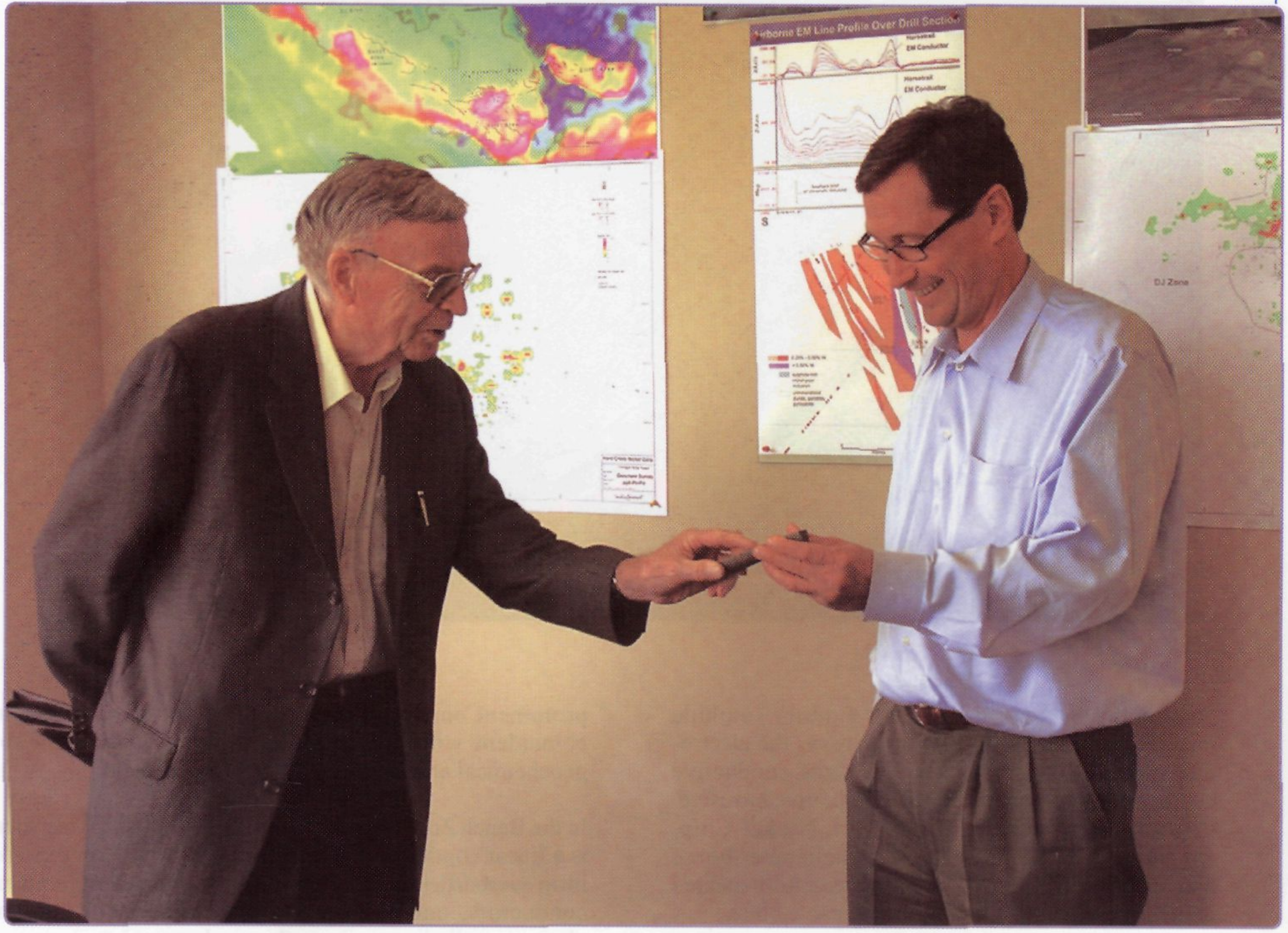
→ Turnagain

889141 - NM insert May 20/05

TURNAGAIN

Hard Creek Nickel
CORPORATION



James J. McDougall, P. Eng., passes a piece of massive sulphide core from the Turnagain property to Mark Jarvis, President of Hard Creek Nickel Corp.

Mr. McDougall, a past recipient of the "Prospector of the Year" award as well as the "Spud Huestis" award, sits on the Advisory Board of Hard Creek Nickel Corp.

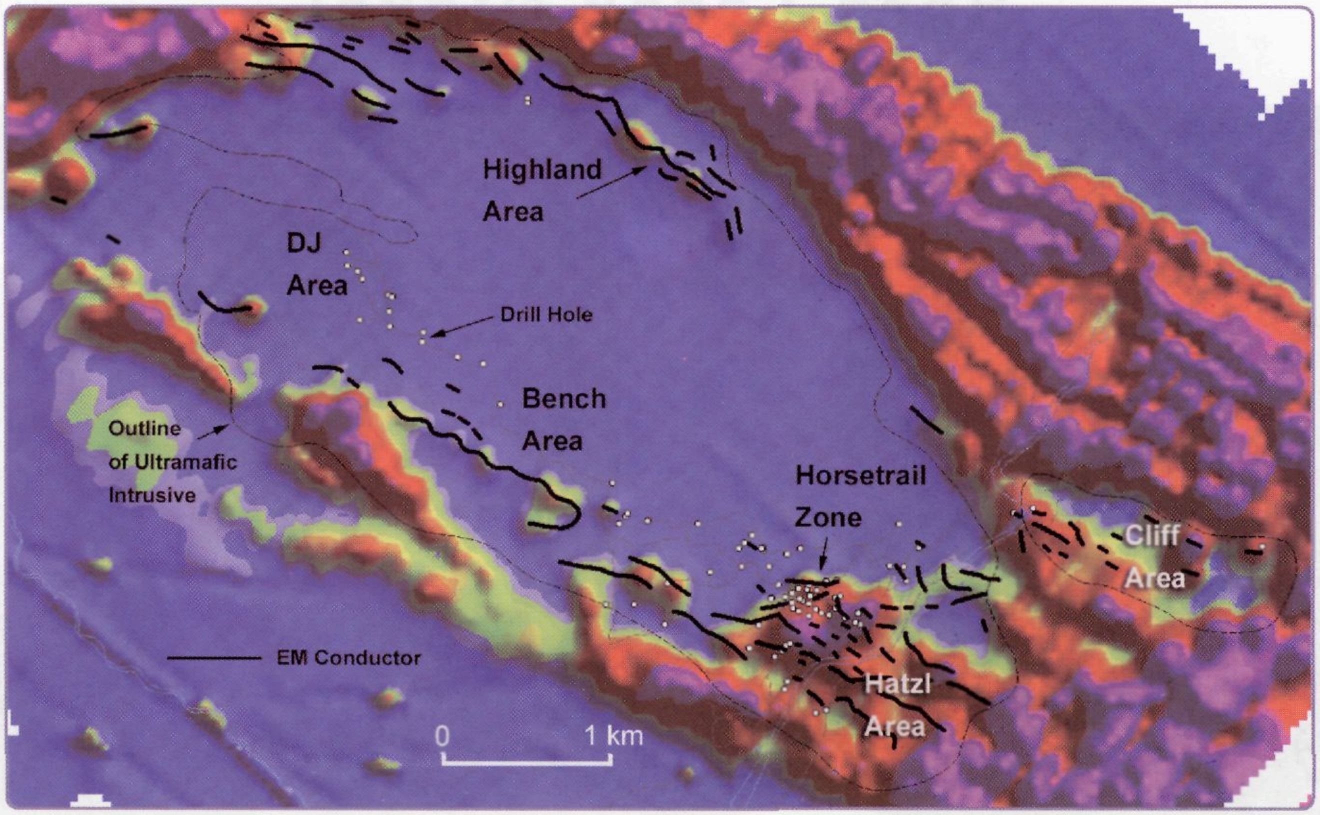
Mr. McDougall was the first to recognize the potential of the Turnagain property as a possible large tonnage, low grade sulphide nickel open pittable deposit when Falconbridge explored the property in the sixties and early seventies.

Working with Falconbridge for 30 years, ultimately as Manager of Western Exploration, McDougall was involved in a truly prodigious amount of reconnaissance exploration throughout British Columbia, Yukon and Alaska.

He was involved with the rebirth of the Tasu copper-iron mine in the Queen Charlottes by proving that the deposit dipped the opposite way to that earlier published. He explored previously untested iron deposits in the southern part of the Charlottes which led to minor production, and he discovered iron reserves on Vancouver Island that await development.

In addition, Mr. McDougall was involved in the discovery of a number of gold deposits, several large copper deposits including Catface and Sustut, the original zinc discovery in the Gataga area, the Windy-Craggy copper-gold-cobalt deposit in northwestern B.C., and numerous mineral deposits in Alaska, success that he attributes largely to company owned helicopters and seasonally employed northern bush pilots.

THE TURNAGAIN



One of the best techniques for finding sulphide mineralization in ultramafic intrusives is the electromagnetic (EM) survey, which locates conductive bodies within the generally non-conductive intrusive. In September of 2004, Hard Creek Nickel Corp. conducted a 1700 line kilometer helicopter-borne magnetic and EM survey which successfully located numerous conductors within the intrusive body.

Almost all of the conductors remain to be drill-tested. Even in the Horsetrail Zone, most of the conductors remain untested. However, where existing drill holes do cross a conductor, we see some of our best nickel grades.

The cross-section at right is an example from the Horsetrail Zone. Coincident with the conductor is a sulphide-rich, nickel poor metasedimentary inclusion, surrounded by a halo of +0.5% nickel, within a further halo of 0.25 – 0.5% nickel in sulphides.

The EM map (above) shows conductors in black within the ultramafic intrusive. In the Highland Area there is a linear zone of multiple conductors along a strike length of approximately 1.6 km, plus several additional prominent conductors. Several of the conductors are coincident with nickel and/or platinum-palladium soil geochemical anomalies; see plan views at right.

In the Bench Zone, 2.5 km south of the Highland Area, there is a linear conductor along approximately 1.4 km of strike in an overburden covered area, plus several other prominent conductors, one of which is coincident with a strong platinum-palladium soil geochemical anomaly.

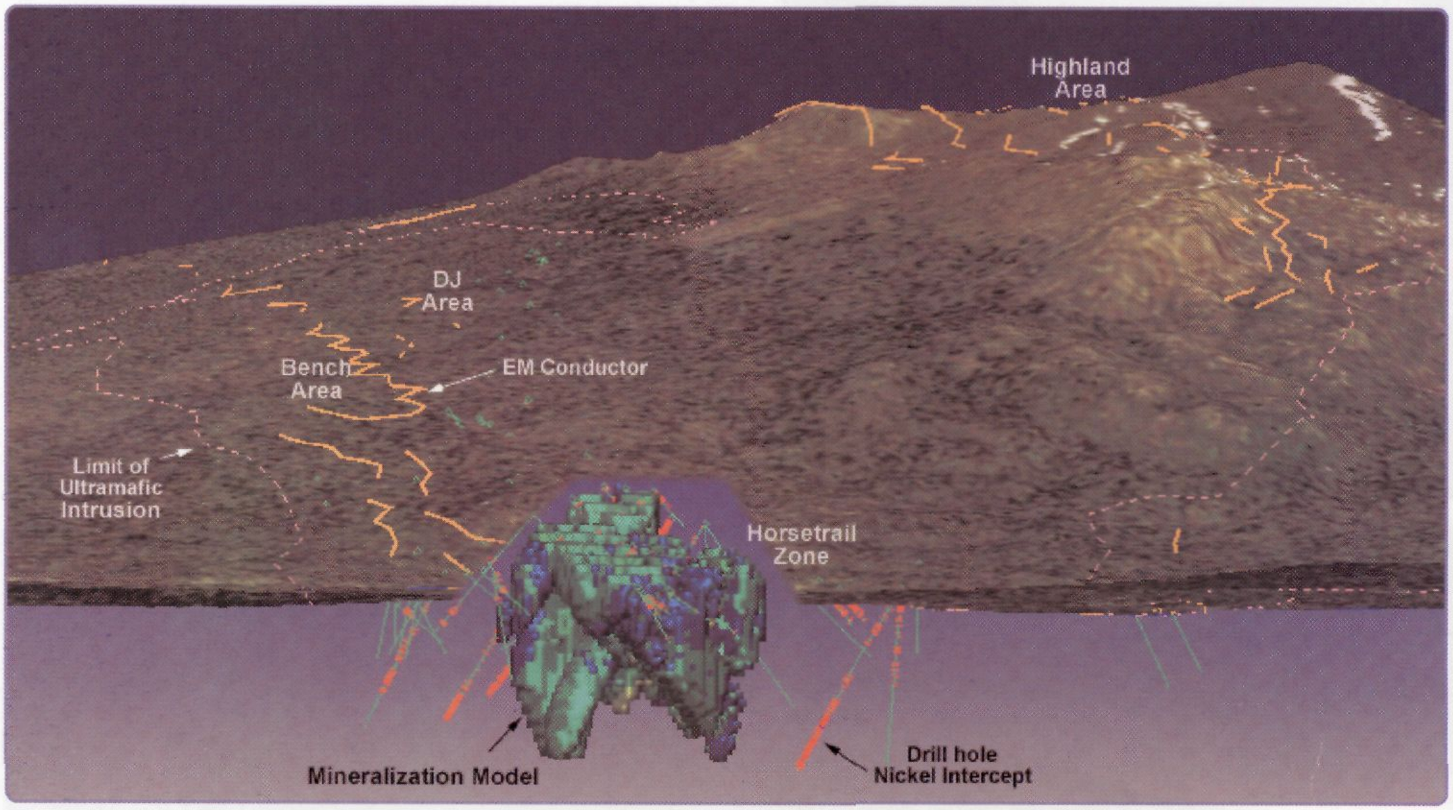
Between the Bench Area and Horsetrail Zone are several conductors that may provide an opportunity to extend the mineralized resource in the Horsetrail Zone towards the west. South and east of the Horsetrail Zone are a series of untested conductors in the Hatzl and Cliff Areas.

We hope to test most of the conductors on our property during the 2005 drilling campaign.

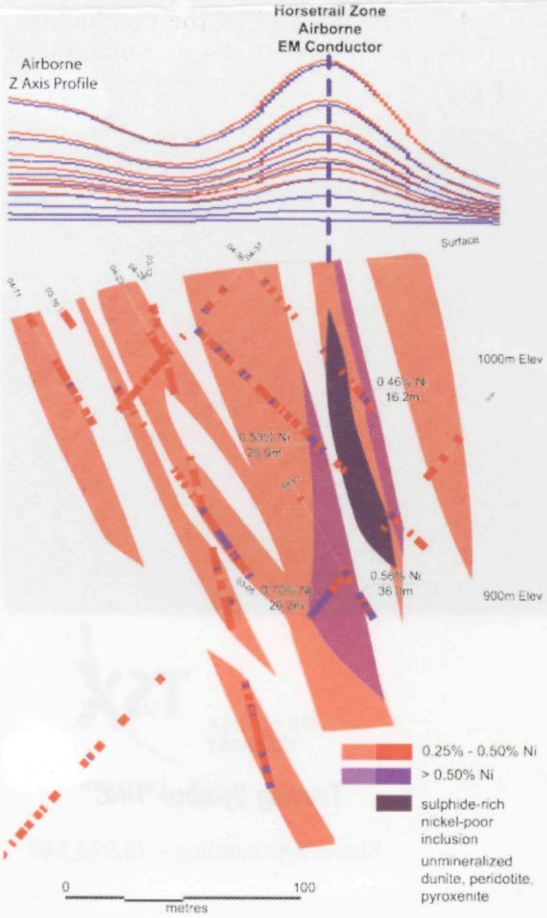
The presence of EM conductors does not guarantee the presence of economic sulphide mineralization. A conductor may be explained by, among other things, non-economic sulphide mineralization such as pyrrhotite or by graphite. Only drill core analysis can provide a definitive explanation for the anomaly.

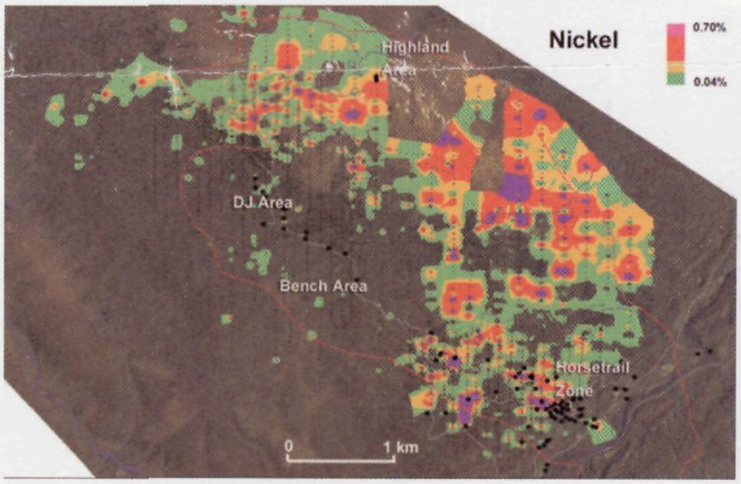
Technical information in this brochure has been reviewed and approved by Neil Froc, P.Eng., Qualified Person.

NICKEL PROJECT

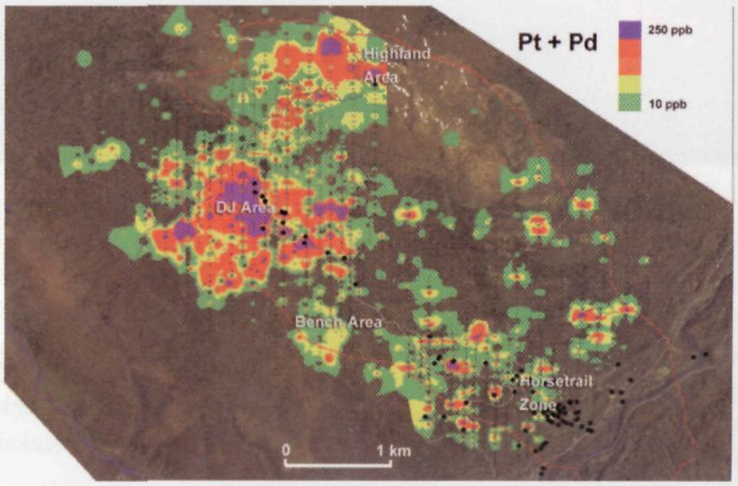


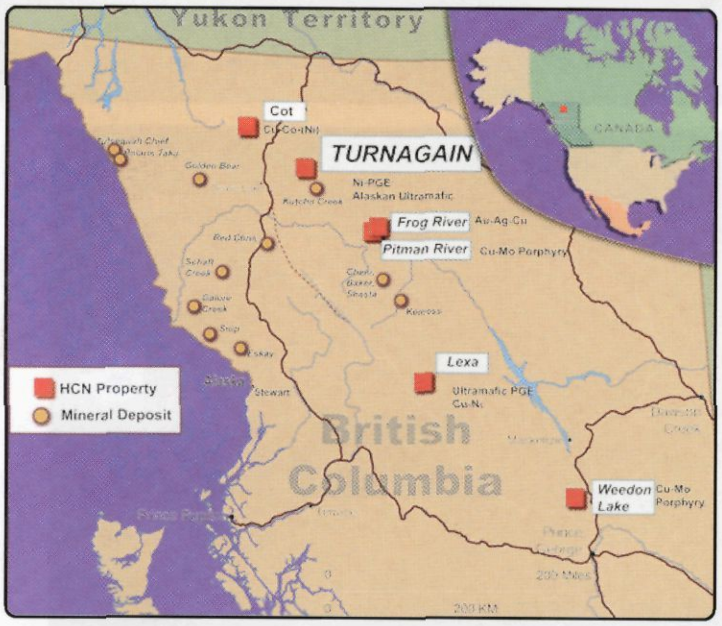
Airborne EM Line Profile over Vertical Drill Section





Geochemical Soil Surveys

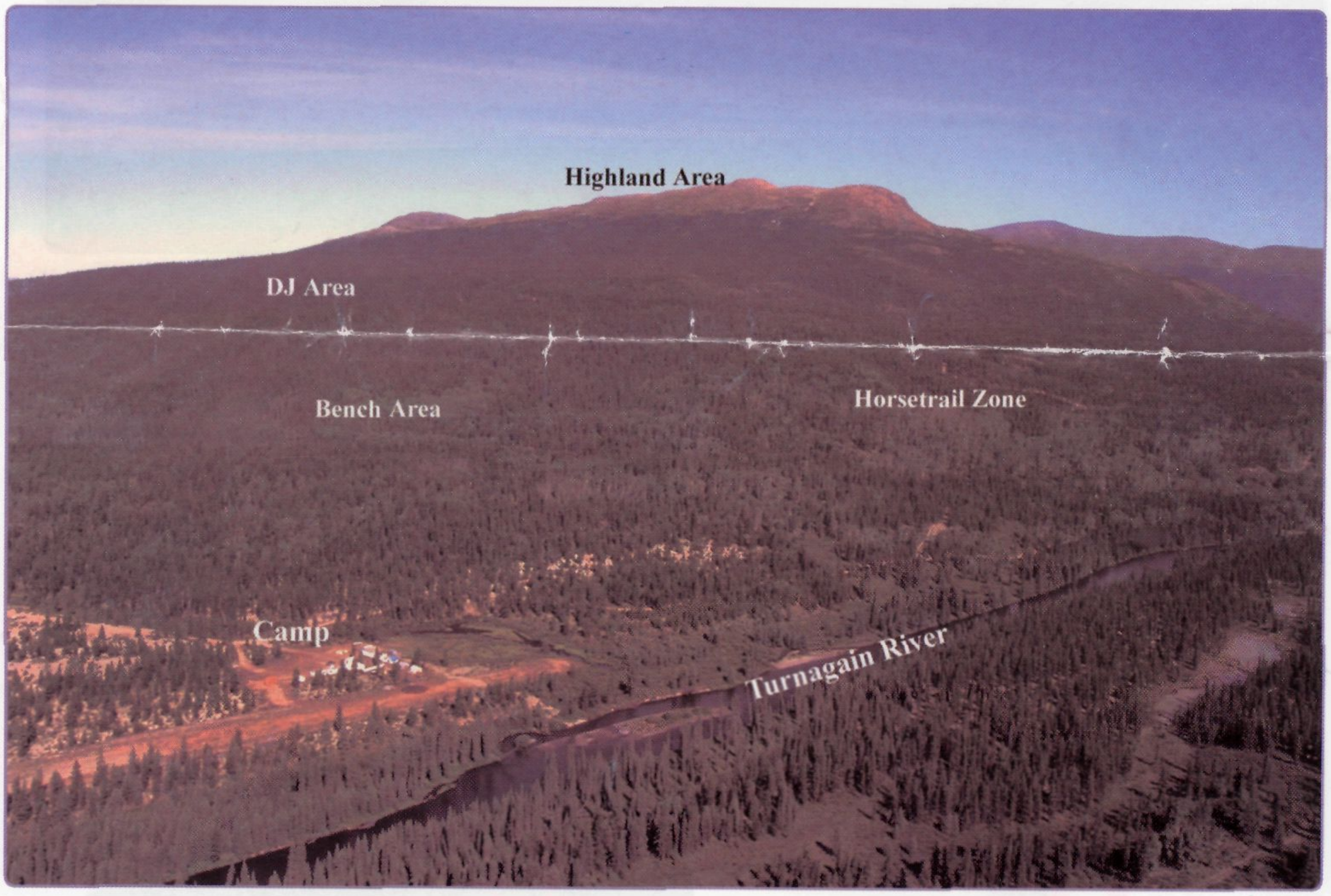




The Turnagain Nickel property is located 70 km east of Dease Lake in northern British Columbia. A mining road, accessible by 4 wheel drive vehicles in the summer months, connects the property to Dease Lake.

The property is in rolling foothills terrain, in a dry belt behind the Coast Range mountains to the west. An air strip suitable for small planes is located right next to camp.

Two drills were stored on the property during the winter, so it will be easy to ramp up the program once surface work is complete. Initial work will begin on the property in mid May with drilling expected to start at the end of June, 2005.



DIRECTORS & OFFICERS

Mark Jarvis, President - Director
Frank Wright, BBA, B.Sc., P.Eng. - Director
George Sookochoff, B. Comm. - Director
Lyle Davis, MBA - Director
Tony Hitchins - COO
Brian Fiddler - CFO
Leslie Young - Corporate Secretary

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TSX venture EXCHANGE

Trading Symbol "HNC"

Shares Outstanding - 28,993,349

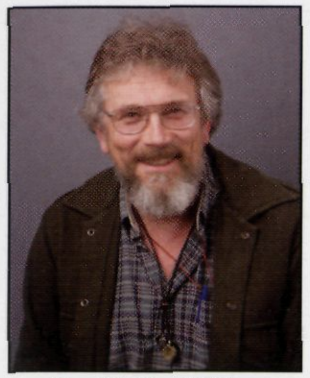
June 12/06

"Some people say our Turnagain project is too large for such a small company.
I say, that is exactly the problem I want to have."

Mark Jarvis,
President,
Hard Creek Nickel Corp.

Hard Creek Nickel
CORPORATION

January 2006



Tony Hitchins, C.O.O
Hard Creek Nickel Corp.

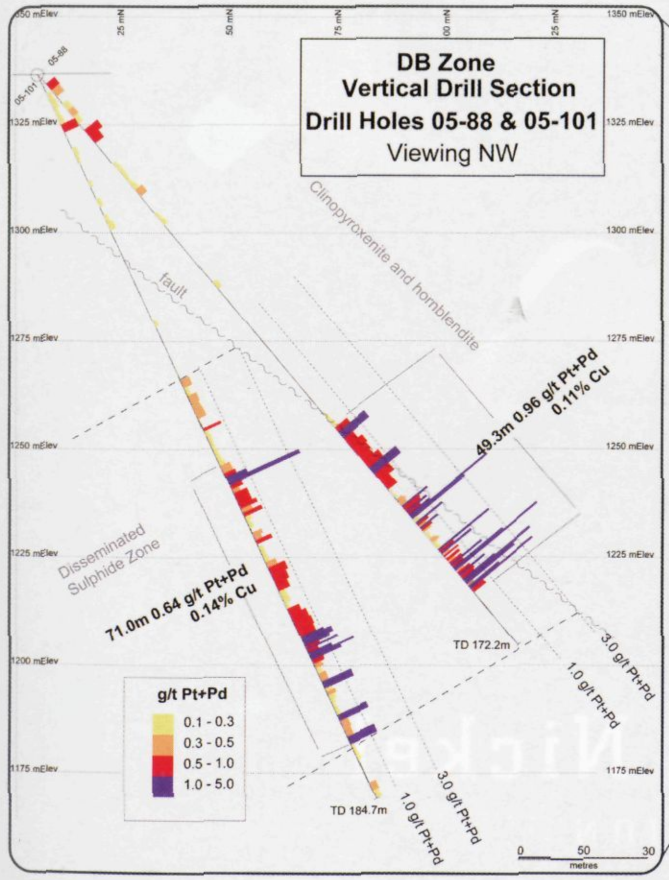
The 2005 field season at the Turnagain Project, comprising 7,143m of drilling in 37 holes, was successful on several fronts:

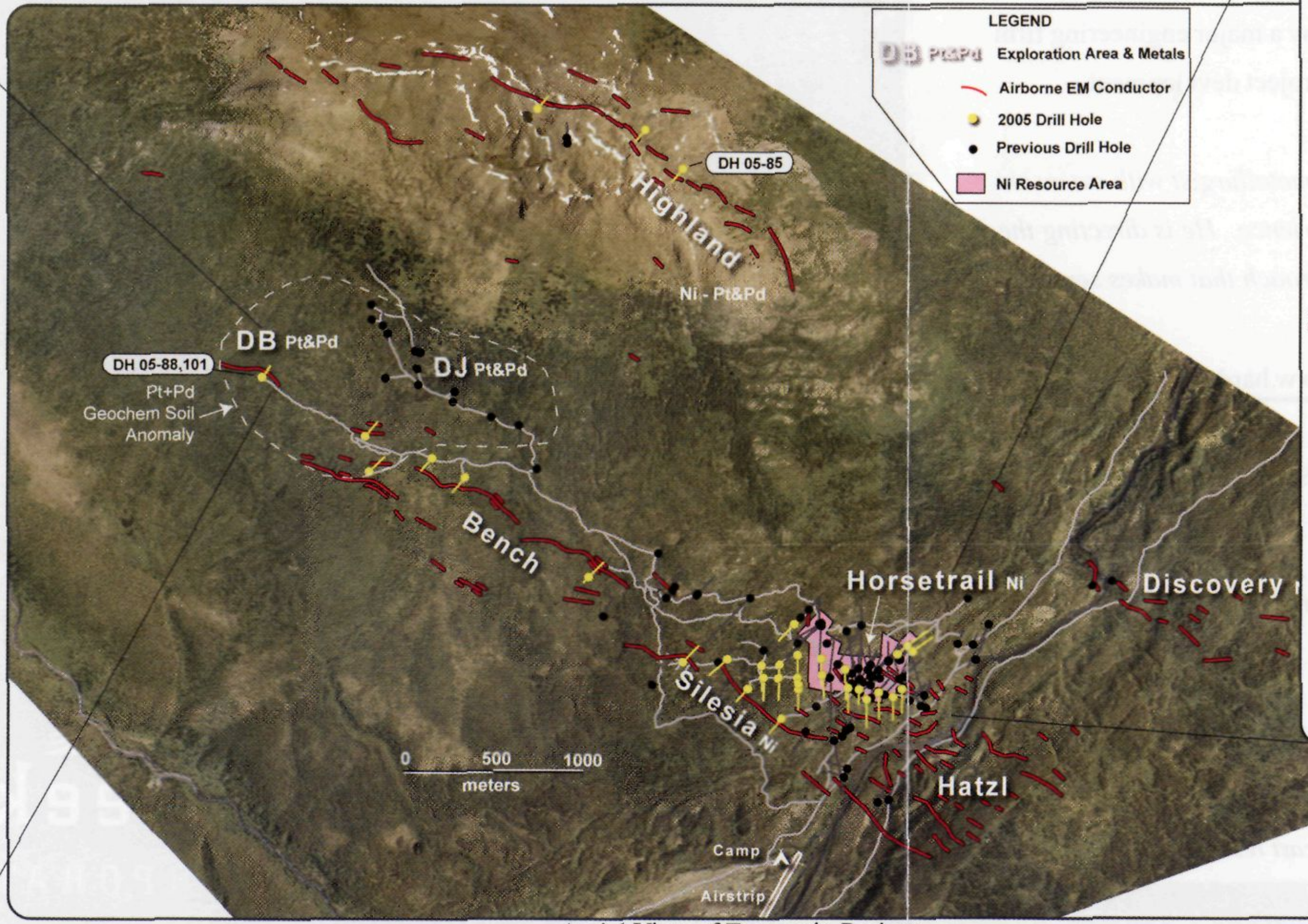
- We significantly expanded the potential resource area of the Horsetrail zone. An updated resource estimate is expected in the first quarter of 2006.
- We discovered a new zone of sulphide nickel mineralization with considerable upside in the Highland zone.
- We obtained some very encouraging platinum-palladium results in the DB-DJ area which has lead to a re-evaluation of the entire 1km by 1km platinum-palladium soil anomaly, as a large tonnage, open pit platinum-palladium target.

In the Horsetrail area, we drilled 23 diamond drill holes designed to expand the resource to the west, northwest, northeast and south (see plan map below). Results were encouraging, with long, continuous intervals of sulphide nickel mineralization in most holes, highlighted by hole 05-106, which returned 0.30% nickel over 236m, starting at 3m depth, and including 53m of 0.46% nickel from 83 to 136m.

In the Highland area, hole 05-85 intersected a new zone of sulphide nickel mineralization in a low sulphur environment but with pentlandite as the dominant sulphide. The entire hole length of 140.2m averaged 0.26% nickel including 0.38% nickel over 17.5m. Metallurgical testwork showed concentration ratios > 90:1 to produce concentrate grades of 20% and 21.5% nickel from two composite core samples. There is at least 1 kilometer of strike length to this zone and follow-up drilling is planned in 2006.

Two holes were drilled to test the DB geophysical anomaly, located in the southwestern corner of an extensive platinum-palladium soil anomaly. Hole 05-88 intersected a 49.3m long interval averaging 0.96 g/t platinum plus palladium and 0.11% copper. Hole 05-101, drilled from the same site as 05-88, intersected a 71.0m long interval averaging 0.64 g/t platinum plus palladium and 0.14% copper. Within these broad intersections, individual assay samples, from 0.5m to 2.0m in length, ranged from less than 0.2 g/t to a high of 4.88 g/t platinum plus palladium. Platinum to palladium ratio is generally 1:1. Most of the soil anomaly remains untested.





Aerial View of Turnagain Project

Mark Jarvis, President & CEO
Hard Creek Nickel Corp.

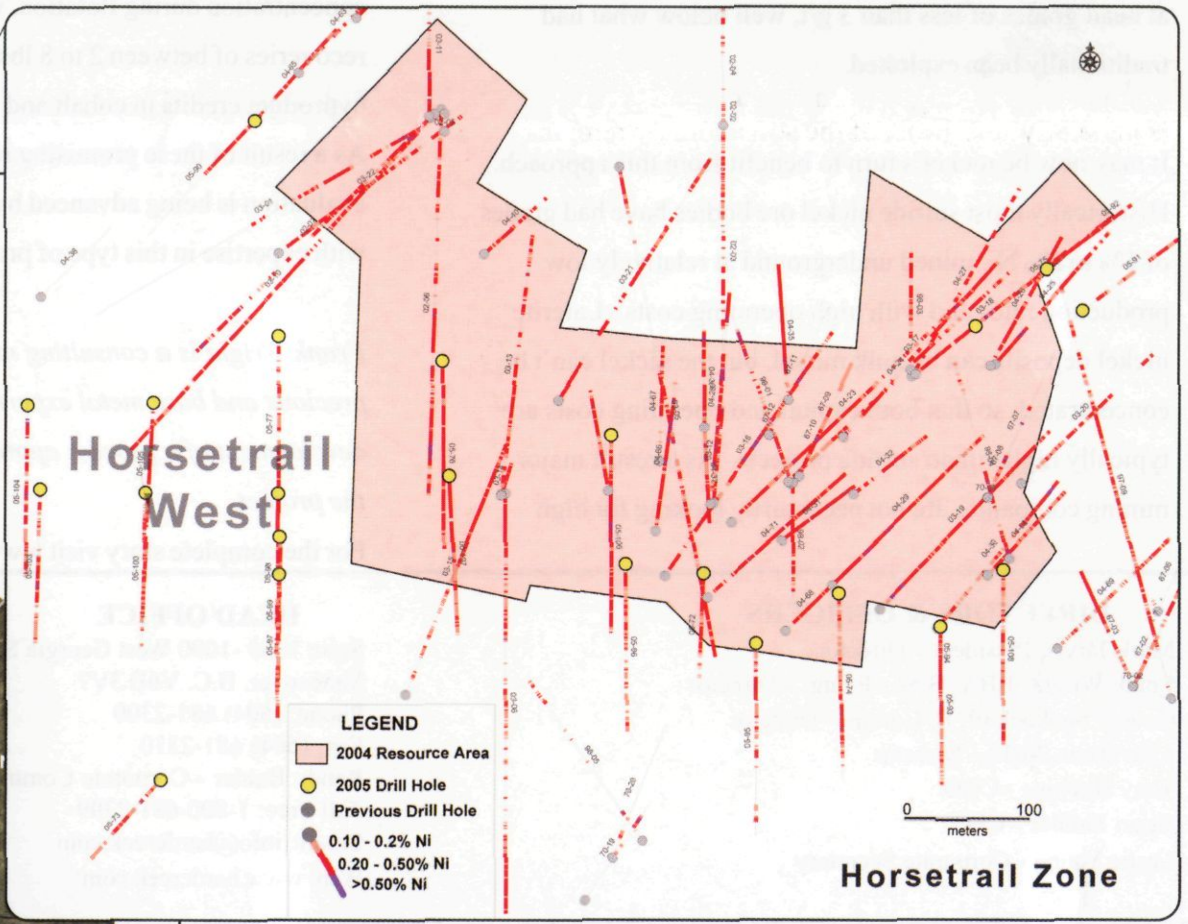
Large projects can be challenging, but if you can work through the challenges, the rewards are very large. So it's worth putting in the effort.

The Turnagain Nickel project is an area about 32 km by 5 km – a large area for an exploration project. The core exploration area is an ultramafic intrusive - an ancient magma chamber - with a surface expression of 12.8 sq. kilometres. The entire intrusive was a source rock for nickel, cobalt, platinum and palladium.

Within this large intrusive we have identified areas where sulphur has mixed in with the magma to form sulphide minerals, which are easy to extract from the rock. Our target is a large tonnage, low grade, open pit mine where economies of scale drive the profitability.

In pursuit of this goal, we have engaged AMEC Americas Limited (AMEC), a leading mine engineering firm, to perform a Preliminary Economic Assessment (PEA) of the Turnagain project. The PEA will provide a base case scoping level engineering study of our resource which will include a financial sensitivity analysis using several different nickel price assumptions.

We have a lot of work to do before we know the ultimate size of the resource on the Turnagain property. In 2006, we plan to continue expansion drilling of the Horsetrail resource, follow up on our exploration success in the Highland zone and the DB zone and continue exploring several other prospective areas of the ultramafic intrusive.



For resource details, see June 23, 2005 Press Release. Also see technical report dated June 15, 2005 by N.C. Carter, Ph.D., P.Eng. at www.hardcreeknickel.com/pdf/2005 Exploration Report.pdf. A mineral resource is an estimate of a geological resource with no demonstration of economic viability.

The Time has Come for Low Grade Sulfide Nickel

Frank Wright, BBA, B.Sc., P.Eng.
(Metallurgy), Director
Qualified Person under 43-101

Turnagain's nickel grades, low by traditional standards, show exciting potential if treated with newly developed process technology, and a bulk tonnage open pit mining approach. Modern mining and process methods have been changing the way large mining companies and knowledgeable investors look at mineral properties. The trend began in the 1960's with copper projects going from smaller underground operations, often with grades exceeding 2% to larger low grade projects with grades that could be less than 0.5%. By the 1970's the bulk mining of other low grade metals was advancing, most notably gold using new hydrometallurgical techniques and at head grades of less than 3 g/t, well below what had traditionally been exploited.

It may now be nickel's turn to benefit from this approach. Historically most sulfide nickel ore bodies have had grades of 1% to 2% Ni, mined underground at relatively low production rates and with high operating costs. Laterite nickel deposits can be bulk mined, but the nickel can't be concentrated, so that both capital and operating costs are typically higher than sulfide projects. As a result major mining companies are not necessarily looking for high grades, but rather for large tonnage potential that can be shown to be economically attractive. An example is the Mt. Keith Mine owned by Western Mining in Australia, recently acquired by BHP Billiton, with open pit mining of sulfide nickel having grades of approximately 0.5% Ni.

At Turnagain, attention was focused on process studies at an early stage of project development, which is key to justifying advancing any low grade metal deposit. This work has been carried out by several well recognized, independent, mineral testing laboratories. The results for the targeted resource at Turnagain show a very encouraging response to standard froth flotation, as well as hydrometallurgical procedures for concentrate treatment. Most of Turnagain's mineral zones provide a high ratio of concentration during flotation, while attaining nickel recoveries of between 2 to 8 lbs/tonne, with potential byproduct credits in cobalt and platinum group elements. As a result of these promising results, the economic evaluation is being advanced by a major engineering firm with expertise in this type of project development.

Frank Wright is a consulting metallurgist with extensive precious and base metal experience. He is directing the development of a process approach that makes sense for the project.

For the complete story visit www.hardcreek.com

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Technical information in this document was reviewed and approved by Chris Baldys, P.Eng., a Qualified Person. This document contains forward looking statements, including statements about future exploration programs, which are subject to risk factors, both known and unknown, which may cause actual results to differ materially from forecast results.

→ Turnagain

Hard Creek channels study to a Turnagain mining project

Hard Creek Nickel Corp	
Symbol	**HNC**
Shares Issued	**40,834,124**
Close 2006-06-20	**C$ 0.75**
Recent Sedar Documents	

2006-06-21 15:21 ET - News Release

Mr. Mark Jarvis reports

HARD CREEK COMPLETES PRELIMINARY ASSESSMENT - TURNAGAIN NICKEL PROJECT

According to Hard Creek Nickel Corp., AMEC Americas Ltd. has completed a preliminary assessment (the study) of the company's 100-per-cent-owned Turnagain nickel project, located near Dease Lake in British Columbia, Canada. The study, dated June 14, 2006, and entitled "Preliminary Assessment of the Turnagain Nickel Project" will be filed on SEDAR and available for viewing on the company's website.

The study was prepared under the supervision of Joe Ringwald, PEng, and Tony Lipiec, PEng, of AMEC. The geology and resource estimate for this report were completed by Ronald G. Simpson, PGeo, the principal of Geosim Services Ltd., and previously filed on SEDAR on April 18, 2006. All are independent qualified persons as defined by National Instrument 43-101.

In evaluating the Turnagain nickel project, AMEC engineers used a base case scenario with the current measured, indicated and inferred resource using a cut-off of 0.14 per cent sulphide nickel for the first six years followed by 0.095 per cent sulphide nickel for the remainder of the mine life. Material between 0.095 per cent and 0.14 per cent sulphide nickel in the first six years was stockpiled and fed to the mill in the later years of operation. With the base case cut-off grade of 0.095 per cent sulphide nickel, the measured and indicated resource is estimated at 184 million tonnes grading 0.17 per cent sulphide nickel. An additional inferred resource is estimated at 286 million tonnes grading 0.16 per cent sulphide nickel.

Resources

The mining assessment for the Turnagain nickel deposit is based on typical industry standards for a preliminary assessment study with regard to the nature and minability of the resource. A preliminary pit design was produced which allowed a production schedule to be derived. This indicates that, at the 50,000-tonne/day throughput selected, the mine has a potential life of 17 years with approximately 302 million tonnes at 0.174 per cent nickel sulphide, 0.014 per cent cobalt and 0.027 per cent copper to the mill at an average stripping ratio of 0.63 to one. The construction schedule is estimated at 24 months.

The ore would be processed through an on-site concentrator and hydrometallurgical process facility that would produce nickel, cobalt and copper precipitation products. Run-of-mine (ROM), open-pit ore would be crushed in a gyratory crusher. The crushed ore would be processed by means of a fine crushing circuit in combination with ball mill grinding, followed by rougher flotation, conventional cleaning, regrind, column cleaner flotation and dewatering, to produce a nickel-cobalt-copper concentrate which would be stored in holding tanks. The concentrate would be reground and then pressure oxidized in an autoclave. Leaching of the copper, cobalt and nickel would take place. Precipitation of ~~copper, cobalt and~~ nickel would happen sequentially to produce hydroxide and sulphide products.

The overall metallurgical recoveries of the metals associated with sulphide minerals have been estimated as follows:

OVERALL METALLURGICAL RECOVERIES (%)

	Concentrator	Hydromet	Cumulative
Nickel	75-77.5	95	71.2-73.6
Cobalt	65	95	62
Copper	50	95	47.5

Turnagain Aug. 9/06
site phone
[Tony Hitching]
604-628-3343
[Van: 644-681-2300]

METAL RECOVERED (AT SITE) OVER THE LIFE OF THE MINE

Nickel	378,127 tonnes (832,879,000 pounds)

Cobalt	26,124 tonnes	(57,542,000 pounds)
Copper	38,755 tonnes	(85,363,000 pounds)

Product would be trucked by the existing road network in the area to the Port of Stewart for shipment to smelters or refiners. The truck haulage of concentrate would be contracted out. Tailings from the process would be impounded in a tailings pond with water to be reclaimed from the pond and reused in the process plant. The initial capital cost of the project is estimated to be $867.1-million in the first quarter of 2006. A contingency of $132.4-million has been included in this cost. The capital cost has been split in the following manner:

Cap. Cost.

CAPITAL ESTIMATES (DIRECT)

Infrastructure	Power line	$17.5-million
	Access road upgrade	$4.6-million
Mining	Equipment capital	$38.9-million
	Waste dump	$3.3-million
	Prestripping	$13.2-million
Metallurgical	Concentrator and hydromet plant	$332.4-million
Tailings facilities		$41.8-million
Ancillary facilities	Buildings	$29.6-million
	Power distribution	$13.8-million
	Total	$495.1-million

CAPITAL ESTIMATES (INDIRECT)

NSR purchase	$4.0-million
Owner's cost	$48.2-million
Engineering, procurement and construction management	$72.3-million
Temporary fuel and services	$43.4-million
Freight	$24.1-million
Man camp	$20-million
Mechanical/electrical spares	$9.4-million
Catering	$10.2-million
First fills and liners	$6.5-million
Vendor's representatives	$1.5-million
Contingency	$132.4-million
Total	$372-million

Sustaining capital for the project over 17 years is $93.9-million. Of this, $17.4-million is spent in year three and $35.7-million is spent in year eight to add and replace equipment in the pit. The remainder is attributed to the capital requirements of the process and tailings facilities. The operating costs are estimated to be the following:

OPERATING COST ESTIMATES ($/TONNE)

	Year	1	2-5	6-10	10-15	16-17
General and administrative	Labour	0.13	0.13	0.13	0.13	0.13
	Direct	0.29	0.29	0.29	0.29	0.29
	Total	0.42	0.42	0.42	0.42	0.42

Mining		1.50	2.01	2.39	2.12	0.48
Processing	Process labour	0.55	0.55	0.55	0.55	0.55
	Consumables	3.47	3.47	3.47	3.47	3.47
	Power	1.35	1.35	1.35	1.35	1.35
	Parts/freight/supplies	1.75	1.75	1.75	1.75	1.75
	Processing total	7.12	7.12	7.12	7.12	7.12
	Total mine site	9.04	9.55	9.93	9.66	8.02

Saleable product would be paid for on the basis of 85 per cent for nickel contained in nickel hydroxide and 80 per cent for cobalt hydroxide and copper in copper sulphide. The average site operating cost over the first three years of mine life to produce nickel has been estimated at $2.77 (U.S.) per pound of nickel and over the life of the mine at $3.45 (U.S.) per pound of nickel. At a price of $5.25 (U.S.) per pound of nickel, $10 (U.S.) per pound of cobalt and $1.10 (U.S.) per pound of copper, at an exchange rate of 85 Canadian cents per $1 (U.S.) and a discount rate of 10 per cent, the resulting net present value (NPV) is $85-million (Canadian). The project, with these assumptions, has a rate of return of 11.96 per cent. Other cases based on nickel price are presented as follows:

IRR
≈12%

PRETAX NET PRESENT VALUE -- VARIOUS CASES

Commodity (U.S. dollars)	Nickel	$4.00	$4.50	$5.00	$5.25	$5.50	$6.00
	Cobalt	$8.00	$9.00	$10.00	$10.00	$11.00	$12.00
	Copper	$0.90	$1.00	$1.10	$1.10	$1.20	$1.30
IRR %		N/A	5.0	10.0	12.0	14.4	18.4
NPV (millions of $)	0% discount	-271	404	882	1,090	1,359	1,839
	5.0% discount	-415	1	297	425	592	887
	7.5% discount	-450	-114	124	228	362	600
	10.0% discount	-471	-196	-1	85	195	390
	12.5% discount	-483	-253	-91	-20	71	234
	15.0% discount	-487	-294	-157	-97	-20	116

Cases using trailing averages for three, five and 15 years are presented as follows:

PRETAX NET PRESENT VALUE -- TRAILING AVERAGES

		15 years	Five years	Three years
Commodity (U.S. $)	Nickel	$4.45	$5.32	$6.60
	Cobalt	$9.00	$10.00	$12.00
	Copper	$1.00	$1.10	$1.30
IRR %		4.6	12.5	22.3
NPV (millions of $)	0% discount	362	1148	2338
	5.0% discount	-24	461	1196
	7.5% discount	-135	257	850
	10.0% discount	-213	109	595
	12.5% discount	-268	0	405

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15.0% discount          -306      -80      260
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The viability of the project depends on access to the North American power grid and an assumption has been made that the grid would be extended to Dease Lake. Issues related to the production of saleable products by concentration and subsequent hydrometallurgical processing still need to be addressed. AMEC recommends that further work is warranted on the Turnagain deposit. This work includes further exploration to define and expand the resource, more mine engineering to optimize the extraction of the ore, and metallurgical work to determine the best approach to producing a saleable product.

Once sufficient reserves are defined by drilling and better metallurgical information is developed, this project should proceed to a prefeasibility study. The prefeasibility study would examine variants to derive the appropriate path to the development of this deposit.

This preliminary assessment includes the use of inferred resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. The study is preliminary in nature and there is no assurance the mining scenarios outlined in this report would ever be realized. This press release uses the terms "measured," "indicated" and "inferred" resources. The company advises United States investors that, while those terms are recognized and required by Canadian regulations, the U.S. Securities and Exchange Commission does not recognize them. U.S. investors are cautioned not to assume that any part or all of mineral deposits in these categories would ever be converted to reserves.

This news release has been reviewed and approved by Neil Froc, PEng, a qualified person consistent with National Instrument 43-101.

We seek Safe Harbor.

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→ Turnagain

Hard Creek estimates 17-year mine life at Turnagain

Hard Creek Nickel Corp	
Symbol	HNC
Shares Issued	40,834,124
Close 2006-06-14	C$ 0.75
Recent Sedar Documents	

2006-06-15 10:01 ET - News Release

Mr. Mark Jarvis reports

HARD CREEK COMPLETES PRELIMINARY ASSESSMENT TURNAGAIN NICKEL

Hard Creek Nickel Corp. has completed a preliminary assessment of the company's 100-per-cent-owned Turnagain nickel project, located near Dease Lake in British Columbia. The study was done by AMEC Americas Ltd. (AMEC). The study, dated June 14, 2006, and entitled "Preliminary Assessment of the Turnagain Nickel Project," will be filed on SEDAR and available for viewing on the company's website.

The study was prepared under the supervision of Joe Ringwald, PEng, and Tony Lipiec, PEng, of AMEC. The geology and resource estimate for this report were completed by Ronald Simpson, PGeo, the principal of Geosim Services Ltd., and previously filed on SEDAR on April 18, 2006. All are independent qualified persons as defined by National Instrument (NI) 43-101.

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166 888 000 tonnes

283 710 tonnes Ni

259 402 000 tonnes

~ 415 043 tonnes Ni

— see June 21/06 Release re: tons vs tonnes

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Nickel	75 77.5	95	71.2 73.6
Cobalt	65	95	62
Copper	50	95	47.5

METAL RECOVERED (ON-SITE)
OVER THE LIFE OF THE MINE

Nickel	378,223 tons	(833,090,000 lbs)
Cobalt	26,124 tons	(57,542,000 lbs)
Copper	38,755 tons	(85,363,000 lbs)

Product would be trucked by the existing road network in the area to the port of Stewart for shipment to smelters or refiners. The truck haulage of concentrate would be contracted out. Tailings from the process would be impounded in a tailings pond with water to be reclaimed from the pond and reused in the process plant.

The initial capital cost of the project is estimated to be $867.1-million in the first quarter 2006. A contingency of $132.4-million has been included in this cost. The capital cost has been split in the following manner:

CAPITAL ESTIMATES (DIRECT)

Infrastructure		
Power line	$	17.5 million
Access road upgrade	$	4.6 million
Mining		
Equipment capital	$	38.9 million
Waste dump	$	3.3 million
Prestripping	$	13.2 million
Metallurgical		
Concentrator and hydromet plant	$	332.4 million
Tailings facilities	$	41.8 million
Ancillary facilities		
Buildings	$	29.6 million
Power distribution	$	13.8 million
Total	$	495.1 million
Capital estimates (indirect)		
NSR purchase	$	4.0 million
Owner's cost	$	48.2 million
Engineering, procurement and constr mgmt	$	72.3 million
Temporary fuel and services	$	43.4 million
Freight	$	24.1 million
Man camp	$	20.0 million
Mechanical/electrical spares	$	9.4 million
Catering	$	10.2 million
First fills and liners	$	6.5 million
Vendor's reps	$	1.5 million
Contingency	$	132.4 million
Total	$	372.0 million

Sustaining capital for the project over 17 years is $93.9-million. Of this, $17.4-million is spent in the third year and $35.7-million is spent in the eighth year to add and replace equipment in the pit. The remainder is attributed to the capital requirements of the process and tailings facilities.

The operating costs are estimated to be the following:

OPERATING COST ESTIMATES ($/TON)

					Year
	1	2-5	6-10	10-15	16-17
General and administrative					

Labor	0.13	0.13	0.13	0.13	0.13
Direct	0.29	0.29	0.29	0.29	0.29
Total	0.42	0.42	0.42	0.42	0.42
Mining	1.50	2.01	2.39	2.12	0.48
Processing					
Process labor	0.55	0.55	0.55	0.55	0.55
Consumables	3.47	3.47	3.47	3.47	3.47
Power	1.35	1.35	1.35	1.35	1.35
Parts/freight and supplies	1.75	1.75	1.75	1.75	1.75
Processing total	7.12	7.12	7.12	7.12	7.12
Total mine site	9.04	9.55	9.93	9.66	8.02

Saleable product would be paid for on the basis of 85 per cent for nickel contained in nickel hydroxide and 80 per cent for cobalt hydroxide and copper in copper sulphide. The average site operating cost over the first three years of mine life to produce nickel has been estimated at $2.77 (U.S.) per pound of nickel and over the life of the mine at $3.45 (U.S.) per pound of nickel.

At a price of $5.25 (U.S.) per pound of nickel, $10 (U.S.) per pound of cobalt and $1.10 (U.S.) per pound of copper, an exchange rate of 85 (Canadian) cents to the U.S. dollar, and a discount rate of 10 per cent, the resulting net present value (NPV) is $85-million. The project with these assumptions has a rate of return of 11.96 per cent. Other cases based on nickel price are presented as follows:

PRETAX NET PRESENT VALUE, VARIOUS CASES

Commodity (US$)						
Nickel	$4.00	$4.50	$5.00	$5.25	$5.50	$6.00
Cobalt	$8.00	$9.00	$10.00	$10.00	$11.00	$12.00
Copper	$0.90	$1.00	$1.10	$1.10	$1.20	$1.30
IRR %	N.A.	5.0	10.0	12.0	14.4	18.4
NPV						
0% discount ($M)	-271	404	882	1090	1359	1839
5.0% discount ($M)	-415	1	297	425	592	887
7.5% discount ($M)	-450	-114	124	228	362	600
10.0% discount ($M)	-471	-196	-1	85	195	390
12.5% discount ($M)	-483	-253	-91	-20	71	234
15.0% discount ($M)	-487	-294	-157	-97	-20	116

Cases using trailing averages for three years, five years and 15 years are presented as follows:

PRETAX NET PRESENT VALUE, TRAILING AVERAGES

	15 years	Five years	Three years
Commodity (US$)			
Nickel	$4.45	$5.32	$6.60
Cobalt	$9.00	$10.00	$12.00
Copper	$1.00	$1.10	$1.30
IRR %	4.6	12.5	22.3
NPV			
0% discount ($M)	362	1148	2338
5.0% discount ($m)	-24	461	1196
7.5% discount ($m)	-135	257	850
10.0% discount ($m)	-213	109	595
12.5% discount ($m	-268	0	405
15.0% discount ($m)	-306	-80	260

The viability of the project depends on access to the North American power grid, and an assumption has been made that the grid would be extended to Dease Lake. Issues related to the production of saleable products by concentration and subsequent hydrometallurgical processing still need to be addressed.

AMEC recommends that further work is warranted on the Turnagain deposit. This work includes further exploration to define and expand the resource, more mine engineering to optimize the extraction of the ore, and metallurgical work to determine the best approach to producing a saleable product.

Once sufficient reserves are defined by drilling, and better metallurgical information is developed, this project should proceed to a prefeasibility study. The prefeasibility study would examine variants to derive the appropriate path to the development of this deposit.

This preliminary assessment includes the use of inferred resources that are considered too speculative geologically to have economic considerations applied to them that would enable them to be categorized as mineral reserves. The study is preliminary in nature and there is no assurance the mining scenarios outlined in this report would ever be realized.

This news release has been reviewed and approved by Neil Froc, PEng, a qualified person consistent with NI 43-101.

We seek Safe Harbor.

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→ Turnagain

Hard Creek Nickel begins Turnagain phase 1 drilling

Hard Creek Nickel Corp	
Symbol	**HNC**
Shares Issued	**40,834,124**
Close 2006-06-05	**C$ 0.70**
Recent Sedar Documents	

2006-06-06 15:45 ET - News Release

Mr. Mark Jarvis reports

TURNAGAIN DRILL PROGRAM UNDERWAY

Hard Creek Nickel Corp. confirms that phase 1 of the 2006 diamond drilling program has started on the company's 100-per-cent-owned Turnagain nickel-cobalt-platinum-palladium property, located 70 kilometres east of Dease Lake in Northern British Columbia. One rig is currently drilling and a second rig is being mobilized.

Phase 1 will consist of 6,000 metres of drilling in approximately 22 drill holes. Most of the holes will be drilled as 100- and 200-metre step-outs to the Horsetrail deposit and several exploration holes may be drilled in the Highland area, depending on snow conditions.

Phase 2 drilling is currently being planned. In addition to further drilling in the Horsetrail, exploration holes are being planned to test for nickel sulphides in the Highland, Hatzl and Cliff zones, and a deeper hole will target a potential feeder zone beneath the Horsetrail deposit. Exploration drilling is also planned in the DJ zone to test soil geochem and geophysical targets for platinum and palladium mineralization.

This press release has been reviewed and approved by Neil Froc, PEng, a qualified person consistent with NI 43-101.

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→ Turnagain

HARD CREEK NICKEL – *No ordinary nickel stock*

by Alf Stewart

Investors in a hot resource market often focus on drill results as a triggering factor for buying mining stocks. A high-grade drill hole which assays 1.0 gold/ton will attract significant trading interest. Such a result may be a new discovery, or possibly a predictable result due to proximity to previous drill holes, and consequently, not a material discovery. Either way, a high-grade drill hole will produce market action. On a basic level, grade is only one factor in the equation for producing a significant discovery, the other being size. If most investors were asked, they would probably agree that the following results are significant grades:

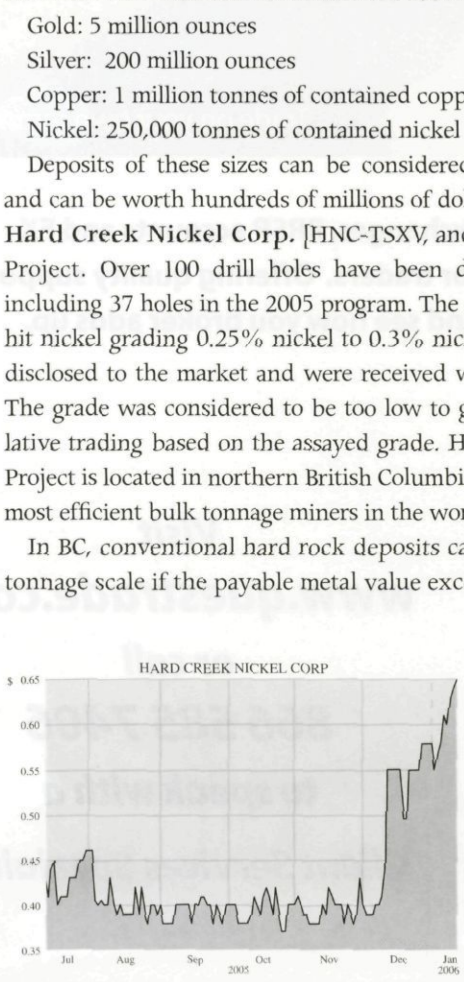
Gold: 1.0 ounce/ton (35 grams per tonne)
Silver: 100 ounces/tonne (3,500 grams per tonne)
Copper: 5%
Nickel: 2%

Some of the best mining discoveries never have a significant high-grade drill hole to attract market interest. They all have one factor in common, however, and that is size. Any truly significant discovery must contain a significant quantity of the identified resource being sought. Most investors, however, would be hard pressed to identify what size of resource is significant. The following is my estimate of what a major mining company would consider a substantial resource for each of the commodities mentioned above.

Gold: 5 million ounces
Silver: 200 million ounces
Copper: 1 million tonnes of contained copper
Nickel: 250,000 tonnes of contained nickel

Deposits of these sizes can be considered world class deposits and can be worth hundreds of millions of dollars. This brings me to **Hard Creek Nickel Corp.** [HNC-TSXV, and its Turnagain Nickel Project. Over 100 drill holes have been drilled on the project, including 37 holes in the 2005 program. The majority of those holes hit nickel grading 0.25% nickel to 0.3% nickel. These results were disclosed to the market and were received with a collective yawn. The grade was considered to be too low to generate typical speculative trading based on the assayed grade. However, the Turnagain Project is located in northern British Columbia, which is home to the most efficient bulk tonnage miners in the world.

In BC, conventional hard rock deposits can be mined on a bulk tonnage scale if the payable metal value exceeds US $10 per tonne whether the payable mineral is gold copper or nickel, and the ore can be mined on an open pit bulk tonnage basis. Specifically if the recovered nickel (at US $4.00 per pound nickel price) is over 2.5 lbs per tonne, it could be of value. This recovered grade would equate to 0.11% nickel. OK for the grade, and though not market stimulating, it could be good enough. What about size?



The inferred resource is 31.6 million tonnes of 0.32% nickel plus the indicated resource is 15.7 million tonnes grading 0.34% nickel that collectively contains 155,000 tonnes of nickel as a mineral resource.* Nickel is different than other commodities in that part or all of low-grade nickel deposits could be economicall unrecoverable which industry people refer to as "refractory." I the case of Hard Creek Nickel, much work has been done over tl past year to evaluate the extent of refractory nickel present. total, less than 22% of the nickel assayed to date is considered be refractory.

Therefore, when comparing this deposit to other deposits, it is prudent to reduce both the grade and contained metal factors by a further 22%. Even with this adjustment the deposit is clearly getting to be very large. Drilling this summer has increased this resource to perhaps 80,000,000 to 100,000,000 tonnes (before refractory adjustment).

The exact number will be the subject of an updated resource estimate due in February 2006. The impact on the size of resource contained in the deposit from this past summer's drilling could be to increase the size to one of the largest undeveloped nickel resources in Canada. The property still has plenty of elbow room to find more nickel. ■

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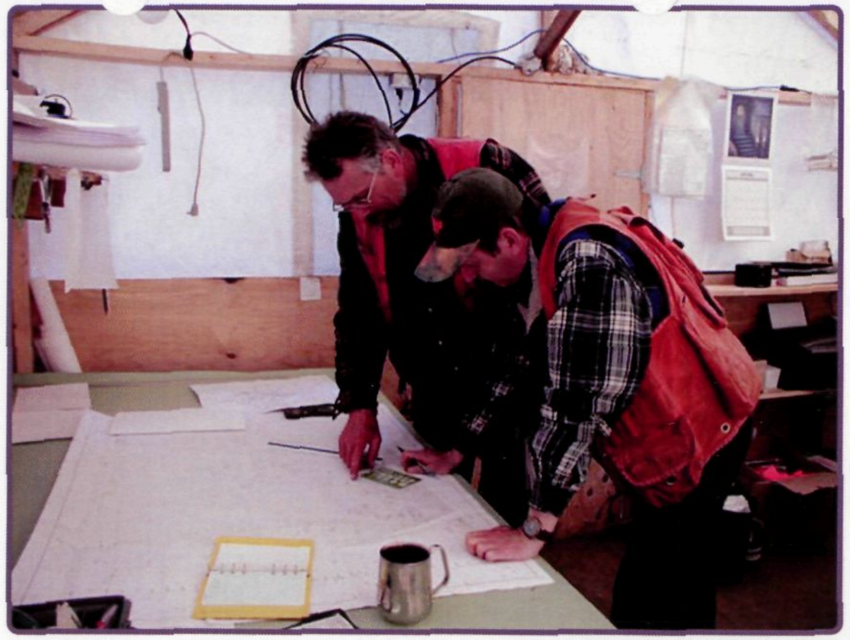
**These mineral resource estimates were prepared pursuant to Canadian Institute of Mining (CIM) Standards on Mineral Resources and Reserves, prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council August 20, 2000 and published in the CIM Bulletin of October 2000 and compliant with National Instrument 43-101 – Standards of Disclosure for Mineral Exploration and Development and Mining Properties. These are not, however, reserves and cannot be considered economic. The economics of this deposit are currently being evaluated by an independent engineering firm and the results to be disclosed in a Preliminary Economic Evaluation due to be disclosed by the end of the seond quarter of 2006.*



Tony Hitchins, Chief Operating Officer, and Chris Baldys, P.Eng, examine data in the field office at the Turnagain Nickel property.

Turnagain Property View

OFFICERS, DIRECTORS AND ADVISORS

Mark Jarvis, President and Director

Frank Wright, BBA, B.Sc., P.Eng. (Metallurgy), Director

George Sookochoff, B.Comm, Director

Lyle Davis, P.Eng. MBA, Director

Tony Hitchins, B.A.Sc., M.Sc.
COO, Project Manager, Exploration

Chris Baldys, P.Eng. (Mining Geology)
Qualified Person, Geologist

Dr. Nicholas C. Carter, Ph.D, P.Eng
Independent Qualified Person

James J. McDougall, M.Sc., P.Eng.
Retired Western Exploration Manager
Falconbridge Group of Companies
Advisory Board Member

Total Exploration Expenditures: approx Cdn $6,500,000.

Working Capital: approx. $1,000,000 (unaudited) as of Jan. 15, 2005.

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TGS → Turnagain

Hard Creek Nickel
CORPORATION

Roundup '05

Nickel Sulphide - Platinum - Palladium Project
Turnagain Ultramafic Complex

TSX-V: HNC

The Turnagain Nickel Project

An extensive soil geochemical survey in 2004 revealed that the Horsetrail Zone is part of a broad zone of **Nickel** anomalies that extends in an arc for approximately 6 km. Most of these anomalies remain to be drill tested. Of particular interest is the Highland Zone, which demonstrated Nickel anomalies coincident with **Platinum (Pt)** and **Palladium** (Pd) anomalies. Outcrop samples in this area range from weakly anomalous to 0.77% Ni, 0.28% Cu, 0.416 gram/tonne Pt and 0.452 gram/tonne Pd.

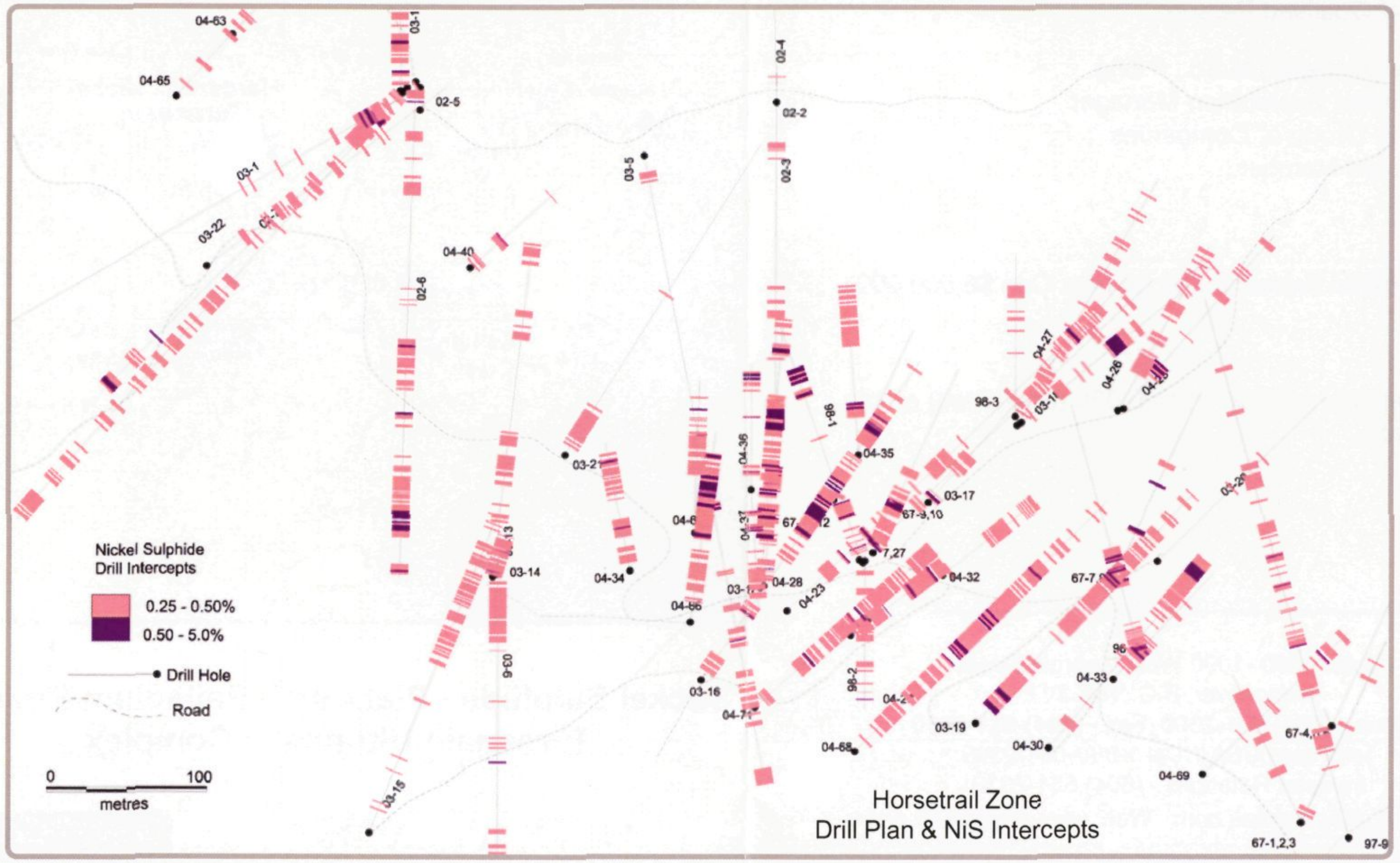
The soil geochemical survey also led to the discovery of the DJ Zone, an area 2 km by 1 km with Pt and Pd anomalies in soils. Limited drilling resulted in strongly anomalous values ranging from 0.1 gram/tonne up to 2.4 gram/tonne combined Pt + Pd over 2 metres, generally with a Pt:Pd ratio very close to 1:1.

This area is interpreted by geologists as a fluid rich environment favorable for concentrating Pt and Pd at the top of the cooling magma chamber.

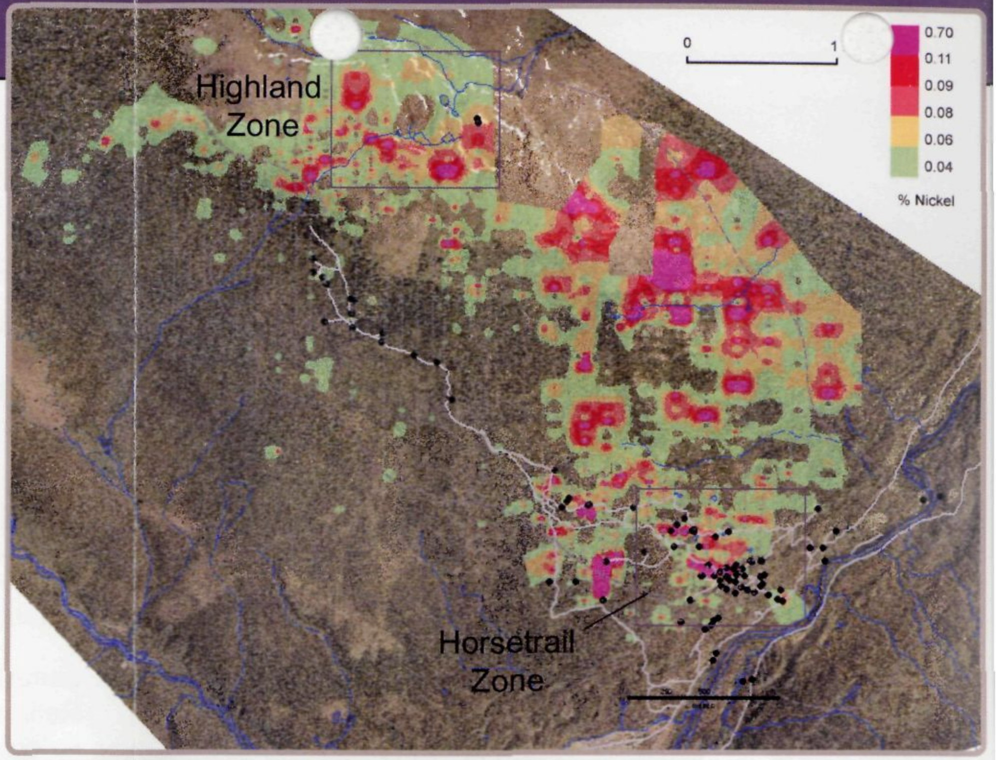
Data from a helicopter-borne magnetic and EM survey covering the entire 33 km. length of the property are being integrated with geochemical and geology to prioritize drill targets for the 2005 field season.

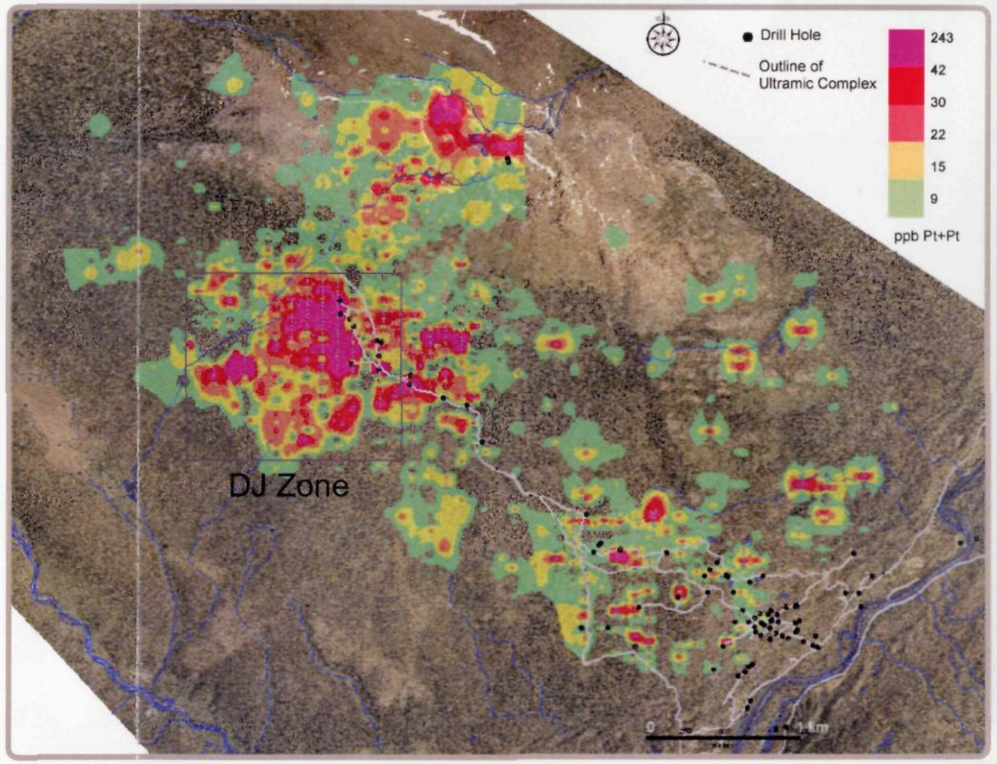
Of 49 diamond drill holes completed in 2004, twenty two were drilled in the Horsetrail Zone. An updated resource estimate is expected in March, 2005.

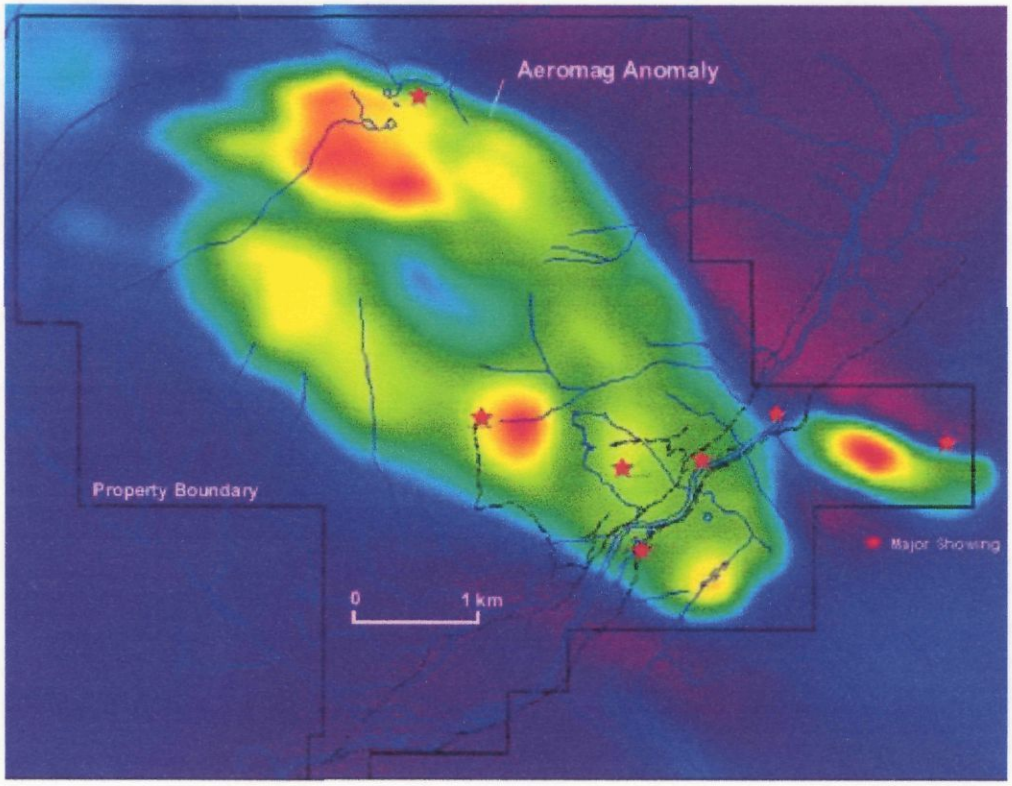
Technical information in this brochure has been reviewed and approved by Chris Baldys, P.Eng., a Qualified Person.

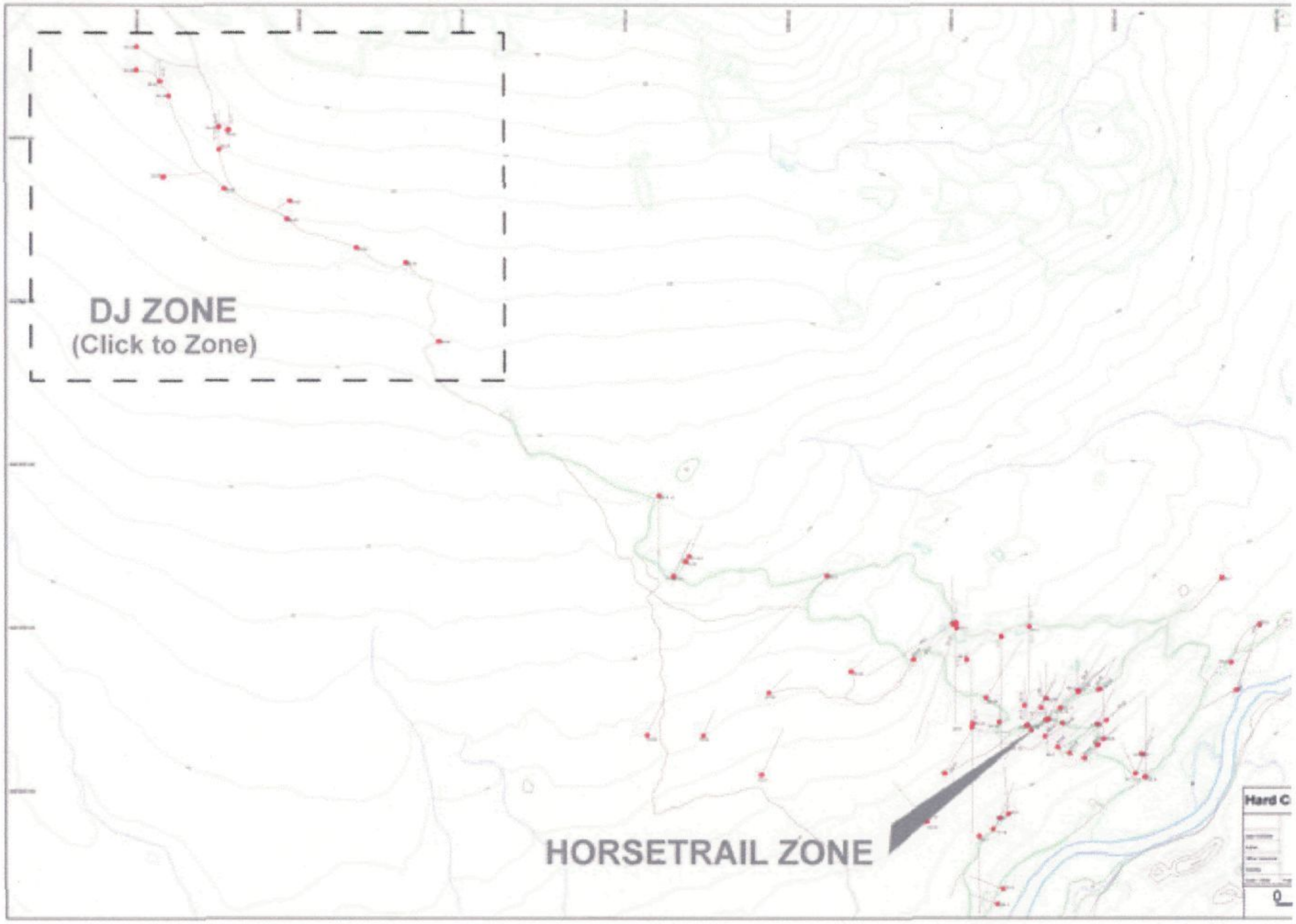


Horsetrail Zone
Drill Plan & NiS Intercepts






Aeromag Anomaly
Property Boundary
Major Showing
0
1 km


DJ ZONE
(Click to Zone)
HORSETRAIL ZONE
Hard C
0

CME
CANADIAN METALS
EXPLORATION LIMITED

T08 → Turnagain
[PDAC '04]

CORPORATE PROFILE

Listed Toronto Stock Exchange Venture Board
TSX Trading Symbol: CEL

Canadian Metals Exploration Ltd., is focused on exploring its 100% owned **Turnagain Nickel Property** situated 70 km east of Dease Lake in the Liard mining division in northern British Columbia. The exploration targets sulfide nickel mineralization associated with a large ultramafic intrusive.

Exploration drilling in spring and summer 2003 resulted in an independent resource calculation that attributed an inferred resource of 38.8 million tonnes grading 0.32% nickel to the Horsetrail zone and 8.8 million tonnes grading 0.42% nickel to the Cub zone. A new geological model is being prepared for the purpose of an updated resource calculation that will incorporate results from 8 additional holes drilled at the end of 2003 season. Please note that an "inferred resource" is a very preliminary estimate of a geological resource with no demonstration of economic viability.

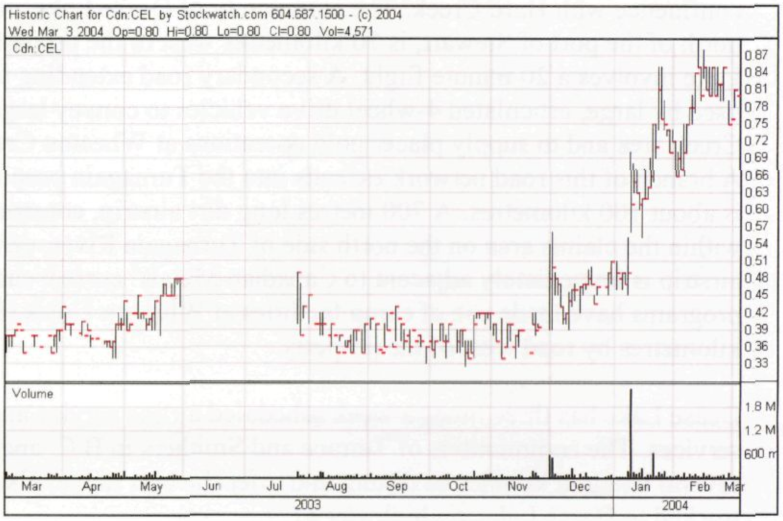
An exploration program is being planned for 2004 with two main objectives. One is explore the potential for a bulk tonnage, low grade nickel deposit amenable to open pit mining by attempting to expand the current resource. The other objective is to follow up on a discovery of higher grade nickel mineralization in two drill holes: hole #03-18 which intersected 25 metre grading 1.00% nickel including 8 metres grading 2.27% nickel, and hole #03-16 which intersected an 81.8 metres zone grading 0.45% nickel including 6 metres grading 1.1% nickel.

Other objectives of the 2004 program include extensive mapping and prospecting, geochemical soil and biogeochemical surveys, an airborne electromagnetic survey, GIS database construction, 3-D geological resource modeling, metallurgical testing of drill sample composites, ongoing baseline environmental surveys and exploration drilling of several geochemical anomalies.

The above technical information and all other technical information in this profile pertaining to geology and drill hole data is under the supervision of Mr. C. Baldys, P.Eng., a Qualified Person consistent with policy Ni 43-101.

CAPITAL STRUCTURE

Authorized	50,000,000
Issued & Out	21,874,060
Options	2,144,000
Warrants	9,769,981
Fully Diluted	33,788,041



MANAGEMENT

Mark Jarvis
Chairman and President

Barry Whelan, P.Geo.
Director and COO

Frank Wright, B.Sc., P.Eng.
Director

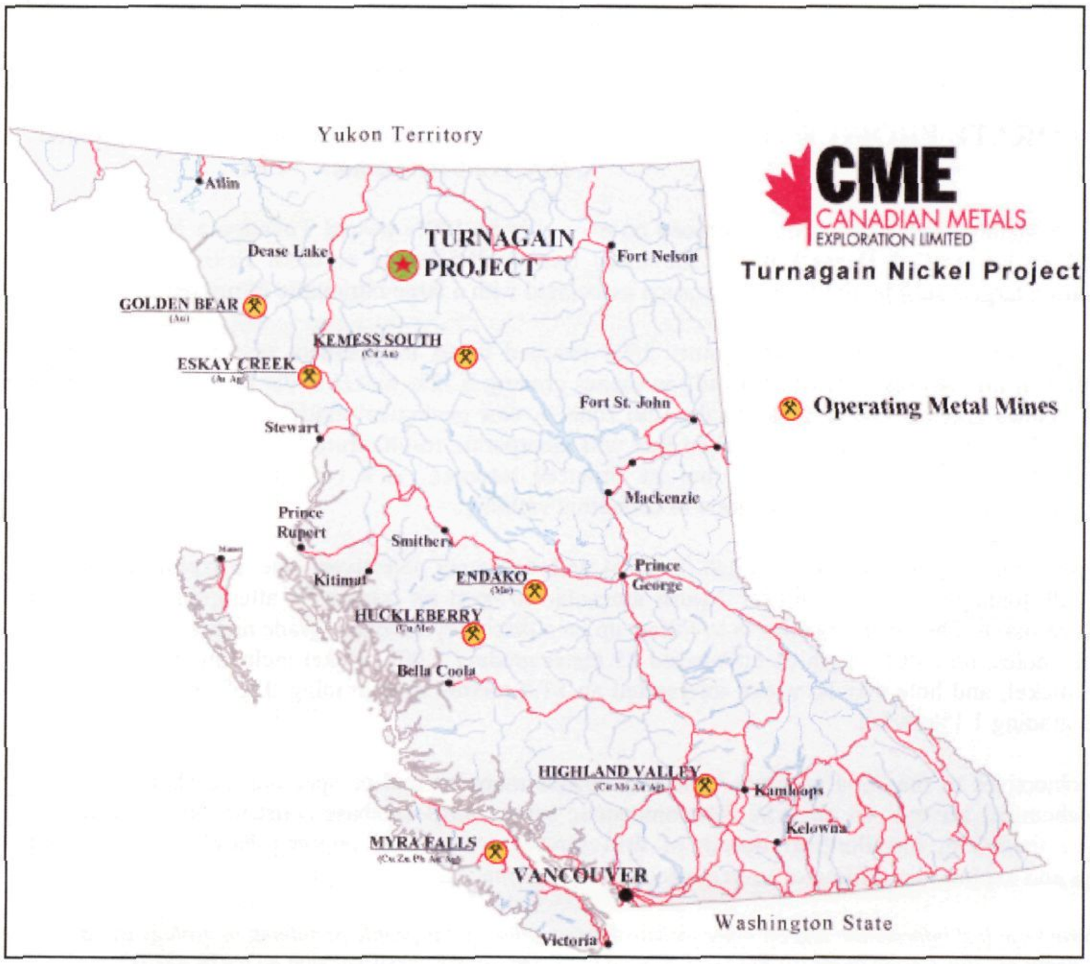
George Sookochoff, B. Comm.
Director

Tony Hitchins B.A.Sc., M.Sc.
Project Manager, Exploration

Chris Baldys, P.Eng.
Qualified Person, Geologist

Dr. Nicholas C. Carter, Ph.D., P. Eng.
Independent Qualified Person

Location



The Turnagain nickel property is situated immediately north of Turnagain River near its confluence with Hard Creek. The community of Dease Lake, on highway 37 some 400 kilometres north of the port of Stewart, is 70 kilometres west of the property. Helicopter access from Dease Lake involves a 20 minute flight. A secondary road extending easterly from Dease Lake has been used by large, articulated 4-wheel drive vehicles to convey large jade boulders from the Kutcho Creek area and to supply placer gold operations at Wheaton Creek over the past number of years. A branch of this road network extends into the Turnagain property; road distance to Dease Lake is about 100 kilometres. A 700 metres long dirt airstrip, constructed in the 1960s and situated within the claims area on the north side of Turnagain River, can accommodate small aircraft. This airstrip is immediately adjacent to Canadian Metals' current camp facility. Previous exploration programs have made use of camp facilities at Wheaton Creek (Boulder) which is about 15 kilometres by road west of the property.

Dease Lake has three times a week scheduled airline service and offers some supplies and services. The communities of Terrace and Smithers in B.C. and Whitehorse in Yukon, are all several hundred kilometres distant and offer the best range of supplies and services which can be trucked to Dease Lake via highway 37.

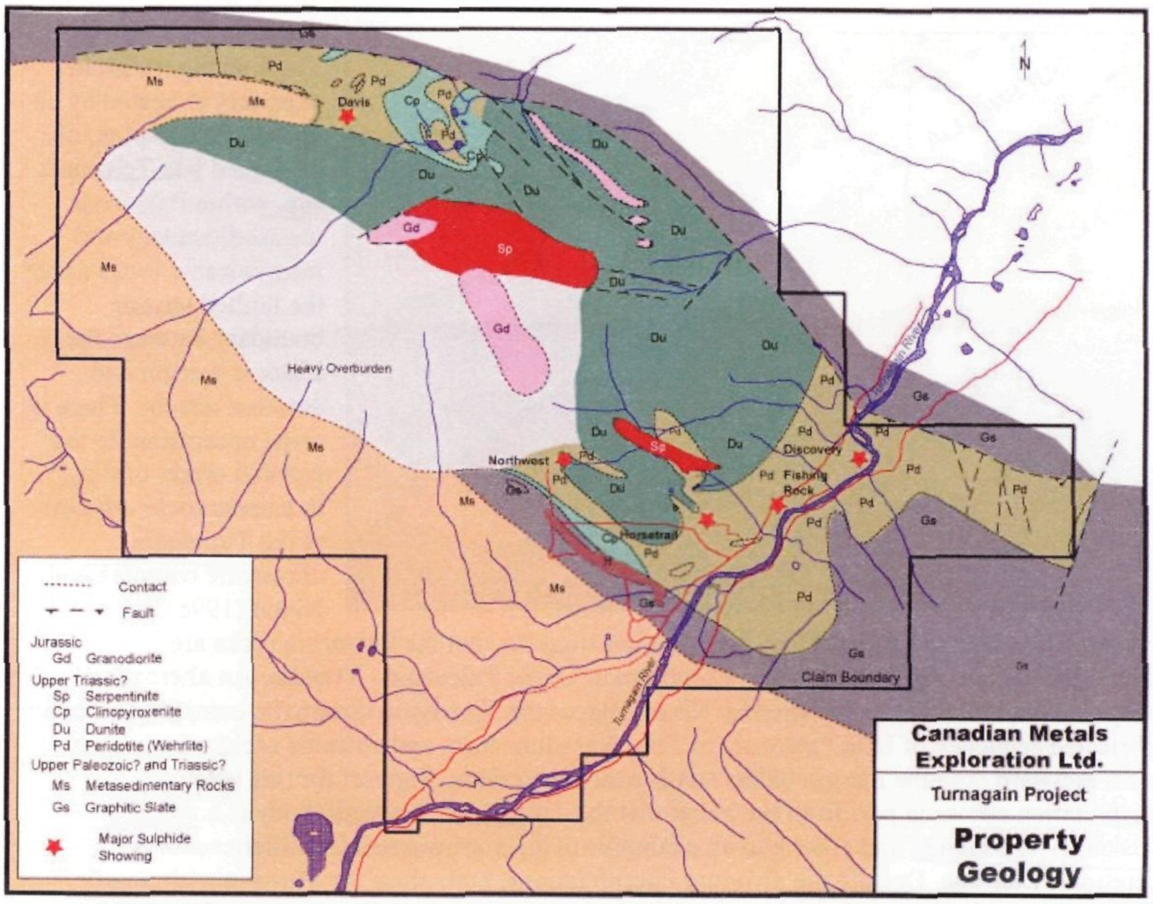
Regional Geology

The **Turnagain nickel property** is hosted by an ultramafic complex, of presumed late Triassic age, within Paleozoic metasedimentary and metavolcanic rocks along the faulted terrane boundary between the cratonic margin and accreted terrane. There is some uncertainty to the age and origin of the Paleozoic rocks adjacent to the Turnagain ultramafic complex and Nixon (1998) has presented two interpretations. One interpretation suggests that the Paleozoic rocks are autochthonous and range in age from Cambrian to Upper Paleozoic - Triassic. An alternative interpretation, and the one favoured by Nixon, places the Turnagain ultramafic complex within an imbricated sequence of Late Paleozoic to Triassic sedimentary and volcanic rocks which were thrust eastward onto the margin of the North American craton. Support for this latter interpretation comes in part from the belief that the Turnagain ultramafic body is a zoned, Alaskan-type complex and other known examples in the northwestern Cordillera occur in accretionary terrane. Despite the differing interpretations, both place the Turnagain ultramafic body along a major terrane boundary, a geological environment similar to many of the major nickel-bearing ultramafic intrusions of the Canadian Shield.

A number of non-zoned, ultramafic bodies are exposed in rocks of the Cache Creek terrane, south and west of the Turnagain ultramafic body. Most of these are strongly serpentinized and host a number of asbestos and jade occurrences.

The above technical information and all the other technical information on this web-site pertaining to geology and drill hole data is under the supervision of Mr. C. Baldys, P. Eng., a Qualified Person consistent with policy NI 43-101.

Property Geology



The Turnagain nickel property covers the known limits of the zoned, Alaskan-type ultramafic intrusion which measures 8 kilometres by 3 kilometres and is elongate in a northwest direction or conformable to the regional structural grain. The ultramafic body is separated from graphitic Paleozoic sedimentary rocks along its northern and eastern margins by thrust or reverse faulting; the poorly exposed southwestern margin is in intrusive contact with metasedimentary rocks as indicated by previous drilling.

The complex consists of a central dunite and an outer zone of peridotite (wehrlite), clinopyroxenite and rare hornblendite, all of which represent crystal cumulate sequences (Clark,1980, Nixon,1998). Gabbros and diorites, common to many Alaskan-type complexes, have not been recognized (Nixon,1998). As indicated on Figure 5, variably serpentinized dunite is the most widespread unit and is flanked by peridotite and clinopyroxenite along the northern and eastern margins of the complex. Contacts between the ultramafic phases are gradational although dunite was seen to intrude pyroxene-bearing phases in the northern margins of the complex (Clark,1980).

In detail, the central dunite is massive and consists solely of olivine with minor chromite, peridotite is composed of nearly equal proportions of olivine and clinopyroxene while the pyroxenites consist mainly of clinopyroxene with lesser olivine and alteration minerals. Dunite weathers to a light brown colour which is particularly evident in the higher (northern) parts of the property. On fresh surfaces, this unit is dark green to black as are the other units except where serpentinized. Layering on a small scale has been noted in a few localities. Metasedimentary rocks marginal to the ultramafic rocks are locally graphitic and those bordering the southwestern margin of the complex show evidence of thermal or contact metamorphism.

A small granodiorite plug intrudes dunite in at least two localities in the central claims area.

Narrow porphyritic gran dykes, usually in the order of 1 to 2 metre width, were noted cutting peridotites and clinopyroxenites in drill core; these may have lateral extents of several hundred metres. These dykes, which are clearly post-mineral, are probably related to the exposed granitic plug which is thought to be of Jurassic or Cretaceous age.

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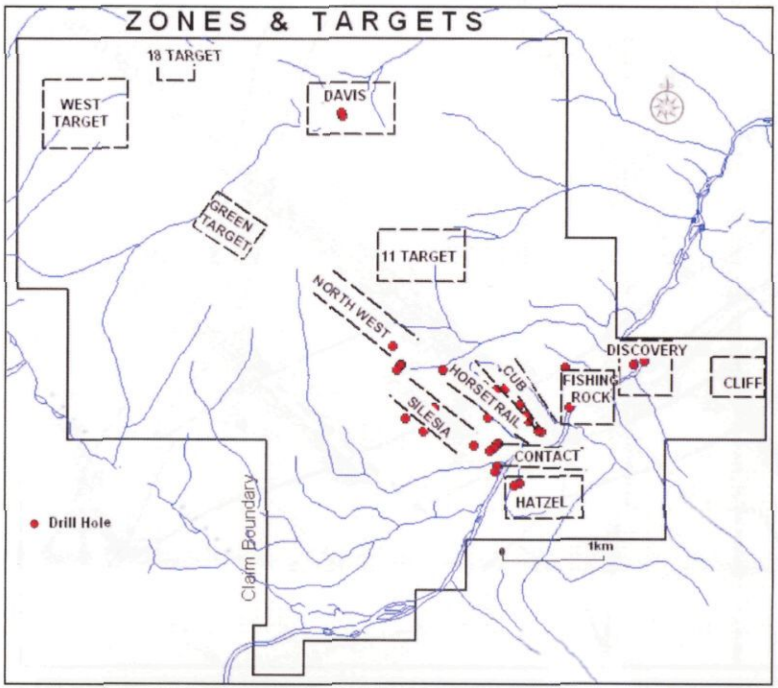
Drilling



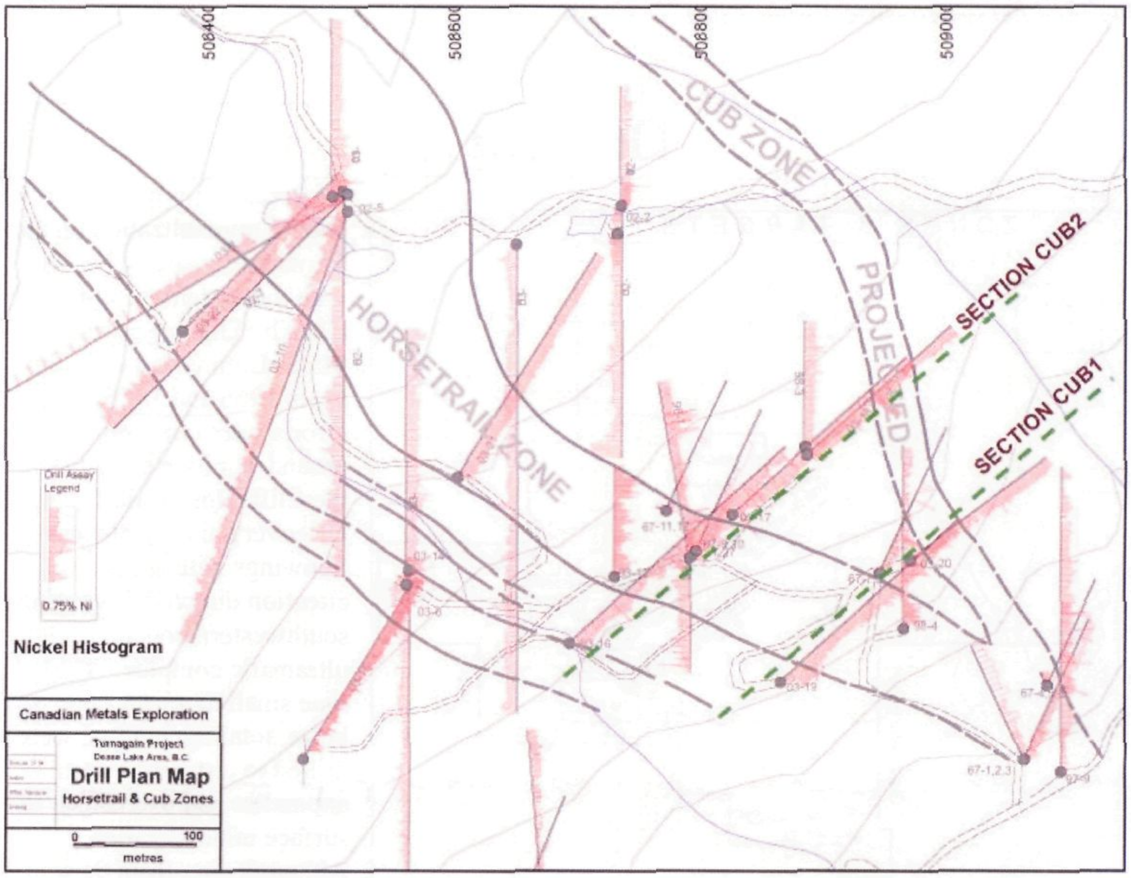
Exploration for nickel and copper mineralization on the Turnagain property began with the systematic approach taken by Falconbridge Nickel Mines Limited between the years 1966 and 1976. Their efforts were concentrated around sulphide exposures at the Cliff, Horsetrail, Hatzl, Discovery and Northwest Showings with some attention directed towards the southwestern contact of the ultramafic complex. Thirty-nine small diameter core holes, totaling 2,000m, were drilled to test geophysical anomalies and extensions to surface mineralization. Although core from these initial holes was of small diameter (QXT and AQ), a number of significant intersections were reported from this exploration program. Analytical results, drill logs, and core from these years, while not complete, are considered reliable and were used to guide recent exploration. Eighteen of the drill collars have been located and are sufficient to orient the contemporaneous geophysical surveys.

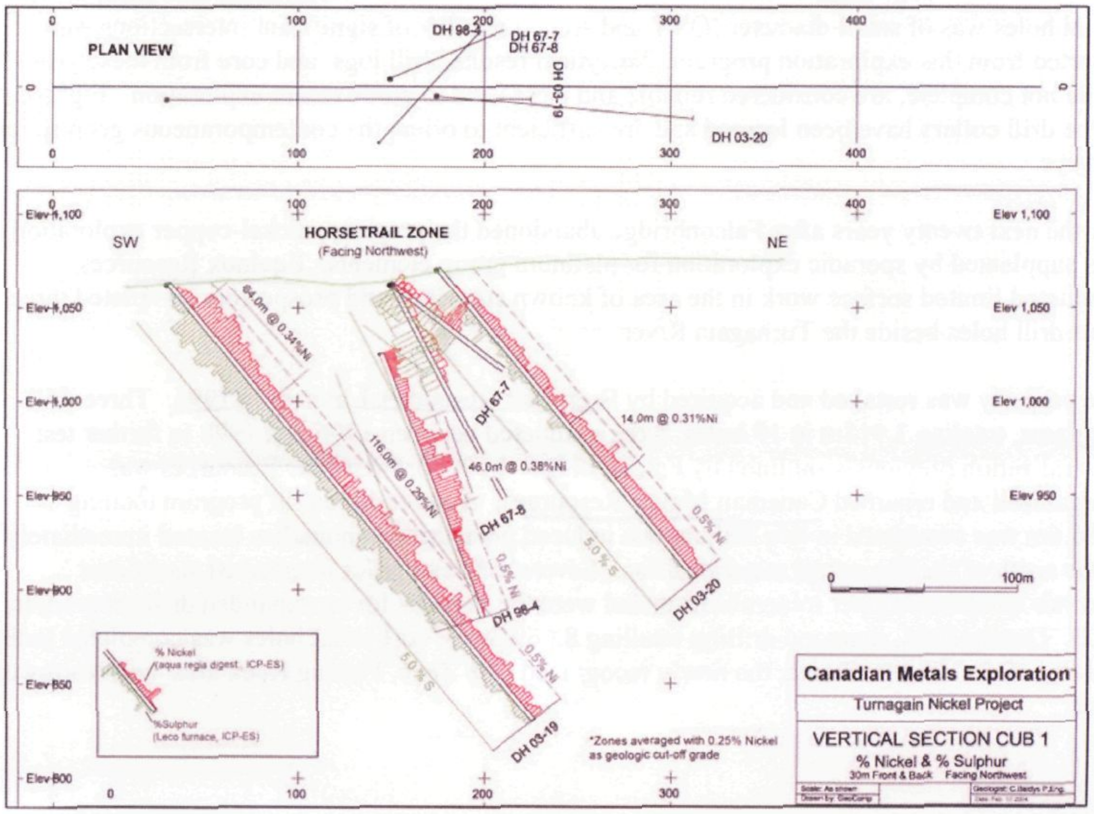
For the next twenty years after Falconbridge abandoned the property, nickel-copper exploration was supplanted by sporadic exploration for platinum group elements. Equinox Resources conducted limited surface work in the area of known showings and prospectors completed three short drill holes beside the Turnagain River.

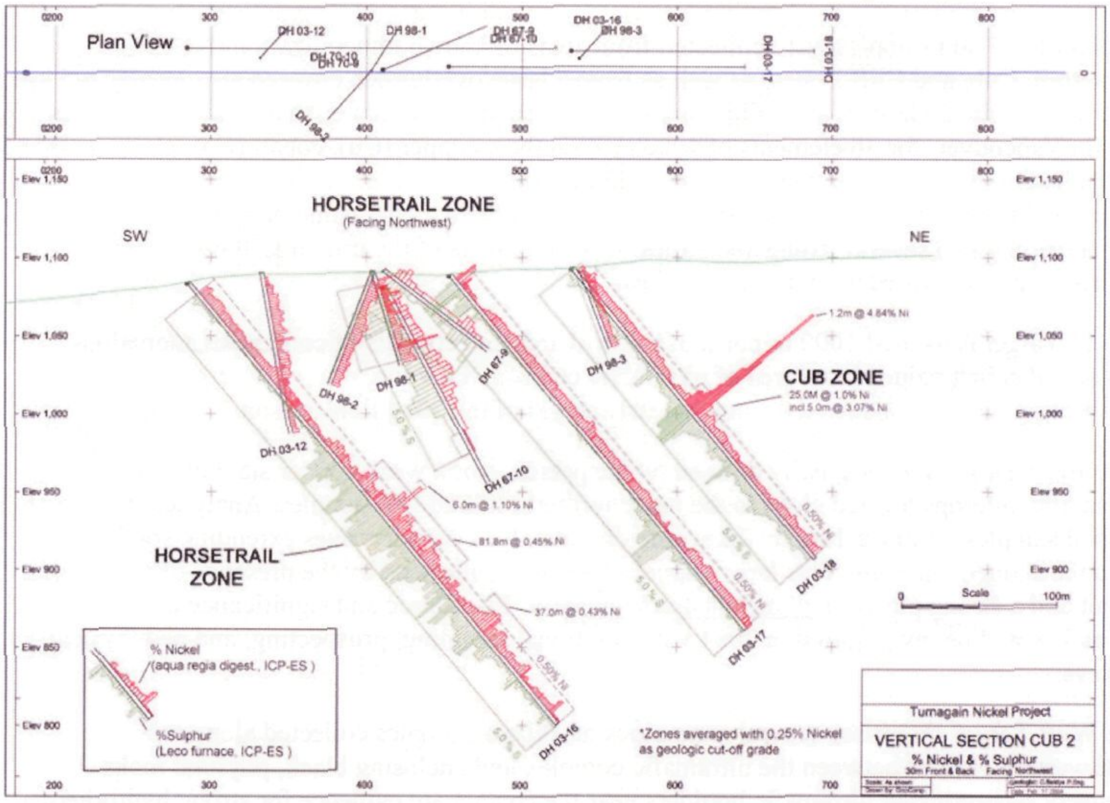
The property was restaked and acquired by Bren-Mar Resources Limited, in 1996. Three drill programs, totaling 3,918m in 19 holes, were conducted between 1996 and 1998 to further test mineralization previously outlined by Falconbridge. In 2000, Bren-Mar Resources was reorganized and renamed Canadian Metals Resources. A seven-hole drill program totaling 1686.6m was conducted in late 2002 to test induced polarization anomalies located immediately to the north of the Horsetrail mineralization. Several of these holes intersected significant intervals of nickel-copper mineralization and were the impetus for an expanded drill program in 2003. During 2003, diamond drilling totalling 8,669.3m of core in 22 holes was completed in the vicinity of the Horsetrail area, the newly recognized Cub Zone, Fishing Rock area, and Northwest Zone.

Drilling

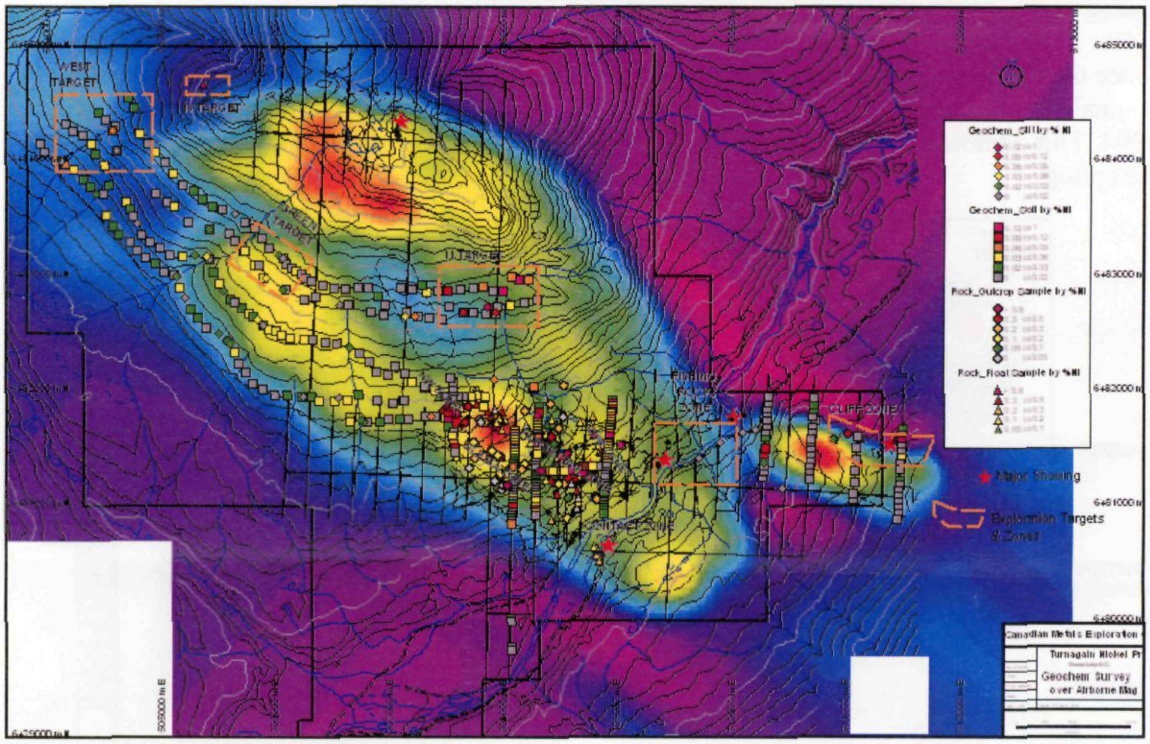
All drilling since 1996 has recovered BQ-size core. Core recovery has been excellent except in areas of sheared talc-serpentine alteration. Acid dip tests indicate minimal deviation for the majority of the drill holes.







Geochem Survey



Although the bulk of the 2003 exploration program concentrated on diamond drilling in the area of the Horsetrail and Cub Zones, limited soil sampling over portions of the Turnagain property was successful in outlining several new targets for additional work in 2004.

Geochem Survey

A total of 357 soil samples were collected from areas of known mineralization (Northwest, Horsetrail, Cub, and Cliff Zones) as well as from a large overburden covered area located 3.5 km northwest of the 2003 drill area. The samples were analyzed by Acme Analytical Laboratories Ltd. in Vancouver, for 36 elements of which nickel (Ni), copper (Cu), cobalt (Co), platinum (Pt), and palladium (Pd) were of most interest. { HYPERLINK "http://www.canmet.ca/geochemsamps.htm" } have outlined a Ni-Co anomaly in the area of recent drilling and several strong anomalies, located outside of the drill area. These untested anomalies are described in more detail below.

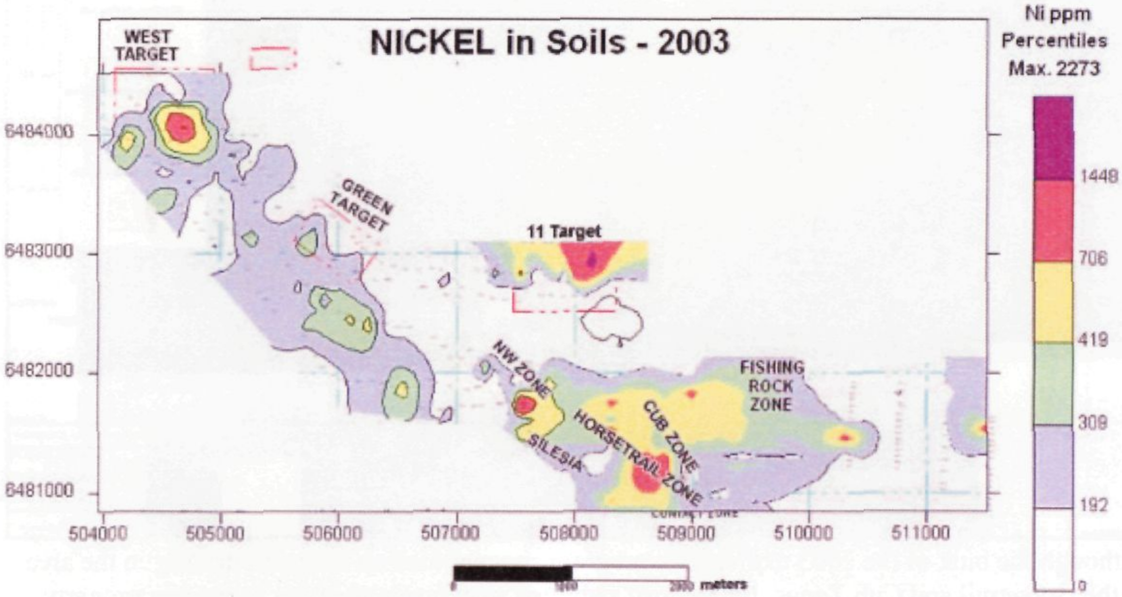
The 11 Target is located 1000 m north of the drill area and consists of coincident anomalous nickel and cobalt values in an area of ultramafic outcrop. Sampling of rock outcrops and prospecting will be conducted during the early stages of the 2004 field season.

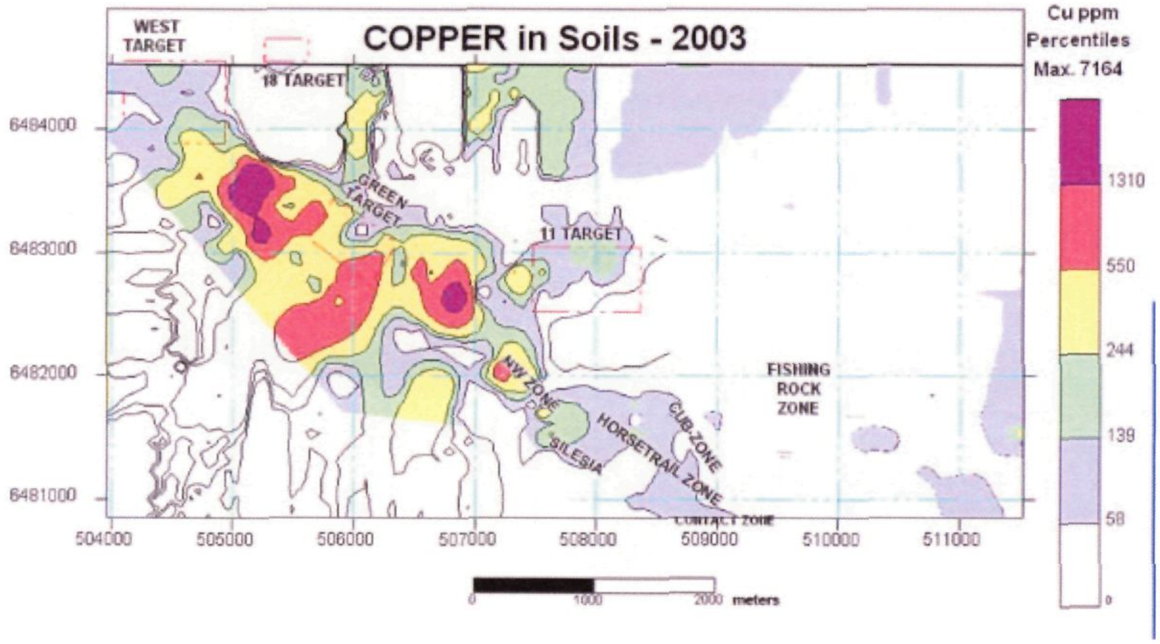
The Green Target was originally defined by the presence of a weak copper stain on small ultramafic outcrops located close to the most northerly line of soil samples. Analytical results of the soil samples outline a 1km by 2 km area of anomalous copper values extending southwest from the stained outcrops. This large copper anomaly is enhanced by the presence of anomalous cobalt and a strong platinum plus palladium anomaly. The source and significance of these anomalies will be investigated in 2004 with additional sampling, prospecting, and geophysical surveys.

The West Target comprises several anomalous nickel soil samples collected along the northwestern contact between the ultramafic complex and enclosing black, phyllitic rocks. Intensely serpentinized ultramafic boulders near the contact are evidence for strong hydrothermal alteration.

The 18 Target was not part of the geochemical survey but is based on a single, sulphide-bearing ultramafic float sample containing 0.72% nickel and 0.21% copper. The area around this anomalous sample will be prospected and sampled once the snow melts.

Since the 2003 soil geochemical program was successful in outlining a number of prominent anomalies, soil sampling will be extended to other portions of the Turnagain nickel property in 2004. This additional surface work will follow a helicopter-borne geophysical survey, planned for the spring.




COPPER in Soils - 2003
WEST TARGET
18 TARGET
GREEN TARGET
11 TARGET
NW ZONE
SILESIA
HORSETRAIL ZONE
CUB ZONE
CONTACT ZONE
FISHING ROCK ZONE
6484000
6483000
6482000
6481000
504000
505000
506000
507000
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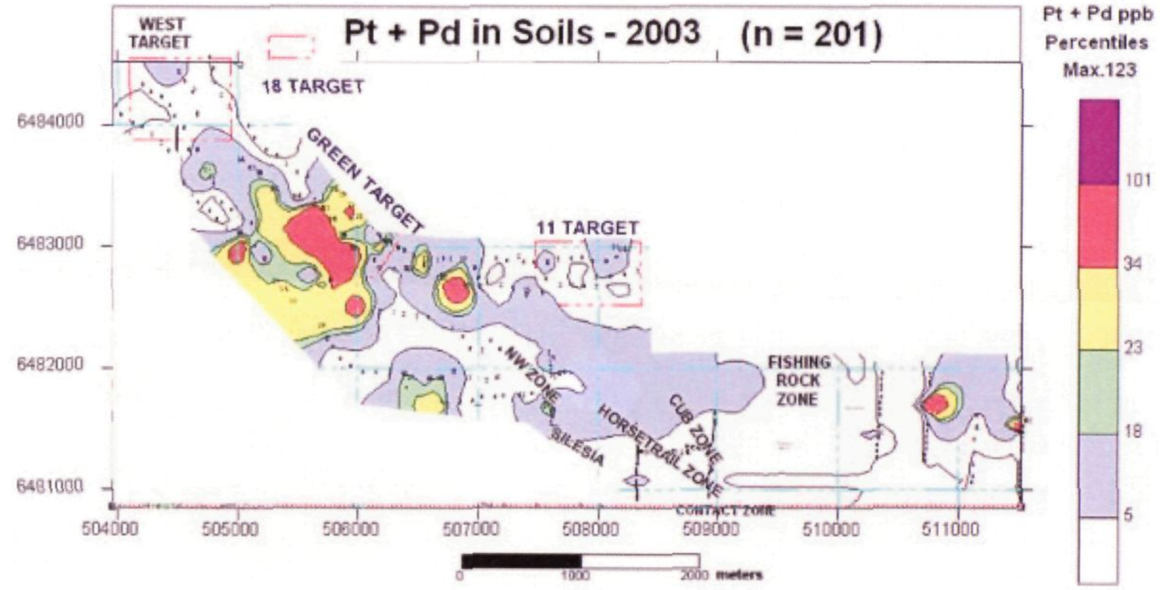
1000
2000 meters
Cu ppm
Percentiles
Max. 7164
1310
550
244
139
58
0


Pt + Pd in Soils - 2003 (n = 201)
WEST TARGET
18 TARGET
GREEN TARGET
11 TARGET
NW ZONE
SILESIA
HORSETRAIL ZONE
CUB ZONE
CONTACT ZONE
FISHING ROCK ZONE
6484000
6483000
6482000
6481000
504000
505000
506000
507000
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510000
511000
0
1000
2000 meters
Pt + Pd ppb
Percentiles
Max.123
101
34
23
18
5

T08 → Turnagain

TURNAGAIN 2005 DRILLING SUMMARY (last updated April 2006)

2005 exploration program was focused on drill testing four target areas in the Turnagain ultramafic complex. Thirty-seven holes totalling 7,143 metres were targeted as follows:

- 28 NQ-size holes drilled within presently defined Horsetrail Ni-Co deposit
- 4 holes tested airborne EM conductors in the Bench area, located 2.5 km west of the Horsetrail deposit
- 3 holes tested airborne EM conductors in Highland area 3 km northwest of Horsetrail deposit
- 2 holes were drilled in the DJ-DB area to test an EM conductor in the area of platinum-palladium mineralization

Horsetrail deposit and extensions

Of the total 28 holes drilled in the area of Horsetrail mineralization in 2005, 22 were drilled to determine the near-surface extent and grade of Ni-Co mineralization intercepted deeper, during previous campaigns. The drilling was successful in outlining a continuous mineralized body from surface to 350 metre depth. The deposit has an estimated indicated resource of 105.7 million tonnes containing 0.25% Ni and 0.015% Co (0.15% sulfide Ni cutoff).

The strike extensions of the Horestrail deposit were intersected in several wide-spaced holes in 1997 and 2002-2004 and the drill core analyses were incorporated during 2006 resource estimate. This resulted in additional resource, in inferred category, of 139.5 million tonnes containing 0.24% Ni and 0.015% Co.

The following is the summary of the resource estimate by Geosim Services Ltd. using cut-off grades ranging from 0.15 per cent to 0.25 per cent sulfide nickel, with a cut-off of 0.20 per cent sulfide nickel as a base case:

Cut-off Grade 0.15 % Sulfide Ni	Tonnes (000)	% Sulfide Ni	% Total Ni	% Co
Measured	22,181	0.23	0.27	0.016
Indicated	83,549	0.21	0.26	0.015
Measured + Indicated	105,731	0.21	0.26	0.015
Inferred	139,488	0.20	0.25	0.015

Cut-off Grade 0.20% Sulfide Ni (Base Case)	Tonnes (000)	% Sulfide Ni	% Total Ni	% Co
Measured	13,472	0.26	0.30	0.017
Indicated	36,442	0.25	0.30	0.017
Measured + Indicated	49,914	0.25	0.30	0.017
Inferred	57,233	0.25	0.28	0.016

Cut-off Grade 0.25% Sulfide Ni	Tonnes (000)	% Sulfide Ni	% Total Ni	% Co
Measured	5,807	0.31	0.35	0.019
Indicated	14,415	0.30	0.34	0.018
Measured + Indicated	20,222	0.30	0.34	0.018
Inferred	21,606	0.29	0.32	0.017

These mineral resource estimates were prepared pursuant to Canadian Institute of Mining (CIM) standards on mineral resources and reserves, prepared by the CIM Standing Committee on Reserve Definitions and adopted by the CIM Council Aug. 20, 2000, and published in the CIM bulletin of October, 2000, and compliant with National Instrument 43-101, Standards of Disclosure for Mineral Exploration and Development and Mining Properties. Numbers have been rounded subsequent to calculation.

The above figures are based on a total of 134 drillholes completed in Horsetrail area between 1967 and 2005. Of the 134 drillholes completed, 106 generated analytical composites that were utilized in 2006 resource estimate.

In summary, seventeen of the twenty eight holes, drilled in the Horsetrail area in 2005, intersected significant disseminated and net-textured pyrrhotite-pentlandite mineralization. When the results of these holes are integrated with all drilling results to date they outline a large area of near-surface nickel-sulfide deposit in the central part of Horsetrail area with excellent potential for expanding the indicated resource. The mineralization tested by drilling has strike length of 1800m and true widths of up to 200m for the Horsetrail deposit and extensions (0.15% sulfide nickel cutoff). The only significant past operator in this area, other than Hard Creek Nickel, was Falconbridge Nickel Mines who drilled 28 holes in 1967-1970. The nickel intercepts from 2005 program are listed below and are based on 0.20% sulfide nickel cutoff.

Hole	From	To	Width (m)	% AC Ni	% Ni	% Cu	% Co
05-72	10.60	36.40	25.80	0.240	0.299	0.038	0.018
05-72	55.40	68.50	13.10	0.292	0.340	0.018	0.014
05-72	94.00	110.70	16.70	0.265	0.310	0.027	0.017
05-74	136.80	166.00	29.20	0.360	0.437	0.079	0.021
05-76	87.00	99.00	12.00	0.223	0.292	0.024	0.016
05-76	107.00	120.00	13.00	0.235	0.325	0.020	0.018
05-76	124.00	149.00	25.00	0.256	0.331	0.020	0.018
05-76	153.00	177.00	24.00	0.249	0.286	0.024	0.015
05-76	185.00	201.50	16.50	0.223	0.274	0.024	0.016
05-77	207.00	223.70	16.70	0.230	0.259	0.026	0.017
05-80	36.00	52.00	16.00	0.227	0.284	0.043	0.020
05-80	155.00	174.00	19.00	0.279	0.333	0.030	0.014
05-90	20.00	32.50	12.50	0.288	0.340	0.065	0.018
05-90	34.60	51.20	16.60	0.274	0.293	0.039	0.019
05-90	58.00	82.00	24.00	0.218	0.260	0.007	0.013
05-93	10.00	21.20	11.20	0.234	0.260	0.019	0.016
05-93	57.40	81.00	23.60	0.241	0.295	0.033	0.021
05-93	97.00	118.00	21.00	0.289	0.363	0.046	0.021
05-94	72.00	82.50	10.50	0.237	0.276	0.021	0.018
05-94	116.00	148.00	32.00	0.263	0.285	0.035	0.017
05-94	168.00	188.00	20.00	0.243	0.268	0.041	0.021
05-94	209.00	234.00	25.00	0.275	0.312	0.061	0.018
05-95	56.00	72.00	16.00	0.265	0.318	0.027	0.023
05-97	24.00	38.00	14.00	0.240	0.309	0.034	0.020
05-98	55.00	67.00	12.00	0.225	0.315	0.023	0.017
05-98	71.00	86.00	15.00	0.229	0.275	0.034	0.021
05-98	140.75	151.00	10.25	0.241	0.265	0.043	0.019
05-99	93.00	108.00	15.00	0.252	0.269	0.033	0.019
05-103	112.90	124.40	11.50	0.423	0.446	0.057	0.031
05-104	16.00	38.00	22.00	0.281	0.404	0.015	0.014
05-104	110.00	124.00	14.00	0.293	0.461	0.061	0.018
05-105	48.00	58.00	10.00	0.270	0.403	0.084	0.018
05-105	203.50	219.00	15.50	0.233	0.266	0.033	0.022
05-105	221.00	235.00	14.00	0.216	0.259	0.037	0.017
05-106	70.90	140.00	69.10	0.331	0.423	0.049	0.021
05-106	173.00	185.00	12.00	0.226	0.276	0.018	0.021
05-106	205.00	219.00	14.00	0.263	0.307	0.031	0.026
05-106	223.00	239.00	16.00	0.269	0.280	0.038	0.023
05-107	38.00	50.20	12.20	0.231	0.346	0.026	0.017
05-107	69.00	79.00	10.00	0.234	0.379	0.033	0.017

Intervals calculated using 0.2% AC Ni cutoff, minimum width 10m, max internal dilution 2 m
% AC Ni - sulfide nickel analysed by partial leach (ammonium acetate and hydrogen peroxide)
% Ni - total nickel analysed by four acid digestion

The above results demonstrate that an increase of overall grade of the deposit is possible based on 2005 intercepts form central part of the deposit (i.e. hole 05-106) as well from drilling near the western periphery of the deposit (holes 05-103 and 104). These holes were drilled at generally normal angles to the mineralization.

Drilling in 2003-2004 within presently defined eastern part of Horsetrail deposit was carried at oblique angles to the strike of mineralization. As a result some holes never penetrated the deposit across the entire width. As an example: hole 04-30 was shut-down within an interval of 0.52% nickel mineralization at 215.2 metres. The length of the interval was 19.2 metres and the new model suggests that it is part of the main zone of the Horsetrail deposit. The intersection was not followed-up since 2004. Hole 03-18 intersected 1.00 % nickel across a true width of 5 metres and is located 150 metres north of 04-30. Based on 2005 prospecting there are indications that several similar east-west trending zones immediately to the northeast of the above holes may be present which would significantly impact the overall grades. As a consequence more drilling will be required to convert the inferred resource to indicated category.

In summary the proposed 2006 drilling will continue to expand the indicated resource of the sulfide-nickel deposit while focusing on those areas where nickel grades are the highest and ranging from 0.4 to over 1.0% in drill core. Large areas of geochemical and geophysical anomalies surrounding the Horestrail deposit will be tested as well.

Bench area

Four holes were drilled to investigate the source of airborne EM conductors west from the limits of Horstrail mineralization exposed at surface. The drilling did not intercept nickel mineralization but sulfide and graphite bands were present and locally contained low-grade copper-platinum-palladium concentrations that will be followed up in 2006.

Highland area

In 2005 the company had also tested several airborne EM anomalies located to the north and northwest of Horsetrail zone with three holes. Hole 05-85 was successful in intersecting several 10-20 m wide intervals of disseminated pentlandite mineralization and was terminated in 0.38% nickel zone. Absence of other sulfides and presence of disseminated pentlandite characterized the entire length of the core. The nickel values below demonstrate that a new area for possible resource expansion is situated along the northern ultramafic contact, 3 km north-northwest of the Horsestrail deposit.

Hole	From	To	Width (m)	% AC Ni	% Ni	% Cu	% Co	Pt (ppb)	Pd (ppb)
05-85	24.00	44.00	20.00	0.222	0.274	0.008	0.012	38	49
05-85	68.00	78.00	10.00	0.210	0.253	0.005	0.010	4	9
05-85	96.00	108.00	12.00	0.231	0.278	0.006	0.010	19	27
05-85	122.65	140.20 EOH	17.55	0.313	0.384	0.043	0.014	70	78

EOH – end of hole

Intervals calculated using 0.2% AC Ni cutoff, minimum width 10m, max internal dilution 2 m
% AC Ni - sulfide nickel analysed by partial leach (ammonium acetate and hydrogen peroxide)
% Ni - total nickel analysed by four acid digestion

Two metallurgical floatation tests from hole 05-85 produced cleaned nickel concentrate grades of 20.4 and 21.3 % from 24-50m and 122.7-140.2m intervals respectively. Recoveries of sulfide nickel were 80 and 85%. The area will be the focus of further drill testing in 2006 along the one kilometre trend of coincident geophysical and geochemical anomaly.

DJ-DB area

Drill holes 05-88 and 05-101 were collared 3.5 km northwest from Horsetrail zone to test a coincident geophysical and Pt+Pd-in-soil geochemical anomaly. The holes were successful in intersecting a wide zone of disseminated sulfides hosted by pegmatitic clinopyroxenite and hornblendite. The analytical results revealed significant platinum and palladium content consistently present in core intervals in 1:1 ratio. A 13-metre-long interval in hole 05-88 averaged 1.53 g/t Pt+Pd, including 3.1 metres of 2.49 g/t Pt+Pd. This includes the best noble metal values obtained to date from Turnagain: a 0.5m core sample from 149.5 to 150.0 metres analysed 2.6 g/t platinum and 2.3 g/t palladium for the combined value of 4.9 g/t Pt+Pd.

The results were averaged using 0.5 g/t Pt+Pd cutoff over minimum 10m core lengths and are summarized in the table below.

Hole	From	To	Width (m)	% Cu	Pt (g/t)	Pd (g/t)	Pt+Pd (g/t)
05-88	106.7	156.5	49.8	0.14	0.50	0.46	0.96
05-101	100.0	171.0	71.0	0.11	0.32	0.31	0.63

Pt and Pd were analysed using fire assay pre-concentration (lead fusion) and ICP-ES finish

The mineralization will be the focus of 2006 drilling along the strike from the only two holes drilled in this area thus far.

Discussion of Results

The platinum and palladium results obtained in 2005 indicate that PGE mineralization is present over wide drill core intercepts. The projected exposure to surface appears to be near the southern limit of the most prominent PGE-Cu soil-geochem anomaly measuring 1 x 1.5 km (DJ area). Association of platinum and palladium mineralization with disseminated sulfides and pegmatoidal rocks at Turnagain is comparable to Stillwater platinum-palladium deposit in Montana rather than a typical, chromitite hosted, Alaskan-type occurrences. This and the presence of significant size sulfide nickel deposit nearby, at Horsetrail, make the entire Turnagain ultramafic one of the most prospective complexes for economic Ni-Co and PGE-Cu deposits in North America.

The Horsetrail nickel-cobalt deposit is presently subject to preliminary economic assessment for open-pit mining concept by independent engineering firm AMEC.

→ Turnagain

Schroeter, Tom EMPR:EX

From: Chris Baldys [cbaldys@hardcreek.com]
Sent: Fri, May 12, 2006 9:43 AM
To: Schroeter, Tom EMPR:EX
Subject: RE: Turnagain 2006 and Results Summary

Sounds good Tom:

I will still be in the office, but will likely depart for Turnagain May 31. Tony Hitchins will be gone before that.
You are very welcome to visit Turnagain with Paul and/or Graham Nixon anytime but I am expecting core worth seeing from both PGE-Cu and Ni-Co parts of project at end of July or beginning of August.

Cheers,

Chris

Hard Creek Nickel Corporation
tel 604-681-2300

-----Original Message-----
From: Schroeter, Tom EMPR:EX [mailto:Tom.Schroeter@gov.bc.ca]
Sent: May 11, 2006 2:15 PM
To: cbaldys@hardcreek.com
Subject: Re: Turnagain 2006 and Results Summary

Chris, thanks very much for the update. I am on the road (out of province) until early June, but would like to request a meeting in your office with you and staff to get a hands-on update. I will call your office during the last few days of May to arrange a meeting for sometime during the week of June. 5th. How does that sound? I want to visit the propery later in August or September (probably with Paul and hopefully when you and/or Tony?). Continued good luck. P.S. I have had recent enquiries about Ni in BC, including Turnagain.

-----Original Message-----
From: Chris Baldys
To: Wojdak, Paul EMPR:EX
CC: Schroeter, Tom EMPR:EX; Nixon, Graham EMPR:EX
Sent: Thu May 11 14:02:11 2006
Subject: Turnagain 2006 and Results Summary

Dear Paul:

We are going to have a very active season at Turnagain Camp this year. I would like to keep you and your entire branch informed about the program for which the details are just being finalized and the permitting is in progress. We also made steps to apply for Core Shack display at Roundup 2007 through AME BC.

In the meantime I am sending you the recent info regarding our Turnagain Ni-Co as well as the Pt-Pd-Cu project located on the same property 2.5 km from each other. Both of them will be drilled this year with a minimum 40 holes in total. We already have financing to have one of the BC's biggest exploration budget project for the 4th consecutive year.

Best Regards,

Chris Baldys, Project Geologist
Hard Creek Nickel Corporation
tel 604-681-2300

Schroeter, Tom EMPR:EX

→ Turnag

From: Schroeter, Tom EMPR:EX
Sent: Thu, May 11, 2006 2:15 PM
To: 'cbaldys@hardcreek.com'
Subject: Re: Turnagain 2006 and Results Summary

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Best Regards,

Chris Baldys, Project Geologist
Hard Creek Nickel Corporation
tel 604-681-2300

TGS → Turnaga ✓

NI-CU SULFIDE MINERALIZATION IN THE TURNAGAIN ALASKAN-TYPE COMPLEX: A UNIQUE MAGMATIC ENVIRONMENT

By G. T. Nixon, B. C. Geological Survey

KEYWORDS: Ni-Cu sulfides, magmatic sulfides, Alaskan-type, Turnagain complex

INTRODUCTION

Nickel is a scarce commodity in the Canadian Cordillera, and there are currently no active nickel mines in British Columbia. The most notable past producer was the Giant Mascot (Pacific Nickel or Pride of Emory) mine (1958-1974) near Hope which processed some 4.2 million tonnes of sulfide ore averaging 0.77 wt. % Ni, 0.33 wt. % Cu, 0.68 g/t Au and 0.34 g/t PGE (platinum-group elements). The ore resided in an ultramafic phase of the Spuzzum pluton (*see* Nixon and Hammack, 1991).

The Turnagain ultramafic complex (Figure 1) hosts one of the few magmatic nickel occurrences of economic potential in British Columbia (Hancock, 1990; Nixon and Hammack, 1991). The geological setting of the sulfide mineralization is unusual in that it is hosted by an Alaskan-type complex, a magmatic environment that is not generally noted for its sulfide potential. In the case of the Turnagain complex, it appears that a unique set of genetic circumstances were responsible for the precipitation of substantial Fe-Ni-Cu sulfides from the parental magmas. The principal factors that appear to have promoted sulfide saturation in the Alaskan-type environment are considered below. It is suggested that the most important control on the formation of magmatic sulfides may ultimately derive from the rocks that host the intrusion, and hence have fundamental significance for exploration.

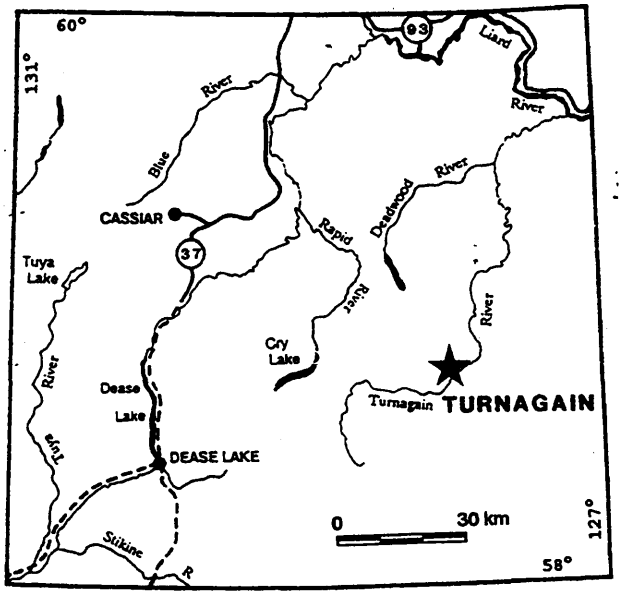

Figure 18-1. Location of the Turnagain Alaskan-type complex.

GEOLOGICAL ENVIRONMENTS FOR MAGMATIC SULFIDE DEPOSITS

Magmatic sulfide ores hosted by mafic and ultramafic rocks have historically been the principal source of world nickel production. Considering the recent discovery of high-grade Ni-Cu-Co deposits at Voisey's Bay, Labrador, such sulfides seem destined to remain the dominant producer of nickel in the foreseeable future. However, with the advent of innovative leaching and electrorefining techniques for metal extraction in recent years, low-grade, bulk-tonnage operations are now feasible for low-cost recovery of nickel and associated base and precious metals in sulfide ores. Owing to these developments, there are several prospective environments for mafic-ultramafic-hosted nickeliferous sulfide deposits in the Cordillera that warrant further attention. The most significant mafic-ultramafic rock packages occur in the oceanic (ophiolitic) and volcanic-arc terranes that were accreted to the margin of North America in the Early Mesozoic.

The geological environments of magmatic sulfide deposits may be classified according to tectonic and petrochemical affiliations. The vast majority of the world's magmatic nickel deposits are hosted by tholeiitic to komatiitic extrusive rocks and their intrusive equivalents (reviewed by Naldrett, 1989). These include important occurrences in Archean greenstone belts (*e.g.* Kambalda, Western Australia), rift-related settings (*e.g.* Thompson Nickel Belt, Manitoba), intrusions related to flood basalts (*e.g.* Noril'sk-Talnakh, Siberia), and large stratiform intrusions (*e.g.* Bushveld Complex, South Africa and Sudbury, Ontario). Among the environments traditionally regarded as least favourable for significant magmatic Ni-Cu sulfide deposits are those associated with ophiolites, kimberlites, carbonatites and other alkaline associations, and Alaskan-type complexes.

In this respect, it is interesting to note that the anorthositic Voisey's Bay intrusive suite was also formerly categorized as an unfavourable exploration environment for important Ni-Cu sulfide deposits. Yet, if predicted reserves are accurate, the Voisey's Bay troctolite body hosts one of the richest Ni-Cu sulfide deposits in the world. The lesson from Voisey's Bay is that, given apparently favourable genetic circumstances, even traditionally unimportant environments for magmatic Ni-Cu sulfide deposits, like that of the Alaskan-type Turnagain complex, may contain economically important sulfide mineralization. The impact of specific geologic variables conducive to sulfide saturation in Alaskan-type parental magmas are considered below following a review of the exploration history and geology of the Turnagain complex.

EXPLORATION HISTORY OF THE TURNAGAIN COMPLEX

Fe-Ni-Cu sulfides in the Turnagain complex were first discovered in 1956 at a showing on the banks of the Turnagain River. Little work was done until 1966 when Falconbridge Nickel Mines Limited acquired the claims. Between 1966 and 1973 extensive geological and geophysical surveys identified a number of sulfide showings (MINFILE 104I 014, 038, 051, 117-120 and references therein) that were subsequently tested by a program of short diamond drill holes (McDougall and Clark, 1972; Clark and McDougall, 1973}. Many mineralized outcrops were tested only by packsack drilling and some important semi-massive sulfide zones, such as the "Discovery" showing on the Turnagain River, were apparently never drilled successfully. The geological studies initiated by Falconbridge culminated in a Ph.D. dissertation by Clark (1975) and resulting publications (Clark, 1978, 1980). Interest in the PGE potential of the Turnagain complex in the mid to late 1980's led to additional geochemical sampling and geological mapping (Page, 1986; Nixon *et al.,* 1989). Maximum PGE values for the sulfide showings were reported as 461 ppb Pt and 1455 ppb Pd (Page, 1986). Renewed interest in the property began in 1996 when Bren-Mar Resources Limited initiated geophysical and geological work, including diamond drilling to more adequately test mineralized areas. To date, some 2500m of drilling have identified narrow (1m) intersections of semi-massive sulfides grading up to 1.4 wt. % Ni and 0.07 wt. % Co within much broader zones of disseminated mineralization (Livgard, 1996). Chalcopyrite-rich grab samples from the Discovery showing have yielded maximum grades of 1.6 wt. % Cu. From both the recent drilling and surface sampling, it is clear that disseminated sulfide mineralization in the Turnagain complex is more widespread than previously indicated.

REGIONAL SETTING

The regional geological setting of the Turnagain complex is somewhat enigmatic (Figure 2). In the most recent revision of the Cry Lake map sheet (Gabrielse, *in press* and personal communication, 1997), which builds upon earlier work (Gabrielse, 1985, 1991), the Turnagain complex is shown to be hosted by a westward-facing, folded and faulted, Cambrian to Mississippian metasedimentary succession that defines the miogeoclinal margin of Ancestral North America (Figure 2A). The wallrocks of the Turnagain complex, in part, are taken as equivalents of the fine-grained clastics of the Road River and Earn Groups. These rocks are overlain in turn by Upper Paleozoic to Triassic metavolcanic and metasedimentary sequences of unknown terrane affinity. The Kutcho Fault separates the latter rocks from the Early Jurassic Eaglehead pluton that forms part of Quesnellia, and oceanic accretionary complexes of the Cache Creek Terrane. Mid-Cretaceous plutons of the Cassiar Batholith intrude Lower Paleozoic and older strata of the miogeocline.

This interpretation of the regional geology implies that the Turnagain body, and an associated ultramafic to dioritic "ring complex" to the south that has a well-defined metamorphic aureole (Clark, 1975), have intruded rocks of the miogeocline. In all other cases (in British Columbia at least), Alaskan-type complexes are confined to the accretionary arc terranes of Quesnellia and Stikinia, and these terranes are faulted against Ancestral North America. Thus, a supra-subduction zone setting is required for the North American margin at the time of intrusion of the Turnagain complex. The age of the Turnagain complex potentially places constraints on this interpretation and is currently being investigated using ^{40}Ar-^{39}Ar dating techniques.

An alternative interpretation of the regional geology proposed in Figure 2B, places the Turnagain complex within an imbricated sequence of rocks thrust eastward onto the miogeoclinal margin of North America. This interpretation is possible because stratigraphic assignments are based largely on lithological similarities, and the contentious units (discussed below) have no age control. The rocks next to the Kutcho Fault that are designated as Upper Paleozoic to Triassic comprise a tightly folded package of interbedded felsic ("quartz-eye") to intermediate volcanic rocks, shale, siltstone, chert, volcanic greywacke and conglomerate, and minor carbonate (Clark, 1975; Gabrielse, *in press*). Their lithological mix and structural style strongly resemble rocks found further south that form the Lay Range Assemblage (Mississippian to Permian), widely regarded as the basement of Quesnellia (Monger, 1973; Ferri *et al.,* 1993), and this correlation is favoured here. However, another possibility (not shown in Figure 2) is that these rocks are atypically deformed and metamorphosed volcanic-sedimentary assemblages of the Upper Triassic Nicola-Takla arc.

The wallrocks of the Turnagain complex are black carbonaceous slates and grey graphitic phyllites. In Figure 2B, these rocks are considered to be correlative with the Middle to Late Triassic "black phyllite" unit which occurs near the base of the Nicola Group in the Quesnel Lake area (Bloodgood, 1987, 1988; Bailey, 1988; Panteleyev *et al.,* 1996). This interpretation, therefore, requires a fault (thrust?) between the Cambro-Ordovician Kechika Group and Triassic slate and phyllite. The exact location of this inferred fault is unknown and has been arbitrarily placed at the top of the Kechika Group where it delineates the easternmost limit of Quesnellia.

The eastern margin of the Turnagain complex is marked by a reverse fault; shear-bands observed in footwall slates indicate an eastward direction of motion. The nature of the southwestern contact of the Turnagain complex, observed only in drill core and inferred from aeromagnetic data, is uncertain (Clark, 1975). However,

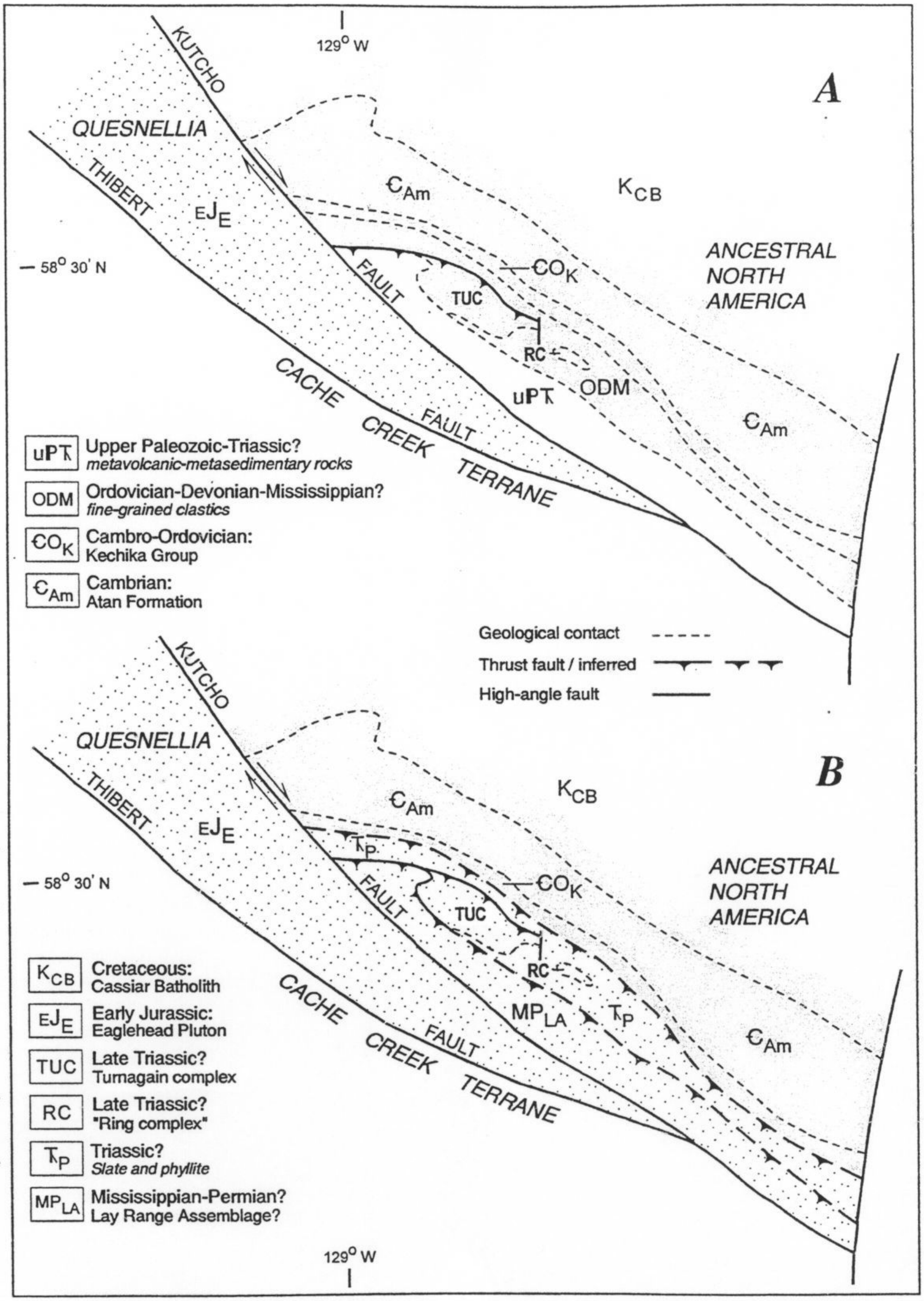

Figure 18-2. Regional geology of the Turnagain Alaskan-type complex according to A. Gabrielse (*in press*); B. this study.

the northwestern contact of the complex is interpreted herein as a thrust fault that places Lay Range Assemblage on ultramafic rocks. Strongly laminated metasedimentary and metavolcanic rocks in the hangingwall of this fault contain garnet, amphibole and oligoclase-andesine, indicating a metamorphic grade of uppermost greenschist to lowermost amphibolite facies. Similar lithologies also containing amphibole-bearing assemblages were mapped south of the Turnagain River by Clark (1975), and allow this fault to be extended along strike where it separates these higher grade rocks from underlying slate and phyllite of lower to middle greenschist facies. The inferred geometry of this fault plane at the northwestern extremity of the ultramafic complex, and difference in metamorphic grade, is consistent with an easterly directed thrust fault. It is noteworthy that the Polaris Alaskan-type complex, which intrudes similar lithologies further south in the Lay Range, is also involved in an eastward-verging deformation (*ca.* 186 Ma) at the leading edge of Quesnellia that reflects the earliest stages of accretion (Nixon *et al.*, 1997).

IS THE SULFIDE-RICH TURNAGAIN INTRUSION REALLY AN ALASKAN-TYPE COMPLEX?

As indicated above, the Turnagain intrusion is unusually well-endowed in sulfides for a Alaskan-type complex. The only other sulfide deposit of presumed Alaskan-type affinity known to the author is found in the Early Paleozoic Salt Chuck intrusion, Prince of Wales Island, southeastern Alaska. In contrast to the Turnagain Ni-Cu sulfides, the Salt Chuck ore is Ni-poor and Cu-rich [Cu/(Cu+Ni) = 0.99] and hosted by biotite-bearing magnetite clinopyroxenite and gabbro (Gault, 1945; Loney and Himmelberg, 1992). During its intermittent mining history, the Salt Chuck mine (1905-1941) produced some 0.3 million tonnes of sulfide ore with an estimated grade of 0.95 wt. % Cu, 1 ppm Au, 5 ppm Ag and 2 ppm Pd (Holt *et al.*, 1948). The principal ore minerals are bornite and lesser chalcopyrite. Minor platinum-group minerals (PGM) identified by Watkinson and Melling (1992) include kotulskite (PdTe), temagamite (Pd_3HgTe_3), sopcheite ($Pd_3Ag_4Te_4$) and auriferous sperrylite ($PtAs_2$). Although the Cu-rich nature of the ore and origin of the PGM have been related to hydrothermal remobilization of magmatic sulfides, the mechanism for concentrating the copper and precious metals is debatable: Loney and Himmelberg (1992) advocated a magmatic process (fractional crystallization) whereas Watkinson and Melling (1992) favoured a hydrothermal origin.

The classification of mafic-ultramafic complexes as Alaskan-type is *not* based on the presence or nature of sulfides or PGM but rather on silicate mineralogy, as outlined by Taylor (1967) and Irvine (1974). The IUGS classification scheme for ultramafic rocks is shown in Figure 3. Cumulate silicate assemblages that characterize the Alaskan-type association lie along the olivine-clinopyroxene join and comprise dunite, wehrlite, olivine clinopyroxenite and clinopyroxenite; orthopyroxene is characteristically lacking. The only other common silicate to appear in ultramafic lithologies is amphibole, which forms hornblende clinopyroxenite, clinopyroxene hornblendite and minor hornblendite. Plagioclase may be found in minor amounts in olivine-poor ultramafic lithologies and becomes a dominant constituent in associated mafic rocks (hornblende- or clinopyroxene-bearing gabbro and diorite). Accessory phases commonly include mica (phlogopite-biotite), apatite, and spinel (chromite in olivine-rich rocks; magnetite in amphibole- or clinopyroxene-rich rocks); primary sphene, ilmenite and rare zircon and quartz may appear in feldspar-rich cumulates and/or late-stage segregation veins. Magnetite may locally become a dominant cumulate phase and an economically viable commodity (*e.g.* Tulameen complex, Findlay, 1969; Nixon *et al.*, 1997).

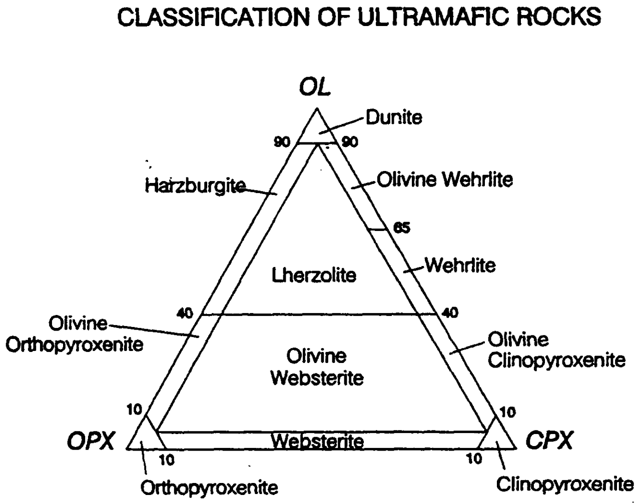

Figure 18-3. Classification of ultramafic rocks (modified after Le Maitre, 1989).

Other features typical of Alaskan-type complexes include a crude internal zonation of ultramafic and mafic lithologies (hence the common reference to zoned complexes in the literature), a general lack of layering in outcrop (Duke Island is a notable exception) which is so typical of stratiform complexes, an absence of high-temperature tectonite fabrics like those that pervade obducted ophiolitic mantle, the common occurrence of fault-bounded contacts, and, where intrusive contacts have been established, thermal aureoles of hornblende hornfels (or amphibolite-grade regional metamorphism where deformation occurred while the intrusion was still hot, *e.g.* Polaris complex, Nixon *et al.*, 1997).

The key features of Alaskan-type complexes portrayed by the Turnagain intrusion include the following:

- ultramafic cumulates are restricted to mixtures of olivine and clinopyroxene with minor chromite, rare amphibole and trace phlogopite; orthopyroxene is absent
- centimetre-scale layering is comparatively rare
- localized chromitite layers (<1m in length) in the dunite have been entirely remobilized to form

schlieren and syndepositional folds, features that are characteristic of all Alaskan-type occurrences in British Columbia

- clinopyroxene compositions are diopsidic (Clark, 1975, 1978) and comparable to other Alaskan-type intrusions

Taken together, these features are sufficient to warrant the Alaskan-type classification for the Turnagain complex.

GEOLOGY OF THE TURNAGAIN COMPLEX: A SYNOPSIS

The generalized geology of the Turnagain complex is shown in Figure 4. The body is elongate (8km x 3km) and broadly conformable to the northwesterly-trending structural grain. The principal lithologies comprise dunite, wehrlite and olivine clinopyroxenite and represent crystal cumulate sequences. Minor hornblende clinopyroxenite and hornblendite appear restricted to the northwestern and southwestern parts of the complex, and clinopyroxenite commonly forms dikes. Unlike many other Alaskan-type complexes, gabbroic to dioritic members of the intrusive suite are lacking. Common accessory minerals include chromite in dunite, and trace amounts of phlogopite, especially in clinopyroxene-rich rocks. Among the oxide phases, cumulus or intercumulus magnetite is conspicuously absent, except for grains intergrown with primary sulfides, and primary ilmenite has only been identified in hornblende-rich rocks (Clark, 1975, 1978).

Dunite occupies the eastern and central portions of the body and is flanked by wehrlite and olivine clinopyroxenite. The ultramafic rocks are generally fresh to mildly serpentinized; however, more intense serpentinization and talc-carbonate alteration are common along faults and restricted zones within the complex. The central part of the ultramafic body is intruded by granodiorite to diorite, and hornblende±clinopyroxene-plagioclase porphyry dikes and sills. The latter are documented in drill core near the southwestern contact of the complex (Clark, 1975).

Primary layering in clinopyroxene-rich cumulates, reflecting variations in the modal abundance of olivine and pyroxene, is comparatively well-developed in outcrop, and at a larger scale, at the northwestern end of the complex (Figure 4). The layering has moderate to steep dips and is truncated by the faulted eastern boundary of the complex. Millimetre- to centimetre-scale layering in the dunite core is evident locally where concentrations of chromite crystals have accumulated. These chromitite horizons are discontinuous and commonly remobilized and intruded by thin dunite dikes. Despite localized zones of well-developed layering, way up criteria are inconclusive and the internal structure of the Turnagain complex is poorly understood.

Contacts between dunite and surrounding clinopyroxene-rich rocks are gradational to sharp. The latter relationship, observed at the northwestern margin of the dunite, was interpreted as evidence for intrusion of wehrlite-clinopyroxenite cumulates by the dunite (Clark, 1975). Such relationships, however, may be of local significance only, and confined to a narrow time interval when dunite and pyroxenite were being deposited penecontemporaneously in different parts of the complex. Another possibility is that the dunite at this contact is a discordant metasomatic body formed locally by replacement of pre-existing cumulates, as documented in other Alaskan-type complexes (*e.g.* Duke Island, Irvine, 1974). In general, the gradational contacts observed elsewhere, the occurrence of interlayered dunite and wehrlite, and the wehrlite-clinopyroxenite dikes so prevalent throughout the main dunite mass are consistent with deposition of clinopyroxene-rich cumulates after the dunite was formed. In this regard, it is also worth noting that olivine compositions determined by Clark (1975) in the dunite are generally more magnesian (Fo>88 mol. %) and more enriched in nickel than those in pyroxenitic cumulates (Fo<88 mol. %), as would be expected during the normal course of fractional crystallization. It was also shown by Clark (*ibid.*) that olivines coexisting with primary sulfides are more depleted in nickel than olivines in sulfide-free rocks due to the preferential partitioning of nickel into the sulfide phase.

SULFIDE MINERALIZATION

The main occurrences of massive to semi-massive Fe-Ni-Cu sulfide mineralization are shown in Figure 4. In addition to these prospects, disseminated primary sulfides are widespread in pyroxenitic rocks. With few exceptions, economically interesting sulfide concentrations are largely hosted by wehrlite, olivine clinopyroxenite and clinopyroxenite. Dunite is practically devoid of significant sulfide mineralization. However, sulfides in the Discovery and Cliff showings, in particular, are hosted by serpentinite that may originally have been dunite. In the case of the Davis #2 showing at the northwestern end of the complex, primary sulfides are hosted by clinopyroxene hornblendite and hornblendite.

Primary sulfides, in decreasing order of abundance, comprise pyrrhotite, pentlandite, chalcopyrite and trace bornite (Clark, 1975). Their textures are diagnostic of the precipitation of an immiscible sulfide melt from a silicate liquid: intercumulus and blebby sulfides in disseminated zones coalesce to form continuous networks enclosing cumulate silicate grains, and these net-textured sulfides locally occlude silicates altogether to form massive accumulations. In coarse-grained rocks, spheroidal to amoeboid sulfide globules are poikilitically enclosed in clinopyroxene or hornblende. Drill intersections reveal centimetre-scale layering of massive and semi-massive sulfide concentrations in zones up to one metre wide, and these concentrations yield the highest assays (>1 wt. % Ni). Locally, there is evidence in drill core for limited remobilization of primary sulfides along fractures and veins, correlated with a general increase in the pyrrhotite/pentlandite ratio (Clark, 1975). Thus, remobilized sulfide appears to be comparatively Ni-poor but may be relatively Cu-rich.

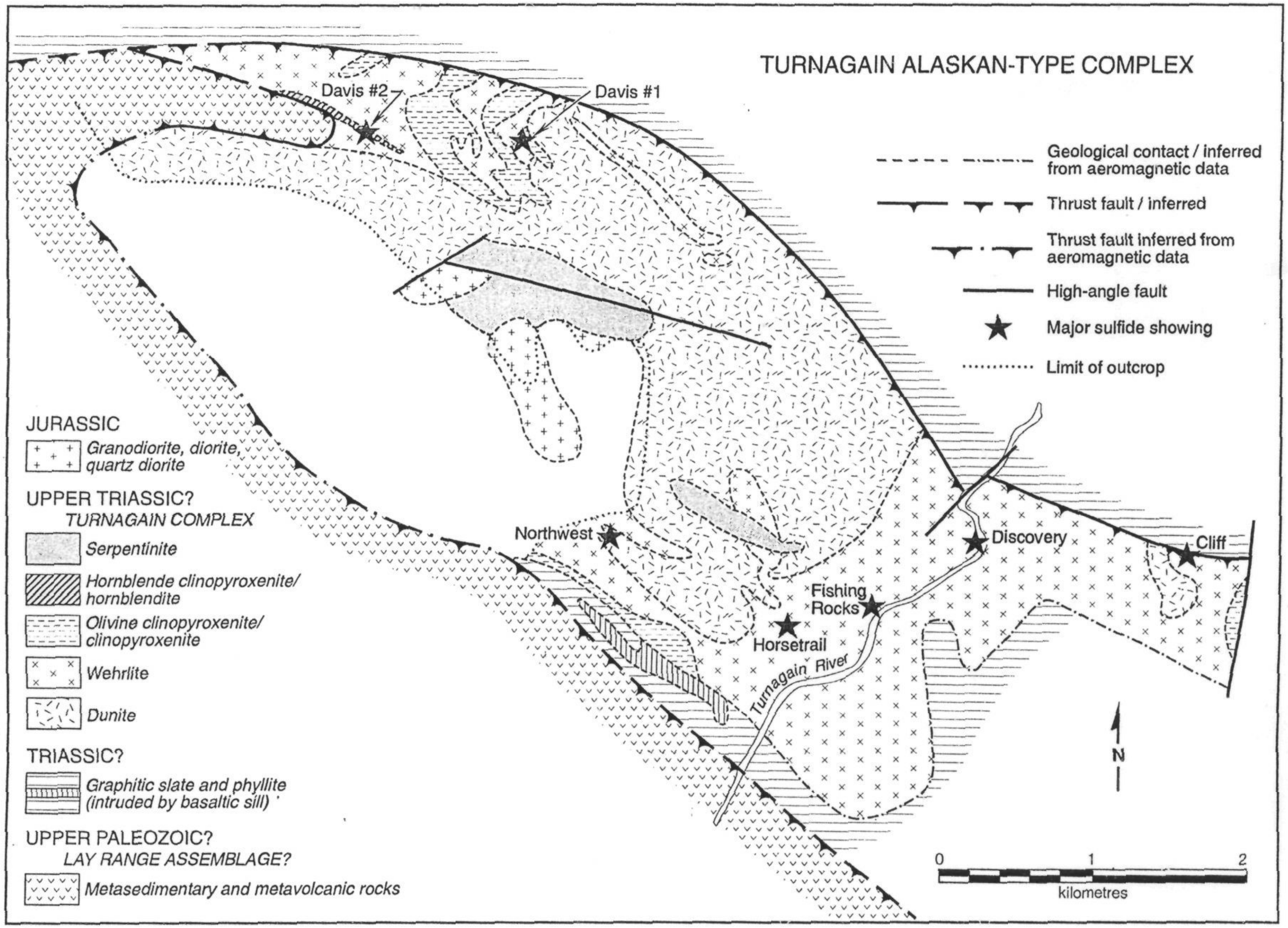

Figure 18-4. Simplified geology of the Turnagain ultramafic complex showing major occurrences of sulfide mineralization (modified after Clark, 1975).

Secondary sulfides include violarite ($FeNi_2S_4$), valleriite $4(Fe,Cu)S.3(Mg,Al)(OH)_2$, pyrrhotite, pyrite, rare molybdenite and possibly mackinawite [$(Fe,Ni)_9S_8$] (Clark, 1975). These minerals are widely distributed as fine disseminations of irregular grains in variably serpentinized rocks, or concentrated in veins and fractures. Clark related their origin to precipitation from hydrous fluids during serpentinization.

It is noteworthy that both primary and secondary sulfides in the Turnagain complex are associated with graphite. The fact that graphite preferentially occurs in serpentinized zones with fine-grained secondary sulfides, forms halos around sulfide veins, and commonly coats fractures and faults, led Clark (1975) to suggest that the graphite was introduced from an external source by CO_2-rich aqueous solutions that became reduced and deposited graphite during the serpentinization process. A viable source of carbon is the graphitic sediments that host the intrusion. Although most of the textural evidence points to a hydrothermal origin for the graphite, the inclusion of graphite flakes in semi-massive to massive primary sulfides, albeit in partially serpentinized host rocks, suggests that some of the carbon may have been introduced at the magmatic stage. This may have been effected by incorporation of xenoliths and/or screens of fine-grained graphitic wallrocks which have been encountered in recent drilling (B. Downing, personal communication, 1997). As indicated below, contamination by carbon-rich wallrocks may be a key mechanism whereby magmas of Alaskan-type affinity precipitate economically significant quantities of primary Fe-Ni-Cu sulfides.

graphite (CO_2)

HYPOTHESIS

ORIGIN OF MAGMATIC SULFIDES IN ALASKAN-TYPE MAGMAS: PROBLEMS AND POSSIBILITIES

On the basis of the sulfide mineralogy and textural evidence summarized above, it is clear that the main concentrations of Fe-Ni-Cu sulfides in the Turnagain complex are of magmatic origin, and conform to the products predicted ~~to form~~ during fractional crystallization of both silicate and sulfide melts. Clark (1975, 1980) concluded that the key factor responsible for unusual concentrations of sulfides in the Turnagain intrusion was a high initial content of sulfur in the primitive magma(s), reflecting extensive melting of a sulfide-enriched region of the upper mantle.

The bulk composition and oxidation state of a magma have been shown to be important factors, among others, governing the separation of an immiscible sulfide liquid from a silicate melt (*e.g.* Naldrett, 1989). It is suggested below that:

- the extremely high MgO content previously proposed for primitive Turnagain magma(s) may be seriously overestimated
- external factors may have played a crucial role in determining the oxidation state of the melt, and thereby promoting conditions conducive to the formation of sulfide deposits in Alaskan-type magmas with nominal amounts of dissolved sulfur

Primitive Alaskan-type magmas

The primitive magmas that produced Alaskan-type complexes are generally considered to be highly magnesian [in terms of the ratio $100Mg/(Mg+\Sigma Fe^{+2})$ or Mg#] with high MgO contents (ultrabasic), and mildly alkalic and hydrous (*e.g.* Findlay, 1969; Irvine, 1974; Clark, 1980). These compositional attributes have to be deduced from crystal compositions since no direct samples of primitive Alaskan-type magmas have been identified, and few volcanic equivalents have been proposed (*e.g.* Irvine, 1973). It is therefore extremely important to distinguish cumulus from post-cumulus (*i.e.* intercumulus) minerals, since only the former potentially yield compositional information that is directly pertinent to initial liquid compositions, assuming subsolidus re-equilibration of such phases is insignificant. The composition of primitive magma deduced for the Turnagain complex is easily the most magnesian ($Mg\# \geq 85$) and MgO-rich (32 wt. %; Clark, 1980) of any parental liquid composition inferred for Alaskan-type complexes. In fact, these particular attributes match those of komatiitic melts.

The hydrous and alkali-rich character postulated for primitive Turnagain magmas seems reasonable in view of the occurrence of phlogopite and hornblende in olivine-rich rocks. In the case of the Turnagain complex, however, these phases appear to be exclusively *intercumulus* in nature and thus yield information that is only directly relevant to pore fluids within the cumulate pile rather than presumably more primitive melt in the main magma chamber. The author has observed trace amounts of rare euhedral phlogopite enclosed by olivine in the dunites of both the Tulameen and Polaris Alaskan-type complexes. In these cases, at least, the alkalic (potassic) nature of their primitive magmas is firmly established. Another facet commonly regarded as evidence for an alkaline affinity is the diopsidic nature of clinopyroxene, which usually occurs as both an intercumulus and cumulus phase. Pyroxenes of this composition, however, are not restricted to alkaline magmas. For example, recent experimental work has shown that diopsidic clinopyroxenes similar to those found in Alaskan-type complexes may crystallize from *subalkaline* melts under high water pressures (Gaetani *et al.*, 1993). From these considerations, the hydrous nature of primitive Alaskan-type magmas appears to be well established, and it is probably necessary to consider a range of alkali contents appropriate to both alkali-rich subalkaline and mildly alkaline magmas.

The interpretation that the primitive liquid for the Turnagain complex was komatiitic rests exclusively on the composition of the most Mg-rich olivine in dunite (reported as ~95 mol. % Fo; Clark, 1980). For comparison, the most Mg-rich olivines in other complexes are ~91 mol. % Fo (*e.g.* Duke Island, Irvine, 1974; Tulameen complex, Findlay, 1969). Although the Turnagain olivine is indeed a cumulus phase, such an Mg-rich composition is not necessarily representative of the liquid from which it crystallized. The total range of olivine compositions in dunite varies from 87 to ~96.5 mol. % Fo. Clark showed that the most Mg-rich olivine compositions (~95-96.5 mol. % Fo) were the result of *subsolidus* cooling and Fe-Mg exchange between olivine and chromite in chromite-enriched dunite, with the result that olivine within and adjacent to chromitite layers became markedly more Mg-rich. This process has also been documented in the Tulameen complex where olivine in chromitite layers changed composition from ~ 91 to 95 mol. % Fo (Nixon *et al.,* 1990). Excluding chromite-enriched samples, only two dunites in the Turnagain complex, both with normal proportions of chromite (1-2 vol. %), have olivine compositions in the range 93-94 mol. % Fo, whereas 11 dunites have olivines in the range 90-92 mol. % Fo. With one exception, the more Mg-rich olivines (≥~92 mol. % Fo) lie within the central part of the Turnagain dunite where there is abundant evidence for disturbance of chromitite layers, reflecting gravitational collapse and transport of cumulates previously deposited on the walls of the magma chamber. It is therefore likely that such processes have redistributed Mg-rich olivine grains that were formerly equilibrated with chromitite layers during subsolidus cooling. Such cryptic Mg-rich olivine accumulations would be expected to be localized and relatively thin (centimetre-scale). Also, for such olivines to preserve their heritage, sedimentation and cooling at the site of deposition must have been fairly rapid so as to effectively expel pore fluid and prevent re-equilibration with more Fe-rich olivine in surrounding cumulates. The fact that these cryptic olivine xenocrysts are less magnesian than olivines in chromitites implies either that subsolidus re-equilibration with chromitite was incomplete, or that they have partially re-equilibrated to their new chromite-poor environment. Thus, the composition of olivine that crystallized from primitive magmas may have been significantly less Mg-rich than Fo_{95}. Small differences in olivine composition are extremely important because they translate into extremely large differences in the estimated MgO content of coexisting melt. For example, all things being equal, an olivine composition of 91 mol. % Fo would be expected to crystallize from a primary mantle-derived melt containing about 12-15 wt. % MgO (i.e. basaltic to picrobasaltic composition; *cf.* Irvine, 1973) as compared to the komatiitic values of 32 wt. % MgO that have been proposed. There is therefore no compelling evidence to support the proposition that unusually high-MgO liquids were responsible for the deposition of sulfides in the Turnagain complex. The question as to whether these magmas were anomalously enriched in sulfur, as suggested by Clark, cannot be addressed with the data presently available. However, other factors that control sulfide precipitation, such as oxidation state, are explored below.

Oxidation State and Sulfide Precipitation

It has been shown that the oxidation state of a magma, as reflected, for example, by the Fe^{+3}/Fe^{+2} ratio of the melt, strongly influences the speciation of sulfur in the melt, which in turn governs the precipitation of magmatic sulfides (reviewed by Wallace and Carmichael, 1992). It has been shown in recent years that certain types of magmas are intrinsically more oxidized than others, and that the oxidation state of the upper mantle is heterogeneous (*e.g.* Carmichael, 1991). In general, tholeiitic magmas and their differentiation products, such as the large stratiform intrusions associated with major magmatic Ni-Cu deposits, have relatively low oxidation states, near or significantly below the synthetic quartz-fayalite-magnetite (QFM) oxygen buffer. In comparison, volcanic arc magmas typically have higher oxidation states appropriate to that of the nickel-nickel oxide (NNO) buffer or higher, and strongly alkaline magmas are inherently the most oxidized, commonly extending well above NNO to the magnetite-hematite (MH) buffer. Observations from natural magmatic systems indicate that the *relative* redox states of parental magmas are generally maintained over the course of crystallization, and over the high-temperature part of the subsolidus cooling interval.

The dissolution of sulfur in a given melt composition is sensitive to the redox state of the melt. At redox conditions near the NNO buffer, there is a marked solubility minimum for sulfur in silicate melts. Under reducing conditions below this transition point, the main dissolved sulfur species is sulfide (S^{2-}) whereas in melts more oxidized than the transition point, the dominant species is sulfate (SO_4^{2-}). Experimental studies have shown that the fugacity of oxygen exerts the dominant control on sulfur speciation, the effects of temperature, pressure and melt composition being relatively minor (*e.g.* Carroll and Rutherford, 1988). For tholeiitic magmas crystallizing at or below the QFM buffer, for example, the dominant sulfur species at magmatic temperatures will be sulfide ($>80\%\Sigma S$), and sulfur saturation will produce an immiscible Fe-Ni-Cu sulfide liquid phase. It is important to note that immiscible monosulfide solution may dissolve appreciable amounts of oxygen (largely controlled by fO_2), and that on cooling, such melts crystallize Fe-Ni-Cu minerals accompanied by a small quantity of magnetite (<4 wt. %; Doyle and Naldrett, 1987). The amount of magnetite exsolved is directly dependent upon ambient redox conditions.

At progressively higher oxidation states, the capacity of the same melt composition to produce immiscible sulfides on cooling is dramatically impaired. In extreme cases, such as the sulfur-rich trachyandesite magmas erupted in 1982 from El Chichon, Mexico, and dacitic pumice ejected in 1991 from Mt. Pinatubo, Philippines, highly oxidizing conditions (near the MH buffer) induced the crystallization of primary anhydrite. Thus, other things being equal, the oxidation state of the magma may play a deterministic role in the ability of silicate melts to produce magmatic sulfide deposits.

In the case of Alaskan-type complexes, the oxidation state of their primitive magmas is poorly known. From their hydrous and relatively alkali-rich nature inferred above, and supra-subduction zone environment (valid for complexes in British Columbia, at least), they would be expected to have oxidation states appropriate to NNO or higher. This would, of course, explain to some degree why such complexes are generally devoid of magmatic sulfide deposits.

Some indication of the oxidation state of Alaskan-type magmas appears to be reflected in the composition of chrome spinel. Irvine (1974) showed that chromites in Alaskan-type complexes have moderately high Cr/(Cr+Al) ratios, similar to those of the major stratiform intrusions, but that their ferric iron contents expressed as $Fe^{+3}/(Cr+Al+Fe^{+3})$ are distinctly higher, which he related to an intrinsic property of the parental magma. Irvine also noted that one such property that could account for chromites enriched in ferric iron was the oxidation state of the melt. Thus, the compositions of early formed chromite in many Alaskan-type complexes is compatible with inferences made above concerning the oxidation state of their primitive melts.

The compositions of early crystallizing chrome spinels in the Turnagain complex appear anomalous in that they have higher Cr/(Cr+Al) ratios and lower ferric iron contents than other Alaskan-type complexes (Clark, 1978). In particular, their $Fe^{+3}/(Cr+Al+Fe^{+3})$ ratios are comparable to the chromites of stratiform intrusions. Following Irvine (1974), Clark cautioned against interpreting these spinel compositions solely in terms of a lower oxidation state for primitive Turnagain magmas, but noted that such an explanation would be consistent with the unusual absence of magnetite in crystal cumulates and the low proportion of magnetite (1-2 vol. %) exsolved during the cooling of primary immiscible sulfide ores. From the available data, therefore, it appears that an anomalously low oxidation state for Turnagain magmas relative to other Alaskan-type complexes is a tenable hypothesis. The higher chrome contents of Turnagain spinels may reflect a *slightly* more magnesian parental magma composition.

Given the general proposition that primitive Alaskan-type magmas are relatively oxidized (at or above the NNO buffer), either the Turnagain magma represents partial melting of an anomalously reduced upper mantle source region, or some process operating after melts left their source served to reduce their oxidation state to levels more appropriate for sulfide-enriched mafic magmas. The latter possibility is particularly intriguing since the wallrocks of the Turnagain complex are slates and phyllites enriched in graphite, and significant contamination by wallrocks appears to be a likely mechanism. As noted earlier, evidence that graphitic wallrocks were in fact incorporated into the Turnagain magma chamber has been observed in drill core. Since it has been found that carbon dissolves in mafic melts primarily as carbonate (CO_3^{2-}) species (Fine and Stolper, 1985), it could promote the reduction of formerly more oxidized melts. For example, addition of carbon at magmatic temperatures may induce the formation of a vapour phase because of the extremely low solubility of carbon dioxide in basaltic melts at shallow crustal pressures. The composition of the initial vapour will be rich in carbon species (CO-CO_2) and relatively poor in water (Mathez, 1989). In the case of a relatively oxidized magma (*e.g.* NNO buffer), the dominant species in the vapour phase will be CO_2 (Mathez, *ibid.*) and degassing reactions of the type:

$$CO_3^{2-}(\text{melt}) = CO_2(\text{vapour}) + O^{2-}(\text{melt})$$

would lead to net loss of oxygen from the magma chamber. Moreover, processes that tend to change the oxidation state of a melt will have more impact on the potential for sulfide saturation if the original oxidation state of the magma was near the sulfide-sulfate transition point. As pointed out above, this redox condition (i.e. near the NNO buffer) seems appropriate for the primitive magmas associated with Alaskan-type complexes. If the intimate intergrowths of graphite and sulfides noted earlier in olivine-rich cumulates of the Turnagain complex were formed at magmatic temperatures, this could place rigorous constraints on the maximum oxidation state of the graphite-sulfide-silicate melt system. If the inferences drawn above are correct, then clearly other types of mafic magma that are not normally associated with significant sulfide deposits could be emplaced in environments that induce economic mineralization.

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