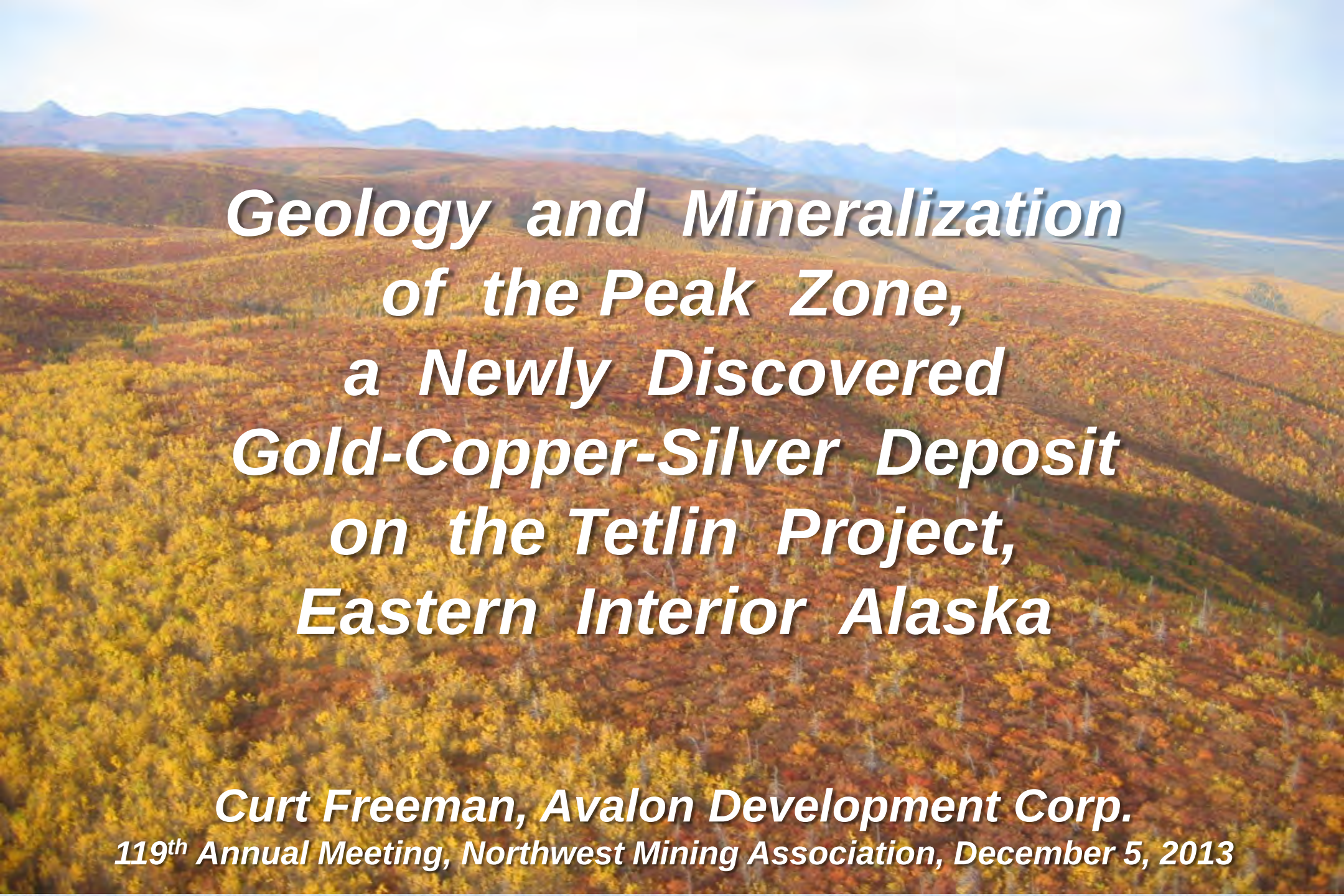

Geology and Mineralization of the Peak Zone, a Newly Discovered Gold-Copper-Silver Deposit on the Tetlin Project, Eastern Interior Alaska

Curt Freeman, Avalon Development Corp.

119th Annual Meeting, Northwest Mining Association, December 5, 2013

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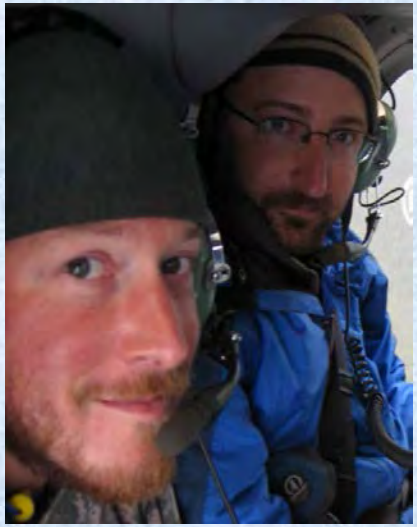
CONTANGO - TETLIN - AVALON TEAM

Contango Founder, President & CEO Brad Juneau

Tetlin Chief Danny Adams and Contango Founder Ken Peak

Avalon President Curt Freeman



Avalon Project Geologists Chris Van Treeck and Chris Brown

Avalon Project Geologist Greg Maynard

Avalon Senior Geologist Dave Adams

TETLIN PROJECT TIMELINE

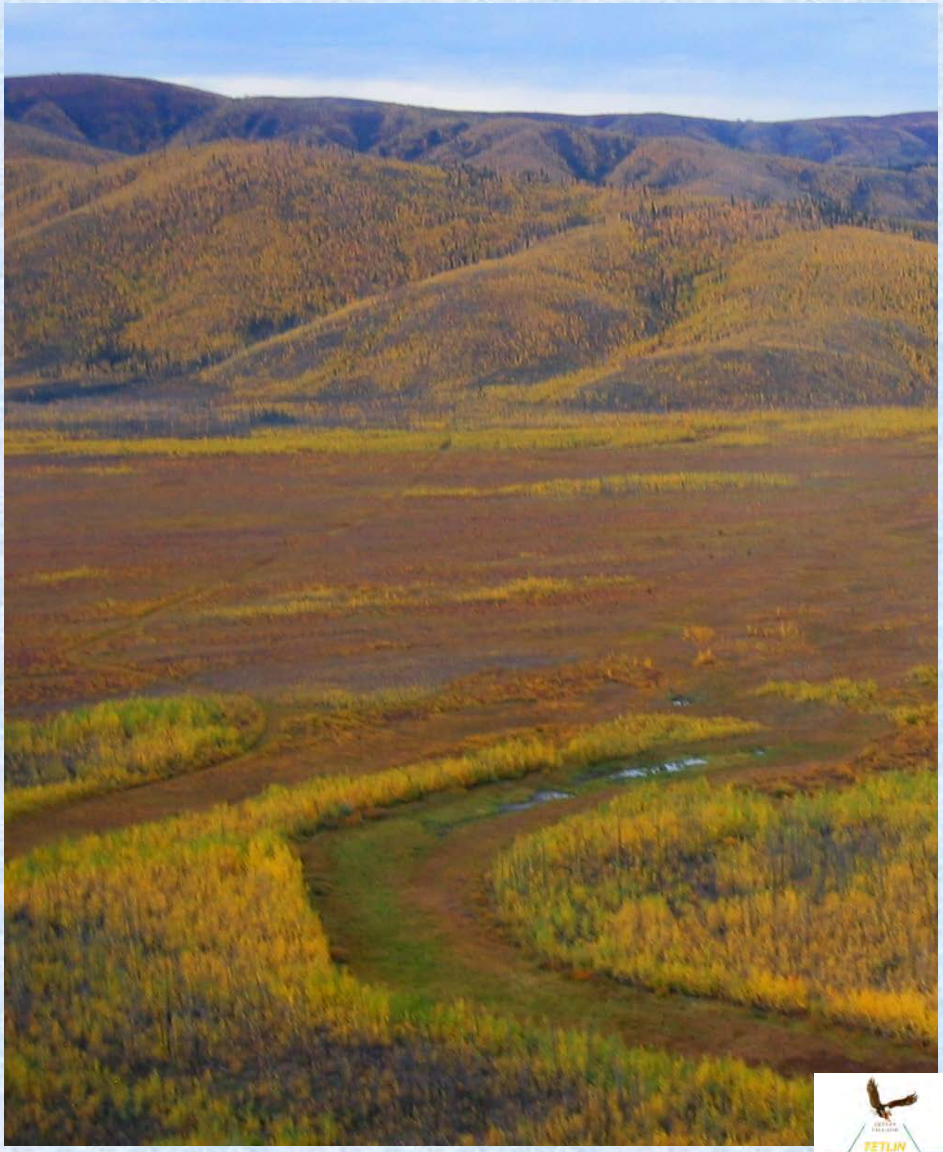
- 2008: Lease Signed in August, remote sensing data acquired and analyzed, initial targeting completed
- 2009: First reconnaissance program Jun - Jul – follow up geochem sampling and trenching Sept - Oct
- 2010: prospecting, stream sediment and pan concentrate sampling, soil sampling, IP surveys, June - Oct
- 2011: Soil sampling, airborne magnetic and resistivity (DigHEM) survey, 11 hole (2456 m) core drilling, May - Oct
- 2012: Soil sampling, 50 hole (10,974 m) core drilling, Inferred Resource Estimate, May - Oct
- 2013: Airborne magnetic and resistivity (DigHEM, HeliTEM) survey, soil sampling, stream sediment & pan concentrate sampling, 69 hole (14,348 m) oriented core drilling, Jun - Sep

EXPLORATION EXPENDITURES

Calendar Year		Expenditures (in millions)
2009	Project-wide Recon, Au-Cu Mineralization Discovery at CD Prospect	$ 0.2
2010	Project-wide Recon, CD Prospect Soils, CD IP Survey	$ 1.8
2011	Airborne Geophysics, CD Prospect Soils, CD Core Drilling	$ 3.3
2012	Project-wide Recon, CD Prospect Soils, CD Core Drilling, Peak Zone Discovery & Non-Compliant Resource	$ 5.4
2013	Airborne Geophysics, Project-wide Recon, CD Core Drilling, Peak Zone Resource Definition	$ 8.6
	TOTAL:	$ 19.3

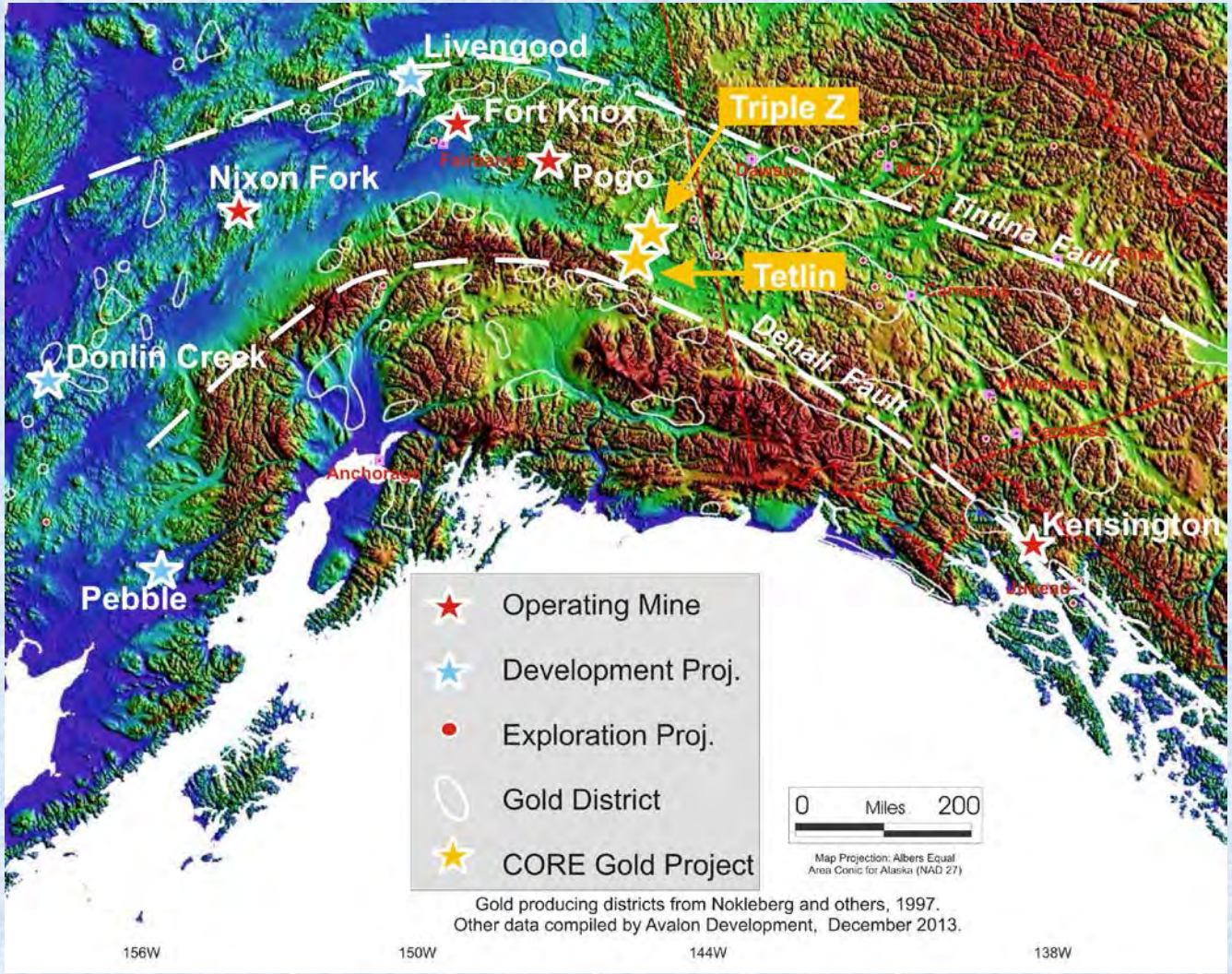
TETLIN PROJECT BACKGROUND

- On Alcan Hwy, 200 paved road miles from Fairbanks, 15 miles south of Tok
- All-season gravel road with power and communications on north half of the project
- Tok has nearest electrical grid, insufficient capacity to support a large mine; high capacity power approx. 60 miles away
- 250 paved road miles north of all-weather ice-free port of Valdez, Alaska



TETLIN LAND STATUS

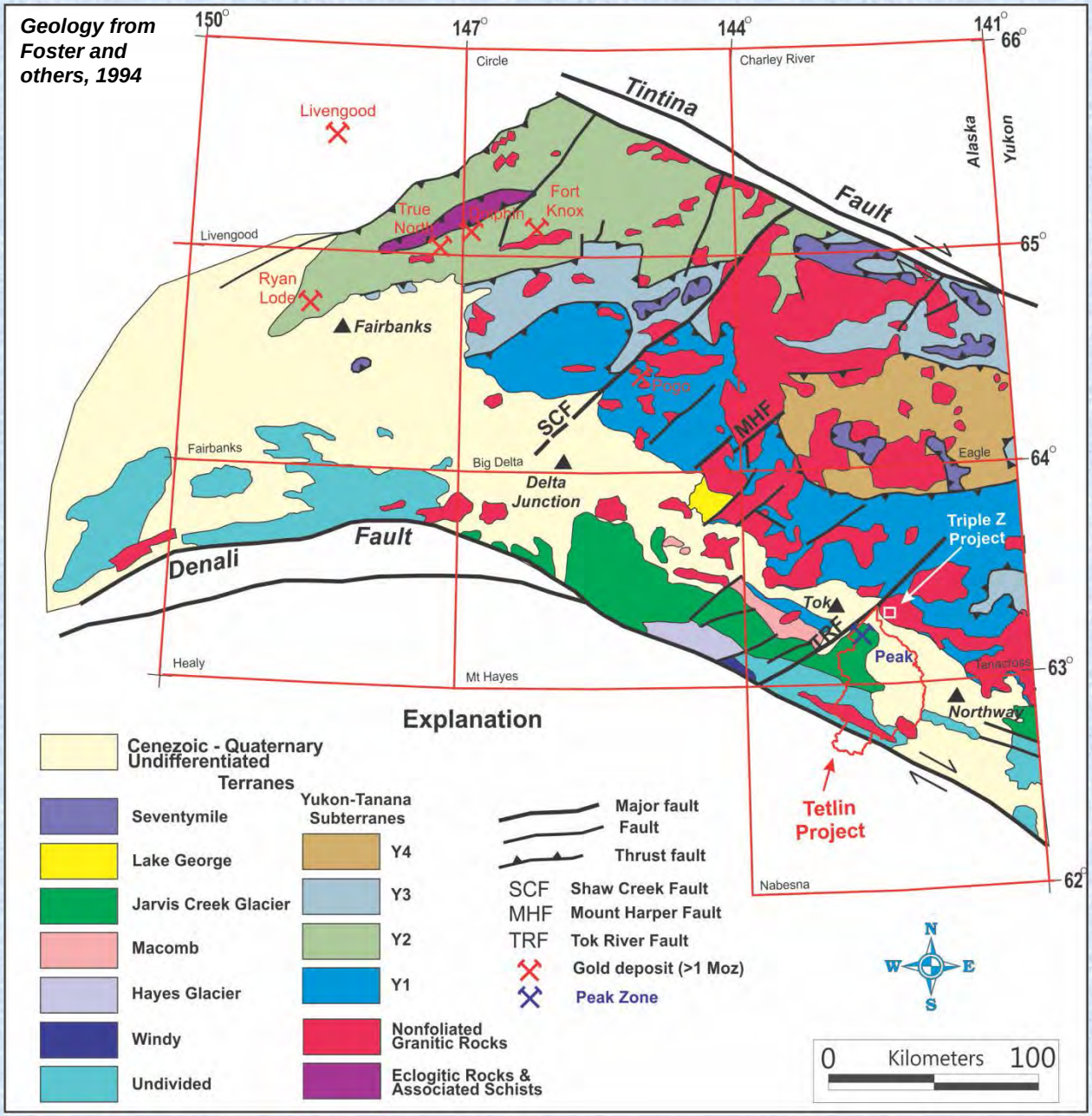
- 676,200 acres of fee simple land leased from Tetlin Village
- 83,720 acres State claims owned 100% by CORE
- Approximate 75% of CORE lands are prospective for mineral exploration
- Detailed exploration conducted on only 2.5% of prospective lands



Tintina Gold Belt

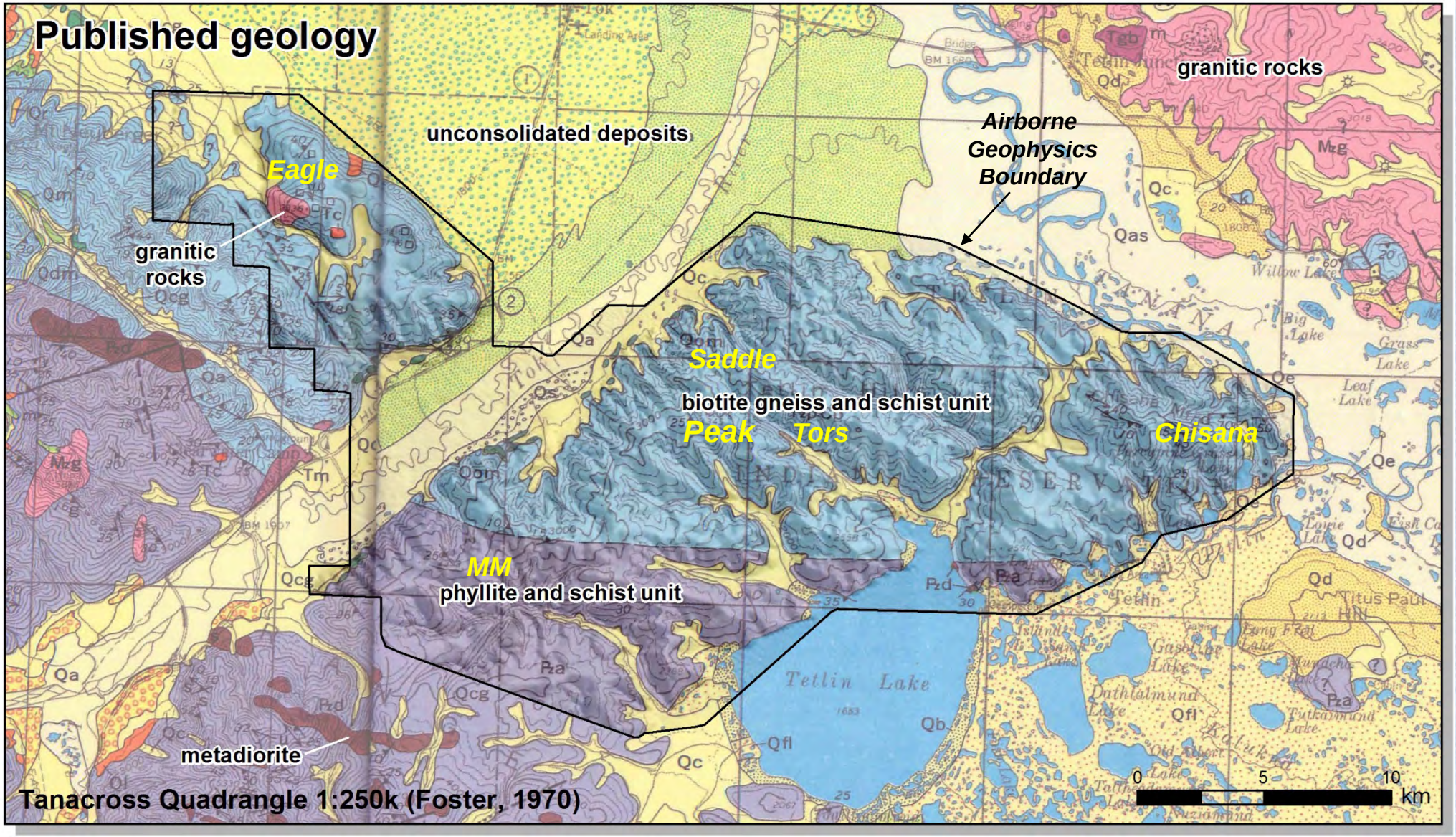
TETLIN PHYSIOGRAPHY

REGIONAL GEOLOGY

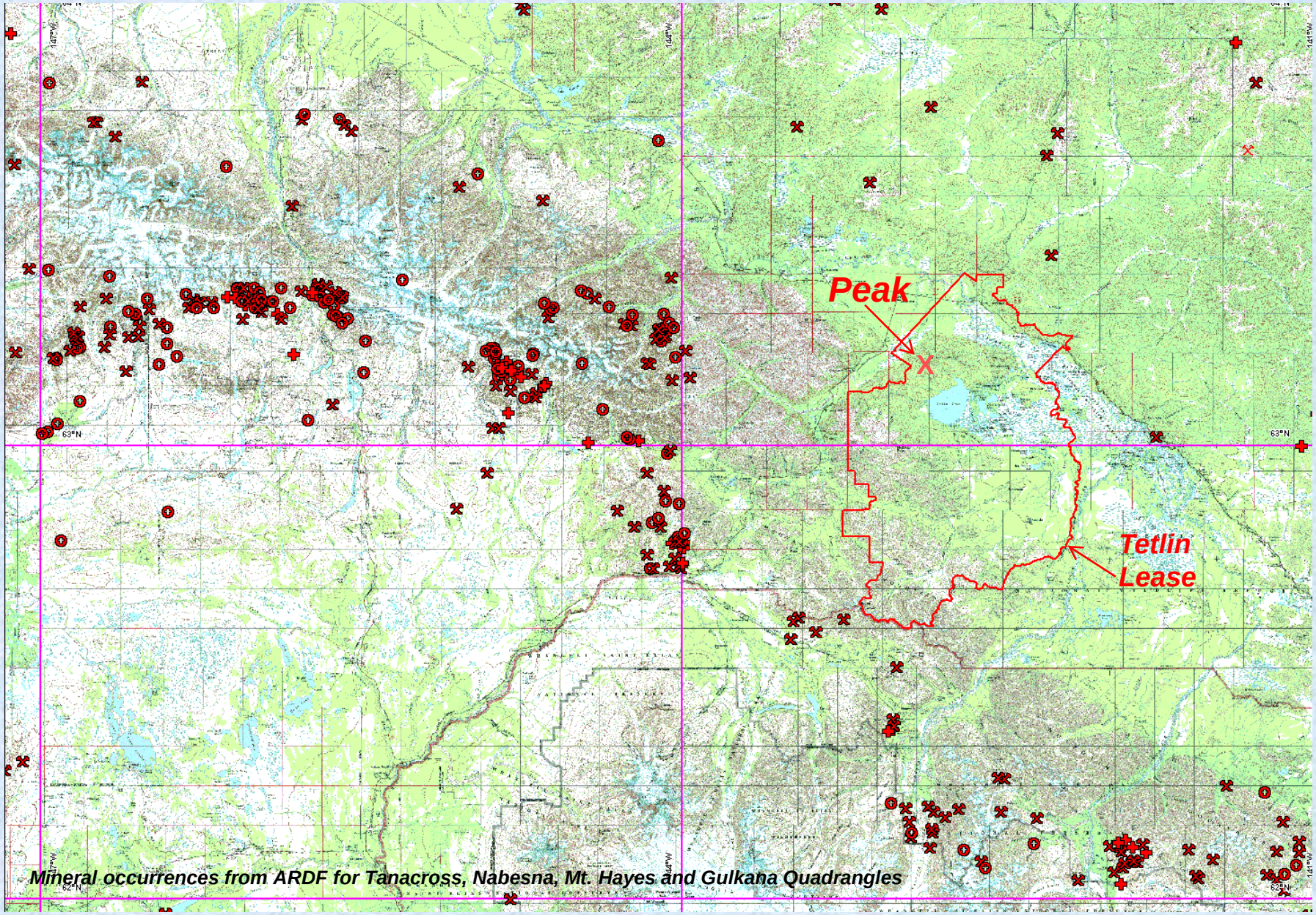


- PreCambrian to lower Paleozoic bedrock, poorly mapped
- Prominent NW and NE trending faults
- Small Cret-Tert? intrusives mapped
- Bedrock covered by Quaternary wind-blown silt
- Good exposure in south half, <5% natural bedrock in north half

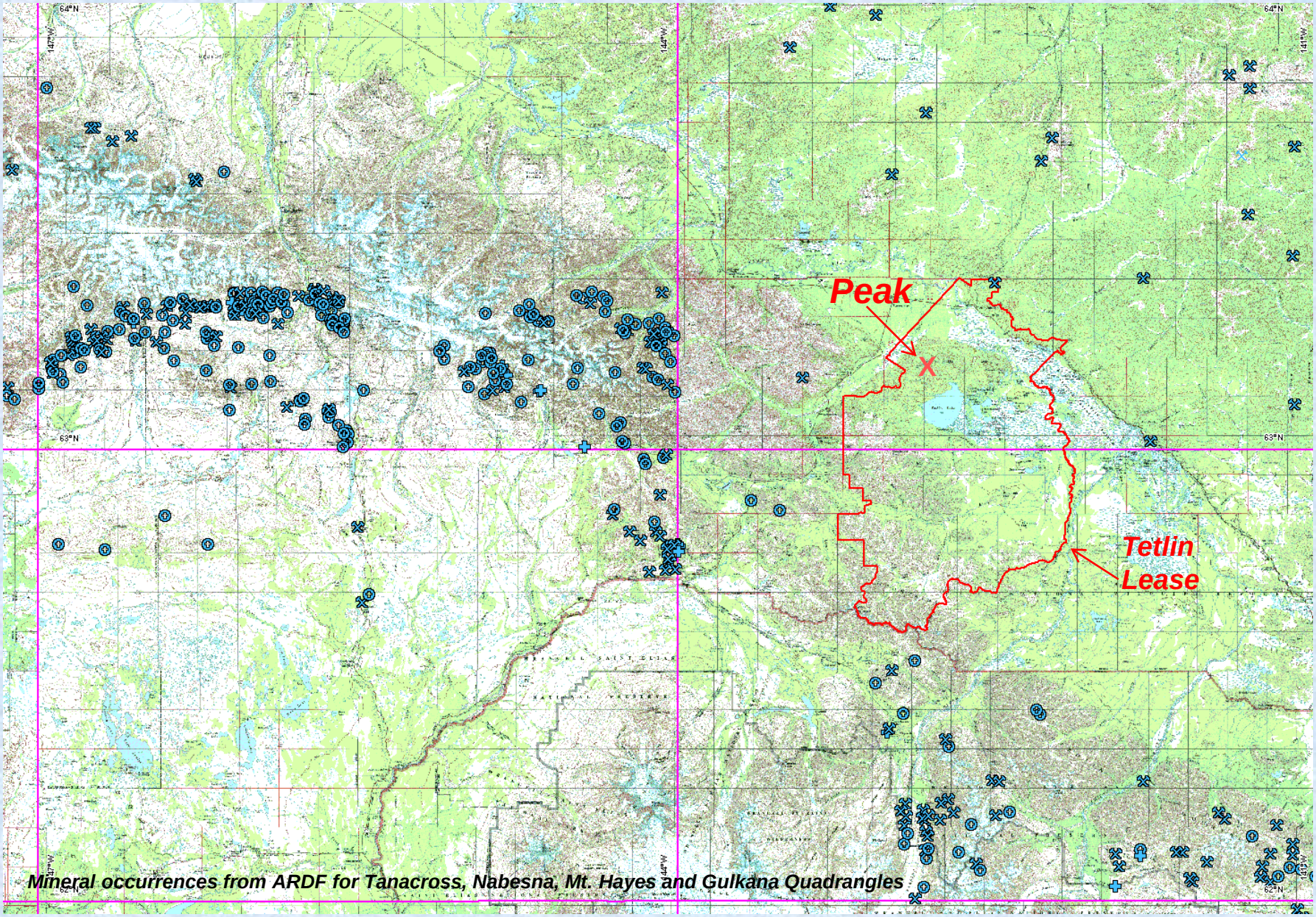
DISTRICT GEOLOGY



REGIONAL GOLD PROSPECTS

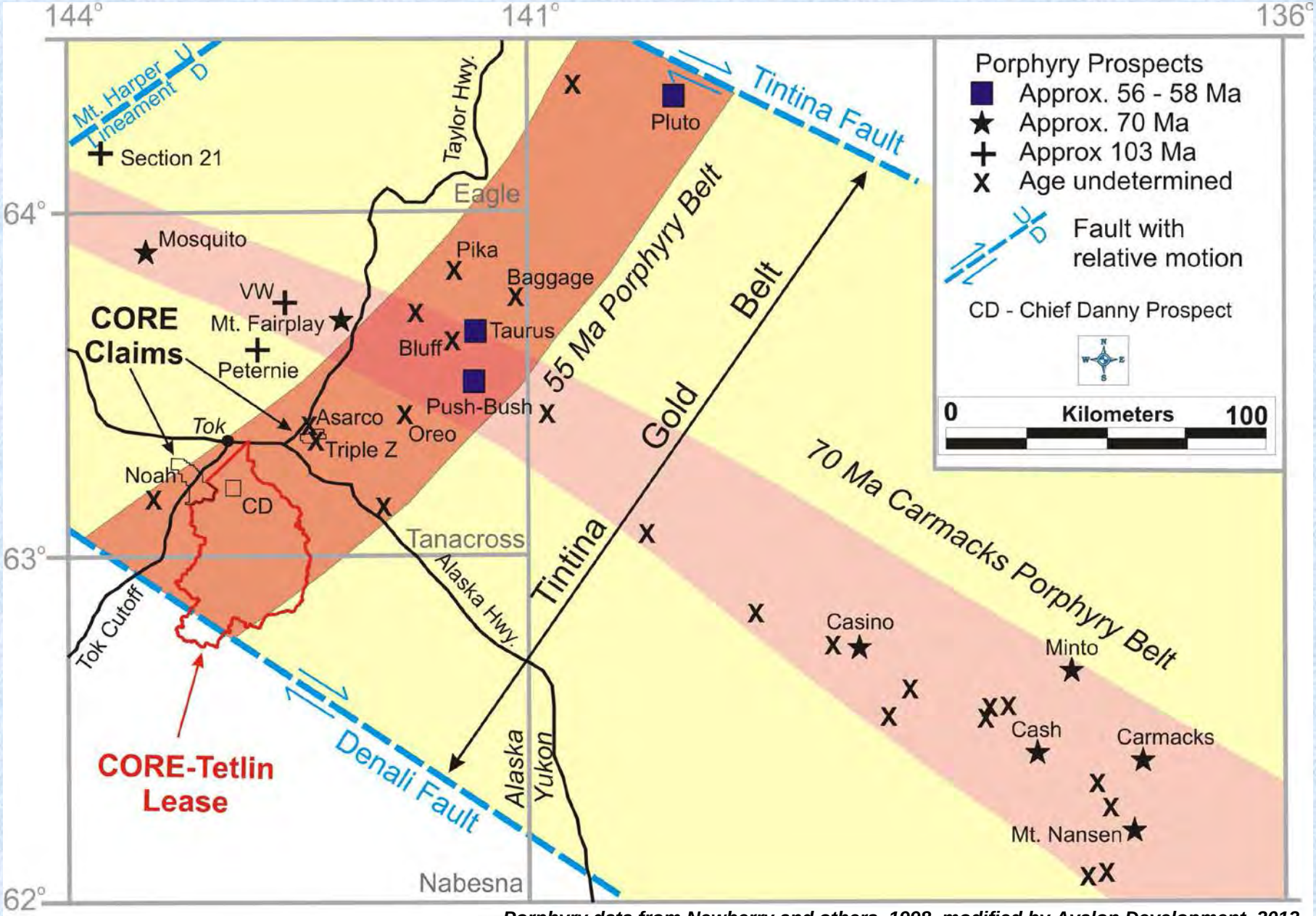


REGIONAL COPPER PROSPECTS



Mineral occurrences from ARDF for Tanacross, Nabesna, Mt. Hayes and Gulkana Quadrangles

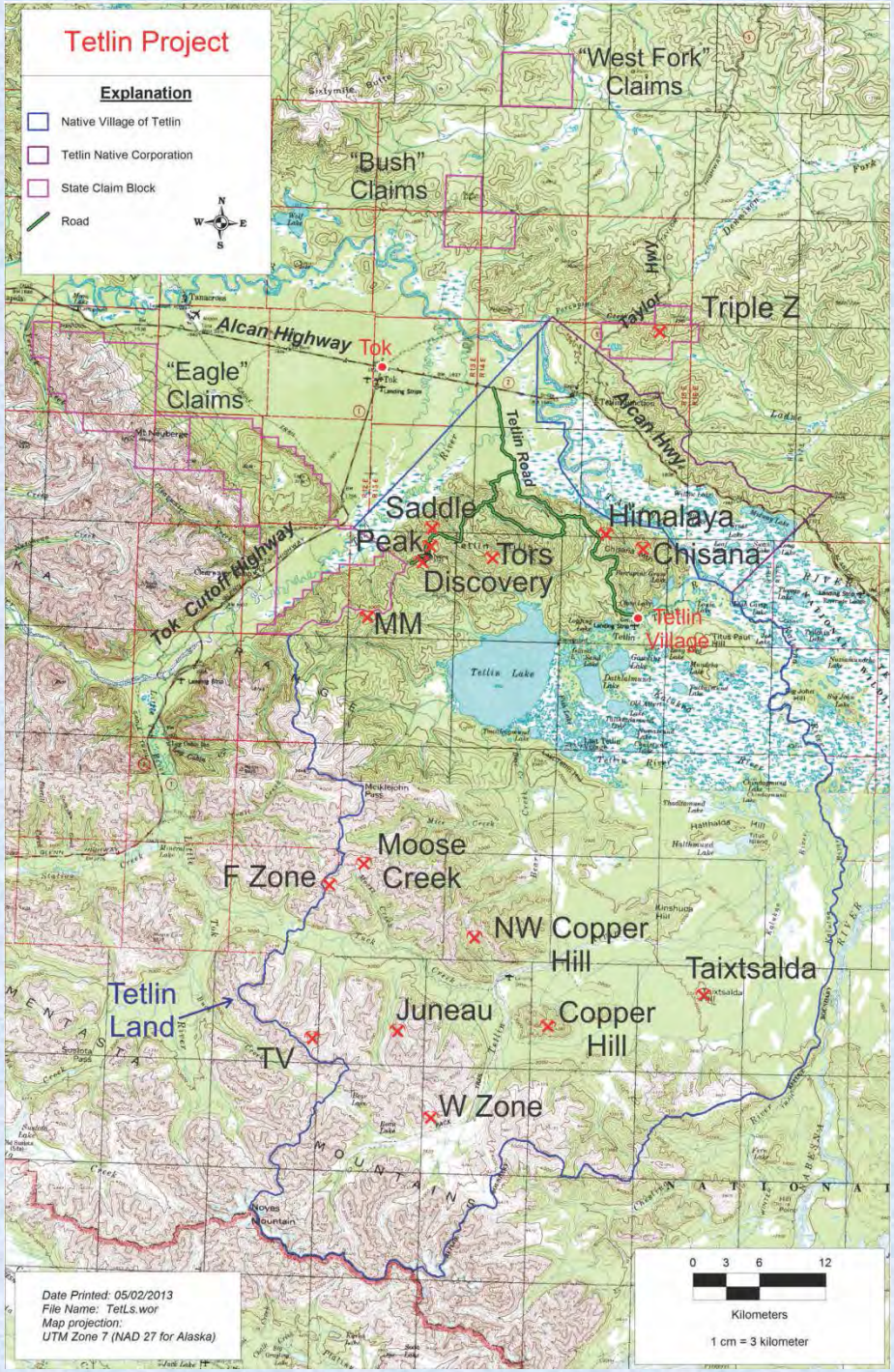
OVERLAPPING MINERAL BELTS



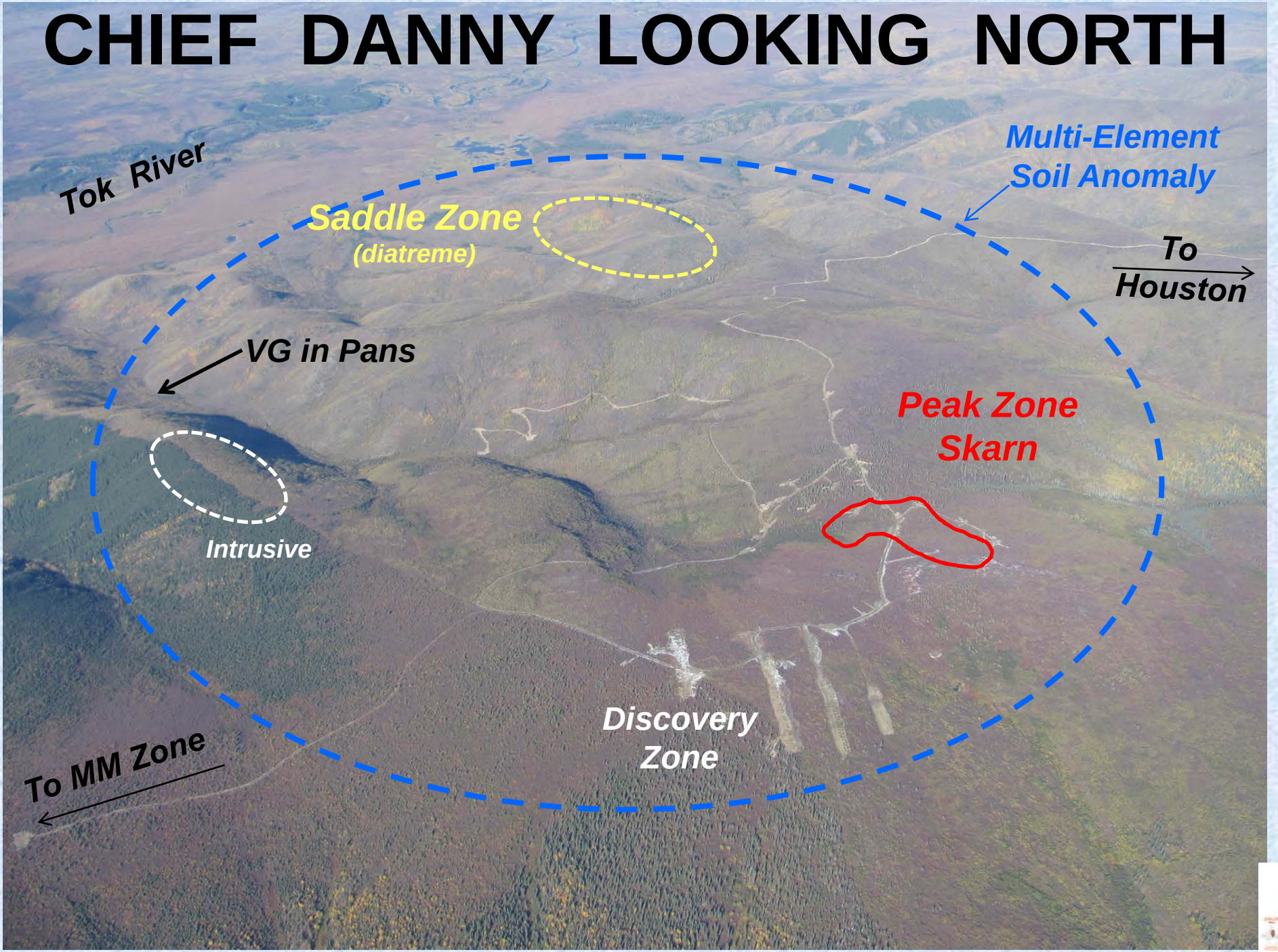
Porphyry data from Newberry and others, 1998, modified by Avalon Development, 2013

CHIEF DANNY HISTORY

- 2009: 2.15 gpt Au rock sample collected during pan con-stream sed sampling, rock sampling and trenching followed
- 2010: expanded by soil auger sampling to 2.5 square miles
- 2011: expanded by soil auger sampling to 12 sq mi; 5 of 11 holes (+8,000 ft) hit gold-silver-copper mineralization
- 2012: +36,000 feet of drilling, new high grade “Peak zone” skarn discovered
- 2013: +47,000 feet drilling, expanded Peak zone, first public resource estimate



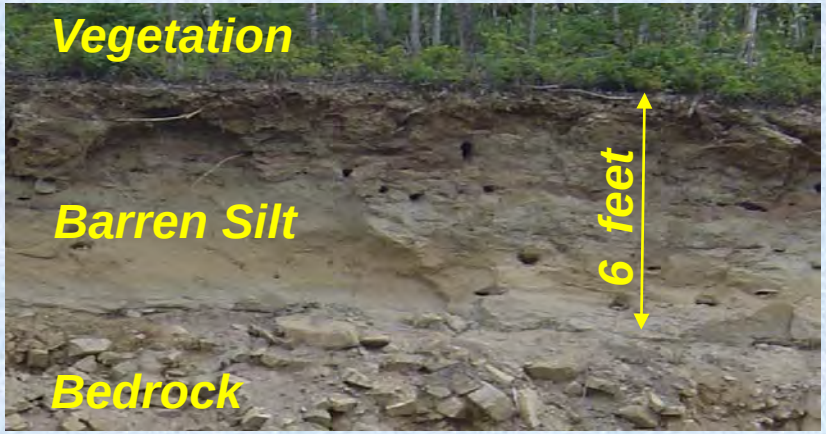
CHIEF DANNY LOOKING NORTH

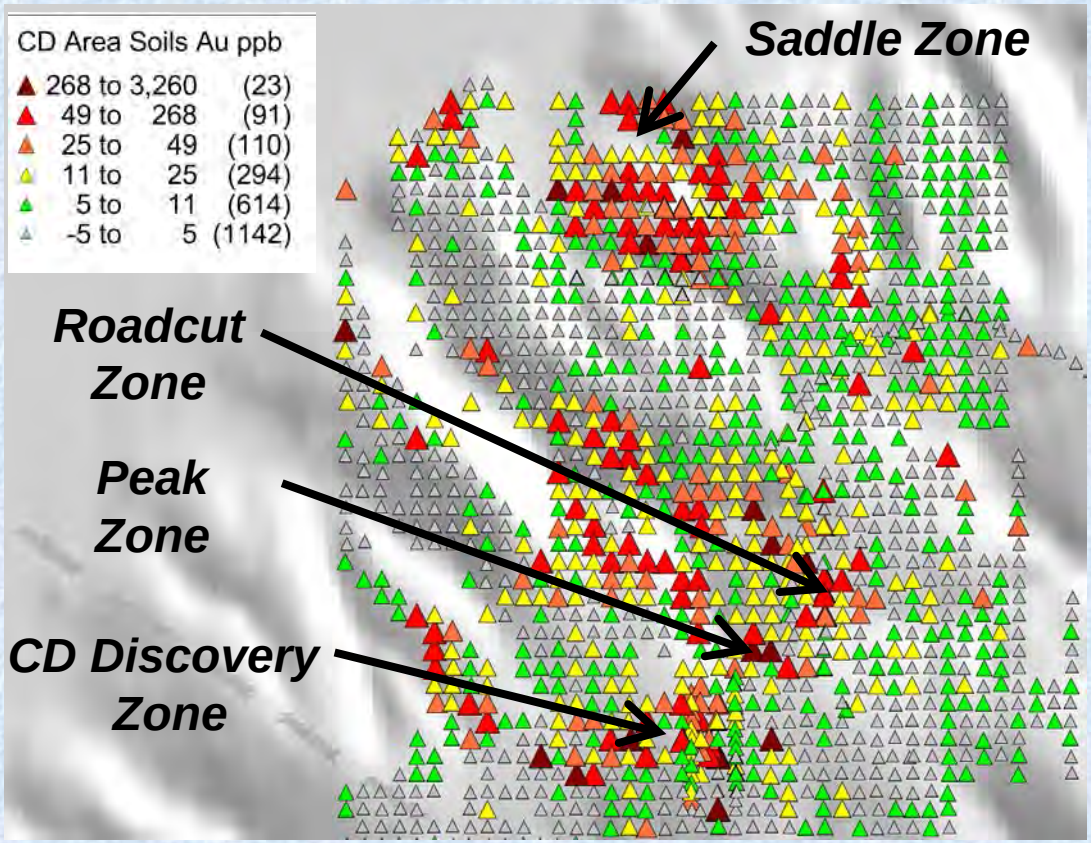


PEAK ZONE: NEW DISCOVERY

- **Discovery holes were targeted as linear Au-Cu soil anomaly with small IP resistivity low**
- **Drilling intercepted high grade gold and copper grades over 400 x 275 m area, from surface to over 250 m down dip, open E & W**
- **69 of 95 holes intercepted grade-thickness >1.5 gram-meters with maximum of 1,116 gm-m and average of 178 gm-m**
- **Gold hosted in skarn-altered carbonates, pyrrhotite dominant, with chalcopyrite, arsenopyrite and lesser pyrite with anomalous Ag, Bi, Co & sporadic anomalous Mo and Sn**

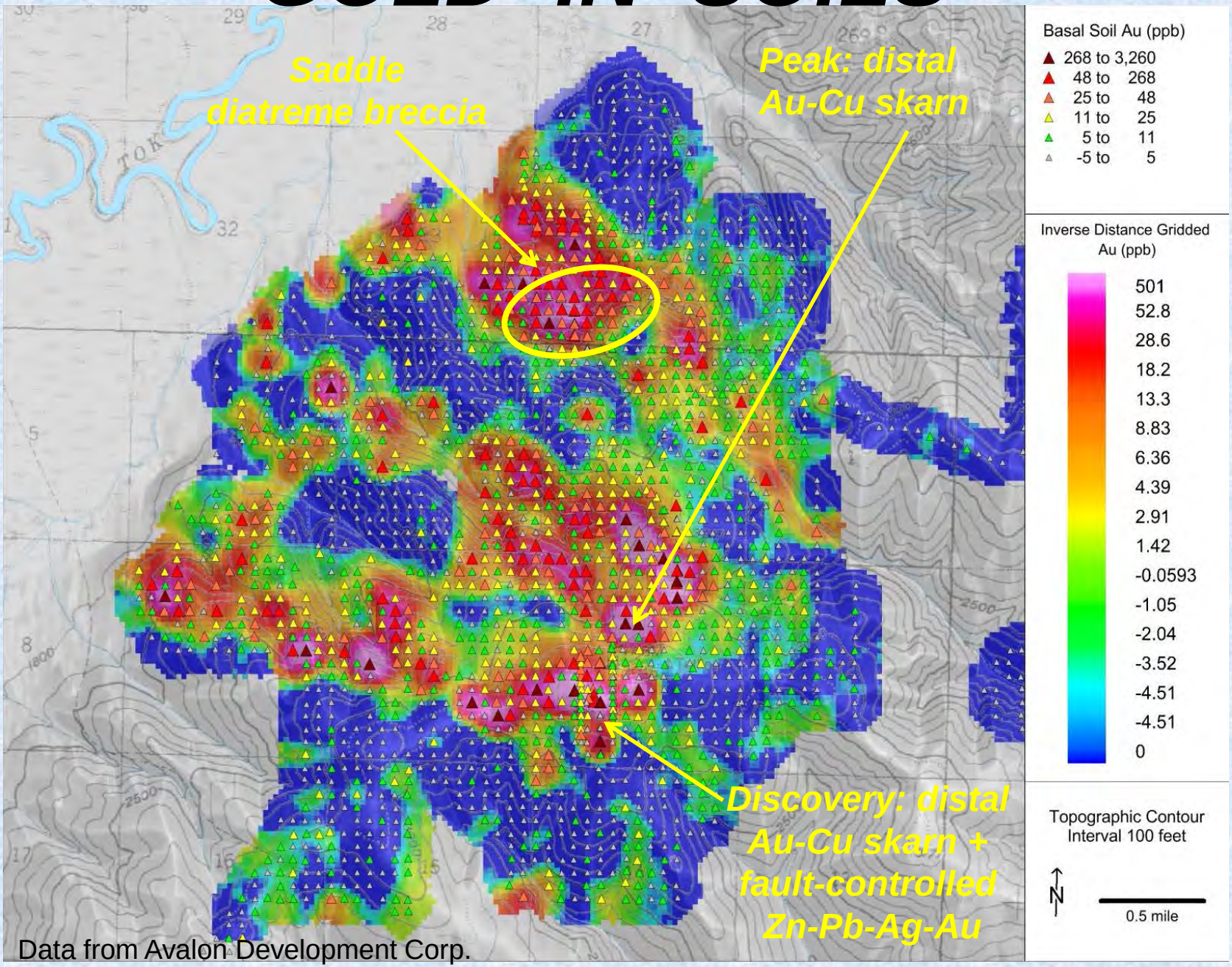
GOLD IN SOILS





- Percentile ranking used to accentuate higher values
- Several distinct northwest trending Au ± Cu anomalies
- NW and NE faults confirmed by geophysics
- Drilling results confirm soil sampling as a targeting tool

GOLD IN SOILS



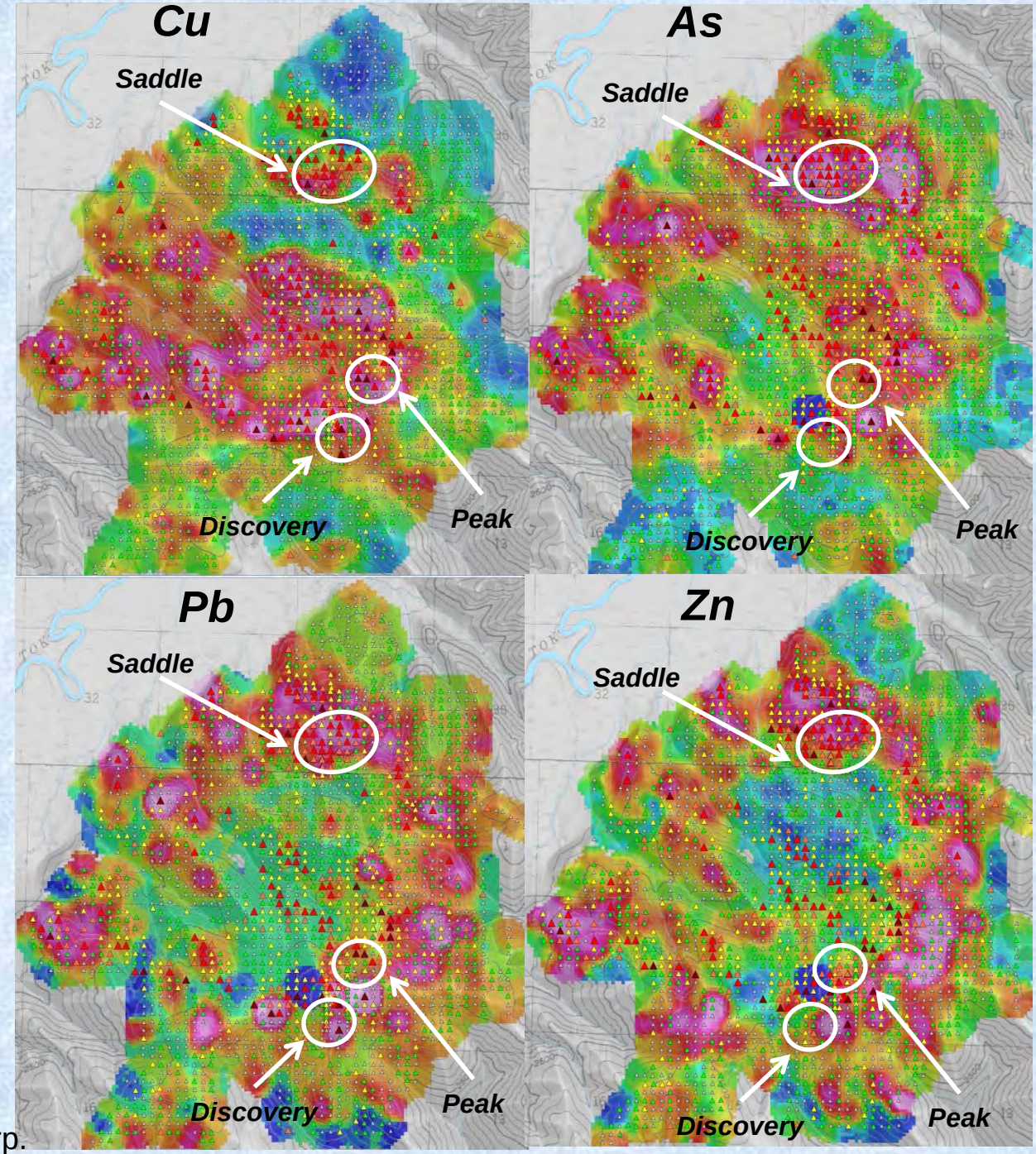
Data from Avalon Development Corp.

Elemental Zoning in Soils

Au/Cu core

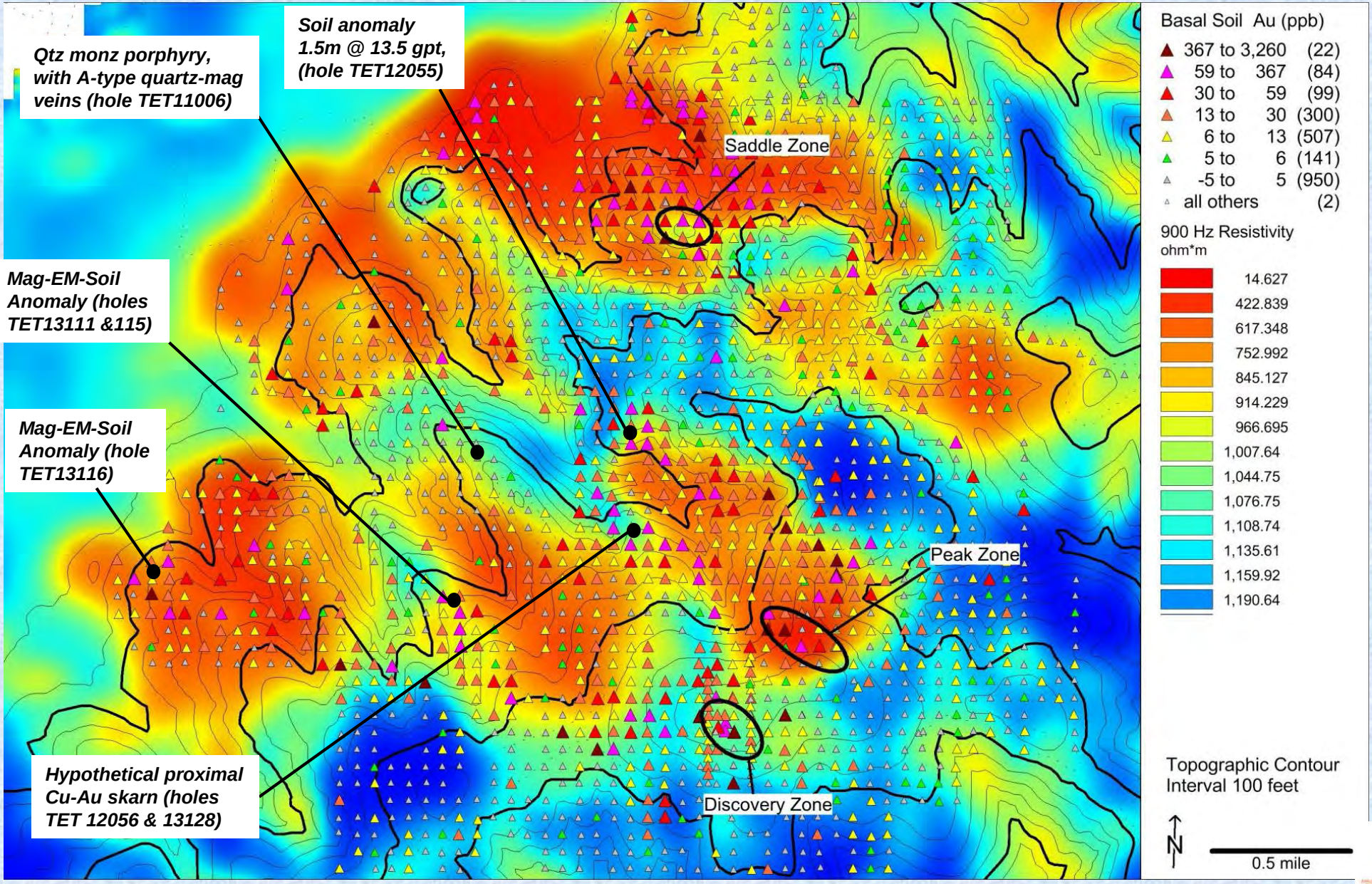
Pb/Zn periphery

Saddle Zone Breccia is Cu poor, As rich



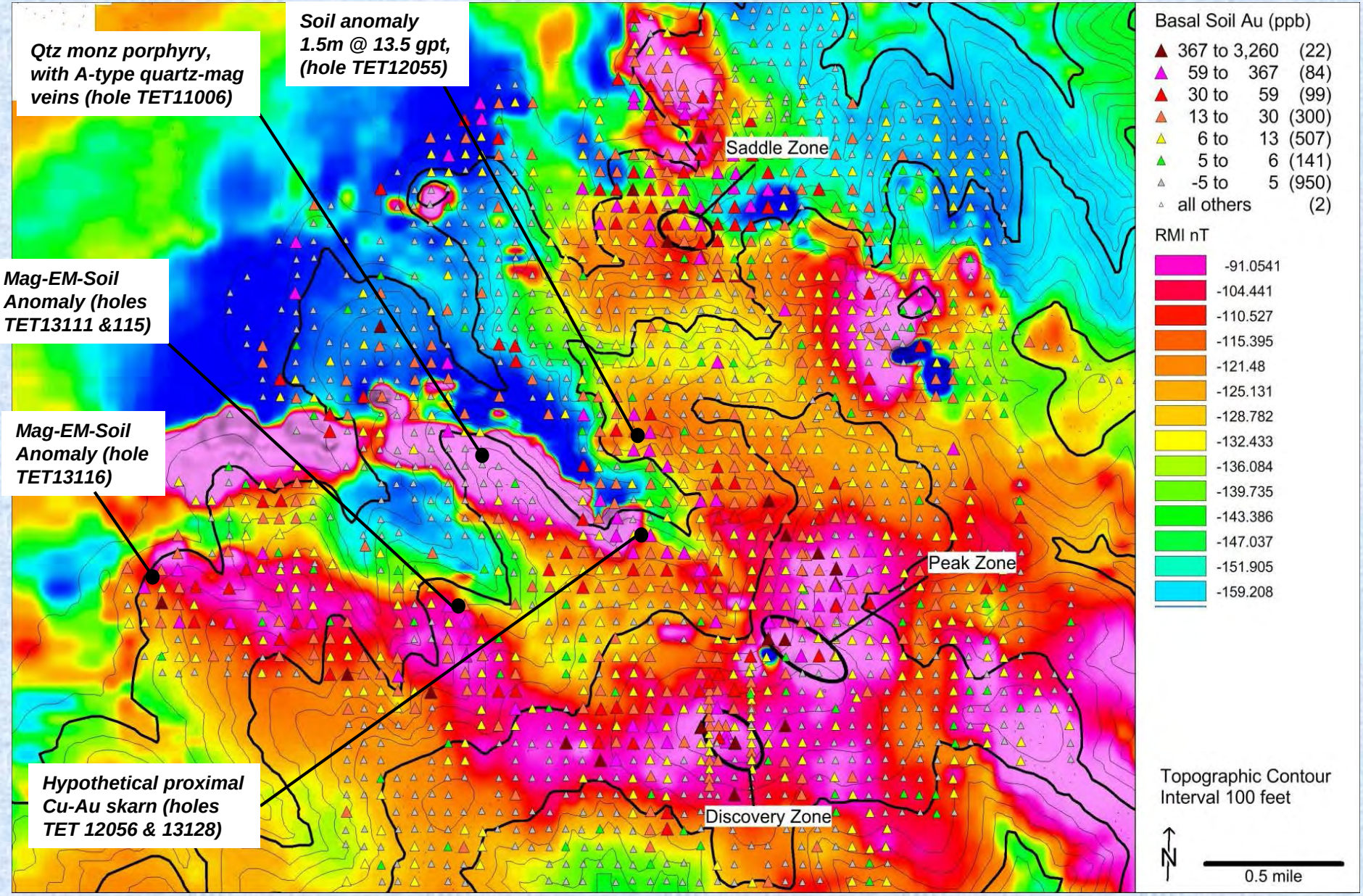
Data from Avalon Development Corp.

GOLD IN SOIL OVER CONDUCTIVITY



Data from Avalon Development Corp.

GOLD IN SOIL OVER MAGNETICS



Data from Avalon Development Corp.

DISCOVERY HOLE TET12016

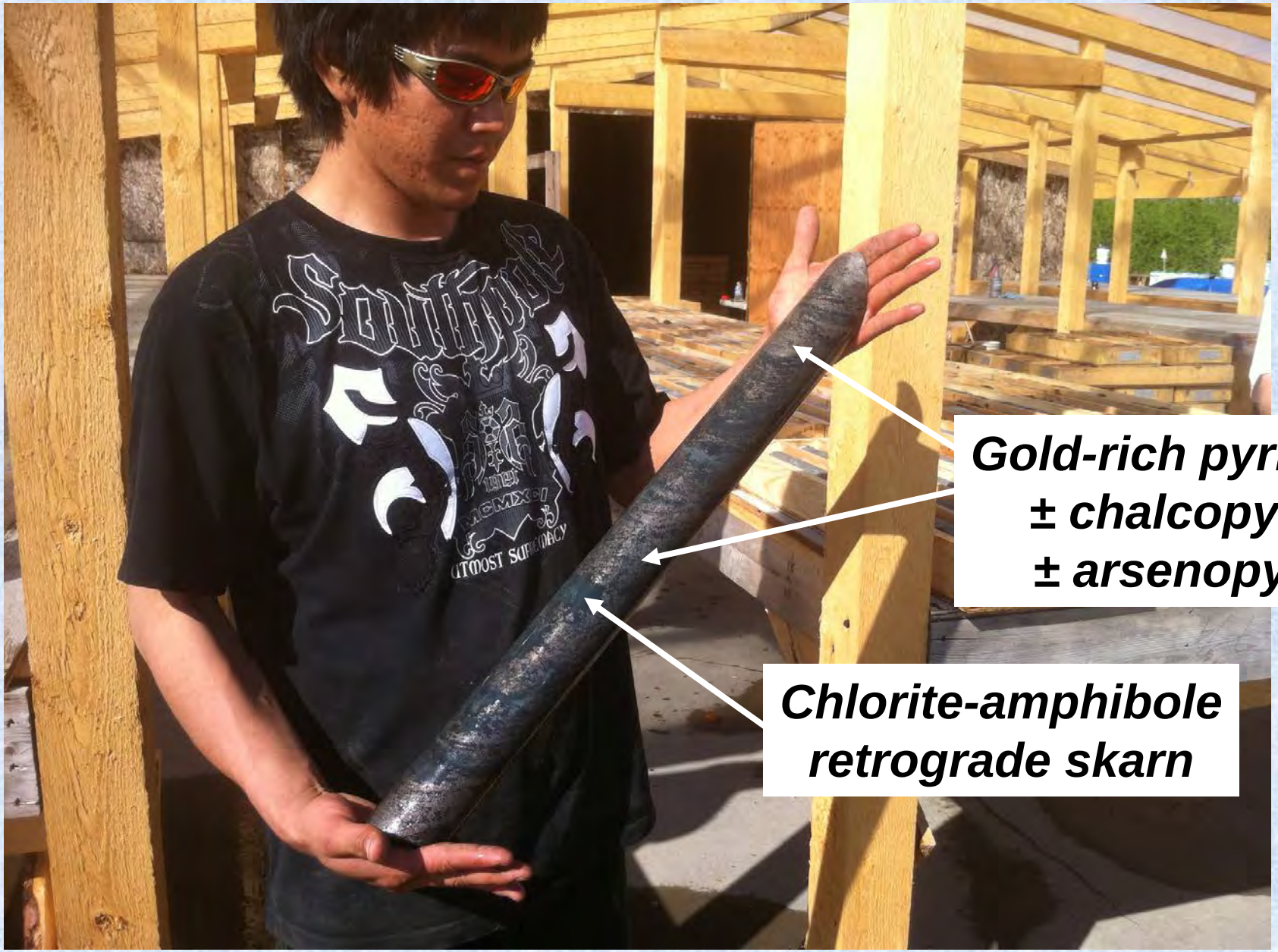
Photo by Avalon Development Corp.

PEAK ZONE DRILL INTERCEPTS 2012

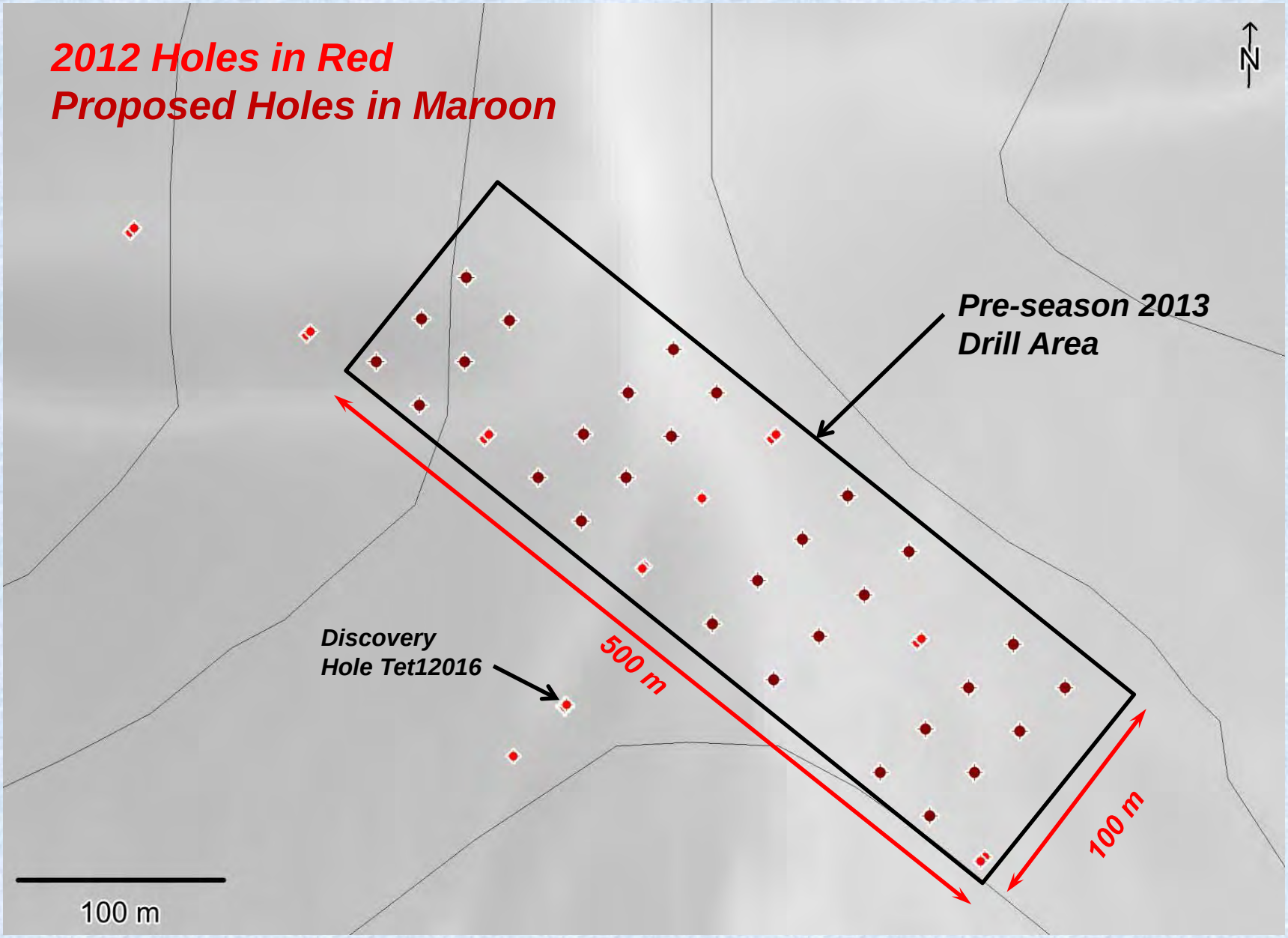
Hole #	Zone	From _m	To_m	Interval_m	Au_gpt	Au_opt	Ag_gpt	Cu_%	Gm x m
TET1216	Peak	20.0	45.7	25.8*	7.832	0.228	23.5	0.061	201.7
TET1216	Peak	53.3	60.0	6.7*	3.499	0.102	15.8	0.535	23.5
TET1216	Peak	64.6	78.3	13.7*	2.766	0.081	1.4	0.053	37.9
TET1216	Peak	81.4	114.0	32.6*	3.735	0.109	2.6	0.113	121.8
TET1217	Peak	7.9	57.0	49.1*	11.218	0.327	21.6	0.085	550.5
including	Peak	7.9	32.3	24.4*	19.677	0.574	16.9	0.082	479.8
TET1218	Peak	85.3	143.9	58.5	14.452	0.422	9.1	0.243	845.7
and	Peak	107.1	111.6	4.4	50.007	1.459	25.9	0.518	221.0
and	Peak	136.1	142.3	6.2	32.249	0.941	13.2	0.347	199.5
TET1219	Peak	44.2	80.5	36.3	2.589	0.076	3.3	0.086	93.9
TET1235	Peak	168.6	185.9	17.3	21.766	0.635	7.4	0.319	376.8
including	Peak	171.7	176.2	4.5	67.797	1.977	10.2	0.363	305.8
TET1236	Peak	155.4	204.2	48.8	14.717	0.429	10.1	0.244	717.7
TET1242	Peak	142.9	162.5	19.5	2.756	0.08	2.6	0.154	53.8
TET1244	Peak	96.3	103.9	7.6	3.273	0.095	0.8	0.013	24.9
TET1248	Peak	12.2	28.3	16.2	1.03	0.03	1.2	0.012	16.6
TET1257	Peak	151.2	167.0	15.8	2.07	0.06	16.9	0.521	32.8

Drilled parallel to mineralization

PEAK ZONE: 46 gpt INTERVAL



INITIAL 2013 DRILL PLAN

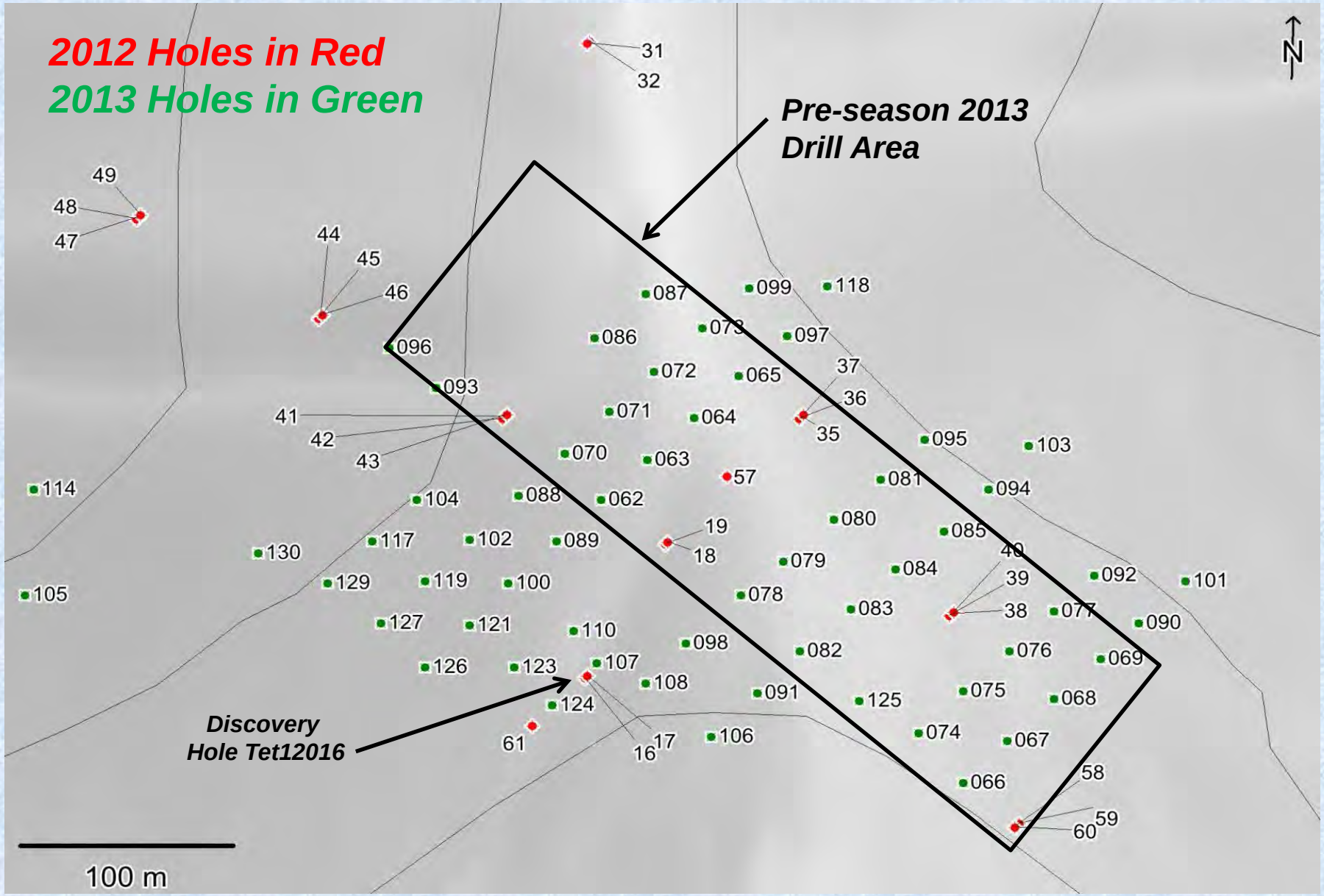


2013 OPERATIONAL METRICS

- **Wheel-mounted and fly drills at Chief Danny completed 47,079 feet of drilling in 69 holes (averaged 412 ft/day)**
- **Recon teams collected 368 recon samples over newly staked Eagle claims**
- **Auger teams collected 1,406 soil samples at Chief Danny, Tors, Chisana and recon**
- **All-in cost at the beginning of December was approximately $8.6 million, leaving ~$5 million for future needs**

PEAK ZONE LOOKING SOUTHEAST

2013 COMPLETED DRILL PLAN

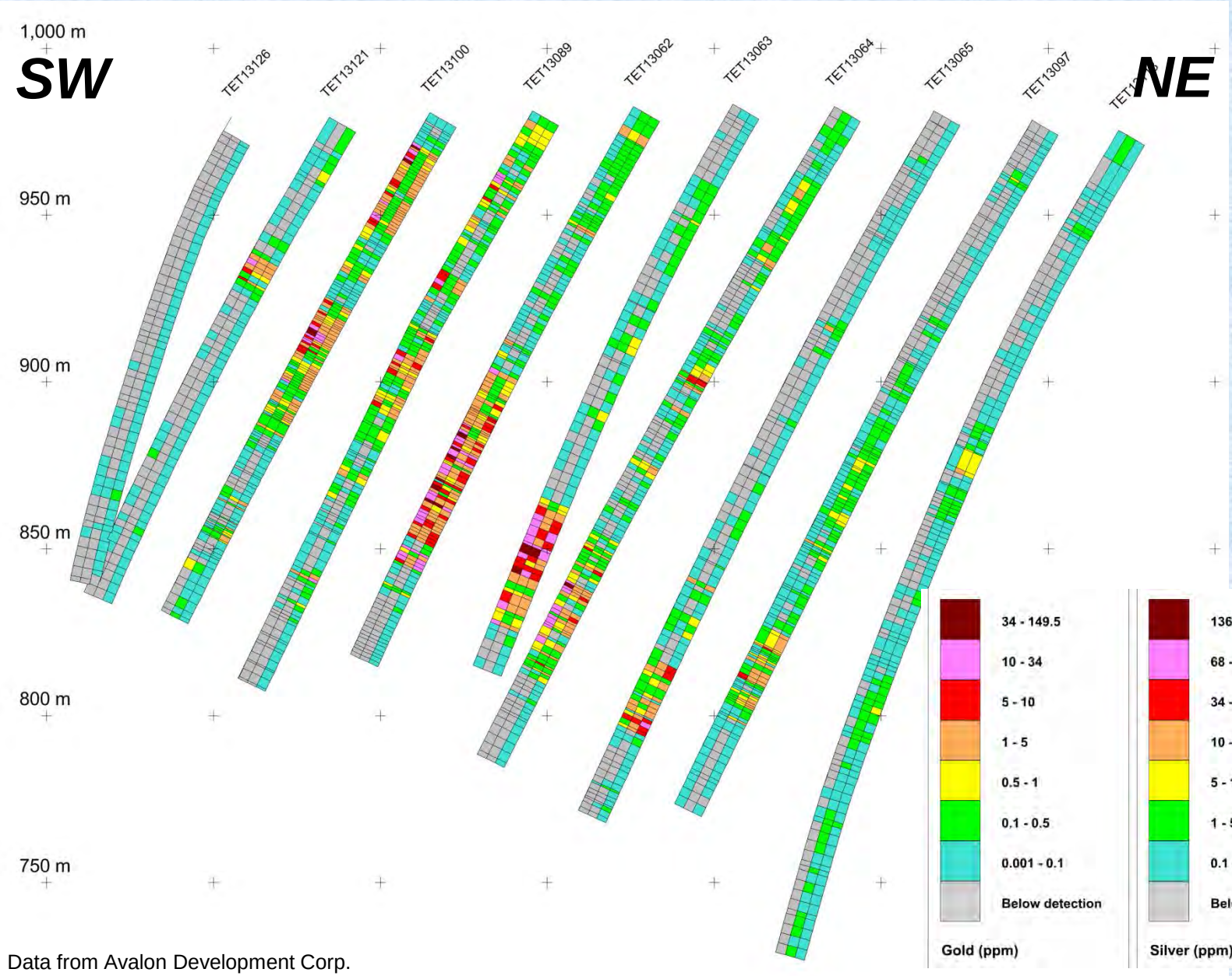


PEAK ZONE DRILL INTERCEPTS 2013

Hole #	From_m	To_m	Interval_m	Au_gpt	Au_opt	Ag_gpt	Cu_%	Gm x M
TET13107	0.00	159.25	159.25*	7.010	0.204	6.6	0.102	1116.3
TET13110	2.13	99.06	96.93	9.060	0.264	4.3	0.093	878.2
TET13062	88.90	153.70	64.80	13.101	0.382	21.0	0.482	848.9
TET13063	131.11	171.60	40.49	16.550	0.483	36.1	0.732	670.1
TET13117	0.00	134.82	134.82	4.848	0.141	2.9	0.084	653.6
TET13100	10.98	106.90	95.92	5.748	0.168	6.9	0.140	551.3
TET13088	19.18	157.20	138.02	3.626	0.106	11.4	0.113	500.5
TET13124	33.22	168.72	135.50	3.240	0.095	3.6	0.115	439.0
TET13098	9.75	94.18	84.43	4.988	0.145	16.7	0.167	421.1
TET13064	147.20	191.40	44.20	8.464	0.247	5.5	0.169	374.1
TET13104	0.00	142.60	142.60	2.529	0.074	2.4	0.082	360.6
TET13082	5.79	93.38	87.59	4.025	0.117	19.3	0.300	352.5
TET13089	2.74	101.60	98.86	2.500	0.073	3.5	0.093	247.2
TET13079	120.04	157.89	37.85	4.366	0.127	3.7	0.203	165.3
TET13084	134.95	160.33	25.38	5.086	0.148	9.0	0.244	129.1
TET13085	130.13	175.16	45.03	2.740	0.080	69.5	1.401	123.4
TET13080	135.41	157.38	21.97	5.378	0.157	2.7	0.070	118.2

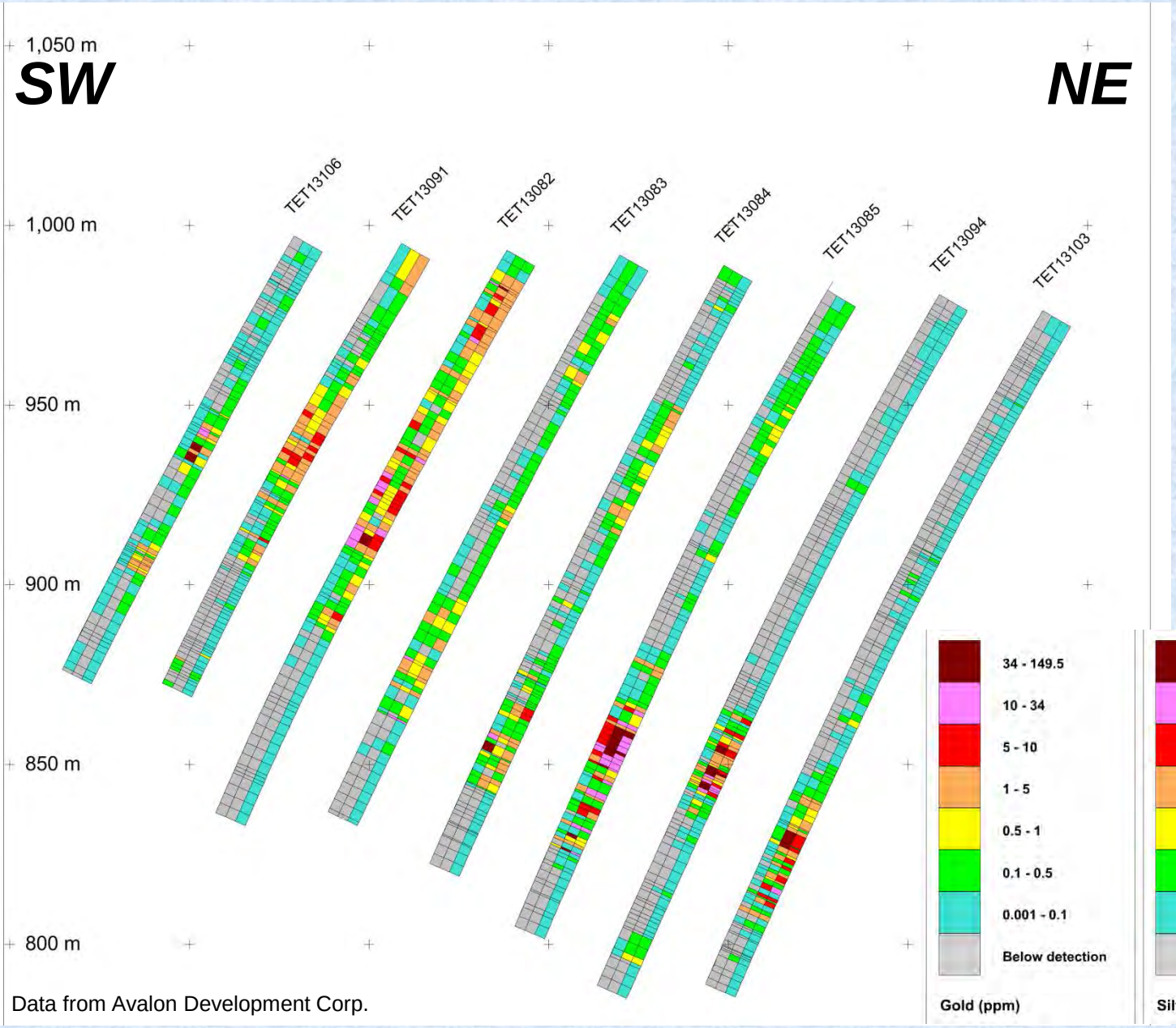
Drilled parallel to mineralization

PEAK ZONE – GOLD AREA



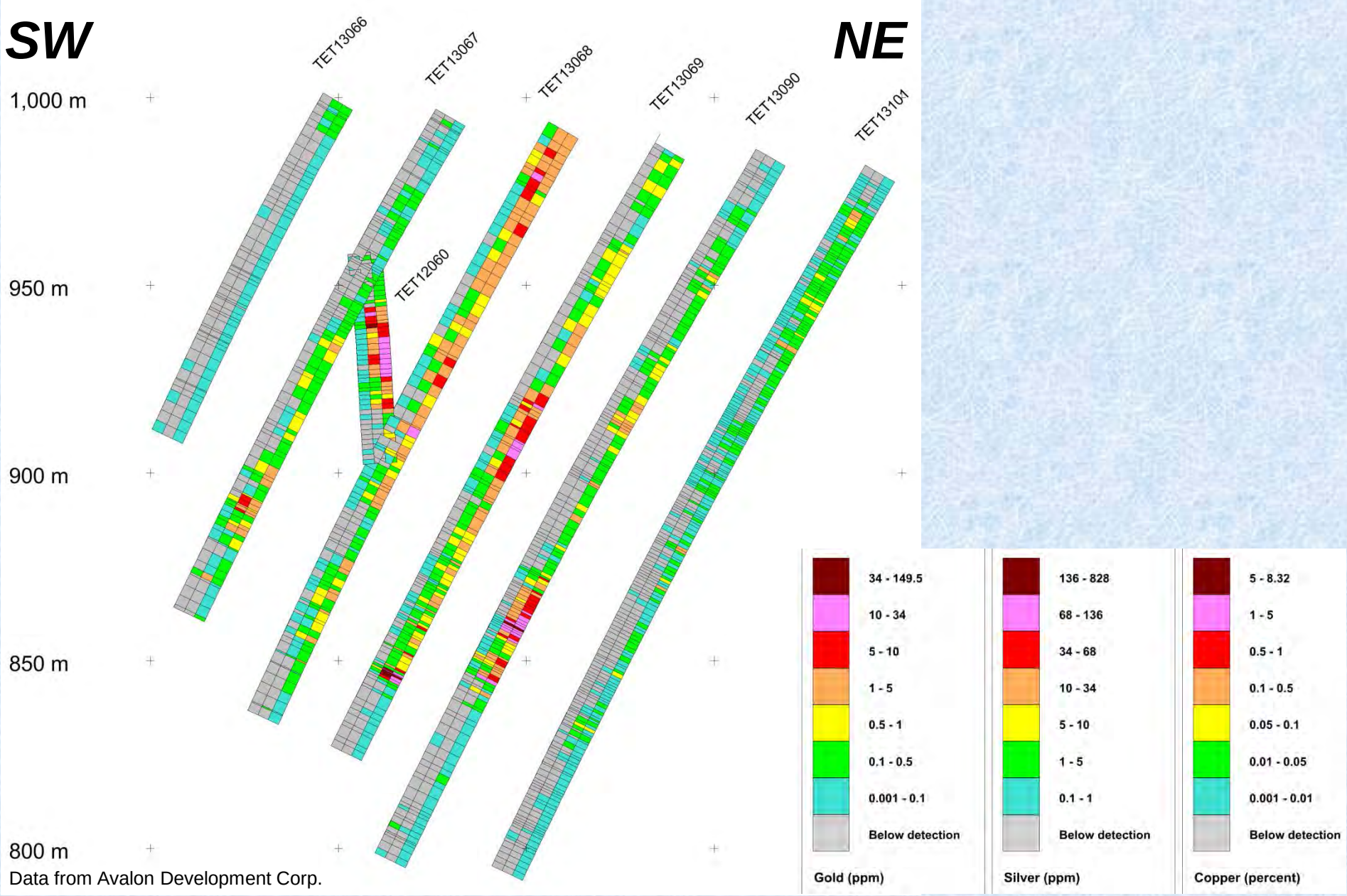
Data from Avalon Development Corp.

PEAK ZONE – TRANSITION AREA



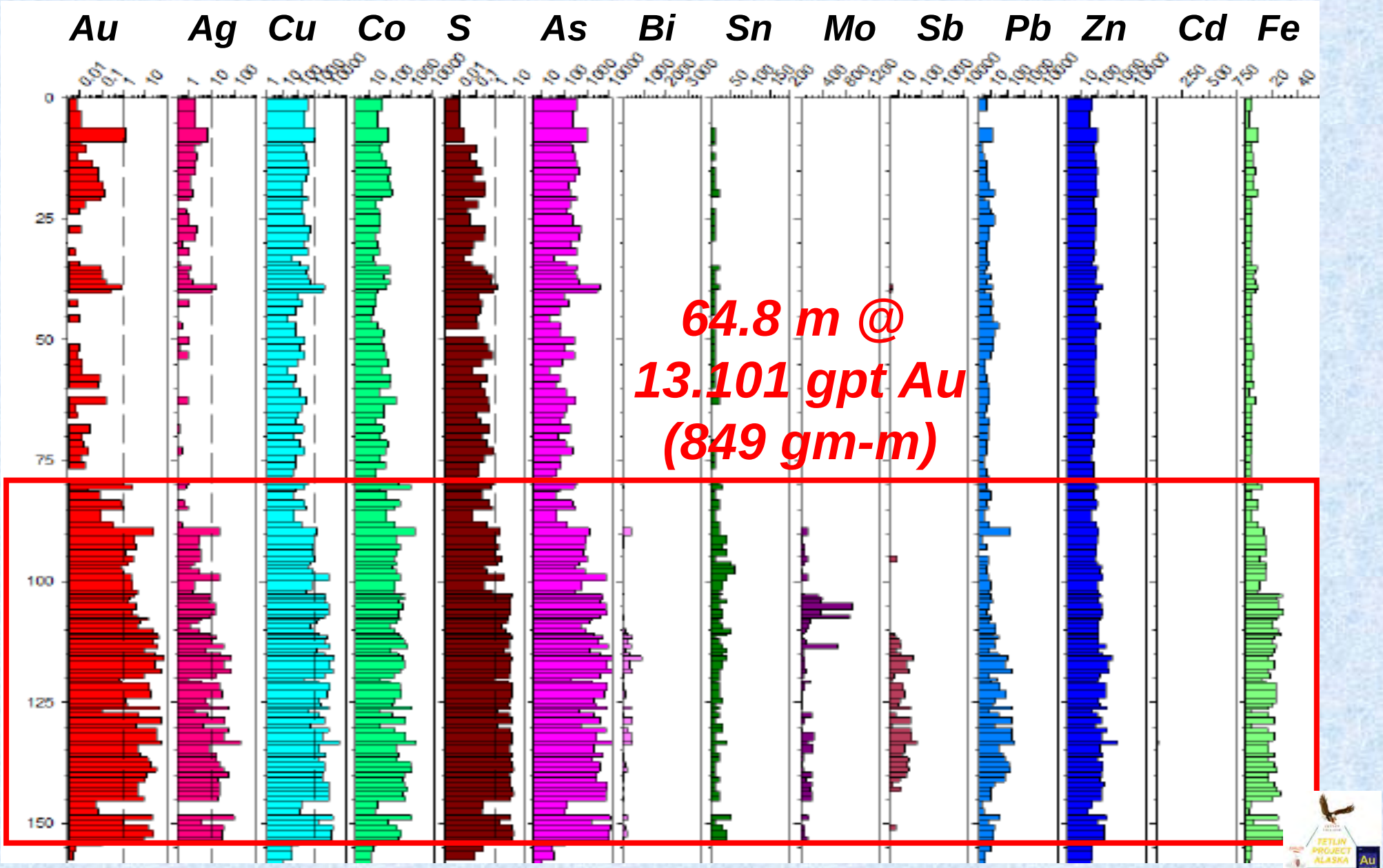
Data from Avalon Development Corp.

PEAK ZONE – COPPER AREA

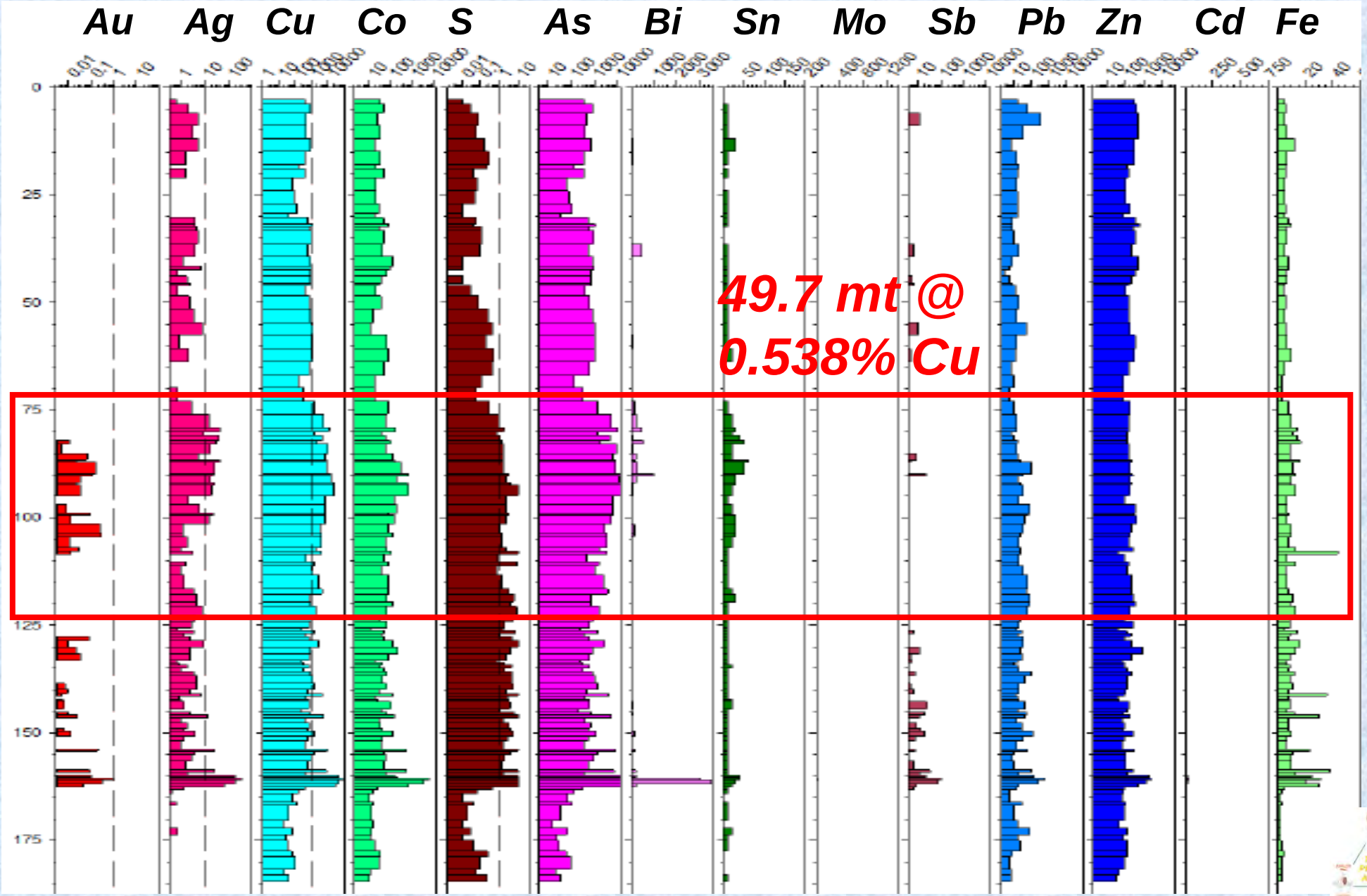


Data from Avalon Development Corp.

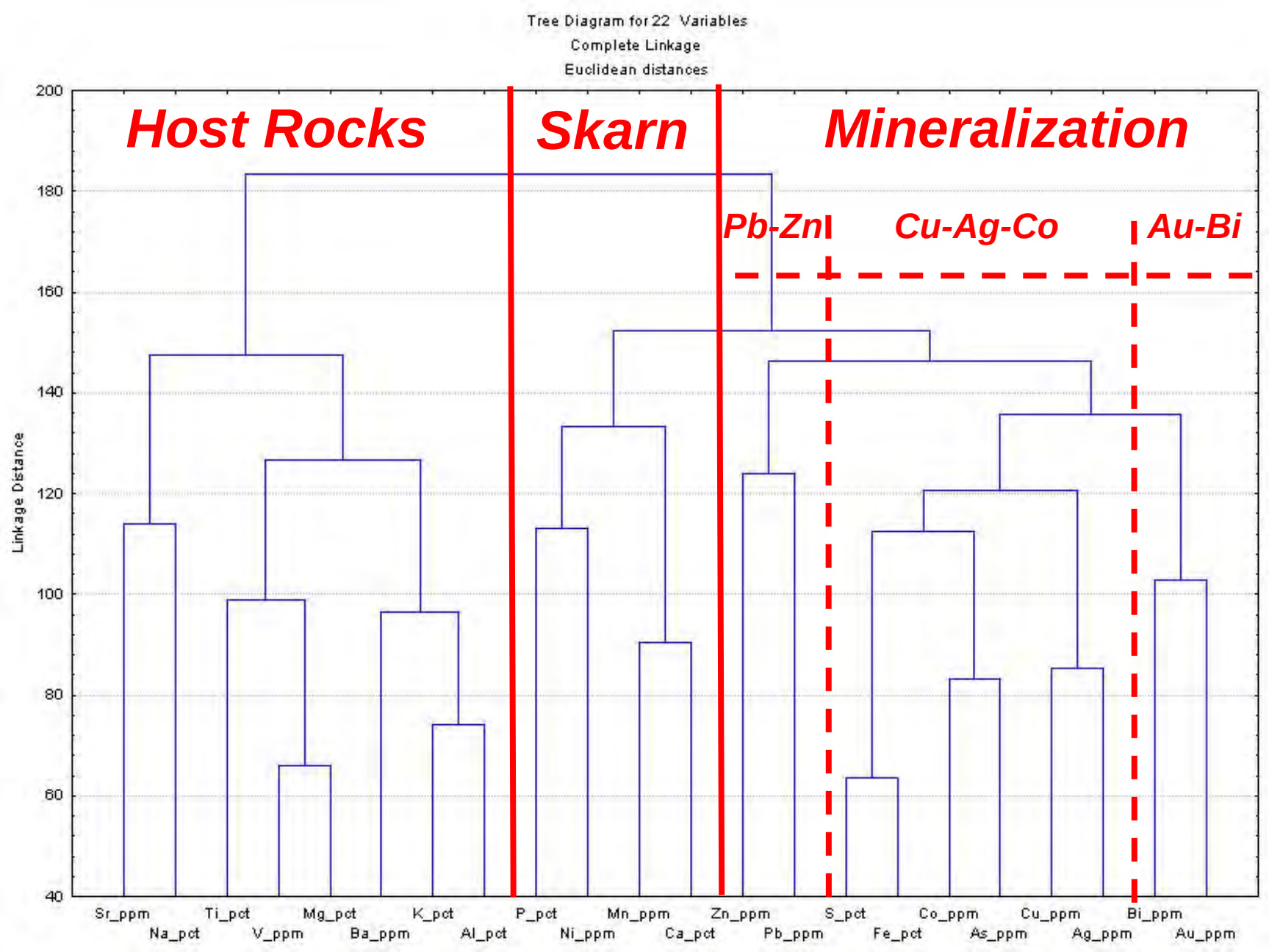
TET1362 MULTI - ELEMENT PLOT



TET1369 MULTI - ELEMENT PLOT



DRILL CORE FACTOR ANALYSIS



SKARN TEXTURES

Massive pyrrhotite with retrograde chlorite + amphiboles

"Cuniform" textured pyrrhotite

Very coarse-grained pyrrhotite + chalcopyrite + arsenopyrite

Data from Avalon Development Corp.

PRIMARY TEXTURES

VCG Massive Sulfide

Saddle Zone Breccia

Cataclastic Massive Sulfide

Data from Avalon Development Corp.

OXIDATION ZONE FEATURES

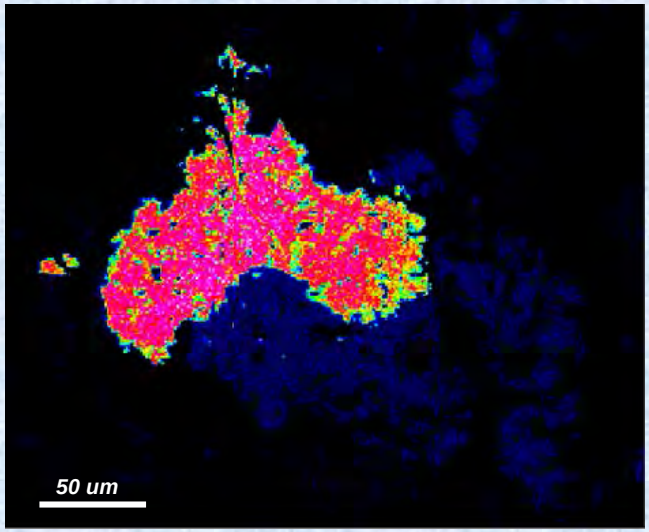
Malachite on fracture

FeOx + Native Copper

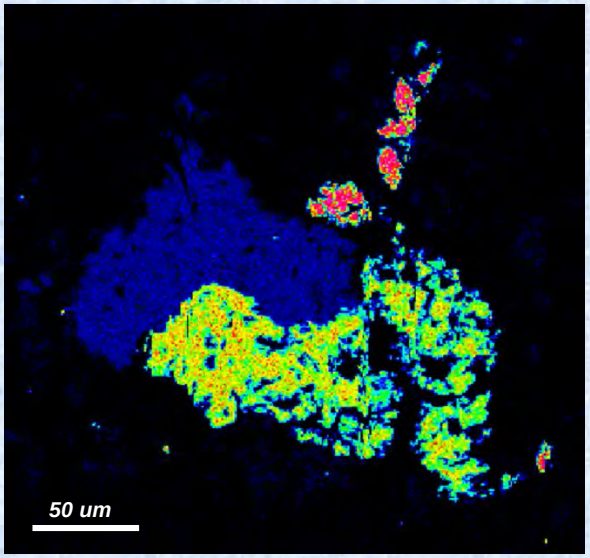
Contact between sulfides and "sponge rock" boxwork

Data from Avalon Development Corp.

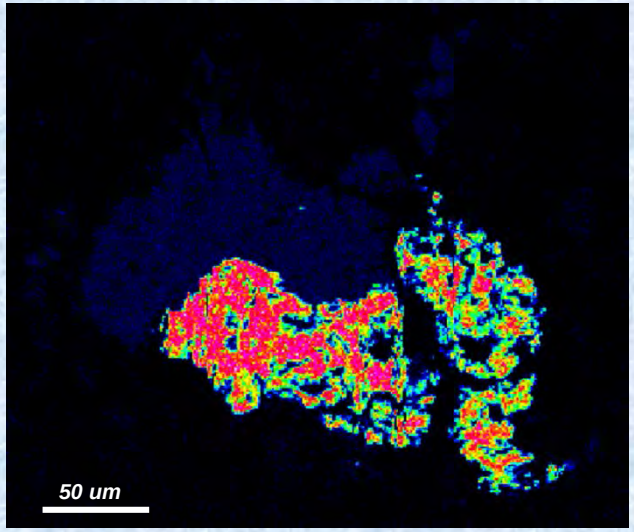
PEAK ZONE ELEMENTAL MAPPING



Native Gold



Bismuth



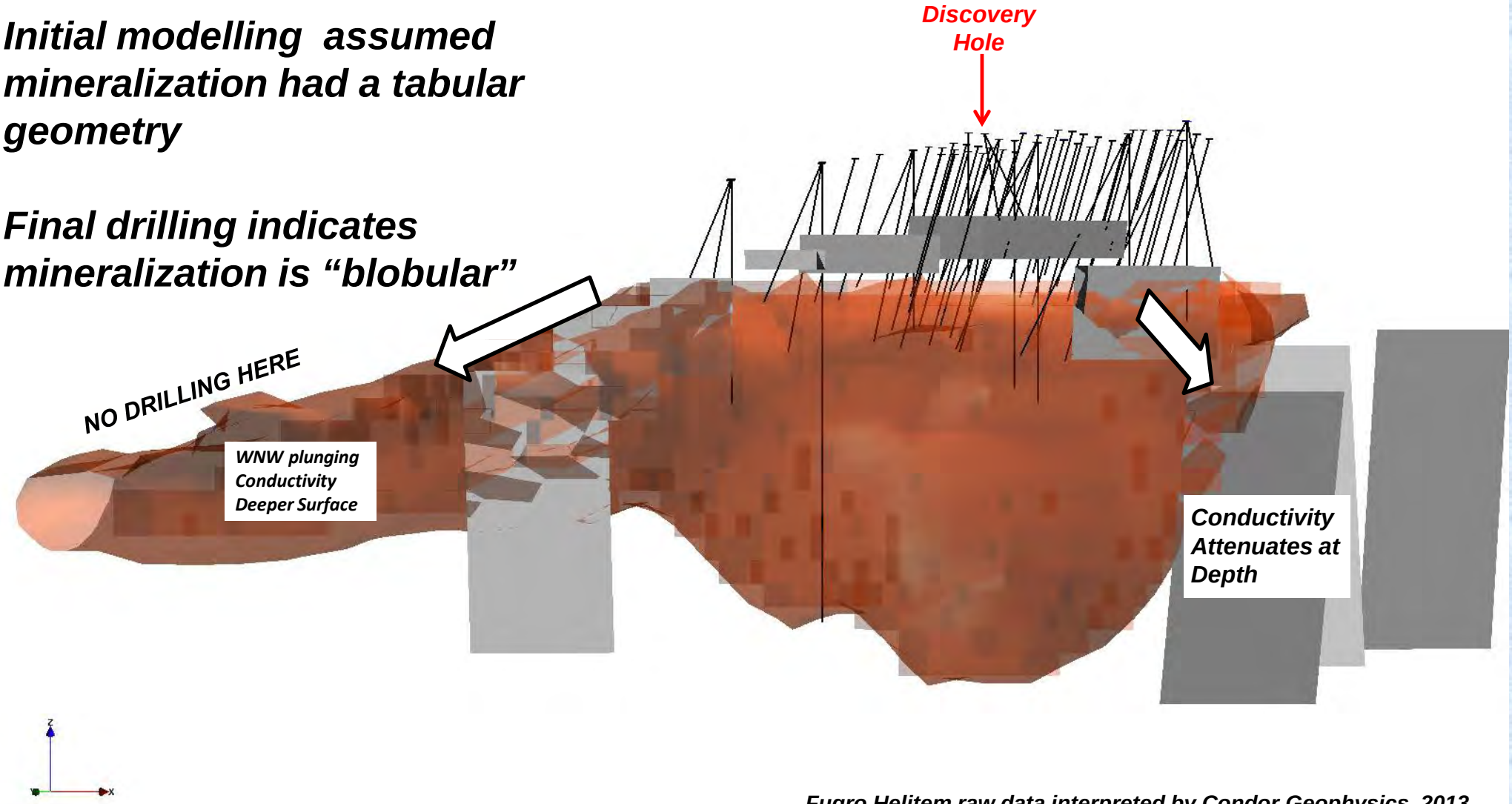
Tellurium

Microprobe data from Peter Illig, 2013

3D HELITEM CONDUCTIVITY MODEL

Initial modelling assumed mineralization had a tabular geometry

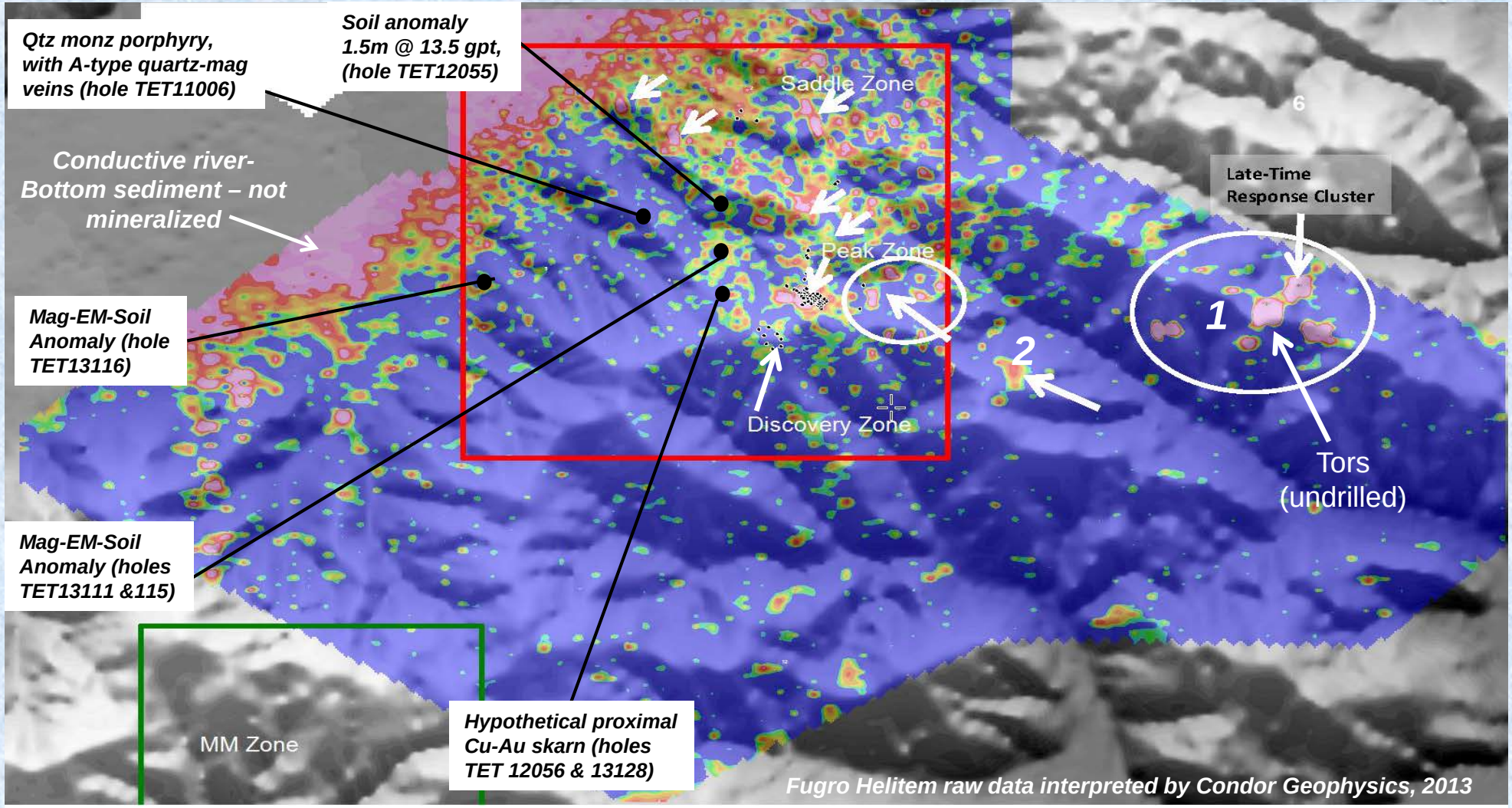
Final drilling indicates mineralization is "blobular"



Fugro Helitem raw data interpreted by Condor Geophysics, 2013

Peak Zone, HELITEM Conductivity Models and Existing Holes Imbedded in Higher Threshold Inversion Model Conductivity Surface. View looking north-northeast. Data from Condor Geophysics.

High conductivity areas in the Helitem channel 25 airborne geophysical survey



(conductive zones in red/hot pink, resistive zones in blue)

INDEPENDENT EXPERT OPINION

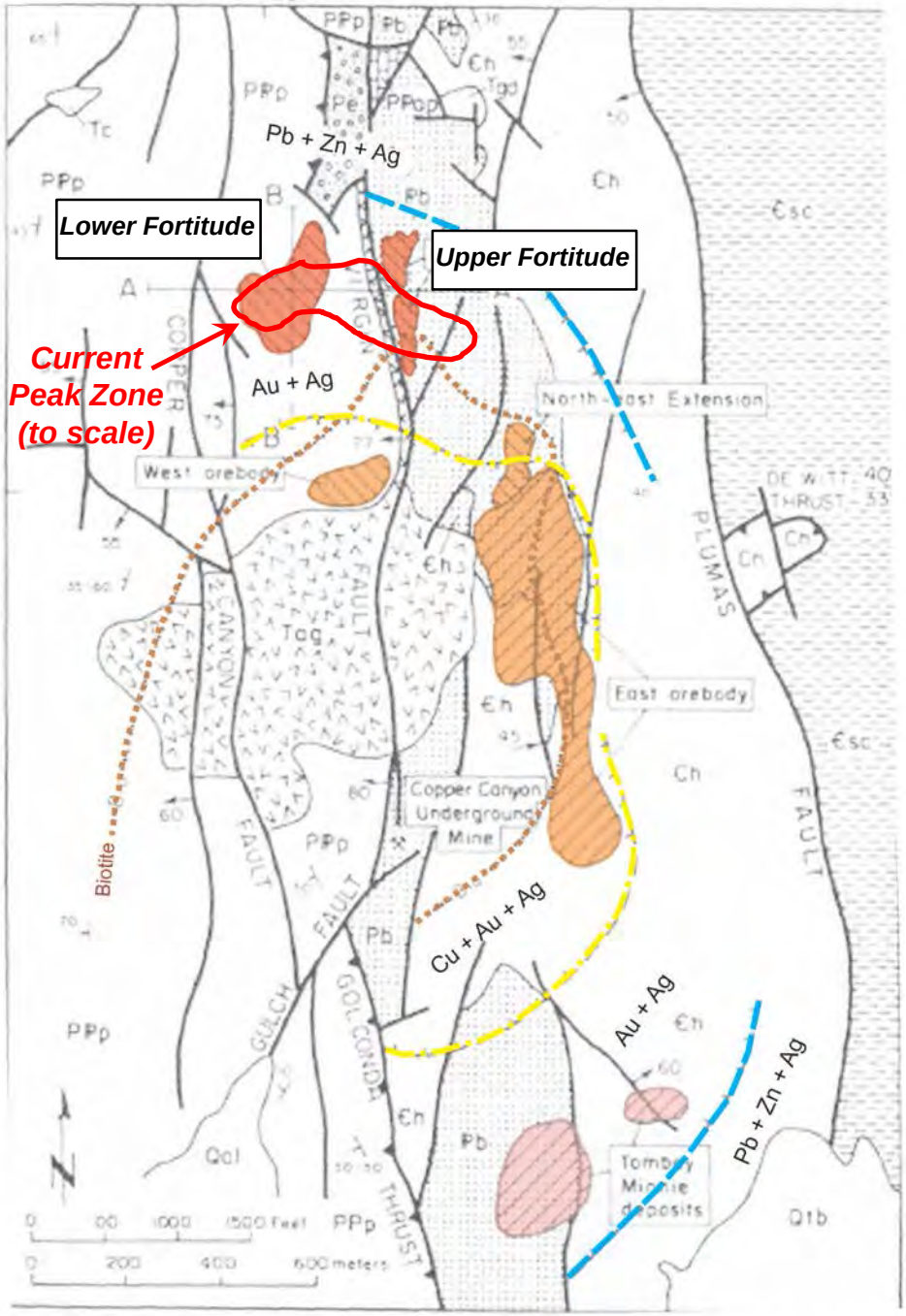
Conclusions by Dick Sillitoe after site visit, Sept. 2013

- ***The Peak Zone mineralization resembles a retrograde calcic skarn***
- ***Semi-massive sulfide hosts the Au, Cu, Ag mineralization***
- ***Quartz monzonite porphyry contains barren quartz magnetite A-type veins***
- ***Peak Zone mineralization resembles the Fortitude skarn in the Copper Canyon district of Nevada***
- ***Additional mineralized marble bodies may exist***
- ***Proximal oxidized skarn mineralization may exist adjacent to the quartz monzonite porphyry***
- ***The arsenic-bearing polymictic breccia at the Saddle Zone is interpreted to be an ignimbrite filling a magmatic diatreme vent and its periphery is a prospective Au - Ag target***

PEAK VERSUS FORTITUDE

Geologic feature	Peak zone, Tetlin	Fortitude deposit
Host rock	Deformed marble lens	Limestone horizon
Inferred related intrusive	Quartz monzonite	Granodiorite Porphyry
Main prograde mineral	Pyroxene	Pyroxene
Main retrograde minerals	Amphibole and chlorite	Amphibole and chlorite
Main sulfide mineral	Pyrrhotite	Pyrrhotite
Subsidiary sulfide minerals	Pyrite, chalcopyrite and arsenopyrite	Pyrite, chalcopyrite and arsenopyrite
Total sulfide content	10–15 vol. %	10 vol. %
Metal signature	Au-Cu-As-Bi-Te-Co	Au-Cu-As-Bi-Te
Metal Zoning	Cu+Au proximal, As+Pb+Zn distal	Cu+Au proximal, As+Pb+Zn distal
Hedleyite (Bi_7Te_3)	Present	Present
Tonnage	TBA	~10 Mt
Gold grade	TBA	7 g/t (half orebody >10 g/t)
Copper grade	TBA	0.12%
Silver grade	TBA	25 g/t
Gold recovery	Flotation?	Cyanidation (Cu+Ag not recovered)

Fortitude data from Wotruba and others, 1988 and Myers and Meinert, 1990.

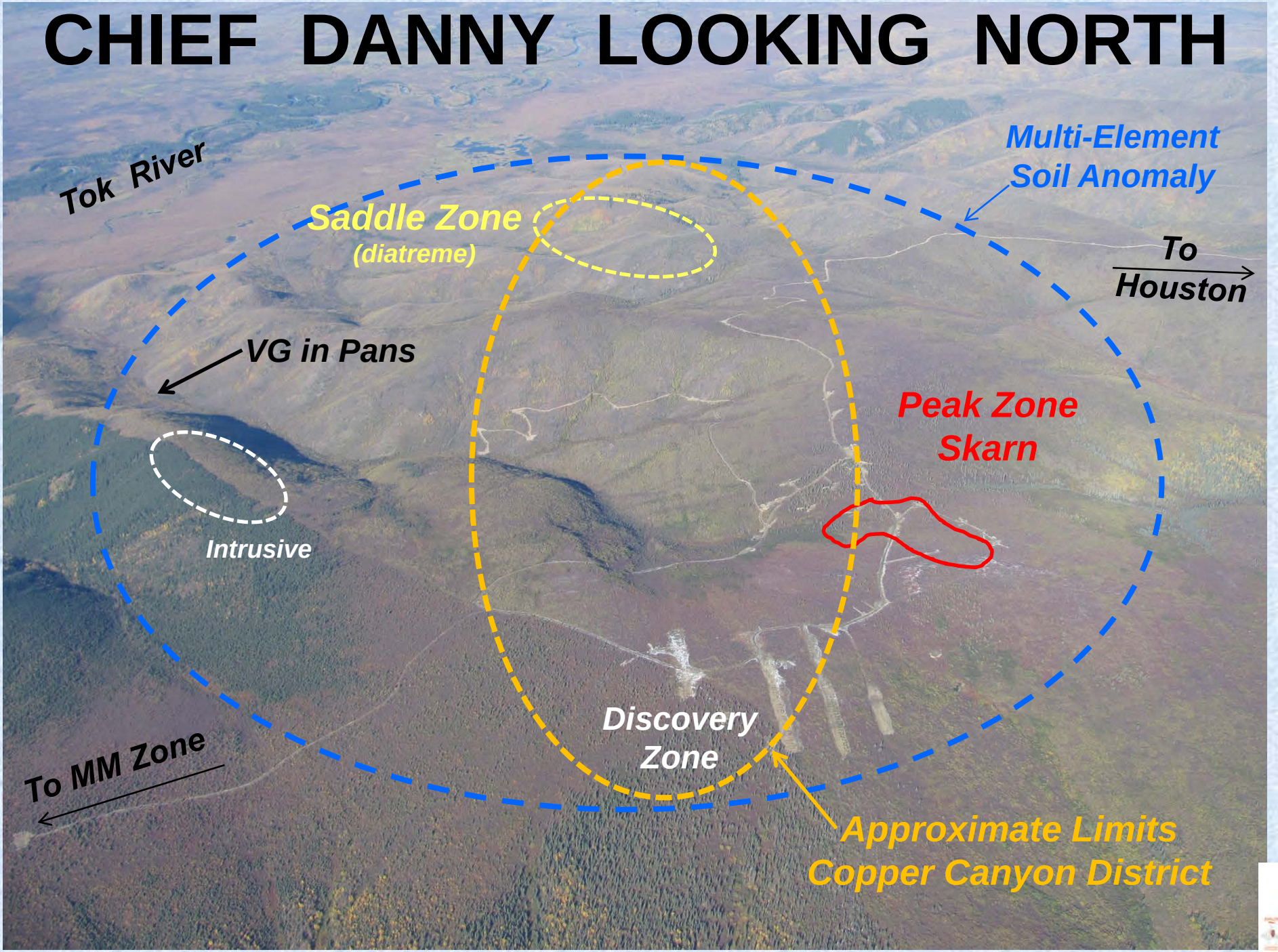


Geology, alteration and mineralization in the Copper Canyon District, Nevada. Data from Wotruba and others, 1988.

PEAK ZONE ANALOG: FORTITUDE, NEVADA

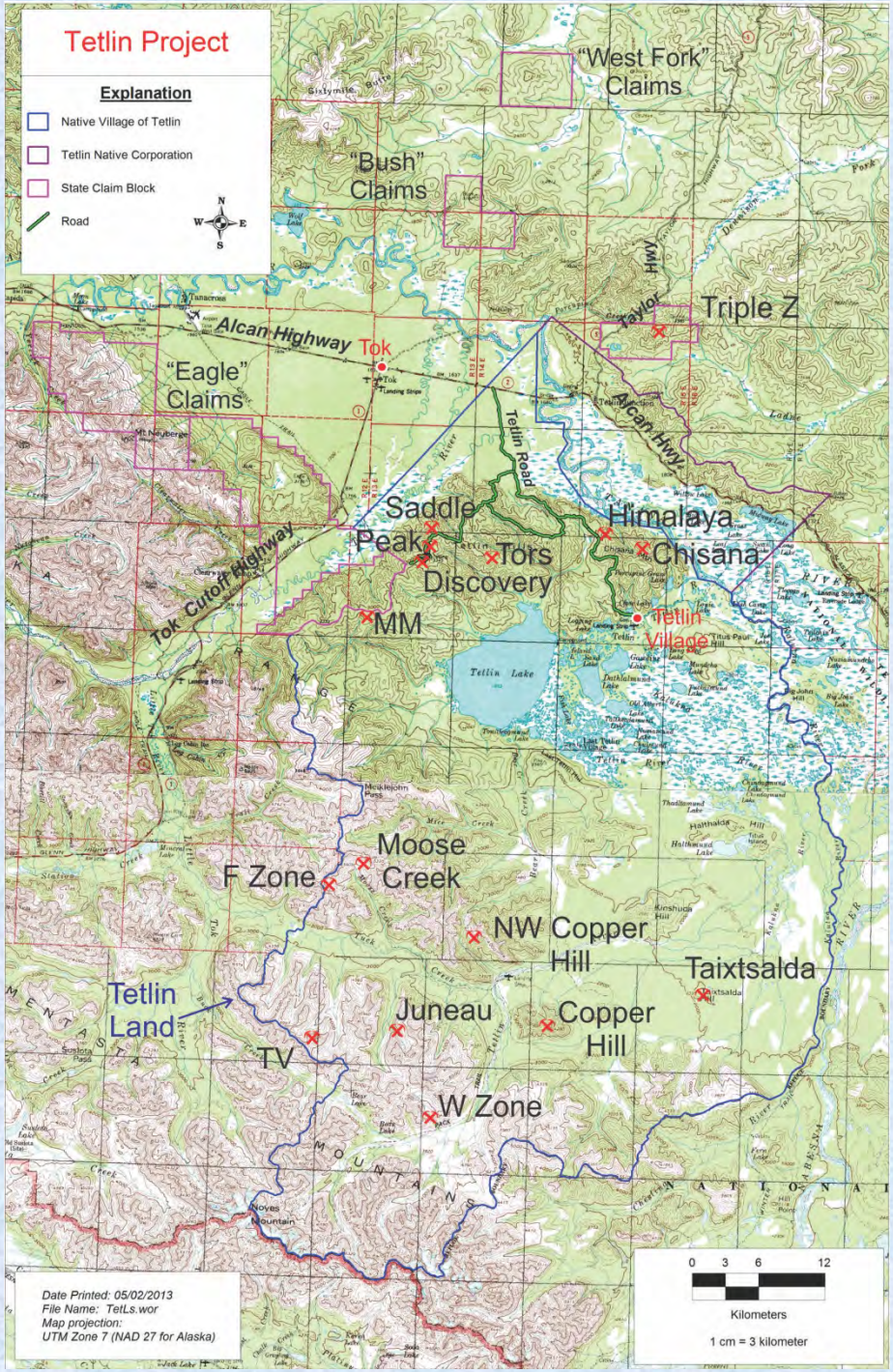
- Pyrrhotite-dominant distal gold skarn
- Cu/Au ratio decreases away from core
- Pb+Zn+Ag form halo around Cu-Au and Au-Ag zones
- Au-enriched skarn outside of biotite halo
- Relationship to nearby intrusive is not obvious

CHIEF DANNY LOOKING NORTH



EXPLORATION PROSPECTS

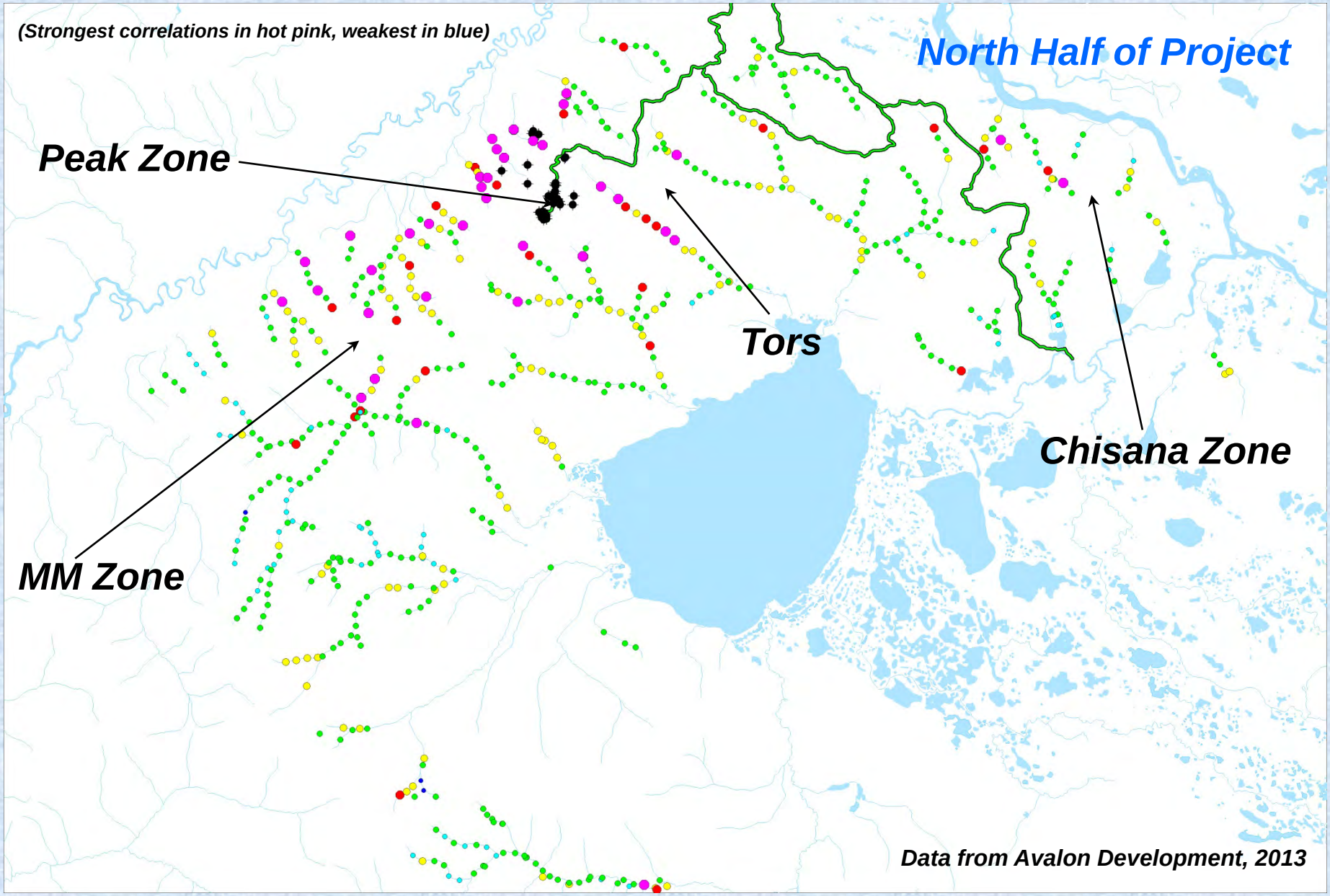
- **Tors: multiple mag-cond highs, anomalous geochem**
- **MM: multiple mag-cond highs, anomalous geochem**
- **Chisana: multiple mag-cond highs, VG in pans**
- **Copper Hill: multiple streams with VG**
- **Eagle: multiple streams with VG or Au ± Cu anomalies**
- **Other: multiple VG or Au ± Cu anomalies, no follow-up**



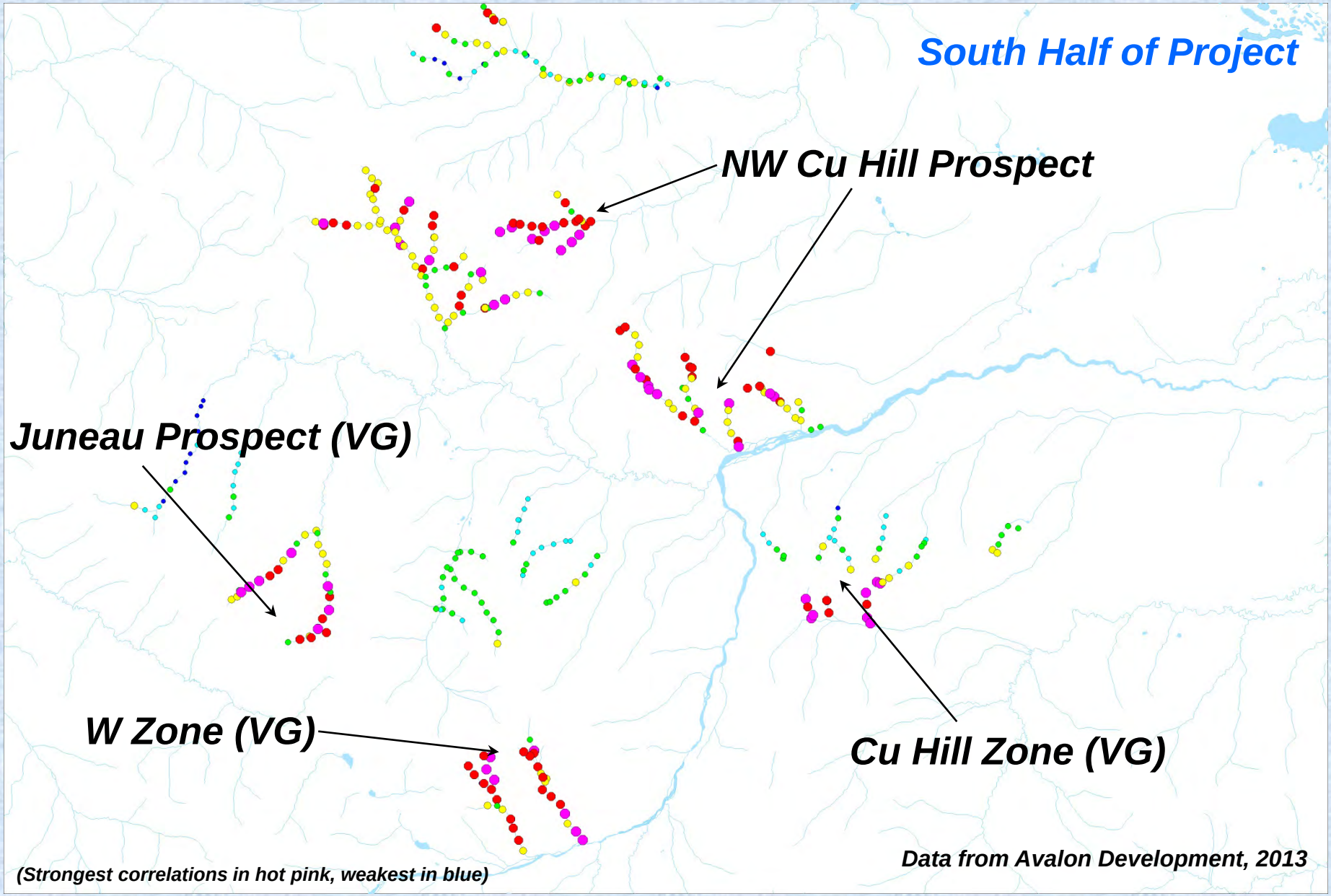
EXPLORATION STAGE

Prospect	Pan-Stream Sampling	Soil Sampling	Trenching	Airborne Geophysics	Ground Geophysics	Drilling
Tors	Yes	Yes	No	Yes	No	No
MM	Yes	Yes	No	Yes	No	No
Chisana	Yes	Yes	No	Yes	No	No
Copper Hill	Yes	Yes	No	Yes	No	No
Taixtsalda	Yes	Yes	No	Yes	No	No
TVR	Yes	No	No	Yes	No	No
NW Copper Hill	Yes	No	No	Yes	No	No
F Zone	Yes	No	No	No	No	No
W Zone	Yes	No	No	No	No	No
Moose Creek	Yes	No	No	No	No	No
Juneau	Yes	No	No	No	No	No
TV Zone	Yes	No	No	No	No	No
Eagle	Yes	No	No	Yes	No	No

Stream Sediments Only – Gold-Arsenic Factor Group 6

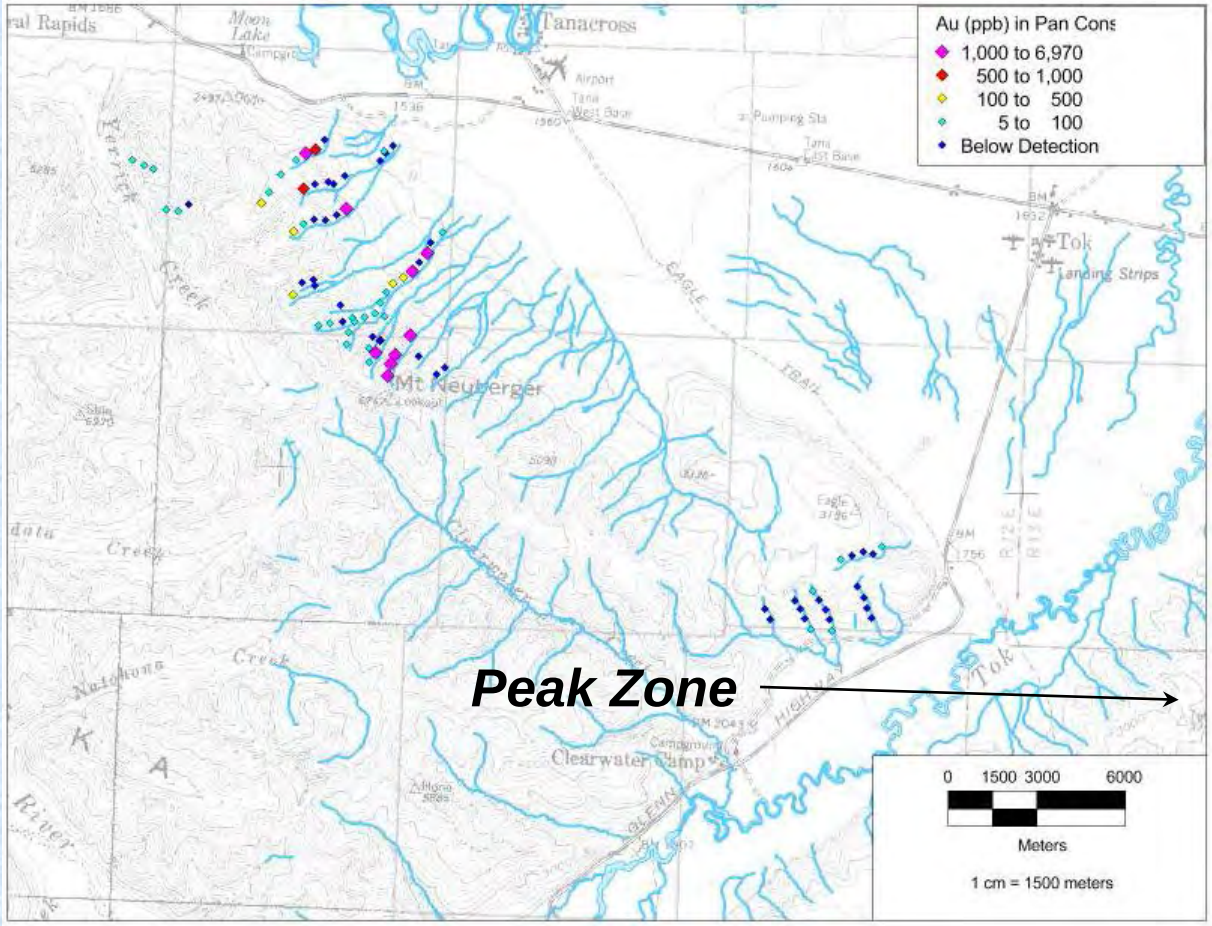


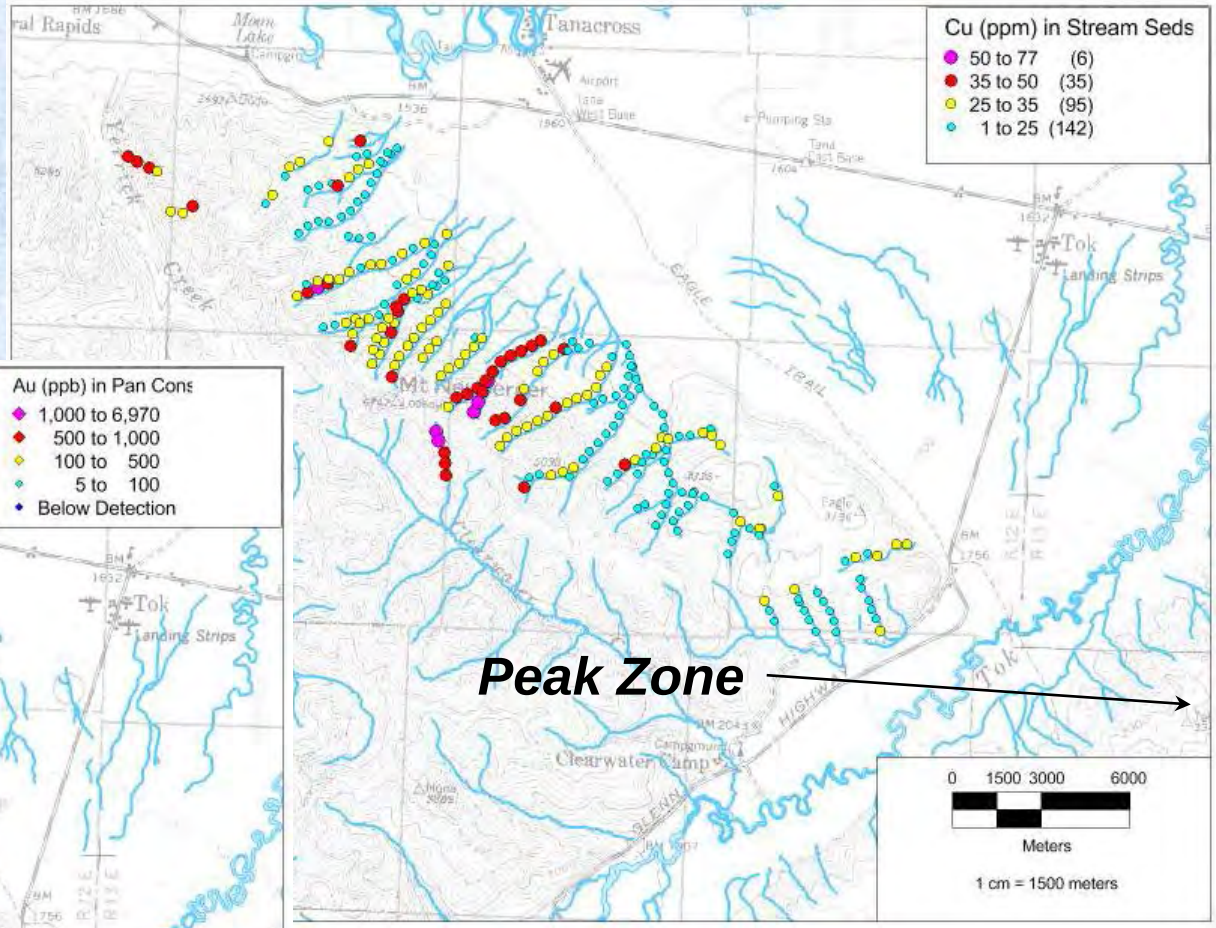
Stream Sediments Only – Arsenic-Copper Factor Group 7



RECON GEOCHEM FACTOR ANALYSIS

Eagle Zone – Gold in Pan Concentrates





Eagle Zone – Copper in Stream Sediments

COMMUNITY ENGAGEMENT

- ***2009 – Tetlin Village Transportation System vehicle donation for matching grant, helicopter transport of Culture Camp supplies, Elder heating oil assistance***
- ***2010 – Helicopter transport of Culture Camp supplies, road maintenance assistance, Tetlin Village Council emergency medical fund donation***
- ***2011 – Helicopter transport of Culture Camp supplies, road maintenance assistance, Tetlin Village Council emergency medical fund donation***
- ***2012 – Helicopter transport of Culture Camp supplies, road maintenance assistance, Tetlin Village Council emergency medical fund donation, Community Open House and cookout, Tetlin Basketball Tournament sponsorship, Tetlin School trip to NYC-Philadelphia-Washington sponsorship***
- ***2013 – Staff participation in Village Clean-up Day, Road Maintenance Assistance, Tetlin Village Council emergency medical fund donation, Softball Tournament Sponsorship, Upper Tanana Language Conference sponsor, Tetlin Dog Mushers Assoc. sponsor, Tetlin Elders Firewood supply donation***

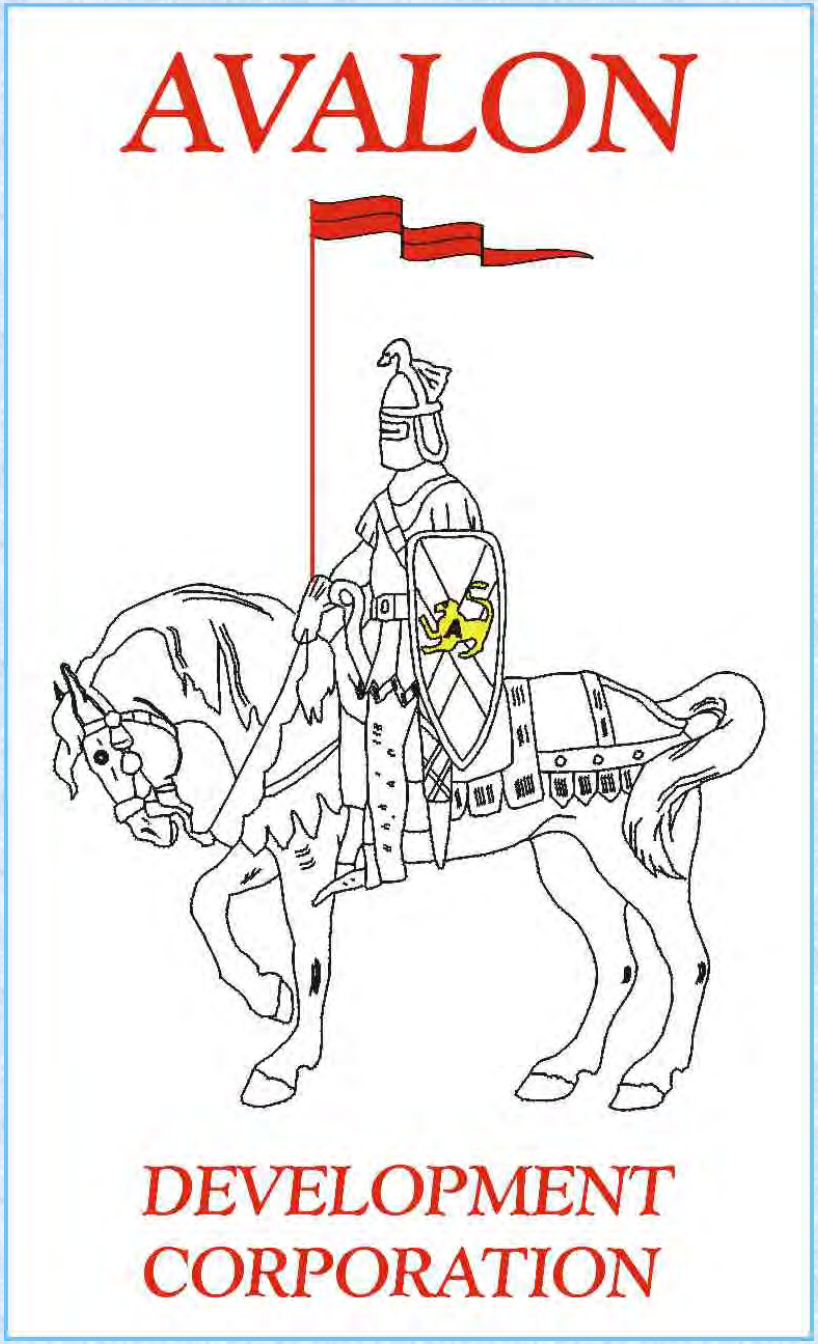
Photos by Avalon Development Corp.

ENVIRONMENTAL - REGULATORY

- **Initial Water Quality Sampling (May & Aug, 2012) ABR**
- **Initial Aquatic Fauna Survey (Aug 2012) ABR**
- **Expanded Water Quality Sampling (June & Oct, 2013) ABR**
- **Aquatic Fauna Survey (June & July, 2013) ABR**
- **Infrastructure Reclamation (July-September, 2013)**
- **US Army Corps Eng. Site Visit (July, 2013)**
- **Weather Station Installation (July, 2013) Avalon**
- **Wetlands Determination (Aug, 2013) ABR**

ONGOING ACTIVITIES

- Regulatory Consultant – SRK
- Acid Rock Drainage – SRK
- Metallurgical/Beneficiation – SRK
- Baseline Water Quality – ABR, Inc.
- Baseline Aquatic Sampling – ABR, Inc.
- Wetlands Determinations – ABR, Inc.
- Resource Estimation – Gary Giroux
- Geophysical Interp – Condor Geophysics



ACKNOWLEDGMENTS

My personal thanks to the Contango ORE, Inc. and the NWMA Convention Committee for allowing us to present today

QUESTIONS?

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www.contangoore.com
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Photo by Avalon Development Corp.