TECHNICAL REPORT

on the

Buchans Wileys Property

Mineral Licences 21555M & 22404M

NTS 12A/15

Central Newfoundland and Labrador
Canada

FOR

Buchans Wileys Exploration Limited

PREPARED BY

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EFFECTIVE DATE

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1.0 SUMMARY

The Buchans Wileys Property consists of two mineral licences (21555M & 22404M) comprised of 48 contiguous, map-staked claims, covering a total area of 12km^2. The property is located on NTS map sheet 12A/15, approximately three kilometers south of the town of Buchans in Central Newfoundland. The town of Buchans lies at the end of Route 370, a 72km paved road which joins the Trans-Canada Highway (TCH – Route 1) 25kms west of the town of Grand Falls-Windsor.

The Buchans area first came to prominence in the early 1900s when Copper-Lead-Zinc mineralization was discovered by Matty Mitchell, a prospector and guide employed by Anglo-Newfoundland Development Company Limited (A.N.D. Co.). Since that time, the area produced an estimated 16,196,876 tonnes of ore at an average mill head grade of 14.51% zinc, 7.65% lead, 1.33% copper, 126 grams/tonne silver and 1.37 grams/tonne gold.

The area currently covered by Buchans Wileys Exploration claims had long been assigned to the footwall lithologies which occupies the stratigraphy immediately below the Buchans orebodies. The area was therefore considered to hold very little ore bearing potential. Following stratigraphic and structural re-interpretation by Thurlow et al. (1987), the area was considered to be underlain by the all formations of the Buchans Group stratigraphic sequence including the Buchans River Formation ore horizon and thus the residual prospectivity was upgraded.

The property area is underlain by the Middle Ordovician Buchans Group. The group is a subaqueous sequence of mafic volcanic rock and coarse immature clastic sediments forming the south end of a sinuous volcanic belt approaching 200 km in length. The Buchans Group from bottom to top is comprised of the Lundberg Hill, Ski Hill, Buchans River and Sandy Lake formations. The Buchans River Formation is the only known formation within the Buchans Group to host significant in-situ VMS mineralization. Within the Wileys property the Buchans River Formation is referred to as the Wileys Trend. The Wileys Trend/ Buchans River Formation within the property is inferred from overlying and underlying formations to be a moderately north dipping band several hundred meters wide and extending the entire length of the property in east northeast direction.

As of the effective date of this document, work completed on the property by Buchans Wileys Exploration Limited/Ubique Minerals Limited has consisted of compilation, prospecting, surface soil and rock sampling, re-logging of diamond drill core and most recently an airborne TDEM survey.

2.0 INTRODUCTION & TERMS OF REFERENCE

This technical report describes the geology, exploration history and mineral potential of Mineral Exploration Licences 21555M & 22404M herein referred to as the 'Buchans Wileys Property', located in the Buchans area of Central Newfoundland, Canada on NTS 12A/15.

This report was prepared by Elliott M. Stuckless, P.Geo. for Buchans Wileys Exploration Limited (**Buchans Wileys Exploration**) to comply with technical, reporting and disclosure requirements set out under National Instrument 43-101 and was prepared at the request of the board of directors of Buchans Wileys Exploration. The terms of reference were established between Buchans Wileys Exploration and the author in August of 2017. It is the understanding of the author that this report will be used to assist in the listing of Buchans Wileys Exploration Limited.

The Buchans Wileys Property is located just south of the former Buchans Mining Camp, a high grade base metal producer for most of the past century. The area covered by Buchans Wileys Exploration claims has seen relatively little exploration as it was deemed to have very little prospective potential until recent stratigraphic and structural re-interpretation.

The data presented in this report was obtained from the following sources:

1. Assessment reports describing exploration on and around the Buchans Wileys Property, filed with the Newfoundland and Labrador Department of Mines and Energy by previous operators.

2. Press releases and other documentation put forward by previous operators.

3. Documents and data supplied by Buchans Wileys Exploration.

4. Various published reports and maps dealing with the geology and mineral potential of the Buchans area

5. The primary author's personal knowledge of the property.

Documents used in the completion of this report are listed in Section 27.0 and have been referenced throughout.

The author of this report is a professional geologist (P. Geo) and prepared this report after a review of past exploration on the property. The author is an independent qualified professional who worked strictly on a fee for service basis with Buchans Wileys Exploration. A site visit was not completed for the purpose of this report, however the author has been on site numerous times as an employee of Celtic Minerals Ltd who operated the property from 2005-2011. During that time mineralization was observed in outcrop, historic workings were viewed, and a diamond drilling project was undertaken. Based on personal involvement in the project, as well as verification of data provided by Buchans Wileys Exploration detailing recent work, the author is certain that the work detailed in this technical report has actually been completed.

3.0 RELIANCE ON OTHER EXPERTS

No other experts were consulted in the preparation of this report. This report was completed by the author for Buchans Wileys Exploration Ltd. and the information, conclusions and recommendations contained herein are based upon information available to the authors at the time of report preparation. This includes data made available by Buchans Wileys Exploration as well as from government and public sources. Information contained in this report is believed reliable but the report is based upon information not within the author's control. There is no apparent reason to question the quality and validity of data used in this report and as such comments and conclusions presented represent the author's best judgment at the time of report preparation and are based upon all known information available at that time.

This report expresses opinions regarding the exploration and development potential of the Buchans Wileys Property as well as recommendations for further evaluation. These opinions and recommendations are intended to serve as guidance for further development, but should not be viewed as a guarantee of success.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Buchans Wileys Property is located on NTS map sheet 12A/15, approximately three kilometers south of the town of Buchans in Central Newfoundland. The town of Buchans lies at the end of Route 370, a 72km paved road which joins the Trans-Canada Highway (TCH – Route 1) 25kms west of the town of Grand Falls-Windsor (*Figure 1*). Buchans is host to a small airstrip, which is capable of dealing with light aircraft, the nearest major airport is located approximately two hours east at the town of Gander.

The Property is accessible via numerous secondary roads and trails that emanate from the town of Buchans, as well as by snowmobile in the winter.

The Buchans Wileys Property consist of two mineral licences (21555M & 22404M) consisting of 48 contiguous, map-staked claims, covering a total area of 12km2 (*Figure 2, Table 1*). The claim area currently cover by licence 22404M was originally staked by Ubique Minerals Limited in 2012 under three mineral licences (20466M, 20533M & 20535M), which were subsequently grouped in September of 2014. Licences were transferred to Buchans Wileys Exploration Limited on December 13th, 2017.

Table 1: Details of Buchans Wileys Property Claims

Licence	Claims	NTS	Issued	Renewal	Required Expenditure	Required By
021555M	6	12A/15	2013/11/07	2018/11/07	$ 1,175.00	2018/11/07
022404M	42	12A/15	2012/09/24	2022/09/24	$ 18,583.09	2018/09/24

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTRE AND PHYSIOGRAPHY

The Buchans Wileys Property is located on NTS map sheet 12A/15, approximately three kilometers south of the town of Buchans in central Newfoundland. The town of Buchans lies at the end of Route 370, a 72km paved road which joins the Trans-Canada Highway (TCH – Route 1) 25kms west of the town of Grand Falls-Windsor. Buchans is host to a small airstrip, which is capable of dealing with light aircraft, the nearest major airport is located approximately two hours east at the town of Gander.

The Property is accessible via numerous secondary roads and trails that emanate from the town of Buchans, as well as by snowmobile in the winter.

Like much of Newfoundland, Buchans has a humid continental climate with maritime influences, seeing large seasonal temperature differences, with warm to hot summers and cold winters. With an annual average temperature of 3.8° C, Buchans hosts an extended summer season with temperatures averaging 11.6° C between May and October. Extreme maximum for summer is 33° C, extreme minimum in winter is -33.5° C. The yearly average rainfall is 877mm and average snowfall is 359.3 cm.

The local terrain is relatively flat with several minor areas of low relief ranging from 250-450 meters above sea level, with wooded areas alternating with bogs and small ponds. There are many small ponds and lakes on the property the largest of which, Wileys Lake, occupies a large portion of the licence 22404M and drains southeast into Red Indian Lake.

6.0 HISTORY

6.1 Introduction

The Buchans Wileys property has been the focus of mineral exploration since 1905 with the discovery of the first Buchans ore bodies. Since that time, the area has been covered by numerous geological, geochemical, geophysical and diamond drilling surveys. The following section will outline the exploration history of the property.

Readers are encouraged to refer to appendix II for historic claim locations as they will be referenced throughout.

6.2 Summary of Past Exploration

6.2.1 1905-1984

The Buchans area has a long and complex history starting in 1905 with the discovery of mineralization by Matty Mitchell on what was to become the Buchans ore bodies. With the development of selective flotation technique in 1925 mining development began. This was a joint venture 50:50 between ASARCO and Anglo-Newfoundland Development Company. In 1926 the Oriental and Lucky Strike ore bodies were found through rudimentary geophysical techniques, followed by the Rothermere ore body in 1946, the MacLean orebody in 1947 and the MacLean Extension in 1979. Production ceased in 1984 with an estimated 16,196,876 tonnes of ore at an average mill head grade of 14.51% zinc, 7.65% lead, 1.33% copper, 126 grams/tonne silver and 1.37 grams/tonne gold having been extracted.

The current claim area, then covered primary by former Reid Lot 232, saw several shallow diamond drill test holes during the 1920s (H-0068 & H-0070), 1930s (H-0250) and 1960s (H-2713, H-2753, H-2758, H-2759, H-2761, H-2763 & H-2769) with little to no mineralization being noted. This is believed to be the result of the holes failing to penetrate deep enough to reach the potential ore horizon.

In 1978, the Wileys Lake area was the focus of detailed geological mapping. The complex geological terrain let to delineation drilling in late 1978 (H-2933, H-2942, H-2944 & H-2946) focused on advancing the geological/structural interpretation of the area (Thurlow & Pearce, 1979). In 1979, two more delineation holes were completed (H-2970 & H-2971) and the area was prepared for geophysical analysis with line cutting being the primary focus.

In 1980, 74.75 km of magnetics and 36.53 km of IP was completed in the area (Thurlow & Barbour, 1981). The following year, the Wileys Lake area was covered by a series geophysical surveys (3.4 km VLF-EM, 26.2 km IP, 4.7 km HLEM, 7.1 km magnetics and 2.7 km gravity) designed to further outline anomalies, with several targets being selected for drill testing (H-3309 and H-3311). No visible sulphides were noted and the corresponding geophysical responses were attributed to strongly hematized basalts in fracture and fault zones (Thurlow & Barbour, 1982).

Between 1928 and 1981, a total of 19 diamond drill holes (*Figure 3*), totalling 3061.10m, were completed by ASARCO/A.N.D Co. in the area currently covered by Buchans Wileys Exploration claims. A summary of all holes can be found in Table 2 below and a copy of the original drill logs can be found in Appendix III.

Table 2 Summary of Diamond Drilling Completed by ASARCO/A.N.D. Co.

Core ID	Year	UTM-East	UTM-North	UTM Zone	Length (m)	Dip	Azimuth	Core Size
H-0068	1928	503206	5403700	21	52.73	-55	175	EX
H-0070	1928	503197	5403667	21	29.26	-90	0	EX
H-0250	1938	507761	5403700	21	501.09	-90	0	EX
H-2713	1968	507785	5404259	21	177.09	-90	0	EX
H-2753	1968	507785	5403344	21	188.67	-90	0	EX
H-2758	1968	507175	5404259	21	91.44	-90	0	EX
H-2759	1968	506870	5404259	21	66.75	-90	0	EX
H-2761	1968	506565	5404259	21	31.39	-90	0	EX
H-2763	1968	506870	5404106	21	105.46	-90	0	EX
H-2764	1969	506870	5403954	21	185.32	-90	0	EX
H-2933	1977	506718	5404106	21	494.08	-90	0	BQ
H-2942	1978	502722	5403459	21	143.26	-55	0	BQ
H-2943	1978	502508	5403467	21	74.68	-50	0	BQ
H-2944	1978	503020	5403463	21	213.36	-50	0	BQ
H-2946	1979	503054	5403292	21	226.77	-50	0	BQ
H-2970	1979	503062	5403497	21	213.36	-90	0	BQ
H-2971	1979	503472	5403373	21	121.92	0	0	BQ
H-3309	1981	505062	5403679	21	54.86	-55	0	AQ
H-3311	1981	505831	5403194	21	89.61	-50	0	AQ

In1983, a 29 line kilometer grid was established in the area and VLF-EM, magnetics and geological mapping surveys were completed. A number of linear magnetic anomalies were identified which correlated to known diabase outcrops, VLF-EM responses were described as generally broad and weak and were subsequently attributed to shear zones. A recommendation was made that the grid be covered by a gravity survey the following year (Thurlow, 1984).

In 1984, 6.44 km Max-Min horizontal loop EM and 10.14 km of gravity were completed over sections of the grid established the previous year. Modest gravity anomalies were observed, coincidental in most cases with known diabase intrusions. Weak EM responses were again attributed to fault zones (Thurlow, 1985).

After the 1984 field season, exploration work in the Buchans area was suspended by ASARCO/A.N.D. Co. citing budgetary restraints caused by dwindling reserves at the Buchans Mine site.

6.2.2 1984-1991

On September 18th, 1985 BP Resources Canada (BP) acquired the rights to the area in a deal with A.N.D. Co and began exploration. During the 1985 field season, a regional lake bottom geochemical survey was completed which saw 1658 samples collected, including several samples from the Wiley's Lake area (Thurlow & Barbour, 1986).

In 1986, BP completed a 2051 km airborne TDEM/Magnetics survey over the Buchans area, this data combined with the previously collected lake bottom sedimentary geochemistry and a thorough review of the work completed by ASARCO/A.N.D. Co. led to several areas being selected for ground work, including the area just south of Wileys Lake. In the current claim area, 23.45 km of ground magnetics, 22.15 km of VLF-EM and geological mapping was completed over a 23.7 line kilometer grid. Outcrops of mafic and felsic volcanics were identified, however no mineralization was discovered. The majority of the EM anomalies were attributed to contacts or faults, however, several were identified as having exploration potential and recommended for further work Thurlow et al., 1987)

6 km of IP was completed in the grid area in 1987 to follow-up on the targets identified the previous year. Two broad, distinct anomalies were identified, separated by a northeast trending low. This data was compared to high resolution magnetic and resistivity data collect from the airborne survey and it was concluded that the anomaly was attributable to major northeast trending fault zone (Thurlow, et al., 1988).

An addition 5.5 km of magnetics and VLF-EM was conducted in 1988 as an extension to the grid previous established by BP. This work failed to produce any significant response (Thurlow et al., 1989).

6.2.3 1991-2012

In 1991, BP completed 67.5 line kilometers of line cutting and covered the grid with 58.05 km of TDEM. This survey resulted in the discovery of what would become known as the Wileys Trend. Believing this trend to be the result of lithology similar to the felsic volcanic rocks which hosted the Buchans deposits, Noranda, on behalf of BP, laid out a 25 line km grid over the anomaly and commissioned Eastern Geophysics to complete a 17 km gravity survey of the area in late 1992. Although noting that several weak gravity anomalies occurred coincident with geochemical Zn anomalies identified by ASARCO, it was concluded that these were most likely related to sedimentary horizons or surficial features (Graves & Squires, 1992, McKenzie, 1992) and further investigating was not warranted.

Newfoundland Mining and Exploration Limited completed compilation in the claim area in 1994 (Tuach, 1994) which included a surficial geology study. This study concluded that high-grade sulphide boulders in the Wileys Lake area were unlikely to have been transported from the Lucky Strike deposit, as was originally interpreted, as there was little evidence of strong ice movement to the southwest. In 1997, a basal till survey was completed, with 73 samples collected in the claim area. The survey returned anomalous Cu, Pb and Zn in several locations and it was recommended that detailed prospecting be completed in an attempt to identify a local source of the high-grade boulders in relation to alteration and geophysical anomalies associated with the Wileys Trend (Saunders et al., 1998).

Concurrent with the work being completed by Newfoundland Mining and Exploration, GT Exploration completed compilation and a diamond drill core relogging program over the southern half of the current claim area in 1997. It was concluded that the TDEM targets identified by BP in 1991 should be revisited, IP coverage should be extended to the east to cover the remainder if the Wileys Trend and that all significant anomalies should be drill tested (Harris et al., 1997).

IN 1998, The Buchans River Joint Venture was established between Billiton Resources, Buchans River Limited, Newfoundland Mining and Exploration and GT Exploration.

In 1999, Billiton completed a massive airborne EM/Mag Survey which covered the Wileys area. In total, 8,858 km of data was collected (Harris, et al., 1999). During the interpretation of this data (Reed, 1999 & Wallis, 1999), it was suggested that a more in-depth understanding of the geochemical composition and structural complexity of each anomalous area should be established before planning further work. This resulted in a series of lithogeochemical and Pb isotope studies being carried out, as well as an MMI survey in 2000, 44 samples of which came from the Wileys area (Saunders, 2001) and a ground IP survey over a very small section of the current claim area with no significant responses noted (Harris et al., 1999)

The culmination of this work was a drilling program carried out by GT Exploration in 2001. Three diamond drill holes were completed in the claim area with no significant base metal sulphide mineralization reported (Harris, 2001). The coincident geochemical and geophysical anomalies remained unexplained by diamond drilling and it was concluded that the area still had mineral potential, but at much greater depths than originally speculated. A summary of these holes can be found in Table 3 below and a copy of the original drill logs can be found in Appendix III.

Table 3 Summary of Diamond Drilling Completed by GT Exploration

Core ID	Year	UTM-East	UTM-North	UTM Zone	Length (m)	Dip	Azimuth	Core Size
BR-12-01	2001	502773	5402964	21	171.80	-50	270	NQ
BR-12-02	2001	503080	5402708	21	155.00	-50	270	NQ
BR-19-02	2001	507038	5403348	21	108.00	-90	0	NQ

GT Exploration continued to hold the property until 2004, but were mostly inactive during this time. A series of borehole EM surveys were completed by Billiton in 2001 (Reed, 2001), but this data was never fully incorporated into a significant geological database as recommended.

In 2005, Celtic Minerals Limited completed a thorough compilation of the area and selected four diamond drill targets based on previous workings. In, 2006 a four hole, 1055.04m program was completed (Delaney & Stuckless, 2007). Penetrating much deeper than the previous GT Exploration program, but still failing to intersect any significant alteration or the desired Buchans River Formation, it was concluded that Sandy Lake Formation, which overlies the ore horizon in Buchans is much thicker in this area. It was recommended that borehole EM be completed on all holes to gain some indication of how far below the end of hole the Buchans River Formation existed, if at all; this work was never completed. A summary of diamond drilling can be found in Table 4 below and a copy of the original drill logs can be found in Appendix III.

Table 4 Summary of Diamond Drilling Completed by Celtic Minerals

Core ID	Year	UTM-East	UTM-North	UTM Zone	Length (m)	Dip	Azimuth	Core Size
BR-19-02A	2006	507038	5403348	21	209.09	-90	0	NQ
WL-06-01	2006	505939	5403110	21	236.35	-60	174	NQ
WL-06-02	2006	506301	5403531	21	244.60	-60	132	NQ
Wl-06-03	2006	507433	5403513	21	365.00	-60	165	NQ

The area saw some minor compilation work after 2007, but no significant new exploration was carried out in the area until recent work completed by Ubique Minerals/Buchans Wileys Exploration (See Section 9.0 of this report).

6.2.4 2012-Present

Work completed by Ubique Minerals Limited in the claim area prior to the transfer of minerals Licences to Buchans Wileys Exploration is as follows:

Originally staked as five separate mineral licences in 2012, the area which now comprises the majority of the current claim area was the subject of prospecting and geochemical sampling in 2013. This work resulted in the discovery of three angular float boulders along the shoreline of Wileys Lake.

These boulders returned assay values up to 13.5% zinc, 1.84% copper, 2.27% lead and 26.4 g/t silver (Quinlan, 2013). Due to the angular shape of the boulders, it was suspected that they were locally derived and further prospecting, systematic soil sampling and re-assessment of historic diamond drill core was recommended (Quinlan, 2013).

After completing a reconfiguration of claims into the current licence structure, exploration work was continued by Ubique in 2014. This included compilation work, digitization of historic workings and an evaluation of previous diamond drilling. A comprehensive digital archive of all available geophysical, geochemical, geological and diamond drilling data resulted, providing an unprecedented knowledgebase for the property, designed to help further decipher the complex stratigraphy of the area, as well as provide insight into why previous exploration work had failed to identify significant mineralization (Stuckless, 2014).

A key finding came with the revaluation of ASARCO borehole H-2944, which was reported as having intersected a thick package of moderately to locally strongly altered and pyritic rhyolite/dacite of the productive Buchans River Formation, with anomalous base metals and barite. Given the strength of alteration and mineralization, this was interpreted as a more distal part of the VMS system and a three hole, step-out diamond drilling program was recommended to determine if the stronger part of the system was preserved (Greene, 2014).

The following year saw additional prospecting and an attempt at rock and soil sampling. Citing a lack of outcrop and dangerously high river and pond water levels caused by abnormally high precipitation rates, the work was limited to just 20 rock samples and 23 soil samples, none of which returned significant base metal values (Quinlan, 2016).

During 2016, a diamond drilling program was developed to test three areas of the property, Clench Brook, Wileys Lake and Clench Brook South (Crossley, 2016).

The most recent work completed on the property consisted of a 140 line kilometer EM and magnetics survey performed by SkyTEM Airborne Surveys Worldwide using their SkyTEM 312M System. The survey, flown from June 8th to June 13th, 2017 was part of a larger survey requested by Altius Minerals to cover their adjacent property and shares the same system set-up, magnetic base and GPS base stations. RDF Consulting Limited was later contracted to review the data and provided an interpretation report, a copy of which can be found in Appendix V.

7.0 GEOLOGICAL SETTING & MINERALIZATION

7.1 Geological Setting

7.1.1 Regional Geology

The island of Newfoundland forms the northern end of the Appalachian Orogen. The Island is split-up into 4 distinct geological subdivisions; from west to east these are the Humber, Dunnage, Gander and Avalon zones (*Figure 4*). These zones are based on stratigraphic and structural contrasts related to the formation and later destruction of a late Precambrian - early Paleozoic ocean known as Iapetus, the proto-Atlantic Ocean.

The Humber Zone, lies furthest to the west, and represents the remnant of the North American continental margin. This zone is comprised of Paleozoic shelf facies units (sedimentary rocks) deposited on crystalline Precambrian (Grenville) basement. The Dunnage zone units, in west-central Newfoundland, consist of ophiolitic and volcanic, volcaniclastic and sedimentary rocks of island arc and back arc affinity that represent the vestiges of the Iapetus (proto-Atlantic) Ocean. The Gander Zone, in east-central Newfoundland, is comprised of mainly deep water sedimentary rocks deposited at or near the eastern side of Iapetus. The Avalon Zone, in eastern Newfoundland, is formed by late Precambrian volcanic, sedimentary and plutonic rocks overlain by early Paleozoic platformal sedimentary rocks which formed part of the European continent (Evans, 1996).

7.1.2 Property Geology

The Middle Ordovician Buchans Group is a subaqueous sequence of mafic and felsic volcanic rocks and coarse, immature clastic sediments that forms the south end of a sinuous volcanic belt stretching from Red Indian Lake to Notre Dame Bay in central Newfoundland. The Buchans Group is in structural contact with the Cambro-Ordovician Victoria Lake Group to the southeast, and is intruded by small bodies of the comagmatic Feeder Granodiorite. Polydeformed intrusive rocks of the Cambro-Ordovician Hungry Mountain Complex are thrust over the Buchans Group in the north and the volcanic package is intruded by the Devonian Topsails Granite in the northeast. The rocks in the Buchans area are metamorphosed to low grade prehnite - pumpellyite facies (*Figure 5*).

Early exploration in the Buchans camp led to the development of a conceptual geological model which involved cyclical mafic to felsic volcanism and sedimentation, culminating in ore formation and subsequent

redeposition in paleochannels (Thurlow et al, 1975). The recognition of widespread thrusting in the group has led to a substantial revision of internal stratigraphy and structure in the Buchans area (e.g- Thurlow and Swanson, 1987). As now envisioned, the group consists of four formations: from bottom to top these are the Lundberg Hill, Ski Hill, Buchans River and Sandy Lake formations. The Buchans River Formation hosts the known ore deposits and is the main exploration target.

The Buchans Group has been disrupted by southerly-directed thrusting and folding to form a complex series of duplex and antiformal stack structures in the immediate Buchans area (Thurlow and Swanson, 1987). Orebodies and alteration zones acted as a locus for thrusting, with the result that all major orebodies are fault-bounded. This structural style implies that the ore horizon sequence, with yet-undetected sulphide zones, could be structurally emplaced anywhere within the Buchans Group.

7.2 Mineralization

The Buchans ore bodies are classed as a Kuroko-like volcanogenic massive sulphide (VMS), they are baritic and polymetallic and are amongst the highest-grade massive sulphide deposits in Canada. In general, there appears to be a close association with coarse-grained pyroclastic rocks and rhyolitic domes.

Three distinct ore types can be found in the Buchans area; these are termed stockwork, in-situ and transported.

The stockwork ore consists of networks of veinlets and disseminated pyrite with minor base metal sulphides and barite. The host rocks are silicified and/or chloritized and in many places may obscure the original host. Peripheral stockwork alteration is dominated by sericite and disseminated pyrite. Stockwork ores tend to be more pyritic than high-grade ore bodies and are relatively higher in copper and poor in lead and zinc.

The in-situ ores structurally over lie the stockwork mineralization. The ore is characterized by texture ranging from massive to brecciated to streaky banded.

Transported ore consists of unsorted, matrix-supported re-sedimented breccia deposits hosted within felsic pyroclastics. These deposits are believed to be developed by gravity flow of the in-situ ore down slope and redeposited in lowland areas where they are re-cemented. Grade is proportional to the abundance of very high grade black ore, yellow ore and barite, but not to the distance of transport from the source.

8.0 DEPOSIT TYPE

Volcanogenic massive sulphides (VMS) deposits are one of the most common families of mineral deposits on earth. They consist of irregularly shaped tubular bodies of nearly 100% sulphides within volcanic host rocks. Pyrite is generally the most abundant sulphide, though many deposits outside of island of Newfoundland contain significant pyrrhotite. The base metals zinc (from sphalerite) and copper (from chalcopyrite) are the two most common commodities produced from VMS deposits, with lead (from galena), gold and silver often seen as secondary products. Canada is home to many of the world's great VMS deposits including districts such as Noranda, Matagami, Bathhurst, Flin Flon, rich deposits like Eskay Creek and Buchans and giant deposits like Kidd Creek and Manitouwadge.

A typical VMS system consists of two main ore types, massive sulphides and stringer/stockwork ore with associated alteration system. Massive sulphide deposits are a much smaller target than the alteration zone and tend to be aligned in conformity with the host volcanic strata. The stringer/stockwork zone forms beneath the massive sulphide and consists of disseminated sulphide and veining in altered volcanic host rocks. This zone can be very irregular in shape. The alteration zone associated with most VMS deposits forms a much larger target than the massive sulphide itself and is therefore the primary feature used to identify massive sulphide during exploration. A massive sulphide district contains a cluster of VMS deposits associated with a single, or sometimes multiple alteration systems.

On a worldwide scale, the Appalachians in general and Newfoundland and Labrador in particular, are recognized as an important VMS belt. This area contains two of the world's greatest VMS deposits in Bathurst and Buchans, both of which contain clusters of economic deposits (Thurlow, 2000).

9.0 EXPLORATION

As of the effective date of this report Buchans Wileys Exploration Minerals has not completed exploration on the Buchans Wileys Property. Prior to the transfer of ownership to Buchans Wileys Exploration, work was completed by Ubique Minerals Limited on the property. This work is summarized in Section 6.2.4 of this report.

10.0 DRILLING

As of the effective date of this report no drilling has been completed on the property by Buchans Wileys Exploration Limited. The most recent drilling program completed in the claim area was back in 2006 by Celtic Minerals Limited. The results of this program, as well as previous drilling programs by GT Exploration and ASARCO/A.N.D. Co. are detailed in Section 6.2 of this report.

11.0 SAMPLE PREPERATION, ANALYSIS AND SECURITY

As of the effective date of this report no sample preparation has been completed by Buchans Wileys Exploration Limited.

12.0 DATA VERIFICATION

As of the effective date of this report no data verification has been completed by Buchans Wileys Exploration Limited.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

As of the effective date of this report no mineral processing or metallurgical testing has been completed by Buchans Wileys Exploration Limited.

14.0 MINERAL RESOURCE ESTIMATES

No mineral resource estimates were prepared as part of this report.

15.0 MINERAL RESERVE ESTIMATES

No mineral reserve estimates were prepared as part of this report.

16.0 MINING METHODS

This section is not applicable to this report.

17.0 RECOVERY METHODS

This section is not applicable to this report.

18.0 PROJECT INFRASTRUCTURE

This section is not applicable to this report.

19.0 MARKET STUDIES AND CONTRACTS

This section is not applicable to this report.

20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

Buchans Wileys Exploration Limited holds the exclusive right to explore for minerals within the boundaries of licences 21555M & 22404M, but does not hold the surface rights to the property. Access to the property has always been granted to exploration companies by the Government of Newfoundland and Labrador in the past and the author has no reason to assume access would be denied in the future.

To the author's knowledge, there are no environmental liabilities applicable to the Buchans Wileys Property. At the time of this report, no new work is being carried out on the property and no exploration permits are currently in place. For any future work contemplated, exploration approval must be obtained from the provincial Department of Natural Resources and all provincial and federal conditions, acts or regulations complied with. Exploration approval for the Buchans Wileys property has always been granted in the past and there is no reason to assume that exploration approval would be denied in the future. A summary of approvals that may need to be obtained can be found below and it should be noted that 4-6 weeks should be allowed to acquire the necessary approvals.

1. **Exploration Approval Permit:** This permit would cover prospecting, rock and soil geochemistry, line cutting, trenching, bulk sampling, airborne &/or ground geophysical surveys, fuel storage, ATV usage, diamond drilling, etc.

2. **Timber Rights Permit:** This permit would cover the removal of timber for line cutting, diamond drilling site preparation, trenching, etc.

3. **Temporary Water Use Permit:** This permit would allow the use of water, from a specified location, for camp and drilling related needs.

4. **Licence to Occupy:** This would be required if a camp location was to be used for a period of time longer than that which was allowed as part of the Exploration Approval. This permit is obtained from the Provincial Department of Crown lands.

20.1 Summary of Exploration Licence Requirements

Mineral exploration licences are issued by the Newfoundland and Labrador Department of Natural Resources and must be registered with the Mineral Claims Recorders Office. Licences are comprised of 500 m^2 single claim blocks which are based on one-quarter of a Universal Transverse Mercator (UTM) grid square. Licences are acquired via map staking using an online system and are referenced using UTM coordinates for the corner points in a relevant map projection. A

maximum of 256 contiguous claims can be covered by one exploration licence. The fees for staking are comprised of a $10/claim claim staking fee as well as $50/claim security deposit, which is refunded upon completion of the 1st year assessment requirements. Each licence is issued for a 5 year term and may be held for a maximum of 20 years, with renewal fees due on the anniversary date in assessment years 5, 10 and 15. In order for claims to remain in good standing, assessment expenditures must be met for each year, with a report summarizing work completed due annually. A summary of the renewal fees and expenditure requirements can be found in Table 2.

Table 5: Summary of Claim Renewal Fees and Expenditure Requirements

Assessment Year	Renewal Fees	Minimum Expenditure
1	N/A	$200/claim
2	N/A	$250/claim
3	N/A	$300/claim
4	N/A	$350/claim
5	$25/claim	$400/claim
6 through 10	$50/claim (Year 10)	$600/claim
11 through 15	$100/claim (Year 15)	$900/claim
16 through 20	N/A	$1200/claim

21.0 CAPITAL AND OPERATING COSTS

This section is not applicable to this report.

22.0 ECONOMICAL ANALYSIS

This section is not applicable to this report.

23.0 ADJACENT PROPERTIES

Several zinc showings occur on the properties immediately adjacent to the Buchans Wileys Property (*Figure 6*). These showings, prospects and past producers share a similar deposit type and style of mineralization with the showings found on the Buchans Wileys Property. These showing are primarily related to the ASARCO/A.N.D. Co. mining operation and have had varying levels of development.

It should be noted that the information in this section is derived from the Government of Newfoundland and Labrador's online Mineral Occurrence Database system and supplemented by data reported in SEDAR filed technical reports and press releases prepared by/for the respective companies and that all specific references have been cited. The author has not visited any of the adjacent properties and is unable to verify the

information presented. Mineralization on adjacent properties should not be considered indicative of mineralization on Buchans Wileys Exploration Limited's Property.

23.1 Lucky Strike

National Mineral Inventory Number: 012A/15/Zn 001
Record ID Number: 1735

DEPOSIT SUMMARY

Deposit Name: Lucky Strike
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Dormant)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: No
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) deposit in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8237240410995
Easting: 509850
Elevation (m): 266
NTS Area: 12A/15
Longitude: 56.8658086300853
Northing: 5407650
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The town of Buchans lies at the end of Route 370 which joins the Trans-Canada Highway 100 kilometres west of the town of Grand Falls and has a population of approximately 800. The town is supported by services such as a medical clinic, a hotel, a small gravel air strip, and grocery, hardware, and service facilities are readily available. The town has power and phone and is serviced by a municipal water supply. The nearest major airports are at Gander 175 km to the east and Deer Lake 250 km to the northwest, by road. The property area also includes the Town of Buchans. RRO currently has permission from the town and

Abitibi Bowater (surface rights) to conduct exploration activities within and adjacent to the town and surrounding areas. The town is immediately adjacent to the Mineral Resources outlined in this report (Webster and Barr, 2008).

Much of the property has been clearcut by Abitibi-Price and this activity has led to the construction and refurbishment of a number of new and existing forestry roads in the area, permitting ready access to most of the property (Webster and Barr, 2008).

Field supplies, fuel and logistical support are available in Millertown or Buchans and contract geotechnical personnel including drill companies and analytical laboratories are available in either Grand Falls or Springdale. The closest deep-water ports are located 125 km northeast in Botwood and 160 km west in St. Georges, formally used as the loading terminus for the past-producing Buchans Mine, while St. Georges is currently used as the loading terminus for Teck's currently operating Duck Pond mine. The main power line from Grand Falls to Corner Brook passes through Buchans 15 km to the north of the property's northeast corner. A core storage facility operated by the Newfoundland Government is available for use in Buchans. This facility is used by private exploration companies, and much of the core from historic drilling on the Buchans area properties and surrounding region is stored at this location. Viewing and re-sampling of core can be arranged under government supervision. Historic mine buildings and a large tailings pond remain on the property from past mining by Asarco. The tailings pond is not permitted for use (Webster and Barr, 2008).

The Lundberg and Engine House deposits underlie the Lucky Strike glory hole, located on the western edge of the town of Buchans which is easily accessed by paved and dirt roads (Webster and Barr, 2008).

PHYSIOGRAPHIC SETTING

The area is generally flat to gently rolling with elevation ranging from 155 m to 165 m at Red Indian Lake to approximately 130 m to 280 m inland. There are numerous small brooks which drain into Red Indian Lake with spruce and fir growing on the slopes. The northern portion of the property is poorly drained and covered by areas of shallow bogs and extensive muskeg in the flat areas. The depth of till is approximately 2 metres with less than 5% outcrop exposure. To the south of the property Red Indian Lake occupies a large northeast trending valley. The climate of central Newfoundland is characterized as northern maritime, with relatively cool summers and winters with an overall annual average temperature of 3.5°C. The area receives an average annual precipitation of 873.3 mm of rain and 331 mm of snow, for a combined total average annual precipitation of 1,204.3 mm (data from Environment Canada, received at the Badger meteorological station) (Webster and Barr, 2008).

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite, Silicates

Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Lucky Strike orebodies occur in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The orebodies currently described occur within the Lucky Strike Ore Horizon Sequence, a complex assemblage of mainly felsic volcanic rocks, including flows, pyroclastics and breccias and clastic sedimentary rocks with an average total thickness of about 200 m (Thurlow and Swanson, 1981). The Ore Horizon Sequence is underlain by the Intermediate Footwall, an areally restricted sequence of altered basaltic to rhyolitic pyroclastics which host the stockwork mineralization that underlies the main Lucky Strike Orebody. The Ore Horizon Sequence is overlain by the Lake Seven Basalt to the west of the main orebody and elsewhere by the Prominent Quartz Sequence of felsic volcanics.

The following deposit description for the Buchans property has been taken from Webster and Barr, 2008. References and figures there in:

Mineralization in the Buchans area is associated with the three main genetically related ore deposit types. The Lucky Strike and Oriental #1 orebodies are the best known examples of the in-situ type ore and represent the highest grade ore mined in the Buchans area and occur on the Royal Roads Corp (RRO) property. The Lucky Strike orebody consisted of massive high-grade sulphides where Asarco mined 5.6 million tonnes of ore with head grades averaging 18.4% Zn, 8.6% Pb, 1.6% Cu, 112 g/t Ag & 1.7 g/t Au (calculated based on Thurlow and Swanson, 1981, pp 122 to 128). Massive in situ ore occurs as several ore textures but the massive fine grained streaky ore seems to form within the bulk of the deposit occurring as aggregates of sphalerite, galena, barite and lesser chalcopyrite.

Thurlow et al, (1975) reported trace amounts of enargite, native silver and argentite, ruby silver and gold tellurides, in addition to native silver and gold. Minor sulphides also include tetrahedrite tenantite, chalcocite and bornite. Pyrite forms a relative minor part of the massive ore but is more common in association with stockwork ores. The paragenetic sequence of mineral deposition is complex but includes resorption, fracturing and re-deposition. Pyrite appears to be the first mineral deposited and sphalerite, chalcopyrite and galena are thought to be deposited at the same time but chalcopyrite is also seen as blebs, lamellae and veins.
Transported ores occur as elongate-tabular accumulations of discrete high-grade fragments. The deposits are transported by density flows that occur in paleotopographic lows, down slope from in situ ore bodies. MacLean, Rothermere, Clementine and Oriental #2 are examples of transported ore and together with the massive ore represent 98% of the ore mined in Buchans. The transported ore bodies occur as mechanically transported sulphide breccia lenses composed of sulphide bearing fragments derived from in situ ore. They maintain grade and have been noted to travel distances of up to 2 km from source areas. Sulphide fragments range from angular to sub-rounded and display streaky textures with sphalerite galena, chalcopyrite and barite being the main minerals. Unlike the in situ ore they have no associated stockwork zone. All of these orebodies occur on the RRO property.

Stockwork mineralization is typically associated with in situ ore and the best example is the Lundberg deposit which was the subject of a drill program by Buchans River Limited (BUV) in late 2007 and early 2008 under management of BUV and the author. The Lundberg deposit is stratigraphically below the historically mined Lucky Strike orebody and consists of quartz-barite-carbonate-sulphide veins and veinlets cutting strongly altered mafic to intermediate volcanics with disseminated sulphide mineralization. The stockwork mineralization comes to surface on the eastern edge of the zone and forms an elongate, wedge shaped body that is 350 m deep on the western end. The highest concentration of sulphide mineralization appears to be within close proximity to the Lucky Strike orebody and more diffuse away from the historic workings. Unlike the in situ ores, fine to coarse grained euhedral pyrite is the dominate sulphide and occurs with varying amounts of chalcopyrite, sphalerite, galena and barite.

A second zone of stockwork mineralization is associated with the Engine House deposit which lies almost immediately south of Lucky Strike and typically has a greater proportion of chalcopyrite. The stockwork system of the Engine House does not appear to connect directly to the Lundberg deposit, in their present configuration, as determined by historic drilling as well as drilling completed by BUV in 2008.

Mineralization is also found in association with high-grade clasts noted from drilling within the Buchans area and their source is not clearly understood. Clasts range in size from grains and pebbles to 30cm boulders of highgrade sulphide mineralization. The clasts contain galena, sphalerite, pyrite, chalcopyrite and gold and silver and are similar in metal grades to the in situ Buchans ores. They occur in polylithic conglomerates within the same stratigraphic horizon as the in situ ore but also at distances of up to 6.7 km away from any know in situ orebody (Webster and Barr, 2008).

METAL/MINERAL CONTENT

Calculated from tonnage and grade figures after Thurlow and Swanson (1981):

Lucky Strike

Cu (tons): 93,258
Pb (tons): 506,432
Zn (tons): 1,074,623
Ag (oz): 20,442,543
Au (oz): 302,674

In a November 27, 2012 news release, Buchans Minerals Corp. released the following highlights and drill hole assays for the Lucky Strike occurence in Buchans, central Newfoundland:

HOLE	INTERVAL (m)	WIDTH (m)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
H-12-3640	9.15-14.35	5.20	4.19	4.23	7.55	60.60	0.41
Includes	9.15-12.30	3.15	6.47	5.46	9.42	85.50	0.63
and	11.85-12.30	0.45	22.20	6.90	9.90	85.80	0.91
H-12-3462	10.00-13.00	3.00	0.48	0.73	1.51	5.37	0.00

Notes:

- All holes drilled vertically from surface. Drill hole details including assays are available at http://www.buchansminerals.com. Drill intercepts quoted are core lengths and true widths have not been estimated due to the stockwork and disseminated nature of mineralization intersected. The mineralized zones are interpreted to consist of flat-lying to shallowly dipping sheets so vertical core length intercepts are considered close to true widths.
- Assay composite for H-3460 from 9.15 to 14.35 m includes dilution from 1.5 m of lost core from 12.3 to 13.8 m.
- Hole 3462 was drilled to 32 m to test for additional high-grade mineralization adjacent to hole 3460.

(Buchans Minerals Corp. news release, November 27, 2012)

Drilling by Minco in 2014 returned several impressive intersections from multiple stratigraphic horizons (Minco Press Release October 28, 2014).

Highlights include:

- Hole 14-3487 that intersected the Lucky Strike horizon at a depth of 53 metres over an intercept of 2.70 metres of massive sulphides assaying 6.07% Zn, 0.53% Cu, 3.27% Pb, 103.5 g/t Ag and 1.65 g/t Au;
- Hole 14-3488 that intersected the Lucky Strike horizon at a depth of 65 metres over an intercept of 4.80 metres assaying 3.30% Zn, 0.22% Cu, 1.43% Pb and 118.7 g/t Ag and 0.81 g/t Au, including 0.80 metres of massive sulphides assaying 16.80% Zn, 0.75% Cu, 7.40% Pb, 518 g/t Ag and 3.54 g/t Au.

- Hole 14-3487 that intersected the Lucky Strike horizon at a depth of 53 metres over an intercept of 2.70 metres of massive sulphides assaying 6.07% Zn, 0.53% Cu, 3.27% Pb, 103.5 g/t Ag and 1.65 g/t Au;
- Hole 14-3488 that intersected the Lucky Strike horizon at a depth of 65 metres over an intercept of 4.80 metres assaying 3.30% Zn, 0.22% Cu, 1.43% Pb and 118.7 g/t Ag and 0.81 g/t Au, including 0.80 metres of massive sulphides assaying 16.80% Zn, 0.75% Cu, 7.40% Pb, 518 g/t Ag and 3.54 g/t Au;
- Hole 14-3488 also intersected mineralization at the Engine House horizon between 105 and 113 metres over an intercept of 7.80 metres averaging 3.43% Zn, 1.85% Cu, 1.30% Pb, 22.9 g/t Ag, and 0.14 g/t Au including1.45 m of massive sulphides assaying 17.00% Zn, 2.51% Cu, 6.54% Pb, 92.5 g/t Ag, and 0.64 g/t Au.
- Hole 14-3491 also intersected the Engine House horizon over an intercept of 3.30 metres averaging 1.23% Zn, 3.29% Cu, 1.00% Pb and 12.59 g/t Ag and 0.02 g/t Au, including 0.45 m assaying 4.75% Zn, 12.50% Cu, 4.50% Pb and 45.10 g/t Ag and 0.01 g/t Au.

PRODUCTION AND/OR RESERVES

The Lucky Strike Orebodies were in production from 1928 to 1958 inclusive and from 1972 to 1979 inclusive. Tonnage and grade figures for the Lucky Strike Main, New Year and North orebodies are taken from Thurlow and Swanson (1981) as follows:

	TONNAGE	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
Lucky Strike Main	4,752,373	1.67	8.42	18.36	3.29	0.05
Lucky Strike New Year	803,112	1.40	9.75	18.76	3.23	0.04
Lucky Strike North	620,510	0.46	4.54	8.20	3.58	0.05
TOTAL	**6,175,995**	**1.51**	**8.20**	**17.40**	**3.31**	**0.05**

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The Lucky Strike Main orebody is an example of the in situ type. It consists of a thick, high grade, polymetallic massive sulphide lens conformable within felsic pyroclastic rocks of the Lucky Strike Ore Horizon Sequence. The ore is very fine grained and consists largely of sphalerite and galena with lesser pyrite and chalcopyrite and a variety of other sulphides in minor quantities. Barite is the most abundant gangue mineral and usually forms a capping to the massive Pb-Zn ore. The orebody is zoned from Cu-Zn rich at the base to Pb-Zn-Ag rich at the top. Au is also concentrated near the top of the deposit. The ore is commonly 'streaky' with thin, discontinuous yellow chalcopyrite bands within black galena-sphalerite rich ore. The paragenetic sequence is complex (e.g. Strong, 1981), however, pyrite appears to be the earliest phase formed followed by sphalerite, chalcopyrite and galena, with galena generally being the latest-formed of the four major

sulphides. Barite, calcite and quartz range from earliest to latest in the depositional sequence.

The in situ ores formed by expulsion of metal-rich brines onto the sea floor and subsequent deposition of sulphides in topographic depressions. Based on a study of lead in the Buchans ores, Sawkins and Kowalik (1981) concluded that the major source of metals in the Buchans deposits was magmatic rather than leaching of underlying rocks.

The Lucky Strike North deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

A distinguishing feature of the North orebody is that it slightly underlies the Lucky Strike orebody, implying the presence of an earlier, up-dip and now presumably eroded source (Thurlow and Swanson, 1981).

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage

Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, pyritic siltstones, heterolithic breccia.

GEOPHYSICAL EXPRESSION

The Lucky Strike Main in situ orebody was discovered by Hans Lundberg, a Swedish geophysicist in 1926 using a variation of the equipotential line methods. In light of current knowledge about the shallow depth and metal content of the ore, it is likely that any electrical method would have been successful (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

A broad area containing numerous weak to moderate zinc anomalies in soil and basal till extends southwest from Buchans. The anomalous tills probably represent glacial ore dispersion trains derived from suboutcropping mineralization in the Buchans area (James and Perkins, 1981).

A lake sediment survey covering the Buchans area was carried out by the Newfoundland Department of Mines and Energy (Butler and Davenport, 1978). The survey failed to detect any significant anomalies in the immediate vicinity, however this may be due in part to the sample density (1 per 4.6 km2) of the survey.

Whole rock geochemical studies on major and trace element distribution in the Buchans area (Thurlow, 1973) show both vertical and lateral variations in certain elements, related to ore deposition. Vertical variations are erratic; those related to ore are only apparent within about 30 m above and below the mineralization and are best shown by the elements Zn, Pb, Cu, Ba, Ag, Fe, Mg and Ca. Lateral variations are more consistent and in particular the base metals and barium show increasing concentrations toward the southeast, indicating a possible source in that direction.

23.2 Oriental # 1

National Mineral Inventory Number: 012A/15/Zn 002
Record ID Number: 1736

DEPOSIT SUMMARY

Deposit Name: Oriental #1
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: No
Adit: No

Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic clastic sediment-hosted deposits associated with marine volcanic rocks (Besshi-Type)

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.826386906181
Easting: 511900
Elevation (m): 236
NTS Area: 12A/15
Longitude: 56.8378718787628
Northing: 5407950
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The orebody is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Oriental #1 orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The

repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Oriental deposit occurs in the Oriental Ore Horizon Sequence, a complex assemblage up to 400 m thick of felsic volcanics including dacitic tuffs, rhyolites and pyroclastic breccia and sedimentary rocks including siltstone, breccia-conglomerate and granite conglomerate (Thurlow and Swanson, 1981). The Ore Horizon Sequence is underlain by the Intermediate Footwall, which consists of pumiceous felsic tuff and breccia and is overlain by the Upper Buchans Subgroup, a thick, mafic to felsic volcanic assemblage. Stockwork mineralization occurs in the Intermediate Footwall beneath the in situ Oriental ore.

The Oriental #1 orebody is a high grade, polymetallic massive sulphide deposit forming a thick, conformable lens within felsic pyroclastics of the Ore Horizon Sequence. The ore consists of a fine grained aggregate of sphalerite, galena and chalcopyrite, with lesser pyrite and minor tetrahedrite. Bornite and covellite also occur in trace amounts. Barite is the most abundant gangue mineral but quartz, calcite, sericite and chlorite also occur.

METAL/MINERAL CONTENT

Calculated from tonnage and grade figures given by Thurlow and Swanson (1981):

Oriental # 1
Cu (tons): 46,831
Pb (tons): 231,965
Zn (tons): 432,709
Ag (oz): 10,762,950
Au (oz): 167,058

PRODUCTION AND/OR RESERVES

Total production from the Oriental #1 orebody given by Thurlow and Swanson (1981):

Oriental # 1
Tonnage: 2,738,664
Cu (%): 1.71
Pb (%): 8.47

Zn (%): 15.80
Ag (oz/t): 3.93
Au (oz/t): 0.06

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).
The Oriental #1 orebody is an example of the in situ type. It consists of a thick, high grade, polymetallic massive sulphide lens conformable within felsic pyroclastic rocks of the Oriental Ore Horizon Sequence. The ore is very fine grained and consists largely of sphalerite and galena with lesser pyrite and chalcopyrite and a variety of other sulphides in minor quantities. Barite is the most abundant gangue mineral and usually forms a capping to the massive Pb-Zn ore. The orebody is zoned from Cu-Zn rich at the base to Pb-Zn-Ag rich at the top. Au is also concentrated near the top of the deposit. The ore is commonly 'streaky' with thin, discontinuous yellow chalcopyrite bands within black galena-sphalerite rich ore. The paragenetic sequence is complex (e.g. Strong, 1981), however, pyrite appears to be the earliest phase formed followed by sphalerite, chalcopyrite and galena, with galena generally being the latest-formed of the four major sulphides. Barite, calcite and quartz range from earliest to latest in the depositional sequence.

The in situ ores formed by expulsion of metal-rich brines onto the sea floor and subsequent deposition of sulphides in topographic depressions. Based on a study of lead in the Buchans ores, Sawkins and Kowalik (1981) concluded that the major source of metals in the Buchans deposits was magmatic rather than leaching of underlying rocks.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, clastic seds, polylithic breccia conglomerate, granite conglomerate.

GEOPHYSICAL EXPRESSION

The Oriental #1 orebody was discovered by Hans Lundberg, a Swedish geophysicist in 1926 using a variation of the equipotential line method. In light of current knowledge about the shallow depth and metal content of the ore, it is likely that any electrical method would have been successful (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

A broad area containing numerous weak to moderate zinc anomalies in soil and basal till extends southwest from Buchans. The anomalous tills probably represent glacial ore dispersion trains derived from suboutcropping mineralization in the Buchans area (James and Perkins, 1981).

A lake sediment survey covering the Buchans area was carried out by the Newfoundland Department of Mines and Energy (Butler and Davenport, 1978). The survey failed to detect any significant anomalies in the immediate vicinity, however this may be due in part to the sample density (1 per 4.6 kms) of the survey.
Whole rock geochemical studies on major and trace element distribution in the Buchans area (Thurlow, 1973) show both vertical and lateral variations in certain elements, related to ore deposition. Vertical variations are erratic; those related to ore are only apparent within about 30 m above and below the mineralization and are best shown by the elements Zn, Pb, Cu, Ba, Ag, Fe, Mg and Ca. Lateral variations are more consistent and in particular the base metals and barium show increasing concentrations toward the southeast, indicating a possible source in that direction.

23.3 Oriental # 2

National Mineral Inventory Number: 012A/15/Zn 003
Record ID Number: 1737

DEPOSIT SUMMARY

Deposit Name: Oriental #2
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8284132616059
Easting: 511780

Elevation (m): 250
NTS Area: 12A/15
Longitude: 56.8395003137073
Northing: 5408175
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite, Silicates
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Oriental #2 orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm

Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Oriental #2 orebody is a transported massive sulphide deposit associated with breccia and granite conglomerate of the Oriental Ore Horizon Sequence. The orebody is largely flat-lying and contains zones of slumped massive sulphides in addition to an accumulation of sulphide fragments. The deposit occupies the central and deepest portion of the Oriental channel and is overlain by coarse granite conglomerate (Walker and Barbour, 1981). The orebody is likely derived from the in situ Oriental #1 orebody although grades are generally higher in the latter.

METAL/MINERAL CONTENT

Calculated from tonnage and grade figures given by Thurlow and Swanson (1981):

Oriental # 2

Cu (tons): 7,059
Pb (tons): 57,590
Zn (tons): 87,406
Ag (oz): 5,712,507
Au (oz): 42,728

PRODUCTION AND/OR RESERVES

Total production from the Oriental #2 orebody to December 31, 1978, as given by Thurlow and Swanson, 1981:

Oriental # 2

Tonnage: 928,863
Cu (%): 0.76
Pb (%): 6.20
Zn (%): 9.41
Ag (oz/t): 6.15
Au (oz/t): 0.46

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The Oriental #2 deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite

conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragment in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, pyritic siltstones, breccia & granite conglomerate.

GEOPHYSICAL EXPRESSION

The discovery of the Oriental #2 orebody was aided by the use of surface and down the hole electrical potential surveys, which were successful in outlining a conductor over the deposit (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

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23.4 Rothermere

National Mineral Inventory Number: 012A/15/Zn 004

Record ID Number: 1738

DEPOSIT SUMMARY

Deposit Name: Rothermere
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Not Drilled
Trench: No
Adit: No
Shaft: No
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.826433509854
Easting: 509150
Elevation (m): 271
NTS Area: 12A/15
Longitude: 56.8753383547782
Northing: 5407950
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite, Silicates

Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Rothermere orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Rothermere orebody occurs within the Lucky Strike Ore Horizon Sequence, a complex assemblage of mainly felsic volcanic rocks including flows, pyroclastics and breccias and clastic sedimentary rocks (Thurlow and Swanson, 1981). The Ore Horizon Sequence is underlain by mafic to felsic volcanics of the Intermediate Footwall, and is overlain by basaltic pillow lavas or dacitic tuffs. The Rothermere Orebody actually consists of at least four deposits separated by lenses of siltstone or dacitic tuff.

METAL/MINERAL CONTENT

Figures based on total Rothermere production (Thurlow and Swanson, 1981):

Rothermere
Cu (tons): 41,732
Pb (tons): 277,736
Zn (tons): 458,336
Ag (oz): 14,102,651
Au (oz): 118,721

PRODUCTION AND/OR RESERVES

Tonnage and grade of the two Rothermere orebodies (Thurlow and Swanson, 1981):

	TONNAGE	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
Rothermere # 1	3,402,000	1.15	7.73	12.68	3.94	0.03
Rothermere # 2	195,615	1.44	7.65	13.73	3.59	0.03
TOTAL	**3,597,615**	**1.16**	**7.72**	**12.74**	**3.92**	**0.03**

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).
The Rothermere deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments; This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

The individual lenses within the Rothermere deposit are crudely zoned with sphalerite-galena ore overlain by fragmental barite, a feature which mimics that of the in situ ore at Buchans (Thurlow and Swanson, 1981).

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, pyritic siltstone, polylithic breccia.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

Whole rock geochemical studies on major and trace element distribution in the Buchans area (Thurlow, 1973) show both vertical and lateral variations in certain elements, related to ore deposition. Vertical variations are erratic; those related to ore are only apparent within about 30 m above and below the mineralization and are best shown by the elements Zn, Pb, Cu, Ba, Ag, Fe, Mg and Ca. Lateral variations are more consistent and in particular the base metals and barium show increasing concentrations toward the southeast, indicating a possible source in that direction.

23.5 MacLean

National Mineral Inventory Number: 012A/15/Zn 005
Record ID Number: 1739

DEPOSIT SUMMARY

Deposit Name: MacLean
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland

UTM Zone: 21
Latitude: 48.8325149584708
Easting: 508500
Elevation (m): 280
NTS Area: 12A/15
Longitude: 56.8841800868588
Northing: 5408625
Location Uncertainty (m): 100
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite, other sulphides in minor amounts
Gangue Minerals: Barite, Pyrite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The MacLean orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails

Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The MacLean orebody occurs within the Lucky Strike Ore Horizon Sequence, a complex assemblage of mainly felsic volcanic rocks including flows, pyroclastics and breccias, and clastic sedimentary rocks (Thurlow and Swanson, 1981). The Ore Horizon Sequence is underlain by mafic to felsic volcanics of the Intermediate Footwall and is overlain by basaltic pillow lavas or dacitic tuffs.

METAL/MINERAL CONTENT

Figures based on total MacLean production to December 31, 1978, after Thurlow and Swanson (1981):

MacLean
Cu (tons): 41,279
Pb (tons): 272,514
Zn (tons): 493,155
Ag (oz): 14,027,520
Au (oz): 102,284

PRODUCTION AND/OR RESERVES

Tonnage and grade of the MacLean orebody after Thurlow and Swanson (1981):

MacLean
Tonnage: 3,653,000
Cu (%): 1.13
Pb (%): 7.46
Zn (%): 13.50
Ag (oz/t): 3.84
Au (oz/t): 0.03

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The MacLean deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

The MacLean is the largest of the transported orebodies at Buchans. It occurs down paleoslope from Rothermere and was likely derived from the same source, either the Lucky Strike or an earlier-deposited, up-dip source or both (Thurlow and Swanson, 1981). Like the Rothermere orebody, the MacLean massive sulphides are overlain by fragmental barite.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, pyritic siltstone, polylithic breccia.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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23.6 Clementine Prospect

National Mineral Inventory Number: 012A/15/Zn 006

Record ID Number: 1740

DEPOSIT SUMMARY

Deposit Name: Clementine Prospect
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Lead, Silver
Status: Developed Prospect
Complexity: Singular Body
DDH: Not Drilled
Trench: No
Adit: No
Shaft: No
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.834572405624
Easting: 505550
Elevation (m): 300
NTS Area: 12A/15
Longitude: 56.9243733169821
Northing: 5408850
Location Uncertainty (m): 100
Object Located: Calhoun & Hutchinson, 1981

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite

Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Clementine Prospect occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The host rocks for the Clementine prospect are mainly pyroclastic in origin and are believed to be stratigraphically equivalent to the Lucky Strike Ore Horizon Sequence (Thurlow and Swanson, 1981). The sequence in this area consists largely of felsic tuffs and breccias with subordinate felsic flows and minor clastic sedimentary rocks. The Ore Horizon Sequence is overlain by andesitic tuffs and breccias of the Intermediate Footwall and is overlain by a sequence of basaltic pyroclastic rock and lava flows with minor felsic volcanics (Calhoun and Hutchinson, 1981).

METAL/MINERAL CONTENT

Calculation based on tonnage and grade estimates after Swanson (1976) reported in Calhoun and Hutchinson (1981):

Clementine Prospect
Cu (tons): 1,089
Pb (tons): 9,438
Zn (tons): 17,787
Ag (kg): 3,739

PRODUCTION AND/OR RESERVES

No production has ever been carried out on the prospect. Reserves are estimated at 363,000 tonnes grading 4.9% Zn, 2.6% Pb, 0.3% Cu and 10.3 g/t Ag (Swanson, 1976, reported in Calhoun and Hutchinson, 1981).

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The Clementine Prospect is an example of the transported type. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

The Clementine Prospect exhibits many of the features common to the transported ores at Buchans. The deposit is subeconomic at present, being an order of magnitude smaller than the major transported orebodies and carrying only one third of the grade (Thurlow and Swanson, 1981). The source of the Clementine breccias is problematical. The deposit lies at the same stratigraphic horizon as the Lucky Strike orebodies but is some 4 km to the

northwest. A study of clast proportions carried out to determine the source direction of the deposit was not conclusive (Calhoun and Hutchinson, 1981) but indicated a primary source to the northwest. A north or northwesterly source could not be the Lucky Strike and would now be removed by erosion.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, clastic sediments, heterolithic breccias.

GEOPHYSICAL EXPRESSION

Downhole EM tests of the Clementine Prospect gave negative results (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

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23.7 Two Level Orebody

National Mineral Inventory Number: 012A/15/Zn 007
Record ID Number: 1741

DEPOSIT SUMMARY

Deposit Name: Two Level Orebody
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland

UTM Zone: 21
Latitude: 48.8260680369948
Easting: 509525
Elevation (m): 270
NTS Area: 12A/15
Longitude: 56.8702302134667
Northing: 5407910
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Two Level orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Two Level orebody occurs in the Lucky Strike Ore Horizon Sequence, a complex assemblage of mainly felsic volcanic rocks including flows, pyroclastics and breccias and clastic sedimentary rocks. The Ore Horizon Sequence is underlain by mafic to felsic volcanic rocks of the Intermediate Footwall, which hosts stockwork mineralization beneath the Lucky Strike deposit. The Two Level is one of the smallest of the transported orebodies and is generally lower grade than the major transported deposits.

METAL/MINERAL CONTENT

Calculated from tonnage and grade figures after Thurlow and Swanson (1981):

Two Levels Orebody
Cu (tons): 1,643
Pb (tons): 14,984
Zn (tons): 26,353
Ag (oz): 1,196,089
Au (oz): 15,444

PRODUCTION AND/OR RESERVES

Tonnage and grade figures after Thurlow and Swanson (1981):

Two Levels Orebody
Tonnage: 328,596
Cu (%): 0.50
Pb (%): 4.56
Zn (%): 8.02
Ag (oz/t): 3.64
Au (oz/t): 0.47

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The Two Level deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide

breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.
The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

The Two Level orebody lies very close to the in situ Lucky Strike Main orebody and was likely derived from it.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, clastics sediments & heterolithic breccia.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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23.8 Engine House Orebody

National Mineral Inventory Number: 012A/15/Zn 008
Record ID Number: 1742

DEPOSIT SUMMARY

Deposit Name: Engine House Orebody
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Dormant)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: No
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic stockwork in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8216991744229
Easting: 509900
Elevation (m): 268
NTS Area: 12A/15
Longitude: 56.8651328883621
Northing: 5407425
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The town of Buchans lies at the end of Route 370 which joins the Trans-Canada Highway 100 kilometres west of the town of Grand Falls and has a population of approximately 800. The town is supported by services such as a medical clinic, a hotel, a small gravel air strip, and grocery, hardware, and service facilities are readily available. The town has power and phone and is serviced by a municipal water supply. The nearest major airports are at Gander 175 km to the east and Deer Lake 250 km to the northwest, by road. The property area also includes the Town of Buchans. RRO currently has permission from the town and Abitibi Bowater (surface rights) to conduct exploration activities within and adjacent to the town and surrounding areas. The town is immediately adjacent to the Mineral Resources outlined in this report (Webster and Barr, 2008).

Much of the property has been clearcut by Abitibi-Price and this activity has led to the construction and refurbishment of a number of new and existing forestry roads in the area, permitting ready access to most of the property (Webster and Barr, 2008).

Field supplies, fuel and logistical support are available in Millertown or Buchans and contract geotechnical personnel including drill companies and analytical laboratories are available in either Grand Falls or Springdale. The closest deep-water ports are located 125 km northeast in Botwood and 160 km west in St. Georges, formally used as the loading terminus for the past-producing Buchans Mine, while St. Georges is currently used as the loading terminus for Teck's currently operating Duck Pond mine. The main power line from Grand Falls to Corner Brook passes through Buchans 15 km to the north of the property's northeast corner. A core storage facility operated by the Newfoundland Government is available for use in Buchans. This facility is used by private exploration companies, and much of the core from historic drilling on the Buchans area properties and surrounding region is stored at this location. Viewing and re-sampling of core can be arranged under government supervision. Historic mine buildings and a large tailings pond remain on the property from past mining by Asarco. The tailings pond is not permitted for use (Webster and Barr, 2008).

The Lundberg and Engine House deposits underlie the Lucky Strike glory hole, located on the western edge of the town of Buchans which is easily accessed by paved and dirt roads (Webster and Barr, 2008).

PHYSIOGRAPHIC SETTING

The area is generally flat to gently rolling with elevation ranging from 155 m to 165 m at Red Indian Lake to approximately 130 m to 280 m inland. There are numerous small brooks which drain into Red Indian Lake with spruce and fir growing on the slopes. The northern portion of the property is poorly drained and covered by areas of shallow bogs and extensive muskeg in the flat areas. The depth of till is approximately 2 metres with less than 5% outcrop exposure. To the south of the property Red Indian Lake occupies a large northeast trending valley. The climate of central Newfoundland is characterized as northern maritime, with relatively cool summers and winters with an overall annual average temperature of 3.5°C. The area receives an average annual precipitation of 873.3 mm of rain and 331 mm of snow, for a combined total average annual precipitation of 1,204.3 mm (data from Environment Canada, received at the Badger meteorological station) (Webster and Barr, 2008).

MINERALOGICAL COMPOSITION

Ore Minerals: Chalcopyrite, Sphalerite, Galena
Gangue Minerals: Quartz, Pyrite, Calcite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Engine House orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Engine House orebody occurs in the Intermediate Footwall, an altered and locally mineralized sequence of mafic to felsic volcanics with interbedded clastic sedimentary rocks. The Intermediate Footwall is underlain by the Footwall Basalt and overlain by the Lucky Strike Ore Horizon Sequence.

The following deposit description for the Buchans property has been taken from Webster and Barr, 2008. References and figures there in:

Mineralization in the Buchans area is associated with the three main genetically related ore deposit types. The Lucky Strike and Oriental #1 orebodies are the best known examples of the in situ type ore and represent the highest grade ore mined in the Buchans area and occur on the Royal Roads Corp (RRO) property. The Lucky Strike orebody consisted of massive high-grade sulphides where Asarco mined 5.6 million tonnes of ore with head grades averaging 18.4% Zn, 8.6% Pb, 1.6% Cu, 112 g/t Ag & 1.7 g/t Au (calculated based on Thurlow and Swanson, 1981, pp 122 to 128). Massive in situ ore occurs as several ore textures but the massive fine grained streaky ore seems to form within the bulk of the deposit occurring as aggregates of sphalerite, galena, barite and lesser chalcopyrite. Thurlow et al, (1975) reported trace amounts of enargite, native silver and argentite, ruby silver and gold tellurides, in addition to native silver and gold. Minor sulphides also include tetrahedrite tenantite, chalcocite and bornite. Pyrite forms a relative minor part of the massive ore but is more common in association with stockwork ores. The paragenetic sequence of mineral deposition is complex but includes resorption, fracturing and re-deposition. Pyrite appears to be the first mineral deposited and sphalerite, chalcopyrite and galena are thought to be deposited at the same time but chalcopyrite is also seen as blebs, lamellae and veins.

Transported ores occur as elongate-tabular accumulations of discrete high-grade fragments. The deposits are transported by density flows that occur in paleotopographic lows, down slope from in situ ore bodies. MacLean, Rothermere, Clementine and Oriental #2 are examples of transported ore and together with the massive ore represent 98% of the ore mined in Buchans. The transported ore bodies occur as mechanically transported sulphide breccia lenses composed of sulphide bearing fragments derived from in situ ore. They maintain grade and have been noted to travel distances of up to 2 km from source areas. Sulphide fragments range from angular to sub-rounded and display streaky textures with sphalerite galena, chalcopyrite and barite being the main minerals. Unlike the in situ ore they have no associated stockwork zone. All of these orebodies occur on the RRO property.

Stockwork mineralization is typically associated with in situ ore and the best example is the Lundberg deposit which was the subject of a drill program by Buchans River Limited (BUV) in late 2007 and early 2008 under management of BUV and the author. The Lundberg deposit is stratigraphically below the historically mined Lucky Strike orebody and consists of quartz-barite-carbonate-sulphide veins and veinlets cutting strongly altered mafic to intermediate volcanics with disseminated sulphide mineralization. The stockwork mineralization comes to surface on the eastern edge of the zone and forms an elongate, wedge shaped body that is 350 m deep on the western end. The highest concentration of sulphide mineralization appears to be within close proximity to the Lucky Strike orebody and more diffuse away from the historic workings. Unlike the in situ ores, fine to coarse grained euhedral pyrite is the dominate sulphide and occurs with varying amounts of chalcopyrite, sphalerite, galena and barite.

A second zone of stockwork mineralization is associated with the Engine House deposit which lies almost immediately south of Lucky Strike and typically has a greater proportion of chalcopyrite. The stockwork system of the Engine House does not appear to connect directly to the Lundberg deposit, in their present configuration, as determined by historic drilling as well as drilling completed by BUV in 2008.

Mineralization is also found in association with high-grade clasts noted from drilling within the Buchans area and their source is not clearly understood. Clasts range in size from grains and pebbles to 30cm boulders of highgrade sulphide mineralization. The clasts contain galena, sphalerite, pyrite, chalcopyrite and gold and silver and are similar in metal grades to the in situ Buchans ores. They occur in polylithic conglomerates within the same stratigraphic horizon as the in situ ore but also at distances of up to 6.7 km away from any know in situ orebody (Webster and Barr, 2008).

The Engine House deposit has been defined as a separate mineralized body that sits immediately adjacent to the main Lundberg deposit. A total of ten holes totaling 1,205 metres were completed within the Engine House deposit. Two intimately-related styles of base metal mineralization were identified on the periphery of the former Engine House orebody. The first style comprises a thin horizon of exhalative massive sulphides (likely corresponding to the historically mined Engine House orebody), capped by a red chert bed and then overlain by a felsic tuff of the Buchans River Formation. Stratigraphically below

the narrow massive sulphide-zone is a stockwork system dominated by chalcopyrite-pyrite with lesser galena-sphalerite hosted within polylithic breccia volcanics and an altered chloritic matrix, lithologically similar to that of the intermediate footwall underlying the Lucky Strike Glory hole. The stockwork veins contain notably less quartz-carbonate and slightly higher barite than the neighbouring Lundberg deposit to the north. The massive sulphide horizon was observed in drill holes within close proximity to the historically mined Engine House Orebody (Webster and Barr, 2008).

METAL/MINERAL CONTENT

Total metal content based on production and reserves after Kean and Thurlow (1975):

Engine House Orebody

Cu (tons): 4,243
Pb (tons): 4,809
Zn (tons): 14,032
Ag (oz): 216,520
Au (oz): 3,960

Drilling Results Lundberg deposit - Engine House Area.

HOLE	INTERVAL (m)	WIDTH (m)	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)	Au (g/t)
H-3402	48.50-51.50	3.00	0.97	0.64	0.04	0.63	0.01
and	88.00-90.00	2.00	1.25	0.97	0.08	2.06	0.01
and	92.00-94.00	2.00	0.75	0.44	0.04	0.51	0.01
H-3403	101.50-102.50	1.00	0.88	0.61	0.08	15.60	0.12
and	108.00-118.04	10.04	0.59	0.35	0.10	7.79	0.08
and	108.00-109.30	1.30	3.52	2.16	0.71	52.57	0.58
including	108.00-108.50	0.50	5.70	3.40	0.53	96.20	0.40
and	117.54-118.04	0.50	2.60	1.29	0.07	16.40	0.01
H-3409	18.75-21.00	2.25	0.85	0.30	0.04	2.85	0.01

H-3404 no significant mineralization observed - not sampled
H-3408 no significant mineralization observed – sampled

(Source: Royal Roads news release dated August 6, 2008)

Drilling by Minco in 2014 returned several impressive intersections from multiple stratigraphic horizons (Minco Press Release October 28, 2014).

Highlights include:

- Hole 14-3488 also intersected mineralization at the Engine House horizon between 105 and 113 metres over an intercept of 7.80 metres averaging 3.43% Zn, 1.85% Cu, 1.30% Pb, 22.9 g/t Ag, and 0.14 g/t Au including 1.45 m of massive sulphides assaying 17.00% Zn, 2.51% Cu, 6.54% Pb, 92.5 g/t Ag,and 0.64 g/t Au.

- Hole 14-3491 also intersected the Engine House horizon over an intercept of 3.30 metres averaging 1.23% Zn, 3.29% Cu, 1.00% Pb and 12.59 g/t Ag and 0.02 g/t Au, including 0.45 m assaying 4.75% Zn, 12.50% Cu, 4.50% Pb and 45.10 g/t Ag and 0.01 g/t Au.

PRODUCTION AND/OR RESERVES

Total production:

Engine House Orebody

Tonnage: 256,646
Cu (%): 1.50
Pb (%): 1.70
Zn (%): 4.96
Ag (oz/t): 0.73
Au (oz/t): 0.01

256,646 1.50 1.70 4.96 0.73 0.014

Engine House Inferred Mineral Resource Estimate:

Zn THRESHOLED (%)	TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
1.00	880,000	0.99	0.96	4.32	5.50	0.06
1.50	590,000	1.14	1.06	5.10	5.24	0.05
2.00	370,000	1.28	0.97	5.86	4.60	0.05
2.50	240,000	1.42	0.94	6.70	3.17	0.03
3.00	190,000	1.50	0.93	7.20	2.57	0.03

Engine House Inferred Resource Estimate - 1% Cu, Pb, Zn, combined Threshold

TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
1,120,000	2.04	0.88	0.82	4.76	0.05

(All inferred resource estimates from Royal Roads Resources Press Release 2008-09-17)

In total, the Buchans orebodies have produced 16,196,876 tonnes of ore from the five known major orebodies. The average grades are reported to be 14.51% zinc, 7.65% lead, 1.33% copper, 126 grams per tonne silver, and 1.37 grams per tonne gold (Webster and Barr, 2008).

In a news release dated March 4, 2013, Buchans Minerals Corporation together with its joint venture partner, Minco plc, announced a new resource estimate for the Lundberg base metal deposit in central Newfoundland.

The following table presents current Indicated and Inferred resource tonnages and grades for the combined Lundberg and Engine House zones.

Resource Statement - Tonnage and grades (From Buchans Minerals Corp. news release dated March 4, 2013)

NSR (US$) CUT-OFF	CATEGORY	TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
15	Indicated	23,440,000	1.41	0.60	0.35	5.31	0.07
15	Inferred	4,310,000	1.29	0.54	0.27	4.47	0.08

Notes: The effective date of the mineral resource estimate is February 22, 2013. Tonnages have been rounded to the nearest 10,000 tonnes. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981). The Engine House orebody is an example of the stockwork type. The stockwork system consists of a zone of intense alteration and mineralization within the Intermediate Footwall sequence and underlying the in situ massive sulphide deposits. Sulphide minerals present include pyrite, chalcopyrite, sphalerite and galena which occur as stringer type veinlets and disseminations with quartz, barite and calcite gangue. Chalcopyrite normally occurs in quartz-bearing structures whereas sphalerite is associated with barite and calcite (Kowalik et al., 1981). The proportion of pyrite and chalcopyrite to sphalerite and galena is much higher than in the massive sulphide ores, a feature typical of massive sulphide deposits elsewhere.

Quartz is the most abundant gangue mineral, being widely dispersed throughout the volcanic host rocks, whereas barite and calcite are typically found in veinlets (Kowalik et al., 1981). Chlorite is the most widespread alteration phase and occurs in a variety of forms, including veinlets and stringers, massive aggregates and as random disseminations.

Contact relations between stockwork ore and wallrock are generally gradational and large portions of the Intermediate Footwall are weakly altered and mineralized. In contrast to many other massive sulphide deposits, the Buchans stockwork does not define a pipe-like structure, but instead forms a stratigraphically controlled blanket with the most intensely mineralized zones occurring near the major in situ deposits (Thurlow and Swanson, 1981).

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group

Geological Age: Upper Ordovician
Rock Type(s): Mafic to felsic flows, pyroclastics & breccias, clastic sediments.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

Whole rock analyses show that the mineralized portion of the Intermediate Footwall is enriched in the base metals and depleted in sodium relative to the unmineralized portion (Thurlow, 1973).

23.9 Old Buchans Main

National Mineral Inventory Number: 012A/15/Zn 009
Record ID Number: 1743

DEPOSIT SUMMARY

Deposit Name: Old Buchans Main
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) deposit in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8273026416183
Easting: 511025
Elevation (m): 238
NTS Area: 12A/15
Longitude: 56.849790331057
Northing: 5408050
Location Uncertainty (m): 100

Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Pyrite, Barite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Old Buchans orebodies occur in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Old Buchans orebodies consist of two relatively small but high grade polymetallic massive sulphide lenses. The exact stratigraphic position of the orebodies is uncertain due to thrusting, but is possibly the Oriental Ore Horizon Sequence (Thurlow and Swanson,

1981). The ore horizon sequence is a complex assemblage of felsic volcanics including dacitic tuffs, rhyolites and pyroclastic breccia and clastic sedimentary rocks. The sequence is underlain by the Intermediate Footwall, which consisted of felsic tuffs and breccias and is overlain by mafic to felsic volcanics of the Upper Buchans Subgroup.

METAL/MINERAL CONTENT

Calculation based on production figures from Thurlow and Swanson (1981):

Old Buchans Main
Cu (tons): 2,544
Pb (tons): 12,245
Zn (tons): 22,453
Ag (oz): 662,083
Au (oz): 9,809

PRODUCTION AND/OR RESERVES

Total production from the Old Buchans orebodies after Thurlow and Swanson (1981):

Old Buchans Main
Tonnage: 153,260
Cu (%): 1.66
Pb (%): 7.99
Zn (%): 14.65
Ag (oz/t): 4.32
Au (oz/t): 0.06

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981). The Old Buchans orebodies are of the in situ type.

Few details are available on these deposits. In general, the in situ ores at Buchans consist of high grade, polymetallic massive sulphide lenses conformable within felsic flows and pyroclastics and commonly underlain by stockwork mineralization and related alteration. The ore consists largely of sphalerite and galena with lesser pyrite and chalcopyrite and a variety of other sulphides in minor quantities. Barite is the most abundant gangue mineral. The ores may be zoned from Cu-Zn rich at the base to Pb-Zn-Ag-Au rich at the top. The in situ ores formed by expulsion of metal-rich brines onto the sea floor and subsequent deposition as massive sulphides in vent areas.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian

Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, clastic sediments, granite conglomerate.

GEOPHYSICAL EXPRESSION

The results of a VLF-EM survey, contoured using the Fraser-filter method (Fraser, 1969), showed a distinct anomaly over remnants of the Old Buchans orebody (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

A broad area containing numerous weak to moderate zinc anomalies in soil and basal till extends southwest from Buchans. The anomalous tills probably represent glacial ore dispersion trains derived from suboutcropping mineralization in the Buchans area (James and Perkins, 1981).

A lake sediment survey covering the Buchans area was carried out by the Newfoundland Department of Mines and Energy (Butler and Davenport, 1978). The survey failed to detect any significant anomalies in the immediate vicinity, however this may be due in part to the sample density (1 per 4.6 km2) of the survey.

Whole rock geochemical studies on major and trace element distribution in the Buchans area (Thurlow, 1973) show both vertical and lateral variations in certain elements, related to ore deposition. Vertical variations are erratic; those related to ore are only apparent within about 30 m above and below the mineralization and are best shown by the elements Zn, Pb, Cu, Ba, Ag, Fe, Mg and Ca. Lateral variations are more consistent and in particular the base metals and barium show increasing concentrations toward the southeast, indicating a possible source in that direction.

23.10 Old Buchans Conglomerate

National Mineral Inventory Number: 012A/15/Zn 010
Record ID Number: 1744

DEPOSIT SUMMARY

Deposit Name: Old Buchans Conglomerate
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes

Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8275301829107
Easting: 510875
Elevation (m): 238
NTS Area: 12A/15
Longitude: 56.8518333298115
Northing: 5408075
Location Uncertainty (m): 100
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Conglomerate Orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The

repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.
The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Conglomerate Orebody occurs in the Oriental Ore Horizon Sequence, a complex assemblage of felsic volcanics including dacitic tuffs, rhyolites and pyroclastic breccia and sedimentary rocks including siltstone, breccia, conglomerate and granite conglomerate (Thurlow and Swanson, 1981). The Ore Horizon Sequence is underlain by the Intermediate Footwall, which consists of felsic tuffs and breccias and is overlain by mafic to felsic volcanics of the Upper Buchans Subgroup.

METAL/MINERAL CONTENT

Calculation based on production figures after Thurlow and Swanson (1981):

Old Buchans Conglomerate
Cu (tons): 553
Pb (tons): 4,278
Zn (tons): 6,891
Ag (oz): 269,223
Au (oz): 3,274

PRODUCTION AND/OR RESERVES

Total production from the Conglomerate orebody after Thurlow and Swanson (1981):

Old Buchans Conglomerate
Tonnage: 72,763
Cu (%): 0.76
Pb (%): 5.88
Zn (%): 9.47
Ag (oz/t): 3.70
Au (oz/t): 0.05

NATURE OF MINERALIZATION AND GENESIS

The Old Buchans Conglomerate deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive

sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic tuffs & flows, clastic sediments, granite conglomerate.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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23.11 Old Buchans West

National Mineral Inventory Number: 012A/15/Zn 012
Record ID Number: 1746

DEPOSIT SUMMARY

Deposit Name: Old Buchans West
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: Yes
Adit: No
Shaft: Yes
Workings: Under Ground
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) deposit in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.822152902415
Easting: 509650
Elevation (m): 266
NTS Area: 12A/15
Longitude: 56.8685374377008
Northing: 5407475
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Pyrite, Barite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The West orebodies occur in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The west orebodies occur in the Intermediate Footwall, an altered and locally mineralized sequence of mafic to felsic volcanics with interbedded clastic sedimentary rocks. The Intermediate Footwall is underlain by the Footwall Basalt and overlain by the Lucky Strike Ore Horizon Sequence.

METAL/MINERAL CONTENT

Calculated from production figures after Kean and Thurlow (1975):

Old Buchans West

Cu (tons): 1,892
Pb (tons): 2,343
Zn (tons): 6,205
Ag (oz): 108,652
Au (oz): 1,864

PRODUCTION AND/OR RESERVES

Total production from the West Orebody after Kean and Thurlow (1975):

Old Buchans West

Tonnage: 53,261
Cu (%): 3.44
Pb (%): 4.40
Zn (%): 11.65
Ag (oz/t): 2.04
Au (oz/t): 0.04

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981). The West orebodies consist of a group of small deposits of both the stockwork and massive, in situ types, hosted by altered volcanic rocks of the Intermediate Footwall. Stockwork ore consists of veinlets and disseminations of pyrite with chalcopyrite, sphalerite and galena, and has associated quartz, barite and calcite gangue. The mineralization is epigenetic and is intimately related to zones of locally intense alteration (chloritization and silicification).

In situ ore occurs as lenses of massive sulphides, including sphalerite, galena and chalcopyrite that are conformable with their felsic volcanic host rocks. Barite and pyrite are the main gangue minerals and grades of all metals except copper are generally higher than for the stockwork ores. The in situ ores form by expulsion of metal rich brines onto the sea floor and subsequent precipitation of sulphides in vent areas.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Mafic to felsic volcanics including flows, pyroclastics, breccias, clastic sedimentary rock.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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23.12 MacLean Extension

National Mineral Inventory Number: 012A/15/Zn 013
Record ID Number: 1747

DEPOSIT SUMMARY

Deposit Name: MacLean Extension
Major Commodity: Zinc
Secondary Commodities: Barium, Copper, Gold, Lead, Silver
Status: Past Producer (Exhausted)
Complexity: Singular Body
DDH: Drilled, number of holes unknown
Trench: No
Adit: No
Shaft: No
Workings: Under Ground
Deposit Type: Stratabound volcanogenic sulphide - bearing breccia in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8331910092333
Easting: 508400
Elevation (m): 280
NTS Area: 12A/15
Longitude: 56.885541134378
Northing: 5408700
Location Uncertainty (m): 50
Object Located: Kean, 1979

ACCESSIBILITY

The deposit is located near the town of Buchans, which is accessible from the Trans-Canada Highway at Badger via Route 370.

PHYSIOGRAPHIC SETTING

The town of Buchans is in an upland area of moderate relief traversed by Buchans Brook and a number of its tributaries. Heavily forested areas alternate with numerous muskeg swamps and small lakes. To the south, Red Indian Lake occupies a large northeast trending valley.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Barite, Pyrite, Silicates
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The MacLean Extension orebody occurs in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The MacLean Extension orebody occurs in the Lucky Strike Ore Horizon Sequence, a sequence of mainly felsic pyroclastic rocks with interbedded flows, breccias and clastic sediments. The Ore Horizon Sequence is underlain by mafic to felsic volcanics of the Intermediate Footwall and is overlain by basaltic pillow lavas or dacitic tuffs.

METAL/MINERAL CONTENT

Calculated from grade and tonnage figures after Binney et al. (1983):

MacLean Extension

Cu (tons): 4,819
Pb (tons): 20,024
Zn (tons): 34,687
Ag (oz): 29,874
Au (oz): 244

PRODUCTION AND/OR RESERVES

Estimated reserves as of September, 1982 (after Binney et al., 1983):

MacLean Extension

Tonnage: 339,400
Cu (%): 1.42
Pb (%): 5.90
Zn (%): 10.22
Ag (oz/t): 88.02
Au (oz/t): 0.72

NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981).

The MacLean Extension deposit is an example of a transported orebody. The transported ores at Buchans are elongate-tabular accumulations of high grade massive sulphide and lithic fragments that occur in paleotopographic channels. Six of these channels, containing at least seven orebodies or subeconomic sulphide deposits have been recognized in the Buchans area (Walker and Barbour, 1981). The orebodies consist of discrete sulphide breccia lenses which grade laterally into low-grade breccia conglomerate and granite conglomerate. The ore horizon breccias occur at or near the same stratigraphic horizon as the in situ ores and are down paleoslope from them.

The breccia ores consist of massive sulphide and lithic fragments in a matrix of finer grained material that is compositionally similar to the fragments. Clasts include various volcanic, sedimentary and plutonic lithologies, all of which are locally derived except for the granitoid fragments whose origin remains speculative. Massive sulphides and barite occur both as clast and matrix material.

The breccias display a wide variation in fragment type and in the development of sedimentary features (e.g. bedding, sorting, grading). All occur as channel fillings, having sharp footwall and hangingwall contacts and showing evidence of scouring and incorporation of fragments of underlying lithologies (Walker and Barbour, 1981).

The breccia ores formed as a result of disruption of in situ massive sulphides and their host rocks and transportation of this material as debris flows along paleotopographic channels.

The disruption may have been triggered by several mechanisms such as volcanic explosion, earthquake or unstable angle of repose (Walker and Barbour, 1981). Thurlow and Swanson (1981) noted the presence of complete or partial altered rims on some lithic fragments. This feature prompted them to suggest that fracturing, permeation and alteration by hydrothermal fluids, and subsequent explosion may have caused the altered rims and provided the energy to initiate down-slope movement of the ore breccias.

The MacLean extension orebody lies adjacent to, and is considered a faulted portion of, the MacLean orebody.

The MacLean Extension was the last orebody to be mined at Buchans. Mining ceased on August 31, 1984. The mill shut down on September 30, 1984.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Felsic pyroclastics, flows, breccia, clastic sediments.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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23.13 Clementine West Zone

National Mineral Inventory Number: 012A/15/Zn 018
Record ID Number: 6614

DEPOSIT SUMMARY

Deposit Name: Clementine West Zone:
Major Commodity: Zinc
Secondary Commodities: Lead, Gold, Copper, Barium
Status: Showing
Complexity: Undefined
DDH: 8
Trench: No
Adit: No
Shaft: No
Workings: No
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) deposit in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8170493498148
Easting: 502700
Elevation (m): 320
NTS Area: 12A/15
Longitude: 56.963221466494
Northing: 5406900
Location Uncertainty (m): 50
Object Located: Saunders and Harris, 2000

ACCESSIBILITY

The town of Buchans lies at the end of a 72 km paved road (Route 370) which joins the Trans-Canada Highway 25 km west of the town of Grand Falls. Buchans hosts a small airstrip for light aircraft and the nearest major airport is at Gander, about two hour drive to the east. The majority of the Buchans West property is accessible by various secondary roads and trails in the Buchans area and by snowmobile in winter (Saunders, 2001).

PHYSIOGRAPHIC SETTING

The local terrain has low relief with wooded areas alternating with small ponds and bogs (Saunders, 2001).

MINERALOGICAL COMPOSITION

Ore Minerals: Galena, Sphalerite
Gangue Minerals: Pyrite
Alteration Minerals: Sericite, Chlorite
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

Mineralization occurs as stockwork veinlets and with interpillow material in the mafic rocks and as matrix grains in the felsic units (Saunders, 2001).

Pillow rims show strong black chloritic alteration and internally the pillows show strong sericite-chlorite alteration with 2-3% disseminated pyrite. The mineralized pillow sequence is overlain by exhalative cherty sediments which contain barite (1.25% Ba/2.1 m), and minor base metal mineralization. Minor remobilized stockwork and fracture controlled mineralization occur above the horizon (Saunders, 2001).

METAL/MINERAL CONTENT

Highlights of diamond drilling include a section of semi-massive sulphides assaying 3.97% zinc, 3.86% lead, 0.03% copper (ie., 7.38% zinc+lead) and 2.5 g/t gold over 1.0 m, as well as broader sections of stockwork and disseminated sulphides assaying up to 3.14% Zn+Pb over a core length of 4.1 m (Buchans River Ltd. Press release, June 13, 2007).

Hole 99-11-01 intersected a pillow basalt containing interpillow massive sulphides (galena, sphalerite and pyrite) and some stockwork veins cutting the pillows. A best assay of 7.2% combined Zn-Pb over 0.9 m was obtained (Saunders, 2001).

The following DDH assay results for the Clementine West prospect have been taken from a Buchans River Ltd. Press release dated May 26, 2008.

Results for the 2008 program include assays of 7.38% combined base metals over a core length of 2.00 metres comprised of 4.30% zinc, 2.66% lead, 0.42% copper, 7.02 g/t silver and 0.03 g/t gold, including 0.50 metres of 12.94% combined base metals comprising 6.40% zinc, 5.60% lead, 0.94% copper, 10.60 g/t silver and 0.01 g/t gold in hole H 3390. Other highlights from adjacent holes include 5.28% combined base metals over a core length of 1 metre comprised of 3.20% zinc, 1.94% lead, 0.14% copper, 4.11 g/t silver and 0.01 g/t gold in hole H-3387; as well as 4.27% combined base metals over a 0.50 metre core length comprised of 2.06% zinc, 2.20 % lead, 0.01% copper, 10.30 g/t silver and 0.01 g/t gold in hole H-3391. These assays are derived from a zone of sulphide stockwork mineralization intersected over core lengths ranging from 29 to 118 metres which are considered to be close to true widths and considered very similar to that observed beneath the former Buchans-Lucky Strike massive sulphide orebody.

2008 Clementine West Drill Results:

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3387	134.74	138.00	3.26	1.33	0.93	0.07	1.40	0.01
Including	136.00	137.00	1.00	3.20	1.94	0.14	4.11	0.01
and	143.00	147.00	4.00	0.68	0.78	0.05	1.64	0.01
and	158.00	164.00	6.00	0.63	0.50	0.01	0.71	0.01
H-3390	229.00	234.00	5.00	2.11	1.42	0.22	3.63	0.02
including	230.00	232.00	2.00	4.30	2.66	0.42	7.02	0.03
with	230.00	230.50	0.50	6.40	5.60	0.94	10.60	0.01
and	237.00	241.00	4.00	0.73	0.51	0.03	0.63	0.01
and	255.00	265.00	10.00	0.72	0.48	0.03	0.86	0.01
including	262.00	263.00	1.00	2.90	0.76	0.03	2.74	0.01
and	291.00	294.00	3.00	1.70	0.01	0.07	0.23	0.02
H-3391	186.00	190.00	4.00	0.91	0.87	0.10	2.24	0.01
including	188.00	190.00	2.00	1.50	1.44	0.13	2.92	0.01
and	209.00	211.75	2.75	1.09	0.79	0.01	2.86	0.01
including	211.25	211.75	0.50	2.06	2.20	0.01	10.30	0.01
and	213.00	214.00	1.00	0.60	3.00	0.02	7.19	0.01
and	223.00	227.00	4.00	0.49	0.67	0.02	1.03	0.01

PRODUCTION AND/OR RESERVES

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NATURE OF MINERALIZATION AND GENESIS

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REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans River Formation
Geological Age: Middle Ordovician
Rock Type(s): mafic and felsic volcanic rocks

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

Results from a lithogeochemistry study conducted in conjunction with Memorial University show that galena samples from the Clementine West Zone have identical Pb isotope signatures to those at the former Lucky Strike Mine, suggesting a common source of lead for to the two areas (Harris, 2001).

23.14 Lundberg Zone

National Mineral Inventory Number: 012A/15/Zn 019
Record ID Number: 6530

DEPOSIT SUMMARY

Deposit Name: Lundberg Zone
Major Commodity: Zinc
Secondary Commodities: Copper, Lead, Silver, Gold
Status: Past Producer (Dormant)
Complexity: Singular Body
DDH: 91
Trench: No
Adit: No
Shaft: No
Workings: No

Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) in thick, felsic - dominated volcanic/epiclastic sequences

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8236332874356
Easting: 509900
Elevation (m): 266
NTS Area: 12A/15
Longitude: 56.865127698967
Northing: 5407640
Location Uncertainty (m): 100
Object Located: DDH-H-3361 [www.buchansriver.ca: May 23, 2008]

ACCESSIBILITY

The Lundberg deposit sits stratigraphically below the historically mined Lucky Strike orebody (Webster and James, 2008).

The following location and access decription for the Buchans property has been taken from Coley, Gagnon, McLaughlin, Webster and Ramsey, 2012. References there in:

The property is situated adjacent to the town of Buchans at the end of Route 370 (Buchans Highway). Route 370 is a 70 km long all-weather, well maintained, paved road which connects Buchans to the Trans-Canada Highway at the town of Badger. Badger is situated approximately 30 km west of Grand Falls by road.

The nearest airports are located at Gander or Deer Lake and access to the property is along the Trans-Canada Highway and then Route 370. The distance from Deer Lake to the Property by road is approximately 250 km and from Gander, approximately 200 km. The distance by road to the property from St. John's is approximately 530 km.

Much of the Property and Buchans area has been clear-cut in the past by Abitibi- Price (now Abitibi Bowater) and this activity has led to the construction and refurbishment of a number of new and existing forestry roads in the area, permitting ready access to most of the property.

The town of Buchans has a population of approximately 800 and has local resources available such as groceries, hardware and gas stations.

Field supplies, fuel and logistical support are available in Millertown or Buchans and contract geotechnical personnel including drill companies and analytical laboratories are available in either Grand Falls or Springdale.

The property is connected by a paved, all-weather, road connecting the town of Buchans to the Trans-Canada Highway. The town of Buchans has electrical power, telephone and water services. There is cellular telephone coverage on the property. The main power line from Grand Falls to Corner Brook passes through Buchans less than 2 km south of the proposed mine site.

Buchans currently has permission from the town of Buchans and the government of Newfoundland (surface rights) to conduct exploration activities within and adjacent to the town and surrounding areas.

Water is abundant on the property.

The nearest major airports are at Gander and Deer Lake. There is a 4,000 ft gravel airstrip on the Property, 2 km north of the town of Buchans.

The closest deep-water ports are located in Botwood, 125 km northeast, and St. Georges, 160 km west, of the Property. The Botwood port was used as the loading terminus for the past-producing Buchans Mine, while St. Georges is currently used as the loading terminus for Teck Resources Ltd.'s (Teck) operating Duck Pond mine.

A core storage facility operated by the Newfoundland Government is available for use in Buchans. This facility is used by private exploration companies, and much of the core from historic drilling on the Buchans area properties and surrounding region is stored at this location. Viewing and re-sampling of core can be arranged under government supervision. Historic mine buildings and two large tailings ponds remain on the property from past mining by ASARCO. The tailings ponds, however, are not permitted for use and are currently the responsibility of the provincial government (Coley, Gagnon, McLaughlin, Webster and Ramsey, 2012).

PHYSIOGRAPHIC SETTING

The property is generally flat to gently rolling with elevation ranging from 155 m to 165 m at Red Indian Lake to approximately 130 m to 280 m inland. There are numerous small brooks which drain into Red Indian Lake with spruce and fir growing on the slopes. The northern portion of the property is poorly drained and covered by areas of shallow bogs and extensive muskeg in the flat areas. The depth of till is approximately two metres with less than 5% outcrop exposure. To the south of the property, Red Indian Lake occupies a large northeast trending valley (Coley, Gagnon, McLaughlin, Webster and Ramsey, 2012. References there in).

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals:
Alteration Minerals:
Alteration Type:

Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Lundberg deposit comprises disseminated and stringer base metal sulphides beneath the mined out Lucky Strike massive sulphide orebody from which Asarco produced 5.6 million tonnes averaging 17.39% zinc, 8.20% lead, 1.51% copper, 113.6 g/t silver and 1.68 g/t gold prior to the Buchans mine closing in 1984. A large portion of the Lundberg deposit extends to surface beneath overburden that is typically less than 10 metres thick, or at similar depths below the floor of the Lucky Strike glory hole (former mine workings now exposed at surface). (Royal Roads Press Release 2008-09-17).

The following deposit description for the Buchans property has been taken from Webster and Barr, 2008. References and figures there in:

Mineralization in the Buchans area is associated with the three main genetically related ore deposit types. The Lucky Strike and Oriental #1 orebodies are the best known examples of the in situ type ore and represent the highest grade ore mined in the Buchans area and occur on the Royal Roads Corp (RRO) property. The Lucky Strike orebody consisted of massive high-grade sulphides where Asarco mined 5.6 million tonnes of ore with head grades averaging 18.4% Zn, 8.6% Pb, 1.6% Cu, 112 g/t Ag & 1.7 g/t Au (calculated based on Thurlow and Swanson, 1981, pp 122 to 128). Massive in situ ore occurs as several ore textures but the massive fine grained streaky ore seems to form within the bulk of the deposit occurring as aggregates of sphalerite, galena, barite and lesser chalcopyrite. Thurlow et al, (1975) reported trace amounts of enargite, native silver and argentite, ruby silver and gold tellurides, in addition to native silver and gold. Minor sulphides also include tetrahedrite tenantite, chalcocite and bornite. Pyrite forms a relatively minor part of the massive ore but is more common in association with stockwork ores. The paragenetic sequence of mineral deposition is complex but includes resorption, fracturing and re-deposition. Pyrite appears to be the first mineral deposited and sphalerite, chalcopyrite and galena are thought be deposited at the same time but chalcopyrite is also seen as blebs, lamellae and veins.

Transported ores occur as elongate-tabular accumulations of discrete high-grade fragments. The deposits are transported by density flows that occur in paleotopographic lows, down slope from in situ ore bodies. MacLean, Rothermere, Clementine and Oriental #2 are examples of transported ore and together with the massive ore represent 98% of the ore mined in Buchans. The transported ore bodies occur as mechanically transported sulphide breccia lenses composed of sulphide bearing fragments derived from in situ ore. They maintain grade and have been noted to travel distances of up to 2 km from source areas. Sulphide fragments range from angular to sub-rounded and display streaky textures with sphalerite galena, chalcopyrite and barite being the main minerals. Unlike the in situ ore, they have no associated stockwork zone. All of these orebodies occur on the RRO property.

Stockwork mineralization is typically associated with in situ ore and the best example is the Lundberg deposit which was the subject of a drill program by Buchans River Limited (BUV) in late 2007 and early 2008 under management of BUV and the author. The Lundberg deposit is stratigraphically below the historically mined Lucky Strike orebody and consists of quartz-barite-carbonate-sulphide veins and veinlets cutting strongly altered mafic to intermediate volcanics with disseminated sulphide mineralization. The stockwork mineralization comes to surface on the eastern edge of the zone and forms an elongate, wedge shaped body that is 350 m deep on the western end. The highest concentration of sulphide mineralization appears to be within close proximity to the Lucky Strike orebody and more diffuse away from the historic workings. Unlike the in situ ores, fine to coarse grained euhedral pyrite is the dominate sulphide and occurs with varying amounts of chalcopyrite, sphalerite, galena and barite.

A second zone of stockwork mineralization is associated with the Engine House deposit which lies almost immediately south of Lucky Strike and typically has a greater proportion of chalcopyrite. The stockwork system of the Engine House does not appear to connect directly to the Lundberg deposit, in their present configuration, as determined by historic drilling as well as drilling completed by BUV in 2008.

Mineralization is also found in association with high-grade clasts noted from drilling within the Buchans area and their source is not clearly understood. Clasts range in size from grains and pebbles to 30cm boulders of highgrade sulphide mineralization. The clasts contain galena, sphalerite, pyrite, chalcopyrite and gold and silver and are similar in metal grades to the in situ Buchans ores. They occur in polylithic conglomerates within the same stratigraphic horizon as the in situ ore but also at distances of up to 6.7 km away from any know in situ orebody (Webster and Barr, 2008).

The Lundberg deposit demonstrates a sub-horizontal zone of mineralization which appears to dip gently to the north and plunge to the northwest, and subcrops as an erosional surface in contact with overburden in the eastern portion of the zone. It is bound to the South by the Airport Thrust fault, to the north by the Ski Hill Thrust fault, and gradually wanes to the west where it is overlain by the transported ore deposits previously mined by Asarco. The deposit is underlain, by thrust contact of the Old Buchans Fault, with the younger Sandy Lake formation which is locally composed of hematitic amygdaloidal basalt and exhibits a weak magnetic character in comparison to the non magnetic character of the Ski Hill Formation basalt. The stockwork zone does not locally penetrate the Sandy Lake Formation, indicating pre-tectonic mineral deposition.

The mineralization is dominantly composed of a quartz carbonate-barite stockwork system hosted by brecciated and vesicular intermediate to mafic volcanics correlative with the Intermediate Footwall (Ski Hill Formation) described by Thurlow (1999). The quartz-carbonate-barite phase is accompanied by pyrite, chalcopyrite and fine-grained galena-sphalerite. Immediately to the east of the Lucky Strike Glory hole, an area is defined by the erosional surface of the stockwork sequence subcropping within 1.5 m of surface. Localized mottled semi-massive horizons of quartz, barite, carbonate and variable amounts of base-metals with up to 30% pyrite occurring as stringers, blebs and fracture fills, cut

the quartz barite phase. Massive pyritic Zn-Pb-Cu sulphides were noted near the interpreted top of the stockwork zone immediately to the northwest of the glory hole but are not considered to be remnant Lucky Strike high grade in situ massive sulphides as they are compositionally and texturally distinct. Alteration was observed to be most advanced in this area (Coley et al., 2011)

METAL/MINERAL CONTENT

The following highlights and tables reporting assay amounts have been taken from the Buchans River news release dated March 28, 2008.

Highlights of the Lundberg Mill area include:

- Hole H-3377: 94.00 metres averaging 2.07% combined base metals comprised of 1.19% Zn, 0.56% Pb, 0.32% Cu, 2.68 g/t Ag and 0.03 g/t Au, including 20 meters of 3.75% combined base metals comprised of 2.12% Zn, 1.17% Pb, 0.46% Cu, 3.82 g/t Ag and 0.06 g/t Au.
- Hole H-3356: 44.73 metres averaging 7.21% combined base metals comprised of 4.85% Zn, 1.64% Pb, 0.72% Cu, 19.4 g/t Ag and 0.17 g/t Au.
- Hole H-3358: 51.00 metres averaging 3.55% combined base metals comprised of 2.04% Zn, 0.83% Pb, 0.68% Cu, 11.0 g/t Ag and 0.11 g/t Au.
- Hole H-3361: 23.15 metres averaging 6.52% combined base metals comprised of 4.22% Zn, 1.99% Pb, 0.41% Cu, 17.1 g/t Ag and 0.21 g/t Au.
- Hole H-3363: 13.61 metres averaging 2.93% combined base metals comprised of 1.32% Zn, 0.34% Pb, 1.27% Cu, 4.8 g/t Ag and 0.04 g/t Au.

Highlights from the Lundberg North area:

- Hole H-3380: 89.33 metres averaging 2.44% combined base metals comprised of 1.41% Zn, 0.76% Pb, 0.27% Cu, 6.29 g/t Ag and 0.06 g/t Au.
- Hole H-3375: 17.00 metres averaging 3.09% combined base metals comprised of 2.08% Zn, 0.78% Pb, 0.23% Cu, 4.33 g/t Ag and 0.02 g/t Au.
- Hole H-3378:16.00 metres averaging 2.19% combined base metals comprised of 1.29% Zn, 0.62% Pb, 0.28% Cu, 3.53 g/t Ag and 0.04 g/t Au.
- Hole H-3381: 36.69 metres averaging 2.16% combined base metals comprised of 1.22% Zn, 0.61% Pb, 0.33% Cu, 5.53 g/t Ag and 0.05 g/t Au.

Drilling Results Lundberg Zone Mill Area:

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3364	22.00	24.00	2.00	0.76	2.05	0.35	3.08	0.02
H-3377	4.00	98.00	94.00	1.19	0.56	0.32	2.68	0.03
including	4.00	24.00	20.00	2.12	1.17	0.46	3.82	0.06
with	5.50	7.20	1.70	10.13	5.47	0.96	10.70	0.08
and	73.00	84.00	11.00	1.00	0.33	0.42	2.99	0.02
and	87.00	98.00	11.00	0.85	0.34	0.45	2.77	0.02
and	106.00	106.50	0.50	2.90	1.02	0.19	1.71	0.03

Drilling Results Lundberg Zone North Area:

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3365	51.00	111.00	60.00	1.06	0.40	0.12	2.26	0.04
with	52.00	53.00	1.00	4.20	0.54	0.42	7.88	0.05
with	91.00	92.00	1.00	4.40	2.37	0.35	2.40	0.07
H-3367	103.00	105.00	2.00	0.62	0.27	0.18	1.08	0.03
H-3369	Hole abandoned in historic workings							
H-3370	no significant assays							
H-3372	44.42	46.40	1.98	2.34	1.67	0.17	9.90	0.15
including	52.45	58.55	6.10	1.08	0.58	0.07	1.53	0.03
with	72.15	73.65	1.50	2.07	1.01	0.17	1.25	0.01
and	86.00	89.00	3.00	1.51	0.48	0.27	2.97	0.06
and	113.00	116.50	3.50	2.03	0.84	0.31	4.98	0.02
H-3375	48.00	50.50	2.50	2.18	1.39	0.19	35.26	0.16
including	58.00	97.00	39.00	1.31	0.50	0.15	3.38	0.02
including	66.10	68.00	1.90	2.63	1.14	0.13	4.03	0.09
with	78.00	95.00	17.00	2.08	0.78	0.23	4.33	0.02
including	93.00	94.00	1.00	5.40	2.45	0.35	6.51	0.01
including	106.00	109.00	3.00	1.72	0.30	0.18	3.08	0.01
including	123.00	126.00	3.00	1.34	0.32	0.43	2.97	0.01
H-3376	54.00	64.00	10.00	0.77	0.18	0.11	1.78	0.04
and	101.00	108.00	7.00	2.31	1.20	0.38	3.47	0.02
and	102.00	107.00	5.00	2.29	1.49	0.43	4.04	0.02
H-3378	212.61	216.53	3.92	2.81	1.47	0.25	102.77	0.97
and	239.00	241.00	2.00	6.30	1.30	0.69	10.12	0.07
including	282.00	308.00	26.00	1.06	0.53	0.22	3.08	0.03
with	285.00	301.00	16.00	1.29	0.62	0.28	3.53	0.04
including	290.00	291.00	1.00	3.90	1.10	1.44	6.16	0.03
H-3379	84.00	97.00	13.00	0.92	0.50	0.12	4.35	0.07
including	86.00	90.00	4.00	1.87	1.14	0.07	7.62	0.14
H-3380	68.67	158.00	89.33	1.41	0.76	0.27	6.29	0.06
including	68.67	98.00	29.33	2.52	1.37	0.23	13.79	0.13
including	68.67	74.00	5.33	6.97	4.10	0.47	61.01	0.60
including	79.00	108.00	29.00	1.46	0.76	0.17	3.05	0.03
and	120.00	141.00	21.00	1.25	0.64	0.45	3.75	0.03
and	136.89	158.00	21.11	0.84	0.41	0.31	2.73	0.02
H-3381	64.31	101.00	36.69	1.22	0.61	0.33	5.53	0.05
and	83.00	89.00	6.00	2.47	1.20	0.36	6.97	0.05

The following table of drilling results from the Lundberg Zone North Area has been taken from a Buchans River Ltd. press release dated June 3, 2008:

Drilling Results Lundberg Zone North Area.

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3388	195.03	199.50	4.47	3.26	2.36	0.21	24.36	0.14
including	195.03	196.00	0.97	12.17	9.14	0.74	84.93	0.43

including	195.03	195.53	0.50	15.90	12.00	0.86	73.30	0.30
H-3389	76.00	86.00	10.00	1.10	0.37	0.54	2.88	0.04
and	126.00	128.00	2.00	2.33	0.85	0.14	7.19	0.05
including	126.00	127.00	1.00	4.10	1.51	0.20	9.93	0.05
and	135.00	173.00	38.00	1.60	0.67	0.27	4.17	0.04
including	137.00	138.00	1.00	3.80	1.67	0.19	3.08	0.02
including	145.00	146.00	1.00	3.50	1.57	0.56	16.80	0.07
including	149.00	150.00	1.00	3.60	1.02	1.27	18.50	0.06
including	157.00	158.00	1.00	5.20	3.60	1.94	11.00	0.10
including	163.00	164.00	1.00	9.00	2.90	1.35	14.40	0.07
H-3393	101.00	105.00	4.00	2.03	1.19	0.12	5.58	0.06
including	103.00	104.12	1.12	3.20	1.82	0.20	6.85	0.06
H-3369A	62.00	97.00	35.00	1.02	0.46	0.27	2.72	0.02
including	62.00	87.00	25.00	1.25	0.54	0.34	3.15	0.03
including	66.00	86.00	20.00	1.34	0.62	0.37	3.29	0.03
including	74.00	75.00	1.00	3.00	1.35	0.32	1.71	0.02
including	82.00	87.00	5.00	0.81	0.61	0.79	4.66	0.02
H-3394	125.00	163.00	38.00	1.30	0.60	0.15	2.67	0.02
including	125.00	152.00	27.00	1.51	0.72	0.14	2.82	0.02
including	128.00	129.00	1.00	4.80	1.58	0.32	3.77	0.01
including	139.00	140.00	1.00	3.80	1.99	0.21	7.19	0.04
including	147.00	148.00	1.00	3.70	2.53	0.38	3.77	0.02
including	157.00	160.00	3.00	1.48	0.71	0.38	4.11	0.02
and	169.00	172.00	3.00	1.60	0.12	0.45	4.33	0.04
H-3395	68.00	70.00	2.00	3.10	1.83	0.15	8.05	0.04
and	113.00	181.00	68.00	1.76	0.77	0.31	6.91	0.06
including	113.00	127.00	14.00	3.19	0.98	0.35	12.18	0.05
including	113.00	118.00	5.00	4.25	1.04	0.64	16.37	0.04
including	113.00	114.00	1.00	6.60	1.70	0.79	31.80	0.08
including	117.00	118.00	1.00	6.40	0.88	0.77	13.00	0.02
including	132.00	181.00	49.00	1.50	0.77	0.33	5.58	0.06
including	137.00	140.00	3.00	5.37	3.35	0.34	8.33	0.05
including	148.00	165.00	17.00	1.81	0.91	0.37	4.58	0.06
and	188.00	191.00	3.00	1.26	0.46	0.22	1.49	0.01
and	198.00	224.00	26.00	0.83	0.42	0.26	14.69	0.02
including	198.00	205.00	7.00	0.82	0.47	0.40	47.85	0.03
including	200.00	201.00	1.00	0.90	0.60	0.23	318.50	0.03
and	208.00	224.00	16.00	0.93	0.44	0.24	2.48	0.02
H-3396	69.00	186.00	117.00	2.06	1.05	0.34	5.09	0.04
including	69.00	93.00	24.00	4.69	2.08	0.53	11.14	0.09
including	69.00	85.00	16.00	6.64	3.01	0.65	15.06	0.11
including	69.00	74.50	5.50	8.90	3.47	0.65	16.57	0.16
including	70.00	71.65	1.65	15.69	7.05	0.92	26.00	0.27
including	76.00	80.00	4.00	9.20	4.85	0.81	22.35	0.11
including	77.00	77.95	0.95	14.90	6.70	0.80	28.10	0.19
including	99.00	104.00	5.00	0.86	0.47	0.19	2.82	0.03

including	108.00	186.00	78.00	1.54	0.87	0.33	3.83	0.02
including	108.00	158.00	50.00	1.81	1.05	0.40	4.84	0.02
including	108.00	124.00	16.00	3.62	2.25	0.44	6.06	0.03
including	108.00	111.00	3.00	6.97	4.80	0.70	7.65	0.02
including	108.00	109.00	1.00	9.90	6.70	0.58	5.82	0.03
including	162.00	170.00	8.00	1.91	1.10	0.26	2.55	0.02
including	164.00	165.00	1.00	3.10	2.70	0.42	4.45	0.04
H-3397	16.24	57.00	40.76	1.20	0.39	0.57	3.70	0.00
including	16.24	51.00	34.76	1.33	0.42	0.66	4.16	0.00
including	16.24	45.00	28.76	1.46	0.44	0.79	4.45	0.00
including	20.00	30.00	10.00	2.06	0.46	1.67	6.44	0.00
including	26.50	27.00	0.50	9.40	0.90	0.38	6.51	0.01
including	47.00	52.00	5.00	0.98	0.47	0.07	2.74	0.00
and	64.00	67.00	3.00	0.78	0.32	0.17	1.94	0.00
and	113.00	115.00	2.00	1.05	0.50	0.15	1.88	0.00

The following tables of drilling results from Lundberg Zones North Area has been taken from a Royal Roads Corporation press release dated August 6, 2008:

Drilling Results Lundberg Zone - North Area

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3399	38.00	61.00	2.48	1.42	0.74	0.31	4.73	0.03
including	40.00	44.00	6.89	3.85	2.11	0.93	13.25	0.04
including	40.00	42.00	8.54	5.50	2.45	0.59	9.40	0.06
and	65.00	67.00	1.70	1.10	0.53	0.07	1.54	0.04
and	77.00	80.00	2.17	1.53	0.53	0.11	2.51	0.04
H-3406	180.07	185.32	3.22	1.99	1.10	0.13	2.17	0.02
including	181.00	182.32	5.86	3.80	1.83	0.23	3.42	0.02
and	189.00	202.00	2.56	1.97	0.39	0.20	5.92	0.07
including	189.00	191.00	3.62	3.03	0.56	0.04	8.05	0.11
and	189.00	202.00	2.56	1.97	0.39	0.20	5.92	0.07
including	194.00	202.00	3.10	2.33	0.46	0.31	6.58	0.06
with	197.00	199.00	4.93	3.95	0.59	0.40	11.43	0.08
and	217.00	232.00	4.06	2.61	1.18	0.27	4.76	0.06
including	224.00	224.50	8.56	4.80	2.80	0.96	5.14	0.08
including	226.00	226.50	8.56	5.30	3.10	0.16	9.93	0.11
and	247.00	270.00	2.30	1.30	0.83	0.16	3.26	0.03
including	247.00	252.50	4.14	2.16	1.61	0.37	4.32	0.02
including	251.00	251.50	12.57	6.80	5.30	0.47	4.79	0.02
and	267.00	270.00	2.06	1.29	0.68	0.09	3.19	0.03
H-3407	128.18	217.00	3.10	2.17	0.78	0.15	6.02	0.05
including	128.18	163.00	5.75	4.06	1.42	0.28	10.21	0.07
including	138.00	162.00	7.07	5.03	1.80	0.24	11.18	0.07
including	139.00	149.00	9.47	6.66	2.54	0.27	15.76	0.11
with	139.00	142.00	12.37	8.87	3.21	0.29	15.40	0.15
also	146.00	149.00	11.65	8.07	3.23	0.35	16.00	0.08

and	179.00	191.00	2.16	1.43	0.61	0.12	3.91	0.03
including	180.00	181.00	8.71	5.60	2.50	0.61	7.19	0.03
and	190.00	191.00	2.99	2.00	0.81	0.18	5.48	0.03
and	194.00	207.00	1.53	1.09	0.36	0.08	3.03	0.03
including	205.00	206.00	3.90	3.40	0.25	0.25	3.08	0.02
including	212.00	213.00	5.53	4.40	0.96	0.17	6.51	0.02

Drilling Results Lundberg deposit - Mill Area.

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-3398	8.42	102.00	1.99	1.11	0.48	0.40	3.02	0.03
including	8.42	37.00	1.80	0.94	0.21	0.65	3.19	0.05
including	11.00	27.00	2.03	0.81	0.22	1.00	4.58	0.05
incl	11.00	17.00	2.57	0.36	0.06	2.16	6.57	0.08
including	20.00	21.00	4.91	3.00	1.32	0.59	6.85	0.04
and	29.00	37.00	2.15	1.63	0.28	0.24	0.91	0.03
and	40.30	46.00	1.41	0.78	0.31	0.32	2.28	0.02
and	50.00	96.00	2.61	1.49	0.77	0.35	3.55	0.02
including	65.00	68.00	6.09	4.07	1.55	0.47	4.34	0.01
including	73.62	78.40	6.34	3.71	1.84	0.79	5.62	0.04
including	75.00	77.10	10.07	6.05	2.98	1.03	8.59	0.05
including	76.30	77.10	14.60	8.70	4.60	1.30	10.60	0.06
and	99.00	102.00	1.71	1.04	0.44	0.23	1.84	0.01
H-3400	9.36	71.00	2.53	1.43	0.66	0.45	3.41	0.02
including	9.36	35.00	2.48	1.42	0.76	0.30	3.17	0.02
including	18.00	21.50	4.17	2.38	1.48	0.31	3.30	0.01
including	18.00	18.50	11.04	6.50	4.10	0.44	7.88	0.02
including	38.00	71.00	2.76	1.53	0.63	0.60	3.77	0.02
including	51.00	59.00	5.15	2.70	1.13	1.32	6.04	0.02
including	51.00	52.00	12.50	6.10	3.10	3.30	9.93	0.04
and	78.00	79.00	2.05	1.36	0.37	0.32	1.71	0.02
and	80.00	82.00	1.46	0.76	0.40	0.31	3.26	0.03
H-3401	7.00	30.00	1.85	1.15	0.46	0.24	2.00	0.02
including	7.00	14.00	1.53	0.95	0.35	0.23	1.73	0.02
and	19.00	30.00	2.59	1.63	0.65	0.31	2.28	0.01
including	19.00	20.00	7.13	4.30	1.54	1.29	3.42	0.03
including	28.00	29.00	5.86	4.10	1.48	0.28	2.05	0.01
and	36.00	38.00	2.32	1.14	1.02	0.17	4.97	0.01
and	41.00	46.00	2.01	1.07	0.68	0.26	3.29	0.01
and	58.00	60.00	1.67	1.37	0.23	0.08	1.21	0.01

In a November 27, 2012 news release, Buchans Minerals Corp. released the following highlights and drill hole assays for the Lundberg deposit in Buchans, central Newfoundland:

Highlights from the northeastern Lundberg area include:

- 50.15 m averaging 2.42% combined base metals (i.e., Cu+Pb+Zn) in hole H-12-3465 (0.36% Cu, 0.52% Pb, 1.54% Zn and 3.5 g/t Ag)
- 30.0 m averaging 1.43% combined base metals in hole H-12 3458 (0.27% Cu, 0.29% Pb, 0.87% Zn and 1.38 g/t Ag)

Additionally, holes drilled into the eastern portion of the Lundberg deposit returned impressive results confirming excellent grades including:

- 102.8 m averaging 3.41% combined base metals in hole H-12 3460 (0.68% Cu, 0.91% Pb, 1.82% Zn, and 4.8 g/t Ag)
- Hole H-12-3460 also intersected remnants of the former Lucky Strike ore body near surface including 5.20 m averaging 15.97% combined base metals (4.19% Cu, 4.23% Pb, 7.55% Zn, 60.6 g/t Ag and 0.41 g/t Au).

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-12-3458	49.00	79.00	30.00	0.27	0.29	0.87	1.38	0.03
including	52.00	57.00	5.00	1.24	0.71	1.82	3.62	0.04
H-12-3459	2.60	111.00	108.40	0.25	0.37	0.88	1.50	0.06
including	2.60	22.00	19.40	0.49	0.50	1.10	3.14	0.05
H-12-3460	17.50	120.30	102.80	0.68	0.91	1.82	4.80	0.05
H-12-3461	46.00	62.00	16.00	0.20	0.42	1.03	1.40	0.04
H-12-3463	19.00	36.00	17.00	0.05	0.25	0.74	1.38	0.02
H-12-3464	53.60	57.60	4.00	0.13	0.86	1.72	32.8	0.33
and	70.60	87.60	17.00	0.20	0.74	1.58	8.71	0.05
and	115.00	151.00	36.00	0.09	0.34	0.66	2.70	0.03
H-12-3465	9.85	60.00	50.15	0.36	0.52	1.54	3.50	0.03
H-12-3466	77.30	97.00	19.70	0.37	1.15	1.59	29.60	0.10
and	121.00	159.00	38.00	0.14	0.43	0.84	1.78	0.02
H-12-3467	90.00	147.00	57.00	0.06	0.23	0.75	1.08	0.04
H-12-3468	76.40	81.40	5.00	0.10	1.17	1.73	8.40	0.06
and	92.60	103.15	10.55	0.46	0.75	1.42	6.09	0.11
H-12-3469	57.00	87.00	30.00	0.52	0.28	0.43	3.45	0.07
H-12-3470	82.20	123.00	40.80	0.24	0.29	0.55	1.61	0.05
H-12-3471	80.00	103.00	23.00	0.16	0.31	0.77	1.87	0.05

Note: All holes drilled vertically from surface except holes 3464, 3466, 3468 and 3471 (angled under the Lucky Strike glory hole). Drill hole details including assays are available at http://www.buchansminerals.com. Drill intercepts quoted are core lengths and true widths have not been estimated due to the stockwork and disseminated nature of mineralization intersected. The mineralized zones are interpreted to consist of flat-lying to shallowly dipping sheets so vertical core length intercepts are considered close to true widths (Buchans Minerals Corp. news release, November 27, 2012).

In a December 7, 2012 news release, Buchans Minerals Corp. released the following highlights and drill hole assays for the Lundberg and Engine House base metal deposits in Buchans, central Newfoundland, Canada:

New assays from this northwest area include hole H-3475 that intersected 134.8 metres averaging 4.96% combined base metals, including 56.8 metres averaging 8.33% combined base metals. Hole H-3473, also drilled on this corridor, intersected 155.7 metres averaging 1.59% combined base metals, including 55.0 metres averaging 1.99% combined base metals.

Assay Highlights:

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-12-3472	69.50	75.00	5.50	0.20	1.47	2.92	8.70	0.04
including	69.50	72.00	2.50	0.39	3.10	6.10	17.80	0.06
H-12-3473	66.30	222.00	155.70	0.26	0.43	0.90	3.00	0.05
including	66.30	122.00	55.70	0.29	0.48	0.95	3.20	0.04
including	130.00	155.00	25.00	0.09	0.40	0.80	1.50	0.06
including	167.00	222.00	55.00	0.39	0.51	1.10	4.00	0.07
H-12-3474	86.00	92.00	6.00	0.37	2.66	4.80	9.90	0.05
and	122.00	133.00	11.00	0.06	0.46	0.92	1.80	0.04
and	150.00	186.00	36.00	0.24	0.26	0.57	1.70	0.05
H-12-3475	59.50	194.30	134.80	0.50	1.34	3.12	7.60	0.06
including	59.50	116.30	56.80	0.83	2.23	5.28	12.20	0.09
and	215.30	225.30	10.00	0.11	0.35	0.91	2.30	0.03

Note: All holes drilled vertically from surface. Drill hole details including assays are available at http://www.buchansminerals.com. Intercepts quoted are core lengths and true widths have not been estimated due to the stockwork and disseminated nature of mineralization intersected. Vertical core length intercepts are considered close to true widths as the mineralized zones are interpreted to consist of flat-lying to shallowly dipping sheets. Assay composite for H-3475 includes dilution from 1.0 m of lost core between 62.5 to 63.5 m (Buchans Minerals Corp. news release, December 7, 2012).

In a January 9, 2013 news release, Buchans Minerals Corp. released the following highlights and drill hole assays for the Lundberg and Engine base metal deposits in Buchans, central Newfoundland, Canada:

Results from the northwest area include multiple thick intercepts that further confirm the resource in this key area including 43 metres averaging 2.37% combined base metals comprised of 0.15% copper, 0.69% lead, and 1.52% zinc in hole 3477. Highlights from the east margin of the Lundberg zone include an intercept of 37.7 metres averaging 1.01% combined based metals comprised of 0.23% copper, 0.15% lead and 0.63% zinc beneath 11.3 metres of overburden in hole 3482. A second hole drilled in this area, 3483, also intersected mineralization immediately below overburden coring 16.55 metres averaging 1.79% combined base metals comprised of 0.26% copper, 0.42% lead and 1.11% zinc. Results from these two holes suggest the zone remains open beyond the eastern limits of the previous resource estimate. Assay highlights for the final 7 holes of the program are summarized below:

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-12-3477	136.00	179.00	43.00	0.15	0.69	1.52	4.00	0.06
and	227.00	272.00	45.00	0.23	0.69	1.28	2.30	0.04

and	290.00	315.00	25.00	016	0.38	0.72	2.50	0.08
H-12-3478	195.00	229.00	34.00	0.11	0.40	0.90	2.30	0.03
and	241.00	330.00	89.00	0.19	0.25	0.59	1.80	0.04
H-12-3479	95.90	169.00	73.10	0.32	0.49	1.20	3.40	0.07
incl.	99.00	129.00	30.00	0.58	0.59	1.48	5.20	0.08
and	206.00	225.00	19.00	0.12	0.48	1.07	2.00	0.05
H-12-3480	66.60	103.00	36.40	0.17	0.23	0.78	4.60	0.04
H-12-3481	97.00	107.00	10.00	0.39	0.64	2.37	9.90	0.08
H-12-3482	11.30	49.00	37.70	0.23	0.15	0.63	1.20	0.02
incl.	16.00	31.00	15.00	0.35	0.19	0.80	1.70	0.02
H-12-3483	14.45	31.00	16.55	0.26	0.42	1.11	2.10	0.03
incl.	69.50	72.00	2.50	0.39	3.10	6.10	17.80	0.06

Note: All holes drilled vertically from surface. Drill hole details including collar locations and complete assays are available at http://www.buchansminerals.com. Intercepts quoted are core lengths and true widths have not been estimated due to the stockwork and disseminated nature of mineralization intersected. Vertical core length intercepts are considered close to true widths as the mineralization is interpreted to consist of flat-lying to shallowly dipping sheets (Buchans Minerals Corp. news release, January 9, 2013).

2013 Resource Statement - Total metal

NSR CUT-OFF	CATEGORY	TONNES	Zn (lbs)	Pb (lbs)	Cu (lbs)	Ag (oz)	Au (oz)
15 USD	Indicated	23,440,000	728,635,728	310,057,757	180,867,025	4,001,686	52,753
15 USD	Inferred	4,310,000	122,574,667	51,310,326	25,655,163	619,406	11,086

Notes: Tonnages have been rounded to the nearest 10,000 tonnes. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental permitting, legal, title, taxation, socio-political, marketing, or other relevant issues (Buchans Minerals Website May 01, 2013).

PRODUCTION AND/OR RESERVES

The following production history has been extracted from the Buchans River website on May 16, 2008 (www.buchansriver.ca).

In a press release dated Sept. 17, 2008 Royal Roads Corp. announced new resource estimates for the Lundberg deposit. The estimates were prepared by independent consultants, Mercator Geological Services Limited of Dartmouth Nova Scotia and comply with Canadian Institute of Mining, Metallurgy and Petroleum Standards and National Instrument 43-101 definitions and guidelines.

Lundberg Inferred Mineral Resource Estimate – Zn % Threshold

Zn THRESHOLD (%)	TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
1.00	15,650,000	1.96	0.83	0.38	3.59	0.05

1.50	9,300,000	2.45	1.03	0.42	4.42	0.05
2.00	5,270,000	3.01	1.26	0.48	5.59	0.06
2.50	3,090,000	3.56	1.47	0.53	6.99	0.07
3.00	1,840,000	4.14	1.68	0.57	8.63	0.08

Lundberg Inferred Resource Estimate - 1% Cu, Pb, Zn, combined Threshold

TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
20,500,000	1.68	0.72	0.38	3.30	0.04

The following resource estimates for the Lundberg occurrence has been taken from Coley, Gagnon, McLaughlin, Webster and Ramsey, 2012. References there in:

Lundberg Inferred Resource Estimate - Zn% Threshold - November 3, 2008:

Zn THRESHOLD (%)	TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
1.00	15,690,000	1.96	0.83	0.38	6.57	0.08
1.50	9,300,000	2.46	1.03	0.43	8.26	0.10
2.00	5,340,000	3.02	1.25	0.49	10.27	0.12
2.50	3,170,000	3.56	1.46	0.53	12.28	0.14
3.00	1,880,000	4.13	1.66	0.57	14.32	0.14
3.50	1,090,000	4.79	1.93	0.62	16.46	0.15

Lundberg Inferred Resource Estimate - 1% Combined Base Metal (Zn%+Pb%+Cu%) Threshold - November 3, 2008 (Coley, Gagnon, McLaughlin, Webster and Ramsey, 2012):

TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
20,700,000	1.68	0.72	0.38	5.92	0.07

In a news release dated March 4, 2013, Buchans Minerals Corporation together with its joint venture partner, Minco plc, announced a new resource estimate for the Lundberg base metal deposit in central Newfoundland.

The following table presents current Indicated and Inferred resource tonnages and grades for the combined Lundberg and Engine House zones.

Resource Statement - Tonnage and grades

NSR (US$) CUT-OFF	CATEGORY	TONNES	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
15	Indicated	23,440,000	1.41	0.60	0.35	5.31	0.07
15	Inferred	4,310,000	1.29	0.54	0.27	4.47	0.08

* Notes: The effective date of the mineral resource estimate is February 22, 2013. Tonnages have been rounded to the nearest 10,000 tonnes. Mineral resources that are not mineral reserves do not have demonstrated economic viability. The estimate of mineral resources may be materially affected by environmental permitting, legal, title, taxation, socio-

political, marketing, or other relevant issues (Buchans Minerals Corp. news release dated March 4, 2013).

NATURE OF MINERALIZATION AND GENESIS

In a Buchans River news release dated March 28, 2008, the mineralization is described as a near surface rock hosting disseminated and stockwork sulphides.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Mafic to intermediate volcanics

GEOPHYSICAL EXPRESSION

-

GEOCHEMICAL EXPRESSION

-

23.15 Buchans North

National Mineral Inventory Number: 012A/15/Zn 020
Record ID Number: 6807

DEPOSIT SUMMARY

Deposit Name: Buchans North
Major Commodity: Zinc
Secondary Commodities: Lead, Copper, Silver
Status: Prospect
Complexity: Singular Body
DDH: 2
Trench: No
Adit: No
Shaft: No
Workings: No
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) deposit in thick, mixed mafic/felsic volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8286734959267
Easting: 510827
Elevation (m):
NTS Area: 12A/15
Longitude: 56.8524839511718
Northing: 5408202
Location Uncertainty (m): 50
Object Located:

ACCESSIBILITY

The property is located in central Newfoundland, Canada - 160 km southwest of the town of Grand Falls and 430 km west-north-west of the provincial capital, St. John's. Access to the property is attained by proceeding west via paved highway from Grand Falls to the town of Buchans located in the middle of the Buchans property.

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Galena, Chalcopyrite
Gangue Minerals: Pyrite, Barite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

DESCRIPTION OF DEPOSIT

The Old Buchans orebodies occur in the Buchans Group, an Ordovician-Silurian island arc complex in central Newfoundland. The Buchans Group comprises a laterally extensive suite of subaqueous calc-alkaline volcanic rocks with interbedded clastic sediments. The volcanics range in composition from basalt to rhyolite and tend to become increasingly felsic with height in the stratigraphy (Thurlow and Swanson, 1981). This variation from mafic to felsic volcanism is repeated several times within the Buchans Group. The repetition was originally interpreted as cyclical (e.g. Thurlow et al., 1975), but is now considered to be largely caused by thrusting (e.g. Thurlow and Swanson, 1981). The volcanic rocks include mafic to felsic flows, pyroclastics and breccias, while the sediments include siltstone, greywacke, arkose and granite conglomerate. They are disposed about a broad, open syncline and contain a weak, steeply dipping cleavage trending northeast. Metamorphism in the Buchans Group is of subgreenschist facies.

The Buchans Group is adjacent to, and may conformably overlie, post-Caradocian greywackes and conglomerates to the southeast and is intruded by the Devonian Topsails Granite to the northwest (Kean et al., 1981). It may be correlative with the Roberts Arm

Group to the northeast, which is host to sulphide occurrences of similar tenor to those at Buchans.

The Old Buchans orebodies consist of two relatively small but high grade polymetallic massive sulphide lenses. The exact stratigraphic position of the orebodies is uncertain due to thrusting, but is possibly the Oriental Ore Horizon Sequence (Thurlow and Swanson, 1981). The ore horizon sequence is a complex assemblage of felsic volcanics including dacitic tuffs, rhyolites and pyroclastic breccia and clastic sedimentary rocks. The sequence is underlain by the Intermediate Footwall, which consisted of felsic tuffs and breccias and is overlain by mafic to felsic volcanics of the Upper Buchans Subgroup.

METAL/MINERAL CONTENT

Hole	From(m)	To(m)	Width (m)	Zn (%)	Pb (%)	Cu (%)	Ag (oz/t)	Au (oz/t)
H-4315	306.30	306.60	0.30	4.70	2.06	0.20	10.70	0.30
and	311.30	311.60	0.30	5.80	1.85	15.50	214.80	2.90
H-3416	342.70	343.20	0.50	3.80	1.34	0.28	18.40	0.10
and	352.10	354.20	2.10	15.25	7.61	0.92	148.90	1.10
including	352.10	353.10	1.00	20.20	9.20	1.26	180.20	0.90
and	353.10	353.60	0.50	6.80	3.50	0.34	57.90	0.60
and	353.60	354.20	0.60	15.00	8.40	0.84	172.60	1.90

- Taken from Royal Roads Press Release 2009-12-15

PRODUCTION AND/OR RESERVES

Total production from the Old Buchans orebodies after Thurlow and Swanson (1981):

Buchans North

Tonnage: 153,260
Cu (%): 1.66
Pb (%): 7.99
Zn (%): 14.65
Ag (oz/t): 4.32
Au (oz/t): .06

NATURE OF MINERALIZATION AND GENESIS

The Buchans property covers highly prospective felsic and mafic volcanic rocks of the Buchans Group, which hosts the high grade, past producing Buchans mines. The Buchans ore bodies are volcanogenic massive sulphide (VMS) deposits which have similarities to other VMS deposits worldwide, in particular, the Kuroko deposits of Japan. Three ore types are commonly recognized at Buchans; in situ massive sulphides, sulphide rich debris flows, and stockwork-type stringer and disseminated mineralization. The first two account for the majority of Buchans past production.

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Gander
Stratigraphic Unit: Buchans Group
Geological Age: Unknown
Rock Type(s): Felsic tuffs & flows, clastic sediments, granite conglomerate.
GEOPHYSICAL EXPRESSION

The results of a VLF-EM survey, contoured using the Fraser-filter method (Fraser, 1969), showed a distinct anomaly over remnants of the Old Buchans orebody (Moss and Perkins, 1981).

GEOPHYSICAL EXPRESSION

The results of a VLF-EM survey, contoured using the Fraser-filter method (Fraser, 1969), showed a distinct anomaly over remnants of the Old Buchans orebody (Moss and Perkins, 1981).

GEOCHEMICAL EXPRESSION

A broad area containing numerous weak to moderate zinc anomalies in soil and basal till extends southwest from Buchans. The anomalous tills probably represent glacial ore dispersion trains derived from suboutcropping mineralization in the Buchans area (James and Perkins, 1981).

A lake sediment survey covering the Buchans area was carried out by the Newfoundland Department of Mines and Energy (Butler and Davenport, 1978). The survey failed to detect any significant anomalies in the immediate vicinity, however this may be due in part to the sample density (1 per 4.6 km^2) of the survey.

Whole rock geochemical studies on major and trace element distribution in the Buchans area (Thurlow, 1973) show both vertical and lateral variations in certain elements, related to ore deposition. Vertical variations are erratic; those related to ore are only apparent within about 30 m above and below the mineralization and are best shown by the elements Zn, Pb, Cu, Ba, Ag, Fe, Mg and Ca. Lateral variations are more consistent and in particular the base metals and barium show increasing concentrations toward the southeast, indicating a possible source in that direction.

23.16 Ore Clast

National Mineral Inventory Number: 012A/15/Zn 023
Record ID Number: 7176

DEPOSIT SUMMARY

Deposit Name: Ore Clast
Major Commodity: Zinc
Secondary Commodities: Copper, Lead, Gold, Silver
Status: Prospect
Complexity: Singular Body
DDH: Not Drilled
Trench: No
Adit: No
Shaft: No
Workings: No
Deposit Type: Stratabound volcanogenic massive sulphide (? stockwork) in thick volcanic/epiclastic sequence

LOCATION

Region: Newfoundland
UTM Zone: 21
Latitude: 48.8210002761055
Easting: 509724
Elevation (m): 268
NTS Area: 12A/15
Longitude: 56.8675323682048
Northing: 5407347
Location Uncertainty (m): 100
Object Located: DDH 14-3489, Minco press release April, 16 2015

ACCESSIBILITY

The town of Buchans lies at the end of Route 370 which joins the Trans-Canada Highway 100 kilometres west of the town of Grand Falls and has a population of approximately 800. The town is supported by services such as a medical clinic, a hotel, a small gravel air strip, and grocery, hardware, and service facilities are readily available. The town has power and phone and is serviced by a municipal water supply. The nearest major airports are at Gander 175 km to the east and Deer Lake 250 km to the northwest, by road. The property area also includes the Town of Buchans. RRO currently has permission from the town and Abitibi Bowater (surface rights) to conduct exploration activities within and adjacent to the town and surrounding areas. The town is immediately adjacent to the Mineral Resources outlined in this report (Webster and Barr, 2008).

Much of the property has been clearcut by Abitibi-Price and this activity has led to the construction and refurbishment of a number of new and existing forestry roads in the area, permitting ready access to most of the property (Webster and Barr, 2008).

Field supplies, fuel and logistical support are available in Millertown or Buchans and contract geotechnical personnel including drill companies and analytical laboratories are available in either Grand Falls or Springdale. The closest deep-water ports are located 125 km northeast in Botwood and 160 km west in St. Georges, formally used as the loading terminus for the past-producing Buchans Mine, while St. Georges is currently used as the loading terminus for Teck's currently operating Duck Pond mine. The main power line from Grand Falls to Corner Brook passes through Buchans 15 km to the north of the property's northeast corner. A core storage facility operated by the Newfoundland Government is available for use in Buchans. This facility is used by private exploration companies, and much of the core from historic drilling on the Buchans area properties and surrounding region is stored at this location. Viewing and re-sampling of core can be arranged under government supervision. Historic mine buildings and a large tailings pond remain on the property from past mining by Asarco. The tailings pond is not permitted for use (Webster and Barr, 2008).

The Lundberg and Engine House deposits underlie the Lucky Strike glory hole, located on the western edge of the town of Buchans which is easily accessed by paved and dirt roads (Webster and Barr, 2008).

PHYSIOGRAPHIC SETTING

The area is generally flat to gently rolling with elevation ranging from 155 m to 165 m at Red Indian Lake to approximately 130 m to 280 m inland. There are numerous small brooks which drain into Red Indian Lake with spruce and fir growing on the slopes. The northern portion of the property is poorly drained and covered by areas of shallow bogs and extensive muskeg in the flat areas. The depth of till is approximately 2 metres with less than 5% outcrop exposure. To the south of the property Red Indian Lake occupies a large northeast trending valley. The climate of central Newfoundland is characterized as northern maritime, with relatively cool summers and winters with an overall annual average temperature of 3.5°C. The area receives an average annual precipitation of 873.3 mm of rain and 331 mm of snow, for a combined total average annual precipitation of 1,204.3 mm (data from Environment Canada, received at the Badger meteorological station) (Webster and Barr, 2008).

MINERALOGICAL COMPOSITION

Ore Minerals: Sphalerite, Chalcopyrite, Galena
Gangue Minerals: Pyrite
Alteration Minerals:
Alteration Type:
Age of Mineralization: Unknown

METAL/MINERAL CONTENT

Historical DDH intersections include (Minco Website March 15, 2016):

- LH-302 (drilled from underground) (8.7% BM) 5.27m @ 1.98% Cu, 3.27% Pb, 3.27% Zn, 19 gpt Ag, 0.48g/t Au

- H-14-3489 215 metres depth (3.9% BM) 1.0m @0.08% Cu, 1.49% Pb, 2.31% Zn, 24.6 g/t Ag, 0.47g/t Au

And (Minco PLC Press Release, April16, 2015)

- 5.27 metres assaying 1.98% Cu, 3.27% Pb, 3.43% Zn, 19.46 g/t Ag, 0.48 g/t Au in historic hole H-302 (historic assays)
- 1.83 metres assaying 0.88% Cu, 1.18% Pb, 5.60% Zn, 92.0 g/t Ag, 8.9 g/t Au, in historic hole H-394 (historic assays)

DRILL HOLE	FROM (m)	TO (m)	WIDTH (m)	Zn (%)	Pb (%)	Cu (%)	Ag (g/t)	Au (g/t)
H-15-3492	175.00	176.00	1.00	0.34	0.37	0.77	6.20	0.11
and	220.00	221.00	1.00	0.12	0.83	1.26	5.10	0.05
H-15-3493	115.35	116.20	0.85	2.42	0.03	0.05	6.46	0.03
and	225.00	227.10	2.10	0.94	1.85	2.63	19.50	0.09
including	226.60	227.10	0.50	1.80	5.20	6.32	53.30	0.18
H-15-3494	100.00	101.00	1.00	0.08	0.67	0.24	6.90	0.06
and	204.40	213.50	9.10	0.41	0.33	0.41	6.96	0.07
H-15-3495	129.06	131.00	1.94	0.25	2.23	4.28	48.40	0.83
including	130.06	131.00	0.94	0.44	3.80	7.80	88.40	1.62
and	220.40	221.60	1.20	0.15	0.25	0.45	5.40	0.05
H-15-3496	76.25	81.30	5.05	0.20	2.15	3.63	8.86	0.05
including	78.60	81.30	2.70	0.23	2.74	4.44	10.10	0.06
and	100.45	102.00	1.55	1.25	0.44	0.42	6.56	0.01
H-15-3497	120.20	120.70	0.50	0.20	3.60	4.43	32.20	0.29
and	170.50	171.50	1.00	0.32	1.55	3.83	53.15	0.20
and	174.00	174.30	0.30	0.37	0.72	4.76	20.10	0.16
H-15-3498	108.30	108.90	0.60	1.14	0.88	1.96	26.80	0.52
including	108.30	108.55	0.25	2.60	1.42	3.39	86.40	1.02
and	131.40	132.40	1.00	1.18	0.11	0.18	3.60	0.04
and	187.10	201.40	14.30	0.09	0.33	0.57	8.68	0.10
H-15-3499	95.45	95.75	0.30	0.28	2.90	4.33	67.90	1.02
and	228.40	229.20	0.80	0.20	1.11	1.33	14.00	0.14
and	240.40	242.70	2.30	0.16	0.44	0.77	5.90	0.04
including	242.35	242.70	0.35	0.16	1.70	2.70	9.60	0.09
H-14-3487	128.70	130.10	1.40	1.03	0.23	0.39	9.10	0.04
and	132.90	135.60	2.70	0.20	0.90	1.31	4.36	0.08
including	134.90	135.60	0.70	0.37	2.90	3.94	8.10	0.14
H-12-3450	220.65	221.00	0.35	0.11	1.16	1.52	4.20	0.03
and	231.32	35.90	4.60	0.16	0.52	0.83	5.09	0.12
H-12-3457	264.00	275.00	11.00	0.06	0.36	0.63	1.19	0.03
and	285.00	288.00	3.00	0.02	0.45	0.73	6.93	0.06

- Reported widths are core length. True widths estimated to be approximately 90% of reported widths. All holes drilled vertically from surface, except hole 15-3495 drilled at an angle of-51°towards azimuth 045°, and 15-3496 drilled at an angle of-65° towards azimuth 045° (Minco Press Release June 18, 2015).

PRODUCTION AND/OR RESERVES

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NATURE OF MINERALIZATION AND GENESIS

The Buchans orebodies comprise three distinct, but genetically related deposit types; stockwork ore, in situ ore and transported ore (Thurlow and Swanson, 1981). The stockwork system consists of a zone of intense alteration and mineralization within the Intermediate Footwall sequence and underlying the in situ massive sulphide deposits. Sulphide minerals present include pyrite, chalcopyrite, sphalerite and galena which occur as stringer type veinlets and disseminations with quartz, barite and calcite gangue. Chalcopyrite normally occurs in quartz-bearing structures whereas sphalerite is associated with barite and calcite (Kowalik et al., 1981). The proportion of pyrite and chalcopyrite to sphalerite and galena is much higher than in the massive sulphide ores, a feature typical of massive sulphide deposits elsewhere.

Quartz is the most abundant gangue mineral, being widely dispersed throughout the volcanic host rocks, whereas barite and calcite are typically found in veinlets (Kowalik et al., 1981). Chlorite is the most widespread alteration phase and occurs in a variety of forms, including veinlets and stringers, massive aggregates and as random disseminations.

Contact relations between stockwork ore and wallrock are generally gradational and large portions of the Intermediate Footwall are weakly altered and mineralized. In contrast to many other massive sulphide deposits, the Buchans stockwork does not define a pipe-like structure, but instead forms a stratigraphically controlled blanket with the most intensely mineralized zones occurring near the major in situ deposits (Thurlow and Swanson, 1981).

REGIONAL GEOLOGY AND TECTONIC SETTING

Geological Province: Appalachian
Tectonic Zone: Dunnage
Stratigraphic Unit: Buchans Group
Geological Age: Upper Ordovician
Rock Type(s): Mafic to felsic flows, pyroclastics & breccias, clastic sediments.

GEOPHYSICAL EXPRESSION

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GEOCHEMICAL EXPRESSION

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24.0 OTHER RELAVENT DATA AND INFORMATION

No other relevant data or information is available that would affect future exploration on the Buchans Wileys Property.

25.0 INTERPRETATION AND CONCLUSIONS

The Buchans area has been the site of mineral exploration for over 100 years; exploration that successfully identified many prospects and showing containing highly anomalous base metals in massive sulphide deposits, many of which were the focus of extensive mining operations throughout most of the 1900s. The Buchans Wileys area, for most of that period, was considered to be located in the non-prospective footwall lithology, which occupied the stratigraphy immediately below the Buchans orebodies, a theory that has since been disproven through stratigraphic and structural re-interpretation. Based on the author's assessment and analysis of all available, historically relevant data, the following exploration targets have been recommended for further assessment (*Figure 7*).

25.1 Clench Brook

The Clench Brook area lies at the western end of the Buchans Wileys claim group and north of Clench Brook. The area is of interest primarily due to the presence of ASARCO/A.N.D. Co. diamond drill hole H-2944, and the belief that the weak mineralization and alteration seen here may indicate the presence of better mineralization nearby. Geological mapping and prospecting of the area has confirmed that it is underlain by felsic rocks and several weakly anomalous geochemical samples have been collected locally. The area also appears to occur along strike from the Clementine Zone, a former producer.

A step-out program centered around H-2944 was proposed in this area twice previously, initially by Greene in 2014 and again by Crossley in 2017; this drilling was never completed. The need for further drill testing in this area is reiterated as there continues to be strong geological evidence that mineralization may improve down dip or along strike. A program similar to those previously proposed should be carried out to better define the mineral potential of the area, and ultimately the property itself.

Additionally, the area just south of Clench Brook contains coincidental IP and TDEM anomalies which are located near a geological contact defined by the Powerline Thrust Fault, a feature which can be traced almost all the way back to the Buchans Mine site. The anomalies occur adjacent to the Powerline Thrust, and appear to run parallel along it for several hundred meters. A diamond drill hole is recommended to test this area.

25.2 Wileys Lake

Previous drilling in this area has failed to provide an explanation for the geophysical and geochemical anomalies that surround Wileys Lake. It has been assumed that this is due to drilling having been performed too shallow to compensate for an

apparent increase in the thickness of the overlying stratigraphy, or because the holes were collared too far back of anomalies to intersect their root cause.

Drilling is recommended to the northeast of Wileys Lake, where it is likely that felsic bedrock host coincidental geochemical (MMI & basil till) and geophysical (IP & EM) anomalies. All drill holes should be designed to penetrate deep enough to ascertain bedrock type and to look for possible mineralization.

26.0 RECOMMENDATIONS

Based on the findings of this report, the following recommendations are presented for ongoing exploration:

26.1 Phase I

1. Detailed digital compilation of all data acquired though historic exploration should be continued, including all geological mapping, geochemical sampling, and geophysical surveys. This should include a review of all previously recommended follow-up work/diamond drilling targets.

2. Core from previous drilling should continue to be located, re-examined and systematic sampling should be carried out. Specific attention should be given to the sections of core that were reported to have intersected the Buchans River Formation.

3. Further, more detailed, examination of the 2017 airborne EM and magnetic data should be carried out. This work should include the incorporation of all know geological and structural data as recommended by Fraser, D.C., 2017 (Appendix V).

4. Establish exploration grids to follow-up on existing targets, as well as any new targets identified during the course of Phase I. Geological mapping, prospecting, and geochemical sampling are recommended.

5. Identify new/refine existing drill targets and make recommendations for Phase II exploration program.

Table 5: Estimated Phase I Exploration Budget

Proposed Exploration	Estimated Cost
Detailed Data Review/Compilation	$ 5,000.00
Re-Logging/Re-Sampling of Historic Core	$ 5,000.00
Review of Airborne Mag/EM Survey	$ 5,000.00
Grid Establishment	$ 7,500.00
Mapping and Prospecting	$ 10,000.00
Geochemical Assays	$ 7,500.00
TOTAL ESTIMATE	**$ 40,000.00**

26.2 Phase II

1. Complete diamond drilling on any existing targets or any new targets identified in Phase I. This should include, but not be limited to, the Clench Brook and Wileys Lake areas.

Table 6: Estimated Phase II Exploration Budget

Proposed Exploration	Estimated Cost
Diamond Drilling (1500-2000m)	$ 200,000.00
Planning & Supervision – Qualified Professional	$ 35,000.00
Drilling Assistant	$ 15,000.00
Geochemical Assays	$ 15,000.00
Logistics, Site Preparation, etc.	$ 25,000.00
TOTAL ESTIMATE	**$ 290,000.00**

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28.0 DATE AND SIGANTURE PAGE

Respectfully Submitted,

Elliott M. Stuckless, P. Geo.

February 1, 2018
Date:

Paul Cullingham, CEO,
Buchans Wileys Exploration Limited

February 1/2018
Date:

APPENDIX I

Statement of Qualifications

Certificate of Qualified Person

I, Elliott M. Stuckless, P. Geo. do hereby certify thot:

1. I currently reside in Paradise, Newfoundland and Labrador and that I am currently employed by:
   Vale
   Suite 700, Baine Johnston Centre
   10 Fort William Place
   St. John's, NL Canada
   A1C 1K4

2. I graduated with a Bachelor of Science (Honours) degree in Earth Science from Memorial University of Newfoundland.

3. I am a registered member in good standing with the Association of Professional Engineers and Geoscientists of Newfoundland and Labrador (PEGNL) – Membership No. 05677.

4. I have been employed as a geologist in the mining and exploration industry in Newfoundland and Labrador for 15 Years.

5. I have read the definition of "Qualified Person" as set out in National Instrument 43-101 and certify that I fulfill the requirements by reason of my education, affiliation with a professional association and relevant past work experience.

6. I am the qualified person responsible for all items in the technical report titled:

   "Technical Report on the Buchans Wileys Property, Mineral Licences 21555M & 22404M NTS 12A/15 Central Newfoundland and Labrador Canada For Buchans Wileys Exploration Limited. Prepared by Elliott M. Stuckless, P. Geo. Effective Date February 1st, 2018"

7. I have visited the Buchans Wileys Property on several occasions.

8. To the best of my knowledge, information and belief, all sections within this technical contains all the scientific and technical information that is required to be disclosed to ensure that those sections are not misleading.

9. I have read the National Instrument 43-101 and Form 43-101F and believe that this technical report has been prepared in compliance with the instrument and form.

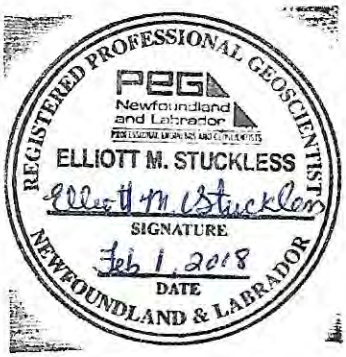
10. As of the effective date of this report, I am independent of Buchans Wileys Exploration Limited and all its affiliates applying all the tests in Section 1.5 of the NI 43-101 guideline.

11. I consent to the filing of this technical report with any stock exchange and other regulatory authority and publication by them for regulatory processes, including electronic publication in the public company files on their website accessible by the public.

Dated this 1st of February, 2018

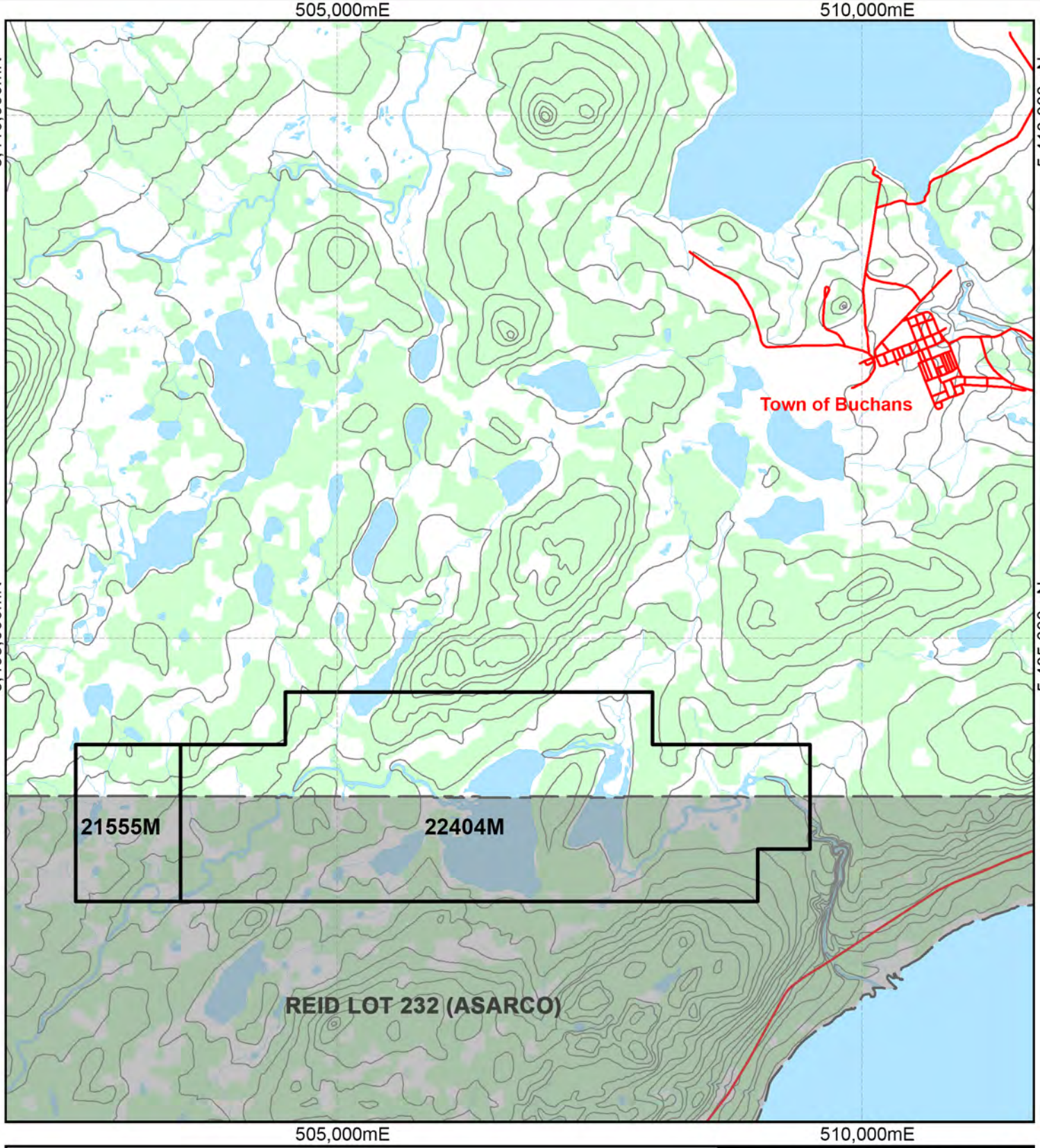
Elliott M. Stuckless

Elliott M. Stuckless, P. Geo.



APPENDIX II

Historic Claim Location Maps



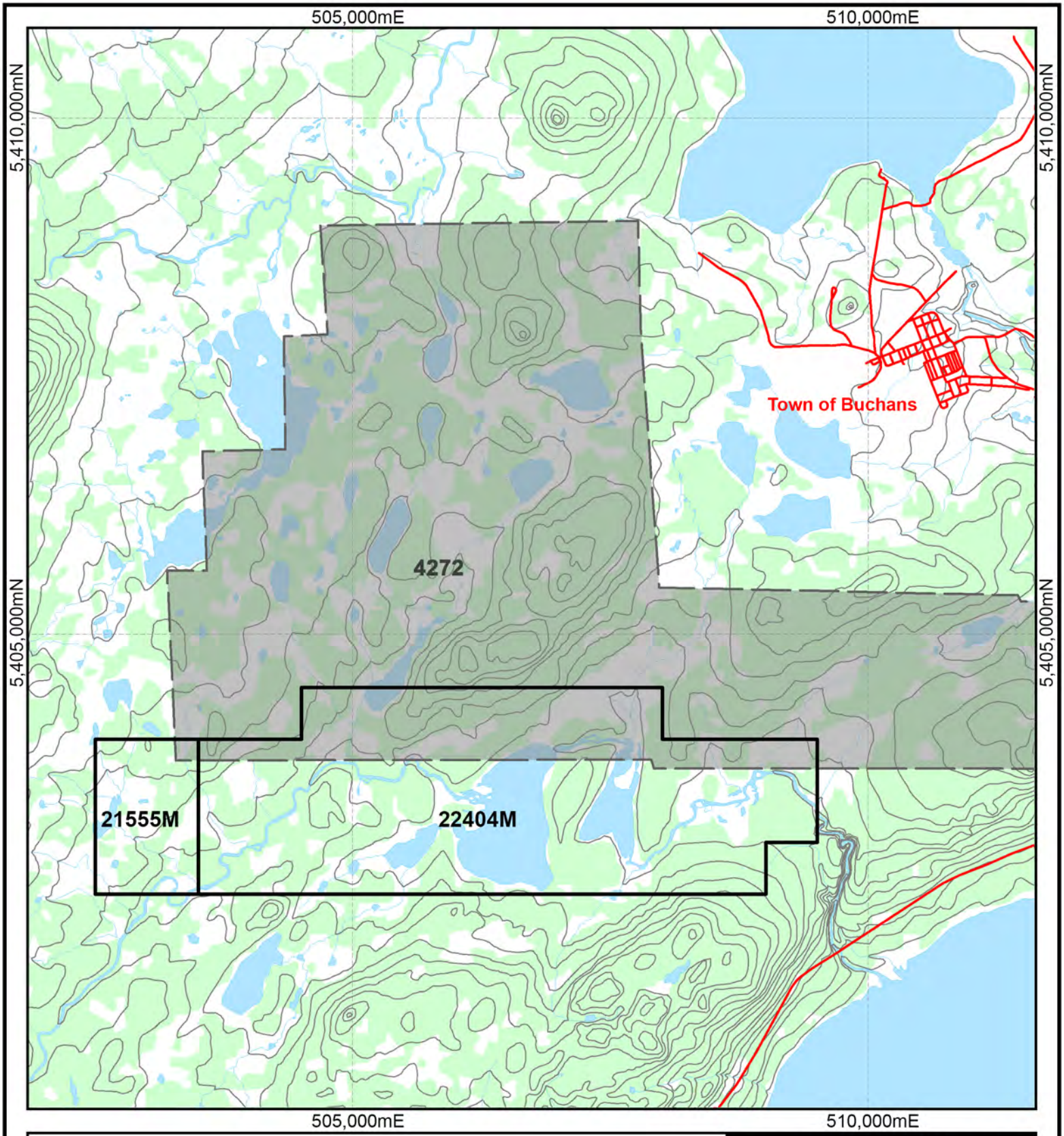
-1 0 1 2 3

Kilometres

UBIQUE MINERALS

Buchans Wileys
Reid Lot 232 Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure A2-1



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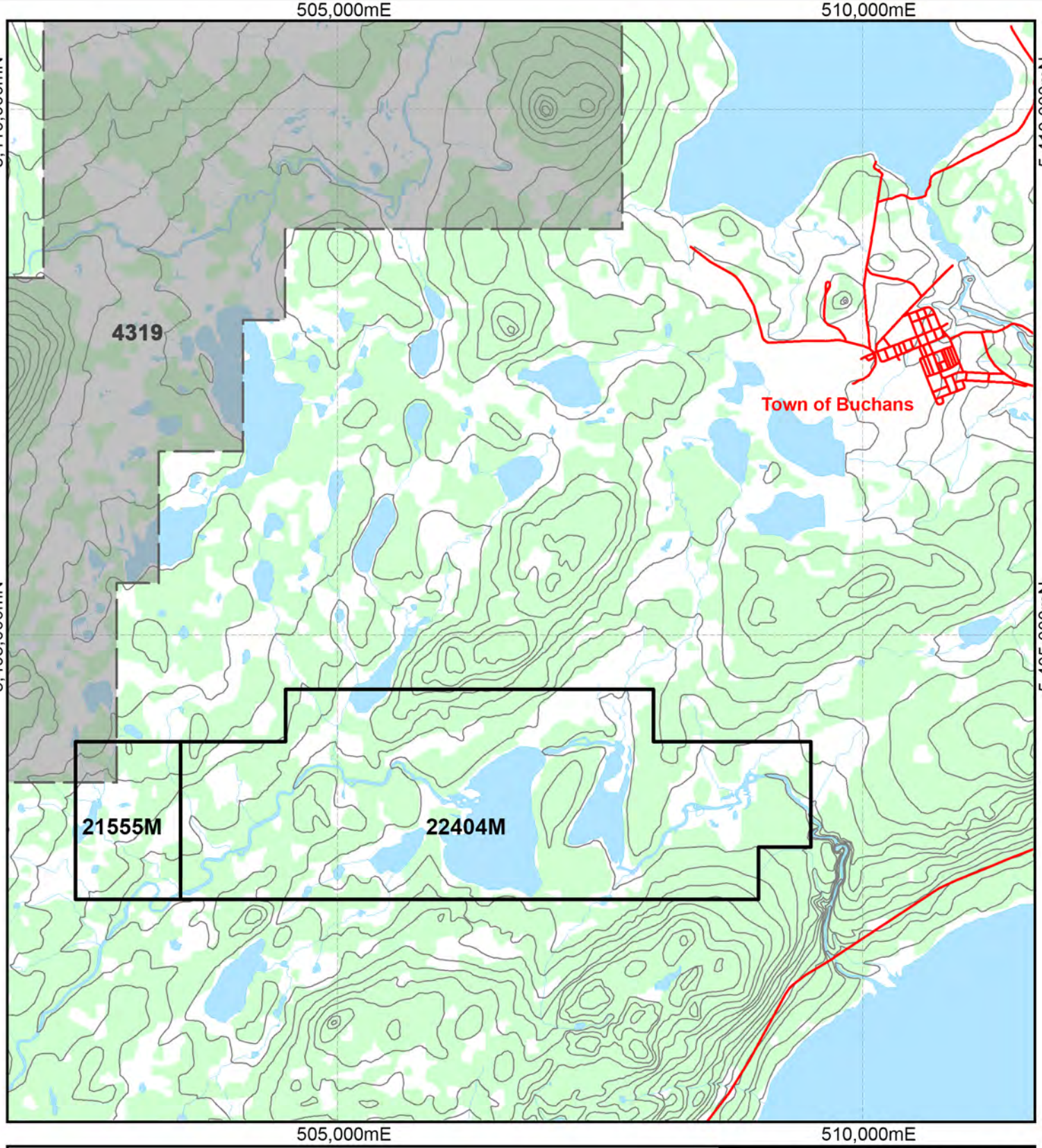
Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4272 Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure A2-2



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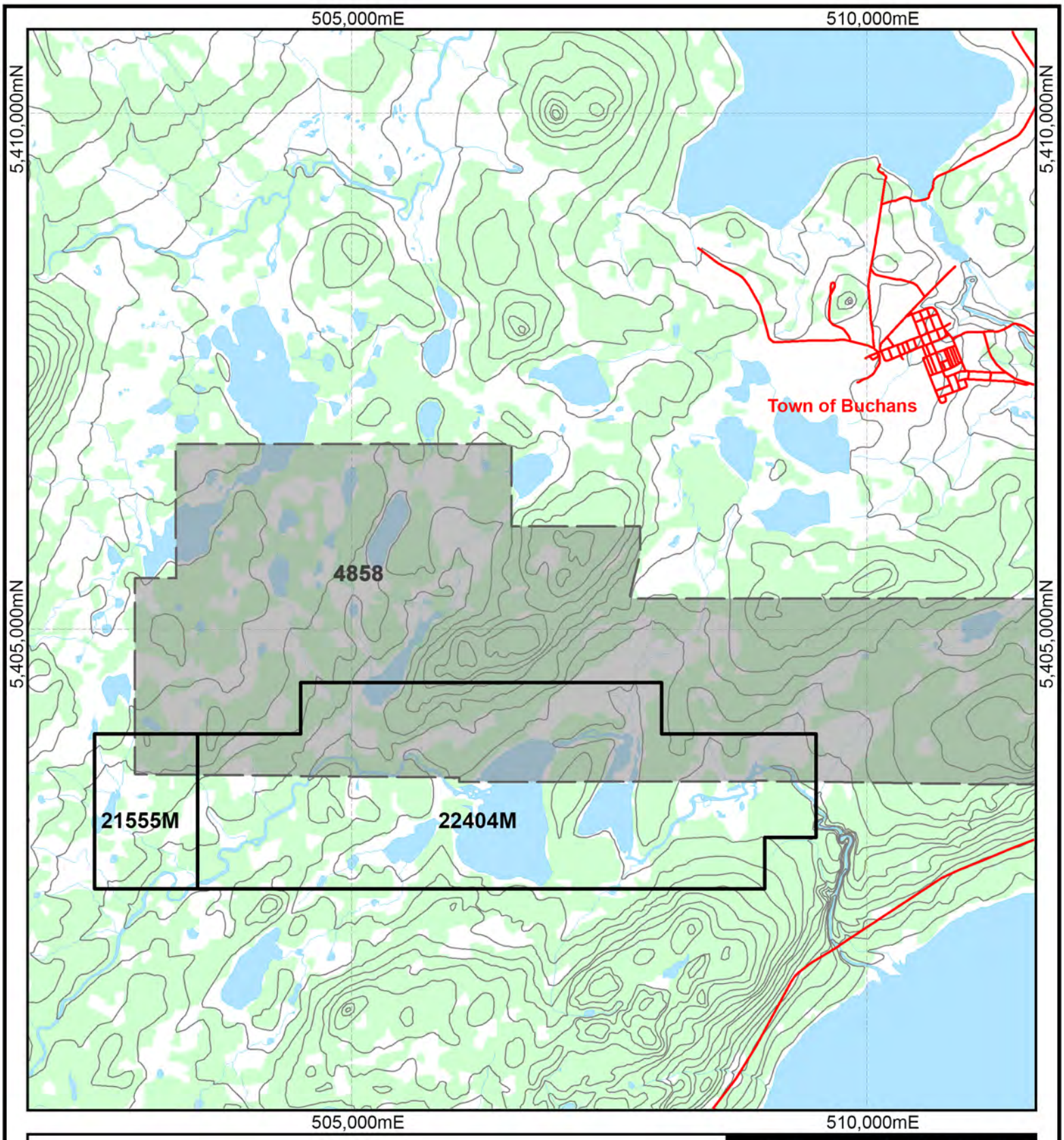
Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4319 Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure A2-3



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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4858 Location Map

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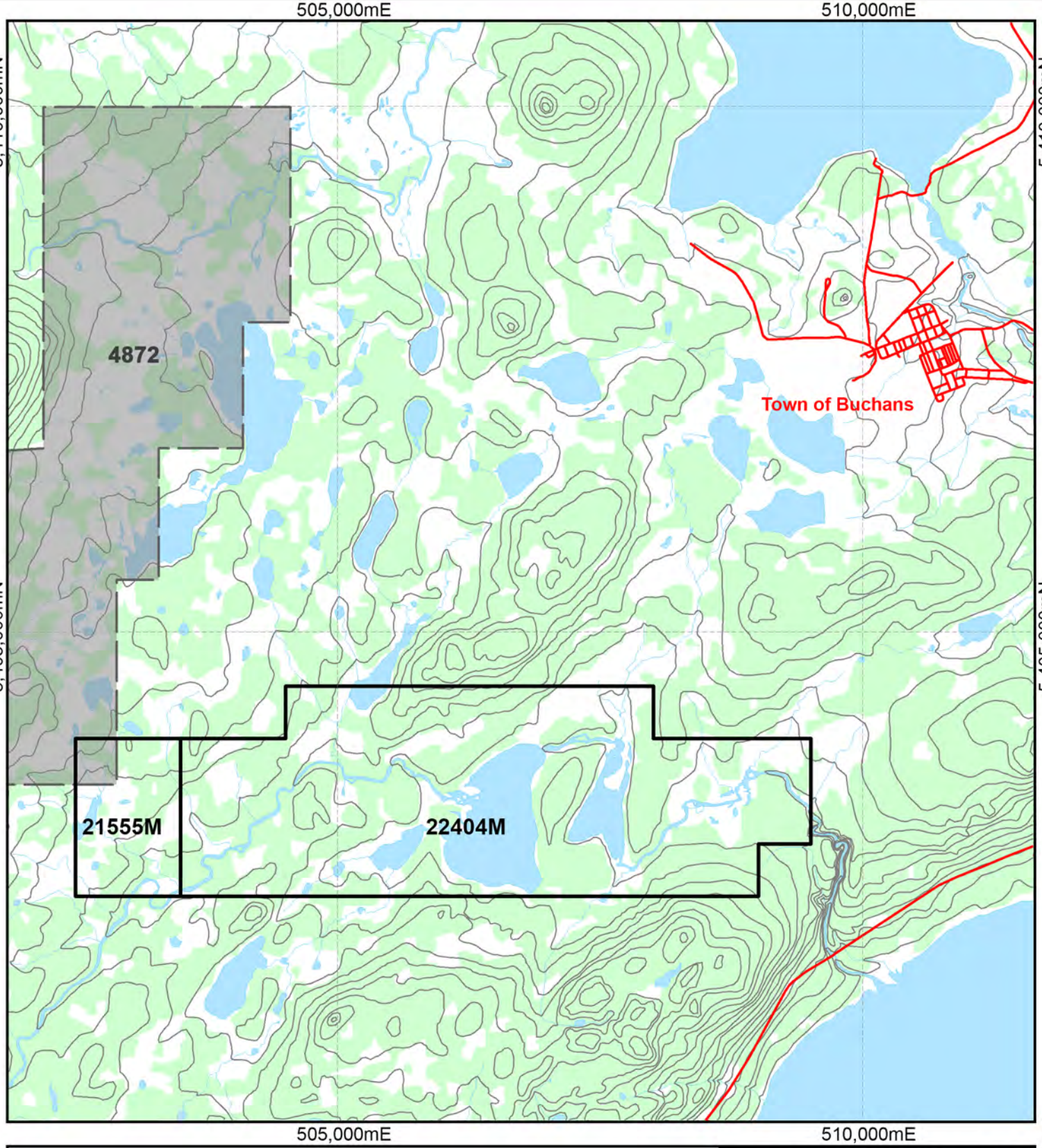

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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4872 Location Map

NTS 12A15	NAD 27-Zone 21
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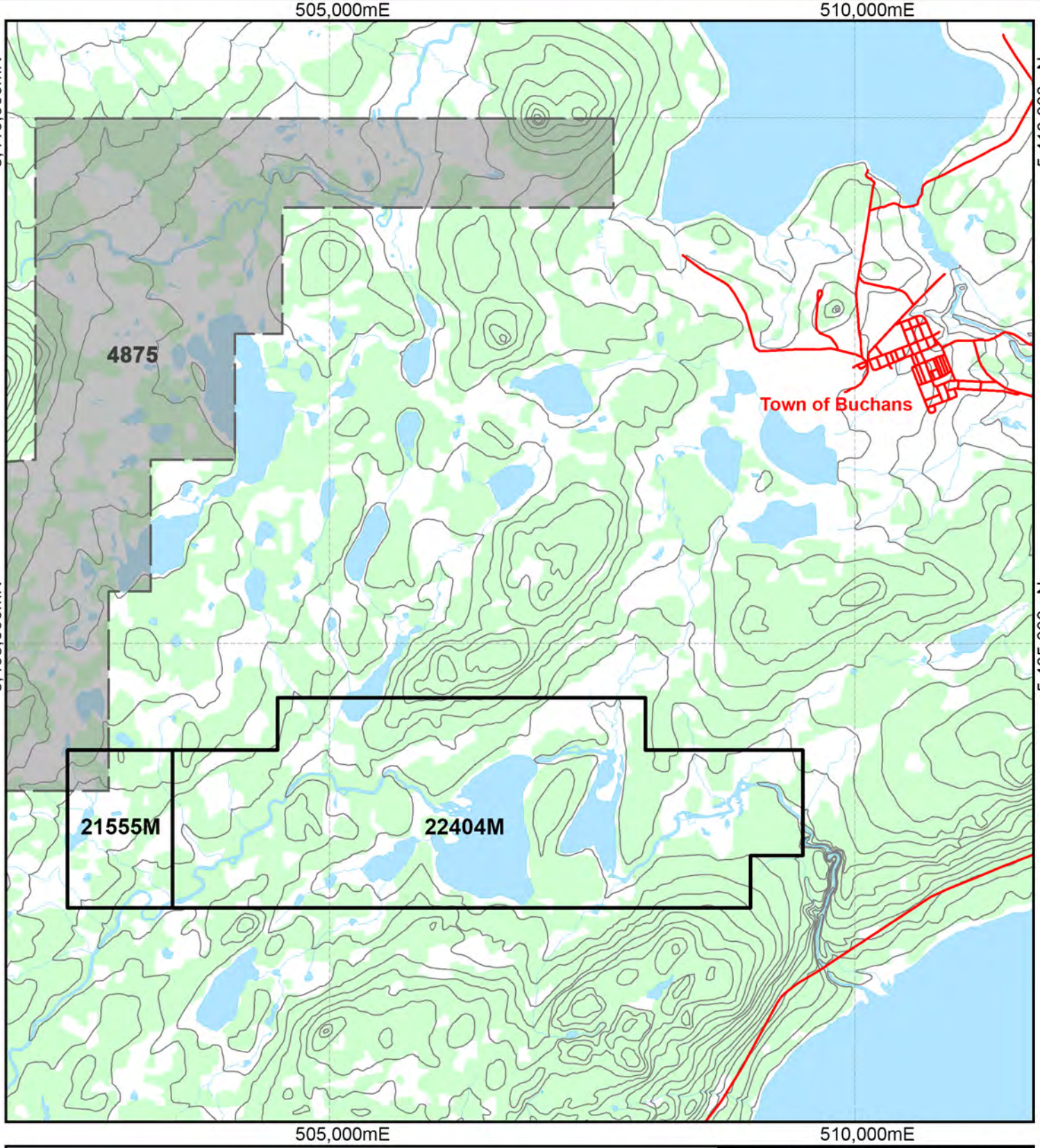

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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4875 Location Map

NTS 12A15	NAD 27-Zone 21
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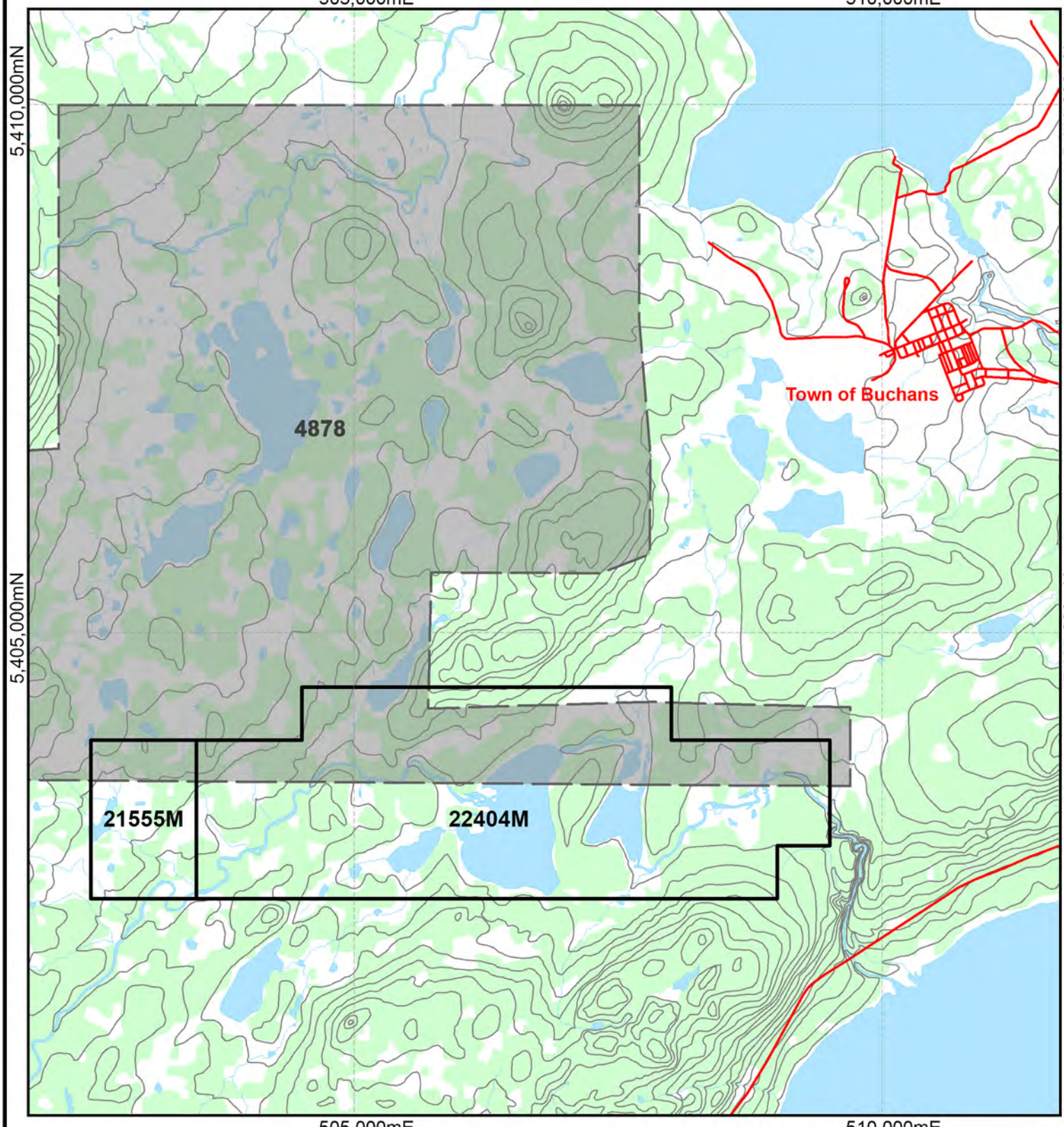

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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4878 Location Map

NTS 12A15	NAD 27-Zone 21
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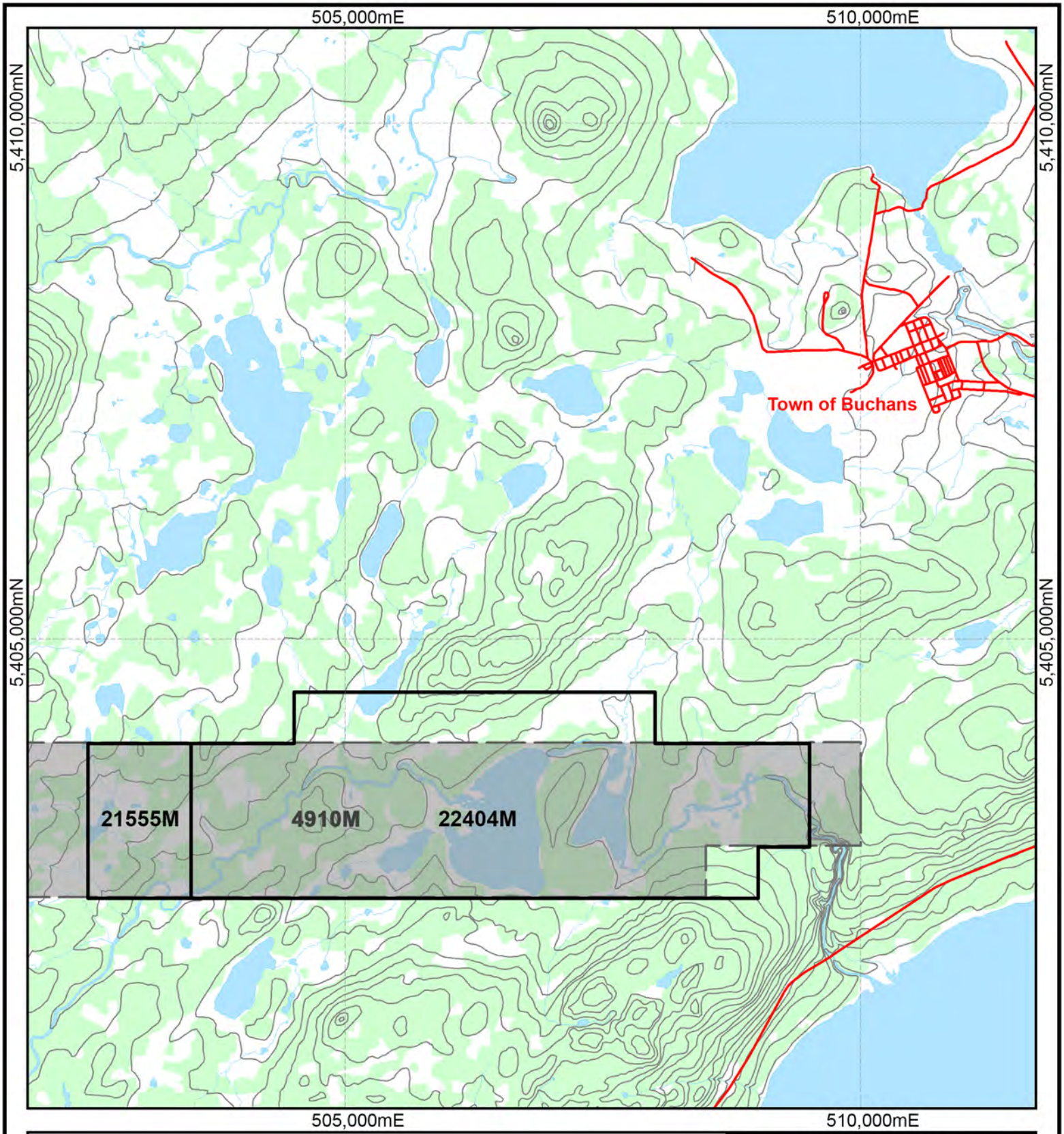

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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 4910M Location Map

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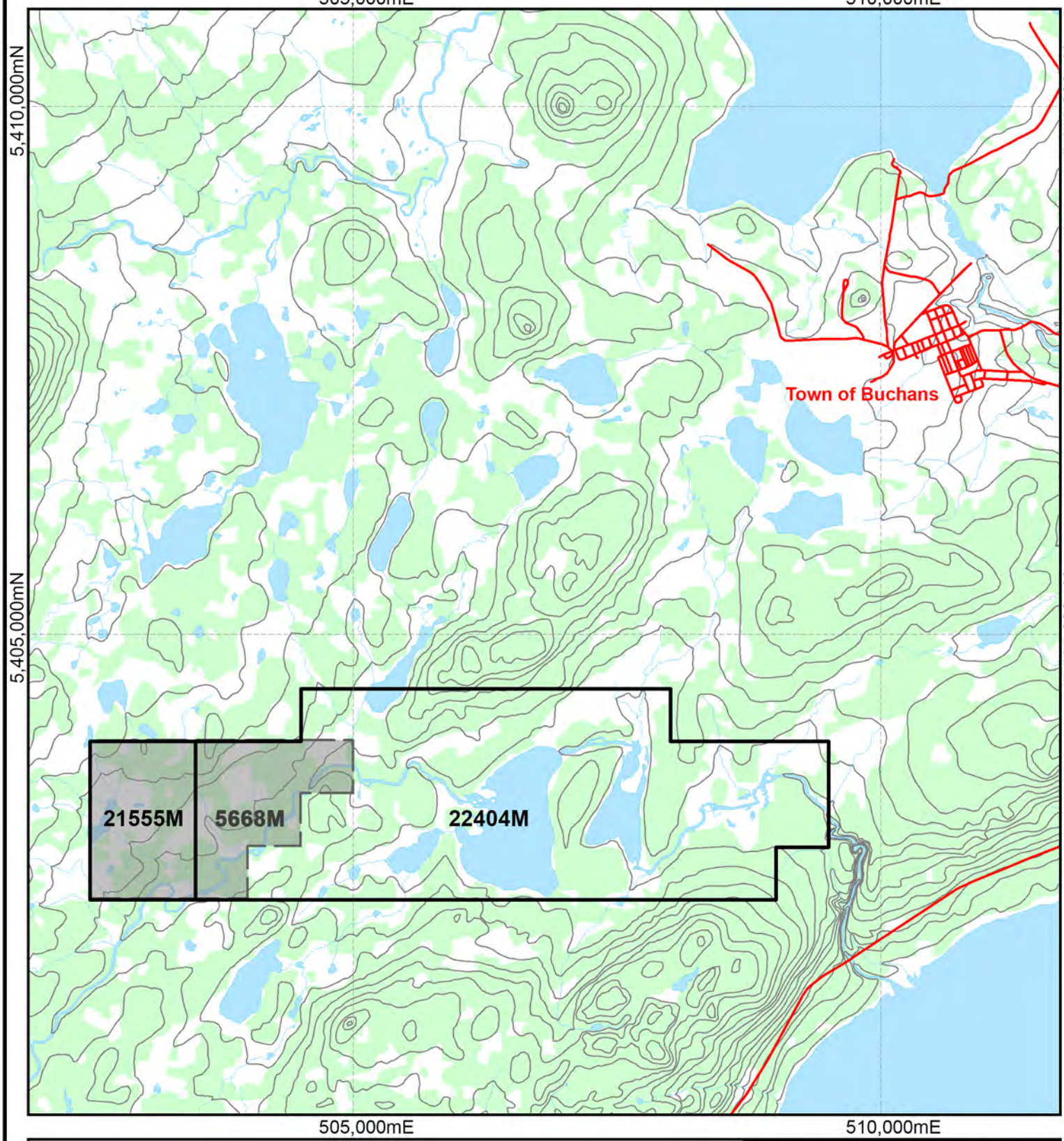
1:50,000	Figure A2-8



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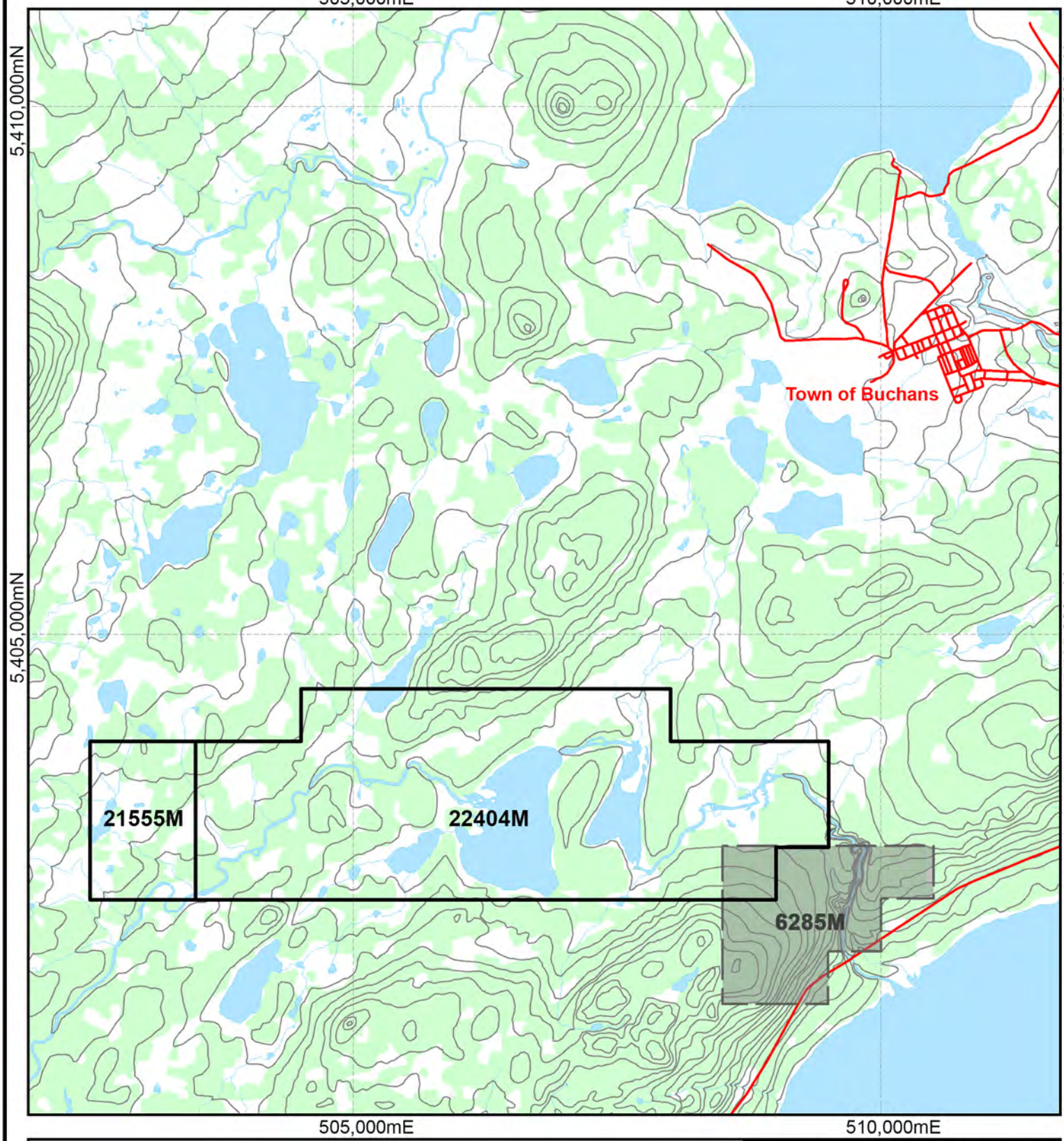
Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 5668M Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure A2-9



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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 6285M Location Map

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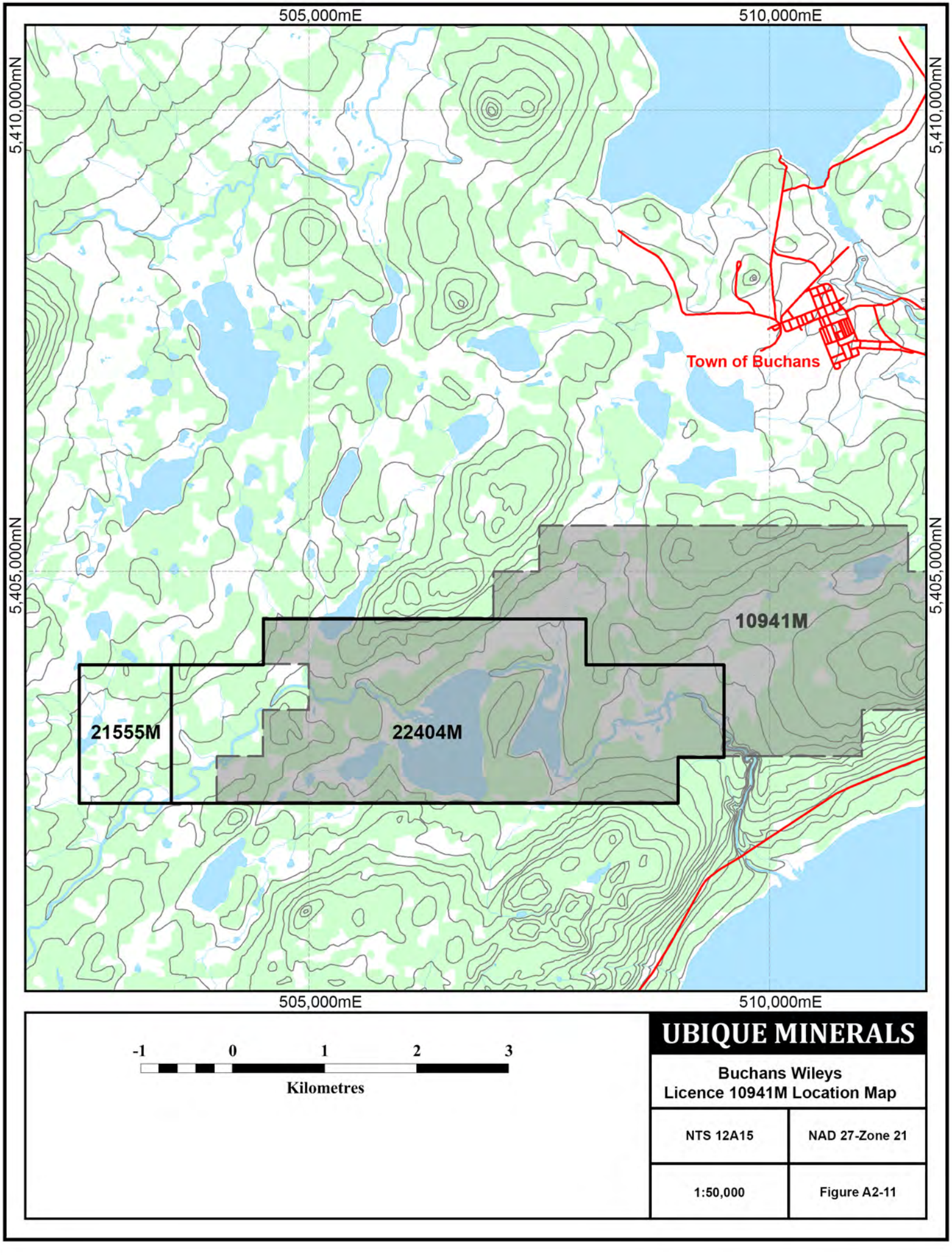

UBIQUE MINERALS

Buchans Wileys
Licence 10941M Location Map

NTS 12A15	NAD 27-Zone 21
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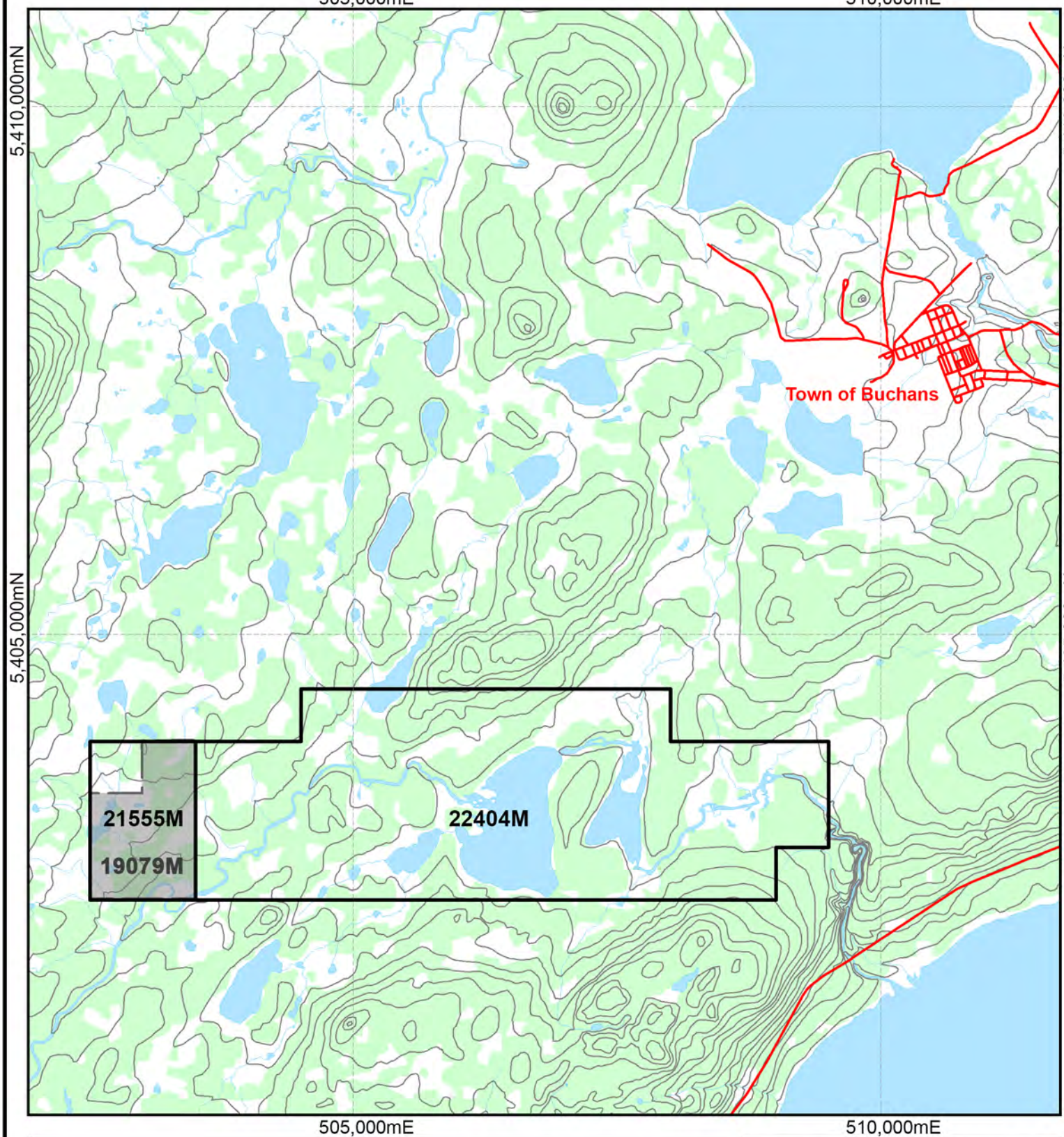

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Kilometres

UBIQUE MINERALS

Buchans Wileys
Licence 19079M Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure A2-12

APPENDIX III

Historic Diamond Drill Logs

BUCHANS MINING CO., LTD.
DIAMOND DRILL HOLE RECORD.

PROPERTY BUCHANS

LOCATION Wiley's River Section Electrical Survey Sq. 12 — Reed Lt 232 — COORDINATES — HOLE No. 68

DIRECTION S 50° E — DIP - 55° — N S 7,870 — E/ W 17,050 approx. — DEPTH 173

STARTED December 5, 1927 FINISHED January 5, 1928. — ELEVATION ? — H.D. - 99 V.D. - 142

CORE

SECTION FROM	SECTION TO	Sample No.	LOG	o/o Rec.	Oz. Au	Oz. Ag	o/o Cu	o/o Pb	o/o Zn.
0	10		0-67 f.g. very hard cherty dark	57					
10	20		greenish gray feldspar porphyry	60					
20	30		(Resembles f.g. portions of Lucky Strike	70					
30	40		qtz. porph. where latter is deficient	80					
40	50		in qtz. pheno's) Barren except for	77					
50	60		occasional fine xt'l of pyr. 0-10	75					
60	67		quite mottled (Light & dark).	59					
67	71		67-92 probably ditto but badly	10					
71	92		fr'd or crushed & somewhat alt'd	1/2					
92	99		Core recovery practically nil.	4					
99	102			47					
102	110		92-173 probably same as 0-67 but	12					
110	122		more mottled & bx.-like (dark & light)	18					
122	130		All badly broken, Feldspar pheno's	25					
130	140		less evident. Some alt'n & leaching	18					
140	150		the most of core still hard but	11					
150	160		rough & pitted. Some jasper	28					
160	173		ground 150.	36					
			E N D						

SLUDGE

SECTION FROM	SECTION TO	Sample No.	LOG	o/o Rec.	Oz. Au	Oz. Ag	o/o Cu	o/o Pb	o/o Zn.
65	75	1524		4	nil	nil	nil	nil	nil
75	80	5		18	"	"	"	"	"
80	90	6		5	"	"	"	"	"
90	100	7		11	"	"	"	"	"
100	105	8		36	"	"	"	"	"
105	110	9		26	"	"	"	"	"
110	115	1520		14	"	"	"	"	"
115	120	1667		45	"	"	"	"	"
120	125	0		64	"	"	"	"	"
125	130	9		52	"	"	"	"	"
130	135	1690		47	"	"	"	"	"
135	138	1		57	"	"	"	"	"
138	140	2		60	"	"	"	"	"
140	145	3		68	"	"	"	"	"
145	150	4		46	"	"	"	"	"
150	155	5		56	"	"	"	"	"

REMARKS

EXAMINED BY C. G. Gilchrist Engr.

APPROVED BY Supt.

J. TUACH GEOLOGICAL CONSULTANTS, INC.
DIAMOND DRILL CORE LOG

LATITUDE _____

DEPARTURE 17,020.62 W 7,831.08 S

ELEVATION 3995.0

DIP AT COLLAR -55°

BEARING 175°

TOTAL DEPTH 173' CORE SIZE Ex

REMARKS Wileys River - drilled on electrical survey

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. H68

Property Buchans - Clementine

NTS 12A/15 Grid Name Mine Grid

Date started 03/12/1927 Completed 03/01/1928

Contractor _____

Logged by J. Harris - 1997

Depth & Lithology	Description	Alteration	Mineralization
0 - 67'	Rhyolite maroon to pinkish rhyolite Buchans River Formation - rhyolite small plagioclase phenos locally bleached along fractures appears to be brecciated over lower 5' or so	below 67' core is rubbly with very poor recovery 0 - 67' - average recovery ≈ 70 - 75%	
67 - 173'	Looks like felsic fragmental - dacitic tuff matrix? Some pieces of above rhyolite, some of dacitic tuff a few jasper clasts around 150' mostly pink and greenish colours	67 - 99' - less than 5% 99 - 173' - average ≈ 15%	
no core 162 - 173' - box missing			small chip with 25%+ py @ ≈ 156', possible sp @ ≈ 155'?

J. TUACH GEOLOGICAL CONSULTANTS, INC.
DIAMOND DRILL CORE LOG

LATITUDE _____

DEPARTURE 17,052.0 W 7,942.0 S

ELEVATION 3990.0

DIP AT COLLAR -90°

BEARING _____

TOTAL DEPTH 96' CORE SIZE Ex

REMARKS _____

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. H 70

Property Buchans - Clementine

NTS 12A/15 Grid Name Mine Grid

Date started Jan. 5, 1928 Completed Jan. 24, 1928

Contractor _____

Logged by J. Harris - 1997

Depth & Lithology	Description	Alteration	Mineralization
45 - 96'	Only one box of core 45 - 96' Rubbly Ex core Poor recovery felsic fragmental lithic clasts of maroon rhyolite, dacite and pumice in a dacitic tuff matrix		

HOLE NO. H 70

BUCHANS MINING CO., LTD.
DIAMOND DRILL HOLE RECORD

Location: Lower Wiley's Lake

Direction: Down Dip: Vertical

Started: August 11, 1937 Finished: September 16, 1937

Approximate COORDINATES N- S7032 E- W2076

Elevation: 800'

Hole No. 250

Depth: 400'

DESCRIPTION				CORE								SLUDGE							
SECTION From	To	GENERAL	ECONOMIC	Core Rec %	Sample No.	Oz. Au	Oz. Ag	% Cu	% Pb	% Zn	% Fe	Core Rec. %	Sample No.	Oz. Au	Oz. Ag	% Cu	% Pb	% Zn	% Fe
52	66	0'-52' Overburden.		63															
66	77		52'-400' Barren.	56															
77	80	52'-400' Volcanic fragmental.		16															
80	92			44															
92	101	Fragments are mostly amygdaloidal lava,		77															
101	122	tuff, rhyolite. Size of fragments		56															
122	136	varies from 1/4" to 6" from 66'-246';		40															
136	157	both rounded and angular are present.		37															
157	165	Narrow bands of lava (amygdaloidal) may		75															
165	170	be larger sized boulders? Occasional		100															
170	178	calcite veinlets.		75															
178	185			43															
185	192	246'-251' Light colored rock with		55															
192	205	reddish brown fragments containing		54															
205	212	quartz eyes. Rock has the appearance		50															
212	225	of arkose.		62															
225	238			31															
238	251			25															
251	261		END	20															
261	276			23															
276	286			59															
286	297			36															
297	309			20															
309	321			50															
321	326			16															
326	331			12															
331	337			20															
337	340			67															
340	350			32															
350	370			50															
370	381			92															
381	390			50															
390	400			72															

SIZE OF CORE

	From	To
	From	To
1¼"	From 52'	To 55'
⅞"	From 55'	To 400'
	From	To

REMARKS: Dip of hole 87° at 400'.

Examined by: A. W. Bleakley — Engineer

Approved by: [signature] — Manager

BUCHANS MINING CO., LTD.
DIAMOND DRILL HOLE RECORD

Location: Lower Wiley's Lake

Direction: Down Dip: Vertical

Re-Started: March 9, 1938 Finished: March 18, 1938

COORDINATES

N 87852 E W2076

Elevation:

Hole No. 250

Deepened Depth 400'-500'

SECTION From	To	DESCRIPTION GENERAL	ECONOMIC	CORE Core Rec.%	Sample No.	Oz. Au	Oz. Ag	% Cu	% Pb	% Zn	% Fe	SLUDGE Core Rec.%	Sample No.	Oz. Au	Oz. Ag	% Cu	% Pb	% Zn	% Fe
400	405	400'-431' Amygdaloidal lava, dark green.	400'-500' Barren.	80															
405	408	Occasional rhyolite fragments up to 3"		100															
408	413	in sections 400'-405' and 413'-431'.		90															
413	423			100															
423	426			80															
426	442	431'-473' Amygdaloidal lava. This		100															
442	447	section contains more rhyolite fragments		64															
447	453	than in section 400'-431'.		97															
453	462			91															
462	468			72															
468	476			60															
473	476	473'-500' Amygdaloidal lava, dark green.		100															
476	486	Scattered brownish rhyolite fragments up		93															
486	493	to 3".		100															
493	495			95															
495	500			100															
		END																	

SIZE OF CORE

From To

1½" From To

⅞" From 400' To 500'

From To

REMARKS: 52' (2⅛") standpipe left in hole.

Examined by: C. C. H. Stanley — Engineer

Approved by: [signature] — Manager

Form 28 — S.P.Co. Lt.

DIAMOND DRILL REPORT

Hole No. 1 Location ______ CO-ORDINATES: N S 7832 W 2076

Evaluation Coll. 805 or 810 Direction of hole ______ Dip of hole ______

Date Started April 8/68 Date finished June 18/68 Large core from Reamed BX 58 to 60

#250 Wiley's Lakes Small core from " AX 60 to 500

DATE	CORE RECOVERY DEPTH FROM	TO		% REC	GENERAL	ECONOMIC
					Deepened from 500'	

500 – 528 – 614 – 643 – 701 – 730 – 745 – 843 – 918

Volcanic breccia as in previous 500'. Full range of volc. frags. in glassy dacitic tuff matrix. Calcite in matrix. Fractured – calcite

503 – 515 Db. or andesite intrusive. Chilled margins, coarse centre. Contacts 45° to core

Some large angular lava boulders. Also some diabase fragments.

687 – 727 bleached, altered, orange coloured, somewhat crushed, not fractured. Small frags. & not so numerous. More matrix. Silicification

719.5 – 723.57 Db. Grey-black, f.g. Fractured – calcite (55° to core

727 – 729)

729 → 740 altered, yellowish green, pinkish silica veins somewhat crushed

745 – 759 – 792 – 830 Diabase. Grey-black, f.g. Orange. Fractured & veined. Breccia [illegible] at 745

750 – 751 inclusion of breccia – a couple blebs pyrite

840 – 876 – 918 bleached, altered pinkish & yellowish Strongly squeezed, fractured, approaching mylonite state. Some calcite veining. Fault lineation developed.

918 – 1527 – 1592 – 1636 – 1644 Diabase Grey-black, f.g. 15° to core becomes grey, med.-gr. Some chl. alteration Fractured – calcite Felds grains visible to naked eye. – co. areas. 1166 → [illegible] fracture & veining

Form 28 —B.P.Co.,L.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 250 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO		% REC.		
	500	502	1.6		Heavy fracturing & calcite veining 1245' – 1285'	
	502	512	10.6		1285' – fracturing gradually decreases.	
	512	516	4.5		Coarse grained to end of hole.	
	516	518	1.7			
	518	528	10.1			
	528	538	9.6			
	538	548	10.5		1644' End	
	548	558	10.2			
	558	568	10.3			
	568	575	7.3			
	575	584	9.0			
	584	590	4.2			
	590	598	8.4			
	598	608	10.5			
	608	616	7.9			
	616	620	3.3			
	620	628	6.9			
	628	634	7.0			
	634	642	8.3			
	642	651	9.0			
	651	661	10.2			
	661	671	10.2			
	671	680	9.3			
	680	694	14.1			
	694	706	11.5			
	706	716	10.5			
	716	722	6.7			
	722	729	6.1			
	729	739	9.5			
	739	749	9.7			

Form 28 — G.P.Co.Ltd.

DIAMOND DRILL REPORT

Hole No. H. Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H.#250 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO		% REC.		
	749	759	10.5			
	759	769	10.2			
	769	779	10.2			
	779	791	7.6			
	791	796	2.6			
	796	804	1.1			
	804	811	7.3			
	811	820	2.2			
	820	830	4.1			
	830	840	10.2			
	840	846	2.9			
	846	856	9.2			
	856	866	9.2			
	866	869	1.7			
	869	877	7.9			
	877	883	2.2			
	883	886	1.4			
	886	894	7.7			
	891	898	1.7			
	898	904	2.2			
	904	914	10.6			
	914	920	4.1			
	920	929	4.2			
	929	939	8.6			
	939	944	3.7			
	944	950	6.5			
	950	953	2.9			
	953	958	3.6			
	958	968	10.5			

Form 28 —B.P.C.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 250 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	968	976	8.0			
	976	985	8.0			
	985	1002	17.3			
	1002	1022	20.0			
	1022	1031	9.0			
	1031	1041	10.6			
	1041	1052	10.2			
	1052	1056	2.7			
	1056	1061	7.0			
	1061	1071	10.1			
	1071	1081	10.3			
	1081	1091	8.3			
	1091	1097	5.0			
	1097	1104	6.2			
	1104	1112	5.4			
	1112	1121	9.7			
	1121	1125	1.7			
	1125	1128	1.4			
	1128	1132	2.0			
	1132	1139	11.3			
	1139	1149	10.1			
	1149	1156	0.7			
	1156	1161	0.6			
	1161	1171	10.6			
	1171	1180	6.2			
	1180	1187	2.9			
	1187	1195	5.1			
	1195	1200	2.1			
	1200	1265	3.0			
1.7						

Form 28 — B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 250 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	1205	1210	2.2			
	1210	1220	10 2			
	1220	1230	10.2			
	1230	1239	9.0			
	1239	1247	8.5			
	1247	1254	5.0			
	1254	1264	4.0			
	1264	1270	4.5			
	1270	1275	4.4			
	1275	1282	4.4			
	1282	1292	10.0			
	1292	1302	11.0			
	1302	1312	11.5			
	1312	1318	2.7			
	1318	1328	11.2			
	1328	1338	10.8			
	1338	1346	4.3			
	1346	1356	10.3			
	1356	1366	10.1			
	1366	1376	10.1			
	1376	1386	10.5			
	1386	1396	10.5			
	1396	1406	10.3			
	1406	1415	9.0			
	1415	1425	10.6			
	1425	1435	10.3			
	1435	1445	10.3			
	1445	1455	10.4			
	1455	1465	10.3			
7.7	1465	1475	9.1			

Form 28 – B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H. 250

Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	1475	1485	10.6			
	1485	1491	6.4			
	1491	1496	3.5			
	1496	1498	1.5			
	1498	1507	8.1			
	1507	1508	3.5			
	1508	1516	9.6			
	1516	1526	10.6			
	1526	1536	10.4			
	1536	1546	10.1			
	1546	1556	10.4			
	1556	1566	10.4			
	1566	1574	7.8			
	1574	1584	10.5			
	1584	1594	10.0			
	1594	1601	5.5			
	1601	1611	10.4			
	1611	1619	9.3			
	1619	1629	11.1			
	1629	1639	10.8			
	1639	1644	5.4			

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE — HOLE NO. 250 — PAGE 1

...ING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)
...E HOLE STARTED	DATE COMPLETED 1938?	DATE LOGGED	LOGGED BY				
...ONATION CO., OWNER OR OPTIONEE		CORE SIZE	DISPOSITION OF CASING				

Comments: Deepened ?? 500 -

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.) S78 32 W2076

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	ROCK TYPE	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
last Box		missing									
1611	1007	Diabase or massive flow?	Probably diabase								
		1396-1096	Broken core, local shears								
		1061-1047	" " " "								
		very gradational and indistinct contact									
1007	918	Similar to massive unit but with some vague fragment margins and "pillow-like" selvedges									
		-996-997 well defined fragmental texture, weakly chilled fragments, chloritic matrix									
		-assume 963, matrix to fragments is diabasic - "late" diabase intruding and brecciating early diabase?									
		- contact at 918 is sharp 46° to core - looks like intrusive contact									
918	830	Homogeneous porphyritic pyroclastic breccia; somewhat fractured and porous core									
		- fragments mainly rhyolitic variety, hard, feldspar-phyric, minor small quartz									
		- many porous pinkish-flesh coloured fragments, some banded (flow bndg? bed bng?)									
		- grey-ish elongate matrix pumice									
		- small qtz in matrix (1mm)									
		- 877-830 badly broken core, local shears, porous core									
		- lithology unchanged									
		- some 2mm-3mm qtz 836-837									
		- contact not cored									
830	745	Diabase - minor screens host rock									
745	687	Rumicsons pyroclastic breccias, as before, except generally smaller (1cm) lithics									
		-720-729 Diabase									
		- mainly rhyolite fragments (1cm + less) grey-ish, hard									
		- abundant pinkish porous fragments as before									
		- very similar to outcrop #103									
		- gradational contact									

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▷ HOLE NO. 250 | PAGE 2

...ING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	MAP REFERENCE NO. / CLAIM NO.
HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY		LOCATION (Tp., Lot, Con. OR Lat. and Long.)
...ORATION CO., OWNER OR OPTIONEE		CORE SIZE	DISPOSITION OF CASING		PROPERTY NAME

Depth (feet)	Dip	Azimuth (True)	Comments

FOOTAGE FROM	FOOTAGE TO	ROCK TYPE	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Cu	Pb	Zn	Au	Ag
?57	66	Polylithic breccia	characterized by large basalt blocks - similar to H2754 39-256 and 764-859								
		- basalt blocks are calcite amygdaloidal, some with [illegible] phenos	- some blocks 1'-2' size								
		- other frag types	- rhyolite - brownish, pinkish to flesh - some small qtz, some 2-4mm coarse qtz ; brownish varieties have 2-4mm plag + look like fine grained equivalent of some [illegible] qtz -rhy)								
			- greenish siltstone								
			- minor pumice, jasper, limy clasts, "apple green"								
			- limy clasts are fairly common - up to 3" size								
		- fairly tight packed	- most frags 1"-3"								
		- coarse qtz in matrix									
		-- 560 - 518	some basalt blocks 3'								
		- 503-516 Pink									
		- virtually unchanged	to top of hole								
		- overall not as	tight packed or as large basaltic blocks as breccias in H2754 - otherwise very similar								
?	0	Overburden									

Form 28

DIAMOND DRILL REPORT

Hole No. 1 Location

CO-ORDINATES: S 7832 E W 2076

Evaluation Collar 825' Direction of hole Dip of hole

Date Started Date finished Large core from to

\# 250 Lower Wiley's Lake Small core from to

DATE	CORE RECOVERY DEPTH FROM	TO		% REC	GENERAL	ECONOMIC
					0 - 52 Overburden	
					52 - 500. Volcanic breccia.	Dacite matrix —
					qtz-feldspar-cutting dacite matrix. Fragments	range from
					rhyolite to andes, a few diorite.	Matrix forms
					about 25% of rock volume.	Local fracture —
					245-251 band of altered dacite tuff	
					Dacite matrix — chloritized.	
					401→441 very coarse breccia.	3% a loss
					matrix mainly andes. frags.	
					441→487 breccia as 52-401	
					487-500 " " 401-441	
					500' End	
					500 — 918 Breccia.	
					918 — 1644 Db.	

Form 28 — B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. ______ Location ______ CO-ORDINATES: S6000 W2000

Elevation Collar ______ Direction of hole Down Dip of hole Vert

Date Started March 15/68 Aug 8/68 Date finished March 20/68 Sept 17/68 Large core from 3½" 0-21 NX 21-22 BX 22-30 to

H.27138 Wiley Small core from AX 30- to

DATE	FROM	TO	CORE RECOVERY	% REC.	GENERAL	ECONOMIC
BX core	22	24	2.5		0 - 22 Overburden	
	24	27	2.8			
	27	30	3.5		22 - 105 Diabase. Fine to med. gr.	
	30	33	3.1		Fractured - very minor veining	
	33	38	4.5		Contact broken at 105' but no suggestion of steep	
1.2	38	43	4.6		contact	
	43	50	6.6			
	50	54	4.0		105-(140)-298-358-399-426 Amyg. andes. flow	
	54	57	3.2		fractured - calcite	
	57	59	1.3		hematite staining 125→	
	59	66	4.9		230 - 231 [illegible]	
	66	72	4.6		253→ [illegible], coarser grained, minor hematite	
	72	80	5.0		[illegible] calcite	
	80	86	1.9			
	86	91	3.5			
	91	95	2.9		426 - 511	
	95	101	2.0		Volcanic breccia. Small frags mainly [illegible]	
	101	106	2.1		larger [illegible] frags (porphyry) [illegible] matrix. Rock	
	106	112	5.6		[illegible] dacite. Entirely pinkish stained	
	112	120	6.7		fractured, calcite	
	120	126	4.4		435 - 440 Grit. Grey-green	Faint bedding - not significant
	126	131	3.3		almost parallel to core	Stratio [illegible]
2.8	131	136	3.2		breccia becomes gradually finer sized	
	136	140	4.3		479→ more of a coarse even grained grit	
					496→ breccia again	
					500→ reddish flecked hematite staining	

Form 28 —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. ______ Location ______ CO-ORDINATES: N ______ E ______

Evaluation Collar ______ Direction of hole ______ Dip of hole ______

Date Started ______ Date finished ______ Large core from ______ to ______

H.2713

Small core from ______ to ______

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	140	142	3.5		516-543 Andes. Flow.	Amyg
	142	144	1.7		Strongly fractured - calcite 535-5	Med. to co. gr.
	144	147	3.3		Contact appears very steep - 15° to core.	
	147	151	4.0			
	151	156	4.1		543-581 Volcanic breccia as	before. Co. dacite
	156	159	3.3		within. Bleached, altered, fractured -	calcite
	159	165	6.7			
	165	167	2.0		563-574 ... mag. green	gut.
	167	177	10.2		Some minor bedding, silty.	Slicks 20-30° to core.
	177	180	2.0		574-5 co. grit to breccia	
	180	182	2.0			
	182	184	1.0			
	184	191	6.5			
	191	201	4.5		581' End	
	201	206	2.3			
	206	212	0.9			
	212	216	2.1			
	216	224	3.7			
	224	230	3.9			
	230	234	3.7			
	234	240	3.1			
	240	246	2.7			
	246	253	3.0			
	253	258	4.6			
	258	266	3.5			
	266	273	3.3			
	273	277	4.0			
	277	285	2.6			
	285	289	1.8			
1.4	289	296	3.2			

Form 28 — B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H.2713 Small core from _____ to _____

DATE	CORE RECOVERY			% REC.	GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO				
	296	303	5.8			
	303	310	6.0			
	310	316	2.6			
	316	321	1.7			
	321	336	2.4			
	336	340	1.7			
	340	343	1.7			
	343	349	0.5			
	349	355	5.2			
	355	362	4.2			
	362	366	1.5			
	366	374	3.6			
	374	380	4.8			
	380	387	6.2			
	387	394	5.0			
	394	404	9.4			
	404	414	8.3			
	414	424	1.5			
	424	426	0.9			
	426	436	1.5			
	436	446	2.8			
	446	456	5.6			
	456	466	10.0			
	466	471	5.4			
	471	479	7.2			
	479	489	10.2			
	489	499	10.3			
	499	509	10.2			
	509	516	4.5			

Form 28 — B.P.Co. Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2713 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	516	520	3.4			
	520	526	5.8			
	526	535	11.0			
	535	541	6.4			
	541	545	3.1			
	545	549	1.2			
	549	555	1.2			
	555	565	1.5			
	565	570	2.3			
	570	571	0.3			
	571	573	3.4			
	573	574	1.1			
	574	581	4.8			

Form 26 — B.P.Co.,Ltd

DIAMOND DRILL REPORT

Hole No. ______ Location ______ CO-ORDINATES: N 5900 E W2000

Evaluation Collar Unit E10 Direction of hole ______ Dip of hole ______

3½" 0-43 NX 43-67

Date Started June 24/68 Date finished Aug 2/68 Large core from 67-80 BX to ...

#2753

Small core from 80 — to ______

DATE	CORE RECOVERY DEPTH FROM	TO		% REC.	GENERAL	ECONOMIC
					0 – 67 Overburden	
					67 – 80 – 317 – 530 – 619	
					Rhyolite – flow or tuff? Some minor hematite staining. Consid. fracture – some calcite. 10-15% felds phenos, 1-2% qtz. med. gr. 98-120 only occas. small patch with felds + qtz – most of rock is fg. reddish stained & hard, cltc, with a few qutz phenos.	
					120 – 141 Reddish brown feldspar porphyry. Very hard. No qutz. Felds. phenos. short stubby + rhyolite? generally vague – 2-3%. Contacts broken core? or but sudden change suggests intrusive welded tuff. Consid. fracture & calcite veining.	
					141 – 175 Grey-green again & altered, reddish stained grey green. Qutz & felds. Consid. fracture – some veining.	
					175 – 215 reddish brown porphyry & as welded? 120-141. A few qutz phenos as well as rhyolite? felds. Consid. fracture + veining. tuff? 20-40 180-183 altered clastic – contacts broken.	
					215 – 248 Grey-green phase again. Consid. fracture – minor veining. Altered. Soft.	
					248 – 272 – 321 Reddish phase again. Fewer felds phenos + very vague. A few qutz eyes. Consid. fracture – very minor veining. 275 → more numerous qtz & phenos. 5-10% combined phenos.	

Form 28 —B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. ______ Location ______ CO-ORDINATES: N ______ E ______

Evaluation Collar ______ Direction of hole ______ Dip of hole ______

Date Started ______ Date finished ______ Large core from ______ to ______

H. 2753

Small core from ______ to ______

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC		
	FROM	TO				
	67	80	3.8		321-530-616-619 Grey-green phase again 3-5% feldsp.	
	80	85	0.8		a few qtz patches look welded, flow like - reddish	
	85	90	0.9		hematite stained. (Similar to from	
	90	95	0.8		qtz horizon north cont of Clementine	
	95	100	0.9		except not as coarse.)	
	100	105	0.9		Also welded areas no hematite staining	
	105	116	2.0		Consistent grain size & texture Fractured - calcite	
	116	122	0.7		& epidote	
	122	126	2.6		Grey-green sections look tuffaceous welded	
	126	136	3.1		[illegible] flow like - fewer feldsp &	
	136	141	3.9		Looks like Clementine trachyte - bleached.	
	141	147	6.3			
	147	151	3.9			
	151	161	6.1			
	161	163	1.8		619' End	
	163	167	3.1			
	167	171	4.8			
	171	176	5.0			
	176	184	3.8			
	184	194	3.7			
	194	196	1.3			
	196	199	0.6			
	199	206	0.9			
	206	211	1.4			
	211	216	1.5			
	216	222	0.9			
	222	227	0.9			
	227	232	2.3			
	232	236	1.0			
	236	240	3.8			

Form 28 —B.F.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H. 2753 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO		% REC.		
	240	248	1.7			
	248	256	1.3			
	256	264	1.7			
	264	268	3.3			
	268	276	6.0			
	276	281	1.0			
	281	284	0.8			
	284	288	0.7			
	288	291	0.6			
	291	293	0.7			
	293	294	0.5			
	294	298	0.6			
	298	300	1.4			
	300	301	0.9			
	301	310	6.5			
	310	320	10.0			
	320	327	7.0			
	327	332	4.1			
	332	337	4.6			
	337	343	4.8			
	343	347	3.9			
	347	357	11.0			
	357	360	3.7			
	360	370	10.2			
4.3	370	380	10.2			
	380	390	8.3			
	390	397	6.6			
	397	403	3.7			

Form 28 —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H. 2753 Small core from _____ to _____

DATE	CORE RECOVERY			% REC.	GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO				
	403	407	5.3			
	407	410	3.8			
	410	420	9.6			
	420	430	10.1			
	430	440	2.7			
	440	442	0.5			
	442	445	1.7			
	445	449	3.2			
	449	455	6.4			
	455	459	3.9			
	459	464	5.2			
	464	469	5.5			
	469	475	5.2			
	475	478	1.7			
	478	480	1.5			
	480	483	4.0			
	483	489	2.2			
	489	493	4.0			
	493	499	5.2			
	499	501	1.7			
	501	504	3.3			
	504	509	1.8			
	509	514	4.8			
	514	516	1.0			
	516	524	10.1			
	524	528	0.9			
	528	531	2.1			
	531	536	4.0			
	536	539	2.1			

Form 28—B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2753

Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	539	549	9.3			
	549	559	10.8			
	559	565	7 3			
	565	567	0.4			
	567	574	7.7			
	574	584	10.0			
	584	594	10.0			
	594	604	10.1			
	604	607	2.6			
	607	609	18			
7.0	609	619	10.1			

Form 28 —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N 56000 E W4000

Evaluation Collar _____ Direction of hole _____ Dip of hole -25

Date Started Oct 24/68 Date finished Nov 5/68 Large core from BX 25-31 to _____

#2758 Small core from 4X 31 — to _____

DATE	CORE RECOVERY DEPTH FROM	TO		% REC.	GENERAL	ECONOMIC
					0-25 Overburden	
					25-143-300 Andesite flow.	
					25-43 grey green coarse rare amyg - fractured - calcite -	
					43-115 heavy hematite staining. Consid. fracture & veining. Frequent amyg	
					115-165 as 25-43. A few more amyg	
					Patchy hematite staining	
					165-231 heavy hematite staining, more fracturing & calcite veining. Patches with numerous amyg. 231-280 heavy hematite again	
					296' - 2" db 35° to core	
					300' - End	

orm 2ª —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2758 Small core from _____ to _____

DATE	CORE RECOVERY			% REC.	GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO				
H.X. Core	31	36	4.0			
	36	41	5.1			
	41	51	9.6			
	51	61	8.5			
	61	70	10.0			
	70	76	6.4			
	76	86	10.1			
	86	93	6.0			
	93	103	10.1			
	103	113	10.3			
	113	123	10.3			
	123	127	3.8			
	127	136	10.2			
	136	146	9.8			
	146	156	10.3			
	156	166	10.4			
	166	176	10.2			
	176	186	10.2			
	186	196	10.2			
	196	206	10.6			
	206	216	10.3			
	216	226	10.5			
	226	231	3.9			
	231	235	3.3			
	235	245	10.6			
	245	255	10.4			
	255	265	10.0			
	265	275	10.2			
	275	285	10.0			

Form 60 —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H.2758 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH FROM	DEPTH TO		% REC.		
	285	295	10.1			
	295	300	4.2			

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 2759 PA

DRILLING COMPANY	COLLAR ELEVATION 850	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE 219'	DIP OF HOLE AT collar °	Comments	MAP REFERENCE NO	CLAIM NO.
DATE HOLE STARTED Nov. 6/68	DATE COMPLETED Nov. 8/68	DATE LOGGED	LOGGED BY	ft °		LOCATION (Tp., Lot, Con. OR Lat. and Long.) S6000 W5000	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size	ft °		PROPERTY NAME Wiley's	
				ft °			

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	PLANAR FEATURE ANGLE °	CORE SPECIMEN FOOTAGE ↓	YOUR SAMPLE NUMBER	SAMPLE FOOTAGE FROM	SAMPLE FOOTAGE TO	SAMPLE LENGTH	ASSAYS ↓
0	20	Overburden							
20	136	Lithic arkose; fine to coarse grained; and fine grained pebbly agl.							
		- coarse quartz; rare syn. prism qtz							
		- wide variety of lithic pebbles							
		- some bedded silty and argillaceous beds - dips 45° avg.							
		- local minor vitric component							
		- 129-130 basalt boulder? intrusive??							
		- 131-132 boulder? bed? of limy tuff - sample for microfossils ←							
		- ~~in~~ limy matrix in strata around this area							
		- 133-135 diabase?? or basalt boulder??							
		- 135-136 arkosic pebble agl. with a number of 1cm light grey limy clasts identical to 131-132.							←
136	219	Diabase - igneous contact weakly chilled.							
		- a few qutz-ct. amyg. near top but grades down into massive weakly magnetic diabase							
		219 end							

Form 283 – B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N S 60000 E W 5000

Evaluation Collar Elev 850 Direction of hole _____ Dip of hole -21

Date Started Nov 6/68 Date finished Nov 18/68 Large core from BX 20-30 to _____

2759 Wiley's Small core from AX 30- to _____

DATE	CORE RECOVERY DEPTH FROM	DEPTH TO		% REC.	GENERAL	ECONOMIC
					0 – 20 Overburden	
					20 – 100 – 135.5 Archaean grits & Greenstone Co. Reddish brown fractured & calcite veining Bands of bedded grits, fg. 77-79, 90-96, siltstone & grit 96-100 – Bedding 40 – 50° to core Contact about 80° to core at 135.5'.	
					135.5 – 175 – 219 Amyg. basalt flow. Black. Fracture & calcite veining Fg. altered Amyg. gradually disappears Rare Amyg. 175 –	
					219' End	

Form 28 — B.B.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2759 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	30	31	1.1			
	31	36	3.4			
	36	46	3.5			
	46	51	1.5			
	51	55	2.4			
	55	61	0.9			
	61	66	0.9			
	66	76	2.0			
	76	84	2.9			
	84	91	2.7			
	91	96	1.1			
	96	100	2.6			
	100	106	1.1			
	106	116	2.2			
	116	119	3.2			
	119	129	10.0			
	129	139	10.2			
	139	149	8.2			
	149	156	4.4			
	156	160	2.7			
	160	170	10.0			
	170	179	9.7			
	179	186	3.0			
	186	195	5.8			
	195	200	6.0			
	200	209	8.5			
	209	215	6.7			
	215	219	1.6			

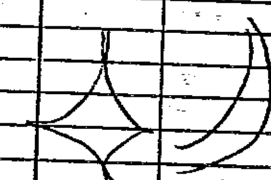
DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ **HOLE NO.** 2761 **PAGE**

...ILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE 103'	DIP OF HOLE AT	Comments	MAP REFERENCE NO	CLAIM NO.
...TE HOLE STARTED Nov 25/68	DATE COMPLETED Nov. 29/68	DATE LOGGED	LOGGED BY		collar		LOCATION (Tp., Lot, Con. OR Lat. and Long.) S 6000 W 6000	
...PLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size		ft / ft / ft / ft		PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	PLANAR FEATURE ANGLE *	CORE SPECIMEN FOOTAGE †	YOUR SAMPLE NUMBER	SAMPLE FOOTAGE FROM	SAMPLE FOOTAGE TO	SAMPLE LENGTH	ASSAYS †
0	16	Overburden							
16	61	Dark green massive andesitic tuff - locally contains minor quartz grains - massive and structureless - basal contact poorly cored, weakly sheared	} vaguely similar to some qtz-bearing andesitic tuffs in Ski Hill Sequence						
61	90	Hematized Basalt, minor fragmental - abundant amoeboid ct. amyg - hematization is weak - moderate and pervasive - calcite veining at basal contact / but contact appears cont.							
90	103	Basaltic lapilli tuff - amygdaloidal basalt lapilli (Scm avg) with ct. amyg (similar to underlying basalt) - abundant cuspate tuff sized fragments - matrix lighter green than fragments							
		103 end							



In general, basalts are different from holes to north east

* features such as foliation, bedding, schistosity, measured from the long axis of the core.

Form 28 — B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: S 6000 W 6000

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started Nov. 25/68 Date finished Nov 29/68 Large core from 0-17 NX, 17-21 BX to _____

H 2761 Small core from 21— AX to _____

DATE	CORE RECOVERY DEPTH FROM	DEPTH TO		% REC.	GENERAL	ECONOMIC
					0 – 16 Overburden	
	21	26	1.8			
	26	33	7.2		21 – 68 Andes. Staff. Altered – chloritized	
	33	40	5.0		21-22 Aggl.	
	40	45	2.7		22 – 42 Fg. fairly even grained tuff.	
	45	53	1.2		42 – 68 Fg. tuff: mainly. Suggested dip 40° to core.	
	53	61	0.8		Foliated – altered	
	61	71	3.1			
	71	76	4.3		68 – 95 – 103 Amyg. basalt flow. Hematite	
	76	86	10.3		Hard, strongly amyg. Fractured – calcite.	
	86	95	5.6		90 – 95 Flow breccia. Some tuff at 90'.	
	95	103	8.6		Interstitial dacitic fillings?	
					103' End	

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 263 PAGE 1

LING COMPANY

COLLAR ELEVATION 845 | BEARING OF HOLE FROM TRUE NORTH | TOTAL FOOTAGE 346' | DIP OF HOLE AT collar | Comments | MAP REFERENCE NO | CLAIM NO.

HOLE STARTED Dec 5/68 | DATE COMPLETED Dec. 20/68 | DATE LOGGED | LOGGED BY | ft | ft | ft | ft

ORATION CO., OWNER OR OPTIONEE | DATE SUBMITTED | Core Size

LOCATION (Tp., Lot, Con. OR Lot. and Long.)
S6500
W5000

PROPERTY NAME
Wiley's

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	PLANAR FEATURE ANGLE °	CORE SPECIMEN FOOTAGE +	YOUR SAMPLE NUMBER	SAMPLE FOOTAGE FROM	SAMPLE FOOTAGE TO	SAMPLE LENGTH	ASSAYS +
2	15	Overburden							
5	186	Massive dark green diabase?? basalt?? - contains minor semi-clear calcite emy, abundant chl emy, rare clear qtz emy. - massive + structureless, fine to medium grained - local weak epidotization - poor gay recovery at basal contact contact not cored	prob dike						
86	250	Basaltic pillow lava - at immediate top is 1 foot dark green chert silt with discontinuous black wispy beds (fluidal wisps) - bedded 40° to core - pillow lava is weakly hematized - numerous small ct emy - very poor recovery at base of contact							
50	345	Basaltic - andesitic lapilli-tuff and tuff - some lapilli have spherical qtz emy - most have ct. emy, some have qtz-ct emy - matrix locally bears resemblance to H2761 16-61 - for the most part though, tuffaceous matrix has abundant interstitial calcite - no bench ~295-346 coarse tuff with interstitial calcite - local lapilli similar to 5th hill type							
		346 end							

locally bears vague resemblance to 5th Hill

287-B.P.Co.,L.

DIAMOND DRILL REPORT

Hole No. ______ Location ______ CO-ORDINATES: N 5 6500 W 5000

Elevation Collar about 345 Direction of hole ______ Dip of hole ______

Date Started Dec 5/68 Date finished Dec 20/68 Large core from NX 0-15, BX 15-21 to ______

#2763 Wiley's. Small core from AX 21- to ______

DATE	CORE RECOVERY: DEPTH FROM	TO		% REC.	GENERAL	ECONOMIC
					0-15 Overburden	
					15-124-163-183.	
					Dark greenish black f.g. diabase or andes. flow - Rare amyg. Blebs calcite - not amyg. A few calcite filled fracture. No feather texture. 124-> consid. fracture & veining. Some bleaching along contact & broken.	
					183 - 191 Dark green & black bedded siltstones. Bedding 35-40° to core. 186-191 several tiny veinlets pyrite & chalco. along fractures.	
					191-213-346	
					Amyg. basalt flow. Fairly consistently amyg. Fractured - veined - calcite & epidote. 200-200.5 Chilled, bleached db. Not step. - 45-65° to core. 260-> fragmental appearance due to alteration - chl. 276->327 consid. calcite in matrix	
					346' End	

Form 28 —B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2763 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
Bed. Rock 15						
B.X. Core	15	21				
	21	22	0.6			
	22	26	2.9			
	26	27	0.9			
	27	31	3.4			
	31	36	2.3			
	36	41	4.0			
	41	45	1.6			
	45	51	4.3			
	51	61	10.3			
	61	70	8.8			
	70	76	5.8			
	76	81	1.8			
	81	86	4.6			
	86	91	3.8			
	91	93	2.0			
	93	101	3.7			
	101	106	4.4			
	106	111	3.2			
	111	118	5.6			
6.2	118	129	10.4			
	129	134	5.3			
	134	141	3.8			
	141	146	2.6			
	146	151	3.5			
	151	161	6.2			
	161	163	1.4			
	163	166	2.0			

Form 28—B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H. 2763

Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	166	168	1.6			
	168	171	1.8			
	171	181	1.6			
	181	191	2.8			
	191	196	4.3			
	196	206	6.2			
	206	216	10.0			
	216	218	3.3			
	218	226	2.7			
	226	236	3.4			
	236	241	2.8			
	241	246	2.1			
	246	254	1.5			
	254	261	0.8			
	261	266	4.8			
	266	271	4.7			
	271	281	8.7			
	281	291	9.5			
	291	299	8.2			
	299	310	10.2			
	310	316	4.0			
	316	326	3.4			
	326	336	3.0			
	336	346	1.5			

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 2764. PAGE 1

Field	Entry
Drilling Company	
Collar Elevation	840
Bearing of Hole from True North	
Total Footage	608'
Dip of Hole at collar / ft / ft / ft / ft	
Comments	
Map Reference No.	
Claim No.	
Date Hole Started	Jan. 1/69
Date Completed	Jan. 31/69
Date Logged	
Logged By	
Location (Tp., Lot, Con. OR Lat. and Long.)	S7000 W5000
Exploration Co., Owner or Optionee	
Date Submitted	
Core Size	
Property Name	Wiley

Footage From	Footage To	Description (Colour, grain size, texture, minerals, alteration, etc.)	Planar Feature Angle *	Core Specimen Footage †	Your Sample Number	Sample Footage From	Sample Footage To	Sample Length	Assays *
608 (cont'd)	529	Pebbly arkose, verging on lithic rich tuff – coarse quartz-bearing – wide variety of frag types – mainly pinkish rhyolite – also includes a few grey limy tuff fragments and one 14 cm. cobble (?) at 582 ← Examined in this section by N. James – fossiliferous – wisps of pumice locally in matrix – above 575 fairly homogeneous arkosic dacite with only a few lithic frags exceeding 1 cm. – grades up into gritty arkosic tuff at top – upper contact not cored							
529	509	Dark green soft tuffaceous siltstone – bedded 25–30° to core –							
509	299	Diabase – basal contact at 80° to core, weakly chilled, contact cuts bedding in underlying silts – massive dark green fine grained, non magnetic – rare ct. amy. – abundant small chloritic spots – 471–472 cut by chilled diab, similar to main body – one foot screen of siliceous silt @ 270 – above 400 numerous ~~pink~~ sections of pinkish hybrid diabase – irregular upper contact							
299	205	Hard to soft dark green silts and f.g. gritty tuffaceous wacke – some silts with black wispy bands – bedded at highly variable angles – cut by diab 271–250 – 256–246 peculiar pyroclastic – contains amygdaloidal basalt frags, andesite frags but matrix has distinct qtz grains – 246–227 Dark grey to black siliceous silts, wackes – 227–205 similar to 256–246 – matrix more felsic than frags but without distinct quartz grains as in previous unit – some interbedded siliceous silt							

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 2764 | PAGE 2

COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	DIP OF HOLE AT	Comments	MAP REFERENCE NO	CLAIM NO.
				collar			
HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY	ft		LOCATION (Tp., Lot, Con. OR Lat. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size	ft			
				ft		PROPERTY NAME	
				ft			

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION (Colour, grain size, texture, minerals, alteration, etc.)	PLANAR FEATURE ANGLE	CORE SPECIMEN FOOTAGE	YOUR SAMPLE NUMBER	SAMPLE FOOTAGE FROM	SAMPLE FOOTAGE TO	SAMPLE LENGTH	ASSAYS
-05	162	Basaltic andesitic lapilli tuff. matrix is more felsic - finely clastic with distinct qtz grains (similar to previous units)							
		- frags mainly with spherical ct. amy							
		- minor interbedded tuffaceous [illegible]							
162	15	cut by dike 162-[illegible] [illegible] ct. amy							
		- contains some pitted [illegible] zone							
		- towards top "diabase" has "integ[illegible]-like" green siliceous silt - [illegible] to [illegible]	very friable [illegible]						
5	0	overburden							

Form 28—B.P.Co. Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: #5 7000 -W 5000

Evaluation Collar about 4'± Direction of hole _____ Dip of hole NX 0-15

Date Started Jan 1/69 Date finished Jan 31/69 Large core from BX 15-25 to _____

#2764 J. Wilson's Small core from AX 25- to _____

DATE	CORE RECOVERY DEPTH FROM	DEPTH TO		% REC.	GENERAL	ECONOMIC
					0-15 Overburden	
					15-99-228-232-281-509.	
					Amyg. + porph. andes. flow Fg, calcite & grey-green cherty veining	Fractured-
					Consid. fracture 69-111 ; veining not increased	
					162-174 section of welded ash flow tuff, fragmental	
					174-> amyg. andes. - fairly strongly amyg.	
					200-206 andes. flow breccia - amyg.	
					206-211 green & grey & buff fg. grits. Some mmm bedding - 70° to core	
					211-219 welded ash flow tuff as 162-174	
					219-228-232 amyg andes. flow breccia	
					232-256 Grey andes. tuff, agglomeratic - amyg frags. patches are	
					frequent bands black & grey chert, occas. grit Mod. bedding 45° to core at 231' & 300 to core at 246'.	
					247-250 Db. sill ?	
					256-271 " " ?	
					271-273 grit, chert.	
					273-288 mainly andes tuffs. Frequent mixt me silt & grit.	
					288-299 Sandstone mainly, frequent mmm grit bands - grey green mainly - some black bands. bedding variable from 50-80° to core.	
298-299 dust of grit - co. to fine.					299-363-480 cored grassed ... Andes flow or db. consistently fractured - calcite veining & trace amyg.	
					369-371 grey, buff sandstone. Not intrusive contact with basic rock.	

Form 28 — B.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H. 2764 Small core from _____ to _____

DATE	CORE RECOVERY DEPTH FROM	DEPTH TO		% REC.	GENERAL	ECONOMIC
					460 – 485 fine grained. Consistently & fairly strongly fractured. – calcite veins – epidote alteration. No massive sections as usual in db.	Blebs calcite
	25	29	4.0		Hot look dike amyg.	Rare amyg.
	29	39	5.7		470.5 – 472 db, chilled contacts 50–55° to core.	
	39	41	1.9			
	41	51	10.0			
	51	56	3.7			
	56	64	7.0			
	64	69	0.4		485 → 509 fine grained again	
	69	71	2.4			
	71	76	1.2		509 – 510 Buff grey med. gr. arkosic grit.	
	76	81	2.3			
	81	86	4.4		510 – 528 Siltstone, minor grit. Green, black & grey green	
	86	94	7.3	Bored to 512	Bedded 70° to core. Fractured – calcite	
	94	100	5.2	Co. to pipe going down hole	veining.	
	100	102	0.8			
	102	106	1.4		528 – 574 – 608 Arkosic grits. Buff & reddish grey	
	106	111	1.6		Med. to fine grained massive	
	111	121	9.0		A few calcite filled fractures.	
	121	131	10.1		Numerous rhyolitic lava chips	Very high Mo
	131	141	9.8		Qtz.-felds. grains. 545 – fractured – calcite	
	141	151	3.5			
	151	161	10.2			
	161	171	10.3			
	171	181	10.3		608 End	
	181	191	10.5			
	191	201	10.3			
	201	208	6.6			
	208	211	2.3			
	211	214	2.2			

Form 28 — B.P.Co., Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H 2764 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	214	219	3.5			
	219	229	9.6			
	229	234	4.8			
	234	239	2.6			
	239	246	1.0			
	246	251	2.5			
	251	256	2.8			
	256	261	3.8			
	261	271	5.7			
	271	276	1.7			
	276	283	3.3			
	283	293	7.4			
	293	303	10.2			
	303	313	10.3			
	313	323	10.0			
	323	333	10.3			
	333	343	10.2			
	343	353	10.2			
	353	363	10.4			
	363	370	2.9			
	370	376	5.8			
	376	384	5.7			
	384	389	4.0			
	389	395	6.7			
	395	400	2.7			
	400	410	10.2			
	410	420	10.2			
	420	430	10.3			
	430	440	10.2			

Form 281-S8.P.Co.,Ltd.

DIAMOND DRILL REPORT

Hole No. _____ Location _____ CO-ORDINATES: N _____ E _____

Evaluation Collar _____ Direction of hole _____ Dip of hole _____

Date Started _____ Date finished _____ Large core from _____ to _____

H-2764 Small core from _____ to _____

DATE	CORE RECOVERY				GENERAL	ECONOMIC
	DEPTH			% REC.		
	FROM	TO				
	440	450	10.3			
	450	460	10.0			
	460	465	4.3			
	465	471	5.7			
	471	481	10.1			
	481	491	10.1			
	491	501	10.1			
	501	511	10.1			
	511	521	5.2			
	521	529	5.7			
	529	539	9.4			
	539	549	9.9			
	549	559	10.0			
	559	569	10.4			
5.0	569	579	10.0			
	579	582	2.7			
	582	592	5.6			
	592	594	0.8			
	594	599	0.8			
	599	604	1.9			
	604	608	3.8			

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

DRILLING COMPANY: Continental	COLLAR ELEVATION: 850 approx.	BEARING OF HOLE FROM TRUE NORTH: –	TOTAL FOOTAGE: ~~1418~~ 1621				HOLE NO.: 2933	PAGE NO.: 1
DATE STARTED: Nov. 25, 1977	DATE COMPLETED: December 15, 1977	DATE LOGGED: Dec. 1-20	LOGGED BY: J.G. Thurlow	Depth (feet)	Dip	Azimuth (True)	MAP REFERENCE NO.	CLAIM NO.
PROPERTY OWNER OR OPTIONEE: Price Co. Ltd., Mineral Res. Dev.	DATE SUBMITTED: Dec. 21	Core Size: BQ		0	90-		LOCATION (Tp., Lot, Con. OR Lat. and Long.): Buchans Co-ordinates S6500 W5500	
							PROPERTY NAME: "Lake Three" First Offering	

Comments: Upper part of hole cemented to prevent caving - casing originally ran to 21 ft. and subsequently deepened to 33 ft.

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION (Colour, grain size, texture, minerals, alteration, etc.)	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
	21	Casing; overburden not reported								
21	125	Hematized basaltic pillow lava with small pinkish calcite amygdules - well defined pillow selvedges - Local areas of mottled moderate epidotization - contains green altered plagioclase and small pyroxene phenocrysts - weakly-moderately magnetic - several zones broken core- possible shearing? - 123.5 - 125 - weakly bedded gritty tuff; bedding at higher angles to core - basal contact sheared and not cored								
125	194	Diabase; fine to medium grained at top; weakly amygduloidal - commonly with mottled green epidote alteration - grain size gradually coarsens with depth - basal contact sheared								
194	206	Massive rhyolitic intrusive - appears to cut coarse diabase - flow banded at 55° to core - several zones badly broken core								
206	231	Coarse grained massive diabase - broken core and some gouge 210-212 - diabase becomes finer grained at basal contact								
231	312	Basaltic pillow lava; small pink to white calcite amygdules - minor interbedded fine grained siltstone bedded at 60° to core - 238-242 cut by coarse diabase - basalt contains small green diffuse plagioclase phenocrysts; no pyroxene - locally weakly hematized; some pillows are hematized near margins - epidetized or hematized interpillow silty material - sheared 289-291								

*Structures such as foliation, bedding, schistosity, measured from the long axis of the core.

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 2933 | PAGE 2

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
12	371	Mainly diabase with some basaltic screens; massive dark green, medium grained; minor calcite amygdules throughout - several zones broken core with shearing 325-328 - thin veinlets in diabase contain 3 minerals; one is calcite - sample for thin section at 343' - basal contact is chilled but looks more like pillow selvedge than typical diabase chill								
71	378	Basaltic fragmental; possible pillow breccia; in general, similar to basalts above diabase - matrix hyaloclastite is epidotized - minor interbedded soft dark tuffaceous silt bedded at high angles to core - basal contact cored								
78	405	Diabase? or massive basalt? - upper contact not typical diabase chill; more like pillow selvedge - colour is slightly lighter green than overlying diabase - weakly calcite amygduloidal - some shearing and calcite veining - basal contact obscurred by veining								
05	450	Massive diabase; more typical diabase than overlying unit - dark green, small chloritic spots, minor small calcite amygdules - contains veinlets of 3 minerals identical to 312-371, sample at 435 - basal contact obscurred by veining								
50	553	Massive basalt with silty interbeds - basalt has calcite amygdules; fresher zones of basalt are quite black - silty beds up to 5 ft. thick are light to dark green, not siliceous, bedded 45° and commonly have fluidal wisps - some well defined pillow selvedges; local hematized interpillow silt								

* features such as foliation, bedding, schistosity, measured from the long axis of the core

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 2933 | PAGE

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lot. and Long.)

PROPERTY NAME

FOOTAGE FROM	TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- some pillows quite large i.e., greater than 10 ft.; these have non-amygduloidal diabase-like cores but with amygdule-rich and amygdule-poor bands at margins								
		- some interpillow hematized clastics have limy component								
		- basal contact conformable								
553	557	Bedded to laminated fine grained siltstone; bedding varies somewhat, averages 45°								
		- colours mainly medium to dark grey to black; locally greenish								
		- hardness and composition vary; locally fluidal wisping								
		- basal contact conformable								
557	561	Massive medium green basalt flow; not nearly as black as overlying basalts								
		- basal contact conformable								
561	563	Bedded to laminated siltstone, similar to 553-557								
		- basal contact conformable								
563	581	Basaltic fragmental; fragments have abundant small to large calcite amygdules								
		- amygdules are spherical to ameboid								
		- some fragments with abundant small calcite amygdules similar to some parts of basal footwall								
		- matrix is locally limy								
		- gradational basal contact								
581	600	Massive dark green basaltic tuff locally grading into fine grained lapillistone and lapilli-tuff; rare possible quartz grain; contains pyroxene crystals								
		- no bedding								
		- contains some amygduloidal fragments similar to overlying unit								
		- similar to some tuffaceous units in Ski-Hill sequence								
		- 597-600 vein introduction, shearing, minor gouge								

or features such as foliation, bedding, schistosity, measured from the long axis of the core.

† Additional cr... available. See Assess...

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

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HOLE NO. 2933 | PAGE

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments	MAP REFERENCE NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						CLAIM NO.
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size						LOCATION (Tp., Lot, Con. OR Lat. and Long.)
									PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
600	616	Bedded basaltic tuff; minor mafic siltstone; bedding averages 45° - similar to overlying tuff but with distinct bedding								
616	630	Unusual bedded tuff; soft, porous, gritty, orangy-pinkish to beige colours - quartz-bearing; minor glass - basal contact conformable								
630	644	Coarse breccia; mafic fragments in felsic matrix - fragments basaltic to andesitic; amygduloidal to non-amygduloidal - matrix is quartz-bearing felsic tuff with epidote alteration - minor brownish rhyolite and light grey limy tuff clasts - some mafic clasts exceed 2 ft.; tight packed; vaguely similar to sample #312 - basal contact conformable								
644	749	Dark grey-green basaltic pillow lava; well defined selvedges - small plagioclase and pyroxene phenocrysts - weakly amygduloidal - locally very weak hematization tinge; some hematized silty interpillow material; elsewhere green non hematized silt - basal contact not cored								
749	776	Massive dark green diabase - abundant black chloritic specks; very rare amygdule - several zones broken core - basal contact sharp and cored at 50° to core; diabase colour is slightly lighter over basal 2 ft. but no strong chill at immediate contact								
776	808.5	Tight packed basaltic fragmental in more felsic matrix - basaltic fragments have calcite amygdules; aphyric to feldspar physic - matrix is lighter colour, contains quartz grains and has epidotized tint, also contains glass shards and shreds								

or features such as foliation, bedding, schistosity, measured from the long axis of the core.

+ Additional credit available. See Assessment

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

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HOLE NO. 2933 | PAGE

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					MAP REFERENCE NO. / CLAIM NO.
LOCATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					LOCATION (Tp., Lot, Con. OR Lot. and Long.) / PROPERTY NAME

FOOTAGE FROM	TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- matrix locally contains interstital calcite								
		- some zones with moderately hematized basaltic fragments								
		- basal contact is weak shearing at 808.5								
8.5	841	Weakly-moderately hematized basaltic fragmental but with only minor felsic matrix								
		- minor internal shears								
		- 827-841 possible diabase								
		- basal contact conformable								
1	849	Green glassy basaltic tuff, lapilli-tuff								
		- matrix with abundant basaltic glass is weakly epidotized								
		- some 2 cm. basaltic lapilli with small white amygdules								
		- basal contact conformable								
9	867	Basaltic fragmental, much coarser than unit above and much less matrix								
		- contains amygduloidal basaltic fragments; some with small orange quartz amygdules, most with calcite amygdules, locally with zoned amygdules with calcite rims and orange quartz cores.								
		- minor interbedded tuff								
		- minor disseminated pyrite at 866								
		- 866-867, porous core, monor shearing and fault breccia								
7	910	Basaltic tuff and lesser fine grained lapilli-tuff								
		- tuff contains numerous pyroxene crystals similar to 581-600 and is lithilogically very similar to 581-600								
		- 897-900 shearing, no change in lithology								
		- beginning at 901 tuff becomes finer grained and bedded with some silty interbeds								
		- bedding steep at 15° to core								
		- fine grained tuffs locally similar to fine grained tuffs in Ski Hill sequence								
		- below 910 mainly tuffaceous silts								

* features such as foliation, bedding, schistosity, measured from the long axis of the core.

+ Additional credit available. See Assessment work

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

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HOLE NO. 2933 | PAGE NO. 6

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)
							°
HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY				°
							°
LOCATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size				°

Comments

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lot. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
910	936	Green to grey to buff tuffaceous siltstones with steep bedding locally near paralell to core - composition gradually becomes more felsic downward - several zones broken and fractured core - basal contact is weak shear								
936	951	Massive dark green diabase, chloritic specks - local fracturing and shearing - basal contact sheared								
951	972	Basaltic pillow lava - rare selvedges and interpillow glass visible - basal contact conformable								
972	1004	Bleached-looking arkosic pyroclasitic breccia; coarse quartz-bearing - wide variety of clast lithologies including limy tuff, limestone; but mainly varieties of pinkish rhyolite; also present, a variety of siltstone clasts, andesite clast and large black chloritic pumic chunks; also some basaltic fragments similar to overlying basalt - matrix is coarse quartz-bearing, mainly arenaceous and arkosic-looking but with some concentrations of pumice chunks - a variety of limy clasts including some with visible skeletal debris - limy clasts vary in colour from white to light to dark grey - maximum fragment size approx. 6 cm.; these are floating outsize cobbles in 5-15 mm. size matrix - some rhyolite clasts have coarse quartz phenocrysts - basal contact conformable								
1004	1016	Bedded grey-brown to beige siliceous and tuffaceous siltstone. - bedding varies with slumping; appears to average 45° or slightly steeper - some fine grained wacke beds - broken core near basal contact; contact is cored but is not typical diabase chill								

* features such as foliation, bedding, schistosity, measured from the long axis of the core.

† Additional credit available. See Assessment Work Page

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

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HOLE NO. 2933 | PAGE

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
016	1154	Diabase; may be in part basaltic down to 1033 - contains small screens? inclusions? of baked rhyolitic-looking silt - local fracturing and calcite-epidote veining - minor amygdules down to 1033 - below 1033, more massive looking - local brownish hybrid tinge - local weak shearing - diabase coarsens slightly to fine-medium grained below 1070 - 1143-45 siltstone screen, similar to silts above diabase - 1 cm. chill at basal contact								
54	1174	Pinkish-orange gritty hard siltstone - well bedded at 25-30 - to core - contains a few thin detrital magnetite beds around 1158 - minor arkosic interbeds with rare limy clasts - at 1166 grades down into coarse arkose; similar to matrix material above diabase - basal contact gradational @ 1174								
74	1262	Medium grained heterolithic breccia-conglomerate, very colourful - wide variety of fragment types; mainly varieties of pinkish rhyolite, fairly abundant limy clasts, less abundant basaltic, andesitic and siltstone clasts, pumice chunks - coarse quartz-bearing matrix and some rhyolite clasts with coarse to semi-prominent (3-4 mm.) quartz phenocrysts; some fragments similar to Lake 7 "apple green" types - matrix is dominantly arenaceous and with arkosic aspect - clasts up to 20 cm.; average 1-3 cm. - rounding varies; most fragments somewhat rounded - several clasts with altered rims - a few weakly pyritic clasts and rare small (2 mm.) fine grained pyrite pebbles								

x features such as foliation, bedding, schistosity, measured from the long axis of the core.

+ Additional credit available. See Assessment

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2933 | PAGE 8

LLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments
TE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					
PLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- one weakly pyritic clast at 1187 has traces Pb-Zn								
		- 1207-1211 light grey hard silicified cherty siltstone; appears to be a boulder								
		- below 1211 becomes less arkosic-looking with a decrease in abundance of pinkish rhyolite detritus and increase in pumiceous material								
		- rare black mudstone clast; one jasperoid clast								
		- basal 1 foot is gritty tuff with limy matrix								
		- basal contact weakly sheared but conformable								
262	1299	Dark grey to black siltstone-mudstone; bedded steeply; average 30° to core								
		- 1264-67 fault gouge, weakly graphitic; no change in lithology								
		- broken ground throughout								
		- variable steep bedding								
		- some interbeds gritty grey tuff similar to underlying unit								
		- basal contact conformable								
299	1330	Medium-dark grey gritty masked dacitic tuff, dacitic grit								
		- locally contains a few limy clasts up to 2 cm. size								
		- traces disseminated pyrite								
		- gradually aquires more lithic fragments downward and grades into fine grained breccia around 1330								
330	1382	Pyroclastic breccia composed mainly of limy clasts and pumice chunks, rare rhyolite and basalt clasts								
		- below 1354 pinkish rhyolite clasts become more abundant								
		- below 1375, broken core, minor shearing								
		- basal contact not cored, sheared								
382	1418	Distinctive basaltic fragmental composed of strongly hematized basalt fragments in greenish glassy somewhat more felsic matrix								
		- similar to material at bottom of H641								
		- considerable shearing to 1384 and broken core and minor shearing below this								

* Features such as foliation, bedding, schistosity, measured from the long axis of the core.

+ Additional credit available. See Assessment Act...

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

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HOLE NO. 2933 PA

COMPANY

DATE STARTED | DATE COMPLETED

APPLICATION CO., OWNER OR OPTIONEE

COLLAR ELEVATION | BEARING OF HOLE FROM TRUE NORTH | TOTAL FOOTAGE

DATE LOGGED | LOGGED BY

DATE SUBMITTED | Core Size

Depth (feet)	Dip	Azimuth° (True)
		°
		°
		°
		°

Comments

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- hematized fragments are tight packed and with white calcite amygdules								
		- unchanged to bottom of hole								
		1418 END								

J.G.T.

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 2933 | PAGE

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Continental		--	1621

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
March 22/78	March 25/78	April 4/78	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE: The Price Company Limited, Mineral Resources Division,

DATE SUBMITTED:

Core Size: BQ

Depth (feet)	Dip	Azimuth° (True)
	90	

Comments: Completion of hole not finished in 1977.
- fractured and broken core throughout

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lot. and Long.)

PROPERTY NAME: Lake Three

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION (Colour, grain size, texture, minerals, alteration, etc.)	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
1418	1538	- continuation of material at bottom of hole before deepening								
		- basaltic fragmental composed of hematized basalt fragments in greenish glassy, somewhat more felsic-looking matrix								
		- some fragments with white to pink calcite amygdules								
		- some thin zones massive basalt, no matrix								
		- irregular calcite and epidote veinlets throughout								
		- 1457-62 broken and somewhat sheared black siltstone-mudstone								
		- 1462-1485 basaltic fragmental as before but fragments not hematized								
		- 1485-1490 fault gouge; badly broken core both above and below this zone								
		- 1490-1538 badly broken basaltic fragmental - hematized to 1500 ft.								
		- at 1503 a few broken pieces of felsic pyroclastic - almost arkosic								
		- core less fractured below 1509'								
		- cut by steep chilled diabase 1522-25 - minor gouge at lower contact								
		- broken core resumes below lower diabase contact								
		- another thin diabase 1529-30.								
		- basal contact broken - appears gradational								
1538	1561	- Porous pinkish arenaceous felsic pyroclastic - almost arkosic								
		- small quartz grains								
		- cut by numerous very thin and irregular calcite veinlets								
		- below 1546 conglomerate mainly with rounded hard pink quartz-bearing rhyolite clasts, minor basalt, dacitic tuff and limy tuff clasts								
		- fragments and matrix have small quartz with local zones coarser 2-3 mm. quartz								
		- porous, fractured and pink calcite veined core throughout								
		- basal contact cored and conformable								
1561	1621	Basaltic fragmental similiar to material above arkose								
		- abundant calcite veining								
	END	- pink to white calcite amygdules								
		- local greenish glassy matrix								
		- below 1610 becomes massive flow, possibly pillowed, epidote veinlets								

* Features such as foliation, bedding, schistosity, measured from the long axis of the core

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2942 | PAGE NO. 1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Petro		270	470'

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
Nov. 16/78	Nov. 28/78	Dec. 14/78	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	DATE SUBMITTED	Core Size
The Price Company Limited Mineral Resources Division	Dec. 14/78	BQ

Depth (feet)	Dip	Azimuth° (True)
0	-55	270

Comments

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)
S8650
W18625
Buchans Coordinates

PROPERTY NAME
"Lake Three" First Offering

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	20	Overburden								
20	23	Rhyolitic breccia - variety of rhyolite fragments, some flow banded								
		- local epidotization								
		- not similar to bottom of H2944								
		- basal contact gradational								
23	82	Basaltic lapillistone, lapilli-tuff - looks like Clementine Footwall								
		- fragments amygduloidal - mainly quartz								
		- fragments feldsparphyric - some brownish-orange feldspar								
		- broken core, blocky ground								
		- some sections lithic tuff								
		- cut by diabase 62-73								
		- poor core recovery at basal contact								
82	381	Rhyolitic fragmental - similar to 20-23								
		- brownish feldsparphyric rhyolite withminor quartz in fragments								
		- some mafic fragments								
		- matrix is somewhat masked and epidotized								
		- some thin zones bedded green to maroon silt - bedding near 45° to core								
		- some large hard rhyolite boulders								
		- some zones dominantly mafic clasts - some of these are hematized								
		- blotchy masking epidotization becomes more prominent below 148								
		- some quartz to 2 mm in fragments and matrix - occasional 5 mm quartz								
		- several zones broken core - no evidence of shearing								
		- cut by diabase 230-235, 249-253								
		- epidote masking locally pervasive - only quartz eyes escape alteration								
		- 356-366 finer grained - dominantly epidotized rhyolitic lithic tuff								
		- 356 onward - epidotized rhyolitic breccias as before								
		- basal contact conformable								
381	393	Basaltic lapilli-tuff; dark green fragments in lighter green matrix								
		- some fragments feldsparphyric and amygduloidal (pink quartz)								
		- basal contact conformable								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2942 | PAGE 2

ILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
TE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY				°		LOCATION (Tp., Lot, Con. OR Lat. and Long.)	
PLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size				°		PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
393	470	Epidotized rhyolitic breccias; identical to unit above 381								
		- unchanged to bottom of hole								
		470' END								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2943 | PAGE NO. 1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Petro		270°	245

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
Nov. 30/78	Dec.	Dec. 14/78	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	DATE SUBMITTED	Core Size
The Price Company Limited Mineral Resources Division	Dec. 14/78	BQ

Depth (feet)	Dip	Azimuth (True)
0	-50°	270°
		°
		°
		°

Comments
- casing pulled
- hole located 700' true west of 2942

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)
S8650
W19325
Buchans Coordinates

PROPERTY NAME
"Lake Three" First Offer

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	28	Overburden								
28	245	Greyish to greenish dacitic tuff with variable lithic fragment content								
		- prominent quartz present in fragments and matrix								
		- much less epidotized than material in H2942; patchy weak epidote								
		- badly broken core to 65' - some minor shearing								
		- most qtz. around 5 mm but some to 1 cm								
		- rare silty clast								
		- most clasts are of dacitic tuff choked with plag. and large quartz pheno in blackish chloritic matrix								
		- a few minor gouge zones								
		- local vague bedding varies from near perpendicular to core to 45° to core								
		- cut by diabase 226-228								
		245' END								

DIANOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE — HOLE NO. 2944 — PAGE 1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Petro		270°	700

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
		Dec. 14/78	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	DATE SUBMITTED	Core Size
Price Company Limited Mineral Resources Division	Dec. 14/78	BQ

Depth (feet)	Dip	Azimuth (True)
0	-50°	270°

Comments
- hole located 960' true east of 2942.

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)
S8650
W17665
Buchans Coordinates

PROPERTY NAME
"Lake Three" First Offering

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	9	Overburden								
9	60	Pumiceous dacitic tuffs - some rhyolitic tuff								
		- variety of colours in greens and greys								
		- local traces pyrite								
		- quartz present but not common; small (less than 1 mm) qtz								
		- locally abundant feldspar								
		- vitric component variable - normally quite abundant								
		- locally abundant chloritic pumice chunks; some flattened pumice								
		- elsewhere, vitric tuffs								
		- rare small rhyolite chips								
		- core moderately broken								
		- textures locally masked with pinkish colouration								
		- gradational basal contact								
	71	Pyroclastic breccia containing numerous 3 inch rhyolitic clasts								
		- matrix identical to overlying tuff								
		- rhyolites in shades of grey to weakly pinkish to weakly hematized								
		- many fragments identical to underlying rhyolite								
		- basal contact conformable								
71	88	Dark weakly maroonish weakly hematized rhyolite; fairly hard								
		- local streaks epidotization								
		- similar to rhyolites in outcrop								
		- some fragments visible								
		- felsparphyric; traces small diffuse quartz								
		- local streaks more intense hematization								
		- becomes gradually more fragmental towards base								
		- basal contact conformable.								
88	114	Pyroclastic breccia - rich in rhyolitic fragments and matrix pumice								
		- rhyolites similar to overlying material - some well flow banded fragments								
		- some fragments exceed one foot; mostly around 3 inches								
		- basal contact conformable.								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2944 | PAGE 2

RILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments	MAP REFERENCE NO. / CLAIM NO.
TE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. OR Lat. and Long.)
PLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size						PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
14	283	Distinctive green pumice tuff - contains minor quartz throughout								
		- pumice fragments dark green; irregular to flattened								
		- matrix lighter green finer grained glassy material								
		- rare pinkish rhyolitic fragment								
		- below 158 textures become somewhat masked but lithology is essentially								
		similar to above - distinction between fragments and matrix becomes obscure								
		- contains some zones with well defined fragments and matrix								
		- several zones localized minor gouge								
		- two large pinkish brownish rhyolite fragments at base of unit								
		- basal contact conformable								
83	286	Bedded sediments - bedding at 45-50° to core								
		- dominantly siltstones; black, grey, green								
		- non pyritic								
		- basal contact conformable								
86	411	Medium green dacitic lithic-vitric tuff to pumice tuff and vitric tuff								
		- contains a few feldsparphyric brownish rhyolite boulders at top of unit								
		- many lithic fragments are vitric tuff								
		- even grained - most fragments less than 1 cm								
		- overall - very glassy; minor quartz throughout								
		- local weak bedding								
		- at 309' becomes more lithic rich with greyish to brownish rhyolite fragments								
		- lithic rich zones persists to 324								
		- below 324', tuffaceous again with local weak bedding								
		- colours is dark greys and greens								
		- 345-360' contains abundant rhyolite fragments again								
		- 360-362' greenish bedded silt, bedding at 50° to core								
		- 362-385' pumiceous vitric tuff as before, local large brown rhyolite boulders								
		- locally abundant small quartz in tuff								
		- 385-398 abundant rhyolite clasts again - rhyolites quartz and feldsparphyric								
		- 398-411 vitric tuff - very glassy; textures become masked near basal contact								
		- basal contact not sheared.								

SCANNED IMAGE

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2944 | PAGE NO. 3

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY			–	°		LOCATION (Tp., Lot, Con. OR Lat. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size				°		PROPERTY NAME	
							°			
							°			

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
11	433	Massive pinkish-brownish quartz and feldsparphyric rhyolite								
		- upper contact rather gradational but interior looks intrusive								
		- basal contact merges with tuff - gradational and diffuse								
33	520	Medium green dacitic tuff containing fragments of dacitic tuff								
		- looks like portions of ore horizon dacite								
		- contains small diffuse quartz and white fsp. crystals								
		- below 450', becomes more lithic-rich and matrix becomes more pumiceous								
		- fragments of rhyolite, dacitic tuff, rare apple green and basaltic fragments								
		- below 480' fragments die out; still vitric-rich								
		- traces pyrite								
		- basal contact conformable								
20	547	Weakly altered fine grained breccia								
		- overall greyish colours but with blotches greenish and creamy colours								
		- pyritic throughout								
		- contains numerous fine grained (silty?) fragments with abundant disseminated pyrite and some thin veinlet pyrite - pyrite is fine grained								
		- matrix contains disseminated pyrite and minor thin veinlet pyrite								
		- alteration may be largely clay mineral								
		- some of the pyritized fragments may be rhyolite; some tuff some silt								
		- overall pyrite content 10-15%								
		- looks much like Lake Seven area alteration								
		- some chloritic tuff interbeds								
		- 539-545 dark grey moderate clay mineral pyrite alteration with several specks Pb-Zn - Pb-Zn occurs as specks and tiny veinlets in frags. and matrix								
		- alteration becomes weaker again below 545' - 1-3 cm. fragments appear to be mainly greyish feldsparphyric rhyolite								
		- matrix greenish sericite - clay mineral locally with moderate chlorite								
		- dissem. pyrite throughout; some zones of stronger alteration with specks Pb-Zn								
		- below 547' rhyolite fragments become tighter packed - some pinkish varieties								
		- occasional speck and small aggregation Pb-Zn still present								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2944 | PAGE No. 4

LLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments
E HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					MAP REFERENCE NO. / CLAIM NO.
PLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					LOCATION (Tp., Lot, Con. OR Lot. and Conc.) / PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
47	670	Rhyolitic tuff, lapilli-tuff, lapillistone with overall brownish cast								
		- traces disseminated pyrite - generally around 1% but locally up to 10% in thin chloritic zones								
		- alteration generally weak but some sections with moderately chloritized matrix with 10% pyrite and specks Pb-Zn (e.g. 559-560.5)								
		- no more Pb-Zn below 561; pyrite and alteration gradually weaker below 561'								
		- rhyolite fragments have 1 mm and less quartz and feldspar phenocrysts								
		- matrix rather more arenaceous than pumiceous								
		- below 585' a small proportion of felsporphyric amygduloidal (calcite) basalt fragments								
		- at 626' possible granitoid pebble								
		- traces pyrite throughout								
		- near base of unit a number of extraneous fragments appear - especially greenish tuffaceous (?) fragments								
		- mafic fragments increase rapidly below 667'								
		- basal contact gradational								
70	700	Basaltic lapilli tuff - may be Clementine Footwall								
		- fragments amygduloidal (qtz-calcite) - some stretched amygdules								
		- matrix weakly epidotized								
		- some thin bedded sections - bedding near perpendicular to core - may not be too reliable								
		- below 682' dominantly lithic tuff								
		700' END								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE — HOLE NO. 2946 — PAGE NO. 1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Petro		270°	744

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
Dec. 15/78	Jan. 8/79	Jan. 23/79	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	DATE SUBMITTED	Core Size
The Price Company Limited Mineral Resources Division	Jan. 23/79	BQ

Depth (feet)	Dip	Azimuth (True)
0	-50	270°
		°
		°
		°

Comments
- casing left in hole
- hole at 406' at end of 1978

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lot. and Long.)
S9210
W17620
Buchans Coordinates

PROPERTY NAME
Lake Three First Offering

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	8	Overburden								
8	77	Mottled and masked intermediate(?) rock - greens and grey-green								
		- mottling largely due to epidote								
		- some darker fragment-like patches								
		- small white altered feldspars throughout, no quartz, traces pyrite								
		- variable hardness from medium to hard								
		- rock is not exactly similar to any material in outcrop								
		- some sections fractured and oxidized core								
		- some portions may be more andesitic than "intermediate"								
		- basal contact conformable								
77	115	Dark brown to weakly maroonish rhyolite - very hard								
		- contains small plagioclase phenocrysts and minor tiny quartz								
		- local flow banding, local hematization								
		- colours locally more orangy, elsewhere near black								
		- basal contact conformable								
115	129	Unit very similar to 8-77', definitely fragmental								
		- mottled and masked								
		- rare trace quartz								
		- grades downward into fresh distinctive pyroclastic with flesh coloured rhyolite and dark chloritic pumice in intermediate - dacitic matrix								
		- unit is graded, tops upright								
		- basal contact interbedded								
129	272	Dark brown rhyolite; identical to 77-115'								
		- feldspar phenocrysts, minor tiny quartz								
		- some flow banding; very hard								
		- local hematization in veinlets								
		- becomes fragmental towards base								
		- basal contact conformable								

+ Additional credit available. See Assessment Work ...

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO.	PAGE NO.
2946	2

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. OR Lot. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size						PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
272	286	Rhyolitic pyroclastics, wide variations in texture and colours								
		- some hard silicified tuffs								
		- basal contact conformable								
286	314	Brownish weakly hematized feldsporphyric rhyolite								
		- similar to previous rhyolites								
		- some interbedded tuffaceous and fragmental sections similar to 272-286'								
		- basal contact conformable								
314	330	Medium grey green pumice tuffs with some small rhyolite fragments								
		- textures weakly masked by weak silicification								
		- some sections originally very glassy								
		- gradational basal contact								
330	363	Rhyolitic tuff breccia								
		- fragments of dark greyish feldsporphyric rhyolite, commonly with brown rims								
		- pumiceous matrix								
		- fragments average 1 inch, fairly tight packing								
363	368	Drillers report "5' of seam"; almost no recovery								
		- small pieces of cemented fault breccia recovered								
		- most probably a fault								
368	394	Interbedded dacitic tuffs, bedded dacitic ash, tuffaceous siltstone, vitric tuff								
		- bedding near perpendicular to core								
		- minor thin red hematitic silt horizons								
		- locally contains outsize brownish feldsporphyric rhyolite fragments, minor quartz								
		- broken and fractured core near top of unit								
394	416	- at 394, grades into rhyolitic pyroclastic breccia								
		- rhyolite fragments with quartz and feldspar phenocrysts, similar to outcrop numbers 135 and 168								
		- greenish dacitic tuff matrix, locally quite pumiceous								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 2946 | PAGE NO. 3

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY				°		LOCATION (Tp., Lot, Con. OR Lat. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size				°		PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
016	474	Masked and mottled light-medium green dacitic tuff; appears to contain								
		fragments of dacitic tuff								
		- contains small quartz throughout and local whiteish plagioclase								
		- looks like an ore horizon type of dacite								
		- dacitic tuff fragments generally lighter green than darker green matrix								
		- quite a consistant and homogeneous lithology								
474	571	Massive brownish orangeish quartz and feldsporphyric rhyolite								
		- local interbeds dark green dacitic tuff with abundant white altered feldspar								
		- rhyolite is very similar to outcrop numbers 135 and 168								
		- hard to very hard, local weak flow banding but mainly massive								
		- basal contact conformable								
571	613	Somewhat masked light grey-green dacitic tuff								
		- abundant greenish white altered feldspar, lesser 1 mm quartz								
		- 585-593, rhyolitic section								
		- dacitic tuff locally contains fragments of dacitic tuff								
		- portions are similar to outcrop sample 136; small section of core around								
		613 similar to outcrops 165 and 166								
		- gradational basal contact								
613	686	Fresher pumiceous dacitic pyroclastic breccia; fairly colourful								
		- contains fragments of dacitic tuff, rhyolite, minor basalt, pumice in								
		pumiceous dacitic tuff with minor bedded tuff; bedding at 65° to core								
		- local traces pyrite								
		- basal contact not cored, probably conformable.								
686	744	Hard to very hard reddish brown rhyolitic lapillistone to fine grained breccia								
		- fragments contain tiny quartz and are weakly hematized								
		- minor epidote in matrix; very little matrix material								
		- fragments locally not very distinct.								
		744' END								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2970 PAGE

COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
Eastern Exploration		–	700

STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
			J.G. Thurlow

OWNER OR OPTIONEE	DATE SUBMITTED	Core Size
Abitibi-Price Inc., Mineral Resources Division		BQ

Depth (feet)	Dip	Azimuth (True)
0	-90	–

Comments: Wiley's Area

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)
Buchans Co-od 58525 W 17490
Line " S 8500 W 17450

PROPERTY NAME: Lake Three First Offerin

FOOTAGE From	FOOTAGE To	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	7	Overburden								
7	63	Purplish grey rhyolitic rock, typical of outcrop in this area								
		- local hematite and epidote mottling								
		- 5% beige feldspar phenocrysts, very rare quartz								
		- medium-hard								
		- blocky near surface								
		- local weak flow banding								
		- contains sections of dark green masked intermediate-looking tuff and lapilli tuff 25-45, 55-57								
		- basal contact gradational								
63	161	Pyroclastics - intermediate to dacitic composition								
		- variety of subtle shades								
		- generally fairly hard, somewhat silicified, originally locally glassy								
		- numerous lapilli								
		- minor local quartz								
		- local vague bedding generally at 45° or greater to core								
		- some elongate quartz amygdules in intermediate-looking fragments								
		- locally bears vague resemblance to pumiceous Oriental intermediate								
		- basal contact gradational								
161	183	Dark purplish-maroonish-brown hard rhyolite, massive								
		- feldspar phenocrysts, rare quartz								
		- textures masked, becomes fragmental towards the base								
		- basal contact gradational								
183	197	Pyroclastics similar to 63-161, somewhat masked and generally pumiceous								
		- basal contact conformable								
197	292	Medium green dacitic tuffs, fairly glassy and with few lithic fragments exceeding 1 cm								
		- massive and homogeneous, moderate 1 mm quartz content								
		- glass is elongate dark chloritic shreds								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE → HOLE NO. 2970 PAG.

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DRILL STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. GR Lot. and Long.)	
DRILLING CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size						PROPERTY NAME	

FOOTAGE FROM	TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- 245-256 a zone with numerous outsize purplish rhyolitic clasts								
		- local vague bedding at greater than 45° to core								
		- below 265' colour becomes lighter and more abundant rhyolite clasts exceeding 1 cm								
		- below 282', textures become masked and tuff looks more like 63-161								
		- basal contact gradational								
292	395	Rhyolite breccia at immediate top grading down into massive rhyolite - very hard								
		- rhyolite is dark purplish maroon, feldspar phenocrysts, local epidote, local reddish hematite veining								
		- minor fragmental zones								
		- some broken core, no evidence of shearing								
		- becomes fragmental within 5 feet of base								
		- strong banding - flow banding?. at 45° over last few feet								
		- basal contact gradational								
395	452	Light to medium grey-green intermediate to dacitic pumice tuff								
		- small quartz throughout								
		- pumice varies from chunks larger than one cm down to ash								
		- originally almost entirely glass, now fairly hard								
		- some darker shades but generally fairly light coloured								
		- basal contact conformable								
452	456	Dark maroonish rhyolitic-looking material but appears to be a facies of overlying pumiceous material								
456	462	Dark green intermediate-dacitic tuff, pumiceous								
462	475	Mottled maroonish rhyolitic fragmental, masked, somewhat silicified and hard								
		- gradational basal contact								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 2970

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments
HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY					
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size					

MAP REFERENCE NO. | CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.)

PROPERTY NAME

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION (Colour, grain size, texture, minerals, alteration, etc.)	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
475	674	Light to medium grey green pumice tuff - intermediate to dacitic composition; generally more intermediate - hard and silicified - very similar to 395-452 - a few cubes of pyrite at 501' - locally broken, weakly sheared and somewhat porous and considerably softer in these sections - on the whole, very similar to portions of pumiceous Oriental Intermediate - beginning at 643', interbedded pumiceous tuff and rhyolitic layers - 643-653 brownish flow banded rhyolite - 653-661 broken porous tuff with some rhyolitic fragments, minor shearing - 661-674 non-broken pumice tuff, variable shades - basal contact conformable								
674	700	Brownish flow banded rhyolite, small plagioclase phenocrysts, rare small quartz - broken core and hard - locally bleached to flesh colour 700 FND								

J. TUACH GEOLOGICAL CONSULTANTS, INC.
DIAMOND DRILL CORE LOG

LATITUDE _____

DEPARTURE 17,492.63W 8497.22S

ELEVATION 3980.0

DIP AT COLLAR -90°

BEARING _____

TOTAL DEPTH 700' CORE SIZE BQ

REMARKS Wileys Area

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. 2970

Property Clench Brook (Buchans)

NTS 12A/15 Grid Name Mine Grid

Date started _____ Completed _____

Contractor _____

_____

Logged by J. Harris - 1997

Depth & Lithology	Description	Alteration	Mineralization
0 - 7'	Overburden		
7 - 63'	Rhyolite with felsic to intermediate tuff interbeds - plagioclase phenos throughout - purple-maroon and green colour - 25 - 45' and 55 - 57' - green lapilli tuff - conformable lower contact	weak chloritic alteration some hematite alteration in rhyolite	
63 - 161'	Dacitic to intermediate tuffs (“locally bears resemblance to pumiceous Oriental intermediate” - Thurlow) - light green and buff colours - local banding at around 45° to the core - resembles flow banding - pumice and green cherty lithic fragments - 2 - 3% white plagioclase crystals, a few quartz grains, flecked with chlorite throughout	moderate sericitic and locally chloritic alteration local moderate silicification	minor disseminated hematite
161 - 183'	Rhyolite - dark maroon - almost black locally - flecked with plagioclase crystals, also a few quartz phenos - locally fragmental - lower contact appears gradational	local hematitization	
183 - 292'	Dacitic tuffs - light to medium green, pumiceous - upper 10' very similar to 63 - 161' - may be due to contact with rhyolite - black chloritic pumice and shards throughout - occasional white and pink calcite stringers - @ 238 - 2-3" fracture/fault zone	weak chloritic alteration	
183 - 292' (Cont’d)	- a few small pink and green lithic chips		

Depth & Lithology	Description	Alteration	Mineralization
	- minor quartz grains - plagioclase also relatively rare - 245 - 256' - large porphyritic rhyolite clasts - a few rhyolite clasts throughout below 256' - 282 - 292' - darker green and similar to 63 - 161' - approaching rhyolite - 267 - 268' - fracture zone		
292 - 395'	Rhyolite - purple, massive, lightly porphyritic with plagioclase - upper 8' rhyolite breccia, tuffaceous epidote rich cement - lower 5' fragmental in part - also strongly flow banded - mainly at ≈ 40° to the core, but locally contorted	local epidote alteration local hematite veining	
395 - 452'	Dacitic to intermediate tuff - somewhat gradational from above, likely due to alteration at contact, mainly light to medium green - pumiceous - small quartz grains throughout - contorted flow banding locally - could be in part altered rhyolite, but obvious pumice fragments - fairly common	weak to moderate chloritic and sericitic alteration locally bleached and hard silicified	
452 - 475'	Mainly maroon rhyolitic rock but resembles overlying tuff - welded tuff? - contorted flow banding - locally along core - 456 - 462' - green chloritic zone	local chloritic alteration patchy silicification	
475 - 674'	Felsic to intermediate tuff - similar to 395 - 452' ("very similar to portions of pumiceous Oriental intermediate" Thurlow) - mainly light green - commonly flow banded - locally pumiceous - 512 - 520' - fractured with calcite infill - 538 - 557' - fractured and rubbly zones - carbonate infill, some faulting - altered plagioclase crystals throughout - flow banding rare below 557' - 643 - 653' - flow banded rhyolite - 653 - 661' - broken and very rubbly - fault to fracture zone - 661 - 674' - some flow banded rhyolite fragments and maybe bands	silicified - moderately	minor pyrite @ 501' also @ 566' local disseminated hematite
674 - 700'	Rhyolite - purple and pink flow banded rhyolite, as above 700' - E.O.H. -		

HOLE NO. 2970

...a LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▷ HOLE NO. 2971

COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
Eastern Exploration Services Ltd.			400'				Wiley's Area.		

HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY	LOCATION (Tp., Lot, Con. OR Lat. and Long.)
			J.G. Thurlow	Buchans Co-od. S 8920 W 16150
				Line co-od S 8900 W 16100

CO., OWNER OR OPTIONEE	DATE SUBMITTED	Core Size	PROPERTY NAME
Abitibi-Price Inc., Mineral Resources Division			Lake Three First Offering

		DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	8	Overburden								
8	62	Mafic lithic tuff, locally well bedded; some lapilli tuff, dark green								
		- bedding consistant at 50-60° to core								
		- strong resemblance to many tuffs of Ski Hill Sequence								
		- some pyroxene crystals in matrix								
		- several sections of bedded tuffaceous silt								
		- some well developed load casts, tops upright								
		- 31-36' hard bleached bedded cherty tuff								
		- local abundant calcite in matrix of tuff								
		- 43-62' mainly dark green to grey to black bedded tuffaceous siltstone and mudstone, minor lithic tuff interbeds								
		- basal contact gradational								
62	69	Intermediate to dacitic tuff, fine grained, bedded; becomes more felsic downward								
		- basal contact gradational								
69	101	Dacitic tuff with 3-5 mm quartz grains								
		- lithic rich at top with fragments of non-pyritic siltstone (some with altered rims), and minor "apple green" fragments with traces pyrite								
		- lithic fragments persist downwards but not nearly as abundant								
		- colours mottled throughout with epidote alteration								
		- quartz size up to 7 mm at 100', appears to be semi-prominent size and not as consistently large as prominent quartz								
		- basal contact gradational								
01	374	Brownish-orange rhyolitic fragmental, hard, quartz to 6 or 7 mm; may be flow in part								
		- fragmental texture somewhat masked								
		- also contains large stained orange plagioclase								
		- numerous subhedral quartz								
		- normally 10% quartz, 15% plagioclase; i.e. quite phenocryst rich								
		- on the whole, quite similar to Prominent Quartz Sequence rhyolites								

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 2971 | PAGE

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DRILL HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. OR Lot. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		DATE SUBMITTED	Core Size						PROPERTY NAME	

FROM	TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
		- rare masked tuffaceous zones - entirely pyroclastic below 200' and orangy colour becomes less predominant								
		- local epidote mottling, trace hematite veinlets								
		- core broken and locally porous, 230-265', little evidence of shearing								
		- below 320', orangy colour essentially disappears; replaced by darker grey-greens								
		- numerous masked lithic fragments locally visible								
		- basal contact conformable								
374	400	Fine grained bedded dacitic tuff with small quartz; light to medium grey-green								
		- bedding at 60° to core								
		- becomes more pumiceous downward, generally with small quartz but some quartz to 5 mm								
		- 393-398 numerous hematized basaltic fragments in gritty tuff								
		- 398-400 pumiceous dacitic tuff								
		400 FND								

J. TUACH GEOLOGICAL CONSULTANTS, INC.
DIAMOND DRILL CORE LOG

LATITUDE _____

DEPARTURE 16,147.05W 8905.07S

ELEVATION 3945.00'

DIP AT COLLAR ? -90°?

BEARING _____

TOTAL DEPTH 400' CORE SIZE BQ

REMARKS Wileys Area

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. 2971

Property Clench Brook (Buchans)

NTS 12A/15 Grid Name Mine Grid

Date started _____ Completed _____

Contractor _____

_____

Logged by J. Harris - 1997

Depth & Lithology	Description	Alteration	Mineralization
0 - 8'	Overburden		
8 - 62'	Interbedded mafic tuff and sediments - dark and light green, bedded at ≈ 60° to the core - 8 - 19' - medium grained lithic tuff - 19 - 62' - mainly siltstone with thin sandy tuff beds 31 - 36' - light cherty siltstone "resembles tuffs of SKI HILL FM." Thurlow - gradational contact		
62 - 69'	Dacitic tuff and resedimented tuff - light green, locally bedded - a few black chloritic pumice fragments		
69 - 101'	Dacitic tuff - pumiceous - light green to creamy, fairly large lithic fragments - fairly large plagioclase crystals,. also fairly large quartz crystals - green siltstone clasts, especially near top - larger quartz grains towards base and less lithic fragments - prominent quartz - gradational to next unit	weak sericitic alteration	minor pyrite
101 - 374'	Rhyolitic fragmental - could be welded tuff - orange brown colour	minor epidote alteration - more common down hole	disseminated hematite throughout, minor magnetite

Depth & Lithology	Description	Alteration	Mineralization
374 - 400'	- prominent quartz grains, large plag. laths - a few small mafic volcanic fragments - locally fragmental - more commonly fragmental below ≈ 190' also often green coloured, below 320' mainly darker green - 230 - 265' - fractured along core - occasional cherty quartz veins - lower contact, fairly sharp and slightly irregular Dacitic tuff and sediments - grey-green and buff coloured - abundant plagioclase and small quartz crystals - sericitic and chloritic pumice fragments - a few thin silty and sandy beds at ≈ 60° to the core - 393 - 398' - basalt lithic fragments 400' - E.O.H. -	weak to moderate sericitic alteration	

HOLE NO. 2971

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO.	PAGE NO.
3309	1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
J.K.S. 300 Drill		180	180

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
OCT. 8 1981	OCT. 15 1981	Oct 30/81	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	CORE SIZE	DISPOSITION OF CASING
Abitibi Price Inc., Mineral Resources Division	AQ	Pulled

Depth (feet)	Dip	Azimuth° (True)
0	-55	180

Comments: I.P. Anomaly W5

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.): Grid Coordinates Line W10,700, S7980

PROPERTY NAME: Lake Three

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	11	Overburden								
11	111	Hematized basalts, broken, strongly fractured, locally sheared								
		- probably pillow lava or pillow breccia								
		- hematite is pervasive, local bright hematite veinlets								
		- minor greenish matrix contains hematized fragments								
		- basalts care calcite amygdular, contain 1 mm greenish diffuse plagioclase phenocrysts and minor pyroxene								
		- 59-77' more tuffaceous, minor specularite, very poor recovery								
		- 63-68', 1.5 feet recovery								
		- 68-77', less than 1 foot recovered								
		- 77-111' coarse hematized fragmental, extremely fractured and broken								
111	126	Zone of mixed greenish epidotized rock and basalt, broken core								
		- greenish epidotized rock is hard, contains small quartz and possible glass								
		- appears to be sheared felsic tuff								
		- basaltic sections are hematitized and epidote veined								
126	180	Basaltic pillow lava, not broken, full recovery								
		- hematization variable weak to moderate; much less hematized than 11-111'								
		- moderately amygdular (small calcite)								
		- pyroxene and plagioclase phenocrysts, weak chlorite throughout								
		- well defined pillow selvedges								
		- minor calcite, hematite and epidote veining; local strong hematization.								
		180' END								

Additional credit available. See Assessment Work Regu...

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE

HOLE NO. 3311 | PAGE NO. 1

DRILLING COMPANY	COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE
J.K.S 300 Drill		180	294

DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY
OCT. 27 1981	NOV. 11 1981	Oct 30/81	J.G. Thurlow

EXPLORATION CO., OWNER OR OPTIONEE	CORE SIZE	DISPOSITION OF CASING
Abitibi Price Inc., Mineral Resources Division	AQ	Pulled

Depth (feet)	Dip	Azimuth (True)
0	-50	180

Comments: I.P. Anomaly W4

MAP REFERENCE NO.

CLAIM NO.

LOCATION (Tp., Lot, Con. OR Lat. and Long.): Grid Coordinates Line W8100, S9940

PROPERTY NAME: Lake Three

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION (Colour, grain size, texture, minerals, alteration, etc.)	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
0	35	Overburden - boulders cored include Topsails granite, basalts, Prominent Quartz sequence, dacitic lithic-crystal tuff								
35	41	Hematized polylithic mixed breccia - conglomerate								
		Fragments: basalts (some hematized), quartz (1 mm) - feldspar - rhyolite (both brownish and maroon, minor calcium carbonate pebbles, minor aphyric, cherty rhyolite pebbles, one pebble similar to underlying "diabase"								
		- 36.5-37.5' very hard pinkish-flesh coloured rhyolitic fragmental								
		- silicified and masked								
		- probably a boulder								
		- most smaller pebbles well rounded								
		- brownish rhyolite fragments are dominant and look like Prominent Quartz rock despite small quartz								
		Matrix: Mixed composition - contains both quartz (1 mm) and pyroxene								
		- also some intermediate composition glass and small lithics								
		- matrix is hematized reddish, minor specularite, possible magnetite								
		- irregular contact at 20-30° to core								
41	56	Dark green diabase-like massive rock, but contacts not chilled								
		- abundant small chloritic spots, rare calcite amygdule								
		- upper contact not chilled, looks conformable								
		- basal contact not chilled, no metamorphism of host, no shearing								
		- may be large block in breccia or possibly massive flow								
56	58.5	Breccia similar to 35-41'								
		- contains a few calcium carbonate-rich clasts (largest is 10 cm) with structures and textures of probable biological origin								
		- conformable contact								
58.5	87	Weakly-moderately hematized basaltic fragmental, calcite rich								
		- abundant amygdule and matrix calcite, minor vein calcite								
		- minor carbonate clasts near top of unit								
		- beginning at 82', hematization more intense, core fractured and broken								

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE — HOLE NO. 3311 — PAGE NO. 2

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth° (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. OR Lat. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		CORE SIZE	DISPOSITION OF CASING						PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
87	131	Dark green, grey and black siltstone, cherty siltstone, minor wacke; broken core throughout								
		- well bedded, locally laminated, locally wispy; some thin disrupted elonage black wisps								
		- bedding variable from 45° to near parallel to core; generally 30° to core.								
		- minor maroonish weakly hematized silt								
		- 4" maroonish mudstone at basal contact								
		- contact conformable								
131	145	Hematized basalt; numerous small white calcite amygdules								
		- either tight packed fragmental or small-sized pillow lava								
		- strongly hematized matrix								
		- local broken core								
		- gradational contact								
145	159	Similar to 131-145' but with much less hematization								
		- matrix is greenish and glassy								
		- below 156', hematized matrix again								
159	229	Greenish basaltic tuffs, lapilli-tuffs with some strongly hematized fragments								
		- matrix green and quite glassy, locally calcite-rich matrix								
		- several sections of broken and sheared core, 186-187' gouge but little apparent change in rock type								
		- 187-220' rapidly varying basaltic fragmental types including all types seen from 131-187'								
		- 220-226' basaltic tuff with some calcite-rich beds								
		- 226-228' basaltic wacke and silt								
		- 228-229' dark green siliceous siltstone bedded 45° to core								
		- contact broken - probably conformable								
229	240	Creamy pale flesh colored felsic tuff (ash) - very porous core								
		- minor quartz visible								
		- becomes more maroonish towards base								
		- conformable contact								

ABITIBI—PRICE INC. MINERAL RESOURCES DIVISION

DIAMOND DRILLING LOG

Start a new page for every new hole, but fill in top portion of form only on first page for each hole.

FILL IN ON EVERY PAGE ▶ HOLE NO. 3311 | PAGE NO 3

DRILLING COMPANY		COLLAR ELEVATION	BEARING OF HOLE FROM TRUE NORTH	TOTAL FOOTAGE	Depth (feet)	Dip	Azimuth (True)	Comments	MAP REFERENCE NO.	CLAIM NO.
DATE HOLE STARTED	DATE COMPLETED	DATE LOGGED	LOGGED BY						LOCATION (Tp., Lot, Con. OR Lot. and Long.)	
EXPLORATION CO., OWNER OR OPTIONEE		CORE SIZE	DISPOSITION OF CASING						PROPERTY NAME	

FOOTAGE FROM	FOOTAGE TO	DESCRIPTION Colour, grain size, texture, minerals, alteration, etc.	Sample Footage From	Sample Footage To	Sample Length	Assays Cu	Pb	Zn	Au	Ag
240	246.5	Dark green maroon; minor black siltstone, mudstone, chert								
		- bedded 30-40° to core								
		- conformable contact								
246.5	274	Tight packed basaltic fragmental, calcite amygdules								
		- conformable contact								
274	280	Strongly hematized basaltic tuff and silt								
280	294	Hematized basaltic fragmental								
		294' END								

GEOLOGICAL CONSULTANTS LTD
DIAMOND DRILL CORE LOG

UTM CO-ORDINATES 502773E, 5402964N
GRID CO-ORDINATES L29N, 2800E
ELEVATION ~295m
DIP AT COLLAR -50°
BEARING 270°
TOTAL DEPTH 171.8m CORE SIZE NQ
REMARKS

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. BR-01-12-01
Property Buchans - Clench Brook
NTS 12/A/15 Grid Name Clem trend
Date started 29/01/2001 Completed 02/02/2001
Contractor Logan Drilling Ltd.

Logged by J. Harris

Depth & Lithology	Description	Alteration	Mineralization
0 - 4.8	overburden		
4.8 - 21.5	Dacite tuff - green to purple BRF tuff - abundant white plag crystals and small quartz crystals - commonly a hard glassy matrix, welded crystal tuff - local vague fragmental textures - weakly magnetic locally - some flow banding at various angles - 20.0 - 20.3 fine grained tuff, crude bedding at 85-90°	silicified weakly epidotized bleached locally	rare pyrite some disseminated magnetite
29.4 - 39.9	Dacite tuff - green crystal lithic tuff, similar to above rhyolite - lithic fragments are similar dacite tuff - 38.0 - 39.9 some layering/flow banding at 50-80° to the core	epidotized	disseminated hematite
39.9 - 43.0	Rhyolite - maroon rhyolite, massive - quartz and feldspar phenos - weakly magnetic		
21.5 - 29.4	Rhyolite - brick red to maroon, small quartz and feldspar phenos - chloritic dacite tuff inclusion 27.1 - 27.9 - moderately magnetic		
43.0 - 56.6	Felsic tuff to rhyolite breccia - pink rhyolite porphyry fragments in a crystal tuff matrix - abundant quartz and plag crystals - 47.0 - 51.3 well fractured with pink calcite, calcite veins along the core - 50.2 - 51.1 fault gouge and breccia at low angle to the core	weakly epidotized some weak chloritic and sericitic alteration of the matrix	

Depth & Lithology	Description	Alteration	Mineralization
56.6 - 92.9	Rhyolite and rhyolite breccia - pink to maroon rhyolite porphyry - a few minor flow breccia to tuff zones - weakly magnetic - mostly bleached to pink down to 71.0m - 62.5 - 67.0 well fractured with local fault breccia		disseminated magnetite
92.9 - 102.3	Felsic tuff and rhyolite breccia - may be in part altered rhyolite - grey-green to pink - crystal tuff, dacitic, with rhyolite breccia zones - abundant feldspar and quartz crystals - magnetic down to 94.0m - 94.5 - 99.3 commonly fractured along the core, pink calcite and clay infill, may be some fault gouge locally - 100.0 - 102.3 rhyolite breccia, green felsic tuff matrix		
102.3 - 109.6	Rhyolite - maroon rhyolite, as above - green, weakly altered from 102.3 - ~103.5 - weakly magnetic - 108 - 109.6 green and coarser crystalline - almost intrusive - gradational contact		
109.6 -132.3	Felsic tuff - rhyolitic to dacitic crystal lithic tuff - lithics are mainly tuff fragments, some chloritic pumice, one fragment of siltstone seen - hard glossy matrix - 130.0 - 132.3 hard glossy rock, may be rhyolite, "shattered" with thin epidote-quartz stringers	weak to moderate pink carbonate alteration weak epidote alteration may be silicified	disseminated light blue clay mineral one cube of py associated with a siltstone fragment 130.0 - 132.3 minor fine grained grey sulphide on fractures, may be sphalerite
132.3 - 134.5	Mafic dyke - grey-green, fine grained, epidotized plag laths - contacts at 10-15° to the core - 133.1 - 134.0 felsic inclusions - all fractured and brecciated with calcite-quartz cement, also some gouge		∠ 1% pyrite rare ga and cp in calcite cement
134.5 - 136.5	Rhyolite - pink rhyolite porphyry - quartz and feldspar phenos		
136.5 - 137.4	Mafic dyke - grey-green, fine grained, epidotized feldspar laths		

HOLE NO. BR-01-12-01

Depth & Lithology	Description	Alteration	Mineralization
137.4 - 141.8	Rhyolite porphyry as above - fractured with epidote-silica veining - 139.0 - 139.3 fault gouge and breccia in mafic dyke		
141.8 - 147.0	Mafic dyke - grey-green, fined grained, epidotized feldspar laths - commonly sheared and brecciated - contact runs along the core locally - locally magnetic		
147.0 - 150.8	Rhyolite porphyry, as above - fractured with epidote-silica veining - brecciated below 150.0m, with some fine grained sandy breccia veins (HAG like)		
150.8 - 152.0	Mafic dyke - faulted, fractured with common gouge and breccia		
152.0 - 154.3	Rhyolite porphyry, as above		
154.3 - 162.5	Mafic dyke - grey-green, epidotized feldspars - epidotized zones - upper contact chilled at 30° to the core - 160.2 - 160.4 fault gouge, also 162.3 - 162.5		
162.5 - 171.8	Felsic tuff - rhyolitic, pink - chloritic pumice, quartz and feldspar crystals, rhyolite fragments - fractured and brecciated quartz-epidote cement, sheared? - 167.6 - 167.9 mafic dyke - fault gouge at 167.9, fault gouge and breccia 168.8 - 159.5, fault gouge and breccia 171.0 - 171.2		
171.8	End of hole		

GEOLOGICAL CONSULTANTS LTD
DIAMOND DRILL CORE LOG

UTM CO-ORDINATES 503080E, 5402708N
GRID CO-ORDINATES L27N, 3150E
ELEVATION ~293m
DIP AT COLLAR -50°
BEARING 270°
TOTAL DEPTH 155.0m CORE SIZE NQ
REMARKS

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. _____ Hole No. BR-01-12-02
Property Buchans - Clench Brook
NTS 12/A/15 Grid Name Clementine Trend
Date started 02/02/2001 Completed 05/02/2001
Contractor Logan Drilling Ltd.

Logged by J. Harris

Depth & Lithology	Description	Alteration	Mineralization
0 - 6.2	Overburden	0.3m lost core between 11 and 14m 1m core "lost" between 38 - 41m (grinding?)	
6.2 - 119.4	Rhyolite - red to maroon rhyolite porphyry, BRFm - feldspar and quartz phenos pink and white feldspars - rubbly core 11-14m possible fault - small fault at 16.4m - weakly magnetic locally - 108.6 - 108.8 flow breccia to lithic tuff, sericitic and hematitic matrix - small fault breccia at 104.2 - 115.6 - 116.0 granular texture may be tuff or alteration associated with faulting - 116.0 - 119.4 rubbly, fractured core with local fault gouge and breccia 115.9 - 119.4 fault gouge and breccia	some local bleaching 76 - 77 green sericitic alteration associated with fracturing also 84 - 87m	
119.4 - 135.5	Felsic tuff - fine grained, rhyolite crystal tuff - some fairly large rhyolite fragments or zones - pink colour, quartz and feldspar crystals also some epidote and chlorite		
135.5 - 155.0	Rhyolite - maroon to pink rhyolite porphyry as above - some short crystal tuff zones (may be alteration) - well fractured below 141.0m, possible fault breccia at 146.8m - fault gouge at 151.5 (some lost core ~20cm)	some sericitic alteration associated with fracturing	
	End of hole		

HOLE NO. BR-01-12-02

GEOLOGICAL CONSULTANTS LTD
DIAMOND DRILL CORE LOG

UTM CO-ORDINATES 507038E, 5403348N
GRID CO-ORDINATES 7050E, 3350N
ELEVATION
DIP AT COLLAR -90°
BEARING
TOTAL DEPTH 108.0m CORE SIZE NQ
REMARKS

Tests Depth	Dip	Magnetic Bearing	Corrected Bearing

Project No. Hole No. BR-01-19-02
Property Buchans - Wileys Trend
NTS 12A/15 Grid Name
Date started 10/02/2001 Completed 12/02/2001
Contractor Logan Drilling

Logged by J. Harris

Depth & Lithology	Description	Alteration	Mineralization
0 - 33.0	Overburden		
33.0 - 108.0	Conglomerate Sandy Lake Fm - rounded to angular cobbles of rhyolite porphyry and basalt. Also some limestone and occasional pyrite siltstone - matrix of coarse quartz rich sand, matrix supported - local coarsely crystalline dacite tuff fragments (4cq) - a few magnetic fragments, also local magnetite in matrix - local calcite rich matrix		rare pyrite in the matrix and in occasional siltstone fragments at 84.0m bleached rhyolite clast with ∠1% py and possible sp
108.0	End of hole		

HOLE NO. BR-01-19-02

DIAMOND DRILL LOG

Hole Number	Page No.
BR-01-19-2a	**1 of 1**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Petro Drilling			**0**	**209.09**	**-90**	**507038E**	**12A/15**	**10941M**
Date Hole Started	Date Completed	Date Logged	Logged By : Paul Delaney			**5403348N**	Location	
June 16/06	**June 17/06**	**June, 2006**						
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)				Property Name	
Celtic Minerals Ltd		May 25/06			m		**Wiley's Lake**	

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
0.00	108.00		Deepen old hole past 108.00											
108.00	209.09	Polylithic Breccio-Conglomerate	Polylithic, very coarse cobble to large bldr bx-cong w matrix of xtl-rich (plag,qtz) finer volc bx/wacke. Clasts consist of mafic int, calc amyg mafic volc, beige/brown/reddish qtz-feld+/-mafic phy aphan felsic, xtl limst, silst. Local hema alt mafic clasts, mainly finer in atrix. Bldrs can be >1m. Minor epi in matrix, and trace Py grain in matrix & diss in siltst clast.											
	EOH													
			Few seams washed out from 110.20-110.60											
			Clasts mostly have good rounding & local good sphericity but also more ang and tab clasts.											
			126.35-126.85 Bx-fault, minor pug.											
			Rock same to EOH. See more siltst locally below ~130m but still thru all core & sporadic. Two clasts have minor Py. Limst consistent in all hole.											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-01	**1 of 2**

Drilling Company	Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference	Claim No.
Petro Drilling		**174 (mag decl 21° 20')**	**236.35m**	Collar - **-60**		No. **12A/15**	**10941M**
Date Hole Started / Date Completed	Date Logged	Logged By : Paul Delaney		**72.25m -66 to 175**		Location	
May 20/06 / **May 24/06**	**May, 2006**			**177.50m -61 to 176**	**506024E NAD83**		
Exploration Co, Owner/Optionee	Date Submitted	Submitted By (signature)			**5403322N**		
Celtic Minerals Ltd	May 25/06				**505939E NAD27**	Property Name	
				m	**5403110N**	**Wiley's Lake**	

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
0.00	8.95	OVB	Overburden											
8.95	42.00	MV	Mafic Volcanic - Grey, fgr, s-mag, plag phy, calc amyg mafic volc. Appears to be mainly pillowed flows. Inter pillow of qtz-cal, jasp, seri, epi. Jasp & minor hematization to ~20.5m. Mostly qtz-cal+/- epi+/-seri below. Some shearing evident in interpill material.											
42.00	66.70	VBX/Vsed	Volcaniclastic, volcanic Sediments & Breccia											
			Mainly, gy/grn, fgr, matrix with variable clast content. Clasts typ ang of MV typ amyg, up to 5-10cm. Matrix var s-wk calcitic. Bedding generally thick mass with little stratification. Local finer, thinnner beds noted. Some local shearing. Larger pill frags not common but thru-out & var thru section. Minor hema& qtz-jasp veins 2~62m	S_o, 50°TCA, 44m										
66.70	236.35	MV	Mainly mafic volcanic pillowed flows and breccias with minor volcaniclastics/sediments. Matrix of bx is volc sed as above.											
			66.70-70.80 s-hema, shearing, qtz-cal veining											
			70.80-80.68 pill flows - gy, plag phy, calc amyg. Minor hema and inter pill material. Minor epi vnlts with qtz											
			80.68-90.37 Main pill bx section. Upper sect more sheared, veined & hema to 85.57m. Minor thin beds of volc sed/bx @ 86.5m spotted with epi. Some larger pill frags in sandy matrix.	S_o, 33°TCA, 86.5m										

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-01	**2**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Cu %	Pb %	Zn %	Ag %
		MV (cont)	90.37-110.11 gy (rare minor hema of pill bx), mainly coarse pill bx with finer matrix. Local darker sections (more chl-epi) with finer bx frags. Pill frags gy, bit blched, ang, hi amyg, cemented increasingly by calc+/-qtz.											
			Hematization starts ~ 101.98 & increases downhole											
			110.11-145.39 **Str Hema Section**. All frags str hema with matrix ~100% calc.w/m-mag. Pill Bx											
			145.39-154.85 grn and mar, v-mag (mar frags are mag, rest not), mafic volc bx. Frags < 10-15cm, ang, amyg. Grn frags and matrix are epi spotted, amyg, w str-calc matrix. More of a sed volc bx.											
			154.85-163.52 str-hema amyg pill bx with white calc matrix, magnetic											
			163.52-167.39 as 145.39-154.85. Hema frags are mag											
			167.39-170.63 as 154.85-163.52. Broken, veined and sheared at base											
			170.63-179.04 mixed grn and hema pill bx/volc bx. Sheared and veined(calc) at base @ 35^{o}TCA											
			179.04-236.35 Pillowed flows. Var str-non hema. Inter pill of glassy mafic, volc or pill bx, qtz-jasp-seri-calc. Flows are plag phy, m-mag, calc amyg, 25-50cm diam. Inter pill often appears sheared.											
			182.26-183.50 broken, faulted core											
			190.40-190.93 broken, faulted core											
			236.35 EOH											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-02	**1 of**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at	Location of Hole in	Map Reference	Claim No.
Petro Drilling			**132° (mag decl 21° 20')**	**244.6**	Collar - **-60**	Relation to a Fixed	No. **12A/15**	**10941M**
Date Hole Started	Date Completed	Date Logged	Logged By: Paul Delaney		**57.5m -61° to 136.8°**	Point on the Claim	Location	
May 24/06	**June 2/06**	**May/June , 2006**			**162.5m -63° to 136°**	**506301E**		
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		**242.1m -62° to 136.5°**	**5403531N**		
Celtic Minerals Ltd							Property Name	
					m		**Wiley's Lake**	

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
0.00	13.16	OVB	Overburden											
13.16	49.44	MV Flows/Dikes	Mass Mafic Volcanic Flows											
			Mid gy, (with rare w-blch zone), s-mag, fgr, chl+/-qtz amyg (chl rims +/-qtz cores, rarely just qtz) of ~1mm, locally larger amygs typ more qtz-rich. Generally aphyric, but local plag phy. Cut by <5%, 1-2cm qtz-cal veins, sometimes hem-colour											
49.44	60.52	Pillowed MV Flows	Grey & maroon, fgr, s-mag, hi amyg (calc, 1-3mm) pill mv flows. Inter pill of fgr, mv material & bx with epi, calc, qtz. Local blch to mid-gy colour.											
60.52	74.03	Volc Sediments	coarse sand layers containing bx frags to ~3mm. Coarsen downhole seen in coarser beds. Coarser w/m hema beds with larger bx frags to 2-3cm amongst glassy beds at 69.00-69.90 appear folded or maybe scoured. Pene contemp deform locally. Coarser sections typically mag, frags or bands. Some dike of below near base. Lower contact sharp but irreg with hema over 15cm.	S_o, 45°TCA, 62m										
74.03	86.65	Mafic flows/Dikes	Same as topmost section. Poss dikes. Plag laths & radial xtl clumps locally. Margins look slightly chilled & blched. Var-mag, cal-chl amyg, local qtz. Lots irreg cal-qtz veins bx cement											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-02	**2**

Drilling Company	Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started / Date Completed	Date Logged	Logged By		m		Location	
				m			
Exploration Co, Owner/Optionee	Date Submitted	Submitted By (signature)		m			
				m		Property Name	
				m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Cu %	Pb %	Zn %	Ag %
86.65	90.78	Volc Seds		S_o, 40°TCA, 87.6m										
			Cherty siltstone/fine sst. Lt gy, cherty siltst to minor fine sst of											
			mafic volc derive. Siltst is streaked darker grey. Var, ocal hema. S	S_o, 10°TCA, 89.25m										
			hema from 90.00-90.78, like jasper (hard). Lower contact irreg											
90.78	136.78	Pillow Flows/Bx	Mainly pillowed flows with lesser breccia											
			Mid-dk gy, s-mag, hi calc amyg. Pill selv are mid-bright green with											
			more evident plag laths(also in core but less visible). Calcite forms											
			bx cement. Some chl amygs.											
			117.80-119.25 Gy/grn, cherty silst, streaked. Contacts											
			broken(upper) & grad irreg. Chilled pill lava mixes with sed @											
			lower contact giving bx look. Looks like depo on soft sed.											
			119.25-136.78 pillw flows as before. Lots cal veins and amygs.											
			Lower contact has nice rounded pills with bx matrix grad to more											
			sed-like with local larger pill frag/pillow.											
136.78	165.37	Mafic Fragmental												
			Green, fmgr, mafic fragmental. Contains vari-sized & text of amyg											
			and scoriaceous pill frags/mafic material. Some frags are mag.											
			Matrix appears as mafic material. Looks more like mafic agglom.											
			Most frags rnded, some ang with indistinct borders. Colours vary.											
			146.95-155.59 get thinner beds. Fgr, volc sed bx & sandy/silty											
			layers of mafic volc frags & finer material. Unit dk grn getting blch											
			towards lower contact over 2m. Var epi. Finer gr to lower contact											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-02	**3**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
			155.59-161.12 Section of felsic tuff(rylt) with coarser pink & gy seds locallywith aphan rylt clasts. Generally plag por, lt seri, & epi in coarser beds. N-mag											
			Below felsic section rock turns to cherty siltst/sst with grn & gy lams. Lower contact sharp											
165.37	204.32	Mafic frag/bx	consists of gy, hi amyg, mag, general rnded, 3-20cm mafic volc frags in a grn mafic volc bx sed matrix. Large rnded frags make rock look like agglom but matrix looks like volc sed bx. Few sectiosn of finer material with no frags of <1-2cm. Cal veins cut matrix/frags.											
204.32	212.88	Mafic Volc Pill Flows	Small sect of more solid pill flows. Inter pill bx locally. Hi amyg, mag, var hema of flows.											
212.88	244.60	Mafic Volc Sed & Pill Bx	214.70-216.10 broken core, faulted, local pug, cal v zone											
			Host appears to be volc sed bx. Some hema, & epi spotted/streaked matrix. Pill frags.											
			214.70-219.23 coarser fragmental. Pill frags in fgr gy/grn mafic											
			219.23-220.16 heavily cal-qtz v sect											
			220.16-221.12 Banded s-hema & gy vfgr laters but with small amyg frags. Rather swirly/sheared look. Prob local mud layer but with lithic frags. Lower contact sharp/conform	S_o, 28^{o}TCA, 221.12										

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-02	**4**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
			221.12-239.83 Coarser bx. Matrix is vcgr sand of var hema volc material, var hema pill frags. Matrix hi calc. frags general gy-maroonish(dark). Matrix has pink tinge. Frags typ ang & irreg, no sorting or bedding.											
			239.83-244.60 Coarser pill bx. Frags more hema (dk maroon) & matrix most cal with bx frags(smaller)											
			EOH											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-03	**1 of**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference	Claim No.
Petro Drilling			**165°**	**365**	Collar - **-60°**		No. **12A/15**	
Date Hole Started	Date Completed	Date Logged	Logged By: Paul Delaney		**-60° to 170°**		Location	
June 5/06	**June 15/06**				**117.5m -60° to 174°**	**507433E**	**Buchans Camp**	
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		**177.5m -61° to 170°**	**5403513N**		
Celtic Minerals Ltd							Property Name	
					m		**Wiley's Lake**	

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Cu %	Pb %	Zn %	Ag %
0.00	13.19	OVB	Overburden											
13.19	17.65	Polylithic Breccia	Mainly mass w some crude stratification. Lt to bright grn, volc-derive bx. Frags typ ang, tight packed, 4-6mm, local 1-2cm. Frags of aphan, aphy to vfgr w tiny feld laths of fel volcs of gy, buff, reddish, grn colour. Has bl-dk grn, qtz or feld phy, chlor patches that may be matrix or pumice, typ larger than other frags or full core width, 1cm thick. Some mainly aphy n dk grn type. Lower contact sharp, irreg, w-hem over 15-20cm, feld xtls	S_o, 30°TCA, 14.10m										
17.65	172.57	Mafic	Possible intrusive or massive flows. Conform contact, but locally good dibs text. Very monotonous, no real chills, but minor text/grain size changes.											
			Dk-mid gy, fgr-mfgr, s-mag, cal-chl amyg, plag phy to aphyric, mafic. Coarser types have good to poor dibs text & are aphyric and no amygs. Subtle grain size changes often at vein boundary. Occas coarser material forms rounded frags in finer matrix over 10-20 cm(as at 60.35m). Trace Py noted										
			cal v,, mcgr, bit vuggy bx, main zones at 84.69-85.00, 92.17-93.65, 105.65-108.06(latter is mixed dike & vein). 115.13-115.19 cal v										
			114.73-114.91 vuggy, cgr, cal v-filled frac@ 90°TCA.Cont mass mafic rock-spotted with mafic mineral, locally better interlock plag										

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-3	**2**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Cu %	Pb %	Zn %	Ag %
			135.03-136.85 Broken, bx, & cal v(some hema) zone with vfgr mafic swirls& zones.											
			Below frac zone bit larger feld, then back to mafic phy flows											
			143.97-148.78 Minor var blching with bx zones cement by lt brown & white calc. Veins locally vuggy with term xtls											
			160.86-161.95 bit finer sect with vfgr patches 7 vein-like fillers as 135.03-136.85 zone											
			172.42-172.55 net-like form of vfgr mafic material in typ maf volc, qtz v. Prob flow/dike boundary. Lower contact sharp @28°TCA. Defn finer grained and no xtls nearing contact											
172.57	278.56	Felsic Volcanic Breccia	Reddish-maroon, felsic fragmental. Clasts mmost fairly angular. Consist mainly of maroon & red-brown, aphan, qtz-fel phy fel and also grn fgr, prob mafic volc. Matrix appears to be finer fel material and xtls, some chl-seri. Lots irreg, wavy, lt cream seri-lined fracs & minor bx zones of few mm's. No bedding or sorting noted. Clasts range up to 4-5cm, some pumice and frag alignmen that seems like bedding. Trace Py clasts or in vein material clasts	S_o?, 25-30°TCA, 173.33-174.60										
			179.12-192.09 grn, finer volc clasticbx of plag-qtz xtls with fel-maf clasts to ~5mm. Some wthered rims on frags. Coarsens down gradational. Some gy, vfgr, cherty clasts@ 187.50 Few large amyg mafic clasts ~191m	S_o, 10°TCA@187.70										

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-3	**3**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
			192.09-206.45 finer volc clastic, gy chert. Very broken core thru section											
			196.95-203.00 var gy chert & Fe-carb alt volc clastic & Fe-carb veins											
			206.45-253.90 back to coarser frags. Polylith bt most fel, some plag por, hi cal amgy mafics. Frags to large blders-generally of amyg mafic volc. Trace Py in maf clasts & matrix. Minor epi-seri in matrix & on fracs, some Fe-carb too. Dk black chl masses, var in matrix. Clasts still most ang but some rounded, more like breccio-cong											
			253.90-278.56 same as above but start to see clasts of lt-gy to white limst, slightly more Py, still trace											
278.56	351.57	Mafic Fragmental	278.56-283.83 Darker grn fragmental. Matrix more chloritic mafic looking. Still polylith, but higher % mafic and dk chl clasts over felsic											
			283.83-292.42 pale grn, var Fe-carb alt, to mid bright grn, volc bx. Paleness grad from above. Epi-ser alt of clasts. No limst. 284.38-284.90 broken core											
			Matrix gets more pinkish-org hematizaton, var more maroon. Frags also hema & local ser-epi alt-prob fel frags. Bottom 22cm dker grn, frags maroon hema, mafic & mixed grn pumice-look. Mar frags mixed into lt grn cherty mdstne. Frags awas in mud that penetrates frags											

DIAMOND DRILL LOG

Hole Number	Page No.
WL06-3	**4**

Drilling Company		Collar Elevation	Bearing of Hole From True North	Total Metreage	Dip of hole at Collar -	Location of Hole in Relation to a Fixed Point on the Claim	Map Reference No.	Claim No.
Date Hole Started	Date Completed	Date Logged	Logged By		m		Location	
					m			
Exploration Co, Owner/Optionee		Date Submitted	Submitted By (signature)		m			
					m		Property Name	
					m			

Metreage From	Metreage To	Rock Type	Description	Planar Feature Angle	Core Specimen Metreage	Sample Number	Sample Metreage From	Sample Metreage To	Sample Length (m)	Assays Au g/t	Assays Cu %	Assays Pb %	Assays Zn %	Assays Ag %
			292.42-340.05 cherty base, sharp contacts downhole with volc lith st. Contact sharp but wavy or scoured a bit @ 40°TCA. Some coarser clasts	S_o, 40°TCA, 292.45										
			Coarsens downhole with occas fine siltst lams. Frags of plag xtls, fel and mafic but increase in mafic downhole. Seri-epi in matrix locally. Hem frags common, best between 308-330 with large fgr, amyg mafic volc flow as cobbles to bldr. Matrix local hi cal. Clasts ang-rnd.	S_o, 35°TCA, 293m										
				S_o, 35°TCA, 297.5m										
			340.05-346.76 Rock becomes finer grained, grn/gy volc wacke, xtl-rich, var vfgr silty layers, some prob ripup clasts. Minor penecontemp deform											
			346.76-351.57 start coarser bx/cong w large feld+/-qtz por fel, siltst cobbles in coarse volc wacke matrix & black plag por patches/clasts. Same black patches common in coarser above. Seem to scoria or pumice, typ flat in beds. Wacke seems mixed mafic-fel, bit more felsic than coarser above											
			351.57-355.55 finer siltst, sst & chert, locally hema(jasper-like) to finer wacke/bx w mid-bright grn prob pumice/scoria. Some of coarser also hema matrix. Very tight packed w fabric of lt gy or creamy poss pumice-bit seri											
			353.85-365.00 generally all coarser variety is +/- hema, clasts to 5-8mm. Pumice?, fel sltst +/- mafic clasts											
			355.55-360.98 Mafic dike, chilled margins, lower contact @90°TCA, upper 38°TCA. EOH											

APPENDIX IV

2017 SkyTEM HTEM Report

DATA REPORT

SkyTEM Survey:
Buchans_SW, Newfoundland

Client: Ubique Minerals Limited

Date: August 2017

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Structure of the Digital Data Delivery catalogue

Folder	Sub folder	Sub folder	File format	Content
01_Data			.gdb (Geosoft database)	Data
02_Inversion	01_Layer_conductivity_Database		.gdb (Geosoft database) .xyz (Ascii file)	Modelled layer conductivity
	02_Layer_conductivity_Grids		.grd (Geosoft grid) .tif (Geotiff)	Modelled layer conductivity
	03_Layer_conductivity_Maps		.map (Geosoft map) .pdf	Modelled layer conductivity
	04_Layer_conductivity_Profiles		.png	Profile sections of modelled layer conductivity & model analysis
03_Geosoft_Grids	01_EM	01_LMZ 02_HMZ	.grd (Geosoft grids)	Height Corrected EM channels
	02_MISC		.grd (Geosoft grids)	DEM & PLNI
	03_MAG		.grd (Geosoft grids)	RMF & TMI
04_Geosoft_Maps			.map (Geosoft maps)	Survey outline Flown lines DEM PLNI Magnetic data (TMI, RMF)
05_PDF_Maps			.pdf	Planned lines Flown lines DEM PLNI Magnetic data (TMI, RMF)
06_Report			.pdf	Data report

Contents

Executive Summary

This report covers data acquisition, technical specifications, data processing and presentation of the SkyTEM 312M survey flown in the period from June 8th to June 13th, 2017 in Buchans_SW, Newfoundland. The survey is comprised of one block containing in total 140 km planned flight lines.

The SkyTEM 312M collects time domain electromagnetic and magnetic data along with supporting navigation measurements.

All material is delivered digitally. The final product includes:

- Data report
- Processed data in Geosoft database
- Inversion results; modelled layer conductivity in Geosoft database and ascii file format
- Grids and maps in Geosoft format
- Presentations of data and inversion results in pdf format

An overview of the digital data delivery can be seen on the front inside cover of this report.

Introduction

The SkyTEM electromagnetic and magnetic survey described in this report were flown with the SkyTEM 312M system. The survey was flown as part of a larger survey requested by Altius Minerals and shares the same system set-up, magnetic base and gps base staions. Basic survey information and key personnel are listed in Table 1.

This report covers data acquisition, instrument descriptions, data processing and presentations. The data delivery includes processed electromagnetic data and presentations, spatially constrained inversion results and model presentations as well as processed magnetic data and presentations. The digital data delivery folder is described in the front inside cover of this report.

This report does not include any geological interpretations of the geophysical dataset.

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Helicopter operator (Universal Helicopters) Helicopter type Pilot	 AS350 B3 Mr Niel Rose
Data acquisition period	June 8th to June 13th, 2017
Data processing, presentations and report	Ms Solvej Trautner

Table 1 Key personnel and survey information.

Survey outline

The survey area is located near Buchans, Newfoundland and flown from June 8th to June 13th, 2017. The survey location and outline is presented as blue lines on Figure 1.

Flight line details are listed in Table 2 and Table 3.

Actual flown lines (red lines) versus planned lines (blue lines) are presented on *Figure* 2. Discrepancies between planned and flown lines occur where cultural features such as roads, buildings, and antennas necessitate a diversion.

The coordinate system is kept in UTM Zone 21N (WGS84) throughout this report and the digital data delivery.

Area name	Line spacing (m)	Line direction (deg)	Tie line spacing (m)	Flight lines (km)	Tie lines (km)	Total line kilometers (km)
Buchans_SW	100	150	1000	126	14	140 km
Total						**140 km**

Table 2 Survey details

Area	Line numbering	Tie line numbering
Buchans_SW	L150001 – L157101	T202101 – T202301

Table 3 Line numbering

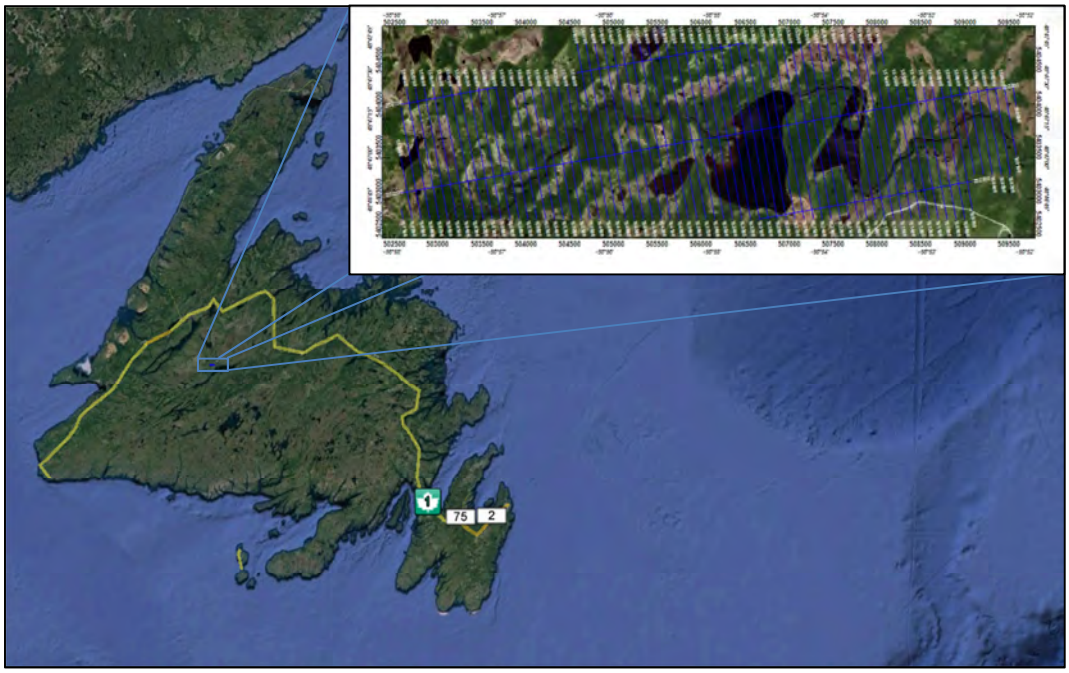


Figure 1. Survey outline. Blue lines represent planned survey lines.

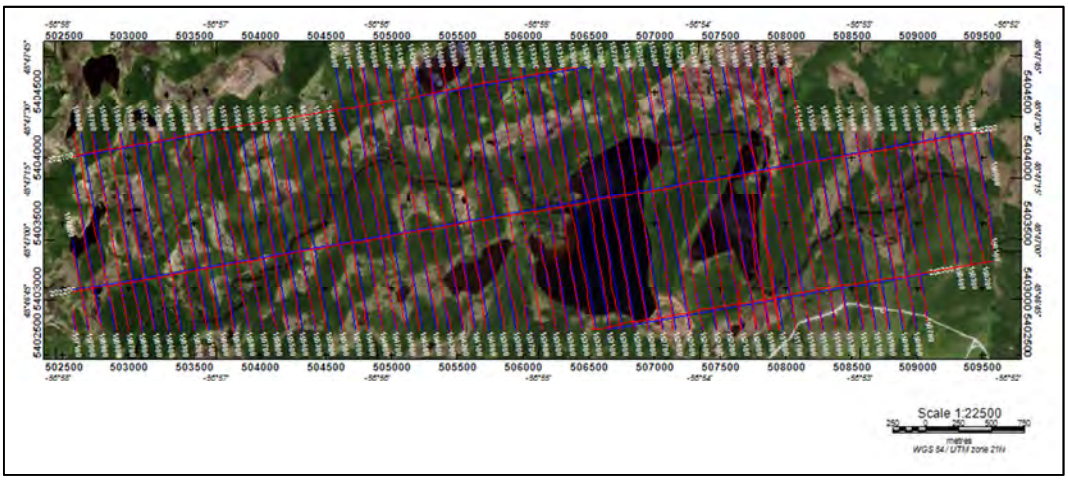


Figure 2 Buchans_SW. Flown lines (red) superimposed on planned lines (blue).Flight Parameters

The nominal terrain clearance is 30 m, with an increase over forests, power lines, or any other obstacles or hazards on the ground. The safe flying height during the survey is always based on the pilot's assessment of risk and deviations from nominal values are at the discretion of the pilot.

The nominal production airspeed is 80-100 kph for a flat topography with no wind. This may vary in areas of rugged terrain and/or windy conditions.

Average values and standard deviations of survey flight parameters are found in Table 4.

Buchans:

Control parameter		Average Value	Standard Deviation
Ground speed*)		93.4 kph	6.7 kph
Processed height		53 m	6.4 m
Tilt angle	X	4.7 degrees	2.8 degrees
	Y	1.0 degrees	1.3 degrees
Tx Voltage	Tx_off	69 - 74 V	-
	Tx_on	68 - 76 V	-
Low Moment Current		5.95 A	0.0 A
High Moment Current		120.9 A	1.1 A
Tx temperature		16 - 34 °C	-

**) Actual speed varies as a function of day and flight direction due to different wind directions and magnitude.*

Table 4 Flight parameters for Buchans_SW area

Flight Reports

For each flight, a report with key information regarding the data acquisition is made in the field. Listed in the reports are details on the weather, special data parameters and other events which may influence data. Selected information from the flight reports are shown in Table 5 and Table 6. Only production flights are listed. Flights referring to tests and ferry have been omitted.

Flight	Temperature (C)	Wind (m/s)	Visibility	Description
20170608.01	8	0	good	clear, sunny
20170608.02	15	10	good	high clouds, clear
20170609.01	16	2	good	clear, sunny
20170609.02	23	10	good	high clouds
20170810				Weather - high winds, gusting 40 knots.
20170611.01	10	20	good	high clouds
20170613.01	5	0	good	clear, sunny
20170613.02	10	10	good	high clouds, rain showers

Table 5 Weather report

Flight	Comments
20170608.01	Production flight
20170608.02	Production flight
20170609.01	Production flight. Tricky terrain with power line at the bottom of a hill.
20170609.02	Production flight
20170610	Stand-by due to bad weather
20170611.01	Production flight
20170613.01	Production flight

Table 6 Flight report

Instruments

This section provides an overview of airborne as well as ground base instruments, thorough technical descriptions are provided in Appendix 1.

Airborne unit

The airborne instrumentation comprising a SkyTEM 312M system includes a time domain electromagnetic system, a magnetic data acquisition system and an auxiliary data acquisition system containing two inclinometers, two altimeters and three DGPS'. All instruments are mounted on the frame suspended ~40 m below the helicopter. The generator used to power the transmitter is suspended between the frame and the helicopter about 20 m below the helicopter. A picture of the airborne SkyTEM 312M unit is seen on Figure 3, and a sketch of the instrumentation is seen on Figure 4.

Figure 3 SkyTEM 312M Airborne unit.

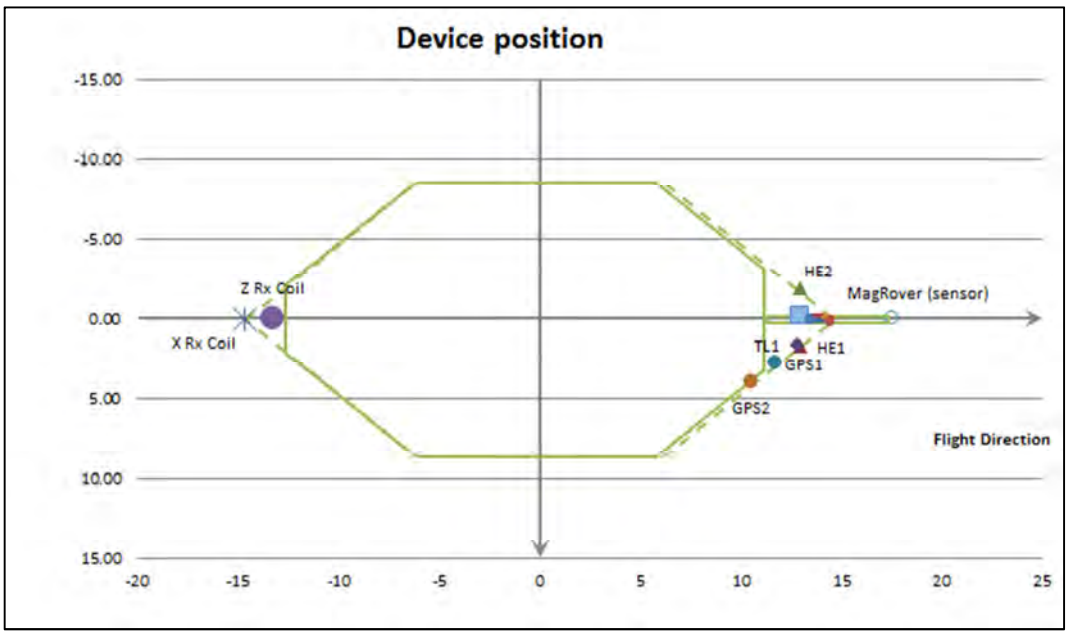


Figure 4 Sketch showing the frame and the position of the basic instruments. The green line defines the transmitter loop. The horizontal plane is defined by (x,y).

Ground base stations

The DGPS and magnetic base stations were positioned in the vicinity of the survey area.

DGPS base station

DGPS base stations were placed at a location of maximum possible view to satellites and away from metallic objects that could influence the GPS antenna.

Table below shows the location of the DGPS base station:

Area	Easting	Northing	Ellipsoidal height
Buchans	-56.860418	48,824097	282 m

Magnetometer base station

The base station magnetometer was placed in a location of low magnetic gradient, away from electrical transmission lines and moving metallic objects, such as motor vehicles and aircrafts.

The table below shows the location of the magnetic base station:

Magnetometer Base station	Easting	Northing	Elevation
Buchans	-56.85881°	48.82152°	268 masl

Data Acquisition

The SkyTEM 312M system setup is a dual moment configuration containing a Low Moment (LM) with a peak moment of ~ 4,000 NIA and a High Moment (HM) with a peak moment of ~500,000 NIA.

A dual moment system provides a major advantage over single moment systems in that it is possible to measure a wider range of time gates. In LM mode early time gates can be measured allowing more accurately resolution in the near surface while in the HM mode, deep penetration can be achieved.

Data from two GPS receivers are recorded by the EM data acquisition system while a third GPS is recorded by the magnetic data acquisition system.
The DGPS system is used for time stamping, positioning, and correlation of the EM and magnetic datasets. All recorded data are marked with a time stamp used to link the different data types.

The time stamp is in UTC/GMT and the formats are either,

- Date and Time defined as; yyyy/mm/dd hh:mm:ss.sss
  or
- Datetime values defined as the number of days since 1900-01-01 and seconds of the day; ddddd.sssssssss

Gate times

Gate times are presented in Table 7.

The earliest gates are not used as these are in the transition zone. HM gate times are shifted 350 µs with respect to start of turnoff ramp.

If third party processing or inversions are undertaken using the processed data as the base dataset, calibrated gate center times should be applied as well as the time shift of 350 µs on HM gate times.

Aarhus Workbench handles time shift and calibrations automatically as they are defined in the geometry file (.gex).

Gate #	GateOpen (µs)	Gate Close (µs)	Gate width (µs)	Raw Gate center (µs)	Comment
1	0.43	1.00	0.57	0.715	Not Used
2	1.43	3.00	1.57	2.215	Not Used
3	3.43	5.00	1.57	4.215	Not Used
4	5.43	7.00	1.57	6.215	Not Used
5	7.43	9.00	1.57	8.215	Not Used
6	9.43	11.00	1.57	10.215	Not Used
7	11.43	13.00	1.57	12.215	Not Used
8	13.43	16.00	2.57	14.715	Not Used
9	16.43	20.00	3.57	18.215	Not Used
10	20.43	25.00	4.57	22.715	LM
11	25.43	31.00	5.57	28.215	LM
12	31.43	39.00	7.57	35.215	LM
13	39.43	49.00	9.57	44.215	LM
14	49.43	62.00	12.57	55.715	LM
15	62.43	78.00	15.57	70.215	LM
16	78.43	98.00	19.57	88.215	LM
17	98.43	123.00	24.57	110.715	LM & HM
18	123.43	154.00	30.57	138.715	LM & HM
19	154.43	194.00	39.57	174.215	LM & HM
20	194.43	245.00	50.57	219.715	LM & HM
21	245.43	308.00	62.57	276.715	LM & HM
22	308.43	389.00	80.57	348.715	LM & HM
23	389.43	490.00	100.57	439.715	LM & HM
24	490.43	617.00	126.57	553.715	LM & HM
25	617.43	778.00	160.57	697.715	LM & HM
26	778.43	980.00	201.57	879.215	LM & HM
27	980.43	1235.00	254.57	1107.715	LM & HM
28	1235.43	1557.00	321.57	1396.215	LM & HM
29	1557.43	1963.00	405.57	1760.215	HM Only
30	1963.43	2474.00	510.57	2218.715	HM Only
31	2474.43	3120.00	645.57	2797.215	HM Only
32	3120.43	3912.00	791.57	3516.215	HM Only
33	3912.43	4880.00	967.57	4396.215	HM Only
34	4880.43	6065.00	1184.57	5472.715	HM Only
35	6065.43	7517.00	1451.57	6791.215	HM Only
36	7517.43	9293.00	1775.57	8405.215	HM Only
37	9293.43	11473.0	2179.57	10383.215	HM Only

Table 7 Gate times. Used gates refer to LM and HM on z-coil.

System Verification

To verify the performance of the SkyTEM 312M system calibration and waveform repetition is carried out. The following sections document the results.

Calibration

The SkyTEM 312M system has been calibrated at the Danish National Reference site. Calibration includes measurements of the transmitter survey data repeated at a range of altitudes at the reference site. Hereby, it is documented that the instrumentation can reproduce the reference site with the same set of calibration parameters independent of the flight altitude. All processed data are corrected according to the calibration parameters.

The calibration resulted in the following parameters:
Low Moment
Shift factor: 0.94 (on the raw dB/dt data)
Time shift: -1.3e-6

High Moment
Shift factor: 0.99 (on the raw dB/dt data)
Time shift: -1.5e-6

The reference data for both LM and HM data are shown as grey curves and the measured data for LM and HM as green and blue curves, respectively, on Figure 5 to Figure 10.

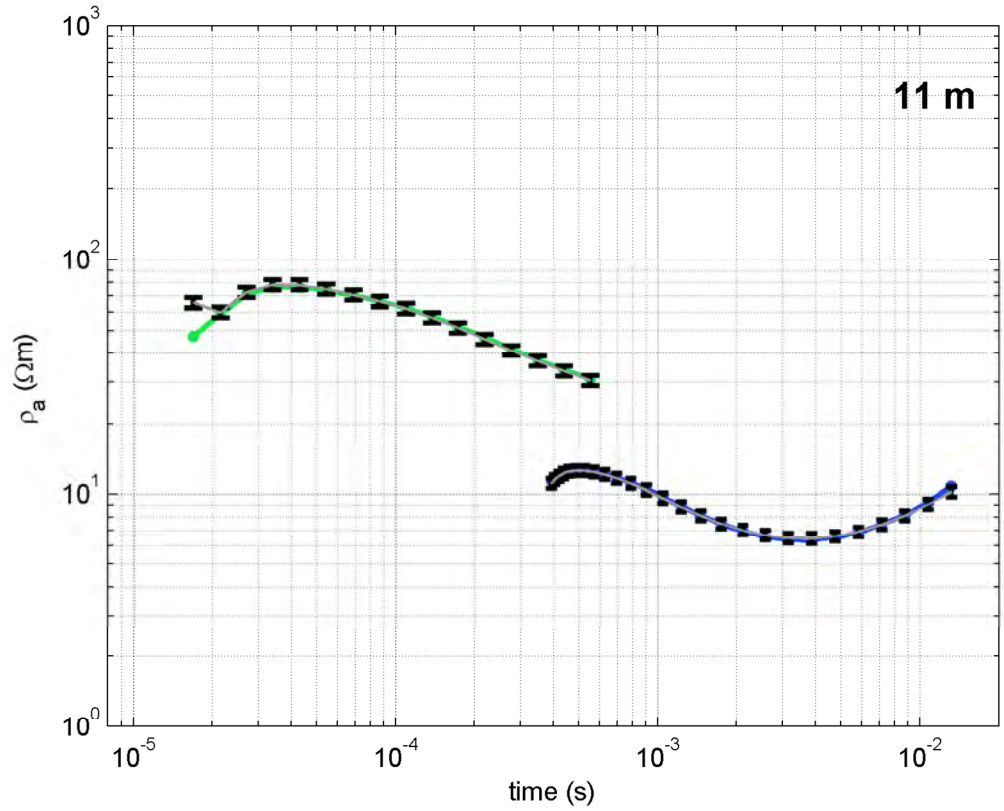


Figure 5 Grey curves with 5% error bars are the expected response, and green curves (LM) and blue curves (HM) are the actual measurements.

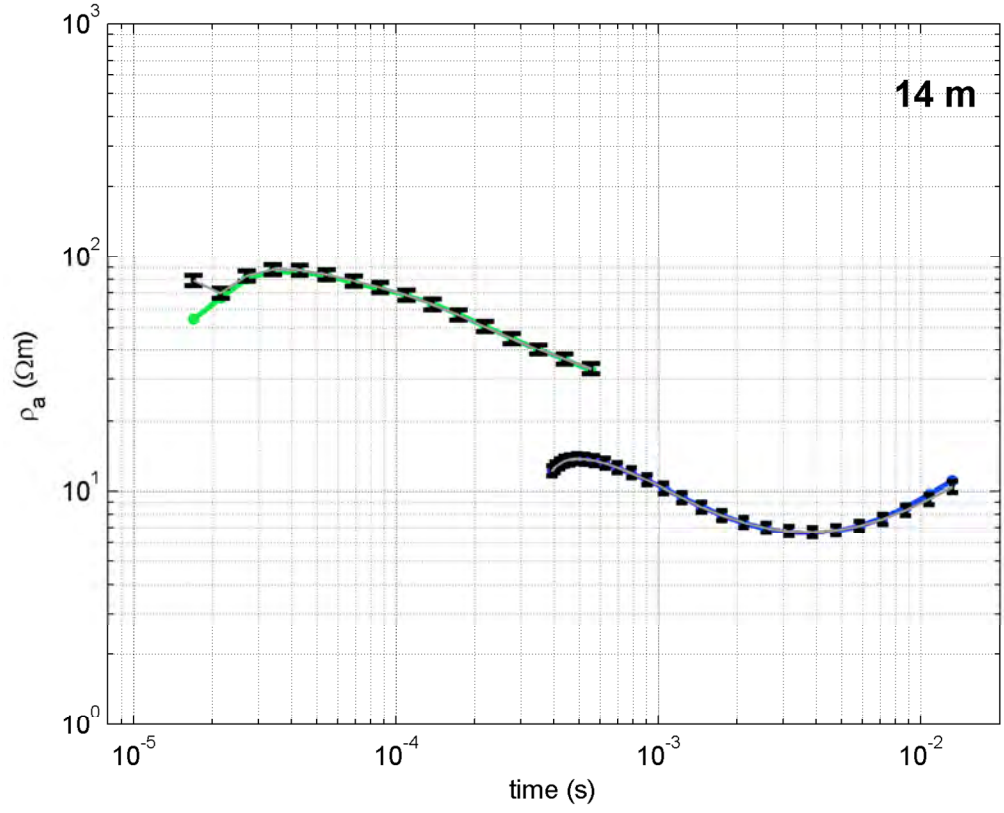


Figure 6 Grey curves with 5% error bars are the expected response, and green curves (LM) and blue curves (HM) are the actual measurements.

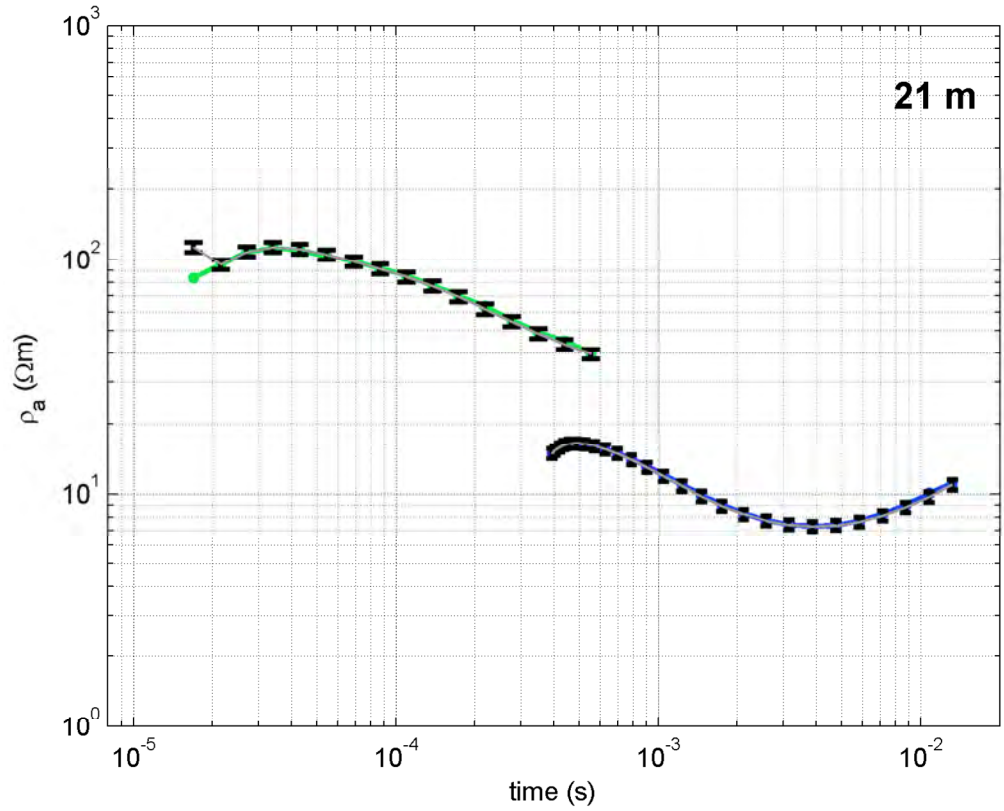


Figure 7 Grey curves with 5% error bars are the expected response and green curves (LM) and blue curves (HM) are the actual measurements.

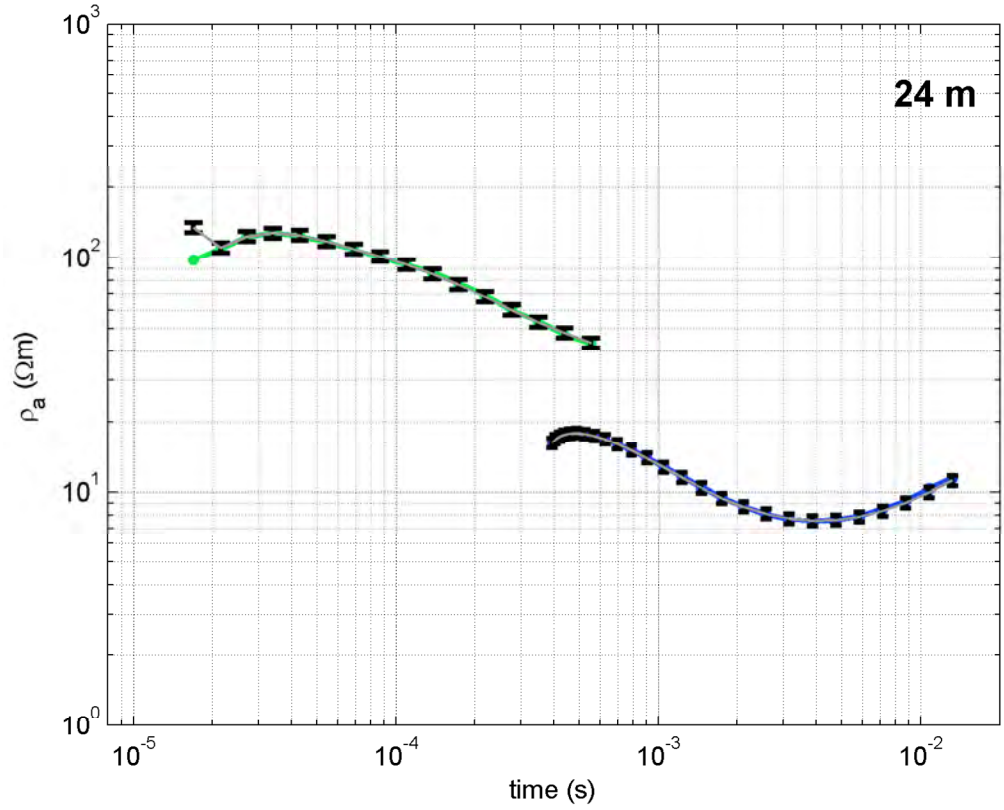


Figure 8 Grey curves with 5% error bars are the expected response and green curves (LM) and blue curves (HM) are the actual measurements.

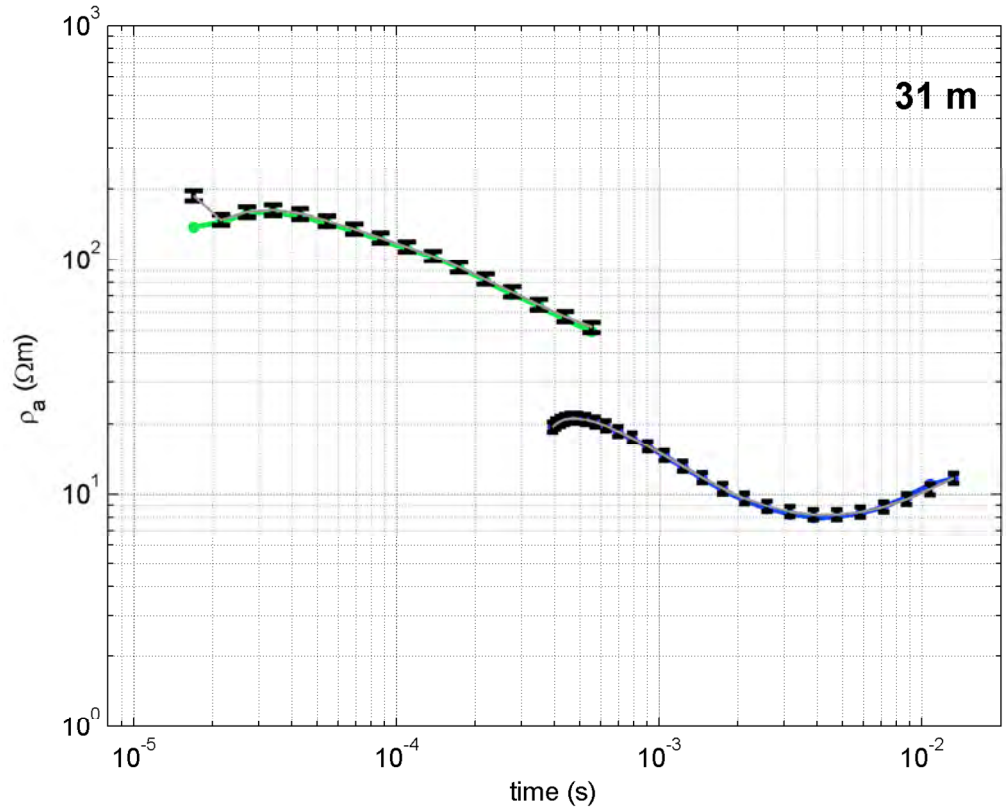


Figure 9 Grey curves with 5% error bars are the expected response and green curves (LM) and blue curves (HM) are the actual measurements.

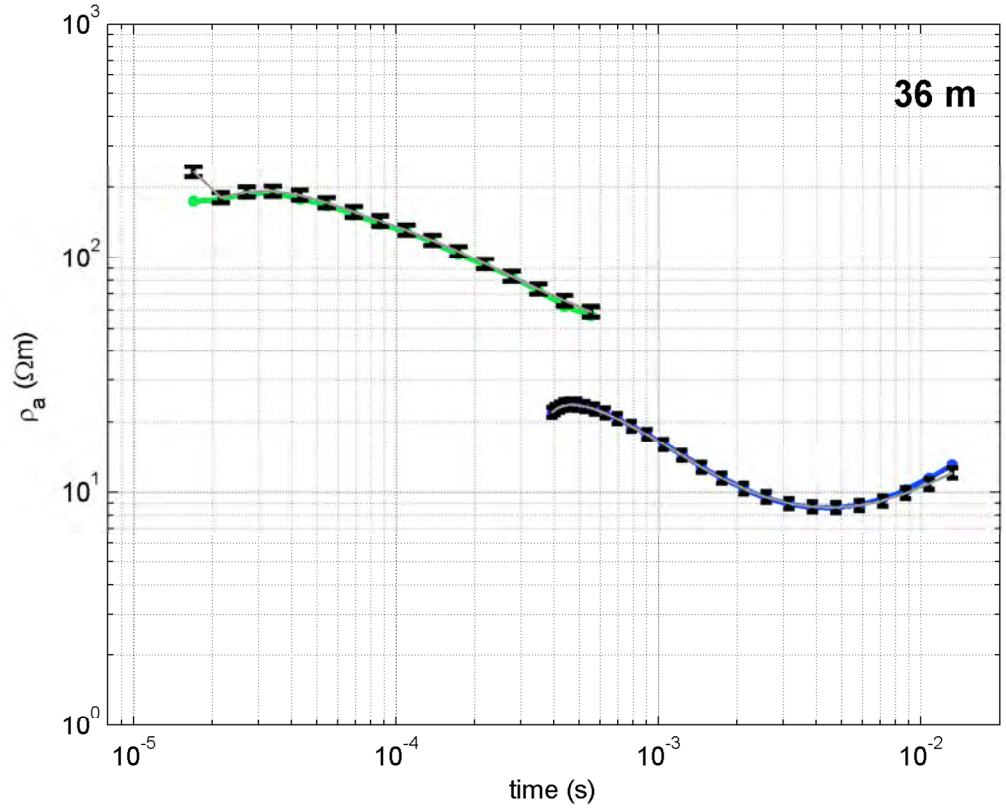


Figure 10 Grey curves with 5% error bars are the expected response and green curves (LM) and blue curves (HM) are the actual measurements.

Waveform

The waveform is measured using the 60 Hz script applied for this survey.

The waveform is measured using a current probe (turn-on ramp) and a pick-up coil (outputs dI/dt) for the turn-off ramp. The approximation to the measured waveform is applied in modelling of the EM data. Figure 11 and Figure 12 show the approximated up and down ramp and waveform details are presented in Table 8 to Table 11.

LM

Parameter	Value
Base frequency	210 Hz
Current range	6 Amp

Table 8: Waveform parameters for LM

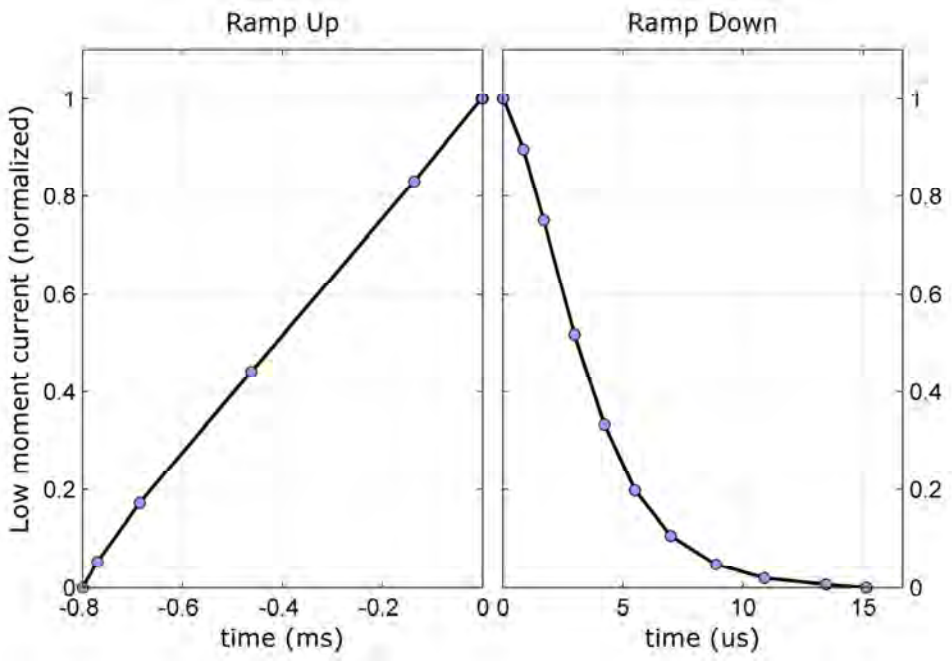


Figure 11 Ramp up and down at 210 Hz (LM). The current is normalised.

Time [s]	Normalized current
-8.00000E-004	0.00000E+000
-7.70368E-004	5.37956E-002
-6.85946E-004	1.72628E-001
-4.62369E-004	4.42409E-001
-1.36744E-004	8.31022E-001
-2.22614E-006	1.00000E+000
1.85837E-008	1.00000E+000
8.59290E-007	8.96573E-001
1.70000E-006	7.50946E-001
2.97787E-006	5.18244E-001
4.22212E-006	3.33584E-001
5.49999E-006	1.98466E-001
6.97963E-006	1.06886E-001
8.86282E-006	4.83355E-002
1.08805E-005	1.98107E-002
1.34363E-005	6.29896E-003
1.51177E-005	0.00000E+000

Table 9: Normalized current for LM

HM

Parameter	Value
Base frequency	30 Hz
Current range	120 Amp

Table 10: Waveform parameters for HM

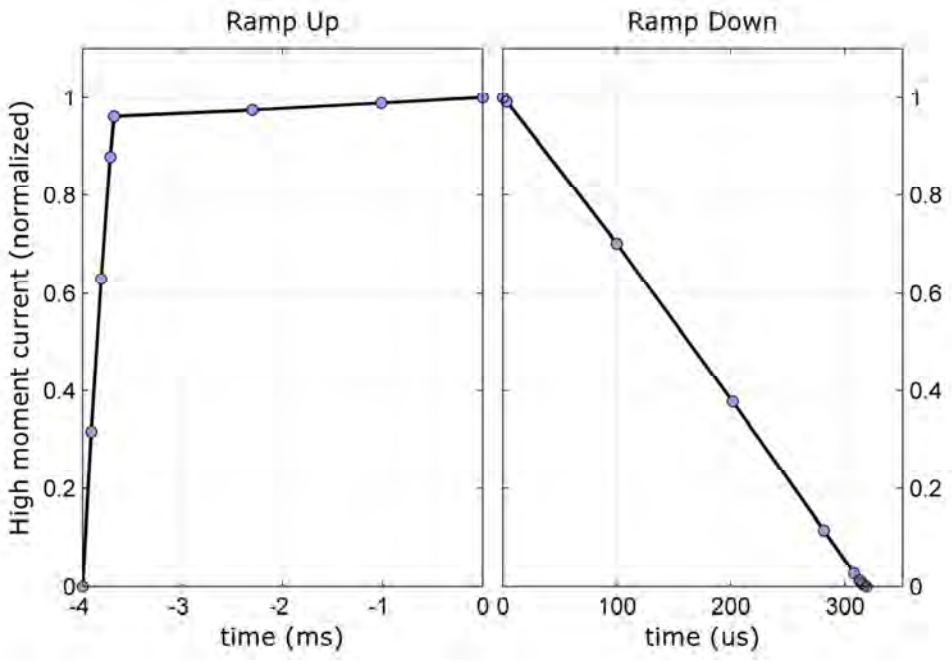


Figure 12 Ramp up and down at 30 Hz (HM). The current is normalised.

Time [s]	Normalized current
-4.00000E-003	0.00000E+000
-3.91300E-003	3.17153E-001
-3.81313E-003	6.30292E-001
-3.72277E-003	8.79197E-001
-3.68473E-003	9.61095E-001
-2.30082E-003	9.73942E-001
-1.01204E-003	9.88394E-001
0.00000E+000	1.00000E+000
3.25433E-006	9.91368E-001
9.99755E-005	7.01860E-001
2.01631E-004	3.77911E-001
2.81574E-004	1.15687E-001
3.08222E-004	2.79070E-002
3.13115E-004	1.21241E-002
3.14989E-004	6.60584E-003
3.16781E-004	3.02920E-003
3.18848E-004	0.00000E+000

Table 11: Normalized current for HM

Digital Data

The complete dataset of the SkyTEM survey is delivered as a Geosoft database (GDB), which can be used as input for further processing and gridding and as input to inversion and interpretation software. The channels of the GDB and XYZ-file are described in Table 12.

Inversion results

The result of the laterally constrained inversion is delivered as a Geosoft database (GDB) and exported to a Geosoft XYZ-file (ascii data file) containing the modelled layer conductivity's. The channels of the GDB and XYZ-files are described in Table 13.

The applied gridding methods, cell size, blanking distance and filtering are listed in Table 14.

Channel description, Survey Data

Parameter	Explanation	Unit
Fid	Unique Fiducial number	seconds
Line	Line number	LLLLLL
Flight	Name of flight	yyyymmdd.ff
DateTime	DateTime format	Decimal days
Date	Date	yyyymmdd
Time	Time	hhmmss.zzz
AngleX	Angle in flight direction	Degrees
AngleY	Angle perpendicular to flight direction	Degrees
Height	Filtered height measurement	Meters
Lon**	Latitude/Longitude, WGS84	Decimal degrees
Lat**	Latitude/Longitude, WGS84	Decimal degrees
E_UTM21N*	UTM Zone 21N (WGS84)	Meter
N_UTM21N*	UTM Zone 21N (WGS84)	Meter
DEM	Digital Elevation Model	M. a. sl.
Alt	DGPS Altitude	M. a. sl.
GdSpeed	Ground Speed	[km/h]
Curr_LM	Current, low moment	Amps
Curr_HM	Current, high moment	Amps
LM_Z_G01[xx]**	Geosoft array channels. Normalized LM Z-coil value.	pV/(m4*A)
HM_Z_G01[xx]**	Geosoft array channels Normalized HM Z-coil value.	pV/(m4*A)
LM_X_G01[xx]**	Geosoft array channels Normalized LM X-coil value.	pV/(m4*A)
HM_X_G01[xx]**	Geosoft array channels Normalized HM X-coil value.	pV/(m4*A)
PLNI	Amplitude spectral density of the power line noise 60 Hz	-
Bmag_raw	Total Magnetic Intensity Magnetic base station data	-
Diurnal	Diurnal variation Magnetic base station data	nT
Mag_Raw	Total Magnetic Intensity Despiked raw magnetic data	nT
Mag_Cor	Total Magnetic Intensity Magnetic data Filtered and diurnal corrected	nT
RMF	Resisual magnetic Field IGRF corrected Final corrected data	nT
TMI	Total Magnetic Intensity IGRF recalculated	nT

Table 12 Channel description, survey data

*) Data positions refer to the center of the frame.

***) The first valid gates are: 10 (LM Z), 10 (LM X), 17 (HM Z), 17 (HM X).*

Channel description, EM inversion database

Parameter	Explanation	Unit
Line	Line number	LLLLLL
E	UTM Zone 21N (WGS84)	Meter
N	UTM Zone 21N (WGS84)	Meter
DTM	Digital Terrain Model	Meters above mean sea level
ResI1	Residual of data	-
Height	Filtered Height Measurement	Meter
InvHei	Inverted Height	Meter
DOI	Depth of Investigation	-
Elev[xx]	Elevation of top of layer xx	Meter
Con [xx]	conductivity of layer xx	S/m
Con [xx]_doi	Masked below DOI of layer xx	S/m
RUnc[xx]	Relative uncertainty of layer xx	-

Table 13 Channel description, inversion results

Gridding method and parameters

Area	Gridding algorithm	Gridding filter	Cell size	Blanking distance
Buchans	Minimum curvature	-	33 m	100 m

Table 14: Geosoft gridding

Data processing and presentation

This section covers processing of auxiliary data and magnetic data and processing and inversion of EM data and presentations.

All devices (DGPS, Laser altimeters, inclinometers) are moved to the centre of the frame and corrected for the tilt of the frame hence all data positions refer to the center of the frame. Data is split at the beginning and end of each planned flight line.

After the initial filtering all data are resampled to 10Hz.

Auxiliary data

Tilt processing

The X and Y angle processing involves manual and automated routines using a combination of the SkyTEM in-house software SkyLab and Geosoft.

The processing involves the following steps:

1. 3 sec box filter (SkyLab)
2. Low pass filtering of 3.0 sec. (Geosoft)

Height processing

The height processing involves manual and automated routines using a combination of the SkyTEM in-house software SkyLab and Geosoft.

The processing involves the following steps:

1. Keeping the 5 highest values pr. second and discarding the rest to correct for the canopy effect (treetop filter) (SkyLab)
2. 3 sec running box filter (SkyLab)
3. Tilt correction (SkyLab)
4. Averaging of the two laser values (SkyLab)
5. Additional filters:
    a. Low pass filter of 3.0 sec (Geosoft)

DGPS processing

The DGPS has been processed using the Waypoint GrafNav Lite Differential GPS processing tool. The standard airborne settings have been used.

1. Import of base station (Master)
2. Import of airborne files (Rover)
3. Calculation of forward and reverse DGPS solution
4. Export as .txt file

The DGPS.txt files are used as input to the SkyLab software assuring DGPS corrected data in the processed files.

The ground speed, altitude, latitude and longitude from the processed DGPS' are imported into Geosoft and merged into the final database, where the coordinates are converted into UTM Zone 21N (WGS84) and a low pass filter of 3.0 sec is applied.

Digital elevation model

A digital elevation model (DEM) has been calculated by subtracting the filtered laser altimeter data from the DGPS elevation. All steps related to the DEM are carried out Geosoft.

The processing of the final DEM involves the following steps:

1. Filtering and processing of the laser altimeter height as described above
2. DEM data received by subtraction of final filtered laser data from final processed DGPS altitude data (height above the GRS80 ellipsoid)
3. Microlevelling
    a. Decorrugation = 400 m
    b. NL filter = 1200 m

Figure 13 shows the DEM of the Buchans_SW block

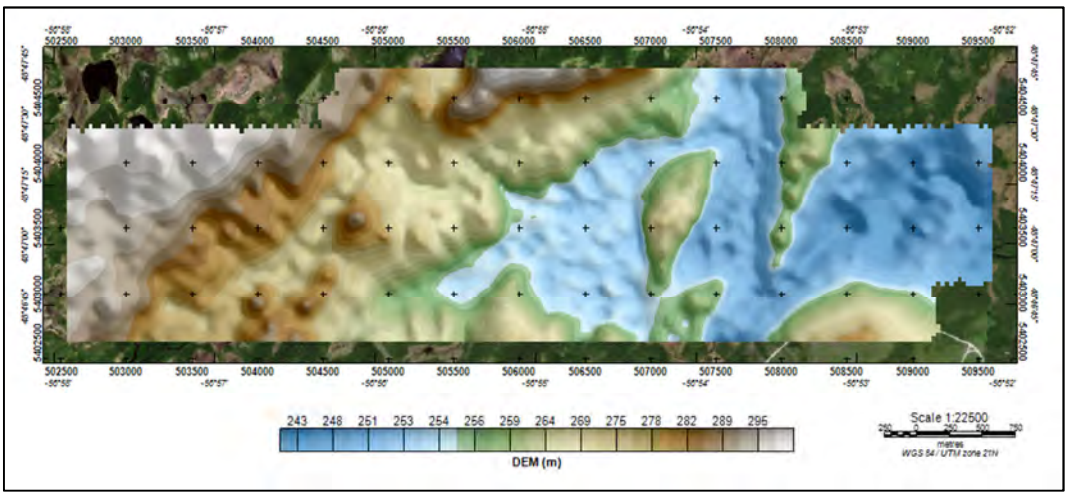


Figure 13 Digital Elevation Model (DEM) in meter above sea level.

Magnetic data

Final processing of the magnetic data involves the application of traditional corrections to compensate for diurnal variation and heading effects prior to gridding. Geosoft magnetic data processing tools are applied as follows:

- Processing of static magnetic data acquired on magnetic base station
- Pre-processing of airborne magnetic data
    - Stacking of data to 10 Hz in SkyLab.
    - Moving positions to the center of the system in SkyLab.
- Processing and filtering of airborne magnetic data
- Standard corrections to compensate the diurnal variation
- IGRF correction
- Levelling
- Gridding

Processing of base station magnetic data

The base station magnetometer data was merged into the base station Geosoft database on a daily basis for further processing.

The following filtering was applied:

- Manual despiking to remove spikes
- Interpolation (Geosoft Prediction)
- Fraser Low-pass filter (width 15 sec)
- IRGF correction
    - IRGF: coefficients defined by IGRF 15th generation
    - Date: variable according to date of acquired data
    - Position: fixed GPS WGS84 longitude, latitude and elevation of magnetic base station.

    - Residual magnetic field (RMF) calculated
    - The average (50.60 nT) of the IGRF corrected base data was subtracted from RMF to calculate the Diurnal.

Processed residual magnetic data from the magnetic base station representing short term variations was merged together with airborne magnetic data.

Processing and Filtering of airborne magnetic data

Airborne magnetic data is filtered and interpolated as follows:

- Adjustment of the data for the time lag between the GPS position and the position of the magnetic sensor
- Data resampling to 10 Hz (stacking)
- Manual despiking to remove spikes and spurious data
- Geosoft processing:
    - B-spline filter (smoothness 0.7, tension 0.0)

Corrections to the magnetic data

The following corrections are applied to the airborne magnetic data:

- Correction for diurnal variation using the digitally recorded ground base station magnetic values as described above
- Lag was negligible and no lag correction was applied
- Heading was negligible and no heading correction was applied
- IGRF correction

IGRF correction

The International Geomagnetic Reference Field (IGRF) is a long-wavelength regional magnetic field calculated from permanent observatory data collected around the world. The IGRF is updated and determined by an international committee of geophysicists every 5 years. Secular variations in the Earth's magnetic field are incorporated into the determination of the IGRF.

The IGRF model is calculated before levelling using the following parameters:

IGRF model year: 2015, IGRF 15th generation
Date: variable according to date channel in database
Position: variable according to GPS WGS84 longitude and latitude
Elevation: variable according to magnetic sensor altitude derived from DGPS data

Tie-line levelling and micro-levelling of magnetic data

After applying the above corrections to the profile data, statistical levelling of control lines followed by full levelling of traverse lines and micro-levelling was applied as a standard procedure.

1. Microlevelling
    a. Decorrugation = 800m
    b. NL filter = 500 m

TMI recalculation

The outcome of processed magnetic data after all corrections and levelling is the Residual magnetic field (RMF).

Total magnetic intensity (TMI) is recalculated by adding the IGRF regional field back to RMF on a fixed date (2017/06/16) for each individual point at flown altitude. The corrected data is used to generate the Residual Magnetic Field (RMF) and Total Magnetic Intensity (TMI) grid.

Figure 14 shows the residual magnetic field of Buchans block.

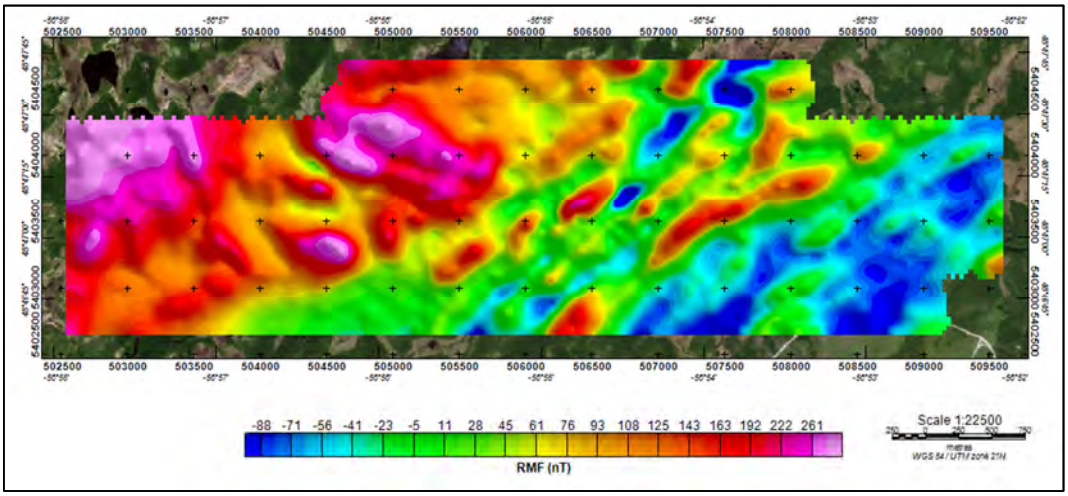


Figure 14 Residual Magnetic Field

Power Line Noise Intensity (PLNI)

The PLNI is a powerful tool for identifying power line noise effect on EM and magnetic data. The PLNI monitor values are derived from a frequency analysis of the raw Z-component EM data. For every low moment EM data block a PLNI value is obtained by Fourier transformation of the measured values for the latest low moment gate. The Fourier transformation is evaluated at the local power transmission frequency yielding the amplitude spectral density of the power line noise. In the present survey area no significant features originating from 60 Hz are present.

CAUTION - When evaluating the PLNI values one should be aware of the following factors that may give rise to anomalous PLNI patterns unrelated to the actual power line noise level:

- The low moment EM data are measured at a rate lower than the Nyquist criterion for the applied system bandwidth which means that some of the frequency components contained may represent aliased frequencies. However,

the considerable integration time of the latest low moment gate reduces this problem significantly.

- Other noise sources than power line noise may contribute to the total noise spectral density in the data at the power transmission frequency. When power line noise is present it tends to dominate all such other noise sources.
- The presented PLNI values are not corrected for fly height or frame angles, which means that adjacent lines crossing the same power line may not exhibit the same values of PLNI.

Figure 15 shows the PLNI of Buchans_SW block.

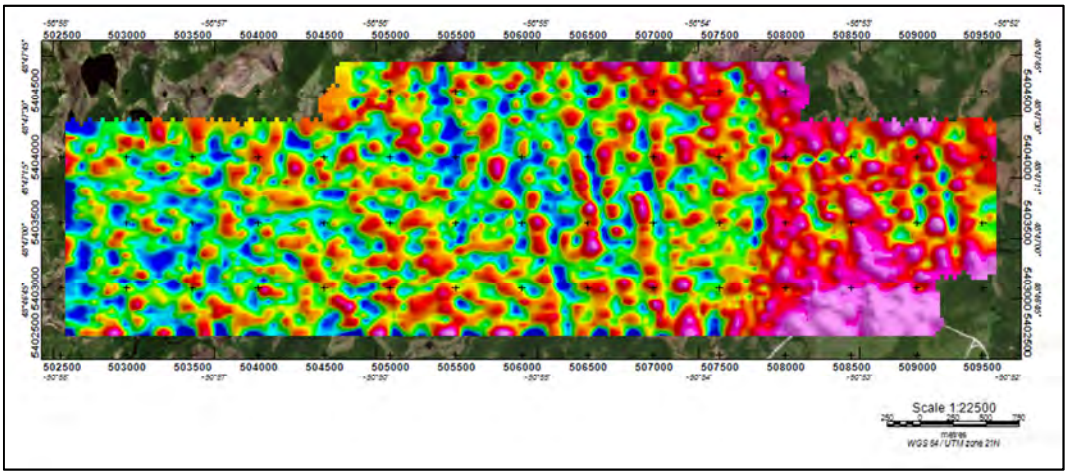


Figure 15 Power Line noise Intensity (PLNI) calculated for Buchans_SW block. Red colours indicate high intensity.

EM data

This section covers processing of EM data, including primary field correction (PFC) and filtering of EM data.

Primary Field Compensation (PFC)

The magnetic field coupling between the receiver coils and the transmitter loop is continuously hardware-monitored, providing a separate value for the magnetic field coupling during each transient sounding. These data are used for raw data correction in a separate post-processing step. The primary field compensation technique has proven stable and has routinely yielded a reduction of the primary field influence in very early time gates by a factor exceeding 50.

EM Filtering

The PFC data is the input for further processing. The data are normalized in respect to effective Rx coil area, Tx coil area, number of turns and current giving the unit [pV/(m^4*A)].

The EM data is filtered adaptively based on the signal-to-noise ratio. The applied EM filtering method is based on iterative weighted spline fitting routines, which operate in positive/negative symmetric transform spaces. The data weighting scheme relies on an extensive noise evaluation performed on the individual gate values of the raw data decays. Optimised sets of averaging filters are used for each measured moment and type of receiver coil in a stepwise averaging process. This allows for optimal suppression of motion induced noise as well as cultural noise components, while keeping track of the resulting data uncertainty.

The provided EM grids are corrected for variations in flying height. All grids are shifted to a level as if it was flown in 45 m above the ground.

No height correction has been applied to the raw EM data channels in the delivered Geosoft database and data file.

Figure 16 shows an example of the LM Z data of Buchans_SW block. Geosoft grids of EM Z channels are included in the digital data delivery.

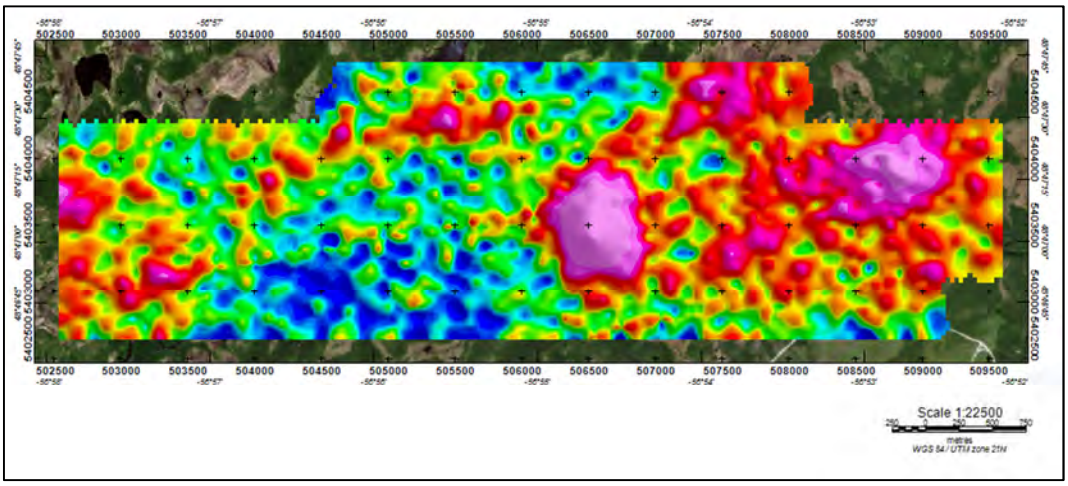


Figure 16. Low Moment Z coil (gate 13). Warm colours (red) represent high intensity, cold colours (blue) low intensity.

Inversion

In this section, the particulars of modelling and inversion of SkyTEM data from Buchans_SW will be described with reference to the more general material found in Appendix 2.

The SkyTEM data have been processed and inverted using spatially constrained inversion (SCI) in Aarhus Workbench, a unique software package initially developed at Aarhus University, Denmark. In this SCI algorithm a group of time-domain EM (TEM) soundings are inverted simultaneously using 1-D models. Each sounding yields a separate layered model, but the models are constrained laterally.

The result of the SCI inversion is a model section that varies smoothly along and across the profiles and yields a conductivity model that combines the very good shallow depth resolution offered by the low moment data and the larger depth of investigation from the high moment data. See Figure 17.

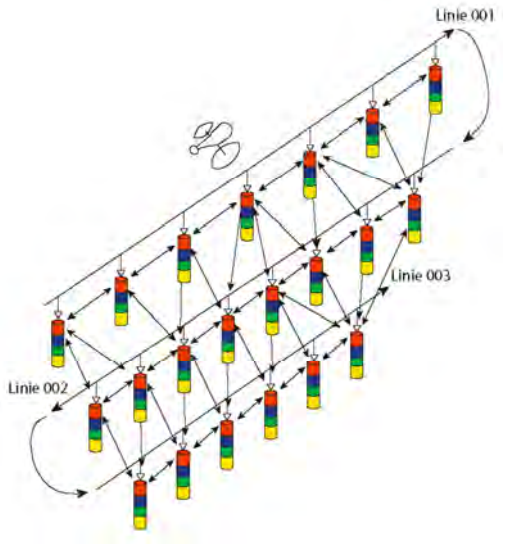


Figure 17. Schematic presentation of the SCI setup. Constraints connect not only soundings located along the flight line, but also those across them (figure from hgg.au.dk).

Initial model and optimisation norm

The SCI code is run in multi-layer, smooth-model mode in which the layer thicknesses are fixed and the data are inverted only for conductivity.

In the inversion the thickness of the first layer is set to 5 m and the depth to the top of the deepest layer boundary is 600 m. While computing the layer thicknesses, the first and last layer boundary scales the model thicknesses automatically using a log distribution. Thicknesses and depths to the top of each layer for the current project are given in the table below.

The input data to the inversion are the LM & HM moments of the Z-component of EM data. The initial model conductivity structure is a homogenous half-space model with an Auto Calculated starting conductivity.

Manually masking of data displaying coupling effects e.g. due to power lines is not part of the current project and therefore cultural effects in the EM data can be present in the final data base.

Layer #	Layer Thickness [m]	Depth to top of layer [m]
1	5.0	0
2	5.4	5.0
3	5.9	10.4
4	6.4	16.4
5	7.0	22.8
6	7.6	29.8
7	8.3	37.4
8	9.0	45.7
9	9.8	54.8
10	10.7	64.6
11	11.6	75.3
12	12.7	86.9
13	13.8	99.6
14	15.0	113.0
15	16.3	128.0
16	17.7	145.0
17	19.3	162.0
18	21.0	182.0
19	22.9	203.0
20	24.9	226.0
21	27.1	250.0
22	29.4	277.0
23	32.0	307.0
24	34.9	339.0
25	37.9	374.0
26	41.3	412.0
27	44.9	453.0
28	48.9	498.0
29	53.2	547.0
30	-	600.0

Table 15 Layer distribution of the multi-layer smooth inversion model.

Model Presentation - Model sections and maps

The models resulting from the inversion are presented as layer conductivity profiles and as grids and maps of mean conductivity in depth intervals in Geosoft and pdf format. Figure 18 and Figure 19 show examples of a layer conductivity profiles and maps respectively. All profiles, grids, images and maps are included in the digital data delivery.

Model Sections

The profile plots consist of four sections; the top section shows the inverted models, with topography, where the conductivity of the individual layers is colour coded according to the colour bar. The conductivity is shown on a logarithmic scale and conductive and resistive features appear with the same weight. The white shading in the analysis section indicates the estimated lower depth of investigation (DOI) and the gray curve the upper DOI. Where the colour fades into the white, the inverted conductivity is determined almost exclusively by the regularization, i.e. the conductivity is essentially undetermined. The measured and inverted flight elevation is shown with a black and blue line, respectively, above the model section.

Below the model section are two plots of the measured data (dots) together with the response of the inverted models (solid lines). LM is low moment data and HM is high moment data.

The bottom section shows the data residual (black line) of the inversions.

Blank sections in the profile indicate areas where the signal to noise ratio has been too low for any data to be used in the inversion. Essentially the resistivity in those sections can be considered as "Very high" (>1000 Ωm). Alternatively a man-made conductor has interfered with the signal which can also lead to data being discarded prior the inversion.

The quality of the inversion results can be evaluated by inspecting the residuals. The data residual is calculated by comparing the measured data with the response of the resulting model after inversion. If the residual is in the range of 1, the misfit between the response of the final model and the data is, on average, equal to the noise. If the residual is high, it might be caused by data that are noisier than the noise model takes into account. This can be seen where resistivity is very high and the signal consequently very low. A high data residual can also be due to the inconsistency between the 1D model assumed in the inversion and the 2D/3D character of the real world. These are found primarily at the edges of sharp lateral conductivity contrasts. Finally, coupling effects due to power lines and other manmade conductors can also be a source of a high residual.

Figure 18 Example of section plot. From top to bottom: resistivity section with flight height and Depth of Investigation (DOI), LM gate plot (data=dots, model=line), HM gate plot (data=dots, model=line), residual.

Layer conductivity maps

The layer conductivity maps show the inverted resistivity for each of the model layers. As the thickness of the model layers increases downwards the maps represent a varying thickness interval. The depth intervals for each layer are stated on the maps in meters below the surface.

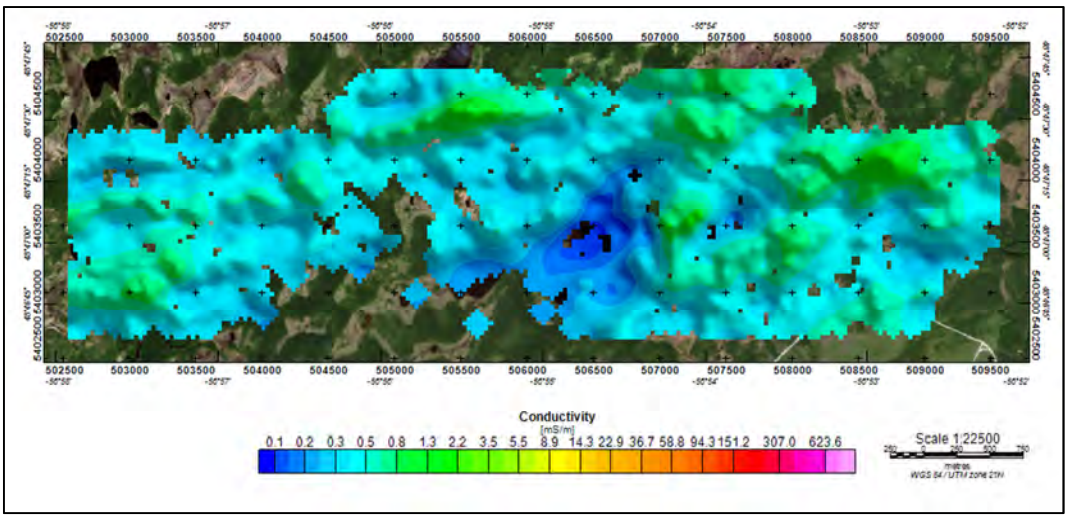


Figure 19. Modelled Layer Conductivity of layer 6 (depth 29.7 – 37.3 m).

References

Aarhus University, n.d., Guide to 1D-LCI inversion.

Auken, E., Foged, N. and Sørensen, K., 2002, Model recognition by 1-D laterally constrained inversion of resistivity data: Proceedings – New Technologies and Research Trends Session, 8th meeting, EEGS-ES.

Auken, E., Christiansen, A. V., Jacobsen, B. H., Foged, N., and Sørensen, K. I., 2005, Piecewise 1D Laterally Constrained Inversion of resistivity data: *Geophysical Prospecting*, 53, 497–506.

Christiansen, A.V. and Auken, E., 2012, A global measure for depth of investigation: *Geophysics,* vol 77, No. 4, 171-177.

Sattel, D., 2005, Inverting airborne electromagnetic (AEM) data with Zohdy's method, Geophysics, 70, G77-G85.

Viezzoli, A., Christiansen, A.V., Auken, E. and Sørensen, K., 2008, Quasi-3D modeling of airborne TEM data by spatially constrained inversion: *Geophysics,* vol 73, No. 3, F105-F113.

Appendix list

Appendix 1: Instruments

Instrument positions

The instrumentation involves a time domain electromagnetic system, two inclinometers, two altimeters and three DGPS'.

The measurements were carried out, using a setup as described below.

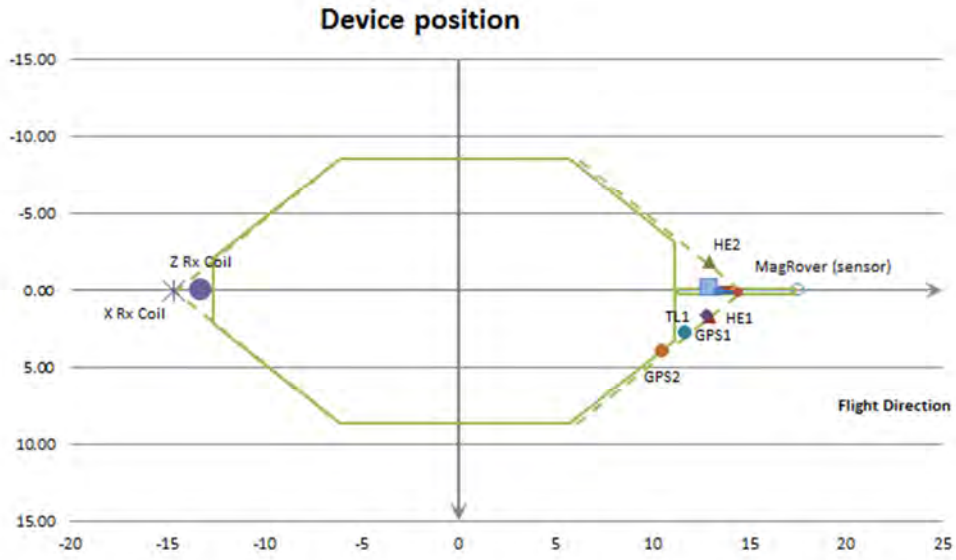


Figure 1 Sketch showing the frame and the position of the basic instruments. The green line defines the transmitter loop. The horizontal plane is defined by (x, y).

The location of instruments in respect to the frame is shown in Figure 1 and is given in (x, y, z) coordinates in the table below.

X and y define the horizontal plane. Z is perpendicular to (x, y). X is positive in the flight direction, y is positive to the right of the flight direction, and z is positive downwards.

The generator used for powering of the transmitter is ~20 m below the helicopter.

Device	X	Y	Z
DGPS1 (EM)	11.68	2.79	-0.16
DGPS2 (EM)	10.51	3.95	-0.16
HE1 (altim.)	12.94	1.79	-0.12
HE2 (altim.)	12.94	-1.79	-0.12
Inclinometer 1	12.79	1.64	-0.12
Inclinometer 2	12.79	1.64	-0.12
RX (Z Coil)	-13.30	0.00	-2.00
RX (X Coil)	-14.65	0.00	0.00
Mag sensor	17.76	0.00	-0.43

For the location of instruments see Figure 1.

Transmitter

The time domain transmitter loop can be described as an octagon with the corners listed below:

X	Y
-12.64	-2.13
-6.15	-8.59
5.74	-8.59
11.13	-3.19
11.13	3.19
5.74	8.59
-6.15	8.59
-12.64	2.13

The total area of the transmitter coil defined by the corner points is 337.04 m² and 67.87 m in circumference.

The key parameters defining the transmitter set up are:

Low Moment

Parameter	Value
Number of transmitter turns	2
Transmitter area	337.04 m²
Peak current	6 Amp
Peak moment	~ 4,000 NIA
Repetition frequency	210 Hz
On-time	800 µs
Off-time	1581 µs
Duty cycle	33 %
Wave form	Square

High Moment

Parameter	Value
Number of transmitter turns	12
Transmitter area	337.04 m²
Peak current	120 Amp
Peak moment	~500,000 NIA
Repetition frequency	30 Hz
On-time	4000 µs
Off-time	12667 µs
Duty cycle	24 %
Wave form	Square

Figure 2 The 337.04 m² frame in production mode.

Receiver system

The decay of the secondary magnetic field is measured using two independent active induction coils. The Z coil is the vertical component, and the X coil is the horizontal in-line component. Each coil has an effective receiver area of 105 m² (Z), 115 m² (x).

The receiver coils are placed in a null-position:

Z coil (x, y, z) = (-13.30 m, 0.0 m, -2.00 m)
X coil (x, y, z) = (-14.65 m, 0.0 m, 0.0 m)

In the null-position, the primary field is damped with a factor of 0.01 on HM and due to PFC correction it can be neglected on LM.

Figure 3 Rudder containing the Z coil located in the top part of the tower.

The key parameters defining the receiver set up are:

Receiver parameters		
Sample rate		All decays are measured
Number of output gates		37 (HM) and 28 (LM)
Receiver coil low pass filter		210 kHz (Z-coil) and 250 kHz (X-coil)
Receiver instrument low pass filter		300 kHz
Repetition frequency	LM HM	210 Hz 30 Hz
Front gate	LM HM	0.0 µs 370 µs

Receiver gate times are measured from the start of the transmitter current turn-off. A complete list describing gate open, close and centre times are listed in Appendix 2.

Inclination

Instrument type: Bjerre Technology

The inclination of the frame is measured with 2 independent inclinometers. The x and y angles are measured 2 times per second in both directions. The inclinometers are placed in the rear of the frame as close to the z coil as possible, see Figure 1.

The angle data are stored as x, y readings. X is parallel to the flight direction and positive when the front of the frame is above horizontal. Y is perpendicular to the flight direction and negative when the right side of the frame is above horizontal.

The angle is checked and calibrated manually within 1.0 degree by use of a level meter.

DGPS airborne unit and base stations

Chipset: OEMV1-L1 14-channel rate.
Antenna: Trimble, Bullet III GPS Antenna

The differential GPS receiver is on top of the boom in front of the frame.

The DGPS delivers one dataset per second. The raw coordinates are given in Latitude/Longitude, WGS84.

The uncertainty in the xyz-directions is ± 1 m after processing.
The processed DGPS data is combined with the EM data in the xyz-files, giving the precise position.

DGPS parameters	
Sample rate	1 Hz
Uncertainty	± 1 m

Altimeter

Instrument type: MDL ILM300R

Two independent laser units mounted on the frame measuring the distance from the frame to the ground, see Figure 1

Each laser delivers 30 measurements per second, and covers the interval from 0.2 m to approximately 200 m.

Dark surfaces including water surfaces will reduce the reflected signal. Consequently, it may occur that some measurements do not result in useful values.

The altimeter measurements are given in meters with two decimals. The uncertainty is 10 - 30 cm. The lasers are checked on a regular basis against well-defined targets.

Laser parameters	
Sample rate	30 Hz
Uncertainty	10 - 30 cm
Min/ max range	0.2 m / 200 m

Magnetometer airborne unit

Instrument type: Geometrics G822A sensor and Kroum KMAG4 counter.

The Geometrics G822A sensor and Kroum KMAG4 counter is a high sensitivity Cesium magnetometer. The basic of the sensor is a self-oscillating split-beam Cesium vapor (non-radioactive) Principe, which operates on principles similar to other alkali vapor magnetometers.

The sensitivity of the Geometrics G822A sensor and Kroum KMAG4 counter is stated as <0.0005 nT/√Hz rms. Typically 0.002 nT P-P at a 0.1 second sample rate, combined with absolute accuracy of 3 nT over its full operating range.

The magnetometer is synchronized with the TEM system. When the TEM signal is on, the counter is closed. In the TEM off-time the magnetometer data is measured from 100 microseconds until the next TEM pulse is transmitted. The data are averaged and sampled as 60 Hz.

Parameter	Value
Sample frequency	60 Hz (in between each HM EM pulse)
Magnetometer on	HM Cycles
Magnetometer off	LM Cycles

Magnetometer base station

Instrument type: GEM Proton.

The GEM Proton is a portable high-sensitivity precession magnetometer.

The GEM Proton is a secondary standard for measurement of the Earth's magnetic field with 0.01 nT resolutions, and 1 nT absolute accuracy over its full temperature range.

The base station data are sampled with 1 Hz frequency.

Appendix 2: Introduction to Spatially Constraint Inversion (SCI)

Model and inversion routine

The SkyTEM data have been processed and inverted using a spatially constrained inversion (SCI) in Aarhus Workbench, a unique software package initially developed at Aarhus University, Denmark. In the SCI algorithm, a group of time-domain EM (TEM) soundings are inverted simultaneously using 1-D models (Auken et al. 2002 & 2005, Viezzoli et al. 2008). Each sounding yields a separate layered model, but the models are constrained spatially on resistivity, see Figure 1 .

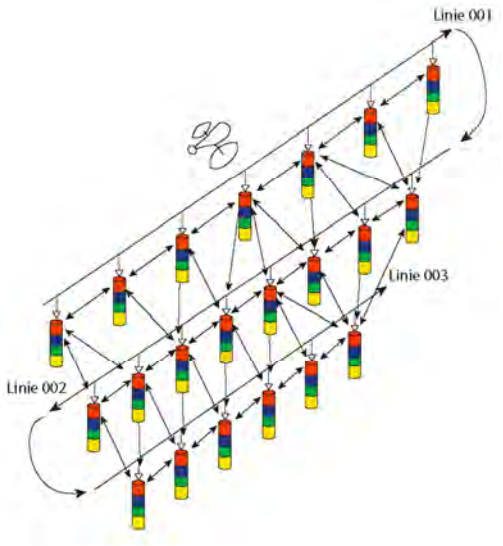


Figure 1Figure 1 Schematic presentation of the SCI setup. Constraints connect not only soundings located along the flight line, but also those across them (figure from hgg.au.dk).

The result of the SCI inversion is a quasi-3D model that varies smoothly along and across the profiles. The SCI inversion is capable of simultaneously inverting the interleaved HM and LM measurements, yielding a conductivity model that combines the very good shallow depth resolution offered by the low moment data and the larger depth of investigation from the high moment data.

The SCI code is run in multi-layer, smooth-model mode, in which the layer thicknesses are fixed and the data are inverted only for resistivity. The SCI smooth-model inversion typically uses 20-30 layers. Smoothness constraints are applied on the variation of resistivity with depth, in additional to the lateral constraints between adjacent models. Multi-layer smooth-model inversion is slower to compute, but is usually able to provide a very close fit to the observed data.

In the model set-up the thickness of the first layer and the depth to the top of the deepest layer boundary is given. While computing the layer thicknesses, the first and last layer boundary scales the model thicknesses automatically using a log distribution.

The input data to the inversion are the LM & HM moments of the Z-component of EM data. Both moments are combined in a single inversion to increase the depth resolution. The initial model resistivity structure is a homogenous half-space model with an Auto Calculated starting resistivity.

Constraints are given as factors, i.e. a factor of 1.1 means that the parameter can vary between the starting value divided by/times 1.1 (Aarhus University).
The SCI inversion allows for horizontal and vertical constraints to be set for resistivities.
Horizontal constraints are scaled by distance using a reference distance and power function:

$$C = 1 + (C_{opt} - 1)\left(\frac{\Delta GPS}{Dist_{ref}}\right)^{n}$$

Where C is the used constraint, C_{opt} is the optimal constraint at a sounding distance of $Dist_{ref}$ and ΔGPS is the actual sounding distance.
The horizontal constraints are initially scaled by distance and a power function. Inversion for flight altitude is included after the first 5 inversion runs. The constraint on the processed flight height is set low and is only allowed a very limited variation.
The methodology for calculating the DOI is based on a recalculated Jacobian matrix from a 1D model (Christiansen and Auken, 2012). Working with global and absolute threshold values requires a relative, data-type, independent relation between the model space and data space, which we obtain by working in the logarithmic model and data spaces. For a given model, the DOI calculations solely include information from the part of the Jacobian relating to the observed data. This means that lateral or vertical model constraints or a priori information, which also contributes information to the model, is not included. The workflow includes the following steps:
1) Starting from a measured data set, the data is inverted into a smooth model. The inversion includes the data uncertainty, estimated from the data stack, and the regularization method of the chosen inversion algorithm.
2) The Jacobian for the sub-discretized model is calculated.
3) The Jacobian is finally used to compute the cumulated sensitivities from which we can deduct the DOI.

Data and noise model

The inaccuracy of TEM data is influenced by the ambient noise. This noise is reduced by selective stacking of delay time series and by applying appropriate filters in the receiver system.

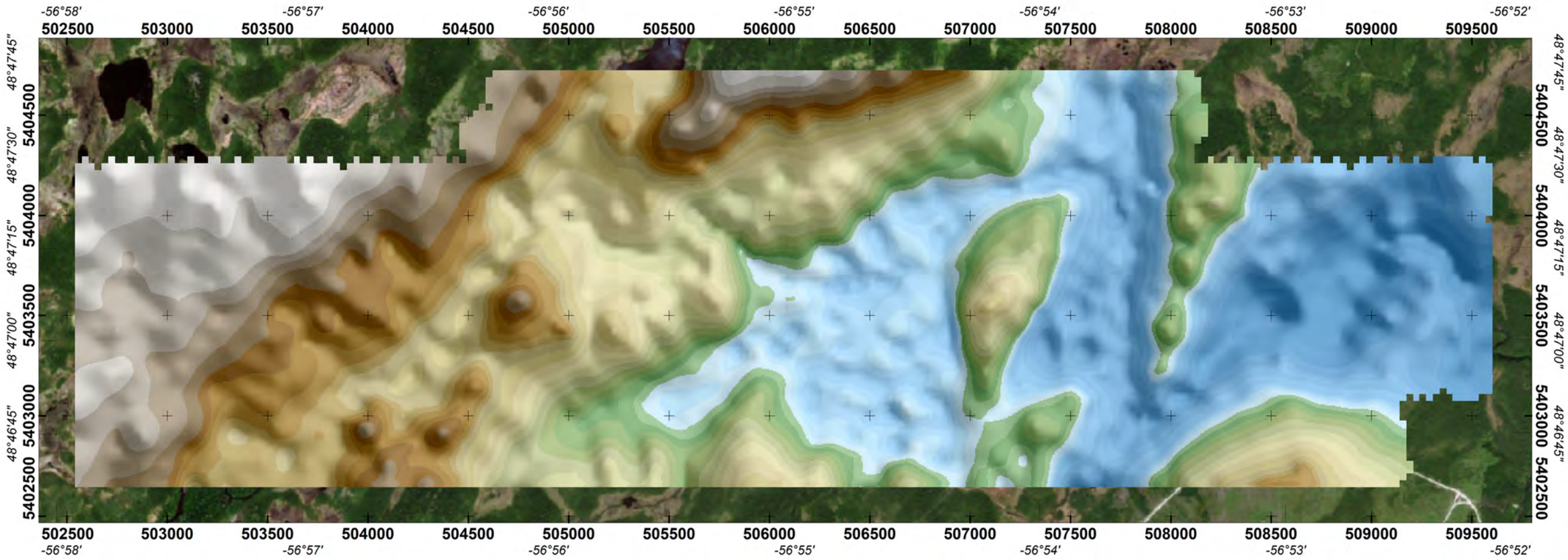
Data insufficiency

For SkyTEM data, the insufficiency lies primarily in the limited delay time range that can be obtained. The earliest obtainable time gate is determined by the

turnoff of the Tx current, and the latest useful time gate is determined by the signal to noise ratio. Increasing the Tx moment will give better measurements at late times, and thus improve the depth penetration, but also increase the turnoff time and thus remove early-time gates, thereby making the near-surface resolution poorer. This trade-off is solved by transmitting an alternating sequence of (1) a low moment that can be turned off quickly to give good near-surface resolution, and (2) a high moment that will improve the signal-to-noise ratio at late times, thus improving depth penetration.

Model inconsistency

When using 1D models in the interpretation of SkyTEM data, inconsistency arises where the lateral gradient of conductivity is not small, e.g. typically in mining applications. However, also in environmental investigations, inconsistencies can arise, typically where near-surface good conductors have abrupt boundaries. Often such inconsistency is indicated by the data residual being high and one should look upon the inversion results with some caution at these locations. 3D effects can also reveal themselves by the so-called 'pant legs', i.e. conductive or resistive structures projecting at an angle of approximately 30 degrees from the horizontal at the edges of high contrast structures.



SKYTEM

Airborne Geophysical Survey

In the region of:

Buchans_SW (Newfoundland, Canada)

Digital Elevation Model

243 248 251 253 254 256 259 264 269 275 278 282 289 295

DEM (m)

Scale 1:22500

250 0 250 500 750

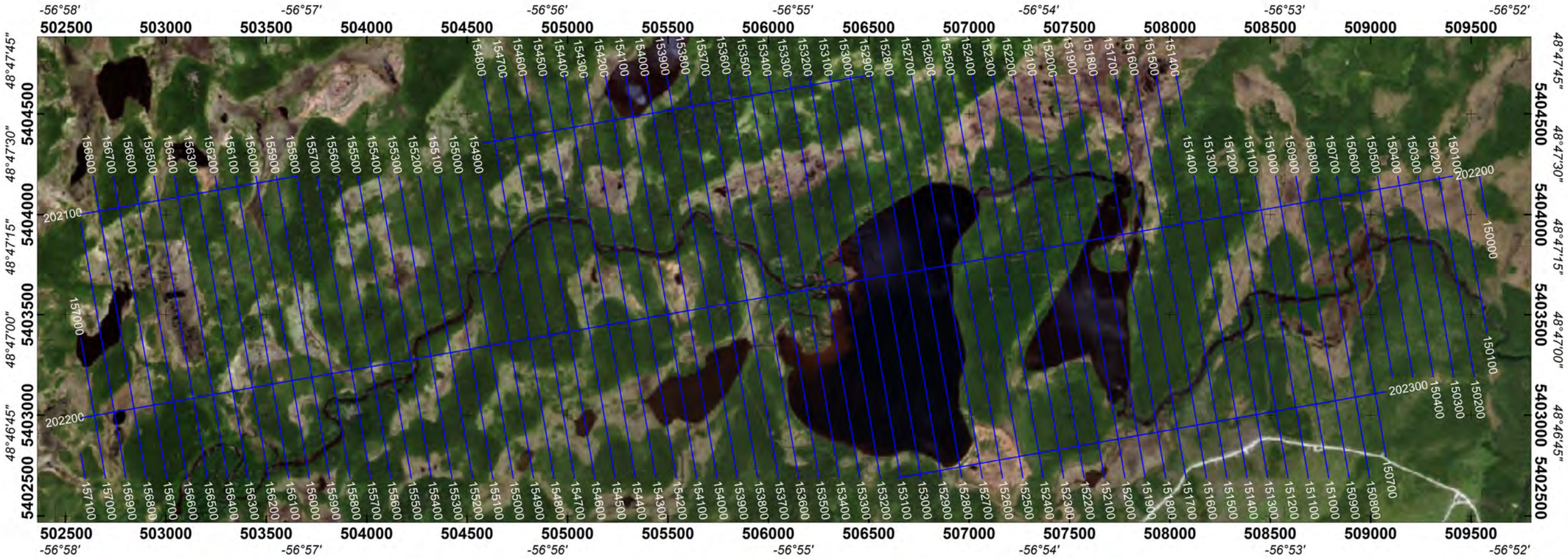
metres

WGS 84 / UTM zone 21N

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23



SKYTEM

Scale 1:22500

250 0 250 500 750

metres

WGS 84 / UTM zone 21N

Airborne Geophysical Survey

In the region of:

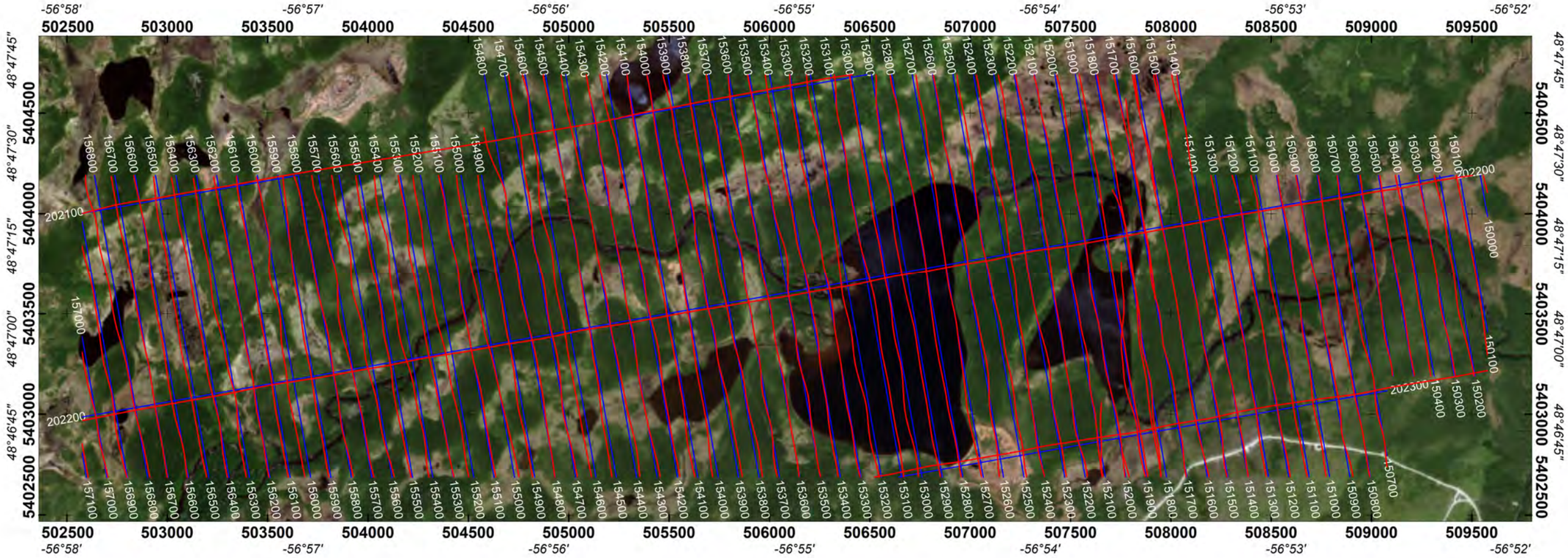
Buchans_SW (Newfoundland, Canada)

Planned Survey Lines

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23



SKYTEM

Scale 1:22500

250 0 250 500 750

metres

WGS 84 / UTM zone 21N

Airborne Geophysical Survey

In the region of:

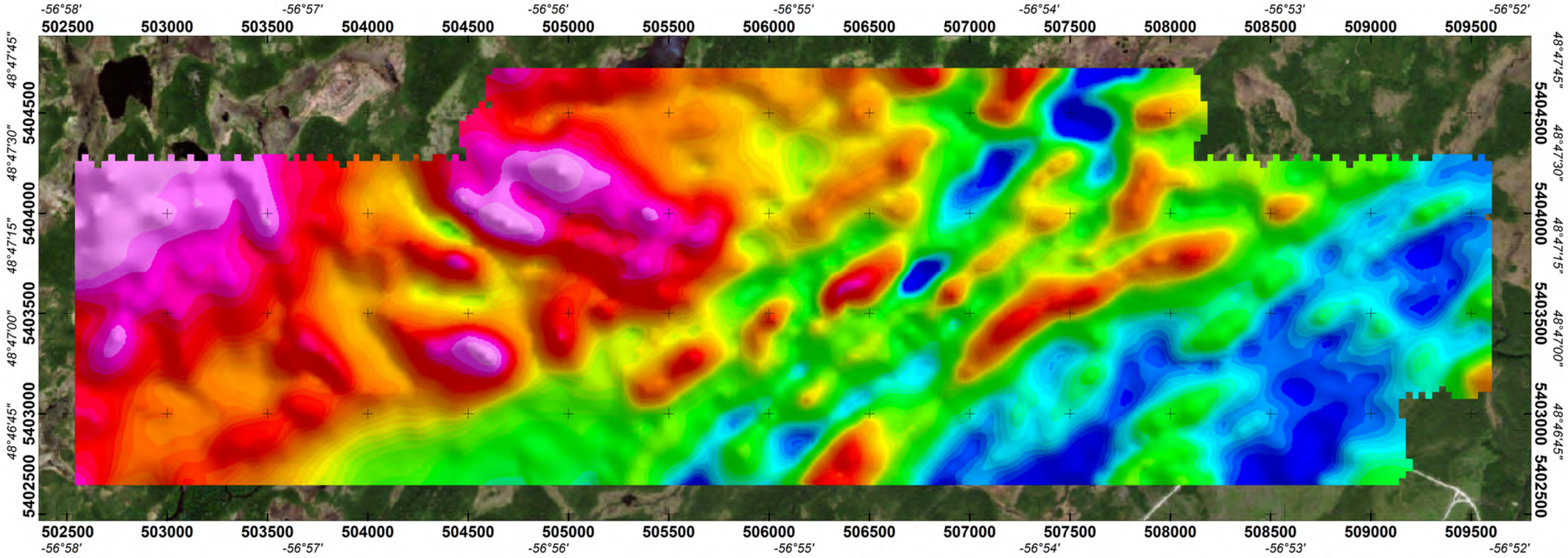
Buchans_SW (Newfoundland, Canada)

Flight Path

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23



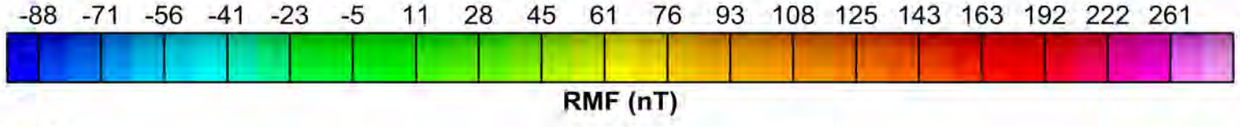
SKYTEM

Airborne Geophysical Survey

In the region of:

Buchans_SW (Newfoundland, Canada)

Residual Magnetic Field



Scale 1:22500

250 0 250 500 750

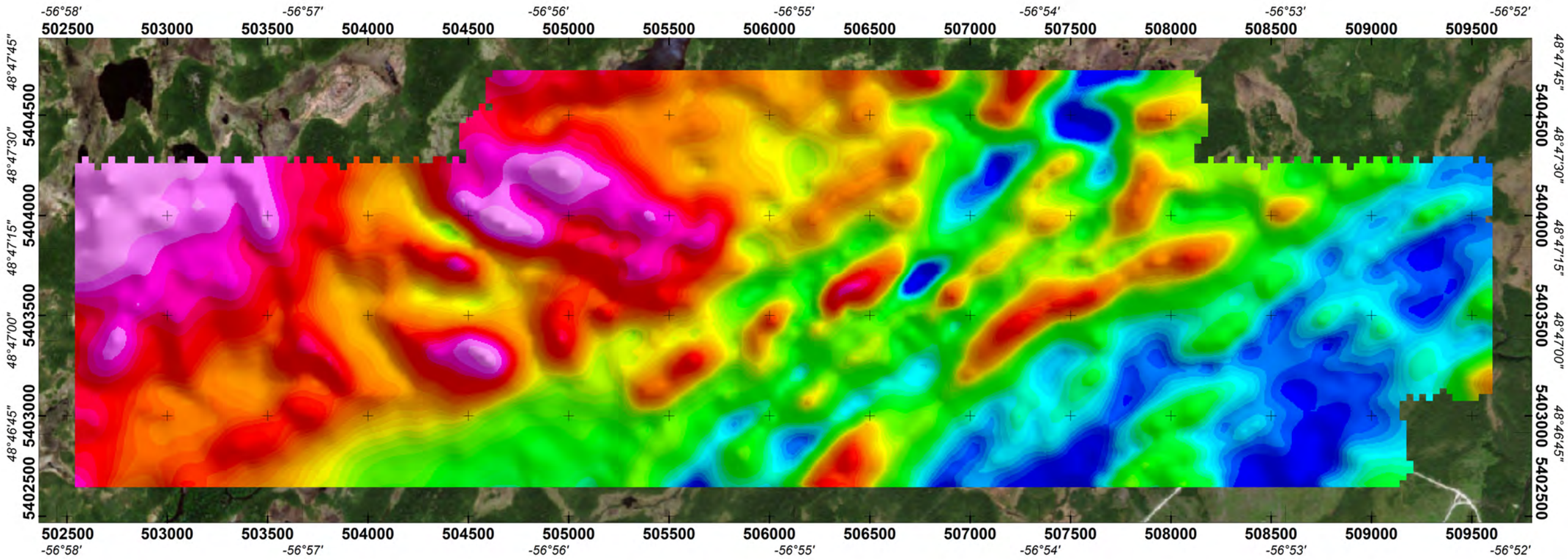
metres

WGS 84 / UTM zone 21N

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23



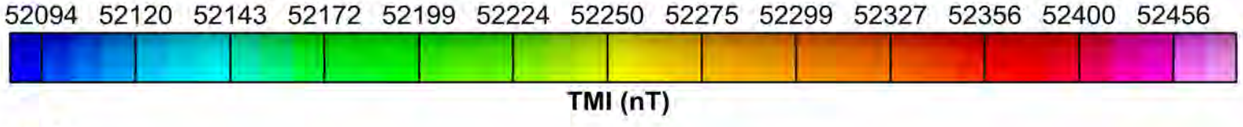
SKYTEM

Airborne Geophysical Survey

In the region of:

Buchans_SW (Newfoundland, Canada)

Total Magnetic Intensity



Scale 1:22500

250 0 250 500 750

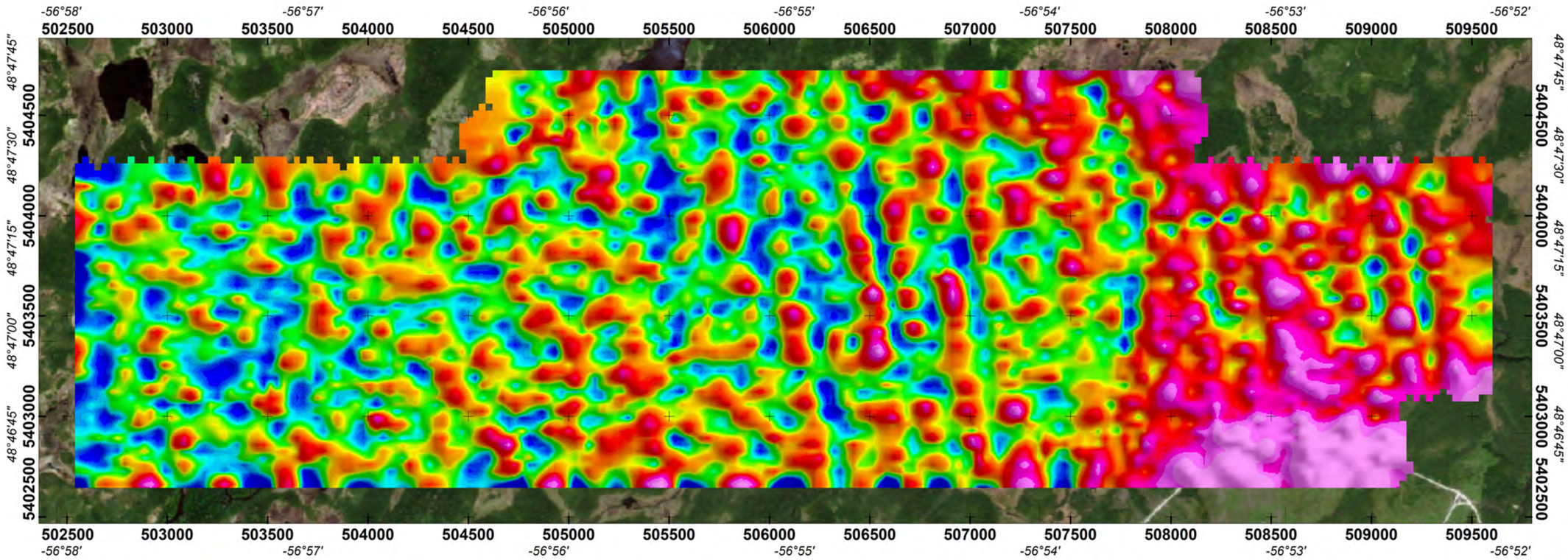
metres

WGS 84 / UTM zone 21N

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23



SKYTEM

Scale 1:22500

250 0 250 500 750

metres

WGS 84 / UTM zone 21N

Airborne Geophysical Survey

In the region of:

Buchans_SW (Newfoundland, Canada)

Power Line Noise Intensity

(Red colours indicate high intensity)

Client: Ubique Minerals Ltd.

Contractor: Skytem Surveys ApS
Denmark

2017/08/23

APPENDIX V

2017 RDF Consulting Report

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UBIQUE MINERALS

BUCHANS BASE METAL PROJECT

PRELIMINARY GEOPHYSICAL AIRBORNE ASSESSMENT

OCTOBER 29, 2017

BY: RDF CONSULTING LTD.

INTRODUCTION

RDF Consulting Ltd. was contracted by Ubique Minerals to perform a review of a recent SKYTEM Airborne geophysical survey over its Property located south of the historical Buchans Mines located in the Buchans area of Newfoundland. The survey consisted of 140 line kilometers of magnetometer and electromagnetic data collection on 100 meter spaced flight lines. Lines were flown at an azimuth of 150 degrees.

The geology of the property is mapped as similar volcanic units that host the world class, high-grade Buchan's type deposits. Buchans style deposits (Kuroko type) are notoriously difficult to find as geophysically they are generally weak to moderate conductors. With that said, they can be quite high grade and large.

The following summary provides a cursory interpretation of the airborne data.

MAGNETICS and GEOLOGY

Figure 1 below illustrates the results of the total field magnetics map produced from the airborne database. Based on the total field magnetic data, it is evident that there is a significant geological contact that runs NE-SW through the project area that generally follows the road. Figure 2 illustrates the first vertical derivative of the total magnetic field (highlighting the shallow magnetic features). Several magnetic high and low magnetic features of interest can be noted to the north of this contact and to the south. For comparison purposes between the geophysical response and Government mapped geology, Figure 3 has been produced. All geological units are classified as differentiated Buchan's Group volcanics. It can be noted that the geology and geophysics do not correlate well in many locations, suggesting that revisions may be required to some of the geological contacts and that the mapping is inaccurate. The strong NE trending magnetic responses outlined in the first derivative are not noted in the geology within the southern portions of the property. As the mapping is generally performed on a regional scale, one can expect discrepancies between the two.

Figure 4 illustrates the documented drill holes located within and surrounding the Property area. Twenty-five drill holes occur with in the Property boundary. No work has been done to determine if any of these holes had significant base metal intercepts.

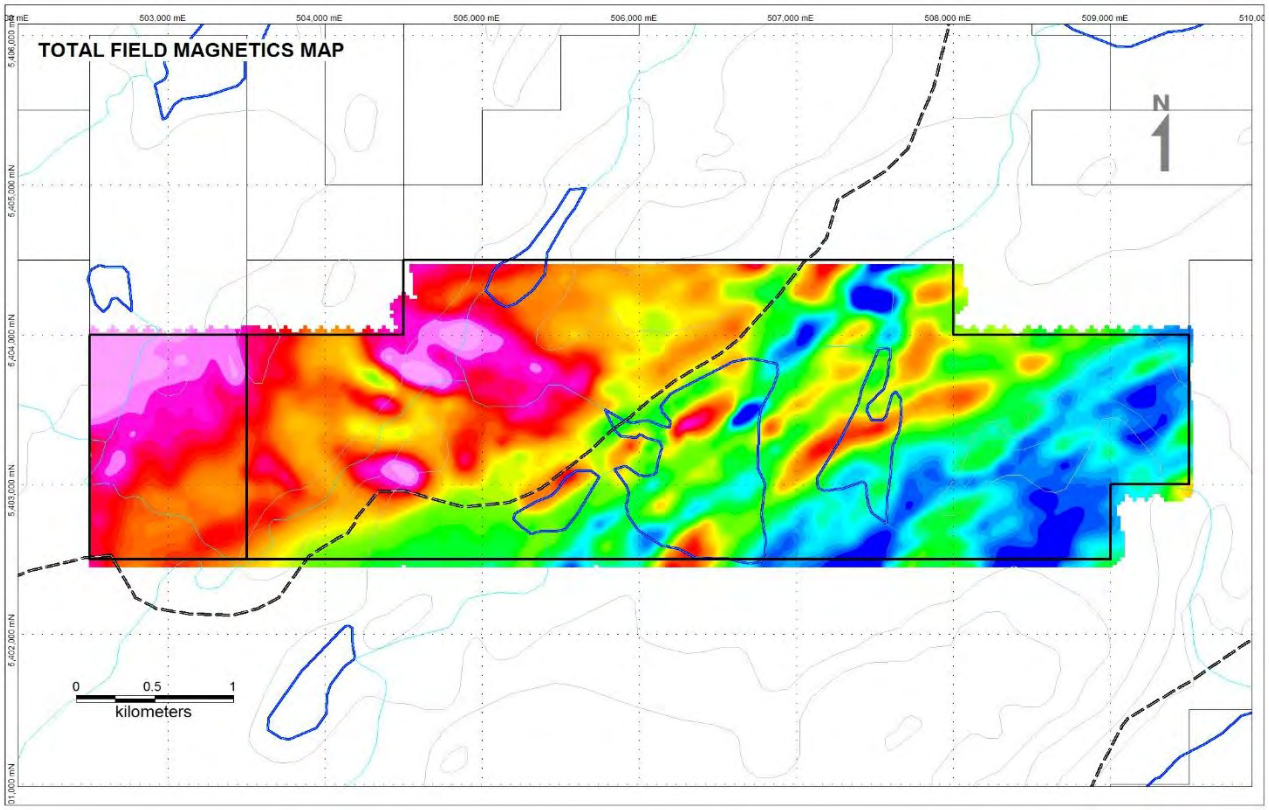

Figure 1: Total Field Magnetics Map

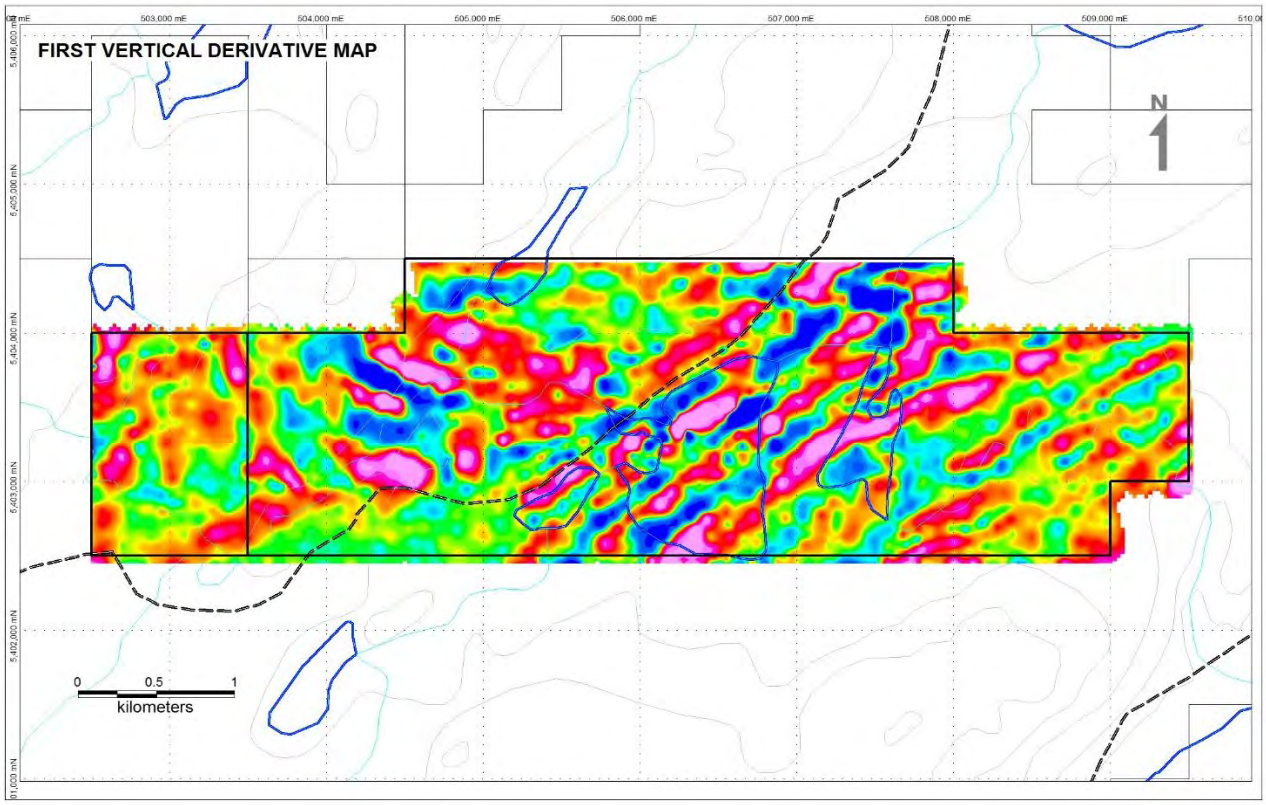

Figure 2: First Vertical Derivative of TMI Map

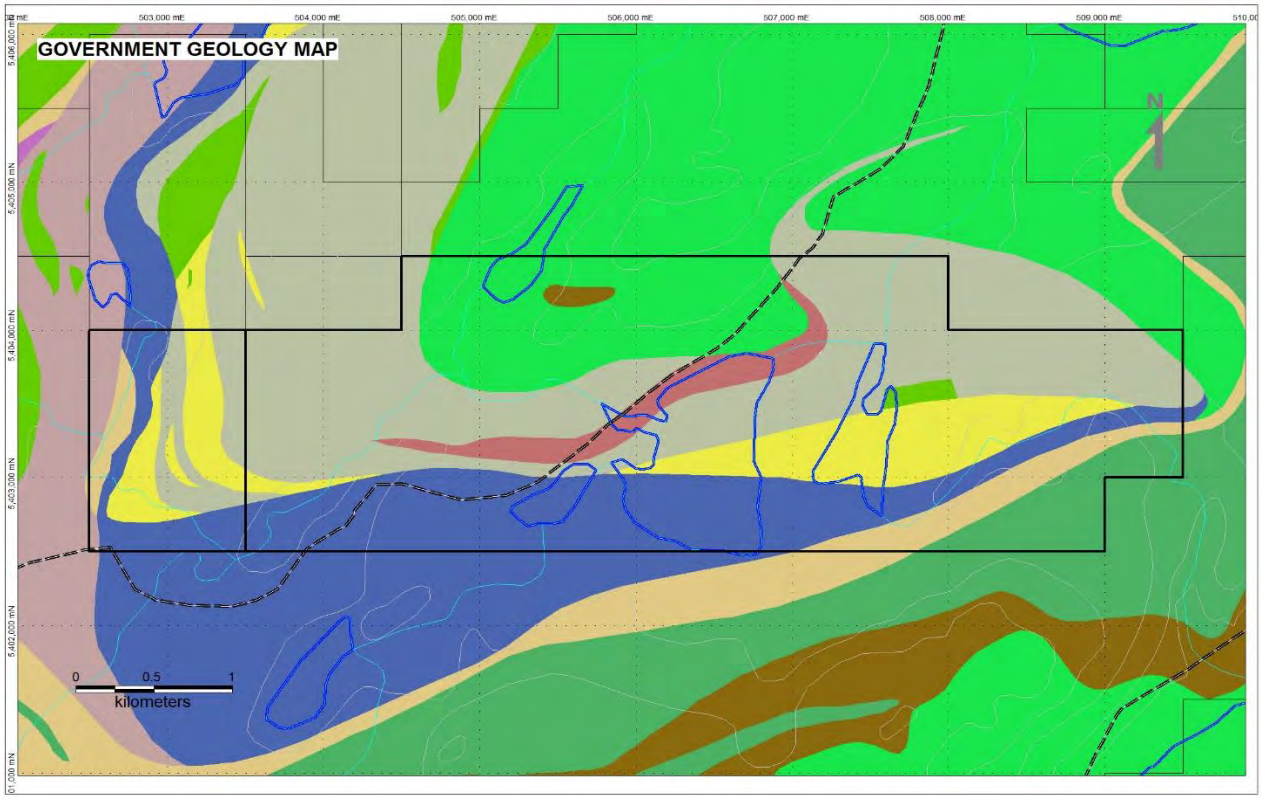

Figure 3: Government Geology Map

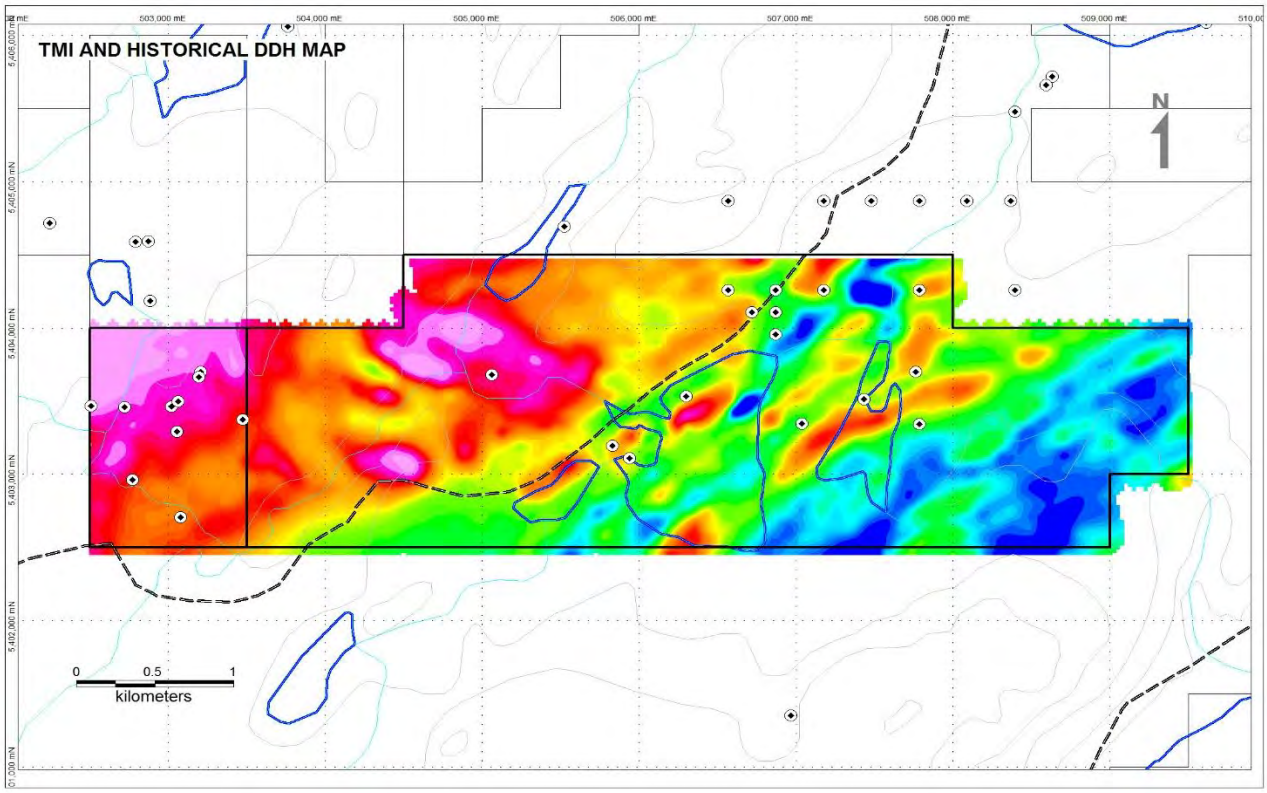

Figure 4: TMI Magnetics and Historical Drill Holes

ELECTROMAGNETIC DATA

The electromagnetic data collected over the Property highlights one priority target of interest. Although other weaker targets of interest do exist, only one EM target would be considered a priority and has been highlighted on the map below. Figure 5 below illustrates the Z field for a selected mid-range channel. It should be noted that this anomaly appears to weaken at depth based on the profiles for the later channels suggesting that it has a limited depth extent. The anomaly occurs between flight lines 152701 and 153401, centered at NAD27/Zone 21, 506600E/5403500N and is characterized by a large circular anomaly that occurs under a pond as shown on Figure 5. Figure 6 illustrates profiles for flight line 153201 related to the anomaly. The strongest response occurs at 506345E/5403138. Figure 7 has been provided to show weaker, shallower targets that require further investigation. These responses are derived from the earlier time channels and thus shallower source.

The Inversion data provided by SKYTEM, suggests that this anomaly has a substantial depth extent even though the conductivity maps and profiles for all channels suggest otherwise. It should be noted that it is not uncommon for the Inversion of EM data to place anomalies much deeper than their actual source. Caution must therefore be taken with the inversion models.

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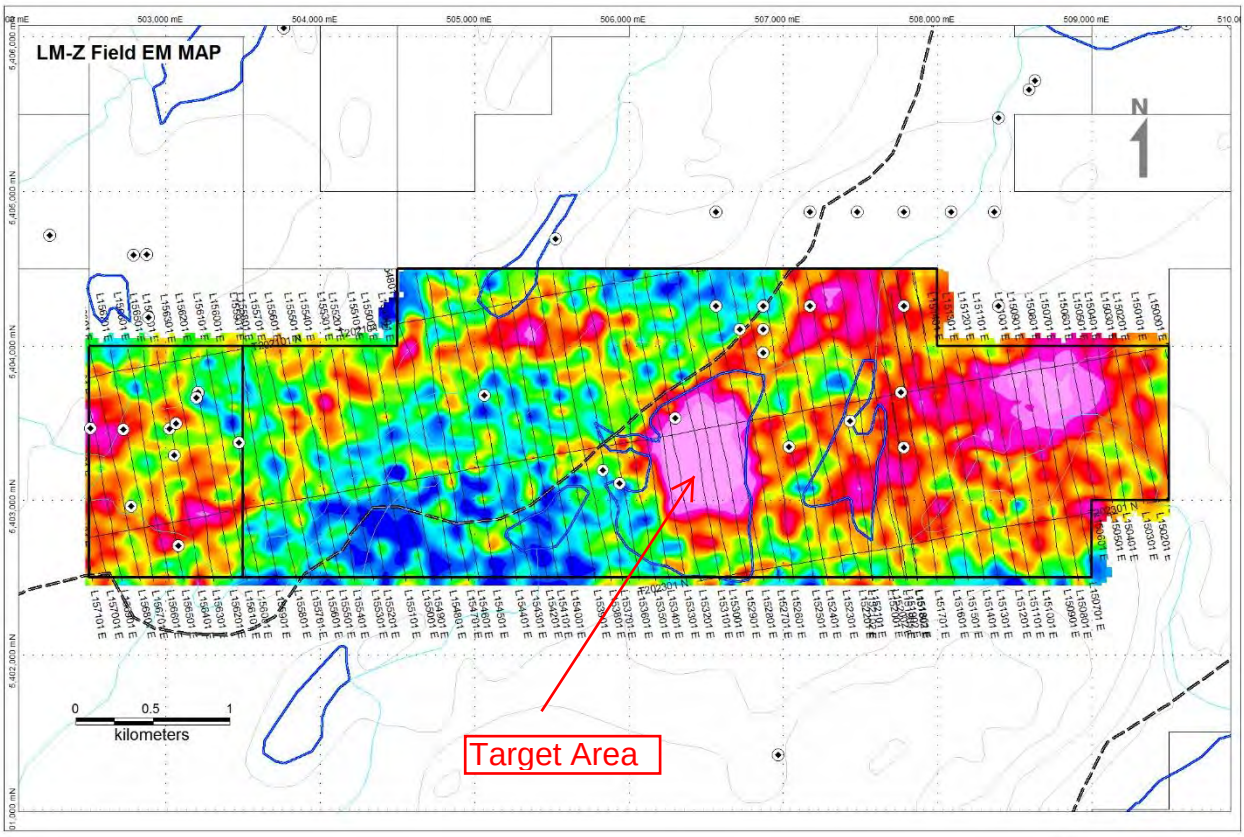


Figure 5: EM Response (Z Field) and Historical Drill Holes

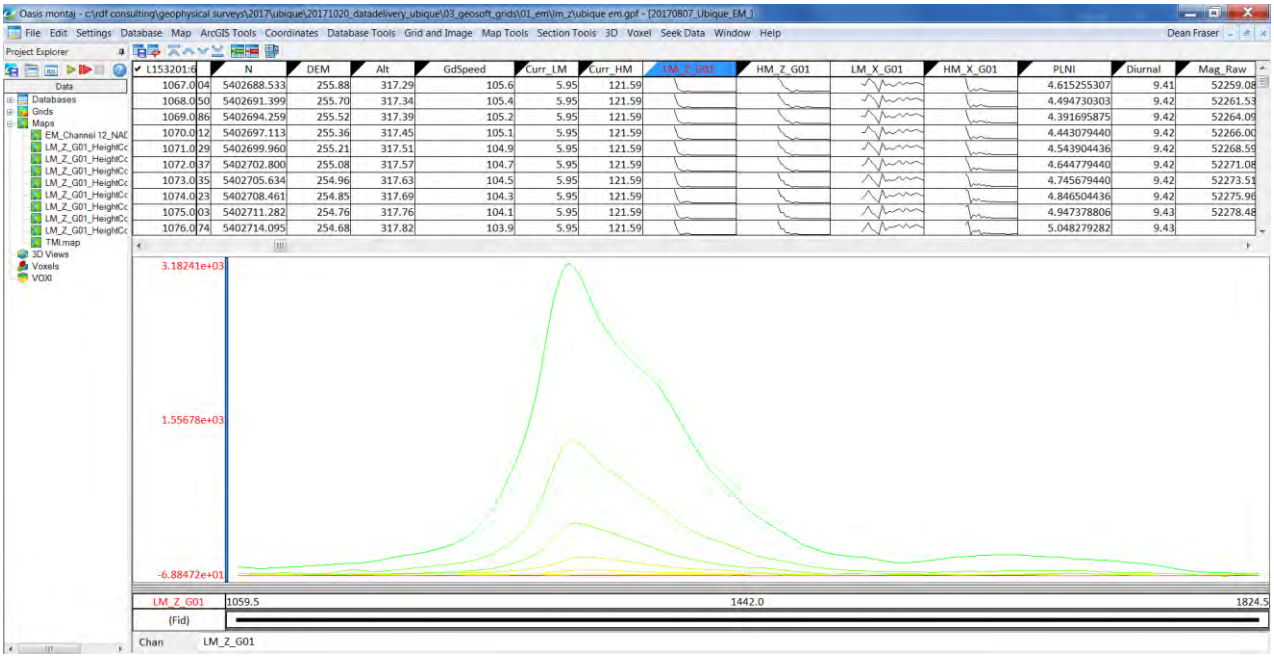


Figure 6: EM Profile Response (LM_Z Field)

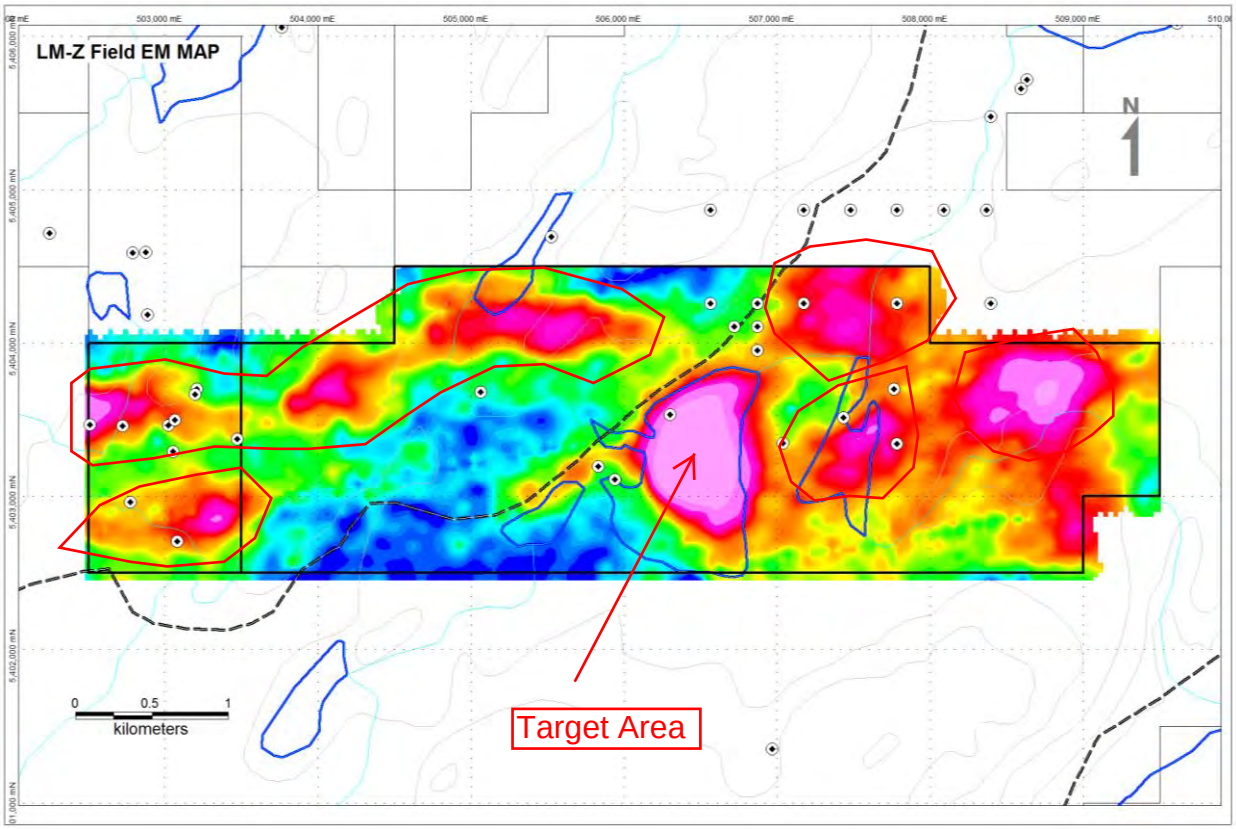


Figure 7: EM LM_Z (Channel 10 Response)

CONCLUSION

Additional work is required on the airborne dataset and its relevance to local geology and known mineralization in the area. A close examination of the correlation between the magnetic features noted in the dataset with the EM anomalies is necessary. There appears to be a significant variation in geology located in the area of the main target identified by the airborne survey.

It is worth noting that many features can cause weak EM responses. These include conductive lake bottoms, clay layers, conductive lithologies and actual mineralization. Additional field work is required to fully understand the geology of the area. It is also recommended that lake bottom sediment samples and localized soil sampling along with additional ground geophysics be performed in this area to further justify the validity of the airborne target. A small ground IP, EM or gravity survey may be required to further delineate potential drill targets. A review of all historical data for this area should be undertaken. EM Plate modeling should be performed prior to any drilling program.

APPENDIX VI

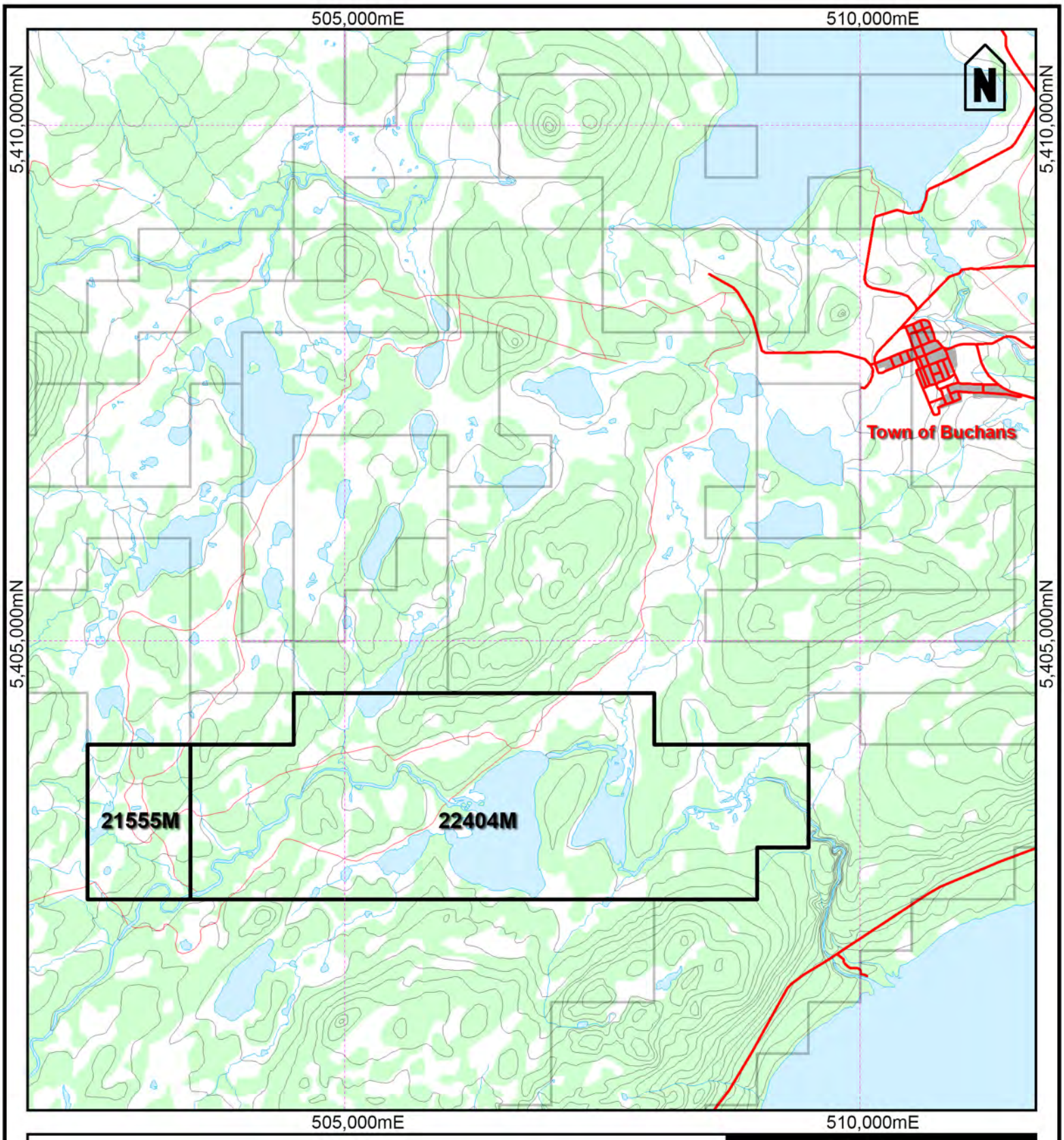
Maps & Figures

-50 0 50 100 150

Kilometres

Buchans Wileys Property Location Map

21555M & 22404M	NAD 27-Zone 21
1:3,000,000	Figure 1

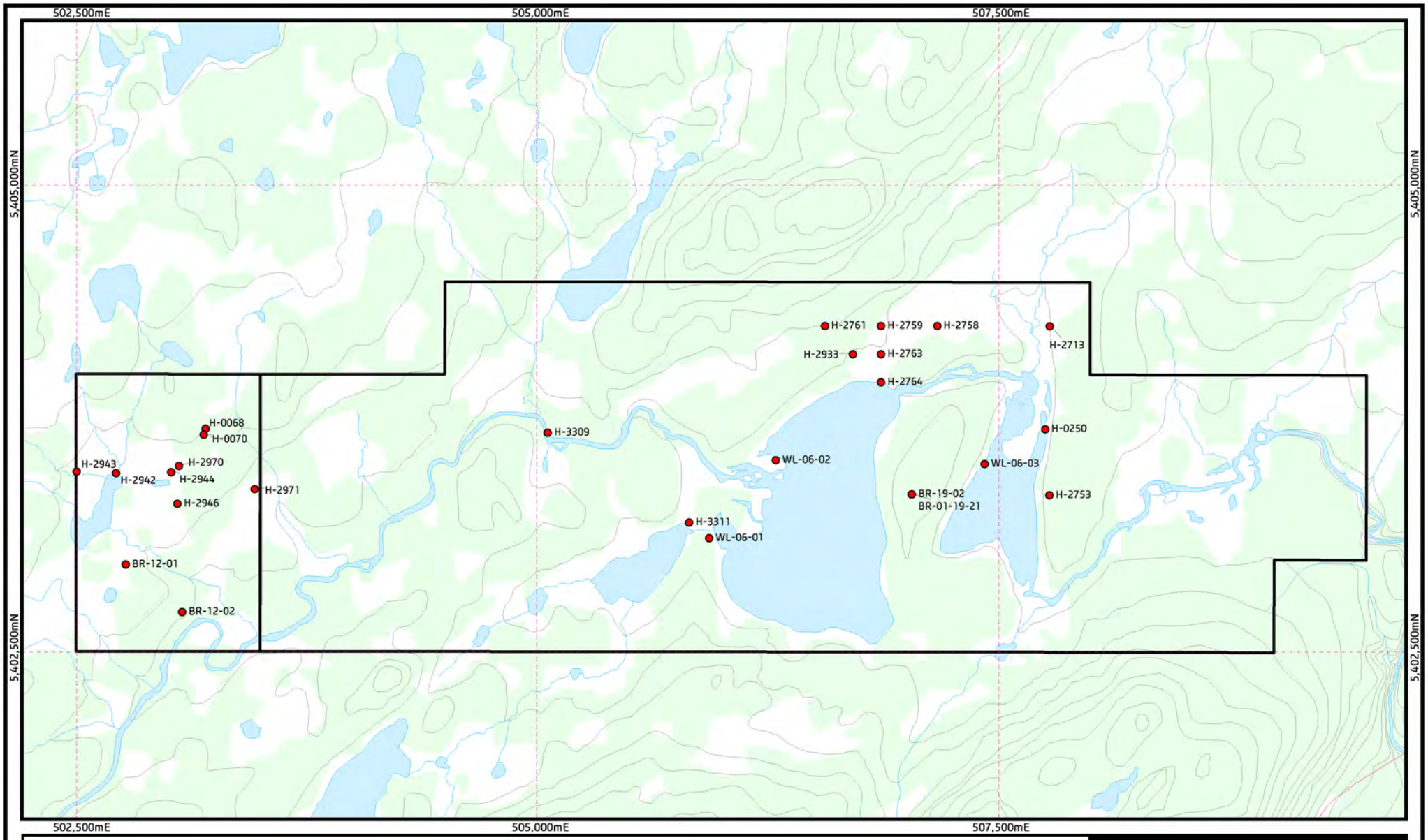


-1 0 1 2 3

Kilometres

Buchans Wileys
Claim Location Map

NTS 12A15	NAD 27-Zone 21
1:50,000	Figure 2



Core ID	Year	Company
H-0068	1928	ASARCO
H-0070	1928	ASARCO
H-0250	1938	ASARCO
H-2713	1968	ASARCO
H-2753	1968	ASARCO
H-2758	1968	ASARCO
H-2759	1968	ASARCO
H-2761	1968	ASARCO
H-2763	1968	ASARCO
H-2764	1969	ASARCO
H-2933	1977	ASARCO
H-2942	1978	ASARCO
H-2943	1978	ASARCO
H-2944	1978	ASARCO
H-2946	1979	ASARCO
H-2970	1979	ASARCO
H-2971	1979	ASARCO
H-3309	1981	ASARCO
H-3311	1981	ASARCO
BR-12-01	2001	GT Exploration Ltd.
BR-12-02	2001	GT Exploration Ltd.
BR-19-02	2001	GT Exploration Ltd.
BR-19-02A	2006	Celtic Minerals Ltd.
WL-06-01	2006	Celtic Minerals Ltd.
WL-06-02	2006	Celtic Minerals Ltd.
WL-06-03	2006	Celtic Minerals Ltd.

Buchans Wileys Property
Historic DDH Location Map

NTS 12A/15	NAD 27-Zone 21
1:20,000	Figure 3

GEOLOGY OF THE ISLAND OF NEWFOUNDLAND

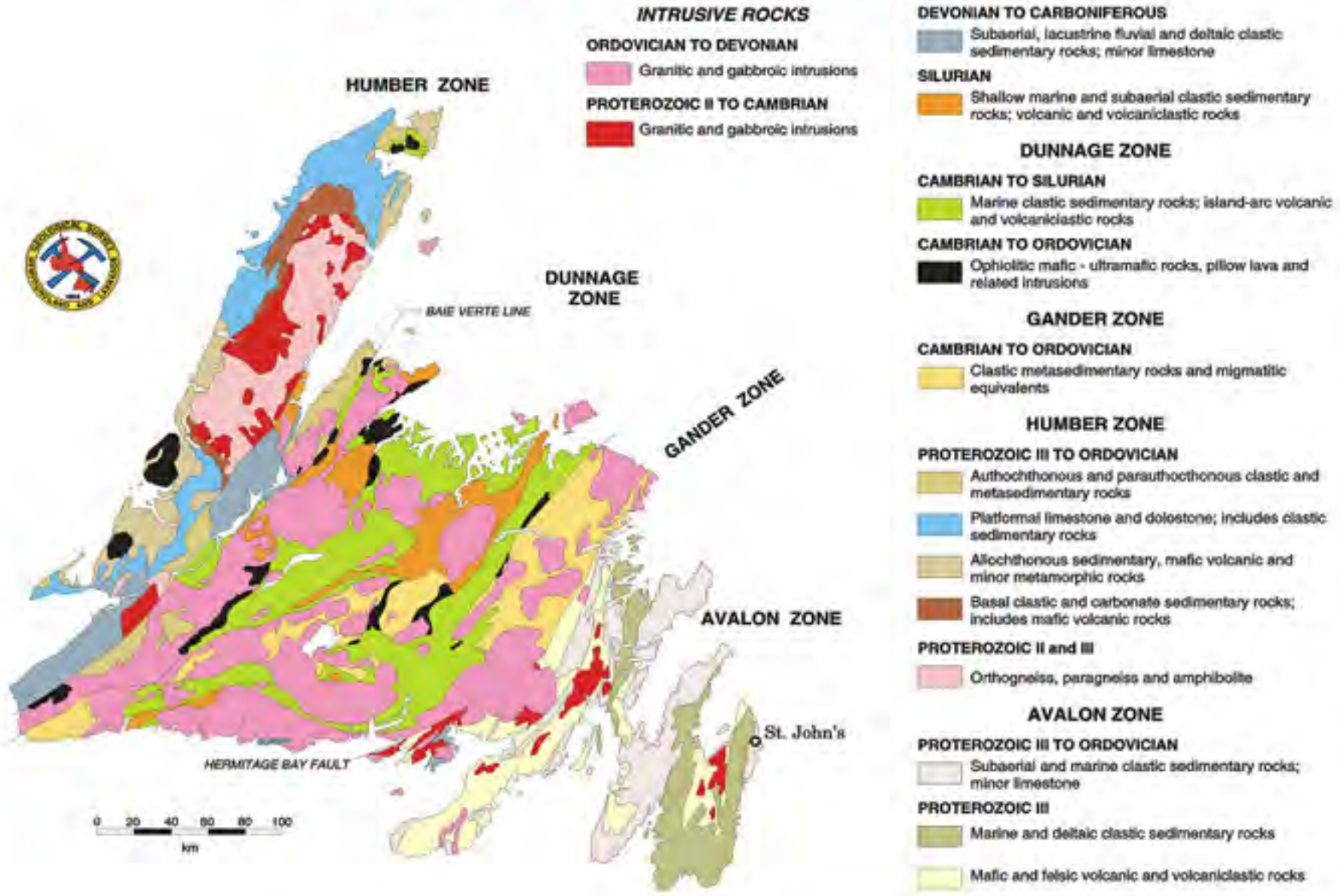
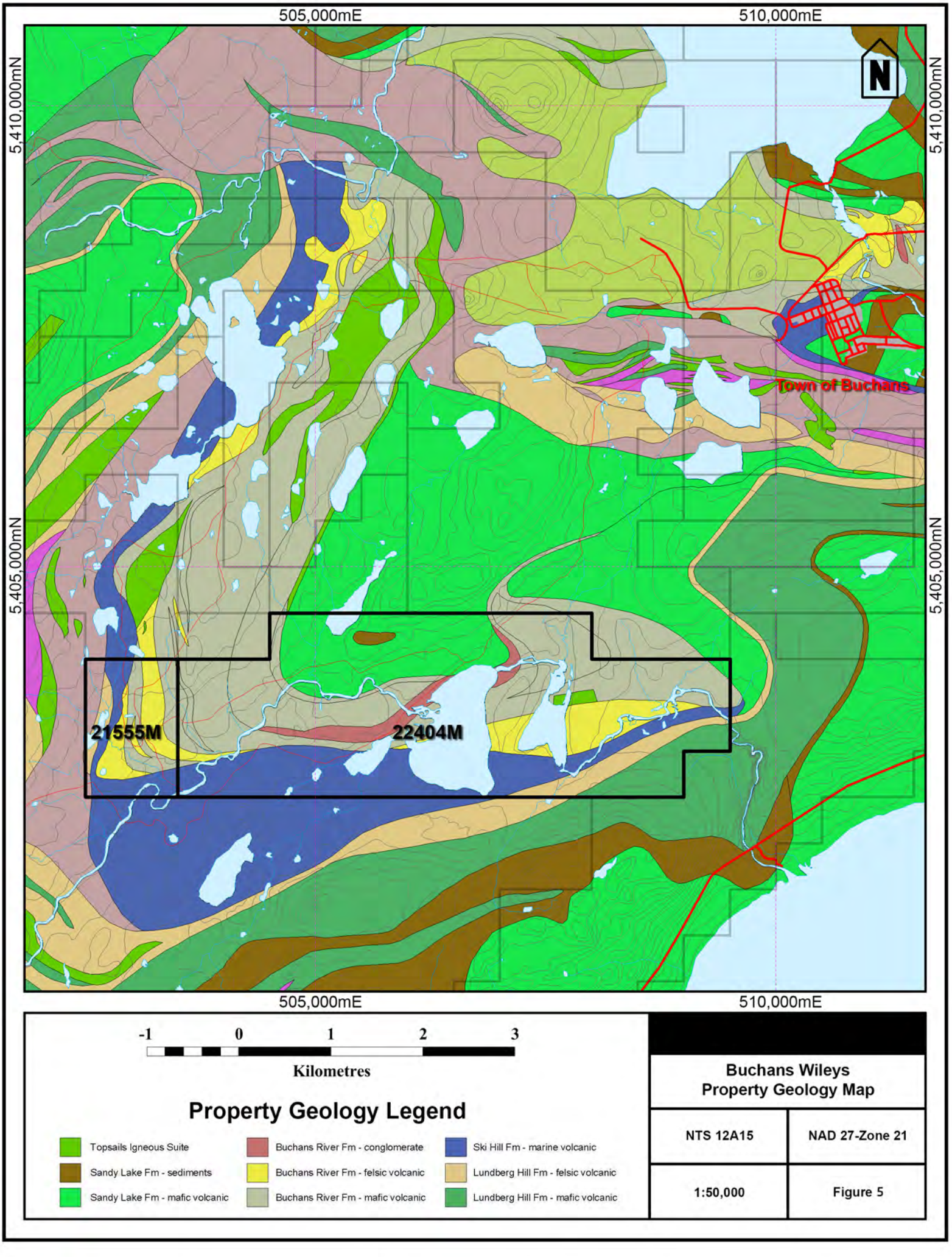
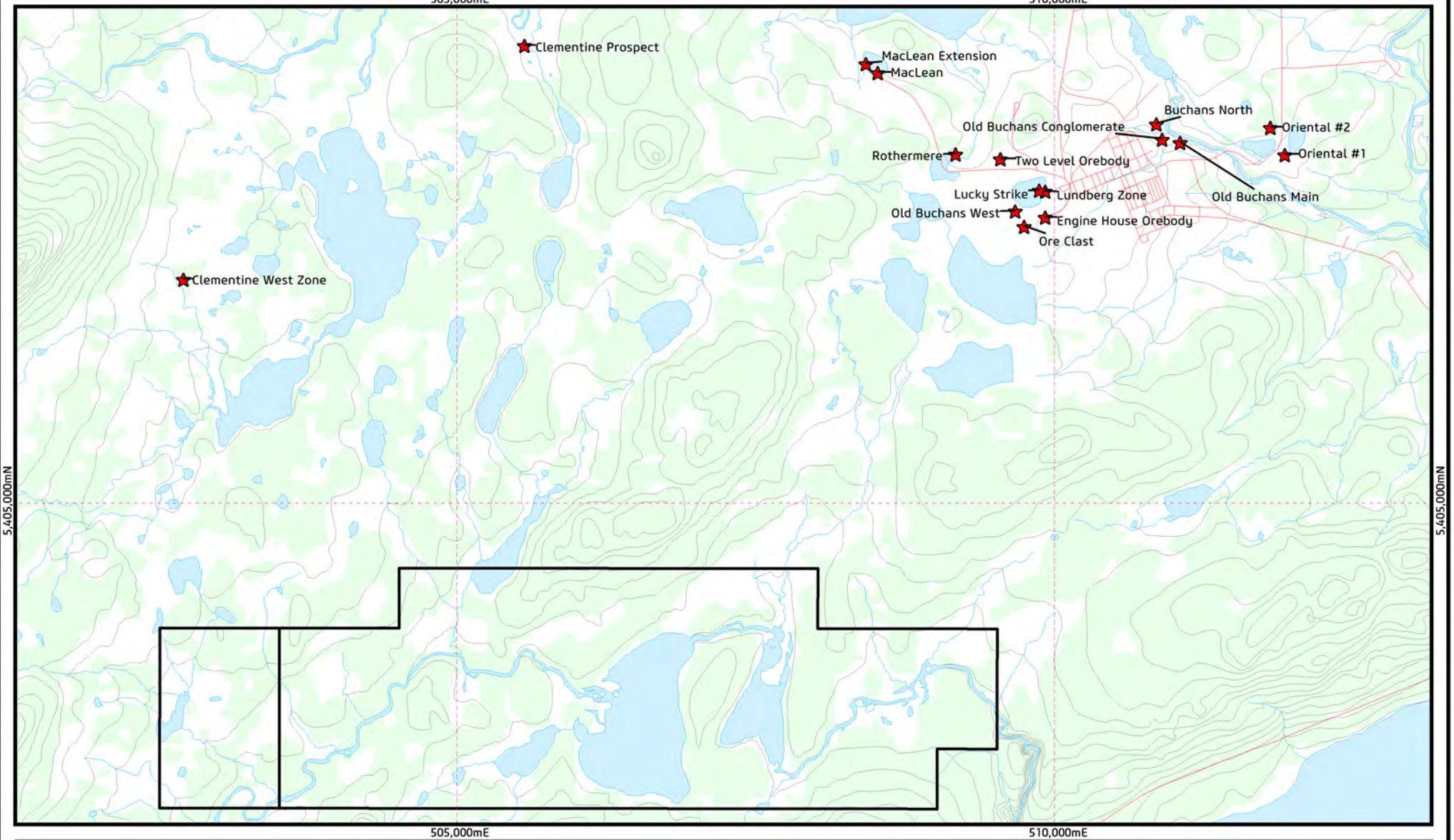
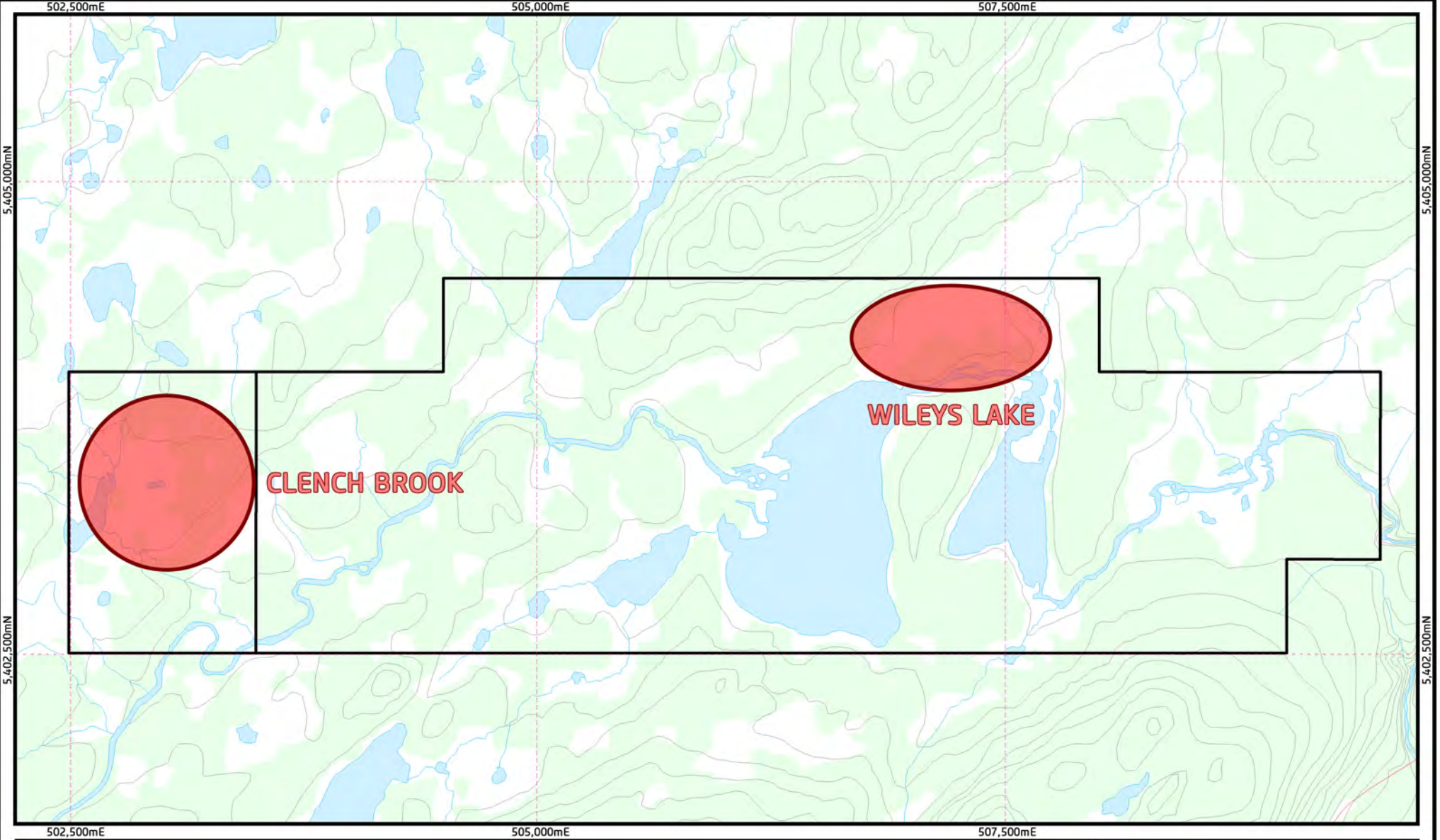


Figure 4 - Generalized Newfoundland Geology Map (Coleman-Saad et al., 1990)


505,000mE
510,000mE
5,410,000mN
5,405,000mN
N
Town of Buchans
21555M
22404M
-1
0
1
2
3
Kilometres
Property Geology Legend
Topsails Igneous Suite
Sandy Lake Fm - sediments
Sandy Lake Fm - mafic volcanic
Buchans River Fm - conglomerate
Buchans River Fm - felsic volcanic
Buchans River Fm - mafic volcanic
Ski Hill Fm - marine volcanic
Lundberg Hill Fm - felsic volcanic
Lundberg Hill Fm - mafic volcanic
Buchans Wileys
Property Geology Map
NTS 12A15
NAD 27-Zone 21
1:50,000
Figure 5



Buchans Wileys Property Adjacent Showings	
NTS 12A/15	NAD 27-Zone 21
1:50,000	Figure 6



Buchans Wileys Property Location of Areas for Follow-Up	
NTS 12A/15	NAD 27-Zone 21
1:20,000	Figure 7