# **KERRS GOLD DEPOSIT**

NI 43-101 RESOURCE ESTIMATION ON THE KERRS GOLD DEPOSIT, MATHESON, ONTARIO

Submitted to: SHELTERED OAK RESOURCES INC.

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# 1 EXECUTIVE SUMMARY

# 1.1 INTRODUCTION

In 2011, Sheltered Oak Resources Inc. (SOR) retained Kirkham Geosystems Ltd. (KGL) to conduct a mineral resource estimation on the Kerrs Gold Deposit which is located 60km northeast of Matheson on the southwest shore of Lake Abitibi, Ontario. The Kerrs Gold Project is 100% owned and managed by SOR. This resource estimate is based on the Phase 1 to Phase 5 drilling programs that were completed between 2005 and 2010. This technical report, authored by Garth Kirkham P.Geo., conforms to the requirements of National Instrument 43-101 (NI 43-101), Companion Policy 43-101CP, and Form 43-101F1 of the Canadian Securities Administrators (CSA).

Contributions to this report include: material from qualifying NI 43-101 reports completed by qualified persons Dr. Eric Owens (July 2005), and Peter Hubacheck of W.A. Hubacheck Consultants Ltd. who, operating as general project supervisor, provided geological management of phase 1 to phase 5 drilling programs. Excerpts from these technical reports have been referenced and summarized in *Sections 6-16, 17, 18 and 19*.

# 1.2 PROPERTY LOCATION AND CLAIMS STATUS

The Kerrs Property is situated in the southeast and east-central sections of Kerrs Township and the adjoining unsurveyed Chesney Bay and Rayner Lake Areas in the northern part of the Larder Lake Mining Division of Northeastern Ontario. The latitude and longitude of the approximate centre of the Property is 48°44'30'' N and 80°08'45''W.

The Property consists of 12 mining leasehold patents and 43 mining claims comprised of 334.5 units covering a total surface area of 7,642 hectares. The 12 leasehold claims were surveyed by Noranda and brought to lease in 1989.

Sage Gold Inc. (SAGE) subsequently acquired 100% undivided interest by staking five additional claims which were registered at the Ministry of Northern Development and Mines (MNDM) in the Kirkland Lake office on October 23, 2003 and November 12, 2003. On November 7, 2003, an option agreement was signed, resulting in the acquisition of unsurveyed claim #1140877; this claim was referred to as the *Kerrs North Claim* in the agreement. This 15 unit claim covers the Jam Lake Zone and the northern portion of the Property.

In August 2005, SAGE staked and optioned 275 additional claim units contiguous to the Kerrs property, increasing the total claim area by 4,400 hectares, for a total of 7,642 hectares.

# 1.3 AGREEMENTS SUMMARY

Sage Gold Inc, formerly Sahelian Goldfields Inc., acquired the 12 leasehold patents subject to an agreement with Newmont Canada Limited (Newmont) dated April 28, 2003. Under the terms of this agreement, SAGE acquired 100% interest in the Newmont Properties (the Kerrs Property forms a part of this), subject to certain royalties, to be retained by Newmont, in addition to other conditions. Newmont is entitled to a net smelter return (NSR) of 1% at a gold price of US\$350 or less; from 1.5% to 2% at a gold price of between US\$350 and US\$400; and up to 2% at a gold price of US\$400 or greater.

Five additional unsurveyed claims adjoining these leases and claims were staked in October 2003 and November 2003. On November 7, 2003 the Campbell Option Agreement was signed, resulting in the acquisition of one unsurveyed claim adjacent to the northern portion of the Kerrs lease. SAGE is entitled to earn a 100% interest, subject to a NSR of 1.5% by completing a 3-year exploration program costing \$15,000 in year one, \$50,000 in year 2, and \$100,000 in year 3. In addition, the following cash payments were disbursed to the holder of the claim: \$5,000 in 2004, \$10,000 in 2005, and \$20,000 in 2006. In December 2005, \$20,000 was paid to exercise the option facilitating the land title transfer. The transfer was completed on February 20, 2006. The NSR can be bought back for \$500,000.

On March 3, 2005, Sahelian Goldfields Inc. changed its name to Sage Gold Inc. (SAGE) and consolidated its Common Shares on an old to new ratio of 25:1.

On August 30, 2005, SAGE entered into an option agreement to acquire a 100% interest in the mining claim contiguous to the Kerrs Property. In order to exercise the option, SAGE agreed to pay the vendors a series of payments and shares totalling \$40,000 and fulfill exploration work expenditures of \$120,000 staged over a three-year period. The vendors acknowledged that the expenditures would not be made within the three-year period. The Vendors retained an NSR of 1.5% on gold and 1.5% gross overriding royalty on diamonds. These royalties can be purchased by the Corporation for \$300,000 each in cash.

On February 7, 2007, SOR entered into an option agreement with SAGE. This agreement was amended and restated on April 19, 2007 and then further amended on August 3, 2007, December 1, 2007 and March 28, 2008, to acquire a 55% interest in the Kerrs Gold Property. In order to exercise the option, SOR agreed to pay SAGE \$200,000 and spend C\$1.8 million on exploration work.

On July 29, 2007, SOR and SAGE entered into a memorandum of understanding with the Wahgoshig (Wahgoshig MOU). SOR and SAGE agreed that if they conducted any mineral exploration work on the Kerrs Property, it would mutually benefit SOR, SAGE and the

Wahgoshig. In exchange for SOR and SAGE meeting their obligations, the Wahgoshig agreed that SOR, SAGE and their contractors could access the Kerrs Property and carry out exploration activities, as outlined in the Technical Report, without interference.

SOR and SAGE's obligations included:

- Issuing the Wahgoshig 300,000 Common Share purchase options of SAGE exercisable at \$0.16 per share until the date that is five years from the date of execution of the Wahgoshig MOU.
- Issuing the Wahgoshig 72,000 SOR shares.
- Helping Wahgoshig-related businesses take advantage of opportunities created by the exploration work done on the Kerrs Property.
- Provide the Wahgoshig members additional SAGE share options in an amount equal to that offered to other members of SAGE's Kerr Property Exploration Committee.
- Contribute on a quarterly basis to the Wahgoshig Community Fund: 2% of all monies spent on exploration work on the Kerrs Property for the duration of the Wahgoshig MOU.
- Provide Wahgoshig members with preferential treatment when hiring workers for exploration activities.
- Consult with the Wahgoshig before beginning any new exploration activities on the Kerrs Property.

On January 19, 2008, SOR entered into a letter of intent (LOI) with Lucrum Capital Corp. (Lucrum). Lucrum is a capital pool corporation that handles a *qualifying transaction* that is to be conducted in accordance with the TSX Venture Exchange (Exchange), Policy 2.4 concerning Capital Pool Companies.

On April 21, 2011, SOR entered into an Option Agreement with Goldcorp Canada Ltd. (Goldcorp) and Goldcorp Inc. concerning the mining rights of 46 leases located in Kerrs Township in the Larder Lake mining division (the Property). The Property is held by the Porcupine Joint Venture (PJV) between Goldcorp and Goldcorp Inc. The Option Agreement provides SOR with the opportunity to earn a 60% interest in the Property by spending \$2.6 million in exploration expenditures, completing 14,000 m of core diamond drilling and making option payments of \$150,000 prior to December 31, 2014, and issuing \$900,000 worth of common shares of SOR prior to the exercise of the option.

### 1.4 ENVIRONMENTAL AND PERMITTING STATUS

There are no outstanding permitting issues with respect to surface rights or access to drilling areas. No stream crossings are anticipated during the next phase of surface drilling. The company

should proceed with a preliminary baseline environmental survey contingent on the results of the recommended program. This work should be initiated during the summer of 2011. The Temiskaming Forestry Alliance (TFA) was contacted and advised that the existing logging road network be used as much as possible. In addition, SAGE and SOR management have committed to best practice mineral exploration guidelines (PDAC E3 Environmental Guidelines) cited in the Wahgoshig MOU.

# 1.5 EXPLORATION HISTORY

The earliest known exploration activity on the property occurred between 1963 and 1966 when Area Mines Ltd. explored for asbestos in the ultramafic rocks underlying the ground. Eight short diamond drill holes were completed, but no significant results are known.

The initial impetus for gold exploration came in the 1960's, when gold-bearing boulders assaying as much as 3 oz/ton were discovered by a prospector in the area of East Ford Lake about 1.5 km south of the south property boundary. These boulders were sitting on top of the Munro Esker.

As a result of this discovery, Kennco Exploration, under the supervision of C. J. Sullivan, conducted a sampling program of sands north (up-ice) of the Ford Lakes area in 1964-1965. The soil samples were analyzed for gold and mercury.

After that, work on the property was nominal until 1977; Noranda Exploration Co. Ltd. (Noranda) began an exploration program that would be active for the better part of the next eleven years. In 1977, Noranda completed an airborne magnetic and electromagnetic survey. In 1978, 44 claims were staked and Noranda covered these with ground, geophysical surveys. In early 1979, most of the area up-ice as far as Lake Abitibi was staked by Noranda, Dome Exploration and C. J. Sullivan, in partnership with K. Bradshaw of Timmins. The Sullivan-Bradshaw claims were optioned to Noranda. At this time, the property size was 224 claims, and was referred to as the *Kerrs 1-77 Property* by Noranda.

Between 1979 and 1983, Noranda conducted a \$1 million, four-year, exploration program. This work included geophysics, reverse circulation (RC) drilling, and reconnaissance diamond drilling. Line-cutting, VLF, electromagnetic, magnetic and I.P. surveys were also completed. RC drilling in 114 holes totalled 15,515 ft (4,723 m). Diamond drilling of 17 holes totalled 13,100 ft (3,988 m). Forty-four RC holes were drilled in 1979, yielding anomalous gold values that suggested multiple sources. This was followed in 1980 with geophysics and 36 RC holes which outlined five areas warranting further interest. Four of the five had anomalous gold values at or near bedrock, suggesting a nearby source, and diamond drilling was proposed. Twenty-four RC holes were drilled in 1981; this yielded two new gold anomalies. Follow-up diamond drilling on the South Grid (7 holes totalling 5,537 ft) intersected thick sequences of favourably-altered rocks.

In 1982, individual pulse electromagnetic (EM) surveys were conducted down diamond drill holes K-82-1 (just west of Bell Lake on the Jam Lake Grid), K-80-3 and 4, and K-81-2 (all located in the South Grid). No significant results were returned. In 1982, seven diamond drill holes totalling 4,587 ft were also completed. K-82-2, drilled to test the northward gold dispersion trend (up-ice) from overburden holes 129 and 143, intersected low grade gold mineralization. Low grade mineralization was also intersected in K-82-4, and drilled to follow up on anomalous gold values in RC hole 234 just west of Bell Lake (on the North or Jam Lake Grid).

In 1983, the company retained Overburden Drilling Management (ODM) of Ottawa to assess Noranda's procedures for sampling and analysis. ODM found that Noranda's sampling, logging, and sample processing procedures were inadequate, and therefore they had to re-log, resample and reinterpret the lower portions of the Noranda RC holes. Ten additional reverse circulation holes were drilled to confirm and better define the three overburden anomalies. Three diamond drill holes were drilled on the South Grid to follow-up on the overburden results. These three holes yielded significant gold, including 5.4 g/t Au over 1.1 m in K-83-1, 9.7 g/t over 0.2 m in K-83-3, and several additional encouraging intervals.

Following the 1982-1983 season, no work was conducted on the property until July 11, 1986 when Noranda signed a Joint Venture agreement with Vital Pacific Resources Ltd., with Noranda as project operator.

From September 1986 to January 1987, Vital Pacific carried out a diamond drilling program consisting of 15 holes totalling 13,604 ft (4,141 m). To-date, cumulative drill footage on the property amounts to 26,704 ft (8,129 m).

The first 13 holes were drilled on the South Grid which covered the southern half of the Noranda claim group. This drill program was designed to test the gold potential of an intrusive quartz-feldspar porphyry (QFP) and to test areas up-ice from RC hole geochemical gold anomalies. Several gold-bearing intersections were obtained in quartz-feldspar porphyry, including 0.075 oz/ton Au over 9.7 ft, 0.089 oz/ton Au over 0.9 ft, 0.077 oz/ton Au over 1.1 ft, and 0.095 oz/ton Au over 6.8 ft. Best intersections were in K-86-1, K-86-2, and K-86-5.

K-87-14 and 15, drilled west of Jam Lake in the northern part of the claim group, intersected mafic volcanics cut by quartz-feldspar porphyry (QFP) and a northeast striking diabase. These holes were drilled to test resistivity highs on the north-western part of the Jam Lake Grid, approximately 600 m west of Jam Lake.

Further diamond drilling in 1987 on the Jam Lake Grid was targeted to test the gold potential of a geologically complex area of intrusive porphyries and highly altered ultramafics and mafic volcanics. As with holes K-87-14 and 15, these holes were targeted to test resistivity highs

interpreted to correspond with intrusive porphyries. Three holes (K-87-16, 17, and 18) were drilled during September and October 1987, all along Section 3600N, just south of Jam Lake. This drilling totalled 3,456 ft (1,052 m). K-87-16 intersected significant gold mineralization – 0.073 oz/ton Au over 34 ft of core length (2.50 g/t Au over 10.4 m) – within intervals of silicification and quartz-green carbonate altered volcanics. More drilling was recommended in the vicinity of K-87-16. Total cumulative footage drilled on the Kerrs Property at this time was 30,460 ft (9,272 m).

Four additional holes totalling 3,198 ft (Guy, K., 1988) were completed in early 1988 on the Jam Lake Grid, in the vicinity of K-87-16, in an effort to expand upon this mineralization. In 1988, the total amount of drilling completed on the Property was 33,838 ft (10,301 m). K-88-20 and 22 intersected interesting gold mineralization. K-88-20 intersected 1.09 g/t Au over 7.2 m, and 11.69 g/t Au over 0.76 metres. K-88-22 intersected three mineralized intervals: 1.69 g/t Au over 1.83 m, 1.63 g/t Au over 3.04 m, and 2.83 g/t Au over 1.67 m.

No work was done on the Property between 1988 and late 2004; at this time SAGE had taken control. Several corporate restructurings and mergers resulted in the property changing hands. In 2001, Newmont Canada Limited acquired the Kerrs Property.

SAGE and Newmont reached their agreement whereby SAGE acquired the Property as part of a larger property agreement on April 28, 2003.

SAGE subsequently staked five adjoining claims in October 2003 and November 2003, and acquired the Kerrs North claim by option in November 2003. All of these claims have been integrated into the Kerrs Property.

In late 2004, SAGE began a program that lead to the identification of drill targets on the property. In essence the company conducted a Mobile Metal Ion (MMI) soil geochemical survey, a ground magnetic survey and a Landsat structure study.

In the fall of 2005, SAGE conducted a surface diamond drilling program totalling 3,000 m involving 7 drill holes.

In the winter of 2006, SAGE conducted a surface diamond drilling program totalling 4,206 m involving 9 drill holes. In the summer of 2006, SAGE completed a MMI mobile ion geochem survey on the Kidston & Dyment Option and surrounding claims.

In May 2008, the Phase 3 drilling program completed 5 holes (K-08-17 to 21) totalling 2,167 metres. In August 2009, the Phase 4 drilling program completed 8 holes (K-09-22 to 29) totalling 1,747 metres. In July 2010, the Phase 5 drilling program completed 15 holes (K-10-30 to 43) totalling 5,944 metres.

# 1.5.1 Geology and Mineralization

The 3-D geological sectional model defined by 41 holes (including 3 historical holes), illustrates that the Kerrs quartz carbonate breccia deposit is stratabound occurring at the contact of a thick, mafic pillow flow sequence overlying an ultramafic, magnetite-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350 m to 425 m below surface. The aeromagnetic contours outline an arc-shaped feature interpreted as a sub-volcanic magma chamber floored in a rift basin, subsequently refolded into a recumbent synclinal structure, possibly overturned facing to the northwest in the same *compression* direction as the NNW-SSE D2 deformation event affecting the Porcupine Destor Deformation Zone.

Gold mineralization occurs as pyritized quartz vein replacement breccias enveloped by quartz fuchsite carbonate vein breccias averaging approximately 10 m and alteration envelopes varying up to 40 m in thickness. The stronger alteration envelopes are characterized by sericite/silica/+/- pyrite bounding the high strain quartz-pyrite replacement breccias. On section 1400N to 1500N, a hematite/sericite/silica alteration envelop is observed bounding the underlying sericite/silica/+/- pyrite alteration. A thick altered porphyry unit was also intersected below the quartz green carbonate breccias zone on these sections. Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages.

# **1.6 RESOURCE ESTIMATION**

The Kerrs QGC Breccia Deposit resource estimate is supported by 34 drill holes arrayed on a grid layout on eight drill fence sections with zone correlations involving 37 composite zones. A 3-D cross-sectional model was generated from the cross-sections with interpreted mineral outlines which served as the basis to perform geometric polygonal and geostatistical calculations. The resource estimation process employed three methods to estimate the gold resources within the Kerrs QGC Deposit. In addition, the polygonal cross-sectional method helped validate the geostatistical methods, as well as serving as a comparison.

The 3-D geological solid model defined by 41 holes, including 3 historical holes, illustrates that the Kerrs quartz carbonate breccia deposit is stratabound occurring at the contact of a thick, mafic pillow flow sequence overlying an ultramafic, magnetic-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350 m to 425 m below surface. The drill hole density has been systematic in all five drilling campaigns, maintaining a 100 m drill

fence spacing arrayed along nine sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonal to the north-easterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake.

Gold mineralization occurs as pyritized quartz vein breccias enveloped by quartz fuchsite carbonate vein breccias and alteration envelopes varying to up to 40 m in thickness. Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages. Anomalous concentrations of trace elements such as molybdenum, lead and barium are found within the replacement breccias and to a lesser extent in the green carbonate breccias which envelope the quartz-pyritic vein breccias.

Block modeling was performed using ordinary kriging which employed a database of 2,117 assays, with 517 intersecting the mineralized zone. The breccias zone was interpreted on 25 m to 100 m spaced sections. The sectional interpretations were then wire-framed to create a 3-D solid with which to constrain the block interpolation process. The solid model was manually adjusted to precisely intersect the zone composites. The grade estimation process included modeling the mineralized structures; statistical analysis; drill holes and composite data; variography; cut grade analysis; and block estimation using ordinary kriging. In addition, inverse distance to the second power; nearest neighbour; and manual polygonal estimation methods were performed for validation and verification purposes.

It is important to note that within the estimation process for all methodologies, a technique known as *Relative Elevation Modelling* was used; this technique is specific to the MineSight<sup>TM</sup> Modeling System. This methodology is particularly important in the case of the Kerrs Deposit because it is extremely effective in addressing the issue of folded structures. This method allows the practitioner to precisely follow the trend of mineralization and structure on a body that has major deviations on strike and dip.

# 1.6.1 Kerrs Inferred Mineral Resource – KBX ZONE

Table 1-1 provides general information regarding the Kerrs Resource Estimate:

CUT-OFF GRADE	TONNES	GOLD (g/t)	METAL (Oz.)	
0.5	7,041,460	1.71	386,467	
1	5,237,213	2.04	342,856	
1.5	3,375,361	2.47	268,468	
2	1,936,189	3.04	188,972	
2.5	1,165,664	3.57	133,778	
3	818,171	3.94	103,622	

TABLE 1-1: KERRS RESOURCE ESTIMATE (A)

### 1.6.2 Estimation Methodology and Parameters

The resource estimation methods and parameters for the Kerr's Deposit are as follows:

- Forty-one drill holes were utilized to interpolate the KBX Zone.
- Composite length of 2 m was chosen and composites were weighted by length.
- Sectional interpretations were wire-framed to create 3-D solids of the zones.
- Zones were coded to the composites, and the block model, to constrain the modeling process.
- Composites for the mineralized zone were used to interpolate into the blocks for each zone.
- Ordinary kriging was used as the interpolator.
- Relative elevation modeling was used to guide the ellipse orientation that accounts for the variation in dip due to the synclinal structure.
- A minimum of two composites were used for each block and a maximum of two composites were used per drill hole; a maximum of 12 composites were used per hole.
- A cutting factor was applied for gold with outlier composites limited to 10 g/t Au based on cumulative frequency plots. A zero cut-off grade was used for the manual polygonal method.
- Minesight<sup>™</sup> Software was used to perform the block modeling and estimations.

- Tonnage comparisons with the polygonal cross-section calculation checked within a variance of -9%. Grade comparisons show an average variance of +20% for gold.
- Tonnage and grade variations between methods were within very reasonable limits as shown in Table 1-2.

TABLE 1-2: KERRS RESOURCE ESTIMATE (B)

CUT OFF	ORDINARY	INVERSE	0/ DIFF	NEAREST	%DIF
CUI-OFF	KRIGING	DISTANCE	70 <b>DIF</b> F	NEIGHBOR	$\mathbf{F}$
0.5	1.71	1.67	2.0%	1.61	6.4%

### 1.6.3 Cross Sectional Methodology and Parameters

The methods and parameters used for the manual cross-sectional method are as follows:

- Mineral outlines were constrained by minimum true thickness of 3.0 m.
- Composite grade modeling of KBX Zone used internal dilution thickness of up to 4 m to cut-off grades of 0.5 g/t Au.
- Average drill hole pierce point spacing was 92 m.
- Average true thickness of KBX Zone was 9.9 m.
- Average Specific Gravity of 2.81 was used to calculate sectional block tonnages for the KBX Zone.

Mineral resources that are not mineral reserves do not have demonstrated economic viability. The mineral resource estimates will be affected by environmental, permitting, taxation, socioeconomic, marketing, political, mining, metallurgical and infrastructure issues. These issues have mainly economic impacts that have not yet been examined, so they are therefore not discussed in this report.

### 1.7 INTERPRETATION AND CONCLUSIONS

Kirkham Geosystems Ltd. (KGL) has completed a NI 43-101 mineral resource estimate on the Kerrs Gold Deposit based on the phase 1 to phase 5 drilling programs completed between 2005 and 2010. Using a cut-off grade of 0.5 g/t Au, KGL estimates that the inferred mineral resources of the Kerrs Gold Deposit total 7,041,460 tonnes at an average grade of 1.71 g/t Au containing 386,467 ounces of gold.

The Kerrs Gold Deposit resource estimate is supported by 34 drill holes arrayed on a grid layout on eight drill fence sections with zone correlations involving 37 composite zones. A 3-D crosssectional model was generated from the cross-sections with interpreted mineral outlines which served as the basis to perform geometric polygonal and geostatistical calculations. The resource estimation process employed three methods to estimate the gold resources of the Kerrs quartz, green carbonate breccia zone (KBX zone) contained within the Kerrs Gold Deposit. In addition, the polygonal cross-sectional method was utilized which served as a comparison and to validate the geostatistical methods.

The 3-D geological solid model defined by 41 holes (including three historical holes) illustrates that the Kerrs Gold Deposit is stratabound occurring at the contact of a thick, mafic pillow flow sequence overlying an ultramafic, magnetic-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350 m to 425 m below surface. The drill hole density has been systematic in all five drilling campaigns maintaining a 100 m drill fence spacing arrayed along nine sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonal to the northeasterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake.

Gold mineralization occurs as pyritized quartz vein breccias enveloped by quartz fuchsite carbonate vein breccias and alteration envelopes varying to up to 40 m in thickness. Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages. Anomalous concentrations of trace elements such as molybdenum, lead and barium are found within the replacement breccias and to a lesser extent in the green carbonate breccias which envelope the quartz-pyritic vein breccias.

The encouraging drilling results from these campaigns have defined the *Kerrs Quartz Green Carbonate Breccia (KBX) deposit* which is postulated to be the *up-ice glacial source* for the East Ford Lake boulder train.

On the basis of stratigraphic and structural controls; alteration strain; and intensity observations, the geological continuity has been established and a major objective of the phase 6 drilling program will be definition drilling to expand the Kerrs Gold Deposit.

Screen metallics should be used on samples with visible gold (VG). High grade gold values have occurred where VG is not observed, but it is suspected in strong alteration characterized by

silicification and pyritization, observed in high strain zones. Increasing gold tenure shows a direct correlation with the coincidence of replacement type quartz vein breccias and strong pyritization.

The ICP trace element study suggests that gold was introduced in three chemo-stratigraphic episodes with the deposition of gold with molybdenum, lead and arsenic occurring towards the stratigraphic top of each hydrothermal phreatomagmatic cycle. These observations also support the structural interpretation involving a recumbent syncline with fold axis striking to the northeast with fold limbs merging to the northwest.

The marked depletion of Ca, Mg, and Al seem to reflect a larger scale whole rock replacement process affecting the contact between the thick, overlying, mafic flow assemblage and the underlying ultramafic flows and interbedded mafic porphyries. In this process, magnetite destruction also occurs with ferrous iron recombining to form sulphide minerals in association with silica flooding and quartz veining. Geophysically, this alteration process generally correlates with magnetic lows which are supported by magnetic susceptibility measurements from core with pyroxenitic and andesitic flows giving the highest readings (10 to 80) and the syenite porphyry/ultramafic complex measuring the lowest (<1). The QGC zone is weakly magnetic with susceptibilities ranging from one to 2.5 due to the occurrence of 0.5% fine-grained magnetic dissemination in the fuchsitic, carbonate breccia alteration envelope.

The enrichment of gold with arsenic, molybdenum, lead, copper, barium and chromium is coincident with the depletion of vanadium, manganese, calcium, magnesium and aluminum is maximized in the middle cycle from 424 m to 431.3 m in DDH K-05-7.

### 1.8 **RECOMMENDATIONS**

Further exploration is warranted on the property in order to extend and increase resources and explore for additional zones. The author has reviewed the proposed exploration program and supports Sheltered Oak's efforts to begin in July 2011 with the following objectives in mind (see Table 1-3 for projected budget):

- 8,300 m of in-fill and extensional drilling on Kerrs Gold Deposit.
- 1,200 m of reconnaissance drilling on parallel structure supported by MMI geochem anomalies.
- 2,000 m of extensional drilling on the Kerrs Gold Deposit trend projected onto the Adjacent Property.

### TABLE 1-3: PHASE 6 BUDGET ESTIMATE FOR 11,500 METRE PROGRAM

Diamond Drilling (NQ holes) 11,500 m x \$100/m	\$1	,150,000		
Ancillary Drilling Charges (mob/de-mob, DDH surveys				
stabilizing equipment, casing, drill moves)	\$	250,000		
Geological Project Management: QP Supervisor/Project Geol.	\$	90,000		
2 field assistants and core prep/sawing/sampling wages	\$	30,000		
Geology Staff: Accommodation and Lodging	\$	24,000		
Geology Staff: logistics, transportation, equip. rentals	\$	20,000		
Geological Database GIS/3D Modeling	\$	16,000		
Geochem Lab: Sample shipping, Fire Assaying and				
Trace element Analysis	<u>\$</u>	28,000		
Sub total	\$1	,608,000		
Contingencies (10%)	\$	160,000		
TOTAL	\$1	,768,000		

In addition, the following recommendations will lead to a better understanding of the mineralogy of the deposit and to help explore other prospective areas on the property:

- Perform screen metallics test assaying on all assay intervals > 10 g/t coring the Kerrs Gold Deposit. All samples should be crushed and pulverized to -230 mesh to recover at least 71.5% of gold in fine-grained auriferous pyrite in the mafic replacement zones.
- Perform thin-section petrographic work and preliminary metallurgical testing of the mineralized zones and alteration envelopes bounding the quartz-pyrite mafic replacement vein breccias.
- Extend the MMI survey to the southwest of the Kerrs Property onto the Goldcorp Lease Property.

# 2 INTRODUCTION AND TERMS OF REFERENCE

In 2011, Sheltered Oak Resources Inc. (SOR) retained Kirkham Geosystems Ltd. (KGL) to conduct a mineral resource estimation on the Kerrs Gold Deposit which is located 60 km northeast of Matheson on the southwest shore of Lake Abitibi, Ontario. The Kerrs Gold Project is 100% owned and managed by SOR. This resource estimate is based on the Phase 1 to Phase 5 drilling programs that were completed between 2005 and 2010. This technical report, authored by Garth Kirkham, P.Geo. of KGL, conforms to the requirements of National Instrument 43-101 (NI 43-101), Companion Policy 43-101CP, and Form 43-101F1 of the Canadian Securities Administrators (CSA).

This report was submitted as a supporting document for the option agreement transaction with SOR. SOR seeks to earn a 55% interest in the Kerrs Gold Project by contributing \$200,000 in cash and incurring exploration expenditures totalling C\$1.8 million. Contributions to this report include: material from qualifying NI 43-101 reports completed by qualified persons Dr. Eric Owens (July 2005) and Peter Hubacheck of W.A. Hubacheck Consultants Ltd. (June 2008). Excerpts from these technical reports have been referenced and summarized in *Sections 6-16, 17, 18 and 19.* 

Prior to this technical report, no mineral resource estimates have been reported for this project.

For this report, monetary units are expressed in Canadian dollars (C\$) unless specified otherwise (for example, US\$ for American dollars) and all measurements are in metric units unless stated otherwise.

### Table 2-1 lists the abbreviations used in this report:

Abbreviation	Description
ft	foot
g	gram
g/t, gpt	gram/tonne, equivalent to 1 ppm
ha	hectare (2.471 acres)
kg	kilogram
km	kilometer
m	metre
m³	cubic metre
OZ	ounce (31.1035 grams)
ppb, ppm	parts per billion, parts per million
t, tonne, tonnes	metric tonne

#### TABLE 2-1: LIST OF ABBREVIATIONS

# 3 RELIANCE ON OTHER EXPERTS

This report has been prepared by Kirkham Geosystems Ltd., on behalf of SOR. KGL has relied on the verified claim titles and printed records provided by SOR, and files downloaded from the Ministry of Northern Development and Mines (MNDM) website. KGL has also relied on the legal agreements executed by SOR's legal counsel and assessment work requirements that specify the status of ownership, taxes, royalties and obligations that exist between SOR, its vendors and the provincial government.

The information, conclusions, and estimates contained in this report are based on:

- information available to KGL at the time this report was prepared.
- assumptions, conditions and qualifications as set forth in this report.
- data, reports, and opinions supplied by SOR and other third party sources.

# 4 PROPERTY DESCRIPTION AND LOCATION

# 4.1 **PROPERTY LOCATION**

The Kerrs Property is situated in the south-east and east-central sections of Kerrs Township and the adjoining unsurveyed Chesney Bay and Rayner Lake Areas in the northern part of the Larder Lake Mining Division of Northeastern Ontario (see Figure 4-1 and Figure 4-2). The Chesney Bay and Rayner Lake Areas overlap Kerrs Township and the Kerrs claims are found under Chesney Bay and Rayner Lake Areas in the MNDM documentation, and not listed under Kerrs Township as would be expected.

The latitude and longitude of the approximate centre of the Property is 48°44'30" N and 80°08'45" W. It can be located on 1:50,000 scale National Topographic System (NTS) maps: 42A/9 (Matheson sheet) and 42A/16 (Low Bush sheet). The Property is positioned on the Mining Land Tenure map of Kerrs Township (Plan G-3523), Larder Lake Mining Division, Cochrane Land Titles/Registry Division.

# 4.2 CLAIMS STATUS

The Property consists of 12 mining leasehold patents and 43 mining claims comprised of 334.5 units covering a total surface area of 7,642 hectares.

The 12 leasehold claims were surveyed by Noranda and brought to lease in 1989. Sage Gold Inc. (SAGE), formerly Sahelian Goldfields Inc., acquired the 12 leasehold patents subject to an agreement (dated April 28, 2003) with Newmont Canada Limited (Newmont). Under the terms of this agreement, SAGE acquired a 100% interest in the Newmont Properties (the Kerrs Property forms a part of this), subject to certain royalties, to be retained by Newmont, in addition to other conditions. Additionally, Newmont is entitled to a net smelter return (NSR) of 1% at a gold price of US\$350 or less; from 1.5% to 2% at a gold price of between US\$350 and US\$400; and up to 2% at a gold price of US\$400 or greater.

All 12 leasehold patents are recorded under a single licence number: 105310. Licence 105310 includes claim numbers: L500433, L500434, L500435, L500436, L500437, L500485, L500486, L500487, L500488, L500489, L500490, and L500491 (see Figure 4-1). Licence 105310 is legally surveyed and covers a total surface area of 185.84 hectares. Licence 105310 was renewed on April 30, 2010 and has been re-registered as Mining Lease 80100079.

In August 2005, three claims adjoining the south side of Licence 105310 - originally registered to Noranda - came open and were re-staked by SAGE. These three claims include numbers: 3013253, 3013254, and 3013255.

SAGE subsequently acquired 100%, undivided interest by staking five additional claims (see Figure 4-2):

- claim 3007429 12 units, approximately 192 ha, adjoining the patent claims on the north
- claim 3007398 6 units, approximately 96 ha, south of the patent claims
- claim 3007399 6 units, approximately 96 ha, south of the patent claims
- claim 3000390 3 units, approximately 48 ha, northwest of the patent claims
- claim 3000391 one full unit plus an irregular fraction, approximately 25 ha, northwest of the patent claims

On October 23, 2003 and November 12, 2003, these 5 unsurveyed claims were registered at the MNDM office in Kirkland Lake.

On November 7, 2003, the Campbell Option Agreement was signed, resulting in the acquisition of one unsurveyed claim #1140877; it is referred to as the *Kerrs North Claim* in the agreement (see Figure 4-2). This 15 unit claim (240 hectare area) covers the Jam Lake Zone and the northern portion of the Kerrs Gold Property (Property). In December 2005, the Campbell Option Agreement was exercised and \$20,000 was paid to facilitate the land title transfer. This transfer was completed on February 20, 2006.

There are no known environmental liability issues relating to this property. No permits are required to conduct the proposed work and, as prescribed by MNDM regulations, all surface-rights owners have been notified of the upcoming work

In August 2005, SAGE staked and optioned 275 additional claim units contiguous to the Kerrs property, increasing the total claim area by 4,400 hectares, for a total of 7,642 hectares (see Figure 4-3 and Table 4-1). As of April 26, 2011, the claim units underlying Abitibi Lake have been reduced to 168 units, totalling 2,688 hectares. SOR currently controls 27 staked claims and one mining lease consisting of 12 patented claims covering a land area of 4,170 hectares as show in Table 4-1.

#### TABLE 4-1: SHELTERED OAK INC. CLAIMS

Property	Number of Claims	Area (ha)	Company Ownership
Mining Leasehold Patents	12	186	100%
Staked Claims	27	3,984	100%
Total Claims	39	4,170	

### **KERRS PROPERTY LAND HOLDINGS**

### Kerrs Lease No: 80100079

L500433	Kerrs
L500434	Kerrs
L500435	Kerrs
L500436	Kerrs
L500437	Rayner Lake & Milligan
L500485	Rayner Lake & Milligan
L500486	Kerrs
L500487	Kerrs
L500488	Kerrs
L500489	Kerrs
L500490	Rayner Lake & Milligan
L500491	Rayner Lake & Milligan

# Kerrs Property

# **Unpatented Claims**

#### Holders

DYMENT, LESLIE MICHAEL SHELTERED OAK RESOURCES INC.

#### Work Report Details

Claim Number	Performed	Performed Approved	Applied	Applied Approved	Assigned	Assigned Approved	Reserve	Reserve Approved	Due Date
80100079	46,423	27,416	0	0	0	2,772	46,423	24,644	
3007398	1,808	1,006	1,808	1,808	0	0	0	0	2013-Oct-23
3007399	7,075	979	2,400	2,400	0	0	4,675	0	2011-Oct-23
3013253	1,180	217	400	400	0	0	780	0	2011-Sep-06
3013254	1,421	217	400	400	0	0	1,021	0	2011-Sep-06
3013255	1,180	217	400	400	0	0	780	0	2011-Sep-06
4202857	79,525	75,453	1,600	1,600	0	0	77,925	73,853	2015-May-26
Totals	\$138,612	\$105,505	\$7,008	\$7,008	\$0	\$2,772	\$131,604	\$98,497	

Township/Area	Claim Number	Recording Date	Claim Due Date	Status	Percent Option	Work Required	Total Applied	Total Reserve	Claim Bank
CHESNEY BAY AREA	3007429	2003-Oct-23	2013-Oct-23	A	100 %	\$ 4,800	\$ 38,400	\$ 168,451	\$ 0
CHESNEY BAY AREA	3013246	2005-Aug-05	2011-Dec-31	A	100 %	\$ 15,600	\$ 10,400	\$4	\$ 0
CHESNEY BAY AREA	3013248	2005-Aug-05	2011-Dec-31	A	100 %	\$ 4,800	\$ 3,200	\$ 1	\$ 0
CHESNEY BAY AREA	4200161	2006-Jan-30	2011-Dec-31	A	100 %	\$ 12,800	\$ 12,800	\$ 5	\$ 0
CHESNEY BAY AREA	4200162	2006-Jan-30	2011-Dec-31	A	100 %	\$ 12,800	\$ 12,800	\$ 5	\$ 0
CHESNEY BAY AREA	4200163	2006-Jan-30	2011-Dec-31	A	100 %	\$ 9,600	\$ 9,600	\$ 4	\$ 0
CHESNEY BAY AREA	4200164	2006-Jan-30	2011-Dec-31	A	100 %	\$ 12,000	\$ 12,000	\$ 5	\$ 0
CHESNEY BAY AREA	4200183	2006-Jan-30	2011-Dec-31	A	100 %	\$ 12,800	\$ 12,800	\$ 5	\$ 0
CHESNEY BAY AREA	4201519	2006-Jan-30	2011-Dec-31	A	100 %	\$ 9,600	\$ 9,600	\$ 4	\$ 0
CHESNEY BAY AREA	4205724	2006-Jan-30	2013-Jan-30	A	100 %	\$ 4,800	\$ 24,000	\$ 0	\$ 0
CHESNEY BAY AREA	4209095	2006-Jan-30	2011-Dec-31	A	100 %	\$ 800	\$ 800	\$ 0	\$ 0
CHESNEY BAY AREA	4209096	2006-Jan-30	2011-Dec-31	A	100 %	\$ 800	\$ 800	\$ 0	\$ 0
CHESNEY BAY AREA	4209097	2006-Jan-30	2013-Jan-30	A	100 %	\$ 4,400	\$ 22,000	\$ 0	\$ 0
KERRS	1140877	1999-Jun-25	2013-Jun-25	A	100 %	\$ 6,000	\$ 72,000	\$ 509,724	\$ 0
KERRS	3000390	2003-Nov-12	2013-Nov-12	A	100 %	\$ 1,200	\$ 9,600	\$ 916	\$ 0
KERRS	3000391	2003-Nov-12	2013-Nov-12	A	100 %	\$ 800	\$ 6,400	\$ 608	\$ 0
KERRS	3007398	2003-Oct-23	2013-Oct-23	A	100 %	\$ 592	\$ 21,008	\$ 2,137	\$ 0
KERRS	3013235	2005-Aug-05	2011-Dec-31	A	100 %	\$ 18,000	\$ 12,000	\$ 5	\$ 0
KERRS	3013236	2005-Aug-05	2011-Dec-31	A	100 %	\$ 19,200	\$ 12,800	\$ 5	\$ 0
KERRS	3013241	2005-Aug-05	2011-Dec-31	A	100 %	\$ 19,200	\$ 12,800	\$ 5	\$ 0
KERRS	3013250	2005-Aug-05	2011-Dec-31	A	100 %	\$ 18,000	\$ 12,000	\$ 5	\$ 0
KERRS	3013251	2005-Aug-05	2013-Aug-05	A	100 %	\$ 2,800	\$ 16,800	\$ 0	\$ 0
KERRS	3013253	2005-Sep-06	2011-Sep-06	A	100 %	\$ 400	\$ 1,600	\$ 3,036	\$ 0
KERRS	3013254	2005-Sep-06	2011-Sep-06	A	100 %	\$ 400	\$ 1,600	\$ 26	\$ 0
RAYNER LAKE AREA	3007399	2003-Oct-23	2011-Oct-23	A	100 %	\$ 2,400	\$ 14,400	\$ 156	\$ 0
RAYNER LAKE AREA	3013255	2005-Sep-06	2011-Sep-06	A	100 %	\$ 400	\$ 1,600	\$ 26	\$ 0







FIGURE 4-2: CLAIM LANDS MAP

FIGURE 4-3: CLAIM LANDS MAP



# 4.3 AGREEMENTS SUMMARY

Pursuant to an agreement entered into April 28, 2003 between Sage Gold Inc. (SAGE), formerly Sahelian Goldfields Inc., and Newmont Canada Limited (Newmont), SAGE issued 400,000 common shares to acquire, from Newmont, 100% interest in 12 leases located in Kerrs Township, Ontario.

This agreement also provided for a one- time cash payment to Newmont in the amount of US\$1.0 million payable within ten business days of a decision by SAGE to construct a commercial mining operation on any of the properties forming part of the agreement. In addition, Newmont is entitled to a Net Smelter Return Royalty (NSR) of 1% at a gold price of US \$350 or less, up to 2% at a gold price of US \$400 or greater.

Five additional unsurveyed claims adjoining these leases and claims were staked in October 2003 and November 2003. On November 7, 2003 the Campbell Option Agreement was signed, resulting in the acquisition of one unsurveyed claim adjacent to the northern portion of the Kerrs lease. SAGE is entitled to earn a 100% interest, subject to a NSR of 1.5%, by completing a 3 year exploration program costing \$15,000 in year 1, \$50,000 in year 2, and \$100,000 in year 3. In addition, the following cash payments are disbursed to the holder of the claim: \$5,000 in 2004, \$10,000 in 2005, and \$20,000 in 2006. In December 2005, \$20,000 was paid to exercise the option facilitating the land title transfer expected in the first quarter of 2005. The NSR can be bought back for \$500,000.

An additional 60,000 common shares were issued to Joseph Baylis as a finder's fee in connection with the acquisition of the Kerrs Property.

On March 3, 2005, Sahelian Goldfields Inc. changed its name to Sage Gold Inc. (SAGE) and consolidated its Common Shares on an old to new ratio of 25:1.

On August 30, 2005, SAGE entered into an option agreement to acquire a 100% interest in the mining claim L4202857 contiguous to the Kerrs Property. On signing, SAGE issued 67,000 Common Shares and paid \$5,000 cash to the *Vendors* J. and M. Dyment. During the first year, SAGE will spend \$15,000 on the Property. On the first anniversary, SAGE will issue the equivalent of \$5,000 in Common Shares, and pay \$10,000 in cash to the Vendors. In the second year, SAGE will spend \$35,000 on the Property. On the second anniversary, SAGE will issue the equivalent of \$10,000 in Common Shares, and pay \$15,000 in cash to the Vendors. In the third year, SAGE will spend \$70,000 on the property. The Vendors will retain an NSR of 1.5% on gold and 1.5% gross overriding royalty on diamonds. These royalties can be purchased by the Corporation for \$300,000 each in cash. As of April 26, 2011, the Vendors were provided with all SAGE's cash payments and Common Shares due to them pursuant to the terms of the Kidston &

Dyment Option Agreement. The registration of the land title transfer from the Vendors to SOR remains to be expedited.

On February 7, 2007, SOR entered into an option agreement with SAGE. This agreement was amended and restated on April 19, 2007 and then further amended on August 3, 2007, December 1, 2007 and March 28, 2008 to acquire a 55% interest in the Kerrs Gold Property.

In order to exercise the option, SOR agreed to pay SAGE \$200,000 and spend \$1.8 million on exploration work. The \$200,000 in cash was paid out as follows:

- \$40,000 on the March 6, 2007 (payment to SAGE confirmed)
- \$60,000 on September 6, 2008
- \$100,000 on September 6, 2009

The \$1.8 million exploration expenditures were paid out as follows:

- a minimum of \$300,000 on or before June 30, 2008
- a minimum of \$500,000 on or before June 30, 2009, having satisfied part a)
- a minimum of \$1.0 million on or before June 30, 2010, having satisfied parts a) and b)

On July 29, 2007, SOR and SAGE entered into a memorandum of understanding with the Wahgoshig (Wahgoshig MOU). SOR and SAGE agreed that if they conducted mineral exploration work on the Kerrs Property, it would mutually benefit SOR, SAGE and the Wahgoshig. In exchange for SOR and SAGE meeting their obligations, the Wahgoshig agreed that SOR, SAGE and their contractors could access the Kerrs Property and carry out exploration activities, as outlined in the Technical Report, without interference.

SOR and SAGE obligations include:

- (i) Issuing the Wahgoshig 300,000 common share purchase options of Sage exercisable at \$0.16 per share until the date that is five years from the date of execution of the Wahgoshig MOU.
- (ii) Issuing the Wahgoshig 72,000 SOR shares.
- (iii) Helping Wahgoshig-related businesses take advantage of opportunities created by the exploration work done on the Kerrs Property.
- (iv) Providing the Wahgoshig members additional SAGE share options in an amount equal to that offered to other members of SAGE's Kerrs Property Exploration Committee.

- (v) Contributing on a quarterly basis to the Wahgoshig Community Fund: 2% of all monies spent on exploration work on the Kerrs Property for the duration of the Wahgoshig MOU.
- (vi) Providing Wahgoshig members with preferential treatment when hiring workers for exploration activities.
- (vii) Consulting with the Wahgoshig before beginning any new exploration activities on the Kerrs Property.

The Wahgoshig MOU requires that SOR, SAGE and the Wahgoshig enter into an impact benefit agreement (IBA) following the receipt of a positive feasibility report with respect to SOR and SAGE mining claims. Once a consensus between all three parties is reached regarding the IBA, SOR and SAGE can commence activities on the Wahgoshig property.

In addition to the Wahgoshig MOU, SOR and the Wahgoshig entered into a Corporate Advisory Agreement. In this agreement, the Wahgoshig agreed to provide SOR with advisory services related to SOR's exploration activities on the traditional land of the Wahgoshig.

As compensation for these advisory services, the Wahgoshig would receive from SOR:

- (i) \$3,000 per month.
- (ii) 10,000 common share options exercisable at a price of \$1.00 until one year from the date that SOR shares are listed for trade on a recognized exchange.
- (iii) the reimbursement of all reasonable expenses incurred by the Wahgoshig in connection with the provision of the relevant advisory services.

SOR may terminate the Corporate Advisory Agreement at any time, with ten days notice, should the Wahgoshig fail to make reasonable efforts to provide the advisory services stated in this agreement. The Wahgoshig may terminate the Corporate Advisory Agreement at any time, with ten days notice, should SOR fail to meet its obligations pursuant to the agreement.

On June 15, 2008, an NI 43-101 qualifying report was filed to support the exercising the Option with SOR and SAGE deemed to have entered into the Joint Venture Agreement. The Owner shall have a back-in option on the Kerrs Property on the terms and conditions contained in the Joint Venture Agreement.

On August 4, 2010, The Kerrs Property was acquired from SAGE for consideration of 2 million Common Shares, and a deferred cash payment of \$400,000 was paid to SAGE before the effective agreement date of December 22, 2010. SOR's obligation to pay the deferred purchase

price is secured by a charge on the Property. SAGE will receive a 2% NSR on the Property of which 1% can be purchased from SAGE by SOR at any time for \$0.5 million. SOR will also pay to SAGE an advance royalty payment of \$125,000, payable in five annual instalments with the first payment due on December 22, 2011.

On April 21, 2011, SOR entered into an Option Agreement with Goldcorp Canada Ltd. (Goldcorp) and Goldcorp Inc. concerning the mining rights of 46 leases located in Kerrs Township in the Larder Lake mining division (the Property). The Property is held by the Porcupine Joint Venture (PJV) between Goldcorp and Goldcorp Inc. The Option Agreement provides SOR with the opportunity to earn a 60% interest in the Property by spending \$2.6 million in exploration expenditures, completing 14,000 m of core diamond drilling and making option payments of \$150,000 prior to December 31, 2014, and issuing \$900,000 worth of common shares of SOR prior to the exercise of the option. Whether or not SOR exercises the option, the Option Agreement provides that SOR is committed to spending \$1.1 million in exploration expenditures, completing 5,000 m of core diamond drilling, making option payments of \$100,000, and issuing \$300,000 worth of common shares of SOR prior to December 31, 2012.

Once a 60% interest is earned in accordance with the terms of the Option Agreement, SOR, OAK and PJV will enter into a definitive joint venture agreement. SOR will be the operator of the Property during the option term and remain the operator unless and until the PJV acquired a majority interest in the joint venture.

Upon SOR earning a 60% interest, Goldcorp may elect to earn back from SOR a 20% interest in the Property by performing \$2.6 million of exploration expenditures within two years of exercising its earn-back right. If Goldcorp successfully exercises this earn-back right SOR would own a 40% interest.

Upon SOR earning a 60% interest and if Goldcorp does not exercise its earn-back right, following the expenditure of \$5 million on joint venture operations on the Property, Goldcorp would have the right to exercise the right to acquire from SOR a 20% interest in the Property by paying SOR 125% of the aggregate of the total minimum qualifying expenditures incurred by SOR during the option period plus 100% of SOR's pro rata contribution to the joint venture expenditures.

On execution of the Option Agreement, SOR paid \$25,000 to Goldcorp, as manager of the PJV, and SOR issued 255,000 common shares to Goldcorp and 245,000 common shares to Goldcorp Inc. The common shares are subject to a hold period expiring August 22, 2011.

# 4.4 ENVIRONMENTAL, PERMITTING, ASSESSMENT WORK AND CLOSURE PLAN

There are no outstanding environmental or permitting issues with respect to surface rights or access to drilling areas. No stream crossings are anticipated during the next phase of surface

drilling. The company should proceed with a preliminary baseline environmental survey contingent on the results of the recommended program. This work should be initiated during the summer of 2011. The Temiskaming Forestry Alliance (TFA) recommends that the existing logging road network should be used as much as possible. SOR management has committed to best practice mineral exploration guidelines (PDAC E3 Environmental Guidelines cited in the Wahgoshig MOU)] involving drill site preparation, water containment and drill site reclamation.

As of April 26, 2011, the MNDM has approved assessment work submissions on claims 3007429, 1140877, 3007398, 3013253, and 4202857, reporting work reserves of \$168,451; \$509,724; \$2,137; \$3,036; and \$72,353 respectively. All claims registered to SOR are in good standing with sufficient work credits in reserve. The 14 claims underlying Abitibi Lake require a total of \$184,000 in work expenditures subject to an order of time extension which expires on December 31, 2011.

# 5 ACCESSIBILITY, LOCAL RESOURCES, PHYSIOGRAPHY AND INFRASTRUCTURE

The Kerrs Property is located in north-eastern Ontario approximately 90 km east-northeast of Timmins and 70 km north of Kirkland Lake. The appropriate NTS sheets are the Matheson 1:50,000 NTS sheet 42 A/9 (north part) and the Low Bush 1:50,000 NTS sheet 42 A/16 (south part). The Property is accessible by an all-weather gravel road which heads northward along the Munro Esker from provincial Highway 101, 24 km east of the town of Matheson (see Figure 4-1). The Property's southern boundary is 22 km north of Highway 101 along this gravel road. From there, a network of old logging roads, in good condition, gives easy access to most of the Property.

The Abitibi region of north-eastern Ontario has long had and continues to have an active economy based on mining, mineral exploration, and forestry products. Its mining history dates back to the discovery of gold at Timmins in 1909 and at Kirkland Lake a few years later. The region has produced gold from many deposits stretching from the Timmins area on the west and eastward to the Rouyn-Noranda area, near the Quebec border. Because of this history, a large workforce skilled in mining exploration, mining, and processing of gold ores is locally available. Related goods and services are also readily available. The Hydro One power grid passes approximately 20 km to the south of the Property.

One producing gold mine and one recently-closed mine are located 20 km east of the Highway 101 at the Munro Esker road intersection. The Holloway Mine, a Newmont operation with reserves of 2,800,000 tons grading 0.189 oz/ton gold (December 31, 2002), continues to operate, producing 1,500 tonnes/day. The Holt-McDermott Mine, a Barrick Gold operation grading about 0.19 oz/ton gold (6.5 g/t), and a 3,000 tonnes per day (tpd) mill, closed in October 2004. It is located 42 km by road from the Kerrs Property.

Topographic relief on the property is low and flat, with several small kettle lakes occupying topographic depressions. This characteristic is governed by the fact that the property is covered by thick sand and gravel deposits of the Munro Esker and glacio-lacustrine sediments of Pleistocene Lake Ojibway; there are no rock outcrops. The esker flattens and thins out along the western edge of the Property along the Bell River, where sand gives way to clay. A subtle topographic high is oriented north-south intermittently along the length of the Property. Elevations from mean sea level range from highs of over 310 m in the central area, to less than 270 m in the west and extreme northeast, near Lake Abitibi.

Because extensive, historical overburden drilling was done on a large part of the property, overburden depths are known with relative accuracy and vary widely between 10 m and 80 m,

and average about 40 m. Drainage is largely subterranean and flows towards the Bell River on the west or towards Lake Abitibi to the northeast.

The Property has been subjected to historic logging activity. As a result, first growth trees are essentially absent from the Property, and the area has been replanted with jack pine. These trees currently average 5 m in height. Stands of mature jack pine, spruce, and birch occur along the northern and western extremities of the Property. The area around the west boundary of the Property is swampy.

The region has a cool continental climate (Köppen classification - Dfc) featuring long cold winters and cool, variable summers. It is not uncommon to have winter temperatures range from -20°C to -40°C. Summer temperatures average in the  $+10^{\circ}$  C to  $+15^{\circ}$  C range and may reach above  $+30^{\circ}$ C. Average winter snow accumulation is 2 m to 3 metres. There is year round access because there are few swamps and watercourses, and the ground is sand and gravel.

# 6 HISTORY

# 6.1 EXPLORATION HISTORY

The initial impetus for gold exploration came in the 1960's, when gold-bearing boulders assaying as much as 3 oz/ton were discovered by a prospector in the area of East Ford Lake about 1.5 km south of the south property boundary. These boulders were sitting on top of the Munro Esker. The earliest known exploration activity on the property occurred between 1963 and 1966 when Area Mines Ltd. explored for asbestos in the ultramafic rocks underlying the ground. Eight short diamond drill holes were completed, but no significant results are known.

As a result of this discovery, Kennco Exploration (Kennco), under the supervision of C. J. Sullivan, conducted a sampling program of sands north (up-ice) of the Ford Lakes area in 1964-1965. The soil samples were analyzed for gold and mercury. During this time, more gold-bearing boulders were discovered, with assays between 0.01 oz/ton and 0.94 oz/ton gold. Kennco also conducted limited induced polarization surveys and diamond drilling. A number of anomalous areas within one mile of the mineralized float were outlined and six diamond drill holes were completed. No significant gold values were returned.

After that, work on the property was nominal until, in 1977, Noranda Exploration Co. Ltd. (Noranda) began an exploration program that would be active for the better part of the next eleven years. In 1977, Noranda completed an airborne magnetic and electromagnetic survey. Surface sampling indicated that gold was present in soils farther north than the area of the Kennco drilling.

In 1978, 44 claims were staked and Noranda covered these with ground geophysical surveys. In early 1979, most of the area up-ice as far as Lake Abitibi was staked by Noranda, Dome Exploration and C. J. Sullivan, in partnership with K. Bradshaw of Timmins. The Sullivan-Bradshaw claims were optioned to Noranda. At this time, the property size was 224 claims, and was referred to as the *Kerrs 1-77 Property* by Noranda.

Similar exploration programs, designed to find the source of gold-bearing float, were conducted on lands to the north, northwest, and west of the Noranda claims, at that time held by Esso Minerals, Utah Mines, and Dome Exploration respectively.

Between 1979 and 1983, Noranda conducted a \$1.0 million exploration program over the next four years. This work included geophysics, reverse circulation (RC) drilling, and reconnaissance diamond drilling. Line-cutting, VLF, electromagnetic, magnetic and I.P. surveys were also completed. RC drilling in 114 holes totalled 15,515 ft (4,723 m). Diamond drilling of 17 holes totalled 13,100 ft (3,988 m). During this time, Noranda staked more claims, increasing the number to 258. Ninety had been optioned from C. J. Sullivan.
As Charlton (2003) noted, the RC drilling was significant for two reasons:

- It allowed a correlation between bedrock geology, which was previously unverified, and surface geological mapping, and airborne geophysical results.
- It traced gold from the surface into bedrock till.

By the time the final RC drilling was completed in the mid-80s, a relatively detailed picture of the glacial overburden had emerged.

Forty-four RC holes were drilled in 1979, yielding anomalous gold values that suggested multiple sources. This was followed in 1980 with geophysics and 36 RC holes which outlined five areas warranting further interest. Four of the five had anomalous gold values at or near bedrock, suggesting a nearby source, and diamond drilling was proposed. Twenty-four RC holes were drilled in 1981; this yielded two new gold anomalies. Follow-up diamond drilling on the South Grid (7 holes totalling 5,537 ft) intersected thick sequences of favourably-altered rocks.

In 1982, individual pulse electromagnetic (EM) surveys were conducted down diamond drill holes K-82-1 (just west of Bell Lake on the Jam Lake Grid), K-80-3 and 4, and K-81-2 (all located in the South Grid). No significant results were returned. In 1982, seven diamond drill holes totalling 4,587 ft were also completed. K-82-2, drilled to test the northward gold dispersion trend (up-ice) from overburden holes 129 and 143, intersected low grade gold mineralization. Low grade mineralization was also intersected in K-82-4, and drilled to follow up on anomalous gold values in RC hole 234 just west of Bell Lake (on the North or Jam Lake Grid).

As this was Noranda's first experience with an overburden drilling program, the company retained Overburden Drilling Management (ODM) of Ottawa in 1983 to assess Noranda's procedures for sampling and analysis. ODM found that Noranda's sampling, logging, and sample processing procedures were inadequate, and therefore they had to re-log, resample and reinterpret the lower portions of the Noranda RC holes. This re-interpretation by ODM allowed distinction between the lowest, or earliest, basal till which is the critical unit in trying to locate near-source transported gold, in addition to other overlying tills previously unrecognized as such. ODM recommended a smaller reverse circulation drilling program to follow up 3 areas of significant gold in overburden. Ten additional reverse circulation holes were drilled to confirm and better define the anomalies. Three diamond drill holes were drilled on the South Grid to follow-up on the overburden results. These 3 holes yielded significant gold, including 5.4 g/t Au over 1.1 m in K-83-1, 9.7 g/t Au over 0.2 m in K-83-3, and several additional encouraging intervals.

Following the 1982-1983 season, no work was conducted on the property until July 11, 1986 when Noranda signed a Joint Venture agreement with Vital Pacific Resources Ltd., whereby Vital

Pacific would provide funding for an extensive diamond drilling program on the Kerrs 1-77. Noranda became project operators and the project name was changed to *Vital Pacific Project*.

From September 1986 to January 1987, a diamond drilling program consisting of 15 holes totalling 13,604 ft (4,141 m) was completed: holes K-86-1 to K-86-13, plus K-87-14 and 15. Cumulative drill footage on the property to this time amounted to 26,704 ft (8,129 m).

The first 13 holes were drilled on the South Grid which covered the southern half of the Noranda claim group. This drill program was designed to test the gold potential of an intrusive quartz-feldspar porphyry (QFP) and to test areas up-ice from RC hole geochemical gold anomalies. K-86-1 to K-86-13 provided an improved interpretation of the bedrock geology and were targeted on I.P. resistivity anomalies and bedrock source areas of gold in overburden over the South Grid. Several gold-bearing intersections were obtained in quartz-feldspar porphyry, including 0.075 oz/ton Au over 9.7 ft, 0.089 oz/ton Au over 0.9 ft, 0.077 oz/ton Au over 1.1 ft, and 0.095 oz/ton Au over 6.8 ft. Best intersections were in K-86-1, K-86-2, and K-86-5.

K-87-14 and 15, drilled west of Jam Lake in the northern part of the claim group, intersected mafic volcanics cut by quartz-feldspar porphyry (QFP) and a northeast striking diabase. These holes were drilled to test resistivity highs on the north-western part of the Jam Lake Grid, approximately 600 m west of Jam Lake. QFP interpreted to correspond with an I.P. resistivity high trending at 045° azimuth, was intersected. The enveloping volcanics were interpreted to dip steeply northwest. No significant mineralization was intersected in either drill hole.

Further diamond drilling in 1987 on the Jam Lake Grid was targeted to test the gold potential of a geologically complex area of intrusive porphyries and highly altered ultramafics and mafic volcanics. As with holes K-87-14 and 15, these holes were targeted to test resistivity highs interpreted to correspond with intrusive porphyries. Three holes (K-87-16, 17, and 18) were drilled during September to October, 1987, all along Section 3600N, just south of Jam Lake. This drilling totalled 3,456 ft (1,052 m). K-87-16 intersected significant gold mineralization – 0.073 oz/ton Au over 34 ft of core length (2.50 g/t Au over 10.4 m) – within intervals of silicification and quartz-green carbonate altered volcanics. K-87-18 was drilled to intersect this mineralization nearer to surface, but was not successful in doing so. The resistivity highs along Section 3600N did correspond to QFP. The QFP, where fractured and silicified, is enriched in gold. More drilling was recommended in the vicinity of K-87-16. Total cumulative footage drilled on the Kerrs Property at this time was 30,460 ft (9,272 m).

Four additional holes totalling 3,198 ft (Guy, K., 1988) were completed in early 1988 on the Jam Lake Grid, in the vicinity of K-87-16, in an effort to expand upon this mineralization. The logs and locations for K-88-20, 21, and 22 are available in the Noranda files; however, the log for K-88-19 is presumably missing. Total length of the available three holes is 2,618 ft so, presumably,

the missing hole was 580 ft in length. Using Guy's footage, the total amount of drilling completed on the Property stood at 33,838 ft (10,301 m) in 1988.

K-88-20 and 22 intersected interesting gold mineralization. K-88-20 intersected 1.09 g/t Au over 7.2 m, and 11.69 g/t Au over 0.76 m. K-88-22 intersected three mineralized intervals : 1.69 g/t Au over 1.83 m, 1.63 g/t Au over 3.04 m, and 2.83 g/t Au over 1.67 m. Guy (1988) states that the zone (Jam Lake Zone) has now been traced for 300 ft – from section 35+50 N to section 38+50 N – and that it occurs at the basalt/ultramafic contact, appears to strike at 040° azimuth and to dip vertically. He also states that the true width of the enveloping alteration zone is in the order of 100 ft to 150 ft. Additional step-out drilling was recommended along the Jam Lake Zone.

There was no work done on the Property between 1988 and late 2004, at this time SAGE had taken control. Several corporate restructurings and mergers resulted in the property changing hands. In 1991, Hemlo Gold Mines Inc. acquired all of Noranda's gold property assets, including the Kerrs Property. In 1996, Hemlo merged with Battle Mountain Canada Ltd.; Battle Mountain Gold thereby acquired the Kerrs Property. In January 2001, Battle Mountain Gold and Battle Mountain Canada Ltd. merged with Newmont Mining Corporation. Through this series of events, Newmont Canada Limited acquired the Kerrs Property, as well as several additional Abitibi gold properties.

SAGE, formerly Sahelian, and Newmont reached their agreement whereby SAGE acquired the Property as part of a larger property agreement on April 28, 2003. SAGE subsequently staked five adjoining claims in October and November of 2003, and acquired the Kerrs North claim by option in November 2003. All of these claims have been integrated into the Kerrs Property.

In late 2004, SAGE began a program that lead to the identification of drill targets on the property. The company conducted a Mobile Metal Ion (MMI) soil geochemical survey, a ground magnetic survey and a Landsat structure study.

The 2005 Phase 1 (August to November) and 2006 Phase 2 (January to April) drilling programs consisted of 16 holes (K-05-01 to 07 and K-06-08 to 16) totalling 7,206 m following up on the Jam Lake Trend in the vicinity of the Noranda drill holes 87-16 and 88-20, as well as targeting specific MMI soil gas and resistivity anomalies.

In August 2006, a soil geochemical program, Mobile Metal Ions (MMI), was carried out on the Kidston & Dyment Option and the analysis and data were processed in September and October of 2006. The results of these activities are discussed in Hubacheck, 2008 (see *Section 18*).

In June 2007, a Stage 1 and 2 archaeological assessment was prepared by White Spruce Archaeology for the 2007 proposed drill sites identified by SAGE and SOR. Stage 1work involved collecting and reviewing relevant regional archaeological data and reviewing the map

biography information collected by Anthropologist Peter Armitage, as well as defining the locations of potential drill sites. Based on the information derived from the Stage 1 process, areas of potential archaeological/heritage value were identified and Stage 2 work commenced. This involved identification and subsurface testing near the reported coordinates of the seven drill locations in the field study area. It also involved a field inspection of the locality along the shores of Lake Abitibi that is of cultural importance to the Wahgoshig First Nation. The seven proposed drill locations are found around the margins of Bell Lake, with two pairs of drill holes being reported with the same coordinates (for example, K07-17, 18 and K07-22, 23). Stage 2 work involved the excavation of a 58 shovel test-pits and the inspection of any exposed soil surfaces at the areas of interest (drill sites, areas of potential archaeological value). Buffer areas (approximately 100 m - 200 m) around the points of interest were inspected to provide a broad coverage of investigation.

During the phase 1 program in August 2005, a significant breakthrough resulted in the understanding of the stratigraphic and structural relationships of the gold-bearing quartz-carbonate breccias with respect to a regional mafic/ultramafic contact. With this knowledge, a traditional economic geological approach was applied in the five successive drilling campaigns to prove up a deposit. The encouraging drilling results from these campaigns have defined the *Kerrs Quartz Green Carbonate Breccia (KBX) deposit* which is postulated to be the *up-ice glacial source* for the East Ford Lake boulder train.

In May 2008, the Phase 3 drilling program completed 5 holes (K-08-17 to 21) totalling 2,167 metres. In August 2009, the Phase 4 drilling program completed 8 holes (K-09-22 to 29) totalling 1,747 metres. In July 2010, the Phase 5 drilling program completed 15 holes (K-10-30 to 43) totalling 5,944 metres.

# 7 GEOLOGICAL SETTING

# 7.1 REGIONAL GEOLOGY

The Greenstone Architecture Project, initiated by the Ontario Geologic Survey, was funded by the Discover Abitibi Initiative in 2004 to provide a multidisciplinary approach to better understanding metallogeny in the Abitibi greenstone belt. Its objective is to improve knowledge of the stratigraphy, volcanology, geochemistry, metamorphic petrology, and structural geology of the greenstone belt, emphasizing selected mineralized and barren areas in order to better understand base metal and gold metallogeny and geological architecture in the Timmins to Kirkland Lake region. Excerpts from Ontario Geological Survey (OGS) Open File 6154 are cited below.

The oldest major stratigraphic unit in the Southern Abitibi Greenstine Belt (SAGB) is the 2750 to 2735 Ma Pacaud assemblage. Although not much of the Pacaud assemblage currently crops out, or has been directly dated because of its lack of zircon-bearing volcanic units, the new inheritance data in younger volcanic assemblages suggests the Pacaud assemblage was considerably more widespread. The zircon data also support an age gap of about 5 Ma with the overlying Deloro assemblage (2730–2724 Ma; see Figure 8-1) in those parts of the Pacaud assemblage intruded by Ramsey–Algoma and the Kenogamissi batholiths in the west. A more significant gap of about 20 m occurs with the overlying Stoughton-Roquemaure assemblage where the Pacaud assemblage is intruded by the Round Lake batholith (see Figure 7-1). Thus, the Pacaud and Deloro assemblages are considered to have been regional basal supracrustal units within the SAGB. The Stoughton-Roquemaure and Kidd–Munro assemblages (2724–2710 Ma) are only found north of the PDDZ and south of the LLCDZ (Kidd-Munro assemblage also found in the Shining Tree and south Swayze areas), but no volcanism nor any inherited zircons of this age are present in the central area in the time interval between the Deloro and Tisdale assemblages. Truncation of these volcanic units by the deformation zones implies that horst and graben style synvolcanic faulting predated ductile deformation with uplift of the central area resulting in non-deposition in this area from 2724 to 2710 Ma, whereas voluminous volcanism (predominantly rift-related mafic and ultramafic in composition) occurs in the areas north and south of these postulated early faults. The volcanic rocks of the Tisdale and Blake River assemblages (2710-2696 Ma) are thickest and most extensive, have complete stratigraphic sections and are also locally truncated by the PDDZ and LLCDZ in the central area (see Figure 7-1). This suggests that dip-slip displacement on the regional faults changed with the central area of the greenstone belt experiencing greater subsidence during this period. Although there are numerous sill-like mafic to ultramafic intrusions of this age within the supracrustal assemblages, it is assumed that these were subvolcanic intrusions conformable with stratigraphy and were unlikely to have caused major amounts of uplift. After 2696 Ma, the tectonic regime shifted from volcanic construction to one dominated by deformation, plutonism and erosion accompanied by development of localized basins in-filled by sedimentary and volcanic rocks. The Porcupine assemblage was deposited with angular unconformity on older volcanic assemblages from about 2690 to 2685 Ma Porcupine assemblage volcanic centres occurred at both Timmins and in the north-eastern part of the Shining Tree area, regions which are also marked by extensive porphyry intrusions of similar adakitic chemistry and age to the volcanic rocks. The D2 event postdates the Porcupine assemblage as it is deformed by it, but D2 structures are unconformably truncated by, and thus predate, the Timiskaming. The D2 event resulted in localized folding and thrusting and early south-side up, dip-slip, ductile deformation on regional deformation zones. The Timiskaming assemblage ranges from 2676 to 2670 Ma and consists of conglomerate and sandstone, locally with volcanic rocks. It was deposited with angular unconformity on the older volcanic and sedimentary assemblages, typically in long linear basins with unconformable contacts along the north margin and in faulted contact with the PDDZ and LLCDZ to the south. Broadly synchronous with the syntectonic opening of Timiskaming basins in dilatational jogs, was D3 folding, only the late stages of which affected the assemblage. Left-lateral strike-slip movement along the PDDZ accompanied D3 and is interpreted to be associated with up to 13 km of sinistral offset of markers across the PDDZ in the Timmins area.





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#### FIGURE 7-2: REGIONAL GEOLOGY

# 7.2 PROPERTY GEOLOGY

# 7.2.1 Quarternary Geology

As noted previously, the property is entirely covered by thick glacial overburden, comprised of glacial lake sediments as well as tills and esker deposits, up to 80 m thick. This has resulted in no bedrock exposure on the Property. Latest, Wisconsinian-stage ice direction movement was  $160^{\circ}$ .

The extensive overburden drill program conducted on the Property by Noranda in the 1970's and 1980's has allowed a relatively detailed stratigraphic picture to emerge. In essence, the picture is one of multiple glacial advances and retreats, with intervening periods marked by the presence of lacustrine and related environments. Thirty to sixty meters of glacio-lacustrine sediments were deposited by glacial Lake Ojibway during the Quaternary. The north-south trending Munro Esker covers much of the Property and is composed mainly of sand and gravel. At least two, and locally three, separate till units are also present locally, at the bedrock interface.

The gold-bearing quartz boulders discovered near East Ford Lake in the early 1960's occurred in a thin patch of till overlying the Munro Esker and not in the esker itself, perhaps resulting in the formation of an ice island. Such till patches are common on eskers that were deposited as subaqueous fans in deep water (Averill, 1983). During southward transport the boulders progressively moved upward to a level more than 45 m above the base of the glacier which may have formed an ice island as the glacial Lake Ojibway dewatered indicated by the 330m to 300m beach strandline events. The main dispersion train delineated by Averill may be the result of calving from the ice island of till boulders ice-rafted to the beaches (Averill, 2004).

The Munro Esker Complex is likely controlled by a major graben structure trending at Az 165, also coincident with the major ice transport direction (see Figure 7-3). The axis of the graben structure also may be coincident with a dominant bedrock ramp bounded by bedrock troughs indicated by topographic lineaments along the east side of Jam Lake. High grade gold-quartz glacial boulders, recovered down ice from Bell Lake, approximately 1.5 km south of the Kerrs property, have been assayed for gold/silver and analysed for multi-element ICP. Results show background levels of arsenic, copper, chrome and boron with enrichment of lead, consistent with typical analyses returned from the green carbonate breccia mineralization encountered in the Kerrs Gold Deposit which trends at Az 040°. High grade visible gold in this boulder sample assayed 91.5.g/t Au and 23g/t Ag. The gold/silver ratio is also similar to the higher grades observed in K-05-01 which returned 33.4 g/t over 0.44 m and 20.9 g/t over 1.5 m at vertical depths of 220 m and 290 m respectively. There is compelling evidence that the *East Ford Lake gold-bearing boulders* were glacially eroded from subcropings of the Kerrs Gold Deposit, possibly below and on strike of Bell Lake (Hubacheck, 2011).



#### FIGURE 7-3 OVERBURDEN DEPTH CONTOURS WITH RCH LOCATIONS

#### 7.2.2 Bedrock Lithologies

The bedrock geology of the region in the vicinity of the Kerrs Property, shown in Figure 7-2, is entirely overburden-covered and therefore must be inferred from diamond drill hole core, bedrock chips from RC drill holes, from regional magnetic survey interpretation, and from the closest relevant outcrop areas in the general vicinity. The area along strike to the west of the Kerrs Property is underlain by a thick sequence of pillowed and massive, mainly tholeiitic basalts which are south-facing and steeply north-dipping. Within this sequence are thin units of felsic volcanic rocks – amygdaloidal rhyodacites and a tuff breccia of rhyolite, dacite and andesite.

This entire sequence is considered to be in the Kidd-Munro assemblage striking ESE at approximately Az 110°. Accordingly, it may be extrapolated to the southern half of the Kerrs Property from the area of abundant outcrop situated about 7 km to the south of the Property in north-eastern Munro Township. A new age of  $2706.8\pm1.2$  Ma from gabbro near the top of the Centre Hill complex in Munro Township confirms that this mafic to ultramafic intrusion, which intrudes the upper Kidd–Munro assemblage, is about 10 my younger than the assemblage and was not the heat source for the stratigraphically overlying Potter Mine VMS mineralization. The Centre Hill intrusion age is within error of the  $2704.9\pm1.9$  Ma age for the Warden–Munro

Complex in north-eastern Munro Township (Barrie 1999), thus indicating that they are both members of an extensive sill-like intrusive complex synclinally closing to the east in McCool Township (see Figure 7-2).

Data from drill hole information (Dome/Noranda/Sheltered Oak) present a hypothesized geological setting in which the area was initially covered by subaqueous mafic and ultramafic flows, with minor interbedded flow breccias, agglomerates and tuffs, some of which are rhyolitic in composition, and possibly local rhyolitic flows. These rocks were then subjected to emplacement of felsic plutonic rocks, as indicated by the numerous quartz-feldspar porphyries in the region, as well as by the presence of a larger body of fine to medium grained felsic intrusive rocks inferred from sparse drilling and geophysical interpretation to lie 2 km west of the Property (see Figure 7-1). Simony (1985) describes syenitic feldspar porphyry dykes, with little quartz in the groundmass, in Kerrs and to the west in Rickard Township.

These rocks were subjected to at least two periods of folding and deformation, as indicated by the regional geophysical and drill hole data. The first event suggests an isoclinal-fold event which tilted the rock layers into a near-vertical position. This was followed by a second D2 fold event, as indicated, for instance, by the magnetic patterns on the Property, which folded the rocks further about an axis trending from Az  $110^{\circ}$  then shifts to Az  $165^{\circ}$  approaching the anticlinal hinge zone as shown on the geologic (see Figure 7-2) and magnetic airborne maps (see Figure 7-4). The timing of the first fold event is unknown; data is limited for precise or relative timing. The later event post-dated all Archean rock units, but pre-dated emplacement of the Proterozoic diabase dikes.

A thick (200 m) ENE-striking diabase dyke cuts through all bedrock units at the north end of Jam Lake, just north of the Property, and across Chesney Bay through Lake Abitibi.

Little work other than exploration activities has been conducted on the Property. The following discussion on lithologies was taken from Charlton (2003) with verification from drill logs, and reports from Penna and Wakeford (1987) and Garber (1987).

Quartz-feldspar porphyry is pale green to grey with 10% glassy quartz eyes and 20 - 30 % feldspar phenocrysts up to 2 mm across. Alteration consists of sericitization to pale yellow-green colour and weak to moderate carbonatization. The QFP intersected in the North (Jam Lake) Grid area appears to be more mafic and contains a higher percentage of feldspar phenocrysts than the QFP intersected in the South Grid area. In fact, it is described in the Garber (1987) report as a porphyry with a predominantly pale greyish-green to dull red colour, an aphanitic to fine-grained groundmass, locally chloritic, and with 10 to 50% white to pink, fine to medium, anhedral to subhedral feldspar phenocrysts. The phenocrysts are mottled and indistinct. Locally it contains up to 3% rounded to elongate glassy grey quartz eyes up to 8 mm in size.

Massive dark green basalts and pillowed amygdaloidal flows were present in drill core. Massive sections are locally to moderately magnetic. Chloritization is the main type of alteration. Andesite intervals are described from K-87-16. They are light green to grey, aphanitic to fine-grained, and range from massive to foliated. Fine quartz-carbonate occurs as irregular stringers, blebs, and fine stockworks of veinlets. This andesite occurs only immediately above and below the quartz-green carbonate alteration zone, is variably altered, and contains ankerite and green carbonate (perhaps fuchsite – Garber, 1987), and is sericitized. Garber (1987) notes that the andesitic flows bear a notable, textural resemblance to the ultramafic rocks that lay beneath it; he proposes that it may simply be an altered equivalent.

Extrusive and possibly intrusive ultramafic rocks were present in drill core. Intrusive units appeared as thick, massive sections. Extrusive units occurred as thin-bedded, spinifex-textured units. Both may be dark green to black, non-magnetic to moderately magnetic, soft, and may contain many talc-chlorite-serpentine fractures and occasional thin asbestos seams. Locally thicker units of strongly foliated chlorite-talc schist occur.

Less abundant rock types include banded jasper-chert-magnetite iron formations, which seem to occur between basalt flows. Three types of dykes were encountered: a moderately magnetic diabase dyke, a fine-grained mafic volcanic dyke (Noranda appellation), and fine-grained felsic dyke.

# 7.2.3 Stratigraphy, Structure, Metasomatism

The volcanic stratigraphy to interpreted to have a north-westerly strike in the South Grid area, changing to a north-easterly strike in the North (Jam Lake) Grid area (see Figure 7-2), as indicated by magnetic patterns. The Kerrs Property is underlain by a series of ocean floor tholeiitic basalts, ultramafic flows and sills, and felsic volcanics. These have been intruded by felsic porphyries of hypabyssal environments, as indicated by their fabric, and by later diabase dikes.

The mafic volcanics have been described in drill logs as massive to pillowed, with typical, widespread greenschist facies mineralogy with pillow selvages of chlorite-epidote-carbonate. The ultramafic rocks tend to be massive, with local spinifex texture. The latter indicates that at least some of the ultramafic rocks are volcanic in origin; massive varieties may be intrusive due to high siliceous and magnetic susceptibility. Felsic volcanic rocks have been intersected in a number of drill holes, where flow banding has been described indicating proximal volcanic flows. In addition, felsic tuffs and breccias have also been noted in drill holes. Local flow breccias, agglomerates, and magnetite iron formations and interflow turbidite sediments form minor components of this series. The volcanic stratigraphy suggests a bimodal affinity, with at least some explosive volcanic activity recorded in the stratigraphy.

Lithologies identified in drill holes suggest that this stratigraphy has been tightly, to isoclinally, folded about north-trending, sub vertical axes. Subsequently, this entire tightly-folded sequence was folded about an east-west to ESE-WNW anticlinal axis. This anticlinal axis is interpreted to strike through the Property on Az 110° (see Figure 7-4 and Figure 7-5). A D2 fold deformation event is superimposed on the D1 open fold which has resulted in a second order syncline with the fold axis having a north-easterly strike of Az 040°.

Numerous feldspar (syenitic), to quartz-feldspar, hypabyssal intrusive rocks have intruded the volcanic rocks, and are semi-concordant with the general stratigraphy. This relationship suggests that these were probably emplaced before the two folding events. A silicification event is recorded in many drill holes and is present in all of the above lithologies, suggesting a syn to post-quartz-feldspar porphyry timing for the alteration. The silicification event appears to be contemporaneous with gold mineralization. It is characterized by a widespread alteration of the mafic/ultramafic rocks and porphyries, and by structurally-controlled quartz veining and quartz-carbonate stringer zones accompanied locally by green carbonate, fine pyrite and gold. The late silicification event may have resulted from nearby late granitic plutonism. Evidence of this is the granitic body of unknown dimensions found in drill holes about 2 km to the west of the Kerrs Property (see Figure 7-3).



#### FIGURE 7-4: STRUCTURAL GEOLOGY: MAGNETICS WITH ANTICLINAL D1 AND SYNCLINAL D2 FOLD AXES



#### FIGURE 7-5: STRUCTURAL INTERPRETATION WITH AIRBORNE MAGNETICS



# 8 DEPOSIT TYPES

# 8.1 VMS AND NICKEL-COPPER-PGE DEPOSIT TYPES

The upper Kidd–Munro assemblage is host to a major VMS epoch, which includes the giant Kidd Creek Mine, associated with high silica rhyolites and ultramafic volcanic rocks and smaller deposits, such as the Potter and Potterdoal mines in Munro Township, associated with ultramafic and mafic volcanic rocks. The ultramafic rocks in this assemblage are also considered to be highly prospective targets for magmatic Ni-Cu mineralization, such as the Alexo Mine and other deposits in Dundonald Township, and the Marbridge deposit in Quebec.

# 8.2 EPIGENETIC GOLD DEPOSIT TYPES

There were several phases of hydrothermal activity and gold mineralization in the Timmins– Porcupine gold camp. Clasts of colloform-crustiform ankerite vein in conglomerate of the Dome formation at Dome Mine demonstrate early hydrothermal low-grade mineralization. Ankerite veining and minor mineralization in Dome and Aunor mines predate the Timiskaming unconformity, and may be related to D2 thrusting. Copper-gold-silver-molybdenum mineralization in the Pearl Lake porphyry predates main-stage quartz-gold veins in the Hollinger Mine and is post-Timiskaming sedimentation.

The bulk of the gold mineralization in Timmins, however, corresponds to auriferous quartz veining in extensional fracture arrays interpreted as syn- to late-S3 foliation. Consequently, this main-stage gold quartz mineralization at Hollinger–McIntyre and Dome mines and in other deposits was the result of late D3 events. Syn-deformation quartz-carbonate vein deposits are commonly spatially associated at the regional scale with Timiskaming-like regional unconformities and suggest an empirical relationship between large-scale greenstone quartz-carbonate gold deposits, deformation opening of these basins, and regional unconformities. Figure 8-1 illustrates the evolution of the Southern Abitibi Greenstone Belt deposits and mineralization episodes.

Gold occurrences of the Anoki and McBean properties are localized within or in the immediate proximity of the first-order Larder Lake–Cadillac deformation zone. Gold occurs in sulphidized Fe tholeiite flows (Anoki Main zone), in quartz stockworks within carbonate and carbonate-fuchsite-altered ultramafic rocks ("green carbonate", McBean and Anoki Deep zones), in quartz-sulphide zones hosted by Timiskaming assemblage clastic rocks and locally associated with feldspar-phyric dikes (40 East zone), and in quartz veining with sulphides in cherty to graphitic exhalite horizons enclosed in basalts (Anoki South). In all cases, mineralization is accompanied by extensive carbonatization. Drill cores from the McBean zone show that mineralization and alteration are most likely synchronous with the development of D2 fabrics.

Mineralized zones at the Anoki and McBean properties are part of a regionally extensive hydrothermal system that affected an approximately 20 km long segment of the Larder Lake–Cadillac deformation zone from the Kerr–Addison–Chesterville gold deposit (east) to the Anoki occurrences (west). Other similar gold deposits include the Cheminis and Omega deposits in McVittie Township. Most gold production and reserves are from sulphide-rich replacement ores in mafic (mostly tholeiitic) volcanic rocks, whereas native gold-bearing quartz stockworks in carbonate-fuchsite-altered ultramafic rocks ("green carbonate ore") are second in importance.

FIGURE 8-1: SOUTHERN ABITIBI GREENSTONE BELT EVOLUTION WITH DEPOSIT AND MINERALIZATION EPISODES



# 9 MINERALIZATION

# 9.1 DEPOSIT GEOMETRY AND MINERALIZATION CONTROLS OF THE KERRS GOLD DEPOSIT

The 3D geological sectional model defined by 41 holes including 3 historical holes, illustrates that the Kerrs quartz carbonate breccia deposit is stratabound occurring at the contact of a thick mafic pillow flow sequence overlying an ultramafic, magnetite-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350m to 425m below surface as shown on the schematic type cross-section on drill fence 1200N (see Figure 9-6). The aeromagnetic contours outline an arc-shaped feature interpreted as a sub-volcanic magma chamber floored in a rift basin, subsequently refolded into a recumbent synclinal structure, possibly overturned facing to the northwest in the same *compression* direction as the NNW-SSE D2 deformation event affecting the Porcupine Destor Deformation Zone.

The drill hole density has been systematic in all five drilling campaigns maintaining a 100 m drill fence spacing arrayed along 9 sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonal to the northeasterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake. No major cross-faults were observed, however 2 cross-cutting mafic dykes locally bifurcate the breccia trend. Gold mineralization occurs as pyritized quartz vein replacement breccias enveloped by quartz fuchsite carbonate vein breccias averaging approximately 10 m and alteration envelopes varying up to 40 m in thickness (see Figure 9-4). The stronger alteration envelopes are characterized by sericite/silica/+/- pyrite bounding the high strain quartz-pyrite replacement breccias. On section 1400N to 1500N, a hematite/sericite/silica alteration envelop is observed bounding the underlying sericite/silica/+/-pyrite alteration. A thick altered porphyry unit was also intersected below the quartz green carbonate breccias zone on these sections (see Figure 9-1). Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias (see Figure 9-3). These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages. Anomalous concentrations of trace elements such as molybdenum, lead and barium are found within the replacement breccias and to a lesser extent in the green carbonate breccias which envelope the quartz-pyritic vein breccias.

Main stage Au mineralization is hosted within green carbonate/quartz/fuchsite/ alteration interpreted to represent a fluid - generated hydraulic fracturing event of incompetent ultramafic flows, stratigraphically capped by competent thick Fe-rich andesitic flows. Concomitant with the

hydrothermal fluids are albitite dykes, also sourcing from the parent magma chamber (QFP dykes and sills-AEM mag low). In K-05-01, an albitite dyke cross-cuts a -z -fold fabric (see Figure 9-2). Hence, the presence of syn-deformational albitite dykes may have similar geochemistry and structural setting to albitite dykes observed at the Kerr-Addison and the Hollinger-McIntyre Mine.

#### FIGURE 9-1: KERRS 3-D MODEL SHOWING QUARTZ GREEN CARBONATE BRECCIA ZONE HOSTING KERRS GOLD DEPOSIT



# 9.2 MINERALIZATION AND ALTERATION IN THE KERRS GOLD DEPOSIT



FIGURE 9-2: QTZ/PY/AU REPLACEMENT VEIN BRECCIA IN K-05-01, SECTION 1100N

FIGURE 9-3: QTZ/PY/AU REPLACEMENT VEIN BRECCIA IN K-10-42, SECTION 800N



# FIGURE 9-4: QTZ/PY/AU REPLACEMENT VEIN AND QTZ/CARBONATE/FUCHSITE BRECCIA IN K-10-37, SECTION 1500N



FIGURE 9-5: COMPOSITE QTZ/PY/AU REPLACEMENT VEIN BRECCIA IN K-05-07 ON TYPE, SECTION 1200N



In DDH K-05-07, an intensely altered zone consists of silicified, sericitized, mafic volcanics with replacement / shear veins enveloped by ghost breccias (see Figure 9-5). The alteration system is characterized by pervasive silicification, seritization and dolomitization with intense shear veining abruptly bounding the top of the deformation zone from 411 m to 412 m. The base of the deformation zone is dominated by a major replacement type veining from 425.2 m to 427.5 m; ghost breccia clasts are angular with some partially ghost fuchsite clasts observed under microscope. A sericitized envelop bounds the upper portion of the shear vein system from 416.5 m to 421 m. A silicified, pyritized brecciated fracture zone bounds the shear vein system on the upper contact from 421 m to 425.2 m and the basal contact from 427.5 m to 431.3 m; fine to coarse py (1- 5%) is disseminated in smoky, grey silica flooding zones and aligned along margins of breccia clasts. Generally, the major shear vein system from 425.2 m to 427.5 m is sulphide poor with tr to .1%. A 2 cm wide graphite zone is seen in the major shear vein at 426.4 m with dark, grey smoky amorphous quartz from 424.6 m to 426.4 m.





# 10 EXPLORATION

# 10.1 Phase 1 to Phase 5 Diamond Drilling Programs

This *first time* resource estimate defining a new deposit in Kerrs Township is the culmination of numerous exploration ventures beginning in the early 1960's with the prospecting discovery of high grade glacial boulders sitting on top of the Munro Esker assaying up to 3 oz/ton Au near East Ford Lake. Notable exploration companies such as Dome Mines and Noranda carried out major exploration programs from 1979 to 1988. During that era, Noranda carried out systematic RC grid drilling which identified two up-ice basal till and esker geochem anomalies which were followed up with core drilling fence programs (15,024 m) located west and south of Jam and Bell Lakes. The discovery hole K-87-16 intersected significant gold mineralization – 0.073 oz/ton Au over 34 ft of core length (2.50 g/t Au over 10.4 m) – within intervals of silicification and quartz-green carbonate altered volcanics. No work was done on the property between 1988 and late 2004, at which time SAGE had taken ownership via Newmont. Exploration work was resumed by SAGE in 2004 to 2007 and carried forward by SOR in 2008 to 2010 to focus on the initial discovery holes near Bell Lake. During the phase 1 program, a significant breakthrough resulted in the understanding of the stratigraphic and structural relationships of the gold-bearing quartz-carbonate breccias with respect to a regional mafic/ultramafic contact.

With this knowledge, a traditional economic geological approach was applied in the five successive drilling phases to prove up a deposit which are summarized in Figure 11-1. The encouraging drilling results from these campaigns have defined the *Kerrs Quartz Green Carbonate Breccia (KBX) Deposit* which is postulated to be the *up-ice glacial source* for the East Ford Lake boulder train.

# 10.2 OTHER GOLD ZONES

There is little historic data from other areas on the Property; however, inferences from the combined information in historical exploration records, and SOR's geochemical and geophysical surveys, indicate two other potential targets as discussed below.

The first lies under the north-western portion of the claims, west of Jam Lake, which hosts the strongest basal till anomalies of the earlier overburden drilling program (RC holes 315, 406, 407, and 408). Noranda DDH's K-87-14 and 15 were planned to test an area thought to be the bedrock source of the gold in these RC holes. However, K-87-14 and 15 were intentionally drilled to the east of the West Trend target source area. They were targeted on resistivity highs thought to correspond with feldspar porphyry bodies. Feldspar porphyries were intersected, but gold mineralization was not; the overburden anomalies have never been tested.

Further south along the northern portion of the West Trend, K-82-2 and 3 were drilled just north of the Dome boundary on the trend, near RC hole 301. They were unsuccessful in intersecting gold mineralization, but did intersect several small feldspar porphyry bodies.

No further drilling was done along the West Trend. The West Trend appears to be two independent, separate trends, which together, happen to coincide with the  $164^{\circ}$  ice direction azimuth. There is, in fact, a northern source area (not yet discovered) and a southern source area (the anticlinal axis area mineralization).

In late 2004, SAGE began a program which would lead to the identification of drill targets on the property. Because of the lack of outcrop, it was felt that additional surface information would aid in locating drill targets and, in the winter of 2004-2005, SAGE conducted a Mobile Metal Ion (MMI) soil geochemical survey (Owens, 2004). The results of this survey indicate that the previously-identified bedrock gold anomalies at both the Jam Lake Zone and the western South Grid area have a signature recorded by the soil results. In addition, other patterns emerged from the data, including an elevated mafic-ultramafic metal association in the northwest corner of the Property, with Co and, in particular, Pd defining NW-trending anomalies. Finally, a Pd-Ag-Ni anomaly was identified along the south-eastern part of the property in the vicinity of diamond drill hole K-80-4, which intersected anomalous Ag, Cu, and Zn in rhyolite. Between 1980 and 1986, 15 diamond drill holes were drilled along and adjacent to the ENE-striking anticlinal axis interpreted to cross the South Grid of the Kerrs Property. Four of these, namely K-83-1, K-83-2, part of K-83-3, and K-86-5, lay outside and just west of the current Kerrs Property boundary. Best gold mineralized intersections were obtained in K-83-1, K-83-3, K-86-1, K-86-2, and K-86-5. All of these latter holes were drilled to test the bedrock up-ice from anomalous gold values obtained in RC holes 129, 143, and 131, which were drilled to the SSE of these drill holes.

DDH's K-83-1, 2, and 3 were drilled to test the southern portion of the West Trend. Drill logs of the 1983 holes are not available in Noranda documents. According to the exploration report, all 3 intersected encouraging gold mineralization, including 5.4 g/t Au over 1.1 m in K-83-1, 9.7 g/t over 0.2 m in K-83-3. In DDH K-86-2 a silicified quartz vein zone with 20% grey pyritic seams in a quartz-feldspar porphyry yielded 2.57 g/t Au over 2.95 m, 3.05 g/t Au over 0.27 m, 2.64 g/t Au over 0.33 m. These three holes were all drilled in a small area proximal to the Noranda/Dome claim boundary. K-83-1 was drilled on Dome ground. Follow-up drilling in this area continued to yield anomalous results. K-86-1, 2, 3, 4, and 5 intersected 2.57 g/t Au over 2.95 m, 3.05 g/t Au over 2.95 m, 3.05 g/t Au over 0.27 m, 2.64 g/t Au over 0.33 m, and 3.26 g/t Au over 2.07 m. Gold mineralization in this area is described from grey, pyritic quartz vein zones in QFP and from pyritic, fractured, brecciated basalt. K-86-5 (3.26 g/t Au over 2.07 m) were obtained in a brecciated basalt horizon with numerous quartz stringers and pyrite-filled fractures. K-86-6 and 7 were drilled farther to the north to test an I.P. resistivity anomaly with little encouragement.

# 11 DRILLING

TABLE 11-1: PROJECT DRILLING SUMMARY									
Previous Drilling Programs	Period	Holes	Metres						
			1 = 2 2						
NORANDA RC DRILLING	1979-83	114	4,723						
NORANDA DIAMOND DRILLING	1979-83	1/	3,988						
VITAL PACIFIC(K-86-1 to K-87-14,15)	1986-87	15	4,141						
VITAL PACIFIC extension: (K-86-16,17,18)	1987	3	1.052						
VITAL PACIFIC extension: (K-86-19.20,21,22)	1988	4	1,120						
Sub total			15,024						
2005 Surface Drilling Program: Phase 1									
SAGE GOLD INC.(K-05-01 to K-05-07)	Aug-Oct	7	3,000						
2006 Surface Drilling Program: Phase 2									
SAGE GOLD INC.(K-06-08 to K-06-16)	Jan-Apr	9	4,206						
2008 Surface Drilling Program: Phase 3									
SHELTERED OAK RESOURCES (K-08-17 to K-08-									
22)	May-Oct	6	2,167						
2009 Surface Drilling Program: Phase 4									
SHELTERED OAK RESOURCES (K-09-23 to K-08-									
29)	Aug-Nov	7	1,747						
2010 Surface Drilling Program: Phase 5									
SHELTERED OAK RESOURCES (K-10-30 to K-10-									
43)	June-Oct	15	5,944						
Grand Total Drilling		197	32,088						

In addition to historic drilling campaigns, there have been five subsequent phases of drilling between 2005 and 2010 performed by SAGE and SOR as listed in Table 11-1 and shown in Figure 11-1.





# 11.1 DRILL CORE LOGGING

# 11.1.1 Phase 1 to Phase 5 Surface Drilling Programs

During the phase 1 drilling program, HCG constructed a geological lithocode format designed to capture all pertinent geological and structural observations from core which can be adapted for preliminary computer 3-D modelling. The criteria employed the retrieval from historic and current drill logs which codify various degrees of alteration, strain intensity, quartz veining percent, sulphide percent, foliation/vein attitudes, and VG Magnetic susceptibility measurements were recorded at 3 m block intervals positioned in the core boxes.

# 11.2 COLLAR SURVEYING

At the onset of the phase 1 drilling program, an attempt was made to locate Noranda surface drill hole collar locations referenced from drill logs. The casing stem for K-88-20 was the only hole located which was chained into the new grid with elevation determined by a Garmin X12 GPS unit. In the 2005 drilling program, the casings were pulled on DDH's K-05-1, 2, 3, 4 and 5. Casings were capped and left in the hole for DDH's K-05-6 and 7. In the successive phase 2 to 5 drilling programs, the casings were left in all the drill holes and capped. The azimuth for most

surface drill holes were determined by turning off angles from cut grids using the sighting pickets for front and back sights and checked with a Brunton compass.

For the purposes of the NI 43-101 resource estimation QA/QC process, the APS dual-GPS device was used to re-check the casing dip and azimuth measurements of 17 drill holes in the resource study area in November 2010. A significant improvement in accuracy was achieved with drill holes having dips ranging between -75 degrees and -85 degrees.

HCG recommends to resurvey the remaining drill hole casings. In addition, the APS device should be used during the drill alignment process when collaring a new hole. The device can be attached to the top of the first casing length before final alignment of the drill chuck. The GPS azimuth recorded from the device would allow the drill operator to re-set the casing if necessary.

# 11.3 DOWN HOLE SURVEYING

During the 2005 and 2006 surface drilling programs, down hole Reflex tests were recorded every 100 m down hole with azimuth readings referenced to magnetic north. Some adjustments were necessary using a susceptibility meter to position Reflex tests to avoid magnetite-rich intervals.  $A + 10^{\circ}$  azimuth correction was applied to all readings to adjust for the magnetic declination. The surface diamond drill holes, drilled by Forage Orbit, used three metre long NQ diameter core barrels with a stabilizing shell employed on DDH's K-05-6 and 7.

During the Phase 2 winter drilling program, Heath and Sherwood Drilling, used full stabilizing equipment including hexagonal core barrel and extensional reaming shells.

During the Phase 3 to 5 drilling programs, Salo Drilling used full stabilizing equipment including hexagonal core barrel and extensional reaming shells.

During the Phase 5 drilling program, Levert Drilling, used full stabilizing equipment including hexagonal core barrel and extensional reaming shells.

# 12 SAMPLING METHOD AND APPROACH

# 12.1 SURFACE DIAMOND DRILLING

The method for sampling drill core has varied over time. Most of the past sampling has been focused on veins, shear zones and/or alteration, with an emphasis on sections that appeared to be higher in grade. Most past sampling carried out by Noranda was conducted using standard five foot (1.5 m) samples. In most cases, the sample boundaries were planned to coincide with lithological contacts. The core length of all mineralized samples was standardized between 0.5 m and 1.5 m.

# 12.1.1 Core Recovery and RQD Measurements

Core recovery and rock quality designation (RQD) are considered excellent within the Kerrs mineralized zones. Some local intervals with poor core recovery are generally associated with fault gouge zones and also occur in a few deeper holes with low core angles to bedding.

RQD measurements were routinely recorded after the core box was inspected to verify block positions at 3 m intervals and check core breakages between boxes for consistency. RQD measurements were always complete before any sampling, processing, photographing or logging procedures began.

# 13 SAMPLE PREPARATION, ANALYSES, SECURITY AND PROTOCOLS

#### 13.1 SAMPLE PREPARATION AND ANALYSIS

Samples were collected and prepared for shipping to the lab in a sample room adjacent to the core logging area by a sample technician. The procedure involved sawing the core into two equal halves. One half was placed into a plastic sample bag along with a sample tag and sealed with a plastic tie wrap. The other half was placed back in the core box and then the core box was placed back on core racks. Sample bags were prepared for shipping by packing them into sealed rice bags or plastic 20 litre pails.

The 2005 Phase 1 diamond drilling program involving overall geological management, including drill hole targeting: geological core logging: sampling: and assaying tasks. This was supervised by Peter Hubacheck, P.Geo. #1059 (APGO) on behalf of Hubacheck Consulting Geologists (HCG) who are affiliated with W.A. Hubacheck Consultants Ltd. The NQ and BQ core samples were collected by HCG personnel at the drill from the drilling contractors (Forage Orbit from Val D'Or) and transported to a core processing facility located at the Perry Lake Lodge, 20 km from the project site. Prior to geological logging and sampling, the core boxes were systematically photographed using a digital camera. The drill core was geologically logged for rock type, alteration, mineralization, percent recovery and RQD factors, prior to being sawn lengthwise in half. Individual core sample lengths (standardized from 0.5 m to 1.5 m) were selected by the HCG personnel on a geological basis to delimit the gold mineralization based on lithological rock type, alteration and structural features. The remaining half core was stored on site in racks after core processing.

The 2006 Phase 2 drilling program employed the same supervision stated above. However, Heath and Sherwood Drilling, based in Kirkland Lake were contracted to carry out the drilling, staging their operations from a winter camp established on the property at Bell Lake. Snowploughing operations of the Munro Lake access road was jointly shared by Heath and Sherwood, and Rosco Forestry operations.

The 2008-09 Phase 3 and 4 drilling programs employed similar supervision. However, Salo Drilling, based in Kirkland Lake, was contracted to carry out the drilling staging their operations from Matheson, Ontario. HCG personnel transported the core from the Kerrs Property to a core processing facility located at the Wahgoshig First Nation, 20 km from the project site. Sample shipments were picked up by Manitoulin Transport and delivered directly to Accurassay's lab in Thunder Bay.

In 2010, the phase 5 drilling program employed the same supervision with Levert Drilling operating out of Sudbury, and Salo Drilling contracted to carry out the drilling operations. Sample shipments were picked up by AGAT's lab personnel from a secure office facility located in Holtyre, Ontario.

# 13.2 SECURITY

In 2005, a core logging facility and core storage area were rented on a temporary basis from the Perry Lake Lodge. The core was temporarily stored outdoors in covered racks and also cross-piled nearby on covered palettes. Individual sample bags are sealed with tape.

In 2006, the core was stored on prefabricated wooden core racks located in a fenced yard area on the premises of the lodge property. In May 2008, the core storage location at Perry Lake Lodge was inspected by the author with some snow load damage of collapsed core racks affecting 25% of the racked core. The core boxes were restored in tarped racks and moved to a secure storage area on the lodge site. In 2009, all core was transported to a fenced storage yard with steel-roofed racks located on the Wahgoshig First Nation Reserve. All mineralized sections are stored in locked core racks inside the Wahgoshig Core Facility (see Figure 13-1).

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#### FIGURE 13-1: CORE PROCESSING FACILITY

# 13.3 ASSAY QUALITY CONTROL AND QUALITY ASSURANCE

In 2005, the core samples were bagged, labelled on site, and then transported in one-time-use wire sealed, rice fibre bags and 20 litre plastic pails by HCG personnel and delivered to Swastika Laboratories in Swastika, Ontario. At this facility, there was crushing of the total sample, splitting to 350 g, and milling using Rolls Crusher to 10 mesh. Gold analysis was by fire assay using a 30 g sample -AA finish. Gold analysis on samples > 1500 ppb was by fire assay using a 30 g gravimetric finish.

From 2006 to 2009, the phase 2, 3 and 4 drilling programs employed Accurassay Laboratories from Thunder Bay. Accurassay's Fire Assay/Pulp Metallic procedure is described as follows:

- Crush the entire sample to 90% -8 mesh and using a Jones Riffle split the sample into a one kilogram sub-sample.
- Pulverize the entire sub-sample to 90% -150 mesh and sieve through a 150 mesh screen.
- Assay the entire +150 portion along with two duplicate cuts of the -150 portion
- Report results as a calculated weighted average of gold in the entire sub-sample.

In 2010, the phase 5 drilling program employed AGAT Laboratories from Mississauga. AGAT's Fire Assay procedure is described as follows:

- Crush 5 kg of the sample to 75% passing 2 mm
- Split the sample to a 250 gm sub-sample
- Pulverize the entire sub-sample to 85% passing -75 mesh.

Fire assays were performed on a 50 gm pulverized sample using the AAS finish with a precision range of 0.002 - 10 g/t.

#### 13.3.1 Metallics

No metallics assaying was performed during the 2005 summer drilling program. No visible gold (VG) was observed in core. However, the presence of fine- to coarse-grained pyrite carried in two distinct styles of quartz veining was proven to be auriferous from intersections in DDH's K-05-01, 6 and 7. During December 2005, pulps and rejects from K-05-07 were assayed by an independent lab, Accurassay Labs of Thunder Bay. Preliminary analyses show an upgrading factor of +11% affecting 17 samples from the central gold interval from 419 m to 431.3 m showing an increase in grade from 2.34 g/t to 2.6 g/t (see Table 13-1). The higher-grade core of the zone was from 427.5 m to 431.3 m grades 5.72 g/t. The reverse affect is observed in the lower gold zone from 441 m to 445.5 m where the +10 mesh grades (5.97 g/t with Swastika versus 5.63 g/t with Accurassay) are overstated by a factor of +3%. The screen metallic results from Accurassay Labs show that 74% of the gold reports in sieve screens ranging from -200 mesh to -400 mesh. The average sample weight for the 47 samples is 647 grams. Re-analysis of the pulps by Accurassay Labs shows less overall variance and greater consistency when pulverized to -150 mesh or finer. However, in this case, as much as 26% of the very fine gold may be recovered grinding down to the -150 to -200 mesh size.

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Table 13-1 :Comparison of Assay Lab Methods				Swast	Acc	Swast	Accurassay				
DDH K-05-7: Mafic Qtz/Py Replacement Zone from 411m to						10 Mesh - 400 mesh					
Sample	From	То	Width(w)	atz %	Pv%		- 400 i	wxa	wxa		
33301	410	411	1	<b>q.</b> = <i>7</i>	. ,	0.27	0.30				
33302	411	411.5	0.5	40	10	1.58	1.76				
33303	411.5	412	0.5	60	5	1.58	1.94				
33304	412	413	1	10	0.5	0.56	0.16				
33305	413	414	1	5	0.1	0.07	0.08				
33306	414	415	1	2	0.1	0.07	0.06				
33307	415	416	1	2	0.1	0.1	0.05				
33308	416	416.5	0.5	5	0.1	0.25	0.28				
33309	416.5	417	0.5	20	2	0.4	0.38				
33310	417	418	1	2	2	0.5	0.54				
33311	418	419	1	2	0.5	0.48	0.50				
33312	419	420	1	2	1	0.01	1.57	0.01	1.57		
33313	420	421	1	2	1	0.53	0.46	0.53	0.46		
33314	421	422	1	5	0.1	0.83	1.06	0.83	1.06		
33315	422	423	1	20	0.1	1.25	1.14	1.25	1.14		
33316	423	424	1	10	0.1	0.8	1.30	0.80	1.30		
33317	424	424.6	0.6	40	7	4.25	4.47	2.55	2.68		
33318	424.6	425.2	0.6	60	2	1.67	1.68	1.00	1.01		
33319	425.2	426	0.8	100	0.1	0.36	0.53	0.29	0.42		
33320	426	426.75	0.75	95	0.1	0.3	0.29	0.23	0.22		
33321	426.8	427.5	0.75	100	0.1	0.61	0.43	0.46	0.32		
33322	427.5	428	0.5	60	5	3.86	5.43	1.93	2.71		
33323	428	428.5	0.5	40	7	10.27	11.21	5.14	5.60		
33324	428.5	429	0.5	30	5	4.67	4.07	2.34	2.03		
33325	429	429.5	0.5	5	1	2.78	3.54	1.39	1.77		
33326	429.5	430	0.5	25	3	5.68	5.35	2.84	2.68		
33327	430	430.6	0.6	15	1	1.93	2.10	1.16	1.26		
33328	430.6	431.3	0.7	25	5	8.66	8.12	<u>6.06</u>	<u>5.68</u>		
33329	431.3	432	0.7	1	0.1	0.39	0.46	28.79	31.92		
33330	432	433	1	5	0.1	1.84	1.86				
33331	433	433.9	0.9	2	0.1	0.26	0.30	<u>2.34</u>	2.60 WAG*		
33332	433.9	435	1.1	2	0.5	0.34	0.52	12.3m	12.3m _		
33333	435	436.2	1.2	5	0.1	1.61	1.56				
33334	436.2	437.6	1.4	1	NIL	0.17	0.17	Upgrade F	actor: -11%		
33335	437.6	439	1.4	5	NIL	0.05	0.04		_		
33336	439	440	1	25	0.5	0.6	0.53				
33337	440	441	1	10	0.25	0.37	0.39				
33338	441	442	1	30	7	5.97	5.63	5.97	5.63		
33339	442	443	1	5	0.1	0.64	0.69	0.64	0.69		

#### TABLE 13-1: COMPARISON OF ASSAY LAB METHODS

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33340	443	444	1	5	0.1		0.38	0.45	0.38	0.45	
33341	444	444.5	0.5	20	5		5.18	5.04	<u>2.59</u>	<u>2.52</u>	
33342	444.5	445.6	1.1	5	0.1		0.71	1.02	9.58	9.30	
33343	445.6	446.1	0.5	25	5		1.69	1.12			
33344	446.1	446.8	0.7	5	0.1		0.66	0.63	<u>2.74</u>	<u>2.66</u>	WAG*
33345	446.8	447.3	0.5	80	NIL		0.32	0.34	3.5m	3.5m	
33346	447.3	448.3	1	95	0.1		0.05	0.06			
33347	448.3	449.3	1	10	NIL	Nil		0.02	Upgrade	Factor	+3%
WAG*	Weigh	ted Ave	rage Grad	е							

\*\* significant assay upgrading with finer grinding to -150 mesh

Assay upgrading = green font

Assay downgrading = red font

During the Phase 2 drilling program, HCG reassayed a high grade interval of DDH K-05-01 from 372 m to 389.49 m having a weighted average grade of 3.48 g/t. The analyses were performed by Swastika labs pulverizing to 10 mesh with AA Fire Assay finish. The 20 pulp samples were reassayed by Accurassay Labs pulverizing to -150 mesh with pulp metallics performed on four samples. A recalculation of the weighted assay grade for this interval is 3.46 g/t denoting good reproducibility and low variance as shown in the scatter plot on Figure 13-2.



FIGURE 13-2: SCATTER PLOT SHOWING COMPARISON OF LAB ASSAY METHODS FOR DDH K-05-01

#### 13.3.2 Quality Control Standards and Blanks

In phase 1 to phase 5 drilling programs, quality control was maintained by atomic absorption (AA) with 157 check assays performed every 10 samples by Swastika, Accurassay and AGAT processing labs (see Figure 13-3). Also, 60 standards, provided by the labs, were inserted into the sample stream (see Figure 13-4) during phases 3, 4 and 5. The standard consisted of mineralized pulps assaying at 1.33 g/t +/- .12 g/t. HCG personnel also inserted 58 blanks through the labs during phase 3, 4 and 5 programs (see Figure 13-5). In phases 2 and 3, 13 quartered core samples of selected mineralized zones were re-assayed as duplicate analyses as shown in Figure 13-6.



FIGURE 13-3: SCATTER PLOT SHOWING COMPARISON OF CHECK ASSAYS WITH ORIGINAL AA AU ASSAYS

FIGURE 13-4: SCATTER PLOT SHOWING VARIANCE OF STANDARDS




FIGURE 13-5: SCATTER PLOT SHOWING VARIANCE OF BLANKS

FIGURE 13-6: SCATTER PLOT SHOWING VARIANCE OF QUARTERED CORE DUPLICATE SAMPLES



#### 13.3.3 QC/QA Conclusions

The use of screen metallics should be used on samples with VG, and on samples where VG is suspected, due to strong alteration characterized by silicification and pyritization hosted in high strain zones. Increasing gold tenure shows a direct correlation with the coincidence of replacement type quartz vein breccias and strong pyritization.

KGL recommends that the following adjustments be made to optimize the sample preparation flow sheet:

- Crush 5 kg of the sample to 75%, passing 2 mm.
- Split the sample to a 1 kg sub-sample.
- Pulverize the entire sub-sample to 85%, passing -200 mesh.
- Perform fire assays on a 50 gm pulverized sample using the AA finish with a precision range of 0.002 g/t to 10 g/t.

The check assays generally showed excellent reproducibility with the original AA fire assay, as shown by the scatter plot in Figure 13-3 with a variance of 2%.

The standards generally showed excellent reproducibility with the mean standard assay value of 1.33 g/t as shown by the scatter plot in Figure 13-4 with a variance of 2%.

The blanks generally showed excellent reproducibility with the mean standard assay value of 1.33 g/t as shown by the scatter plot in Figure 13-5 with a variance of almost 0%.

The quartered core duplicate generally showed reasonable reproducibility with the original fire assay of the split half core sample as shown by the scatter plot in Figure 13-6 with a variance of almost 24%. A continuation of this program is recommended to ascertain the nugget effect in mineralized zones with composite assays greater than 2 g/t.

# 14 DATA VERIFICATION

#### 14.1 DATABASE VALIDATION AND VERIFICATION

KGL reviewed Hubacheck's June 2008 NI 43-101 qualifying report and concludes that the report is accurate and reliable in documenting and verifying previous work. In addition, Geografix Inc., from Tucson, was retained by W. A. Hubacheck Consultants during phases 3 to 5 to assemble and digitize the geological, geochemical, and geophysical databases using the Mapinfo/Discover GIS software platform. The exercise resulted in an effective interpretative geoscience tool which has been employed by HCG throughout the report. Barbara Carroll, an independent QP, helped to validate and verify the assay database, drill logs and 3-D cross-section modelling using Mapinfo/Discover software to support the resource estimation process.

# 14.2 HCG INDEPENDENT SAMPLING

During Noranda's 1988 program, an independent sampling program was conducted on drill core from the QGC Zone in K-87-16 showing a consistent upgrading (60%) of results reported by Min-En Laboratories of 2.71 g/t versus 1.69 g/t by TSL Labs over a 10.4 m interval.

A follow-up drilling program also utilized Min-En, unfortunately no records are available to indicate their assay flow sheet. HCG elected to re-assay 47 samples collected from K-05-07 containing fine grained auriferous pyrite. Preliminary results are discussed in *Section 13.3.1*.

# 14.3 ICP TRACE ELEMENT STUDY: CHEMO-STRATIGRAPHIC CORRELATIONS OF GOLD ZONES IN K-05-01, K-05-7 AND K-06-12B

A 50 trace element ICP study was performed on drill hole K-05-7 in section 1200N involving 47 samples selected in sequence from the top of the mineralized zone at 411 m to the bottom of the zone at 447.3 m. A preliminary inspection of these results demonstrated a significant chemostratigraphic correlation of several trace elements with the gold-bearing zones discovered in DDH K-05-7. These results are described below:

- In hole K-05-7: As, Mo, and Pb show a remarkably high degree of correlation with significant enrichment within the three auriferous envelopes shown in Figure 14-1.
- Conversely, in hole K-05-7: Sr and V show a remarkably high degree of correlation with significant depletion within the three auriferous envelopes as shown in Figure 14-2.
- In hole K-06-12B: Mo, Ba and Cr show a remarkably high degree of correlation with significant enrichment within the three auriferous envelopes shown in Figure 14-3.
- In hole K-05-01: Ba, Cu and Sr show a remarkably high degree of correlation with significant enrichment within the three auriferous envelopes shown in Figure 14-4.

#### 14.4 CONCLUSIONS

The ICP trace element study suggests that gold was introduced in three chemo-stratigraphic episodes with the maximum deposition of gold with molybdenum, lead, copper, barium, chromium and arsenic occurring in the middle of the replacement vein breccia assemblage consisting of three hydrothermal phreatomagmatic cycles. These observations also support the structural interpretation involving a recumbent syncline with fold axis striking to the northeast with fold limbs vergent to the northwest.

The marked depletion of Ca, Mg, and Al seem to reflect a larger scale whole rock replacement process affecting the contact between the thick overlying mafic flow assemblage and the underlying ultramafic flows and interbedded, mafic feldspar porphyries. In this process, magnetite destruction occurs as well with ferrous iron recombining to form sulphide minerals in association with silica flooding and quartz veining. This alteration process generally correlates with magnetic lows.

The enrichment of gold with arsenic, molybdenum, copper and lead is observed in holes K-05-01 and K-06-12b which have albite intrusions and mafic, feldspathic intrusions underlying the green carbonate/red carbonate alteration package enveloping the auriferous pyrite-bearing green carbonate breccias.



#### FIGURE 14-1: ICP TRACE ELEMENTS K-05-07, ARSENIC + LEAD + MOLYBDENUM



#### FIGURE 14-2: ICP TRACE ELEMENTS K-05-07, STRONTIUM + VANADIUM



#### FIGURE 14-3: ICP TRACE ELEMENTS K-06-12B, GOLD + MOLYBDENUM + BARIUM + CHROMIUM



FIGURE 14-4: ICP TRACE ELEMENTS K-05-01, GOLD + BARIUM + COPPER + STRONTIUM

# 15 ADJACENT PROPERTIES

The Goldcorp Lease Property (see Figure 15-1) is contiguous to the northwest boundary of SOR's Kerrs Property. Dome Exploration explored the project area from 1977 to 1989. Fifty-five diamond drill holes totalling 10,279 m tested geophysical, stratigraphic and mineralized targets. Gold mineralization is associated with quartz; carbonate; pyrite in narrow, altered brecciated zones of mafic volcanic rocks and chert; jasper; pyrite; and magnetite. The volcanic stratigraphy shows an arc-shaped fold geometry which is interpreted from regional airborne magnetic surveys to be a large antiform occupying most of Chesney Bay and the eastern portion of Kerrs Township.

Historical drilling in the central portion of the property intersected significant amounts of quartz feldspar porphyry. The Kerrs Gold Deposit trend has been extrapolated over a distance of 1,500 m encompassing the auriferous porphyries drilled by Dome Exploration.



FIGURE 15-1: GOLDCORP LEASE PROPERTY MAP WITH MAGNETICS

# 16 MINERAL PROCESSING AND METALLURGICAL TESTING

There is no data to report in this section.

# 17 MINERAL RESOURCES AND MINERAL RESERVES

#### 17.1 RESOURCE ESTIMATION

#### 17.1.1 Summary

The Kerrs QGC Breccia Deposit resource estimate is supported by 34 drill holes arrayed on a grid layout on eight drill fence sections with zone correlations involving 37 composite zones. A 3-D cross-sectional model was generated from the cross-sections with interpreted mineral outlines which served as the basis to perform geometric polygonal and geostatistical calculations. The resource estimation process employed three methods to estimate the gold resources within the Kerrs QGC Deposit. In addition, the polygonal cross-sectional method helped validate the geostatistical methods, as well as serving as a comparison.

The 3-D geological solid model defined by 41 holes including 3 historical holes, illustrates that the Kerrs quartz carbonate breccia deposit is stratabound occurring at the contact of a thick mafic pillow flow sequence overlying an ultramafic, magnetic-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350 m to 425 m below surface. The drill hole density has been systematic in all five drilling campaigns maintaining a 100 m drill fence spacing arrayed along nine sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonal to the northeasterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake.

Gold mineralization occurs as pyritized quartz vein breccias enveloped by quartz fuchsite carbonate vein breccias and alteration envelopes, varying up to 40 m in thickness. Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages. Anomalous concentrations of trace elements such as molybdenum, lead and barium are found within the replacement breccias and to a lesser extent in the green carbonate breccias which envelope the quartz-pyritic vein breccias.

Block modeling was performed using ordinary kriging which employed a database of 2,117 assays, with 517 intersecting the mineralized zone. The breccias zone was interpreted on 25 m to 100 m spaced sections. The sectional interpretations were then wire-framed to create a 3-D solid with which to constrain the block interpolation process. The solid model was manually adjusted to precisely intersect the zone composites. The grade estimation process included modeling the

mineralized structures; statistical analysis; drill holes and composite data; variography; cut grade analysis; and block estimation using ordinary kriging. In addition, inverse distance to the second power; nearest neighbour; and manual polygonal estimation methods were performed for validation and verification purposes.

It is important to note that within the estimation process for all methodologies, a technique known as *Relative Elevation Modelling* was used; this technique is specific to MineSight<sup>TM</sup> Modelling System. This methodology is particularly important in the case of the Kerrs Deposit because it is extremely effective in addressing the issue of folded structures. This method allows the practitioner to precisely follow the trend of mineralization and structure on a body that has major deviations on strike and dip.

CUT-OFF	TONNES	GOLD	METAL (Oz)
GRADE	IUNINES	(g/t)	METAL (OZ.)
0.5	7,041,460	1.71	386,467
1	5,237,213	2.04	342,856
1.5	3,375,361	2.47	268,468
2	1,936,189	3.04	188,972
2.5	1,165,664	3.57	133,778
3	818,171	3.94	103,622

# 17.1.1.1 Kerrs Inferred Mineral Resource – KBX ZONE

TABLE 17-1: KERRS RESOURCE ESTIMATE (C)

#### 17.1.1.2 Estimation Methodology and Parameters

The resource estimation methods and parameters for the Kerr's Deposit are as follows:

- 41 drill holes were used to interpolate the KBX Zone.
- Composite length of 2 m was chosen and composites were weighted by length.
- Sectional interpretations were wire-framed to create 3-D solids of the zones.
- Zones were coded to the composites, and the block model, to constrain the modeling process.
- Composites for the mineralized zone were used to interpolate into the blocks for each zone.
- Ordinary kriging was used as the interpolator.
- Relative elevation modeling was used to guide the ellipse orientation that accounts for the variation in dip due to the synclinal structure.

- A minimum of two composites were used for each block and a maximum of two composites were used per drill hole; a maximum of 12 composites were used per hole.
- A cutting factor was applied for gold with outlier composites limited to 10 g/t Au based on cumulative frequency plots.
- A zero cut-off grade was used for the manual polygonal method.
- Minesight<sup>TM</sup> Software was used to perform the block modeling and estimations.
- Tonnage comparisons, with the polygonal cross-section calculation, checked within a variance of -9%. Grade comparisons showed an average variance of +20% for gold.
- Tonnage and grade variations between methods were within very reasonable limits as shown in Table 17-2.

CUT OFF	ORDINARY	INVERSE	0/ DIFE	NEAREST	%DIF
CUI-OFF	KRIGING	DISTANCE	70 <b>DIF</b> F	NEIGHBOR	F
0.5	1.71	1.67	2.0%	1.61	6.4%

TABLE 17-2: KERRS RESOURCE ESTIMATE (D)

#### 17.1.1.3 Cross Sectional Methodology and Parameters

The methods and parameters used for the manual cross-sectional method are as follows:

- Mineral outlines were constrained by minimum true thickness of 3 m.
- Composite grade modeling of KBX Zone used internal dilution thickness of up to 4 m at cut-off grades of 0.5 g/t Au.
- Average drill hole pierce point spacing was 92 m.
- Average true thickness of KBX Zone was 9.9 m.
- Average Specific Gravity of 2.81 was used to calculate sectional block tonnages for the KBX Zone.

Mineral resources that are not mineral reserves do not have demonstrated economic viability. The mineral resource estimates will be affected by environmental, permitting, taxation, socioeconomic, marketing, political, mining, metallurgical, and infrastructure issues. These issues have mainly economic impacts that have not yet been examined so they are, therefore, not discussed in this report.

#### **17.2** INTRODUCTION

The following *Sections* detail the methods, processes and strategies employed in creating the revised resource estimate for the Kerrs Deposit. Table 17-3 lists some conventions and abbreviations that are encountered throughout the resource estimation section of this report.

Abbreviation	Description
Au	Gold
g/t or gpt	Grams per Tonne (Gold Grade)
М	Meters
QA/QC	Quality Assurance / Quality Control
Χ, Υ, Ζ	Cartesian Coordinates, also "Easting", "Northing", and "Elevation"
DDH	Diamond Drill Hole.
N, S, E, W	Cardinal points, North, South, East, and West, respectively, and combinations thereof.
CV	Coefficient of Variation.

#### TABLE 17-3: REPORT CONVENTIONS AND ABBREVIATIONS

Before proceeding with the resource modelling, composites of the zones were created to delineate the geologic regions to mask and constrain the modelling process. This was performed by Peter Hubacheck of Hubacheck Consulting in Toronto, Ontario.

#### 17.3 Assay Database

The database has a total of 209 surface drill holes, covering the entire Kerrs Project area with 41 (including 3 historical) drill holes intersecting the Kerrs Deposit as it is currently defined.

AU	#	Min	Max	Mean	1st Q	Median	3rd Q	Std. Devn.	CV
ZONE	517	0	32.80	1.46	0.18	0.53	1.33	2.98	2.04
All	3,783	0	50.11	0.35	0.03	0.03	0.18	1.53	4.36

TABLE 17-4: SUMMARY STATISTICS FOR ASSAY DATA (UN-WEIGHTED)

AU	Length	Min	Max	Mean	1st Q	Median	3rd Q	Std. Devn.	CV
ZONE	471.5	0	32.80	1.25	0.18	0.53	1.33	2.56	2.05
All	3637.9	0	50.11	0.29	0.03	0.03	0.18	1.22	4.28

Summary statistics for the assay gold database containing 3,783 Au values (minimum value of 0.00 gpt Au and maximum value of 50.11 g/t) are shown in Table 17-4 and Table 17-5. The overall average Au grade (weighted by sample length) is 0.29 g/t, with a standard deviation of

1.22. However, when all of the assays are considered, the coefficient of variation<sup>1</sup> (CV) is 4.28 which is very high.

However, within the mineralized breccia/alteration zone, the summary statistics for the assay gold database containing 517 Au values (minimum value of 0.00 gpt Au and maximum value of 32.8 g/t) are shown in Figure 17-2. This analysis suggests that the gold distribution is not very well behaved in comparison with other Au deposits. The overall average Au grade (weighted by sample length) is 1.25 g/t, with a standard deviation of 2.56. However, in this case, when all of the assays are considered, the coefficient of variation (CV) is 2.05 which is moderate.

Figure 17-1 and Figure 17-2 show the histogram and basic statistics of all Au assays available and those falling within the breccia/alteration zone, respectively weighted by assay interval. Figure 17-3 and Figure 17-4 illustrate a plan view and long section views of the drill holes for spatial reference

<sup>&</sup>lt;sup>1</sup> The coefficient of variation is defined as  $CV=\sigma/m$  (standard deviation/mean) and represents a measure of variability that is unit-independent. This is a variability index that can be used to compare different and unrelated distributions.

⊕ His	togra	m														
File	View	Setting	s Exter	nal Histo	grams	Prope	erties S	Statistics								
Histog	ram	Report by	Cutoff Gra	ade												
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	0	0 05	10	15	2.0	2.5	3.0	35	40	4.5	5.0	5.5	6.0	6.5	7.0	- pol
		0.0	1.0		210	2.0		Cut	-off			0.0	5.6			
							<u>о</u> к			ancel	]					

#### FIGURE 17-1: HISTOGRAM AND BASIC STATISTICS OF ALL AU SAMPLES WEIGHTED BY ASSAY INTERVAL LENGTH









FIGURE 17-4: LONG SECTION VIEW OF DRILL HOLE DATABASE



### 17.4 TOPOGRAPHY

As the topographic relief is fairly limited and relatively flat lying, measuring between 270 and 310 meters, the author is satisfied with this preliminary surface for bounding the top of the model. Figure 17-5 shows the triangulated surface in plan view and Figure 17-6 shows the gridded topographic surface.







FIGURE 17-6: PLAN VIEW OF GRIDDED TOPOGRAPHY

# 17.5 DENSITY

The density used for tonnage calculations was 2.81.

A total of 284 specific gravity measurements using the picnometer method were recorded during the phase 5 drilling program. Each sample interval in the composite zones from the KBX zone used in the resource estimation has a corresponding SG measurement. The average specific gravity of 78 measurements recovered from composite zones from holes K-10-30, 32, 32A, 34, 35, 36, 37, 38, 40, 41 and 42 is 2.81.

# 17.6 COMPUTERIZED GEOLOGIC MODELING

A solids model was created using the drill hole intersections coded into the database for the alteration zones. The top and bottom of each zone was triangulated and a corresponding solid was created. The solids were then used to code the drill holes, create composites, and constrain the block modelling process. Therefore, for the purpose of the resource model, the solids were used to constrain the block model by matching assays to those within the corresponding breccia/alteration zone solids coded into the block model. The orientation and ranges (distances) used for search ellipsoids within the estimation process were derived from visual inspection, drill hole spacing, and observations of the gold mineralized zones.









Once the triangulated models were created for the tops and bottoms of each zone, ensuring that all drill holes were honoured, a 3-D solid of the zone was created using the top and bottom, and then the surface was linked together and a solid created. The Figures 17-7 and 17-8 show the solid models in long section and plan view.

Once the geologic solid was completed, it was coded in order to be assigned geological controls for constraining the estimation process. The composite and model coding process is designed to set a priority to insure that all grade and volumes are accurately interpolated into the appropriate solid and to insure that there is no overestimation of grade and tonnage or double counting within blocks that overlap geologic boundaries.

After the solids were completed, they were used to assign a numeric code into the intervals within the assay database so that they could be used to match the geology back into the assays and subsequent composite database. For this process to work, a numeric code must first be assigned to the assays depending on whether the intervals fall within the particular geologic solid or not.

The next step is to composite the drill holes at 2 m intervals as discussed above, but the zone for the individual geologic solid is then matched from the drill hole to the corresponding composite interval. At the transition boundaries, the composites are truncated and the remaining tails retained.

A necessary, parallel process involves assigning numeric codes based on the geology solid, back to the block model as described above. This step insures that the geology codes in the grade model are matched with the corresponding codes in the composite database.

In addition to a numeric code, it is necessary to assign a percent for the amount in which these geologic solids fall within the defined solid. This is primarily done when weighting the block model for the purpose of resource calculations.

At this point, both the composite database and the block model are prepared to set up the interpolation and grade modeling process detailed in the following sections.

It is important to note that relative elevation techniques were employed during the interpolation process which entails coding the composites and the block model with the relative distance from the footwall surface. This is then used to guide the interpolation process while using composites that follow the bended surface instead of limiting the interpolation strictly to one ellipsoid direction.

#### 17.7 COMPOSITING

In terms of selectivity and estimation quality, it was decided that a 2 m composite provided the best compromise between the number of composites available for estimation and a reasonable degree of dilution and regularization. Figure 17-9 and Figure 17-10 show the histogram and statistics for the composites of all samples, and those created for the breccia/alteration zone, respectively. Table 17-6 and Table 17-7 summarize un-weighted and weighted composites.

AU	#	Min	Max	Mean	1st Q	Median	3rd Q	Std. Devn.	сѵ
2	240	0.00	10	1.24	0.31	0.62	1.42	1.65	1.34
All	2,594	0	10	0.22	0.01	0.04	0.14	0.69	3.10

**TABLE 17-6: SUMMARY STATISTICS FOR COMPOSITES (UN-WEIGHTED)** 

	TABLE 17-7: SUMMARY STATISTICS FOR COMPOSITES (WEIGHTED)								
AU	Length	Min	Max	Mean	1st Q	Median	3rd Q	Std. Devn.	сѵ
2	471.5	0.00	10	1.23	0.31	0.62	1.42	1.63	1.33
All	3637.9	0.00	10	0.28	0.01	0.04	0.14	0.79	2.81



#### FIGURE 17-9: HISTOGRAM AND BASIC STATISTICS OF 2.0M COMPOSITES WITHIN THE ALTERATION ZONE

FIGURE 17-10: HISTOGRAM AND BASIC STATISTICS OF 2.0M COMPOSITES WITHIN THE ALTERATION ZONE





#### FIGURE 17-11: PROBABILITY PLOT AND STATISTICS OF ZONE COMPOSITES

FIGURE 17-12: LOG-NORMAL PROBABILITY PLOT AND STATISTICS OF ZONE COMPOSITES



# 17.8 AU HIGH GRADE OUTLIERS

Based on evidence that shows a relatively moderate nugget effect, compared to other gold deposits shown in the variography and the relatively consistent and continuous cumulative frequency plots,(see Figure 17-11 and Figure 17-12), there is little support for cutting grades or limiting the influence of high grade outliers at this time. Two values were cut to 10 gpt as they were very high in relation to the remaining population.

# 17.9 VARIOGRAPHY

To prepare for the implementation of the grade estimation method, variograms for Au grades were run using the 2.0 m composites. The variography was run over the entire dataset and then limited to within the solids. The spatial continuity estimator chosen for this study was the correlogram; this has been shown in previous work to be more robust with respect to drift and data variability, allowing for a better estimation of the observed continuity (Parker and Srivastava, 1988).

A down hole correlogram was generated in order to make an estimate of the nugget effect as shown in Figure 17-13. Figure 17-13 shows the abundance of data in this area. Geostatistical analyses were performed on the assays and composites, using no constraints, as well as the coded intervals within the zone solid.

Figure 17-14 shows the summary of the correlogram model within the mineralized zones used to guide the Kerrs deposit estimation. In Figure 17-14, the rotations of the angles are given according to the convention used by GSLIB in MineSight Medsystems (see the SAGE2001 documentation for more details). Figure 17-15 shows a sample of the example of the sample correlograms for the breccias/alteration zone.



FIGURE17-13: DOWN HOLE CORRELOGRAM.

# 🔁 AU ZONE rose.pdf - Adobe Reader File Edit View Document Tools Window Help 😝 🍓 • 🌍 🔶 🍣 1 /10 💿 🖲 98.7% • 🔚 🎛 Find 1 **Calculate Sample Variograms GSLIB** Rotation Conventions Nugget ==> 0.76613 C1 ==> 0.12710 C2 ==> 0.10678 First Structure -- Spherical LH Rotation about the Z axis ==> -25 RH Rotation about the X' axis ==> 83 RH Rotation about the Y' axis ==> -25 Range along the Z' axis => 3.6 Azimuth ==> 180 Dip ==> 6 Range along the Y' axis ==> 30.1 Azimuth ==> 335 Dip ==> 83 Range along the X' axis ==> 145.4 Azimuth ==> 90 Dip ==> 3 Second Structure -- Spherical LH Rotation about the Z axis ==> -82 RH Rotation about the X' axis ==> 57 RH Rotation about the Y' axis ==> 34 Range along the Z axis ==> 224.4 Range along the X' axis $\implies 6.9$ Range along the Y' axis $\implies 25.3$ Azimuth ==> 338 Dip ==> -18 Azimuth ==> 278 Dip ==> 57 Modeling Criteria Minimum number pairs req'd ==> 20 Sample variogram points weighted by # pairs

# FIGURE 17-14: EXAMPLE SUMMARY DESCRIPTION OF THE VARIOGRAM MODEL WITHIN BRECCIA/ALTERATION ZONE



FIGURE17-15: EXAMPLE OF SAMPLE CORRELOGRAMS WITHIN BRECCIA/ALTERATION ZONE

The ellipsoid direction for the estimation process was chosen to be 130 degrees azimuth and -10 degrees dip as this is the predominant direction of mineralization as well as the orientation of the zone solids. It should be noted that the orientation of the ellipsoid defines the dominant strike and dip directions of the gold mineralization.

#### 17.10 THE KERRS BLOCK MODEL DEFINITION

The Kerrs Resource Block Model used for calculating the resource was defined according to the following limits shown in Figure 17-16 and Figure 17-17:





Mardal I Sector	nts			- >	
Model Limits	s (in n	nodel co	ordinates	s) ——	Marchan
Coordinate		MIN	мах	BIOCK	Number
Direction			4000	size	of blocks
X ( columns	(1)	0	1000	20	50
Y (rows/j	)	0	1000	20	50
Z ( levels /	к)	-200	200	2	200
	(	562210.	75)	(	563619.58 )
	(	302210.	(9)	1	0.00
Lasung 15				100001	5.00
-	( :	5400352	.21)		5401761.04 )
Northing 5	4003	52		54017	761
		( -200	)		(200)
	00			200	
Elevation -2	efaul	ts that b	ound mo	del shov	vn in parenthesis
Elevation  -2 Project limit d		1			
Elevation  -2 Project limit d	4.0		and a second		

FIGURE 17-17: BLOCK MODELS DEFINITION- EXTENTS AND DIMENSIONS

The selected block size was 20 m x 20 m x 2 m, oriented to the east, north and elevation respectively. This was the ideal size to adequately and discretely define the mineralized zones and avoid injecting an inordinate amount of internal dilution; to reflect drill hole spacing available; and to characterize the breccia/alteration zone solids with a reasonable number of discrete points. Note that the model was rotated 40 degrees in an effort to orient the blocks along strike.

#### 17.11 INTERPOLATION METHOD

For the grade modelling process, kriging was chosen as the method of interpolation. Correlograms and other variogram estimators were used to obtain a spatial variability model that could be used in the estimation of the resources.

For the purpose of validation, inverse distance to the second power; nearest neighbour; and manual polygonal modelling were used.

#### 17.12 ESTIMATION PLANS

A two-pass strategy was used to estimate the resource model because a better block-by-block estimation can be achieved by using more restrictions on those blocks that are closer to drill holes, and thus better informed. The first pass utilized a search ellipse and distances of 140 m x 100 m x 100 m at an azimuth of 130 degrees and a dip of 40 degrees down from horizontal. A minimum of 2 composites and maximum of 12 composites were allowed for each block with a maximum 2 from any one drill hole. The second pass utilized a search ellipse and distances of 70 m x 50 m x 50m at an azimuth of 130 degrees and a dip of 40 degrees down from horizontal. A minimum of 3 composites and maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block and a maximum of 12 composites were allowed for each block with a maximum 2 from any one drill hole.

It is important to note that within the estimation process for all methodologies, a technique known as *Relative Elevation Modelling* was used; this technique is specific to the MineSight<sup>TM</sup> Modeling System. This methodology is particularly important in the case of the Kerrs Deposit because it is extremely effective in addressing the issue of folded structures. This method allows the practitioner to precisely follow the trend of mineralization and structure on a body that has major deviations on strike and dip.

Figure 17-18 illustrates a 3-D long section view looking perpendicular to the zones at 310 degrees azimuth and -70 dip at varying cut-off grades. Figure 17-19 shows a plan view of the block model within the zone. In each case, it indicates where the concentration of gold mineralization is focused; the trend of mineralization; and areas that warrant investigation. Table 17-8 lists the resources at varying cut-off grades.

Cut-off	Tonnes	Au	Ounces
0.5	7,041,460	1.71	386,467
1	5,237,213	2.04	342,856
1.5	3,375,361	2.47	268,468
2	1,936,189	3.04	188,972
2.5	1,165,664	3.57	133,778
3	818,171	3.94	103,622

#### TABLE 17-8: KERRS RESOURCE ESTIMATE (E)

Mineral resources that are not mineral reserves do not have demonstrated economic viability. The mineral resource estimates will be affected by environmental, permitting, taxation, socioeconomic, marketing, political, mining, metallurgical, and infrastructure issues. These issues have mainly economic impacts that have not yet been examined so they are, therefore, not discussed in this report.

# FIGURE 17-18: LONG SECTION VIEW (310 DEGREES AZIMUTH AND -70 DEGREES DIP) OF RESOURCE BLOCKS ILLUSTRATING GRADE CONTOURS.





#### FIGURE17-19: PLAN VIEW OF BRECCIA ZONE WITH RESOURCE BLOCKS ILLUSTRATING GRADE CONTOURS.

#### 17.13 RESOURCE CLASSIFICATION

At this time, the resources are classified as Inferred resources. .

#### 17.14 VALIDATION OF THE BLOCK MODEL

A graphical validation was done on the block model: cross-sections and plans were used to check the block model on the computer screen which showed the block grades, the composite data, and the topographic surface. There was no evidence to suggest that any blocks were incorrectly estimated and it appears that every block grade examined can be explained as a function of the surrounding composites; the search strategy employed for modeling; and the estimation plan applied.

As mentioned previously, inverse distance and nearest neighbour estimates were performed as a check and validation of the kriged estimate. The inverse distance was 2.0% lower Au grade while the nearest neighbour estimate was 6.4% lower than the kriged estimate, which is well within reasonable limits (see Table 17-9).

CUT-OFF	ORDINARY INVERSE KRIGING DISTANCE		%DIFF	NEAREST NEIGHBOR	%DIFF
0.5	1.71	1.67	2.0%	1.61	6.4%

TABLE 17-9: KERRS RESOURCE ESTIMATE (F)

The Kerrs Gold Deposit resource estimate is supported by 34 drill holes arrayed on a grid layout on eight drill fence sections with zone correlations involving 37 composite zones. A 3-D crosssectional model was generated from the cross-sections with interpreted mineral outlines which served as the basis to perform geometric polygonal and geostatistical calculations. The resource estimation process employed three methods to estimate the gold resources of the Kerrs quartz, green carbonate breccia zone (KBX zone) contained within the Kerrs Gold Deposit. In addition, the polygonal cross-sectional method helped validate the geostatistical methods, as well as serving as a comparison. The 3-D geological solid model, defined by 41 holes including three historical holes, illustrates that the Kerrs Gold Deposit is stratabound occurring at the contact of a thick, mafic, pillow flow sequence overlying an ultramafic, magnetic-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from 350 m to 425 m below surface. The drill hole density has been systematic in all five drilling campaigns maintaining a 100 m drill fence spacing arrayed along nine sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonal to the north-easterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake.

The following are the methods and parameters utilized for the manual cross-sectional method:

- Mineral outlines constrained by minimum true thickness equals 3.0 m.
- Composite grade modeling of KBX zone used internal dilution thickness up to of 4 m at a cut-off grade of 0.5 g/t Au.
- Average drill hole pierce point spacing equals 92 m.
- Average true thickness of KBX zone equals 9.9 m.
- Average Specific Gravity of 2.81 was used to calculate sectional block tonnages for the KBX zone.

Figure 17-20 to Figure 17-22 illustrate cross-sections showing typical composite grades on sections 900N, 1200n and 1500N. Table 17-10 summarizes the calculations used for the polygonal cross-section resource estimation.



FIGURE 17-20: POLYGONAL RESOURCE OUTLINE FOR SECTION 900N

FIGURE 17-21: POLYGONAL RESOURCE OUTLINE FOR SECTION 1200N





#### FIGURE 17-22: POLYGONAL RESOURCE OUTLINE FOR SECTION 1400N

TABLE 17-10: KERRS	MANUAL POLYGONAL	<b>RESOURCE ESTIMATE</b>
--------------------	------------------	--------------------------

Section ID	Zone_Code	Zone Area L x Tr Th(m <sup>2</sup> )	Section Width (m)	Block Volume (m <sup>3</sup> )	Spec. Grav	Block Tonnage (tonnes)	Au Grade g/t	Au T x G tonnes x g/t	WAG g/t Au
800	KBX ZONE	3805	50	190260	2.81	534,631	1.035	553343	
900	KBX ZONE	2369	100	236940	2.81	665,801	1.891	1259030	
1000	KBX ZONE	3939	50	196935	2.81	553,387	0.973	538446	
1100	KBX ZONE	7036	75	527700	2.81	1,482,837	1.243	1843166	
1200	KBX ZONE	8011	100	801070	2.81	2,251,007	1.635	3680396	
1300	KBX ZONE	1473	75	110445	2.81	310,350	1.1	341385	
1400	KBX ZONE	4070	100	407020	2.81	1,143,726	1.296	1482269	
1500	KBX ZONE	2212	75	165915	2.81	466,221	1.321	615878	
1600	KBX ZONE	705	100	70530	2.81	198,189	0.774	153399	
						7,732,094		11,049,175	1.43
								Troy Oz.	322,268

A comparison of the kriged estimate to the manual polygonal estimate (shown in Table 17-10) shows that the kriged estimate has 9% less tonnes, 20% higher grade, and 9% more contained gold. The differential in tonnes is nominal considering the nature of polygonal extrapolation versus the more precise solids modeling method. The grade differential is relatively high; however it appears that the manual polygonal method may be including a disproportionate amount of dilution as a result of irregular shapes in the sectional interpretations.

The author is confident that the estimate is representative of the deposit for the following reasons:

- the inverse distance and nearest neighbour methods are in relative agreement with the kriged estimate.
- the nearest neighbour estimate is within 12% of the manual polygonal method.
## 18 OTHER RELEVANT DATA AND INFORMATION

### **18.1 EXPLORATION POTENTIAL**

#### 18.1.1 Additional Surface Exploration Targets

A soil geochemical program, Mobile Metal Ions (MMI) program was carried out during phases 3 and 4 with some of the results published in an assessment report filed in September 2010 (Hubacheck, September 2010). Within the framework of an extensive exploration program, the MMI program was undertaken in an attempt to expand the previous orientation MMI geochem survey completed in 2004 by designing orientation lines to cover magnetic low trends which were not surveyed in 2004. The decision to orient the baseline at Az 162° and Az 045° was based on the axis of the airborne magnetic high and low trends shown Figure 7-5 and Figure 18-1 (Jagodiz, 2009). The orientation lines used a sample spacing interval of 25 meters and a full suite of 50 pathfinder trace elements were run for each sample. In addition, profile depth sampling was also attempted in select locations to determine relative capillary metal ion response in various sample horizons. In all, 1,468 samples were collected below and passed the organic layer, and in most cases at 15 cm to 25 cm and in some cases as deep as 150 cm, where black peat was encountered.

The interpretation of the data was based on a multivariate statistical technique called *Principal Component Analysis*. The individually transformed observations are called *factor scores*, and the principal components are interpreted to represent geological processes which can be mapped by the factor scores.

Figure 18-1 illustrates the correlation factor scores for the associated elements of Sr /Ca/Mg/Ba/Ni which is a pathfinder suite associated with a silicified, pyritized, feldspar porphyry unit intersected in drill holes K-09-23 and 24.



#### FIGURE 18-1: MMI SOIL TARGET SHOWING SR/MG/CA/BA/NI FACTOR

#### 18.2 FACTORS AFFECTING POTENTIAL PROJECT ECONOMICS AND VIABILITY

A number of factors impact the evaluation of a mineral deposit that is undergoing a first-time resource estimation to determine whether the deposit has a reasonable expectation of economic extraction. Physiographic; geological setting; deposit geometry; distribution and continuity of gold grades; underground/open pit mining methods; and metallurgical recoveries are the key factors that determine how a project evolves from an advanced exploration stage to the development stage.

The Kerrs Gold Deposit which is covered by an extensive thickness of esker deposits in excess of 60 m and is also underlying Bell Lake, would require a ramp/shaft excavation method to undertake a bulk sampling, advanced exploration program. The geological setting and deposit geometry is conducive to this approach as the KBX zone is structurally located in a shallow syncline at vertical depths of between 275 m and 450 m. The KBX zone is also strongly influenced by the volcanic stratigraphy at the contact of a thick sequence of competent, pillow flows in the hanging wall and incompetent, ultramafic flows in the mining footwall. Gold mineralization occurs as pyritized quartz vein breccias enveloped by quartz fuchsite carbonate vein breccias averaging 10 m and alteration envelopes varying up to 40 m in thickness. Gold tenure is proportional to the pyrite content and ranges up to 10% which is commonly disseminated and results in crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein breccia and alteration envelope assemblages.

An advanced underground exploration and development program could be a viable option for the Kerrs Gold deposit and would involve a bulk sampling program, followed by a development program leading to production. A preliminary economic assessment should consider underground bulk mining that would average approximately 7,500 tonnes/day and potentially utilize room and pillar mining method.

Two economic underground mining situations are cited below that have demonstrated the viability for success with similar deposit styles and potential mining methods:

- The Goldex Mine serves as a profitable example of an underground bulk mining situation in the Abitibi Greenstone Belt. The Goldex Mine in Val D'Or, Quebec operated by Agnico-Eagle Mines Ltd., began operating in 2008 and has proven and probable gold reserves totalling 1.6 million ounces from 27.8 million tonnes grading 1.8 g/t. The Goldex mill processed an average of 7,844 tpd in the fourth quarter of 2010. Their minesite costs per tonne were approximately C\$21 in the fourth quarter of 2010, down from C\$23 in the fourth quarter of 2009. In 2010, the total mine site costs per tonne were approximately C\$23 per tonne in 2009; this was largely due to the strong tonnage performance which more than offset industry-wide cost pressures. Agnico-Eagle believes this is one of the most economic, hard rock underground mines in the world, on a cost per tonne basis. In 2010, Goldex's payable gold production was a record 184,386 ounces and their total cash costs per ounce were \$335. This compares favourably to 2009's production of 148,849 ounces at total cash cost per ounce of \$366.
- The Musselwhite Mine at Opapimiskan Lake Northwest Ontario, operated by GoldCorp Inc., is currently producing 4,500 tonnes per day at a grade of 5.78 g/t and incurring

mining costs of \$65/tonne. The estimated mine life is 18 years with production to continue along lateral, flat dipping anticlinal structures.

# **19 INTERPRETATION AND CONCLUSIONS**

The following conclusions contained in this section support the current interpretation.

### **19.1 RESOURCE ESTIMATION**

Kirkham Geosystems Ltd. (KGL) completed a NI 43-101 mineral resource estimate on the Kerrs Gold Deposit based on the phase 1 to phase 5 drilling programs completed between 2005 and 2010. Using a cut-off grade of 0.5 g/t Au, KGL estimates that the Inferred mineral resources of the Kerrs Gold Deposit totals 7,041,460 tonnes at an average grade of 1.71 g/t Au containing 386,467 ounces of gold.

The Kerrs Gold Deposit resource estimate is supported by 34 drill holes arrayed on a grid layout on eight drill fence sections with zone correlations involving 37 composite zones. A 3-D crosssectional model was generated from the cross-sections with interpreted mineral outlines which served as the basis to perform geometric polygonal and geostatistical calculations. The resource estimation process employed three methods to estimate the gold resources of the Kerrs quartz, green carbonate breccia zone (KBX zone) contained within the Kerrs Gold Deposit. In addition, the polygonal cross-sectional method helped validate the geostatistical methods, as well as serving as a comparison.

The 3-D geological solid model defined by 41 holes, including three historical holes, illustrates that the Kerrs Gold Deposit is stratabound occurring at the contact of a thick mafic pillow flow sequence overlying an ultramafic, magnetic-rich flow sequence. Also, quartz feldspar porphyry sills are spatially located above and below the breccia zones. This stratigraphy is draped on a shallow dipping synclinal fold structure varying from between 350 m and 425 m below surface. The drill hole density has been systematic in all five drilling campaigns maintaining a 100 m drill fence spacing arrayed along nine sections with hole spacing ranging from 50 m to 100 m between pierce points along the cross-section plane. Seven holes were oriented orthogonally to the northeasterly strike direction of the deposit trend in order to define the boundaries of the mineral resource below Bell Lake.

### 19.2 GEOLOGICAL ENVIRONMENT AND GOLD DEPOSITION

Gold mineralization occurs as pyritized quartz vein breccias enveloped by quartz fuchsite carbonate vein breccias and alteration envelopes varying to up to 40 m in thickness. Gold tenure is proportional to the pyrite content ranging up to 10% which is commonly disseminated and crystal aggregates in the sheeted, quartz vein replacement breccias. These breccias, averaging 31% quartz, exhibit reasonable correlation conforming to volcano-stratigraphic contacts as well as moderate to good continuity in grade correlations at the lower and upper boundaries of the vein

breccia and alteration envelope assemblages. Anomalous concentrations of trace elements such as molybdenum, lead, and barium are found within the replacement breccias and to a lesser extent in the green carbonate breccias which envelope the quartz-pyritic vein breccias.

The encouraging drilling results from these campaigns have defined the *Kerrs Quartz Green Carbonate Breccia (KBX) deposit* which is postulated to be the *up-ice glacial source* for the East Ford Lake boulder train (Hubacheck, April 2011).

On the basis of stratigraphic and structural controls; alteration strain; and intensity observations, geological continuity has been established and a major objective of the phase 6 drilling program will be definition drilling to expand the Kerrs Gold Deposit.

Screen metallics should be used on samples with VG. High grade gold values have occurred where VG is not observed, but it is suspected in strong alteration characterized by silicification and pyritization, observed in high strain zones. Increasing gold tenure shows a direct correlation with the coincidence of replacement type quartz vein breccias and strong pyritization.

The ICP trace element study suggests that gold was introduced in three chemo-stratigraphic episodes with the deposition of gold with molybdenum, lead and arsenic occurring towards the stratigraphic top of each hydrothermal phreatomagmatic cycle. These observations also support the structural interpretation involving a recumbent syncline with fold axis striking to the northeast with fold limbs vergent to the northwest.

The marked depletion of Ca, Mg, and Al seem to reflect a larger scale, whole rock replacement process affecting the contact between the thick, overlying, mafic flow assemblage and the underlying, ultramafic flows and interbedded mafic porphyries. In this process, magnetite destruction also occurs with ferrous iron recombining to form sulphide minerals in association with silica flooding and quartz veining. Geophysically, this alteration process generally correlates with magnetic lows which are supported by magnetic susceptibility measurements from core with pyroxenitic and andesitic flows giving the highest readings (10 to 80) and the syenite porphyry/ultramafic complex measuring the lowest (<1). The QGC zone is weakly magnetic with susceptibilities ranging from one to 2.5 due to the occurrence of 0.5% fine-grained magnetic dissemination in the fuchsitic, carbonate breccia alteration envelope.

The enrichment of gold with arsenic, molybdenum, lead, copper, barium and chromium is coincident with the depletion of vanadium, manganese, calcium, magnesium and aluminum is maximized in the middle cycle from 424 m to 431.3 m in DDH K-05-7.

### 20 RECOMMENDATIONS

The author has reviewed the proposed exploration program and supports Sheltered Oak's efforts to begin in July 2011 with the following objectives in mind:

- 8,300 m of in-fill and extensional drilling on Kerrs Gold Deposit.
- 1,200 m of reconnaissance drilling on parallel structure supported by MMI geochem anomalies.
- 2,000 m of extensional drilling on the Kerrs Gold Deposit trend projected onto the Adjacent Property. Figure 20-1 illustrates the three drill target areas in relation to the regional magnetic trends.

The Adjacent GoldCorp Lease Property is contiguous to the northwest boundary of SOR's Kerrs Property; Dome Exploration explored this same project area between 1977 and 1989. Fifty-five diamond drill holes totalling 10,279 m tested the geophysical, stratigraphic and mineralized targets. Gold mineralization is associated with quartz; carbonate; pyrite in narrow, altered brecciated zones of mafic volcanic rocks and chert; jasper; pyrite and magnetite. The volcanic stratigraphy shows an arc-shaped fold geometry which is interpreted from regional airborne magnetic surveys to be a large antiform occupying most of Chesney Bay and the eastern portion of Kerrs Township.

Historical drilling in the central portion of the property intersected significant amounts of quartz feldspar porphyry. The Kerrs Gold Deposit trend has been extrapolated over a distance of 1,500 m encompassing the auriferous porphyries drilled by Dome Exploration.

The estimated budget for the proposed drilling campaign is shown in Table 20-1.

#### TABLE 20-1: PHASE 6 BUDGET ESTIMATE FOR 11,500 METRE PROGRAM

Diamond Drilling (NQ holes) 11,500 m x \$100/m	\$	1,150,000
Ancillary Drilling Charges (mob/demob, DDH surveys		
stabilizing equipment, casing, drill moves)	\$	250,000
Geological Project Management: QP Supervisor/Project Geo	I. \$	90,000
2 field assistants and core prep/sawing/sampling wages	\$	30,000
Geology Staff: Accommodation and Lodging	\$	24,000
Geology Staff: logistics, transportation, equip. rentals	\$	20,000
Geological Database GIS / 3D Modeling	\$	16,000
Geochem Lab: Sample shipping, Fire Assaying and		
Trace element Analysis	<u>\$</u>	28,000
Sub total	\$	1,608,000
Contingencies (10%)	\$	160,000
TOTAL	\$	1,768,000

#### 20.1 ADDITIONAL RECOMMENDATIONS TO BE CONSIDERED

In addition, the following recommendations will lead to a better understanding of the mineralogy of the deposit and to help explore other prospective areas on the property:

- Perform screen metallics test assaying on all assay intervals > 10 g/t coring the Kerrs Gold Deposit. All samples should be crushed and pulverized to -230 mesh to recover at least 71.5% of gold in fine-grained auriferous pyrite in the mafic replacement zones.
- Perform thin-section petrographic work and preliminary metallurgical testing of the mineralized zones and alteration envelopes bounding the quartz-pyrite mafic replacement vein breccias.
- Extend the MMI survey to the southwest of the Kerrs Property onto the Goldcorp Lease Property.

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# 22 DATE AND SIGNATURE PAGE

This report titled "NI 43-101 Resource Estimation on the Kerrs Gold Deposit, Matheson, Ontario", prepared for Sheltered Oak Resources Inc., dated June 10, 2011 was prepared by and signed by the following author:

"Signed and Sealed"

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Dated at Burnaby, B.C.

June 10, 2011

KIRKHAM GEOSYSTEMS LTD.,

Garth Kirkham, P.Geo. A.P.G.O.

Professional Geologist

# 23 CERTIFICATE OF QUALIFICATIONS

### **CERTIFICATE OF QUALIFICATION**

I, Garth David Kirkham, do hereby certify that:

- 1) I am a consulting geoscientist with an office at 6331 Palace Place, Burnaby, BC, V5E 1Z6.
- 2) This certificate applies to the "NI43-101 Resource Estimation on the Kerrs Gold Deposit, Matheson, Ontario" with an effective date of June 10, 2011.
- 3) I am a graduate of the University of Alberta in 1983 with a B.Sc. in Geophysics. I am a member in good standing of the Association of Professional Geoscientists of Ontario, Association of Professional Engineers and Geoscientists of the Province of Alberta, the Association of Professional Engineers and Geoscientists of BC, and the Northwest Territories and Nunavut Association of Engineers and Geoscientists. I have continuously practiced my profession performing computer modelling since 1988, both as an employee of a geostatistical modelling and mine planning software and consulting company and as an independent consultant.
- 4) I have visited the property on April  $25^{\text{th}}$ , 2011.
- 5) In the independent report titled "NI43-101 Resource Estimation on the Kerrs Gold Deposit, Matheson, Ontario" with an effective date of June 10, 2011, I am responsible for all sections and the complete technical report.
- 6) I have been involved with the Kerrs Gold Deposit as a consultant to Sheltered Oak Resources and Sage Resources since 2005, performing preliminary exploration data analysis and recommendations.
- 7) I have read the definition of "qualified person" set out in National Instrument 43-101 and certify that by reason of education, experience, independence and affiliation with a professional association, I meet the requirements of an Independent Qualified Person as defined in draft National Policy 43-101.
- 8) I am not aware of any material fact or material change with respect to the subject matter of the technical report that is not reflected in the Technical Report and that this technical report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
- 9) I have read National Instrument 43-101, Standards for Disclosure of Mineral Properties and Form 43-101F1. This technical report has been prepared in compliance with that instrument and form.

"Signed and Sealed"

Garth Kirkham, P.Geo.

Dated: June 10, 2011