TITLE OF REPORT [type of survey(s)] Analyses of Geophysical Data: Sun Rise Precious Metal Property

TOTAL COST $6,000

AUTHOR(S) Frederick A. Cook

SIGNATURE(S) ____________________________

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S) ____________________________ YEAR OF WORK 2012

STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S) Event 5252211;

Date: March 23, 2012

PROPERTY NAME Sun Rise

CLAIM NAME(S) (on which work was done) SR 1-5; SR; SREX

COMMODITIES SOUGHT Precious metals

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN ____________________________

MINING DIVISION Trail NTS 82E06

LATITUDE 49° 33' 59" LONGITUDE 118° 06' 10" (at centre of work)

OWNER(S)
1) Kootenay Silver, Inc. 2)

MAILING ADDRESS Suite 920 - 1055 W. Hastings St.

Vancouver, BC V6E2E9

OPERATOR(S) [who paid for the work]
1) Kootenay Silver, Inc. 2)

MAILING ADDRESS Suite 920 - 1055 W. Hastings

Vancouver, BC

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude):
Western limb of the Valhalla complex hosts a number of shear zones and quartz veins within Jurassic and Eocene plutonic rocks.

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS Report 27545; Report 27945

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Assessment Report:

Analyses of Geophysical Data:

Sun Rise Precious Metal Property,

Southern British Columbia

North 49° 33' 59"; West 118° 06' 10"

UTM Zone 11 420250E, 5491000N

NTS map sheet 82E

Trail Creek Mining Division

by

F. A. Cook, Ph.D., P.Geo.
Salt Spring Imaging, Ltd.
128 Trincomali Heights
Salt Spring Island, B.C.

For

Property Operator: Kootenay Silver Inc.
Suite 920-1055 W. Hastings St.
Vancouver, B.C. V6E 2E9

Property Owner: Kootenay Silver, Inc. of Vancouver, BC.
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1.0 Summary

Application of a variety of processing techniques to potential field geophysical data in the vicinity of the Sun Rise epithermal gold property in southeastern British Columbia has aided in identification of northwest-oriented anomalies that appear to be associated with the existing showings with elevated gold values. The northwest anomalies are visible on high resolution (15 m grid spacing) aeromagnetic and conductivity data, but are more cryptic on larger scale (200 m grid spacing) regional data.

2.0 Introduction

Salt Spring Imaging Ltd. was retained by Kootenay Silver Inc., a British Columbia company, to analyse geophysical data on, and in the vicinity of, the Sun Rise Property with an objective of evaluating information bearing on the subsurface extent and future potential of the area.

This report provides a brief description of the geological setting, a description and analysis of the available geophysical data sets and the processing applied to them, and a presentation of interpretations based upon the results. Regional potential field geophysical data (gravity and magnetics) were obtained from the Geoscience Data Repository of the Geological Survey of Canada. Additional analyses were accomplished on a detailed survey that was acquired over the northern two tenures of the property by Aeroquest, Ltd in 2007.

The author is familiar with the geology and geophysics of the region, having been responsible for acquiring geophysical data in the area since 1983 and as the transect leader for the Lithoprobe Southern Canadian Cordillera transect from 1985-1995 (e.g., Cook, 1995).

Metric units are used throughout the report.

3.0 Property Description and Location

The Sun Rise Property is a collection of claims that are located in southeastern British Columbia (Figure 1) on the west flank of the Valhalla metamorphic core complex,
one of a series of north-striking metamorphic complexes in the interior of the Cordillera (Figure 2). The approximate geographical limits of the property are the following: (degrees; UTM): **North (49° 35’ 19’’; 5493500); east (118° 4’ 57’’; 421700); south (49° 31’ 9’’; 5485750); west (118° 7’ 42’’; 418400)**.

The Sun Rise property comprises three (3) mineral tenures containing approximately 1592 hectares (Table I). The mineral cell titles were acquired online and as such there are no posts or lines marking the location of the Property on the ground.

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**Figure 1.** Satellite image from Google Earth of the area near Lower Arrow Lake, BC with the locations of the three tenures that comprise the Sun Rise property indicated in yellow.
Figure 2. Geological map of the western part of the Valhalla gneiss complex west of Slocan, BC (modified from the British Columbia Ministry of Energy and Mines, http://www.mapplace.ca). The Valhalla complex is the north-striking, oblong feature that has the Gwillim Creek shear zone (GCsz) in its core, and that is bounded by the Valkyr shear zone (VSZ) on the west and the Slocan Lake fault (SLF) on the east. The approximate location of the Sun Rise property is shown as the rectangular outlines near the center of the figure. Additional abbreviations are: GF, Granby fault; KRF, Kettle River fault. X and Y on this and all subsequent maps are UTM easting and northing, respectively, in metres.
Table 1. Description of Sun Rise property mineral titles.

### 4.0 Geological Setting

The Sun Rise property is situated on the west flank of the Valhallla gneiss complex along the east shore of Lower Arrow lake. The deepest exposed level of the Valhalla complex in this area occurs along Gwillim Creek in the northeast corner of Figure 2. Here, an arched, late Cretaceous, mylonitic, east-verging contractional shear zone that overlies probable metamorphosed Paleozoic strata is exposed (Parrish et al. 1988; Cook et al. 1988; Carr and Simony, 2006). The exposure of the Gwillim Creek shear zone is a window into the much larger, north-striking domal uplift that is delineated by the Eocene Slocan lake extensional fault on the east and the west-dipping, but east-verging arched Eocene Valkyr shear zone on the west (Figure 2; Parrish et al. 1988). Subsidiary extensional faults, such as a north-striking unnamed fault that is subparallel to the Valkyr shear zone and that crosses the Sun Rise property, are common.

Intrusive rocks are common throughout the area (Figure 2) and range from limited exposures of Devonian orthogneiss (e.g., Trail gneiss; Simony, 1979), to widespread Jurassic Nelson batholith and related rocks, Cretaceous plutons, and extensive Eocene Coryell syenitic rocks (Figure 2). Many of these plutonic rocks were intruded as extensive sheets, with thicknesses that are far less than their lateral extents.

The Late Cretaceous – Paleocene contraction that was responsible for the formation of the Rocky Mountains to the east was manifested in this area as ductile deformation along the Gwillim Creek shear zone, intrusion of Cretaceous plutons and associated uplift. Additional uplift was accompanied by extension, first along ductile structures (e.g., Valkyr shear zone) and then along brittle faults (e.g., Slocan Lake fault). It is likely that during the latest period of extension, shear zones that are antithetic to the
Regional extensionsl direction formed. Detailed mapping in the vicinity of the Sun Rise property has identified such shears that are enriched in metals.

5.0 Detailed Geology of the Sun Rise Property

Hoy and Jackaman (2006) mapped the northern two tenures of the Sun Rise property at a scale of 1:10,000 (Figure 3a) and Kennedy (2004, 2005) has sampled shear zones and argillic alteration. Regions with anomalous gold assays (>500 ppb areas are circled areas on Figure 3a) are associated with quartz veining and/or shear zones. Although some of these appear to be spatially coincident with the contacts between the Jurassic intrusive rocks and the Eocene intrusive rock (A and B on Figure 3a), other localities are not located near intrusive contacts (e.g., C and D on Figure 3a). This suggests that there may be a deeper control on the orientation of these zones than the intrusive contacts alone.
Figure 3a. Geological map (mapped at scale: 1:10,000) by Hoy and Jackaman (2006) of the northern two tenures of the Sun Rise property.

Figure 3b. Flight paths for geophysical data acquisition of the northern two tenures of the Sun Rise property (Aeroquest International 2007).
6.0 Geophysical Data

Geophysical data in the vicinity of the Sun Rise property include magnetic and gravity anomaly data that are available from the Government of Canada Geoscience Data Repository (200 m and 2000 m grid spacing, respectively) and a high resolution magnetic and ZTEM survey (15 m grid spacing; Figure 3b) acquired by Aeroquest International (2007).

The regional data are presented in two views. The first is an area of about 80x80 km centered on the Sun Rise property (Figures 4a and 4b) and the second is a more focused view of approximately 20x20 km centered on the property (Figure 5). There were three reasons for analysing data from the regional Natural Resources Canada data base. First, the high resolution survey completed by Aeroquest was focused only on the northern two tenures of the property; second, the information obtained from correlating the detailed data to the field relationships might be extended to a larger area for exploration, and third, the regional data base includes gravity data (albeit relatively low resolution) that may be helpful in relating significant patterns to regional mass distributions. For the purposes of this study, the residual total field magnetic data and the isostatic gravity data were used.

The detailed data (Figure 6) on the northern two tenures of the Sun Rise property were recorded in 2007. The data were recorded with 50 m line spacing east-west with seven north south tie lines (Aeroquest International 2007). Although gridded data were provided (15 m grid spacing), the magnetic data do not have the International Geomagnetic Reference Field (IGRF) removed. To accommodate this, the data were reduced using a single value of the field near the centre of the survey for the dates that the data were acquired. This means that, while the actual magnetic anomaly values may be somewhat different when comparing to the regional data that have the IGRF removed, the relative values and geometric trends are preserved.

All of the magnetic data were reduced to the pole prior to application of further processing.
Figure 4a. Regional magnetic anomaly data (reduced to pole) of the same area as shown in Figure 1. Data were obtained from the Geoscience Data Repository of Natural Resources Canada (http://gdr.nrcan.gc.ca/aeromag/index_e.php). Also shown are faults from Figure 2. X and Y are UTM easting and northing, respectively, in metres.
Figure 4b. Regional isostatic gravity anomaly data of the same area as shown in Figure 1. Data were obtained from the Geoscience Data Repository of Natural Resources Canada (http://gdr.nrcan.gc.ca/aeromag/index_e.php). Also shown are faults from Figure 2.
Figure 5. Regional magnetic anomaly (reduced to pole) data of a detailed area in the vicinity of the Sun Rise property. Data were obtained from the Geoscience Data Repository of Natural Resources Canada (http://gdr.nrcan.gc.ca/aeromag/index_e.php).
Figure 6a. Detailed magnetic anomaly data (reduced to pole) of the northern two tenures of the Sun Rise property. Data were acquired by Aeroquest International in 2007. Circled areas are the same as shown in Figure 3a.
Figure 6b. Electrical conductivity (ZTEM) data of the northern two tenures of the Sun Rise property. Data were acquired by Aeroquest International in 2007. Circled areas are the same as shown in Figure 3a. Note that some of the areas (e.g., B, D) with elevated gold values correlate with high conductivity, while others (A, C) do not.

7.0 Reprocessing and Reanalysis

7.1 Reprocessing of Detailed Survey

In order to establish a baseline relationship between the geological characteristics of the showings on the property, their geological setting(s) and the geophysical anomalies, the detailed data were analysed first. Reanalysis of the magnetic data (Figures 4a and 4b) has taken place with two objectives: 1) to correlate known alteration zones to
the magnetic patterns and, 2) to seek anomalous behaviour in the magnetic patterns that
may focus additional field work. Processing included bandpass (wavelength) filtering,
vertical and horizontal derivatives and the tilt gradient (Figure 7). A new technique, here
called the 'modified tilt gradient', appears to produce even better detail than bandpass
filtering or the simple tilt gradient (Figure 8).

The modified tilt gradient of the magnetic anomaly map displays a prominent
northeast (~020°) grain with occasional features that appear to be oriented at ~330°
(arrows on Figure 8). The causes of the dominant grain are unknown. Most of the
regional structures (e.g., Valkyr shear zone, Slocan Lake fault) have a dominant north-
south orientation with only occasional excursions to northeast. However, the detailed
mapping by Hoy and Jackaman (2006) indicates that some of the contacts between the
Jurassic and Eocene intrusive rocks are oriented northeast on the Sun Rise property. This
may suggest zones of weakness with this orientation.

Nearly all of the showings that are mapped (Figure 3a) coincide with northwest-
striking magnetic anomalies that cross the northeast trend at an angle of 50-60° (Figure
8), and the veining and shear zones are oriented in both directions (Kennedy 2004; 2005).
One likely interpretation is that these anomalies represent antithetic structures to the
dominant trend, and thus present opportunities for fluid migration and mineral
enhancement. A number of additional locations that display similar northwest-striking
magnetic anomalies and that therefore may deserve further examination, are identified
with the white rectangles in Figure 9.

Finally, in an effort to enhance the northwest-striking anomaly trends, a series of
directional filters was applied. The most effective result from this filtering is shown in
Figure 10; it is a filter that attenuates waveforms that are oriented between due east (090°)
and 22.5° south of east (112.5°). This filter will attenuate linear features that are oriented
perpendicular to this direction, or between north and 022.5°. Thus, the dominant
magnetic fabric with an orientation of ~015-020° is minimized (Figure 10) and some
additional northwest-oriented anomalies appear (added white rectangular outlined areas
in Figure 10).
Figure 7. Reprocessing of magnetic anomaly data across the Sun Rise property with the tilt gradient. The data were upward continued to maintain stability of the gradient function. Circled areas are the same as in Figure 3a.
Figure 8. Magnetic data reprocessed with the new procedure, the 'modified tilt gradient'. Compare with Figure 7 and note the enhanced detail. Of particular note is the appearance of a series of northwest–striking features that, in some locations, coincide with elevated gold values. The wavy lines near the edges are edge effects due to the filter.
Figure 9. Same image as Figure 8, with several areas outlined by rectangles that highlight areas with cross-cutting magnetic anomalies that may be analogous to the circles areas that have elevated gold values.
Figure 10. Same area as Figure 9 after application of a directional filter. The directional filter is shown in the box at the lower left. The gray areas in that box indicate the filter limits between $90^\circ$ east and $112.5^\circ$ east of north (as well as in the direction $180^\circ$ opposite). The map has additional areas (rectangular white boxes) identified beyond those in Figure 9 that are northwest-striking.
7.2 Reprocessing of Regional Data

Reprocessing of the regional data (obtained from Natural Resources Canada: http://gdr.nrcan.gc.ca/aeromag/index_e.php) was undertaken to determine if there are regional features or trends that can be related to the Sun Rise property showings and their characteristics. The regional data consist of isostatic gravity data (grid spacing 2000 m; Figure 4b) and residual total field magnetic data (200 m grid spacing; Figures 4a and 5).

The low resolution of the gravity data preclude any detailed analyses for the property. However, after application of the modified tilt gradient (Figure 11), the resulting map provides substantially greater detail. Of particular note are the identification of three gravity highs (labeled 1, 2 and 3 on Figure 11). The first is located over the deepest rocks exposed in the Valhalla complex along Gwillim Creek. This gravity high is likely due to uplifted relatively high density rocks. The second is a large ring structure located west of Lower Arrow lake. The origin of this feature is not known at this time. The third is another ring structure located on the east edge of the Sun Rise property. As with #2, the origin of this feature is not known.

The magnetic anomaly data have been reprocessed with tilt gradients (Miller and Singh 1994), modified tilt gradients and directional filters. The map that resulted from application of the tilt gradient to the regional data of Figure 4a is shown in Figure 12, and the modified tilt gradient is shown in Figure 13. These maps are similar, and, although the modified tilt gradient has a greater amount of detail, they are both significantly more detailed than the magnetic anomaly map of Figure 4a. Some features, such as the Granby fault (GF), the Kettle River fault (KRF), the Slocan Lake fault (SLF) and unnamed faults in the west appear to have coincident linear magnetic anomalies. Other faults, such as the Valkyr shear zone (VSZ), do not. This difference is likely a result of the fact that the faults with coincident magnetic anomalies are young, brittle structures, with distinct contrasts across them, whereas the Valkyr shear zone is a ductile structure.

In the vicinity of the Sun Rise property, both versions of the tilt gradient display a ring-like structure that coincides, at least partially, with #3 of Figure 11. Because this feature displays both high gravity and high magnetic values, it is may represent a mafic phase of the Jurassic intrusive complex.
In an effort to examine the regional data with greater detail near the property, analyses were focused to a significantly smaller area (Figure 5). The modified tilt gradient version of this data set is shown in Figure 14 and a directionally filtered version of it (same filter parameters as the previous filter: 090° to 112.5°) is shown in Figure 15. In Figure 14, it is possible to see the northeast-striking anomalies that dominate the high resolution magnetic anomaly maps of the property (Figures 7 through 10). However, the less dominant northwest-striking features are not visible within the property boundaries due to the low resolution of the data. Nevertheless, after directional filtering (Figure 15) some regional northwest-striking anomalies that may be associated with those on the property are visible (arrow on Figure 15).

**Figure 11.** Regional isostatic gravity data (Figure 4b) after application of the modified tilt gradient. The map displays a number of features that are difficult to see on Figure 4b. For example, in the vicinity of the deepest expose rocks of the Valhalla complex, near Gwillim Creek in the northeast corner of the map. A number of ring-like features are also apparent (numbers 2 and 3); however, the origins of these are not known at this time.
Figure 12. Regional magnetic anomaly data (Figure 4a) after reduction to pole and application of the tilt gradient. Note the linear anomalies associated with a number of the faults (e.g., GF, KRF, SLF), but not with others (e.g., VSZ). Feature #2 is a ring-like anomaly near the property that may be related to a mafic phase of the intrusive complex.
Figure 13. Regional magnetic anomaly data (Figure 4a) after application of the modified tilt gradient. Although similar to Figure 12, the map does show enhanced detail in a number of locations.
Figure 14. Detail of the regional magnetic anomaly data set in the vicinity of the Sun Rise property after application of the modified tilt gradient. Note the north-northeast oriented anomalies in the Property area reflect the dominant northeast trends seen in Figures 7 and 8.
Figure 15. Directional filter applied to the map in Figure 14. As in Figure 10, the filter that was used applied removed wavelengths in the range from 090° to 112.5°. The arrow indicates the trend that was identified on the high resolution data set as being associated with anomalous gold values.
8.0 Interpretation

8.1 Detailed Data

The origin of the northeast-striking magnetic anomaly trend in and near the property is unknown at this time. Most of the late structures, such as the Valkyr shear zone, strike northerly, with local variations to more northeasterly (Figure 2). Detailed geological mapping of the property (Figure 3a) has identified some contacts and shear zones with northeast orientation, but as the surface exposures are dominantly plutonic rocks, the pervasive fabric is not visible. One possible interpretation is that the plutonic rocks are relatively thin and that the magnetic anomalies represent an underlying fabric in rocks that are not generally exposed.

In any case, the known showings appear to be related to structures that cross the northeast-striking anomalies. These may be antithetic faults and shear zones, as the angular separation between them and the northeast anomalies is ~50-60°. Additional processing, including directional filtering, has effectively enhanced a number of these crossing anomalies. Accordingly, this result may provide a method to use the high resolution geophysical data to identify additional targets for field checking.

8.2 Regional Data

The regional data provide information on a much larger scale than the property-scale survey. The small scale of the showings when compared to the grid spacing of the regional geophysical data preclude identifying the showings on the regional data sets. If, however, there were regional structures that were associated with the trends that are characteristic of the showings, it might be possible to target specific areas with the larger-scale data. Nevertheless, that does not appear to be the case. This may be because the late large-scale structures, such as the Valkyr shear zone, are often shallow and shallow-dipping. In this case, the potential field anomalies may be reflecting features that are at greater depth and that may have different orientations to the near surface rocks above the shallow structures.
9.0 Conclusions

It is the author's opinion that geophysical data coupled with geological mapping will provide key components for future exploration and delineation of mineralization of the Sun Rise property as well as other zones of mineral enrichment in these rocks. As the comparison between the regional data (200 m grid spacing) and the detailed data (15 m grid spacing) shows, the limited extent and relatively small scale of the alteration zones require detailed geophysical methods to be able to relate the geological observations to the geophysical anomalies for the scales of showings that appear to be typical in this area.

Compilation, reprocessing and re-evaluation of the geophysical data in the vicinity of the Sun Rise property in southeastern British Columbia provide a template for further exploration. Particularly important are methods that provide enhanced details of anomaly patterns. These include the tilt gradient and the modified tilt gradient. Important elements that derive from the reprocessing are the following:

1) Reprocessing and analyses of regional aeromagnetic data using gradient analyses and directional filters provide evidence that some showings are located where secondary magnetic anomalies appear to cross the more dominant northeast magnetic trend on the property.

2) There does not appear to be a strong correlation between the northwest magnetic anomalies and any larger-scale regional trend.

3) Analyses of the regional gravity and magnetic data has identified a number of anomalies whose origins and relationships to the mineralization are not clear.

10.0 Recommendations

An exploration program that contains three components is recommended. The first phase could include the following:

1) Field mapping and sampling to test the several identified northwest-striking anomalies.
2) Ground-based geophysics, especially TEM profiling, but perhaps including ground penetrating radar, to identify the spatial relationships of any near-surface conductors that may indicate zones of elevated metals in the upper 10's to 100's of meters.

A second phase could be a drilling program guided by the results of the subsurface mapping combined with geological fieldwork.
11.0 References


12.0 Statement of Costs

Personnel:

   F. Cook (4.5 person-days \( @ \$800.00/\text{day} \) ) ..........................  $ 3,600.00
   - data processing and interpretation

Miscellaneous:

   Report preparation ..........................................................  $ 2,400.00

TOTAL .................................................................  $ 6,000.00
13.0 Statement of Qualifications

I, Frederick A. Cook do hereby certify that:

1) I attained the degree of Doctor of Philosophy (Ph.D.) in geophysics from Cornell University in Ithaca, New York in 1981.
2) I have a B.Sc. in geology (1973) and an MSc. in Geophysics (1975) from the University of Wyoming in Laramie, Wyoming.
3) I am a registered member of the Association of Professional Engineers and Geoscientists of British Columbia (P. Geo. 2009). Previously, from 1984-2009, I was registered with the Association of Professional Engineers, Geologists and Geophysicists of Alberta as both a P. Geol. and a P. Goph.
4) I am a member of the American Geophysical Union and the Geological Society of America.
5) I have worked as a geophysicist/geologist for a total of 36 years since my graduation from university.
6) I have worked for the Continental Oil Company (1975-1977) and the University of Calgary (1982-2010).
7) I was the Director of the Lithoprobe Seismic Processing Facility at the University of Calgary from 1987-2003.
8) I have recently (2011) been appointed an International Consultant for the Chinese SinoProbe project.
9) I have a thorough knowledge of the geology of southern British Columbia based on extensive geological and geophysical field work.
10) I have authored more than 100 scholarly publications in peer-reviewed journals and books, and am co-editor of a book in press on the Tectonic Styles of Canada.
11) I was retained by Kootenay Silver Inc. to undertake analyses of the geophysical data in the vicinity of the Silver Fox property.
12) I am the sole author of this report.
13) I am not aware of any material fact or material change with respect to the subject matter of this report, which is not reflected in this report.
14) I have no interest, direct or indirect, in the Silver Fox property.

“signed and sealed” at Salt Spring Island, B.C.
Frederick A. Cook, P. Geo.
Salt Spring Imaging, Ltd.
128 Trincomali Heights
Salt Spring Island, B.C.

Dated at Salt Spring Island, B.C. this 11th day of April, 2012
Registration License No. 34585
Association of Professional Engineers and Geoscientists of British Columbia