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LOCATION

- GREENWOOD MINING CAMP, SOUTHERN B.C., NEAR CANADA, U.S. BORDER

+ SURROUNDING AREA

SMELTER SLIDE - CITY HAS HISTORY OF MINING DATING TO 1900

- WELL KNOWN AS PAST PRODUCER - Cu, Au

FROM SKARN MINERALIZATION

- MOST PRODUCTION FROM PHOENIX

↑ - 1900 - 1978

> 1 MILLION OZ Au, 6.5 MILL OZ Ag, 250K TONS Cu

FROM > 25 MILLION TONS MINED

- TOTAL PRODUCTION FROM CAMP FROM 1900 - 1978 FROM 32 MILLION TONS MINED.

- 1.2 MILLION OZ Au, 7.2 MIL. OZ Ag
270K TONS Cu.

- MESOTHERMAL VEINS → Au + ASSOC. METALS

↓ REGIONAL GEOLOGY

- LATE PALEOZOIC, MESOZOIC VOLC + SEDS
META^m → GREENSCHIST

- INTRUDED BY MESOZOIC PLUTONS, AND ARE UNCONFORMABLY overlain BY TERTIARY VOLCANIC CLASTIC + FLOWS.

- LATE PALEOZOIC → CHERT GST, DIOR, SERP OF KNOB HILL GRP

+ DARK GREY ARGILLITE, LST, MINOR VOLC BELONGING TO ATTWOOD GROUP.

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- UNCONFORMABLY OVERLAIN BY E BROOKLYN FM. - SEQUENCE OF CLASTIC SED, LST, SUBMARINE PYROCLASTICS BX + DIORITIC INT.
- TECTONISM
 - EARLY TERTIARY
 - RESURGENT MAGMATIC ACTIVITY, HORST AND GRABEN DEVELOPMENT, THRUSTING
 - EXTENSIONAL FAULT CONTROL OF TERTIARY ROCKS DISTRIBUTIONS.
- TAM PORPH → EASTERN MARGINS OF TORONTO WHICH FLANKS TENAS MARY HORST TO WEST
 - REPUBLIC TO EAST OF HORST → U.S.
 - MOTHERLODE + GREYHOUND - NORTH AND EAST OF PORPHYRY.
 - 2 km AWAY AND EASILY SEEN FROM PROPERTY → ARCUATE TREND → ~~PER~~ PERIPHERAL TO TAM SYSTEM

PROPERTY GEOLOGY

- BOUNDING SYSTEM TO WEST ARE TERT SEDS
 - KETTLE RIVER FM. ARKOSIC AND VOLCANICLASTIC SEDS AND MARRON FM TRACHYTIC FLOWS
- TERT UNITS IN FAULT CONTACT
 - FLT DIPS MODERATELY WEST
- ~~LATE PALEOZOIC~~ PERMIAN CHRTY SEDS, XTAL + ASH TUFFS, MINOR ANDEBITIC VOLCANICS OVERLIE PORPHYRY TO SOUTH
 - HOST SMALL Cu-Au BRG SULPHIDE VEIN DEPOSITS.

- PORPHYRY - DIORITIC IN COMPOSITION, TEXTURALLY RANGING FINE GRAINED MCDR TO COARSER & LOCAL FSPAR CROWDED PHASES
- EXPOSED \approx 1.4 KM NORTH X 1.6 EAST
- BLOCK FAULTING HAS DISSECTED SYSTEM.

OVERLAY PROPERTY ALTERATION

- THREE PRINCIPAL ZONES
 - ① CHL-MT
 - ② Outer ANNULAR PYRITIC HALOS
 - ③ OUTER ZONES OF PERVASIVE SILICIFICATION
- CENTRAL CHL-MT
 - POTASSIC CORE TO SYSTEM
 - RATHER THAN K-FELDSPAR ALT'N, BIOT THOUGHT TO BE ORIGINAL ALT. ASSEMBLAGE - SUBSEQUENT RETROGRADE ALTERED \rightarrow CHL-MT.
- WITHIN ZONE CP UP TO ~~8%~~ 10% FINELY DISS
- ALSO ~~AS~~ WITH EP. AS VEIN SELVAGES ABOUT CENTRAL SILICA VEIN CORES.
- OUTWARD FROM CORE \rightarrow INTERMEDIATE ARGILLIC RECOGNIZED OVER BROAD AREA - VARIES IN INTENSITY AND MINERALOGY
 - CHL, CALC VEINS + STRINGERS, HEMATIZED MT, Py, SPEC ITEM IN VEINS + DISS.
 - LOCALISED FSPAR SEEN ALTERED TO CLAYS
- FURTHER FROM CORE - ADVANCED ARGILLIC ALT.
 - QUARTZ SEEN LOCALLY CHALCEDONIC
 - Py RICH HIGH SULPHIDATION ASSEMBLAGES INCL MT, OBSERVED

- PYROPHYLLITE MAY BE PRESENT OCCURRING AS VEINS + FRAC. FILLINGS
- SERICITE → MINOR - FRAC FILLINGS
- FINALLY, OUTER ~~HOMELAR~~ ZONE OF SILICA FLOODING
 - COARSE TO FINE SUGARY CRYSTALLINE QUARTZ TO UGGY SILICA ELSEWHERE.
 - UP TO 90% STOCKWORK FRAC + SIL HEALING
 - MC + Fe STAINING
 - HTHERMAL BX COMMON IN OUTER ZONES OF SIL.

Cu-Au ROCK GEOCHEM.

- OUTLINES A # OF AREAS OF HIGH Cu-Au
 - Cu IN BLUE > 500 > 1000
 - Au RED > 100 > 500
- WITHIN THESE AREAS ARE SAMPLES OF > 7000ppm Cu > 3500ppb Au
- ZONES CONSTRAINED BY AVAILABILITY OF OUTCROP TO BE SAMPLED - AS LITTLE AS 15% PRIMARILY IN ROAD CUTS.
- NOTEWORTHY THAT ANOMALOUS Cu + Au TOGETHER

OVERLAY GEOLOGY/ALTERATION & Cu/Au

- CORRELATION BETWEEN Cu/Au RESULTS AND PERIPHERAL ADUARGILL, AS WELL AS & CENTRAL CHL-MT ALT. ZONES.
- HIGHER GRADES GENERALLY OCCUR ALONG INNER MARGINS OF PYRITIC HALOS.

Overlay Cu/Au ON CHARGEABILITY

- RELATING SURFACE GRADES TO I.P. - STRONG CORRELATION BETWEEN MARGINS OF HIGH CHARGE AND HIGHER GRADES
 - CONTOURS +10, +20, +30
- ~~OBSERVATION~~ RELATION HAS DIRECT IMPLICATIONS FOR EXPLORATION IN AREAS ON PROP \bar{c} POOR O/C EXPOSURE BUT GOOD CHARGEABILITIES

Overlay Cu/Au ON MAG

- RELATING MAG TO CHARGE AND SURFACE GEOCHEM
 - HIGHER GRADES OCCUR \bar{c} COINCIDENT CHARGE + MAG
- AGAIN, IMPLICATIONS OBVIOUS FOR EXPLORING IN OTHER AREAS WHERE OUTCROP EXPOSURE OF PORPH IS LIMITED, OR OBSCURED^{by} EITHER STRUCTURALLY OR STRATIGRAPHICALLY OVERLYING UNITS TO WEST, NORTH, SOUTH.
- CAN SEE THERE ARE SEVERAL AREAS OF COINCIDENT MAG + CHARGE ANOMALIES \bar{c} ONLY MARGINAL GEOCHEM RESPONSE THAT PRESENT THEMSELVES AS EXCELLENT EXPLORATION TARGETS.

- PROPERTY SCALE MAPPING, GEOPHYSICS, AND REGIONAL OBSERVATIONS MAY BE SUMMARISED IN THE FOLLOWING METALLOGENIC MODEL

METALLOGENIC MODEL

- NORTH-SOUTH TRANSECT FACING WEST
- INCORPORATES ALL PROPERTY AND REGIONAL OBSERVATIONS
- CLEARLY ACCOUNTS FOR GEOMETRIC RELATIONS BETWEEN PORPH SYST. AND KNOWN SKARN AND VEIN MIN
- CENTRAL PORTION - DISS Cu-Au PORPH
- OUTWARD ZONATION THROUGH PROXIMAL Cu-Au BRG MSSK VEINS TO BASE METAL BRG QUNS MORE DISTALLY, AND FINALLY TO PERIPHERAL SKARN DEPOSITS i.e. MOTHERLOPE, GREYTOWN, PHOENIX.

OVERLAY ALTERATION

- STRONG ALT ZON IS ENCOMPASSED BY MODEL EXTENDING FROM CENTRAL POTASSIC ZONE (CHL-MT) THROUGH INTERMED ARGILLIC (CHL VEINING, Calc VEINS + DISS, LOCALISED CLAY ALTERATION OF F'SPANDS, HEMATIZED MT, Py, Spz/Hem)
- INTER. GRADES TO ADV ARG. ZONE IN PORPH AND INTO VOLCANIC AND VOLCANICLASTICS
 - INCREASED SILICA, PYROPHYLLITE AND/OR ANHYDRITE, PYRITIC HALOES, MT.

- PROP. IS OF REGIONAL AND NOT SHOWN.
- FINALLY ADV. ARG. GRABES INTO SILIC. ZONES CHARACTERISED BY HTHERMAL BX, STOCKWORK FRAC + SIL. HEALING, + PERU, SILICA FLOODING
- CONCENTRIC CONFIC. PRESENTS # OF AREAS COULD HOST POTENTIAL ORE ZONES
- AS MUCH OF Au IN Au RICH PORPH Cu DEPOSITS WAS INTRODUCED \pm Cu DURING K-SILICATE ALT'N, POTASSIC CORE BECOMES ATTRACTIVE AS TARGET; HOWEVER, SINCE ADV. ARG. ZONES GENERALLY LAST TO BE ACTIVE AND MAY HAVE OVERPRINTED SOME POTASSIC ALT'N, THESE AREAS TOO ARE PROSPECTIVE

LIST OF SUMMARY

- LARGE SYSTEM
- CONCENTRIC ALT, MINⁿ ZON
- SOIL GEOCHEM
- HIGH CHARGEABILITY, LOW RES ZONE
- HIGH Cu-Au SURFACE SAMPLE GRADES ASSOC \pm CHARGE + MAG
- GOOD Cu-Au CORRELATION
- GEOMETRIC RELATIONSHIP TO DEPOSITS MORE THAN COINCIDENCE.
- MINING HISTORY OF GREENWOOD, AND DEPOSIT TYPES MINED IN PAST SUGGEST LARGE TONNAGE DISS^{Cu} PORPH SYSTEM SHOULD BE PRESENT.

OVERLAY CITY OF GREENWOOD

- MAY BE THAT SYSTEM, AND IF SO MINNOCUA MAY WELL BECOME MAJOR CONTRIBUTOR IN RESTORING CITY OF GREENWOOD TO THE FLORISHING COMMUNITY IT WAS AT TURN OF CENTURY.

ANNUAL GENERAL MEETING SLIDES

1. OPENING SLIDE - TITLE AND LOCATION
2. SMELTER FOLLOWED BY PHOENIX SHAFT HOUSE ?
3. REGIONAL GEOLOGY WITH PHOENIX, GREYHOUND AND MOTHERLODE DEPOSITS AND GRADES, PROPERTY OUTLINE
4. GEOLOGY 1:5000 - focus on porphyry - size aspects - relation to Motherlode and Greyhound deposits
5. Alteration 1:5000 - focus on concentric aspects about central chlorite magnetite core
6. Cu, Au rock geochemistry or possibly soils
7. Mag map 1:5000 - focus on mag highs - concentric aspects
9. Chargeability map 1:5000 - concentric aspects
10. Interpretive cross section WITH ALTERATION
11. Scenery shot to close - smelter stack?

RAINBOW TAM O'SHANTER PORPHYRY

TITLE AND LOCATION SLIDE

Good morning. IN the next 10 minutes I will give a brief overview of Minnova's porphyry prospect in the Greenwood area of B.C.

The Rainbow-Tam O'Shanter property is located in the Greenwood Mining camp of southern B. C. near the Canada U.S. border.

SMELTER SLIDE

The area is well known as a past producer of Cu and Au primarily from skarn mineralization. Most production came from the Phoenix mine which operated from the turn of the century until 1978 producing over 1 million ounces of Au, 6.5 million ounces of Ag, and 253,630 tons of Cu from over 25 million tons mined. Total production from the Greenwood Camp from 1900-1978 from 32 million

tons mined was 1.2 million oz Au, 7.2 million oz Ag, and 270,945 tons of Cu. Mesothermal veins in the area have produced smaller amounts of Au and associated metals.

REGIONAL GEOLOGY SLIDE

Regional geology of the area consists of Late Paleozoic and Mesozoic volcanic and sedimentary rocks metamorphosed to greenschist facies. These are intruded by Mesozoic plutons and unconformably overlain by Tertiary volcanoclastic and flow rocks.

Late Paleozoic rocks consist of chert greenstone, diorite and serpentinite of the Knob Hill Group, and dark grey argillite, limestone and minor volcanic rocks (andesite) belonging to the Attwood Group. These rocks are unconformably overlain by Triassic Brooklyn Fm - a sequence of clastic sedimentary rocks, limestones and submarine pyroclastic breccias and dioritic intrusions.

Early Tertiary tectonism included resurgent magmatic activity, horst and graben development, and thrusting. Tertiary rock distributions in the area are controlled by extensional faulting.

The Tam O'Shanter porphyry is located along the eastern margins of the Toroda Creek graben, which flanks the Tenas Mary horst to the west. To the east of the horst is the Republic graben which extends south into the United States. To the north and east of the porphyry are the Motherlode and Greyhound skarn deposits. These are less than 2 km away and can be seen from the property forming a roughly arcuate trend, occurring as ~~proximal~~ *peripheral* deposits to the Tam system.

PROPERTY GEOLOGY

Bounding the porphyry system to the west are Tertiary sediments made up of Kettle River Formation arkosic and volcanoclastic sediments and Marron Formation trachytic flows. The Tertiary units are in fault contact with the porphyry, the fault dipping moderately to the west.

Permian cherty sediments, crystal and ash tuffs and minor andesitic volcanics overlie the porphyry to the south and are host to small Cu-Au bearing sulphide vein deposits.

The porphyry itself is dioritic in composition, texturally ranging from fine grained microdiorite to coarser grained (2mm) phases, and local feldspar crowded phases. The system is exposed for roughly 1.4km northward by 1.6km eastward. Extensive block faulting has strongly dissected the system.

OVERLAY PROPERTY ALTERATION

Alteration consists of three principal zones - a central zone of chlorite-magnetite alteration, outer annular pyritic haloes and outer zones of pervasive silicification. The central chlorite-magnetite alteration zone is interpreted as a potassic core to the system, but rather than K-feldspar alteration, biotite is thought to be the original alteration assemblage, and has subsequently been retrograde altered to chlorite and magnetite. Within this area ~~disseminated~~ Cp is seen to ¹⁰5% finely disseminated throughout. Cp also occurs with epidote as vein selvages about central silica vein cores.

Moving outward from the core zone, intermediate argillic alteration is recognized over a broad area and varies in intensity and mineralogy. Chlorite and calcite veins and stringers are seen, as is hematized magnetite, pyrite and specular hematite in veins and disseminations. In localised areas feldspars are seen to be altered to clays within the porphyry.

Further from the core a zone of advanced argillic alteration is encountered with quartz seen locally, though not dominantly, in chalcedonic form. Pyrite rich high sulphidation assemblages which include abundant magnetite are observed, and pyrophyllite may be present occurring as veins and fracture fillings. Sericite is also encountered to a small degree occurring as fracture fillings.

Finally, an outer ~~annular~~ zone of silica flooding is encountered consisting of coarse to fine sugary crystalline quartz in some areas and vuggy silica elsewhere. These areas display stockwork fracturing up to 90% locally, and subsequent silica healing. Malachite and Fe staining is seen on many exposures of this alteration type occurring along fractures. Hydrothermal breccias are commonly seen in the outer zones of silicification.

CU-AU ROCK GEOCHEMISTRY SLIDE

Rock geochemistry from surface samples outlines a number of areas of high Cu-Au values. Cu is outlined in blue showing areas of >500 ppm and >1000 ppm Cu; Au is outlined in red showing areas of >100ppb and >500 ppb Au. Within these areas however are samples of greater than 7000 ppm Cu and greater than 3500 ppb Au. Furthermore, the zones outlined are constrained by the availability of outcrop to be sampled which in this area is as little as 15% and primarily exposed in road cuts. It is noteworthy that anomalous Cu and Au values occur together.

OVERLAY GEOLOGY/ALTERATION SLIDES ON CU/AU GEOCHEM

Relating rock geochemistry to geology and alteration shows a correlation between higher Cu-Au results and peripheral advanced argillic alteration zones, as well as with the central Chl-Mt alteration zone. Higher grades generally occur along the inner margins of the pyritic haloes.

OVERLAY CU/AU ON CHARGEABILITY

Relating surface grades to induced polarization geophysics shows a strong correlation between the margins of high chargeabilities and higher grades. Contours shown are for +10 mV/V, +20 mV/V and +30 mV/V. This ^{relation} observation has direct implications for exploration in areas on the property having poor outcrop exposure but exhibiting good chargeability response.

OVERLAY CU/AU ON MAG

Relating magnetometer results to both chargeability and surface sample grades shows higher grades occurring with coincident chargeability and magnetometry anomalies. Again the implications are obvious for exploring in other areas where outcrop exposure of the porphyry is limited, or obscured by either structurally or stratigraphically overlying units present to the west and south. As you can see there are several areas of coincident mag and chargeability anomalies with only marginal geochem response that present themselves as excellent exploration targets.

So property scale mapping of rock types and alteration, property scale geophysics, and regional observations may be summarised in the following metallogenic model.

METALLOGENIC MODEL

The section represents a north-south transect through the property facing west and incorporates all property and regional observations. The model clearly accounts for the geometric relations between the porphyry system and known skarn and vein mineralization. In the central portion of the model disseminated Cu-Au porphyry mineralization is seen with an outward zonation through proximal Cu-Au bearing mssx veins to base metal bearing quartz veins more distally, and finally to peripheral skarn deposits such as the Motherlode, Greyhound, and Phoenix deposits.

OVERLAY ALTERATION ON MODEL

The strong alteration zonation is encompassed by the model, extending from the central potassic zone indicated by chl-Mt alteration through an intermediate argillic zone indicated by chlorite veining, calcite veining and disseminations, localised clay alteration of feldspars, hematized Mt, pyrite and specular hematite. Intermediate argillic alteration grades into advanced argillic alteration within the porphyry and into the volcanic and volcanoclastic portions of the system and is indicated by the increasing presence of silica, pyrophyllite and/or anhydrite, pyritic haloes, and magnetite. Propylitic alteration is of a

regional scale and is not shown. Finally, advanced argillic alteration is associated with, or grades into silicification zones characterized by hydrothermal breccias, stockwork fracturing and silica healing, and pervasive silica flooding throughout.

The concentric configuration of the system therefore presents a number of areas that could host potential ore zones. As much of the gold in gold rich porphyry copper deposits was introduced with copper during K-silicate alteration, the potassic core presents a possible ore zone. However, as advanced argillic zones were the last to be active in these systems, and may have overprinted some potassic alteration, these areas too present potential ore zones.

LIST OF SUMMARY??

In closing, the Tam O'Shanter porphyry system is a large system showing concentric alteration and mineralization zonation, excellent soil geochemistry, broad zones of high chargeabilities, and excellent Cu-Au surface sample grades associated with chargeability and mag response. The geometric relationship of the porphyry to known deposits appears at this stage to be more than mere coincidence. The mining history of the Greenwood area, and deposit types mined in the past suggest a large tonnage disseminated porphyry system should be present in the area.

OVERLAY CITY OF GREENWOOD

The Tam O'Shanter porphyry may be that system, and if so Minnova may well become the major contributor in restoring the city of Greenwood to the flourishing community it was at the turn of the century. Well, on second thought we could just build a new town.