Occurrence Details

Occurrence Number: 105I 066
Occurrence Name: Brodel
Occurrence Type: Hard-rock
Status: Deposit
Date printed: 6/16/2025 12:34:16 PM

General Information

Primary Commodities: lead, zinc
Aliases: Howards Pass, Selwyn Project
Deposit Type(s): Sediment hosted Sedimentary Exhalative Zn-Pb-Ag (Sedex)
Location(s): 62°29'35" N - -129°16'12" W
NTS Mapsheet(s): 105I
Location Comments: .5 Kilometres
Hand Samples Available: No
Last Reviewed:

Capsule

Work History

Canex Placer Ltd, a wholly owned subsidiary of Placer Development Ltd, carried out extensive regional reconnaissance and grid geochemical and geological mapping programs in the Howard's Pass area in 1968, 1971 and 1972 before discovering lead-zinc mineralization on the adjoining X claims (to the east). The company staked Don cl 1-8 (Y64845), cl 10-135 (Y64911) and cl 136-164 (Y70201) between September and Oct/72. The claims became part of the company's larger Howard's Pass property. The announcement of widespread mineralization on the Howard's Pass property prompted a staking rush and the recording of some 4,400 claims by various other companies from Oct/1972 to Apr/1973.

Canex Placer conducted limited bulldozer trenching and sampling in late 1972, built a winter road, an airstrip and extensive tote roads on the Howard's Pass property, and carried out extensive trenching, mapping, grid soil sampling, test geophysical work and claim surveys and drilled 26 diamond drill holes (4,267.2 m) in 1973, and 12 holes (1,981.2 m) in 1974. Based on historical records it appears two holes (unknown date, undetermined length) tested the Brodel zone (this occurrence).

In 1975, Canex entered a joint venture with Essex Minerals Company (a wholly owned subsidiary of U.S. Steel Corporation). The joint venture continued exploring the Howard's Pass property with diamond drilling, road building, camp construction and underground mining through the late 1970s and early 1980s. Essex's Minerals interest in the property was transferred to Cygnus Mines Ltd in Apr/1982.

Placer Development and Cygnus Mines completed an economic analysis of the Howard's Pass property at the end of 1982. The study concluded that mining the various deposits identified on the property was not economically viable at that time. No reserves were identified at this occurrence. Placer Development Ltd was amalgamated into Placer Dome Inc. in Aug/87. Placer Dome performed cleanup work on the Howard's Pass property in 1991.

In Jul/2000 Copper Ridge Explorations Inc acquired an option to purchase a 100% interest in the Howard's Pass property, including this occurrence. The agreement called for a 150 day due diligence followed by a pre-feasibility study. In Sep/2000 Copper Ridge signed a letter of agreement with Billiton Metals Canada Inc for a joint evaluation and possible development of the property. Billiton provided Copper Ridge with $200,000.00 through a private placement, which Copper Ridge used to fund a diamond drill program. Copper Ridge collared 8 diamond drill holes (717 m) on the Anniv Central and Don showings (located 10 to 15 km to the west) as part of their due diligence. In Nov/2000 Billiton informed Copper Ridge that they would not proceed with the proposed joint venture. In Dec/2000 Copper Ridge failed to make a payment as required by the option agreement and the agreement was cancelled.

In May/2005 Pacifica Resources Ltd entered into a Letter of Intent to purchase a 100% interest in the Howard's Pass property. The agreement was signed between Pacifica and Placer Dome (CLA) a wholly owned subsidiary of Placer Dome Inc (51% owner) and Cygnus Mines Ltd (49% owner). The agreement was formally approved in Aug/2005.

Pacifica Resources drilled 53 diamond drill holes (8286.9 m) on the Howard's Pass property in 2005. Ten holes (1,948.5 m) were collared on the Brodel zone. The company also carried out regional mapping and soil sampling programs and Dense Media Separation test work on grab samples collected during previous underground mining programs and from diamond drill core samples. In Feb/2006 Pacifica released a National Instrument 43-101 compliant mineral resource estimate for the newly identified Brodel deposit. Using a 2% zinc cut-off the Brodel deposit hosts an inferred resource of 12,110,000 million tonnes grading 4.31% zinc and 1.16% lead.

In Mar/2006 Barrick Gold Corporation acquired Placer Dome Inc. In May 2006 Barrick sold Placer Dome's 51% interest and other mines and exploration properties to Goldcorp Inc. In Jul/2006 Goldcorp sold Placer Dome's 51% interest in the Howard's Pass property to Terrane Metals Corp. During 2006 Pacifica completed 191 diamond drill holes (131,550.2 m). One hole (154.7 m) targeted the Brodel deposit. The company also continued Dense Media Separation test work, geochemical sampling, commenced baseline environmental and engineering studies and surveyed all previous drill hole locations, roads and grids in order to digitize and compile all historical geological data.

In Jan/2007 Pacifica released a preliminary assessment report for the development of the larger Howard's Pass project. The assessment indicates excellent potential for a long life mine, having large-scale, low cost zinc and lead production. The company used the results to help plan future exploration and engineering work.

On January 29, 2007 Pacifica Resources announced a plan of re-organization in which the Howard's Pass project would be spun off to a new company, Selwyn Resources Ltd and the company's remaining properties would be transferred to a new company Savant Exploration Ltd. Pacifica shareholders received shares in Savant Exploration as compensation for the transfer of assets from Pacifica to Savant. The agreement was approved on May 31, 2007 and completed on June 6, 2007 at which time control of the Howard's Pass property, commonly referred to as the Selwyn Project was transferred to Selwyn Resources and the charter of Pacifica Resources was cancelled.

Selwyn Resources drilled 106 diamond drill holes (37,208.6 m) in 2007. In Jun/2008, shortly after beginning exploration for the season Selwyn received a Land Use Permit from the Mackenzie Valley Land and Water Board to rehabilitate the all-season access road that joins the Howard's Pass area with the existing Nahanni Range Road and ultimately the town of Watson Lake, Yukon. The use of this road significantly reduced the cost of access to Selwyn's various exploration zones located in the Howard's Pass area. The company completed 13 diamond drill holes (3,856.9 m) in 2008 and 10 diamond drill holes (4,214 m) in 2009. None of the holes targeted this occurrence.

In mid-2009 Selwyn opened discussions with various companies regarding the formation of a possible strategic partnership. In Dec/2009 Selwyn Resources announced that they had signed a binding Framework Agreement with Yunnan Chihong Zinc & Germanium Company Ltd (China), whereby both companies would form a joint venture company to hold all assets associated with the Selwyn project. In return for a 50% interest in the joint venture Yunnan Chihong deposited 100 million dollars in cash irrevocably to a bank account for the joint venture to use to fund development of the Selwyn project. As part of the agreement Yunnan Chihong agreed to fund all of Selwyn Resources direct costs incurred from July 1, 2009 on the Selwyn project.
On January 5, 2010 Selwyn Resources announced that they had engaged Wardrop Engineering Inc to start a Phase 1 work program leading to the completion of a National Instrument 43-101 compliant feasibility study on the Selwyn project. The company hopes to complete the study by the end of 2010.

On August 18, 2010 Selwyn announced the completion of the joint venture with Yunnan Chihong and the formation of a new company Selwyn Chihong Mining Ltd. Selwyn Resources transferred all Selwyn Project claims, equipment, permits and licenses to the new company. At the same time the joint management committee approved in principal a predevelopment budget of 89 million dollars for

2010 and 2011. The money will be directed to the advancement of permitting, completion of the feasibility study and related engineering and resource definition drilling from both surface and underground.

A September 2012 report by Kirkham Geosystems lists a global resource for the Selwyn Project, which includes the 2006 estimate for the Brodel deposit.

Capsule Geology

The Selwyn project (Howard's Pass project) is located in eastern Yukon and straddles the Northwest Territories border, approximately 350 km northeast of Whitehorse, Yukon and approximately 80 km north-northwest of the former mining town of Tungsten. Over ninety percent of the property lies in the Yukon. To date Selwyn Resources Ltd has identified 15 lead-zinc deposits over a strike length of 37.5 km.

The Selwyn Basin is a region of deep-water offshelf sedimentation that persisted from Late Precambrian to Middle Devonian time. Its basal deposits consist of late Precambrian rift (-) clastics; it is overlain by rift clastics of late Devonian age. On its north-eastern side are time-equivalent shallow shelf strata of Mackenzie Platform. Along its southwestern margin there developed in the Silurian to Devonian a carbonate-clastic shelf the Cassiar Platform. Its southwestern limit is essentially the limit of the miogeocline as presently preserved in the Yukon.

Geological mapping in the Howard's Pass area has changed significantly since Pacifica/Selwyn Resources Ltd has acquired control of the entire area. Based on various reports released by the companies stratigraphy in the Howard's Pass area can be summarized as follows. Regionally, Selwyn Basin stratigraphy overlies a basement of Upper Proterozoic to Lower Cambrian maroon to dark blue-grey weathering shale assigned to the Narchilla Formation of the Hyland Group. This unit is conformably overlain by the Upper Cambrian to Lower Ordovician Rabbitkettle Formation. The Rabbitkettle Formation is comprised of an Upper member consisting of grey weathering fine crystalline nodular limestone and a Lower member consisting of grey orange weathering, argillaceous to silty limestones usually limited to beds of less than 10 cm.

Pacifica/Selwyn Resources report the presence of a Transition Formation between the Rabbitkettle Formation and the overlying Duo Formation. This unit identified in drill core, consists of thin interlaminations of grey limestone and buff coloured shale, generally well cleaved.

The Transition Formation is overlain by the Ordovician to Middle Silurian Road River Group which is divided into the Duo Lake and Steel Formations. Various operators working in the area have locally renamed the Duo Formation the Howard's Pass Formation and have subdivided it into various units. Currently Pacifica/Selwyn Resources have divided the Dou Formation into five member units measuring 300 m thick. The lowest member is a pyritic siliceous shale member, which is overlain by a calcareous mudstone member and a lower cherty mudstone member. These members are overlain by the Active member, a heterogeneous mudstone, limestone, chert that hosts the region's abundant sulphide mineralization in lamella within a poorly preserved graptolite horizon. An upper siliceous mudstone member tops the formation. The Steel Formation which measures approximately 140 m thick and consisting of a flaggy mudstone containing orange weathered siliceous argillite in beds 10-80 cm thick overlies the Howard's Pass Formation.

The Road River Group is overlain by the Lower to Upper Devonian Portrait Lake Formation of the Lower Earn Group. The Portrait Lake Formation is comprised of a Lower, Middle and Upper member. The Lower Member consists of a dark brown weathering, silty shale and shale in beds up to 420 m thick. The Middle member consists of a black weathering, massive pebble conglomerate up to 195 m thick and the Upper Member consists of a gun-blue weathering black platy siltstone up to 260 m thick.
The Portrait Lake Formation is overlain by the Upper Devonian to Middle Mississippian Prevost Formation of the Upper Earn Group. It also divided into Lower, Middle and Upper members. The Lower member consists of a grey weathering, dark grey, medium to coarse-grained chert-quartz sandstone up to 160 m thick. The Middle member consists of brown weathering, dark grey, thin bedded shale and siltstone measuring up to 90 m thick and an Upper member consisting of coarse-grained, poorly sorted, chert-quartz sandstone and conglomerate in beds up to 300 m thick. The entire sequence is intruded by various Middle to Late Cretaceous stocks and batholiths ranging in composition from intermediate to granitic assigned to the Selwyn plutonic suite.

Historical drilling and geological mapping carried out by Placer Development suggested that the XY and Anniv (Minfile Occurrences 105I 012 & 037) sedimentary-exhalative deposits occurred in separate sub-basins along the base of a paleo-slope of the eastern Selwyn Basin. New geological mapping and diamond drilling carried by Pacifica/Selwyn Resources indicates the lead-zinc mineralization hosted by the Selwyn project (Howard's Pass property) was part of a long-lived, single mineralizing event. As proof of this theory the companies report that the sulphide textures, mineralogy and thickness are similar in each of the 15 deposits identified to date. The hydrothermal fluids that formed the different deposits are also isotopically identical throughout the property. The companies believe the strataform and tabular Active Member was affected by post-depositional structural deformation. At least two generations of brittle faults offset the tabular geometry of the Active Member within the Don Valley (located to the west of this occurrence) which likely accounts for the thickening and thinning of the Active Member across the property. Understanding the timing of the faults with respect to each other will aid future exploration programs in locating extensions of the known deposits and locating new resources.

Zinc and lead mineralization at the Selwyn project is hosted in the Active Member and consists of alternating layers of carbonaceous mudstone, limestone and chert, interlayered with stratobound laminated sulphide rich bands. The sulphides are fine grained and dominantly sphalerite and galena with minor pyrite. The mineralized horizon is generally 20 to 30 m thick and is texturally and mineralogically consistent throughout the property.

Ongoing metallurgical test work has confirmed that high-grade zinc and lead concentrate can be achieved. These concentrates have low levels of deleterious elements. Floatation test work indicates that a zinc concentrate grading 55 to 57% can be produced with an overall recovery of about 80% and a lead concentrate grading 65 to 70% lead with a recovery of approximately 70%. The ore will require fine grinding and floatation processing which will include the removal of carbon prior to producing high grade concentrates. Test work completed to date on the application of dense media separation indicates that simple gravity processing could provide an effective means of upgrading run-of-mine ores.

The Brodel deposit is located approximately 4 km northeast of the XY Central deposit (Minfile Occurrence 105I 012A). The 2009 Resource Estimate Update for the Selwyn Project displays two historic diamond drill holes in vicinity of this occurrence. The results of these holes which were drilled by Canex Placer/ Placer Development are unknown, but they were likely drilled to test for mineralization outbound from the XY deposits.

Prospecting by Pacifica Resources personnel in 2005 located a surface showing on top of a ridge. Two rock samples collected by staff returned 23.6% zinc and 8.05% lead (sample B345501) and 24.1% zinc and 8.16% lead (sample 345502). Follow up diamond drilling intersected mineralized Active Member in 8 out of the 10 holes collared in 2005. Hole BR02, the discovery hole intersected 12.6 m grading 4.90% zinc and 1.36% lead. Hole BR-03 collared 500 m northwest of hole BR-02 returned 9.5 m grading 4.61% zinc and 1.35% lead and 11.3 m grading 4.09% zinc and 1.04% lead. The single 2006 drill hole failed to intersect mineralization.

The Brodel deposit is thought to be the strike extension of the HP deposit also located on the moderately southwest dipping limb of the major XY regional synclinal structure. The deposit measures approximately 1,060 m long, striking 112° and dipping between 50 to 55°. Both the northwest and southeast strike extents of the deposit have been defined by drilling. The down dip extension of the deposit appears to be cut off by one of the larger tear faults that truncate the northeast limb of the regional synclinal structure and offsets the deposit to the northeast to become the HC deposit.

In Feb/2006 Pacifica released a National Instrument 43-101 compliant mineral resource estimate for the Brodel deposit. Using a 2% zinc cut-off the Brodel deposit hosts an inferred resource of 12,110,000 million tonnes grading 4.31% zinc and 1.16% lead (Nilsson and O'Donnell, 2006). As of Sep/2010 the entire Howard's Pass property (consisting of 15 individual deposits) hosts an indicated resource (using a 2% zinc cut-off) of 154,350,000 tonnes grading 5.35% zinc and 1.86% lead and an inferred resource of 234,150,000 tonnes grading 4.54% zinc and 1.41% lead.

A September 2012 report by Kirkham Geosystems lists a global resource for the Selwyn Project, which includes the 2006 estimate for the Brodel deposit. At a 2% Zn cut-off, the Global INDICATED Mineral Resource for the Selwyn Project is calculated at 185,570,000 tonnes grading 5.2% Zn and 1.79% Pb for a contained total of 21.26B lbs(9.64B kg) Zn and 7.3Blbs (3.3B kg) Pb. The Global INFERRED resource is listed at 237,860,000 tonnes grading 4.47% Zn and 1.38% Pb for a contained total of 23.45B lbs(10.63B kg) Zn and 7.22Blbs (3.27B kg) Pb.

Work History

Date	Work Type	Comment
9/27/2012	Studies	Kirkham Geosystems, Sept 27 2012 for Global Selwyn resource.
3/24/2006	Studies	Nilsson and O'Donnell, March 2006. Newly designated Brodel deposit, stated resource remains current as of March 2014.
12/31/2006	Drilling	1 hole, 154.7 m Hole abandoned due to ground conditions.

12/31/2005	Geochemistry	surface showing hosting high grade zinc-lead mineralization
12/31/2005	Drilling	10 holes, 1948.5 m
12/31/2005	Geology	
12/31/2005	Other	
12/31/1982	Pre-existing Data	economic analysis of property
12/31/1970	Other	regional geochemical surveys
12/1/2018	Development, Surface	continued cleanup of site work areas
12/1/2017	Development, Surface	cleanup camp sites, trails and drill sites
12/1/2016	Development, Surface	
12/1/2015	Studies	
12/1/2015	Studies	
12/1/2014	Drilling	
12/1/2014	Studies	
12/1/2014	Studies	
12/1/2014	Development, Surface	

Assessment Reports that overlap occurrence

Report Number	Year	Title	Worktypes	Holes Drilled	Meters Drilled
094657	2005	Assessment Report Describing Prospecting, Geochemical Sampling and Diamond Drilling on the Selwyn Project Property	Diamond - Drilling, Rock - Geochemistry, Silt - Geochemistry, Soil - Geochemistry, Bedrock Mapping - Geology, Regional Surficial Mapping - Geology	53	8285.72
097005	1976	Final Report on the 1976 Exploration Program at Howards Pass, Yukon	Access Road - Development, Surface, Diamond - Drilling, Soil - Geochemistry, Bedrock Mapping - Geology, EM - Ground Geophysics, Gravity Survey - Ground Geophysics, Surveying - Other, Mechanical - Trenching	70	9501.23
091190	1976	[Diamond Drilling at Howard Pass Property]	Diamond - Drilling		
091186	1976	[Diamond Drilling and Metallurgical Report on Don Claims]	Diamond - Drilling, Metallurgical Tests - Lab Work/Physical Studies	6	926.60
097007	1975	Final Report on the 1975 Exploration Program at Howards Pass, Yukon	Air Strip - Development, Surface, Diamond - Drilling, Soil - Geochemistry, Bedrock Mapping - Geology, Prospecting - Other, Mechanical - Trenching	19	4013.45
061275	1973	Report on the Geology and Mineralization Summit Lake Area, Y.T.-N.W.T.	Silt - Geochemistry, Soil - Geochemistry, Regional Bedrock Mapping - Geology		

Related References

Number	Title	Page(s)	Reference Type	Document Type
ARMC009055	Geological map - 105H-9 - MacMillan project - Anmac		Property File Collection	Geoscience Map (Geological - Bedrock)
BROCK000105	Report on 1974 field work (geological, geochemical, bulldozer trenching, diamond drilling) - PAS mineral claim group		Property File Collection	Report

Resource/Reserve

Year	Zone	Type	Commodity	Grade	Tonnage	Amount	Reported Amount	43-101 Compliant	Cut-off
2012	Selwyn Global Resource (Open Pit & Underground)	Indicated	zinc	5.2 %	185,570,000	9643373786	Yes	Yes	2% Zn
Kirkham Geosystems, Sept 27 2012.									
2012	Selwyn Global Resource (OPen Pit & Underground)	Indicated	lead	1.79 %	185,570,000	3311224301	Yes	Yes	2% Zn
Kirkham Geosystems, Sept 27 2012.									
2012	Selwyn Global Resource (Open Pit & Underground)	Inferred	zinc	4.47 %	237,860,000	10636741076	Yes	Yes	2% Zn
Kirkham Geosystems, Sept 27 2012.									
2012	Selwyn Global Resource (Open Pit & Underground)	Inferred	lead	1.38 %	237,860,000	3274936911	Yes	Yes	2% Zn
Kirkham Geosystems, Sept 27 2012.									
2006	BRODEL DEPOSIT (OPEN PIT)	Inferred	lead	1.16 %	12,110,000		No	Unknown	Unknown
Prepared by Independent Qualified Person John Nilsson of Nilsson Mine Services Ltd and J.J. O'Donnell Qualified Person for Pacifica. Using 2% Zinc cut-off.; Pacifica Resources Ltd Press Release February 28, 2006. Initial NI 43 - 101 compliant mineral resource estimate for Brodel deposit. Also repeated in various reports going forward.									

2006	BRODEL DEPOSIT (OPEN PIT)	Inferred	zinc	4.31 %	12,110,000		No	Unknown	Unknown
Prepared by Independent Qualified Person John Nilisson of Nilsson Mine Services Ltd and J.J. O'Donnell Qualified Person for Pacifica. Using 2% Zinc cut-off.; Pacifica Resources Ltd Press Release February 28, 2006. Initial NI 43 - 101 compliant mineral resource estimate for Brodel deposit. Also repeated in various reports going forward.									