



**Technical Report Summarizing Exploration Work on the  
DUKE Project, Babine Porphyry Copper District, Central British  
Columbia, Canada**

**National Instrument 43-101 Technical Report**



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## ELEMENT LIST

Element	Name	Element	Name	Element	Name	Element	Name
Al (Al <sub>2</sub> O <sub>3</sub> )	Aluminum	Eu	Europium	Nd	Neodymium	Ta	Tantalum
Ag	Silver	Fe (Fe <sub>2</sub> O <sub>3</sub> )	Iron	P (P <sub>2</sub> O <sub>5</sub> )	Phosphorus	Tb	Terbium
As	Arsenic	Ga	Gallium	Pb	Lead	Ti (TiO <sub>2</sub> )	Titanium
Au	Gold	Gd	Gadolinium	Pd	Palladium	Th	Thorium
Ba (BaO)	Barium	Hf	Hafnium	Pt	Platinum	Tm	Thulium
Bi	Bismuth	Ho	Holmium	Pr	Praseodymium	U	Uranium
C	Carbon	K (K <sub>2</sub> O)	Potassium	Rb	Rubidium	V	Vanadium
Ca (CaO)	Calcium	La	Lanthanum	Re	Rhenium	W	Tungsten
Ce	Cerium	Lu	Lutetium	S	Sulphur	Y	Yttrium
Cr (Cr <sub>2</sub> O <sub>3</sub> )	Chromium	Mg (MgO)	Magnesium	Si (SiO <sub>2</sub> )	Silicon	Yb	Ytterbium
Cs	Cesium	Mn (MnO)	Manganese	Sm	Samarium	Zn	Zinc
Cu	Copper	Mo	Molybdenum	Sb	Antimony	Zr	Zirconium
Dy	Dysprosium	Na (Na <sub>2</sub> O)	Sodium	Sn	Tin		
Er	Erbium	Nb	Niobium	Sr (SrO)	Strontium		

## UNITS AND ABBREVIATIONS LIST

Abbreviation	Unit or Description
1VD	First Vertical Derivative (geophysics)
ACME	ACME Laboratories
AAS	Atomic absorption spectrometry (geochemical analysis)
AES	Atomic emission spectrometry (geochemical analysis)
ANHY	Anhydrite ± Pyrite Vein
AR	Aqua Regia, a mixture of hydrochloric and nitric acid (geochemical analysis)
ARIS	Assessment Report Index System (British Columbia government)
BC	British Columbia, Canada
BCGS	BC Geological Survey
BCGS-RGS	BC Geological Survey Regional Geochemical Survey
BL	Blank Standard (QAQC)
BFP	Biotite Feldspar Porphyry (rock unit)
BQ	Drill core size (3.64 centimetre diameter)
BV	Bureau Veritas (laboratory)
C	Celsius (temperature)
CAD	Canadian dollars
cm	Centimetre
cm <sup>2</sup>	Square centimeter
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CIPW	Cross-Iddings-Pirsson-Washington Normative Calculation
CuEQ	Copper Equivalent
°	Degree
DX- DP	Duplicate Sample or Replicate Sample (QAQC)
EBV1	Early Diffuse Quartz Vein
EGV1	Early Magnetite Vein
FA	Fire assay (precious metal geochemical analysis)
Fm	Formation (geology)
FSR	Forest service road
g	Gram
GBC	Geoscience BC
g/t	Grams per tonne
>	Greater than
≥	Greater than or equal to
Ha	Hectare (10,000 m <sup>2</sup> )
IP	Induced Polarization (geophysical survey)
ICP	Inductively coupled plasma (geochemical analysis)
ICPAES	Inductively coupled plasma atomic adsorption spectrometry
ICP-MS	Inductively coupled plasma Mass Spectrometry
IDW	Inverse distance weighted
INAA	Instrumental neutron activation analysis (geochemical analysis)
K-Ar	Potassium argon (geochronology)
kg	Kilogram
km	Kilometre
km <sup>2</sup>	Square kilometre
lb	Pound (weight)
l	Litre
LDL	Lower Detection Limit
LOI	Loss on ignition (geochemical analysis)
m	Metre
m <sup>2</sup>	Square metre
m <sup>3</sup>	Cubic metre
M	Million

Abbreviation	Unit or Description
Ma	Mass in air (density measurement)
Ma	Millions of years ago (geochronology)
Mw	Mass in water (density measurement)
µm	Micron
mg	Milligram
mm	Millimetre
'	Minute (plane angle)
(ICP-) MS	Mass spectrometry (geochemical analysis)
Ms	Mainstream sample (QAQC)
NAD	North American Datum (mapping)
NI	National Instrument (43-101)
NQ	Drill core size (4.76 centimetre diameter)
NQ2	Drill core size (5.06 centimetre diameter)
NTS	National topographic system (map sheets in Canada)
OES	Optical emission spectrometry (geochemical analysis)
OTCBB	Over-the-counter bulletin board (electronic trading service United States)
oz	Troy ounce
±	Plus or minus (above or below)
%	Percent
ppb	Parts per billion
ppm	Parts per million
QAQC	Quality assurance / quality control
QGIS	Geographical Information System (software)
QP	Qualified Person (defined by NI 43-101)
QZCP	Quartz-chalcopyrite vein
QZMO	Quartz-molybdenum vein
QZCS	Quartz-sulphide vein
QZPY	Quartz-pyrite vein
"	Second (plane angle)
s	Second (time)
SG	Specific gravity (density)
SQL	Structured query language (database)
ST-SD	Standard or Certified Reference Material (QAQC)
SWIR	Short wave infra-red (spectrometry)
RC	Reverse circulation (drill)
RQD	Rock quality designation (geotechnical)
3D	Three dimensional
t	Tonne (1,000 kg)
t/d	Tonnes per day
TD-ICP	Actlabs analytical laboratory method code (geochemical analysis)
TEM	Time domain electromagnetic system
UTM	Universal Transverse Mercator (mapping)
ZTEM	Z-tipper time-domain electromagnetic (geophysics)

# 1 EXECUTIVE SUMMARY

## 1.1 *Project Description, Location and Access*

The DUKE Project (the “Project”, or “DUKE”) comprises 76 mineral claims covering an area of 70,360.65 ha. The Project is located in the Babine District of the Omineca Mining Division, central BC. The centre of the Project lies approximately 85 km northeast of Smithers.

Extensive infrastructure exists in the area to support the forestry industry and the construction of a new LNG pipeline, and also dates back to the nearby past-producing Bell and Granisle Cu mines. As such, access is relatively easy via an extensive and well maintained FSR network, which is accessed via commercial barge that departs from Michelle Bay in Topley Landing, 9 km south of the village of Granisle and 37 km north of the town of Topley, and arrives into Nose Bay on the eastern shore of Babine Lake.

## 1.2 *Ownership*

The Project is 100% owned by Amarc Resources Ltd (“Amarc”). The authors are not aware of any existing underlying legal agreements, joint ventures, royalty agreements or partnerships on the DUKE Project.

## 1.3 *Geology and Mineralization*

The exploration stage DUKE Project is located within a belt of Tertiary and Cretaceous age porphyry Cu occurrences in central BC (MacIntyre et al., 1997). The prospective Babine Intrusive Suite intrudes Mesozoic volcanic and sedimentary rocks that comprise the Stikine Terrane, which in turn lies within the Intermontane Tectonic belt of central BC. The Babine Igneous Suite intrusions (biotite feldspar porphyry, “BFP”) are central to the mineralization of the area. The Babine District is a 40 by 100 km north-northwesterly striking mineralized belt that hosts both the past operating porphyry Cu-Au mines of Bell and Granisle, the advanced stage Morrison porphyry Cu-Au deposit, the NAK porphyry Cu-Au deposit, and the DUKE porphyry Cu-Mo-Ag deposit target.

The mineralization at the DUKE deposit target occurs within north and northwest-striking, steeply dipping quartz – chalcopyrite ± bornite veinlets hosted by a Tertiary BFP, mafic volcanic sequences, and a previously undocumented monzonite. Higher grades occur locally at, or adjacent to, contacts between the intrusive phases and the volcanic and sedimentary host rocks of the Hazelton Group. The DUKE porphyry is crosscut by porphyritic dykes, porphyritic monzonite, and several intrusion breccias. Alteration is primarily potassic as defined by the presence of secondary biotite after amphibole with little evidence of significant K-feldspar. Pervasive phyllic alteration overprints the currently known potassic core of the deposit where sericite has commonly replaced plagioclase.

The DUKE deposit target is located on the flank of a magnetic high and displays a subtle magnetic signature. The porphyry hydrothermal system has a large IP chargeability anomaly that measures 3 km by 1 km with chargeability between 14–60 mV/V. The IP chargeability anomaly coincides with the magnetic target.

Currently, Amarc interprets the DUKE porphyry as a fault bisected pregnant hydrothermal system offset by a younger regional northwest-trending fault that crosscuts and offsets the deposit. A step-out hole (DK18004) drilled by Amarc located and collared 1 km to the north of Amarc’s other drill holes, investigated the possible dextral offset to the Cu-Mo-Ag±Au mineralization. This hole successfully encountered mineralization grading 0.22% Cu, 0.01% Mo, and 1 g/t Ag over 93 m, so confirming the presence of a larger mineralized hydrothermal system.

#### **1.4 Environmental, permitting, and community impact**

The authors are not aware of any existing environmental liabilities related to the DUKE Project. The Project is currently permitted for exploration drilling at the DUKE deposit target and geophysical surveys across the Project. These permits include all ancillary permits to allow exploration work in the future.

The DUKE Project is situated within the asserted traditional territory of First Nations. Amarc works closely with local First Nations and other project stakeholders in order to advance its mineral properties responsibly, and seeks early and meaningful engagement to ensure its mineral exploration and development activities are well-coordinated and broadly supported, to address local priorities and concerns, and to optimize opportunities for collaboration and local benefit.

#### **1.5 Conclusions**

The Babine District (or the “District”) is one of BC’s most prolific porphyry Cu belts, with past producing Cu-Au mines (Bell, Granisle) and a sizable advanced-stage project (Morrison). The District is extensively covered by sequences of glaciofluvial and lacustrine cover. Although historical workers located the outcropping porphyry Cu-Au mineralization, most of the prospective ground lies under the Quaternary cover, which is thought to be of variable thickness (0 m to 30 m). Amarc has staked a controlling position across the district and is positioned to identify new porphyry Cu-Au-Mo-Ag discoveries under cover.

Amarc has identified the DUKE porphyry as a significant and sizable Cu-Mo-Ag±Au deposit-scale target. The company has completed 4,107 m of drilling since 2017. Significant Cu mineralization was intersected, for example, 318 m of 0.24% Cu, 0.01% Mo, and 1.1 g/t Ag, including 58 m at 0.34% Cu, 0.02% Mo, and 1.5 g/t Ag.

Many of shallow historical drill holes completed at the DUKE deposit target both intercepted encouraging grades and ended in mineralization. Amarc’s modern drilling expanded the known mineralization laterally and to depth, with the mineralization remaining open to expansion in all directions. The hydrothermal system, as outlined by IP and drilling, is extensive, measuring 3 km by 1 km at surface, of which only a small percentage has been drill tested to date. A single step-out hole (DK18004) was drilled by Amarc to test a possible faulted off-set target 1 km to the north of the previously Amarc drilling. This hole returned anomalous grades of Cu-Mo-Ag including 93 m at 0.22% Cu, 0.012% Mo and 1.0 g/t Ag, and confirmed the hydrothermal system present at the DUKE deposit is extensive in both volume and mineralization.

Recent regional targeting has identified 12 high-priority porphyry style exploration targets on the wider DUKE Project tenure for field follow-up and potential drill testing. These new targets are in addition to the known porphyry deposit target at DUKE and the porphyry prospect at Trail Peak. These new targets were identified as areas with anomalous Cu-Au-Mo-Ag and other porphyry indicator till geochemistry, compelling up-ice magnetic features, and were structurally controlled along secondary faults emanating from large deep-seated regional faults that likely controlled the emplacement of the prospective Babine Intrusions.

#### **1.6 Recommendations**

It is recommend that the 12 new porphyry-style regional exploration targets identified across the DUKE Project be initially assessed with reconnaissance level IP surveys along the existing and extensive FSR system that crosses many of the newly identified targets, to establish the presence (or not) of a sulphide system. Where IP surveys identify a chargeability anomaly a detailed IP grid should be completed, potentially followed by B or C horizon soil sampling up-ice of the existing geochemical train, and possibly geological mapping to check for evidence of the prospective Babine Intrusive suite or associated hydrothermal alteration that may outcrop through the extensive glacial cover. On prioritized targets an

initial focused program of RC drilling is recommended, to test for the presence of a potential porphyry Cu mineralized system below cover. The completion of this recommended program is expected to generate new quality porphyry Cu-Au-Mo-Ag targets for follow-up with diamond drilling.

In addition, at both the DUKE and Trail Peak porphyry deposit targets, new IP surveys, diamond drilling, and surficial geochemical sampling are required to extend the known mineralization laterally and to depth. Notably at the DUKE deposit target, drilling will be required to test the newly discovered northern extension to the deposit.

## **2 Introduction**

### **2.1 Terms of Reference and Purpose**

This report was prepared by Mr. C. Mark Rebagliati, P. Eng., and Mr. Eric Titley, P. Geo at the request of Dr. Diane Nicolson, President and CEO of Amarc to provide an up-to-date summary of exploration work completed on the DUKE Project (the “Project” or “DUKE”), located in BC. The objective of this report is to summarize historical work, outline exploration completed by Amarc to date, appraise the exploration potential of the DUKE Project, and if warranted, make recommendations for future exploration work.

The authors completed this report in compliance with NI 43-101 of the Canadian Securities Administrators and the guidelines in Form 43-101 F1. The lead authors are “QPs” within the meaning of NI 43-101.

The content of this report is based on information provided by and for Amarc. Other information was obtained from the public domain. The authors have no reason to doubt the reliability of the information provided by Amarc.

This technical report is based on the following sources of information:

- Information from Amarc for matters relating to permits, environmental studies, social or community impacts, surface rights, royalties, agreements and encumbrances relevant to this report;
- Information from drilling and geophysical surveys conducted or commissioned by Amarc;
- Exploration Targeting utilizing information from historical drilling, geological, geochemical, and geophysical surveys;
- Discussions with the Amarc technical team;
- Inspection of the DUKE Project and surrounding area;
- Compilation, integration, and review of the exploration datasets from work by both historical operators and Amarc; and
- Additional information from public domain sources, including previous NI 43-101 reports on the Babine District, historical workers (ARIS Assessment Reports), Government Datasets from, for example, the BCGS and GBC.

This report has been prepared by Mr. C. Mark Rebagliati, P. Eng., and Mr. Eric Titley, P. Geo., and also by Dr. Andrew J. Fagan CGeol. under the supervision of the QPs. The information, opinions and conclusions contained herein are based on:

- Information available to the authors 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 Amarc and obtained from other third party sources.

Standard professional procedures were followed in preparing the contents of this report. Data used in this report has been verified where possible and the authors have no reason to believe that the data was not

collected in a professional manner. The report was assembled in Vancouver, Canada during February to April 2020. The effective date of this report is, April 3<sup>rd</sup>, 2020.

**Table 2-1: Qualified Persons Responsible for Each Section of this Technical Report.**

Section	Report Section	Responsibility	
		Company	Qualified Person & Professional Accreditation
1.0	Summary	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
2.0	Introduction	Amarc	C. Mark Rebagliati, P.Eng
3.0	Reliance on Other Experts	Amarc	C. Mark Rebagliati, P.Eng
4.0	Project Description and Location	Amarc	C. Mark Rebagliati, P.Eng
5.0	Accessibility, Climate, Local Resources, Infrastructure and Physiography	Amarc	C. Mark Rebagliati, P.Eng
6.0	History	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
7.0	Geological Setting and Mineralization	Amarc	C. Mark Rebagliati, P.Eng
8.0	Deposit Types	Amarc	C. Mark Rebagliati, P.Eng
9.0	Exploration	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
10.0	Drilling	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
11.0	Sample Preparation, Analyses and Security	Amarc	Eric Titley, P.Geo
12.0	Data Verification	Amarc	Eric Titley, P.Geo C. Mark Rebagliati, P.Eng
13.0	Mineral Processing and Metallurgical Testing	Amarc	C. Mark Rebagliati, P.Eng
14.0	Mineral Resource Estimates	Amarc	C. Mark Rebagliati, P.Eng
15.0	Adjacent Properties	Amarc	C. Mark Rebagliati, P.Eng
16.0	Other Relevant Data and Information	Amarc	C. Mark Rebagliati, P.Eng
17.0	Interpretation and Conclusions	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
18.0	Recommendations	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo
19.0	References	Amarc	C. Mark Rebagliati, P.Eng Eric Titley, P.Geo

## 2.2 Site Visit

In accordance with NI 43-101 guidelines, Mr. Rebagliati has visited the DUKE Project. The last such visit occurred on October 30, 2017 to perform a QP inspection while the Amarc drilling program was underway. The program began in the fall of 2017 and continued through early 2018. During this visit, the QP reviewed all operations at the DUKE deposit target as then completed, including safety, drilling procedures, QAQC and

data management. The QP also reviewed the geology and the veracity of geological observations being recorded by the Amarc field-crews. All aspects of the program were found to be of a suitable standard.

On July 14, 2019 the QP also visited the facility in Williams Lake where the DUKE core is stored. During this visit, the QP examined four intervals of core ranging in length from 60.0 m to 93.0 m totalling 296.0 m from holes DK1803, DK1804, DK1806 and DK1808. The diamond saw-cut half core was examined and compared with drill logs and with laboratory assays. The quality of core cutting, geological logging were to acceptable standards and Cu assays appeared realistic relative to visual estimates of chalcopyrite in the core.

### **3 Reliance on Other Experts**

Standard professional procedures were followed in preparing the contents of this report. Data used in this report has been verified where possible and the authors have no reason to believe that the data was not collected in a professional manner.

The QP has not independently verified the legal status or title of the claims or exploration permits, and has not investigated the legality of any of the underlying agreement(s) that may exist concerning the DUKE Project, and has relied on legal counsel in terms of the confirmation of these matters.

C. Mark Rebagliati, P.Eng., relied on a letter from Trevor Thomas, LLB, Amarc's legal counsel, dated April 3<sup>rd</sup>, 2020, confirming that title to the claims comprising the DUKE Project are held in the name of Amarc and these are in good standing. Legal counsel also confirmed there are no underlying agreements, royalties and encumbrances.

## **4 Project Description and Location**

### **4.1 Project Area and Location**

The DUKE Project is located in central BC, in the Omineca Mining Division, on NTS map sheet 93M/08 and 93M/01 and BCGS maps 93M.049, 93M.039, 93M.029, 93M.030, and 93M.010 (Figure 4-1). The centre of the Project is approximately 85 km northeast of Smithers, BC, at 55° 14' 35" N Latitude and 126° 10' 25" W Longitude; or UTM Zone 9 (NAD 83) at 6,126,000 m N and 681,000 m E. The location of the DUKE mineral tenure is shown in Figure 4-2.

### **4.2 Current Agreements, Royalties, and Encumbrances**

The authors are not aware of any existing underlying legal agreements, joint ventures, royalty agreements or partnerships on the DUKE Project. The Project is 100% owned by Amarc.

### **4.3 Current Environmental Liabilities**

The authors are not aware of any existing environmental liabilities related to the DUKE Project.

### **4.4 Current Tenure**

Initially the DUKE Project comprised 34 mineral claims covering an area of approximately 19,057 hectares (Figure 4-3). Subsequently in 2018 and 2019 Amarc's tenure was expanded as various rounds of data compilation and targeting work were completed. Currently the tenure consist of 76 claims covering 70,360.65 ha (see Table 4-1). All claims are 100% held by Amarc.

Amarc does not hold any surface rights. British Columbia mining law allows for access and use of the surface for exploration through notification of surface rights holders. None of the claims are covered by placer mining claims.

The DUKE Project is situated within the asserted traditional territory of First Nations. Amarc works closely with local First Nations and other project stakeholders in order to advance its mineral properties responsibly, and seeks early and meaningful engagement to ensure its mineral exploration and development activities are well-coordinated and broadly supported, to address local priorities and concerns, and to optimize opportunities for collaboration and local benefit.

**Table 4-1: Current DUKE Project Mineral Tenure.**

Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)	Area (km <sup>2</sup> )
548719	DOROTHY	100% Amarc Resources Ltd.	2007/JAN/05	2027/NOV/30	368.83	3.69
1037003	WIN1	100% Amarc Resources Ltd.	2015/JUL/01	2027/NOV/30	165.93	1.66
1037010	WIN2	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	165.98	1.66
1037015	WIN3	100% Amarc Resources Ltd.	2015/JUL/01	2027/NOV/30	405.82	4.06
1037016	WIN4	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	294.93	2.95
1037017	WIN5	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	295.04	2.95
1037018	WIN6	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	331.96	3.32
1037021	BARRICKSLYNN	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	73.66	0.74
1037024	DUCANEX	100% Amarc Resources Ltd.	2015/JUL/01	2023/OCT/05	220.99	2.21
1038439	TRAIL2	100% Amarc Resources Ltd.	2015/SEP/08	2023/OCT/05	275.45	2.75
1038490	TRAIL3	100% Amarc Resources Ltd.	2015/SEP/11	2023/OCT/05	532.78	5.33
1042004	TRAIL4	100% Amarc Resources Ltd.	2016/FEB/12	2023/OCT/05	110.23	1.10
1042005	TRAIL3	100% Amarc Resources Ltd.	2016/FEB/12	2023/OCT/05	91.80	0.92
1044544	TRAIL5	100% Amarc Resources Ltd.	2016/JUN/04	2023/OCT/05	183.60	1.84
1044550	-	100% Amarc Resources Ltd.	2016/JUN/04	2023/OCT/05	330.66	3.31
1045582	WIN7	100% Amarc Resources Ltd.	2016/JUL/26	2023/OCT/05	811.57	8.12
1046201	WIN8	100% Amarc Resources Ltd.	2016/AUG/22	2023/OCT/05	1786.72	17.87
1046202	WIN9	100% Amarc Resources Ltd.	2016/AUG/22	2023/OCT/05	441.75	4.42
1046205	WIN10	100% Amarc Resources Ltd.	2016/AUG/22	2023/OCT/05	883.43	8.83
1046680	WIN11	100% Amarc Resources Ltd.	2016/SEP/14	2023/OCT/05	165.76	1.66
1046681	WIN12	100% Amarc Resources Ltd.	2016/SEP/14	2023/OCT/05	92.02	0.92
1046682	WIN13	100% Amarc Resources Ltd.	2016/SEP/14	2023/OCT/05	110.40	1.10
1046683	OSCAR	100% Amarc Resources Ltd.	2016/SEP/14	2023/OCT/05	772.07	7.72
1046684	TRAIL6	100% Amarc Resources Ltd.	2016/SEP/14	2023/OCT/05	1725.61	17.26
1047912	WIN14	100% Amarc Resources Ltd.	2016/NOV/16	2023/OCT/05	1456.54	14.57
1047913	WIN15	100% Amarc Resources Ltd.	2016/NOV/16	2023/OCT/05	1754.41	17.54
1047914	WIN16	100% Amarc Resources Ltd.	2016/NOV/16	2023/OCT/05	1808.41	18.08
1049427	DUKE SOUTH	100% Amarc Resources Ltd.	2017/JAN/24	2023/OCT/05	1219.84	12.20
1049436	DUKE SE	100% Amarc Resources Ltd.	2017/JAN/24	2023/OCT/05	388.14	3.88
1049932	DUKE SE 2	100% Amarc Resources Ltd.	2017/FEB/10	2023/OCT/05	905.68	9.06
1050190	LINK1	100% Amarc Resources Ltd.	2017/FEB/21	2023/OCT/05	55.13	0.55
1050191	LINK2	100% Amarc Resources Ltd.	2017/FEB/21	2023/OCT/05	147.15	1.47
1051647	PIM2	100% Amarc Resources Ltd.	2017/APR/28	2023/OCT/05	166.49	1.66
1051648	PIM3	100% Amarc Resources Ltd.	2017/APR/28	2023/OCT/05	221.90	2.22
1059001	DK1	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1707.30	17.07
1059002	DK4	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1649.78	16.50
1059003	DK2	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1651.41	16.51
1059004	DK5	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1649.00	16.49
1059005	DK3	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1650.59	16.51
1059006	DK6	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	1648.11	16.48

**Table 4-1: (continued)**

Tenure Number	Claim Name	Owner	Issue Date	Good To Date	Area (ha)	Area (km <sup>2</sup> )
1059007	DK7	100% Amarc Resources Ltd.	2018/MAR/02	2023/OCT/05	658.99	6.59
1066478	WIN17	100% Amarc Resources Ltd.	2019/FEB/12	2021/JUN/23*	533.53	5.34
1066725	DK14	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1825.91	18.26
1066726	DK8	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1285.05	12.85
1066727	DK15	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1605.72	16.06
1066728	DK9	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1430.71	14.31
1066729	DK16	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1255.81	12.56
1066730	DK10	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	902.62	9.03
1066731	DK17	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1589.10	15.89
1066732	DK11	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1822.54	18.23
1066733	DK18	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1294.10	12.94
1066734	DK13	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	497.25	4.97
1066735	DK20	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1015.93	10.16
1066737	DK21	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1034.76	10.35
1066736	DK12	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	607.10	6.07
1066738	DK23	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	778.93	7.79
1066739	DK22	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1741.52	17.42
1066740	DK25	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1410.29	14.10
1066741	DK26	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	1782.48	17.82
1066742	DK24	100% Amarc Resources Ltd.	2019/FEB/22	2021/FEB/14*	908.74	9.09
1066798	DK19	100% Amarc Resources Ltd.	2019/FEB/25	2021/FEB/14*	1567.70	15.68
1067210	DK28	100% Amarc Resources Ltd.	2019/MAR/13	2021/FEB/14*	1166.16	11.66
1067211	DK29	100% Amarc Resources Ltd.	2019/MAR/13	2021/FEB/14*	961.86	9.62
1067212	DK27	100% Amarc Resources Ltd.	2019/MAR/13	2021/FEB/14*	1741.77	17.42
1067213	DK30	100% Amarc Resources Ltd.	2019/MAR/13	2021/FEB/14*	185.18	1.85
1068824	DK31	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1286.07	12.86
1068826	DK 32	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	716.45	7.16
1068828	DK33	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1102.80	11.03
1068827	DK 34	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1544.99	15.45
1068829	DK35	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1232.78	12.33
1068831	DK36	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	424.12	4.24
1068823	DK37	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	555.53	5.56
1068825	DK38	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1479.47	14.79
1068830	DK39	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1711.28	17.11
1068832	DK40	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	1545.26	15.45
1068833	DK41	100% Amarc Resources Ltd.	2019/MAY/31	2021/FEB/14*	441.26	4.41

\* Note: As per the BC Chief Gold Commissioners Extension Order, Dated 2<sup>nd</sup> April, 2020 all BC mineral claims with good-to dates due before December 31, 2021 have been protected to December 31, 2021. On or before December 31, 2021 Amarc will be posthumously required to file Assessment Work, or pay cash-in-lieu, in order to maintain the mineral claims denoted by an \* in the above table, in good standing.

#### 4.5 Permits

All government permits required for Amarc's drilling and proposed surface geophysical surveys on the DUKE Project have been acquired under BC Mines Act Permit MX-13-289. These included the following:

Permission to complete up to 20 drill holes on the DUKE deposit target as issued on August 8, 2017 and valid until June 30, 2022, which was accompanied by a Free Use Timber Permit.

A Deemed Authorization received on August 8, 2018 that allows for IP surveying over the area covered by the above drill permission, which is valid to June 14, 2022.

Permission to complete up to 250 line-kilometers of IP surveying on regional targets across the Duke Project. This permission was initially granted on August 18, 2017 and subsequently amended on July 13, 2018 and October 11, 2019, and is in good standing through to October 10, 2024,

#### 4.6 Factors Affecting Access

A Road Users Agreement was signed with Canadian Forest Products (CanFor) in 2017 but will need to be updated to enable access to the required FSR network prior to future field mobilization. The authors are not aware of any further access, title, or issue affecting Amarc's right to work on the Project.



**Figure 4-1: Map of BC Showing the Location of the DUKE Project (Red Star) in Respect to Operating and Past Producing Porphyry Mines, and Advanced Stage Porphyry Projects. Approximate Area Outlined in Figure 4-2 (White Box). Also Shown are the Locations of Amarc's Other Porphyry Projects JOY and IKE (Red Stars).**

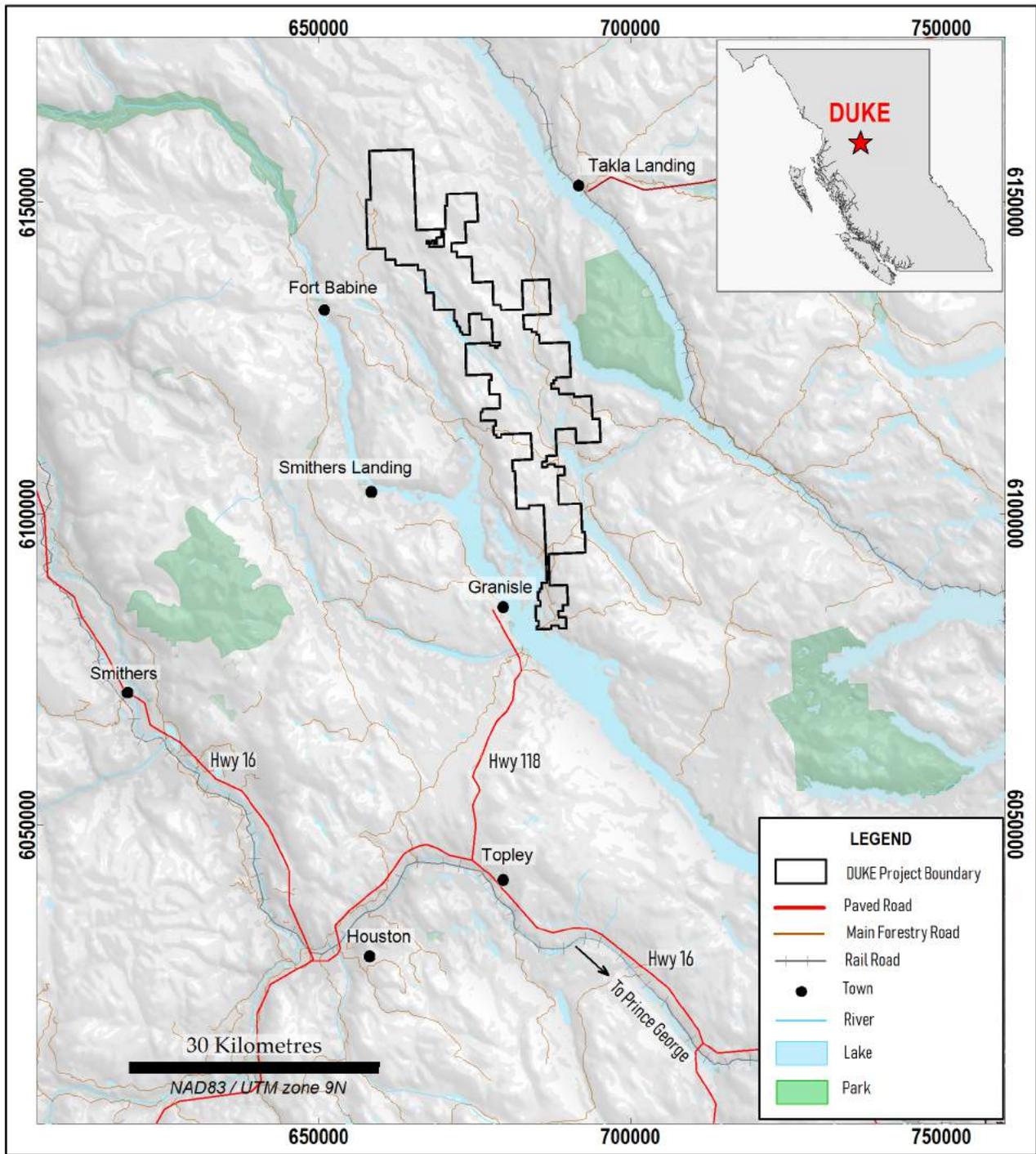
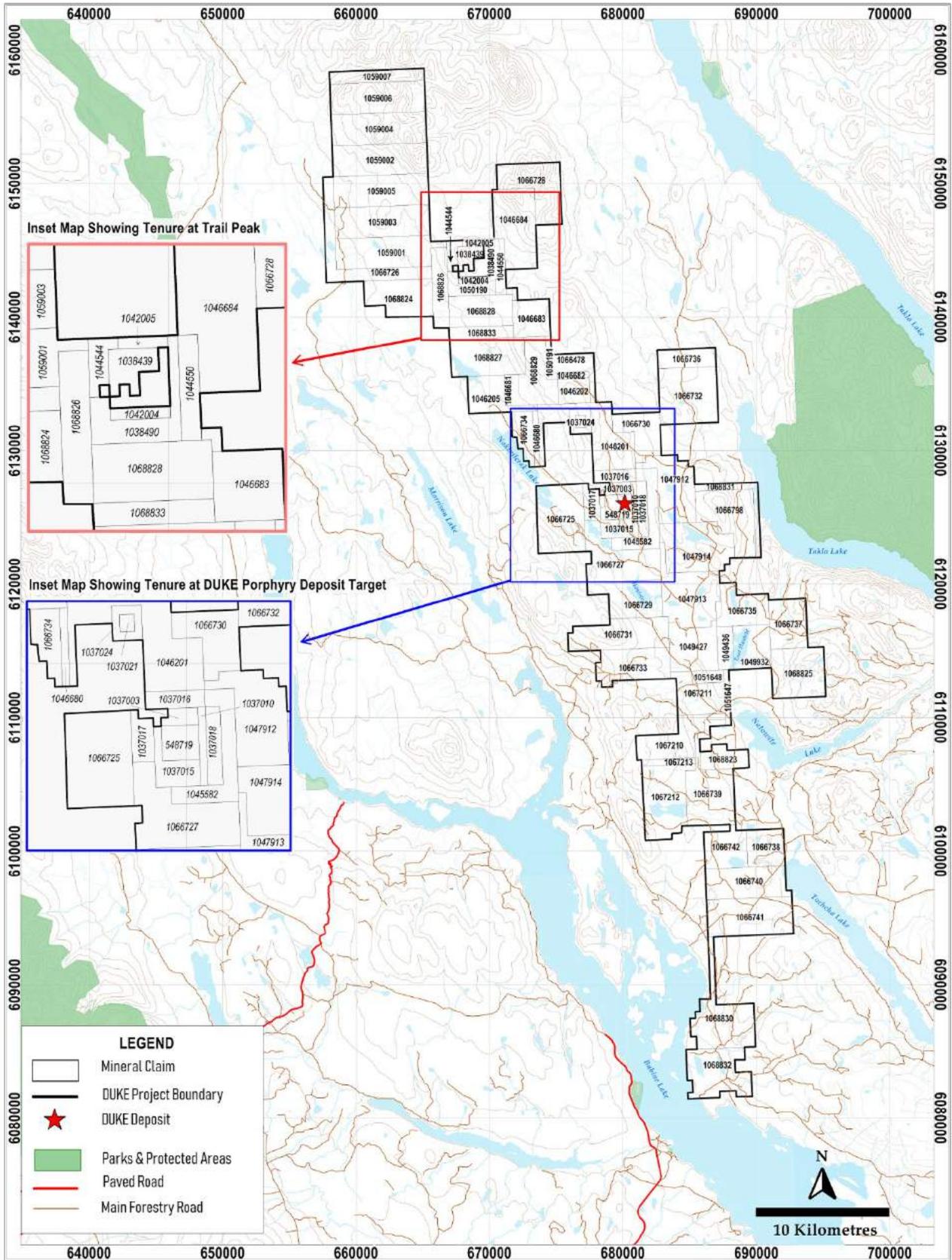


Figure 4-2: DUKE Project Location and Access Map.



**Figure 4-3: DUKE Project Tenure Map. Blue inset Shows Area Around DUKE Porphyry Deposit Target, Red Inset Shows Area Around Trail Peak Porphyry Prospect.**

## **5 Accessibility, Climate, Local Resources, Infrastructure & Physiography**

### **5.1 Access**

Access to the heart of the Project is along the Yellowhead Highway 16 to Topley and then north (40 km) via Highway 118 to Michelle Bay in Topley Landing. Barge travel across Babine Lake to Nose Bay is facilitated by Babine Barge Ltd. The landing at Nose Bay is within the DUKE tenure. To access the northern part of the claim group, and specifically the DUKE porphyry deposit target locality, follow the Jinx FSR north to km 44 where it meets the NAK FSR. At km 8.8 on the NAK FSR, an un-named spur road forks to the northwest and leads to the DUKE porphyry deposit target area. The Project can also be accessed from the east through Fort St James (165 km) via the paved Tachie Road, then the Grostete, Leo Creek, 300 and 900 FSRs.

### **5.2 Physiography and Climate**

The DUKE Project is situated in the Nechako Plateau, which forms a large portion of the Intermontane Belt of central BC. In the Babine region, the plateau is broken by a series of normal faults into basin and range topography. Down faulted grabens tend to be occupied by large bodies of fresh water. The uplands are heavily forested, with mature stands of white spruce and lodgepole pine. Devil's club occurs in the swampy low-lying areas. Though alpine vegetation is less frequently encountered across DUKE, sub-alpine meadows have been documented to occur nearby on Old Fort Mountain (Ogryzlo 1990).

The DUKE Project covers an area of low to moderate relief. The wide glacial valley central to the Project averages 1,000 m elevation above sea level, and ridges flanking the east and west of the valley have elevations of 1,200 m and 1,400 m respectively. Extensive glacial sediments cover the region, including gravels, sand, till, and clay; these may be up to 30 m thick and have severely limited outcrop exposure to high ridges and creek valleys (Carter, 1995, Amarc 2017-2018 drilling). It is also the reason why classic surficial geochemical exploration in the Babine has been relatively ineffective as a regional targeting tool. Amarc estimates the top of the lacustrine layers to be around the 900 m elevation.

Winters tend to be relatively mild with a minimum January average of -12.7 ° C and approximately 50 cm of precipitation, mostly snow. Summers are cool and wet with an average temperature for June and July of approximately 20° C, and 50 mm of rain per month (528 mm per year) (Environment Canada - [https://climate.weather.gc.ca/climate\\_normals/](https://climate.weather.gc.ca/climate_normals/); accessed 27-Feb, 2020).

Exploration can be conducted all year but is more cost effective to avoid work during the spring break-up.

### **5.3 Local Resources and Infrastructure**

The Babine District of central BC is well endowed in mineral deposits and prospects. These include the past-producing Bell Mine, Granisle Mine, and the advanced Morrison Project that is at the mine permitting stage. BC Hydro powerlines reach the site of the Bell Mine processing plant, located approximately 26 km to the southwest of the current center of the DUKE Project. Exploration programs can be easily supported from the extensive network of FSR that cover this actively logged region. A sizable commercial accommodation camp exists proximal to Nose Bay, mostly to support forestry operations, but it has also been used by Amarc staff to support exploration drilling operations. Overall the local infrastructure and resources is considered as good.

## 6 History

Geophysical and geochemical surveys completed by Kerr Addison Mines (“Kerr Addison”) in 1965 comprise the earliest work recorded within the DUKE Project tenure. Exploration by the Ducanex Resources Ltd. and Twin Peaks Mines Limited Joint Venture (“Ducanex JV”) in the early 1970s, including diamond drilling, led to the recognition of the Dorothy porphyry Cu-Mo (“Dorothy”) and NAK porphyry Cu-Au deposit targets. Since the 1970’s, exploration work both at the Dorothy pluton and regionally continued in a sporadic manner. At the Dorothy deposit target these works comprised re-assaying of the Ducanex JV drill core, surface geochemical sampling (silt, soil and rock), and geophysical surveys (IP, magnetic and radiometric).

Between 2008 and 2010, Copper Ridge Exploration Inc. (“Copper Ridge”) conducted two seasons of exploration work focused on the Dorothy and NAK deposit targets and with limited regional exploration at various sites now underlain by the DUKE Project tenure. The work at Dorothy and NAK comprised of geological mapping, geophysical and geochemical surveys and diamond drilling.

Amarc acquired the initial claims comprising the DUKE Project in December 2016 and renamed Dorothy as the DUKE porphyry Cu-Mo deposit target (from herein Dorothy will be referred to as the DUKE porphyry Cu-Mo deposit target).

For brevity and to focus on the most important historical results, only the major exploration programs with drilling are described in detail below. Table 6-1 summarizes all historical work completed on the DUKE Project prior to Amarc’s involvement. Table 6-2 summarizes the historical drill programs at the DUKE porphyry Cu-Mo deposit target, which are further described in Sections 6.1 - 6.7 below. Note that in respect to the historical drilling at the DUKE deposit target, the factors that attracted Amarc’s attention were the mineralization and grade encountered, the shallow nature of the holes and that many of the drill holes ended in mineralization.

**Table 6-1: History of Exploration on the DUKE Project.**

Year	Operator	Work Categories	ARIS Number
1965	Kerr Addison	Geophysical, Geochemical	746
1967	Kerr Addison	2 Diamond Holes	-
1968	Texasgulf	Geophysical, Geological, Physical, Geochemical	1672
1970	Noranda Mining and Exploration Inc.	Geophysical, Physical, Geochemical	2608
1970	Amoco Canada Petroleum Co	Geophysical	2872
1970	Ducanex/ Twin Peak JV	Geophysical	2959
1970	Ducanex/ Twin Peak JV	IP survey, 13 diamond drill holes	-
1971	Ducanex/ Twin Peak JV	16 diamond drill holes and trenching	-
1971	Noranda Mining and Exploration Inc.	Geochemical, Geophysical	3311
1972	Caliente Min.	Physical, Geophysical	3683
1972	Caliente Min.	Physical, Geochemical	3878
1972	Ducanex Res.	Geophysical, Physical	4206
1975	Texasgulf	Drilling	5706
1990	Carter, N.C.	Prospecting, Geochemical, Geological	19557
1991	International Corona Corp.	Geochemical	22143
1992	Noranda Mining and Exploration Inc.	Drilling, Physical, Geochemical	22047
1992	Noranda Mining and Exploration Inc.	Geochemical, Geological	22156
1992	Carter, N.C.	Prospecting, Geochemical	22719

**Table 6-1: (continued)**

Year	Operator	Work Categories	ARIS Number
1993	Noranda Mining and Exploration Inc.	Geophysical	23141
1994	Hewitt, L.	Prospecting	23349
1994	Hewitt, L.	Prospecting	23350
1994	Hewitt, L.	Prospecting	23351
1994	Carter, N.C.	Prospecting, Geochemical, Geological	23739
1995	Hewitt, L.	Prospecting, Geochemical	24107
1996	Soby, K.	Prospecting	24479
1996	Cominco Ltd.	Geophysical, Physical	24559
1996	Lucero Resource Corp.	Geophysical	24758
1996	Hera Resources Inc.	Geological, Geophysical, Physical, Geochemical	24783
1997	Pacific Golden Spike Res. Ltd.	Prospecting	24808
1997	Soby, K.	Prospecting, Geochemical	25100
1996	Teck Corporation	Geophysical	25376
2008	NXA Inc.	Physical, Geochemical	30159
2008	Copper Ridge	Geological, Geophysical, Diamond Drilling	30986
2009	NXA Inc.	Geophysical, Physical, Geochemical	30686
2010	Copper Ridge	Geophysical, Geochemical	32356
2011	Astorius Resources Ltd.	Geophysical	32485
2014	Astorius Resources Ltd.	Geophysical	34809
2016	Brookes, C.	Prospecting, Geological, Geophysical	36012

Note: Physical work includes trenching, line-cutting, road preparation and other physical works

**Table 6-2: Historical Drilling Summary at the DUKE Porphyry Cu-Mo Deposit by Operator and Year.**

Operator	Year(s)	No. of Holes	Drill hole ID	Core Size	Total (m)	Average Length (m)
Kerr Addison	1967	2	-	-	-	-
Ducanex Resources Limited/ Twin Peaks Mines Limited JV	1970	13	70-01 to 70-13	BQ	1642.56	126 m
Ducanex Resources Limited/ Twin Peaks Mines Limited JV	1971	16	71-14 to 71-29	BQ	1342.95	85 m
Copper Ridge Explorations Inc.	2008	1	BB08-01	NQ	294.00	294 m
<b>Total Historical</b>	<b>1970, 1971 &amp; 2008</b>	<b>32</b>			<b>3,279.51</b>	

Note: Copper Ridge drilled four additional holes outside the DUKE Project during their 2008 program.

### 6.1 Kerr Addison 1967 Drilling

Company correspondence indicating that at least 136 m were drilled in two 1967 holes on the Project by Kerr Addison (Woolverton, 1971). At least one drill hole encountered graphite, the presumable source of the EM anomaly targeted. The drill hole collar locations, orientations and core sizes of these two holes are unknown. No drill core, drill logs, samples, assays, or any other information pertaining to these holes was located in the historical records.

## 6.2 Ducanex JV 1970-1971 Drilling

The Ducanex JV drilled the first holes on the DUKE porphyry Cu-Mo deposit target as part of a program following up on porphyry Cu prospects associated with Babine shear structures, and the mapped extent of the Dorothy pluton in 1970. By late 1971 the Ducanex JV had completed 2,985.51 m of drilling in 29 holes (Tables 6-3 to 6-4, with significant intercepts reported in Table 6-6). Drilling focussed on a small part of the mapped intrusive at Dorothy. Notably all holes attained only shallow vertical depths (see Table 6-2), with many ending in Cu-Mo mineralization (see Table 6-6, and Section 10).

The initial 13 holes, for a total 1,642.56 m and an average hole length of 126 m, targeted coincident geophysical and Cu in soil geochemical anomalies (holes 70-01 through 70-13), and were completed between late November 1970 and February 1971 (Woolverton, 1971). The additional 16 holes for a total length of 1,342.95 m at an average depth of 84 m, were completed later in 1971. An original drill log for hole 70-02, appended to a later report by the International Corona JV (“Corona”), indicates three 3 m zones of 75% or less core recovery. Only three other original drill logs are known from this drilling and they do not describe any other sections of poor recovery. Core recovery in the other 25 holes is unknown.

For drill hole identification purposes in the DUKE SQL database, Amarc added the prefix '70-' to the 13 holes completed in the initial Ducanex JV series of holes drilled between late November 1970 and February 1971. The prefix '71-' was added to the 16 holes drilled in the second phase from 1971. The historical drill hole names used are listed in Table 6-3. The collar coordinates for the 1970 and 1971 holes were georeferenced and digitized from historical drawings and have not been verified by Amarc in the field. Table 6-4 lists the drill hole coordinates, lengths and orientations of the Ducanex JV holes. A memo from Carter (2017) describes an examination of the Ducanex drill core at the DUKE Cu-Mo deposit target, however, any observations by Carter were not provided. Amarc is unaware if any of the remaining drill core from the Ducanex JV holes is still stored on the Project.

**Table 6-3: List of Historical Drill Holes at the DUKE Cu-Mo Deposit Target with Current Drill Hole Name.**

Current Name	Other Name(s)	Current Name	Other Name(s)	Current Name	Other Name	Current Name	Other Name
70-01	71-01, DDH 1	70-09	71-09, DDH 9	71-17	DDH 17	71-25	DDH 25
70-02	71-02, DDH 2	70-10	71-10, DDH 10	71-18	DDH 18	71-26	DDH 26
70-03	71-03, DDH 3	70-11	71-11, DDH 11	71-19	DDH 19	71-27	DDH 27
70-04	71-04, DDH 4	70-12	71-12, DDH 12	71-20	DDH 20	71-28	DDH 28
70-05	71-05, DDH 5	70-13	71-13, DDH 13	71-21	DDH 21	71-29	DDH 29
70-06	71-06, DDH 6	71-14	DDH 14	71-22	DDH 22		
70-07	71-07, DDH 7	71-15	DDH 15	71-23	DDH 23		
70-08	71-08, DDH 8	71-16	DDH 16	71-24	DDH 24		

**Table 6-4: Historical Ducanex JV Drill Hole Collar Information (1970-1971) at the DUKE Cu-Mo Deposit Target.**

Drill Hole	Year	Easting-X (m)	Northing-Y (m)	Elevation (m)	Length (m)	Azimuth (°)	Dip (°)
70-01	1970	679,772.60	6,125,327.87	933.00	91.44	270	-45
70-02	1970	679,772.60	6,125,327.87	933.00	163.37	90	-45
70-03	1970	679,968.31	6,125,336.06	939.00	163.37	270	-45
70-04	1970	679,968.31	6,125,336.06	939.00	163.37	90	-45
70-05	1970	680,018.66	6,125,592.11	971.00	94.49	90	-45
70-06	1970	679,715.53	6,125,202.61	933.00	100.58	90	-45
70-07	1970	679,846.49	6,125,078.22	922.00	95.10	270	-45

**Table 6-4: (Continued)**

Drill Hole	Year	Easting-X (m)	Northing-Y (m)	Elevation (m)	Length (m)	Azimuth (°)	Dip (°)
70-08	1970	679,846.49	6,125,078.22	922.00	132.59	90	-45
70-09	1970	679,841.68	6,125,205.57	925.00	148.13	90	-45
70-10	1970	679,758.64	6,125,580.65	944.00	170.08	90	-45
70-11	1970	679,758.64	6,125,580.65	944.00	73.46	270	-45
70-12	1970	680,169.61	6,125,219.57	959.00	71.02	90	-45
70-13	1970	680,101.76	6,125,216.16	942.00	175.56	270	-45
71-14	1971	679,559.02	6,125,698.97	953.00	115.21	0	-90
71-15	1971	679,522.15	6,125,763.55	957.00	93.88	0	-90
71-16	1971	679,587.43	6,125,765.11	955.00	66.45	0	-90
71-17	1971	679,598.38	6,125,638.86	950.00	61.57	0	-90
71-18	1971	679,528.77	6,125,635.39	951.00	69.19	0	-90
71-19	1971	679,490.19	6,125,698.15	954.00	89.92	0	-90
71-20	1971	679,683.28	6,125,705.36	954.00	91.44	0	-90
71-21	1971	679,810.22	6,125,710.98	968.00	62.48	0	-90
71-22	1971	679,419.01	6,125,946.15	969.00	85.65	0	-90
71-23	1971	679,692.87	6,125,451.55	939.00	64.92	0	-90
71-24	1971	679,568.58	6,125,446.03	942.00	91.44	0	-90
71-25	1971	679,496.76	6,125,570.88	950.00	91.44	0	-90
71-26	1971	679,459.88	6,125,635.45	953.00	92.96	0	-90
71-27	1971	679,421.14	6,125,819.58	966.00	54.56	0	-90
71-28	1971	679,421.14	6,125,819.58	966.00	112.78	270	-45
71-29	1971	679,045.81	6,126,055.34	971.00	99.06	270	-45

Note: Coordinates are UTM NAD83, Zone 9, and azimuths and dips were measured at collar.

### 6.3 Copper Ridge 2008 Drilling

Copper Ridge completed a single hole numbered BB08-01 in the DUKE Cu-Mo deposit target area, approximately 300 m northeast of the 1970-1971 Ducanex JV holes. This hole was designed to test a moderate IP chargeable zone and coincident surface outcrop of BFP. The 294 m drill hole was oriented to the northeast at an azimuth of 045° and an inclination of 50° (see Table 6-5). The hole encountered 3.1 m of overburden (not recovered) followed by 290.9 m of core to the end of hole. Dawson (2010) contains geological logs that include descriptions of geologic units encountered and detailed information on alteration and mineralization type and intensity for this drill hole. This report states that the core drilled is NQ size (4.76 cm diameter), however the appended drill logs indicate the core is a slightly larger NQ2 size (5.06 cm diameter). This apparent discrepancy has not yet been resolved. No geotechnical, core recovery or downhole survey data were provided in this report. According to the report, the remaining drill core was stored at Rugged Edge Expediting in Smithers, BC, however its current status is unknown.

**Table 6-5: Historical Copper Ridge Drill Hole Collar Information, and 2008 DUKE Cu-Mo Deposit Target Drilling.**

Drill Hole	Year	Easting-X (m)	Northing-Y (m)	Elevation-Z (m)	Length (m)	Azimuth (°)	Dip (°)
BB08-01	2008	679,784.00	6,125,970.00	990.00	294.00	45	-50

Note: Coordinates are UTM NAD83, Zone 9, azimuths and dips were measured at collar.

#### **6.4 Historical Drill Hole Surveying at the DUKE-Dorothy Cu-Mo Deposit**

The locations of the 1970 and 1971 historical drill holes were digitized from georeferenced drill hole diagrams. The location of drill hole BB08-01 is from a table in the 2010 report by Dawson (ARIS 30986, pg. 27) however a description of the collar survey method is lacking. Amarc visually confirmed the approximate drilling locations of some of the historical drill holes in the field, but none of the collars have been resurveyed. Amarc is unaware of any downhole surveying performed on any historical holes.

#### **6.5 Historical Drill Hole Sampling, Sample Preparation, Security & Analysis**

Amarc is unaware of any information on the sampling method, security, sample preparation procedures, analytical methods and analytical laboratories used in the 1970 and 1971 drill programs. Details of the 1991 Corona International JV ("Corona") resampling and the 2008 Copper Ridge programs are from the Dawson (2010, ARIS Report 30986).

##### **6.5.1 Ducanex JV 1970-1971**

Information for the 1970 and 1971 drill holes completed by the Ducanex JV is largely derived from a set of 1:600 scale, vertical, east-west, north-looking cross-sections. These drawings illustrate drill hole orientations, geologic codes, Cu % and MoS<sub>2</sub> % results (labelled 'Mo' on the plots) and a calculated value (described as Cu + 3 Mo) as downhole grade bars. These sections were georeferenced and digitized. Drill hole locations, orientations, geological codes, structural details and Cu % and MoS<sub>2</sub> % assay grades were scaled off the diagrams. This information was entered in a spreadsheet and the Mo % concentrations calculated by dividing the entered MoS<sub>2</sub> concentrations by 1.6681. This information was imported into the Amarc DUKE SQL database. Four original Ducanex drill hole logs appended to a later report by Corona were used to guide this exercise. For example, these logs indicate that the original Mo % results plotted on the Ducanex JV cross-sections are actually MoS<sub>2</sub>% results. A total of 566 samples averaging 3.0 m in length were digitized and recorded via this method. Primary geological unit information was similarly digitized and recorded by Amarc.

Two holes, 71-22 and 71-29, are not plotted on the cross-sections and it is not known if these holes were assayed. Assays for Ducanex drill hole 71-21 were not digitized because they had not been located at the time that Amarc completed the digitization. A copy of the original Ducanex JV assay grade bar cross-section for this hole has since been located, however digitizing of this section is pending. The Ducanex JV did not systematically assay all the cored sections of their drill holes. The original drill log for 70-10 shows a 4.57 m long section of dyke that was not sampled or assayed. The log for 70-02 indicates three sections of this drill hole with poor or no core recovery were also not sampled or assayed. According to the cross-sections, portions of drill holes not assayed include sections of 70-04, 70-09 and 71-18, the end of hole 71-15, most of holes 70-06, 70-07, 70-08 and 70-12 and all of holes 71-27 and 71-28. Drill holes 71-22 and 71-29 do not appear on any cross-sections and it is not known if they were sampled or assayed.

Amarc is unaware of the analytical laboratory or assay methods used for the determination of Cu and MoS<sub>2</sub>, or if any core or samples still exist from this program.

##### **6.5.2 International Corona JV 1991**

In 1991, the Corona JV resampled four drill holes from the 1970 - 1971 Ducanex JV program. An extract of Robertson (1992, ARIS 22143) described the core resampling program as follows:

*"Drill holes 2, 10, 14 and 19 were among the best mineralized in the 1970 - 1971 drill programs and were chosen for re-sampling. Samples were generally taken over 10 foot intervals, down the entire length of the hole. Occasionally the condition of the core prohibited sampling at regular intervals (rotten or destroyed core boxes). All samples consisted of a representative sampling of the intervals noted in Appendix A."*

The original 1970 - 1971 Ducanex JV geology logs (compiled by Evergreen Explorations Ltd.) are appended to the Corona report for the four holes re-sampled and re-assayed by Corona. These logs detail the original sample intervals, sample numbers, Cu and MoS<sub>2</sub> analytical results in percent concentration, and Amarc utilized them to calibrate results digitized directly from the cross-sections of the other Ducanex JV holes. Unfortunately, original logs and assays for the other Ducanex JV holes were not included in this report and were not located by Amarc during the historical results compilation.

Corona took 140 samples numbered 84557 - 84648 and 84651 - 84698 from the other half of core. Sample preparation and analysis was completed at Acme and are reported on assay certificate 91-4808 provided in the ARIS Report 22143 (Robertson (1992)). Analysis at Acme included, Au by FA with an AAS finish and the determination of 30 elements, including Cu, Mo, Ag and Au, by AR digestion ICP-AES finish. The provenance and quality of the Corona results are clearly superior to the original Ducanex JV data and supersede them in the Amarc database. However, the multi-element data recorded on the Corona assay certificates was not of suitable quality to digitize via automated methods, as such manual entry of the important elements for porphyry exploration (Cu, Mo, Ag, Au) was completed by Amarc and imported into the SQL database. Manual data entry of the remaining elements from the paper assay certificates is pending.

### **6.5.3 Copper Ridge 2008**

Dawson (2010) reported that the Copper Ridge drill holes were sampled by splitting the entire length of core in half using a hydraulic splitter. Samples were allocated a unique numeric identifier and bagged on site. They were transported to the Acme sample preparation facility in Smithers for drying and crushing to 70% passing 10 mesh (2 mm). A 250 g coarse split was taken and pulverized to 95% passing 150 mesh (100 micron). A total of 105 regular samples averaging 2.77 m in length were recorded for this hole.

The pulp samples were shipped to the Acme laboratory in Vancouver for analysis by AR (HCl-HNO<sub>3</sub>) digestion of a 15 g sample and 36-element ICP-MS finish (Acme method 1DX). Analyses returning >1,000 ppm Cu were re-analyzed by AR digestion of a 1 g sample followed by ICP-AES finish (Acme method 7AR). Unfortunately, the analytical certificate for drill hole BB08-01 is the only one not included in ARIS Report 30986. The analytical information for this hole is derived from a table provided by Copper Ridge that only includes Cu and Au results. The analytical certificate number and the results for the 34 other elements are unknown.

## **6.6 Historical Drilling QAQC**

Amarc is unaware of any analytical QAQC programs by the Ducanex JV on the 1970 or 1971 drill programs, however other operators do record their QAQC in Assessment Reports, these have been summarized below.

### **6.6.1 Corona 1991**

In 1991, Corona re-assayed four Ducanex JV holes, 70-02, 70-10, 71-14 and 71-19, by re-sampling the remaining half core and submitting them to Acme for Cu and Au assay and 30 element geochemical analysis including Cu, Mo, Ag and Au, as described in Section 6.5.2 above. Corona did not match the original sampling intervals of the Ducanex JV exactly in their program because of missing and degraded sections of core. Scatterplots of Cu and Mo for 67 Corona intervals that were a reasonable match to the original Ducanex JV intervals in holes 70-02, 71-14 and 71-19 are shown Figure 6-1. Although the sample intervals, analytical increments and methods differ between the two series, the results are reasonably similar. The correlation for Cu is 0.85 and for Mo 0.82. In general, the 1991 results are somewhat higher for Cu and Mo than the original results.

The Corona re-sampling results for drill hole 70-10 are somewhat problematic as approximately 75% of the sample intervals reported in assessment report 22143 (Robertson, 1992) for this hole are clearly mislabeled in the source. The intervals in question are for sample numbers 84651 through 84698 on pages 24 and 25 labelled as drill hole DDH-19 (71-19) that repeat several times. It is assumed that these 48 samples are actually from hole DDH-10 (70-10), the other hole that Corona resampled for which corresponding Acme assay results were received. Since the sample intervals are also incorrect, the Cu and Mo results for these 48 samples were matched with results of the original Ducanex JV assays for hole 70-10 as best as possible and

approximate 10 foot (3.05 m) assay intervals assigned. Based on this matching exercise, the Acme results for hole 70-10 were reconstructed for the interval from 35 to 558 feet (10.67-170.08 m) and these grades used in the Amarc database. Although this circumstance is not ideal, these results were deemed suitable for use in ongoing exploration.

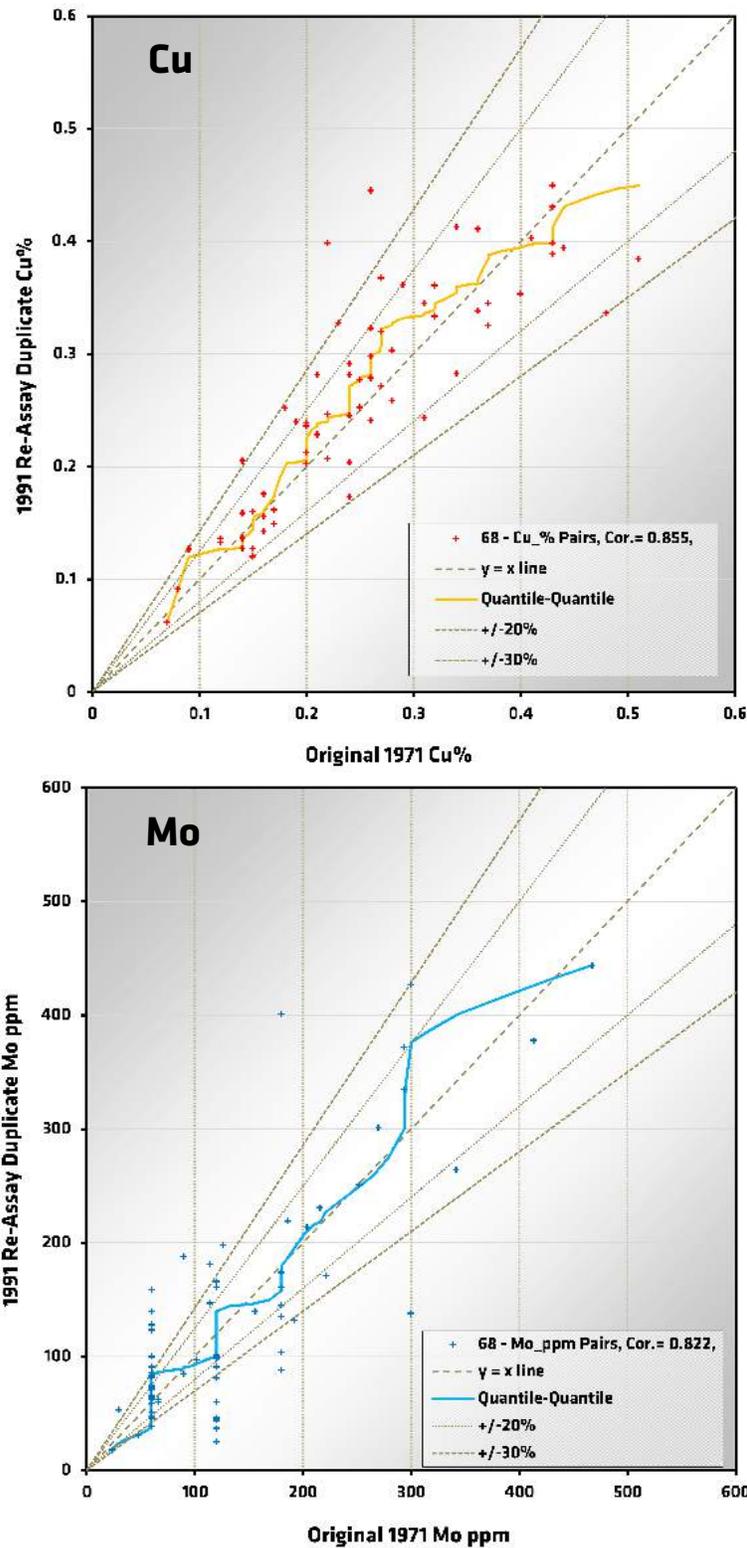


Figure 6-1: Corona 1991 Half Core Duplicate Samples vs Ducanex JV 1971 Original Results – Cu and Mo.

### 6.6.2 Copper Ridge 2008

Dawson (2010) describes the analytical QAQC protocols in respect to the Copper Ridge drill program in detail. Every 25th sample was quartered as a field duplicate. A CDN Resource Laboratories Ltd. (CDN) standard and blanks of un-mineralized Bulkley Valley Diorite were inserted every 20th and 21st sample, respectively. Eleven QC samples were taken, including five blanks, five standards and one quarter core field duplicate.

According to the results provided by Copper Ridge, of the six CDN-CGS-13 standards inserted, all passed QC for Cu. One of the six standards, sample 865320, failed low for Au at 0.7334 g/t (0.845-1.175 acceptable range). Copper Ridge attributed this failure to the use of a semi-quantitative geochemical method for the determination of Au, and not FA. They deemed the results to be suitable for an early-stage exploration program. Results for the six inserted Bulkley Valley Diorite blanks are low for Au ranging from 1.0 to 2.5 ppb indicating no significant contamination. The Cu concentrations range from 60 to 100 ppm Cu and are somewhat anomalous. It is not known if these concentrations are typical of Bulkley Valley Diorite or indicative of some minor Cu contamination. The Cu and Au results for the three matched pairs of quarter core, intra-laboratory duplicates appear to be reasonable.

### 6.7 Historical Drill Results from DUKE Porphyry Cu-Mo Deposit Target

The intervals of significant results from the historical Ducanex JV drill holes compiled in Table 6-6 for the DUKE deposit target are selected length weighted average composites from the Corona re-sampling program that were re-assayed at Acme.

CuEQ grades are listed in Table 6-6, column 9 by colour, where significant intervals with “hotter” colours have a higher CuEQ grades over the intercept. See footnotes of Table 6-6 for description and assumptions in relation to how the calculation of CuEQ% was based on conceptual metallurgical recoveries estimated from other porphyry Cu deposits.

**Table 6-6: Significant Intercept Table for Historical Drilling Assay Results at the DUKE Porphyry Deposit, Including CuEQ based on Conceptual Metallurgical Recoveries Estimated from Other Porphyry Cu Deposits**

Drill Holes	From (m)	To (m)	Int. (m) <sup>1,2</sup>	Cu (%)	Mo (%)	Ag (g/t)	Au (ppb)	CuEQ <sup>4</sup> (%)
70-01	3.96	48.77	44.81	0.20	0.022			0.28
70-02 <sup>3</sup>	30.48	143.26	112.78	0.29	0.012	1.1	60	0.38
Incl.	73.15	85.34	12.19	0.41	0.010	1.6	91	0.50
70-03	57.91	64.01	6.10	0.10	0.060			0.31
and	100.58	106.68	6.10	0.17	0.017			0.23
and	140.21	163.37	23.16	0.25	0.023			0.33
70-04	123.75	129.84	6.09	0.17	0.016			0.23
70-05	12.19	82.30	70.11	0.20	0.014			0.25
70-09	61.26	70.41	9.15	0.16	0.023			0.25
and	76.50	103.94	27.44	0.32	0.019			0.39
and	113.08	146.61	33.53	0.29	0.015			0.34
70-10 <sup>3</sup>	21.34	164.59	143.25	0.26	0.016	1.7	68	0.37
Incl.	115.82	131.06	15.24	0.47	0.027	2.9	110	0.64
70-11	12.50	73.46	60.96	0.26	0.020			0.33
70-13	12.19	18.29	6.10	0.21	0.014			0.25
and	67.06	76.20	9.14	0.26	0.017			0.32
and	124.97	146.30	21.33	0.30	0.011			0.34
and	152.40	158.50	6.10	0.18	0.016			0.24

**Table 6-6: (continued)**

Drill Holes	From (m)	To (m)	Int. (m) <sup>1,2,3</sup>	Cu (%)	Mo (%)	Ag (g/t)	Au (ppb)	CuEQ <sup>4</sup> (%)
71-14 <sup>3</sup>	28.65	115.21	86.56	0.40	0.021	2.2	53	0.52
Incl.	34.75	74.37	39.62	0.48	0.023	2.6	67	0.61
71-15	21.34	58.83	37.49	0.17	0.018			0.24
71-17	24.99	61.57	36.58	0.22	0.026			0.31
71-18	60.05	69.19	9.14	0.38	0.020			0.45
71-19 <sup>3</sup>	28.65	89.92	61.27	0.24	0.021	1.5	39	0.35
Incl.	46.94	89.92	42.98	0.28	0.026	1.6	41	0.41
71-20	21.34	91.44	70.10	0.19	0.022			0.27
71-23	21.34	60.96	39.62	0.22	0.020			0.29
71-24	54.86	91.44	36.58	0.23	0.023			0.31
71-25	42.67	91.44	48.77	0.26	0.024			0.35
71-26	22.86	41.15	18.29	0.21	0.013			0.25
and	50.29	89.92	39.63	0.24	0.019			0.30

Note: The following drill holes have no significant interval: 70-06 to 70-08, 70-12, 71-16, 71-21, 71-22, 71-27 to 71-29 and BB08-01.

- 1 Widths reported are drill widths, such that the thicknesses are unknown.
- 2 All assay intervals represent length-weighted averages.
- 3 Results of these Ducanex JV drill holes are from the 1991 Corona resampling and analysis by Acme.
- 4 Copper equivalent (CuEQ) calculations use metal prices of: Cu US\$3.00/lb, Mo US\$12.00/lb, Ag US\$18.00/oz and Au US\$1,400.00/oz and conceptual recoveries of: Cu 90%, Au 72%, 67% Ag and 82% Mo. Conversion of metals to an equivalent copper grade based on these metal prices is relative to the copper price per unit mass factored by predicted recoveries for those metals normalized to the copper recovery. The net metal equivalencies for each metal are added to the copper grade. The general formula for this is:  $CuEQ = Cu\% + (Au\ g/t * (Au\ recovery / Cu\ recovery) * (Au\ \$\ per\ oz / 31.1034768) / (Cu\ \$\ per\ lb * 22.04623)) + (Ag\ g/t * (Ag\ recovery / Cu\ recovery) * (Ag\ \$\ per\ oz / 31.1034768) / (Cu\ \$\ per\ lb * 22.04623)) + (Mo\ \% * (Mo\ recovery / Cu\ recovery) * (Mo\ \$\ per\ lb / Cu\ \$\ per\ lb))$ .
- 5 The estimated metallurgical recoveries are conceptual in nature. There is no guarantee that the metallurgical testing required to determine metal recoveries will be done or, if done, the metallurgical recoveries could be at this level.

## 7 Geological Setting

### 7.1 Regional Geological Setting

The DUKE Project is located within a belt of Tertiary and Cretaceous age porphyry occurrences in central BC (MacIntyre et al., 1997). The prospective Babine Intrusive Suite intrudes Mesozoic volcanic and sedimentary rocks that comprise the Stikine Terrane, which in turn lies within the Intermontane Tectonic belt of central BC. The Stikine Terrane is believed to have formed from an ocean island arc that accreted onto the western margin of North America. This Late-Triassic (Takla Group) and Early-Jurassic (Hazelton Group) marine volcanic, volcanoclastic and sedimentary package was intruded by granitic rocks of various ages. The currently defined intrusion suites are as follows: Early-Jurassic Topley intrusions, Early Cretaceous Omineca intrusions, Late-Cretaceous rhyolite and granodiorite porphyries of the Bulkley sequence, and the Early-Tertiary (Eocene) Babine Igneous suite. Marine and non-marine sedimentary rocks of the Mid- to Late-Jurassic Bowser Lake and Mid-Cretaceous Skeena groups overlie the older volcanic and sedimentary units, and are preserved in down-dropped basins bounded by north-northwest trending faults developed during extensional and transtensional tectonic activity in Late-Cretaceous and Early-Tertiary time (Carter et al., 1995).

The Babine Igneous Suite intrusions are central to the mineralization of the area (Figure 7-1). A 40 by 100 km north-northwesterly striking belt parallel to the northern part of Babine Lake hosts both the past operating mines of Bell and Granisle, the advanced stage Morrison deposit, the NAK deposit and the DUKE deposit target. Plutonism occurred through the early Eocene, with mineralization at Granisle dated by K-Ar (biotite) at  $51.2 \pm 2$  Ma. Mineralization at Bell lies 75% within the host biotite-feldspar porphyry (“BFP”) and 25% within the host volcanic sequences, and the K-Ar age has been determined as 51.0 Ma with an error inside the same window as Granisle Mine. The advanced stage Morrison Deposit has mineralization aged 52 Ma, with BFP intruding Ashman Fm (Middle to Upper Jurassic sediments and silts).

The DUKE Project is underlain by an irregularly dipping sequence of Mesozoic andesite flows, breccias and lapilli tuff in faulted contact with volcanoclastic sandstone and mudstone (Richards, 1973). These units were uplifted into a north-easterly trending arc (the Skeena Arc) during the development of the Bowser and Nechako basins to the north and south. The northern basin was filled with sedimentary rock of the Mid- to Late-Jurassic Bowser Lake Group and the Mid-Cretaceous Skeena Group. These rocks were subsequently preserved in complex down-dropped graben structures, bounded by major north-northwest trending fault systems that were developed during a period of regional extension and transtensional faulting in the Late-Cretaceous to Early-Tertiary.

Several periods of intrusive activity have been documented along the Skeena Arc between the Late-Cretaceous to Tertiary period. The most important porphyry Cu-Au-Ag-Mo mineralization in the area is associated with the Babine Intrusive Suite. These rocks are Eocene (and possibly Cretaceous) intrusions composed of an early quartz-diorite and quartz-monzonite suite were followed by distinctive biotite-feldspar porphyry intrusions. Field evidence indicates that the northwest to north-northwest trending regional faults were active during the period of mineralization at both the Morrison-Hearne Hill deposits and possibly at the DUKE deposit target (Bridge, 1997).

Alteration zones are associated with the hydrothermal mineralization of Babine Intrusive suite rocks or their hosts, and typically include a potassic central core containing hydrothermal biotite +/- K-feldspar, grading outwards to a phyllic (quartz-sericite-pyrite) zone and finally an outer zone of propylitic alteration (chlorite-carbonate +/- epidote). Regionally, mineralization is hosted by northeast and northwest striking, steeply dipping quartz-chalcopyrite +/- bornite veinlets less than 5 mm wide (Carter, 1995). Higher grades occur locally at, or adjacent to contacts between intrusive phases and volcanic and sedimentary rocks of the Hazelton Group.



Figure 7-1: DUKE Project Regional Geology Map. Modified after BCGS Open File 2001-03.

## Geological Map Legend

<b>MINERALIZED STRATIGRAPHY</b>	<b>EOCENE</b>			<b>EARLY TO MIDDLE JURASSIC</b>
		EE Endako Group: basalt flows and mirrow flow top breccia		MJsy Syenitic to monzonitic intrusive rocks
BELL [		ENv Newman Formation: andesite to dacite flows breccia and lahar		MJd Diorite to quartz diorite
		Ecj Boulder to pebble conglomerate		MJg Granodiorite to quartz monzonite
		GOOSLY PLUTONIC SUITE		MJp Tacheek Creek Phase: porphyritic granodiorite to quartz diorite
		EGsy Monzodioritic to gabbroic intrusive rocks		
		BABINE INTRUSIONS		<b>LOWER TO MIDDLE JURASSIC</b>
		EBq Granodiorite to quartz monzonite	HEARNE HILL DUKE BELL [	HAZELTON GROUP
MINERALIZATION SOURCE [		EBp Porphyritic granodiorite		mUS Smithers Formation: sandstone siltstone and feldspathic wacke
		EBg Granodiorite to quartz diorite		ImJr White weathering, phryic dacite to rhyolite domes, part of Saddle Hill volcanic succession
		PALEOCENE TO EOCENE		mJv Saddle Hill volcanics: undivided basalt, andesite and dacite
		PEs Sandstone, siltstone, conglomerate & shale		LA Nikikwa Formation, Ankwel Member: subaqueous greenstone, basalt breccia, flows, tuffs,
		LATE CRETACEOUS or TERTIARY	NAK GRANISLE [	IJN Nikikwa Formation, marine feldspathic wacke, siltstone and conglomerate
		KTd Diorite to quartz diorite		IJT Telkwa Formation: tuffs, andesite flows and volcanic breccia
		LATE CRETACEOUS		
MINERALIZATION ± [		LKBd Bulkley Intrusions: Diorite to gabbro		
		UPPER CRETACEOUS		UPPER TRIASSIC TO LOWER JURASSIC
		uKK Kasalke Group: phryic andesite to dacite flows, volcanic breccia and lahar		uTJcg Pebble to boulder conglomerate
		LOWER TO UPPER CRETACEOUS		<b>LATE TRIASSIC TO EARLY JURASSIC</b>
		uKT Sustut Group, Tango Creek Formation: chert pebble conglomerate		TOPLEY INTRUSIVE SUITE
		SKEENA GROUP		EIbx Nose Bay intrusive breccia;
		IKS Undivided sandstone, shale, pebble conglomerate		EJmp Feldspar porphyry dikes
		IKRs Red Rose Formation: sandstone, chert pebble conglomerate		EJp Porphyritic granodiorite
		mKr Rhyolite to rhyodacite, submarine flows, flow breccia and subvolcanic domes		LTJm Granodiorite to monzonite
		IKRv Rocky Ridge Formation: chert pebble conglomerate		LTg Granodiorite, quartz diorite
BELL [		IKsh Kitsumkalum black shale	OTHER PROSPECTIVE HOST ROCK [	
		IKcg Hanawald chert pebble conglomerate		uTT Takla Group: undivided basalt, andesite and marine sedimentary rocks
		IKK Kitsuns Creek Formation: feldspathic, volcanic sandstone, siltstone, shale		uTS Undivided siltstone and shale, mudstone & minor limestone
		IKv Undivided felsic and intermediate volcanic rocks		uTSa Sitlika Assemblage: undivided slate, phyllite, banded siltstone, sandstone and conglomerate
		EARLY CRETACEOUS		
		EKp Quartz monzonite, monzonite and rhyodacite		PERMIAN TO TRIASSIC
				PTs Chert, siltstone, limestone, graphitic phyllite
		MIDDLE TO UPPER JURASSIC		PTv Metavolcanic rocks; cyllite and schist, minor argillaceous limestone,
		BOWSER LAKE GROUP		PSgs Sitlika Assemblage: greenstone & greenschist metamorphic rocks
NAK [		uJTC Trout Creek Formation: pebble to boulder conglomerate		LOWER PERMIAN
				iPA Asitka Group: massive, grey, bioclastic limestone
TRAIL PEAK MORRISON [		mJA Ashman Formation: siltstone and shale		PSd Sitlika Assemblage: dioritic intrusive rocks
				PSi Sitlika Assemblage: tonalite intrusive rocks (part of Cache Creek Terrane)
				DEVONIAN TO PERMIAN
				DAGs Asitka Group: greenstone & greenschist metamorphic rocks
				DTm Tallapin Metamorphic Complex: limestone, marble, calcareous sedimentary rocks

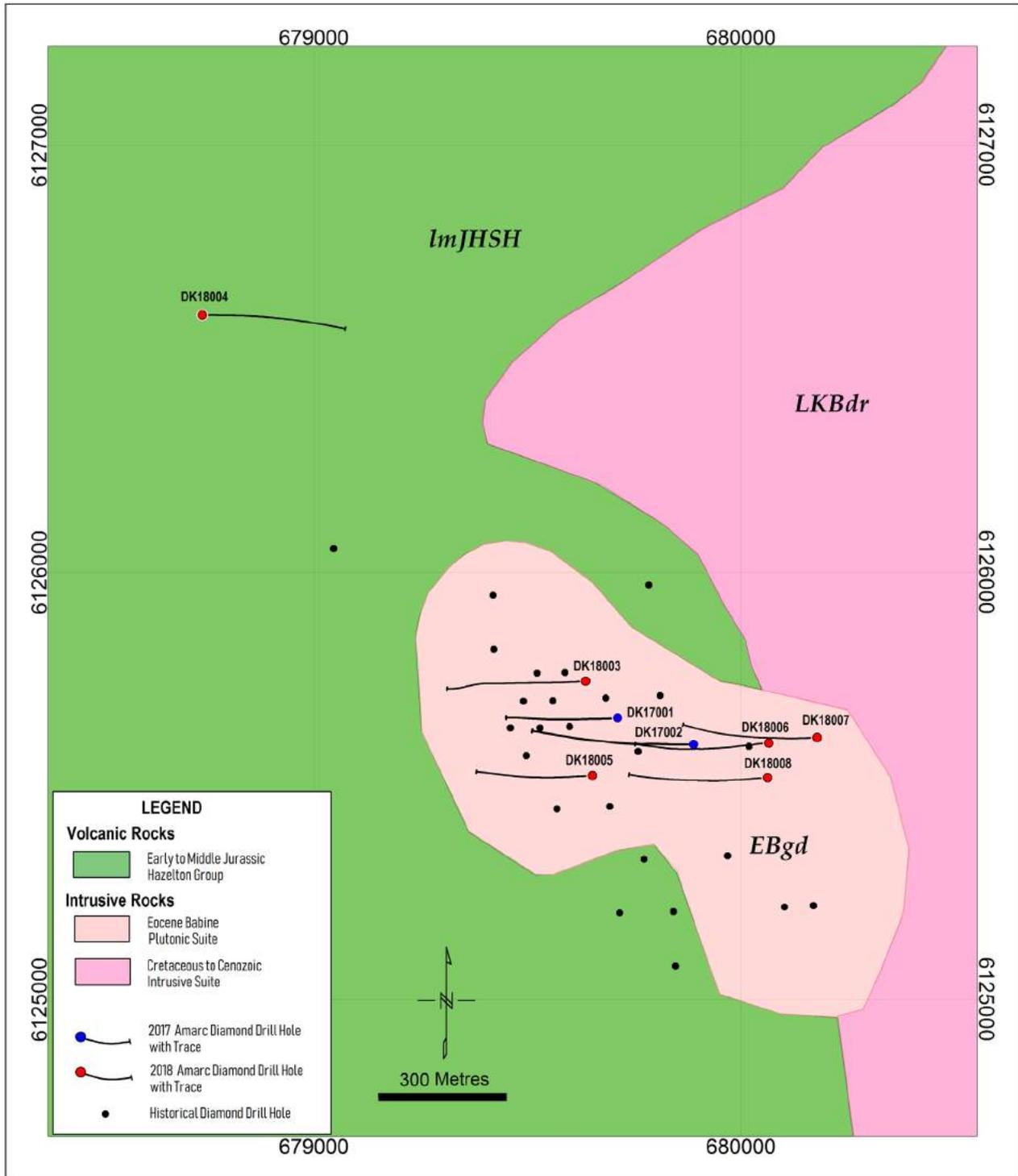
## 7.2 Project Geology

Very little outcrop is exposed within the Project area due to the extensive regional glacial till cover. Overburden thicknesses vary from 0 m to up to >30 m, with an apparent average depth of between 8 - 10 m. According to the BCGS glacial striations, where visible, support evidence of glacial movement from the north-northwest, with significant channeling effect of the deep glacial basins that resulted in the elongate Babine, Morrison and Takla Lakes (to the east of the Project) (see Ferbey, 2009).

The focus of Amarc's field exploration activities has been on the DUKE porphyry Cu-Mo-Ag deposit target, located towards the center of the wider DUKE Project tenure. The presently known geology of the DUKE deposit target is largely derived from the 2017 - 2018 Amarc drill holes which is further discussed in Section 10 below, and a summary of the geology included in this section is from Fagan et al. (2020).

The known geology of the DUKE porphyry Cu-Mo-Ag deposit target (as shown in Figure 7-2) is comprised of two intrusive bodies. The first is a granodiorite to diorite with apparent affinity to the Omineca Intrusive Suite (LKBdr, Figure 7-2), and the second is a BFP that makes up part of the mineralized Babine Intrusive Suite (EBgd, Figure 7-2). The intrusions are aligned north-south, and north-northwest to south-southeast respectively, so conforming to the regional tectonic and fault trends (Figure 7-1). The Hazelton Group (Triassic) volcanic units (ImJHSH, Figure 7-2), mostly comprise mafic flows and welded tuffs, and host both sets of intrusions. These volcanic units are receptive for mineralization, and according to Amarc's drilling appear to make up a sizable volume of mineralized rock at the DUKE Cu-Mo deposit target, and were logged as a mafic volcanic unit (MVC1, see Sections 7.3 and 10). Historical operators have also documented the importance of these volcanic and pyroclastic host units as mineralized units at economic deposits such as Bell and Granisle mines (Newman Fm) and Morrison deposit (Hazelton Group).

Woolverton (1993) recognized a central potassic zone at the DUKE Cu-Mo deposit target, alongside an apparently restricted small peripheral propylitic zone and a moderately developed pyrite halo outside of the potassic zone. This initial target was restricted in size as there was a lack of both outcrop amongst the extensive till around the DUKE deposit target and drilling to document the extent of mineralization and alteration. Drilling by Amarc has significantly expanded this potassically altered core, and further has provided useful initial mineralogical descriptions and insights into timing relations in respect to the hydrothermal alteration. The potassic zone is characterized by hydrothermal biotite rather than potassium feldspar replacement. Younger, post-mineral felsic dykes cut the potassic zone and are characterized by a brecciated texture.



**Figure 7-2: Local Geology of DUKE Porphyry Cu-Mo-Ag Deposit, Modified After BCGS Open File 2001-03. The Rock Units are Comprised - *ImJHSH* (green) Hazelton (Triassic) Volcanic Units, *LKBdr* (darker pink) are Bulkley Suite (Cretaceous) Diorite Orientated Northwest-Southeast, and *EBgd* (lighter pink) is the Dorothy Pluton Comprised of BFP (Eocene).**

### 7.3 Rock Types

During 2018, the geological rock-codes were created from geological information obtained from the 2017 - 2018 Amarc drilling at the DUKE porphyry Cu-Mo deposit target (Galicki et al., 2017; Bui et al., 2018; Roberts, 2018, and references therein). Earlier, BCGS regional mapping unit codes (like those shown on Figure 7-2) were initially utilized to tie exploration into the regional geological setting. However the detailed drill core logging required a new set of codes to reflect the higher level of geological detail being captured. Petrographic analysis was completed on the 2017 drill holes, which enabled better, more accurate rock, alteration, and veining codes to be developed for the on-going drilling in 2018 (Oliver, 2017). Table 7-1 illustrates these new rock codes and the units they correspond to. These units are described below as they represent the most accurate description of the rocks, alteration, and mineralization at the DUKE deposit target, and likely represent the target host units for Cu-Au mineralization across the wider DUKE Project as well.

**Table 7-1: List of Core-logging and Geological Codes.**

2018 Code	Rock Type and Description
BFP1	Biotite Feldspar Porphyry -relatively coarse grained
BFP2	Biotite Feldspar Porphyry - finer grained than BFP1, prismatic mafics
MVC1	Mafic Volcanics hornfels
MZP1	Monzonite - variably feldspar-phyric, typically strongly (carbonate) altered
DIO1	Hornblende Diorite Dyke
IBX1	Intrusion Breccia
APL1	Quartz Aplite Dyke

#### 7.3.1 Mafic Volcanics (MVC1):

The mafic volcanics are typically fine grained, dark brown to black (biotitic) to pale greenish-grey (sericitic-chloritic) rocks, which ordinarily lack macroscopic textural features. However, characteristically they are heavily fractured and cut by a fine, albeit somewhat variably developed stockwork of quartz-sulphide microveinlets enhanced by thin pale grey sericitic envelopes. Still, despite the general lack of macroscopic textures, in a few places they are distinctly finely bedded and tuffaceous.

In thin section, textural preservation is shown to be poor but in places a volcaniclastic nature is strongly evident, with fine sub-angular to subrounded mm scale clasts locally defining a very weak stratification, set in a matrix of blurred, abraded plagioclase grains. Sporadic (polysutured) quartz grains also occur in places and may be lithic in origin.

It should also be noted that one thin section sample, obtained from an interval originally logged as 'mafic volcanic' (from its general appearance in drill core), actually turned out to be a fine-grained feldspathic quartz wacke. It is therefore possible that some portion of the intervals within the mafic volcanics are actually volcano-sedimentary in origin. On the limited evidence available, however, such rocks do not appear to behave much differently to the mafic volcanics in terms of their potential to host mineralization.

#### 7.3.2 Biotite-Feldspar Porphyry (BFP1)

The BFP1 biotite-feldspar porphyry phase is generally coarser grained and typically has a more 'crowded' feldspar-phyric texture relative to the BFP2 as described below. In terms of colour, the unit can vary significantly depending on the style of alteration but it is commonly a mid to dark grey with a somewhat 'white-speckled' appearance, depending on the degree of alteration of the plagioclase phenocrysts. Elsewhere, the unit can be pale grey to slightly greenish-grey, locally pinkish or even patchily beige where

sericite-Fe-carbonate alteration predominates. In addition to the main BFP intrusions, thin dykes of BFP are also common within the mafic volcanic sequences throughout the deposit area.

In thin section the rock is seen to consist primarily of 50-60% plagioclase phenocrysts, typically 1-1.5 mm in longest dimension, although the very largest may reach 4-5 mm in size. The remainder of the rock comprises 12-15%, slightly smaller (1-1.25 mm) biotite plates set in a groundmass of feldspar (including minor primary orthoclase) and small amounts of quartz (1-2%). Rare accessory garnet was also noted in samples from two different drill holes (i.e. in DK18004 at 441.55 m and in DK18006 at 64.77 m).

### **7.3.3 Biotite-Feldspar Porphyry (BFP2)**

Mineralogically, this porphyry phase was considered little different to the BFP1 during Amarc's 2017 - 2018 core logging, and at times it is difficult to distinguish between the two units where alteration has obscured primary textures to any significant extent. Characteristically, however, the plagioclase phenocrysts are typically much less abundant in the BFP2 and it has more of a hial texture, with a few large phenocrysts scattered throughout the finer grained but still somewhat porphyritic groundmass. Another defining characteristic of this unit in drill core is the distinctly prismatic nature of the biotite phenocrysts (largely misidentified as hornblende originally) in comparison to the more typical euhedral biotite 'flakes' or 'plates' seen in the BFP1. This feature is particularly useful for distinguishing between the two rock types when alteration has obscured other primary textures to a significant extent.

In terms of colour, like the BFP1, the BFP2 can vary significantly depending on the style of alteration but, in general, it is usually a darker grey than the BFP1 phase (although this is not due to magnetite since they typically have similar magnetic susceptibilities). Elsewhere, like the BFP1, the BFP2 unit can also be pale grey to slightly greenish-grey or even pale beige.

Thin section examination of a contact zone between the BFP1 and BFP2 provided a useful comparison of these two rock types and confirmed to a large extent the original field observations. These are: (a) BFP1 is coarser grained and considerably more porphyritic overall than the BFP2; and (b) BFP1 biotite typically occurs as coarse grained 'plates', whereas in the BFP2 biotite is more prismatic or finely lath-like.

While the contact relations are not definitive, there is nevertheless other evidence that the BFP2 is a later phase (e.g. there is enhanced alteration of biotite in the BFP1 adjacent to the contact). Elsewhere, as well, the BFP2 exhibits distinctly chilled margins against the BFP1 and in one instance (see IBX1 below) there are xenoliths of BFP1 hosted in a breccia matrix composed of BFP2 material.

### **7.3.4 Hornblende Diorite (DI01)**

A single thin hornblende diorite dyke was logged by Bui (2017) during Amarc's 2017 drill program, subsequently this was recoded to DI01 prior to the 2018 drilling (Roberts, 2018). This rock unit was not encountered during the 2018 drill program, and the following description is extracted from Bui (2017):

*"The hornblende diorite dyke is dark to medium green coloured and porphyritic to granitic in texture. The unit comprises of 65-80% euhedral feldspar phenocrysts of 1-2 mm size supported in a fine chloritic groundmass. In addition to fine-grained chlorite within the groundmass, crystalline chlorite up to 2 mm large replaces prismatic hornblende sites that exhibit a weak preferential alignment. Chill margins are very fine-grained and commonly contain sericite and clay altered feldspar phenocrysts that appear translucent to blue-green in colour."*

### **7.3.5 Monzonite Porphyry (MZP1)**

Individual units of MZP1 are typically quite strongly altered and there is usually some degree of textural destruction. As a result, there may be several variants of this rock type, with some being slightly more mafic and/or more strongly porphyritic than others. In places, they are clearly somewhat coarser or finer grained

than the norm, although this may simply relate to the size/thickness of individual dykes, since a number of these bodies exhibit chilled contacts with their host rocks (e.g. APL1). Nonetheless, all of these rocks are characteristically affected by sericite-carbonate alteration, which imparts a pale cream to slightly beige colouration, accentuated in part by carbonate alteration of the mafics. In many places, the alteration is texturally destructive although elsewhere scattered feldspar phenocrysts (2-3 mm) and platy biotite (Fe-carbonate) pseudomorphs can still be identified. Locally, there is also a distinctive 'flow-banding' texture, which was likely generated by laminar flow during dyke emplacement. Irrespective of the degree of alteration, sporadic small  $\leq 2$  mm quartz 'eyes' are commonly visible in drill core, although rarely exceeding 2% modally. Another distinguishing feature of these rocks is their xenolith content. This is highly variable and, while locally they may be relatively pristine, in many cases, they carry a significant xenolith component, particularly adjacent to intrusive contacts with the biotite feldspar porphyries and/or mafic volcanics, when they essentially transition to intrusion breccias (IBX1). It should be noted, however, that the xenolith component is commonly heterolithic and not necessarily restricted to the immediate host rock. This clearly implies that some fragments have been transported from depth and possibly over a considerable distance.

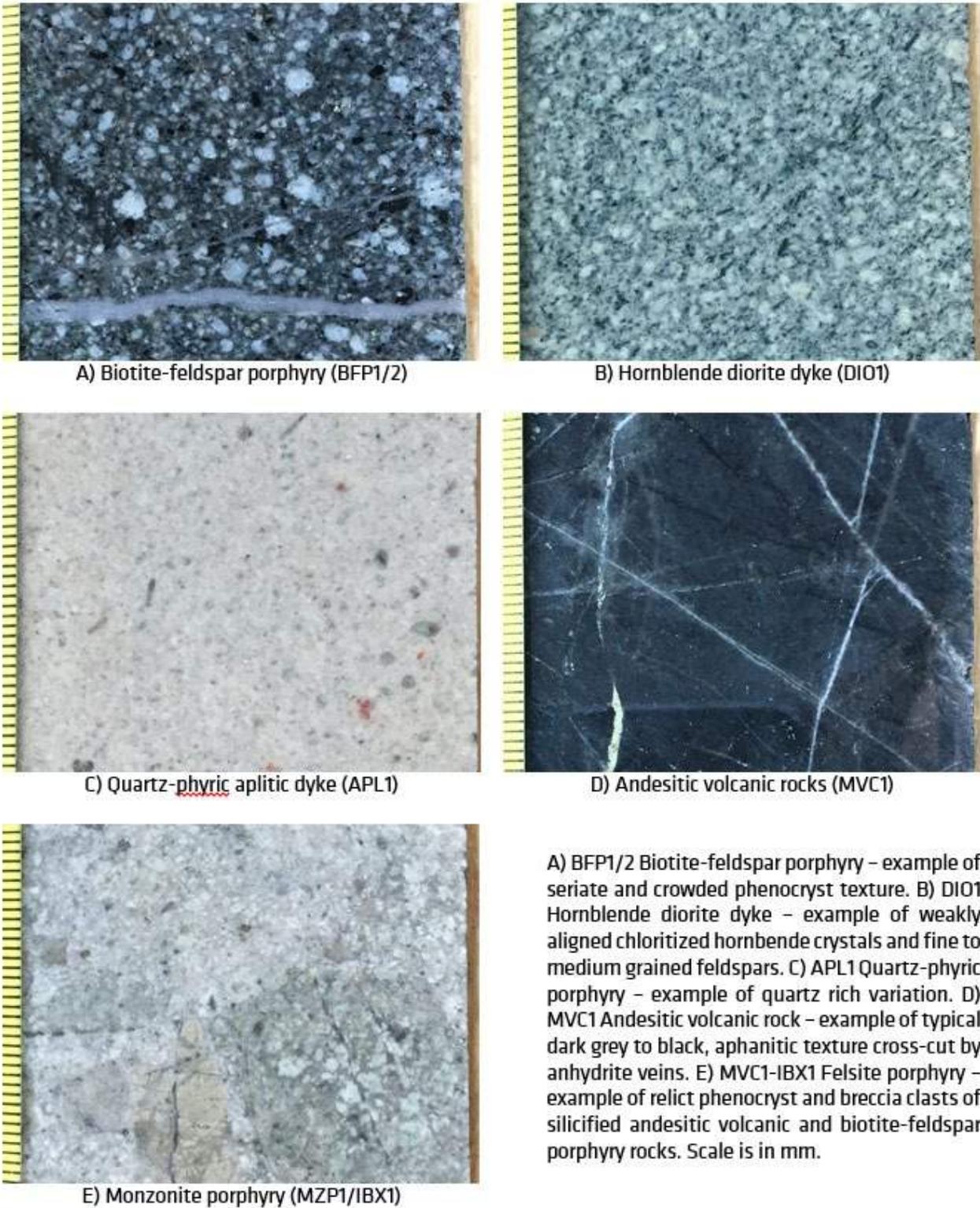
In thin section, there is further evidence of the incorporation of other rock types at the microscopic scale. For example, some of the mm-size quartz 'eyes' are polysutured grains and are quite likely xenocrystic in origin. Elsewhere these quartz grains are often subrounded and embayed and clearly not in equilibrium with the groundmass, although these features are more equivocal in terms of an external origin.

### **7.3.6 Heterolithic Intrusion Breccia (IBX1)**

During the 2018 drill campaign only a single instance of this rock type as a standalone entity was encountered (in DK18004, where a thin breccia interval is present between 213.65 m and 226.7 m). Field and thin section examination of this particular occurrence revealed that the breccia consists of a heterolithic assemblage of mineralized angular volcanic fragments, potassically altered biotite feldspar porphyry and disrupted quartz vein material, set in a very dark, unmineralized matrix of biotite-plagioclase-phyric monzonite of uncertain affinity.

However, as noted above, individual MZP1 intrusive bodies often possess some percentage of xenolithic content, particularly marginally and can therefore progressively grade into heterolithic intrusion breccias with increase in entrained wall rock fragments. These breccias are nonetheless an integral part of the same intrusion and are clearly not a separate entity. In a similar fashion, as noted above, the so-called xenolith-bearing 'felsite' intrusive rock at the base of DK17001 (377.3-518.5 m) is now believed to be simply a much thicker example of this style of monzonitic intrusion.

Figure 7-3 includes photographs of the main rock types.



**Figure 7-3: Lithologies Encountered in Amarc's 2017-2018 Drill Program at DUKE Porphyry Cu-Mo Deposit Target.**

## 7.4 Alteration

In 2017 - 2018 Amarc confirmed historical workers interpretations that two main styles of hydrothermal alteration occur at the DUKE Cu-Mo deposit target, namely potassic (biotite) and sericite-illite-carbonate (Galicki et al., 2017; Bui et al. 2018; Roberts, 2018). It must be noted that these observations are based on a limited number of drill holes and are thus only initial descriptions of the units. In addition, minor amounts of (typically) weak quartz-sericite ( $\pm$  pyrite) alteration, usually in the form of vein envelopes but locally more pervasive over short intervals are observed. Relatively rare examples of sericite-chlorite  $\pm$  epidote and minor K-feldspar overprints (thin vein envelopes, usually in association with biotite) also occur.

### 7.4.1 Potassic Alteration (Biotitic)

In the BFPs (BFP1, BFP2), significant potassic (biotitic) alteration is not generally evident in drill core and much of the primary igneous biotite appears only marginally affected, at best. While it was difficult to be certain at the macroscopic level this conclusion is also borne out by limited thin section examination (Oliver, 2017). In the mafic volcanic rocks, however biotitic alteration is widespread and these rocks are commonly a characteristic dark brown colour, with readily visibly biotite in hand sample. Nonetheless, in thin section this is often seen to be the result of an early hornfels (i.e. thermal) event, which may or may not be accentuated by a later potassic overprint associated with the development of the hydrothermal system. In addition, it should be noted that not all of the volcanics exhibit evidence of this early biotite hornfels event and, in some places, the pre-hydrothermal 'protolith' is more grey-green, with a weak sericite-chlorite style of alteration.

In contrast to the somewhat selective but widely distributed biotitic alteration, cobaltinitrite staining revealed little evidence of any significant K-feldspar overprint at the DUKE deposit target, although primary orthoclase is a major component of the groundmass in the biotite feldspar porphyries and stains heavily. While this could potentially mask any secondary K-feldspar signature, there is no obvious replacement of the adjacent feldspar phenocrysts. Nevertheless, there are thin, pinkish vein selvages, in places, that may represent incipient K-feldspar alteration and localized patchy secondary K-feldspar was identified in several thin sections, including the volcanic rocks (Oliver, 2017).

### 7.4.2 Sericite-Illite-Carbonate alteration

Sericite-illite-carbonate alteration is quite widespread at DUKE deposit target and, in particular, affects the late monzonite intrusions (MZP1), where this type of alteration is characteristically strong and locally texturally destructive. This style of alteration was originally logged as sericite-Fe carbonate-clay in the field because of the brownish colouration. However, thin section examination revealed that the groundmass also contains significant amounts of calcite as well, so the generic 'carbonate' is a better descriptor. Illite was also later identified in thin section.

Nonetheless, in many places, there is often a patchy weak to locally strong sericite-illite-carbonate overprint within the BFP units as well (rarely in the MVC1). In the latter case much of the groundmass as well as the biotite phenocrysts is variably replaced by sericite-illite and accessory carbonate and this imparts a patchy, pale brown to beige coloration to the drill core. In contrast, in the MZP1 in particular, complete biotite replacement is quite common, in which case there is often significant development of illite in the rock mass and it becomes very pale cream to almost white in colour.

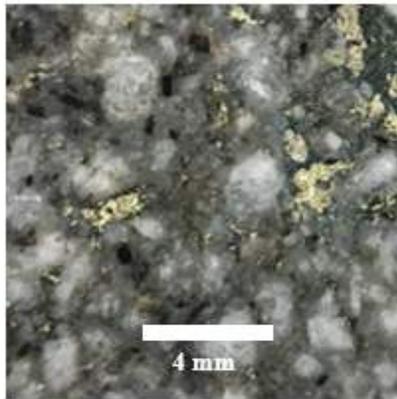
### 7.4.3 Argillic Alteration (Kaolinite):

Argillic alteration is incipient to weak in and along the margins of the quartz-phyric aplitic dykes where feldspar crystals have altered to sericite and white clay, which is interpreted as kaolinite.

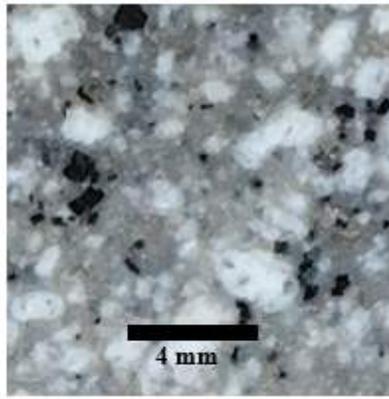
### 7.4.4 Anhydrite Alteration (Anhydrite-sulfide):

Anhydrite is generally observed below a vertical depth of 130 m from surface and is characterized by anhydrite  $\pm$  pyrite veining that cross cuts all other vein types and lithologies. The presence of anhydrite also corresponds to an increase in the measured RQD values. Carbonate, chlorite and pyrite are generally present

throughout zones of anhydrite ± pyrite veining and occupy vein selvages. Anhydrite alteration is assumed to be a late alteration/vein feature. Figure 7-3 includes photographs of the main types of alteration.



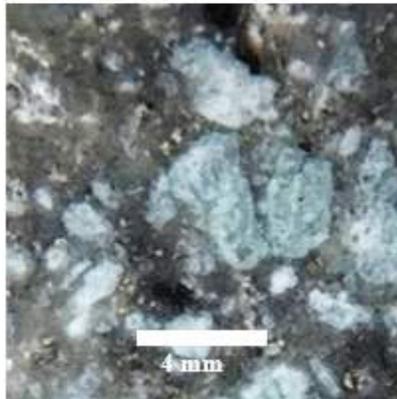
A)  
K-silicate biotite alteration  
(Potassic)



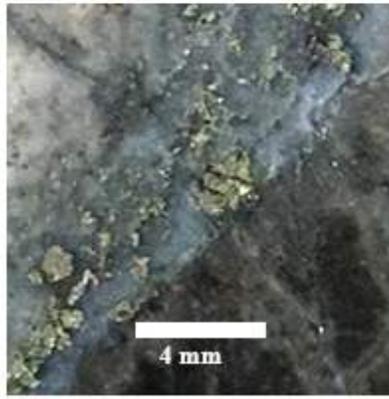
B)  
Quartz-sericite alteration (Phyllic)

A) Example of potassic alteration in the biotite-feldspar porphyry with fine-grained biotite replacing mafic sites in the groundmass.

B) Example of phyllic alteration in the biotite-feldspar porphyry with quartz-sericite replacing the fine groundmass while larger secondary biotite sites remain unaltered.



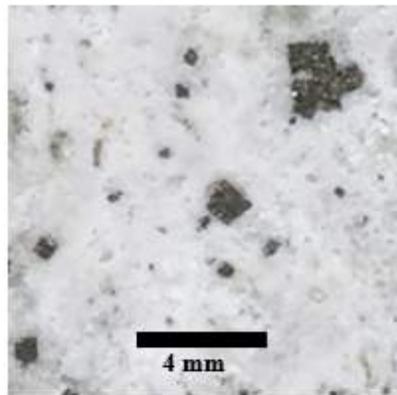
C)  
Sericite alteration (Phyllic)



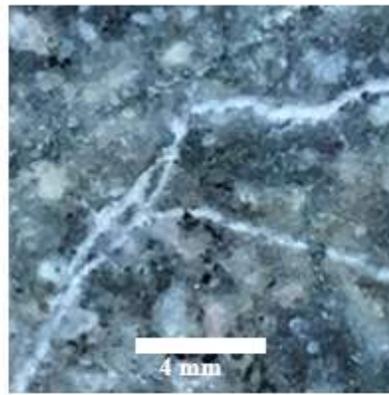
D)  
Quartz-sericite alteration (Phyllic)

C) Example of phyllic alteration in the biotite-feldspar porphyry with sericite replacing feldspar phenocrysts within a zone of late quartz-pyrite veining.

D) Example of fine grained secondary biotite alteration within volcanic rocks that is locally altered to quartz-sericite.



E)  
Quartz-sericite-pyrite (Phyllic)



F)  
Anhydrite-sulfide alteration  
(Anhydrite)

E) Example of intense quartz-sericite-pyrite and minor kaolinite alteration within biotite-feldspar porphyry.

F) Example of anhydrite ± pyrite zone with anhydrite veins and a moderately sericitic groundmass.

**Figure 7-4: Examples of Various Alteration Types at DUKE Cu-Mo Deposit Target.**

## 7.5 Veining

### 7.5.1 Vein Description

Veining recorded in the 2017 - 2018 drilling (Galicki et al., 2017; Bui et al. 2018; Roberts, 2018) from the DUKE Cu-Mo deposit target is quite variable in terms of abundance and is reflective of the host rock. Many (sulphide-bearing) veins are also very thin, so even though numerically quite abundant they rarely constitute a significant percentage of the total rock mass. As a general rule, veining is better developed in the MVC1, while in the BFP1 and BFP2 intrusions it is typically more subdued (commonly 0.5%-1.0% by volume). The MZP1 units are usually devoid of any significant vein content.

Irrespective of local abundance, there are a number of vein types present at the DUKE deposit target, with quartz-molybdenite and quartz-pyrite-chalcopyrite veins being the most important sulphide-bearing varieties. It should also be noted that some drill holes contain up to 2% gypsum/anhydrite ( $\pm$  carbonate) veins, an example is DK18005 where it's located primarily in the upper part of the hole. These (typically several mm thick) veins are also present elsewhere but are much less abundant. The possibility that pre-existing gypsum veins may have been removed by later dissolution cannot be discounted, particularly in the more rubbly upper portions of individual drill holes. Elsewhere, sporadic magnetite  $\pm$  quartz  $\pm$  sulphide veins and comparatively rare, 'hairline' chalcopyrite-quartz veinlets occur. Sporadic thick, pyrite-quartz ('D') veins are also present locally but are usually quite sparse although they are somewhat more abundant in drill hole DK18004.

Relative age relationships are somewhat equivocal and will require a more intensive study to fully determine. In part, this uncertainty may be due to later veins exploiting earlier vein pathways or, alternatively, there may be different generations of chalcopyrite-bearing quartz-sulphide veins in particular. Nonetheless, the early magnetite  $\pm$  quartz  $\pm$  sulphide and scattered quartz-chalcopyrite micro-veinlets are cut by quartz-molybdenite veins when present (Bui 2017).

The more abundant quartz-pyrite-chalcopyrite suite, which are often very fine and may develop pale sericitic envelopes in the BFP, appear to postdate the quartz-molybdenite veins. However, there are only rare examples of crosscutting relationships and in the mafic volcanics some quartz-pyrite-chalcopyrite veins possess biotitic envelopes, which suggest that at least some of these veins developed quite early in the evolution of the hydrothermal system. The MZP1 units, as already noted, generally lack veining although isolated, late, pyrite-only veins and minor amounts of re-mobilized sulphide adjacent to contacts occur in some units.

In addition to vein sulphide, mineralization at the DUKE deposit also consists of variably abundant disseminated sulphide. This can comprise several per cent of the rock mass in the better mineralized portions of the deposit and, like many of the veins, it is usually dominated by pyrite although chalcopyrite is a common accessory component within the deposit itself. In the BFP phases it tends to be more evenly distributed, although grain sizes can typically range from  $\sim$ 0.5 mm up to 2 mm or more, even within the same unit. On the other hand, in the MVC1 disseminated sulphide is typically much finer grained and more patchily distributed, with total contents varying over short intervals. Irregular masses of sulphide (primarily pyrite) are also present in places. Some of the MZP1 units also carry moderate amounts of disseminated pyrite.

## 7.5.2 Vein Timing

Table 7-2 summarizes the timing of the seven veins types (as estimated from limited drilling and geological interpretation) into three broad categories – early, main and late stage. In summary, diffuse quartz veins and magnetite veins (early stage) are cross-cut by quartz-chalcopyrite and quartz-molybdenite veins (main stage), which are subsequently cross-cut by quartz-sulfide and quartz-pyrite veins (late stage). These three veins are all cross-cut by late anhydrite-carbonate veins that are present below 130 m (after Galicki et al., 2017).

**Table 7-2: Timing of Veins as recorded in Amarc Drilling.**

Type	Code	Early	Main	Late
Diffuse Quartz	EGV1	1		
Magnetite	EBV1	2		
Quartz-chalcopyrite	QZCP		3	
Quartz-molybdenite	QZMO		4	
Quartz-sulfide	QZCS			5
Quartz-pyrite	QZPY			6
Anhydrite ±pyrite	ANHY			7

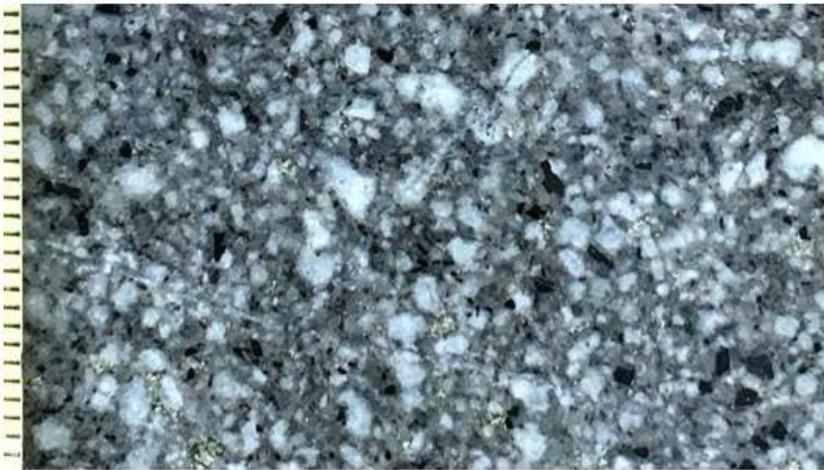
Note: Thin line = less abundant. Medium line = moderately abundant. Thick line = abundant

## 7.6 MINERALIZATION

### 7.6.1 Disseminated

The Amarc 2017 - 2018 drilling intercepted finely disseminated chalcopyrite that occurs throughout the biotite-feldspar porphyry and is generally incipient to absent in other lithologies encountered (Figure 7-5A). Chalcopyrite grains occur within the interstices of feldspar phenocrysts and range between 0.1 mm to 0.5 mm.

Coarser disseminations occur in zones of increased potassic alteration and quartz-chalcopyrite veining where  $\leq 2$  mm chalcopyrite grains partially replace biotite sites (Figure 7-5B). On average, disseminated chalcopyrite occurs up to 0.1% within the biotite-feldspar porphyry, with higher-grade zones containing three m samples ranging up to 1% chalcopyrite.



A)

A) Example of finely disseminated chalcopyrite throughout the groundmass within the biotite-feldspar porphyry. Average chalcopyrite grain size is approximately 0.2 mm. Scale is in mm.



B)

B) Example of coarsely disseminated chalcopyrite within the biotite-feldspar porphyry. Average chalcopyrite grain size is approximately 0.5 mm and may reach up to 2.0 mm. Scale is in mm.

**Figure 7-5: Disseminated Mineralization Examples from the DUKE Porphyry Cu-Mo Deposit Target.**

### 7.6.2 Vein Hosted

The Amarc 2017 - 2018 drilling intercepted chalcopyrite in veins, including quartz-chalcopyrite, quartz-molybdenite and quartz-sulfide veins. The majority of vein hosted mineralization is attributed to hairline quartz-chalcopyrite veins that contain fine grained secondary biotite along vein selvages. These veins are generally high in chalcopyrite to quartz ratio (5:1) and can locally appear as chalcopyrite-only veins (Figure 7-6). Coarser grained to blebby chalcopyrite tends to form in late quartz-sulphide veins (and quartz-molybdenite veins (Figure 7-7). Vein-hosted molybdenite is isolated to quartz-molybdenite veins where molybdenite is generally very fine grained. Molybdenite either infills the vein or occurs along the vein selvage (Figure 7-7).

Early diffuse quartz veins, magnetite veins, late quartz-pyrite veins, and late anhydrite-carbonate veins tend not to be mineralized.



A)



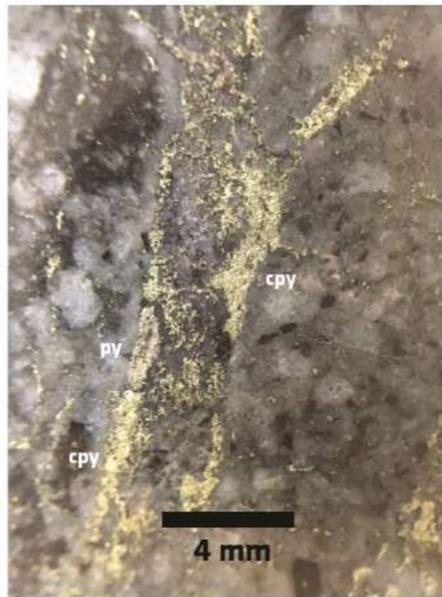
B)

A) Example of chalcopyrite-only vein comprised of fine-grained chalcopyrite and secondary biotite filling vein selvages. Scale is in mm.

B) Close-up image of A showing medium grained chalcopyrite (cpy) veins with biotite (bt) selvages. Width of chalcopyrite veins are approximately 0.5 mm wide.



C)

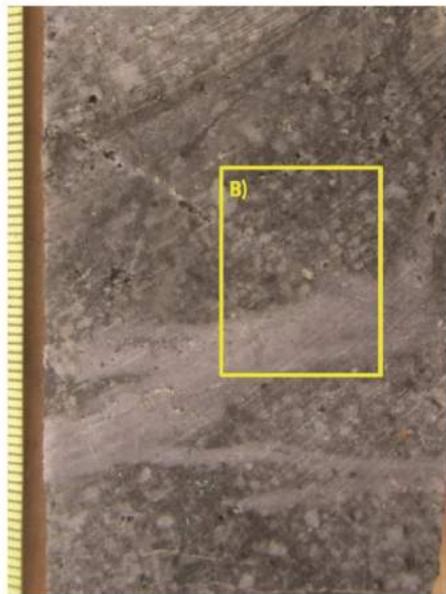


D)

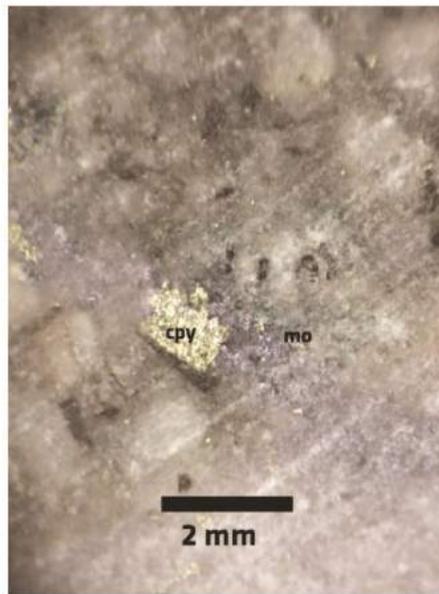
C) Example of quartz-sulfide vein comprised of chalcopyrite and pyrite with minor quartz. Vein is emplaced into brecciated biotite-feldspar porphyry and shows silicification and replacement of biotite rich groundmass along vein contact. Scale is in mm.

D) Close-up image of A showing chalcopyrite (cpy), pyrite (py) filling vein selvages. Width of vein is 4mm wide.

**Figure 7-6: Examples of Chalcopyrite Bearing Veins at DUKE Porphyry Deposit Target.**



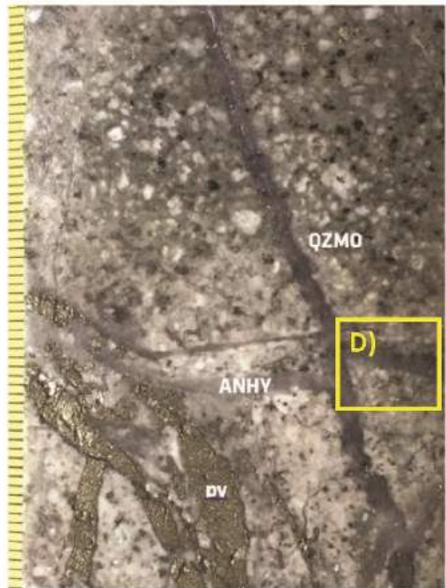
A)



B)

A) Example of quartz-molybdenite vein cross cutting earlier quartz vein. Vein is 1-2mm wide. Scale is in mm.

B) Close-up image of A. Showing coarse chalcopyrite mineralization within a diffuse quartz-molybdenite vein. Molybdenite is very fine-grained and disseminated throughout.



C)



D)

C) Example of quartz-molybdenite vein where fine-grained molybdenite infills vein. Vein is 2mm wide. Scale is in mm.

D) Example of quartz-molybdenite vein (QZMO) with coarse grained molybdenite (mo) filling vein selvages. Top vein is 7 mm wide and bottom vein is 9 mm wide. Scale is in mm.

**Figure 7-7: Examples of Other Vein Hosted Mineralization at the DUKE Porphyry Deposit Target, including Later Quartz-Sulfide Vein (QZCS) and Quartz-Molybdenum Vein (QZMO).**

## 8 Deposit Type

The DUKE Project is an exploration stage project focused on locating porphyry-style Cu-Au-Mo-Ag deposits.

The principal features of porphyry Cu deposits, as summarized by Gustafson (1975), Sillitoe (2010), and other workers, include:

- Mineralization defined by Cu and other metals which occur as disseminations and in veins and breccias which are relatively evenly distributed throughout their host rocks;
- Large tonnage amenable to bulk mining methods;
- Low to moderate overall Cu grades, typically between 0.3% and 2.0%;
- A genetic relationship to igneous porphyritic intrusions of intermediate composition that typically formed in convergent-margin tectonic settings;
- Generally these deposits form in clusters, or within a camp area and not as single events;
- A metal assemblage dominated by various combinations of Cu, Au, Mo and Ag, but commonly with other associated metals of lower concentration; and,
- A spatial association with other styles of intrusion-related mineralization, including skarns, polymetallic replacements and veins, distal disseminated Au-Ag deposits, and intermediate to high-sulphidation epithermal deposits.

These characteristics correspond closely to the principal features of the DUKE calc-alkalic deposit target as described in Section 7.0 of this report. Other deposit types, including intrusion-related skarn, vein and porphyry style mineralization have been documented elsewhere on the wider DUKE Project but have not been the subject of detailed exploration or delineation to date.

## 9 Exploration

### 9.1 Overview

Amarc's exploration efforts in 2017 - 2018 were largely focused on the initial exploration of the DUKE porphyry Cu-Mo deposit target. After the historical data from the DUKE deposit target was compiled, it was systematically verified by the Amarc team, including georeferencing locations and comparing them original source data (to make adjustments where necessary); and supplementing available digital databases with information derived from examination of original assay certificates as further described in Section 9.3.1. Due diligence, verification and validation work completed by Amarc staff and consultants on historical and Amarc drill data is described in Section 11.5.1. The verified and integrated database was used to direct on-going, and also future exploration works (see Section 9.2-9.3). The DUKE deposit target is pending drill delineation.

The DUKE deposit target was intermittently explored between 1965 and 2010 with geochemical, IP and magnetometer surveys and shallow core drill holes (see Section 6). Extensive glacial cover largely precluded surface geological mapping and hinders geochemical survey interpretation. Most of the shallow historical drill holes completed by the Ducanex JV (average vertical depth 90 m, with the deepest only extending to 124 m from surface) intersected significant porphyry-style mineralization, with many

ending in mineralization, likely indicating the presence of a larger porphyry system open both laterally and to depth (Table 6-6 and Figure 10-2). For example, drill hole 71-14, intersected 87 m of 0.40% Cu, 0.021% Mo, 2.2 g/t Ag and 0.05 g/t Au from 29 m to the end of the hole. Another drill hole 70-02, located 430 m southeast of 71-14 intersected 112.78 m of 0.29% Cu, 0.012% Mo, 1.1 g/t Ag and 0.06 g/t Au from 30.48 m. This drill information together with the resampling and analyses completed by Corona in 1991 (on four of the Ducanex JV drill holes) confirmed the tenor of Cu and Mo concentrations (Section 6.6.1), and encouraged Amarc to proceed with its drill program.

Seven of the eight holes drilled by Amarc have successfully outlined porphyry copper-style mineralization over an area currently measuring approximately 400 m north-south by 600 m east-west, by a vertical depth of 360 m. This mineralization remains open to expansion in all directions (Galicki et al. 2017, Bui et al. 2018, Roberts, 2018; Fagan et al. 2018). Notably a single step-out hole (DK18004) completed by Amarc 1 km to the north of the seven other Amarc holes, intersected substantial lengths of moderate to low grade Cu and Mo mineralization, confirming a very extensive lateral dimension to the DUKE mineralized porphyry Cu system. This mineralized system, as outlined by the core of an historical chargeability IP anomaly associated with the DUKE deposit target, measures some 3 km north-south by 1 km east-west.

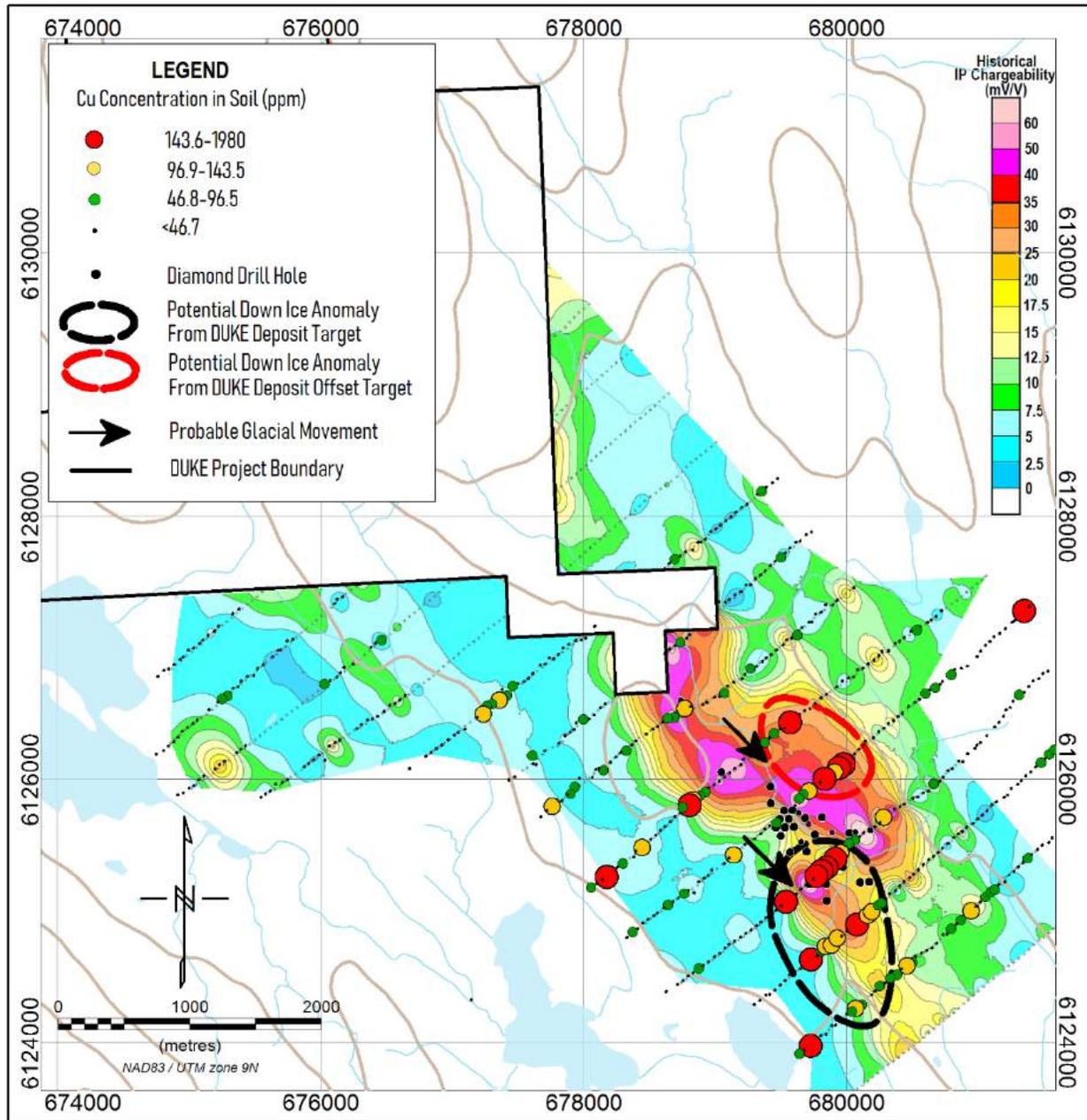
Having completed the successful drilling on the DUKE deposit target and recognizing the prospectivity of the Babine District and its relatively underexplored nature (due in part due to the extensive glacial cover), in 2018 and 2019 Amarc undertook a detailed and methodical compilation of all available data from historical workers, Government agencies and data within Amarc's own databases. This comprehensive study (summarized below) yielded a new interpretation of the geological, geochemical and geophysical characteristics of the Babine District, defining several high potential new porphyry Cu-Au-Mo-Ag deposit targets for focused ground surveys and drill testing (Fagan and Rebagliati, 2019). As targets were defined Amarc expanded its tenure position to cover favorable areas (see Section 4.4).

## **9.2 DUKE Porphyry Cu-Mo Deposit Target**

All historical drilling and surveys on the DUKE deposit target area were compiled and reviewed together with the Amarc drill results, and a high resolution aeromagnetic survey which was also completed by the company. Amarc's aeromagnetic survey assisted the 2017 - 2018 drill program and is also being used to establish the extent and characteristics of the target for future exploration efforts, including the drill delineation of the deposit. Historical drilling by the Ducanex JV of 29 core holes into the DUKE Cu-Mo-Ag deposit target intercepted significant porphyry-style mineralization, with many holes ending in mineralization, likely indicating the presence of a larger porphyry system open both laterally and to depth (Table 6-6 and Figure 10-2).. Amarc also compiled historical workers soil geochemical sampling, and work completed by Amarc since 2017 to better assess and target drilling at the DUKE porphyry deposit target.

### **9.2.1 Reprocessing Historical Surficial Geochemistry Results**

Assessment report 30986 documented geophysical, geochemical and geological exploration results generated by Copper Ridge (Dawson, 2010). These results were integrated into the new Amarc database. This report includes information for 1,199 surficial samples (B-horizon soil samples), of which only the 733 samples over the DUKE porphyry are reported herein (samples with verified digital data are bolded black symbols in Figure 9-1).



**Figure 9-1: DUKE Porphyry Cu-Mo Deposit Target as Outlined by the Historical IP Chargeability with Historical Cu-in-Soils Anomalies. Showing Potential Down-Ice Dispersion from the Main Drilling Area of the DUKE Deposit Target (black outline), and Dispersion Potentially from the DUKE Deposit Offset Target (Red Outline). Figure Modified After Dawson, 2009.**

### 9.2.2 Cu and Mo in Soils

In Figure 9-1 there are two zones of surficial Cu-enrichment outlined by a historical soil survey from a survey carried out by Copper Ridge in 2008 (Dawson, 2009). In one instance it would appear that there may have been minor down ice dispersion (200 m or so) of the Cu-in-soils anomaly to the south-southeast away from the main area of Amarc and historical drilling. Notably to the north-northeast of the main area of drilling there is a second area of anomalous Cu which could, applying the same principle of limited down ice dispersion, indicate a source within the northern (fault offset) area of the DUKE target which is defined as the outer limits of the historical IP chargeability anomaly (see section 9.2.2.) (Benn, 2019).

The same geochemical survey also recorded anomalous to highly anomalous concentrations of Mo down-ice of the DUKE Deposit Target. The Mo has similar dispersion to Cu, and shows a dispersion train ~1 km long towards the southeast. It is coincident with the southern Cu anomaly outlined in Figure 9-1. Interestingly, the Mo also shows several highly anomalous samples to the north of the DUKE drilling which are coincident with the postulated northern (red outlined) anomaly in Figure 9-1, this may correlate with Mo dispersion from the up-ice DUKE Deposit Offset Target.

### 9.2.3 Au in Soils

Au is predominant in most of the Babine District porphyries, the DUKE deposit target is a notable exception as Cu-Mo mineralization dominates. However, Harivel (1997) reported the discovery of a Cu-Au breccia outcrop near the DUKE deposit target, unfortunately the location and details of grades are not given in the final report. A single Au-in-soil anomaly was also highlighted by the 2008 Copper Ridge (Dawson, 2009) soil sampling program. This anomaly lies to the north of the drilling at the DUKE Deposit Target, and has not been followed up with subsequent sampling.

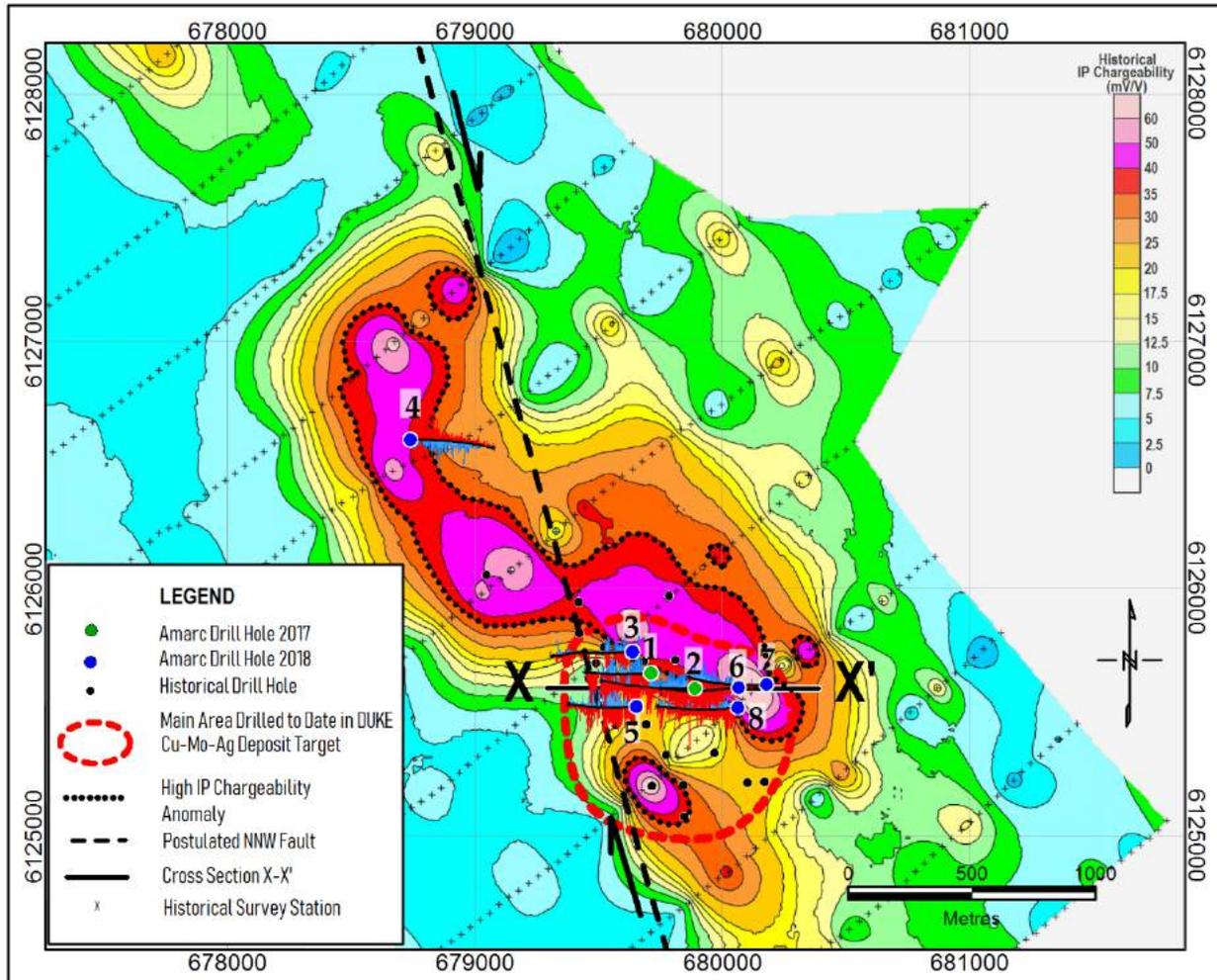
### 9.2.4 Reinterpretation of Historical IP Chargeability Results

Historical IP surveys were conducted in both 1971 and 2008 (Woolverton, 1971; Dawson, 2009). The IP surface chargeability from the 2008 survey is shown in Figure 9-2 (as reported in Dawson, 2009). The outer limits of this survey in terms of IP chargeability define the overall DUKE deposit target, which has an internal a 3 km by 1 km area of high chargeability (14–60 mV/V). The overall internal morphology of the higher chargeability response (>40 mV/V) is sigmoidal in shape and is surrounded by a lower chargeability envelope (>14 and <40 mV/V). This distribution of the IP chargeability could be interpreted as a pyritic halo, as evidenced by the higher IP chargeability and internal comparatively low IP chargeability core that may possibly have been bisected and offset by a significant northwest trending regional fault, with a component of right lateral displacement. This interpreted fault is observed in the high resolution airborne magnetic survey (Figure 9-4).

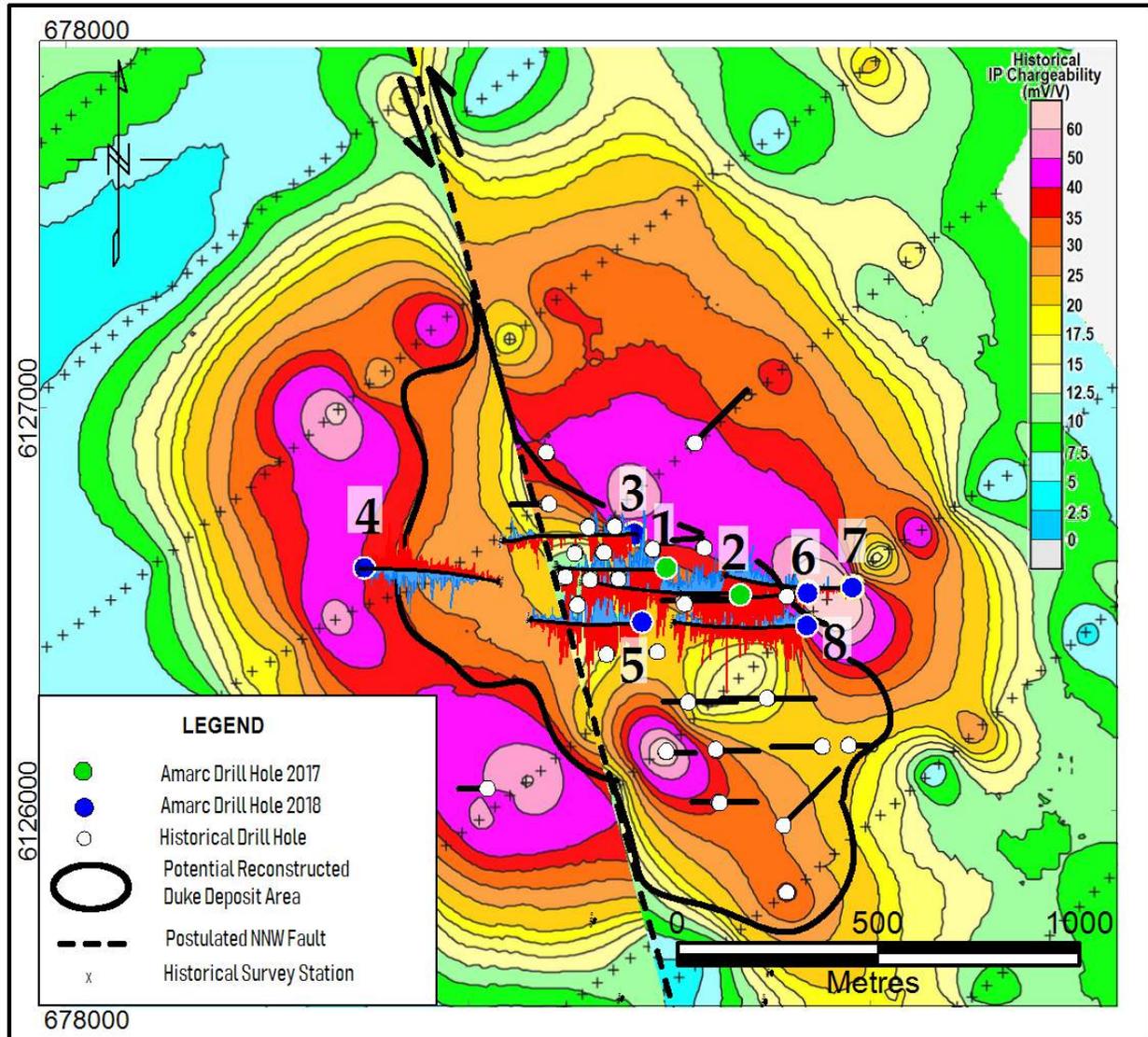
Thus, approximately half of the IP chargeability signature of the DUKE porphyry Cu-Mo hydrothermal system, including the core of the IP chargeability anomaly and its associated mineralization, may have been displaced approximately 1.4 km to the northwest.

For clarity when the IP chargeability anomaly is reconstructed, and the movement on the fault corrected to show what the hydrothermal system would have been at the time of emplacement, then a very large classic calc-alkaline porphyry signature may be interpreted (Figure 9-3). This chargeability anomaly has a typical, comparatively low, chargeable core (black solid outline in Figure 9-3) where hydrothermal ore forming fluids have potentially deposited economic mineralization. This low chargeability core lies central to the development of a large, highly chargeable halo, which Amarc interpret to be a classic pyritic

halo around the porphyry centre. A single Amarc drill hole (DK18004, also delineated as drill hole “4” in Figures 9-2, 9-3, and 9-4) has confirmed that the offset core on the western side of the fault is mineralized, with the hole returning significantly anomalous Cu, Mo and Ag concentrations (see Section 10).



**Figure 9-2: Historical IP Chargeability Survey at the DUKE Porphyry Cu-Mo Deposit. The Red Circle Outlines the Main Area Drilled to Date in the DUKE Deposit Target. The Cross-Section Denoted X-X' is Discussed in Section 10. Hole ID's from the Amarc Drill Program are Abbreviated in the Figure, Thus For Example Hole DK17001 Becomes Hole '1' and hole DK18004 Hole '4' Above. The Targets Position in Relation to the Project Boundary are Shown In Figure 9-1.**



Note Amarc drillholes 3 and 5 are at a steep angle and the surface projection (above, and Figure 9-2) illustrates them crossing the projected fault, however drill logs do not record crossing this feature, either due to the angle of the hole or because the fault has an inclined fault plane. The fault has not yet been drill tested.

**Figure 9-3: Reconstructed Large IP Chargeability Anomaly at the DUKE Porphyry Deposit Target to Pre-Faulted Stage.**

### 9.2.5 Amarc and Historical DUKE Porphyry Cu-Mo Deposit Target Aeromagnetic Surveys

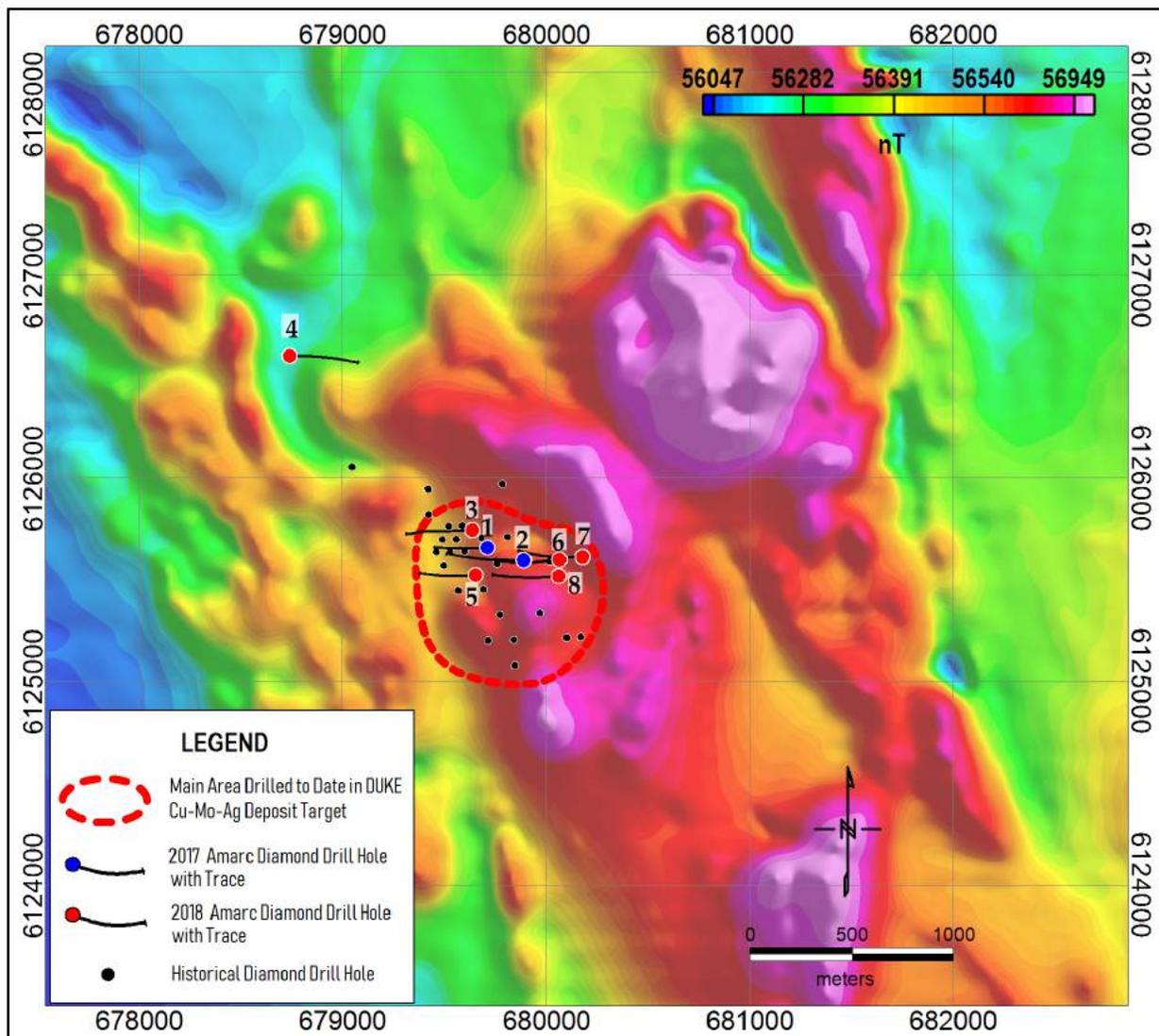
Regional airborne magnetic surveys were conducted by Teck Corporation (Farmer & Smith, 1996), Astorius Resources (Walcott, 2011) and Amarc (Galicki et. al., 2017). These surveys show that the area around the DUKE deposit target has a northwest-dominant structural grain marked by linear magnetic trends that correspond to the general NW-oriented Cordilleran structural fabric (Harivel, 1996; Ferbey, Levson, & Lett, 2009; Bui et al., 2018).

Isolated magnetic anomalies are correlated with the Babine and Bulkley intrusive bodies across the DUKE Project, these bodies also trend northwest-southeast (Walcott, 2017). There is no defined magnetic

signature for the main deposits in the Babine, with both Bell mine and Morrison deposit lying on the flank of a large magnetic high anomaly without their own discrete magnetic signatures (Harivel, 1996).

The southern part of the DUKE porphyry Cu-Mo-Ag deposit target (around the potential core of the historical and Amarc drilling) lies on the flanks of a series of intense magnetic highs (Figure 9-4). These anomalies correlate with surface exposures of the Babine Suite granodiorite and BFP. Magnetic destruction may be interpreted along the eastern edge of the DUKE intrusion, in the area away from the main mineralization and known hydrothermal activity.

The northern extension of the DUKE deposit, as discovered by drill hole DK18004 (Figure 9-4, drill hole number “4”), occupies a subtle magnetic low with few defined features. This quiet flank setting is similar to the magnetic signatures observed at Morrison-Hearne Hill (Mitchinson et al., 2013). As at Hearne Hill, a more detailed magnetic survey (e.g. ground based), may enable features to be discerned and utilized for future drill collar placement.



**Figure 9-4: Magnetic Signature of the DUKE Porphyry Cu-Mo-Ag Deposit Target (main focus of historical drilling in red circle). The Overall Targets Position in Relation to the Property Boundary is Shown in Figure 9-1.**

### **9.3 Regional Geology, Geochemistry and Geophysical Data Compilation for Exploration Targeting**

This compilation reviewed and summarized data from many different sources and brought them together into a GIS digital environment to utilize in the regional targeting of porphyry Cu-Au-Ag-Mo targets. This compilation included:

Acquiring all BCGS data for regional till, lake, and stream sediment sampling as reported by Han and Rukhlov (2017), Plouffe and Ferbey (2016), Ferbey et al. (2016), Rukhlov and Naziri (2015), Lett (2005), and Levson (2002).

Acquiring and reassessing the GBC regional geophysical survey datasets for the Babine district including 116,344 line-km of raw and processed magnetic and radiometric data (Bates and Upiter, 2017), 25,500 line-km of aerogravity survey (Farr et al. 2008), and 11,600 line-km time domain electromagnetic dataset (Geotech, 2008).

Evaluating relevant BC provincial assessment reports stored in the ARIS database. These reports document the efforts of historical workers during their exploration generally within but also proximal to the DUKE Project. In total, 329 assessment reports were reviewed. Where this revealed important data regarding mineralization, potential mineralizing structures, or unexplained geophysical anomalies the relevant data was imported into the GIS environment (see Fagan and Rebagliati, 2019, and references therein).

Acquiring all relevant BC Provincial Property File reports and querying the datasets. Amarc then evaluated the data for use and incorporated geological comments to assist interpretation and deposit targeting.

Figures 9-5 and 9-6 illustrate the types of regional geophysical and geochemical datasets that were compiled and leveraged during Amarc's exploration targeting work. Re-processing and integrating the historical and Government regional surveys were a key part in identifying and refining the new exploration targets on the DUKE Project, especially in areas identified as being previously underexplored.

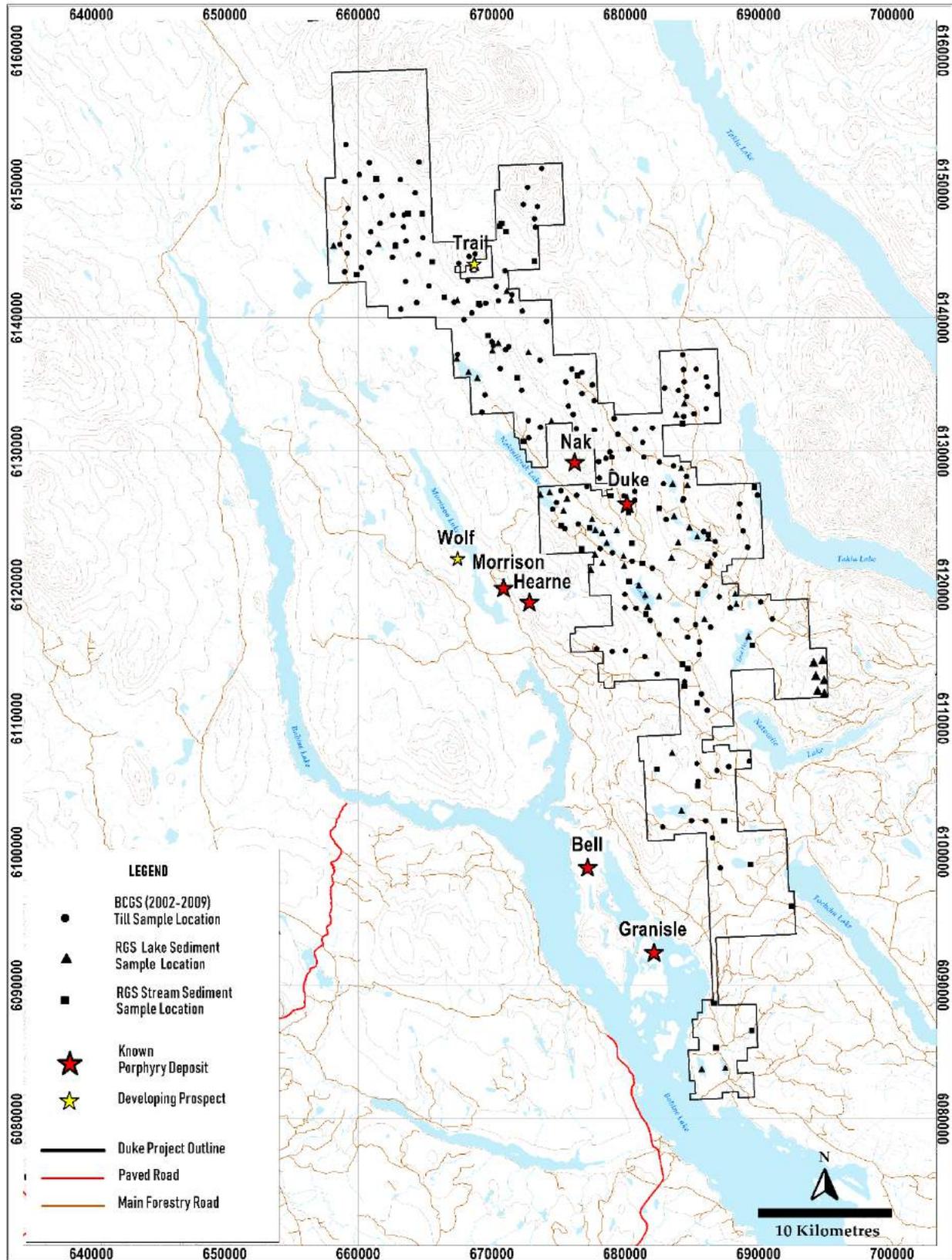


Figure 9-5: Geochemistry Compilation - Till, Lake Sediment and Stream Sediment Sample Location Map.

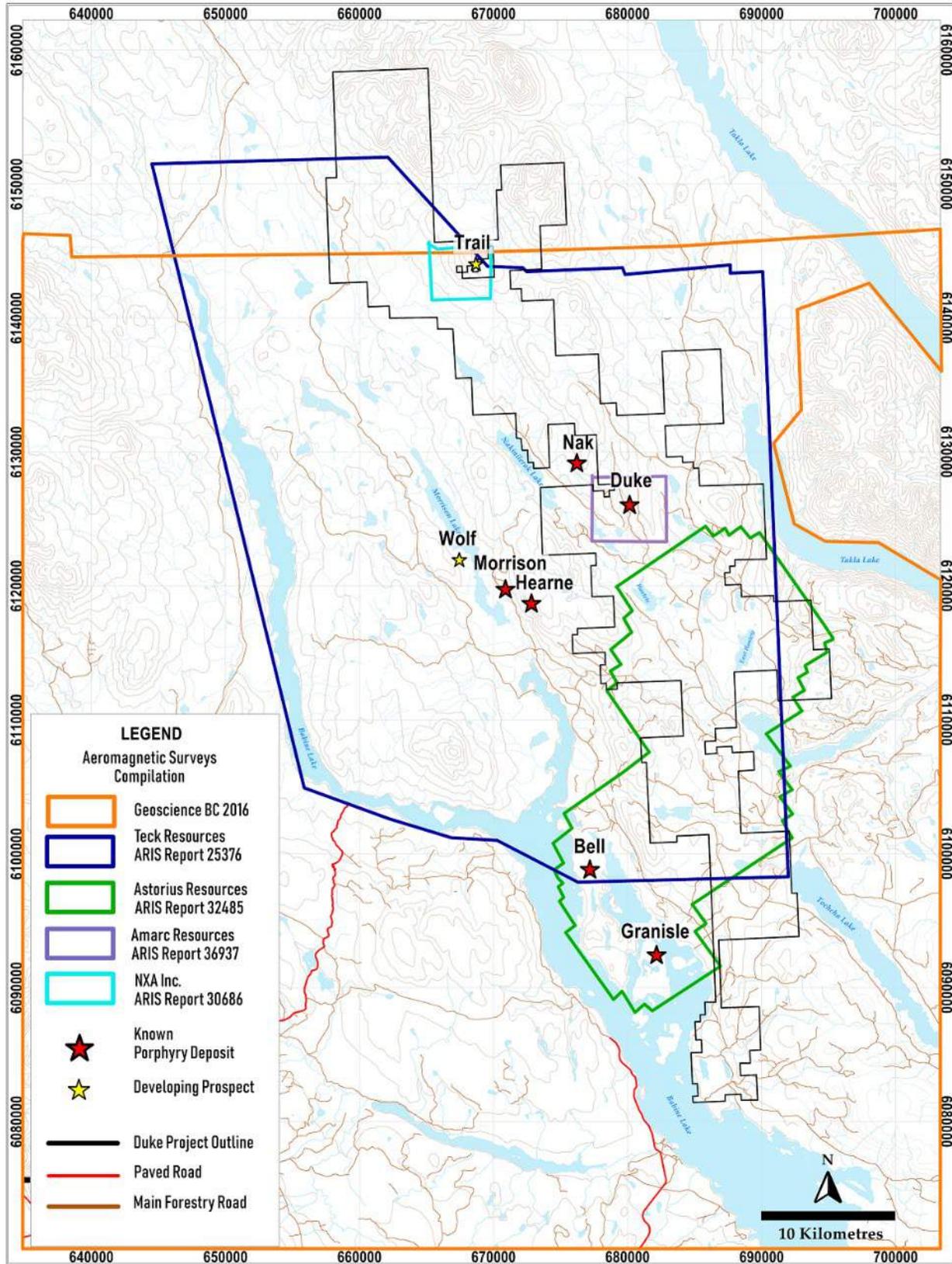


Figure 9-6: Historical and Amarc Airborne Magnetic Surveys in the DUKE Project Area.

### 9.3.1 Compilation Data Verification

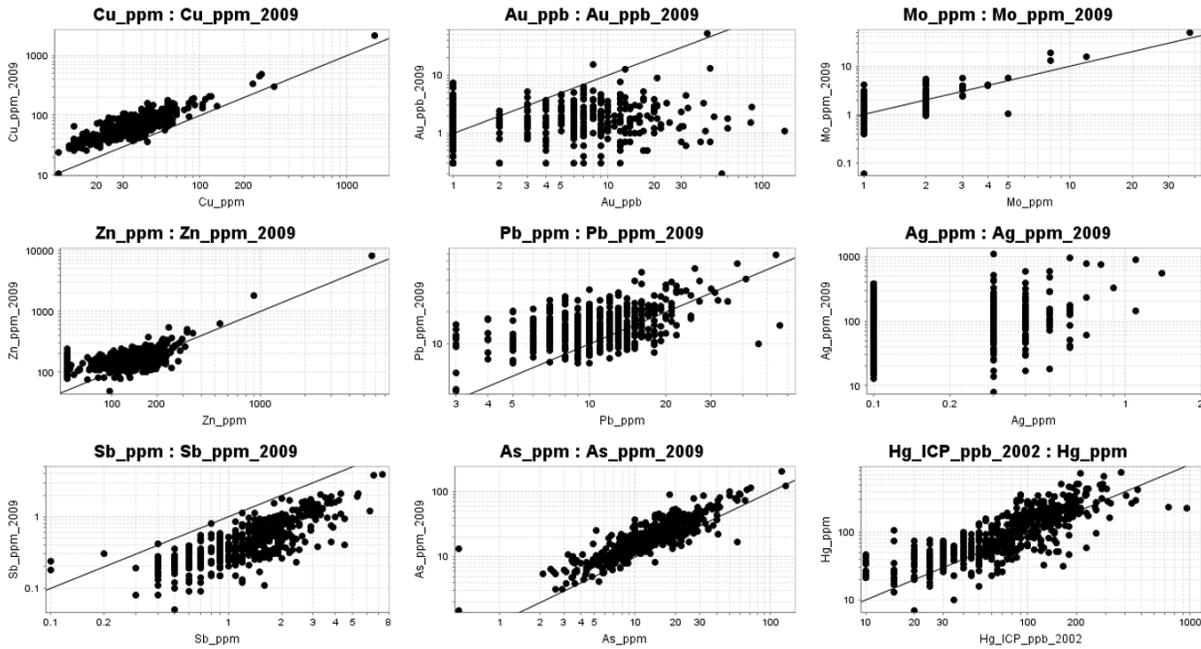
All BCGS and GBC data was downloaded in digital format, which greatly assisted the Amarc QAQC process. The majority of assessment reports after the year 2000 also contained downloadable digital datasets, however, the pre-2000 reports and data were typically paper-based and a significant effort was required to georeference historical maps and create GIS overlays to assess the validity and usefulness of this older data compared with the more modern purely digital datasets. Where digital data was available the sample numbers, locations and analytical results were spot checked against the assessment report maps and the analytical certificates for verification. Upon GIS plotting, if a spatial disparity was identified in the data then the assessment report maps were used to correctly locate and name the samples. Several digital assessment report data files had incomplete geochemical analytical information, which was supplemented by manually entering elements of interest (Cu, Au, Ag, Mo, Ni, As, Cr, Mn, Hg etc.) from the original laboratory certificates.

A total of 937 samples of basal till were utilized from the 2002 BCGS dataset, which equates to approximately 1 sample per 2.5 km<sup>2</sup>. This data was QAQC checked by the BCGS and issues surrounding Au contamination of the samples during processing made Au unreliable (Levson, 2002). In Amarc's compilation, care was taken to account for the identified data concerns during geochemical compilation and targeting.

In 2009, the BCGS resampled the 2002 samples and subjected them to an 'ultrafine' clay fraction analysis, aiming to improve the contrast between background and chalcophile elements (see Ferbey et al., 2009). Of the original 937 samples, only 533 had sufficient material in storage at the BCSC for reprocessing. Amarc performed its own set of strict QAQC tests on both the 2002 and 2009 BCGS datasets to ensure only the most appropriate data was utilized and compiled (Benn, 2019). The following was concluded:

1. Au by INAA in the 2002 BCGS dataset is insufficiently characterized to be utilize in Amarc's compilation, and BCGS reported their QAQC recognized Au contamination of some samples.
2. Mo in the 2002 dataset is at a very low concentration compared to analytical detection limit (Figure 10-1), with only six samples within the dataset above the analytical technique detection limit. As such, the Mo data from 2002 analysis needs to be treated with caution when plotting. This information was shared and discussed with the BCGS (Ferbey, 2019, Per. Comm.).
3. QAQC graphs comparing 2002 (x-axis) geochemical data to the ultrafine 2009 data (y-axis) are shown in Figure 9-5 (after Benn, 2019). The 2009 clay fraction samples were designed to increase chalcophile ratio to elemental background concentration, thus improving anomaly detection. As shown below, this worked well for Cu, As, and Zn, but as expected had poor correlation for elements such as Sb and Au.
4. This new geochemical targeting preferentially concentrated on samples from the high quality BCGS 2009 dataset, and was augmented by other regional stream and lake sediment samples (RGS-BCGS samples). The compilation also used various high-resolution geochemical studies to create deposit-style case studies (Bell Mine, Morrison-Hearne Hill etc.), which outlined elements typically documented in Babine porphyry deposits. Of particular use was the MDRU-GBC

assessment of the Morrison-Hearne Hill deposits, as this aided in selecting the most appropriate 'direct' porphyry vectoring elements (Blaine, 2016).



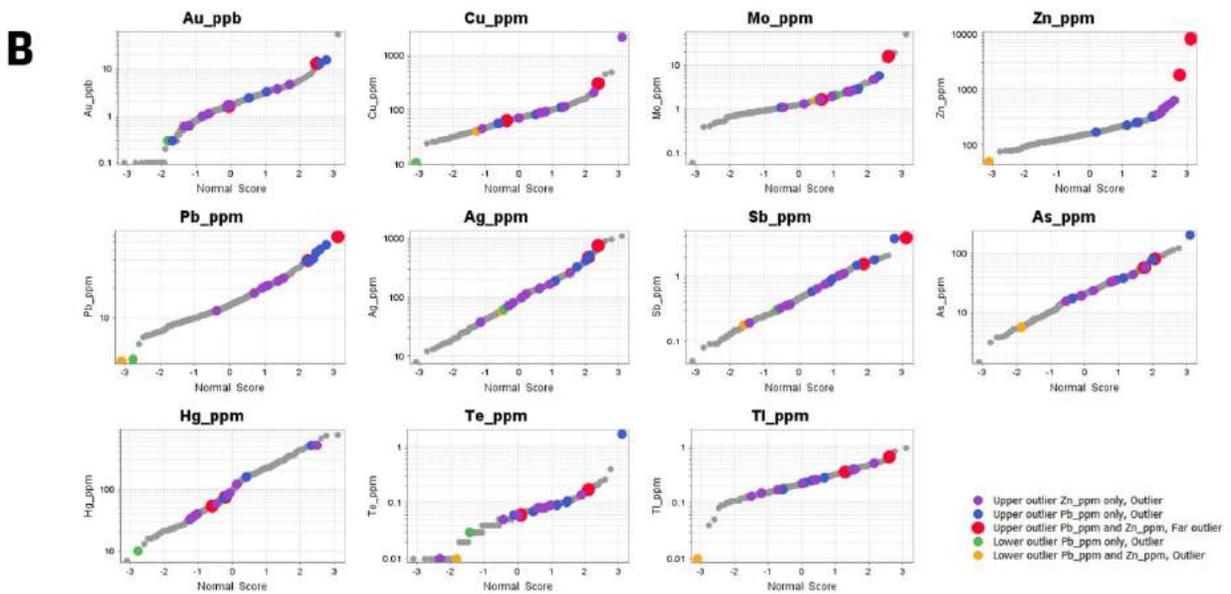
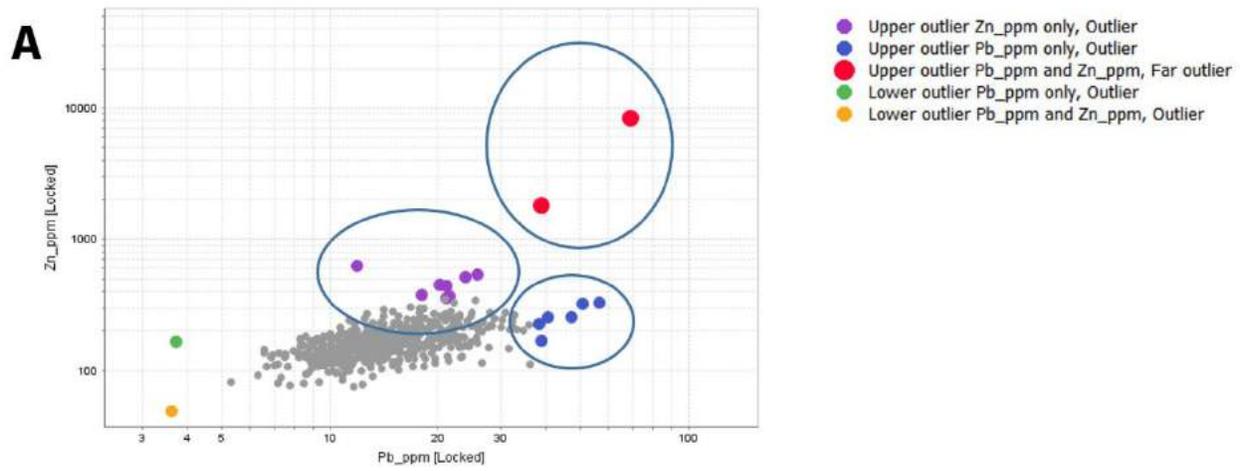
**Figure 9-7: Amarc QAQC Data Quality Assessment Graphs of 2002 (x-axis) vs 2009 (y-axis) BCGS Analyses of Till Samples for Various Elements (Benn, 2019).**

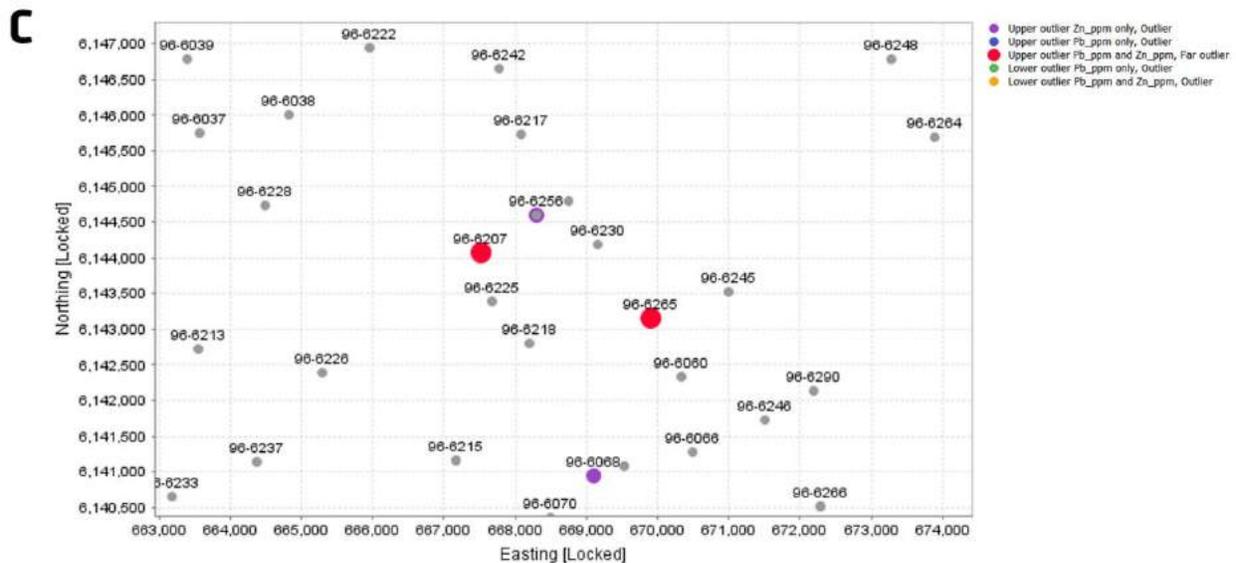
### 9.3.2 Down-Ice Geochemical Dispersion Calculations

The BCGS suggests a southeast dominant ice-direction for the Babine District (Ferbey et al, 2009). Geochemical trains show elemental concentration returns to within error of the overall background concentration approximately 3 – 5 km down-ice from the source rocks (Figure 9-8, Levson, 2002).



scatterbox plots, samples with significant concentrations of key elements were identified for follow-up (Figure 9-9).





**Figure 9-9: Example of Anomaly Assessment and Targeting; (A) Scatterbox Ranked Outliers in Pb-Zn Space; (B) Cumulative Plots Assess Correlation of Trace Elements for Vectoring; (C) Map of Spatial Distribution of High Pb-Zn Outliers (red) in (A) and (B) above, after Benn, 2019.**

### 9.3.4 Geological Mapping Compilation

Proximity to BFP units is crucial for mineralization, as these are the known source of the hydrothermal fluids related to mineralization. Proximity to major faults and regional fluid pathways also appears highly important, with all of the known deposits sitting on secondary faults lying subparallel to perpendicular to the main northwest trending regional faults.

In general, lithology does not appear to control mineralization as there are numerous rock-types, at several stratigraphic levels, that host porphyry mineralization. However, given the usually resistive nature (unless highly altered) of the intrusive rocks the use of traditional geological mapping may be effective at locating them in the field, as they may variably crop out through the till sequences.

Despite the known primary mineralized unit being BFP, the Bell mine has over 40% of its mineralization hosted in altered rhyolites and tuffs of the Hazelton Fm. The BFP intrusive units are hosted in the Jurassic and Cretaceous siliciclastic and volcanoclastic units. Thick cover sequences throughout the district makes surface geological mapping difficult, thus the regional geology map, and the placement of the various surface faults should be considered as inferred unless supported by regional magnetic and gravity data. Figure 7-1 shows the regional geological surface mapping by the BCGS over the target area; this has been simplified to highlight where BFP was been documented and mapped.

A review of regional ARIS databases (historical assessment reports) was undertaken in an attempt to locate other (non-BCGS mapped) BFP outcrops. Table 9-1 shows the assessment report sources for BFP outcrop assessment.

**Table 9-1: Historical Geological Compilation (BFP outcrop).**

ARIS #	Report Title	Work Year	Operator	Target Area
1854	Geological, Geophysical and Geochemical Surveys and Preliminary Diamond Drilling on the Wolf and Kofit Claim Groups, Morrison Lake, BC	1968	Can. Superior Ex.	WOLF
5058	Geochemical, geophysical and diamond drilling report on the Old Fort Property	1974	Noranda	DDT, OFF, RAID
9974	Line-cutting, Geology, Geochemistry and Geophysics on the Lake Mineral Claims (Babine Group I and Babine Group II)	1981	Noranda	LAKE
10688	1982 Line-cutting, Geology, Geophysics and Geochemistry on the Sat 1-4 Mineral Claims, Omineca Mining Division	1982	Noranda	SAT
17774	Geological, Geophysical and Geochemical Report on the Fireweed Mineral Claim Group	1988	Can. United Min.	Ger 1-4,
23536	Geological, Geochemical and Geophysical Report on Babs	1994	Noranda	Babs
24560	Babs Claim Group 1995 Line-Cutting, Geochemical Sampling, Geological Mapping, Geophysical Survey and Drill Programs	1996	Pacific Sentinel Gold	Babs 5-21
25287	Diamond Drilling, Geochemistry and Geophysics Report on the Hearne Hill Project	1997	Booker Gold Exploration	Morrison-Hearne
33707	Riverside Resources Report on the Flute and Lennac Project	2013	Riverside Resources	Lennac Area

### 9.3.5 Catchment Basin Analysis

Catchment basin area analysis was completed for the whole Babine District in QGIS utilizing Government stream and lake sediment databases to trace anomalous streams and identify areas of potentially anomalous for mineralization, or areas with high dilution (>16 km<sup>2</sup> basin area) which require removal from the targeting database. The BCGS data for Cu, Au, Mo, As, Sb and Ag were plotted and several new highly anomalous yet untested basin areas were discovered on the DUKE Project (Figure 9-10).

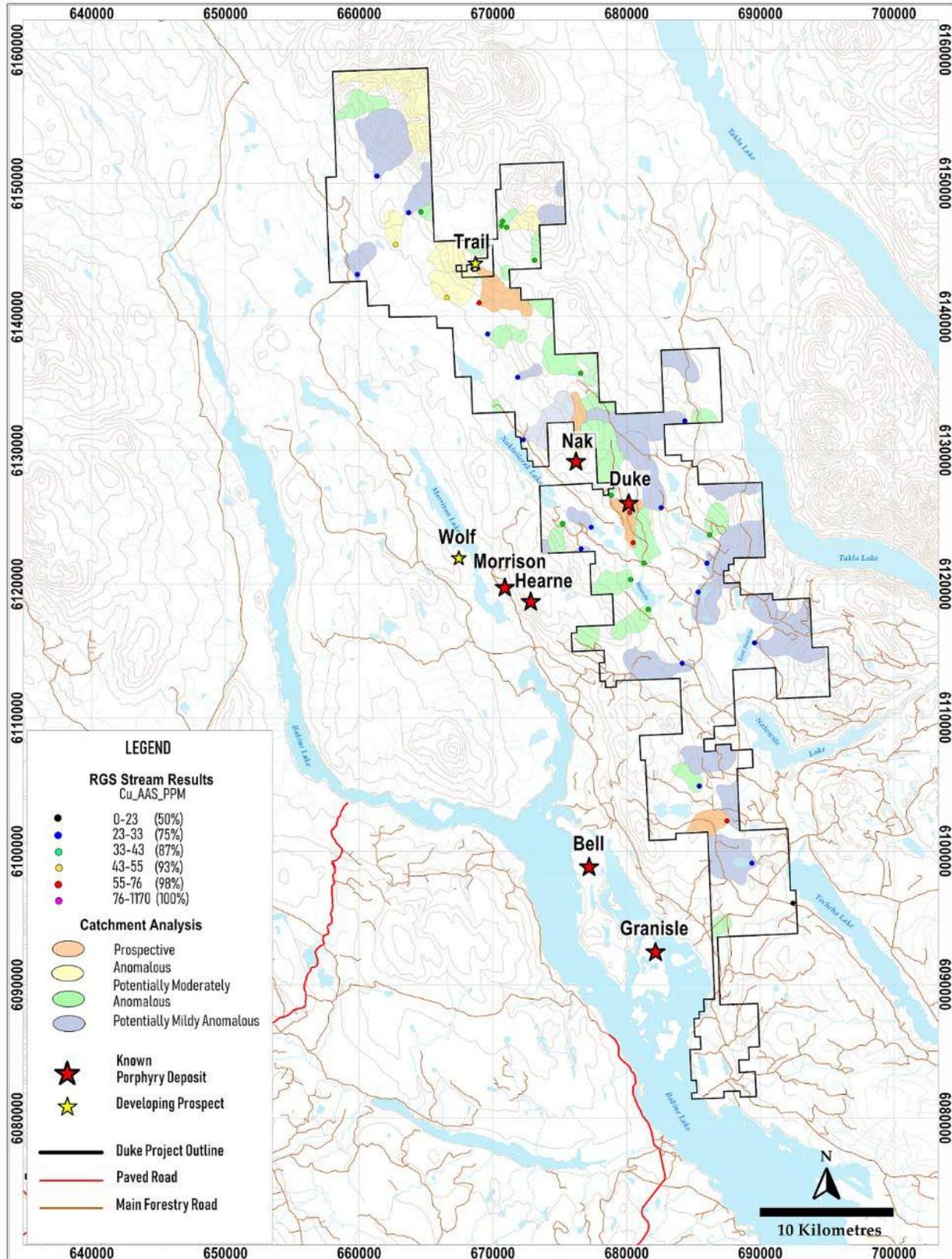


Figure 9-10: Catchment Basin Prospectivity Analysis from Regional Spaced BCGS-RGS Dataset (after Benn, 2019).

### 9.3.6 Till Clast Analysis – BFP and Cu-Mineralization Grain Scoring

Analysis of the till fragments and clast descriptions in the regional compiled dataset was also completed. This data was gathered by the BCGS and historical industry samplers and comprised parameters such as colour, till consistency, and clast mineralogical descriptions.

Amarc identified samples with any combination of important porphyry or mineralized grains, including BFP clasts, pyrite, chalcopyrite, and bornite. Important grains were then collated into a logarithmic scoring matrix with a weighing factor applied to promote samples containing chalcopyrite and bornite (factor 100), then BFP (factor 10) and finally pyrite (factor 1). Such a weighting resulted in a single till sample with bornite, chalcopyrite and BFP clasts scoring the highest. High scoring samples are correspondingly displayed as red and orange circles on the grain-score map (see Figure 9-11).

On Figure 9-11, the yellow circles are the next highest priority samples with, for example, BFP and pyrite grains, or chalcopyrite and pyrite, and are still priority samples given the regional nature of the dataset. Samples with a low score (green) likely contain single or multiple pyrite grains, and are plotted to show samples that sit above background (which has a score of zero). These low scoring areas are important as pyrite survives in the surficial environment longer than chalcopyrite and bornite, and the pyrite may be tracking areas of hydrothermal alteration. Although pyrite may also be lithologically rather than hydrothermally derived, as such care is required when interpreting the data.

The subsequent targeting identified till samples with a high grain count dispersed in a down-ice direction to identify new priority targets. Since the application of grain shape analysis to exploration was a technique refined after the BCGS had completed their work in this area, and no photographs of each processed sample were issued with the report (Ferbey et al, 2006), the further refinement and calibration of erosional down-ice train length was not considered possible without new data or samples.

### 9.3.7 Till Clast Analysis – Till Mineralogy & CIPW Normative Scoring

The BCGS regional till samples were also analyzed for whole rock geochemistry, including major oxides (e.g.  $\text{Al}_2\text{O}_3$ ,  $\text{MgO}$ ) and a large number of trace elements. This enabled a Cross-Iddings-Pirsson-Washington (CIPW) normative mineralogy calculation to be completed (see Bickel, 1979, and references therein).

CIPW normative is a statistical geochemistry technique based on mineral stoichiometry and is most applicable to igneous rocks, however, in this setting it has been applied to identify samples with high Al (potentially advanced argillic alteration) by tracking the CIPW percentage of corundum (bulk  $\text{Al}_2\text{O}_3$ ) in a specific sample. Importantly, the technique does not necessarily identify actual corundum in the till, instead it identifies samples with a high Al phase (for example, this could be corundum, andalusite, kyanite, or clay minerals).

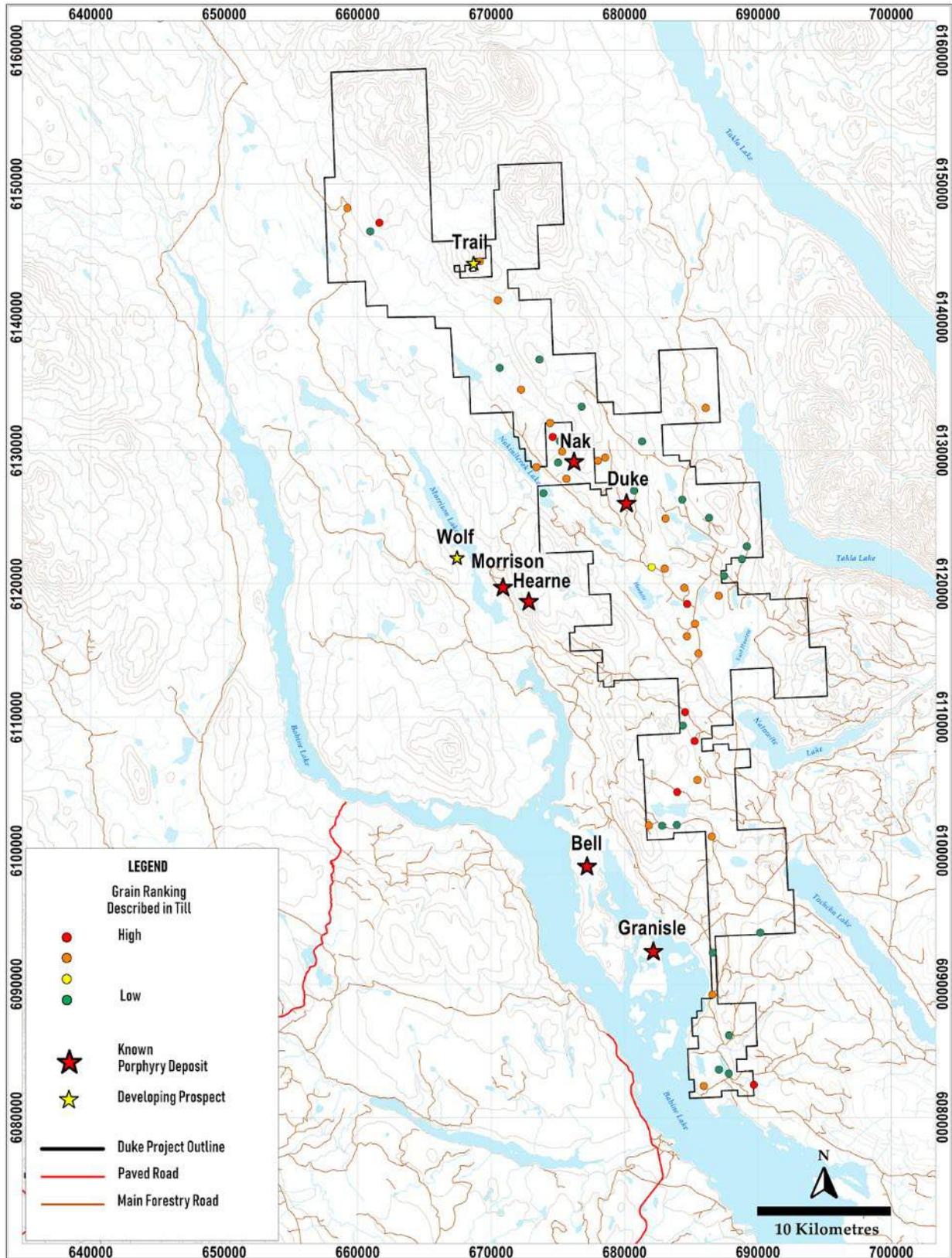


Figure 9-11: Till Clast Analysis - Grain Scoring.

Applying this technique to the samples over the Bell mine showed a significant number of high-Al samples directly over and down-ice of the main deposit. This high corundum area also occurs at both the NAK and Trail porphyry project areas. Given the apparent correlation between porphyry Cu-Au mineralization and high-Al samples, the CIPW technique employed here yields mineral train's down-ice from 'Bell-like' targets and may identify areas of potentially hidden argillic alteration. Verification and documentation of till mineralogy outlining the type of high-Al phase would further validate the technique and its exploration targets going forward.

CIPW normative calculations were also completed and plotted for other 'granitic' minerals including apatite and magnetite. Apatite has been identified as a porphyry Cu indicator mineral (Bouzari et al, 2016), and if recovered can yield information regarding fertility and hydrothermal alteration. However, in this setting the train of apatite simply represents a probable igneous or hydrothermal source up-ice. Magnetite trains were also considered as potential vectors for hydrothermal activity. Magnetite derived from isolated magnetic highs up-ice of the dispersion train was considered to be geologically interesting, however, no direct link between projected magnetite and known mineralization was observed.

### **9.3.8 Regional Time-Domain Electromagnetic Survey**

In 2009, GBC completed regional TEM surveys across the Babine District (Figure 9-14, Geotech, 2008). This dataset was too coarse (4 km-line spacing) for direct deposit scale targeting, however, the production of late tau<sup>1</sup> TEM maps (Figure 9-12) did generate a better understanding on regional geology and conductivity pathways.

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<sup>1</sup> The time decay constant or "tau" of airborne electromagnetic (AEM) systems is commonly used to indicate the presence and relative conductivity or conductance of conductors in the survey area. In fact, it is not a constant because it depends on the system, the survey design and the method of calculation.

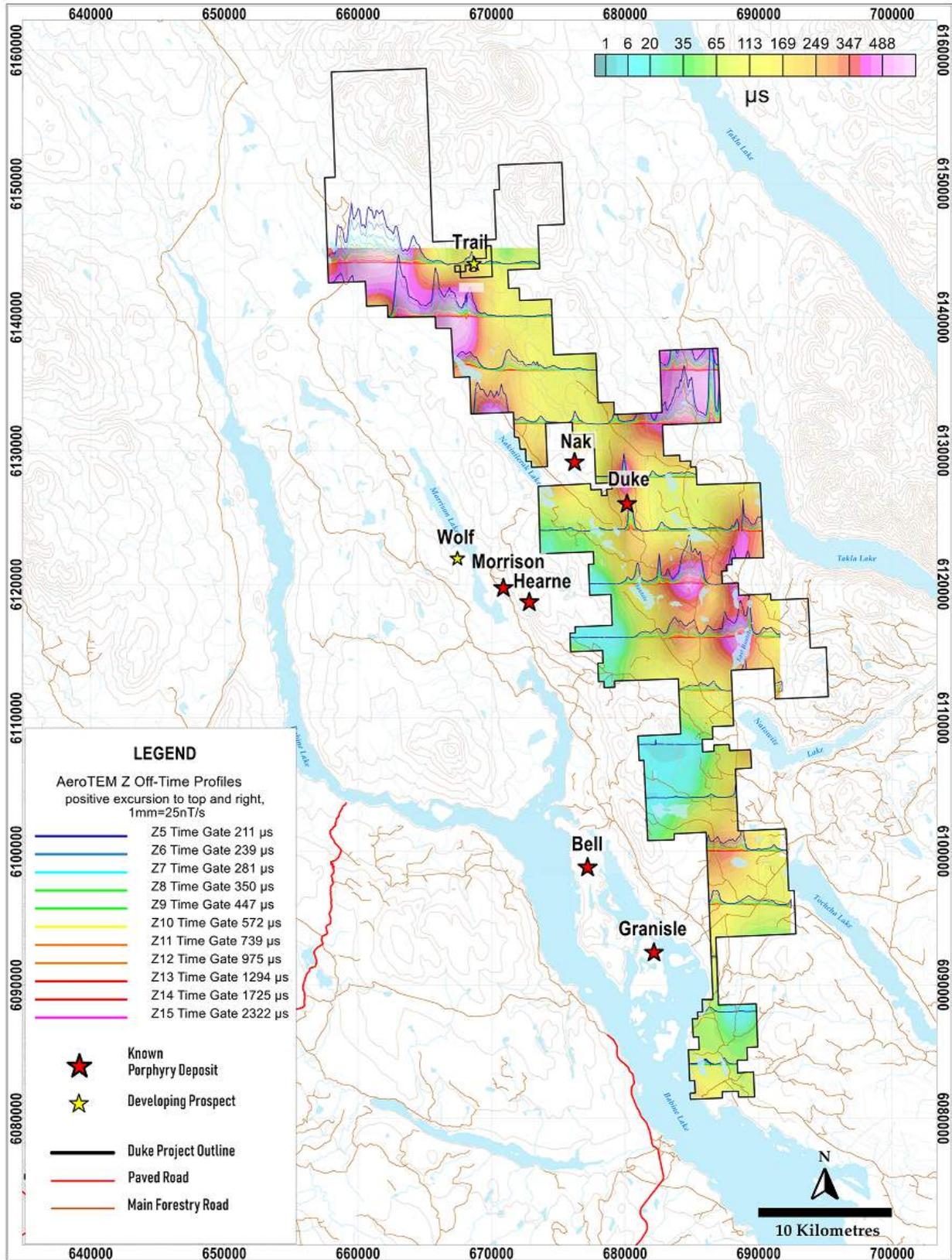


Figure 9-12: Reprocessed Time Domain Electromagnetic Survey Reprocessing and Grids.

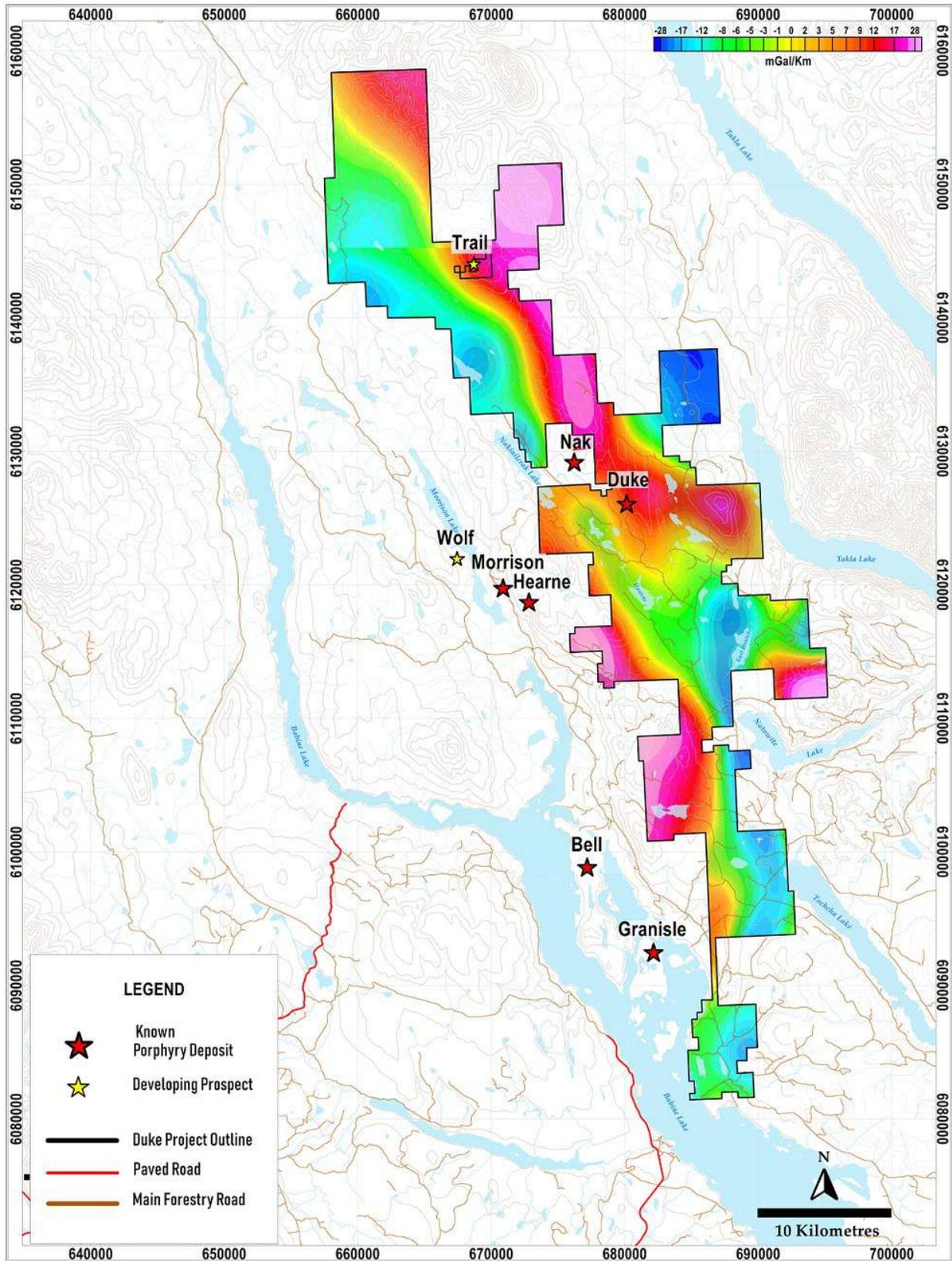
### 9.3.9 Regional Aerogravity Survey

The gravity dataset from one historical assessment report (1973, ARIS #4249) was reassessed and compiled (Scott, 1973). In addition, Amarc reprocessed the large GBC aerogravity dataset for the Babine District (Farr et al., 2008). This reprocessing involved assessing various derivatives of the bouguer gravity anomaly and the free air corrected total bouguer, and compared them to both the surface geology and regional airborne magnetic datasets.

The surface fault network, as geologically mapped by the BCGS and historical workers, was compared to the first vertical derivative (1VD) gravity map and regional fault structures were identified (Figure 9-13). Numerous shallow rotational blocks, horsts, and structural complexities are apparent, but large deep structures are restricted to the northwest trending regional faults and the northeast trending crosscutting secondary faults.

All past producing mines (Bell, Granisle) and known deposits (Morrison, Wolf, Hearne Hill, Trail Peak, NAK) lie on the western flank of the core Babine gravity anomaly (Figure 9-13). This anomaly is bounded to the west by the regional Morrison and Newman Faults, which appear to be the same fault system at depth. Secondary north-northeast trending faults splay off the larger structures and may influence or control mineralization. The first vertical derivative of the gravity data analysis was utilized, initially on overhead maps, and later on a newly reprocessed 3D inversion models (Walcott, 2019). The 1VD gravity gradient is useful as it is very steep and traces the flank target well (deep regional faults). Areas where the 1VD gradient was steepest were traced in a GIS and spatially analyzed to show target areas several km's wide running coincident with the flanks of the large gravity anomalies/faults, these were then correlated with other layers (e.g. geology, till geochemistry). The use of the 3D inversion modelling narrowed the gravity flank anomalies and enabled better targeting of the regional faults compared to standard two-dimensional gridded data.

The western flank anomalies contain all of the known mineralization in the Babine. Regional faulting has been known to control these deposits but until the gravity survey was flown, there was no way to trace these structures under the deep Quaternary cover. Significant areas of the western flank remain underexplored (or have no recorded exploration) include the area between NAK and Trail. Other priority regional flank anomalies include to the south of the Granisle Mine, where coincident geochemical targets lie on the flank of the gravity anomaly. Several major crosscutting faults (trending approximately east-west) can be observed cutting the northwest gravity structure, such as at Granisle and to the north of Morrison. It is unclear how these faults tie-in with mapped surface faulting as they currently run perpendicular to the surface faults, however thick till cover likely prevents good geological control in this region.



**Figure 9-13: First Vertical Derivative (1VD) of Newly Inverted Regional GBC Aerogravity Data Shows Deep Regional Northwest Trending Fault Structures.**

### 9.3.10 Regional Aeromagnetic Surveys

Numerous regional airborne magnetic surveys have been flown over the Babine District since the 1970's by various companies. Amarc located these surveys in historical assessment reports, scanned and georeferenced the relevant maps and correlated them with any overlapping areas of the modern GBC datasets. Specifically Amarc utilized the large regional airborne surveys, released in historical Assessment Reports, by Teck (Farmer, 1996), Copper Ridge (Bourne, 2011) and Astorius Resources (Walcott, 2011).

In 2007-2009 GBC completed a 200 m line spaced regional aeromagnetic survey. This high resolution dataset provided an excellent control of deep and near surface magnetic features (Figure 9-14, and Bates and Uptier, 2017).

When compiled as GIS layers, the surficial geochemistry, gravity flank analysis, grain analysis, CIPW mineralogy scoring and the TEM datasets were correlated against the aeromagnetic total magnetic intensity (TMI), Reduced to Pole (RTP), and 1VD base-maps. This enabled magnetic anomalies that lie up-ice of geochemical and geophysical anomalies to be identified.

Care was taken during processing as the Morrison deposit has a very subtle magnetic signature, whereas NAK has a very intense, isolated, distinctive magnetic high. As such, the presence of either a high or a low magnetic anomaly was not a hard requirement for a coincident geochemical target to qualify for the Amarc targeting matrix. However, the presence of a well-defined magnetic anomaly would elevate the target favorability towards drill testing before one without a magnetic feature as the majority of known Babine porphyry's (Bell mine, Granisle mine, DUKE deposit target, NAK deposit, Hearne Hill deposit, Trail Peak deposit, Wolf prospect) all have some form of magnetic signature.

As anticipated, the deep surficial till coverage hindered the placement of surficial faults on the regional BCGS geological maps. A full 3D structural network analysis based on the high resolution magnetic surveys would be a useful addition to assist in defining individual geological units and structural blocks.

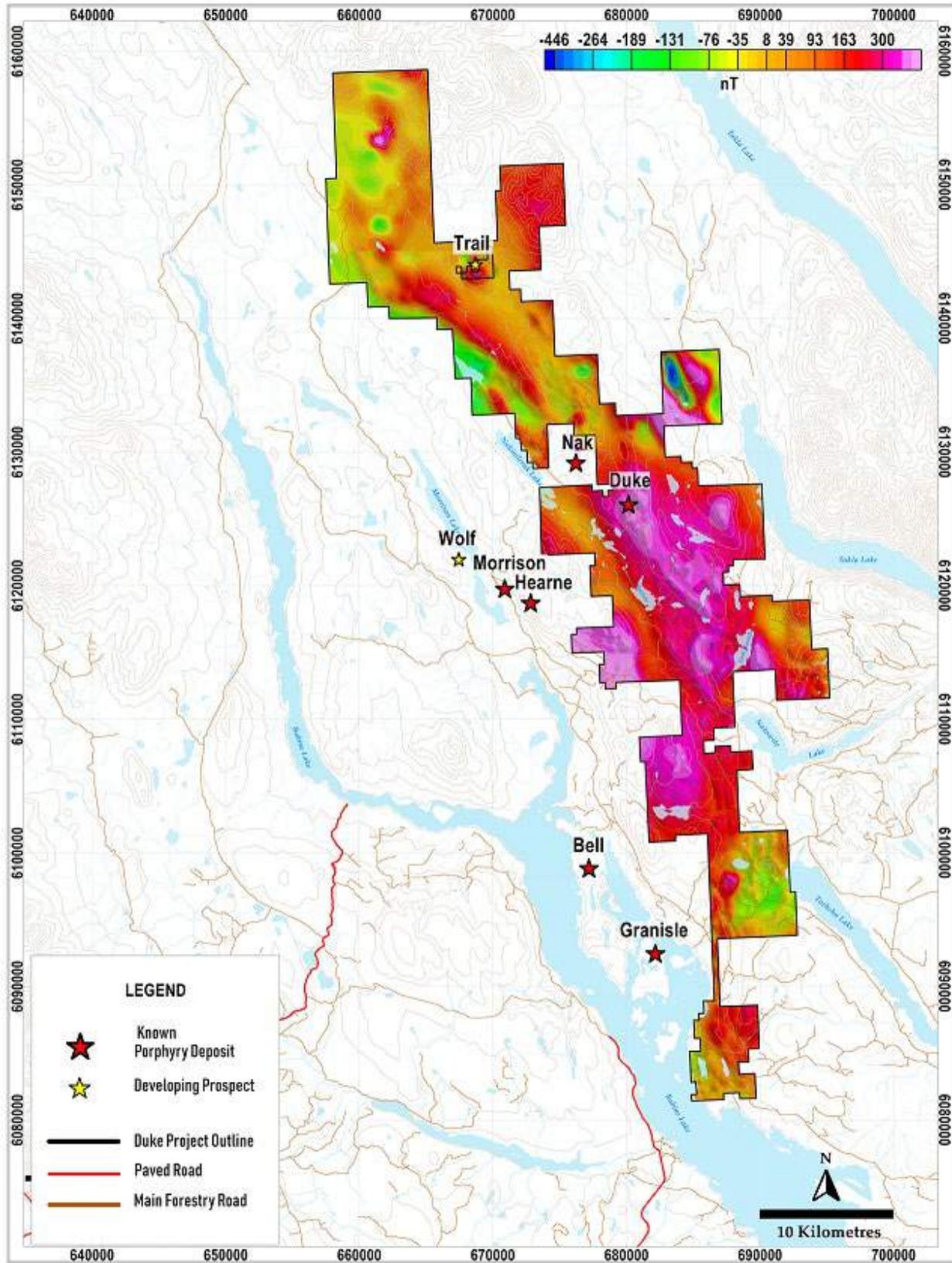


Figure 9-14: Aeromagnetic Survey Compilation Grids.

### 9.3.11 Other Historical Geophysical Surveys

#### 9.3.11.1 IP Surveys

IP surveys were utilized by historical workers throughout the Babine District, with the BFP targets typically showing excellent responses. In total 35 ARIS assessment reports with IP surveys were selected and compiled into a central IP layer within the GIS environment (see Fagan and Rebagliati, 2019, and references therein). Table 9-2 documents the historical IP surveys utilized for targeting on the current DUKE Project.

**Table 9-2: Historical IP Chargeability and Resistivity Surveys Compiled/Analyzed by Amarc.**

ARIS Number	Report Title	Year	Project	Operator	Survey Type
2872	Report on the Induced Polarization and Resistivity Survey on the Haut Project	1970	HAUT	Amoco Canada Petroleum Co. Ltd.	IP - Res.
24559	Assessment Report I.P.; Resistivity and Magnetics Survey on the Hautet Property	1996	HAUTETE	Cominco Ltd.	IP-Ground mag
24783	Geological, Geochemical, Geophysical, and Line cutting Report	1996	TRAIL PEAK	Hera Resources Ltd.	IP-Ground mag
29855	Induced Polarization and Magnetic Surveys on the Babine Property	2007	NAK	Copper Ridge Exploration Inc.	IP-Ground mag
30686	Geophysical and Geochemical Report	2008	TRAIL PEAK	NXA Inc.	IP-Ground mag
33966	Geophysical Survey on the Babine Property	2012	BABINE	Astorius Resources Ltd.	IP
34809	Induced Polarization Surveying Babine Property	2013	BABINE	Astorius Resources Ltd.	IP

#### 9.3.11.2 Electromagnetic and Self-Potential Surveys

An assessment of ground electromagnetic and self-potential historical surveys was also completed (see Table 9-3). In total 20 historical assessment report datasets were selected for compilation, however many of these areas are outside the area of the DUKE Project and are not shown here. These surveys offered regional insights for interpreting magnetic and TEM anomalies that could occur on the DUKE Project tenure, and gave indications of the EM signature of Babine porphyries (see Fagan and Rebagliati, 2019).

**Table 9-3: Ground EM, Airborne EM, and Self-Potential Surveys Assessed.**

ARIS #	Report Title	Year	Project	Operator	Survey Type
2960	A Geophysical Report on the Dorothy Claims	1971	DIANE	Twin Peaks	Mag/EM
23141	Combined Airborne Magnetic, EM, and VLF-EM Report	1993	NAT	Noranda Mining	Magnetic/EM /VLF

### 9.3.11.3 Z-tipper Axis Airborne Electromagnetic Surveys

Copper Ridge completed a 502 line-km ZTEM survey in 2010 over the DUKE Deposit Target area that was in part drill tested by Amarc in 2017 - 2018. This ZTEM dataset was issued as Assessment Report 32356 (Bourne, 2011), and the raw data was re-compiled for this work to assess previously unexplained Z-axis resistivity contrast targets at the DUKE Deposit Target. It was also useful for assessing targets across the wider DUKE Project, and to correlate with GBC's high resolution aeromagnetic, airborne gravity datasets, and Amarc's newly developed up-ice geochemical targets.

## 9.4 Integrated Exploration Targeting

The results of the DUKE Project regional targeting program are summarized in Table 9-4 as an un-prioritized exploration-targeting list. All new primary targets are denoted by geographic zone (e.g. NW1, SW2 etc.). The first two targets listed in Table 9-4 are known porphyry deposit targets that require reassessment using modern IP and continued drilling. Newly generated exploration targets begin at Target C1 (line 3, Table 9-4). There is no preferential order applied to the targets in the table as each is a stand-alone anomaly that deserves further work in its own right.

In Amarc's view, an ideal target would have the following components of the targeting matrix: a high contrast multi-element geochemical anomaly with a high anomaly-to-background ratio, situated on or near a gravity flank (major fault), receptive host-rocks (MCV1/BFP1) with mapped BFP at surface, late tau TEM signature, distinct aeromagnetic feature (high or low), thin till veneer, historical undrilled IP chargeability anomaly, down ice dispersion of BFP-chalcopryrite-bornite grains from a point source, and an associated CIPW apatite and corundum dispersion train. No target had all of these features, but the more advanced prospects tended to have more features.

Figure 9-15 shows a location map of the various existing and new exploration targets on the DUKE Project generated by this work. Each of these new targets was designated for field follow-up using geophysical surveys, geochemical sampling and prospecting, and where justified, RC and diamond drilling.

**Table 9-4: Targeting Matrix (for cross referencing see Figure 9-15 and Figure 18-2).**

Target	Name	Description	Proposed
DUKE	DUKE	Known BFP with ~7,400 m drilling and mineralization confirmed to depths >500 m. Step out to western side of fault required	IP, geochem, drilling
TP	Trail	Known BFP, shallow drill holes (30 m @ 0.37% Cu + 0.18g/t Au), complex IP, mag high, gravity flank, secondary fault structures, BFP grains in till, corundum CIPW, apatite CIPW	Aeromag, Drilling
C1	Hautet	Geology host appears similar to DUKE and Bell, edge of major fault and on secondary faults, historical IP shows chargeable area, two isolated apatite CIPW targets, BFP $\pm$ cpy $\pm$ bn grains in till, gravity flank, flank of magnetic high, tier 1 geochem (coincident Au-Ag-As-Cu-Mo-Pb-Sb-Zn)	IP, geochem, drilling
NW2	New Target	BFP outcrop, no previous assessment work, tier 2 geochem (Cu-Pb-Zn) anomaly, magnetic high, gravity flank, apatite CIPW, corundum CIPW, BFP-py in till	IP, geochem, drilling
NW1	Friday	IP chargeability (~14-16mv/V), subtle mag, Morrison-NAK setting, Tier 3 geochem (coincident Au-Hg $\pm$ Ag), BFP-py in till	IP, geochem, drilling
SW2	North Nizik-Arcwest	Geological setting similar to Bell & Hearne Hill, tier 1 geochem (Ag-As-Cu-Hg-Sb), lies on secondary fault from major NW regional fault, apatite CIPW present.	Geological traverse, IP + geochem
SW1	BFP Area-PB	Geological setting similar to Bell & Hearne Hill, tier 1 geochem (Ag-Au-As-Cu-Hg-Zn), confluence of secondary faults and alongside major NW regional fault, complex magnetic high, apatite CIPW train, py+cpy grains in till down-ice, minor corundum CIPW.	IP, Drilling
C3	Mast	BFP outcrops, geology appears similar to DUKE deposit, secondary faulting off major NW structure, IP with increasing chargeability towards Mast, apatite CIPW coincident anomaly, pyrite-in-till, positive gravity flank, same magnetic body as the DUKE deposit, coincident tier 1 geochem (Ag-Au-As-Cu-Hg-Mo-Pb-Sb-Zn).	IP, Drilling
C2	Western Mag	BFP outcrops, secondary faulting next to major regional NW fault, isolated magnetic high, minor CIPW apatite train, py $\pm$ BFP grains in till, CIPW corundum train, positive gravity flank, geological setting similar to Bell, Wolf, and NW4, tier 3 geochem (Ag-Au-As-Cu-Mo-Zn)	IP, geochem, Drilling
SW3	East Nizik	Geological setting similar to Bell & Hearne Hill, tier 2 geochem (Ag-Au-As-Cu-Mo-Hg-Sb), secondary faulting from major NW regional fault, apatite CIPW, gravity flank, complex magnetic highs (possible stocks?)	IP, geochem, Drilling
C4	Lynn	BFP outcrop, geology similar to DUKE, secondary faulting off major NW structure, IP increasing in chargeability towards Mast, apatite CIPW coincident anomaly, pyrite-in-till, positive gravity flank, same magnetic body as DUKE deposit, tier 4 geochem (Ag-Mo-Pb)	IP, geochem, Drilling
NW3	Newman Fm	apatite CIPW, corundum CIPW, subtle magnetic high under volcanics, tier 3 geochem (coincident Au-Ag-Mo-Pb-Sb), favorable Newman Formation (extrusive BFP)	IP, geochem, Drilling
NW5	North Lynn	Isolated small magnetic high, on trend from Lynn/DUKE/Trail, tier 4 geochem (coincident Zn-Mo-Pb), minor apatite CIPW, minor corundum CIPW, 1VD gravity flank	IP, geochem, Drilling
NW4	North Babine	Babine Diorite stock outcropping, underexplored area, possible small gossans in aerial photos, apatite CIPW down-ice, corundum CIPW in drainages, isolated magnetic high	Geological traverse, IP, geochronology

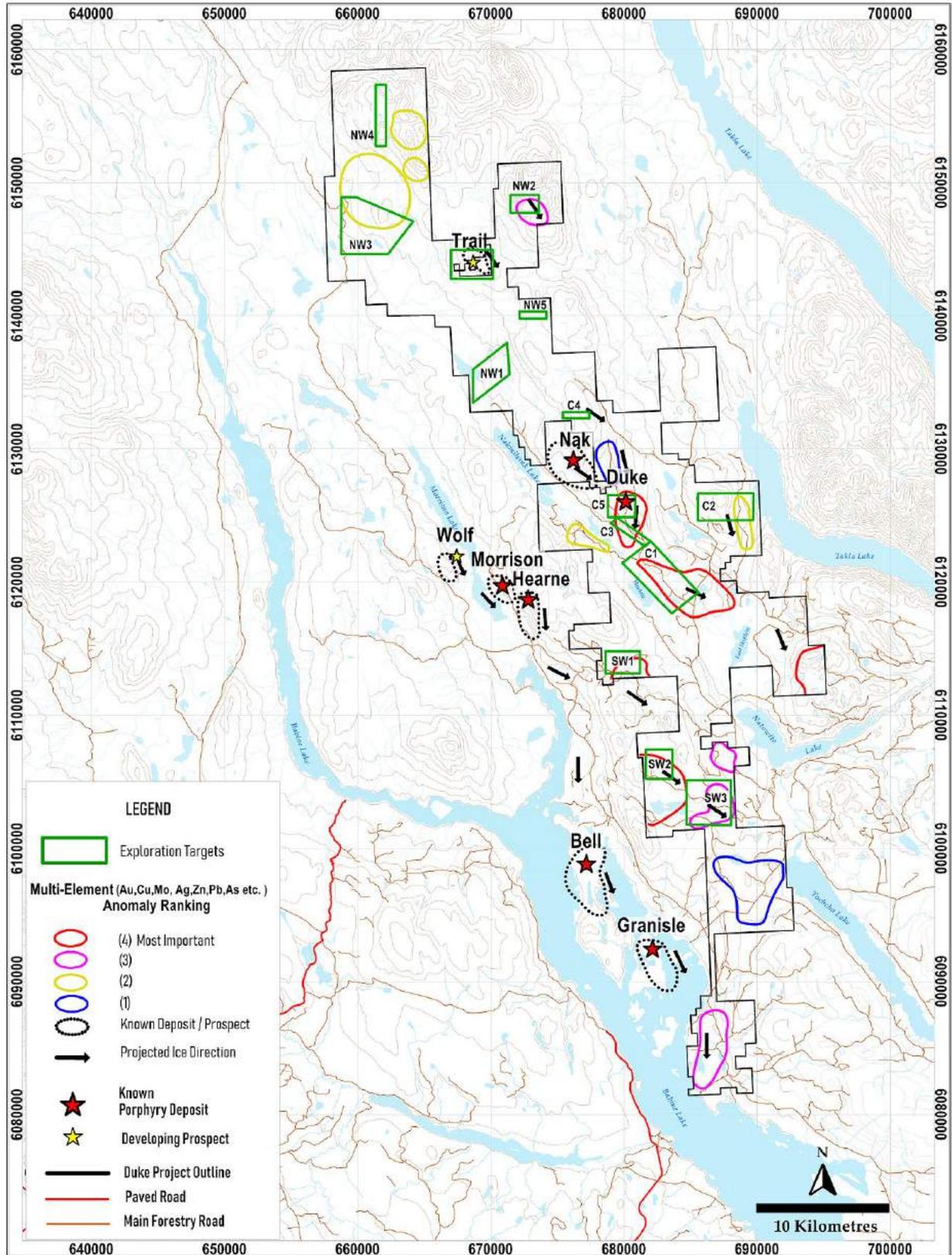


Figure 9-15: Exploration Targets (Green Boxes) Compared to Till Geochemical Anomalies.

## 10 Drilling

Twenty-nine shallow historical diamond drill holes were completed at the DUKE porphyry Cu-Mo deposit target in the early 1970's (see Section 6). Only one other historical drill hole was completed by Copper Ridge between then and 2017, when Amarc commenced drilling (see Section 6). The Amarc drill holes mainly targeted below the shallow historical drilling in order to test for depth and lateral extensions to the area of known mineralization. To date, 7,386.61 m of drilling in 38 diamond holes has been completed on the DUKE deposit target, of which 55% (4,107 m) was completed by Amarc.

The historical holes initially interested Amarc as the majority reported significant porphyry Cu style mineralization, penetrated to only shallow vertical depths and most ended in Cu-Mo mineralization (see Section 6, Table 6-6). Since the holes were drilled in the early 1970's the lower cut-off grade for porphyry Cu deposits has been significantly lowered, thus targets drilled historically and found to be uneconomic may now possibly be economic.

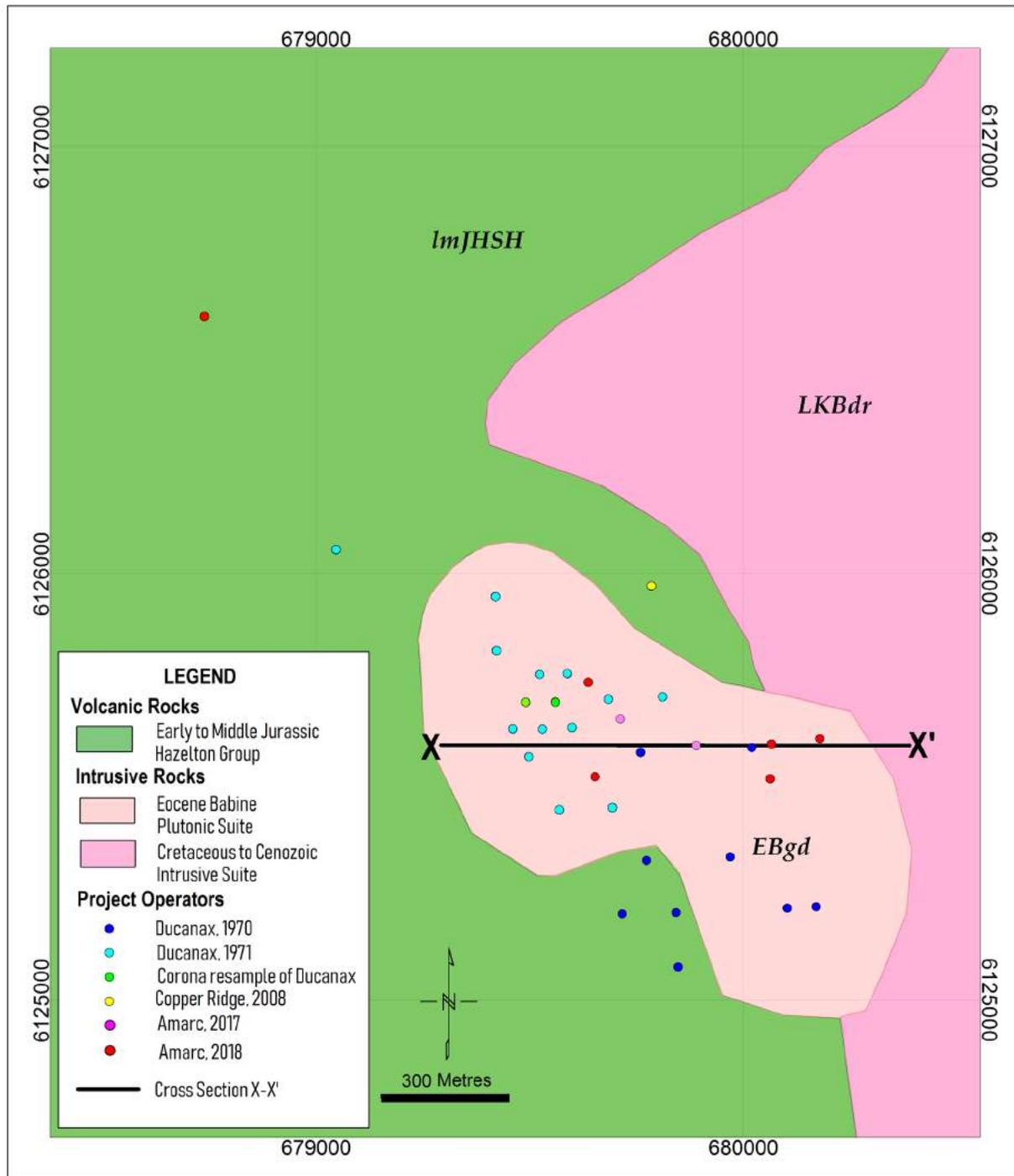
Historical drill logs suggested the core of a porphyry system was present, as shown by the potassic alteration and veining style. In late 2017 Amarc drilled two exploratory holes to verify the target as a porphyry, validate the historical information, assess the grade using modern techniques, and to test the target to depth. Results were positive and this led to the continuation of the drilling into 2018. This latter drilling was designed to expand the known volume of mineralization.

Amarc has drilled eight deep core holes into the BFP of the Dorothy Pluton (Table 10-1). These rocks are part of the Babine Igneous Suite of intrusions that are central to the mineralization across the Babine District. Seven of the Amarc drill holes were step-outs from mineralization intersected in historical drilling to test the extents of Cu-Mo-Ag±Au mineralization laterally and at depth. The Amarc drilling reached well below the extents of the previous drilling. Hole DK18004 was collared 1 km to the north and drilled to follow up on a historical IP survey (see Figure 9-2, where DK18004 is labelled "4"). The Amarc results are encouraging, confirming and expanding the known extents of Cu, Mo and Ag mineralization in the area and documenting the presence of Au for the first time. There is still significant further potential for expansion laterally and to depth.

All core recovered in the Amarc drill programs was photographed, geologically and geotechnically logged, sampled and assayed. Many of the cored holes were advanced through 10 - 20 m of overburden using a tricone bit with no core recovery. These overburden lengths are included in the drilling total. The average core recovery and RQD for the 2017 - 2018 drill program is 95.4% and 42.2%, respectively, from 1,337 drill runs averaging 3 m in length. Figure 10-1 is a drill hole plan map illustrating the locations and projected traces of the Amarc and historical drill holes described in this report. The core sizes, total meterage and average hole lengths of the Amarc drilling program are summarized in Table 10-1.

**Table 10-1: Amarc 2017-2018 Drilling, Meterage and Average Hole Length by Year.**

Year	No. of Holes	Casing (m)	NQ Core (m)	Total (m)	Average Length (m)
2017	2	16.00	1,029.50	1,045.5	523
2018	6	105.07	2,956.53	3,061.6	510
<b>Total</b>	<b>8</b>	<b>121.07</b>	<b>3,986.03</b>	<b>4,107.1</b>	<b>513</b>
<b>Percentage</b>		<b>2.9</b>	<b>97.1</b>	<b>100.0</b>	



**Figure 10-1: DUKE Deposit Drill Hole Location Map with Amarc 2017-2018 and Historical Drill Collar Locations, with Cross-Section X-X' as Shown in Figure 10-2. The Rock Units are Comprised - ImJHSH (Green) Hazelton (Triassic) Volcanic Units, LKBdr (dark pink) is Bulkley Suite (Cretaceous) Diorite Orientated Northwest-Southeast, and EBgd (light pink) is the Dorothy Pluton Comprised of BFP (Eocene).**

### 10.1 Amarc 2017

The 2017 Amarc drilling consisted of two ~500 m long core holes that successfully tested the DUKE porphyry Cu-Mo target to depths below the maximum vertical depth (110 m deep) attained by historical holes 70-10, 70-11, 71-17, 71-18 and 71-26. Amarc completed 1,045.5 m in holes DK17001 and DK17002 in 2017. Of the total meterage, 1,029.5 m was cored bedrock and the remaining 16 m was overburden that was not recovered, logged or sampled. The cored portion was drilled NQ size and comprised 342 drill run intervals averaging 3 m in length, with an average core recovery of 94.6% and an average RQD of 49.2%.

### 10.2 Amarc 2018

In early 2018, Amarc drilled six additional core holes totaling 3,061.6 m for an average depth of 510 m in early 2018. Holes DK18003, DK18005 through DK18008 were drilled west at inclinations of -50° and -55° as step outs to test the mineralization intersected at the historical deposit and Amarc 2017 drilling. Hole DK18003 was a 100 m step out northwest of DK17001 designed to intercept and extend the Au-Cu mineralization in fine porphyritic, xenolith-rich and locally brecciated, monzonite at the bottom of DK17001. Hole DK18004 was drilled 1,000 m northwest of the main body of historical and 2017 drilling to test a historical IP survey. Of the total meterage, 2,956.53 m was cored bedrock and the remaining 105.07 m was overburden that was not recovered, logged or sampled. The cored portion was drilled NQ size and comprised 995 drill run intervals averaging 3 m in length with an average core recovery of 95.7% and an average RQD of 39.8%.

### 10.3 Surveying 2017 – 2018

Amarc personnel surveyed drill hole collar locations using a Garmin GPSMap 62s hand held tool. The drilling contractor obtained downhole survey measurements with a Reflex EZ-Shot magnetic and gravimetric instrument. Measurements were taken immediately below the casing and approximately every 50 m downhole until completion. Table 9-2 lists the drill hole collar coordinates and orientations at the collar of the eight Amarc drill holes.

**Table 10-2: Amarc Drill Hole Coordinates and Orientations 2017 – 2018 at the DUKE Porphyry Deposit Target.**

Drill Hole	Year	Easting-X (m)	Northing-Y (m)	Elevation (m)	Length (m)	Azimuth (°)	Dip (°)
DK17001	2017	679,711.01	6,125,658.87	948.00	518.50	266	-59
DK17002	2017	679,889.00	6,125,597.00	976.58	527.00	270	-45
DK18003	2018	679,636.00	6,125,745.00	950.00	528.50	267	-50
DK18004	2018	678,738.00	6,126,602.00	988.70	502.00	90	-50
DK18005	2018	679,652.00	6,125,524.00	950.00	485.00	267	-55
DK18006	2018	680,065.00	6,125,600.00	977.00	500.00	267	-50
DK18007	2018	680,178.00	6,125,613.00	992.60	559.60	267	-55
DK18008	2018	680,062.00	6,125,519.00	996.60	486.50	267	-50

### 10.4 Drill Core Assay Results 2017 - 2018

A summary of Cu, Mo, Ag, Au and CuEQ results for the 2017 – 2018 Amarc drill program is listed in Table 10-3.

The intervals presented in these tables are downhole lengths. The orientation and dimensions of the porphyry-style mineralized zones intercepted by these drill holes is unknown and are likely to be irregular in shape. As such, the true thickness of the mineralization encountered has not been determined. CuEQ

values are listed in Table 10-3, column 9 by colour, where significant intervals with “hotter” colours have a higher CuEQ value over the intercept. See footnotes to Table 10-3 for description and assumptions in relation to how the calculation of CuEQ% was based on conceptual metallurgical recoveries estimated from other porphyry Cu deposits.

**Table 10-3: Amarc Drill Program Assay Results and Significant Intercepts, Including CuEQ with Conceptual Metallurgical Recoveries Estimated from Other Porphyry Cu Deposits.**

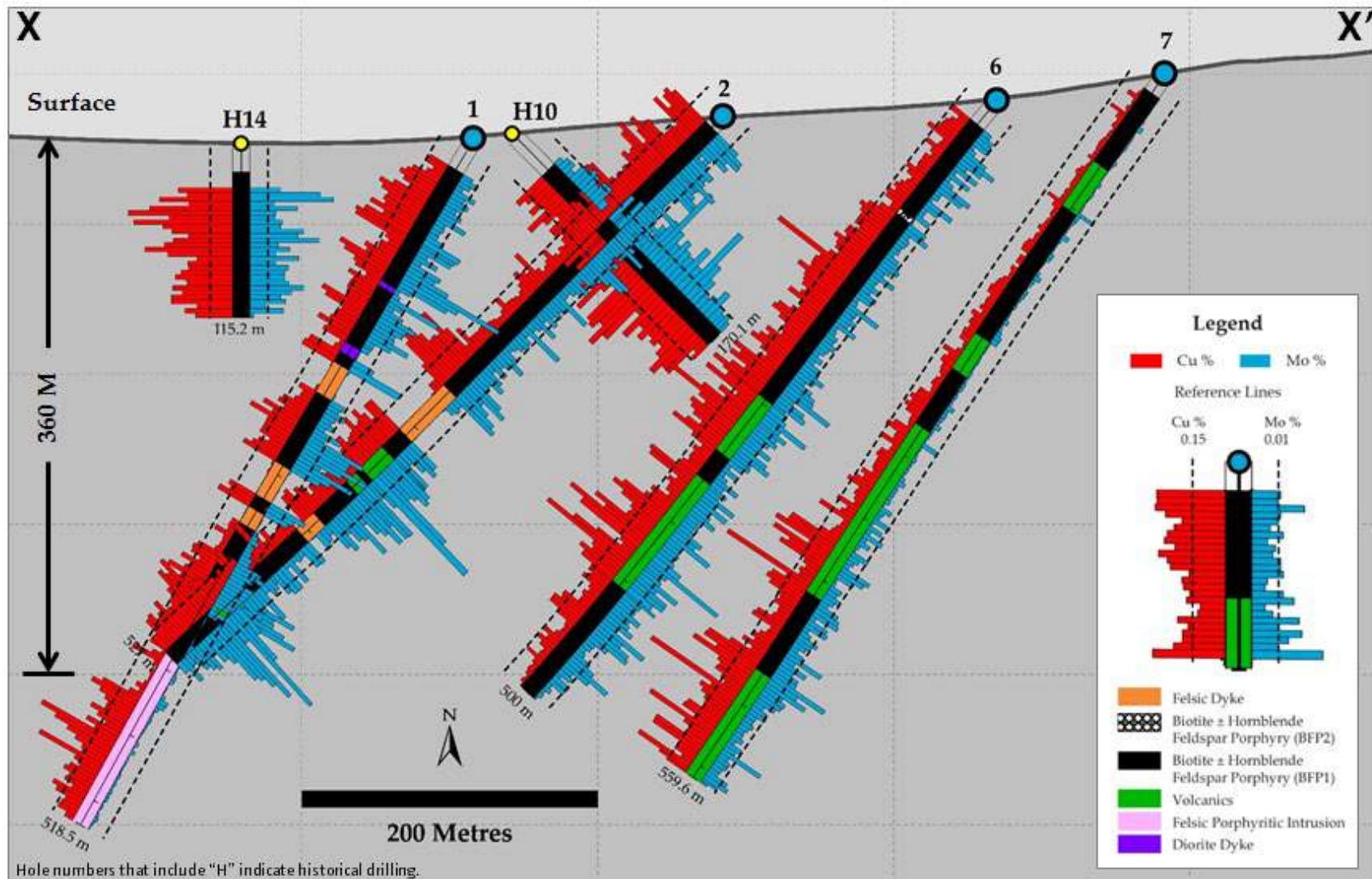
Drill Holes	From (m)	To (m)	Int. (m) <sup>1,2</sup>	Cu (%)	Mo (%)	Ag (g/t)	Au (ppb)	CuEQ <sup>3</sup> (%)
DK17001	25.00	73.00	48.00	0.27	0.012	1.3	66	0.36
and	82.00	165.96	83.96	0.19	0.017	1.0	44	0.28
and	201.00	243.00	42.00	0.20	0.022	1.2	38	0.31
and	268.30	277.90	9.60	0.20	0.018	1.3	29	0.29
and	314.00	347.00	33.00	0.20	0.028	1.1	36	0.33
and	425.00	518.50	93.50	0.23	0.001	2.7	117	0.31
Incl.	458.00	479.00	21.00	0.35	0.001	3.3	42	0.40
Incl.	509.00	518.50	9.50	0.11	0.001	3.0	677	0.49
DK17002	17.00	32.00	15.00	0.44	0.019	2.1	126	0.59
and	40.30	142.00	101.70	0.22	0.014	1.3	64	0.31
and	169.00	181.00	12.00	0.18	0.013	0.9	32	0.25
and	238.00	268.00	30.00	0.33	0.019	1.9	69	0.45
and	308.45	398.95	90.50	0.21	0.025	1.1	43	0.34
and	428.60	435.92	7.32	0.22	0.016	0.9	34	0.30
and	450.55	523.00	72.45	0.23	0.022	1.2	30	0.33
Incl.	486.00	495.00	9.00	0.41	0.040	2.0	62	0.61
DK18003	14.00	20.00	6.00	0.17	0.005	0.5	67	0.22
and	32.00	92.00	60.00	0.20	0.010	1.0	48	0.27
and	395.00	407.40	12.40	0.21	0.004	2.3	341	0.42
DK18004	88.00	181.00	93.00	0.22	0.012	1.0	40	0.29
Incl.	136.00	145.00	9.00	0.35	0.020	1.6	62	0.47
DK18005	13.50	89.90	76.40	0.23	0.012	1.1	42	0.30
and	98.90	246.00	147.10	0.27	0.028	1.1	46	0.40
Incl.	125.00	137.00	12.00	0.32	0.037	1.1	72	0.51
Incl.	212.10	231.85	19.75	0.45	0.033	2.0	62	0.62
and	258.80	272.00	13.20	0.19	0.030	1.0	30	0.32
and	302.00	344.00	42.00	0.28	0.019	1.2	59	0.38
DK18006	98.00	416.00	318.00	0.24	0.012	1.1	52	0.32
Incl.	206.00	296.00	90.00	0.27	0.015	1.2	67	0.37
Incl.	347.00	405.20	58.20	0.34	0.015	1.5	59	0.45
Incl.	338.00	416.00	78.00	0.30	0.016	1.4	55	0.39
and	431.00	446.00	15.00	0.21	0.023	1.2	34	0.31

**Table 10-3: Continued.**

Drill Holes	From (m)	To (m)	Int. (m) <sup>1,2</sup>	Cu (%)	Mo (%)	Ag (g/t)	Au (ppb)	CuEQ <sup>3</sup> (%)
DK18007	373.00	394.00	21.00	0.34	0.010	1.3	49	0.41
and	406.00	424.00	18.00	0.30	0.011	1.2	75	0.39
and	439.00	445.00	6.00	0.22	0.011	0.9	69	0.30
and	454.00	557.80	103.80	0.25	0.012	1.1	75	0.34
DK18008	21.00	86.00	65.00	0.30	0.012	1.1	76	0.39
and	110.00	116.00	6.00	0.17	0.013	0.5	50	0.24
and	125.00	158.00	33.00	0.16	0.012	0.6	38	0.23
and	170.00	176.00	6.00	0.16	0.011	0.6	53	0.23
and	191.00	203.00	12.00	0.16	0.017	0.8	41	0.24
and	419.00	425.00	6.00	0.16	0.006	0.7	43	0.21
and	447.00	464.00	17.00	0.28	0.010	1.4	73	0.36

- 1 Widths reported are drill widths, such that the thicknesses are unknown.
- 2 All assay intervals represent length-weighted averages.
- 3 Copper equivalent (CuEQ) calculations use metal prices of: Cu US\$3.00/lb, Mo US\$12.00/lb, Ag US\$18.00/oz and Au US\$1,400.00/oz and conceptual recoveries of: Cu 90%, Au 72%, 67% Ag and 82% Mo. Conversion of metals to an equivalent copper grade based on these metal prices is relative to the copper price per unit mass factored by predicted recoveries for those metals normalized to the copper recovery. The equivalencies for each metal are added to the copper grade. The general formula for this is:  

$$\text{CuEQ\%} = \text{Cu\%} + (\text{Au g/t} * (\text{Au recovery} / \text{Cu recovery}) * (\text{Au \$ per oz} / 31.1034768) / (\text{Cu \$ per lb} * 22.04623)) + (\text{Ag g/t} * (\text{Ag recovery} / \text{Cu recovery}) * (\text{Ag \$ per oz} / 31.1034768) / (\text{Cu \$ per lb} * 22.04623)) + (\text{Mo \%} * (\text{Mo recovery} / \text{Cu recovery}) * (\text{Mo \$ per lb} / \text{Cu \$ per lb}))$$
- 4 The estimated metallurgical recoveries are conceptual in nature. There is no guarantee that the metallurgical testing required to determine metal recoveries will be done or, if done, the metallurgical recoveries could be at this level.



**Figure 10-2: X-X' Cross Section through DUKE Cu-Mo Deposit Target, as Shown in Plan View in Figure 10-1. As Indicated, Holes with an H Prefix are Historical and Not Amarc Drilling.**

### 10.5 Density Measurements

An overall median density of 2.621 was obtained from 113 bulk density measurements, also described as specific gravity or “SG” in some descriptions. Measurements were taken at a company warehouse in Langley, BC. The results by measurement sequence are illustrated in Figure 10-2. A water immersion method was employed on dry, uncoated sections of whole core. The A&D EJ2000 electronic balance used for measuring density was calibrated daily with Mettler-Toledo certified standard weights. Core samples free of visible moisture were selected for measurement. Samples selected ranged from 8 to 20 cm in length and averaged 10 cm. They were dried, allowed to cool and weighed in air on a digital scale with a capacity of 2.1 kg. The mass in air (Ma) was recorded to the nearest 0.1 g. The sample was then suspended in water below the scale and the mass in water (Mw) measured and recorded.

Measurements were made at minimum 30 m intervals within continuous rock units down hole. As different rock units were encountered, more measurements were taken. Because of this variation, the typical distance between measurements is actually about 10 m. Where the sample selection point occurred in a section of missing core, or poorly consolidated material unsuitable for measurement, the nearest intact piece of core was measured instead. Measurements were made on whole pieces of drill core from the 2017 drill program. Calculation of density was made using the following formula:

$$\text{Density} = \text{Ma} / (\text{Ma} - \text{Mw})$$

No density measurements were taken on the 2018 drill core. Amarc is not aware of any density data for the historical drilling.

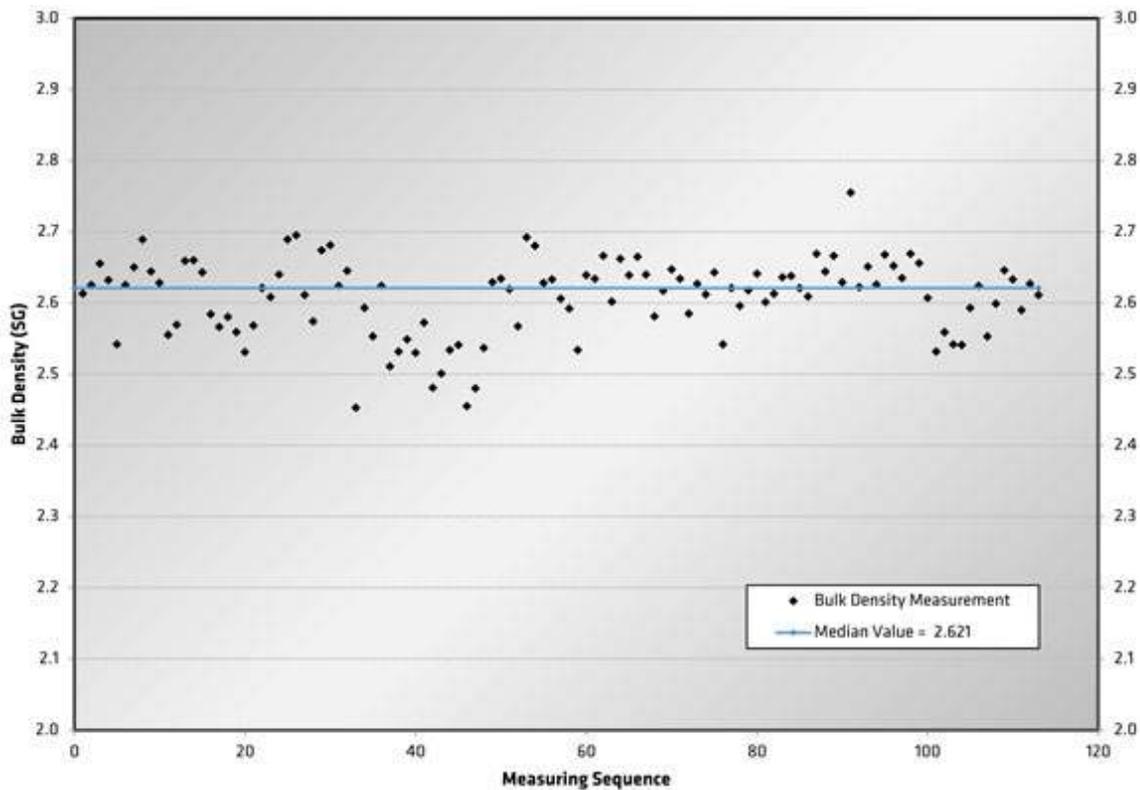


Figure 10-3: Amarc Drill Core Density Measurement Results.

## 10.6 Conclusions

The Amarc 2017 - 2018 drilling and sampling program was carried out in a proficient manner consistent with industry standard practice. Most intervals of poor recovery typically occur at, or just below, the bedrock overburden interface. An overall average core recovery of 95.4% and RQD of 42% was calculated. No significant factors of drilling, sampling, or recovery that impact the accuracy and reliability of the results were observed. No significant higher grade intervals within lower grade intersections of core were encountered. The QPs consider this program is reasonable and adequate for the purposes of sampling and assessing the copper porphyry and associated deposit types targeted. Information on the historical drilling is presented in Sections 6.1 through 6.4. Factors which impact the accuracy and reliability of these results are described there and in Section 17.3.

## 11 Sample Preparation, Analyses and Security

Amarc and previous project operator Copper Ridge systematically sampled and analyzed all potentially mineralized sections of drill core in their programs on the DUKE deposit target. The sample preparation and analytical laboratories used by Amarc and the historical workers are listed in Table 11-1.

**Table 11-1: Sample Preparation and Analytical Laboratories Used.**

Year	Sample Preparation & Analytical Laboratory
1970 & 1971 Ducanex JV	Unknown
1991 Corona resampling of selected Ducanex JV Core	Acme Analytical <sup>1</sup> , Vancouver, BC
2008 Copper Ridge	
2017 - 2018 Amarc	MS Analytical, Langley, BC

1. Bureau Veritas (BV) acquired Acme Analytical in February 2012 and rebranded it as Bureau Veritas in January 2015.

### 11.1 Amarc Drill Program 2017 - 2018

Amarc completed 4,107.1 m of drilling in eight holes averaging 513 m in length in the 2017 - 2018 campaign. Of this total, 3,986.03 m of rock was cored and 127.07 m of overburden was triconed. Drill holes averaged 15 m in depth of overburden and 498 m of core for this drilling. All core was sawn in half and 1,324 regular samples with an average length of 3 m were submitted for preparation and analysis. Overburden was not recovered or sampled. Full chain of custody control was maintained for all analytical samples in the 2017 - 2018 drill campaign, from collection at the drill rig through to delivery at the analytical laboratory.

At the drill rig, drill core was placed in wooden core boxes marked with the drill hole and box number, and wooden depth blocks were inserted at the end of each drill run. Filled core boxes were then sealed with wooden lids, which were held in place by heavy-duty rubber bands and transported by pickup truck to Babine camp.

Downhole assay samples were assigned by Amarc geological staff. Assay samples were typically laid out in 3 m lengths and were adjusted to lithological boundaries, or other major logging intervals defined by the geologist. The beginning of each sample interval was marked (for the core cutters) by a transverse

red line on the core and core box, and a sample tag marked with the sample interval from and to depths was stapled into the core box at the same position. Tags indicating the position of certified pulp standards or duplicate analytical samples were inserted every ten regular core samples. At a minimum, every 10th sample is a QAQC sample.

On completion of all core logging procedures, the core was transferred to the core cutting facility for processing by Amarc core cutters who were trained and supervised by senior Amarc technical staff. Using a diamond bladed rock saw, the various whole core samples were cut lengthwise using red guidelines marked on the core by a geologist. The sampling procedure involved placing the bottom tab of the sample tag from the sample book into a 'pre-marked' plastic sample bag and fixing the 'stub' from the tag book stapled to the core box at the beginning of each sample interval. One half of the cut core was then placed into the appropriate bag, with the cutters instructed to always select the sample from the same side of the whole core, to avoid sample bias. This also ensured that the remaining half-core pieces fit together when placed back in the core box for storage. Once a sample was completed, the sample bag was securely closed with a locking plastic cable tie. At the end of each shift, these sample bags were placed into labelled rice bags (4 - 5 samples per bag), which were also securely closed with cable ties and made ready for transport to the analytical laboratory. The rice bags and sample shipment paperwork were transported in pick-up trucks by Amarc personnel to Houston or Smithers, BC, and subsequently delivered to MS Analytical in Langley, BC, by Bandstra Transport.

Throughout this process drill core and samples were stored at the core facility and complete chain of custody control was maintained. The half core remainder is stored at a core storage facility in Williams Lake, BC.

### **11.2 Sample Preparation**

Amarc samples were submitted to MS Analytical Services, Langley, BC (MS Analytical) for sample preparation and analysis between: November 3 and November 17 in 2017 and April 2 and April 18 in 2018. Drill core samples were prepared under laboratory code PRP-910. Samples were weighed, dried and crushed to >70% passing to 2 mm, then a 250 g riffle split was taken. The sub-sample was pulverized to >85% passing 75 microns prior to aliquot selection for digestion and analysis. Figure 11-1 is a sampling, sample preparation, security and analytical flow chart for the Amarc 2017 - 2018 drill program.

Several months after the completion of sample preparation, assay analysis and Amarc QAQC review, the coarse rejects were discarded and the assay pulps returned to Amarc for long-term storage at a company warehouse in Surrey, BC.

### **11.3 Assay Analysis**

The 2017 - 2018 drill core and surface samples were processed and analyzed at the ISO 17025:2005 accredited MS Analytical Services, Langley, BC. Amarc coordinated analytical method selection with MS Analytical prior to initiation of analytical work on the project. All Amarc drill core samples were digested and analyzed by two separate analytical methods at MS Analytical, a 39 element AR digestion ICP-AES and Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method (IMS-116) and a 30 g FA ICP-AAS finish for Au. Selected samples were analyzed by three additional methods. The analytical methods used were:

1. Ultra Trace Level 39 Element AR digestion ICP-AES/ICP-MS;

- a. Method IMS-116;
  - i. All drill core samples;
2. 30 g FA fusion FA-AAS;
  - a. Method FAS-111;
    - i. All drill core samples;
3. Whole Rock Analysis 13 Parameter + LOI Lithium Borate Fusion ICP-AES;
  - a. Method WRA-310/IMS-310;
    - i. Selected drill core samples;
4. Refractory and Rare Earth 30 Element Lithium Borate Fusion ICP-MS;
  - a. Method IMS-300/IMS-310;
    - i. Selected drill core samples;
5. Total Carbon and Sulphur by Induction;
  - a. Method SPM-512;
    - i. Selected drill core samples.

MS Analytical method IMS-116 was selected as the method for the determination of Cu and Mo and 37 additional elements on all samples. In this method, a 0.5 g sample is digested under heat with a dilute AR mixture and deionized water. Upon completion of the digestion step, the sample is made up to volume. This sample solution is then analyzed by ICP-AES and ICP-MS and the quantified multi-element concentrations are reported. As part of the laboratory quality control, the samples are analyzed with suitable reference materials, blanks, and duplicates. Corrections are made for spectral inter-element interferences. Results are evaluated prior to release of the final certificate. For Cu or Mo results >10,000 ppm, MS Analytical recommends methods ICP-6Cu or ICP-6Mo or ICP-240, four acid digestion ore grade ICP-AES analysis. The maximum results received for Cu and Mo were 9,961.4 ppm and 750.63 ppm respectively, so these over-limit methods were not triggered. The elements analyzed and the reporting units are noted in Table 11-2.

MS Analytical method FAS-111 was selected as the method for the determination of Au on all samples. In this method, a 30 g homogeneous pulverized sample is weighed, mixed with flux (a blend of litharge, soda ash, borax, silica, silver and various other essential reagents), and then fused to produce a lead button. The Au-containing lead button is cupelled to remove the lead and yield a bead, which contains precious metals. The bead is digested with nitric acid and hydrochloric acid. After the digestion is complete, the solution is bulked up to volume with dilute hydrochloric acid. The final solution is analyzed either by AAS, MP-AES (Microwave Plasma - Atomic Emission Spectrometry) or ICP-AES. As part of the laboratory quality control, random insertion of preparation duplicates at a rate of one for every thirty samples occurred during the sample login stage. For every analytical batch of 42 fusions, one analytical blank, one analytical duplicate, and two certified reference materials are randomly distributed. A BC Certified Assayer reviewed all results prior to release. For Au results >10 ppm, MS Analytical recommended method FAS-415 30 g FA by gravimetric finish. The maximum Au result received was 1.041 ppm, so this over-limit method was not triggered. The element analyzed, reporting unit and range for this method are in Table 11-3.

A total of 23 selected samples from drill holes DK17001, DK18003, DK18004, DK18005 and DK18006 were also analyzed by a combination of three analytical methods, WRA-310, IMS-300/IMS-310 and SPM-512 for the determination of major oxides, refractory and rare earth elements (REE) and total carbon and total sulphur.

In MS Analytical method WRA-310, decomposition is by lithium borate fusion on a 5 g sample. Fusion occurs when weighed samples are heated in a high temperature muffle furnace at 1,000°C with lithium borate flux. The fused sample is then cooled and dissolved in mineral acids. The resulting solution is analyzed by ICP-OES and the quantified multi-element concentrations and LOI are reported. Suitable reference materials, blanks, and duplicates are analyzed with the samples and corrections are made for spectral inter-element interferences. Laboratory personnel evaluate the analytical results prior to release of the final assay certificate. The analytes and the reporting units are noted in Table 11-4.

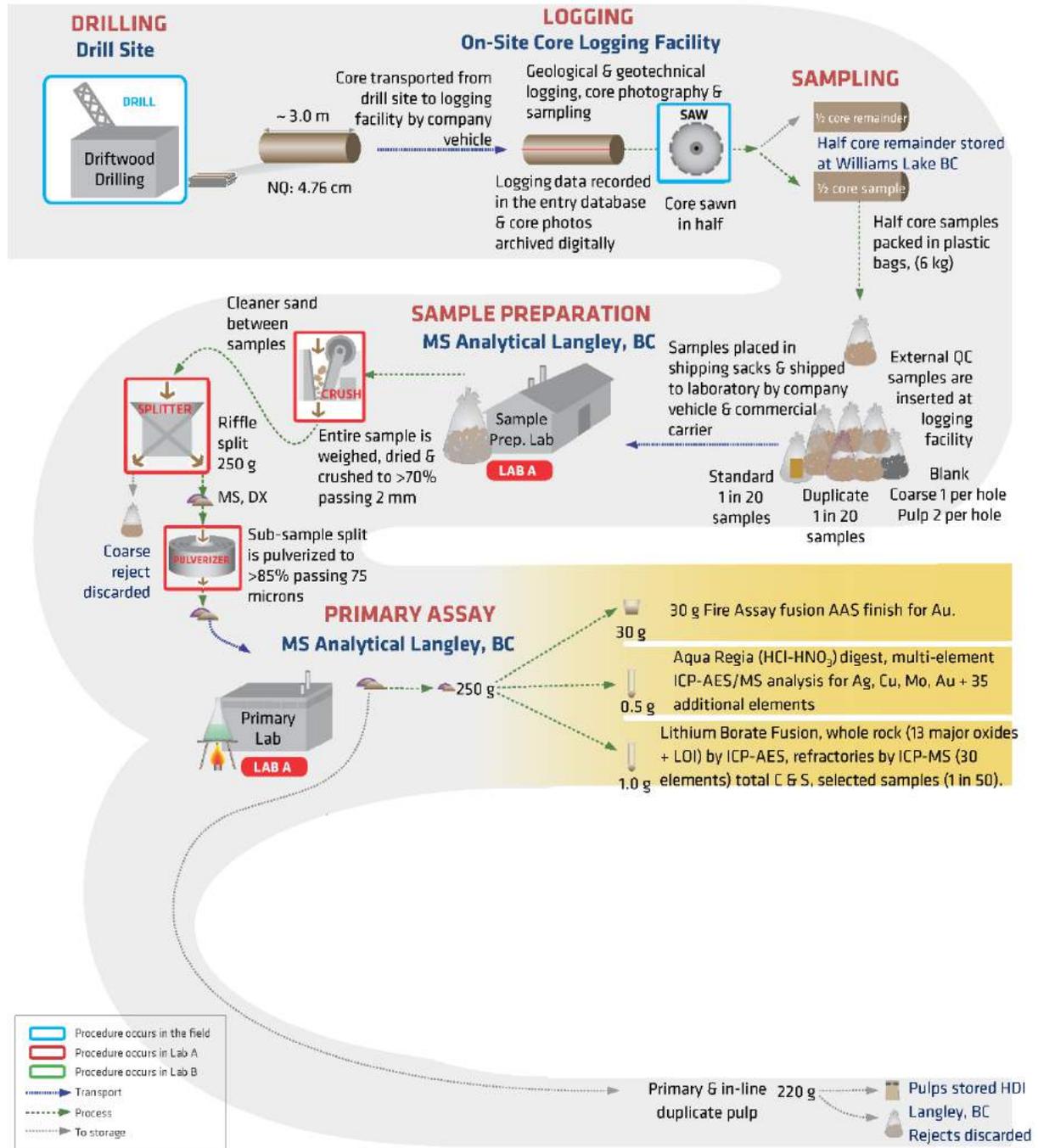


Figure 11-1: Amarc Sampling, Sample Preparation, Security and Analytical Flow Chart.

**Table 11-2: Multi-Element Analytical Method IMS-116 AR Digest ICP-AES/ICP-MS Elements and Limits.**

Element	Unit	Detection Limit	Upper Limit	Note
Ag	ppm	0.05	100	
Al	%	0.01	25	
As	ppm	0.2	10,000	
Au	ppb/ppm	1	25	
B	ppm	10	10,000	
Ba	ppm	10	10,000	*
Bi	ppm	0.05	10,000	
Ca	%	0.01	25	*
Cd	ppm	0.05	1,000	
Co	ppm	0.1	10,000	
Cr	ppm	1	10,000	*
Cu	ppm	0.2	10,000	
Fe	%	0.01	50	
Ga	ppm	0.1	10,000	
Hg	ppm	0.01	10,000	
K	%	0.01	10	*
La	ppm	0.5	10,000	
Mg	%	0.01	25	*
Mn	ppm	5	50,000	
Mo	ppm	0.05	10,000	

Element	Unit	Detection Limit	Upper Limit	Note
Na	%	0.01	10	*
Ni	ppm	0.01	10,000	
P	ppm	10	10,000	*
Pb	ppm	0.2	10,000	
Re	ppm	0.005	50	
S	%	0.01	10	
Sb	ppm	0.05	10,000	
Sc	ppm	0.1	10,000	*
Se	ppm	0.2	1,000	
Sr	ppm	0.5	10,000	*
Te	ppm	0.05	500	
Th	ppm	0.2	10,000	
Ti	%	0.005	10	*
Tl	ppm	0.05	10,000	*
U	ppm	0.05	10,000	
V	ppm	1	10,000	
W	ppm	0.05	10,000	*
Y	ppm	0.5	500	
Zn	ppm	2	10,000	

Note: The customized mixture digestion should be considered a 'leach' and as such, may exhibit partial recovery for some elements, including but not limited to the elements marked with an asterisk (\*) above.

**Table 11-3: Gold Fire Assay Analytical Method (FAS-111) Limits.**

Element	Unit	Detection Limit	Upper Limit
Au	ppm	0.005	10

In MS Analytical method IMS-300/IMS-310, decomposition by lithium borate fusion is employed on a 4 g sample. Fusion of weighed samples takes place in a high temperature muffle furnace at 1,000°C with lithium borate flux. The fused sample is cooled and dissolved in mineral acids. The resulting solution is analyzed by ICP-MS and the quantified multi-element concentrations are reported. Suitable reference materials, blanks, and duplicates are analyzed with the samples and corrections are made for spectral inter-element interferences.

Laboratory personnel evaluate the results prior to release of the final assay certificate. The analysis and the reporting units are noted in Table 11-5.

**Table 11-4: Whole Rock Analysis Method WRA-310 Lithium Borate Fusion ICP-OES Oxides and Limits.**

Analyte	Unit	Detection Limit	Upper Limit	
Al <sub>2</sub> O <sub>3</sub>	%	0.01	100	
BaO	%	0.01	100	
CaO	%	0.01	100	
Cr <sub>2</sub> O <sub>3</sub>	%	0.01	100	
Fe <sub>2</sub> O <sub>3</sub>	%	0.01	100	
Al <sub>2</sub> O <sub>3</sub>	%	0.01	100	
K <sub>2</sub> O	%	0.01	100	
MgO	%	0.01	100	

Analyte	Unit	Detection Limit	Upper Limit	Note
MnO	%	0.01	100	
Na <sub>2</sub> O	%	0.01	100	
P <sub>2</sub> O <sub>5</sub>	%	0.01	100	
SiO <sub>2</sub>	%	0.01	100	
SrO	%	0.01	100	
TiO <sub>2</sub>	%	0.01	100	
LOI	%	0.01	100	*
Total	%	97	103	*

Note: \* Total value is dependent upon other base metals that may be present in the sample. LOI is performed at 1,000°C.

**Table 11-5: Multi-Element Method IMS-300/IMS-310 Lithium Borate Fusion ICP-MS Elements and Limits.**

Element	Unit	Detection Limit	Upper Limit	Note
Ba	ppm	0.5	10,000	
Ce	ppm	0.1	10,000	*
Cr	ppm	10	10,000	
Cs	ppm	0.01	10,000	
Dy	ppm	0.05	1,000	*
Er	ppm	0.03	1,000	*
Eu	ppm	0.03	1,000	*
Ga	ppm	0.2	1,000	
Gd	ppm	0.05	1,000	*
Hf	ppm	0.2	10,000	
Ho	ppm	0.01	1,000	*
La	ppm	0.1	10,000	*
Lu	ppm	0.01	1,000	*
Nb	ppm	0.1	2,500	
Nd	ppm	0.1	10,000	*

Element	Unit	Detection Limit	Upper Limit	Note
Pr	ppm	0.03	1,000	*
Rb	ppm	0.2	10,000	
Sm	ppm	0.03	1,000	*
Sn	ppm	5	10,000	
Sr	ppm	0.1	10,000	
Ta	ppm	0.1	2,500	
Tb	ppm	0.01	1,000	*
Th	ppm	0.05	1,000	
Tm	ppm	0.01	1,000	*
U	ppm	0.05	1,000	
V	ppm	10	10,000	
W	ppm	1	10,000	
Y	ppm	0.5	10,000	*
Yb	ppm	0.03	1,000	*
Zr	ppm	2	10,000	

Note: \* Elements reported from the IMS-310 Method

In MS Analytical method SPM-512, a homogeneous pulverized 10 g sample is weighed into a ceramic container. Iron and Tungsten accelerators are added to the sample and a stream of oxygen is passed over the sample in an induction furnace. As the sample is heated, carbon oxides and sulfur dioxide released from the sample are measured by an infrared (IR) detection system and the total carbon (C) and sulphur (S) content are determined.

Suitable reference materials, blanks, and duplicates are analyzed with the samples and corrections are made for spectral inter-element interferences. Laboratory personnel evaluate the results prior to release

of the final assay certificate. The reporting units and quantitation limits for carbon and sulphur by this method are listed in Table 11-6.

**Table 11-6: Total Sulphur and Total Carbon Method SPM-512 by LECO Limits.**

Element	Unit	Detection Limit	Upper Limit
Total C	%	0.01	50
Total S ( $\leq 20\%$ )	%	0.01	20
Total S ( $> 20\%$ )	%	0.1	50

All 1,324 samples were analyzed by two analytical methods for Au. Au results by 30 g FA fusion method FAS-111 were used, as this is the more accurate and precise method for the determination of Au of the two methods. Au results by the 0.5 g sample-size trace level geochemical method IMS-116 were relegated. For the 23 selected samples analyzed by methods WRA-310, IMS-300/IMS-310 and SPM-512, a total of 75 analytes were determined. For these 23 samples, a total of 11 elements were analyzed by two analytical methods IMS-116 and IMS300 or IMS-116 and SPM-512. The most appropriate combination of digestion and analytical method is selected for use in instances requiring the reporting of a single value for each element. This analytical hierarchy is listed in Table 11-7.

**Table 11-7: Analytical Hierarchy for Elements Analyzed by Two Methods.**

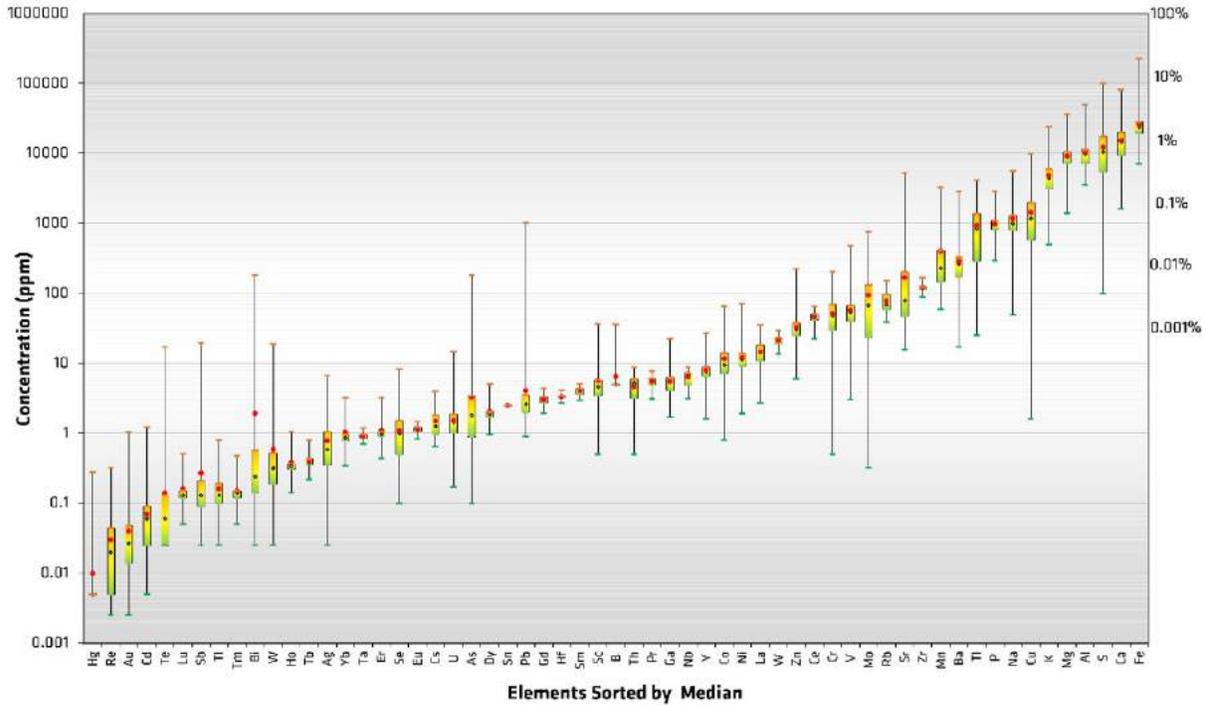
Element	Method	Element	Method	Element	Method
Au	FAS-111 over IMS-116	La	IMS-300/IMS-310 over IMS-116	U	IMS-300/IMS-310 over IMS-116
Ba	IMS-300/IMS-310 over IMS-116	S	SPM-512 over IMP-116	V	IMS-300/IMS-310 over IMS-116
Cr	IMS-300/IMS-310 over IMS-116	Sr	IMS-300/IMS-310 over IMS-116	W	IMS-300/IMS-310 over IMS-116
Ga	IMS-300/IMS-310 over IMS-116	Th	IMS-300/IMS-310 over IMS-116	Y	IMS-300/IMS-310 over IMS-116

If a sample is analyzed more than once, particularly in the case of QAQC reruns, the first valid analytical result received which has passed QAQC from the primary laboratory, is used in the digital compilation. This compilation also respects the priority in the analytical hierarchy. Averaging of assay results for samples analyzed multiple times is not employed. Inter-laboratory duplicate analysis of drill core samples is described in Section 11.0 Verification.

An average 18-day analytical turnaround was achieved for the 2017 - 2018 drilling program, this is measured from the date the laboratory received the samples to the certification date, including weekends and holidays. These figures do not include QC reruns or additional methods requested later.

#### **11.4 Analytical Results**

The Cu, Mo, Ag, Au and CuEQ results for the Amarc drilling are presented in Table 10-3. Figure 11-2 is a box-plot statistical summary of the 2017 - 2018 multi-element analytical results from all drill core samples.



**Figure 11-2: Box Plot Statistical Summary of 2011-2018 Drill Results.**

**11.5 Amarc Drill Program QAQC 2017 - 2018**

2017 – 2018 drill program QAQC samples were designated by the core logging field geologists QP. Appropriate QC samples were inserted at the Amarc core logging facility in the regular sample stream prior to shipment of samples to the preparation and analytical laboratories. This QAQC system is external and in addition to the QAQC procedures used internally by the analytical laboratory. Table 11-8 outlines the types of external QAQC sample types used in this system. A summary of mainstream (MS) and QAQC sampling completed by Amarc and historical workers is shown in Table 11-9.

**Table 11-8: QAQC Sample Types Used in Amarc 2017-2018 Drill Program.**

QC Code	Sample Type	Description	Percent of Total
MS	Regular Mainstream	Regular samples submitted for preparation and analysis at the primary laboratory.	88%
DX DP	Duplicate or Replicate	An additional split taken from the remaining pulp reject (“DP”) and coarse reject (“DX”). Random selection using pre-numbered sample tags.	4.5% 9 in 200
ST SD	Standard or Certified Reference Material or CRM	Mineralized material in pulverized form with a known concentration and distribution of element(s) of interest. Inserted at primary laboratory (“ST”) and check laboratory (“SD”). Randomly inserted using pre-numbered sample tags.	4.5% 9 in 200*
BL	Blank	Sample containing negligible or background amounts of elements of interest to test for contamination. Includes pulp blanks and coarse (1-2 cm size) blanks	1.5% 3 in 200

Note: For the 2017 drill program, the rate of standard insertion was doubled to 9% or 9 in 100 of the total samples.

**Table 11-9: Drill Hole Sampling & Analysis Summary by QC Code for All Years.**

Year	MS	BL	DC	DQ	DX	ST	Total
1970	368	0	0	0	0	0	276
1971	188	0	0	0	0	0	140
1991*	0	0	132	0	0	0	132
2008	105	10	0	6	0	10	131
2017	333	7	0	0	18	32	398
2018	991	20	0	0	51	52	1,114
<b>Total</b>	<b>1985</b>	<b>37</b>	<b>132</b>	<b>6</b>	<b>69</b>	<b>94</b>	<b>2,191</b>

Note: QC codes are listed in Table 11-4, except types “DC” other half of core duplicate and “DQ” quarter core duplicate.

\* Corona resampled four 1970 and 1971 Ducanex drill holes (70-02, 70-10, 71-14 and 71-19). The results of these samples are deemed to supersede the original Ducanex samples, sample intervals and results.

### 11.5.1 Validation and Verification

The following due diligence, verification and validation work was completed by Amarc staff and consultants on the historical and Amarc drill data (also see Benn, 2019):

- Established a drill hole database in SQL with appropriate access, tracking and permissions (2014);

- Reviewed all available historical hard copy and digitally scanned documents (2017, 2018);

- Georeferenced and digitized the historical analytical results (2017, 2018); and

- Printed and reviewed the new digital assay results in report format (2017 - 2018).

The flow of data from the project site and the analytical laboratories for the 2018 program is illustrated in Figure 11-3. For the 2017 - 2018 program, a site-specific digital data entry module was used to compile and validate project data. This program was used by the core logging geologist to compile the project data, and as part of an error trapping and data verification process. It standardized and documented the data entry, restricted data which could be entered and processed, and enabled corrections to be made at an early stage. Users were prompted to select from pick-lists where appropriate. Other entries were restricted to reasonable ranges of input. In other instances, entry of information had to be entered and certain steps completed prior to advancing to the next step. After the logs were entered, they were reviewed and validated by the logger.

Site data were transmitted to the DUKE database compilation group in Vancouver on a regular basis. Validation routines were run to identify several types of errors. The compiled data from the header, survey, assay, geology and geotechnical tables were validated for missing, overlapping or duplicated intervals or sample numbers, and for matching drill hole lengths in each table. Drill hole collars and traces were viewed in data reports, plan view and in cross-section by a geologist as a visual check on the validity of the location information.

As the analytical data were received from the laboratory, they were merged with the sample logs, and printed out, and the Cu, Mo, Au and Ag concentrations of the regular and QAQC samples reviewed. Particular attention was paid to standards that failed QAQC, high blanks and duplicates that did not match, as they were targeted for immediate review. Re-runs were requested from the analytical laboratory as necessary.

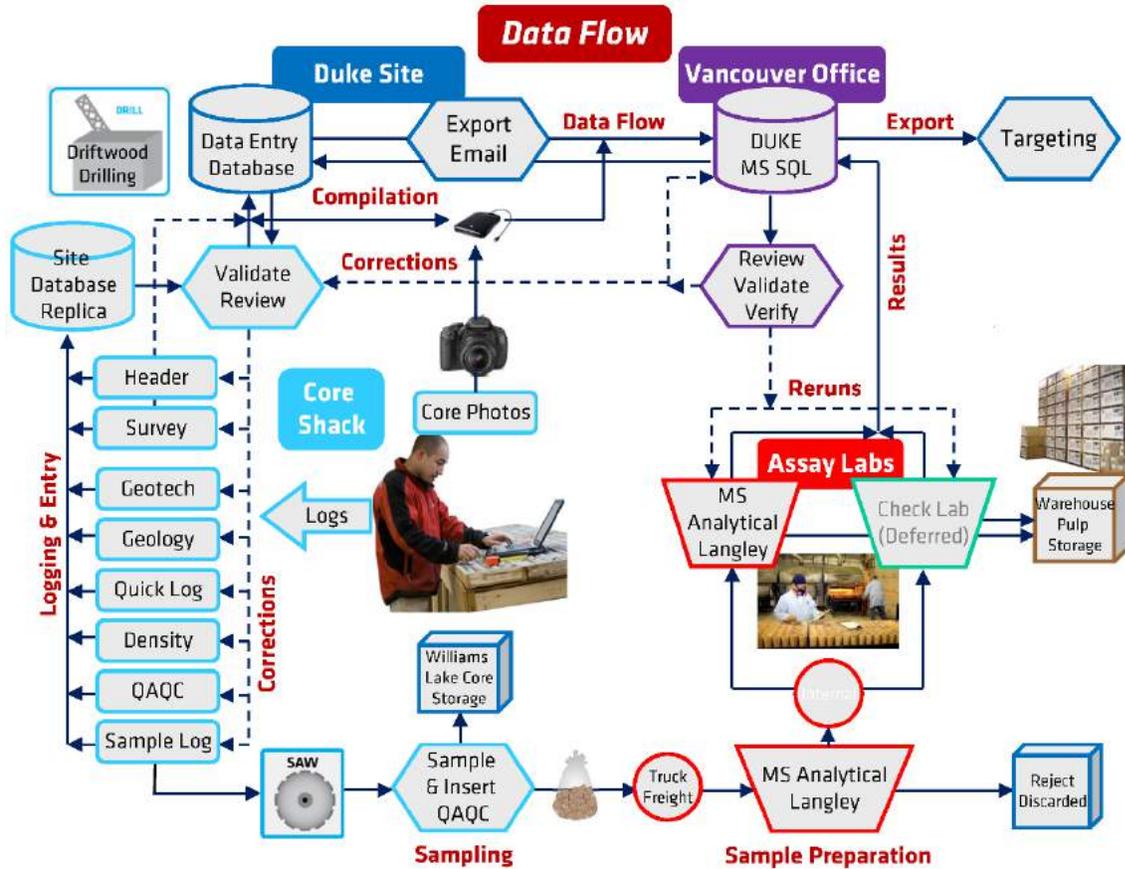


Figure 11-3: DUKE Project Data Flow 2017-2018.

Amarc drill data was processed so they could be assessed with respect to ongoing exploration requirements and for timely disclosure of material information by company management. In this regard, compiled drill data and assay results were made available to management, the technical team and C. Benn, Amarc’s consulting geochemist. This advanced the project, immediately after the initial error trapping and analytical QAQC appraisal process was completed, provided there were no significant concerns. The data were then subjected to more extensive, long-term validation, verification, QAQC and error correction procedures as the project progressed.

### 11.5.2 Standards (Certified Reference Materials)

Table 11-10 lists the standards used in the 2017 - 2018 exploration drilling program. The concentrations given for Cu, Mo and Ag are by AR digestion and the Au results are by FA. The assay results for Cu, Mo, Au and Ag were controlled based on limits determined for the inserted standards from round-robin analysis as follows: Mean ± 3 Standard Deviations (3SD) define the Control Limits (e.g. red lines defining upper and lower control limits on Figure 11-4).

A standard is deemed to have failed when a result falls outside the control limits for the element of interest. The laboratory is notified and the affected range of the samples is subjected to re-run for that element until the included standard passes (falls within the control limits). The data from the affected range is then replaced by the data that has passed QC.

In the typical Amarc protocol, standards are inserted by geologists at the logging facility at a rate of 1 in 20 regular samples by the use of pre-numbered sample tags. In the two drill hole 2017 program, the standard insertion rate was doubled to a rate of 1 in 10 regular samples. Standards were selected based on the anticipated grade range of the surrounding regular samples. Their identities are anonymous to the analytical laboratory.

**Table 11-10: Standards Used All Drill Programs – Certified and Mean Values of Results Received.**

Standard	Times Used	Cu % (AR)	Mo ppm (AR)	Au ppb (FA)	Ag ppm (AR)	As ppm (AR)	Re ppm (AR)	S % (AR)
CDN-CGS-16	7	0.112 <sup>†</sup>	<i>16</i>	<i>140</i>	<i>1.0</i>	<i>45</i>	<i>0.02</i>	<i>1.4</i>
CDN-CGS-23	14	0.182 <sup>†</sup>	<i>166</i>	<i>218</i>	<i>2.0</i>	<i>25</i>	<i>0.04</i>	<i>1.8</i>
OREAS-151b	45	0.180 <sup>†</sup>	54	65	0.516	30.8	0.17	0.723
OREAS-152b	1	0.377	78	134	0.865	38.3	0.18	0.972
OREAS-PLP-1	15	0.297 <sup>†</sup>	154 <sup>†</sup>	0.289	1.74 <sup>†</sup>	106 <sup>†</sup>	<i>0.29</i>	<i>2.4</i>
OREAS-PLP-2	12	0.016 <sup>†</sup>	3.3 <sup>†</sup>	<i>7</i>	0.11 <sup>†</sup>	12 <sup>†</sup>	<i>0.007</i>	<i>0.15</i>
OREAS-PLP-5	2	0.369 <sup>†</sup>	275 <sup>†</sup>	0.369	2.00 <sup>†</sup>	43.0 <sup>†</sup>	<i>0.45</i>	<i>3.4</i>

1. Unshaded concentrations are certified.
2. Italicized concentrations are not certified. Lightly shaded values are provisional and darkly shaded are indicated concentrations or the mean of the results received from analysis at MS Analytical.
3. † symbol are by multi-acid (four-acid) digestion.

#### 11.5.2.1 Cu and Mo

The Cu and Mo performance of standard OREAS 151b (regularly inserted by Amarc personnel and analyzed by MS Analytical method IMS-116) is illustrated in Figure 11-4 and Figure 11-5. The chart shows the analytical results after completion of QC re-runs. The QC performance is generally quite good and lends confidence to the veracity of the Cu and Mo analytical results of the regular mainstream samples.

Standards CDN-CGS-16 and CDN-CGS-23 are older CRMs certified for Cu only, the main element of interest. CDN-CGS-16 is not certified for Au and the Au certification for CDN-CGS-23 is provisional only. Neither are certified for Mo. It is recommended that the use of these two standards be discontinued in future programs and that they be replaced by standards fully certified for Cu, Mo, Au and Ag by the analytical methods used.

Standard CGS-16 sample 747030 in hole DK17001 failed high for Cu at 121 ppm (104.5-119.5 acceptable range). Nearby standards all pass QC. Based on this and the marginal nature of the failure the fact that this sample was not rerun does not have a significant impact on the QAQC program.

#### 11.5.2.2 Au

Samples were analyzed for Au by two methods in the 2017-2018 drill programs, 30 g FA fusion (FAS-111) with an AAS or ICP-AES finish and as part of the 0.5 g sample, ultra-trace 39 element AR digestion ICP-AES/ICP-MS method (IMS-116). The analytical performance by method FAS-111 for Au on standards inserted by Amarc is generally good, as is the accuracy and precision. The results by this method are acceptable for use in exploration targeting, but not ideal for resource estimation and advanced studies. The performance of standard OREAS-151b for Au is illustrated in Figure 11-7.

Au by the AR digestion method IMS-116 uses a 0.5 g aliquot size, which is too small to achieve reliable Au results. Analytical results confirmed the inadequate to poor performance of this method for the quantitative determination of Au with respect to the certified Au-bearing standards inserted by Amarc. Intra-laboratory duplicate results for Au by this method exhibit similarly inadequate to poor Au reproducibility. The 2017 - 2018 Au results by IMS-116 are deemed semi-quantitative at best and should not be used.

**11.5.2.3 Ag**

Accurate Ag analysis in the range of typical porphyry Cu project grades, such as those encountered at the DUKE porphyry Cu-Mo deposit target, can be challenging. The Ag results by MS Analytical method IMS-116 of blind standards submitted by Amarc is generally good and this method is appropriate for the ongoing determination of Ag in exploration targeting. The analytical performance of OREAS-151b for Ag is illustrated in Figure 11-8.

**11.5.2.4 Other Elements**

Analytical accuracy, precision and reproducibility of elements other than Cu, Mo, Ag and Au were not investigated in detail.

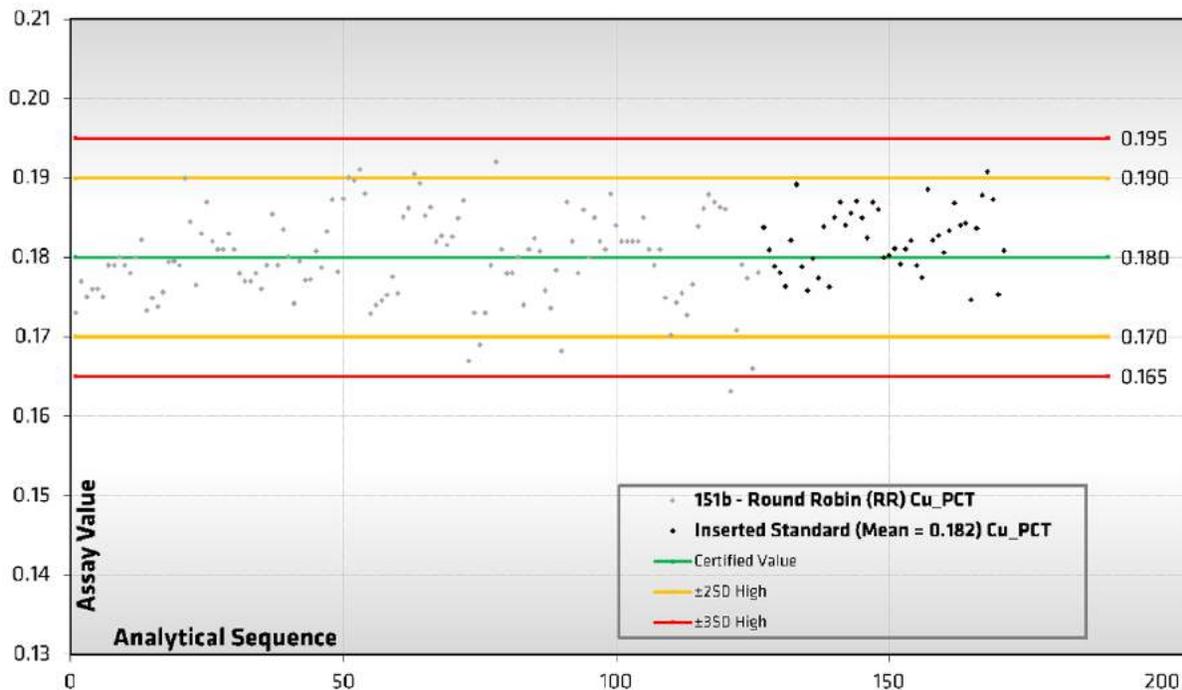


Figure 11-4: Cu Results - Standard OREAS 151b.

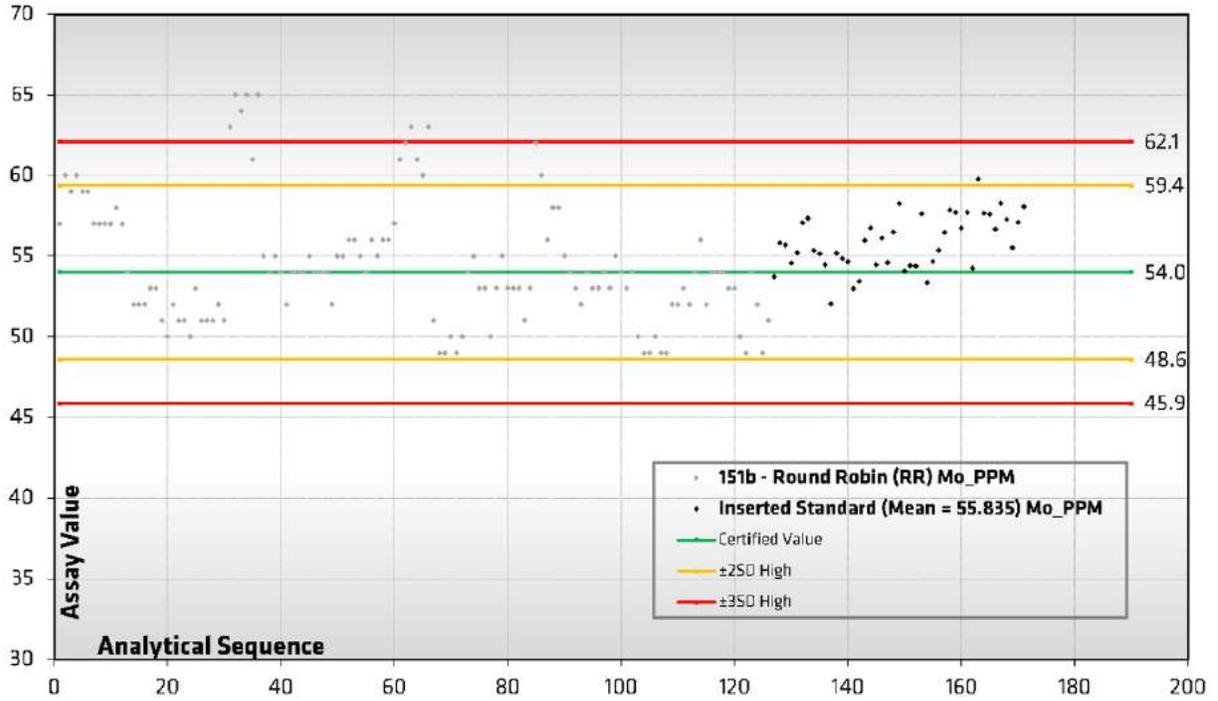


Figure 11-5: Mo Results - Standard OREAS 151b.

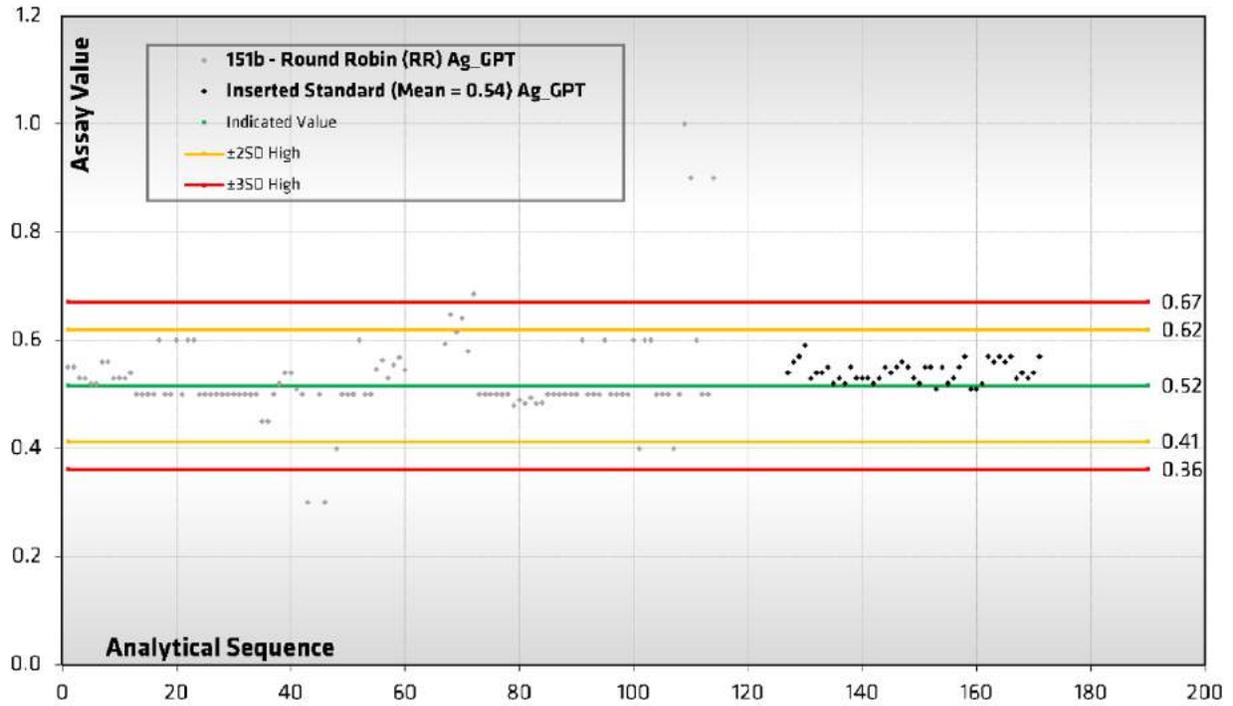
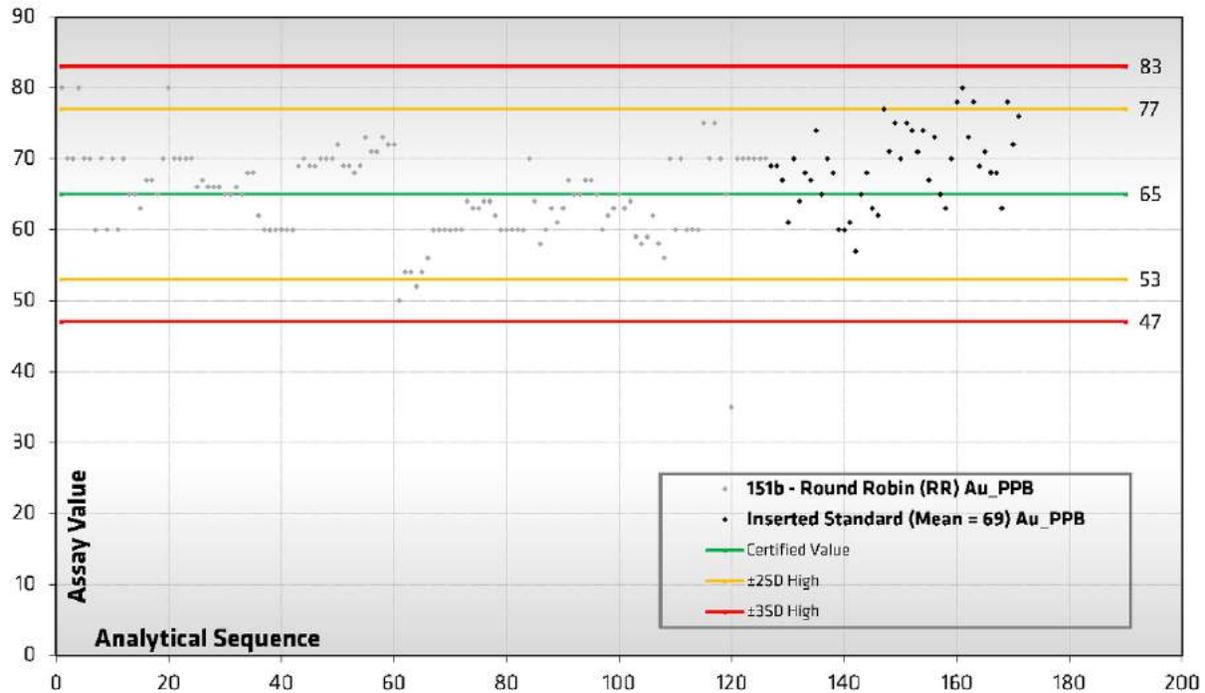


Figure 11-6: Ag Results - Standard OREAS 151b.



**Figure 11-7: Au Results - Standard OREAS 151b.**

**11.5.3 Blanks**

Blanks were used to test for contamination during sampling, sample preparation and analysis. Based on the results received from the blank samples inserted during this program, there is no evidence that any significant contamination or cross-contamination has taken place in these materials. None of the pulp blanks or coarse granitic material inserted in this program returned appreciable quantities of Cu, Mo, Ag or Au.

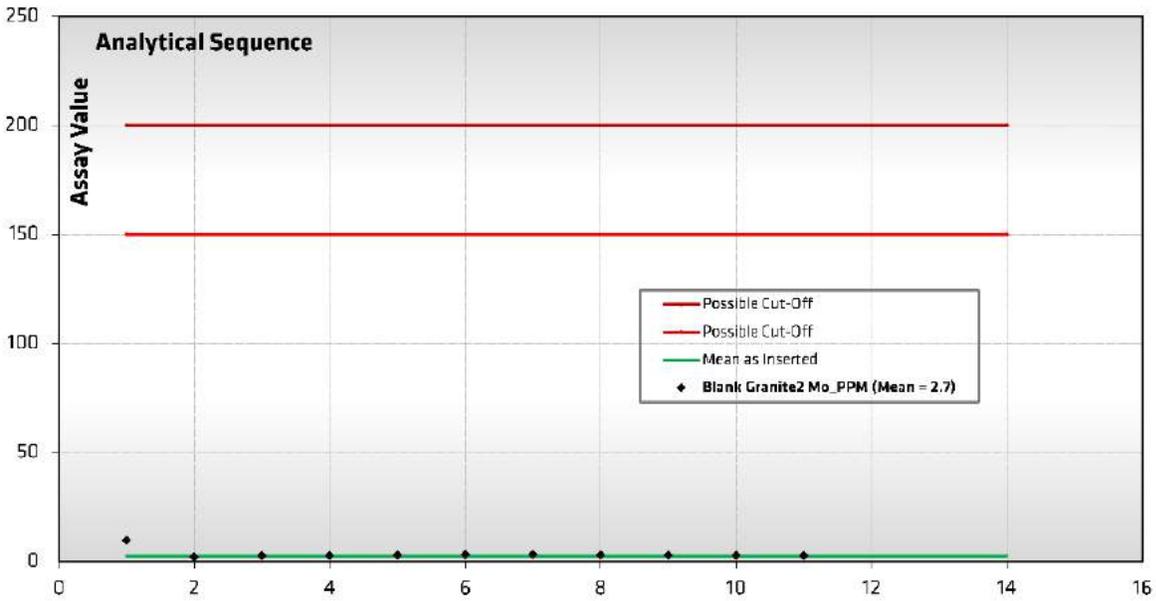
Pulverized (pulp) and coarse field blanks were inserted at the core logging facility at a rate of three per hole. Pulp blank CDN-BL-10 is certified for low levels of Au, Pt and Pd, but is not certified for Cu, Mo or Ag. Pulp blank PLP-2 is a reference material that is certified for low levels of Cu, Mo and Ag. The coarse gravel-size (1 to 2 cm) field blank “Granite2” is of pink granitic material from bulk commercial aggregate. It is visually barren of sulphide minerals, relatively homogeneous and has been assayed numerous times at several analytical laboratories. The inserted blanks are consistently low in the key elements, particularly: Cu, Mo, Ag, Au, As, Re and S. They are suitable for use in the analytical process to test for possible contamination or cross-contamination.

Table 11-11 lists the mean obtained values for the nominal blanks used. The analytical performance for Cu, Mo, Ag, and Au of the coarse blank sample Granite2 is presented in Figure 11-8 through Figure 11-10.

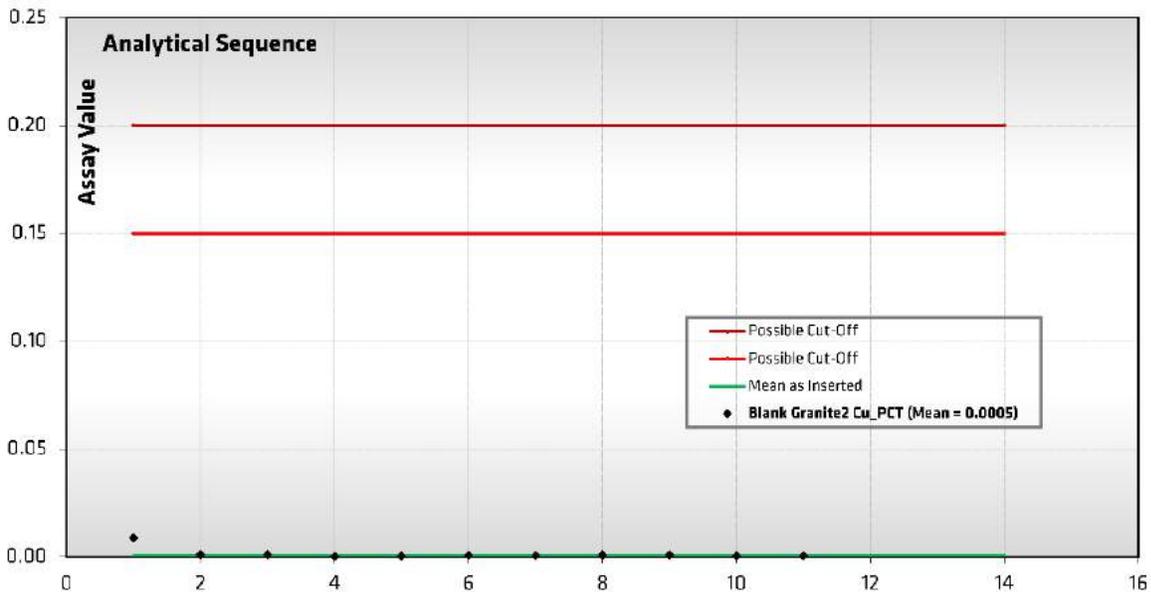
**Table 11-11: Mean Values from MS Analytical of Nominal Blanks Inserted.**

Blank	Times Used	Cu ppm (AR)	Mo ppm (AR)	Ag ppm (AR)	As ppm (AR)	Re ppm (AR)	S % (AR)
CDN-BL-10	4	<i>24</i>	<i>2.6</i>	<i>0.21</i>	<i>4.4</i>	<i>&lt;0.005</i>	<i>0.04</i>
Granite2	11	<i>14</i>	<i>3.5</i>	<i>0.60</i>	<i>0.64</i>	<i>&lt;0.005</i>	<i>0.02</i>

1. The nominal blanks are not certified for any of the elements listed above.
2. Italicized values (shaded) are the mean values of data as received from the analytical laboratory with outliers removed.
3. Lower detection limits (LDL) in ppm are Cu (<0.2), Mo (<0.05), Ag (<0.05), As (<0.2), Re (<0.005) and S (<0.01 %) by the analytical method used.



**Figure 11-8: Cu (above) and Mo (below) (ppt) Results - Coarse Blank - Granite2.**



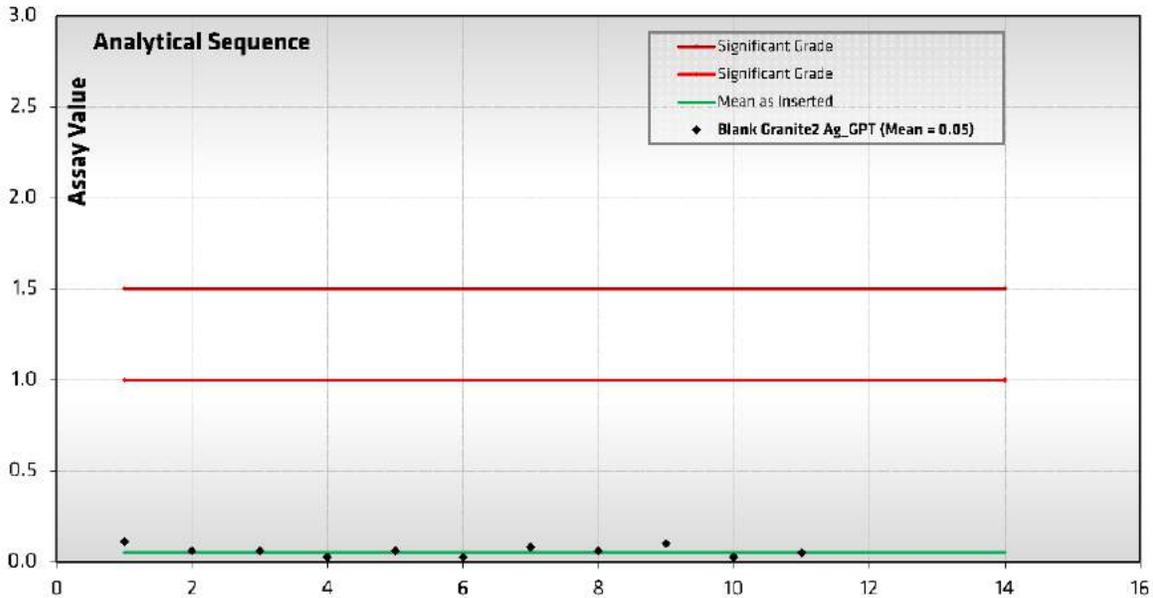


Figure 11-9: Ag Results - Coarse Blank - Granite2.

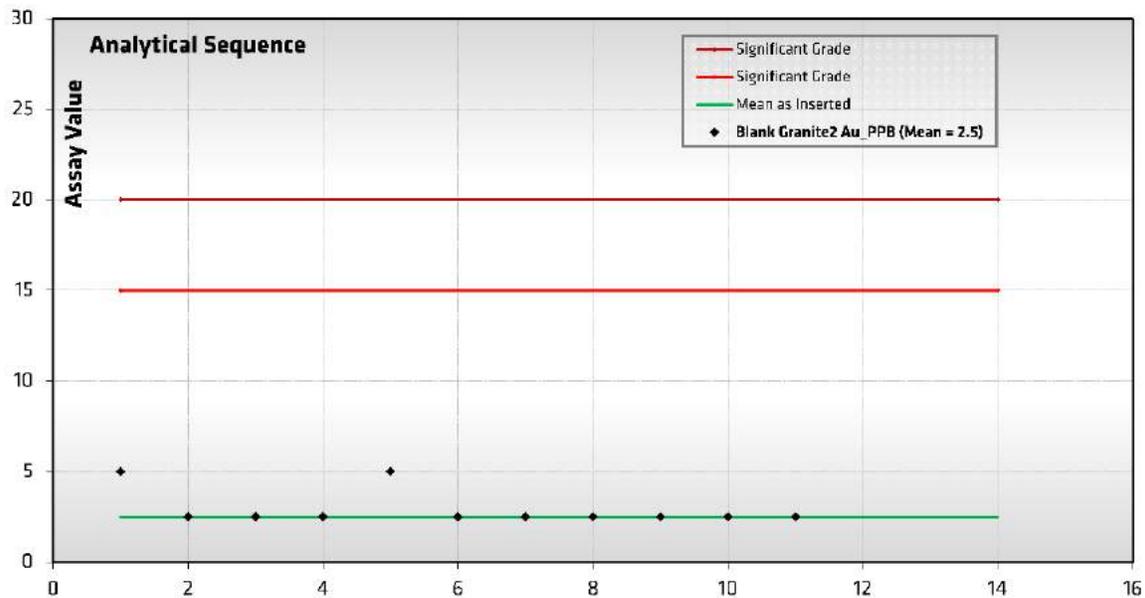


Figure 11-10: Au Results - Coarse Blank - Granite2.

### 11.5.4 Duplicates

Amarc analyzed random in-line, intra-laboratory coarse reject duplicate samples in the 2017 - 2018 drill program at the DUKE Porphyry Cu-Mo deposit target to monitor precision. This procedure is in addition to the laboratory internal QA/QC performed by MS Analytical. All samples were also analyzed for Au by two different analytical methods. Eleven additional trace elements were analyzed by two different analytical methods on some selected samples.

The two types of duplicates analyzed by Amarc in the 2017 - 2018 program are:

1. Random in-line, intra-laboratory reject "DX" duplicates - samples marked and tagged in the field at a rate of 1 in 20 regular samples by the use of pre-marked sample tags; and
2. Method Duplicates - all samples submitted in 2017 - 2018 were analyzed by two separate analytical methods for Au; 30 g FA-AAS finish and 0.5 g AR digest ICP-AES/MS.

Figure 11-11 is a flow chart illustrating the sample processing sequence for MS and duplicate samples. Random duplicate samples designated by Amarc staff were prepared and assayed by MS Analytical, Langley at the same time and in the same sequence as the regular samples. These in-line, intra-laboratory series of duplicates are labeled type "DX" in the QC coding scheme. They were prepared from a second 250 g split riffled from the coarse reject, pulverized and analysed within the regular sample stream and reported on the same assay certificate at the primary laboratory. Inter-laboratory duplicate analyses were not performed. The original assay pulps have been retained for this purpose if necessary.

The Au analytical method duplicates were plotted in normal and log format in scatterplots in Figure 11-12. Figure 11-13 is a mean percent difference plot comparing the two methods. The results by the two methods are reasonably well-clustered about the  $y=x$  line and include artefacts reflecting the proximity of the LDL. The Au Fire Assay results are consistently higher as would be expected as it is the recommended method.

The intra-laboratory, in-line reject duplicates are plotted as a series of scatterplots for Cu, Mo and Ag in Figure 11-14 and for Au in Figure 11-15. Mean percent difference charts of these data are presented in Figure 11-16 for Cu and Figure 11-17 for Mo and for Ag and Au in Figures 11-18 and 11-19, respectively. For Cu, Mo and Ag, the results are favorable, and the correlation between the two data sets is reasonable for reject duplicate pairs. The Au duplicates are more scattered and several matched pairs differ by a significant amount, particularly in the lower grade range. This is typical for Au mineralization due to the affect a single Au particle (nugget) can have on the analysis. Overall, the results are reasonable and appear to be somewhat better correlated above 70 ppb Au.

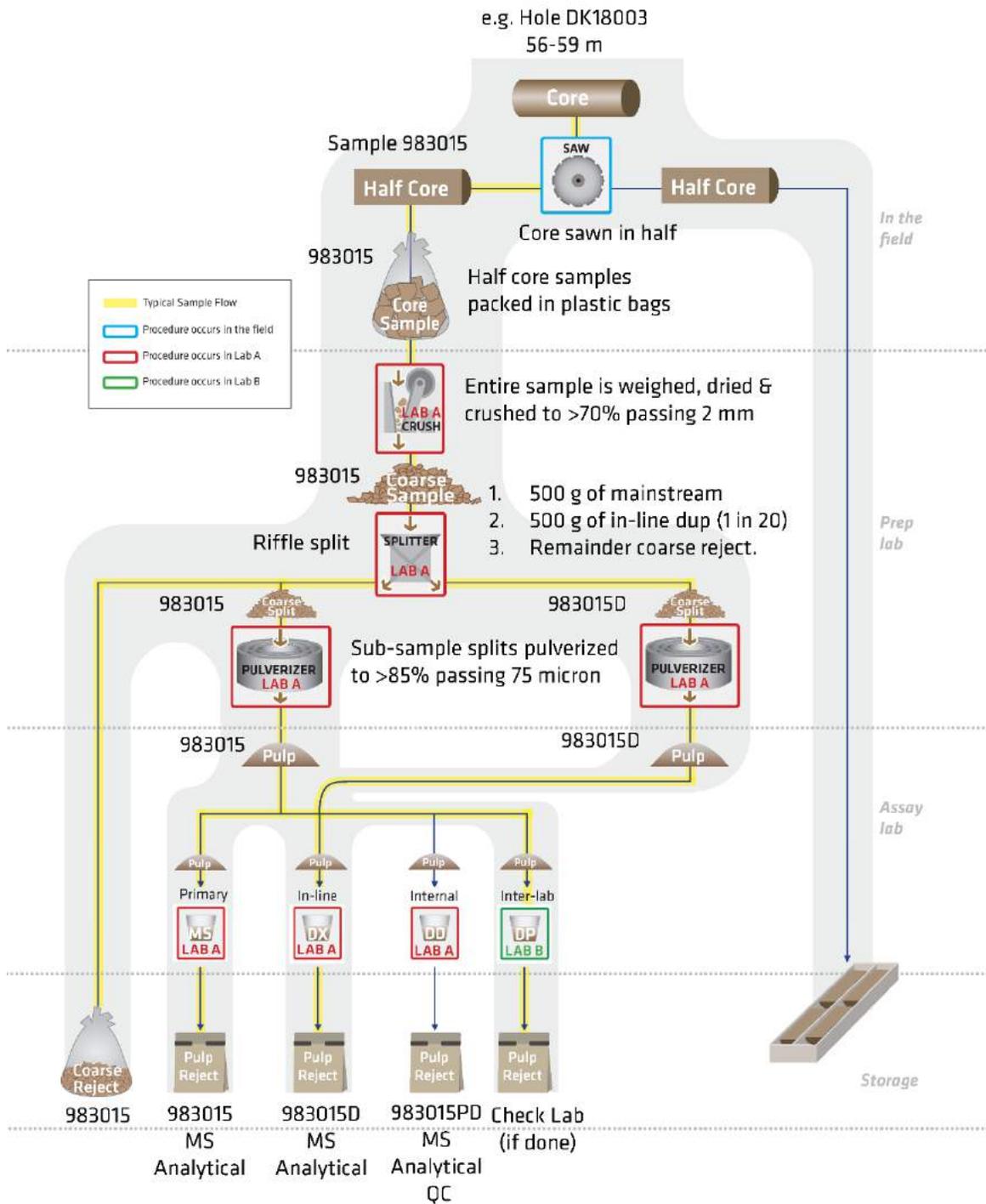


Figure 11-11: Duplicate Sample Processing Flow Chart.

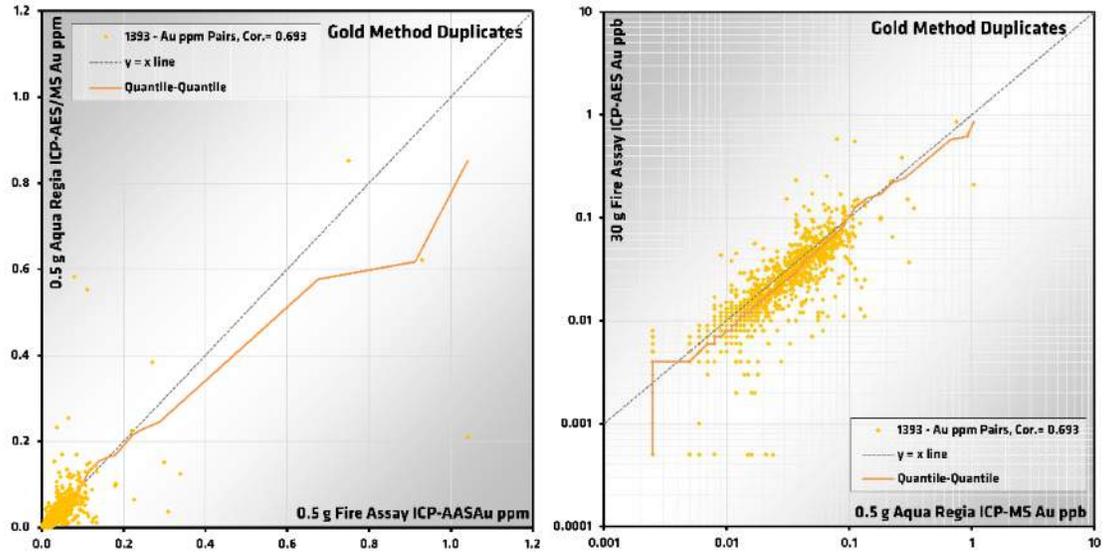


Figure 11-12: Method Duplicates Au – 30 g FA vs 0.5 g AR-MS (Normal & Log).

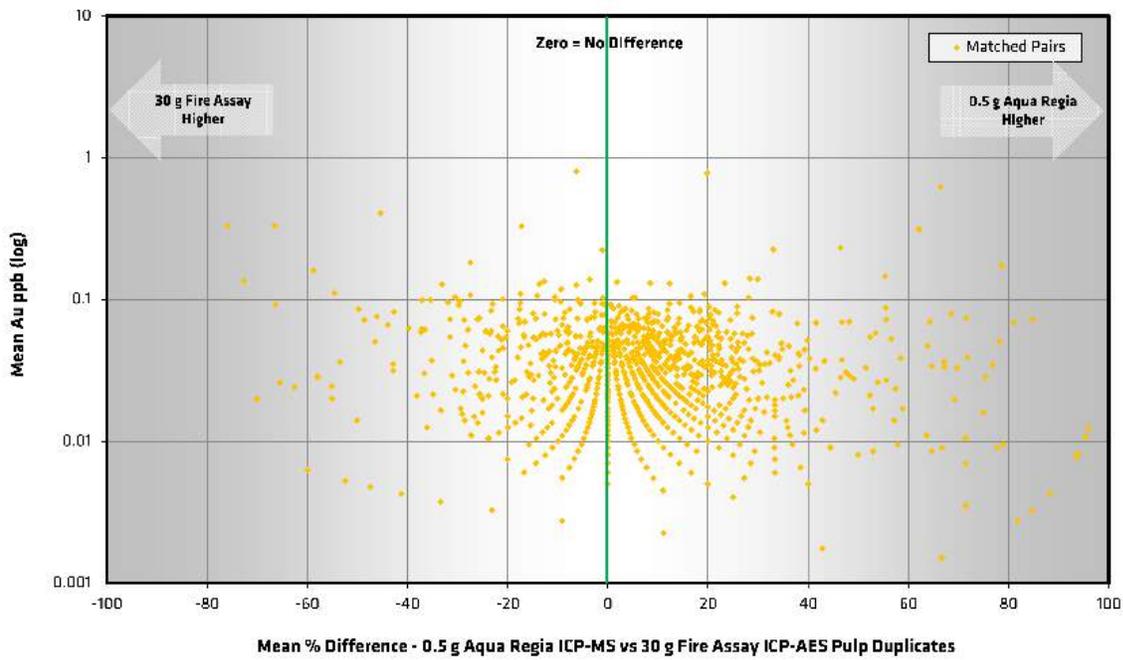


Figure 11-13: Method Duplicates - Au Mean % Difference.

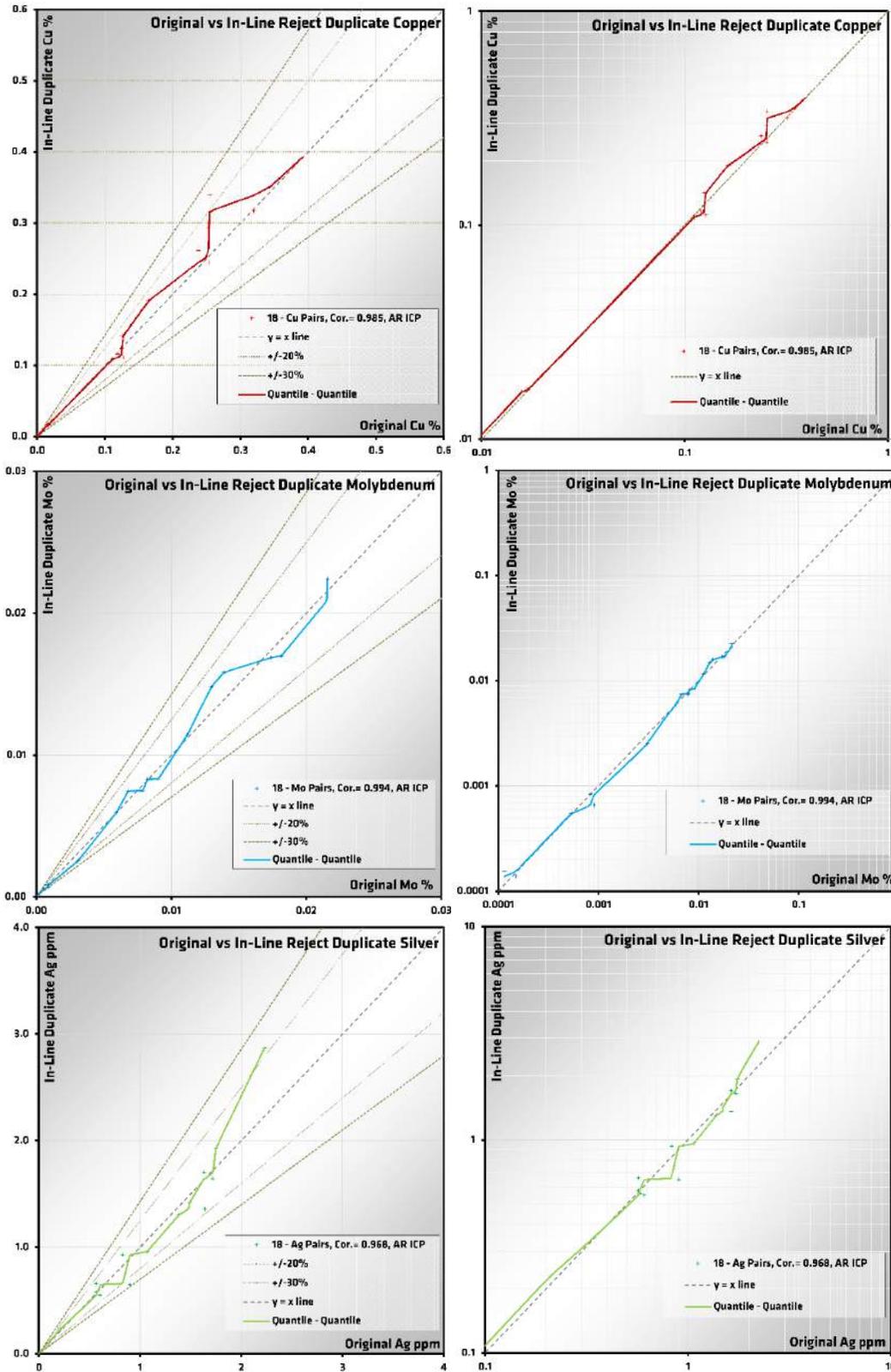


Figure 11-14: Intra-Laboratory Reject Duplicates Actlabs – Cu, Mo, Ag AR-MS (Normal & Log)

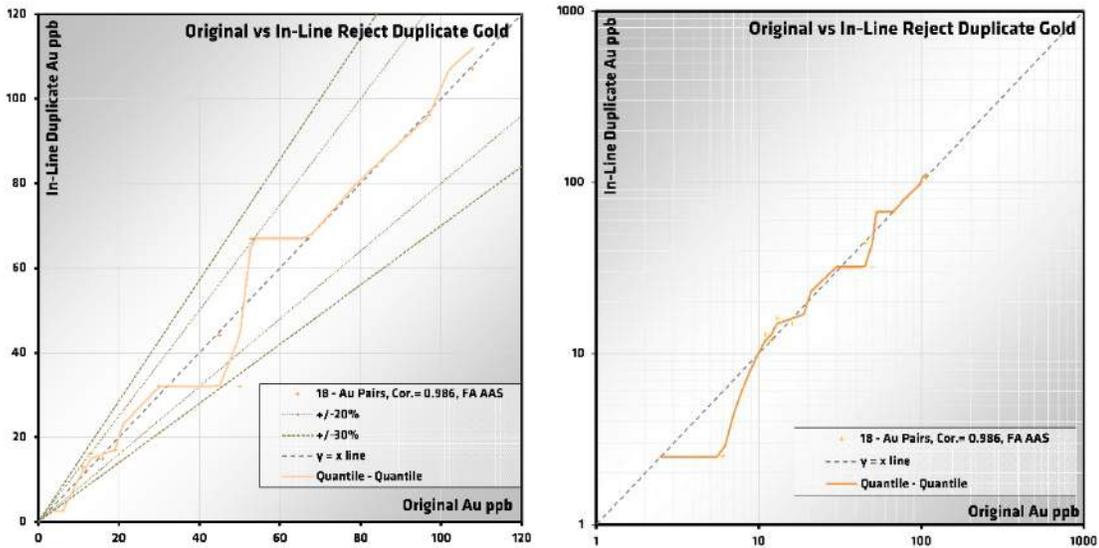


Figure 11-15: Intra-Laboratory In-Line Duplicates Au – Fire Assay AAS Normal (left) and Log (right).

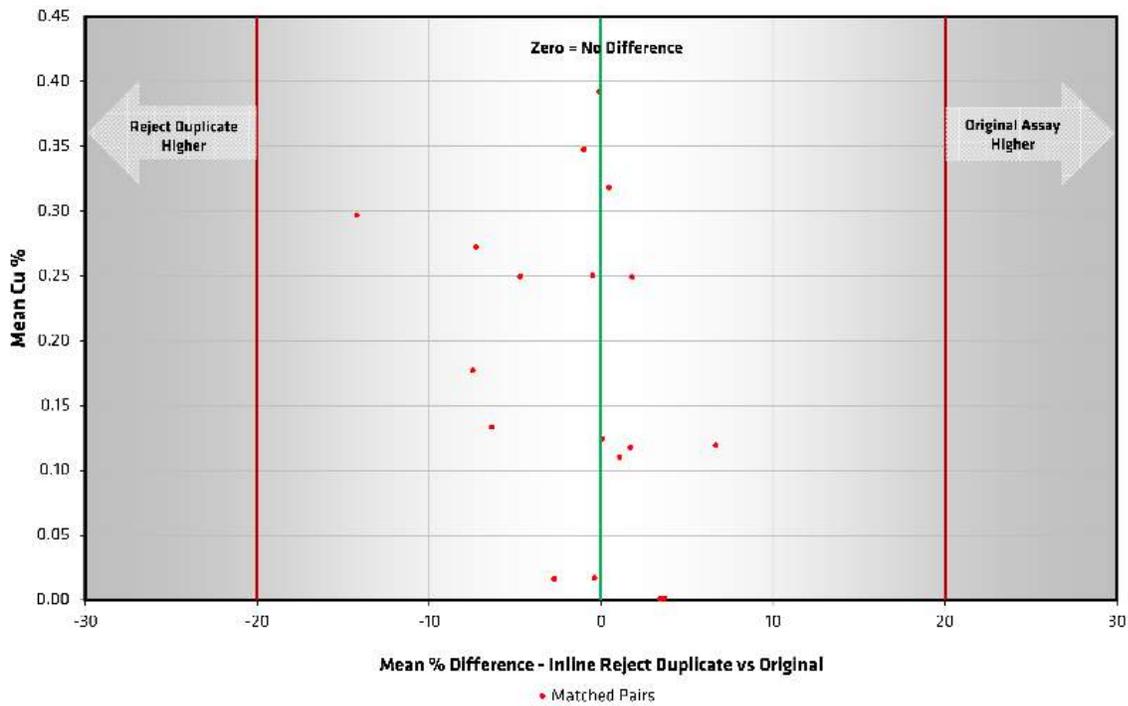


Figure 11-16: Intra-Laboratory Reject Duplicates Actlabs - Cu Mean % Difference.

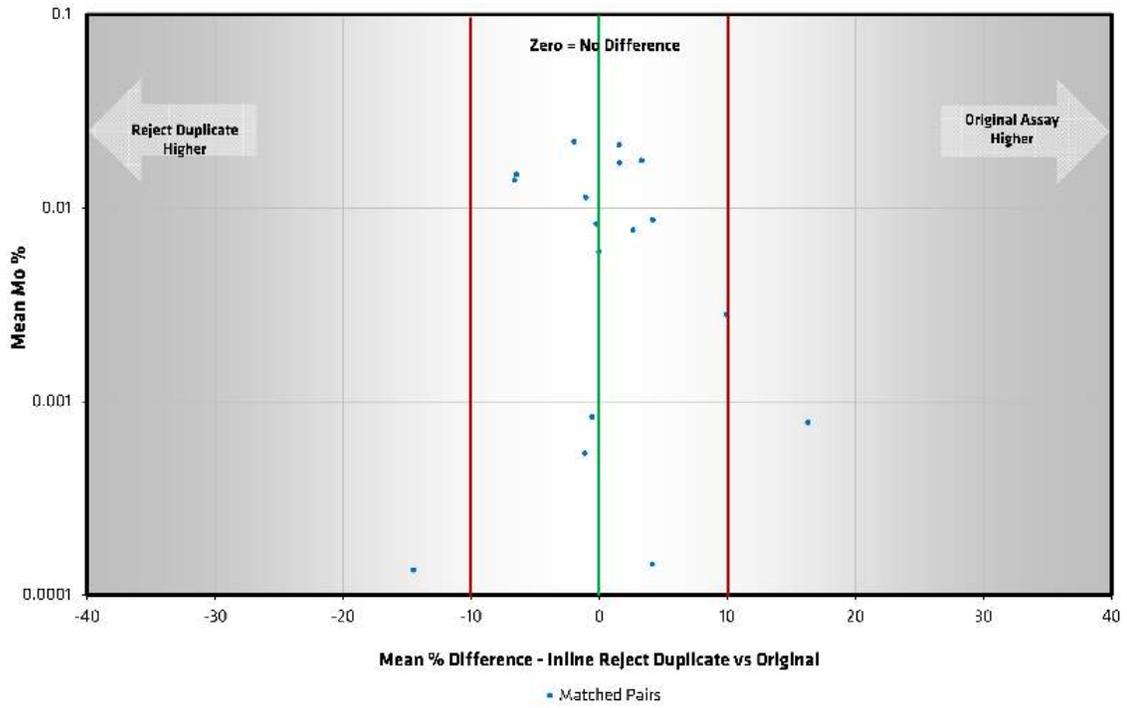


Figure 11-17: Intra-Laboratory Reject Duplicates Actlabs - Mo Mean % Difference.

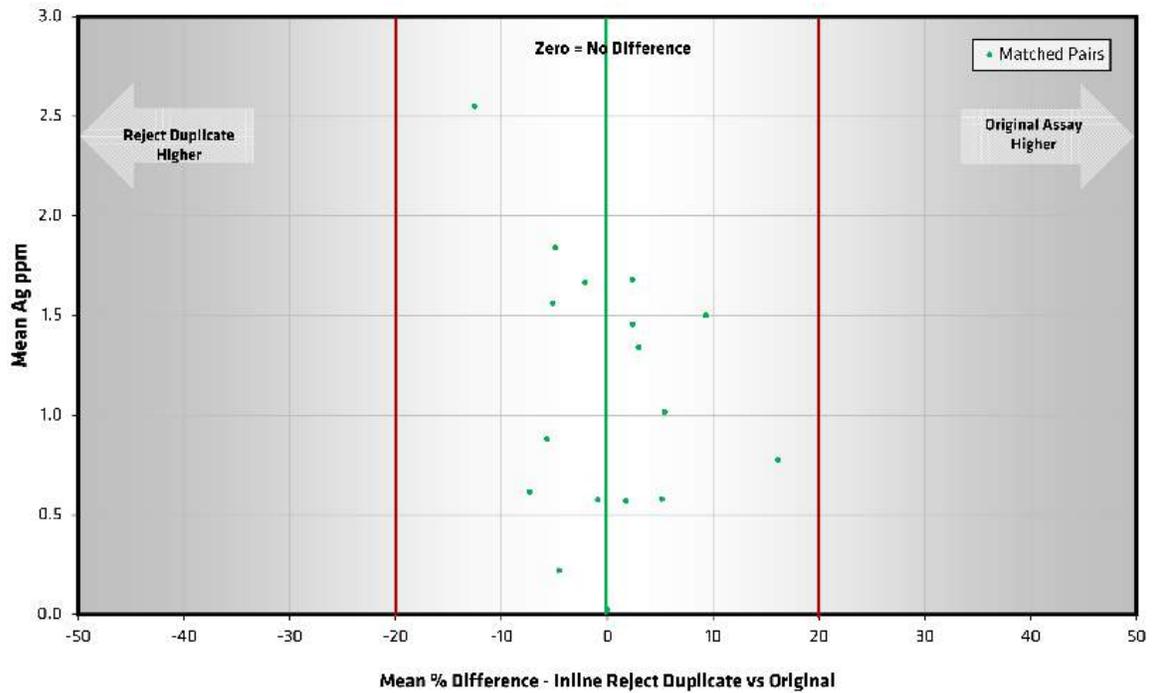
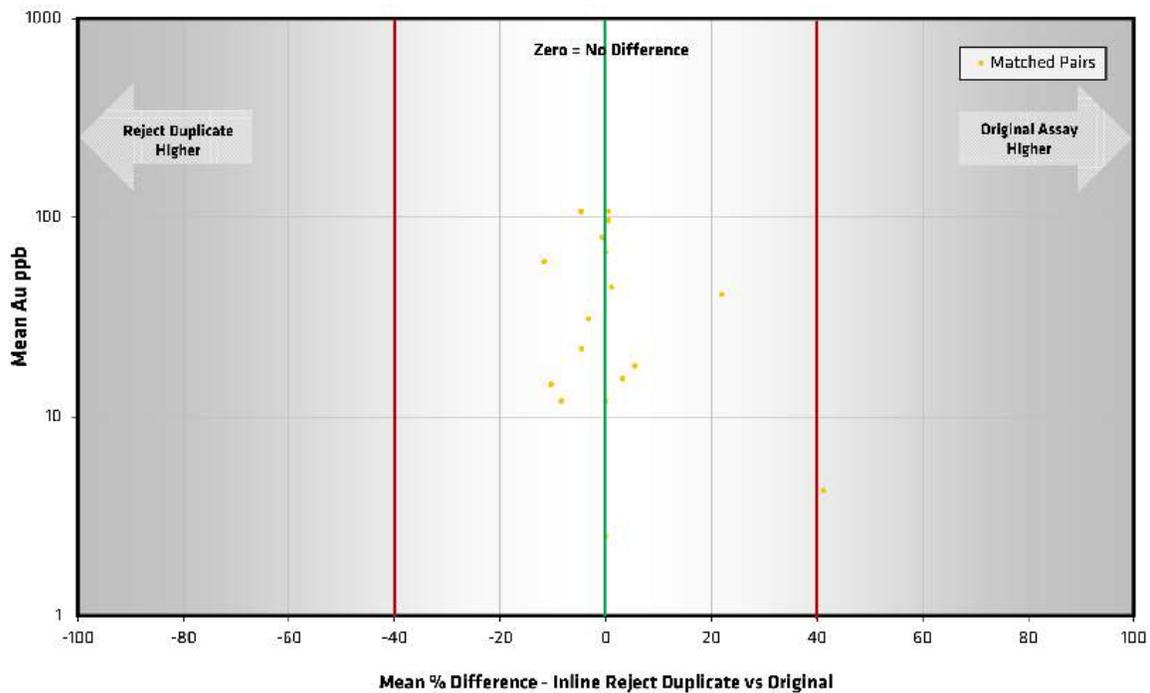


Figure 11-18: Intra-Laboratory Reject Duplicates Actlabs - Ag - Mean % Difference.



**Figure 11-19: Intra-Laboratory Reject Duplicates Actlabs - Au- Mean % Difference.**

### 11.5.5 Reruns

Sections of two of the 12 original primary analytical work orders analyzed in the Amarc 2017 - 2018 drill program were rerun for QC failures as listed in Table 11-12. The standard in a failed batch on work order YVR1810392 failed a second time on the rerun. In this instance, a fresh standard was inserted and the batch was rerun a second time. This second rerun passed QC. A total of 56 of the original 1,512 original samples were rerun for a single parameter, or 4% of the total number of samples. The author considers this rate of QC reruns to be acceptable.

**Table 11-12: Table of Analytical QAQC Reruns.**

Drill Hole	Certificate Number	# Samples	Date Received	Date Certified	Comment
DK17002	YVR1710997	88	2017-11-17	2017-12-05	QC Rerun on YVR1710997-R1, IMS-116 747205-747210, 749907, 747211-747215 high Cu PLP-5.
DK17002	YVR1710997-R1	12	2017-12-06	2017-12-11	QC Rerun of YVR1710997, IMS-116 747205-747210, 749907, 747211-747215 high Cu PLP-5 now passes QC.
DK18008	YVR1810392	89	2018-04-18	2018-05-08	QC Rerun on YVR1810392AB, FAS-111 713140-713180D high Au PLP-1 twice.
DK18008	YVR1810392A	44	2018-04-18	2018-05-17	QC Rerun of YVR1810392, FAS-111 713140-713180D high Au PLP-1 twice, fails high again.
DK18008	YVR1810392AB	44	2018-04-18	2018-06-02	QC Rerun of YVR1810392, FAS-111 713140-713180D high Au PLP-1 twice, now passes QC.

### 11.5.6 Density Validation

A solid, core-sized, aluminum cylinder known as density standard AI-14 was measured in air and water three times in the 2017 program as part of the quality control procedure for core density measurements. The density of the standard calculated from the control measurements was compared with the expected value of 2.70 on a regular basis as a check on the procedure. Density standard performance is illustrated in Figure 11-20.

As part of the validation process, project geological staff reviewed the highest and lowest density values recorded in the 2017 program. Data entry and geologic information corresponding with one errant value listed in Table 11-12 was reviewed and a correction was made to the Mass-in-Water measurement. The resulting SG was recalculated and deemed to be reasonable. The single inadvertent measurement represents less than 0.9% of the total overall measurements.

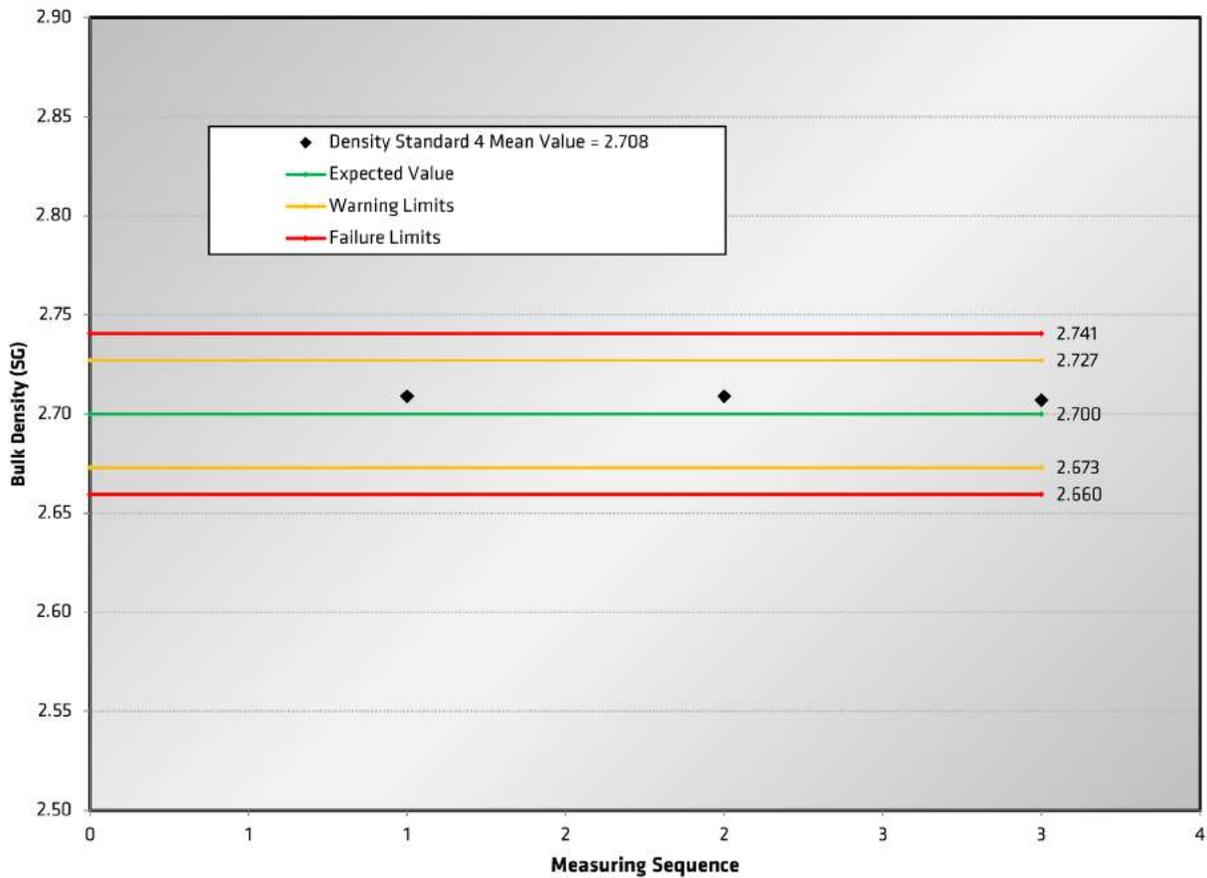


Figure 11-20: Density Standard Performance.

Table 11-13: Density Validation Table.

HOLE-ID	Depth	Type	Density
DK17001	229.760	Low	2.054
After correction of Mass in Water			
DK17001	229.760	Okay	2.566

## 11.6 Conclusions

It is the QP's opinion that Amarc implemented an effective external QAQC system consistent with industry best practice and applied it to the 2017 - 2018 drilling program. The results of this QAQC program lend credence to the veracity of the geological and analytical data.

The QP thoroughly assessed the sample preparation, security and analytical procedures for Amarc's exploration programs and believes that they are appropriate for an early-stage exploration program. The sampling, sample preparation, security, analytical procedures and QAQC of the historical drilling are described in Sections 6.5 and 6.6. Their adequacy is assessed there and in Section 17.3.

## 12 Data Verification

During his site visit in October 2017, QP Mark Rebagliati reviewed all operations at the DUKE deposit target as then completed and in progress, including safety, drilling procedures, QAQC and data management. The QP also reviewed the geology and the veracity of geological observations being recorded by the Amarc field-crews. All aspects of the program were found to be of a suitable standard.

On July 14, 2019 QP Mark Rebagliati also visited the facility in Williams Lake where the DUKE core is stored to further verify the procedures for the drilling program. During this visit, the QP examined four intervals of core ranging in length from 60.0 m to 93.0 m totaling 296.0 m from holes DK1803, DK1804, DK1806 and DK1808. The diamond saw-cut half core was examined and compared with drill logs and with laboratory assays. The quality of core cutting, geological logging were to acceptable standards and Cu assays appeared realistic relative to visual estimates of chalcopyrite in the core.

Amarc completed a comprehensive compilation of both the historical and Amarc exploration drill hole data from the DUKE deposit target and other historical exploration programs in the Project area. Amarc also completed systematic verification of all of the historical data (further details in Section 9.3.1 and Section 11.5.1). QP Eric Titley was extensively involved in this program between September 2017 and April 2020 on behalf of Amarc and has detailed knowledge of this work.

The following procedures were applied by the QP's to verify this information:

For the historical 1967, 1970, 1971, 2008 drill programs and 1991 resampling program:

- Reviewed available hard copy and digitally scanned technical documents including;
  - Assessment reports;
  - Unpublished company reports and assay cross-sections;
  - Survey information;
  - Geological logs;
  - Sampling and assay reports; and
  - Laboratory assay certificates.
- Reviewed the 1991 Corona resampling and reanalysis program;
  - Which were compared with original Ducanex results.
- Reviewed the keypunched historical assay results.
- Reviewed the georeferenced drill hole collar locations; and
- Verified a subset of the keypunched sampling, resampling and analytical data in the compiled database against the original source documents.

For the Amarc 2017 - 2018 drill program:

- Reviewed sampling, security and analytical protocols;

- Reviewed geological, sampling, core photographs and density information from the field programs;
- Reviewed digital assay data and assay certificates received directly from the analytical laboratory;
- Verified a subset of the imported assay data against the assay certificates;
- Reviewed merged sampling and assay results and analytical QAQC;
- Checked for failed standards, high blanks and mis-matching duplicates in the QAQC data;
- Checked for mismatching, overlapping and underlapping intervals in the assay and geological tables; and
- Checked for errant or improbable collar and downhole survey records, density and geotechnical measurements.

For the compiled historical and Amarc drill program information:

- Printed and reviewed the assay results reported directly from the database;
- Reviewed drill data in plan, cross-section and 3D view from the compiled database and compared all with historical figures; and
- Prepared a table of significant assay intervals and compared with historical tables.

### **12.1 Data Verification Conclusions**

Amarc continues to compile information on the historical programs and so verification of information such as collar locations for drill holes, acquisition and review of assay certificates is incomplete. As a result, the QP concludes:

The work performed on the eight Amarc (2017 – 2018) and (2008) Copper Ridge drill holes at the DUKE porphyry Cu-Mo deposit target provides a high degree of confidence that the derived datasets are of good quality and acceptable for use in geological investigation and further exploration of the DUKE deposit target.

The documentation of the historical drill data from the DUKE Cu-Mo deposit target (circa 1970 – 1971) from Ducanex JV is poorer and more varied in quality. None of the historical drill collar locations have been verified in the field and as such their location recorded in the database has not been confirmed with exact certainty. No assay certificates or core samples were located for these drill programs. The only known analytical data for 25 of these drill holes was digitized from down-hole grade bars illustrated in hand-drafted cross-section. The most significant portions of four drill holes were re-sampled by Corona and re-assayed at Acme in 1991. Although most these logs appear to be of good quality, the supporting information is much less robust than for the modern drill holes. Given the limited amount of data on the project, these holes serve as useful guides to ongoing exploration. However, the use of Ducanex JV drill hole data beyond that, must be carefully assessed and is not currently advised.

The QPs applied several verification procedures to the DUKE deposit target drill data to assess the appropriateness and accuracy of this information for use in public disclosure and establishing targets for further exploration. The QPs have thoroughly assessed the data from the DUKE Project exploration programs and believe that they are appropriate for use in exploration stage programs.

### 13 Mineral Processing and Metallurgical Testing

No mineral processing or metallurgical testing has been carried out on any samples from the DUKE Project.

### 14 Mineral Resource Estimates

No resource or reserves have been established on the DUKE Project by Amarc.

### 15 Adjacent Properties

The Babine District adjacent to the DUKE Project hosts the past producing Bell and Granisle Cu-Au mines and the development-stage project at Morrison-Hearne Hill. As indicated by Table 15-1 which is a summary of the past production from the Bell and Granisle mines and Table 15-2 which is a summary of current mineral resources and mineral reserves for the mines and advanced-stage deposits within the Babine District. This confirms the Babine District's place as a high potential BC porphyry Cu-Au belt, with credible prospectivity for further discoveries, under the extensive cover sequences.

**Table 15-1: Past Mine Production from the Babine District Adjacent to the DUKE Project.**

Owner/Operator	Mine Name	Production Years	Status	Cu (M lbs)	Au (K oz)	Ag (K oz)	Tonnes (Mt)
Noranda	Granisle	1965-1982	Closed	472	219	2242	52.3 <sup>i</sup>
Noranda	Bell Copper	1970-1992	Closed	672	414	1232	77.2 <sup>ii</sup>

<sup>i</sup> Granisle past-production numbers (milled) from MINFILE 0937 146.

<sup>ii</sup> Bell Copper past-production numbers (milled) from MINFILE 093M 001.

**Table 15-2: Mineral Reserves and Mineral Resources of Projects Adjacent to the DUKE Tenure.**

Name	Category	Million Tonnes	Cu %	Au g/t	Mo %	Source
<b>Bell</b>	<b>Measured</b>	<b>57</b>	<b>0.41</b>	0.18		Glencore Annual Report 2014
	<b>Indicated</b>	<b>200</b>	<b>0.40</b>	0.20		
	<b>M+I</b>	<b>257</b>	<b>0.40</b>	0.20		
<b>Granisle</b>	<b>Measured</b>	<b>18</b>	<b>0.34</b>	0.11		Glencore Annual Report 2014
	<b>Indicated</b>	<b>55</b>	<b>0.30</b>	0.10		
	<b>M+I</b>	<b>73</b>	<b>0.30</b>	0.10		
<b>Morrison</b>	<b>Proven</b>	<b>115</b>	<b>0.36</b>	0.17	0.004	Wardrop, "Morrison Copper/Gold, Project – Feasibility Study NI 43-101, Technical Report", February 12, 2009
	<b>Probable</b>	<b>109</b>	<b>0.30</b>	0.15	0.004	
	<b>P+P</b>	<b>224</b>	<b>0.33</b>	0.16	0.004	
	<b>Measured</b>	<b>98</b>	<b>0.40</b>	0.19	0.005	Wardrop, "Morrison Copper/Gold Project – Feasibility Study NI 43-101, Technical Report", March 12, 2009
	<b>Indicated</b>	<b>110</b>	<b>0.39</b>	0.19	0.005	
	<b>M+I</b>	<b>208</b>	<b>0.39</b>	0.19	0.005	
<b>Hearne</b>	<b>Inferred</b>	<b>60</b>	<b>0.16</b>	0.10		Hearne Hill Porphyry deposit as at Dec 31, 1992; MINFILE 093M1 Cu5
	<b>Indicated</b>	<b>4.2</b>	<b>0.6</b>	0.19		Bland/Chapman Zones, Pacific Booker News Release July 7, 1998; MINFILE 093M15
	<b>Inferred</b>	<b>0.95</b>	<b>0.41</b>	0.18		

The QP has not been able to verify the mineral resources and mineral reserves presented in Table 15-2; as such, the information may not be indicative of the mineralization on the DUKE Project.

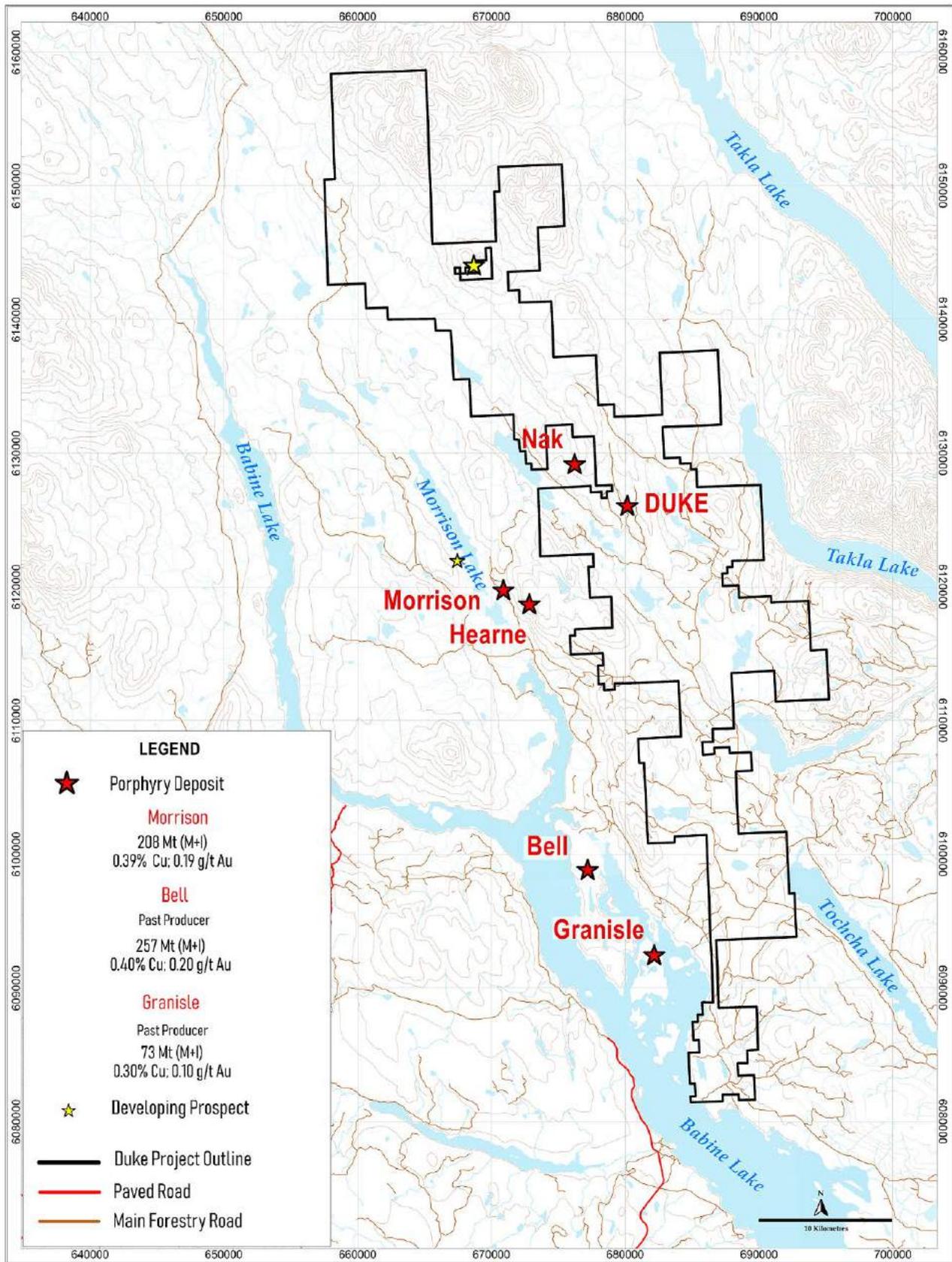


Figure 15-1: Adjacent Properties to the DUKE Project.

## 16 Other Relevant Data & Information

The authors are unaware of any further information and data relevant to the DUKE Project.

## 17 Interpretations & Conclusions

At the DUKE porphyry Cu-Mo-Ag±Au deposit target Amarc's successful initial drill campaign, in combination with historical drilling and geochemical and geophysical surveys have both: (1) intersected significant lengths of porphyry-style mineralization over an area of 800 m by 400 m that remains open laterally in several directions and to depth; and (2) indicated the presence of a significant 3 km by 1 km hydrothermal system that remains to be fully explored. Subsequent to its initial drill campaigns at the DUKE deposit target and recognizing the prospectivity of the Babine District, and its relatively unexplored nature, Amarc has also completed a detailed compilation of historical data over the Project identifying a number of other regional high potential porphyry Cu-Au-Mo-Ag deposit targets for focused ground survey follow up and drill testing. As targets were defined Amarc expanded its tenure position to cover favorable areas.

### 17.1 DUKE Deposit Target

The DUKE porphyry Cu-Mo-Ag±Au deposit target was significantly expanded and re-interpreted as a result of drilling completed by Amarc in 2017 - 2018. Mineralization previously recorded in shallow historical holes was significantly expanded to depth and laterally extended away from the core area drilled in the 1970's.

A significant historical surface IP chargeability anomaly (3 km x 1 km in area) is reported at the DUKE porphyry deposit target. Amarc and historical drilling has tested only a small part of this anomaly, and significant further step-out drilling is warranted to both trace mineralization laterally within the known eastern core area, and across the postulated fault in the western core zone located around hole DK18004.

Grades from exploratory drilling completed by Amarc within DUKE deposit target are promising, and together with historical drill information can be used effectively to guide exploration. However, further drilling will be required for a mineral resource estimate and advanced studies to be undertaken.

### 17.2 DUKE Regional Targets

Amarc's exploration efforts have identified 14 high-priority porphyry Cu-Au-Mo-Ag deposit-style exploration targets, which include the expanded DUKE deposit target, the Trail Peak deposit target, and 12 other new targets across the wider DUKE Project that require focused field surveys followed by drilling.

These new regional targets were identified as areas with anomalous geochemistry, up-ice magnetic features, located on or near to the flank of a regional gravity high, should be considered as high priority targets for field follow-up, especially if they have support from grain analysis (BFP-chalcopyrite-pyrite-bornite) and/or positive CIPW corundum/apatite/magnetite-in-till indicator mineral trains.

At the known Trail Peak deposit target, new IP and geochemical surveys followed by diamond drilling are warranted.

### 17.3 DUKE Project Data Verification

The relevant QP's have thoroughly assessed the data verification procedures for Amarc's exploration programs and believe that they are appropriate for exploration stage programs. Further work is necessary to assess and confirm the historical drilling information if it is to be used in the future for more advanced studies.

Documentation of the historical drill data from the DUKE porphyry Cu-Mo deposit target (circa 1970 - 1971) from the Ducanex JV is poor and varied in quality. Drill hole collar locations have not been surveyed in the field. No assay certificates or core samples were located from this drill program and the only known analytical data for 25 of these shallow historical drill holes was digitized by Amarc from down-hole grade bars on hand-drafted cross-sections in the Ducanex assessment reports. The most significant portions of four drill holes were re-sampled by Corona and re-assayed at Acme in 1991. Although most of these 1991 drill logs appear to be of good quality, the supporting information remains much less robust than Amarc's modern drill holes and QAQC procedures. Given the limited amount of data on the DUKE deposit target, and the shallow depth of the historical drilling, these holes serve as useful guides to ongoing exploration, however, their use beyond that such as for resource estimation is not appropriate at this time and the data must be carefully assessed if to be included in the future. Recommendations to upgrade this data, perhaps to a level it can be fully utilized in the future, have been included in Section 18.2 Additional Recommendations.

Several issues with historical drill holes could also be corrected as exploration moves forward over time. None of these issues are critical for completion prior to the initiation of the recommended exploration program but would aid in the interpretation of results. Ideally this work would include:

- Re-surveying the collar locations of the 1970-1971 and 2008 drill holes, wherever possible. The locations for the pre-2008 holes currently in use were georeferenced and digitized from drill hole figures and were not measured in the field.
- Digitization of assays from the Ducanex JV drill hole 71-21 that was missing from the previous version, and complete a geostatistical assessment of the validity of the 1970-1971 holes prior to their use in resource estimation or economic analysis (these assays are currently poorly-documented in comparison to the modern drill holes). A program of re-logging, re-sampling, and re-analyzing historical drill core could also add weight to the dataset currently available.
- Digitize the full multi-element analytical data from the 1991 four drill hole International Corona re-sampling and re-analysis program, this would complete the dataset and allow multi-element interpretation to augment the modern geochemical data from 2017 and 2018.
- Analyze the original assay pulp samples from the 2017 - 2018 Amarc drill program for Cu, Mo, and Ag analyses by MS Analytical 4-Acid multi-element ICP-AES ore grade method ICP-240 or equivalent assay method. This would achieve better accuracy and precision in the determination of Cu and Mo as required for resource estimation or economic analysis.
- Complete an inter-laboratory duplicate check assay program on the mineralized sections of the Amarc 2017 - 2018 holes drilled in the DUKE deposit target area.
- Other minor work that would aid in the interpretation of the results to date would include retrieving the assay certificate for 2008 Copper Ridge drill hole BB08-01 from Acme successor laboratory BV. This assay certificate is missing from the original assessment report. Reviewing the results of the analytical QAQC programs on drill core done by previous

operators and analytical laboratories, and measuring density of representative rock types at regular intervals in 2018 Amarc drill core in the same way as the 2017 Amarc drill core.

## 18 Recommendations

### 18.1 Recommended exploration program

It is recommended that Amarc initiate a two pronged exploration campaign: one focused on regional porphyry Cu targets (including the Trail Peak deposit target) and the other on the DUKE porphyry deposit target. Each of these programs may be completed independently of the other depending on corporate priorities, and since each has merit in its own right, completing one program does not negate the requirement to complete the other.

It is recommend that the 12 new porphyry-style regional targets identified across the DUKE Project be initially assessed with reconnaissance level IP surveys along the existing and extensive FSR network which crosses many of these targets. Where IP surveys identify a chargeability anomaly, indicating the possible presence of a subsurface sulphide system, a detailed IP grid should be completed. Potential survey follow-up also include B or C horizon soil sampling up-ice of the existing geochemical train, and possibly geological mapping to check for evidence of the prospective Babine Intrusive suite or associated hydrothermal alteration. On prioritized targets (positive IP chargeability anomaly), an initial focused program of RC drilling is recommended, to test for the presence of a potential porphyry Cu mineralized system below cover. The recommended program is expected to generate new porphyry Cu-Au-Mo-Ag targets for future diamond drilling.

In addition, at the DUKE porphyry Cu-Mo deposit target, new IP surveys and surficial geochemical sampling and diamond drilling six holes is required to test for both extensions to the known mineralization laterally and to depth and also the newly discovered northern extension to the deposit target.

#### Surface Reconnaissance Program:

IP surveys, infill geochemical surveys and geological mapping	\$1,260,000
Reporting, processing and associated costs	\$250,000
<b>Total estimated cost</b>	<b>\$1,560,000</b>

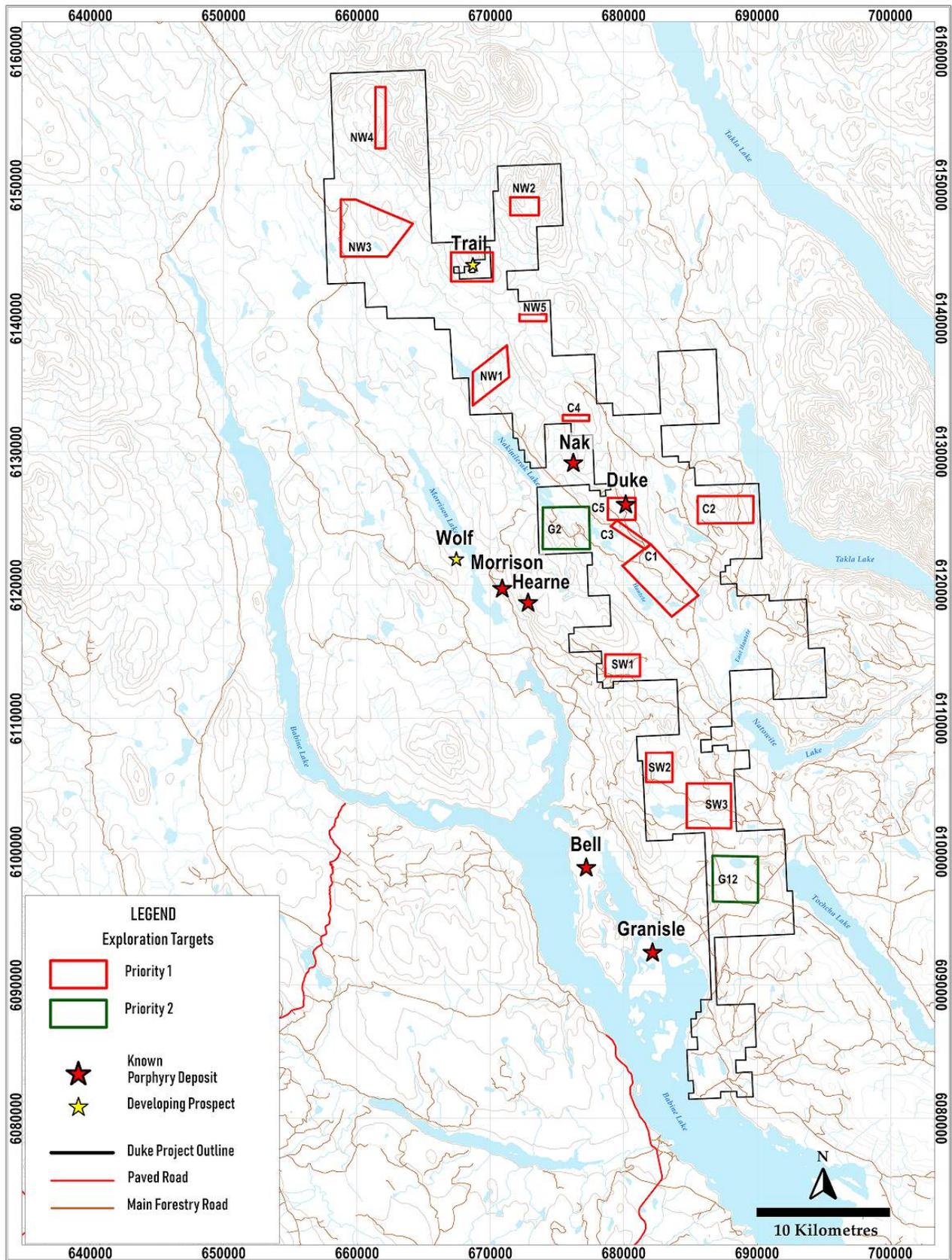
#### RC Drill Testing of Regional Targets (contingent upon favourable surface reconnaissance program results)

RC scout drilling 3,300 m	\$1,100,000
Technical support, processing, and associated costs	\$200,000
<b>Total estimated cost</b>	<b>\$1,300,000</b>

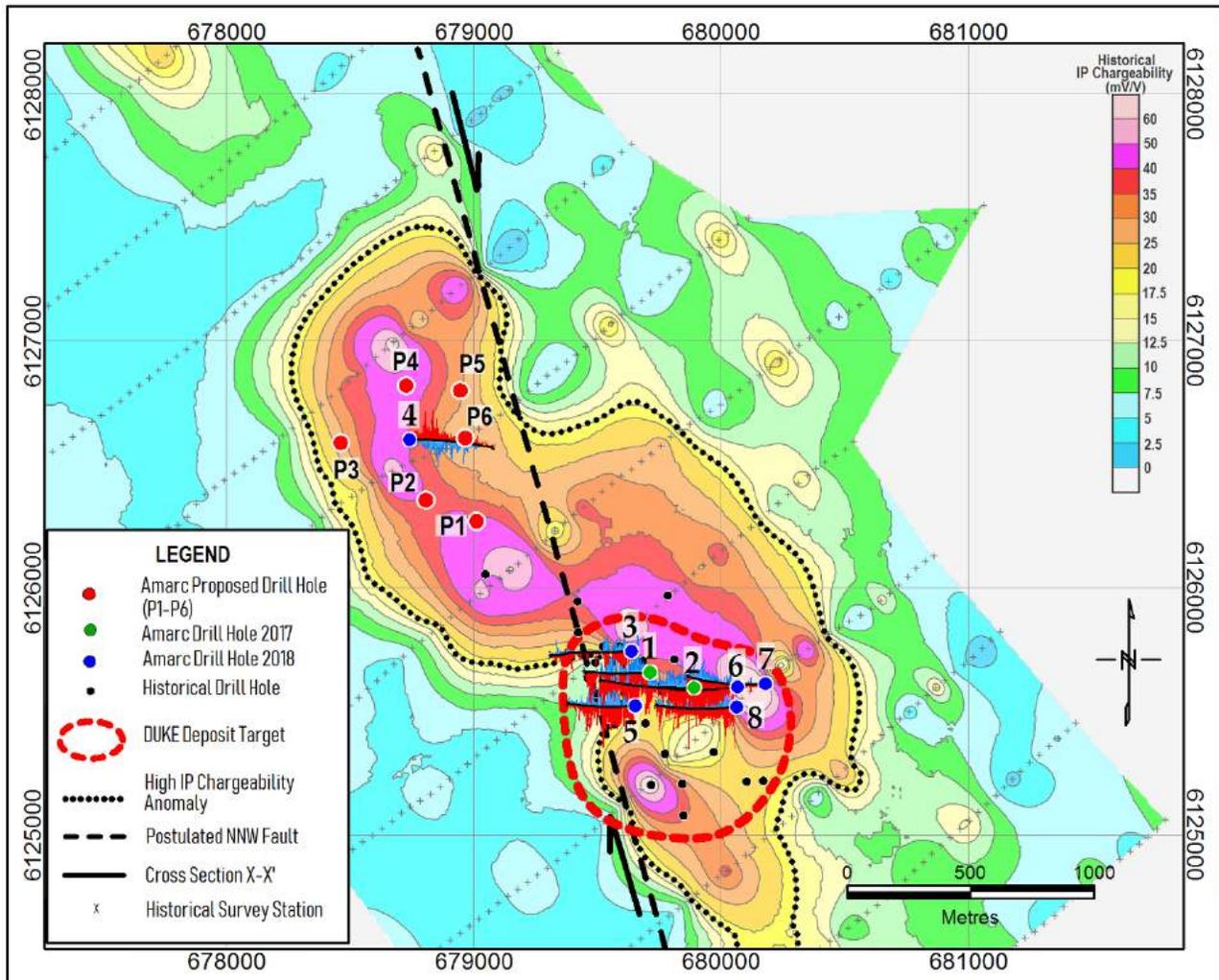
#### DUKE Porphyry Deposit Target Drilling:

3,000 m diamond drilling program	\$1,500,000
Reporting, processing and associated costs	\$250,000
<b>Total estimated cost</b>	<b>\$1,750,000</b>

Figure 18-1 shows the locations of new regional target zones for field follow up resulting from Amarc's exploration work on the wider DUKE Project. Figure 18-2 show proposed areas of drilling at the DUKE porphyry Cu-Mo deposit target.



**Figure 18-1: Proposed Regional Exploration Program Targets on the DUKE Project. For Full Description of the Target Anomalies Refer to Table 9-4.**



**Figure 18-2: Proposed Exploration Drilling at the DUKE Porphyry Cu-Mo-Ag Deposit Target. Anomaly Position in Relation to the Property Boundary is Shown in Figure 9-1.**

## 18.2 Other Recommendations

The documentation of the historical drill data from the DUKE Cu-Mo deposit target (circa 1970 – 1971) from Ducanex JV is more varied in quality. None of the historical drill collar locations have been confirmed in the field and as such their location recorded in the database is not known with exact certainty. No assay certificates or core samples were located for these drill programs. The only known analytical data for 25 of these drill holes was digitized from down-hole grade bars illustrated in hand-drafted cross-section. The most significant portions of four drill holes were re-sampled by Corona and re-assayed at Acme in 1991. Although most these logs appear to be of good quality, the supporting information is much less robust than for the modern drill holes. Given the limited amount of data on the project, these holes serve as a useful guides to ongoing exploration. However, the use of Ducanex JV drill hole data beyond that, such as for resource estimation must be carefully assessed. This work could continue in conjunction with the field program recommended above.

It is recommended that the use of CDN-CGS-16 and CDN-CGS-23 standards be discontinued in future programs and that they be replaced by standards fully certified for Cu, Mo, Au and Ag by the analytical methods used.

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## 20 Certificates of Qualified Persons

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I, C. Mark Rebagliati, P. Eng., do hereby certify that:

1. I am co-author of this report entitled "Technical Report Summarizing Exploration Work on the DUKE Project, Babine Porphyry Copper District, British Columbia, Canada". that has an effective date of 3<sup>rd</sup> April, 2020 (the "technical report"). I am responsible sections 2, 3, 4, 5, 7, 8, 13, 14, 15, 16 and jointly responsible for sections 1, 6, 9, 10, 12, 17, 18 and 19 of this report.
2. I have been involved with the project since 2017. I have not authored a previous technical report.
3. I am a member in good standing of: Engineers and Geoscientists British Columbia (EGBC), registration No. 8352, The Society of Economic Geologists, Canada and the Association for Mineral Exploration British Columbia.
4. I am a graduate of the Provincial Institute of Mining, Haileybury, Ontario (Mining Technology, 1966).
5. I am a graduate of the Michigan Technological University, Houghton, Michigan USA (B.Sc., Geological Engineering, 1969).
6. I have practiced my profession continuously since graduation and have been involved in mineral exploration for precious and base metal deposits in Canada, USA, Mexico, El Salvador, Chile, Panama, Peru, Bolivia, Brazil, Albania, Armenia, Argentina, Australia, Fiji, New Zealand, Solomon Islands, Papua New Guinea, Ireland, Spain, Portugal, Romania, Albania, Hungary, Poland, Germany, Russia, Kazakhstan, Afghanistan, India, China, Ghana, Laos, Viet Nam, Turkey, Saudi Arabia, Morocco, Philippines and South Africa. I have extensive experience with porphyry-type copper prospects and deposits, notably the Copper Mountain, Red Chris, Gibraltar, Whiting Creek, Mt. Milligan, Southern Star, Lorraine, Kemess South, Kemess North, Pine, Casino, Prosperity, Xietongmen, Newtongmen and Pebble deposits.
7. As a result of my qualifications and experience I am a Qualified Person as defined in National Instrument 43-101.
8. I am not independent of the issuer, Amarc Resources Ltd.
9. I have visited the DUKE Property, most recently October 30, 2017, and have supervised the exploration programs from 2017 to 2018. I am very familiar with the geology, topography, physical features, access and local infrastructure.
10. I have read National Instrument 43-101, Form 43-101F1 and this report has been prepared in compliance with NI 43-101 and Form 43-101F1.
11. I am not aware of any material fact or material change with respect to the subject matter of this technical report, which is not reflected in the report, the omission of which to disclose would make this report misleading.
12. I consent to the filing of the subject Technical Report with any stock exchange and any other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the subject Technical report.

Dated in Vancouver on this 29<sup>th</sup> day of April, 2020.

*C. Mark Rebagliati*

C. Mark Rebagliati, P. Eng.

I, **Eric Titley**, P. Geo. do hereby certify that:

I am Senior Manager | Resource Geology for Hunter Dickinson Services Inc., at the address below.

This certificate applies to the technical report titled “Technical Report Summarizing Exploration Work on the DUKE Project, Babine District, Central British Columbia, Canada” that has an effective date of 3<sup>rd</sup> April, 2020 (the “technical report”).

I am a Professional Geoscientist registered with Engineers and Geoscientists British Columbia (EGBC) in the province of British Columbia, Canada. I graduated from the University of Waterloo, Waterloo, Ontario, Canada with a Bachelor of Science degree in Earth Sciences (geography minor) in 1980.

I have practiced my profession continuously since 1980 on Projects in North America, Africa, Asia, South America, Europe and Australia. I have been directly involved in providing geological and technical assistance to mineral exploration, mineral development and mining projects, and in the development of resource models and in resource estimation on mineral projects.

I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) because of my experience and qualifications.

I am a co-author of the report entitled “Technical Report Summarizing Exploration Work on the DUKE Project, Babine District, Central British Columbia, Canada” that has an effective date of 3<sup>rd</sup> April, 2020 (the “technical report”).

I am jointly responsible for Sections 1, 6, 9, 10, 12, 17, 18, and 19, and responsible for Section 11 of the technical report.

The Technical Report is based on my knowledge of the project area and drilling database included in the Technical Report, and on review of published and unpublished information on the Project and surrounding areas. I have not conducted a site visit.

I am not independent of Amarc and affiliated companies applying the tests in section 1.5 of National Instrument 43-101.

I have had prior involvement with the Project in the compilation of historical work and the Amarc drilling database.

I have read National Instrument 43-101. The sections of the Technical Report that I am responsible for have been prepared in compliance with that Instrument.

I consent to the filing of the Technical Report with any Canadian stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their website accessible by the public, of the Technical Report.

As of the effective date of the technical report, to the best of my knowledge, information and belief, the sections of the technical report that I am responsible for preparing contain all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated this 29<sup>th</sup> day of April, 2020.

*Eric Titley*

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