

Ministry of Energy & Mines  
Energy & Minerals Division  
Geological Survey Branch

**ASSESSMENT REPORT  
TITLE PAGE AND SUMMARY**

TITLE OF REPORT [type of survey(s)] REPORT ON GEOLOGICAL MAPPING TOTAL COST \$15,257.40

AUTHOR(S) ARNE O. BIRKELAND SIGNATURE(S) Arne Birkeland

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S) N/A YEAR OF WORK 2008

STATEMENT OF WORK - CASH PAYMENT EVENT NUMBER(S)/DATE(S) EVENT 4246148 2008/NOV/12

PROPERTY NAME DEER BAY PROPERTY

CLAIM NAME(S) (on which work was done) CLAIM RECORD No. 516936

COMMODITIES SOUGHT Ni Cu PGE's Au Ag

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN 092 F 029

MINING DIVISION ALBERNI NTS 092 F/4 ; 092 F/5

LATITUDE 49° 14' " LONGITUDE 125° 35' " (at centre of work)

OWNER(S)  
1) PETER BIRKELAND 2) ARNE BIRKELAND

MAILING ADDRESS  
PO Box 425 TOFINO, BC V0R 2E0 2069 WESTVIEW DR NORTH VANCOUVER, BC, V7M 3B1

OPERATOR(S) [who paid for the work]  
1) PETER BIRKELAND AS ABOVE 2) ARNE BIRKELAND AS ABOVE

MAILING ADDRESS

PROPERTY GEOLOGY KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and altitude):

Property underlain by West Coast Crystalline Complex and Paleozoic Sucker Group. At the main showing a 1 metre massive sulphide zone is exposed in trenching over a 30 metre strike length. Disseminated and stringer sulphides occur over 7-10 m in the

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS 1898-1133; 1899-72; Scot wall.

1905-212; 1910-152; 1916-232, 233, 362; 1917-292; 1918-264; 1919-188; 1921-212, 213; 1922-231; 1926-302; 1927-344; 1928-371, 372; 1930-293, 894; 1955-78; 1961-104; 1962-111; 1963-111, 116; 1966-74; 1967-75; 13121; 14162; 15155; 15449; 17284 (OVER)

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (IN METRIC UNITS)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
<b>GEOLOGICAL (scale, area)</b>			
Ground, mapping	<i>ORIGINAL SCALE 1:1500 10th</i>	<i>516936</i>	<i>\$ 15,257.46</i>
Photo interpretation			
<b>GEOPHYSICAL (line-kilometres)</b>			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
<b>GEOCHEMICAL (number of samples analysed for ...)</b>			
Soil			
Silt			
Rock			
Other			
<b>DRILLING (total metres; number of holes, size)</b>			
Core			
Non-core			
<b>RELATED TECHNICAL</b>			
Sampling/assaying			
Petrographic			
Mineralographic			
Metallurgic			
<b>PROSPECTING (scale, area)</b>			
<b>PREPARATORY/PHYSICAL</b>			
Line/grid (kilometres)			
Topographic/Photogrammetric (scale, area)			
Legal surveys (scale, area)			
Road, local access (kilometres)/trail			
Trench (metres)			
Underground dev. (metres)			
Other			
<b>TOTAL COST</b>			<i>\$ 15,257.46</i>

## **REPORT ON GEOLOGICAL MAPPING**

**Deer Bay Property, Alberni M.D.**

**NTS: 092F/4, 092/F5**

**Lat: 49° 14'      Long: 125° 35'**

**Report By**

**Arne O. Birkeland, P. Eng.**

**Arnex Resources Ltd,**

**June 4, 2008**

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# **Report on Geological Mapping**

## **Deer Bay Property**

### **1.0 Introduction**

#### 1.1 General

Geological mapping was carried out over approximately a 10 Ha area on outcrop exposed on the eastern facing slope west of Similar Island on the Deer Bay Property. Thirteen person-days of field-work were conducted by A. Birkeland, P. Eng., during the periods June 12-16, August 16-23, September 13-21, and October 21-24, 2008.

The principle objective of the geologic mapping was to investigate the occurrence of gabbro and amphibolite reported by various previous operators and determine the nature and extent of the contact zone of the gabbroic intrusion.

A total Expenditure of \$15,257.40 was incurred as itemized in Table 2, Statement of Expenditures. This assessment report is submitted in conjunction with a Statement of Work filed on November 12, 2008, Event Number 4246148. No Notice of Work and Reclamation Permit was filed as there was no surface disturbance caused by the work which was done.

#### 1.2 Property Description

The Deer Bay Property (formerly known as the Tofino Nickel Property), Mineral Inventory Minfile Number 092F 029, is comprised of 6 contiguous mineral claims owned by Peter Buckland of Boat Basin, BC, and A. O. Birkeland (FMC 102420) of North Vancouver, B. C. (see Table 1, Figure 2).

### 1.3 Location and Access

The Deer Bay Property is located in the Alberni Mining Division 25 km ENE of Tofino near the head of Tofino inlet on the west central coast of Vancouver Island (Figure 1). The center of the property is located at approximately 49° 14' north latitude and 125° 35' east longitude in NTS 092F/4,5. The Main Showing is located on a steep timbered hillside 0.5 km north of Similar Island at an elevation of approximately 295 m.

Access is by logging road (70 km from Tofino via Kennedy Lake Bridge) or by boat (30 km from Tofino). Access for the 2008 Geological Mapping Program was from Tofino by boat taking 45 minutes, then by hiking up the hillside on a crude access trail.

### 1.4 History

Exploration activity on the Deer Bay property dates back to the late 1890's when hand cobbled ore was produced from shafts and adits dug on small quartz veins along Tofino Creek. Between 1953 and 1984 the property was explored for its skarn and porphyry Cu-Mo potential associated with an Island Intrusive Stock at the head of Tofino Bay.

In 1984, Cominco examined the Cu-Ni-PGE Main Showing and optioned the property in 1985. Detailed geologic mapping, soil sampling, limited geophysics and trenching was carried out. Cominco concluded that *PGE bearing Cu-Ni mineralization may have been emplaced as an immiscible liquid at the same time of injection of the ultrabasic host*. A report by Mason, July 1986 states: *While the isolated outcrop (Main Showing) is only 30 m by 10 m, the associated rock types (altered ultramafics and anorthosite) and the Cu-Ni sulfide bands suggest that it is part of a much larger body... the property has both demonstrated grades and potential for significant tonnage*. Additional work was recommended but was not carried out by Cominco.

Reconnaissance geological mapping and geochemical surveys were conducted by Stag Explorations during 1988. Soil geochemistry was somewhat effective in delineating anomalous zones around the gabbro intrusion and at the Main Showing. The program also discovered an anomaly at the northeastern end of the soil grid which has never been followed-up further. In 1992, reconnaissance soil and moss mat stream sediment sampling along new road-cuts above the Main

Showing detected anomalous Cu, Ni, Co, Au and PGM extending the prospective mineralized strike length up to 2 km beyond the areas previously explored.

Recent orientation soil and stream sediment sampling conducted in 1995 defined geochemical anomalies up-drainage from the Main Showing. These results confirm earlier reports of anomalies up-slope and indicate additional undiscovered mineralization is present. Petrographic examination of specimens of host rock from the Main Showing indicated that the mineralization is hosted in a zoned ultramafic intrusion complex and the occurrence was classified as belonging to the economically important Gabbroid Cu-Ni-Co deposit type.

Detailed mapping and engineering geology was carried out at the Main Showing in April of 1997. It was concluded that the massive sulphide band at the Main Showing is concordant with the foliation and the contact of the host amphibolite. The massive sulphides and footwall disseminated and stockwork zone strikes northwesterly and dips moderately to the southwest. The topography will allow two relatively convenient drill site locations on 15 metre sections lines. It was recommended that a fan of holes be drilled by a light-weight helicopter portable diamond drill on each section line to test the down-dip continuation of the mineralized zone that is exposed on surface.

Geologic Mapping was carried out on rocks exposed by a debris slide along a drainage in the central portion of the property in April 1997.

Arnex Resources Ltd. conducted a grid magnetometer survey and rock chip geochemical exploration program on the Deer Bay Property during June to August, 2000. Twenty six rock chip samples were analyzed. Magnetometer readings were taken from approximately a 200 metre by 400 metre grid. SJ Geophysics of Delta BC processed the magnetic data. Three days of physical work was performed by rehabilitating the access trail to the Main Showing. The total cost of the year 2000 exploration program was \$16,485.

The magnetometer survey indicated that a strong magnetic high exists to the west and northwest of the Main Zone Showing. It is interpreted that the high is due to an accumulation of magnetic Ni assemblage mineralization down dip from the Main Showing. Deeper drill targets are indicated. The magnetometer survey also indicates surface projections of the Main Zone on strike to the southeast.

## **2.0 Geology**

### **2.1 Regional Geology and Stratigraphy**



Vancouver Island lies within the Canadian Cordillera within terrain classified as Wrangellia. Central and western Vancouver Island is predominantly underlain by Paleozoic and Mesozoic strata intruded by Jurassic and Tertiary Intrusions (See Figure 3, Regional Geology Map).

## 2.2 Property Geology and Lithologic Descriptions

The Deer Bay property is underlain by a northwesterly striking southwesterly dipping stratigraphic sequence known as the West Coast Crystalline Complex on the western portion of the property, and by Paleozoic Sicker group rocks on the eastern part of the claims. Intruding the Paleozoic strata to the southwest and northeast respectively are intrusive stocks of Tertiary Catface Intrusions and Jurassic Island Intrusions.

The country rock underlying the Main Showing area is the West Coast Complex which consists of quartzo-felspathic gneiss containing foliated amphibolite lenses and numerous thin amphibolite bands.

The principal rock type hosting the mineralization at the Main Showing is characterized by dark gray to black medium to coarse grained amphibolite. Previous petrographic analysis of the amphibolite indicates that it is part of a differentiated-zoned ultramafic intrusion complex. It appears that the amphibolite dykes sills and lenses are related to a major hornblende gabbro intrusive body, which has been historically reported to outcrop approximately 400 m southwest of the Main Showing. A genetic relationship between the gabbro intrusive and the Cu-Ni-Co-PGE bearing amphibolite at the Main Showing has been previously suggested supported by the fact that the gabbro intrusive is geochemically anomalous in the same suite of metals.

## 3.0 Geological Mapping

Geologic mapping was conducted on outcrop exposed on the eastern facing slope in the central portion of the Deer Bay Property over an area of approximately 10 Ha. The mapping was compiled at an original scale of approximately 1:1,500. The digitized geological compilation map is presented as Figures 3.

Chain and compass surveying was used to establish survey points at approximately 100 metre slope distance intervals. Hip chain was used between survey points. Portions of the old Cominco and Arnex geophysical grids were also used as ground control.

### 3.1 Lithology

The mapped area is underlain by rocks belonging to the West Coast Crystalline Complex. In the area mapped the lithology is dominated by layered gneissic rocks containing amphibolite layers, lenses and bands.

The medium to thin layered gneissic rocks are light grey to green, coarsely crystalline quartzo-feldspathic (muscovite) gneisses of varying composition with moderately well developed foliation. Dark green chlorite rich bands and amphibolite dykes and sills are common within the gneissic rocks where they are in proximity to a large gabbro intrusion (a zoned ultramafic intrusive complex). Chalky white feldspar, light coloured muscovite and disseminated pyrite often occur at contacts between gneiss and amphibolite bands. Numerous small-scale quartz veins and lenses that are too narrow to be mapped are commonly present.

Amphibolites occur as layers, as lenses and as fault bounded blocks. The layered amphibolites are often coarsely crystalline in the core of the layers with finer grained border phases. Locally the amphibolites are often folded or displaced by faulting. Pyrrhotite and pyrite often occur in the amphibolites, particularly at the contacts or where cut by gabbro dykes.

Gabbro (and dioritic) dykes and sills are common. Gabbros are dark green, fine to medium grained, and are commonly porphyritic containing pyroxene and anorthosite. Dykes commonly demonstrate chilled contact zones. The gabbroic dykes and sills are interpreted to be associated with, and as originating from, a large gabbro body mapped on the western portion of the Property. Minor fine grained steeply dipping, north striking felsic dykes are present. The dykes generally crosscut all other units and are unmetamorphosed. They are interpreted to be related to the Tertiary Catface intrusives which are present to the west of the property.

### 3.2 Structure

The regional attitude of the foliated rocks mapped on the Property is northwesterly striking (N55°W to N75°W) and moderately southeasterly dipping. Local folding (north striking with flat plunge most common) and faulting (generally north-south and east-west striking, steeply dipping) dislocate the rocks in outcrop scale, but the regional northwest attitude of the foliation remains prevalent.

### 3.3 Metamorphism and Alteration

The gneisses and amphibolites exposed in mapped area are re-crystallized and have been subjected to amphibolite grade regional metamorphism. Pyroxene and anorthosite in the mafic rocks have been altered to amphibole and tremolite. Gneisses are characterized by saussuritised plagioclase and muscovite. The hydrothermal recrystallization of the rocks indicates regional elevated temperatures and pressures in the presence of a fluid phase. This may represent deep level metamorphism associated with subduction of rocks that have been uplifted to form the steep terrain on the property.

Local silic and clay alteration is often associated with faults and the margins of gabbro dykes. This local metamorphism and alteration is suspected to be related to the emplacement of a large gabbroic intrusion to the southwest of the Debris Slide Channel.

## 4.0 Conclusions

The layered foliated gneissic rocks mapped may be metamorphosed felsic and mafic volcanic rocks belonging to the Paleozoic Sicker group. “Fresh” Sicker group volcanics and sediments that grade into gneiss in the northern portion of the property. These rocks are mapped as West Coast Complex but are in part regionally metamorphosed Paleozoic rocks.

Contained within the metamorphosed Paleozoic volcanic and sedimentary strata of the West Coast Complex are large gabbroic intrusions and related dyke and sill swarms. These “old gabbros” are known to exist in the Insular Belt from Vancouver Island to Alaska. Cu-Ni-Co+/-PGE mineralization is associated with an anorthositic gabbro on Mears Island approximately 25 km west of the Deer Bay Property.

In Alaska, two types of deposits occur. Small tonnage, high-grade “Alaskan” type Cu-Ni-Co massive sulphide deposits are associated with small proxenite gabbroic plugs. Large tonnage (up to 100,000,000 tonnes as reported by the USGS) Cu-Ni deposits are also present hosted in layered anorthositic gabbro-pyroxenite intrusive complexes.

Ninety seven percent of the world’s PGM production comes from Cu-Ni ores hosted in layered ultramafic intrusive complexes, principally from Merensky Reef

(South Africa), the Noril'sk complex (Russia), the Stillwater Complex (Montana) and Sudbury (Ontario). Based on the fact that a belt of gabbros with associated Cu-Ni-Co+/-PGM is present in the Insular belt and considering the geological setting of the Deer Bay Property, it is concluded that mineralization at the Main Showing is of the economically important gabbroid layered ultramafic intrusive complex type.

## **5.0 Recommendations**

It is recommended that a diamond drill program be conducted on the massive sulphide and mineralized footwall at the Main Showing which has never been drilled. Drilling should be done on section to test the down-dip extension of the surface showing. The drill program should be helicopter supported by long line sling and access for personnel should be by boat, then hiking up the trail to the Main Showing at the 295 m elevation.

Subsequent recommendations for work on the property should be based on the results of the drill program. The drill program offers the advantages of a quick evaluation for the future of the property while keeping the next phase of exploration expenditure to a minimum.

**Dated this 4<sup>th</sup> day of June, 2008**

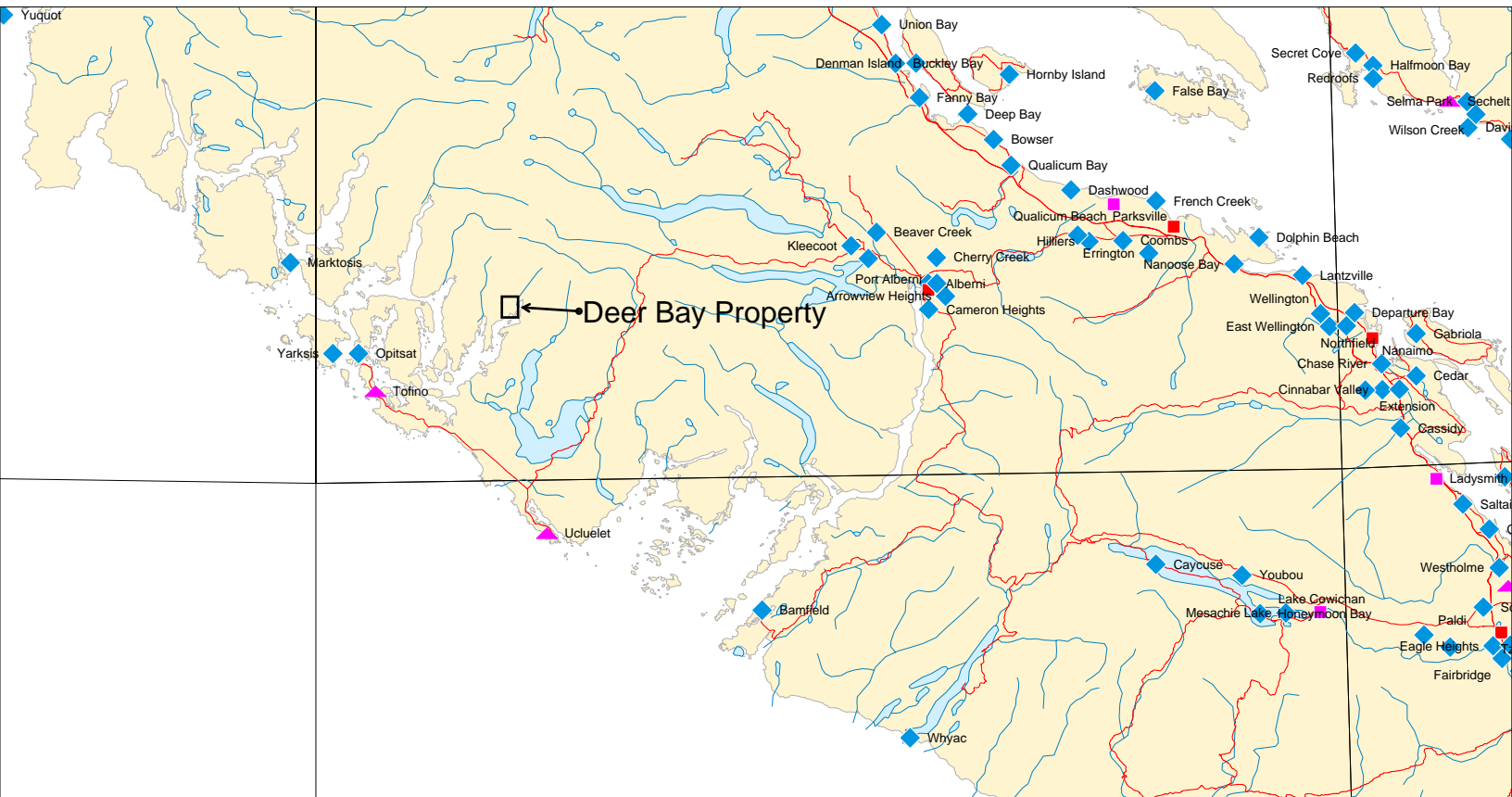
**By:** \_\_\_\_\_  
**Arne O. Birkeland, P. Eng.**

**Table 1**  
**Claim Tenure**  
**Deer Bay Property**

Tenure Number	Claim Name	Owner	Tenure Type	Tenure Sub Type	Map Number	Issue Date	Good To Date	Status	Area (ha)
200235	SUPER 2	102420 (100%)	Mineral	Claim	092F	1984/may/10	2012/nov/13	GOOD	300.0000
516936		102420 (100%)	Mineral	Claim	092F	2005/jul/11	2012/nov/13	GOOD	316.4170
524927		102420 (100%)	Mineral	Claim	094E	2006/jan/09	2018/oct/03	GOOD	1669.2020
569909	ARNIE1	102420 (100%)	Mineral	Claim	092F	2007/nov/12	2010/nov/12	GOOD	21.0963
570161	NICK 2	102420 (100%)	Mineral	Claim	092F	2007/nov/16	2012/nov/13	GOOD	21.0963
570162	NIICK 1	102420 (100%)	Mineral	Claim	092F	2007/nov/16	2012/nov/13	GOOD	105.4950
							Total		2433.3066

<b>Table 2</b>					
<b>Statement of Expenditures</b>					
<b>Deer Bay Property</b>					
<b>2008 Geological Mapping Program</b>					
<b>Exploration Work type</b>	<b>Comment</b>	<b>Days</b>			<b>Totals</b>
<b>Personnel (Name)* / Position</b>	<b>Field Days (list actual days)</b>	<b>Days</b>	<b>Rate</b>	<b>Subtotal*</b>	
Arne Birkeland, P.Eng.	Jun 12-16, Aug 16-23, Sep 13-21, Oct 21-24	13	\$400.00	\$5,200.00	
				\$5,200.00	<b>\$5,200.00</b>
<b>Ground Exploration Surveys</b>	<b>Area in Hectares/List Personnel</b>				
Geological mapping	GeoSpark Consulting (digitizing)			\$2,000.00	
<b>Transportation</b>	<b>Actual Costs</b>			<b>Subtotal</b>	<b>\$2,000.00</b>
Ferries				\$682.15	
fuel				\$2,074.54	
				\$2,756.69	<b>\$2,756.69</b>
<b>Accommodation &amp; Food</b>	<b>Actual Costs</b>				
Campsite				\$468.90	
Groceries				\$668.73	
Meals				\$149.44	
				\$1,287.07	<b>\$1,287.07</b>
<b>Miscellaneous</b>	<b>Actual Costs</b>				
GST(All)				\$485.00	
Assessment Report				\$2,710.68	
Other	Moorage			\$817.96	
					<b>\$4,013.64</b>
<b>TOTAL Expenditures</b>					<b>\$15,257.40</b>

# Location Map- Deer Bay Property



SCALE 1 : 1,000,000

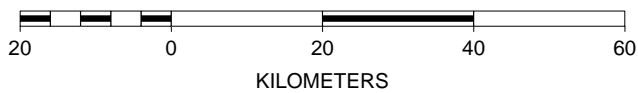
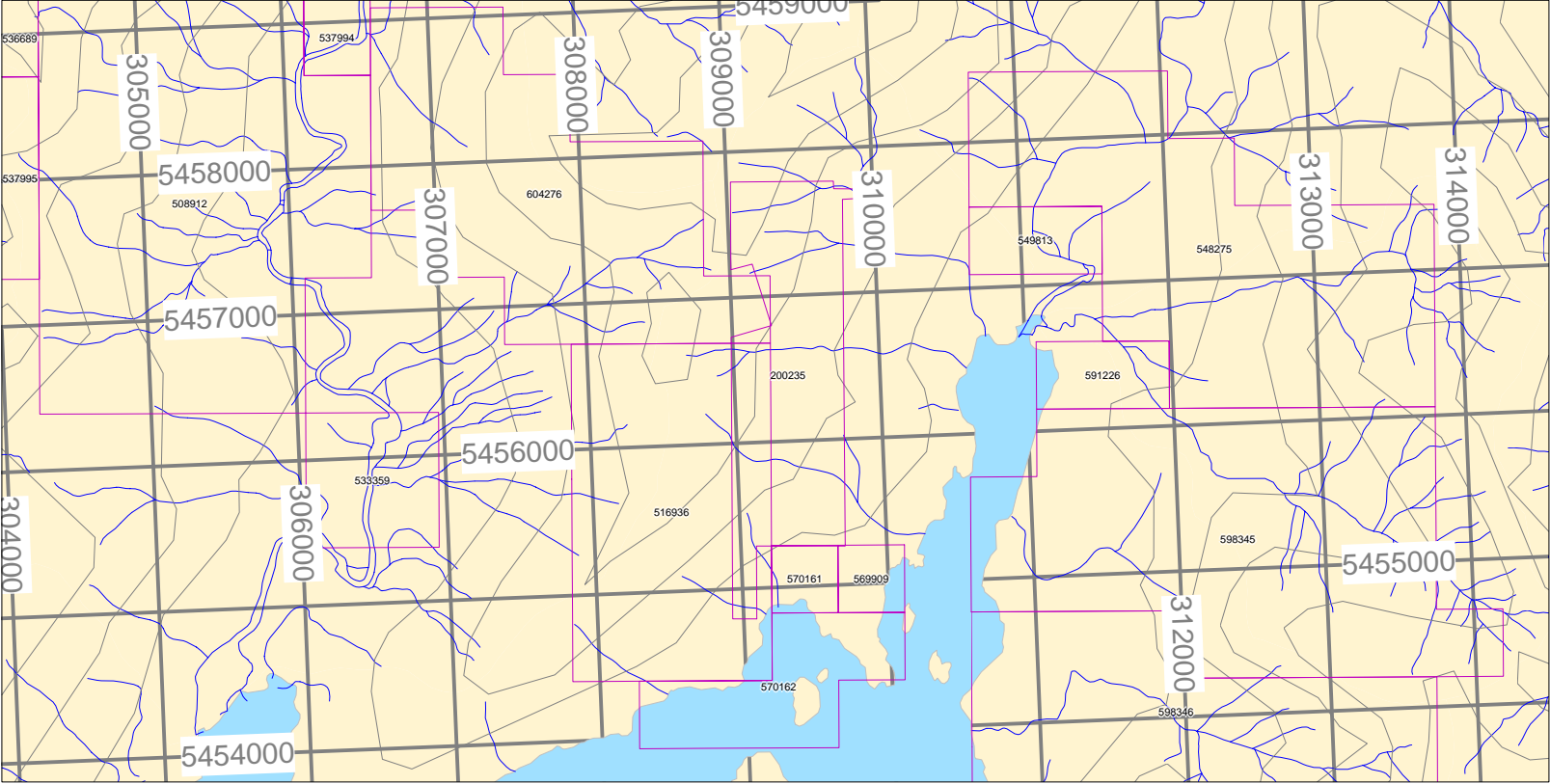


Figure 1



# Deer Bay Property - Claim Map



SCALE 1 : 50,000

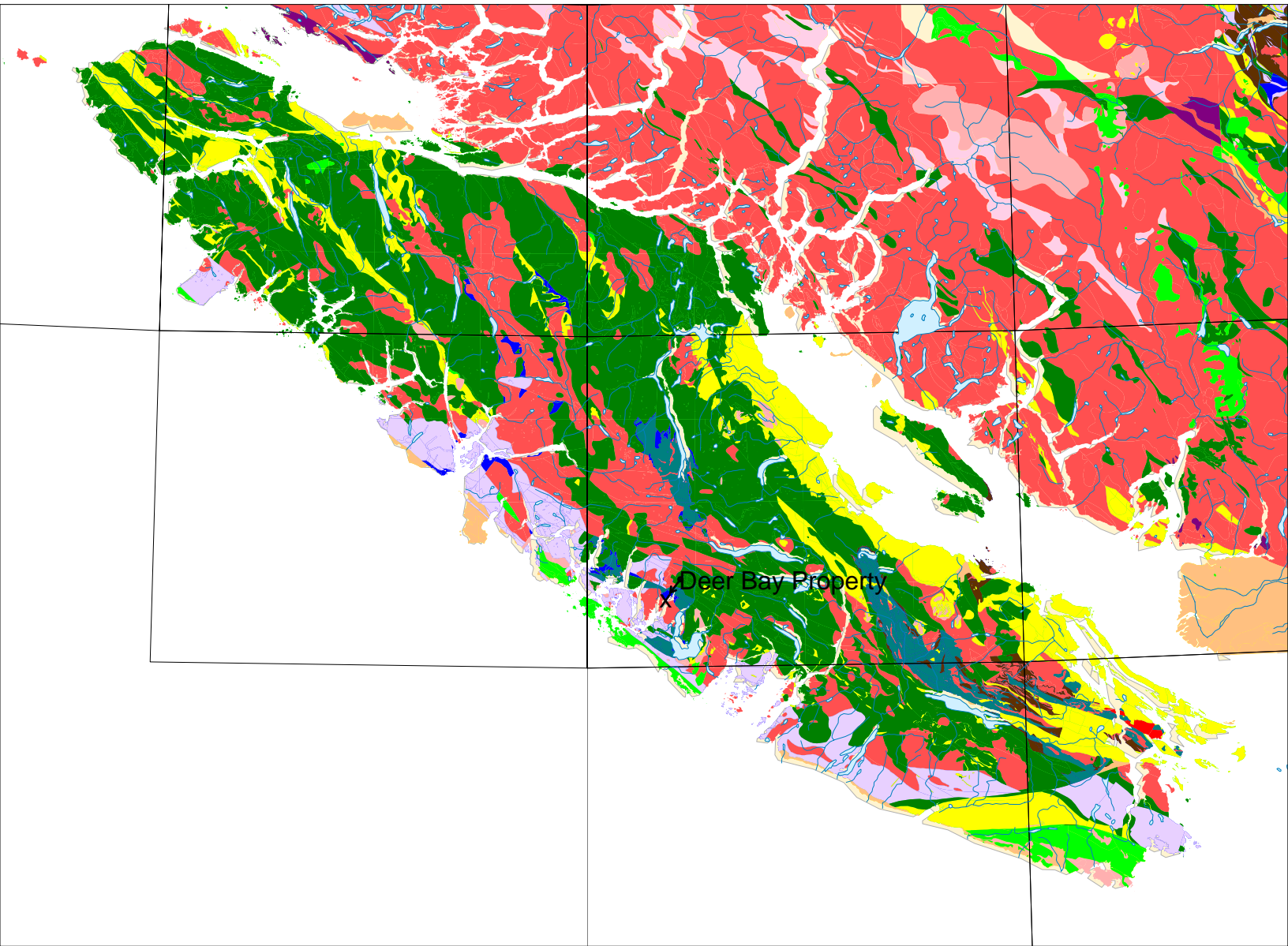


Figure 2

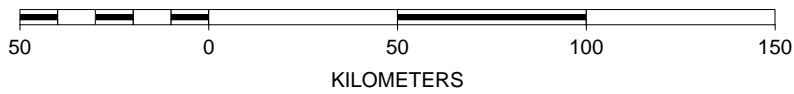




# Regional Geology Map - Vancouver Island



SCALE 1 : 2,000,000



Figur 4



