TECHNICAL REPORT

PURPLE ONION PROPERTY MACKENZIE MOUNTAINS

NTS: 106B/01, 106B/02 and 105O/16
Mackenzie Mining District, Northwest Territories, Canada
64°03’7.095” N and 130°30’22.658”W

PREPARED FOR:

SCAVO RESOURCE CORP.

PREPARED BY:
Aurora Geosciences Ltd.

TECHNICAL REPORT

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Northwest Territories, Canada

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1 SUMMARY

This report was commissioned by Scavo Resource Corp. ("SCAVO") and was prepared by Gary Vivian, M.Sc., P.Geo (the "Author"). The Purple Onion Property is a conceptual play based upon stream sediment results released by the Northwest Territories Geoscience Office in early 2011. The primary purpose of this report is to provide background information on the general area concentrating on the idea the SCAVO ground sits within the Selwyn Basin (hosting the Howard's Pass, Jason and Tom Deposits). The area has had little exploration work completed and as such most of the SCAVO ground has not had any exploration completed upon it. It is SCAVO's full intent to evaluate the property for its potential to host economic base metal (Zn-Pb-Ag) mineralization.

The property comprises 39 mineral claims containing 60,670 acres or 24,552 hectares. The property lies within the Selwyn Basin approximately 200 km southwest of Norman Wells in the Northwest Territories or 275km northeast of Mayo in the Yukon Territory. The property covers an area some 24 km long by up to 13km wide and is owned 100% SCAVO.

The Purple Onion Property is situated on the eastern margin of the Selwyn Basin, a late Precambrian to Devonian depositional basin characterized by off-shelf deep water shale in a basin bounded by platform carbonates to the northeast. The Selwyn Basin is well known for its propensity to host large lead-zinc sedimentary exhalative (SEDEX) massive sulphide deposits. These types of deposits have been discovered in Cambrian (Faro or Anvil), Silurian (Howard's Pass) and Devonian (MacMillan Pass; Tom and Jason) shale. The author has been unable to personally verify the mineralization of adjacent properties and any such mineralization is not necessarily indicative of the mineralization on the property that is the subject of this technical report.

The Purple Onion Property is considered a relatively early stage exploration project and as such no mineral resource or mineral reserve estimates have been performed on any material from the area presently covered by the property.

SCAVO acquired the Purple Onion Property in the fall of 2012 from Coltstar Ventures Inc. based upon the positive stream sediment sampling results from the NTGO during the 2007 and 2008 field season. There has been little work completed on the Purple Onion and the potential for hosting a SEDEX massive sulphide resource is indicated from the prospective Earn group stratigraphy, the encouraging stream sediment results and the conceptual affinities to the SEDEX deposits of the Selwyn basin.

Between August 21st and 28th of 2012, a first phase prospecting, sampling and mapping program was conducted on the Purple Onion Property. A total of 79 stream sediment samples and 16 rock samples were collected. While no visible economic mineralization was identified, positive stream sediment geochemical results derived from this work have delineated areas for detailed ground follow up.

Further work on the property is warranted. A second phase of exploration is recommended for 2013. The exploration would include airborne geophysics, possibly using the HeliTEM survey, and ground examination such as ridge and spur sampling, additional mapping and stratigraphic sections, detailed soil grid sampling as warranted. Systematic evaluation of the airborne survey data in the context of

ground datasets will be required to isolate exploration targets on the Purple Onion Property for SEDEX-type mineralization. The proposed budget is (CDN) $580,000.

2 INTRODUCTION

This report was commissioned by Scavo Resource Corp. ("SCAVO") and was prepared by Gary Vivian, M.Sc., P.Geo (the "Author"). The author was asked to undertake a review of the available data and assess the base metal potential for hosting economic base metal mineralization on the basis of a Selwyn/SEDEX-type environment. The identification of these areas would be based on the regional geology of the area, stream sediment data made available by the Northwest Territories Geoscience Office in 2008, and a property-scale exploration conducted in August of 2012. These data will be used to provide observations and interpretations for a conceptual model to follow.

The Author was retained to complete this report in compliance with National Instrument 43-101 of the Canadian Securities Administrators ("NI 43-101") and the guidelines in Form 43-101 F1 for application to the Canadian National Securities Exchange (CNSX). The Author is a "Qualified Person" within the meaning of National Instrument 43-101. This report is intended to be filed with the CNSX.

A detailed review of the historical exploration records pertaining to the Purple Onion Property, available through the Northwest Territories Assessment Report File, and the incorporation of this data into exploration completed in 2012 has been undertaken. In the preparation of this report, the Author has utilized geological maps, geological reports, claim assessment maps and claim maps prepared by the Geological Survey of Canada and the Northwest Territories Geoscience Office. Most of this information is available online via the Northwest Territories' SID Database and the Northwest Territories Geoscience Office.

The most significant websites, from which the author drew information, are as follows:

Northwest Territories Geoscience Office: www.nwtgeoscience.ca/
NWT Mining Recorder's Office: www.ainc-inac.gc.ca/ai/scr/nt/erd/mm/mro/index-eng.asp
NWT Government and Assessment Reports: http://gateway.nwtgeoscience.ca/
Natural Resources Canada: http://apps1.gdr.nrcan.gc.ca/mirage/db_search_e.php

The Author has no reason to doubt the reliability of the information comprised within this report. A test audit of the SCAVO database did not reveal any discrepancies with the original material filed by the original license holders for assessment purposes. The Author has independently reviewed legal title to the Purple Onion Property described in this NI 43-101 report.

The Author is very familiar with the exploration techniques applied to evaluating the potential of SEDEX type deposits. The Author has made one short trip to the property for staking and last visited the property in September of 2010.

3 RELIANCE ON OTHER EXPERTS

Aurora Geosciences Ltd has provided copies of all the relevant maps, analytical data, presentations, assessment reports, photographs and documents relating to the property. Reports and memoranda on the strategy and plans for exploration with a budget have also been reviewed. The Author has no reason

to believe that any of the data supplied by previous explorers in the area or from the NTGO (Northwest Territories Geoscience Office) is neither incorrect nor incomplete. This report is based upon the author's personal examination of all available reports in the area of the Purple Onion Property. The information, opinions and conclusions contained herein are based on:

- Information available to the Author at the time of preparation of this report;
- Assumptions, conditions, and qualifications as set forth in this report; and
- Data, reports, and other information supplied by any third party source

For the purpose of the report, on February 5, 2013 the Author completed a tenure data search on Northwest Territories Sidviewer website (www.ainc-inac.gc.ca/ai/scr/nt/erd/mm/mro/index-eng.asp). All leases and claims that comprise the Purple Onion Property are registered in the name of SCAVO. While the author has reviewed the assignment of mineral claims that document the transfer of the Purple Onion Property mineral claims from Coltstar to SCAVO, the Author is relying on the above noted website to accurately reflect that the leases remain valid and in good standing. This reliance applies to Section 4 of this technical report (Property Description and Location). However, the limited research by the Author does not express a legal opinion as to the ownership status of the mineral claims, collectively comprising the Purple Onion Property. The reader should further note that the online tenure website for the Northwest Territories will change as of March 1, 2013 from Sidviewer to the NT Region Geoviewer at (http://ntgeoviewer.aandc.gc.ca/geoviewer/Default.aspx?Map=NTMINTEN).

As a principal of Aurora, I have written this report and completed the staking of the Purple Onion claims. I last visited the property on September 14, 2010**.** I am responsible for all sections of this report titled – "Technical Report-Purple Onion Property - Mackenzie Mountains - Northwest Territories, Canada". In the opinion of the Author, there has been no material change to the scientific and technical information concerning the Purple Onion Property since 2010 and therefore the personal inspection can be considered current for the purposes of this report.

As of the date of this report, the Author is not aware of any material fact or material change with respect to the subject matter of this technical report that is not presented in this report, which the omission to disclose would make this report misleading.

4 PROPERTY LOCATION AND DESCRIPTION

The Purple Onion Property within the Mackenzie Mountains, Northwest Territories, Canada is located on NTS Map Sheets 106 B/1 and 2 and 105 O/16, close to the NWT and Yukon border (Figure 4.1). The property is geographically centered at 64° 03" 7.095' N latitude and 130° 30' 22.658' W longitude or UTM 427052E and 7104180 N, Zone 9W, NAD 83.

The property consists of 39 mineral claims (Figure 4.2 and Table 4.1) comprising a total of 60,670 acres or 24,552 hectares. Coltstar Ventures Inc. (Coltstar) originally staked the ground. During ground acquisition, Coltstar had a staking dispute with Archer Cathro and Associates, 1981. (AC) and as such Coltstar had to amend their property boundaries to mend with the AC ground.

Figure 4-1 Property Location Map

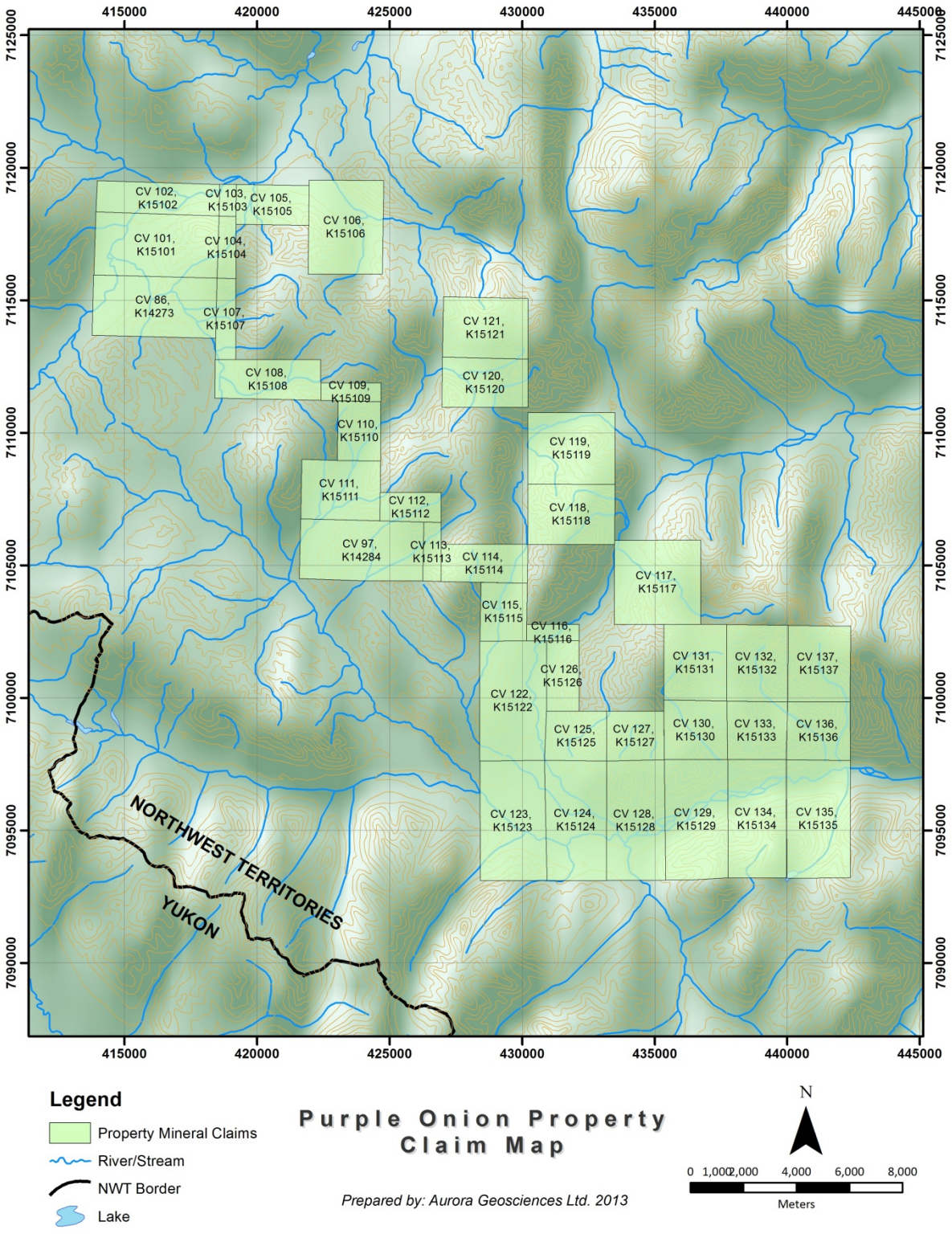

Figure 4-2. Purple Onion Property Claim Map

The Purple Onion Property is located 200km southwest of Norman Wells, NT and 275 km northeast of Mayo, YT. The property covers an area up to 24km long by up to 13km wide in a northwest-southeast direction.

The property was originally staked in September of 2010 and required amendments to that staking which were completed during September of 2011. The mineral claims of the Purple Onion Property were staked under, and are subject to, the provisions of the Canada Mining Regulations (CMR) (CRC, 2001). The claims and leases are administered from the Mining Recorder's Office of Indian and Northern Affairs Canada in Yellowknife, NT. Mineral claims staked on Crown Land in the Northwest Territories are valid for a two year period from the date of recording. Within the first two year period from the recording date, expenditures of $2 per acre per year are required to hold the claims for the next one year period. A work assessment report must be filed with the Mining Recorder's so that the value of the work performed can be assessed and the claim retained. A further $2 per acre per year in exploration expenditures is required to maintain a mineral claim for up to a maximum of ten years from the original recording date. At this point, subject to a legal survey, a mineral claim can be converted to a mining lease. Mineral claims can be dropped or allowed to lapse at any point without incurring further expenditures. Mining leases are valid for an initial term of 21 years subject to an annual rental fee of $1 per acre. Upon expiry of the initial term, mining leases can be renewed for a second 21 years term with an annual rental fee of $2 per acre. For more details the reader is referred to the CMR and related amendments (CRC, 2001).

The property is located in the Sahtu Dene Settlement Area. The property is not located on surface or subsurface settled Sahtu lands and is therefore free of legal restrictions to access. SCAVO has sufficient surface rights and legal access to the Purple Onion Property to conduct the recommended exploration programs on the property.

Land use activities in the Mackenzie Mountains area are conducted under the Mackenzie Valley Resource Management Act (MVRMA). Under the MVRMA, the Sahtu Land and Water Board (SLWB) issues and administers land use and water licenses in the project area. The property is not presently subject to a land use permit as exploration conducted on the property is considered early stage and therefore classified below land use permit thresholds. In the event of a discovery on the properties, more advanced exploration projects may require screening by the Mackenzie Valley Environmental Impact Review Board (MVEIRB).

At the present time there are no significant mineralised zones, mineral resources, mineral reserves or mine workings, existing tailing ponds or waste deposits known to occur on the property. There are no known environmental liabilities at the present time. Potential sites of archaeological significance may be present within the area, but these are both unknown at the present time and unlikely to be impacted by early stage exploration activities.

Coltstar Ventures Inc. retains a 0.5% net smelter return royalty (NSR) as a condition of SCAVO's acquisition of the property from Coltstar. SCAVO may repurchase this NSR for 100,000 common shares in the capital stock of SCAVO any time after total property expenditures meet or exceed $325,413.36.

According to the Purchase Agreement between SCAVO and Coltstar, this total expenditure must be completed by September 19, 2013.

Table 4.1 Claim Summary

Claim Number	Claim Name	NTS Sheet	NTS Sheet	Anniversary Date (expiry date)	Claim Acreage
K14284	CV 97	106B02		9/14/2012	2580
K14273	CV 86	106B02		9/14/2012	2580
K15101	CV 101	106B02		9/19/2013	2580
K15135	CV 135	105O16	106B01	9/19/2013	2580
K15117	CV 117	106B01		9/19/2013	2530
K15134	CV 134	105O16	106B01	9/19/2013	2580
K15127	CV 127	105O16	106B01	9/19/2013	1070
K15124	CV 124	105O16		9/19/2013	2580
K15123	CV 123	105O16		9/19/2013	2580
K15131	CV 131	106B01		9/19/2013	1550
K15130	CV 130	106B01		9/19/2013	1290
K15132	CV 132	106B01		9/19/2013	1550
K15125	CV 125	105O16	106B01	9/19/2013	1030
K15129	CV 129	105O16		9/19/2013	2580
K15128	CV 128	105O16		9/19/2013	2580
K15137	CV 137	106B01		9/19/2013	1550
K15136	CV 136	106B01		9/19/2013	1290
K15102	CV 102	106B02		9/19/2013	1550
K15116	CV 116	106B01		9/19/2013	224
K15122	CV 122	105O16	106B01	9/19/2013	2580
K15114	CV 114	106B01		9/19/2013	1140
K15111	CV 111	106B02		9/19/2013	1700
K15110	CV 110	106B02		9/19/2013	904
K15112	CV 112	106B02		9/19/2013	602
K15113	CV 113	106B02		9/19/2013	387
K15121	CV 121	106B01		9/19/2013	1810
K15115	CV 115	106B01		9/19/2013	760
K15107	CV 107	106B02		9/19/2013	521
K15103	CV 103	106B02		9/19/2013	232
K15105	CV 105	106B02		9/19/2013	1030
K15104	CV 104	106B02		9/19/2013	387
K15109	CV 109	106B02		9/19/2013	343
K15108	CV 108	106B02		9/19/2013	1290
K15126	CV 126	106B01		9/19/2013	930
K15133	CV 133	106B01		9/19/2013	1290
K15120	CV 120	106B01		9/19/2013	1450
K15118	CV 118	106B01		9/19/2013	1810
K15119	CV 119	106B01		9/19/2013	2170

K15106	CV 106	106B02	9/19/2013	2480
			Total	60,670.51

Mineral claims K14284 and K14273 show anniversary (expiry) dates of September 14, 2012. SCAVO has paid in lieu against the $2/acre work commitment required to maintain the claims in good standing. This payment has pushed the anniversary date to September 14, 2013. The author has confirmed with the Northwest Territories Mining Recorder that these two claims remain in good standing.

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

The Purple Onion Property is located approximately 275 km east of Mayo, and 200 km south west of Norman Wells, Northwest Territories. Access to the property requires a helicopter due to the mountainous terrain and lack of reasonable sized lakes. Fixed wing, float-equipped aircrafts have be used in the past to access a few lakes approximately 30 to 50km west of the property including Misty Lake, Yukon. The closest infrastructure other than the communities of Mayo, Ross River and Normal Wells include the North Canol Road and Macmillan Pass Airstrip which lie approximately 120km south of the property. All historic work in the area and on the property has been staged out of the Yukon Territory.

Typically, exploration can be conducted the beginning of June, coincident with snow melt, and may be efficiently operated until the end of August. Weather conditions and accumulating snow beginning in September quickly prove insurmountable obstacles to exploration. The opening of the North Canol Road varies as a function of seasonal snowfall and resources for road maintenance; it commonly opens later in June or early July.

5.1 Climate

The Purple Onion Property is located in the northern most part of the Selwyn Mountain Range close to the Mackenzie Mountain Range. This part of the Northwest Territories is classified as the Taiga Cordillera Ecozone of Canada (Ecological Stratification Working Group, 1995) and can be further classified as part of the Tainga Cordillera – Low Subarctic (LS) Ecoregion.

The climate is characterized by short cool summers with mean temperature of 9.5°C and long and cold winters with a mean temperature of -19.5°C. The majority of precipitation in this region falls between May and September with an average annual precipitation of 280-350mm.

5.2 Topography and Physiography

The property is dominated by rugged mountains and narrow valleys. Rock and ice glaciers are found throughout the area along with colluvial fans and thin till veneers cover the valley floors. The elevation of the property ranges from 1000 meters to over 2000 meters.

5.3 Flora and Fauna

Vegetation at higher elevations is characterized by alpine tundra flora including dwarf shrubs, lichens, saxifrages and mountain avens. At lower elevations the vegetation is characterized by subalpine open woodland flora which includes spruce, mix of medium to low shrubs, mosses and lichens. Tree line on north facing slopes and valley bottom is about 1300 mASL and about 1500 mASL on south facing slopes.

The region has a diverse range of wildlife which include caribou, Dall's sheep, moose, mountain goat, black and grizzly bear, wolf, lynx, beaver, fox, hare, raven, rock and willow ptarmigan and bald and golden eagle.

The climatological data for the nearest weather station (Norman Wells) is shown below in Figure 5-1.

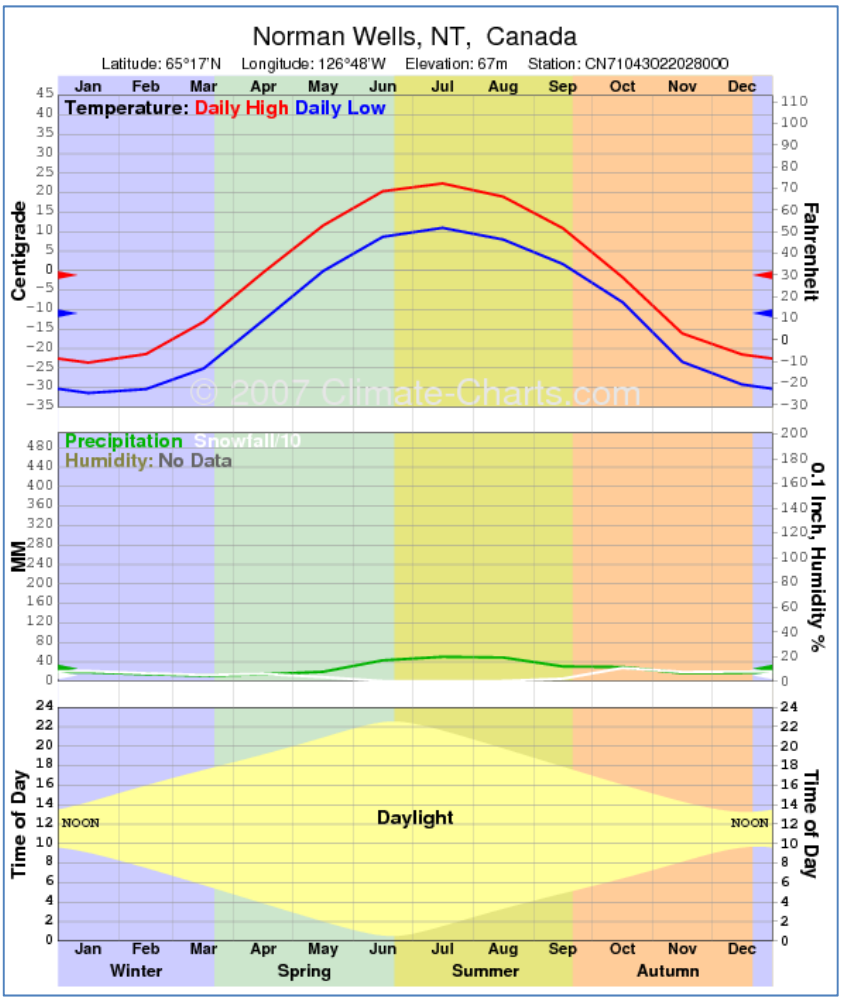

Figure 5-1 Climatological Data from Norman Wells

6 HISTORY OF MINING AND EXPLORATION

Very little historic work has actually been completed on the property. The first recorded work in the area was a regional prospecting program (Debicki, E.J., 1978) carried out by the Arctic Red Joint Venture in 1974. Several lead and zinc showings (ie. CAB and Gayna River) were discovered during this program.

Regional prospecting and mapping programs have taken place in and around the property throughout the 1970's and 1980's by a number of different companies including Canadian Nickel Company Limited (Canico), Harman Syndicate, Welcome North Mines Ltd., Serem Ltd., Noranda Exploration Company Ltd.

From the late 1970's to early 1980's Canadian Nickel Company Limited (Canico) conducted a number of geology and geochemical surveys on Prospecting Permits 524-528 which overlaps the Purple Onion property. Surveys included prospecting and mapping as well as soil and stream sediment sampling. The regional exploration program for shale-hosted Pb-Zn-Ag style mineralization resulted in the identification of a number of barite occurrences in the Besa River Formation and a number of Pb, Zn, Ag and Cu soil anomalies. In the late summer of 1980 Canico drilled 4 diamond drill holes (208.8 meter total) to test soils anomalies. The work program was unsuccessful at finding any economic Pb-Zn-Ag mineralization and Canico determined that the barite occurrences were too remote to pursue further. Permits were left to lapse at the end of 1980.

The area covering the property was part of a much larger regional geochemical survey conducted in 2008 and 2009, under a Joint Research Agreement between the Northwest Territories Geoscience Office (NTGO) and Natural Resources Canada. It is this data which mostly encourages further work in this area Figures 6.1 to 6.4). The NTGO stream sediment sampling reveals as significant number of anomalous results over the Purple Onion Property. Of particular interest to SCAVO is the high arsenic values which lends to a conceptual SEDEX model versus sedimentary carbonate MVT type mineralization in this area. The stream sediment data definitely indicate further work is warranted in this area to follow up on potential SEDEX mineralization occurrences.

Strategic Metals Ltd. staked the ground which the Purple Onion Property surrounds in early September of 2010. These claims were recorded in October in 2010. The author is unaware of what exploration has been conducted on Strategic's ground.

Coltstar Ventures Inc. staked the Purple Onion Property in 2010. Exploration conducted on the property since this time is documented in Section 9 of this technical report.

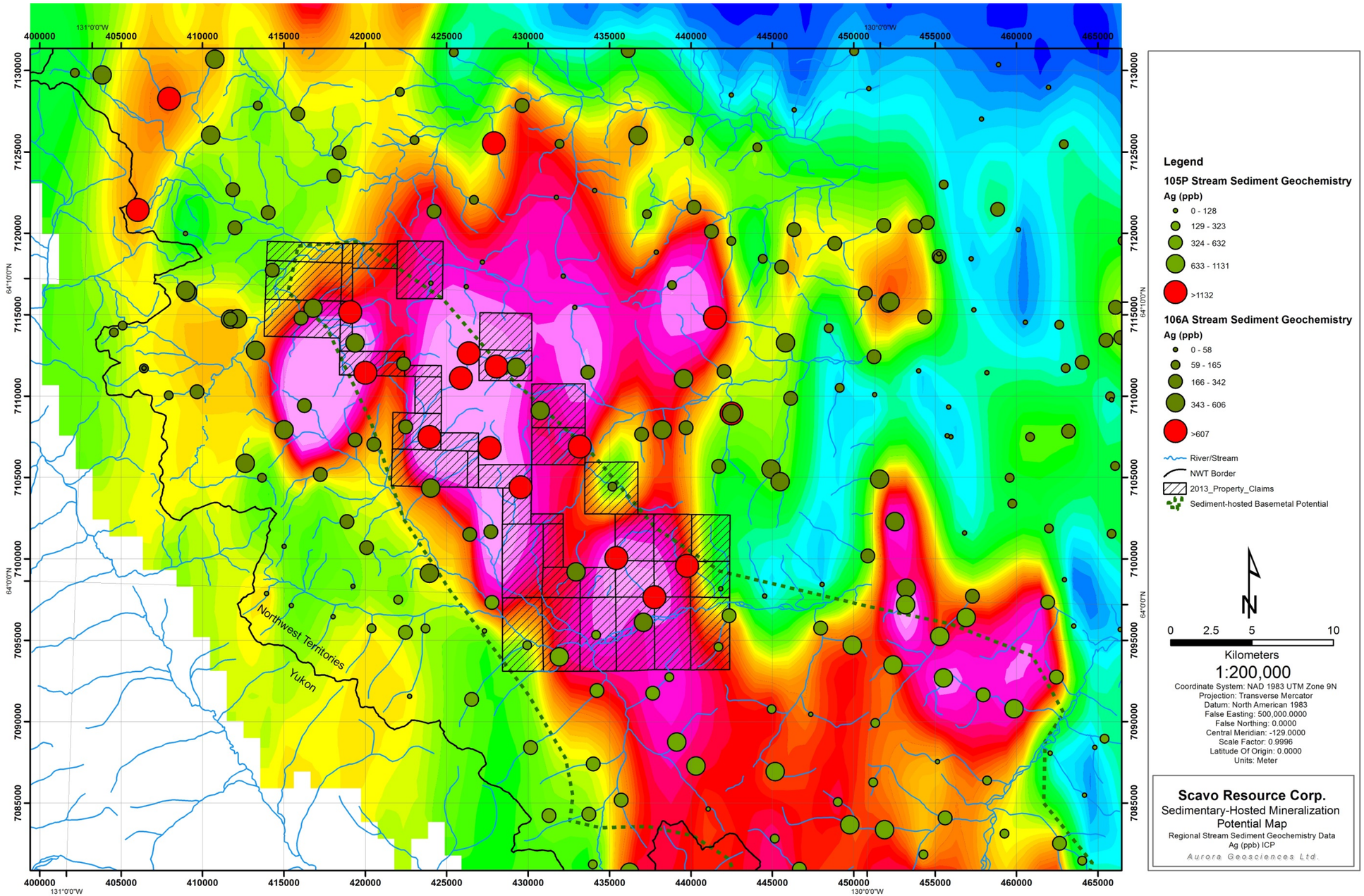

Figure 6-1. Stream Sediment Sampling Results - Ag (ppm) (Day et al., 2008)

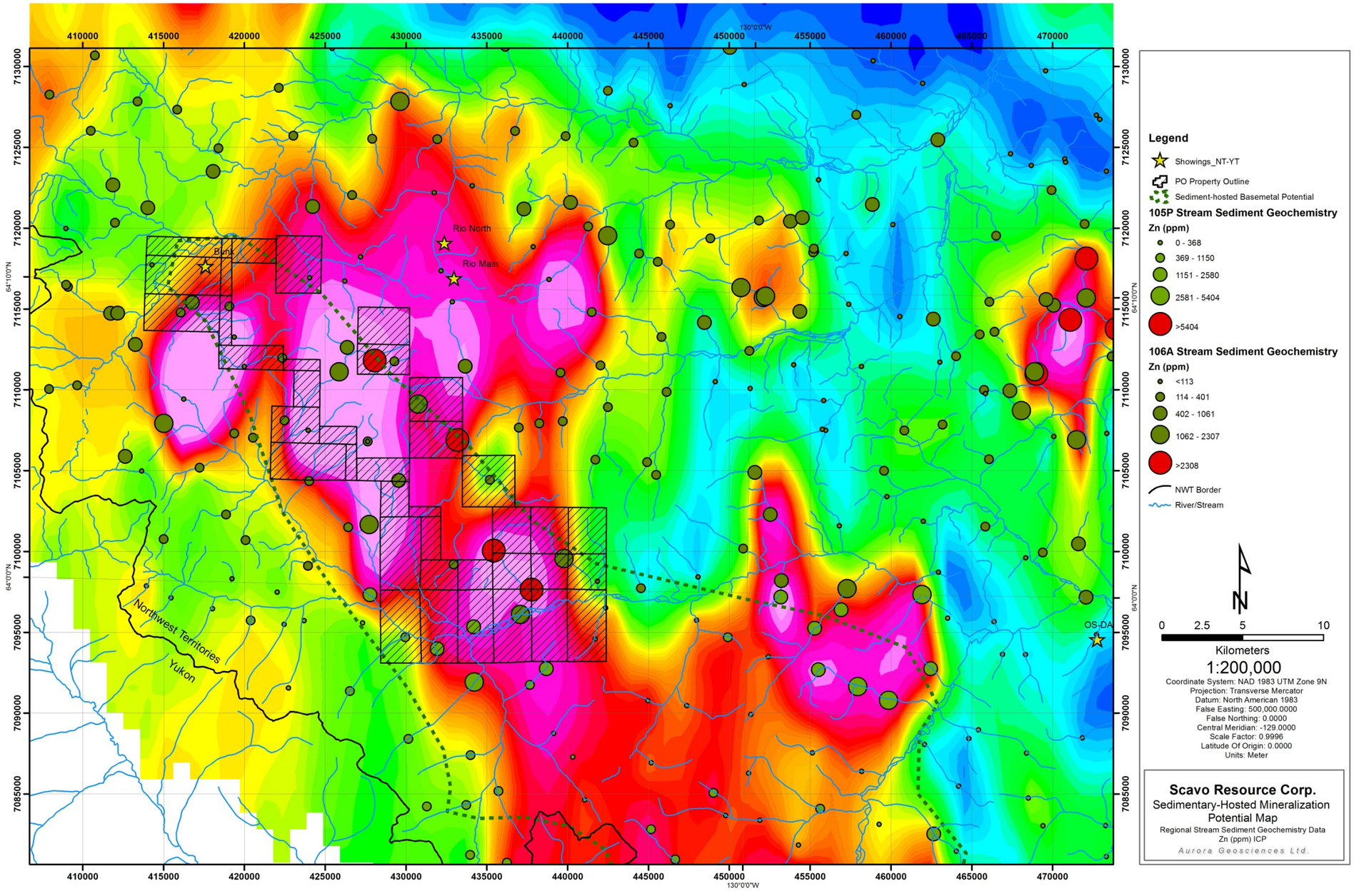

Figure 6-2. Stream Sediment Sampling Results - Zn (ppm) (Day et al., 2008)

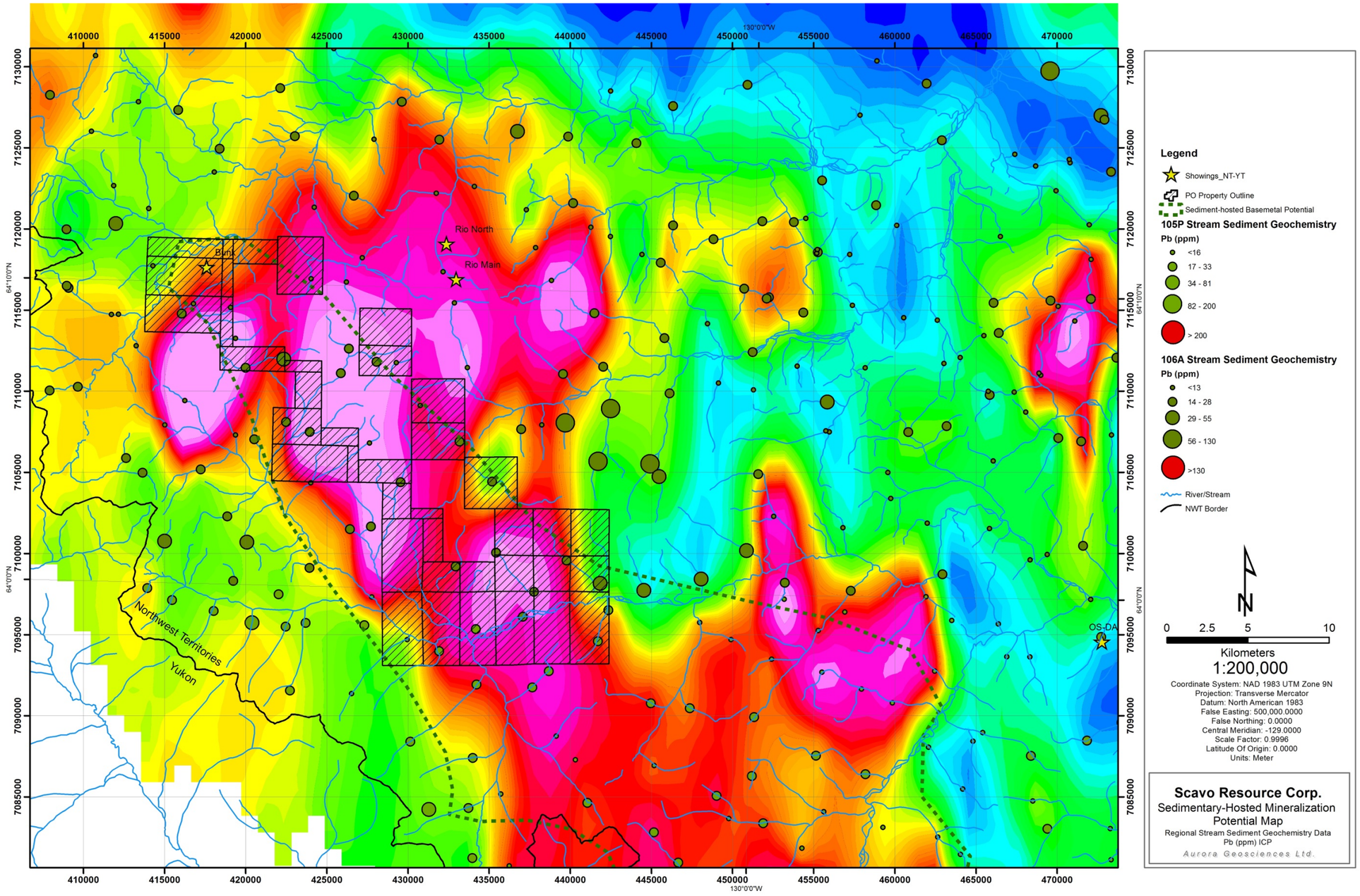

Figure 6-3. Stream Sediment Sampling Results - Pb (ppm) (Day et al., 2008)

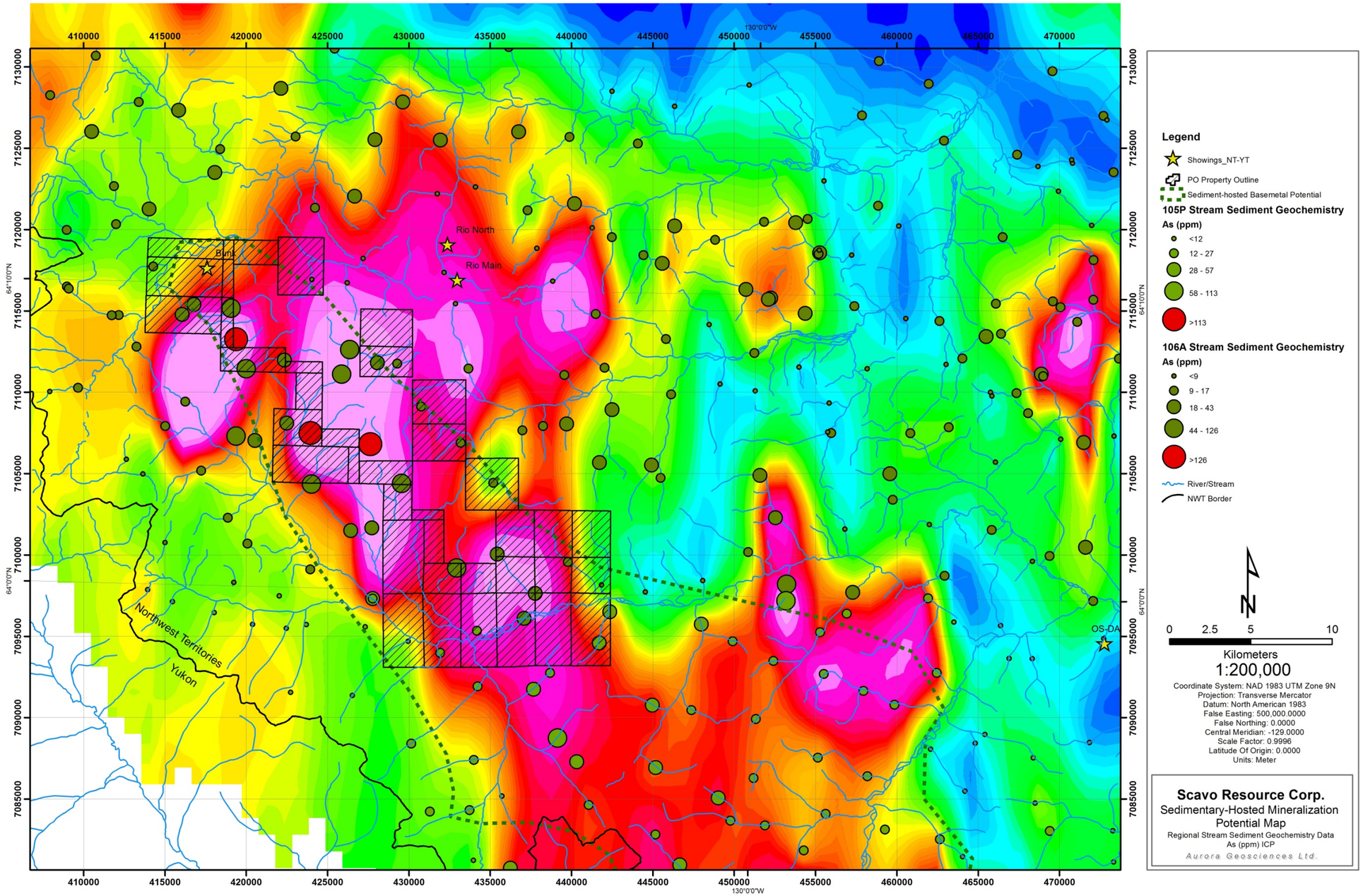

Figure 6-4.Stream Sediment Sampling Results- As (ppm) (Day et al., 2008)

7 GEOLOGICAL SETTING

7.1 Regional Geology

The Purple Onion Property lies within a geological environment known as the Selwyn Basin and particularly within the Misty Creek Embayment. The Selwyn Basin is located on the east central edge of the Yukon Territory and extreme southwestern edge of the Northwest Territories, encompassing an area approximately 200 km by 250 km (Figure 7.1). The Basin thins out to the northwest and is offset up to 600km into Alaska. Remnants of the Selwyn Basin can be traced into northeastern British Columbia. The Selwyn basin definition is taken from Gordey (1993) as a "region of deep-water offshelf sedimentation that persisted from late Precambrian to Middle Devonian time. The basal deposits consist of late Precambrian rift clastics, overlain by rift clastics of late Devonian age. The northeast margin comprises time-equivalent strata of the Mackenzie Platform (MA) and along the southwest margin is the Cassiar Platform (CA) comprising Siluro-Devonian carbonate clastics. The southwestern limit is the approximate limit of the miogeocline in the Yukon". The Gordey definition spans the offshelf facies comprising the late Precambrian to lower Devonian stratigraphy and also the offshelf facies marking the irregular transition to the carbonate platform.

The following is a description of the regional geology as referenced from the NTGO Selwyn-Mackenzie Shale basins (SELMA) Project (Ficsher, 2011).

The Lower Paleozoic basinal rocks in 106B and the northeastern portion of 105 O were deposited in an embayment, known as the Misty Creek embayment, whose development initiated off the NE edge of the Selwyn basin in the Early or Middle Cambrian. The embayment continued to deepen as a result of recurrent incipient rifting throughout the Ordovician (Cecile, 1982). A submarine ridge known as the Niddery high delimited the southern end of the Misty Creek embayment and the northeastern edge of Selwyn basin proper (Cecile, 2000; Fischer, 2011; *Figure 7.1).*

Facies changes at all stratigraphic levels, from Middle Cambrian to late Early Devonian, mark the transition from basinal rocks of the Misty Creek embayment to carbonate rocks of the Mackenzie platform to the east, NE, and north of the embayment; and carbonate rocks of the Ogilvie arch to the NW of the embayment. The position and character of the slope transition changed with time, and is as-yet poorly understood (Cecile, 1982). Northeast-trending structures in the Mackenzie Mountains have been suggested to represent ancestral strike-slip faults, formed during the same Late Proterozoic or Early Cambrian rifting that led to passive margin development (Cecile et al., 1997), but the relationship of the NW-trending Misty Creek embayment to this earlier rifting is not known.

Carbonate rocks of the Mackenzie platform are exposed in the eastern and northeastern parts of 106B. These rocks include the Early Cambrian Sekwi Fm., which was deposited as a carbonate ramp and open shelf along the margins of the Selwyn basin before development of the Misty Creek embayment, and younger carbonate-dominated successions of Ordovician (Franklin Mountain Fm.), Silurian (Mount Kindle Fm.), and Devonian (numerous formations) age, ranging to as young as early

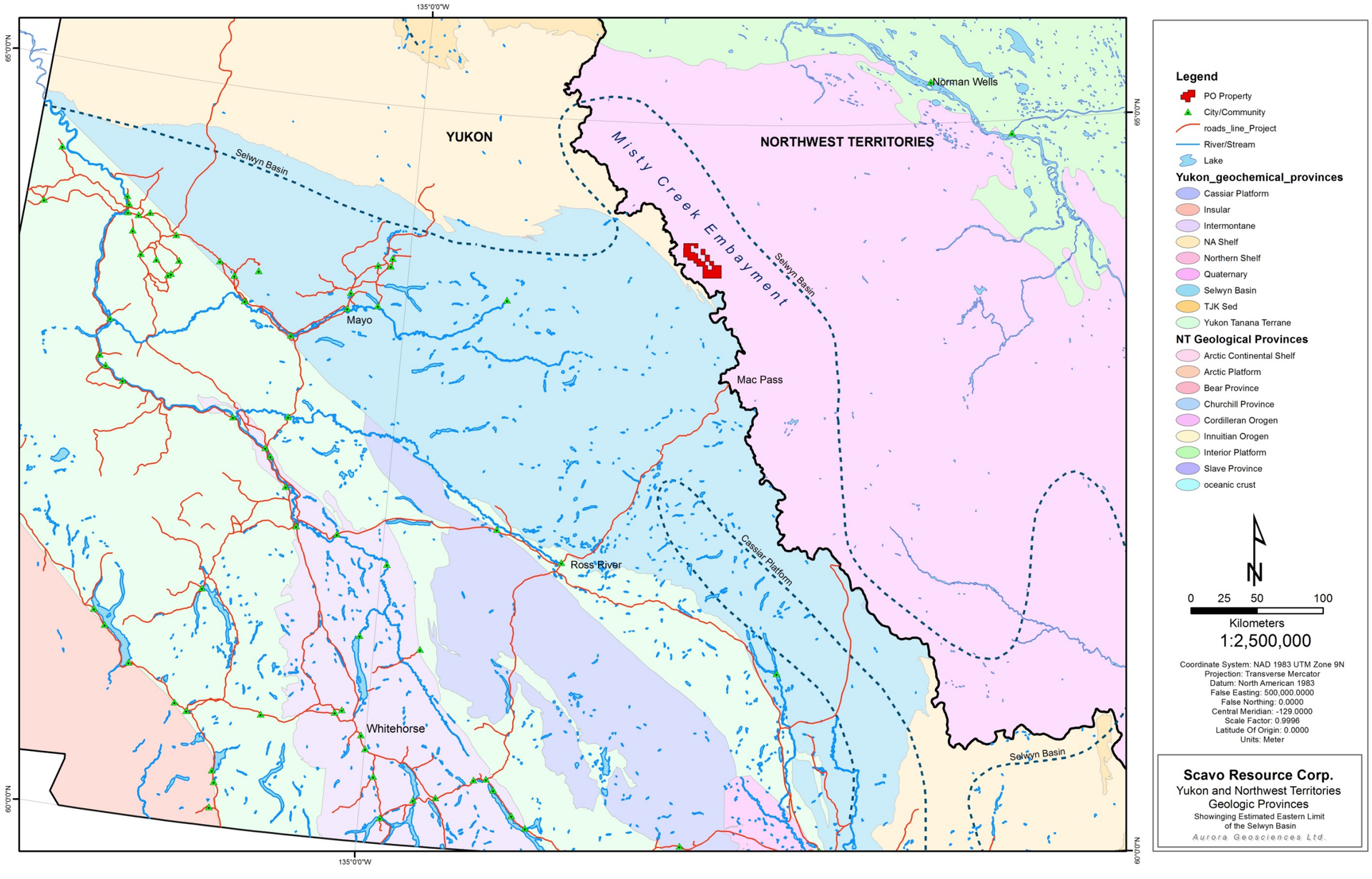

Figure 7-1. Terrane Map of Yukon and Western NWT (after Gordey and Makepeace, 1999)

Middle Devonian. Many of these host significant mineralization of the "carbonate-hosted Zn-Pb" type (MVT).

A major shift in tectonic regime in the middle of the Middle Devonian resulted in uplift of parts of the Selwyn basin west of 106B. These rocks and other sources to the NE, north, and west shed terrigenous clastic debris across the remaining parts of the Selwyn basin and the Mackenzie platform, terminating the development of the passive margin. The youngest strata of the new regime are shale and siltstone; NE of the Hess River these strata belong to the Canol Fm., and SW of the Hess River to the Misfortune Fm, (The Canol and Misfortune formations are mutually continuous and differentiated only on the basis of overlying strata; Cecile, 2000). Repeated turbidity flows created extensive sandstone fans on top of the fine-grained siliciclastic strata. Northeastern sources produced dominantly quartzitic, coarse-clastic strata (Imperial Fm.), while western sources produced coarse quartz-chert-lithic strata (Thor Hills Fm.). The dividing line between them is roughly along the Hess River, they have not been distinguished in the 106B area, where all such rock are mapped as Earn Group (Figure 7-2 and 7-3).

Orogeny and consequent mountain-building began in the late Mesozoic. By the Late Cretaceous, the rocks of 106B had been thrust northeastward in a number of parallel belts, and folded tightly on NW-trending axes. They are largely unmetamorphosed.

7.1.1 Stratigraphy

The oldest unit in the mapped area is the Early Cambrian Sekwi Formation, which consists primarily of resistant, orange and grey weathering limestone and dolostone.

The Middle Cambrian Hess River Fm. consists of black shale, black calcareous shale, and thinly bedded lime mudstone. Although generally recessive, the nature of the thrusting has preserved it in broad, rounded, debris-covered hills where it is locally well-exposed in sheer cliffs. It is also exposed in creek cuts.

A thick succession of Rabbitkettle Fm. (which regionally is Late Cambrian to Ordovician) overlies Hess River Fm. and consist of thin- to medium-bedded, yellowish grey weathering, silty lime mudstone and lime siltstone with light grey, bedding-parallel bands and lenses of diagenetic calcite. Yellow-weathering, silty cross-laminations and current ripples are common. Horizontal burrows are locally abundant on bedding planes, and slump breccias of imbricated, elongate clasts were noted in a few places. An upper member of deeper-water deposits about 50 m thick is present in some parts of the mapped area, and consists of very thinly bedded, dark grey lime mudstone with very little terrigenous silt.

Duo Lake Fm. in the mapped area consists of black shale, black calcareous shale, dark grey siltstone, and thinly bedded to platy limestone. The upper part of this unit contains abundant black chert and beds of bioclastic limestone. Regionally, the unit is Ordovican to Silurian; we identified Early Silurian graptolites

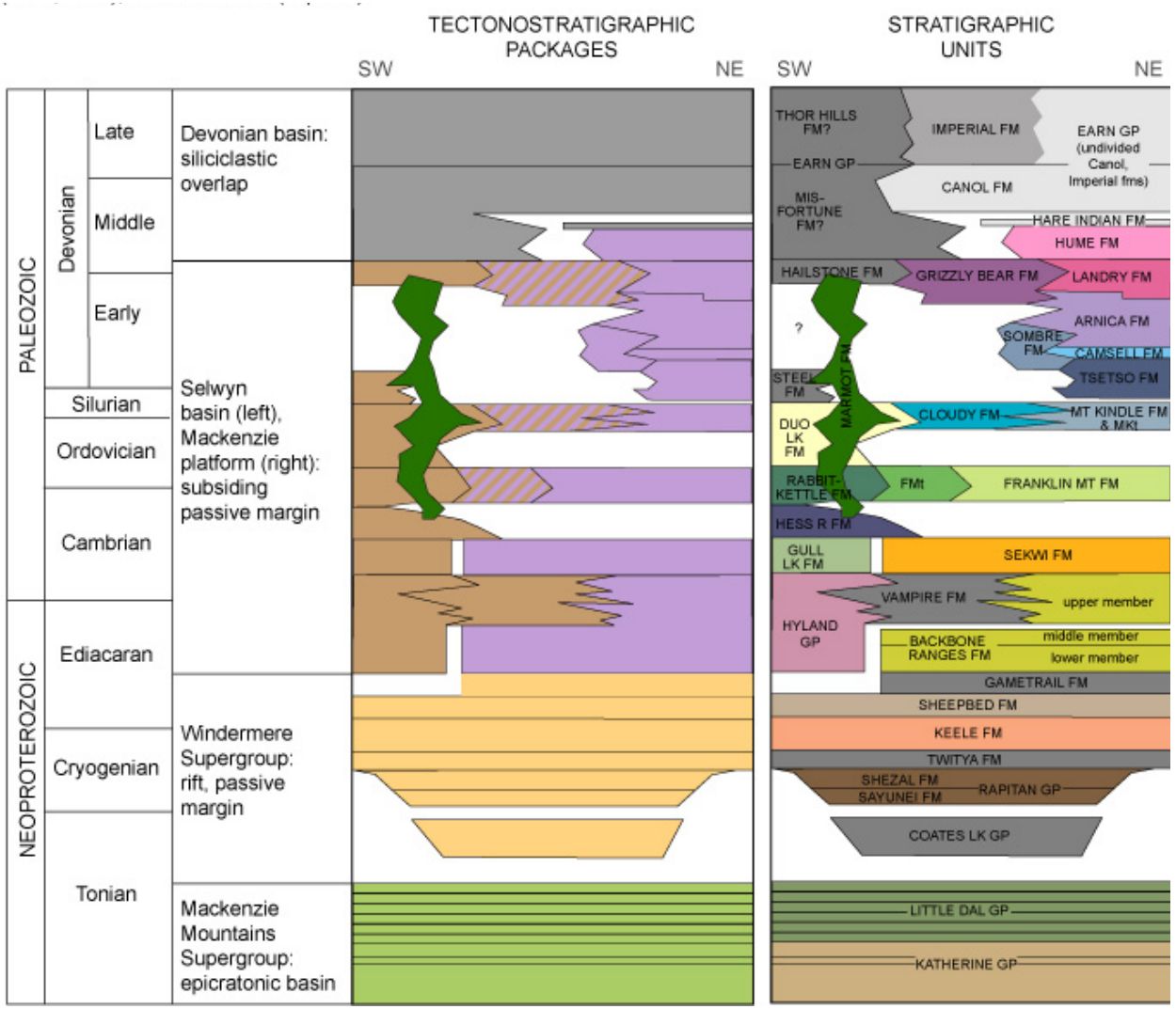

Figure 7-2. Lithological Units for Geology Map of 106B (after Fischer, 2011)

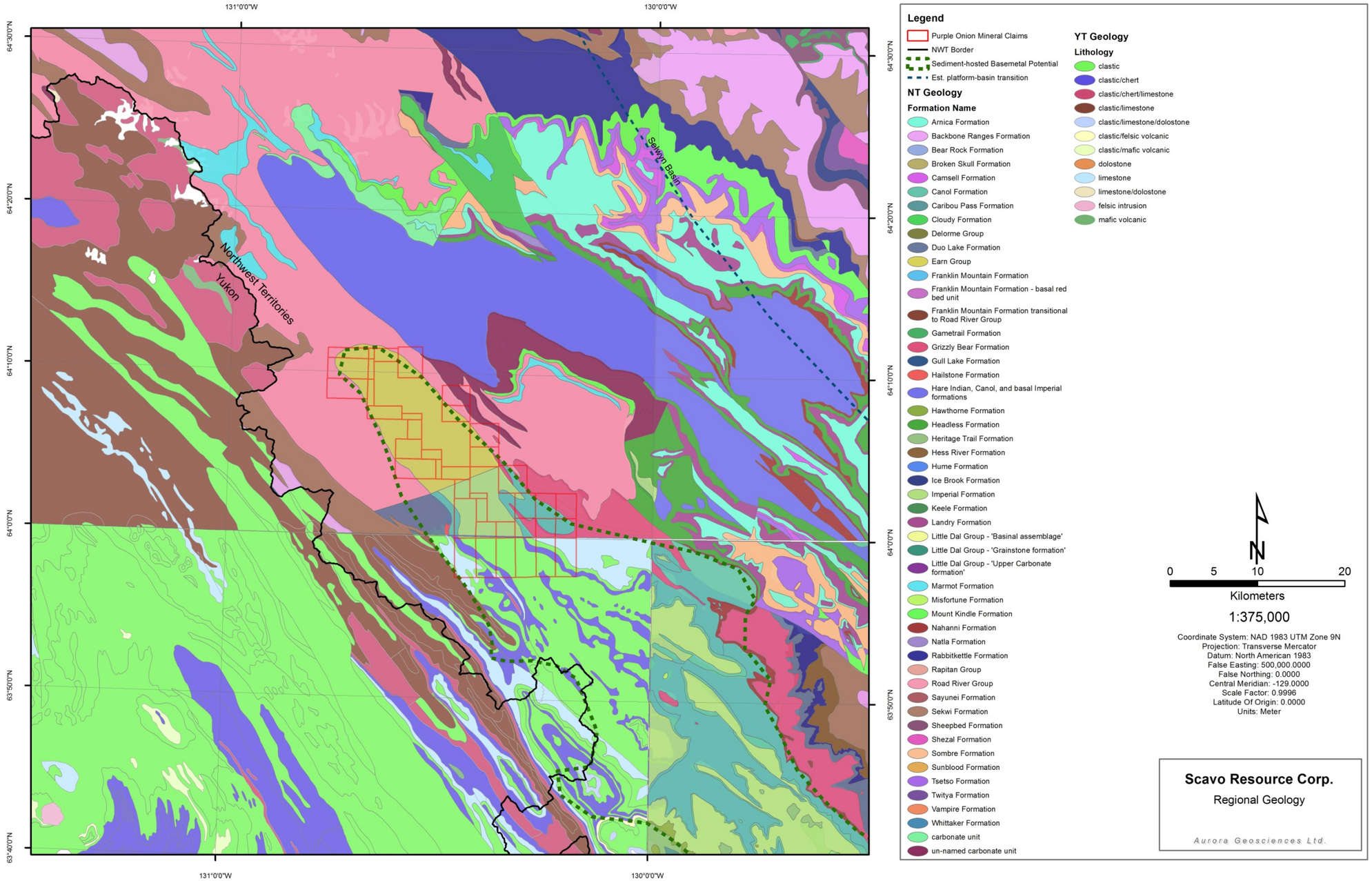

Figure 7-3. Regional Geology (Geology after Fischer, 2011; Gordey and Mackpeace,1999)

A disconformable contact with overlying Early Devonian Hailstone Fm. was noted by Cecile. In the southern part of the map area, this contact is marked by a 2-5 in-thick bed of massive, unsorted limestone conglomerate, but in the north there appears to be an intervening unit (Cloudy Fm?) of thin-bedded limestone and black shale. Cecile (1982, section 9) had previously identified an olistostrome of Cloudy Fm at the north end of the mapped area. We observed chaotically folded strata sandwiched between largely undeformed strata, and interpret this as the southern part of the same olistostrome, which is at least 8 km long.

Hailstone Fm. in the study area consists of black shale and mudstone in centimeter-, meter-and decameter-scale intervals alternating with meter-scale intervals of yellowish grey-weathering bioclastic limestone. The unit was distinguished by the presence of crinoid ossicles with twin axial canals, said to be diagnostic of a late Early Devonian to early Middle Devonian age (Cecile, 1982, referencing a personal communication from A.W. Norris in 1980).

The Marmot Fm. is a mafic volcanic and volcaniclastic unit. Regionally it is interstratified with and intrudes Rabbitkettle to Hailstone formations and all intervening units. In the central part of the study area, Marmot Fm. lies directly on Rabbitkettle Fm., whereas in the north and south, it is younger, and lies within the Duo Lake Fm. near its base. Both flows and elastic units were identified, but we were unable to map them separately in the time available. A diatreme and sills were previously identified on the outskirts of the mapped area. Volcaniclastic rocks predominate along traversed paths, but large areas that were inaccessible by traverse were not investigated. A major rock type in the traversed areas is a poorly to un-sorted, clast-supported, volcaniclastic conglomerate containing fossil fragments (crinoids, corals), volcanic clasts, and limestone clasts. Cecile (1982) noted the same rock type 40 km to the southeast, associated with abundant monolithic, unsorted volcanic breccia and coinciding with an unusual thickness of Marmot Fm.. He interpreted these features to indicate proximity to a volcanic center which, in its later stages, included a subaerial edifice. The succession in the Selma 2011 area is very similar, and may represent the second major volcanic center to be identified in the Misty Creek Embayment.

We visited dolostone (including coral dolorudstone) cliffs of probable Silurian age, separated from underlying Cloudy(?) Fm. by a thin interval of quartz-pebble conglomerate and dirty sandstone. The mapping needs to be extended in order to characterize and identify this unit. The sandstone at its base is probably a platform-to-slope transitional facies.

The youngest units in the mapped area are Canol Fm. shale and siliceous mudstone with sparse thin beds of limestone, and overlying Imperial Fm. sandstone, both of which belong to the Mid-Late Devonian Earn Group. In rubble covering the base of a mountain whose upper parts are Canol Fm., we found a sample of black shale containing abundant specimens of the mollusc Tentaculites sp., which is common in the Bluefish member of the Hare Indian Fm. The Hare Indian Fm. is a black shale unit that underlies the Canol Fm. east of 106B. We also mapped a very graphitic black shale along a fault, and have yet to determine whether this belongs to the Eam Group (Bluefish member?) or an older unit. Strata to the east of the Selma 2011 area, that we examined in 2009, include a Tentaculitid-containing unit that might be Bluefish member above a thick-bedded Early-Mid Devonian limestone.

7.2 Property Geology

The property geology has been summarized from the Canadian Nickel work that was completed back in the late 1970's (Debicki, 1978). Most of the area work was completed during the original findings and

releases on the Howard's Pass, Tom and Jason deposits.

The geology map from the Bebicki report cannot, without significant work be reproduced but there is a table of stratigraphy (Table 7-1) for units located within the Purple Onion area and a detailed description of these units. The following is excerpted from the Debicki report noted above:

Table 7.1. Lithologies on the Purple Onion Claims

Unit Number	Unit Host	Lithologic Description
7a	**1 gr**	Felsic plutonics - granite, granodiorite, qtz monzonite (not seen on permits)
7b	**Vb**	Basic Volcanics - amygdaloidal flows - green to brown & orange weathering
6a	**Schrt**	Chert - dk grey to black on weathered & fresh surface, minor slst and shale
6b	**Schrt**	Chert - light grey to green on weathered and fresh surface
5a	**Sbrt**	Barite - bedded, finely lam, light to dark grey on fresh and weathered surface
4a	**Sslts**	Siltstone, sandstone - light to dark brown weath, grey on fresh surface, pyritc and partly calcareous
4b	**Ssltsh**	Siltstone, intbd shale - pyrtic in part, predominantly slst with shale, black weathering
3a	**Ssh**	Shale - black, silvery weathering, fissile and calcareous in part
3b	**Ssh**	Shale - dark brown to black weathering, fissile, crunchy, graptolitic
3c	**Ssh**	Shale - grey-green to brown weathering, grey-green on fresh surface, minor sandstone beds
3d	**Ssh,brt**	Shale, barite shale with spotted barite - minor pyrite and cherty in part
3e	**Ssh**	Shale, mudstone - green to maroon weatheirng, green and maroon on fresh surface (Hadrynian)
2a	**Scong**	Conglomerate - chert pebble, interbedded shale, slst, slst in part graphitic
2b	**Scong,ss**	Conglomerate, sandstone - light grey to dark grey on fresh and weathered surface
2c	**Vplc**	Volcanic, pyroclastic - polymictic, light grey, calcareous matrix, light green weathering, prob volc origin
1a	**Sls**	Limestone - dark grey to balck, fetid, blocky to flaggy-buff weathering in part
1b	**Sls**	Limestone - light to buff grey on fresh and weathered surface, finely laminated

1c	**Sls**	Limestone - light to medium grey weathering, massive, fossiliferous-graptolitic
	Sbx	Diatreme breccia - kimberlite??

In general, the mapping of the Permit block was confined to the Selwyn Basin sequences of the Road River and Besa River Formations, considered favourable for shale-hosted lead-zinc-silver deposits. The Road River Formation consists of shale, silt-stone, chert, limestone, sandstone to quartzite, conglomerate and volcanic pyroclastic breccia-conglomerate. Overlying these sequences are shale, siltstone, minor limestone, chert and barite of the Besa River Formation and shale, siltstone and sandstone of the Imperial Group. A shale similar to the Besa River Formation was found to overlie the Imperial Group and has been temporarily correlated with shales of Tertiary age known to occur in the Macmillan Pass area, Yukon, 100 km to the south.

The Road River Formation occupies the western portion of the Permit block, with a smaller sliver on the eastern side. It is generally recessive, poorly exposed and occurs at lower elevations. The Besa River Formation and overlying Imperial Group occupy the east-central portion of the Permit block. They are generally much better exposed and occur at higher elevations. The Imperial Group normally caps the tops of some of the higher ridges in the area. Cambrian Sekwi Formation carbonates and Ordovician-Devonian Mt. Kindle, Franklin Mountain and Delorme Formation carbonates occupy the western and eastern portions of the Permit block, respectively. On the eastern edge of Permit #525, a diatreme breccia with a diameter of about 500 metres has intruded the Road River Formation.

Geological mapping was carried out by detailed ground traverses and helicopter reconnaissance. Traverse locations and traverse numbers are noted on Map 3, Stream Sediment Anomaly and Traverse Locations.

The characteristics of the lithologies in the work area correspond to Table 7.2 and are as follows:

(i) Unit la

Unit la is comprised of grey to black weathering, locally buff to light brown weathering, dark grey to black micritic limestone. It is flaggy to blocky, weak to strongly fetid, locally laminated with bedding up to 10 cm thick; parts are graphitic to sooty; it contains minor fossils, bioclastics and nodules. Sedimentary structures include convoluted bedding and mega-ripples. Locally, it is interbedded with shale. Overall, Unit la becomes siltier to the west.

In the western portion of the area, Unit la becomes a silty micrite, grey weathering, and with cross laminations and ripple drift cross laminations. It grades locally to buff to grey weathering with black calcareous shale interbeds. Locally, it is intensely brecciated and re-cemented with calcite. Calcite veining up to several decimeters is common.

In the northern part of the work area, Unit la is composed of inter-beds of sandy limestone, calcareous black shale and shale-limestone conglomerate. Disseminated pyrite up to 2% occurs as euhedral crystals

and colloform aggregates up to 5 mm in size. Pyrite-calcite nodules up to 20 cm in diameter occur sparsely scattered within the limestone beds.

Unit la is assigned to the Road River Formation.

Unit lb

Unit lb is a buff-brown, buff-grey to light-grey weathering, medium-grained, grey, massive, finely laminated limestone. It is flaggy to blocky. This unit includes grey to grey-black fossiliferous limestone, thin to thickly bedded, with sparry calcite fossil fragments. It contains interbanded black, gritty, sooty to graphitic, lamellar, platey limestone and sandy, grey to grey-brown lamellar, platey limestone. Calcite, quartz carbonate and barite-calcite veins 1 - 30 cm wide cross-cut the limestone or are parallel to the bedding as zebra structures.

The Unit lb is assigned to the Road River Formation.

Unit lc

Unit lc is a light to medium grey weathering massive bioclastic and conglomeratic limestone. It is locally fetid, very resistant to weathering, generally massive, and graptolitic. It contains abundant coarse bioclastic fragments and occasional limestone clasts. Fossils include crinoids, gastropods and bryozoans. Locally, near the contacts with Unit 3b in the eastern portion of the work area, Unit lc is comprised of a collapse limestone breccia.

The unit may represent a transitional facies of the Mt. Kindle and Franklin Mountain Formations.

Unit lc is part of the Road River Formation.

Unit 2a

Unit 2a is a chert pebble conglomerate with interbedded shale and silt-stone (in part graphitic). This unit does not outcrop on the Permit block, and no facies equivalents were noted.

Unit 2a is grouped into the Besa River Formation.

Unit 2b

Unit 2b is a conglomerate-sandstone, light-grey to dark-grey on both fresh and weathered surfaces. Locally, where it occurs as a limonite-rich sandstone to silty sandstone, it is dark brown to rusty weathering and platey. This sandstone grades to a limonitic quartzite, yellow-green coloured quartzite or quartz wacke containing minor or no calcite and occasionally with a minor Unit 2c pyroclastic component.

In the north part of the work area, Unit 2b is a sandstone to rudaceous conglomerate containing clasts of grey chert and siliceous silt-stone with minor pyrite. It may be transitional with the Unit 2c pyroclastic volcanic; however, it contains depositional features such as ripple marks and cross-bedding in the sandstones. Locally, it is cut by calcite veins up to 2 cm in width which localizes the pyrite as colloform

masses. The pyrite colloforms are in the same orientation as the calcite veins. Pyrite also occurs as ellipsoidal blebs 5 cm - 2 m in length along planar surfaces.

In the western portion of the work area, near the Sekwi Formation contact, Unit 2b is a grey to rusty weathering limonitic quartzite, partly calcareous and conglomerate containing fine polymictic clasts to coarse (10 cm) black chert clasts in a calcareous matrix. This conglomerate may actually be a pyroclastic tuff-breccia of Unit 2c.

Generally, Unit 2b is restricted to the western portion of the work area; it is assigned to the lower Road River Formation.

Unit 2c

Unit 2c occurs at several localities throughout the work area. It is a volcanic pyroclastic tuff-breccia, generally light green to greenish brown weathering, polymictic, light grey on fresh surfaces and with a highly calcareous matrix.

Unit 2c is interstratified with chert, shale, sandstone and limestone of the Road River Formation. According to Cecile, 1978, the volcanic centre can be placed somewhere near the southeastern portion of the work area.

Unit 3a

Unit 3a is a silvery weathering black shale, very fissile, carbonaceous and siliceous. It makes a tinkly sound when one walks upon talus slopes or felsenmeer. The unit contains interbands of chert, flaggy black graphitic chert, limestone, sandy limestone up to 4 metres thick, spotted barite and bedded barite. The chert beds are cut by numerous white, moderately crystalline quartz stringers which weather rusty.

The limestone is grey to light-grey/buff weathering, partly sandy, lamellar and platey. Within Unit 3a occur one massive bedded barite horizon (Unit 5a) and several spotted barite horizons (Unit 3d) above and below Unit 5a. Below Unit 5a, Unit 3a shales contain fine to medium grained, thickly bedded limestone (3 metres thick), spotted barite horizons (Unit 3d) (4 to 5 metres thick) and partly graphitic blocky chert. Above Unit 5a, the Unit 3a black, silvery weathering shales are non-calcareous and grade into Unit 3d upwards (spotted barite).

Unit 3a occurs at two levels: one, as the Besa River Formation, and the other as a shale unit without barite in the Road River Formation below Unit 3b.

Along the western edge of the work area, a light grey to black siliceous, carbonaceous shale (undivided Unit 3) overlies the Imperial Group. This unit caps the top of a mountainous peak. It is similar to the shales of Unit 3a. There is no evidence for emplacement by thrusting according to field relationships observed. It has tentatively been correlated to Tertiary shales which overlie the Imperial Group, south of the work area.

Unit 3b

Unit 3b is a dark brown, dark grey to black weathering black shale, non-calcareous to calcareous, composed of beds 5 to 15 cm thick. It gives off a crunchy sound when walked on in talus or felsenmeer. Interbedded with the black shale are 5 cm beds of highly resistant siliceous silt-stone, concoidally fractured, with 3 mm thick rinds weathering to a bright, creamy, rust-brown colour. Unit 3b can be sheared with resultant well-developed cleavage and jointing, making bedding very difficult to discern.

The upper portion of Unit 3b consists of a 25-metre section of sandy shale, rusty black weathering, and an increased proportion of leucocratic material (greywacke or volcanoclastic). It is more resistant to weathering where intercalated with black shale. Rusty weathering, very siliceous concretions 10 - 20 cm in length occur throughout with very finely disseminated pyrite.

Unit 3b is graphitic and carbonaceous along shear planes. Monograptus graptolites were identified at several localities. Traces of spotted barite(?) were observed occasionally. The unit generally coarsens to the southeast. To the west, the unit contains 2 cm thick interbedded limestone beds.

Very fine disseminated pyrite occurs in some beds. Unit 3b is assigned to the upper Road River Formation.

Unit 3c

Unit 3c is a grey-green to brown weathering, grey-green (on fresh surfaces) shale with minor sandstone beds. Unit 3c has not been identified in the work area. It is part of the Proterozoic Windermere Grit sequence.

Unit 3d

Unit 3d is a dark grey to rusty weathering spotted barite horizon which grades from Unit 3a (black silvery weathering, calcareous to non-calcareous, siliceous shale) upwards into Unit 3d. Carbonate content in the shale decreases as barite content increases. The spotted barite is white to cream to occasionally dark grey, crystalline, forming elongated blebs up to 10 cm in length parallel to bedding planes and occupies a volume from 1% to 70%. Some spotted barite horizons have a considerable cherty component. Average thicknesses of Unit 3d are 10 metres and it occurs in Unit 3a, generally with one horizon above Unit 5a and one horizon below Unit 5a. Cleavage is platey to blocky. Minor pyrite occurs in some spotted barite horizons. A black fetid nodular limestone (Unit la) contains very minor spotted barite, but this was the only barite noted in the Road River Formation.

Unit 3d is assigned to the Besa River Formation. It forms very distinctive marker horizons within this Formation.

Unit 3e

Unit 3e is a green to maroon shale and mudstone with the same colour on fresh surfaces. This unit was not identified in the work area. It forms part of the Hadrynian Windermere Grit sequence.

Unit 4 (Units 4a and 4b)

Unit 4 is a coarsening upward turbidite sequence of predominantly siltstone, and silty sandstone with minor shale. The basal section is dominated by interbeds of black shale typical of Unit 3a. These finely bedded, fissile, black shales give way to siltstones upwards in the sequence. Some of the siltstone beds are weakly calcareous. The siltstone beds contain a high proportion of limonite disseminations causing the unit to weather a rusty red colour. Bedding thickness is lamellar to thick (proportional to grain size). Average bed thickness is 3 to 10 cm, with shales at the base of the unit exhibiting platey cleavage, becoming blocky in the siltstones. Primary structures include flute casts, small scale cross-bedding, laminated bedding, ripple marks and scour channels. The unit is interpretated as a turbidite.

Unit 4 is generally resistant and caps the tops of hills and ridges. It is a very distinctive unit because of its resistant character, obvious bedding, and weathering colour. Locally, some horizons contain "concretions" of black crystalline fetid limestone up to a 20 cm diameter. Numerous sections are weakly to strongly pyritic (pyrite grains up to 5 mm).

Unit 4 is the Imperial Group which always overlies the Besa River Formation. Mapping in the work area has divided the Imperial Group (Unit 4) into the upper siltstone-sandstone portion, Unit 4a, and the lower siltstone-shale portion, Unit 4b.

Unit 4a is an interbedded siltstone and sandstone, light to dark brown weathering, grey on fresh surfaces. It is calcareous and pyritic in part.

Unit 4b is an interbedded siltstone and shale (beds 5 cm thick) which is also calcareous and pyritic in part. Siltstone beds are medium to thickly bedded. The shale is black weathering.

(xiii) Unit 5a

Unit 5a is a light grey to grey and brown-weathering laminated, massive barite. It is resistant to weathering. Lamallae alternate in colour (white, black and dark grey). Cleavage is platey to blocky. Locally it contains laminated limestone nodules. It has a general appearance and hardness of chert. In part, the unit is highly calcareous. Barite along the northeastern margin contains distinct laminated crystalline limestone beds.

Unit 5a occurs near the top of Unit 3a. In the southeast corner of Permit #524, the bedded barite reaches a maximum thickness of 25 metres. Locally, the horizon reacts to zinc zap solutions. Barium content reaches a maximum assay value of 59.9% Ba.

Unit 6a

Unit 6a is a dark grey to black weathering, dark grey to black chert, flaggy and finely lamellar in part. It contains minor interbeds of shale and siltstone.

In the western area, Unit 6a is light grey weathering, black, partly shaly and carbonaceous. It is composed of beds 4 - 6 cm thick with fine parallel laminations visible only on the weathered surface. Graphite along shear planes is common. Locally, it contains shale interbeds, becoming very shaly at the upper and lower contact.

Unit 6a is part of the Road River Formation.

Unit 6b

Unit 6b is a chert, light grey to grey green on weathered and fresh surfaces. It does not occur on the Permit block. The unit represents a deeper-water facies and is part of the Road River Formation.

Diatreme Breccia

A diatreme breccia, with a surface exposed diameter of about 500 metres, occurs on the eastern edge of Permit #525./ The matrix, composed of quartz, feldspar, white mica and a calcareous cement, is light green weathering and of felsic composition. The clasts are pebbles and coarse sand size fragments, rounded to sub-rounded, commonly of incorporated chert and shale wallrock material. In addition, biotite mica books up to 1 cm in diameter are common in the matrix.

7.3 Mineralization

The history of mineralization in the Canadian-Alaskan Cordillera is very long, spanning over 1.6 billion years, from Mesoproterozoic to the present time. The Paleozoic might be called "the age of syngenetic sulphides", in the sense that VMS deposits associated with rifting arcs and SEDEX deposits associated with rifting continental margins, characterize this phase of tectonic history. In particular, both peri-Laurentian and exotic pericratonic terranes of the Cordillera contain deposits that are part of a worldwide peak in syngenetic sulphide formation and preservation during Devonian-Mississippian time, probably because of dual factors of rift-related tectonics and ocean anoxia (Goodfellow and Lydon, 2007).

The mineralization is variable within any of the syngenetic deposits but essentially is dominated by Zn-Pb-Cu-Ag. The mineralization commonly occurs between two formations delineating a pause in deformational environments. The deposits are characteristically hosted in fine-grained clastics in linear second- or third-order sediment starved anoxic basins.

Mineralization appears to be related to a local rifting event, although only in the MacMillan Pass deposits has this been well documented. Clear evidence of rifting is coincident with extensional faulting, deposition of coarse clastics, volcanism and mineralization. SEDEX deposits are the result of exhalative fluids being channeled by syn-sedimentary faults and precipitating on the sea floor. Syngenetic ores are laminated and interbedded with host rocks and can be replaced and brecciated by later ore fluids.

Volcanism can be coeval with mineralization, such as at Anvil and Mac Pass. Some occurrences within the Selwyn Basin have characteristics of both SEDEX and VMS deposits and can be classified as transitional between the two.

The author has been unable to personally verify the mineralization of adjacent these properties and any such mineralization is not necessarily indicative of the mineralization on the property that is the subject of this technical report.

8 DEPOSIT TYPES

8.1 Howard's Pass ,Tom and Jason SEDEX Massive Sulphide Deposits

Syngenetic deposits in rocks of Selwyn Basin and Earn Group span a range of ages, size and grade, mineralogy, tectonic environments and levels of deformation, alteration, metamorphism and preservation. The large, significant deposits are distributed on either side of Selwyn Basin.

Some elements are common between these deposits. Mineralization occurs at or near contact between two formations, marking a pause or transition in depositional environment. Deposits are usually hosted in fine grained clastics in linear second- or third-order sediment-starved anoxic basins. In all cases, mineralization is inferred to be related to a local rifting event, although only in Macmillan Pass is this well documented. Throughout the evolution of Selwyn Basin, several local and episodic extensional events are documented. In the best of cases, clear evidence of rifting is found in the coincidence of extensional faulting, deposition of coarse clastics, volcanism and mineralization. SEDEX deposits occur as the exhalative fluids are channeled by syn-sedimentary faults and precipitate on the sea floor.

Some mineralogical, chemical and textural zoning is usually present. Syn-sedimentary ores are laminated and interbedded with host rocks, and can be replaced and brecciated by later ore fluids.

Igneous rocks can be important controls for some syngenetic deposits. Volcanism is quite often found to be coeval with mineralization such as in the Anvil and Macmillan Pass district. Volcanogenic mineralization is present at the Marg deposit. It is discussed here as it represents another end of the spectrum of exhalative activity. Some occurrences within Selwyn Basin have characteristics of both SEDEX and VMS deposits and would be classified as transitional between the two models.

The author has been unable to personally verify the mineralization of the properties discussed in this section and any such mineralization is not necessarily indicative of the mineralization on the property that is the subject of this technical report.

A brief description of the 4 main deposits within the Selwyn basin are listed in Table 8-1.

Table 8.1. Selwyn Basin Mineral Deposit Summary

	Anvil district	***Howards Pass***	***Macmillan Pass***	***Marg***
Age	Cambrian	Silurian (Llandovery)	Devonian	Devono-Mississippian
Host Formation	Mt Mye/ Vangorda contact (correlated to Gull Lake/ Rabbitkettle)	Road River	Earn Group	Earn Group
Main minerals	Pyrite (sphalerite, galena, barite, minor pyrrhotite)	sphalerite, pyrite, and galena	galena, sphalerite and barite	pyrite, sph, cp, galena, tetrahedrite and asp
Ore zoning	Anvil cycle siliceous at base, pyritic above, barite in core	Active Member: zoned vertically and laterally: Zn/Pb+Zn increase from base to top and from center to margin; Hg/Zn in sphalerite increases from center to margin. High grade core where thickest.	Zoning of metal ratios, hydrothermal facies and sedimentary textures upward and away from vent and related syn-sedimentary fault.	Vent: carbonate massive pyrite with high Cu/ Pb and Zn/Pb ratios; footwall: carbonate-qtz-py-sericite schist
District approximate size	Pre-mining: 120 Mt 5 deposits Relatively high grade and large tonnage	Geological: 110 Mt Inferred: 360 Mt 2 deposits Low grade, large tonnage	Geological: 17 Mt calculated on 2 deposits. High grade, small tonnage. District: 3 massive sulphide deposits, 13 barite deposits	Geological: 5.5 Mt 1 deposit
Pb/Zn	Zn> Pb	Zn>> Pb	Tom and Jason: Pb≥Zn, > 1on/T Ag. Boundary Ck:: Zn> Pb	Zn>Pb> Cu
SEDEX features ***Presence of volc./intr. rocks***	Associated with facies change; diffuse stringer zones textures masked by metamorphism. Neither vent facies nor breccia. Mafic volcanics and related intrusions, spatially related to prospective contact	Fine grained laminated sulphidic ores in anoxic chert-limestone-shale basin; syn-sedimentary deformation; no evident growth fault (only slumping and thickening of strata) No	Associated with active rifting: coarse clastics, syndepositional faults, brecciated vent complexes, laminated ores, diamictites, volcanism Mafic flows and tuffs, also reworked in diamictites	**VMS** features: mineralization above metavolcanic rocks (crystal tuffs), Cu and Au; massive to layered sulphides Felsic lithic, crystal ash and lapilli tuffs and flows below mineralization
Metamorphism	Metamorphic recrystallization obliterate primary textures	Sedimentary and diagenetic textures		Upper greenschist
Alteration	Sericite	Muscovite, illite	Fe-carbonate (hydrothermal alteration) associated with silicification	Footwall alteration: sericite, Fe-carbonate, local black chlorite

9 2012 EXPLORATION PROGRAM

Sections 8.1, 8.2, 8.3, and 8.4 were extracted from an internal report prepared by Baldwin (2012)

The crew mobilized from Whitehorse to Colorado Resources' Oro base camp at Macmillan Pass, YT on August 21st, 2012 and began work on the property on August 23rd, 2012 due to delays caused by vehicle trouble on the North Canol Road, YT. The geological program was designed to follow up on areas where the Earn group, particularly the Canol Formation, is mapped on the CV claims, as well as investigating lead, zinc, silver, and arsenic anomalies in silts collected by the NTGO as part of the National Geochemical Reconnaissance (NGR) program in 2008. The goals of the geological program were twofold: 1) To greatly expand the NGR stream sediment (silt) dataset on the CV claims in an effort to better isolate the source areas for the existing anomalies, and 2) To perform reconnaissance-level mapping and rock sampling in areas where there are known geochemical anomalies. This later objective was aided by the use of a Thermo Scientific Niton portable XRF analyzer. A total of 79 silt samples and 16 rock samples for assay, as well as 42 field analyses by XRF were collected over the course of the program

The program was structured to focus on stratigraphy in several areas across the claim block, chosen on their proximity to existing stream sediment geochemical anomalies, the quality and amount of bedrock exposure, accessibility of the target area by helicopter, and the presence of previously mapped lower Earn Group, or where subdivided, the Canol Formation. Mixed weather conditions provided a moderate impediment to the productivity of the program, limiting the choice of flight routes, thereby increasing the already considerable ferry time from camp at Macmillan Pass, as well as limiting access to higher altitude portions of the property. This, paired with the limitations presented by a recessive rock type (shale) limited most of the mapped areas to stream valleys, although several ridge and spur sections were completed in the southern and western CV claims towards the end of the program. No Pb-Zn mineralization was directly observed on the CV claims during the program; however several areas with highly graphitic and pyritic shales were observed, as well as float of both bedded and nodular barite in shales, a feature commonly associated with SEDEX-type mineralization. Furthermore, most of the streams in the area were either heavily iron stained due to acid mine drainage, or contained white sulfate precipitates, which have been previously observed to react with zinc zap, indicating the presence of zinc oxide minerals.

9.1 Personnel and Equipment

The program was conducted by the following personnel:

Senior Geologist:	Geoff Baldwin
Junior Geologist:	Tomasz Kalkowski

The crew was equipped with the following:

Gear:	2 hand-held, non-differential GPS
	Rock hammer

	Niton Portable XRF analyzer
	Geological Compass
Sampling:	Kraft Sample Bags (for stream sediment samples)
	Poly Sample bags (for rock samples)
	Flagging tape
	Permanent markers
	Camera
Computer:	Laptop equipped with GPS utility software

9.2 Project Operations

The crew left Whitehorse to Colorado Resource's Oro base camp at MacMillan Pass (MacPass), YT via Ross River on August 21st, 2012. Ground transport to MacMillan Pass was conducted using trucks owned by Aurora Geosciences. The crew mobilized via Bell 206B Long Ranger helicopter supplied by Canadian Helicopters daily from MacPass to the Purple Onion Property. The geology program was completed on August 27th, 2011, when the helicopter was demobed to Norman Wells. The crew was demobed to Whitehorse the following day.

Due to the very long distance between camp and the property (approx. 60 nautical miles), fuel supply was an impediment to production, eliminating the ability to return to camp to refuel partway through the day. Thus, only up to 2 hours of dedicated flight time at the property was possible which limited stream sediment sampling to a maximum of 17 samples a day. The rest of each day was dedicated to mapping and prospecting. Although neither was a major obstacle to production, both the weather and the helicopter slightly limited the overall productivity of the program.

9.3 Photographs

A total of 149 photos were taken of the stream sediment sample locations (58), specific mapping stations (43) and general property stratigraphy and geology (38). Photos of stratigraphy and geology are intended to offer a better feel of the regional and local lithological and structural/basinal associations of the property. Photos and a brief description of each are summarized in an attached Excel file.

9.4 Geologic discussion

Due to the short duration of the geology program and its additional focus of collected stream sediment samples, the level of detail in geological mapping is limited to the lithofacies and structural measurements collected from specific stream and ridge outcrop sections, and these are limited to areas with documented geochemical anomalies in NGR stream sediment samples. Thus, mapping was performed on the following claims: CV 92, 94, 99, 107, 108, 110, 111, 112, 114, 115, 118, 119, 120, 122, 127, 128, and 133. This provided a reasonable first-order overview of the geology of the Purple Onion Property. Figures 9.1 and 9.2 show the results of the geologic mapping and rock sampling, respectively. Table 9.1 is a summary of relevant geochemical results of the rock samples collected.

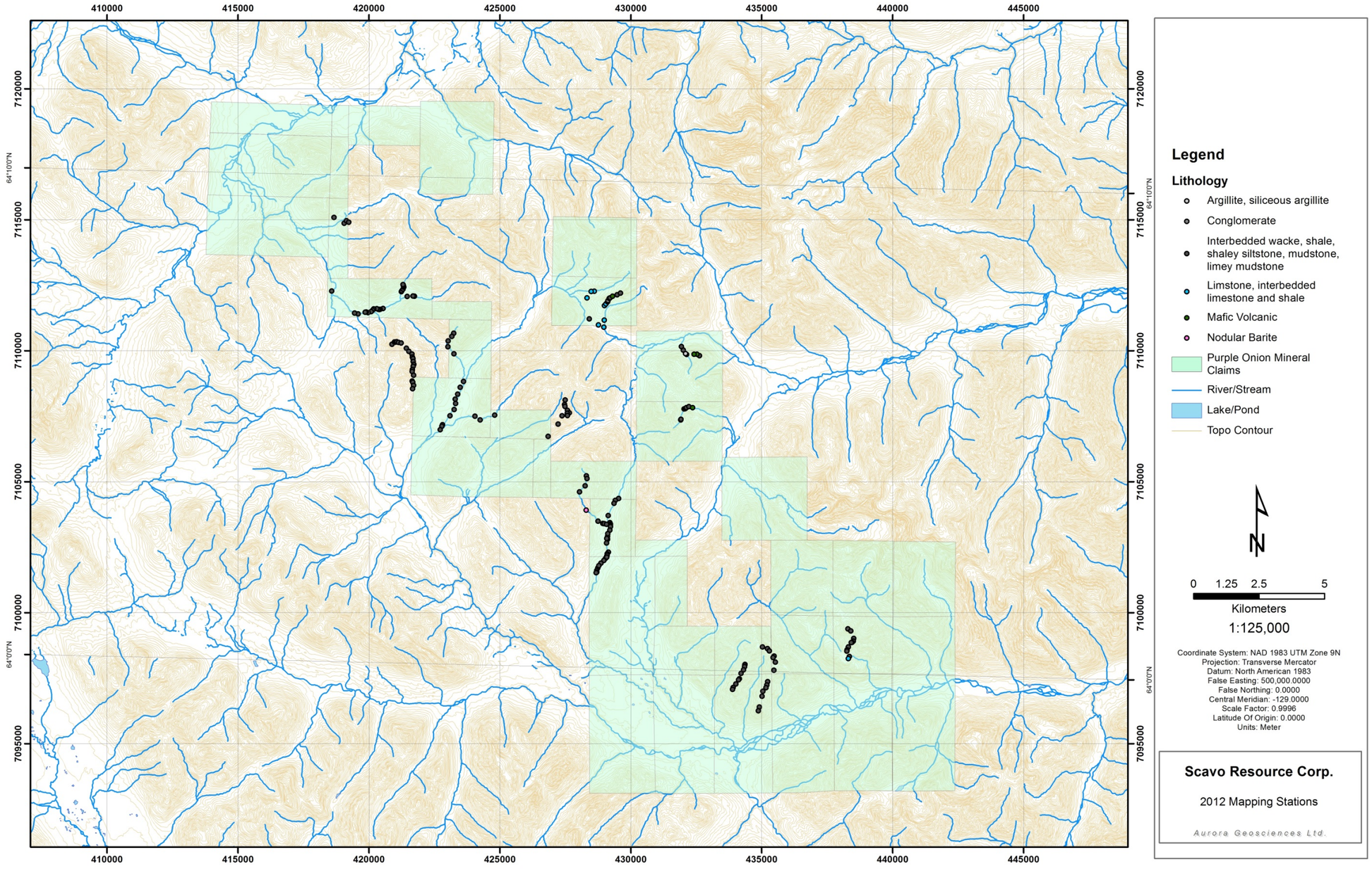

Figure 9.9-1. 2012 mapping stations showing lithology.

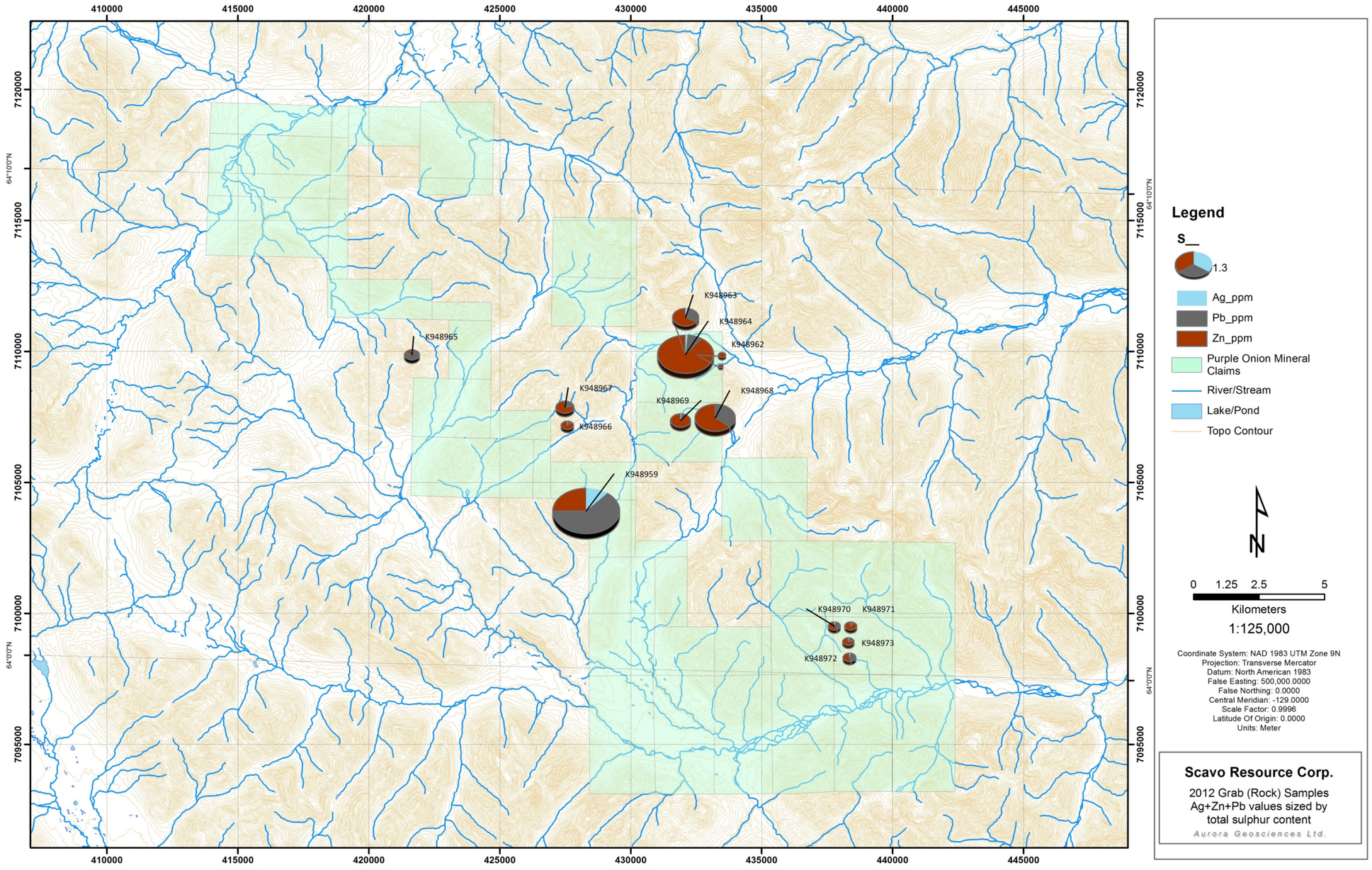

Figure 9.9-2. 2012 grab sample geochemical results. Ag, Zn, and Pb ratios are sized by total sulphur content. For Geochemical results see Table 9.1

Table 9.1. 2012 Rock sample geochemical summary (only elements of primary interest are shown)

Sample Number	Station	East83z9	North83z9	Ag_ppm	As_ppm	Au_ppm	Ba_ppm	Cu_ppm	Hg_ppm	Pb_ppm	Zn_ppm	Description
K948959	G041	428300	7103909	4.08	30.4	0.1	20	47.9	0.32	19.8	8	Nodular Barite
K948961	G055	432626	7109813	1.01	12.2	0.1	470	209	0.18	6.7	690	Shale
K948962	G056	432531	7109866	0.16	0.4	0.1	2490	111	0.03	1.1	183	Mafic Volcanic?
K948963	G059	432095	7109889	2.9	29.1	0.1	140	111.5	0.36	29.4	68	Siliceous Argillite w/ graphite and minor pyrite
K948964	G059	432095	7109889	2.37	29.6	0.1	100	125.5	0.37	19.6	171	Siliceous Argillite w/ pyrite discs
K948965	G070	421641	7109870	0.15	5.9	0.1	1170	3.1	0.08	17.3	4	Orange gossanous Wacke
K948966	none	427578	7107609	0.25	14.5	0.1	740	13.4	0.08	3.4	21	none
K948967	none	427487	7107873	0.4	11.9	0.1	250	9.2	0.1	4.7	18	none
K948968	none	431921	7107467	0.05	1	0.1	160	7.4	0.08	3.2	6	none
K948969	none	431901	7107363	1.25	11.7	0.1	440	25.9	0.16	7.4	69	none
K948970	G083	438291	7099377	0.71	6.9	0.1	2950	20.5	0.14	8.8	15	Siltstone
K948971	G084	438400	7099297	0.95	9.6	0.1	2100	33.2	0.16	10.3	80	Shale
K948972	G089	438309	7098691	0.62	12.4	0.1	2670	44.4	0.15	12.6	44	Shale
K948973	G092	438350	7098320	0.73	11.3	0.1	2690	7.4	0.32	14.6	19	Silty shale

Existing regional-scale geological maps of the Purple Onion Property are large-scale in terms of detail and accuracy. Mapped lithologies on the property consist, in broad terms, of the Paleozoic Road River (Cambrian to Devonian) and Earn (upper Devonian) Groups. Locally, these have been subdivided, with some mapping separating the Duo Lake Formation out of the Road River Group, and the Earn Group being subdivided into its constituent Canol and Imperial Formations in the southern claim blocks, although throughout much of the property, these are undivided. The target lithology on the property is black shales of the lower Canol Formation, a stratigraphic horizon that hosts the Tom and Jason deposits of the MacMillan Pass SEDEX Pb-Zn camp, as well as numerous sedimentary (stratiform and nodular) barite showings across the Mackenzie and Selwyn Mountains (e.g. Anita-Wise). The Canol Formation is conformably overlain by shales, siltstones, and deep-water sandstones (wackes) of the Imperial Formation, and is unconformably underlain by the crinoid-rich limestone of the Grizzly Bear Formation. The Canol Formation itself is predominantly grey to black shales, with variable amounts of wacke, siltstones, and local deep-water carbonates. All lithologies in the Earn Group (Canol and Imperial Formations) are known to contain significant amounts of pyrite and other sulfides, as reflected by the often gossanous weathering of these rocks and the extensive iron staining (acid mine drainage) in many of the creeks and rivers in areas where these formations outcrop.

Target areas for mapping were initially identified prior to arriving on site based on the locations of existing geochemical anomalies and what appeared to be manageable terrain (i.e. no large, steep cliffs). These selections were modified on site, depending on the amount of exposed bedrock, with areas of significant exposure selected to make the most of the limited time dedicated to mapping on the property. Other target areas were selected based on the appearance of float found during portions of the stream sediment program. Mapping focused on identifying the rock types on the property as well as collecting some structural data. Descriptions of the findings of this program are outlined below in the order different areas were investigated.

Existing anomalies on claims CV 108 and 107 were investigated on August 23rd, the investigations of which involved lithological and structural mapping in streams (CV 108) and cliffs on the valley walls (CV107). Each of these areas have significant NGR anomalies, draining from elsewhere on the property (CV108) and adjacent claims owned by Strategic Metals (CV107). Mapping on CV108 showed that most of the exposed Earn Group sedimentary rocks consist of interbedded shales and fine to medium grained wackes. The relative proportions of these lithologies and their thickness was variable, with some areas consisting primarily of wacke, whereas others were dominated by shale. Bed thickness for both lithologies range from 5 to 50+ cm, and each rock type is rarely the same thickness at any given stratigraphic thickness (i.e., where wacke beds are >15 cm, shale beds are <10 cm and vice versa. Both rock types are locally gossanous, and the main creek is heavily iron stained from acid mine drainage. Rocks in this area are intensely folded at the intra-formational level, containing many observed and inferred isoclinal chevron folds, which appear to generally be non-penetrative (or localized). Coincident with this are frequent and dramatic changes in both strike and dip, although overall the property dips steeply (~40-80°) to the northeast. In the eastern end of claim CV108 there is a major lithological shift towards strictly very fine grained wacke which dips 68° to the SSW. Based on this shift, as well as existing regional mapping, this is inferred to be the Cambrian to Devonian Road River Group (undivided

in this area, but most likely the Ordovician to Silurian Duo Lake Formation). Very few outcrops were visited on claim CV107 due to time limitations and minimal exposure. Cliffs on either side of the valley were visited, and the observed lithologies consisted of mudstone with very coarse sand to granule-size white quartz clasts, as well as some shaley siltstones closer to the eastern claim boundary. Structurally, this area generally dips >60° to the west or southwest, although the shaley siltstones were observed to have several different orientations. Limited exposure in this overall area makes it difficult to assess its mineral potential, indicating that more mapping is required, based on the results of additional stream sediment samples collected in the area as part of this program.

Mapping on claims CV 110, 111, and far western 112 was performed on August 24th, an area to the southeast along regional strike from the previously mapped area. The dominant lithology in this area was also interbedded wacke and shale, again with variable proportions of each and bed thicknesses, also with similar localized folding and dramatic changes in bed orientation. The dominant structural orientation of the area is dipping 30-80° to the southwest, with local steep dips and fold limbs dipping to the northeast. Closer to the eastern margins of the Purple Onion Property the lithologies become finer grained, increasingly shaley, suggesting that further investigation under more favorable conditions is required in areas such as northern and western CV110, and western CV109. The portable XRF was used while mapping this area and did not reveal any noteworthy anomalies (e.g., Zn, Pb, Ag, As, Ba) in shale outcrops.

Mapping was conducted along the contact between the Grizzly Bear Formation and the Earn Group in the northeastern claim block (CV 120), an area with several NGR anomalies. As this area contains the base of the Earn Group, from a regional geological perspective, it may be very prospective. However, limited exposure along the contact limited these investigations. The contact was directly observed in one area, where the underlying crinoidal lime grainstones of the Grizzly Bear Formation were observed to be folded, and in apparent conformable and unconformable contact with the Earn Group on either side of the same creek. In the eastern part of CV120, several horizons of what appeared to be an olive-green conglomeratic unit was observed, and may be a distal volcaniclastic equivalent to the alkalic mafic volcanic Marmot Formation, which consists of intrusive and supracrustal components cutting through and interleaving with the majority of the stratigraphy of the Selwyn Basin. None of the rocks appear to be directly magmatic, and include many clasts of country rock, which paired with the apparent stratiform position of these rocks in this area, suggests an epiclastic genesis for this unit.

Claims CV114, 99 (sample K948959), 115, and 122 were investigated due to the existence of a large NGR anomaly in southern CV 114, as well as a nearby stream with abundant white precipitate in the stream bed. The precipitate was observed to locally react with Zinc Zap (aka A-B solution, composed of potassium ferrocyanide and oxalic acid), indicating the presence of minerals formed by the oxidation of zinc mineralization (principally smithsonite (Zn-carbonate) and hydrozincite (Zn-hydroxide). No surfaces of this precipitate were observed to react with Zinc Zap during the 2012 field program, and an analysis with the portable XRF did not return significant Zn values, however this may be the product of a small sample size. Mapping in this area revealed that nearly all of the lithologies exposed in the streams of this area consist of interbedded wacke and shales, with the most upstream (eastern) exposures being the most shale-rich. The dominant structural trend in much of the area is 40-90° to the northeast, although

some areas are very structurally complex, with significant local folding, typically intra-formational chevron and isoclinal folds as observed in other map areas. The northern portions of this map area, in CV 114 and north-central CV 115 had a dominant dip of 50-80° to the southwest, which appears to be changed by a major fold system that trends northwest-southeast, wherein most rocks to the southwest of it trend 40-90° northeast. Although not observed in outcrop, float clasts of nodular barite were found in western CV 99, which was both field analyzed using the portable XRF and sampled for assay. This is important, as the presence of nodular or bedded sedimentary barite is an important indicator of SEDEX-type Pb-Zn mineralization and is associated with the known Tom and Jason deposits at Macmillan Pass. Another float clast was found in the main creek bed, which appeared to be heavily silicified and contained up to 5% wispy disseminated pyrite, which was also sampled for assay. The area also contained abundant milky quartz veins, a feature abundant in float and to a lesser degree in outcrop across the entirety of the Purple Onion claims, however all veins (both in outcrop and float clasts) were found to be solely quartz with minor calcite, and completely devoid of sulfides and iron carbonate. Furthermore, in areas were the veins were exposed in outcrop, they appeared to be concentrated in the coarser grained material (60+% of observed veins were hosted in wacke), and followed joint and fracture planes, suggesting that the veins significantly post-date any potential syngenetic mineralization (i.e., SEDEX), and are more likely to have formed during the Laramide Orogeny.

Mapping and prospecting was conducted in northern CV 119 (samples K948963, 964, 962) and 118 (samples K948968, 969) on the eastern margin of the Purple Onion Property. These targets were chosen on the strength of existing NGR anomalies in the area (CV 118) and on the presence of a clast of graphitic and pyritic argillite found during stream sediment sampling the previous day (CV 119). Compared to other areas mapped, this area is comparatively fine grained, with the dominant lithology being shale with no observed wacke. Many of these shales were very black, and often contained variable amounts of graphite. The blackest, most graphitic shales were samples for assay to hopefully help detect distal equivalents to mineralization. Additionally, in both of these map areas, the olive-green conglomeratic unit was observed, which locally appeared to be almost purely magmatic, supporting the previous interpretation that it ultimately shared an origin with the Marmot Formation to the west. Locally, this unit appeared to cross-cut stratigraphy, while still containing many clasts of country rock, suggesting that it may be a diatreme in the area, a feature that is locally observed in the Marmot Formation. Elsewhere, the graphitic and pyritic argillite found in float on CV119 was found in outcrop, and individual beds contain highly variable amounts of pyrite. Some beds contain up to 5% finely disseminated pyrite, whereas others have large numbers of flat pyrite nodules or fans on bedding surfaces (usually no more than 5 mm thick and ranging 1-5 cm in diameter). Samples were collected from each of these different horizons for assay.

Claims CV 92, 94, 111, and 112 were targeted for mapping. Due to a navigation error, the geologist set to map on CV112 was dropped off too far east, and accidentally spent the afternoon mapping mostly on the Strategic Metals property adjacent to the Purple Onion Property (samples K948967, 966). In this area, the dominant lithology was found to be shales, with increasing contents of coarser clastic material to the west, consisting of interbedded wacke and flaggy, platy mudstone (“slate” on map), with a dominant structural trend of 30-70 to the southwest across the area. Mapping conducted on CV 92, 94,

and 111 had similarly disappointing results, consisting almost entirely of wackes of variable sand grain size, with some finer material occurring along the boundary of CV 94 and 111, where minor siltstone and shale was found interbedded with the wacke, although this comprised no more than 20% of the rock. Structurally, this area was found to be fairly complex, with numerous and frequent reversals of dip direction, thus inhibiting the interpretation of the dominant dip direction, although based on the dominant directions, seems to be 20-55° either SSW or NE. This is likely the result of numerous small intra-formational folds, the hinges of which may have eroded off of the ridge crest. Of interest in this area was the moderately pervasive presence of moderate to severe gossanous weathering on certain wacke units. Light grey, fine grained wacke was often found to be heavily gossaned to dark red to purple, and locally bright-red orange (similar to the color of realgar, for comparison's sake). This latter gossan was found by portable XRF to be rich in Ag (31.8 ppm), although fresh surfaces of this rock were below detection limits. This material was sampled for assay to hopefully better elucidate whether there is actually significant silver present in this rock. Additionally, several horizons containing rusty-weathering rounded large (15-45 cm) concretions were observed, although these concretions were predominantly siliclastic material. Portable XRF analysis of these concretions revealed that they were very rich in Fe and Mn; with abnormally high concentrations of Ni and Co. this suggests that although they had high siliclastic content, a fair bit of iron or manganese carbonates or oxides may also have been present. This chemistry suggests that these may have been somewhat similar to modern ferromanganese deep-sea nodules.

Mapping of CV 133 (samples K948970, 971, 972, 973), 127, and 128 was limited in this area due in part to poor exposure in many areas, heavily vegetated stream valleys with minimal helicopter access, and rugged terrain. The areas mapped were chosen because they were ridges proximal to existing anomalies and relative ease of access. Due to unpredictable weather conditions, the portable XRF was not used on this day. Mapping on CV133 proved to be the most productive, as this area was found to be predominantly fine grained clastic material, principally shale and siltstone, with minor (<5% of exposure) wacke interbeds. Shale and siltstone in this area were fairly hard and siliceous with minimal friability, instead consistently showing pencil fracture and locally platy to blocky fracture. Several samples of black shale and siltstone were collected, although no visible sulfide minerals were observed. Structurally, this area was somewhat variable, with a mix of orientations trending 10-40° northeast and local orientations of 30-60° southwest. No folds were directly observed, due in part to patchy bedrock exposure and erosion. In the southwest part of the claim, the shales and siltstones of the Canol Formation (lower Earn Group) were unconformably underlain by crinoid lime floatstone of the Grizzly Bear formation, which dipped 42° to the east-northeast. Mapping on CV 127 and 128 was less promising, consisting almost entirely of wacke of variable grain size with variable amounts of siltstone or shale interbeds. This area had numerous different orientations, controlled by a pair of fold hinges (1 syncline, 1 anticline) trending in approximately opposite directions (30-50° southwest and 40-80° northeast). The almost completely coarse clastic lithology in this area suggests that the Earn Group in this area is the Imperial Formation, the upper, barren formation of the group, which is further borne out by the existing regional mapping.

9.5 Stream Sediment Sampling

A total of 79 stream sediment samples were collected from 1st and 2nd order streams on the property. This survey was designed to follow up on the regional NGR government survey completed in 2008; specifically to define the source of elevated base metal values in the context of stratigraphy. The results of this survey are presented in Figure 9.3 and 9.4 (Ag and As, respectively).

The 2012 survey results support consistently elevated silver and arsenic values interpreted from the NGR survey (Day et al., 2009) and a significant metals/pH correlation. Elements of interest are Ag, As, Zn, Pb and to a lesser degree Cu. The eastern and southern sides of the property (CLAIMS CV 116-CV 121) show elevated response to all four elements. The western and northern sides of the property (CV 88-115) show depressed metal values. This disparity in geochemical response of stream sediments is interpreted to be a function of water pH in these areas more than any elevated response to sulphide-related mineralization, or even lithologic control. This interpretation does lead to the division of the property into two areas (Figure 9.5).

Area 1 (CV 116-121) covers drainages coincident with near neutral pH. These drainages cut the Earn Group, Imperial Formation, Grizzly Bear Formation and Road River Group, the latter two host carbonate or limey clastic rocks as indicated by regional and 2012 property-scale mapping. These carbonate rocks could act as a buffer in Area 1 waters to acidity generated by sulphide mineralization that is otherwise unbuffered in Area 2.

Area 2 (CV 88-115) covers the drainages coincident with low pH waters that cut clastic stratigraphy of the Earn and Road River groups. Significant sulphide in greywacke was observed during the 2012 exploration program on claim CV 92. Rock sample K948959 (4.08 g/t Ag) was collected from this area.

If silver-in-sediment and arsenic-in-sediment values are considered as a property-scale dataset, anomalies appear isolated, random and appear to be isolated occurrences (Figure 9.4 and 9.5). Drainages underlying CV 105, 104, 86, and 107 in Area 2 show Ag values between 0.5 and >1.5 std. deviation from the mean and nearly all samples in Area 1 are greater than 0.5 std. deviation from the mean with isolated >1.5 SD values underlying CV 131, 132, 133, and 134.

Treating the survey silver, zinc, and lead dataset as a ratio can mitigate the effect of pH, assuming that Ag, Zn, and Pb behave similarly in reduced conditions, and elevated Zn+Pb background values as a result of host lithologies. This procedure shows that the silver-in-sediment and arsenic-in-sediment values are elevated in Area 2 relative to the property as a whole (Figure 9.6 and 9.7 Drainages underlying CV 86, 107, 108, 109, 110, 111, 112, 97, and 113 in Area 2 show Ag values between 0.5 and >2.5 std. deviation from the mean. If silver-in-sediment is considered a proxy for unexposed economic potential, these claims should be considered a priority for future exploration

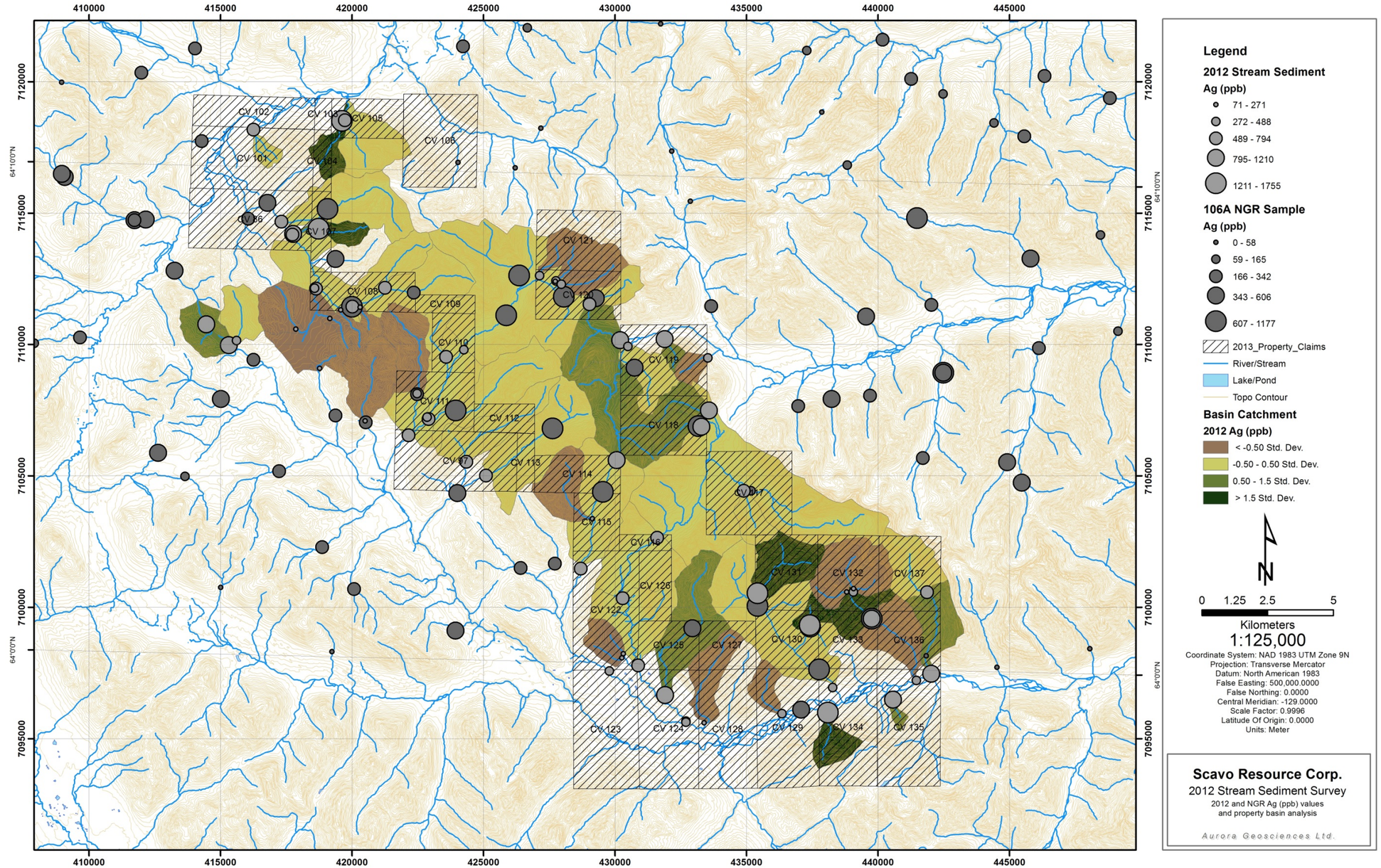

Figure 9-3. 2012 property-scale stream sediment survey: Ag (ppb) results. (NGR data from Day et. al, 2009)

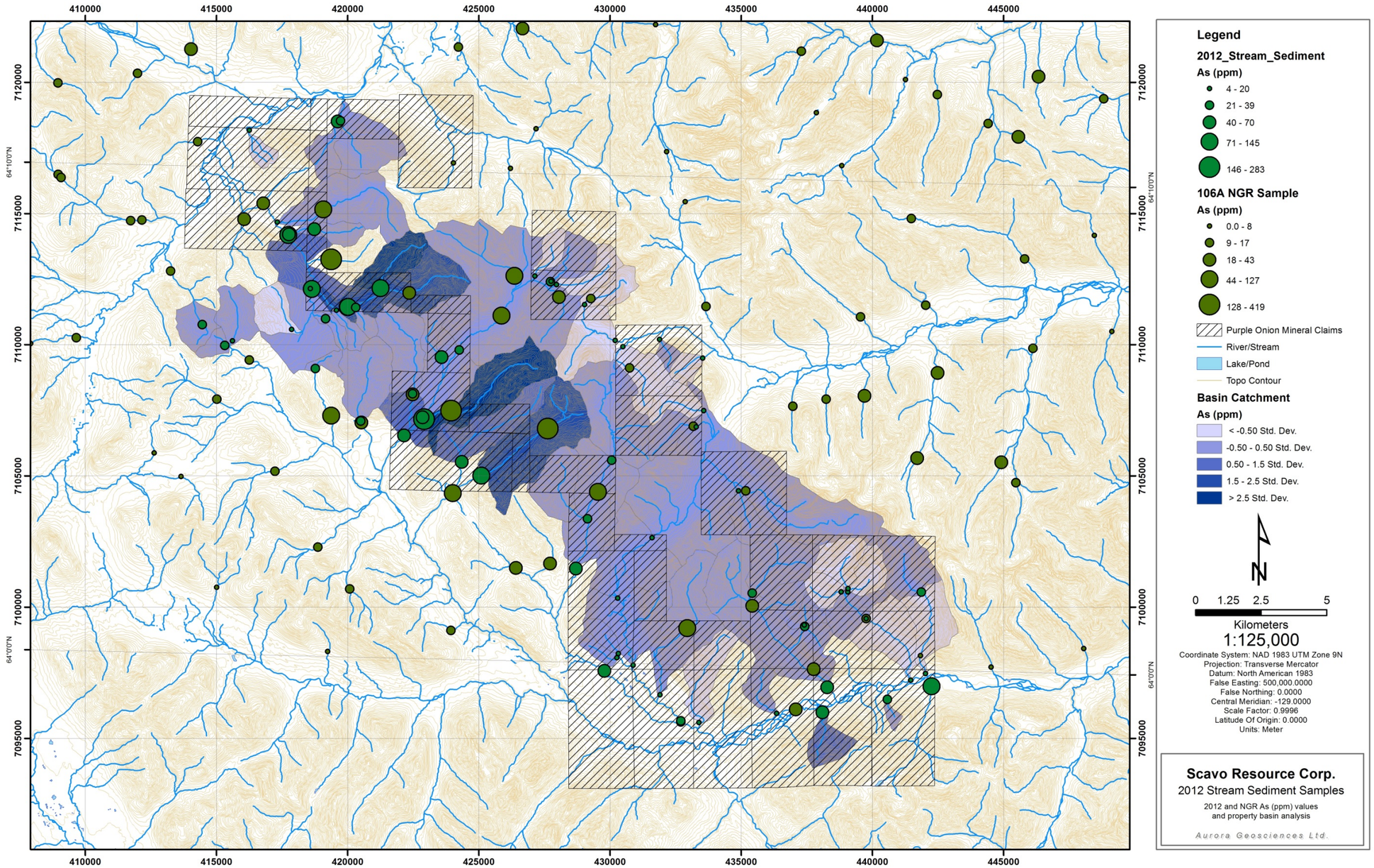

Figure. 9-4. 2012 property-scale stream sediment survey: As (ppm) results. (NGR data from Day et. al, 2009)

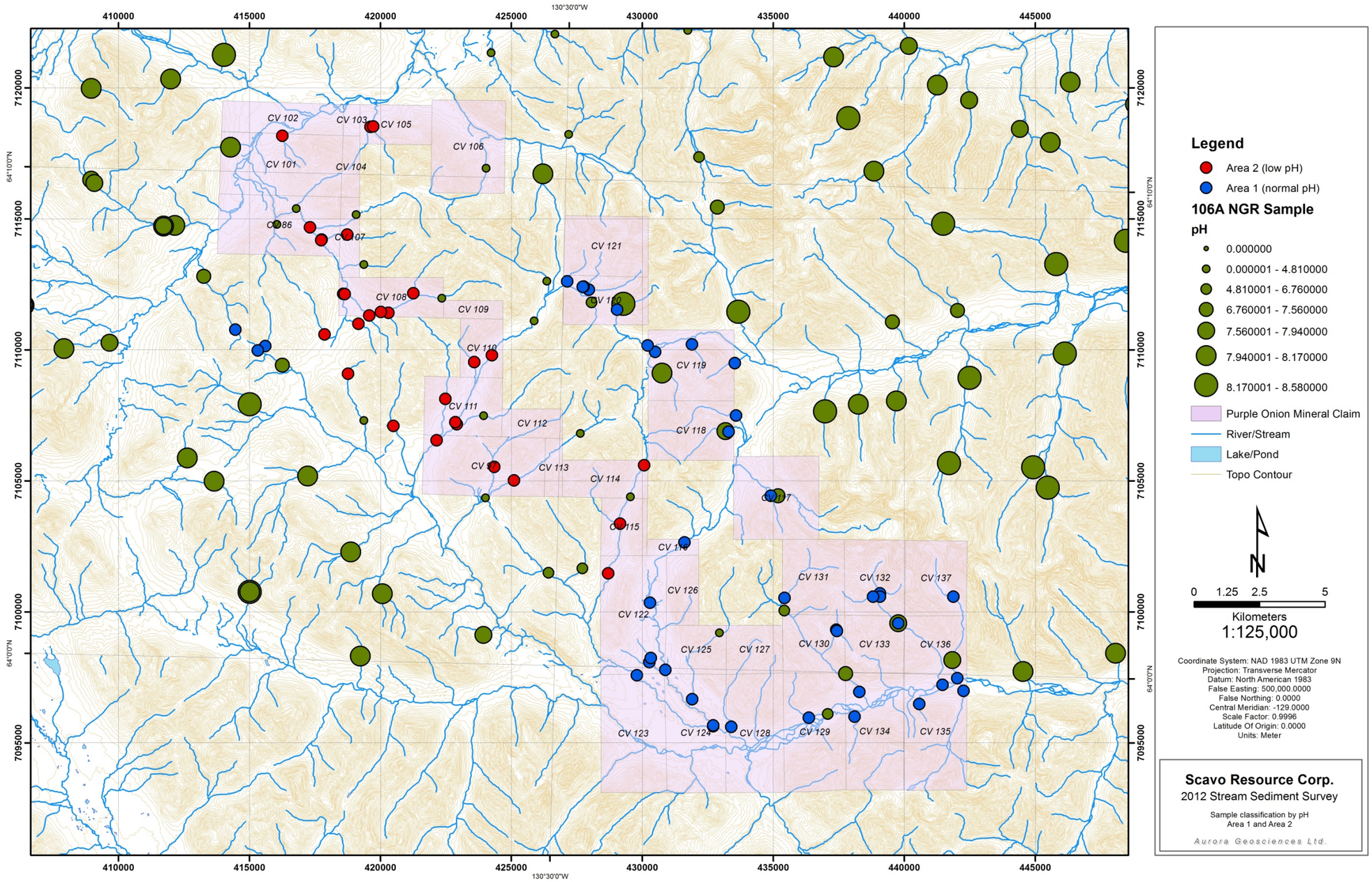

Figure 9-5. Areas of interest as defined by water pH (pH data from Day et. al., 2009)

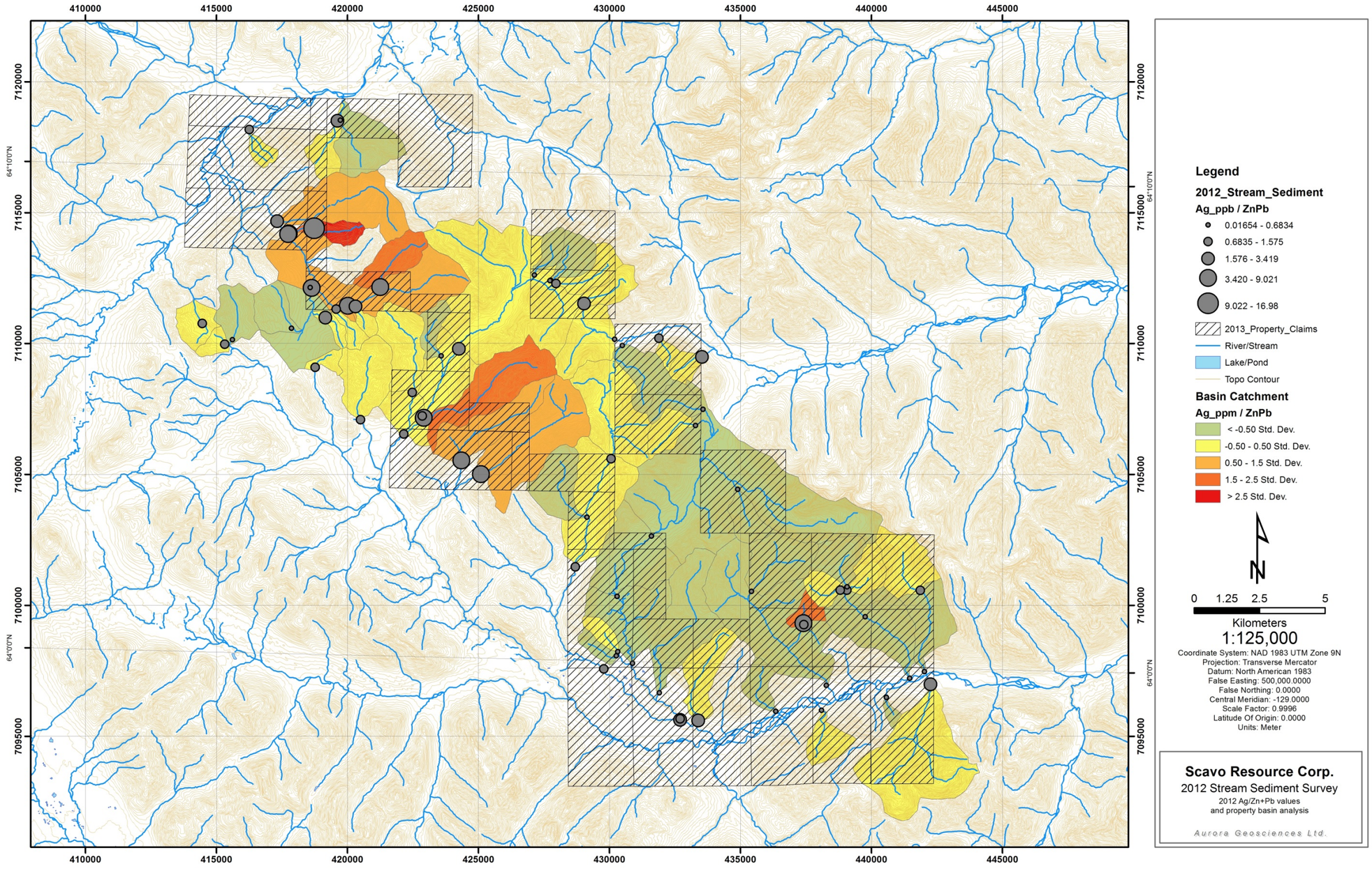

Figure 9-6. 2012 Silver-in-sediment data statistical presentation – anomalous basin drainages

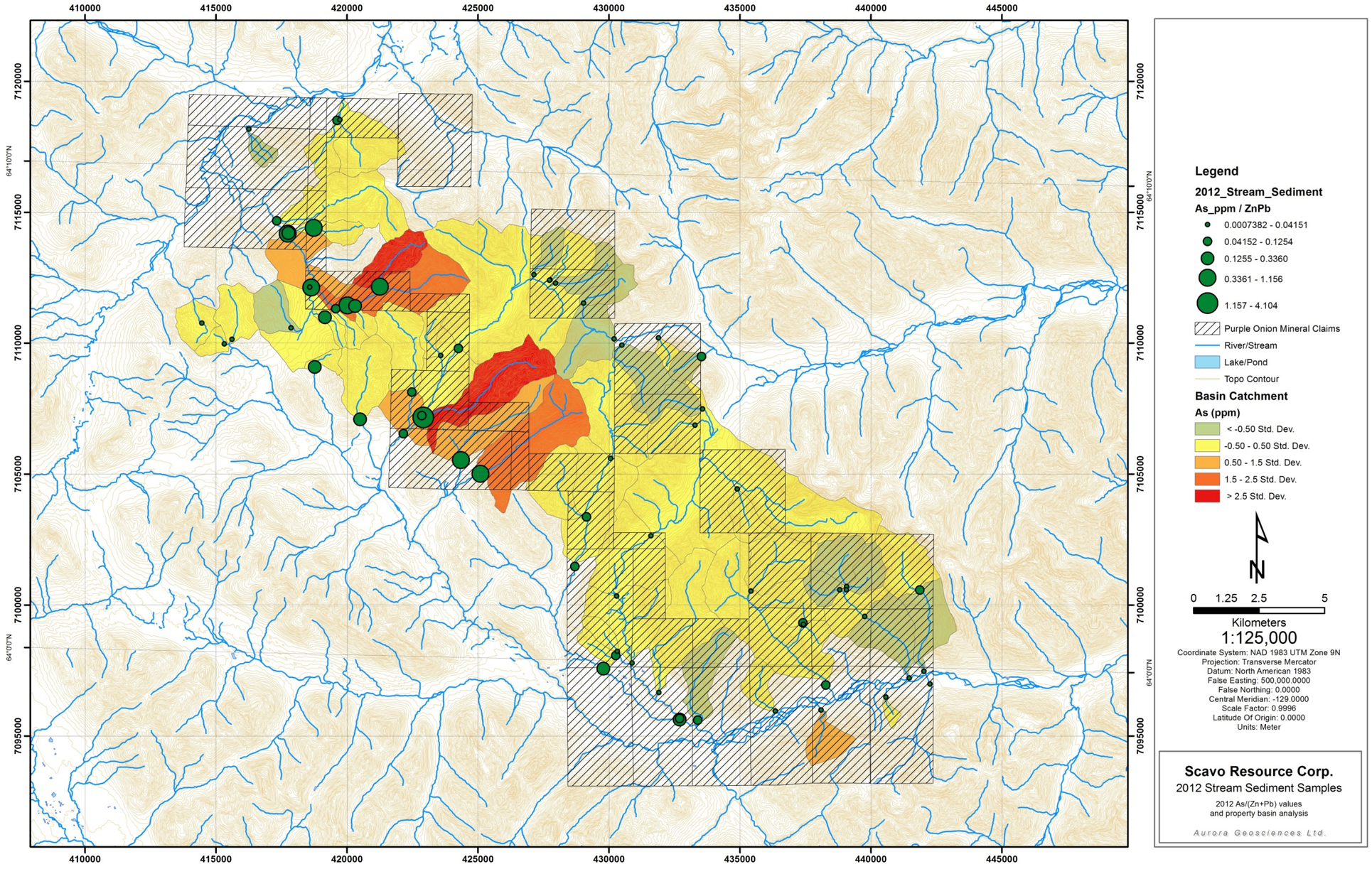

Figure 9-7. 2012 Arsenic-in-sediment data statistical presentation – anomalous basin drainages

9.6 Sampling Method and Approach

The sampling portion of the program was divided into two parts: stream sediment, and rock sampling. The stream sediment samples were collected following the National Geochemical Reconnaissance (NGR) protocol in order to keep the new data consistent with the regional-scale sampling conducted by the NTGO in 2008, as well as maximize the sampling coverage across the Purple Onion Property. Stream sediment sampling was conducted almost entirely by helicopter, wherein pre-planned sampling targets were selected on a GPS, the helicopter would land, and the Junior Geologist would climb out to grab the fine grained, silty stream sediment sample. The Senior Geologist rode in the front seat to take notes on the surrounding area and photograph the sampling site. Within every 20 samples, gaps were left for the insertion of both a blank (samples 12PLV001, 12PLV021, etc.) and a lab standard (samples 12PLV011, 12PLV031, etc.), as well as one randomly selected stream to be sampled in duplicate.

Rock samples were collected based on the presence of sulfide mineralization, similarity to units known to host SEDEX mineralization elsewhere, and other relevant geological significance. A total of 16 grab rock samples were collected, mostly from outcrop, although several samples were float clasts found in streams on the property.

The Author believes that the sampling on the property in 2012 was conducted in a professional and technically proficient manner. The Author believes that the results from this sampling are consistent with the materials collected and have contributed to a greater understanding of the property geology.

10 DRILLING

No drilling has been completed on the Purple Onion Property.

11 SAMPLE PREPARATION, ANALYSIS AND SECURITY

Stream sediments sampled during the 2012 program were collected in accordance with NGR protocol. This procedure was used by the NTGO during a regional sampling of NTS 106A, 106B, and parts of 106C in 2008 and 2009 (Falck and Day, 2008; Day et al., 2009). The sample methodology is outlined and can be referenced in the Falck and Day (2008) and Day et al. (2009) publications.

Grab-type rock samples were collected at the sample location. Locations were marked by flagging on site and recorded by GPS. Samples were placed in a unique plastic sample bag and secured in the field. A sample card was filled out for each sample while in the field.

Stream sediment and rock samples were submitted to the ALS Minerals preparation facility in Whitehorse and analyzed at ALS Minerals in Vancouver, BC. A total of 15 Rock samples and standards were analyzed by ME-MS41 (aqua regia digestion and ICP-MS and AES analysis). A total of 79 soil samples and standards were analyzed by ME-MS41L which employs an ultra-trace method more suitable for stream sediment and soil sample analysis.

The ALS Minerals Vancouver lab facility is accredited to ISO/IEC 17025-2005 standards. ALS Minerals is

independent of SCAVO.

Samples were handled in compliance with NI 43-101 standards. Samples were stored at a secure location at the Mac Pass base camp and transported to Whitehorse in sealed and tagged rice bags. The Aurora Geosciences Ltd. field crew or expeditor staff was in presence of the samples when samples were not in a secured facility.

12 DATA VERIFICATION

The data provided in this report has been verified by the author in the sense the author has been involved in this program since its inception in 2010. Aurora Geosciences Ltd (AGL) has directly managed and completed the ground acquisition and the 2012 exploration program conducted on the property. The author has been included in all pertinent discussions pertaining to the property and the exploration conducted on the property, including the relevance of the retrieved data and recommendations for further work.

As a result of Aurora's direct involvement in all data acquisition on the property and reporting thereto, it is the opinion of this author that the data presented in this report adequately meets the requirements for NI43-101 submission.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

No mineralogical, metal processing or metallurgical testing has been done on mineralized material from the Purple Onion Property.

14 MINERAL RESOURCE ESTIMATES

No mineral resource estimates have been performed on any material from the area presently covered by the Purple Onion Property in the Mackenzie Mountains, Northwest Territories.

15 MINERAL RESERVE ESTIMATES

No mineral reserve estimates have been performed on any material from the area presently covered by the Purple Onion Property in the Mackenzie Mountains, Northwest Territories.

16 ADJACENT PROPERTIES (ITEM 23)

Mineralization identified in this section is suggested to be similar to mineralization on the property that is the subject of this report only because mineralization on these adjacent properties share a common exploration model. The author has been unable to personally verify the mineralization of these adjacent properties (Sections 16.1 and 16.2) and any such mineralization is not necessarily indicative of the mineralization on the property that is the subject of this technical report.

16.1 Howard's Pass

The Howard's Pass deposits lie some 160 km south of the Purple Onion property. The Selwyn Project now contains 14 drill defined deposits which are complexly folded and faulted saucer-shaped bodies which contain laminated to massive sulphides. The sulphides are dominated by sphalerite and galena with minor pyrite.

Selwyn Chihong Mining Ltd (the joint venture company) has produced an updated NI 43-101 compliant resource as of Sept 12, 2011. The current resources have been established as an Indicated resource of 180.69 million tonnes grading 5.25% Zn and 1.83% Pb. The inferred mineral resource totals 216.04 million tonnes grading 4.47% Zn and 1.38% Pb (taken from the Selwyn Resources website : TSX.V SWN on July 5, 2012).

16.2 MacMillan Pass Deposits (Tom and Jason)

The MacMillan Pass deposits comprise the Tom and Jason which lie just 13km southeast of the Mac Pass and just 100km due south of the Purple Onion property. These two deposits are concentrated within the shales and turbidites of the Lower earn Group which are Devonian-Mississippian in age.

The Tom Deposit comprises three zones (East, West and Southeast) and Scott Wilson Roscoe Postle and Associates completed a NI 43-101 compliant resource for Hudbay Minerals Inc in 2007. This resource comprises an Indicated resource of 4.98 million tonnes at 6.64% Zn, 4.36% Pb and 47.7 g/t Ag and an Inferred resource of 13.55 million tonnes at 6.68 % Zn, 3.10% Pb and 31.77 g/t Ag (Deklerk and Burke, 2008 and Press Release from HudBay July 6, 2007)).

The Jason Deposit comprises two primary zones (South and Main) and Scott Wilson Roscoe Poslte and Associates completed a NI 43-101 compliant resource for HudBay Minerals in May of 2007. The current resources at Jason comprise an Indicated resource of 1.45 million tonnes at 5.25% Zn, 7.42% Pb and 86.68 g/t Ag and an Inferred resource of 11.0 million tonnes at 6.75% Zn, 3.96% Pb and 36.42 g/t Ag. Deklerk and Burke, 2008 and Press Release from HudBay, July 6, 2007.)

17 OTHER RELEVANT DATA AND INFORMATION (ITEM 24)

17.1 Prohibited Disclosure

All Mineral Resource and Mineral Reserve calculations regarding adjacent properties as discussed in (*Section 16.0*) have not been verified by the qualified Author of this Technical Report. The estimates/calculations in Section 16 are known to be prepared by independent Qualified Persons for the NI 43-101 compliant resources; however the Author is not aware if any of the information contained therein has been audited by an independent Qualified Person.

The Author has not verified the character of mineralization on these properties; therefore, it cannot be confirmed that mineralization at the aforementioned deposits is indicative of mineralization described on the Purple Onion Property. The data has been primarily summarized from the Government of Northwest Territories mineral assessment database and references therein and publically available data accessed from the companies that hold the properties.

18 INTERPRETATION AND CONCLUSION (ITEM 25)

Previous work at the Purple Onion Property, mostly by Canico (Canadian Nickel) in the 1970's, indicates the Earn Group stratigraphy hosting the Jason and Tom deposits is present. Although Canico concluded that they could not locate any mineralization associated with SEDEX type deposits, the information from the stream sediment sampling completed by the Northwest Territories Geoscience Office (NTGO) suggests further work is warranted to verify the conclusions by Canico. It appears from the arsenic values returned from the stream sediment sampling that a host of possible shale origins is responsible for these values. The approximate geological boundaries from the newly interpreted NTGO geology suggest that significant Earn Group stratigraphy underlies the Purple Onion property. As such, the Selwyn Basin as a SEDEX dominated mineralogical environment warrants further work in this area.

The SCAVO claims covering the Purple Onion Property are peripheral to the Archer-Cathro claims which cover the central portion of the project area. The stream sediment sampling program documents a significant area of SEDEX-type potential and follow-up work is warranted to try and locate mineralization and alteration considered to be critical for this type of occurrence. The Archer-Cathro claims cover only a small part of the area outlined for potential SEDEX type mineralization and the SCAVO claims cover a significant portion of the area suggested by the NTGO stream sediment results.

It is difficult to fully assess the full mineral potential of the Purple Onion Property based solely on the limited scope of this brief exploration program; however, several areas that warrant focused additional work have been identified. Based on the preponderance of fine grained clastic rocks in certain areas, whereas many others are dominated by wackes, a first order screening can be applied to suggest that these areas are the most prospective, principally areas such as CV 92, 118, 119, 120, and 133, as well as adjacent claims that were not specifically visited as part of the mapping program. Anomalous silver-in-sediment geochemical response from stream sediment samples show that claims CV 86-113 warrant additional exploration.

More detailed mapping, particularly in the eastern margins of the western claim blocks may be required, based on the observation of many streams containing white or orange precipitates, as well as the discovery of nodular barite, and rarely small clasts of bedded barite in these areas, however this material may often be derived from upstream areas that are on claims owned by Archer-Cathro. If the presence of sulfide minerals is used as the primary means of judging the potential of an area, claim CV 119 appears to be promising, as well as (to a lesser degree) CV 118, but other nearby areas may prove to be promising pending more in-depth mapping and prospecting.

19 RECOMMENDATIONS (ITEM 26)

It is recommended that a helicopter-borne HeliTEM survey and ground-based mapping/prospecting/sediment sampling be completed as the next stage of exploration. Initially, the results of the airborne survey would be considered in the context of the existing datasets including the mapped geology (both regional government mapping and property-scale mapping) and the results of the improved stream sediment sampling density from this program. The airborne survey and data review would guide a ground program consisting of targeted mapping/prospecting, ridge and spur sampling, and soil sampling to be completed later in the season. Ridge and spur sampling and, as warranted, gridded soil sampling could prove very productive due to the limited exposure in the much of area.

While an airborne geophysical survey would be a best case scenario to evaluate the property, additional ground exploration is not contingent upon the successful completion of such a survey. Mapping and prospecting conducted in 2012 and the existing stream sediment geochemical database provide a sufficient starting point to from which to direct additional ground exploration on the property. This work would include mapping, prospecting, and ridge and spur sampling. As the program is conducted, detailed gridded soil sampling may be warranted and completed.

The following is a budget for a two-stage program to complete a HeliTEM airborne geophysical survey and ground-based follow-up.

Proposed helicopter-borne HeliTEM survey (if possible):

Est. 3500 line kilometers	$	**420,000.00**

Proposed ground exploration budget:

Item	Value (CDN$)
Mobe and demobe Norman Wells via Canadian North (gear and people)	$10,000.00
Two twin otter - 3 trips (Willow Handle Lake with gear, people and fuel)	$12,600.00
Chopper mobe to Purple Onion (W Handle to PO is 25 miles) – 9 hrs	$12,600.00
Chopper Mobe to move camp twice in three weeks @ $5600 X 2	$11,200.00
Chopper demob from PO to Willow Handle	$8,400.00
Twin otter demobe from Willow handle to N Wells	$8,400.00

Two geos for 21 days @ $1,600 per day	$33,600.00
Two soil samplers for 21 days @ 900/day	$18,900.00
Camp, grub, phone, sampling gear and safety gear @ $300 per day	$6,300.00
Shipping commercially for grub and samples	$3,000.00
Expediting	$2,000.00
Assaying – 300 samples X $40per sample	$12,000.00
Assessment report	$7,000.00
Subtotal	$146,000.00
Contingency – plus 10%	$14,600.00
Proposed Ground Exploration Budget for 2013	**$160,600.00**

It is the opinion of the Author that the two-stage **$580,000** one year budget represents the best exploration strategy to quickly and efficiently advance the property.

Respectfully submitted,

Gary Vivian (sealed)

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Gary Vivian, M.Sc., P.Geol.
AURORA GEOSCIENCES LTD.

dated and signed this 5th of February, 2013 at Yellowknife, NT.

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21 CERTIFICATION OF AUTHORS

I, Gary Vivian, of the City of Yellowknife, in the Northwest Territories, Canada,

HEREBY CERTIFY:

1. That my business address is 3506 McDonald Drive, Yellowknife, NT, X1A 2H1
2. This certificate applies to the report titled "Technical Report, Purple Onion Property – Mackenzie Mountains – Northwest Territories, Canada" and dated February 05, 2013.
3. That I am a graduate of Sir Sandford Fleming College as a Geophysical Technologist, 1976.
4. That I am a graduate of the University of Alberta in Geology:
   a. B.Sc. – Specialization Geology, 1983.
   b. M.Sc. – Geology, 1987, U of A – The Geology of Blackdome Ag-Au Deposit, BC
5. That I have been practicing Geology since 1983:

a)	May 1983 – November 1986	Noranda Exploration Co. Ltd., Bathurst, NB
b)	December 1986 – May 1988	Noranda Exploration Co. Ltd., Timmins, ON
c)	May 1988 – Present	Covello, Bryan and Associates Ltd. and currently Aurora Geosciences Ltd., Yellowknife, NT

6. That I am a registered Professional Geologist in the Northwest Territories. I have professional designation in Manitoba, Saskatchewan, and Alberta. I am also registered with AIPG (American Institute of Professional Geologists). I have over 35 years of exploration experience concentrating in massive sulphide, magmatic sulphide, diamond, uranium and precious metal deposition. As such I am a Qualified Person for the purposes of National Instrument 43-101.
7. As a principal of Aurora, I have written this report. As a staking agent for Coltstar Ventures Inc., I completed the staking of the Purple Onion claims. I last visited the property on **September 14, 2010.** I am responsible for all sections of this report titled – "Technical Report-Purple Onion Property - Mackenzie Mountains - Northwest Territories, Canada".
8. That I am not aware of any material fact or material change with respect to technical aspects of the report which is not reflected in the report.
9. That I am independent of the issuer of this report, the property, and current NSR holder, Coltstar Ventures Inc., as defined by the tests set out in Section 1.5, "Standards of Disclosure for Mineral Projects", National Instrument 43-101., and Section 3.2, 'Mining Standards Guidelines' (TSX Venture Exchange Appendix 3F).
10. That I have read "Standards of Disclosure for Mineral Projects", National Instrument 43-101 and read Form 43-101F1. This report has been prepared in compliance with this Instrument and Form 43-101F1.
11. That, as of February 05, 2013, to the best of my knowledge, information and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the technical report not misleading.

Dated, February 05, 2013 at Yellowknife, NT.

Gary Vivian (sealed)

_____

Gary Vivian, M.Sc., P.Geol.

22 DATE AND SIGNATURE PAGE

This report titled "Technical Report, Purple Onion Property – Mackenzie Mountains - Northwest Territories, Canada" and dated February 05, 2013 was prepared by and signed by the following author:

Gary Vivian (sealed)

_____

Gary Vivian, M.Sc., P.Geol.
President, Aurora Geosciences Ltd

Dated at Yellowknife, Northwest Territories on February 05, 2013

APPENDIX I

GLOSSARY OF GEOLOGIC TERMS AND ABBREVIATIONS

APPENDIX I
Glossary of Terms and Abbreviations

Adit – common mining term for a horizontal to sub–horizontal tunnel driven into a hillside to access an ore body.

Agglomerate – a volcanic rock consisting of fragments of *pyroclastic* rocks more than 2 cm in size.

Alkaline – a term applied to igneous rocks which are characterised by relatively high concentrations of sodium and potassium.

Alluvial – deposits of sediment, usually sand and gravel, transported and deposited by a river.

Archean – period of geological time that is the older of the two main *Precambrian* divisions. Ends 2500 million years ago.

Argillaceous rocks – a group of detrital, fine grained, sedimentary rocks subdivided into silt grade (particle size range 1/16 to 1/256 mm) and clay grade (particle size < 1/256 mm).

Arsenide – a mineral formed by the combination of arsenic with another chemical

Banded iron formation (BIF) (also known as banded ironstone formations or BIFs) is a distinctive type of rock often found in primordial (Precambrian) sedimentary rocks. The structures consist of repeated thin layers of iron oxides, either magnetite (Fe_3O_4) or hematite (Fe_2O_3), alternating with bands of iron-poor shale and chert. Some of the oldest known rock formations, formed over 3,700 million years ago, include banded iron layers, and the banded layers are a common feature in sediments for much of the Earth's early history. The formations are abundant around the time of the Great oxygenation event, 2400 million years ago (mya), and become less common after 1800 mya. The reappearance of BIF conditions at 1,900 million years ago, and in association with the Snowball Earth 750 million years ago, is problematic to explain.

The total amount of oxygen locked up in the banded iron beds is estimated to be perhaps twenty times the volume of oxygen present in the modern atmosphere. Banded iron beds are an important commercial source of iron ore, such as the Pilbara region of Western Australia and the Animikie Group in Minnesota.

Barite – a white, yellow or colourless mineral, $BaSO_4$. The principal ore of barium used in paints, drilling muds and as a filler for paper and textiles. Syn: baryte, barytes.

Basic – describes an igneous rock with a relatively low silica content (between 45–52% SiO_2). Basic rocks are relatively rich in iron, magnesium and calcium and thus include most mafic rocks.

Beneficiation – the process of concentration of the valuable components of an ore or other mineral commodity. Commonly includes multiple stages such as crushing, grinding, washing, screening, flotation, roasting, etc.

Bituminous – type of coal that contains a naturally occurring tar–like hydrocarbon mineral of indefinite composition. It ranges in consistency from a thick liquid to a brittle solid.

Breccia – a rock that has been mechanically, hydraulically or pneumatically broken into angular fragments and re–cemented

Bulk Leach Extractable Gold - more commonly shortened to BLEG is a geochemical sampling/analysis tool used during exploration for gold. It was developed in the early 1980s to address concerns relating to the accurately

measuring fine grained gold, and dealing with problems associated with sample heterogeneity.

Calcite – a very common rock forming mineral comprising calcium, carbon and oxygen ($CaCO_3$).

Cambrian – period of geological time from 545 to 495 million years ago. Marks the beginning of the *Paleozic Era*.

Carbonate – a mineral characterized by a fundamental structure of CO_3. Common examples include calcite, dolomite, magnesite and siderite.

Carbonatite – a magmatic rock consisting of calcium carbonate, usually associated with nepheline–syenite systems.

Carboniferous – period of geological time from 354 to 292 million years ago. So named because of the globally extensive occurrence of coal and limestone ($CaCO_3$) that was formed during this time. In the UK the Lower Carboniferous is dominated by marine sediments. Upper Carboniferous rocks are almost entirely fresh–water and lacustrine sediments. The bulk of coal deposits in the UK occur in Upper Carboniferous strata.

Cenozoic Era – period of geological time extending from 65 million years ago to the present.

Chert – sedimentary rock that is ultra–fine grained and composed almost entirely of silica. May be of organic or inorganic origin.

Conglomerate - clastic sedimentary rock that contains large (greater than two millimeters in diameter) rounded clasts. The space between the clasts is generally filled with smaller particles and/or a chemical cement that binds the rock together

Core strategy: sets out the long-term spatial vision for the local planning authority area, the spatial objectives and strategic policies to deliver that vision. The core strategy will have the status of a *development plan document*.

Cretaceous – period of geological time from 142 to 65.5 million years ago. Marks the end of the *Mesozoic Era*.

Devonian – period of geological time from 417 to 354 million years ago.

Diamagnetic – having a small negative magnetic susceptibility.

Dolomite – a common rock forming mineral comprising calcium, carbon, magnesium and oxygen ($CaMg(CO_3)_2$.

Electrolytic – the process of extracting metal based on passing an electric current through a solution containing dissolved metals, causing the metals to be deposited on the cathode.

Evaporite – a sedimentary rock composed mainly of minerals produced by evaporation, normally from an enclosed body of seawater or a salt lake. Minerals formed in this way include gypsum, rock salt, and various nitrates and borates.

Extrusive – describes igneous rocks that have been formed by solidification of magma on or above the Earth's surface.

Felsic – In modern usage, the term felsic rock, although sometimes used as a synonym, refers to a high-silica-content (greater than 63% SiO_2 by weight) volcanic rock, such as rhyolite. In order to be classified as felsic, it generally needs to contain >75% felsic minerals; namely quartz, orthoclase and plagioclase. Rocks with greater than 90% felsic minerals can also be called *leucocratic*, meaning 'light-coloured'.

Ferromagnesian – describes rock–forming silicate minerals which contain essential iron (Fe) and/or magnesium (Mg). The most common ferromagnesian minerals include olivine, pyroxene, amphibole and mica.

Footwall – the name given to the host rock of an ore deposit that is physically below the ore deposit.

Gabbro – a coarse–grained mafic igneous rock consisting of plagioclase feldspar and pyroxene. Olivine may also be a major constituent, while hornblende, biotite, quartz, magnetite and ilmenite are common minor phases.

Gangue – the undesirable or unwanted minerals in an ore deposit.

Graben - An elongated block of the earth's crust lying between two faults and displaced downward relative to the blocks on either side, as in a rift valley.

Hangingwall – the name given to the host rock of an ore deposit that is physically above the ore deposit.

Highwall mining – mining method used to maximize the output of an open–pit coal mine. Remotely operated cutting or boring machines are used to penetrate the coal seam at the foot of the highwall (the final wall in an open–pit) to extract coal.

Holocene – period of geological time from 11,500 years ago to the present day. The youngest epoch and series of the *Cenozoic Era*.

Horst - A raised elongated block of the earth's crust lying between two faults

Hydrometallurgy – the treatment of ores by wet processes, resulting in the dissolution of a particular component and its subsequent recovery by precipitation, adsorption or electrolysis.

Igneous – one of the three main groups of rocks on Earth. They have a crystalline texture and appear to have consolidated from a silicate melt (magma).

Inductively coupled plasma mass spectrometry (ICP-MS) -- a type of mass spectrometry that is highly sensitive and capable of the determination of a range of metals and several non-metals at concentrations below one part in 10^{12} (part per trillion). It is based on coupling together an inductively coupled plasma as a method of producing ions (ionization) with a mass spectrometer as a method of separating and detecting the ions. ICP-MS is also capable of monitoring isotopic speciation for the ions of choice.

Intrusion – a body of *igneous* rock emplaced into pre–existing rocks, either along some structural feature such as a fault or by deformation and rupturing of the invaded rocks. (intrusive, *adj*).

Iron Formation - Iron-rich sedimentary rocks, mostly of Precambrian age, containing at least 15% iron. The iron occurs as an oxide, silicate, carbonate, or sulphide, deposited as laminated, deep-water, shelf-sea, and lagoonal sediments, often associated with cherts (see also BANDED IRON FORMATION). Other iron formations contain iron-rich ooids, pellets, and intraclasts, representing deposits comparable to shallow marine limestones.

Jurassic – period of geological time from 205.1–142 million years ago.

Kaolin – group of pale coloured clay minerals. In the UK kaolin is an industrial mineral extracted from kaolinised granites in south–west England. It is used as a paper filler and coater, and for high grade ceramics and pottery (china clay). .

Lenticular – lens shaped body of rock.

Limestone – any sedimentary rock consisting mostly of carbonates (calcite and/or *dolomite*).

Lode – mining term for a mineralized *vein* (used irrespective of whether the *vein* can be economically extracted).

Mafic – composed of one or more *ferromagnesian* (iron–magnesium), dark–coloured minerals, such as olivine and pyroxene, in combination with quartz, feldspar or feldspathoid minerals.

Marl – a calcareous *mudstone*.

Mesozoic Era – period of geological time from 250 to 65.5 million years ago.Subdivided into the *Triassic*, *Jurassic* and *Cretaceous* periods.

Miocene – period of geological time from 23.8 to 5.32 million years ago.

Mississippi Valley type, (MVT) – a type of *stratabound* deposit of lead and/or zinc in carbonate rocks, as occurring in the Mississippi valley, USA.

Mudstone – fine grained sedimentary rocks that are similar to *shales* in their non–plasticity, cohesion and low water content but lack fissility.

Neogene – part of the *Cenozoic Era*, comprising the *Miocene* and *Pliocene* epochs from 23.8 to 1.81 million years ago.

Neoproterozoic Era - is the unit of geologic time from 1,000 to 542.0 ± 1.0 million years ago.[1] The terminal Era of the formal Proterozoic Eon (or the informal "Precambrian"), it is further subdivided into the Tonian, Cryogenian, and Ediacaran Periods. The most severe glaciation known in the geologic record occurred during the Cryogenian, when ice sheets reached the equator and formed a possible "Snowball Earth". The earliest fossils of multicellular life are found in the Ediacaran, including the earliest animals.

Oligocene – period of geological time from 28.5 to 23.8 million years ago.

Ophiolite – a distinctive assemblage of *mafic* and *ultramaficigneous* rocks which occur in sequence from a basal *ultramafic* complex upwards to a gabbroic complex, a mafic sheeted–dyke complex and an uppermost mafic volcanic complex. Commonly associated with deep–water sediments such as *shales* and *cherts*.Generally interpreted to be derived from oceanic crust and upper mantle. Ophiolites may contain important deposits of chromite, copper and the platinum–group elements (PGE).

Ordovician – period of geological time from 495 to 440 million years ago.

Paleogene – part of the *Cenozoic Era* comprising the *Paleocene*, *Eocene* and *Oligocene* epochs, from 65.5 to 23.8 million years ago.

Paleozoic Era – period of geological time from 545 to 245 million years ago.Subdivided into the *Cambrian*, *Ordovician*, *Silurian*, *Devonian*, *Carboniferous* and *PermianPeriods*.

Permian – period of geological time from 280 to 255 million years ago, marks the end of the Paleozoic Era. Globally important source of coal.

Pliocene – period of geological time from 5.3 to 1.81 million years ago.

Precambrian - an informal name for the span of time before the current *Phanerozoic* Eon, and is divided into several eons of the geologic time scale. It spans from the formation of Earth around 4600 Ma (million years ago) to the beginning of the Cambrian Period, about 542 Ma, when macroscopic hard-shelled animals first appeared in abundance. Accounts for 90% of all geological time and ends approximately 545 million years ago.

Proterozoic - a geological eon representing a period before the first abundant complex life on Earth. The Proterozoic Eon extended from 2500 Ma to 542.0 ± 1.0 Ma (million years ago), and is the most recent part of the old, informally named 'Precambrian' time.

The Proterozoic consists of 3 geologic eras, from oldest to youngest:

1. Paleoproterozoic
2. Mesoproterozoic
3. Neoproterozoic

The well-identified events were:

- The transition to an oxygenated atmosphere during the Mesoproterozoic.
- Several glaciations, including the hypothesized Snowball Earth during the Cryogenian period in the late Neoproterozoic.
- The Ediacaran Period (635 to 542 Ma) which is characterized by the evolution of abundant soft-bodied multicellular organisms

Pyroclastic – fragmental volcanic material that has been blown into the atmosphere by an explosive eruption.

Pyrometallurgical – the treatment of ores by processes involving heating.

Quarrying (mining) – the extraction of rock from an open pit site.

Quaternary – the uppermost part of the *Cenozoic Era* from 1.81 million years ago to present day.

Refractory – a general term for a material that resists chemical or physical change.

Refractory ore – ore from which it is difficult to extract the valuable constituents. This material may require special treatments, such as pressure leaching, to recover the valuable minerals.

Sedimentary exhalative (Sedex) – an ore deposit formed from hydrothermal fluids discharged onto the sea–floor and hosted by sedimentary rocks such as black shale, siltstone and chert. Deposits comprise sheets or lenses of fine–grained laminated sulphides. Sedex deposits are important sources of zinc, lead and silver.

Sedimentary rocks – rocks formed from material derived from other rocks by weathering. Deposited by water, wind or ice.

Silurian – period of geological time from 440 to 417 million years ago.

Snowball Earth - the hypothesis that the Earth's surface became nearly or entirely frozen at least once, some time earlier than 650 million years ago. The geological community generally accepts this hypothesis because it best explains sedimentary deposits generally regarded as of glacial origin at tropical paleolatitudes and other otherwise enigmatic features in the geological record. Opponents to the hypothesis contested the implications of the geological evidence for global glaciation, the geophysical feasibility of an ice- or slush-covered ocean, and the difficulty of escaping an all-frozen condition. There are a number of unanswered questions, including whether the

Earth was a full snowball, or a "slushball" with a thin equatorial band of open (or seasonally open) water.

The geological time frames under consideration come before the sudden multiplication of life forms on earth known as the Cambrian explosion and the most recent Snowball episode may have triggered the evolution of multi-cellular life on earth. Another, much earlier and longer, Snowball episode, the Huronian glaciation (2.4 to 2.1 billion years) may have been triggered by the oxygen catastrophe.

Stope – mining term for the underground void left after ore extraction has taken place.

Stratabound – an ore deposit that is confined to a single stratigraphical bed or horizon but which does not constitute the entire bed.

Stratiform – an ore deposit that occurs as a specific stratigraphic (i.e. sedimentary) bed.

Sulphide – a mineral formed by the combination of sulphur with another chemical element. Most economic deposits of non–ferrous metals occur as sulphide minerals e.g. galena, PbS; sphalerite, ZnS; chalcopyrite, $CuFeS_2$.

Triassic – period of geological time from 250 to 205.1 million years ago. This period marks the beginning of the *Mesozoic Era*.

Tuff -- (from the Italian *tufo*) is a type of rock consisting of consolidated volcanic ash ejected from vents during a volcanic eruption.

Tuff Breccia and Volcanic Agglomerate - as distinguished from the true ashes, these tend to occur in angular fragments; and when they form a large part of the mass the rock is more properly a "volcanic breccia" than a tuff. The ashes vary in size from large blocks ten meters or more in diameter to the minutest impalpable dust. Any ash in which large angular blocks are very abundant is called anagglomerate.

Ultrabasic – describes an igneous rock containing less than 45% silica (SiO_2), including most ultramafic rocks.

Ultramafic – composed chiefly of *ferromagnesian* (Fe–Mg) minerals, such as olivine and pyroxene.

Vein – A tabular or sheet–like assemblage of minerals that has been intruded into a joint or fissure in rocks.

Volcanogenic massive sulphide, VMS – an ore deposit typically comprising a lens of massive sulphide minerals (>60% sulphide) formed by volcanic processes normally on the sea–floor. VMS deposits are important sources of copper, lead and zinc.

Wallrock – an economic geology term used to describe the rock adjacent to an accumulation of ore minerals (veins, layers, disseminations, etc).

Workings – the current or past underground or surface openings and tunnels of a mine. More specifically, the area where the ore has been extracted.

Xenolith – a discrete and recognizable fragment of country rock in an igneous intrusion.

Zoning – in economic geology, the spatial distribution of distinct mineral assemblages or chemical elements associated with an ore–forming process.