NI 43-101 technical report on the Groundhog Project, Bristol Bay Region, southwestern Alaska
60°04’N / 155°08’ W

prepared for:

Quaterra Resources Inc.

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1 Summary

The Groundhog project ("Groundhog") is an early-stage exploration property located in the Bristol Bay region of southwestern Alaska, 300 km (186 mi) west-southwest of Anchorage, 18 miles north-northwest of the village of Iliamna, within the Lake and Peninsula Borough (Figure 1). The Groundhog property consists of 343 claims located on Alaska State land within the Iliamna recording district held by Chuchuna Minerals Company. The aggregate area covered by all claims is 22,209 hectares (54,880 acres) (Figures 2 and 3). Groundhog is situated in close proximity to the Pebble Cu-Au-Mo porphyry deposit. Quaterra Resources "Quaterra" reached an agreement with Chuchuna in April 2017 whereby it has to provide $5 million over five years in exploration spending, later amended to six years, in order to earn a 90% interest in Groundhog. Quaterra is also required to pay a lump sum of $3 million at the end of the sixth year. Quaterra has no obligation to exercise its option and can terminate the agreement at its discretion annually.

Evaluation of the Groundhog property has primarily been via geophysical means with ground-based CSAMT, VIP and dipole-dipole IP surveys together with a property-wide airborne magnetic and ZTEM surveys. In 2017, 1241 m of core drilling from four widely spaced sites tested IP anomalies. Two of the drill holes (CHU-17-001 and 004) were entirely in Tertiary-aged volcanic and intrusive rocks, the remaining two drill holes (CHU-17-002 and CHU-17-003/3A) were in metasediments and intrusive rocks broadly correlative with geologic units present at the Pebble deposit. While none of the mineralization was economic, the highest Cu values were measured in CHU-17-003/3A. Both drillholes CHU-17-001 and CHU-17-003/3A were designed to drill test IP anomalies but failed to reach the target depths and neither drillhole reached the strongest part of the IP anomalies.

Surface geochemical surveying methods to date have been shown to be of lesser value than the geophysics largely due to a combination of glacial and Tertiary-cover over prospective geologic units.

Sisyphus Consulting concludes that Quaterra's Groundhog project represents a potentially promising early-stage exploration project in south-west Alaska. Its close proximity to the Pebble Cu-Au-Mo porphyry deposit and presence on the project of geologically correlative units means that Groundhog has excellent potential to host similar mineralization.

Recommendations for continuing exploration efforts at the Groundhog project should be focused on refining targets defined by existing geophysical surveys. Geophysics has proven to be an effective tool in identifying structures that host mineralization. The ZTEM survey completed in September 2019 should be the focus of additional data processing (3D inversion modelling) and integration with the existing ground-based IP surveys in order to assist in prioritizing potential drill targets. It is possible that some additional ground-based geophysical surveys (VIP and/or dipole-dipole IP lines) will be required in the final drill target selection, but ultimately success or failure at Groundhog will be determined by drilling intercepting porphyry Cu mineralization and that should be the priority of future exploration expenditures.

Community engagement and baseline environmental studies should be undertaken and maintained throughout the exploration stages.

Sisyphus Consulting has reviewed a Phase 1 exploration program totaling $35,000 as a budget that is adequate and appropriate for the proposed work. Specifics as to the subsequent Phase 2 budget are unable to be detailed until the Phase 1 portion is completed, however budgeting should be capped at the amount of funds required for Quaterra to complete its exploration requirements according to their agreement with Chuchuna Minerals Company.

This technical report complies with disclosure and reporting requirements set forth in National Instrument 43-101 Standards of Disclosure for Mineral Projects, Companion Policy 43-101CP, and Form 43-101F.

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2 Introduction

The Groundhog project is an early-stage exploration program located in south-west Alaska (Figure 1). At present the Groundhog property consists of 343 claims, an area of 22,209 hectares (54,880 acres), located adjacent to the Pebble project.

Figure 1: Groundhog Project Location.

2.1 Terms of Reference

Quaterra Resources Inc. ("Quaterra") requested Sisyphus Consulting to perform a property visit and to prepare an independent technical report for the Groundhog Project (the "Property"). Quaterra is based in Vancouver, British Columbia. The author of this document is Nicholas Van Wyck, Ph.D. CPG, of Sisyphus Consulting, who is an independent consultant, and has agreed to compile the information pertaining to the Property. The author is an independent consultant with has more than 27 years of experience in related mineral exploration and has sufficient experience relevant to the style of mineralization and type of deposit under consideration, and to the activities which are being recommended. Dr. Van Wyck is therefore an Independent and Qualified Person as defined in National Instrument 43-101.

2.2 Purpose of Report

The purpose of this report is to compile past exploration activities on the property and to provide recommendations for further exploration. This report conforms to the guidelines set out by the National Instrument 43-101 for the disclosure of technical information regarding mineral projects owned by publicly traded Canadian companies.

2.3 Sources of Information

The material and data provided in this report were provided to the author by AES and through interviews with the principals at AES. Information consists of data generated from ongoing exploration by AES and historical data maintained by AES from previous owners. All the data files that were reviewed for the report were provided by AES in digital format. Also included in this report are personal observations made by Dr. Van Wyck in the course of field visits and on general geologic information available to the public through peer review journals, publications by the U.S. Geological Survey, and agencies of the State of Alaska. Public data and press releases on this and adjacent properties have been accessed via SEDAR.

A complete list of the reports and source documents used in the preparation of this report are cited in Section 19 References.

2.4 Field Examination

Dr. Van Wyck visited the project from September 11 to 12th, 2019.

2.5 Units and Abbreviations

All technical terms of reference regarding the terms resources, reserves or mineralization used in this report conform to the standards of practice published by the Canadian Institute of Mining Metallurgy and Petroleum. All geographic locations in this report are relative to North American Datum 1983. Geological and structural measurements, and directional bearings, are expressed relative to true north unless otherwise stated. Non-geodetic coordinates are expressed in Universal Transverse Mercator Zone 5N metric coordinates. All geological terms used are in standard use within the geological consulting profession in Canada and the U.S.A. This report uses metric units whenever possible and falls back to imperial measure when it is necessary to preserve historical context. Chemical elements and compounds are abbreviated using standard International Union of Pure and Applied Chemistry abbreviations. All references to dollars are in U.S. Dollars unless otherwise indicated. Other abbreviations are listed in Table 1.

Table 1: List of Abbreviations.

Abbreviation	Definition
2D	2 dimensional (data is modelled along a section)
3D	3 dimensional (data is modelled within a volume)
AERI	Alaska Earth Resources Inc
AES	Alaska Earth Sciences
amsl	Above mean sea level
ANCSA	Alaska Native Claims Settlement Act

APMA	Application for Permit to Mine in Alaska
ºC	Degrees Celsius
CHU	Chuchuna Minerals Company
CSAMT	Controlled-source Audio-frequency Magnetotellurics
DDH	Diamond Drill Hole
g	Grams
g/t	Grams per Tonne - synonymous with ppm
ft	feet
Hz	hertz
ICP – AES	Inductively Coupled Plasma - Atomic Emission Spectra
IP	Induced polarization
KEC	Kennecott Exploration Company
km	kilometers
m	meters
Ma	Million years
MTRSC	Meridian-Township-Range-Section-Quarter Section; the grid on which Alaska bases its mining claims
mrad, mradian	milliradian
MT	Magneto-telluric
NI 43-101	National Instrument 43-101
NQ	NQ drill core = 47.6 mm inside diameter
ppb	Parts per Billion
ppm	Parts per Million
QA/QC	Quality Assurance/Quality Control
QSP	Quartz-sericite-pyrite
VIP	Vector IP (also known as RIP or reconnaissance IP)
UTM	Universal Transverse Mercator Geographic Coordinate System (type of map projection)
XYZ	Cartesian Coordinates; “Easting”, “Northing”, and “Elevation”
ZTEM	Z-tipper axis electromagnetic survey (http://bit.ly/1WPDmcz)

3 Reliance on Other Experts

This report has been prepared by the author for Quaterra Resources. The information, conclusions, opinions, and estimates contained herein are based on:

• Information available to the author at the time of preparation of this report,

• Assumptions, conditions, and qualifications as set forth in this report, and

• Data, reports, and other information supplied by AES and other third-party sources.

For the purpose of this report, the author has relied on ownership information provided by AES.

The author has not researched Property title or mineral rights for the Groundhog property and expresses no opinion as to the ownership status at the property. Effort was made to review the information provided for obvious errors and omissions; however, the author is not responsible for any errors or omissions relating the legal status of claims described within this report.

Except for the purposes legislated under provincial securities laws, any use of this report by any third party are at that party's sole risk.

4 Property Description and Location

4.1 Area and Location

The Groundhog property is located in the Bristol Bay region of southwestern Alaska, 300 km (186 mi) west-southwest of Anchorage, 18 miles north-northwest of the village of Iliamna, within the Lake and Peninsula Borough.

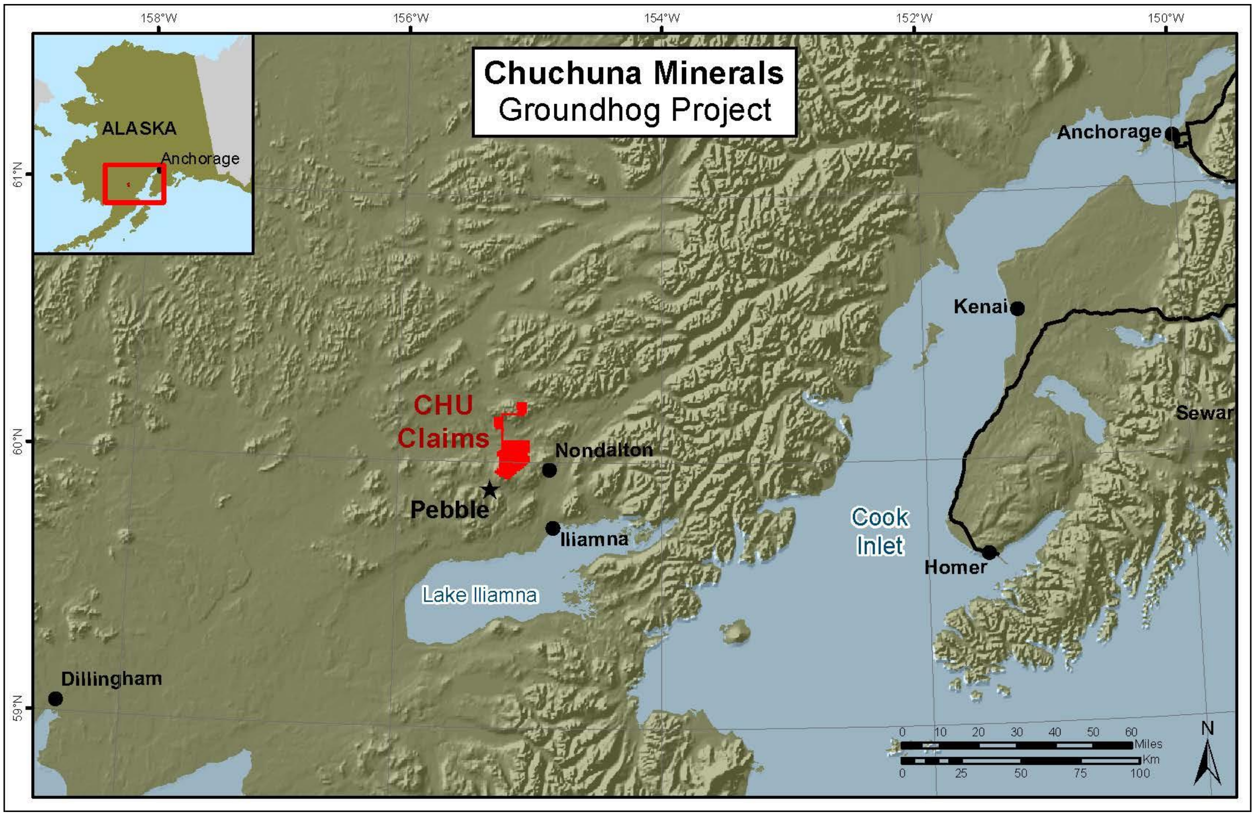

Figure 2: Groundhog Property Location, Access, and Infrastructure.

The property is centered, approximately, at latitude 60°04' N and longitude 155°08' W, and is located on the United States Geological Survey (USGS) topographic maps Iliamna D6 and Lake Clark A6, in Townships 1 North and South, Township 2 South, Ranges 33–34 West, Seward Meridian.

4.2 Claims

Chuchuna Minerals Company holds 100% interest in a contiguous block of 343 mineral claims covering approximately 84 square miles or 54,880 acres or 22,209 hectares.

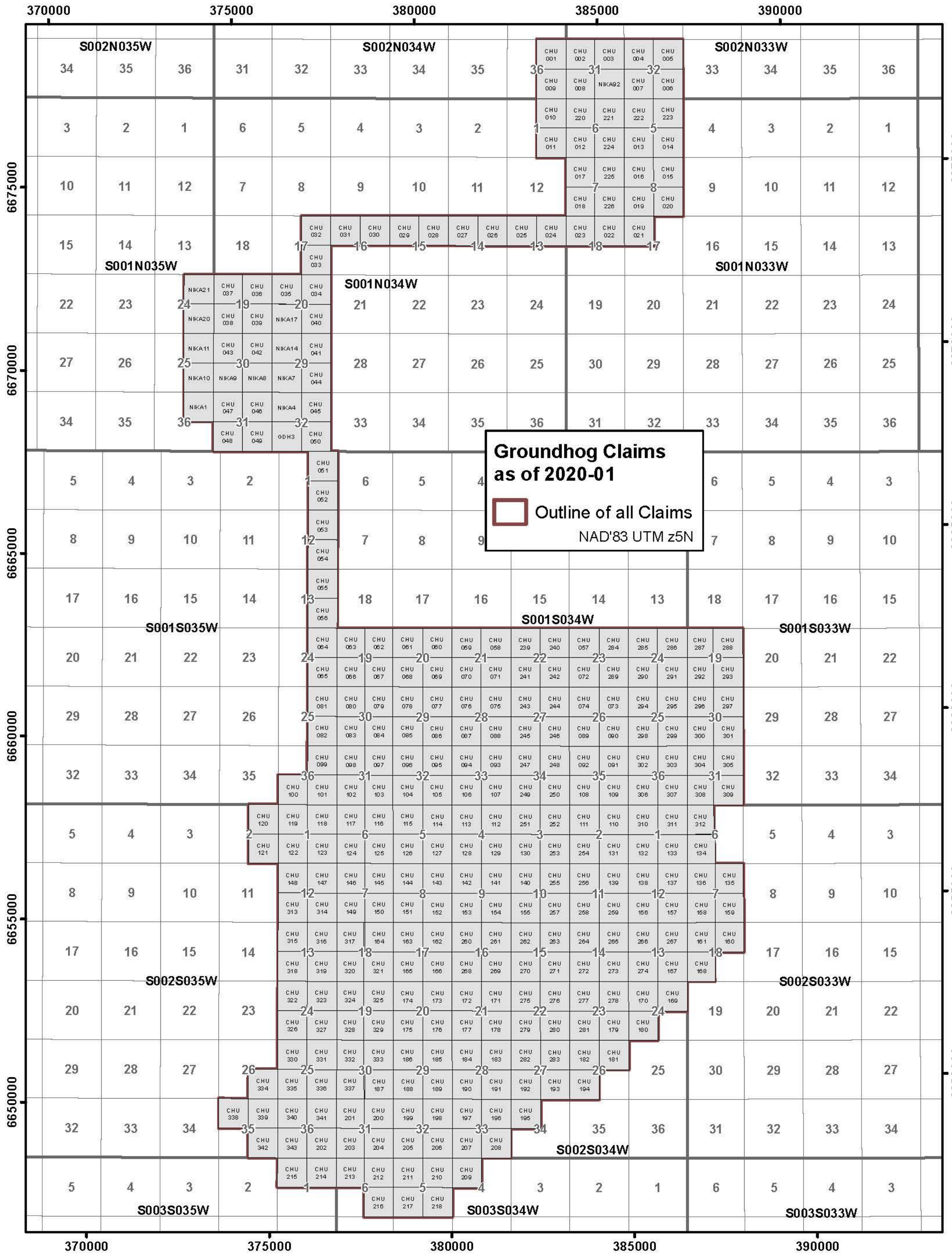

Figure 3: Claim map of the Groundhog property.

State mineral claims in Alaska are kept in good standing by performing annual assessment work or in lieu of assessment work by paying $100 per year per 40 acre (0.06 square mile) mineral claim, and by paying annual escalating state rentals. All of the claims come due annually on August 31. However, credit for excess work can be banked for a maximum of five years afterwards, and can be applied as necessary to continue to hold the claims in good standing. The property claims have a variable amount of work credit available that can be applied in this way. Annual assessment work obligations for the property total US$111,200; existing credit for past work available for use going forward after 2019 total US$1,416,338. The annual rentals for 2019 were US$47,685. At the effective date of this report all rentals and assessment payments were current, all claims had been formally approved by the State of Alaska, and quitclaim transferred to Chuchuna.

Quaterra reached an agreement with Chuchuna in April 2017 whereby it has to provide $5 million over five years in exploration spending, later amended to six years, in order to earn a 90% interest in Groundhog. The Company is also required to pay a lump sum of $3 million at the end of the sixth year. Quaterra has no obligation to exercise its option and can terminate the agreement at its discretion annually. (All amounts are expressed in U.S. dollars). Chuchuna is the operator of the project and plans, implements and manages exploration field programs as set out in a budget and work plan approved by Quaterra. Chuchuna is an Alaskan company jointly owned by Kijik Corporation, the ANCSA village corporation for the community of Nondalton, and Alaska Earth Sciences, an Anchorage-based mineral exploration company. In February, 2019 a private party purchased Chuchuna shares and the percentage of ownership now consists of AES (48.433%), Kijik (46.533%), and private party (5.033%).

The details of the mineral claims are provided below (ADL refers to the Alaska Department of Lands).

Table 2: Active Claims on the Groundhog Property.

ADL	Claim	T	R	S	Q	Owner	Loc Date	Acres	Status
647270	GDH 3	01N	34W	32	SW	Chuchuna Minerals Company	12/18/2004	160	State
648191	NIKA 14	01N	34W	29	NW	Chuchuna Minerals Company	2/17/2005	160	State
648478	NIKA1	01N	35W	36	NE	Chuchuna Minerals Company	2/17/2005	160	State-Selected
648481	NIKA 4	01N	34W	32	NW	Chuchuna Minerals Company	2/17/2005	160	State
648484	NIKA 7	01N	34W	29	SW	Chuchuna Minerals Company	2/17/2005	160	State
648485	NIKA 8	01N	34W	30	SE	Chuchuna Minerals Company	2/17/2005	160	State
648486	NIKA 9	01N	34W	30	SW	Chuchuna Minerals Company	2/17/2005	160	State
648487	NIKA10	01N	35W	25	SE	Chuchuna Minerals Company	2/17/2005	160	State-Selected
648488	NIKA11	01N	35W	25	NE	Chuchuna Minerals Company	2/17/2005	160	State-Selected
648494	NIKA 17	01N	34W	20	SW	Chuchuna Minerals Company	2/17/2005	160	State
648497	NIKA20	01N	35W	24	SE	Chuchuna Minerals Company	2/17/2005	160	State-Selected
648498	NIKA21	01N	35W	24	NE	Chuchuna Minerals Company	2/17/2005	160	State-Selected
648569	NIKA 92	02N	33W	31	SE	Chuchuna Minerals Company	2/17/2005	160	State
724143	CHU 001	02N	34W	36	NE	Chuchuna Minerals Company	4/15/2017	160	State
724144	CHU 002	02N	33W	31	NW	Chuchuna Minerals Company	4/15/2017	160	State
724145	CHU 003	02N	33W	31	NE	Chuchuna Minerals Company	4/15/2017	160	State
724146	CHU 004	02N	33W	32	NW	Chuchuna Minerals Company	4/15/2017	160	State
724147	CHU 005	02N	33W	32	NE	Chuchuna Minerals Company	4/15/2017	160	State
724148	CHU 006	02N	33W	32	SE	Chuchuna Minerals Company	4/15/2017	160	State
724149	CHU 007	02N	33W	32	SW	Chuchuna Minerals Company	4/15/2017	160	State
724150	CHU 008	02N	33W	31	SW	Chuchuna Minerals Company	4/15/2017	160	State

724151	CHU 009	02N	34W	36	SE	Chuchuna Minerals Company	4/15/2017	160	State
724152	CHU 010	01N	34W	01	NE	Chuchuna Minerals Company	4/15/2017	160	State
724153	CHU 011	01N	34W	01	SE	Chuchuna Minerals Company	4/15/2017	160	State
724154	CHU 012	01N	33W	06	SW	Chuchuna Minerals Company	4/15/2017	160	State
724155	CHU 013	01N	33W	05	SW	Chuchuna Minerals Company	4/15/2017	160	State
724156	CHU 014	01N	33W	05	SE	Chuchuna Minerals Company	4/15/2017	160	State
724157	CHU 015	01N	33W	08	NE	Chuchuna Minerals Company	4/15/2017	160	State
724158	CHU 016	01N	33W	08	NW	Chuchuna Minerals Company	4/15/2017	160	State
724159	CHU 017	01N	33W	07	NW	Chuchuna Minerals Company	4/15/2017	160	State
724160	CHU 018	01N	33W	07	SW	Chuchuna Minerals Company	4/15/2017	160	State
724161	CHU 019	01N	33W	08	SW	Chuchuna Minerals Company	4/15/2017	160	State
724162	CHU 020	01N	33W	08	SE	Chuchuna Minerals Company	4/15/2017	160	State
724163	CHU 021	01N	33W	17	NW	Chuchuna Minerals Company	4/15/2017	160	State
724164	CHU 022	01N	33W	18	NE	Chuchuna Minerals Company	4/15/2017	160	State
724165	CHU 023	01N	33W	18	NW	Chuchuna Minerals Company	4/15/2017	160	State
724166	CHU 024	01N	34W	13	NE	Chuchuna Minerals Company	4/15/2017	160	State
724167	CHU 025	01N	34W	13	NW	Chuchuna Minerals Company	4/15/2017	160	State
724168	CHU 026	01N	34W	14	NE	Chuchuna Minerals Company	4/15/2017	160	State
724169	CHU 027	01N	34W	14	NW	Chuchuna Minerals Company	4/15/2017	160	State
724170	CHU 028	01N	34W	15	NE	Chuchuna Minerals Company	4/15/2017	160	State
724171	CHU 029	01N	34W	15	NW	Chuchuna Minerals Company	4/15/2017	160	State
724172	CHU 030	01N	34W	16	NE	Chuchuna Minerals Company	4/15/2017	160	State
724173	CHU 031	01N	34W	16	NW	Chuchuna Minerals Company	4/15/2017	160	State

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724178	CHU 036	01N	34W	19	NE	Chuchuna Minerals Company	4/15/2017	160	State
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724183	CHU 041	01N	34W	29	NE	Chuchuna Minerals Company	4/15/2017	160	State
724184	CHU 042	01N	34W	30	NE	Chuchuna Minerals Company	4/15/2017	160	State
724185	CHU 043	01N	34W	30	NW	Chuchuna Minerals Company	4/15/2017	160	State
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724244	CHU 102	01S	34W	31	SW	Chuchuna Minerals Company	4/15/2017	160	State
724245	CHU 103	01S	34W	31	SE	Chuchuna Minerals Company	4/15/2017	160	State
724246	CHU 104	01S	34W	32	SW	Chuchuna Minerals Company	4/15/2017	160	State
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724249	CHU 107	01S	34W	33	SE	Chuchuna Minerals Company	4/15/2017	160	State
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724252	CHU 110	02S	34W	02	NE	Chuchuna Minerals Company	4/15/2017	160	State
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724258	CHU 116	02S	34W	06	NE	Chuchuna Minerals Company	4/15/2017	160	State
724259	CHU 117	02S	34W	06	NW	Chuchuna Minerals Company	4/15/2017	160	State
724260	CHU 118	02S	35W	01	NE	Chuchuna Minerals Company	4/15/2017	160	State
724261	CHU 119	02S	35W	01	NW	Chuchuna Minerals Company	4/15/2017	160	State
724262	CHU 120	02S	35W	02	NE	Chuchuna Minerals Company	4/15/2017	160	State
724263	CHU 121	02S	35W	02	SE	Chuchuna Minerals Company	4/15/2017	160	State
724264	CHU 122	02S	35W	01	SW	Chuchuna Minerals Company	4/15/2017	160	State
724265	CHU 123	02S	35W	01	SE	Chuchuna Minerals Company	4/15/2017	160	State

724266	CHU 124	02S	34W	06	SW	Chuchuna Minerals Company	4/15/2017	160	State
724267	CHU 125	02S	34W	06	SE	Chuchuna Minerals Company	4/15/2017	160	State
724268	CHU 126	02S	34W	05	SW	Chuchuna Minerals Company	4/15/2017	160	State
724269	CHU 127	02S	34W	05	SE	Chuchuna Minerals Company	4/15/2017	160	State
724270	CHU 128	02S	34W	04	SW	Chuchuna Minerals Company	4/15/2017	160	State
724271	CHU 129	02S	34W	04	SE	Chuchuna Minerals Company	4/15/2017	160	State
724272	CHU 130	02S	34W	03	SW	Chuchuna Minerals Company	4/15/2017	160	State
724273	CHU 131	02S	34W	02	SE	Chuchuna Minerals Company	4/15/2017	160	State
724274	CHU 132	02S	34W	01	SW	Chuchuna Minerals Company	4/15/2017	160	State
724275	CHU 133	02S	34W	01	SE	Chuchuna Minerals Company	4/15/2017	160	State
724276	CHU 134	02S	33W	06	SW	Chuchuna Minerals Company	4/15/2017	160	State
724277	CHU 135	02S	33W	07	NE	Chuchuna Minerals Company	4/15/2017	160	State
724278	CHU 136	02S	33W	07	NW	Chuchuna Minerals Company	4/15/2017	160	State
724279	CHU 137	02S	34W	12	NE	Chuchuna Minerals Company	4/15/2017	160	State
724280	CHU 138	02S	34W	12	NW	Chuchuna Minerals Company	4/15/2017	160	State
724281	CHU 139	02S	34W	11	NE	Chuchuna Minerals Company	4/15/2017	160	State
724282	CHU 140	02S	34W	10	NW	Chuchuna Minerals Company	4/15/2017	160	State
724283	CHU 141	02S	34W	09	NE	Chuchuna Minerals Company	4/15/2017	160	State
724284	CHU 142	02S	34W	09	NW	Chuchuna Minerals Company	4/15/2017	160	State
724285	CHU 143	02S	34W	08	NE	Chuchuna Minerals Company	4/15/2017	160	State
724286	CHU 144	02S	34W	08	NW	Chuchuna Minerals Company	4/15/2017	160	State
724287	CHU 145	02S	34W	07	NE	Chuchuna Minerals Company	4/15/2017	160	State
724288	CHU 146	02S	34W	07	NW	Chuchuna Minerals Company	4/15/2017	160	State

724289	CHU 147	02S	35W	12	NE	Chuchuna Minerals Company	4/15/2017	160	State
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724293	CHU 151	02S	34W	08	SW	Chuchuna Minerals Company	4/15/2017	160	State
724294	CHU 152	02S	34W	08	SE	Chuchuna Minerals Company	4/15/2017	160	State
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724296	CHU 154	02S	34W	09	SE	Chuchuna Minerals Company	4/15/2017	160	State
724297	CHU 155	02S	34W	10	SW	Chuchuna Minerals Company	4/15/2017	160	State
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724299	CHU 157	02S	34W	12	SE	Chuchuna Minerals Company	4/15/2017	160	State
724300	CHU 158	02S	33W	07	SW	Chuchuna Minerals Company	4/15/2017	160	State
724301	CHU 159	02S	33W	07	SE	Chuchuna Minerals Company	4/15/2017	160	State
724302	CHU 160	02S	33W	18	NE	Chuchuna Minerals Company	4/15/2017	160	State
724303	CHU 161	02S	33W	18	NW	Chuchuna Minerals Company	4/15/2017	160	State
724304	CHU 162	02S	34W	17	NE	Chuchuna Minerals Company	4/15/2017	160	State
724305	CHU 163	02S	34W	17	NW	Chuchuna Minerals Company	4/15/2017	160	State
724306	CHU 164	02S	34W	18	NE	Chuchuna Minerals Company	4/15/2017	160	State
724307	CHU 165	02S	34W	17	SW	Chuchuna Minerals Company	4/15/2017	160	State
724308	CHU 166	02S	34W	17	SE	Chuchuna Minerals Company	4/15/2017	160	State
724309	CHU 167	02S	34W	13	SE	Chuchuna Minerals Company	4/15/2017	160	State
724310	CHU 168	02S	33W	18	SW	Chuchuna Minerals Company	4/15/2017	160	State
724311	CHU 169	02S	34W	24	NE	Chuchuna Minerals Company	4/16/2017	160	State

724312	CHU 170	02S	34W	24	NW	Chuchuna Minerals Company	4/15/2017	160	State
724313	CHU 171	02S	34W	21	NE	Chuchuna Minerals Company	4/15/2017	160	State
724314	CHU 172	02S	34W	21	NW	Chuchuna Minerals Company	4/15/2017	160	State
724315	CHU 173	02S	34W	20	NE	Chuchuna Minerals Company	4/15/2017	160	State
724316	CHU 174	02S	34W	20	NW	Chuchuna Minerals Company	4/15/2017	160	State
724317	CHU 175	02S	34W	20	SW	Chuchuna Minerals Company	4/16/2017	160	State
724318	CHU 176	02S	34W	20	SE	Chuchuna Minerals Company	4/16/2017	160	State
724319	CHU 177	02S	34W	21	SW	Chuchuna Minerals Company	4/16/2017	160	State
724320	CHU 178	02S	34W	21	SE	Chuchuna Minerals Company	4/16/2017	160	State
724321	CHU 179	02S	34W	23	SE	Chuchuna Minerals Company	4/16/2017	160	State
724322	CHU 180	02S	34W	24	SW	Chuchuna Minerals Company	4/16/2017	160	State
724323	CHU 181	02S	34W	26	NE	Chuchuna Minerals Company	4/16/2017	160	State
724324	CHU 182	02S	34W	26	NW	Chuchuna Minerals Company	4/16/2017	160	State
724325	CHU 183	02S	34W	28	NE	Chuchuna Minerals Company	4/16/2017	160	State
724326	CHU 184	02S	34W	28	NW	Chuchuna Minerals Company	4/16/2017	160	State
724327	CHU 185	02S	34W	29	NE	Chuchuna Minerals Company	4/16/2017	160	State
724328	CHU 186	02S	34W	29	NW	Chuchuna Minerals Company	4/16/2017	160	State
724329	CHU 187	02S	34W	30	SE	Chuchuna Minerals Company	4/16/2017	160	State
724330	CHU 188	02S	34W	29	SW	Chuchuna Minerals Company	4/16/2017	160	State
724331	CHU 189	02S	34W	29	SE	Chuchuna Minerals Company	4/16/2017	160	State
724332	CHU 190	02S	34W	28	SW	Chuchuna Minerals Company	4/16/2017	160	State
724333	CHU 191	02S	34W	28	SE	Chuchuna Minerals Company	4/16/2017	160	State
724334	CHU 192	02S	34W	27	SW	Chuchuna Minerals Company	4/16/2017	160	State

724335	CHU 193	02S	34W	27	SE	Chuchuna Minerals Company	4/16/2017	160	State
724336	CHU 194	02S	34W	26	SW	Chuchuna Minerals Company	4/16/2017	160	State
724337	CHU 195	02S	34W	34	NW	Chuchuna Minerals Company	4/16/2017	160	State
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724340	CHU 198	02S	34W	32	NE	Chuchuna Minerals Company	4/16/2017	160	State
724341	CHU 199	02S	34W	32	NW	Chuchuna Minerals Company	4/16/2017	160	State
724342	CHU 200	02S	34W	31	NE	Chuchuna Minerals Company	4/16/2017	160	State
724343	CHU 201	02S	34W	31	NW	Chuchuna Minerals Company	4/16/2017	160	State
724344	CHU 202	02S	35W	36	SE	Chuchuna Minerals Company	4/16/2017	160	State
724345	CHU 203	02S	34W	31	SW	Chuchuna Minerals Company	4/16/2017	160	State
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724347	CHU 205	02S	34W	32	SW	Chuchuna Minerals Company	4/16/2017	160	State
724348	CHU 206	02S	34W	32	SE	Chuchuna Minerals Company	4/16/2017	160	State
724349	CHU 207	02S	34W	33	SW	Chuchuna Minerals Company	4/16/2017	160	State
724350	CHU 208	02S	34W	33	SE	Chuchuna Minerals Company	4/16/2017	160	State
724351	CHU 209	03S	34W	04	NW	Chuchuna Minerals Company	4/16/2017	160	State
724352	CHU 210	03S	34W	05	NE	Chuchuna Minerals Company	4/16/2017	160	State
724353	CHU 211	03S	34W	05	NW	Chuchuna Minerals Company	4/16/2017	160	State
724354	CHU 212	03S	34W	06	NE	Chuchuna Minerals Company	4/16/2017	160	State
724355	CHU 213	03S	34W	06	NW	Chuchuna Minerals Company	4/16/2017	160	State
724356	CHU 214	03S	35W	01	NE	Chuchuna Minerals Company	4/16/2017	160	State
724357	CHU 215	03S	35W	01	NW	Chuchuna Minerals Company	4/16/2017	160	State

724358	CHU 216	03S	34W	06	SE	Chuchuna Minerals Company	4/16/2017	160	State
724359	CHU 217	03S	34W	05	SW	Chuchuna Minerals Company	4/16/2017	160	State
724360	CHU 218	03S	34W	05	SE	Chuchuna Minerals Company	4/16/2017	160	State
728084	CHU 239	01S	34W	22	NW	Chuchuna Minerals Company	5/8/2018	160	State
728085	CHU 240	01S	34W	22	NE	Chuchuna Minerals Company	5/8/2018	160	State
728086	CHU 241	01S	34W	22	SW	Chuchuna Minerals Company	5/8/2018	160	State
728087	CHU 242	01S	34W	22	SE	Chuchuna Minerals Company	5/8/2018	160	State
728088	CHU 243	01S	34W	27	NW	Chuchuna Minerals Company	5/8/2018	160	State
728089	CHU 244	01S	34W	27	NE	Chuchuna Minerals Company	5/8/2018	160	State
728090	CHU 245	01S	34W	27	SW	Chuchuna Minerals Company	5/8/2018	160	State
728091	CHU 246	01S	34W	27	SE	Chuchuna Minerals Company	5/8/2018	160	State
728092	CHU 247	01S	34W	34	NW	Chuchuna Minerals Company	5/8/2018	160	State
728093	CHU 248	01S	34W	34	NE	Chuchuna Minerals Company	5/8/2018	160	State
728094	CHU 249	01S	34W	34	SW	Chuchuna Minerals Company	5/8/2018	160	State
728095	CHU 250	01S	34W	34	SE	Chuchuna Minerals Company	5/8/2018	160	State
728096	CHU 251	02S	34W	03	NW	Chuchuna Minerals Company	5/8/2018	160	State
728097	CHU 252	02S	34W	03	NE	Chuchuna Minerals Company	5/8/2018	160	State
728098	CHU 253	02S	34W	03	SE	Chuchuna Minerals Company	5/8/2018	160	State
728099	CHU 254	02S	34W	02	SW	Chuchuna Minerals Company	5/8/2018	160	State
728100	CHU 255	02S	34W	10	NE	Chuchuna Minerals Company	5/8/2018	160	State
728101	CHU 256	02S	34W	11	NW	Chuchuna Minerals Company	5/8/2018	160	State
728102	CHU 257	02S	34W	10	SE	Chuchuna Minerals Company	5/8/2018	160	State
728103	CHU 258	02S	34W	11	SW	Chuchuna Minerals Company	5/8/2018	160	State

728104	CHU 259	02S	34W	11	SE	Chuchuna Minerals Company	5/8/2018	160	State
728105	CHU 260	02S	34W	16	NW	Chuchuna Minerals Company	5/8/2018	160	State
728106	CHU 261	02S	34W	16	NE	Chuchuna Minerals Company	5/8/2018	160	State
728107	CHU 262	02S	34W	15	NW	Chuchuna Minerals Company	5/8/2018	160	State
728108	CHU 263	02S	34W	15	NE	Chuchuna Minerals Company	5/8/2018	160	State
728109	CHU 264	02S	34W	14	NW	Chuchuna Minerals Company	5/8/2018	160	State
728110	CHU 265	02S	34W	14	NE	Chuchuna Minerals Company	5/8/2018	160	State
728111	CHU 266	02S	34W	13	NW	Chuchuna Minerals Company	5/8/2018	160	State
728112	CHU 267	02S	34W	13	NE	Chuchuna Minerals Company	5/8/2018	160	State
728113	CHU 268	02S	34W	16	SW	Chuchuna Minerals Company	5/8/2018	160	State
728114	CHU 269	02S	34W	16	SE	Chuchuna Minerals Company	5/8/2018	160	State
728115	CHU 270	02S	34W	15	SW	Chuchuna Minerals Company	5/8/2018	160	State
728116	CHU 271	02S	34W	15	SE	Chuchuna Minerals Company	5/8/2018	160	State
728117	CHU 272	02S	34W	14	SW	Chuchuna Minerals Company	5/8/2018	160	State
728118	CHU 273	02S	34W	14	SE	Chuchuna Minerals Company	5/8/2018	160	State
728119	CHU 274	02S	34W	13	SW	Chuchuna Minerals Company	5/8/2018	160	State
728120	CHU 275	02S	34W	22	NW	Chuchuna Minerals Company	5/8/2018	160	State
728121	CHU 276	02S	34W	22	NE	Chuchuna Minerals Company	5/8/2018	160	State
728122	CHU 277	02S	34W	23	NW	Chuchuna Minerals Company	5/8/2018	160	State
728123	CHU 278	02S	34W	23	NE	Chuchuna Minerals Company	5/8/2018	160	State
728124	CHU 279	02S	34W	22	SW	Chuchuna Minerals Company	5/8/2018	160	State
728125	CHU 280	02S	34W	22	SE	Chuchuna Minerals Company	5/8/2018	160	State
728126	CHU 281	02S	34W	23	SW	Chuchuna Minerals Company	5/8/2018	160	State

728127	CHU 282	02S	34W	27	NW	Chuchuna Minerals Company	5/8/2018	160	State
728128	CHU 283	02S	34W	27	NE	Chuchuna Minerals Company	5/8/2018	160	State
728130	CHU 220	01N	33W	06	NW	Chuchuna Minerals Company	5/8/2018	160	State
728131	CHU 221	01N	33W	06	NE	Chuchuna Minerals Company	5/8/2018	160	State
728132	CHU 222	01N	33W	05	NW	Chuchuna Minerals Company	5/8/2018	160	State
728133	CHU 223	01N	33W	05	NE	Chuchuna Minerals Company	5/8/2018	160	State
728134	CHU 224	01N	33W	06	SE	Chuchuna Minerals Company	5/8/2018	160	State
728135	CHU 225	01N	33W	07	NE	Chuchuna Minerals Company	5/8/2018	160	State
728136	CHU 226	01N	33W	07	SE	Chuchuna Minerals Company	5/8/2018	160	State
730658	CHU 284	01S	34W	23	NE	Chuchuna Minerals Company	9/13/2019	160	State
730659	CHU 285	01S	34W	24	NW	Chuchuna Minerals Company	9/13/2019	160	State
730660	CHU 286	01S	34W	24	NE	Chuchuna Minerals Company	9/13/2019	160	State
730661	CHU 287	01S	33W	19	NW	Chuchuna Minerals Company	9/13/2019	160	State
730662	CHU 288	01S	33W	19	NE	Chuchuna Minerals Company	9/13/2019	160	State
730663	CHU 289	01S	34W	23	SE	Chuchuna Minerals Company	9/13/2019	160	State
730664	CHU 290	01S	34W	24	SW	Chuchuna Minerals Company	9/13/2019	160	State
730665	CHU 291	01S	34W	24	SE	Chuchuna Minerals Company	9/13/2019	160	State
730666	CHU 292	01S	33W	19	SW	Chuchuna Minerals Company	9/13/2019	160	State
730667	CHU 293	01S	33W	19	SE	Chuchuna Minerals Company	9/13/2019	160	State
730668	CHU 294	01S	34W	25	NW	Chuchuna Minerals Company	9/13/2019	160	State
730669	CHU 295	01S	34W	25	NE	Chuchuna Minerals Company	9/13/2019	160	State
730670	CHU 296	01S	33W	30	NW	Chuchuna Minerals Company	9/13/2019	160	State
730671	CHU 297	01S	33W	30	NE	Chuchuna Minerals Company	9/13/2019	160	State

730672	CHU 298	01S	34W	25	SW	Chuchuna Minerals Company	9/13/2019	160	State
730673	CHU 299	01S	34W	25	SE	Chuchuna Minerals Company	9/13/2019	160	State
730674	CHU 300	01S	33W	30	SW	Chuchuna Minerals Company	9/13/2019	160	State
730675	CHU 301	01S	33W	30	SE	Chuchuna Minerals Company	9/13/2019	160	State
730676	CHU 302	01S	34W	36	NW	Chuchuna Minerals Company	9/13/2019	160	State
730677	CHU 303	01S	34W	36	NE	Chuchuna Minerals Company	9/13/2019	160	State
730678	CHU 304	01S	33W	31	NW	Chuchuna Minerals Company	9/13/2019	160	State
730679	CHU 305	01S	33W	31	NE	Chuchuna Minerals Company	9/13/2019	160	State
730680	CHU 306	01S	34W	36	SW	Chuchuna Minerals Company	9/13/2019	160	State
730681	CHU 307	01S	34W	36	SE	Chuchuna Minerals Company	9/13/2019	160	State
730682	CHU 308	01S	33W	31	SW	Chuchuna Minerals Company	9/13/2019	160	State
730683	CHU 309	01S	33W	31	SE	Chuchuna Minerals Company	9/13/2019	160	State
730684	CHU 310	02S	34W	1	NW	Chuchuna Minerals Company	9/13/2019	160	State
730685	CHU 311	02S	34W	1	NE	Chuchuna Minerals Company	9/13/2019	160	State
730686	CHU 312	02S	33W	6	NW	Chuchuna Minerals Company	9/13/2019	160	State
730687	CHU 313	02S	35W	12	SW	Chuchuna Minerals Company	9/13/2019	160	State
730688	CHU 314	02S	35W	12	SE	Chuchuna Minerals Company	9/13/2019	160	State
730689	CHU 315	02S	35W	13	NW	Chuchuna Minerals Company	9/13/2019	160	State
730690	CHU 316	02S	35W	13	NE	Chuchuna Minerals Company	9/13/2019	160	State
730691	CHU 317	02S	34W	18	NW	Chuchuna Minerals Company	9/13/2019	160	State
730692	CHU 318	02S	35W	13	SW	Chuchuna Minerals Company	9/13/2019	160	State
730693	CHU 319	02S	35W	13	SE	Chuchuna Minerals Company	9/13/2019	160	State
730694	CHU 320	02S	34W	18	SW	Chuchuna Minerals Company	9/13/2019	160	State

730695	CHU 321	02S	34W	18	SE	Chuchuna Minerals Company	9/13/2019	160	State
730696	CHU 322	02S	35W	24	NW	Chuchuna Minerals Company	9/13/2019	160	State
730697	CHU 323	02S	35W	24	NE	Chuchuna Minerals Company	9/13/2019	160	State
730698	CHU 324	02S	34W	19	NW	Chuchuna Minerals Company	9/13/2019	160	State
730699	CHU 325	02S	34W	19	NE	Chuchuna Minerals Company	9/13/2019	160	State
730700	CHU 326	02S	35W	24	SW	Chuchuna Minerals Company	9/13/2019	160	State
730701	CHU 327	02S	35W	24	SE	Chuchuna Minerals Company	9/13/2019	160	State
730702	CHU 328	02S	34W	19	SW	Chuchuna Minerals Company	9/13/2019	160	State
730703	CHU 329	02S	34W	19	SE	Chuchuna Minerals Company	9/13/2019	160	State
730704	CHU 330	02S	35W	25	NW	Chuchuna Minerals Company	9/13/2019	160	State
730705	CHU 331	02S	35W	25	NE	Chuchuna Minerals Company	9/13/2019	160	State
730706	CHU 332	02S	34W	30	NW	Chuchuna Minerals Company	9/13/2019	160	State
730707	CHU 333	02S	34W	30	NE	Chuchuna Minerals Company	9/13/2019	160	State
730708	CHU 334	02S	35W	26	SE	Chuchuna Minerals Company	9/13/2019	160	State
730709	CHU 335	02S	35W	25	SW	Chuchuna Minerals Company	9/13/2019	160	State
730710	CHU 336	02S	35W	25	SE	Chuchuna Minerals Company	9/13/2019	160	State
730711	CHU 337	02S	34W	30	SW	Chuchuna Minerals Company	9/13/2019	160	State
730712	CHU 338	02S	35W	35	NW	Chuchuna Minerals Company	9/13/2019	160	State
730713	CHU 339	02S	35W	35	NE	Chuchuna Minerals Company	9/13/2019	160	State
730714	CHU 340	02S	35W	36	NW	Chuchuna Minerals Company	9/13/2019	160	State
730715	CHU 341	02S	35W	36	NE	Chuchuna Minerals Company	9/13/2019	160	State
730716	CHU 342	02S	35W	35	SE	Chuchuna Minerals Company	9/13/2019	160	State
730717	CHU 343	02S	35W	36	SW	Chuchuna Minerals Company	9/13/2019	160	State

The claim boundaries have not been surveyed.

4.3 Environmental Liabilities

There are no known environmental liabilities associated with the property.

4.4 Permits

All necessary permits and authorizations are in place for the Company to continue to conduct ground-based exploration on the property including helicopter-supported drilling.

A multi-year APMA application was submitted in 2017 to explore on the property. APMA authorization (APMA# 173099) was approved by the DNR on July 6, 2017 and has been revised four times. The current APMA (#173099#4) is valid until 12/31/2021 along with an additional Miscellaneous Land Use Permit 3099#4.

Reclamation bonding for the project is through the Alaska Statewide Bond Pool, for which there is an annual fee of $112.50 per acre of disturbance. The project is not required to post bond as the area of disturbance is currently less than 5 acres and the project has 0.25 acres of recorded disturbance. An annual reclamation statement was last submitted to DNR April, 2019 documenting no new surface disturbance in 2018.

5 Accessibility, Climate, Local Resources, Infrastructure and Physiography

[portions of the text in this section have been excerpted and modified from the same section of the current 43-101 report from the adjacent Pebble project (Gaunt et al., 2018)]

5.1 Access

Access to the property is typically via air travel from the city of Anchorage, which is situated at the north-eastern end of Cook Inlet and is connected to the national road network via Interstate Highway 1 through Canada to the USA. Anchorage is serviced daily by several regularly scheduled flights from major national and international airports. From Anchorage, there are regular flights to Iliamna and/or Nondalton through three currently active Part 135 air taxi services. Charter flights may also be arranged from Anchorage. From Nondalton, access to the Groundhog property can be accomplished by four-wheeler to the southern portion of the claim block or by helicopter to the remainder.

5.2 Climate

The climate of the Groundhog ranges between continental in winter and more maritime conditions in summer due to variations in local ice cover on Iliamna Lake and, to a lesser extent, the Bering Sea and Cook Inlet. Mean monthly temperatures range from about 55°F in summer to 2°F in winter. There is approximately 50 inches per year of precipitation with a third of that falling as snow. The wettest months are August through October.

The adjacent Pebble Project has demonstrated the climate-conditions do not preclude a 12-month exploration season.

5.3 Infrastructure

The closest public airfield is in the village of Nondalton where the State of Alaska maintains a 2800 foot gravel strip. The Iliamna airport, with two paved 4,920 foot airstrips, suitable for DC-6 and Hercules cargo aircraft, and commercial jet aircraft, is located 16 miles south of the project area (early exploration campaigns at Groundhog were based out of Iliamna). A partly paved, partly gravel road extends from Iliamna to a proposed Newhalen River crossing near Nondalton, but at present it is not possible to drive from Iliamna to Nondalton. The property is currently not connected to any local communities by road.

There is no access road that connects the communities of Nondalton, Newhalen and Iliamna to the coast on Cook Inlet. From the coast, at Williamsport on Iniskin Bay, there is an 18.6 mile state-maintained road that terminates at the east end of Iliamna Lake, where watercraft and transport barges may be used to access Iliamna. The route from Williamsport, over land to Pile Bay on Iliamna Lake, is currently used to transport bulk fuel, equipment and supplies to communities around the lake during the summer months.

Also during summer, supplies are barged up the Kvichak River, approximately 43.4 miles southwest of Iliamna, from Kvichak Bay on the North Pacific Ocean.

A small run-of-river hydroelectric installation on the nearby Tazamina River provides power to Nondalton in the summer months. Supplemental power generation using diesel generators is required during winter months.

5.4 Local Resources

Iliamna and surrounding communities have a combined population of just over 400 people. As such, there is limited local commercial infrastructure except that which services seasonal sports fishing and hunting.

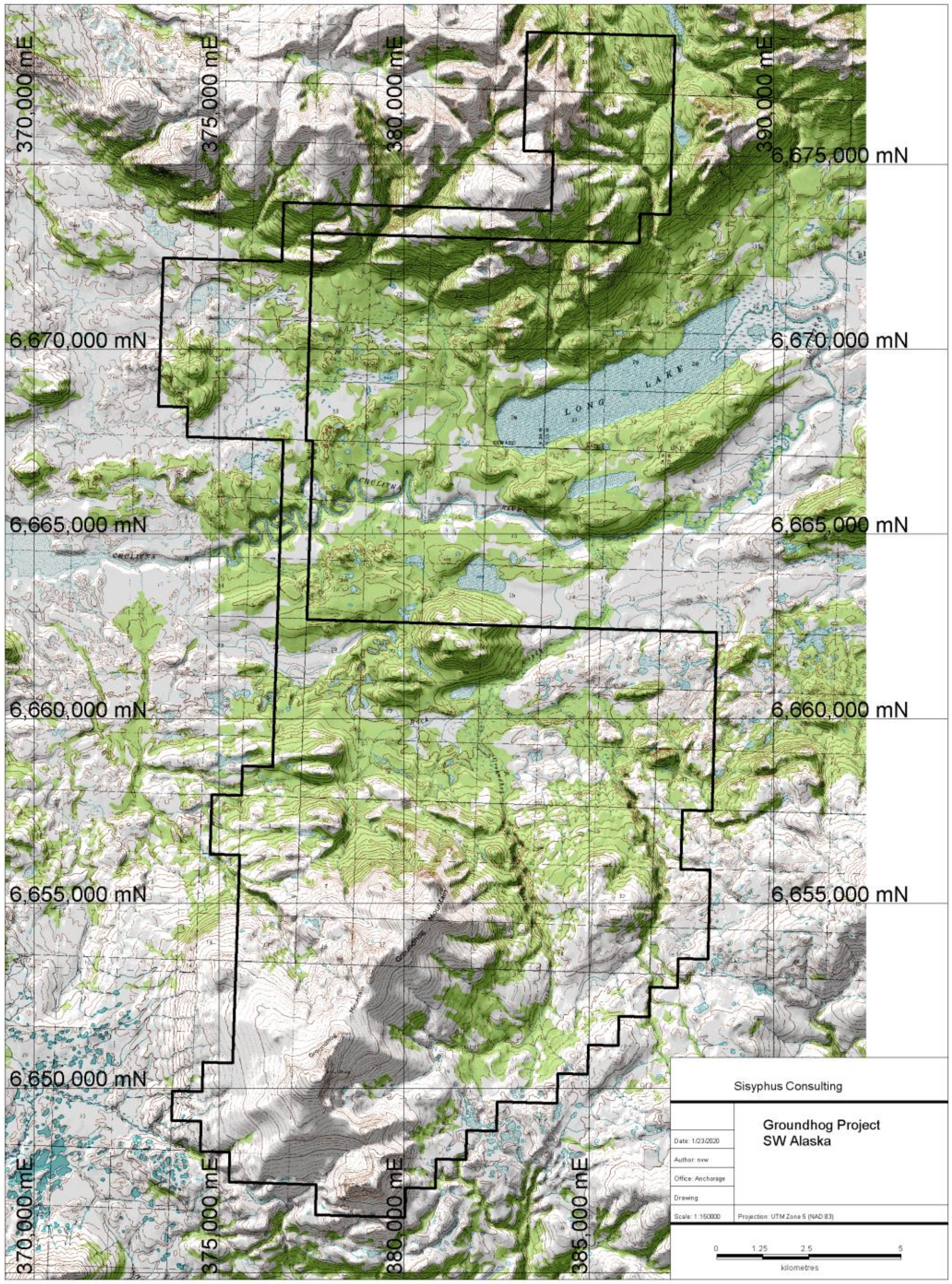

Figure 4: Groundhog property topography.

5.5 Physiography

Property elevation ranges from 3074 ft amsl (937 m) at Groundhog Mountain to 306 ft (93 m). The area consists of rolling hills and low mountains separated by wide, shallow valleys blanketed with glacial deposits that contain numerous small, shallow lakes and streams.

Tundra plant communities (mixtures of shrub and herbaceous plants) cover the project area. Willow is common only along streams, and sparse patches of dense alder are confined to better drained areas where coarse soils have developed. Poorly drained lowland regions support black spruce and marsh vegetation.

6 History

The history of the Groundhog prospect began with the expanded exploration of the adjacent Pebble deposit by the Hunter-Dickinson Group in 2001. Mining claims over the Groundhog prospect area were staked up to the edge of adjacent Pebble claim block by AERI on behalf of a private investor between December 2004 and February 2005. AERI and AES share two owner-investors and AERI contracted preliminary investigations to AES which included geologic mapping, sampling, a CSAMT geophysical survey and a dipole IP survey between 2005 and 2007. The business relationship between AERI and the initial investor were dissolved and ownership in the Groundhog project claims was reassigned to AES in 2009. The following year the property was optioned to Kennecott Exploration (KEC), a subsidiary of Rio Tinto Corporation. At that time Rio Tinto was a 19.8% owner of the adjacent Pebble deposit.

In June 2010 KEC commissioned a detailed high resolution helicopter-borne aeromagnetic geophysical survey over the Groundhog project area and a ground-based “deep-looking” 3D magnetotelluric (3DMT) survey. In Jan 2011 KEC applied for drilling permits for seven sites based on the aeromagnetic data. In July 2011 they commenced a VIP (reconnaissance induced polarization) survey followed immediately by dipole IP surveys along specific areas of interest. During the same 2011 summer field season KEC conducted geologic mapping and sampling (Laberge, 2011).

No further fieldwork was performed by KEC after 2011 and in 2014 Rio Tinto donated its shares in Pebble to local charities and withdrew from the project.

In 2014 Chuchuna was incorporated with the Groundhog project as the principle asset. In April 2017 Quaterra entered into an agreement with Chuchuna with Quaterra providing $5 million over five years in exploration spending, later amended to six years, in order to earn a 90% interest in Groundhog. Quaterra is also required to pay a lump sum of $3 million at the end of the sixth year. Quaterra has no obligation to exercise its option and can terminate the agreement at its discretion annually. Chuchuna is the operator of the project and plans, implements and manages exploration field programs as set out in a budget and work plan approved by Quaterra.

During the 2017 field season three of the previous IP lines were extended to permit greater signal penetration-depth together with a one new additional line. From August to September 2017 four drillholes were completed at Groundhog targeting IP anomalies in addition to further surface geologic mapping and sampling. Drill results are discussed further in the Section 10.

In 2019, 1664 line-km ZTEM and magnetic survey was flown and interpreted (Inman, 2019), 60 additional claims were staked together with a modest program of surface sampling and mapping.

7 Geological Setting and Mineralization

7.1 Regional Geology

[The following section is excerpted from Gaunt et al., 2018 from their regional geology description of the adjacent Pebble deposit, itself derived largely from Goldfarb et al. (2013).]

The tectonic and magmatic history of southwest Alaska is complex interaction between the formation of sedimentary basins between tectonostratigraphic terranes, amalgamation of these terranes and their translation along crustal-scale strike-slip faults, and episodic magmatism and formation of related mineral occurrences (Plafker and Berg, 1994).

The allochthonous Wrangellia superterrane comprises the amalgamated Wrangellia, Alexander and Peninsular oceanic arc terranes that approached North America from the southwest in the early Mesozoic.

West-dipping subduction beneath the superterrane formed the Late Triassic to Early Jurassic Talkeetna oceanic arc, which is now preserved in the Peninsular terrane east of Pebble (Figure 5). Several foreland sedimentary basins dominated by Jurassic to Cretaceous flysch, including the Kahiltna basin that hosts the Pebble deposit (Kalbas et al., 2007), formed between Wrangellia and pericratonic terranes and previously amalgamated allochthonous terranes of the Intermontane belt (Wallace et al., 1989; McClelland et al., 1992).

Basin closure occurred as Wrangellia accreted to North America by the late Early Cretaceous (Detterman and Reed, 1980; Hampton et al., 2010). Between approximately 115 to 110 Ma and 97 to 90 Ma, the strata in the foreland basins were folded, complexly faulted and subjected to low-grade regional metamorphism (Bouley et al., 1995; Goldfarb et al., 2013). Intrusions at Pebble are undeformed (Goldfarb et al., 2013) and were probably emplaced during a period when at least local extension occurred across southwest Alaska in the mid-Cretaceous (e.g. Pavlis et al., 1993).

Since the early Late Cretaceous, deformation in southwest Alaska has occurred mostly on major dextral strike-slip faults, broadly parallel to the continental margin. The major Denali fault in central Alaska forms the contact between the Intermontane Belt and the collapsed flysch basins (Figure 5). Smaller, subparallel faults are located south of the Denali fault, and the Pebble district is located between what are probably terminal strands of the Lake Clark fault zone; Shah et al., 2009). The Lake Clark fault zone marks the poorly defined boundary between the Peninsular terrane to the southeast and the Kahiltna terrane, which hosts Pebble, to the northwest. Haeussler and Saltus (2005) propose about 16.1 miles of dextral offset along the Lake Clark fault zone, most of which is interpreted to have occurred prior to approximately 38 to 36 million years ago. Recent field studies of geomorphology along the Lake Clark fault indicate that this structure has not experienced seismic activity for at least the last 10,000 years (Haeussler and Saltus, 2005, 2011; Koehler, 2010; Koehler and Reger, 2011). Other sub-parallel strike-slip faults also form terrane boundaries in the region, including the Mulchatna and Bruin Bay faults (Figure 5). Goldfarb et al. (2013)

propose that most or all movement on these smaller structures occurred during oroclinal bending in the Tertiary, after formation of the Pebble deposit.

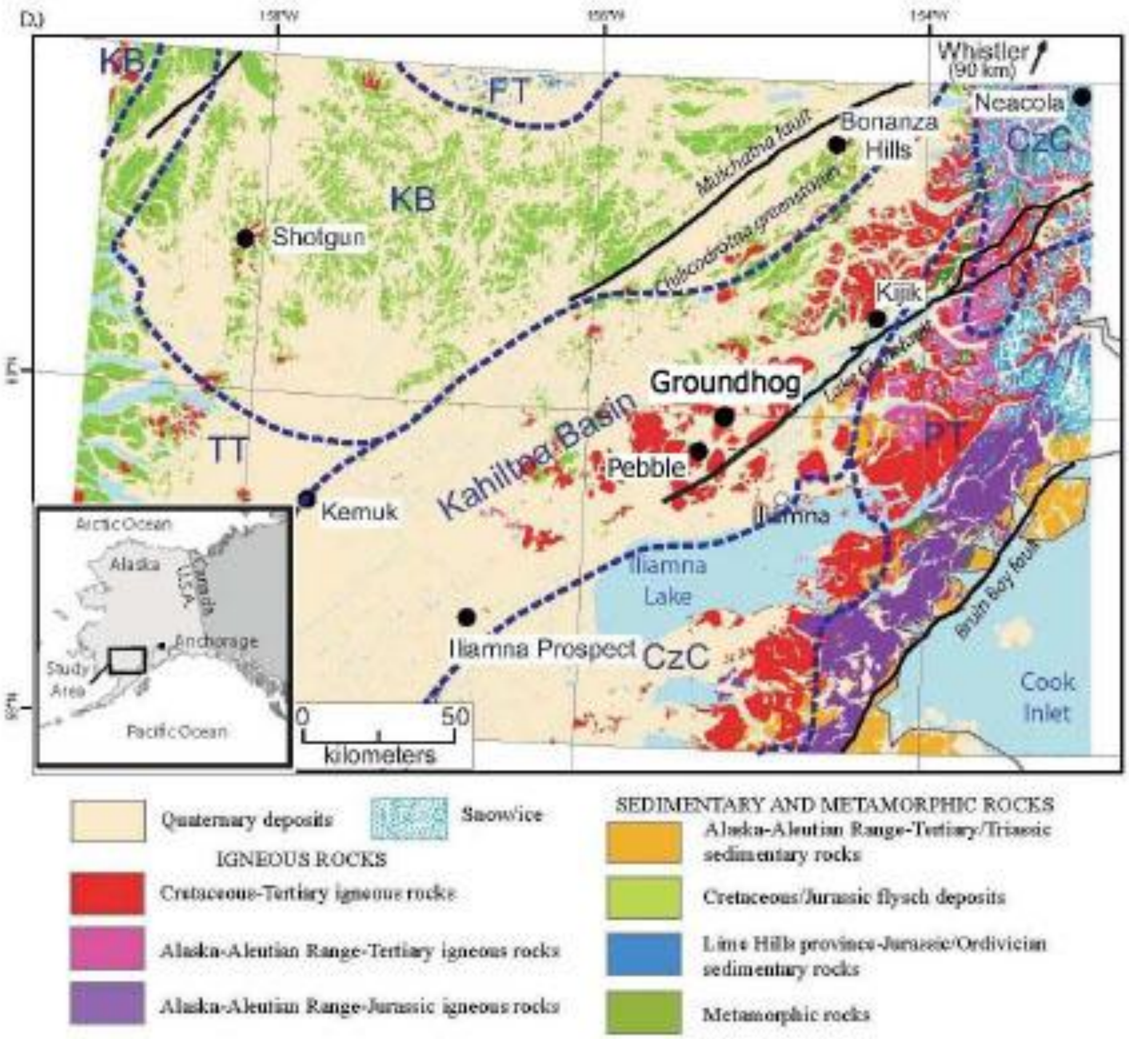

Figure 5: Location of Groundhog within regional geology of SW Alaska (modified from Gaunt et al., 2018)

7.2 Local and property geology

There are three salient features of the local property-scale geology relevant to the regional geology framework described in the preceding section.

First, the topographic high portions of the property are underlain by Tertiary-aged volcanic, volcaniclastic and hypabyssal intrusive rocks. Second, this package of rocks overlies older deformed, Kahiltna-flysch sequence metasediments intruded by Mesozoic-aged igneous rocks. This package can be observed in scattered outcrop in the topographically lower portions of the property. This basement sequence is directly correlative with the package hosting the Pebble deposit. Finally the entire property is variably mantled by recent glacially derived deposits. The details of this are discussed below. Much of the property scale geology was elucidated by KEC in 2010-11 and described in the internal company report of Leberge (2011), from which the following descriptions are excerpted.

7.2.1 Jura-Cretaceous metasediments

The oldest unit exposed on the property is a flysch sequence of fine-grained, light green, thinly bedded siltstone, mudstone and massive greywacke. Bedding is commonly well preserved in these rocks, with thin beds a few centimeters thick. The sediments have been regionally metamorphosed from greenschist to lower-amphibolite facies with some middle amphibolite facies contact metamorphism near Jura-Cretaceous mafic intrusions locally containing clinopyroxene ± cordierite. The mineralogy and chemistry suggests that these sediments are andesitic in composition. This unit is interpreted to correlate with the Kahiltna flysch (Koksetna River sequence?).

7.2.2 Jura-Cretaceous intrusive rocks

The Jura-Cretaceous sedimentary sequence is intruded by some intermediate to mafic intrusive bodies a few kilometers in length. These intrusions are mainly composed of fine- to medium grained gabbro and form strong magnetic anomalies. The three main intrusions have been referred to, from south to north, as Alpha, Beta and Gamma. Alpha is Late Jurassic medium grained ophitic gabbro dated by U-Pb at 149.2 ± 0.3 Ma. It is commonly banded, with 2-10 mm thick alternating leucocratic and mesocratic bands. Beta is a Late Cretaceous medium-grained biotite gabbro, yielding a U-Pb age date of 98.2 ± 0.2 Ma. It is generally equigranular, massive, with local K-feldspar veins and epidote veinlets. Gamma is a fine-grained, magnetite-rich, massive gabbro, likely of Cretaceous age. It is very poorly exposed and has only been observed at one outcrop.

Veinlets containing pyrite and chalcopyrite have been observed on Alpha and Beta, but no significant mineralization was found. Beta yielded the highest Cu content with values up to 0.5%. Au values were consistently low in these intrusions, with Au/Cu ratio of ~0.2 (ppm/%).

7.2.3 Tertiary Volcanics

Tertiary volcanic rocks represent the most common and best exposed units on the property. It is a sequence of volcanic flows and tuffaceous beds of various compositions which are not easily split in lithological map units. The units presented here attempt to group some lithologies for simplification.

7.2.3.1 Intermediate Volcanic Rocks

This unit is composed mostly of porphyritic dacite and massive to porphyritic andesite. Euhedral plagioclase phenocrysts up to 3 mm are common in these rocks, as well as smaller subhedral clinopyroxene phenocrysts <1mm in size. The matrix varies from a light grey glassy matrix to a medium grey to purplish-grey fine-grained matrix. These rocks are moderately magnetic. Note that some rhyolitic to intermediate tuffaceous beds and minor basalt are also present within the unit.

7.2.3.2 Intermediate Tuffaceous Rocks

A volcaniclastic sedimentary unit of lithic intermediate tuff has been mapped above the intermediate volcanics. It is composed mainly of grey, fine-grained andesitic volcaniclastic rocks, with minor amount of white, fine-grained porphyritic rhyolite and rhyolitic tuff. These rocks are locally bedded and commonly have the appearance of a siltstone. They are either ash to lithic tuffs or volcaniclastic siltstone.

7.2.3.3 Mafic Volcanic Rocks

Sub-horizontal basaltic flows are well exposed at higher elevations on Groundhog Mountain, dipping at shallow angle to the south. Flows are 10-30 m thick and commonly columnar jointed. The basalt is dark-grey, very magnetic, fine-grained and massive. Thin rhyolitic tuff is locally interbedded within the basaltic sequence.

7.2.3.4 Rhyolitic Tuff

Although rhyolitic tuff occurs throughout the Tertiary volcanic package on the property, some beds have been mapped independently. These rhyolitic to rhyodacitic tuff are white, fine grained, and commonly porphyritic, with small euhedral quartz and/or plagioclase phenocrysts up to 2 mm in size. The matrix is glassy to aphanitic, locally banded. These include ash tuffs, crystal tuffs and welded tuffs.

7.2.3.5 Volcanic Breccia

Two small lenses of volcanic breccias have been mapped on the north slope of Groundhog. These breccias are composed of angular volcanic fragments generally a few mm in size, but locally up to 10 cm, in a fine-grained, light-green matrix. It is not clear whether these breccias are truly volcanic or cataclastic breccias.

7.2.3.6 Tertiary Intrusive

Rubble crop of intermediate intrusive rocks are present on the ridge extending northeast from the peak of Groundhog. Because these rubble crops are located on the ridge and within zones of subcrop, it is believed that this rubble and boulders are locally derived. This unit is a medium to fine-grained, light-colored, leuco-diorite with hornblende, magnetite, biotite and common secondary epidote. The diorite is strongly magnetic, and the extent of the unit was interpreted from the magnetic data. Whole-rock composition indicates it is a silica-saturated alkalic intrusion.

7.2.4 Quaternary Geology

Hamilton and Klieforth (2010) prepared a detail surficial geology report and map of the Iliamna D6 and D7 quadrangles. Portion of their mapping extends on to the southern tip of the Groundhog property.

Their mapping and analysis identified the latest Wisconsin-aged ice advance (Newhalen stade) as responsible for the mantling moraines present along the southern property boundary at high elevations on the flanks of Groundhog Mountain. Their inferred ice-flow direction was from the northeast flowing to the southwest into the Iliamna Lake drainage basin.

7.2.5 Structural Geology

7.2.5.1 Folding

Deformation observed on the Groundhog property is dominated by late brittle faults that cut through the Tertiary sequence. Outcrop-scale folding has not been observed in any unit, but the Jura-Cretaceous sedimentary package is regionally known to be affected by broad, open folding. The Jura-Cretaceous sediments generally dip to the north 60°-70°, but dip 35°-65° to the south in the vicinity of the Alpha anomaly. Tertiary stratigraphy, well exposed on Groundhog Mountain, appears upright and is locally tilted ~10° to the south-southwest.

7.2.5.2 Faulting

Most faults on the property have been interpreted from the airborne magnetic data acquired in 2010. Two major sets of faults have been interpreted, one striking northeast and the other striking west-northwest to northwest. The northwest structures appear to be cut by the northeast faults. Because of a poor understanding of the Tertiary stratigraphy, the displacement on these faults is poorly constrained. By extending faults from the Pebble property, combined with IP data observations, the northeast-striking faults appear to be normal faults dipping to the southeast. The most prominent of the NE-trending fault continuing along strike from the Pebble deposit is identified as the ZG Fault at Groundhog.

Fault breccia has been observed on multiple Tertiary outcrops and as rubble crop, commonly where faults had also been interpreted from the magnetic data. These cataclastic breccias are clearly the result of brittle deformation along Tertiary or later faults. Fault breccias are cutting though volcanic and volcaniclastic units, contain angular fragments a few millimeters to a few centimeters in size, and are partially to fully indurated.

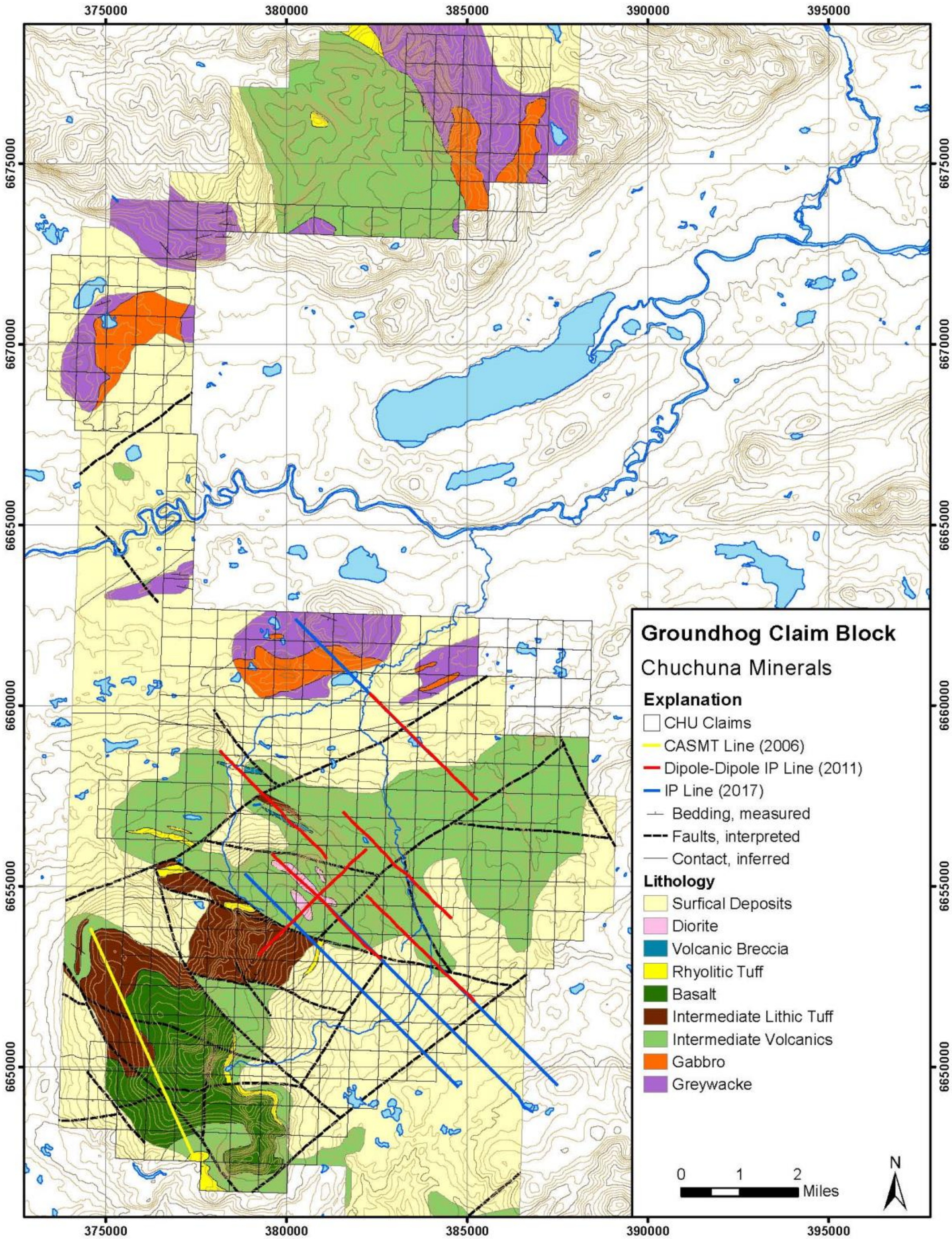

Figure 6: Property geology (Leberge, 2010)

8 Deposit Type

The adjacent Pebble deposit is described as a copper-gold-molybdenum porphyry deposit (Gaunt et al. 2018). They further go on to state:

"*Pebble has one of the largest metal endowments of any gold-bearing porphyry deposit currently known. Comparison of the current Pebble resource to other major gold-bearing porphyry deposits shows that it ranks at or near the top in terms of both contained copper and gold. In fact, Pebble is both the largest known undeveloped copper resource and the largest known undeveloped gold resource in the world today*."

[The author has not verified this information, and it is not necessarily indicative of the mineralization on the Groundhog Project.]

This observation is the basis for the mineral deposit type being explored for at the Groundhog property, specifically all exploration to date has been focused on finding a similar copper-gold-molybdenum porphyry deposit.

The characteristics of porphyry copper deposits are summarized by Sinclair (2007):

Porphyry deposits are the world's most important source of Cu and Mo, and are major sources of Au, Ag, and Sn; significant byproduct metals include Re, W, In, Pt, Pd, and Se. They account for about 50 to 60% of world Cu production and more than 95% of world Mo production. In Canada, they account for more than 40% of Cu production, virtually all Mo production, and about 10% of Au production. Porphyry deposits are large, low- to medium-grade deposits in which primary (hypogene) ore minerals are dominantly structurally controlled and which are spatially and genetically related to felsic to intermediate porphyritic intrusions. They are distinguished from other granite-related deposits such as skarns and mantos by their large size and structural control, mainly stockworks, veins, vein sets, fractures, and breccias. Porphyry deposits typically contain hundreds of millions of tonnes of ore, although they range in size from tens of millions to billions of tonnes; grades for the different metals vary considerably but generally average less than 1%. In porphyry Cu deposits, for example, Cu grades range from 0.2% to more than 1% Cu; in porphyry Mo deposits, Mo grades range from 0.07% to nearly 0.3% Mo. In porphyry Au and Cu-Au deposits, Au grades range from 0.2 to 2 g/t Au. Associated igneous rocks vary in composition from diorite-granodiorite to high-silica granite; they are typically porphyritic epizonal and mesozonal intrusions, commonly subvolcanic. A close temporal and genetic relationship between magmatic activity and hydrothermal mineralization in porphyry deposits is indicated by the presence of intermineral intrusions and breccias that were emplaced between or during periods of mineralization. Porphyry deposits range in age from Archean to Recent, although most economic deposits are Jurassic or younger.

9 Exploration

On account of the geologically perspective interval of rocks at the Groundhog property being covered by Tertiary-aged and younger rocks and unconsolidated material much of the exploration has utilized geophysical methods. However a systematic ground-based geologic mapping program has been completed as well as selected areas covered by geochemical soil sampling. Four widely-spaced areas have been tested with reconnaissance core drilling.

Details are discussed below in broadly chronological order subdivided into geophysical surveys and surface geological mapping and sampling programs. The following section on geophysical surveys is largely based on an internal company report (Inman, 2019) cited without direct attribution.

All exploration work conducted after April 2017 was conducted on behalf of Quaterra.

9.1 Geophysical surveys

9.1.1 2006 to 2007 CSAMT and IP

In August and September 2006 Zonge International was contracted to perform a CSAMT survey over the southern portion of the claim block. A single line (7.8 line-km) data was collected and resistivity was measured and processed both with 1D and 2D inversion techniques. The following year in early spring 2007 one line (4.8 km long) of dipole-dipole IP was completed along the CSAMT line from stations 2600N to 7400N, essentially the NW portion of the CSAMT line. The survey was completed with 150m dipoles and readings to N=8 which generally results in a depth of investigation equal to 250-350m below surface. The resistivity section is very similar to that of the CSAMT; i.e. mixed high resistivity and conductivity to a depth of 150m (volcaniclastics and intermediate volcanics) and conductive unit (<50 ohm-m) extending to the bottom of the section near 350m depth. The IP response is very low over the entire line (<4 mrads) to the full depth of the section. It would appear the use of 150m dipole size was insufficient to 'see' through the Tertiary volcanic rocks; except for the odd station at the largest dipole separation (N=8) which is anomalous at four locations: 4250, 5400, 6400 and near the NW end of the line at 7200. These stations are shown as yellow dots in Figure 9. There are at least two possible explanations of these results:

1. The anomalous stations are the result of alteration/mineralization within the Tertiary volcanic rocks; or
2. The 150m dipole spacing was insufficient to 'see' through the Tertiary volcanic rocks except in a very few areas (as noted) where anomalies were just detected sourced from alteration/mineralization from below at a depth exceeding 350m, within the pre-Tertiary basement rocks. These small and isolated 'peeks' extend over a distance of 3500m along the IP line and could be considered leakage from a deeper zone.

9.1.2 2010 to 2011 geophysical surveys

KEC commissioned a helicopter-borne magnetic survey by MPX Geophysics, Ltd. in June 2010. A total of 1,745.7 line-kilometers of data were acquired over a total area of 314.7 km². The survey blocks were flown at a nominal mean terrain clearance of 70 meters (40 meters for the magnetic sensor). The survey blocks were flown along N-S (001.5°) flight lines separated by 200 meters, and E-W (091.5°) tie lines at a line separation of 2000 meters.

Three significant areas of magnetic highs were detected: Alpha (gabbroic intrusive in the Groundhog Mountain area); Beta (gabbroic intrusive approximately 10km NNW of Alpha and Gamma (unknown source) 16 km NNE of Alpha. Figure 7 shows the extent of the aeromagnetic survey with named anomalies.

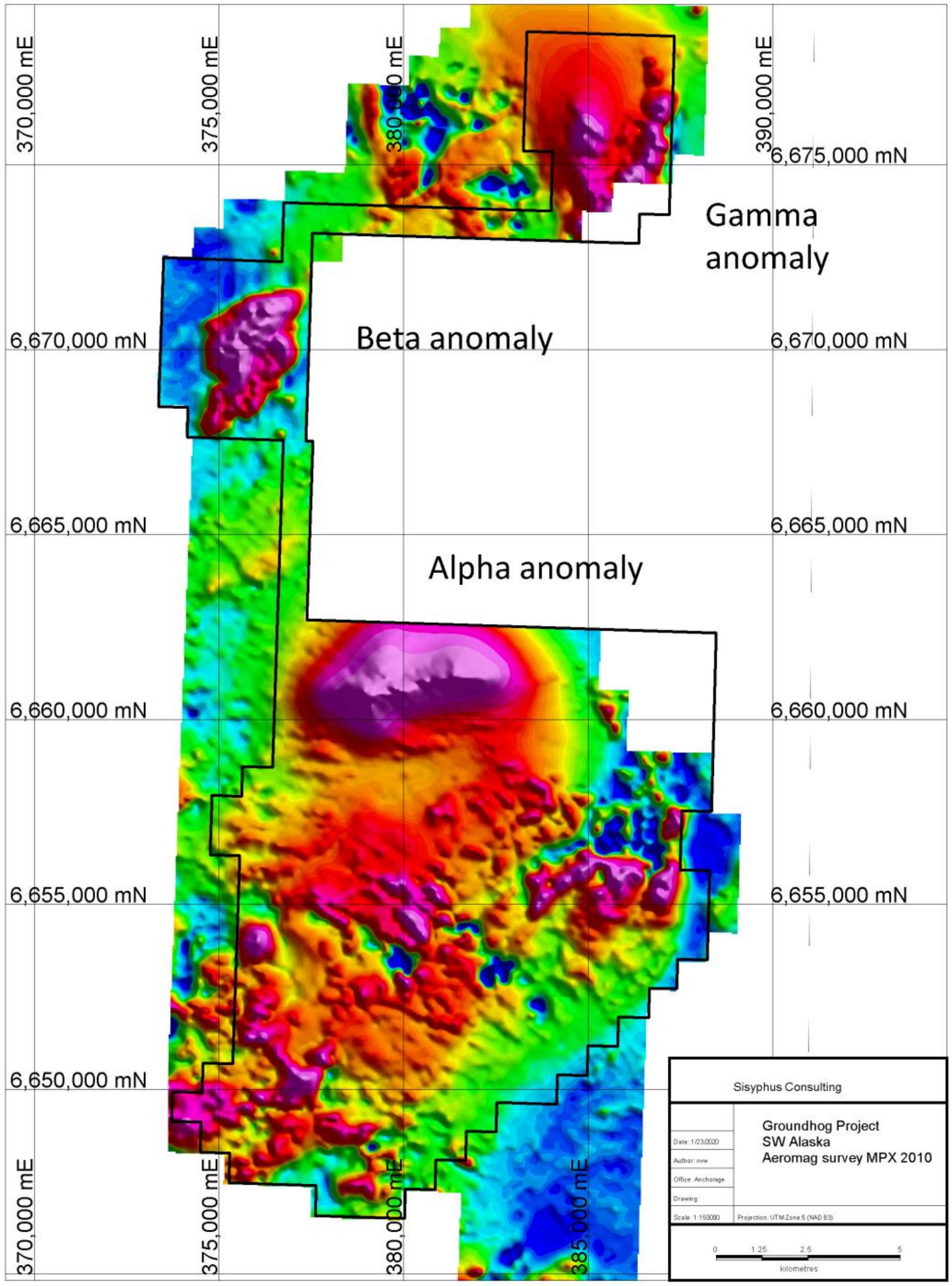

Figure 7: 2010 aeromagnetic survey Groundhog project

In July 2010 a ground-based magneto-telluric survey (MT) consisting of 185 stations covering an area of 135 km^2 with the data reduced to an 800 by 800 m grid. The survey covered nearly all of the magnetic high characterizing the Groundhog and Pig Mountain area EXCEPT for the Alpha magnetic high itself. Both 2D and 3D inversions of the MT resistivity data were completed.

A thick, layered conductive feature is mapped in the southern portion of the area and was presumed to be indicative of Tertiary volcanic rocks exceeding 500m in depth. The MT 3D model would suggest the thickest interpreted Tertiary rocks occur at the SW edge of the claim block thinning to the N and NE from that point.

Within the MT survey area a significant NW-SE trending high resistivity (>2000 ohm-m) feature and a NNW-SSE trending low resistivity (<80 ohm-m) feature dipping to the NE can be noted.

From July to August 2011 KEC commissioned Zonge International to collect vector IP survey (VIP), or reconnaissance IP, in the areas where the MT survey had identified a relatively shallow resistive feature. Chargeable anomalies from the VIP survey were then followed up with some dipole-dipole IP lines. The purpose of the double-dipole IP survey was to identify chargeable features that could be associated with porphyry-style alteration (Leberge, 2011).

The VIP survey consisted of measurements at 94 stations utilizing three transmitter setups covering an area of 89.2 km². The resultant data was gridded at a 1 km resolution.

IP surveys were run that included VIP as well as 6 lines of dipole-dipole IP, utilizing 300m dipoles to achieve a depth of investigation exceeding 500m depth and in most cases exceeding 600m depth.

The VIP survey layout is similar to the MT layout with a grid of receiver stations on 1000m centers. A total of 94 stations were collected using three different transmitting locations to achieve coverage and signal strength over an area of nearly 9000 hectares. The VIP survey was offset to the north relative to the MT survey, but did cover the features noted earlier in the MT survey but also fell short of covering the gabbro intrusive and main magnetic anomaly to the northwest (Alpha). Figure 10 shows the individual VIP stations with IP values in mradians and an approximate outline of the anomalous areas. The VIP identified two major areas of IP anomalies; a NW sector and a SE sector. The NW sector follows the high resistive body defined in the MT data and includes the copper anomalous gabbro intrusive. The SE sector is also open to the south and east and contains anomalous stations east of the ZG fault zone; however, VIP stations are indicative of a general area of IP response and the source of the anomalous stations east of the fault could actually lie back to the west towards the bipole transmitters.

Six dipole-dipole IP survey lines (18 line-km) with dipole spacing of 300 meters and N=1 to 8 were also completed in 2011. Lines are oriented NW-SE except for line 4 which was oriented NE-SW and crosses lines 3 as well as the area between lines 1 and 6 (Figure 8). In 2017, prior to drilling, the three pre-existing dipole-dipole IP lines were extended as a means to increase the depth of analysis with the same dipole spacing of 300 meters but with N=1 to 10. The depth of investigation of this survey exceeds 600m below ground surface. Three of the lines, L1, L3 and L5 are extensions and overlaps of lines run in 2011. Line 10 is a new line located SW of line 3. Zonge International performed the geophysical survey under contract.

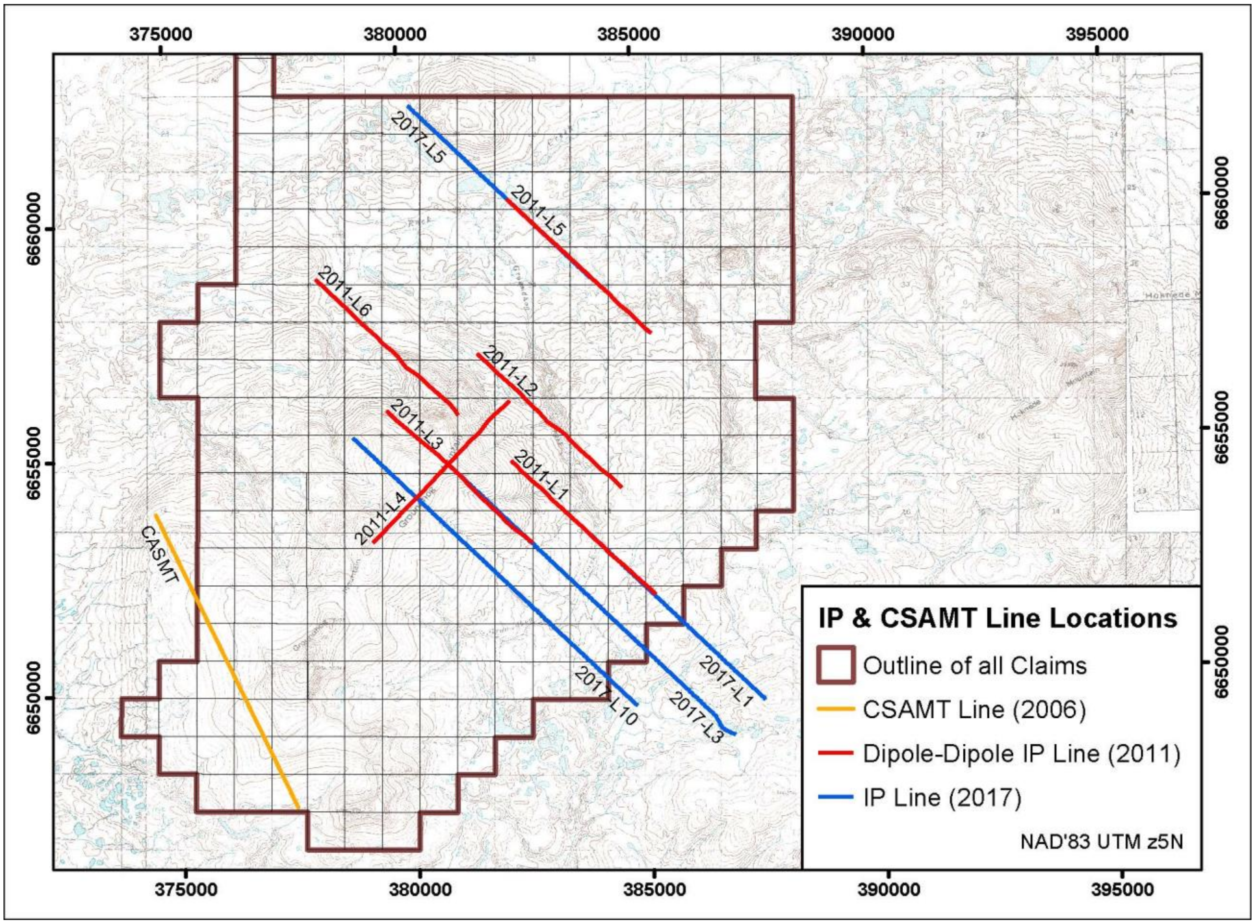

Figure 8: IP line locations for ground IP surveys completed in 2007, 2011 and 2017

9.1.3 Discussion of 2011 and 2017 IP results

The results of the IP surveys indicate significant anomalies occur on every line. It is problematic to correlate anomalies from line-to-line because of the wide spacing between lines, which is as great as 4 km (lines 5 and 6) and the minimal spacing of 1 km (lines 3, 6, 10, 1 and 2). The anomalies are shown as color-coded bars in Figure 9 along each line, with the shallower anomalies (<300m depth to top) above the line itself and the deeper anomalies (>300m and generally 500m or greater) below the lines. The strength of the anomalies is color-coded as follows:

Intense – red - >50 mradians; ~7%+ by volume metallic sulfides

Strong – orange – 40-50 mradians; 5-7% by volume metallic sulfides

Moderate – green – 25-40 mradians; 3-5% by volume metallic sulfides

Weak – light blue – 15-25 mradians; < 3% by volume metallic sulfides

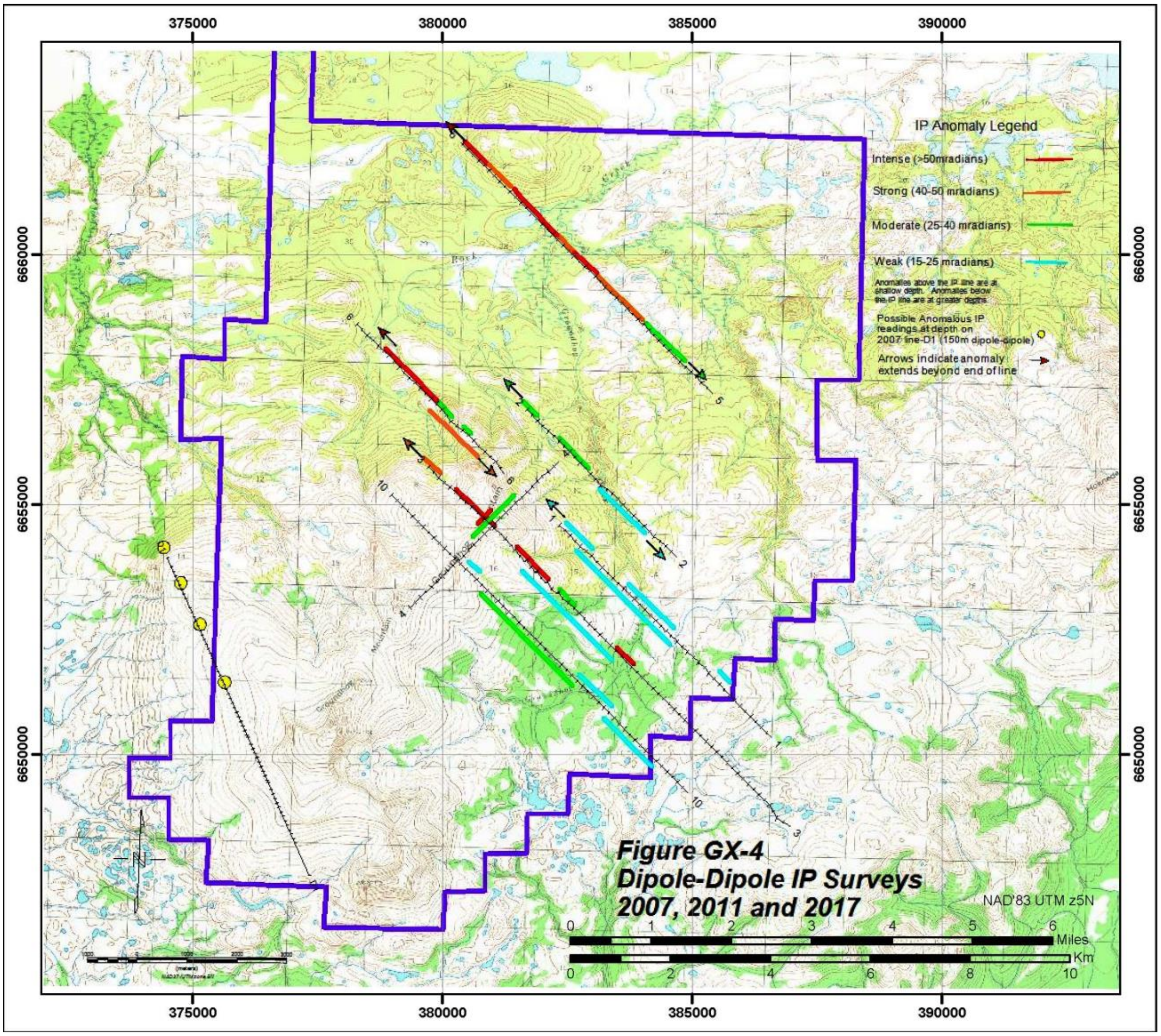

Figure 9: IP surveys with anomalous chargeability areas indicated

Figure 10 summarizes the results of the 2011 VIP survey as identifying two major sectors of anomalous VIP data; a NW sector extending from Groundhog Mountain 4-5 km further to the NW and a SE sector on the east side of Groundhog Mountain. Further, the VIP survey seems to have established the limits of the shallow anomalies defined by the dipole-dipole surveys, although the dipole-dipole survey provides much greater detail about the individual anomalies; specifically, depth, extent and strength.

NW Sector- Two dipole-dipole lines, 5 and 6, contain shallow 'intense' IP anomalies near the NW ends of both lines, and both extend beyond the ends of the lines. The anomalous zone on line 5 occurs within the immediate area of the Cu-anomalous gabbro intrusive. The anomaly on line 6 (unknown full extent) occurs in an area that is indicated to be an extension of the gabbro intrusive based on the helicopter magnetic map. Outcropping gabbro is 1500m to the north, and yet the magnetics indicate it is likely to extend beyond the apparent outcrop to the south.

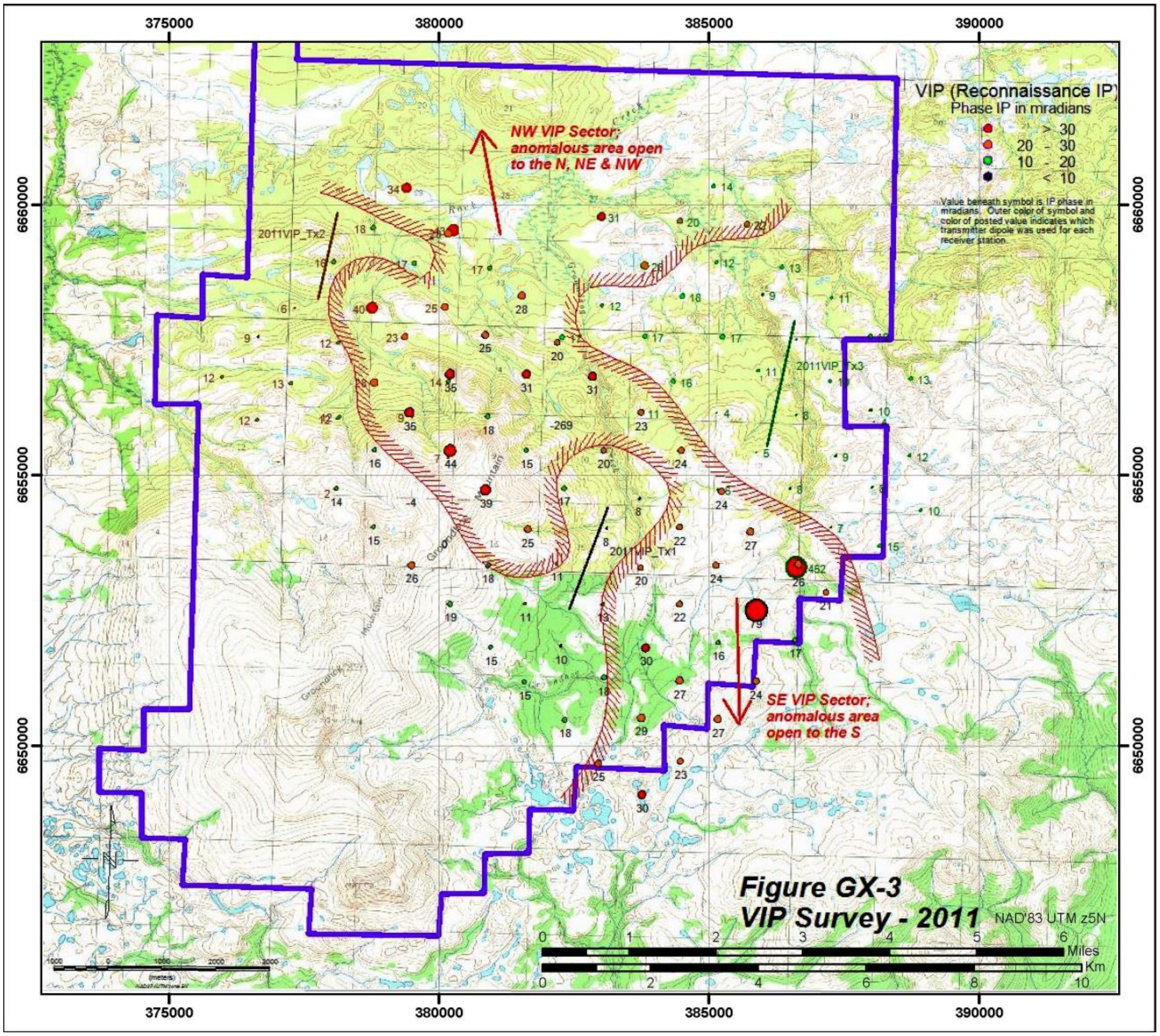

Figure 10: VIP interpretation

SE Sector – Zones of ‘intense, strong and moderate’ IP anomalies occur on all of the remaining lines with the strongest group occurring on Line 3. A number of these zones occur near the top of Groundhog Mountain and west of the SE sector. And an additional tantalizing target occurs at depth exceeding 500m, dipping to the E and SE. These IP anomalies are generally moderate in strength but this could be a result of the depth at which they occur. Further, it appears the anomalies continue to the point of offset along the ZG normal fault zone, at which point the zones are terminated or more likely they are down-dropped beyond the ability of 300m dipole-dipole IP to sense the response; which is the case at the east side of Pebble East. The deep anomalous zones occur on lines 6, 2, 1, 3 and 10; and there is indication on line 10 of a deep response on the down-dropped side of the fault (the response could also be shallower but off-line to the south). Additionally, the shallow 'intense' anomalies on line 3 appear to be connected to and likely sourced (leakage) from a more extensive deep zone.

Summarizing the IP results, a major zone of intense IP anomalies possibly 4 km in size has been delineated in the NW sector and remains open in all directions. Shallow zones of narrow but intense/strong IP anomalies occur in the SE sector and appear to be sourced from a more extensive, deep source.

9.1.4 2019 ZTEM and magnetics

In parts of August and September 2019 a helicopter borne ZTEM and magnetic survey was flown over the southern portion of the claim block by Geotech, Ltd. 1664 line-km were flown covering an area of 467 km^2. Line spacing was 300 m with calculated resistivities recorded at frequencies from 30 hz to 720 hz. Of interest and relevance is a case study published by Geotech of a similar ZTEM survey over the adjacent Pebble deposit (Geotech, 2015).

ZTEM is very similar to MT and the results of the 2d inversion of the ZTEM data are very similar to the 2d and 3d inversion of the data from the 2010 MT survey. It is noted that ZTEM and MT do NOT measure IP response, but rather measure changes in resistivity. However, IP response from sulfides is often associated with changes in resistivity typical of various alteration types.

The ZTEM survey data were process and interpreted with nineteen targets identified based on similarities to other ZTEM surveys over known porphyry deposits, including the adjacent Pebble deposit (Inman, 2019). Targets with a top ranking, rank 1, most closely resemble the response to known deposits, whereas ranks 2 and 3 are of interest but less similar to the known deposits. The targets shown in Figure 11 are colored red are rank 1 anomalies, those colored orange rank 2 and blue is used for the lowest rank 3.

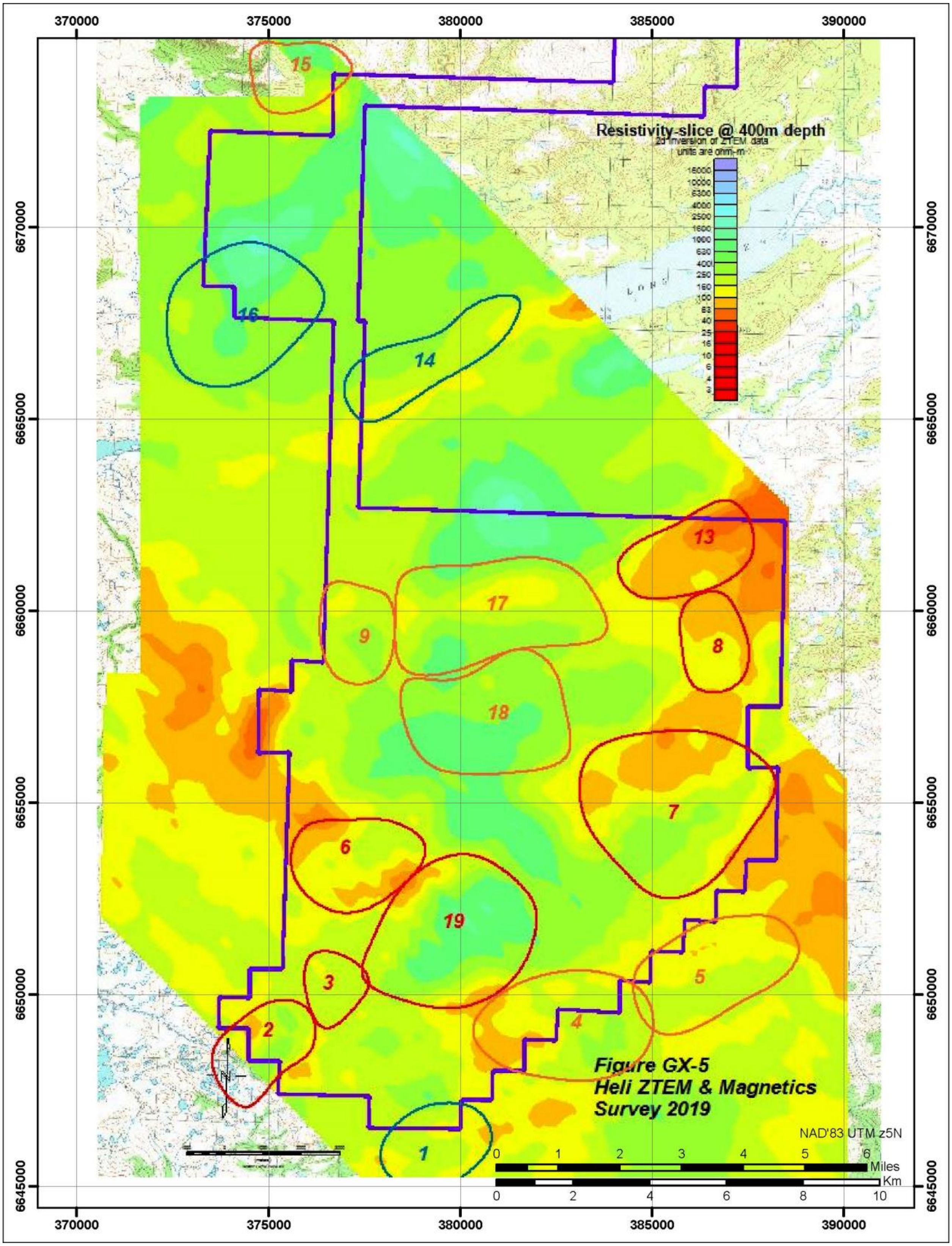

Figure 11: ZTEM targets

9.2 Surface geochemical sampling and mapping

9.2.1 2006 to 2008

Prior to KEC involvement in the Groundhog project 460 soil, rock chip and stream sediment samples were collected using conventional sampling methods in conjunction with 256 vegetation samples. None of the results were deemed anomalous with subsequent follow-up work.

9.2.2 2010 to 2011

Following identification of the Alpha and Beta magnetic anomalies by KEC in 2010, rock chip and soil sampling over the areas indicated the presence of anomalous copper in gabbroic rocks with values as high as 1810 ppm Cu at Alpha and 5060 ppm Cu at Beta.

KEC focused their surface sampling for lithological characterization to aid in their mapping, collecting 19 whole rock samples for major and trace element geochemistry as well as selective geochronology samples.

13 rock and 60 soil samples were recorded as collected as part of the property-wide geochemical database.

9.2.3 2017 to 2019

In addition to 384 DDH core samples discussed in section 10, 105 rock, soil and stream silt samples were collected primarily along IP line extensions. In 2019, in a program designed to address whether selective leach techniques could identify geochemical anomalies beneath the younger Tertiary cover 66 selective leach samples were collected along with 7 till samples within the southern limits of the claim block.

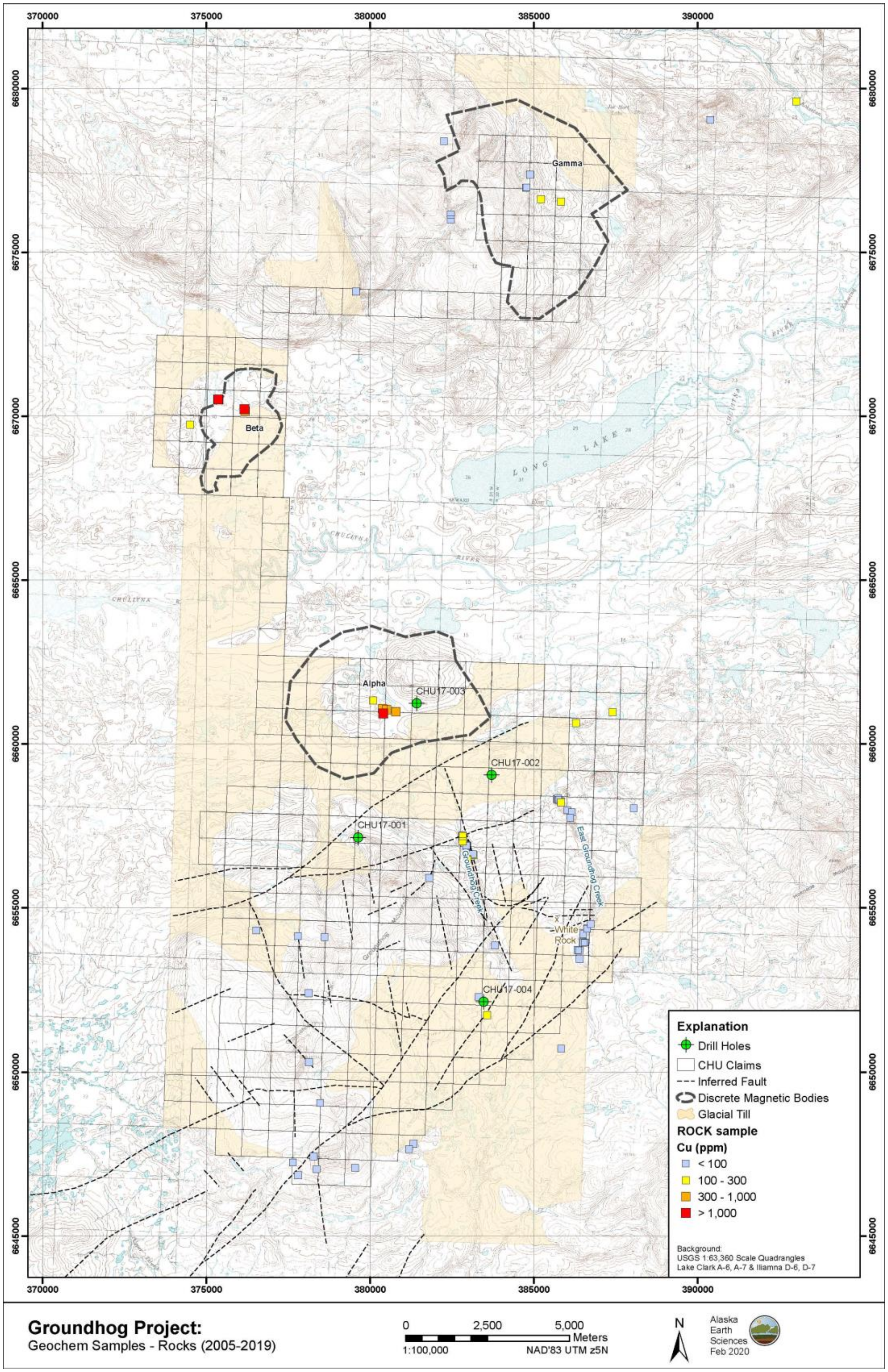

Figure 12: Rock chip samples at Groundhog 2006 - 2019

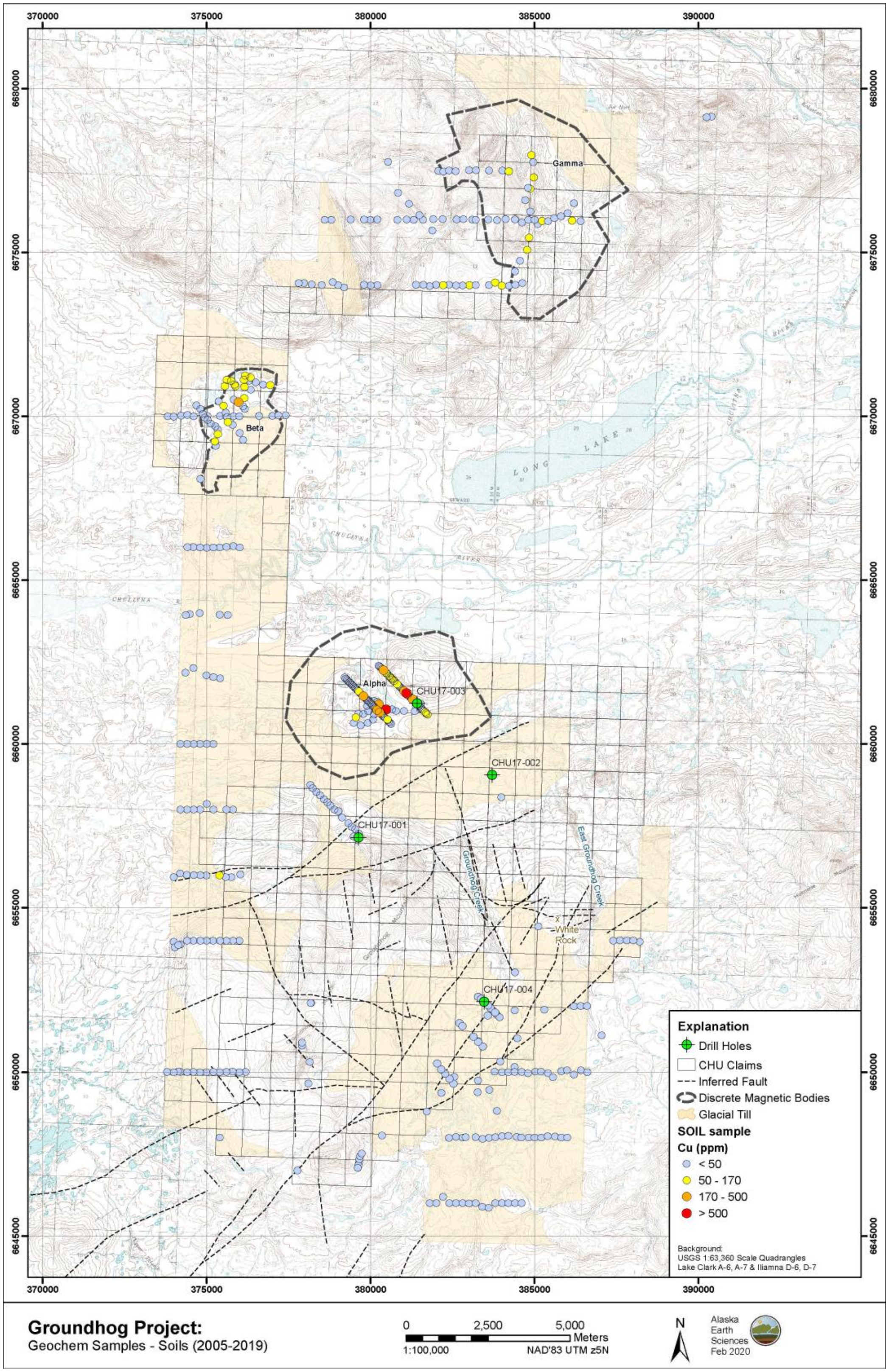

Figure 13: Soil samples at Groundhog 2006 – 2019

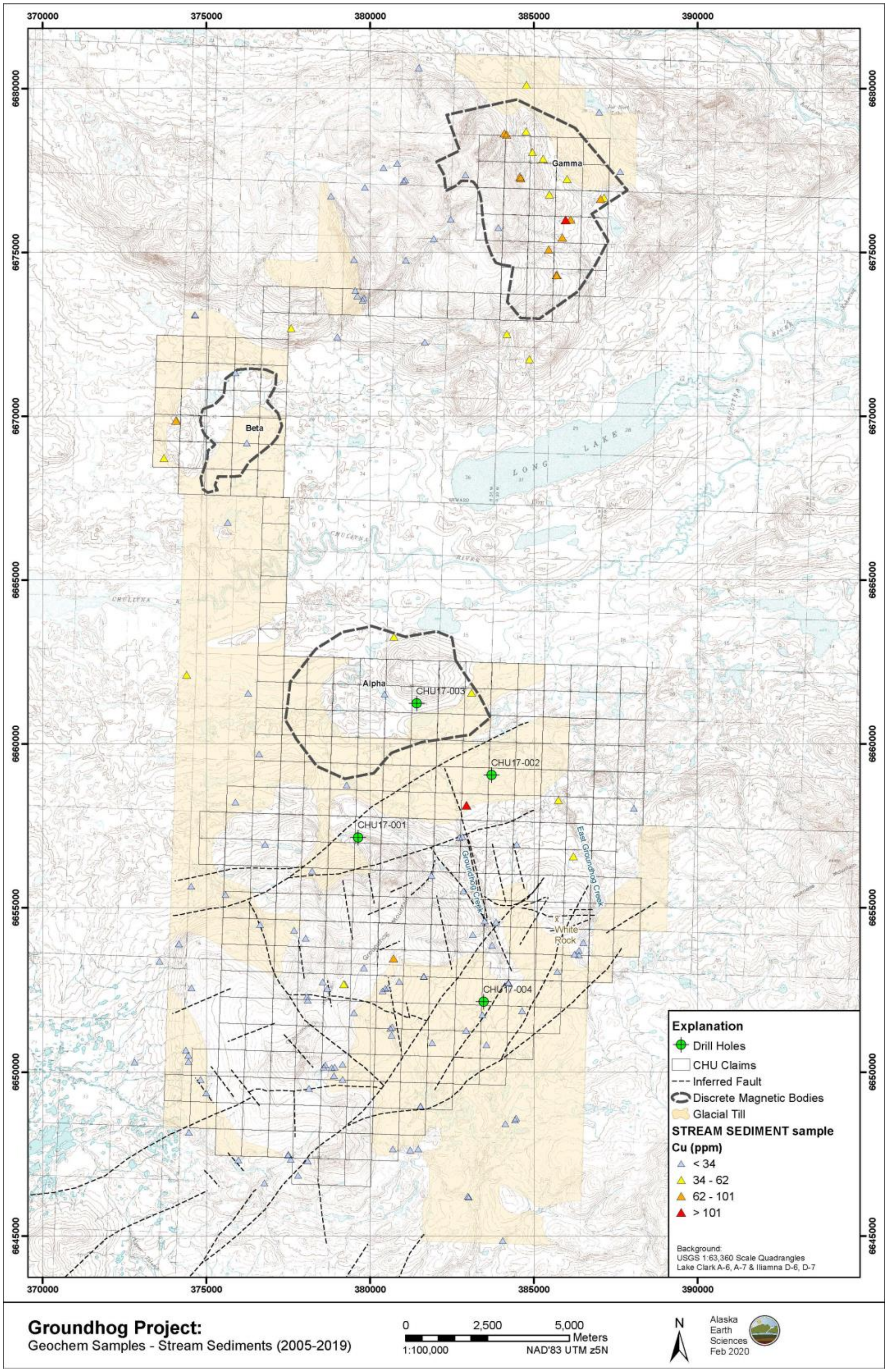

Figure 14: Stream silt samples at Groundhog 2006 – 2019

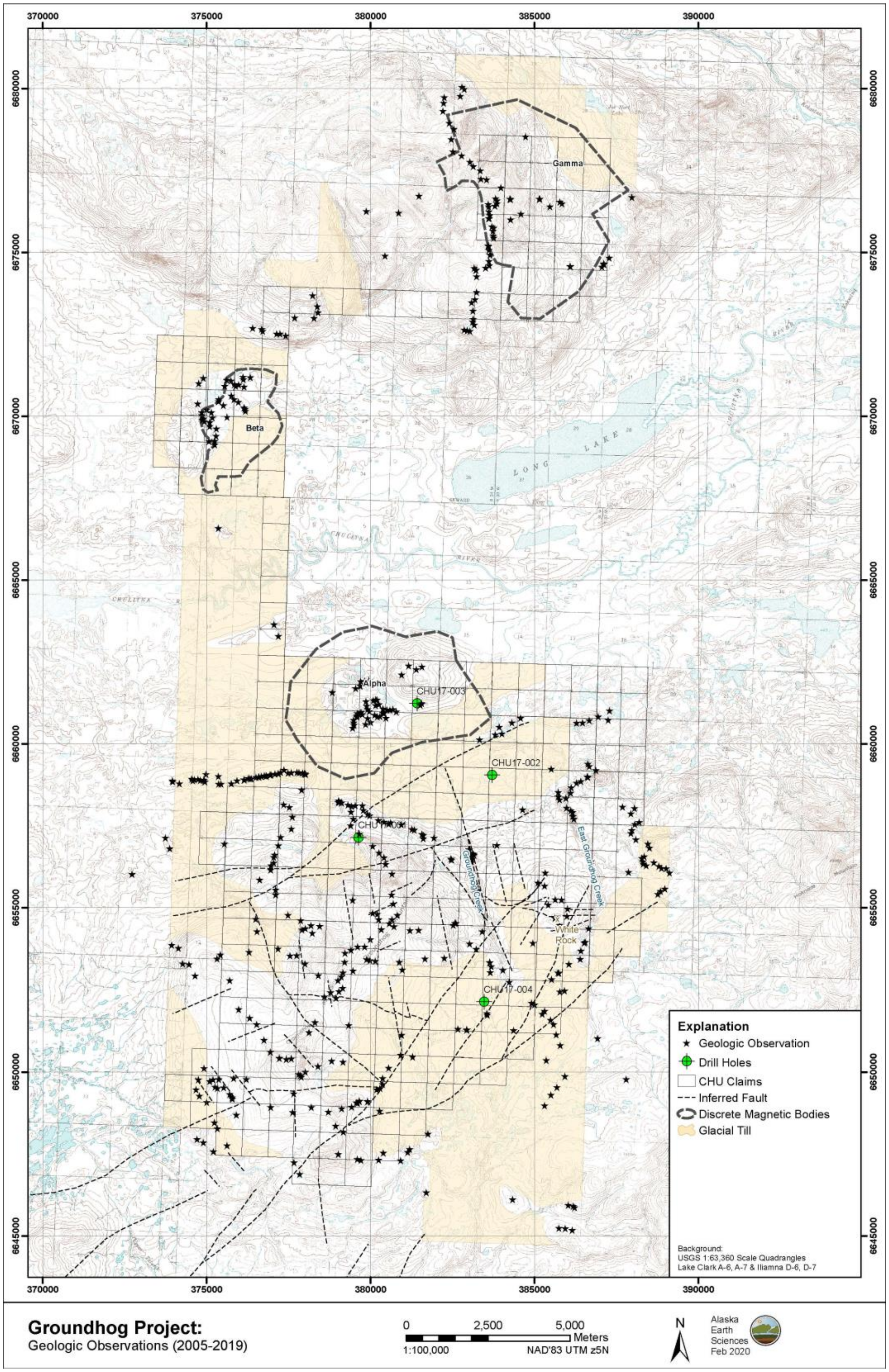

Figure 15: Geologic observations at Groundhog 2006-2019

9.3 Geochronology at Groundhog

The primary mineral deposit objective at Groundhog is a Cu-Au-Mo porphyry deposit. The regional geology shows that mineralization at the adjacent Pebble deposit is closely constrained in age and limited to intrusive rocks with ages between 89 to 98 Ma, emplaced into Jurassic to Cretaceous-aged flysch. At Groundhog, as at Pebble, rocks of this age are covered by younger Tertiary volcanic, sedimentary and hypabyssal intrusive rocks. As a consequence selective rock units have had their ages calculated using a variety of radiometric isotopic techniques. The author is aware of the following ages at the Groundhog property. The degree of specificity of the location as referenced in the description below reflects information shared with the author.

9.3.1 Alpha anomaly area

KEC report U/Pb ages of 149.2±0.3 Ma on sphene/titanite collected from a gabbro in the Alpha magnetic anomaly. AES report two other U/Pb ages on zircon (115±1.2 Ma and 152.4±0.8 Ma) separated from fine grained and equigranular diorites from the Alpha anomaly collected approximately 1 km west of DDH CHU-17-003 and 03A.

9.3.2 Beta anomaly area

KEC report U/Pb ages of 98.2±0.2 Ma on zircon collected from a gabbro in the Beta magnetic anomaly (Laberge, 2011).

9.3.3 Groundhog Mountain area

AES cites two USGS ages from volcanic rocks collected towards the top of Groundhog Mountain of 38.5 and 39.7 Ma. In 2011 KEC submitted a diorite sample (JL-122) (UTM coordinates: 380689E 6654390N) for TIMS U/Pb zircon analysis. By the time the results were finalized KEC had exited the project and it was verbally reported to be Tertiary in age and similar to the USGS ages cited above.

In 2018 AES submitted two samples to the USGS from DDH CHU-17-004 for U/Pb zircon analysis. Both ages were reported as Tertiary (64.9 and 64.2 Ma).

10 Drilling

The first drilling at the Groundhog property was in 2017 when five widely spaced core holes were drilled in 2017 (two were from the same location). 1241 m core was recovered.

Table 3: Drillhole collars

Hole #	Northing	Easting	Elevation (m)	Bearing	Dip	Depth (m)
CHU-17-001	6657152	05V0379620	356	N45E	-80	274.6
CHU-17-002	6659056	05V0383700	159	S45W	-80	159.1
CHU-17-003	6661238	05V0381412	172	S50E	-80	148.4
CHU-17-003A	6661239	05V0381411	172	S65E	-70	358.7
CHU-17-004	6652136	05V0383455	375	S45E	-77	300.2

A light-weight, helicopter transported drill rig was used for all holes which were drilled with NQ sized core. The holes were all targeting identified IP anomalies.

CHU-17-001 was targeted at an IP anomaly identified by KEC in 2011 along their IP line 6. The anomaly was projected to be within approximately 200 m from the surface. Lithologies described from core to the end of the hole included a sequence of tuffs, breccias and volcaniclastic sediments. Mineralization was weak consisting of veinlets of pyrite and carbonate with sulphide content increasing downhole to 5% in places. Traces of chalcopyrite and sphalerite were reported. CHU-17-001 reported the highest Zn assays of all drillholes with 1980 ppm from 182.9 – 184.8 m and averaged 631 ppm over an 8.5 m interval from 143.3 to 151.8 m. The interpretation of the stratigraphy was that the entire drillhole sampled Tertiary-aged rocks. Regrettably drilling did not reach the main IP anomaly (Figure 16) and the possibility remains that stronger, deeper IP anomaly contain significant mineralization.

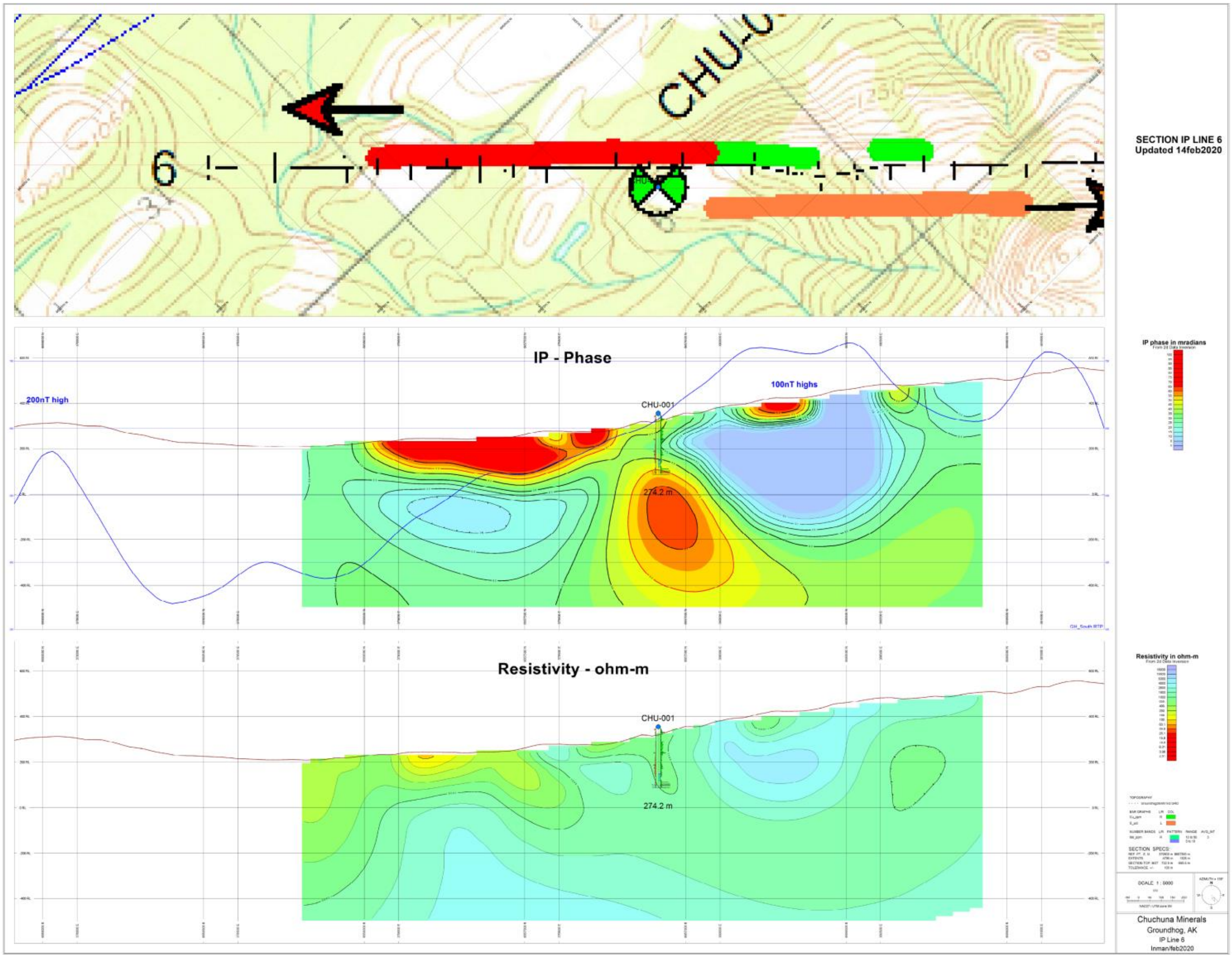

Figure 16: DDH CHU-17-001 on IP Line 6 section

CHU-17-002 was targeted at an IP chargeability anomaly first identified by KEC but the line was extended and refined by AES in 2017 along IP survey line 5. The anomaly was interpreted to be within 100 m of the surface. The entire hole was within grey to black bedded siltstone interpreted to be part of the Kahiltna flysch sequence. Several high-strain fault zones were noted in the log. Trace to 0.5% pyrite was reported throughout the hole with occasional zones as high as 4%. Of the four holes drilled in 2017 CHU-17-002 had the lowest maximum assay values for Cu, Mo and Zn. None of the alteration or mineralization was described as porphyry-related or indicative of nearby intrusive activity. It was concluded that the hole was of sufficient depth to reach the IP anomaly. Samples were collected for geophysical property testing returned chargeability values ranging from 70 to 42 mrads in accord with values measured on the IP survey.

CHU-17-003 (and 003A) were drilled 3.1 km NW of CHU-17-002 along the same geophysical line likewise targeting an IP anomaly as well as being within the large “Alpha” aeromagnetic anomaly. Hole 3 was lost at 148.4 m and hole 003A was offset and drilled to depth of 358.7 m. Drill core contained a sequence of basalt, clinopyroxenite and gabbro. Alteration was moderate to strongly propylitic with abundant epidote, chlorite and quartz/carbonate veining. Sulphides to 2% were mostly pyrite but with regular trace amounts of visible chalcopyrite. High magnetic susceptibilities were recorded on core as well as up to 10 % magnetite noted in thin section of core samples (Deininger, 2018). Maximum assay values for Au, Cu and Mo for all holes drilled in 2017 were measured with values of 0.892, 612 and 177 ppm respectively. In addition to the maximum assay values CHU-17-003/3A had broad, anomalous high-background Cu over much of its length; collectively from 6 to 25 m 235 ppm Cu, 54 to 97 m 253 ppm Cu, 295 to 307 m 340 ppm Cu and 313 to 325 m 281 ppm Cu.

A significant IP anomaly remains at depth beneath CHU-17-003 as the drillhole failed to reach sufficient depth (Figure 17).

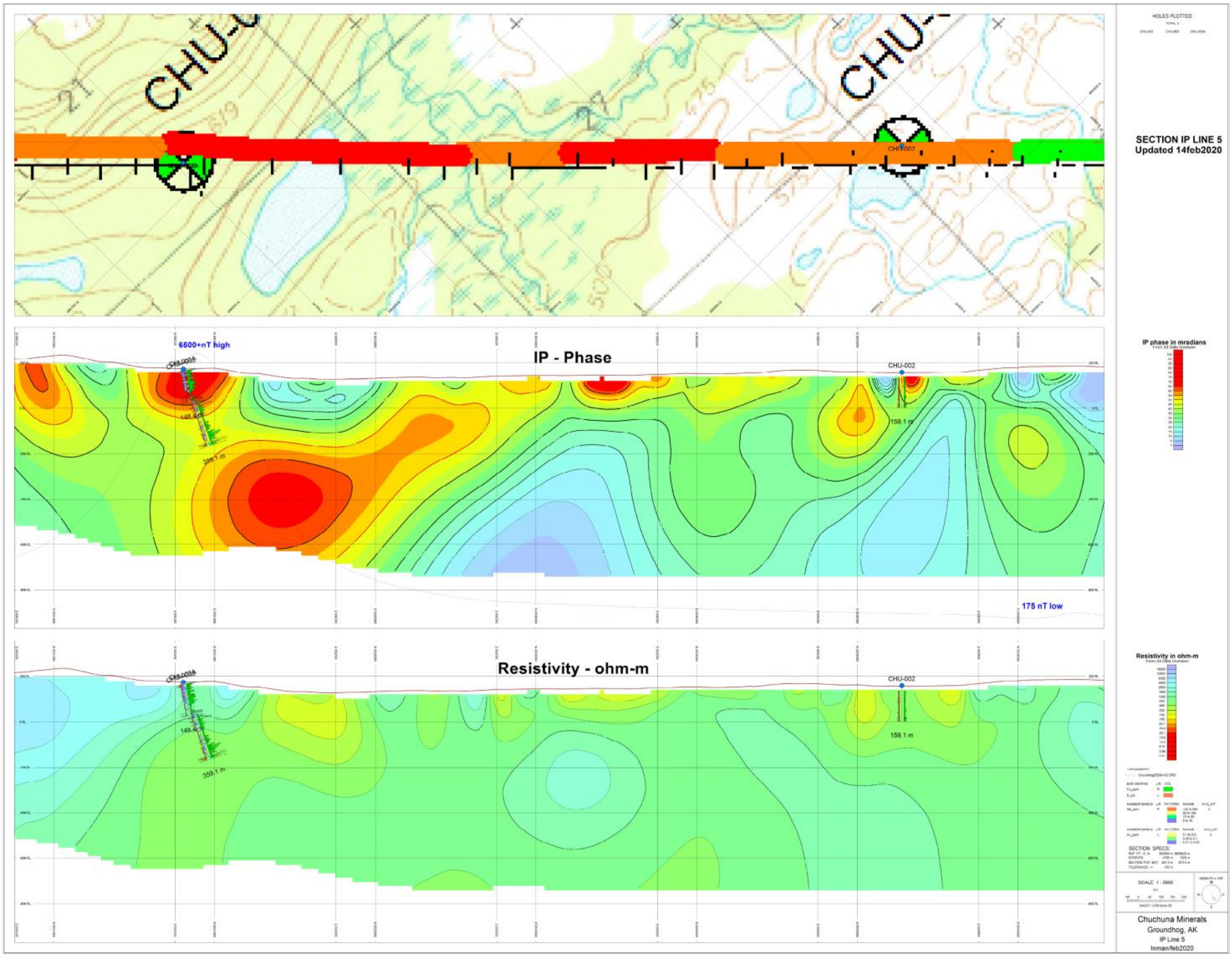

Figure 17: DDH CHU-17-003/3A on IP Line 5 section

CHU-17-004 was drilled 6.3 km SE of CHU-17-001 targeting an IP chargeability anomaly along IP line 3. The hole intersected predominantly diorite porphyry consisting of altered clinopyroxene, plagioclase phenocrysts in a dark altered matrix. Alteration consisted of epidote, carbonate and clays cut by later quartz pyrite veining. Assays down the length of the drillhole showed background Au, Cu and Zn values, with the maximum reported values of 6 ppb Au, 89 ppm Cu and 341 ppm Zn. Two U/Pb zircon ages of 64.2 and 64.9 Ma were returned from core samples of diorite collected at a depth of 147.5 and 285 m down hole respectively, and is interpreted as indicating that the age of intrusion, mineralization and the associated measured IP response as being Tertiary in age and younger than the Pebble-aged mineralizing event.

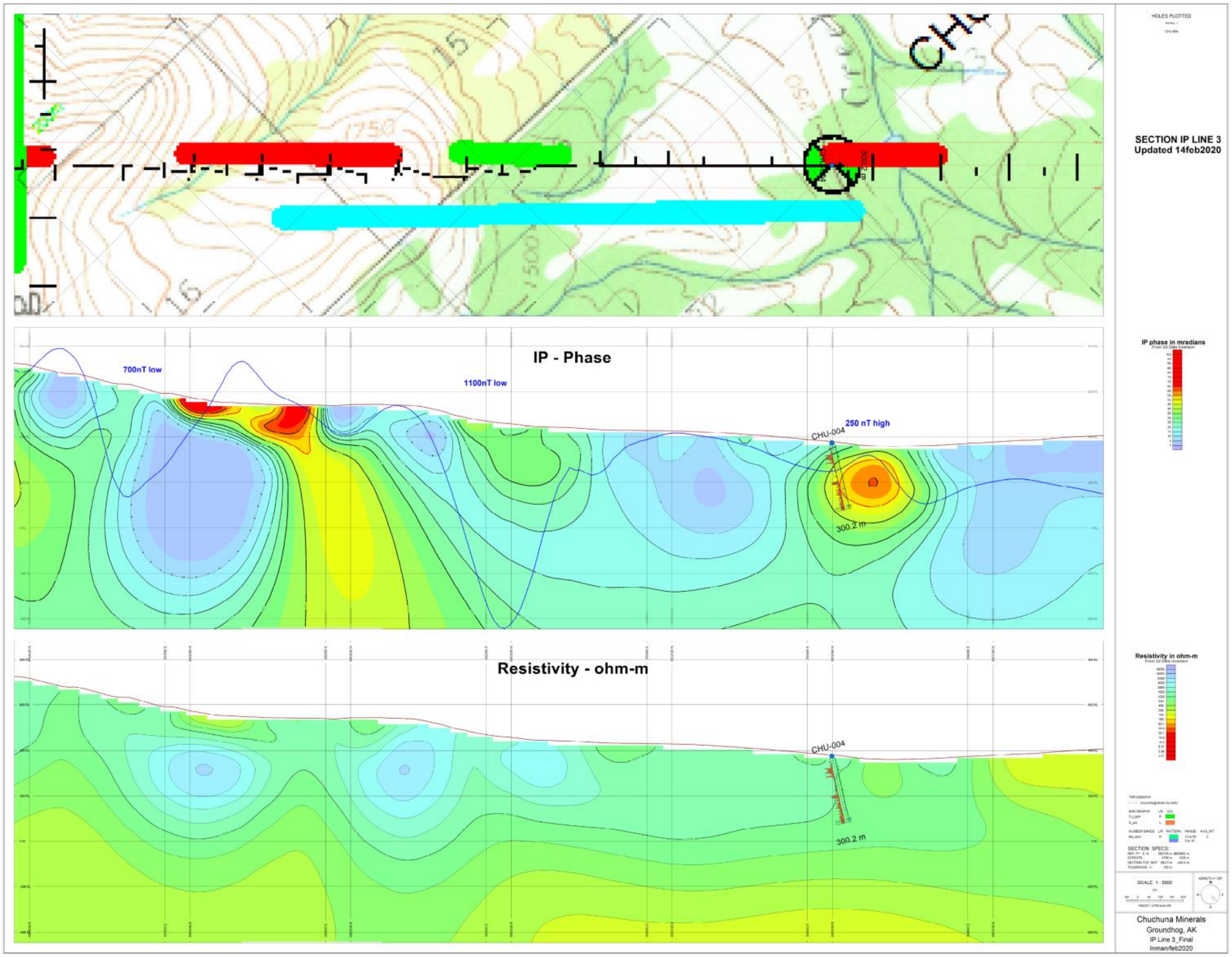

Figure 18: DDH CHU-17-004 on IP Line 3 section

11 Sample Preparation, Analyses and Security

11.1 Sample Preparation

11.1.1 Conventional surface rock, stream silt and soil samples

Specific details were not available to the author as to how conventional surface sampling was conducted from 2005 to 2017 at the property. There is no reason to conclude anything other than the typical methods used in the area were employed. These consist of rock chip sampling of exposed bedrock, silt-sized fractions of flowing stream sediment and soil samples (the predominant method used at Groundhog).

In 2019 37 soil samples, 34 rock and 7 stream silts were collected and analyzed. Soils and silts are dried and sieved to pass 80 mesh (although curiously three stream silts were pulverized and split prior to analysis); rocks are crushed, split and pulverized. Analysis for all rocks, silts and some soils was by ALS method code AuME-TL43. Subsets of soils were analyzed by ALS method code AuMe-ST43. Both methods used a 25g sample dissolved in acids differing only in the minimum detection limit for Au. At the adjacent Pebble deposit these methods are all effective where mineralization is at or close to the surface. However in areas with thick glacial or post-mineralization cover these methods are less effective.

11.1.2 Vegetation sampling

Limited data from prior to 2010 suggest some vegetation sampling was undertaken. No documentation has been provided to document sampling protocols. There were no anomalous results or follow-up studies.

11.1.3 Selective soil leach 2019

At the adjacent Pebble deposit the USGS published results of an orientation survey comparing different methods of selective elemental analysis of soil samples subjected to weak leaching by various solutions (Fey and others, 2008). Two methods were chosen for use at Groundhog, out of the suite tested at Pebble: an ionic leach method, and a cold hydroxylamine leach method, both provided by ALS Laboratories. A total of twenty-two sample sites were established on 2017 IP lines 1, 3, and 10. Three samples were analyzed from each site; all analyses were done by ALS Laboratories in Vancouver, after drying and preparation by ALS Laboratories preparation facility in Fairbanks. The analyses include Ionic Leach (AuME-MS23), Cold Hydroxylamine Leach (AuME-MS05), and traditional sieving to -80 mesh and total digestion (Au-ME-ST43).

11.1.4 Till heavy mineral sampling 2019

Seven samples of glacial till were collected in close proximity in the SE corner of the property. Sampling methodology involved collecting approximately 12kg of -8mm material from holes 30 to 50 cm deep into 5 gallon plastic buckets.

Samples were processed by Overburden Drill Management, Ontario, Canada and involved:

a) Collecting 500 g archival sample with all or portion of the archival split sieved to completion at 0.063 mm and -0.063 mm silt+clay fraction submitted for conventional geochemical analysis.

b) Panning the remainder for gold, PGMs and fine-grained metallic indicator minerals.

c) Separating nonferromagnetic heavy mineral fractions with SG of 2.8 to 3.2 and SG >3.2, with a grain size of 0.25-2.0 mm picked for porphyry Cu indicator minerals.

d) Separating nonparamagnetic (>1.0 amp) with a grain size of 0.5-1.0 mm and 0.25-0.5 mm heavy mineral fractions for scheelite by UV lamping.

11.1.5 Drill core samples 2017

Four drill holes totalling 1241 m of recovered core have been collected. Of that 754.3 m was divided into 384 sample intervals and assayed during the 2017 drill program. Specific intervals were selected for sampling and not all NQ core was assayed. Core was halved via rock saw.

A total of 424 drill core samples, including 15 standards, 19 blanks, and 7 duplicates, were analysed during the 2017 drilling program. All samples were prepared and analysed by ALS Minerals. Sample preparation consisting of sample login, coarse crush and fine crush (CRU-31 and CRU-21), sample splitting (SPL-21), was performed at the ALS lab in Fairbanks, AK. A split was shipped and pulverization of the split sample to 85% <75 microns (PLU-31) and gold analysis (Au-AA23) was completed at ALS Reno, NV, USA. Trace elements (ME-MS41) was completed at the ALS lab, Vancouver, Canada.

The raw samples were crushed in an oscillating steel jaw crusher (>70% of the sample passing through a 2mm screen), a 500 g riffle split was then pulverized to 85% passing through a 75-micron screen. Aqua regia digestion (ALS method ME-MS41) was performed for analysis of 51 elements: Ag, Al, As, Au, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, Hg, In, K, La, Li, Mg, Mn, Mo, Na, Nb, Ni, P, Pb, Rb, Re, S, Sb, Sc, Se, Sn, Sr, Ta, Te, Th, Ti, Tl, U, V, W, Y, Zn and Zr. The method utilizes a 0.5 g of prepared sample digested in aqua regia with the resultant solution analysed by induced coupled plasma mass spectroscopy (ICP-MS) finish.

Gold analyses were performed on a 30 g sub-sample using ALS method Au-AA23; fire assay fusion with atomic absorption spectroscopy (AAS) finish.

11.2 QA/QC procedures

The author is unable to comment specifically on the nature and extent of all quality control measures employed including check assays and other check analytical techniques used. Review of the drill core assay certificates show that the assay labs maintained and reported on internal quality control methods. The sampling documentation show sample blanks, standards and duplicates have been inserted but the results have not been collected and analyzed. The author is not aware of any summary or analysis of QA/QC procedures.

11.3 Sample Security

The author was not present during any of the sample collection and preparation for shipping and is unable to comment on specific sample security details.

According to the NI43-101 reporting requirements a statement is required if any aspect of the sample preparation is conducted by an employee, officer, director or associate of the issuer. AES was significantly involved in collecting and submitting multiple soil, rock and drill core samples to assay labs.

11.4 Opinion on the adequacy of sample preparation, security, and analytical procedures

The author recognizes that during early stages of the exploration process many different methods are used to best identify an effective technique. That some analytical procedures have not demonstrated their effectiveness is not a criticism of the approach or of the method itself.

11.4.1 Quality Assurance

The Groundhog project covers two geological domains: an area where pre-Tertiary ("Pebble-aged") rocks are variably exposed (mostly north of UTM Northing 6655000) and a region to the south covered by Tertiary volcanic, volcaniclastic and intrusive rocks centered on Groundhog Mountain. Both domains are covered by glacial overburden. The author's concerns with geochemical sampling are that geochemical sampling techniques that may be appropriate for one domain have been used in less than optimal locations. Specifically:

Glacial till samples were collected over a small portion of the property, at a high elevation within an area known to be underlain by a thick Tertiary section. The report of Hamilton and Klieforth (2010) map these tills as part of the last glacial advance from the NE moving to the SW. Any indicator mineralization would presumably be derived from off the property area if present. If it is argued that the till is locally derived and represents a geochemical sample of the immediate area, then conventional soil sampling techniques would presumably also be geochemically anomalous. It is the author's opinion that the till sampling does not provide meaningful data.

The selective leach sampling likewise was collected entirely in the Tertiary-cover domain and while designed to test whether geochemical "leakage" could be observed across the ZG Fault the results reportedly were equivocal. The USGS orientation sampling at Pebble (Fey et al., 2008) showed the strongest response over the exposed and thinly covered by glacial material. For this reason the author considers the selective leach sampling results to not be meaningful in the area of the property where employed (but thinks the sampling technique could be useful over the “Pebble-aged” domain of the property).

11.4.2 Quality control

Going forward the author recommends a more formal and clearly documented approach to sample preparation, sample security and analytical methods used, as well as documenting the results of QA/QC procedures used at the end of each field season.

11.4.3 Summary statement on QA/QC

Pursuant to section 3.3 of 43-101 a summary statement on quality assurance and quality control is present thus:

The quality assurance and quality control measures applied and the data collected during the execution of the work being presented in this report are fit and adequate for their current purposes of early-stage exploration.

12 Data Verification

12.1 Author's visit check sample verification

The Author was not present for the 2019 or prior season sampling and was unable to personally collect duplicate samples for verification purposes.

The author randomly selected and checked 10% of the rock and soil samples in the 2019 sample database against the assay certificates and found them all to be clearly tabulated and without errors.

Pre-2019 work has not been verified by the author.

The existing core was properly stored and available for future examination and sampling should there be need in the future.

12.2 Drill database verification

The author examined the existing historic drillhole database. Where checked, assay values in the database matched with the corresponding assay certificates. Were the drillhole database to be used for resource calculations, the author would expect and require more detailed verification work, however for its current purpose of documenting detailed subsurface geochemical samples it is fit-for-purpose.

The author has not surveyed the DDH collars.

13 Mineral Processing and Metallurgical Testing

No mineral processing or metallurgical testing analyses have been performed on samples collected from the property

14 Mineral Resource

There are no mineral resources or mineral reserves estimates for the Groundhog project

15 Adjacent Properties

The Groundhog property lies adjacent to the Pebble project claim block. The current resource estimate is provided below copied from Gaunt et al. (2018) and has been publically released according to NI 43-101 standards. The author of this report has not verified the information and is accepting the reported data as stated.

Figure 1.5-1 Pebble Resource Estimate December 2017

Threshold CuEq %	CuEq%	Tonnes	Cu (%)	Au (g/t)	Mo (ppm)	Ag (g/t)	Cu Blb	Au Moz	Mo Blb	Ag Moz
Measured										
0.3	**0.65**	**527,000,000**	**0.33**	**0.35**	**178**	**1.7**	**3.83**	**5.93**	**0.21**	**28.1**
0.4	0.66	508,000,000	0.34	0.36	180	1.7	3.81	5.88	0.20	27.4
0.6	0.77	279,000,000	0.40	0.42	203	1.8	2.46	3.77	0.12	16.5
1.0	1.16	28,000,000	0.62	0.62	302	2.3	0.38	0.56	0.02	2.0
Indicated										
0.3	**0.77**	**5,929,000,000**	**0.41**	**0.34**	**246**	**1.7**	**53.58**	**64.81**	**3.21**	**316.4**
0.4	0.82	5,185,000,000	0.45	0.35	261	1.8	51.42	58.35	2.98	291.7
0.6	0.99	3,455,000,000	0.55	0.41	299	2.0	41.88	45.54	2.27	221.1
1.0	1.29	1,412,000,000	0.77	0.51	343	2.4	23.96	23.15	1.07	109.9
Measured + Indicated										
0.3	**0.76**	**6,456,000,000**	**0.40**	**0.34**	**240**	**1.7**	**56.92**	**70.57**	**3.42**	**344.6**
0.4	0.81	5,693,000,000	0.44	0.35	253	1.8	55.21	64.06	3.18	320.3
0.6	0.97	3,734,000,000	0.54	0.41	291	2.0	44.44	49.22	2.40	237.7
1.0	1.29	1,440,000,000	0.76	0.51	342	2.4	24.12	23.61	1.08	112.0
Inferred										
0.3	**0.55**	**4,454,000,000**	**0.25**	**0.25**	**226**	**1.2**	**24.54**	**35.80**	**2.22**	**170.4**
0.4	0.68	2,646,000,000	0.33	0.30	269	1.4	19.24	25.52	1.57	119.1
0.6	0.89	1,314,000,000	0.48	0.37	292	1.8	13.90	15.63	0.85	75.6
1.0	1.20	361,000,000	0.68	0.45	377	2.3	5.41	5.22	0.30	26.3

Notes:

These resource estimates have been prepared in accordance with NI 43-101 and the CIM Definition Standards. Inferred Mineral Resources are considered to be too speculative to allow the application of technical and economic parameters to support mine planning and evaluation of the economic viability of the project. Northern Dynasty Minerals Ltd. advises investors that although these terms are recognized and required by Canadian regulations (under National Instrument 43-101 Standards of Disclosure for Mineral Projects), the U.S. Securities and Exchange Commission does not recognize them. Investors are cautioned not to assume that any part or all of the mineral deposits in these categories will ever be converted into reserves. In addition, "inferred resources" have a great amount of uncertainty as to their existence, and economic and legal feasibility. It cannot be assumed that all or any part of an Inferred Mineral Resource will ever be upgraded to a higher category. Under Canadian rules, estimates of Inferred Mineral Resources may not form the basis of feasibility or pre-feasibility studies, or economic studies except for Preliminary Economic Assessment as defined under 43-101. Investors are cautioned not to assume that part or all of an inferred resource exists, or is economically or legally mineable.

Copper equivalent calculations use metal prices of $1.85/lb for copper, $902/oz for gold and $12.50/lb for molybdenum, and recoveries of 85% for copper 69.6% for gold, and 77.8% for molybdenum in the Pebble West zone and 89.3% for copper, 76.8% for gold, 83.7% for molybdenum in the Pebble East zone.

Contained metal calculations are based on 100% recoveries.

A 0.30% CuEQ cut-off is considered to be appropriate for porphyry deposit open pit mining operations in the Americas.

All mineral resource estimates, cut-offs and metallurgical recoveries are subject to change as a consequence of more detailed analyses that would be required in pre-feasibility and feasibility studies.

Figure 19: Northern Dynasty's Pebble resource estimate in December 2017 (Gaunt et al., 2018).

Furthermore the author states unequivocally that the reported mineralization on the adjacent Pebble property in no way is indicative of mineralization on the Groundhog property (the subject of this report).

16 Other Relevant Data and Information

16.1 Environmental Studies, Permitting and Social or Community Impact

The southwest portion of the Groundhog claim block is the closest to the proposed Pebble mine area and the Upper Talarik Creek drainage, but the majority of the Groundhog claim block lies in a northward-draining catchment basin that flows away from the Pebble area. The Pebble project remains a highly visible and contentious project in Alaska with significant local community opposition. The author considers that success at Groundhog would be very difficult were the Pebble project terminated through a failure to receive all necessary permits.

17 Interpretation and Conclusions

17.1 Interpretations

The Groundhog property lies in close proximity to the Pebble deposit. Groundhog has been the focus for the episodic exploration over the past fourteen years. A sizable body of data has been collected designed to identify whether similar mineralization to that seen at the adjacent Pebble project exists at Groundhog. Mapping, limited drilling and geochronology have demonstrated the presence of similar aged-rocks in a similar structural setting occur at Groundhog. To date no significant porphyry- Cu mineralization has been found on the property. The majority of attention has been focused on the southern portion of the property and significant areas of potential promising geochemistry around the Alpha and Beta magnetic anomalies remain underexplored.

The main exploration approach has been the use of a suite of geophysical tools: aeromagnetic, CSAMT, VIP, dipole-dipole IP and ZTEM surveys. The magnetic survey has identified three magnetic anomalies that show good correlation with intrusive centers. The southernmost anomaly (Alpha) is associated with a Jurassic-aged gabbro significantly older than mineralization at Pebble. The Beta magnetic anomaly is associated with a Cretaceous-aged diorite, close in age to the Pebble mineralization and contains surface rock chip samples with values of 0.5% Cu. The resistivity and IP geophysical methods have largely been focused in the southern portion of the property largely covered by Tertiary-aged rocks and have outlined a SE and NW sectors. The SE sector contains shallow zones of narrow but intense/strong IP anomalies. A single DDH (CHU-17-004) into one of these anomalies showed the IP anomaly originating from Tertiary-aged intrusive rocks and associated mineralization and alteration. However geophysical interpretation of the data does not rule out an IP response from a more extensive deep source. The NW sector likewise contains major zones of intense IP anomalies and remains open. Both drillholes CHU-17-001 and CHU-17-003/3A were designed to drill test IP anomalies in the NW sector but failed to reach the target depths and neither drillhole reached the strongest part of the IP anomalies.

The thickness of Tertiary cover is a significant constraint in interpreting the existing geophysical data. The majority of IP lines are south of the N6,655,000 line and any anomalies have to be evaluated as to whether they are sourced in the Tertiary cover or are derived from a deeper source. Surprisingly limited IP lines test areas known to have Pebble-correlative stratigraphy exposed at the surface or at least only covered by Quaternary glacial deposits. For example between IP Lines 5 and 6 just south of the Alpha anomaly there is a 4 km gap without data.

The true thickness of Tertiary cover at the southern end of the property is poorly constrained but estimates may be applied. These include the following constraints: KEC describe the Tertiary at Groundhog Mountain and having southward dips of between 0 to 10 degrees. In the vicinity of the upthrow-side of the ZG Fault a cross section indicates the base of the Tertiary would be at a depth of 800 meters below the surface using a 5 degree dip. These depths to the base of the Tertiary are comparable to those seen in published cross sections along strike at the Pebble deposit. On the down-throw side of the ZG Fault drilling at the Pebble East intersected Tertiary-thicknesses of 1400 meters. Without drill data there remains a large degree of uncertainty of the depth to pre-Tertiary rocks in the vicinity of the ZG Fault. Similarly the uncertainty in the Tertiary thickness impacts the interpretation of the IP geophysics data; at present the IP data is depth limited to approximately 350 m below the surface. Deep IP anomalies remain interpretable as either chargeable-zones beneath the Tertiary cover section, or as deep anomalies still within the Tertiary.

A disinterested discussion of the exploration data collected to date at Groundhog would be amiss not to discuss potential for exploration ideas to fall into the trap of circular-thinking. The main attraction of the Groundhog property is its close proximity to Pebble. The general geology can reasonably be extrapolated between the two areas; for example the ZG Fault is present on published cross sections at Pebble and is known to separate the Pebble West deposit from the buried, higher-grade Pebble East portion of the deposit. The ZG Fault can be traced via offsets in aeromagnetic trends onto the Groundhog property. The main difference in the geology of the two areas is that porphyry-mineralization is exposed at the surface at Pebble yet to date no evidence of any economic mineralization has been found in the southern portion of the Groundhog property, which is entirely covered by Tertiary rocks. In order to prospect beneath the Tertiary cover the majority of geophysics and geochemical techniques have been employed in this area. The best surface geology and geochemistry at Groundhog lie in the central to northern portions of the property, yet because of their distance from Pebble, the area has received less exploration.

Conventional geochemical soil and stream silt sampling has not been effective to date on account of the glacial cover and Tertiary stratigraphy. A pilot program in 2019 to evaluate selective leaching and glacial till/heavy mineral analysis has also produced equivocal results. Regrettably the sampling for the pilot program covered a small area of the property with likely the thickest section of Tertiary cover. As an orientation program it failed to sample over a wide-enough area to encompass the known range of differing topography, vegetation, soil and overburden type areas. It is still possible that the selective leach soil sampling methods will be effective in areas without Tertiary cover and therefore it is suggested the method not be abandoned yet.

17.2 Conclusions

Groundhog remains potentially-promising early stage exploration project targeting a porphyry Cu deposit.

As results of past exploration work at and nearby the property it can be demonstrated that:

- Groundhog contains rocks correlative with those hosting porphyry Cu mineralization at the adjacent Pebble deposit.
- Significant areas of the property remain untested.

- Geophysics has shown the best potential to evaluate broad areas of potentially favorable geology and, given the problems of overburden geology, should be continued going forward to identify targets for drill-testing.

Independent constraints on Tertiary thickness are required to assist in interpretation of geophysical data and target selection.

Exploration efforts should be shifted to the areas around the Alpha and Beta magnetic anomalies where the surface geochemistry and stratigraphy are more favorable than the southern areas characterized by a thick Tertiary section.

18 Recommendations

18.1 Phase 1: target refinement via addition data modelling

The primary goal of future exploration at Groundhog must be to return drilled intercepts from a mineralized porphyry system. Selecting the best drill target is critical and to that regard it is recommended that a modest budget be allocated to extract additional information from the 2019 ZTEM survey with 3D inversion modelling of the data. The objectives of this work are twofold. The first is to help rank the existing ZTEM targets. Second, the inversion data should be examined to see if it provides information on the thickness of Tertiary cover in the southern portion of the property.

It is recognized that there are multiple reasons why depth modelling will not work including little to no resistivity contrast between the Tertiary cover and the Pebble-aged basement or that the Tertiary is thicker than the ZTEM can effectively resolve, however the great advantage of the Groundhog ZTEM survey is that it is a uniform dataset covering much of the property area. If the data is carefully interpreted in conjunction with the known geology it is possible that of the existing ZTEM anomalies one or two will become obvious priorities. The costs to do this additional work are modest compared to drill testing.

Without this additional 3D inversion modelling the focus for future geophysics work as well as targeting the source of anomalous geophysics data should be in the NW sector around the Alpha and Beta magnetic anomalies.

18.2 Phase 2: target selection for drill testing or ground-based IP

Decision making at Phase 2 presents a greater number of choices. What is discussed below represents anticipated options but other unforeseen choices may be viable following Phase 1 data modelling.

Best option: Following the data processing one or two existing ZTEM anomalies, either with or without additional constraints from the ground-based IP data, become high priority drill-ready targets. The proposed Stage 2 budget could be entirely directed towards the drilling costs.

The lest-best option will be that the Stage 1 data processing does not produce a clearly highest ranked target. This is essentially the situation at present. In this case the recommended course of action is to focus on the NW sector around the Alpha and Beta magnetic anomalies.

18.2.1 NW Sector – Alpha Anomaly and ZTEM targets 9, 17, 13, 8 and 18.

There are two options to test these targets. Either four additional lines of dipole-dipole IP should be surveyed in addition to extending line 6 further to the NW and to the SE to connect with Line 1. Three of the additional lines will be spaced at 1km intervals between lines 5 and 6 and the fourth line will be an offset of 1km NE of line 5. Or alternatively two grids of vector VIP data in the NW sector and then, if necessary, a single dipole-dipole line to define a specific drill target.

The objective of the additional lines is to define the extent and character of the intense IP anomalies in the NW sector and to possibly to provide drill targets for 3 drill holes.

18.2.2 Existing IP anomalies on Lines 5 and 6

The existing IP anomalies that were partially tested by DDH CHU-17-001 and 003/3A remain as untested targets at depth. Regardless of the potential improvements from 3D inversion of the ZTEM data, these IP targets remain as top priority drill targets deserving of further drill testing. Special attention should be afforded to the inverted ZTEM data around these known IP anomalies in order to 'extend' the untested target zones on lines 5 and 6 into the areas of no ground data. If a decision is made to drill test to depth the known IP anomalies, having additional off-line ZTEM-generated targets should be identified for immediate follow-up targeting while the drill rig is on-site.

18.2.3 SE Sector – extension of ZG fault zone

Much attention has been spent on this area as the Pebble mineralizing system has been shown to extend under younger Tertiary cover. To date at Groundhog all the significant IP targets are very deep and shallow targets are not of great extent. Examination of the 3D inversion data should be examined carefully for evidence as to the thickness of the Tertiary in this sector. It may be that the results of the Phase 1 data modelling are equivocal in this region leaving a difficult choice of testing geophysical targets without knowledge of the overlying Tertiary cover thickness. At the present point of knowledge the safest approach would be to not spend any further effort in the SE Sector; however this may change after the Phase 1 data modelling.

18.2.4 Beta Magnetic Anomaly

The area at Beta of anomalous rock chip and soil geochemistry is large as is the magnetic anomaly defining the gabbroic intrusive at Alpha. Therefore it is recommended a vector VIP survey be conducted initially to define the general extent of a possible sulfide system.

Following the completion and interpretation of the VIP survey a single dipole-dipole line should be run in the best area in order to define the depth and size of a possible target. The data from this line when merged with the vector VIP data should result in an accurate map of the sulfide system at Beta.

Depending on the results returned at least one drill hole should be planned for to test the source of the best IP anomalies and copper geochemistry. One advantage of working in the NW sector is the shallow depth to potential targets and the existing drill rig should be of sufficient size to test IP and geochemical target.

Additional notes: vector VIP surveys assume a large transmitter/generator and two field receiver teams. This will greatly increase the speed of the survey and lower the cost. Helicopter support will be required and all geophysics should be done as early as possible in the area, so that drilling could potentially follow in the same field season.

18.3 Geochemistry

Continued application of selected leach soil samples is recommended within areas target by vector VIP survey in the Alpha and Beta areas. Sample lines are to have no larger than 150 m spacing between samples with lines starting outside, crossing and ending beyond anomalous VIP response areas. Sampling is to follow precise, documented procedures to ensure uniform sampling methods among field staff. Selective leach soil samples should be collected along any new IP lines in order to facilitate direct comparison of IP responses with geochemical anomalies.

18.4 Project supervision and data management

Sisyphus Consulting recommends that during drill core sampling and assaying the project be managed by people or persons independent of the Issuer. They would be responsible for documenting and supervising core sample handling and security from drill rig, through sample splitting and delivery to an assay lab. They would be responsible for implementing, documenting, maintaining and evaluating procedures for quality assurance/quality control including a regular procedure of introducing standards, duplicates and blanks into the sample submittals. In addition a subset of sample pulps should be submitted to a second assay lab. All results should be documented, including analysis of results, and included as part of the project database.

18.5 Costs

The estimated budget for this work is estimated as follows:

Phase 1 3D inversion modelling of ZTEM data and interpretation by a geophysicist/geologist $35,000.

Phase 2 is budgeting should be capped as the amount of funds required for Quaterra to complete its exploration requirements according to their agreement with Chuchuna Minerals Company ($5 million total to be spent prior to April 17, 2023). It is estimated that approximately half of this funding requirement has been met. With three field seasons remaining between the effective date of this report and the agreement deadline, there is sufficient time to carefully prioritize geophysical targets for subsequent drill testing.

If the decision is made to drill-test priority targets and the work fails to result in finding the QSP halo associated with a porphyry copper system and/or the potassic zone with high copper mineralization, then further work is not recommended.

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Date, Signature and Certificate of Qualifications Pages

Effective Date: April 28, 2020

I, Nicholas Van Wyck Ph.D., 3705 Arctic Blvd #1150, Anchorage, AK 99503 do hereby certify that:

1. I have graduated from the following Universities with degrees as follows:
    a. Tufts University, B.S. Geology 1985
    b. University of Wisconsin - Madison, M.S. Geology 1989
    c. University of Wisconsin - Madison, Ph. D. Geology 1994
2. I am a member in good standing of the following professional associations:
    a. American Institute of Professional Geologists
3. I have worked as a geologist for 34 years since my graduation from Tufts University.
4. I am a Certified Professional Geologist (AIPG #10553).
5. I have read the definition of "Qualified Person" set out in National Instrument 43-101 and certify that by reason of my education, affiliation with professional associations and past relevant work experience, I fulfill the requirements to be a "Qualified Person" for the purposes of NI 43-101.
6. I am the author of this report responsible for the preparation of the report titled "NI 43-101 technical report on the Groundhog Project, Bristol Bay Region, southwestern Alaska 60°04'N / 155°08' W" and dated April 28, 2020 (the "Technical Report") relating to the Groundhog property.
7. I visited the Groundhog property September 11h to 12th, 2019.
8. I have not had prior involvement with the property that is the subject of the Technical Report.
9. As at the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.
10. I am independent of the issuer applying all of the tests in section 1.5 of National Instrument 43-101.
11. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, or the Technical Report.

Signed and dated this April 28, 2020 at Anchorage, Alaska.

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Signature of Qualified Person

Nicholas Van Wyck Ph.D., CPG #10553

Effective Date: April 28, 2020