Volume of Abstracts

Alaska Miners Association Annual Convention, November 2 – 5, 2020

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Geoscience Investigations

Tuesday, November 3, 2020 Session 1 – Joe Kurtak, BLM (Retired), Chair

The New Shaw Creek and Shawnee Peak Airborne Magnetic Survey and DGGS Minerals Program Update

Abraham Emond, Evan Twelker, Melanie Werdon

Alaska Division of Geological & Geophysical Surveys, Fairbanks, AK

Join us to see the new Shaw Creek and Shawnee Peak magnetic data.

Emond, A.M., and MPX Geophysics LTD, 2020, Shaw Creek and Shawnee Peak airborne magnetic and radiometric geophysical survey: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2020-16, 2 p. https://doi.org/10.14509/30551

We will also outline our exciting plans for the Yukon Tanana Uplands in 2021 and 2022.

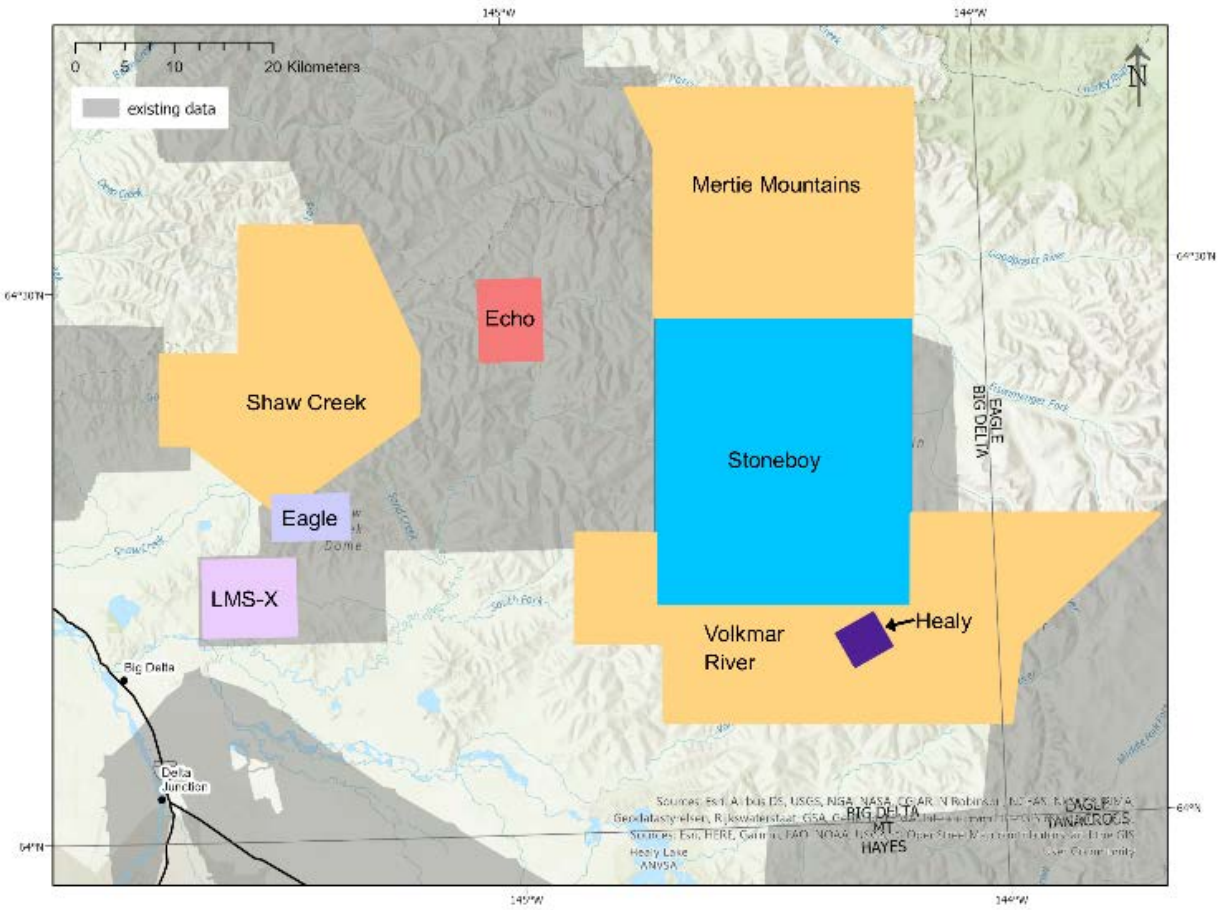

Figure 1: Shaw Creek and Shawnee Peak survey location map. Blocks LMS-X, Eagle, Echo, Stoneboy, and Healy were funded by our industry partners Northern Star Pogo, Millrock Resources, and Northway-Kenorland.

Tungsten Skarn Potential of the Yukon-Tanana Uplands, Eastern Alaska, USA—A Mineral Resource Assessment

George Case[1], Garth Graham[2], Erin Marsh[2], Ryan Taylor[2], Carlin Green[3], Philip Brown[2], and Keith Labay[1]

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[3]*US Geological Survey, Eastern Minerals and Environmental Resources Science Center, Reston, VA*

Tungsten (W) has a variety of industrial and technological uses. It has been identified by the U.S. Government as a critical mineral for the United States owing to its strategic importance and U.S. reliance on W imports. Consequently, there is an ongoing initiative by the USGS to understand domestic resource potential. W skarn deposits are a major source of world W supply and the Yukon-Tanana Uplands (YTU), in eastern Alaska, are prospective for this deposit type. The regional geology is characterized by juxtaposed Paleozoic lithotectonic packages that were rifted from and reaccreted to North America in the Mesozoic. Multiple episodes of arc-related magmatism followed accretion. W-skarn genesis is mainly associated with 100-90 Ma plutonic suites in the YTU; major W-skarns in Canada (e.g., Mactung, Cantung) are part of the same metallogenic event, supporting a favorable geologic setting for W skarns in the YTU. We conducted an assessment for undiscovered W-skarn resources for parts of the lesser-explored (Alaskan) portion of the YTU.

Geographic Information System (GIS) proximity analysis was used to delineate the intersection of granitoid plutonic rocks and carbonate-bearing rocks to define three tracts of land permissive for W-skarn. The permissive tracts were qualitatively mapped for mineral potential using the Alaska Geochemical Database (AGDB) and Alaska Resource Data File (ARDF). This analysis indicated that much of the western YTU near Fairbanks has high potential for undiscovered W-skarn deposits, whereas the eastern and southern YTU (Fortymile district and Eastern Alaska Range) has only isolated areas of medium and high potential. The western YTU has sufficiently high potential and data quality to warrant a quantitative assessment of undiscovered W resources. Probabilistic estimates suggest a potential range of 1 to 3 undiscovered W skarn deposits in the western YTU tract. Estimates were combined with a recently published global W skarn grade-tonnage model in a Monte Carlo simulation to estimate undiscovered contained resources, and the USGS Resource Assessment Economic Filter (RAEF) was then applied to constrain the amount of simulated WO_3 that may be economically recoverable in various mining scenarios. This simulation indicates approximately 60 - 30 kt WO_3 may be recoverable from a potential undiscovered W-skarn deposit in the western YTU tract, with a Net Present Value (NPV) of ca. $330 to $40 million USD, depending mainly on proximity to infrastructure.

Contained WO_3 estimates for the western YTU tract in our analysis are significantly lower than the known resources in W skarns in the Canadian portion of the YTU, but still potentially economically significant. Some of the differences in prospectivity may result from lower permeability and lack of continuity of favorable carbonate rock horizons in the relatively high-grade metamorphic country rocks of the YTU in Alaska. Qualitative and quantitative mineral resource assessments such as this one in the western YTU are helpful tools for making initial regional estimates of undiscovered resources, delineating target areas for new data acquisition, focusing future investigations, and steering research on the underlying controls of district-scale metallogenic budgets.

Progress Report: Cobalt at Bornite

Zach Mahaffey, Rainer Newberry

University of Alaska, Department of Geosciences, Fairbanks Alaska USA

Cobalt is a critical and strategic element, used in a variety of technical applications. Cobalt deposits are rare outside of war-torn central Africa, however, and the international community has long searched for new sources. The Bornite Cu-Co deposit in the SW Brooks Range foothills is one such source. Getting the cobalt out of the deposit, however, is complicated by the multiple minerals and modes of occurrents. Bornite, formerly known as Ruby Creek, has been known since the 1960's to contain Co as cobaltiferous pyrite (Co-pyrite) and carrollite (ideally, $CuCo_2S_4$) and also (since 2013) as cobaltite (ideally, CoAsS). However, the distribution and mineralogical associations have been poorly constrained. The importance of better knowing such is that metallurgical testing indicates that carrollite and cobaltite report to the copper concentrate; Co-pyrite does not.

We are determining mineral compositions, relationships, and spatial distributions through: 1) detailed handheld XRF analyses of >2 km of drill core (at 5-10 cm intervals) followed by sample selection and polished section preparation and then 2) reflected light microscopy and subsequent Electron Probe Microanalyzer (EPMA) study (quantitative analyses & detailed Co maps). We have nearly completed the HHXRF studies and are about 1/3 of the way through petrography and microprobe analyses. We selected 15 drill holes that compose two cross sections: one through the historic deposit composed of the Upper and Lower Reefs (NW section) and one through the more recently discovered South Reef (SW section).

The occurrence and distribution of Co minerals and their apparent relations to other sulfides has been complicated by regional deformation events, evidenced by thrust sheets and at least 1 internal thrust (Table 1). The Bornite carbonate sequence, which hosts the sulfide mineralization, is Late Silurian to Early Devonian, as indicated by conodonts (Till et al., 2008). Selby et al. (2009) generated mid-Devonian $^{187}Re/^{187}Os$ ages for sulfide mineralization (Fig. 1), indicating that mineralization was epigenetic. The deposit likely experienced partial re-equilibration during the Jurassic-Cretaceous as evidenced by textural and compositional variations in sulfide minerals as well as the presence of cymrite intergrowths (cymrite is restricted to relatively high pressure and moderate temperature conditions, Graham et al., 1992; Fig. 2). Cobaltite compositions (Fig. 3) further indicate re-equilibration temperatures of approximately 400-500°C, from solid solution limits determined by Klemm (1965).

Delineating the distribution of the three Co minerals (Co-pyrite, carrollite, and cobaltite) from drill core assay data is convoluted by compositional variations of each of the Co minerals. So far, Co-enriched pyrite is restricted to assay intervals containing more than 0.3 wt.% Cu (Fig. 4). Similarly, cobaltite occurs in intervals of 0.5 wt.% to 5 wt.% Cu (Fig. 4) and does not typically occur in bornite rich intervals. Carrollite occurrence is restricted to intervals with >2 wt.% Cu (Fig. 4) and is commonly associated with bornite rich assemblages. Since Co broadly correlates with Cu (Fig. 5), Co was likely introduced with Cu-bearing fluids.

Cobaltite rarely occurs with carrollite (18% of occurrences) and infrequently occurs with bornite (12% of occurrences). Cobaltite is not the only As mineral, however; it never occurs with tennantite ($Cu_{10}(Zn,Fe)_2As_4S_{13}$), but can occur with tetrahedrite ($Cu_{10}(Zn,Fe)_2Sb_4S_{13}$) suggesting (Fig. 6) the reaction tennantite + Co-pyrite = tetrahedrite + cobaltite + pyrite. Compositions of cobaltite are highly variable, however is best described as (Co,Ni)(As,S)S; As-poor (disequilibrium) cobaltite is typically anhedral and rimmed by euhedral (equilibrium) normal As cobaltite (Fig. 7). The more stable cobaltite approaches the stoichiometric composition of $As_{.9\text{-}1}S_1$, and likely represents recrystallization during metamorphism (Fig. 3). Pyrite associated with cobaltite is sometimes depleted in Co, though usually not, but never depleted in As (Fig. 8) suggesting that pyrite is not usually the source of the Co and As needed for formation of cobaltite.

Carrollite displays two characteristic compositions depending on the associated Cu phase. Carrollite present with bornite has Co:Ni ratio of 3-20 and approximates $Cu(Co,Ni)_2S_4$ (Fig. 9). Carrollite in bornite-absent samples has a Co:Ni ratio of 1.3-10, and is best described as $(Cu,Ni)(Co,Ni)_2S_4$ (Fig.9). Unlike cobaltite, carrollite commonly occurs with tennantite in bornite rich assemblages and rarely occurs with cobaltite. The Ni content of pyrite increases with increasing Ni in the associated carrollite (Fig. 11). Pyrite associated with carrollite is neither Co or Ni depleted (Figs. 8, 12) and there is no textural evidence for the formation of carrollite at the expense of Co-rich pyrite (Fig. 10).

Pyrite in the Bornite deposit displays a wide range in compositions: in addition to Co, pyrite can be enriched in Ni, As, and to a lesser extent Cu. In addition to various compositions, there are multiple generations of pyrite. Co in pyrite frequently correlates with As (e.g., Fig. 13) although such As-rich pyrite appears (so far) to be rare. Conversely, Co and Cu (so far) inversely correlate (e.g., Fig. 14). Similar to the other Co bearing minerals, Co-pyrite can contain detectable Ni. However, pyrite Co:Ni ratios are extremely variable (<6 to >500), mostly due to variations in Co; most pyrite contains very little Ni (Fig. 12).

We have identified several generations of pyrite through Co mapping: the earliest is essentially Co-free and the others consistently display oscillatory Co zonation (e.g., Fig. 15). The complexity surrounding the multiple generations of pyrite highlighted by the concentric oscillatory zonation is further complicated by inclusions of other Cu minerals (Fig. 16) and less frequently (one case) microscopic cobaltite inclusions. For the SW cross section through the South Reef, there appears to be a spatial pattern of Co-pyrite sporadically throughout the Cu mineralization, with an apparent cobaltite zone higher and carrollite zone lower in the main Cu zone (Fig. 17).

Efforts continue to determine through petrography and EPMA analyses if there are consistent mineralogical zones (as suggested by Fig. 17) or if another pattern is present for Co minerals in the deposit.

Table 1: Bornite 'stratigraphy', modified from Hitzman et al. (1986) with ages from Hoiland (unpublished report).

Unit	Age	Lithology	Metamorphic Grade	Thickness
Beaver Creek	Early-Late Devonian	Phyllite, quartzite, marble	Lower Greenschist	>2000m
Upper Bornite carbonate	Early Devonian-Late Silurian	Marble, argillaceous marble, dolomitic marble, phyllite, phyllitic marble	Lower Greenschist	200-1000m
THRUST				
Phyllite - in Bornite carbonate	Late Devonian	Phyllite (PH-118)	Lower Greenschist	
Lower Bornite carbonate	Early Devonian-Late Silurian	Marble, argillaceous marble, dolomitic marble, phyllite, phyllitic marble	Lower Greenschist	200-1000m
THRUST				
Anirak schist	Permian, 287 Ma	Pelitic schist, quartzite, marble	Greenschist	3000m
THRUST				
Kogoluktuk schist	Jurassic	Pelitic schist, quartzite, marble	Epidote-Amphibolite	4000m

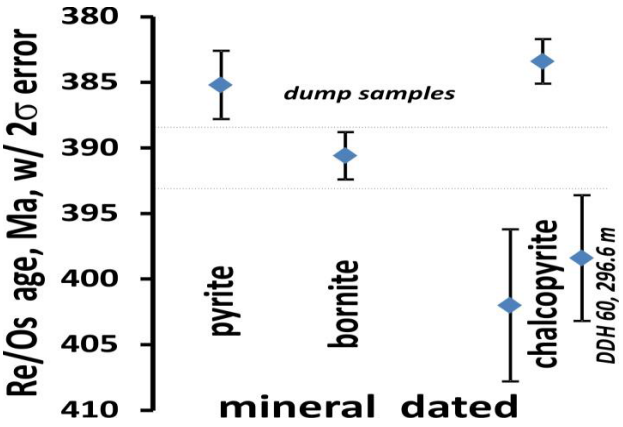


Figure 1: Highest precision 187Re/187Os ages for Ruby Creek samples, from Selby et al. (2009). These ages are inconsistent, do not coincide with apparent formation textures, and seemingly indicate a 10-15 Ma lifespan for mineralization.

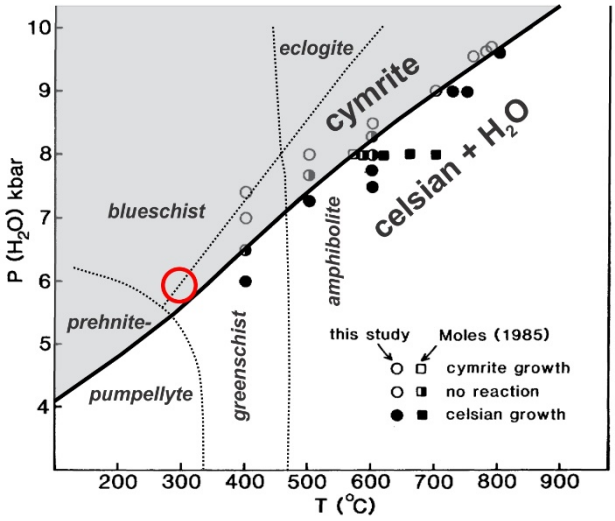


Figure 2: Stability region of cymrite (shaded) modified from Graham et al. (1992) with general boundaries between several metamorphic facies, as commonly accepted. For a minimum temperature of 300oC (from CAI) the minimum pressure conditions are approximately the red circle, near the blueschist-greenschist facies boundaries. This presumably represents the minimum metamorphic conditions experienced at Bornite.

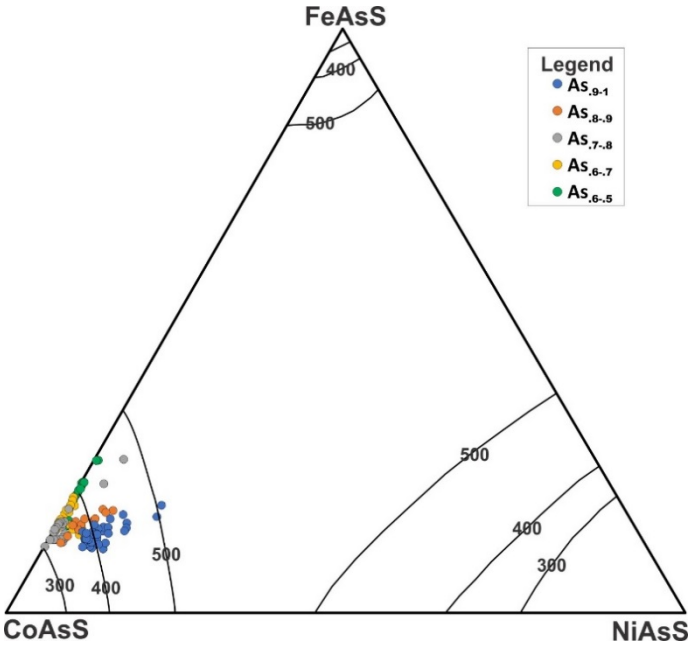


Figure 3: EPMA compositions of cobaltite from Ruby Creek plotted on the ternary diagram FeAsS-CoAsS-NiAsS. All Ruby Creek cobaltites analyzed are slightly to seriously S-enriched and As- depleted; the analyses are sorted by degree of As-deficiency. The dark blue points represent analyses closest to stoichiometric As1S1 compositions. Solid solution for those cobaltites closest to ideal As1S1 in composition indicate temperatures of 400-500℃, consistent with Upper Blueschist-Greenschist facies conditions. Modified from Klemm (1965)

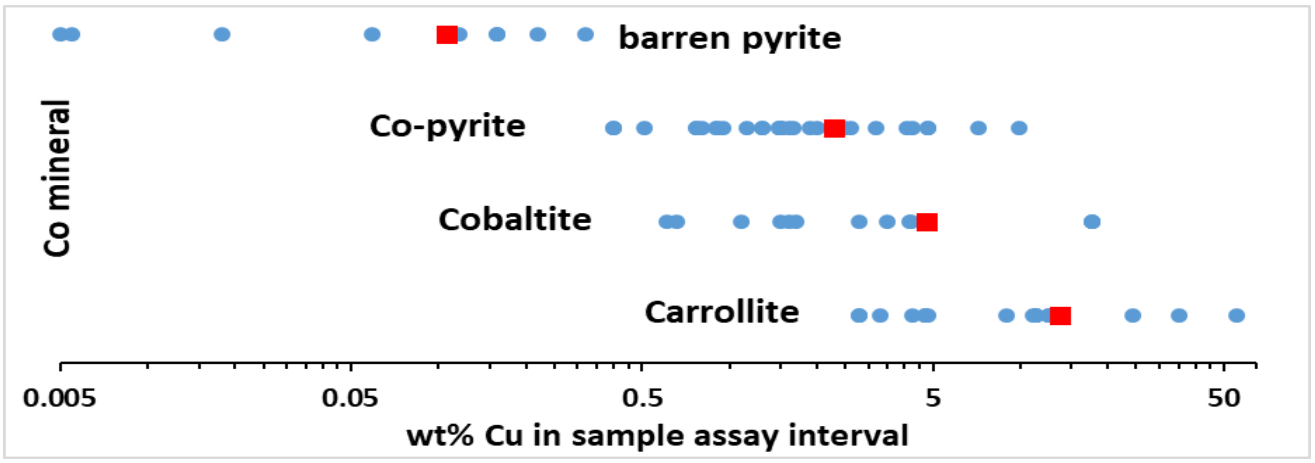


Figure 4: Blue dots represent 1 sample with EPMA verified mineralogy and the associated Cu wt.% from drill core assay. The red box represents the average Cu wt.% associated with the occurrence of each Co species.

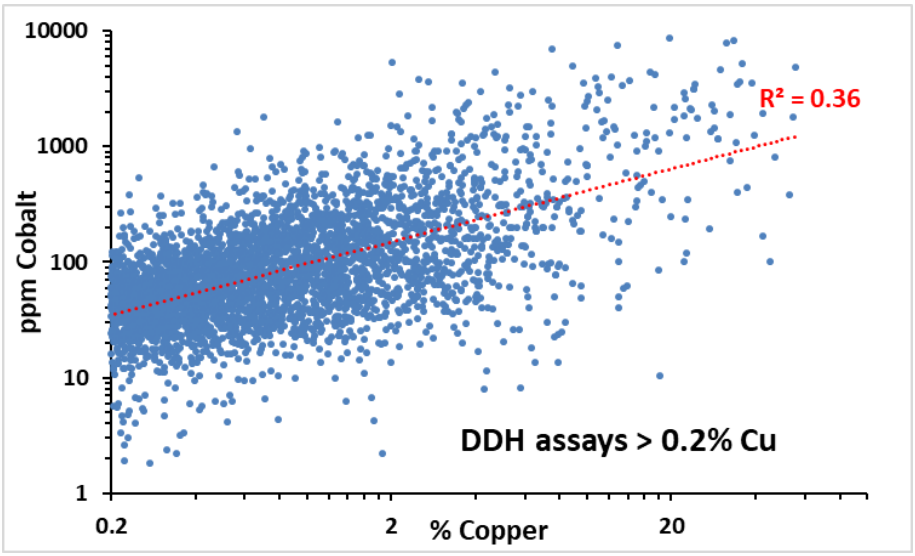


Figure 5: %Cu vs. ppm Co for drill core assays with > 0.2% Cu. The correlation between the two, present despite the occurrence of Co as Co-pyrite and cobaltite (both of which lack Cu) suggests that Cu and Co were introduced together into the Ruby Creek depo*sit*.

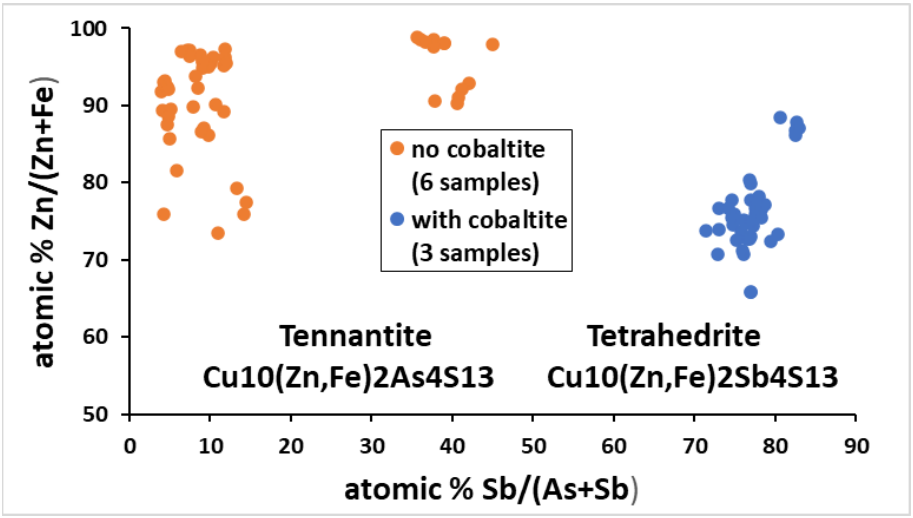


Figure 6: WDS analyses of tetrahedrite-tennantite. When cobaltite is present with fahlore the solid solution produces tetrahedrite, when cobaltite is absent tennantite is the stable phase.

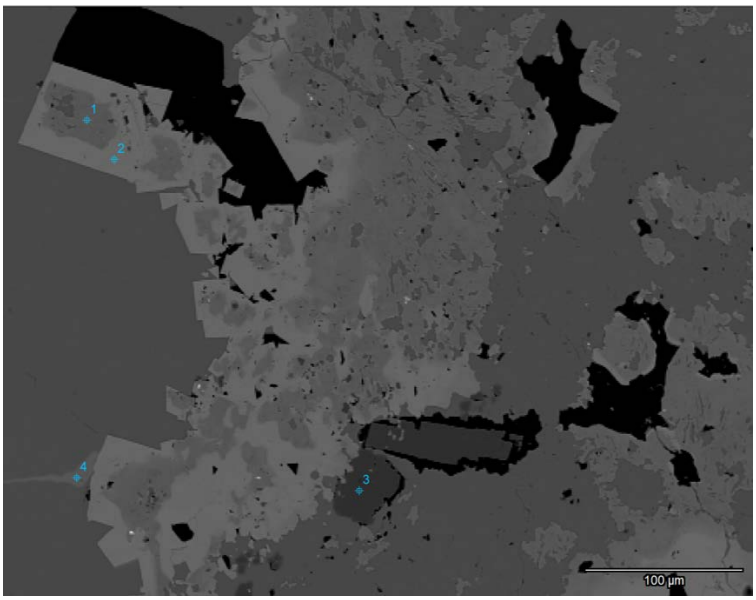


Figure 7: BSE image of euhedral, re-crystallized equilibrium (?) cobaltite (point #2), surrounding anhedral, low-As (point #1) early cobaltite. The cobaltites are surrounded by chalcopyrite (darker grey) with minor subhedral pyrite (point #3).

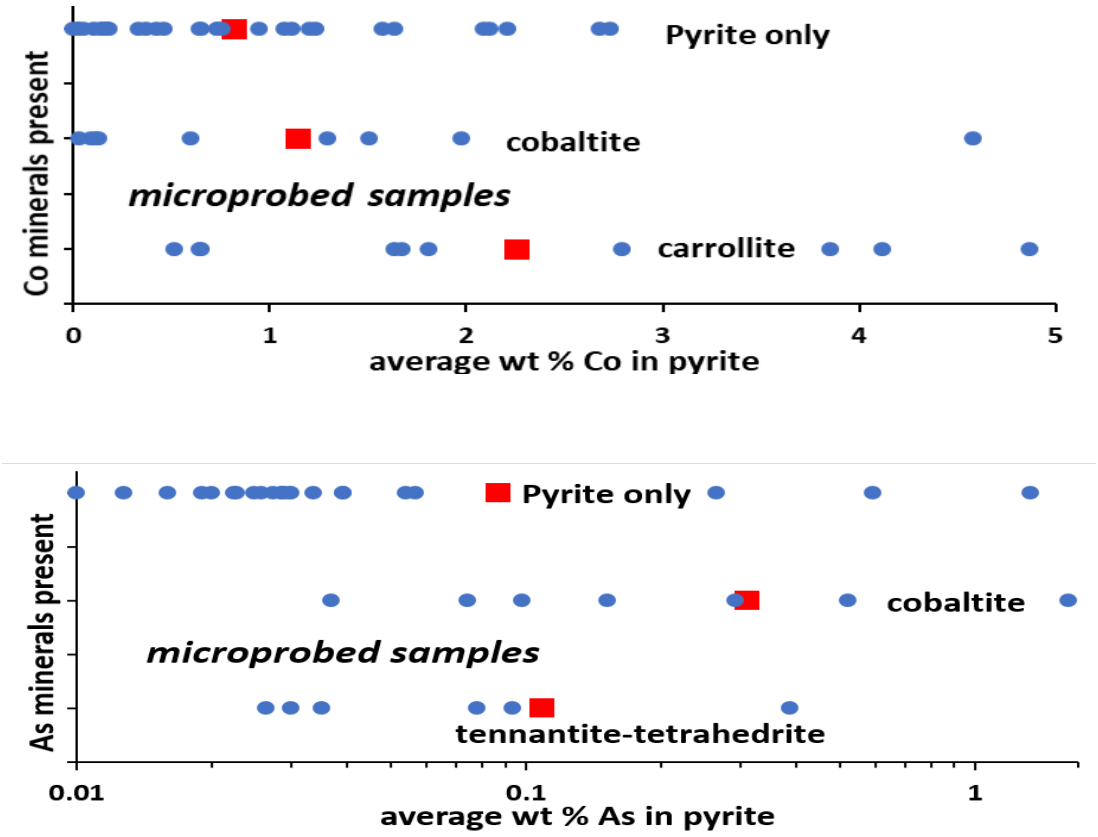


Figure 8: EMPA-determined Co (upper) and As (lower) concentrations in pyrite with different mineralogical associations.

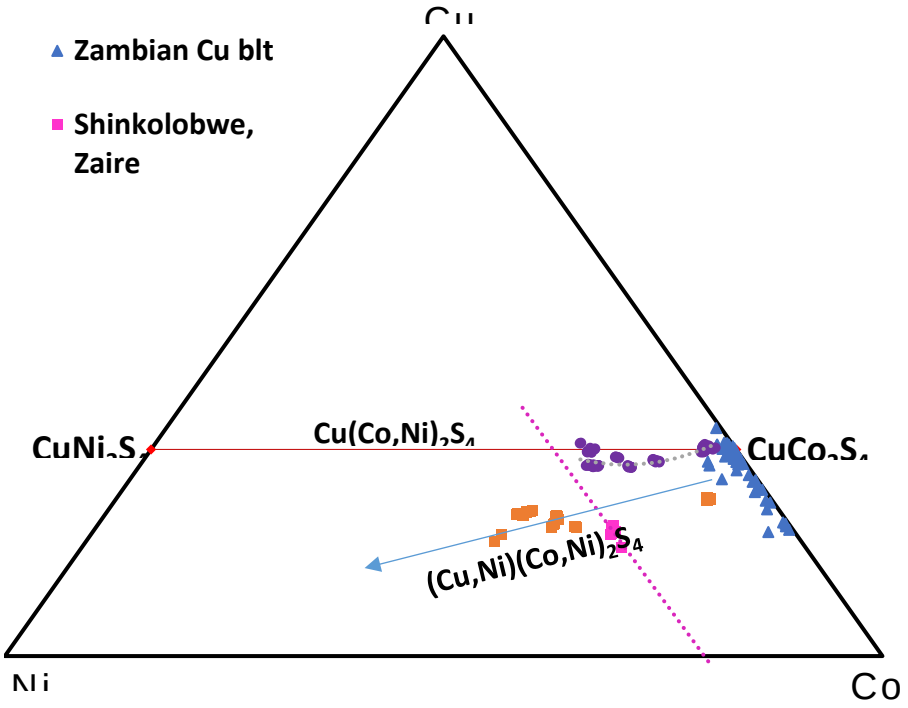


Figure 9: Carrollite compositions at Ruby Creek showing the two compositional variations. Also shown are carrollite compositions from deposits of the Congo, the leading producer of world Co.

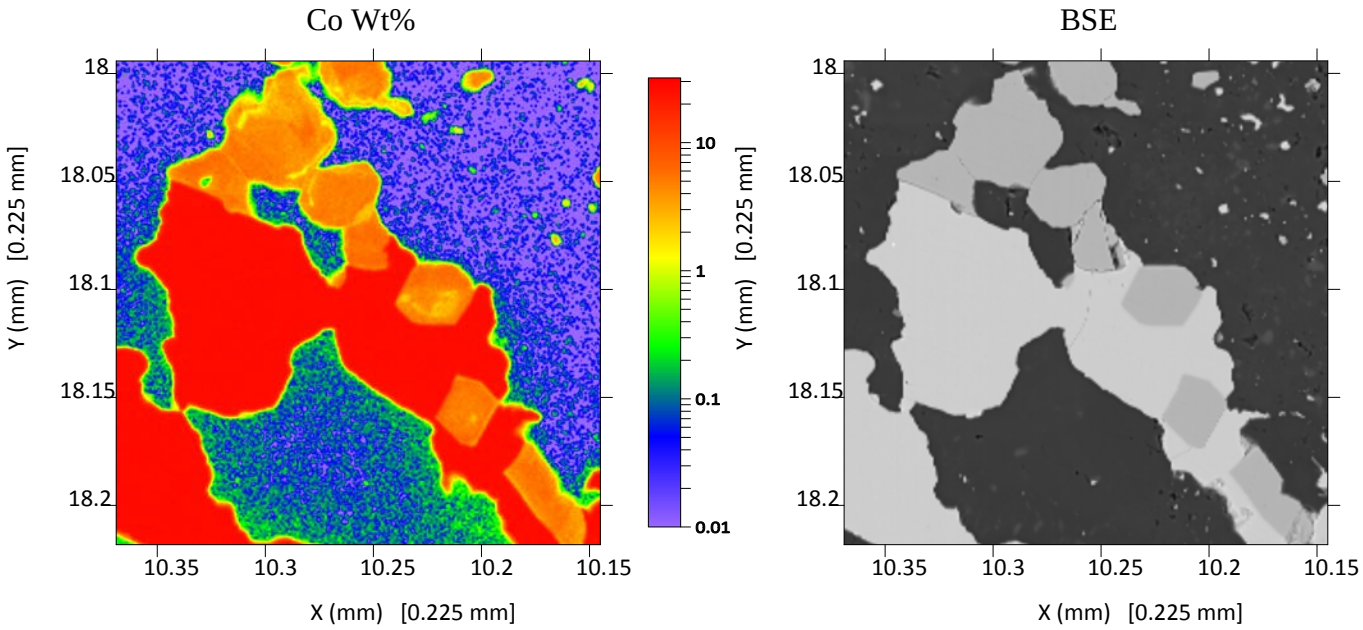


Figure 10: WDS map of carrollite (left) surrounding/adjacent to Co-rich pyrite (wt% Co as colors). The apparently elevated Co in carbonate host is likely a result of Co X-ray dispersion during analysis. BSE image (right) of the Co-mapped area for reference. Dark grey is carbonate host rock, lightest grey is carrollite and slightly darker grey is pyrite.

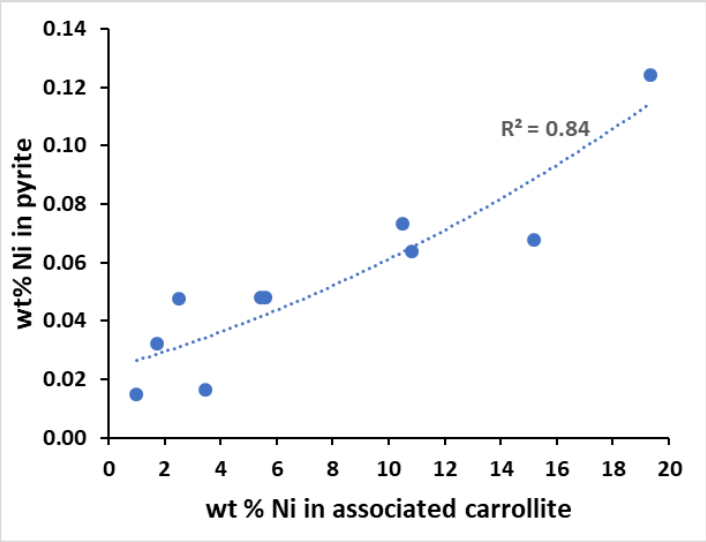


Figure 11: EMPA-based wt.% Ni in pyrite is proportional to the wt.% Ni in the associated carrollite.

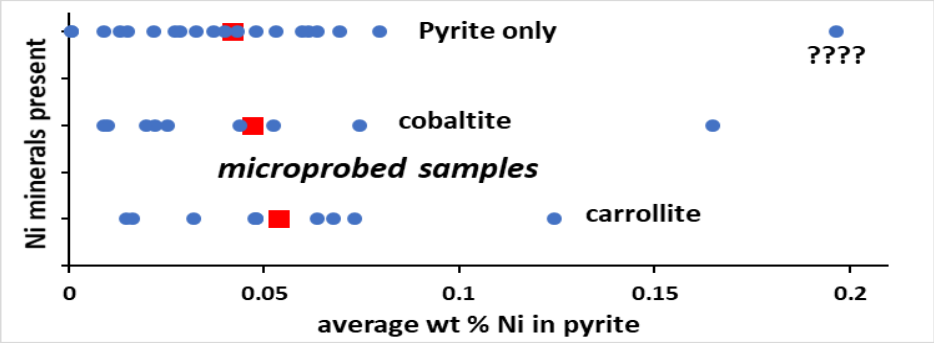


Figure 12: EMPA-based Ni contents of pyrite with different mineral assemblages. On average, pyrite associated with carrollite is slightly Ni-enriched relative to pyrite that occurs without carrollite or cobaltite.

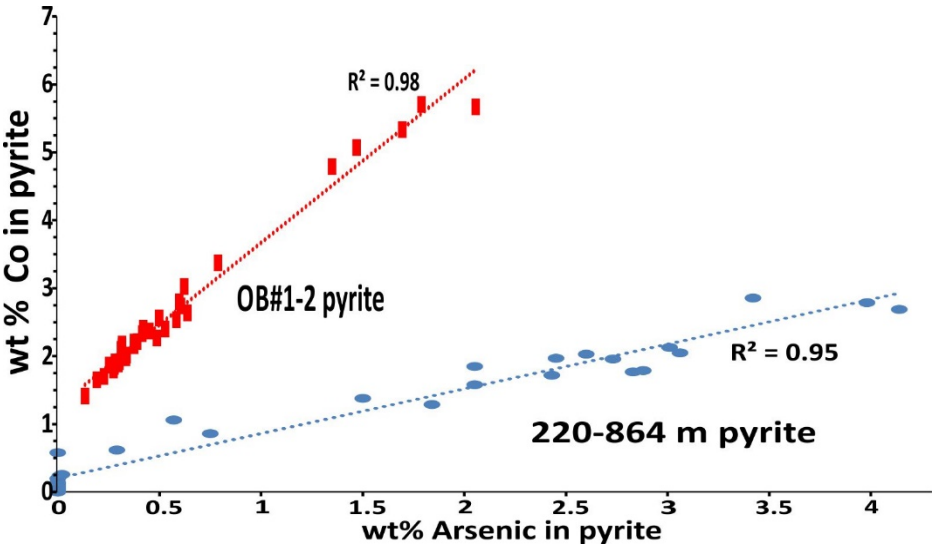
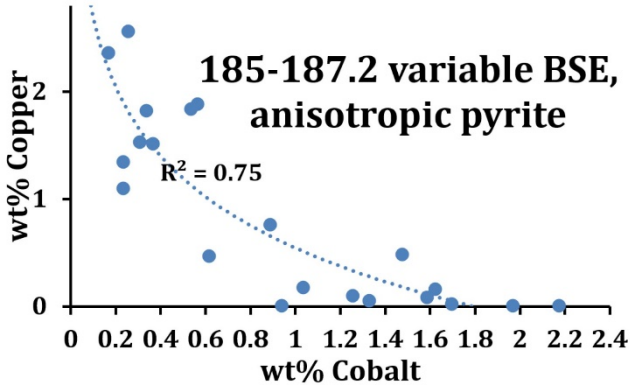


Figure 13: EMPA-based Co vs. As concentrations in pyrite for two Ruby Creek samples with high-As pyrite. So far, most Ruby Creek pyrite (Fig. 8) contains considerably less As.

Figure 14: EMPA-based inverse correlatin between Cu and Co in a relatively Cu-rich pyrite sample.



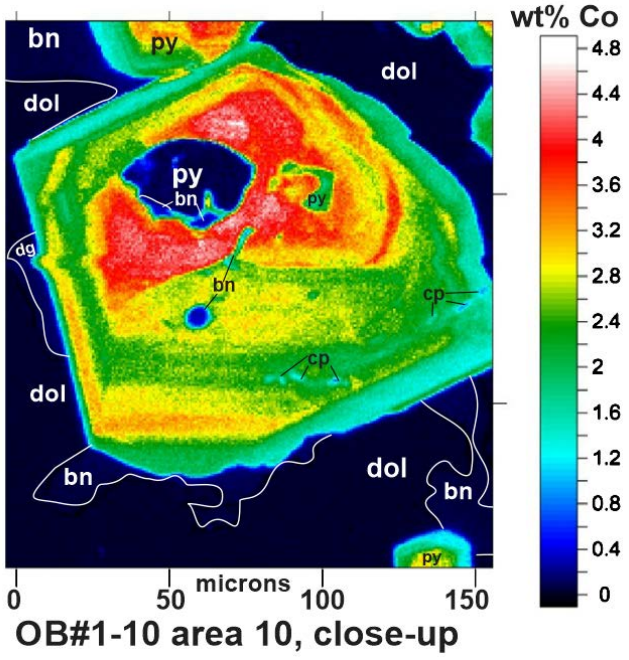


Figure 15: Co concentration map of pyrite & vicinity, showing earliest (barren) pyrite inclusion (and bornite and chalcopyrite inclusions), and later generation Co-rich pyrite. The latter commonly displays Co-enrichment towards the core and concentric oscillatory zonation. (dol = dolomite, bn = bornite, cp = chalcopyrite, py = pyrite)

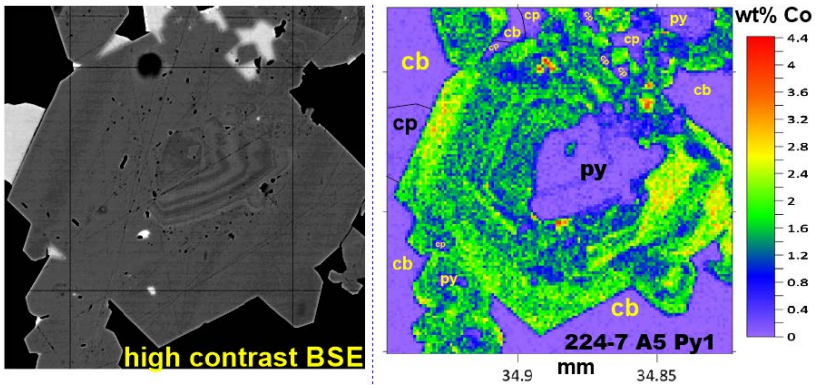


Figure 16: 2nd generation pyrite weakly Co-bearing, with distinct BSE banding (due to variable As?), surrounded by 3rd or 4th generation, oscillatory zoned pyrite. This pyrite also contains chalcopyrite (cp) inclusions (visible as bright areas in BSE image) and carbonate (cb) inclusions.

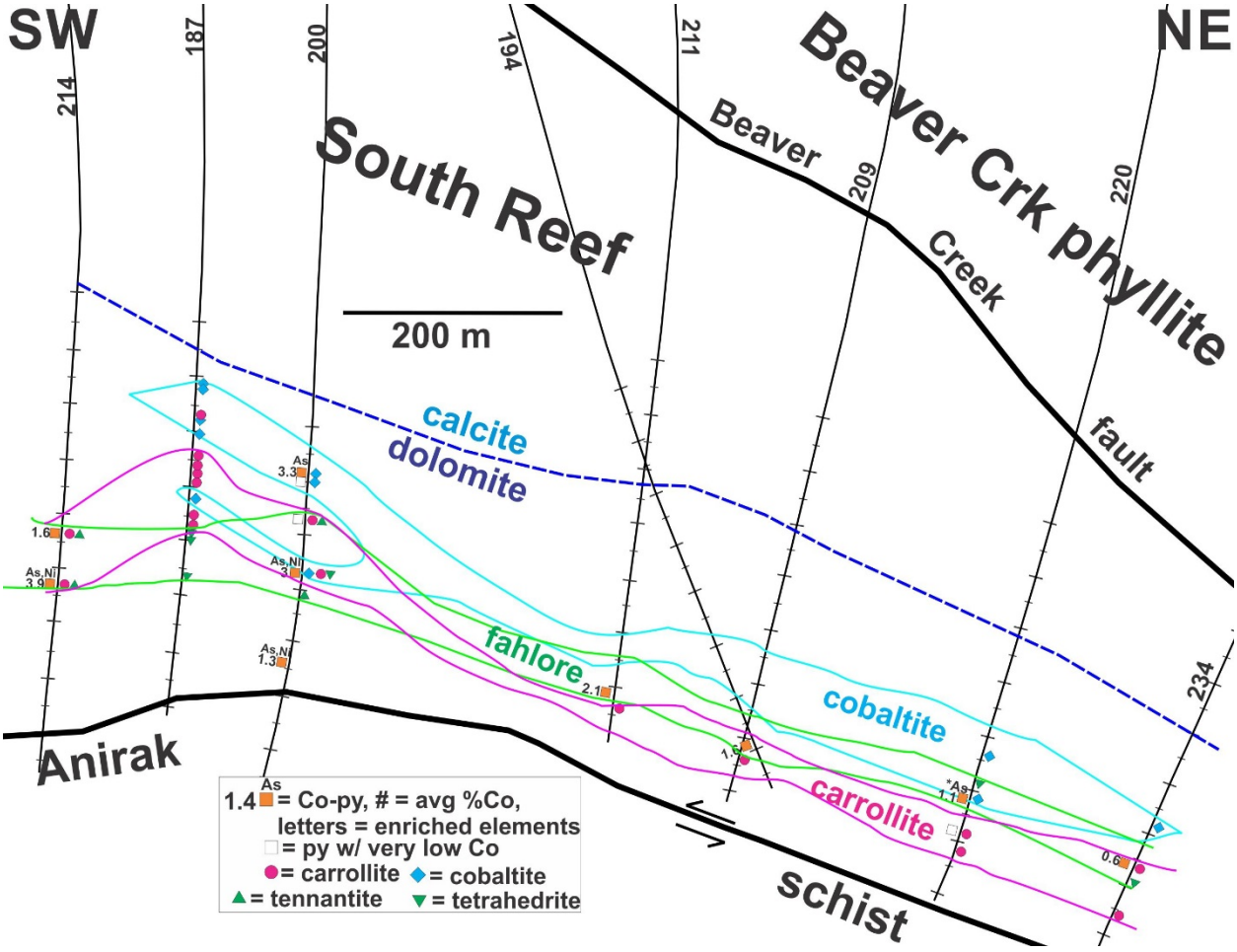


Figure 17: Generalized cross section through the South Reef showing proposed cobaltite, carrollite, and fahlore zones within Cu mineralization. Mineralogy is here is predicted from HHXRF analysis completed on drill core. Samples still need to be verified by petrographic and EPMA analyses.

Alteration Characteristics of the Newly Discovered AG Zone Deposit Volcanogenic Massive Sulfide Prospect, Palmer Property, Southeast Alaska

Frederick Warren Transburg, M.Sc.

University of Alaska, Department of Geosciences, Anchorage, Alaska USA

The Palmer property located in southeast Alaska, ~60 km northwest of Haines, hosts the Palmer and AG Zone VMS deposits. This research focuses on white mica physico-chemical variations within the AG Zone deposit.

Alteration within the AG Zone deposit consists of five distinct color variations of white mica: brown, green, grey, white, and pink. This study evaluates these physico-chemical variations using short wave infrared (SWIR), petrography, and electron microprobe analysis (EPMA). SWIR data indicate the wavelength of the Al-OH absorption feature of white mica in mineralization proximal samples (within 100 m) tends to be shorter (paragonite-muscovite). The Al-OH absorption feature of white mica in distal samples tend to be longer (muscovite-phengite), providing a vector towards mineralization. EPMA results show white mica color variation is related to its chemical composition. Of all the samples analyzed, the pink color variant contains the highest weight percentage of SiO_2, Al_2O_3, and NaO. The pink variant also has the relatively least weight percentages ofs K_2O, MgO, and TiO_2.

Al-OH wavelength absorption increases as the FeO and MgO oxide weight percentages increase, providing another vectoring tool. A relationship exists between FeO, MgO weight percent and the K_2O/Na_2O ratio, both increase distal from the upwell center. Crystallinity in samples varies from microcrystalline elongate crystals to platy intergrown microcrystalline crystals and a third type of crystallinity which consists of cryptocrystalline and amorphous white mica. The results of this study shed new light onto white mica physico-chemical variations within the AG Zone deposit, vectoring future research and exploration.

Industry Overview and Policy Updates

Tuesday November 3, 2020, Session 2 – Bill Jeffress, AMA President, Chair

Alaska Mining 2020: Discoveries Are Waiting

Curt Freeman

Avalon Development Corp.

Office of Project Management and Permitting: Looking Forward

Kyle Moselle, Executive Director, Office of Project Management and Permitting

State of Alaska, Department of Natural Resources

The Office of Project Management and Permitting (OPMP), within the Alaska Department of Natural Resources, coordinates state multi-agency regulatory reviews and authorizations for complex natural resource development projects, while collaboratively engaging federal agencies on land use planning and policy initiatives to maintain and enhance the state's economy, quality of life, and maximize the value of Alaska's vast natural resources.

2020 has been a year of change and growth for the OPMP, including appointments of a new executive director and associate director, as well as onboarding of two additional large project coordinators.

Executive Director Kyle Moselle will discuss OPMP's mission, which remains as relevant as ever, and present his vision looking forward.

Alaska Mineral Tenure Post-SB155

Ramona Monroe, Partner, and Shannon Bleicher, Associate

Stoel Rives LLP

Senate Bill 155, which took effect on April 30, 2020, changed the requirements for mineral tenure on state lands. This presentation will tell you what you need to know about the changes to the law, particularly focusing on changes to the definition of labor and what is now required on an annual affidavit of labor. We will provide tips for preparing an affidavit under the new law. We will discuss the status of new regulations implementing the statutory changes and what to expect in the future. Finally, we will address how the changes in the law protect claim owners from past flaws in qualifications and affidavits of labor.

We encourage the audience to ask questions and provide comments on any issues that they would like to see addressed in new regulations implementing SB 155.

Clean Water Act 404 Changes within the Last Year

Victor Ross, Alaska Mining Lead and Senior Regulatory Specialist

Stantec Environmental Services, Wasilla, Alaska
Cell: (907) 521-3588, Victor.Ross@stantec.com

I will summarize the changes made and proposed by USACE/EPA as shown below. These changes have been presented by Public Notice since 2019. I will cover the highlights of each and the implication to Alaskan miners.

Notice	**Topic**	**Issue**	**Impacts**
Special Public Notice 10 June 2019	National Wetland Plant list published by USACE on 21 May 2020	20 Plants status changes, none for Alaska	•Use 2018 plant list in JDR, work with 2016 list in Alaska
Special Public Notice 11 October 2019	ENG Form 6082 Nationwide Permit (NWP) Form	Pre-Construction Notification (PCN) Form updates	•New PCN form for Alaska
Special Public Notice 9 April 2020 POA 2014-0055-M1 Current GP expires 31 October 2020	Reissuance of Placer Mine General Permit	Conditions Change in proposed new authorization of GP	•Removes 1,500-foot limit on stream diversions/relocations •Stream diversion/relocation require a complete Stream Channel form and written approval from the Corps •Excludes work in and/or affecting anadromous streams.
Federal Register 21 April 2020	WOTUS, Navigable Waters Protection Rule	Rule effective 22 June 2020 in Alaska	•Ephemeral streams non-jurisdictional. •Abutting wetlands •TNWs and Tributaries replace RPWs
Public Notice 9 September 2020	NWP Reauthorization	Five new NWPs proposed	•Request for comment expires 16 Nov 2020
Special Public Notice 11 September 2020 SPN 2020-00399	Consultant-Supplied Jurisdictional Determination Reports	New requirements in JDR	•Minor changes to JDR
Special Public Notice 28 September 2020	401 Prefiling Changes	EPA Clean Water Act Section 401 Certification Rule	•New Form/Deadline for DEC 401 Filings

Early and Intermediate Stage Exploration Projects

Wednesday, November 4, 2020, Session 3 – Varina Zinno, Calista Corp., Chair

The Oreo Mountain Porphyry Cu-Mo-Ag-Au Prospect and Exploration History, Metallogenics and Industry Activity in the Tanacross Quadrangle, East-Central Alaska

David A. Hedderly-Smith, Ph.D., P.G.

D.A. Hedderly-Smith & Associates

The development of exploration geochemistry in the latter part of the 1960s led to the discovery of the Casino porphyry copper-molybdenum-silver-gold deposit in the Yukon Territory in 1969 through reconnaissance soil sampling. Casino was clearly a large deposit, and its discovery led to the Yukon-Tanana Uplands being suspected to be a significant porphyry copper province. In 1970 the U.S. Geological Survey published a 1:250,000-scale reconnaissance geologic map of the Tanacross Quadrangle by Helen Foster. Continued exploration in the Yukon and adjacent east-central Alaska soon led to the discovery of several additional porphyry copper prospects on both sides of the border.

Between 1970 and 1976, exploration programs in the Tanacross quadrangle by several companies including Resource Associates of Alaska, American Smelting and Refining Company and Cities Service Minerals Corporation led to discoveries and the location of claim blocks at the Taurus, Bluff, Push-Bush, Peternie, Mosquito, Tok, Pika Canyon, Northeast Pika Canyon, Fairplay, Oreo Mountain, Northeast Pika Canyon, Ladue Camp, Big Creek and Shady Ridge prospects. Most of these have turned out to be porphyry copper systems displaying geologic and metallogenic similarities to Casino, although a few may be volcanogenic massive sulfide or polymetallic vein deposits.

Continued development of the Casino deposit over the past 50 years has shown it to be a true giant system with contained metal resources of over 1 billion tons of “reserves” containing some $25 billion of copper and gold and another 1.7 billion tons of “inferred resources” with another $15 billion of contained metal (per Western Gold and Copper). Casino is about 320 kilometers (200 miles) southeast of the Tanacross quadrangle on geologic trend.

Additionally, in the last 25 years, gold discoveries in what we now call the Tintina Gold Province have further boosted industry interest in the area. The Peak Gold deposit in the Tanacross Quadrangle has spurred interest in this area, and substantial increases in world demand and the price of copper as well as gold have led to an uptick of industry interest in the area today.

Over the blast 15 year the State of Alaska has published 21st-century airborne geophysical survey data from airborne magnetic and electromagnetic surveys in the Yukon-Tanana Uplands of the east-central Alaska in Burns *et al.* (2006), Burns *et al.* (2011) and Emond *et al.* (2015).

Sanchez *et al.,* 2014 (*Extracting ore-deposit-controlling structures from aeromagnetic, gravimetric, topographic and regional geologic data in western Yukon and eastern Alaska*) studied aeromagnetic lineaments interpreted from reduced-to-pole magnetic grids, along with gravity, topography and field-based geologic maps to infer regional structural controls in an area of Yukon-Tanana Uplands terrain bounded by the Tintina Fault on the north and the Denali Fault on the south in the western Yukon and

eastern Alaska as part of the ongoing Yukon-Alaska Metallogeny Project by the Mineral Deposit Research Unit at the University of British Columbia. They recognized ten major northwest-trending orogen-parallel fault systems oriented sub-parallel to the regional Cordilleran deformation fabric which they interpreted to play a major role in the emplacement of known porphyry Cu-Au and epithermal Au of mid-Cretaceous (115-98 Ma) and Late Cretaceous (79-72 Ma) age. They also recognized seven northeast-trending orogen-perpendicular fault-fracture systems, which they interpreted to govern the emplacement of Late Cretaceous (72-67 Ma) porphyry Mo and Ag-rich polymetallic vein and carbonate replacement systems.

For the last few years, the State of Alaska Division of Geologic and Geophysical Surveys has been working on an update of Foster's 1970 geologic map of the quadrangle and has released numerous preliminary publications from this work. Field work in the eastern half of this quadrangle, including the Oreo area, has largely been completed. Continuing work in the quadrangle was interrupted by COVID-19 in 2020, but presumably will be restarted this coming field season. The U.S.G.S. is also currently conducting studies in the area.

The Oreo Mountain deposit was initially discovered in 1976 by Cities Service Minerals Corporation and 40 federal claims were located at the prospect. An ensuing soil survey delineated a zone of strong copper (up to 425 ppm Cu), molybdenum (up to 120 ppm Mo) and silver (up to 1. 3 ppm Ag) soil anomalies. Cities Service terminated their program in the area in the latter 1970s, and the claims lapsed.

In 2007 fifty 160-acre State of Alaska claims were located at Oreo Mountain by Full Metal Minerals. Soil sampling by Full Metal and their 2008 j-v partner BHP-Biliton identified an area of anomalous soils ranging up to 398 ppm Cu that was about 5 kilometers east-west and up to 2 kilometers north-south. In late 2008, BHP-Billiton terminated their interest in the joint venture, and in early 2009, Full Metal dropped the Doyon option. The Oreo claims were eventually dropped by Full Metal in 2012.

A key objective of the metallogenic study of Sanchez *et al.* (2014) was the generation of a **lineament system map**, which was accomplished by evaluating all components of their multidata, set stacking (of aeromagnetic, gravimetric, topographic and geologic data layers). Their Figure 9(a) displays the resultant aeromagnetic lineament length, and their Figure 9(b) shows the line spatial density. The Oreo Mountain prospect sits within the highest density area within their study (see Figure 9[b]), adjacent to the intersection of the Tanacross North fault (the northwest extension of the Big Creek fault) and the Sixtymile-Pika fault, essentially on their bullseye.

In September of 2017, thirty-two 160-acre State of Alaska MTRSC mining claims were located on the Oreo Mountain prospect on behalf of Tubutulik Mining Company LLC. In April of 2018 the property was optioned to Kennecott Exploration Company (Rio Tinto) and later that spring another 106 160-acre claims were staked, bringing the total to 138 160-acre claims (=22,080 acres, about 8,935 hectares), covering an aeromagnetic high that included the anomalous soil area. In 2018 during a three-week project in September, Kennecott established several helipads at Oreo Mountain and conducted helicopter-assisted auger soil sampling and trenching on the prospect. The soil work extended the footprint of the soil anomaly to over 8 kilometers in length east-west and 1 to 2 kilometers in width north-south while the trenching identified some local altered and mineralized rocks. Work by Kennecott in 2019 consisted of a six-week program and focused on drilling six HQ core holes totaling 3481 feet (1061 meters) with the deepest TDed at 618 feet (187 meters). The holes were apparently located largely by copper soil geochemistry. Copper and molybdenite mineralization was encountered in all six

holes, but values were not overly impressive with significant intercepts only ranging up to 71 meters of 290 ppm Cu (Oreo 19-001), 66 meters of 190 ppm Mo & 12 meters of 391 ppm Mo (Oreo 19-003 & 3A) and 88 meters of 4 ppm Ag (Oreo 2). Oreo 19-001 was probably the best hole overall with analyses averaging 263 ppm Cu, 37 ppm Mo and 1.7 ppm Ag over its entire length to TD at 166 meters. Kennecott dropped their Oreo option in late November 2019, although they paid the 2019-2020 rentals to the state and filed all their work with the State of Alaska. The property currently has "carry-forward" assessment work for four more years (through 2023) for the 138 claims.

The author's efforts to promote the property during the past year have been severely limited by the COVID restrictions both in Alaska and British Columbia. 2020 is essentially a "lost year" at Oreo.

Kennecott did not attempt any significant geologic mapping at Oreo and performed absolutely no geophysical work on the prospect during their tenure with it. Recommendations for future work on the prospect include a detailed analysis of the soil geochemical data (on-going; some results will be presented) and existing core (currently stored in Anchorage and not available for the author's examination due to Alaskan COVID restrictions, but should otherwise be available; analyses and logs by Kennecott are available). Recommendations for geophysical work include an IP/resistivity survey and a high-density (drone?) aeromagnetic survey. In their nine total weeks on the prospect in 2018 and 2019, Kennecott did little prospecting and geologic mapping, and the best geologic map of the prospect area is the reconnaissance map of the Alaska DGGS from their 2019 work (which is currently available in draft form). Clearly the Oreo prospect area also needs substantial additional geologic mapping and prospecting.

64North Project - First Year Exploration Highlights From an Emerging Gold Camp

Christine Lawley, Exploration Manager

Resolution Minerals LTD

The 64North Project is located 120km east of Fairbanks, covering a 660km^2 footprint within the Goodpaster District of the Tintina Gold Province, surrounding the Pogo Gold Mine and adjacent to Tectonic Metals' Tibbs Project. The 64North Project is subdivided into nine blocks, containing 31 prospects and numerous historic gold occurrences (Figure 1). The Project is considered highly prospective and underexplored for Intrusion Related Gold Systems (IRGS) and is considered an emerging Gold Camp. Resolution Minerals Ltd is an Australian ASX listed company who have executed a binding agreement with Millrock Resources to acquire, via $20M joint venture earn-in to a 60% interest of the 64North Project in Alaska (ASX:RML Announcement 16/12/2019) with a conditional pathway to an 80% interest.

During 2020, Resolution Minerals, in collaboration with project vendor Millrock Resources, completed the first field season in the Goodpaster District spending US$5M. A methodical approach commenced over winter with an extensive desktop review on the 64North Project synthesising geological, geochemical, geophysical and remote sensing data sets. Reconnaissance field mapping, surface geochemistry, trenching, ground geophysical surveys (CSAMT & ELF-EM), airborne geophysical surveys (magnetics/radiometrics & ZTEM), satellite remote sensing (multispectral) and structural analysis were

undertaken across the highest priority prospects. Diamond drilling was completed at the Aurora, Echo and Reflection Prospects on the West Pogo Block.

The primary focus for year one drilling was to progress the West Pogo Block, given the close proximity (~1km) to Northern Star Resource's 11Moz Pogo Gold Mine and Goodpaster Prospect, the latter of which is currently the focus of an AU$21M resource drill out. Targeting involved the integration of historic mapping, drilling and surface geochemistry with recently acquired CSAMT, ELF-EM, ZTEM, magnetic and radiometric geophysical data sets. With each drill hole, the technical team have acquired a greater understanding of the geology and structural regime of the project area and on the seventh drill hole had a major technical success intersecting a 7m thick, sulphide bearing quartz vein, hosted in paragneiss on the Aurora Prospect. Although gold grades were lower than expectations (maximum 0.185g/t Au), they are above background and the presence of a thick, flat lying quartz vein demonstrates the right structural setting to create space and focus mineralising fluids. Resolution believe this to be a near miss, given the extreme grade variability seen over short distances (50m) illustrated in published literature on the Liese veins at the Pogo Mine. Follow up drilling is underway to step out and acquire more pierce points into the vein to test for higher grade gold mineralisation, results are expected late 2020 (Figure 2, Figure 3 & Figure 4).

A major success for the 2020 reconnaissance program was the advancement of the East Pogo Block, Boundary Prospect. The Boundary Prospect is favourably positioned along the "Pogo Trend" between the highly gold endowed Pogo Mine/Goodpaster Prospect and the Tibbs Project. The Boundary Prospect has historic drilling intersecting high gold grades including 0.1m @ 35g/t Au from 224m (BND00-04) and 0.5m @ 24g/t Au from 147m (Figure 5). The application of CSAMT across historic mineralised drillholes at the Boundary Prospect has demonstrated a conductive response associated with the known mineralisation and further defined a large, thick contiguous anomaly to the south-west. Follow up mapping of the geophysical anomaly found evidence for thrust faulting associated with the surface projection of the large anomaly, which Resolution deem extremely positive given the potential for this structural feature to host Pogo-style mineralisation.

Progression of the E1 Prospect (Eagle Block) was another 2020 highlight. The E1 prospect is considered a Fort Knox analogue, and we propose the E1 Prospect to be an intrusion hosted IRGS with potential structurally controlled high-grade zones. A structural analysis defined a NW-dipping, NE-SW trending sinistral shear zone, with prospective subsidiary and step over structures (i.e. higher permeability). Trenching has been completed across these features to assess the prospect for future drill targeting. Results are pending.

Resolution Minerals participated in the 2020 DGGS Shaw Creek and Shawnee Peak airborne magnetic and radiometric geophysical survey (GPR 2020-16) covering three survey blocks (West Pogo, Eagle & LMS-X). These datasets were used to produce 3D magnetic models, which have greatly aided our targeting. Resolution Minerals have been proactive, trialling exploration techniques, which are relatively new to the District including ELF-EM, ZTEM, World View 3 mineral mapping and soil/stream sediment clay fraction analysis (highly successful in the western Yukon).

The technical collaboration undertaken between the Australian and Northern American geoscientists, adaption of modern geophysics and emerging exploration techniques has resulted in a synergy of ideas from geologists with diverse backgrounds, leading to better exploration outcomes.

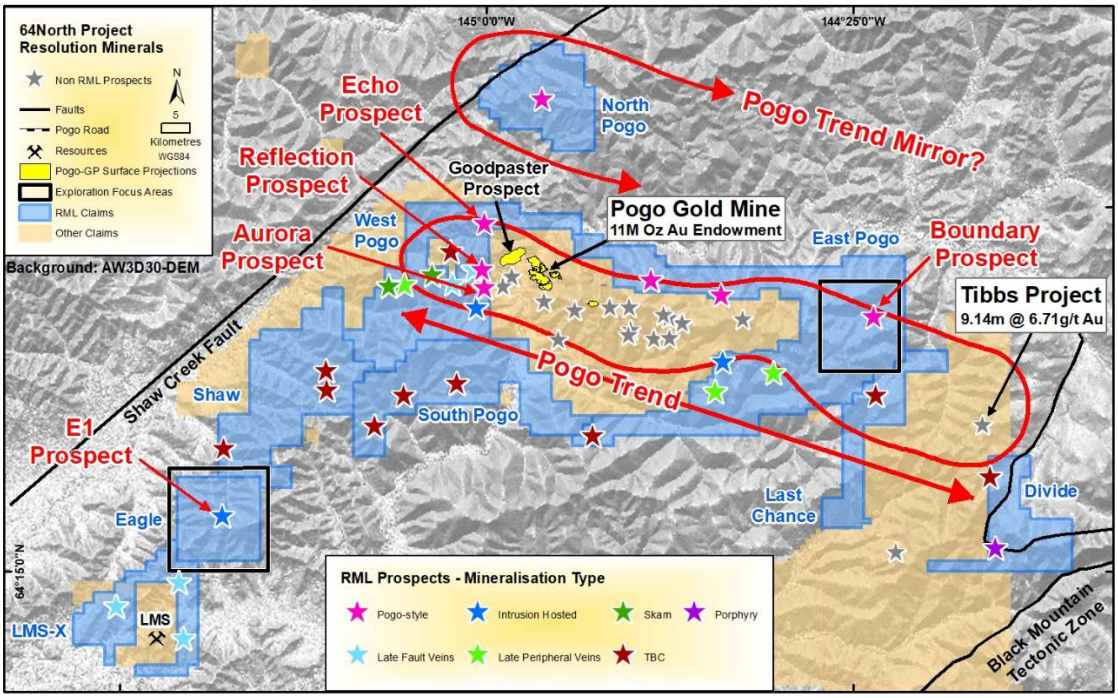


Figure 1: 64North Project Block and Prospect locations (within blue RML claims) with respect to the Pogo Gold Mine, Goodpaster Prospect, Tibbs Project, LMS Resource and other non-RML Prospects.

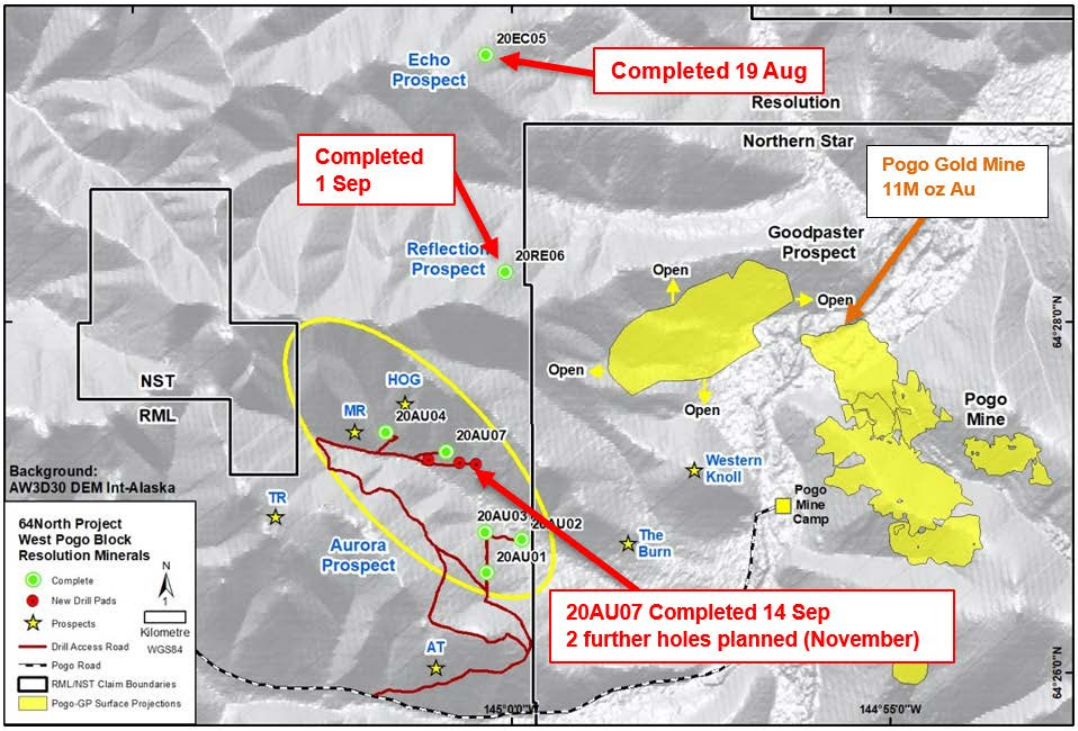


Figure 2: Aurora, Echo & Reflection Prospects – West Pogo Block, 64North Project Alaska, current drilling focus seven (7) drill holes completed for total of 4,000m of DDH March-Sept 2020.

Figure 3: Aurora Prospect, West Pogo Block, Hole #7 (20AU07) 488.69m – 488.93m quartz vein with fuchsite, arsenopyrite, pyrite and pyrrhotite included in a 7m thick interval of quartz vein.

Figure 4: Aurora Prospect, West Pogo Block, Hole #1 (20AU01) 127.16m - 127.3m quartz veins, arsenopyrite and pyrite in paragneiss. Grade 0.19g/t Au, >10,000ppm As, 9.4ppm Bi, 1.13ppm Te.

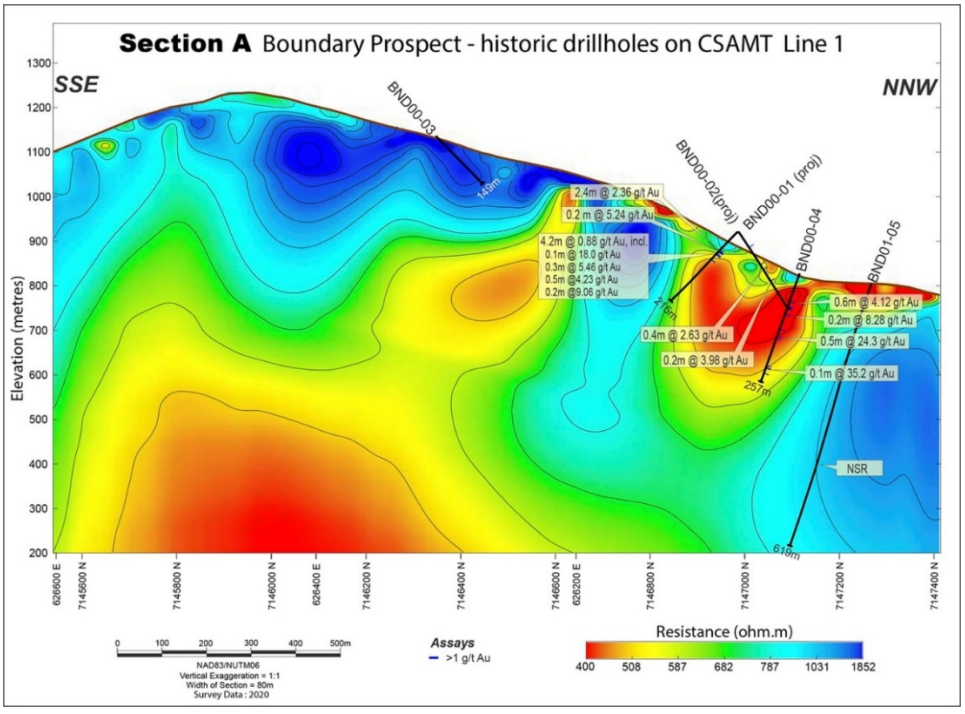


Figure 5: Boundary Prospect, East Pogo Block, 64North Project, Line 1 shallow CSAMT anomaly coincident with historic high-grade Au mineralised drill intersections.

The Tibbs Gold Project – Mineralization Styles and the Gneiss Frontier

Eric Buitenhuis

Tectonic Metals Inc.

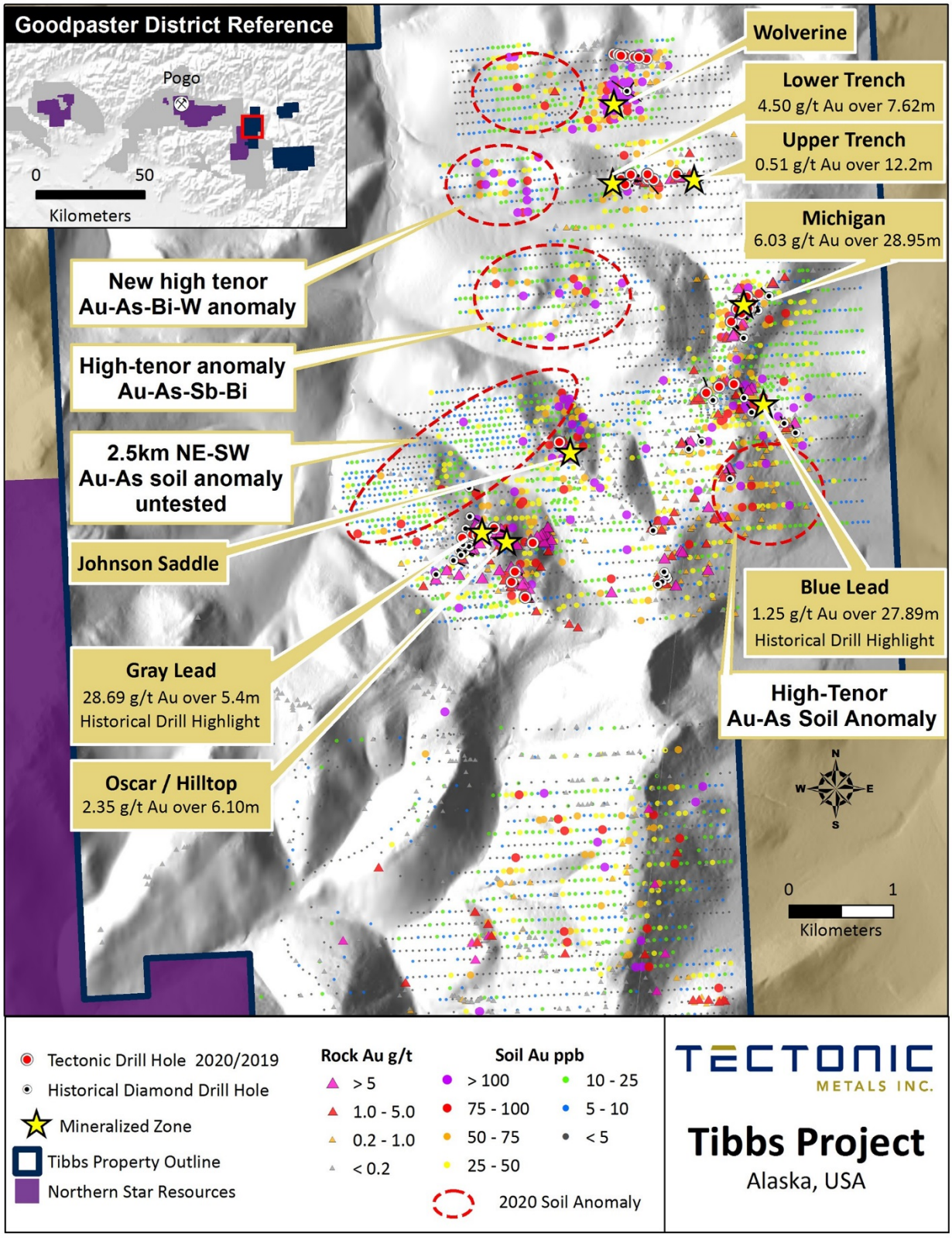
The Tibbs Gold Project is located in the Goodpaster Mining District approximately 175 kilometres southeast of Fairbanks, Alaska, and 35 kilometres east of the Pogo Mine. The property is comprised of 169 State of Alaska mining claims covering ~13,000 acres with at least 25 known target areas and historic lode gold production in three locations. Tectonic's recent lease of the Carrie Creek property, comprised of two blocks of land contiguous with the Tibbs property to the north and south and owned by Doyon, Ltd., an Alaska Native regional corporation, adds an additional 15,800 acres to the land position.

Tibbs is located within the Black Mountain Tectonic Zone (BMTZ), a district-scale northeast trending structural corridor centered on the project area. Mineral prospects occur along the western boundary of the mid-Cretaceous Black Mountain intrusion, and where it is in contact with Devonian biotite gneiss and augen gneiss to the west. In the property area, the BMTZ occurs as a series of northeast to north-northeast trending normal and left-lateral high-angle strike-slip faults. The Black Mountain intrusion is comprised of biotite granodiorite with lesser andesite porphyry. A late biotite-hornblende diorite dyke crosscuts all units, and marks much of the west margin of the intrusion.

Two styles of gold mineralization have been observed at the project: "proximal" Au+Bi±As±Te±W mineralization in quartz veins at the Gray Lead and Hilltop/Oscar prospects, and "distal" Au+As+Sb mineralization in quartz veins and wall rock disseminations at the Michigan, Blue Lead, Grizzly Bear, Upper/Lower Trench, O'Reely, and Wolverine prospects. Several of these prospects host both styles of mineralization in the same structure, suggesting multi-phase mineralization took place. At the Gray Lead prospect, a quartz-arsenopyrite ± pyrite ± bismuthinite ± jamesonite vein attaining widths of up to 4 metres was formed at temperatures from 260 – 455 °C, and pressures of not less than 1,700 bar. The vein appears to extend roughly along the western contact of the Black Mountain intrusion at the Gray Lead prospect. In the east of the project, quartz-stibnite-arsenopyrite veins and stockworks are found within sericitized granodiorite, notably at the > 1 km long, northeast trending corridor which defines the Michigan prospect. Both styles of mineralization are believed to represent a single intrusion-related gold system, with a deeper, hotter, higher-pressure setting for Gray Lead-style mineralization, and a higher-level, cooler, lower pressure, outboard setting for mineralization at Michigan.

Historic exploration work dominantly focused on finding mineralization similar to that found at the Pogo Mine – high grade gold-quartz veins found within reactivated low-angle thrust faults. At Tibbs, work focused on the Gray Lead vein, which exhibits near-identical mineralogy, geochemistry, orientation, and fluid characteristics as the North Zone veins at Pogo. Recent work by Tectonic has focused on testing high-grade gold values found in rock and trench sampling at surface throughout the Tibbs property, regardless of mineralization style or model. At the Michigan target, Au-As-Sb mineralization was found to contain significant grade and thickness, with a highlight intercept of 6.03 g/t Au over 28.95m, indicating that "distal" Au-As-Sb quartz stockwork veining and disseminated sulphide mineralization could also support high grades.

Both “proximal” (Gray Lead: Au+Bi±As±Te±W), and “distal” (Michigan: Au+As+Sb) styles of mineralization are currently known to be controlled by high angle faulting within the Black Mountain Tectonic Zone. Notably, exploration work has been confined to the main structural corridor, without stepping outside of the corridor. Along the western margin of the BMTZ lies a dome of Devonian gneisses – rocks similar to those which host the Liese veins at the Pogo Mine. These gneissic rocks have received little exploration work despite sitting adjacent to a structural corridor which exhibits high levels of fluid flow as defined by soil, rock, and drill core/chip geochemistry. In addition, low-angle thrust faults have been mapped within the gneissic rocks – an analogous structural setting to Pogo’s Liese veins. Recently announced high-tenor Au-As-Bi-W soil anomalies within the gneisses, west of the previously known targets and delineated this past field season, point to the “gneiss frontier” as a high-priority exploration target at the Tibbs property.


Goodpaster District Reference
Pogo
0
50
Kilometers
Wolverine
Lower Trench
4.50 g/t Au over 7.62m
Upper Trench
0.51 g/t Au over 12.2m
Michigan
6.03 g/t Au over 28.95m
New high tenor Au-As-Bi-W anomaly
High-tenor anomaly Au-As-Sb-Bi
2.5km NE-SW Au-As soil anomaly untested
Johnson Saddle
Blue Lead
1.25 g/t Au over 27.89m
Historical Drill Highlight
High-Tenor Au-As Soil Anomaly
Gray Lead
28.69 g/t Au over 5.4m
Historical Drill Highlight
Oscar / Hilltop
2.35 g/t Au over 6.10m
N
W
E
S
0
1
Kilometers
Tectonic Drill Hole 2020/2019
Historical Diamond Drill Hole
Mineralized Zone
Tibbs Property Outline
Northern Star Resources
Rock Au g/t
> 5
1.0 - 5.0
0.2 - 1.0
< 0.2
Soil Au ppb
> 100
75 - 100
50 - 75
25 - 50
10 - 25
5 - 10
< 5
2020 Soil Anomaly
TECTONIC METALS INC.
Tibbs Project
Alaska, USA

The Complete and Continuing Story of the Niblack Project; Prince of Wales Island, Southeast Alaska

Graham Neale, Project Manager & Robert McLeod, President and CEO

Heatherdale Resources Ltd (Blackwolf Copper and Gold)

The Niblack volcanogenic massive sulphide deposit is an advanced-stage copper-gold-zinc-silver project located at tidewater, approximately 50km west of Ketchikan, on Prince of Wales Island in southeast Alaska. This newly restructured Company's founding vision is to be an industry leader in transparency, inclusion and innovation.

The Property has been explored for minerals since the discovery of direct-shipping copper mineralization at Niblack Anchorage in 1899 with production commencing in 1902 and operating until 1908. 30,000 tons was mined averaging 3.2% Cu 1.3 g/t Au and 21 g/t Ag. From 1974 until 1994 the Property was explored by Cominco, Anaconda, Noranda and Lac Minerals. From 1995 until 2009, Abacus Minerals and subsequently Niblack Mining and Committee Bay Resources completed substantial drilling programs followed by underground exploration, delineating significant resources primarily at the Lookout and Trio Zones. Starting in 2009, Heatherdale Resources completed further drilling, as well as engineering, metallurgical work, environmental baseline work and community consultation. To-date, over 120,000 meters of drilling has been completed. In 2020, new management restructured Heatherdale, with the intent to rename to Blackwolf Copper and Gold. Permits and the underground workings have been kept in good standing.

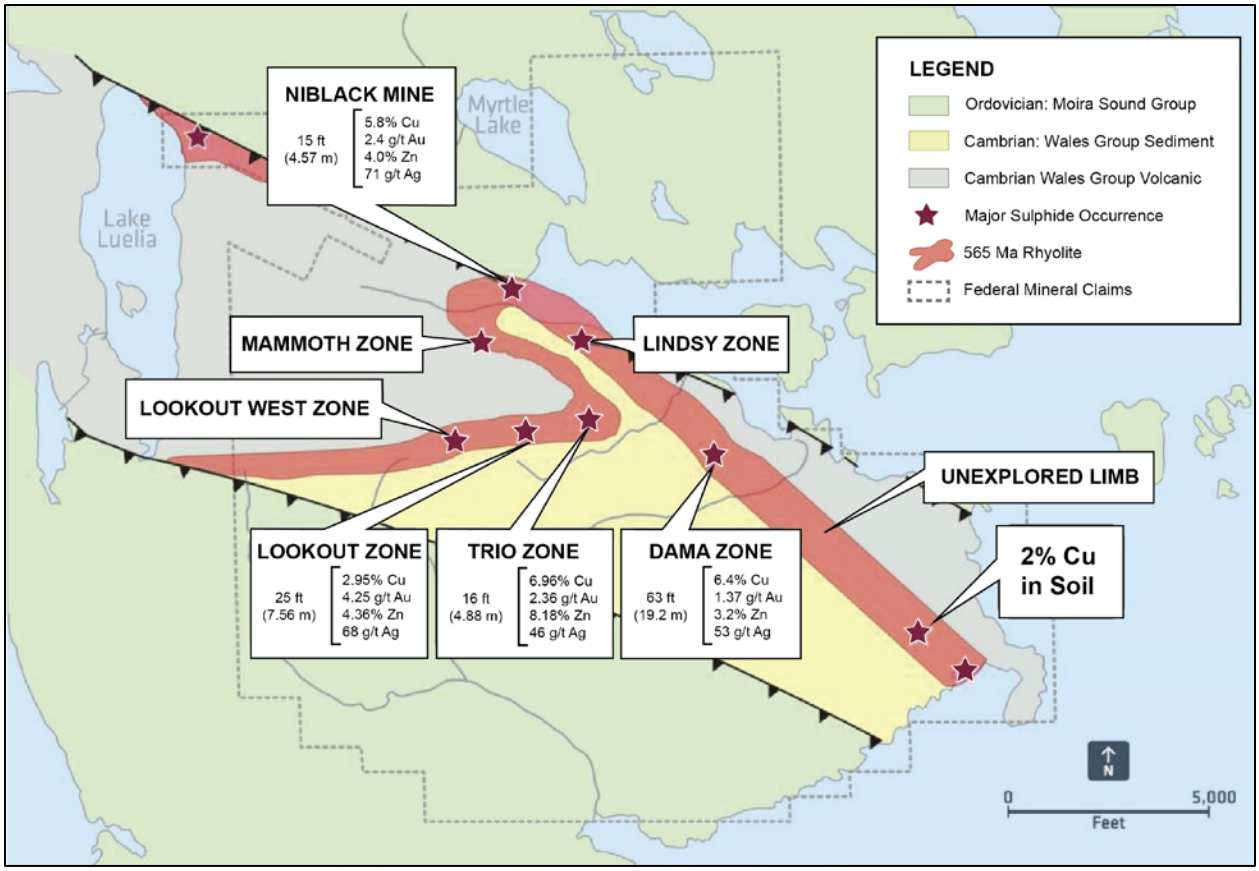
The Niblack project occurs within a volcanic and sedimentary assemblage which underlies portions of southern Prince of Wales Island and is correlative with the Neo-Proterozoic-Cambrian Wales group. Stratigraphy is comprised of a bimodal mafic-felsic suite of volcanic flows and volcaniclastics, overlain by a younger volcanosedimentary cover and have experienced low-grade greenschist facies metamorphism. These rocks are underlain by late Proterozoic flows and volcaniclastics belonging to the Alexander Terrane. The stratigraphic sequence at Niblack has been deformed into northerly-verging, moderate to tight folds, recently reinterpreted as an antiformal syncline containing younger, mafic volcanic rocks in the core, and having a moderate southeasterly plunge. Mineralization is locally affected by post-mineral faults.

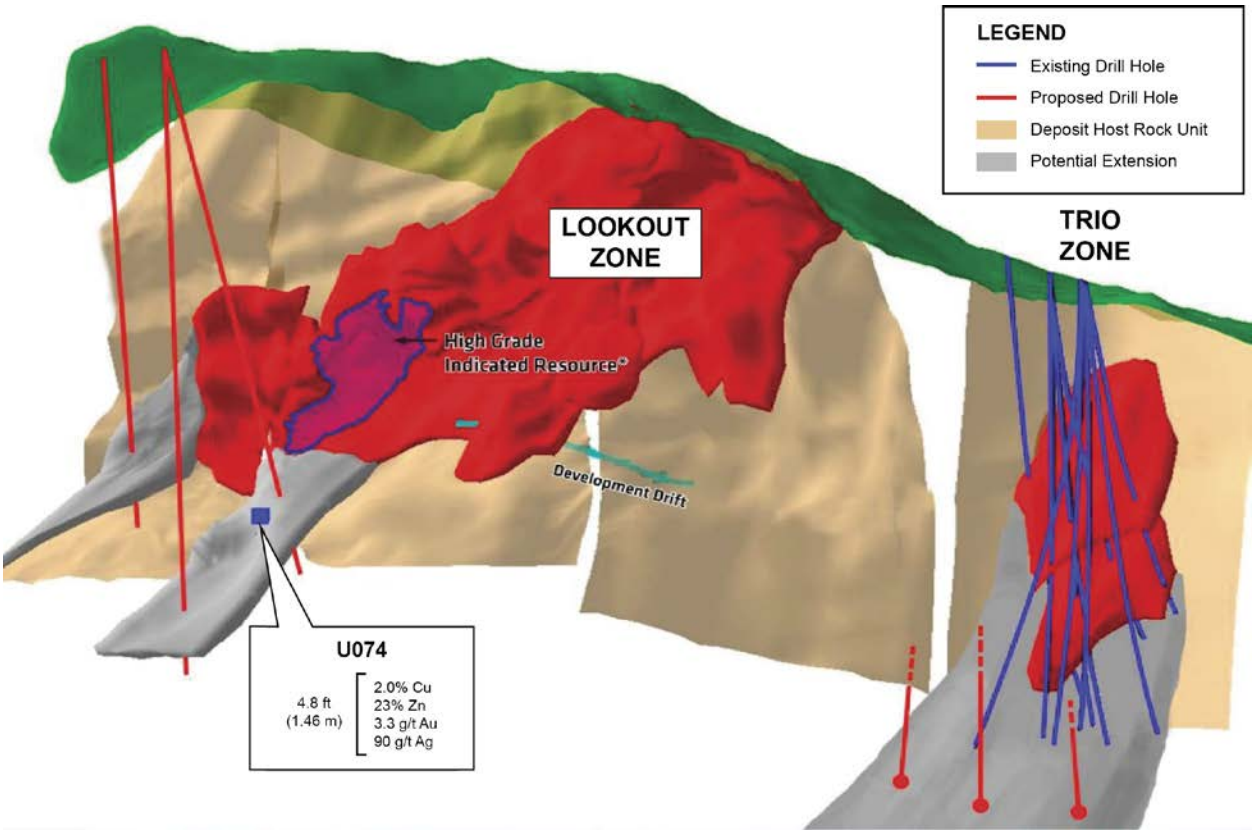
Niblack is host to at least six main massive sulphide occurrences: Lookout, Trio, Dama, Mammoth, Lindsy, and the historic Niblack mine. Mineralization is primarily pyrite, sphalerite, and chalcopyrite, and can occur as (in decreasing order of importance): sub-seafloor replacement of a porous-permeable volcaniclastic host; classic seafloor accumulations of massive sulphide; and as stringers and stockwork. Mineralization thickness ranges from one to over 100 meters, averaging 16 meters, potentially amenable to bulk underground mining methods.

The current NI43-101 Mineral Resource Estimate is as follows:

Niblack	Tonnes	Cu (%)	Au (g/t)	Ag (g/t)	Zn (%)	Cu (Mlb)	Au (oz)	Ag (oz)	Zn (Mlb)
Indicated									
Lookout	5,638,000	0.95	1.75	29.52	1.73	118.1	317,220	5,351,052	215.0
Total	**5,638,000**	**0.95**	**1.75**	**29.52**	**1.73**	**118.1**	**317,220**	**5,351,052**	**215.0**
Inferred									
Lookout	2,370,000	0.73	1.42	21.63	1.17	38.1	108,202	1,648,172	61.1
Trio	1,023,000	1.00	1.11	16.56	1.56	22.6	36,509	544,670	35.2
Total	**3,393,000**	**0.81**	**1.33**	**20.10**	**1.29**	**60.7**	**144,710**	**2,192,842**	**96.3**

November 2011 estimates by Deon Van Der Heever, Pr. Sci. Nat., Hunter Dickinson Inc., a Qualified Person who is not independent of the Company. Net Smelter Return (NSR) cutoff uses long-term metal forecasts: gold US$1,150/oz, silver US$20.00/oz, copper US$2.50/lb, and zinc US$1.00/lb; Recoveries (used for all NSR calculations) to Cu concentrate of 95% Cu, 56% Au and 53% Ag with payable metal factors of 96.5% for Cu, 90.7% for Au, and 89.5% for Ag; to Zn concentrate of 93% Zn, 16% Au, and 24% Ag with payable metal factors of 85% for Zn, 80% for Au and 20% for Ag. Detailed engineering studies will determine the best cutoff.


NIBLACK MINE
15 ft (4.57 m)
5.8% Cu
2.4 g/t Au
4.0% Zn
71 g/t Ag
Myrtle Lake
Lake Luelia
LEGEND
Ordovician: Moira Sound Group
Cambrian: Wales Group Sediment
Cambrian Wales Group Volcanic
Major Sulphide Occurrence
565 Ma Rhyolite
Federal Mineral Claims
MAMMOTH ZONE
LINDSY ZONE
LOOKOUT WEST ZONE
UNEXPLORED LIMB
LOOKOUT ZONE
25 ft (7.56 m)
2.95% Cu
4.25 g/t Au
4.36% Zn
68 g/t Ag
TRIO ZONE
16 ft (4.88 m)
6.96% Cu
2.36 g/t Au
8.18% Zn
46 g/t Ag
DAMA ZONE
63 ft (19.2 m)
6.4% Cu
1.37 g/t Au
3.2% Zn
53 g/t Ag
2% Cu in Soil
N
0
5,000
Feet


LEGEND
Existing Drill Hole
Proposed Drill Hole
Deposit Host Rock Unit
Potential Extension
LOOKOUT ZONE
TRIO ZONE
High Grade Indicated Resource*
Development Drift
U074
4.8 ft (1.46 m)
2.0% Cu
23% Zn
3.3 g/t Au
90 g/t Ag

Advanced Stage Exploration Projects

Wednesday, November 4, 2020, Session 4 – Dave Szumigala, Ambler Metals, Chair

Alaska's Pebble Opportunity – A Project Update

John Shively, CEO

The Pebble Partnership

The Pebble Project went into federal permitting in late 2017. The U.S. Army Corps of Engineers (USACE) published the final Environmental Impact Statement (EIS) for the project at the end of July 2020. The next milestones for the project include a federal record of decision, the initiation of state permitting, and finding a long-term partner for the project. CEO John Shively will provide a status update about the well-known project.

Pebble Partnership CEO John Shively will discuss recent events at the project including why he decided to come out of retirement to retake the leadership helm for Pebble. Shively will share an update about the status of federal permitting for Pebble now that the USACE has published the final EIS for the Pebble Project. Shively will discuss some of the top line conclusions from the EIS including the findings that the project can be done without harm to the Bristol Bay fishery and that it could bring significant economic activity to Southwest Alaska, especially for the communities around Iliamna Lake.

Shively will discuss next steps for the project including the key state permits that must be secured before the project can receive final approval.

Alaska's Next Gold Mine - Advancing the Peak Gold Deposit to a Production Decision in Partnership with Kinross and the Tetlin Tribe

Rick Van Nieuwenhuyse, President and CEO

CONTANGO ORE Inc., Cell 778-386-6227

Contango recently entered into 70/30 joint venture agreement with Kinross (70 % and Operator) to form new Peak Gold JV with former operator Royal Gold and the Tetlin Tribe each retaining royalties. This is a win-win agreement all the way around. The plan is to mine roughly 1 milion ounces of gold equivalent (Gold + Silver) from the Peak Gold Project, crush the ore on site and then truck and process the ore at Kinross' Fort Knox Milling Complex. According to preliminary estimates by Kinross, capital costs for the Project are expected to be ~US$110M (100% basis). Operations could potentially start in 2024 with Contango's share of production being approximately 65,000 GEO/year at $750 AISC/GEO (All-In-Sustaining Costs/Gold Equivalent Ounces) based on Kinross' estimates. There is exploration potential immediately surrounding the known Peak Gold resource as well as on the remainder of the 675,000 acres of Tetlin Lease lands. As part of the transaction, Contango acquires 100% control over approximately 170,000 acres of State of Alaska Mining claims on lands adjacent to the Peak Gold Project and the Tetlin Lease lands where preliminary exploration work has identified numerous exploration targets including Hona, Eagle and Triple Z. The Tetlin Tribe has indicated their support for the project

development plan and the Peak Gold JV plans to rename the project in consultation with the Tetlin Tribe and looks forward to a productive and mutually beneficial partnership with the Tetlin, and the other local communities.

Processing ore from the Peak Gold Project at Fort Knox avoids permitting and construction of a mill and tailings disposal facility, which is expected to decrease execution risk, lower capital expenditures, drive attractive returns, and reduce the project's environmental footprint and permitting requirements. This plan leverages Fort Knox's successful 25-year operating history in Alaska, the second largest gold producing State in the USA and one of the world's top mining jurisdictions. This Plan is expected to contribute to the state economy and provide additional employment opportunities and benefits to local communities throughout interior Alaska from Northway to Fairbanks, and in particular the Upper Tanana Athabascan Village of Tetlin where the Tetlin Tribe will receive royalties, jobs and training opportunities.

The Peak Gold JV has commenced a $3.6 million infill, geotechnical and metallurgical drilling program to advance feasibility and permitting studies. Peak Gold JV expects to complete permitting and a feasibility study by the end of 2022. Project construction is expected to take approximately one year, with production planned to commence in 2024. Future exploration of the Peak Gold JV will focus on extending mine life by finding additional high quality gold ounces immediately adjacent to the known resource that can be processed at the Fort Knox facility. There remains most of the rest of the 675,000 Acres of Exploration Lands with an extensive geological, geochemical and geophysical database on which to apply sounds geologic reasoning to identify and test additional targets. In addition, Contango plans to explore it 170,000 acres of 100% owned State mining claims located immediately north and west of the Peak Gold/Tetlin lands. There are multiple targets to drill test including Hona, Eagle and Triple Z and again, an extensive database in a very prospective and underexplored part of Alaska.

Ambler VMS Belt – A New Company, New Access, and New Opportunities

Andy West and Dave Szumigala

Ambler Metals LLC.

The Upper Kobuk Mineral Projects (UKMP) are advancing under a new company, Ambler Metals LLC. The UKMP consists of two advanced projects, the Arctic Deposit, a high-grade Cu-Zn-Pb-Ag-Au volcanogenic massive sulfide (VMS) deposit, which is advancing towards permitting, and the Bornite Deposit, a high-grade copper carbonate replacement deposit. Ambler Metals also controls the majority (70 km) of the Ambler VMS Belt on State of Alaska land and has exploration and development rights to the Cosmos Hills prospective carbonate belt under an exploration agreement with the NANA Corporation.

Over the last three years (2017 to 2019) exploration on the Bornite Deposit was funded by South32 Limited under an Exploration Agreement to earn an option to acquire a 50% stake in the UKMP. South32 exercised its option on December 19, 2019, and on February 11, 2020 the joint venture formation was completed with Trilogy Metals transferring the UKMP assets and South32 transferring $145 million into the Ambler Metals LLC, a private company. Ramzi Fawaz, most recently the Senior Vice President of Projects with Newmont Corporation, assumed the CEO position on September 1, 2020. Ambler Metals is an Alaska based company with offices in Anchorage and Fairbanks.

Trilogy Metals completed a Feasibility Study on the Arctic deposit that was announced via press release on August 20, 2020 and the accompanying Technical Report was filed on October 2. Results of this Feasibility Study provides a strong base for Amber Metals Prefeasibility Study, including numerous trade-off studies.

The Record of Decision (ROD) regarding the Right of Way permit for the Ambler Mining District Industrial Access Project (AMDIAP) was signed by the U.S. Bureau of Land Management (BLM) on July 23, 2020. This is the most significant milestone to date in fulfilling the promise in Alaska National Interest Claim Act (ANILCA) to provide access to the Ambler Mining District. Previous to the ROD, Ambler Metals signed a Memorandum of Understanding (MOU) with the Alaska Industrial Development and Export Authority (AIDEA), the project owner, which specifies how AIDEA and Ambler Metals will jointly establish a plan to complete the remaining permitting, feasibility, engineering and design, construction, and operation of the AMDIAP. Ambler Metals will contribute up to $35 million as a match to AIDEA's contribution for these activities.

Ambler Metals deferred all 2020 field activities due to the uncertainty regarding the Covid 19 pandemic, which raised concerns for the health and safety of employees, local residents, contractors, new travel restrictions and a shortened field season. Exploration work is planned to resume in 2021 at similar levels to previous exploration programs with self-funding. Most of the drilling will focus on the Arctic Deposit to advance the project through the Ambler Metals Prefeasibility study, including collecting additional mineralized material for metallurgical testing, converting the early mine production to a measured resource, and providing additional geotechnical data for pit design. The Regional Exploration program, which re-started in 2019, will accelerate with ground truthing and follow-up work focused on targets identified from the 2019 VTEM and ZTEM airborne geophysical surveys, as well as the scores of previously identified prospects and targets in the 70 km long VMS belt controlled by Ambler Metals. Selected targets will be drill tested in 2021. Exploration work will also continue near Bornite with a large-scale soil sampling program covering the prospective carbonate sequence in the northern Cosmos Hills.

Swabs and Jobs: Rising to the Challenge at Donlin

Michelle Deal, Exploration Manager and Dan Graham, General Manager

Donlin Gold LLC

The Donlin Gold deposit is located in southwestern Alaska, approximately 10 miles north of Crooked Creek and 270 miles west of Anchorage, Alaska. The project is situated on mineral rights leased to Donlin by the Calista Corporation, with the surface including a combination of native lands owned by Calista Corporation and The Kuskokwim Corporation. The project is operated by Donlin Gold LLC, co-owned by NOVAGOLD and Barrick in a 50/50 partnership. Gold mining dates back to the early 1900's with placer work in the Snow Gulch area. The mid-1980's saw increased hard rock exploration and by the mid-2000's several mineralization centers had been recognized at Lewis, ACMA, Richelieu, and 400.

The Donlin deposit is hosted in a series of rhyolitic to rhyodacite intrusives within the Kuskokwim flysh basin. The system has been identified as a Cretaceous-aged hypothermal deposit with measured and

indicated mineral resources of 39.0 million ounces (Moz) of gold. Mineralization is hosted within structural corridors trending north-northeast with vein sets dipping southeast. Gold mineralization is present disseminated throughout the intrusive body and within veins; often accompanied by very fine-grained arsenic sulfides and oxides, native arsenic, stibnite, pyrite, and trace sphalerite. Associated alteration is dominantly argillic with lesser sericite and assorted clays.

Recent field activity has seen some significant interruptions in the form of the 2019 wildfire activity and the 2020 Covid-19 pandemic. The 2020 program was designed to confirm the validity of a new geologic model and improve reserve definition. The original 2020 program included 22,000 meters of drilling in the ACMA and Lewis regions. Despite the obstacles presented by the pandemic, Donlin Gold drilled more than 23,000 meters, maintained above 80% shareholder hire, and completed the season with no positive Covid19 cases at the camp.

This talk will present a summary of the exploration field program completed in 2020.

Elections Recap and Policy Updates

Thursday, November 5, 2020, Session 5 – Deantha Skibinski, AMA, Chair

2020 General Election Recap

Ralph Samuels

While most of the people attending the AMA conference vote, unless they have been deeply involved with the nuances of an individual campaign, it is hard to keep track of the different issues that impact elections in various regions across the State.

Ralph Samuels is the former House Majority Leader in the Alaska Legislature, as well as a former candidate for Governor of Alaska. He will walk through the various Legislative districts and how the various issues impact different districts in different ways.

The Founding Fathers built a system of governance in America in which it is very difficult to actually pass laws. Numerous checks and balances combine with personalities, egos, and philosophies to generally steer things to compromise. Issues may take several years in order for them to take hold in the public, and in the Legislative arena. The obvious current issues in Alaska revolve around State financing. The role of the permanent fund, the permanent fund dividend, the size of government and taxes are all facets of this debate. Mix this with discussions on social issues such as school choice, abortion, crime/punishment, and many others makes it easy to see how it seems that nothing ever changes.

Elections are fundamental to our way of life as Americans. The more we understand the nuances of them, and understand that what may be important in my neighborhood or business may not be important in other neighborhoods or businesses, the more we are able to impact public policies that have a large influence on our businesses.

Investing in Alaskans, Access and Infrastructure for Alaska's Resources

Alan Weitzner

Alaska Industrial Development and Export Authority

Implications of the Supreme Court's *Maui County* Decision for the Mining Industry

Eric Fjelstad, Partner

Perkins Coie LLP

The Supreme Court's decision in *County of Maui* disrupted long-settled understandings of the scope of the Clean Water Act and has created uncertainty for the mining industry and others. The Court's ruling not only expands the discharge pathways subject to NPDES permitting, but also suggests that federal permits might be required for surface discharges dozens of miles and decades away from a traditional navigable water.

Courts and stakeholders have famously struggled to define which surface waters are regulated under the Act. Although the statutory synonym for a "water of the United States" (WOTUS) is "navigable water," courts have long agreed that Congress intended to regulate more than waters that are navigable-in-fact. At the same time, it has long been understood that discharges to groundwater unconnected to surface waters were not subject to federal regulation. So, despite uncertainty about when discharges to wetlands or intermittent streams require a Clean Water Act permit, it has been understood that subsurface injections and discharges to groundwater generally did not.

In *Maui,* however, the Court held that the Clean Water Act regulates discharges into underground waters that impact surface waters "if the addition of the pollutants through groundwater is the *functional equivalent* of a direct discharge from the point source into navigable waters." That ruling brought an unceremonious end to the modest regulatory certainty offered by the Trump administration's Navigable Waters Protection Rule.

Had the Court's opinion been limited to its unique facts, the looming fallout might not be so severe. In that case, the underground injections were a half mile away from the Pacific Ocean, which is indisputably a WOTUS, and there was no dispute that at least some of the discharge was reaching the ocean within a few months. However, the Court established a new "functional equivalence" test and the majority opinion, written by Justice Breyer, provided little guidance on its interpretation, suggesting that discharges to groundwater many miles from navigable waters might be subject to regulation.

The Essential Art of Prospecting

Jessica Bjorkman

Bjorkman Prospecting

Jessica is a prospector who has worked full-time in mineral exploration doing hard rock prospecting for the past twenty years. She has worked across Canada, as well as in Alaska and Norway. Although some believe prospecting is obsolete, Jessica shares how hardrock prospecting is essential to mineral exploration. As an endangered art, support and training are key to creating a future generation of prospectors. *(Please note: this presentation focuses on hardrock prospecting and does not discuss placer prospecting).*

The Value of Hardrock Prospecting And Its Role In The Canadian Mineral Exploration Industry

Prospectors have a niche skillset comprised of two components, “gold fever” and “boots on the ground,” which makes them successful at finding new showings. Modern-day prospectors combine methodical sampling techniques with these timeless skillsets to become career prospectors who are proficient in the remote wilderness.

In Canadian Exploration, prospectors contribute to building a dataset through reconnaissance prospecting, grassroots prospecting, and defining known targets that help focus drilling and other exploration.

The Importance of Prospector Training and Support

With society’s focus on university education, ie. geology degrees, the prospecting skillset has been neglected, leading to a shortage of modern-day prospectors. As a specialized trade, it is imperative government and mining companies support a future generation of prospectors through training programs, funding to conduct grassroots prospecting, and mentorship by pairing experienced prospectors with trainees. Supporting prospectors is an investment that will lead to new discoveries and a thriving Mining Industry in any jurisdiction that recognizes the value of it.

Parting Stories

Jessica gives examples from her career of discoveries made, including some of the myths and biases that had previously prevented others from discovery.

Mining Operations

Thursday, November 3, 2020, Session 6 – Dan Graham, Donlin Gold LLC, Chair

The Future of Kinross in Alaska

Jeremy Brans

Kinross Fort Knox

Since the approval of the Gilmore life of mine extension on June 12, 2018 the teams at Fort Knox and Kinross corporate have been collaborating to shift the ground beneath Fort Knox to an even more positive future. Recent accomplishments include:

- Kept focus on our first priority – safety. Earned the Sentinels of Safety award in 2019 and are today over 600 days since our last Lost Time Incident
- Commissioned Barnes Creek Heap Leach on schedule and under budget to enable processing of the Gilmore ore
- Improved our process capabilities for milling, water, and tailings to change our future

These improvements have led to the enhancement of our production profile, ramping up from ~200,000 ounces per year to ~400,000 ounces per year. It has also led to a shift in thinking: It is no longer just "Kinross Fort Knox"; it is "Kinross Alaska…with Fort Knox at its heart".

As we look to Kinross' future in Alaska beyond Gilmore, we look forward to the following:

- Further mill industrial trials to find cost efficiencies and better utilize our tailings
- If permitting and business studies are successful, the development of the Gil Sourdough deposit
- As part of our partnership with the Village of Tetlin, the development of the primary Peak deposits and additional regional exploration

While we are very proud of our accomplishments we know that mining has long lead times and are actively seeking opportunities now to move us beyond 2027 – similar to how work on Gilmore began many, many years before mining commenced.

Recent Water Quality Changes in Northwest Alaska
Observations from the Red Dog Mine Area

Michael Rieser

Teck American Incorporated

The water quality in Ikalukrok Creek, a major tributary to the Wulik River in the Northwest Arctic Region of Alaska, has changed significantly since summer 2018. High turbidity was observed in Ikalurkok Creek during the 2019 and 2020 flow seasons, and total dissolved solids (TDS) concentrations at surface water monitoring stations have increased significantly above historical levels.

Figure 2: Station 9 Ikalukrok Creek – July 2019 and July 2020 (ADF&G)

Teck Alaska Incorporated (Teck) routinely monitors surface water in Red Dog Creek and Ikalukrok Creek. During 2020 Teck expanded monitoring to include weekly water sampling from several locations on the Ikalukrok Creek drainage above the Red Dog Creek confluence, and conducted additional field reconnaissance in September. The objective of this monitoring and reconnaissance is to provide information to help identify the mechanisms contributing to the turbidity and elevated TDS in the Ikalukrok and Red Dog Creek watersheds.

Initial observations and laboratory testing of surface water samples indicate that total suspended solids concentrations remain low, suggest that mass wasting or erosion is unlikely to be a significant contributor to changes in water quality. Initial observations and laboratory analyses results indicate the TDS is primarily attributable to sulfate (60% and greater), with calcium, iron, manganese, and magnesium as other major components at percentages varying by location.

The elevated background TDS concentrations in both Red Dog Creek and Ikalukrok Creek have necessitated the reduction or curtailment of treated water discharge from the Red Dog Mine during significant parts of the historical discharge season in 2019 and 2020. This occurred when background TDS levels approached or exceeded regulatory limits at compliance points in Red Dog and Ikalukrok Creek, leaving no assimilative capacity for treated water discharge.

Unusual turbidity has been observed in other drainages in Northern Alaska, including tributaries to the Sag. Initial water sampling by the Alaska Department of Fish and Game indicate water in these areas has elevated iron, magnesium and manganese, and lowered pH levels. In the Northwest Arctic Region, elevated turbidity has been seen in upper regions of the Wulik River, as well as in the Kivalina River.

Late summer is when baseflow contribution to surface waters would be expected to be near a maximum, in particular areas in the upper drainage where taliks are either not present or limited in extent. The field reconnaissance during September 2020 found that tributaries to the Ikalukrok had significantly elevated TDS, as high as 5,000 mg/L, and pH levels as low as 3.

Additional work includes review of current research information on water quality change in the arctic in response to climate change, establishing continuous monitoring stations in the Ikalurkok drainage, and continuing ground temperature measurements in the West Fork Ikalukrok.

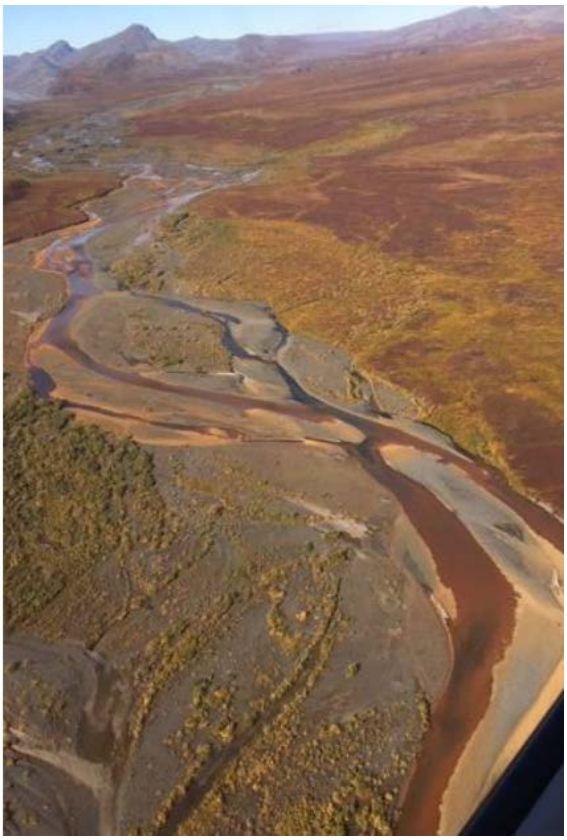


Figure 3: Upper Wulik River
August 2020 (NANA)

Figure 3: Canning River Tributary
September 2019 (ADF&G)

Hecla Greens Creek Mine Drystack Tailings: North Extension Project

Aaron K. Marsh, PE

Hecla Greens Creek Mining Company

Hecla Greens Creek Mine (HGCMC) plans to extend the existing Tailings Disposal Facility (TDF) to provide permanent disposal capacity within the existing Forest Service-approved HGCMC Lease Boundary for an additional 4 to 5 million cubic yards ("CY") of tailings and waste rock produced by the existing mill and mine. This additional disposal capacity is intended to meet HGCMC's objectives for continued uninterrupted tailings and waste rock disposal operations at the mine site in a safe, environmentally sound, technically and economically practicable, and cost-effective manner, while remaining in compliance with regulatory requirements. The Project is needed to allow planned mineral production at the mine site to continue pursuant to applicable law and pre-existing rights beyond the year 2031, when current disposal capacity is expected to be exhausted. Combined with the practicable disposal capacity of about 8.5 million CY in the approved TDF, the total disposal capacity of the extended TDF would reach approximately 12.5 to 13.5 million CY of tailings and waste rock.

The Greens Creek Mine is located on Admiralty Island, approximately 18 miles south of Juneau. It produces silver, zinc, lead and gold. The mine is 100% owned and operated by Hecla Mining Company. Last year, it produced 9,890,125 ounces of silver, 56,625 ounces of gold, 20,112 tons of lead and 56,805 tons of zinc.

Kensington Mine - A Stalwart Member of the Community Looks to its Future

Mark Kiessling, General Manager

Coeur Alaska – Kensington Mine

The effects of the COVID-19 pandemic continue to impact our nation's health and economy. In these uncertain times, many businesses have been forced to close; some permanently. As a critical infrastructure business, the Kensington mine quickly implemented measures to protect our workforce, families, and communities. This quick response has enabled continued, safe operation throughout the pandemic, preserving jobs for its approximately 400 employees and 100 contractors, supporting multiple businesses in Southeast Alaska and supporting economic stability in the region. The mine also increased donations (in-kind, financial and materials) to help the community prepare and weather the COVID-19 storm.

Coeur Alaska looks to continue to support economic and social stability, and the Southeast Alaska community. In 2019, Coeur Alaska achieved a significant milestone of over 1 million gold ounces produced since production began in 2010 and celebrated its tenth year of production in 2020. Coeur Alaska is also seeking an amendment to its Plan of Operations (POA 1) to increase tailings and waste rock storage capacity to support future operations. POA 1 offers environmental benefits, maintaining Kensington's minimal footprint by using existing infrastructure and enhancing fish and wildlife habitat through reclamation efforts. POA 1 is currently being analyzed in a Supplemental Environmental Impact Statement (SEIS) by the U.S. Forest Service. The Final SEIS is expected to be released mid-year in 2021**.**

Attracting Venture Capital for Large-Scale Mine Exploration and Development in Alaska

Greg Beischer, B.Sc., CPG, President & CEO, Director

Millrock Resources

This presentation analyzes the State of Alaska as a target jurisdiction for mineral investment in a global context and makes four specific recommendations that, if adopted, would result in more exploration spending, more mineral deposit discoveries and more mines in Alaska. With the right choices now Alaska's economy will diversify, grow and thrive in coming generations.

Every large-scale mine has a dramatic, positive, economic impact on Alaska's economy and that of its constituent boroughs, cities and lands. Growth of the mining industry is key to diversification of the state's economic base. Despite a huge land mass, exceptional geological potential, and a long history of small-scale alluvial mining, there are only six large-scale mines in the state. There could be many more, and it is necessary to replace those that will be exhausted in the coming years. Alaska must attract the industry for future economic survival and continued prosperity and to provide the basic materials our country needs.

Finding and developing new mines is extremely expensive and fraught with risk and subject to large cyclical shifts in capital availability. Many millions of dollars must be risked to discover new ore bodies. Exploration and development companies have their choice on where to deploy funds in the world in the search for new mines. Alaska must compete globally to attract those funds from both domestic and foreign sources.

Over the past decade, Alaska has earned a solid reputation as a Tier I jurisdiction for mineral development. There is a set of parameters that decision-makers and financiers often consider when deciding where to deploy funding. These include: 1) Geological Potential, 2) Degree of Previous Exploration, 3) Land Availability, 4) Mineral Tenure System Functionality, 5) Mineral Land Tenure Security, 6) Accessibility and Infrastructure, 7) Taxation, 8) Investment Climate – Political Risk, 9) Cost of Exploration and Development, 10) Public Geological Database, and 11) Regulatory Framework.

While Alaska scores highly on most of these parameters and it is becoming a favored jurisdiction globally, there are four actions that could be taken that would result in far more exploration spending, mineral deposit development spending, and ultimately more mines being put into production. The recommended actions are:

Real-time online claim maps. Alaska Department of Natural Resources Mining Divisions must keep AlaskaMapper – the state website that tracks mining claims – up to date in real time. It is crucial to know what land is available or not at any given moment in time.

On-line claim staking. Modernize the manner in which mineral rights are obtained so that companies can secure mineral rights from wherever they may be headquartered. Real-time on-line computer claim staking will boost exploration spend many-fold.

Exploration data capture. Most modern jurisdictions require explorers to provide a copy of the exploration information they create through their millions of dollars of exploration work on public lands. Alaska should institute a similar "assessment system" that captures this data for the future benefit of the Alaskans.

Advertise! Joint Government – Industry marketing is needed. We must let the world's mining and mine finance industry know that Alaska appreciates mining investments and that it truly wants the industry to grow. Our neighbor Yukon has made a successful initiative called the Yukon Mining Alliance that attracted many hundreds of millions of investment dollars. It is recommended that Alaska embark on a similar joint industry-government marketing venture. Alaska must consistently let the world know it is open to the mining business!

Prospectors Tent

Tuesday, November 3, 2020 – Varina Zinno, Calista Corp, Chair

The Boulder Prospect, Flat, Alaska

Ben Porterfield M.Sc. | PO Box 112521, Anchorage Alaska 99511 | (907)947-5739
porterfield57@gmail.com

The prospect is located in Western Alaska in the Iditarod Quadrangle. It is two miles north of the historic mining town of Flat. The target at Boulder is a partially unroofed cupola of a late Cretaceous Monzonite pluton which intrudes Mesozoic sedimentary rocks and Cretaceous volcanic rocks. Gossan and stock-work quartz veins are found in colluvium covering two square kilometers.

The Boulder pluton is on the north end of a 5-mile long belt of Cretaceous plutons, hornfels, and volcanic rock which runs from Chicken Mountain north to the head of Boulder Creek. Over 1.4 million ounces of placer gold production is closely associated with this belt. Two historic (1930's) adits on the prospect have assays up to 1.47 ounces gold and 14.7 ounces of silver.

Elliott Creek Prospect, Wrangell Saint Elias at Elliott Creek Incorporated

Nick Begich, President | P.O. Box 201393, Anchorage, AK 99520 | Cell: 1-907-854-9912

drnick@alaska.net

The Property

Wrangell Saint Elias at Elliott Creek Incorporated (WSEECI) holds, in fee, 812 acres of patented federal land inclusive of the mineral and surface estate, extralateral rights, water rights, and timber rights, among others. We are seeking partners that have an interest in creating a development that may include mining, tourism, hydroelectric or other opportunities as will optimally leverage the historic, geologic or other natural aspects of the property.

WSEECI has consolidated the properties within the Elliott Creek valley, bringing together all privately held land under a single entity. Property history is referenced throughout public literature, inventoried by the National Park Service, and supplemented by many additional original documents held by WSEECI.

Assays and Field Work

Preliminary investigation of the WSEECI property was conducted by SRK in 2009, and included field assessment, initial sampling, analysis, and recommendations. As part of its continuing review, WSEECI

has located original mining artifacts, excavations, historic markers, trenches and tunnels / adits throughout the property. Approximately 1,500 feet of underground workings have been explored with as much remaining to be examined.
Over 150 grab samples and continuous chip samples have been collected by WSEECI since 2008, and have assayed up to 18% copper with additional silver, palladium, platinum, and gold as further CuEq drivers (Exhibit 1).

Geology
The mineralization at Elliot Creek has been identified as basaltic, hydrothermal copper. These deposits include native Cu-Ag and copper-sulfide mineralization occurring as veins and disseminations in amygdaloidal flows, tuffs, breccias, conglomerates and in places sandstones. Mineralization is found in the Nikolai Greenstone below the Chitistone Limestone. Mineralization is described by Moffet et al., (1923) as structurally controlled occurring along fracture planes and faults. Copper minerals also occur as disseminations proximal to fractures and faults. Copper minerals include bornite, chalcopyrite, cuprite and chalcocite.
The geology of Elliott Creek provides the ingredients for a remarkably environmentally friendly mining operation, should one be engaged. Extensive limestone deposits as well as concomitant calcite complement an ore profile exceptionally low in deleterious elements.

Next Steps
WSEECI is developing a strategy to optimize the value its property holdings. These possibilities include mining, tourism, and other land use strategies. In addition to a number of agency permits and clearances, the company has engaged with the National Park Service and gained the necessary approvals to advance surficial infrastructure improvement. As a next step, WSEECI is seeking partners capable of contributing toward efforts advancing these holdings to their highest and best use.

Elliott Creek Progress Highlights

Field and Analytical Work

- Initial field study and report provided by SRK.
- Historic Geology and Regional Geology collected.
- Preliminary Metallurgic review indicating “clean ore.”
- Samples taken showing consistent copper values of identified mineralized areas **between 2% and 18% Cu** with additional noteworthy **silver**, **palladium**, **platinum** and **gold** (Exhibit 1).

Ownership and Rights

- Consolidated Elliott-Hubbard historic patented federal claims (812 acres).
- Quiet Title Action Summary Judgment completed
- Key corner markers located on the property and certified copies of the mining claim surveys obtained from the National Archives.
- Significant mapping obtained and available from the NPS in digital formats.

Access

- Confirmation by Alaska Fish & Game on all stream crossings to the property are clear to cross as non-salmon streams.
- Survey of road access completed. Access plan preliminary work on Construction. Survey completed by GPS and platted.
- Discussion with the Alaska Division of Natural Resources on potential activities and state permit requirements
- Understanding with the National Park Service on Historic Archeological matters
- Executed binding memorandum with the neighboring Native Corporations addressing,
    - Access
    - Exploration Rights
    - Hydro-electric co-generation
    - Tribal Relations
    - Contracting and Hiring Cooperation
    - Hunting and Subsistence Issues
    - Environmental Provisions
- Received BIA Access Improvement Letter
- Received National Park Service Access Improvement Permit
- Received National Park Service Surface Estate Improvement Approval Letter

CSAL INC.
Copper State Analytical Lab
President D.A. Shah
Since 1981

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WSEECI
Mr. Nicolas J. Begich
Box 201393
Anchorage, AK 99520

Date Received 11/07/2016
Date Reported 12/12/2016

ANALYTICAL REPORT

CSAL ID	Client ID	Gold ppm	Silver ppm	Cu %
1116-172156	NT 16 - 1N	0.337	7.3	6.02
1116-172157	UT 16 - 1u	0.101	7.9	6.62
1116-172158	UT 16 - 2u	0.842	6.0	5.14
1116-172159	UT 16 - 3u	0.269	9.7	10.99
1116-172160	UT 16 - 4u	0.135	6.1	5.45
1116-172161	UT 16 - 5u	0.168	16.0	14.14
1116-172162	UT 16 - 6u	0.236	20.1	18.82
1116-172163	UT 16 - 7u	0.168	13.4	6.77
1116-172164	UT 16 - 8u	0.168	13.0	9.68
1116-172165	LT 16 - 1 L	0.168	5.8	9.41
1116-172166	LT 16 - 2 L	0.269	8.3	8.37
1116-172167	LT 16 - 3 L	0.202	8.3	5.90
1116-172168	LT 16 - 4 L	0.202	10.5	10.27
1116-172169	LT 16 - 5 L	0.135	13.0	8.23
1116-172170	LT 16 - 6 L	0.135	7.9	5.31
1116-172171	LT 16 - 7 L	0.135	14.9	5.44
1116-172172	LT 16 - 8 L	0.135	11.6	7.99
1116-172173	LT 16 - 9 L	0.135	5.8	5.61
1116-172174	LT 16 - 10L	0.101	1.1	0.167

REGISTERED ASSAYER CERTIFICATE NO. 8888 Dnyanendra Amrutlal Shah ARIZONA U.S.A.

12/12/16

Reported By_____ 12/12/2016
D.A. Shah / Laboratory Director

President: D.A. Shah Parle1940@aol.com • Lab Manager: Andrew Shah Andrew@prescottlab.com
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Page 1 of 1

Oreo Mountain Porphyry Cu-Mo-Ag-Au Prospect, Tanacross Quadrangle, Alaska

David A. Hedderly-Smith, Ph.D., P.G, Tubutulik Mining Company LLC

See Technical Session 3, Early to Intermediate Exploration for complete abstract.

Intrusion Related Gold in Nyac Mining District, Southwest Tintina Gold Province, Southwest Alaska

Varina Zinno, M.Sc., CPG, Calista Corporation, Anchorage, Alaska

vzinno@calistacorp.com

The Nyac mining district has been actively mined since its discovery in 1908. Approximately 900,000 oz of placer gold has been recovered using four bucket line dredges and other mechanical means. The land ownership has changed many times over the years and is now consolidated under Anchorage-based Calista Corporation ("Calista" or "Calista Corp"). The Calista mineral estate at Nyac is 69,924 acres comprising 354 square kilometers (137 square miles) of land.

Calista Corporation is one of 13 Alaska Native Regional Corporations created under the Alaska Native Claims Settlement Act of 1971 (ANCSA) in settlement of aboriginal land claims. The Donlin Gold deposit (39M oz Au) is the best-known deposit situated on mineral rights leased to Donlin by Calista Corp. The Calista Region has a land endowment of 6.5 million acres, with over 264,000 acres designated to resource development opportunities and much of the land is located in the southwest extension of the Tintina Gold Province, known as the Kuskokwim Gold Belt. This region has great discovery potential with many more prospects at earlier exploration stages.

At Nyac, the search for a hardrock source for the placer gold has been ongoing since the early 1970's, starting with Resource Associates, then Placer Dome, Tonogold Resources, Nyac Gold LLC, and Calista Corp. Exploration methods have included a total of 14,339.2 meters (47,044.7 feet) of diamond drilling, geologic mapping and prospecting, soil sampling, geophysical surveys, and trenching. Highlights of historic drilling include altered quartz monzonite dikes and a hybrid quartz monzonite-gabbro rock encountered in the headwaters of Ed's Creek which produced multiple intervals to 169.5 meters (556 feet) thick of + .200 grams per ton (gpt) Au, with the highest gold value being 4.99 gpt over 2.8 meters (9.2 feet). These intercepts also contain variably anomalous Ag, Bi, Cu, Mo, Pb, Sb, Zn and Hg (Flanders, 2013). The gold mineralization, which is thought to be possibly late Cretaceous in age, is situated over prominent positive magnetic anomalies generated by an airborne survey conducted in 1993 by the Alaska DGGS and indicate a potential for numerous additional mineralized occurrences across the district (Flanders, 2013).

The 2020 exploration program consisted of soil and rock sampling in previously unsampled areas and follow up on previous anomalous samples. Two discoveries of significant mineralized areas were made at Nyac this season including in a previously unsampled zone. The Headwaters of Happy Creek, near Spruce Creek, displays pervasive quartz stockwork veins in diorite outcrops extending at least 100 meters to the east. Some of these veins contain chalcopyrite, malachite coatings, and occasional

occurrence of clinochlore. Clinochlore is significant because it is the mineral associated with high grade gold at Wallace and other prospects in the Nyac district. Potassium feldspar and possible sodic-calcic alteration halo around some veins were observed in this area and are consistent with Cu-Au porphyry deposit mineralization style. This area is upstream of Happy Creek where it forks near the upstream area of Spruce Creek, of which 25,000 ounces placer gold has already been mined. The Spruce Creek placer tailings are about 2000 meters from this occurrence.

A previously unsampled area now called the Rex Occurrence was initially prospected this season by soil samplers, who brought back an interesting rock sample. Upon follow-up, this area contains widespread high intensity quartz hydrothermal breccia veins scattered over 100 meters distance on the ridgetop as float and rubble crop (Figure 1). Some vein fragments contained patchy chalcopyrite, chalcocite, malachite coatings, and trace visible gold. Strong fault slickensides along the vein fragments indicate vein-fault association and ground preparation for mineralized fluid. This occurrence is about 2300 meters from the Shamrock placer deposit, where 50,000 oz of placer Au was mined, including the largest gold nugget ever mined in the Nyac Mining District.

Geochemical results for the 2020 summer exploration program are pending.

Calista Corporation is seeking partners to enter into an Exploration and Mining Lease Agreement.

Figure 1: Explorers from 2020 field crew at discovery rubble crop for the Rex occurrence where mineralization consists of chalcopyrite, chalcocite +/- trace visible gold mineralization in quartz hydrothermal breccia vein with strong fault slicks. In background is the Shamrock placer deposit.

Poster Sessions

Wednesday, November 4, 2020 - Eric Cannon, Golder Associates & Sue Karl, USGS - Chairs

Rite in the Rain to iPhone: a transition to digital underground data collection at Kensington

Rae Keim, Chief Mine Geologist

Kensington Mine

Yellow Rite in the Rain notebooks have been a ubiquitous part of any geologist's field gear, whether underground or on surface, for decades. While their ruggedness is commendable, the use of notebooks has the potential to introduce errors when transferring data from the book to the digital database and creates inefficiencies in data management. During an average day of underground collection, mainly centered on chip sampling of faces, the Mine Geologists at Kensington were writing and typing the same sample numbers at least four separate times. A goal of 2020 has been to move from pen and paper to digital data collection and management by designing an app to use on an iPhone. The design work was done in house by Kensington's Database Administrator and has been crafted to automatically sync with the database once the iPhone has reconnected to Wi-Fi. In addition, the app allows for digital creation of assay request forms when dropping samples off at the lab and nearly instantaneous generation of the Daily Ore Control Report. The app was created using Microsoft's PowerApps program which had a steep learning curve but allowed for cost savings associated with in-house app creation, continuous updates and future upgrades. While testing is still underway, it is expected that digital data collection will decrease the risk of simple database errors and save the Mine Geologists at least 1 hour of data entry per day.

New Detrital Zircon Ages Indicate Potential for Expansion of the Upper Triassic Hyd Group Along Strike from Hyd Group Host Rocks of the Palmer VMS Prospect, Southeast Alaska

Karl, S.M.[1], Quinn, K.[2], Green, D.[3], Steeves, N.[3], Proffett, J.[4], O'Sullivan, P.[5], and Jones, J.V., III[1]

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3 Highgold Mining, Inc., Vancouver, B.C., Canada
4 Proffett Exploration, Eagle River, AK
5 GeoSep Services, Moscow, ID

New stratigraphic studies and U-Pb detrital zircon ages for rocks at the Palmer Zn-Cu-Pb-Ag-Au volcanogenic massive sulfide (VMS) prospect, north of Haines, Alaska, and in rocks along strike from the Palmer prospect indicate potential for wider regional distribution of the Upper Triassic Hyd Group that hosts the VMS occurrences on the Palmer property. The rocks along strike with the prospect are currently mapped with the Paleozoic Porcupine Slate unit. The Hyd Group hosts the massive sulfide bodies at the Greens Creek mine and other massive sulfide occurrences in the Alexander Triassic Metallogenic Belt (ATMB), which extends for more than 600 km in southeast Alaska.

On the Palmer property stratigraphic sections in the Hyd Group vary within a few km. The Palmer section consists of several hundred meters of basalt and volcaniclastic rocks that are overlain by meter-scale U-Pb-dated Late Triassic rhyolite flows and associated baritic massive sulfide bodies, in turn overlain by argillite, basalt flows, calcareous siltstone, tuff, Late Triassic conodont-bearing limestone, additional basalt flows, volcaniclastic rocks, and a thin cap of thin-bedded black limestone. The Late Triassic rocks are overlain by a polylithic debris flow that contains a single Early Jurassic zircon population at ~195 Ma. The section at the occurrence named AG consists of meter-scale basalt flows interlayered with andesite and rhyolite breccia and flows, in turn overlain by basalt with associated baritic massive sulfide bodies, volcaniclastic rocks, tuffaceous and exhalative rocks, and capped by more than 100 m of carbonaceous argillite that contains Late Triassic *Heterastridium?* sponges. The Pump Valley section overlies an unconformity on Paleozoic limestone and consists of limestone-clast-bearing conglomerate overlain by limestone, several hundred meters of basalt flows with subordinate volcaniclastic rocks, and a cap of several hundred meters of carbonaceous argillite that includes a sample containing a youngest zircon population at ~145 Ma. A lack of pre-Triassic zircons in the Jurassic samples from these sections suggests the underlying Paleozoic rocks were not exposed during deposition of the Jurassic rocks. The lack of evidence for an unconformity or intervening deformation event and the apparent depositional continuity of Jurassic sediments on the Hyd Group in the Pump Valley and Palmer sections suggest deposition of the Jurassic sediments in pre-existing Triassic basins.

The Triassic Hyd Group on the Palmer property overlies a regional stratigraphic section that extends for more than 50 km along strike, consisting of Devonian mafic volcanic rocks, Upper Devonian fossiliferous limestone, Mississippian limestone, chert and argillite, and Devonian to Permian black argillite, chert, siltstone, and carbonate of the Porcupine Slate. With the exception of the immediate area of the Palmer prospect, all rocks in this region that overlie the Devonian limestone are currently mapped as part of the Porcupine Slate. In Porcupine Creek, seven km east of the Palmer prospect, argillite at the basal contact of the Porcupine Slate on Devonian limestone yielded a youngest zircon population at ~395 Ma. Argillite one km upstream contains zircon populations at ~159 Ma, ~169 Ma, ~182 Ma, and oldest zircons at 227 Ma. Zircons from the matrix of a volcaniclastic conglomerate five km upstream from the basal contact

have a dominant zircon population at ~160 Ma. This conglomerate stratigraphically overlies thin-bedded fetid black limestone and sooty pyritic argillite that are typical of the Hyd Group and is structurally overlain by interbedded limestone and siltstone that have a youngest zircon population of ~329 Ma. These new geochronologic data indicate the Porcupine Creek section includes at least two horizons of Jurassic rocks within what was previously mapped as Paleozoic Porcupine Slate. This distribution of rock types and ages suggests that massive sulfide-hosting Triassic rocks could be present between the Paleozoic and Jurassic rocks in Porcupine Creek and along strike in the region.

Early Jurassic sedimentary and volcanic rocks were not previously known from the Palmer property, the ATMB, or the Alexander terrane. The lack of mineralization associated with the Jurassic rocks suggests the magmatic-hydrothermal system that produced the Triassic massive sulfide bodies at the Palmer prospect did not persist into the Jurassic. The age range of Jurassic zircon populations indicates intervals of magmatic activity from earliest to latest Jurassic. A possible explanation for Jurassic magmatic activity may be earlier initiation of the Gravina arc on the Alexander terrane than was previously known. The Jurassic ages thus define an important new stratigraphic element for the Alexander terrane and provide an upper stratigraphic boundary for the Triassic Hyd Group and associated VMS deposits.

Supra-subduction Zone Origin for Ultramafic Rocks from the Seventymile Ophiolitic Terrane, Eastern Alaska

Genevieve Llewellyn[1], Marlon M. Jean[1], Michael Bizimis[2], Matthew Loewen[3]

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We use geochemical characteristics to investigate potential tectonic settings of the Seventymile ultramafic complex (SUC) in eastern Alaska. The SUC, a component of the upper Paleozoic Slide Mountain-Seventymile Terrane (SMST), is thought to represent part of a dismembered ophiolite suite obducted onto western ancestral North America during the late Paleozoic to Triassic. The petrogenesis of the SMST is unclear. It occurs as discrete, tectonized, fault-bounded klippen that overlie the Yukon-Tanana Terrane (YTT) in eastern Alaska and western Canada, a composite of allocthonous and parautochonous Paleozoic metavolcanic assemblages previously separated by an ocean basin. It has been previously proposed that the SMST klippen are remnants of this ocean basin.

We use new whole-rock and mineral analyses to constrain the relative roles of hydrous flux-melting (i.e., supra-subduction zone – SSZ) versus decompression melting (i.e., "abyssal" or mid-ocean ridge - MOR) origins for SUC peridotite samples, which include spinel harzburgite and spinel lherzolite. Thin-section petrography and whole-rock and silicate-phase geochemistry of the Seventymile peridotites are compared with other MOR- and SSZ-derived peridotites. The SUC peridotites display minor, yet distinct, chemical variations that can be used to differentiate between MOR-, back-arc basin (BAB-), and SSZ-type peridotites, such as Cr# and Mg# in spinel grains and Al_2O_3 wt. % in pyroxenes. Preliminary peridotite whole-rock compositions have heavy rare-earth element (HREE) contents 0.1–0.8 times N-MORB (normal mid-ocean ridge basalt) values and positive normalized REE slopes. Volcanic samples associated with the ultramafic rocks have more variable HREE (up to 2 times N-MORB) and display light REE enrichment up to 5 times N-MORB. Olivine in peridotite is typically $Fo_{91.1}$ Average TiO_2 in orthopyroxene, clinopyroxene, and spinel are 0.02%, 0.05%, and 0.12%, respectively. Orthopyroxene has an average Mg# of 91.3 ± 2.3 and an average Cr# of 9.7 ± 6.0. Clinopyroxene has an average Mg# of 94.5 ± 1.9 and Cr# of 13.9 ± 7.1.

Previous interpretations of the petrogenesis of the Seventymile Terrane have suggested all three tectonic settings that are often presented for ophiolites: SSZ, MOR, and BAB. We find that the major-element chemistry of olivine-orthopyroxene-clinopyroxene is consistent with a SSZ origin. However, Mg# for most spinels ranges from 60 - 70 and Cr# from 25 - 45, which is more consistent with MOR peridotite. The occurrence of both MOR- and SSZ-like peridotites is not unusual in SSZ-derived ophiolites. Additionally, whole rock REE values are 0.1x – 0.8x depleted MORB mantle, which is consistent with the highly depleted nature of SSZ peridotites. The petrographic texture and spinel compositional ranges may also indicate reactions with later melts. In aggregate, the geochemical features of the ultramafic rocks and minerals suggest a SSZ setting for SUC rocks.

Water Quality Violations in Alaska 2011-2019

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Funding:

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Abstract:

The poster will present a portion of a research study published in May 2020. The study is titled, "Air and Water Violations in Alaska: 2011-2019." The full report is available from UAA, Institute of Social and Economic Research at: UAA-Study.[1] The poster will present the water portion of that research study.

EPA maintains a comprehensive public list of air and water permits, and of violations, in Alaska. It is an excellent data source and is searchable. The public can quickly see whether any facility has a permit, and what that facility's record has been. However, the database is organized by facility, not by industry. It is difficult to step back from EPA's data and see patterns such as: How frequently do violations occur? Which industries accumulate the most violations? The highest penalties? It is not easy to use EPA's available data to answer these questions.

The poster, based on the paper, takes EPA's publicly available data and organizes it by industry. Its purpose is to allow the reader to step back and see the patterns about compliance and violations of Alaska's water requirements as a whole. It is intended to provide a statewide and industry-by-industry view of water violations and compliance in Alaska. A comprehensive apples-to-apples comparison of industries provides a useful complement to the fragmented source of newspaper articles, advertisements, charges, and countercharges that may otherwise form people's impressions about air and water violations in Alaska.

The conclusions are different, depending on how you categorize violations. For the lowest level of violation - those meriting solely an informal enforcement action - the violations are spread widely throughout Alaska's industries, except that logging has very few. The greatest number of violations come from Alaska's wastewater treatment facilities, followed by those of the seafood processing industry.

Penalties are different way to measure violations. The penalty amount measures, in part, the seriousness of the issue. In assessment of penalties from 2011-2019, the seafood processing industry has far and away the highest dollar value of penalties. Over two-thirds the value of the total penalties assessed during those nine years were assessed to seafood processing. It also had the largest number of

[1] https://pubs.iseralaska.org/media/dc9f3ec0-b2d6-4efa-89aa4fa0aab42a1b/Air_and_Water_Violations_in_Alaska.pdf

violations with penalties, and the highest penalty per violation. However, it is important to remember that the method for assessing penalties includes a mechanism to lower the fine for municipally owned facilities and small businesses. The only industry, other than seafood processing, that accumulated more than one penalty per year was placer mining. This industry had 11 penalties over the nine years, though average fine per penalty for these small businesses was relatively small.

The final way to measure violations was EPA's violations of significant non-compliance. In this measure, most seasonal businesses such as placer mines and seafood processing facilities are not included. In this measure, wastewater treatment facilities had the largest number of these violations – more than double the number of other industry groups.

Core Shack

Thursday, November 5, 2020, - Jared Anderson, Avidian Gold, Chair

Advancing Near-Mine Exploration Prospects at Kensington Mine

Richard Halvorsen, Sam Kilfoyle, and Jean-Pierre Londero

Coeur Alaska - Kensington Mine

Coeur Alaska's Kensington mine is located approximately 45 miles northwest of Juneau, Alaska. The property sits within the Berners Bay Mining District, at the northern-most edge of the Juneau Gold Belt. The Juneau Gold Belt is a 120-mile long, 10-mile wide structural zone hosting several major gold producers. Coeur Alaska has mined over 1,000,000 ounces from the property since beginning commercial production at Kensington in 2010. The Kensington Mine is currently producing from three major deposits: Kensington, Raven, and Jualin. Recent drilling on the Elmira and Eureka prospects have been encouraging with most intercepts well above Kensington's current resource grade. Drilling on the Johnson prospect in 2020, both on surface and from underground, has been promising. These successes demonstrate the continuing exploration potential to advance additional deposits within the district.

The property lies to the west of the Coastal Megalinament, situated between the Wrangellia terrane and the Treadwell formation of the Gravina belt. The deposits are modeled as low-sulfide, mesothermal, gold-quartz veins with strict structural controls. The economic deposits have reportedly been restricted to a Cretaceous diorite intrusion, known as the Jualin diorite, which intrudes the Triassic basalts of the Wrangellia terrane and lies unconformably against the Gravina belt.

The vein systems are generally shear hosted veins or vein packages comprised of extensional vein arrays, sheeted extensional veins, and stacked, en-echelon, shear veins. The Kensington, Jualin, and Raven deposits strike north-northwest and dip moderately to the east. The mineralogy of the deposits varies between gold tellurides, most commonly calavarite ($AuTe_2$) and petzite (Ag_3AuTe_2), associated with pyrite-rich zones at Kensington, and coarse free gold (Au) commonly associated with galena, sphalerite, tennantite, and pyrite at Jualin. The Raven deposit shares characteristics with both the Jualin and Kensington deposits.

The Elmira and Eureka vein systems share similar vein style and mineralization characteristics with the Kensington deposit, lying 2,000 feet east and 200 feet west of Kensington respectively. At midyear,

Coeur Alaska's exploration team had completed 15,500-feet of drilling targeting Elmira, and 10,800-feet of drilling targeting Eureka to further define these deposits. An additional 35,000-feet of Elmira drilling is planned in the second half of the year. The Johnson vein, which lies 500 feet east of Elmira, was intercepted from surface, adding 500 feet of extension along strike to the south. Additional underground drilling which began in October of this year continues to feed the Johnson model. Other near-mine prospects drill targeted this year include Big Lake, Jennifer, Northern Belle, and Upper Raven.

Recent drilling of these prospects builds upon previous drill programs, surface geochemistry, surface and underground mapping, and compilation of historic data. The programs focused on developing a stronger structural interpretation of the district and outlining potentially economic zones. This rigorous approach is driving new interest in known prospects and is focused on driving the additional discovery necessary to unlock the potential of underexplored areas of the Berners Bay Mining district.

The Tibbs Gold Project – Mineralization Styles and the Gneiss Frontier

Tectonic Metals Inc.

See Technical Session 3, Early to Intermediate Exploration for complete abstract.

Zarembo Island Project 2020 Update; Wrangell District, Southeastern Alaska

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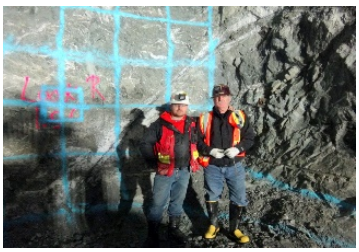


The *Frenchie* Au-rich Ag, Zn, Pb VMS prospect is located on Zarembo Island 15 miles (24 kilometers) west of Wrangell Alaska and is hosted in rocks of the Late Triassic Hyd Group figure 5. Hyd Group rocks on Zarembo are part of the Admiralty subterrane of the Alexander terrane. The Alexander terrane in southeastern Alaska is important because it hosts Heclas' world-class Greens Creek massive sulfide deposit on Admiralty Island, the Windy Craggy deposit in B.C, Constantine Metal Resources' Palmer VMS deposit near Haines, and Heatherdale Resources' Niblack massive sulfide deposit on Prince of Wales Island.

Alexander Terrane rocks on Zarembo Island are dominated by black and dark-brown shale / argillite, minor tuffaceous and calcareous sediments, coarse-grained conglomerates and mixed volcanic rocks. The rock package was most likely deposited in a restricted shale basin in a back-arc setting (Duke and others, 2010 and Taylor and others, 2010), much like is proposed for the Greens Creek deposit. Basin development and subsequent basin collapse resulted in complex mixing of sedimentary facies, volcanic rocks and massive sulfides. Within the Frenchie Zone, west of the adit exposure, a thick section of barite -rich rocks rests on a section of variably altered quartz sericite argillite, similar to the mine argillite at Greens Creek. The barite -rich section may represent deposition from white smoker type hydrothermal fluids in a backarc setting.

The basal section of the sulfide zone at Frenchie on Zarembo contains five feet (1.5 meters) of massive pyrite (sulfides > 75%), and an eight foot-thick (2.4 meters) section of semi-massive sulfide grading up to 4.8% zinc, 1% lead, and 2 grams gold per ton. Figure 2, 3, 4, and 5.

West of the main exposure at Frenchie a 3 to foot (1 meter) thick section of altered shale / argillite or tuff near the base of the sulfide zone contains grades up to *21.72 grams per ton GOLD within a 5.4 meter thick zone grading 4.36 grams per ton GOLD overall.*

The sulfide-bearing zone is highly conductive and magnetic, and is outlined by a helicopter aeromagnetic airmag and electromagnetic (HEM) survey conducted by DGGS and the BLM in 1996.

Recent 3d inversion modelling by *CONDOR* of LEGACY HEM and AEROMAGNETIC data in Figue 1 suggests that there is a distinct conductive and magnetic zone associated with Frenchie that can be traced in the data for over 12,000 feet and plunges to the southeast.

Soil geochemistry along same trend suggests that mineralization may be present.

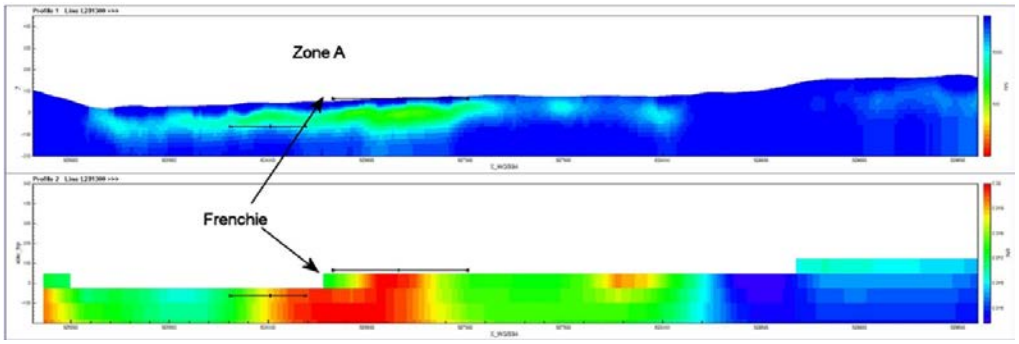


Figure 1: 3d inversion depth section sections of electromagnetics – top and aeromagnetics bottom including the location of Frenchie.

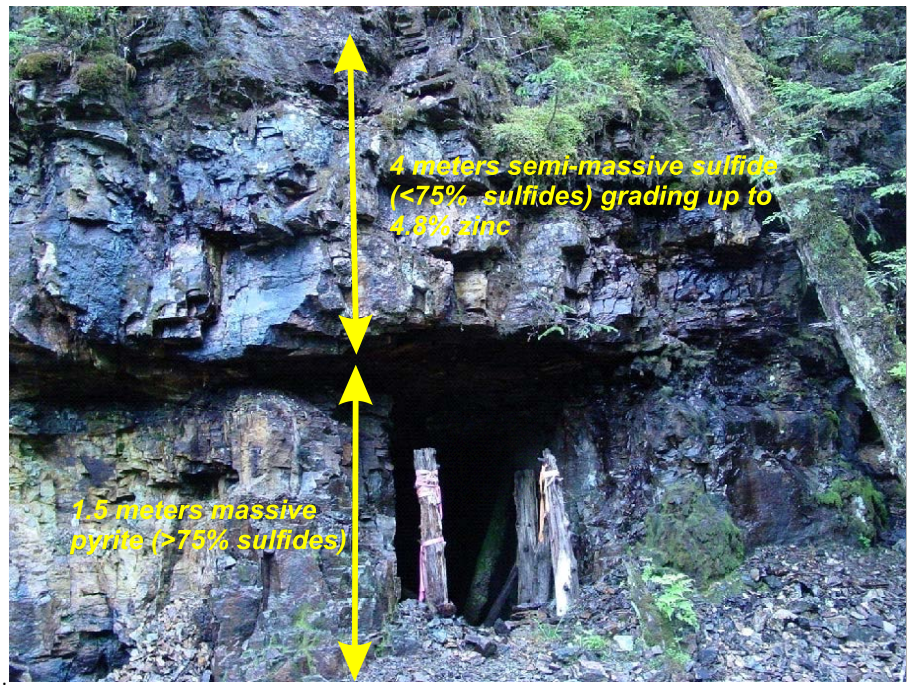


Figure 2: Frenchie mineralization at the discovery outcrop is hosted in rocks of the Late Triassic Hyd Group. Hyd Group rocks at Frenchie are a complex mixture of brown and black shale, dark gray and black cherty argillite and minor calcareous sediments. The mineralized section at Frenchie consists of a 5 foot thick layer of massive pyrite that is overlain by 5 feet of semi massive sulfide grading up to 4.8% zinc, minor lead and containing 2 gram per ton gold. Overlying the massive and semi- massive sulfide is a zone of variably altered and silicified shale and argillite breccia.

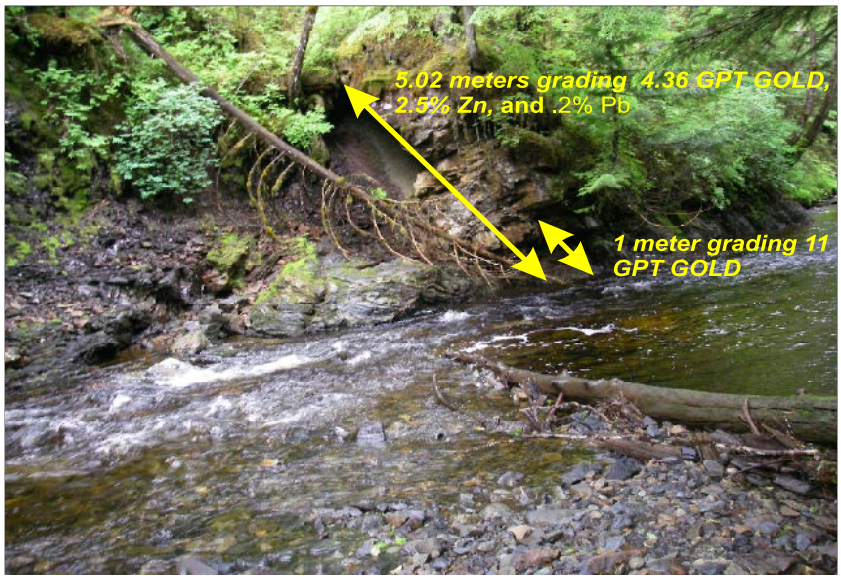


Figure 3: West of the discovery outcrop at Frenchie, is a mineralized exposure that contains a 5.02 meter thick section of semi-massive sulfide grading 2.5% zinc, 0.2 % lead and 4.36 grams per ton gold. The base of the mineralized zone that includes a 1 meter (3 feet) thick zone grading *22 grams per ton gold.*

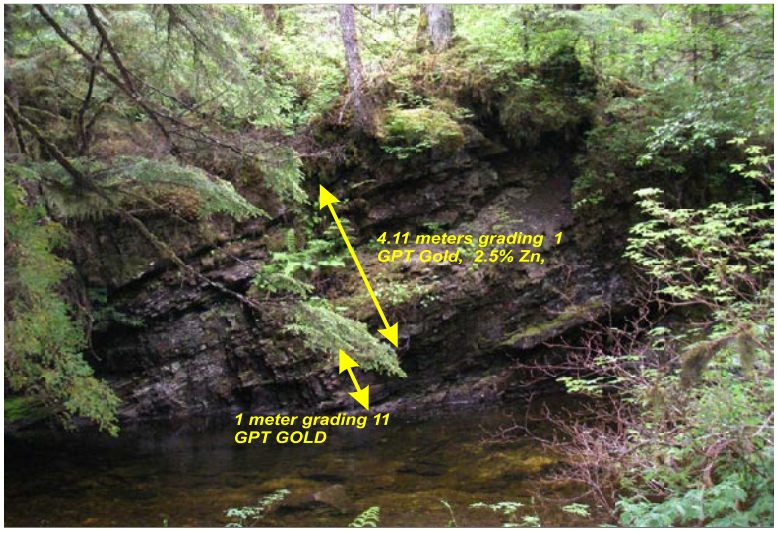
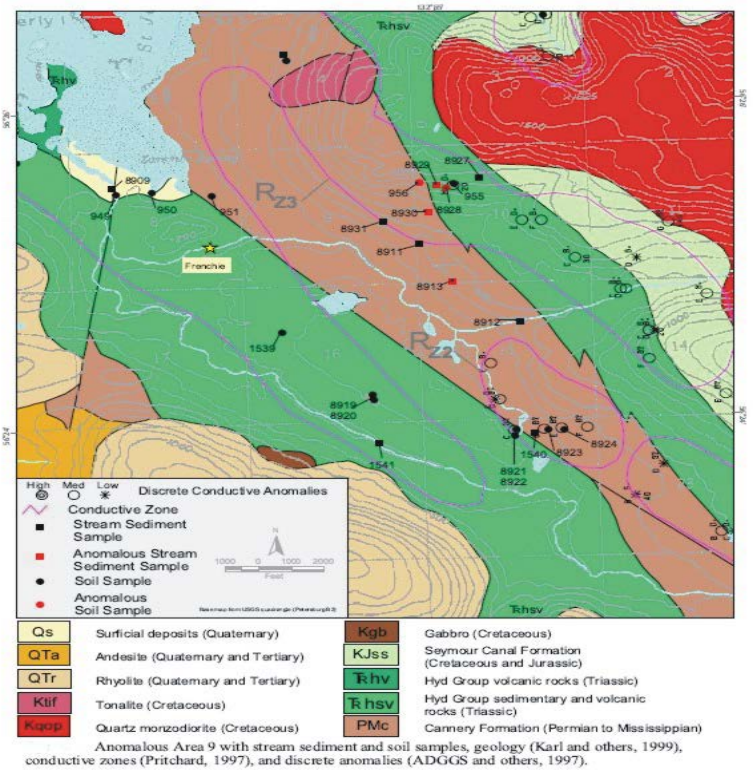


Figure 4: On North side of Frenchie Creek is a good exposure of semi -massive sulfide consisting of 4.11 meters grading 1 GPT Gold, 2.5% Zn, and .2% Pb. The exposure also contains a 1 meter thick zone grading *22 GPT gold figure 2.*



Anomalous Area 9 with stream sediment and soil samples, geology (Karl and others, 1999), conductive zones (Pritchard, 1997), and discrete anomalies (ADGGS and others, 1997).

Figure 5: Geologic map of the Frenchie Prospect area. Note the location of Frenchie and the distribution rocks of the Hyd Group (GREEN) (Triassic) and Cannery Formation (PINK) (Permian). Image also contains Dighem electromagnetic picks.

Avidian Gold's Amanita Property, Fairbanks Mining District

Jerad Anderson

Location

Amanita is located 21 km (13 mi) northeast of Fairbanks, Alaska. The Property lies within the Fairbanks Mining District in the north-central portion of the nearly 1,000 km long Tintina Gold Belt. Enclosing an area of 14.6 km^2 (3,600 acres), Amanita covers 88 State of Alaska mining claims. In June 2020, 5.3 km^2 (1320 acres) were converted to an Upland Mining Lease. The Property is contiguous with Fort Knox open-pit gold mine located approximately 5 km (3 mi) to the northeast. Avidian (the "Company") expanded access to the Property in 2020 for diamond core drilling.

Geology

Amanita is underlain by micaceous quartzite and quartz biotite muscovite schist of the Fairbanks Schist unit. The Property borders the Mid-Cretaceous Gilmore Dome pluton which occurs in the northwest corner of the claim block and is interpreted to extend to depth under the metamorphic rocks. Historical drill hole AH-1 in the northwest portion of the Property was drilled through 150 m of continuous granitic rock. At least one southwest-striking felsic dike intrudes across the northwest portion of the Property. The host rocks are cut by a series of high angle, left-lateral, northeast-trending faults. As mapped by the State Geological Survey (Newberry et. al., 1996) two of these fault zones, spaced about 600 m to 900 m apart, comprise the Tonsina Trend, which is mineralized on the Property. This trend strikes in the Fort Knox deposit.

Exploration

Between 1998 and 2001 Kinross held a lease on the Amanita Prospect. During that time workers defined a 1500 by 3700 m Au in soil anomaly associated with As, Bi, Sb, and W. Additionally, they mapped a nearly 300 m wide subparallel zone of mineralized steeply-dipping northeast faults. This was partially achieved by a 230 m long cross-cutting trench spanning the Tonsina Trend. Additionally, thirty-nine (39) reverse-circulation drill holes totaling roughly 4,700 m (15,420 ft) identified an oxidized zone nearly 100 m thick. The RC drilling primarily focused on a 1,500 m by 500 m area located in the heart of the property. Highlights from these efforts include:

- 4.57 m @ 11.49 g/t Au
- 22.86 m @ 1.01 g/t Au
- 12.19 m @ 2.28 g/t Au
- 13.72 m @ 3.02 g/t Au

Avidian built upon this work. In 2019, excavation of six trenches totaling 1,750 m followed up on soil and rock anomalies. Notable intersections from these trenches include:

- 94.5 m @ 3.04 g/t Au
- 27.0 m @ 4.22 g/t Au

In 2020, the Company completed nine HQ, oriented diamond core drill holes for a total of 1,945 m between August and October. Targeting for these holes was guided by results from previous surface work and a high-resolution UAV magnetics survey; oriented data gathered during the course of the program further refined drill targets.

The Company's drilling program tested high-angle, left-lateral northeast-striking structures previously identified along with a conjugate northwest striking fault system. Series of sheeted iron-oxide bearing quartz veins running sub-parallel and perpendicular to foliation in the schist package are common. Past work would suggest that many of these veins should be mineralized. Several small intrusive bodies discovered in 2020 are of felsic to intermediate composition. Further investigation of the intrusives aim to further understanding of the mineralization and alteration found on the property.

One method of advancing that understanding was to employ a TerraSpec Halo spectral instrument to identify alteration minerals. TerraSpec analyses were collected from a 97 m road cut, the nine 2020 core holes, and the 39 previously drilled RC holes. Preliminary results showing illite, kaolinite, montmorillonite, dickite, and halloysite among others further lend evidence to argillic alteration.

The Company is awaiting assay results of the 2020 drilling campaign and will share those in the upcoming weeks.

The Significance of Prospecting at Golden Zone, Alaska

Tom Setterfield / Jerad Anderson

Avidian Gold Alaska Inc's Golden Zone property, mid-way between Anchorage and Fairbanks, is 125 sq km and occurs 15 km west of the main transportation corridor between Anchorage and Fairbanks, on the southern margin of the Tintina Gold Belt (Fig. 1). Mineralization is mostly of the Intrusion Related Gold Systems (IRGS) style; analogues include Donlin Creek, Alaska, and Dublin Gulch in the Yukon Territory. The Property contains the Breccia Pipe deposit, which has a 2016 NI 43-101 Indicated Resource of 267,400 ounces Au and 1,397,800 oz Ag (4.187 Mt at 1.99 g/t Au & 10.38 g/t Ag). The resource is amenable to open pit mining and contains recoverable copper (~0.1% Cu). The deposit is an arsenopyrite-chalcopyrite-pyrite mineralized breccia pipe that forms the core of a small Cretaceous plug. The Breccia Pipe is approximately 150 m x 80 m near surface, plunging to the northeast and not fully tested below a depth of 200 m; it remains open at depth and along strike. The deposit has been the focus of much of the historical exploration. Avidian believes that the resources can be expanded somewhat, but that the Property has good potential for larger deposits.

The Property contains numerous mineral occurrences in three NNE trending structural corridors (Fig. 2). Mineralization within the Golden Zone Corridor includes quartz-arsenopyrite-sulphide veins at the Riverside prospect; similar veins and skarn mineralization at Banner; veins and shears at the GAS, Lupin, Bunkhouse, Mayflower and BLT prospects; the highly mineralized breccia and mineralized porphyry at the Breccia Pipe deposit, pyrite-rich gossans at the JJ Zone and Au-Cu mineralization in sediments proximal to a QFP at the MJ showing. This corridor is typified by anomalous Au-Ag-As-Cu-Bi ± Zn and Pb; mineralization (>5 g/t Au) occurs over a strike length of >12 km. Mineralization in the Long Creek Corridor includes skarn, replacement bodies, and probable porphyry mineralization associated with granite; hosts are carbonate-rich volcaniclastic sediments. Named prospects are Copper King, Long Creek and South Long Creek; mineralization is known to occur over a strike length of greater than 3 km. The corridor is typified by the elements Ag-Cu-Au-Bi. Mineral occurrences in the poorly understood Silver Dikes Corridor are veins and shear zones associated with granitic dikes. Characteristic elements are Ag-Bi-Pb-Zn and possibly Sn. On a property-wide scale, mineralization is known to occur from the NE end to the SW corner, a distance of greater than16 km.

Avidian acquired the Golden Zone property in 2016; it was approximately 40.5 sq km at the time (Fig. 3). Avidian immediately initiated a campaign of re-locating and resampling known occurrences plus minor prospecting. During this field program the West Breccia occurrence was discovered, only 450 m from the Breccia Pipe deposit, which had been discovered in 1907. The West Breccia showing returned results of up to 14.6 g/t Au and 355 g/t Ag. This discovery showed that new mineralization could be discovered even in close proximity to mineralization that had been known for over a hundred years, and was instrumental in Avidian's decision to expand the property to 61.7 sq km in December 2016.

During prospecting in 2018, Avidian discovered the JJ Zone, which consists of multiple 0.5 to 3 m thick, sulphide-bearing gossans over a true width of approximately 150 m across a steep rock face that extends approximately 200 m in height; the strike length of this mineralization is on the order of 500 m. Grab samples of the gossans ran up to 6.14 g/t Au. The new zone was considered to be important on its own merits; of equal interest was the implication that significant surface zones of mineralization presumably remain to be discovered on the Property. The JJ zone was on open ground; Avidian staked an additional 44 sq km to expand its land position to 105.5 sq km. Prospecting of the newly staked ground in 2019 led to the discovery of the MJ showing, which returned values up to 5.14 g/t Au and 4.2 g/t Au and 2.77% Cu over an area at least 200 m x 200 m. When adjacent ground became available in 2020, Avidian staked a further 19.75 sq km, to bring the Property to its present 125.25 sq km. Approximately half of the Property is accessible without using a helicopter.

The lesson from Avidian's work to date is thus that even in the Golden Zone region, an area that has in theory been prospected for upwards of 100 years, there are many important discoveries still to be made by basic prospecting. Avidian has assembled a large land package with demonstrated mineral potential, and expects to discover new mineralization in the coming years via continued prospecting.

Figure 1: Location of the Golden Zone Property in the Tintina Gold Belt

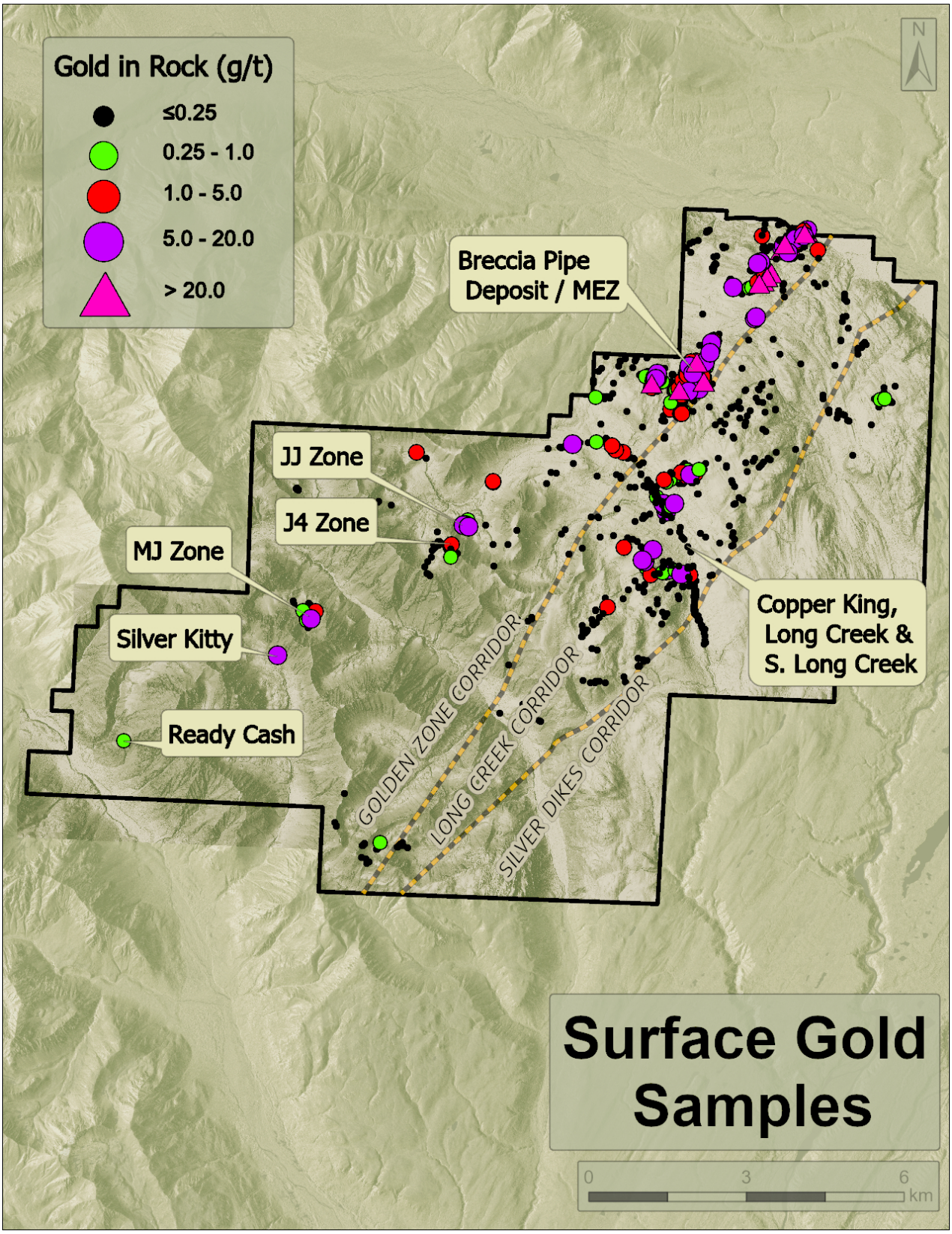


Figure 2: Property Position with Prospects and Corridors

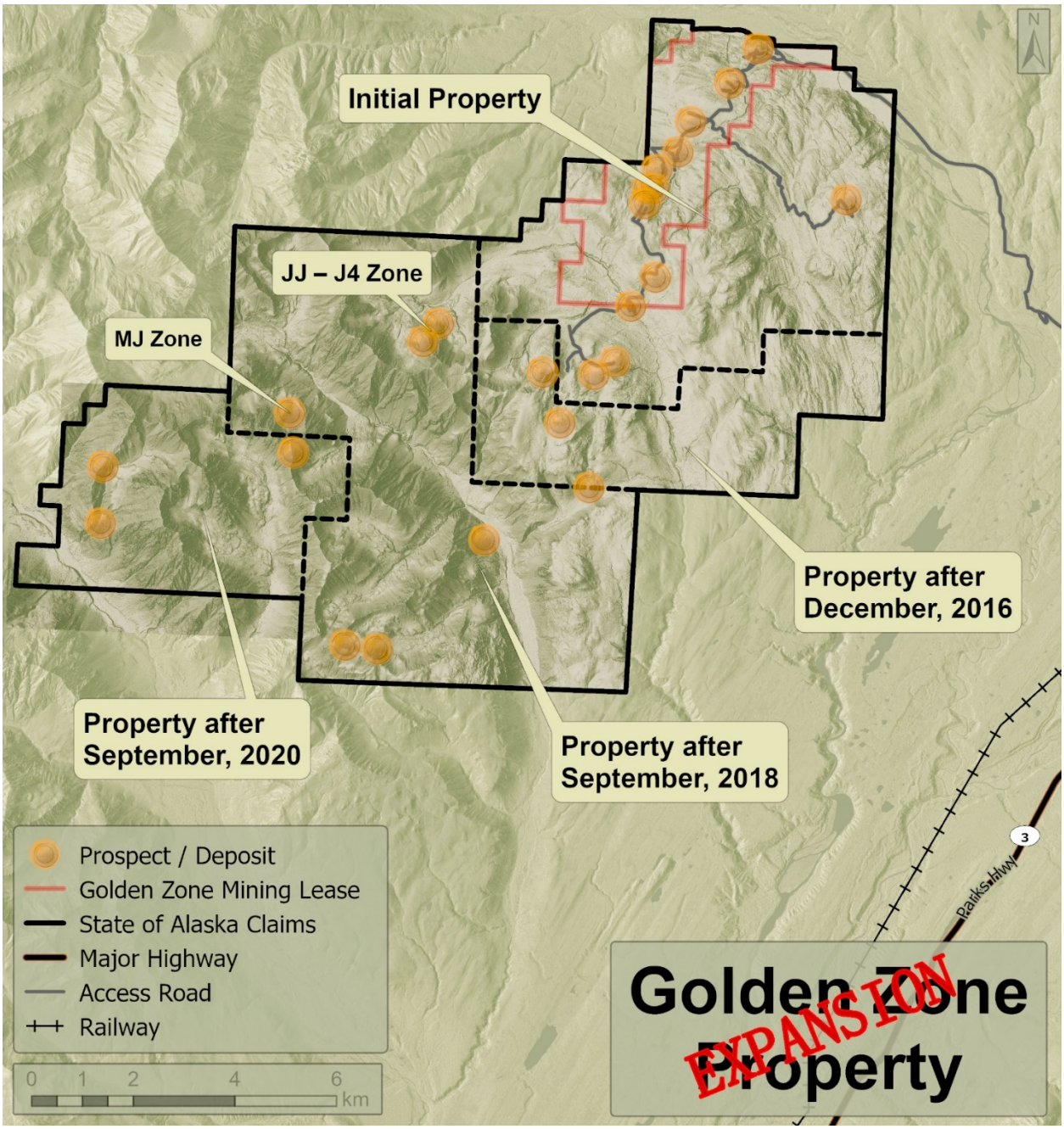


Figure 3: Golden Zone Property Expansion