

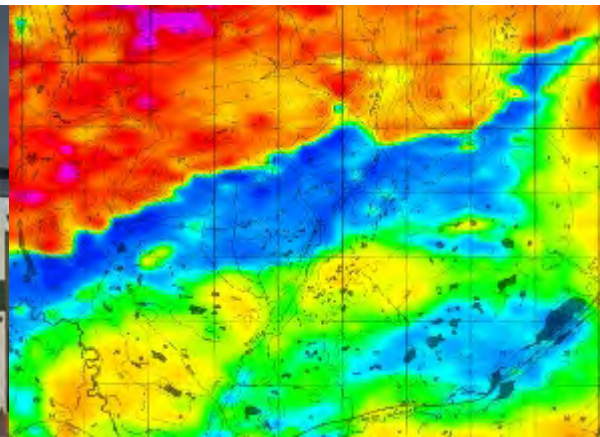


2020 Alaska Mining Industry Update

Melanie Werdon

Alaska Division of Geological & Geophysical Surveys

AME Mineral Exploration Roundup
January 18, 2021



2019 FRASER INSTITUTE REPORT

ALASKA

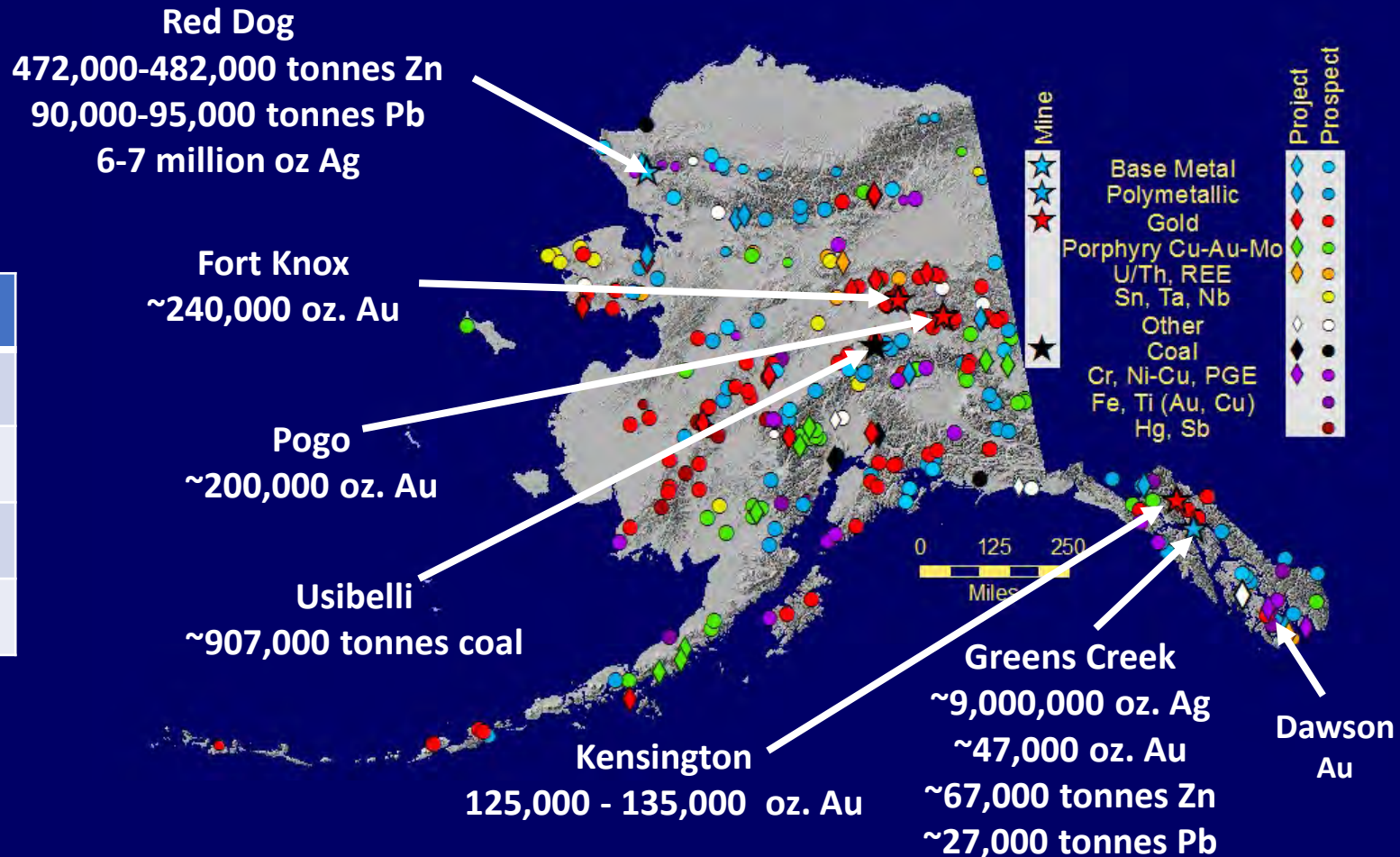
- World's 4th most attractive development area
- Top U.S. state for mineral potential
- Top U.S. state for mining-friendly regulatory & fiscal policies
- U.S. state best able to meet its own permitting timelines



2020 PRODUCTION FORECAST

	2020 Production Est.
Zn	550,000 tonnes
Pb	120,000 tonnes
Au	620,000 oz.
Ag	15,5000,000 oz.

6 lode mines
1 coal mine
~ 200 placer Au mines
~ 35 exploration projects



KINROSS - FORT KNOX MINE

Open-pit gold mine; intrusion hosted

Reserves & Resources (Dec. 31, 2019)	Million Tonnes	Au g/T	Ounces (million)
Reserves	255.8	0.34	2.801
Measured & Indicated	176.7	0.4	2.026
Inferred	86.1	0.3	0.774
Total	518.6	0.34	5.601

- 8 millionth ounce of gold poured 2019
- 2020 forecast: ~240,000 oz. Au

Replaced Resource base

- Extends mine life through 2027
- 2021-2027 annual production: ~250,000 oz.

Barnes Creek Heap Leach:

- New 172.4-MT-capacity leach pad
- Loading began in 2020
- Leaching through 2030

Purchased interest in Peak Deposit (October 2020)



Gilmore
Expansion

8-millionth-ounce gold pour
(photo credit: North of 60 Mining News)

KINROSS – PEAK/TETLIN

Open-pit, Au-Ag-Cu skarn, Tetlin tribe native land

Kinross purchased 70% interest for US\$93.7 million

Contango ORE retains 30% interest

- Kinross to receive management & toll milling fees for Contango's share of milling
- One-year construction
- Truck ore ~370 km to Fort Knox mill
- Adds ~220,000 oz. Au/year to Fort Knox production
- Production 2024 – 2029

2020 Program (US\$3.6 million):

- Initiated permitting
- Water- and rock-geochemical sampling

2021 Program (US\$18 million):

- Initiate feasibility study; FS & initial permitting by EOY 2022
- Infill drilling, engineering, & environmental studies
- Exploration

Dec. 31, 2019	Million Tonnes	Au g/T	Ounces (million)	Ag g/T	Ounces (million)
Measured	0.473	6.4	0.097	17	0.254
Indicated	8.73	4.0	1.111	14	3.945
Inferred	1.34	2.7	0.116	16	0.694
Total	10.55	3.9	1.324	14.4	4.893

Metric	Kinross Estimate (100% basis)
First production	2024
Life of mine	4.5 years
Total production (Au eq. oz.)	~1 million
Average AISC (Au eq. oz.)	~\$750/oz
Mined gold grade	~6 gpt
Initial capital expenditures	~\$110 million



NORTHERN STAR - POGO MINE

Underground, shear zone/quartz vein-hosted gold mine

Estimated 2020 Production: ~200,000 oz Au

- Increasing production to 300,000 oz/yr by 2023
- Cumulative production – 4.2 million oz
- Endowment ~ 11 M oz, and expanding resource
- AISC US\$1,200 – \$1,400/oz

Accomplishments:

- Since acquiring Pogo, reduced AISC/T by 29%
- New mining fleet significantly improving tonnage productivity
- Development rates increased 76% since March 2019
- Transitioned to 60% longhole stoping

2020 Mine Drilling:

Underground reserve definition and extension drilling:

- All Liese Vein systems (L1, L2, L3), North Zone, X-Vein, South Pogo, and Fun Zones
- Excellent intersections from extensions
- New veins in Liese 2 and South Pogo areas

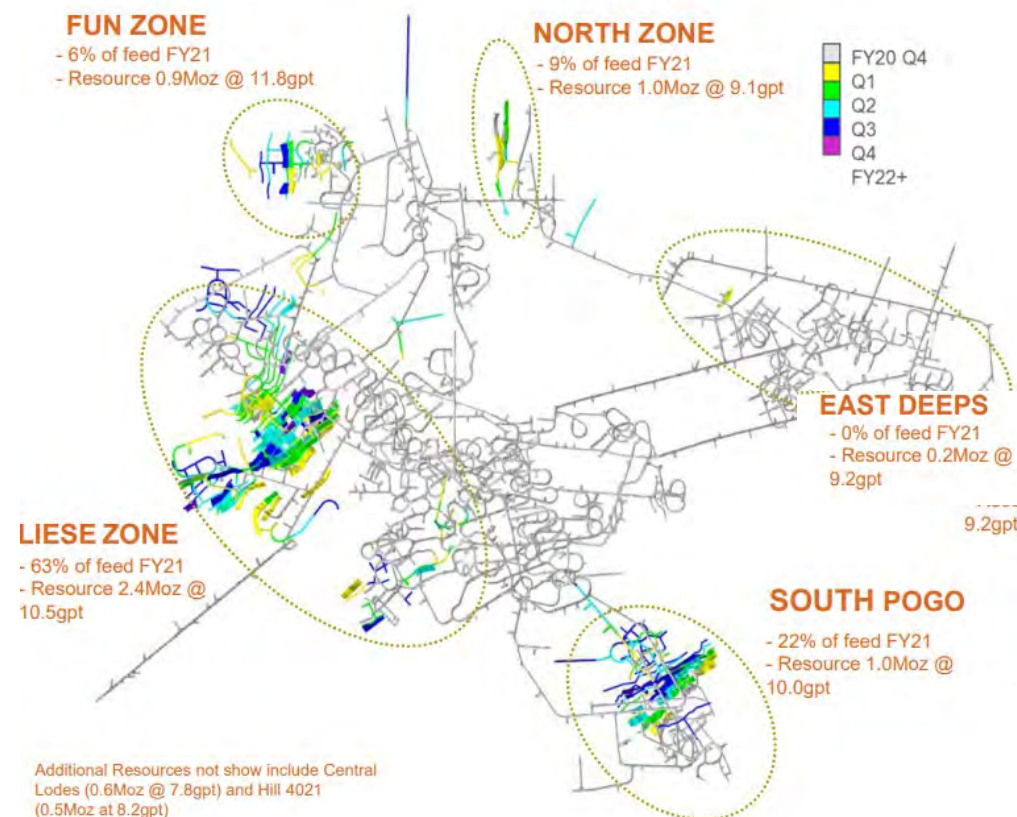
Plans through 2021:

- Expand mill from ~1.0 to 1.3 M T/year



4 million ounces; Feb. 2020

June 30, 2020	Million Tonnes	Au g/T	Ounces (million)
Reserve	5.867	8.0	1.507
Resource	21.255	9.8	6.672
Total	27.122	9.4	8.179



POGO - EXPLORATION

2020 Goodpaster Exploration:

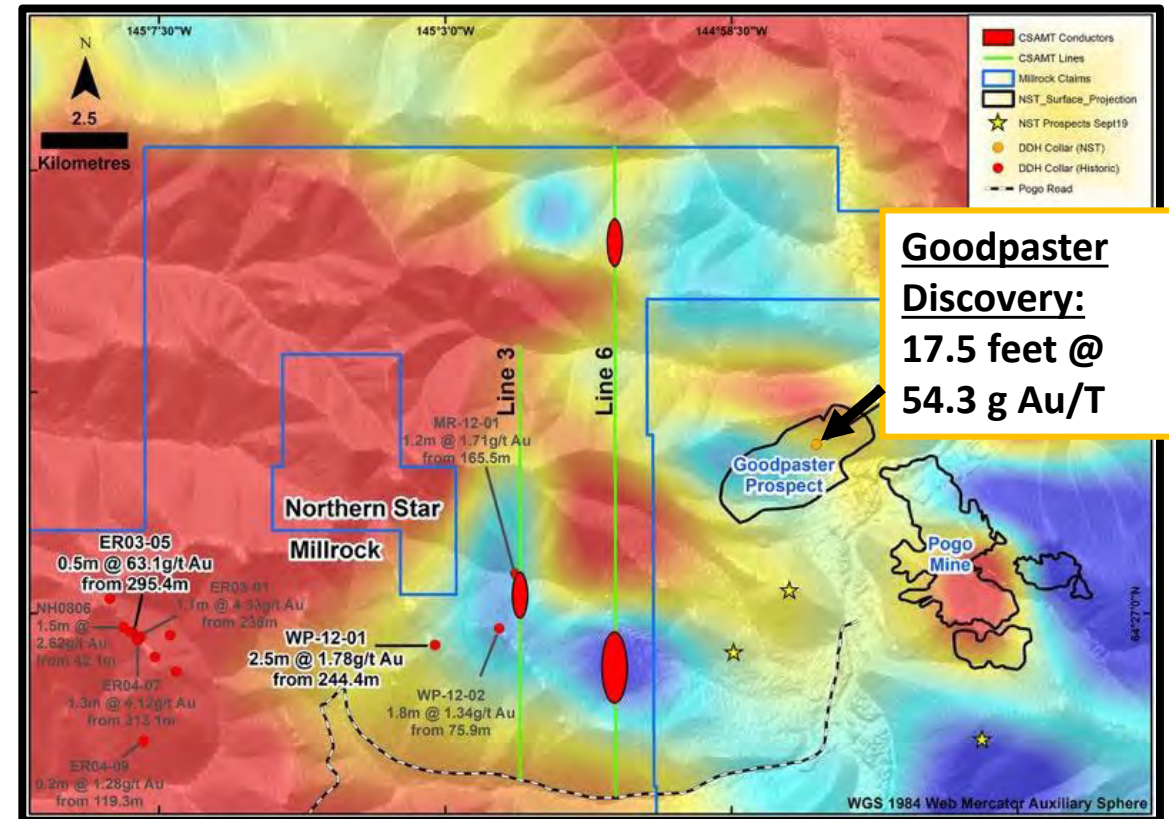
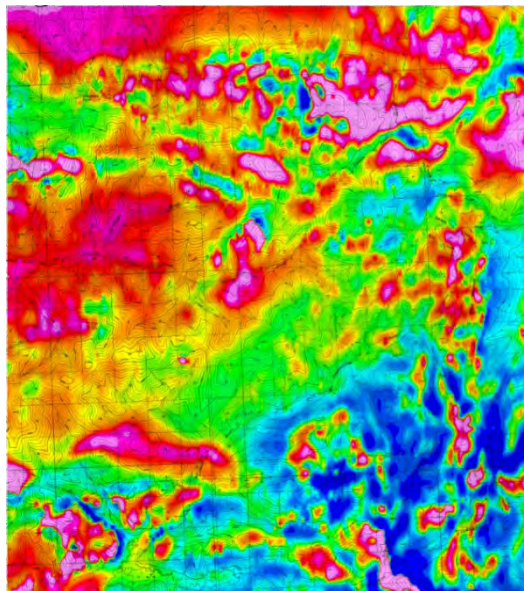
- Surface exploration drilling commenced in Q3
- Focused on southeast portion for conversion to resources

Select results:

4.0 m at 67.5 g Au/T;
5.2 m at 15.7 g Au/T;
8.9 m at 5.0 g Au/T

- 2.3 km strike, 500 m depth, open in all directions
- Series of stacked, flat- & steeply-dipping veins, very similar to Pogo Liese vein system

- New airborne magnetic & radiometric survey for regional exploration



COEUR - KENSINGTON MINE

Underground mesothermal gold quartz-vein system

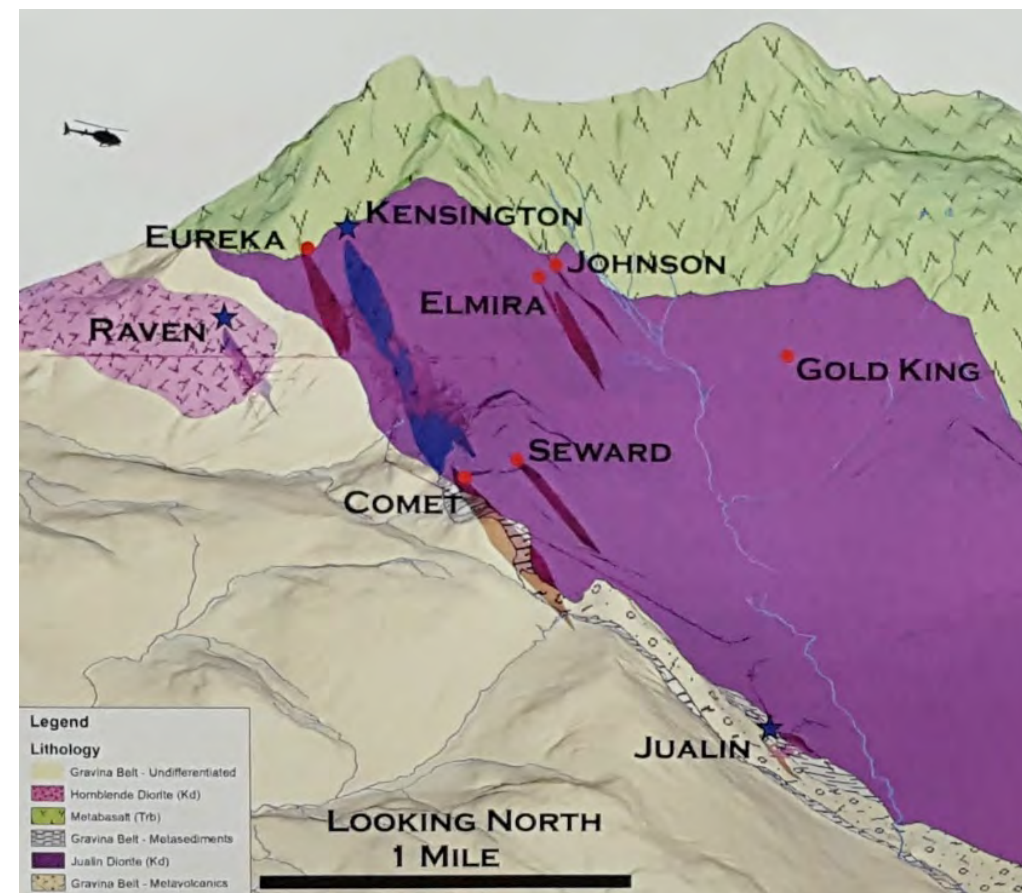
- Forecast production (2020): 122,500-130,000 oz. Au
- Production to date: ~1M oz. Au
- Current mine life through 2023

Jualin:

- First production Dec. 2018
 - 15-20% of Kensington's Au production in 2020
 - Driving improved cash flow and lower costs
-
- US\$6.8M 2020 exploration program (as of Q3)
 - 3 drills active in Q3
 - Surface drilling at Raven, Big Lake and Johnson Veins
 - All drills underground in Q4 for resource conversion on Kensington, Johnson and Elmira veins

Dec. 31, 2019	Million Tonnes	Au (g/T)	Au Ounces (million)
Reserves	1.677	6.78	0.366
Measured & Indicated	3.226	7.34	0.762
Inferred	1.562	7.12	0.358
Total	6.465	7.15	1.486

Data from Coeur Mining, 2020



HECLA - GREENS CREEK MINE

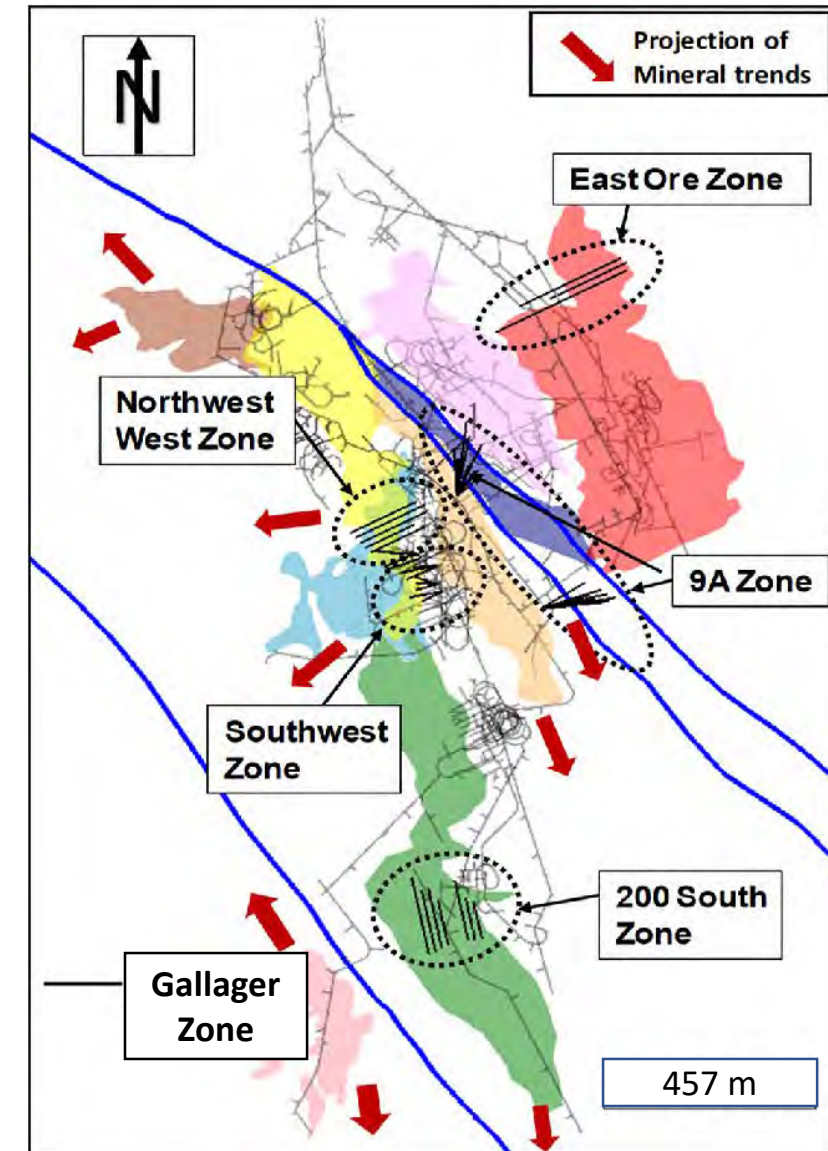
Volcanogenic massive sulfide deposit, Southeast Alaska

Dec. 31, 2019	Million Tonnes	Zn %	Pb %	Au g/T	Ag g/T
Reserves	10.721	7.3	2.8	2.8	379
Measured & Indicated	8.569	8.1	3.0	3.1	364
Inferred	1.848	7.4	3.1	2.8	426
Total	21.2	7.6	3.0	2.95	378

2020 Production Estimates:

10.5 M oz. Ag; 47,000 oz. Au; 67,000 tonnes Zn; 27,000 tonnes Pb

- Definition drilling in the Upper Plate, 9A, East Ore, Northwest, West zones
- Strong exploration drill results in 200 South zone (eg., 631 g Ag/T, 6.3% Zn, 2.9% Pb over 8.7 m



TECK - RED DOG MINE

Sediment-hosted Zn-Pb-Ag deposit

Began operating in 1989

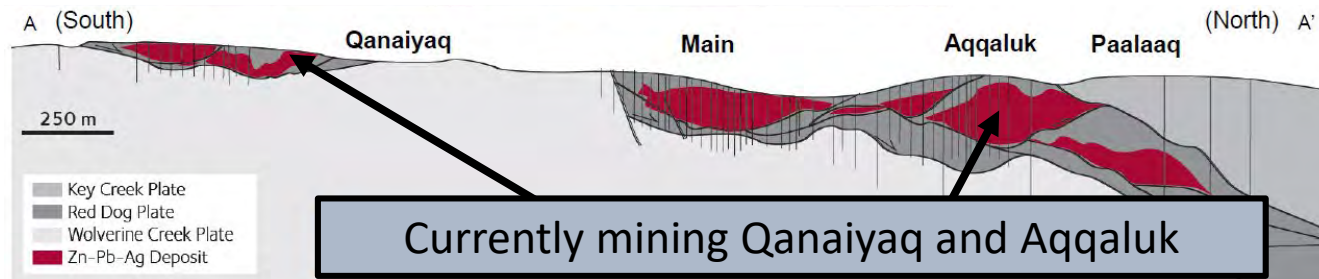
2020 Production Estimates:

472,000 to 497,000 tonnes Zn;

90,000 to 95,000 tonnes Pb

~7 million ounces Ag

- VIP2 mill-upgrade project was commissioned in 2020
- Expected to improve throughput by ~15%
- Increased precipitation impacted water storage, necessitating intense water-management activities and an early tailings dam raise; also installed a new water-treatment plant to increase water-discharge capacity.



Dec. 31, 2019	Million Tonnes	Zn %	Pb %	Ag g/T
Reserves	50.9	12.9	3.6	67.7
Measured & Indicated	6.6	9.0	3.0	55.5
Inferred	30.3	13.2	4.9	87.2
Total	87.8	12.7	4.0	73.5

RED DOG AREA EXPLORATION

Aktigiruk/Anarraaq

Sediment-hosted massive sulfide deposits

Anarraaq inferred resource (Dec 2016): 19.44 M T @ 14.4% Zn, 4.2% Pb, 73 g/T Ag

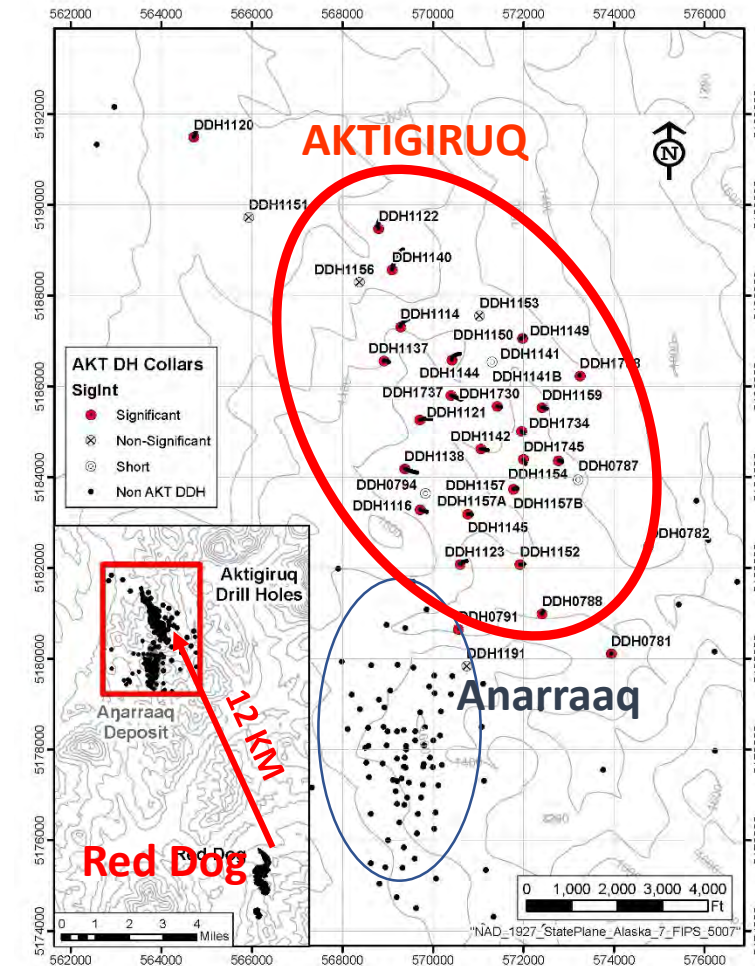
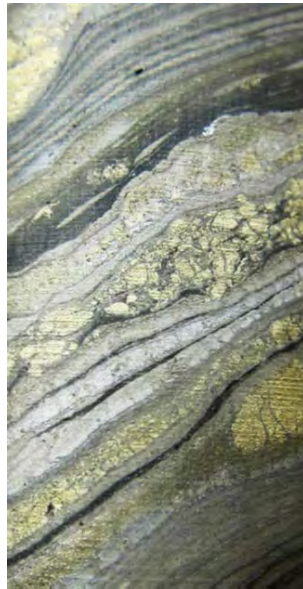
Aktigiruk target: 80-150 M tonnes @ 16-18% Zn+Pb

2017-2019 program:

- 2016 drilling - 54.6 m @ 16.8% Zn, 3.63% Pb (DDH1737)
- Applied for permit to build road
- Resource-definition drilling at Aktigiruk and Anarraaq
- Ore bodies are 400 to 1,000 m below surface

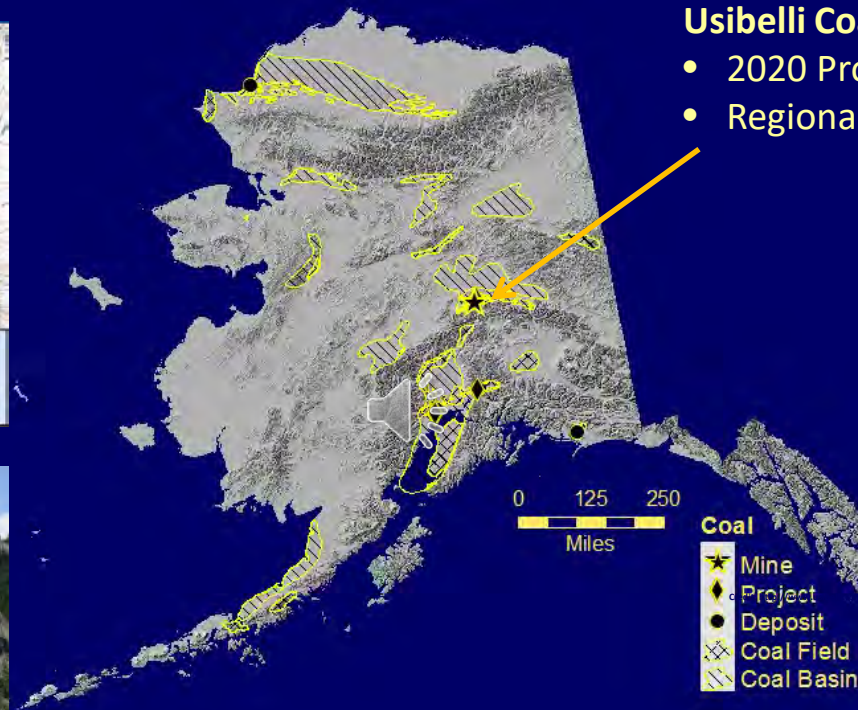
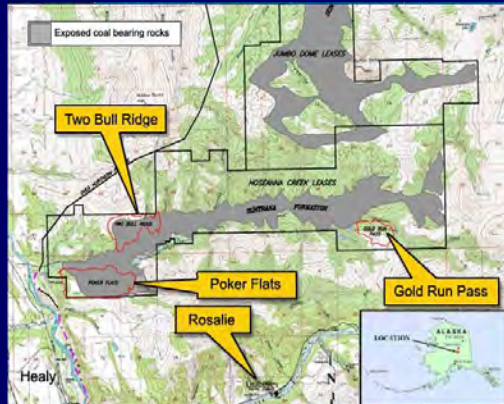
2020 program:

- Analyzing 2019 core
- New drilling deferred to 2021



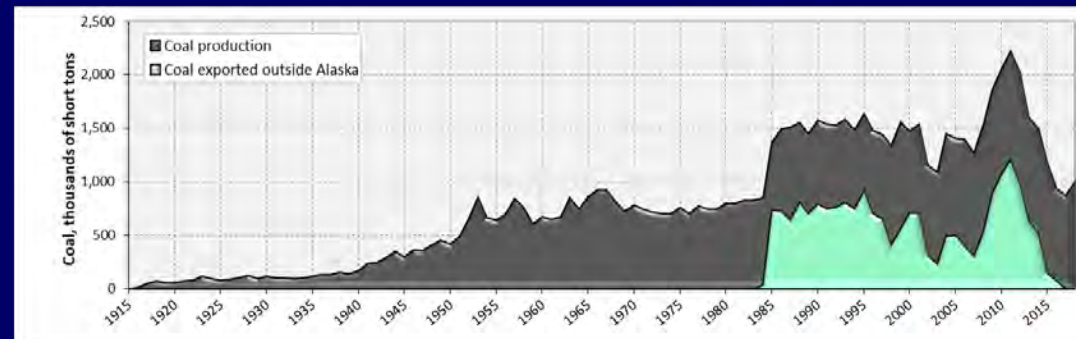
USIBELLI MINE

Usibelli Coal Mine [Usibelli]



Usibelli Coal Mine:

- 2020 Production ~907,000 tonnes
- Regional electrical generation



DONLIN GOLD - DONLIN

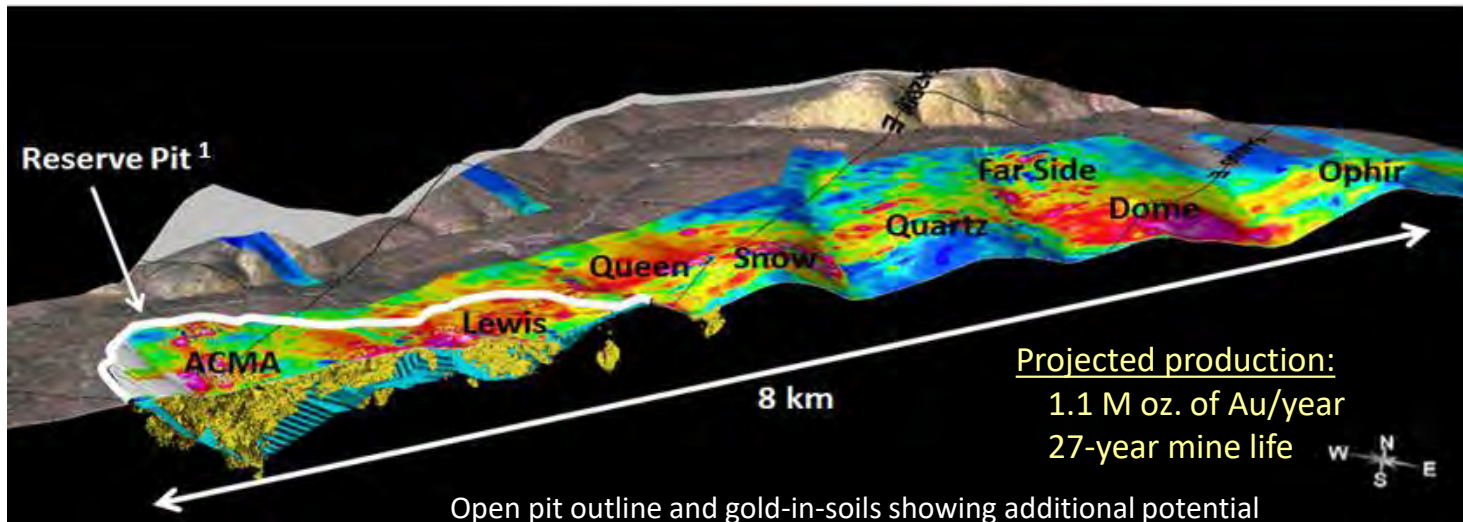
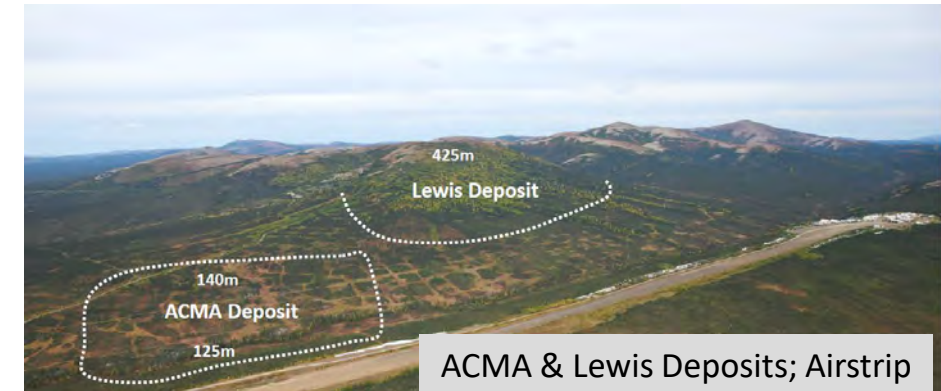
[50% Barrick Gold Corp./50% NovaGold Resources Inc.]

2019 Program – US\$26M

- State of Alaska permitting
- Geotechnical drilling of water & tailing storage areas
- Updating 2011 feasibility study to reflect optimized development plan

2020 Program – US\$40M:

- Resource confirmation and model validation drilling
- 4 drill rigs, 85 holes, 23,400-m DDH program in ACMA & Lewis areas
- Results exceed prior modeled grades/thicknesses



Jan. 2012	Million Tonnes	Au (g/T)	Ounces (million)
Proven & Probable	504.8	2.09	33.85
Resources, inclusive of reserves*			
Measured & Indicated*	541.3	2.24	39.0
Inferred	92.2	2.02	5.99
Total	633.6	2.21	45.0

Data from Donlin Gold, 2020

INTERNATIONAL TOWER HILL - LIVENGOOD

Metasediment-hosted, intrusion-related gold

April 2017	Million Tonnes	Au g/T	Ounces (million)
Proven/Probable	392	0.71	8.9
Measured, Indicated & Inferred***	578	0.68	12.6

***Inclusive of reserves

2017 Initial PFS:

- 6.8 M oz. of Au/yr.; 23-yr mine life

2019 program:

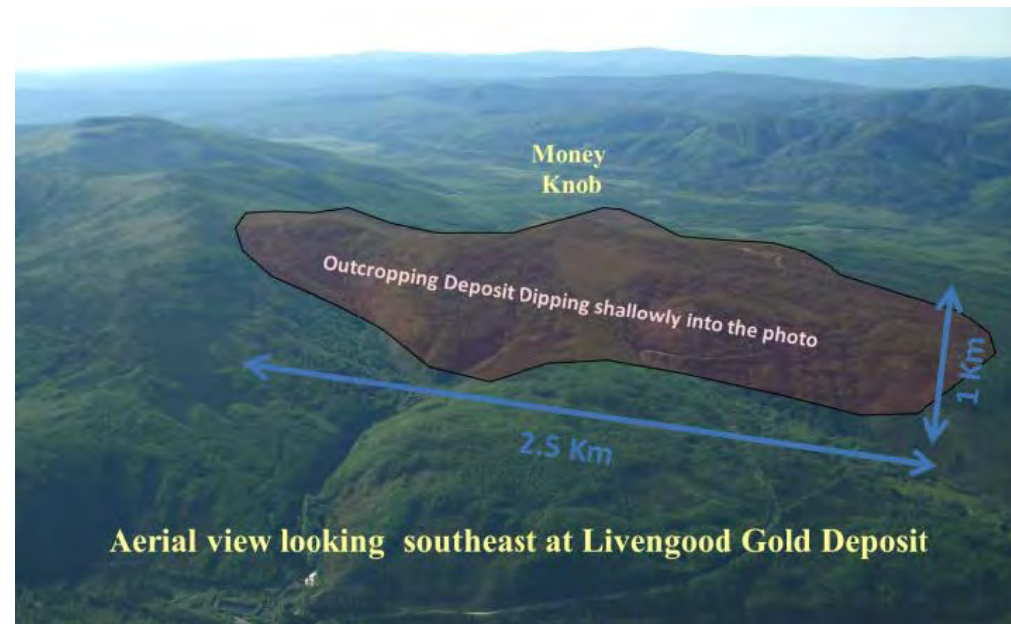
- US\$3.7 million work program
- Metallurgical studies
- Environmental studies

2020 program:

- US\$2.6 million work program
- Metallurgical studies
- Environmental studies

2021 program:

- US\$5.6 million work program
- Complete a PFS (Oct. 2021)

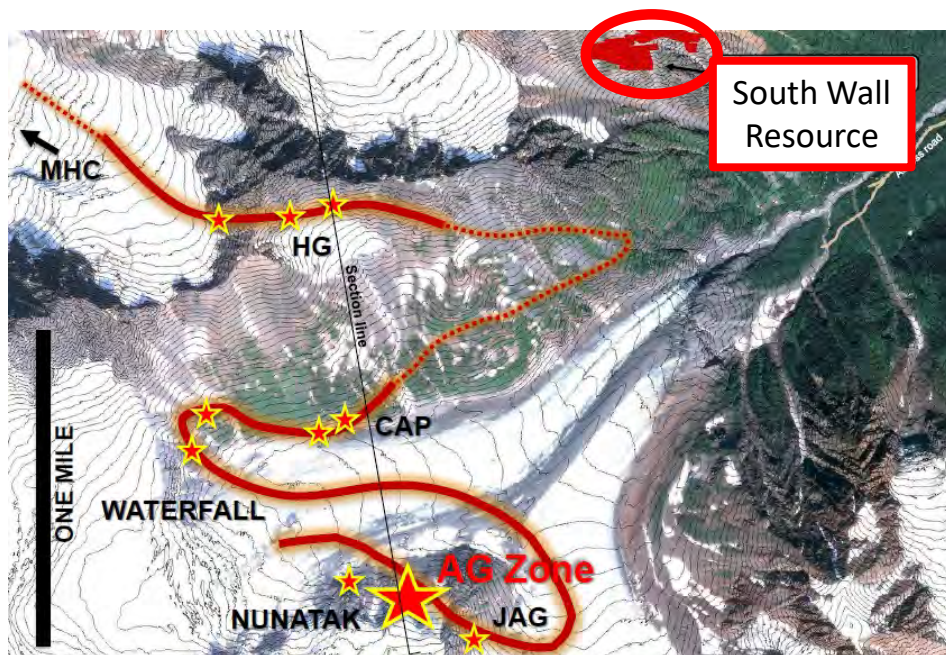


Drilling atop the Money Knob area of the Livengood Project

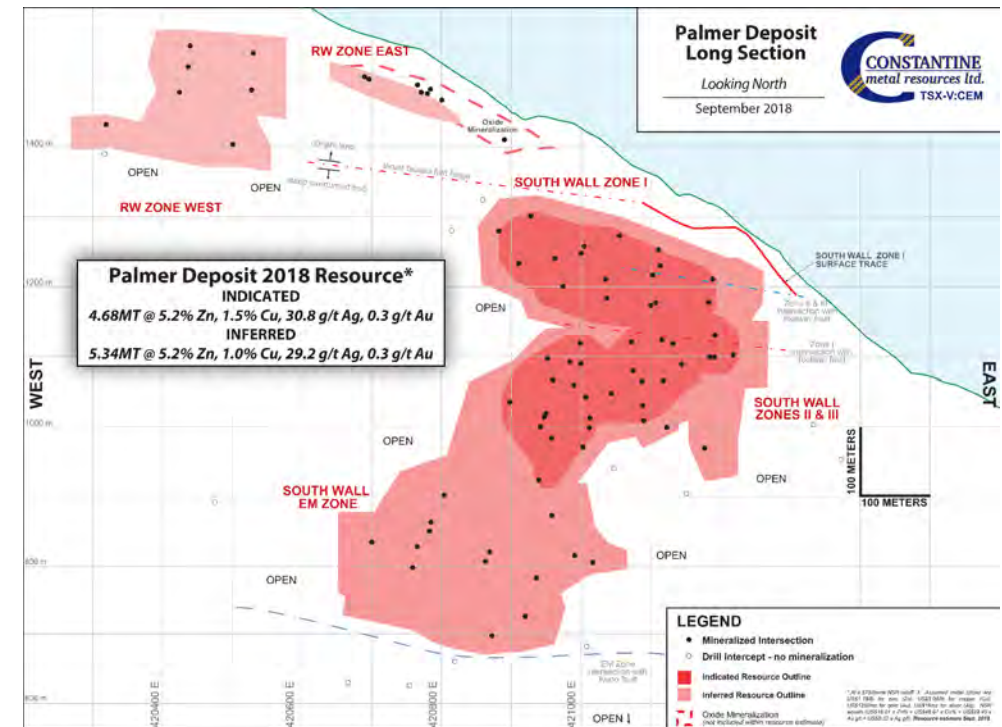
CLOSE X

CONSTANTINE/DOWA - PALMER

Volcanogenic massive sulfide, SE Alaska



[Constantine Metal Resources Ltd. (51%) & Dowa Metals & Mining Alaska Ltd. (49%)]



	Million Tonnes	Cu %	Zn %	Ag g/T	Au g/T	Barite %
Indicated	4.7	1.49	5.23	30.8	0.30	23.9
Inferred	9.6	0.59	4.95	69.3	0.39	27.7
Total	14.3	0.89	5.04	56.6	0.36	26.5

2020 program (US\$2.2M):

- Environmental and permitting work for underground exploration drift
- Greenfields exploration at Big Nugget Gold project in the Porcupine Creek placer district

AMBLER METALS - ARCTIC

Volcanogenic massive sulfide, Northwest Alaska

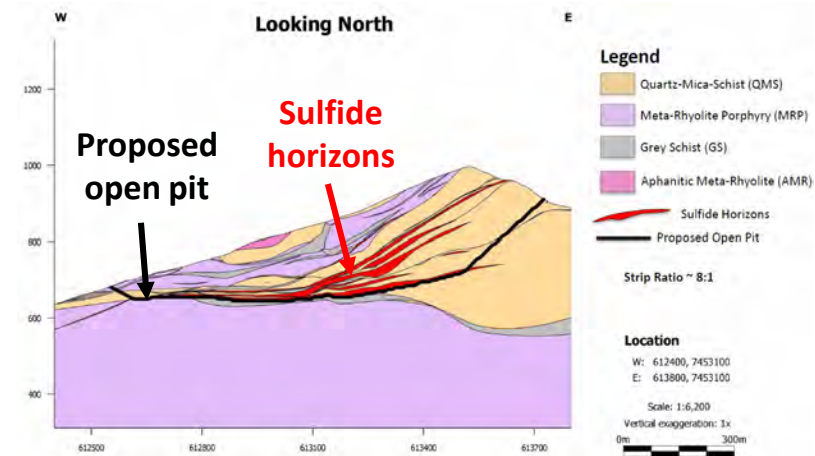
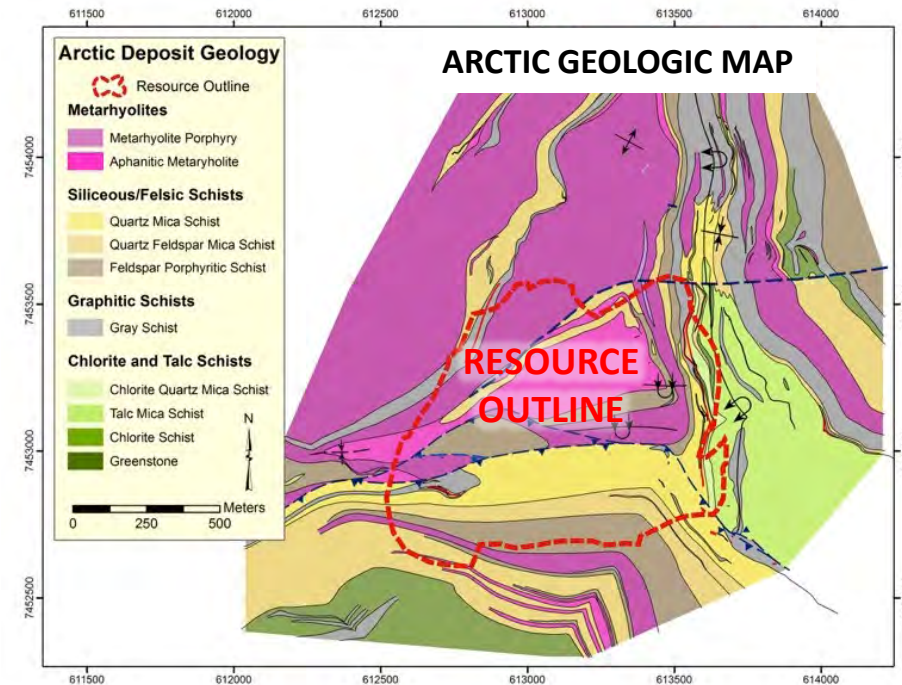
April 2018	Million Tonnes	Cu %	Zn %	Pb %	Au g/T	Ag g/T
Probable	43.04	2.32	3.24	0.57	0.49	36.0

2019 program (US\$7 M):

- 11 holes, total 2,405 m
- Geotechnical & hydrological studies for Feasibility Study
- Working with AIEDA to advance Ambler Mining District Industrial Access Road project.

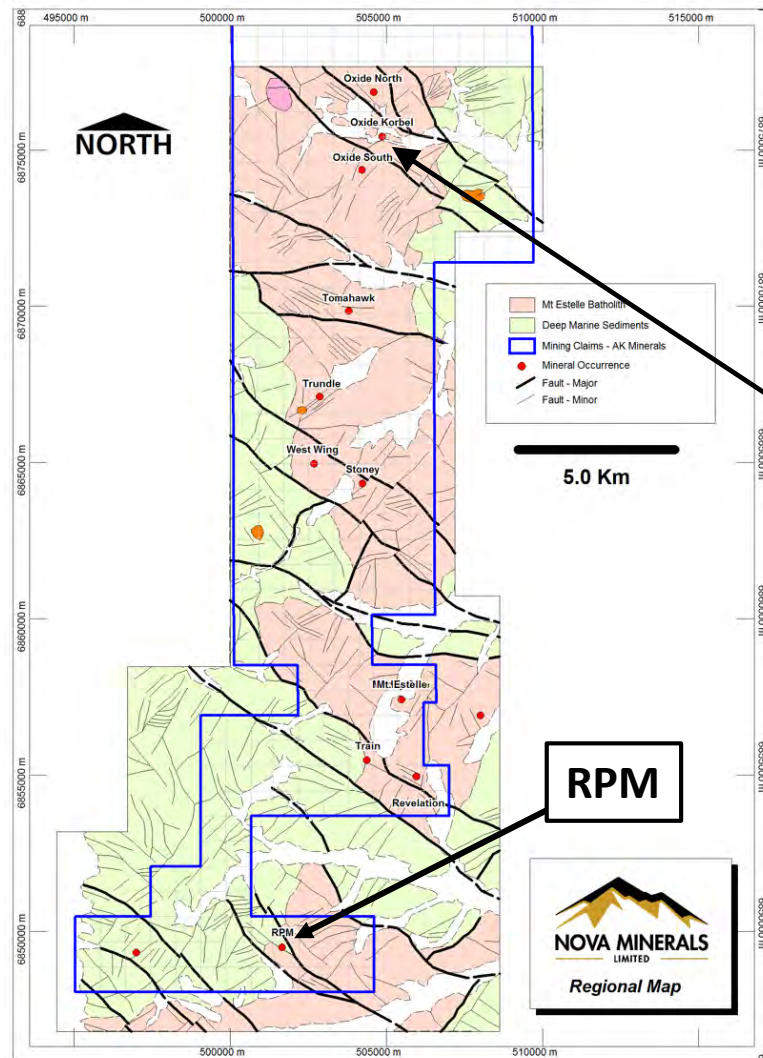
2020 program:

- Completed Feasibility Study
- 3-year payback at US\$3.00/lb. Cu
- After-tax NPV(8%) of US\$1.1B
- 12-year mine life
- All-in cash cost of US\$0.96/lb. Cu
- Final EIS issued March 27, 2020 for Ambler Access Road
- Located 200,000 acres of new mining claims



NOVA MINERALS - ESTELLE

Intrusion-hosted Au system



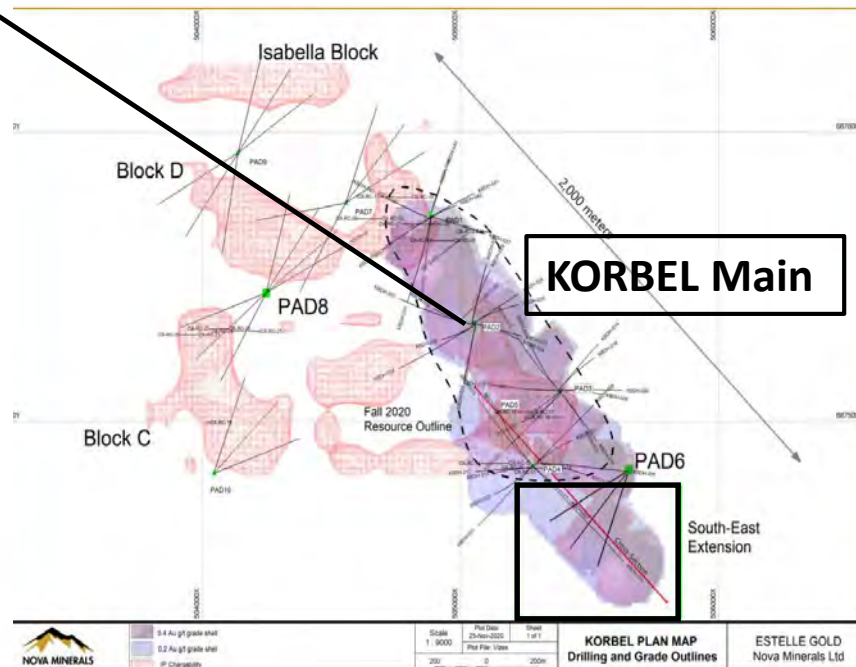
Data from Nova Minerals, 2020

2020 Program:

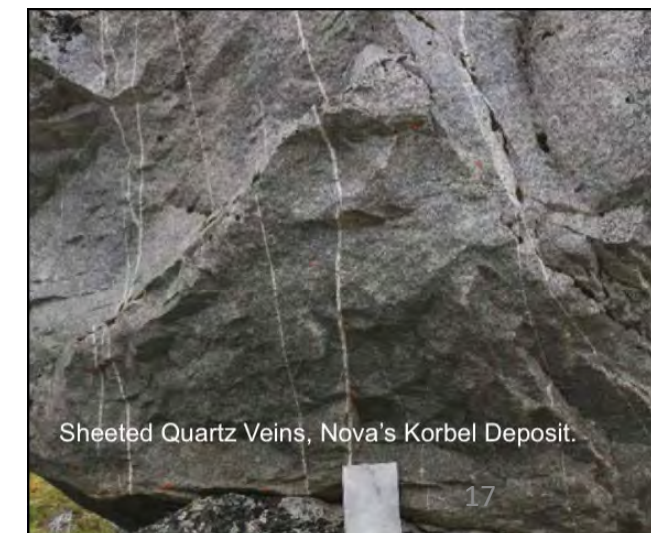
- 16 DDH, +25,000 m @ Korbel
- Expanded Korbel 2,000 m to SE
- Mineralization extends 200 m below resource, over +1,500 m of strike; open to expansion in multiple directions
- Initiated PEA; initial bulk ore-sorting tests are promising

RPM Area:

- 5 to 291 g Au/T from rock sampling
- DDH SE12-008 178 m @ 0.8 g Au/T



Korbel Main - B Resource (Oct 2020)	Million Tonnes	Au (g/T)	Ounces (million)
Inferred	291	0.35	3.3



FREEGOLD - GOLDEN SUMMIT

Intrusion-related gold system - Fairbanks District

- +500,000 oz past production underground; grades >1 oz. Au/T
- +6.75 M oz. placer Au recovered from streams draining project area

2020 Program:

- Testing possible connection between historical, high-grade Cleary Au-vein system & Dolphin intrusion-hosted Au system
- 3 drill rigs, 15-20 DDH, 10,000 m (average 500-m depth)

Select results:

- GSDL2001 – 188 m @ 3.69 g Au/T
- GSDL2002 – 136.4 m @ 1.02 g Au/T
- GSDL 2005 – 119 m @ 3.78 g Au/T
- Additional assays pending
- Drilling resumes in February 2021

Dolphin Resource (Jan. 2016)	Million Tonnes	Au Eq (g/T)	Ounces (million)
Indicated	61.5	0.69	1.36
Inferred	71.5	0.69	1.58
Total	132	0.69	2.94



Data from Freegold Ventures, 2020

AVIDIAN GOLD – AMANITA

Intrusion-related gold system - Fairbanks District

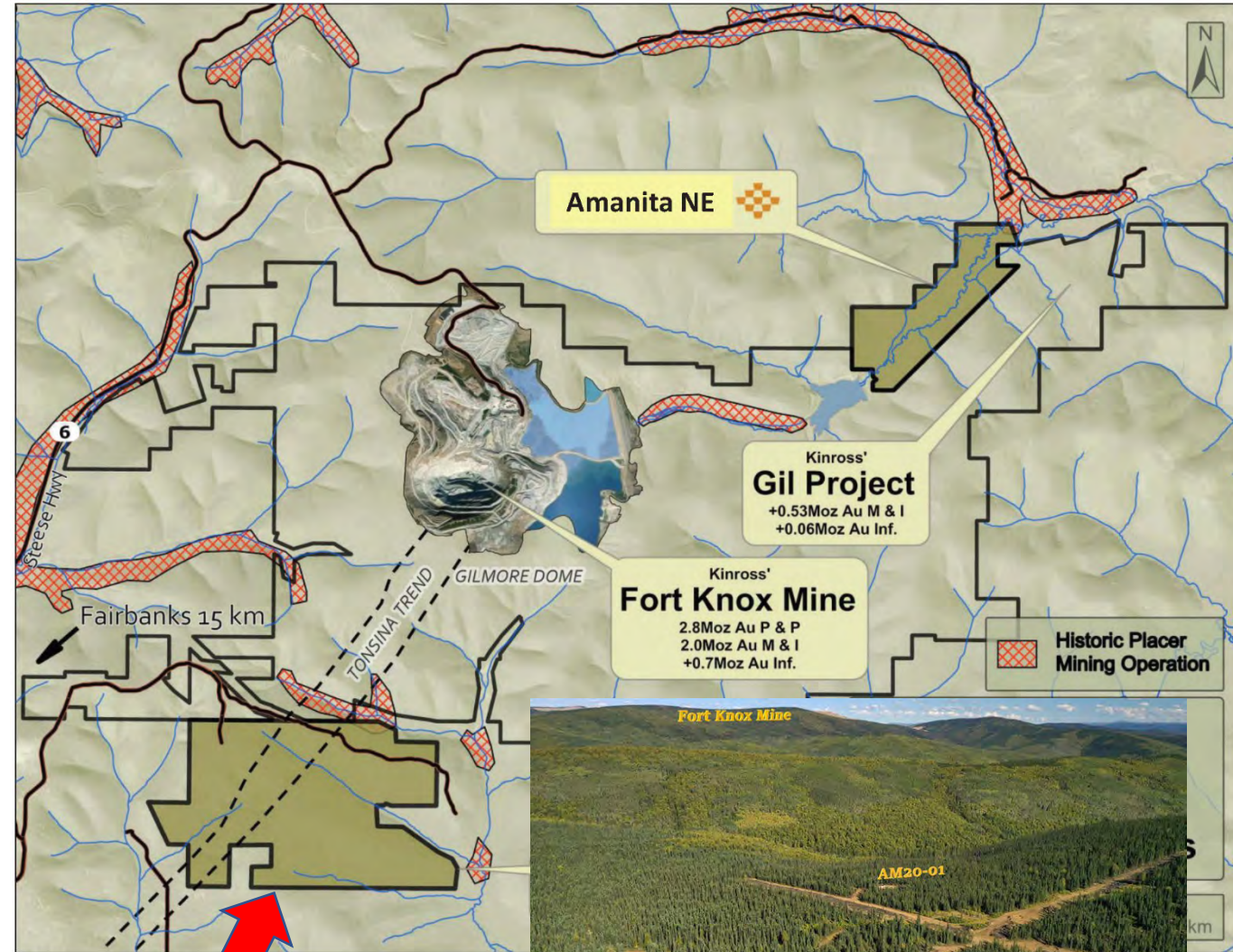
- Adjacent to Fort Knox mine property
- 800-m-wide, NE-trending, gold-bearing structural zone

2020 Program:

- 9 DDH; 1,945 m
- Targeted down-dip extension of 2019 trench with 27 m of 4.22 g Au/T
- High-resolution lidar & drone magnetic surveys

Select results:

- DDH AM20-02 – 22.7 m @ 3.11 g Au/T
- Intrusion intersected at end of DDH AM20-07
- Additional assays pending



AMANITA

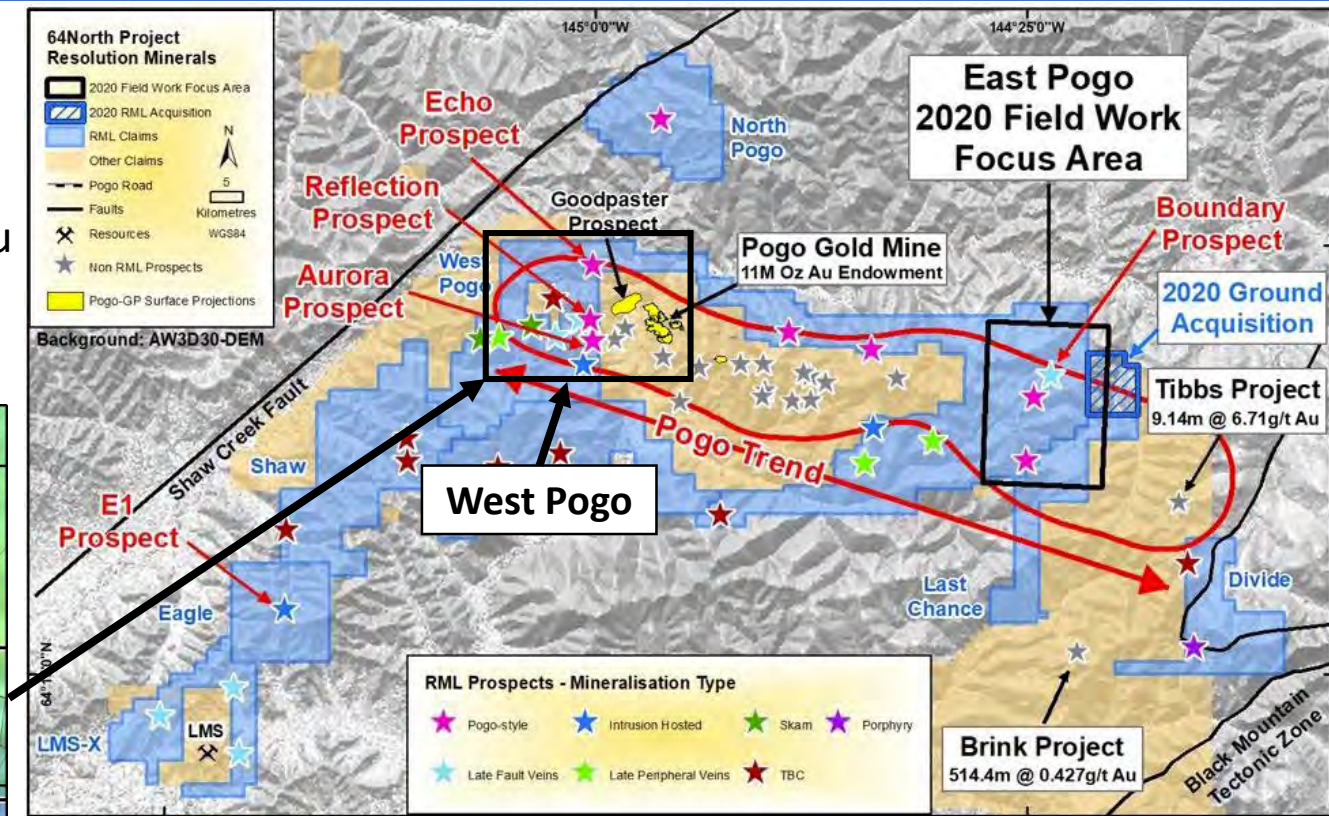
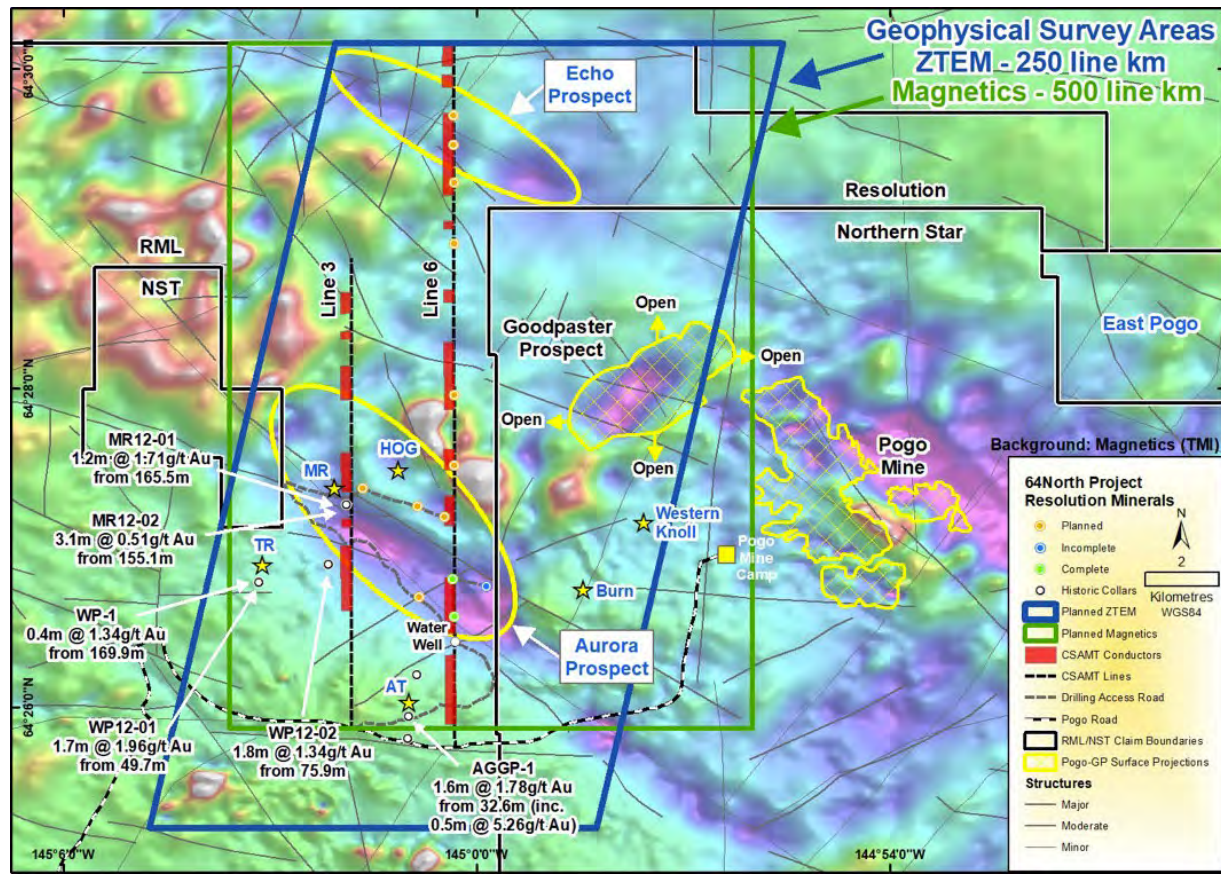


Data from Avidian Gold, 2020

RESOLUTION MINERALS – 64 NORTH

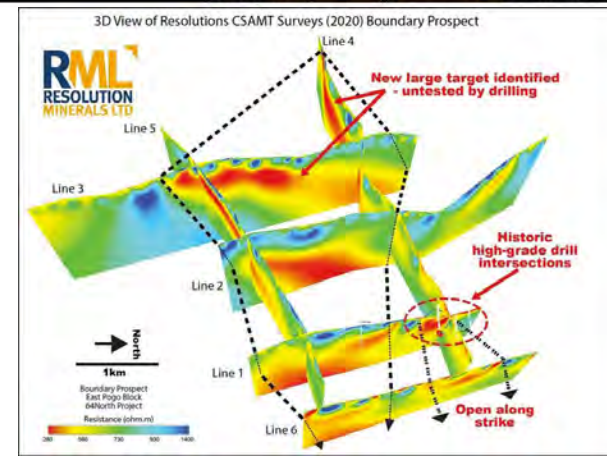
2020 West Pogo Program:

- 9 DDH, 4,778 m Aurora, Echo, & Reflection prospects
- DDH 20AU07: 7 m quartz vein within 22-m-thick zone of intense sulfides, alteration, quartz veining, and anomalous Au in Central Zone at Aurora.
- Airborne ZTEM & magnetic surveys; ground-based CSAMT



2020 East Pogo Program:

- Reconnaissance exploration
- Rock & soil sampling
- CSAMT lines
- Expanded claim block



GAME – SAM

Intrusion-related, structurally hosted Au-Ag, Interior Alaska

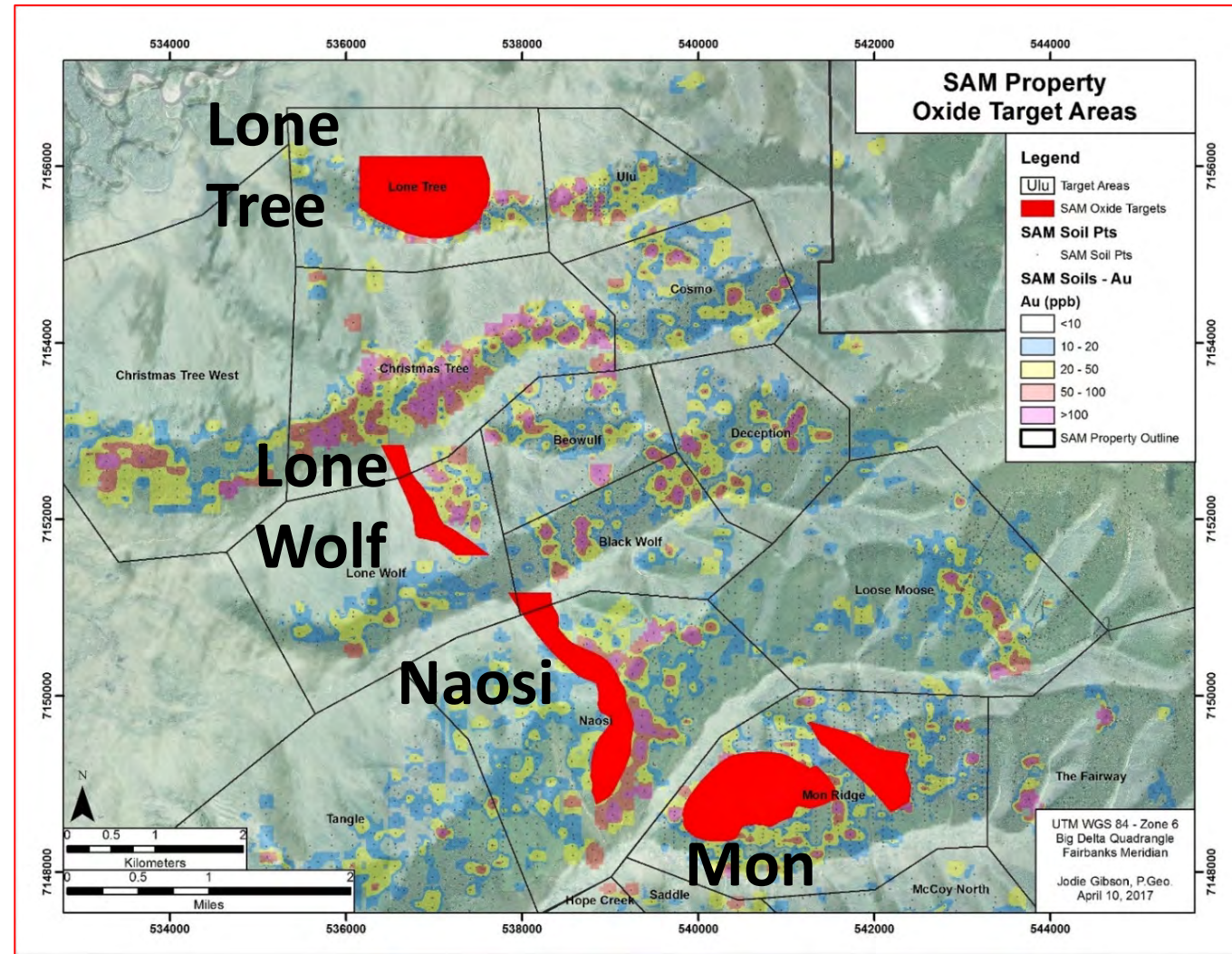
- Low-angle, gold-bearing veins/breccias
- High-angle, higher-grade zones

2020 Program:

- 6,400 m DDH & RC; Naosi + 8 targets
- Exploration (~800 rock & soil samples)
- Metallurgy studies (positive; ongoing)
- Environmental baseline work
- 2020 update: North of 60 Mining News – Q1 2021
- Upgraded NI 43-101 resource estimate in Q1 of 2021

Naosi (pit-constrained, sulfide + oxide) draft resource:

Dec. 2019	Million Tonnes	Au Oz. (million)	Ag Oz. (million)
Indicated	8.144	0.844	10.976
Inferred	10.398	0.524	6.414
Total	18.542	1.368	17.390



Data from GAME (Sam Alaska), 2020

TECTONIC METALS– TIBBS

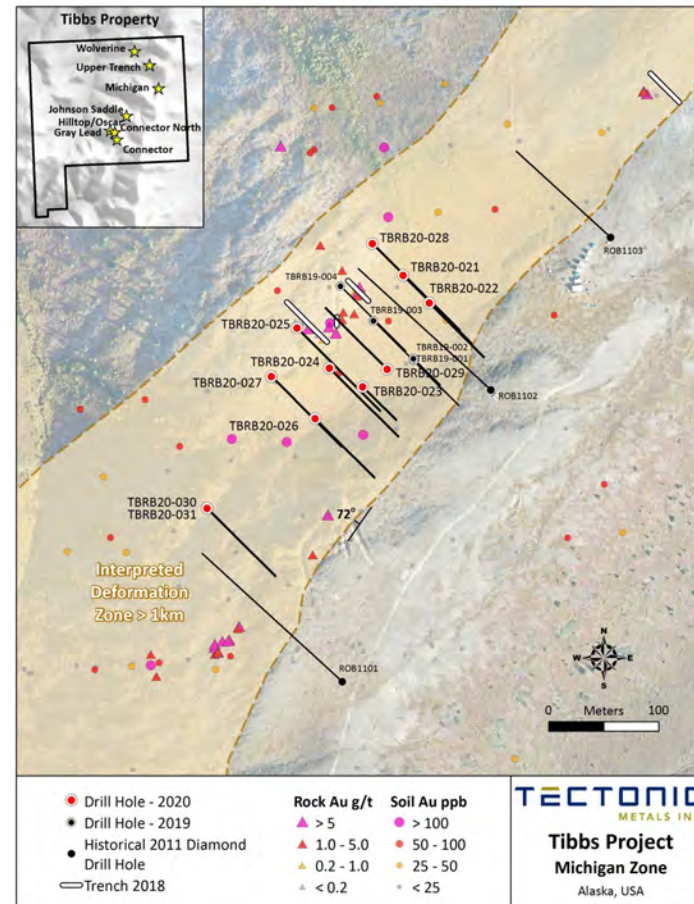
Three styles of Au mineralization:

- Pogo-style high-grade Au-quartz veins (Gray Lead);
- Intrusion-hosted disseminated sulfides & stockwork Au+quartz+stibnite+arsenopyrite veins (Michigan & Upper/Lower Trench)
- Fort Knox-style intrusion-hosted sheeted Au-quartz-bismuthinite veins (Jorts and Hilltop)

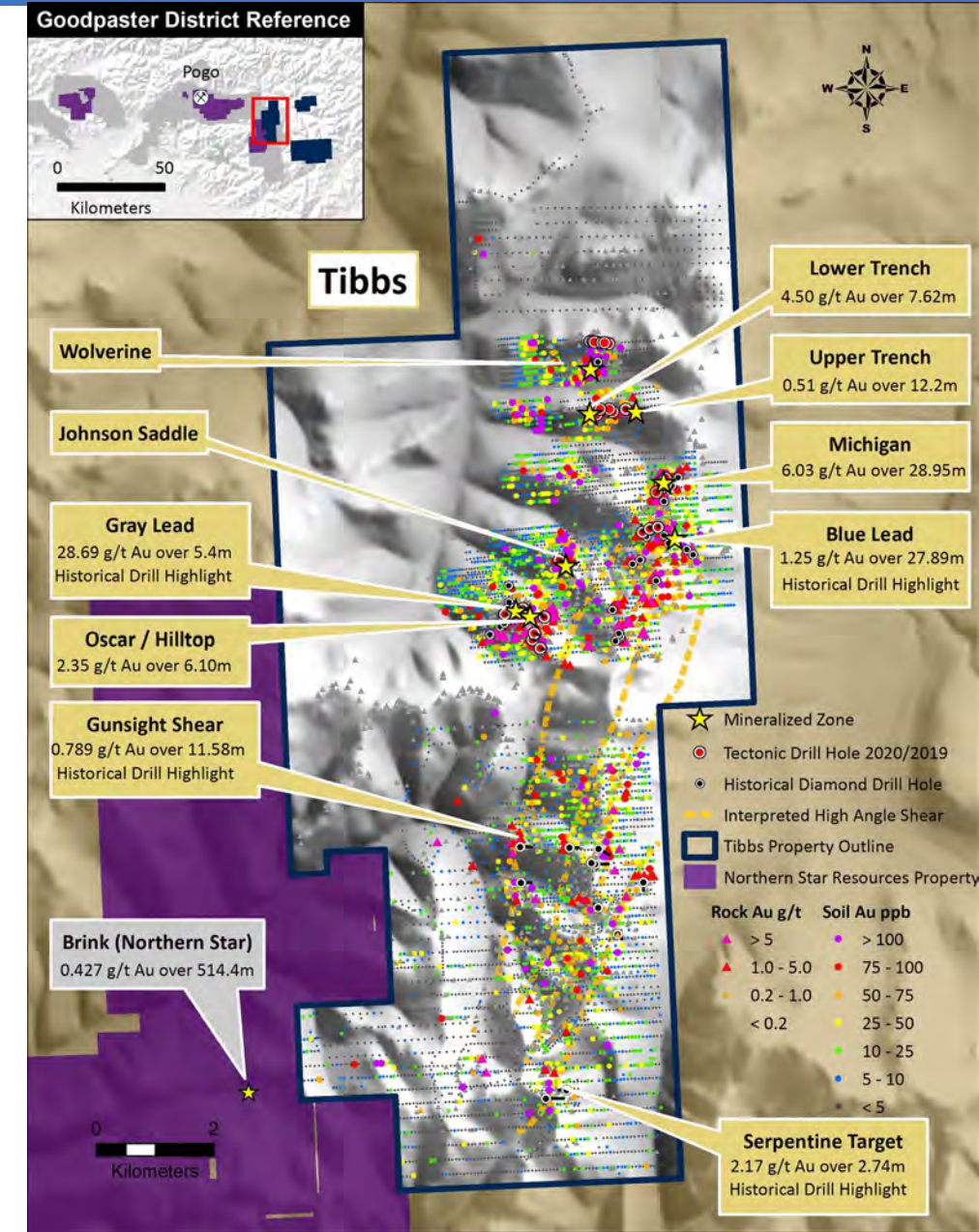
2020 Program:

- 27 holes, 3,202 m RAB drilling
- Geologic mapping
- 115 rock samples
- 27.9 g Au/T; rock w/visible gold

-Partnership with Doyon, Alaska's largest Native Corporation and private land holder



Data from Tectonic Metals, 2020



POLARX – ZACKLY EAST

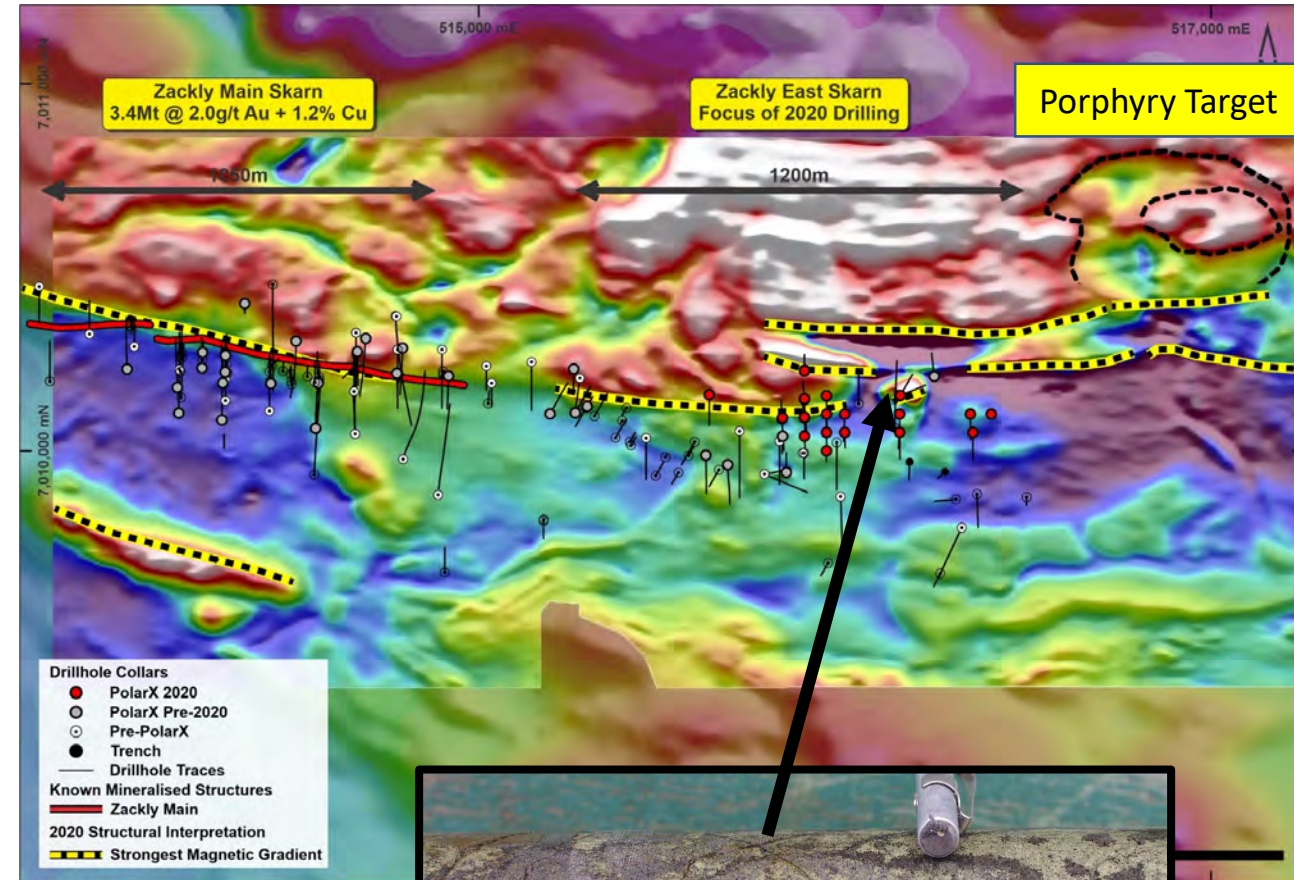
Cu-Au skarn, central Alaska Range

2020 program:

- 23-holes, 3,130 m DDH @ Zackly East
- Mineralization extended 900 m along strike; open in all directions (not in Zackly Main resource)
- Significant 2020 results:
 - ZX20035 - 11.6m @ 1.8 g/T Au, 0.4% Cu
 - ZX20040 – 11.2m @ 2.45 g/T Au, 1.07% Cu
- Assays pending on 7 holes

Ultra-high-resolution drone magnetic survey:

- Completed over entire Zackly system (3.5 x 1.5 km)
- Steep magnetic gradients = most intense skarn mineralization
- Identified new porphyry target



JORC Resource	Million Tonnes	Au (g/T)	% Cu
Zackly (Main)	3.4	2.0	1.2
Caribou Dome	2.8		3.1

GRANDE PORTAGE – HERBERT GOLD

Mesothermal gold vein system, SE Alaska

- Large “ladder-vein” system
- Gold hosted in E-W veins within larger, district-scale NW-trending shear zone

2020 program:

- 21 DDH; 8,375 m
- Intersected 2 new veins
- Untested vein systems over 1,400 m to SE and 400 m to NW

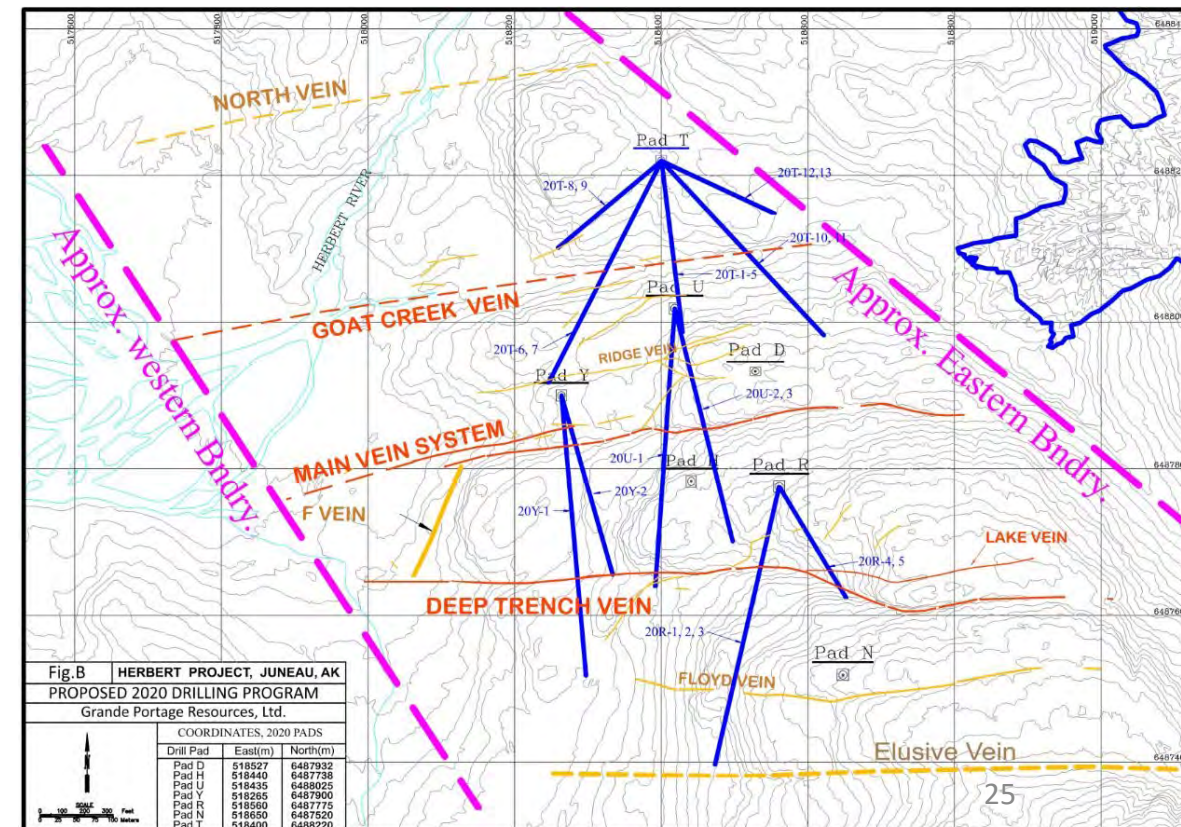
Select results:

20T-3 – 2.71m @ 52.34 g/T Au

20T-7 – 3.74m @ 20.7 g/T Au

20T-9 – 2.63m @ 18.67 g/T Au

Resource (June 2019)	Million Tonnes	Au (g/T)	Oz Au (million)
Indicated	1.9	10.03	0.61
Inferred	0.55	14.15	0.25
Total	2.01	10.95	0.86



HEATHERDALE - NIBLACK

Volcanogenic massive sulfide - Southeast Alaska

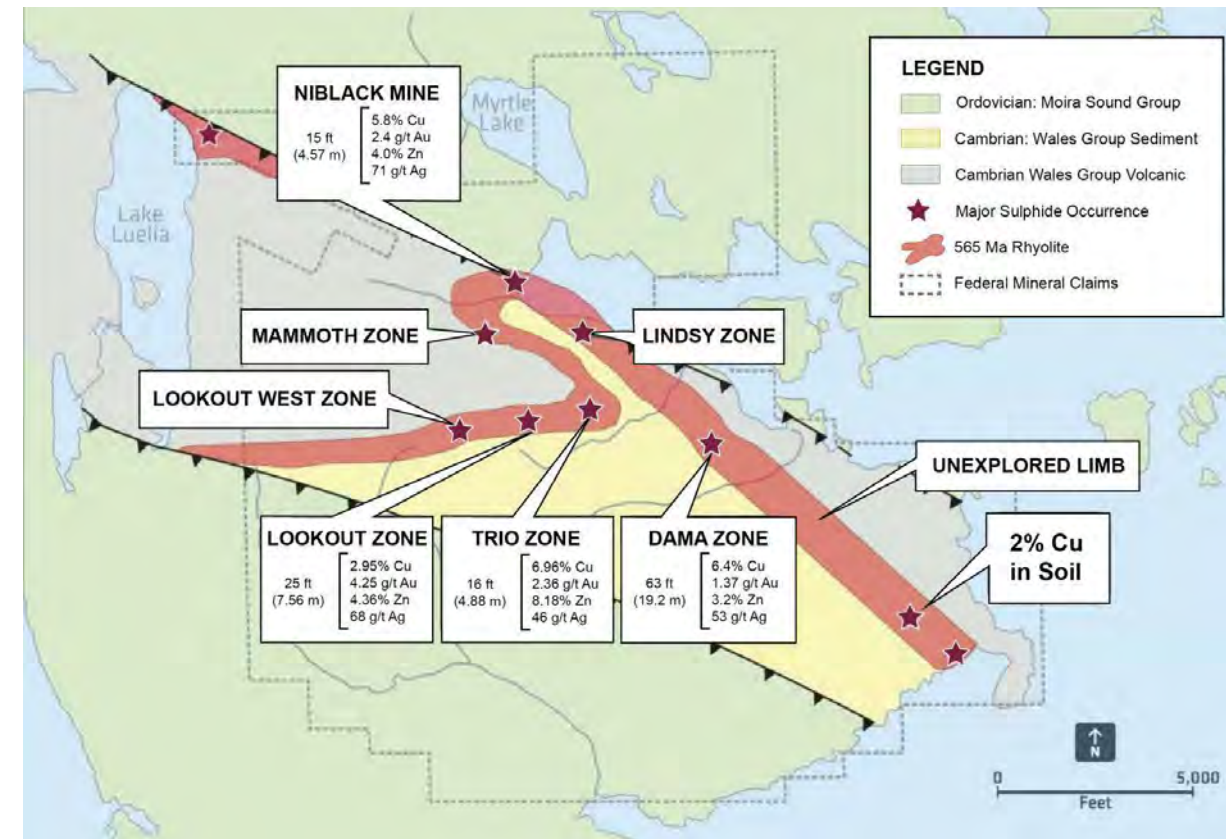
- Corporate restructuring & US\$5.8 M financing
- New management team

2020 Program:

- 10 DDH, 1,774 m at historical Niblack mine
- Re-interpretation of folding
- Underground drift rehabilitation

2021 Program:

- Resource update (Q1 2021)
- >2,000 m drilling
- Drill targets:
 - Lookout Zone down-dip (underground)
 - Dama Zone step-out
 - Down plunge from historical Niblack mine
 - Undrilled prospects on east and west side of trend
- Modern exploration targeting: IP geophysics & soil sampling



Resource (2011)	Million Tonnes	Cu %	Au g/T	Zn %	Ag g/T
Indicated	5.64	0.95	1.75	1.76	29.52
Inferred	3.94	0.73	1.42	1.17	20.1
Total	9.6	0.86	1.61	1.52	25.65

WESTERN ALASKA CU & AU– ILLINOIS CREEK

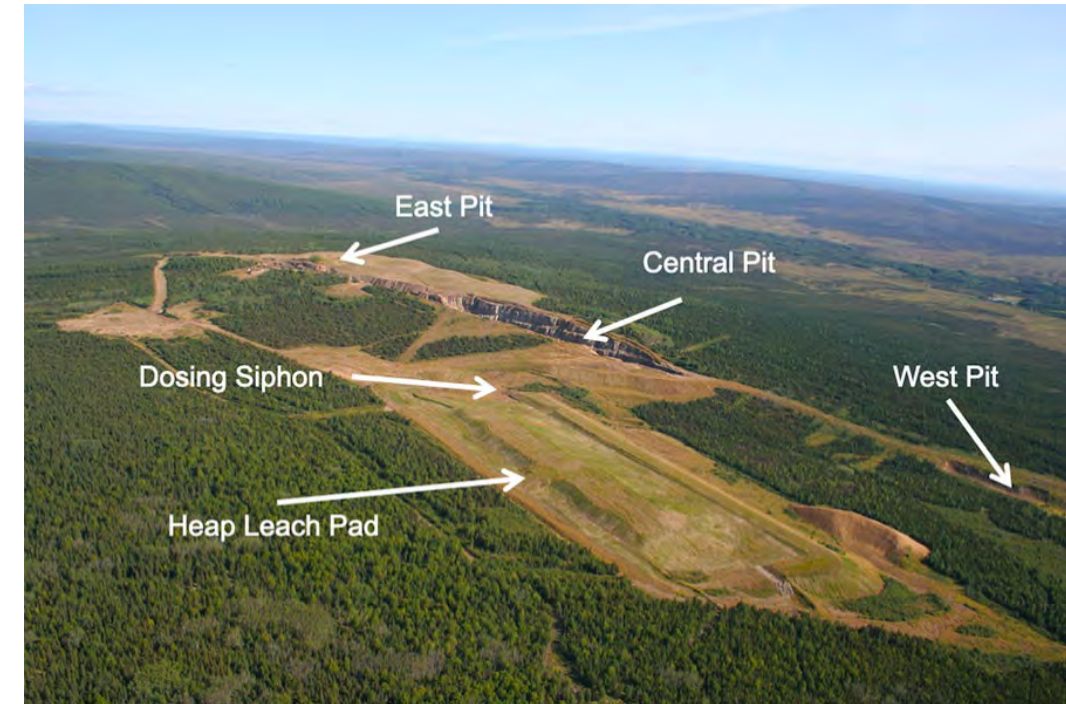
Historical Oxide Au-Ag-Cu mine, Western Alaska

- Investigating reprocessing historical heap leach pad
- ~2.25 million tonnes stacked ore

2020 Program:

- 73 RC holes, 640 m (heap leach pad)
- Sampling for grade determination
- Metallurgical studies to optimize Au, Ag, & Cu recovery
- PEA in progress

RC drilling of historical Illinois Creek mine's heap leach pad



Resource (in pit) (Oct. 2019)	Million Tonnes	Au Eq (g/T)	Ounces Au (thousand)
Indicated	6.76	1.48	226
Inferred	2.03	1.56	70
Total	8.79	1.50	296

WHITE ROCK MINERALS – LAST CHANCE

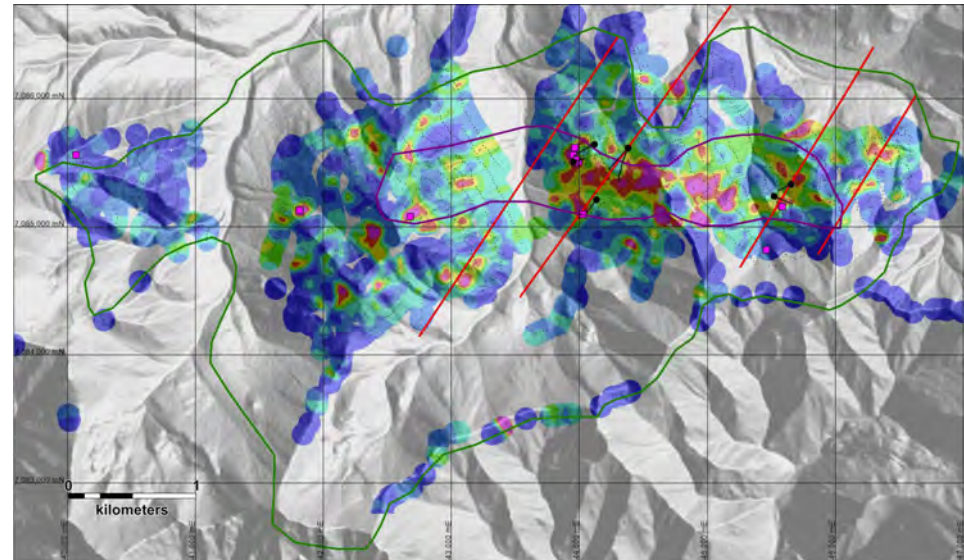
Orogenic(?)/Intrusion(?) Au, Northern Alaska Range

- New Au discovery in 2019
- Hydrothermal silica-breccia bodies with Au-As-Sb; quartz-arsenopyrite veins; silicification

2020 Program:

- 2,700 line-km, 400 square km, airborne magnetic & radiometric survey
- Follow-up stream-sediment sampling (131 samples) identified new large Au anomaly to west
- 8 DDH, 1,990 m; maiden drill program
- 4 targets: Pickle, Sidewinder West, Double Down, & Sidewinder Blowout
- 9 line-km, 4 lines CSAMT to identify resistive zones

Data from White Rock Minerals, 2020



Gold-arsenic-weighted soil image using laboratory gold assays and pXRF arsenic results for soil samples. Drill collars and traces in black. Completed CSAMT line location in red.

TECTONIC METALS— SEVENTYMILE

Orogenic Au system, eastern Alaska

- 40-km-long structural zone
- Gold, arsenopyrite, pyrite, quartz veins
- Lease with Doyon Regional Native Corporation

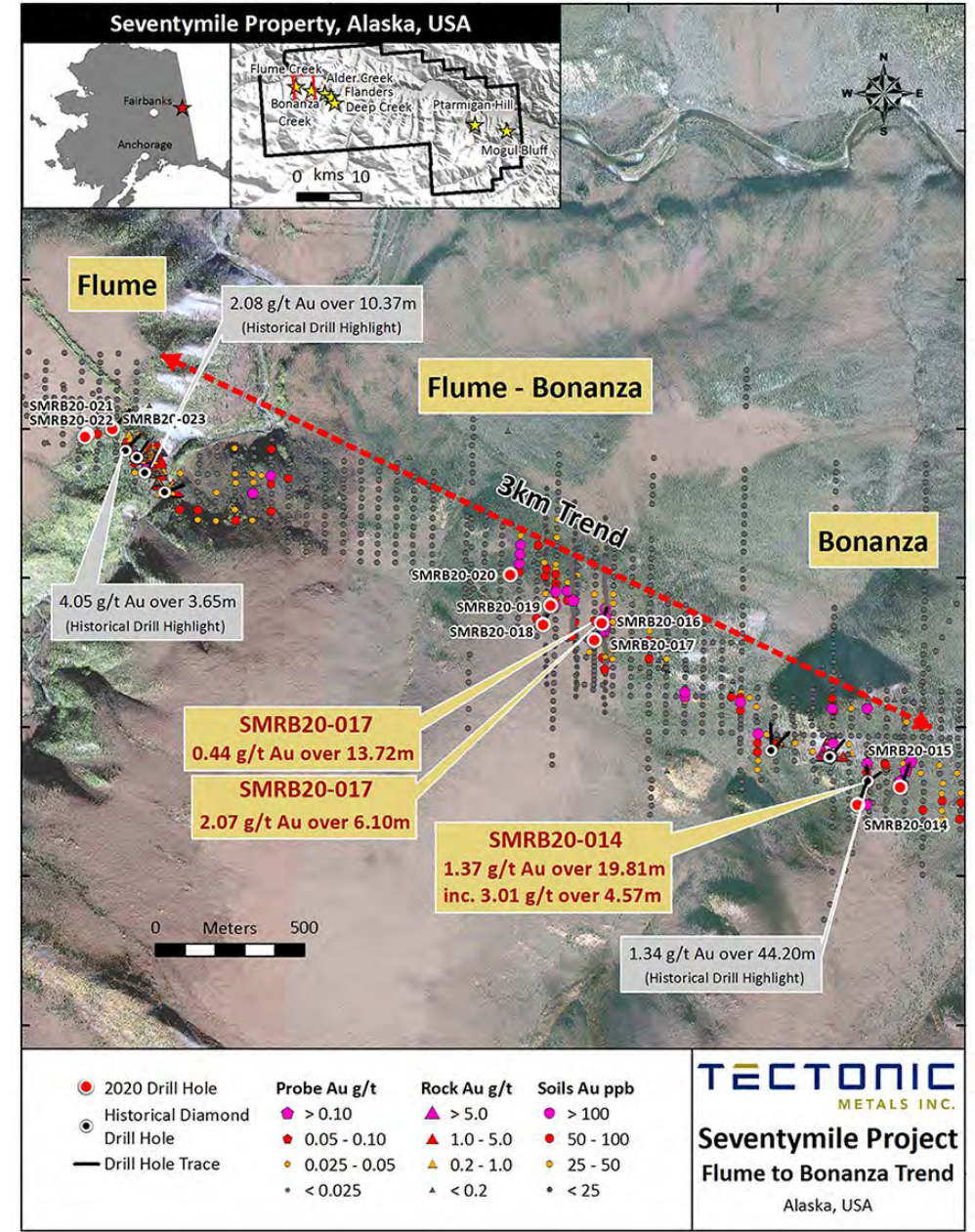
2020 Program:

- Geologic mapping; 82 rock samples
- 26 holes, 2,587 m RAB drilling
- Tested high-tenor Au-in-soil & top-of-bedrock anomalies situated above interpreted shear zones along lithological contacts

Select results:

2.07 g Au/T over 6.10 m at previously undrilled Flume-Bonanza Zone;
1.37 g Au/T over 19.81 m at Bonanza Zone;
1.20 g Au/T over 4.57 m at Flanders Zone

Data from Tectonic Metals, 2020



HELIOSTAR— UNGA

Epithermal Au-Ag, Aleutians

-Surface outcrops of high-grade Au-Ag mineralization

2020 Program:

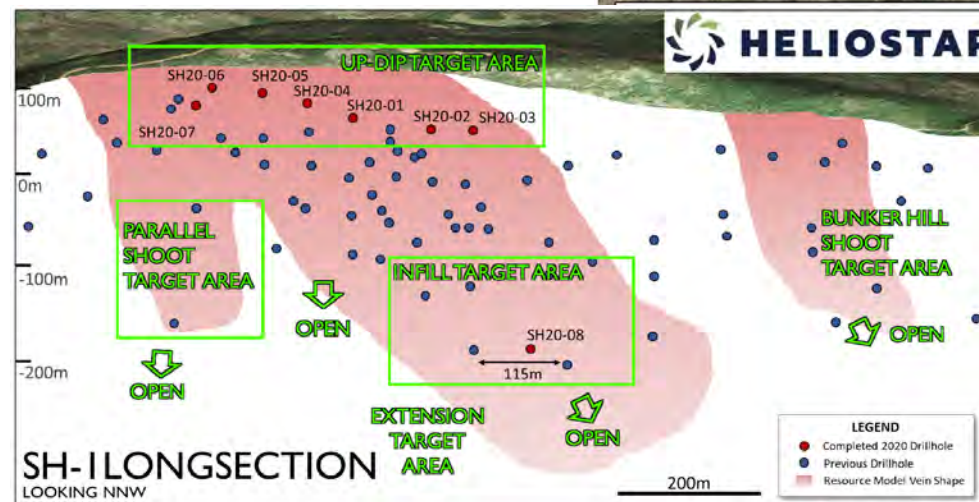
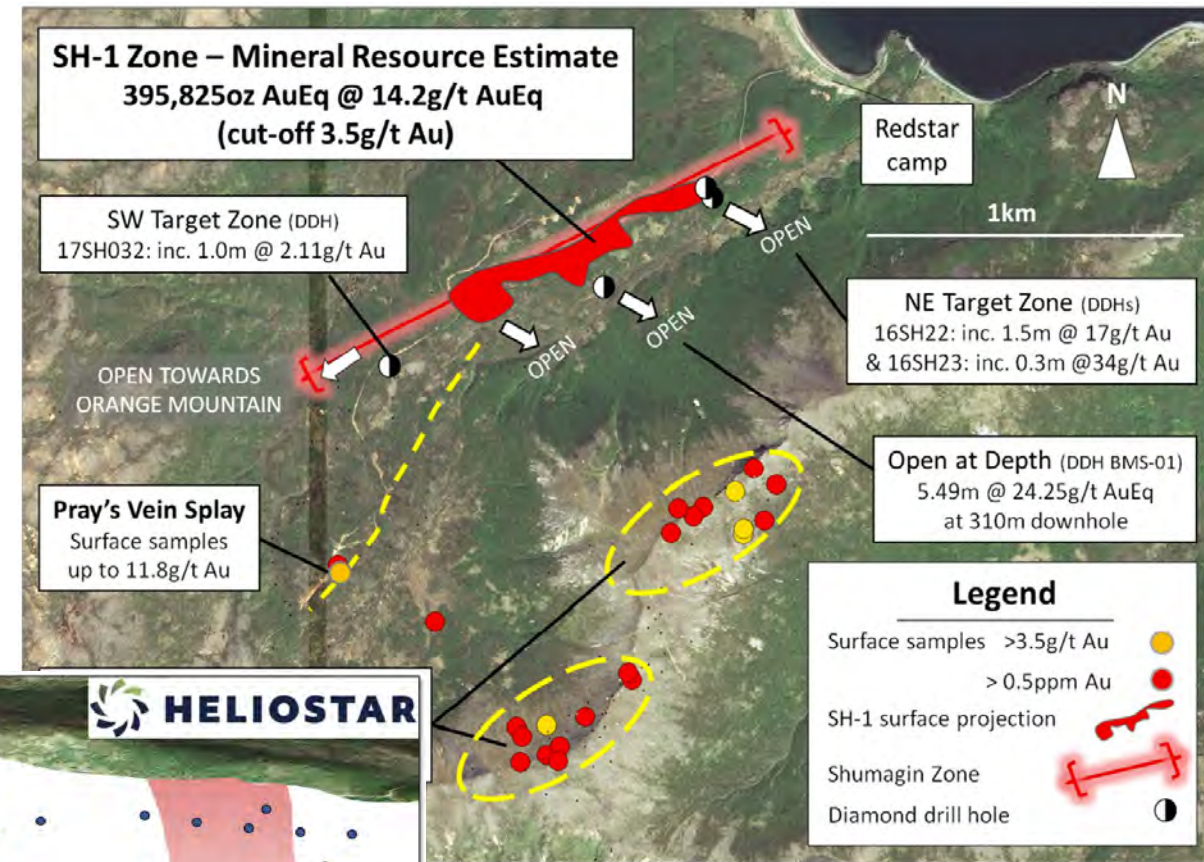
-Released results of 2019's regional geochemical and ground-geophysical surveys on Unga & Popf Islands

-Maiden resource SH-1 Zone (formerly Shumagin Zone):

Avg. grade of 13.8g/t Au; and Avg. grade of 35.4g/t Ag

Resource (Feb. 2020)	Tonnes	Au (oz.)	Ag (oz.)
Inferred	866,015	384,318	986,321

- 3 rigs, 22 DDH, 3,063 m (as of Nov.)
- SH-1 resource (9 DDH, 743 m)
- Historical Apollo mine (3 DDH)
- Aquila prospect (5 DDH, 508.5 m);
with 3.6 m of 4.5 g Au/T in first DDH
- Sitka prospect (4 DDH)
- Empire Ridge prospect (1 DDH)

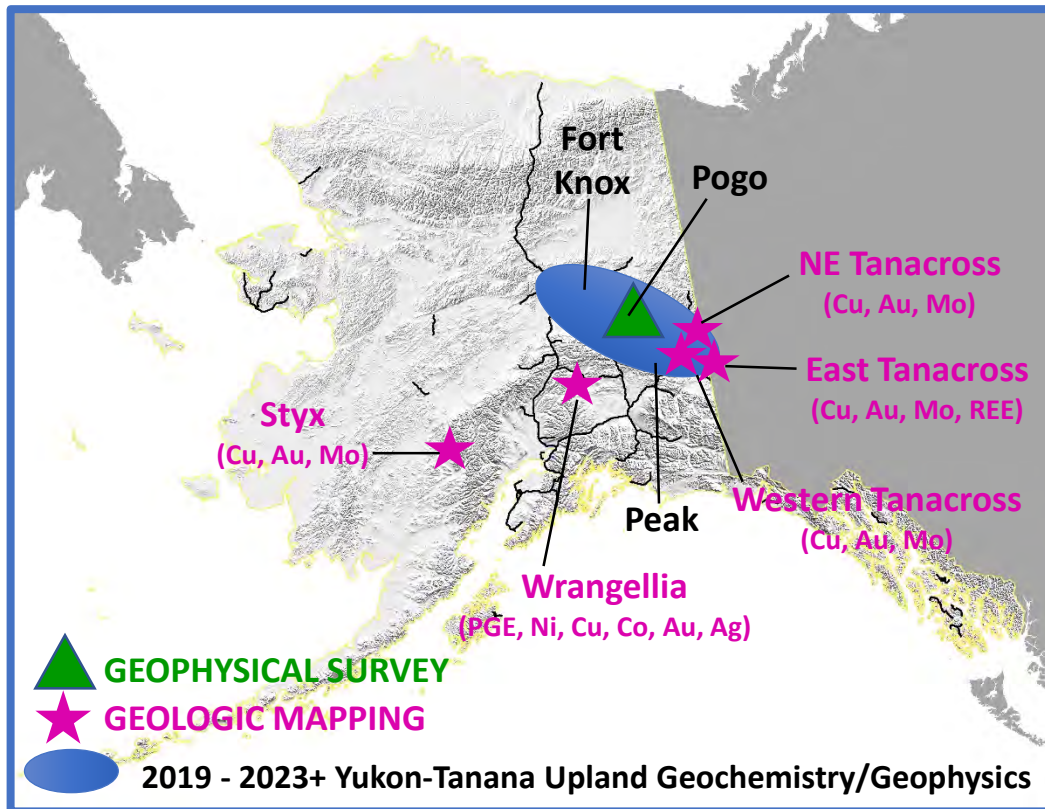


ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS (DGGS) 2020



<https://dggs.alaska.gov/>

DGGS Projects



2020 ACTIVITIES:

- Pogo area helicopter magnetic and radiometric surveys

UPCOMING 2021:

- Styx digital geologic map
- Wrangellia digital geologic map & mineral potential report

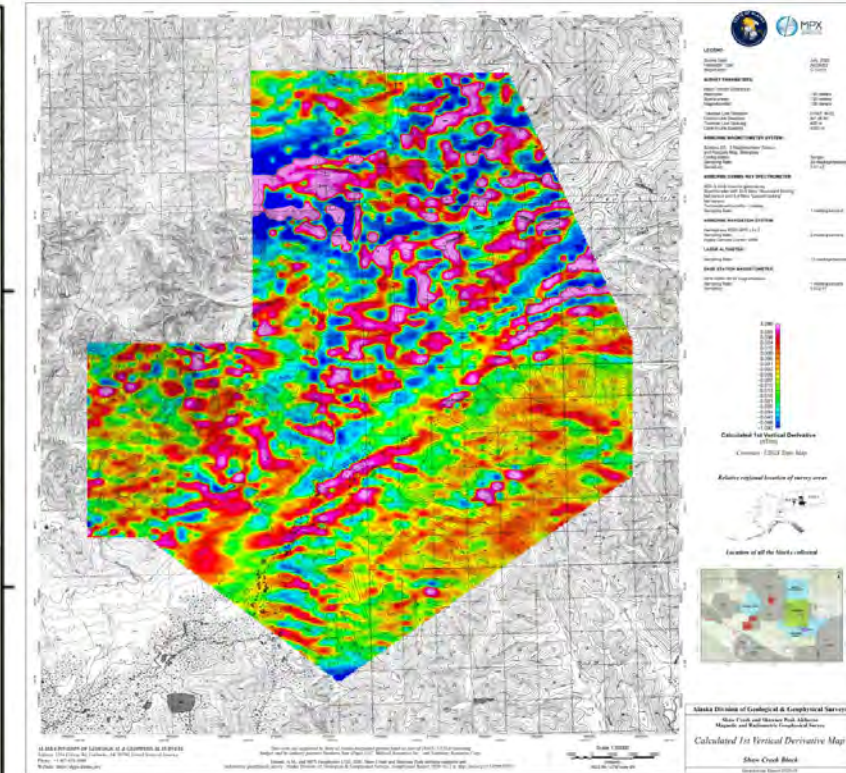
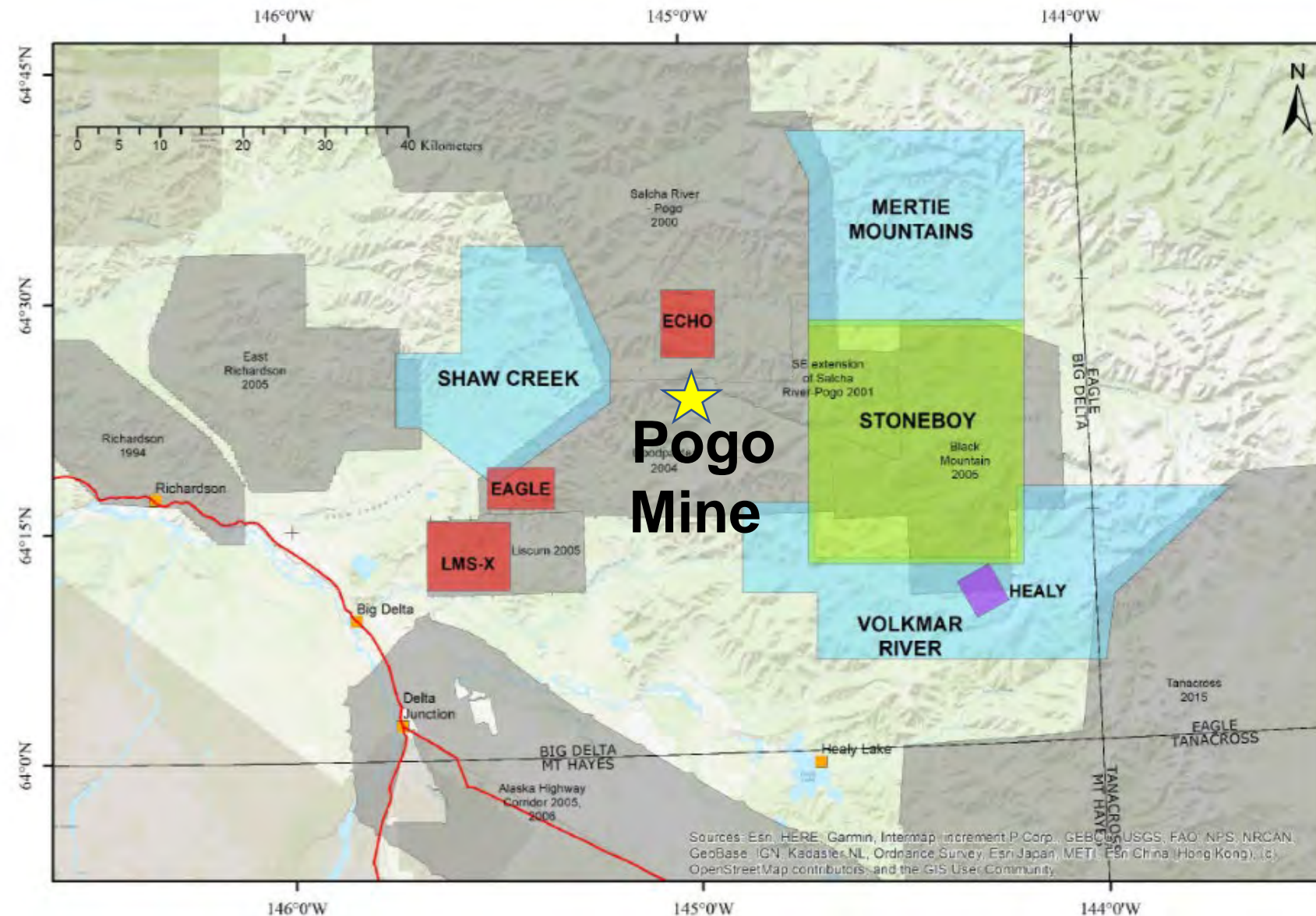
Yukon-Tanana Upland:

- Eastern Tanacross geologic map
- New geologic mapping in W. Tanacross and Eagle quadrangles
- New fixed-wing magnetic + radiometric surveys
- Stream sediment (modern, full-elemental-suite re-analyses) & online geochemical anomaly maps

DGGS - AIRBORNE GEOPHYSICS



<https://dggs.alaska.gov/pubs/gpdata/386>

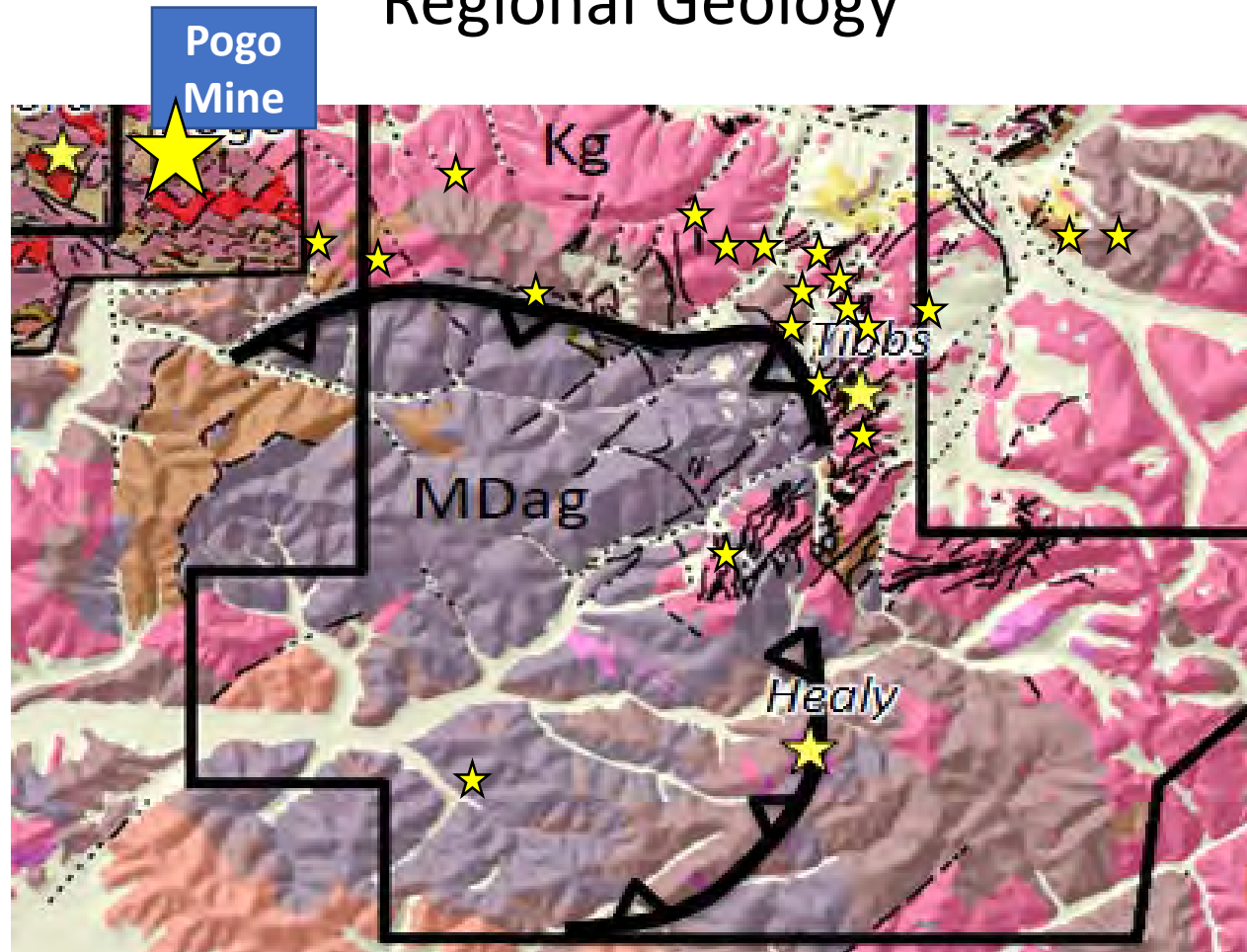


- 2020 State of Alaska + industry funded helicopter magnetic + radiometric surveys
- 2021 State of Alaska fixed-wing magnetic + radiometric surveys

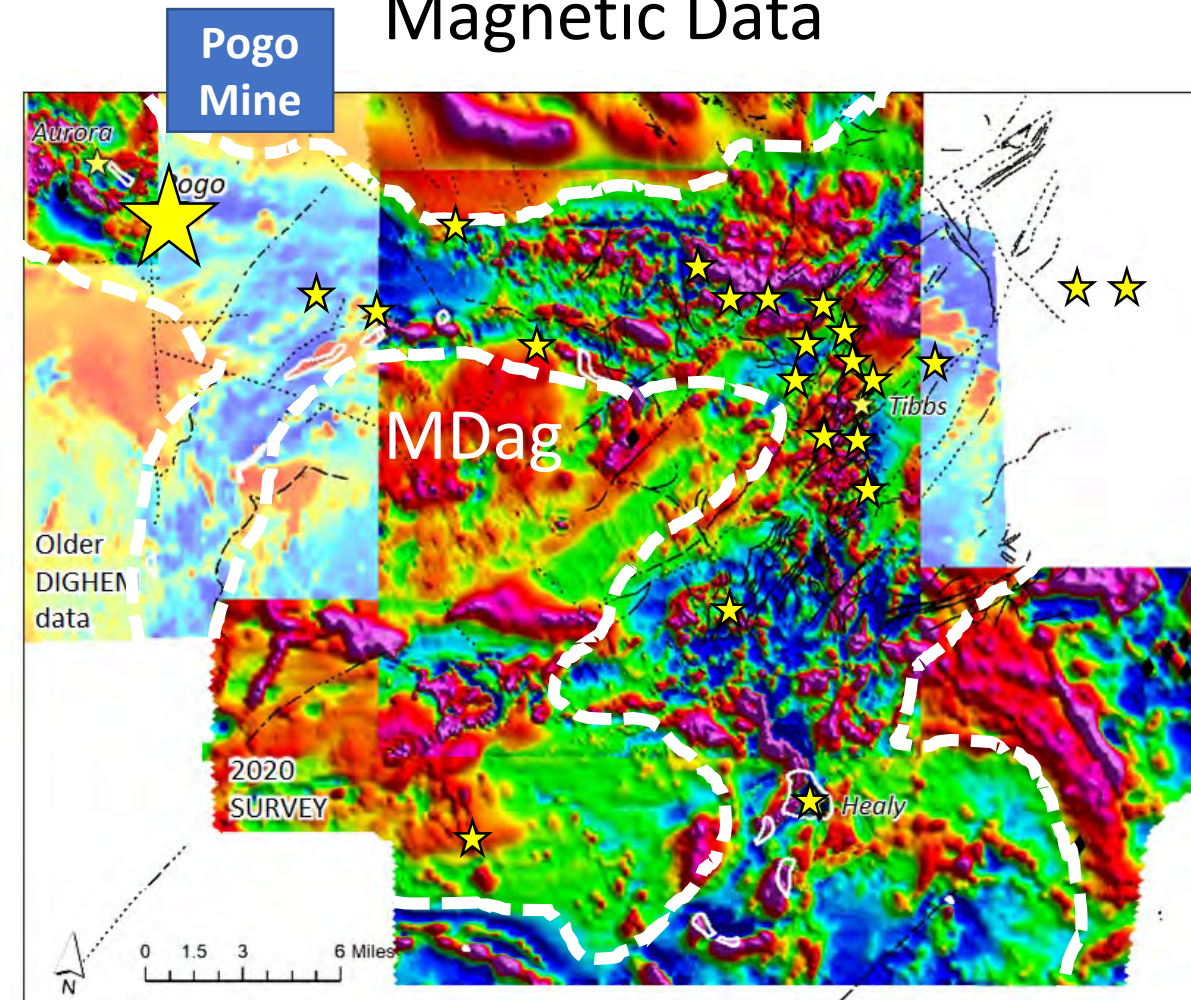
DGGS – 2020 HELI MAG SURVEY



Regional Geology



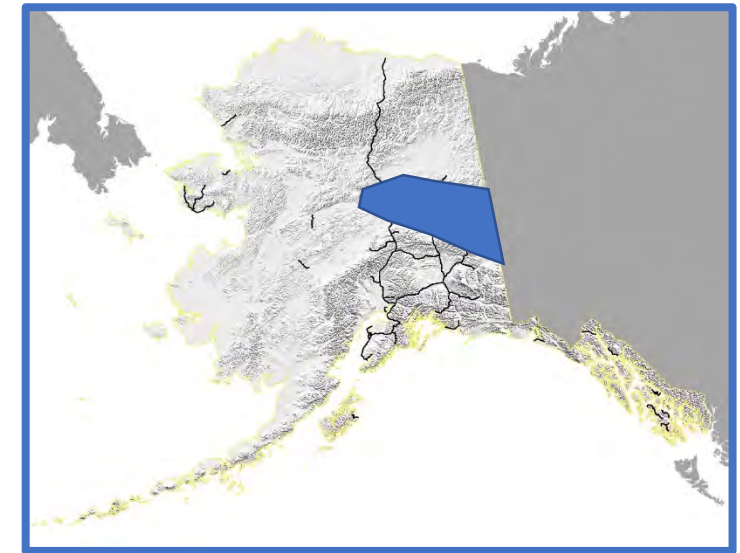
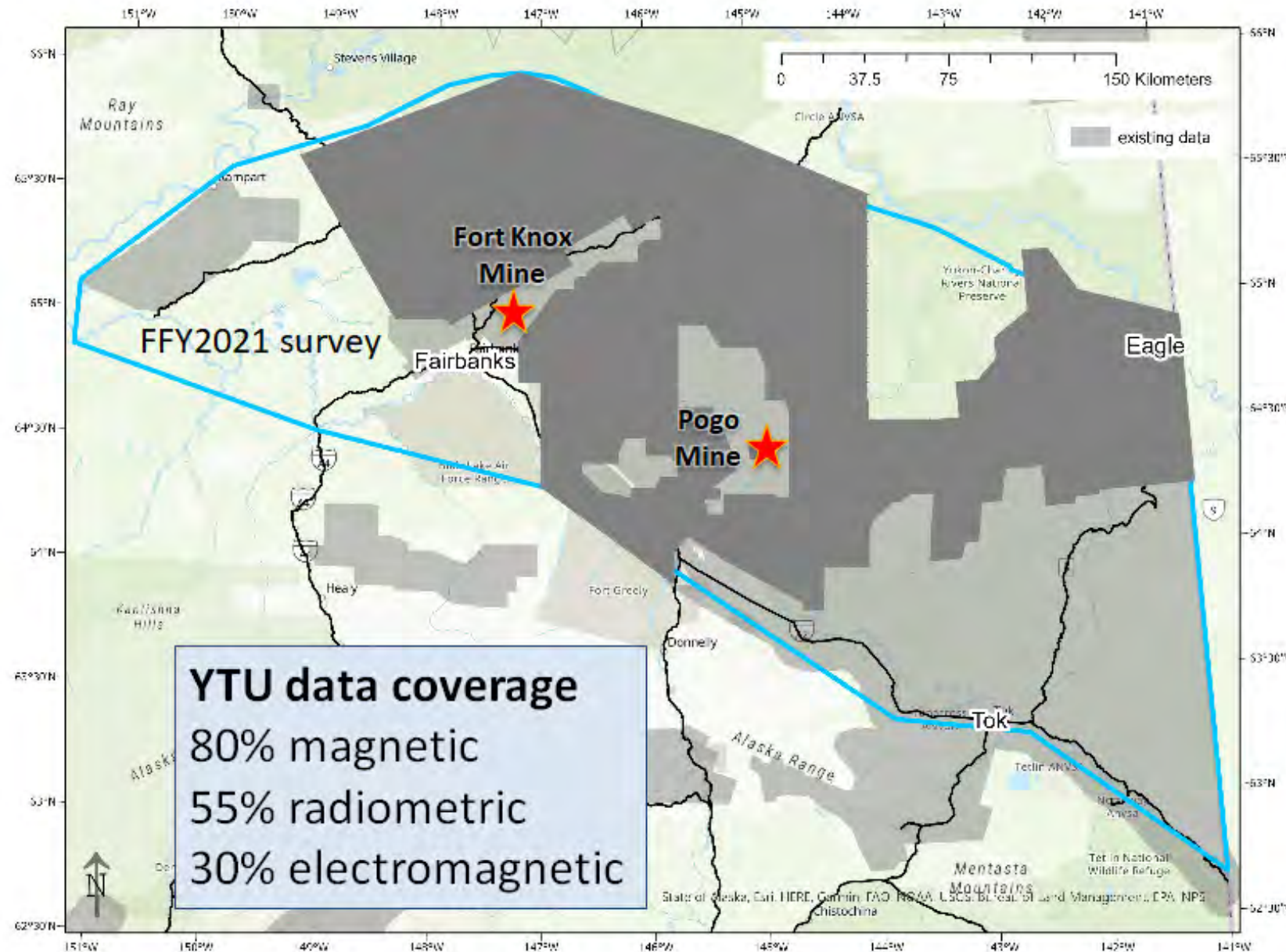
Magnetic Data



MDag = Augen gneiss

★ = Pogo mine & prospects

EARTH-MRI FW MAG+RAD SURVEYS



Summer 2021-2022

- Fixed-wing magnetic & radiometric surveying of Yukon-Tanana Upland
- USGS, BLM, SOA funded

DGGS – GEOLOGIC MAPPING

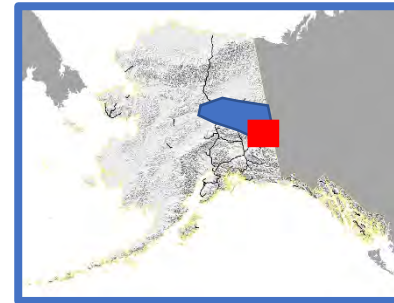
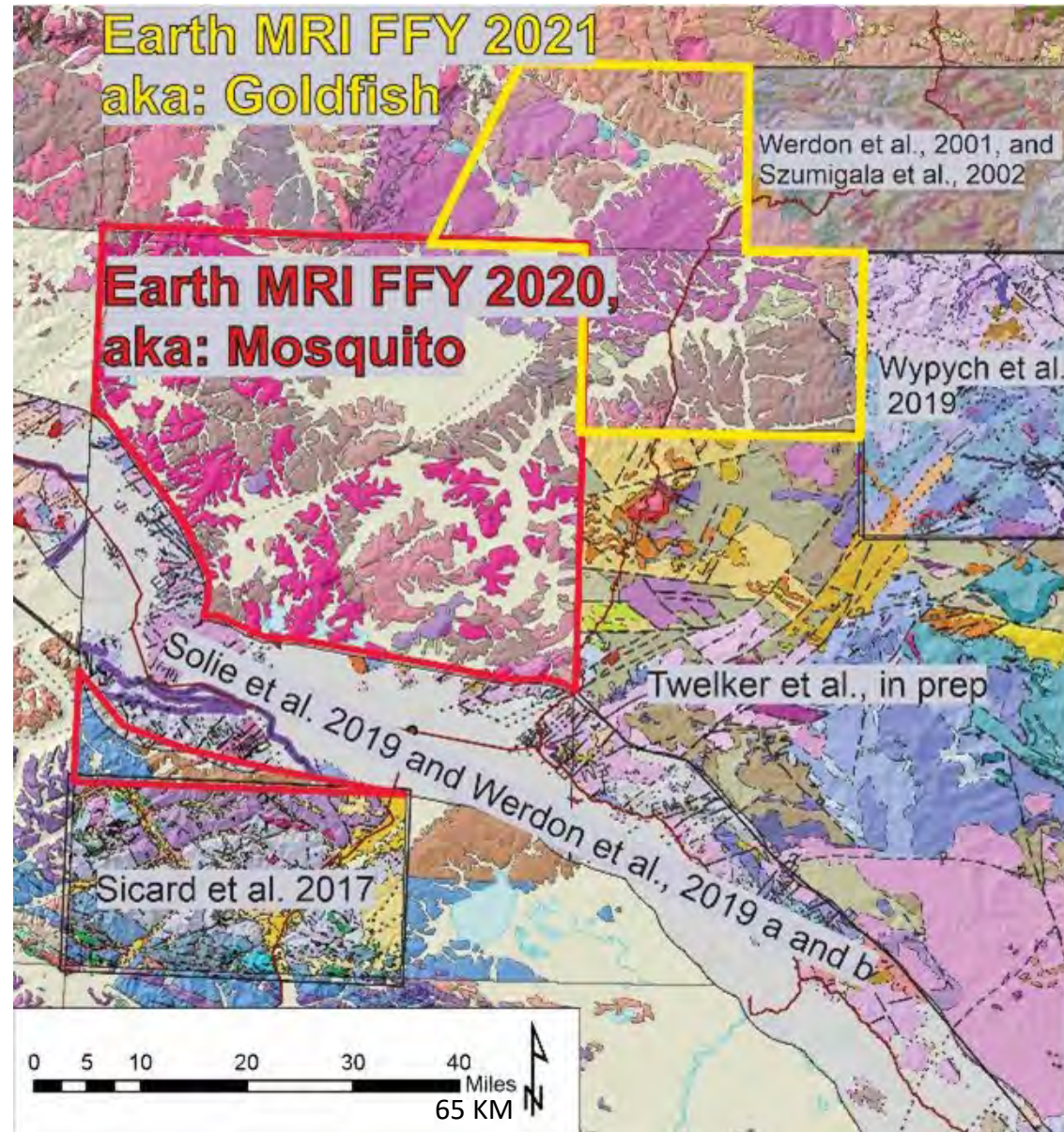


Summer 2021

- Mosquito & Goldfish projects
- 1:100,000-scale geologic mapping
- 7-week, helicopter-supported program
- 7-geologists
- Total area: 6,320 sq. km (2,440 sq. miles)

Geologic Investigations:

- Mineral-resource potential
 - Porphyry/skarn Cu-Au-Ag-Mo
 - Reduced intrusion Au
 - Orogenic Au
 - Epithermal Au-Ag
 - REE and other critical minerals
- Lake George & Yukon-Tanana Terranes
- Low- & high-angle fault systems



ALASKA INFORMATION AND DATA

Division of Geological & Geophysical Surveys

<http://dggs.alaska.gov/>



- Geochemistry
- Geophysics
- Geology Maps
- Elevation Data
- Mineral Report
- Mineral Occurrences

Geologic Materials Center

<http://dggs.alaska.gov/gmc/>



- Core Repository
- Indoor core viewing
- Surface samples
- Geochemistry pulps
- Online Inventory
- Confidential storage and viewing

Division of Mining, Land & Water

<http://dnr.alaska.gov/mlw/>



- Land status
- Mining claims
- Mine Permitting
- Mine Regulation

Office of Project Management and Permitting

<http://dnr.alaska.gov/opmp/>

- Project and mine permit coordination