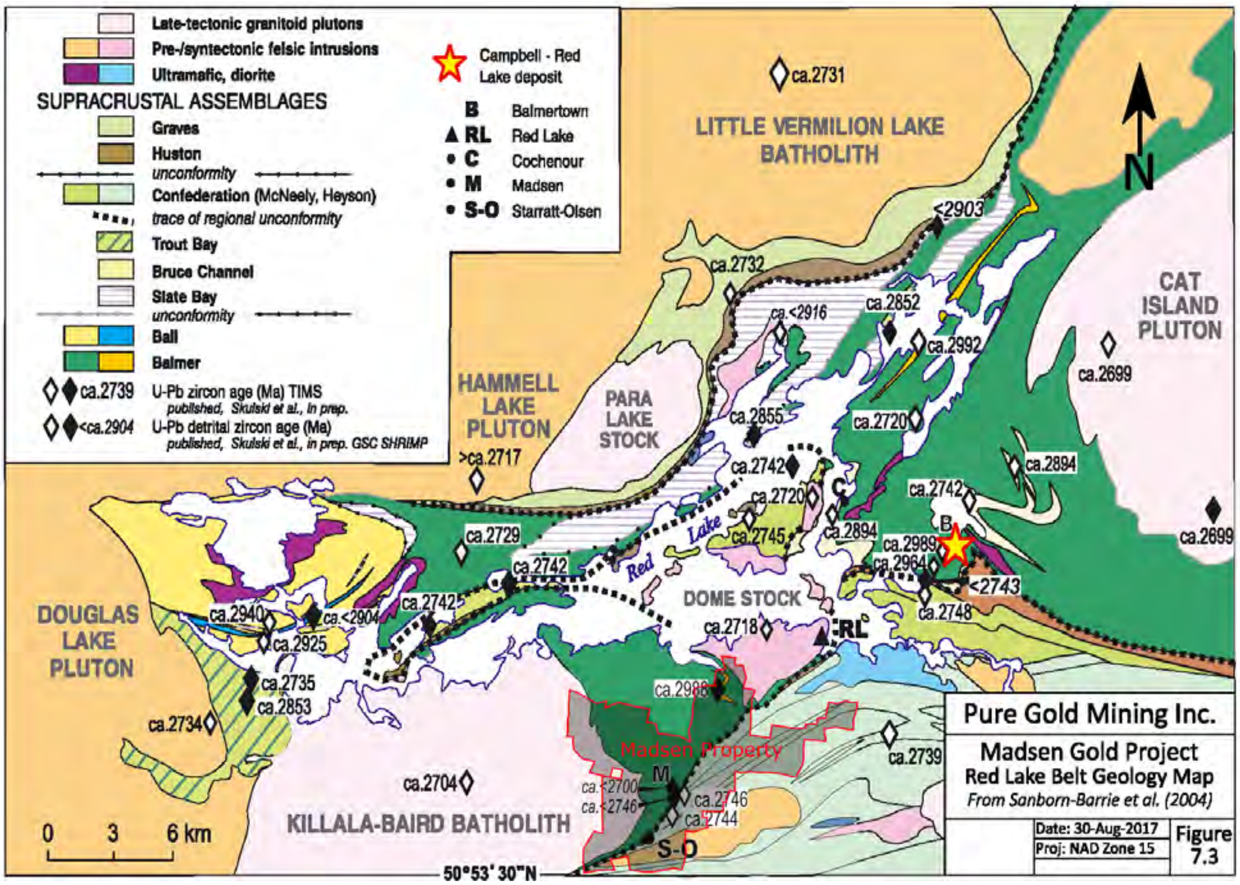


Figure 7.3: Simplified Geology of the Red Lake Greenstone Belt. Madsen Property is shown in red with grey shading. From Sanborn-Barrie et al. (2004b) and drafted by Equity August 30, 2017.

7.1.2.2 Ball assemblage

Underlying the northwestern portion of the Red Lake Greenstone Belt is the ca. 2.94-2.92 Ga Ball assemblage, comprising a thick sequence of metamorphosed intermediate to felsic calc-alkaline flows and pyroclastic rocks.

7.1.2.3 Slate Bay assemblage

The Slate Bay assemblage extends the length of the belt and lies disconformably on Balmer and Ball assemblage volcanic rocks. It comprises clastic rocks of three main lithological facies varying from conglomerates, quartzose arenites, wackes, and mudstones. Detrital zircon data indicate that the Slate Bay clastic material is mostly derived from Ball assemblage rocks with minor input from Balmer assemblage rocks. Based on the youngest zircon ages, the maximum age of deposition for the Slate Bay assemblage is ca. 2916 Ma whereas overlying ca. 2850 Ma volcanic rocks (Trout Bay assemblage) provide a minimum age for deposition (Corfu et al., 1998; Sanborn-Barrie et al., 2004b).

7.1.2.4 Bruce Channel assemblage

A thin (<500 m) sequence of calc-alkaline dacitic to rhyodacitic pyroclastic rocks, clastic sedimentary rocks and banded iron formation is dated at ca. 2.89 Ga and assigned to the Bruce Channel assemblage. Enriched LREE trace element profiles relative to the Balmer assemblage are interpreted to indicate crustal growth at a juvenile continental margin.

7.1.2.5 Trout Bay assemblage

The Trout Bay assemblage was previously correlated with Balmer rocks but represents a distinct sequence in the northwestern part of the belt. It comprises tholeiitic basalt, clastic rock and iron formation. An interbedded, intermediate tuff returned a ca. 2.85 Ga age for this assemblage.

7.1.2.6 Confederation assemblage

Following a hiatus in volcanic activity for approximately 100 million years, the Confederation assemblage records a time of widespread calc-alkaline volcanism from ca. 2,748–2,739 Ma. A ca. 2,741 Ma (Lichtblau et al., 2012) quartz-feldspar-porphyritic lapilli tuff forms a distinctive basal Confederation assemblage unit within the Madsen Mine area.

Overlying the McNeely sequence in the Confederation assemblage is the Heyson sequence of tholeiitic basalts and felsic volcanic rocks. Isotopic and geochemical data suggest the McNeely rocks were formed during a shallow marine to subaerial arc on the existing continental margin with later intra-arc extension and eruption forming the Heyson sequence. In the Madsen area, the strata of the Confederation and Balmer assemblages depict an angular unconformity with opposing facing directions. The Balmer assemblage was, thus, at least tilted and possibly overturned prior to the deposition of the Confederation assemblage (Sanborn-Barrie et al., 2001).

7.1.2.7 Huston assemblage

Following the Confederation assemblage, the Huston assemblage (approximately between 2,742 and 2,733 Ma) records a time of clastic sedimentary deposition varying from immature conglomerates to wackes. The Huston assemblage has been compared to the Timiskaming conglomerates commonly associated with gold mineralization in the Timmins camp of the Abitibi greenstone belt (Dubé et al., 2003).

7.1.2.8 Graves assemblage

The ca. 2.73 Ga Graves assemblage comprises andesitic to dacitic pyroclastic tuff on the north shore of Red Lake. It is interpreted to represent the volcanic deposits of a shallow water to subaerial arc complex. It overlies and is locally transitional with the Huston assemblage.

7.1.2.9 Intrusive Rocks

Intrusive rocks found in the Red Lake Greenstone Belt generally coincide with the various stages of volcanism described in the assemblage sections above. In the simplest interpretation, these intrusive rocks are the subvolcanic feeders to the extrusive volcanism that occurred at the earth's surface. These rocks include mafic to ultramafic intrusions during Balmer and Ball time periods, gabbroic sills related to Trout Bay volcanism, felsic dykes and diorite intrusions during the

Confederation assemblage, as well as, intermediate to felsic plutons, batholiths, and stocks of Graves assemblage age.

Post-volcanism plutonic activity is also evident from granitoid rocks such as the McKenzie Island stock, Dome Stock, and Abino granodiorite (2,720 and 2,718 Ma), which were host to past producing gold mines. The last magmatic event recorded in the belt is from about 2.7 Ga and includes a series of potassium-feldspar megacrystic granodiorite batholiths, plutons and dykes, including the post-tectonic Killala-Baird batholith. The contact between Killala-Baird granodiorite and the Balmer assemblage volcanics is well exposed on the Madsen property at Flat Lake.

7.1.2.10 Deformation History

The structural and deformation history of the Red Lake Greenstone Belt is summarized here from the published regional mapping of Sanborn-Barrie (Sanborn-Barrie et al., 2000; Sanborn-Barrie et al., 2001; Sanborn-Barrie et al., 2004a; Sanborn-Barrie et al., 2004b). Note that more detailed, recent work at the Madsen Gold Project has developed a modified structural history and this is discussed in the next section.

The earliest deformation event (denoted as D_0) involved non-penetrative deformation which resulted in only tilting of Balmer assemblage rocks prior to Confederation-aged volcanism. Evidence for this is cited as opposed younging directions on either side of the Balmer/ Confederation unconformity near Madsen and within central Red Lake.

The main stage of penetrative deformation (i.e. that which has imposed a strong tectonic fabric to the rocks) occurred post Confederation time so after 2.74 Ga. This D_1 event resulted in formation of northerly-trending F_1 folds including a NNW-trending fold that trends through the centre of the Madsen Property concordant with the Killala-Baird batholith contact. Sanborn-Barrie suggests that D_1 deformation was completed prior to deposition of ca. 2.73 Ga Graves assemblage volcanic rocks since these do not seem to be affected by F_1 folds.

Superimposed on D_1 structures are E to NE-trending D_2 structures in western and central Red Lake Greenstone Belt whereas these trend SE in the eastern part of the belt. This change in orientation is gradual – consistent with coeval timing rather than an overprinting relationship. Significantly, Sanborn-Barrie views the penetrative deformation events as widespread and affecting the entire belt rather than strongly partitioned into crustal-scale shear zones as proposed by an earlier round of researchers (e.g. Andrews et al., 1986). The timing of D_2 strain is constrained by the ca. 2.72 Ga Dome Stock which exhibits a weak S_2 fabric but country rock xenoliths within the pluton exhibit a penetrative S_2. Sanborn-Barrie suggests that this means the deformation largely predated Dome Stock but continued after stock emplacement which brackets the timing at about 2.72 Ga and this deformation is therefore linked to the Uchian orogeny. Since the post 2.70 Ga English River assemblage conglomerate is deformed by a penetrative S_2 fabric, this suggests that D_2 was a protracted event.

In summary, Sanborn-Barrie's deformation history of the Red Lake Greenstone Belt involves tilting of Balmer stratigraphy (D_0) followed by penetrative foliation development during belt-scale folding (D_1) post-Confederation time and lastly, widespread overprinting of D_1 structures by an S_2 foliation.

7.2 Property Geology

The Madsen Property is underlain by Balmer, Confederation and possibly Huston assemblage supracrustal rocks (Figure 7.4). These rocks are cut by a series of plutonic rocks (post-tectonic Killala-Baird batholith to the west and syntectonic Dome Stock to the east) and associated smaller sills and dykes. Although detrital zircon geochronological data suggests that epiclastic rocks near the Madsen Mine belong to the Huston or English River assemblages (Sanborn-Barrie et al., 2004b; Lichtblau et al., 2012; Lichtblau and Storey, 2015), the sequence of these units based on drilling data suggests that the Huston assemblage underlies the Confederation assemblage. This is difficult to reconcile with regional relations so these units are grouped with the Confederation until more geochronological data is available.

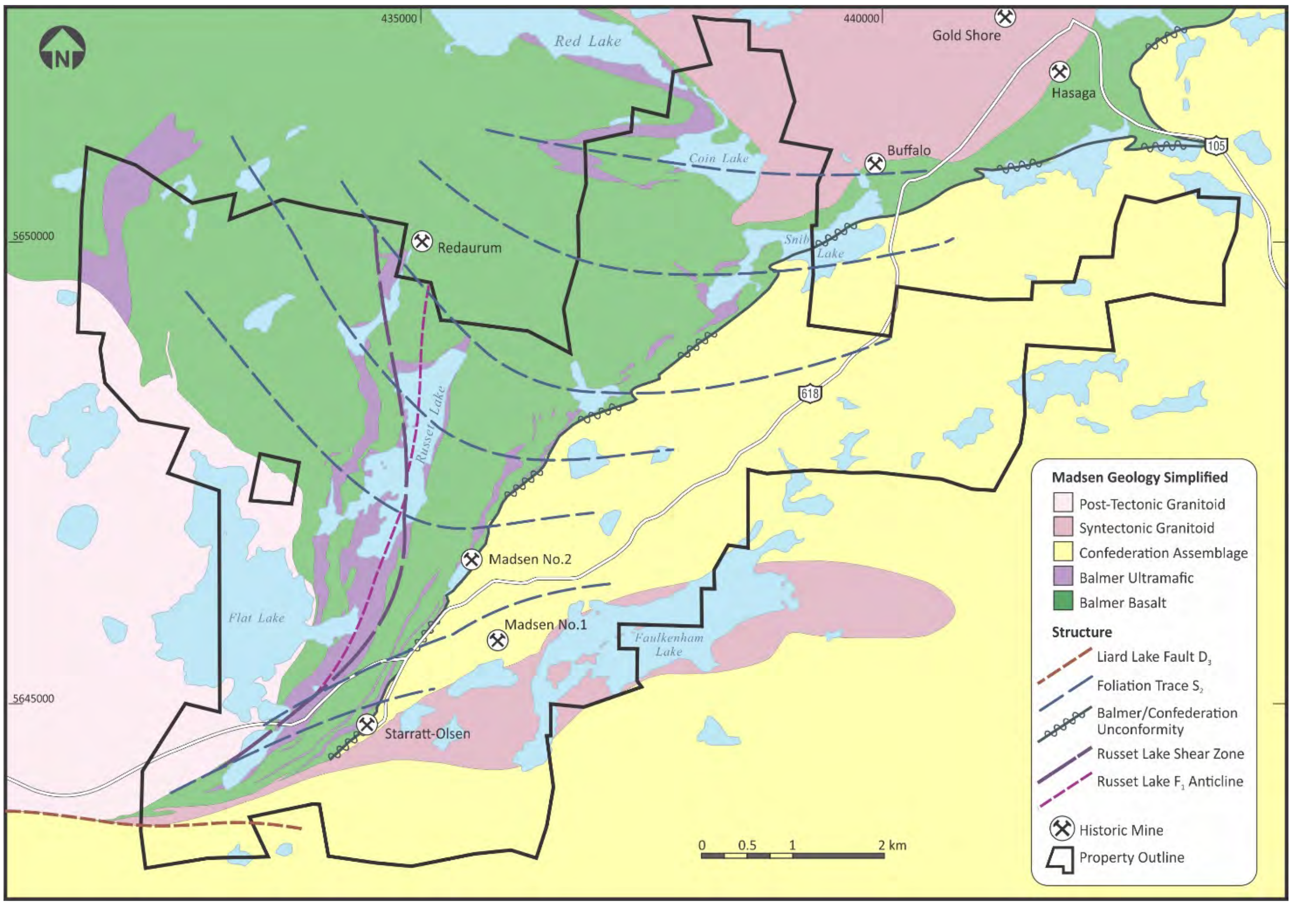


Figure 7.4: Simplified geology map of the Madsen Property area showing traces of the main structural features. An F_1 axial trace trends along the core of the Russet Lake ultramafic volcanic unit (purple unit underlying Russet Lake). Minor displacement along the Russet Lake Shear Zone likely occurred during D_1 and is linked with the gold event at 8 Zone which occurs at depth along this structure. A regional overprinting S_2 foliation cuts obliquely across Balmer and Confederation assemblage rocks and overprints gold mineralization at Madsen and Starratt. Drawn by D. Baker, September 10, 2017.

7.2.1 Structural Geology

Given the significant role that deformation-related structures (e.g. shear zones and fault zones) play in transporting and focusing gold-bearing fluids in orogenic gold systems, determining the structural architecture and deformation history of the Madsen Gold Project has been a focus of surface exploration work since the property was acquired by Pure Gold (Baker, 2014a, b; Cooley and Leatherman, 2014a, b, 2015; Baker and Swanton, 2016). Additionally, oriented core drilling data along with three-dimensional interpretation of major lithological contacts has constrained the relations between the Madsen host stratigraphy, gold-bearing structures and deformation features.

Based on surface mapping and core analysis, most supracrustal rocks exhibit a tectonic foliation which is the most common structural element present across the property. The intensity of this foliation varies widely from a decimetre-scale-spaced planar fabric to an intense, sub-millimetre-spaced schistosity with local shear-related fabrics. Mafic rock units such as massive and pillowed Balmer basalt (BSLT), typically do not exhibit strong tectonic foliations. By contrast, felsic units of the Confederation assemblage (e.g. FVOL) readily developed foliations owing to a bulk chemistry that encourages phyllosilicate (e.g. sericite) growth during stress-related recrystallization and metamorphism. As such, use of a qualitative determination of “intensity” of strain must be used with caution because this is a rock composition dependant feature. The focus of Madsen surface work has been on recording structures from outcrop to outcrop with the understanding that a given foliation in Confederation assemblage felsic volcanic rock will manifest itself much differently in adjacent Balmer basalt across the regional unconformity.

The pitfalls of using foliation development to equate to degree of regional deformation is apparent in some past work at Madsen and in the Red Lake Greenstone Belt. For example, the premise that the Confederation / Balmer unconformity is a major structural break has been promulgated based on the early work (e.g. Hugon and Schwerdtner, 1988) that described the Madsen and Starratt mineralized trends as a major mylonitic deformation zone (called the Flat Lake-Howey Bay Deformation Zone) parallel to the Confederation / Balmer unconformity. This concept of a greenstone belt-scale series of transcurrent deformation zones (Hugon and Schwerdtner, 1988) is discussed by Sanborn-Barrie et al. (2000) who, based on their regional mapping, report that foliations transect the theorized deformation zone, are not mylonitic, and that most surpracrustal rocks generally show excellent preservation of primary structures. The author’s observations at Madsen are consistent with these conclusions and there seems to be little supporting evidence for the Flat Lake-Howey Bay Deformation Zone.

New, detailed data, shows that the strong foliation developed in and around the Madsen Mine is an overprinting, regional foliation that cuts obliquely across gold-bearing trends as well as Balmer and Confederation lithological contacts (Figure 7.4), including across the unconformity (Figure 8.1, 8.2, 8.3). Significantly, these contacts are not displaced by this foliation precluding it to be a major shear zone (or even a minor shear zone). Instead, this fabric is equivalent to a regional cleavage formed in response to a far-field stress regime consistent with the conclusion of Dubé et al. (2000) that the foliation affecting the Madsen deposit is mainly a flattening foliation. Not surprisingly, small-scale features exhibit minor shearing and boudinage along this foliation but this is interpreted as a local, accommodation feature rather than representative of belt-scale shear zone development.

Based on recent work, the deformation history of the Madsen Gold Project is best summarized with three deformation events: D_1, D_2 and D_3. Identification and interpretation of these structures is not everywhere unambiguous, but these sets of structures show the best continuity across surface outcrop and drill hole data.

D_1 deformation is confined to Balmer-aged rocks and equates to the D_0 event of Sanborn-Barrie et al. (2004b). Outcrop-scale evidence for this event is largely absent because, as described above, the unaltered mafic and ultramafic rocks of the Balmer assemblage do not readily develop penetrative foliations. The strongest evidence, however, is the property-scale map pattern showing repetition of Balmer stratigraphic units on the east and west sides of the Russet Lake ultramafic body. Taken alone, this pattern could be explained by structural duplication but opposing, consistent and numerous pillow tops way-up indicators in both ultramafic and mafic rocks (Atkinson, 1993) suggest that the Russet Lake ultramafic is the core of an isoclinal antiform with an overturned western limb. Although no widespread penetrative foliation developed during this folding event, strain was seemingly partitioned into axial planar shear zones such as the Russet Lake shear zone, an interpreted ductile shear zone that is concordant with the F_1 fold axis which trends along the core of the Russet Lake ultramafic body. Importantly, this structure seems to exert controls on gold mineralization (8 Zone) and by extension, other gold mineralization on the property including the Austin, South Austin, A3, McVeigh and Starratt are possibly linked to this generation of structure. The current interpretation is that these individual, planar deposits all formed within early (D_1?) planar structures.

S_1 deformation fabrics are difficult to identify and only locally are S_1/S_2 overprinting relationships observed. Within these structures, the rock has been strongly overprinted by D_2 deformation and metamorphism such that most D_1 structures are obliterated. As such, characterizing these structures is difficult because of later strain and metamorphism so it is unclear if these structures behaved in a ductile (i.e. shear zones), brittle (i.e. fault or breccia zones) or a combination of both strain types. What is clear, however, is that these structures and associated gold mineralization pre-date the penetrative regional D_2 foliation.

The strongest evidence for these being early structures is the planar geometry and scale as well as their low angle oblique relationship to lithological contacts and the Balmer / Confederation unconformity. This is based on systematic geological interpretation and contradicts early descriptions that suggest the Madsen deposit is stratabound and occurs at the unconformity (Dubé et al., 2000). In detail, the Madsen deposits trend away from the unconformity and locally (e.g. the Austin deposit) end at the unconformity surface. Significantly for exploration, this opens up a voluminous sequence of prospective host rocks away from the unconformity. Stated another way, with this interpretation, gold prospectively does not decrease away from the unconformity and indeed the high-grade 8 Zone is an example of significant gold mineralization well down section from the unconformity.

No evidence exists that Confederation assemblage rocks were affected by F_1 folds such as the Russet Lake anticline or other F_1 folds in the eastern part of the Red Lake Greenstone Belt (Sanborn-Barrie et al., 2004b). As such, the current interpretation is that D_1 predates 2,744 Ma.

The second generation of structural fabric development at Madsen includes a conspicuous, penetrative, regional foliation (S_2) which is generally consistent with the D_2 structural trends of Sanborn-Barrie et al. (2004b). As described above, this foliation has been described as parallel to the Balmer / Confederation unconformity and to represent a major transcurrent, regional shear zone (e.g. Hugon and Schwerdtner, 1988). By contrast, recent detailed data shows that this fabric consistently cuts across the unconformity with no displacement of lithological contacts. Minor (10s of metres scale) S-shaped folds are defined by lithological contacts and also by historical outlines of Madsen orebodies on numerous original underground level plans (Horwood, 1940). The S_2 foliation is axial-planar to these small folds linking the S-folds to D_2.

The latest deformation to affect the Madsen Gold Project is localized brittle faulting. Such faults are rare across the property, particularly in the Madsen Mine area but are common at Starratt where they are characterized by metre-scale intervals of fault breccia and fault gouge recovered in recent drill core. These are most likely steeply-dipping, approximately east-west trending and related to faulting along the southern contact of the Killala-Baird Batholith (e.g. the Liard Lake fault of Sanborn-Barrie et al., 2004b). These faults clearly post-date gold deposition as they locally displace gold mineralized lenses at Starratt but offsets seem to be less than a few metres.

Generally, the deformation history outlined for the Madsen Gold Project above is consistent with that for the Red Lake Greenstone Belt (Sanborn-Barrie et al., 2004b). Sanborn-Barrie interprets a tilting-only event to explain the angular relation between Balmer and Confederation assemblage rocks but the pre-Confederation deformation event is clearly much more significant and involved broad folding (F_1 folds of Sanborn-Barrie et al., 2004b) of Balmer rocks across the belt. Early, planar structures with unclear style (brittle versus ductile) host gold mineralization at Madsen and Starratt and may coincide with F_1 folding since they are at least locally axial-planar to F_1 structures. Significantly, Confederation rocks are not affected by these folds so the interpretation herein is that D_1 predates 2,744 Ma. Therefore only minor differences between the deformation history of Sanborn-Barrie et al. (2004b) and the working deformation history for the Madsen Gold Project are required. These include the intensity of Balmer-only deformation and the lack of requiring a cryptic, tilting-only D_0 deformation as this tilting is accomplished via F_1 folding.

The following sections briefly describe the recognized supracrustal, metasomatic (altered), vein and intrusive rock units that are present across the Madsen Gold Project and form the basis of geological mapping and drill core logging database.

7.2.2 Balmer Assemblage Rocks

The oldest rocks underlying the Madsen Gold Project below to the ca. 2.99-2.96 Ga Balmer assemblage comprising predominantly mafic volcanic and intrusive rocks with minor ultramafic volcanic and intrusive rocks, and metasedimentary rocks including narrow iron formations which serve as useful stratigraphic markers. Each of the logged and mapped Balmer lithologies are described below.

7.2.2.1 Peridotite

Peridotite (PRDT) sills and flows with komatiitic geochemistry are common within the Balmer assemblage. These ultramafic bodies are often altered to serpentine-magnetite or talc (Plate 7.1a), but where their original textures are preserved both primary intrusive and extrusive features have been observed. On this basis and on Al_2O_3-TiO_2 ratios which chemically classify an Al-depleted komatiite derived from a depleted mantle source and an Al-undepleted komatiite as distinct units with different source magmas. Spatial relationships of these two chemical units combined with field relationships and primary textures have allowed discrimination into two main units: (1) an intrusive or largely intrusive unit and (2) an extrusive unit named the Russet lake Ultramafic (Figure 7.6, Plate 7.1b, and Plate 7.1c). PRDT is not itself prospective for gold mineralization at Madsen, it is not known whether this is related to its chemical or physical nature but it is rarely significantly hydrothermally altered. However, this unit has an important close spatial relationship with all known gold zones.

7.2.2.2 Pyroxenite

Medium to coarse grained Pyroxenite (PXNT) (Plate 7.1d) occurs within composite sills with PRDT (Section 7.2.2.1) within the Balmer assemblage. The close association of PXNT and PRDT in these sills suggests that PXNT is a product of olivine fractionation during the emplacement of the sills (Mackie, 2016). Due to its lack of hydrothermal alteration, PXNT is not itself prospective for gold mineralization at Madsen except as part of a composite sill with PRDT as described above.

7.2.2.3 Iron Formation

Iron formation (IRFM) occurs exclusively within the Balmer assemblage in the Madsen area, forming 0.1–1 m thick beds within rare clastic sedimentary packages or more commonly between individual basalt flows. Three types are recognized at Madsen: chert magnetite iron formation (Plate 7.1e), garnet-rich silicate iron formation (Plate 7.1f, g), and chert sulphide iron formation (Plate 7.1h). Silicate iron formations seem generally less prospective than sulphide iron formations which ubiquitously host low-grade (<1 g/t Au) gold mineralization, with much higher grades (>10 g/t Au) possible where intersected by mineralized structures.

7.2.2.4 Metasedimentary Rock

Bedded, clastic metasedimentary rocks (MTSD) (Plate 7.3a, b) occur as isolated, thin (1–10 m) units hosted within the volcanic package. They typically contain garnet, staurolite, andalusite, and amphibole porphyroblasts indicating an aluminous parent rock.

7.2.2.5 Basalt

Dark green-brown, fine grained, unaltered basalt (BSLT) (Plate 7.3c) is the most common lithology in the Balmer assemblage. Basaltic flows are typically massive but are locally pillowed, with rare flow top breccias and hyaloclastic textures preserved. Unaltered basalt has low prospectively for gold mineralization but altered Balmer basalt is the main host to gold mineralization on the Madsen Property, particularly when proximal to PRDT units.

7.2.2.6 Gabbro

Dark grey, massive, equigranular, medium to coarse grained gabbro (GBRO) (Plate 7.3d) cuts basalt rocks and shows relatively high ratios of Mg, Ni and Cr relative to younger Confederation gabbro (O'Connor-Parsons, 2015). Gabbro is not prospective for gold mineralization at Madsen.

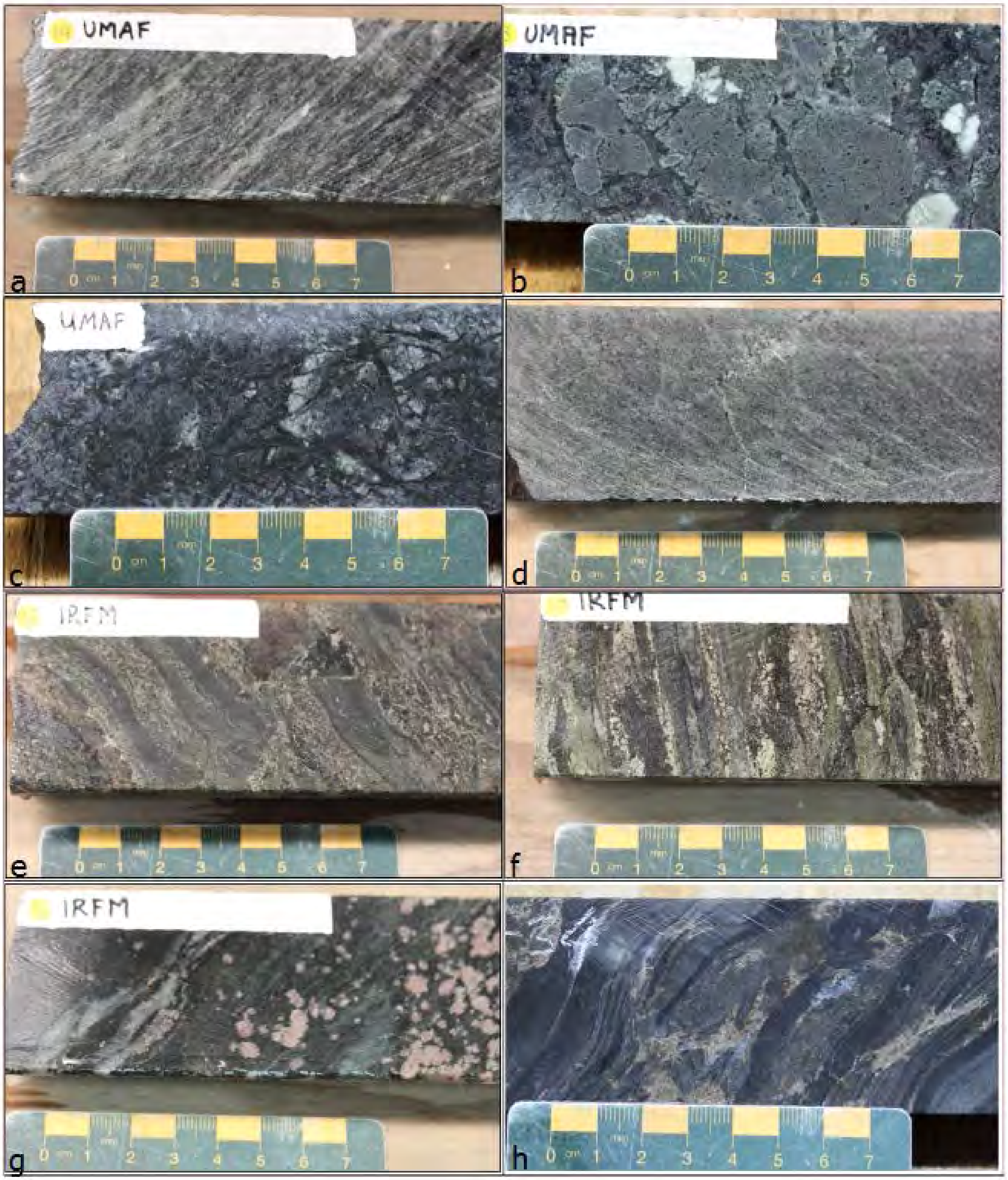


Plate 7.1: Photos of type ultramafic and iron formation units in half-sawn drill core. (a) Serpentinized PRDT, typical of the margins of PRDT bodies, (b) fragmental PRDT from the Russet Lake Ultramafic, (c) pyroxene-phyric PRDT, (d) Coarse, crystalline, equigranular PXNT, (e) IRFM with chert bands separated by garnet-amphibole layers, (f) amphibole-garnet rich silicate IRFM, (g) garnet rich silicate IRFM, (h) finely-laminated sulphide-rich IRFM.

7.2.3 Confederation Assemblage Rocks

7.2.3.1 Felsic Volcanic

Felsic volcaniclastic rocks (FVOL) form the majority of the lower Confederation assemblage comprising ash, lapilli tuff and juvenile epiclastic rocks sourced from tuffaceous material (Plate 7.2a) that commonly directly overlies the quartz crystal-lithic rhyolite tuff (QPXL, section 7.2.3.3). FVOL is not prospective for gold mineralization at Madsen, except where cut by late quartz veins that host remobilized gold.

7.2.3.2 Intermediate Volcanic

Dark coloured, lustrous, intermediate volcanic rocks overlie the felsic volcaniclastic rocks (FVOL) of the Confederation assemblage in the Madsen area. This unit comprises massive and locally pillowed or variolitic flows (Plate 7.2b). This unit is not prospective for gold mineralization at Madsen, except where cut by late quartz veins that host rare, remobilized gold.

7.2.3.3 Quartz Crystal and Lithic Rhyolite Tuff

A distinctive, quartz crystal-rich lithic-crystal tuff (QPXL) forms the majority of the lowest Confederation assemblage in the Madsen area. The unit includes 5-15% quartz phenocrysts and rare flattened lithic fragments in a silica rich, sericitic, tuffaceous matrix (Plate 7.2c). QPXL is locally interbedded with lenses of clastic metasedimentary rock and is not prospective for gold mineralization at Madsen, except where it hosts remobilized gold from the underlying Balmer units. QPXL is dated at ca. 2,741 Ma (Lichtblau et al., 2012) near Madsen Mine.

7.2.3.4 Conglomerate

A pebble-cobble conglomerate (CONG) makes up the lowest part of the Confederation assemblage where it locally underlies the lithic-quartz crystal tuff. However, a similar unit is also found locally elsewhere in the stratigraphic sequence and in the Balmer assemblage. This unit would be interpreted as Huston assemblage by Sanborne-Barrie et al. (2004b). Flattened but identifiable clasts may be of mafic or felsic origin (Plate 7.2d). The brown matrix locally contains porphyroblasts of staurolite, andalusite, garnet, and amphibole. This unit is not prospective for gold mineralization at Madsen, except where hosts remobilized gold from the underlying Balmer units.

7.2.3.5 Metasedimentary Rock

Bedded, clastic metasedimentary rocks (MTSD) (Plate 7.3a, b) are present in both the Balmer and Confederation assemblages as thin (1-10 m) units within volcaniclastic packages. They commonly host garnet, staurolite, andalusite, and amphibole porphyroblasts indicating an aluminous parent rock. In the Confederation assemblage, these units have low gold prospectivity.

7.2.3.6 Basalt

Dark green-brown, fine-grained, unaltered basalt (BSLT) (Plate 7.3c) is the most common lithology in the Balmer assemblage but is less abundant in the Confederation assemblage. Basaltic flows are typically massive but variations include pillowed, flow top breccia and hyaloclastic textures. Confederation basalt has low prospectively for gold mineralization and is typically massive.

7.2.3.7 Gabbro

Dark grey, massive, equigranular, medium to coarse grained gabbro (GBRO) (Plate 7.3d) are Fe-rich relative to older Balmer gabbro. None of the gabbros identified are prospective for gold mineralization at Madsen.

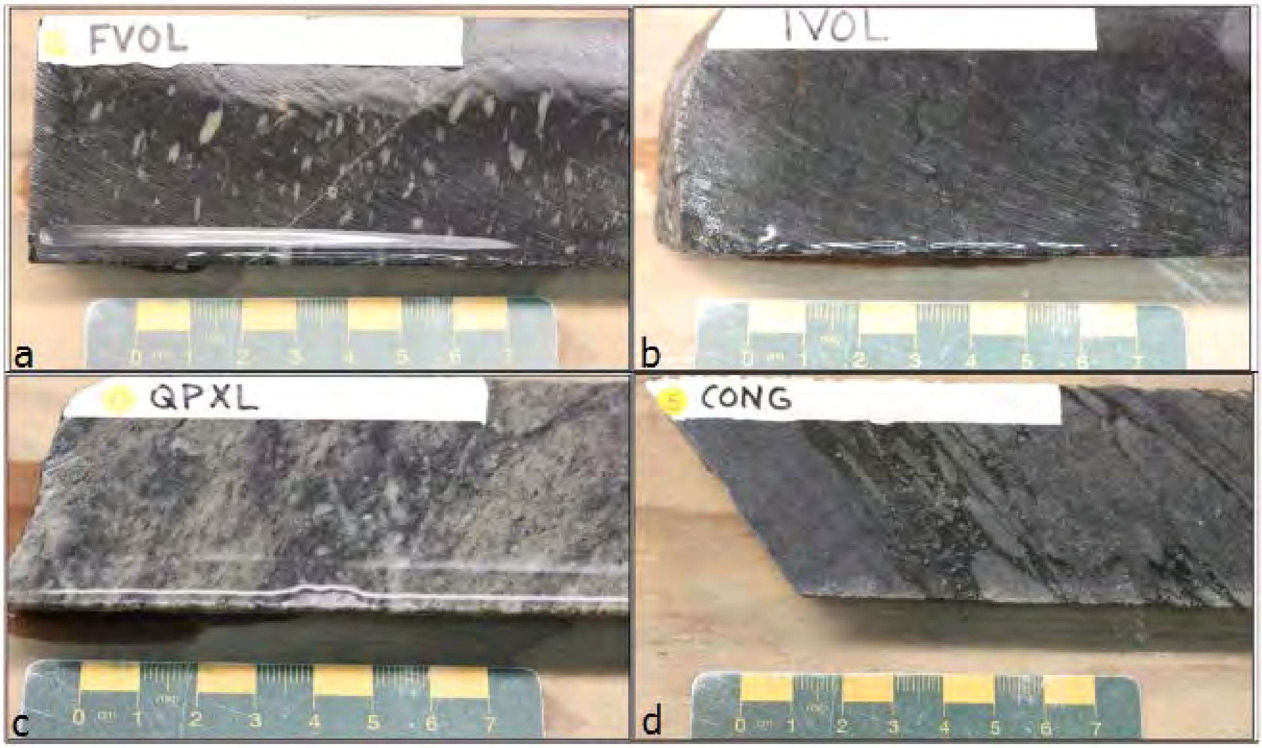


Plate 7.2: Photos of type Confederation assemblage units in half-sawn drill core. (a) Felsic volcaniclastic rock (FVOL), (b) intermediate variolitic volcanic flow (IVOL), (c) lithic-quartz crystal rhyolite tuff (QPXL), (d) pebble-cobble bearing conglomerate (CONG) – light coloured domains represent flattened clasts.

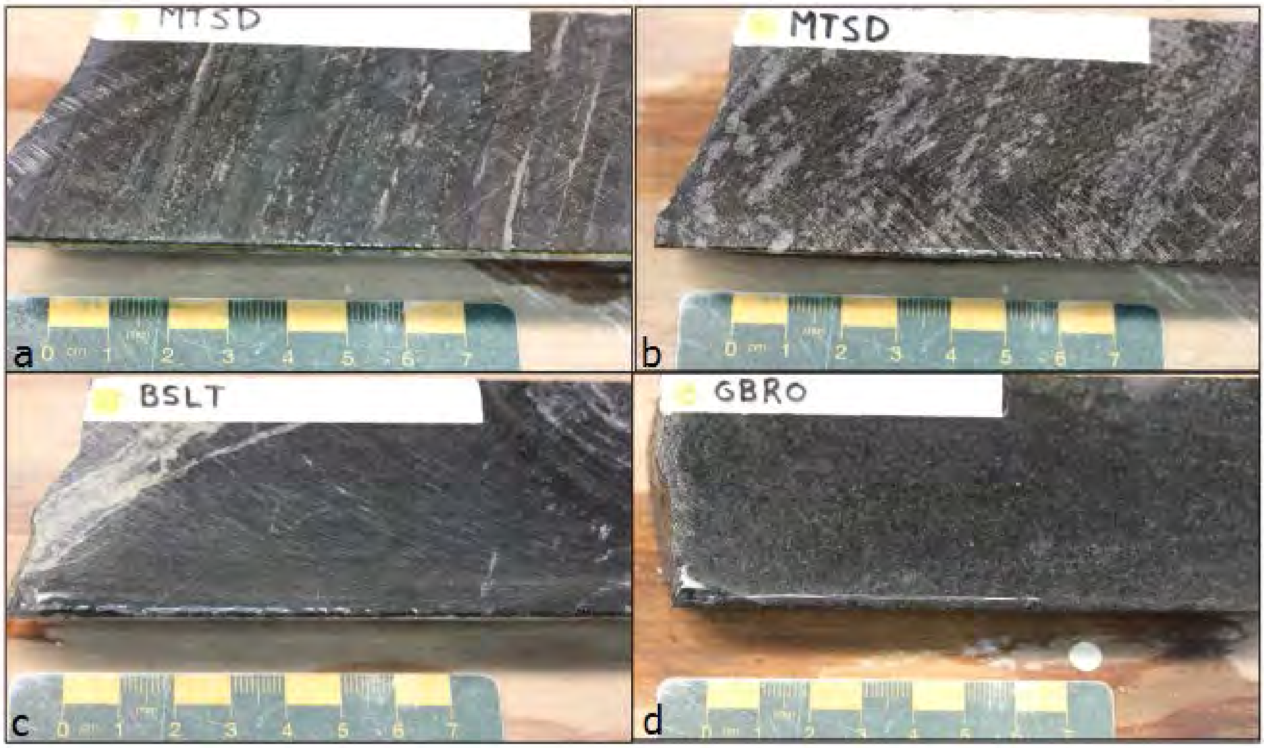


Plate 7.3: Photos of type Balmer assemblage units in half-sawn drill core. (a) Typical MTSD showing primary laminations, (b) aluminosilicate-rich MTSD, (c) calcite-veined dark green, fine grained BSLT, (d) typical medium to coarse grained GBRO.

7.2.4 Vein Types

7.2.4.1 Quartz-Carbonate Veins

Carbonate-quartz veins (VQCB) (Plate 7.4a) commonly fill tension gashes and extensional zones in BSLT and GBRO. They do not carry gold and are not associated with gold-bearing structures.

7.2.4.2 Early Carbonate-Magnetite Veins

White-grey to violet grey, massive to dismembered, fine-grained, early carbonate-magnetite veins (VECB) (Plate 7.4b), occur only within Balmer assemblage rocks and were emplaced early in the deformation history. These veins are overprinted (metamorphosed) by later amphibole-bearing veins or nearly completely replaced by VNDI. This vein type has a close spatial association with gold mineralization, and although they seemingly predate the gold mineralizing event in detail, broadly they seem part of the same hydrothermal system. The consistent and locally intense metamorphic overprint of these veins resembles a skarn assemblage as suggested by Dubé et al. (2000) but these mineral phases grew from metamorphism of a pre-existing carbonate alteration event.

7.2.4.3 Diopside Replacement Veins

Light green, massive, coarse crystalline diopside-quartz-amphibole-calcite veins (VNDI) (Plate 7.4c) represent the partial to total replacement of early magnetite-carbonate veins (VECB). These veins are highly prospective for gold mineralization, especially along vein margins where VNDI is in contact with altered country rock, quartz veins, or quartz porphyry.

7.2.4.4 Quartz Veins

Fine grained, white to translucent, mono-mineralic quartz veins (VNQZ) (Plate 7.4d) cut both Balmer and Confederation rocks. These veins do not have a clear association with any gold-bearing structures although a few contain remobilized gold.

7.2.4.5 Blue-Grey Quartz Veins

Blue-grey to white, massive, recrystallized quartz veins (VBGQ) (Plate 7.4e) are commonly associated with gold mineralization at both the Russet South and 8 Zone Deposits and have only been identified within Balmer rocks. This vein set is folded and/or boudinaged and clearly pre-dates D_2 deformation, consistent with a D_1 timing for gold mineralization. These veins are highly prospective for gold mineralization. Gold is present as unevenly distributed, discrete gold grains within the vein mass. Narrow zones of biotite and amphibole are commonly present on the immediate selvages of these veins. This vein set may relate to more pervasive silicification within the main Madsen deposits.

7.2.4.6 Quartz-Tourmaline Veins

Black and white, crystalline, quartz-tourmaline veins (VQTM) (Plate 7.4f) fill tensional fractures in unaltered basalt and gabbro. At the Treasure Box showing and other deposits off of the Madsen property these veins host bonanza-grade gold. These veins are common across the Red Lake Greenstone Belt particularly proximal to the Dome Stock suggesting a temporal and genetic relationship. They occur late in the temporal sequence and seem to be more brittle in nature. At Madsen, they are rare and cut across the main, penetrative S_2 foliation.

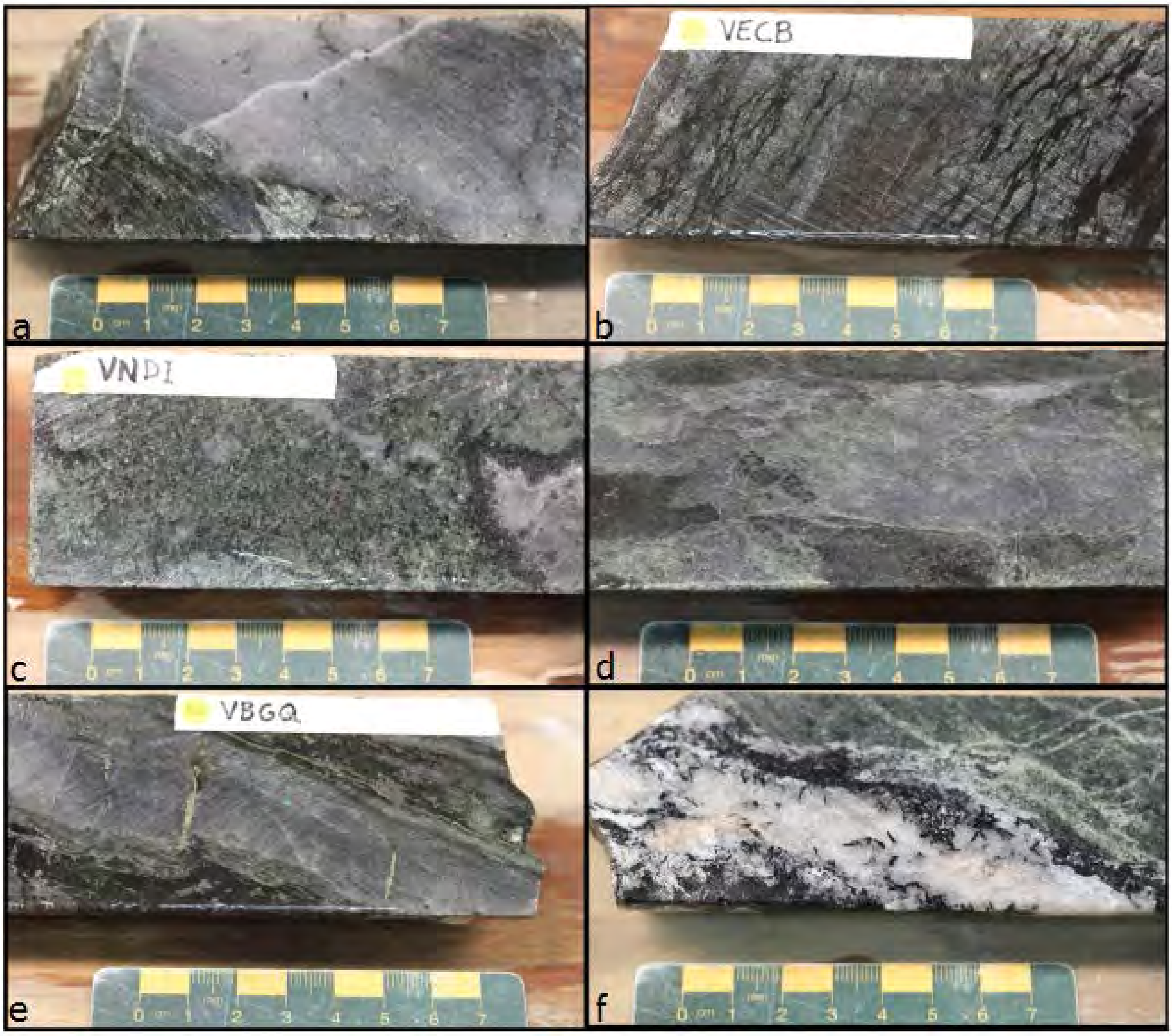


Plate 7.4: Photos of type vein examples in half-sawn drill core.(a) Typical VQCB cutting chloritic basalt, (b) VECB with a dark, biotite-rich selvage, (c) typical coarse crystalline VNDI, (d) VNQZ cutting chloritic basalt, (e) recrystalized and boudinaged VBGQ from the Russet South Deposit, assays of this vein returned 29.5 g/t Au, (f) late-stage Treasure-Box style VQTM with coarse acicular tourmaline crystals.

7.2.5 Metasomatized rocks

Balmer assemblage rocks vary from unfoliated, pristine volcanic rocks with well-preserved fine-scale primary volcanic features (e.g. pillow structures), to mafic and ultramafic rock that has been pervasively altered, deformed and metamorphosed to the point that essentially no primary features are discernible (Plate 7.5). Such rocks are associated with gold mineralization across the property at all known gold-bearing zone except Treasure Box (which is characterized by late quartz-tourmaline veins without significant wall-rock alteration). Two important points need to be made about these metasomatized volcanic rocks.

Firstly, it was recognized that metasomatized, or hydrothermally altered, Balmer rock locally forms coherent, planar units (coincident with suspected early, gold-associated structures as described above) and that it was advantageous for drill targeting to delineate these intervals with codes that highlight this alteration. Strictly, these intervals are probably mostly basalt but that original protolith has been modified to the point that it is inappropriate to log or map this rock as basalt. So, three codes were developed that are defined by secondary mineral assemblages as described in the following sections.

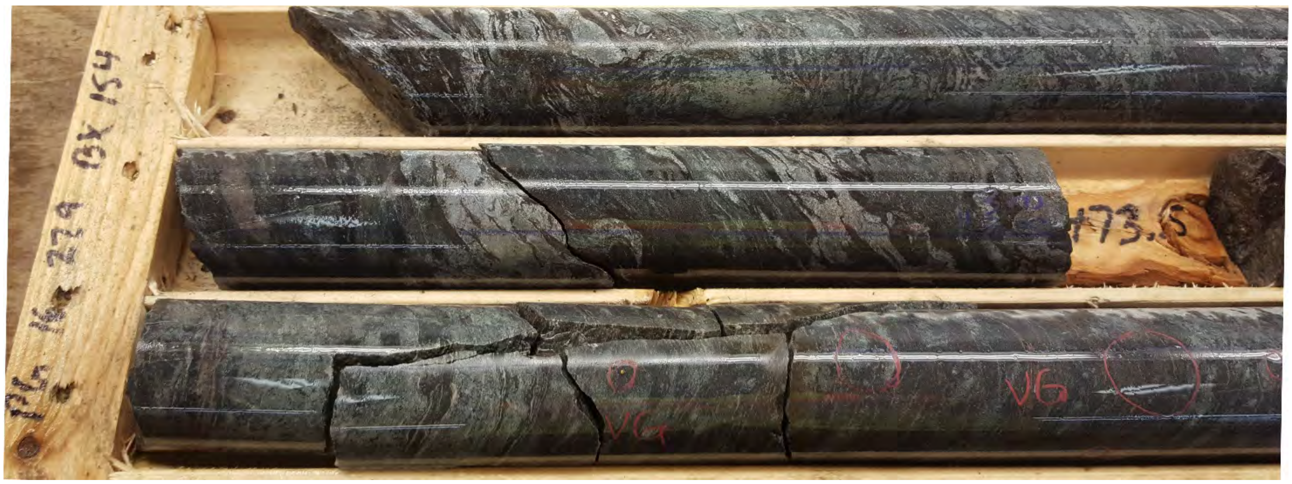


Plate 7.5: Typical example of Madsen-style strongly altered and auriferous rock in drill core. Initially this rock was probably a pillowed basalt of the Balmer assemblage but has been carbonate veined and altered during the early gold event and subsequently metamorphosed to strong biotite-amphibole-diopside during regional D_2 deformation. Drill hole PG16-229 from the A3 Deposit at about 474 m depth. Gold-bearing interval in the bottom row returned 41.3 g/t Au from 471.1–475.7 m down hole.

Secondly, the distinction between metasomatic mineral phases (those derived from interaction with hydrothermal fluid) and metamorphic mineral phases (those derived from metamorphism generally in an isochemical system) is indiscernible at Madsen. Regional metamorphism (synchronous with D_2 deformation) has overprinted the Madsen gold systems to the degree that the host rocks to the gold-bearing zones are characterized by a seemingly complex mineral assemblage that has grown during regional metamorphism and, arguably, should not be described as alteration. But, because the rock surrounding the Madsen gold systems was altered before metamorphism, an assemblage of abundant metamorphic biotite, garnet and diopside resulted such that these minerals are useful as proxies for hydrothermally altered Balmer rock. So, these sensu stricto metamorphic minerals are herein treated as alteration indicators and this has proven an effective approach to delineating a halo surrounding gold mineralization. The three metasomatic rock assemblages identified are described in the following sections.

7.2.5.1 Strongly Altered and Foliated Zone

Strongly altered foliated zone (SAFZ) refers to coherent domains of rock that are altered and foliated to a degree that the protolith is unrecognizable. These domains of strong alteration and foliation represent structural corridors that were exploited by gold bearing fluids and delineate areas known to host gold mineralization (Plate 7.6a, b, c). Zones of strong silicification within the SAFZ are especially prospective for gold mineralization.

In the Madsen deposit area, a well developed SAFZ is generally defined by the presence of 1-2 cm thick bands (ribbons) of cream-brown colored biotite-potassium feldspar (microcline) separating larger bands and pods of diopside, green amphibole and (locally) quartz and carbonate. The sulphide content of SAFZ is highly variable but ranges up to 20% pyrite-pyrrhotite-chalcopyrite-arsenopyrite. There is limited to no correlation between sulphide content and gold values. The unit typically contains abundant VECB and VNDI veins which are commonly transposed into the main fabric of the foliation.

7.2.5.2 Pervasively Altered Basalt

Pervasively altered basalt (BSLA) refers to coherent domains of weakly to moderately foliated, banded or mottled, pervasively biotite-amphibole altered rocks (Plate 7.6d), interpreted to have a mafic volcanic protolith in most cases. Primary textures are locally preserved, though in many instances they are obscured by alteration and foliation.

These domains of weak to moderate alteration and foliation represent the margins of structural corridors that were exploited by gold bearing fluids and halo areas known to host gold mineralization. Where this unit is proximal to an ultramafic sill or SAFZ unit, it has low to moderate potential to host gold mineralization.

7.2.5.3 Biotite-Amphibole Altered Peridotite

Biotite-amphibole altered peridotite (PRBA) refers to domains of moderately to strongly altered and foliated rocks proximal to the 8 Zone within the Russet Lake Ultramafic, interpreted to have a peridotite protolith. In contrast with the surrounding peridotite, PRBA has a well-developed foliation due to the alignment of metasomatic biotite porphyroblasts. These domains of alteration and foliation represent structural corridors that were exploited by gold bearing fluids and delineate areas proximal to gold mineralization.

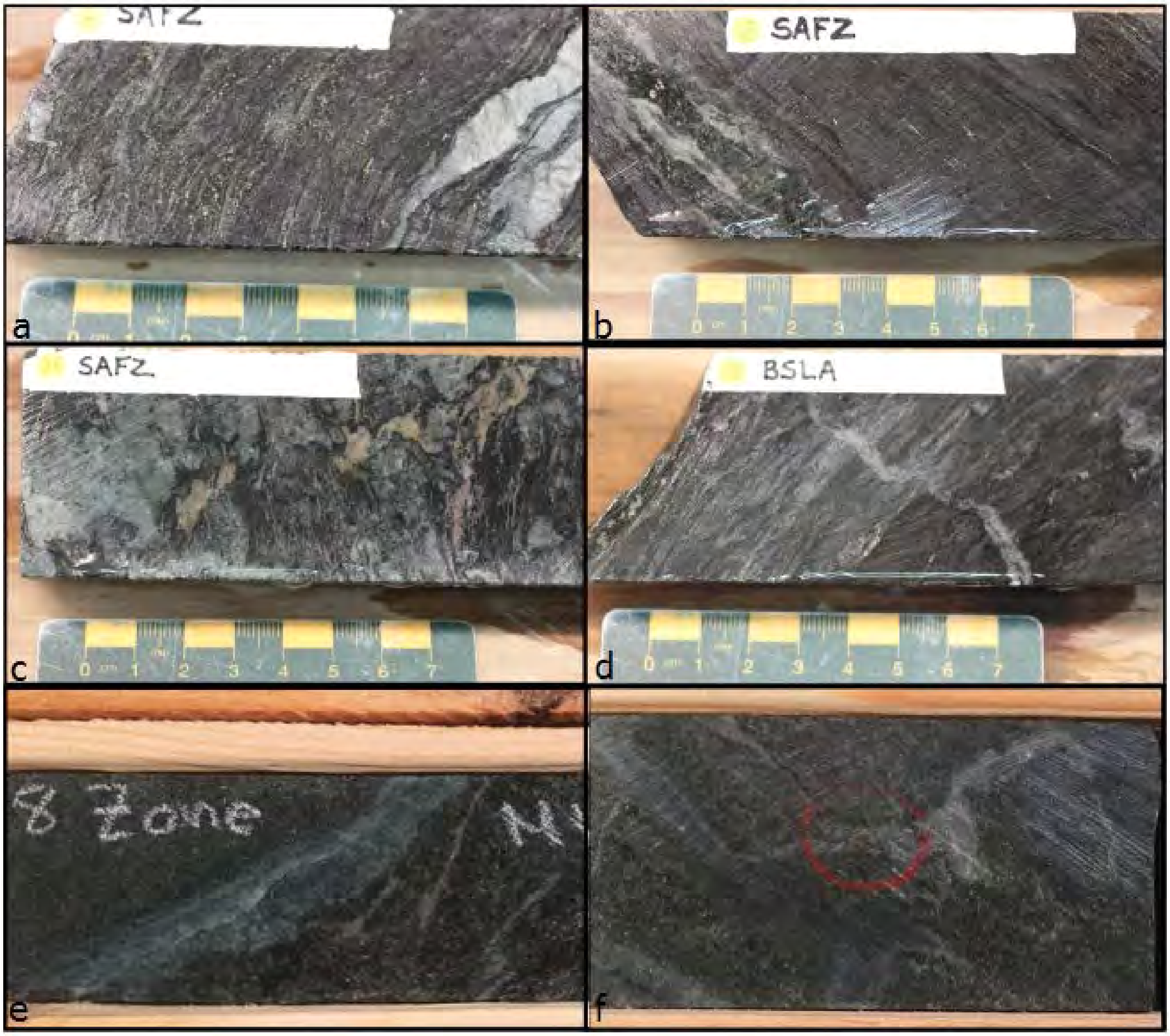


Plate 7.6: Photos of type metasomatized rocks in half-sawn drill core. (a) SAFZ from the Austin Deposit grading 7.5 g/t Au. Displays well foliated pervasive bands of biotite-amphibole and weak diopside with 3% fine-medium subhedral pyrite, cross-cut by VECB veinlets with amphibole altered margins, (b) SAFZ from the South Austin Deposit grading 10 g/t Au. Displays well foliated pervasive biotite alteration, patchy amphibole alteration, 1% fine-grained disseminated pyrite, and weak potassium feldspar alteration, (c) SAFZ from the McVeigh Deposit. Displays ribboned biotite-potassium feldspar-amphibole alteration, coarse grained diopside replacement, and moderate silicification, (d) BSLA showing biotite and amphibole alteration with cross-cutting carbonate veins, (e) well-developed PRBA with an amphibole halo surrounding a gold-bearing quartz vein, (f) gold-bearing silica vein within a zone of biotite rich PRBA.

7.2.1 Plutonic Rocks

7.2.1.1 Monzonite

Monzonite (MNZT) refers to a medium to dark grey, unfoliated, medium grained, equigranular plutonic rock (Plate 7.7a), assigned to the Faulkenham Lake Stock. It is typically epidote and hematite altered. The Faulkenham Lake Stock post-dates mineralization and is not prospective for significant gold.

7.2.1.2 Granodiorite

Granodiorite (GRDI) refers to a white to light grey, unfoliated, medium to coarse grained, equigranular plutonic rock of the Killala-Baird Batholith (Plate 7.7b). The Killala-Baird Batholith is unaltered and post-dates mineralization (2704 +/-1.5 Ma), and therefore is not prospective for gold.

7.2.2 Dykes and Sills

7.2.2.1 Intermediate Intrusive

Intermediate intrusive (IINT) refers to a group of intermediate, medium to light grey, undeformed, fine to medium grained dykes that cross-cut both the Balmer and the Confederation group and cut gold mineralization at Madsen and Starratt. These dykes have sharp, chilled margins and strike concordant to this property-wide foliation suggesting they exploited the S_2 structural grain. IINT have been dated at ca. 2698 Ma from underground at Madsen and ca. 2696 Ma from the Creek Target and provide a minimum age for Madsen gold mineralization (Dubé et al., 2004). Their similar composition and age suggests that they may be related to the Killala-Baird Batholith.

7.2.2.2 Mafic Intrusive

Mafic intrusive (MINT) refers to a group of dark grey, post-tectonic (unfoliated), fine to medium grained dykes that cross-cut both the Balmer and the Confederation assemblage rocks. These dykes have sharp, typically chilled, margins with their host lithologies. These dykes post-date mineralization and are not prospective for gold.

7.2.2.3 Quartz Feldspar and Feldspar Porphyry

Quartz-feldspar porphyry (QFPY) and feldspar porphyry (FSPY) refer to a set of intermediate, grey-pink, unfoliated, quartz and/or feldspar-phyric dykes (Plate 7.7c and e) that cut the Balmer assemblage. QFPY dykes have not been found cutting the Confederation assemblage, however, they are interpreted to post-date the Confederation assemblage due to their lack of foliation. These dykes post-date mineralization, are not prospective for gold and are rare within Madsen Mine.

7.2.2.4 Hornblende Feldspar Porphyry

Hornblende-feldspar porphyry (HFPY) refers to a set of intermediate, dark grey-pink, unfoliated, hornblende-feldspar-phyric dykes (Plate 7.7e) that cut the Balmer assemblage in the Russet South area but are unknown in the Madsen Mine. HFPY dykes have not been found cutting the Confederation assemblage; however, they are interpreted to post-date the Confederation assemblage due to their lack of foliation. It is possible that these dykes are a local phase of the FSPY. These dykes post-date mineralization and are not prospective for gold.

7.2.2.5 Quartz Porphyry

Quartz Porphyry (QZPY) refers to a group of felsic, light to medium grey, foliated, quartz-phyric or fine-grained (aphyric) dykes (Plate 7.7f) that cut the Balmer assemblage. Porphyritic examples contain sparse, rounded, quartz phenocrysts and foliation-parallel biotite aggregates. These dykes are pervasively sericite altered and chemically are sodium-depleted (Mackie, 2016).

Proximal to mineralized zones, early carbonate veins (VECB) cut QZPY dykes and amphibole-quartz-diopside replaces QZPY. Collectively, this is strong evidence that QZPY dykes predate the Madsen gold event and QZPY dykes typically show a close spatial association with gold mineralization. QZPY dykes are typically concordant to the planar Madsen deposits (this relation is particularly strong at Austin) so these dykes likely exploited the same early structures that controlled gold-associated hydrothermal systems.

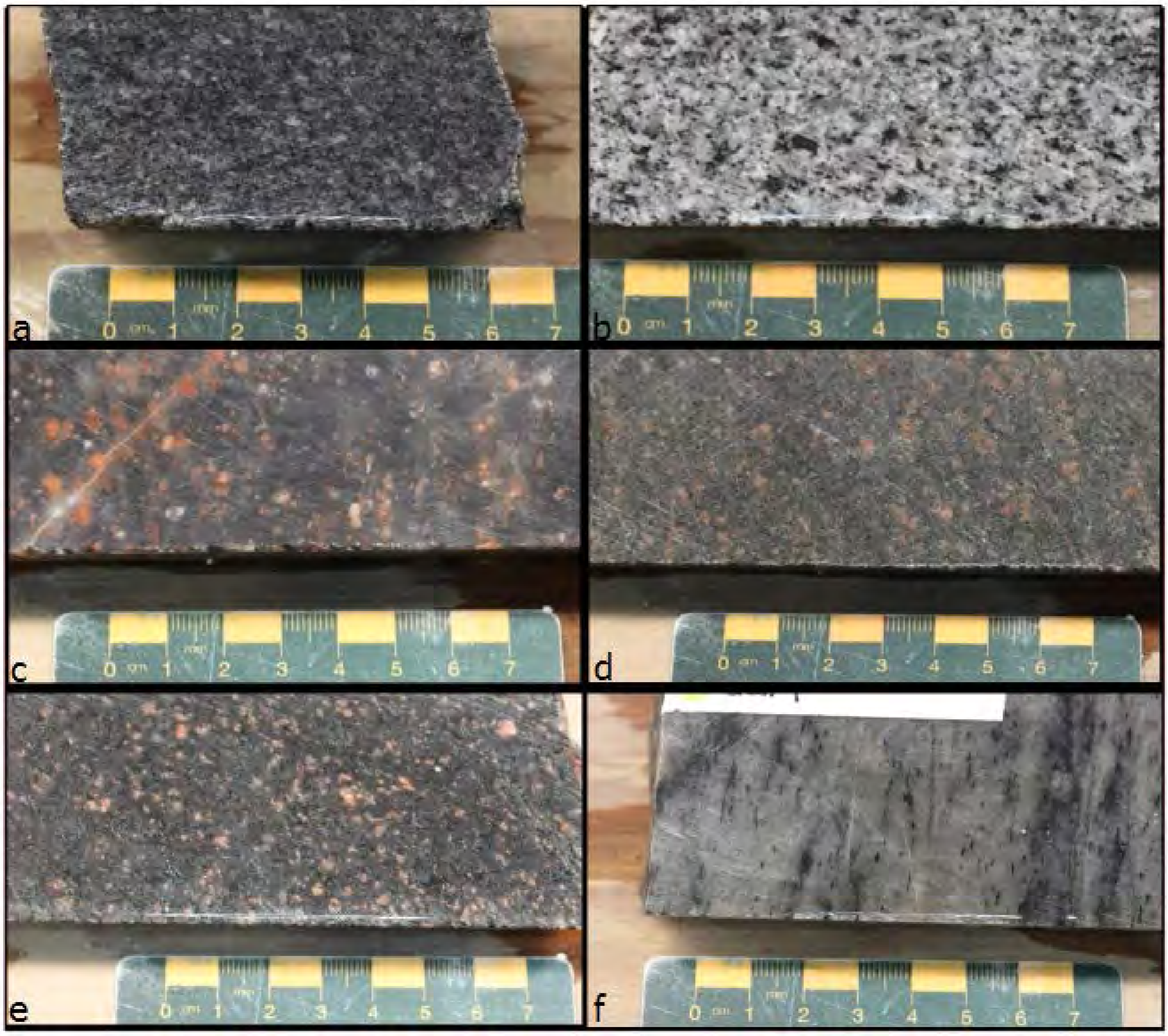


Plate 7.7: Type photos of dykes and sills. Intrusive rocks from the Madsen Property. (a) monzonite from the Faulkenham Lake Stock (MNZT), (b) granodiorite from the Killala-Baird Batholith (GRDI), (c) silica-hematite altered quartz-feldspar porphyry (QFPY), (d) potassium feldspar porphyry dyke (FSPY), (e) potassium feldspar-hornblende porphyry (HFPY), (f) strongly foliated biotite and quartz-phyric porphyry (QZPY).

7.3 Property Mineralization

The following sections summarize the geology, geometry and style of the significant mineralized zones and associated targets encountered on the Madsen Property (Figure 7.5).

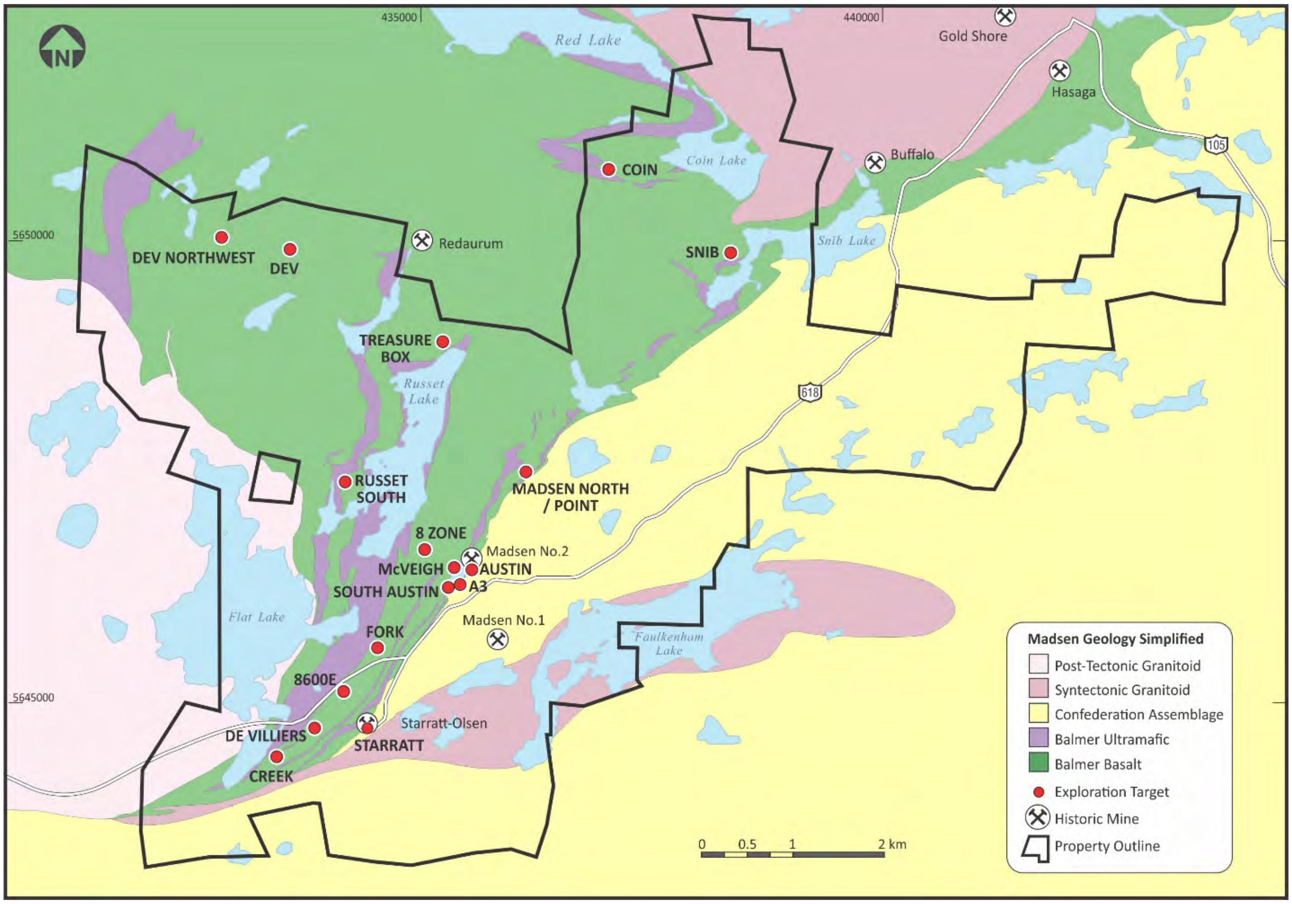


Figure 7.5: Madsen Gold Project simplified geology showing historical mines and exploration targets (red dots). Property outline shown by solid black line. September 9, 2017. Image provided by Pure Gold.

7.3.1 Madsen – Austin, South Austin, A3 and McVeigh Deposits

Gold mineralization at Madsen comprises the Austin, South Austin, A3 and McVeigh Deposits and is controlled principally by the intersection of a series of cryptic, early structures and lithological contacts between basalt and ultramafic rocks of the Balmer assemblage (Figure 7.6, Figure 7.7). A secondary plunge control is defined by the intersection of these structures with Confederation assemblage rocks. These controls are both evident in Figure 7.6: the -40^{o} plunge control is defined by Balmer ultramafic sills (purple) whereas the steeper plunge control is defined by intersection with Confederation rocks (yellow). The Austin Deposit has approximate plunge length of 2,300 m, strike width of 500 m and thickness of 10–25 m. Similarly, the South Austin Deposit has a plunge length of 2,000 m, strike width of 300 m and a similar thickness. The A3 deposit is approximately 800 m in plunge extent, 100 m strike width and approximately 10 m thickness. The McVeigh Deposit extends for a plunge length of 1,300 m, strike width of 200–300 m and a thickness similar to both Austin and South Austin.

These structures are oriented at low angles to both the Balmer assemblage stratigraphy (as defined by narrow metasedimentary units) as well as to the dominant, overprinting regional foliation (S_2). The geometry of the historical ore bodies (and the waste zones between them) is the result of intersection between the early (D_1?) mineralizing structures and prospective stratigraphy. Primary lithological control on gold distribution is proximity to one of the several ultramafic bodies which cross-cut the mafic volcano-sedimentary sequence within the upper several hundred meters of the Balmer assemblage. Note that the ultramafic rocks are interpreted as sills and a proxy for stratigraphy. Most gold mineralization is located within approximately 100 m of one of these contacts, in rock characterized by strong to intense biotite, garnet and diopside alteration. As such, the Austin and South Austin Deposits occur on the same mineralizing structure, with a poorly mineralized zone of ultramafic rock separating them.

Gold mineralization at Madsen is best identified visually by fine (sub-millimetre) grains of free gold that occurs associated with various mineral phases. Generally, all high-grade intervals contain visible gold but there are numerous examples of high-grade assays returned from samples in which no visible gold was initially identified on the core surface but has been later explained by gold identified within the interior of the core samples. Sulphides (primarily pyrite and pyrrhotite with minor arsenopyrite and chalcopyrite) are relatively common throughout the deposit, though they do not appear to have any direct positive correlation with gold grade. It is believed that present sulphide abundance reflects primary sulphide abundance or alteration in the host rock, and does not serve as a marker for gold mineralization suggesting it was not introduced by the mineralizing fluids. Apart from the presence of free gold, pervasive silicification (locally accompanied by discrete quartz veining) is the best indicator that a given interval is within a high-grade lens within the mineralized structure.

As discussed below (Section 8.0) controls on mineralization at Madsen are consistent with a typical orogenic gold system. Many deposit-scale features such as control by lithological/structural contacts and association with felsic dykes are typical and not unusual in these systems. Smaller-scale features may indicate that Madsen is an unusual or end-member type of orogenic gold system. For example, Dubé et al. (2000) conclude that Madsen is a disseminated, stratabound deposit that shares similarities with mafic-hosted gold-skarns and also with higher-temperature Australian deposits. Recent work and new data collected by Pure Gold, however, indicates that, apart from its early timing of emplacement prior to the dominant regional deformation and metamorphism, Madsen shares many characteristics with typical orogenic gold deposits.

While mineralization throughout much of the Austin Deposit does locally exhibit a correlation with metasedimentary units at the top of Balmer assemblage (likely part of the reason much of the ore host rock was referred to as “Tuff” during mine operations) concentration of gold mineralization in this unit is now thought of as being a consequence of the receptivity of this unit to gold deposition (perhaps owing to primary sulphidation) upon intersection with the mineralizing structure, as opposed to the host unit acting as a unique primary control of gold deposition.

Consistent with Pure Gold’s work, it was previously demonstrated through detailed field mapping that the Austin and McVeigh Tuff, as historically mapped, include strongly foliated pillow basalts (Zhang, 1996). For example, the slightly deformed pillow basalts immediately west of the Process Water Pond, in which the pillows are readily recognizable, are included in the tuffaceous unit in the mine level mapping. Furthermore, it has been found that the pillowed basalts southwest of the Process Water Pond are progressively deformed and transposed into well-foliated rocks with amphibole banding over short strike distance. These observations and others suggest that much of what was historically described as Tuff is volcanic flow-derived rather than true Tuff of volcano-sedimentary origin.

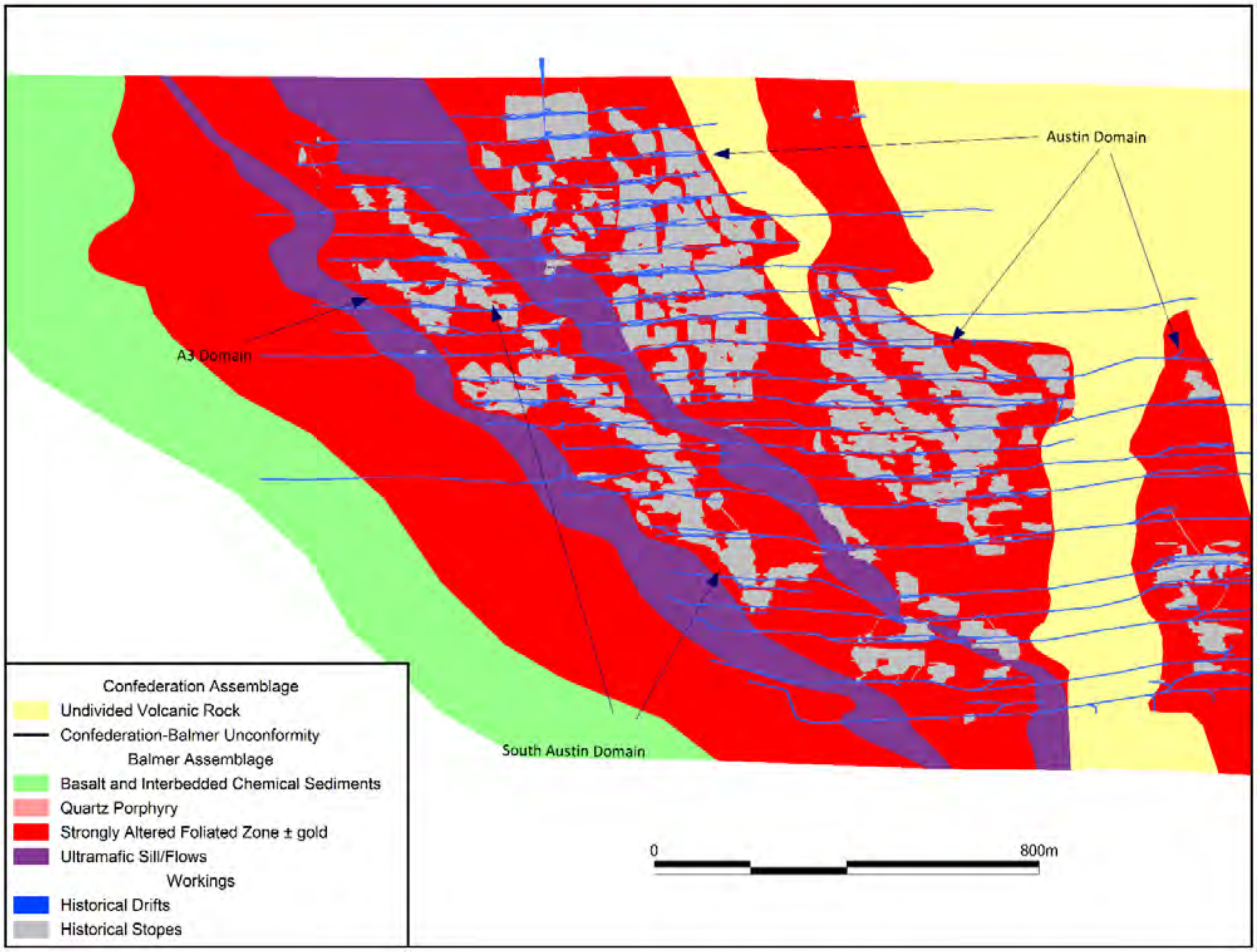


Figure 7.6: Inclined long section through the Austin and South Austin Deposits of the Madsen Mine with projected geology. Mined stopes (grey) demonstrate gold-bearing zones which clearly show a strong northwest plunge at about 40°. The projected geology shows the strong alteration halos (red) surrounding gold-bearing zones (here represented by mined stopes) and, significantly, that these zones are interrupted by ultramafic sills (purple). Long section geology contacts were determined from detailed geological interpretation on 30 level plans from surface to below the deepest developed part of Madsen Mine. Note that the McVeigh Deposit lies in the footwall to this long section and is not shown.

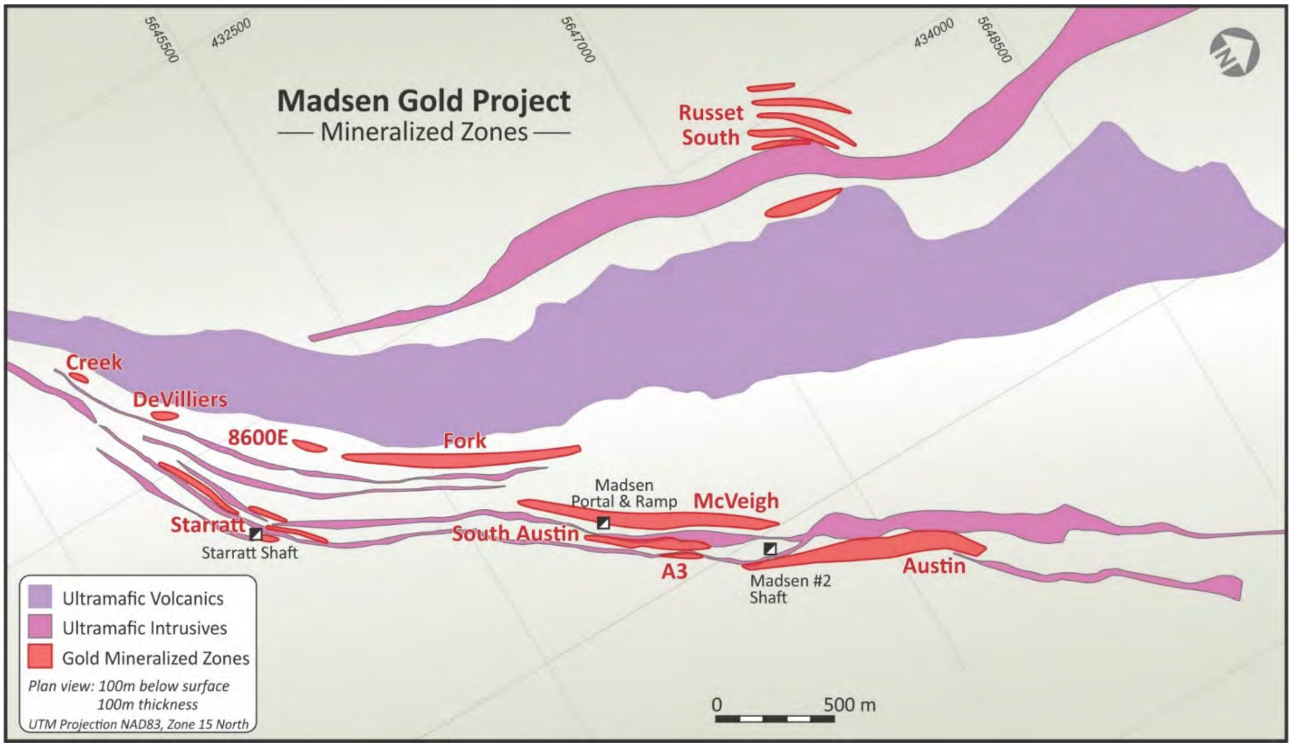


Figure 7.7: Plan map of Madsen Gold Project mineralized zones projected at 100 m below surface. Note that 8 Zone occurs in the deepest parts of Madsen Mine just west of the ultramafic volcanic (Russet Lake ultramafic) contact so it does not project through this level. Source: P. Smerchanski, September 10, 2017.

7.3.2 8 Zone

The geology and mineralization style at the 8 Zone is somewhat distinct from that of other known deposits within the Madsen Mine area. Gold mineralization at the 8 Zone occurs within strongly altered and veined peridotite of the Russet Lake Ultramafic (see section 7.3.5.3 for description of the PRBA unit). By contrast, most gold at the mine is hosted within mafic hosts rocks proximal to barren ultramafic units. The 8 Zone has a planar geometry, strikes generally north-south and dips to the east at approximately 45° which is significantly shallower than the other deposits. As it is presently modelled, the 8 Zone mineralization has approximate dimensions of 700 by 130 x 30 m thickness.

Within this mineralized plane, gold occurs in highly deformed, centimetre- to metre-scale blue-grey recrystallized quartz veins (VBGQ) located within a corridor of amphibole-biotite alteration which is generally on the order of tens of meters wide. The more intense zones of alteration are marked by near-total replacement by 1 – 10 cm intervals with biotite, an abundance of blue-green Ca-Mg rich amphibole, and a well-developed foliation defined by alignment of secondary biotite.

It is important to note that modern drilling (for which core is available for review) is relatively limited compared to the other zones of mineralization, and as such there is much that is still not fully understood about the geometry and mineralogy of the 8 Zone but it appears to lie adjacent the Russet Lake Shear Zone. This early structure dissects the length of the Russet Lake ultramafic volcanic unit which represents the lowermost Balmer assemblage rocks on the Madsen Property.

7.3.3 Russet South

Gold at the Russet South Deposit is hosted within folded and/or boudinaged blue-grey quartz veins similar to those characteristic of the 8 Zone. At Russet, however, the veins mostly occur within weakly deformed 10 m-scale wide, planar zones proximal to the northern contact of Russet Lake ultramafic volcanic rocks and on both the hanging and footwalls of a smaller ultramafic sill running parallel to this contact (Figure 7.7). The veins are most commonly hosted within relatively weakly biotite-amphibole altered basalt, though some occur within ultramafic rock and underlying iron formations. Despite the chaotic arrangement of individual veins, due to their transposed nature, zones of high vein density, deformation, alteration and gold mineralization can be defined over hundreds of meters of strike length, trending generally broadly sub-parallel or at low angle to stratigraphy which is itself broadly folded about south-plunging D_2 folds in the Russet area. When projected to surface, these zones of high vein density extend over a footprint of approximately 650 m by 650 m, and have been defined to a vertical depth of 200 m.

7.3.4 Starratt

Mineralization at the Starratt Target is very similar in nature to that found at the Madsen Mine. Gold occurs in similarly strongly altered and deformed basalt with the typical biotite-amphibole-diopside assemblage with local silicification and potassium feldspar alteration. The structural setting is also equivalent to Madsen whereby mineralized zones occur in planar bodies that cut across the same ultramafic sills that occur at Madsen. Like at Madsen, plunge control of mineralization at Starratt is controlled by the intersection of sills and interpreted early structures but at Starratt the plunge is steeper owing to the generally steepening of the stratigraphy as the Balmer rocks become constricted between the Killala-Baird Batholith and Faulkenham Lake stock towards the southwest.

Historically, Starratt and Madsen were operated by different companies and original records from Starratt are fragmented such that the historical drill hole database for Starratt is sparse. No original early drill logs are available and the existing drill database has been built largely from fragmented original section and plan maps showing selected data only. Nonetheless, available historical information, surface mapping and geophysical interpretation aided drill-targeting as step-outs from mined out areas in 2016. Gold intercepts (such as 34.0 g/t Au over 2.3 m true thickness in PG16-198) indicate that Starratt is open at depth. The mineralized lenses at Starratt extend for approximately 1200 m strike length vertical depth of 550 m, with a thickness of 10 – 15 m.

Interestingly, since the Starratt and Madsen mines were originally separated by a tenure boundary, the area between these historical mines seems under-explored especially given that the area is underlain by Balmer basalt intruded by ultramafic sills. Though drill density is not adequate the alteration and host stratigraphy appear continuous between the two historical mines and Starratt is interpreted to be part of the same mineral system at Madsen.

7.3.5 Fork

The style of mineralization at the Fork Deposit is somewhat similar to that described above for the Russet South Deposit. Gold is hosted by quartz veins that occur at the intersection of an early gold-bearing structure (D_1?) with an iron formation unit and also intersection with a mafic-ultramafic contact. At the main Fork Deposit, the mineralized body is a shallow southwest plunging rod shaped zone defined by the intersection of these two planes. The Fork Deposit has an approximate strike length of 450 m and has been drill tested to 200 m vertical depth, Average thickness of the mineralization is 1-5 m.

7.3.6 Creek

The Creek target is located near the south end of the Starratt-Olsen mine, along strike of the De Villiers and 8600E targets, northwest of the trend along which the main Starratt deposit lies. Surface exposure and limited historical drilling indicates the zone has a similar geometry and character to the other zones along the same trend. Extents of the zone as it is currently defined suggests a strike length of approximately 50 m and thickness of 5–10 m. Limited historical data suggests that the zone may extend down to approximately 400 m vertical depth, though this has been poorly tested by modern work.

7.3.7 De Villiers

The De Villiers target is located near the Starratt-Olsen mine about 2.4 km southwest of the Madsen mill complex. De Villiers is characterized by gold-bearing quartz veins hosted by Balmer assemblage basalt. The target was mechanically stripped, bulk sampled and drill-tested (29 holes for 2,480 m) in 1998 (Panagapko, 1999). Results indicate a north-dipping quartz vein system that is at least 60 m by 90 m in strike length with 1-5 thickness. The zone has been intersected by very limited drilling to 150 m vertical.

7.3.8 Dev Northwest

The Dev Northwest target area has seen limited work to date. Follow-up of a 700 m by 100 m areal extent gold in soil anomaly at the end of the 2015 field season identified quartz veining and silicification in iron carbonate and banded amphibole-biotite altered basalt. Anomalous gold values were returned from limited outcrop grab sampling. Further work is required to determine depth potential and prospectivity (Baker and Swanton, 2016).

7.3.9 Dev

At the Dev Target, a large, D_2 fold defined by magnetic anomalies is cut by several axial planar shear zones. Banded iron formation defines at least three stratigraphic marker units which may fold back on themselves to define an F1 fold hinge (Cooley and Leatherman, 2015). MMI soil surveys have defined a significant multi-element, gold associated anomaly stretching over 1500 m by 200 m (Baker and Swanton, 2016). A program of mechanized outcrop stripping during the 2016 field season (Jones, 2016) designed to follow up on these anomalies identified several zones of altered and mineralized sedimentary rocks cut by significant quartz veining, from which isolated grab samples which carry significant gold values (up to 59.3 g/t Au in grab sample). These samples are not considered representative of the outcrops but are considered indicative of prospective veining. The 2016 work demonstrated that gold mineralization is present along chemical and competency contrasts in the Dev area, making it an attractive exploration target with similar characteristics to Russet South. Further work is required to better define the extent of gold mineralization in this area.

7.3.10 Coin

Immediately south of Coin Lake, a strongly carbonate-altered ultramafic unit occurs along an interpreted D2 shear by Cooley and Leatherman (2015). This ultramafic unit returned 0.25 g/t Au in one outcrop sample collected in 2014 (Baker, 2014). This and other host rocks in the vicinity appear highly prospective but little work has been completed to date largely due to the remote nature of the target. Weakly anomalous gold in soil values have been returned from Coin over a footprint of approximately 250 x 500 m.

7.3.11 Snib

Historically, this area was part of the Newman Madsen Property acquired by Pure Gold in 2014 and hosts the Newman Rajah Red Lake occurrence, which has been described as quartz veins occurring in a narrow, easterly-trending, mineralized shear zone. Pure Gold completed MMI soil sampling over the Snib target and returned anomalous gold in soil values at the northern and southern limits of Snib Lake, associated with quartz veining at the contact of folded ultramafic units. Shearing and strong carbonate alteration were mapped north of the lake (Cooley and Leatherman, 2015). Historically, a small number of core drill holes tested the unconformity between the Balmer and the Confederation assemblages and returned intercepts of 22.56 g/t Au over 2.0 m from drill hole NM06-02, and 43.51 g/t Au over 0.65 m from drill hole NM-10-02. Limited prospecting in this area by Pure Gold has returned anomalous gold values associated with disseminated pyrrhotite and pyrite. Further investigation of this target is required and will require a complete review of all drilling results. There is approximately 1000 m of poorly tested strike length between the two drill intercepts noted above.

7.3.12 Madsen North/Point

Highly anomalous gold in soil values northeast of the Madsen area (extending over a footprint of approximately 600 m x 300 m) are believed to be related to drainage downstream from the Madsen historical tailings (Baker and Swanton, 2016). The alteration zone which hosts the Austin Deposit trends along the unconformity towards the property boundary, however it is not known to be mineralized here. Limited drilling completed in 2014 by Pure Gold returned only weakly anomalous gold up to 0.4 g/t Au over 8.0 m. While no high-grade drill intercepts occur in the area, access is complicated by tailings infrastructure which has made adequate drilling difficult. Recent geological modelling indicates that the geology is highly prospective and further work is warranted.

7.3.13 8600E / Madsen #3 Vein

The 8600E target was explored in 1998 by mechanical stripping and recent mapping of these outcrops (Cooley and Leatherman, 2015) suggests that the 8600E target may represent the southern extension of the Fork Zone as the host rocks are continuous and the style of mineralization is similar. Recent drilling by Pure Gold (PG15-037) has tested the current southern limit of the Fork Zone 470 m along strike to the north of 8600E. A historical gold occurrence (Madsen #3 Zone) lies on strike between the two targets and is described as a quartz vein from 0.15 m to 0.50 m width, traced over 45.75 m along strike. Sampling in 1935 returned a reported average of 16 channel samples grading 36.3 g/t Au over a width of 0.3 m (Panagapko, 1998). At 8600E, limited rock sampling by Pure Gold of outcropping iron formation characterized by banded magnetite, pyrrhotite, and amphibole has returned a value of 0.3 g/t Au.

7.3.14 No. 1 Shaft

The reclaimed No. 1 Shaft mine is located about one kilometre south-southeast of the Madsen mill complex within Confederation assemblage rocks. This is a very old prospect whose discovery predates that of the Madsen Deposit. Records of the No. 1 Shaft area are fragmented but some original linens and later plans and sections are archived at the Madsen record collection. These show that the No. 1 Shaft was sunk south of the steeply southeast-dipping No. 1 Vein. Five levels of workings are shown on plan maps from the 1930s.

Detailed mapping by Pure Gold (Baker, 2014) indicates that the No. 1 Shaft mine was developed on a 30–70 cm metre-wide quartz vein that occurs within a layer-concordant sinistral shear zone. The vein has a strike length of about 110 m and has been intersected down to 100 m depth. Grab samples by Pure Gold confirm local high gold grades in both the quartz vein (up to 24.1 g/t Au) and adjacent wall rock (16.9 g/t Au).

7.3.15 Treasure Box

The Treasure Box Target near the north end of Russet Lake is characterized by extensional quartz-tourmaline veins and stockwork veins that locally contain visible gold. Quartz tourmaline veins preferentially formed during the boudinage of pre-existing barren iron-carbonate veins, possibly during a regional folding event. Vein swarms can vary in width from 10 to 70 m but individual veins are commonly 10-40 cm thick. Gold mineralization in the host rock is negligible.

Extensive drilling by Placer Dome and Claude has delineated a package of mineralized veins over a strike length of 165 m and to a vertical depth of 250 m with an average zone thickness of 30–40 m.

8.0 Deposit Types

The Madsen Gold Project is focused on identifying and delineating Archean-aged orogenic gold deposits (Groves et al., 1998)).

8.1 Characteristics

Following Kerrich et al. (2000), orogenic gold deposits are typically associated with crustal-scale fault structures, although the most abundant gold mineralization is hosted by lower-order splays from these major structures. Deposition of gold is generally syn-kinematic, syn- to post-peak metamorphism and is largely restricted to the brittle-ductile transition zone. However, deposition over a much broader range of 200–650^{o}C and 1–5 kbar has been demonstrated. Host rocks are highly variable, but typically include mafic and ultramafic volcanic rocks, banded iron formation, sedimentary rocks and rarely granitoids. Alteration mineral assemblages are dominated by quartz, carbonate, mica, albite, chlorite, pyrite, scheelite and tourmaline, although there is much inter-deposit variation. The hydrothermal fluid responsible for gold mineralization is consistently H_2O-rich with <6 eq. wt. % NaCl and 5–30 mole % $CO_2 6 CH_4$.

The absolute timing of mineralization has revealed that gold was deposited over large areas during short time periods. Based on the uniformity of fluid composition over broad crustal depths (3–15 km), Groves (1993) erected the crustal continuum model for late-Archean orogenic gold deposits, which implies the involvement of giant hydrothermal systems that tapped a deeply-sourced gold rich fluid.

Among Archean orogenic gold deposits, much variability exists in characteristics such as host rock and structural style, but other characteristics such as the structurally late timing of gold deposition and fluid properties are remarkably consistent. Hagemann and Cassidy (2000) explain these observations with the mineral system concept. In this way, highly variable characteristics are related to deposit-, or smaller-scale influences and thus are affected by the final stages of gold deposition. By contrast, consistent characteristics imply underlying, system-scale (5–500 km) influences. Perhaps the starkest example of such controls is the consistent, ca. 2630 Ma age for gold mineralization across an area of ~600 x 700 km in the Yilgarn Craton (Kerrich and Cassidy, 1994; Qiu and Groves, 1999). Craton-scale models have evolved to explain these underlying, large-scale characteristics and almost universally invoke some form of orogenesis and crustal thickening (Kerrich and Wyman, 1990; Groves et al., 1998).

8.2 Geodynamic Setting

Archean, Proterozoic and Phanerozoic orogenic gold deposits share similar associations with accretionary belts (Kerrich and Wyman, 1990; Barley and Groves, 1992; Kerrich and Cassidy, 1994; Kerrich et al., 2000). Continent-continent collisions (such as the modern Alpine-Himalaya orogen) produced much less gold, whereas transpressive zones where allochthonous terranes accreted (external orogens of Barley and Groves, 1992) are highly prolific. The typical late-kinematic timing of gold deposition implies that thickening associated with accretion was a necessary precursor to formation of large gold deposits (Kerrich et al., 2000).

8.3 Madsen Gold Project Mineralization Model

Like most geological deposit models, the orogenic gold model is built upon generalized similarities. But, since these deposits formed within extensive hydrothermal systems which extended across thick sequences of the crust comprising diverse rock types, the specific mineralogy, timing and morphology of mineralized and altered rock is highly variable. Similarly, the Madsen geological model includes larger-scale features sharing consistency and several small-scale characteristics that are highly-variable.

At the largest-scale, all significant gold mineralization at Madsen is demonstrably early relative to the most significant, penetrative deformation event (D_2). Quartz veins at 8 Zone and Russet South are boudinaged, recrystallized and folded and are cut by the penetrative S_2 foliation. Mineralized bodies of the Austin, South Austin, A3 and McVeigh are folded and transposed into S_2. Thus, a major component of the deposit model is the expectation that mineralized bodies are deformed and may be dismembered and/or folded. The early timing also implies that the causative, gold-bearing structures (D_1?) are cryptic and difficult to identify owing to post-mineral deformation and metasomatism. At the property-scale, however, these structures are conspicuous based on patterns of gold mineralization and alteration and importantly these structures transect the Balmer stratigraphy at low-angles. For instance, the Austin and South Austin deposits lie within the same planar structure which cuts across an ultramafic sill (Figure 8.1, Figure 8.2).

At drill core scale, much variation in mineralogy and structural features of gold-bearing zones exists. Typically, these features are linked to the chemical and rheological features of the host rock. At least minor gold mineralization is hosted in most rock types on the property but some important patterns form the basis of the exploration model. Principal among these patterns is the occurrence of the most significant gold mineralization within Balmer basalt adjacent to ultramafic sills (Figure 8.1, Figure 8.2). This pattern is repeated in level plan and cross section throughout the Madsen and Starratt Mines. Most gold has precipitated within several 10s of metres of the intersection of mineralized structures and an ultramafic/ mafic contact. Likely, the more iron-rich basalt encouraged destabilization of gold-bearing bisulfide complexes (considered the most likely transport candidate; Mikucki, 1998) where the fluid interacted with the ultramafic / mafic interface. Additionally, mafic rock likely acted more competently promoting fluid pathways and permeability (e.g. Cox et al., 1986). A similar mechanism of chemical and rheological contrast was likely at work where mineralized structures intersected iron formation in close proximity to ultramafic contacts; significant gold mineralization is present in these settings at the Russet South and Fork deposits.

Within the Madsen deposits a secondary control was apparently provided by early, metre-wide-scale, quartz porphyry intrusive bodies (lithological code QZPY). In detail, the quartz porphyry bodies are preferentially unmineralized (or very weakly mineralized) but the basalt surrounding these bodies is locally exceptionally well-mineralized. The most extreme example of this relationship is within the Austin Deposit at deeper levels within the Madsen Mine (Figure 8.3). In this area the quartz porphyry body forms a largely barren core within the Austin historical ore body, the orientation of which is an effective vector to the South Austin historical ore body on the footwall side of an ultramafic sill. The Madsen geological model interprets that these felsic intrusions emplaced along the same early (D_1?) structures that controlled gold mineralization. These intrusions are sodium-depleted (Mackie, 2016), weakly mineralized and altered suggesting they typically intruded slightly pre-gold deposition.

Thus, the main components of the Madsen Gold Project mineralization model include:

- Significant gold deposition occurred prior to the main, belt-scale deformation event (D_2) within largely planar structures that have been nearly completely recrystalized by overprinting deformation and metamorphism;
- Geometrically, gold deposits were folded by small-scale, localized folds, structurally dismembered by transposition and gold was remobilized into secondary (metamorphic) mineral phases. Effective exploration drill targeting requires anticipation of these shapes and expectation of a heterogeneous gold system;
- At a small-scale (10s of metres), characteristics of mineralized rock were heavily influenced by host rock. These controls include both rheological (quartz porphyry dykes) and chemical controls (Balmer mafic versus ultramafic and Balmer mafic versus felsic Confederation rock).

8.4 Madsen Gold Project Geologic History

The Madsen Gold Project mineralization model is based on a geologic history for the western part of the Red Lake Greenstone Belt. This is an interpretative chronology based on published data and recent exploration work. The geologic history can be summarized by the following events:

- Deposition of Balmer assemblage ultramafic and mafic volcanic rock with minor subordinate iron formation (deposited during periods of volcanic quiescence) and rare felsic volcanic rock at ca. 2.99–2.96 Ga. Gabbroic and ultramafic sills and dykes are common within the Balmer assemblage and these represent probable coeval subvolcanic feeders.
- Possible tilting (D_0 event of Sanborn-Barrie et al., 2004b)
- Folding. Evidenced by the Russet Lake ultramafic which is cored by a ~N-S trending antiformal fold axis supported by opposed way-up indicators (pillow tops) and symmetrical stratigraphy (basalt units and iron formation). Fold geometry of ultramafic/ gabbroic sills within Madsen Mine area with consistent NE-plunging axis indicate possible smaller-scale but coeval folding. Caused by D_1 deformation event.
- Faulting or shearing. Planar structures such as the Russet Lake Shear Zone and the structures that host gold mineralization at Madsen and Starratt may have formed during the D_1 folding event or earliest in the D_2 event but later overprinting has largely obliterated these structures.
- Emplacement of quartz porphyry dykes within structures at Madsen and Starratt.
- Gold deposition and hydrothermal alteration. Gold was deposited in tabular, planar bodies at Austin, McVeigh and Starratt and vein-dominant mineral systems Russet South and 8 Zone. This event was superimposed on the Balmer units that had increased complexity owing to D_1 folding creating variably-dipping limbs (e.g. McVeigh vs. Austin) resulting in variable gold mineralized shoot plunges. Interplay of gold-bearing structures (which are now cryptic) and lithological competence contrasts (e.g. quartz porphyry dykes and mafic/ultramafic contacts) is key.

- Ca. 100-million-year volcanic quiescence with no major volcanic event recorded in the Red Lake Greenstone Belt.
- Uplift and Erosion. Balmer host rocks were emergent at surface at 2744 Ma (age of basal Confederation assemblage at Madsen). Madsen and other gold systems are assumed to predate Confederation but no direct age dates are available on gold mineralization.
- Deposition of Confederation assemblage. Felsic, intermediate and mafic volcanism resulted in deposition of the Confederation assemblage between ca. 2,748-2,739 Ma along an unconformable horizon developed on Balmer assemblage.
- Deposition of the Huston conglomerate (possibly present in the Madsen sequence) at approximately 2,742 and 2,733 Ma.
- Burial of Balmer volcanic rocks, gold deposits and Confederation rocks causing regional metamorphism (locally amphibolite grade based on garnets) and foliation (regional cleavage) development. Assigned as D_2 deformation event. Foliation (S_2) cross-cuts all lithological contacts, the Balmer/ Confederation unconformity and gold deposits at ~5-20^o angles. Deformation causes minor, S-shaped open folding about steeply ESE-plunging axes, with local alignment of mineralized bodies within the S_2 foliation. Metamorphic event has major impact on mineralogy with alteration phases (carbonate-sericite?-other?) replaced by diopside-amphibole-biotite-chlorite-garnet. Gold may have been locally remobilized into Confederation assemblage rocks (evidenced by elevated gold in Confederation rocks proximal to the unconformity).
- Intrusion of Dome and Faulkenham stocks.
- Emplacement of locally high-grade quartz-tourmaline veins at Treasure Box and other deposits near the Dome Stock (Buffalo, Madsen North, Hasaga).
- Intrusion of post-tectonic plutonic rocks including the Killala-Baird Batholith and associated granodiorite dykes across the Madsen greenstone belt at 2699 Ma.
- Modern uplift and erosion.

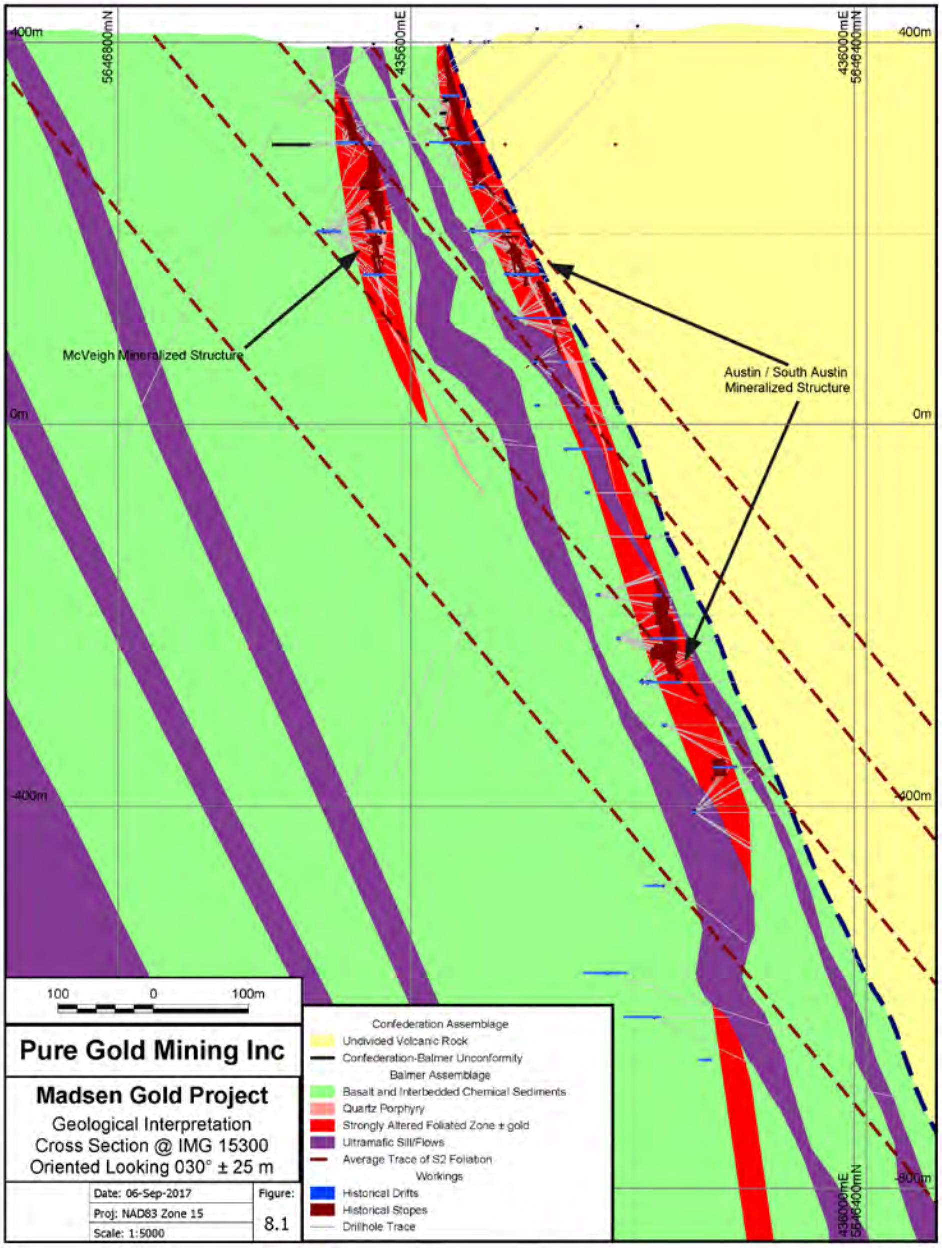


Figure 8.1: Cross sectional geological interpretation showing planar mineralized zones. Red outline delineates strongly altered Balmer basalt (SAFZ and BSLA) including the Austin at surface near the Balmer/Confederation unconformity, South Austin down dip between ultramafic sills and the McVeigh in the footwall to a lower ultramafic sill. Although now cryptic owing to over-printing deformation and metamorphism during D_2, these planar, red-outlined zones of strong alteration and localized gold (mined stopes shown in dark red) are interpreted to be early structures that cut across Balmer stratigraphy during a D_1 deformation event. Significantly, the trace of S_2 – a belt-scale deformation involving mostly flattening at Madsen – cuts obliquely across gold mineralization and lithological contacts including the unconformity. By D.Baker, September 6, 2017.

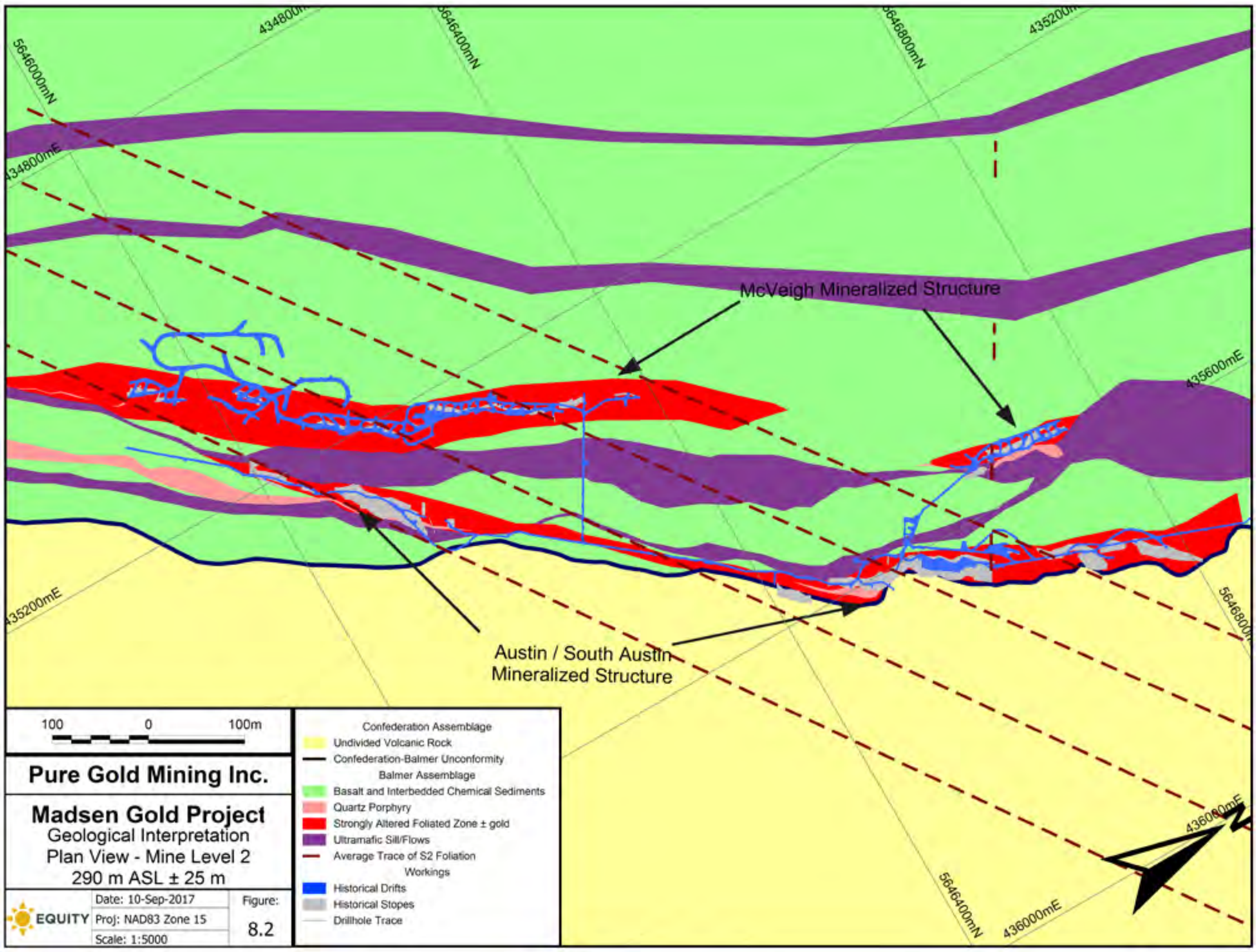


Figure 8.2: Level plan geological interpretation showing planar mineralized zones with similar geometry to that in cross sectional view (Figure 8.1). Red outline delineates strongly altered Balmer basalt (SAFZ and BSLA) including the Austin at the Balmer/Confederation unconformity, South Austin along strike to the southwest located between ultramafic sills and the McVeigh in the footwall to an ultramafic sill. Although now cryptic owing to over-printing deformation and metamorphism during D_2, these planar, red-outlined zones of strong alteration and localized gold (mined stopes shown in grey) are interpreted to be early structures that cut across Balmer stratigraphy during a D_1 deformation event. Significantly, the trace of S_2 – a belt-scale deformation involving mostly flattening at Madsen – cuts obliquely across gold mineralization and lithological contacts including the unconformity. By D.Baker, September 10, 2017.

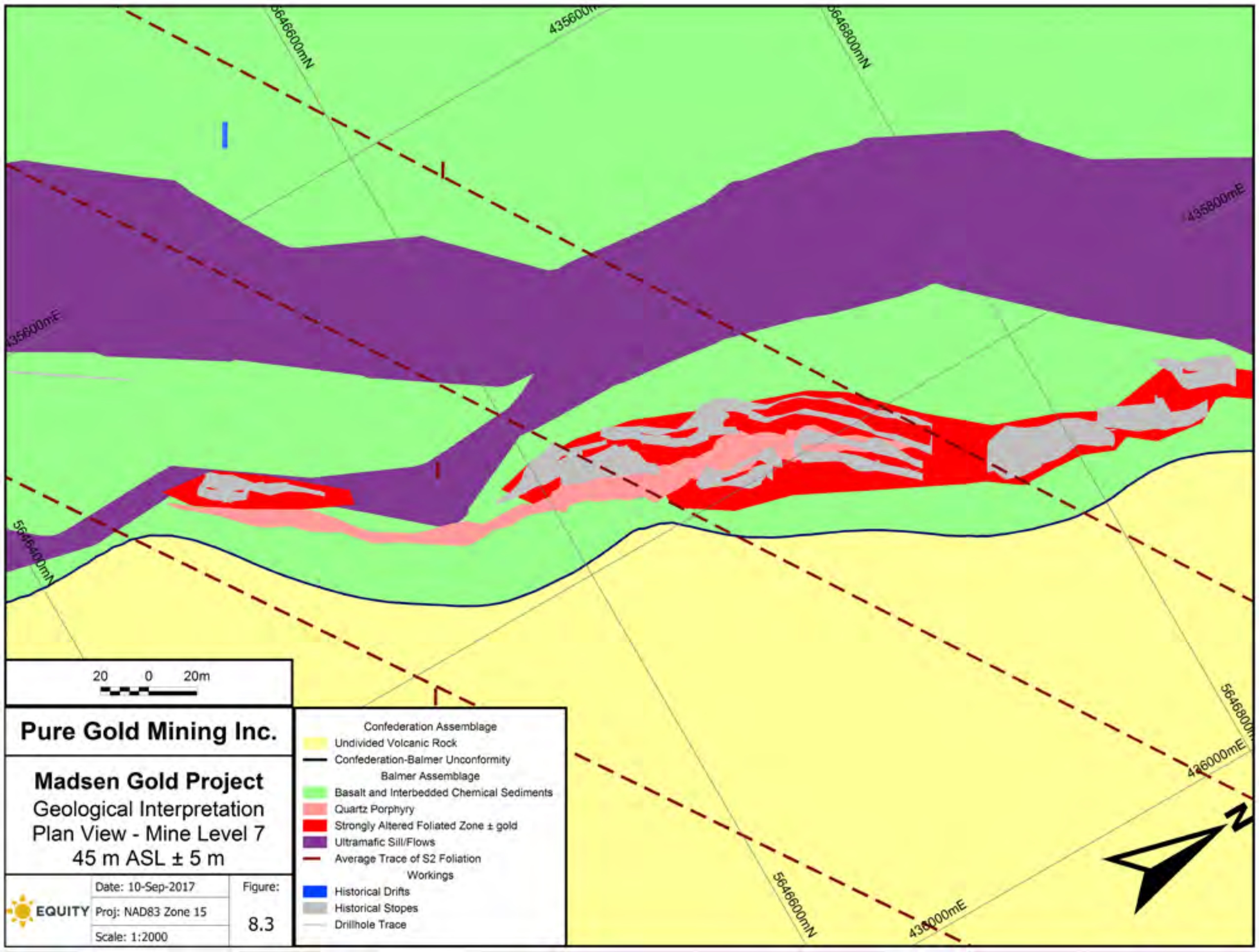


Figure 8.3: Level plan geological interpretation showing intimate relation between gold and quartz porphyry (QZPY). Mined-out stope wireframe solids shown in grey. Like planar, gold-bearing zones, the quartz porphyry dykes cut across Balmer stratigraphic contacts and are concordant with gold-bearing zones. Quartz porphyries pre-date gold mineralization (they are sodium-depleted, locally host low-grade gold and are altered) and so likely infiltrated the same cryptic structures which ultimately focused the hydrothermal fluids that were responsible for gold deposition. By D.Baker, September 10, 2017.

9.0 Exploration

A summary of the historical exploration work completed between 1928 and 2013 is discussed in Section 6.0.

Since acquiring the Madsen Gold Project in 2014, in addition to extensive diamond drilling Pure Gold has completed several exploration campaigns (Table 9.1) focused mostly on geological mapping and surface (rock and soil) sampling. An airborne geophysical survey was completed across the property in 2014 to aid in structural interpretation and targeting and two programs of mechanical overburden stripping were completed at the Russet South prospect in 2015. A similar program of mechanical stripping and outcrop mapping/sampling was conducted on the Dev target in 2016. To date these programs have been largely successful in contributing significant new geoscience data relied on to develop a new geological model for mineralization on the property. The sampling programs have delineated new gold anomalous zones in all target areas described in section 7.3 and uncovered new high-grade gold surface mineralization at several targets. New drilling targets have been developed and significant drill intersections have resulted at Fork, Starratt, and Russet South.

Table 9.1: Madsen Gold Project non-drilling exploration 2014–2017

Exploration Technique	Year(s)	Target or prospect	Quantity	Reference
Airborne magnetic survey	2014	Property-wide	1,702.8 line km	CGG (2014)
Drill collar location survey	2014	Property-wide	221 drill collars	Pure Gold database
Geological mapping, rock sampling	2014	Madsen deposit/unconformity, Fork, Madsen North	123 rock	(Cooley and Leatherman, 2014a)
Geological mapping, rock and soil sampling	2014	Property-wide & Russet South grid sampling	37 rock 117 B horizon soil 505 MMI soil 123 lithogeochem	(Baker, 2014a)
Geological mapping, rock sampling	2014	Durlak Lk towards Red Lk, Buffalo	79 rock	(Cooley and Leatherman, 2014b)
Geological mapping, rock and soil sampling	2014	mapping at Russet South and No. 1 Shaft; MMI sampling at Madsen South, Pumphouse, SPfold and Dev grids	29 rock 2,021 MMI soil 8 lithogeochem	(Baker, 2014b)
Geological mapping, rock sampling	2015	Flat Lake, Dev, Hasaga, Buffalo, DeVillier, Snib Lake, McVeigh, Coin Lake, Fork, Shore	410 rock, most analysed by portable XRF only	(Cooley and Leatherman, 2015)
Mechanical stripping, geological mapping, rock sampling	2015	Russet South (Alpha, Beta, Kappa stripped outcrops), Dev, Russet North	202 rock, 72 chip/channel, 3,234 MMI soil	Baker and Swanton (2015)
Petrography	2015, 2016	Russet South, Madsen	67 thin polished sections	Ross (2015), Leitch (2016)
Mechanical stripping, rock sampling	2015	Russet South	78 rock	Pure Gold database
Mechanical stripping, geological mapping, rock sampling	2016	Dev	123 Rocks	Jones (2016)
Soil Sampling	2016	Property-wide	2481 Soils	Pure Gold Database
Geological mapping, rock sampling	2017	Property-wide	143 Rocks	Pure Gold Database
Soil Sampling	2017	Derlak	686 Soils	Pure Gold Database

9.1 Airborne Geophysics

In May, 2014 Pure Gold commissioned CGG Canada Services, Ltd (CGG) of Mississauga, Ontario to carry out a high resolution magnetic airborne geophysical survey over the entire Madsen Property. The purpose of the survey was to provide geophysical support for detailed mapping of the geology and structure of the property.

The survey consisted of 1,702.8 line-km comprising 1,543.6 km of traverse lines (flown east-west at 50 m line spacing) and 159.2 km of tie lines (flown north-south at 500 m line spacing). Nominal ground clearance was 20 m. A GPS electronic navigation system and laser altimeter ensured accurate positioning of the geophysical data. Data were acquired using a MIDAS magnetic system with two helicopter boom-mounted high-sensitivity cesium vapour magnetometers in a horizontal gradient configuration.

Survey data were post processed by Zion Geophysics, Inc. (Zion) to extract as much information as possible. Zion provided processed images to Pure Gold that define subtle lithologic and structural details previously not recognized.

9.2 Collar Location Survey

During 2014 Pure Gold completed a property-wide program to survey a selection of historical drill hole locations to improve confidence in data acquired from historical drill holes Location data were collected with a Trimble ProXRT differential GPS receiver with Omnistar real-time correction, which achieved sub-metre precision. In all, 221 collars were surveyed from across the property. Many Madsen Gold Corp. historical collars could not be located due to casing being removed.

9.3 Geological Mapping

Several geological mapping campaigns were completed during the 2014 and 2015 summer field seasons as detailed in reports by Michael Cooley, Lamont Leatherman and Darcy Baker (Cooley and Leatherman, 2014a, b; Baker, 2014a, b; Cooley and Leatherman, 2015; Baker and Swanton, 2016). During the 2017 season, a comprehensive property-wide mapping and prospecting campaign was initiated, designed primarily to follow up on soil and surface rock anomalies.

GPS-enabled field computers were used to map locations and shapes of outcrop exposures and to collect data on lithology, alteration and structure which has resulted in a database of nearly 3,200 individual outcrops over an area of 31 km^2. Mapping efforts were focused on gold-prospective regions particularly along the Confederation assemblage/Balmer assemblage unconformable contact and at the Russet South and Fork Zone prospects.

The resultant property-wide geological map with lithological, alteration and structural interpretations is summarized in Figure 7.5. Mapping has defined structures (foliations, folds) relating to different deformation events and constrained the timing of gold mineralization relative to these events.

9.4 Outcrop Stripping

A series of six outcrops were stripped with an excavator by Pure Gold in 2015 to provide bedrock exposure over key areas where previous drilling had intersected gold mineralization. Stripped areas were mapped and sampled in detail. The exposure revealed several structural relations and indications of the timing of gold mineralization that are not apparent in drill core (Baker and Swanton, 2016).

A reconnaissance outcrop stripping program was completed in the Dev area in 2016 to follow up on a series of gold anomalies in surface grab samples and MMI soil samples. Several prospective zones with similar mineralization style to that at Russet South were identified as requiring additional follow-up (Jones, 2016).

9.5 Rock Geochemistry

Pure Gold has analysed about 1,224 surface rock samples using whole rock lithogeochemical, conventional gold plus multi-element or portable XRF analysis. The lithogeochemical samples were collected to determine the composition of the main rock units across the property. Mostly, however, rock samples were collected during mapping and prospecting and analysed to determine gold and pathfinder metal content. Numerous chip and channel samples were collected at the Russet South and Dev outcrops exposed during mechanical stripping. All rock samples collected by Pure Gold are analysed by the same analytical methods for gold and multi-element ICP geochemistry as drill core. While industry best practice techniques are applied to the collection of chip and channel samples. The sampling techniques and results are not considered in themselves to be representative of average gold grades of the zones but are rather used as one guide to prospectivity of a mineral target prior to drilling.

9.6 Soil Geochemistry

Two soil sampling techniques were trialled by Pure Gold: conventional, B-horizon soil sampling and Mobile Metal Ion (MMI) soil sampling. During the first sampling program in 2014, both types of samples were collected at the same widely-spaced sites across the property whereas subsequent surveys focused on collecting follow-up soil samples using only the MMI technique which was deemed to be the most appropriate for the majority of the sample sites (Arne, 2014).

MMI soil samples were collected in plastic Ziploc bags from a continuous interval between 10 cm and 25 cm below the organic/inorganic interface. Undecomposed organic material was avoided and excluded from the sample. Depending on the depth to the organic/mineral soil interface and the amount of groundwater, samples were collected with a hand auger or by digging a pit. Sites were photographed, marked with Tyvek tags and data recorded in field notebooks to be entered into Pure Gold’s spreadsheet template. Location data was recorded on handheld Garmin GPSs.

Conventional B-horizon soil samples were collected in paper kraft bags from the B soil horizon using a shovel or auger. Undecomposed organic material was avoided and excluded from the sample. Sites were photographed, marked with Tyvek tags and data recorded in field notebooks to be entered into Pure Gold's spreadsheet template. Location data was recorded on handheld Garmin GPSs.

For the initial, property-wide soil sampling program, sample locations were spaced about 1,000 to 500 m apart. For subsequent, follow-up programs MMI samples were collected along east-west grid lines spaced 100 m apart. Sample spacing along these lines was 25 m although sampling sites were modified slightly as appropriate to select a suitable location.

In all, Pure Gold has collected 8,972 MMI soil samples covering the majority of the property that is underlain by Balmer assemblage rocks. Several regions of anomalous gold exist including some which are not explained by bedrock geology (these are explained in greater detail in Section 7.4). Given the highly sensitive nature of the MMI technique, some broad areas of anomalous gold near historical mine sites are likely due to wind-blown tailings.

9.7 Petrography

Pure Gold has undertaken several petrographic studies of samples selected to characterize timing of mineralization. alteration phases and igneous precursors (Ross, 2015; Leitch, 2016; Ross, 2016). The results of this work have been integrated along with lithogeochemical studies to refine core logging schema.

9.8 Exploration Targets

The mineralized zones in described in Section 7.3 are all subject to ongoing exploration by Pure Gold.

10.0 Drilling

10.1 Historical Drilling

Information about historical drilling on the Madsen Property is described in Sections 6.0 and 14.0.

10.2 Drilling Considered for Mineral Resource Modelling

The Mineral Resource Statement reported herein for the Madsen Gold Project is based on historical and recent drilling data. The database, which is the basis for the current mineral resource estimate, has a cut-off date of April 11, 2017 and includes the results of 178,293 m of drilling from 435 holes (Claude plus Pure Gold drilling) completed since the 2009 resource estimate. Although the database includes 14,627 drill holes, only 13,151 of these were used to inform the resource estimate as the other holes are located outside of the area of estimation. Of the drill holes used for the resource estimation within this subset, 245 were drilled by Pure Gold. Figure 10.2 shows all drill holes used in the resource estimation, highlighting those drilled by Pure Gold in section view and Figure 14.2 shows a plan view of the same.

10.3 Pure Gold Drilling Program (2014–2017)

From project acquisition to April 11, 2017, Pure Gold has drilled 355 holes totalling 114,584 m of drilling. All drill holes completed by Pure Gold are shown in plan view in Figure 10.1. Drilling within the Madsen Mine area was aimed at characterizing the historically mined zones using modern methodologies and on extending the strike and dip extents of known mineralization. Targeted exploration drilling occurred within and adjacent to all of the resource domains (except the 8 Zone) with a focus on resource growth. All drill holes drilled by Pure Gold used for the resource estimation are shown in Figure 10.2 in section view. In addition, several target areas across the property were tested including Starratt, Fork, Russet South and initial drill holes into several regional targets.

Drill holes completed within the resource domains confirmed data contained in the historical mine compilation and allowed a thorough study of the structural geology, geochemistry, and alteration of the mineralized zones. Information acquired through the latest drilling and supported by surface work is consistent with interpretations that the gold mineralization at Madsen developed early in the tectonic history of the belt, and has been deformed and folded.

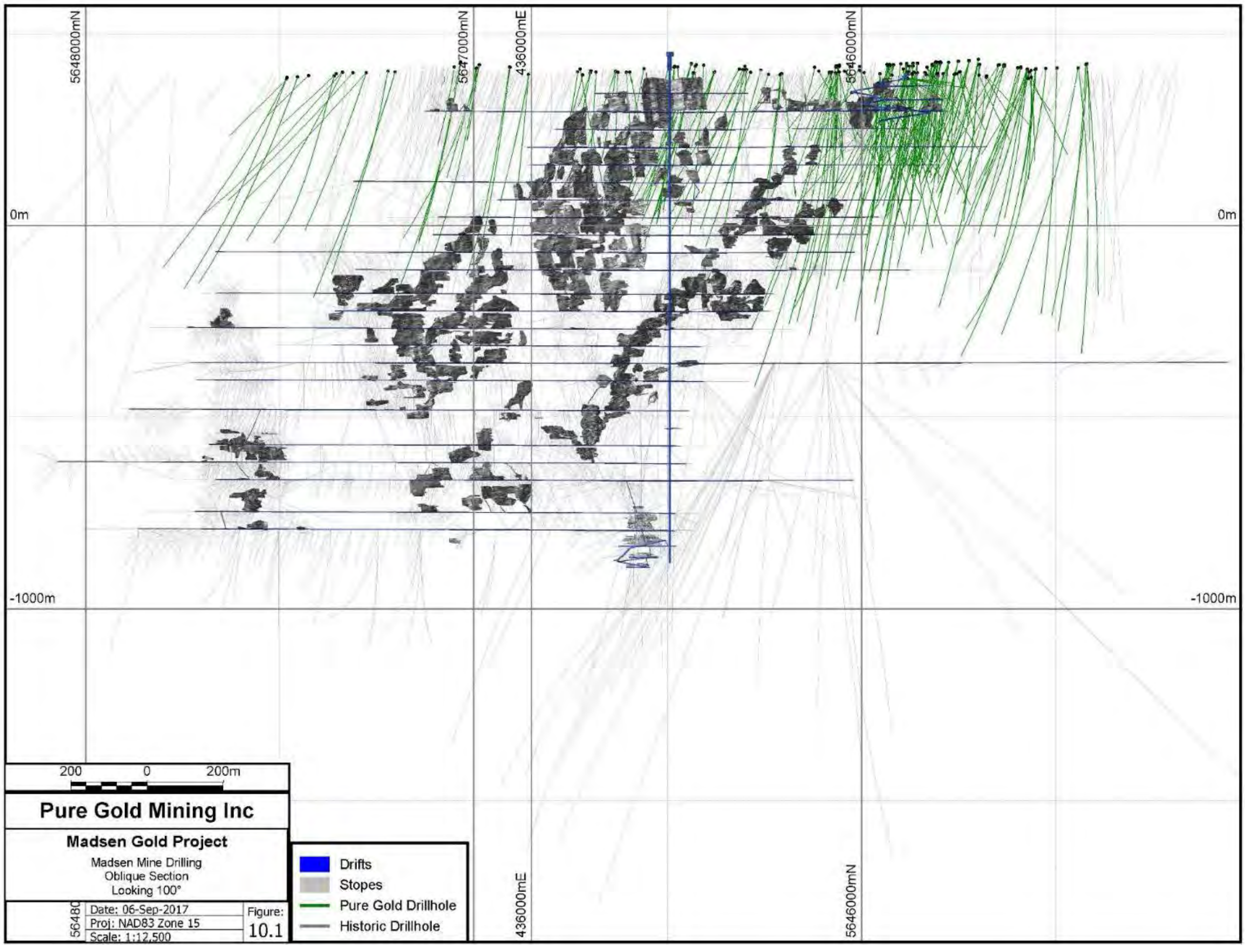


Figure 10.1: Drilling by Pure Gold and previous operators in the Madsen Mine area to April 11, 2017. Drawn by Equity Exploration.

Drilling was completed by Major Drilling in 2014 and early 2015 and Hy-Tech drilling from early 2015 to present. All holes were drilled with NQ-size equipment and 4 foot wooden core boxes were used to reduce manual handling injury potential. All drill collar casings were preserved and capped with caps labelled with the drill hole name. A pressure treated 2’x6’ post with an orange painted top was added adjacent to the casing to assist in locating the capped casings. Hole collar locations were surveyed post-completion using a Trimble ProXRT differential GPS receiver with Omnistar real-time correction, which achieved sub-metre precision. Down-hole surveys in 2014 and 2015 were initially completed with a Reflex EZ-Shot tool every 20 to 30 m. Drill holes were re-surveyed at completion with a Reflex Gyro survey tool from hole bottom to top. Starting azimuths for the gyroscopic instruments and drill alignments were determined with an azimuth pointing system (APS) GPS based compass in 2014 and 2015. In 2016, survey procedures were improved through the replacement of the APS with a Reflex TN14 Gyrocompass for drill alignments and initial gyro orientations. All drilling sites were cleared of any cut timber and debris, re-contoured and re-seeded with a native seed mix post-drilling. All drill holes were logged, photographed, and sampled at the Madsen Mine following the procedures described in Section 10.4. All data collected during core processing is stored in the Reflex Hub (formerly ioHub) cloud database.

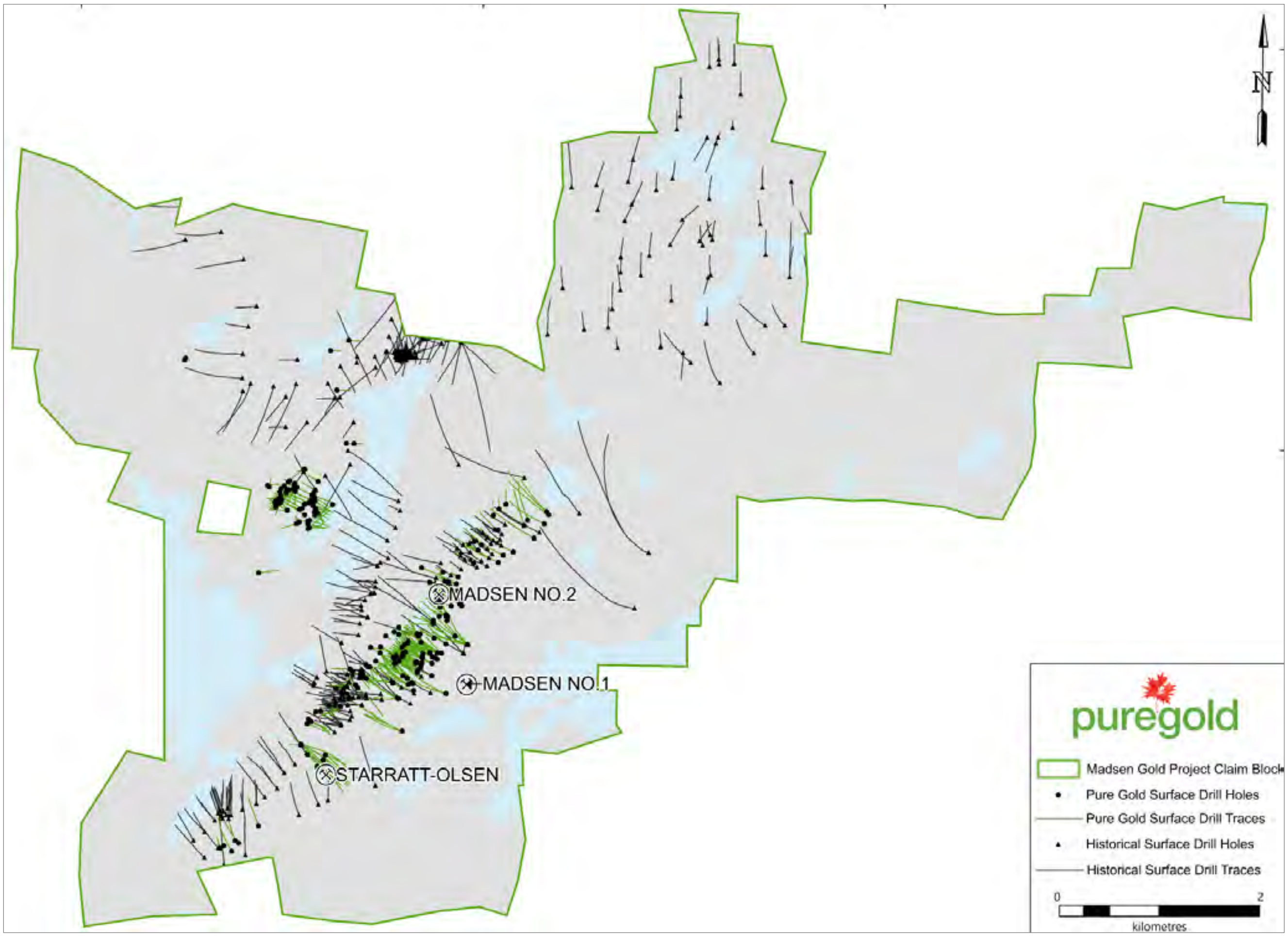


Figure 10.2: Surface Drilling by Pure Gold and Previous Operators. Provided by Pure Gold, September 10, 2017.

10.4 Core Processing

Core processing at the Madsen Gold Project is a collaborative effort between geologists and geotechnicians, with each assigned specific roles and responsibilities to ensure that drill core is processed and relevant data captured in a manner consistent with the standards set by Pure Gold. Upon initiation of drilling on a hole, project management will assign a Logging Geologist and Geotechnician to each hole. Data collection responsibility for each hole is tasked to the Logging Geologist and supervised by the Project Geologist. It is the responsibility of the Project Geologist to validate all drill hole data and ensure transfer to the cloud Hub database on completion of the logging and sampling.

10.4.1 Geological Quick Logging

Immediately following delivery of core from the drill rig to the core shack at morning shift change, the Logging Geologist assigned to each drill hole will complete a quick log and the results of the quick log are entered into an online tracking sheet. Observations and interpretation are discussed at daily meetings to enable consistent interpretation and adjustments for the planning of subsequent holes. The emphasis is on the mineralized zones and the potential to host gold.

10.4.2 Geotechnical Procedures

All core drilled on the Madsen Gold Project is prepared by a technician prior to geological logging. This preparation work includes reassembly and orientation of drill core pieces, checking and correction of block errors, drawing bottom of hole core orientation marks on core, measuring offset angles of bottom of hole marks, recording loss of orientation lines, and placing down-hole meter marks as well as measuring recovery, RQD and magnetic susceptibility. All downhole measurements are collected to the nearest centimetre.

Core recovery at Madsen is excellent and averages >95%.

Each core tray is permanently labelled with details of drill hole number, box number and depth interval engraved onto an aluminium tag affixed to the end of the tray. Box intervals are recorded into an Excel file and retained.

10.4.3 Geological Logging

All drill core at Madsen is geologically logged by experienced logging geologists. All core logging is captured directly into a laptop or tablet computer using the Reflex Logger software. This program captures and stores geological data in discrete and specific data tables.

Geological boundaries and annotations are marked on the core using coloured china markers on the portion of the core to be retained after cutting and sampling. Section 7.3 details the individual lithological units and codes that are used in logging. Due to the focus on mineralization, any major structures (primarily large or gold-hosting veins) are reported both in the lithology table as well as being recorded in structure or vein tables. Lithologies are split out for intervals that are greater than 1 m in thickness and/or of geological significance. Mineralized veins 20 cm length or larger, are logged separately. In zones of mineralization, boundaries attempt to constrain the mineralized interval as precisely as possible. The focus of the geologic logging is to highlight the mineralized zones and to also capture lithology, alteration and veins, and structural data.

10.4.4 Structural Data

All drilling by Pure Gold uses Reflex ACTIII core orientation tools. All core intervals in the Balmer assemblage target units are oriented with a bottom of core mark and additional intervals of interest such as quartz veins captured in other less prospective rock units. Representative average foliation measurements are logged downhole every 10 to 20 m or on major changes in orientation. Strike and dip of key structural features including vein and lithologic contacts, fold axes, and lineations are recorded using alpha, beta and gamma angles and DIPS software or the GEOTECH module in GEOACCESS 2000, Micromine or Geocalculator software are used to calculate and plot the true strike and dip of structural features. The structural data can then be visualized in Leapfrog or Micromine.

10.4.5 Core Photography

All drill core is photographed both wet and dry after sampling layout, prior to cutting. Core photography uses a high quality DSLR camera in a fixed mount with standardized camera settings, lighting and layout. HoleID, core box number, depth blocks, cut lines, and sample marks and tags are visible in the photographs. All digital photograph files are renamed to include the hole number, box numbers and depths (Plate 10.1).

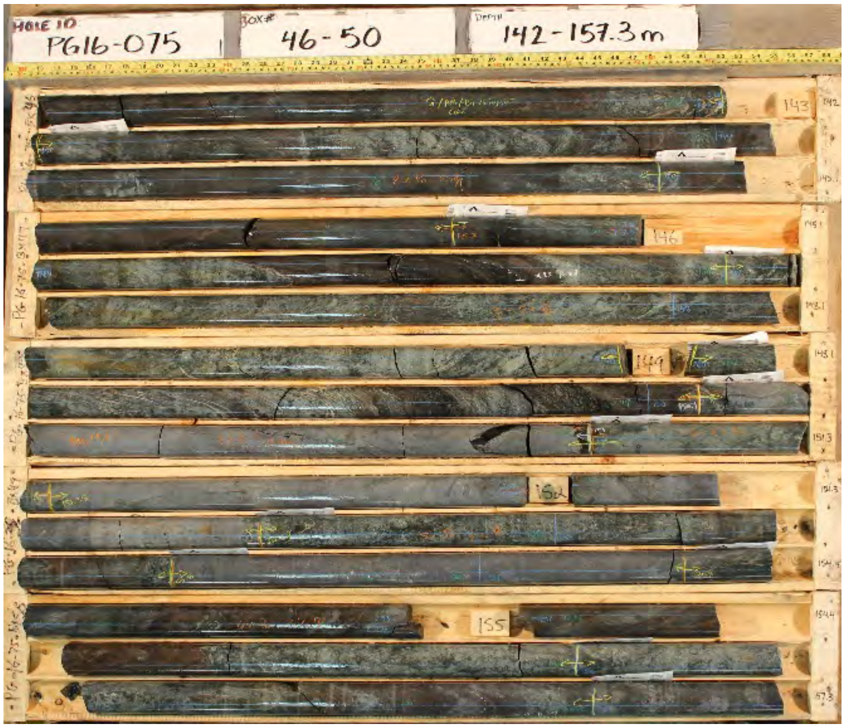


Plate 10.1: Typical core photographs. These are generally taken of both dry and wet core at a standardized photo station.

10.4.6 Core Storage

After logging, photographing and sampling the core is cross-stacked, strapped and is stored in ordered rows on pallets in a newly created core storage facility at the Madsen project site (Plate 10.2). All returned pulps and coarse reject material from the assay labs are tarped and also stored in this area.

Plate 10.2: Madsen Gold Project core storage facility.

11.0 Sample Preparation, Analyses and Security

11.1 Historical Sampling

11.1.1 Historical Sampling (1936–1982)

Sample preparation, analyses and security procedures for historical samples taken during the operation of the Madsen Mine (core and chip samples) are not specifically documented and therefore difficult to review. Samples were assayed for gold at the mine laboratory. No information exists regarding lab certifications. ISO 9000 series standards were first published in 1987, and the ISO 17025 standard was first published in 1999 and as such could not have been applied. The preparation and assaying technique is not documented. Assay records are preserved on paper logs, level maps and sections.

Sample preparation, analyses and security procedures for historical samples taken by Central Patricia Gold Mines and Cockeram Red Lake Gold Mines between 1943 and 1946 and by Noranda Inc. in 1981 and 1982 are unknown. No information exists regarding lab certifications. ISO 9000 series standards were first published in 1987, and the ISO 17025 standard was first published in 1999 and as such could not have been applied. The preparation and assaying technique is not documented.

11.1.2 Placer Dome (2001–2006)

Between 2001 and 2006 all samples collected by Placer Dome were sent to either XRAL Laboratory in Toronto, Ontario or ALS Chemex Laboratory in Vancouver, British Columbia.

Placer Dome used two primary laboratories for assaying samples collected from the Madsen Gold Project. All samples from 2001 to 2006 were assayed by XRAL Laboratories or ALS Chemex Laboratories. Upon the receipt of the samples at the laboratories, samples were organized in numerical order and subdivided into batches. The author is of the opinion that the sampling information collected by Placer Dome was conducted using procedures generally meeting industry best practices, and that the assaying results are sufficiently reliable to support mineral resource estimation.

11.1.3 Teck Cominco (2003)

Sample preparation, analyses and security procedures for historical samples taken by Teck Cominco Ltd. in 2003 are unknown. No information exists regarding lab certifications.

11.1.4 Wolfden and Sabina (2003–2012)

Wolfden submitted samples to Accurassay Laboratories in Thunder Bay, Ontario. Accurassay received ISO 17025 accreditation in 2002 from the Standards Council of Canada. It is unknown which analytical methods were covered under this accreditation.

At Accurassay, samples were prepared using a standard rock preparation procedure consisting of drying, weighing, crushing, splitting, and pulverization. Prepared samples were assayed for gold, platinum, palladium, and rhodium using inductively coupled mass spectroscopy (ICP-MS) as well as for a suit of base metals using ICP-MS.

Procedures followed by Sabina are known in more detail. During 2010 and 2011 Sabina submitted samples to SGS Laboratories (SGS) in Red Lake for sample preparation and analysis. SGS was accredited by the Standard Council of Canada (SCC) to ISO 17025:2005 (accredited laboratory number 598) for gold analysis by fire assay.

All samples were delivered by Sabina personnel to SGS. Sample preparation and assay analysis included crush to passing to 75% passing 2 millimetres and then pulverizing a 250-gram split to 85% passing 75 micrometres. Samples were assayed by fire assay with an atomic absorption spectroscopy (AAS) finish on 50-gram aliquots. A duplicate sample was assayed by SGS as part of their assaying procedures.

In 2012, Sabina submitted samples to Activation Laboratories Ltd. (Actlabs) in Red Lake for sample preparation and analysis. Actlabs was accredited to ISO 9001:2008 by Kiwa International Cert GmbH (certificate number 1109125). Samples were crushed to 90% passing 2 mm after which a 250 g split was pulverize to 95% passing 105 micrometres. Samples were assayed by fire assay with AAS finish using a 30 g aliquot.

11.1.5 Claude (2006–2013)

Claude used four primary laboratories between 2006 and 2012. SGS Laboratory in Red Lake and TSL Laboratory located in Saskatoon, Saskatchewan were used from 2006 to May 2008, until Claude identified performance issues with samples submitted to the SGS Laboratory in Red Lake and as a result stopped submitting samples to this laboratory. Starting in 2009 Claude submitted samples to Accurassay Laboratories in Thunder Bay, Ontario but experienced lengthy delays in receiving assay results. Then in 2010, Claude submitted all samples to ALS Limited (ALS) in Thunder Bay for sample preparation and to ALS Vancouver for assaying. All these laboratories are accredited ISO/IEC Guideline 17025 by the Standards Council of Canada for conducting certain testing procedures, including the procedures used for assaying samples submitted by Claude. These laboratories also participate in proficiency testing programs.

These laboratories all used standard rock sample preparation procedures involving coarse crushing dried sample, pulverization of 500 g subsamples to 90% passing 150 mesh screens (105 microns).

All core samples were assayed for gold using a standard fire assay procedure on pulverized subsamples with an atomic absorption finish. Samples assaying more than 1.0 g/t gold were re-analyzed by fire assay with a gravimetric finish. Samples assaying greater than 5.0 g/t gold were re-analyzed using screen metallic fire assay procedures.

11.2 Pure Gold Sampling

11.2.1 Pure Gold (2014–2016)

During 2014, 2015 and 2016 Pure Gold submitted all samples to ALS Minerals (ALS) Laboratory in Thunder Bay and Vancouver for sample preparation and analysis, respectively. Pure Gold submitted pulp duplicate samples to SGS Laboratory in Burnaby, British Columbia for check assay testing. The ALS laboratory in Vancouver is ISO 9001:2008 and CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified by the Standards Council of Canada (SCC) for the analytical methods used on the Madsen samples (accredited lab 579). The SGS laboratory is CAN-P-159, CAN-P-1578, and CAN-P-4E (ISO/IEC 17025:2005) certified by the SCC for the analytical methods used on the Madsen samples (accredited lab 744).

Samples were dried and crushed to 70% of the sample passing a 2 mm screen (method CRU-31). Initial crushing was followed by a Boyd rotary split of a 1 kg subsample (method SPL-22Y), and pulverization of the split in a ring mill to better than 85% of the ground material passing through a 75 micron screen (method PUL32).

Sample pulps were shipped to the ALS laboratory in Vancouver. Assays for gold were by a 30-gram aliquot fire assay followed by aqua regia (HNO_3-HCl) digestion and measurement by atomic absorption spectroscopy (AAS, method Au-AA23). Samples in which the gold concentration exceeded 5 ppm were re-assayed from the same pulp by method Au-GRA21, fire assay of a 30-gram aliquot, parting with nitric acid (HNO_3) followed by gravimetric gold determination. In cases of significant visible gold in samples, the complete interval was re-assayed by method Au-SCR24, screened fire assay (metallic screen). In addition to the gold assays, multi-element geochemical trace level analyses were completed by method ME-ICP61, induction coupled plasma-atomic emission spectroscopy (ICP-AES) following digestion by hydrofluoric (HF), nitric (HNO_3) and perchloric ($HClO_4$) acids followed by a hydrochloric (HCl) acid leach.

As routine external quality control methods for the samples re-assayed by method Au-SCR24 were not practical, for this method Pure Gold relied on the internal quality control performed by ALS and a comparison with the initial assays by methods Au-AA23 and Au-GRA21.

11.2.2 Pure Gold (2017)

In 2017 Pure Gold submitted all samples to SGS Minerals Services (SGS) in Red Lake for sample preparation and gold analysis, with additional analysis conducted at SGS's Vancouver facility. Some samples were diverted to the SGS Laboratories in Lakefield and Burnaby for preparation and all analyses after being delivered to the Red Lake laboratory due to capacity limits.

The SGS laboratory in Red Lake is CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 598). The SGS laboratory in Vancouver is CAN-P-1587, CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 744). The SGS laboratory in Lakefield is CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) certified for the analytical methods used on the Madsen samples (accredited lab 184).

Samples were dried and weighed (method G_WGH79) and crushed to 75% of the sample passing a 2 millimetres screen (method G_CRU21, method G_CRU22 where sample weight is > 3.0 kg). Initial crushing was followed by a split (to obtain a sample weight of 1.0 – 1.5 kg), and then pulverization of the split in a Cr steel bowl to better than 85% of the ground material passing through a 75 micron screen (method PUL47).

Analysis for gold was conducted at the SGS laboratory in Red Lake, by a 30 g fire assay with an atomic absorption spectroscopy finish (method GE_FAA313). In cases where the assay value returned > 5 ppm Au, a follow up gravimetric analysis was conducted (30 g fire assay with a gravimetric finish, method GO_FAG303). In cases where visible gold was noted during core logging, a screen metallic gold analysis was conducted in addition to the AAS and gravimetric analytical procedures (screen to 106 microns followed by fire assay, method codes GO_FAS31K and GO_FAS51K for samples <1 kg and >1 kg respectively). In addition to the gold assays, 49-element geochemical trace level analyses were completed in the Burnaby laboratory by method GE_ICM40B, induction coupled plasma-atomic emission spectroscopy (ICP-AES) and induction coupled plasma mass spectrometry (ICP-MS) following digestion by hydrofluoric (HF), nitric (HNO_3), perchloric ($HClO_4$) and hydrochloric (HCl) acids.

In a minority of cases, the analyses described above were conducted at the SGS facility in Lakefield as opposed to Red Lake and Burnaby.

11.3 Sample Security

11.3.1 Pure Gold (2014–2017)

During the 2014–2017 drilling programs, Pure Gold's personnel employed the following security and chain of custody procedures:

i. Core was placed in wooden core boxes by drilling contractors, covered with wooden lids, and sealed with fiber tape.
ii. These boxes were delivered to the locked and fenced logging facility by drill crew members twice daily at shift changes by truck or snowmobile.
iii. Core shack personnel opened core boxes and sorted boxes for logging as described above.
iv. Core awaiting sawing (sampling) was stored in a rack in the core shack.
v. Core was sawn and bagged into pre-labelled sample bags by samplers under the supervision of the senior sampler and project geologist.
vi. Sample bags were placed inside pre-labelled rice bags.
vii. Rice sacks containing bagged samples were sealed and palletized (or placed within plastic shipping totes) within the core shack.
viii. During the 2014–2016 programs shrink-wrapped pallets of rice sacks were shipped directly from the core shack via Manitoulin Transport Trucking Services LTL of Winnipeg, Manitoba to ALS Minerals laboratory in Thunder Bay, Ontario for sample preparation. During the 2017 program, plastic shipping containers and shrink-wrapped pallets were picked up from the Madsen Mine site by SGS personnel and driven to their Red Lake facility via pickup truck.
ix. Access to the core logging facility was restricted to authorized staff.
x. Hardcopy chain of custody forms and sample analytical instructions were included with each shipment and copies were sent by email. The analytical labs (ALS from 2014–2016 and SGS in 2017) reported all shipments were received intact

11.4 Quality Assurance and Quality Control Programs

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

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

11.4.1 Historical Period (1927–2000)

There are no records to indicate if specific analytical quality control measures were implemented by any operator during early exploration activities or at the mine laboratory during the operation of the Madsen Mine (1936–1976). Neither is there any information regarding analytical quality control measures implemented by Claude between 1998 and 2000.

11.4.2 Placer Dome (2001–2006)

Placer Dome annual reports indicate that analytical quality control measures were implemented, however the details of these measures and the analytical quality control data were not transferred to Claude in 2006.

11.4.3 Wolfden and Sabina (2003–2012)

Wolfden and Sabina implemented external analytical quality control measures on core sampling. The exact extent of the implemented program is unknown, and data prior to 2006 are unavailable. Implemented measures included using control samples (blank and standard reference material). Quality control samples were inserted into the sample stream on regular intervals. A sample blank was inserted every 25 samples, and a standard inserted every 75 samples.

The material used as blanks was what was termed a quartz-crystal tuff and amphibole mafic intrusive and was sourced from an outcrop in the southwest corner of Wolfden's Bonanza/Follansbee property. These samples were assayed by Accurassay Laboratories to ensure suitability. The performance of the blank material is unknown.

A 2006 drilling report noted that two different standards were used, SK21 that had a certified assay of 4.048 g/t Au and SN16 that had a certified assay of 8.367 g/t Au. Certificates are not available and the source of the standards in unknown. The report suggests performance issues with standard SK21 as the average assay value was approximately 10% higher than the expected value. However, only 21 assay results are available. This number is too low to extract meaningful statistical information from the results.

Sabina submitted blank and standard material in the sample stream of at a rate of one quality control sample type in 20 samples. No information was available detailing the type and source of the reference material and whether it was from a commercial vendor or produced by Sabina in-house.

11.4.4 Claude (2007–2013)

The exploration work conducted by Claude since 2006 was carried out using a quality assurance and quality control program in line with industry best practices. Standardized procedures were used in all aspects of exploration data acquisition and management including mapping, surveying, drilling, sampling, sample security, assaying, and database management.

Claude relied partly on the internal analytical quality control measures implemented by the primary laboratories. Assay results for quality control samples inserted by the primary laboratories were submitted with routine assaying results and reviewed for consistency by Claude personnel.

In addition, Claude implemented comprehensive external analytical quality control measures to monitor the reliability of the assaying results delivered by the primary laboratories. External control samples (blanks, field or certified reference material samples or field duplicate) were inserted at a rate of approximately 13% within each batch of samples submitted for preparation and assaying.

Field duplicate samples were inserted at a rate of one in 50 in all batches of drilling samples submitted for assaying. Duplicate core samples were collected by splitting in half the remaining split core over the same length.

For the drilling program in 2009, Claude used four reference control samples purchased from Rocklabs in New Zealand (Table 11.1). The silica sand blank material was sourced from Accurassay.

Table 11.1: CRMs used by Claude (2007–2013)

Standard	Source	Year(s) in use	Gold Assays (ppm Au)	
			Certified Value	SD
SE29	Rocklabs Ltd	2009	0.597	0.016
SH35	Rocklabs Ltd	2009	1.323	0.044
SL46	Rocklabs Ltd	2009	5.867	0.34
SQ36	Rocklabs Ltd	2009	30.04	1.2
SG40	Rocklabs Ltd	2010–2013	0.976	0.022
SL46	Rocklabs Ltd	2010–2013	5.867	0.17
SH41	Rocklabs Ltd	2010–2013	1.344	0.041
SH55	Rocklabs Ltd	2010–2013	1.375	0.045
SL61	Rocklabs Ltd	2010–2013	5.931	0.057
SQ36	Rocklabs Ltd	2010–2013	30.04	0.024
SN38	Rocklabs Ltd	2010–2013	8.573	0.158

The quality control program developed by Claude was overseen by appropriately qualified geologists. In the opinion of the author, the Madsen Gold Project exploration data sourced from Claude were acquired using adequate quality control procedures that generally meet industry standard practices.

Starting in 2010, Claude changed some of the standard reference material that was used during the drill programs. A total of seven gold standards were used during sampling (Table 11.1). Certified blank material was a mixture of material from Rocklabs and Canadian Resource Laboratories.

A blank and a standard were inserted every 20 samples. The inserted standard typically alternated between three medium to low grade standards (SG40, SL46 and SH41). In addition, a high grade standard and a blank were inserted after any sample containing visible gold.

No independent laboratory check assay tests were performed. Field duplicate samples were collected at a rate of one in 50 samples. Laboratory duplicate samples were not collected or assayed.

11.4.5 Pure Gold (2014–2017)

During the drilling programs from 2014–2017, Pure Gold's Quality Assurance and Quality Control (QAQC) program consisted of insertion of blanks, certified reference materials (analytical standards) and duplicates into the sample stream. Results of gold analyses on these samples were monitored by Pure Gold personnel and corrective measures implemented where deficiencies identified.

Field duplicate and preparation duplicate samples were alternately inserted at a ratio of one to every 20 samples. Field duplicates were obtained by quartering the core and submitting the two quarters in sequence to the lab. Preparation duplicates consisted of a second split of the coarse reject of the selected sample and were collected by the laboratory during the sample crushing stage. Preparation duplicates were assigned the sample number immediately succeeding the original and in shipping were represented by a labeled empty bag containing the assigned sample tag. A list of preparation duplicates and instructions for preparation were included in each completed sample submittal form.

Blank sample material consisting of coarse, clean marble landscape rock was purchased commercially in 18 kg bags. An average weight of approximately 2 kg was used for each blank sample. Blank samples were routinely inserted every 20th sample, with two additional blanks following intervals containing visible gold.

Standards used by Pure Gold between 2014 and 2017 fell into four categories: low, medium and high-grade standards for routine analysis, and fourth of even higher grade for intervals with visible gold. These standards were selected to cover all potential analytical gold methods. Three primary standards were inserted on a rotating basis in roughly equal proportions every 20th sample, and a fourth high-grade standard was inserted occasionally when visible gold was identified in core. The standards used in these categories varied over the course or program, dictated largely by availability of standard from commercial suppliers. Standard IDs, along with the supplier and certified gold values are listed in Table 11.2. Pure Gold requested extra cleaning of both crusher and pulverizer (ALS Codes: WSH-21 and WSH-22) during sample preparation of samples collected from within mineralized intervals (including shoulder samples)

Table 11.2: CRMs used by Pure Gold (2014–2017)

Supplier	Standard ID	Year(s) in use	Use Case	Gold Assays (ppm Au)	
				Certified Value	SD
Ore Research	OREAS6pc	2015	Low Grade	1.52	0.07
CDN Labs	CDN-GS-1M	2016–2017	Low Grade	1.07	0.05
Rocklabs	SG56	2014–2016	Low Grade	1.027	0.01
Rocklabs	SH55	2016	Low Grade	1.375	0.05
CDN Labs	CDN-GS-1T	2017	Low Grade	1.08	0.05
Ore Research	OREAS 214	2016–2017	Medium Grade	3.03	0.08
Ore Research	OREAS 17c	2014–2015	Medium Grade	3.04	0.08
CDN Labs	CDN-GS-5F	2014–2015	High Grade	5.27	0.17
Rocklabs	SL61	2015–2016	High Grade	5.931	0.06
CDN Labs	CDN-GS-6E	2016–2017	High Grade	6.06	0.15
Rocklabs	SQ 36	2014–2016	High Grade following VG	30.04	0.02
CDN Labs	CDN-GS-22	2016–2017	High Grade following VG	22.94	0.56
Rocklabs	SQ87	2016	High Grade following VG	30.87	0.21

11.5 Specific Gravity Data

Historically, the Madsen Mine used a tonnage factor of 11.25 cubic feet per ton to convert volumes into tonnages. This factor was determined from a bulk sample of the Austin zone in 1938 and proven to be adequate by 40 years of production. This tonnage factor is equivalent to a specific gravity of 2.84.

Specific gravity was measured for 256 split core samples taken from a variety of rock types for auriferous and barren material from three surface drill holes drilled by Claude. These data are summarized in Table 11.3; note that the values do not vary much between rock types or between auriferous and barren rock.

Table 11.3: Summary of specific gravity data for the Austin Deposit

Specific Gravity	1	2	3	4
Mean	2.90	2.90	2.91	2.91
Standard Error	0.01	0.01	0.01	0.01
Standard Deviation	0.11	0.10	0.10	0.11
Sample Variance	0.01	0.01	0.01	0.01
Kurtosis	1.63	-0.85	-0.32	1.38
Skewness	0.92	0.27	0.32	0.83
Range	0.66	0.41	0.53	0.66
Minimum	2.71	2.71	2.71	2.71
Maximum	3.37	3.12	3.24	3.37
COV	0.04	0.03	0.03	0.04
Count	227	188	217	256

1 = All material within modelled Austin solid
2 = Only "tuffaceous material" within modelled Austin solid
3 = All "tuffaceous material" (not modelled)
4 = All drill samples undifferentiated (all material types)

Claude continued to collect specific gravity data from core using the water displacement method until approximately mid-2012. At the end of the data collection, a total of 3,010 specific gravity determinations were completed on core from all areas of the Madsen Mine as well as form a number of other exploration targets. The average specific gravity has a value of 2.91.

Pure Gold conducted a program of specific gravity determinations on selected intervals of core using the ALS water displacement method (OA-GRA08) at the analytical preparation stage in 2016. A total of 3,013 samples were selected from a full range of lithologies and flagged for measurement at the ALS prep lab. Results for the most common rocks types within the vicinity of mineralization are summarized in Figure 11.1. The overall average specific gravity for these rock types is 2.91, which is 2.5% higher than 2.84, the value used during 40 years of mining and in the current Mineral Resource estimate.

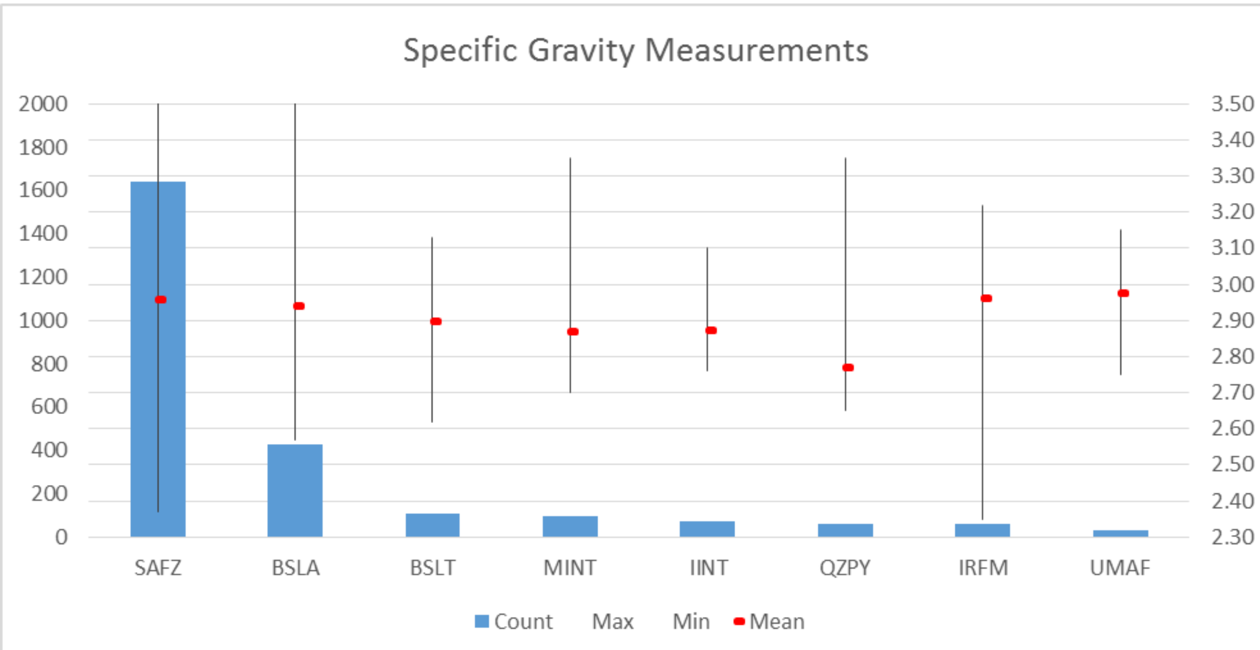


Figure 11.1: Summary of specific gravity data by rock type from Pure Gold study

The program was not continued into the 2017 season as there was judged to be sufficient data on the Madsen mineral domains for the current level of study.

12.0 Data Verification

Due to the long history of exploration and production at Madsen, there have been numerous campaigns of data verification, validation and reconciliation. The most comprehensive recent verification effort was conducted during the compilation and digitization of the sizable historical database, prior to Pure Gold's acquisition of the property. This work was completed by Claude and SRK, and is described below, in Section 12.1. Pure Gold has taken significant additional steps to further validate the historic database, as well as, ongoing data collection programs. These are described in Section 12.2.

12.1 Verification by Claude and SRK

12.1.1 Historical Database

Claude conducted extensive verifications of historical exploration and mine production data available for the Madsen mine and the Madsen Gold Project.

Claude began capturing historical drill hole and underground chip sampling data for the Madsen mine into a digital database in 1998. Placer Dome continued this process between 2002 and 2006.

The process was completed in 2009 resulting in the construction of a validated and verified historical database comprising 13,617 drill holes and 550,687 gold assays. The construction of this historical database was an enduring process that involved meticulous investigative work, data entry, and verifications over several months. The chronological steps involved are summarized in Table 12.1.

Table 12.1: Summary of steps leading to the creation of the final historical drill hole database

Date	Activity	Results
1998-2001	Initial database creation	3,834 drill holes digitized from paper logs
2002-2006	Data entry by Placer Dome	4,031 drill holes, expanded from previous database
Feb-Nov 2008	Data entry	13,042 drill holes, expanded from previous database
Nov-Dec 2008	Database validation	Logical data checks and 3D graphical checks of 4% of data Discovery of 24 significant errors on average per drill hole
Dec-Apr 2009	Numerical data check/correction	Record by record verification and correction of header, survey and assay tables
Feb-Apr 2009	Initial 5% validation	Identification of collar coordinate and survey issues Conversion issues of original orientations recorded in quadrant degrees Prevalent assay table errors identified in area with visible gold or no samples
Apr- May 2009	Lithology table	Systematic re-entry of lithology with standardized code
Apr-May 2009	Additional data entry	731 new paper logs found and digitized 705 additional "stope definition" logs digitized 115 Placer Dome drill logs digitized
May 2009	Final 5% validation	No major error detected Validation of all assays greater than 2 ounces of gold per ton Final count of 13,617 drill holes after validation
Jun 2009	Drillhole renaming	New standardized naming convention
Jun 2009	Lithology table validation	3D graphical validation Errors checked, verified and corrected in GEMS

12.1.2 Madsen Database Completion and Validation

In preparation for a new resource evaluation of the Madsen mine, a team was assembled by Claude in February 2008 to digitize the balance of the underground drill hole dataset. By

November 2008, the historical Madsen database included 13,042 drill holes. SRK was commissioned in 2008 to aid with the construction of a three-dimensional geological and mineral resource model. As part of this work SRK routinely verified historical records. SRK was intimately involved in the data capture process undertaken by Claude between 2008 and 2009. During this period SRK visited the site on several occasions to review and audit the compilation work. Furthermore, SRK reviewed all underground maps and cross-sections as part of a validation of the digital data delivered by Claude.

Database validation checks and 3D graphical checks in November 2008 revealed significant problems. In December 2008, a checking and correction program was initiated. In mid-January of 2009 Claude retained a database manager to oversee the data capture and validation process. A series of checks and corrections were undertaken on all digital values. Using a systematic approach batch flow and tracking protocols were refined, and the existing error tracking workbooks and batch tracking workbooks were combined into a single master tracking system.

Between February and April 2009, an error checking program was designed and implemented to verify the numeric data quality. A randomly selected sample of 5% of the completed drill holes was selected. To avoid bias this checking was completed by geologists rather than the original data entry clerks. The 5% check also highlighted collar and survey data issues, requiring systematic re-checking of all collar and down-hole surveys. This check stage was completed for all of the original database batches as re-entry batches were completed. The assay table was also inspected for logical errors such as missing intervals and long samples possibly representing combined samples.

In May 2009, a final 5% check was performed by Claude on the dataset to be used for resource estimation. All numerical data were validated on a cell by cell basis for 684 drill holes. 731 associated survey records and 26,084 assay records were validated. No significant errors were detected.

The final historical Madsen drill hole database in 2009 consisted of:

i. 13,617 validated drill holes.
ii. 24,582 survey points.
iii. 182,197 lithological intervals.
iv. 550,687 assay results.

The database represented 808,344 m of drilling undertaken through exploration and development and approximately 40 years of production.

12.1.3 Claude Drilling

Claude implemented a series of routine verifications to ensure the collection of reliable exploration data. All work was conducted by appropriately qualified personnel under the supervision of qualified geologists.

Sample shipments and assay deliveries from the assaying laboratory were routinely monitored.

Failures and potential failures were examined and depending on the nature of the failure, re-assaying was requested from the primary laboratory. Analysis of quality control data was documented in the quality control spreadsheet along with relevant comments or actions undertaken either to investigate or mitigate problematic sample batches containing the problematic control samples.

12.1.3.1 Verification of Analytical Quality Control Data up to 2009

Claude made available to SRK external analytical quality control data collected by Claude in 2009. The data were contained in an Access database that aggregated the assay results for the quality control samples, which were accompanied by comments by Claude personnel. These data represent a very small percentage of the sampling database considered for resource estimation.

SRK aggregated the assay results for the external quality control samples for further analysis. Blanks and certified standards data were summarized on time series plots to highlight the performance of the control samples. Paired field duplicate data were analyzed using bias charts, quantile-quantile and relative precision plots. The analytical quality control data generated by Claude in 2009 are summarized in Table 12.2.

Table 12.2: Summary of analytical quality control data produced by Claude in 2009

	DDH Samples	(%)	Comment
Sample Count	2,495		
Field Blanks	143	5.7	Provided by Accurassay
Certified Reference Materials:	142	5.7	
SE29	46		Rocklabs (0.597 g/t Au)
SH35	46		Rocklabs (1.32 g/t Au)
SL46	44		Rocklabs (5.867 g/t Au)
SQ36	6		Rocklabs (30.04 g/t Au)
Field Duplicates	39		Quarter core samples
Total QC Samples	**324**	**13.0**	

In general, the performance of the control samples inserted with samples submitted for assaying was acceptable. Blank samples did not show evidence of contamination in the sample preparation process.

The performance for the certified Rocklabs reference materials was also acceptable. Although, the few samples assayed using the screen fire assay method reported gold concentrations greater than the expected value, which was interpreted by SRK to suggest contamination in the sample preparation. In the specific case of the failures, the three Rocklabs SQ36 reference material failures occurred within samples assayed by screen fire assay and/or in a sample stream containing gold concentrations varying between 4 and 58 g/t Au. The exact cause for failure was difficult to ascertain. SRK recommended Claude to investigate with the laboratory.

Field duplicate data were generated by Accurassay and examined by SRK suggested that gold grades were difficult to reproduce by standard fire assay. Rank half absolute difference (HARD) plots suggested that only 41% of the quarter-core duplicate samples had HARD below 10%. However, this trend is not uncommon in gold deposits with highly variable grades.

In the opinion of SRK, the analytical results delivered by Accurassay were sufficiently reliable for the purpose of resource estimation.

In the opinion of SRK Claude used industry best practices in the collection, handling, management, and verification of exploration data collected on the Madsen Gold Project.

SRK was also of the opinion that Claude used best efforts to digitize, verify, and validate the large historical sampling and mining records available for the Madsen mine. Although by nature these data are hard to validate, SRK deemed the historical data sufficiently reliable for resource evaluation because they are supported by more than forty years of sustained production.

SRK concluded that the Madsen mine sampling database compiled and verified by Claude was sufficiently reliable for the purpose of resource estimation. Based on the considerable amount of database review (described below) and use, in conjunction with current data, in detailed modeling, this conclusion is shared by the current author.

12.1.3.2 Verification of Analytical Quality Control Data 2010–2013

As part of the 2016 PEA (Cole et al., 2016) Pure Gold made available to SRK external analytical quality control data collected by Claude for the Madsen Gold Project for all core drilling between 2010 and 2013. The data were contained in Excel spreadsheets. Assay results from standard reference material were recorded and plotted in a template provided by Rocklabs, manufacturer of the standard reference material used by Claude.

The external analytical quality control data produced for the Madsen Gold Project are summarized in Table 12.3. These data represented 15.56% of the total number of samples assayed at that time.

Table 12.3: Summary of 2010–2013 analytical quality control data produced by Claude

	Samples	(%)	Comment
Sample Count	22,375		
Blanks*	1,232	5.51	
Standards	1,414	6.32	
SG40	472		Rocklabs (0.976 g/t Au)
SL46	423		Rocklabs (5.867 g/t Au)
SH41	421		Rocklabs (1.344 g/t Au)
SH55	44		Rocklabs (1.375 g/t Au)
SL61	36		Rocklabs (5.931 g/t Au)
SQ36	10		Rocklabs (30.040 g/t Au)
SN38	8		Rocklabs (8.573 g/t Au)
Field Duplicates	1,058	4.73	
Total QC Samples	**2,646**	**15.56**	

**Blank samples include a mix of CDN-BL-10 prepared by CDN Resource Laboratories (<0.01 g/t) and AuBlank42 prepared by Rocklabs (<0.003 g/t Au).*

SRK reported the following results of their analysis:

"A total of seven standards were employed throughout the sampling process. Three of these standards (SG40, Sl46, and SH41) were used at least 395 times, while the remaining four (SH55, SL61, SQ36, SN38) were used less than 50 times. These reference materials performed reasonably well with 6% and 7% of samples outside of the expected range for standards SH 41 and SG 40, respectively. Numerous analyses of the two commonly used standards (SG40 and SL46) yield values equivalent or nearly equivalent to other standard or blank material. These results suggest that numerous standards and blanks were mislabelled during the assaying process. According to Pure Gold, Claude re-assayed batches with failed standards if samples in the affected batch were from mineralized zones.

Analyses of all blank samples are below the warning line of 0.05 ppm gold. The warning line is defined as ten times the lower detection limit. Blank samples comprise a mixture of two certified pulp blanks: CDN-BL-10 prepared by CDN Resource Laboratories, and AuBlank42 prepared by Rocklabs. Prior to 2012, CDN-BL-10 was the predominant blank used, after which it was typically substituted for AuBlank42. However, both blanks were used interchangeably throughout the assaying process.

Paired assay data examined by SRK show that assay results can be reproduced by TSL and ALS laboratories from field duplicates with confidence. The combined correlation coefficient is 0.83. Half absolute ranked difference (HARD) plots show that 57.1% of the samples have HARD below 10%. Bias and precision plots indicate that the majority of the variation in paired analyses occurs at low gold concentrations of approximately 0.02 g/t gold and below.

Pulp duplicate assays, and check assays were not performed for any samples.

The data sets examined by SRK do not present obvious evidence of analytical bias. However, no duplicate or check assays were performed. In addition, analyses of standards are mediocre, and show evidence of multiple samples being mislabelled."

12.2 Verification by Pure Gold

12.2.1 Database Review

Pure Gold has conducted numerous verification efforts of the historical database and this work is still ongoing, including significant amounts of re-logging and re-sampling of Claude drill core where relevant and still available Use of the historical database in comprehensive, detailed modelling has allowed evaluation of the consistency of historical logs between drill holes. Pure Gold has modified numerous lithology intervals (while retaining original data in a separate column) to improve the internal consistency of the database.

Pure Gold contracted CSA Global to conduct a preliminary comparison of the drill hole database with provided source data (Mackie, 2015). The review focused specifically on: collar coordinates, survey data, gold assay values, and geological logs for a selection of 55 holes from different operators and target areas. Collar coordinates, survey data and gold assay values were all consistently comparable with the original source data. Some discrepancies were found in drill hole names, along with minor inconsistencies in the lithology, mineralization and alteration logs. Mackie (2015) made several recommendations to improve the data collection and documentation procedures; most of which have been implemented.

A similar follow-up review was conducted more recently in August 2017 (Mackie, 2017) and included an additional 50 holes, again from multiple operators and target areas. Once again, collar information and assay results in the database matched well with the original source data. Survey data for several holes drilled by Claude showed extremely variable azimuth readings, which are believed to be related to zones of high magnetic susceptibility. This had been recognized previously by Pure Gold and revision is ongoing, including re-entering and re-surveying of certain Claude drill holes where practical.

Based on these comparisons, Mackie (2017) opined that the database is of high quality and reliability and is a reasonable rendition of historic data, and this opinion is shared by the current author.

12.2.2 Verification of Analytical Quality Control Data 2014–2015

Pure Gold analytical quality control data for sampling conducted between 2014 and 2015 were reviewed and analysed G.N. Lustig Consulting Ltd. (Lustig) and were presented in Excel format and in a MS Word document, respectively (Lustig, 2015). The data include assays for six types of certified standard reference material, blanks, as well as field, coarse reject (preparation), pulp, and umpire duplicate samples.

Pure Gold submitted a total of 410 blank samples as part of the regular sample streams. Blank samples performed well with five out of 2,734 samples (approximately 0.2%) yielding more than five times the detection limit.

Pure Gold submitted a total of 405 standard reference samples; the material performed well overall; no bias was detected in any of the material submitted for analysis, and no instrument drift was apparent. In total 15 standard samples exceed a ±3 standard deviation envelope. Of those, ten failures were identified as being mislabelled, four standard failures required no corrective actions as they were gravimetric analyses in batches that had no core samples analysed by the same method, and one group of samples was re-assayed due to a standard failure, with the re-assays having the standard within acceptable limits.

The performance of duplicate samples was analyzed by Pure Gold using a number of statistical measures including the average relative error and the absolute relative difference (ARD). Overall the precision of duplicate samples increases from field (200 samples), over preparation (206 samples), to pulp duplicate pairs (318 samples) as expected. To take into account the strong impact high grade values have on statistical distributions, Pure Gold separated assays into two group with assay values less and more than 15 times the laboratory detection limit. The percent of sample pairs with absolute relative deviation below 10% ranges from approximately 12 for high grade core duplicates to approximately 75% for high grade pulp duplicate samples. The relatively poor reproducibility of duplicate core samples is expected and a typical feature of gold deposits with coarse-grained gold.

Pure Gold submitted a total of 83 randomly selected pulp samples to SGS for umpire testing in 2015. Analysis of the results does not indicate obvious analytical bias; the correlation coefficient for sample pairs analyzed by the primary and umpire laboratory is 0.97, indicating good reproducibility.

12.2.3 Verification of Analytical Quality Control Data 2016

Dennis Arne of CSA Global conducted an independent review of Pure Gold's 2016 drill program. The following is paraphrased from his report (Arne, 2017).

Overall, he found the control data to have performed very well, with only a few minor issues. Quality control samples submitted during the course of this drill program included a total of 2,058 coarse blanks, 2,661 certified reference materials (CRM or 'Standard'), 963 field (1/4 core), 985 coarse crush and 1,517 pulp duplicates.

Coarse blanks showed a compliance rate of 99.4%, with two blank samples showing evidence of significant cross contamination from high grade samples immediately ahead of them in the preparation sequence, probably due to contamination during crushing.

Many obvious standard failures during the first half of 2016 have been traced back to misidentified CRMs during sampling. Once these are removed, there is a 99% compliance rate of CRMs at 3 standard deviations (3SD). Average relative biases of the cleaned data vary from +1.5% to -0.76%, with the CDN Resource Laboratories CRMs typically having a positive bias.

Screen tests on 870 coarse crush and 1,404 pulp samples indicate compliances of 99.9% and 99.6% respectively, for crushing to 70% passing 2 mm and pulverizing to 85% passing 75 microns, respectively.

Considering all analyses >0.05 g/t Au, the field, coarse crush and pulp duplicates have average coefficients of variation (CV) of 37.9%, 31.8% and 23.9%, respectively. The high uncertainties associated with the pulp duplicates are largely associated with sub-economic grades; grades >0.5 g/t Au have an average CV of 8.9%. The field and coarse crush duplicate values fall within acceptable uncertainties proposed by Abzalov (2008) for very coarse grained and nugget gold deposits, and within best practice for pulp duplicates for coarse to medium grained gold deposits for grades above 0.5 g/t Au.

12.2.3.1 Analytical Laboratory Audits and Check Assays

Pure Gold commissioned Dennis Arne of CSA Global to conduct a lab audit of the ALS sample preparation lab in Thunder Bay and the SGS sample preparation and analytical lab in Red Lake, in November 2016, as part of its on-going quality control program. In general, both laboratories were found to be professionally managed and are part of larger companies that facilitate the laboratory information management systems (“LIMS”), accreditation and quality control systems. No “red flag” issues were noted during the visits to either facility (Arne, 2016).

Following the audit, Pure Gold submitted a selection of 276 coarse rejects from 2016 drilling, originally processed by ALS in Thunder Bay and analysed by ALS Vancouver, to SGS Red Lake for comparison. Overall, the correlation is very good and shows no bias (Figure 12.1). After removal of one outlier with a grade of 249 g/t Au, a linear regression of the data has an R^2 value of 0.968 and slope of 0.905.

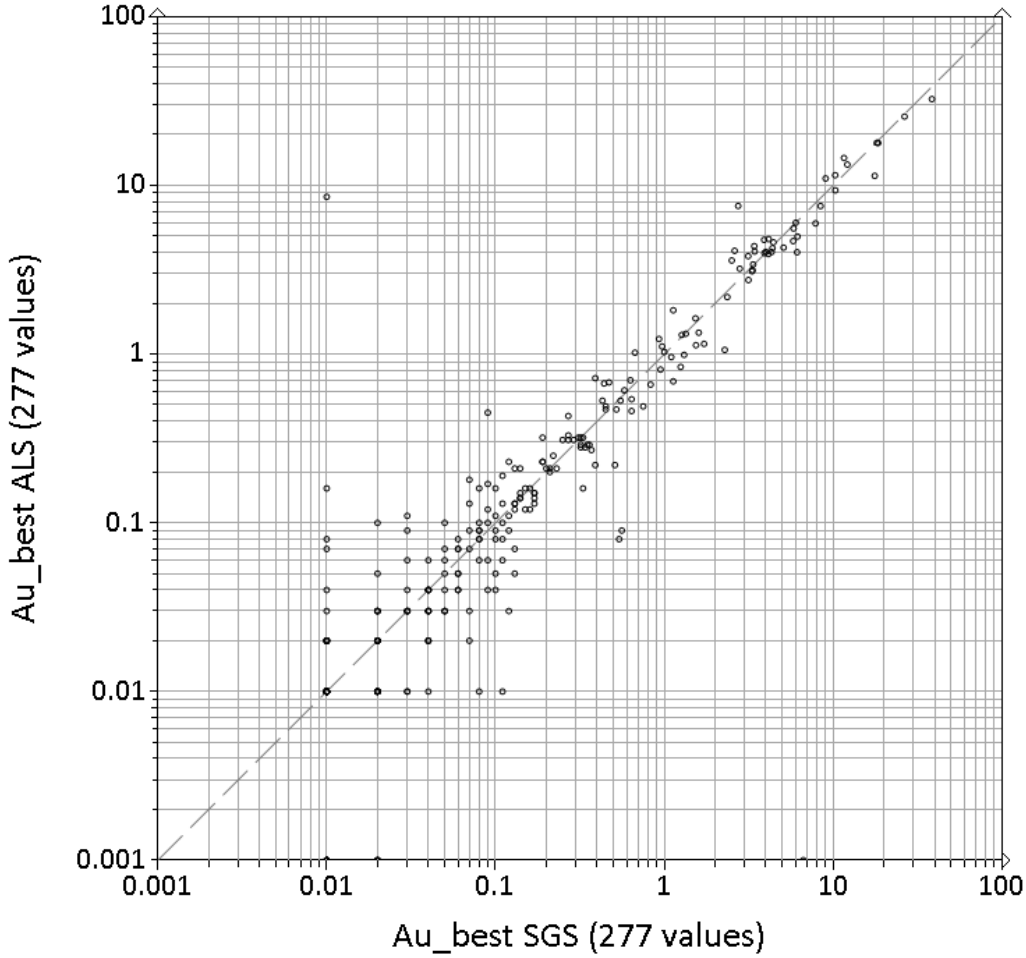


Figure 12.1: Log-Log scattergram showing ALS versus SGS check assay results for a selection of coarse rejects from the 2016 drill program.

Despite the strong correlation between the ALS and SGS results, the quality control data submitted to SGS along with the coarse crush samples did not perform particularly well. Of the 55 coarse blanks submitted, 8 were above 10 times the lower limit of detection (i.e. >0.01 g/t Au) and 2 exceeded the 0.05 g/t threshold, indicating the need to identify high grade samples submitted to the laboratory, so they may be treated accordingly. Also, four out 35 CRMs failed on the high side of the expected values – an unacceptably high failure rate of 11.4%. Also, a high bias of approximately 2.9% is evident across all CRMs and should be monitored.

Based on the favourable comparison of analytical results between labs and conclusions of the lab audits, notwithstanding the manageable QAQC issues, a decision was made to switch from ALS to SGS as Pure Gold's primary lab. A number of factors weighed in favour of SGS Red Lake, including: proximity to site, greater familiarity with preparing and analyzing high grade gold samples from other nearby clients, and the promise of a 5-day turn-around time for assay results. Pure Gold began shipping drill core samples to SGS Red Lake in January 2017.

12.2.4 Verification of Analytical Quality Control Data 2017

From the beginning of the 2017 drill program, to the cut-off date for data used in the current resource estimate of April 11, 2017, Pure Gold submitted 498 CRMs, 543 coarse blanks, 245 field (1/4 core) and 246 coarse crush duplicates to SGS.

Blanks performed better than previously with an overall failure rate of 1.3%. This was likely to due to the flagging of all samples know to be high grade or carrying visible gold, as recommended by Arne (2017). These samples would automatically be followed by two quartz washes in the crushers, since that is where contamination is most likely to take place. Pure Gold also regularly inserted two blanks after samples with visible gold to ensure no contamination was following the high-grade samples. The blank failures in all but two cases occurred within areas that contained no significant mineralization, the source of this contamination could therefore not be traced. In the 2 cases where blanks showed some carry over from adjacent high-grade samples, the contamination was negligible compared to the previous samples and were followed by core samples that were effectively blank themselves, indicating the limited extent of the carry-over.

In general, the accuracy of the CRM AA results (Figure 12.2) are good and show negligible bias over the grade range of chosen standards. For example, CDN-GS-1M (1.07 g/t Au) had a 0.57% bias, CDN-GS-6E (6.06 g/t Au) showed a bias of -0.39%, and OREAS 214 (3.03 g/t Au) had a -1.77% bias overall. CDN-GS-22E (22.94 g/t Au) has a very low bias, but at 23 g/t Au is well outside the optimal range of the AA spectrometer. The gravimetric analyses (Figure 12.3) are comparably good with a mean bias of 0.24% for CDN-GS-22E and 2.99% for CDN-GS-6E.

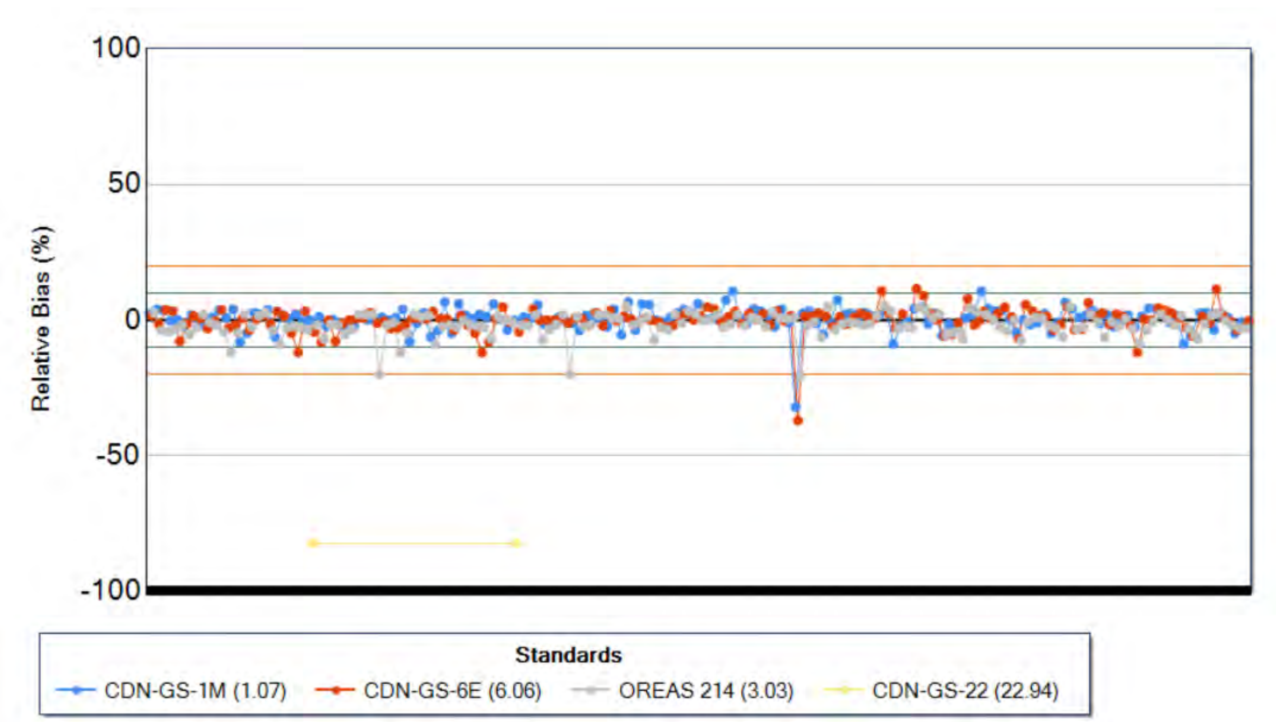


Figure 12.2: Performance chart showing relative bias for SGS fire assay with AA finish.

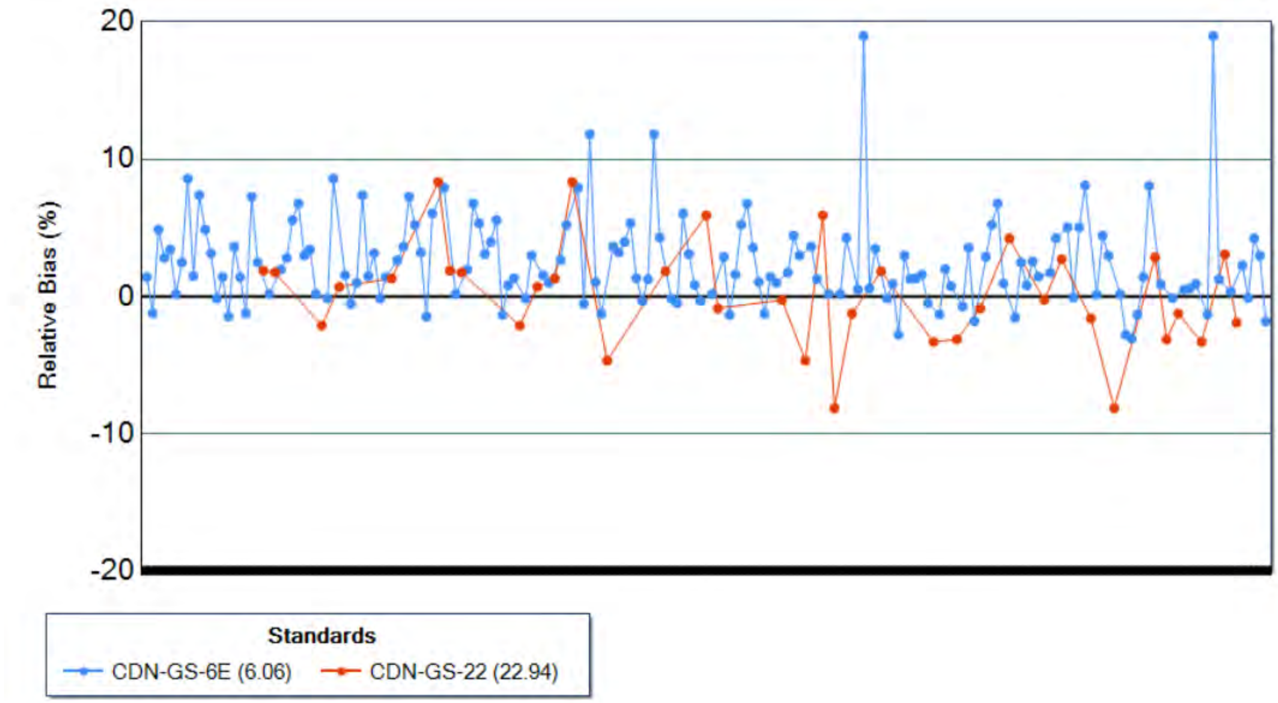


Figure 12.3: Performance chart showing relative bias for SGS fire assay with gravimetric finish.

Although a low bias is a good indication of overall accuracy, the results show a very high degree of variability which indicates a relatively poor precision. In the AA results, CDN-GS-1M had 2.1% results fail, CDN-GS-6E had 10.1% failures, and OREAS 214 failed 6.9% of the time. In gravimetric analyses, CDN-GS-22E never failed in 55 analyses and CDN-GS-6E failed 12.2% of the time. These results are closely monitored and, while the failure rate is unacceptably high, very few few of the failures occur in proximity to mineralized samples. Those that do occur within range of mineralization above 3 g/t Au trigger a re-assay of 10 samples on either side of the failed CRM.

The poor performance of CRMs, especially with CDN-GS-6E, was communicated to the lab early in the program and launched a detailed investigation into the causes of the problems. Part of the cause of the observed variability of CDN-GS-6E was due to the practice of using manual dilutions in the AA sample stream. It is believed that the inherent inconsistencies between operators, as well as, with a single operator, while diluting samples above 5 g/t Au, was to blame. Since CDN-GS-6E is very close to this grade, at 6.06 g/t Au, it would be particularly vulnerable to any such inconsistencies. Following this analysis, SGS Red Lake implemented an automated dilution machine (SIPS) to their AA spectrometers and variability in CDN-GS-6E results has improved to within acceptable limits (Figure 12.4).

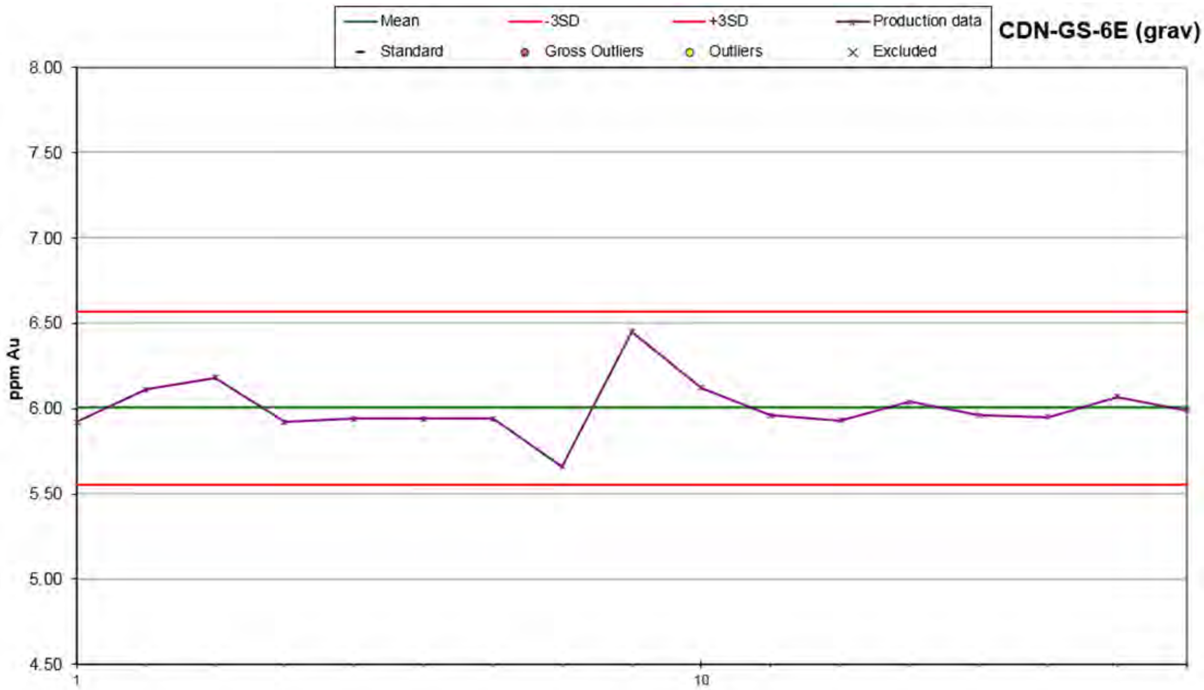


Figure 12.4: Performance chart showing SGS lab results for CDN-GS-6E following implementation of the automated dilution tool (SIPS).

Duplicate data for field samples (1/4 core) and coarse crush samples have average CVs of 27.3%, 23.3%, respectively, which is well within acceptable ranges for this style of mineralization.

Overall, the Pure Gold control samples have performed as expected. Minor issues have been identified in a timely manner, triggering communication with the lab and process improvements. While failure rates have been higher than normal, the vast majority of these have been outside the range of any significant mineralization. The QC data that are found within range of the mineralized areas have performed within compliance ranges for this style of mineralization, and the data are considered to be acceptable for use in the current resource estimate.

13.0 Mineral Processing and Metallurgical Testing

No metallurgical testing has been conducted by the current issuer; however, historic records of mineral processing and gold recovery for the Madsen mine are voluminous and remain the only metallurgical data available. For about 40 years of operation the mill nominal capacity ranged from 350 to 850 tons per day. Madsen Red Lake Gold Mines Limited's annual report for 1951 reports yearly average gold recoveries as follows: 96.15% for 1949, 95.44% for 1950, and 94.58% for 1951.

A report by the Ontario Department of Mines (Ferguson, 1965) states that "Gold recovery in the (Madsen) mill has averaged 94.00% during the time that the mill has been in operation. During 1962 the milling operation recovered 92.7% of the gold contained in the ore."

The early Madsen mill used the Merrill-Crowe process as the separation technique for removing gold from a cyanide solution. The historic Madsen mill was decommissioned in the late 1970s. The present Madsen mill was purchased from Placer Dome and relocated from the Dona Lake mine site in Pickle Lake, Ontario in the 1990s. The present mill uses the more efficient carbon-in-pulp (CIP) gold recovery process and has a nominal capacity of 550 tons per day. Mill records from Madsen Gold Corp and Claude during 1998-1999 show average monthly mill throughput of 14,840 tons at an average head grade of 6.51 g/t gold and average recoveries of 90.09%.

While metallurgical testing has not been completed to date, an average mill recovery of 92% has been assumed on the basis of actual operating data from the plant, and factored into the choice of cut-off grade used to report the current mineral resource estimate. Pure Gold plans to complete further metallurgical testing to confirm grade-recovery relationships and optimize design.

14.0 Mineral Resource Estimate

The mineral resource estimate for the Madsen Gold Project is the first new mineral resource estimate since Pure Gold took ownership of the property in 2014. It follows a previous estimate of the mineral resources prepared by SRK in December of 2009 for the previous owner Claude. The current mineral resource estimate of the Madsen Project follows a drilling program of 355 holes undertaken by Pure Gold from 2014 to 2017 and a resultant new geological model.

The zones within the Madsen mineral resources include the Austin, South Austin, McVeigh, A3, and the 8 Zone deposits. A separate block model was built for each of these mineral zones, with the A3 domain being part of the South Austin zone block model. All measurements are metric with coordinates in the local metric mine grid.

The geologic interpretations were carried out by Pure Gold's personnel while the estimation of gold grades into a mineral resource was carried out by Mr. Marc Jutras, Principal, Mineral Resources at Ginto Consulting Inc. Mr. Jutras is an independent qualified person as defined under National Instrument 43-101.

This mineral resource estimation exercise was primarily undertaken with the Vulcan® software and utilities internally developed in GSLIB-type format. The geologic interpretations were generated in the Leapfrog® software. The following sections outline the procedures undertaken to calculate the mineral resource.

14.1 Drill Hole Data

The drill hole database was provided by Pure Gold with a cut-off date of April 11, 2017. It is comprised of 14,627 holes located within the Madsen Property area. There are 355 holes drilled by Pure Gold from 2014 to 2017 with a total of 114,583.5 m of drilling. Since the 2009 mineral resource estimation by Claude, which had a cut-off date of September 27, 2009, an additional 435 holes with 178,293 m of drilling were added, where 80 holes with 63,709.5 m of drilling are from Claude. All holes are diamond drill holes. There are 1,292 holes drilled from surface and 13,333 holes drilled from underground. All 355 holes drilled by Pure Gold are from surface.

A few changes were made to the original drill hole database:

- 205 holes without any Au assays were removed (no logs found, abandoned holes, geotechnical holes).
- assays with 0.000 g/t Au values were changed to 0.002 g/t Au.
- assays with -1.000 g/t Au values (missing assays) were changed to 0.005 g/t Au.
- assays with -0.050 g/t Au values (below detection limit) were changed to 0.025 g/t Au.
- assays with -0.005 g/t Au values (below detection limit) were changed to 0.003 g/t Au.
- 121 holes with logs but no Au assays were considered barren and replaced with values of 0.005 g/t Au.
- 29 duplicate holes had their X coordinate increased by 0.05 m. These holes had the same x, y, z, azimuth and dip values but with different names, depths, and Au assays.

- 63 drill hole names with more than 12 characters were brought back to 12 characters. The first 9 characters were kept and a "Z" with a 2-digit counter was added.
- hole 05NM30: a down-hole survey at 0.0m was added with an azimuth value of -59.31° and dip of -41.0°.
- hole M1 was removed as no down-hole surveys are available.
- holes TB0703, TB0704, TB0705, and TB0175 had their down-hole dips changed from 0.0° to -90°.

14.1.1 Drill Hole Data Statistics

The Madsen drill hole database as of April 11, 2017 is comprised of 14,627 drill holes with 683,909 gold assays in grams per tonne. Multi-element analyses are also available for the more recent drilling as well as other geologic information including alteration, lithology, veining, mineralization, structure, magnetic susceptibility, specific gravity, ICP geochemistry, and geotechnical data.

Statistics on the drill hole database are presented in Table 14.1 and in Figure 14.1. As seen in Figure 14.1, the average drill hole depth is 78.3m, with depths varying from 1.2m to 2,543.0m. Most of the underground holes are of short lengths while the surface holes are of much longer lengths. Sample lengths are observed to be 1.64m on average, with samples lengths varying from 0.001m to 1,249.5m, and with the most common sampling length being 1.52m (5 feet).

Gold grade statistics on the original samples are presented in Table 14.2 at various cut-off grades. It can be seen from this Table that the metres and accumulation (grade x thickness) of gold have similar and consistent decreasing patterns with increasing grade cut-offs. It is also noted that the average gold grades of samples at elevated cut-offs is more than twice the cut-off grade, indicating the presence of a large proportion of higher grade samples.

Table 14.1: Drill hole summary

Operator	Years	Number of Holes	Metres	Number of Assays
Russet Red Lake Gold Mines	1944 to 1947	105	8,449.4	2,070
Aiken-Russet Red Lake Mines	1968, 1969, 1974, 1977	46	4,640.9	1,044
Madsen R.L. Gold Mines	1936 to 1976	12,572	675,033.7	456,438
Noranda Inc.	1981, 1982	27	4,994.8	2,539
United Reef Petroleum	1987	24	5,466.6	2,348
Red Lake Buffalo Resources	1988, 1990	18	2,511.2	442
Madsen Gold Corp.	1992 to 1998	556	30,312.2	24,947
Placer Dome	2001 to 2005	114	60,832.7	32,493
Claude Resources Inc.	1998 to 2012	631	204,837.8	93,403
Pure Gold Mining Inc.	2014 to 2017	355	114,583.5	48,430
Others		179	34,098.4	19,755
Total		14,627	1,145,776.9	683,909

Pure Gold Mining Inc. - Exploratory Data Analysis Drill Hole Data Statistics

Tue Aug 1 21:00:46 2017

Madsen Project - Ontario - Drill Hole Database - April 11, 2017

Collar Data	Number of Data	Mean	Standard Deviation	Coefficient of Variation	Minimum	Lower Quartile	Median	Upper Quartile	Maximum	Number of 0.0 values	Number of < 0.0 values
Easting (X)	14627	4949.48	848.317	0.171	1125.68	4523.15	4846.19	5372.19	11016.3	–	–
Northing (Y)	14627	2418.21	415.291	0.172	69.76	2212.1	2390.7	2514.69	6610.03	–	–
Elevation (Z)	14627	993.764	351.031	0.353	222.1	745.8	1033.3	1307.5	1538.4	–	–
Hole Depth	14627	78.306	125.173	1.599	1.22	27.43	45.72	76.2	2543.0	–	–
Azimuth	14627	177.55	118.59	0.668	0.0	109.26	180.39	213.57	359.99	–	–
Dip	14627	-5.837	33.321	-5.709	-90.0	-28.0	0.0	0.0	90.0	–	–
Overburden	14627	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–	–
Survey Data											
Azimuth	44109	172.084	147.137	0.855	0.0	19.61	179.46	334.7	360.0	–	–
Dip	44109	-55.285	13.022	-0.236	-90.0	-62.79	-54.83	-46.94	86.0	–	–
Assay Data											
Interval Length (from-to)	683909	1.635	5.98	3.657	0.001	0.8	1.52	1.53	1249.46	57	0
AU_GPT	683909	1.279	19.623	15.344	0.0	0.003	0.17	0.34	6661.03	872	0

Figure 14.1: Statistics on the Madsen Drill hole database.

Table 14.2: Statistics on gold grades of original samples

Statistics of Gold Assays Above Cut-Off								
Cut-Off g/t	Total Metres	Increm. Percent	Avg. Au g/t	grd-thk g/t-m	Increm. Percent	Std. Dev.	Coef. of Var.	# of Samples
0.0	1,145,776.9	100.0	1.28	1,466,594.4	100.0	19.648	15.313	683,907
1.0	78,936.8	54.1	9.34	737,269.7	50.3	55.089	5.900	84,913
2.0	48,075.6	33.6	13.56	651,905.1	44.4	67.651	4.989	55,676
3.0	30,825.3	21.1	18.65	574,891.8	39.2	81.067	4.348	38,289
4.0	25,049.8	17.2	21.73	544,332.2	37.1	88.582	4.076	31,839
5.0	19,586.2	13.4	26.07	510,612.2	34.8	98.595	3.782	25,454
6.0	16,793.7	11.5	29.17	489,872.2	33.4	105.393	3.613	22,130
7.0	13,973.9	9.6	33.29	465,191.1	31.7	114.088	3.427	18,727
8.0	12,525.1	8.6	35.99	450,778.3	30.7	119.604	3.323	16,948
9.0	10,797.0	7.4	40.04	432,311.9	29.5	127.608	3.187	14,773
10.0	9,930.2	6.8	42.47	421,735.6	28.8	132.315	3.115	13,678

14.1.2 Location, Orientation, and Spacing of Drill Holes

The location of the drill holes in the resource area is presented in Figure 14.2 for the Madsen project area. As seen in this Figure, although a large proportion of the drill holes are located within the area of interest, drill holes in surrounding areas are also observed. The latter are however not part of the current study.

Statistics on drill hole spacing are presented in Table 14.3 for each zone within the area of interest and within the high-grade and low-grade units. The overall average drill spacing is 6.3 m in the high-grade zones and 9.5 m in the low-grade zones, while the overall median drill spacing is 5.9 m in the high-grade zones and 6.8 m in the low-grade zones. These results indicate a very tight drill spacing in the area of interest.

Table 14.3: Drill hole spacing statistics

	Mean (m)		Median (m)	
	High-Grade Zone	**Low-Grade Zone**	**High-Grade Zone**	**Low-Grade Zone**
Austin	6.2	7.4	6.1	6.6
South Austin	6.1	7.1	5.8	6.4
McVeigh	6.9	19.2	5.4	10.6
8 Zone	7.1	-	4.9	-
A3	7.7	10.1	5.6	7.4
All	6.3	9.5	5.9	6.8

With regard to the orientation of the drill holes, although a multitude of orientations is observed, two main orientations of drilling are noted at azimuths of 0° and 180°. Along those orientations dips vary from +90° to -90° (Figure 14.3), which represents the bottom half of a sphere, displays the various azimuth and dip angles of the downward drill holes for the Madsen project.

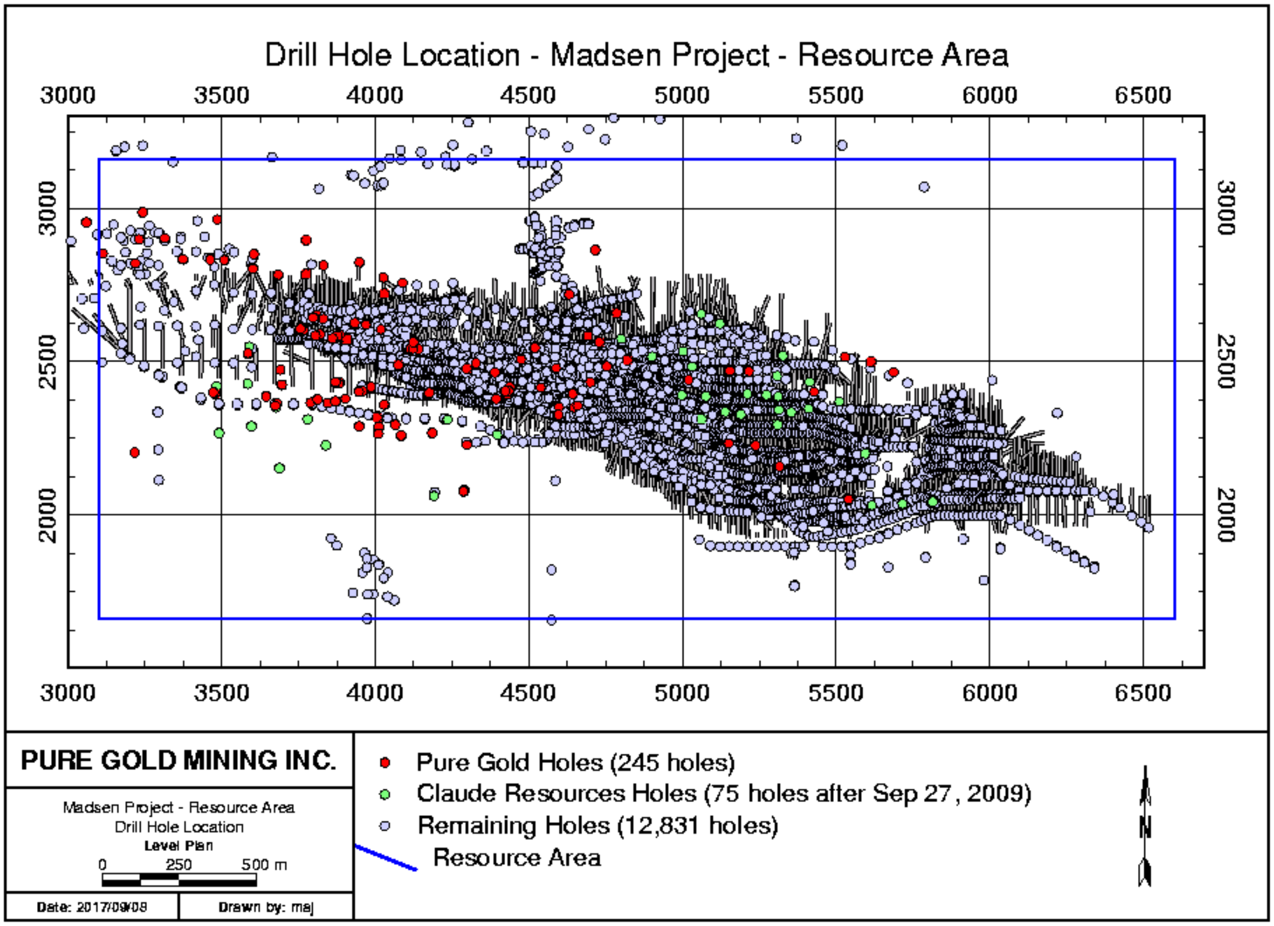


Figure 14.2: Drill hole location map – resource area.

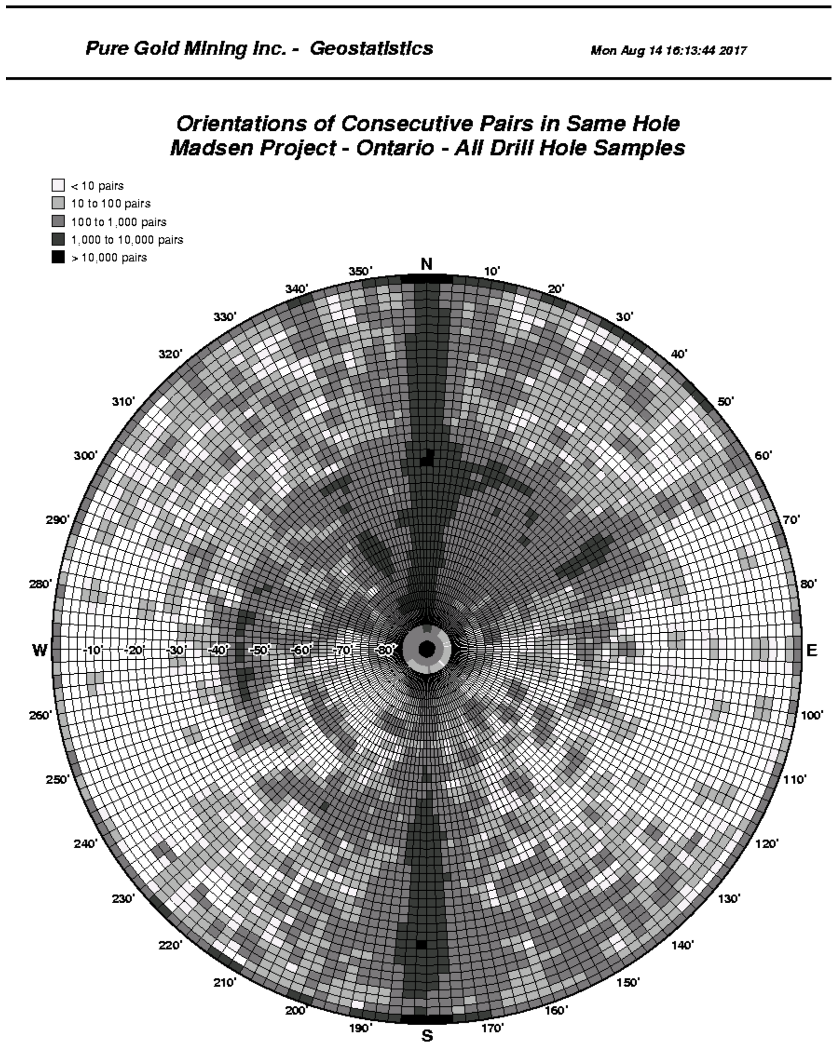


Figure 14.3: Stereonet plot of drill hole orientations at Madsen.

14.2 Geologic Modelling

The domains modelled include the Austin, the South Austin, the McVeigh, the 8 Zone, and the A3. Geological domain models were developed by Pure Gold's personnel for each specific zone, including both "high grade domains" and "low grade domains". A low grade domain was not modelled for the 8 Zone due to the discrete nature of the quartz vein hosted mineralization in that domain. The geologic domains were built using the recently developed understanding that the mineralization: (i) was emplaced within an early cryptic structure that transects the Balmer stratigraphy, and that this structure has been, (ii) transposed, metamorphosed and annealed during D_2 deformation. The continuity of mineralization is therefore restricted to relatively narrow corridors within the 'SAFZ' unit (see Section 7) and may be strongly undulating and/or fold repeated. High grade domains have been wireframed to capture this continuity which is defined by a rapid change in gold grades, corresponding in general to a grade of approximately 3 g/t Au. Low grade domains represent the broader alteration halo (SAFZ unit), in which high grade intercepts exist but do not exhibit the same high degree of continuity.

Three-dimensional modelling of the mineral resource domains was performed using Leapfrog© software; specifically, Leapfrog's Vein Modelling Tool. The high grade domains were defined using drill hole composites of 3 g/t Au and greater for all holes in the database, which served as snapping points for the interpolation of 3-D surfaces to form the hanging wall and footwall contacts of each domain. The outer boundaries of each high grade domain were then manually clipped to an approximate distance of 50 m away from the nearest drill hole to restrict undue extrapolation of any grade estimates. A minimum width of 2 m was applied to each high grade domain where there were no data to show otherwise. Modelling of the low grade domains was performed by the personnel at Equity Exploration Consultants Ltd., who used manually digitized wireframes to primarily capture the logged SAFZ unit, but also rare mineralization within other adjacent units.

The Austin and South Austin high grade domains are mainly oriented east-west at an azimuth of 095° (mine grid), dipping to the south at -65°, and plunging to the east at approximately -35°. The McVeigh high grade domains are broadly sub-parallel to the Austin domains, but plunge in the opposite direction at about 75°.The high grade 8 Zone is slightly different, with a shape more elongated along a shallower dip of -40°. The low grade domains are similarly oriented along the east-west direction, dipping to the south at -65°, and plunging to the east at -40°. The low grade domains enclose the high grade domains. Examples of the high and low grade domains for each zone are presented in Figures 14.4 to 14.9.

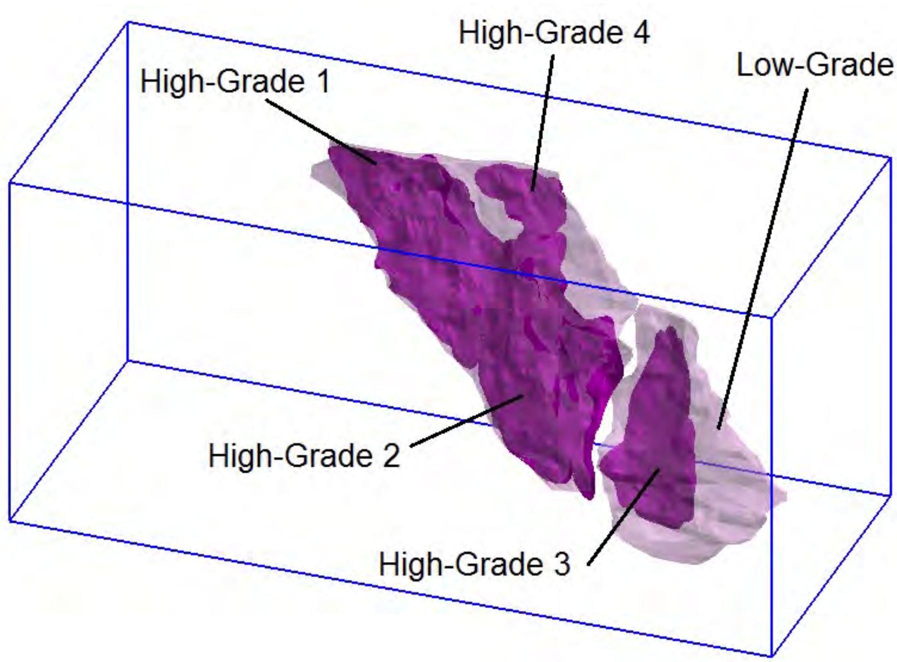


Figure 14.4: Geologic model of the Austin Domain – viewed to the northwest

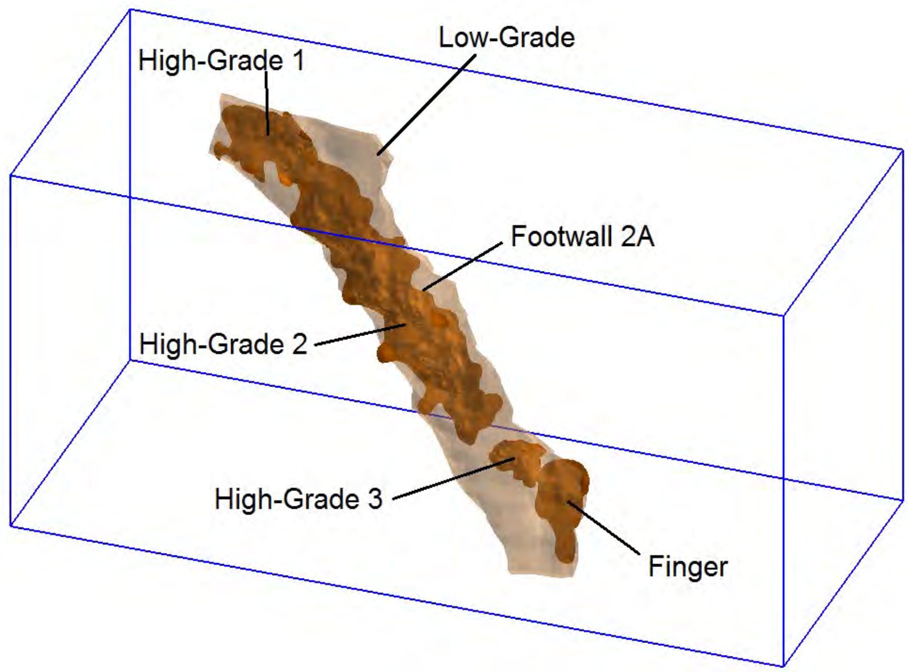


Figure 14.5: Geologic model of the South Austin Domain – viewed to the northwest

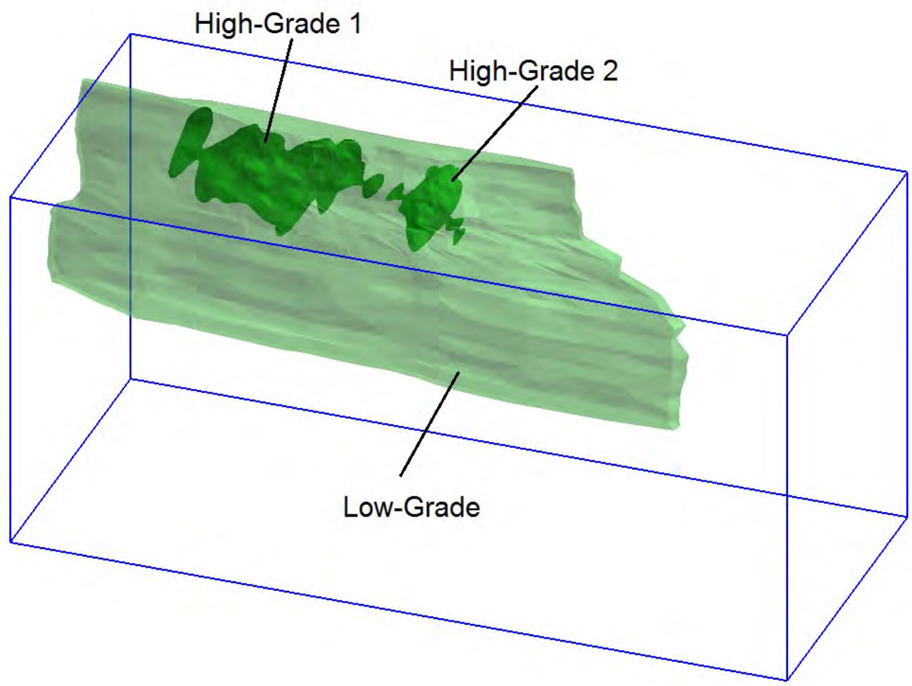


Figure 14.6: Geologic model of the McVeigh Domain – viewed to the northwest

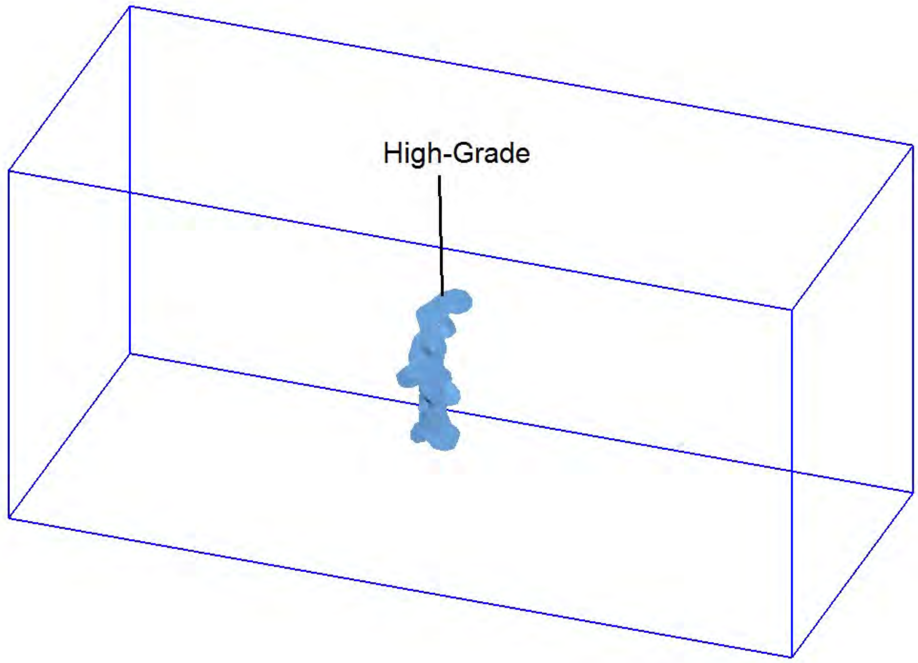


Figure 14.7: Geologic model of the 8 Zone Domain – viewed to the northwest

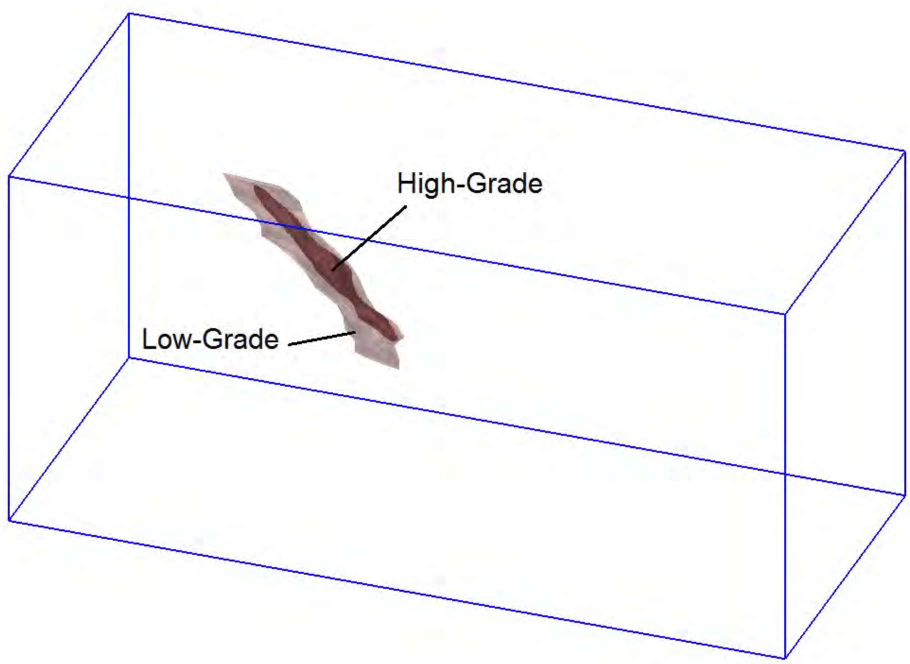


Figure 14.8: Geologic model of the A3 Domain – viewed to the northwest

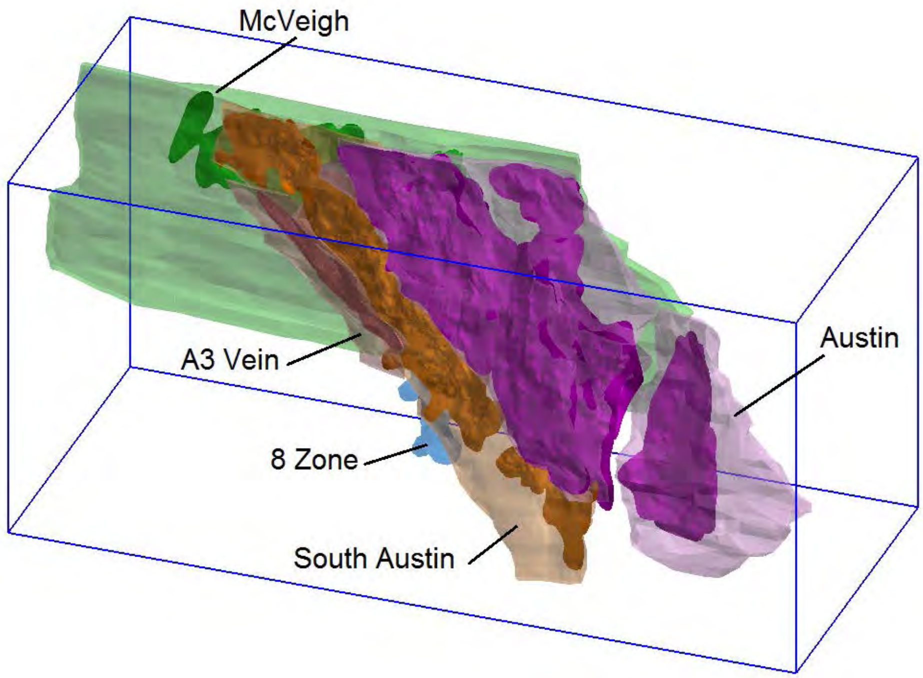


Figure 14.9: Geologic model (All Domains) – viewed to the northwest

These new domains differ significantly from the previous domain models used in the previous SRK mineral resource estimate in that the high-grade domains are much narrower. Where the previous model had one high grade domain, the current model has in some cases as many as 4 discrete high-grade domains within the same volume. Average thicknesses of the 39 current high grade wireframes are between 5 m and 10 m, up to a maximum of 30 m; whereas the previous model domains were closer to 50 m, on average. A comparison of the different generations of domain models to the mined stopes from historic production shows that the distribution and dimensions of the current domains are a closer approximation to what was mined. This correlation provides a high level of confidence that the current domain model is a reasonable representation of the high grade mineralization at Madsen and is acceptable as a basis for the mineral resource estimate.

14.2.1 Geologic Domain Codes

From the modeling of the geologic controls on mineralization, a set of geologic domain codes were defined for each of the zones. Table 14.4 lists the codes applied.

Table 14.4: Geologic domain codes for the Madsen Gold Project

Zone	Domain Codes	Description	Volume m^3
Austin	1	high-grade 1	3,904,939.7
	2	high-grade 2	3,447,707.2
	3	high-grade 3	2,195,302.7
	4	high-grade 4	574,595.1
	5	low-grade	97,260,437.9
South Austin	1	high-grade 1	432,412.8
	2	high-grade 2	2,593,704.8
	3	high-grade 3	172,624.8
	4	finger zone	205,259.3
	5	footwall 2a zone	94,677.3
	6	low-grade	38,018,515.1
McVeigh	1	high-grade 1	1,887,209.0
	2	high-grade 2	430,703.5
	3	low-grade	286,740,744.0
8 Zone	1	high-grade	793,069.8
A3	1	high-grade	235,963.4
	2	low-grade	4,165,604.4

The topographic surface at Madsen was obtained by a Lidar survey and down sampled to 5 m resolution and utilized as built for the estimation of the mineral resources. An example of this surface is presented in Figure 14.10.

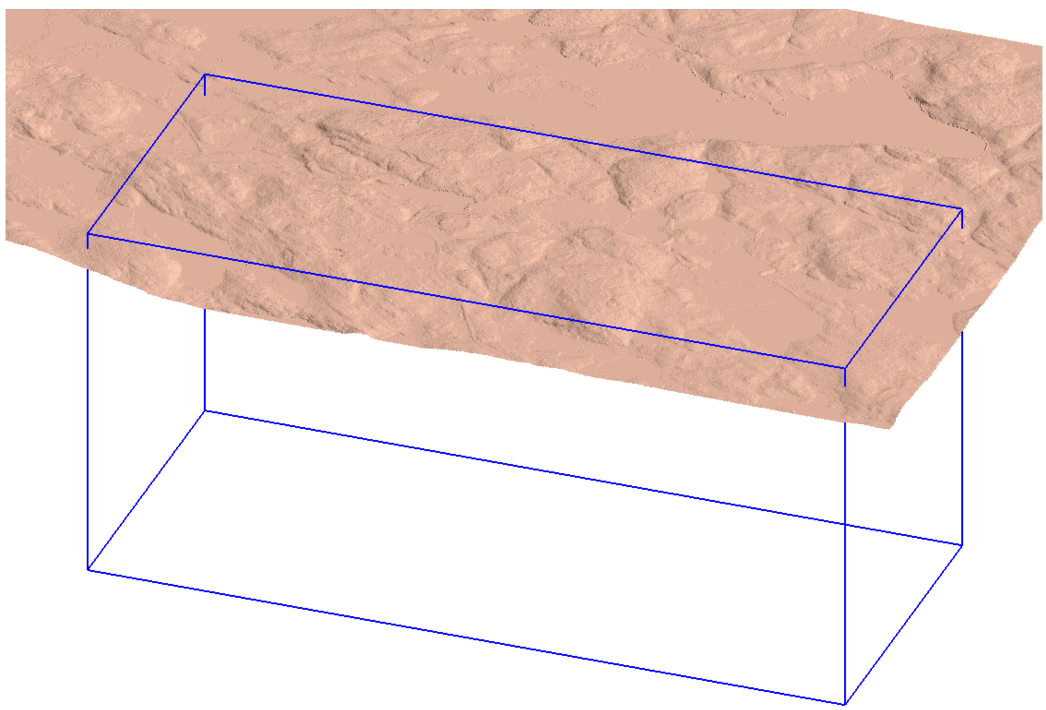


Figure 14.10: Topographic surface at Madsen – viewed to the northwest

14.2.2 Dykes

A series of barren post-mineral dykes are observed within the resource area at Madsen. Due to their geometric complexity, it is quite difficult to correlate them from one hole to the next and consequently to model them with wireframes. As an alternative approach, an indicator technique was selected. In this procedure, the dykes from the lithology database were first regrouped into intermediate intrusives (IINT) and mafic intrusives (MINT) by Pure Gold's personnel. An indicator code of 1.0 was assigned for each dyke interval and 0.0 for all others. A histogram of dyke lengths was computed and showed that the most common dyke length was 1.0m with 40% of the data. The indicator data was then composited to 1.0m regular intervals. A variographic study was performed on the IINT and MINT composited indicator dyke data with results presented in Table 14.5.

Table 14.5: Variography results for indicator dykes at Madsen

Parameters	01 – intermediate intrusives (IINT)			02 – mafic intrusives (MINT)		
	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	95°	185°	185°	105°	195°	195°
Dip**	0°	-65°	25°	0°	-45°	45°
Nugget Effect C_0	0.249			0.123		
1st Structure C_1	0.126			0.064		
2nd Structure C_2	0.202			0.274		
1st Range A_1	13.8m	12.4m	5.2m	48.5m	57.1m	88.9m
2nd Range A_2	125.0m	90.3m	35.5m	141.0m	111.0m	116.0m

**positive clockwise from north*
***negative below horizontal*

The indicator dyke composites were then estimated within the mineralized zones of interest of the resource area. An ordinary kriging interpolation method was utilized to estimate dyke proportions into a block model corresponding to that of the gold grade estimates (see Section 14.6).

A minimum of two samples and maximum of 12 samples were utilized to calculate an estimate. The search ellipsoid was dimensioned and oriented according to the variogram parameters for each type of dyke. The resulting estimate represents a proportion of dyke within each block with values varying from 0.0 (no dyke) to 1.0 (all dyke). These estimates of dyke proportions were kept to later edit the block model of gold grade estimates.

14.2.3 Underground Mined Voids

The original wireframes of the underground mined voids from the 2009 resource estimate by Claude were utilized in the current study, as no new underground development was carried out since then. The voids were grouped into 5 separate units as follows: stopes, drifts, shafts, raises, and ramps. The stope wireframes were expanded 15 feet in all directions to provide a geotechnical buffer in order to address the more degraded condition of the underground stopes. No geotechnical buffer was developed for the 8 Zone due to the more discrete nature of the quartz vein-hosted mineralization. For each set of wireframes, a fraction value representing the proportion of the block inside the wireframe was calculated and stored for each block of the block model. These values were kept to later edit the block model of gold grade estimates. The underground voids are displayed in Figure 14.11.

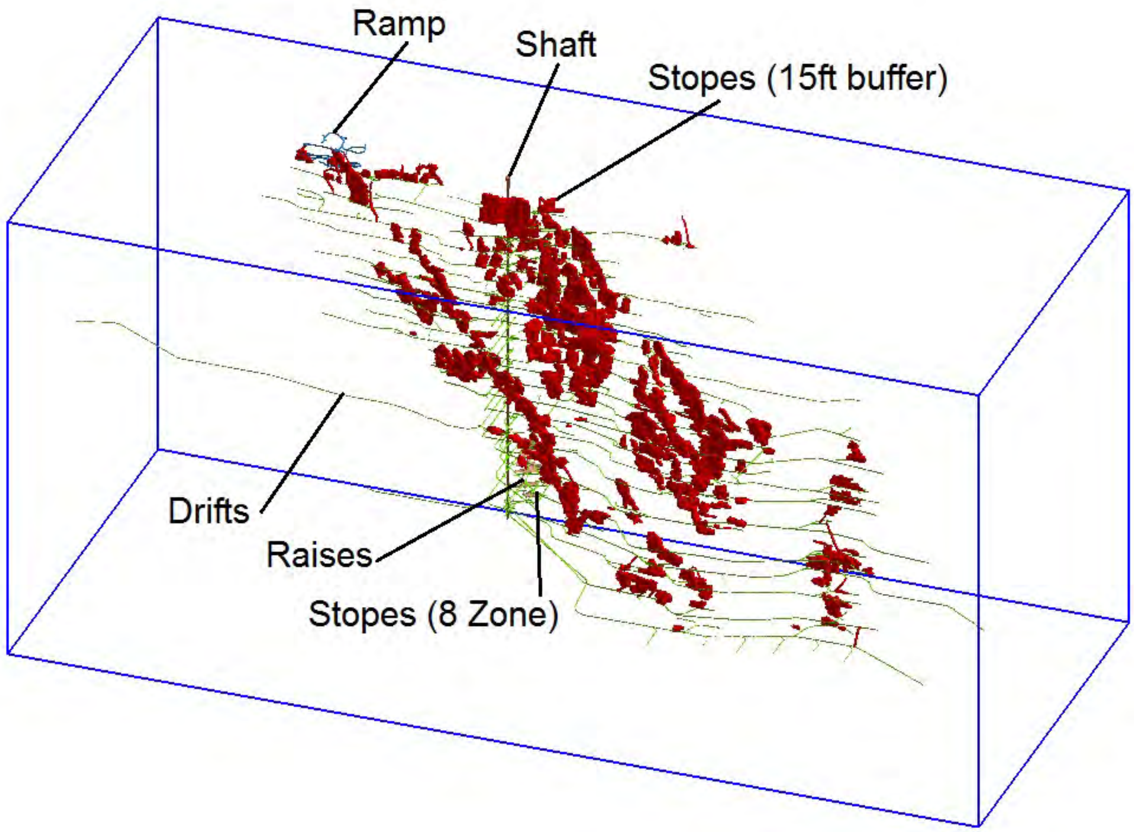


Figure 14.11: Underground mined voids at Madsen – viewed to the northwest

14.3 Compositing

Statistics were computed on the original sample lengths and it was noted that the most common sample length for the Austin, South Austin, McVeigh, and A3 zones is 1.52 m (5ft), with 45% of the data. For the 8 Zone, statistics on the sample length show that the most common sampling length is 0.3 m, with 23% of the data.

For the Austin, South Austin, McVeigh, and A3 zones, the compositing length was set at 1.52 m to reflect the most common sampling length, as well as providing a satisfactory ratio of sample length to block height (1:2). For the 8 Zone the most common sampling length of 0.3 m represents a low ratio of sample length to block height of 1:10 and for such a compositing length of 0.60m, representing a multiple of 0.3 m and a ratio of 1:5, was selected.

The compositing process consisted in starting the compositing at the collar of each hole with continuous composite intervals. At the contact with a different unit from the geology model, a last interval was composited, while a new set of regular composite lengths is generated within the other unit. Within the Austin, South Austin, McVeigh, 8 Zone, and A3 zones, a total of 407,218 composites were generated from 13,151 holes. A summary of statistics on the composites at Madsen is presented in Table 14.6

Table 14.6: Drill hole composites summary at Madsen

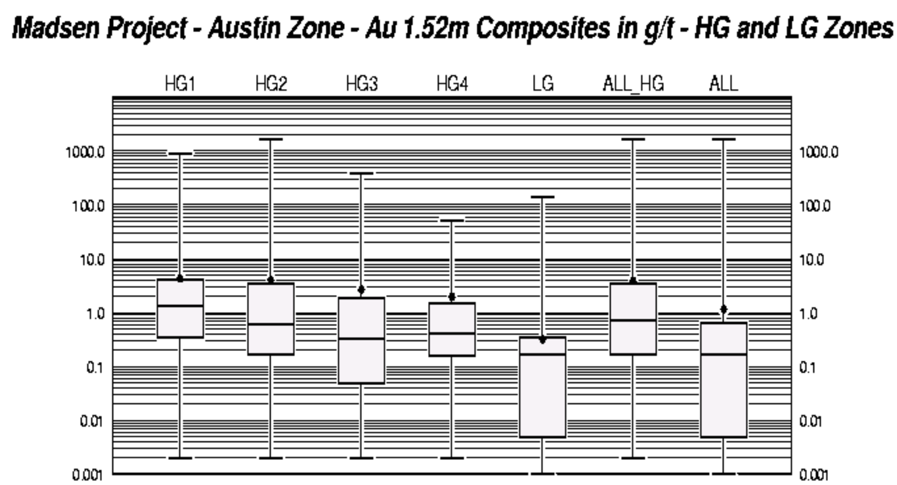
Domain	# of Holes	%	# of Composites	%	# of Meters	%	Average Au Grade g/t
Austin	8,235	62.6	228,410	55.8	316,572.3	55.6	1.16
South Austin	4,214	32.0	103,776	25.3	145,142.4	25.5	1.18
McVeigh	1,364	10.4	68,469	16.7	98,556.1	17.3	0.42
8 Zone	217	1.7	3,858	0.9	2,192.3	0.4	7.93
A3	362	2.3	5,179	1.3	7,192.2	1.2	0.49
All	13,151	100.0	409,692	100.0	569,655.3	100.0	1.03

14.4 Exploratory Data Analysis (EDA)

A set of various statistical applications was utilized to provide a better understanding of the gold grade populations within the various mineralized zones.

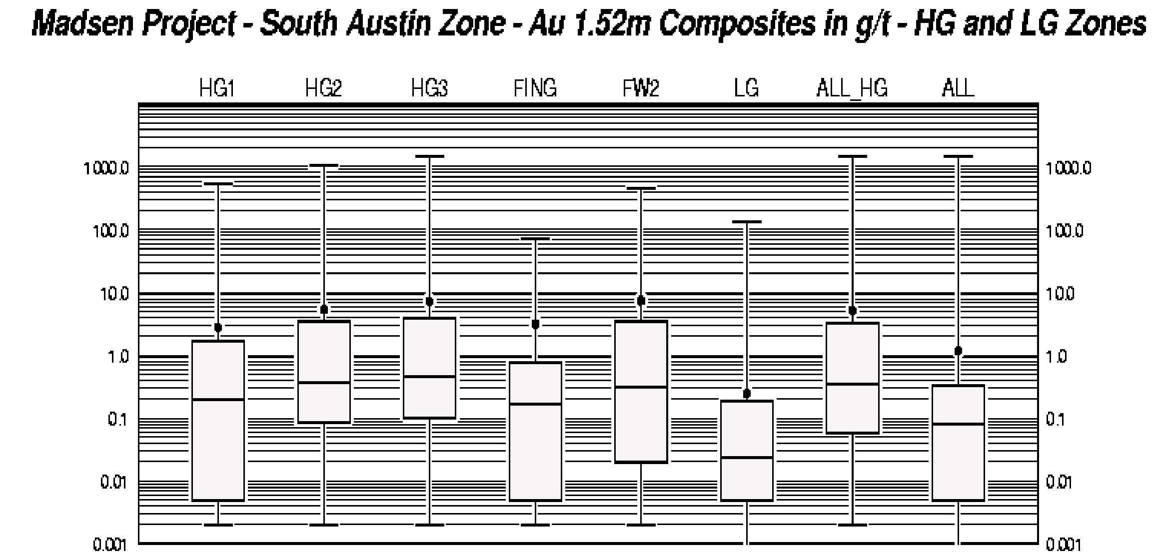
14.4.1 Univariate Statistics

Basic statistics were performed on the gold grades of the Austin, South Austin, McVeigh, 8 Zone, and A3 composites. Histograms and probability plots indicated that the gold grade distributions resemble positively skewed lognormal populations. Basic statistics results are presented as boxplots per unit for each zone in Figures 14.12 to 14.16. As seen in these figures, the gold grade populations are more heterogeneous with coefficients of variation (CV) greater than 3.0 in many of the units. This is most likely attributable to high gold grade values found in these unit.



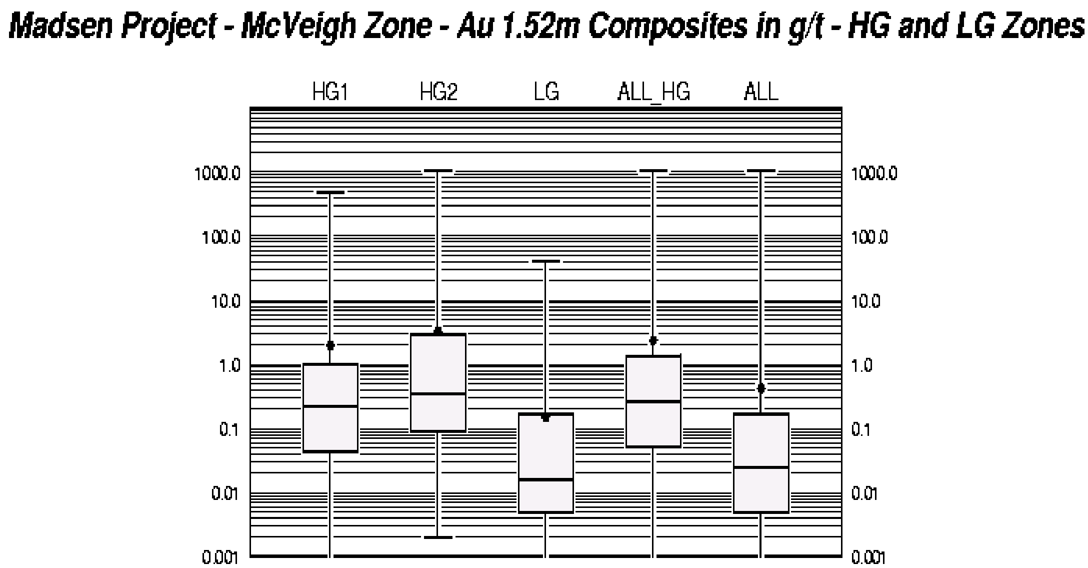
	HG1	HG2	HG3	HG4	LG	ALL_HG	ALL	
Number of data	26028	19192	11260	1018	170914	57498	228410	Number of data
Mean	4.266	4.02	2.659	1.968	0.319	3.839	1.156	Mean
Std. Dev.	14.491	17.898	9.016	4.672	0.926	14.8	7.416	Std. Dev.
Coef. of Var.	3.397	4.452	3.39	2.374	2.906	3.855	6.416	Coef. of Var.
Maximum	911.559	1648.33	391.64	51.43	136.46	1648.33	1648.33	Maximum
Upper quartile	4.138	3.38	1.868	1.471	0.34	3.44	0.649	Upper quartile
Median	1.301	0.596	0.324	0.406	0.17	0.703	0.17	Median
Lower quartile	0.34	0.17	0.05	0.16	0.005	0.17	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.001	0.002	0.001	Minimum
Number of holes	3108	2673	1348	198	8082	7296	8235	Number of holes

Figure 14.12: Basic statistics of gold – Austin Zone



	HG1	HG2	HG3	FING	FW2	LG	ALL_HG	ALL	
Number of data	2345	15801	1424	512	931	82763	21013	103776	Number of data
Mean	2.791	5.29	7.295	3.16	7.392	0.245	5.197	1.179	Mean
Std. Dev.	12.37	20.951	49.539	8.637	26.079	1.399	23.389	10.421	Std. Dev.
Coef. of Var.	4.432	3.96	6.791	2.733	3.528	5.719	4.5	8.838	Coef. of Var.
Maximum	543.77	1038.76	1470.65	70.175	461.939	129.383	1470.65	1470.65	Maximum
Upper quartile	1.699	3.43	3.913	0.777	3.43	0.184	3.198	0.327	Upper quartile
Median	0.194	0.37	0.469	0.17	0.313	0.023	0.34	0.083	Median
Lower quartile	0.005	0.086	0.101	0.005	0.02	0.005	0.059	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.002	0.0	0.002	0.0	Minimum
Number of holes	592	2384	231	138	273	4172	3395	4214	Number of holes

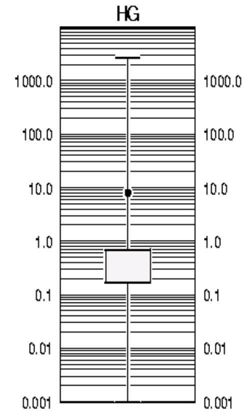
Figure 14.13: Basic statistics of gold – South Austin Zone



	HG1	HG2	LG	ALL_HG	ALL	
Number of data	6255	2855	59359	9110	68469	Number of data
Mean	1.972	3.255	0.151	2.366	0.421	Mean
Std. Dev.	11.191	22.613	0.469	15.625	5.521	Std. Dev.
Coef. of Var.	5.674	6.947	3.11	6.603	13.112	Coef. of Var.
Maximum	481.287	1049.9	40.321	1049.9	1049.9	Maximum
Upper quartile	1.027	2.868	0.17	1.37	0.17	Upper quartile
Median	0.223	0.34	0.016	0.255	0.025	Median
Lower quartile	0.043	0.092	0.005	0.052	0.005	Lower quartile
Minimum	0.0	0.002	0.0	0.0	0.0	Minimum
Number of holes	606	382	1360	988	1364	Number of holes

Figure 14.14: Basic statistics of gold – McVeigh Zone

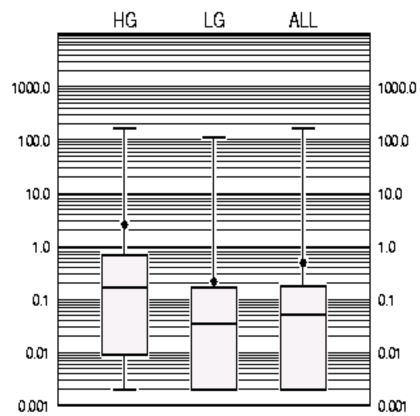
Madsen Project - 8 Zone - Au 0.6m Composites in g/t - HG Zone



	HG	
Number of data	3858	Number of data
Mean	7.929	Mean
Std. Dev.	73.555	Std. Dev.
Coef. of Var.	9.276	Coef. of Var.
Maximum	2684.47	Maximum
Upper quartile	0.69	Upper quartile
Median	0.17	Median
Lower quartile	0.17	Lower quartile
Minimum	0.001	Minimum
Number of holes	217	Number of holes

Figure 14.15: Basic statistics of gold – 8 Zone

Madsen Project - A3 Vein - Au 1.52m Composites in g/t - HG and LG Zones



	HG	LG	ALL	
Number of data	667	4512	5179	Number of data
Mean	2.559	0.217	0.49	Mean
Std. Dev.	10.313	2.112	4.112	Std. Dev.
Coef. of Var.	4.03	9.75	8.395	Coef. of Var.
Maximum	163.2	112.307	163.2	Maximum
Upper quartile	0.69	0.17	0.18	Upper quartile
Median	0.17	0.035	0.052	Median
Lower quartile	0.009	0.002	0.002	Lower quartile
Minimum	0.002	0.002	0.002	Minimum
Number of holes	197	362	362	Number of holes

Figure 14.16: Basic statistics of gold – A3

14.4.2 Capping of High-Grade Outliers

It is common practice to statistically examine the higher grades within a population and to trim them to a lower grade value based on the results from specific statistical utilities. This procedure is performed on high-grade values that are considered outliers and that cannot be related to any geologic feature. In the case at Madsen, the higher gold grades were examined with three different tools: the probability plot, decile analysis, and cutting statistics. The usage of various investigating methods allows for a selection of the capping threshold in a more objective and justified manner. For the probability plot method, the capping value is chosen at the location where higher grades depart from the main distribution. For the decile analysis, the capping value is chosen as the maximum grade of the decile containing less than an average of 10% of metal. For the cutting statistics, the selection of the capping value is identified at the cut-off grade where there is no correlation between the grades above this cut-off. The resulting compilation of the capping thresholds is listed in Table 14.7. One of the objectives of the capping strategy is to have less than 10% of the metal affected by the capping process. This was achieved in most of the cases, however in some instances it was noted that the capping had a greater effect on the metal content, indicating that few higher-grade outliers were quite different than the population in general by carrying a good proportion of the metal content.

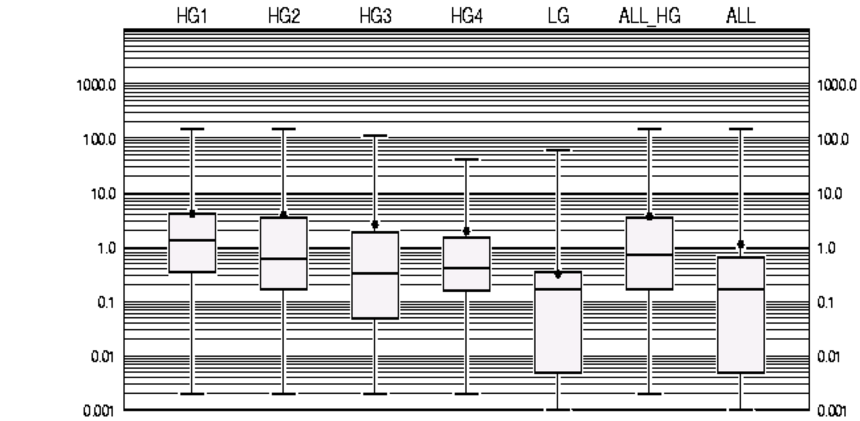
Table 14.7: List of capping thresholds of higher gold grade outliers

Domain	Units	Capping Threshold g/t	% Metal Affected	Number of Comps Capped
Austin	high-grade 1	150.0	4.0	24
	high-grade 2	150.0	4.0	25
	high-grade 3	110.0	3.0	12
	high-grade 4	40.0	1.0	5
	low-grade	60.0	1.0	7
South Austin	high-grade 1	80.0	9.0	4
	high-grade 2	250.0	3.0	16
	high-grade 3	180.0	21.0	4
	finger zone	40.0	6.0	8
	footwall 2a zone	180.0	5.0	3
	low-grade	60.0	2.0	12
McVeigh	high-grade 1	100.0	8.0	11
	high-grade 2	90.0	12.0	5
	low-grade	15.0	2.0	8
8 Zone	high-grade	450.0	22.0	14
A3	high-grade	80.0	9.0	4
	low-grade	60.0	6.0	2

Basic statistics were re-computed with the gold grades capped to the thresholds listed in Table 14.7. Boxplots of Figures 14.17 to 14.21 display the basic statistics resulting from the capping of the higher gold grade outliers. It can be observed from those Figures that the coefficients of variation are in general below or close to 3.0 for the different gold grade populations. However, a few units display a coefficient greater than 3.0, as seen for the LG unit at South Austin, the HG1 unit at McVeigh, the HG unit at 8 Zone, and the HG and LG units at A3. The effect of the capping of higher gold grade outliers has slightly reduced the overall mean gold grade by 3.2% at Austin, by 5.2% at South Austin, by 8.4% at McVeigh, by 24.3% at 8 Zone, and by 6.3% at A3. The greater reduction observed at 8 Zone is due to a high-grade outlier carrying a large portion of the metal and thus having a greater influence on the population's average gold grade.

Because of the generally low coefficients of variation observed for the gold grade populations of the major units at Madsen, it was concluded that there is no need to treat the higher-grade composites differently than the lower grade composites during the estimation process. Ordinary kriging was thus selected as a well-suited estimation technique in this case.

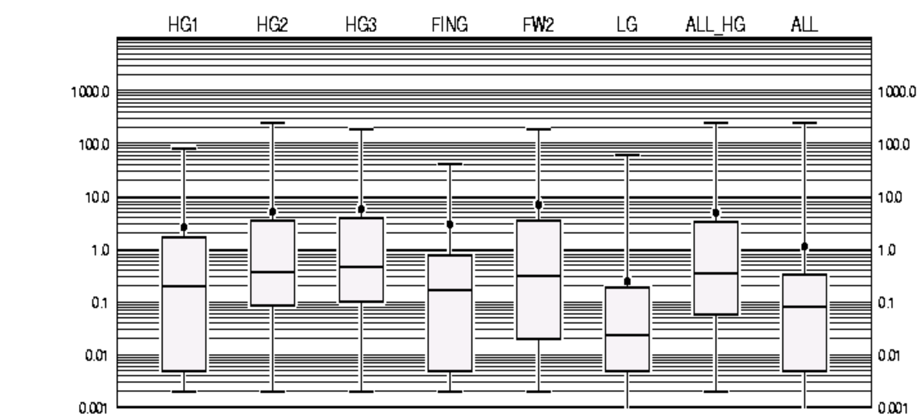
Madsen Project - Austin Zone - Au 1.52m Composites in g/t - Capped - HG and LG Zones



	HG1	HG2	HG3	HG4	LG	ALL_HG	ALL	
Number of data	26028	19192	11260	1018	170914	57498	228410	Number of data
Mean	4.105	3.824	2.589	1.954	0.319	3.686	1.119	Mean
Std. Dev.	9.613	10.515	7.45	4.539	0.908	9.512	4.917	Std. Dev.
Coef. of Var.	2.342	2.75	2.878	2.323	2.851	2.581	4.393	Coef. of Var.
Maximum	150.0	150.0	110.0	40.0	60.0	150.0	150.0	Maximum
Upper quartile	4.138	3.38	1.868	1.471	0.34	3.44	0.649	Upper quartile
Median	1.301	0.596	0.324	0.406	0.17	0.703	0.17	Median
Lower quartile	0.34	0.17	0.05	0.16	0.005	0.17	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.001	0.002	0.001	Minimum
Number of holes	3108	2673	1348	198	8082	7296	8235	Number of holes

Figure 14.17: Basic statistics of capped gold grades – Austin

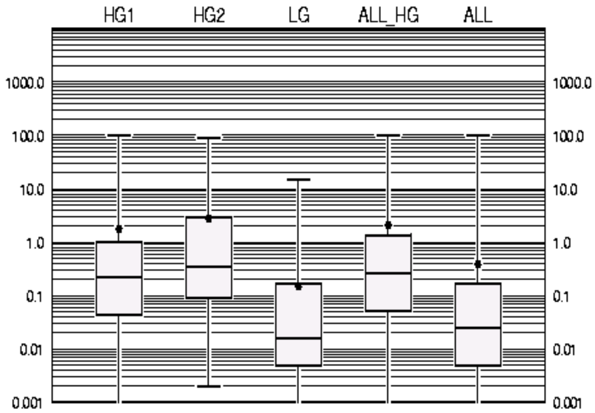
Madsen Project - South Austin Zone - Au 1.52m Composites in g/t - Capped - HG and LG Zones



	HG1	HG2	HG3	FING	FW2	LG	ALL_HG	ALL	
Number of data	2345	15801	1424	512	931	82763	21013	103776	Number of data
Mean	2.568	5.086	5.676	2.952	6.955	0.242	4.885	1.117	Mean
Std. Dev.	7.419	15.769	16.143	7.412	20.611	1.202	15.252	6.95	Std. Dev.
Coef. of Var.	2.89	3.101	2.844	2.511	2.963	4.971	3.122	6.221	Coef. of Var.
Maximum	80.0	250.0	180.0	40.0	180.0	60.0	250.0	250.0	Maximum
Upper quartile	1.699	3.43	3.913	0.777	3.43	0.184	3.198	0.327	Upper quartile
Median	0.194	0.37	0.469	0.17	0.313	0.023	0.34	0.083	Median
Lower quartile	0.005	0.086	0.101	0.005	0.02	0.005	0.059	0.005	Lower quartile
Minimum	0.002	0.002	0.002	0.002	0.002	0.0	0.002	0.0	Minimum
Number of holes	592	2384	231	138	273	4172	3395	4214	Number of holes

Figure 14.18: Basic statistics of capped gold – South Austin

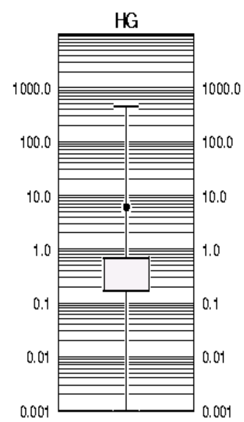
Madsen Project - McVeigh Zone - Au 1.52m Composites in g/t - Capped - HG and LG Zones



	HG1	HG2	LG	ALL_HG	ALL	
Number of data	6255	2855	59359	9110	68469	Number of data
Mean	1.776	2.785	0.149	2.086	0.386	Mean
Std. Dev.	6.606	6.898	0.388	6.713	2.456	Std. Dev.
Coef. of Var.	3.719	2.477	2.595	3.218	6.368	Coef. of Var.
Maximum	100.0	90.0	15.0	100.0	100.0	Maximum
Upper quartile	1.027	2.868	0.17	1.37	0.17	Upper quartile
Median	0.223	0.34	0.016	0.255	0.025	Median
Lower quartile	0.043	0.092	0.005	0.051	0.005	Lower quartile
Minimum	0.0	0.002	0.0	0.0	0.0	Minimum
Number of holes	606	382	1360	988	2348	Number of holes

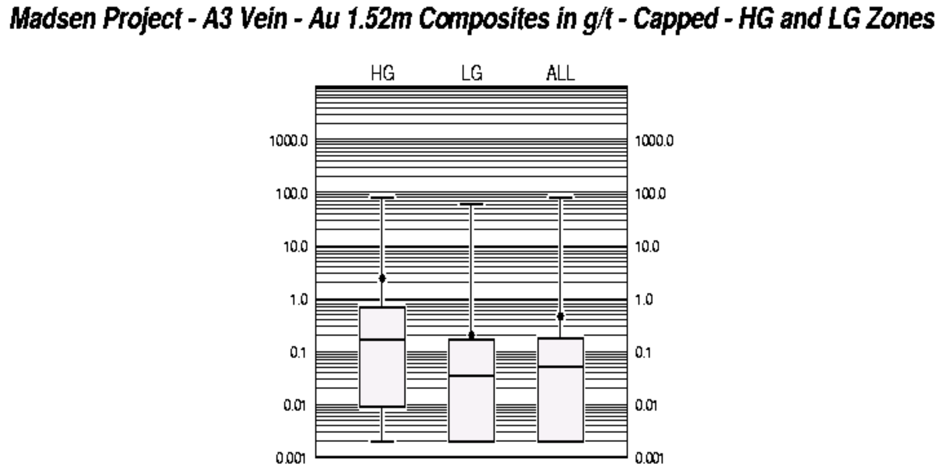
Figure 14.19: Basic statistics of capped gold – McVeigh

Madsen Project - 8 Zone - Au 0.6m Composites in g/t - Capped - HG Zone



	HG	
Number of data	3858	Number of data
Mean	5.999	Mean
Std. Dev.	36.289	Std. Dev.
Coef. of Var.	6.05	Coef. of Var.
Maximum	450.0	Maximum
Upper quartile	0.69	Upper quartile
Median	0.17	Median
Lower quartile	0.17	Lower quartile
Minimum	0.001	Minimum
Number of holes	217	Number of holes

Figure 14.20: Basic statistics of capped gold – 8 Zone



	HG	LG	ALL	
Number of data	667	4512	5179	Number of data
Mean	2.408	0.203	0.46	Mean
Std. Dev.	8.684	1.456	3.342	Std. Dev.
Coef. of Var.	3.606	7.186	7.268	Coef. of Var.
Maximum	80.0	60.0	80.0	Maximum
Upper quartile	0.69	0.17	0.18	Upper quartile
Median	0.17	0.035	0.052	Median
Lower quartile	0.009	0.002	0.002	Lower quartile
Minimum	0.002	0.002	0.002	Minimum
Number of holes	197	362	559	Number of holes

Figure 14.21: Basic statistics of capped gold – A3

14.4.3 Declustering

In general, there is a tendency to drill more holes in higher grade areas than in lower grade areas when delimiting a potential ore body. As a result, the higher grade portion of a deposit will be overly represented and would translate into a bias towards the higher grades when calculating statistical parameters of the population. Thus, a declustering method is utilized to generate a more representative set of statistical results within the zone of interest. In this case, a polygonal declustering technique was applied to the composites of the high-grade zones of Austin, South Austin, McVeigh, 8 Zone, and A3. This approach consists of assigning the volume of a polygon, defined by the halfway distance between a sample and its surrounding neighbours, as a weight for each sample within the high-grade mineralized zone. Therefore, a sample that is isolated will have a larger weight than a sample located in a densely sampled area.

Comparisons of average gold capped and declustered grades with the capped and un-declustered gold averages show little clustering overall with only slight decreases or increases in average declustered grades. The regular pattern of the tight underground definition drilling is most likely responsible for the limited clustering observed. A reduction of 10.0% of the mean gold grade was observed at South Austin and A3, while increases of 2.2%, 5.4%, and 1.5% were noted at Austin, McVeigh, and 8 Zone, respectively.

The average grade from the declustered statistics provides an excellent comparison with the average grade of the interpolated blocks, as a way to assess any overall bias of the estimates.

14.5 Variography

A variographic analysis was carried out on the gold grade composites within the different geologic domain units at Austin, South Austin, McVeigh, 8 Zone, A3. The objective of this analysis was to spatially establish the preferred directions of gold grade continuity. In turn, the variograms modeled along those directions would be later utilized to select and weigh the composites during the block grade interpolation process. For this exercise, all experimental variograms were of the type relative lag pairwise, which is considered robust for the assessment of gold grade continuity.

Variogram maps were first calculated to examine general gold grade continuities in the XY, XZ, and YZ planes. The next step undertaken was to compute omni-directional variograms and down-hole variograms. The omni-directional variograms are calculated without any directional restrictions and provide a good assessment of the sill of the variogram. As for the down-hole variogram, it is calculated with the composites of each hole along the trace of the hole. The objective of these calculations is to provide information about the short scale structure of the variogram, as the composites are more closely spaced down the hole. Thus, the modeling of the nugget effect is usually better derived from the down-hole variograms.

Directional variograms were then computed to identify more specifically the three main directions of continuity. A first set of variograms were produced in the horizontal plane at increments of 10 degrees. In the same way a second set of variograms were computed at 10° increments in the vertical plane of the horizontal direction of continuity (plunge direction). A final set of variograms at 10° increments were calculated in the vertical plane perpendicular to the horizontal direction of continuity (dip direction). The final variograms were then modeled with a 2-structure spherical variogram, and resulting parameters presented in Tables 14.8 to 14.12 for gold populations of the different zones.

The directions of gold grade continuity are in general agreement with the orientation of the mineralized zone, with best directions of continuity trending east-west and down-dip at approximately -65°. The ranges of gold grade continuity along the principal direction (strike) vary from 28m to 47m in the high-grade units and from 36m to 55m in the low-grade units. Along the minor direction (dip), the ranges of continuity vary from 26m to 41m in the high-grade units and from 40m to 50m in the low-grade units. Finally, along the vertical direction (across strike and dip), the ranges of continuity vary from 11m to 21m in the high-grade units and from 29m to 31m in the low-grade units. The modeled variograms have relatively low nugget effects with values varying from 8% to 27% of the sill for the high-grade units and from 13% to 27% of the sill for the low-grade units.

The experimental variograms are considered of good quality throughout the Madsen deposit, most likely due to the tighter spaced drilling in the mineralized zones.

Table 14.8: Modeled variogram parameters for gold composites at Austin

Parameters	1 – high-grade 1			2 – high-grade 2			3 – high-grade 3		
	Principal	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**
Azimuth*	90°	180°	180°	95°	185°	185°	100°	190°	190°
Dip**	0°	-65°	25°	0°	-65°	25°	0°	-65°	25°
Nugget Effect C_0	0.288			0.598			0.301		
1st Structure C_1	1.113			1.202			1.735		
2nd Structure C_2	0.448			0.409			0.393		
1st Range A_1	5.7m	7.8m	4.6m	5.2m	5.7m	4.6m	6.2m	7.3m	6.2m
2nd Range A_2	40.6m	35.8m	20.7m	43.9m	31.5m	14.3m	34.7m	38.4m	18.0m
Parameters	4 – high-grade 4			5 – low-grade					
	Principal	Minor	Vertical	Principal	Minor	Vertical			
Azimuth*	90°	180°	180°	95°	185°	185°			
Dip**	0°	-60°	30°	0°	-65°	25°			
Nugget Effect C_0	0.366			0.451					
1st Structure C_1	0.872			1.107					
2nd Structure C_2	0.562			0.345					
1st Range A_1	6.2m	7.3m	7.3m	3.0m	4.1m	2.5m			
2nd Range A_2	40.6m	28.2m	15.9m	48.2m	40.1m	29.3m			

**positive clockwise from north*
***negative below horizontal*

Table 14.9: Modeled variogram parameters for gold composites at South Austin

Parameters	1 – high-grade 1			2 – high-grade 2			3 – high-grade 3		
	Principal	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**
Azimuth*	95°	185°	185°	100°	190°	190°	95°	185°	185°
Dip**	-5°	-70°	20°	-25°	-70°	20°	0°	-60°	30°
Nugget Effect C_0	0.569			0.447			0.682		
1st Structure C_1	1.338			1.645			1.140		
2nd Structure C_2	0.661			0.389			0.733		
1st Range A_1	1.9m	4.1m	1.9m	3.5m	3.5m	3.5m	7.8m	7.8m	5.2m
2nd Range A_2	42.2m	40.0m	10.5m	46.5m	41.1m	14.8m	39.0m	26.1m	14.8m
Parameters	4 – finger			5 – footwall 2a			6- low-grade		
	Principal	Minor	Vertical	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	100°	190°	190°	95°	185°	185°	95°	185°	185°
Dip**	10°	-65°	25°	-15°	-80°	10°	0°	-65°	25°
Nugget Effect C_0	0.225			0.785			0.583		
1st Structure C_1	1.422			1.480			1.124		
2nd Structure C_2	1.054			0.504			0.433		
1st Range A_1	5.7m	13.7m	10.0m	2.5m	4.1m	2.5m	2.5m	2.5m	2.5m
2nd Range A_2	33.0m	41.0m	13.7m	39.5m	35.7m	10.5m	55.1m	49.2m	30.9m

**positive clockwise from north*
***negative below horizontal*

Table 14.10: Modeled variogram parameters for gold composites at McVeigh

Parameters	1 – high-grade 1			2 – high-grade 2			3 – low-grade		
	Principal	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**	**Principal**	**Minor**	**Vertical**
Azimuth*	95°	185°	185°	80°	170°	170°	95°	185°	185°
Dip**	0°	-80°	10°	0°	-70°	20°	0°	-65°	25°
Nugget Effect C_0	0.256			0.425			0.264		
1st Structure C_1	1.188			1.552			1.114		
2nd Structure C_2	0.758			0.444			0.575		
1st Range A_1	4.1m	4.1m	5.7m	1.9m	4.6m	4.1m	3.0m	10.5m	7.3m
2nd Range A_2	34.7m	38.4m	13.2m	28.2m	30.9m	14.3m	36.3m	50.2m	30.4m

**positive clockwise from north*
***negative below horizontal*

Table 14.11: Modeled variogram parameters for gold composites at 8 Zone

Parameters	1 – high-grade		
	Principal	Minor	Vertical
Azimuth*	15°	105°	15°
Dip**	40°	0°	-50°
Nugget Effect C_0	0.170		
1st Structure C_1	1.038		
2nd Structure C_2	0.605		
1st Range A_1	6.2m	7.3m	4.1m
2nd Range A_2	35.2m	27.1m	11.6m

**positive clockwise from north*
***negative below horizontal*

Table 14.12: Modeled variogram parameters for gold composites at A3

Parameters	1 – high-grade			2 – low-grade		
	Principal	Minor	Vertical	Principal	Minor	Vertical
Azimuth*	100°	190°	190°	95°	185°	185°
Dip**	0°	-80°	10°	0°	-65°	25°
Nugget Effect C_0	0.602			0.583		
1st Structure C_1	1.446			1.124		
2nd Structure C_2	0.568			0.433		
1st Range A_1	7.3m	6.8m	9.5m	2.5m	2.5m	2.5m
2nd Range A_2	38.0m	28.8m	12.7m	55.1m	49.2m	30.9m

**positive clockwise from north*
***negative below horizontal*

14.6 Gold Grade Estimation

The estimation of gold grades into a block model was carried out with the ordinary kriging technique. The estimation strategy and parameters were tailored to account for the various geometrical, geological, and geostatistical characteristics previously identified. A separate block model of gold grade estimates was assigned to each of the zones with a total of 4 block models: Austin, South Austin and A3, McVeigh, 8 Zone. The estimate of the A3 domain was included as a part of the South Austin block model due to its spatial proximity. Each block model has the same grid definition, as presented in Table 14.13. It should be noted that the origin of the block model corresponds to the lower left corner, the point of origin being the exterior edges of the first block. A block size of 3 m (easting) x 3 m (northing) x 3 m (elevation) was selected to better reflect the geometrical configuration and anticipated underground production rate. The block model is orthogonal with no rotation applied to it.

Table 14.13: Block grid definition

Madsen					
Coordinates	Origin m	Rotation (azimuth)	Distance m	Block Size m	Number of Blocks
Easting (X)	3,100.0		3,504.0	3.0	1,168
Northing (Y)	1,660.0	0°	1,500.0	3.0	500
Elevation(Z)	-100.0		1,680.0	3.0	560
Number of Blocks		327,040,000			

The database of 1.52 m capped gold grade composites was utilized as input for the grade interpolation process at Austin, South Austin, McVeigh, and A3, while for the grade estimation of the 8 Zone, the database of 0.6 m capped gold composites was utilized.

The size and orientation of the search ellipsoid for the estimation process was based on the variogram parameters modeled for gold. A minimum of 2 samples and maximum of 12 samples were selected for the block grade calculations. Hard boundaries were assigned in the estimation of each unit. No other restrictions, such as a minimum number of informed octants, a minimum number of holes, a maximum number of samples per hole, etc., were applied to the estimation process. A summary of the estimation parameters is presented in Table 14.14.

Table 14.14: Estimation parameters for gold

Estimation Parameters – Gold Grade – Madsen Project								
Rock Code	**minimum # of samples**	**maximum # of samples**	**search ellipsoid - long axis - azimuth/dip**	**search ellipsoid - long axis - size**	**search ellipsoid - short axis - azimuth/dip**	**search ellipsoid - short axis - size**	**search ellipsoid - vertical axis - azimuth/dip**	**search ellipsoid - vertical axis - size**
Austin								
1	2	12	90°/0°	41.0m	180°/-65°	36.0m	180°/25°	21.0m
2	2	12	95°/0°	44.0m	185°/-65°	32.0m	185°/25°	14.0m
3	2	12	100°/0°	35.0m	190°/-65°	38.0m	190°/25°	18.0m
4	2	12	90°/0°	41.0m	180°/-60°	28.0m	180°/30°	16.0m
5	2	12	95°/0°	48.0m	185°/-65°	40.0m	185°/25°	29.0m
South Austin								
1	2	12	95°/-5°	42.0m	185°/-70°	40.0m	185°/20°	11.0m
2	2	12	100°/-25°	47.0m	190°/-70°	41.0m	190°/20°	15.0m
3	2	12	95°/0°	39.0m	185°/-60°	26.0m	185°/30°	15.0m
4	2	12	100°/10°	33.0m	190°/-65°	41.0m	190°/25°	14.0m
5	2	12	95°/-15°	40.0m	185°/-80°	36.0m	185°/10°	11.0m
6	2	12	95°/0°	55.0m	185°/-65°	49.0m	185°/25°	31.0m
McVeigh								
1	2	12	95°/0°	35.0m	185°/-80°	38.0m	185°/10°	13.0m
2	2	12	80°/0°	28.0m	170°/-70°	31.0m	170°/20°	14.0m
3	2	12	95°/0°	36.0m	185°/-65°	50.0m	185°/25°	30.0m
8 Zone								
1	2	12	15°/40°	35.0m	105°/0°	27.0m	15°/-50°	12.0m
A3								
1	2	12	100°/0°	38.0m	190°/-80°	29.0m	190°/10°	13.0m
2	2	12	95°/0°	55.0m	185°/-65°	49.0m	185°/25°	31.0m

The grade estimation process consisted of a three-pass approach with the parameters of the first pass as presented in Table 14.14. The estimation parameters of the second and third passes are the same with the exception of an enlarged search ellipsoid by 1.5 times and 3 times the dimensions from the first pass, respectively. In this case, priority was given to estimates from the first pass, followed by estimates from the second pass for un-estimated blocks from the first pass, and finally the estimates of the third pass for un-estimated blocks from the first and second passes. Only blocks within the high-grade and low-grade zones were estimated.

In the planning of the grade estimation strategy in an environment where previous extensive underground mining occurred, two scenarios where investigated: estimation with grades outside mined stopes only and estimation with grades inside and outside mined stopes. To better understand the behaviour of drill hole gold grades in the vicinity of stope boundaries, contact plots were performed. In these plots, the average gold grades are compared on both side of the stope contacts in increments of distance away from the contacts. Contact plots for the Austin, South Austin, McVeigh, and 8 Zone areas are displayed in Figure 14.22.

From the plots in Figure 14.22, it can be seen that no abrupt changes in gold grades are observed on both sides of stope contacts. For Austin, South Austin, and McVeigh mineralized zones, the changes in gold grades are more transitional, while they are more similar at 8 Zone. For these reasons it was decided to proceed with a grade estimation procedure where all drill hole gold grades inside and outside stopes were utilized. Mined underground voids were then extracted from the block model.

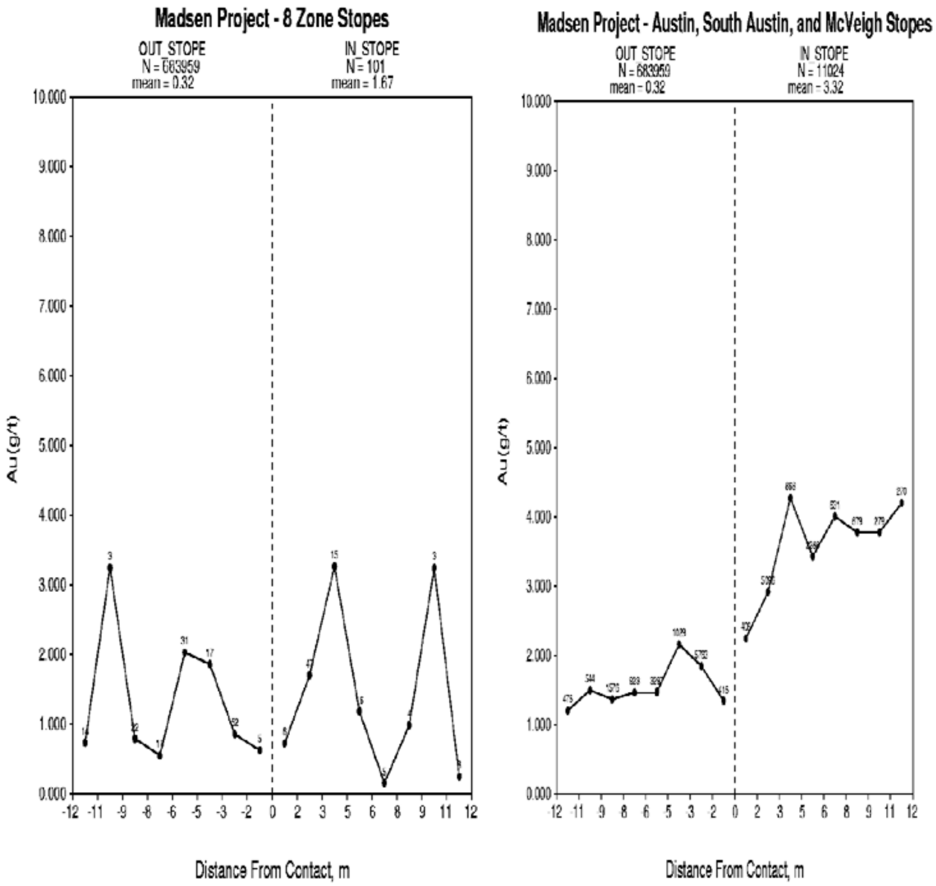


Figure 14.22: Contact plots of gold grades in the vicinity of mined stopes at Madsen

14.7 Validation of Grade Estimates

Validation tests were carried out on the estimates to examine the possible presence of a bias and to quantify the level of smoothing/variability.

14.7.1 Visual Inspection

A visual inspection of the block estimates with the drill hole grades on plans, east-west and north-south cross-sections was performed as a first check of the estimates. Observations from stepping through the estimates along the different planes indicated that there was good agreement between the drill hole grades and the estimates. The orientations of the estimated grades were also as expected according to the projection angles defined by the search ellipsoid. Examples of cross-sections and level plans for gold grade estimates of the different mineralized domains are presented in Figures 14.23 to 14.32.

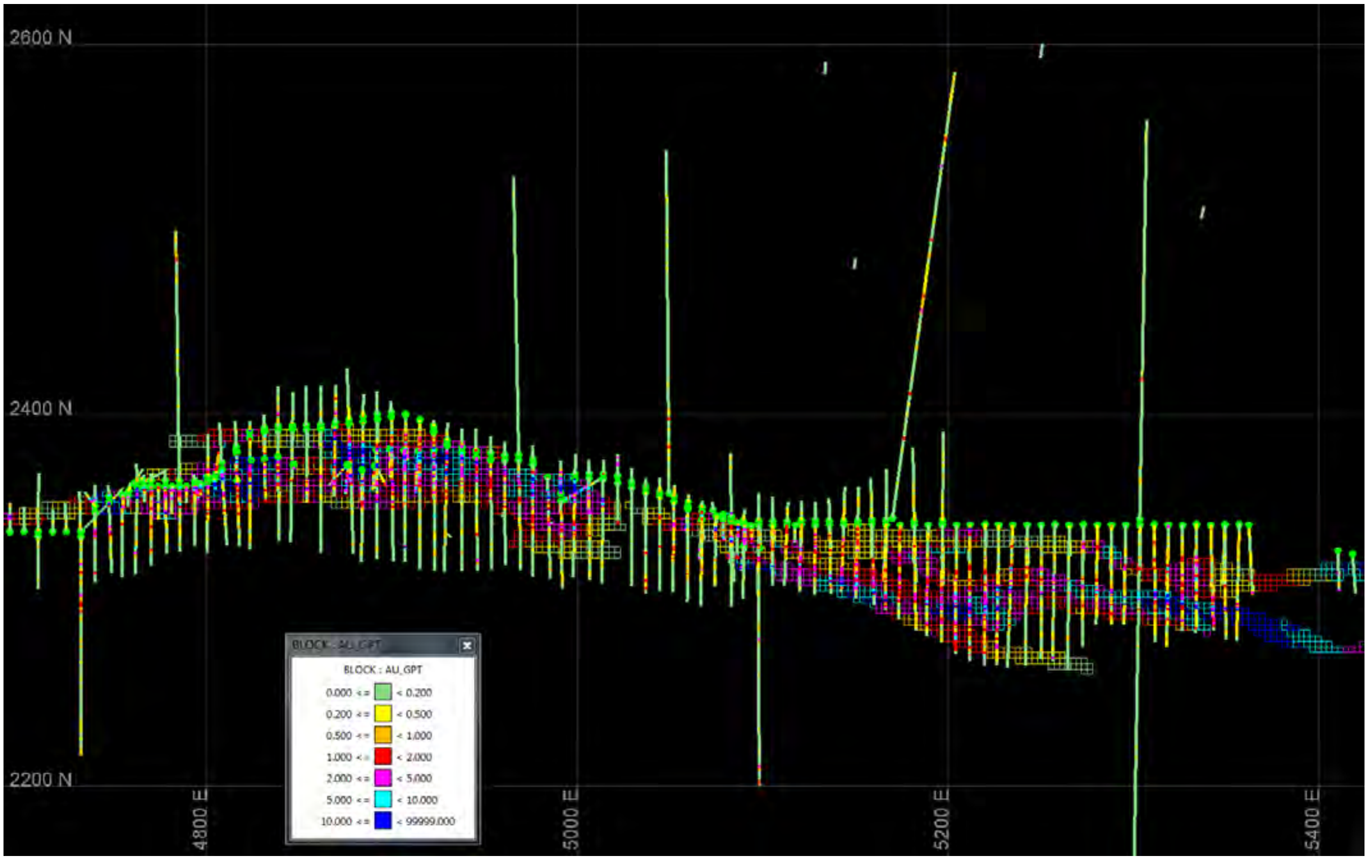


Figure 14.23: Gold block grade estimates and drill hole grades at Austin – high-grade 1 and 2 – Level 985 El.

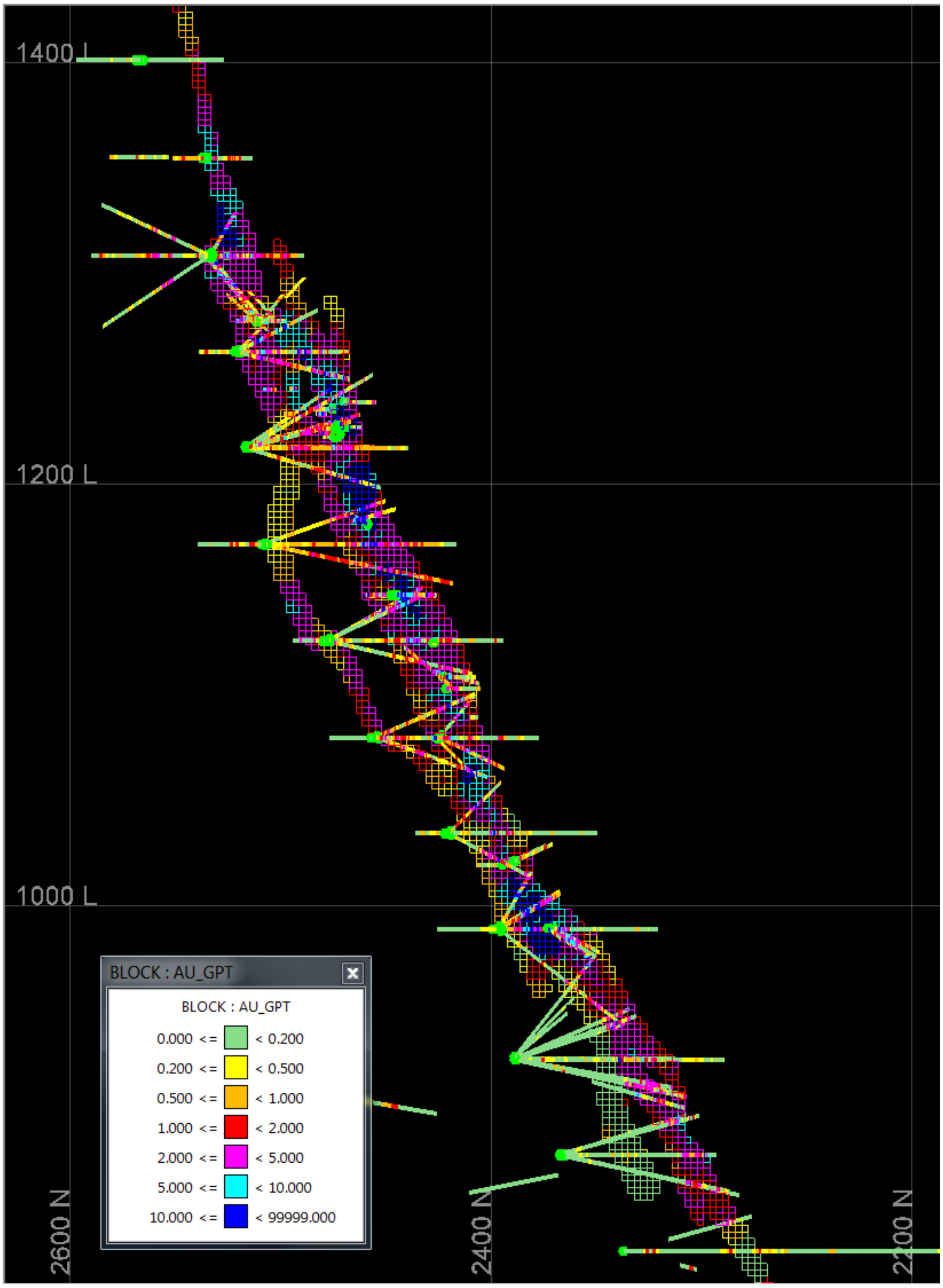


Figure 14.24: Gold block grade estimates and drill hole grades at Austin – High-Grade 1 – North-South Section 4880E.

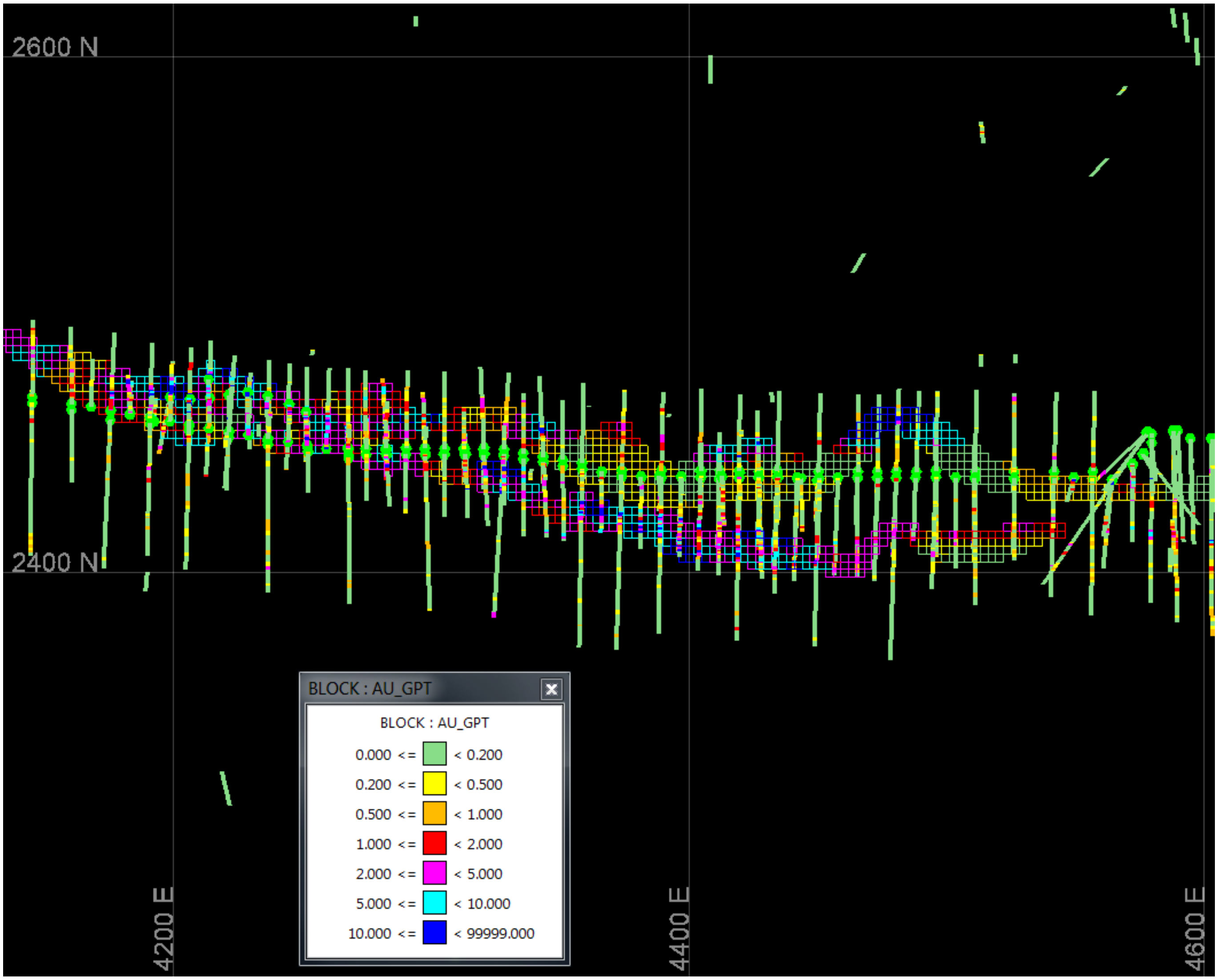


Figure 14.25: Gold block grade estimates and drill hole grades at South Austin – High-Grade 2 – Level 1125 El.

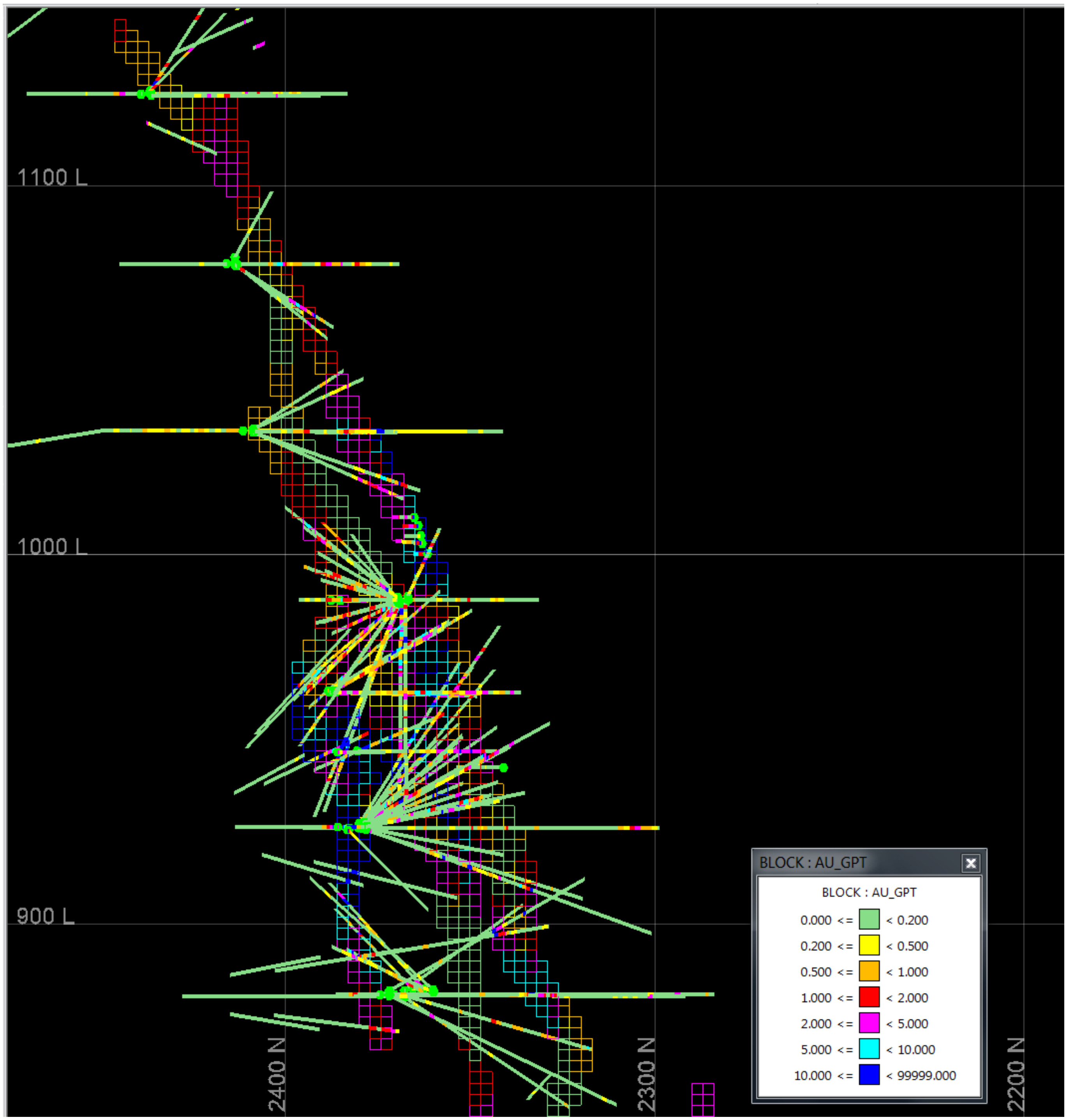


Figure 14.26: Gold block grade estimates and drill hole grades at South Austin – high-grade 2 and FW2 – north-south Section 4550E

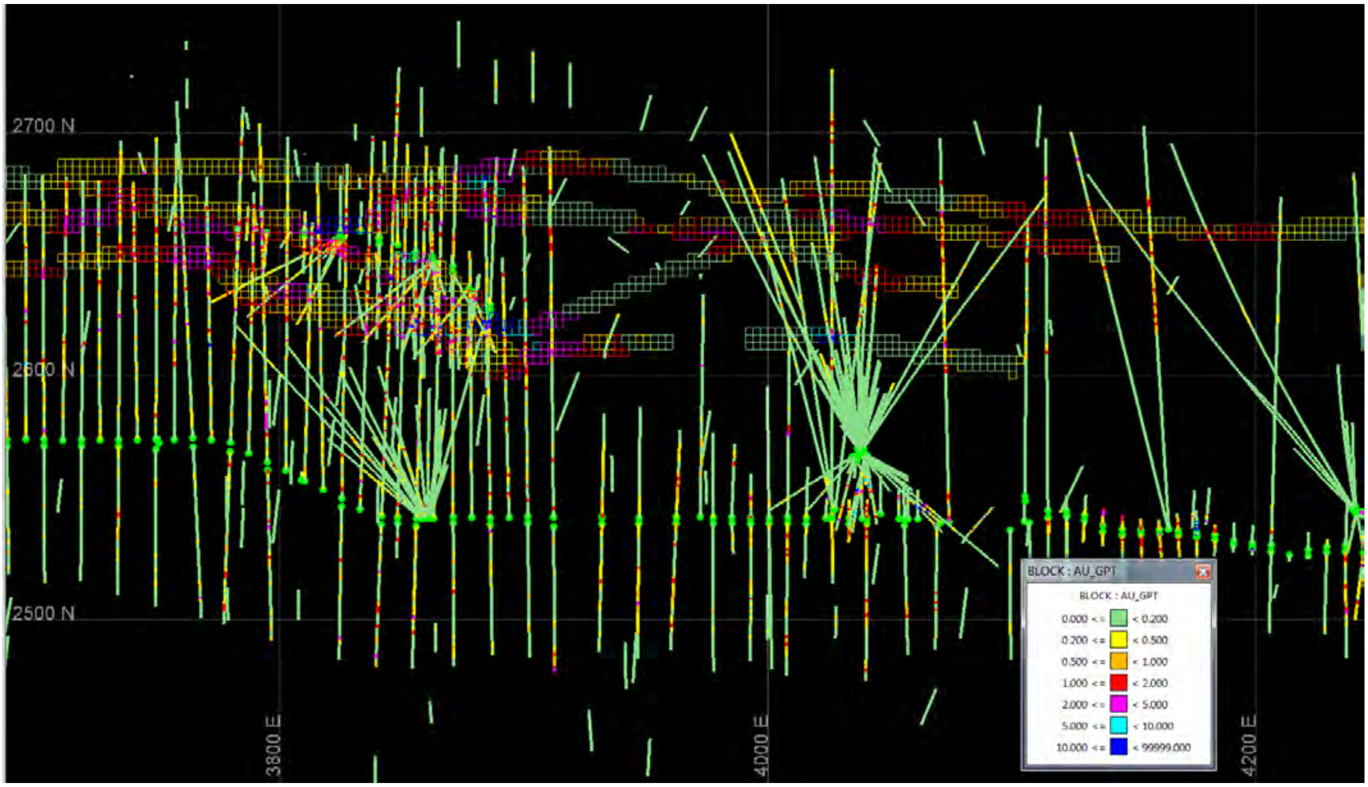


Figure 14.27: Gold block grade estimates and drill hole grades at McVeigh – high-grade 1 – Level 1315 El.

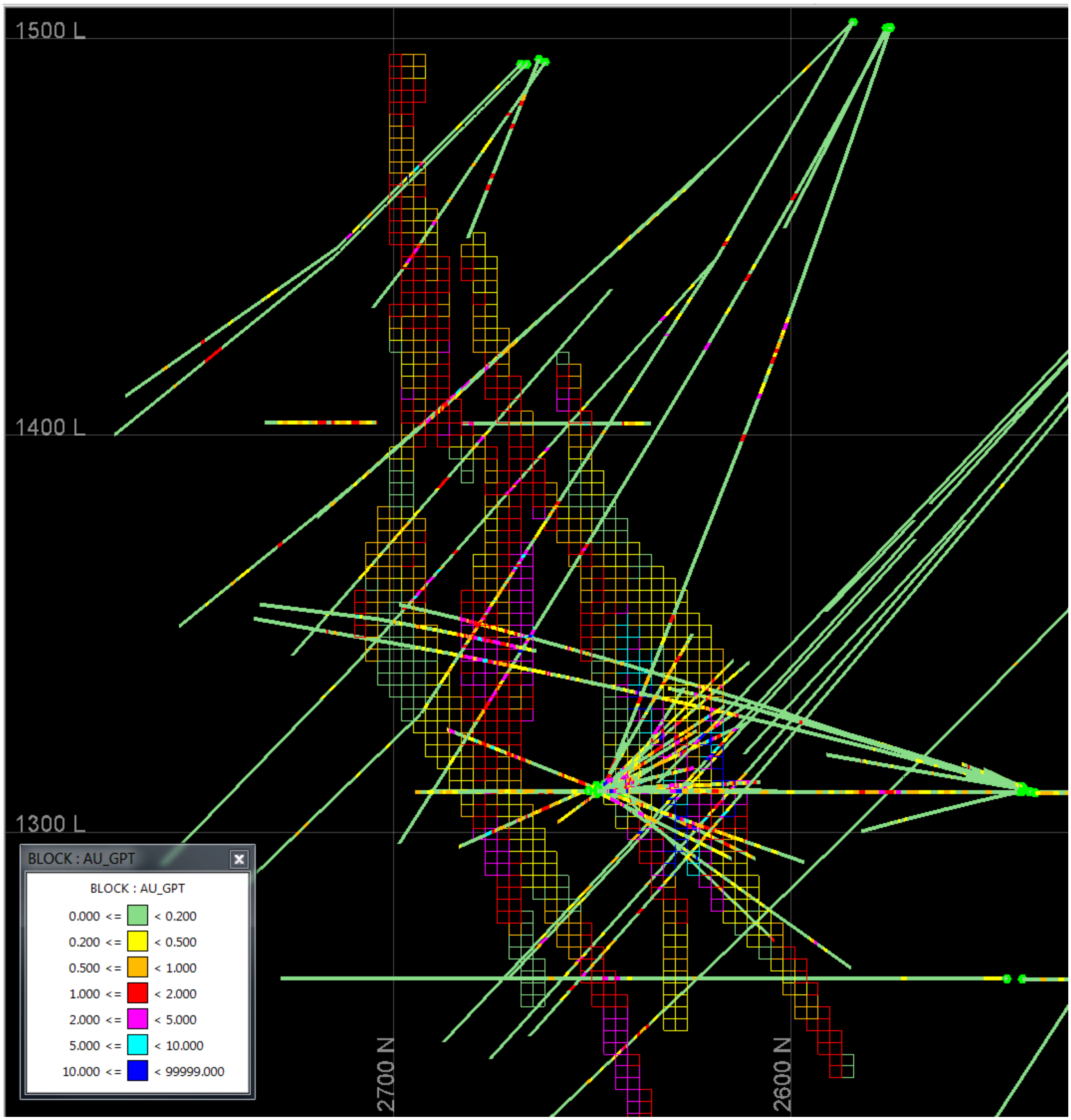


Figure 14.28: Gold block grade estimates and drill hole grades at McVeigh – high-grade 1 – north-south Section 3865E

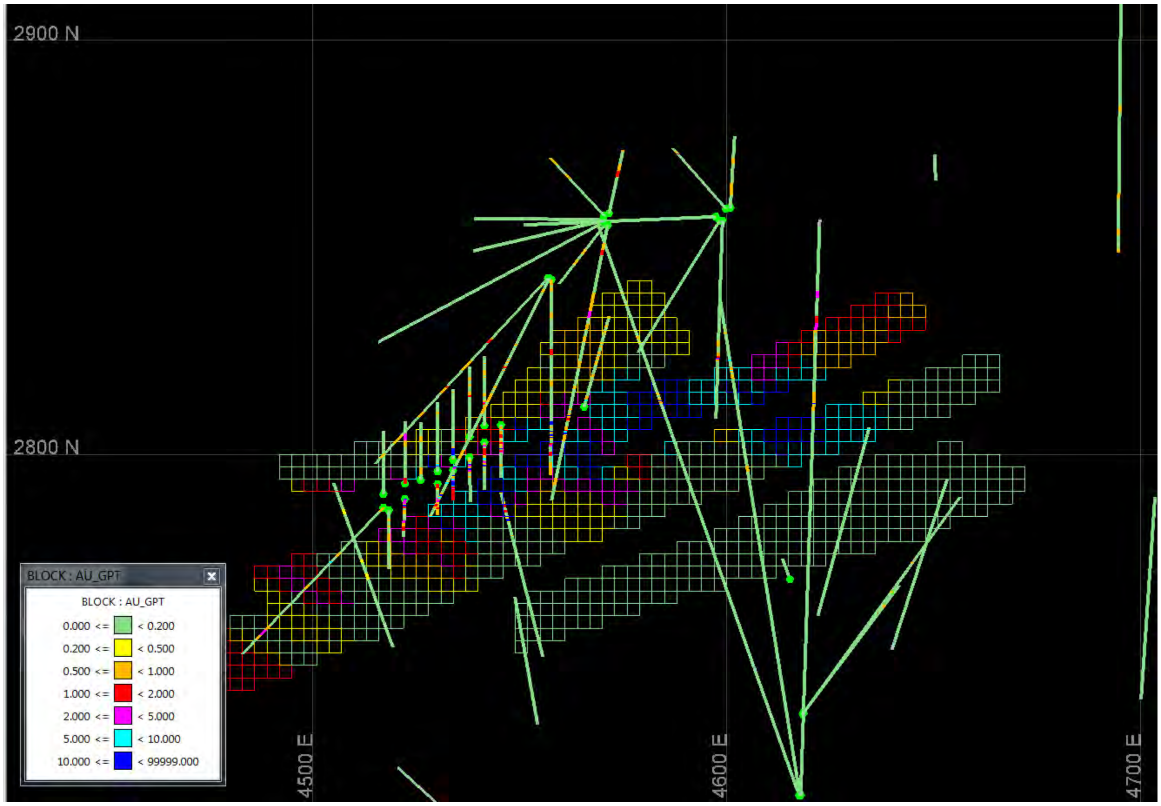


Figure 14.29: Gold block grade estimates and drill hole grades at 8 Zone – high-grade – Level 260 El.

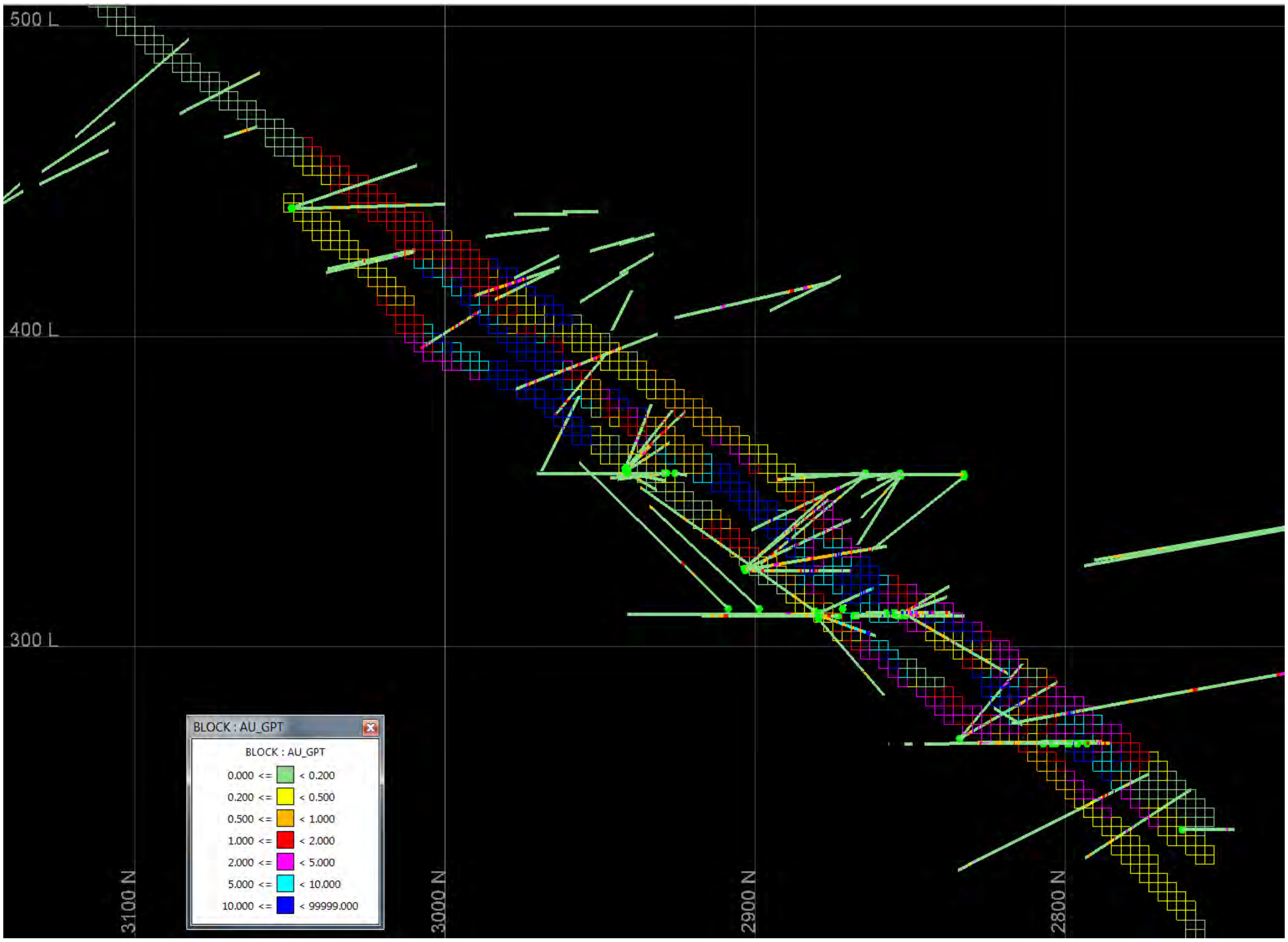


Figure 14.30: Gold block grade estimates and drill hole grades at 8 Zone – high-grade – North-South Section 4540E.

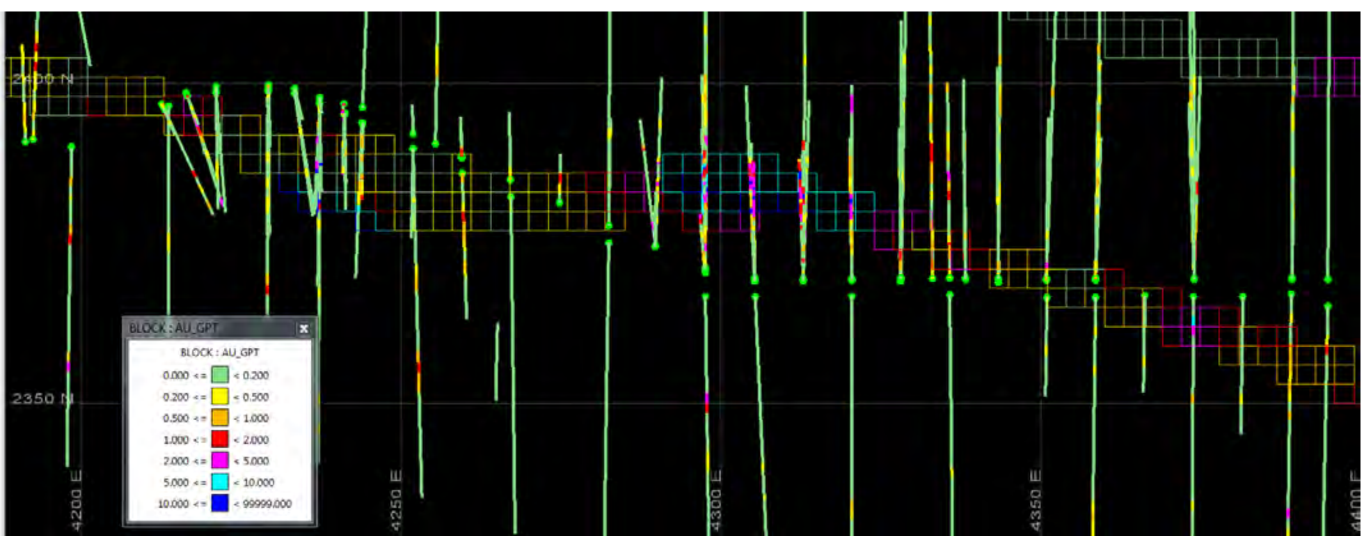


Figure 14.31: Gold block grade estimates and drill hole grades at A3 – high-grade – Level 990 El.

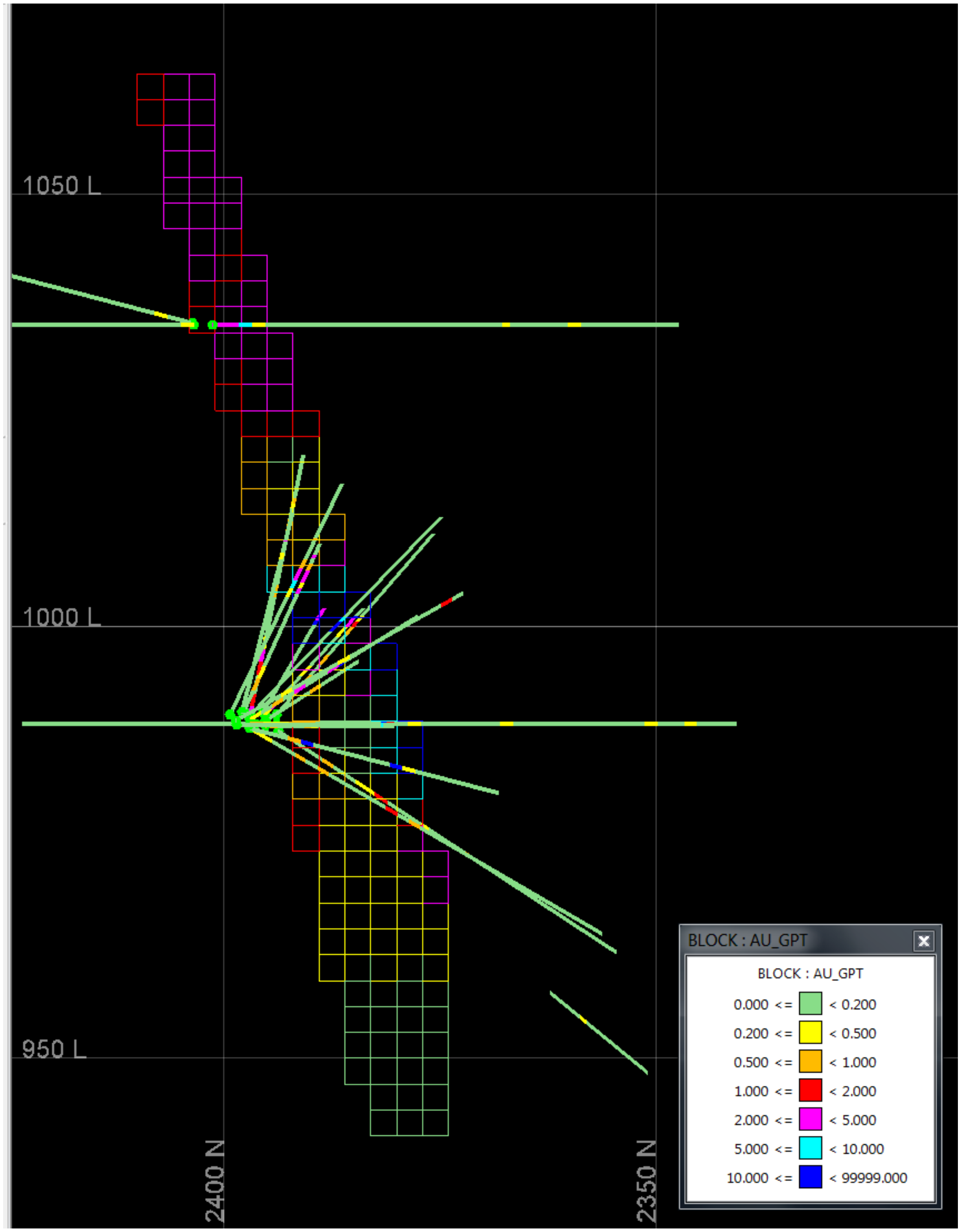


Figure 14.32: Gold block grade estimates and drill hole grades at A3 – high-grade - North-South Section 4240E.

14.7.2 Global Bias Test

The comparison of the average gold grades from the declustered composites and the estimated block grades examines the possibility of a global bias of the estimates. As a guideline, a difference between the average gold grades of more than ± 10% would indicate a significant over- or under-estimation of the block grades and the possible presence of a bias. It would be a sign of difficulties encountered in the estimation process and would require further investigation.

Results of this average gold grade comparison are presented in Table 14.15 for the different high-grade mineralized zones at Madsen.

Table 14.15: Average gold grade comparison – polygonal-declustered composites with block estimates – high-grade zones

Statistics	Declustered Composites	Block Estimates
Austin		
Average Gold Grade g/t	3.76	3.42
Difference	-9.0%	
South Austin and A3		
Average Gold Grade g/t	4.39	4.27
Difference	-2.7%	
McVeigh		
Average Gold Grade g/t	2.16	1.95
Difference	-9.7%	
8 Zone		
Average Gold Grade g/t	6.09	6.21
Difference	-2.0%	

As seen in Table 14.15, the average gold grades between the declustered composites and the block estimates are within the acceptable limits of the tolerance. Therefore, it can be concluded that no significant global bias is present in the gold grade estimates.

14.7.3 Local Bias Test

A comparison of the grade from composites within a block with the estimated grade of that block provides an assessment of the estimation process close to measured data. Pairing of these grades on a scatterplot gives a statistical valuation of the estimates. The estimated block grades should be similar to the composited grades within the block, without being exactly the same value. Thus, a high correlation coefficient will indicate satisfactory results in the interpolation process, while a medium to low correlation coefficient will be indicative of larger differences in the estimates and would require a further review of the interpolation process. Results from the pairing of composited and estimated grades within blocks pierced by a drill hole are presented in Table 14.16 for the high-grade gold zones at Madsen.

As seen in Table 14.16 for gold, the block grade estimates are very similar to the composite grades within blocks pierced by a drill hole, with high correlation coefficients, indicating satisfactory results from the estimation process.

Table 14.16: Gold grade comparison for blocks pierced by a drill hole – paired composite grades with block grade estimates – high-grade zones

Data	Average Gold Grade g/t	Correlation Coefficient
Austin		
Composites	3.84	0.807
Block Estimates	3.80	
South Austin and A3		
Composites	4.98	0.736
Block Estimates	5.02	
McVeigh		
Composites	2.23	0.782
Block Estimates	2.27	
8 Zone		
Composites	7.19	0.637
Block Estimates	7.47	

14.7.4 Grade Profile Reproducibility

The comparison of the grade profiles of the declustered composites with that of the estimates allows for a visual verification of an over- or under-estimation of the block estimates at the global and local scales. A qualitative assessment of the smoothing/variability of the estimates can also be observed from the plots. The output consists of three graphs displaying the average grade according to each of the coordinate axes (east, north, elevation). The ideal result is a grade profile from the estimates that follows that of the declustered composites along the three coordinate axes, in a way that the estimates have lower high-grade peaks than the composites, and higher low-grade peaks than the composites. A smoother grade profile for the estimates, from low to high grade areas, is also anticipated in order to reflect that these grades represent larger volumes than the composites.

Gold grade profiles are presented in Figures 14.33 to 14.36 for the high-grade zones at Madsen.

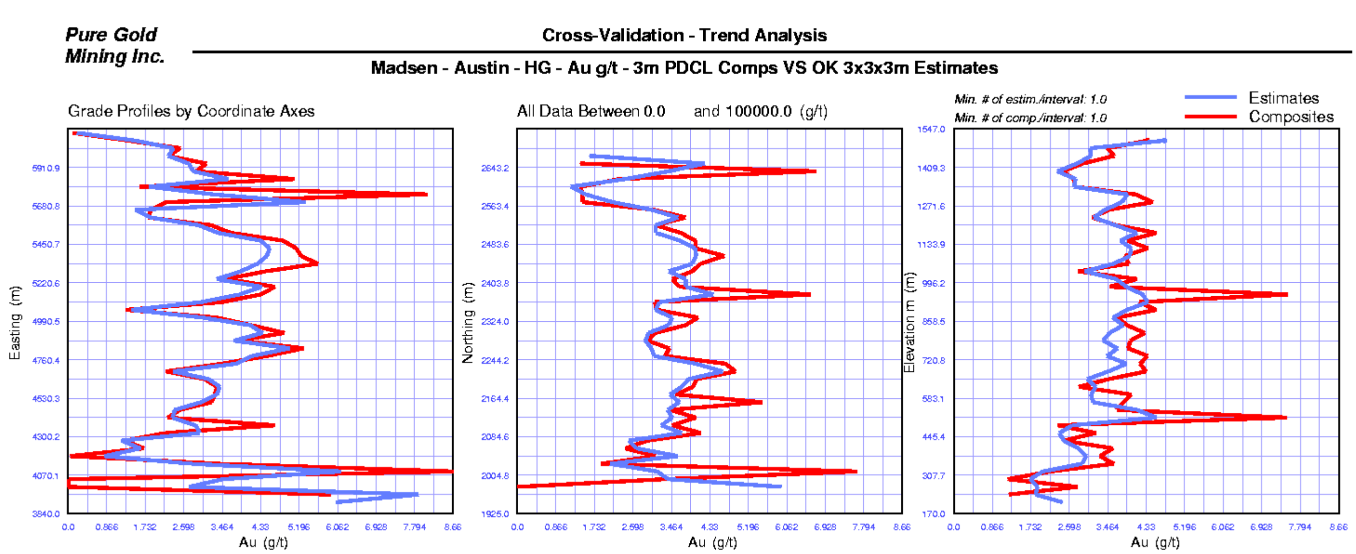


Figure 14.33: Gold grade profiles of declustered composites and block estimates – high-grade zones – Austin – Madsen Project.

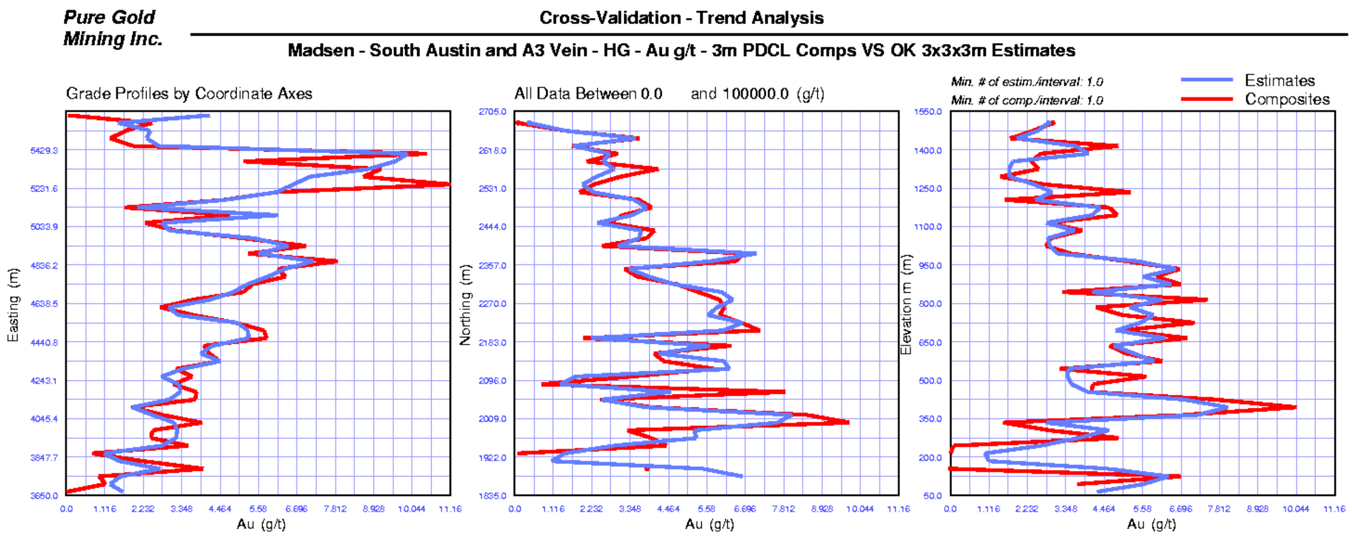


Figure 14.34: Gold grade profiles of declustered composites and block estimates – high-grade zones – South Austin and A3 – Madsen Project.

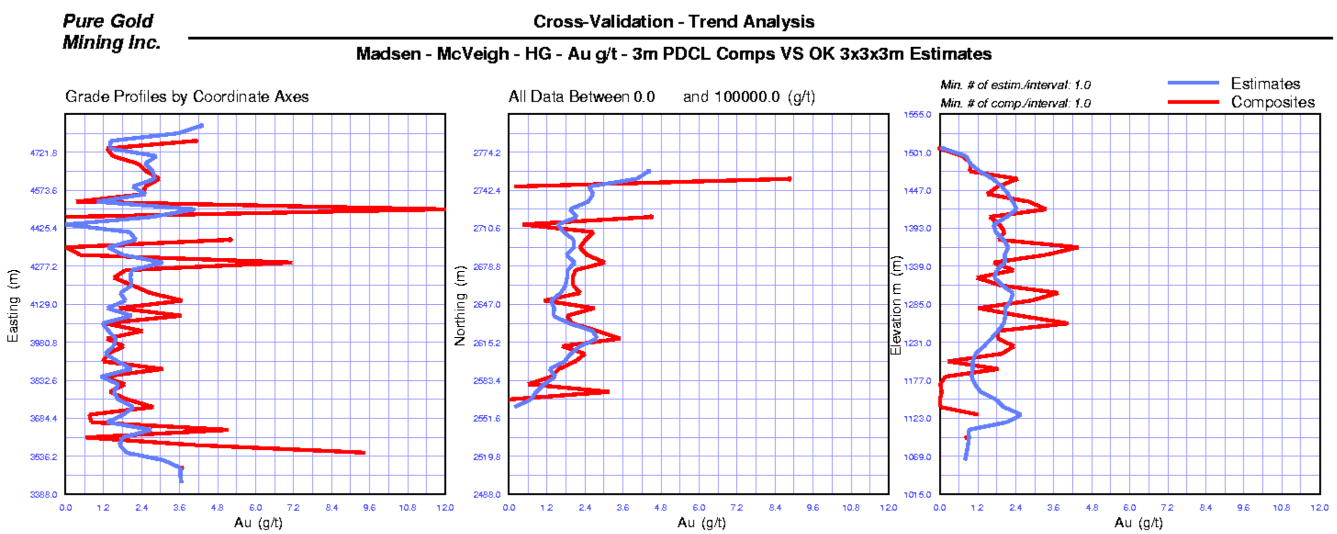


Figure 14.35: Gold grade profiles of declustered composites and block estimates – high-grade zones – McVeigh – Madsen Project.

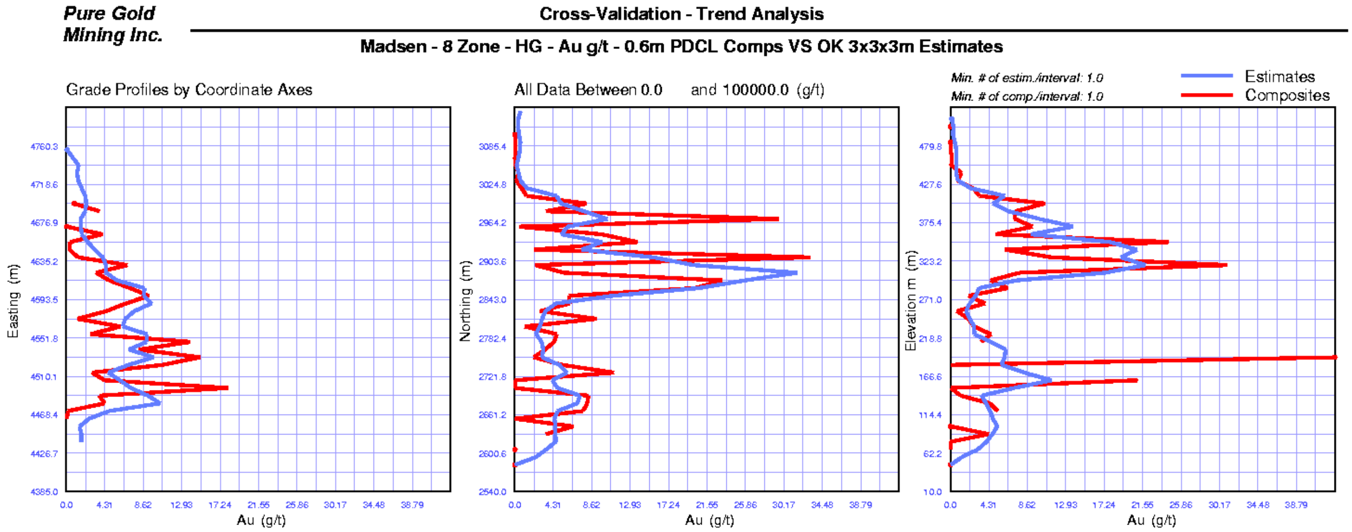


Figure 14.36: Gold grade profiles of declustered composites and block estimates – high-grade zone – 8 Zone.

From the plots of Figures 14.37 to 14.40, it can be seen that the grade profiles of the declustered composites are well reproduced by those of the block estimates and consequently that no global or local bias is observed. As anticipated, some smoothing of the block estimates can be seen in the profiles, where estimated grades are higher in lower grade areas and lower in higher grade areas. To quantify the level of smoothing of the estimates, further investigation is required (section 1.7.5, Level of Smoothing/Variability).

14.7.5 Level of Smoothing/Variability

The level of smoothing/variability of the estimates can be measured by comparing a theoretical distribution of block grades with that of the actual estimates. The theoretical distribution of block grades is derived from that of the declustered composites, where a change of support algorithm is utilized for the transformation (Indirect Lognormal Correction). In this case, the variance of the composites' grade population is corrected (reduced) with the help of the variogram model, to reflect a distribution of block grades (3m x 3m x 3m). The comparison of the coefficient of variation (CV) of this population with that of the actual block estimates provides a measure of smoothing. Ideally a lower CV from the estimates by 5 to 30% is targeted as a proper amount of smoothing. This smoothing of the estimates is desired as it allows for the following factors: the imperfect selection of blocks at the mining stage (misclassification), the block grades relate to much larger volumes than the volume of core (support effect), and the block grades are not perfectly known (information effect). A CV lower than 5 to 30% for the estimates would indicate a larger amount of smoothing, while a higher CV would represent a larger amount of variability. Too much smoothing would be characterized by grade estimates around the average grade, where too much variability would be represented by estimates with abrupt changes between lower and higher-grade areas.

Results of the level of smoothing/variability analysis are presented in Table 14.17 for the different high-grade zones at Madsen. As observed in this Table, the CVs of the gold estimates are within or close to the targeted range, towards the higher end of the smoothing level. A possible measure to reduce this observed smoothing would be to decrease the number of samples at the grade estimation stage.

Table 14.17: Level of smoothing/variability of gold estimates

CV – Theoretical Block Grade Distribution	CV – Actual Block Grade Distribution	Difference
Austin		
1.978	1.342	-32.1%
South Austin and A3		
2.096	1.497	-28.6%
McVeigh		
1.914	1.427	-25.4%
8 Zone		
3.541	2.725	-23.0%

14.8 Resource Classification

The mineral resource was classified as indicated, and inferred based on the variogram ranges of the second structures. The average distance of samples from the block center was utilized as the classification criterion. The classification distances for each mineralized zones are provided in Table 14.18.

Table 14.18: Classification distances

Mineralized Zone	Indicated	Inferred
Austin	≤ 30.0m	>30.0m
South Austin	≤ 30.0m	>30.0m
McVeigh	≤ 27.0m	>27.0m
8 Zone	≤ 25.0m	>25.0m
A3	≤ 30.0m	>30.0m

It should be noted that there are no mineral resources in the measured category, mainly due to some uncertainty associated with the historical data.

14.9 Editing of the Block Model

The block model of gold grade estimates was edited with the mined voids, the dykes, and the topographic surface at Madsen.

14.9.1 Underground Mined Voids

The underground voids from the historical mining at Madsen were provided as 3-D wireframes that were developed by SRK for the 2009 resource estimate. As previously mentioned in section 14.2.3, the mined voids were grouped into 5 different types: stopes, ramps, shafts, raises, and drifts. A geotechnical buffer of 15 feet was added to the stope wireframes to reflect their more degraded condition at Austin, South Austin, and McVeigh. No geotechnical buffer was developed for the stope wireframes of the 8 Zone due to the more discrete nature of the quartz vein-hosted mineralization. All wireframes of the underground mined voids were validated in Vulcan©.

The editing of the block model with the mined voids consisted of determining the exact fraction of the stope within each block and storing this information in a variable. This fraction variable with values ranging from 0.0 (no stopes) to 1.0 (all stope), was then utilized to affect the specific gravity in the calculation of the block tonnage: sg x (1.0 – stope fraction) x 3 m x 3 m x 3 m. The gold grade within the stope was assigned a 0.0 g/t value.

14.9.2 Dykes

The proportion of dyke within each block was estimated with an indicator approach, as described in section 14.2.2. The dyke variable was utilized to dilute the gold grade estimates of the block model with a 0.0 g/t Au grade, since the dykes were considered barren. The dyke variable has values ranging from 0.0 (no dyke) to 1.0 (all dyke). The final gold grade was derived as follows: Au final = Au estimate x (1.0 – dyke fraction).

14.9.3 Topographic Surface

The percentage of block below the topographic surface was stored in a variable and utilized in the tonnage calculation of each block. The topography variable was utilized to affect the specific gravity in the calculation of the block tonnage: sg x (below topo percentage) / 100.0.

14.10 Mineral Resource Calculation

The mineral resource was calculated for 3 m (X) x 3 m (Y) x 3 m (Z) blocks with a constant specific gravity (SG) value of 2.84. Statistics on the specific gravity measurements from the Pure Gold drill holes indicated similar results as the historical value of 2.84, and for such it was kept for the tonnage calculations.

For the mineral resource's tonnage calculation, the proportion of underground mined voids and proportion below topographic surface of each block was integrated in the tonnage computation. Only gold grade estimates outside the stopes with a 15 ft geotechnical buffer and outside all other underground mined voids were kept for the reporting of the mineral resources. As well, the fraction of each block within the high-grade and low-grade zones was accounted for in the tonnage and grade calculations. For the mineral resource's gold grade calculation, the estimates were diluted to the proportion of dyke material within each block.

The indicated and inferred mineral resources for the different zones are presented in Tables 14.19 to 14.23 and for the overall Madsen project in Table 14.24. The Madsen indicated mineral resources at a 4.0 g/t gold cut-off are 5.785 million tonnes at an average gold grade of 8.86 g/t, for a total of 1.648 million ounces of gold. The Madsen inferred mineral resources at a 4.0 g/t gold cut-off are 0.587 million tonnes at an average gold grade of 9.42 g/t, for a total of 0.178 million ounces of gold. A grade-tonnage curve of the resource is presented in Figure 14.41.

It should be noted that mineral resources are not mineral reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the mineral resources estimated will be converted into mineral reserves. The estimate of mineral resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

The CIM definitions were followed for the classification of indicated and inferred mineral resources. The quantity and grade of reported inferred mineral resources in this estimation are uncertain in nature and there has been insufficient exploration to define these inferred mineral resources as an indicated mineral resource and it is uncertain if further exploration will result in upgrading them to an indicated mineral resource category. All figures in Tables 14.19 to 14.24 have been rounded to reflect the relative accuracy of the estimates. Mineral resources are reported at a cut-off grade of 4.0 g/t gold based on US$1,200 per troy ounce gold and gold metallurgical recoveries of 92%.

Table 14.19: Mineral resources – Austin – effective August 2, 2017*

AUSTIN						
	INDICATED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	Tonnes	g/t	ouncesOunces	Tonnes	g/t	Ouncesounces
3.0	1,849,000	6.14	365,000	1,982,000	6.37	406,000
4.0	1,184,000	7.65	291,000	1,384,000	7.63	339,000
5.0	806,000	9.14	237,000	981,000	8.93	282,000
	HG3			**HG4**		
3.0	1,246,000	6.69	268,000	291,000	6.24	58,000
4.0	841,000	8.25	223,000	182,000	7.88	46,000
5.0	609,000	9.70	190,000	133,000	9.16	39,000
	LG			TOTAL		
3.0	-	-	-	5,368,000	6.36	1,097,000
4.0	-	-	-	3,591,000	7.79	900,000
5.0	-	-	-	2,529,000	9.19	748,000
	INFERRED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	Tonnes	g/t	Ouncesounces	Tonnes	g/t	Ouncesounces
3.0	18,000	7.64	4,000	64,000	5.90	12,000
4.0	11,000	10.16	4,000	38,000	7.55	9,000
5.0	10,000	10.86	4,000	28,000	8.71	8,000
	HG3			**HG4**		
3.0	42,000	10.93	15,000	82,000	6.61	17,000
4.0	34,000	12.81	14,000	53,000	8.26	14,000
5.0	27,000	14.78	13,000	41,000	9.37	12,000
	LG			**TOTAL**		
3.0	265,000	4.52	39,000	471,000	5.77	87,000
4.0	132,000	5.61	24,000	269,000	7.51	65,000
5.0	73,000	6.54	15,000	180,000	9.02	52,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.20: Mineral resources – South Austin – effective August 2, 2017*

SOUTH AUSTIN									
	INDICATED								
	HG1			**HG2**			**HG3**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	175,000	6.33	36,000	1,221,000	7.41	291,000	131,000	8.70	37,000
4.0	118,000	7.72	29,000	887,000	8.89	254,000	102,000	10.13	33,000
5.0	87,000	8.88	25,000	671,000	10.31	222,000	85,000	11.31	31,000
	FW2			**FING**			**LG**		
3.0	60,000	7.54	15,000	136,000	8.09	35,000	-	-	-
4.0	47,000	8.67	13,000	110,000	9.18	33,000	-	-	-
5.0	36,000	9.87	12,000	86,000	10.48	29,000	-	-	-
	TOTAL								
3.0	1,723,000	7.46	413,000						
4.0	1,265,000	8.90	362,000						
5.0	966,000	10.27	319,000						
	INFERRED								
	HG1			**HG2**			**HG3**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	8,000	5.62	1,000	19,000	5.81	4,000	2,000	8.93	1,000
4.0	5,000	6.79	1,000	12,000	7.01	3,000	2,000	8.93	1,000
5.0	3,000	7.77	1,000	9,000	7.95	2,000	2,000	8.93	1,000
	FW2			**FING**			**LG**		
3.0	0	-	0	38,000	7.78	9,000	100,000	4.67	15,000
4.0	0	-	0	29,000	8.99	9,000	52,000	5.78	10,000
5.0	0	-	0	24,000	9.98	8,000	32,000	6.60	7,000
	TOTAL								
3.0	166,000	5.60	30,000						
4.0	100,000	6.99	23,000						
5.0	70,000	8.05	18,000						

**mineral resources' tonnage and ounces have been rounded to the nearest thousand*

Table 14.21: Mineral resources – McVeigh – effective August 2, 2017*

MCVEIGH						
	INDICATED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	537,000	5.93	102,000	233,000	5.93	45,000
4.0	327,000	7.51	79,000	163,000	6.99	37,000
5.0	220,000	9.00	64,000	111,000	8.16	29,000
	LG			**TOTAL**		
3.0	-	-	-	770,000	5.93	147,000
4.0	-	-	-	490,000	7.34	116,000
5.0	-	-	-	331,000	8.72	93,000
	INFERRED					
	HG1			**HG2**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	136,000	4.58	20,000	11,000	5.83	2,000
4.0	56,000	6.02	11,000	7,000	7.53	2,000
5.0	28,000	7.55	7,000	5,000	8.54	1,000
	LG			**TOTAL**		
3.0	40,000	3.32	4,000	188,000	4.39	26,000
4.0	4,000	4.84	1,000	66,000	6.11	13,000
5.0	1,000	6.54	0	34,000	7.67	8,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.22: Mineral resources – 8 Zone –effective August 2, 2017*

8 ZONE						
	INDICATED					
	INDICATED			**INFERRED**		
	HG			**HG**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	440,000	18.35	260,000	180,000	13.60	78,000
4.0	379,000	20.77	253,000	142,000	16.29	74,000
5.0	343,000	22.48	248,000	112,000	19.41	70,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.23: Mineral resources – A3– effective August 2, 2017*

A3						
	INDICATED					
	HG			**LG**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	73,000	8.31	20,000	-	-	-
4.0	61,000	9.29	18,000	-	-	-
5.0	50,000	10.37	17,000	-	-	-
	TOTAL					
3.0	73,000	8.31	20,000			
4.0	61,000	9.29	18,000			
5.0	50,000	10.37	17,000			
	INFERRED					
	HG			**LG**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	10,000	8.65	3,000	2,000	7.08	0
4.0	8,000	9.77	3,000	2,000	7.39	0
5.0	8,000	9.94	3,000	1,000	7.97	0
	TOTAL					
3.0	12,000	8.42	3,000			
4.0	10,000	9.39	3,000			
5.0	10,000	9.66	3,000			

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

Table 14.24: Mineral resources – effective August 2, 2017*

MADSEN GOLD PROJECT						
	INDICATED					
	AUSTIN			**SOUTH AUSTIN**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	5,368,000	6.36	1,097,000	1,723,000	7.46	413,000
4.0	3,591,000	7.79	900,000	1,265,000	8.90	362,000
5.0	2,529,000	9.19	748,000	966,000	10.27	319,000
	MCVEIGH			**8 ZONE**		
3.0	770,000	5.93	147,000	440,000	18.35	260,000
4.0	490,000	7.34	116,000	379,000	20.77	253,000
5.0	331,000	8.72	93,000	343,000	22.48	248,000
	A3			**TOTAL**		
3.0	73,000	8.31	20,000	8,374,000	7.19	1,936,000
4.0	61,000	9.29	18,000	5,785,000	8.86	1,648,000
5.0	50,000	10.37	17,000	4,218,000	10.50	1,423,000
	INFERRED					
	AUSTIN			**SOUTH AUSTIN**		
Au Cut-Off	Tonnage	Au Grade	Au Content	Tonnage	Au Grade	Au Content
g/t	tonnes	g/t	ounces	tonnes	g/t	ounces
3.0	471,000	5.77	87,000	166,000	5.60	30,000
4.0	269,000	7.51	65,000	100,000	6.99	23,000
5.0	180,000	9.02	52,000	70,000	8.05	18,000
	MCVEIGH			**8 ZONE**		
3.0	188,000	4.39	26,000	180,000	13.60	78,000
4.0	66,000	6.11	13,000	142,000	16.29	74,000
5.0	34,000	7.67	8,000	112,000	19.41	70,000
	A3			**TOTAL**		
3.0	12,000	8.42	3,000	1,017,000	6.90	225,000
4.0	10,000	9.39	3,000	587,000	9.42	178,000
5.0	10,000	9.66	3,000	406,000	11.62	152,000

**mineral resources' tonnage and ounces have been rounded to the nearest thousand.*

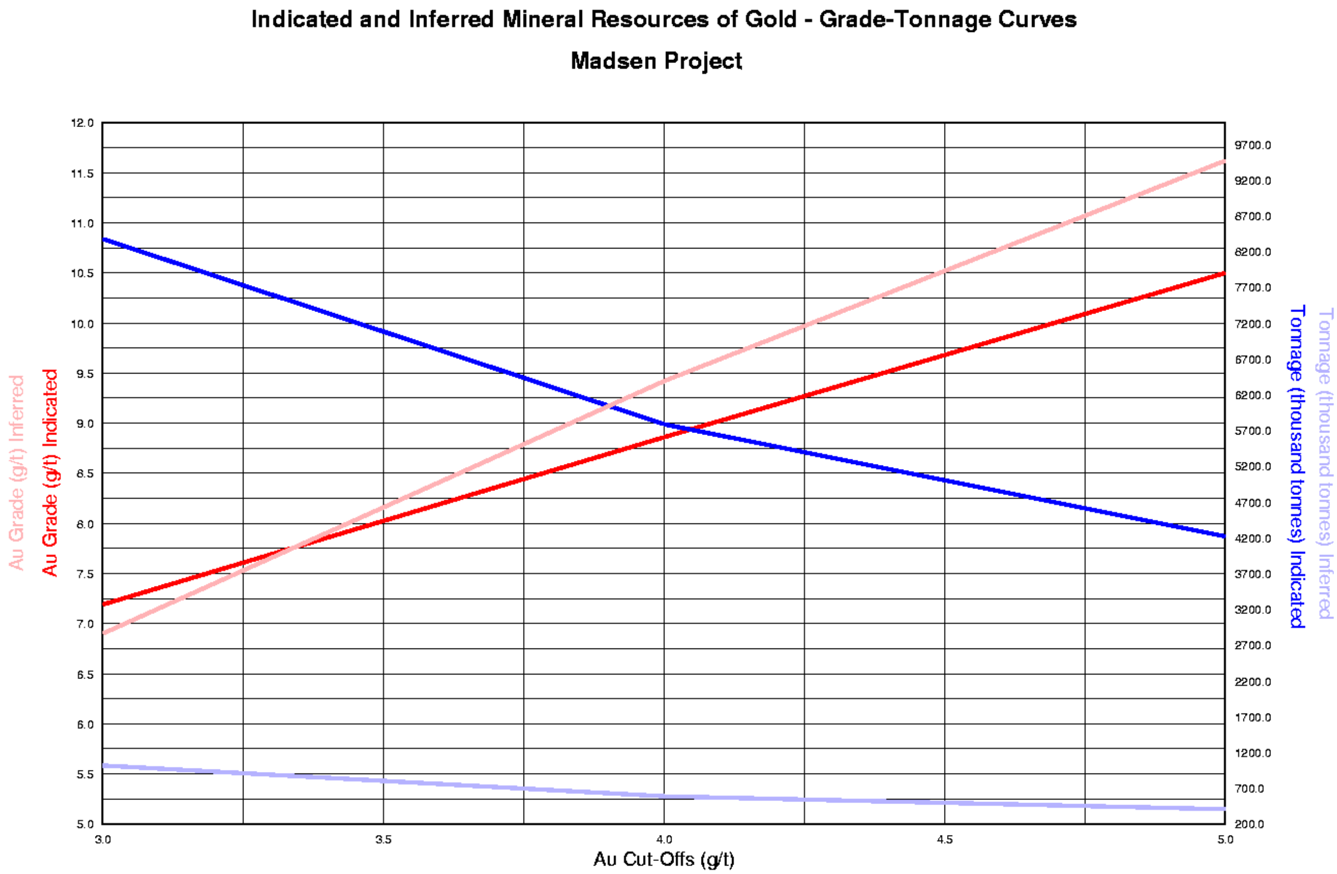


Figure 14.37: Gold grade-tonnage curves of the Indicated and Inferred mineral resources Madsen Gold Project.

14.11 Comparison with the 2009 Mineral Resources

The current estimation of the mineral resources at the Madsen Gold Project was compared to the 2009 estimate in Table 14.25.

Table 14.25: Comparison of mineral resources from 2009 and 2017

Au Cut-Off g/t	Mineral Resources	Indicated			Inferred		
		Tonnage tonnes	Avg Au Grade g/t	Au Content ounces	Tonnage tonnes	Avg Au Grade g/t	Au Content ounces
3.0	August 2017	8,374,000	7.19	1,936,000	1,017,000	6.90	225,000
	December 2009	6,911,000	6.20	1,378,000	1,888,000	7.07	429,000
	Difference	21.2%	16.0%	40.5%	-46.1%	-2.4%	-47.6%
4.0	August 2017	5,785,000	8.86	1,648,000	587,000	9.42	178,000
	December 2009	4,540,000	7.63	1,114,000	1,103,000	9.64	342,000
	Difference	27.4%	16.1%	47.9%	-46.8%	-2.3%	-48.0%
5.0	August 2017	4,218,000	10.50	1,423,000	406,000	11.62	152,000
	December 2009	3,236,000	8.92	928,000	788,000	11.72	297,000
	Difference	30.3%	17.7%	53.3%	-48.4%	-0.9%	-48.8%

From Table 14.25, an increase of the indicated and decrease of the inferred mineral resources are observed for the current estimate. The 2017 indicated mineral resources show increases of the tonnage, average gold grade, and metal content, while the 2017 inferred mineral resources show decreases of the tonnage, average gold grade, and metal content, when compared to the 2009 mineral resources. These differences are believed to mainly stem from the changes brought in the modeling approach of the geologic model. In the current estimate, the high-grade zones were modeled with the objective to represent more accurately the intricacies of the higher-grade areas. In the 2009 estimate, the high-grade zones were defined as broader zones including a greater proportion of lower grades than in the current geology model.

14.12 Mineral Resources in Stopes

The mineral resources within the original stopes and within the stopes with a 15-foot geotechnical buffer were computed for comparison with the historical production from 1938 to 1999. Results are presented in Tables 14.26 and 14.27 for the original stopes and 15-foot buffer stopes, respectively. The resources inside the other underground excavations were also added to that of the stopes in these tables. All gold grades within the underground voids are reported at a 0.0 g/t Au cut-off.

As seen in Table 14.26, the tonnages within the underground voids from the current mineral resource estimate and the historical production are very similar. However, the gold grades differ, with the past production results showing a higher average grade and metal content.

Table 14.26: Comparison of mineral resources within original stopes with historical production

	Mineral Resources Inside Original Stopes and Other Excavations						
Zones	Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces		Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces
Austin	4,167,437	5.25	702,846	HG	2,787,875	7.50	672,242
				LG	1,379,562	0.69	30,604
South Austin	1,726,907	7.13	395,663	HG	1,039,421	11.39	380,633
				LG	687,486	0.68	15,030
McVeigh	198,404	3.57	22,785	HG	128,124	5.29	21,791
				LG	70,280	0.44	994
8 Zone	86,324	18.76	52,066	HG	86,324	18.76	52,066
All Stopes	6,179,072	5.91	1,173,360	HG	4,041,744	8.67	1,126,732
				LG	2,137,328	0.68	46,628
Drifts	1,438,543	1.46	67,394				
Raises	3,026	0.43	41				
Ramp	95,041	0.52	1,579				
Shaft	106,158	0.02	84				
All UG Voids	7,821,840	4.94	1,242,458				
Historic Production 1938-1999	7,872,679	9.69	2,452,388		7,872,679	9.69	2,452,388

The mineral resources within the stopes with a 15-foot geotechnical buffer were presented in Table 14.27 to quantify the impact of utilizing the buffered stopes for the final statement of the mineral resources. It is uncertain at this time if a portion or any of this material could potentially be added to the current mineral resources.

Table 14.27: Comparison of mineral resources within 15-foot buffer stopes with historical production

	Mineral Resources Inside 15 Foot Buffer Stopes and Other Excavations						
Zones	Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces		Tonnage tonnes	Avg Au Grade g/t	Metal Content ounces
Austin	13,488,257	3.51	1,520,350	HG	6,769,472	6.39	1,390,742
				LG	6,718,785	0.60	129,608
South Austin	5,745,157	4.28	790,727	HG	2,461,854	9.27	733,724
				LG	3,283,303	0.54	57,003
McVeigh	927,274	2.43	72,307	HG	444,082	4.64	66,248
				LG	483,192	0.39	6,059
8 Zone	86,324	18.76	52,066	HG	86,324	18.76	52,066
All Stopes	20,247,012	3.74	2,435,450	HG	9,761,732	7.15	2,242,780
				LG	10,485,280	0.57	192,670
Drifts	1,438,543	1.46	67,394				
Raises	3,026	0.43	41				
Ramp	95,041	0.52	1,579				
Shaft	106,158	0.02	84				
All UG Voids	21,889,780	3.56	2,504,548				
Historic Production 1938-1999	7,872,679	9.69	2,452,388				

14.13 Discussion and Recommendations

The estimation of the mineral resources in an environment with a long and extensive mining history is a challenging assignment. It is believed that all reasonable efforts were carried out by SRK in 2009 and more recently by Pure Gold to gather all of the information available to a quality standard acceptable for the estimation of a mineral resource.

The uncertainty associated with the historical drilling was addressed by Pure Gold's recent drilling, where the overall grades were confirmed and modern data was gathered to allow for the construction of a more robust geological model. Comparisons of the statistics at McVeigh with only the historical drill holes versus only the Pure Gold drill holes show similar results, providing additional confidence to the historic data.

A comparison of the mineral resources within the mined stopes and the historical production represents a valuable assessment of the estimation results. It was observed that the tonnage of all the underground excavations in the model (stopes, shaft, drifts, raises, and ramp) matches very well the tonnage of the historical production. However, in this comparison, it was also noted that the gold grades of the estimates and the past production are quite different, with the estimates being of much lower grade. One plausible explanation for this difference might come from the fact that the stope outlines were derived from more information than that provided by the drill holes. Examination of original paper sections and level plans indicate that channel, chip, and face samples were utilized to define the stope shapes in addition to the drill holes. In many cases, areas outside the currently modeled high-grade zones were made part of the stopes based on channel/chip/face samples results indicating high-grade gold mineralization in these areas without any drill holes. In the current estimate, these areas would be identified as part of the low-grade zone, which could explain the lower resulting gold grade observed from the current estimate within the underground excavations. In order to assess the impact of this observation, it is recommended that a subset area be selected where all channel/chip/face sample data are available on the historic paper sections and plans. Following the digitization of this data and adjustment to the geologic model, a new grade estimate with the channel/chip/face samples and the drill hole data would be performed for this area. A comparison of this estimate with and without the channel/chip/face samples would provide a better assessment of the current observation. It should be noted that the tonnage and average gold grade calculated from the current estimate within the underground excavations matches that from the 2009 SRK estimate.

The statistics on gold grades within the high-grade zones indicated heterogeneous populations with higher coefficients of variability. Although an estimation technique, such as indicator kriging, could be recommended to provide more restrictive constraints to the higher grade portion, the validation tests on the current grade estimates show satisfying results without any overestimation of the higher-grade fraction. It is thus believed that the usage of ordinary kriging on capped gold grades provides satisfactory results in this case.

The large abundance of drill hole gold assays on a densely spaced grid within the resource area has allowed for well-defined variograms. This has brought additional confidence in the modeling of the experimental variograms.

The validation tests have indicated that in general the estimates have levels of smoothing closer to the upper limit of acceptability. For such, it is recommended that a reduction of the maximum number of samples, used in the grade estimation process, be investigated in order to decrease the level of smoothing.

The modelling of the high-grade zones (HG), with the distribution and dimensions of the 3-D shapes more closely approximating the historically mined stopes, seems to be the main source of the differences observed with the 2009 mineral resource estimate. The 2009 estimate used much broader dimensions for the high-grade domains and was therefore vulnerable to more smoothing of the grade estimates. In a high-grade deposit such as Madsen, over-smoothing can result in excessive dilution in the grade estimates, and thereby reduce the amount of material above a cut-off grade. Such a contrast in modelling approach could account for the differences observed between the two estimates.

In the 2009 estimation of the mineral resource, the effect of using the assays within the dykes with those outside dykes during the grade interpolation process was compared to using only the assays outside dykes. Because results showed no significant differences, it was chosen in the current study to use all assays in and out of dykes for grade estimation, as in the 2009 study.

Similarly, to the 2009 resource estimate, there were no estimates categorized in the measured class. This is to account, in part, for some uncertainty associated with the historical data, but also to acknowledge the differences observed between the estimated grade in the stopes and the reported production. It is likely that Madsen, as with many other high-grade gold mines of this type, will require more detailed information such as underground development in mineralized zones, combined with closely-spaced chip sampling, to achieve a “Measured” level of definition.

Overall, it is believed that the current estimation is a realistic representation of the remaining mineral resources at the Madsen project, based on the current geologic understanding and available information.

15.0 Items 15–22: Other relevant information for advanced properties

The Madsen Gold Project is not an advanced property and Items 15-22 are therefore not relevant for the purposes of this technical report. The company is currently in the process of updating its PEA to incorporate the current updated resource estimate into a revised mining and economic scenario.

23.0 Adjacent Properties

Relevant information is provided herein for three adjacent properties to the Madsen Property – the Hasaga Property of Premier Gold Mines Limited ("Premier") (Jourdain et al., 2017); the North Madsen Property of Yamana Gold Inc. ("Yamana") (McCracken and Utiger, 2014); and the Red Lake Gold Mines Property of Goldcorp Inc. ("Goldcorp") (Goldcorp Inc., 2017).

The qualified person has been unable to verify the information provided with respect to the adjacent properties which was obtained from publicly disclosed documents as indicated. The proximity and geologic similarities between these adjacent properties and Madsen does not mean that Pure Gold will obtain similar results on the Madsen Property.

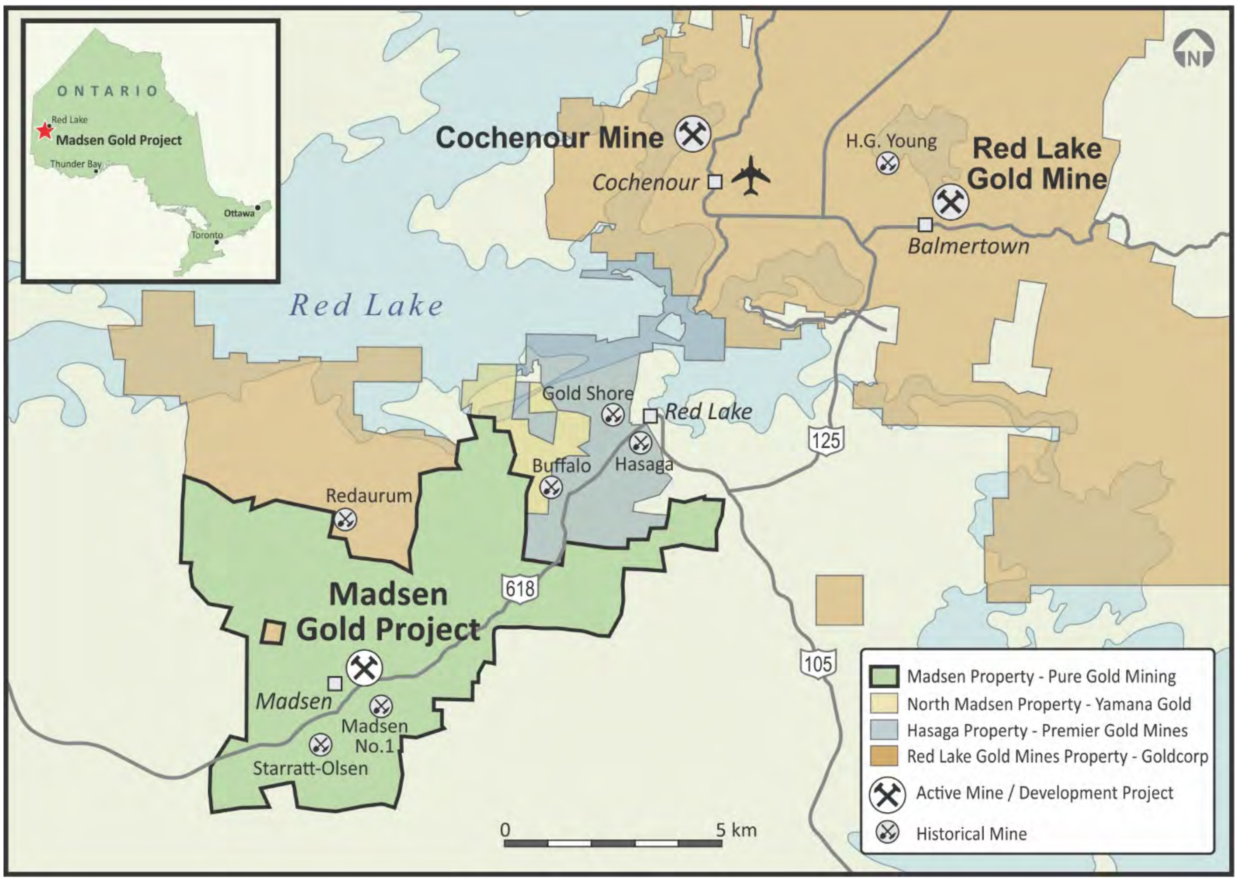


Figure 23.1: Location of Adjacent Properties

23.1 Hasaga Property – Premier Gold Mines Limited

Premier has recently been exploring the Hasaga Property which is contiguous to the Madsen Property on the northeast boundary (Figure 23.1). The property contains three past producing mines – the Gold Shore, Buffalo and Hasaga Mines. The combined historical gold production of these three historical operations is reported to be 240,970 ounces (Lichtblau et al., 2017). Exploration has been conducted on these properties since 1927 and the most recent phase of work carried out by Premier in 2015 and 2016 programs on the Hasaga Property comprised diamond-drilling of 259 holes, totalling 110,166 m (Jourdain et al., 2017).

23.1.1 Hasaga Property Mineral Resource Estimate

The Hasaga operation was the largest deposit and mineralization is hosted within a quartz-feldspar porphyry dyke intruding Balmer assemblage basalt. All gold mineralization is structurally controlled and occurs in veins, lenses and fractures. Competency contrasts between host lithologies provide an important focus for gold mineralizing fluids (Jourdain et al., 2017). Table 23.1 summarizes the recent mineral resource estimate for the Hasaga Property.

Table 23.1: Hasaga Property mineral resource estimate of Jourdain et al. (2017)

Zone	Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Central	Indicated Resources	31,613,000	0.8	0.5	803,900
Central	Inferred Resources	23,733,000	0.8	0.5	582,700
Hasaga	Indicated Resources	9,050,000	0.9	0.5	258,100
Hasaga	Inferred Resources	806,000	1.0	0.5	26,000
Buffalo	Indicated Resources	1,632,000	1.2	0.5	61,900
Buffalo	Inferred Resources	604,000	1.1	0.5	21,800

Pure Gold holds a 1.0% net smelter return royalty on the southwestern portion of the Hasaga Property (Buffalo Claims). The proximity and geologic similarities to Madsen North does not mean that Pure Gold will obtain similar results on the Madsen Property.

23.2 North Madsen Property – Yamana Gold Inc.

Yamana has recently been exploring their North Madsen Property which is contiguous along on the northeast boundary of Pure Gold's Madsen Property. The North Madsen Property has been explored since 1925, however no mined production has resulted.

23.2.1 North Madsen Property Mineral Resource Estimate

Table 23.2 summarizes the recent mineral resource estimate of McCracken and Utiger (2014). Most of the resources in all categories are hosted in the Main (41) Zone. The Main Zone mineralization is hosted within the Dome Stock granodiorite and associated with both structurally controlled shear zone-related mineralization and in quartz-tourmaline veins that overprint the earlier style of mineralization (McCracken and Utiger, 2014). The proximity and geologic similarities to Madsen North does not mean that Pure Gold will obtain similar results on the Madsen Property.

Table 23.2: North Madsen Property mineral resource estimate of McCracken and Utiger (2014)

Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Measured Resources	16,728,310	1.3	0.6	685,891
Indicated Resources	6,230,600	1.0	0.6	202,862
Measured and Indicated Resources	22,958,910	1.2	0.6	888,752
Inferred Resources	10,138,000	1.2	0.6	383,936

23.3 Red Lake Gold Mines Property – Goldcorp Inc.

Goldcorp's Red Lake Gold Mines Property is contiguous to the Madsen property on the northern boundary and the Madsen Mine and the Red Lake Gold Mines (RLGM) complex are approximately 16 km apart. The RLGM is the largest mining operation in the Red Lake mining district and has been in continuous operation since 1948. Mines on what is now the RLGM Property have produced more than 24.5 million ounces of gold to 2016 including gold production of 324,000 ounces in 2016 (Lichtblau et al., 2017).

23.3.1 RLGM Reserves and Resources

Table 23.3 provides Reserve and Resource values for the RLGM as recently disclosed by Goldcorp (Goldcorp Inc., 2017).

Table 23.3: RLGM reserves and resources Goldcorp Inc. (2017)

Category	Tonnage	Grade (g/t)	Cutoff Grade (g/t)	Contained Ounces
Proven Reserves	1,280,000	11.7	7.9*	480,000
Probable Reserves	6,260,000	7.7	7.9*	1,540,000
Proven & Probable Reserves	7,550,000	8.4	7.9*	2,030,000
Measured Resources	1,430,000	19.8	7.3**	910,000
Indicated Resources	3,050,000	15.4	7.3**	1,510,000
Measured & Indicated Resources	4,480,000	16.8	7.3**	2,420,000
Inferred Resources	4,580,000	17.8	7.3**	2,620,000

**Mineral Reserves are reported using variable cut-off grades depending on the mineralization type and zone. The mineral reserve cut-off grade averages 7.90 g/t. **Mineral Resources are reported using variable cut-off grades depending on the mineralization type and zone. The mineral resource cut-off grade averages 7.30 g/t.*

The RLGM deposits are hosted by tholeiitic basalts of the Archean Balmer assemblage. The host rock sequence is intruded by ultramafic, mafic and felsic dykes and sills of the Balmer assemblage and uncomformably overlain by felsic and intermediate volcanic, volcaniclastic, and sedimentary rocks of the Bruce Channel assemblage and Confederation Group calc-alkaline volcanics. The deposit lies near the transition between greenschist and amphibolite metamorphic facies. The key alteration assemblage is comprised of widespread pervasive carbonatization and aluminous alteration. Potassic alteration (biotite and potassium feldspar) and silicification overprint the earlier alteration. Gold is associated with the silicification event and is overprinted by a second quartz-tourmaline +/- gold event associated with the Dome Stock. Gold-bearing ore types include silica replaced carbonate veins, siliceous replacement-style mineralization, disseminated sulphide mineralization along major shears, and minor sulphidized chemical sediment-hosted ore (Cadieux et al., 2006).

In 2017, two of the original shafts Campbell and Red Lake Number 1, as well as the Red Lake Mill were placed on care and maintenance as part of a program to reduce fixed costs through infrastructure rationalization. RLGM exploration in 2017 is focused on the newly discovered HG Young deposit and at the High Grade Zone at depth including testing for potential deep offsets. The Cochenour Project is in prefeasibility stage with initial production expected in 2017 and the HG Young Project is in Preliminary Economic stage, with prefeasibility work expected to start in early 2018 (Goldcorp Inc., 2017). The proximity and geologic similarities to RLGM does not mean that Pure Gold will obtain similar results on the Madsen Property.

24.0 Other Relevant Data and Information

The authors are not aware of any other information or explanation that is necessary to make this technical report understandable and not misleading.

25.0 Interpretation and Conclusions

25.1 Mineral Resource Estimate

The new mineral resource estimate for the Madsen Gold Project (Table 25.1) includes 1,648,000 indicated ounces and 178,000 inferred ounces of gold at a 4.0 g/t cut-off grade. This represents a 48% increase to the indicated ounces from the previous estimate completed in 2009 (Cole et al., 2010).

Table 25.1: Madsen Gold Project mineral resource statement

Au Cut-Off g/t	Indicated			Inferred		
	Tonnage tonnes	Avg Au Grade g/t	Au Content oz	Tonnage tonnes	Avg Au Grade g/t	Au Content oz
3.0	8,374,000	7.19	1,936,000	1,017,000	6.90	225,000
4.0	5,785,000	8.86	1,648,000	587,000	9.42	178,000
5.0	4,218,000	10.50	1,423,000	406,000	11.62	152,000

25.2 Mineral Resource Estimate Discussion

The estimation of the mineral resources in an environment with a long and extensive mining history is a challenging assignment. It is believed that all reasonable efforts were carried out by SRK in 2009 and more recently by Pure Gold to gather all of the information available to a quality standard acceptable for the estimation of a mineral resource.

The uncertainty associated with the historical drilling was addressed by Pure Gold's recent drilling, where the overall grades were confirmed. Comparisons of the statistics at McVeigh with only the historical drill holes versus only the Pure Gold drill holes show similar results, providing additional confidence to the historic data.

A comparison of the mineral resources within the mined stopes and the historical production represents a valuable assessment of the estimation results. It was observed that the tonnage of all the underground excavations in the model (stopes, shaft, drifts, raises, and ramp) matches very well the tonnage of the historical production. However, in this comparison, it was also noted that the gold grades of the estimates and the past production are quite different, with the estimates being of much lower grade. One plausible explanation for this difference might come from the fact that the stope outlines were derived from more information than that provided by the drill holes. The examination of the original paper sections and level plans indicate that channel, chip, and face samples were utilized to define the stope shapes in addition to the drill holes. In many cases, areas outside the currently modeled high-grade zones were made part of the stopes based on channel/chip/face samples results indicating high-grade gold mineralization in these areas without any drill holes. In the current estimate, these areas would be identified as part of the low-grade zone, which could explain the lower resulting gold grade observed from the current estimate within the underground excavations. In order to confirm this observation, it is recommended that a subset area be selected where all channel/chip/face sample data are available on the historic paper sections and plans. Following the digitization of this data and adjustment to the geologic model, a new grade estimate with the channel/chip/face samples and the drill hole data would be performed for this area. A comparison of this estimate with and without the channel/chip/face samples would provide a better assessment of the current observation. It should be noted that the tonnage and average gold grade calculated from the current estimate within the underground excavations matches that from the 2009 SRK estimate.

The statistics on gold grades within the high-grade zones indicated heterogeneous populations with higher coefficients of variability. Although an estimation technique, such as indicator kriging, could be recommended to provide more restrictive constraints to the higher grade portion, the validation tests on the current grade estimates show satisfying results without any overestimation of the higher-grade fraction. It is thus believed that the usage of ordinary kriging on capped gold grades provides satisfactory results in this case.

The large abundance of drill hole gold assays on a densely spaced grid within the resource area has allowed for well-defined variograms. This has brought additional confidence in the modeling of the experimental variograms.

The validation tests have indicated that in general the estimates have levels of smoothing closer to the upper limit of acceptability. For such, it is recommended that a reduction of the maximum number of samples, used in the grade estimation process, be investigated in order to decrease the level of smoothing.

The modelling of the high-grade zones (HG), with the distribution and dimensions of the 3-D shapes more closely approximating the historically mined stopes, seems to be the main source of the differences observed with the 2009 mineral resource estimate. The 2009 estimate used much broader dimensions for the high-grade domains and was therefore vulnerable to more smoothing of the grade estimates. In a high-grade deposit such as Madsen, over-smoothing can result in excessive dilution in the grade estimates, and thereby reduce the amount of material above a cut-off grade. Such a contrast in modelling approach could account for the differences observed between the two estimates.

In the 2009 estimation of the mineral resource, the effect of using the assays within the dykes with those outside dykes during the grade interpolation process was compared to using only the assays outside dykes. Because results showed no significant differences, it was chosen in the current study to use all assays in and out of dykes for grade estimation, as in the 2009 study.

Similarly, to the 2009 resource estimate, there were no estimates categorized in the measured class. This is mainly due to account for some uncertainty associated with the historical data.

Overall, it is believed that the current estimation is a realistic representation of the mineral resources at the Madsen project, based on the current geologic understanding and available information.

25.3 Geological Interpretation

Significant efforts have recently been made to utilize the large historical database for the Madsen Gold Project. Recoding of the many decades of drill hole lithological logging has been refined through some drill core relogging and by comparison of recent drill holes with the historical lithological descriptions. The qualified persons conclude that the historical database is a highly effective and reliable tool for predicting the location of all main rock types as well as hydrothermally altered intervals. As such, this is a valuable tool for exploration targeting and should be leveraged as much as possible to identify prospective areas, particularly those which are sparsely drilled.

Predicting gold grade within altered areas is challenging owing to inhomogeneities in gold distribution. Persistence is required with drill-testing target areas since negative results in widely spaced drill holes does not necessarily condemn a target area.

The current geological interpretation is built mostly from drill hole data with input from surface geological mapping and historical underground level plan maps. Nonetheless, historical drill hole data are somewhat limiting in terms of modelling fine details and cross-cutting relations so detailed underground mapping of mineralized zones will help to refine the interpretation.

The geological model and history described in Section 8.0 is an evolving understanding and provides some new ideas and interpretations published here for the first time. In particular, the Madsen mineralization style was previously described as a stratabound, disseminated, high-temperature gold deposit that occurs at the Balmer / Confederation unconformity and is unusual for Archean orogenic gold deposits (Dubé et al., 2000). The interpretation herein, however, suggests that the Madsen gold mineralization style is not atypical but rather has been overprinted and strongly modified by the regional D_2 event. This new understanding suggests that the regional unconformity did not play a direct genetic role in deposition of gold at Madsen. Significantly, this increases the exploration potential for all of the Balmer stratigraphy. In particular, mafic and ultramafic contacts throughout the Balmer package should be evaluated as host rocks whether they are proximal to the unconformity or not.

The timing of the main gold event is key and although the model described above suggests that this event may predate the Confederation assemblage, there is no direct age on the gold event. The geometry of the Madsen mineralized zones is equivocal – in level plan view the Austin Deposit ends at the uncomformable contact with Confederation assemblage felsic rocks which could indicate that the mineralization is cut by the unconformity as proposed here, but this relation might simply indicate that the felsic Confederation rocks were a poor host rock so gold did not precipitate. Indeed, some minor gold mineralization occurs within Confederation rocks and the model above suggests that this gold is remobilized during D_2.

On the other hand, the D_1 deformation event seemingly did not involve Confederation assemblage rocks and is therefore interpreted to predate 2744 Ma (age of basal Confederation). Given that the deformed Balmer rocks are ca. 2990–2960 Ma, there is a time period of approximately 215 million years available for crustal thickening, deformation and gold deposition. In conclusion, further work is required to fully answer the question of the timing of gold mineralization at Madsen and candidates for geochronology should be evaluated.

26.0 Recommendations

The following recommendations are provided to continue advancing the Madsen Gold Project.

26.1 Program

1) Continue exploration
   a. Surface drilling (satellite targets and Madsen targets outside resource domains)
   b. Underground drilling (infill and exploration)
2) Complete initial mineral resource estimates for the Russet South and Fork satellite deposits and update Madsen resource estimate
3) Surface mapping and sampling to develop additional satellite targets
4) Detailed underground mapping and sampling
5) Complete additional study of mine grid survey network and transformation to UTM
6) Geochronology of key lithological units such as the quartz porphyry dykes to help constrain the timing of gold mineralization
7) Continue processing historical drill core to refine geological models of satellite targets and continue historical data capture from detailed mine records
8) Continue environmental baseline work and update permitting and advance understanding of tailings requirements as a potential long lead item
9) Continue engineering and design work and update Preliminary Economic Assessment.

26.2 Budget

The following budget is recommended for the Madsen Gold Project.

Table 26.1: Recommended budget to advance the Madsen Gold Project

Program	Cost (C$)
58,000 metres of drilling including assay costs, wages and project G&A	13,050,000
Underground Drilling	
18,000 metres of drilling including underground support, assay costs, wages and project G&A	4,050,000
Resource Work	
Initial mineral resource estimate Russet South and Fork deposits and update Madsen Estimate	100,000
Mapping and Survey	
Surface geological mapping including geochronology	110,000
Underground geological mapping	40,000
Underground and mine grid survey control	50,000
Historical Data Capture	
51,000 metres of historical core re-logging and historical data compilation	250,000
Environmental and Permitting	
Environmental baseline studies, permitting support and tailings study	750,000
Engineering	
Engineering studies and design work, including PEA	2,250,000
TOTAL	**$20,650,000**

27.0 References

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28.0 Certificates and Consents of Qualified Persons

Certificate of Qualified Person

I, Marc Jutras, P.Eng., residing at 333 West 17th Street, North Vancouver, British Columbia, V7M 1V9, do hereby certify:

1) I am a professional engineer and Principal, Mineral Resources at Ginto Consulting Inc., a consulting company specializing in the estimation of mineral resources, with offices at 333 West 17th Street, North Vancouver, British Columbia, V7M 1V9.
2) This Certificate applies to the report *Madsen Gold Project, 2017 Mineral Resource Estimate* with an effective date of August 2, 2017.
3) I am a graduate of the University of Québec in Chicoutimi in 1983, and hold a Bachelor's degree in Geological Engineering. I am also a graduate of the Ecole Polytechnique of Montréal in 1989, and hold a Master's degree of Applied Sciences in Geostatistics.
4) Since 1984, I have worked continuously in the field of mineral resource estimation of numerous international exploration projects and mining operations. I have been involved in the evaluation of mineral resources at various levels: preliminary studies, preliminary economic assessments, pre-feasibility studies, feasibility studies and technical due diligence reviews.
5) I am a Registered Professional with the Engineers and Geoscientists British Columbia (license # 24598) and Engineers and Geoscientists Newfoundland and Labrador (license # 09029). I am also a Registered Engineer with the Quebec Order of Engineers (license # 38380).
6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Proects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.
7) I have completed a site inspection of the Madsen Gold property on August 30, 2017. At that time the core logging and sample preparation facilities were visited, as well as the SGS assaying laboratory. Drill hole core of the high-grade and low-grade mineralized zones from the Austin, South Austin, McVeigh, and 8 Zone areas were examined. An underground visit of the McVeigh area was performed from the ramp access down to the 1 level. A brief review of some of the historical sections and plans was also carried out during this visit. Overall, the site inspection was satisfactory.
8) I have completed the estimation of the mineral resources of the Madsen Gold Project.
9) I am independent as defined by Section 1.5 of NI 43-101.
10) I am responsible for sections 14, 25.1 and 25.2, but not section 14.2 of this report.
11) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.
12) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

Effective date: August 2, 2017

Signed date: September 12, 2017

"Marc Jutras"

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Marc Jutras, P. Eng., M.A.Sc.

CONSENT OF QUALIFIED PERSON

TO: British Columbia Securities Commission

Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of August 2, 2017 and a signing date of September 12, 2017 entitled *Madsen Gold Project, 2017 Mineral Resource Estimate* (the "Technical Report")

I, Marc Jutras, Principal, Mineral Resources at Ginto Consulting Inc., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated August 2, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 12th day of September, 2017.

"Marc Jutras"

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Marc Jutras, P. Eng., M.A.Sc.

Certificate of Qualified Person

I, Darcy E.L. Baker, P.Geo., residing at 3579 Marshall Street, Vancouver, British Columbia, V5N 4S2, do hereby certify:

1) I am a consulting geologist and President of Equity Exploration Consultants Ltd., a mining exploration management and consulting company with offices at 1510 – 250 Howe Street, Vancouver, British Columbia, V6C 3R8.
2) This Certificate applies to the report *Madsen Gold Project, 2017 Mineral Resource Estimate* with an effective date of August 2, 2017.
3) I am a graduate of Dalhousie University (1997) with an Honours Bachelor of Science degree in Geology and am a graduate of the University of Newcastle, Australia (2003) with a Doctor of Philosophy degree in Geology.
4) Since 2003, I have worked managing exploration programs focused on identifying and delineating epithermal, porphyry, VMS, orogenic gold, IOCG and other deposits in Alaska, British Columbia, Mexico, Nevada, Nunavut, Ontario, Quebec and Yukon. Prior to launching a career in mineral exploration, I completed a Ph.D. research project studying the timing and structural relations of orogenic gold deposits in the Archean Pilbara Craton of Western Australia.
5) I am a Professional Geologist in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (registration number 33448) and with the Association of Professional Geoscientists of Ontario (registration number 2746).
6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.
7) Since 2014, I have visited the Madsen Gold Project numerous times and my most recent property visit was June 26 to 29, 2017.
8) I have completed geological mapping, geochemical sampling, drill targeting, geological modelling, review of historical hard copy plan maps and diamond drill logs and examination of historical and recent drill core at the Madsen Gold Project.
9) I am independent as defined by Section 1.5 of NI 43-101.
10) I am responsible for sections 1–9 and 24–27, but not sections 25.1 and 25.2 of this report.
11) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.
12) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

Effective date: August 2, 2017

Signed date: September 12, 2017

"Darcy Baker"

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Darcy E.L. Baker, Ph.D., P.Geo.

CONSENT OF QUALIFIED PERSON

TO: British Columbia Securities Commission

Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of August 2, 2017 and a signing date of September 12, 2017 entitled *Madsen Gold Project, 2017 Mineral Resource Estimate* (the "Technical Report")

I, Darcy E.L. Baker, a consulting geologist at Equity Exploration Consultants Ltd., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated August 2, 2017 (the "Press Release").

I certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 12th day of September, 2017.

"Darcy Baker"

____

Darcy E.L. Baker, Ph.D., P.Geo.

Certificate of Qualified Person

I, Philip Steven Smerchanski, P.Geo., having a business address at 1055 West Hastings Street, Suite 1900, Vancouver, British Columbia, V6K 1V3, do hereby certify:

1) I am a Senior Exploration Geologist employed by Oxygen Capital Corp. and also hold the title of Vice President, Exploration of Pure Gold Mining Inc..
2) This Certificate applies to the report *Madsen Gold Project, 2017 Mineral Resource Estimate* with an effective date of August 2, 2017.
3) I am a graduate of the University of Manitoba (2002) with a Bachelor of Science Honours degree in Geological Sciences and am a graduate of the University of Tasmania, Australia (2009) with a Master of Economic Geology degree.
4) Since 2001, I have participated in and led metals exploration programs focused on identifying and delineating economic precious and base metals deposits through regional reconnaissance and property-scale exploration programs across northern Canada and Alaska; managed underground and surface exploration drill programs; and studied and worked at a diverse variety of metals exploration properties and mines across South America, South Africa, and Australia. Many of these projects were focussed on geologically similar environments to the Madsen Gold Project and several were Archean Orogenic Gold deposits including in the Red Lake Mining District.
5) I am a Professional Geologist in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (registration number 152602) and with the Association of Professional Geoscientists of Manitoba (registration number 23669).
6) I have read the definition of “Qualified Person” in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* (“NI 43-101”) and according to NI 43-101 I am a Qualified Person owing to my education, experience and registration with professional associations.
7) From April 2014 to April 2016 I was Director, Geoscience for Pure Gold Mining Inc. and since April 2016 have held the position of Vice President, Exploration with Pure Gold. Since 2014, I have been involved in the technical aspects of the exploration programs of the Madsen Gold Project and have visited the Project several times; having completed supervision of geoscience programs, targeting and target modelling, review of historical records, and examination of drill core and outcrops. My most recent property visit was August 9 to 15, 2017.
8) I am not independent as defined by Section 1.5 of NI 43-101.
9) I am responsible for sections 10 and 23 of this report.
10) I have read NI 43-101 and confirm that the sections of this report for which I am an author or co-author have been prepared in compliance with NI 43-101.
11) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am an author or co-author contain all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

Effective date: August 2, 2017

Signed date: September 12, 2017

“Philip Steven Smerchanski”

____

Philip Steven Smerchanski, M.Econ.Geol., P.Geo.

CONSENT OF QUALIFIED PERSON

TO: British Columbia Securities Commission

Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of August 2, 2017 and a signing date of September 12, 2017 entitled *Madsen Gold Project, 2017 Mineral Resource Estimate* (the "Technical Report")

I, Philip Steven Smerchanski, Vice President, Exploration at Pure Gold Mining, Inc., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated August 2, 2017 (the "Press Release").

I also that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 12th day of September, 2017.

"Philip Steven Smerchanski"

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Philip Steven Smerchanski, M.Econ.Geol., P.Geo.

Certificate of Qualified Person

I, Christopher Lee, M.Sc., P.Geo., residing at 901 Weldon Court, Port Moody, BC, V3H 1H3, do hereby certify:

1) I am a Senior Exploration Geologist employed by Oxygen Capital Corp. and also hold the title of Chief Geoscientist of Pure Gold Mining Inc.
2) This Certificate applies to the report *Madsen Gold Project, 2017 Mineral Resource Estimate* with an effective date of August 2, 2017.
3) I am a graduate of University of Waterloo (1991) with an Honours Bachelor of Science degree in Geology and a graduate of the Memorial University of Newfoundland (1994) with a Master of Science degree in Geology.
4) I have worked continuously as a geologist since 1991, and specialized in the structural geology of ore deposits since 1995; beginning with 4 years of graduate research on the structural controls on Archean gold deposits, followed by 7 years as a structural geology consultant with SRK, focused on exploration, resource modelling and estimation on more than 75 different projects worldwide. During this time, I placed as a semi-finalist in the Goldcorp Challenge – a worldwide targeting competition focused on Goldcorp's Red Lake mine. Later, I acted as Chief Geoscientist for Fronteer Gold, Aurora Energy and True Gold where I participated in the discovery, delineation and resource estimation of 14 million ounces of gold in 7 different deposits; 3 of which are currently in production.
5) I am a Professional Geologist in good standing with the Association of Professional Engineers and Geoscientists of British Columbia (registration number 29049).
6) I have read the definition of "Qualified Person" in National Instrument 43-101 – *Standards of Disclosure for Mineral Projects* ("NI 43-101") and according to NI 43-101 I am a qualified person owing to my education, experience and registration with professional associations.
7) Since 2015, I have visited the Madsen Gold Project numerous times having completed detailed geological surface and underground mapping, drill targeting, geological modelling, review of historical hard copy plan maps and diamond drill logs and examination of historical and recent drill core. I have acted as Chief Geoscientist of Pure Gold since April 2016. My most recent property visit was August 29th – September 1st, 2017.
8) I am not independent as defined by Section 1.5 of NI 43-101;
9) I am responsible for sections 11, 12, 13 and 14.2 of this report.
10) I have read NI 43-101 and confirm that the sections of this report for which I am responsible have been prepared in compliance with NI 43-101;
11) As of the effective date of this report, to the best of my knowledge, information and belief, the sections of this report for which I am responsible contains all scientific and technical information that is required to be disclosed so as to make the technical report not misleading.

Effective date: August 2, 2017

Signed date: September 12, 2017

"Christopher Lee"

____

Christopher Lee, M.Sc., P.Geo.

CONSENT OF QUALIFIED PERSON

TO: British Columbia Securities Commission

Alberta Securities Commission

RE: Technical report prepared for Pure Gold Mining Inc. with an effective date of August 2, 2017 and a signing date of September 12, 2017 entitled *Madsen Gold Project, 2017 Mineral Resource Estimate* (the "Technical Report")

I, Christopher Lee, Chief Geoscientist of Pure Gold Mining Inc., hereby consent to the public filing of the Technical Report by Pure Gold Mining Inc.

I also consent to any extracts from, or the summary of, the Technical Report in the press release of Pure Gold Mining Inc. dated August 2, 2017 (the "Press Release").

I also certify that I have read the Press Release filed by Pure Gold Mining Inc. and that it fairly and accurately represents the information in the sections of the Technical Report for which I am responsible.

Dated the 12th day of September, 2017.

"Christopher Lee"

____

Christopher Lee, M.Sc., P.Geo.