DAVID A. ODT, M.Sc.
CONSULTING GEOLOGIST
221 SOUTH THIRD AVENUE
BOZEMAN, MONTANA 59715

(406) 585-2687

L999

GEOLOGY, GOLD GEOCHEMISTRY

and

ALTERATION of the MORNING GLORY PROJECT AREA,

LEMHI COUNTY, IDAHO

by:

David A. Odt

Consulting Geologist

for:

Battle Mountain Exploration Company

Helena, Montana

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SUMMARY

At the request of Battle Mountain Exploration Company, the author performed geologic mapping and geochemical sampling at the Morning Glory project area, Lemhi County, Idaho. One man-month was spent reconnaissance mapping and sampling the 12 square mile area.

Results of mapping achieved a new level of precision and accuracy on the location of contacts, structure, and geometry of known gold occurrences.

Several new ore targets were identified, based on geology and geochemistry. Ore targets were identified on and peripheral to the claim block.

The recognition and definition of Quaternary glacial and landslide deposits is significant. In two cases, geophysical and gold-anomalous targets are concealed by or adjacent to glacial cover.

Only one of seven recognized targets is drill-tested, with encouraging results.

RECOMMENDATIONS

1) Survey and compile a geology and grade model of the King Solomon zone. Re-log drillholes.

2) Compile Gilt Edge soil and trench data.

3) Follow-up on Fall, 1994 Odt geochem anomalies.

4) Follow-up on Fall, 1994 BMEC soil line anomalies.

5) Finish BMEC soil line program.

6) Continue recon mapping and sampling in areas described in the body of this report.

7) Land acquisition, if warranted.

8) Drill, based on results of above programs.

GENERAL INFORMATION

Summary.

The Morning Glory project area is 5 miles west of Salmon, in T.22N., R.21E., Boise Meridian, Idaho. Main access is U.S.F.S. road 023, the Stormy Peak (Beartrack) Road. A network of subsidiary roads and jeep trails access all sides of the property (figure 1).

Project area elevation ranges from 5600 to 8600 feet. Vegetation consists of coniferous forest, with more open south facing slopes and grassy parks at lower elevations.

Mining history of the district and region is described in detail by FCC (1994). Kilsgaard (1989) describes many gold-silver deposits along NE-trending faults of the trans-Challis fault system. The discovery of Beartrack and Musgrove confirms the presence of large precious-metal systems in the region.

Morning Glory has been extensively studied since 1988 by FCC, Teck and Pathfinder. Work consists of surface rock sampling, soil geochem grids, trenching, underground mapping, airborne and ground geophysics, and drilling.

Recent geologic mapping (FCC, 1994) at 1:12,000 scale displays general lithology and postulated structures.

Data Base.

Previous work is well documented by FCC (1994) and Pathfinder(?) (1992). This writer's work generated a geologic map of the project area and eastern periphery. Outcrop geology, alteration and rock geochemistry was mapped at a scale 1:12,000 (one inch equals 1,000 feet).

Geologic Mapping Methods.

Field investigation consisted of geologic mapping and geochemical sampling. Over 53 line-miles of field traverse was accomplished (figure 2).

Outcrop and sub-outcrop was located and described during field traverse and aerial photo examination. Photo-linears were identified from stereo and non-stereo aerial photo analysis.

Due to an early winter, mapping was stopped before complete. The following areas need more work:

1) Jesse Creek (map and sample alteration)
2) Wallace Lake (prospect north of U.P. Vein)
3) Gilt Edge (map and sample immediately NE)
4) Follow-up on Fall, 1994 geochem anomalies

GEOLOGY

Regional Geology.

Two regionally extensive rock units are: 1) Proterozoic Yellowjacket meta-sediments, and 2) Proterozoic quartz monzonite porphyry.

Two intrusive masses occupy the region. The Leesburg stock occupies a large area west of Morning Glory, with the eastern contact present in the SW map area. U.P. and King Solomon gold occurrences are in an east lobe of the Leesburg stock. The Diamond Creek stock is a NNW-elongate intrusive east of the Leesburg stock. Gilt Edge and the Queen of the Hills mine are hosted in the Diamond Creek stock.

Yellowjacket lithologies consist of argillite, siltite and fine-grained quartzite deposited in two environments: 1) quiet basinal conditions, and 2) prograding submarine fan complexes (Hughes, 1990).

Regional Structure.

Regional structure is dominated by the trans-Challis fault system (figure 3). This broad structural system has been traced from the Boise Basin to north of Leesburg, and has exerted structural control on the location of gold- silver deposits in the area (Kilsgaard, 1989).

Regional Gold Occurrences.

Principal gold occurrences consist of fissure veins and replacement deposits along shear zones (Umpleby, 1913). Shear zone replacement deposits at Beartrack exceed 50 MT with over 1 M contained ounces gold (Bartels, et al, 1990).

At Beartrack, epigenetic structure-controlled mineralization is characterized by an extensive zone of stockwork veining within a zone of quartz-sericite-pyrite alteration (Bartels, et al, 1990).

Local Geology.

The Morning glory project area is dominated by two intrusive masses of Proterozoic age: 1) the Leesburg stock, and 2) the Diamond Creek stock. Proterozoic Yellowjacket meta-sediments occupy the intervening ground.

Minor occurrences of Proterozoic(?) diabase occupy E-W fractures. Augen gneiss was mapped by Hughes (1992) in the vicinity of Gilt Edge.

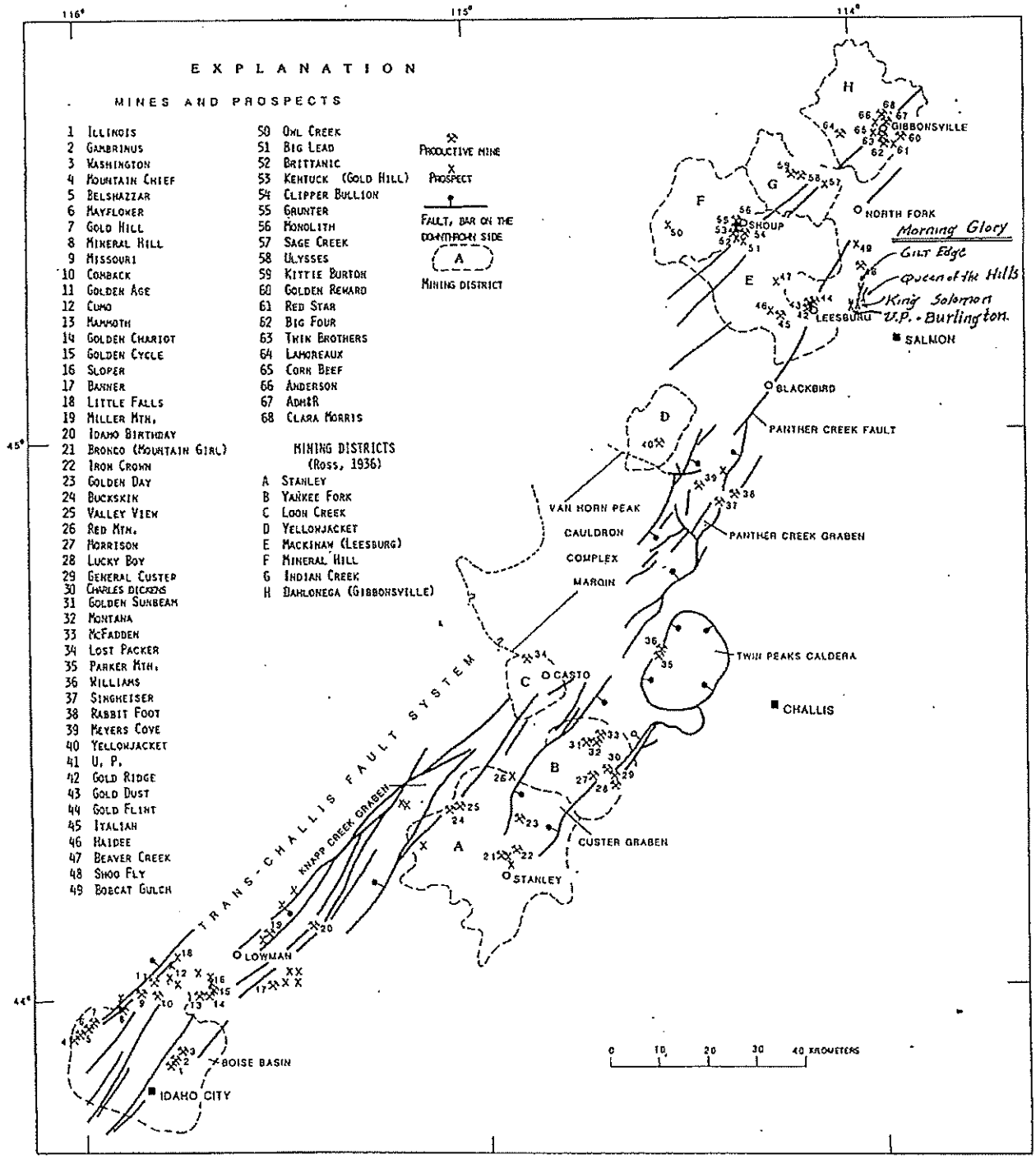

Figure 3 . The trans-Challis fault system and location of associated gold-silver deposits.

(from Kilsgaard, et al, 1989)

Three classes of Quaternary deposits were mapped: 1) glacial deposits, 2) landslide deposits, and 3) alluvial deposits. Glacial and landslide deposits are significant because they conceal two ore targets.

The writer's field studies failed to identify the Sharkey Creek fault as defined by FCC mapping (1994), except for alteration and photo-linears projecting SW from Gilt Edge, where Hughes (1992) mapped the Sharkey Creek fault.

Aerial photo analysis identified numerous photo-linears, with interesting trends noted:

1) NNE trends in Diamond Creek stock, coincident with vein trends at Queen of the Hills mine.
2) several intersecting NE and NW trends observed near the King Solomon vein zone
3) a major NNW trending photo-linear with 2.5 mile strike, west of U.P. Lake

In general, field mapping of structure is difficult. The majority of mapped structures were identified from aerial photo analysis.

ORE TARGETS

Summary.

Only the King Solomon area has sufficient data to define a resource. Lack of drill or underground data at U.P., Gilt Edge and Queen of the Hills prohibits any speculation on ore reserves. Tonnage and grade was postulated at the U.P. Mine based on surface geology, surface sampling and literature.

The following areas constitute potential ore targets that warrant additional work:

1) King Solomon
2) U.P. Mine
3) Jesse Creek
4) Queen of the Hills Mine
5) Geophysical Anomaly
6) South King Solomon Extension
7) Odt Geochem Anomalies
8) West of U.P. Lake

King Solomon.

Veins at King Solomon display as N30E strike and 55SE dip (Foo, 1992). Two to three veins constitute a 60 to 100 foot wide zone with 500 foot strike identified from underground mapping (Foo, 1992).

Pathfinder drill results identify a strike of 800 feet on this trend (KSDH92-12, 80'@.036 opt Au) and (KSDH92-13, 45'@.050 opt Au). Teck's KS-90-6 (160'@ .034 opt Au) increases possible strike to 1000 feet.

Assuming 500 foot dip, a speculated tonnage of 3.3 MT grading .037 opt Au contains 122,100 ounces gold.

Note: This writer is concerned with the accuracy of surface surveys that display adit, road and drillhole locations. Prior to additional drilling, it is recommended that a surface survey and drillhole modeling program be completed to accurately define known gold occurrence geometry.

U.P. Mine.

Mapping identified a 1,300 foot minimum vein strike. Umpleby (1913) reports a fracture width of 5 feet, with quartz veining up to 2 feet. Umpleby (1913) reported a mill run assaying about .75 opt gold. The author's surface sampling of waste dumps at two of the adits returned .050 opt gold.

Assuming 15% vein and 85% low grade, an average grade for the five foot structure is .155 opt gold. Assuming 500 foot dip, 271,000T of material could contain 42,000 oz. gold.

Gilt Edge.

Detailed study of geology and alteration at Gilt Edge was performed by Hughes (1992). A grid soil survey was performed by Pathfinder, but apparently due to low values, the data was never compiled. No drilling has been performed at the property.

Refer to Hughes (1992) report for a detailed description of geology, alteration, chemistry and ore targets at Gilt Edge.

Jesse Creek.

Previous work consists of reconnaissance sampling. The author's mapping identified a WNW-striking, SW-dipping contact between intrusive and sediments. Sampling identified anomalous gold from intrusive and distal exoskarn(?). The author was snowed out and could not complete a more detailed study of gold anomalies at Jesse Creek.

Queen of the Hills Mine.

Three subparallel veins comprise the Queen of the Hills Mine, and are classified as fissure veins. Vein width is reported to range from 8 inches to 6 feet, and average grade is reported to range from .1 to .6 opt gold. The better ore in the east (Nellie) vein averaged .15 to .20 opt gold (all from Umpleby, 1913).

Without underground maps, veins mapped by the author are tentatively located, and correlate with the strongest vein trends observed on the surface. Wallrock alteration appeared narrow, proximal to vein occurrences over a few feet.

No underground mapping or drill data is available to speculate on the previous production or in-place reserves of this fissure vein system.

Vein trends indicate a horsetail target 1000 feet SW of the southern limit of mapped veins. The target zone is covered by alluvium, and is crossed by the Stormy Peak (Beartrack) road.

NNE-trending photo-linears were identified for 7,000 feet SSW of the Queen of the Hills Mine, in both intrusive and sedimentary lithologies. Large areas of pervas: alteration were also identified 4,000 to 7,000 the Queen of the Hills Mine.

Check on this

A N80W vein system was identified in SW/23, T2: Possible strike is measured at 800 feet. Width at less than 5 to 10 feet. A vein select sampl to .282 opt gold (BC3600).

Geophysical Anomaly.

An aerial geophysics program was completed by Aerodat Limited, for Teck in July, 1990. A total field magnetic anomaly was identified in a north tributary of Jesse Creek, in SE/19, SW/20, T.22N., R.21E. The elliptical anomaly measures 1,200 by 2,000 feet, elongate WNW.

The area is covered by glacial deposits, making this strong magnetic anomaly a "blind" target.

South King Solomon Extension.

Glacial deposits likewise mask a large area near the known King Solomon vein zone. Lateral and medial morainal drift appears to truncate gold soil anomalies. The "blind" target measuring 1,500 by 3,000 feet is just south of King Solomon.

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Odt Geochem Anomalies.

Sample BC3513. A rock chip sample in SW/10, T22N, R21E returned ore-grade gold from a sericitized and quartz-stockworked exposure of Yellowjacket formation. Stockwork and locally pervasive limonite is sometimes accompanied by limonitic quartz stockworks and veinlets. Talus in the roadcut is colored tan-orange-brown over a ten foot horizontal distance. No prospects were observed.

Follow-up is recommended.

Sample BC3574. A second non-vein anomaly was obtained at field station DA094-102, in NW/22, T22N, R21E. Sample BC3574 returned 245 ppb gold from pervasively sericitized Yellowjacket formation, with moderate to strong limonitic FeOx. Strong fracturing and good alteration was noted over 70 feet in the roadcut. No quartz was mentioned.

Follow-up is recommended.

West of U.P. Lake.

In the cliffs west of U.P. Lake, a N75W trending altered zone was identified. Minimum strike is 350 feet. Moderate to strongly altered Proterozoic(?) diabase dike occupies the structure, and mineralized dike(?), quartz veining, and wallrock was observed in float, outcrop and dumps. Samples BC1576 and BC3582-BC3585 test this structure.

All samples identified anomalous gold, ranging from .009 to .151 opt. Width ranges from 5 feet near the base of the cliffs, to over fifty feet apparent structure width at the top of the cliffs.

Of most interest, sample BC3585 returned .151 opt gold from intrusive displaying strong sericitization, bleaching and FeOx. The sample was a selective chip sample from outcrop. No quartz was noted in sample notes.

GEOCHEMISTRY

BMEC Soil Lines.

Soil lines run by BMEC in Fall, 1994 were generally negative, except for lines six and seven, that returned up to 375 ppb gold.

No obvious trace element geochem signature was associated with soil gold anomalies. There is a possible weak positive correlation between Au-As and a possible weak negative correlation between Au-Ba, Au-K, and Au-La.

Suspect elements that failed to show any correlation include: Ag, Sb, Hg, Pb, Cu, Zn.

It is recommended that trace element geochem be run over King Solomon, in addition to gold, to define any trace element signature with this known gold occurrence.

Rock Geochemistry.

Silver. Silver ranging from .5 to 15. ppm is associated with moderate to strong gold enrichment.

Arsenic. Slight enrichment in As was observed, with or without gold. An intrusive vein and wallrock sample with 5.18 ppm gold had no detectable arsenic.

Highest arsenic (96 ppm) was associated with a 7.02 ppm Yellowjacket gold anomaly (BC3513).

Bismuth. Fairly consistent minor bismuth enrichment is associated with gold anomalies. Bismuth is generally very low with low grade gold (.01 - .05 opt Au).

Copper. Copper may or may not be anomalous with gold kicks. Highest copper observed was 736 ppm, associated with a high grade intrusive-hosted vein sample that assayed 9.58 ppm Au

A vein select sample at Queen of the Hills returned a stunning gold assay of 1.34 opt, displayed visible copper oxides, but only carried 138 ppm Cu.

Mercury. Generally 0 to trace mercury is associated with gold anomalies. Strong mercury was identified in Yellowjacket sample BC3513, where 25 ppm Hg compliments the 7.02 ppm gold kick.

Lead. Lead is notably anomalous at U.P., King Solomon, Queen of the Hills, Yellowjacket sample BC3513, and BC3600 vein. Lead appears to be the best indicator element.

Antimony. Antimony is locally coincident with gold. Strong Sb was observed at Yellowjacket sample BC3513, with 466 ppm Sb. Vein sample BC3600 returned 52 ppm Sb.

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